

# **Wildlife Habitat Features Field Guide**

## **(Kootenay Boundary Region)**



American Badger at burrow entrance (Photo: Rich Weir)

B.C. Ministry of Environment and Climate Change Strategy  
Ecosystems Branch

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## **Executive Summary**

A “wildlife habitat feature” is defined as a feature used by one or more wildlife species to meet their life history requirements; special management is necessary to ensure that these features are protected and remain functional. These features are established under the authority of the *Forest and Range Practices Act*. Various regulations under the Act require that an authorized person carrying out primary forest or range activities “does not damage or render ineffective a wildlife habitat feature.” Forest agreement holders are also required to report locations of new features encountered during routine forest activities. The Act includes provisions that allow agreement holders to seek exemptions from the requirement to protect a wildlife habitat feature. Before providing an exemption, the delegated decision maker must be satisfied that compliance with the requirement is not feasible.

The current Wildlife Habitat Feature Order (hereafter “the Order”) for the Kootenay Boundary Region of British Columbia includes some of the features listed in the Act’s Government Actions Regulation. In addition, the Order includes localized features identified by the Ministry of Environment and Climate Change Strategy in consultation with regional staff from the Ministry of Forests, Lands, Natural Resource Operations and Rural Development and industry stakeholders. These represent high-priority features associated with species of special management concern. The current list for the Kootenay Boundary Region may be expanded from time to time to reflect new information that indicates potential threats from forest or range activities on particular localized features.

Identification of a wildlife habitat feature must be sufficiently specific to enable a person affected by it to identify the feature in the normal course of carrying out forest or range practices. Therefore, clear definitions and descriptions accompany the Order. This Field Guide expands on these definitions and descriptions, and also offers suggested management strategies for consideration when carrying out primary forest or range activities; however, under the Act’s results-based professional reliance regulatory model, forest agreement holders are under no legal requirement to follow these strategies.

### **List of Wildlife Habitat Features – Kootenay Boundary Region**

1. a nest of a Bald Eagle
2. a nest of an Osprey
3. a nest of a Flammulated Owl
4. a nest of a Western Screech-Owl *macfarlanei* subspecies
5. a nest of a Great Blue Heron
6. a nest of a Lewis’s Woodpecker
7. a nest of a Williamson’s Sapsucker
8. an American Badger burrow
9. a Grizzly Bear den
10. a significant mineral lick
11. a significant wallow
12. a bat hibernaculum
13. a bat nursery roost
14. a hot spring or thermal spring

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## **PART 1: INTRODUCTION**

### **Background**

A “wildlife habitat feature” is defined as a feature used by one or more wildlife species to meet their life history requirements; special management is necessary to ensure that these features are protected and remain functional. Wildlife habitat features are established under the authority of the *Forest and Range Practices Act* Government Actions Regulation,<sup>1</sup> The Forest Planning and Practices Regulation,<sup>2</sup> Woodlot Planning and Practices Regulation,<sup>3</sup> and Range Planning and Practices Regulation<sup>4</sup> all require that an authorized person carrying out primary forest or range activities “does not damage or render ineffective a wildlife habitat feature.” In addition, *Forest Act* agreement holders are required to report annually to the district manager the location of new wildlife habitat features.<sup>5</sup>

The current Wildlife Habitat Feature Order (hereafter “the Order”) for the Kootenay Boundary Region of British Columbia includes some of the features listed in the regulation (i.e., mineral lick, wallow, and the nests of bird species such as Bald Eagle and Osprey). In addition, the Order includes localized features identified by the Ministry of Environment and Climate Change Strategy in consultation with regional staff from the Ministry of Forests, Lands, Natural Resource Operations and Rural Development and industry stakeholders. These represent high-priority features associated with species of special management concern that are potentially affected by forest or range practices, and for which no other means exists to provide special management (e.g., bat hibernacula and hot springs or thermal springs that provide unique habitat for certain plant and invertebrate species). The current wildlife habitat feature list for the Kootenay Boundary Region may be expanded from time to time to reflect new information that indicates potential threats from forest or range activities on a particular localized feature.

#### **\*\*Important Note\*\***

- ***The information contained in this Field Guide does not constitute a legal or professional practice requirement.***
- This information does not create any mandatory obligations on a person undertaking forest or range practices and cannot establish the site-specific prescription for compliance with the requirements of regulation.
- It is up to the prescribing professional, and forest or range manager, to determine the most appropriate practices given site-specific situations and circumstances, and with due consideration of the best current technical information available to that person.
- This approach is consistent with the results-based professional reliance regulatory model required for forest and range management under the *Forest and Range Practices Act*.

<sup>1</sup> See the Government Actions Regulation, Section 11(1):  
[http://www.bclaws.ca/Recon/document/ID/freeside/582\\_2004#section11](http://www.bclaws.ca/Recon/document/ID/freeside/582_2004#section11).

<sup>2</sup> See the Forest Planning and Practices Regulation, Section 70(2):  
[http://www.bclaws.ca/Recon/document/ID/freeside/14\\_2004#section70](http://www.bclaws.ca/Recon/document/ID/freeside/14_2004#section70).

<sup>3</sup> See the Woodlot Planning and Practices Regulation, Section 56(1):  
[http://www.bclaws.ca/civix/document/id/complete/statreg/21\\_2004#section56](http://www.bclaws.ca/civix/document/id/complete/statreg/21_2004#section56).

<sup>4</sup> See the Range Planning and Practices Regulation, Section 37(1):  
[http://www.bclaws.ca/civix/document/id/complete/statreg/19\\_2004#section37](http://www.bclaws.ca/civix/document/id/complete/statreg/19_2004#section37).

<sup>5</sup> See the Forest Planning and Practices Regulation, Section 86(3)(b):  
[http://www.bclaws.ca/civix/document/id/complete/statreg/14\\_2004#section86](http://www.bclaws.ca/civix/document/id/complete/statreg/14_2004#section86); and the Woodlot Planning and Practices Regulation, Section 76(2): [http://www.bclaws.ca/civix/document/id/complete/statreg/21\\_2004#section76](http://www.bclaws.ca/civix/document/id/complete/statreg/21_2004#section76).

## **Purpose of the Wildlife Habitat Feature Field Guide**

Intended specifically for Kootenay Boundary Region forest and range practitioners, this Field Guide will assist in:

- identifying wildlife habitat features;
- understanding how forest and range activities may damage or render ineffective a wildlife habitat feature;
- understanding reporting requirements (*Forest Act* agreement holders only) when a wildlife habitat feature is encountered; and
- preparing an exemption request when compliance with the Order may not be practical or realistic.

The Field Guide also provides information regarding the choice of practices to consider when undertaking primary forest or range activities around a given feature so as not to damage it or render it ineffective.

Additional supporting information is available on the Wildlife Habitat Features website: [gov.bc.ca/Kootenay-Boundary-Wildlife-Habitat-Features-Order](http://gov.bc.ca/Kootenay-Boundary-Wildlife-Habitat-Features-Order)

## **Definition and Description of Wildlife Habitat Features**

The following 14 features are identified in the Wildlife Habitat Feature Order for the Kootenay Boundary Region:

1. a nest of a Bald Eagle (*Haliaeetus leucocephalus*)
2. a nest of an Osprey (*Pandion haliaetus*)
3. a nest of a Flammulated Owl (*Psiloscopus flammeolus*)
4. a nest of a Western Screech-Owl *macfarlanei* subspecies (*Megascops kennicottii macfarlanei*)
5. a nest of a Great Blue Heron (*Ardea herodias*)
6. a nest of a Lewis's Woodpecker (*Melanerpes lewis*)
7. a nest of a Williamson's Sapsucker (*Sphyrapicus thyroideus*)
8. an American Badger burrow (*Taxidea taxus*)
9. a Grizzly Bear den (*Ursus arctos*)
10. a significant mineral lick
11. a significant wallow
12. a bat hibernaculum
13. a bat nursery roost
14. a hot spring or thermal spring

In addition to these definitions, to become recognized as a wildlife habitat feature, *all* of the following attributes must be present.

- The feature is newly or previously known to exist at a specified location.
- The feature is in functioning condition; that is, the feature is capable of providing the habitat and ecological functions associated with it.

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- The feature has visible evidence of past use<sup>6</sup> by the associated wildlife species (except for bat nursery roost features and hot spring or thermal spring features).
- The feature is naturally occurring; it is not created by human activities.

Occasionally, it may be difficult to determine whether suspected features meet the definition. For example, a potential bat hibernaculum is observed in summer, or an unoccupied cavity nest is spotted outside the usual breeding time. If any doubt exists, the precautionary principle is applied by considering the above criteria. When all attributes are present, it is reasonable to assume the feature meets its definition. If greater certainty is required, revisit the site during the appropriate season or ask a qualified professional to assess the feature.

## **Reporting and Tracking Wildlife Habitat Features**

Tracking the locations of wildlife habitat features is important to ensure effective management, as well as data access and availability. Doing so serves two purposes: (1) it provides those who carry out primary forest activities with the ability to determine the locations of known features and to plan their operations accordingly; and (2) it allows the location of these features to be known for compliance and effectiveness evaluations.

Each year, *Forest Act* agreement holders must report any newly encountered features within, or contiguous to, cutblocks or roads. This information is forwarded to district managers. Woodlot licence holders must report new wildlife habitat features by May 31.<sup>7</sup> All other forest licence and agreement holders must report new features by June 1.<sup>8</sup> At this time, *Range Act* agreement holders have no reporting requirements.

The location of new features is reported online. Paper forms are also available from the regional biologist. For more information on how to report new wildlife habitat features, see: [gov.bc.ca/Kootenay-Boundary-Wildlife-Habitat-Features-Order](http://gov.bc.ca/Kootenay-Boundary-Wildlife-Habitat-Features-Order).

## **Exemptions from Requirements to Protect Wildlife Habitat Features**

In certain circumstances, it may not be practical or realistic to comply with the regulatory requirements to protect wildlife habitat features. Various *Forest and Range Practices Act* provisions allow agreement holders to seek exemptions from the requirement to protect (“not damage or render ineffective”) a feature.<sup>9</sup>

Requests for an exemption are made to the delegated decision maker (currently the Director of Resource Management, Ministry of Forests, Lands, Natural Resource Operations and Rural Development). Before providing an exemption, the delegated decision maker must be satisfied that compliance with the Order is not realistic. This will depend on the circumstances or conditions related to the area in which the feature occurs.

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<sup>6</sup> “Visible evidence of past use” means the presence of the associated wildlife species, or observable sign of the species (e.g., tracks, hair, feathers, fecal droppings, feeding sign or prey remains, excavations, nesting or bedding material, etc.), is seen at the feature location.

<sup>7</sup> See the Woodlot Licence Planning and Practices Regulation, Sections 76(2) and Section 76(3)(d): [http://www.bclaws.ca/civix/document/id/complete/statreg/21\\_2004#section76](http://www.bclaws.ca/civix/document/id/complete/statreg/21_2004#section76).

<sup>8</sup> See the Forest Planning and Practices Regulation, Section 86(3)(b): [http://www.bclaws.ca/civix/document/id/complete/statreg/14\\_2004#section86](http://www.bclaws.ca/civix/document/id/complete/statreg/14_2004#section86).

<sup>9</sup> See the Forest Planning and Practices Regulation, Section 92(2) ([http://www.bclaws.ca/civix/document/id/complete/statreg/14\\_2004#section92](http://www.bclaws.ca/civix/document/id/complete/statreg/14_2004#section92)); Woodlot Licence Planning and Practices Regulation Section 79(2) ([http://www.bclaws.ca/civix/document/id/complete/statreg/21\\_2004#section79](http://www.bclaws.ca/civix/document/id/complete/statreg/21_2004#section79)); and the Range Planning and Practices Regulation, Section 37(2) ([http://www.bclaws.ca/civix/document/id/complete/statreg/19\\_2004#section37](http://www.bclaws.ca/civix/document/id/complete/statreg/19_2004#section37)).

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Exemption requests should be discussed with the Regional Biologist. A request must include a rationale that describes the nature of the problem and any options that may minimize impacts to the feature. Information provided in a formal request will inform any conditions that the decision maker may attach to an exemption.

Consideration of exemption requests begins when a completed formal request is received; incomplete requests are returned to the proponent. Exemption requests are administered as soon as possible after receiving a complete request (e.g., 5–10 business days). During the review process, the delegated decision maker may ask for additional information from the proponent.

### **Due Diligence and Professional Reliance**

Section 72(a) of the *Forest and Range Practices Act* provides for the defence of due diligence to any alleged contravention of the Act, its regulations, and standards.<sup>10</sup> A person is expected to exercise due diligence to meet the requirement to protect wildlife habitat features.

Due diligence refers to the amount of care that a person must exercise in any given situation.<sup>11</sup> A professional must have taken all reasonable care to avoid a contravention (in this case, “not damage or render ineffective a wildlife habitat feature”). This involves a consideration of what a reasonable person would have done in the same circumstances. Each situation must be evaluated considering its own particular facts.

There are two basic elements of due diligence - “reasonable foreseeability” and “reasonable care.” The first is based on what a person engaged in the same activity, exercising all reasonable care, would likely have foreseen in those same circumstances; the second is based on the standard of what a person engaged in the activity exercising all reasonable care would have foreseen. The following two principles apply: (1) The greater the likelihood of a harmful event occurring, generally the higher the standard of care; and (2) The greater the potential damage, the greater the degree of care required.

Forest and range practitioners (or qualified professionals, if required) will thus determine the most appropriate actions and practices to adequately protect a wildlife habitat feature. Identifying features in the field, seeking additional specialized advice, and determining how best to protect them are all areas of professional reliance and due diligence.

### **Related *Forest and Range Practices Act* Provisions, Other Laws, and Legal Obligations**

Legal provisions in the *Forest and Range Practices Act* exist to protect and conserve wildlife values across the Crown forest land base (i.e., riparian reserves, wildlife tree retention areas, wildlife habitat areas, and ungulate winter ranges). A wildlife habitat feature is a specific habitat element that has no legally defined measures for protection under the Act. Instead, the protection of these features depends on the professional reliance approach that ensures the feature will not be “damaged or rendered ineffective” by primary forest and range activities. *Forest Act* and *Range Act* agreement holders are expected to protect these habitat features through tools such as wildlife tree retention requirements, the purpose of which is to manage stand-level biodiversity, and through their range use plans.

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<sup>10</sup> See the *Forest and Range Practices Act*, Section 72(a):  
[http://www.bclaws.ca/Recon/document/ID/freeside/00\\_02069\\_01#section72](http://www.bclaws.ca/Recon/document/ID/freeside/00_02069_01#section72).

<sup>11</sup> For more guidance about due diligence, see “Assessing Due Diligence as a Defence”:  
[https://www.for.gov.bc.ca/ftp/hen/external/publish/web/bulletins/C\\_and\\_E\\_Advice\\_Bulletin\\_14.pdf](https://www.for.gov.bc.ca/ftp/hen/external/publish/web/bulletins/C_and_E_Advice_Bulletin_14.pdf).

## *Wildlife Habitat Features Field Guide (Kootenay Boundary Region)*

Forest and range practitioners are responsible to understand their obligations to protect and (or) manage special habitats or attributes under other provincial and federal laws. The table below describes the habitat protection provisions supplied by these statutes and how the Order provides additional special management for wildlife habitat features. This is not an exhaustive list; practitioners may wish to consult the appropriate authorities for further information.

Habitat Protection in Related Statutes	Additional Protection Provided by the Order <sup>12</sup>
<p><b><i>Species at Risk Act (SARA):</i></b><sup>13</sup> Under general prohibitions of this Act, it is an offence to damage or destroy the residence (e.g., nest or den) of species listed under the Act. This Act also includes a prohibition against destroying any part of “critical habitat”<sup>14</sup> that is identified in a recovery strategy for a listed species. More specifically, prohibitions against killing an individual or damaging its habitat apply to all listed species that occur on federal lands; however, on private or provincial land, these prohibitions apply <i>only</i> to SARA-listed aquatic species and migratory birds.</p>	<p>Wildlife habitat features will be protected where <i>Forest Act</i> or <i>Range Act</i> agreements occur on provincial Crown land.</p> <p>Some features are not related to federally designated species at risk (e.g., a mineral lick, a wallow, an Osprey nest).</p> <p>The Government Actions Regulation requires that primary forest and range activities “not damage or render ineffective” a wildlife habitat feature; however, ensuring the effectiveness of a nest is not addressed under the federal <i>Species at Risk Act</i>.</p>
<p><b><i>Migratory Birds Convention Act:</i></b><sup>15</sup> Activities affecting migratory birds and (or) their nests and eggs (including “incidental take” or damage), regardless of their scale, the level of potential detrimental effects on bird populations, or the nature of mitigation measures taken, can result in violations of the Act. Possibility of prosecution is elevated if no reasonable attempt was made to avoid or reduce the risk of impact if the person had reasonable knowledge of the presence of migratory birds, nests, and eggs in the area and (or) the potential harm.</p>	<p>The list of wildlife habitat features includes features other than the nests of migratory birds.</p> <p>The Government Actions Regulation requires that primary forest and range activities “not damage or render ineffective” a wildlife habitat feature; however, ensuring the effectiveness of a nest is not addressed under the <i>Migratory Birds Convention Act</i>.</p>

<sup>12</sup> That is, the ways in which including each wildlife habitat feature in the Order satisfies the Minister that the feature requires special management not otherwise provided under the *Forest and Range Practices Act*, Government Actions Regulation, or other enactment.

<sup>13</sup> Canada *Species at Risk Act*: <http://laws-lois.justice.gc.ca/eng/acts/s-15.3/>. See, also, the Species at Risk Public Registry website for a wide range of information related to species at risk in Canada: <https://www.registrelep-sararegistry.gc.ca/default.asp?lang=en&n=24F7211B-1>

<sup>14</sup> “Critical habitat” is habitat necessary for the survival or recovery of a listed endangered, threatened, or extirpated species.

<sup>15</sup> *Migratory Birds Convention Act*: <http://laws.justice.gc.ca/eng/acts/M-7.01/>; see also: <https://www.canada.ca/en/environment-climate-change/services/migratory-birds-legal-protection/convention-act.html>

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<p><b>Wildlife Act:</b><sup>16</sup> Under this Act, a person commits an offence if they: possess, take, injure, molest, or destroy certain bird nests (Eagle, Peregrine Falcon, Gyrfalcon, Osprey, Heron, or Burrowing Owl) and (or) bird nests occupied by a bird or its egg (Section 34). In addition, the Minister may, by regulation, designate land in a wildlife management area as a critical wildlife area for species of wildlife designated under this Act as an endangered species or threatened species (Section 5).</p>	<p>The list of wildlife habitat features includes features other than bird nests and for other species than the four endangered and threatened species that could be protected in a critical wildlife habitat area under the <i>Wildlife Act</i>.</p> <p>The Government Actions Regulation requires that primary forest and range activities “not damage or render ineffective” a wildlife habitat feature; however, ensuring the effectiveness of a nest is not addressed under the <i>Wildlife Act</i>.</p>
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### **Field Guide Contents**

Part 2 of this Field Guide contains a chapter for each wildlife habitat feature currently identified by the Order for the Kootenay Boundary Region. Each chapter contains a definition and description of the feature and some suggested management strategies to consider when carrying out primary forest or range activities in the vicinity of these features.

Section 1 supplies a specific definition of each wildlife habitat feature along with photographs showing typical examples. For features associated with bird nests or animal burrows or dens, Section 2 provides clear descriptions of the related bird and animal species. Where applicable, the conservation status of these species is provided using both British Columbia and Committee on the Status of Endangered Wildlife in Canada (COSEWIC) designations. For localized features, such as mineral licks, wallows, or bat hibernacula, this section describes the importance of these features. Section 3 offers a more extensive summary of the feature’s characteristics, including tips on identification, information to consider when conducting primary forest and range activities near the feature and, for some features, suggested alternatives to avoid rendering the features ineffective. Section 4 outlines specific timing windows (i.e., sensitive periods and periods of least risk) and guidance on disturbance buffers for the features in the Kootenay Boundary Region. This section includes maps of feature distribution or species’ areas of occupancy, any relevant biogeoclimatic associations, and detailed recommendations regarding disturbance buffers. The concluding Section 5 provides links to chapter source material and additional relevant information.

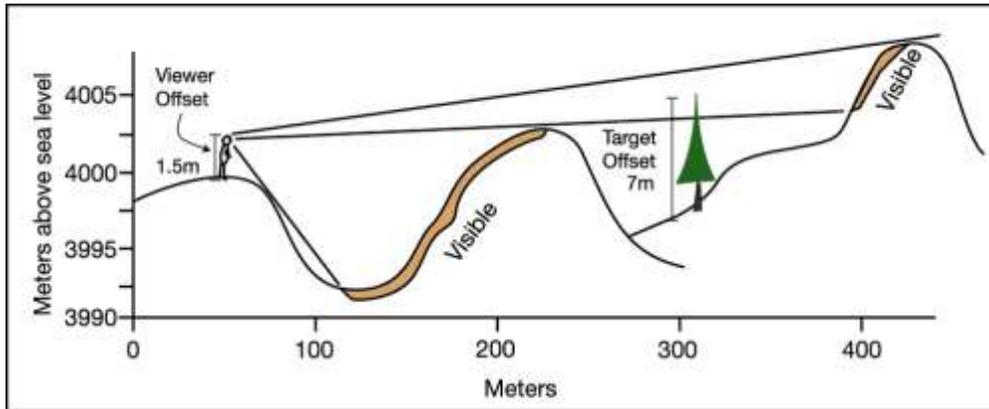
Some chapters include information about the types of disturbance that may affect specific nesting birds along with suggestions of lower-impact alternatives. Implementation of these alternatives relies on knowledge of the two distance concepts illustrated on the next page.

Additional supporting information is available on the Wildlife Habitat Features website: [gov.bc.ca/Kootenay-Boundary-Wildlife-Habitat-Features-Order](http://gov.bc.ca/Kootenay-Boundary-Wildlife-Habitat-Features-Order).

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<sup>16</sup> *Wildlife Act*: [http://www.bclaws.ca/Recon/document/ID/freeside/00\\_96488\\_01](http://www.bclaws.ca/Recon/document/ID/freeside/00_96488_01).

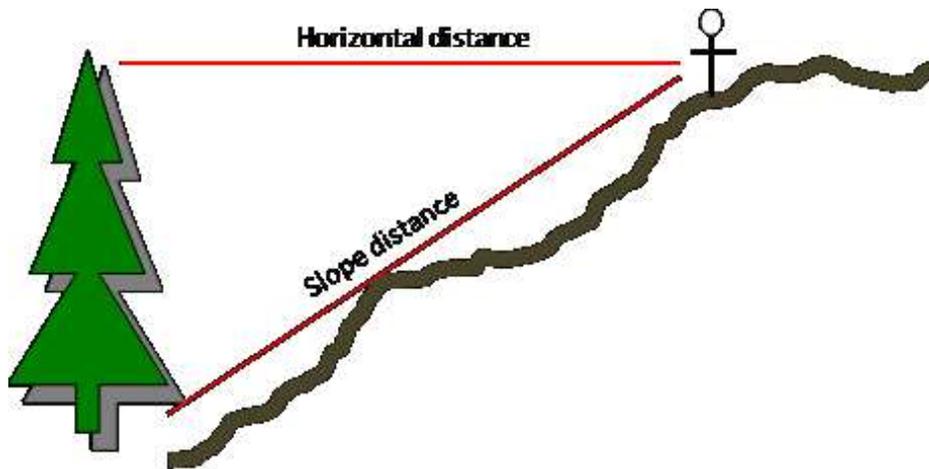
**Line-of-Sight** – Defined as a straight line along which an observer has unobstructed vision.



*A single Line of Sight (LOS) in a particular direction, with examples of viewer and target offsets. Collectively, all of the LOS from a given location make up its viewshed.*

[http://mapaspects.org/colca/research/viewshed/what\\_is.html](http://mapaspects.org/colca/research/viewshed/what_is.html)

**Horizontal Distance** – Defined as a straight line distance measured on a flat plain between two objects.



## **PART 2: GUIDANCE FOR MANAGING WILDLIFE HABITAT FEATURES**

### **1. A Nest of a Bald Eagle**

#### **1) Definition**

*A nest of a Bald Eagle (Haliaeetus leucocephalus)* means the nest and its supporting structure that either (1) is currently occupied by a Bald Eagle to hold its eggs or offspring, or (2) is habitually occupied and still capable of holding eggs or offspring of a Bald Eagle (Figure 1).



**Figure 1. Immature Bald Eagle at nest.** (Photo: Jared Hobbs)

#### **2) Species Description**

One of British Columbia's largest raptors, adult Bald Eagles are easily identified by a distinctive white head and tail and a powerful yellow bill (Figure 2). Immature birds are mostly dark. As these birds mature, increasing amounts of mottled white appear on the head and tail. Immature Bald Eagles look similar to immature Golden Eagles; however, Golden Eagles have more defined white wing patches and a broad white band at the base of the tail, whereas the tails of juvenile Bald Eagles are mottled with white.

The Bald Eagle is Yellow-listed in British Columbia. This bird is designated as *Not at Risk* by COSEWIC.



**Figure 2. Adult Bald Eagle.** (Photo: Jared Hobbs)

### 3) What to Look For

Bald Eagles nest primarily in coniferous forests near a permanent water source, although deciduous and mixed woodlands are also used. Nests are notably large. Made of bulky sticks and branches, the nests are at least 1 m across and often conspicuously placed in the top third of a large tree. Bald Eagles tend to repair and reuse the same nest for many years. Often, more than one nest is built in a breeding territory, with alternate nests used in different years. As many as four nests may occur in one territory, although not more than one is active in a given year. Breeding eagles defend territories of 1.5–6.0 km<sup>2</sup> but will forage outside the defended zone. In areas of discontinuous habitat, nests may be widely dispersed, although this is not a function of territoriality.

The surest way to determine which bird species is using a large stick nest is to observe an adult bird at the nest site. The breeding season (typically March through August) is the best opportunity to do this. If a large stick nest is found during the non-breeding season, and cannot be attributed to a particular bird species, then assess the nest characteristics to determine whether it is a Bald Eagle nest.

Table 1 summarizes what to look for when identifying a Bald Eagle nest. Table 2 provides information to consider when conducting primary forest activities near a Bald Eagle nest. Consider substituting lower-impact, alternative activities in areas near a Bald eagle's nest during the breeding season. Table 3 suggests some alternatives to avoid rendering a nest ineffective.

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**Table 1. Bald Eagle nests: what to look for.**

<b>Bald Eagle Nest Description</b>
<ul style="list-style-type: none"><li>• Nests are:<ul style="list-style-type: none"><li>○ large, ranging in size from 1.0 to 3.5 m in diameter and from 0.5 to 2.5 m in depth;</li><li>○ made of large sticks, forming generally cup-shaped platforms with relatively flat tops;</li><li>○ typically built in large trees, up against the tree trunk or on a large, forked branch or stem crotch;</li><li>○ generally built in the upper third of the tree with an unobstructed view of the surrounding area;</li><li>○ along the Coast, usually within 100 m of shore;</li><li>○ in the Interior, usually within 100 m of shore but up to 2 km from a water body (e.g., lake or river);</li><li>○ on the Coast, usually in coniferous trees with large limbs, such as Douglas-fir, Sitka spruce, western redcedar, and western hemlock; large black cottonwood and red alder are also used; on treeless offshore islands, nests may be on the ground, usually on cliffs or steep slopes; and</li><li>○ in the Interior, most nests are found in black cottonwood, Douglas-fir, balsam poplar and trembling aspen; ponderosa pine and spruce are also used.</li></ul></li><li>• Evidence of use (e.g., whitewash [feces], remains of prey, raptor feathers) is often located at the base of nest trees.</li><li>• Adult birds are often seen flying to and from the nest or perched nearby.</li><li>• Young, small birds are often not seen from the ground but are heard begging for food from within the nest.</li></ul>

**Table 2. Information to consider when conducting primary forest activities near a nest of a Bald Eagle.**

<b>Information to Consider</b>
<ul style="list-style-type: none"><li>• If you are unsure whether an unoccupied large stick nest is that of a Bald Eagle, consult a qualified professional biologist to identify the species.</li><li>• The nest is protected throughout the year under Section 34b of the <i>Wildlife Act</i>.</li><li>• Unless they occur in more developed locations (e.g., urban/rural interfaces), Bald Eagles generally have low to moderate thresholds for new human disturbance, especially during the breeding season. Unaccustomed levels of noise or human activity near the nest tree can cause some pairs to abandon their nest, particularly during the early part of the nesting season (i.e., before June). Therefore:<ul style="list-style-type: none"><li>○ Avoid conducting high-impact activities (see Table 3) during the breeding season (March 1–August 15) in areas near a Bald Eagle nest.</li><li>○ Establish a forested windfirm buffer to provide some visual screening around confirmed nest trees; habitat functions of this buffer include perching and roosting opportunities near the nest site and security cover.</li><li>○ Locate any new roads at a distance that will not result in disturbance to the nest site.</li></ul></li></ul>

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**Table 3. Activity impacts near Bald Eagle nests and suggested lower-impact alternatives.**

Activity	Suggested Lower-impact Alternatives
<b>High Impact</b>	
Blasting	<ul style="list-style-type: none"> <li>○ Delay until after breeding season (January 1–August 31).</li> </ul>
Road construction	<ul style="list-style-type: none"> <li>○ Delay until after breeding season (January 1–August 31).</li> </ul>
Repeated low altitude helicopter flight activity (< 300 m altitude)	<ul style="list-style-type: none"> <li>○ Plan recurring flight paths to a &gt; 300 m line-of-sight distance from known nest trees during the breeding season (January 1–August 31).</li> <li>○ Fly at higher altitudes (generally &gt; 300 m) near nest sites during the breeding season.</li> </ul>
Falling and yarding (including mechanized falling)	<ul style="list-style-type: none"> <li>○ Delay until after breeding season (January 1–August 31).</li> <li>○ Restrict falling and yarding to a &gt; 500 m horizontal distance from known nest trees during the breeding season.</li> <li>○ Where sufficient visual screening is provided by continuous forest cover (of at least mid-forest age) or topography, restrict falling and yarding to a &gt; 300 m horizontal distance from known nest trees during the breeding season.</li> <li>○ For region-specific guidance, refer to Section 4.</li> </ul>
<b>Medium Impact</b>	
Brushing and thinning	<ul style="list-style-type: none"> <li>○ Delay until after breeding season (January 1–August 31).</li> </ul>
<b>Low Impact</b>	
Block layout, surveys, timber cruising	<ul style="list-style-type: none"> <li>○ Minimize loud voices or shouting; try to remain at least 50 m away from active nest sites.</li> <li>○ Minimize time spent in the nest area during the most sensitive courtship, nest building, and egg-laying periods (January to mid-May).</li> </ul>

**4) Regional Information – Kootenay Boundary**

In this section, we provide specific timing windows and guidance on disturbance buffers for the Kootenay Boundary Region. This information may vary from provincial guidance and may not be applicable outside of the Kootenay Boundary Region because of regional specificity.

Bald Eagles are British Columbia residents, meaning they both breed and overwinter within the province (Figure 3). During the breeding season, these birds are found in most forest types (Table 4) and are generally associated with permanent water sources. They overwinter around low-elevation, ice-free water bodies. Bald Eagle sensitivity to disturbance varies with their existing exposure to disturbance and the level of disturbance from the proposed activity. Figure 4 provides suggested minimum buffer sizes. Table 5 supplies additional guidance on protection or alternative measures that may be needed, depending on the nature of the disturbance, existing landscape and cover, or other factors.

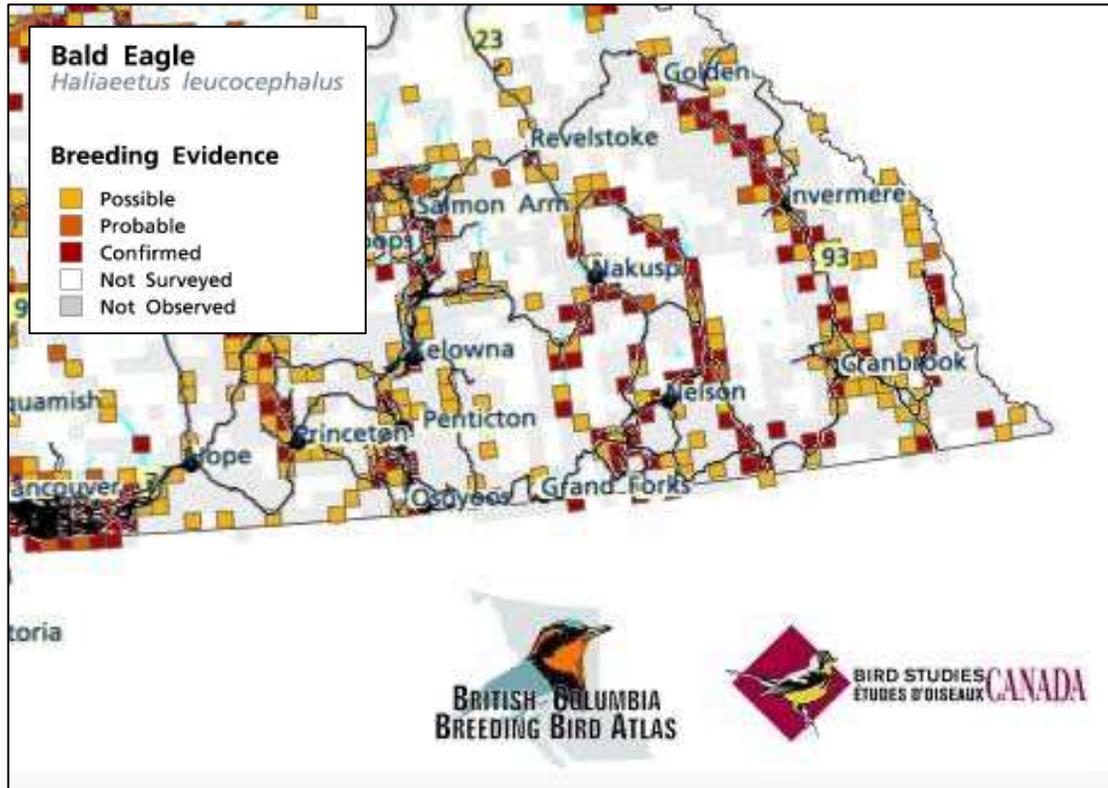
Bald Eagles are most sensitive during the breeding season, which includes territory establishment and courtship stages. Each breeding season stage requires protection because this disturbance-sensitive raptor could abandon a site at any time during the entire breeding period. Please note that the following dates offer a general guide of when you might expect to see breeding season

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activities in the Kootenay Boundary Region; actual breeding season length will depend on the year and area.

- Courtship and nest initiation: January 1–February 1
- Eggs present: February 1–June 30
- Young present: April 1–August 31

This creates a potential *sensitive period of January 1–August 31*, which encompasses courtship (month before nesting), nesting, and fledging.<sup>1</sup> Based on observations of nest stage, the length of this sensitive period can be refined. The period of *least risk is September 1–December 31*.



**Figure 3. Distribution of Bald Eagles in the Kootenay Boundary Region.<sup>2</sup>**

**Table 4. Habitat and biogeoclimatic associations of Bald Eagles in the Kootenay Boundary Region.<sup>2,3</sup>**

Habitat	Biogeoclimatic Zone <sup>4</sup>
Interior Douglas-fir	IDF
Interior Cedar–Hemlock	ICH
Montane Spruce	MS
Engelmann Spruce–Subalpine Fir	ESSF
Ponderosa Pine	PP

<sup>1</sup> Modified from Develop with Care 2014: Environmental Guidelines for Urban and Rural Land Development in British Columbia.

<sup>2</sup> Atlas of the Breeding Birds of British Columbia (2015).

<sup>3</sup> Adapted from BC Species and Ecosystems Explorer – BC Species Summary.

<sup>4</sup> A Field Guide for Site Identification and Interpretation for the Nelson Forest Region (1992).

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		Existing Exposure to Disturbance			
NEST SITE BUFFER		NIL Isolated site, little or no prior access	LOW Undeveloped area with occasional human use	MODERATE Near secondary logging road or minor recreation site	HIGH Near primary road, major recreation site, or human development
Disturbance Level of Proposed Activity	LOW Activities on foot. Small group, visual screening present. Livestock attractants. Examples: layout, cruising, salt licks.	100–200 m	1.5 × tree length	1.5 × tree length	1.5 × tree length
	MODERATE Light mechanized activities. Larger group/duration, no visual screening. Examples: spacing, planting, fence construction.	200–500 m	100–200 m	100–200 m	1.5 × tree length
	HIGH Mechanized activities. Examples: road construction, falling and yarding, landing sites.	200–500 m	200–500 m	200–500 m	100–200 m
	VERY HIGH Blasting, helicopter logging.	1000 m+	1000 m+	1000 m+	1000 m+

**Figure 4. Recommended disturbance buffers around a Bald Eagle’s nest, depending on existing disturbance and disturbance level of the proposed activity.<sup>5</sup>**

**Table 5. Additional guidance on disturbance buffers for a Bald Eagle’s nest.<sup>6</sup>**

A Nest of a Bald Eagle – Guidance on Buffers
<ul style="list-style-type: none"> <li>• Increase buffer, or delay activities, if a nest is active and the bird constantly flushes away when using minimum buffers.</li> <li>• Consider the sight lines between the activity and the nest; in more open forests or terrain, a larger buffer may be required for these visually acute species.</li> <li>• During breeding season, consider adding a “quiet” buffer of an extra 100 m to the no disturbance buffer in which no unusual or sudden loud activities will occur (e.g., blasting, tree felling, chain saws, trucking, etc.).</li> </ul>

<sup>5</sup> Develop with Care 2014: Environmental Guidelines for Urban and Rural Land Development in British Columbia.

<sup>6</sup> Guidelines for Raptor Conservation during Urban and Rural Development Land Development in British Columbia (2013).

**5) Additional Information**

A Field Guide for Site Identification and Interpretation for the Nelson Forest Region, Land Management Handbook No. 20:

<https://www.for.gov.bc.ca/hfd/pubs/docs/lmh/lmh20.htm>

Atlas of the Breeding Birds of British Columbia – Bald Eagle Species Account:

<http://www.birdatlas.bc.ca/accounts/speciesaccount.jsp?sp=BAEA&lang=en>

BC Species and Ecosystems Explorer – Species Summary for Bald Eagle:

<http://a100.gov.bc.ca/pub/eswp/speciesSummary.do?id=18209>

Develop with Care 2014: Environmental Guidelines for Urban and Rural Land Development in British Columbia:

<https://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/natural-resource-standards-and-guidance/best-management-practices/develop-with-care>

Guidelines for Raptor Conservation during Urban and Rural Development Land Development in British Columbia:

<https://www2.gov.bc.ca/assets/download/E3DEB5DA9E2A4FFA8F24F8E10FDD4C47>

Status of the Bald Eagle in British Columbia:

<http://www.env.gov.bc.ca/wld/documents/statusrpts/wr62.pdf>

U.S. Fish and Wildlife Service National Bald Eagle Management Guidelines:

<http://www.fws.gov/southdakotafieldoffice/NationalBaldEagleManagementGuidelines.pdf>

## 2. A Nest of an Osprey

### 1) Definition

*A nest of an Osprey (Pandion haliaetus)* means the nest and its supporting structure that either (1) is currently occupied by an Osprey to hold its eggs or offspring, or (2) is habitually occupied and still capable of holding eggs or offspring of an Osprey (Figure 5).



**Figure 5. Osprey nest.** (Photo: Mark Nyhof)

### 2) Species Description

The Osprey is a large raptor, although smaller than the Bald Eagle. It is dark brown above and generally white below, with a mostly white head and a prominent dark eye stripe (Figure 6). The sexes have a similar appearance, although males are usually all white below, whereas females have some dark streaking across the upper breast. In flight, the long, narrow wings are distinctively bent at the wrist, showing a conspicuous dark wrist patch. The common call of the Osprey is a loud, whistled *kyew kyew kyew kyew kyew*.

The Osprey is Yellow-listed in British Columbia. COSEWIC provides no designation for this bird.



**Figure 6. Adult Osprey.** (Photo: Chris Wilson)

### **3) What to Look For**

Ospreys breed throughout British Columbia except on Haida Gwaii; however, most nest sites occur in the southern two-thirds of the province. Most nests are located close to permanent water, including lakes, rivers, or marine shores. Nests are large and often conspicuously placed near the top of a tree, artificial platform, or utility pole. Nests are made of sticks and branches and are at least 1 m across in size. Nests are typically used year after year by the same pair or their offspring.

The surest way to determine which bird species is using a large stick nest is to observe an adult bird at the nest site. The breeding season (typically March through August) is the best opportunity to do this. If a large stick nest is found during the non-breeding season, and cannot be attributed to a particular bird species, then assess the nest characteristics to determine whether it is an Osprey nest.

Table 6 summarizes what to look for when identifying an Osprey nest. Table 7 provides information to consider when conducting primary forest activities near an Osprey nest. Consider substituting lower-impact, alternative activities in areas near an Osprey's nest during the breeding season. Table 8 suggests some alternatives to avoid rendering a nest ineffective.

**Table 6. Osprey nests: what to look for.**

<b>Osprey Nest Description</b>
<ul style="list-style-type: none"><li>• Nests are:<ul style="list-style-type: none"><li>○ 1.5–2.5 m in diameter and 0.5–1.5 m in depth;</li><li>○ made of large sticks that are generally &gt; 0.75 cm in diameter (i.e., the width of a pencil);</li><li>○ typically built at the top of dead trees, snags, live trees, and on artificial structures (e.g., utility poles); and</li><li>○ generally close to a permanent source of water but sometimes up to 4 km away.</li></ul></li><li>• Evidence of use (e.g., whitewash [feces], remains of prey, and raptor feathers) is often located at the base of nest trees.</li><li>• Adult birds are often seen flying to and from the nest or perched nearby.</li><li>• Young, small birds are often not seen from the ground but are heard begging for food from within the nest.</li></ul>

**Table 7. Information to consider when conducting primary forest activities near a nest of an Osprey.**

<b>Information to Consider</b>
<ul style="list-style-type: none"><li>• If you are unsure whether an unoccupied large stick nest is that of an Osprey, consult a qualified professional biologist to identify the species.</li><li>• The nest is protected throughout the year under Section 34b of the <i>Wildlife Act</i>.</li><li>• Unless they occur in more developed locations (e.g., urban/rural interfaces), Ospreys generally have low to moderate thresholds for new human disturbance, especially during the breeding season. Unaccustomed levels of noise or human activity near the nest tree can cause some pairs to abandon their nest, particularly during the early part of the nesting season (i.e., before June). Therefore:<ul style="list-style-type: none"><li>○ Avoid conducting high-impact activities (see Table 8) during the breeding season (March 1–August 15) in areas near an Osprey nest.</li><li>○ Establish a forested windfirm buffer to provide some visual screening around confirmed nest trees; habitat functions of this buffer include perching and roosting opportunities near the nest site and security cover.</li><li>○ Locate any new roads at a distance that will not result in disturbance to the nest site.</li></ul></li></ul>

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**Table 8. Activity impacts near Osprey nests and suggested lower-impact alternatives.**

Activity	Suggested Lower-impact Alternatives
<b>High Impact</b>	
Blasting	○ Delay until after breeding season (April 1–September 1).
Road construction	○ Delay until after breeding season (April 1–September 1).
Repeated low altitude helicopter flight activity (< 300 m altitude)	○ Plan recurring flight paths to a > 300 m line-of-sight distance from known nest trees during the breeding season (April 1–September 1). ○ Fly at higher altitudes (generally > 300 m) near nest sites during the breeding season.
Falling and yarding (including mechanized falling)	○ Delay until after breeding season (April 1–September 1). ○ Restrict falling and yarding to a > 500 m horizontal distance from known nest trees during the breeding season. ○ Where sufficient visual screening is provided by continuous forest cover (of at least mid-forest age) or topography, restrict falling and yarding to a > 300 m horizontal distance from known nest trees during the breeding season. ○ For region-specific guidance, refer to Section 4.
<b>Medium Impact</b>	
Brushing and thinning	○ Delay until after breeding season (April 1–September 1).

**4) Regional Information – Kootenay Boundary**

In this section, we provide specific timing windows and guidance on disturbance buffers for the Kootenay Boundary Region. This information may vary from provincial guidance and may not be applicable outside of the Kootenay Boundary Region because of regional specificity.

The Osprey is a migratory species. It arrives in British Columbia in April and departs by October. This species is found primarily along rivers, lakes, and reservoirs (Figure 7) but occurs in a wide range of forest types (Table 9). Osprey sensitivity to disturbance varies with their existing exposure to disturbance and the level of disturbance from the proposed activity. Figure 8 provides suggested minimum buffer sizes. Table 10 supplies additional guidance on protection or alternative measures that may be needed, depending on the nature of the disturbance, existing landscape and cover, or other factors.

Ospreys are most sensitive during the breeding season, which includes territory establishment and courtship stages. Each breeding season stage requires protection because this disturbance-sensitive raptor could abandon a site at any time during the entire breeding period. Please note that the following dates offer a general guideline of when you might expect to see breeding season activities in the Kootenay Boundary Region; actual breeding season length will depend on the year and area.

- Courtship and nest initiation: April 1–April 31
- Eggs present: May 1–July 1
- Young present: May 31–September 1

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This creates a potential *sensitive period of April 1–September 1*, which encompasses courtship (month before nesting), nesting, and fledging.<sup>1</sup> Based on observations of nest stage, the length of this sensitive period can be refined. The period of *least risk is September 15–January 15*.

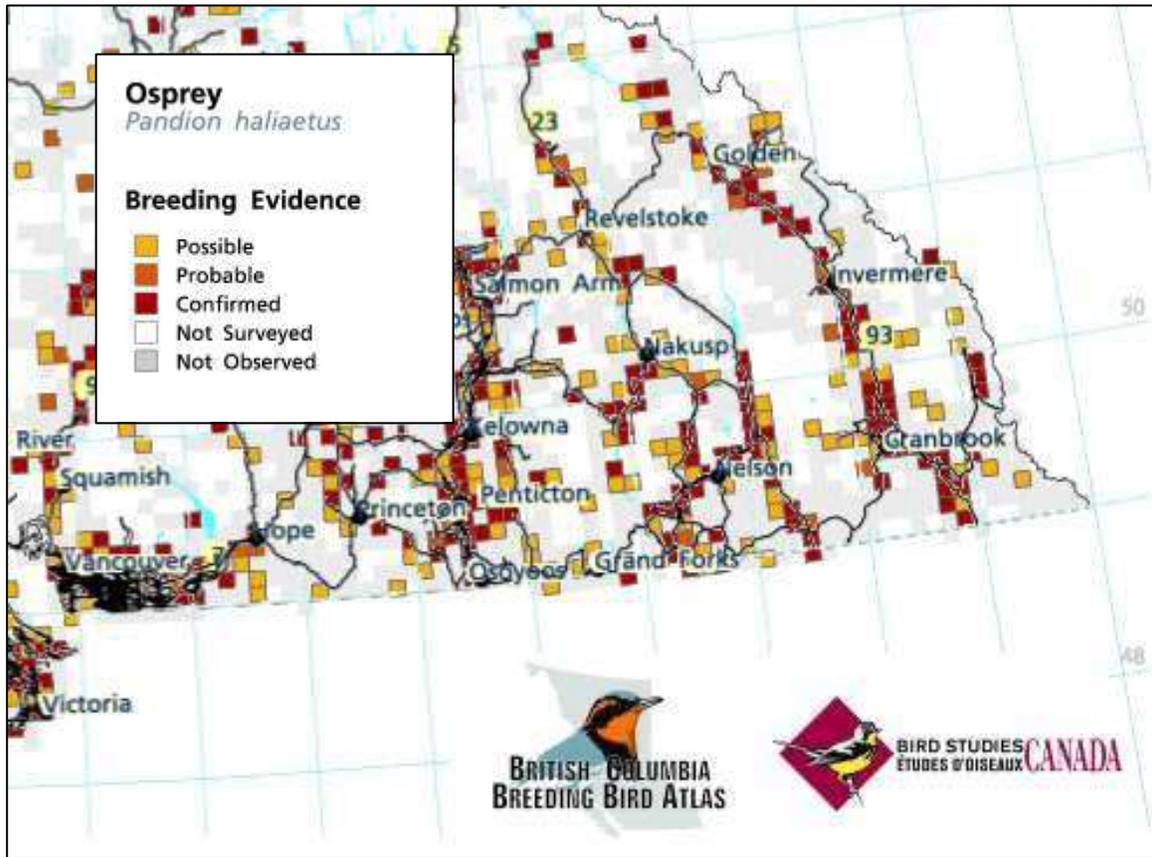


Figure 7. Distribution of Ospreys in the Kootenay Boundary Region.<sup>2</sup>

Table 9. Habitat and biogeoclimatic associations of Osprey in the Kootenay Boundary Region.<sup>2,3</sup>

Habitat	Biogeoclimatic Zone <sup>4</sup>
Interior Douglas-fir	IDF
Ponderosa Pine	PP
Interior Cedar–Hemlock	ICH
Engelmann Spruce–Subalpine Fir	ESSF
Montane Spruce	MS

<sup>1</sup> Modified from Develop with Care 2014: Environmental Guidelines for Urban and Rural Land Development in British Columbia.

<sup>2</sup> Atlas of the Breeding Birds of British Columbia (2015).

<sup>3</sup> Adapted from BC Species and Ecosystems Explorer – BC Species Summary.

<sup>4</sup> A Field Guide for Site Identification and Interpretation for the Nelson Forest Region (1992).

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		Existing Exposure to Disturbance			
NEST SITE BUFFER		NIL Isolated site, little or no prior access	LOW Undeveloped area with occasional human use	MODERATE Near secondary logging road or minor recreation site	HIGH Near primary road, major recreation site, or human development
Disturbance Level of Proposed Activity	LOW Activities on foot. Small group, visual screening present. Livestock attractants. Examples: layout, cruising, salt licks.	100–200 m	1.5 × tree length	1.5 × tree length	1.5 × tree length
	MODERATE Light mechanized activities. Larger group/duration, no visual screening. Examples: spacing, planting, fence construction.	200–500 m	100–200 m	100–200 m	1.5 × tree length
	HIGH Mechanized activities. Examples: road construction, falling and yarding, landing sites.	200–500 m	200–500 m	200–500 m	100–200 m
	VERY HIGH Blasting, helicopter logging.	1000 m+	1000 m+	1000 m+	1000 m+

**Figure 8. Recommended disturbance buffers around an Osprey’s nest, depending on existing disturbance and the disturbance level of the proposed activity.<sup>5</sup>**

**Table 10. Additional guidance on disturbance buffers for an Osprey’s nest.<sup>6</sup>**

A Nest of an Osprey – Guidance on Buffers
<ul style="list-style-type: none"> <li>• Increase buffer, or delay activities, if the nest is active and the bird constantly flushes away when using minimum buffers.</li> <li>• Consider the sight lines between the activity and the nest; in more open forests or terrain, a larger buffer may be required for these visually acute species.</li> <li>• During breeding season, consider adding a “quiet” buffer of an extra 100 m to the no disturbance buffer in which no unusual or sudden loud activities will occur (e.g., blasting, tree felling, chain saws, trucking, etc.).</li> </ul>

<sup>5</sup> Modified from Develop with Care 2014: Environmental Guidelines for Urban and Rural Land Development in British Columbia.

<sup>6</sup> Guidelines for Raptor Conservation during Urban and Rural Development Land Development in British Columbia (2013).

**5) Additional Information**

A Field Guide for Site Identification and Interpretation for the Nelson Forest Region, Land Management Handbook No. 20:

<https://www.for.gov.bc.ca/hfd/pubs/docs/lmh/lmh20.htm>

Atlas of the Breeding Birds of British Columbia – Osprey Species Account:

<https://www.birdatlas.bc.ca/accounts/speciesaccount.jsp?lang=en&sp=OSPR>

BC Species and Ecosystems Explorer – Species Summary for Osprey:

<http://a100.gov.bc.ca/pub/eswp/speciesSummary.do?id=19401>

Develop with Care 2014: Environmental Guidelines for Urban and Rural Land Development in British Columbia:

<https://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/natural-resource-standards-and-guidance/best-management-practices/develop-with-care>

Guidelines for Raptor Conservation during Urban and Rural Development Land Development in British Columbia:

<https://www2.gov.bc.ca/assets/download/E3DEB5DA9E2A4FFA8F24F8E10FDD4C47>

### 3. A Nest of a Flammulated Owl

#### 1) Definition

*A nest of a Flammulated Owl (Otus flammeolus)* means the nest and its supporting structure that either (1) is currently occupied by a Flammulated Owl to hold its eggs or offspring, or (2) is habitually occupied and still capable of holding eggs or offspring of a Flammulated Owl (Figure 9).



**Figure 9. Flammulated Owl in nest cavity.** (Photo: Michael Woodruff)

#### 2) Species Description

The Flammulated Owl is a tiny, dark-eyed owl with small, indistinct ear tufts (Figure 10). Its red and gray variegated plumage resembles tree bark. This owl is strictly nocturnal; it is best identified at night by its call—a long series of low-pitched, single or paired hollow hoots.

The Flammulated Owl is a *Species at Risk* under the *Forest and Range Practices Act* and is Blue-listed in British Columbia. It is designated as a species of *Special Concern* by COSEWIC.



**Figure 10. Flammulated Owl.** (Photo: Michael Woodruff)

### 3) What to Look For

Flammulated Owls nest mainly in mature, open ponderosa pine–Douglas-fir forests that are characterized by multi-layered canopies, some shrub or sapling thickets in the understory, and an abundance of old or veteran trees used for nesting and roosting. The Flammulated Owl is a secondary cavity nester that uses natural cavities or those excavated by Pileated Woodpeckers (*Dryocopus pileatus*) or Northern Flickers (*Colaptes auratus*). Alternative cavities have been used for nesting in the same tree in successive years and alternative trees have been used within the same foraging areas. Small forest openings are important for foraging.

Pairs re-mate in the previous year's territory, if both birds return; alternatively, the male will return and find a new mate. Territory size varies with time of year and habitat quality. Average breeding season territory size ranges from 15.9 ha during incubation to 3.6 ha during fledging.

Table 11 summarizes what to look for when identifying a Flammulated Owl nest. Table 12 provides information to consider when conducting primary forest activities near a nest.

**Table 11. Flammulated Owl nests: what to look for.**

<b>Flammulated Owl Nest Description</b>
<ul style="list-style-type: none"> <li>• Owls prefer to nest in mature, open stands of ponderosa pine–Douglas-fir.</li> <li>• Nests are usually located in ponderosa pine (preferred) or Douglas-fir snags &gt; 30 cm dbh.</li> <li>• Nest trees are typically softer snags (wildlife tree classes 4–6, and sometimes class 7).</li> <li>• Nest trees are often located within, or near, small forest openings (&lt; 1 ha) that are adjacent to thickets of regenerating conifers and shrubs or large trees with heavy branching, which provides security cover.</li> <li>• Flammulated Owls use natural cavities and abandoned woodpecker (usually Northern Flicker or Pileated Woodpecker) cavities for nesting and roosting.</li> <li>• Pileated Woodpecker cavities are oblong or oval in shape rather than the circular shape of most woodpecker holes.</li> <li>• The entrance diameters of Northern Flicker cavities range from 6 to 11 cm (average 8.3 cm).</li> <li>• Nests can occur from 1.5 to 14 m above the ground.</li> </ul>

**Table 12. Information to consider when conducting primary forest activities near a nest of a Flammulated Owl.**

<b>Information to Consider</b>
<ul style="list-style-type: none"> <li>• Establish a windfirm forested retention area centred around the nest tree. If this spatial configuration is not practical for operational, topographic, safety, or other reasons, then maintain forest connectivity (where possible) between the retention patch and adjacent forested habitat. Ensure this corridor is as wide as possible to minimize edge effects (e.g., predation, windthrow risk), and to provide additional security cover, perching, and hunting opportunities.</li> <li>• Retain large-diameter, decayed ponderosa pine and Douglas-fir (especially with existing woodpecker cavities) that are near thick cover, such as shrub thickets, dense regeneration, or large conifers with dense crowns (see Table 11).</li> <li>• Maintain some vegetation cover (where available) around the nest tree for security cover, and perching and roosting sites, if the nest tree is a single tree within an existing opening (i.e., meadow, clearing, or cutblock). This cover may include:             <ul style="list-style-type: none"> <li>○ advance regeneration,</li> <li>○ shrub cover and (or) dense thickets,</li> <li>○ non-crop trees (deciduous species), or</li> <li>○ non-merchantable trees (especially standing dead trees or trees with existing cavities and [or] evidence of internal decay).</li> </ul> </li> <li>• Avoid constructing roads, trails, or other structures within a wildlife tree patch or other forested retention patch that is located around the nest tree.</li> <li>• Dead or decayed trees are often targeted by firewood cutters. Place a “Wildlife Tree Sign” on nest trees to educate the public and others about their high ecological value.</li> <li>• <b>Note:</b> Because of potential worker safety concerns, dead and defective trees that are considered for retention must either be located within a suitable-sized retention patch or have a danger tree assessment conducted by a certified wildlife/danger tree assessor. Consult the Wildlife Tree Committee of British Columbia website for information and links relevant to dangerous tree assessment (see Section 5).</li> </ul>

#### 4) Regional Information – Kootenay Boundary

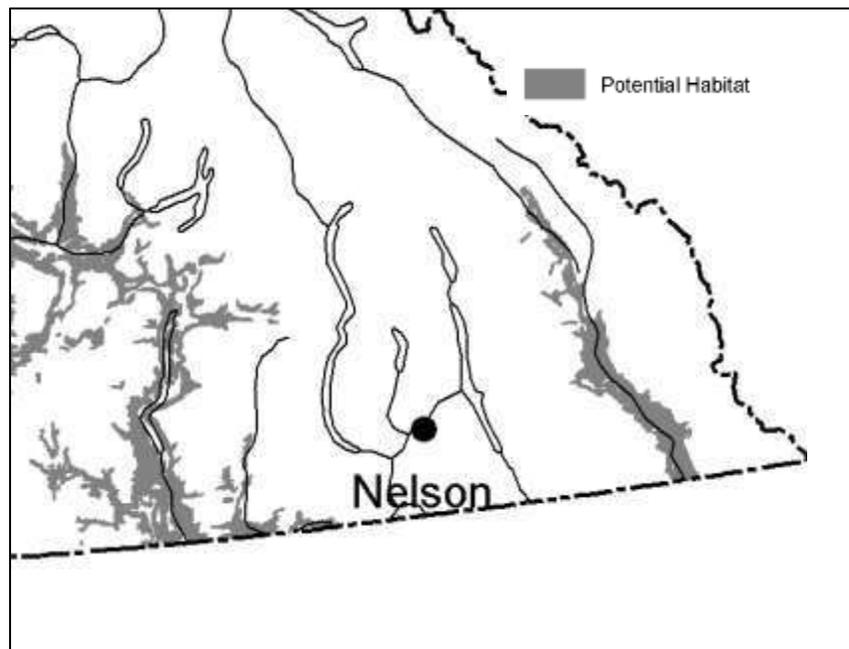
In this section, we provide specific timing windows and guidance on disturbance buffers for the Kootenay Boundary Region. This information may vary from provincial guidance and may not be applicable outside of the Kootenay Boundary Region because of regional specificity.

The Flammulated Owl is a migratory species. It arrives in British Columbia in early May and departs by mid-October. This species has a fairly narrow habitat range (Figure 11, Table 13). In the Thompson Region, nests have been observed at elevations of 400–1375 m. Flammulated Owl sensitivity to disturbance varies with their existing exposure to disturbance and the level of disturbance from the proposed activity. Figure 12 provides suggested minimum buffer sizes. Table 14 supplies additional guidance on protection or alternative measures that may be needed, depending on the nature of disturbance, existing landscape and cover, or other factors.

Flammulated Owls are most sensitive during the breeding season, which includes territory establishment and courtship stages. Each breeding season stage requires protection because this disturbance-sensitive raptor could abandon a site at any time during the entire breeding period. Please note that the following dates offer a general guide of when you might expect to see breeding season activities in the Kootenay Boundary Region; actual breeding season length will depend on the year and area.

- Courtship and nest initiation: April 1–April 30
- Eggs present: April 30–July 31
- Young present: May 31–August 31

This creates a potential *sensitive period of April 1–August 31*, which encompasses courtship (month before nesting), nesting, and fledging.<sup>1</sup> Based on observations of nest stage, the length of this sensitive period can be refined. The period of *least risk is September 1–March 31*.



**Figure 11. Distribution of Flammulated Owl habitat in the Kootenay Boundary Region.<sup>2</sup>**

<sup>1</sup> Modified from Develop with Care 2014: Environmental Guidelines for Urban and Rural Land Development in British Columbia.

*Wildlife Habitat Features Field Guide (Kootenay Boundary Region)*

**Table 13. Habitat and biogeoclimatic associations of Flammulated Owls in the Kootenay Boundary Region.<sup>3,4,5</sup>**

Habitat	Biogeoclimatic Zone <sup>6</sup>	Biogeoclimatic Subzone/Variant
Ponderosa Pine	PP	dh1, dh2
Interior Douglas-fir	IDF	dk5, dm1, dm2, xk
Interior Cedar–Hemlock	ICH	dm, dw1, mk5, mw2, mw4, xw
Montane Spruce	MS	dk1, dk2

		Existing Exposure to Disturbance			
NEST SITE BUFFER		NIL Isolated site, little or no prior access	LOW Undeveloped area with occasional human use	MODERATE Near secondary logging road or minor recreation site	HIGH Near primary road, major recreation site, or human development
Disturbance Level of Proposed Activity	LOW Activities on foot. Small group, visual screening present. Livestock attractants. Examples: layout, cruising, salt licks.	100–200 m	1.5 × tree length	1.5 × tree length	1.5 × tree length
	MODERATE Light mechanized activities. Larger group/duration, no visual screening. Examples: spacing, planting, fence construction.	200–500 m	100–200 m	100–200 m	1.5 × tree length
	HIGH Mechanized activities. Examples: road construction, falling and yarding, landing sites.	200–500 m	200–500 m	200–500 m	100–200 m
	VERY HIGH Blasting, helicopter logging.	1000 m+	1000 m+	1000 m+	1000 m+

**Figure 12. Recommended disturbance buffers around a Flammulated Owl’s nest, depending on existing disturbance and the disturbance level of the proposed activity.<sup>7</sup>**

<sup>2</sup> Modified from the Identified Wildlife Management Strategy – Species Accounts and Measures (2004).

<sup>3</sup> Adapted from BC Species and Ecosystems Explorer – Species Summary.

<sup>4</sup> Atlas of the Breeding Birds of British Columbia (2015).

<sup>5</sup> M. Machmer, Registered Professional Biologist, Pandion Ecological Research Ltd., pers. comm. (2018).

<sup>6</sup> A Field Guide for Site Identification and Interpretation for the Nelson Forest Region (1992).

<sup>7</sup> Modified from Develop with Care 2014: Environmental Guidelines for Urban and Rural Land Development in British Columbia.

**Table 14. Additional guidance on disturbance buffers for a Flammulated Owl's nest.<sup>8</sup>**

<b>A Nest of a Flammulated Owl – Guidance on Buffers</b>
<ul style="list-style-type: none"><li>• Increase buffer, or delay activities, if the nest is active and the bird constantly flushes away when using minimum buffers.</li><li>• Consider the sight lines between the activity and the nest; in more open forests or terrain, a larger buffer may be required for these visually acute species.</li><li>• During breeding season, consider adding a “quiet” buffer of an extra 100 m to the no disturbance buffer in which no unusual or sudden loud activities will occur (e.g., blasting, tree felling, chain saws, trucking, etc.).</li></ul>

### **5) Additional Information**

A Field Guide for Site Identification and Interpretation for the Nelson Forest Region, Land Management Handbook No. 20:

<https://www.for.gov.bc.ca/hfd/pubs/docs/lmh/lmh20.htm>

Atlas of the Breeding Birds of British Columbia – Flammulated Owl Species Account:

<https://www.birdatlas.bc.ca/accounts/speciesaccount.jsp?sp=FLOW&lang=en>

BC Species and Ecosystems Explorer – Species Summary for Flammulated Owl:

<http://a100.gov.bc.ca/pub/eswp/speciesSummary.do?id=18697>

Develop with Care 2014: Environmental Guidelines for Urban and Rural Land Development in British Columbia:

<https://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/natural-resource-standards-and-guidance/best-management-practices/develop-with-care>

Flammulated Owl COSEWIC Status Report:

[http://www.sararegistry.gc.ca/virtual\\_sara/files/cosewic/sr\\_Flammulated%20Owl\\_0810\\_e.pdf](http://www.sararegistry.gc.ca/virtual_sara/files/cosewic/sr_Flammulated%20Owl_0810_e.pdf)

Guidelines for Raptor Conservation during Urban and Rural Development Land Development in British Columbia:

<https://www2.gov.bc.ca/assets/download/E3DEB5DA9E2A4FFA8F24F8E10FDD4C47>

Identified Wildlife Management Strategy – Flammulated Owl Species Account:

[http://www.env.gov.bc.ca/wld/frpa/iwms/documents/Birds/b\\_flammulatedowl.pdf](http://www.env.gov.bc.ca/wld/frpa/iwms/documents/Birds/b_flammulatedowl.pdf)

Wildlife Tree Committee of British Columbia website:

<https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/wildlife/wildlife-habitats/wildlife-tree-committee>

<sup>8</sup> Guidelines for Raptor Conservation During Urban and Rural Development Land Development in British Columbia (2013).

#### **4. A Nest of a Western Screech-Owl *macfarlanei* subspecies**

##### **1) Definition**

*A nest of a Western Screech-Owl macfarlanei subspecies (Otus kennicottii macfarlanei)* means the nest and its supporting structure that either (1) is currently occupied by a Western Screech-Owl to hold its eggs or offspring, or (2) is habitually occupied and still capable of holding eggs or offspring of a Western Screech-Owl (Figure 13).

*Note:* The Western Screech-Owl *macfarlanei* subspecies is often referred to as the “Interior” subspecies of Western Screech-Owl in British Columbia.



**Figure 13. Western Screech-Owl at nest cavity.** (Photo: Kevin Alexander)

##### **2) Species Description**

The Western Screech-Owl *macfarlanei* subspecies is slightly larger than a robin, with yellow eyes and a dark beak (Figure 14). Its ear tufts are noticeable when raised, but when they are flattened, the head appears round. It is generally gray overall, with under parts marked with blackish streaks and thinner bars. This owl is nocturnal; it is best identified at night by its calls. Two common calls are a series of short whistles of the same pitch that accelerate in tempo and a short trill followed by a longer trill.

The Western Screech-Owl *macfarlanei* subspecies is a *Species at Risk* under the *Forest and Range Practices Act* and is Red-listed in British Columbia. It is designated as *Endangered* by COSEWIC.



**Figure 14. Western Screech-Owl *macfarlanei* subspecies.** (Photo: Jared Hobbs)

### 3) What to Look For

The Western Screech-Owl *macfarlanei* subspecies nests mainly in low-elevation (360–840 m) deciduous, coniferous, or mixed woodlands close to water (i.e., riparian areas). Upland habitats, up to 500 m away from riparian nesting areas, may be used for roosting and foraging. In the Okanagan Valley and Boundary, this species frequents narrow riparian zones dominated by water birch, black cottonwood, or trembling aspen. Pairs are resident throughout the year on nesting territories that range in size from 5 to 10 ha. Because cavities are needed for both nesting and roosting, a breeding territory must contain at least two suitable cavities.

Table 15 summarizes what to look for when identifying a nest of a Western Screech-Owl *macfarlanei* subspecies. Table 16 provides information to consider when conducting primary forest activities or range practices near a Western Screech-Owl *macfarlanei* subspecies nest.

**Table 15. Western Screech-Owl *macfarlanei* subspecies nests: what to look for.**

Western Screech-Owl <i>macfarlanei</i> subspecies Nest Description
<ul style="list-style-type: none"><li>• Nests in cavities, both naturally occurring and those excavated by woodpeckers.</li><li>• Cavities with entrance openings close to the owl's body size (about 7 cm in diameter) are preferred.</li><li>• Nests can occur from 1 to 12 m above the ground.</li><li>• Nest trees are:<ul style="list-style-type: none"><li>○ living or dead;</li><li>○ black cottonwood, Douglas-fir, water birch, and trembling aspen (other tree species may also be used); and</li><li>○ often &gt; 25 cm dbh.</li></ul></li></ul>

**Table 16. Information to consider when conducting primary forest or range activities near a nest of a Western Screech-Owl *macfarlanei* subspecies.**

<b>Information to Consider</b>
<ul style="list-style-type: none"><li>• Establish a windfirm forested retention area centred around the nest tree. If this spatial configuration is not practical, maintain forest connectivity (where possible) between the retention patch and adjacent forested habitat. Ensure this connectivity corridor is as wide as possible to minimize edge effects (e.g., predation, windthrow risk), and to provide additional security cover, perching, and hunting opportunities.</li><li>• Retain large-diameter black cottonwood and Douglas-fir, especially those with existing woodpecker cavities and in forested riparian areas (see Table 15).</li><li>• Maintain some vegetation (where possible) around the nest tree for security cover, and perching and roosting sites, if the nest tree is isolated in an opening (i.e., meadow, clearing, or cutblock). This cover may include:<ul style="list-style-type: none"><li>○ advance regeneration,</li><li>○ shrubs,</li><li>○ deciduous trees, and</li><li>○ non-merchantable trees (especially standing dead trees or trees with existing cavities and [or] evidence of internal decay).</li></ul></li><li>• Avoid constructing roads, trails, or other structures within a wildlife tree patch or other forested retention area that is located around the nest tree.</li><li>• Dead or decayed trees are often targeted by firewood cutters. Place a “Wildlife Tree Sign” on nest trees to educate the public and others about their high ecological value.</li><li>• Use livestock attractants and range developments to keep livestock away from nest tree and foraging habitat.</li><li>• <b>Note:</b> Because of potential worker safety concerns, dead and defective trees that are considered for retention must either be located within a suitable-sized retention patch or have a danger tree assessment conducted by a certified wildlife/danger tree assessor. Consult the Wildlife Tree Committee of British Columbia website for information and links relevant to dangerous tree assessment (see Section 5).</li></ul>

#### **4) Regional Information – Kootenay Boundary**

In this section, we provide specific timing windows and guidance on disturbance buffers for the Kootenay Boundary Region. This information may vary from provincial guidance and may not be applicable outside of the Kootenay Boundary Region because of regional specificity.

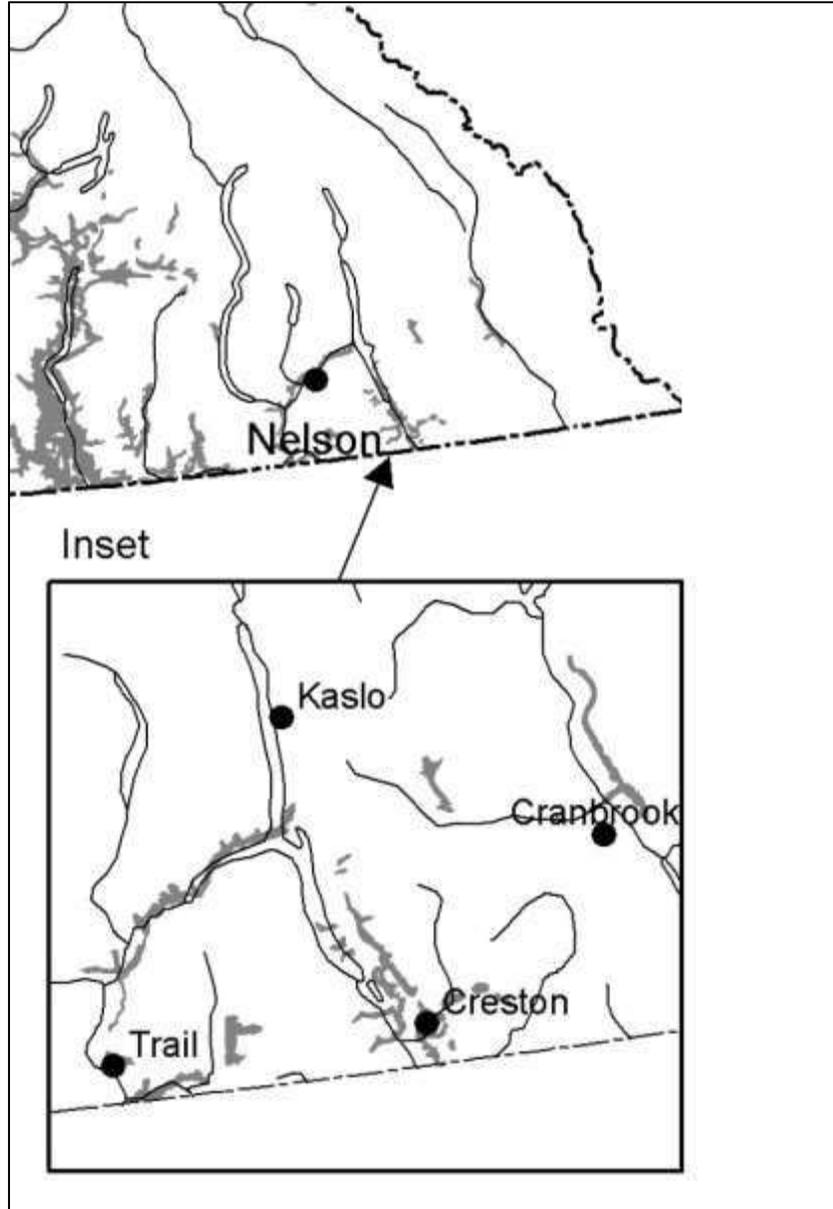
Western Screech-Owls are British Columbia residents and are most commonly found in riparian associated habitats below 1000 m (Figure 15, Table 17). Western Screech-Owl sensitivity to disturbance varies with their existing exposure to disturbance and the level of disturbance from the proposed activity. Figure 16 provides suggested minimum buffer sizes. Table 18 supplies additional protection or alternative measures that may be needed, depending on the nature of disturbance, existing landscape and cover, or other factors.

Western Screech-Owls are most sensitive during the breeding season, which includes territory establishment and courtship stages. Each breeding season stage requires protection because this disturbance-sensitive raptor could abandon a site at any time during the entire breeding period. Please note that the following dates offer a general guide of when you might expect to see breeding season activities in the Kootenay Boundary Region; actual breeding season length will depend on the year and area.

*Wildlife Habitat Features Field Guide (Kootenay Boundary Region)*

- Courtship and nest initiation: March 1–April 1
- Eggs present: March 31–June 1
- Young present: April 31–August 31

This creates a potential *sensitive period of March 1–August 31*, which encompasses courtship (month before nesting), nesting, and fledging.<sup>1</sup> Based on observations of nest stage, the length of this sensitive can be refined. The period of *least risk is October 1–February 28*.



**Figure 15. Distribution of the Western Screech-Owl *macfarlanei* subspecies habitat in the Kootenay Boundary Region.<sup>2</sup>**

<sup>1</sup> Modified from Develop with Care 2014: Environmental Guidelines for Urban and Rural Land Development in British Columbia.

<sup>2</sup> Modified from the Identified Wildlife Management Strategy – Species Accounts and Measures (2004).

*Wildlife Habitat Features Field Guide (Kootenay Boundary Region)*

**Table 17. Habitat and biogeoclimatic associations of Western Screech-Owl *macfarlanei* subspecies in the Kootenay Boundary Region.**<sup>3,4,5</sup>

Habitat	Biogeoclimatic Zone <sup>6</sup>	Biogeoclimatic Subzone/Variant
Ponderosa Pine	PP	dh1, dh2, xh1, xh2
Interior Douglas-fir	IDF	dk1, dk2, dk3, dm1, mw1, mw2, xh1, xh1a, irregular in xh2, xw
Interior Cedar–Hemlock	ICH	dw, mw2, irregular in xw

		Existing Exposure to Disturbance			
NEST SITE BUFFER		NIL Isolated site, little or no prior access	LOW Undeveloped area with occasional human use	MODERATE Near secondary logging road or minor recreation site	HIGH Near primary road, major recreation site, or human development
Disturbance Level of Proposed Activity	LOW Activities on foot. Small group, visual screening present. Livestock attractants. Examples: layout, cruising, salt licks.	100–200 m	1.5 × tree length	1.5 × tree length	1.5 × tree length
	MODERATE Light mechanized activities. Larger group/duration, no visual screening. Examples: spacing, planting, fence construction.	200–500 m	100–200 m	100–200 m	1.5 × tree length
	HIGH Mechanized activities. Examples: road construction, falling and yarding, landing sites.	200–500 m	200–500 m	200–500 m	100–200 m
	VERY HIGH Blasting, helicopter logging.	1000 m+	1000 m+	1000 m+	1000 m+

**Figure 16. Recommended disturbance buffers around a Western Screech-Owl *macfarlanei* subspecies’ nest, depending on existing disturbance and the disturbance level of the proposed activity.**<sup>7</sup>

<sup>3</sup> Adapted from BC Species and Ecosystems Explorer – Species Summary.

<sup>4</sup> Atlas of the Breeding Birds of British Columbia (2015).

<sup>5</sup> M. Machmer, Registered Professional Biologist, Pandion Ecological Research Ltd., pers. comm. (2018).

<sup>6</sup> A Field Guide for Site Identification and Interpretation for the Nelson Forest Region (1992).

<sup>7</sup> Modified from Develop with Care 2014: Environmental Guidelines for Urban and Rural Land Development in British Columbia.

**Table 18. Additional guidance on disturbance buffers for a Western Screech-Owl *macfarlanei* subspecies nest.<sup>8</sup>**

<b>A Nest of a Western Screech-Owl <i>macfarlanei</i> subspecies – Guidance on Buffers</b>
<ul style="list-style-type: none"><li>• Increase buffer, or delay activities, if the nest is active and the bird constantly flushes away when using minimum buffers.</li><li>• Consider the sight lines between the activity and the nest; in more open forests or terrain, a larger buffer may be required for these visually acute species.</li><li>• During breeding season, consider adding a “quiet” buffer of an extra 100 m to the no disturbance buffer in which no unusual or sudden loud activities will occur (e.g., blasting, tree felling, chain saws, trucking, etc.).</li></ul>

### **5) Additional Information**

A Field Guide for Site Identification and Interpretation for the Nelson Forest Region, Land Management Handbook No. 20:

<https://www.for.gov.bc.ca/hfd/pubs/docs/lmh/lmh20.htm>

Atlas of the Breeding Birds of British Columbia – Western Screech-Owl Species Account:

<https://www.birdatlas.bc.ca/accounts/speciesaccount.jsp?sp=WSOW&lang=en>

BC Species and Ecosystems Explorer – Species Summary for Western Screech-Owl, *macfarlanei* subspecies:

<http://a100.gov.bc.ca/pub/eswp/speciesSummary.do?id=20030>

Develop with Care 2014: Environmental Guidelines for Urban and Rural Land Development in British Columbia:

<https://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/natural-resource-standards-and-guidance/best-management-practices/develop-with-care>

Guidelines for Raptor Conservation during Urban and Rural Development Land Development in British Columbia:

<https://www2.gov.bc.ca/assets/download/E3DEB5DA9E2A4FFA8F24F8E10FDD4C47>

Identified Wildlife Management Strategy – “Interior” Western Screech-Owl Species Account:

[http://www.env.gov.bc.ca/wld/frpa/iwms/documents/Birds/b\\_interiorwesternscreechowl.pdf](http://www.env.gov.bc.ca/wld/frpa/iwms/documents/Birds/b_interiorwesternscreechowl.pdf)

Western Screech-Owl COSEWIC Status Report:

[http://www.sararegistry.gc.ca/virtual\\_sara/files/cosewic/sr\\_western\\_screech\\_owl\\_e.pdf](http://www.sararegistry.gc.ca/virtual_sara/files/cosewic/sr_western_screech_owl_e.pdf)

Wildlife Tree Committee of British Columbia website:

<https://www2.gov.bc.ca/gov/content?id=D81A1EAB5A7F45688B4CBC746DB9DD05>

<sup>8</sup> Guidelines for Raptor Conservation During Urban and Rural Development Land Development in British Columbia (2013).

## 5. A Nest of a Great Blue Heron

### 1) Definition

*A nest of a Great Blue Heron (Ardea herodias)* means the nest and its supporting structure that either (1) is currently occupied by a Great Blue Heron to hold its eggs or offspring, or (2) is habitually occupied and still capable of holding eggs or offspring of a Great Blue Heron (Figure 17).



**Figure 17. Great Blue Heron nesting colony.** (Photo: John Wanderer)

### 2) Species Description

The Great Blue Heron is a large, long-legged, wading bird with a long, yellow bill. The plumage is mostly gray-blue, with a white crown and face and a black eyebrow stripe (Figure 18). The front of the neck is white, streaked with black. Breeding adults have shaggy plumes on the head, neck, and back. Juvenile herons have a dark crown and lack the breeding plumes.

Two subspecies occur in British Columbia: *Ardea herodias fannini* breeds along the Coast, whereas *A. h. herodias* breeds in the Interior. Both subspecies of Great Blue Heron are *Species at Risk* under the *Forest and Range Practices Act* and are Blue-listed in British Columbia. The coastal subspecies, *A. h. fannini*, is designated as a species of *Special Concern* by COSEWIC.



**Figure 18. Great Blue Heron.** (Photo: Jared Hobbs)

### **3) What to Look For**

Great Blue Herons nest in relatively contiguous forest, fragmented forest, or solitary trees near foraging areas. The most common tree species used for breeding on the Coast are red alder, black cottonwood, bigleaf maple, lodgepole pine, Sitka spruce, and Douglas-fir. In the southeastern Interior, black cottonwood comprises just over one-half of nest trees, with coniferous species (Douglas-fir, western white pine, hybrid white spruce, ponderosa pine, western redcedar, and western hemlock) accounting for the rest.

In British Columbia, breeding colonies of 2–400 nests occur, although some pairs nest solitarily. Research suggests that colonies probably function as an assembly area for herons to find new mates and nest sites each year. Some colonies are used for many years (> 20), but most colonies, especially those of under 50 nests, are relocated more frequently. Once a colony has been abandoned for more than 1 year, recolonization occurs infrequently.

The surest way to determine which bird species is using a large stick nest is to observe an adult bird at the nest site. The breeding season (March through August) is the best opportunity to do this. If a large stick nest is found during the non-breeding season, and cannot be attributed to a particular bird species, then assess the nest characteristics to determine whether it is a Great Blue Heron nest.

Table 19 summarizes what to look for when identifying a Great Blue Heron nest. Table 20 provides information to consider when conducting primary forest activities near a nest. Consider substituting lower-impact, alternative activities in areas near a Great Blue Heron nest during the breeding season. Table 21 suggests some alternatives to avoid rendering a nest ineffective.

**Table 19. Great Blue Heron nests: what to look for.**

<b>Great Blue Heron Nest Description</b>
<ul style="list-style-type: none"> <li>• Nests are:                             <ul style="list-style-type: none"> <li>○ large, stick platforms, generally 1 m in diameter and approximately 0.5 m in depth;</li> <li>○ less robust (“flimsy”), smaller, and shallower than raptor nests; and</li> <li>○ typically made with small-diameter branches that are loosely arranged.</li> </ul> </li> <li>• Herons may nest in loose or tight colonies, building nests in several different trees that may or may not be clustered.</li> <li>• Several pairs of herons may build nests in a single tree (see Figure 17); not all of them are necessarily active during a single year.</li> <li>• Herons often regurgitate indigestible food, which is found at the base of the nest tree. Like its whitewash (feces), the regurgitated food is usually dark gray in colour with a slight sheen or greasy appearance and may smell of fish.</li> <li>• Adult birds are often seen flying to and from the nest or perched nearby.</li> <li>• Young birds are often heard begging for food from within the nest.</li> </ul>

**Table 20. Information to consider when conducting primary forest or range activities near a nest of a Great Blue Heron.**

<b>Information to Consider</b>
<ul style="list-style-type: none"> <li>• Great Blue Heron nests are protected under Section 34b of the <i>Wildlife Act</i>.</li> <li>• If you are unsure whether an unoccupied large stick nest is that of a Great Blue Heron, consult a qualified professional biologist to identify the species (see also Table 19).</li> <li>• Unless they occur in more developed locations (e.g., urban/rural interfaces), Great Blue Herons have low to moderate thresholds for new human disturbance, particularly during the breeding season. Unaccustomed levels of noise or human activity near the nest tree can cause some pairs to abandon their nest, particularly during the early part of the nesting season (i.e., before June). Therefore:                             <ul style="list-style-type: none"> <li>○ Avoid disturbance near nests and nest colonies during the breeding season (Coastal: February 15–August 31; Interior: March 15–September 31).</li> <li>○ Minimize access on existing roads and trails during the breeding season (types and levels of use should not exceed customary levels).</li> <li>○ Establish a forested buffer to provide visual screening around confirmed nest colonies. Ideally, the colony should be centred in the forested patch. If this is not practical, locate the patch so that the nest trees are connected to adjacent forested habitat.</li> <li>○ Avoid developing new roads, recreation trails, structures, or facilities within retention patches.</li> </ul> </li> <li>• Use livestock attractants and range developments to keep livestock away from nest trees and surrounding habitat.</li> </ul>

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**Table 21. Activity impacts near Great Blue Heron nests and suggested lower-impact alternatives.**

Activity	Suggested Lower-impact Alternatives
<b>High Impact</b>	
Blasting	○ Delay until after breeding season (March 1–August 31).
Road construction	○ Delay until after breeding season (March 1–August 31).
Repeated low altitude helicopter flight activity (< 300 m altitude)	○ Plan recurring flight paths to a > 300 m line-of-sight distance from known nest trees during the breeding season (March 1–August 31). ○ Fly at higher altitudes (> 300 m) near nest sites during the breeding season (March 1–August 31).
Falling and yarding (including mechanized falling)	○ Delay until after the breeding season (March 1–August 31).
<b>Medium Impact</b>	
Brushing and thinning	○ Delay until after breeding season (March 1–August 31).
<b>Low Impact</b>	
Block layout, surveys, timber cruising	○ Minimize loud voices or shouting; try to remain at least 50 m away from active nest sites. ○ Minimize time spent in the nest area during the breeding season (March 1–August 31).

**4) Regional Information – Kootenay Boundary**

In this section, we provide specific timing windows and guidance on disturbance buffers for the Kootenay Boundary Region. This information may vary from provincial guidance and may not be applicable outside of the Kootenay Boundary Region because of regional specificity.

The Great Blue Heron is a migratory species. It is most commonly found in lowlands and valley bottoms of the Kootenay Boundary Region (Figure 19, Table 22). Great Blue Heron sensitivity to disturbance varies with their existing exposure to disturbance and the level of disturbance from the proposed activity. Figure 20 provides suggested minimum buffer sizes. Table 23 supplies additional guidance on protection or alternative measures that may be needed, depending on the nature of the disturbance, existing landscape and cover, or other factors.

Great Blue Herons are most sensitive during the breeding season, which includes territory establishment and courtship stages. Each breeding season stage requires protection because this disturbance-sensitive bird could abandon a site at any time during the entire breeding period. They are most sensitive during the early stages of nest selection and nest building, pair-forming, and egg-laying. Please note that the following dates offer a general guideline of when you might expect to see breeding season activities in the Kootenay Boundary Region; actual breeding season length will depend on the year and area.

- Courtship and nest initiation: February 15–April 30
- Eggs present: April 1–June 30
- Young present: July 1–August 31

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This creates a potential *sensitive period of February 15–August 31*, which encompasses courtship (month before nesting), nesting, and fledging.<sup>1,2</sup> Based on observations of nest stage observations, the length of this sensitive period can be refined. The period of *least risk is September 15–January 15*.

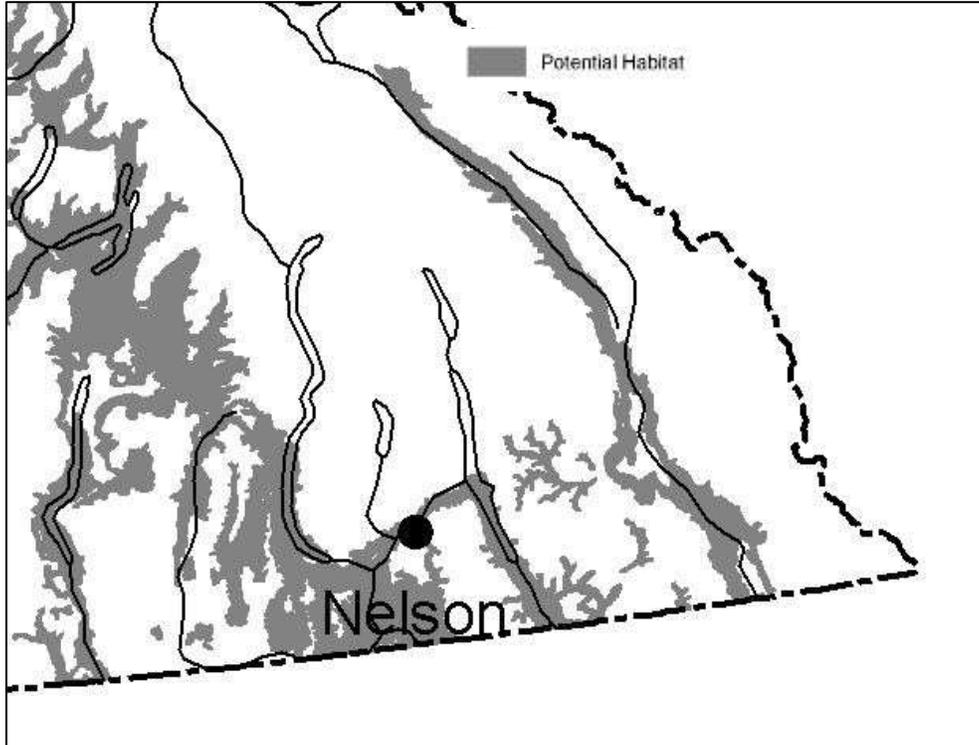


Figure 19. Distribution of Great Blue Heron habitat in the Kootenay Boundary Region.<sup>3</sup>

Table 22. Habitat and biogeoclimatic associations of Great Blue Heron in the Kootenay Boundary Region.<sup>3,4</sup>

Habitat	Biogeoclimatic Zone <sup>5</sup>	Biogeoclimatic Subzone/Variant
Interior Cedar–Hemlock	ICH	dw1, dw2, dm, mk1, mk2, mk3, mk4, mk5, mw2, mw3, mw4, mw5, xw, vk1, wk1
Interior Douglas-fir	IDF	dk3, dk5, dm1, dm2, mw1, mw2, un, xh1, xh2, xh4, xk
Montane Spruce	MS	dk1, dk2
Ponderosa Pine	PP	dh1, dh2, xh1, xh2

<sup>1</sup> Modified from Develop with Care 2014: Environmental Guidelines for Urban and Rural Land Development in British Columbia.

<sup>2</sup> Status of the Great Blue Heron in British Columbia (2001).

<sup>3</sup> Adapted from the Identified Wildlife Management Strategy – Species Accounts and Measures (2004).

<sup>4</sup> M. Machmer, Registered Professional Biologist, Pandion Ecological Research Ltd., pers. comm. (2018).

<sup>5</sup> A Field Guide for Site Identification and Interpretation for the Nelson Forest Region (1992).

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		Existing Exposure to Disturbance			
NEST SITE BUFFER		NIL Isolated site, little or no prior access	LOW Undeveloped area with occasional human use	MODERATE Near secondary logging road or minor recreation site	HIGH Near primary road, major recreation site, or human development
Disturbance Level of Proposed Activity	LOW Activities on foot. Small group, visual screening present. Livestock attractants. Examples: layout, cruising, salt licks.	200 m	60 m	60 m	60 m
	MODERATE Light mechanized activities. Larger group/duration, no visual screening. Examples: spacing, planting, fence construction.	300 m	200 m	200 m	60 m
	HIGH Mechanized activities. Examples: road construction, falling and yarding, landing sites.	300 m	300 m	300 m	200 m
	VERY HIGH Blasting, helicopter logging.	1000 m+	1000 m+	1000 m+	1000 m+

**Figure 20. Recommended disturbance buffers around a Great Blue Heron nest, depending on existing disturbance and the disturbance level of the proposed activity.<sup>6</sup>**

**Table 23. Additional guidance on disturbance buffers for a Great Blue Heron nest.<sup>6</sup>**

A Nest of a Great Blue Heron – Guidance on Buffers
<ul style="list-style-type: none"> <li>• The buffer should be measured as a line drawn around the outer perimeter of all nest trees.</li> <li>• Increase buffer or delay activities, if the nest is active and the bird constantly flushes away when using minimum buffers.</li> <li>• During breeding season, consider adding a “quiet” buffer of an extra 200 m to the no disturbance buffer in which no unusual or sudden loud activities will occur (e.g., blasting, tree felling, chain saws, trucking, etc.).</li> </ul>

<sup>6</sup> Modified from Develop with Care 2014: Environmental Guidelines for Urban and Rural Land Development in British Columbia.

**5) Additional Information**

A Field Guide for Site Identification and Interpretation for the Nelson Forest Region, Land Management Handbook No. 20:

<https://www.for.gov.bc.ca/hfd/pubs/docs/lmh/lmh20.htm>

Atlas of the Breeding Birds of British Columbia – Great Blue Heron Species Account:

<http://www.birdatlas.bc.ca/accounts/speciesaccount.jsp?sp=GBHE&lang=en>

BC Species and Ecosystems Explorer – Species Summary for Great Blue Heron, *herodias* subspecies:

<http://a100.gov.bc.ca/pub/eswp/speciesSummary.do?id=17626>

Develop with Care 2014: Environmental Guidelines for Urban and Rural Land Development in British Columbia:

<https://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/natural-resource-standards-and-guidance/best-management-practices/develop-with-care>

Great Blue Heron COSEWIC Status Report:

[http://www.registrelep-sararegistry.gc.ca/virtual\\_sara/files/cosewic/sr\\_great\\_blue\\_heron\\_0808\\_e.pdf](http://www.registrelep-sararegistry.gc.ca/virtual_sara/files/cosewic/sr_great_blue_heron_0808_e.pdf)

Identified Wildlife Management Strategy – Great Blue Heron Species Account:

[http://www.env.gov.bc.ca/wld/frpa/iwms/documents/Birds/b\\_greatbluheron.pdf](http://www.env.gov.bc.ca/wld/frpa/iwms/documents/Birds/b_greatbluheron.pdf)

Status of the Great Blue Heron in British Columbia:

<http://www.env.gov.bc.ca/wld/documents/statusrpts/wr102.pdf>

## 6. A Nest of a Lewis's Woodpecker

### 1) Definition

*A nest of a Lewis's Woodpecker (Melanerpes lewis)* means the nest and its supporting structure that either (1) is currently occupied by a Lewis's Woodpecker to hold its eggs or offspring, or (2) is habitually occupied and still capable of holding eggs or offspring of a Lewis's Woodpecker. Figure 21 shows typical ponderosa pine nest trees.



**Figure 21. Lewis's Woodpecker nest trees.** (Photos: John Cooper)

### 2) Species Description

The Lewis's Woodpecker is a medium-sized woodpecker. Adults are mostly greenish-black on the head and back with a red face patch, pinkish belly, and gray collar and breast (Figure 22). Both male and female are similar in appearance; juveniles resemble adults but are duller in colour.

In British Columbia, Lewis's Woodpeckers breed locally at lower elevations throughout the southern Interior, from Williams Lake in the north, east to Invermere, west to Lillooet and Lytton, and south to the United States border. Before the 1960s, Lewis's Woodpeckers bred on southern Vancouver Island and the lower Fraser River valley; this Georgia Depression population has since been extirpated. Across their range in British Columbia, Lewis's Woodpecker populations are in decline.

Clearing of mature ponderosa pine forests, urbanization, and agricultural development of lower valley slopes are the primary threats for Lewis's Woodpecker. In addition, wildfire suppression has led to the development of dense forest stands and an associated reduction of fire-maintained, open-canopy ecosystems; livestock grazing in valley-bottom habitats has reduced deciduous shrub cover. Both of these conditions represent poor habitat characteristics for Lewis's Woodpecker. Another threat is the expansion in range of invasive species, such as European Starling, which compete with Lewis's Woodpeckers for nest cavities.

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Lewis's Woodpecker is a *Species at Risk* under the *Forest and Range Practices Act* and is Blue-listed in British Columbia. It is designated as *Threatened* by COSEWIC.



**Figure 22. Lewis's Woodpecker at nest cavity.** (Photo: Jared Hobbs)

### **3) What to Look For**

Lewis's Woodpeckers typically nest in open, mature ponderosa pine forests; riparian black cottonwood stands; recent burns; agricultural areas; open grasslands with sporadic mature trees; and urban environments. Breeding habitat is characterized by an open canopy (i.e., < 25% crown closure), the availability of a suitable dead or dying tree (> 30 cm dbh) for a nesting site, and understorey vegetation that provides an abundant supply of insects. Where closed-canopy riparian stands are frequented, trees at the edge of the stand are usually used for nesting.

Unusual among woodpeckers, Lewis's Woodpeckers "flycatch" for insects by perching on open branches, and then flying out and catching winged insects in mid-air. As a result, large perch trees and snags are an important habitat element for this species.

Lewis's Woodpeckers tend to form long-term pair bonds and typically return to the same nesting sites annually. They tend to breed as solitary pairs but may nest in loose colonies. Table 24 summarizes what to look for when identifying a Lewis's Woodpecker nest. Table 25 provides information to consider when conducting primary forest or range activities adjacent to a nest.

**Table 24. Lewis’s Woodpecker nest description: what to look for.**

<b>Lewis’s Woodpecker Nest Description</b>
<ul style="list-style-type: none"> <li>• Nest trees are found in low-elevation, open-growing ponderosa pine and (or) Douglas-fir forests; grasslands with scattered, large decayed trees; and treed riparian habitat adjacent to open forests and grasslands.</li> <li>• Nest cavities are found in:               <ul style="list-style-type: none"> <li>○ living and dead deciduous and coniferous trees;</li> <li>○ ponderosa pine, black cottonwood, and Douglas-fir; and</li> <li>○ snags with heart rot decay (often tree decay classes 6–8) as this bird is a weak excavator.</li> </ul> </li> <li>• Nests occur in natural or excavated tree cavities.</li> <li>• Cavity entrance diameter can range from 5 to 7.5 cm.</li> <li>• Lewis’s Woodpecker can excavate its own cavity but will also reuse old Northern Flicker or Hairy Woodpecker nest holes.</li> <li>• Nests can occur from 3.5 to 9.0 m above the ground.</li> </ul>

**Table 25. Information to consider when conducting primary forest and range activities near Lewis’s Woodpecker nests.**

<b>Information to Consider</b>
<ul style="list-style-type: none"> <li>• If you are unsure whether a Lewis’s Woodpecker is using a tree for nesting, consult a qualified professional biologist to identify the species (see also Table 24).</li> <li>• Establish a windfirm, forested retention area centred around the nest tree. If this is not practical, maintain forest connectivity (where possible) between the retention patch and adjacent forested habitat. Ensure this corridor is as wide as possible to minimize edge effects (e.g., predation, windthrow risk, etc.), and to provide additional security cover, perching, and hunting opportunities.</li> <li>• Retain large-diameter, decayed ponderosa pine and black cottonwood, which are especially important for this species (see Table 24); a single nest tree may be reused over many years.</li> <li>• Maintain some vegetation (where available) around the nest for additional security cover, and perching and roosting sites, if the nest tree is a single tree within an existing opening (i.e., meadow, clearing, or cutblock). This vegetation may include:               <ul style="list-style-type: none"> <li>○ advance regeneration,</li> <li>○ shrubs,</li> <li>○ deciduous trees,</li> <li>○ and non-merchantable trees (e.g., standing dead trees or trees with existing cavities and [or] evidence of internal decay).</li> </ul> </li> <li>• Avoid constructing roads, trails, or other structures within the retention patch.</li> <li>• Protect nesting and foraging habitat when burning grasslands for forest ingrowth or encroachment purposes.</li> <li>• Place livestock attractants to keep livestock away from nest and foraging habitat.</li> <li>• Dead or decayed trees are often targeted by firewood cutters. Place a “Wildlife Tree Sign” on nest trees to educate the public and others about their high ecological value.</li> <li>• Use fungal inoculation techniques to create wildlife trees and suitable nesting substrate for Lewis’s Woodpecker (see Section 5).</li> <li>• <b>Note:</b> Because of potential worker safety concerns, dead and defective trees that are considered for retention must either be located within a suitable-sized retention patch or have a danger tree assessment conducted by a certified wildlife/danger tree assessor. Consult the Wildlife Tree Committee of British Columbia website for information and links relevant to dangerous tree assessment (see Section 5).</li> </ul>

**4) Regional Information – Kootenay Boundary**

In this section, we provide specific timing windows and guidance on disturbance buffers for the Kootenay Boundary Region. This information may vary from provincial guidance and may not be applicable outside of the Kootenay Boundary Region because of regional specificity.

Lewis’s Woodpecker is a migratory species. It arrives in British Columbia in May and departs in October. This species typically nests at elevations of 250–1200 m, with higher-elevation nests associated with burned sites (Table 26). Lewis’s Woodpecker is known to rapidly colonize new burn sites within suitable biogeoclimatic zones. Within the Kootenay Boundary Region, Lewis’s Woodpeckers nest in the Boundary (Figure 23), Pend D’Oreille (Figure 24), and East Kootenay (Figure 25) areas. Lewis’s Woodpeckers are sensitive to disturbance. Table 27 provides suggested minimum buffer sizes. Additional protection or alternative measures may be needed, depending on the nature of the disturbance, existing landscape and cover, or other factors.

Lewis’s Woodpeckers are most sensitive during the breeding season, which includes territory establishment and courtship stages. Each breeding season stage requires protection because this disturbance-sensitive bird could abandon a site at any time during the entire breeding period. Please note that the following dates offer a general guide of when you might expect to see breeding season activities in the Kootenay Boundary Region; actual breeding season length will depend on the year and area.

- Courtship and nest initiation: May 1–May 31
- Eggs present: June 1–June 30
- Young present: July 1–August 31

This creates a potential *sensitive period of May 1–August 31*, which encompasses courtship (month before nesting), nesting, and fledging.<sup>1</sup> Based on observations of nest stage, the length of this sensitive period can be refined. The period of *least risk is September 1–April 30*.<sup>2</sup>

**Table 26. Habitat and biogeoclimatic associations of Lewis’s Woodpecker in the Kootenay Boundary Region.**<sup>3,4</sup>

Habitat	Biogeoclimatic Zone <sup>5</sup>	Biogeoclimatic Subzone/Variant
Interior Cedar–Hemlock	ICH	dw, dm, dw1, dw2, mk1, mk5, mw2, mw3, mw4, mw5, xw, wk1
Interior Douglas-fir	IDF	dk1, dk2, dk3, dk4, dk5, dm, dm1, dm2, dw, mw1, mw2, un, xh1a, xh2a, xm, xw, xw2, xh4, xk
Ponderosa Pine	PP	dh1, dh2, xh1, xh2
Montane Spruce	MS	un, dk1

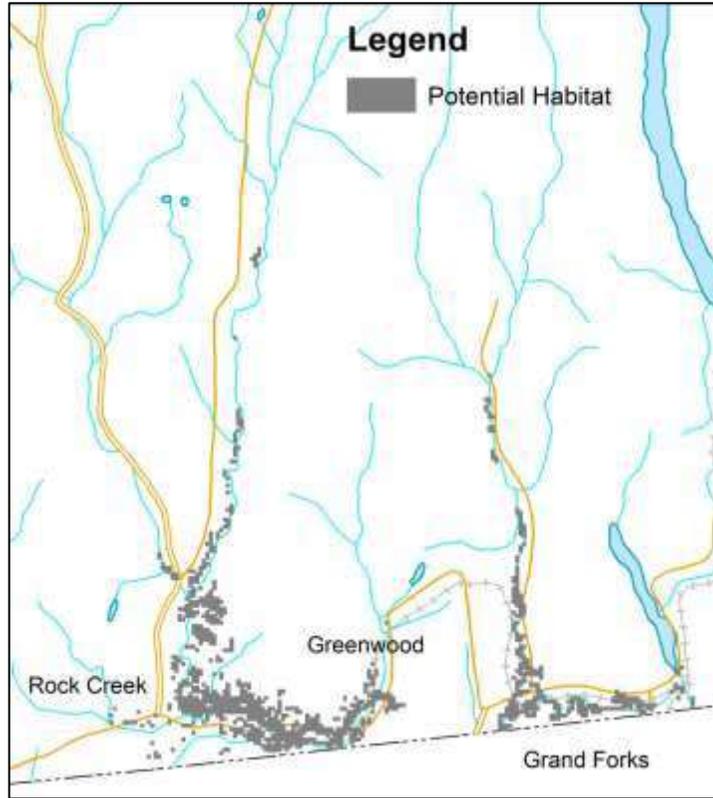
<sup>1</sup> Adapted from the BC Species and Ecosystems Explorer – Species Summary.

<sup>2</sup> Recovery Strategy for the Lewis’s Woodpecker (2017).

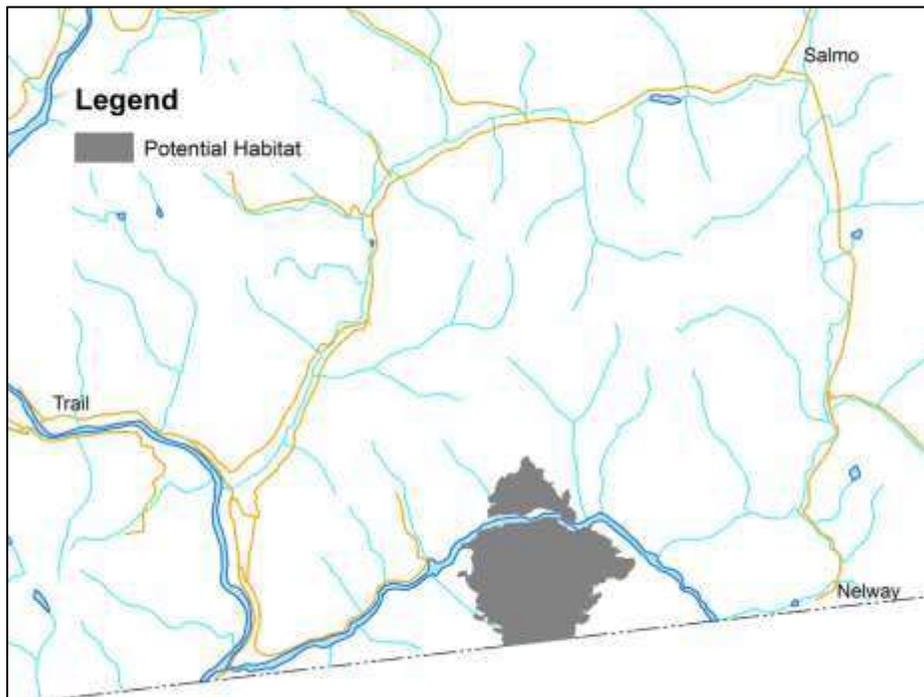
<sup>3</sup> Identified Wildlife Management Strategy – Species Accounts and Measures (2004).

<sup>4</sup> M. Machmer, Registered Professional Biologist, Pandion Ecological Research Ltd., pers. comm. (2018).

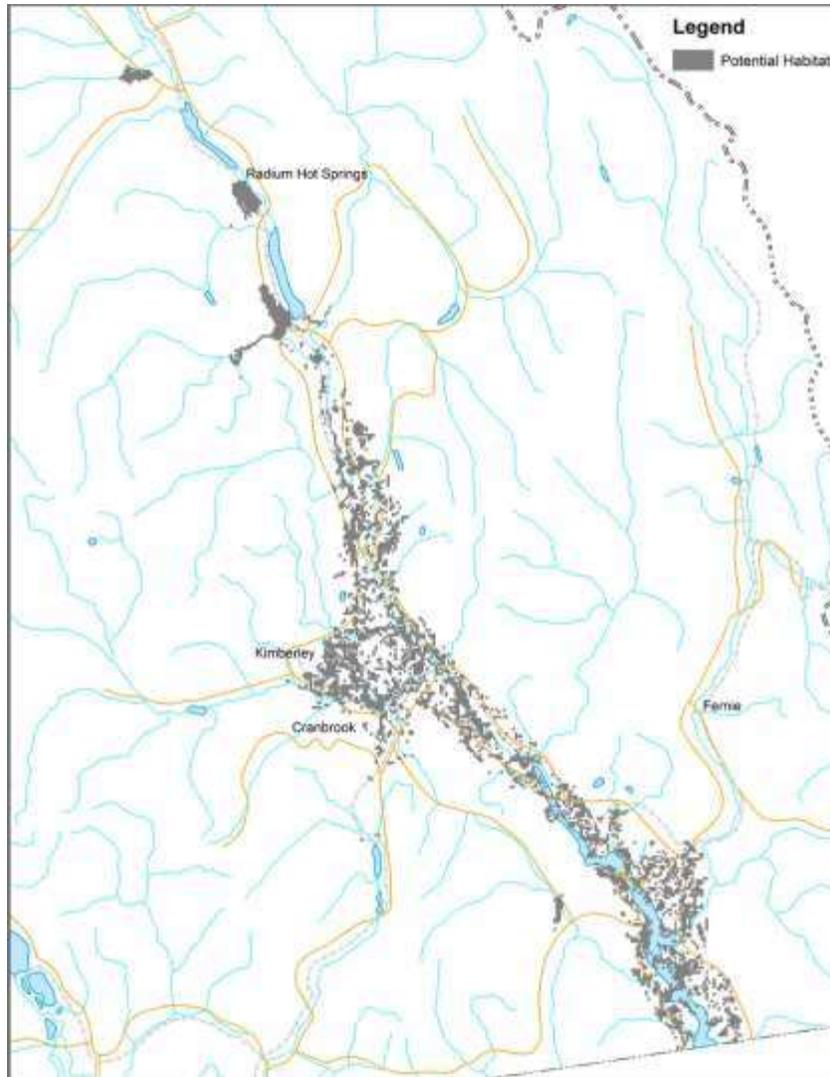
<sup>5</sup> A Field Guide for Site Identification and Interpretation for the Nelson Forest Region (1992).



**Figure 23. Distribution of Lewis's Woodpecker in the Boundary area based on habitat suitability mapping.**



**Figure 24. Distribution of Lewis's Woodpecker in the Pend D'Oreille area based on habitat suitability mapping.**



**Figure 25. Distribution of Lewis's Woodpecker in the East Kootenay area based on habitat suitability mapping.**

**Table 27. Guidance on disturbance buffers for a Lewis's Woodpecker nest.** <sup>6</sup>

<b>A Nest of a Lewis's Woodpecker – Guidance on Buffers</b>
<ul style="list-style-type: none"> <li>• Avoid high-disturbance forestry activities with potential for prolonged disturbance (i.e., more than a few hours) within 100 m of a confirmed or probable nest from May 1–August 31.</li> <li>• Within 400 m of a flagged known/potential nest tree:                         <ul style="list-style-type: none"> <li>○ prioritize removal of smaller (&lt; 20 cm dbh) trees and non-preferred species (i.e., not ponderosa pine or black cottonwood) when removal of mature trees is necessary; and</li> <li>○ use mechanical removal, rather than herbicides, and prioritize non-fruit-bearing species for removal, when understorey vegetation brushing/clearing is necessary.</li> </ul> </li> </ul>

<sup>6</sup> Management Plan for the Lewis's Woodpecker (*Melanerpes lewis*) in Canada (2014).

**5) Additional Information**

A Field Guide for Site Identification and Interpretation for the Nelson Forest Region, Land Management Handbook No. 20:

<https://www.for.gov.bc.ca/hfd/pubs/docs/lmh/lmh20.htm>

Atlas of the Breeding Birds of British Columbia – Lewis’s Woodpecker Species Account:

<http://www.birdatlas.bc.ca/accounts/speciesaccount.jsp?sp=LEWO&lang=en>

BC Species and Ecosystems Explorer – Species Summary for Lewis’s Woodpecker:

<http://a100.gov.bc.ca/pub/eswp/speciesSummary.do?id=20006>

Develop with Care 2014: Environmental Guidelines for Urban and Rural Land Development in British Columbia:

<https://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/natural-resource-standards-and-guidance/best-management-practices/develop-with-care>

Identified Wildlife Management Strategy – Lewis’s Woodpecker Species Account:

[http://www.env.gov.bc.ca/wld/frpa/iwms/documents/Birds/b\\_lewisswoodpecker.pdf](http://www.env.gov.bc.ca/wld/frpa/iwms/documents/Birds/b_lewisswoodpecker.pdf)

Lewis’s Woodpecker COSEWIC Status Report:

[http://www.sararegistry.gc.ca/virtual\\_sara/files/cosewic/sr\\_Lewis%27s%20Woodpecker\\_0810\\_e.pdf](http://www.sararegistry.gc.ca/virtual_sara/files/cosewic/sr_Lewis%27s%20Woodpecker_0810_e.pdf)

Management Plan for the Lewis’s Woodpecker (*Melanerpes lewis*) in Canada:

[https://www.registrelep-sararegistry.gc.ca/virtual\\_sara/files/plans/mp\\_lewis%27s\\_woodpecker\\_e\\_final.pdf](https://www.registrelep-sararegistry.gc.ca/virtual_sara/files/plans/mp_lewis%27s_woodpecker_e_final.pdf)

Recovery Strategy for the Lewis’s Woodpecker (*Melanerpes lewis*) in Canada:

[http://www.registrelep-sararegistry.gc.ca/virtual\\_sara/files/plans/rs%5Flewiss%5Fwoodpecker%5Fe%5Ffinal%2Epdf](http://www.registrelep-sararegistry.gc.ca/virtual_sara/files/plans/rs%5Flewiss%5Fwoodpecker%5Fe%5Ffinal%2Epdf)

Results of Fungal Inoculation Treatments as a Habitat Enhancement Tool in the East Kootenay Region of British Columbia: 2007–2014:

<https://www.for.gov.bc.ca/hfd/pubs/docs/en/EN112.pdf>

Wildlife Tree Committee of British Columbia website:

<https://www2.gov.bc.ca/gov/content?id=D81A1EAB5A7F45688B4CBC746DB9DD05>

## 7. A Nest of a Williamson's Sapsucker

### 1) Definition

*A nest of a Williamson's Sapsucker (Sphyrapicus thyroideus)* means the nest and its supporting structure that either (1) is currently occupied by a William's Sapsucker to hold its eggs or offspring, or (2) is habitually occupied and still capable of holding eggs or offspring of a William's Sapsucker. Figure 26 shows typical nest trees.



**Figure 26. Williamson's Sapsucker nest trees: (left) western larch, and (right) trembling aspen. (Photos: Les Gyug)**

### 2) Species Description

The Williamson's Sapsucker is a medium-sized woodpecker. The male is predominantly black with a yellow belly and red throat. It has a white rump, wing patch, and stripes on the head (Figure 27). Unique among woodpeckers, the female is different in appearance than the male with a dark brown and white barred body, brownish head, yellow belly, and white rump (Figure 27). Juveniles resemble adults of their sex but are duller in colour.

Two subspecies (*nataliae* and *thyroideus*) of Williamson's Sapsucker are recognized in British Columbia; however, the subspecies do not overlap in range and are indistinguishable in the field. The species breeds in three distinct geographic regions: (1) Western (Merritt and Princeton area), (2) Okanagan-Boundary, and (3) East Kootenay. Using the best available inventory data, the

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likely number of breeding adults within these three areas is estimated at 837 individuals—424 in the Okanagan-Boundary, 374 in the Western, and 39 in the East Kootenay.<sup>1</sup>

Both subspecies of Williamson’s Sapsucker are *Species at Risk* under the *Forest and Range Practices Act* and Blue-listed in British Columbia. Both are designated *Endangered* by COSEWIC. Both subspecies are in decline.



**Figure 27. Williamson’s Sapsucker: (left) male, and (right) female.** (Photos: Les Gyug)

**3) What to Look For**

Williamson’s Sapsuckers nest in, or adjacent to, mature and old coniferous stands containing large, veteran western larch with heart rot, a disease which better enables the excavation of nest cavities. Other important habitat features are live, medium-sized western larch and Douglas-fir, which are used to create sap wells, and older trees, which support carpenter ants, a main food source.

Nest trees are typically western larch, although trembling aspen are also used. Nest trees can be isolated leave trees in a clearcut or trees within a closed-canopied forest. Nests are typically located within 400 m of suitable foraging habitat. In British Columbia, most nests are usually found at 700–1520 m elevations.

Male and female birds often re-pair between years and may reuse the same nest tree, although new cavities are usually excavated each year. In one 5-year study in British Columbia, only 3 of 18 original nest trees were still used at the end of 5 years; pairs often moved to alternative nest

<sup>1</sup> Amended Recovery Strategy for the Williamson’s Sapsucker (*Sphyrapicus thyroideus*) in Canada (2016).

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trees in their areas. The minimum territory size estimate is 16 ha, based on nearest neighbour nest distances in high-quality habitat but are likely greater than 20 ha. One Williamson’s Sapsucker home range, determined by radio-telemetry data, was at least 54.2 ha.

The main threat to Williamson’s Sapsucker breeding habitat is the harvesting or clearing of mature and old-growth western larch stands. The amount, type, and spatial configuration of retention areas within a cutblock will influence the degree of impact from forest harvesting on Williamson’s Sapsucker habitat. Felling of standing dead trees for firewood, urbanization, and agriculture also contribute to habitat loss for this species. Table 28 summarizes what to look for when identifying a Williamson’s Sapsucker nest. Table 29 provides information to consider when conducting primary forest and range activities adjacent to a nest tree.

**Table 28. Williamson’s Sapsucker nest description: what to look for.**

<b>Williamson’s Sapsucker Nest Description</b>
<ul style="list-style-type: none"><li>• Nest tree species include western larch, ponderosa pine, trembling aspen, Douglas-fir, water birch, black cottonwood, and spruce:<ul style="list-style-type: none"><li>○ Okanagan–Boundary: western larch is the preferred nest tree.</li><li>○ Western area: western larch is largely absent; the majority of nests are in trembling aspen followed by ponderosa pine.</li><li>○ East Kootenay: preferred nest trees are western larch, ponderosa pine, Douglas-fir, and trembling aspen.</li></ul></li><li>• Nest trees include:<ul style="list-style-type: none"><li>○ live western larch (tree class 2), usually with evidence of decay and stem damage (e.g., dead top, broken top, stem scars, visible fungal conks);</li><li>○ live trembling aspen with heart rot decay (caused by <i>Phellinus tremulae</i>), preferably &gt; 40 cm dbh and in clumps;</li><li>○ larger-diameter conifers (&gt; 70 cm dbh) that are older than other trees in the stand; or</li><li>○ dead trees of other tree species listed above.</li></ul></li><li>• Nest cavities are typically excavated in trees with outward signs of decay (i.e., broken tops, large stem scars, nest holes, and fungal conks); this species is a relatively weak excavator and cannot excavate cavities in completely sound wood.</li><li>• Nest trees range in height from 49 m (standing live trees) to short, 5 m broken-trunk, dead trees.</li><li>• Nests can occur at any height, even as low as 1 m above the ground.</li><li>• Nest cavity entrance diameters are small, approximately 3–4 cm (about the size of a golf ball).</li></ul>

**Table 29. Information to consider when conducting primary forest and range activities near Williamson’s Sapsucker nests.**

<b>Information to Consider</b>
<ul style="list-style-type: none"><li>• Establish a windfirm, forested retention area centred around the nest tree. If this is not practical, maintain forest connectivity (where possible) between a retention patch and adjacent forested habitat. Ensure this corridor is as wide as possible to minimize edge effects (e.g., predation, windthrow risk, etc.), and to provide additional security cover, perching, and hunting opportunities.</li><li>• Retain large-diameter western larch (often live with stem damage and internal decay), which are especially important for this species (see Table 28); where larch is absent, retain larger-diameter (i.e., the largest available on site, at least &gt; 30 cm dbh) ponderosa pine, Douglas-fir, and trembling aspen.</li><li>• Maintain some vegetation (where available) around the nest for additional security cover, and perching and roosting sites, if the nest tree is a single tree within an existing opening (i.e., meadow, clearing, or cutblock). This vegetation may include:<ul style="list-style-type: none"><li>○ advance regeneration,</li><li>○ shrubs,</li><li>○ deciduous trees, and</li><li>○ non-merchantable trees (e.g., standing dead trees or trees with existing cavities and/or evidence of internal decay).</li></ul></li><li>• Avoid constructing roads, trails, or other structures within the retention patch.</li><li>• Avoid forestry activities (if possible), such as active falling and yarding, road construction, and mechanized silviculture treatments (e.g., chainsaws, excavators), within 100 m of confirmed or probable nest from March 15 to July 15.</li><li>• Replant with western larch, Douglas-fir, and ponderosa pine in areas with high value (suitability) Williamson’s Sapsucker habitat.</li><li>• Conduct vegetation management (where possible) to recruit some large-diameter trembling aspen; retain “pockets” of aspen and birch that will develop into mature trees suitable for nesting.</li><li>• Ants are an extremely important food source for Williamson’s Sapsucker nestlings. Retain large (&gt; 30 cm dbh) coniferous coarse woody debris as substrate for ant populations; western larch and ponderosa pine coarse woody debris is most valuable.</li><li>• Provide large-diameter (&gt; 40 cm) stumps of variable heights as habitat substrate for ants.</li><li>• Protect nesting and foraging habitat when burning for forest ingrowth or encroachment purposes.</li><li>• Dead or decayed trees are often targeted by firewood cutters. Place a “Wildlife Tree Sign” on nest trees to educate the public and others about their high ecological value.</li><li>• Use fungal inoculation techniques to create wildlife trees and suitable nesting substrate for Williamson’s Sapsucker (see Section 5).</li></ul> <p><b>Note:</b> Because of potential worker safety concerns, dead and defective trees that are considered for retention must either be located within a suitable-sized retention patch or have a danger tree assessment conducted by a certified wildlife/danger tree assessor. Consult the Wildlife Tree Committee of British Columbia website for information and links relevant to dangerous tree assessment (see Section 5).</p>

#### 4) Regional Information – Kootenay Boundary

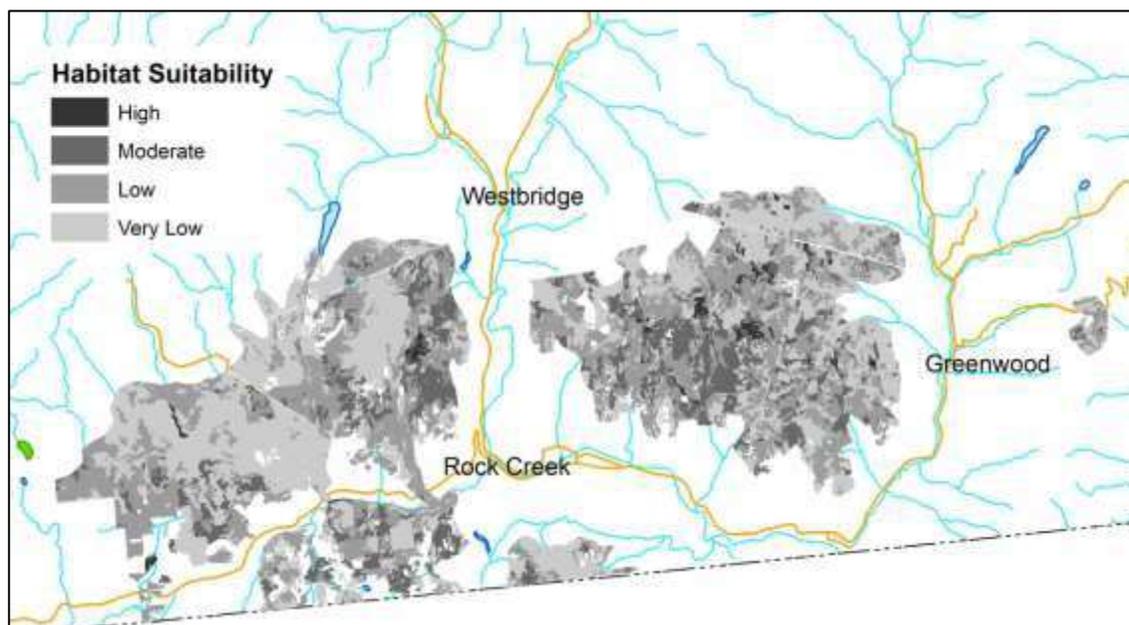
In this section, we provide specific timing windows and guidance on disturbance buffers for the Kootenay Boundary Region. This information may vary from provincial guidance and may not be applicable outside of the Kootenay Boundary Region because of regional specificity.

Williamson's Sapsucker is a migratory species. It arrives in British Columbia in late March and departs in September. In the Okanagan-Boundary and East Kootenay areas, these birds most often use veteran western larch and trembling aspen as nest trees at elevations of 610–1580 m (Figures 28–29; Table 30). Williamson's Sapsuckers are sensitive to disturbance. Table 31 provides suggested minimum buffer sizes. Additional protection or alternative measures may be needed, depending on the nature of the disturbance, existing landscape and cover, or other factors.

Williamson's Sapsuckers are most sensitive during the breeding season, which includes territory establishment and courtship stages. Each breeding season stage requires protection because this disturbance-sensitive bird could abandon a site at any time during the entire breeding period. Please note that the following dates offer a general guide of when you might expect to see breeding season activities in the Kootenay Boundary Region; actual breeding season length will depend on the year and area.

- Courtship and nest initiation: March 15–April 31
- Eggs present: May 1–June 1
- Young present: June 1–July 15

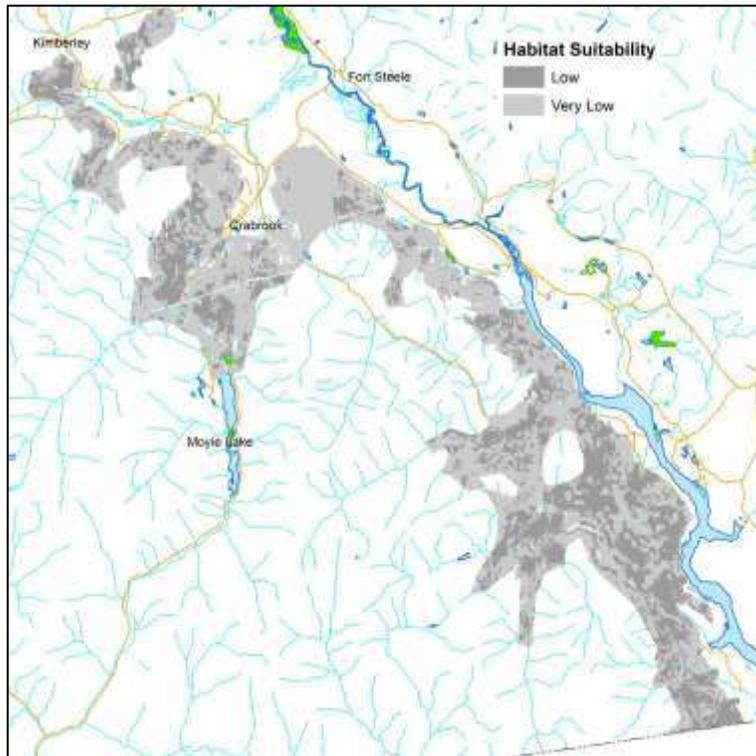
This creates a potential *sensitive period of March 15–July 15*, which encompasses courtship (month before nesting), nesting, and fledging.<sup>2</sup> Based on observations of nest stage, the length of this sensitive period can be refined. The period of *least risk is September 15–March 15*.



**Figure 28. Suitable habitat for Williamson's Sapsucker within the Boundary portion of the Okanagan-Boundary area of occupancy.**

<sup>2</sup> Amended Recovery Strategy for the Williamson's Sapsucker (*Sphyrapicus thyroideus*) in Canada (2016)

*Wildlife Habitat Features Field Guide (Kootenay Boundary Region)*



**Figure 29. Suitable habitat for Williamson's Sapsucker within the East Kootenay area of occupancy.**

**Table 30. Habitat and biogeoclimatic associations of Williamson's Sapsuckers in the Kootenay Boundary Region.<sup>3</sup>**

Habitat	Biogeoclimatic Zone <sup>4</sup>	Biogeoclimatic Subzone/Variant
Engelmann Spruce–Subalpine Fir	ESSF	mw (very rare)
Interior Cedar–Hemlock	ICH	dw, mk1, mk2, mw2, xw
Interior Douglas-fir	IDF	dk1, dk1a, dk2, dm, dm1, dm2, mw1, mw2, un, xh1, xh1a, xh2, xh2a, xh4, xw
Montane Spruce	MS	dk, dm1, dm2, xk
Ponderosa Pine	PP	dh1, dh2, xh1, xh1a, xh2, xh2a

<sup>3</sup> Identified Wildlife Management Strategy – Species Accounts and Measures (2004).

<sup>4</sup> A Field Guide for Site Identification and Interpretation for the Nelson Forest Region (1992).

**Table 31. Guidance on disturbance buffers for a Williamson’s Sapsucker nest.**

<b>A Nest of a Williamson’s Sapsucker – Guidance on Buffers</b>
<ul style="list-style-type: none"><li>• Retain important habitat attributes within 200-500 m of a known nest where Williamson’s sapsuckers will forage.</li><li>• Wildlife tree patches should be a minimum of 0.25 ha.</li><li>• If a confirmed or probable nest tree is a single, isolated tree within an existing open area, maintain all existing trees as well as woody debris in a 0.5 ha area.</li><li>• Locate road and landing construction at a sufficient distance from confirmed and probable nest trees to ensure the tree does not need to be removed as a danger tree.</li><li>• Avoid high-disturbance forestry activities with potential for prolonged disturbance (i.e. more than a few hours) within 100 m of a confirmed or probable nest during the breeding season (March 15 – July 15).</li><li>• Where blasting is required for road construction, establish a buffer of 1000 m around any confirmed or probable nest sites during the breeding season (March 15 – July 15).</li><li>• Establish wildlife tree patches of a sufficient size to safely buffer an existing nest tree, suitable nest trees, snags, or other trees containing nest cavities from the adjacent work area and to maximize wind firmness.</li><li>• Refer to <a href="#"><i>Best Management Practices for Timber Harvesting, Roads, and Silviculture for Williamson’s Sapsucker in British Columbia</i></a> for your area (East Kootenay area of occupancy, Okanagan-Boundary area of occupancy) for detailed information on managing Williamson’s sapsucker habitat.</li></ul>

**5) Additional Information**

A Field Guide for Site Identification and Interpretation for the Nelson Forest Region, Land Management Handbook No. 20:

<https://www.for.gov.bc.ca/hfd/pubs/docs/lmh/lmh20.htm>

Amended Recovery Strategy for the Williamson's Sapsucker (*Sphyrapicus thyroideus*) in Canada:

<http://registrelep->

[sararegistry.gc.ca/virtual\\_sara/files/plans/amended%5Frs%5Fwilliamson%27s%5Fsapsucker%5Fe%2Epdf](http://registrelep-sararegistry.gc.ca/virtual_sara/files/plans/amended%5Frs%5Fwilliamson%27s%5Fsapsucker%5Fe%2Epdf)

Atlas of the Breeding Birds of British Columbia – Williamson's Sapsucker Species Account:

<http://www.birdatlas.bc.ca/accounts/speciesaccount.jsp?sp=WISA&lang=en>

BC Species and Ecosystems Explorer – Species Summary for Williamson's Sapsucker:

<http://a100.gov.bc.ca/pub/eswp/speciesSummary.do?id=15025>

Best Management Practices for Timber Harvesting, Roads, and Silviculture for Williamson's Sapsucker in British Columbia:

*East Kootenay Area of Occupancy:*

<http://a100.gov.bc.ca/pub/eirs/finishDownloadDocument.do?subdocumentId=9691>

*Okanagan-Boundary Area of Occupancy:*

<http://a100.gov.bc.ca/pub/eirs/finishDownloadDocument.do?subdocumentId=9692>

Identified Wildlife Management Strategy – Williamson's Sapsucker Species Account:

[http://www.env.gov.bc.ca/wld/frpa/iwms/documents/Birds/b\\_williamsonssapsucker.pdf](http://www.env.gov.bc.ca/wld/frpa/iwms/documents/Birds/b_williamsonssapsucker.pdf)

Results of Fungal Inoculation Treatments as a Habitat Enhancement Tool in the East Kootenay Region of British Columbia: 2007–2014:

<https://www.for.gov.bc.ca/hfd/pubs/docs/en/EN112.pdf>

Wildlife Tree Committee of British Columbia website:

<https://www2.gov.bc.ca/gov/content?id=D81A1EAB5A7F45688B4CBC746DB9DD05>

Williamson's Sapsucker COSEWIC Status Report:

[http://www.sararegistry.gc.ca/virtual\\_sara/files/cosewic/sr\\_williamsons\\_sapsucker\\_e.pdf](http://www.sararegistry.gc.ca/virtual_sara/files/cosewic/sr_williamsons_sapsucker_e.pdf)

## 8. An American Badger Burrow

### 1) Definition

*An American Badger (Taxidea taxus) burrow* means an excavated hole that descends below ground that either (1) is currently occupied for denning, shelter, or foraging; or (2) is habitually occupied and still capable of providing for denning, shelter, or foraging (Figure 30).



**Figure 30. American Badger at its burrow.** (Photo: Rich Weir)

### 2) Species Description

The American Badger is a powerful carnivore, about the size of a raccoon (Figure 30). It is squat and muscular with mottled, reddish-brown colouration. Its shaggy hair is short on the back and belly, longer on the sides and gives the body a flattened, short-legged appearance. The wedge-shaped head has distinctive alternating black and white bands; a central white stripe runs from the nose to the back of the neck. Badgers have a short bottlebrush tail and long claws for digging. Badgers run with a characteristic trotting gait. They are most active at night; consequently, badgers are rarely seen during the day.

The American Badger is a *Species at Risk* under the *Forest and Range Practices Act* and is Red-listed in British Columbia. It is designated as *Endangered* by COSEWIC.

### 3) What to Look For

Optimum badger habitats are grasslands and open ponderosa pine and Douglas-fir forests along the major valleys of the southern Interior of British Columbia. Sites with fine, sandy loam soils with few large rocks that are suitable for digging are particularly important for badgers (e.g., loose soils originating from glaciofluvial and glaciolacustrine parent materials). Burrows are typically round or oval in shape and have a mound of loose, freshly dug soil mounded at their entrances that may have track marks (Figure 31).



**Figure 31. A freshly dug badger burrow.** (Photo: Luke Robertson)

Burrows are used by badgers for birthing sites, safe resting areas, food storage, and protection from the elements, particularly during winter when they may enter a state of torpor. Burrows may persist for up to a decade, depending on soil conditions, and are re-dug and re-used several times. Natal dens are burrows used for rearing young (kits). Females may move litters to new burrows throughout the rearing season (April–August). Table 32 summarizes what to look for when identifying an American Badger burrow.

The main threats to American Badger populations are mortality from vehicle collisions and habitat loss related to forest encroachment, intensive agriculture, rural development, and urban sprawl, as well as rodent (prey species) control programs. Table 33 provides information to consider when conducting primary forest and range activities adjacent to a burrow.

***Note: American Badger burrows that are excavated into a constructed road (i.e., within the road prism or grade slope) are not considered a wildlife habitat feature.***

**Table 32. American Badger burrows: what to look for.**

<b>American Badger Burrow Description</b>
<ul style="list-style-type: none"> <li>• Burrows are usually found in grassland and sparsely treed habitats.</li> <li>• Burrows generally extend several metres underground.</li> <li>• Identifying features include:               <ul style="list-style-type: none"> <li>○ large oval or elliptical-shaped entrance (20–30 cm wide and 15–25 cm high (about the size of a volleyball));</li> <li>○ often a large mound of loose dirt at the front of the entrance;</li> <li>○ horizontal claw marks (approximately 1.5 cm between claw marks) on the sides of recent burrows;</li> <li>○ sweeping marks along the main route into the burrow created by underbelly hair from moving badgers; and</li> <li>○ badger hair at the entrance.</li> </ul> </li> <li>• Coyote or fox may defecate at the entrances of badger burrows, making burrow identification challenging.</li> <li>• The presence or evidence of young (kits) is the only reliable way of differentiating a natal (maternal) den from a burrow used for foraging or shelter.</li> </ul> <p><i>Note:</i> Coyote and red fox burrows are often triangular in shape, with claw marks that run vertically downward along the sides from the peak of the entrance. Additionally, coyote and fox dens may have more feces and prey remains at their entrances than badger dens.</p>

**Table 33. Information to consider when conducting primary forest or range activities near badger burrows.**

<b>Information to Consider</b>
<ul style="list-style-type: none"> <li><input type="checkbox"/> If you are unsure whether an American Badger is using a burrow, or whether use is recent, consult a qualified professional biologist to identify the species.</li> <li><input type="checkbox"/> Activities conducted near a burrow that result in soil disturbance or compaction may damage the burrow (e.g., road or skid trail construction, felling/yarding, ground skidding, mechanical site preparation [mounding/trenching], and broadcast burning). To avoid damage to badger burrows:               <ul style="list-style-type: none"> <li>○ Maintain herbaceous and shrub ground cover around burrows.</li> <li>○ Avoid developing any new road access near clusters of known active burrows.</li> <li>○ Establish a no machine zone around burrows to protect them from collapse under heavy harvesting equipment (Figure 32).                   <ul style="list-style-type: none"> <li>▪ Zone size of 5–7 m around single burrows.</li> <li>▪ Establish a larger zone of at least 20 m around clusters of burrows or single natal den.</li> <li>▪ For natal dens, avoid disturbance during the breeding season (April 15–August 15).</li> <li>▪ Flag zones with brightly coloured tape to alert equipment operators.</li> <li>▪ Do not harvest trees within a zone unless a mechanical harvester can reach in to extract them.</li> <li>▪ Do not harvest trees that provide stability to a burrow or are located within 1 m of a burrow entrance.</li> <li>▪ Retain trees harvested along the periphery of a zone as “high stubs” to prevent log-skidding through the zone and also to provide some residual stand structure for other species.</li> </ul> </li> </ul> </li> <li><input type="checkbox"/> Erect exclosure fencing if damage from livestock is degrading the vegetative structure or threatening the collapse of burrows.               <ul style="list-style-type: none"> <li>○ Avoid placing livestock attractants (e.g., salt licks, water troughs, feeding sites) within 250 m of the burrow.</li> </ul> </li> <li><input type="checkbox"/> During the maternal period (April 15–August 15), do not construct range developments within 250 m of active burrows.</li> </ul>



**Figure 32. A no machine zone (green treed area in centre) established around an American Badger burrow (tan-coloured mound at red arrow). Note stub trees left around the perimeter of the zone. (Photo: Melissa Hogg)**

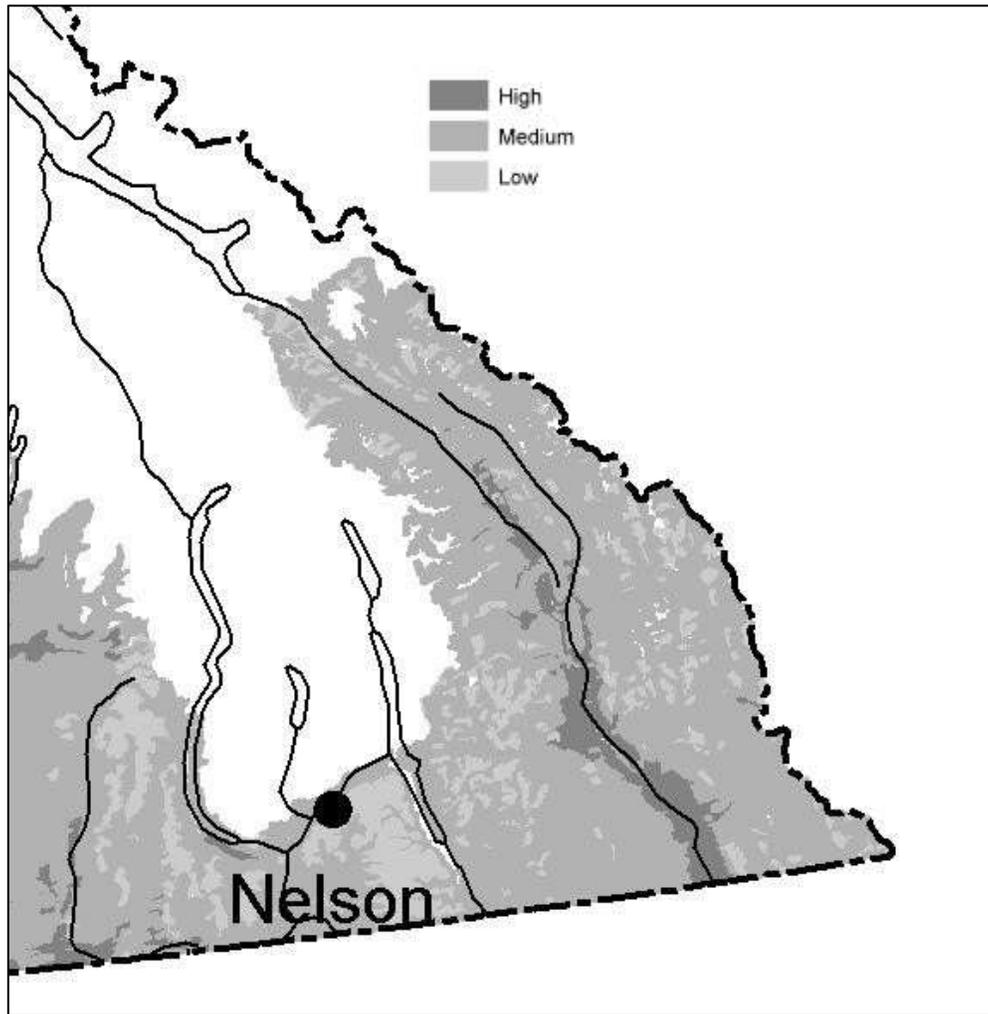
#### **4) Regional Information – Kootenay Boundary**

In this section, we provide specific timing windows and guidance on disturbance buffers for the Kootenay Boundary Region. This information may vary from provincial guidance and may not be applicable outside of the Kootenay Boundary Region because of regional specificity.

The American Badger is a wide-ranging resident species that is commonly found near valley bottoms and in open areas, such as grasslands in the East Kootenay and Boundary (Figure 33, Table 34). No specific regional guidance is available on buffers for burrows; follow the “Information to Consider” provided in Table 33.

American Badgers are most sensitive during the late July and August breeding season, with young born between March and April. This creates a potential *sensitive period of April 15–August 15*.<sup>1</sup> Based on site observations, the length of this sensitive period can be refined. The period of *least risk is August 15–April 15*.

<sup>1</sup> Adapted from the BC Species and Ecosystems Explorer – Species Summary.



**Figure 33. Distribution of potential American Badger habitat in the Kootenay Boundary Region.<sup>2</sup>**

**Table 34. Habitat and biogeoclimatic associations of American Badgers in the Kootenay Boundary Region.<sup>2,3</sup>**

Habitat	Biogeoclimatic Zone <sup>4</sup>	Biogeoclimatic Subzone/Variant
Engelmann Spruce–Subalpine Fir	ESSF	dc1, dc2, dcp, dk, dk1, dkw, dkp, mw, mwp, wc1, wc4, wcp, wm, wmp, xc, xcp, dw
Interior Cedar–Hemlock	ICH	dw, mk1, mk2, mk3, mw1, mw2, mw3, xw
Interior Douglas-fir	IDF	dk1, dk2, dk3, dm1, dm2, mw, mw1, mw2, un, xh1, xh2, xm, xw, xw2
Montane Spruce	MS	dk, dm1, dm2, un, xk
Ponderosa Pine	PP	dh1, dh2, xh1, xh2

<sup>2</sup> From Identified Wildlife Management Strategy – Species Accounts and Measures (2004).

<sup>3</sup> M. Machmer, Registered Professional Biologist, Pandion Ecological Research Ltd., pers. comm. (2018).

<sup>4</sup> A Field Guide for Site Identification and Interpretation for the Nelson Forest Region (1992).

**5) Additional Information**

A Field Guide for Site Identification and Interpretation for the Nelson Forest Region, Land Management Handbook No. 20:

<https://www.for.gov.bc.ca/hfd/pubs/docs/lmh/lmh20.htm>

American Badger COSEWIC Status Report:

[http://www.sararegistry.gc.ca/virtual\\_sara/files/cosewic/sr%5Fblaireau%5Fam%5Fbadger%5F1113%5Fe%2Epdf](http://www.sararegistry.gc.ca/virtual_sara/files/cosewic/sr%5Fblaireau%5Fam%5Fbadger%5F1113%5Fe%2Epdf)

Badger Burrow Identification Field Card:

[http://badgers.bc.ca/pubs/Badger\\_burrow\\_ID.pdf](http://badgers.bc.ca/pubs/Badger_burrow_ID.pdf)

BC Species and Ecosystems Explorer – Species Summary for American Badger:

<http://a100.gov.bc.ca/pub/eswp/speciesSummary.do?id=15604>

Identified Wildlife Management Strategy – American Badger Species Account:

[http://www.env.gov.bc.ca/wld/frpa/iwms/documents/Mammals/m\\_badger.pdf](http://www.env.gov.bc.ca/wld/frpa/iwms/documents/Mammals/m_badger.pdf)

## 9. A Grizzly Bear Den

### 1) Definition

A **Grizzly Bear** (*Ursus arctos*) **den** means an excavated hole that descends below ground or under a tree root system or is a naturally occurring tree cavity that either (1) is currently used for winter denning, or (2) is habitually used and still capable of providing for winter denning (Figure 34).



**Figure 34. Grizzly Bear ground den in alpine.** (Photo: Stefan Himmer)

### 2) Species Description

Grizzly Bears are large carnivores that average 160–225 kg in weight and stand approximately 1 m at the shoulder (Figure 35). They vary in colour from blonde to black, although most are a medium to dark brown. Grizzlies have long guard hairs that often have lighter tips, giving some bears their “grizzled” appearance. They are distinguished from Black Bears by a distinct shoulder hump, large claws (5–10 cm long), and a facial profile that has a clear depression between the eyes and the nose. Black Bears have a straighter facial profile, lack a shoulder hump, and tracks that do not show the long front claw marks often visible in grizzly tracks.



**Figure 35. Grizzly Bear.** (Photo: Jared Hobbs)

The Grizzly Bear is a *Species at Risk* under the *Forest and Range Practices Act* and is Blue-listed in British Columbia. It is designated as a species of *Special Concern* by COSEWIC.

### **3) What to Look For**

Grizzly Bear ground dens are typically located on moderate to steep (approximately 40–90%) mountain slopes in alpine, subalpine, or montane environments. Ground dens are usually located on cooler north or east-facing aspects where insulating snow accumulations are greater. In flat topography, ground dens may be located on high spots or small knolls, as the sides of these features provide easier digging conditions. Where conditions are optimal (i.e., slope, soil texture, aspect, snow cover, security), more than one den site may be found in a relatively small area (1–2 ha). Grizzly Bears may use these areas year after year as hibernation sites.

In contrast, Black Bear dens are more often found in valley-bottom environments on the forest floor, often under root mats and fallen logs or in hollow tree cavities; however, Black Bears will excavate ground dens in areas with suitable soil substrates. In general, Grizzly Bear ground dens usually have larger entrances and larger inside chambers (Figure 36) than the dens of Black Bears, Wolves, or Coyotes.

Table 35 summarizes what to look for when identifying a Grizzly Bear den. Table 36 provides information to consider when conducting primary forest activities adjacent to a den.



**Figure 36. Interior of Grizzly Bear ground den.** (Photo: Stefan Himmer)

**Table 35. Grizzly Bear ground dens: what to look for.**

<b>Grizzly Bear Ground Den Description</b>
<ul style="list-style-type: none"><li>• Ground den entrances are usually about 75 cm in diameter.</li><li>• Den chambers may be 150–225 cm in diameter with a height of 125 cm.</li><li>• Dens are usually lined with shrub branches, tree boughs, duff, or grass; however, some dens may be unlined.</li><li>• Hair is often visible at the den entrance and in bedding material.</li><li>• Because the Grizzly Bear’s long front claws and powerful shoulder muscles adapted for digging, many dens are excavated. In these cases, large piles of soil, rocks, or wood (called a “porch”) are found downslope of the den entrance (Figure 34).</li><li>• Fresh material, with little or no vegetation growing on a debris pile, may indicate a freshly dug den.</li><li>• Unexcavated dens are often located under root wads of large trees and occasionally in sheltered, dry caves or rock cavities.</li><li>• Den sites are often most visible in spring during snowmelt when soil from the den gets tracked onto the surrounding snow; this enhances snowmelt immediately around the den (i.e., the den area becomes more visible in contrast to the adjacent snow).</li><li>• Tracks in the snow or trails on the ground may lead to or from den sites.</li></ul>

**Table 36. Information to consider when conducting primary forest activities near Grizzly Bear ground dens.**

<b>Information to Consider</b>
<ul style="list-style-type: none"><li>• Because Grizzly Bear dens are often located in alpine and subalpine habitats, few trees may occur immediately around a den. Bears may reuse suitable den sites or excavate new dens in the vicinity. Therefore:<ul style="list-style-type: none"><li>○ Establish a buffer zone around a recently used den (see Table 35); a buffer size of approximately 1 ha is suggested.</li><li>○ Restrict resource activities (e.g., forestry, mining, helicopter landing pads, road construction) to areas outside the buffer zone.</li></ul></li><li>• Establish a wildlife tree patch or other retention area around a recently used den discovered in a forested area.</li><li>• Develop access management plans to minimize potential disturbance to den areas.</li><li>• If more than one den site is confirmed in a relatively small area (1–2 ha), then bears may regularly (and repeatedly) use this area for winter denning.</li></ul>

#### **4) Regional Information – Kootenay Boundary**

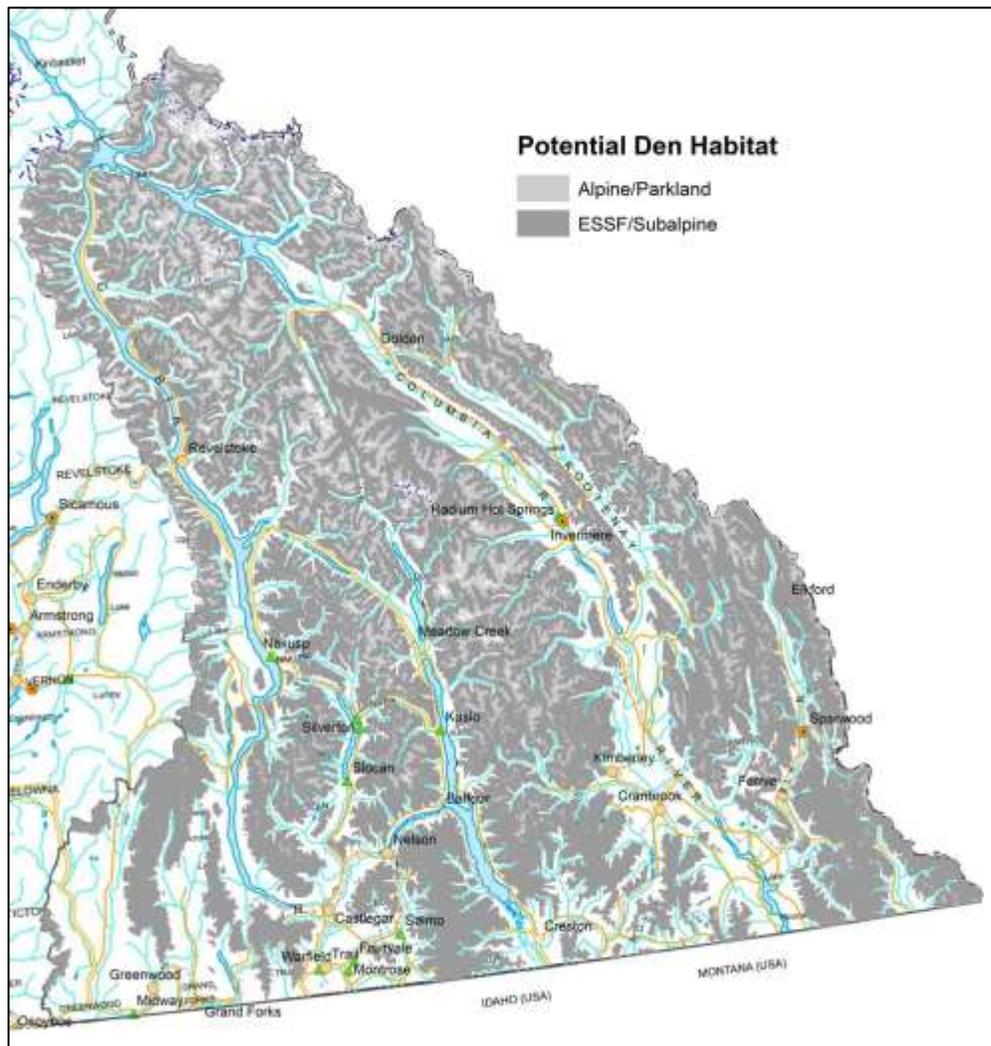
In this section, we provide specific timing windows and guidance on disturbance buffers for the Kootenay Boundary Region. This information may vary from provincial guidance and may not be applicable outside of the Kootenay Boundary Region because of regional specificity.

Grizzly Bears reside within the entire Kootenay Boundary Region (Figure 37), occupying all regional habitat types. These bears generally den above the treeline. In areas with no alpine, bears are expected to den in upper-elevation forests (i.e., Engelmann Spruce–Subalpine Fir [ESSF] habitat). This is most likely to occur in the Boundary and South Purcells.

Grizzly Bears are sensitive to disturbance. Table 37 provides suggested minimum buffer sizes. Additional protection or alternative measures may be needed, depending on the nature of the disturbance, existing landscape and cover, or other factors.

Grizzly Bears are most sensitive during denning season. They usually enter dens in November after snow begins to fall and emerge in March when the snow melts. This creates a potential ***sensitive period of November 1–March 31***.<sup>1</sup> The length of this sensitive period is flexible and will depend on seasonal changes in denning activity. The period of ***least risk is April 1–October 31***.

<sup>1</sup> Identified Wildlife Management Strategy – Species Accounts and Measures (2004).



**Figure 37. Potential Grizzly Bear denning habitats in the Kootenay Boundary Region.**

**Table 37. Guidance on disturbance buffers for a Grizzly Bear den.**<sup>2</sup>

<b>A Grizzly Bear Den – Guidance on Buffers</b>
<ul style="list-style-type: none"> <li>• If you find dens that have been used in the last 2 years, consult a qualified professional about how to manage the area within 200 m of a den. If you find no recently used dens, proceed with development as the area is apparently of relatively low importance as den habitat. Maintaining the integrity of the den structure and access are primary considerations.</li> <li>• Rehabilitate road surfaces within 500 m of an area with important Grizzly Bear habitat (i.e., areas with two or more recently used dens). This will prevent access and reduces road density, a known factor in Grizzly Bear habitat suitability.</li> <li>• Do not disturb a bear during the winter hibernation period (while snow is present):             <ul style="list-style-type: none"> <li>○ Establish a minimum 250 m no machine zone for low machine activity during the winter, and up to 500 m for higher-level machine activity.</li> <li>○ Buffers may be altered if topography will reduce the transmission of sounds and vibrations, or if existing disturbance is already within 500 m of the den.</li> </ul> </li> </ul>

<sup>2</sup> BC Timber Sales Cariboo–Chilcotin Field Guide to Wildlife Habitat Management (2009).

**5) Additional Information**

BC Species and Ecosystems Explorer – Species Summary for Grizzly Bear:

<http://a100.gov.bc.ca/pub/eswp/speciesSummary.do?id=16065>

BC Timber Sales Cariboo–Chilcotin Field Guide to Wildlife Habitat Management:

<https://www.for.gov.bc.ca/ftp/tcc/external/!publish/ems2/SFM/TCC-Field-Guide.pdf>

Grizzly Bear COSEWIC Status Report:

<http://www.registrelep->

[sararegistry.gc.ca/virtual\\_sara/files/cosewic/sr/%5Fours%5Fgrizz%5Fbear%5F1012%5Fe%2Epdf](http://www.registrelep-sararegistry.gc.ca/virtual_sara/files/cosewic/sr/%5Fours%5Fgrizz%5Fbear%5F1012%5Fe%2Epdf)

Identified Wildlife Management Strategy – Grizzly Bear Species Account:

[http://www.env.gov.bc.ca/wld/frpa/iwms/documents/Mammals/m\\_grizzlybear.pdf](http://www.env.gov.bc.ca/wld/frpa/iwms/documents/Mammals/m_grizzlybear.pdf)

## 10. A Significant Mineral Lick

### 1) Definition

A **significant mineral lick** means a naturally occurring mineral lick that is used at least annually by one or more species as evidenced by:

- well-established trails or braided trail systems leading to the mineral lick site,
- extensive excavation or trampling, and/or
- teeth marks, pellets, tracks, and hair.

This definition is not applicable where the mineral lick has been created by a human activity (e.g., road construction).

A mineral lick (Figure 38) is an area used on a habitual basis by ungulates to obtain dietary macroelements, including sodium, calcium, and phosphorous, and trace elements such as manganese, copper, or selenium.



**Figure 38. Mountain Goats at a wet mineral lick.** (Photo: Karl Bachmann)

### 2) Importance of Mineral Licks

A mineral lick is a natural mineral deposit where animals in nutrient-poor ecosystems can obtain essential mineral nutrients. Mineral licks are frequented by ungulates throughout the year but particularly during periods when bone, antler, horn, and muscle growth peak (i.e., spring and summer). Ungulates require these minerals for nutrition and also to aid in digestion by countering

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the effects of unpalatable plant compounds. Mineral licks are relatively uncommon across the landscape and some ungulates will travel extensive distances (e.g., over 15 km) to visit them.

#### **3) What to Look For**

Three types of mineral licks are generally recognized:

1. wet or mucky mineral licks found in seepage areas;
2. dry earth exposures, such as clay or lacustrine deposits, often found above river cut banks (Figure 39); and
3. rock face mineral licks.



**Figure 39. Bighorn Sheep at dry mineral lick.** (Photo: Tatiana Gettelman).

Some mineral licks are easily recognizable by their exposed crystallization, which shows as white or colourful deposits. Other mineral licks are nondescript and are easily overlooked, only appearing as bare soil areas or muddy seepages. Most mineral licks will have visible, well-used wildlife trails that typically radiate out in multiple directions from the mineral lick. Bare soil areas associated with most mineral licks are usually covered in animal tracks that can help identify the wildlife species using the mineral lick.

Significant licks include those that are known or are relatively rare on the landscape. Individual ungulates would need to travel relatively long distances from traditional escape terrain (> 1 km) to reach these licks. They may be used annually by multiple species of ungulate or multiple individuals of a single species.

Table 38 summarizes what to look for when identifying a significant mineral lick. Table 39 provides information to consider when conducting primary forest activities or range practices adjacent to a mineral lick.

**Table 38. A significant mineral lick: what to look for.**

<b>Description of a Significant Mineral Lick</b>
<ul style="list-style-type: none"> <li>• Well-established trails or braided trail systems through forested and non-forested areas usually lead to regularly used mineral lick sites. Although these trails are used most frequently in the spring and early summer, Mountain Goats and Sheep also visit these sites during the autumn (October–November).</li> <li>• Both dry and wet mineral licks can occur. Seepage areas and hot springs may provide potential mineral licks. In contrast, clay and (or) silty lacustrine cut banks or rock face areas can provide high concentrations of minerals.</li> <li>• Heavy use of mineral licks is shown by areas of trampling (wet lick) or significant excavation (dry lick).</li> <li>• Other evidence of use at each mineral lick site includes teeth marks, pellets, tracks, or hair.</li> </ul>

**Table 39. Information to consider when conducting primary forest or range activities or near a significant mineral lick.**

<b>Information to Consider</b>
<ul style="list-style-type: none"> <li>• Avoid physical destruction of the mineral lick site (e.g., skid trail or road building).</li> <li>• Maintain the integrity of trails between mineral lick sites and seasonal ranges (winter/spring range).</li> <li>• Avoid locating new roads near known mineral lick sites and trails. It is important not to isolate the mineral lick from nearby escape cover (forest, cliffs, rocky outcrops); if roads are required near mineral licks, implement measures to minimize disturbance to mineral lick access trails by restricting the number of road crossings and by maintaining connectivity to adjacent forest areas.</li> <li>• For existing roads near known mineral licks, minimize road use and disturbance (where possible) during critical use periods (May–November; date will depend on geographic location and ungulate species).</li> <li>• Where roads can be deactivated, do so as soon as possible; erect all-terrain vehicle barriers; reclaim roads with native vegetation.</li> <li>• Where harvesting activities occur near lick sites, provide some visual screening (i.e., forested cover) around the lick; this will provide security and escape cover for animals using the lick.</li> <li>• Arrange helicopter or fixed-wing flight plans to avoid areas with known mineral licks, especially during critical use periods (May–November; date will depend on geographic location and species).</li> <li>• Consult a qualified professional biologist to assess use and significance of the site for local ungulate populations; some licks may be assessed as “non-significant.”</li> </ul>

#### **4) Regional Information – Kootenay Boundary**

In this section, we provide specific timing windows and guidance on disturbance buffers for the Kootenay Boundary Region. This information may vary from provincial guidance and may not be applicable outside of the Kootenay Boundary Region because of regional specificity.

Mineral licks are unique and are found across the landscape. They are generally associated with mineral springs or places where mineral precipitate is deposited. No identified biogeoclimatic associations are relevant for mineral licks. Ungulates using these licks have varying sensitivity to

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disturbance, depending on their existing exposure to disturbance and the level of disturbance from the proposed activity. Table 40 provides suggested minimum buffer sizes. Additional protection or alternative measures may be needed, depending on the nature of the disturbance, existing landscape and cover, or other factors.

Licks are most heavily used when ungulates are most active (spring to autumn). Visiting animals will be most sensitive to disturbance at lick sites during early season green-up. Fall use of licks is linked to horn growth in males and post-lactation nutrient requirements in females. This creates a potential *sensitive period of April 1–October 1* in the Kootenay Boundary Region. The length of this sensitive period will depend on the geographic location and ungulate species. No regional range maps exist for mineral licks.

**Table 40. Guidance on disturbance buffers for significant mineral licks.**

A Significant Mineral Lick – Guidance on Buffers
<ul style="list-style-type: none"><li>• Do not construct roads within 200 m of a significant lick, unless no other practical option exists. Maintain a visual screen between any roads (existing or built) and the lick.<sup>1</sup></li><li>• If no longer needed, reclaim any existing roads within 200 m of the lick.</li><li>• Maintain a minimum 100 m buffer of intact forest around significant licks; this buffer should include at least two primary trails leading to the lick and connect adjacent forest to provide a windfirm travel corridor.</li><li>• Avoid conducting field reconnaissance, layout, cruising, or tree planting within 100 m of a significant lick from April 1 to October 1 (where possible). Leave the area if animals are observed approaching or at the site.</li></ul>

**5) Additional Information**

BC Timber Sales Cariboo–Chilcotin Field Guide to Wildlife Habitat Management:  
<https://www.for.gov.bc.ca/ftp/tcc/external/!publish/ems2/SFM/TCC-Field-Guide.pdf>

Management Plan for the Mountain Goat (*Oreamnos americanus*) in British Columbia:  
[http://www.env.gov.bc.ca/wld/documents/recovery/management\\_plans/MtGoat\\_MP\\_Final\\_28May2010.pdf](http://www.env.gov.bc.ca/wld/documents/recovery/management_plans/MtGoat_MP_Final_28May2010.pdf)

Wildlife Habitat Features – Summary of Management Guidelines, Northern Interior Forest Region (Draft):  
<https://www2.gov.bc.ca/assets/gov/environment/plants-animals-and-ecosystems/wildlife-wildlife-habitat/regional-wildlife/northeast-region/draftwhfnorthinteriorrevisejuly30.pdf>

<sup>1</sup> Modified from BC Timber Sales Cariboo–Chilcotin Field Guide to Wildlife Habitat Management (2009).

## 11. A Significant Wallow

### 1) Definition

A **significant wallow** means a wallow that is:

- (i) used by Moose (*Alces americanus*), Bison (*Bos bison*), Elk (*Cervus elaphus*), Mountain Goat (*Oreamnos americanus*), or Grizzly Bear (*Ursus arctos*); and
- (ii) used at least annually by multiple individuals of one or more of the species in (i) as evidenced by well-established trails leading to the wallow, tracks in the wallow, lack of vegetation in the centre of the wallow, and/or vegetation disturbed by pawing, trampling, digging, or rolling.

A wallow is an existing depression or a shallow depression in the ground created and maintained by ungulates or Grizzly Bears through regular digging, trampling, or rolling (Figure 40).



**Figure 40. Moose wallow in high-elevation fen.** (Photo: Eliot Terry)

### 2) Importance of Wallows

Ungulates roll in wallows to cover themselves in mud or dust to provide relief from biting insects. In addition, wallowing may serve a social function during the breeding season where male ungulates (e.g., Moose and Elk) will urinate in the wallow and roll in it to attract females. Wallowing may also be important as a grooming behaviour associated with moulting, social behaviour for group cohesion, or simply play behaviour. Bears will also roll in wallows to help cool themselves in summer and as a method of marking their presence to other bears.

**3) What to Look For**

Wallows are typically shallow depressions in the soil that can either be wet or dry (Figure 41). They are generally situated in openings or clearings, usually adjacent to nearby security cover. Many wallows lack plants in their centres because the disturbed conditions from frequent wildlife use inhibits plant growth. The bare soils of wallows are usually covered in animal tracks that can indicate which wildlife species use the wallow. Well-used wildlife trails typically radiate out in multiple directions from the wallow.



**Figure 41. Moose in wallow.** (Photo: Lindsey Ballard)

Table 41 summarizes what to look for when identifying a significant wallow. Table 42 provides information to consider when conducting primary forest or range activities adjacent to a wallow.

**Table 41. A significant wallow: what to look for.**

Species	Description of a Significant Wallow
Ungulates and Grizzly Bears	<ul style="list-style-type: none"> <li><input type="checkbox"/> Shallow, wet or mucky depressions, 2–3 m to many metres wide and typically less than 20 cm deep.</li> <li><input type="checkbox"/> Disturbed vegetation (herbs and low shrubs) as a result of pawing, digging, or rolling, often in a non-forested area for ungulates (e.g., wet meadow); these sites may have a strong odour of urine, and may have tracks, shed hairs, or droppings nearby.</li> </ul>
Grizzly Bears	<ul style="list-style-type: none"> <li>• Almost always found where seepage occurs or where the water table is close to the surface (e.g., near skunk cabbage seeps); others are found in muddy patches (Figure 42); typical locations are in, or beside, shrubby fringes of estuaries and wetlands, in open forests where an underground spring comes to the surface, or in small pockets of imperfect drainage.</li> <li>• Contain shed hairs and provide excellent conditions for tracks; the edges of wallows may be worn smooth from bears lying and rubbing against them; any tree branches, roots, and duff along the edges usually have an abundance of snagged hairs; fine bear hairs contrast with the coarse hair of ungulates.</li> <li>• Often found near mark trees; well-worn bear trails or mark trails may also lead to, or skirt around, the wallow.</li> </ul>



**Figure 42. Grizzly Bear in wallow.** (Photo: Steve Stuller)

**Table 42. Information to consider when conducting primary forest or range activities near a significant wallow.**

<b>Information to Consider</b>
<ul style="list-style-type: none"><li>• Avoid destruction of the wallow site.</li><li>• Avoid road construction and human disturbances near known wallow areas during the autumn rut for ungulates (September–November) and hot summer months for Grizzly Bears (July–August).</li><li>• Incorporate wallows into forested retention areas, such as a wildlife tree patch or riparian management area.</li><li>• Maintain the integrity of trails between wallow sites and seasonal ranges.</li><li>• Avoid locating new roads near known wallow sites and trails; if roads are required near wallows, implement measures to minimize disturbance to wallow access trails by restricting the number of road crossings and by maintaining connectivity to adjacent forest areas.</li><li>• For existing roads near known wallows, minimize road use and disturbance (where possible) during critical use periods (September–November for ungulates).</li><li>• Where roads can be deactivated, do so as soon as possible, and erect all-terrain vehicle barriers; reclaim roads with native vegetation.</li><li>• Where harvesting activities occur near wallow sites, provide some visual screening (i.e. forested cover) around the lick; this will provide security and escape cover for animals using the lick.</li><li>• Consult a qualified professional biologist to assess use and significance of the site for local ungulate and bear populations; some wallows may be assessed as “non-significant.”</li></ul>

#### **4) Regional Information – Kootenay Boundary**

In this section, we provide specific timing windows and guidance on disturbance buffers for the Kootenay Boundary Region. This information may vary from provincial guidance and may not be applicable outside of the Kootenay Boundary Region because of regional specificity.

Wallows are unique and are found across the landscape. They are generally associated with riparian receiving areas, springs, or other water sources. Although no identified biogeoclimatic associations are relevant for wallows, these features are often connected with localized moist soil regimes and site series. The species that use wallows are sensitive to disturbance. Table 43 provides suggested minimum buffer sizes. Additional protection or alternative measures may be needed, depending on the nature of the disturbance, existing landscape and cover, or other factors.

Wallows are most heavily used during the autumn ungulate breeding season. This creates a potential *sensitive period of September 1–November 1*. The length of this sensitive period will depend on geographic location and ungulate species. For *Grizzly Bears, the sensitive period is July 1–August 31*. No regional range maps exist for wallows.

**Table 43. Guidance on disturbance buffers for significant wallows.**

<b>A Significant Wallow – Guidance on Buffers</b>
<ul style="list-style-type: none"><li>• Do not construct roads within 200 m of a significant wallow, unless no other practical option exists; maintain a visual screen between any roads (existing or built) and the wallow.<sup>1</sup></li><li>• If no longer needed, reclaim any existing roads within 200 m of the wallow.</li><li>• Maintain a minimum 100 m buffer of intact forest around significant wallows; this buffer should include at least two primary trails leading to the lick and connect adjacent forest to provide a windfirm travel corridor.</li><li>• Avoid conducting field reconnaissance, layout, cruising, or tree planting within 100 m of a significant ungulate wallow from September 1 to November 1 (where possible). Leave the area if animals are observed approaching or at the site.</li><li>• Avoid conducting field reconnaissance, layout, cruising, or tree planting within 100 m of a significant Grizzly Bear wallow from July 1 to August 31 (where possible). Leave the area if animals are observed approaching or at the site.</li></ul>

#### **5) Additional Information**

BC Timber Sales Cariboo–Chilcotin Field Guide to Wildlife Habitat Management:  
<https://www.for.gov.bc.ca/ftp/tcc/external/!publish/ems2/SFM/TCC-Field-Guide.pdf>

Wildlife Habitat Features – Summary of Management Guidelines, Northern Interior Forest Region (Draft):  
<https://www2.gov.bc.ca/assets/gov/environment/plants-animals-and-ecosystems/wildlife-wildlife-habitat/regional-wildlife/northeast-region/draftwhfnorthinteriorrevisejuly30.pdf>

<sup>1</sup> Modified from BCTS Cariboo-Chilcotin Field Guide to Wildlife Habitat Management 2009.

## 12. A Bat Hibernaculum

### 1) Definition

A *bat hibernaculum* (plural: hibernacula) means a site where one or more bats hibernate in winter. Figure 43 shows the entrance to a cave hibernaculum.



Figure 43. Townsend's Big-Eared Bat hibernaculum located in a cave. (Photo: Anna Roberts)

### 2) Importance of a Bat Hibernaculum

A bat hibernaculum is a site where bats hibernate over the winter. A specific hibernaculum may only be used for part of the winter and may or may not be used every year. The lack of use in a given year does not mean that the hibernaculum has been abandoned. Hibernacula occur most often in caves (Figure 43), rock or cliff crevices (Figure 44), or abandoned mines. **Note: Only naturally occurring bat hibernacula are considered wildlife habitat features.**

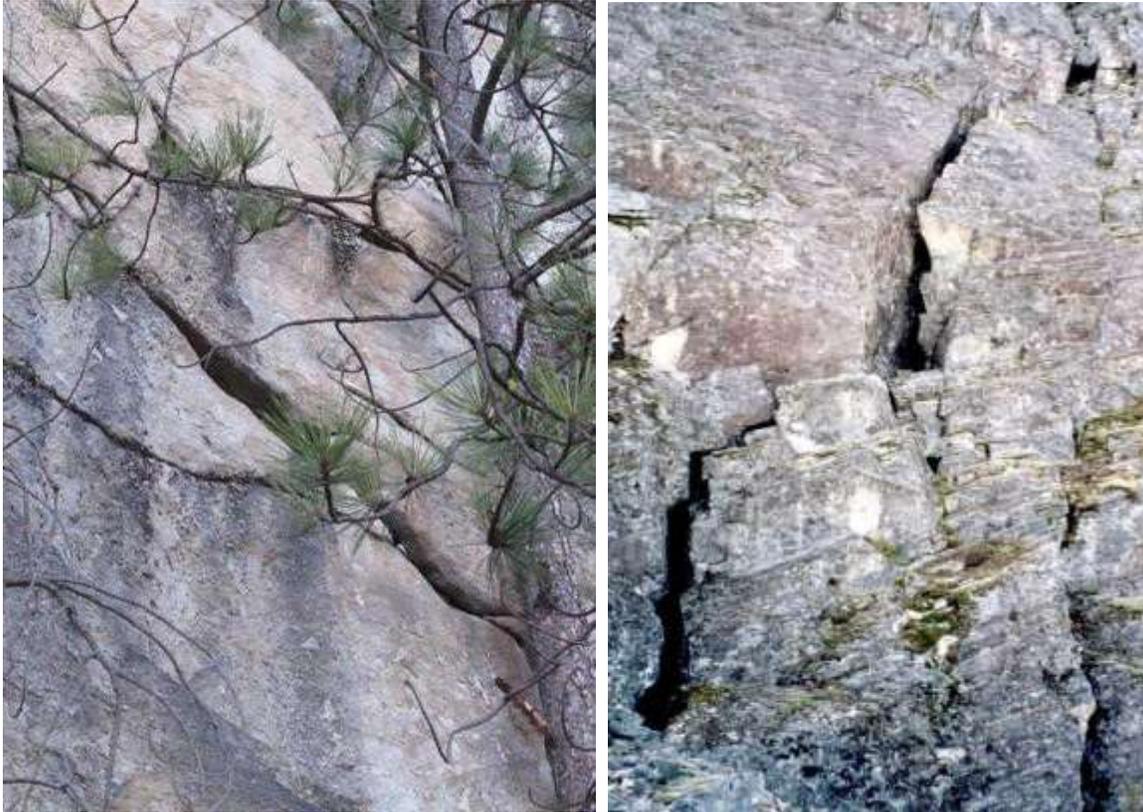
Hibernacula provide cold, constant temperatures and protection from weather and predators. Rock features with suitable characteristics for hibernation by bats are relatively scarce across the landscape and therefore are typically used by several species of bats at once.

The cool, moist microclimate of a hibernaculum allows bats to enter a torpid state where breathing rate, metabolic rate and heart rate are significantly decreased from active levels and body temperatures drop to match the air temperature. Bats naturally awaken infrequently over the winter from this torpid state. Recent work on wintering bats in British Columbia has revealed that bats are far more active in winter than previously assumed. Movements appear to occur during warmer periods in winter. During these periods' bats may move to different roosting areas within the hibernation site or move outside the underground feature to roost in adjacent large roost trees

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within 500 m of a hibernaculum opening. Like summer roost trees, winter trees tend to be large, with dbh >50 cm, showing moderate decay with decay class 2-5, and with defects or features that provide roosting sites for bats. Although it is still unclear how many winter tree roosts are required, the features appear to be important for some bat species.

Human disturbance such as presence, noise or changes in site conditions can cause awakening and arousal of bats in winter. These disturbance-related arousals deplete a bats' limited energy reserves. Continued disturbance to bats during hibernation can prove fatal by causing bats to starve once their energy reserves are depleted.



**Figure 44. Bat hibernacula in cliff crevices.** (Photo: (left) Cori Lausen, (right) Province of British Columbia)

Secure hibernacula are important for protection of bats from white-nosed syndrome. White-nose syndrome is a disease that affects hibernating bats and is caused by an introduced fungus, *Pseudogymnoascus destructans*, or Pd for short. The Pd fungus and white-nose syndrome has resulted in the death of millions of bats across North America since it was first detected in 2006. In affected hibernacula, documented overwinter mortality rates of little brown myotis was 90-95% and Northern myotis (Figure 45) up to 98%. Although white-nose syndrome has not yet been detected in British Columbia, it has been detected in Washington State. Do not enter a hibernaculum without consulting a qualified professional biologist with specific and current experience with bats (herein referred to as a bat specialist) and ensuring use of the most up-to-date protocols for limiting the spread of infection.



**Figure 45. Northern Myotis exhibiting symptoms of white-nose syndrome.** (Photo: Kirstin Alvey-Mudd)

### 3) What to Look For

Thirteen of British Columbia's fifteen recorded bat species hibernate within the province (Table 44).

The entrances of bat hibernacula may be large and conspicuous, such as a cave or a large fissure in a rock face. Alternatively, entrances may be small and easily overlooked, such as a ground sinkhole or a narrow rock crevice. In underground features such as caves, the pattern of use may depend on bat species. Microclimate within the hibernation site is critical for bats. Generally, bats prefer temperature ranges above freezing but less than about 9°C, with high relative humidity. Bats are sensitive to water-loss during hibernation, so increases in airflow can result in dehydration. As more is learned about bats it is becoming apparent that there may be species-specific micro-climate requirements. Table 45 summarizes what to look for when identifying bat hibernacula.

Crevice habitat may be very important to wintering bat populations however our current understanding of how bats use crevices in winter is limited. Recent work in the Kootenay Boundary Region found bats roosting in rock crevices. Crevice habitat used by wintering bats requires an entrance at least 1-2 cm wide (or larger) and must run deep enough underground to provide roosting spaces below the frostline with stable, cold temperatures above freezing. One limited study found that bats may prefer rock crevice features on cool aspects (north and northeast-facing). Further information is needed to accurately classify winter crevice-habitat for hibernating bats, but its importance should be noted. As well, in coastal British Columbia, bats may overwinter in very large diameter trees with defects that offer roost spaces. Bats, including little brown myotis, have been found wintering in spaces under root wads.

If an entrance is large enough, cautiously inspect the suspected hibernaculum by shining a flashlight into the chamber to look for evidence of use including presence of live or dead bats, urine staining, and possibly small amounts of bat guano or insect parts on the floor of the hibernaculum. Table 46 summarizes the types of evidence of use that may be visible at a hibernaculum site.

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**Table 44. Bat conservation status and distribution of hibernating bat species by region in British Columbia.<sup>1</sup>**

Species	Conservation Status (COSEWIC/ British Columbia)	Region							
		Cariboo	Kootenay Boundary	Northeast	Omineca	Skeena	South Coast	Thompson Okanagan	West Coast
Pallid Bat ( <i>Antrozous pallidus</i> )	Threatened/ Red-listed		X					X	
Townsend's Big-eared Bat ( <i>Corynorhinus townsendii</i> )	Not assessed/ Blue-listed	X	X				X	X	X
Big Brown Bat ( <i>Eptesicus fuscus</i> )	Not at risk	X	X	X	X	X	X	X	X
Spotted Bat ( <i>Euderma maculatum</i> )	Special Concern/ Blue-listed	X	X					X	
Silver-haired Bat ( <i>Lasionycteris noctivagans</i> )	Not at risk	X	X	X	X	X	X	X	X
Californian Myotis ( <i>Myotis californicus</i> )	Not at risk	X	X			X	X	X	X
Western Small-footed Myotis ( <i>Myotis ciliolabrum</i> )	Not assessed/ Blue-listed	X	X					X	
Long-eared Myotis ( <i>Myotis evotis</i> )	Not at risk	X	X	X	X	X	X	X	X
Little Brown Myotis ( <i>Myotis lucifugus</i> )	Endangered/ Not assessed	X	X	X	X	X	X	X	X
Northern Myotis ( <i>Myotis septentrionalis</i> )	Endangered/ Blue-listed	X	X	X	X	X			
Fringed Myotis ( <i>Myotis thysanodes</i> )	Not assessed/ Blue-listed	X	X				?	X	?
Long-legged Myotis ( <i>Myotis volans</i> )	Not at risk	X	X	X	X	X	X	X	X
Yuma Myotis ( <i>Myotis yumanensis</i> )	Not at risk	X	X			X	X	X	X

<sup>1</sup> Modified from Best Management Practices for Bats in British Columbia (2016).

**Table 45. Bat hibernacula: what to look for.**

Description of a Bat Hibernaculum
<p><b>Temperature:</b> A key feature of hibernacula is stable temperature. Generally preferred temperatures are above freezing and below 9°C. Preferred temperature range may vary by species.</p> <p><b>Relative Humidity:</b> Most bats prefer very high relative humidity (90-100%) within hibernation sites. Preferences may be species specific based on a species' tolerance to water loss.</p> <p><b>Airflow:</b> Prefer sites with very little airflow to limit water loss.</p> <p><b>Light levels:</b> Hibernacula are generally dark.</p> <p><b>Disturbance:</b> Hibernacula are secluded sites with little disturbance from human activity.</p> <p><b>Size:</b> Size of hibernacula varies widely. There seems to be no pattern regarding size. Depth of underground features ranges from as little as 30 m to depths of 150-700 m underground.</p> <p><b>Caves and caverns:</b> Most caves in British Columbia occur in karst features. Other caves and caverns can form depending on the geomorphology of a region. How and where bats roost within the feature may be dependent on bat species. Bat use may also vary depending on the depth and structure of the feature.</p> <ul style="list-style-type: none"><li>• size of openings used by bats is highly variable</li><li>• sites where openings are covered by vegetation may not be useable by bats</li><li>• bats generally avoid sites that flood, although cave hibernation sites often have interior water sources</li></ul> <p><b>Rock crevice/erosion crevice:</b> Rock crevices in any type of rock may function as a hibernation site for bats. Erosion crevices may occur in river banks where deep cavities form in soils that have durable matrices with high clay content that form a stone-like consistency when dry.</p> <ul style="list-style-type: none"><li>• a crevice/fissure must be 1-2 cm wide or more</li><li>• must provide a protected, dark, quiet area</li><li>• must run deep enough under the frostline to have stable temperatures</li></ul> <p><b>Root wad/Trees:</b> Little brown myotis have been found hibernating in a cavity under a large stump in a root wad. Recent work in the Kootenay Boundary region found a group of bats using both a rock crevice for hibernation as well as a nearby large ponderosa pine. It is unknown how commonly bats use trees as winter roosts. Winter tree hibernacula likely require similar characteristics as summer nursery roosts.</p> <ul style="list-style-type: none"><li>• moderate decay (tree classes 2–5)</li><li>• large diameter (&gt;50 cm dbh in the interior dry zones and &gt;70 cm dbh on the Coast and Interior Cedar–Hemlock zone).</li><li>• vertical hollow cavity accessed via a stem scar or woodpecker excavations</li><li>• deep stem cracks; hollows created at points where branches have broken off at the bole</li><li>• any defect that results in a crevice 1-2 cm wide (or more) and 10 cm deep (or more)</li><li>• peeling bark is unlikely to provide adequate site conditions in winter</li></ul>

**Table 46. How to determine if a bat hibernaculum is occupied.**

<b>Identifying an Occupied Hibernaculum</b>
<p><b>Bats flying at an entrance:</b></p> <ul style="list-style-type: none"><li>• In autumn, at dusk, bats may be seen emerging from, or flying around, the entrance to underground features.</li><li>• Sites with a great deal of bat activity in the fall may indicate a “swarming site”, where bats congregate for pre-hibernation courtship and mating.</li><li>• Bats may also use swarming sites for hibernation. The presence of autumn bat activity may indicate the location of a hibernaculum.</li></ul> <p><b>Bats present:</b></p> <ul style="list-style-type: none"><li>• The presence of live bats (Figure 46) or dead bats/bat bones (Figure 47) indicates the presence of bats.</li><li>• Hibernating bats may cluster together in groups (possibly to maintain water balance); clusters may be obvious on ceilings or walls.</li><li>• Other species may roost singly and may jam themselves into small cracks or spaces in the walls of the hibernaculum and may be very challenging to find.</li><li>• Groups of bats may consist of a single species or multiple species.</li></ul> <p><b>Bat guano (feces):</b></p> <ul style="list-style-type: none"><li>• Small amounts of bat guano may be present (Figure 48). While bats do not generally forage or eat during the hibernation period, in late fall, bats may still forage and return to roost inside the hibernation site.</li><li>• Bat guano is similar in size, shape and colour to mouse droppings; however, bat guano pellets easily crush into a rough powder of undigested insect parts (especially indigestible hard bits of exoskeletons, wings and legs). Mouse droppings are typically hard and claylike.</li></ul> <p><b>Urine stains:</b></p> <ul style="list-style-type: none"><li>• There may be visible urine staining on roost surfaces (although staining may be limited).</li><li>• Stains may be white or brown and concentrated in the roosting area (Figure 49)</li></ul> <p><b>Discarded food items:</b></p> <ul style="list-style-type: none"><li>• Bats eat the soft, nutritious parts of their insect prey but discard the wings, heads and legs.</li><li>• Insect parts on the floor of the site may be an indication of the presence of bats.</li></ul> <p><b>Body Oil Staining:</b></p> <ul style="list-style-type: none"><li>• Bat fur contains oils that may leave a residue or mark on roost surfaces.</li><li>• These darkened areas are usually where bats have roosted for many years.</li></ul> <p>If occupancy is not easily determined from these signs or methods, confirming occupation will require the services of a bat specialist. The methods used by bat specialists require specialized training and equipment.</p>



**Figure 46. Cluster of hibernating bats.** (Photo: Martin Davis)



**Figure 47. Signs of bat occupancy in a cave or rock crevice may also include dead or live bats or bat skeletal remains.** (Photo: Martin Davis)



**Figure 48. Bat guano from two species, Big Brown Bat on the left and slightly smaller Little brown bat on the right. (Photo: Cory Olson)**



**Figure 49. Staining from roosting bats. (Photos: Martin Davis)**

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Management activities around hibernacula have the potential to negatively affect a hibernaculum. Blocking or damaging the entrances to hibernacula can prevent bats from entering them or change the microclimate of the roost (e.g., air flow can be affected by changes to an entrance) thereby rendering the sites unsuitable. Care must also be taken in the immediate area above ground at a hibernation site for bats. Above ground removal of vegetation or changes in drainage patterns can significantly affect the features below ground and possibly change the microclimates available to bats in the underground feature. This is especially important at sites in karst features. Table 47 summarizes information to consider when conducting primary forest activities near a bat hibernaculum.

**Table 47. Information to consider when conducting primary forest activities near a bat hibernaculum.**

<b>Information to Consider</b>
<ul style="list-style-type: none"><li>• The hibernation period for bats occurs between November 1 and April 1, however there may be tremendous variation among regions, between years, and among species. When available, local information should be used to inform timing windows for management.</li><li>• Establish the total hibernaculum area by describing a polygon that encompasses the entire area of the underground feature and all portals.</li><li>• Establish a buffer around the hibernaculum polygon.</li><li>• Incorporate the hibernaculum and buffer into a forested retention area or other retention patch.</li><li>• Do not harvest or salvage trees within the retention area without first consulting a bat specialist.</li><li>• Minimize adjacent disturbance during critical times, generally November 1 to April 1.</li><li>• Consider installing a bat-friendly gate or other means of limiting human disturbance/access to known hibernacula.</li><li>• Establish additional special management zone outside of the core area to avoid disturbances that may affect the functionality of the hibernaculum.</li><li>• Develop prescriptions to ensure harvest management adjacent to the core area protects it from windthrow.</li><li>• Conserve understory vegetation along core area boundaries and leave some green trees in the adjacent opening, especially near the edge of the patch. Removal of all vegetation may alter air flow or hydrology in the area, rendering the temperature or humidity conditions of the hibernaculum unsuitable.</li><li>• Blasting may occur during periods when bats are not occupying the hibernaculum, however, ensure that the hibernaculum habitat is not degraded. Blasting itself is variable in intensity and effect. Larger blasts close to a feature have a different effect than small blasts further away. For a bat hibernaculum located within a karst landscape:<ul style="list-style-type: none"><li>○ Establish a minimum two-tree-length reserve (based on the average height of the dominant and co-dominant trees at 100 years) extending outward from the mouth of the cave entrance;</li><li>○ Design an adjacent management zone of an appropriate size to protect the reserve from windthrow;</li><li>○ Maintain understory vegetation along reserve boundaries and leave some green trees in the adjacent opening, especially near the edge of the reserve. These measures help maintain interior microclimatic conditions and inhibit the encroachment of edge species into the interior habitat of the reserve</li></ul></li><li>• For more details on managing bat hibernacula located within a karst landscape refer to the <i>Karst Management Handbook for British Columbia</i> (Section 5) and the <i>Best Management Practices for Bats in British Columbia</i> (Chapters 2 and 3).</li></ul>

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Construction of bat-friendly gates in portals of known roosts is often considered to control access for people because of safety and liability considerations. Gates should only be installed when necessary as they can disrupt airflows and may prevent access for some bat species if improperly installed. There are numerous options for bat-friendly gates. Appropriate gate design is site-specific due to the variation in bat species, the size and type of opening for the gate, and the geomorphology of an area. Any bat-gate installation should involve a bat specialist. There are numerous sources of information on the variety of gate designs available. Bat Conservation International ([www.batcon.org](http://www.batcon.org)) continues to be one of the best resources.

### **4) Regional Information – Kootenay Boundary**

In this section, we provide guidance on specific timing windows and disturbance buffers for the Kootenay Boundary Region. This information may vary from provincial guidance and may not be applicable outside of the Kootenay Boundary Region because of regional specificity.

Bats occur throughout the Kootenay Boundary Region, although habitat types and hibernacula structures vary among species (Table 48). Hibernacula occur throughout a species' range, and are restricted by topographic features, not vegetation type. Bats are sensitive to disturbance.

Bats begin hibernating in the Kootenay Boundary Region around early October, depending on the autumn weather, and emerge during spring when temperatures warm. This creates a potential *sensitive period of October 1–April 30*.<sup>2</sup> Based on weather observations in a specific year, the length of this sensitive period can be refined.

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<sup>2</sup> Best Management Practices for Bats in British Columbia (2016).

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**Table 48. Biogeoclimatic zones and characteristics of hibernacula structures within species' distributions in the Kootenay Boundary Region.<sup>2,3</sup>**

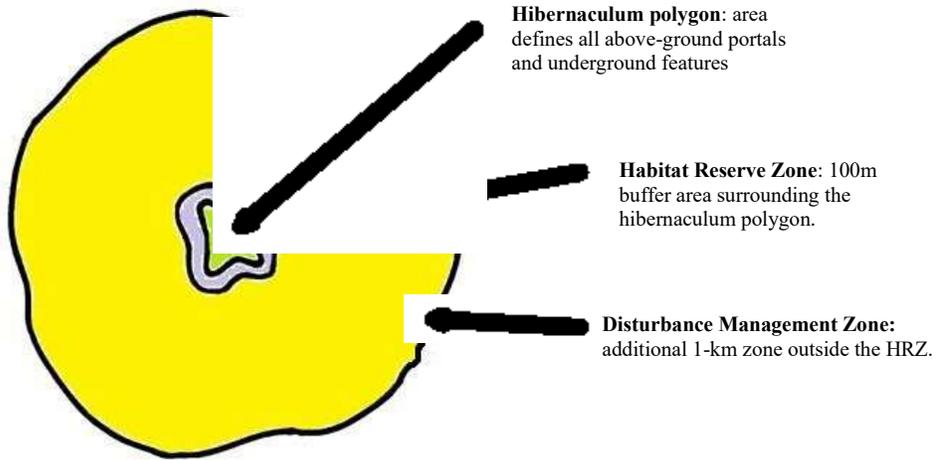
Species	Biogeoclimatic Zone <sup>4</sup>					Hibernacula Structures
	PP	IDF	MS	ICH	ESSF	
Pallid Bat (may occur in Boundary)	X					Rock crevices
Townsend's Big-eared Bat	X	X		X		Caves, mines
Big Brown Bat	X	X	X	X		Rock crevices, mines, buildings
Spotted Bat	X					Cliffs, mines
Silver-haired Bat (migrates)	X	X	X	X	X	Dead/dying/live trees, mines, buildings.
Californian Myotis	X	X	X	X	X	Caves, mines, buildings
Western Small-footed Myotis	X	X				Caves, mines, buildings
Long-eared Myotis	X	X	X	X	X	Mines, buildings
Little Brown Myotis	X	X	X	X	X	Caves, mines
Northern Myotis				X		Mines
Fringed Myotis	X	X				Mines
Long-legged Myotis	X	X	X	X	X	Caves, mines
Yuma Myotis	X	X	X	X		Caves, mines

Two different management zones (Habitat Reserve Zone and Disturbance Management Zone) are prescribed for bat hibernacula (Figure 50).

1. The 100-m **Habitat Reserve Zone** is a zone of retention (no harvest) designed to protect the feature from damage (from wind, harvest-related injury or damage or disturbance from other activities such as blasting) and to retain microclimatic features of the Wildlife Habitat Feature.
2. The 1-km **Disturbance Management Zone** is not a retention zone. Within the Disturbance Management Zone recommendations are provided on the timing of specific activities that represent different levels of disturbance and on how to manage habitat within these zones to benefit bats.

<sup>3</sup> BC Species and Ecosystems Explorer – Species Summaries.

<sup>4</sup> A Field Guide for Site Identification and Interpretation for the Nelson Forest Region (1992); PP = Ponderosa Pine; IDF = Interior Douglas-fir; MS = Montane Spruce; ICH = Interior Cedar–Hemlock; ESSF = Engelmann Spruce–Subalpine Fir.



**Figure 50. Hibernaculum polygon, 100-m Habitat Reserve Zone, and additional 1-km Disturbance Management Zone around a bat hibernaculum Wildlife Habitat Feature.**  
(Figure: Susan Holroyd)

Table 49 provides guidance on disturbance buffers and acceptable activities for a bat hibernaculum. Disturbance recommendations are more stringent in the Habitat Reserve Zone than in the Disturbance Management Zone. Habitat management within both zones should be used to help retain connectivity between the Wildlife Habitat Feature and surrounding habitats for bats. Additional protection or alternative measures may be needed, depending on the nature of the disturbance, existing landscape and cover, or other factors. Table 50 provides information to consider when conducting primary forest or range activities near a bat hibernaculum.

Once an occupied or known bat hibernaculum is discovered, consultation with a bat specialist is recommended. Hibernation features are vital to the conservation of local bat populations so are relevant to local wildlife managers. Forestry personnel are unlikely to find many of these sites as these features are difficult to identify due to both their cryptic nature and restricted period of use. Most bat species are relatively flexible and adaptable in their behaviour and habitat use; in many cases, a bat specialist can assess a situation and offer a workable strategy that suits both forestry operations and bat conservation goals.

The Kootenay Boundary Region has a rich history of mining and the landscape is riddled with old mines that are likely being used by bats. Mines are not classified as a Wildlife Habitat Feature, however there are “Best Management Practices for Bats in British Columbia” that includes a chapter devoted to mine habitat used by hibernating bats as well as a chapter devoted to Cave and Crevice Management for Bats.

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**Table 49. Guidance on disturbance buffers and acceptable activities for bat hibernaculum.**

<b>Level of Disturbance</b>	<b>Time Period</b> Oct 1-Apr 30	<b>Habitat Reserve Zone</b> (100-m around hibernaculum polygon)	<b>Disturbance Management Zone</b> (additional 1-kilometre buffer)
<b>Low Impact</b> (i.e., livestock attractants, activities on foot, small groups; examples include layout, cruising, reconnaissance)	Outside	<b>Acceptable</b>	<b>Acceptable all-year</b>
	During	<b>May be acceptable</b> if bats and hibernaculum will not be negatively affected by the disturbance generated. If in doubt, consult a bat specialist.	
<b>Medium Impact</b> (i.e., light mechanized activities, larger groups/duration; examples include fence building, spacing, planting)	Outside	<b>May be acceptable</b> if bats and hibernaculum will not be negatively affected by the disturbance generated. If in doubt, consult a bat specialist.	<b>Acceptable</b>
	During	<b>Not acceptable</b>	<b>Acceptable with caution.</b> Use extra caution immediately adjacent to the hibernaculum. If in doubt, consult a bat specialist.
<b>High Impact</b> (i.e., mechanized activities; examples include road construction, falling and yarding, landing sites)	Outside	<b>Not acceptable</b>	<b>Acceptable</b>
	During		<b>May be acceptable</b> if bats and hibernaculum will not be negatively affected by the disturbance generated. Consult a bat specialist.
<b>Very High Impact</b> (i.e., blasting, helicopter logging)	Outside	<b>Not acceptable</b>	<b>Acceptable with caution.</b> Use extra caution immediately adjacent to the hibernaculum. If in doubt, consult a bat specialist.
	During		<b>May be acceptable</b> if bats and hibernaculum will not be negatively affected by the disturbance generated. Consult a bat specialist.

*Wildlife Habitat Features Field Guide (Kootenay Boundary Region)*

**Table 50. Information to consider when conducting primary forest activities near a bat hibernaculum.**

<b>Information to Consider</b>
<p><b>General management considerations:</b></p> <ul style="list-style-type: none"><li>• Maintain habitat connectivity on the landscape. Habitat connectivity is vital for some of the smaller bat species.</li><li>• Connectivity can be maintained with non-merchantable timber or tall (e.g. 3 m) shrub cover provided a contiguous line of vegetation (with gaps less than 10-20 m wide) connects hibernaculum areas to large forest retention zones on the landscape.</li><li>• Designating narrow (1 to 3 m wide) “no-machine” zones within blocks may be an effective means of keeping habitat connectivity for small bat species. Adjacent blocks with green-up heights of 2-3 metres may also function as an edge that connects habitats.</li></ul> <p><b>Habitat Reserve Zone:</b></p> <ul style="list-style-type: none"><li>• Do not harvest within the 100 m core area without first consulting a bat specialist.</li><li>• Minimize all other disturbance adjacent to hibernaculum sites during the sensitive period (October 1 to April 30)</li><li>• Do not blast, remove rock or talus, or constructing new roads within the Habitat Reserve Zone at any time.</li><li>• Consult a bat specialist to determine whether High or Very High impact activities can be conducted safely outside of the sensitive timing window.</li></ul> <p><b>Disturbance Management Zone:</b></p> <ul style="list-style-type: none"><li>• Low and medium impact activities may take place within the Disturbance Management Zone throughout the year without concern.</li><li>• High and Very High impact activities may take place in the Disturbance Management Zone throughout the year. Assessment by a bat specialist is recommended to ensure the activities do not compromise the effectiveness of the feature.</li><li>• Use caution in the Disturbance Management Zone to ensure that High and Very High impact activities do not disrupt roosting bats with excessive noise or vibration.<ul style="list-style-type: none"><li>○ Excessive noise includes loud (&gt;80dB) high frequency sound between 20-200kHz</li><li>○ For blasting and jackhammer-type activities ensure;<ul style="list-style-type: none"><li>▪ Sound concussion of less than 150 decibels</li><li>▪ Shock waves of less than 15 p.s.i.</li><li>▪ Peak particle velocity of less than 15 mm/second</li></ul></li></ul></li><li>• If Very High Impact activities are planned in the unoccupied period use protective methods (such as blast mats) to ensure the feature remains unchanged (see British Columbia Best Management Practices for Bats: Cave and Crevice Management for further details).</li></ul>

**5) Additional Information**

A Field Guide for Site Identification and Interpretation for the Nelson Forest Region, Land Management Handbook No. 20:

<https://www.for.gov.bc.ca/hfd/pubs/docs/lmh/lmh20.htm>

BC Species and Ecosystems Explorer–Species Summaries for Bat Species:

<http://a100.gov.bc.ca/pub/eswp/search.do?method=reset>

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Best Management Practices for Bats in British Columbia:

<http://a100.gov.bc.ca/pub/eirs/viewDocumentDetail.do?fromStatic=true&repository=BDP&documentId=12460>

Karst Management Handbook for British Columbia:

<http://www.for.gov.bc.ca/hfp/publications/00189/Karst-Mgmt-Handbook-web.pdf>

Identified Wildlife Management Strategy—additional guidance concerning the management of any *Forest and Range Practices Act* species at risk associated with a bat hibernaculum:

<http://www.env.gov.bc.ca/wld/frpa/iwms/accounts.html>

Species at Risk Public Registry—additional information for each bat species:

[http://www.registrelep-sararegistry.gc.ca/species/default\\_e.cfm](http://www.registrelep-sararegistry.gc.ca/species/default_e.cfm)

### 13. A Bat Nursery Roost

#### 1) Definition

*A bat nursery roost* means a feature that “houses” an aggregation of female bats and their young.

A nursery roost is a type of *maternity roost* (a grouping of females) but refers specifically to the period when females have given birth and are roosting with their offspring. The Wildlife Habitat Features Order differentiates nursery roosts from maternity roosts. Maternity roosts are used by pregnant females and are generally occupied from April 1 – May 30. Maternity roosts can be in tree or rock features and can be used alone or in small groups. While particularly important, maternity roosts are not included in the Wildlife Habitat Feature Order.

The Wildlife Habitat Feature criterion of ‘evidence of use’ is not required for bat nursery roosts because it is very difficult to identify evidence of use and confirm occupancy. High quality suitable features should be managed as bat nursery roost Wildlife Habitat Features based on the guidance provided in this chapter. If steps are taken to confirm occupancy and the results are negative, the high-quality suitable feature does not need to be managed as a Wildlife Habitat Feature.

Figure 51 shows three tree roost features. Figure 52 shows three rock crevice nursery roosts.



**Figure 51. Bat nursery roosts in trees can occur in a variety of tree species. Clockwise from top: vertical crevice in a live aspen, large opening and cavity in an advanced decay class Western redcedar, and a crevice under thick bark of a live cottonwood. (Photos: Cory Olson, Province of British Columbia)**



**Figure 52. Bat nursery roosts in rock features can occur in a variety of formations such as cliff faces, rock outcrops, split boulders, stacked rock, and talus slopes. Top: Cliff face illustrating a roost area with multiple roost sites in rock crevices. (Photo: Mandy Kellner) Bottom left: crevices under rocks in a boulder field provide a bat roost. (Photo: Doug Burles) Bottom right: crevice under a sandstone slab used by a long-eared myotis. (Photo: Cori Lausen)**

## **2) Importance of a Bat Nursery Roost**

Bats have a small litter size and long lifespan, the opposite life history strategy for most small mammals. Most bat species give birth to just a single young (called “pup or pups”) each year. Some species, such as little brown myotis, can live up to 42 years. Growth and survival of young bats depends primarily on having a safe warm roost and an abundant food source. The slow reproductive rate of bats and high overwinter mortality of pups in their first year means that bat populations are extremely sensitive to activities that would have a negative impact on reproductive success and survival. This makes the effective protection of bat nursery roosts a priority for wildlife management.

Pregnant females move to nursery roosts as they approach time to give birth. Nursery roosts are generally occupied from May 30 – September 30 but can be occupied as early as April 1. Bats

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tend to give birth from late June until mid-July. The sites used by “nursery” and “maternity” colonies may or may not overlap. All sensitive period dates can vary in timing depending on regional and annual climatic conditions and/or the geographic location within the province.

Nursery roosts provide protection from the elements, such as rain, wind and excessive heat, and help to regulate the temperature of pups while the mothers are away hunting. Young bats achieve adult size by around 4-5 weeks of age, but then must learn to fly, hunt insects, and fatten enough to ensure survival through the winter hibernation period. Overwinter survival rates of young bats can be as low as 40-50%. Any factors that can accelerate or maintain optimum growth rates of young bats will improve their chances of overwinter survival.

Nursery roosts are classified as “permanent”, “long-duration”, or “ephemeral” based on the longevity of the feature and fidelity of bats to a site.

A **permanent roost** is one that is available for bat use over many decades and has suitable characteristics (e.g., microclimate, access) that remain stable over time. Examples of natural, permanent roosts include caves or cliffs. Permanent nursery roosts are especially important for bats, as these features may be used by the same females and their breeding female offspring year after year, sometimes for decades. Permanent roost sites are relatively uncommon on many landscapes. Narrow crevice habitats in rock formations are important for bat species that form small colonies.

A **long-duration roost** is one available for bat use for many years or even decades. An example of a long-duration roost is a slow-decaying tree species such as a hollow western redcedar (Figure 53). These trees can remain standing on the landscape for many years as they decay. Larger trees can also provide long-duration roost sites because they support larger cavities and crevice features. Narrow crevice habitats in trees (of varying decay class and diameter) are important for small bat species and bat species that form small colonies.

An **ephemeral roost** is one where the characteristics important to a bat colony (e.g., microclimate) change quickly or unpredictably. An example of an ephemeral roosts is an area under sloughing tree bark (Figure 54). In some circumstances areas of peeling bark may provide suitable bat-roosting habitat for a few seasons, but their unpredictable nature and relatively short permanency makes them an ephemeral roost.

For both rock-type and tree roosts, some species will show strong fidelity to one specific roost site while other species may show fidelity to a roost area and move between several roost sites. For example, a cliff face may provide several roost sites that a single colony will use during a season. Nursery roosts may be abandoned by bats if they experience repeated disturbance that affects the roost microclimate. Large cavities have been found capable of housing larger colonies, for the species with this life history strategy. Large colonies have been shown to have higher reproductive success because females and their young benefit from the additional warmth from huddling in a group.

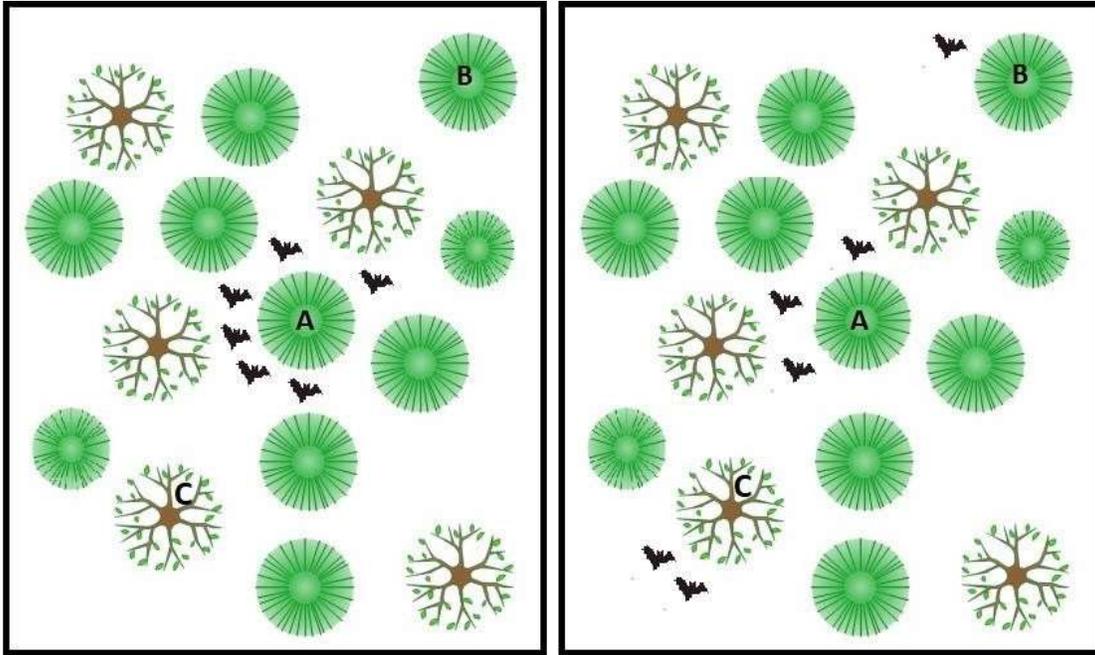


**Figure 53. Inside a western red cedar bat nursery roost (looking upwards).** (Photo: Suzanne Beauchesne)



**Figure 54. Sloughing bark provides potential nursery roost sites.** (Photo: Todd Manning)

For many bat species, a nursery colony may need more than a single tree for raising pups and having alternate roost sites within an area is important. Colonies of pregnant and nursing female bats can use several roost trees in a roost area (Figure 55). The size of a roost area varies and may depend on the availability of suitable roost trees. Studies have recorded roost areas ranging from 0.3-3 ha in size. The colony may split up and roost in different trees in one area one night and return to roost in a primary roost on the next night. Depending on the bat species, a colony may use from 10-30 trees in a roost area but may have two or three “nodal” trees where the socially-linked colony forms a large group together. Movements may occur for any number of reasons.



**Figure 55. Nursery colonies are social groups that may roost together in a primary nodal tree (tree A) but split up and roost in separate trees on some nights (right panel, trees B & C) eventually grouping together again in a nodal tree (left panel).** (Figure: Susan Holroyd)

### 3) What to Look For

There are fifteen different bat species in the province (Table 51). These species have many different life history characteristics and there is variation in the features of a nursery roost used by different species.

While all bats in British Columbia use forest habitat for either roosting or foraging, only four species exclusively use trees as nursery roosts. Table 52 summarizes the nursery roost types used by species. Many species use both rock crevice habitat and trees as nursery roosts, and a few use only rock crevices or cliff habitats for nursery roosts. Hoary and red bats roost as single-family units. Long-eared bats and Northern myotis likely have smaller-sized colonies at less than 25 individuals per colony. The species with the largest colony sizes are Yuma and Little Brown bats. Their colonies can be larger than 1000 individuals. Big brown bats can also have sizeable colonies when in human structures (e.g. buildings) however tree roost colonies are generally around 40 or fewer individuals. Silver-haired bats seem to have smaller colony sizes as well at 8-30 individuals. A colony can often be difficult to define as there may be a group that is socially linked but it may roost all together in one tree one night and spread in smaller groups in several trees on another night (fission-fusion roosting behaviour).

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**Table 51. Bat conservation status and distribution by region and biogeoclimatic zone in British Columbia.<sup>1</sup>**

Species	Conservation Status (COSEWIC/ British Columbia)	Region							
		Cariboo	Kootenay Boundary	Northeast	Omineca	Skeena	South Coast	Thompson Okanagan	West Coast
Pallid Bat ( <i>Antrozous pallidus</i> )	Threatened/ Red-listed		X					X	
Townsend's Big-eared Bat ( <i>Corynorhinus townsendii</i> )	Not assessed/ Blue-listed	X	X				X	X	X
Big Brown Bat ( <i>Eptesicus fuscus</i> )	Not at risk	X	X	X	X	X	X	X	X
Spotted Bat ( <i>Euderma maculatum</i> )	Special Concern/ Blue-listed	X	X					X	
Silver-haired Bat ( <i>Lasionycteris noctivagans</i> )	Not at risk	X	X	X	X	X	X	X	X
Eastern Red Bat ( <i>Lasiurus borealis</i> )	Not assessed/ Unknown			X			X	?	
Hoary Bat ( <i>Lasiurus cinereus</i> )	Not at risk	X	X	X	X		X	X	X
Californian Myotis ( <i>Myotis californicus</i> )	Not at risk	X	X			X	X	X	X
Western Small-footed Myotis ( <i>Myotis ciliolabrum</i> )	Not assessed/ Blue-listed	X	X					X	
Long-eared Myotis ( <i>Myotis evotis</i> )	Not at risk	X	X	X	X	X	X	X	X
Little Brown Myotis ( <i>Myotis lucifugus</i> )	Endangered/ Not assessed	X	X	X	X	X	X	X	X
Northern Myotis ( <i>Myotis septentrionalis</i> )	Endangered/ Blue-listed	X	X	X	X	X			
Fringed Myotis ( <i>Myotis thysanodes</i> )	Not assessed/ Blue-listed	X	X				?	X	?
Long-legged Myotis ( <i>Myotis volans</i> )	Not at risk	X	X	X	X	X	X	X	X
Yuma Myotis ( <i>Myotis yumanensis</i> )	Not at risk	X	X			X	X	X	X
Canyon Bat ( <i>Parastrellus hesperus</i> )	Not assessed							?	

<sup>1</sup> Modified from Best Management Practices for Bats in British Columbia (2016); updated with information from the BC Species and Ecosystems Explorer (January 2019).

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**Table 52. Types of nursery roosts used by bats in British Columbia, typical habits and distinguishing features.**

Bat Species	Nursery Roost Type	Habit	Notes
Spotted bat, Pallid Bat, Western Small-footed Myotis and Canyon Bat	Roosts in <b>rock features</b> only.	All species will fly in open habitats. Crosses large gaps easily.	Easy to identify, either visually or by echolocation call.  Single acoustic detection of Canyon bat in south Okanagan. More inventory required.
Hoary bat	Roosts on <b>small twigs</b> in open foliage. Requires tall trees with open space below to “drop and fly”.	Uses older, tall, mature trees with open canopy; flies in open habitats. Often chooses the tallest tree available. Open understory is essential.	Easily identifiable both visually and acoustically.
Silver-haired bat	Roosts only in <b>tree features</b> .	Forages in open habitats. Crosses large gaps easily.	Silver-haired bats are easily identifiable visually or with acoustic detectors.
Northern Myotis	Old-growth or mature, old-seral trees.	Forages along edges or in interior forest habitat. Sensitive to fragmentation.	Northern Myotis require capture, DNA or acoustic detection for identification.
Big brown bat, Little Brown Myotis, Yuma Myotis, Long-legged Myotis, Fringed Myotis	Roosts in <b>rock and tree features</b> . Tree roosts generally in old-growth, mature, old-seral trees.	Forages in open habitats. Crosses large gaps easily.	Identification for all species requires capture, DNA, or acoustic detection.
California Myotis, Long-eared Myotis		Forages along edges or in interior forest habitat. Sensitive to fragmentation.	
Townsend’s Big-eared Bat	Roosts in <b>rock and tree features</b> . Tree roosts generally very large cavities. Rock roosts generally shallow cave formations.	Prefers roosts with large entry points. Selects wide open locations within roosts, easy to locate and identify.	Easy to identify visually. As a “whispering bat” not easily detected by acoustic detectors.

It can be difficult to confirm bat use of a potential nursery roost. The period when bats occupy a nursery roost is relatively short, and evidence of use may or may not be obvious without specialized equipment or training. Absence of obvious current bat use does not necessarily mean that a site is not a nursery roost.

The following information will help in identification of bat nursery roosts and assessing occupancy. Table 53 summarizes what to look for when identifying bat nursery roosts. Table 54 provides guidance on methods to determine if a nursery roost is occupied. Table 55 provides information on how to select high quality suitable nursery roosts in absence of evidence of use and confirmed occupancy. Table 56 summarizes information to consider when conducting primary forest activities near a bat nursery roost.

**Table 53. Bat nursery roosts: what to look for.**

Description of a Bat Nursery Roost
<p><b>Aspect:</b> Preference for warm, south – southwest aspects with long periods of sun exposure.</p> <p><b>Elevation:</b> Generally, below the ESSF and upper MS biogeoclimatic zones. Upper slopes in valley bottoms are common warm sites as they will be exposed to the sun for longer durations. Lower elevations can still be used, particularly if the roost sites are within 1-km of water.</p> <p><b>Exposure:</b> Nursery roosts need to be dry and provide protection from the weather and wind. This can be difficult to determine, particularly when there is an emphasis on sites with high periods of solar exposure.</p> <p><b>Temperature:</b> Bats select for warmer sites to promote pup development but locations with extreme temperatures (over 40°C) are often avoided.</p> <p><b>Habitat Connectivity:</b> Some bat species will not cross large open spaces surrounding a roost site. Vegetative connectivity can be achieved with a narrow strip of trees or shrubs, at least 3 m in height. Locations with connectivity within 1-km of water, preferably open, still water, acceptable for drinking. Required size of water source varies by bat species depending on bat size and maneuverability.</p> <p><b>Tree roosts:</b> Tree features can include hollow trees, trees with defects, stub trees, cavities, or gaps behind loose, sloughing bark. Bats using tree roosts prefer trees in older forests that meet many of the following criteria:</p> <ul style="list-style-type: none"><li>○ moderate decay (tree classes 2–5)</li><li>○ large diameter (&gt; 50 cm dbh in the interior dry zones and &gt; 70 cm dbh on the Coast and Interior Cedar–Hemlock zone). Trees with these dbh represent the largest and potentially the most effective roost trees; however, bats will use smaller dbh trees with appropriate roosting features</li><li>○ vertical hollow cavity accessed via a stem scar (Figure 51)</li><li>○ woodpecker excavations</li><li>○ deep stem cracks; hollows created at points where branches have broken off at the bole (Figure 53)</li><li>○ most bark intact but loosening (Figure 54)</li><li>○ any defect that results in a crevice 1-2 cm wide (or more) and 10 cm deep (or more)</li><li>○ bat features (cracks, cavities and crevices) must be at least 3m off the ground</li><li>○ prefer open vegetation conditions on the side of the tree with the roost feature</li></ul> <p><b>Rock roosts:</b> Most naturally occurring caves are suitable for overwintering but not as nursery roosts. Suitable rock features include rock crevices, cliffs, rock outcrops, boulder fields, and talus slopes in warm sites on south-facing aspects. Rock crevices used for nursery roosts usually have (Figure 52):</p> <ul style="list-style-type: none"><li>○ crevice openings are at least 1-2 centimetres wide or more</li><li>○ crevice depth of 15 centimetres or more</li><li>○ crevices may be horizontal or vertical</li><li>○ can be lower than 3 m off the ground but needs to be high enough to all bats to ‘drop and fly’ from the opening</li></ul> <p>Bridges and buildings can also be used as nursery roosts however <i>only naturally occurring bat nursery roosts are considered wildlife habitat features.</i></p>

**Table 54. How to determine if a roost is occupied**

<b>Identifying an Occupied Nursery Roost Site</b>
<p>Nursery roosts are most often occupied by a group of bats. Evidence of use by a group or repeated use include:</p> <ul style="list-style-type: none"><li>• large accumulations of bat feces (guano) under the roost site</li><li>• dark staining on roosting surfaces from the natural oils in their fur</li><li>• urine stains and/or “pissicles” (light coloured staining or hardened, light yellow icicle-shaped features made of urine)</li><li>• distinct smell of bat guano and urine.</li></ul> <p>Field staff can undertake basic measures to assess occupancy such as:</p> <ul style="list-style-type: none"><li>• Inspect suspected nursery roosts cautiously by briefly shining a flashlight into the entrance and looking for individuals</li><li>• Bat roosts can also be monitored at night for direct visual observations. At dusk, bats may be seen emerging from, or flying around, the entrance as they leave to forage and return</li><li>• Look for bat guano. Guano is often present at the base of an entrance and the smell of ammonia from bat urine may be noticeable at recently used roosts.</li><li>• Bat guano looks like mouse droppings (Figure 56) but contains chewed up bits of insect exoskeletons and wings that crush into a crumbly powder and may appear to have shiny flecks. In comparison, mouse droppings are solid and claylike.</li><li>• If guano is found, collecting a sample for DNA analysis will allow verification of species</li></ul> <p>If occupancy is not easily determined from these signs or methods, confirming occupation will require the services of a qualified professional biologist with specific and current experience with bats (herein referred to as a bat specialist). The methods used by bat specialists require specialized training and equipment.</p>



**Figure 56. Bat guano from two species, Big Brown Bat on the left and slightly smaller Little brown bat on the right. (Photo: Cory Olson)**

**Table 55. How to select high quality suitable nursery roosts for protection as Wildlife Habitat Features in absence of evidence of use.**

<b>Selecting a High-Quality Suitable Nursery Roost</b>
<ul style="list-style-type: none"><li>• Identify whether you are in a suitable habitat area<ul style="list-style-type: none"><li>○ South or southwesterly exposure</li><li>○ Upper slope or lower slope with access to water</li><li>○ Elevation and BEC zone</li></ul></li> <li>• Identify tree and rock features based on suitability to support nursery roosts</li><li>• Target the biggest trees in the appropriate decay class range with defects that could be used by bats for roosting</li><li>• Focus on permanent or long-duration features</li><li>• Permanent nursery roosts in rock features and in long-duration tree roosts should receive a higher level of protection and management than ephemeral roosts (such as under peeling bark, or in trees that are known to decay quickly)</li><li>• Selection of candidate Wildlife Habitat Feature trees can be narrowed by considering<ul style="list-style-type: none"><li>○ tree longevity</li><li>○ quality of cavities available for roosting</li><li>○ tree diameter</li><li>○ site (warm sites, sites near water, sites connected to other tree retention areas are better)</li></ul></li><li>• Balance the targeted number of Wildlife Habitat Features for bats in the area with the availability of suitable bat roost trees in existing reserve zones on the landscape</li><li>• Expect high variability in the availability of suitable trees; some areas may have very few suitable trees others may have a large number that may be suitable as nursery roosts</li><li>• Not every suitable tree needs to be managed as a Wildlife Habitat Feature.</li><li>• Where there is a high number of suitable nursery roost trees, target 10 trees/ha; prioritize the best trees on site for retention</li></ul>

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**Table 56. Information to consider when conducting primary forest or range activities near a bat nursery roost.**

<b>Information to Consider</b>
<ul style="list-style-type: none"><li>• Permanent nursery roosts should receive a higher level of protection and management than ephemeral roosts. Actively manage landscape areas with ephemeral roost habitat to maintain and recruit suitable amounts of roost habitat over time. Focus management decisions on protecting permanent nursery roosts from degradation, disturbance, or loss.</li><li>• Establish a forested retention area centred around nursery roosts.</li><li>• Where available, retain multiple trees close to one another (e.g., a wildlife tree patch) as alternative roost sites.<ul style="list-style-type: none"><li>○ Valuable tree characteristics include: loose sloughing bark, hollow vertical cavities, deep stem cracks, large diameter (Interior: &gt; 50 cm dbh; Coast and Interior Cedar–Hemlock (ICH) biogeoclimatic zone: &gt; 70 cm dbh).</li></ul></li><li>• Avoid blasting, removing rock or talus, or constructing new roads within the retention area.</li><li>• Avoid harvesting or salvaging trees within the retention area.</li><li>• When harvesting adjacent to the retention area, retain an open, residual stand structure. Possible retention strategies:<ul style="list-style-type: none"><li>○ Retain some large-diameter defective trees; ideally, these are trees with hollows, stem cracks, broken tops, woodpecker cavities, or loose bark, and are usually of low merchantability.</li><li>○ Retain veteran trees, especially those which extend above the main canopy.</li><li>○ Preferred roost trees on the Coast and southern Interior include western redcedar, Douglas-fir, western hemlock, and white spruce; in central and northern Interior, trembling aspen is frequently selected for roosting.</li></ul></li><li>• If operating areas contain cliffs, or rock outcrops with openings or crevices (especially those which have sunny aspects), include these in a wildlife tree patch (these sites are typically inoperable); most suitable cliff or rock outcrop sites are usually at lower elevations, especially in the ICH biogeoclimatic zone.</li><li>• Minimize disturbance adjacent to known nursery roost sites during critical times, generally May–September (i.e., when young are born and reared).</li><li>• Because many nursery roost trees are either dead or decayed, they are often targeted by firewood cutters. Place a “Wildlife Tree Sign” on known and potential nursery roost trees near public roads to educate the public on their high ecological value.</li></ul>

**4) Regional Information – Kootenay Boundary**

In this section, we provide specific timing windows and guidance on disturbance buffers for the Kootenay Boundary Region. This information may vary from provincial guidance and may not be applicable outside of the Kootenay Boundary Region because of regional specificity.

Bats occur throughout the Kootenay Boundary Region, although preferred habitat types and nursery roost characteristics vary with species (Table 57). Nursery roosts occurring within a species’ range are restricted by topographic features, not vegetation type. Bats are sensitive to disturbance. Table 58 provides suggested minimum buffer sizes. Additional protection or alternative measures may be needed, depending on the nature of the disturbance, existing landscape and cover, or other factors. Table 59 summarizes information to consider when conducting primary forest activities near a bat nursery roost.

Bats begin roosting and preparing for birth when they emerge from hibernation and pregnancy is initiated. There can be considerable variability in the timing of birth due to climatic conditions in

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the spring. Generally, the pregnancy period is between April 1 – May 31 and the nursery period between May 31 – September 1. This creates a potential *sensitive period of April 30 – September 1*.<sup>2</sup> Based on site observations, the length of this sensitive period can be refined.

**Table 57. Characteristics of natural bat nursery roosts in the Kootenay Boundary Region.<sup>3</sup>**

Species	Biogeoclimatic Zone <sup>4</sup>				Nursery Roost Characteristics*		
	PP	IDF	MS	ICH	Trees	Rock Crevices, Outcrops	Cliffs
Pallid Bat	X				dead/dying	No	Yes
Townsend’s Big-eared Bat	X	X		X	dead/dying, live >70 cm dbh	Yes	Yes
Big Brown Bat	X	X	X	X	dead/dying	Yes	Yes
Spotted Bat	X				No	No	Yes
Silver-haired Bat	X	X	X	X	live, in tree bark	No	No
Hoary Bat	X	X	X	X	dead/dying, live	No	No
Californian Myotis	X	X	X	X	dead/dying	Yes	No
Western Small-footed Myotis	X	X			No	Yes	Yes
Long-eared Myotis	X	X	X	X	dead/dying, stump	Yes	Yes
Little Brown Bat	X	X	X	X	dead/dying	Yes	Yes
Northern Myotis				X	dead/dying	No	No
Fringed Myotis	X	X			dead/dying	Yes	No
Long-legged Myotis	X	X	X	X	dead/dying, stump	Yes	Yes
Yuma Myotis	X	X	X	X	dead/dying	Yes	No

<sup>2</sup> Best Management Practices for Bats in British Columbia (2016).

<sup>3</sup> Best Management Practices for Bats in British Columbia (2016).

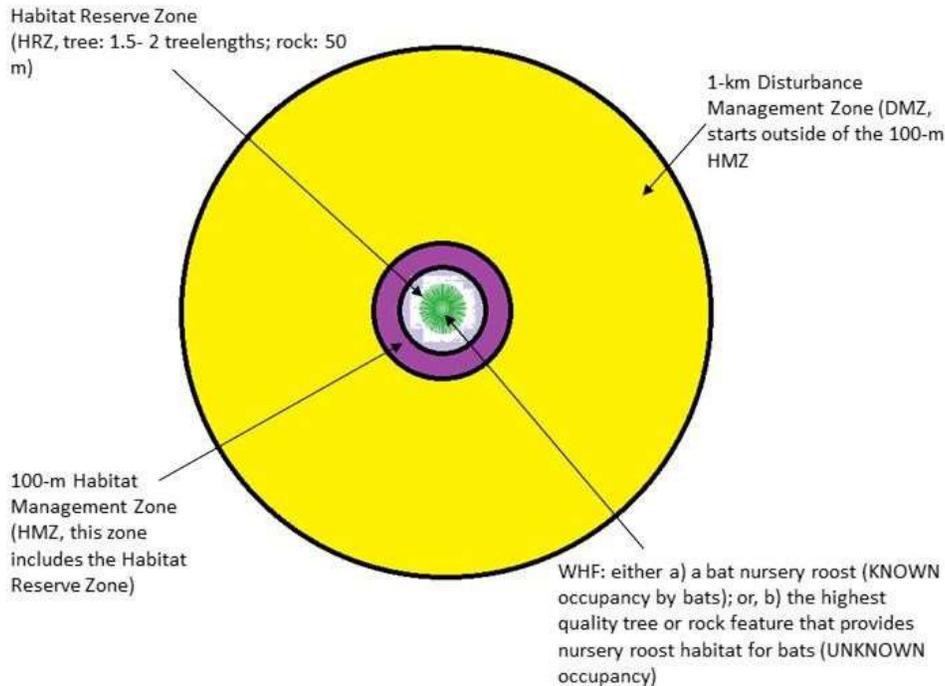
<sup>4</sup> A Field Guide for Site Identification and Interpretation for the Nelson Forest Region (1992); PP = Ponderosa Pine; IDF = Interior Douglas-fir; MS = Montane Spruce; ICH = Interior Cedar–Hemlock; ESSF = Engelmann Spruce–Subalpine Fir.

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Three different management zones are prescribed for bat nursery roosts (Figure 57).

1. The **Habitat Reserve Zone** is a zone of retention (no harvest) and is designed to protect the feature from damage (from wind, harvest-related injury or damage or disturbance from other activities such as blasting) and to retain microclimatic features of the Wildlife Habitat Feature.
2. The 100-m **Habitat Management Zone** is not a zone of retention. Disturbance recommendations are more stringent in the Habitat Management Zone than in the Disturbance Management Zone.
3. 1-km **Disturbance Management Zone** is not a zone of retention.

Recommendations are provided on the timing of specific activities that represent different levels of disturbance and on how to manage habitat within the Habitat Management Zone and Disturbance Management Zone to benefit bats. Habitat management within both these zones should be used to help retain connectivity between the Wildlife Habitat Feature and surrounding habitats for bats.



**Figure 57. Habitat Reserve Zone, 100-m Habitat Management Zone and additional 1-km Disturbance Management Zone around a bat nursery roost Wildlife Habitat Feature.**  
(Figure: Susan Holroyd)

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**Table 58. Level of Disturbance allowable within each of the management zones with respect to the time of year.** Outside the sensitive period is September 2 – April 29. During the sensitive period is April 30 – September 1.

<b>Level of Disturbance</b>	<b>Time Period<sup>1</sup></b>	<b>Habitat Reserve Zone</b> (tree: 1.5-2 tree lengths; rock: 50 m)	<b>Habitat Management Zone</b> (100-m buffer)	<b>Disturbance Management Zone</b> (additional 1-kilometre buffer)
<b>Low Impact</b> (i.e., livestock attractants, activities on foot, small groups; examples include layout, cruising, reconnaissance)	Outside	<b>Acceptable</b>		<b>Acceptable all-year</b>
	During	<b>Acceptable</b>		
<b>Medium Impact</b> (i.e., light mechanized activities, larger groups/duration; examples include fence building, spacing, planting)	Outside	<b>Acceptable with caution.</b> Use extra caution adjacent to the roost. If in doubt, consult a bat specialist.	<b>Acceptable</b>	<b>Acceptable all-year</b>
	During	<b>May be acceptable</b> if bats and roost will not be negatively affected by the disturbance generated. If in doubt, consult a bat specialist.	<b>Acceptable with caution.</b> Use extra caution immediately adjacent to the roost. If in doubt, consult a bat specialist.	
<b>High Impact</b> (i.e., mechanized activities; examples include road construction, falling and yarding, landing sites)	Outside	<b>Not acceptable</b>	<b>Acceptable</b>	
	During		<b>May be acceptable</b> if bats and roost will not be negatively affected by the disturbance generated. Consult a bat specialist.	
<b>Very High Impact</b> (i.e., blasting, helicopter logging)	Outside	<b>Not acceptable</b>	<b>Acceptable with caution.</b> Use extra caution adjacent to the roost. If in doubt, consult a bat specialist.	<b>Acceptable</b>
	During		<b>Not acceptable</b>	<b>May be acceptable</b> if bats and roost will not be negatively affected by the disturbance generated. If in doubt, consult a bat specialist.

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**Table 59. Information to consider when conducting primary forest activities near a bat nursery roost.**

<b>Information to Consider</b>
<p><b>General management considerations:</b></p> <ul style="list-style-type: none"><li>• Maintain habitat connectivity on the landscape. Habitat connectivity is especially important for some of the smaller bat species.</li><li>• Connectivity can be maintained with non-merchantable timber or tall (3 m) shrub cover provided there is a contiguous line of vegetation (with gaps less than 10-20 m wide) connecting roost areas to large forest retention zones on the landscape. This is especially important if these connections afford bats routes to foraging or drinking areas.</li><li>• Designating narrow (1-3 m wide) “no-machine” zones within blocks may be an effective means of keeping habitat connectivity for small bat species. Adjacent blocks with green-up heights of 2-3 m may also function as an edge that will connect habitats.</li><li>• Not every roost requires this type of connectivity but incorporating connectivity where possible (i.e., where it can be added with little impact to harvesting objectives) will improve the habitat effectiveness for many species.</li><li>• If operating areas contain cliffs or rock outcrops with openings or crevices on solar aspects include these in a wildlife tree patch. Most suitable cliff or rock outcrop sites are usually at lower elevations, especially in the ICH biogeoclimatic zone.</li><li>• Because many nursery roost trees are either dead or decayed, they are often targeted by firewood cutters. Place a “Wildlife Tree Sign” on known and potential nursery roost trees near public roads to educate the public on their high ecological value.</li></ul> <p><b>Habitat Reserve Zone:</b></p> <ul style="list-style-type: none"><li>• Minimize all disturbance adjacent to nursery roost sites during the sensitive period (April 30 – September 1)</li><li>• Do not blast, remove rock or talus, construct new roads, or perform harvest or salvage activities within the Habitat Reserve Zone (1.5-2 tree lengths around a tree or 50 metres around a rock feature) at any time.</li></ul> <p><b>Habitat Management Zone:</b></p> <ul style="list-style-type: none"><li>• When harvesting within the 100-m Habitat Management Zone, retain an open, residual stand structure. Possible retention strategies include:<ul style="list-style-type: none"><li>○ Retain some large-diameter defective trees; ideally, these are trees with hollows, stem cracks, broken tops, woodpecker cavities, or loose bark, and are usually of low merchantability.</li><li>○ Retain veteran trees, especially those which extend above the main canopy.</li><li>○ Preferred roost trees in the southern Interior include western redcedar, Douglas-fir, western hemlock, and white spruce; in central and northern Interior, trembling aspen is frequently selected for roosting and could be used across the province where these trees occur.</li></ul></li><li>• Do not blast, remove rock or talus, or constructing new roads, or undertake harvest or salvage activities within the 100-m Habitat Management Zone during the sensitive period (April 30 – September 1)</li><li>• Outside of the sensitive timing window, consult a bat specialist to determine if high or very high impact activities can be conducted</li></ul> <p><b>Disturbance Management Zone:</b></p> <ul style="list-style-type: none"><li>• Low and medium impact activities may take place within the Disturbance Management Zone throughout the year without concern.</li><li>• High and very high impact activities may take place in the Disturbance Management Zone</li></ul>

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throughout the year, however assessment by an experienced bat biologist may be needed to ensure the activities do not compromise the effectiveness of the feature.

- Use caution in the Disturbance Management Zone to ensure that high and very high impact activities do not disrupt roosting bats with excessive noise or vibration.
  - Excessive noise includes loud (>80dB) high frequency sound (20-200kHz)
  - For blasting and jackhammer-type activities ensure sound concussion of <150 decibels, shock wave <15 p.s.i., and peak particle velocity <15 mm/second
- Ensure that activities such as blasting do not compromise the structure of the roost or that excavation activities do not compromise the roost through changes in drainage patterns.
- If very high impact activities are planned in the unoccupied period use protective methods (such as blast mats) to ensure the feature remains unchanged (see British Columbia Best Management Practices for Bats: Cave and Crevice Management for further details).

### **5) Additional Information**

A Field Guide for Site Identification and Interpretation for the Nelson Forest Region, Land Management Handbook No. 20:

<https://www.for.gov.bc.ca/hfd/pubs/docs/lmh/lmh20.htm>

BC Species and Ecosystems Explorer – Species Summaries for Bats:

<http://a100.gov.bc.ca/pub/eswp/search.do?method=reset>

Best Management Practices for Bats in British Columbia:

<http://a100.gov.bc.ca/pub/eirs/viewDocumentDetail.do?fromStatic=true&repository=BDP&documentId=12460>

Karst Management Handbook for British Columbia:

<http://www.for.gov.bc.ca/hfp/publications/00189/Karst-Mgmt-Handbook-web.pdf>

Identified Wildlife Management Strategy – Additional guidance concerning the management of any *Forest and Range Practices Act* species at risk associated with a bat hibernaculum:

<http://www.env.gov.bc.ca/wld/frpa/iwms/accounts.html>

Species at Risk Public Registry – Additional information for bat species:

[http://www.registrelep-sararegistry.gc.ca/species/default\\_e.cfm](http://www.registrelep-sararegistry.gc.ca/species/default_e.cfm)

## 14. A Hot Spring or Thermal Spring

### 1) Definition

*A hot spring or thermal spring* means a source of water that is heated geothermally and comes to the surface as a seep or forming a pool of unspecified size or temperature (Figure 58).



**Figure 58. Hot spring.** (Photo: Hans Roemer)

### 2) Importance of Hot and Thermal Springs

The elevated water temperature, air temperature, and humidity surrounding hot and thermal springs create their own unique microclimates that support species exclusively adapted to such environments. Because the microclimate of the springs mimics warmer climatic conditions, these areas sometimes support populations of plants and animals that are disjoint from the rest of their species distribution further south. In some cases, species isolated and confined to hot or thermal springs evolve into new, endemic species that are found nowhere else in the world.

The heated water of hot and thermal springs often dissolves minerals from the surrounding bedrock. These mineral-laden waters create ecosystems that may support unique warm-water bacteria and, in some cases, invertebrates and fish species. The waters from hot and thermal springs often produce mineral deposits around the springs that are used by wildlife as mineral licks.

### 3) What to Look For

As geomorphic features, hot and thermal springs are unique, with no defined minimum sizes or temperatures for the heated water coming from the spring. The unique microclimates associated with hot and thermal springs often make the vegetation surrounding them appear conspicuously different than nearby areas. Many hot and thermal springs have lush, oversized vegetation surrounding them related to their higher humidity, warmer temperatures, and mineral-rich growing conditions. Other hot and thermal springs are devoid of much plant growth other than

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brightly coloured algae; in these cases, the high mineral content of the waters or bacterial blooms may suppress growing conditions (Figure 59). Most hot and thermal springs are small seeps without pools that can be easily overlooked.



**Figure 59. Hot spring.** (Photo: Ken Lund)

Some hot and thermal springs emit unpleasant odours. Sulphur-bearing minerals dissolved in spring water often emit a rotten-egg odour (hydrogen sulphide), produced when these minerals are broken down by bacteria in the water. In winter, steam and running or open water are often noticeable around hot and thermal springs. Additionally, prominent tracks and trails may lead to the hot or thermal spring created by wildlife coming regularly to the mineral licks created by the springs.

Table 60 summarizes what to look for when identifying hot springs or thermal springs. Table 61 provides information to consider when conducting primary forest activities adjacent to springs.

**Table 60. Hot or thermal springs: what to look for.**

Description of a Hot or Thermal Spring
<ul style="list-style-type: none"><li>• Hot or thermal springs may form as distinct pools, or be small, inconspicuous streams that only pool when an obstruction or natural dam blocks the water flow.</li><li>• Waters are often tainted by bright, unnatural-looking colours caused by bacterial blooms and mineral deposits.</li><li>• Lush, dense and oversized vegetation surrounding the springs related to warm, humid microclimate, or devoid of much plant life because of noxious bacterial blooms.</li><li>• Unpleasant odours (rotten-egg smell) emitted from bacteria breaking down mineralized waters.</li><li>• Under frozen conditions in winter, steam and open or running water may be present.</li><li>• Noticeable wildlife tracks and trails leading to mineral sources around the springs.</li></ul>

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**Table 61. Information to consider when conducting primary forest or range activities near hot springs and thermal springs.**

<b>Information to Consider</b>
<ul style="list-style-type: none"><li>• Retain a vegetated buffer around the hot or thermal springs; this buffer will consist of the native vegetation (e.g., trees, shrubs, herbs, or bryophytes) occurring at the site at the time.</li><li>• Restrict all resource management activities (e.g., forestry, range, mining, etc.) within this buffer zone.</li><li>• Determine the source of water (when visible) feeding the hot or thermal springs. Karst springs can be recharged by diffuse infiltration through contributing karst catchments, by surface runoff from sinking/losing streams flowing off. Avoid restricting water flow by road construction or other activities; use appropriate crossing structures, if necessary.</li><li>• When rehabilitating roads and landings, or temporary access structures near a hot or thermal spring, restore natural surface drainage patterns as much as possible to maintain the quantity and quality of subsurface flows.</li><li>• In areas where cattle are grazed, avoid placing livestock attractants near hot or thermal springs; erect exclusion fencing in some areas to prevent cattle from damaging the riparian zone adjacent to identified hot or thermal springs.</li><li>• For hot or thermal springs located within a karst landscape and described as a “significant karst spring” maintain:<ul style="list-style-type: none"><li>○ a minimum 20-metre reserve extending outward from the edge of the discharge point of the spring.</li><li>○ an adjacent management zone of an appropriate size to protect the reserve from windthrow.</li></ul></li><li>• If the karst spring discharges into a stream channel or wetland, consult the default standards for riparian management as specified in the regulations supporting the <i>Forest and Range Practices Act</i>.</li><li>• Refer to the <i>Karst Management Handbook for British Columbia</i> for detailed information on managing karst springs (see Section 5).</li><li>• Consult a qualified professional biologist to assess site use by Red- or Blue-listed species; report occurrences to the B.C. Conservation Data Centre (see Section 5).</li></ul>

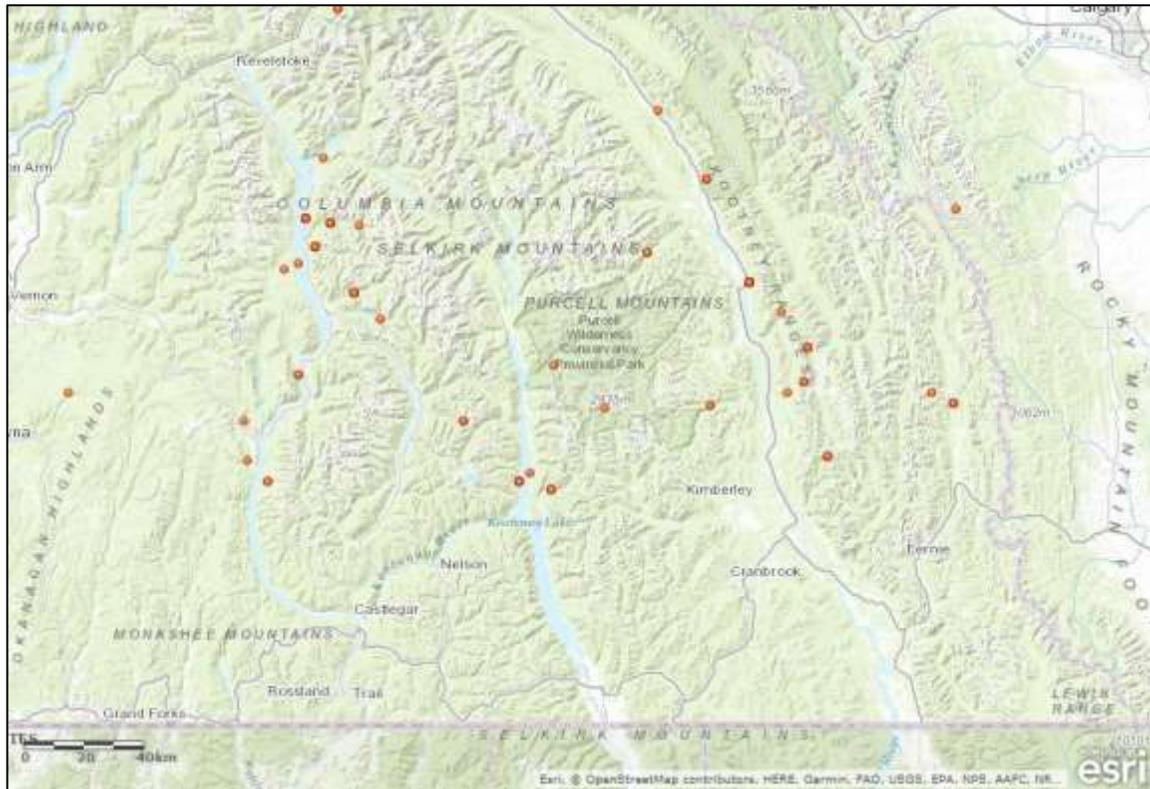
**4) Regional Information – Kootenay Boundary**

In this section, we provide specific timing windows and guidance on disturbance buffers for the Kootenay Boundary Region. This information may vary from provincial guidance and may not be applicable outside of the Kootenay Boundary Region because of regional specificity.

Hot springs and thermal springs are found throughout the Kootenay Boundary Region but are localized features with no known biogeoclimatic associations (Figure 60). Table 62 provides suggested minimum buffer sizes. Additional protection or alternative measures may be needed, depending on the nature of the disturbance, existing landscape, or other factors.

Hot springs and thermal springs create a unique microclimate that can support rare or highly specialized species and are sensitive year-round.

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**Figure 60. Locations of thermal springs in the Kootenay Boundary Region.<sup>1</sup>**

**Table 62. Guidance on disturbance buffers for a hot or thermal spring.**

<b>A Hot Spring or Thermal Spring – Guidance on Buffers</b>
<ul style="list-style-type: none"><li>• Establish an undisturbed vegetative buffer of 30 m. If windfirmness or rare plants are a concern, consider extending this buffer.</li><li>• Provide a buffer for water sources that may support the hydrology of the hot or thermal spring.</li></ul>

<sup>1</sup> From Canada Geothermal – ArcGIS Online (Spatial Layer; 2016).

**5) Additional Information**

B.C. Conservation Data Centre – Submit information on Red- or Blue-listed species associated with a hot or thermal spring to the Wildlife Species Inventory database:

[http://www.env.gov.bc.ca/wildlife/wsi/incidental\\_obs.htm](http://www.env.gov.bc.ca/wildlife/wsi/incidental_obs.htm)

Canada Geothermal – ArcGIS Online (Spatial Layer):

<http://www.arcgis.com/home/webmap/viewer.html?webmap=cebc4e70ad4c48fd8314a681ae65f09c&extent=-180,36.9029,-59.1385,71.5063>

Karst Management Handbook for British Columbia:

<http://www.for.gov.bc.ca/hfp/publications/00189/Karst-Mgmt-Handbook-web.pdf>

Identified Wildlife Management Strategy – Additional guidance concerning the management of any *Forest and Range Practices Act* species at risk associated with a hot or thermal spring:

<http://www.env.gov.bc.ca/wld/frpa/iwms/accounts.html>