Proposed Wildlife Habitat Areas for the Northern Goshawk (*Accipiter gentilis laingi*) on the Central Coast of British Columbia

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Summary

The coastal subspecies of the Northern Goshawk (*Accipiter gentilis laingi*) is considered at risk (Red listed, Conservation Data Centre 2008) in British Columbia. Although a variety of inventories and studies on the coastal subspecies have been conducted in the northern (Haida Gwaii/Queen Charlotte Islands) and southern (Vancouver Island) regions in British Columbia (Doyle 2005, McClaren 2003, Zeeman 2003, Ethier 1999, Roberts 1997), limited information was previously available for the mainland coast (Environment Canada 2008).

We assessed the occurrence of Northern Goshawks and their nests to distribute Wildlife Habitat Areas (WHAs) for this species throughout the Central Coast Forest District. We also assessed nest characteristics, verified nesting habitat suitability based on the BC Recovery Team's predictive model (Mahon et al. 2007, and estimated nesting density of the Northern Goshawk.

Throughout the 2007 and 2008 field seasons, we conducted call-broadcast surveys at 630 sample points and completed 148 habitat plots throughout predicted high and moderate suitability classes on the Central Coast. We identified a total of seven WHAs, each representing individual goshawk territories, in four landscape units. Due to the elusive nature of goshawks, the large areas to be covered, and the steep terrain, we were not always able to locate nests despite visual observations of birds in certain areas. Further field work is required to identify additional WHAs and provide more information for calculating nesting density in the region.

Acknowledgements

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Introduction

The coastal subspecies of the Northern Goshawk (*Accipiter gentilis laingi*)[1] is designated as threatened in Canada (COSEWIC 2000) and as a species at risk (Red listed) in British Columbia (Conservation Data Centre 2008). This goshawk subspecies, also known as the "Queen Charlotte Goshawk", is vulnerable due to its limited range in southeastern Alaska, Haida Gwaii (Queen Charlotte Islands), Vancouver Island, and the mainland British Columbia coast (Campbell et al. 1990, Environment Canada 2008). The goshawk is also vulnerable because of its preference for mature or old-growth trees which also possess stand characteristics (e.g. low elevations) preferred for logging (COSEWIC 2000, Environment Canada 2008).

To ensure maintenance of viable goshawk populations, it is important to identify and protect habitat in existing breeding and foraging territories due to their high site-fidelity to an area over years or even decades (Squires and Reynolds 1997, BC Ministry of Environment, Land and Parks and BC Ministry of Forests, 1999). Provincial legislation and government policy, including the Identified Wildlife Management Strategy (IWMS) (Ministry of Environment 2004), legal orders and proposed legislation (Ministry of Agriculture and Lands 2007a, 2007b, Ministry of Environment 2008) indicate the need for specialized goshawk management.

Although detailed surveys have been conducted elsewhere, very little is known about the occurrence of goshawks on the Central Coast. It is vitally important that as many goshawks territories can be identified in this area to ensure their persistence on the mainland coast.

Our main objectives for the project were to:
- Confirm the presence of goshawks by locating actual nest locations; and
- Identify (WHAs) for goshawks throughout the Central Coast.

Our secondary objectives were to:
- Confirm modelled nesting habitat suitability by comparing model output to habitat surveys conducted in the field;
- Confirm modelled nest tree and site parameters based on field surveys; and
- Establish a first approximation of goshawks nesting density on the Central Coast.

These objectives represent the largest survey effort for goshawks on the mainland coast. These objectives were chosen to provide valuable measures of the performance of the predictive model produced by the Provincial Goshawk Recovery Team, and to contribute to their extensive work on goshawk habitat verification. Displaying the ecological importance of this model through confirmation of goshawk presence helps to guide forest management on the Central Coast, and ensures areas delineated as WHAs adequately provide the necessary requirements for goshawk persistence in this region.

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[1] Hereafter, reference to the goshawk will be specific to *A. gentilis laingi*.

Study area

The study area consists of a land base of roughly 4.8 million hectares encompassing the Central Coast portion of the North Island – Central Coast forest district. The study area includes a range of biogeoclimatic zones and variants of which the Coastal Western Hemlock (CWH) and the Mountain Hemlock (MH) zones are the most common in forested areas (Meidinger and Pojar 1991). The study area falls within the Pacific Maritime Ecozone, however, less survey focus was placed on the hypermaritime portions because of budgetary constraints in accessing these areas (Figure 1.).

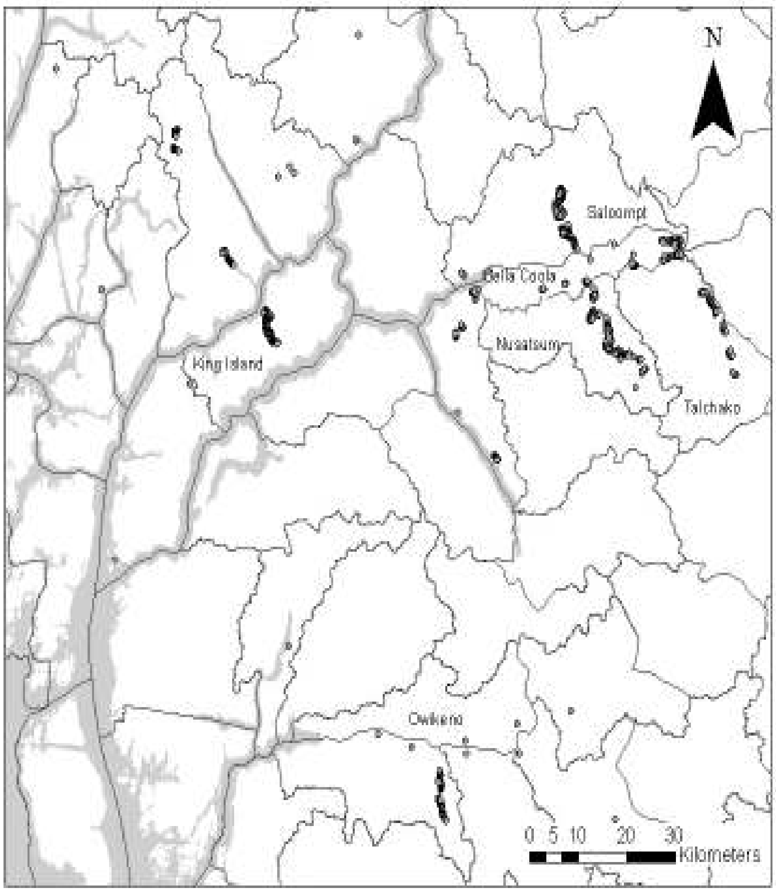

Figure 1: Map of goshawk survey areas on the Central Coast in 2007 and 2008

Despite some apparently suitable habitat, none of the known nests in coastal BC are within the hypermaritime CWH or MH BEC variants (Mahon et al. 2007). The distribution boundary used as the eastern most extent of the study area was based on the extent of the CWH and MH zones with which the *Laingi* subspecies is associated. Also considered, were the proposed and existing protected areas of the Central Coast. Recent major anthropogenic disturbances in the study area include logging and subsequent silvicultural efforts. Historic natural disturbances include windthrow, snow and debris avalanches, and infrequent fires.

Methods

Data collection and sampling design

We collected habitat and presence data using survey transects and goshawk call playback as outlined by RISC standards (2001) and Doyle (2004). Data was collected using two standardized forms developed with the input of Recovery Team members; one for call playback and one for habitat surveying (see Appendix I, Figures 3 and 4). We relied heavily on model output provided by the BC Goshawk Recovery Team (Mahon et al. 2007) in our selection for survey sites. However, since it was higher priority to locate nests rather than stratify our sampling throughout all habitat suitability classes, we excluded habitat identified as having low habitat suitability for nesting. We also used anecdotal accounts and local knowledge to narrow our searches in certain areas, and increase our probability of finding goshawks and nests.

Our selection of sample locations within the model output strata was not random largely due to limited accessibility. The overlap of highly suitable habitat and areas of interest for logging made many sample locations accessible by truck. Significant foot traverse was still required to run transects though an entire area of interest. An attempt was made to survey as many landscape units in the Central Coast as possible that had significant model output of highly and moderately suitable habitat. For more remote access, we also used both boat and helicopter transportation.

We conducted call playback transects every 100 to 400m, depending on the terrain and level of acoustic obstruction. For example, in areas with highly steep terrain and dense vegetation the distances between call stations was decreased. Habitat surveys were conducted at the first station following a change in habitat characteristics. If birds were located during a survey the call was stopped, the sex, age, and distance the bird arrived and left were recorded, and an attempt was made to locate the nest. When nests were identified their locations were recorded and a habitat survey was conducted. Additional information on the nest tree, such as tree species, height, DBH, and height of the nest in the tree, was also recorded.

WHA design

The methods used to delineate WHAs on the Central Coast contributes to the Ecosystem Based Management (EBM) framework which seeks to achieve "healthy, fully functioning ecosystems and human communities" by better coordinating land and resource decision-making for the benefit of all stakeholders (e.g., rural communities and various levels of First Nations, provincial, and federal government) and ecosystems (CIT 2004).

We considered several spacial scales for WHA establishment on the Central Coast. On a regional scale, the establishment of goshawk WHAs allows for the maintenance of spatial and temporal characteristics of ecosystems, and thus follows the intent of EBM for coastal British Columbia (CIT 2004, Ministry of Agriculture 2007a, 2007b). Because goshawks have large breeding and winter home ranges and often build multiple nests within the breeding areas, we are also addressed goshawk habitat requirements at the landscape level with our WHA design (see Table 1). Finally, the requirements for goshawks are addressed at the stand level since the ultimate goal in establishing WHAs for goshawks of ensuring successful fledging of young through maintenance of breeding habitat at known goshawk nests (IWMS 2004) was our primary basis for WHA delineation.

We used the Identified Wildlife Management Strategy (IWMS) (2004), Ministerial Orders (Ministry of Agriculture and Lands 2007a, 2007b, Ministry of Environment 2008) and species expert consultation as guides (E. McClaren pers. comm., Todd et al. 2007) for our WHA design. A distinct two-tiered design and several site, stand and landscape level criteria were used to delineate WHAs for goshawks on the Central Coast (Figure 2 and Table 1).

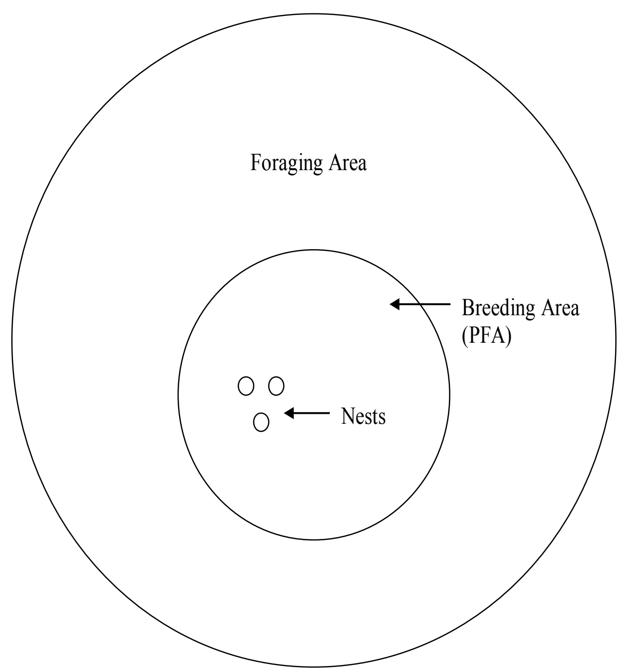

Figure 2: WHA design components for goshawk territories (modified from Mahon et al. 2007)

Table 1: Summary of criteria used for goshawk WHA delineation

Criteria (IWMS 2004, Ministry of Environment 2008)	Breeding (PFA)	Foraging
Known goshawk nests present	Yes	N/A
Signs of goshawk breeding (e.g., sightings, juvenile vocalizations, down feathers, pellets)	Yes	N/A
Nest areas >200 m from hard edge (to minimize windthrow and predation effects)	Yes	N/A
Elevation	generally <900 m	some areas can be above 900 m
Slope	< 60%*	< 60%*
Structural stage (MOF class)	6 - 7 (+ 5 but not preferred)	5 - 7
Crown closure (MOF class) (measure of multilayered canopies)	6 - 7 (+ 5 but not preferred)	6 - 7
Area	Approximately 200 ha	Approximately 2200 ha
Connectivity	Maximize	Minimize number of patches between forested areas and maintain in close proximity to nests
Can be maintained by other landscape level planning units (e.g, UWR, OGMAs, WTAs and other species WHAs)	Preferred (but areas are generally not large enough to cover area needed for PFA)	Preferred
Proportion of Timber Harvesting Land Base (THLB) (contributing and partially contributing)	Minimize	Minimize

*IWMS has <40% but Todd et al. 2007 suggest <60%, this is more appropriate for terrain of the Central Coast

We used known goshawk nests, regardless of their status (active or inactive), as the primary basis for identifying goshawk territories and delineating WHAs at the stand scale (IWMS 2004). A nest was considered active when breeding activity was apparent (e.g. juveniles were observed), and considered inactive when the nest had no signs of use and/or was overgrown or falling apart.

Certain circumstances also enabled the delineation of a goshawk territory within a particular area in which a nest has not yet been located. Based on repeated sightings (e.g. observations of territorial behaviour within 500 m of each other), and clear evidence of breeding (e.g. the presence of recently moulted juvenile down feathers) WHAs can still be established (E. McClaren pers. comm., IWMS 2004 and Ministry of Environment, Land and Parks and BC Ministry of Forests 1999). In addition to following those recommendations, we incorporated as many locations of 'signs' (e.g. whitewash, plucking posts, and pellets) as possible when determining our WHA boundaries (IWMS 2004). As part of our methods we also used multiple territories found within individual valleys to estimate a nesting density.

The breeding habitat is characterized as the areas used by goshawks for nest areas as well as for post-fledging dispersal, and for the purpose of WHA delineation is considered 200 Ha surrounding the nesting site (Ministry of Environment 2008). Breeding habitat areas should be in contiguous mature to old growth forest stands (structural stages 6-7), with open understorey, a closed canopy (60% or greater), and be greater than 200 meters from a hard edge (a difference in height > 12-15 m between mature forest and the edge – generally anthropogenic) (E. McClaren pers. comm., Mahon et al. 2007, Ministry of Environment 2008). Contrary to this an edge can also be soft or natural, such as a river (E. McClaren pers. comm.), and is not considered to have a negative impact on juvenile survival and dispersal as is associated with hard edges. The post-fledging area (PFA) is an area of concentrated use by the juveniles after they leave the nest but before they disperse from the area (Todd el at. 2007). We used the criteria laid out in Table 1 to evaluate each candidate WHAs based on their perceived ability to support successful breeding.

Foraging habitat for goshawks does not have specific requirements like breeding habitat. Given that goshawks are known to forage over large areas, it is important that it covers a substantial area surrounding the breeding habitat (IWMS 2004). An area of 2200 ha surrounding the breeding area is recommended to adequately sustain a goshawk pair and their young throughout the year (Ministry of Environment 2008). Foraging areas can consist of areas with lower seral condition and structural stages (5-7), but must still maintain forest structure that supports prey species (e.g. red squirrels, sapsuckers, blue grouse, and varied thrush) diversity and availability (IWMS 2004, Ministry of Environment 2008). We used foraging model output provided by the Recovery Team to estimate how much of the area surrounding the breeding habitat was already maintained by other landscape level planning and was covered by the Timber Harvesting Land Base (THLB).

While we put a lot of emphasis on foraging habitat, it should be noted however, that none of the WHAs include foraging area at this time. Rather than spatially delineate

2200 Ha the Forest and Range Practices Act and the Government Action Regulations (GAR) may provide other contraints to protect foraging areas (e.g., IWMS 2004). On an operational level, managers should overlap non-contributing THLB ungulate winter ranges, old growth management areas and other legal protection to provide essential foraging area, which complement the PFA.

Management of goshawk territories can include some forestry activity, although it should be severely limited in the breeding habitat area, particularly during courtship and nest establishment (i.e. March 15-June 30). Harvesting in foraging habitat areas should occur in a sequence that would create a mosaic of successional stages (Ministry of Environment, Land and Parks and BC Ministry of Forests 1999), to avoid the creation of too many hard edges and the loss of large tracks of areas important to prey species.

Nest characteristics and nesting habitat suitability

In order to determine how nest characteristics and nesting habitat suitability on the Central Coast compare to habitat features identified as important to goshawk survival and persistence, we used two methods of assessing the performance of the Recovery Team's predictive model (Todd et al. 2007). We chose to use this model because it represents the culmination of a large body of research (observed habitat characteristics at already known goshawk nest areas in Coastal BC, relevant literature, and species expert's opinions), and is based on the Habitat Suitability Index (HSI) methodology, a common tool used for land management (US Fish and Wildlife Service 1981). Through use of this model, our results will add to the assessment of the relative amount and distribution of goshawk breeding habitat in Coastal BC as is intended by the Recovery Team (Todd et al. 2007).

The first method of assessing the performance of the Recovery Team's predictive model, also referred to as habitat validation, involved comparing what habitat characteristics make up the areas goshawks actually use (i.e., where nests were found) to what parameters have been identified in the model and from other sources as contributing to highly suitable habitat (Table 2). To approximate this, we summarized and compared characteristics of nests and the surrounding habitat because we only used the nesting portion of the model and not the foraging component in our selection of survey sites.

Table 2: Summary of parameters for assessing goshawk nesting habitat suitability

Suitability rating	Nil (0 - 0.25)	Low (0.25 - 0.50)	Moderate (0.50 - 0.75)	High (0.75 - 1.00)
Interpretation	Habitat fails to meet minimum requirements	Suitability of two or more habitat variables is suboptimal	Suitability of one or two habitat variables is lower than optimal	All habitat variables meet optimal conditions
Dominant tree species	Non-forested or forested bog	Yc, Pl, Bl, Cw	Ba, Hm, deciduous	Hw, Ss, Fd
BEC variant	Non-forested or forested bog	Alpine tundra and parkland, ESSF parkland	ESSF (all except parkland)	CWH, CDF mm, ICH, IDF, and MH
Stand age - yrs (MOF Age class)*	<50 (≤ 3/4)	50-80 (3/4)	81-120 (5 + 6)	>121 (7, 8 + 9)
Stand height	<14m	14 - 20m	20-26m	>26m
Stand DBH***	<25cm	26 - 34cm	35 - 50cm	>50cm
Structural stage	0 - 4	4 - 7	5 - 7	(5) 6 + 7
Canopy closure	<20%	<35%	35-44%	≥ 45%
Understory**	100%	70-99%	36-69%	≤35%
Slope	>100%	>100%	60-100%	0-60%
Elevation*	>1600m	1301-1600m	700-1300m	0-700m
Edge (distance and type)*	N/A	< 200 m to soft edge	< 200 m to soft edge	> 200 m to any edge

* Estimates are based on Habitat Suitability Index (HIS) graphs provided in Mahon et. al. 2007
** Estimates are based on the quantification of open through dense categories of understory
*** Estimates are approximations of average DBH for typical tree species and average age of trees in each rate class
**** Estimates are based on our field recording techniques, Mahon et al. 2007, and personal communications with the Recovery Team
References. Table II in Workplan - Field Assessment of the Coastal Northern Goshawk Habitat Model. Mahon 2008
Parameterization of the Northern Goshawk Habitat Model for Coastal BC. Mahon et al. 2007
E. McClaren pers. comm. 2008

We assessed nesting habitat suitability using aspects of the second method, habitat verification. Habitat verification involves determining how accurately the model identified highly and moderately suitable habitat using our ground-truthed surveying. We qualitatively assessed nesting habitat suitability by using surveyor assessments of how accurately the model identified suitable habitat. We also performed a quantitative assessment of nesting habitat suitability by using the nesting model equation and the ratings assigned to each parameter provided by Todd et al. (2007)[1]:

[1] $HSI_n = \text{mean}(Age_r Height_r) * CanCl_r * Edge_r * ITG_r * Elev_r * Slope_r * BECvar_r$

Where: HSI = Habitat Suitability Index;
Age = Stand age;
Height = Stand height;
CanCl = Canopy closure
Edge = Distance to edge
ITG = Inventory Type Group (a measure of the dominant tree species)
Elev = Elevation
Slope = Slope
BECvar = Biogeoclimatic variant

It should be noted that the equation is designed using a limiting factor, non-compensatory structure (Mahon et al. 2007). Essentially, suboptimal ratings are multiplicative, decreasing the overall value, and one variable cannot compensate deficiencies elsewhere. Measures of each of these parameters are assigned a rating from 0 to 1 based on their evaluated importance to goshawk nesting (0 representing no value to 1 representing high value). After assigning a rating to the measures for each parameter, we calculated a habitat suitability index to determine which class (Nil (0 – 0.250), Low (0.251-0.500), Moderate (0.501 – 0.750), or High (0.751-1.000)) the habitat surveyed actually belonged. Once we determined the actual class of the habitat, we compared that to the predicted class provided by the model. Some parameters (e.g., distance to edge) were not recorded in exactly the same manner as presented in the model, therefore our calculations for nesting habitat suitability are only an approximation of any verification preformed by the Recovery Team.

Potential bias and limitations

Our highest priority was to locate goshawk nests in the Central Coast. To accomplish this, we limited our search to moderate and high suitability model classes (therefore excluding low suitability and foraging classes). Inferences based on sampling approach cannot be scientifically rigorous due to the lack of stratified random design. Furthermore, only a small section of the Central Coast model was sampled, therefore restricting inferences to areas that are ecologically comparable.

False negatives may also have resulted from the model output. Thus, areas of suitable nesting habitat may have been excluded in the searches. Even more likely, however, is that foot traverses across steep mountainous terrain limited the time available to thoroughly search for signs (e.g. plucking posts) and nests.

Even more frequently, goshawk sightings were reported to indicate activity but should not be interpreted as nesting or breeding in that vicinity. Goshawks may have traveled several kilometres from the nest in response to a call broadcast. Phenology[2] also plays a big role in when responses can be elicited from breeding adults (highest during nesting) and juveniles (highest during fledging). Since the lack of response does not necessarily mean the absence of activity in an area, attempts at validating the model may be statistically uncertain. Another bias related to detectability may be due to the fact that 2008 was a poor year for nesting success in other areas within the range of the coastal subspecies of the Northern Goshawk (F. Doyle pers. comm.). This may have reduced the probability of locating goshawks or nests in our region due to the fact that goshawks are less likely to respond when they are not actively nesting and defending their nest or young.

Finally, because only a few territories were located in just two valleys and because long-term monitoring has not been conducted to determine the use of territories by individual goshawk pairs from year to year, our estimation of nesting density is very rudimentary.

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[2] Refers to timing of nesting and breeding events (e.g. hatching of eggs).

Results and Discussion

Sampling effort

We surveyed 19 landscape units and completed a total of 630 call playback surveys throughout the 2007 and 2008 field seasons (Appendix II and Figure 1). The majority (73.1%) of these surveys were in the submaritime, while 26.7% were in the maritime and only 0.2% were conducted in hypermaritme areas (Table 3). Surveying was conducted almost entirely in the Coastal Western Hemlock zone with wet submaritime (CWH ws 2) being the most common BEC variant surveyed. Most locations were also west-facing, on a slope of less than 60%, and lower than 600m in elevation.

Table 3: Parameters at call playback survey locations on the Central Coast in 2007 and 2008

Habitat parameters								
Dominant tree species	# of points	% of total	**BEC variant**	# of points	% of total	**Continentality**	# of points	% of total
Western Hemlock	449	71.8%	CWH ds 2	97	15.5%	Submaritime	457	73.1%
Western Redcedar	24	3.8%	CWH ms 2	120	19.2%	Maritime	167	26.7%
Douglas Fir	112	17.9%	CWH vm 1, 2 + 3	166	26.6%	Hypermaritime	1	0.2%
Amablis Fir	22	3.5%	CWH ws 2	240	38.4%			
Sitka spruce (6) and others	18	2.9%	CWH vh 2 + MH mm 2	2	0.3%			
Terrain parameters								
Aspect (direction*)	# of points	% of total	**Slope (%)**	# of points	% of total	**Elevation (m)**	# of points	% of total
North	85	13.6%	0-59	510	81.6%	0-600	500	80.0%
East	152	24.3%	60-100	113	18.1%	>600	125	20.0%
South	116	18.6%	>100	2	0.3%			
West	272	43.5%						
TOTAL**	**625**							

*Direction is based on 315-44° = North facing, 45-134° = East facing, 135-224° = South facing, 225-314° = West facing

**Although a total of 630 surveys were conducted, 5 locations were surveyed twice for goshawks and information is the same for these points

Goshawks were detected at 26 stations (4.2%) and a total of nine nests were located while completing survey transects. An additional five nests (representing one territory) were located through consultation with community foresters.

We completed 148 habitat surveys, distributed throughout all surveyed landscape units. Again the majority or 72.3% of these occurred in the submaritime region. Twenty-six percent were in the maritime and the remaining 1.4% of points were in the hypermaritime (Table 4). The dominant BEC variant surveyed for habitat plots was also the Coastal Western Hemlock wet submaritime (CWH ws). Habitat plot areas also were predominantly on West facing slopes of <60% and at an elevation lower than 600m.

Although sightings or sign occurred in some survey areas (i.e., King Island, Labrouchere, and Clayton Falls) we did not accumulate enough information in order to establish territories. Further surveying will be required to locate nests or identify territories in these areas. Ultimately, we were able to establish seven goshawk territories, all occurring in the submaritime zone, and estimate a nesting density based on territories in two valleys.

Table 4: Parameters at habitat plot locations on the Central Coast in 2007 and 2008

Habitat parameters								
Dominant tree species	# of points	% of total	**BEC variant**	# of points	% of total	**Continentality**	# of points	% of total
Western Hemlock	91	61.5%	CWH ds 2	27	18.2%	Submaritime	107	72.3%
Western Redcedar	11	7.4%	CWH ms 2	33	22.3%	Maritime	39	26.4%
Douglas Fir	19	12.8%	CWH vm 1, 2 + 3	39	26.4%	Hypermaritime	2	1.4%
Amablis Fir	13	8.8%	CWH ws 2	47	31.8%			
Sitka spruce (6) and others	14	9.5%	CWH vh 2	2	1.4%			
Terrain parameters								
Aspect (direction*)	# of points	% of total	**Slope (%)**	# of points	% of total	**Elevation (m)**	# of points	% of total
North	30	20.3%	0-59	112	75.7%	0-600	120	81.1%
East	46	31.1%	60-100	36	24.3%	>600	28	18.9%
South	27	18.2%	>100	0	0.0%			
West	45	30.4%						
TOTAL	**148**							

*Direction is based on 315-44° = North facing, 45-134° = East facing, 135-224° = South facing, 225-314° = West facing

WHA evaluation

We propose a total of 7 WHAs to protect goshawk habitat. They all fall within the Bella Coola, Nusatsum, Saloompt and Talchako/Gyllenspetz landscape units, which reflects the high sampling effort due to accessibility to those areas. Although we sampled other less accessible areas of the maritime and submaritime zones as much as possible, we were not able to find nests or locations of relevant activity and sign (see methods), and thus establish WHAs in those areas.

Each proposed WHA satisfies all IWMS criteria and other considerations that were laid out in Table 1. For example, all proposed WHAs include >95% late structural-staged forests throughout. This ensures both favourable breeding and foraging habitat. Connectivity of forest patches is also maintained with only small cutblocks included in Nusatsum north and south. A summary of biophysical characteristics in the proposed WHAs can be found in Table 5. Maps of each WHA, indicating nest sites, goshawk observations and other indirect observations of goshawk activity can be found in Appendix III (Figures 5 through 11).

In all instances there are signs of goshawk breeding or activity and in all instances except Saloompt south, known goshawk nests are present. The Saloompt area represents the most goshawk activity noted during the two field seasons. One active nesting site was found at Saloompt north with one adult and juvenile recorded. Other signs of activity including pellets and prey remains were also found within this area. Saloompt central hosts several inactive nests but goshawk responses were elicited multiple times resulting in both vocal and sighted observations. While Saloompt south is the only site with no nest sites found, freshly moulted juvenile feathers were found indicating the presence of a natal area and probable nesting site. This was deemed suitable evidence of breeding and activity within the delineated area by one of the species experts (McLaren pers. comm.).

The Snootli Creek contains an active nesting site. Two pre-fledged juveniles were observed in 2008. Because of easy access (close proximity to roads and trail), this site was used as a benchmark for comparison of phenology and behaviour. The Snootli Creek WHA is located in the Bella Coola Landscape Unit and is therefore restricted by the surrounding private land holdings. It should be noted that for management considerations, 12.5% also contributes to the Timber Harvesting Land Base (THLB).

In the Nusatsum WHAs, 8 nests were found (5 south and 3 north) with multiple sightings of both males and females. While all nests have been observed as inactive, signs of activity (including plucking posts) have been observed at both locations. As mentioned above, small cutblock patches were also included in the delineation of this WHA. While this may detract from optimal nesting habitat, it may provide some foraging opportunities depending on the seral stage of the regrowth.

The Talchako WHA contains an inactive nesting site but there was also an active plucking post found and a goshawk sighting within the proposed area. King Island and Labouchere landscape units both had sightings of goshawks but insufficient evidence of nesting or breeding activity.

Table 5: Proposed WHA features on the Central Coast

WHA Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**
WHA Name	**Snootli creek**	**Nusatsum south**	**Nusatsum north**	**Talchako**	**Saloompt south**	**Saloompt central**	**Saloompt north**
Known goshawk nests present	Yes	Yes	Yes	Yes	No	Yes	Yes
Nest status in years of study	Active	Inactive	Inactive	Inactive	N/A	Inactive	Active
Signs of goshawk breeding or activity	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Nest areas >200 m from hard edge	Yes	No	No	Yes	Yes	Yes	Yes
Elevation (m) Min-Max (Majority)	31 - 642 (48)	459 - 1032 (585)	323 - 923 (364)	176 - 920 (487)	216 - 804 (602)	328 - 988 (568)	326 - 617 (365)
Slope (%) Min-Max (Majority)	2 - 134 (69)	10 - 118 (57)	14 - 136 (64)	10 - 119 (78)	10 - 136 (33)	7 - 92 (37)	1 - 81 (18)
Structural stage 6-7 (5) % of area	97.2 (<1)	95 (0)	97.1 (0)	99.1 (0)	99.8 (0)	98.2 (0)	96.9 (0)
Crown closure 6-7 (5) % of area	97.2 (<1)	12.4 (25.9)	<1 (65.7)	0 (98.8)	0 (49.7)	25.1 (41.9)	17.9 (11.3)
Area (Ha)	205	227	207	219	220	221	223
Connectivity (Contiguous patch)	Yes	Yes (but included small cutblock portions)	Yes (but included small cutblock portions)	Yes	Yes	Yes	Yes
Other landscape level planning % of area	2.6	12.3	42.1	98.5	1.1	11.9	57.3
THLB contributing % of area	12.5	32.6	8.0	25.2	95.7	1.5	58.4
THLB partially contributing % of area	0	15.8	28.1	0	0	0	16.7

Nesting density

We estimated nesting density from the location of five territories (two in the Nusatsum Valley and three in the Saloompt). The average nesting density for the Central Coast we calculated to be 4.0 km (3.3 km average in Saloompt and 5.5 km distance between the two territories in Nusatsum).

Nest characteristics

A total of 14 goshawk nests were located at 6 nest sites in 2007 and 2008 on the Central Coast (Table 6). Overall, the characteristics of nests and nest sites were consistent with what is expected for goshawk nesting, and in fact most represented features associated with high suitability as defined by the model and other sources (Table 2.). Characteristics where the majority of nest sites fell into the high suitability category included; the dominant tree species (and BEC variant), stand height and DBH, stand age and structural stage, canopy closure, understory, and elevation. However, the remaining characteristics of slope and edge (distance and type) for many nests differed from what is generally expected for goshawk nesting, and did not meet the requirements of high suitability.

The dominant tree species at most nests (n = 11) was Western Hemlock (Hw), followed by Douglas Fir (Fd) (n = 2). This is not unexpected since Western Hemlock dominated stands commonly display many of the key structural requirements for goshawk nesting (e.g., branch structures that form platforms) (Mahon et al. 2007, IWMS 2004). One nest area was dominated by Amabalis Fir (Ba) which is also a tree species that goshawks commonly use for nesting. However, Amabalis Fir dominated stands are rated at a slightly lower level (moderate) of suitability, due to their tendency to have more broken canopies (Mahon et al. 2007).

Although the dominant tree species at most nest sites was Western Hemlock, the nest trees were most often (n = 10) Douglas Fir. Having Douglas Fir or Western Hemlock tree species as the commonly used as a nest tree is consistent with what has been observed throughout the range of the coastal subspecies of the goshawk and fits well into the model for high suitability (Ethier 1999; McClaren 2003, Mahon et al. 2007)

In cases, where both stand and nest tree heights were recorded, the nest tree height was predominantly lower than the stand height (80% of the time). Goshawks on the Central Coast appear to be selecting nest trees that are smaller than the average stand tree rather the largest trees in the stand as has been previously observed (Reynolds et al. 1992, Ethier 1999). However, the unique nature of the forest stands on the Central Coast, being largely contiguous patches of mature and old growth (stand ages 5 – 9 and structural stages 6 and 7), compared to other areas in goshawks range may suggest that on average older larger trees are in some stage of decay and would not adequately support a nest because of weakened branch structure (Fenger et al. 2006). All nest sites on Central Coast were found to, in fact, be in these patches of mature and old growth forest and considered in moderate and highly suitable habitat.

Table 6: Summary of nest and stand-level habitat characteristics

	Nest site	Nest name	Status in year surveyed	Nest tree species	Nest tree height (m)	Nest tree DBH (cm)	Dominant tree species (ITG)	BEC variant	Stand height (m)	Stand DBH (cm)	Stand age[a]	Structural stage[b]	Canopy closure (%)	Understory (%)	Slope (%)	Elevation (m)	Distance to edge (m)	Edge type
Optimal **		N/A	Active	N/A	N/A	N/A	Hw, Ss, Fd	CWH, CDF mm, ICH, IDF, MH	>26m	>50cm	>121 (7, 8, 9)	(5), 6 & 7	≥ 45%	≤ 35%	0-60%	0-700 m	>200	any
Actual*	Snooti creek	SNN1	Active	Fd	29	48	Fd	CWH ds 2	n/a	n/a	7	6	65	8	3	53	>200	Hard
		SNN2	Inactive	Ep	18	n/a	Hw	CWH ds 2	24	50	6	6	40	5	45	76	>200	Hard
	Nusatsum north	NUN1	Inactive	Fd	22	n/a	Hw	CWH ws 2	36	138	8	7	50	35	55	366	<200	Hard
		NUN2	Inactive	Hw	19	n/a	Hw	CWH ws 2	26	48	8	7	50	5	35	379	<200	Hard
		NUN3	Inactive	Fd	18	n/a	Hw	CWH ws 2	32	100	8	7	55	1	60	412	<200	Hard
	Nusatsum south	NUN4	Inactive	Hw	37	84	Hw	CWH ws 2	28	49	8	7	70	15	60	682	<200	Hard
		NUN5	Inactive	Fd	34	87	Hw	CWH ws 2	n/a	n/a	8	7	85	10	65	789	<200	Hard
		NUN6	Inactive	Fd	38	37	Hw	CWH ws 2	n/a	n/a	8	7	60	10	72	710	<200	Hard
		NUN7	Inactive	Fd	40	100	Hw	CWH ws 2	n/a	n/a	8	7	40	15	70	747	<200	Hard
		Nunest	Inactive	Fd	n/a	n/a	Hw	CWH ws 2	n/a	n/a	8	7	60	10	72	691	<200	Hard
	Talchako	TAN1	Inactive	Fd	n/a	n/a	Fd	CWH ds 2	n/a	43	9	7	50	n/a	90	323	>200	Hard
	Saloompt central	SAN1	Inactive	Fd	28	50	Hw	CWH ws 2	n/a	n/a	5	6	30	20	15	580	>200	Soft
		SAN2	Inactive	Fd	35	89	Hw	CWH ws 2	n/a	n/a	6	6	20	35	25	554	>200	Soft
	Saloompt north	SAN3	Active	Hw	32	82	Ba	CWH ws 2	n/a	n/a	8	7	55	85	9	389	>200	Soft

n/a Not recorded
[a] Ministry of forests (MOF) Age Class System: 1:1-20yrs, 2:21-40, 3:41-60, 4:61-80, 5:81-100, 6:101-120, 7:121-140, 8:141-250, 9:>250
[b] Ministry of forests (MOF) Structural Stage System: 1:Sparse, 2: Herb, 3:Shrub/Herb, 4:Pole/Sapling, 5:Young Forest, 6: Mature Forest, 7: Old Forest
* Actual values based on field surveys from this study
** See Table 2

All nest sites occurred in a variant of the Coastal Western Hemlock (CWH) biogeoclimatic unit, where goshawks are commonly found nesting (IWMS 2004). Although we surveyed throughout the hypermaritime, maritime, and submaritime regions (Appendix II), all nests that were located on the Central Coast occurred in the submaritime This is not unexpected as none of the currently known nest sites in Coastal BC have been shown to occur in the hypermaritime, and this is believed to be a function of prey availability in this habitat type (Mahon et al. 2007). However, our inability to locate nests in maritime and hypermaritime areas, despite observing several sightings and sign of goshawks, may also be the result of the limited survey effort (Table 3 and 4) we were able to dedicate.

Both canopy closure and understory characteristics were shown to be consistent with expected conditions for goshawk nesting and again were classed predominantly in the high suitability category. Ten (or 71.4%) of nests had a canopy closure of greater than 45%, and nearly all (n = 13) had an understory of less than or equal to 35%. However, one nest in particular, SAN3 (Saloompt central), had significantly higher understory than expected (85% understory). Reasons for this are unclear, but it may be attributed to this area having apparently high prey abundance and availability as observed by surveyors at the site (D. Walkey pers. comm. 2008, See also 'Qualitative Nesting habitat suitability' in this report). This is contradictory to the belief that high densities of understory generally hamper the ability of goshawks to hunt successfully (Mahon et. al. 2007).

Because of the steep terrain that characterizes the Central Coast, several nests (n = 3) were above 700m (but still no higher than 800m). Despite the fact that all currently known nest sites in Coastal BC are below 600m elevation (Mahon et al. 2007), the majority of nest and habitat characteristics in our study site were such that elevation did not negatively affect the overall suitability.

The slope percentage for half of the nest sites was 60% or greater and would fall into the moderate category for suitability. Although the parameter of slope did not meet the requirements of high suitability for many nest sites, this may be a function of the terrain of the Central Coast rather than actual lower suitability of the habitat. Review of this characteristic is currently under review by the Recovery Team, and will likely result in increasing the slope percentage that is included with the high suitability category (T. Mahon pers. comm. 2008). It appears from field verification that slope, like elevation, for the Central Coast can be higher and still meet the requirements for high nesting habitat suitability.

Edge (distance and type) represented the only characteristic where the majority (n = 8) of nest sites fell within the low category of nesting habitat suitability. This characteristic may have had some influence on the status of the nest in the years of this study. Although the majority of other characteristics met the requirements for high suitability, the overall suitability for these nests was reduced by anthropogenic activities (logging cutblocks) causing hard edges. However, because the age of the cutblocks and the nests are unknown, a correlation between the presence of the cutblock and the nests being inactive cannot be made. Active nests, on the other hand, were found in the expected conditions of being greater than 200 m from a hard edge.

Nesting habitat suitability

Qualitative

The 2008 goshawk surveys were conducted using a predictive model output of medium to high probability goshawk nesting habitat (Mahon et al. 2007). Nesting habitat attributes were based on a variety of parameters *inter alia* slope, elevation, canopy closure and tree species composition. The accuracy of model output was variable with some model patches being highly predictive of good nesting habitat while others failed to capture this adequately.

The following qualitative judgement is derived from assessments of three field researchers and based on expert training (Frank Doyle), the Goshawk Recovery Team and available literature (e.g. Shaffer et al 1999, Marquis et al 2005). It should also be noted that this is a subjective impression of where the model's strengths and weaknesses occurred as the research team was out in the field.

Within the model output areas there were patches of excellent habitat observed alongside less favourable habitat (false positives). Recently harvested areas and cut blocks were poorly captured by the model which may be a result of older forest cover data. Similarly, the model predicted good habitat area in sub-alpine bogs characterized by sparse Hm and Yc krummholz.

In some otherwise ideal habitat areas, sub-canopy flyways and understorey density were not adequately captured by the model. This occurred more in the maritime areas rather than sub-maritime. Unfavourably high understorey obscured potential foraging flyways and plucking post locations. In particular, a distinction between *O. horridus* (Devil’s Club) and *Vaccinium spp*. dominated understorey may improve the performance of the model in maritime areas.

The model used on the Central Coast has proven to be effective in finding several active and inactive goshawk nests. While this validation is qualitative and represents the opinions of the field researchers, the results are optimistic. Based on observations, it appears that the likely limiting factor affecting goshawk nesting habitat is the abundance and availability of prey species in the nesting and winter foraging habitat. A way to better proxy this attribute would certainly serve to refine the model output.

Quantitative

The low accuracy of the predictive model was somewhat unexpected based on its’ reported accuracy in other locations and as a whole throughout Coastal BC (Doyle 2004, Mahon pers. comm. 2008). The model, by our calculations, was only 16% accurate in predicting nesting habitat suitability (i.e., the suitability of that percentage of plots represented was what predicted). 3 % of plots had a higher suitability than what was predicted, and 81 % had a lower suitability than what was predicted (Appendix IV). This estimate does, however, more closely resembles point level accuracy (58%) rather than project level accuracy (85%) as reported by Mahon (2008). Since we used a transect-sampling design rather than using multiple points to assess the suitability of an area, errors in the model prediction (e.g., spatial) would have a more profound affect on our estimates.

Because of the multiplicative nature of the model equation we used, only one or two variables would have to be sub-optimal to cause a significant reduction in the overall suitability. We also included canopy closure percentage because it appeared in the model equation, despite the mention of its' exclusion in the model as stated by (Mahon et al. 2007). Of the individual variable ratings (see page 7), 25% (n=37) of the canopy closure ratings were lower than the overall predicted nesting suitability. As for the other variables, 26% (n=38) of the stand age, 23% (n=34) of the stand height, 7% (n=11) of the ITG, 24% (n=36) of the edge, 7% (n=10) of the slope, 0% of the elevation, and 0% of the BEC variant ratings were lower than the overall predicted nesting suitability (see also Appendix IV).

Finally, it has already been identified that the categorical field ratings are inappropriate for assessing continuous habitat index (Mahon 2008). Although we calculated a HSI index for determining the actual (field survey) class, we only had access to the category of the predicted class. Therefore, there is potential for the actual and predicted values to be quite close but be straddled over a category boundary, and ultimately be considered in different categories.

Future Work

Further surveying, particularly in areas where sightings have occurred, will be required to locate more nest locations and add to the knowledge available on goshawk occurrence and distribution on the Central Coast. Long-term monitoring of nesting success and goshawk pairs' use of territories from year to year is needed in order to better understand the nesting density in this area. Finally, sampling would need to occur in areas identified as having low nesting suitability as well as outside of the model output to provide a more statistically rigorous basis for analyzing the performance of the model.

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Appendix I: Data forms

Figure 3: Call playback survey form

Animal Observation Form - Northern Goshawk Broadcast Survey
Bella Coola Inventory Project 2008

Survey Identification: Project Name _______________ Survey Name ____________________
Sample Unit: UTM: Start ___/_________/___________
UTM: End ___/_________/_____________
Distance Between Call Stns 200/400 m
Location Description: ____
____

Survey Segment Visit: Date (Y/M/D): ______________ Surveyors: _____________________________

	Time	Wind	Cloud Cover	Ceiling	Precip. Class	Temp. (^{0}C)
Start						
End						

CODES: Wind (0=<2km/hr; 1=2-5km/hr; **2**=6-11km/hr; **3**=12-19km/hr; **4**=20-29km/hr; **5**=30-39km/hr; **6**= >40km/hr)
CC (**1**=clear; **2**=scattered clouds (<50%); **3**=scattered clouds (>50%); **4**=unbroken clouds)
Ceiling (**a/b tt**=above/below tree tops; **a/b r**=above/below ridges; **h/v h**=high/very high)
Precip. Class (**N** =None; **F**=Fog; **M**=Misty drizzle; **D**=Drizzle; **LR**=Light Rain; **HR**=Hard Rain; **S**=Snow)

Call Type Used: ___________________ Goshawk Detected (Y/N): _____ Nest Found (Y/N): _____
Comments: ____
____

Bird Observations

Error	Stn. #	UTM East	UTM North	Start Time	End Time	Mimic	Bird Species (Obs. Type)

CODES: **Bird Species** (**B-4 letter code** in capitals); **Obs Type** (**OB**=visual; **SI**=sign (includes auditory); **NO**=no obs. were made); **Mimic** (record **B-4 letter code** of mimic species)

NOGO Observations **Nest Search #** __________

Stn #	Time	Response (A/V)	Direction of obs.	Distance	Sex	Age Class

CODES: **Sex** (**M**=male; **F**=female; **UC**=unclassified); **Age Class** (**J**=juvenile; **A**=Adult; **UC**=unclass.)

Other Animal Observations

Stn #	UTM East	UTM North	Species	Type of Sign	Comments

Comments: ____

Figure 4: Habitat survey form (nesting habitat suitability)

Bella Coola Goshawk Habitat Verification – 2008

Plot ID ________________ UTM ___/___________/____________

Location ____

Surveyor ______________ Date ___ ______________

Habitat Variables

Tree Comp. top 3 ________________

Stand Ht ______________ Str. Stg. ____________________________

Average DBH __________________

Stand Age ______ MoF __________________

Canopy Cl. ____________________

Slope _______________________________

Dist. to Edge _____ indicate if > or< 200 meters __________ Edge Type Soft/Hard__________ Understory (%): CWD (%):

Misc. Comments ____________________________________

____

____

Age Class
1 : 1-20 ; 2 : 21-40 ; 3 : 41-60 ; 4 : 61-80 ;
5 : 81 :100 ; 6 : 101-120 ; 7 : 121 :140, 8 :
141-250, 9 : >250.

Appendix II: Summary of Surveyed Areas in 07/08

BEC subzone	Landscape unit	Area surveyed	Results	WHAs proposed
Submartime	Bella Coola	Snootli creek	One active nest	**1**
		Burnt bridge	Nothing detected	0
		Schoolhouse falls	Nothing detected	0
	Talchako/Gyllenspetz	Talchako valley	Sighting, plucking posts, and nest	**1**
		Cacoohtin creek (Hammer rd)	Nothing detected	0
		Noomst	Nothing detected	0
	Nusatsum	Nusatsum valley	Multiple sightings, plucking post, and nest sites	**2**
	Saloompt	Saloompt valley	One active nest, multiple sightings, signs, and nest sites	**3**
		Talheo canary	Nothing detected	0
		Noosgulch	Nothing detected	0
Maritime	Braden	Braden valley	Nothing detected	0
		Elcho harbour	Nothing detected	0
	Clayton	Clayton falls valley	Sign	0
		South bentinck	Nothing detected	0
	Clyak	Moses inlet	Nothing detected	0
	Doos/Dallery	Doos valley	Nothing detected	0
	Don Peninsula	Kynoch (name of pt)	Nothing detected	0
	King Island	West of Hole-in-the-wall	Sightings	0
	Nascall	Nascall	Nothing detected	0
	Owikeno, Sheemahant, Macmell, Neechanz	Owikeno lake, Pashleth	Nothing detected	0
Hypermaritime	Sutslem/Sqowquiltz	Sqowquiltz bay	Nothing detected	0
	Evans	Windsor cove	Nothing detected	0
	Labouchere	Deas point	Sightings	0
	Yeo	Roshoa inlet	Nothing detected	0
			TOTAL	**7**

Appendix III: Maps of WHAs

Figure 5: Saloompt south

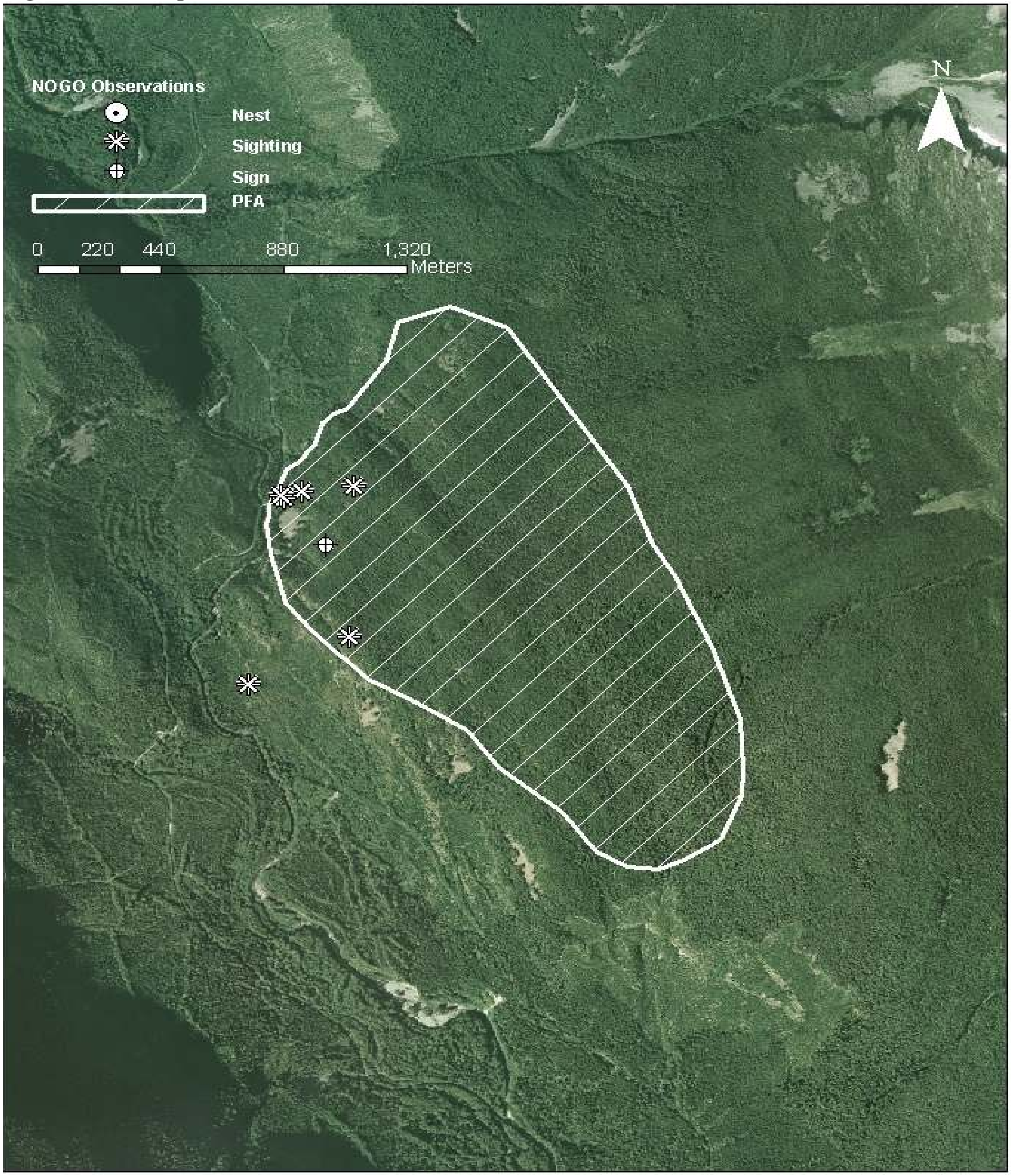


Figure 6: Saloompt north

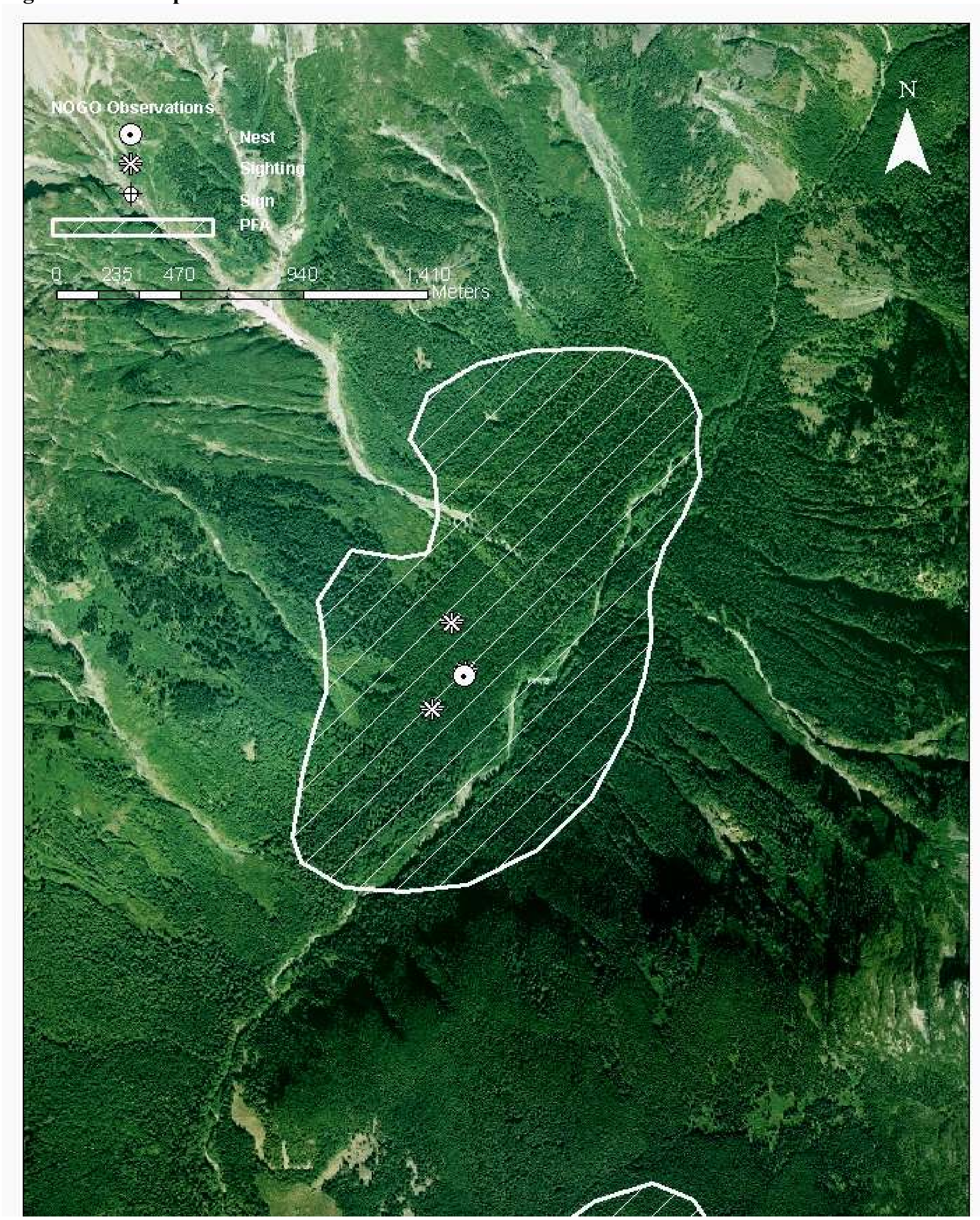


Figure 7: Saloompt central

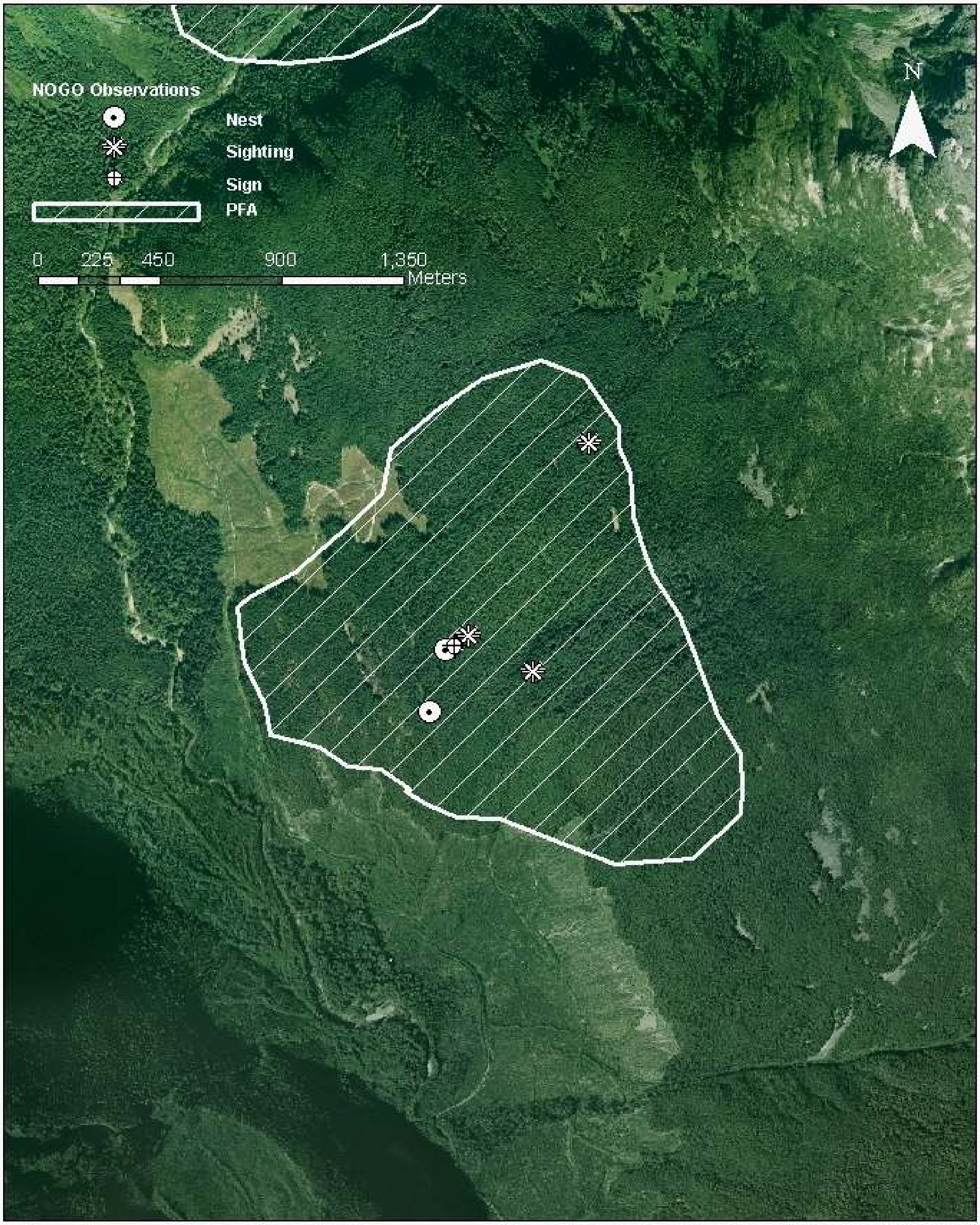


Figure 8: Snootli Creek

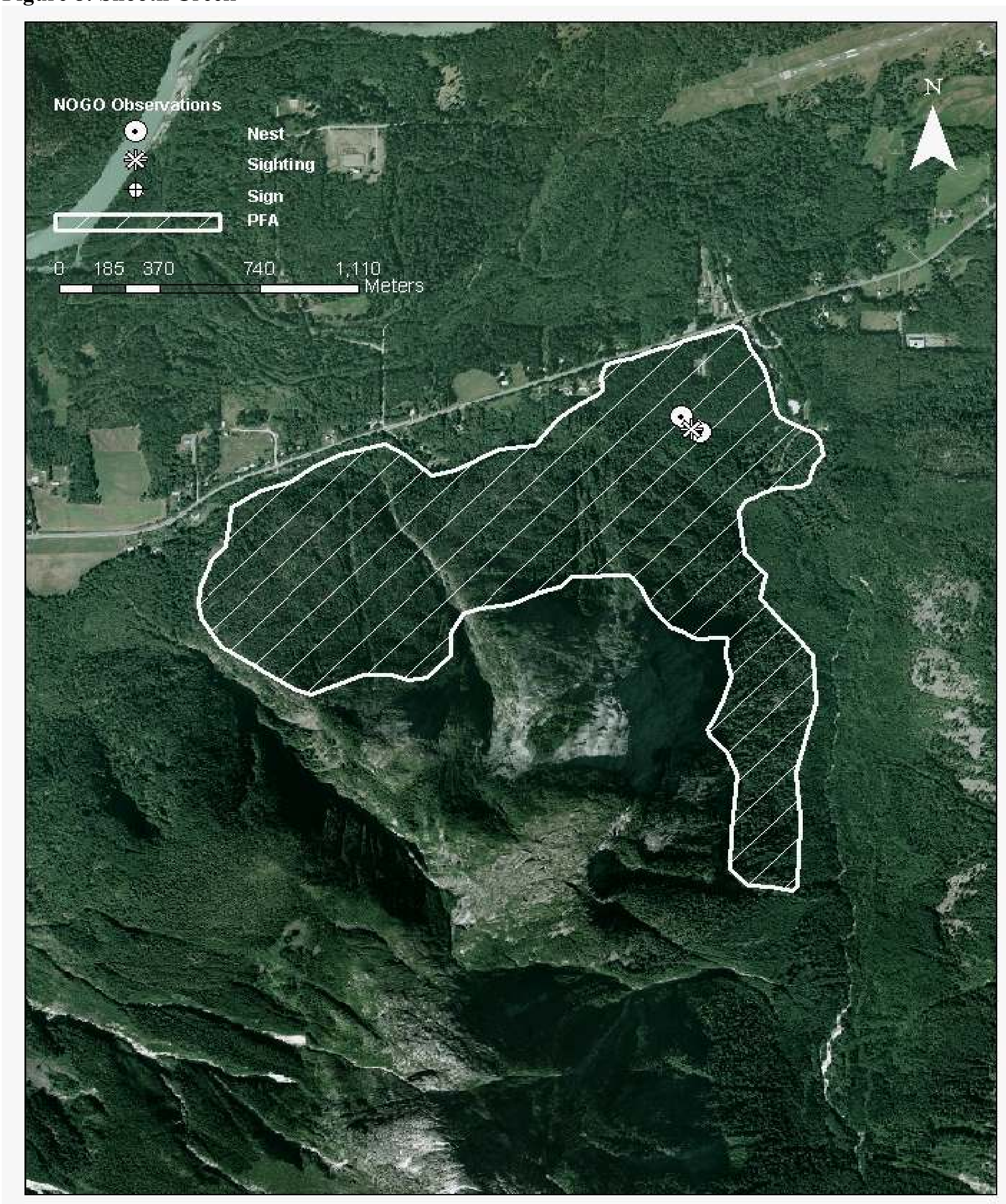


Figure 9: Nusatsum south

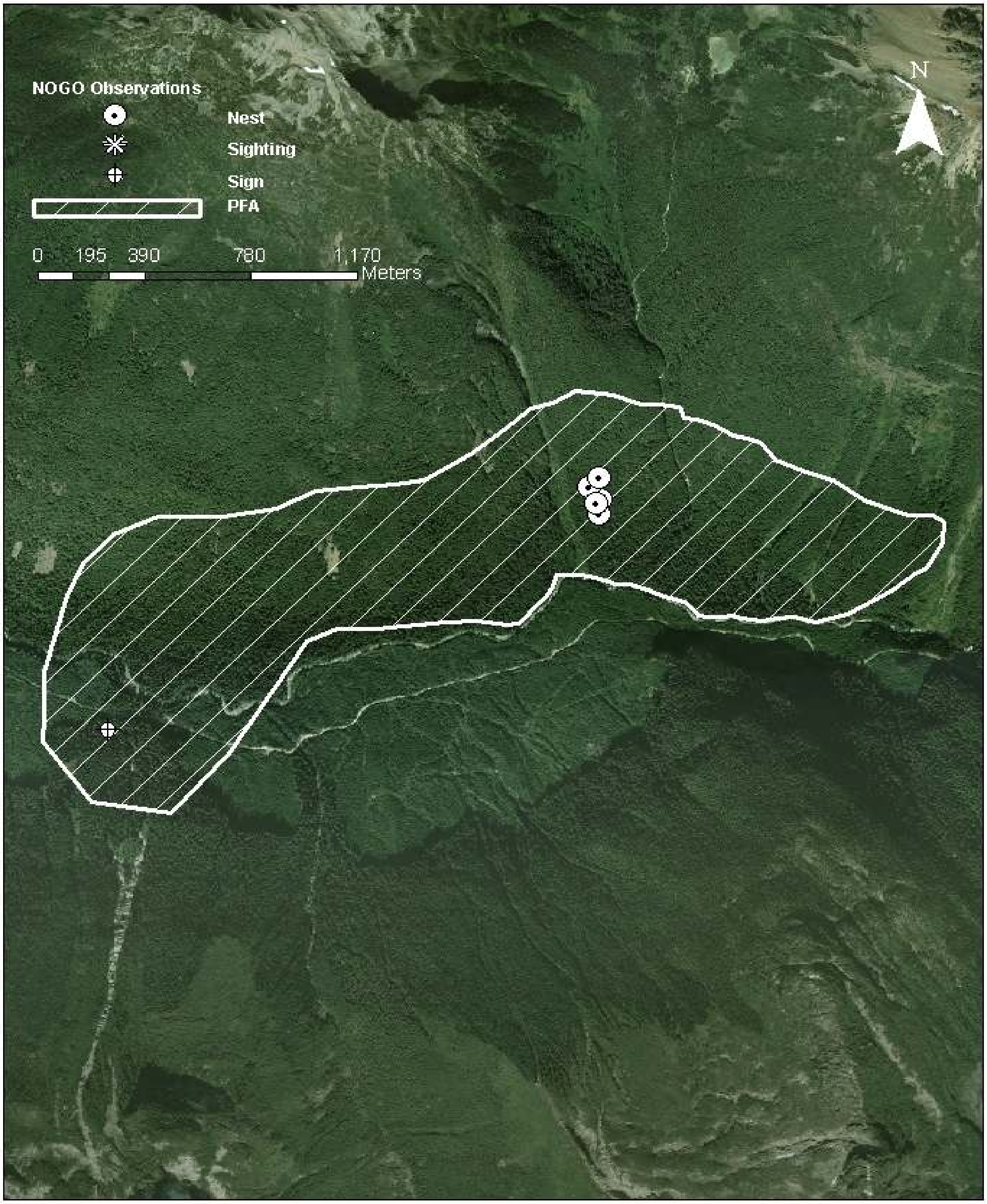


Figure 10: Nusatsum north

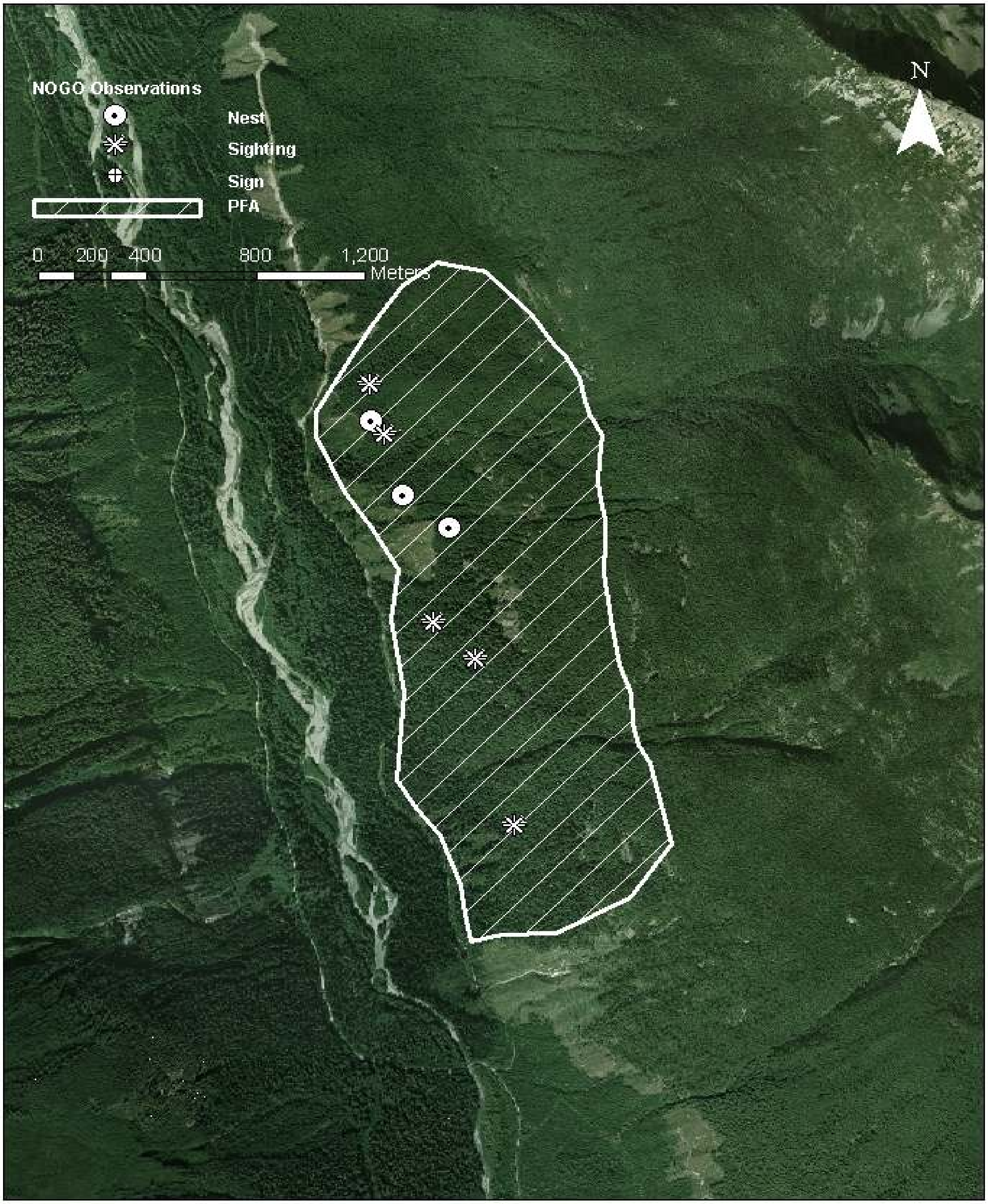
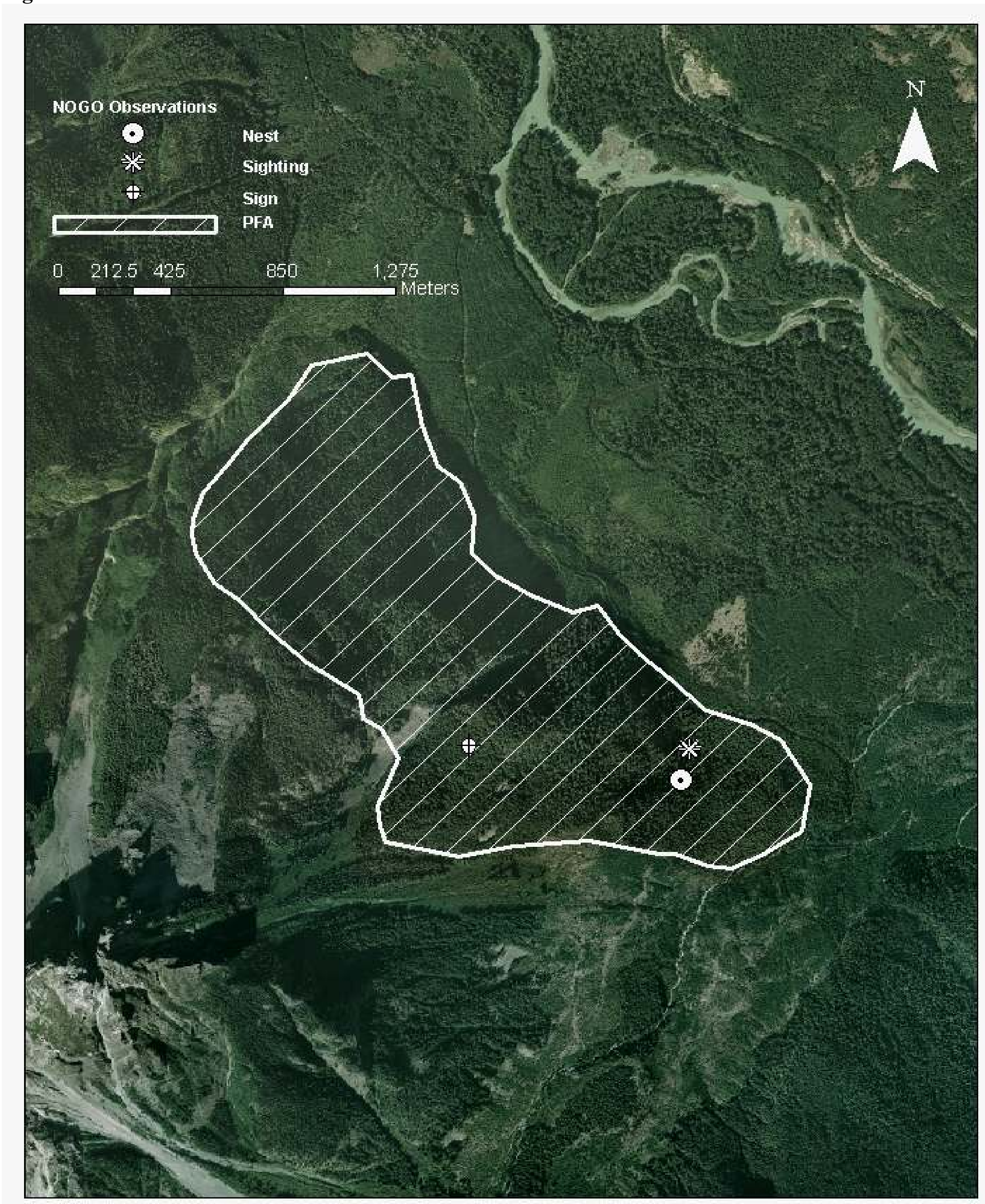


Figure 11: Talchako



Appendix IV: Predicted and expected nesting habitat suitability ratings

Year	Location	Plot ID	Stand Age	HSI rating	Tree Height (m)	HSI rating	Canopy Closure (%)	HSI rating	Distance to edge (m)	Edge Type	HSI rating	ITG - Sp 1	% Tree Sp 1	Tree Sp 2	% Tree Sp 2	HSI rating	Elevation (m)	HSI rating	Slope (%)	HSI rating	BEC variant	HSI rating	HSI Calculated (Actual)	*Actual Class*	*Predicted Class*
2008	Bella Coola	HA008	130	0.92	23	0.68	65	0.84	>200	Hard	0.80	Hw	65	Fd	35	1.00	376	1.00	25	1.00	CWH ds 2	1.00	0.54	moderate	high
2008	Bella Coola	HA001	70	0.42	20	0.55	70	0.86	>200	Hard	0.80	Hw	80	Ba	15	1.00	762	0.77	60	1.00	CWH ws 2	1.00	0.26	low	moderate
2008	Braden Valley	BR003	200	1.00	33	1.00	0	0.00	<200	Soft	0.60	Yc	65	Hm	35	0.40	249	1.00	30	1.00	CWH vm 1	1.00	0.00	nil	high
2008	Braden Valley	BR005	250	1.00	35	1.00	90	0.95	<200	Soft	0.60	Ss	45	Hw	45	1.00	129	1.00	18	1.00	CWH vm 1	1.00	0.57	moderate	high
2008	Braden Valley	BV108	130	0.92	20	0.55	25	0.34	>200	Soft	0.90	Yc	34	Hw	33	0.40	236	1.00	30	1.00	CWH vm 1	1.00	0.09	nil	moderate
2008	Braden Valley	BV101	130	0.92	25	0.77	70	0.86	>200	Soft	0.90	Hw	34	Ba	33	1.00	330	1.00	45	1.00	CWH vm 1	1.00	0.66	moderate	moderate
2008	Braden Valley	BR002	250	1.00	31	1.00	75	0.89	>200	Soft	0.90	Cw	50	Hw	45	0.65	222	1.00	75	0.70	CWH vm 1	1.00	0.36	low	moderate
2008	Braden Valley	BV106	200	1.00	27	0.86	80	0.91	>200	Soft	0.90	Hw	45	Ba	35	1.00	362	1.00	65	0.70	CWH vm 1	1.00	0.53	moderate	moderate
2008	Burnt Bridge	BB004	200	1.00	24	0.73	60	0.82	>200	Hard	0.80	Fd	100	n/a	n/a	1.00	364	1.00	50	1.00	CWH ds 2	1.00	0.57	moderate	high
2008	Burnt Bridge	BB007	130	0.92	16	0.36	65	0.84	>200	Hard	0.80	Fd	90	Ep	10	1.00	300	1.00	60	1.00	CWH ds 2	1.00	0.43	low	high
2008	Burnt Bridge	BB017	200	1.00	28	0.91	75	0.89	<200	Hard	0.40	Fd	90	Cw	10	1.00	175	1.00	0	1.00	CWH ds 2	1.00	0.34	low	high
2008	Burnt Bridge	BB015	130	0.92	24	0.73	65	0.84	>200	Hard	0.80	Fd	70	Dg. Mpl	30	1.00	333	1.00	40	1.00	CWH ds 2	1.00	0.55	moderate	moderate
2008	Burnt Bridge	BB001	70	0.42	17	0.41	80	0.91	>200	Hard	0.80	Fd	40	Cw	30	1.00	252	1.00	29	1.00	CWH ds 2	1.00	0.30	low	moderate
2008	Burnt Bridge	BC104	90	0.58	12	0.18	20	0.25	>200	Hard	0.80	Fd	80	Pl	20	0.70	734	0.78	80	0.70	CWH ws 2	1.00	0.03	nil	nil/low
2008	Burnt Bridge	BC100	90	0.58	14	0.27	25	0.34	>200	Hard	0.80	Fd	85	Ep	10	1.00	436	1.00	40	1.00	CWH ds 2	1.00	0.12	nil	nil/low
2007	Clayton Falls	ClG1a	110	0.75	19	0.49	30	0.43	>200	Hard	0.80	Hw	80	Ss	10	1.00	192	1.00	50	1.00	CWH ms 2	1.00	0.21	nil	high
2008	Clayton Falls	CL007	30	0.08	15	0.32	45	0.75	<200	Soft	0.60	Dr	60	Hw	35	0.90	437	1.00	30	1.00	CWH vm 3	1.00	0.08	nil	high
2007	Clayton Falls	ClG2a	250	1.00	28.72	0.94	55	0.80	>200	None	1.00	Hw	45	Ba	45	1.00	615	0.84	50	1.00	CWH vm 3	1.00	0.65	moderate	high
2008	Clayton Falls	CL006	130	0.92	27	0.86	60	0.82	<200	Soft	0.60	Hw	65	Ba	35	1.00	434	1.00	35	1.00	CWH vm 3	1.00	0.44	low	high
2008	Clayton Falls	CL005	110	0.90	25	0.77	80	0.91	>200	Soft	0.90	Ss	50	Hw	35	1.00	503	1.00	10	1.00	CWH vm 3	1.00	0.68	moderate	high
2007	Clayton Falls	ClG6a	200	1.00	35	1.00	35	0.50	>200	Hard	0.80	Ba	45	Hw	45	0.80	681	0.81	30	1.00	CWH vm 3	1.00	0.26	low	moderate
2007	Clayton Falls	ClG1c	70	0.42	20	0.55	50	0.77	>200	Hard	0.80	Hw	90	Ba	5	1.00	188	1.00	31	1.00	CWH ms 2	1.00	0.30	low	moderate
2008	Clayton Falls	CL108	110	0.75	18	0.45	70	0.86	>200	Soft	0.90	Hw	85	Pl	10	0.70	78	1.00	55	1.00	CWH ms 2	1.00	0.33	low	moderate
2008	Clayton Falls	CL105	130	0.92	31	1.00	70	0.86	<200	Hard	0.40	Hw	50	Ss	30	1.00	89	1.00	40	1.00	CWH ms 2	1.00	0.33	low	moderate
2008	Clayton Falls	CL107	110	0.75	19	0.50	85	0.93	>200	Soft	0.90	Hw	50	Cw	40	1.00	161	1.00	35	1.00	CWH ms 2	1.00	0.52	moderate	moderate
2008	Doos Valley	DO005	200	1.00	36	1.00	70	0.86	>200	Soft	0.90	Hw	60	Ba	40	1.00	398	1.00	20	1.00	CWH vm 1	1.00	0.78	high	high
2008	Doos Valley	DO001	200	1.00	35	1.00	70	0.86	<200	Soft	0.60	Hw	51	Ba	49	1.00	290	1.00	35	1.00	CWH vm 1	1.00	0.52	moderate	high
2008	Doos Valley	CV100	250	1.00	28	0.91	75	0.89	>200	Soft	0.90	Ba	50	Hw	40	0.80	252	1.00	5	1.00	CWH vm 1	1.00	0.61	moderate	high
2008	Doos Valley	DO015	250	1.00	42	1.00	80	0.91	>200	Soft	0.90	Ba	65	Hw	35	0.80	371	1.00	25	1.00	CWH vm 1	1.00	0.65	moderate	high
2008	Doos Valley	DO009	200	1.00	37	1.00	85	0.93	>200	Soft	0.90	Hw	80	Ba	20	1.00	300	1.00	16	1.00	CWH vm 1	1.00	0.84	high	high
2008	Doos Valley	DO021	200	1.00	38	1.00	70	0.86	<200	Soft	0.60	Hw	40	Ba	40	1.00	399	1.00	35	1.00	CWH vm 1	1.00	0.52	moderate	moderate
2008	Elcho Harbour	EL007	200	1.00	37	1.00	40	0.64	<200	Hard	0.40	Hw	65	Ba	35	1.00	86	1.00	26	1.00	CWH vm 1	1.00	0.26	low	high
2008	Elcho Harbour	EH101	200	1.00	30	1.00	50	0.77	>200	Soft	0.90	Cw	40	Hw	40	0.65	43	1.00	15	1.00	CWH vm 1	1.00	0.45	low	high
2008	Elcho Harbour	EL006	250	1.00	40	1.00	50	0.77	<200	Soft	0.60	Hw	50	Ss	40	1.00	51	1.00	5	1.00	CWH vm 1	1.00	0.46	low	high
2008	Elcho Harbour	EL001	200	1.00	28	0.91	60	0.82	<200	Soft	0.60	Hw	80	Ba	15	1.00	78	1.00	5	1.00	CWH vm 1	1.00	0.47	low	high
2008	Elcho Harbour	EH107	200	1.00	36	1.00	60	0.82	>200	Soft	0.90	Hw	45	Ss	15	1.00	60	1.00	35	1.00	CWH vm 1	1.00	0.74	moderate	high
2008	Elcho Harbour	EL004	30	0.08	17	0.41	80	0.91	<200	Soft	0.60	Dr	100	n/a	n/a	0.90	148	1.00	95	0.70	CWH vm 1	1.00	0.08	nil	moderate
2008	King Island	BL110	200	1.00	27	0.86	50	0.77	<200	Soft	0.60	Hw	55	Cw	30	1.00	417	1.00	40	1.00	CWH vm 1	1.00	0.43	low	high
2008	King Island	BL120	200	1.00	18	0.45	50	0.77	>200	Hard	0.80	Hw	40	Yc	40	0.60	647	0.83	50	1.00	CWH vm 2	1.00	0.22	nil	high
2008	King Island	BL022	200	1.00	33	1.00	55	0.80	>200	Soft	0.90	Hw	65	Ba	35	1.00	408	1.00	60	1.00	CWH vm 1	1.00	0.72	moderate	high
2008	King Island	BL100	250	1.00	30	1.00	60	0.82	>200	Hard	0.80	Hw	50	Ss	45	1.00	178	1.00	10	1.00	CWH vm 1	1.00	0.65	moderate	high
2008	King Island	BL002	250	1.00	33	1.00	70	0.86	>200	Soft	0.90	Cw	60	Hw	30	0.65	223	1.00	20	1.00	CWH vm 1	1.00	0.51	moderate	high
2008	King Island	BL005	200	1.00	30	1.00	85	0.93	>200	Soft	0.90	Ba	45	Hw	40	0.80	481	1.00	65	0.70	CWH vm 1	1.00	0.47	low	high
2008	King Island	BL028	250	1.00	34	1.00	90	0.95	>200	Soft	0.90	Ba	60	Hw	40	0.80	432	1.00	30	1.00	CWH vm 1	1.00	0.69	moderate	high
2007	King Island	KiG1a	250	1.00	30	1.00	30	0.43	>200	None	1.00	Cw	60	Hm	30	0.65	445	1.00	14	1.00	CWH vm 2	1.00	0.28	low	moderate
2007	Kynock	KyG1a	250	1.00	40	1.00	50	0.77	>200	Soft	0.90	Ss	40	Cw	40	1.00	186	1.00	10	1.00	CWH vm 1	1.00	0.70	moderate	high
2007	Moses Inlet	MoFG1a	110	0.75	30	1.00	40	0.64	>200	Soft	0.90	Hw	65	Ss	25	1.00	77	1.00	10	1.00	CWH vm 1	1.00	0.50	low	moderate
2008	Nascall	NA10	250	1.00	38	1.00	40	0.64	>200	Soft	0.90	Ss	90	Hw	10	1.00	80	1.00	0	1.00	CWH vm 1	1.00	0.58	moderate	moderate
2008	Nascall	NA11	250	1.00	38	1.00	50	0.77	<200	Soft	0.60	Ba	50	Hw	45	0.80	263	1.00	0	1.00	CWH vm 1	1.00	0.37	low	moderate

Year	Location	Plot ID	Stand Age	HSI rating	Tree Height (m)	HSI rating	Canopy Closure (%)	HSI rating	Distance to edge (m)	Edge Type	HSI rating	ITG - Sp 1	% Tree Sp 1	Tree Sp 2	% Tree Sp 2	HSI rating	Elevation (m)	HSI rating	Slope (%)	HSI rating	BEC variant	HSI rating	HSI Calculated (Actual)	*Actual Class*	*Predicted Class*
2008	Noomst	NO010	130	0.92	10	0.09	40	0.64	>200	Soft	0.90	Pl	85	Bl	12	0.50	812	0.74	90	0.70	CWS ws 2	1.00	0.08	nil	moderate
2008	Noomst	NO005	200	1.00	28	0.91	70	0.86	>200	Soft	0.90	Fd	50	Cw	20	1.00	532	1.00	47	1.00	CWH ds 2	1.00	0.74	moderate	moderate
2008	Noomst	NO011	90	0.58	28	0.91	75	0.89	>200	Soft	0.90	Fd	55	Hw	5	1.00	268	1.00	80	0.70	CWH ds 2	1.00	0.42	low	moderate
2008	Noomst	NO007	130	0.92	29	0.95	90	0.95	>200	Soft	0.90	Hw	60	Cw	30	1.00	682	0.81	5	1.00	CWH ws 2	1.00	0.65	moderate	moderate
2007	Noosgulch	NoG1a	70	0.42	20	0.55	25	0.34	<200	Hard	0.40	Hw	90	Ep	5	1.00	224	1.00	0	1.00	CWH ds 2	1.00	0.07	nil	moderate
2008	Nusatsum	NU002	200	1.00	35	1.00	25	0.34	>200	Hard	0.80	Hw	40	Ba	40	1.00	442	1.00	25	1.00	CWH ws 2	1.00	0.27	low	high
2008	Nusatsum	NU113	130	0.92	30	1.00	35	0.50	>200	Hard	0.80	Hw	99	Ba	1	1.00	390	1.00	12	1.00	CWH ws 2	1.00	0.38	low	high
2008	Nusatsum	NU095	200	1.00	22	0.64	35	0.50	>200	Soft	0.90	Hw	45	Cw	30	1.00	662	0.82	68	0.70	CWH ws 2	1.00	0.21	nil	high
2007	Nusatsum	NuG8b	200	1.00	30	1.00	40	0.64	<200	Hard	0.40	Hw	40	Ba	30	1.00	341	1.00	30	1.00	CWH ms 2	1.00	0.26	low	high
2007	Nusatsum	NuG6b	200	1.00	20	0.55	40	0.64	<200	Soft	0.60	Hw	50	Ba	50	1.00	361	1.00	30	1.00	CWH ws 2	1.00	0.30	low	high
2008	Nusatsum	NU145	110	0.75	17	0.41	40	0.64	>200	Hard	0.80	Fd	80	Hw	10	1.00	371	1.00	70	0.70	CWH ds 2	1.00	0.21	nil	high
2008	Nusatsum	NU001	250	1.00	40	1.00	45	0.75	<200	Hard	0.40	Hw	75	Ba	24	1.00	280	1.00	50	1.00	CWH ms 2	1.00	0.30	low	high
2008	Nusatsum	NU213	130	0.92	22	0.64	45	0.75	>200	Soft	0.90	Cw	70	Hw	25	0.65	546	1.00	45	1.00	CWH ws 2	1.00	0.34	low	high
2008	Nusatsum	NU003	70	0.42	26	0.82	60	0.82	<200	Hard	0.40	Ba	68	Cw	30	0.80	236	1.00	75	0.70	CWH ms 2	1.00	0.11	nil	high
2008	Nusatsum	NU119	70	0.42	27	0.86	65	0.84	<200	Hard	0.40	Hw	85	Fd	15	1.00	389	1.00	70	0.70	CWH ms 2	1.00	0.15	nil	high
2008	Nusatsum	NU149	110	0.75	21	0.59	70	0.86	>200	Hard	0.80	Hw	90	Ba	8	1.00	734	0.78	35	1.00	CWH ws 2	1.00	0.36	low	high
2007	Nusatsum	NuG2b	200	1.00	4	1.00	35	0.50	>200	H + S	0.80	Hw	55	Ba	40	1.00	533	1.00	40	1.00	CWH ws 2	1.00	0.40	low	moderate
2008	Nusatsum	NU097	200	1.00	23	0.68	40	0.64	>200	Soft	0.90	Hw	40	Cw	40	1.00	882	0.71	48	1.00	CWH ws 2	1.00	0.34	low	moderate
2008	Nusatsum	NUN7	200	1.00	40	1.00	40	0.64	<200	Hard	0.40	Hw	75	Fd	22	1.00	747	0.78	70	0.70	CWH ws 2	1.00	0.14	nil	moderate
2007	Nusatsum	NOGO PP	110	0.75	20	0.55	40	0.64	<200	Soft	0.60	Ba	50	Hw	40	0.80	533	1.00	55	1.00	CWH ws 2	1.00	0.20	nil	moderate
2008	Nusatsum	NU085	70	0.42	22	0.64	45	0.75	>200	Soft	0.90	Hw	50	Cw	40	1.00	487	1.00	55	1.00	CWH ws 2	1.00	0.36	low	moderate
2008	Nusatsum	NU087	70	0.42	22	0.64	45	0.75	>200	Soft	0.90	Hw	50	Cw	15	1.00	532	1.00	50	1.00	CWH ws 2	1.00	0.36	low	moderate
2008	Nusatsum	NUN2	200	1.00	26	0.82	50	0.77	<200	Hard	0.40	Hw	65	Fd	33	1.00	379	1.00	35	1.00	CWH ws 2	1.00	0.28	low	moderate
2008	Nusatsum	NUN1	200	1.00	36	1.00	50	0.77	<200	Hard	0.40	Hw	60	Fd	30	1.00	366	1.00	55	1.00	CWH ws 2	1.00	0.31	low	moderate
2007	Nusatsum	NuG1b	200	1.00	39	1.00	50	0.77	>200	H + S	0.80	Hw	60	Ba	35	1.00	737	0.78	74	0.70	CWH ws 2	1.00	0.34	low	moderate
2008	Nusatsum	NU159	200	1.00	28	0.91	50	0.77	>200	Soft	0.90	Hw	70	Cw	20	1.00	571	1.00	75	0.70	CWH ws 2	1.00	0.46	low	moderate
2008	Nusatsum	NU111	50	0.25	12	0.18	50	0.77	<200	Hard	0.40	Hw	75	Ba	25	1.00	368	1.00	0	1.00	CWH ws 2	1.00	0.07	nil	moderate
2008	Nusatsum	NU103	90	0.58	27	0.86	50	0.77	<200	Hard	0.40	Ba	55	Hw	44	0.80	631	0.83	64	0.70	CWH ws 2	1.00	0.10	nil	moderate
2008	Nusatsum	NUN3	200	1.00	32	1.00	55	0.80	<200	Hard	0.40	Hw	65	Fd	33	1.00	412	1.00	60	1.00	CWH ws 2	1.00	0.32	low	moderate
2008	Nusatsum	NUN6	200	1.00	38	1.00	60	0.82	<200	Hard	0.40	Hw	90	Fd	5	1.00	710	0.80	72	0.70	CWH ws 2	1.00	0.18	nil	moderate
2008	Nusatsum	NUN4	200	1.00	37	1.00	70	0.86	<200	Hard	0.40	Hw	90	Fd	5	1.00	682	0.81	60	1.00	CWH ws 2	1.00	0.28	low	moderate
2008	Nusatsum	NUN5	200	1.00	34	1.00	85	0.93	<200	Hard	0.40	Hw	75	Fd	22	1.00	789	0.76	65	0.70	CWH ws 2	1.00	0.20	nil	moderate
2007	Nusatsum	NuG3e	50	0.25	10	0.09	30	0.43	<200	Hard	0.40	Hw	40	Ba	30	1.00	804	0.75	20	1.00	CWH ws 2	1.00	0.02	nil	nil/low
2007	Nusatsum	NuG3c	90	0.58	31	1.00	50	0.77	<200	Hard	0.40	Hw	60	Cw	20	1.00	906	0.70	45	1.00	CWH ws 2	1.00	0.17	nil	nil/low
2007	Owikeno	OwG3a	250	1.00	40	1.00	30	0.43	>200	N/A	0.80	Hw	80	Fd	10	1.00	75	1.00	51	1.00	CWH ms 2	1.00	0.34	low	high
2007	Owikeno	OwG2a	250	1.00	50	1.00	30	0.43	>200	Soft	0.90	Ss	75	Cw	15	1.00	12	1.00	2	1.00	CWH ms 2	1.00	0.39	low	high
2007	Owikeno	OwG7a	250	1.00	35	1.00	30	0.43	<200	Soft	0.60	Cw	40	Fd	20	0.65	20	1.00	45	1.00	CWH ms 2	1.00	0.17	nil	high
2007	Owikeno	OwG5a	250	1.00	30	1.00	40	0.64	<200	Soft	0.60	Ss	60	Hw	20	1.00	54	1.00	63	0.70	CWH vm 1	1.00	0.27	low	moderate
2007	Owikeno	OwG6a	200	1.00	30	1.00	40	0.64	<200	Soft	0.60	Hw	60	Cw	20	1.00	28	1.00	18	1.00	CWH vm 1	1.00	0.38	low	moderate
2007	Owikeno	OwF4a	130	0.92	30	1.00	30	0.43	<200	Soft	0.60	Hw	50	Fd	40	1.00	11	1.00	60	1.00	CWH ms 2	1.00	0.25	low	nil/low
2007	Owikeno	OwG1a	200	1.00	34	1.00	40	0.64	<200	Hard	0.40	Hw	50	Ss	40	1.00	611	0.84	30	1.00	CWH ws 2	1.00	0.22	nil	nil/low
2007	Pashleth	PaG1	200	1.00	45	1.00	45	0.75	>200	None	1.00	Hw	50	Ss	50	1.00	725	0.79	20	1.00	CWH ws 2	1.00	0.59	moderate	nil/low
2007	Roshoa Inlet	RoG1	250	1.00	45	1.00	40	0.64	>200	Soft	0.90	Hw	40	Ss	30	1.00	34	1.00	80	0.70	CWH vh 2	0.80	0.32	low	nil/low
2007	Salloompt	SaG5c	110	0.75	19	0.50	25	0.34	>200	Soft	0.90	Hw	40	Fd	40	1.00	562	1.00	38	1.00	CWH ms 2	1.00	0.19	nil	high
2008	Salloompt	NestSiteInac	90	0.58	28	0.91	30	0.43	>200	Soft	0.90	Hw	75	Fd	20	1.00	580	0.97	15	1.00	CWH ws 2	1.00	0.28	low	high
2008	Salloompt	SA035	200	1.00	35	1.00	30	0.43	>200	Soft	0.90	Hw	75	Cw	20	1.00	695	0.80	30	1.00	CWH ws 2	1.00	0.31	low	high
2008	Salloompt	SA034	70	0.42	22	0.64	30	0.43	>200	Soft	0.90	Hw	85	Fd	10	1.00	608	0.85	40	1.00	CWH ws 2	1.00	0.17	nil	high
2008	Salloompt	SA103	110	0.75	23	0.68	30	0.43	>200	Soft	0.90	Fd	95	Hw	4	1.00	507	1.00	70	0.70	CWH ws 2	1.00	0.19	nil	high
2008	Salloompt	SA030	90	0.58	28	0.91	35	0.50	>200	Soft	0.90	Hw	80	Fd	15	1.00	516	1.00	28	1.00	CWH ms 2	1.00	0.34	low	high

Year	Location	Plot ID	Stand Age	HSI rating	Tree Height (m)	HSI rating	Canopy Closure (%)	HSI rating	Distance to edge (m)	Edge Type	HSI rating	ITG - Sp 1	% Tree Sp 1	Tree Sp 2	% Tree Sp 2	HSI rating	Elevation (m)	HSI rating	Slope (%)	HSI rating	BEC variant	HSI rating	HSI Calculated (Actual)	*Actual Class*	*Predicted Class*
2007	Salloompt	SaG4b	70	0.42	24	0.73	35	0.50	<200	Soft	0.60	Hw	40	Cw	40	1.00	247	1.00	40	1.00	CWH ms 2	1.00	0.17	nil	high
2007	Salloompt	SaG5b	130	0.92	26	0.82	40	0.64	>200	Soft	0.90	Hw	50	Cw	30	1.00	531	1.00	55	1.00	CWH ms 2	1.00	0.50	low	high
2008	Salloompt	SA018	90	0.58	23	0.68	45	0.75	<200	Soft	0.60	Cw	40	Hw	40	0.65	460	1.00	53	1.00	CWH ms 2	1.00	0.19	nil	high
2007	Salloompt	SaG1a	90	0.58	20	0.55	50	0.77	>200	none	1.00	Hw	34	Cw	33	1.00	245	1.00	85	0.70	CWH ms 2	1.00	0.31	low	high
2008	Salloompt	SA104	90	0.58	25	0.77	50	0.77	>200	Soft	0.90	Fd	45	Hw	45	1.00	675	0.81	55	1.00	CWH ws 2	1.00	0.38	low	high
2007	Salloompt	SaG3Fea	70	0.42	25	0.77	55	0.80	>200	Soft	0.90	Hw	80	Fd	10	1.00	513	1.00	95	0.70	CWH ms 2	1.00	0.30	low	high
2008	Salloompt	SA168	200	1.00	25	0.77	60	0.82	>200	Hard	0.80	Cw	50	Hw	35	0.65	407	1.00	20	1.00	CWH ws 2	1.00	0.38	low	high
2008	Salloompt	SA151	200	1.00	25	0.77	60	0.82	>200	Hard	0.80	Hw	50	Cw	30	1.00	411	1.00	40	1.00	CWH ws 2	1.00	0.58	moderate	high
2008	Salloompt	SA117	90	0.58	24	0.73	65	0.84	<200	Hard	0.40	Hw	75	Ss	20	1.00	304	1.00	5	1.00	CWH ms 2	1.00	0.22	nil	high
2008	Salloompt	SA207	200	1.00	33	1.00	70	0.86	>200	Soft	0.90	Hw	60	Ba	40	1.00	389	1.00	15	1.00	CWH ws 2	1.00	0.78	high	high
2008	Salloompt	SA200	200	1.00	28	0.91	85	0.93	>200	Soft	0.90	Hw	45	Ba	50	1.00	385	1.00	20	1.00	CWH ws 2	1.00	0.80	high	high
2008	Salloompt	SA113	10	0.00	2	0.00	0	0.00	<200	Hard	0.40	n/a	n/a	n/a	n/a	0.00	341	1.00	5	1.00	CWH ms 2	1.00	0.00	nil	moderate
2008	Salloompt	SA051	110	0.75	35	1.00	20	0.25	>200	Soft	0.90	Hw	80	Fd	15	1.00	554	1.00	25	1.00	CWH ws 2	1.00	0.20	nil	moderate
2008	Salloompt	SA100	30	0.08	9	0.05	30	0.43	>200	Soft	0.90	Act	95	Hw	5	0.90	325	1.00	10	1.00	CWH ms 2	1.00	0.02	nil	moderate
2008	Salloompt	SA107	90	0.58	22	0.64	35	0.50	>200	Soft	0.90	Hw	85	Ba	10	1.00	786	0.76	35	1.00	CWH ws 2	1.00	0.21	nil	moderate
2007	Salloompt	SaG5a	130	0.92	16	0.36	40	0.64	>200	Soft	0.90	Hw	50	Fd	45	1.00	492	1.00	45	1.00	CWH ms 2	1.00	0.37	low	moderate
2008	Salloompt	SA158	200	1.00	24	0.73	50	0.77	>200	Hard	0.80	Ba	45	Hw	35	0.80	730	0.79	20	1.00	CWH ws 2	1.00	0.34	low	moderate
2008	Salloompt	SA101	70	0.42	27	0.86	50	0.77	>200	Soft	0.90	Fd	45	Hw	40	1.00	430	1.00	24	1.00	CWH ms 2	1.00	0.45	low	moderate
2008	Salloompt	SA105	110	0.75	33	1.00	50	0.77	>200	Soft	0.90	Hw	50	Ba	20	1.00	827	0.74	45	1.00	CWH ws 2	1.00	0.45	low	moderate
2008	Salloompt	SA213	200	1.00	32	1.00	55	0.80	>200	Soft	0.90	Ba	70	Hw	30	0.80	389	1.00	9	1.00	CWH ws 2	1.00	0.57	moderate	moderate
2008	Salloompt	SA209	200	1.00	33	1.00	60	0.82	<200	Soft	0.60	Cw	45	Hw	40	0.65	370	1.00	15	1.00	CWH ws 2	1.00	0.32	low	moderate
2008	Salloompt	SA155	130	0.92	26	0.82	70	0.86	>200	Hard	0.80	Cw	65	Ss	25	0.65	367	1.00	60	1.00	CWH ms 2	1.00	0.39	low	moderate
2008	Salloompt	SA114	70	0.42	24	0.73	70	0.86	<200	Hard	0.40	Hw	80	Ss	11	1.00	367	1.00	80	0.70	CWH ms 2	1.00	0.14	nil	moderate
2008	Salloompt	SA014	110	0.75	29	0.95	28	0.39	<200	Hard	0.40	Hw	60	Ss	20	1.00	271	1.00	1	1.00	CWH ms 2	1.00	0.13	nil	nil/low
2007	School House Falls	ShG1b	30	0.08	24	0.75	55	0.80	>200	Hard	0.80	Hw	50	Dr	40	1.00	145	1.00	45	1.00	CWH ds 2	1.00	0.26	low	nil/low
2007	School House Falls	ShG1a	70	0.42	30	1.00	50	0.77	>200	Hard	0.80	Hw	60	Dr	30	1.00	88	1.00	48	1.00	CWH ds 2	1.00	0.44	low	moderate
2007	Skowquiltz Bay	SkG1c	200	1.00	20	0.55	20	0.25	>200	None	1.00	Hw	50	Cw	50	1.00	369	1.00	10	1.00	CWH ms 2	1.00	0.19	nil	high
2007	Skowquiltz Bay	SkG1a	110	0.75	30	1.00	40	0.64	>200	None	1.00	Ba	50	Hw	35	0.80	335	1.00	35	1.00	CWH ms 2	1.00	0.45	low	high
2008	Skowquiltz Bay	SK100	130	0.92	33	1.00	50	0.77	<200	Soft	0.60	Hw	85	Ss	10	1.00	470	1.00	24	1.00	CWH vm 1	1.00	0.44	low	nil/low
2008	Snootli Creek	SN010	90	0.58	25	0.77	40	0.64	>200	Hard	0.80	Hw	55	Fd	35	1.00	76	1.00	0	1.00	CWH ds 2	1.00	0.35	low	high
2008	Snootli Creek	SN02	110	0.75	24	0.73	40	0.64	>200	None	1.00	Hw	50	Fd	25	1.00	76	1.00	45	1.00	CWH ds 2	1.00	0.47	low	high
2007	Snootli Creek	SnoG2b	70	0.42	20	0.55	40	0.64	<200	Soft	0.60	Hw	80	Fd	15	1.00	63	1.00	0	1.00	CWH ds 2	1.00	0.18	nil	high
2008	Snootli Creek	SN001	130	0.92	29	0.95	65	0.84	>200	None	1.00	Fd	50	Hw	45	1.00	53	1.00	3	1.00	CWH ds 2	1.00	0.79	high	high
2007	Snootli Creek	SnoG1a	130	0.92	23	0.68	60	0.82	<200	Hard	0.40	Hw	50	Fd	45	1.00	53	1.00	0	1.00	CWH ds 2	1.00	0.26	low	moderate
2008	South Bentick	BS100	200	1.00	28	0.91	35	0.50	<200	Hard	0.40	Hw	40	Fd	30	1.00	65	1.00	40	1.00	CWH ms 2	1.00	0.19	nil	high
2007	South Bentick	SbG1	110	0.75	25	0.77	35	0.50	<200	Soft	0.60	Hw	60	Cw	40	1.00	38	1.00	60	1.00	CWH ms 2	1.00	0.23	nil	moderate
2008	Sutslem	SU02	250	1.00	30	1.00	25	0.34	<200	Soft	0.60	Ba	63	Hw	37	0.80	428	1.00	16	1.00	CWH vm 3	1.00	0.16	nil	nil/low
2008	Talchako	TA013	200	1.00	30	1.00	5	0.07	>200	Hard	0.80	Fd	50	Cw	30	1.00	344	1.00	50	1.00	CWH ds 2	1.00	0.05	nil	high
2008	Talchako	TA034	90	0.58	18	0.45	30	0.43	>200	Hard	0.80	Hw	45	Fd	50	1.00	628	0.84	60	1.00	CWH ds 2	1.00	0.15	nil	high
2008	Talchako	TA027	110	0.75	27	0.86	35	0.50	>200	Soft	0.90	Fd	95	Cw	5	1.00	379	1.00	42	1.00	CWH ds 2	1.00	0.36	low	high
2007	Talchako	TaG1a	250	1.00	43	1.00	50	0.77	>200	Hard	0.80	Fd	100	n/a	n/a	1.00	177	1.00	90	0.70	CWH ds 2	1.00	0.43	low	high
2008	Talchako	TA012	130	0.92	27	0.86	65	0.84	>200	Hard	0.80	Hw	40	Fd	40	1.00	449	1.00	67	0.70	CWH ds 2	1.00	0.42	low	high
2008	Talchako	TA200	10	0.00	<20	0.20	1	0.01	>200	Hard	0.80	Dg. Mpl	100	n/a	n/a	0.70	364	1.00	45	1.00	CWH ds 2	1.00	0.00	nil	moderate
2008	Talchako	TA006	200	1.00	14	0.27	35	0.50	<200	Soft	0.60	Hw	80	Fd	18	1.00	768	0.77	45	1.00	CWH ws 2	1.00	0.15	nil	moderate
2008	Talchako	TA002	200	1.00	25	0.77	40	0.64	>200	Hard	0.80	Hw	40	Cw	40	1.00	442	1.00	75	0.70	CWH ds 2	1.00	0.32	low	moderate
2008	Talchako	TA024	90	0.58	29	0.95	60	0.82	<200	Hard	0.40	Fd	95	Cw	5	1.00	320	1.00	45	1.00	CWH ds 2	1.00	0.25	low	moderate
2008	Talchako	TA102	110	0.75	26	0.82	85	0.93	>200	Soft	0.90	Fd	70	Hw	30	1.00	593	0.90	45	1.00	CWH ds 2	1.00	0.59	moderate	moderate
2007	Tallyheo Canary	TcG1a	70	0.42	34	1.00	55	0.80	>200	Hard	0.80	Hw	90	Cw	5	1.00	252	1.00	30	1.00	CWH ms 2	1.00	0.45	low	high
2007	Tallyheo Canary	TcG1c	90	0.58	26	0.80	40	0.64	>200	Hard	0.80	Hw	85	Ba	10	1.00	305	1.00	60	1.00	CWH ms 2	1.00	0.35	low	moderate
2007	Windsor Cove	WiG1a	200	1.00	15	0.32	30	0.43	>200	Soft	0.90	Cw	80	Ba	10	0.45	13	1.00	5	1.00	CWH vh 2	0.80	0.09	nil	high