

Best Management Practices for Northern Goshawk Foraging Habitat

Retaining Old Growth Structural Attributes



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Managing for Goshawk Foraging Habitat

Goshawk foraging habitat is a critical component of a functioning goshawk territory (McClaren et al, 2015, Stuart-Smith et al. 2013). Clear-cut harvest and even-aged conifer plantations do not support the forest structure on which goshawks, and many of their prey depend. In addition, restoration of these clearcut areas will take 100's of years and at least a generation of trees, to restore back to its original forest structure. This Best Management Practice (BMP) provides guidance as to the precautionary stewardship objectives and approaches required to maintain a functioning territory, through the retention of critical old forest structural attributes, within the foraging area of known and suitable predicted goshawk territory areas.

This BMP is intended as a companion document to existing BMP and Science Based Guidance documents (Manning C. 2012, McClaren et al. 2015, and Stuart-Smith et al. 2012) that are focused on the Goshawk Breeding Area Management.

NOTE: This BMP should only be applied within the framework of a coordinated regional population goshawk plan, as any harvest within an active or suitable goshawk territory area incrementally increases the risk of abandonment of that territory. In the absence of a coordinated plan, we do not recommend any harvest within the remaining suitable or known occupied goshawk foraging (or breeding) territory areas.

Given the rapidly declining numbers of suitable and occupied goshawk territories (and thus goshawks themselves), we recommend a strong adaptive management, and effectiveness monitoring, component, both pre- and post-harvest. Further, this should be coordinated within an agreed-upon regional Adaptive Management Framework (as per the Skeena Region Planning App, below). In the context of harvest activities, there is still much to learn about what – and how much – is required to sustain a goshawk territory. This monitoring will help managers and biologists to determine whether the harvest/stewardship plan was successful in maintaining old-growth forest structural attributes - the associated biodiversity, and the long-term occupancy and breeding success of the goshawk territory. Through this feedback and lessons learned, we can ensure the development and implementation of an effective BMP.

Specific to understanding the challenges here, the foraging home range habitat threshold of each territory predictably changes both with habitat, and with fluctuations in prey, such that on an individual territory basis we do not know that threshold until it has been past, and that territory is abandoned. With this knowledge, this management approach looks to maintain the forest structure, and associated abundance and availability of prey across the breadth of a goshawk territory area, at a scale that is comparable with the observed largest home ranges of birds in interior BC.

Suggested citation:

Ferguson, P., F. I. Doyle and M. Buirs. 2023. Best Management Practices for Northern Goshawk Foraging Habitat: Retaining Old Growth Structural Attributes; V. 1.0 May 2023. Wildlife Dynamics Consulting and Molly Creek Forestry.

Territory Harvest Management

As a management approach, this strategy has used the large territory requirements (~6,000ha) (Mahon 2008, Chase 2021), and habitat needs of the goshawk as an umbrella species for the forest habitat needs of many other focal species including fisher, moose, marten, and old-growth dependent birds and small mammals.

Table 1. Management zones in the Skeena Region with recommended percent retention for partial cutting treatments.

Goshawk Territory Management Zones						
Zone	Radius from center point [m]	Area (ha)	Description*	Treatment Type: Timber Removal	Maximum % of Zone Area Disturbed	% Retention of Gross Block Area
A - Coastal (i.e., CWH BEC zone) [Kalum]	800	200	Core	No Harvest - Complete Retention	0	100
A - Interior (all other BEC zones and "transition" portion of CWH) [Kalum transition, Kispiox, Bulkley, Morice, Lakes TSAs]	560	100	Core	No Harvest - Complete Retention	0	100
B	1000	350	Breeding Area Buffer	Partial Cutting	20	80
C	2787	2400	Summer Foraging Zone	Partial Cutting	50	70
D - Manage for in landscapes with greater disturbance	4371	3600	Winter Foraging Zone	Partial Cutting	70	50

*Total home range = zone C + D with areas A and B internal to that total area. The harvest target is 100% partial cutting.

Core: Encompasses the nest site(s) and is critical to preserve intact as old forest which has suitable structure.

Breeding Area Buffer: Partial cutting harvest systems can occur in this zone to a maximum of 20% of the area. Focus disturbance further from the Core where possible. Harvest entry once every 30 years.

Summer Foraging Zone: Only partial cutting recommended in this zone. Total disturbance of the zone is 50% of the area using a silviculture system with an average of 70% retention (partial cut) of gross block area. Disturbed areas can become active again for goshawks once they reach "mature" seral stage as defined by the Biodiversity Guidebook (BC, 1995).

Winter Foraging Zone: Additional forage area to manage in landscapes with less intact old and mature forest (ie. Bulkley, Morice and Lakes Timber Supply Areas (TSAs)). Only partial cutting is recommended in this zone. Total disturbance of the zone is 70% using a silviculture system with an average of 50% retention (partial cut) of gross block area. Disturbed areas become active again once they reach "mature" seral stage as defined by the Biodiversity Guidebook (BC,1995). Annual home range area can overlap between adjacent territories.

Partial Cutting Defined for this Guidance: Partial cutting refers to any silviculture system that does not include a clearcut system and that **does** include rotational reserves. Examples of partial cutting silviculture systems include patch cut, seed tree, shelterwood, coppice, retention systems and selection systems. No matter what partial cut silviculture system is used, the retention requirements identified in Table 1 are necessary for suitable habitat structure.



Figure 1. 4 zone territory management. Winter foraging (blue) area can overlap between territories.

A short biology lesson: The male goshawk is smaller than the female. During the nesting and rearing phase from February to August the male feeds the female and chicks. His ability to carry food back to the nest is limited by prey weight, the distance he must fly to find food. Preferentially he forages in larger areas of suitable habitat closer to the nest. If there is abundant food in winter, the female will have enough to prepare herself for breeding the following spring.

Goshawk Territory Design: The assumption is that you are working with a goshawk territory that has already been designed (Figures 1 and 2). Designing or re-designing territory instructions can be found here:

<https://governmentofbc.maps.arcgis.com/apps/MapSeries/index.html?appid=feb9d7e2add94c>

[bba54313db59c112a4](#) UserID – PX.Skeena
Password – Skeena1234

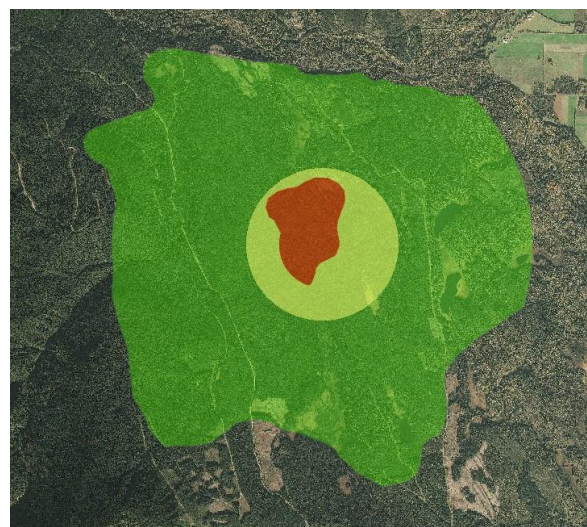


Figure 2. 3 zone territory management.

Harvest Implementation Strategies

Focus on promoting forage for Goshawk by promoting habitat for forage species and features for hunting. These features come from:

- *Coarse woody debris (CWD)*
- *Snags and live retention (mature perch trees for hunting)*
- *Habitat and food sources for forage species*

CWD: Make maintaining large CWD a priority.

- Collect pre-harvest data to understand what is present to start with.
- Larger is better: >30cm diameter and >7m length.
- Maintain what you have: protect good CWD patches through Machine Free Zones; avoid crushing it; maintain root wads; winter harvest when possible.
- Vertical and Horizontal structure: Place logs in jackstraw fashion so they are elevated above ground (25-50cm). Create connectivity by using windrows of CWD.
- Create CWD piles larger than 3m x 5m (x 2m high). At least one pile every 4ha located adjacent to standing retention on sunny aspect is recommended for marten habitat.
- Recruit future CWD through standing retention.



Snags and Live retention: Dispersed and clumped.

- Larger is better: snags >30cm DBH.
- Target 40% retention of existing snags and a minimum of 12-15/ha.
- Recruit new snags through girdling if necessary: Aim for the stand to have a continuum of decay classes as per Figure 3.
- Aim for 50% of the standing retention as clumped and 50% as dispersed.
- Maintain live retention in the form of deciduous, clumps of non-merchant, and a mix of merchantable sizes present within the stand.
- Retain tree species that are uncommon in the stand.
- Maximum distance between standing timber (i.e., edge trees and/or internal retention) in the range 50-70m.

Wildlife Tree Class								
Live		Dead						Dead Fallen
		Hard →			Spongy	→ Soft		Not Sampled
1	2	3	4	5	6 ≈ 2/3 original height	7 ≈ 1/2 original height	8 ≈ 1/3 original height	9
Live		Dead					Dead Fallen	
		Hard →		Spongy	→ Soft		Not Sampled	
1	2	3	4	5	6			
CWD Decay Class								
Log class 1	Log class 2	Log class 3	Log class 4	Log class 5				
Hard	Sap rot (but still hard)	Advanced decay (spongy)	Extensive decay (crumbles/mushy)	Many small pieces, soft				
Bark firm	Loose bark	Bark trace/absent	Bark absent	Bark absent				
Elevated	Sagging	Sagging to settled on ground	Fully settled on ground	Partly sunken in ground				
Hard branches with twigs	Soft branches	Branches stubs/ absent	No branches	No branches				
Supports person	May not support person	Breaks easy	Shape collapses when stepped on	Collapsed oval				
No invading roots	No invading roots	Roots in sapwood	Roots in heartwood	Roots in heartwood				

Figure 3. Wildlife tree and coarse woody debris decay classes used for stand-level biodiversity resource stewardship monitoring in British Columbia (Province of BC, 2009).

Habitat and food sources for forage species: Who are you catering to?

Retaining snags and CWD are important for typical summer prey such as squirrels, woodpeckers, jays and thrushes. Retention and recruitment of high-quality snags is a critical structure for over 67 primary and secondary nesting and denning birds and mammal species in BC (Bunnell, 2012). Additionally, grouse and hares are critical winter food sources for the northern goshawk and have specific habitat needs.



Figure 4. Ruffed grouse in winter.

- Spruce and Blue grouse eat conifer needles (typically spruce of any age) in the winter. Identify feed trees in the field by locating piles of grouse fecal pellets beneath them.
- Ruffed Grouse eat buds of deciduous trees and shrubs. Incorporate deciduous into the retention strategy.
- All native berry plants are important food sources for grouse (flowers and berries). Protect and promote the berry species population on your site.

- Hares have an affinity for dense, unthinned sapling patches. Because hares show an affinity for dense patches of residual forest, any retention of untreated sapling patches may be beneficial for hares.
- Hares benefit in winter months from a connectivity of dense patches of cover. Maintain clumps of natural regeneration during harvest. Larger patches are better for survival from sun exposure.



Figure 5. Snowshoe hare in summer.

Finally, minimize the area occupied by long term roads (reduce length of permanent road, reduce surface width and ROW). All extra road surface reduces available habitat for forage species.

Important Reminders:

- The northern goshawk needs to be managed at a landscape scale. With a declining and now small population, managing individual and clusters of territories is a critical piece for maintaining a viable population.
- A coordinated management approach to harvest and restoration activities across the remaining individual goshawk territories is critical to the success of maintaining a long-term viable territory.
- Implementing both structure and wildlife assessments pre- and post- harvest supports the science and will allow this BMP to evolve.
- Managing forests for habitat requires a long-term outlook. You are setting up a future forest for certain habitat values.
- A range of treatments and disturbances in the forest is required rather than one similar approach used often. Don't do the same thing everywhere.



Figure 6. Partial cutting in ICH BEC zone. Cover photo: Partial cutting second growth in CWH BEC zone.

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Skeena Region Northern Goshawk Population Management Planning Web Application:

<https://governmentofbc.maps.arcgis.com/apps/MapSeries/index.html?appid=feb9d7e2add94cbba54313db59c112a4> UserID – PX.Skeena Password – Skeena1234

Stuart-Smith, A.K., W.L. Harrower, T. Mahon, E.L. McClaren, and F. I. Doyle. (2012). A scientific basis for managing northern goshawk breeding areas in the Interior of British Columbia: Best management practices. FORREX Kamloops, B.C. Series 29.

Links:

Date Creek Research Forest Publications:

<https://www2.gov.bc.ca/gov/content/industry/forestry/managing-our-forest-resources/silviculture/silviculture-research/silvicultural-systems-research/date-creel-research-forest>

John Prince Research Forest: <http://www.jpfr.ca/research/post>

Stand Level Biodiversity Brochure: https://www2.gov.bc.ca/assets/gov/environment/plants-animals-and-ecosystems/conservation-habitat-management/wildlife-conservation/wildlife-tree-committee/stand_level_biodiversity_brochure_side_1.pdf