

Implementation Plan for the Recovery of Northern Goshawk, *laingi* Subspecies (*Accipiter gentilis laingi*) in British Columbia



Prepared by the Ministry of Forests, Lands,
Natural Resource Operations and Rural Development



February 2018

About British Columbia Implementation Plans

The Province prepares implementation plans to meet its commitments to manage and/or recover species at risk under the *Accord for the Protection of Species at Risk in Canada*, and the *Canada–British Columbia Agreement on Species at Risk*. Species at risk management and/or recovery is the process by which the decline of an endangered, threatened, or extirpated species is reduced, arrested, or reversed, and threats are removed or reduced to improve the likelihood of a species' persistence in the wild.

What is an implementation plan?

An implementation plan outlines the response of the provincial government to the need to manage species at risk for which management and/or recovery in British Columbia may have significant socio-economic implications. Implementation plans guide and prioritize management actions that are required to meet objectives and goals identified through government decisions. Such government decisions are informed by science and technical information but are also made with consideration of socio-economic factors.

What's next?

Directions set out in this implementation plan are intended to involve governments, communities, land users, and other interested parties in cost-effective implementation of conservation activities that build towards managing and/or recovering the species.

For more information

To learn more about species at risk recovery in British Columbia, please visit the B.C. Recovery Planning webpage at: <<http://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/species-ecosystems-at-risk/recovery-planning>>

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Preface

This implementation plan outlines the direction provided by the government of British Columbia to manage Northern Goshawk, *laingi* subspecies, in British Columbia. This direction reflects the potentially significant socio-economic implications associated with management of this species. The British Columbia Ministry of Forests, Lands, Natural Resource Operations and Rural Development, as the agency responsible for managing wildlife in British Columbia, has been charged with leading the implementation of government's commitments for the management of Northern Goshawk, *laingi* subspecies, through the development of this implementation plan with the support of other provincial agencies.

This document identifies the management actions that are deemed necessary, based on the best available scientific and technical information and considering socio-economic values, to ensure viable populations of Northern Goshawk, *laingi* subspecies persist across the species range in each conservation region in coastal British Columbia. Implementation of the management actions to achieve the goals and objectives identified herein are subject to the priorities and budgetary constraints of participatory agencies and organizations. It may also be necessary to modify these actions, while respecting their intent, to accommodate new science resulting from effectiveness monitoring of management actions and continuing research on habitat requirements, to address socio-economic objectives of Northern Goshawk, *laingi* subspecies management, and/or to meet direction provided by the government of British Columbia.

Success in the management and recovery of this subspecies depends on the commitment and cooperation of many different parties that may be involved in implementing the directions set out in this plan.

ACKNOWLEDGEMENTS

This implementation plan was prepared by the British Columbia Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNR) and builds on the 2013 provincial management plan for Northern Goshawk, *laingi* subspecies.

Steve Gordon and Darryn McConkey (FLNR) led completion of this document. Leah Westereng and Karen Stefanyk (B.C. Ministry of Environment and Climate Change Strategy [ENV]) coordinated its posting to the recovery planning website. Tom Ethier, Kevin Kriese, and Craig Sutherland (FLNR), and Kaaren Lewis, Jennifer McGuire, and Mark Zacharias (ENV), provided guidance and oversight during plan development and review. Allan Lidstone, Charlie Short, and Chris Ritchie (FLNR), and Alec Dale and James Quayle (ENV), provided strategic leadership during plan development. Scott Allen, Lew Greentree, Linda Sinclair, Dan Sirk, and John Sunde (FLNR) provided geographical information system and analytical assistance. Janice Anderson, Greg George, Karen Stefanyk, Josh Malt, and Melanie Wilson provided review comments. Sinclair Tedder, Cameron Woodbridge, and Alex Barnes (FLNR), and Michele MacIntyre and Rob Dorling (ENV), provided analyses in support of the plan.

Engagement coordination was led by Laura Body (FLNR). District resource managers and staff assisted with venue coordination and logistics. Engagement participants provided valuable feedback on management approaches that helped guide plan development.

Linda Sinclair assisted the Northern Goshawk *Accipiter gentilis laingi* Recovery Team to produce range maps, which were modified for this report. The recovery team provided the range map in 2008.

Many members of the recovery team (Carita Bergman, John Deal, Frank Doyle, Todd Mahon, Dave Marquis, Erica McClaren, Sean Muise, Nick Reynolds, Ross Vennesland, and Berry Wijdeven) provided input to the threats assessment in 2012. Doug Steventon provided technical information regarding population viability to inform the threats assessment and Dave Fraser (ENV) led completion of the threats assessment to International Union for Conservation of Nature standards.

EXECUTIVE SUMMARY

The Northern Goshawk is the largest accipiter hawk in British Columbia. This hawk has short, rounded wings and a long tail, which helps it maneuver through the mature and old forest it selects for nesting and foraging. Two subspecies, *Accipiter gentilis laingi* and *Accipiter gentilis atricapillus*, are recognized in the province. The coastal *laingi* subspecies occurs along the northwest coast of North America from Washington to Alaska, with the entire Canadian population found in British Columbia.

The Northern Goshawk, *laingi* subspecies, was assessed as “Threatened” in 2013 by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and is listed on Schedule 1 of the federal *Species at Risk Act*. This hawk is Red-listed (Threatened) in British Columbia. The most imminent threats to this bird are roads and forest harvesting that result in the loss and fragmentation of nesting and foraging habitats. Ecosystem modification and subsequent reductions in prey diversity and abundance in Haida Gwaii related to introduced Black-tailed Deer (*Odocoileus hemionus columbianus*) are also a concern.

The Northern Goshawk, *laingi* subspecies, is protected from capture and killing under the provincial *Wildlife Act*. It is also identified as a species requiring special management to mitigate impacts of forest and range activities under the *Forest and Range Practices Act* and impacts of oil and gas activities under the *Oil and Gas Activities Act* on Crown land.

The long-term recovery goal for the Northern Goshawk, *laingi* subspecies, is to ensure viable populations persist in each conservation region in coastal British Columbia.

The population and distribution objectives for the Northern Goshawk, *laingi* subspecies, are to:

- maintain at least 408 home ranges in British Columbia; and
- distribute these home ranges amongst the four conservation regions:
 - Haida Gwaii – 25 home ranges
 - North Coast – 128 home ranges
 - South Coast – 110 home ranges
 - Vancouver Island – 145 home ranges

The short-term (2018–2021) implementation objectives are as follows:

- By 2020, protect at least 95 new priority breeding areas in British Columbia through establishment of breeding area reserves (wildlife habitat areas or equivalent) consistent with provincial breeding area management guidelines.
- Facilitate research on foraging habitat requirements to inform the development of foraging habitat management options.
- Facilitate research on the distribution and habitat requirements of Northern Goshawk, *laingi* subspecies, in the transition zone.
- By 2020, return to senior provincial government with:
 - an implementation update;
 - recommendations for foraging habitat management; and
 - recommendations for additional implementation actions.

The goal and objectives of this implementation plan are intended to maximize conservation efforts to benefit Northern Goshawk, *laingi* subspecies, and support current and future recovery efforts, while providing resource development opportunities. This vision provides certainty in maintaining socio-economic and environmental values, which are important to the people of British Columbia and the global community.

TABLE OF CONTENTS

ACKNOWLEDGEMENTS	III
EXECUTIVE SUMMARY	IV
1 SCOPE OF THE IMPLEMENTATION PLAN	1
1.1 Associated Documents.....	1
2 ENGAGEMENT	1
3 SUMMARY OF SPECIES INFORMATION	2
3.1 COSEWIC* Species Assessment Information	2
3.2 Species Status Information.....	2
3.3 Population and Distribution.....	3
3.3.1 Transition Zone.....	4
3.4 Threat Assessment	4
4 IMPLEMENTATION ACTIONS	4
4.1 Recovery Goal and Population and Distribution Objectives	4
4.2 Rationale for the Population and Distribution Objectives	5
4.2.1 Existing Protection	6
4.3 Implementation Objectives	8
4.4 Actions and Performance Measures.....	9
4.5 Narrative to Support Implementation Table	13
4.5.1 Habitat Protection and Private Land Stewardship	13
4.5.2 Species and Population Management.....	13
4.5.3 Foraging Habitat	14
5 MONITORING	14
6 UNCERTAINTY	15
7 ADAPTIVE MANAGEMENT	15
8 EFFECTS ON OTHER SPECIES	15
9 REFERENCES.....	17
APPENDIX A: PROVINCIAL BREEDING AREA MANAGEMENT GUIDELINES	19
APPENDIX B: GUIDELINES TO PRIORITIZE BREEDING AREAS FOR RESERVE ESTABLISHMENT	21

LIST OF TABLES

Table 1. Implementation actions for Northern Goshawk, <i>laingi</i> subspecies management	9
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LIST OF FIGURES

Figure 1. Conservation region and range map for Northern Goshawk, <i>Accipiter gentilis laingi</i>	3
Figure 2. Estimated existing protection of Northern Goshawk, <i>laingi</i> subspecies, home ranges.....	7

1 SCOPE OF THE IMPLEMENTATION PLAN

This implementation plan is limited to the Northern Goshawk, *laingi* subspecies, found in British Columbia and represents direction provided by the provincial government to manage this species.

1.1 Associated Documents

This implementation plan was informed by the following references and additional scientific information on the management of Northern Goshawk, *laingi* subspecies, in British Columbia.

- Recovery Strategy for the Northern Goshawk *laingi* Subspecies (*Accipiter gentilis laingi*) in Canada (Parks Canada Agency 2017)
- Science-based Guidelines for Managing Northern Goshawk Breeding Areas in Coastal British Columbia (McClaren *et al.* 2015)
- Management Plan for the Northern Goshawk, *laingi* Subspecies (*Accipiter gentilis laingi*) in British Columbia (B.C. Ministry of Forests, Lands, and Natural Resource Operations and Ministry of Environment 2013)
- Committee on the Status of Endangered Wildlife in Canada Assessment and Status Report on the Northern Goshawk *Accipiter gentilis laingi* in Canada (COSEWIC 2013)
- Recovery Strategy for the Northern Goshawk *laingi* Subspecies (*Accipiter gentilis laingi*) in British Columbia (Northern Goshawk *Accipiter gentilis laingi* Recovery Team 2008)
- Queen Charlotte Goshawk (B.C. Ministry of Water, Land and Air Protection. 2004)

2 ENGAGEMENT

In January 2016, engagement was initiated on the proposed provincial management approaches for Northern Goshawk, *laingi* subspecies, to seek feedback that would inform a senior government decision on these approaches.

Between January and March 2016, 34 engagement sessions were conducted in 12 coastal locations with First Nations and key stakeholders, including the forest sector, local governments, and environmental organizations. Over 30 formal responses were received from session participants, in addition to extensive feedback recorded at the engagement sessions.

The provincial government continues to encourage First Nations and stakeholders to conduct shared stewardship of the Northern Goshawk, *laingi* subspecies, and to develop implementation mechanisms to achieve the management direction in this plan along with recovery goals, while minimizing potential impacts to resource values.

3 SUMMARY OF SPECIES INFORMATION

Basic species assessment and status information is presented in this section. For more detailed information about the Northern Goshawk, *laingi* subspecies, please refer to the associated documents (Section 1.1).

3.1 COSEWIC* Species Assessment Information

<p>Assessment Summary: May 2013</p> <p>Common Name: Northern Goshawk</p> <p>Scientific Name: <i>Accipiter gentilis laingi</i></p> <p>Status: Threatened</p> <p>Reason for Designation: Over half of the global range of this subspecies occurs in coastal British Columbia, where it favours mature coniferous forest. This non-migratory bird needs a relatively large home range that contains a good food supply. Despite some recent habitat protection efforts, continuing habitat loss is predicted, in part because of anticipated short rotation times in forest harvest. On Haida Gwaii, populations are very low and face an added risk from declines of prey species due to forest understory losses associated with high levels of browsing from an introduced population of deer.</p> <p>Occurrence: British Columbia</p> <p>Status History: Designated Special Concern in April 1995. Status re-examined and designated Threatened in November 2000 and May 2013.</p>
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* Committee on the Status of Endangered Wildlife in Canada.

3.2 Species Status Information

The Northern Goshawk, *laingi* subspecies, was assessed as “Threatened” in 2013 by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and is listed on Schedule 1 of the federal *Species at Risk Act* (Government of Canada 2002). This hawk is Red-listed (Threatened) in British Columbia.

Northern Goshawk, <i>laingi</i> subspecies^a			
Legal Designation			
FRPA : Species at Risk ^b (2004)	Wildlife Act : ^c Schedule A	SARA : ^d Schedule 1 –Threatened (2003)	
OGAA : Species at Risk ^b (2004)			
Conservation Status^e			
B.C. List: Red	B.C. Rank: S2B (2010)	National Rank : N2 (2011)	Global Rank: G5T2 (2008)
Other Subnational Ranks : ^f Alaska: S2			

^a See B.C. Conservation Data Centre (2017) for species summary.

^b Species at Risk = a listed species that requires special management attention to address the impacts of forestry and range activities on Crown land under the *Forest and Range Practices Act* (FRPA; Province of British Columbia 2002) and/or the impacts of oil and gas activities on Crown land under the *Oil and Gas Activities Act* (OGAA; Province of British Columbia 2008).

^c Schedule A = designated as wildlife under the provincial *Wildlife Act*, which offers it protection from direct persecution and mortality (Province of British Columbia 1982).

^d Schedule 1 = found on the List of Wildlife Species at Risk under the *Species at Risk Act* (SARA; Government of Canada 2002).

^e S = Subnational; N = National; G = Global; T = infraspecific taxa (subspecies or varieties); B = Breeding; 2 = imperiled; 5 = demonstrably widespread, abundant, and secure.

^f Data source: NatureServe (2017).

3.3 Population and Distribution

The British Columbia portion of the range of *A. gentilis laingi* reflects the distribution of wet Coastal Western Hemlock biogeoclimatic subzones/variants and the Coastal Douglas-fir biogeoclimatic zone. Four conservation regions (Haida Gwaii, North Coast, South Coast, and Vancouver Island) occur within Canadian jurisdiction (British Columbia) and two occur within United States jurisdiction (western Washington and southeast Alaska) (Figure 1).

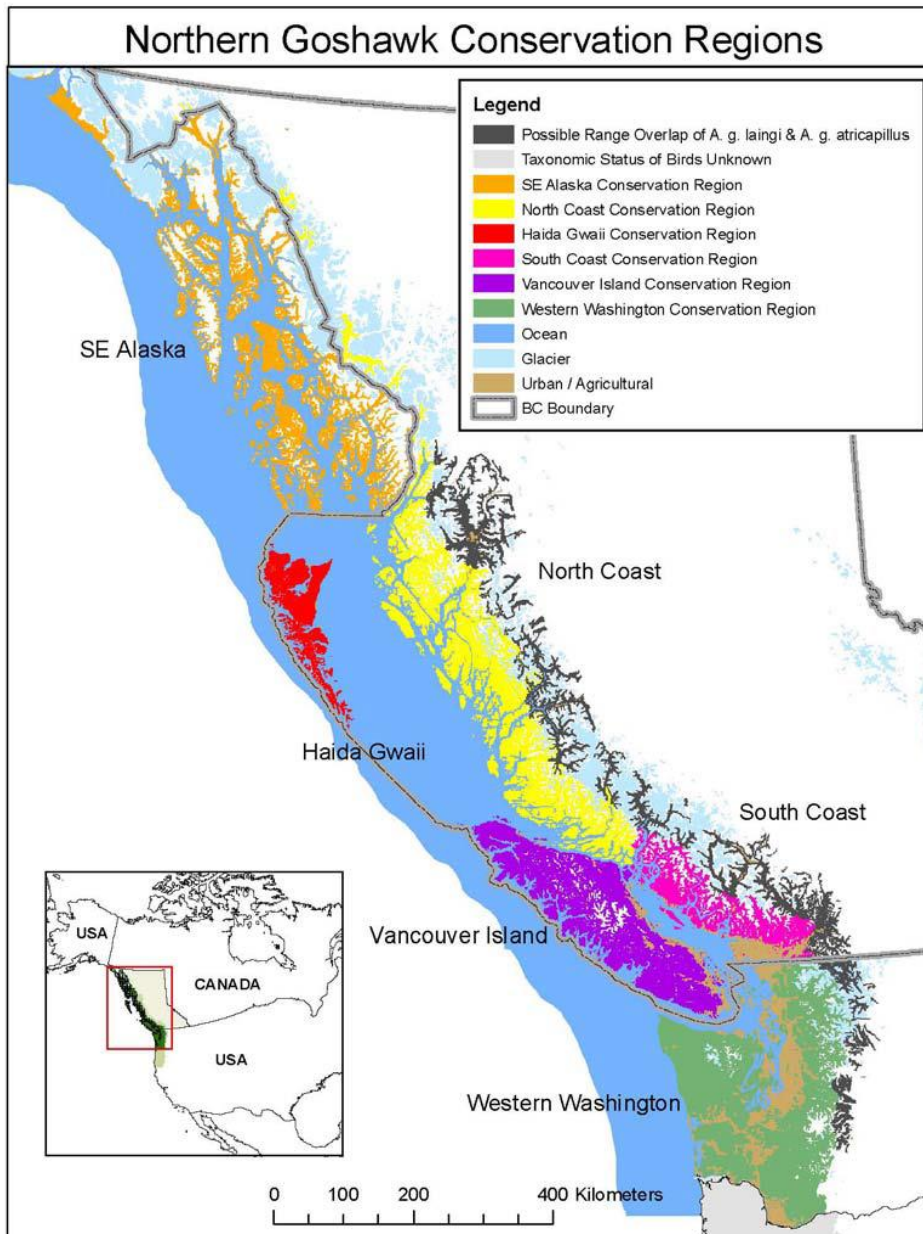


Figure 1. Conservation region and range map for Northern Goshawk, *Accipiter gentilis laingi* (Northern Goshawk *Accipiter gentilis laingi* Recovery Team 2008).

3.3.1 Transition Zone

The Northern Goshawk *Accipiter gentilis laingi* Recovery Team identified a transition zone (the drier variants of the Coastal Western Hemlock biogeoclimatic zone on the coastal mainland) in which the coastal *laingi* subspecies and interior *atricapillus* subspecies may overlap (Northern Goshawk *Accipiter gentilis laingi* Recovery Team 2008) and where differences between the subspecies are likely less clear (McClaren *et al.* 2015). This transition zone was included in the federal status assessment for Northern Goshawk *laingi* (COSEWIC 2013). A significant portion of the transition zone includes the coastal, *laingi* subspecies as the forest structure and composition used for breeding and the utilization of prey species is typical of this subspecies. Until the *laingi* subspecies range boundary is better defined and the understanding of habitat requirements of Northern Goshawks in this transition zone improves, both population and distribution objectives, and management actions, are included for this zone.

3.4 Threat Assessment

Threats for the Northern Goshawk, *laingi* subspecies, were assessed for the entire province and are available in the provincial management plan (B.C. Ministry of Forests, Lands, and Natural Resource Operations and Ministry of Environment 2013).

The most imminent threats to populations of Northern Goshawk, *laingi* subspecies, are roads and forest harvesting that result in loss and fragmentation of nesting and foraging habitats. Ecosystem modification and subsequent reductions in prey diversity and abundance in Haida Gwaii related to introduced Black-tailed Deer (*Odocoileus hemionus columbianus*) are also a concern.

4 IMPLEMENTATION ACTIONS

This implementation plan (e.g., population and distribution objectives, habitat protection, threat mitigation, and other management actions) is influenced by past and current industrial activities, current resource development commitments, and socio-economic considerations (e.g., future revenues from industrial development).

4.1 Recovery Goal and Population and Distribution Objectives

The long-term recovery goal for the Northern Goshawk, *laingi* subspecies, is to ensure viable populations persist in each conservation region in coastal British Columbia (Northern Goshawk *Accipiter gentilis laingi* Recovery Team 2008). This implementation plan is informed by the recovery objectives outlined in the Team's 2008 recovery strategy; that is:

1. to manage and, where necessary, conserve and recover habitat that meets the needs of Northern Goshawk, *laingi* subspecies, through its annual cycle; and
2. to conserve and, where necessary, recover a well-distributed and viable population of Northern Goshawk, *laingi* subspecies within coastal British Columbia.

The *laingi* subspecies is distributed in adult pairs that occupy a home range. The number of home ranges is used to set population and distribution objectives. The following population and distribution objectives are necessary to meet the long-term recovery goal:

- maintain at least 408 home ranges in British Columbia; and
- distribute these home ranges amongst the four conservation regions:
 - Haida Gwaii – 25 home ranges
 - North Coast – 128 home ranges
 - South Coast – 110 home ranges
 - Vancouver Island – 145 home ranges

These objectives were informed by the draft Parks Canada recovery strategy (Parks Canada Agency 2017).

4.2 Rationale for the Population and Distribution Objectives

COSEWIC assesses a species as “Threatened” if it has a 90% probability of persistence over 100 years or less. To estimate the probability of persistence for the *laingi* subspecies, Steventon (2012) conducted a population viability analysis for the Northern Goshawk *Accipiter gentilis laingi* Recovery Team. This analysis suggested that 346 home ranges would be required in British Columbia for a 90% probability of persistence over 100 years. Recognizing a high degree of uncertainty in this analysis, a provincial target of 400 home ranges was originally selected. The provincial home range target was distributed among the four conservation regions as follows:

- Haida Gwaii – 18 home ranges
- North Coast – 128 home ranges
- South Coast – 110 home ranges
- Vancouver Island – 145 home ranges

This distribution was based on the estimated proportion of the total population for each region derived from the territory analysis model using the Northern Goshawk (*Accipiter gentilis laingi*) habitat models for coastal British Columbia (adapted from Smith 2012). Given the isolation of the Haida Gwaii population, however, 18 home ranges is likely too small to prevent inbreeding; therefore, a minimum home range target of 25 to support 50 breeding individuals in Haida Gwaii was chosen. Management of breeding areas in Haida Gwaii will continue to occur through implementation of Objective 20 for Northern Goshawk habitat in the Haida Gwaii Land Use Objectives Regulation Order.¹

¹ See Haida Gwaii Management Council website:

http://www.haidagwaiimanagementcouncil.ca/documents/HGLUOO_Consolidated_Order_2017_Final_Signed.pdf

4.2.1 Existing Protection

Population estimates and trends are uncertain for the Northern Goshawk, *laingi* subspecies, because it breeds at low densities, may not breed every year, and can be difficult to detect. As such, knowing the locations of all occupied home ranges at any given time is not realistic.

Through various types of conservation designations in coastal British Columbia (e.g., parks and protected areas, *Land Act* reserves, old growth management areas, wildlife habitat areas, ungulate winter ranges), the province already has considerable protection in place for nesting and foraging habitat. Additional habitat will be protected when existing land use planning is fully implemented on the Coast and boundaries of reserves are legalized (e.g., old growth management areas on Vancouver Island and the South Coast and landscape reserves in the Great Bear Rainforest).

Using nesting and foraging habitat suitability models developed by the Northern Goshawk Recovery Team, a territory analysis model was created that projects theoretical home ranges onto the land base using parameters for breeding areas, territory spacing, and amounts of suitable foraging habitat. These models only partially account for habitat in the transition zone. Based on five territory analysis modelling runs, which used a foraging habitat supply threshold of 40% of suitable foraging habitat within projected home ranges, enough currently suitable habitat is available to support an estimated 682–764 potential *laingi* home ranges within the province's four conservation regions (adapted from Smith 2012).

The median model run, which generated 730 territories coast-wide, was overlaid on the network of conservation designations to estimate the number of home ranges protected across the Coast. Two methods to derive this estimate were considered and generated nearly identical results:

1. a territory was considered protected if the centroid (point) of the territory overlapped with a reserve; and
2. a territory was considered protected if the amount of foraging habitat protected in reserves fell within the known distribution of foraging habitat associated with occupied territories on Vancouver Island (see McClaren *et al.* 2015).

The analyses considered two types of reserves:

1. (1) hard reserves, such as provincial parks and wildlife habitat areas, whose boundaries are generally fixed and confer a higher level of protection; and
2. (2) soft reserves, such as old growth management areas, whose boundaries may be adjusted and generally confer a lower level of protection.

Figure 2 shows the estimate of existing protection and the contribution to the home range targets in each conservation region. Based on this analysis, the total gap between the estimated existing protection and proposed provincial home range targets is 168 home ranges, which includes the 148 home ranges (grey bars in Figure 2). It also includes another 20 reserves in the North Coast Conservation Region (green bar in Figure 2) to account for existing management of known breeding areas in the Great Bear Rainforest, where these areas may not achieve the minimum breeding area size of 176 ha if reserves are not

established (Appendix A). This approach also assumes that approximately one-half of the landscape reserves for ecosystem and old-growth representation in the Great Bear Rainforest are of sufficient size to support a home range. The estimate of existing protection will be updated to reflect improved information (habitat and territory models, forest depletions and new reserves) and methods.

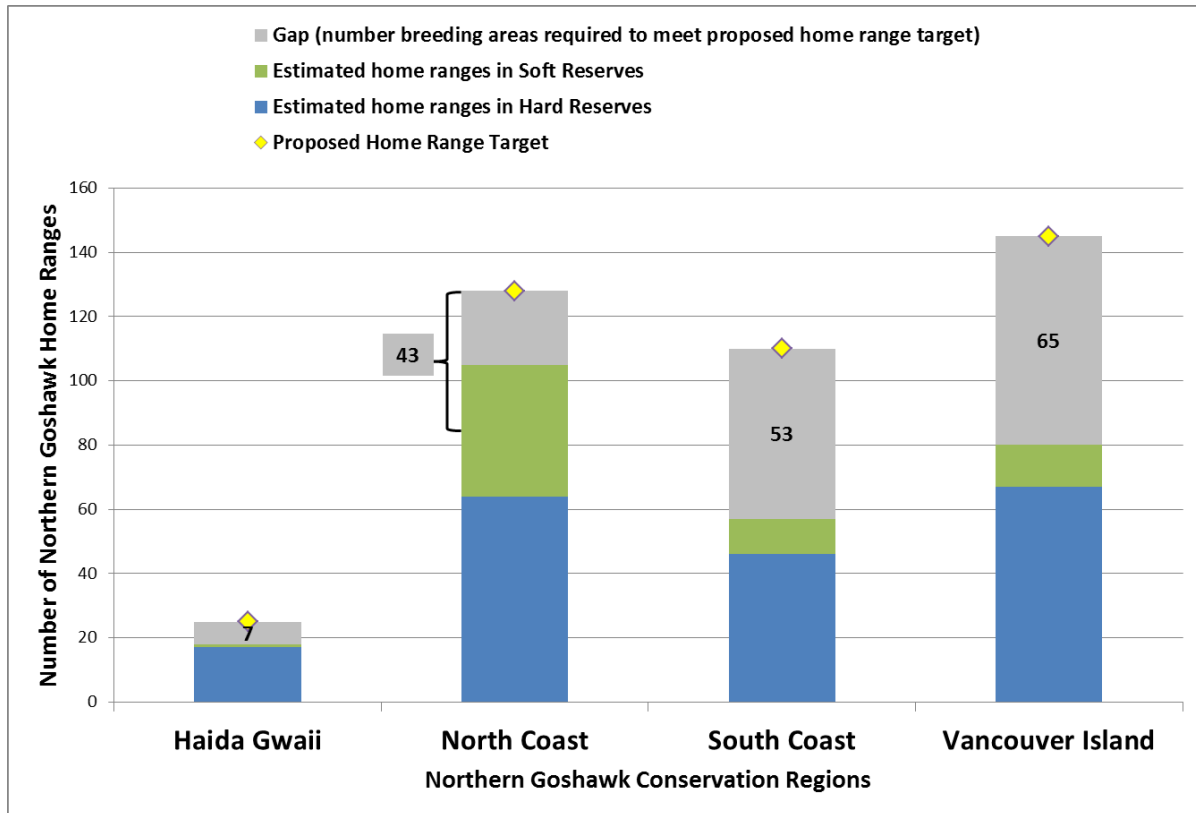


Figure 2. Estimated existing protection of Northern Goshawk, *laingi* subspecies, home ranges.

Based on the Northern Goshawk Recovery Team territory analysis model, the home range target represents approximately 60% of the currently existing home ranges. Therefore, not all home ranges are required to meet population objectives; home range targets can be achieved without protecting every known or newly discovered home range. Until further analyses and research is complete to support a provincial decision on foraging habitat management (anticipated in 2020), protection efforts will focus on breeding area reserves following the provincial breeding area management guidelines (Appendix A). To maximize protection of foraging habitat around priority breeding areas, opportunities to protect additional foraging habitat using existing measures will be explored.

Appendix B outlines guidelines to prioritize breeding areas for reserve designation. Prioritization of breeding areas for protection considers both biological and socio-economic objectives. This management approach seeks to ensure that protection efforts maximize conservation benefits and minimize socio-economic impacts. The biological factors relate to maximizing the likelihood that a breeding area forms part of a viable home range (i.e., one that contributes to long-term population objectives). The socio-economic factors relate to

minimizing impacts to timber supply and natural resource agreement (e.g., *Forest Act*) holders.

For breeding areas in the transition zone, field assessments are needed to determine whether the forest structure and composition and prey are typical of the Northern Goshawk, *laingi* subspecies. If confirmed, these areas will be prioritized for reserve designation and established reserves in the transition zone will contribute to provincial home range targets in the adjacent South Coast and North Coast conservation regions.

Genetics research will also inform ongoing management of goshawks in the transition zone.

4.3 Implementation Objectives

The following implementation objectives provide measurable targets for action and evaluation.

1. By 2020, protect at least 95² new priority breeding areas in British Columbia (see Appendix B) through establishment of breeding area reserves (wildlife habitat areas or equivalent³) consistent with provincial breeding area management guidelines (Appendix A), including:
 - a. 30 breeding area reserves in each of the North Coast, South Coast and Vancouver Island conservation regions, and;
 - b. 5 breeding area reserves on Haida Gwaii.
2. Facilitate research on foraging habitat requirements to inform the development of foraging habitat management options.
3. Facilitate research on the distribution and habitat requirements of Northern Goshawk, *laingi* subspecies, in the transition zone.
4. By 2020, return to senior provincial government with:
 - a. an implementation update;
 - b. recommendations for foraging habitat management; and
 - c. recommendations for additional implementation actions.

These implementation objectives are intended to maximize conservation efforts to benefit the Northern Goshawk, *laingi* subspecies, and to support current and future recovery efforts while providing resource development opportunities. This vision provides certainty in maintaining socio-economic and environmental values, which are important to the people of British Columbia and the global community.

² These short-term objectives will contribute to the longer-term recovery objective of 408 home ranges and are not intended to be a cap.

³ Reserves not established under the *Forest and Range Practices Act* that confer similar type and level of protection (e.g., in Clayoquot Sound and Haida Gwaii).

4.4 Actions and Performance Measures

Table 1 summarizes the actions required to meet the implementation objectives outlined in Section 4.3, and presents associated performance measures.

Table 1. Implementation actions for Northern Goshawk, *laingi* subspecies management.

Threat or Concern addressed	Objective	Priority ^a	Actions	Range	Performance measures ^b	Participating agencies ^c (lead agency in bold type)	Status
Loss of nesting habitat	Maintain target number of home ranges in each conservation region	Essential	Establish at least 95 priority ^d breeding area reserves to short-term targets in each conservation region	Coast-wide	At least 95 breeding area reserves established, 30 in each of North Coast, South Coast, and Vancouver Island conservation regions and 5 in Haida Gwaii, by December 2020	FLNR , forest sector, First Nations	In progress
Loss of nesting habitat	Maintain target number of home ranges in each conservation region	Essential	Achieve recovery objective of 408 home ranges across coast	Coast-wide	408 home ranges protected by wildlife habitat areas or other conservation measures (e.g., parks)	FLNR , ENV, First Nations	In progress
Knowledge gaps	Better understand foraging habitat requirements to inform its management	Essential	Develop foraging habitat management recommendations for senior provincial government to inform a decision on foraging objectives	Coast-wide	Foraging habitat/occupancy analysis completed by April 2018 Foraging habitat management options developed for senior government by March 2020	FLNR	In progress
Loss of foraging habitat	Maintain foraging habitat around priority breeding areas	Essential	Incorporate foraging habitat objectives during land-use planning across the goshawk's range	Coast-wide	Rationales for landscape reserves in Great Bear Rainforest and old growth management areas include consideration of foraging habitat around priority breeding areas	FLNR , forest sector, First Nations	In progress
Knowledge gaps	Understand impacts of foraging habitat	Necessary	Analyze timber supply impact of various foraging habitat	Coast-wide	Report to inform senior government in support of	FLNR	In progress

Threat or Concern addressed	Objective	Priority^a	Actions	Range	Performance measures^b	Participating agencies^c (lead agency in bold type)	Status
	management options to timber supply through time		management scenarios to inform senior government decision		foraging habitat objectives by 2020		
Knowledge gaps	Improve understanding of nesting and foraging habitat	Essential	Update foraging, nesting and territory models with new vegetative resource inventory data and forest depletions	Haida Gwaii, Mid-Coast and South Vancouver Island	Habitat models are updated in Haida Gwaii and the Mid-Coast by May 2017 Habitat models are updated in South Island District when inventory is complete	FLNR , forest sector, First Nations	Complete (Haida Gwaii and Mid-Coast)
Knowledge gaps	Improve understanding of annual foraging habitat requirements	Necessary	Pursue telemetry research if supported by results of foraging habitat and occupancy analyses	To be determined	Pending results of foraging habitat and occupancy analysis	FLNR	Not initiated
Knowledge gaps	Improve understanding of habitat requirements in the transition zone	Necessary	Conduct problem analysis to guide future research, including potential telemetry studies, to inform nesting and foraging habitat management in the transition zone	Transition zone	Problem analysis completed and research initiated by 2019	FLNR , university, forest sector	Not initiated
Inventory	Identify location of known nests and occupied home ranges	Essential	Refine knowledge of known nests and occupied home ranges	Coast-wide	Field inventory is completed annually to identify locations of known nests and occupied home ranges	FLNR , forest sector	In progress
Inventory	Identify location of known nests and occupied home ranges	Essential	Refine knowledge of habitat suitability around known nests	Coast-wide	Habitat assessments are completed around known nests to inform potential breeding area reserves	FLNR , forest sector	In progress
Knowledge gaps	Improve estimate of existing protection	Essential	Improve methods to estimate existing protection and update analyses using best available information	Coast-wide	Estimates for existing protection of home ranges are updated by June 2019	FLNR	Not initiated
Knowledge gaps	Update the distribution of home	Essential	Improve estimate of home range distribution across	Coast-wide	Distribution of home range targets across conservation	FLNR	Not initiated

Threat or Concern addressed	Objective	Priority ^a	Actions	Range	Performance measures ^b	Participating agencies ^c (lead agency in bold type)	Status
	ranges across conservation regions		conservation regions based on updated habitat modelling		regions is updated by June 2019		
Knowledge gaps	Prioritize research topics	Necessary	Develop and prioritize list of Northern Goshawk research topics in a research plan	Coast-wide	Prioritized research topics identified in research plan available to focus future research efforts by June 2018	FLNR , ENV, ECCC, forest sector	Underway
Knowledge gaps	LIDAR	Necessary	Assess utility of LIDAR and emerging remote sensing technologies for management	Coast-wide	Report outlining the applicability of LIDAR to habitat management with recommendations	FLNR , university, forest sector	Not initiated
Monitoring	Monitor the status (availability and levels of protection) of foraging habitat around known sites	Necessary	Using foraging habitat model, monitor the amount and level of protection of foraging habitat around known sites	Coast-wide	Report outlining the status of foraging habitat around known sites by January 2018	FLNR	In progress
Monitoring ^e	Monitor breeding area reserves to ensure management actions are achieving the desired results	Necessary	Remotely monitor habitat condition at all breeding areas; at a subset of known breeding areas within each conservation region, monitor occupancy and nesting success	Coast-wide	Design an office and field monitoring and reporting framework to monitor habitat condition and breeding at selected breeding areas by June 2020	FLNR , forest sector	Not initiated
Monitoring	Compliance monitoring	Necessary	Monitor compliance with breeding area reserves	Coast-wide	Monitor compliance with breeding area reserves by June 2019	FLNR	Not initiated
Knowledge gaps	Understand the effect of silvicultural activities on nesting and foraging habitat	Necessary	Implement research project to define relationship of silvicultural activities on nesting habitat	Vancouver Island; other areas to be determined	Complete final report by March 2018	FLNR	In progress
Knowledge gap	Improve understanding of the effects of habitat loss	Necessary	Implement research project to investigate the effects of habitat loss	Coast-Wide	Pending results of problem analysis	FLNR , university	Not initiated

Threat or Concern addressed	Objective	Priority^a	Actions	Range	Performance measures^b	Participating agencies^c (lead agency in bold type)	Status
Knowledge gaps	Genomics research	Necessary	Continue to support ongoing genomics research through sample collection linked with field inventory and telemetry projects	Coast-wide	Samples for genetic analysis are collected and forwarded to UBC in a timely fashion	UBC , FLNR, CFPA, forest sector	In progress

Note that actions may be modified based on provincial priorities and research results.

^aEssential (urgent and important); Necessary (important but not urgent); or Beneficial.

^bPerformance measures for objectives and other implementation activities.

^cENV – Ministry of Environment and Climate Change Strategy; FLNR – Ministry of Forests, Lands, Natural Resource Operations and Rural Development; ECCC – Environment and Climate Change Canada; UBC – University of British Columbia; CFPA – Coast Forest Products Association.

^dPriority Breeding Areas for implementing management actions as defined in Appendix B. This short-term goal is not a cap on protection measures.

^eDifferent levels of monitoring effort may occur, depending on resources.

4.5 Narrative to Support Implementation Table

This section provides additional information to support the understanding of implementation actions identified in Table 1 for Northern Goshawk, *laingi* subspecies management.

4.5.1 Habitat Protection and Private Land Stewardship

Northern goshawk breeding habitats are undergoing active management on some non-Crown land, particularly private managed forest lands on Vancouver Island. Annual nest site monitoring programs are in place on some lands and included in some forest certification programs. Because of the pattern of land ownership, some known home ranges overlap both Crown and non-Crown lands. Options for shared stewardship and management of these home ranges will be explored with land owners.

Any protection measures for Northern goshawk on non-Crown land are considered to support overall population objectives but are not included in protection totals; this is because such measures are considered voluntary unless legal protection measures are implemented to provide long-term management certainty. Options for long-term habitat protection or management enabled through legislation, forest certification programs, and corporate stewardship commitments will be investigated.

4.5.2 Species and Population Management

As of September 2017, 243 Northern Goshawk, *laingi* home ranges were known⁴ across the four conservation regions in British Columbia (19 home ranges in Haida Gwaii, 50 in North Coast, 43 in South Coast, and 131 in Vancouver Island; includes transition zone). Because of resource development, not all known home ranges are currently occupied, nor are they all considered viable. Based on modelling results, suitable habitat currently exists to support an estimated 682–764 potential home ranges within the four conservation regions; this assumes the application of a 40% forage supply threshold for suitable forage habitat within a home range (adapted from Smith 2012).

The implementation objectives of this plan are intended to support conservation and ongoing recovery efforts for the Northern Goshawk, *laingi* subspecies, while providing continued resource development opportunities.

Discussion continues regarding the delineation of the subspecies' boundaries. Current and future work will likely inform issues regarding conservation units for this species. Existing information, including recent unpublished genetic and morphological information, has resulted in a recommendation from the COSEWIC bird species specialist subcommittee to retain the boundaries as shown in the British Columbia recovery strategy (Northern Goshawk *Accipiter gentilis laingi* Recovery Team 2008), which includes Vancouver Island and the Mainland Coast as part of the Northern Goshawk, *laingi* subspecies distribution (Fraser, pers. comm., 2012).

⁴ This includes 576 known nests, as birds may build multiple nests within each home range.

4.5.3 Foraging Habitat

Foraging habitat requirements appear to vary both across the species range and over time, likely in response to several factors, including fluctuations in prey availability, habitat quality, brood size, and individuals (e.g., hunting efficiency and experience) (McClaren *et al.* 2015). A key knowledge gap to inform the management and recovery of Northern Goshawk, *laingi* subspecies, is the lack of available information that describes the amount, quality, and spatial configuration of foraging habitat required to support a viable home range (McClaren *et al.* 2015). This variability presents a challenge to translate the available science into biologically effective management actions that also consider socio-economic implications. To make a more informed decision on foraging habitat management, the provincial government is undertaking additional research and pursuing additional analyses to better understand:

- the location of foraging habitat through updates to the foraging habitat model;
- whether the existing data can be statistically analyzed to link amounts of foraging habitat to the occupancy of home ranges;
- whether additional field studies (e.g., telemetry) are required to inform future management;
- the habitat requirements in the transition zone; and
- the socio-economic implications of various foraging habitat management scenarios.

Recognizing that the viability of home ranges is influenced by habitat conditions at spatial scales larger than breeding areas, the provincial government is committed to:

- maximizing the contribution of existing conservation measures to protect foraging habitat;
- examining, and adjusting as necessary, management provisions for other conservation measures (e.g., old growth management areas) such that their contribution to Northern Goshawk habitat conservation is explicitly understood and not inadvertently compromised (e.g., through a co-location exercise);
- monitoring the availability and levels of protection of foraging habitat around known sites; and
- incorporating this information into management actions.

5 MONITORING

Monitoring is important to inform ongoing management efforts and to ensure implementation actions achieve provincial management objectives. British Columbia is committed to using the best available information and implementing an adaptive management approach (see Section 7). Information supporting management objectives, including spatial analyses of known sites and habitat models, will be updated as new information becomes available.

Effectiveness monitoring of management actions and protection efforts at breeding area reserves will be conducted to ensure these are effective and achieve the desired results. Monitoring a portion of known nest sites will provide information about the occupancy and the success of breeding areas that will inform natural resource development and mitigation of potential impacts.

Compliance monitoring of existing reserves will occur to monitor reserve integrity and adjacent resource extraction activities.

6 UNCERTAINTY

Some uncertainty is associated with translating the best available science for Northern Goshawk, *laingi* subspecies, into management objectives. Such uncertainty is addressed through application of a precautionary approach, such as the use of the population viability analysis to rationalize home range targets. Other uncertainty underlies the information used to support recovery goals but this will be reduced over time through improvements to the body of literature for Northern Goshawk, *laingi* subspecies. These include improving: the understanding of habitat using modelling and other methods; the understanding of known locations of Northern Goshawk, *laingi* subspecies; the estimate of existing protection of home ranges; the understanding of foraging habitat requirements; and the understanding of habitat requirements in the transition zone. The provincial government will foster research that fills key knowledge gaps to inform management objectives and will apply knowledge from other regions and jurisdictions to Northern Goshawk, *laingi* subspecies management in British Columbia. Implementation of actions in this plan will further reduce uncertainty through effective adaptive management.

7 ADAPTIVE MANAGEMENT

Adaptive management is an iterative process that seeks to reduce uncertainty by monitoring outcomes of management actions and adjusting them where required. Adaptive management acknowledges the uncertainty inherent in the outcomes of implementing management actions. This uncertainty is associated with the amount of information available to develop management strategies and the likelihood that these strategies achieve desired outcomes. Considerable uncertainty is associated with external factors, such as climate, land use management policies, and funding availability. To accommodate these uncertainties, the provincial government will adaptively manage Northern Goshawk, *laingi* subspecies, by monitoring and adjusting implementation actions as necessary to achieve the population and distribution goals. Actions may be added, removed, or changed to best achieve the goals. Future updates to this implementation plan will clarify the provincial approach to the management of foraging habitat. This plan may also be revised if the science supporting management objectives, or the *laingi* subspecies distribution, significantly improves or if significant changes occur to other strategic government goals (e.g., cumulative effects management, endangered species legislation).

Future minor amendments to this plan may be approved by the Assistant Deputy Minister of the Ministry of Forests, Lands, Natural Resource Operations and Rural Development's Resource Stewardship Division. If, in their opinion, proposed amendments are substantive or major, then the amendment will be referred to the Deputy Minister's Committee on Natural Resources for a decision.

8 EFFECTS ON OTHER SPECIES

Habitat protection for Northern Goshawk, *laingi* subspecies, is expected to benefit other species that depend on coastal mature and old-growth forests. Such protection will demonstrate British Columbia's commitment to conservation and recovery of species at risk, and wildlife and habitat conservation and also benefit old-growth and biodiversity conservation. For example, suitable habitats for Northern Goshawk, *laingi* subspecies, and Marbled Murrelet nesting habitat are

estimated to overlap by 15–18%; thus, habitat protection for the Northern Goshawk, *laingi* subspecies, is expected to benefit other species at risk.

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APPENDIX A: PROVINCIAL BREEDING AREA MANAGEMENT GUIDELINES

For breeding areas identified as priorities for reserve establishment, this appendix outlines the provincial breeding area management guidelines for reserve establishment. The objective of these guidelines is to maximize the likelihood of long-term occupancy and reproductive success of breeding areas.

Breeding Area Reserve Design

These provincial breeding area management guidelines are consistent with the current provincial approach for implementing wildlife habitat areas under the Identified Wildlife Management Strategy (Province of British Columbia 2004) of the *Forest and Range Practices Act* and direction for breeding area reserve establishment under the Haida Gwaii Land Use Objectives Regulation Order.⁵ These guidelines are intended to meet expectations outlined in the *draft* federal Recovery Strategy for breeding area reserves (Parks Canada Agency 2017).

Once a confirmed goshawk nest is discovered, it should be reported to a regional government biologist for inclusion in provincial records. A qualified environmental professional should conduct an extensive search of the surrounding area to locate active and alternate nest trees and conduct habitat assessments throughout the surrounding area. This information, in conjunction with operational input, will be used to define the location and configuration of the breeding area reserve.

- The target size for breeding area reserves is 200 ha of suitable nesting habitat, with a minimum size of 176 ha. Maximize the amount of higher-quality suitable breeding habitat within the breeding area reserve.
- Include all known nest trees in the breeding area reserve at least 200 m away from the breeding area reserve boundary and maintain forested connectivity between nest trees within the breeding area reserve.
- Prohibit forest harvesting and road building within the breeding area reserve.
- Minimize edge effects and avoid areas less than 200 m wide within the breeding area reserve.
- Avoid existing roads, wherever possible, within the breeding area reserve.
- Maximize the inclusion of areas of known use such as detections and sign, including plucking posts, within the breeding area reserve.
- Maximize connectivity between the breeding area reserve and adjacent forests to provide forested linkages to foraging habitat beyond the breeding area.
- Minimize the risk of wind throw along breeding area reserve boundaries.
- If necessary, include recruitment areas to meet reserve design guidelines over time. Areas likely to develop suitable habitat soon are higher priorities than longer-term recruitment areas.

⁵ See Haida Gwaii Management Council website:

http://www.haidagwaiimanagementcouncil.ca/documents/HGLUOO_Consolidated_Order_2017_Final_Signed.pdf

Minimizing Direct Disturbance: Timing Restrictions

As goshawks may nest in different locations each year within their breeding areas, attempts should be made by a qualified professional to locate the active nest and implement measures to minimize impacts during the goshawk breeding season. As the location of an active nest may not be known, these guidelines apply to all known nests within a breeding area reserve.

Minimize the risk of nest failure or abandonment from direct disturbance in the vicinity (within 1 km) of an active nest (if known) or all known nests, if the location of the active nest is unknown, by following the timing restrictions and setback distances in Section 8.4 of in “Science-based Guidelines for Managing Northern Goshawk Breeding Areas in Coastal British Columbia” (McClaren *et al.* 2015).

These timing restrictions and setback distances should be applied to other unprotected home ranges, which currently do not contribute to provincial population objectives. Ensuring that disturbances occur outside the breeding season for all active nests is required to enable juvenile goshawks to fledge and contribute to the future population, irrespective of whether a given breeding area is formally protected through reserve establishment. This approach is consistent with requirements of Section 34 of the provincial *Wildlife Act* (Province of British Columbia 1982).

APPENDIX B: GUIDELINES TO PRIORITIZE BREEDING AREAS FOR RESERVE ESTABLISHMENT

This section provides guidance for resource professionals and statutory decision makers to aid in prioritizing Northern Goshawk, *laingi* subspecies, breeding areas for protection. Refer to Appendix A (Provincial Breeding Area Management Guidelines) for details on reserve design.

To achieve the population and distribution goals and implementation objectives outlined in Section 4, the establishment of additional breeding area reserves is required in all four conservation regions. As outlined in the Haida Gwaii Land Use Objectives Order,⁶ minimum 200 ha breeding area reserves are established to protect all newly discovered breeding areas on Crown land. For the remainder of the Coast, breeding areas will be prioritized for protection according to the following criteria to both maximize conservation benefits and minimize socio-economic impacts.

The population goal to maintain 408 home ranges in British Columbia represents a portion of the home ranges currently estimated to exist. To achieve the provincial population goal and to demonstrate progress in protection of breeding areas, the proportion of known breeding areas to be protected in reserves must be greater than the proportion of the provincial home range target relative to the estimated total number of home ranges (approximately 60% +/-).

To account for a degree of uncertainty in the underlying modelling used to estimate the total number of home ranges and amount protected, it is anticipated that, outside of Haida Gwaii, up to 75% of known breeding areas will be protected through implementing the Provincial Breeding Area Management Guidelines (Appendix A). This approach will ensure home range targets are achieved while providing increased management flexibility, reducing impacts to natural resource development, and focusing management actions on viable home ranges.

Biological Factors Used to Prioritize Breeding Areas for Reserve Implementation

Biological factors for prioritizing breeding areas for reserve implementation relate to the likelihood that a breeding area represents part of a viable home range that will contribute to long-term population objectives. The following factors are intended to help guide prioritization of breeding area reserve placement.

- **Recent use and long-term occupancy** – Breeding areas with evidence of recent use and long-term occupancy should be prioritized over areas without recent occupancy.
- **Productivity** – Breeding areas with evidence of fledgling juveniles should be prioritized over areas without evidence of successful fledging of juveniles.
- **Habitat suitability** – Breeding areas with high-quality nesting habitat are higher priorities than areas with moderate to low suitability habitat.

⁶ *Ibid.*

- **Configuration** – Breeding areas with good interior forest conditions and connectivity to adjacent forested stands, especially those in existing reserves, should be preferentially selected over areas that are fragmented or unconnected to adjacent forests.
- **Foraging habitat** – Home ranges require both breeding areas and sufficient foraging habitat to maximize the likelihood of long-term viability. Breeding areas surrounded by higher amounts of foraging habitat and higher levels of protection should be prioritized over areas that have lesser amounts of foraging habitat or lower levels of protection.
- **Distribution within conservation regions** – Breeding areas that are well distributed across biogeoclimatic zones, subzones, or variants, and conservation regions, and breeding areas that fill distribution gaps should be prioritized for protection over areas that already have a high proportion of known sites protected.
- **Known nests** – Breeding areas where all known nests can be included in a reserve are preferred over areas where only a portion of known nests can be protected.
- **Other biodiversity benefits** – All other factors being equal, breeding areas that overlap with other biodiversity values (e.g., high priority wildlife, species at risk, and ecosystems at risk) may be preferentially established.
- **Other government objectives** – Breeding areas overlapping areas that contribute to meeting other government objectives, such as First Nations cultural areas, should be prioritized.

Socio-economic Factors Used to Prioritize Breeding Areas for Reserve Implementation

Socio-economic factors for prioritizing breeding areas for reserve implementation relate to minimizing impacts to timber supply and *Forest Act* agreement holders.

- **Co-location** – Breeding areas that overlap existing or pending reserves are priorities to reduce overall impacts.
- **Administrative fairness** – The socio-economic impact of implementing breeding area reserves is expected to be absorbed across all *Forest Act* agreement holders. Breeding areas that do not disproportionately affect *Forest Act* agreement holders are priorities.
- **Timber supply impacts** – Breeding areas that minimize impacts to the timber harvesting land base are priorities.
- **Relative development priority** – Breeding areas that overlap lower-value potential developments are priorities.
- **Existing investment** – Breeding areas that do not overlap areas with existing development investment are preferred for reserve designation to minimize overall socio-economic impacts.
- **Existing protection** – Areas that have a high degree of existing protection of nesting and foraging habitat should be prioritized to minimize the incremental impact of management actions.