



Best Management Practices for Coastal Northern Goshawks (*Accipiter gentilis laingi*) in BCTS Strait of Georgia Operating Areas

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Overview

BC Timber Sales (BCTS) is bound by legal, non-legal, and certification requirements¹ to protect Species at Risk (SAR). Northern goshawk *laingi* subspecies (hereafter ‘goshawk’) is listed under Schedule 1 of the *Species at Risk Act* (SARA), designated as ‘Threatened’ by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), and red listed in Species and Ecosystems at Risk in British Columbia. Consequently, goshawks and their active nests² are protected under provincial and federal legislation (e.g., Section 34 of BC’s *Wildlife Act*³ and SARA). Moreover, the *Forest and Range Practices Act* (FRPA) has listed goshawks in the Identified Wildlife Management Strategy (IWMS) as a species requiring special management to mitigate impacts of forest and range activities (MFLNRORD 2018). Habitat fragmentation caused by roads and forest harvesting has been linked to recent population declines (MFLNRORD 2018).

As declared in the *Implementation Plan for the Recovery of Northern Goshawk, laingi Subspecies (Accipiter gentilis laingi) in British Columbia* (2018), 145 home ranges were identified for protection on Vancouver Island. As of 2018, 80 of those home ranges were protected by either hard (e.g., Wildlife Habitat Areas (WHA), Ungulate Winter Ranges (UWRs), parks, and/or legally designated Old Growth Management Areas (OGMAs)) or soft (e.g., non-legally designated OGMAs) reserves (MFLNRORD 2018).



Figure 1: Range map of Northern goshawk *laingi* subspecies adapted from McClaren 2005. Dark green denotes *laingi* subspecies range and light green denotes subspecies transition zone (range overlap with *A. g. atricapillus* subspecies).

¹ ‘Legal, non-legal, and certification requirements’ refer to a) legally-binding Acts and Regulations set by provincial and federal governing bodies, b) non-legally binding stewardship plans and promises, and c) requirements set by organizations awarding certifications (e.g., Sustainable Forestry Initiative Certification).

² Active nests are defined as occupied by an adult and/or eggs and/or hatchlings.

³ Section 34 of the BC Wildlife Act ([Wildlife Act \(gov.bc.ca\)](http://www.gov.bc.ca)), which states: A person commits an offence if the person, except as provided by regulation, possesses, takes, injures, molests, or destroys:

- (a) a bird or its egg;
- (b) the nest of an eagle, peregrine falcon, gyrfalcon, osprey, heron, or burrowing owl; or
- (c) the nest of a bird not referred to in paragraph b when the nest is occupied by a bird or its egg.

Regional government biologists rely on chance finds and reports of nesting goshawks to identify priority breeding areas for protection. Furthermore, previously known site monitoring is crucial to assess the effectiveness of land protections and adaptive management strategies such as the creation of critical breeding and foraging areas (Parks Canada Agency 2018).

The following protocol outlines the best management practices (BMP) for Northern goshawks *laingi* subspecies (*Accipiter gentilis laingi*) when an observation is made on BCTS Strait of Georgia (TSG) operating areas. It is intended to guide BCTS staff and Licensees, Permittees or Contractors (LPCs) across any and all phases of work.

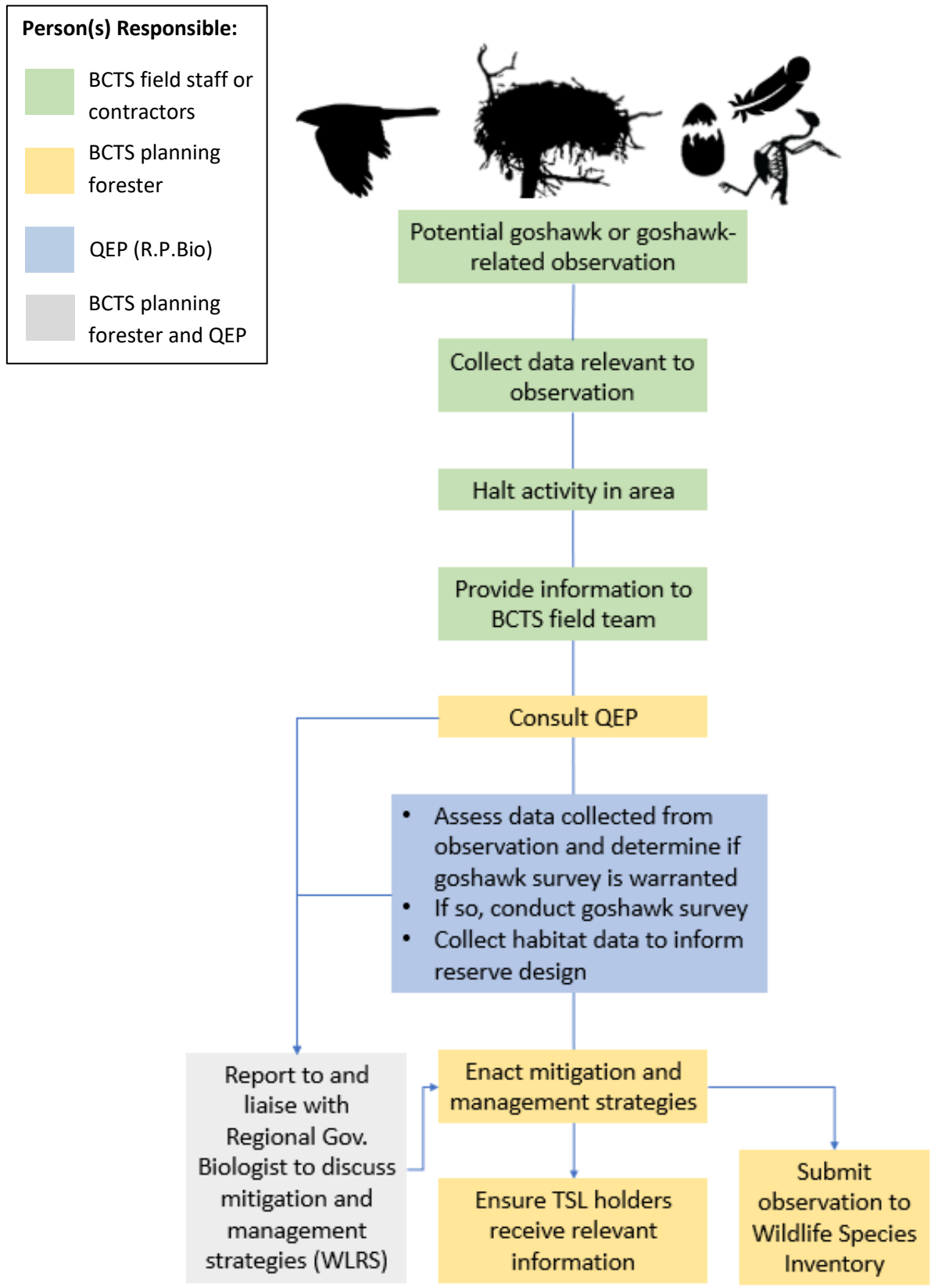
Objectives

The objectives of the following protocol are:

1. Facilitate identification of goshawks, their nests, habitat, and signs of occupancy;
2. Provide clear direction on steps to take if an observation is made that may be goshawk-related;
3. Recommend mitigation and management prescriptions; and
4. Add to the goshawk knowledge base by reporting observations to the BC's Wildlife Species Inventory (WSI) – Incidental Observation Reports⁴.

⁴ <https://a100.gov.bc.ca/pub/wiof/locationForm.do>

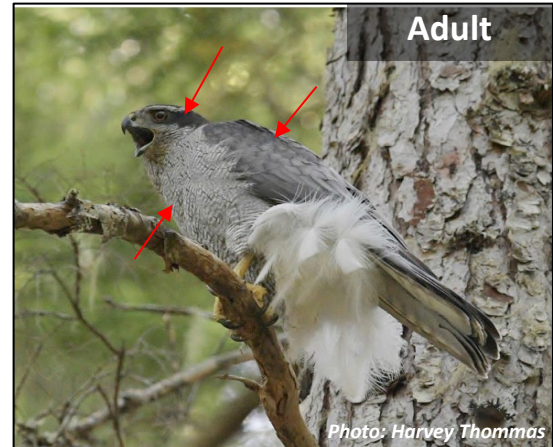
Process Summary



How to identify goshawks and their nests

Goshawk visual characteristics:

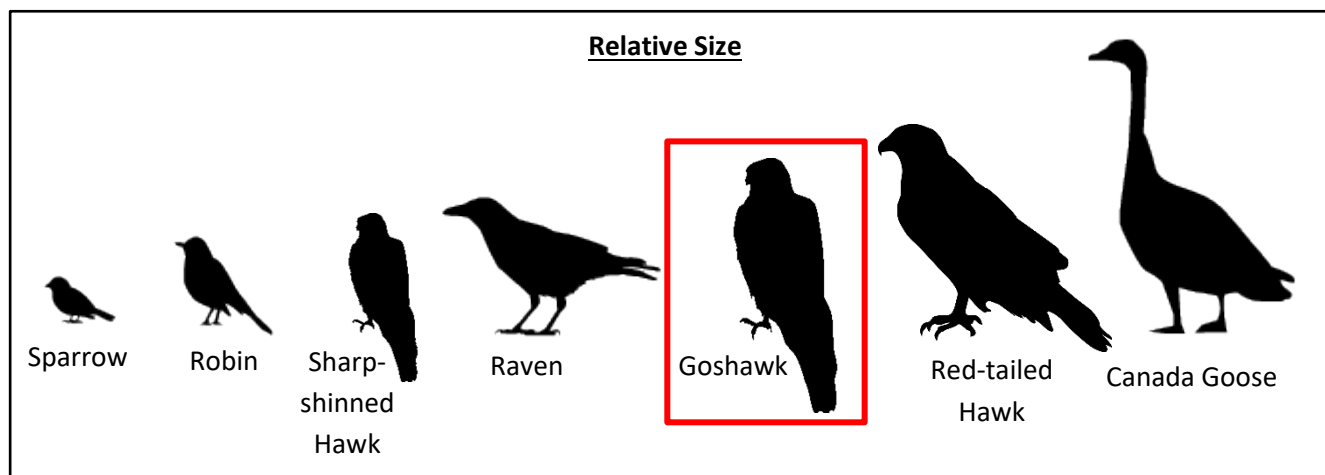
- Large-bodied hawk (50-60 cm; similar size as a raven)
- Adults:
 - Backside is dark blueish-slate becoming blackish on head
 - Belly and chest are pale grey with fine barring (e.g., faint stripes)
 - Distinct white stripe over eye (e.g., 'white eyebrow')
 - Red eyes
- Juveniles:
 - Similar size to adults
 - Browner overall
 - Coarse barring on chest and belly
 - Stripe over eye is less distinct



Goshawk song characteristics:

- Adult alarm call is a harsh "ki-ki-ki-ki" repeated 10 – 20 times. They might make this call when someone is near an active nest.
- Juvenile begging call is a drawn out 'kree-ahhh' wailing call. These types of calls are usually heard later in the breeding season (approx. July – August)
- Listen online at

https://www.allaboutbirds.org/guide/Northern_Goshawk/sounds



Nesting Phenology:

- Goshawks are non-migratory residents of coastal temperate rainforests in BC. Initiation of the breeding season can shift from year to year based on food availability (Keane 1999), which may be influenced by inter-annual variation in precipitation (Reynolds et al. 2017).
- Breeding window is typically between February 15 – September 15 (Figure 2), with courtship and nest building beginning in mid-February. Adults may be seen carrying twigs with which to build their stick nests.

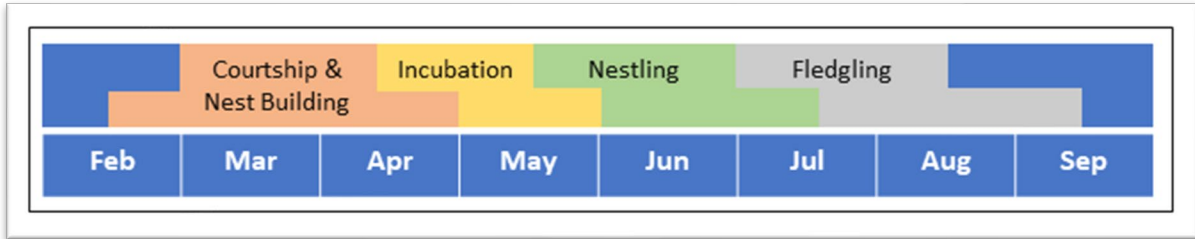


Figure 2: Nesting phenology of Northern goshawks.

- Females will begin laying 2 to 4 eggs mid- to late-April and incubation will last for ~30-32 days (Beebe 1974; Iverson et al. 1996; McClaren 2005; McClaren et al. 2005). During this phase, the female is very still on the nest and the male, if present, may or may not act defensively (e.g., alarm call, dive bomb, etc.) when a person approaches the nest. Due to low goshawk response rates to call playback surveys during this phase, it is not recommended that surveys be conducted before May 25th (McClaren 2003).
- Eggs will begin to hatch mid- to late-May and adults will care for nestlings for ~38-42 days (McClaren et al. 2005). Activity at the nest will increase as adults will be bringing prey items to feed nestlings. The trunk of the nest tree and the vegetation below the nest may be covered in white excrement (termed 'whitewash'). Eggshells, regurgitated pellets, as well as bones, fur, and feathers from prey items may scatter the forest floor in the nearby vicinity. Adults will likely display a strong defensive response (e.g., dive-bombing, alarm calling, etc.) to a person near the nest, or to alarm calls broadcast in the nest vicinity. Because of this defensive response, likelihood of finding an active nest during call playback surveys is highest during this nestling period (McClaren 2003).



Pluck post



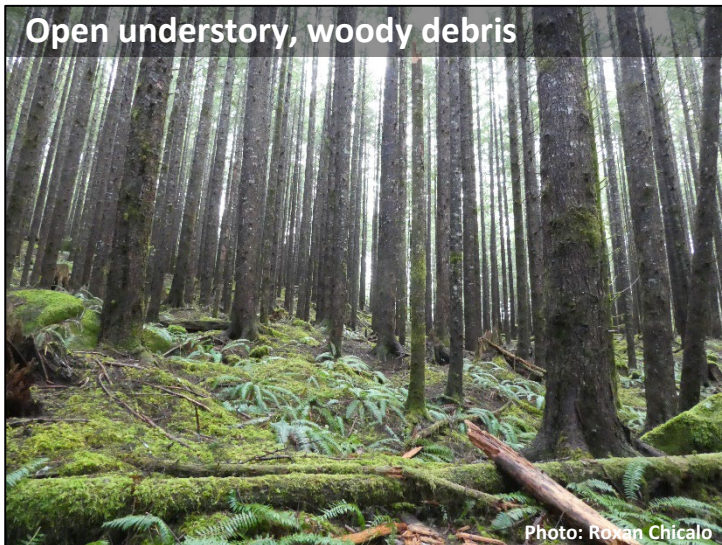
Photo: Roxan Chicalo

- After young fledge the nest (young are now called 'fledglings'), adults will feed fledglings for another 35-55 days (McClaren 2005). Most often, young will stay within 500 m of the nest tree and audibly beg from roosting sites. Fledglings will be in juvenile plumage (see Page 4). Adults may act aggressively if a person is too close to recently fledged young. The likelihood of locating a goshawk breeding territory from call playback surveys is highest during this period (McClaren 2003).

Nesting habitat⁵:

Forest stands with a closed canopy, open understory, sub-canopy flyways, and suitable nest platforms are critical nesting habitat for goshawks. The following list identifies specific habitat:

- Suitable stands from sea level to approx. 900 m in elevation
- Coastal Douglas-fir (CDF), Coastal Western Hemlock (CWH), and Mountain Hemlock (MH) forests that are structurally diverse with snags and coarse woody debris
- Multi-layered canopy structure
- Structural stage 6 (mature) and 7 (old) forest stands; however, some nests have been found in forests with structural stage 5 that have suitable attributes (e.g., created from thinning activities)
- Trees >45 years old
- >50% canopy closure
- Lower two thirds of a slope
- <40-degree slope gradient



⁵ Iverson et al. 1996; Daw et al. 1998; McClaren 2003; BC Minist. 2004; Manning et al. 2004, Mahon 2015.

Nest characteristics:

- Large stick nests in the crook of a tree, on large lateral branches near the trunk of a tree, or on a platform created by a deformity in a tree (BC MOE 2004).
- Nests are usually within the lower third or half of the tree height where branches are large and sturdy enough to support a stick nest (McClaren et al. 2015).
- Common nest tree species are Douglas fir (*Pseudotsuga menziesii*), Western hemlock (*Tsuga heterophylla*), and Sitka spruce (*Picea sitchensis*). Occasionally, goshawks will build nests in large red alder (*Alnus rubra*) trees growing in or along edges of decommissioned roads (McClaren 2000). Such linear corridors created by decommissioned roads can be used by goshawks as flyways.
- Active nests may have white, feathery down along the nest edges (highlighted in the Active Nest photo).
- Goshawks build alternate nests within, on average, 1km of each other (McClaren et al. 2015). If a primary nest blows down or is deemed unusable, an alternate nest may be used as a primary nest. Alternate nests look very similar to active nests but will not have whitewash, fresh prey items, or defensive adult goshawks. Alternate nests can sometimes be in very poor condition.



What to do if you see a goshawk, find a stick nest, or detect signs of occupancy (immediate actions)

Step 1a: If a suspected **goshawk** is detected, the following information should be collected:

- Collect exact location (GPS coordinates) of sighting
- Count individuals seen or heard
- Describe sighting
 - direction of flight (in-coming and out-going)
 - colouration of feathers
 - relative size (e.g., robin-sized, raven-sized, etc.)
 - colour of eyes
 - sound (e.g., is it calling?)
 - behaviour
 - roosting (i.e., sitting quietly in tree)
 - acting defensively (e.g., dive-bombing, alarm calling)
 - nest building (i.e., carrying sticks)
 - incubating (i.e., adult sitting in nest)
 - carrying food (i.e., prey item in talons)
 - provisioning young (e.g., feeding nearby juveniles)
- Take a video or pictures if possible
- Note habitat characteristics
 - Forest age
 - Dominant tree species
 - Crown closure
 - Elevation
 - Slope

Step 1b: If a **stick nest** is found, the following information should be collected:

- Collect exact location (GPS coordinates) of nest. Do not flag or mark the tree. This may attract nest predators and increase the likelihood of nest failure. Flagging a reference tree approx. 25 m away, with a ribbon that has exact distance and a bearing to the nest tree, is recommended.
- Take a video or pictures
- Describe nest tree characteristics
 - Species
 - Decay class
 - Nest height
 - Tree height
 - Evidence at base of tree (e.g., feathers, whitewash, bones, pellets, etc.)
- Note habitat characteristics
 - Forest age
 - Dominant tree species

- Crown closure
- Elevation
- Slope

Step 1c: If **signs of occupancy** (e.g., feathers, prey remains, pluck sites, eggshell, pellets, whitewash) is detected, the following information should be collected:

- Collect exact location (GPS coordinates) of signs of use. Search in vicinity for additional signs – numerous signs of use in a small area usually indicates a nest is nearby. Look for stick nests in trees.
- Take a video or pictures. For raptor feathers and eggshells, take close-up photos against dark background with a ruler or pen for scale. If needed, take sample back to the office to get better photos.
- Note habitat characteristics
 - Forest age
 - Dominant tree species
 - Crown closure
 - Elevation
 - Slope



Step 2: Temporarily halt activity in the nearby vicinity of the observation. Suggested no-activity buffer is a 500 m radius as per *Guidelines for Raptor Conservation during Urban and Rural Land Development in British Columbia* (MFLNRO 2013). This buffer mainly applies to active primary harvest activities such as road building, blasting, logging, etc. whereas quieter work such as layout or silviculture survey work could proceed; however those works may contribute to sunk costs if the area is found to be suitable for a goshawk reserve.

Step 3: Notify BCTS Field Team

Recommended mitigation and management prescriptions

Field Surveys:

It is recommended that a Registered Professional Biologist (R.P.Bio) with experience in avian ecology visit the location of the observation to confirm species, collect additional site information, and provide site-specific recommendations. If the R.P.Bio. confirms or suspects that the observation is goshawk related, then they will initiate goshawk surveys following standardized protocol (McClaren 2003). A summary of survey methods is provided here:

- If a suspected goshawk nest is found, surveys conducted during:
 - March (goshawk courtship phase) could identify if the general area is being used for breeding. This survey is not standardized yet has high potential for passive monitoring (see paragraph below describing methodology).
 - April-May (goshawk incubation phase) could confirm whether an incubating female is present. If a bird is found on the nest, the territory is considered active.
- To increase the potential to locate an active/occupied nest, on the south coast of BC, the first inventory and monitoring surveys of the season are typically conducted in late **May through June (nestling phase)**. Call playback surveys using adult alarm calls are conducted within an 800 m radius of the nest or sighting that could elicit a goshawk response. Canopy and forest floor searches conducted at this time of year could identify sign that goshawks are using the area (e.g., feathers, prey remains, pluck posts, pellets, and whitewash). Search efforts for alternate nests are also conducted during nestling phase surveys.
- If surveys during late May through June do not result in goshawk detections, the area is resurveyed in **July and August (fledgling phase)** using call playback broadcasting juvenile begging calls. Surveys conducted during this period has the highest chance of goshawk detections (McClaren et al. 2015).
- If there are no goshawks detections after two surveys (nestling and juvenile), the territory is considered inactive for that breeding season.
- Reporting of survey results to BCTS will document the following:
 - territory occupancy and activity status,
 - the active nest if known,
 - the area searched for nests and survey effort (amount of time),

- any habitat data collected,
- the location and details of any goshawk sign such as whitewash, plucking posts, feathers,
- the nesting outcomes (number of fledglings) if known.
- if the territory is inactive, direction on future survey effort through the evaluation of previous survey results and field habitat data to support planning of future BCTS goshawk monitoring effort.

Since the standardized protocol has not been updated since 2003, it is worth considering application of Autonomous Recording Units (ARUs) in association with standard surveys. ARUs represent new technology used to passively monitor species occupancy (Campos-Cerqueira and Aide 2016, Shonfield and Bayne 2017). ARUs can significantly increase survey effort, which can have positive effects on detection rates (Shonfield and Bayne 2017) and can reduce human effort (Shonfield et al. 2018). To gain greater confidence in occupancy and potentially obtain early confirmation of goshawk presence, ARUs could be deployed during the courtship and nest building phase (mid-February to mid-March), a time when goshawks increase their vocal activity (Penteriani 1999). This method has demonstrated a higher success rate (e.g., 80%) in confirming goshawk occupancy than surveying during nestling and fledgling periods using traditional surveying methods since unpaired adults or pairs where nests failed during incubation are likely to be detected (DeMarco, C [2020] *Improved Methods for Monitoring and Estimating Occupancy of Northern Goshawks: A Field Test of Modified Survey Methods* [unpub M.Sc. Thesis]). Gaining occupancy information using ARUs prior to conducting nestling period call playback surveys could guide efforts in nest searching, thus creating a more efficient process. Thought and consideration should be given to the application of ARUs in complementing goshawk surveying methodology.

Site Prescriptions:

The following management recommendations are for confirmed or suspected goshawk nests:

- Retain at least 200 m of forested habitat around all known nest trees to maintain breeding habitat and security cover near nests (McClaren et al. 2015; MFLNRORD 2018).
 - No creation of hard edges closer than 200 m of an active or alternate nest (MFLNRORD 2018, Parks Canada Agency 2018). A hard edge is defined as an abrupt change in the forest canopy, typically where mature or old forest is adjacent to non-forested habitat or younger forest, and where the height difference between the two habitat types is at least 15 m (e.g., clearcut edge, lake shore, alpine area; Parks Canada Agency 2018).
- Maintain forested habitat within the reserve to ensure habitat connectivity between the nest trees (MFLNRORD 2018). Goshawk nests do not need to be active (i.e., occupied by a bird, eggs, or young) to receive breeding area reserve mitigations since goshawks are site-faithful and may use previously active or alternate nests for breeding in consecutive years (McClaren et al. 2015). To account for this tendency to use alternate nests over a broad area and help ensure that goshawk nests remain potentially viable, nests should not be deemed inactive until 5 years of consecutive surveys that return no detections. These are the guidelines currently used by industry on Vancouver Island and are proposed here until Regional Government Biologists provide further direction.

- If the suspected goshawk nest is later confirmed as belonging to another species (e.g., Common raven [Corvus corax], Red-tailed hawk [Buteo jamaicensis], Sharp-shinned hawk [Accipiter striatus], Cooper’s hawk [Accipiter cooperii], Barred owl [Strix varia], or Great-horned owl [Bubo virginianus]), then the R.P.Bio should defer to the *Wildlife Act*, *Migratory Birds Convention Act*, and/or *Guidelines for Raptor Conservation during Urban and Rural Land Development in British Columbia*⁶ for species-specific management prescriptions. These nests will need to be assessed during the breeding season to determine occupancy and, if active, then species-specific no-activity buffers will need to be implemented.

Disturbance Timing and Distance Buffers:

- No-activity buffers will be placed on active nests during the critical breeding window (February 15th – September 15th). The table below outlines the buffer distance from an active nest required for various forestry related activities (McClaren et al. 2015). If it is unknown which nest is active but the territory is considered occupied, then no-activity buffers will be placed on all known nests (i.e., active, and alternate nests; MFLNRORD 2018).

Disturbance Activity	Buffer from known nest (m)
Hauling and road maintenance ¹	100
Road Construction ²	500
Logging ³	500
Aircraft activities (repeated yarding with helicopters)	1000
Blasting	1000

Footnotes:	In the context of BCTS forest operations, the following are encompassed in each disturbance activity:
1	All hauling with trucks, including rock/gravel, logs, heavy equipment, bridges, etc. Road maintenance includes clearing drainage structures, removing debris, repairing washouts, installing signs and barriers, grading, gravelling, ditching, dust control, and snow plowing. Road deactivation activities such as removing culverts, establishing cross ditches and waterbars, and barricading the road surface are also included.
2	Road construction includes clearing right-of-way, sub-grade construction, overlanding, road drainage construction, surfacing, bridge and culvert installation. In some circumstances the removal of major structures are included in this buffer zone (for ex. structure removal requiring multiple pieces of equipment, cutting / grinding etc.).
3	Logging encompasses all forest harvesting activities, including tree felling (with a feller buncher, or hand falling), yarding, hoe chucking, skidding, processing, and loading.

⁶ https://www.env.gov.bc.ca/wld/documents/bmp/raptor_conservation_guidelines_2013.pdf

- If implementing no-activity disturbance buffers around active nests is not practicable for the entire duration of the breeding season, then, at the very least, attempts should be made to avoid disturbance during the most sensitive portion of the breeding season between March 15 and July 1, and (or) schedule activities nearest to the breeding area (or active nest) to occur outside this sensitive period (McClaren et al. 2015; Figure 3).



Figure 3: Goshawk nesting periods that are susceptible to human activity and noise disturbance (adapted from McClaren et al. 2015). Orange and red colours indicate periods when goshawks are most susceptible to disturbances that may lead to nest failure.

- Disturbance activity buffer distances and timing restrictions do not need to be applied to a known goshawk territory if nest occupancy surveys completed by an R.P.Bio with experience in goshawk breeding ecology indicate that a breeding area is not occupied by adult birds or their young (McClaren et al. 2015). Occupancy must be carefully assessed with surveys completed multiple times following recommended survey protocols (Appendix 4, McClaren et al. 2015).
- In the case of an emergency where there is an immediate and significant risk of harm to public safety, the environment, land or other property, road repairs or the installation of protection works can be done as required without adhering to timing or distance restrictions.

External Reporting protocols:

- Before and after surveys, findings should be reported to the Regional Governmental Biologist to discuss mitigation and management prescriptions (e.g., potential establishment of a WHA). Knowing whether a territory is occupied through consistent monitoring not only provides important insights of how to best adhere to legal and non-legal legislations regarding goshawk management, but also contributes to provincial databases regarding population trend assessments.
 - For unprotected areas with active nests, it will likely be a priority to establish a breeding area reserve under the Implementation Plan (MFLNRORD 2018). These decisions should be discussed with the Regional Government Biologist to determine candidacy and priority.
 - If a breeding area reserve is not feasible or determined not to be a priority in a given area by the Regional Government Biologist, then discussions should determine risk tolerances regarding site management with guidance from a QEP.
- Final management prescriptions should be disseminated to all participating stakeholders.

Strategic and operational planning considerations:

It is in the best interest of forest operations to maintain and support goshawk breeding and foraging areas. If these areas are compromised, goshawks may move into adjacent forests that could conflict with future harvesting plans (McClaren et al. 2015). The following strategic and operation planning considerations are adapted from McClaren et al. (2015) and the Federal Recovery Strategy for the Northern Goshawk *laingi* subspecies (Parks Canada Agency 2018) and may increase the likelihood of long-term territory occupancy:

- Details of initial observations should be sent directly to the Regional Governmental Biologist as well as submitted to the Wildlife Species Inventory as an Incidental Observation (Wildlife Incidental Observation Form⁷).
- A desktop evaluation of blocks on the five-year plan will be completed using modeled Northern Goshawk nesting habitat suitability. Any blocks modelled as having moderate to high nesting habitat suitability will be flagged as requiring a goshawk nest survey completed prior to layout. Blocks that are within 1 km of current, recent, or historic goshawk territories that contain suitable nesting habitat should also have a nest search conducted prior to layout. This type of pre-emptive survey can help to reduce sunk costs if a new territory is located in a proposed block.
- If an area modeled as high value habitat is assessed in the field and determined to have unfavorable or poor goshawk nesting habitat, then no further action is required. If a proposed block has moderate to high nesting habitat, but no goshawk detections were made during the initial survey, a final nest search and goshawk survey will be conducted the same year the block is to be sold.
- Pre-emptive nest searches can occur mid-April onward for a block that is to be harvested that same year. That timeframe should account for any new nests that may have been built during the courtship/nestbuilding phase (Feb – Apr). Nest searches should be conducted by QEP familiar with identifying goshawk nests. Windthrow risk should be carefully assessed for any roads or cutblocks adjacent to breeding reserves or within 252 m from nest locations (e.g., most nests are >252m from a hard edge; Parks Canada Agency, 2018).
- Maintain mature and old-forest representation across the managed landbase. Rotations >60 years will assist in maintaining recruitment of mature forest attributes. Older forests are more likely to contain features required for nesting goshawks such as large lateral branches on live or dead trees that could provide nesting platforms.
- Aim for clustered retention of trees that meet requirements for goshawk nest site characteristics in stands that are too young to provide good nesting platforms. Other forest structures such as snags, and coarse woody debris should also be retained since those forest attributes are important for prey species.

⁷ <https://a100.gov.bc.ca/pub/wiof/locationForm.do>

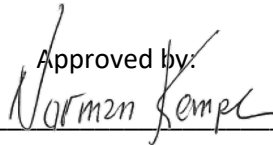
- Irregular (commercial) thinning can promote light penetration through the canopy, which could aid in understory regeneration that enhances goshawk prey diversity.
- Practice adequate snag recruitment to provide potential nesting platforms, sites to pluck prey items (i.e., plucking posts), and/or to enhance prey diversity (e.g., woodpeckers). Retaining areas with laminated root rot (*Phellinus weirii*) could be important in snag generation.
- Coarse woody debris should remain onsite rather than removed/collected since it provides plucking posts, nutrients for soil regeneration, growth medium for seedlings, and enhances prey diversity.
- Spacing and pruning applied to younger, second growth stands may enhance formation of subcanopy flyways (i.e., important for goshawk foraging activities). Recent work by Boyer (2021) on Haida Gwaii assessed the efficacy of silvicultural thinning to improve goshawk foraging. Specifically, plots were treated to mimic older forest structure in second growth monocrops that are hypothesized to increase prey resource availability and formation of subcanopy flyways. This study detected key goshawk prey species (e.g., Red squirrels and Red-breasted sapsuckers) in treatment plots and will continue to evaluate if the treatment plots are effective in supporting goshawk foraging.

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Approved by:



Timber Sales Manager

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