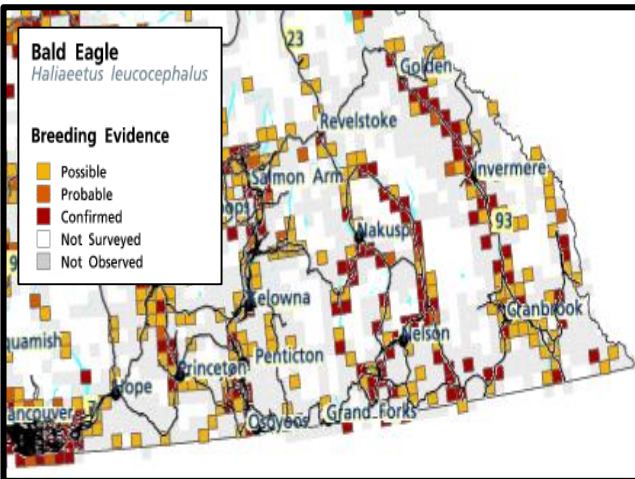


Bald Eagle

Haliaeetus leucocephalus

Breeding Evidence

- Possible
- Probable
- Confirmed
- Not Surveyed
- Not Observed



A NEST OF A BALD EAGLE

Definition

A 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.

Location

- Primarily in coniferous forest within 100 m of water but can be up to 2 km from a waterbody
- Usually in the top third of a large tree against trunk, on a large forked branch, or stem crotch

Features

- Made of large sticks and branches
- Relatively cup-shaped platforms with flat tops
- Evidence of use at base of tree (e.g. feces, prey remains, feathers)
- Size:
 - Diameter: 1.0-3.5 m
 - Depth: 0.5-2.5 m

Other

- Strong fidelity to nests; used year after year
- Yellow-listed in British Columbia and designated as Not at Risk by COSEWIC

Sensitive Timing

Courtship	Eggs Present	Young Present
Jan 1 – Feb 1	Feb 1 – Jun 30	Apr 1 – Aug 31



Photos: Jared Hobbs

Similar features to a Bald Eagle's nest

Osprey nests - how to distinguish:

- Osprey nests are smaller, and often are at the very top of the tree
- Osprey nests often contain other material such as grasses, sod, plastic bags, and other man-made materials

Great blue heron nests - how to distinguish:

- Great blue heron nests are less robust ('flimsy'), smaller and shallower
- Multiple heron nests can be found in the same area (rookery) whereas eagle nests are solitary
- May regurgitate food leaving dark gray wash with greasy-look at base of tree

Habitat	BEC
Interior Douglas-fir	IDF
Interior Cedar – Hemlock	ICH
Montane Spruce	MS
Engelmann Spruce – Subalpine Fir	ESSF
Ponderosa Pine	PP

Information to Consider

- Sensitive Timing:** January 1 – August 31
- Increase buffer, or delay activities, if a nest is active and the bird constantly flushes away when using minimum buffers.
- 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.
- 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.).

Recommended disturbance buffers around a Bald Eagle's nest depending on existing disturbance and disturbance level of the proposed activity.

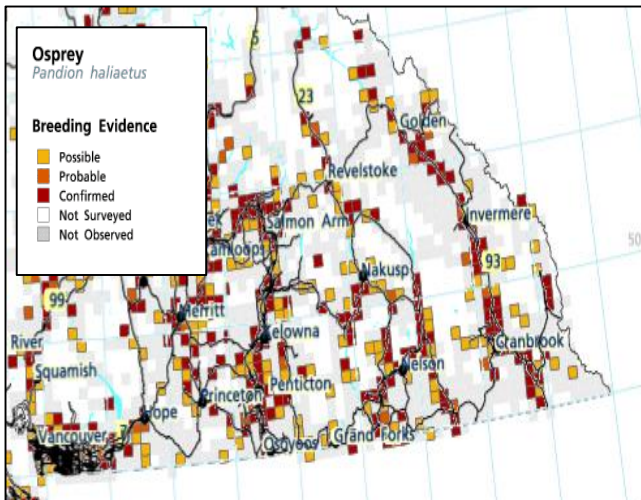
		Existing Exposure to Disturbance			
		NIL Isolated site, little or no prior access	LOW Undeveloped area with occasional human use	MODERATE Near secondary logging road or minor recreation site	HIGH Near primary road, major recreation site or human development
Disturbance Level of Proposed Activity	NEST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

Osprey

Pandion haliaetus

Breeding Evidence

- Possible
- Probable
- Confirmed
- Not Surveyed
- Not Observed



A NEST OF AN OSPREY

Definition

A 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.

Location

- Generally close to a permanent body of water
- Typically at the top of dead or live trees, and on man-made structures such as power poles (nest in manmade structures are not features)

Features

- Made of large sticks >0.75 cm in diameter
- Often lined with bark, sod, grass, or man-made materials
- Evidence of use at base of tree (e.g. feces, prey remains, feathers)
- Size
 - Diameter: 1.5-2.5 m
 - Depth: 0.5-1.5 m

Notes

- Strong fidelity to nests; used year after year
- Yellow-listed in British Columbia.
- COSEWIC provides no designation for this bird.

Sensitive Timing

Courtship	Eggs Present	Young Present
Apr 1 – Apr 30	May 1 – Jul 1	May 31 – Sept 1



Photos left to right: Mark Nyhof, Chris Wilson

Similar features to an Osprey nest

Bald eagle nests - how to distinguish:

- Bald eagle nests are larger, and are often within the top third of the tree
- Bald eagle nests often contain only sticks, not other material such as grasses, sod, plastic bags, and other man-made materials.

Great blue heron nests - how to distinguish:

- Great blue heron nests are less robust ('flimsy'), smaller and shallower
- Multiple heron nests can be found in the same area (rookery) whereas eagle nests are solitary
- May regurgitate food leaving dark gray wash with greasy-look at base of tree

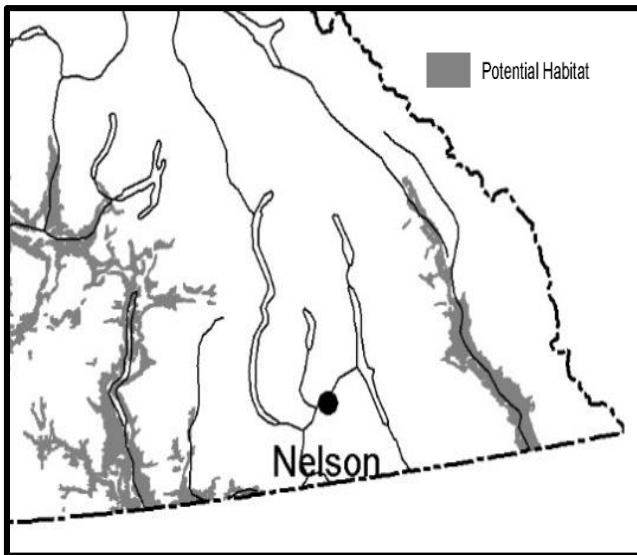
Habitat	BEC
Interior Douglas-fir	IDF
Interior Cedar – Hemlock	ICH
Montane Spruce	MS
Engelmann Spruce – Subalpine Fir	ESSF
Ponderosa Pine	PP

Information to Consider

- Sensitive Timing: April 1 – September 1**
- Unaccustomed levels of noise or activity near the nest tree can cause pairs to abandon their nest, particularly early in nesting season. Minimize time spent in the nest area during late January to mid-May.
- Increase buffer, or delay activities, if the nest is active and the bird constantly flushes away when using minimum buffers.
- 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.
- 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.).

Recommended disturbance buffers around an Osprey nest, depending on existing disturbance and disturbance level of the proposed activity.

		Existing Exposure to Disturbance			
		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 reconnaissance.	100-200m	1.5 x tree length	1.5 x tree length	1.5 x tree length
	MODERATE Light mechanized activities. Larger group/duration, no visual screening. Examples: spacing, planting, fence construction.	200-500m	100-200m	100-200m	1.5 x tree length
	HIGH Mechanized activities Examples: road construction, falling and yarding , landing sites.	200-500m	200-500m	200-500m	100-200m
	VERY HIGH Blasting, helicopter logging.	1000m +	1000m +	1000m +	1000m +



A NEST OF A FLAMMULATED OWL

Definition

A 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.

Location

- Usually in mature, open stands of ponderosa pine or Douglas fir with a multilayered canopy
- In soft snags >30 cm dbh, wildlife tree class 4-6, sometimes 7
- Usually 1.5-14 m above the ground
- Often located within or near small forest openings (<1 ha) that are adjacent to thickets of regenerating conifers and shrubs or large trees with heavy branching

Features

- Use natural cavities and abandoned woodpecker (primarily pileated woodpecker and northern flicker) cavities for nesting and roosting
- Size:
 - Entrance diameter: usually about 7 cm, close to their body size
 - Depth: 25-60 cm

Notes

- Migrate south during the winter (October-April)
- Designated as a Species at Risk under the *Forest and Range Practices Act* ; Blue-listed in British Columbia.
- Designated as a species of Special Concern by COSEWIC.



Photos left to right: Michael Woodruff, Michael Woodruff, Jared Hobbs

Sensitive Timing

Courtship	Eggs Present	Young Present
Apr 1 – Apr 30	Apr 30 – Jul 31	May 31 – Aug 31

Similar features to a Flammulated Owl Nest

Woodpecker nest - how to distinguish:

- The presence of pellets and prey remains at the base of the tree will indicate an owl species
- Woodpeckers leave white fecal sacs that are much smaller than pellets and do not have prey remnants. They may have insect exoskeletons.

Western screech owl nest - how to distinguish:

- Western screech owls almost always nest near riparian areas unlike flammulated owls, but visual or auditory detection of the owl is required to identify the nest

Habitat	BEC	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

Information to Consider

- **Sensitive Timing: April 1 – August 31**
- Establish a windfirm forested retention area centered around the nest tree.
- Maintain forest connectivity between the retention patch and adjacent forested habitat.
- Ensure this corridor is as wide as possible to minimize edge effects and to provide additional security cover, perching, and hunting opportunities.
- Retain large-diameter, decayed ponderosa pine and Douglas-fir (especially with existing woodpecker cavities) that are near thick cover
- 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.).

Recommended disturbance buffers around a Flammulated Owl's nest, depending on existing disturbance and disturbance level of the proposed activity.

		Existing Exposure to Disturbance			
		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	NEST SITE BUFFER				
	LOW Activities on foot. Small group, visual screening present. Livestock attractants. Examples: layout, cruising reconnaissance.	100-200m	1.5 x tree length	1.5 x tree length	1.5 x tree length
	MODERATE Light mechanized activities. Larger group/duration, no visual screening. Examples: spacing, planting, fence construction.	200-500m	100-200m	100-200m	1.5 x tree length
	HIGH Mechanized activities Examples: road construction, falling and yarding, landing sites.	200-500m	200-500m	200-500m	100-200m
	VERY HIGH Blasting, helicopter logging.	1000m +	1000m +	1000m +	1000m +

A NEST OF A WESTERN SCREECH OWL

Definition

A 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.

Location

- Mainly in low-elevation (360-840 m) forests and riparian areas close to water (0-700 m elevation)
- Often in living or dead black cottonwood, Douglas-fir, water birch, or trembling aspen trees with >25 cm dbh and wildlife tree classes 2-6
- Usually 1-12 m off the ground

Features

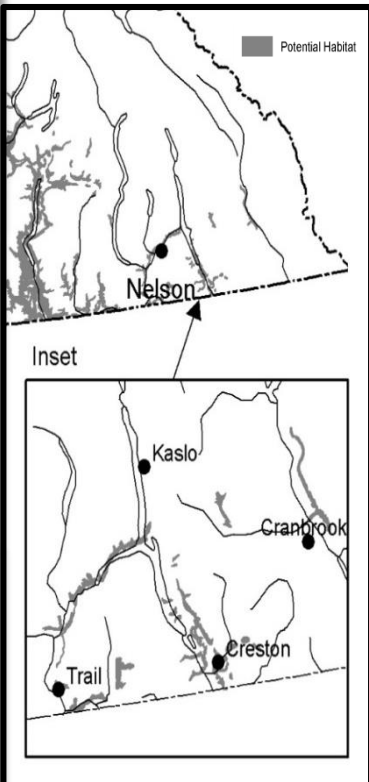
- Use natural cavities and abandoned woodpecker (primarily pileated woodpecker and northern flicker) cavities for nesting and roosting
- Entrance diameter: 7-9 cm
- Depth: 25-60 cm

Notes

- Present year round as resident species
- Designated as a Species at Risk under the *Forest and Range Practices Act* and is Red-listed in British Columbia.
- Designated as Endangered by COSEWIC.

Sensitive Timing

Courtship	Eggs Present	Young Present
Apr 1 – Apr 30	Apr 30 – Jul 31	May 31 – Aug 31



Photos top to bottom: Kevin Alexander, Laura Keene, Jared Hobbs

Similar features to a Western Screech Owl Nest

Woodpecker nest - how to distinguish:

- Pellets and prey remains at the base of the tree will indicate an owl species
- Woodpeckers leave white fecal sacs that are much smaller than pellets and do not have prey remnants. They may have insect exoskeletons.

Flammulated owl nest - how to distinguish:

- Flammulated owls don't always nest near riparian areas like western screech owls, but visual or auditory detection of the owl is required to identify the nest

Habitat	BEC	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

Information to Consider

- **Sensitive Timing: April 1 – August 31**
- Establish a windfirm forested retention area centered around the nest tree.
- Maintain forest connectivity between the retention patch and adjacent forested habitat.
- Ensure this corridor is as wide as possible to minimize edge effects and to provide additional security cover, perching, and hunting opportunities.
- Retain large-diameter black cottonwood and Douglas-fir, especially those with existing woodpecker cavities and in forested riparian areas
- 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.).

Recommended disturbance buffers around a Western Screech Owl's nest, depending on existing disturbance and disturbance level of the proposed activity.

		Existing Exposure to Disturbance			
		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	NEST SITE BUFFER				
	LOW Activities on foot. Small group, visual screening present. Livestock attractants. Examples: layout, cruising reconnaissance.	100-200m	1.5 x tree length	1.5 x tree length	1.5 x tree length
	MODERATE Light mechanized activities. Larger group/duration, no visual screening. Examples: spacing, planting, fence construction.	200-500m	100-200m	100-200m	1.5 x tree length
	HIGH Mechanized activities Examples: road construction, falling and yarding , landing sites.	200-500m	200-500m	200-500m	100-200m
	VERY HIGH Blasting, helicopter logging.	1000m +	1000m +	1000m +	1000m +

A NEST OF A GREAT BLUE HERON

Definition

A 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.

Location

- Typically in riparian areas near water
- Primarily in black cottonwood trees, with coniferous species accounting for the rest

Features

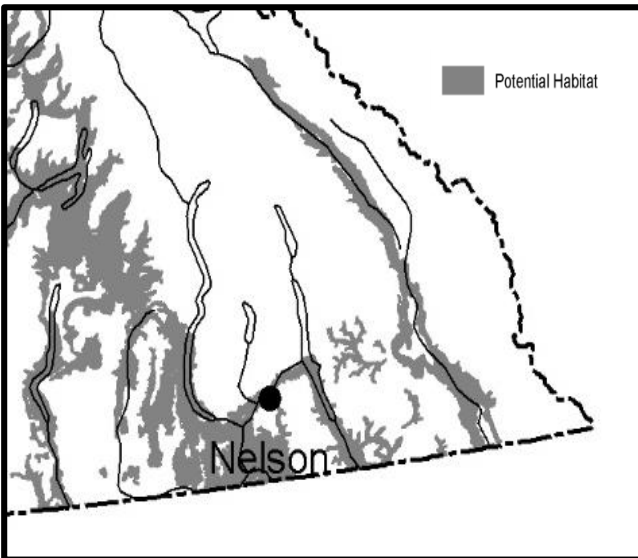
- May nest in loose or tight colonies, building nests in several trees
- Large, stick platforms made with loosely arranged, small diameter branches
- Often regurgitate indigestible food that can be found at the base of the tree along with feces (regurgitated food is usually dark gray with a slight sheen or greasy appearance and may smell of fish)
- Diameter: 1.0 m
- Depth: 0.5 m

Notes

- Designated a Species at Risk under the *Forest and Range Practices Act* and Blue-listed in British Columbia.
- COSEWIC provides no designation for this bird.

Sensitive Timing

Courtship	Eggs Present	Young Present
Feb 15 – Apr 30	Apr 1 – Jun 30	Jul 1 – Aug 31



Photos left to right: John Wanderer, Mary Holland

Similar features to a Great Blue Heron Nest

Raptor nests - how to distinguish:

- Raptor nests are larger, deeper, and more robust
- Sticks used in construction are generally >0.75 cm in diameter (pencil size)
- Typically built in larger trees, up against the tree trunk or on a large forked branch or stem crotch.
- Generally built at ½ to ¾ canopy height. Some raptor species prefer building near the top of the tree, particularly, Bald Eagles, Ospreys and Swainson's Hawk.
- Some are built on top of mistletoe-like structures or other defects on the tree.

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

Information to Consider

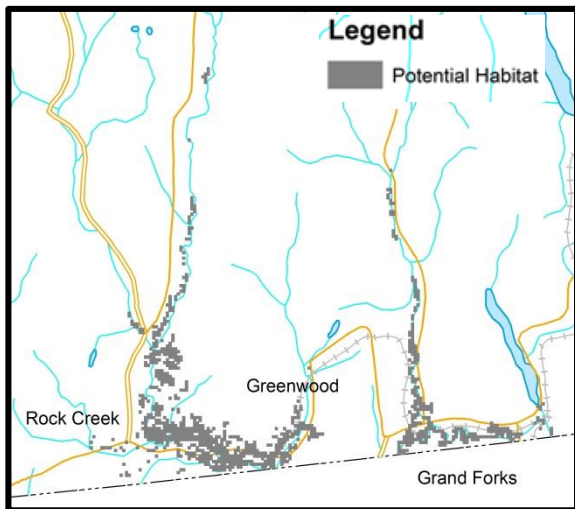
- **Sensitive Timing: February 15 – August 31**
- Great Blue Herons have low to moderate thresholds for new human disturbance, particularly during the breeding season.
- Buffers should be measured as a line drawn around the outer perimeter of all nest trees.
- Increase buffer or delay activities, if the nest is active and the bird constantly flushes away when using minimum buffers.
- During breeding season, add 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.).

Recommended disturbance buffers around a Great Blue Heron's nest, depending on existing disturbance and disturbance level of the proposed activity.

		Existing Exposure to Disturbance			
		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	NEST SITE BUFFER				
	LOW Activities on foot. Small group, visual screening present. Livestock attractants. Examples: layout, cruising reconnaissance.	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 +



Photos left to right: Ian Routley, Jared Hobbs, John Cooper



A NEST OF A LEWIS'S WOODPECKER

Definition

A 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.

Location

- Typically nest in open (<25% crown closure), mature ponderosa pine forests, riparian black cottonwood stands, recent burns, agricultural areas, and open grasslands with sporadic mature dead or dying trees (>30 cm dbh)
- Usually 3.5-9 m off the ground in deciduous and coniferous trees of decay classes 6-8
- Three areas of occupancy: Boundary, Pend D'Oreille and East Kootenay (see reverse). Isolated nests near Slocan and historic nests near Fruitvale.

Features

- Use natural or excavated tree cavities (can excavate their own cavities or reuse old northern flicker and hairy woodpecker cavities)
- Entrance diameter: 5-9 cm
- Depth: 20-60 cm

Notes

- Strong fidelity to nests; used year after year
- Quick to occupy low elevation wildfire sites and remain for up to 10 years
- Designated a Species at Risk under the *Forest and Range Practices Act* and is Blue-listed in British Columbia.
- Designated as Threatened by COSEWIC

Sensitive Timing

Courtship	Eggs Present	Young Present
May 1 – May 31	Jun 1 – Jun 30	Jul 1 – Aug 31

Similar features to a Lewis's Woodpecker Nest

Owl nest - how to distinguish:

- If pellets and prey remains are present at the base of the tree the cavity is likely occupied by an owl species

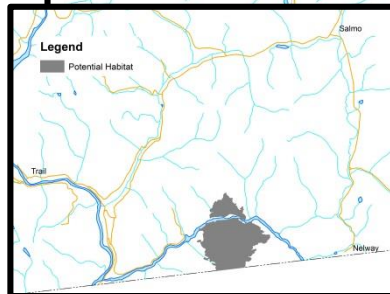
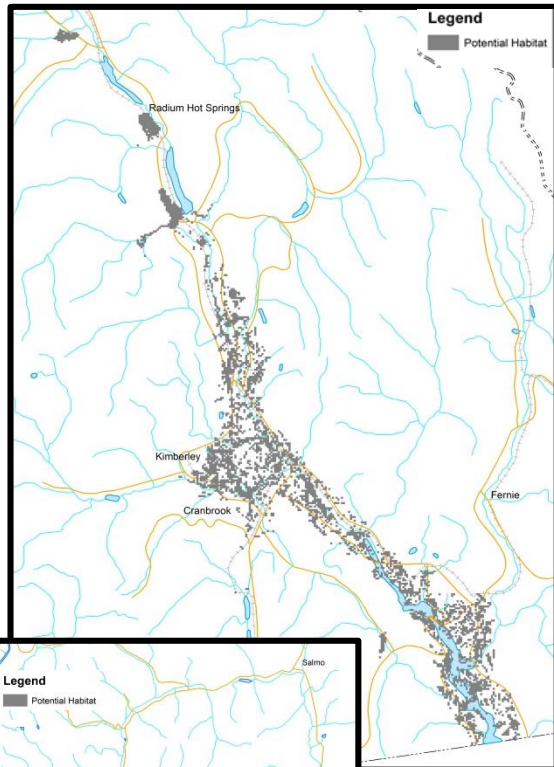
Williamson's sapsucker nest - how to distinguish:

- Williamson's sapsuckers excavate their own cavities and are much smaller with an entrance diameter of 3-4 cm

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

Information to Consider

- **Sensitive Timing: May 1 – August 31**
- Avoid high-disturbance forestry activities with potential for prolonged disturbance (i.e., more than a few hours) within 100 m of a nest from May 1–August 31.
- Within 400 m of a flagged known/potential nest tree:
 - prioritize removal of smaller (< 20 cm dbh) trees and non-preferred species (i.e., not ponderosa pine or black cottonwood) when removal of mature trees is necessary; and
 - use mechanical removal, rather than herbicides, and prioritize non-fruit-bearing species for removal, when understory vegetation brushing/clearing is necessary.





Photos: Les Gyug

A NEST OF A WILLIAMSON'S SAPSUCKER

Definition

A nest and its supporting structure that either (1) is currently occupied by a Williamson's sapsucker to hold its eggs or offspring, or (2) is habitually occupied and still capable of holding eggs or offspring of a Williamson's sapsucker.

Location

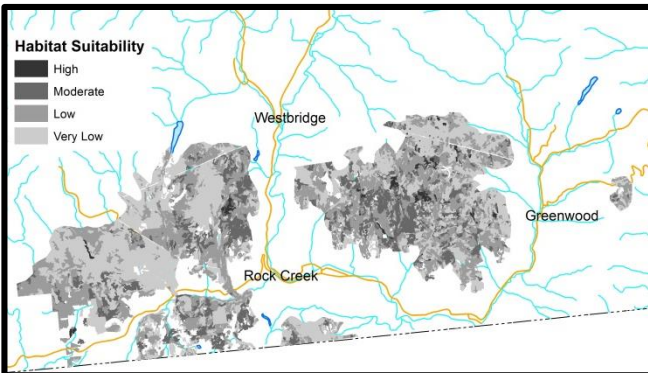
- Typically nest in or adjacent to mature coniferous stands that have large veteran western larch with heart rot
- Primarily in western larch; sometimes trembling aspen, ponderosa pine and Douglas fir between 700-1,500 m in elevation

Features

- Excavate their own cavities in trees with outward signs of decay (eg. broken tops, large stem scars, fungal conks)
- Entrance diameter: 3-4 cm

Notes

- May use the same nest year after year, but new cavities are usually excavated
- Two subspecies (*nataliae* and *thyroideus*) are recognized in British Columbia; the subspecies do not overlap in range and are indistinguishable in the field.
- Designated a Species at Risk under the *Forest and Range Practices Act* and Blue-listed in British Columbia.
- Both subspecies are designated Endangered by COSEWIC.



Sensitive Timing

Courtship	Eggs Present	Young Present
Mar 15 – Apr 1	May 1 – Jun 1	Jun 1 – Jul 15

Similar features to a Williamson's Sapsucker Nest

Owl nest - how to distinguish:

- If pellets and prey remains are present at the base of the tree the cavity is likely occupied by an owl species

Lewis's woodpecker nest - how to distinguish:

- Lewis's woodpeckers use natural cavities or old northern flicker and hairy woodpecker nests and are much larger with an entrance diameter of 5-9 cm

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

Information to Consider

- **Sensitive Timing: March 15 – July 15**
- Retain important habitat attributes within 200-500 m of a known nest where Williamson's sapsuckers will forage.
- Wildlife tree patches should be a minimum of 0.25 ha.
- 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.
- Refer to *Best Management Practices for Timber Harvesting, Roads, and Silviculture for Williamson's Sapsucker in British Columbia* for your area

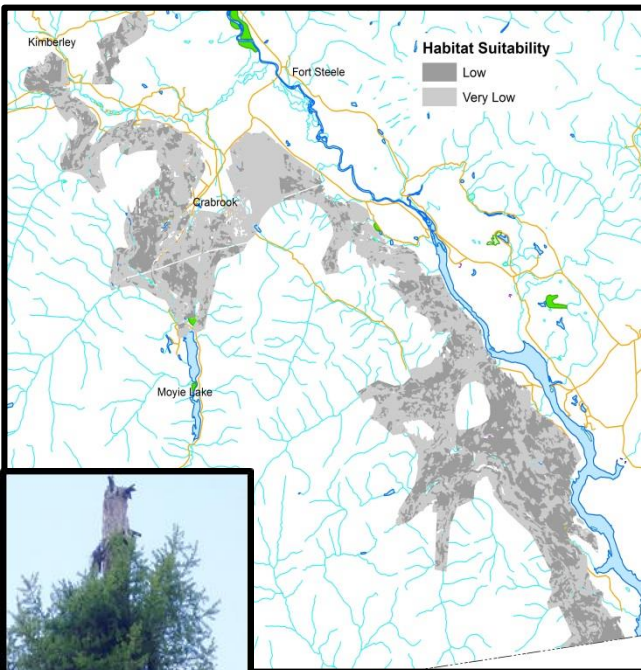


Photo: Les Gyug

AN AMERICAN BADGER BURROW

Definition

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.

Location

- Den in grasslands or open ponderosa pine or Douglas fir forests with fine sandy loam soils with few large rocks
- Badger burrows are often associated with existing road surfaces and embankments that have the correct soil properties

Features

- Typically round or oval in shape and have loose, freshly dug soil mounded at the entrance
- Often horizontal claw marks (approx. 1.5 cm between claw marks) on the sides of recent burrows
- Height: 15-25 cm
- Width: 20-30 cm
- Extends several meters under the ground

Notes

- Burrows may be re-dug and re-used several times over a decade
- Females may move litters to new burrows throughout the rearing season
- Sensitive during Apr 15 - Aug 15
- Designated as a Species at Risk under the *Forest and Range Practices Act* and is Red-listed in British Columbia.
- Designated as Endangered by COSEWIC.

Similar features to a Badger Burrow

Coyote and red fox burrows - how to distinguish:

- 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
- Coyote and red fox burrows usually have more feces and prey remains at their entrances than badger burrows

Columbian ground squirrel burrows - how to distinguish:

- Columbia ground squirrel burrows are fairly round with entrances about 10 cm in diameter

High
Medium
Low

Nelson

Information to Consider

- **Sensitive Timing: April 15 – August 15**
- 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:
- Maintain herbaceous and shrub ground cover around burrows.
- Avoid developing any new road access near clusters of known active burrows.
- Establish a no machine zone around burrows to protect them from collapse under heavy harvesting equipment (Figure 32).
 - Zone size of 5–7 m around single burrows.
 - Establish a larger zone of at least 20 m around clusters of burrows or single natal den.
 - For natal dens, avoid disturbance during the breeding season (April 15–August 15).
- Erect enclosure fencing if damage from livestock is degrading the vegetative structure or threatening the collapse of burrows.
 - Avoid placing livestock attractants (e.g., salt licks, water troughs, feeding sites) within 250 m of the burrow.
 - During the maternal period (April 15–August 15), do not construct range developments within 250 m of active burrows



Photos top to bottom:
Rich Weir, Luke Robertson

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

Similar features to a Grizzly Bear Den

Black bear den - how to distinguish:

- Black bear dens are often located on or near valley bottom
- Most dens are lined with leaves, grass, or rotted wood.
- Commonly den in or under large-diameter trees (>85 cm in diameter), snags, logs, or stumps.

Wolf den - how to distinguish:

- Den entrance is usually less than 60 cm in diameter, may be > 1 entrance
- Wolf dens often have prey remains near their entrance whereas grizzly bears do not bring food to their den
- Den sites are often at lower elevations (e.g. valley bottoms and lower slopes) in areas with low slope angles.



Photo: Stefan Himmer

A GRIZZLY BEAR DEN

Definition

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.

Location

- Primarily on moderate to steep slopes (40-90%) in mountainous or alpine habitat on cooler, north or east-facing aspects
- In flat topography, ground dens may be located on high spots or small knolls
- Grizzly bears generally den above treeline in areas where there is no alpine, bears may den in upper elevation forests (ESSF). This is most likely to occur in the Boundary and South Purcells.

Features

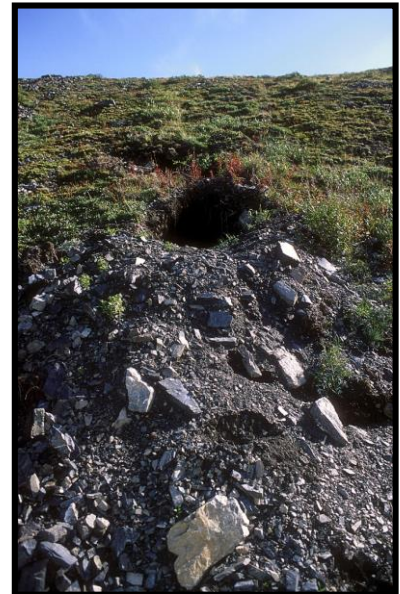
- Den chamber usually lined with shrub branches, tree boughs, duff, or grass
- Often large piles of soil, rocks, or wood (called a "porch") are found downslope of the den entrance
- Entrance diameter: approx. 75 cm
- Chamber diameter: 150-225 cm
- Chamber height: approx. 125 cm

Notes

- Den sites can be reused year after year
- Sensitive during beginning - end of winter (Nov 1 – Mar 31)
- Designated a Species at Risk under the *Forest and Range Practices Act* and is Blue-listed in British Columbia.
- Designated as a species of Special Concern by COSEWIC

Information to Consider

- **Sensitive Timing: November 1 – March 31**
- 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.
- 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.
- 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.



Potential Den Habitat

- Alpine/Parkland
- ESSF/Subalpine

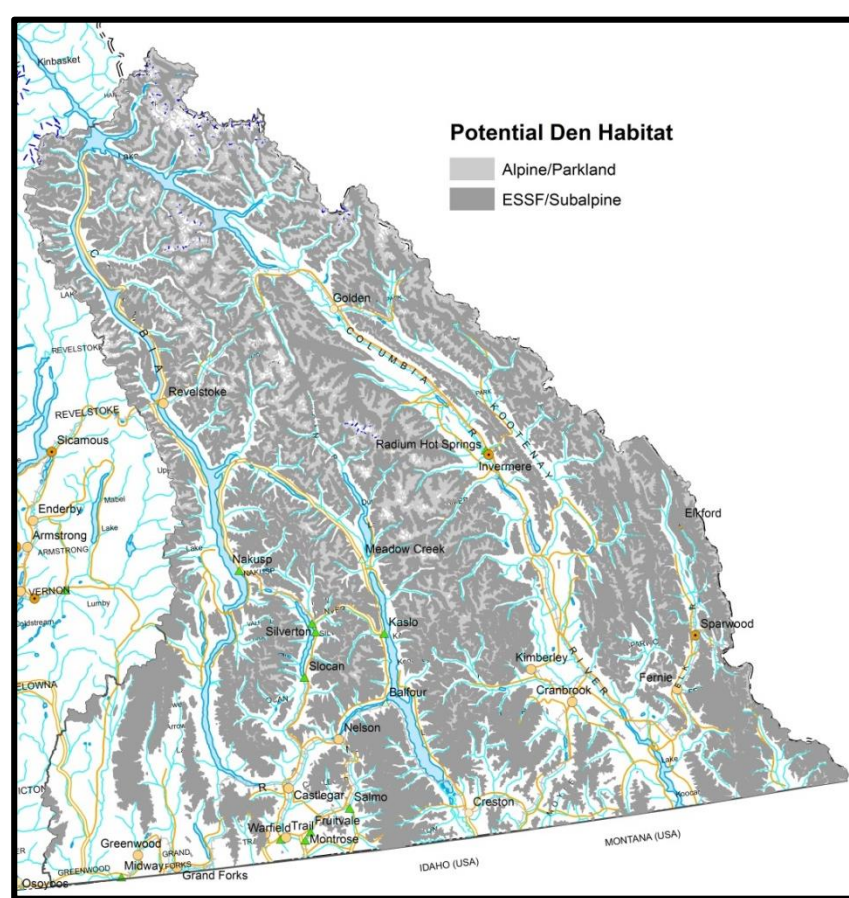


Photo: Stefan Himmer

Similar features to a Mineral Lick

Wallow - how to distinguish:

- Wallows are typically larger, have a greater depression, and are wetter/muddier
- Wallows are typically in water receiving areas, although dry wallows do exist
- Wallows are on flat terrain, not hill sides or cliffs
- Wallows may have a stronger smell of urine
- Wallows do not contain licking/ sucking marks



Photos left to right: Karl Bachmann, Tatiana Gettelman.

Information to Consider

- **Sensitive Timing: April 1 – October 1**
- 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.
- If no longer needed, reclaim any existing roads within 200 m of the lick.
- 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.
- 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.

A SIGNIFICANT MINERAL LICK

Definition

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

Location

- Not associated with any particular habitat type
- Found in seepage areas (wet or mucky licks), dry earth exposures such as clay or lacustrine deposits often found above river cutbanks, and rock face licks

Features

- Some licks with exposed mineral crystallization are easily recognizable due to their white or colourful mineral deposits; other licks are nondescript and only appear as bare soil areas or muddy slopes
- Most licks will have many visible, well used wildlife trails and the area will be trampled
- Vary greatly in size but usually several m²

Notes

- Mineral licks are relatively uncommon across the landscape and some ungulates will travel extensive distances (e.g., over 15 km) to visit them
- 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; and
 3. rock face mineral licks.

Similar features to a Wallow

Mineral lick - how to distinguish:

- Mineral licks are typically smaller, have less of a depression, and can be drier/less muddy
- Mineral licks can be on hillsides and cliffs rather than flat terrain
- Mineral licks often lack a strong urine smell
- Mineral licks often contain licking/sucking marks



Photos: Lindsey Ballard, Eliot Terry

Information to Consider

- 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.
- If no longer needed, reclaim any existing roads within 200 m of the wallow.
- 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.
- Avoid conducting field reconnaissance, layout, cruising, or tree planting within 100 m of a significant wallow during the sensitive period. Leave the area if animals are observed approaching or at the site.

A SIGNIFICANT WALLOW

Definition

A wallow that is :

- i) used by moose, bison, elk, mountain goat, or grizzly bear; 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 center of the wallow, and/or
- vegetation disturbed by pawing, trampling, digging or rolling

Location

- Ungulate wallows are often found in openings or clearings , usually adjacent to nearby security cover
- Generally associated with a spring or water source
- Grizzly bear wallows are often found in seepage and wet areas

Features

- Shallow depressions in the soil that can either be wet or dry
- Usually lack plant cover in the center due to the disturbed conditions
- Bare soil is usually covered in wildlife tracks and wildlife trails usually radiate from wallow
- May be a strong smell of urine
- Range in size from 2-3 m² to several m²
- Typically less than 20 cm deep

Notes

- **Ungulate Wallow Sensitive Timing: September 1 – November 1**
- **Grizzly bear Wallow Sensitive Timing: July 1 to August 31**

Information to Consider

- **Sensitive Timing:** October 1 – April 30
- **Temperature:** A key feature is stable temperature. Generally, preferred temperatures are above freezing and below 9°C.
- **Relative Humidity:** Most bats prefer very high relative humidity (90-100%) within hibernation sites.
- **Airflow:** Prefer sites with very little airflow to limit water loss.
- **Light levels:** Hibernacula are generally dark.
- **Disturbance:** Hibernacula are secluded sites with little disturbance from human activity.
- **Caves and caverns:**
 - size of openings used by bats is highly variable but generally > 30 cm
 - sites where openings are covered by dense vegetation may not be useable by some bat species. Light foliage is not an issue.
 - bats generally avoid sites that flood, although cave hibernation sites often have interior water sources
- **Rock/erosion crevice:**
 - a crevice/fissure must be 1-2 cm wide or more
 - must provide a protected, dark, quiet area
 - must run deep enough under the frostline to have stable temperatures

A BAT HIBERNACULUM

Definition

A site where one or more bats hibernate in the winter (hibernacula [plural]).

Location

- Typically in undisturbed areas with exposed rock close to foraging habitat; cave features in karst deposits

Features

- Most often caves, cliffs, rock crevices, or abandoned mines that provide cool, constant temperatures and protection from the elements and predators
- Bat droppings may be present; urine staining; remains of insects; live or dead bats may be present indicating use
- Entrances can be large and conspicuous or small and obscure
- Chambers in caves are typically deep and quite large; crevice-roosts can have very narrow openings but extend deep under the frost line
- Large trees within a few 100 metres of the roost may be used for roosting at times through the hibernation period

Notes

- Several species of bats may use the same hibernaculum
- Hibernacula are used year after year
- There are no BEC associations of hibernacula
- **White-nose syndrome decontamination protocols are required when entering bat hibernation sites to protect bats.**

Similar features to a Bat Hibernaculum

Bat nursery roost- how to distinguish:

- Nursery roosts are very warm locations often located in trees or shallow rock crevices, not cold sites like caves or old mines
- Nursery roosts are active during the spring and summer, whereas hibernacula are used during the winter



Photos left to right: Province of British Columbia, Anna Roberts, Paul Griffiths

IDENTIFYING AN OCCUPIED HIBERNACULUM



Skeletal remains of bats may be evident in some locations. Accumulations of bones may occur or single skeletons. (Photos: Martin Davis)



Hibernating bats may occur in groups or as single bats. Groups of bats may consist of a single species or multiple species. Some species prefer to roost in the open while others will find crevices & holes within the hibernaculum to hide. (Photos: Martin Davis)



Bat Guano (feces): Similar in size, shape and colour to mouse droppings. Easily crush into a rough powder of undigested insect parts. Big brown bat (left); little brown myotis (right) (Photo: Cory Olson)

Bats flying at an entrance:

- In autumn, at dusk, bats may be seen emerging from, or flying around, the entrance to underground features.
- 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.
- Bats may also use swarming sites for hibernation. The presence of autumn bat activity may indicate the location of a hibernaculum.

Body Oil Staining:

- Bat fur contains oils that may leave a residue or mark on roost surfaces.
- These darkened areas are usually where bats have roosted for many years.

Bat Nursery Roost – Tree Features

Tree roosting bats prefer trees in older forests with many of the following criteria:

- Moderate decay (tree classes 2–5)
- Large diameter (> 50 cm dbh) trees are the most effective roost trees. Small bats will use smaller dbh trees if suitable features present.
- Vertical hollow cavity accessed via a stem scar
- Woodpecker excavations, especially pileated woodpecker
- Deep stem cracks; hollows where branches have broken off at the bole
- Most bark intact but loosening
- Any defect that results in a crevice ≥ 1 -2 cm wide and ≥ 10 cm deep
- Long-duration tree species such as ponderosa pine, western red cedar, western larch, Douglas-fir or cottonwood
- Potential roost entrance 3m off the ground
- Open vegetation conditions on the side of the tree with the roost feature

Site Characteristics that increase the value of a potential roost site:

- Within 1 km of water that provides drinking habitat. Suitable water sources include small waterbodies, quiet streams or river areas, or wetlands with open water.
- Within 1 km of wetlands which are used for foraging.
- Connected to other forest patches with landscape or vegetation features. Connectivity features can be narrow, such as a single line of trees or tall shrubs with a limited number of gaps greater than 20 m across.

A BAT NURSERY ROOST

Definition

A feature that houses an aggregation of female bats and their young.

Location

- **Aspect:** Preference for warm, south – southwest aspects with long periods of sun exposure.
- **Elevation:** Generally, below the ESSF and upper MS BEC zones. Upper slopes in valley bottoms are common warm sites. Lower elevations can be used, particularly if within 1 km of water.
- **Exposure:** Nursery roosts need to be dry and provide protection from the weather and wind.
- **Temperature:** Bats select for warmer sites to promote pup development but locations with extreme temperatures (over 40°C) are often avoided.
- **Habitat Connectivity:** Some bat species will not cross large open spaces surrounding a roost site. Locations with forest connectivity within 1 km of a water source can be suitable.

Features

- **Tree roosts:** 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. Roost entrances are often 3m high or higher.
- **Rock roosts:** Suitable rock features include rock crevices, cliffs, rock outcrops, boulder fields, and talus slopes in warm sites on south-facing aspects. Most naturally occurring caves are not suitable for nursery roosts.

Notes

- **Sensitive Timing:** April 30 to September 1

Similar features to a bat nursery roost

Bat hibernaculum (rock crevice)

- Hibernation sites are in opposite aspects (cool sites)
- Crevices for hibernation are deep (reach under the frost line)

Cavity nesting birds

- Different signs of use. No preference for south – southwest aspects

Photos left to right: Province of BC, Jared Hobbs



Bat Nursery Roost – Rock Features

Bats using rock roosts prefer warm sites on south-facing aspects that meet many of the following criteria:

- Crevice openings are at least 1-2 cm wide or more
- Crevice depth of 15 cm or more
- Crevices may be horizontal or vertical
- 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

Site Characteristics that increase the value of a potential roost site:

- Within 1 km of water that provides drinking habitat. Suitable water sources include small waterbodies, quiet streams or river areas, or wetlands with open water.
- Within 1 km of wetlands which are used for foraging.
- Connected to other forest patches with landscape or vegetation features. Connectivity features can be narrow, such as a single line of trees or tall shrubs with a limited number of gaps greater than 20 m across.

Identifying an Occupied Nursery Roost

Evidence of use by a group or repeated use include:

- Large accumulations of bat feces (guano) under the roost site
- Dark staining on roosting surfaces from the natural oils in their fur
- Urine stains and/or "pissicles" (light coloured staining or hardened, light yellow icicle-shaped features made of urine)
- Distinct smell of bat guano and urine.

Basic measures for assessing occupancy:

- Inspect suspected nursery roosts cautiously by briefly shining a flashlight into the entrance and looking for individuals
- Monitor at night for direct visual observations. At dusk, bats may be seen emerging from, or flying around, the entrance.
- The smell of ammonia from bat urine may be noticeable at recently used roosts.
- Look for bat guano. Often present at the base of an entrance.
- Bat guano looks like mouse droppings 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.
- If guano is found, collecting a sample for DNA analysis will allow verification of species



Photos: Top, Mandy Kellner.
Bottom, Doug Burles



Bat Guano (feces): Similar in size, shape and colour to mouse droppings. Easily crush into a rough powder of undigested insect parts. Big brown bat (left); little brown myotis (right) guano pellets (Photo: Cory Olson)

Location

- Not associated with any particular habitat, but typically near rivers and streams

Features

- Vegetation surrounding the area is often conspicuously different than nearby areas (often lush, over-sized vegetation)
- Often contain brightly coloured algae or bacterial blooms
- Unpleasant odours (rotten-egg smell) often present
- Steam may be noticeable
- Range in size and shape from distinct pools to inconspicuous streams or small seeps

Notes

- **Sensitive Timing: May 1 – August 31**
- Thermal springs can create mineral ticks
- There are no identified BEC associations for hot springs or thermal springs.

Information to Consider

- Establish an undisturbed vegetative buffer of 30 m. If windfirmness or rare plants are a concern, consider extending this buffer.
- Provide a buffer for water sources that may support the hydrology of the hot or thermal spring.
- For hot or thermal springs located within a karst landscape and described as a “significant karst spring” maintain:
 - a minimum 20-metre reserve extending outward from the edge of the discharge point of the spring.
 - an adjacent management zone of an appropriate size to protect the reserve from windthrow.
- 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.

A HOT SPRING OR THERMAL SPRING

Definition

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



