



**Technical Data Report—  
Wildlife and Wildlife Habitat**

Ksi Lisims LNG – Natural Gas  
Liquefaction Facility and Marine  
Terminal

June 2024

Prepared for:



**KSI LISIMS LNG**

Prepared by:

Stantec Consulting Ltd.

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## 1 Executive Summary

2 The Nisga'a Nation, Rockies LNG Limited Partnership (**Rockies LNG**) and Western LNG LLC (via its  
3 subsidiary, Western LNG) (each a Proponent and collectively referred to herein as **the Proponents**),  
4 are proposing to jointly develop an energy project, the Ksi Lisims LNG – Natural Gas Liquefaction and  
5 Marine Terminal Project (**the Project**). The Project is a floating liquefied natural gas (**FLNG**) production,  
6 storage, and offloading facility, with supporting upland infrastructure and a Marine Terminal. The Project  
7 site (the **Site**) is located at Wil Milit, on the northern end of Pearse Island, approximately 15 kilometres  
8 (**km**) west of the Nisga'a community of Gingolx. The Site is on Category A fee simple land as defined in  
9 the Nisga'a Final Agreement (**Nisga'a Treaty**) and is adjacent to a proposed water lot located on the  
10 east side of the Site, in Portland Canal.

11 The Project is subject to environmental assessment (**EA**) requirements under the British Columbia  
12 *Environmental Assessment Act (BC EAA)* and the federal *Impact Assessment Act (IAA)*. The  
13 Government of BC requested substitution of the provincial review process for the federal impact  
14 assessment process from the federal Minister of Environment and Climate Change. The federal  
15 Minister of Environment and Climate Change approved the request for substitution. The Project will also  
16 undertake an assessment in accordance with Chapter 10 (Environmental Assessment and Protection) of  
17 the Nisga'a Treaty, which will be incorporated into the BC environmental assessment and the federal  
18 impact assessment process. This Technical Data Report presents detailed technical data related to  
19 wildlife and wildlife habitat. Reference case conditions were determined by reviewing existing information,  
20 undertaking Project-specific field studies, and developing wildlife habitat suitability models that use  
21 terrestrial ecosystem mapping specific to the Project. Information presented in this report includes:

- 22 • Traditional knowledge and information about the use of wildlife by the Nisga'a Nation, including  
23 Nisga'a Interest species, and other Indigenous nations.
- 24 • Federal and provincial wildlife species of conservation concern that are defined as species that are  
25 red- or blue-listed provincially, designated as Special Concern, Threatened, or Endangered by the  
26 Committee on the Status of Endangered Wildlife in Canada, or listed as Special Concern,  
27 Threatened, or Endangered on Schedule 1 of the *Species at Risk Act*.
- 28 • Results from a review of existing information related to wildlife on Pearse Island and the  
29 marine waters from Portland Inlet west to Dundas and Stephens Island and south to Porcher Island.
- 30 • Results from the following Project-specific field surveys:
  - 31 – Stationary point-count surveys for terrestrial birds;
  - 32 – Nocturnal and diurnal raptor surveys;
  - 33 – Shorebird and marine bird surveys;
  - 34 – Remote cameras targeting medium and large terrestrial mammals;
  - 35 – Bat acoustic recorder surveys;



# TECHNICAL DATA REPORT—WILDLIFE AND WILDLIFE HABITAT KSI LISIMS LNG PROJECT



KSI LISIMS LNG

Executive Summary  
June 2024

- 1       – Pond-dwelling amphibian surveys; and
- 2       – Field-based wildlife habitat suitability assessments.

3 This Technical Data Report presents the model ratings assumptions and Reference Case results for  
4 wildlife habitat suitability models developed for the Project. Reference Case wildlife habitat suitability  
5 models were developed based on existing conditions for the following species and life requisites:

- 6       • grizzly bear (*Ursus arctos*) spring and fall foraging;
- 7       • moose (*Alces alces*) winter foraging and shelter;
- 8       • Pacific marten (*Martes caurina*) year-round living;
- 9       • western screech-owl, *kennicottii* subspecies (*Megascops kennicottii kennicottii*) year-round living;
- 10      • northern goshawk (*Accipiter gentilis laingi*) breeding;
- 11      • marbled murrelet (*Brachyramphus marmoratus*) breeding;
- 12      • old forest bird community breeding;
- 13      • young forest bird community breeding;
- 14      • wetland bird community breeding; and
- 15      • western toad (*Anaxyrus boreas*) breeding.

16 Key results from the review of existing data, Project-specific surveys, and Project-specific habitat models  
17 are:

- 18      • Collectively, there are 56 species of conservation concern known or likely to occur in the  
19        Terrestrial Wildlife Regional Study Area, Marine Terminal Regional Study Area, Marine Shipping  
20        Regional Study Area, Transmission Line Study Area, or Open Water Study Area.
- 21      • Three bald eagle nests were identified along the eastern portion of Pearse Island within the  
22        Terrestrial Wildlife Local Study Area. Bald eagle nests are protected year-round, whether active or  
23        inactive, under the BC *Wildlife Act*.
- 24      • Western toad, a species of conservation concern, was detected breeding in wetlands during  
25        Project-specific field surveys in the Terrestrial Wildlife Local Study Area.
- 26      • Marbled murrelet, a species of conservation concern, was detected during surveys in the  
27        Marine Terminal Regional Study Area.
- 28      • Wildlife habitat suitability models identified effective habitat for grizzly bear, moose, Pacific marten,  
29        western screech-owl, northern goshawk, marbled murrelet, old forest bird community, young forest  
30        bird community, wetland bird community, and western toad.



## 1 Abbreviations

ARU	Acoustic Recording Unit
BC	British Columbia
BC CDC	BC Conservation Data Centre
BC EAA	British Columbia <i>Environmental Assessment Act</i>
BC MOE	BC Ministry of Environment
BCR	Bird Conservation Region
BEC	Biogeoclimatic Ecosystem Classification
CWH	Coastal Western Hemlock zone
CWHvh2	Coastal Western Hemlock Very Wet Hypermaritime subzone
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
EA	environmental assessment
ECCC	Environment and Climate Change Canada
ESSF	Engelmann Spruce-Subalpine Fir
FLNG	floating liquefied natural gas production, storage, and offloading facility
GBPU	Grizzly Bear Population Unit
HSI	Habitat Suitability Index
IA	impact assessment
IAA	<i>Impact Assessment Act</i>
IBA	Important Bird Area
IK	Indigenous knowledge
km	kilometres
LSA	Local Study Area



**TECHNICAL DATA REPORT—WILDLIFE AND WILDLIFE HABITAT  
KSI LISIMS LNG PROJECT**



Abbreviations  
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MBCA	<i>Migratory Birds Convention Act</i>
MH	Mountain Hemlock
MHwh1	Mountain Hemlock Wet Hypermaritime subzone, windward variant
MHwhp1	Mountain Hemlock Wet Hypermaritime subzone, parkland variant
Nisga'a Treaty	Nisga'a Final Agreement
OPS	Octaves per second
OWSA	Open Water Study Area
RSA	Regional Study Area
RISC	Resources Information Standards Committee
SARA	<i>Species at Risk Act</i>
the Project	Ksi Lisims LNG – Natural Gas Liquefaction and Marine Terminal Project; the Project includes the marine terminal and project activities (e.g., shipping)
the Site	The Project site (i.e., the terminal area)
TDR	Technical Data Report
TEM	Terrestrial Ecosystem Mapping
TLSA	Transmission Line Study Area
TUS	Traditional use studies
UARU	ultrasonic acoustic recording unit
UWR	Ungulate winter range
VC	Valued Component
VRI	Vegetation resource inventory
WHA	Wildlife Habitat Areas
ZOI	Zone of Influence





## 1 1.0 INTRODUCTION

2 The Nisga'a Nation, Rockies LNG Limited Partnership (**Rockies LNG**) and Western LNG LLC (via its  
3 subsidiary, Western LNG) (each a Proponent and collectively referred to herein as **the Proponents**),  
4 are proposing to jointly develop an energy project, the Ksi Lisims LNG – Natural Gas Liquefaction and  
5 Marine Terminal Project (**the Project**). The Project is a floating liquefied natural gas (**FLNG**) production,  
6 storage, and offloading facility, with supporting upland infrastructure and a Marine Terminal. The Project  
7 site (the **Site**) is located at Wil Milit, on the northern end of Pearse Island, approximately 15 km west of  
8 the Nisga'a community of Gingolx. The Site is on Category A fee simple land as defined in the  
9 Nisga'a Final Agreement (**Nisga'a Treaty**) and is adjacent to a proposed water lot located on the  
10 east side of the Site, in Portland Canal.

11 The Project is subject to an environmental assessment (**EA**) under the British Columbia (**BC**)  
12 *Environmental Assessment Act* (**BCEAA**) and an impact assessment (**IA**) under the federal *Impact*  
13 *Assessment Act* (**IAA**). The Government of BC requested substitution of the provincial review process for  
14 the federal impact assessment process from the federal Minister of Environment and Climate Change.  
15 The federal Minister of Environment and Climate Change approved the request for substitution. Given the  
16 location of the Project on Category A Lands owned by the Nisga'a Nation, the Application for an  
17 Environmental Assessment Certificate (the Application) must also meet the requirements of Chapter 10,  
18 paragraph 8, of the Nisga'a Treaty. Accordingly, the Application focuses on a suite of valued components  
19 (**VCs**), including Wildlife and Wildlife Habitat. Valued Components are components of the natural and  
20 human environment that are considered by the Proponents, public, Indigenous nations, scientists and  
21 other technical specialists, and government agencies involved in the assessment process to have  
22 scientific, ecological, economic, social, cultural, archaeological, historical, or other importance. Wildlife  
23 and Wildlife Habitat was identified as a VC, and this Technical Data Report (**TDR**) presents existing  
24 conditions for that VC to support the Application and permitting requirements.

25 Information on terrestrial wildlife occurrence and habitat use was gathered for the Terrestrial Wildlife Local  
26 Study Area (**LSA**), Regional Study Area (**RSA**), and Transmission Line Study Area (**TLSA**). Information  
27 on marine bird occurrence was gathered for the Marine Terminal RSA, Marine Shipping RSA, marine  
28 portions of the TLSA, and Open Water Study Area (**OWSA**). Data was collated from both existing data  
29 sources and Project-specific field studies. A review of existing data sources was completed to identify  
30 data gaps, and Project-specific field studies were undertaken to fill those gaps. Wildlife resources  
31 addressed in this report include:

- 32 • **Wildlife species of conservation concern** – wildlife species designated as endangered, threatened,  
33 or special concern by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) or  
34 listed under Schedule 1 of the federal *Species at Risk Act* (SARA; SRPR 2024), and species that are  
35 red- or blue-listed by the BC Conservation Data Centre (BC CDC 2024).
- 36 • **Species of cultural use and value to Nisga'a Nation** – species identified as being of importance to  
37 Nisga'a Nation.



TECHNICAL DATA REPORT—WILDLIFE AND WILDLIFE HABITAT  
KSI LISIMS LNG PROJECT



Introduction  
June 2024

- 1 • **Species of Indigenous cultural use and value** – species identified as being of importance to other  
2 Indigenous nations.
- 3 • **Migratory birds** – bird species protected under the federal *Migratory Birds Convention Act* (MBCA)  
4 and the Migratory Birds Regulations 2022.
- 5 • **Non-migratory birds** – bird species not listed under the MBCA and protected under the  
6 BC *Wildlife Act*.
- 7 • **Terrestrial mammals** – terrestrial mammal species known or likely to occur in the Terrestrial Wildlife  
8 RSA.
- 9 • **Amphibians** – amphibian species known or likely to occur in the Terrestrial Wildlife RSA.



Study Areas  
June 2024

## 1    **2.0    STUDY AREAS**

2    The Project is located at Wil Milit on the northern end of Pearse Island, approximately 15 km west of the  
3    Nisga'a community of Gingolx. The local and regional study areas presented in this TDR represent the  
4    areas where data was compiled/collected from to allow for an understanding of the environment in  
5    support of the Project-specific effects assessment, including cumulative effects.

6    The land-based Project facilities will be located on the northern end of Pearse Island within  
7    District Lots 5431 and 7235. The Marine Terminal and other marine-based facilities (e.g., floating worker  
8    accommodation) will be located within a proposed Water Lot at the northern end of Pearse Island.

### 9    **2.1    LOCAL STUDY AREA**

10    The Terrestrial Wildlife LSA is defined by a 1 km buffer around the two district lots and bound to the area  
11    of Pearse Island above the high tide mark. The spatial extent of the Terrestrial Wildlife LSA was selected  
12    based on the predicted extent of potential adverse direct and indirect effects on terrestrial wildlife.  
13    Terrestrial wildlife species which are known to use intertidal habitat are discussed within the context of the  
14    marine study areas.

15    The Marine Terminal LSA for Marine Birds is defined as a 1 km buffer around the water lot, but not  
16    extending above the high tide line (Figure 2.2–1). The spatial extent of the Marine Terminal LSA was  
17    selected based on the predicted extent of potential adverse direct and indirect effects on marine birds,  
18    and shorebirds.

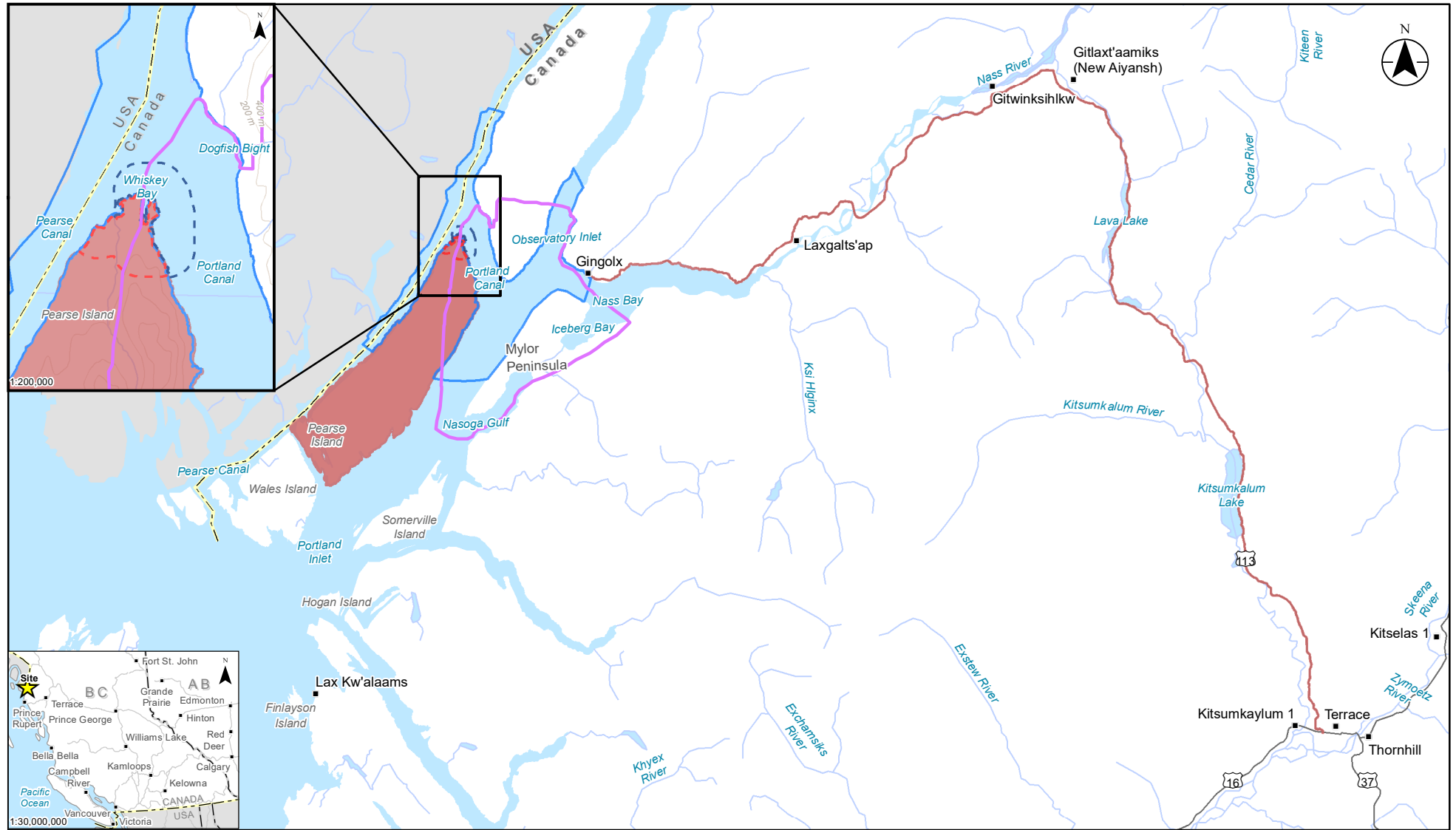
19    The Marine Shipping LSA is defined as a 2 km buffer centred on the Marine Shipping and supply routes,  
20    but not extending above the high tide line, between Wil Milit and the pilot boarding location at or near the  
21    Triple Island Pilotage Station, Wil Milit and Prince Rupert, and Wil Milit and Gingolx (Figure 2.2–1). The  
22    spatial extent of the Marine Shipping LSA was selected based on the predicted extent of potential  
23    adverse direct and indirect effects on marine birds.

### 24    **2.2    REGIONAL STUDY AREA**

25    The Terrestrial Wildlife RSA is comprised of two parts: 1) the area of Pearse Island, and;  
26    2) Highway 113/Nisga'a Highway road allowance from Gingolx to the junction with Highway 16  
27    (Figure 2.2–1). The spatial extent of the Terrestrial Wildlife RSA reflects feedback received during review  
28    of the Application Information Requirements, and was chosen based on the extent to which residual  
29    Project effects are expected to act cumulatively with similar residual effects from other projects and  
30    activities on terrestrial wildlife.

31    The Marine Terminal RSA is defined as a 15 km buffer around the water lot, but not extending above the  
32    high tide line (Figure 2.2–1). The spatial extent of the Marine Terminal RSA was selected based on the  
33    extent to which residual Project effects are expected to act cumulatively with residual effects from other  
34    projects and activities on marine birds.





- Marine Terminal Local Study Area
- Marine Terminal Regional Study Area
- Terrestrial Wildlife Local Study Area
- Terrestrial Wildlife Regional Study Area
- Transmission Line Study Area
- International Boundary
- Highway
- Watercourse
- Waterbody

**Notes**  
 1. Coordinate System: NAD 1983 UTM Zone 9N  
 2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada, Stantec, Rockies LNG, Maxar

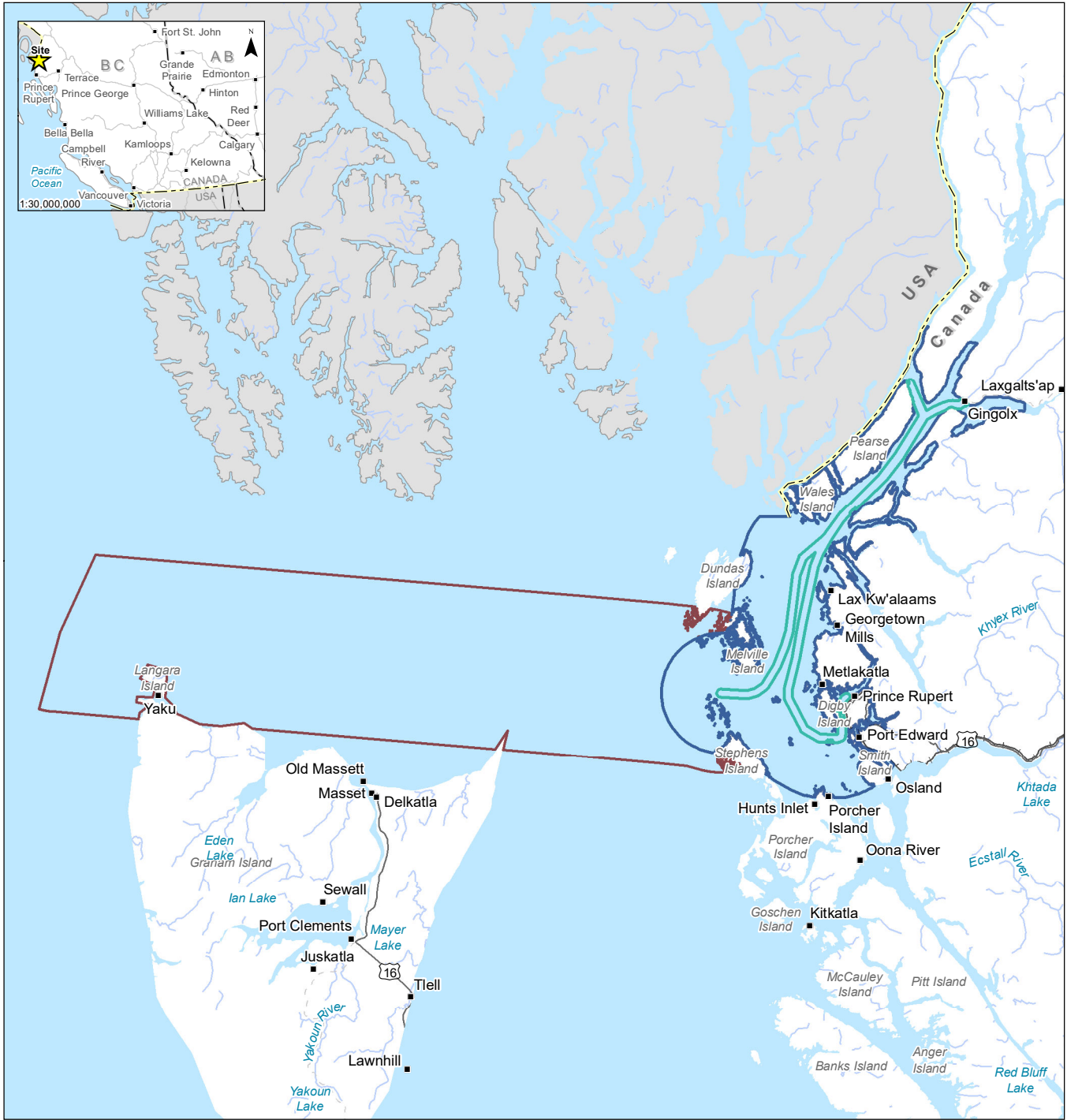


**Stantec**

Project Location: Pearse Island, BC  
 Client/Project/Report: Ksi Lisims LNG  
 Natural Gas Liquefaction and Marine Terminal  
 Technical Data Report – Wildlife and Wildlife Habitat

Project Number: 123221820  
 Prepared by TOULICHINI on 20230718  
 Requested by CBALL on 20230713  
 Checked by NFORRESTER on 20230719

Figure No: **2.2-1**  
 Title: **Terrestrial Wildlife, Marine Terminal, and Transmission Line Study Areas for Wildlife**



I:\CA0153-FBAGF01\Workgroup\123221820\figures\reports\TDR\WMA\fig\_2\_2\_123221820\_marine\_shipping\_study\_areas.mxd Revised: 2024-06-05 By: ayh



- Marine Shipping Local Study Area
- Marine Shipping Regional Study Area
- Open Water Study Area
- Populated Place
- International Boundary
- Highway
- Resource Road
- Watercourse
- Waterbody



Project Location: Pearse Island, BC  
 Project Number: 123221820  
 Prepared by SPARKER on 20220705  
 Requested by CBALL on 20220623  
 Checked by TQUILICHINI on 20220712

Client/Project/Report  
 Ksi Lisims LNG  
 Natural Gas Liquefaction and Marine Terminal  
 Technical Data Report – Wildlife and Wildlife Habitat

Figure No.

**2.2-2**

Title

**Marine Shipping and Open Water Study Areas for Wildlife**

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Study Areas  
June 2024

1 The Marine Shipping RSA is defined as a 30 km buffer centred on the shipping and supply routes, but not  
2 extending above the high tide line, between Wil Milit and the Triple Island Pilotage Station, Wil Milit and  
3 Prince Rupert, and Wil Milit and Gingolx (Figure 2.2–2). The spatial extent of the Marine Shipping RSA  
4 was selected based on the extent to which residual Project effects are expected to act cumulatively with  
5 residual effects from other projects and activities on marine birds.

## 6 **2.3 OPEN WATER STUDY AREA**

7 The OWSA for marine birds is defined as a 30 km buffer centred on the shipping and supply route, but  
8 not extending above the high tide line or into protected channels where Project effect interactions are  
9 unlikely, between the 12 nautical mile limit of Canada’s territorial sea and the BC Coast Pilots boarding  
10 location at or near Triple Island Pilotage Station (Figure 2.2–2). The OWSA does not overlap with the  
11 spatial extent of the Marine Shipping RSA in the area around Triple Island; the eastern boundary of the  
12 OWSA abuts the western boundary of the Marine Shipping RSA.

## 13 **2.4 TRANSMISSION LINE STUDY AREA**

14 The TLSA is a broad area between the Site and Nisga’a Lands (as defined under the Nisga’a Treaty)  
15 within which a portion of the third-party transmission line will be developed. The TLSA is defined to  
16 encompass the likely options for the transmission line, including necessary rights-of-way as well as  
17 associated infrastructure. The portion of the transmission line within the TLSA will tie into to a  
18 transmission line that will be developed on Nisga’a Lands, connecting to the BC Hydro grid. The TLSA  
19 encompasses portions of Nisga’a Category A Lands and the Nass Area but does not include  
20 Nisga’a Lands (as defined in the Nisga’a Treaty). The TLSA includes a portion of Pearse Island, the Mylor  
21 Peninsula, and the southern part of the Ashington Range (Figure 2.2–1). The TLSA includes both marine  
22 and terrestrial environments within its boundaries.





## 1 3.0 REVIEW OF EXISTING DATA

2 A review of existing information and data from the Terrestrial Wildlife, Marine Terminal, and  
3 Marine Shipping LSA and RSA, TLSA, and OWSA was completed for terrestrial wildlife and marine birds  
4 to characterize existing conditions. Information on terrestrial wildlife occurrence and habitat use was  
5 gathered for the Terrestrial Wildlife RSA and TLSA, and information on marine bird occurrence was  
6 gathered for the Marine Terminal RSA, Marine Shipping RSA, TLSA, and OWSA. Sources of information  
7 included traditional knowledge and information on traditional use species, current conservation listings,  
8 relevant literature, publicly available data, and historical data.

### 9 3.1 REGIONAL SETTING

10 The Terrestrial Wildlife, Marine Terminal, and Marine Shipping RSAs, TLSA, and OWSA are located in  
11 the Coast and Mountain Ecoprovince. This ecoprovince encompasses the Coast Mountain range and  
12 coastal islands (Demarchi 2011). The ecoprovince is characterized by wet, mild air moving in from the  
13 Pacific resulting in high precipitation and snowpack, and drier conditions due to rainshadow effects east  
14 of the Coast Mountains (Demarchi 2011). The ecoprovince is divided into ecosections which are areas of  
15 minor physiographic and macroclimatic variation (Demarchi 2011).

16 The Terrestrial Wildlife RSA is in the Southern Boundary Ranges, Meziadin Mountains, Nass Mountains,  
17 and Nass Basin ecosections, and the TLSA is located in the Southern Boundary Ranges and  
18 Kitimat Ranges ecosections. The Southern Boundary Ranges, Meziadin Mountains, Kitimat Ranges, and  
19 Nass Mountains ecosections are characterized by rugged, mountainous terrain, while the Nass Basin  
20 ecosection is a lower relief basin bordered by sharply rising mountain ranges (Demarchi 2011). Across  
21 these ecosections the climate varies from west to east from a warmer, higher precipitation coastal climate  
22 to a drier, cooler climate in inland areas (Demarchi 2011).

23 The Marine Terminal RSA and Marine Shipping RSA are in the North Coast Fjords ecosection, which  
24 consists of narrow deep fjords, channels, and sounds (Demarchi 2011). The area receives a high volume  
25 of precipitation from the Pacific Ocean resulting in wet Coastal Western Hemlock (**CWH**) and cold and  
26 wet subalpine Mountain Hemlock (**MH**) forests (Demarchi 2011). The OWSA overlaps the Hecate Strait  
27 and Dixon Entrance ecosections. The Hecate Strait ecosection is a relatively shallow (50 m to 300 m)  
28 submarine valley and is characterized by heavy precipitation, strong winds, and rough seas  
29 (Demarchi 2011). The Dixon Entrance ecosection is characterized by an east-west depression in the  
30 continental shelf, and is an area of strong winds, heavy rains, and rough seas (Demarchi 2011).

31 The Terrestrial Wildlife RSA and TLSA are primarily within the CWH and MH biogeoclimatic (**BEC**) zones,  
32 with small areas located in the Coastal Mountain-heather Alpine (**CMA**) and Interior Cedar-Hemlock (**ICH**)  
33 BEC zones. The CWH is the zone of low- to middle-elevation forest, ranging in elevation from sea level to  
34 approximately 1,000 m. It has a maritime climate with relatively mild temperatures and heavy rainfall. The  
35 growing season tends to be cool and cloudy, with winters extremely wet and quite mild. Low-elevation





Review of Existing Data  
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1 coastal areas receive little snow (Banner et al. 1993). The natural vegetation of the CWH is dominated by  
2 old growth conifer stands (rainforests) of western hemlock (*Tsuga heterophylla*), western redcedar  
3 (*Thuja plicata*), and amabilis fir (*Abies amabilis*). Sitka spruce (*Picea sitchensis*) is common but never  
4 dominant and occurs mainly on alluvial soils. Shore pine (*Pinus contorta*) and yellow-cedar  
5 (*Callitropsis nootkatensis*) are abundant on the outer coast where a scrubby forest grows on organic soils  
6 over bedrock (Banner et al. 1993). The Terrestrial Wildlife LSA is within the central variant of the  
7 CWH Very Wet Hypermaritime subzone (CWHvh2). This variant occurs below 600 m elevation and is  
8 characterized by a cool, mild climate with little snow and year-round rain and fog (Banner et al. 1993).  
9 Dominant tree species in the CWHvh2 variant are western redcedar, yellow cedar, western hemlock,  
10 mountain hemlock, and lodgepole pine (*Pinus contorta*) (Banner et al. 1993).

11 The MH BEC zone occupies the high elevation or subalpine zones of the coastal regions (400 m to  
12 1,600 m elevation) and is located almost entirely on the western slopes of the Coast Mountains with some  
13 occurrences on the eastern slopes (Banner et al. 1993). The climate within this zone is characterized by  
14 short, cool summers, rainy autumns, and long, cool, wet winters with heavy snow cover for five to  
15 nine months. Mountain hemlock and amabilis fir are the characteristic dominant tree species  
16 (Banner et al. 1993). The higher elevations of Pearse Island occur within the windward and parkland  
17 variants of the Mountain Hemlock Wet Hypermaritime subzone (MHwh1 and MHwhp1). The MHwh1  
18 variant occurs immediately above the CWHvh2 variant, between 600 m and 1,100 m elevation, and is  
19 characterized by a mild, foggy, wet climate with intermittent heavy snowpack (Banner et al. 1993).  
20 Mountain hemlock, western hemlock, western redcedar, lodgepole pine, and Sitka spruce are the  
21 dominant tree species in this variant (Banner et al. 1993). The MHwhp1 variant occurs above the MHwh1  
22 and occupies the transitional zone from the treeline to true alpine tundra. Parkland subzones are  
23 characterized by discontinuous forest interspersed with subalpine heath, herb meadows, and  
24 subalpine bogs (Banner et al. 1993).

25 The CMA BEC zone is an alpine zone that occurs along the windward spine of the Coast Mountains  
26 where the snowpack is deep and summers are moderated by maritime influences. The treeline is lower in  
27 elevation than in the alpine of comparable latitudes in the dry interior caused by heavy and prolonged  
28 snow cover. In the north part of the province, the CMA begins at 1,000 m. Most of the land area is  
29 occupied by glaciers or recently exposed bare rock (Mackenzie 2006). The CMA is treeless, but  
30 krummholz occurs at lower alpine elevations but is usually not extensive. The most common krummholz  
31 species are mountain hemlock, yellow-cedar, and subalpine fir (*Abies lasiocarpa*) in coastal alpine areas.  
32 Most alpine vegetation is dominated by shrubs, herbs, mosses, liverworts, and lichens (Banner et al.  
33 1993).

34 The ICH is a zone of low- to mid-elevation forest (100 m to 1,000 m elevation) in the transitional zone  
35 between the coast and interior. The zone lies east of the Coast Mountains and encompasses most of the  
36 Nass Basin (Banner et al. 1993). The climate in this zone is intermediate between the cool, wet conditions  
37 of the north coast, and the drier conditions of the interior (Banner et al. 1993). Climax forests are  
38 dominated by western hemlock, subalpine fir, western redcedar, and Engelmann spruce  
39 (*Picea engelmannii*). A small amount of the ICH Moist Cold Hazelton variant (**ICHmc2**) occurs within the  
40 Highway 113 portion of the Terrestrial Wildlife RSA. The ICHmc2 occurs at lower elevations, between





Review of Existing Data  
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1 100 m and 750 m elevation, and is characterized by moderately wet to dry, warm summers and cool,  
2 wet winters (Banner et al. 1993). Dominant tree species include western hemlock, western redcedar,  
3 lodgepole pine, trembling aspen (*Populus tremuloides*), and paper birch (*Betula papyrifera*)  
4 (Banner et al. 1993).

## 5 **3.2 INFORMATION SHARED BY THE NISGA'A NATION**

6 The Nisga'a Nation is not completing a Project-specific Indigenous knowledge (IK) study but instead  
7 completing cultural, social, and economic surveys, interviews, and focus group sessions with Nisga'a  
8 community members. These results will include information on wildlife relevant to the Project, but results  
9 will not be available until after the Wildlife TDR for the Project is submitted for regulatory review. Results  
10 will be reviewed and considered in developing the Application.

11 The Nisga'a Nation has been completing wildlife studies within the Nass Area for the past 30 years.  
12 A summary of biophysical reports collected over the past five years is provided in the Detailed Project  
13 Description (Ksi Lisims 2022a). The Nisga'a Nation provided several biophysical reports from 1992 to 2021  
14 for review and consideration in the Application. The following describes the methods and results of the review  
15 of these reports.

### 16 **3.2.1 Methods**

17 Information from available sources shared by the Nisga'a Nation for the Project were reviewed in context  
18 of the Terrestrial Wildlife RSA, Marine Terminal RSA, TLSA, and Marine Shipping RSA, and  
19 summarised to support an understanding of existing wildlife conditions in these RSAs. Sources included a  
20 wildlife habitat assessment in the Nass Wildlife Area (Yazvenko et al. 2002), reports from 2000 to 2017  
21 on moose (*Alces alces*) surveys in the Nass Area and Nass Wildlife Area (e.g., Demarchi 2017), reports  
22 on mountain goat (*Oreamnos americanus*) in the Nass Wildlife Area (e.g., NLG 2021), a wildlife habitat  
23 assessment in the Nisga'a Wildlife Management Area (Searing et al. 1997), the Nass Bear Project in the  
24 Lower Nass Area (Demarchi et al. 2017), a grizzly bear (*Ursus arctos*) inventory in the Nass Wildlife Area  
25 (Johnson and Demarchi 1999), grizzly bear monitoring for the Greenville to Kincolith Road Project  
26 (Hawkes and Demarchi 2008), northern goshawk (*Accipiter gentilis*) and marbled murrelet (*Brachyramphus*  
27 *marmoratus*) studies in Nisga'a Lands (d'Entremont and McKinnon 2017; d'Entremont et al. 2018), and  
28 bird studies in the lower Nass River (Demarchi 1997; Holst et al. 2007).

### 29 **3.2.2 Results**

30 Terrestrial mammals that are known to occur within the Marine Terminal and Terrestrial Wildlife RSAs and  
31 TLSA include grizzly bear, black bear (*Ursus americanus*), black-tailed deer (*Odocoileus hemionus*),  
32 grey wolf (*Canis lupus*), cougar (*Puma concolor*), wolverine (*Gulo gulo luscus*), and Pacific marten  
33 (*Martes caurina*). Pearse Island was considered low quality habitat for moose in 2002  
34 (Yazvenko et al. 2002), although moose has been detected on the island in the summer in more recent  
35 years (NLG 2021). Most of the Highway 113 corridor intersects low quality moose habitat, although there  
36 are areas of high quality habitat around Laxgalts'ap and where the Nass River is braided





Review of Existing Data  
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1 (Demarchi 2017). Moose were detected during surveys in January 2017 where the Nass River is braided,  
2 but not near Laxgalts'ap (Demarchi 2017). Mountain goat is not expected on Pearse Island  
3 (Yazvenko et al. 2002) but is expected in terrestrial portions of the TLSA where it overlaps the mainland.  
4 The Nass Bear Project (Demarchi et al. 2017) area overlaps the Marine Terminal and Terrestrial Wildlife  
5 LSA and RSA including northern Pearse Island, Portland Canal, and northern Portland Inlet. A team of  
6 biologists and Nisga'a technicians completed investigations of grizzly and black bear use of seasonal  
7 habitats in the Nass Bear Project area, although not on Pearse Island. In summary, the area is largely  
8 undeveloped and free of industrial activities, which sustains a healthy number of grizzly and black bears  
9 (Demarchi et al. 2017). There is an abundance of bear forage (forbs, herbs, grasses, berry shrubs, roots)  
10 and salmon spawning streams. Bears feed on sedges (e.g., Lyngbye's sedge [*Carex lyngbyei*]),  
11 seaside arrow-grass (*Triglochin maritima*), seaside plantain (*Plantago maritima*), northern rice-root  
12 (*Fritillaria camschatcensis*), and skunk cabbage (*Lysichiton americanus*) in spring, and pink salmon  
13 (*Oncorhynchus gorbuscha*), skunk cabbage, and berries in the fall (Demarchi et al. 2017). Narrow,  
14 fringing marshes away from creek mouths are often more heavily grazed by bears than marshes  
15 associated with estuaries.

16 Beach fringes and foreshores around creek mouths and along forest margins at shallow slopes to  
17 low tidelines are important foraging habitats for bears because they support a suite of palatable plants  
18 not found elsewhere (Demarchi et al. 2017). Bears (and wolves) also feed on sea lion (*Eumetopias*  
19 *jubatus*) carcasses that are left on beaches from sea lion hunts by Nisga'a citizens in late winter  
20 (Demarchi et al. 2017).

21 Wildlife detected from cameras on southern Ashington Range Peninsula that are expected to occur in the  
22 Marine Terminal and Terrestrial Wildlife RSAs included grizzly bear, black bear, Pacific marten, red  
23 squirrel (*Tamiasciurus hudsonicus*), grey wolf, bald eagle (*Haliaeetus leucocephalus*), and common raven  
24 (*Corvus corax*) (Demarchi et al. 2017). At Dogfish Creek, the frequency of wolf detections increased in  
25 early August, likely with returning pink salmon. Wildlife detected from cameras on the western part of  
26 Mylor Peninsula (i.e., east of the proposed shipping route and within the TLSA) included grizzly bear,  
27 black bear, black-tailed deer, and grey wolf. Mylor Peninsula sustains more grizzly bears than other areas  
28 sampled for the Nass Bear Project, likely due to abundant sedge patches, swamp forests, more salmon  
29 streams, and adjacency to the Khutzeymateen region that has been closed to grizzly bear hunting  
30 (Demarchi et al. 2017). The north side of Nass Bay, including Ashington Range Peninsula, supports more  
31 black bears than the south side, likely due to good quality black bear forage, fewer grizzly bears, and  
32 greater availability of rocky intertidal areas rich with bivalves that black bears (known by Gingolx residents  
33 as 'rock bears' – a race of black bear that specializes in foraging in the intertidal zone) frequent.

34 Grizzly bears in the Lower Nass Area likely den in old forests and alpine areas and black bears likely  
35 avoid denning below 200 m above sea level (Davis 1996 as cited in Demarchi et al. 2017). 'Mark trees'  
36 were infrequent but widely distributed along the Mylor Peninsula and Sgawban areas; trees were primarily  
37 western redcedar and to a lesser extent western hemlock, along trails parallel to shoreline riparian or  
38 stream banks.





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1 A northern goshawk survey was completed in 2016 in Nisga'a Lands, east of Gingolx (d'Entremont and  
2 McKinnon 2017) and in 2017 in the Lower Nass River Valley including Mylor Peninsula  
3 (d'Entremont et al. 2018), but excluding Pearse Island. The surveys identified suitable nesting habitat that  
4 occurs within the TLSA but did not confirm nest sites, although one goshawk responded to call playback  
5 in each survey year at two different locations.

6 Marbled murrelet nesting surveys were completed in 2017 in the Lower Nass River Valley  
7 (d'Entremont et al. 2018), which is along the Highway 113 corridor and within the TLSA. Surveys  
8 confirmed suitable nesting habitat and detected murrelets flying in and out of the Kincolith River  
9 watershed, Iknouk River, and Nass Harbour.

10 The lower Nass River and Nass Bay (within the Marine Terminal and Marine Shipping RSAs) provide high  
11 quality foraging habitat for water-associated birds. High-suitability bald eagle nesting and roosting habitat  
12 is present along and up to 200 m from the shoreline of the Nass River (Demarchi 1997; Holst et al. 2007);  
13 nesting and roosting sites may also occur more than 200 m from shore. Bald eagle is particularly  
14 abundant during the eulachon (*Thaleichthys pacificus*) run in March and April; bald eagles scavenge on  
15 carcasses on the mudflats of the Nass River and perch in trees along the shoreline. During spring, diving  
16 and dabbling ducks forage and rest in near-shore habitats such as Iknouk River estuary and sedge-grass  
17 shoreline areas. Gulls take advantage of the eulachon run and several species are abundant in March  
18 and April (e.g., more than 20,000 gulls counted in a single day; Holst et al. 2007). Gulls may roost at night  
19 in Portland Canal or Observatory Inlet; Demarchi (1997) noted that during ebbing tides in the mornings,  
20 gulls were observed flying eastward from these areas up the Nass River.

### 21 **3.3 INDIGENOUS KNOWLEDGE**

22 Indigenous Knowledge includes Nation-specific direct observations about the biophysical world, as well  
23 as ecological indicators, oral histories, community practices, language, teachings, laws, relationships,  
24 rituals, cultural identity, spirituality, cultural values, and other ways of knowing that have been identified by  
25 the Nation (EAO 2020). Indigenous nations were engaged to discuss IK for the Project to inform existing  
26 conditions reports and the Application; a record of engagement and consultation activities is presented in  
27 the Detailed Project Description (Ksi Lisims 2022a). Funding was provided for project-specific Indigenous  
28 use studies (e.g., traditional use studies [TUS]) to be completed by the following Indigenous nations:

- 29 • Lax Kw'alaams Band: Indigenous Knowledge and Traditional Land Use Study Specific to the  
30 Ksi Lisims LNG Project (Lax Kw'alaams Band 2023). Received on April 3, 2023.
- 31 • Metlakatla First Nation: Traditional Knowledge and Use Study Specific to the Ksi Lisims Project  
32 Proposed by the Nisga'a Nation, Rockies LNG Limited Partnership, and Western LNG LLC  
33 (Metlakatla First Nation 2022). Received on September 8, 2022.
- 34 • Kitsumkalum First Nation: Land use study is being completed and expected to be available in 2023.  
35 Kitsumkalum First Nation also prepared a report – Highway 113 and Supporting Roadways Risk  
36 Assessment Report (Kitsumkalum First Nation 2022).





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- 1 • Kitselas First Nation: Preliminary Report was received on June 6, 2022 and the Final Report on
- 2 August 3, 2022 – Kitselas First Nation Traditional Use and Occupancy Study for the Ksi Lisims LNG
- 3 Project, Pearse Island, Portland Inlet. Prepared for the Ksi Lisims LNG Project
- 4 (Kitselas First Nation 2022).
- 5 • Gitxaala Nation: Baseline Report is being completed and expected to be available in 2023.
- 6 • Gitga'at First Nation: Final Report was received on September 24, 2022 – Gitga'at First Nation
- 7 Traditional Use and Occupancy Study for the Ksi Lisims LNG Project, Pearse Island, Portland Inlet
- 8 and Chatham Sound (Gitga'at First Nation 2022).
- 9 • The Haida Nation and Métis Nation BC are not completing TUS or other Project-specific reports.

10 In the absence of Project-specific IK available from an Indigenous nation, the Project is permitted to use  
11 publicly available IK from Indigenous nations provided for other EA Applications in the region, where  
12 relevant, such as Prince Rupert Gas Transmission Project (PRGT 2014), Cedar LNG (2022a), and  
13 Vopak Pacific Canada Project (Vopak 2020a). The methods and results of IK collected from these  
14 secondary sources are summarized in Section 3.2.1 and Section 3.2.2, respectively.

### 15 **3.3.1 Methods**

16 Where an Indigenous nation has provided Project-specific TUS or IK for the Project, wildlife information  
17 from primary sources (e.g., TUS) was summarised, including names of places, where available, as  
18 related to the Marine Terminal LSA and RSA, Marine Shipping LSA and RSA, Terrestrial Wildlife LSA and  
19 RSA, OWSA, and TLSA. In the absence of Project-specific IK from an Indigenous nation, wildlife  
20 information from secondary sources (e.g., Vopak Pacific Canada Project EA Application) was  
21 summarised. The original TUSs for EA applications may include specific locations and mapping; however,  
22 TUSs prepared for other EA applications (e.g., Gitxaala Use Study: Vopak Pacific Canada Project Report,  
23 draft prepared by Gitxaala Environmental Monitoring) are confidential and not publicly available. Where  
24 specific place names and mapping are not available in the secondary sources, information about  
25 harvesting and wildlife occurrences was generalized for the traditional territory of the Indigenous nation. It  
26 is understood that the absence of IK or traditional land use information pertaining to the Indigenous nation  
27 does not indicate an absence of traditional or present use, occupation, or interest in the Project study  
28 areas.

### 29 **3.3.2 Results**

#### 30 **3.3.2.1 Lax Kw'alaams Band**

31 The Lax Kw'alaams Band territory overlaps the Marine Terminal and Marine Shipping LSAs from Wil Milit  
32 to Triple Island (see Figure 12.15-5 in Section 12.0 of the Application). The territory also overlaps the  
33 TLSA and part of the Highway 113 corridor. Lax Kw'alaams Band identified in their TUS for the Vopak  
34 Pacific Canada Project (Vopak 2020a) that they hunt and trap terrestrial wildlife in their territory. There  
35 are traplines within the area registered to Lax Kw'alaams Band members, including on Pearse Island.  
36 Species harvested that occur in the RSAs and TLSA include black bear, grizzly bear, wolf, cougar,  
37 moose, deer, beaver (*Castor canadensis*), marten, mink (*Neovison vison*), and mountain goat.





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1 Furbearer species that are expected to occur in the RSAs that the Lax Kw'alaams Band members  
2 traditionally trapped include mink, river otter (*Lontra canadensis*), beaver, and muskrat  
3 (*Ondatra zibethicus*) (Vopak 2020a; Cedar LNG 2022a). Study participants reported hunting and trapping  
4 areas for bear, moose, deer, goat, mink, and otter; key areas that overlap the Marine Terminal and  
5 Marine Shipping RSAs include Dundas Island, Kaien Island, Pearse Island, and Stephens Island  
6 (Lax Kw'alaams Band 2023). Traditional harvesting activities are critical components of Lax Kw'alaams  
7 Band members' way of life, and support the Nation's food, medicine, ceremonial, and commercial uses  
8 (Lax Kw'alaams Band 2023). Marine birds traditionally harvested include ducks, geese, swans, and the  
9 eggs of gulls and oystercatchers (Vopak 2020a). Lax Kw'alaams Band members continue to harvest  
10 waterfowl such as ducks, geese, and swans (Lax Kw'alaams Band 2023).

### 11 3.3.2.2 Metlakatla First Nation

12 The Metlakatla Band Council territory overlaps the Marine Terminal and Marine Shipping LSAs from  
13 Wil Milit to Triple Island (see Figure 13.16-5 in Section 13.0 of the Application). The territory also overlaps  
14 the TLSA. The Metlakatla First Nation identified in their TUS for PRGT (2014) and the Vopak Pacific  
15 Canada Project (Vopak 2020a) that they traditionally hunted and trapped and continue to harvest a  
16 variety of terrestrial and marine species throughout the year in their territory. Terrestrial animals are  
17 harvested for food, materials, ceremony, trade, and cultural purposes (PRGT 2014). Trapping areas  
18 occur throughout the waters and islands of Nass Bay, the Portland and Observatory inlets, and  
19 Chatham Sound (PRGT 2014). Bear, beaver, and deer are hunted in the summer months; moose, bear,  
20 and cougar are targeted in the fall, and trapping of furbearers (e.g., beaver, mink, red squirrel, weasel  
21 [*Mustela* sp.]) is primarily done in the winter (Vopak 2020a). Terrestrial species presently harvested by  
22 community members include beaver, otter, marten, wolf, bear, mink, and grouse (Vopak 2020a).  
23 Marine species presently harvested include geese, ducks, gulls, swans, and eggs of gulls (Vopak 2020a).  
24 The Traditional Knowledge and Use Study (Metlakatla First Nation 2022) focused on marine resources  
25 and therefore has limited information on terrestrial wildlife or marine birds. The Metlakatla First Nation  
26 data identified egg harvesting as part of the seasonal round in late spring, and there are several hunting  
27 sites identified within the Metlakatla First Nation study area, although these sites do not distinguish  
28 marine from terrestrial wildlife hunting sites (Metlakatla First Nation 2022).

### 29 3.3.2.3 Kitsumkalum First Nation

30 The Kitsumkalum Band Council territory overlaps the proposed Marine Terminal and Marine Shipping and  
31 supply routes from Wil Milit to Triple Island (see Figure 14.16-5 in Section 14.0 of the Application). The  
32 territory also partly overlaps the TLSA on Pearse Island and the Mylor Peninsula and southern half of the  
33 Highway 113 corridor. Study participants reported that moose are frequently seen on Highway 113  
34 (Kitsumkalum First Nation 2023). The Kitsumkalum Valley is an important area for the Nation's land and  
35 marine use practices (Kitsumkalum First Nation 2023). The Kitsumkalum First Nation identified in their  
36 TUS for the Vopak Pacific Canada Project (Vopak 2020a) that they harvest a range of terrestrial species  
37 throughout their territory, including within the intertidal and marine environments. Study participants  
38 reported that wild meat is integral to the Nation's traditional diet, and provides food security and an  
39 important source of nutrition (Kitsumkalum First Nation 2023). Terrestrial species commonly harvested for





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1 subsistence that occur in the RSAs and TLSA include moose, deer, bear, and mountain goat  
2 (Kitsumkalum First Nation 2023). Ducks, scoters, and seagull eggs are also harvested (Vopak 2020a;  
3 Kitsumkalum First Nation 2023). The Highway 113 and Supporting Roadways Risk Assessment report  
4 (Kitsumkalum First Nation 2022) is focused on effects of increased traffic on human safety and did not  
5 provide information on wildlife.

#### 6 **3.3.2.4 Kitselas First Nation**

7 The Kitselas First Nation territory overlaps the Marine Terminal and Marine Shipping LSAs from Wil Milit  
8 to Triple Island (see Figure 15.14-5 in Section 15.0 of the Application). It does not overlap the terrestrial  
9 portion of the TLSA or Highway 113 corridor. Aquatic and land resource sites and areas overlap the  
10 Marine Terminal LSA and RSA, Terrestrial Wildlife LSA, and Marine Shipping RSA (Kitselas First Nation  
11 2022). The Kitselas First Nation people harvest a diversity of animals in a pattern of the seasonal round  
12 within their traditional territory (Kitselas First Nation 2022). Hunting, trapping, and harvesting of gull eggs  
13 contribute food to the community and sustains cultural practices. Traditionally, families had their  
14 harvesting areas (house territories); however, many areas are no longer accessible due to changes over  
15 time related to new technologies, government legislation, industrial and urban developments, participation  
16 in the industrial and wage economies, settlement and resource harvesting by non-Indigenous people, and  
17 a shifting and diminished resource base due to pollution and climate change (Kitselas First Nation 2022).  
18 Wildlife resource harvesting remains, and will continue to be, of central importance to Kitselas culture and  
19 economy.

20 Species that are currently hunted include bear, deer, moose, geese, ducks (e.g., mallard  
21 [*Anas platyrhynchos*]), grouse, and beaver. Hunting these species is the main activity in the fall  
22 (Kitselas First Nation 2022); bears are hunted in October or November before hibernation when they have  
23 the most fat on them to render into grease (Kitselas First Nation 2022). Bear and beaver are also hunted  
24 in the spring (Kitselas First Nation 2022). The Kitselas First Nation trap furbearers that likely occur in the  
25 RSAs such as beaver, marten, weasel, squirrel, wolf, and wolverine; however, trapping of furbearers is  
26 currently limited because of the low price of furs (Kitselas First Nation 2022). Small species are trapped in  
27 the fall for use as bait in the winter for larger animals.

28 Hunting of terrestrial wildlife is primarily done opportunistically while Kitselas people are engaging in  
29 aquatic resource harvesting or traveling between harvesting areas and settlements such as Prince  
30 Rupert, Port Edward, and Kitkatla (Kitselas First Nation 2022), which overlap the southern portion of the  
31 Marine Shipping RSA. Interviewees noted that while traveling throughout the coast they are on the  
32 lookout for deer and other land mammals on the shorelines and making short crossings between islands  
33 (Kitselas First Nation 2022). Deer is hunted along the shore in Mud Bay (Fleming Bay), Telegraph  
34 Passage, Port Edward, and around the old canneries in Inverness Passage. Deer and bear are hunted  
35 near the mouth of Skeena River (Kitselas First Nation 2022).





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1 The Kitselas people harvest gull eggs from nests on rocks and cliffs throughout southern Chatham Sound  
2 and mouth of the Skeena River (Kitselas First Nation 2022). Motorized boats have allowed Kitselas  
3 people to access many parts of the coast for collecting gull eggs in hours or days rather than weeks or  
4 months as previously required (Kitselas First Nation 2022). Current travel routes are used to access gull  
5 egg harvesting sites.

### 6 **3.3.2.5 Gitxaala Nation**

7 The Gitxaala Nation traditional territory overlaps the southern portion of the Marine Shipping RSA through  
8 Chatham Sound from Prince Rupert, and a disjunct terrestrial area at the mouth of the Nass River  
9 (an eulachon fishing station) that overlaps Highway 113 and the Marine Terminal RSA, but does not  
10 overlap the TLSA (see Figure 16.16-4 in Section 16.0 of the Application). Gitxaala Nation members also  
11 use marine areas outside their territory boundary, including as far as Triple Island (Calliou Group 2014).  
12 Study participants reported that deer, ducks, geese, and other waterfowl, moose, and bear are important  
13 species occurring in the Marine Shipping RSA (Gitxaala Nation 2023). The Gitxaala Nation has and  
14 continues to rely on their ability to hunt and gather food from their territory and the people harvest wild  
15 game, waterfowl such as geese and ducks, and gull eggs (Calliou Group 2014; Vopak 2020a). The  
16 Gitxaala Nation identified in their TUS for Vopak Pacific Canada Project (Vopak 2020a) that they hunt  
17 terrestrial mammals including deer and bear on coastal islands such as Lelu Island. Members of Gitxaala  
18 Nation reported that they trade seafood for moose meat with people from the Nass Valley  
19 (Gitxaala Nation 2023). In the Marine Shipping RSA, members of the Gitxaala Nation currently harvest  
20 gull eggs on islands in the Tree Nob Group and Rachael Islands and hunt ducks off southern Digby Island  
21 (Calliou Group 2014). Study participants note that gull egg harvesting takes place in early summer within  
22 the Marine Shipping RSA (Gitxaala Nation 2023).

### 23 **3.3.2.6 Gitga'at First Nation**

24 The Gitga'at First Nation harvesting area overlaps the southernmost portion of the Marine Shipping LSA  
25 through Chatham Sound to Tree Nob Group south of Triple Island and the marine supply route from  
26 Prince Rupert (see Figure 17.14-4 in Section 17.0 of the Application). Gitga'at First Nation traditional  
27 territory does not overlap the TLSA or Marine Terminal RSA; however, the Gitga'at have traditional  
28 interests within Portland Channel and lower Nass River (Gitga'at First Nation 2022). Seasonal hunting,  
29 fishing, and harvesting provides resources that are used to meet the Nation's subsistence needs, support  
30 food security and trading activities, and foster community gatherings (Gitga'at First Nation 2022). Gitga'at  
31 First Nation harvest a variety of marine and terrestrial animal species along the shoreline and intertidal  
32 zones whenever the opportunity presents itself, including bear, deer, mountain goat, geese, ducks,  
33 murrelets, seabird eggs (e.g., gulls and oystercatcher), and beaver (Cedar LNG 2022a; Gitga'at First  
34 Nation 2022). Study participants reported that there are many areas within the Marine Shipping RSA near  
35 Prince Rupert that are good hunting areas for deer. These includes Kinahan Islands, Tugwell Island,  
36 Rachael Islands, Ridley Island, Pillsbury Cover, the eastern side of Telegraph Passage, and parts of  
37 Porcher Island (Gitga'at First Nation 2022). Marten and mink are trapped on the western shoreline of  
38 Digby Island and grouse hunting areas include the shoreline of larger islands south of the marine supply  
39 route, such as near Hunt Inlet (Gitga'at First Nation 2022). Nesting sites for seabirds that overlap the





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1 Marine Shipping RSA include Lucy Island, Hanmer Rocks, Tree Nob Group, and Alexandra Bank  
2 (Gitga’at First Nation 2022). Seabird eggs are collected from many small island, offshore rocks, and cliffs  
3 within the Marine Shipping RSA, including Greentop Islet, Rachael Islands, Holland Rock west of Smith  
4 Island, the small rocks off of Lawyer Islands, the rocks over Alexandra Bank, and Grey Island (Gitga’at  
5 First Nation 2022). The pattern and seasonal round have changed over time, but seafood remain of  
6 central importance to the Gitga’at economy (Gitga’at First Nation 2022). Duck and goose hunting areas  
7 overlap the Marine Shipping RSA and Marine Terminal RSA, including Winter Harbour on Pearse Island  
8 (Gitga’at First Nation 2022).

### 9 **3.3.2.7 Haida Nation**

10 The Haida Nation traditional territory overlaps with the OWSA and the 12 nautical mile limit of the  
11 proposed Marine Shipping and supply routes (see Figure 18.12-4 in Section 18.0 of the Application).  
12 Marine birds are common in this area, and Haida Nation identified pelagic species (e.g., fulmars,  
13 shearwaters, albatross), seagulls, and alcids (e.g., ancient murrelet [*Synthliboramphus antiquus*]) as  
14 species that are culturally important (Cedar LNG 2022b).

### 15 **3.3.2.8 Métis Nation British Columbia**

16 There is no unique land base (e.g., traditional territory) associated with Métis Nation BC. Métis families  
17 have specific harvesting areas that may overlap with the Terrestrial Wildlife RSA, Marine Terminal RSA,  
18 Marine Shipping RSA, and OWSA (see Section 19.1.5.1 of the Application). Métis Nation BC currently  
19 harvest shorebirds, seabirds, waterfowl, ducks, and deer (Métis Nation British Columbia 2021;  
20 Cedar LNG 2022b). In the early 1800s the Métis Nation created a “conservation doctrine” titled *The Laws*  
21 *of the Hunt* that outlined appropriate use and harvesting of terrestrial and marine resources in the  
22 northwest (Métis Nation British Columbia 2021). The Métis people continue to recognize these laws and  
23 employ them when they are out in harvesting areas.

## 24 **3.4 LITERATURE REVIEW**

### 25 **3.4.1 Methods**

26 Existing data on terrestrial wildlife and marine birds in the Terrestrial Wildlife, Marine Terminal, and  
27 Marine Shipping LSAs and RSAs, TLSA, and OWSA were compiled from published regional and local  
28 literature, publicly available online provincial and federal databases, conservation science databases, and  
29 published technical data reports completed for other environmental assessments in the region. Regional  
30 and local peer-reviewed literature were reviewed for articles that helped characterize historical and  
31 existing conditions for terrestrial wildlife and marine birds, including literature related to wildlife-habitat  
32 associations, species’ ranges in the Pacific northwest, and occurrence records in the area surrounding  
33 Pearse Island and Portland Canal.





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- 1 The following publicly available online provincial and federal databases were reviewed:
- 2 • **BC Species and Ecosystem Explorer** – database of wildlife species occurrence records and  
3 BC conservation listings (BC CDC 2024)
  - 4 • **eFauna BC** – an electronic atlas of the wildlife of BC, which pulls records from museums and other  
5 research institutions (eFauna 2021)
  - 6 • **HabitatWizard** – displays provincial and federal defined management areas and public wildlife  
7 occurrence records, including Wildlife Species Inventory records (Province of British Columbia 2022)
  - 8 • **eBird Canada** – bird records collected for science and conservation (eBird 2022)
  - 9 • **BC Coastal Waterbirds Survey** – monthly shoreline bird surveys completed by volunteers  
10 (Birds Canada 2022a)
  - 11 • **BC Nocturnal Owls Survey** – annual nocturnal owl surveys completed by volunteers  
12 (Birds Canada 2022b)
  - 13 • **BC Breeding Bird Atlas** – A five-year (2008 to 2012) systematic survey of the breeding birds of BC  
14 (Birds Canada 2022c)
  - 15 • **WildResearch Nightjar Surveys** – annual nightjar surveys completed by volunteers  
16 (WildResearch 2015)
  - 17 • **iNaturalist Research-grade Observations** – observations of wildlife and other taxa which meet  
18 iNaturalist’s “research grade” status (i.e., has a date, is georeferenced, has photos or sounds, and is  
19 not a record of a captive or cultivated organism) (iNaturalist 2023)
  - 20 • **Wildlife Accident Reporting System** – vehicle-related wildlife mortality data collected by highway  
21 maintenance contractors (BC MOTI 2023)
- 22 Published literature and reports were reviewed, including but not limited to:
- 23 • COSEWIC assessment and status reports
  - 24 • Federal recovery strategies, action plans, and management plans (e.g., ECCC 2018, ECCC 2023)
  - 25 • Provincial wildlife management reports and population estimates (e.g., MFLNRORD 2019,  
26 MFLNRORD 2020)
  - 27 • Royal BC Museum Handbooks
  - 28 • BC Breeding Bird Atlas species accounts (BC BBA 2015)
  - 29 • Cornell Lab of Ornithology Birds of the World species accounts (BOW 2022)
  - 30 • Raincoast Conservation Foundation marine birds survey reports (Harvey and Fox 2013)



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- 1 The following published reports completed for other environmental assessments in the region were  
2 reviewed:
- 3 • Cedar LNG (2022a) – the study area for Cedar LNG partially overlaps the Marine Shipping RSA but  
4 does not overlap the Terrestrial Wildlife RSA or Marine Terminal RSA.
  - 5 • Aurora LNG (Brooks 2016) – the study area for Aurora LNG partially overlaps the Marine Shipping  
6 RSA near Prince Rupert. The study area for this Project does not overlap the Terrestrial Wildlife RSA  
7 or Marine Terminal RSA.
  - 8 • PRGT (2014) – the study areas for PRGT partially overlap the Marine Terminal and Marine Shipping  
9 RSAs but do not overlap the Terrestrial Wildlife RSA.
  - 10 • Westcoast Connector Gas Transmission Project (Archipelago 2014) – the marine bird study area for  
11 the Westcoast Connector Gas Transmission Project overlaps the Marine Shipping RSA.
  - 12 • Vopak Pacific Canada Project (Vopak 2020b) – the marine birds local study area for Vopak Pacific  
13 Canada Project overlaps with the Marine Shipping RSA.
  - 14 • Greenville to Kincolith Highway Project (Demarchi 1997) – the study areas for the Greenville to  
15 Kincolith Highway Project do not overlap the Project study areas, but the report provides regionally  
16 applicable information.
  - 17 • Kitsault Mine Project – the study areas for this Project do not overlap the Project study areas, but the  
18 report provides regionally applicable information.
- 19 A list of terrestrial wildlife species known or likely to occur in the Terrestrial Wildlife, Marine Terminal, and  
20 Marine Shipping RSAs, TLSA, and OWSA was developed as part of the review of existing information.  
21 The list of species was developed by querying the BC Species and Ecosystems Explorer (BC CDC 2024).  
22 Species were then added or removed from the list based on published range maps and species accounts,  
23 Project and third-party (e.g., eBird) occurrence records, and professional experience of the assessment  
24 team on species' distributions, habitat associations, and consideration of the kinds of habitats in the  
25 wildlife RSAs. Species considered accidental or vagrant were not included, as were non-native species.  
26 Terrestrial wildlife and marine bird species of conservation concern, and Nisga'a Valued Components, are  
27 identified in the final list (Appendix A). Species of conservation concern are species that are:
- 28 • Listed on Schedule 1 of SARA as Special Concern, Threatened, or Endangered
  - 29 • Designated by COSEWIC as Special Concern, Threatened, or Endangered
  - 30 • Red- or blue-listed in BC
- 31 Nisga'a valued components are wildlife species or species groups identified in the Nisga'a Treaty, or  
32 species that were identified by Nisga'a Nation during consultation.





1 **3.4.2 Results**

2 **3.4.2.1 Important Wildlife Areas**

3 Areas that are particularly important for sustaining wildlife populations and have been designated  
4 provincially, federally, or by a conservation organization are termed 'important wildlife areas' in this TDR  
5 and include (i) provincially and federally managed parks, ecological reserves, and conservancies,  
6 (ii) provincially designated areas (e.g., wildlife habitat areas (WHAs), ungulate winter range (UWR)),  
7 (iii) federally designated areas (e.g., critical habitat, migratory bird sanctuary), and (iv) areas defined by  
8 conservation organizations (e.g., Important Bird Areas (IBAs), Bird Conservation Regions (BCRs)).

9 Wildlife Habitat Areas are provincially managed areas that designate habitat for specific wildlife species  
10 (BC MOE 2022a). Ungulate Winter Ranges are provincially managed areas that contain habitat  
11 necessary to meet the winter habitat requirements of one or more ungulate species (BC MOE 2022b).

12 Important Bird Areas are areas identified by BirdLife International members, Birds Canada, and  
13 Nature Canada as areas that are important for three groups of birds: 1) threatened birds, 2) large groups  
14 of birds, and 3) birds that are restricted by range or habitat (IBA Canada 2022a). Most of Canada's IBAs  
15 are identified because of large groups of birds in the area during breeding or migration, or because the  
16 IBA supports birds that are threatened (Moore and Couturier 2011).

17 Bird Conservation Regions are ecologically defined ecoregions developed by the North American  
18 Bird Conservation Initiative (Environment Canada 2017). They function as the primary planning unit for  
19 integrated conservation planning across Canada, the United States, and Mexico. The Terrestrial Wildlife,  
20 Marine Terminal, and Marine Shipping RSAs are located within BCR5, Northern Pacific Rainforest  
21 (Environment Canada 2013). This BCR extends from the western Gulf of Alaska south to northern  
22 California. In BC, the terrestrial portion of BCR5 includes Haida Gwaii, Vancouver Island, and the coastal  
23 region from the Lower Mainland to the Alaska border (Environment Canada 2013). Available habitat in  
24 BCR5 includes a variety of forest types, wetlands, estuaries, and open habitat. Conservation objectives in  
25 BCR5 include maintaining and enhancing the full range of natural habitat types, and maintaining  
26 important habitat features, such as snags (Environment Canada 2013). The marine portion of BCR5  
27 encompasses the coastal marine environment west to the limit of Canada's 200 nautical mile exclusive  
28 economic zone (Environment Canada 2013). Coastal areas of BCR5 include a variety of shoreline  
29 habitats, such as rocky to sand shorelines, saltmarshes and tidal flats, and rugged cliffs. Estuaries  
30 comprise 2.3% of BCR5 and provide important habitat for waterfowl, shorebirds, and other waterbirds  
31 (Environment Canada 2013). Offshore areas of BCR5 include areas of high productivity around  
32 upwellings. Threats to birds in the marine portion of BCR5 are commercial fisheries (e.g., bycatch,  
33 entanglement), ingestion of plastics, oil spills, and effects from climate change  
34 (Environment Canada 2013).

35 The Terrestrial Wildlife, Marine Terminal, and Marine Shipping RSAs and OWSA are located within the  
36 Pacific Birds Habitat Joint Venture area. The joint venture is a regional partnership that includes  
37 representatives from Canada and United States government agencies, First Nations, private landowners,  
38 conservation groups, and businesses that work on large-scale conservation planning and monitoring





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1 initiatives (PBHJV 2022). The BC portion of the Pacific Birds Habitat Joint Venture area is a complex of  
2 inlets, bays, fjords, straits, and islands resulting in a diversity of nearshore, intertidal, and upland habitats  
3 (PBHJV 2022). The joint venture area is an important overwintering area for waterfowl such as snow  
4 goose and trumpeter swan. Joint venture projects in BC have focused on the southwestern portion of the  
5 province, which and have secured, restored, or enhanced approximately 45,000 hectares of habitat  
6 (PBHJV 2022).

## 7 **Terrestrial Wildlife Study Areas**

8 The Terrestrial Wildlife LSA does not overlap with any migratory bird sanctuaries, UNESCO reserves, or  
9 IBAs. The Terrestrial Wildlife RSA overlaps with UWR u-6-009, designated for moose, from Sand Lake  
10 south to Highway 16 (Figure 3.4–1). The Terrestrial Wildlife RSA also overlaps with WHA 6-287,  
11 designated for grizzly bear, between Kitsumkalum Lake and just north of the intersection between  
12 Highway 113 and Highway 16.

13 The Terrestrial Wildlife RSA intersects two provincial parks and four protected areas: Anhluut'ukwsim  
14 Laxmihl Anwinga'asanakwhl Nisga'a Provincial Park, Nisga'a Memorial Lava Bed Corridor Protected  
15 Area, Kitsumkalum Provincial Park, and Lundmark Bog Protected Area. Anhluut'ukwsim Laxmihl  
16 Anwinga'asanakwhl Nisga'a Provincial Park is a 17,683-ha park located approximately 100 km north of  
17 Terrace on Highway 113. The park features old growth forest and several lava flow features. Wildlife  
18 known to occur in the park include moose, goats, marmots, and black and grizzly bear (BC Parks 2023a).  
19 A master plan for the park was jointly developed by the Nisga'a/BC Parks Management Committee  
20 (Nisga'a/BC Parks Committee 1997). Conservation of natural ecosystems and the fragile volcanic  
21 features of the park are the primary focus of the master plan (Nisga'a/BC Parks Committee 1997).  
22 Nisga'a Memorial Lava Bed Corridor Protected Area is contiguous with the Anhluut'ukwsim Laxmihl  
23 Anwinga'asanakwhl Nisga'a Provincial Park. It features lava flow features and extensive lichen growth.  
24 Wildlife known to occur in the area include moose, goats, marmots, and black and grizzly bear  
25 (BC Parks 2023b). A management plan has not been developed for this protected area.

26 Kitsumkalum Provincial Park is located on the southern tip of Kitsumkalum Lake and was established in  
27 1946 (BC Parks 2023c). Wildlife known to frequent the park include black and grizzly bear, moose, and  
28 eagles (BC Parks 2023c). A management plan has not been developed for this park.

29 Kitsumkalum Lake North Protected Area is a 400-ha protected area located on the northern extent of  
30 Kitsumkalum Lake at the confluence of the Kitsumkalum and Cedar Rivers (BC Parks 2023d). Wildlife  
31 within the park includes black and grizzly bear, moose, and eagles (PC Parks 2023d). A management  
32 plan has not been developed for this protected area.

33 Lundmark Bog Protected Area is a 78-ha protected area established in 2005 (BC Parks 2023e) located  
34 approximately 14 km north of Terrace on Highway 113. The park extends east and west of Highway 113,  
35 but the highway right-of-way is excluded from the park. Lundmark Bog Protected Area was protected as  
36 part of the implementation of the Kalum Land and Resource Management Plan. A management plan has  
37 not been developed for this protected area.

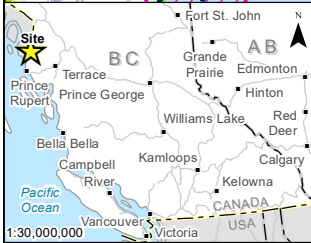
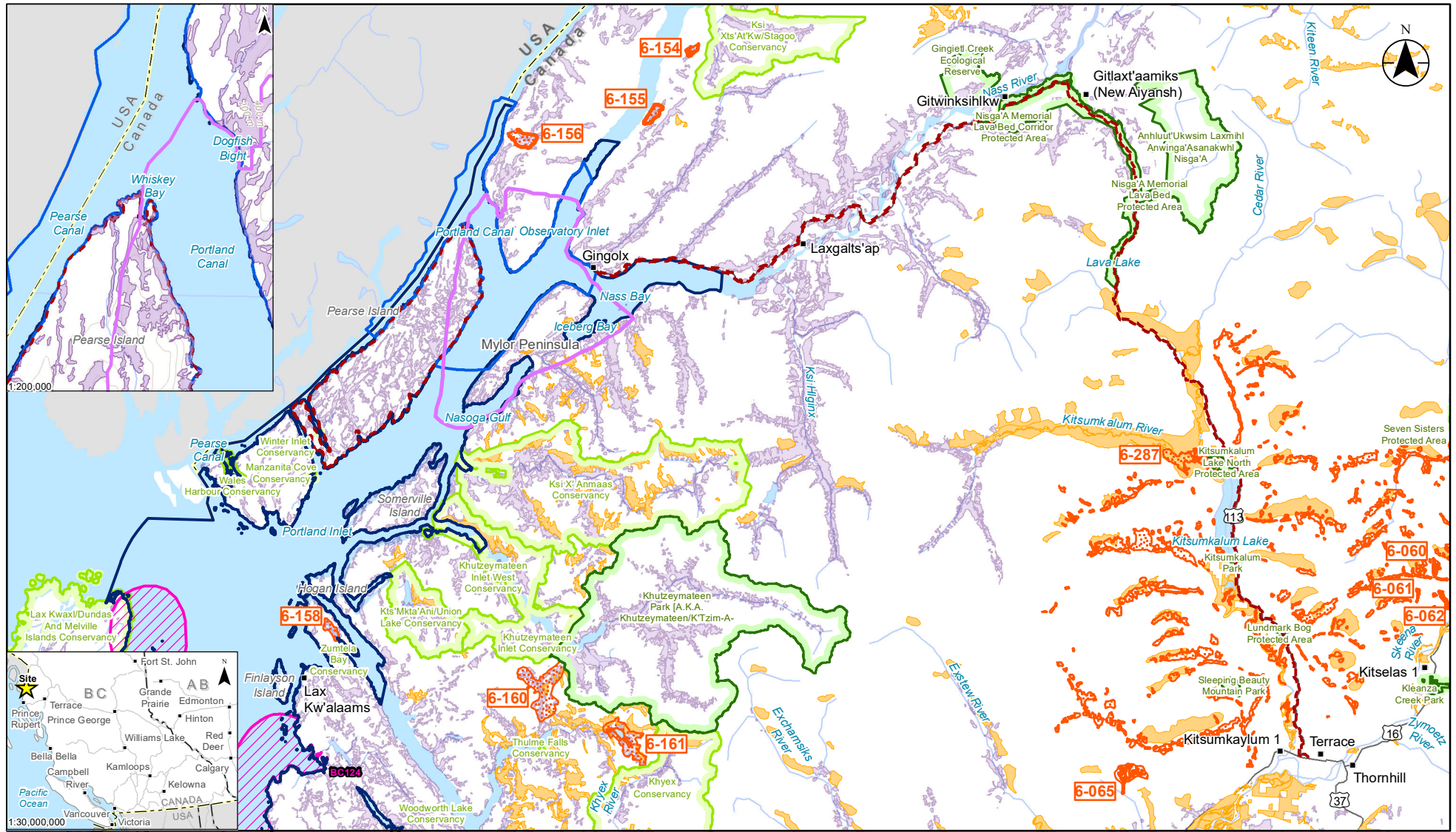




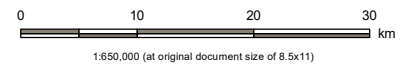
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- 1 Winter Inlet Conservancy is a 30-ha protected area located on the southwestern extent of Pearse Island  
2 and was established in 2008 as part of the BC government's land use decision for the North Coast  
3 planning area to protect an important recreational anchorage and associated view (BC Parks 2023f).  
4 A management plan has not been developed for this protected area.
- 5 The Terrestrial Wildlife RSA overlaps 24 trapline tenures. Data was available from the Province of BC for  
6 14 of the 24 trapline tenure areas for the period 1985 to 2021. Species trapped include American beaver,  
7 muskrat, squirrel, black bear, Canada lynx, coyote, grey wolf, red fox, fisher, marten, mink, river otter,  
8 wolverine, and weasel. A summary of the trapping data is provided in Section 3.4.2.2.
- 9 The Terrestrial Wildlife LSA and RSA is within the Northern Mainland Coast Conservation Region for  
10 marbled murrelet, for which recovery objectives are defined in the species' amended federal recovery  
11 strategy (ECCC 2023). The Terrestrial Wildlife LSA and RSA overlap with Geographic Location Polygons  
12 that may contain terrestrial (nesting) critical habitat for marbled murrelet (Figure 3.4–1; Figure 3.4–2);  
13 these polygons represent areas where biophysical attributes that meet the definition of terrestrial critical  
14 habitat may occur (ECCC 2023). Biophysical attributes for marbled murrelet nesting include old growth  
15 coniferous forest with canopy gaps and tall trees that have large mossy branches to support a nest  
16 (ECCC 2023). The Terrestrial Wildlife LSA and RSA, respectively, overlap 202 ha and 6,851 ha of  
17 Geographic Location Polygons for marbled murrelet (Figure 3.4–1; Figure 3.4–2).
- 18 Environment and Climate Change Canada (**ECCC**) use the total area of these polygons in the  
19 Northern Mainland Coast Conservation Region, in part, to define the recovery objective for the amount of  
20 nesting habitat that is estimated to be required to address the recovery of the species. The short-term  
21 conservation goal for nesting habitat within the Northern Mainland Coast Conservation Region is 68%  
22 retention of suitable nesting habitat estimated to occur in the conservation region in 2002 (ECCC 2023).  
23 In 2011, there was an estimated 420,221 ha of suitable nesting habitat remaining in the region which was  
24 an excess of 43.6% over the retention goal (ECCC 2023). The Terrestrial Wildlife LSA and RSA represent  
25 0.05% and 1.6%, respectively, of the available habitat estimate for 2011.





- Marine Shipping Regional Study Area
- Marine Terminal Regional Study Area
- Terrestrial Wildlife Regional Study Area
- Transmission Line Study Area
- Conservancy
- Important Bird Area
- Marbled Murrelet Critical Habitat Geographic Location Polygon
- Park
- Ungulate Winter Range
- Wildlife Habitat Area
- International Boundary
- Highway
- Watercourse
- Waterbody



Project Location: Pearse Island, BC  
 Project Number: 123221820  
 Prepared by: TQUILICHINI on 20230718  
 Requested by: CBALL on 20230713  
 Checked by: NFORRESTER on 20230719

Client/Project/Report: Ksi Lisims LNG  
 Natural Gas Liquefaction and Marine Terminal  
 Technical Data Report – Wildlife and Wildlife Habitat  
 Figure No.: 3.4-1  
 Title:

**Important Wildlife Areas within the Terrestrial Wildlife, Marine Terminal and Transmission Line Study Areas**

**Notes**  
 1. Coordinate System: NAD 1983 BC Environment  
 Albers  
 2. Data Sources: DataBC, Government of British  
 Columbia, Natural Resources Canada, Stantec,  
 Rockies LNG, Maxar

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Review of Existing Data  
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## 1 Marine Terminal Study Areas

2 The Marine Terminal LSA and RSA do not overlap with parks, ecological reserves, UNESCO reserves,  
3 migratory bird sanctuaries, or IBAs.

## 4 Marine Shipping Study Areas

5 The Marine Shipping LSA and RSA do not overlap migratory bird sanctuaries, UNESCO reserves,  
6 ecological reserves, or offshore marine protected areas.

7 The Marine Shipping LSA does not overlap any parks or conservancies, and the Marine Shipping RSA  
8 overlaps one marine park and eight conservancies (Figure 3.4–2). Kitson Island Marine Provincial Park,  
9 located on the southwestern edge of Flora Bank, protects marine areas of moderate importance to  
10 waterfowl (BC MWLAP 2003). A small portion of the Khutzeymateen Inlet Conservancy and adjacent  
11 Ksi X'Anmass Conservancy overlap the Marine Shipping RSA. The shoreline areas of both conservancies  
12 protect important grizzly bear habitat and important habitat for waterfowl (BC Parks 2011;  
13 BC Parks 2022g). Winter Inlet Conservancy, Manzanita Cove Conservancy, and Wales Harbour  
14 Conservancy are three smaller conservancies located on the southern end of Pearse Island and adjacent  
15 Wales Island. Lax Kwaxl/Dundas and Melville Islands Conservancy encompasses a large archipelago at  
16 the western extent of the Marine Shipping RSA. The rocky islets within the park contain seabird colonies.  
17 The park is also important for bald eagle, goldeneye (*Bucephala* spp.), bufflehead (*Bucephala albeola*)  
18 and harlequin duck (*Histrionicus histrionicus*) (BC Parks 2022h). Lucy Islands Conservancy protects  
19 globally significant breeding area for seabirds, particularly rhinoceros auklet (*Cerorhinca monocerata*)  
20 (BC Parks 2022i). Approximately 26,000 nesting pairs of rhinoceros auklet nest in the conservancy.  
21 The conservancy is also important for pigeon guillemot (*Cepphus columba*), glaucous-winged gull  
22 (*Larus glaucescens*), black oystercatcher (*Haematopus bachmani*), and bald eagle (BC Parks 2022c).  
23 Ksgaxl/Stephens Islands Conservancy supports a diversity of marine birds, terrestrial birds, and terrestrial  
24 mammal species (BC Parks 2022j). BC Parks has not developed a management plan for any of the  
25 eight conservancies.

26 The Marine Shipping LSA and RSA overlap four IBAs: BC119, BC122, BC124, and BC125  
27 (IBA Canada 2022a) (Figure 3.4–2). Important Bird Area BC119 is south of Prince Rupert and  
28 encompasses Porcher Island and several adjacent islands (IBA Canada 2022b). The IBA is important for  
29 large congregations of surf scoter (*Melanitta perspicillata*). Potential threats to this IBA include fuel spills  
30 from marine traffic (IBA Canada 2022b).

31 Important Bird Area BC122 encompasses Lucy Islands in the middle of Chatham Sound, west of  
32 Prince Rupert (IBA Canada 2022c). The archipelago is comprised of small, low-lying, heavily forested  
33 islands. Many of the islands are connected by sandy beaches and tidal mud flats (IBA Canada 2022c).  
34 This IBA supports a globally significant population of rhinoceros auklet and large concentrations of pigeon  
35 guillemot (IBA Canada 2022c). The surrounding waters are important feeding areas for a variety of  
36 marine birds. Birds using this IBA are at risk from fuel spills from marine traffic, and disturbance from  
37 recreational boaters (IBA Canada 2022c).



**TECHNICAL DATA REPORT—WILDLIFE AND WILDLIFE HABITAT  
KSI LISIMS LNG PROJECT**

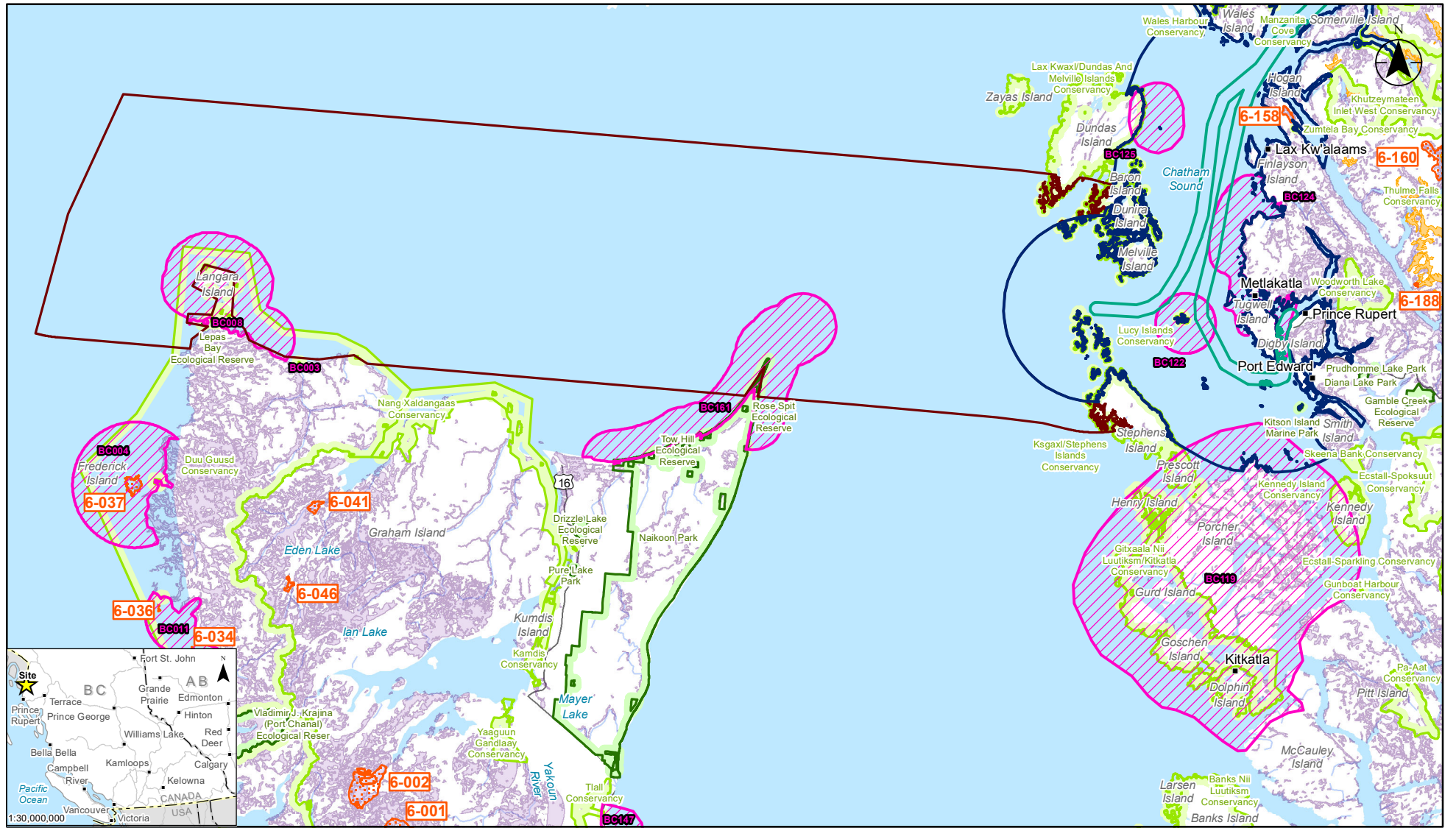


**KSI LISIMS LNG**

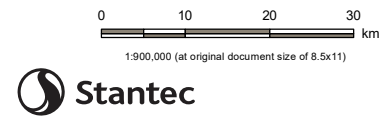
Review of Existing Data  
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- 1 Important Bird Area BC124 encompasses the area west of Prince Rupert north to Georgetown Mills  
2 (IBA Canada 2022d). The area includes estuaries, mud flats, and rocky shoreline. This IBA supports  
3 globally significant populations of Iceland gull (*Larus glaucoides*) (fall) and surf scoter (spring)  
4 (IBA Canada 2022d). The primary threats to birds in this IBA are fuel spills and impacts from fisheries  
5 (IBA Canada 2022d).
- 6 Important Bird Area BC125 encompasses two small rocky islets, Grey and Green Islets, approximately  
7 3 km east of Dundas Island. This IBA supports the largest glaucous-winged gull breeding colonies in the  
8 Chatham Sound area, representing 1.4% of the national glaucous-winged gull population  
9 (IBA Canada 2022e). Other bird species that nest on the islands include black oystercatcher and  
10 pigeon guillemot. The area around the islets is also an important feeding area for many marine birds  
11 (IBA Canada 2022e).





- Marine Shipping Local Study Area
- Marine Shipping Regional Study Area
- Open Water Study Area
- Conservancy
- Important Bird Area
- Marbled Murrelet Critical Habitat Geographic Location Polygon
- Park
- Ungulate Winter Range
- Wildlife Habitat Area
- International Boundary
- Highway
- Watercourse
- Waterbody



**Stantec**

Project Location: Pearse Island, BC

Client/Project/Report: Ksi Lisims LNG Natural Gas Liquefaction and Marine Terminal Technical Data Report – Wildlife and Wildlife Habitat

Figure No.: 3.4-2

Title: Important Wildlife Areas within the Marine Shipping and Open Water Study Areas

**KSI LISIMS LNG**

Notes

- Coordinate System: NAD 1983 BC Environment Albers
- Data Sources: DataBC, Government of British Columbia, Natural Resources Canada, Stantec, Rockies LNG, Maxar

Project Number: 123221820  
 Prepared by TOULICHINI on 20230718  
 Requested by CBALL on 20230713  
 Checked by NFORRESTER on 20230719

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## 1 Open Water Study Area

2 The OWSA does not overlap migratory bird sanctuaries, UNESCO biosphere reserves, ecological  
3 reserves, or marine protected areas. The OWSA overlaps the marine portions of Duu Guusd  
4 Conservancy around Langara Island and the marine portion of Naikoon Provincial Park at Rose Spit  
5 (Figure 3.4–2). Most of the two protected areas are outside of the OWSA. Duu Guusd Conservancy is a  
6 large, protected area that includes Langara Island, and western parts of Graham Island south to  
7 Rennell Sound. Langara Island has large populations of marine birds such as ancient murrelet,  
8 pelagic cormorant (*Urile pelagicus*), black oystercatcher, tufted puffin (*Fratercula cirrhata*), and glaucous-  
9 winged gull (Haida Nation and BC Parks 2011). The management plan for the conservancy identifies  
10 protecting and maintaining ecosystems and ecological connectivity as a primary goal (Haida Nation and  
11 BC Parks 2011). Naikoon Provincial Park provides an important area for migrating shorebirds and is an  
12 important wintering area for sanderling (*Calidris alba*) (BC MELP 1999). Wildlife management objectives  
13 for the park include conserving rare, endangered, sensitive, or vulnerable species, and conserving natural  
14 populations of endemic species (BC MELP 1999).

15 The eastern extent of the OWSA also overlaps the marine portions of Ksgaxl/Stephens Island Group  
16 Conservancy and Lax Kwaxl/Dundas and Melville Islands Conservancy (Figure 3.4–2).  
17 Ksgaxl/Stephens Islands Conservancy supports a diversity of marine birds, terrestrial birds, and terrestrial  
18 mammal species (BC Parks 2022j). Lax Kwaxl/Dundas and Melville Islands Conservancy supports  
19 seabird colonies and is also important for bald eagle, goldeneye, bufflehead, and harlequin duck  
20 (BC Parks 2022h). BC Parks has not developed a management plan for either conservancy.

21 The OWSA overlaps two IBAs located on the northern areas of Haida Gwaii: BC003 and BC161  
22 (IBA Canada 2022a) (Figure 3.4–2). BC003 is located on and around Langara Island, off the  
23 northwestern tip of Haida Gwaii. This IBA supports a globally significant breeding population of ancient  
24 murrelet, and nationally significant populations of pigeon guillemot and pelagic cormorant (IBA Canada  
25 2022f). The surrounding marine waters are important staging areas and foraging habitat for marine birds.  
26 BC161 overlaps McIntyre Bay and Rose Spit on the northeastern tip of Graham Island. This IBA is an  
27 important winter foraging area for marine birds, including black-legged kittiwake (*Rissa tridactyla*), sooty  
28 shearwater (*Ardenna grisea*), and white-winged scoter (*Melanitta deglandi*), and the beaches of BC161  
29 support migrant shorebirds (IBA Canada 2022g).

## 30 Transmission Line Study Area

31 The TLSA does not overlap with parks, ecological reserves, migratory bird sanctuaries, UNESCO  
32 reserves, or IBAs. The TLSA does not overlap with provincially designated or proposed WHAs. The TLSA  
33 overlaps 173.7 ha of UWR for mountain goat on the Mylor Peninsula (Figure 3.4–1). The TLSA overlaps  
34 12 trapline tenures. Data was available from the Province of BC for four of the 12 trapline tenure areas for  
35 1987, 1988, and 1991. Species trapped include red fox, fisher, marten, mink, river otter, and weasel. A  
36 summary of the trapping data is provided in Section 3.4.2.2.





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1 The TLSA is within the Northern Mainland Coast Conservation Region for marbled murrelet and overlaps  
2 with Geographic Location Polygons that may contain terrestrial (nesting) critical habitat for marbled  
3 murrelet (Figure 3.4–1). These polygons represent areas where biophysical attributes that meet the  
4 definition of terrestrial critical habitat may occur (ECCC 2023). Biophysical attributes for marbled murrelet  
5 nesting includes old growth coniferous forest with canopy gaps and tall trees that have large mossy  
6 branches to support a nest (ECCC 2023). The TLSA overlaps 4,479 ha of Geographic Location Polygons  
7 for marbled murrelet (Figure 3.4–1).

### 8 **3.4.2.2 Terrestrial Mammals**

9 There are 52 terrestrial mammal species known or likely to occur within the Terrestrial Wildlife,  
10 Marine Terminal, or Marine Shipping RSAs and TLSA (Appendix A). Terrestrial mammals are not  
11 expected to regularly occur within the OWSA, however some species may use near-shore or intertidal  
12 areas of the OWSA. Of the 52 species, 10 are species of conservation concern, and 13 are important to  
13 Nisga'a Nation or other Indigenous nations (Appendix A). Four of the 52 species are introduced or  
14 invasive species that are likely to occur in the RSAs, TLSA, or OWSA: house mouse (*Mus musculus*),  
15 brown rat (*Rattus norvegicus*), roof rat (*Rattus rattus*), and domestic (feral) cat (*Felis catus*).

16 Grizzly bear and black bear are expected to occur throughout the Terrestrial Wildlife RSA and terrestrial  
17 portions of the TLSA. They are also expected to forage in and travel along shoreline habitat within the  
18 Marine Terminal and Marine Shipping RSAs and intertidal areas of the TLSA. Bear tracks have been  
19 observed along several areas of shoreline within the Marine Terminal and Marine Shipping RSAs and  
20 TLSA, including Echo Cove and Iceberg Bay (Demarchi et al. 2017). The Khutzeymateen area partially  
21 overlaps the Marine Shipping RSA and is a particularly important area for grizzly bear (MacHutchon et al.  
22 1993). Black bear tracks have been observed along the Nass River, and grizzly bear has been reported in  
23 and around Greenville and Gingolx (Demarchi 1997). Black bear has been trapped in four trapline tenures  
24 overlapping the Terrestrial Wildlife RSA. A total of 14 black bears were trapped between 1985 and 2005  
25 (BC MOF 2023). There are four traffic mortality records for bear (species unknown), and one traffic  
26 mortality record for grizzly bear along Highway 113 (BC MOTI 2023). These mortalities were detected on  
27 August 18, 2004, July 8, 2005, May 15, 2013, August 16, 2020, and August 30, 2020 (BC MOTI 2023).

28 Both bear species use a diversity of habitats, including forests, wetlands, riparian areas, and estuaries  
29 (Hatler et al. 2008; COSEWIC 2012a). Salmon-bearing streams within the Terrestrial Wildlife RSA and  
30 TLSA may be of seasonal importance, and there is evidence of bears foraging on salmon along several  
31 streams on Nisga'a Lands (Demarchi et al. 2017). Grizzly bear and black bear each hibernate in dens,  
32 which are key habitat features. The denning period is a sensitive period for both species, the duration of  
33 which depends on sex, reproductive status, and body condition, which can be influenced by winter  
34 conditions (Hatler et al. 2008; Davis 2021). In northern and coastal BC denning typically occurs from early  
35 November through March or as late as mid-May (Hatler et al. 2008; FLNRO 2014; Davis 2021).  
36 Grizzly bear typically excavates dens under the roots of large trees or into the side of alpine slopes, or in  
37 caves (Hatler et al. 2008). Black bear dens are often at the base of large diameter trees and stumps, in  
38 cavities in large diameter trees, and occasionally in caves (Hatler et al. 2008). Grizzly bear does not occur





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1 on Haida Gwaii, but black bear may use shoreline areas within the OWSA. Both grizzly bear and  
2 black bear are species of Indigenous cultural use and value, and are Nisga'a valued components.

3 In BC, the overall distribution of grizzly bear is divided into 55 Grizzly Bear Population Units (GBPUs) for  
4 conservation and management purposes (MFLNRORD 2020). Pearse Island does not overlap a GBPU,  
5 but the Highway 113 portion of the Terrestrial Wildlife RSA overlaps the Khutzeymateen, Stewart, and  
6 Cranberry GBPUs (Environmental Reporting BC 2020). The TLSA overlaps the Khutzeymateen and  
7 Stewart GBPUs, (Environmental Reporting BC 2020). Each GBPU is assigned a local conservation  
8 ranking that reflects the GBPUs population size and trend, genetic and demographic isolation, as well as  
9 threats to bears and their habitats (Morgan et al. 2019). The Khutzeymateen and Cranberry GBPUs have  
10 a conservation ranking of low,<sup>1</sup> and the Stewart GBPU has a conservation ranking of negligible  
11 (Environmental Reporting BC 2020).

12 Grey wolf is expected to occur throughout the Terrestrial Wildlife RSA and the terrestrial portion of the  
13 TLSA. They are expected to forage in and travel along shoreline habitat within the Marine Terminal and  
14 Marine Shipping RSAs and TLSA. Grey wolf is a species of Indigenous cultural use and value, and is a  
15 Nisga'a valued component. Grey wolf occurs in a variety of habitats, wherever there is an abundance of  
16 prey, such as deer (Hatler et al. 2008). Grey wolves in coastal areas also feed on spawning salmon  
17 (Darimont et al. 2003; Demarchi et al. 2017). Grey wolf is known to occur on Pearse Island and many of  
18 the islands and mainland areas on the north coast (Darimont and Paquet 2002). Wolf tracks have been  
19 identified from several shoreline areas within the Marine Terminal and Marine Shipping RSAs and TLSA,  
20 including Echo Cove, Nasoga Gulf, and Iceberg Bay (Demarchi et al. 2017). Wolves have been detected  
21 in the Nass River valley during moose surveys (Demarchi 2017) and there are iNaturalist records of grey  
22 wolf along the Highway 113 corridor (iNaturalist 2023). Grey wolf has been trapped in three trapline  
23 tenures overlapping the Terrestrial Wildlife RSA. A total of eight wolves were trapped between 1986 and  
24 2011 (BC MOF 2023).

25 Several mustelid species may occur in the Terrestrial Wildlife RSA and TLSA, including wolverine and  
26 Pacific marten which are species of Indigenous cultural use and value and Nisga'a valued components.  
27 Wolverine is not expected to occur in the Marine Terminal or Marine Shipping RSAs, OWSA, or marine  
28 portions of the TLSA. Wolverine uses a variety of higher-elevation habitats, driven primarily by availability  
29 of prey and winter snow cover for denning (Hatler et al. 2008). Wolverine have been trapped in six  
30 trapline tenures overlapping the Terrestrial Wildlife RSA. A total of 16 wolverines were trapped between  
31 1985 and 2010 (BC MOF 2023). Pacific marten is expected to occur in mature to old forest habitat in the  
32 Terrestrial Wildlife RSA and TLSA (Hatler et al. 2008) and may also forage in intertidal areas  
33 (Breault et al. 2021a). On Haida Gwaii the distribution of Pacific marten was associated with riparian and  
34 shoreline habitat (Breault et al. 2021b). Pacific marten has been detected in several terrestrial areas in  
35 the Nass Area near Echo Cove and Dogfish Creek (Demarchi et al. 2017). There are iNaturalist records of  
36 marten from near Kitsumkalum Lake, and near Prince Rupert (iNaturalist 2023). Marten have been  
37 trapped in 13 trapline tenures overlapping the Terrestrial Wildlife RSA and three trapline tenures

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<sup>1</sup> Grizzly bear conservation ranking is based on a combination of population size and isolation, population trend, and level of threat. Conservation ranking categories range from negligible concern to extreme concern (Morgan et al. 2019).





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1 overlapping the TLSA. A total of 125 marten were trapped between 1985 and 2021 (BC MOF 2023).  
2 Ermine (*Mustela richardsonii*) may occur in shrub and tree-dominated riparian and forest edge habitat in  
3 the Terrestrial Wildlife RSA and TLSA (Hatler et al. 2008). In winter, ermine uses the subnivean spaces  
4 around coarse woody debris, boulders, and other materials for thermal and predator protection, and for  
5 hunting (Hatler et al. 2008). Haida ermine (*Mustela erminea haidarum*) are known to forage in intertidal  
6 areas (COSEWIC 2015) and may occur in intertidal areas of the OWSA.

7 Mink and North American river otter are expected to use nearshore marine areas in the Marine Terminal  
8 and Marine Shipping RSAs, OWSA and TLSA, and terrestrial areas in the Terrestrial Wildlife RSA and  
9 TLSA. Mink is semiaquatic and rarely found far from water. Coastal mink typically forage in sheltered  
10 marine areas that are protected from heavy wave action and have an abundance of intertidal structure  
11 (e.g., boulders, crevices) (Hatler et al. 2008). Mink den in cavities between logs, under stumps or  
12 tree roots, or rock rubble above the high tide line and rarely travel more than a few hundred metres (m)  
13 inland (Hatler et al. 2008). Mink is a species of Indigenous cultural use and value. Mink have been  
14 detected on East Peninsula near Observatory Inlet (Demarchi et al. 2017). Mink have been trapped in  
15 seven trapline tenures overlapping the Terrestrial Wildlife RSA and four trapline tenures overlapping the  
16 TLSA. A total of 47 mink were trapped between 1985 and 2021 (BC MOF 2023). North American river  
17 otter is also semiaquatic and occurs in marine and freshwater environments. Suitable habitat is primarily  
18 driven by prey availability, and includes marshes, estuary, ponds, nearshore marine, streams, and lakes  
19 (Hatler et al. 2008). River otter dens in abandoned beaver lodges, burrows created by other animals, and  
20 natural cavities (Hatler et al. 2008). Otters have been trapped in five trapline tenures overlapping the  
21 Terrestrial Wildlife RSA and one trapline tenure overlapping the TLSA. A total of 26 otters were trapped  
22 between 1985 and 2021 (BC MOF 2023).

23 A variety of small mammals, including red squirrel, may occur in the Terrestrial Wildlife RSA and TLSA  
24 (Appendix A). Red squirrel is a species of Indigenous cultural use and value. Red squirrel occurs in young  
25 to old coniferous and mixedwood forests. Red squirrel builds food middens, around which they centre  
26 their territory and vigorously defend (Nagorsen 2005). Red squirrel is expected to occur in the Terrestrial  
27 Wildlife RSA, but not in the Marine Terminal or Marine Shipping RSAs or OWSA. Squirrels have been  
28 trapped in five trapline tenures overlapping the Terrestrial Wildlife RSA. A total of 43 squirrels were  
29 trapped between 1985 and 2021 (BC MOF 2023).

30 There are 10 bat species that may occur within the Terrestrial Wildlife RSA and TLSA (Appendix A),  
31 including five species of conservation concern: northern myotis (*Myotis septentrionalis*), little brown  
32 myotis (*Myotis lucifugus*), Yuma myotis (*Myotis yumanensis*), silver-haired bat (*Lasionycteris*  
33 *noctivagans*), and hoary bat (*Lasiurus cinereus*). Surveys completed for the Kitsault Mine Project in 2009  
34 detected two species: likely little brown myotis and long-eared myotis (*Myotis evotis*) (AMEC 2011).  
35 Several species, including both northern myotis and little brown myotis, hibernate during winter and may  
36 occur year-round in the Terrestrial Wildlife RSA or TLSA. Myotis species select sheltered areas with  
37 warmer ambient temperatures and higher humidity for hibernation, including caves and mines. No  
38 hibernacula have been documented in the Terrestrial Wildlife RSA. Similarly, maternity roost sites tend to  
39 be warm, sheltered areas, with preference for hollow trees, rock crevices, and buildings, all with southern  
40 exposure (Fenton 1980). No maternity roosts have been documented in the Terrestrial Wildlife RSA or





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1 TLSA. All 10 bat species may migrate through or forage over the Marine Terminal and Marine Shipping  
2 RSAs, and marine portions of the TLSA. Most bat species in BC are aerial insectivores, including little  
3 brown myotis and northern myotis. Aerial insectivores - bats that feed on flying insects while they  
4 themselves are also flying - prefer open areas where flying insects aggregate. This includes marine  
5 areas, over water, especially when there's roost availability in nearby forest, cliffs and rockfaces, and  
6 buildings. The abundance of flying insects can be influenced by human factors such as artificial light or  
7 congregation of humans in marine areas (Nagorsen and Brigham 1993). Both factors could attract blood-  
8 feeding insects and moths, on which insectivorous bats have been known to feed. Additionally, migratory  
9 species (such as hoary bat and silver-haired bat [*Lasionycteris noctivagans*]) use open waterways as  
10 flight corridors in migration season (Weller et al. 2016). A bat survey in the Kitimat region in 2014 for the  
11 Rio Tinto Alcan Terminal A extension project identified five species in the area: long-eared myotis (*Myotis*  
12 *evotis*), Californian myotis (*Myotis californicus*), Yuma myotis, little brown myotis, and long-legged myotis  
13 (*Myotis volans*) (Worley Parsons 2015). Little brown myotis, Californian myotis, long-eared myotis, and  
14 silver-haired bat occur on Haida Gwaii (Burles 1999) and may fly over nearshore areas of the OWSA.

15 American beaver may occur in wetland habitat in the Terrestrial Wildlife RSA and TLSA. American beaver  
16 prefers narrow streams, lakes, and ponds of sufficient depth to avoid freezing solid in winter and with an  
17 abundance of woody vegetation (Nagorsen 2005). Wetlands on Pearse Island and in the TLSA are  
18 primarily treed swamps and bogs that may provide limited suitable habitat for American beaver.  
19 American beaver is a species of Indigenous cultural use and value. American beaver have been trapped  
20 in nine trapline tenures overlapping the Terrestrial Wildlife RSA. A total of 55 beaver were trapped  
21 between 1985 and 2017 (BC MOF 2023).

22 Sitka black-tailed deer (*Odocoileus hemionus sitkensis*) is a subspecies of mule deer (*Odocoileus*  
23 *hemionus*) that occurs in the central and north coast regions of BC. Sitka black-tailed deer is expected to  
24 occur throughout the Terrestrial Wildlife RSA and TLSA in conifer forest and treed wetlands with a dense  
25 undergrowth of herbs and shrubs for foraging (Bunnell 1990). Sitka black-tailed deer may use intertidal  
26 areas of the Marine Terminal and Marine Shipping RSAs, TLSA, and OWSA. There are records of  
27 Sitka black-tailed deer from Arrandale, Double Islet Point, and other terrestrial areas near the  
28 Terrestrial Wildlife LSA (Demarchi et al. 2017). There are two traffic mortality records for black-tailed deer  
29 along Highway 113 near Terrace; one mortality was detected September 5, 2003 and the second was  
30 detected on August 28, 2008 (BC MOTI 2023). Sitka black-tailed deer is a species of Indigenous cultural  
31 use and value, and is a Nisga'a valued component.

32 Moose was included in the list of species likely to occur in the Terrestrial Wildlife RSA and  
33 Marine Terminal RSA but based on regional-level records and range mapping it is likely uncommon on  
34 Pearse Island. Moose hair has been found in grey wolf scat on the Mylor Peninsula (Darimont et al.  
35 2005). Surveys completed for the Kitsault Mine Project detected moose (AMEC 2011). Aerial winter  
36 moose surveys detected moose in survey blocks overlapping Highway 113 (Demarchi 1997). There are  
37 11 traffic mortality records for moose along Highway 113, primarily from the area around  
38 Kitsumkalum Lake (BC MOTI 2023). Between 2003 and 2013 approximately one mortality per year was  
39 reported along Highway 113, and almost all mortalities occurred between October and March  
40 (BC MOTI 2023). Moose is a species of Indigenous cultural use and value, and is a Nisga'a valued  
41 component.





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1 Mountain goat is a medium-sized ungulate commonly associated with steep, rugged terrain such as cliffs  
2 and rock faces (Shackleton 1999). They are most common in alpine and subalpine meadows and steep,  
3 forested slopes near cliffs or other escape terrain (Shackleton 1999). The TLSA overlaps seven UWR  
4 polygons for mountain goat totalling 173.7 ha (Figure 3.4–1). These polygons are located on the  
5 Mylor Peninsula and adjacent parts of the mainland. Mountain goat has been observed on rocky bluffs  
6 near IR13 and IR88 between Gingolx and Greenville (Demarchi 1997). Late winter and summer surveys  
7 for mountain goat did not detect the species on Pearse Island but did detect them in survey blocks  
8 overlapping the TLSA and Highway 113 (Rancourt 2021). Those detections were at or above 365 m  
9 elevation (Rancourt 2021). They are unlikely to occur in the valley bottom along Highway 113 and are not  
10 known to occur on Pearse Island. There are records of mountain goat from near Marten Arm in Alaska  
11 (eFauna 2021). Mountain goat is a species of Indigenous cultural use and value and is a Nisga'a valued  
12 component.

### 13 **3.4.2.3 Birds**

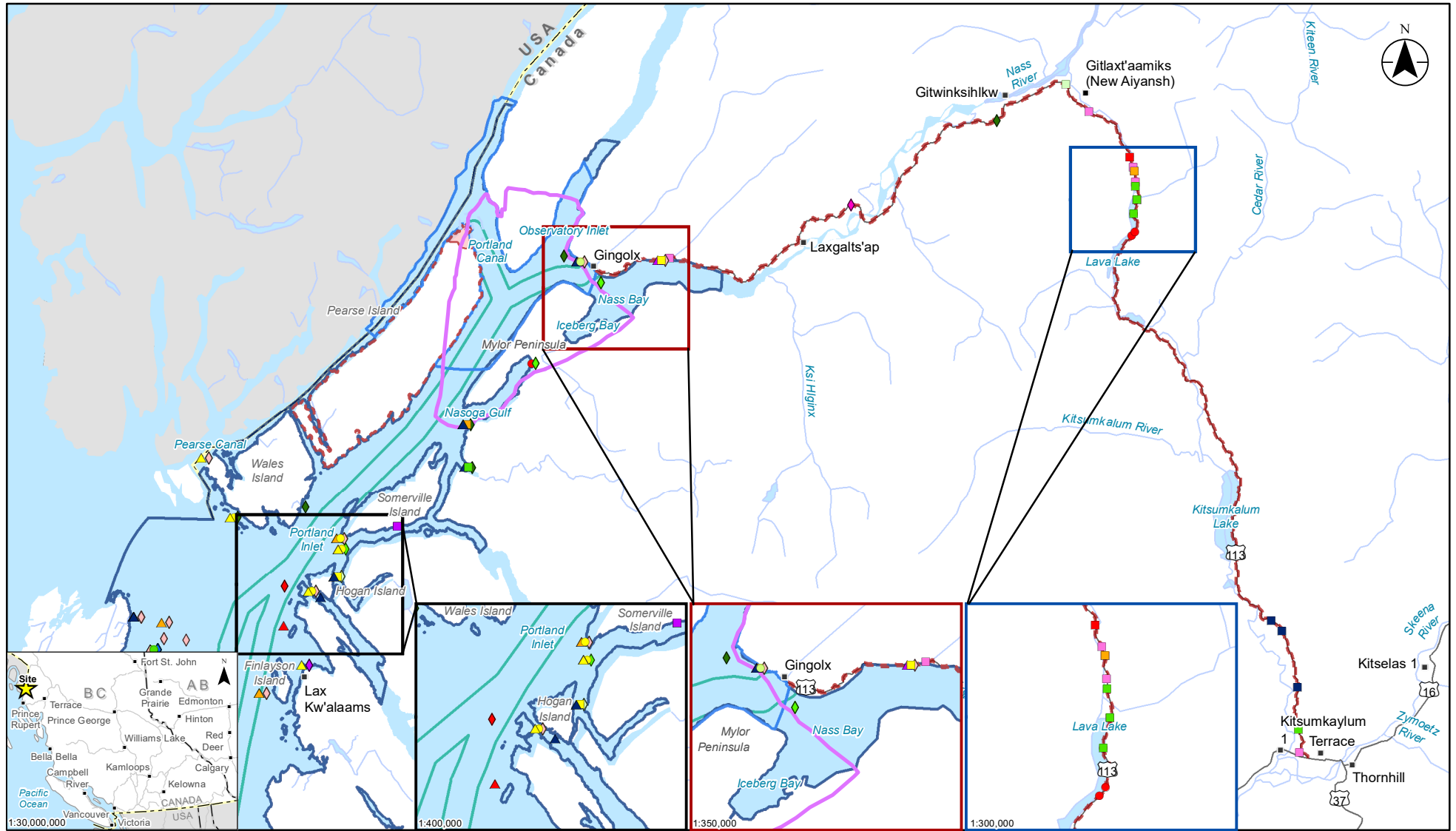
14 There are 200 bird species, including both migratory birds and other birds,<sup>2</sup> that are known or likely  
15 to occur within the Terrestrial Wildlife, Marine Terminal, or Marine Shipping RSAs, TLSA, or OWSA  
16 (Appendix A). There are 167 migratory birds that are known or likely to occur in the study areas. There  
17 are 45 bird species of conservation concern and 42 bird species of importance to Indigenous nations  
18 likely to occur in the RSAs (Appendix A). There are four introduced or invasive bird species that may  
19 occur in the Terrestrial Wildlife, Marine Terminal, or Marine Shipping RSAs, TLSA, or OWSA: European  
20 starling (*Sturnus vulgaris*), house sparrow (*Passer domesticus*), rock pigeon (*Columba livia*), and  
21 Eurasian collared-dove (*Streptopelia decaocto*).

22 There are no publicly available records of bird species within the Terrestrial Wildlife LSA or the  
23 Pearse Island portion of the Terrestrial Wildlife RSA. It is likely that many bird species occur in these  
24 areas, but have not been reported due to a lack of access and survey effort. There are bird records from  
25 eBird, the BC Breeding Bird Atlas (BC BBA), BC Coastal Waterbird Survey, BC Nocturnal Owl Survey,  
26 PRGT, Aurora LNG, Westcoast Connector, Vopak, and Cedar LNG that collectively from the Highway 113  
27 portion of the Terrestrial Wildlife RSA, Marine Terminal and/or Marine Shipping RSA, TLSA, and OWSA.  
28 Only records of species of conservation concern or species of importance to Indigenous nations, for  
29 which there is spatial data, are included on Figure 3.4–3 through Figure 3.4–6.

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<sup>2</sup> 'migratory birds' are bird species listed in Article 1 of the *Migratory Birds Convention Act*





**Species Observed**

- Brant
- Canada Goose
- Mallard
- Harlequin Duck
- Surf Scoter
- White-winged Scoter
- Black Scoter
- Long-tailed Duck
- Bufflehead
- Common Goldeneye

- Barrow's Goldeneye
- Hooded Merganser
- Common Merganser
- Red-breasted Merganser
- Ruffed Grouse
- Sooty Grouse
- Horned Grebe
- Western Grebe
- Black Nighthawk
- Common Swift
- Red-necked Phalarope

- ▲ Wandering Tattler
- ▲ Parasitic Jaeger
- ▲ Common Murre
- ▲ Marbled Murrelet
- ▲ Ancient Murrelet
- ▲ Cassin's Auklet
- ▲ Black-legged Kittiwake
- ▲ Bonaparte's Gull
- ▲ Short-billed Gull
- ▲ California Gull
- ▲ Herring Gull

- ◇ Glaucous-winged Gull
- ◇ Yellow-billed Loon
- ◇ Northern Fulmar
- ◇ Brandt's Cormorant
- ◇ Double-crested Cormorant
- ◇ Great Blue Heron
- ◇ Bald Eagle
- ◇ Peregrine Falcon
- ◇ Olive-sided Flycatcher
- ◇ Barn Swallow

- Marine Shipping Local Study Area
- Marine Shipping Regional Study Area
- Marine Terminal Local Study Area
- Marine Terminal Regional Study Area
- Terrestrial Wildlife Local Study Area
- Terrestrial Wildlife Regional Study Area
- Transmission Line Study Area
- International Boundary
- Highway
- Watercourse
- Waterbody



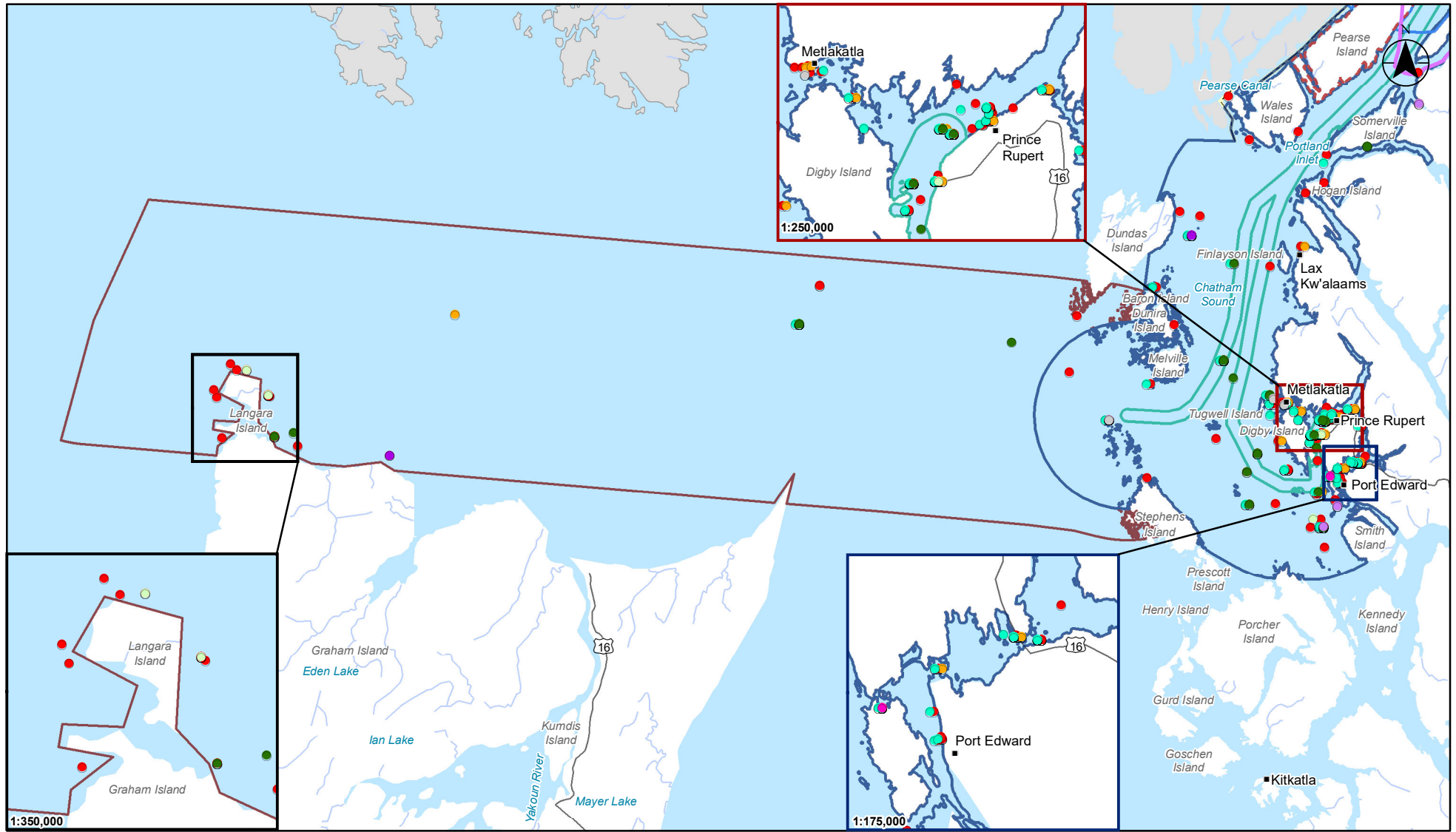
Project Location: Pearse Island, BC  
 Client/Project/Report: Ksi Lisims LNG  
 Natural Gas Liquefaction and Marine Terminal  
 Technical Data Report – Wildlife and Wildlife Habitat  
 Project Number: 123221820  
 Prepared by TOULICHINI on 20230718  
 Requested by CBALL on 20230713  
 Checked by NFORRESTER on 20230719

Figure No: 3.4-3  
 Title: Existing Records of Bird Species of Conservation Concern or Indigenous Importance in the Terrestrial Wildlife, Marine Terminal and Transmission Line Study Areas



**Notes**  
 1. Coordinate System: NAD 1983 BC Environment  
 Albers  
 2. Data Sources: DataBC, Government of British  
 Columbia; Natural Resources Canada, Stantec,  
 Rockies LNG, Maxar

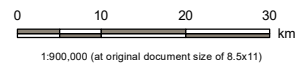
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**Species Observed**

- Bald Eagle
- Band-tailed Pigeon
- Barn Swallow
- Black Swift
- Common Nighthawk
- Great Blue Heron
- Olive-sided Flycatcher
- Peregrine Falcon
- Red Knot
- Red-necked Phalarope
- Ruffed Grouse
- Short-billed Dowitcher
- Sooty Grouse
- Wandering Tattler
- Whimbrel

- Marine Shipping Local Study Area
- Marine Shipping Regional Study Area
- Marine Terminal Regional Study Area
- Open Water Study Area
- Terrestrial Wildlife Regional Study Area
- Transmission Line Study Area
- International Boundary
- Highway
- Watercourse
- Waterbody



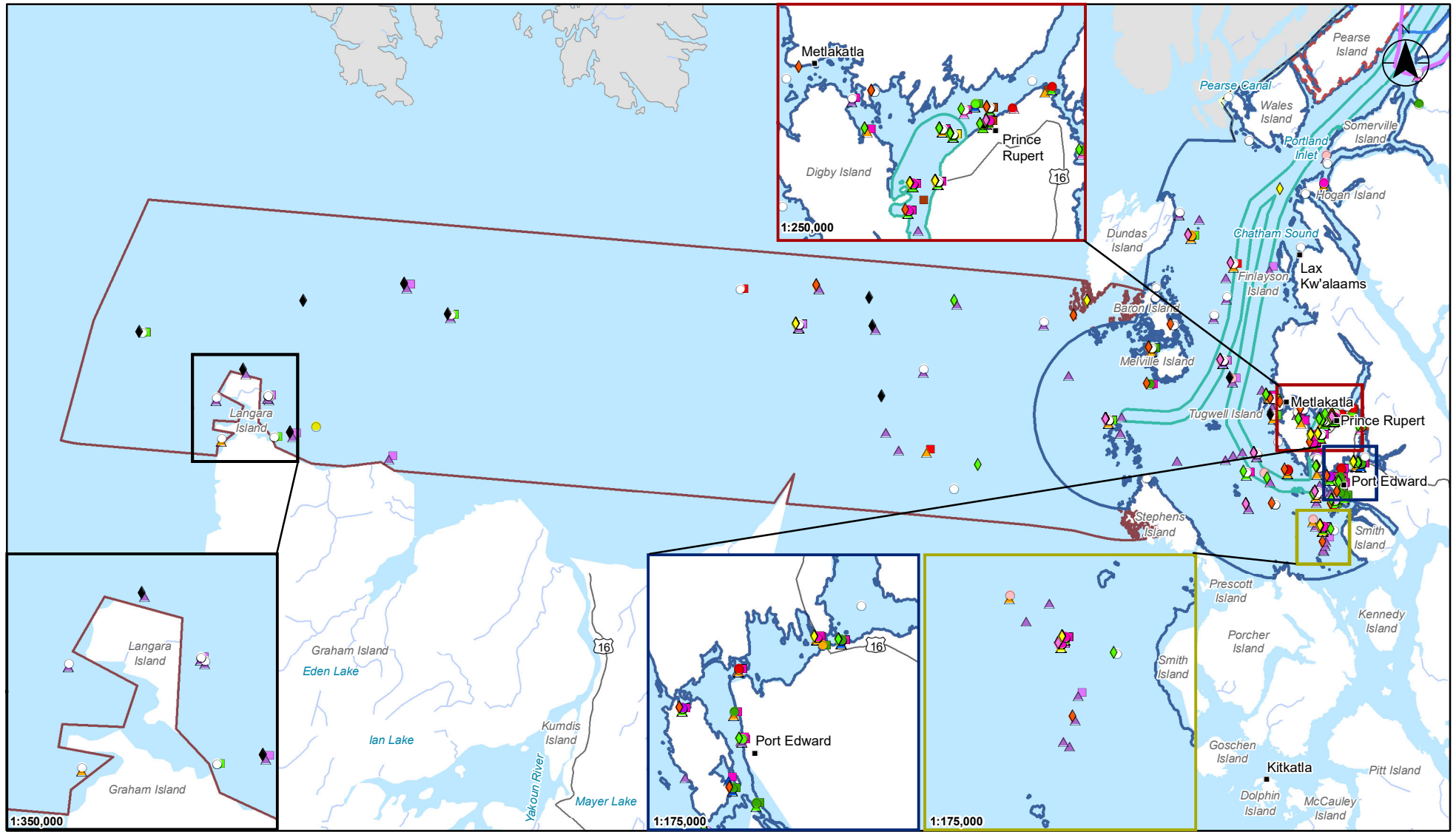
Project Location: Pearse Island, BC  
 Project Number: 123221820  
 Prepared by: TOULICHINI on 20230718  
 Requested by: CBALL on 20230713  
 Checked by: NFORRESTER on 20230719

Client/Project/Report:  
 Ksi Lisims LNG  
 Natural Gas Liquefaction and Marine Terminal  
 Technical Data Report – Wildlife and Wildlife Habitat  
 Figure No:  
**3.4-4**  
 Title

**Existing Records of Terrestrial Bird and Shorebird Species of Conservation Concern or Indigenous Importance in the Marine Shipping and Open Water Study Areas**

**KSI LISIMS LNG**  
 Notes  
 1. Coordinate System: NAD 1983 BC Environment  
 Albers  
 2. Data Sources: DataBC, Government of British  
 Columbia; Natural Resources Canada, Stantec,  
 Rockies LNG

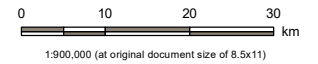
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**Species Observed**

- |                      |                               |                     |                          |
|----------------------|-------------------------------|---------------------|--------------------------|
| ■ American Wigeon    | ■ Canada Goose                | ▲ Green-winged Teal | ○ Northern Pintail       |
| ■ Ancient Murrelet   | ■ Cassin's Auklet             | ● Harlequin Duck    | ● Northern Shoveler      |
| ■ Barrow's Goldeneye | ▲ Common Goldeneye            | ● Hooded Merganser  | ● Red-breasted Merganser |
| ■ Black Scoter       | ▲ Common Merganser            | ● Horned Grebe      | ● Ring-necked Duck       |
| ■ Brandt's Cormorant | ▲ Common Murre                | ● Horned Puffin     | ● Surf Scoter            |
| ■ Brant              | ▲ Double-crested Cormorant    | ● Lesser Scaup      | ◆ Trumpeter Swan         |
| ■ Bufflehead         | ▲ Gadwall                     | ● Long-tailed Duck  | ◆ Tufted Puffin          |
| ■ Cackling Goose     | ▲ Greater Scaup               | ● Mallard           | ◆ Western Grebe          |
|                      | ▲ Greater white-fronted goose | ○ Marbled Murrelet  | ◆ White-winged Scoter    |
|                      |                               |                     | ◆ Yellow-billed Loon     |

- |  |
|--|
| ■ Marine Shipping Local Study Area         |
| ■ Marine Shipping Regional Study Area      |
| ■ Marine Terminal Regional Study Area      |
| ■ Open Water Study Area                    |
| ■ Terrestrial Wildlife Regional Study Area |
| ■ Transmission Line Study Area             |
| — International Boundary                   |
| — Highway                                  |
| — Watercourse                              |
| ■ Waterbody                                |



Project Location: Pearse Island, BC  
 Client/Project/Report: Ksi Lisims LNG  
 Project Number: 123221820  
 Prepared by: TOULICHINI on 2023/08/02  
 Requested by: CBALL on 2023/08/01  
 Checked by: SMOSS on 2023/08/02

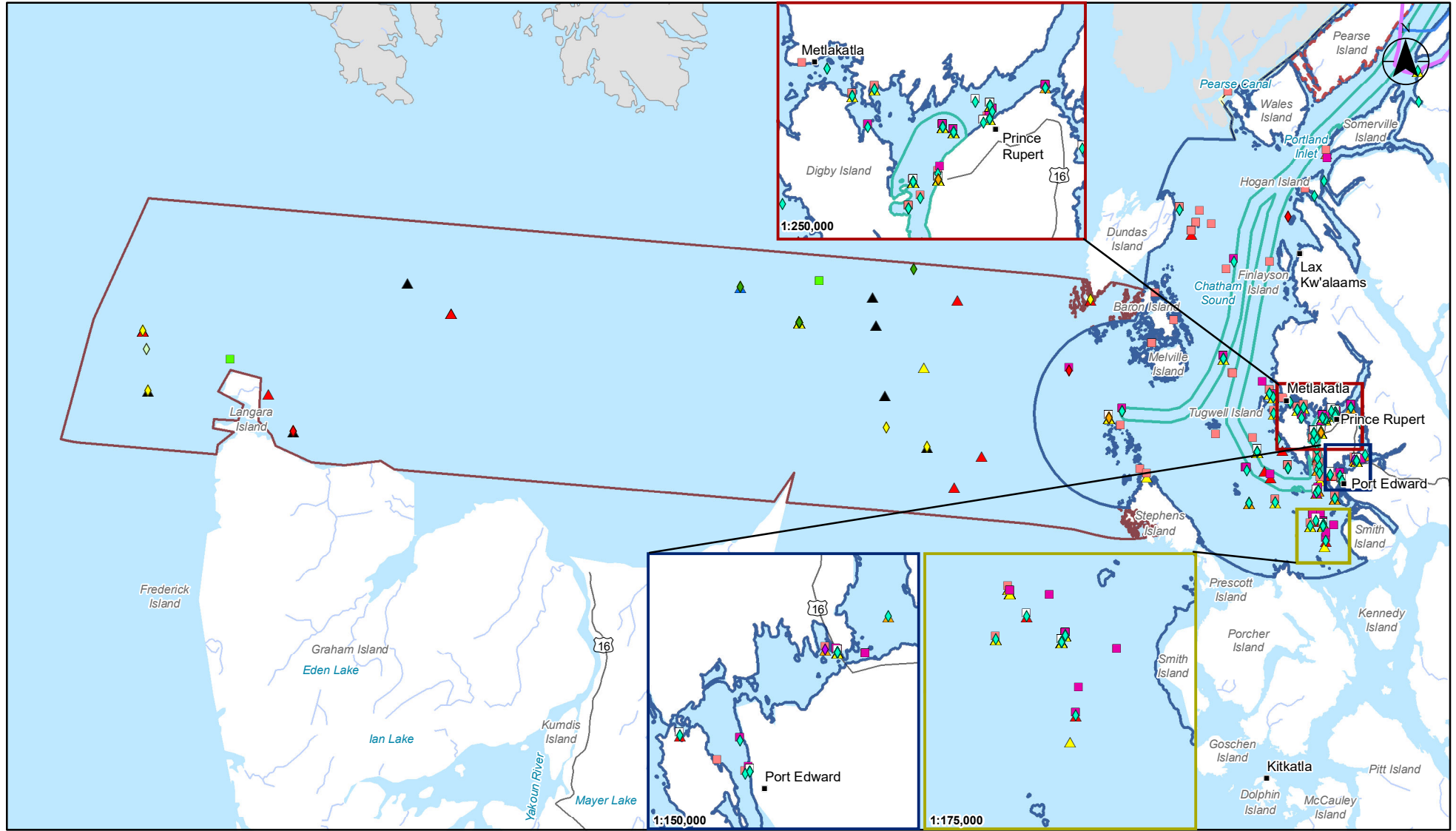
Natural Gas Liquefaction and Marine Terminal  
 Technical Data Report – Wildlife and Wildlife Habitat

Figure No: 3.4-5  
 Title: Existing Records of Duck, Geese, Swan, Grebe, Alcid, Loon, and Cormorant Species of Conservation Concern or Indigenous Importance in the Marine Shipping and Open Water Study Areas

**KSI LISIMS LNG**

**Notes**  
 1. Coordinate System: NAD 1983 BC Environment  
 Albers  
 2. Data Sources: DataBC, Government of British  
 Columbia; Natural Resources Canada, Stantec,  
 Rockies LNG

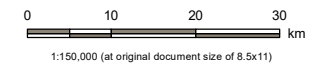
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**Species Observed**

- ▲ Black-footed Albatross
- ▲ Black-legged Kittiwake
- ▲ Bonaparte's Gull
- ▲ Buller's Shearwater
- ▲ California Gull
- ▲ Caspian Tern
- ▲ Glaucous Gull
- ▲ Glaucous-winged Gull
- Herring Gull
- Iceland Gull
- ◆ Northern Fulmar
- ◆ Parasitic Jaeger
- ◆ Pink-footed Shearwater
- ◆ Ring-billed Gull
- ◆ Short-billed Gull
- ◆ Short-tailed Albatross
- ◆ Western Gull

- Marine Shipping Local Study Area
- Marine Shipping Regional Study Area
- Marine Terminal Regional Study Area
- Open Water Study Area
- Terrestrial Wildlife Regional Study Area
- Transmission Line Study Area
- International Boundary
- Highway
- Watercourse
- Waterbody



**KSI LISIMS LNG**

**Notes**  
 1. Coordinate System: NAD 1983 BC Environment  
 Albers  
 2. Data Sources: DataBC, Government of British  
 Columbia; Natural Resources Canada, Stantec,  
 Rockies LNG



Project Location: Pearse Island, BC  
 Project Number: 123221820  
 Prepared by: TOULICHINI on 20230802  
 Requested by: CBALL on 20230801  
 Checked by: SMOSS on 20230802

Client/Project/Report:  
 Ksi Lisims LNG  
 Natural Gas Liquefaction and Marine Terminal  
 Technical Data Report – Wildlife and Wildlife Habitat

Figure No:  
**3.4-6**  
 Title:

**Existing Records of Gull, Tern, and Pelagic Marine Bird Species  
 of Conservation Concern or Indigenous Importance in the  
 Marine Shipping and Open Water Study Areas**

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Review of Existing Data  
June 2024

1 Songbirds, or Passeriformes, comprise a diverse group of species with a range of life history strategies.  
2 The group includes flycatchers, chickadees, warblers, sparrows, crossbills, grosbeaks, jays, thrushes,  
3 and others. Some species may occur year-round, although most occur seasonally during migration or for  
4 breeding (Appendix A). Songbirds use a variety of habitat types, including forests, wetlands, riparian  
5 areas, and open habitat. They are expected to forage, nest, and overwinter throughout the  
6 Terrestrial Wildlife RSA and terrestrial portions of the TLSA. Some members of the group, such as  
7 savannah sparrow (*Passerculus sandwichensis*), may use shoreline areas within the Marine Terminal and  
8 Marine Shipping RSAs, TLSA, and OWSA for foraging or nesting. Songbird species may transit through  
9 or forage over the Marine Terminal and Marine Shipping RSAs, and marine portion of the TLSA during  
10 migration or dispersal. Songbirds are not expected to occur regularly within the OWSA but they may fly  
11 over the OWSA during migration or occur along the shoreline of the OWSA.

12 Grouse are species of Indigenous cultural use and value, and sooty grouse (*Dendragapus fuliginosus*) is  
13 a Nisga'a valued component. Sooty grouse is expected to occur year-round in the Terrestrial Wildlife RSA  
14 in suitable habitat. Sooty grouse occurs in coastal young and old coniferous forest with well developed  
15 herb and shrub layers from sea level to the subalpine (Zwickel and Bendell 2020). Ruffed grouse  
16 (*Bonasa umbellus*) and spruce grouse (*Canachites canadensis*) may also occur year-round in the  
17 Terrestrial Wildlife RSA. Ruffed grouse prefers a mix of young and old mixedwood forest and is often  
18 found in association with white birch or aspen (Rusch et al. 2020). Spruce grouse generally prefers  
19 young, coniferous forests, including hemlock, cedar, lodgepole pine, and spruce forests, but in parts of  
20 coastal Alaska prefers old coniferous forest (Schroeder et al. 2021). Grouse are not expected to occur in  
21 the Marine Terminal or Marine Shipping RSAs, marine portions of the TLSA, or the OWSA. There are no  
22 existing records of grouse from Pearse Island, but there are records of sooty grouse and ruffed grouse  
23 along Highway 113 (Birds Canada 2022c; eBird 2023). There are also records of sooty grouse on the  
24 mainland from the Khutzeymateen area and Kwinamass Bay (eBird 2022). Ruffed grouse and sooty  
25 grouse were heard in areas, including near the shore, between Gingolx and Greenville (Demarchi 1997).  
26 Sooty grouse are also known to occur in the Kitsault Mine Project assessment area (AMEC 2011).

27 Band-tailed pigeon (*Patagioenas fasciata*) may occur in the Terrestrial Wildlife RSA and terrestrial  
28 portions of the TLSA but is only expected to occur in the Marine Terminal or Marine Shipping RSAs,  
29 marine portion of the TLSA, and the OWSA during overflights. Band-tailed pigeon is a species of  
30 conservation concern, a migratory bird, and a Nisga'a valued component. The species occurs in  
31 temperate, coniferous rainforest up to 300 m elevation in areas with fruiting shrubs such as elderberry  
32 (*Sambucus* spp.), cascara (*Rhamnus purshiana*), and huckleberries (*Vaccinium* spp.; Keppie and Braun  
33 2020; COSEWIC 2021a). There are no existing records of band-tailed pigeon from Pearse Island,  
34 however there is a record from Gingolx and records from Prince Rupert (eBird 2022). Band-tailed pigeon  
35 was observed in trees along the highway between Gingolx and Iknouk River Estuary (Demarchi 1997).

36 Common nighthawk (*Chordeiles minor*) may occur in the Terrestrial Wildlife RSA but is rare on the north  
37 coast of BC and absent from Haida Gwaii (Boyd 2015). The species is expected to occur infrequently in  
38 the Marine Terminal and Marine Shipping RSAs during migration or foraging and is not expected to occur  
39 in the OWSA. Common nighthawk is an aerial insectivore that nests in open, dry areas such as  
40 grasslands, recent burns, gravel roads, sand dunes, and rocky outcrops (Boyd 2015; Brigham et al.





Review of Existing Data  
June 2024

1 2020). There are no existing records of common nighthawk on Pearse Island or from within the  
2 Marine Terminal or Marine Shipping RSAs or TLSA. Targeted surveys for common nighthawk detected  
3 20 individuals in Nisga'a Memorial Lava Beds Provincial Park (Rancourt n.d.). There are records from the  
4 Nisga'a Memorial Lava Bed Park and parts of Highway 113 near Rosswood and Kitsumkalum Lake  
5 (eBird 2022).

6 There are five woodpecker and one sapsucker species that are known or likely to occur year-round in the  
7 Terrestrial Wildlife RSA and terrestrial portions of the TLSA: American three-toed woodpecker (*Picoides*  
8 *dorsalis*), downy woodpecker (*Dryobates pubescens*), hairy woodpecker (*D. villosus*), pileated  
9 woodpecker (*Dryocopus pileatus*), northern flicker (*Colaptes auratus*), and red-breasted sapsucker  
10 (*Sphyrapicus ruber*). None of these species are species of conservation concern, but all five are migratory  
11 birds under the MBCA. All six species use forests and treed wetland habitat for foraging and breeding.  
12 Downy woodpecker prefers deciduous forest and riparian areas (Jackson and Ouellet 2020), whereas  
13 hairy woodpecker and red-breasted sapsucker prefer coniferous forest (Jackson et al. 2020;  
14 Walters et al. 2020). Pileated woodpecker is uncommon on the north coast of BC and coastal Alaska and  
15 is absent from Haida Gwaii. The species prefers mature to old forest and treed wetlands with large  
16 diameter nest trees (Bull and Jackson 2020). Pileated woodpecker is an important primary cavity nest  
17 excavator, whose nests are often used by other secondary cavity nesting species (Bull and Jackson  
18 2020). Pileated woodpecker nests are protected year-round under the Migratory Birds Regulations.  
19 Before a pileated woodpecker nest can be removed, notification to the abandoned nest registry must be  
20 made, which then starts a 36-month waiting period during which time the nest must remain unoccupied by  
21 pileated woodpecker or other migratory birds. American three-toed woodpecker is uncommon in coastal  
22 areas, although breeding evidence was found at sites near Prince Rupert and New Aiyansh (Birds  
23 Canada 2022c). The species inhabits mature to old spruce and Douglas-fir (*Pseudotsuga menziesii*)  
24 dominated coniferous forests from 1,300 m to 2,750 m elevation (Tremblay et al. 2020). All five species  
25 use cavity nests, which requires live or dead trees of sufficient diameter to accommodate a nest cavity.  
26 There are no existing records of woodpeckers or sapsuckers on Pearse Island. There are records of hairy  
27 woodpecker and red-breasted sapsucker from Gingolx and records of hairy woodpecker, downy  
28 woodpecker, American three-toed woodpecker, pileated woodpecker, and red-breasted sapsucker from  
29 the Highway 113 portion of the Terrestrial Wildlife RSA (eBird 2022). Woodpeckers are non-migratory and  
30 are not expected to regularly occur in the Marine Terminal or Marine Shipping RSAs, and the OWSA.

31 Diurnal raptors include hawks, eagles, and falcons, and nine species are known or likely to occur in the  
32 study areas (Appendix A). Raptors are expected to nest, forage, and overwinter in the Terrestrial Wildlife  
33 RSA and terrestrial areas of the TLSA, and some species may forage in or fly through the marine study  
34 areas. The group includes two species of conservation concern, northern goshawk, *laingi* subspecies,  
35 and peregrine falcon (*Falco peregrinus pealei*), and one Nisga'a valued component, bald eagle. Diurnal  
36 raptors occur in forested, open, and shoreline habitats. Northern goshawk forages and nests in mature to  
37 old coniferous forest, with complex canopy structure (Mahon et al. 2019). Peregrine falcon typically  
38 forages in open habitat, and often nests on cliff ledges, but in coastal areas may also nest in forest habitat  
39 (White et al. 2020). Bald eagle is common in coastal BC and is abundant in the lower Nass River during  
40 the eulachon spawning period (Holst et al. 2007). Bald eagle forages in open habitats such as wetlands,  
41 grass and shrubland, shoreline, and intertidal areas, and nests in large trees near suitable foraging





Review of Existing Data  
June 2024

1 habitat. Bald eagle nests are protected year-round under the BC *Wildlife Act*, whether active or not.  
2 Surveys completed for PRGT identified eight bald eagle nests in Nasoga Bay, Iceberg Bay, Nass Bay,  
3 and along the lower reaches of the Nass River (PRGT 2014; Figure 3.4–3). Six bald eagle nests were  
4 identified along the Nass River between Gingolx and Greenville (Demarch 1997). Bald eagle,  
5 northern harrier (*Circus hudsonius*), red-tailed hawk (*Buteo jamaicensis*), and merlin (*Falco columbarius*)  
6 have been observed in the Kincolith River estuary and/or lower Nass River between Gingolx and  
7 Stony Point (Demarchi 1997). Large aggregations of bald eagle have been observed during the eulachon  
8 run on the mudflats of the Nass River (Demarchi 1997; Holst et al. 2007). There are records of  
9 bald eagle, osprey (*Pandion haliaetus*), northern goshawk, red-tailed hawk, sharp-shinned hawk  
10 (*Accipiter striatus*), northern harrier, American kestrel (*Falco sparverius*), and merlin from along the  
11 Highway 113 portion of the Terrestrial Wildlife RSA (eBird 2023). There are records of bald eagle in the  
12 Marine Terminal and Marine Shipping RSAs (BC BBA 2015; eBird 2022), and records of red-tailed hawk,  
13 sharp-shinned hawk, peregrine falcon and merlin in the Marine Shipping RSA (Birds Canada 2022a,c;  
14 eBird 2022). Northern goshawk has been detected near Ts’oohl Ts’ap Creek on the mainland near  
15 Gingolx (d’Entremont et al. 2018). There are records of bald eagle and peregrine falcon in the OWSA  
16 from areas such as Dixon Entrance, Langara Island, and Gunia Point (eBird 2022). Bald eagle was also  
17 detected in the OWSA near Triple Island in spring 2007 (Harvey and Fox 2013).

18 There are nine owl species that are known or likely to occur year-round in the Terrestrial Wildlife RSA  
19 or TLSA (Appendix A), including two species of conservation concern, western screech-owl  
20 *kennicottii* subspecies (*Megascops kennicottii kennicottii*) and short-eared owl (*Asio flammeus*).  
21 Western screech-owl uses low-elevation coniferous or mixed forest stands, often near watercourses  
22 (COSEWIC 2012b). Short-eared owl uses open habitats such as grasslands, tundra, and wetland  
23 (COSEWIC 2021b). There are no existing records of owls on Pearse Island. There are records of barred  
24 owl (*Strix varia*), boreal owl (*Aegolius funereus*), northern saw-whet owl (*Aegolius acadicus*), and snowy  
25 owl (*Bubo scandiacus*) from near Prince Rupert (BC BBA 2015; Birds Canada 2022a, Birds Canada  
26 2022b; eBird 2022). There are also records of barred owl, northern pygmy-owl (*Glaucidium gnoma*),  
27 short-eared owl, northern hawk owl (*Surnia ulula*), and great gray owl (*Strix nebulosa*) from along  
28 Highway 113 (eBird 2023). Surveys completed for the Kitsault Mine Project detected great gray owl  
29 (AMEC 2011). Owls are not expected to occur regularly in the Marine Terminal or Marine Shipping RSAs,  
30 but may transit through these areas.

31 There are five swallow species that may occur in the Terrestrial Wildlife RSA during the breeding season:  
32 tree swallow (*Tachycineta bicolor*), violet-green swallow (*T. thalassina*), northern rough-winged swallow  
33 (*Stelgidopteryx serripennis*), cliff swallow (*Petrochelidon pyrrhonota*), and barn swallow (*Hirundo rustica*).  
34 Only barn swallow is a species of conservation concern. All five species forage over open habitat, such  
35 as meadows, grassland, and open wetland (Brown and Brown 2020; Brown et al. 2020a; Winkler et al.  
36 2020). Swallows may also forage close to shore in the Marine Terminal and Marine Shipping RSAs and  
37 may transit through these areas during migration. Violet-green swallow and tree swallow nest in tree  
38 cavities in open forest, while barn swallow nests primarily on anthropogenic structures such as bridges  
39 and buildings (Brown and Brown 2020; Brown et al. 2020a; Winkler et al. 2020). Northern rough-winged  
40 swallow nests in burrows or crevices, including those in anthropogenic structures often near rocky banks  
41 and gorges, gravel pits, railway embankments, and exposed clay, sand, or gravel banks (De Jong 2020).





Review of Existing Data  
June 2024

1 Cliff swallow breeding habitat includes open canyons, escarpments, and river valleys with vertical cliff  
2 faces suitable for nesting (Brown et al. 2020b). Tree swallow, violet-green swallow, and  
3 northern rough-winged swallow were detected near Kincolith River estuary or Gingolx (Demarchi 1997).  
4 There are records of barn swallow, northern rough-winged swallow, tree swallow, and violet-green  
5 swallow from the Highway 113 portion of the Terrestrial Wildlife RSA (eBird 2023). There are records of  
6 tree, violet-green, and barn swallow in the Marine Terminal RSA and Marine Shipping RSA, and a record  
7 of northern rough-winged swallow in the Marine Shipping RSA (BC BBA 2015; eBird 2022). There is one  
8 record of barn swallow in the OWSA, offshore of Rose Spit (eBird 2022).

9 There are two swift species that may occur in the Terrestrial Wildlife RSA: black swift (*Cypseloides niger*;  
10 provincially blue-listed and Endangered on Schedule 1 of SARA) and Vaux's swift (*Chaetura vauxi*).  
11 Both species may forage over nearshore marine areas in the Marine Terminal and Marine Shipping  
12 RSAs, and TLSA and may transit through these areas. Vaux's swift uses old coniferous and deciduous  
13 forest to nest and roost, and forages over the forest canopy and nearby grassland and wetland habitat  
14 (Schwitters et al. 2021). Black swift nests on coastal cliffs, behind waterfalls, and in caves on steep  
15 slopes (Gunn et al. 2021). There are three records of black swift in the Marine Shipping RSA (eBird  
16 2022). There are records of black swift or Vaux's swifts in the Highway 113 portion of the Terrestrial  
17 Wildlife RSA.

18 Shorebirds are a group of wading birds that use wetland edges, flooded fields, and marine shorelines for  
19 foraging, resting, and breeding. Shorebirds may occur in wetland habitat in the Terrestrial Wildlife RSA, or  
20 along the shoreline in the Marine Terminal and Marine Shipping RSAs, TLSA, or OWSA. Different species  
21 use different habitats, with some species preferring rocky shorelines (e.g., black oystercatcher  
22 [*Haematopus bachmani*]), sandy or muddy shoreline (e.g., semipalmated plover [*Charadrius*  
23 *semipalmatus*]), or wetlands (e.g., Wilson's snipe [*Gallinago delicata*]). This group includes nine shorebird  
24 species of conservation concern: American golden-plover (*Pluvialis dominica*), whimbrel (*Numenius*  
25 *phaeopus*), red knot, *roselaari* subspecies (*Calidris canutus roselaari*), short-billed dowitcher  
26 (*Limnodromus griseus*), red-necked phalarope (*Phalaropus lobatus*), wandering tattler (*Tringa incana*),  
27 lesser yellowlegs (*Tringa flavipes*), killdeer (*Charadrius vociferus*) and great blue heron, *fannini*  
28 subspecies (*Ardea herodias fannini*). Great blue heron nests are protected year-round under the  
29 BC *Wildlife Act* and federal Migratory Birds Regulations. The Migratory Birds Regulations require that  
30 before a great blue heron nest can be removed, notification to the abandoned nest registry must be  
31 made, which then starts a 24-month waiting period during which time the nest must remain unoccupied by  
32 great blue heron or other migratory birds. There are no existing records of shorebirds on Pearse Island,  
33 however there are records of spotted sandpiper (*Actitis macularius*), lesser yellowlegs, red-necked  
34 phalarope, and great blue heron from the Highway 113 portion of the Terrestrial Wildlife RSA  
35 (BC BBA 2015; eBird 2023). Western sandpiper (*Calidris mauri*), spotted sandpiper, and red-necked  
36 phalarope have been detected in areas near the Marine Terminal RSA (Hamel 1994). Greater yellowlegs  
37 (*Tringa melanoleuca*), Wilson's snipe, dunlin (*Calidris alpina*), and least sandpiper (*Calidris minutilla*) have  
38 been observed in the lower Nass River between Gingolx and Stony Point (Demarchi 1997). Least  
39 sandpiper has been observed in the lower Nass River during the eulachon spawning period  
40 (Holst et al. 2007). Surveys completed for the Westcoast Connector project detected surfbird  
41 (*Aphriza virgata*) and black turnstone (*Arenaria melanocephala*) in the Marine Shipping RSA





Review of Existing Data  
June 2024

1 (Archipelago 2014). Surveys completed for the Vopak Pacific Canada Project recorded several  
2 shorebirds, including killdeer and great blue heron, in 2018 and 2019 in the Marine Shipping RSA  
3 (Vopak 2020b). Surveys completed for PRGT detected two species of conservation concern in the  
4 Marine Shipping RSA: red-necked phalarope and great blue heron (PRGT 2014). Great blue heron,  
5 greater yellowlegs, and black oystercatcher were recorded incidentally in the Marine Shipping RSA during  
6 surveys for the Aurora LNG project in 2014 and 2015 (Brooks 2016). There is one record of great blue  
7 heron in the Marine Terminal RSA (BC BBA 2015). There are records from BC BBA, eBird, and/or the  
8 BC Coastal Waterbird Survey of six shorebird species of conservation concern in the Marine Shipping  
9 RSA: great blue heron, red knot, red-necked phalarope, short-billed dowitcher, wandering tattler, and  
10 whimbrel (BC BBA 2015; Birds Canada 2022a; eBird 2022). Surveys completed by Raincoast  
11 Conservation Foundation detected red-necked phalarope in the OWSA (Harvey and Fox 2013).  
12 Surveys completed for the Kitsault Mine Project detected great blue heron and red-necked phalarope  
13 (AMEC 2011). There are records of black oystercatcher, black turnstone, great blue heron, killdeer,  
14 red phalarope, red-necked phalarope, semipalmated plover, wandering tattler, and western sandpiper in  
15 the OWSA (eBird 2022).

16 Marine birds are a diverse group of species that can be subdivided into groups of species with similar life  
17 history strategies. The marine bird group includes diving birds such as loons, cormorants, and alcids,  
18 dabbling ducks and geese, gulls, terns, and pelagic marine birds.

19 Loons and cormorants dive to catch fish and occur in marine estuaries, sheltered marine areas, larger  
20 wetlands, and subtidal waters. Loons and cormorants are expected to occur in the Marine Terminal and  
21 Marine Shipping RSAs, TLSA, and the OWSA. Wetlands in the Terrestrial Wildlife RSA and TLSA tend to  
22 be small, treed wetlands and not likely to provide habitat for loons and cormorants. The group includes  
23 three species of conservation concern: double-crested cormorant (*Nannopterum auritum*), Brandt's  
24 cormorant (*Urile penicillatus*), and yellow-billed loon (*Gavia adamsii*). Red-throated loon (*Gavia stellata*),  
25 Pacific loon (*Gavia pacifica*), and common loon (*Gavia immer*) have been observed in Observatory Inlet  
26 and Alice Arm (Hamel 1994). Common loon, red-throated loon, double-crested cormorant, Brandt's  
27 cormorant, and pelagic cormorant have been observed in the lower Nass River between Gingolx and  
28 Stony Point (Demarchi 1997). There are records of common loon and red-throated loon from the  
29 Highway 113 portion of the Terrestrial Wildlife RSA (eBird 2013). Double-crested and Brandt's cormorants  
30 have been observed in the lower Nass River during the eulachon run (Holst et al. 2007). Surveys  
31 completed for the Westcoast Connector project detected common loon, Pacific loon, red-throated loon,  
32 and Brandt's cormorant in the Marine Shipping RSA (Archipelago 2014). Surveys completed in 2018 and  
33 2019 for the Vopak Pacific Canada Project recorded common loon, Pacific loon, red-throated loon, and  
34 pelagic cormorant in the Marine Shipping RSA (Vopak 2020b). Common loon was recorded incidentally in  
35 the Marine Shipping RSA during surveys for the Aurora LNG project in 2014 and 2015 (Brooks 2016).  
36 Surveys completed for PRGT detected three species of conservation concern in the Marine Shipping  
37 RSA: double-crested cormorant, Brandt's cormorant, and yellow-billed loon (PRGT 2014). There is  
38 one record each of pelagic cormorant and red-throated loon in the Marine Terminal RSA (eBird 2022).  
39 There are records within the Marine Shipping RSA of Brandt's cormorant, double-crested cormorant, and  
40 yellow-billed loon (Birds Canada 2022a; eBird 2022). Surveys completed by Raincoast Conservation  
41 Foundation detected Pacific loon, common loon, yellow-billed loon, Brandt's cormorant, double-crested





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1 cormorant, and pelagic cormorant in the OWSA (Harvey and Fox 2013). Surveys completed for the  
2 Kitsault Mine Project detected pelagic cormorant and yellow-billed loon in Alice Arm (AMEC 2011).  
3 There are eBird records of Pacific loon, common loon, yellow-billed loon, red-throated loon,  
4 double-crested cormorant, and pelagic cormorant in the OWSA (eBird 2022). There are also  
5 BC BBA (2015) records of Brandt's cormorant and pelagic cormorant in the OWSA.

6 Alcids are a group of marine diving birds that comprise the auks, puffins, murres, and murrelets  
7 (Appendix A). This group forages in nearshore (e.g., marbled murrelet) and offshore (e.g., tufted puffin,  
8 ancient murrelet) waters. Nesting habitat is diverse and includes old coniferous forest (marbled murrelet),  
9 shrubby or forested islands (e.g., rhinoceros auklet), or barren islands and cliffs (e.g., horned puffin  
10 [*Fratercula corniculata*]) (Gaston and Dechesne 2020; Nelson 2020; Piatt and Kitaysky 2020). Only  
11 marbled murrelet is expected to occur in the Terrestrial Wildlife RSA. Marbled murrelet has been detected  
12 during radar and audio-visual surveys near Gingolx (d'Entremont et al. 2018). There are six alcid species  
13 of conservation concern that may occur in the Marine Terminal or Marine Shipping RSAs, TLSA, or  
14 OWSA: marbled murrelet, ancient murrelet, Cassin's auklet (*Ptychoramphus aleuticus*), common murre  
15 (*Uria aalge*), horned puffin, and tufted puffin. Common murre and marbled murrelet were observed on the  
16 lower Nass River and near Gingolx (Demarchi 1997; Holst et al. 2007). There are records of common  
17 murre, marbled murrelet, and rhinoceros auklet from the Highway 113 portion of the Terrestrial Wildlife  
18 RSA near Gingolx (eBird 2023). Ancient murrelet, common murre, and marbled murrelet were recorded in  
19 the Marine Shipping RSA during surveys for the Vopak Pacific Canada Project in 2018 and 2019  
20 (Vopak 2020b). Surveys completed for the Westcoast Connector project detected ancient murrelet,  
21 marbled murrelet, pigeon guillemot, common murre, and rhinoceros auklet in the Marine Shipping RSA  
22 (Archipelago 2014). Surveys completed for PRGT detected three species of conservation concern in the  
23 Marine Shipping RSA: marbled murrelet, ancient murrelet, and common murre (PRGT 2014).  
24 Marbled murrelet was recorded in the Marine Shipping RSA during field work for the Aurora LNG project  
25 in 2014 and 2015 (Brooks 2016). There is one eBird record of common murre in the Marine Terminal  
26 RSA. There are records from BC BBA, eBird, and/or the BC Coastal Waterbird Survey of five species of  
27 conservation concern in the Marine Shipping RSA: common murre, ancient murrelet, marbled murrelet,  
28 Cassin's auklet, and tufted puffin (BC BBA 2015; Birds Canada 2022a; eBird 2022). Surveys completed  
29 for the Kitsault Mine Project detected marbled murrelet and common murre in Alice Arm (AMEC 2011).  
30 Surveys completed by Raincoast Conservation Foundation detected common murre, pigeon guillemot,  
31 marbled murrelet, ancient murrelet, Cassin's auklet, rhinoceros auklet, and tufted puffin in the OWSA  
32 (Harvey and Fox 2013). There are eBird records of ancient murrelet, marbled murrelet, common murre,  
33 pigeon guillemot, Cassin's auklet, rhinoceros auklet, horned puffin, and tufted puffin in the OWSA  
34 (eBird 2022).

35 Diving ducks such as surf scoter and bufflehead are expected to occur in marine waters in the  
36 Terrestrial Wildlife, Marine Terminal, and Marine Shipping RSAs, TLSA, and the OWSA. Diving ducks  
37 typically occur in nearshore or sheltered marine waters where forage fish species congregate. Diving  
38 ducks were identified as a group of importance to Indigenous nations and are a Nisga'a valued  
39 component. This group includes three species of conservation concern: surf scoter, black scoter  
40 (*Melanitta americana*), and long-tailed duck (*Clangula hyemalis*). Hamel (1994) detected surf scoter,  
41 white-winged scoter (*Melanitta deglandi*), and Barrow's goldeneye (*Bucephala islandica*) in areas in and





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1 around the Marine Terminal RSA, although precise locations are not available. Scoters and goldeneye  
2 are abundant during the eulachon spawning period in the lower Nass River area (Holst et al. 2007).  
3 Greater scaup (*Aythya marila*), surf scoter, white-winged scoter, harlequin duck, long-tailed duck,  
4 Barrow's goldeneye, common goldeneye (*Bucephala clangula*), and bufflehead have been observed in  
5 the lower Nass River between Gingolx and Stony Point (Demarchi 1997). There are records of several  
6 species from the Highway 113 portion of the Terrestrial Wildlife RSA that include ring-necked duck  
7 (*Aythya collaris*; Terrace and Sand Lake areas), greater scaup (Gingolx area), harlequin duck  
8 (Gingolx area), surf scoter (Gingolx and Kincolith Road areas), bufflehead (Rosswood/Dutch Valley,  
9 Kalum Lake, Sand Lake, and Gingolx areas), Barrow's goldeneye (Gingolx and Kincolith Road areas),  
10 and common goldeneye (Gingolx, Greenville Bridge, and Nisga'a areas) (eBird 2023). Surveys completed  
11 for the Kitsault Mine Project detected surf scoter in Alice Arm (AMEC 2011). Surf scoter, bufflehead, and  
12 ring-necked duck were recorded in the Marine Shipping RSA during surveys for the Vopak Pacific  
13 Canada Project in 2018 and 2019 (Vopak 2020b). Surveys completed for the Westcoast Connector  
14 project detected Barrow's and common goldeneye, long-tailed duck, black scoter, surf scoter,  
15 white-winged scoter, harlequin duck, and bufflehead in the Marine Shipping RSA (Archipelago 2014).  
16 Surveys completed for PRGT detected several diving duck species in the Marine Shipping RSA, including  
17 black scoter, surf scoter, white-winged scoter, and long-tailed duck (PRGT 2014). There are records of  
18 black scoter and surf scoter in the Marine Terminal RSA (eBird 2022), and records of all three species of  
19 conservation concern in the Marine Shipping RSA (BC BBA 2015; Birds Canada 2022a; eBird 2022).  
20 Surveys completed by Raincoast Conservation Foundation detected surf scoter, white-winged scoter,  
21 black scoter, and long-tailed duck in the OWSA (Harvey and Fox 2013). There are also eBird records of  
22 surf scoter, white-winged scoter, harlequin duck, and long-tailed duck in the OWSA (eBird 2022).

23 Mergansers are expected to occur in marine waters in the Terrestrial Wildlife, Marine Terminal, and  
24 Marine Shipping RSAs, TLSA, and OWSA. Hamel (1994) detected hooded merganser (*Lophodytes*  
25 *cucullatus*), common merganser (*Mergus merganser*), and red-breasted merganser (*Mergus serrator*) in  
26 areas in and around the Marine Terminal RSA, although precise locations are not available. Mergansers  
27 are abundant during the eulachon spawning period in the lower Nass River area (Holst et al. 2007).  
28 Common merganser and red-breasted merganser have been observed in the lower Nass River between  
29 Gingolx and Stony Point (Demarchi 1997). There are records of common merganser along the  
30 Highway 113 portion of the Terrestrial Wildlife RSA near Terrace, Deep Creek, Kalum Lake, Sand Lake,  
31 Gingolx, and Kincolith Road (eBird 2023). Surveys completed for the Westcoast Connector project  
32 detected common merganser in the Marine Shipping RSA (Archipelago 2014). Surveys completed for  
33 PRGT detected red-breasted merganser (PRGT 2014). There are records of common merganser in the  
34 Marine Terminal RSA (BC BBA 2015; eBird 2022), and records of all three merganser species in the  
35 Marine Shipping RSA (BC BBA 2015; eBird 2022; Birds Canada 2022a). Surveys completed by  
36 Raincoast Conservation Foundation detected red-breasted merganser in the Marine Shipping RSA  
37 (Harvey and Fox 2013).

38 Grebes are diving birds with lobed toes that occur on both fresh and marine waters. Some species, such  
39 as western grebe (*Aechmophorus occidentalis*) occur further offshore than species such as pied-billed  
40 grebe (*Podilymbus podiceps*), which occur in sheltered waters. This group includes two species of  
41 conservation concern: horned grebe (*Podiceps auratus*) and western grebe. Hamel (1994) detected





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1 horned grebe and western grebe in Observatory Inlet and Alice Arm. Western grebe, red-necked grebe  
2 (*Podiceps grisegena*), and horned grebe have been observed in the lower Nass River between  
3 Gingolx and Stony Point (Demarchi 1997). There are records from along Highway 113 of horned grebe  
4 (Gingolx area), red-necked grebe (Gingolx and Sand Lake areas), and western grebe (Sand Lake and  
5 Gingolx areas) (eBird 2023). Red-necked grebe and western grebe were recorded in the Marine Shipping  
6 RSA during surveys for the Vopak Pacific Canada Project in 2018 and 2019 (Vopak 2020b). Surveys  
7 completed for the Westcoast Connector project detected red-necked grebe and western grebe in the  
8 Marine Shipping RSA (Archipelago 2014). Surveys completed for PRGT detected two grebe species in  
9 the Marine Shipping RSA: horned grebe and western grebe (PRGT 2014). There are eBird and  
10 Coastal Waterbird Survey records of both species of conservation concern in the Marine Shipping RSA  
11 (Birds Canada 2022a; eBird 2022). Surveys completed for the Kitsault Mine Project detected horned  
12 grebe and western grebe in Alice Arm (AMEC 2011). Surveys completed by Raincoast Conservation  
13 Foundation detected horned grebe, red-necked grebe, and western grebe in the OWSA (Harvey and  
14 Fox 2013). There are eBird records of red-necked grebe and western grebe in the OWSA (eBird 2022).

15 Dabbling ducks include species such as mallard, green-winged teal (*Anas carolinensis*), and northern  
16 shoveler (*Spatula clypeata*). None of the species in the dabbling duck group are species of conservation  
17 concern, however the dabbling duck group was identified as being of Indigenous cultural use and value  
18 and is a Nisga'a valued component. Dabbling ducks forage for food particles on the surface of the water  
19 or by tipping upside-down to reach food on the bottom. Food items include plant matter, crustaceans,  
20 molluscs, seeds, and insects (typically larval form). Dabbling ducks typically occur in calm, relatively  
21 shallow waters such as estuaries, sheltered bays, intertidal areas, and wetlands. Dabbling ducks are  
22 expected to occur in the Marine Terminal, Terrestrial Wildlife, and Marine Shipping RSAs, TLSA, and  
23 sheltered areas of the OWSA. Wetlands on Pearse Island tend to be small, treed wetlands and may not  
24 provide habitat for dabbling ducks. Mallard and northern pintail (*Anas acuta*) have been observed in  
25 Observatory Inlet, Alice Arm, and Portland Canal (Hamel 1994). American wigeon (*Mareca americana*)  
26 has been observed in Alice Arm and Observatory Inlet, while green-winged teal has been observed in  
27 Alice Arm (Hamel 1994). Mallard, green-winged teal, American wigeon, northern pintail, and northern  
28 shoveler have been observed in the lower Nass River between Gingolx and Stony Point (Demarchi 1997;  
29 Holst and Demarchi 2007). There are records of American wigeon (Gingolx, Kincolith Road, Lava Lake  
30 areas), gadwall (Kalum Lake area), green-winged teal (Kalum Lake, Sand Lake, Gingolx areas), mallard  
31 (Terrace, Sand Lake, Gingolx, Kincolith Road areas), northern pintail (Sand Lake area), and northern  
32 shoveler (Gingolx, Kincolith Road areas) within the Highway 113 portion of the Terrestrial Wildlife RSA  
33 (iNaturalist 2023; eBird 2023). Dabbling ducks, including gadwall (*Mareca strepera*), green-winged teal,  
34 mallard, and northern shoveler were recorded in the Marine Shipping RSA during surveys for the  
35 Vopak Pacific Canada Project in 2018 and 2019 (Vopak 2020b). Surveys completed for the  
36 Westcoast Connector project detected mallard in the Marine Shipping RSA (Archipelago 2014). Surveys  
37 completed for PRGT detected several dabbling duck species in the Marine Shipping RSA, including  
38 American wigeon, green-winged teal, northern pintail, and northern shoveler (PRGT 2014). There are  
39 records from eBird, and/or the BC Coastal Waterbird Survey of American wigeon, gadwall, green-winged  
40 teal, mallard, northern pintail, and northern shoveler in the Marine Shipping RSA (Birds Canada 2022a;  
41 eBird 2022). There are eBird records of green-winged teal in the OWSA (eBird 2022).





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1 Geese and swans such as Canada goose (*Branta canadensis*) and trumpeter swan (*Cygnus buccinator*)  
2 are expected to occur on inshore, sheltered waters in the Marine Terminal and Marine Shipping RSAs,  
3 TLSA, and protected areas of the OWSA. Wetlands on Pearse Island tend to be small, treed wetlands  
4 and are not expected to provide habitat for geese and swans. This group includes two species of  
5 conservation concern, brant (*Branta bernicla*) and Canada goose *occidentalis* subspecies. Canada goose  
6 *occidentalis* subspecies is expected to occur only during migration, while Canada goose (nominate  
7 species) may occur year-round in the Marine Terminal, Terrestrial Wildlife, and Marine Shipping RSAs,  
8 TLSA, or OWSA. Canada goose was identified as a Nisga'a valued component, and geese and swans  
9 were identified as having importance to Indigenous nations. Surveys during the 2007 eulachon spawning  
10 period detected 574 Canada goose in the lower Nass River area (Holst et al. 2007). Canada goose was  
11 observed in the Kincolith Estuary near Gingolx (Demarchi 1997). There is a record of Canada goose in  
12 the TLSA (eBird 2023). Within the Highway 113 portion of the Terrestrial Wildlife RSA, there are records  
13 of Canada goose (Terrace, Kalum Lake, Sand Lake, Gingolx, Lava Lake, Nass River Bridge, and  
14 Rosswood areas), cackling goose (Terrace area), greater white-fronted goose (Terrace area),  
15 snow goose (Terrace area), and trumpeter swan (Terrace, Nisga'a Highway, Sand Lake, Rosswood and  
16 Greenville Bridge areas) (eBird 2023; iNaturalist 2023). Surveys completed for the Westcoast Connector  
17 project detected brant, Canada goose, and greater white-fronted goose (*Anser albifrons*) in the  
18 Marine Shipping RSA (Archipelago 2014). Canada goose was recorded during spring and fall surveys for  
19 the Vopak Pacific Canada Project in 2018 and 2019 in the Marine Shipping RSA (Vopak 2020b), and  
20 incidentally during surveys for the Aurora LNG project in 2014 and 2015 (Brooks 2016). Marine bird  
21 vessel surveys completed for PRGT detected cackling goose (*Branta hutchinsii*), snow goose  
22 (*Anser caerulescens*), and Canada goose in the Marine Shipping RSA (PRGT 2014). There are eBird  
23 records of brant, cackling goose, greater white-fronted goose, Canada goose, and trumpeter swan in the  
24 Marine Shipping RSA (eBird 2022). There are also Coastal Waterbird Survey records of brant and greater  
25 white-fronted goose in the Marine Shipping RSA (Birds Canada 2022a). Surveys completed by Raincoast  
26 Conservation Foundation detected snow goose and brant in the OWSA (Harvey and Fox 2013). There  
27 are eBird records of greater white-fronted goose (1 record) and brant in the OWSA (eBird 2022).

28 Gulls, kittiwakes, and terns such as Bonaparte's gull (*Chroicocephalus philadelphia*), black-legged  
29 kittiwake, and Arctic tern (*Sterna paradisaea*) are expected to occur throughout the Marine Terminal and  
30 Marine Shipping RSAs, TLSA, and the OWSA. Some species, such as black-legged kittiwake and  
31 Arctic tern are most likely to occur in offshore areas and are unlikely to occur in Portland Inlet. Other  
32 species, such as herring gull (*Larus argentatus*), may occur in any of the RSAs. Gulls were identified as a  
33 group of Indigenous cultural use and value. This group includes three species of conservation concern:  
34 black-legged kittiwake, California gull (*Larus californicus*), and Caspian tern (*Hydroprogne caspia*).  
35 Large concentrations of gulls are known to occur in Nass Bay and the lower Nass River during the  
36 eulachon spawning period (Holst et al. 2007). Bonaparte's gull, short-billed gull (*Larus brachyrhynchus*),  
37 herring gull, California gull, glaucous gull (*Larus hyperboreus*), glaucous-winged gull, black-legged  
38 kittiwake, and common tern (*Sterna hirundo*) have been observed in the Kincolith River estuary and/or  
39 lower Nass River between Gingolx and Stony Point (Demarchi 1997). There are records of several  
40 species within the Highway 113 portion of the Terrestrial Wildlife RSA: Bonaparte's gull (Sand Lake,  
41 Gingolx, Kincolith Rd areas), California gull (Gingolx area), glaucous-winged gull (Terrace, Gingolx,  
42 Fishery Bay, Nass River Bridge areas), herring gull (Terrace, Gingolx, Fishery Bay, Nass River Bridge





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1 areas), Iceland gull (*Gingolx* area), and short-billed gull (*Gingolx*, Fishery Bay, Nass River Bridge areas)  
2 (eBird 2023). There are eBird (2022) records of glaucous-winged gull, herring gull, and short-billed gull in  
3 the Marine Terminal RSA. Several gull species were recorded in the Marine Shipping RSA during surveys  
4 for the Vopak Pacific Canada Project, but none are species of conservation concern (Vopak 2020b).  
5 Glaucous-winged gull was recorded incidentally in the Marine Shipping RSA during surveys for the  
6 Aurora LNG project in 2014 and 2015 (Brooks 2016). Surveys completed for the Westcoast Connector  
7 project detected black-legged kittiwake and Bonaparte's gull in the Marine Shipping RSA  
8 (Archipelago 2014). Marine bird vessel surveys completed for PRGT detected western gull  
9 (*Larus occidentalis*), Thayer's gull (*Larus glaucooides thayeri*), herring gull, ring-billed gull  
10 (*Larus delawarensis*), Sabine's gull (*Xema sabini*), Bonaparte's gull, California gull, Franklin's gull  
11 (*Leucophaeus pipixcan*), glaucous gull, glaucous-winged gull, and black-legged kittiwake in the  
12 Marine Shipping RSA (PRGT 2014). There are records from BC BBA, eBird, and/or the BC Coastal  
13 Waterbird Survey of black-legged kittiwake, Bonaparte's gull, California gull, glaucous gull,  
14 glaucous-winged gull, herring gull, Iceland gull, ring-billed gull, Sabine's gull, short-billed gull,  
15 western gull, Caspian tern, and Arctic tern in the Marine Shipping RSA (BC BBA 2015; Birds Canada  
16 2022a; eBird 2022). Surveys completed by Raincoast Conservation Foundation detected black-legged  
17 kittiwake, Bonaparte's gull, short-billed gull, California gull, and glaucous-winged gull in the OWSA  
18 (Harvey and Fox 2013). There are also eBird (2022) records of black-legged kittiwake, Bonaparte's gull,  
19 California gull, glaucous gull, glaucous-winged gull, herring gull, Iceland gull, Sabine's gull, short-billed  
20 gull, Caspian tern, and Arctic tern in the OWSA.

21 Pelagic marine birds spend most of their lives at-sea often at or past the continental shelf-break.  
22 This group includes the storm-petrels, shearwaters, fulmars, albatross, skuas, and jaegers. There are  
23 12 pelagic marine bird species that may occur in the Marine Shipping RSA or and OWSA, including  
24 six species of conservation concern: northern fulmar (*Fulmarus glacialis*), parasitic jaeger  
25 (*Stercorarius parasiticus*), pink-footed shearwater (*Ardenna creatopus*), Buller's shearwater  
26 (*Ardenna bulleri*), short-tailed albatross (*Phoebastria albatrus*), and black-footed albatross  
27 (*Phoebastria nigripes*) (Appendix A). Surveys completed for the Westcoast Connector project detected  
28 parasitic jaeger in the Marine Shipping RSA (Archipelago 2014). Marine bird vessel surveys completed  
29 for PRGT detected sooty shearwater, northern fulmar, parasitic jaeger, and pomarine jaeger  
30 (*Stercorarius pomarinus*) in the Marine Shipping RSA (PRGT 2014). There are eBird records of  
31 northern fulmar, pink-footed shearwater, short-tailed shearwater, sooty shearwater, fork-tailed storm-  
32 petrel (*Hydrobates furcatus*), and Leach's storm-petrel (*Hydrobates leucorhous*) in the Marine Shipping  
33 RSA (eBird 2022) (Figure 3.4–6). Surveys completed by Raincoast Conservation Foundation detected  
34 black-footed albatross, northern fulmar, pink-footed shearwater, parasitic jaeger, Leach's storm-petrel,  
35 and fork-tailed storm-petrel in the OWSA (Harvey and Fox 2013). There are also eBird records of  
36 black-footed albatross, short-tailed albatross, Leach's storm-petrel, fork-tailed storm-petrel,  
37 parasitic jaeger, pomarine jaeger, pink-footed shearwater, short-tailed shearwater, sooty shearwater, and  
38 northern fulmar in the OWSA (eBird 2022).





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#### 1    **3.4.2.4            Amphibians and Reptiles**

2    There are six amphibian and one reptile species known or likely to occur within the Terrestrial Wildlife  
3    RSA and terrestrial portions of the TLSA (Appendix A), of which western toad (*Anaxyrus boreas*) and  
4    coastal tailed frog (*Ascaphus truei*) are species of conservation concern. There are no amphibian or  
5    terrestrial reptile species identified as important to Nisga'a Nation or other Indigenous nations. Amphibian  
6    and terrestrial reptile species are not expected to occur in the Marine Terminal or Marine Shipping RSAs,  
7    marine portions of the TLSA, or OWSA. There are no introduced or invasive amphibian or reptile species  
8    likely to occur in the RSAs, TLSA, or OWSA.

9    Western toad is found in various habitat types throughout BC and can be considered an opportunistic  
10    breeder because of their ability to breed in a wide variety of habitats and environmental conditions  
11    (i.e., ephemeral ponds, shallow water, or remarkably small pools). Western toad lays its eggs in strands,  
12    which allows them to breed in very shallow water and not rely on submergent vegetation. In the  
13    Terrestrial Wildlife RSA and terrestrial portions of the TLSA, available habitat for western toad breeding  
14    consists mainly of standing water pools of various depths in swamp wetlands. There are no existing  
15    occurrence records for western toad within the Terrestrial Wildlife RSA or TLSA. There are records of  
16    western toad from the Kitsault Mine Project (AMEC 2011). There are records of western toad along the  
17    Northwest Transmission Line Project route between Terrace and New Aiyansh (Golder 2013).  
18    Western toad was detected during surveys for PRGT on the mainland on Nisga'a Lands (PRGT 2014).

19    Coastal tailed frog is found throughout the Cascade and Coast Mountain ranges in BC in moderate to  
20    high gradient streams (COSEWIC 2011). The species requires streams that maintain their flow during all  
21    seasons because the tadpole phase lasts multiple years (Ascaphus 2003; COSEWIC 2011). Channel  
22    substrate texture and embeddedness greatly influence coastal tailed frog occurrence. Tadpoles prefer  
23    stream reaches with a high percentage of cobbles, low fines, and prefer smooth rocks (COSEWIC 2011).  
24    The species is uncommon in north-facing basins in northern parts of its range, likely because these were  
25    too cold to support the growth and development of tadpoles (COSEWIC 2011). There are no occurrence  
26    records for coastal tailed frog within the Terrestrial Wildlife RSA or TLSA.

27    Other amphibians likely to occur within the Terrestrial Wildlife RSA are northwestern salamander  
28    (*Ambystoma gracile*), long-toed salamander (*Ambystoma macrodactylum*), Columbia spotted frog  
29    (*Rana pretiosa*), and roughskin newt (*Taricha granulosa*). These pond-dwelling amphibians require  
30    deeper and more permanent pools for breeding because they typically attach their eggs to aquatic or  
31    submergent vegetation. In colder climates, these species may overwinter in ponds or remain as aquatic  
32    larvae before metamorphosing in the spring. Occasionally, roughskin newt and northwestern and long-  
33    toed salamander are neotenic (i.e., never fully metamorphose) and will remain in aquatic habitat for their  
34    entire life cycle. In the Terrestrial Wildlife RSA, available habitat for these pond-dwelling species includes  
35    wetland complexes that have pools of standing water with aquatic vegetation. There are no existing  
36    amphibian occurrence records within the Terrestrial Wildlife RSA or TLSA. Surveys completed for the  
37    Kitsault Mine Project detected Columbia spotted frog, rough-skinned newt, and long-toed salamander  
38    (AMEC 2011). There is a record of Columbia spotted frog along the Northwest Transmission Line Project  
39    route between Terrace and New Aiyansh (Golder 2013). Columbia spotted frog and long-toed  
40    salamander were detected during surveys for PRGT on the mainland in Nisga'a Lands (PRGT 2014).





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1 One reptile species, common gartersnake (*Thamnophis sirtalis*), may to occur in the Terrestrial Wildlife  
2 RSA and terrestrial portions of the TLSA. This species is not known to occur on Pearse Island or the  
3 Ashington Range on the mainland, but is expected to occur along portions of Highway 113/  
4 Nisga'a Highway (Atkins 2021). This species is associated with a wide variety of habitats, though is  
5 typically found near water. Available habitat includes terrestrial areas in forests, around wetlands, and  
6 rocky shorelines. There are no publicly available records of reptile species in the Terrestrial Wildlife RSA  
7 or TLSA, but there are records from near Laxgalts'ap, New Aiyansh, and Rosswood (iNaturalist 2023).

### 8 **3.5 SELECTION OF KEY SPECIES AND SPECIES GROUPS**

9 Key species and species groups were selected to focus the assessment of the Wildlife and Wildlife  
10 Habitat VC. The VC includes five subcomponents: 1) migratory and non-migratory birds, 2) species of  
11 conservation concern, 3) species of Indigenous cultural use and value, 4) terrestrial mammals, and  
12 5) amphibians. The key species and species groups chosen for the assessment: (i) are representatives of  
13 the five subcomponents, (ii) representative of the range of habitats (e.g., old coniferous forest, wetlands,  
14 riparian areas, marine environments) used by wildlife over various spatial and temporal scales  
15 (e.g., summer, winter, breeding) in the Project's study areas, (iii) are likely to interact with the Project, and  
16 (iv) can be used as indicators of potential effects on other species that have similar habitat associations  
17 and seasonal use patterns in the study areas. The selection of key species was undertaken through a  
18 review of existing terrestrial and marine habitats and associated species known to occur within the study  
19 areas for the Project. Table 3.5–1 provides the list of key species and species groups for the VC and the  
20 rationale for their inclusion.





**Table 3.5–1 Wildlife and Wildlife Habitat Key Species and Species Groups and Rationale for Selection**

Key Species or Species Group	Rationale for Selection
Grizzly bear	<ul style="list-style-type: none"> <li>• Provincially blue-listed, is designated as Special Concern by COSEWIC, and is listed as Special Concern on Schedule 1 of SARA (BC CDC 2024; SRPR 2024)</li> <li>• Species of Indigenous cultural use and value<sup>1</sup>; a designated species under the Nisga’a Treaty</li> <li>• Occurs widely year-round within the Terrestrial Wildlife RSA and TLSA. Likely to use shoreline habitat within the Marine Terminal and Marine Shipping RSAs and TLSA</li> <li>• The grizzly bear population in BC is estimated to be 14,925 (MFLNRORD 2020). The Pearse Island portion of the Terrestrial Wildlife RSA does not overlap a Grizzly Bear Population Unit (GBPU). The population estimate for the adjacent Khutzeymateen and Stewart GBPUs is 277 bears and 358 bears, respectively (MFLNRORD 2020)</li> <li>• Pearse Island is in the Nass Wildlife Area, which is subject to Nisga’a Treaty provisions for regulating the harvest of grizzly bear</li> <li>• Uses a wide range of habitat types in western BC, such as forests, alpine, wetlands, estuaries, wet meadows, and watercourses. Individuals typically have large home ranges with a range of habitat types that satisfy life history requirements</li> <li>• Potential to interact with the Project through change in habitat, change in mortality risk, and change in movement</li> <li>• Can be used to infer effects on other species that have overlapping life requisites (e.g., black bear)</li> <li>• Can serve as an umbrella species for conserving habitat values for many other terrestrial species</li> </ul>
Grey wolf	<ul style="list-style-type: none"> <li>• A species of Indigenous cultural use and value, and a Nisga’a valued species</li> <li>• Occurs widely year-round within the Terrestrial Wildlife RSA and TLSA. Likely to use shoreline habitat within the Marine Terminal and Marine Shipping RSAs</li> <li>• The most recent population estimate for the Skeena Region is 1,600 to 3,300 (BC MFLNRO 2014)</li> <li>• Occupies forested areas and open, grassy areas close to water, with access to den sites such as burrows, hollow logs, caves, and abandoned beaver lodges (Paquet and Carbyn 2003)</li> <li>• Potential to interact with the Project through change in habitat, change in mortality risk, and change in movement</li> </ul>





**Table 3.5–1 Wildlife and Wildlife Habitat Key Species and Species Groups and Rationale for Selection**

Key Species or Species Group	Rationale for Selection
Wolverine, <i>luscus</i> subspecies	<ul style="list-style-type: none"> <li>• Provincially blue-listed, designated as Special Concern by COSEWIC, and listed as Special Concern on Schedule 1 of SARA (BC CDC 2024, SRPR 2024)</li> <li>• Species of Indigenous cultural use and value, and a Nisga’a valued species</li> <li>• May occur year-round within the Terrestrial Wildlife RSA and TLSA. Wolverine is not expected to regularly occur in the intertidal zone or in marine habitat</li> <li>• The 2007 estimated population in BC was 3,530 wolverine (Lofroth and Krebs 2007). A more recent population estimate is not available</li> <li>• Occupies conifer forests and alpine areas, often at higher elevation but may occur at all elevations (Hatler et al. 2008). Habitat use is primarily driven by availability of prey and snow depths suitable for winter denning (Slough 2007; Lofroth and Krebs 2007; Hatler et al. 2008)</li> <li>• Potential to interact with the Project through change in habitat, change in mortality risk, and change in movement</li> </ul>
Pacific marten	<ul style="list-style-type: none"> <li>• Species of Indigenous cultural use and value, and a Nisga’a valued species</li> <li>• Important furbearer species for trappers</li> <li>• Occurs year-round within the Terrestrial Wildlife RSA and TLSA, and may forage in shoreline habitat in the Marine Terminal and Marine Shipping RSAs, TLSA, and OWSA</li> <li>• A population estimate is not available due to a lack of provincial population monitoring for this species</li> <li>• Occupies forested habitats with a high degree of structural complexity and coarse woody debris (Buskirk and Ruggiero 1994; Thompson et al. 2012)</li> <li>• Potential to interact with the Project through change in habitat, change in mortality risk, and change in movement</li> <li>• Pacific marten year-round living habitat also represents overwintering habitat for western toad</li> </ul>





**Table 3.5–1 Wildlife and Wildlife Habitat Key Species and Species Groups and Rationale for Selection**

Key Species or Species Group	Rationale for Selection
Moose	<ul style="list-style-type: none"> <li>• Species of Indigenous cultural use and value; a designated species under the Nisga’a Treaty</li> <li>• Important ungulate species for hunters</li> <li>• Occurs year-round widely across northern BC, although it is uncommon in coastal regions of BC (Shackleton 1999). Moose may occur in the Terrestrial Wildlife RSA and TLSA, but is not expected to occur in the Marine Terminal or Marine Shipping RSAs or OWSA</li> <li>• Most recent provincial estimate suggests that the moose population in BC is between 110,000 to 185,000 individuals (MFLNRORD 2019). The 2017 population estimate for the Nass Wildlife Area is 1,061 moose (Demarchi 2017)</li> <li>• Moose occurs in forested areas with ample shrubs and young trees on which to browse. In summer moose also forage on aquatic vegetation in wetlands. In winter they seek out areas with lower snowpack, such as dense coniferous forest with high snow interception (Shackleton 1999)</li> <li>• Potential to interact with the Project through change in habitat, change in mortality risk, and change in movement</li> </ul>
Sitka black-tailed deer	<ul style="list-style-type: none"> <li>• Sitka black-tailed deer is a subspecies of mule deer (<i>Odocoileus hemionus</i>) found in the central and northern coastal areas of BC</li> <li>• Is a species of Indigenous cultural use and value, and a Nisga’a valued species</li> <li>• Important ungulate species for hunters</li> <li>• Occurs year-round in the Terrestrial Wildlife RSA and TLSA. The species may use intertidal areas within the Marine Terminal or Marine Shipping RSAs, TLSA, and OWSA</li> <li>• The most recent available population estimate of 65,000 deer is from 1997 (Shackleton 1999)</li> <li>• Habitat includes forested areas, especially with conifers, and with a dense undergrowth of herbs and shrubs for foraging (Bunnell 1990)</li> <li>• Potential to interact with the Project through change in habitat, change in mortality risk, and change in movement</li> </ul>





**Table 3.5–1 Wildlife and Wildlife Habitat Key Species and Species Groups and Rationale for Selection**

<b>Key Species or Species Group</b>	<b>Rationale for Selection</b>
Bats	<ul style="list-style-type: none"> <li>• Group includes five species of conservation concern:                             <ul style="list-style-type: none"> <li>• Little brown myotis is blue-listed in BC, is designated as Endangered by COSEWIC, and is federally listed as Endangered under Schedule 1 of SARA (BC CDC 2024; SRPR 2024)</li> <li>• Northern myotis is blue-listed in BC, is designated as Endangered by COSEWIC, and is federally listed as Endangered under Schedule 1 of SARA (BC CDC 2024; SRPR 2024)</li> <li>• Yuma myotis is blue-listed in BC (BC CDC 2024)</li> <li>• Hoary bat is blue-listed in BC (BC CDC 2024) and is designated as Endangered by COSEWIC (BC CDC 2024; SRPR 2024)</li> <li>• Silver-haired bat is yellow-listed in BC and is designated as Endangered by COSEWIC (BC CDC 2024; SRPR 2024)</li> </ul> </li> <li>• Bats occur in the Terrestrial Wildlife RSA and TLSA from spring through fall. Some species may overwinter in the Terrestrial Wildlife RSA or TLSA. Bats may forage over and migrate through the Marine Terminal and Marine Shipping RSAs during the active season. Bats are not expected to regularly occur in the OWSA</li> <li>• Population estimates for bats are either not available, or not recent enough to represent the population considering the effects that white-nose syndrome has had on susceptible species</li> <li>• Uses forested habitat with larger trees (mature and older forests) as well as rock crevices and buildings for summer or maternity roosting and warm and humid features for overwintering (e.g., abandoned mines, caves, and occasionally buildings). Foraging habitat is typically open areas where swarms of flying insects congregate, including over water bodies and meadows and within open forest (ECCC 2018).</li> <li>• Potential to interact with the Project through change in habitat, change in mortality risk, and change in movement</li> </ul>





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**Table 3.5–1 Wildlife and Wildlife Habitat Key Species and Species Groups and Rationale for Selection**

Key Species or Species Group	Rationale for Selection
Western screech-owl, <i>kennicottii</i> subspecies	<ul style="list-style-type: none"> <li>• Western screech-owl is provincially blue-listed, is designated as Threatened by COSEWIC and listed as Threatened under SARA schedule 1 (BC CDC 2024, SRPR 2024)</li> <li>• Western screech-owl may occur year-round in the Terrestrial Wildlife RSA and TLSA. It is not expected to regularly occur in the Marine Terminal or Marine Shipping RSAs, but may travel through these areas</li> <li>• The BC population of western screech-owl, <i>kennicottii</i> subspecies is estimated to be between 1,500 to 3,000 (COSEWIC 2012b). A population estimate for the Terrestrial Wildlife RSA or broader regional area is not available</li> <li>• Primarily uses lower elevation mature to old coniferous or mixedwood forest and riparian habitat. Breeding habitat is often near wetlands, streams, or other water (COSEWIC 2012b)</li> <li>• Potential to interact with the Project through change in habitat, change in mortality risk, and change in movement</li> <li>• Can be used to infer effects on other birds and wildlife preferring a variety of low-elevation coastal and woodland habitat types, particularly mixedwood and deciduous forests in riparian areas</li> </ul>
Northern goshawk, <i>laingi</i> subspecies	<ul style="list-style-type: none"> <li>• The subspecies is provincially red-listed, is designated as Threatened by COSEWIC and listed as Threatened under SARA schedule 1 (BC CDC 2024, SRPR 2024)</li> <li>• The subspecies, is expected to occur year-round within the Terrestrial Wildlife RSA and TLSA. It is not expected to regularly occur in the Marine Terminal or Marine Shipping RSAs, or OWSA, but may fly through these areas</li> <li>• The BC population is estimated at 1,104 to 1,237 individuals, with approximately 365 to 383 mature individuals occurring in the north coast area (COSEWIC 2013a)</li> <li>• Uses mature to old coniferous forest with complex structure. Prefers to nest away from edges in stands dominated by western hemlock or a mix of western redcedar and western hemlock</li> <li>• Potential to interact with the Project through change in habitat, change in mortality risk, and change in movement</li> <li>• Can be used to infer effects on other raptors and wildlife preferring similar mature coniferous and mixedwood forest habitat types</li> </ul>





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**Table 3.5–1 Wildlife and Wildlife Habitat Key Species and Species Groups and Rationale for Selection**

Key Species or Species Group	Rationale for Selection
Bald eagle	<ul style="list-style-type: none"> <li>• Species of Indigenous cultural use and value</li> <li>• Nests are protected year-round under the BC <i>Wildlife Act</i></li> <li>• Expected to occur year-round within the Terrestrial Wildlife, Marine Terminal, and Marine Shipping RSAs, TLSA, and OWSA</li> <li>• The most recent population estimate from 2004 was 60,000 individuals across BC (BC MFLNRO 2013). Common in coastal BC and abundant in the lower Nass River during the eulachon spawning period (Holst et al. 2007)</li> <li>• Forages in open habitats such as wetlands, grass and shrubland, shoreline, and intertidal areas, and nests in large trees near suitable foraging habitat</li> <li>• Potential to interact with the Project through change in habitat, change in mortality risk, and change in movement</li> </ul>
Marbled murrelet	<ul style="list-style-type: none"> <li>• Marbled murrelet is provincially blue-listed, is designated as Threatened by COSEWIC and listed as Threatened under SARA schedule 1 (BC CDC 2024, SRPR 2024)</li> <li>• Migratory bird protected under the MBCA</li> <li>• Marbled murrelet may nest in the Terrestrial Wildlife RSA and TLSA. The species is expected to forage in the Marine Terminal and Marine Shipping RSAs and OWSA, and marine portions of the TLSA</li> <li>• The most recent population estimate is 72,600 to 125,6000 individuals in BC, of which 18,400 to 26,000 occur in the Northern Mainland Coast conservation region (COSEWIC 2012c)</li> <li>• Exclusively uses old growth coniferous forest for nesting. Marbled murrelet forages in near shore, sheltered waters, where it forages for small schooling fish typically less than 1 km from land and in waters less than 30 m deep (ECCC 2023)</li> <li>• Potential to interact with the Project through change in habitat, change in mortality risk, and change in movement</li> <li>• Can be used to infer effects on other species that are associated with old growth coniferous forest</li> </ul>





**Table 3.5–1 Wildlife and Wildlife Habitat Key Species and Species Groups and Rationale for Selection**

Key Species or Species Group	Rationale for Selection
Old forest bird community	<ul style="list-style-type: none"> <li>• The old forest bird community includes 34 species, each of which are migratory birds under the MBCA, which use old forest types for breeding, foraging and general living (see Appendix B). The community includes songbirds, hummingbirds, woodpeckers, and swallows.</li> <li>• Species comprising the old forest bird community are expected to use the Terrestrial Wildlife RSA and TLSA for foraging, nesting, or overwintering. Some species may use intertidal habitat in the Marine Terminal and Marine Shipping RSAs, OWSA, and TLSA. Some species in the old forest bird community are expected to migrate through, forage in, or disperse through marine areas</li> <li>• Includes one species of conservation concern:                         <ul style="list-style-type: none"> <li>– Olive-sided flycatcher is yellow-listed in BC, is designated as Special Concern by COSEWIC, and is federally listed as Special Concern under Schedule 1 of SARA (BC CDC 2024; SRPR 2024)</li> </ul> </li> <li>• Community uses mature (structural stage 6) and old (structural stage 7) forest for breeding, foraging, or general living. Can be used to infer effects on other species that are associated with mature and old forest</li> <li>• Potential to interact with the Project through change in habitat, change in mortality risk, and change in movement</li> </ul>
Young forest bird community	<ul style="list-style-type: none"> <li>• The young forest bird community includes 35 species, each of which are migratory birds under the MBCA, that use young forest for breeding, foraging, or general living (see Appendix B). The community includes songbirds, hummingbirds, woodpeckers, and swallows</li> <li>• Does not include any species of conservation concern</li> <li>• Species comprising the young forest bird community are expected to use the Terrestrial Wildlife RSA and TLSA for foraging, nesting, or overwintering. Some species may use intertidal habitat in the Marine Terminal and Marine Shipping RSAs, OWSA, and TLSA. Some species in the young forest bird community are expected to migrate through, forage in, or disperse through marine areas</li> <li>• Community uses young forest (e.g., structural stage 4 – 5) for breeding, foraging, or general living. Can be used to infer effects on other species that are associated with young forest</li> <li>• Potential to interact with the Project through change in habitat, change in mortality risk, and change in movement</li> </ul>





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**Table 3.5–1 Wildlife and Wildlife Habitat Key Species and Species Groups and Rationale for Selection**

<b>Key Species or Species Group</b>	<b>Rationale for Selection</b>
Wetland bird community	<ul style="list-style-type: none"> <li>• The wetland bird community includes 26 species, each of which are migratory birds under the MBCA, that use wetlands for breeding, foraging, or general living (see Appendix B). The community includes songbirds, hummingbirds, woodpeckers, and swallows.</li> <li>• Includes two species of conservation concern:             <ul style="list-style-type: none"> <li>– Olive-sided flycatcher is yellow-listed in BC, is designated as Special Concern by COSEWIC, and is federally listed as Special Concern under Schedule 1 of SARA (BC CDC 2024; SRPR 2024)</li> <li>– Barn swallow is yellow-listed in BC, is designated as Special Concern by COSEWIC, and is federally listed as Threatened under Schedule 1 of SARA (BC CDC 2024; SRPR 2024)</li> </ul> </li> <li>• Species comprising the wetland bird community are expected to use the Terrestrial Wildlife RSA and TLSA for foraging, nesting, and overwintering. Some members of the wetland bird community are expected to migrate through, forage in, or disperse through marine areas</li> <li>• Community uses wetlands for breeding, foraging, or general living. Can be used to infer effects on other species that are associated with wetland habitat</li> <li>• Potential to interact with the Project through change in habitat, change in mortality risk, and change in movement</li> </ul>





**Table 3.5–1 Wildlife and Wildlife Habitat Key Species and Species Groups and Rationale for Selection**

Key Species or Species Group	Rationale for Selection
Shorebirds	<ul style="list-style-type: none"> <li>• Shorebirds are a group of wading birds that use wetland and marine shorelines for foraging, resting, and breeding. Sandhill crane and great blue heron are not shorebirds, but are included in the assessment of the shorebird group because they use many of the same habitats as shorebirds.</li> <li>• There are 29 species included in the shorebird group (Appendix A), each of which are migratory birds under the MBCA</li> <li>• Includes 9 species of conservation concern:             <ul style="list-style-type: none"> <li>– American golden-plover is blue-listed in BC (BC CDC 2024)</li> <li>– Whimbrel is red-listed in BC (BC CDC 2024)</li> <li>– Red knot, <i>roseaari</i> subspecies, is blue-listed in BC, is designated as Threatened by COSEWIC, and is federally listed as Threatened under Schedule 1 of SARA (BC CDC 2024; SRPR 2024)</li> <li>– Short-billed dowitcher is red-listed in BC (BC CDC 2024)</li> <li>– Red-necked phalarope is blue-listed in BC, is designated as Special Concern by COSEWIC, and is federally listed as Special Concern under Schedule 1 of SARA (BC CDC 2024; SRPR 2024)</li> <li>– Wandering tattler is blue-listed in BC (BC CDC 2024)</li> <li>– Lesser yellowlegs is blue-listed in BC, and designated as Threatened by COSEWIC (BC CDC 2024; SRPR 2024)</li> <li>– Great blue heron, <i>fannini</i> subspecies is blue-listed in BC, is designated as Special Concern by COSEWIC, and is federally listed as Special Concern under Schedule 1 of SARA (BC CDC 2024; SRPR 2024)</li> <li>– Killdeer is blue-listed in BC (BC CDC 2024)</li> </ul> </li> <li>• Great blue heron nests are protected year-round under the BC <i>Wildlife Act</i> and federal Migratory Birds Regulations. The Migratory Birds Regulations require that before a great blue heron nest can be removed, notification to the abandoned nest registry must be made, which then starts a 24-month waiting period during which time the nest must remain unoccupied by great blue heron or other migratory birds.</li> <li>• Shorebirds are expected to occur in shoreline and estuarine habitat in the Marine Terminal and Marine Shipping RSAs, OWSA and TLSA. Some species may also occur in suitable wetland habitat, including forested wetlands, in the Terrestrial Wildlife RSA and TLSA</li> <li>• The shorebird group uses wetlands, estuaries, and shoreline habitat. Different species may use different types of shoreline habitat, such as sandy beaches, mud flats, estuaries, or rocky shoreline. The Marine Terminal and Marine Shipping RSAs are primarily comprised of rocky material (i.e., bedrock, cobbles, boulders, gravel)</li> <li>• Potential to interact with the Project through change in habitat, change in mortality risk, and change in movement</li> </ul>





**Table 3.5–1 Wildlife and Wildlife Habitat Key Species and Species Groups and Rationale for Selection**

Key Species or Species Group	Rationale for Selection
Marine birds	<ul style="list-style-type: none"> <li>• The marine birds group includes the alcids, gulls, terns, loons, cormorants, diving ducks, mergansers, dabbling ducks, geese, swans, and pelagic birds</li> <li>• There are 72 species included in the marine bird group (Appendix A), of which 69 are migratory birds under the MBCA. The three cormorant species included in the group are not migratory birds under the MBCA</li> <li>• This group includes 23 species of conservation concern: <ul style="list-style-type: none"> <li>– Common murre is red-listed in BC (BC CDC 2024)</li> <li>– Ancient murrelet is blue-listed in BC, is designated as Special Concern by COSEWIC, and is federally listed as Special Concern under Schedule 1 of SARA (BC CDC 2024; SRPR 2024)</li> <li>– Marbled murrelet is blue-listed in BC, is designated as Threatened by COSEWIC, and is federally listed as Threatened under Schedule 1 of SARA (BC CDC 2024; SRPR 2024)</li> <li>– Cassin’s auklet is red-listed in BC, is designated as Special Concern by COSEWIC, and is federally listed as Special Concern under Schedule 1 of SARA (BC CDC 2024; SRPR 2024)</li> <li>– Horned puffin is red-listed in BC (BC CDC 2024)</li> <li>– Tufted puffin is blue-listed in BC (BC CDC 2024)</li> <li>– Surf scoter is blue-listed in BC (BC CDC 2024)</li> <li>– Black scoter is blue-listed in BC (BC CDC 2024)</li> <li>– Long-tailed duck is blue-listed in BC (BC CDC 2024)</li> <li>– Horned grebe is yellow-listed in BC, is designated as Special Concern by COSEWIC, and is federally listed as Special Concern under Schedule 1 of SARA (BC CDC 2024; SRPR 2024)</li> <li>– Western grebe is red-listed in BC, is designated as Special Concern by COSEWIC, and is federally listed as Special Concern under Schedule 1 of SARA (BC CDC 2024; SRPR 2024)</li> <li>– Yellow-billed loon is blue-listed in BC (BC CDC 2024)</li> <li>– Black-legged kittiwake is red-listed in BC (BC CDC 2024)</li> <li>– California gull is red-listed in BC (BC CDC 2024)</li> <li>– Caspian tern is blue-listed in BC (BC CDC 2024)</li> <li>– Parasitic jaeger is red-listed in BC (BC CDC 2024)</li> </ul> </li> </ul>





**Table 3.5–1 Wildlife and Wildlife Habitat Key Species and Species Groups and Rationale for Selection**

Key Species or Species Group	Rationale for Selection
Marine birds (cont'd)	<ul style="list-style-type: none"> <li>– Black-footed albatross is blue-listed in BC, is designated as Special Concern by COSEWIC, and is federally listed as Special Concern under Schedule 1 of SARA (BC CDC 2024; SRPR 2024)</li> <li>– Short-tailed albatross is red-listed in BC, is designated as Threatened by COSEWIC, and is federally listed as Threatened under Schedule 1 of SARA (BC CDC 2024; SRPR 2024).</li> <li>– Northern fulmar is red-listed in BC (BC CDC 2024)</li> <li>– Pink-footed shearwater is blue-listed in BC, is designated as Endangered by COSEWIC, and is federally listed as Endangered under Schedule 1 of SARA (BC CDC 2024; SRPR 2024)</li> <li>– Buller’s shearwater is blue-listed in BC (BC CDC 2024)</li> <li>– Brandt’s cormorant is red-listed in BC (BC CDC 2024)</li> <li>– Double-crested cormorant is blue-listed in BC (BC CDC 2024)</li> <li>• Dabbling ducks and diving ducks, including mergansers, are a Nisga’a valued component and are important to Indigenous nations. Gull eggs are traditionally harvested by some Indigenous nations</li> <li>• Marine birds are expected to occur in the Marine Terminal and Marine Shipping RSAs, marine portions of the TLSA, and OWSA. Marbled murrelet was selected as a stand-alone Key Species for the assessment</li> <li>• Marine bird species occur in nearshore and offshore marine waters. Some species frequently occur far offshore often at or beyond the continental shelf. Species may occur year-round or seasonally (Appendix A). Diving ducks include marine ducks, mergansers, and grebes that forage by diving to catch fish. Dabbling ducks typically occur in calm, relatively shallow waters such as sheltered bays, estuaries, and wetlands</li> <li>• Potential to interact with the Project through change in habitat, change in mortality risk, and change in movement</li> </ul>





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**Table 3.5–1 Wildlife and Wildlife Habitat Key Species and Species Groups and Rationale for Selection**

Key Species or Species Group	Rationale for Selection
Western toad	<ul style="list-style-type: none"> <li>• Western toad is provincially yellow-listed, is designated as Special Concern by COSEWIC, and is listed as Special Concern under SARA schedule 1 (BC CDC 2024, SRPR 2024)</li> <li>• Western toad is expected to occur in suitable habitat in the Terrestrial Wildlife RSA and TLSA. It is not expected to occur in the Marine Terminal or Marine Shipping RSAs or the OWSA</li> <li>• Population estimates for western toad are unavailable but recent data suggests the population is declining in northwestern BC (Slough and deBruyn 2018)</li> <li>• Breeding habitat includes shallow waterbodies, ponds, lakeshores, road ruts, ditches, alpine areas, wetlands, marshes, and open meadows (COSEWIC 2012d). Some populations seek warm springs over winter while others hibernate in cold water bodies (Slough and DeBruyn 2018)</li> <li>• Potential to interact with the Project through change in habitat, change in mortality risk, and change in movement</li> <li>• Breeding habitat can be used to infer effects on breeding habitat for other pond-dwelling amphibians</li> </ul>
<p>NOTE:  <sup>1</sup> Species identified as being of importance to the Nisga'a Nation and/or other Indigenous communities</p>	

1





## 1 4.0 FIELD STUDIES

2 Project-specific field surveys were completed in the Terrestrial Wildlife LSA and Marine Terminal LSA to  
3 supplement existing data compiled for this TDR. Survey programs were designed to target specific  
4 species or species groups during key seasonal periods. The plan to document existing conditions was  
5 provided to Nisga'a Nation for review, and feedback was incorporated into the survey plan. Project-  
6 specific surveys include breeding bird point-counts, northern goshawk call-playback, autonomous  
7 acoustic and ultrasonic recording surveys for owls and bats respectively, marine bird vessel surveys,  
8 marine bird and shorebird land-based surveys, remote cameras targeting medium- and large-sized  
9 mammals, amphibian surveys, and habitat suitability assessments for key species and species groups  
10 (see Section 5.0) to support the development of habitat suitability models. The methods and results for  
11 each survey program are discussed in the following sections.

### 12 4.1 BREEDING BIRD SURVEYS

13 Breeding bird (songbird) point-count surveys were completed to collect information on species presence,  
14 relative abundance, and diversity within broad habitat types present within the Terrestrial Wildlife LSA.

#### 15 4.1.1 Methods

16 Breeding bird point-count surveys were completed following the methods described in *Inventory Methods*  
17 *for Forest and Grassland Birds* (RISC 1999a), with adjustments based on *Inventory Methods for Swallows*  
18 *and Swifts* (RISC 1998a) and *Inventory Methods for Woodpeckers* (RISC 1999b). Surveys were  
19 completed between sunrise and up to 4 hours after sunrise. Surveys used a 100 m fixed radius for  
20 songbirds, and a 400 m fixed radius for swifts, swallows, and woodpeckers (RISC 1998a). Songbirds  
21 outside of 100 m, and swifts, swallows, and woodpeckers outside of 400 m, were recorded as incidentals.  
22 Each point count survey had a count duration of 10 minutes. At each survey station the field crew waited  
23 one minute after their arrival before starting the survey, to allow birds potentially affected by their arrival to  
24 return to normal activity.

25 Survey stations were pre-selected based on broad habitat type (e.g., forest, wetland) and distance  
26 between adjacent sites using satellite imagery. Final point-count station locations were determined in the  
27 field by the field crew based on site-specific conditions (e.g., broad habitat type, topography) and distance  
28 to adjacent point count stations. Stations were spaced at least 200 m apart to reduce the potential for  
29 double-counting songbirds at adjacent stations. Swifts, swallows, and woodpeckers had the potential to  
30 be double-counted because the count radius of 400 m could partially overlap with a count radius of  
31 another survey location.





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1 Point-count data was collected using Stantec’s proprietary digital data collection application, onLOOKer.  
2 Weather conditions and habitat information (i.e., forest or wetland type, forest class, tree species and  
3 tree species cover, shrub cover and herb cover) was collected at each survey station. Surveys were  
4 delayed or cancelled if wind speed was greater than 19 km/h (4 on the Beaufort Scale), there was  
5 moderate to heavy precipitation, or if ambient sound exceeded a moderate noise level (i.e., constant but  
6 not overwhelming).

#### 7 **4.1.2 Results**

8 Breeding bird point-count surveys were completed between June 9 and June 17, 2021, between  
9 0430 and 0800 hours. Surveys were completed at 32 stations, each sampled once, within the Terrestrial  
10 Wildlife LSA (Figure 4.1–1). Surveys were not completed in the southern portion of the Terrestrial Wildlife  
11 LSA due to access constraints (i.e., steep terrain) and because an expansion of the spatial extent of the  
12 Terrestrial Wildlife LSA was made after completion of the field season.

13 Survey stations were in wetland (13 stations), young forest (3 stations), and mature to old forest  
14 (16 stations) habitats. Freshwater wetlands comprise 188 ha (36%) of the Terrestrial Wildlife LSA  
15 (Ksi Lisims 2022b). Most wetlands were bogs comprised of multiple small to large ponds with deep, dark  
16 colored waters and little emergent vegetation. Terrestrial areas in bogs were characterized by a dominant  
17 herb layer with patches of mix coniferous shrub and stunted lodgepole pine. Forested areas were typical  
18 of the Coastal Western Hemlock (CWH) biogeoclimatic zone with dominant coniferous tree species  
19 including western hemlock, western redcedar, yellow cedar, and Sitka spruce mixed with thin deciduous  
20 riparian zones comprised of red alder (*Alnus rubra*) along drainages. Young forest (structural stage 4 to 5)  
21 comprises 18 ha (4%) of the Terrestrial Wildlife LSA (Ksi Lisims 2022b) characterized by natural and  
22 planted regenerating conifers within overgrown logging blocks. Mature (structural stage 6) to old  
23 (structural stage 7) forest comprises 303 ha (58%) of the Terrestrial Wildlife LSA (Ksi Lisims 2022b) and  
24 characterized by coniferous trees with a sparse to moderate shrub layer comprised mostly of blueberry  
25 (*Vaccinium* spp.), huckleberry (*Vaccinium ovatum*), salal (*Gaultheria shallon*) and false azalea  
26 (*Menziesia ferruginea*). Old forest was observed mainly along drainages and was characterized by  
27 patches of large Sitka spruce.



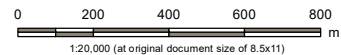


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**Notes**  
 1. Coordinate System: NAD 1983 UTM Zone 9N  
 2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada, Stantec, Rockies LNG, Maxar

- Breeding Bird Survey Site
- Boundaries of District Lots 7235 and 5431
- Terrestrial Wildlife Local Study Area
- International Boundary
- Project Mapped Stream
- Waterbody



Project Location: Pearse Island, BC  
 Project Number: 123221820  
 Prepared by SPARKER on 20220707  
 Requested by CBALL on 20220623  
 Checked by XXXX on 20220707

Client/Project/Report  
 Ksi Lisims LNG  
 Natural Gas Liquefaction and Marine Terminal  
 Technical Data Report – Wildlife and Wildlife Habitat

Figure No.

**4.1-1**

Title

**Breeding Bird Point Count Locations**

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Field Studies  
June 2024

- 1 Thirty bird species, and no species of conservation concern, were detected during the surveys  
2 (Table 4.1–1). Across habitats the most frequently detected species were Pacific-slope flycatcher  
3 (*Empidonax difficilis*) (26 birds detected across 20 sites) and Townsend’s warbler (*Setophaga townsendi*)  
4 (23 birds detected across 20 sites). Diversity was greater among wetland stations (26 species) compared  
5 to forested stations (20 species). Abundance was greater among forested stations (98 birds) compared to  
6 wetland stations (80 birds), but this may be because more survey stations were located in forest  
7 compared to wetland habitat.
- 8 The 400 m survey radius for swifts, swallows, and woodpeckers creates the potential for double-counting  
9 of individuals at adjacent stations. However, only one swallow, a tree swallow, was detected during  
10 surveys. Hairy woodpecker and red-breasted sapsucker were both detected at 6 stations. All detections  
11 of hairy woodpecker and red-breasted sapsucker were within 125 m of the survey station and detections  
12 did not occur at adjacent stations, suggesting that double-counting was unlikely to have occurred.

**Table 4.1–1 Breeding Bird Point-Count Survey Detections**

Species	Number of Birds Detected			
	Young Forest	Mature to Old Forest	Wetland	Total
Spruce grouse	-	-	1	1
Rufous hummingbird <sup>1</sup>	7	4	6	17
Sandhill crane <sup>1</sup>	-	-	2	2
Greater yellowlegs <sup>1</sup>	-	-	1	1
Red-tailed hawk	-	-	1	1
Red-breasted sapsucker <sup>1</sup>	1	1	5	7
Hairy woodpecker <sup>1</sup>	-	4	3	7
Pacific-slope flycatcher <sup>1</sup>	1	14	11	26
Warbling vireo <sup>1</sup>	-	-	2	2
Steller’s jay	-	2	1	3
American crow	3	-	1	4
Chestnut-backed chickadee <sup>1</sup>	-	1	3	4
Tree swallow <sup>1</sup>	1	-	-	1
Ruby-crowned kinglet <sup>1</sup>	-	-	1	1
Golden-crowned kinglet <sup>1</sup>	-	2	-	2
Pacific wren <sup>1</sup>	3	8	2	13
Varied thrush <sup>1</sup>	-	4	1	5
Swainson’s thrush <sup>1</sup>	1	1	1	3
Hermit thrush <sup>1</sup>	-	3	2	5
American robin <sup>1</sup>	-	5	1	6
Red crossbill <sup>1</sup>	-	12	6	18



**Table 4.1–1 Breeding Bird Point-Count Survey Detections**

Species	Number of Birds Detected			
	Young Forest	Mature to Old Forest	Wetland	Total
Pine siskin <sup>1</sup>	-	1	-	1
Dark-eyed junco <sup>1</sup>	-	1	9	10
Song sparrow <sup>1</sup>	-	-	1	1
Lincoln's sparrow <sup>1</sup>	-	-	3	3
Orange-crowned warbler <sup>1</sup>	-	1	1	2
American redstart <sup>1</sup>	-	-	2	2
Yellow-rumped warbler <sup>1</sup>	-	-	5	5
Townsend's warbler <sup>1</sup>	2	13	8	23
Western tanager <sup>1</sup>	-	2	-	2
<b>Total</b>	<b>19</b>	<b>79</b>	<b>80</b>	<b>178</b>
NOTE:				
<sup>1</sup> Indicates species is a migratory bird as listed under the <i>Migratory Birds Convention Act, 1994</i>				

## 1 4.2 NORTHERN GOSHAWK SURVEYS

2 Diurnal call-playback surveys were completed within the Terrestrial Wildlife LSA to collect information on  
3 the presence and distribution of northern goshawk, which is listed on Schedule 1 of SARA.

### 4 4.2.1 Methods

5 Call-playback surveys for northern goshawk were completed following the methods described in  
6 *Inventory Methods for Raptors* (RISC 2001). Potential call-playback stations were pre-selected using  
7 satellite imagery to identify potentially suitable northern goshawk habitat (e.g., mature forest) within the  
8 Terrestrial Wildlife LSA. Final selection of stations was made by the field crew based on habitat  
9 conditions. Stations were placed at least 400 m apart, and where possible, located in areas that allowed  
10 for the surveyors to visually scan the surrounding environment.



Field Studies  
June 2024

1 Upon arrival at each survey station, the survey crew remained quiet for one minute prior to commencing  
2 the survey to allow potentially disturbed birds to resume normal activity and to listen for northern  
3 goshawk. A nine-minute call playback sequence of recorded northern goshawk calls was broadcasted  
4 using a FoxPro X2S device. The sequence was comprised of:

- 5 • 2 minutes of listening and visual scans
- 6 • Played northern goshawk alarm call for 20 seconds, followed by 30 seconds of listening and  
7 visual scans
- 8 • Played recording of northern goshawk juvenile begging call for 20 seconds, followed by 30 seconds  
9 of listening and visual scans
- 10 • Played recording of northern goshawk alarm call for 20 seconds
- 11 • 5 minutes of listening and visual scans

12 Call-playback surveys were ceased if a northern goshawk was detected, to limit further disturbance. If a  
13 northern goshawk was detected, the biologists recorded the detection type (e.g., visual, auditory, both),  
14 direction and estimated distance to detection, time of detection, number of individuals, and sex (if known).  
15 As well, weather conditions and habitat information (i.e., forest type, tree species, tree cover, stand age,  
16 stand cover, and understory cover) were collected at each survey station. Surveys were delayed or  
17 cancelled if wind was greater than 19 km/h (4 on the Beaufort Scale), precipitation exceeded a light  
18 drizzle, ambient sound exceeded moderate noise level (constant but not overwhelming), or if visibility was  
19 too poor to detect flying birds.

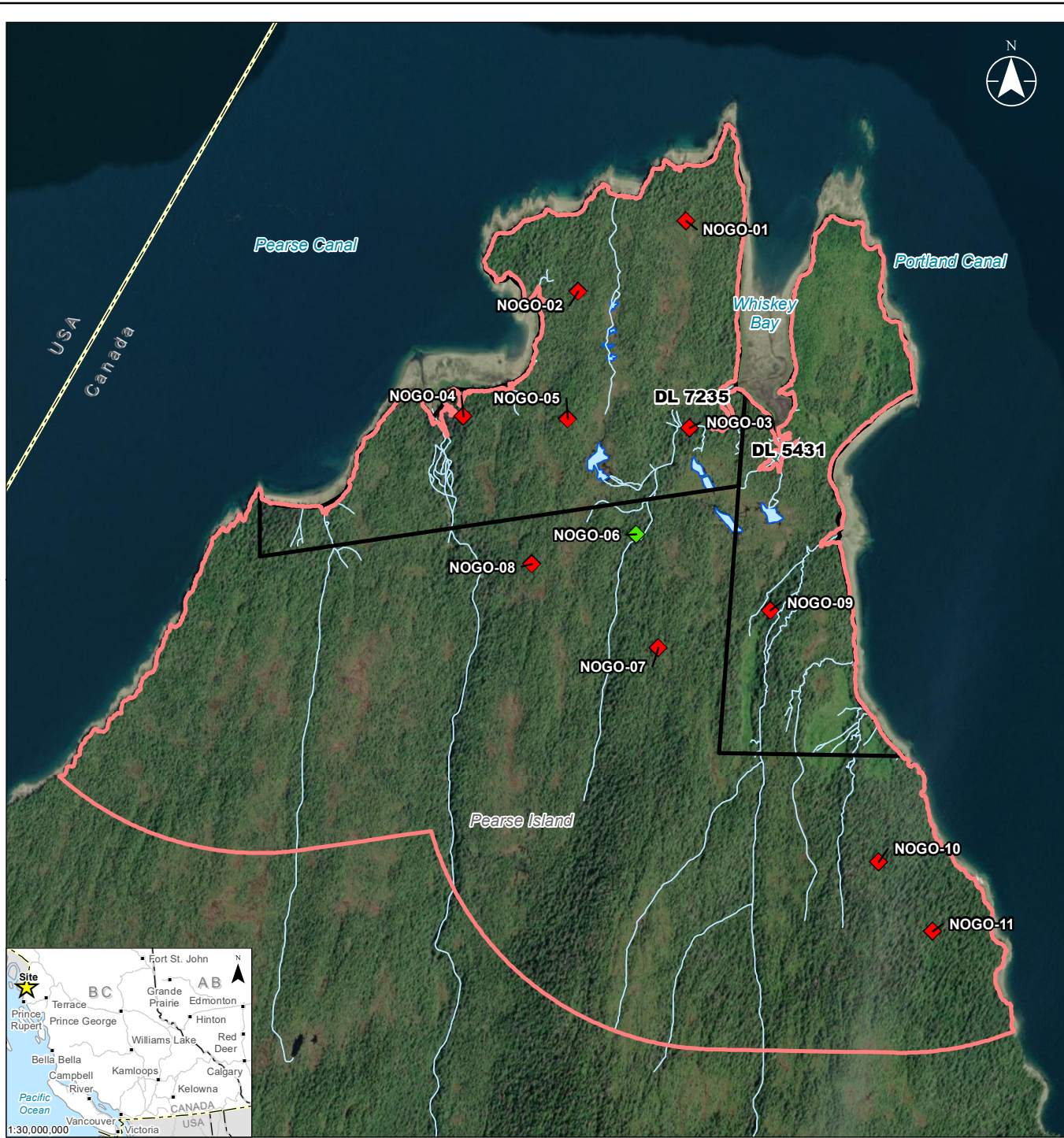
## 20 **4.2.2 Results**


21 Northern goshawk call-playback surveys were completed between June 10 and June 15, 2021, between  
22 0800 hrs and 1400 hrs. Eleven sites were surveyed within the Terrestrial Wildlife LSA. Most sites (ten)  
23 were in mature coniferous forest, and one site was in a treed bog. Western hemlock was the dominant  
24 tree species at most (ten) sites. Other tree species present were western redcedar, Sitka spruce,  
25 lodgepole pine, and red alder. Sites were located between 7 m and 129 m above sea level.

26 Northern goshawk was detected on June 14, 2021 at one site (Figure 4.2–1) where one adult flew while  
27 calling towards the survey station from the south, approaching within approximately 20 m of the survey  
28 station before flying off to the south. A search was completed for potential northern goshawk nests within  
29 approximately 50 m of the detection. No northern goshawk nests were detected.

30







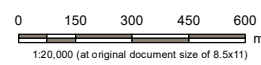
**Notes**


- Coordinate System: NAD 1983 UTM Zone 9N
- Data Sources: DataBC, Government of British Columbia; Natural Resources Canada, Stantec, Rockies LNG, Maxar

**Northern Goshawk Call-Playback Survey**

- ◆ Not Detected
- ◆ Detected
- Boundaries of District Lots 7235 and 5431
- Terrestrial Wildlife Local Study Area

- International Boundary
- Project Mapped Stream
- Waterbody





Project Location:  
Pearse Island, BC

Project Number: 123221820  
 Prepared by TQUILICHINI on 20220118  
 Requested by CBALL on 20220112  
 Checked by NFORRESTER on 20220118

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 Technical Data Report – Wildlife and Wildlife Habitat

Figure No.  
**4.2-1**

Title  
**Northern Goshawk Call-Playback Survey  
 Station and Detection Locations**

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## 1 **4.3 NOCTURNAL RAPTOR SURVEYS**

2 Western screech-owl, *kennicottii* subspecies, is listed on Schedule 1 of *SARA* and is likely to occur within the  
3 Terrestrial Wildlife RSA. Additional nocturnal raptor species that may occur in the Terrestrial Wildlife LSA  
4 include great horned owl (*Bubo virginianus*), barred owl, northern pygmy-owl, and northern saw-whet owl.

5 Autonomous acoustic recording units (ARUs) were used to passively survey for nocturnal raptors as the  
6 ARUs have the benefit of being able to be deployed for long periods. While this survey targeted western  
7 screech-owl, the ARUs record the songs or calls of other species that may be calling at the same time.

### 8 **4.3.1 Methods**

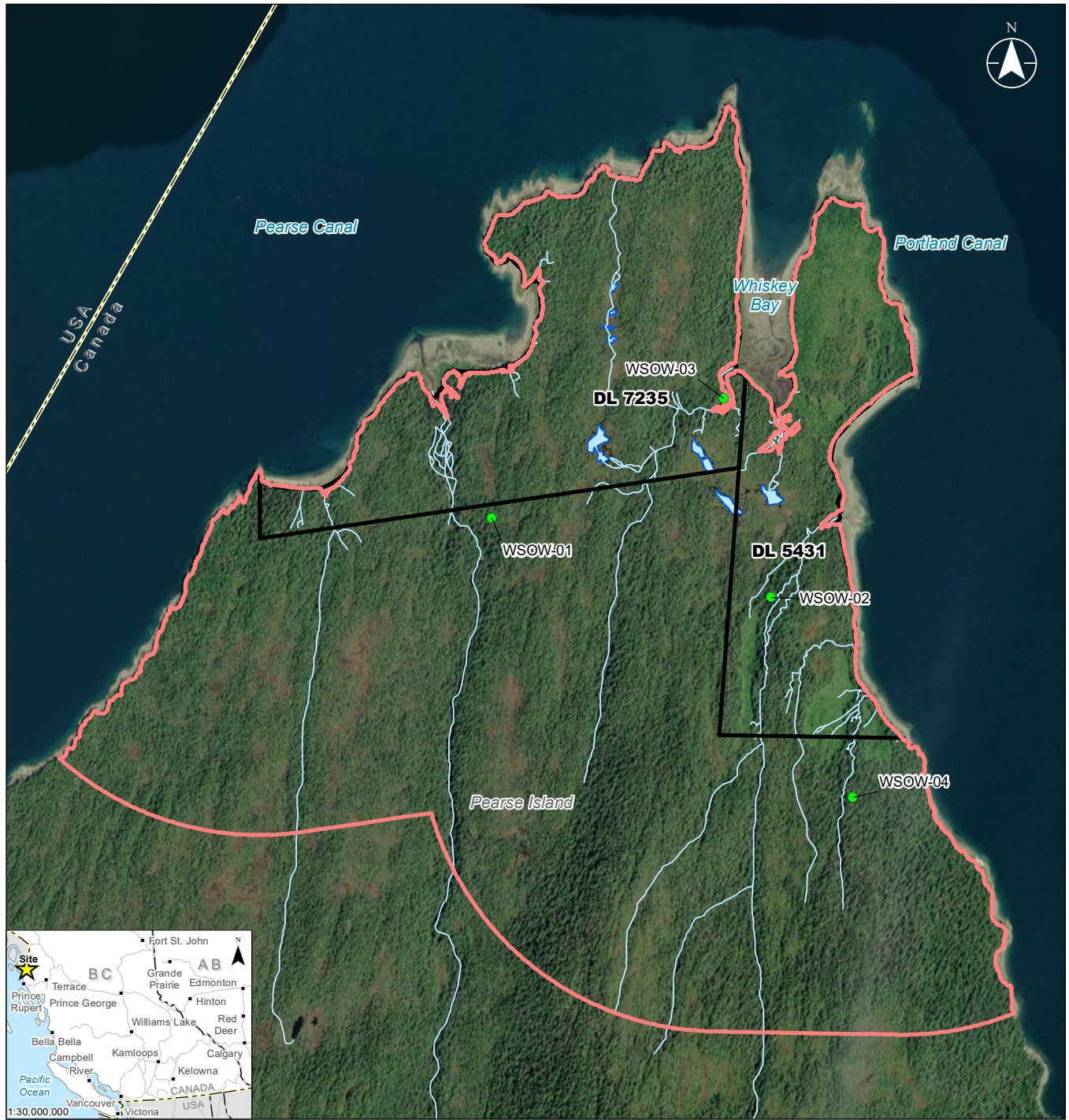
9 Four Wildlife Acoustics SM2 ARUs, each equipped with a single omnidirectional external microphone,  
10 were deployed within the Terrestrial Wildlife LSA to collect information on the presence and activity of  
11 nocturnal raptors. The ARUs were deployed in mature to old coniferous forests suitable for western  
12 screech-owl. Deployment sites were identified using information collected from vegetation and wildlife  
13 habitat assessment surveys. The ARUs were securely mounted on trees approximately 1.5 to 2.0 m  
14 above ground. The ARUs were programmed to record for 15 minutes, once per hour, between sunset and  
15 sunrise, to coincide with the expected timing of western screech-owl vocalizations (e.g., RISC 2001; RISC  
16 2006).

17 Acoustic files were analyzed using the Kaleidoscope Pro 5.4.2 (Wildlife Acoustics, Inc., Maynard, MD)  
18 cluster analysis, which finds and groups similar acoustic patterns using a custom classifier. An advanced  
19 classifier was developed for western screech-owl and an acceptance threshold of 2.0 maximum distance  
20 from cluster centre was used to include all detected vocalizations in the analysis. All other settings were  
21 set to manufacturer's defaults. A subset of the files with the lowest distance to the cluster centre were  
22 manually classified (i.e., listened to) using Kaleidoscope Pro's Viewer software.

### 23 **4.3.2 Results**

24 Acoustic recorders were deployed at four sites within the Terrestrial Wildlife LSA (Figure 4.3–1).  
25 The four sites were in mature to old coniferous forest within 50 m of water (e.g., wetland or stream).  
26 Western redcedar, Sitka spruce, and western hemlock were the dominant tree species.

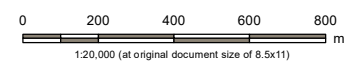




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- Western Screech-Owl Recorder Site
- Boundaries of District Lots 7235 and 5431
- Terrestrial Wildlife Local Study Area
- International Boundary
- Project Mapped Stream
- Waterbody



Project Location: Pearce Island, BC  
 Project Number: 12321820  
 Prepared by SPARKER on 20220707  
 Requested by CBALL on 20220623  
 Checked by XXXX on 20220707

Client/Project/Report  
 Ksi Lisims LNG  
 Natural Gas Liquefaction and Marine Terminal  
 Technical Data Report – Wildlife and Wildlife Habitat

Figure No.  
**4.3-1**

Title  
**Western Screech-Owl Acoustic Recorder  
 Deployment Locations**

- Notes**
1. Coordinate System: NAD 1983 UTM Zone 9N
  2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada, Stantec, Rockies LNG, Maxar

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Field Studies  
June 2024

1 A total of 1,937 acoustic files were recorded over 177 survey nights between March 28 and May 13,  
2 2022. Kaleidoscope Pro’s cluster analysis produced a total of 30,640 detected individual sound files, each  
3 representing a possible vocalization (Table 4.3–1). The files with the lowest distance to the cluster centre  
4 were manually classified and no western screech-owl vocalizations, or vocalizations from other owl  
5 species were detected. There were, however, identifiable vocalizations from red-breasted sapsucker,  
6 sandhill crane (*Grus canadensis*), and hermit thrush (*Catharus guttatus*).

7 **Table 4.3–1 Summary of Acoustic Recorder Deployment and Detection Information**

Site	Deployment Date	Retrieval Date	No. Survey Nights	No. Acoustic Files Recorded	Red-breasted Sapsucker	Sandhill Crane	Hermit Thrush
WSOW-01	March 29, 2022	May 13, 2022	45	496	present	-	-
WSOW-02	March 30, 2022	May 13, 2022	44	471	-	present	-
WSOW-03	March 28, 2022	May 12, 2022	45	500	-	-	-
WSOW-04	March 31, 2022	May 13, 2022	43	470	-	-	present

8 **4.4 MARINE BIRD VESSEL SURVEYS**

9 Marine bird vessel surveys were completed to determine presence, relative abundance, and distribution  
10 patterns of birds in the marine environment, which may be affected by shipping route traffic, floating  
11 facilities, or nearshore Project activities. The purpose of the fall migration and eulachon spawn surveys  
12 was to document use of the Marine Terminal LSA by marine birds such as gulls, cormorants, alcids,  
13 phalaropes, mergansers, and ducks.

14 **4.4.1 Methods**

15 Vessel surveys were completed adjacent to the proposed Project facility in Pearse Canal, Portland Canal,  
16 Observatory Inlet, and the upper portion of Portland Inlet adjacent to Portland Canal. The survey area  
17 was stratified into near-shore (within 500 m of shore) and far-shore (more than 500 m from shore) areas  
18 to be consistent with other existing data collected from the region (e.g., PRGT). Surveys were timed to  
19 coincide with the fall marine bird migratory period and eulachon fish spawning period (typically early to  
20 mid March).

21 Survey methods followed the *Inventory Methods for Seabirds: cormorants, gulls, murre, storm-petrels,*  
22 *Ancient Murrelet, auks, puffins, and Pigeon Guillemot* (RISC 1997a). Surveys were completed along  
23 transects oriented parallel to the coastline using a mid-sized vessel at a speed not exceeding 10 knots  
24 (RISC 1997a). To maintain near-shore (i.e., within 500 m of shore) and far-shore stratification, transects  
25 were linear or curvilinear, depending on the contour of the coastline. Transects 2-km long were spaced at  
26 least 500 m apart, with a minimum 500 m gap between the end and start of sequential transects.





Field Studies  
June 2024

1 A GPS was used to navigate to transect 'start' and 'end' waypoints and to navigate along each transect  
2 line. Each biologist (one on each side of the vessel) recorded birds detected within 200 m of the center-  
3 line of the transect to species.

4 Biologists continuously scanned for birds directly in front of the vessel to 90° toward the port and  
5 starboard side and routinely scanned the transect centreline for birds that could dive or flush as the  
6 vessel approached. For each detection, the transect name, time, species, number of individuals, age,  
7 sex, behaviour, and estimated distance from the transect centreline were recorded. Biologists recorded  
8 birds detected in the air or on the water, including raptors, common raven, and American crow  
9 (*Corvus brachyrhynchos*). Birds detected outside of the 200 m survey limit were recorded as incidental  
10 observations.

11 Survey conditions were recorded every 30 minutes throughout the day or when there was a marked  
12 change in weather. Data recorded include time, location, temperature, wind speed and direction,  
13 precipitation, sea state, tide state, and visibility. Surveys were suspended in rainy or windy conditions  
14 (i.e., above 4, greater than 19 km/h, on the Beaufort scale). The vessel travel path was oriented to avoid  
15 glare to the extent possible (RISC 1997a).

#### 16 **4.4.2 Results**

##### 17 **Fall Migration Period**

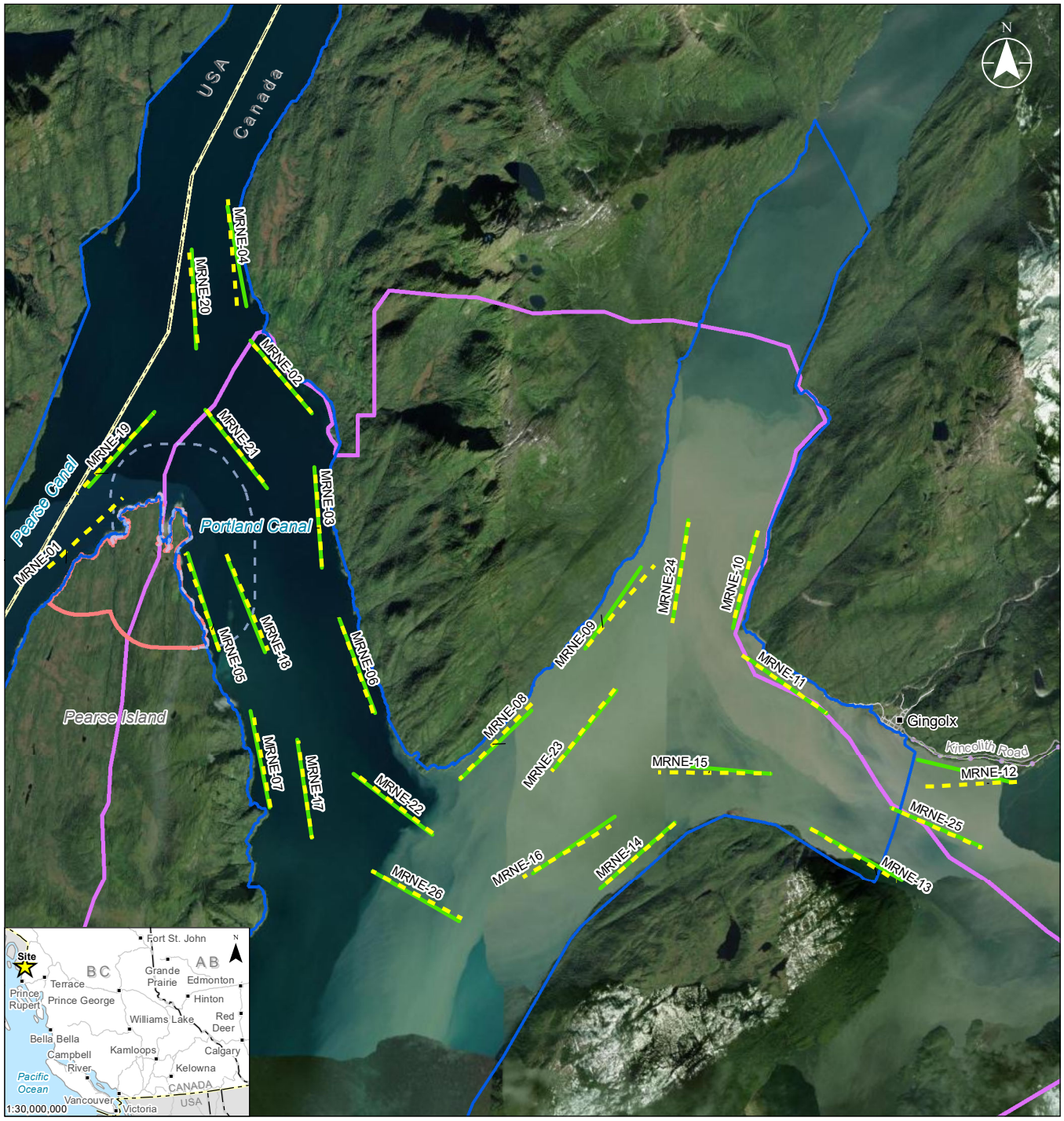
18 Fall migration surveys were completed from October 4 to October 6, 2021, along 26 transects  
19 (Figure 4.4–1). Transects were stratified into nearshore (n=14) and offshore (n=12) groups. The distance  
20 from shore to the centerline of nearshore transects ranged from 59 m to 291 m, and the distance from  
21 shore to the centreline of offshore transects ranged from 790 m to 2,141 m.

22 There were 1,082 birds comprised of 24 species detected across the transects (Table 4.4–1). Detections  
23 of species of conservation concern were California gull, surf scoter, marbled murrelet, western grebe, and  
24 red-necked phalarope. Thirteen species of importance to Indigenous communities were observed during  
25 the surveys (Table 4.4–1).

26 Most birds (1,012) were detected in the nearshore strata (Table 4.4–1). Species diversity was greatest  
27 within 51 m to 100 m from the vessel (15 species), while species abundance was greatest within 100 m to  
28 200 m from the vessel (498 birds). The most frequently detected species in the nearshore strata were surf  
29 scoter (261 birds), glaucous-winged gull (255 birds), and herring gull (109 birds). The nearshore transects  
30 with the greatest number of birds were Transect-02 (270 birds), Transect-07 (205 birds), and Transect-01  
31 (187 birds). All other nearshore transects had fewer than 100 birds.

32 Relatively few birds (70) were detected in the offshore strata. Species diversity and abundance was  
33 greatest within 100 m to 200 m from the vessel in the offshore strata. The most frequently detected  
34 species in the offshore strata were herring gull (19 birds), surf scoter (18 birds), and glaucous-winged gull  
35 (11 birds). The offshore transects with the greatest number of birds were Transect-25 (19 birds),  
36 Transect-24 (15 birds), and Transect-19 (13 birds).





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**Notes**  
 1. Coordinate System: NAD 1983 UTM Zone 9N  
 2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada, Stantec, Rockies LNG, Maxar

- Populated Place
- Fall Migration Survey Transect for Birds
- Spring (Eulachon Spawning) Survey Transect for Birds
- Marine Terminal Local Study Area
- Marine Terminal Regional Study Area
- Terrestrial Wildlife Local Study Area
- Transmission Line Study Area
- International Boundary



Project Location: Pearse Island, BC  
 Project Number: 123221820  
 Prepared by SPARKER on 20220707  
 Requested by CBALL on 20220623  
 Checked by TQUILICHINI on 20220712

Client/Project/Report  
 Ksi Lisims LNG  
 Natural Gas Liquefaction and Marine Terminal  
 Technical Data Report – Wildlife and Wildlife Habitat

Figure No.  
**4.4-1**

Title  
**Marine Bird Vessel Surveys in the Marine Terminal Regional Study Area**

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Field Studies  
June 2024

**Table 4.4–1 Species Detected during Fall Migration Marine Bird Vessel Surveys**

Strata	Species	Number of Individuals Detected				Number of Transects with Detections
		0 – 50 m	51 – 100 m	100 – 200 m	Total	
Nearshore	Mallard <sup>2,3</sup>	-	7	13	<b>20</b>	3
	Harlequin duck <sup>2,3</sup>	-	7	-	<b>7</b>	1
	Surf scoter <sup>1,2,3</sup>	8	127	126	<b>261</b>	5
	White-winged scoter <sup>2,3</sup>	-	1	30	<b>31</b>	2
	Barrow's goldeneye <sup>2,3</sup>	-	43	12	<b>55</b>	4
	Common merganser <sup>2,3</sup>	-	3	-	<b>3</b>	1
	Red-necked grebe <sup>2</sup>	-	1	4	<b>5</b>	2
	Western grebe <sup>1,2</sup>	-	2	2	<b>4</b>	3
	Black turnstone <sup>2</sup>	-	-	75	<b>75</b>	1
	Surfbird <sup>2</sup>	-	25	-	<b>25</b>	1
	Bonaparte's gull <sup>2,3</sup>	8	56	14	<b>78</b>	8
	Short-billed gull <sup>2,3</sup>	6	19	45	<b>70</b>	10
	California gull <sup>1,2,3</sup>	4	-	2	<b>6</b>	2
	Herring gull <sup>2,3</sup>	32	33	44	<b>109</b>	93
	Iceland gull <sup>2,3</sup>	1	-	-	<b>1</b>	1
	Glaucous-winged gull <sup>2,3</sup>	25	28	202	<b>255</b>	10
	Red-throated loon <sup>2</sup>	1	-	1	<b>2</b>	2
	Pacific loon <sup>2</sup>	-	-	1	<b>1</b>	1
Common loon <sup>2</sup>	-	-	2	<b>2</b>	2	
Bald eagle <sup>3</sup>	1	1	-	<b>2</b>	2	





Field Studies  
June 2024

**Table 4.4–1 Species Detected during Fall Migration Marine Bird Vessel Surveys**

Strata	Species	Number of Individuals Detected				Number of Transects with Detections
		0 – 50 m	51 – 100 m	100 – 200 m	Total	
Offshore	Surf scoter <sup>1,2,3</sup>	11	-	7	<b>18</b>	2
	Western grebe <sup>1,2</sup>	-	-	10	<b>10</b>	1
	Red-necked phalarope <sup>1,2</sup>	-	1	-	<b>1</b>	1
	Marbled murrelet <sup>1,2</sup>	-	-	1	<b>1</b>	1
	Short-billed gull <sup>2,3</sup>	-	1	2	<b>3</b>	2
	Herring gull <sup>2,3</sup>	9	4	6	<b>19</b>	6
	Glaucous-winged gull <sup>2,3</sup>	2	7	2	<b>11</b>	6
	Red-throated loon <sup>2</sup>	-	-	2	<b>2</b>	1
	Pacific loon <sup>2</sup>	-	1	-	<b>2</b>	1
	Fork-tailed storm-petrel <sup>2</sup>	1	1	1	<b>3</b>	2

NOTES:

<sup>1</sup> Indicates a species of conservation concern

<sup>2</sup> Indicates species is listed under the MBCA, 1994

<sup>3</sup> Indicates a species of importance to Nisga'a Nation or other Indigenous communities





Field Studies  
June 2024

1 Eight species were present in both nearshore and offshore strata. Species diversity was greater in the  
2 nearshore strata (20 species) than in the offshore strata (10 species). This may be a result of different  
3 species assemblages which occur in nearshore and offshore waters. Species that prefer sheltered waters  
4 (e.g., mallard) or occur in the intertidal zone (e.g., black turnstone, surfbird) were not detected on offshore  
5 transects. Relatively few birds (15) were detected along Transect-05 which overlaps the waterlot and  
6 proposed marine facilities.

7 Surveys detected seven species in both the nearshore and offshore strata. Some species, such as  
8 mallard and red-necked grebe, were only detected in the nearshore strata and other species, such as  
9 fork-tailed storm petrel and red-necked phalarope, were detected only in offshore strata.

## 10 **Spring (Eulachon Spawning) Period**

11 Marine bird vessel surveys were completed from March 7 to March 9, 2022 during the spring eulachon  
12 spawning period. Surveys were completed along 25 transects stratified into nearshore (n=13) and  
13 offshore (n=12) groups (Figure 4.4–1). The distance from shore to the centerline of nearshore transects  
14 ranged from 48 m to 214 m, and the distance from shore to the centreline of offshore transects ranged  
15 from 770 m to 2,197 m.

16 There were 1,521 birds comprised of 22 species detected across the transects (Table 4.4–2). Species of  
17 conservation concern detected were long-tailed duck, surf scoter, common murre, marbled murrelet, and  
18 yellow-billed loon. Fifteen species of importance to Indigenous communities were observed during  
19 surveys (Table 4.4–2).

20 Most birds (1,082) were detected in the nearshore strata (Table 4.4–2). Species diversity was greatest  
21 within 51 m to 100 m from the vessel (18 species), and species abundance was greatest within 100 m to  
22 200 m from the vessel (741 birds). The most frequently detected species in the nearshore strata were  
23 Barrow's goldeneye (444 birds), short-billed gull (320 birds), and surf scoter (95 birds). The nearshore  
24 transects with the greatest number of birds were Transect-04 (616 birds) and Transect-05 (184 birds).

25 Fewer birds (439) were detected in the offshore strata compared to the nearshore strata. In the offshore  
26 strata, species diversity and abundance were similar among distance bands. The most frequently  
27 detected species in the offshore strata were short-billed gull (192 birds), surf scoter (94 birds), and  
28 herring gull (44 birds). The offshore transects with the greatest number of birds were Transect-25  
29 (171 birds) and Transect-18 (68 birds).

30 Surveys detected 10 species in both the nearshore and offshore strata. Some species, such as mallard  
31 and Canada goose, were detected only in the nearshore strata and other species, such as long-tailed  
32 duck, were only detected in offshore strata.





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**Table 4.4–2 Species Detected during Eulachon Spawning Period Marine Bird Vessel Surveys**

Strata	Species	Number of Individuals Detected				Number of Transects with Detections
		0 – 50 m	51 – 100 m	100 – 200 m	Total	
Nearshore	Canada goose <sup>2,3</sup>	-	-	5	<b>5</b>	1
	Mallard <sup>2,3</sup>	-	3	-	<b>3</b>	1
	Harlequin duck <sup>2,3</sup>	-	-	3	<b>3</b>	1
	Surf scoter <sup>1,2,3</sup>	11	34	50	<b>95</b>	6
	Bufflehead <sup>2,3</sup>	-	4	28	<b>32</b>	4
	Common goldeneye <sup>2,3</sup>	-	10	5	<b>15</b>	5
	Barrow's goldeneye <sup>2,3</sup>	-	116	328	<b>444</b>	4
	Common merganser <sup>2,3</sup>	-	1	-	<b>1</b>	1
	Black turnstone <sup>2</sup>	-	4	-	<b>4</b>	1
	Common murre <sup>1,2</sup>	-	1	1	<b>2</b>	2
	Marbled murrelet <sup>1,2</sup>	-	3	4	<b>7</b>	3
	Short-billed gull <sup>2,3</sup>	3	22	295	<b>320</b>	11
	Ring-billed gull <sup>2,3</sup>	-	1	-	<b>1</b>	1
	Herring gull <sup>2,3</sup>	-	20	3	<b>23</b>	2
	Glaucous-winged gull <sup>2,3</sup>	-	32	5	<b>37</b>	5
	Yellow-billed loon <sup>1,2</sup>	-	1	-	<b>1</b>	1
	Pelagic cormorant	1	2	-	<b>3</b>	2
	Bald eagle <sup>3</sup>	-	3	4	<b>7</b>	4
	American crow	2	65	10	<b>77</b>	4
Common raven	-	2	-	<b>2</b>	1	





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**Table 4.4–2 Species Detected during Eulachon Spawning Period Marine Bird Vessel Surveys**

Strata	Species	Number of Individuals Detected				Number of Transects with Detections
		0 – 50 m	51 – 100 m	100 – 200 m	Total	
Offshore	Surf scoter <sup>1,2,3</sup>	11	32	51	<b>94</b>	3
	Long-tailed duck <sup>1,2,3</sup>	-	-	8	<b>8</b>	1
	Bufflehead <sup>2,3</sup>	-	-	2	<b>2</b>	1
	Common murre <sup>1,2</sup>	5	18	12	<b>35</b>	3
	Marbled murrelet <sup>1,2</sup>	4	5	10	<b>19</b>	3
	Short-billed gull <sup>2,3</sup>	6	65	121	<b>192</b>	12
	Ring-billed gull <sup>2,3</sup>	-	5	-	<b>5</b>	1
	Herring gull <sup>2,3</sup>	10	14	20	<b>44</b>	3
	Iceland gull <sup>2,3</sup>	-	1	-	<b>1</b>	1
	Glaucous-winged gull <sup>2,3</sup>	4	18	8	<b>30</b>	8
	Pelagic cormorant	2	5	1	<b>8</b>	3
	Common raven	-	-	1	<b>1</b>	1

NOTES:  
<sup>1</sup> Indicates a species of conservation concern  
<sup>2</sup> Indicates species is listed under the MBCA 1994  
<sup>3</sup> Indicates a species of importance to Nisga'a Nation or other Indigenous communities

1





## 1 4.5 SHOREBIRD AND MARINE BIRD SURVEYS

2 Stationary point-count surveys were completed to determine presence and relative abundance of birds in  
3 the marine environment that may be affected by the floating facilities or nearshore Project activities.  
4 The purpose of the spring and late-summer surveys was to document use of the Marine Terminal LSA by  
5 migrating shorebirds. The purpose of the mid-summer surveys was to document use of the  
6 Marine Terminal LSA by marbled murrelet during the post-fledging period. These surveys also recorded  
7 use of the marine environment by bald eagle and other non-target species. Additionally, a vessel-based  
8 transect survey was completed during the spring and fall shorebird migration period to complement the  
9 stationary shore-based surveys.

### 10 4.5.1 Methods

#### 11 4.5.1.1 Shore-based Surveys

12 Shore-based survey methods followed the methods described in *Standardized Inventory Methodologies*  
13 *for Components of British Columbia's biodiversity: Shorebirds. Plovers, Oystercatchers, Stilts, Avocets,*  
14 *Sandpipers, Phalaropes, and Allies* (RISC 1997b). Surveys were completed at ten stationary shoreline  
15 stations spaced at least 500 m apart. Stations were pre-selected using satellite imagery and finalized in  
16 the field based on access and visibility. Surveys were repeated at the same stations during the spring,  
17 mid-summer, and late-summer survey periods.

18 Surveys were timed to occur during daylight hours and between 2 hours before and 2 hours after high  
19 tide, when birds were expected to be more active. May and August surveys were timed to coincide with  
20 the spring and fall shorebird migratory period. July surveys were timed to coincide with the marbled  
21 murrelet post-fledging period.

22 Biologists recorded all birds observed in a 20-minute period within a 300 m radius from the point of  
23 observation on land where a clear line of sight to the water and shoreline could be viewed. Data was  
24 recorded using Stantec's proprietary data collection application, onLOOKer. Birds identified outside the  
25 300 m radius were recorded as incidental observations. For all detections, biologists recorded the  
26 observation time, species or species guild, number of individuals, behavior, and age and sex when  
27 possible.

28 In addition to species information, environmental data was recorded at each station including  
29 temperature, wind speed and direction, precipitation, sea state (using the Beaufort scale), visibility,  
30 glare condition, and tide state. Stationary shore surveys were suspended in conditions where visibility  
31 was reduced or bird behavior would be influenced, such as during heavy precipitation or when the  
32 sea state is greater than three on the Beaufort scale (e.g., wind speed greater than 19 km/h,  
33 large wavelets with scattered whitecaps).





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#### 1    **4.5.1.2            Vessel-based Surveys**

2    A vessel-based transect survey was completed during the spring and fall shorebird migration period to  
3    document the presence of shorebirds and marine birds. The vessel-based transect survey was not  
4    completed during the marbled murrelet post-fledging period survey. The vessel transect survey was  
5    intended to complement shore-based surveys and provide additional information on shorebird and  
6    marine bird use of the Marine Terminal LSA. A single, continuous transect was surveyed along the  
7    shoreline within the Marine Terminal LSA. The vessel travelled along the shoreline at approximately 60 m  
8    from shore and at a speed of 4 knots. The survey was completed by one biologist surveying from the  
9    vessel. For each bird detected the biologist recorded the observation time and location, species or  
10   species guild, number of individuals, behavior, and where possible age and sex.

#### 11   **4.5.2            Results**

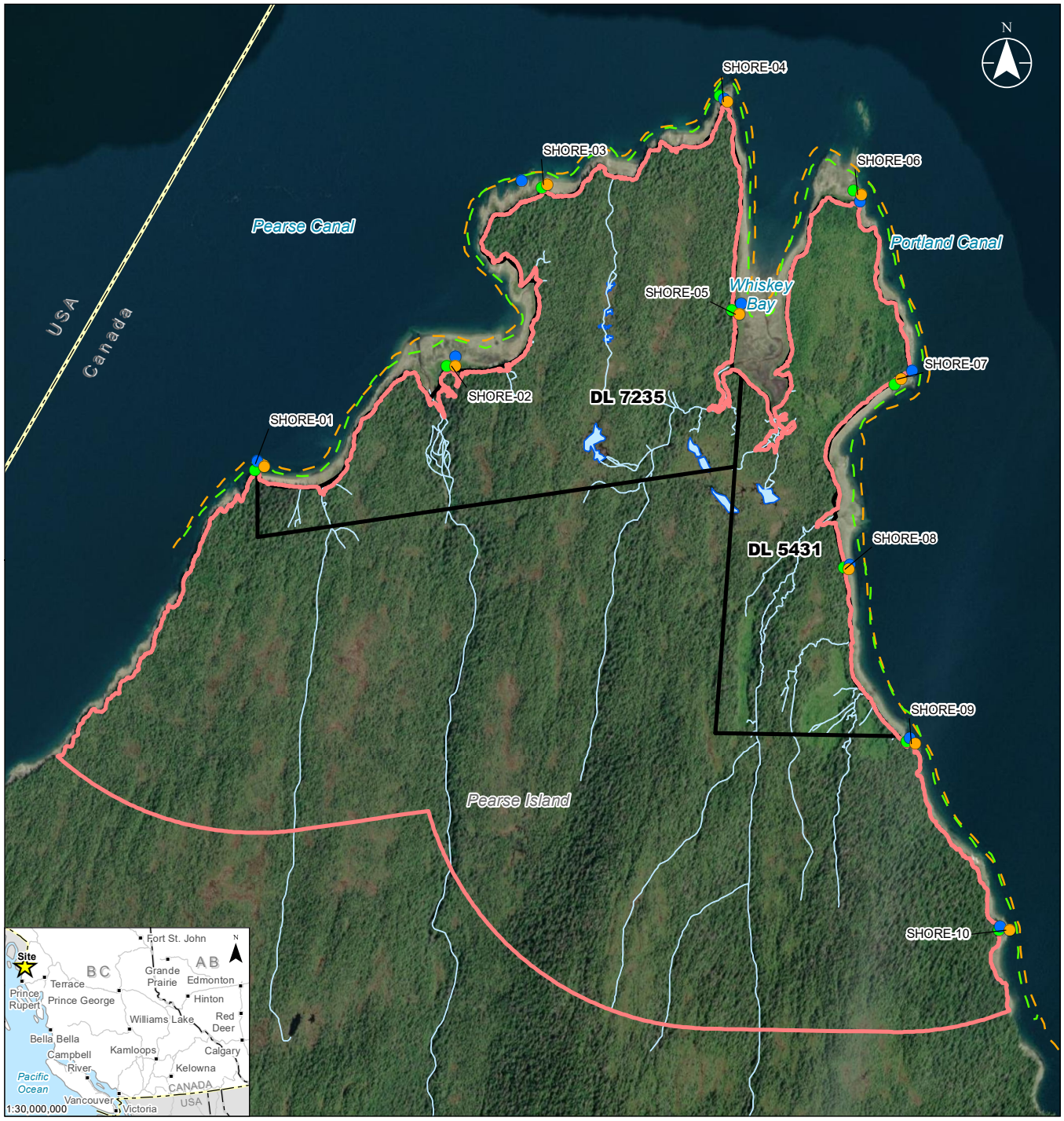
##### 12   **4.5.2.1           Shore-based Surveys**

13   Shore-based surveys were completed at 10 stations during the marbled murrelet post-fledging and spring  
14   migration survey periods, and at nine stations during the fall migration survey period (Figure 4.5–1). The  
15   precise location of each survey station varied slightly between survey periods. Most stations were located  
16   on steep rocky ledges or outcrops positioned between the forested edge and marine waters. Stations  
17   located within coves or bays were a mix of rock outcrops and beaches containing material ranging from  
18   cobble to sand.

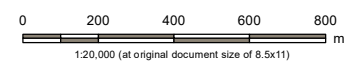
##### 19   **Marbled Murrelet Post-Fledging Period**

20   The marbled murrelet post-fledging period surveys were completed from July 16 to July 19, 2021. A total  
21   of 20 marbled murrelet were detected across five survey stations. Marbled murrelet was most abundant at  
22   SHORE-06 (six birds) and SHORE-09 (nine birds) (Figure 4.5–1). All but one marbled murrelet was  
23   detected at least 100 m offshore, and most (15 birds) were detected at least 150 m offshore. An  
24   additional eight bird species were detected during the surveys, including one species of conservation  
25   concern (surf scoter), and three species of Indigenous concern (Table 4.5–1).





- Survey Type**
- Spring Migration
  - Fall Migration
  - Marbled Murrelet Fledgling
  - Fall Vessel Transect
  - Spring Vessel Transect
  - Boundaries of District Lots 7235 and 5431
  - Terrestrial Wildlife Local Study Area
- - - International Boundary
  - Project Mapped Stream
  - Waterbody



Project Location: Pearse Island, BC  
 Project Number: 123221820  
 Prepared by SPARKER on 20220707  
 Requested by CBALL on 20220623  
 Checked by TQUILICHINI on 20220712

Client/Project/Report  
 Ksi Lisims LNG  
 Natural Gas Liquefaction and Marine Terminal  
 Technical Data Report – Wildlife and Wildlife Habitat

Figure No.  
**4.5-1**

Title  
**Shore-based and Vessel Transect Survey Locations for Shorebirds and Marine Birds**

**Notes**  
 1. Coordinate System: NAD 1983 UTM Zone 9N  
 2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada, Stantec, Rockies LNG, Maxar

Disclaimer: Stantec assumes no responsibility for data supplied in electronic format. The recipient accepts full responsibility for verifying the accuracy and completeness of the data. The recipient releases Stantec, its officers, employees, consultants and agents, from any and all claims arising in any way from the content or provision of the data.

S:\12322\projects\123221820\figures\reports\TDR\Wildlife\fig\_4\_5\_123221820\_shore\_based\_shorebird\_and\_marine\_bird\_survey\_locations.mxd Revised: 2023-05-08 By: tquilichini



Field Studies  
June 2024

1 **Table 4.5–1 Marbled Murrelet Post-Fledging Period Survey Detections**

Species	Number Detected	Survey Station
Surf scoter <sup>1,2,3</sup>	1	SHORE-04
Sandhill crane <sup>2</sup>	3	SHORE-03
Sanderling <sup>2</sup>	2	SHORE-02
Marbled murrelet <sup>1,2</sup>	3	SHORE-01
	1	SHORE-04
	6	SHORE-06
	1	SHORE-08
	9	SHORE-09
Bonaparte's gull <sup>2,3</sup>	3	SHORE-04
	8	SHORE-06
	1	SHORE-09
Short-billed gull <sup>2,3</sup>	2	SHORE-01
	2	SHORE-02
	2	SHORE-03
	1	SHORE-04
	20	SHORE-06
	6	SHORE-07
	2	SHORE-09
	1	SHORE-10
Herring gull <sup>2,3</sup>	1	SHORE-01
	1	SHORE-07
	1	SHORE-08
Common loon <sup>2</sup>	1	SHORE-08
Red-throated loon <sup>2</sup>	2	SHORE-01
	1	SHORE-08
NOTES:		
<sup>1</sup> Indicates a species of conservation concern		
<sup>2</sup> Indicates species is listed under the MBCA, 1994		
<sup>3</sup> Indicates a species of importance to Nisga'a Nation or other Indigenous communities		





Field Studies  
June 2024

## 1 Fall Shorebird Migration

2 Fall shorebird migration surveys were completed from August 21 to August 24, 2021 at 10 survey stations  
3 (Figure 4.5–1). Fifteen species were detected during the surveys of which only one, least sandpiper, was  
4 a shorebird on the northern tip of Pearse Island at SHORE-06 (Table 4.5–2).

5 Three species of conservation concern, great blue heron, surf scoter, and marbled murrelet, were  
6 detected during the fall migration survey. Great blue heron (1 bird) was detected at SHORE-05 on the  
7 shoreline of Whiskey Bay, marbled murrelet (1 bird) was detected 80 m offshore of SHORE-04, and  
8 surf scoter (360 birds) was detected 256 m offshore from SHORE-06. Both SHORE-04 and SHORE-06  
9 are rocky outcrops with connected shoals located adjacent to Whiskey Bay at the north end of the  
10 Marine Terminal LSA.

11 Bald eagle is not a species of conservation concern but is a species of interest to the Nisga'a Nation and  
12 other Indigenous communities. During the fall shorebird migration survey a bald eagle was observed as a  
13 flyover detection at SHORE-09 along the south-east side of the Marine Terminal LSA. Eight additional  
14 species of importance to Indigenous communities were observed during surveys (Table 4.5–2).

**Table 4.5–2 Fall Migration Stationary Survey Detections**

Species	Number Detected	Survey Station
Hooded merganser <sup>2,3</sup>	2	SHORE-03
Harlequin duck <sup>2,3</sup>	1	SHORE-06
Surf scoter <sup>1,2,3</sup>	360	SHORE-06
White-winged scoter <sup>2,3</sup>	5	SHORE-06
Least sandpiper <sup>2</sup>	7	SHORE-06
Marbled murrelet <sup>1,2</sup>	1	SHORE-04
Bonaparte's gull <sup>2,3</sup>	3	SHORE-01
	7	SHORE-02
	3	SHORE-03
	4	SHORE-04
	19	SHORE-06
	2	SHORE-08
Short-billed gull <sup>2,3</sup>	1	SHORE-01
	2	SHORE-02
	2	SHORE-03
	22	SHORE-06
Herring gull <sup>2,3</sup>	1	SHORE-08
	1	SHORE-10





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**Table 4.5–2 Fall Migration Stationary Survey Detections**

Species	Number Detected	Survey Station
Glaucous-winged gull <sup>2,3</sup>	6	SHORE-01
	1	SHORE-03
	11	SHORE-06
	2	SHORE-08
	3	SHORE-09
Great blue heron <sup>1,2</sup>	1	SHORE-05
Bald eagle <sup>3</sup>	1	SHORE-09
Steller's jay	1	SHORE-09
Chestnut-backed chickadee <sup>2</sup>	2	SHORE-02
Pacific wren <sup>2</sup>	1	SHORE-01
	1	SHORE-09

NOTES:  
<sup>1</sup> Indicates a species of conservation concern  
<sup>2</sup> Indicates species is listed under the MBCA, 1994  
<sup>3</sup> Indicates a species of importance to Nisga'a Nation or other Indigenous communities

**1 Spring Shorebird Migration**

2 Spring shorebird migration surveys were completed on May 13 and May 14, 2022 at 10 survey stations  
3 (Figure 4.5–1). A total of 26 bird species were detected during surveys, including three shorebird species:  
4 western sandpiper (17 birds), least sandpiper (3 birds), and greater yellowlegs (1 bird) (Table 4.5–3).  
5 The western sandpiper and least sandpiper detections occurred at SHORE-05, which is a cobble and  
6 rock beach on Whiskey Bay adjacent to shallow sandy tidal flats. The greater yellowlegs was detected as  
7 a flyover observation from SHORE-10.

8 Four species of conservation concern were detected during surveys: surf scoter, marbled murrelet,  
9 California gull, and great blue heron (Table 4.5–3). Bald eagle, a species of interest to the Nisga'a Nation  
10 and other Indigenous communities, was observed at SHORE-04 along the northern tip of Pearse Island  
11 and the Marine Terminal LSA and at SHORE-10 along the south-east end of the Marine Terminal LSA.  
12 Eleven additional species of interest to Indigenous communities were observed during surveys  
13 (Table 4.5–3).





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**Table 4.5–3 Spring Migration Stationary Survey Detections**

Species	Number Detected	Survey Station
American wigeon <sup>2,3</sup>	10	SHORE-10
Harlequin duck <sup>2,3</sup>	2	SHORE-02
	8	SHORE-03
	3	SHORE-08
Surf scoter <sup>1,2,3</sup>	250	SHORE-04
	32	SHORE-06
	91	SHORE-08
Bufflehead <sup>2,3</sup>	3	SHORE-05
Common goldeneye <sup>2,3</sup>	1	SHORE-08
Barrow's goldeneye <sup>2,3</sup>	1	SHORE-02
Rufous hummingbird <sup>2</sup>	1	SHORE-03
	2	SHORE-05
Least sandpiper <sup>2</sup>	3	SHORE-05
Western sandpiper <sup>2</sup>	17	SHORE-05
Greater yellowlegs <sup>2</sup>	1	SHORE-10
Marbled murrelet <sup>1,2</sup>	1	SHORE-01
	1	SHORE-04
	1	SHORE-05
Bonaparte's gull <sup>2,3</sup>	4	SHORE-06
Short-billed gull <sup>2,3</sup>	2	SHORE-01
	1	SHORE-03
	2	SHORE-04
	6	SHORE-06
	1	SHORE-07
	2	SHORE-08
	1	SHORE-09
	1	SHORE-10
Iceland gull <sup>2,3</sup>	1	SHORE-07
California gull <sup>1,2,3</sup>	1	SHORE-01
Glaucous-winged gull <sup>2,3</sup>	1	SHORE-03
	4	SHORE-06
Red-throated loon <sup>2</sup>	2	SHORE-01
	2	SHORE-09
Common loon <sup>2</sup>	1	SHORE-06



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**Table 4.5–3 Spring Migration Stationary Survey Detections**

Species	Number Detected	Survey Station
Great blue heron <sup>1,2</sup>	1	SHORE-05
Bald eagle <sup>3</sup>	1	SHORE-04
	1	SHORE-10
Steller's jay	1	SHORE-09
American crow	4	SHORE-03
	7	SHORE-04
Common raven	1	SHORE-03
Pacific wren <sup>2</sup>	1	SHORE-09
American pipit <sup>2</sup>	11	SHORE-02
Townsend's warbler <sup>2</sup>	1	SHORE-09
NOTES:		
<sup>1</sup> Indicates a species of conservation concern		
<sup>2</sup> Indicates species is listed under the MBCA, 1994		
<sup>3</sup> Indicates a species of importance to Nisga'a Nation or other Indigenous communities		

#### 1 **4.5.2.2 Vessel-based Surveys**

2 Vessel-based surveys were completed during the fall and spring shorebird migratory periods. A single,  
3 continuous transect was surveyed, approximately 60 m offshore, within the Marine Terminal LSA  
4 (Figure 4.5–1).

#### 5 **Fall Shorebird Migration**

6 The vessel-based transect survey was completed on August 24, 2021, during high tide, from 1414 hrs to  
7 1535 hrs. Ten species were detected during the survey, including two species of shorebird: spotted  
8 sandpiper and least sandpiper. The other eight species detected were Bonaparte's gull, glaucous-winged  
9 gull, short-billed gull, common raven, song sparrow (*Melospiza melodia*), great blue heron, harlequin  
10 duck, and hooded merganser.

11 Least sandpiper (6 birds) was detected onshore on a rocky outcrop at the north end of Pearse Island.  
12 Spotted sandpiper was detected at two locations: one bird was detected on a rocky shore on the  
13 south-west side of the Marine Terminal LSA, and two birds were detected on the shore near the  
14 south-east end of the Marine Terminal LSA.

15 One species of conservation concern, great blue heron (1 bird), was detected during the vessel-based  
16 survey. Great blue heron was observed on the shore of Whiskey Bay. Bonaparte's gull, glaucous-winged  
17 gull, short-billed gull, harlequin duck, and hooded merganser are all species identified as being important  
18 to Indigenous communities. Bonaparte's gull was observed at four locations, and the other species were  
19 each observed at one location.





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## 1 Spring Shorebird Migration

2 The vessel-based transect survey was completed on May 15, 2022, during high tide, from 1230 hrs to  
3 1350 hrs. A single shorebird species, spotted sandpiper (1 bird), was observed on a rocky shoreline along  
4 the northwest side of Pearse Island in the Marine Terminal LSA. Twelve additional species were  
5 detected: bald eagle, green-winged teal, harlequin duck, marbled murrelet, common loon,  
6 glaucous-winged gull, short-billed gull, Iceland gull, sandhill crane, dark-eyed junco (*Junco hyemalis*),  
7 common raven, and yellow-rumped warbler (*Setophaga coronata*).

8 One species of conservation concern, marbled murrelet, was detected at the north end of Pearse Island  
9 near a rocky outcrop. Six species of importance to Indigenous communities were detected during the  
10 spring shorebird migration survey bald eagle, glaucous-winged gull, short-billed gull, Iceland gull,  
11 green-winged teal, and harlequin duck. Bald eagle (4 birds) was detected at three locations in the  
12 Marine Terminal LSA; once near the mouth of Whiskey Bay, and twice along the eastern side of  
13 Pearse Island. Harlequin duck was detected at 10 locations, and short-billed gull was detected twice in  
14 the Marine Terminal LSA. The remaining species of importance to Indigenous communities were each  
15 detected once.

## 16 4.6 REMOTE CAMERA SURVEYS

17 Remote cameras were deployed within the Terrestrial Wildlife LSA to document ungulates and  
18 large carnivores and to characterize their presence and use of habitat within the Terrestrial Wildlife LSA.  
19 Target species include moose, Sitka black-tailed deer, grizzly bear, black bear, and grey wolf.

### 20 4.6.1 Methods

21 Remote cameras were deployed within the Terrestrial Wildlife LSA in target areas pre-selected using  
22 satellite imagery. Target habitats included wetlands, marine shoreline, and forests. Final site selection  
23 was completed in the field based on the presence of wildlife trails, signs of wildlife use, or presence of  
24 wildlife habitat features. Ten Reconyx Hyperfire 2 Professional Covert IR cameras were deployed in  
25 June 2021. Cameras were revisited in October 2021 and March 2022 to undertake maintenance and data  
26 retrieval; final camera retrieval was completed in June 2022.

27 Cameras were oriented parallel to movement paths to increase the likelihood of capturing multiple images  
28 of each observation. Where possible, cameras were oriented in a northerly direction to limit backlighting  
29 of the animal and to reduce the potential for false triggers caused by sun glare. Cameras were attached  
30 to the trunk of sturdy trees, approximately 2 m above ground, to reduce false triggers caused by tree  
31 movement during wind events and to be above the estimated snowpack during the winter season.  
32 Vegetation within the camera's field of view was removed by hand to reduce false triggers caused by  
33 moving branches, but not to the extent that the vegetation removal may deter wildlife use.

34 Weather conditions, camera setup information (i.e., height, direction, tree species) habitat description,  
35 and sign of wildlife use were recorded at each camera location.





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1 Camera photos were reviewed using Reconyx MapView Professional software. Photos of individuals or  
2 groups were considered independent detections if five or more minutes elapsed between photos with  
3 detections. For each detection the date, time, species, number of individuals, and, if possible, the age and  
4 sex were recorded. For each camera, the number of camera days (i.e., the number of confirmed days of  
5 operation) was determined by counting the number of days elapsed between the deployment and  
6 retrieval dates during which the camera was in operation.

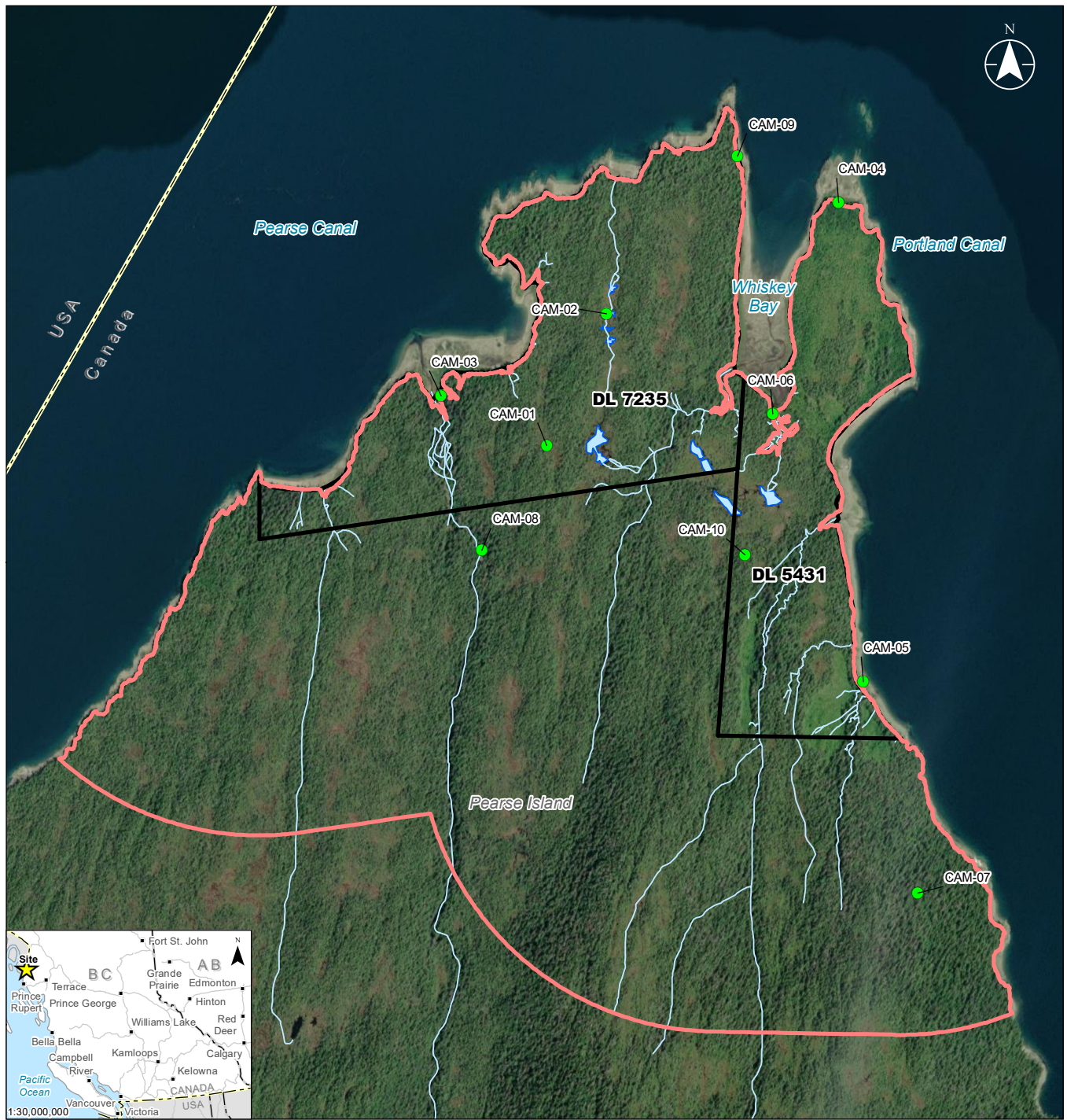
7 **4.6.2 Results**

8 Cameras were deployed in five broad habitat types within the Terrestrial Wildlife LSA: wetland (3 sites),  
9 shoreline (3 sites), estuary (1 site), riparian (1 site), and forest (2 sites) (Figure 4.6–1). A summary of  
10 camera deployment information is provided in Table 4.6–1 and a sample of wildlife photos is provided in  
11 Appendix C.

12 **Table 4.6–1 Remote Camera Information and Habitat Description**

Site ID	Camera Deployment Date	Camera Retrieval Date	Number of Camera Days	Broad Habitat Type	Habitat Description
CAM-01	June 12, 2021	June 3, 2022	356	Wetland	Open, treed bog with scattered pools of water.
CAM-02	June 18, 2021	June 4, 2022	351	Wetland	Open, treed bog with deep, interconnected ponds.
CAM-03	June 16, 2021	June 3, 2022	352	Forest	Old, coniferous forest along a wildlife trail leading into an estuary.
CAM-04	June 17, 2021	June 3, 2022	204	Shoreline	Shoreline between a mature mixedwood forest and a gravel and cobble beach.
CAM-05	June 17, 2021	June 3, 2022	351	Shoreline	Shoreline between a mature coniferous forest and a gravel and cobble beach.
CAM-06	June 19, 2021	June 4, 2022	350	Estuary	Estuary shoreline adjacent to a mature coniferous forest.
CAM-07	June 10, 2021	June 4, 2022	265	Forest	Mature coniferous forest comprised of western hemlock and western redcedar.
CAM-08	June 11, 2021	June 3, 2022	357	Riparian	Riparian area adjacent to an old, coniferous forest.
CAM-09	June 16, 2021	June 3, 2022	306	Shoreline	Shoreline between a mature coniferous forest and a rocky beach.
CAM-10	June 15, 2021	June 4, 2022	354	Wetland	Open, coniferous-dominated bog-forest.



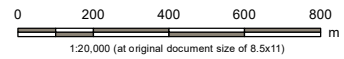


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**Notes**  
 1. Coordinate System: NAD 1983 UTM Zone 9N  
 2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada, Stantec, Rockies LNG, Maxar

- Remote Camera Location
- Boundaries of District Lots 7235 and 5431
- Terrestrial Wildlife Local Study Area
- International Boundary
- Project Mapped Stream
- Waterbody



Project Location: Pearse Island, BC  
 Project Number: 123221820  
 Prepared by SPARKER on 20220707  
 Requested by CBALL on 20220623  
 Checked by TQUILICHINI on 20220712

Client/Project/Report  
 Ksi Lisims LNG  
 Natural Gas Liquefaction and Marine Terminal  
 Technical Data Report – Wildlife and Wildlife Habitat

Figure No.  
**4.6-1**

Title  
**Remote Camera Deployment Locations**

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Field Studies  
June 2024

1 Six wildlife species, including two bird species and four mammals, were detected across the 10 remote  
2 camera sites (Table 4.6–2). No species of conservation concern were detected. Five of the six species  
3 detected are species of Indigenous importance: black bear, Pacific marten, grey wolf, Sitka black-tailed  
4 deer, and mallard.

5 **Table 4.6–2 Summary of Species Detected by Remote Cameras**

Site ID	Species and Number of Detections					
	Black Bear <sup>2</sup>	Grey Wolf <sup>2</sup>	Sitka black-tailed Deer <sup>2</sup>	Pacific Marten <sup>2</sup>	Sandhill Crane <sup>1</sup>	Mallard <sup>1,2</sup>
CAM-01	5	5	5	-	4	-
CAM-02	-	4	8	-	7	-
CAM-03	2	1	2	-	-	-
CAM-04	1	1	2	-	-	-
CAM-05	1	9	3	-	-	-
CAM-06	7	8	2	-	-	1
CAM-07	-	-	1	-	-	-
CAM-08	-	-	5	-	-	-
CAM-09	-	2	1	-	-	-
CAM-10	-	6	2	1	1	-
<b>Total</b>	<b>16</b>	<b>36</b>	<b>31</b>	<b>1</b>	<b>12</b>	<b>1</b>

NOTES:  
<sup>1</sup> Species listed under the MBCA, 1994  
<sup>2</sup> Indicates a species of importance to Nisga'a Nation or other Indigenous communities

6 The most frequently detected species were grey wolf (36 detections) and Sitka black-tailed deer  
7 (31 detections). Grey wolf was detected at eight remote camera locations and was most frequently  
8 detected at CAM-05 (rocky shoreline) and CAM-06 (estuary). Most grey wolf detections occurred from  
9 January 2022 through March 2022 (25 detections). Sitka black-tailed deer was detected at each of the  
10 10 remote camera sites and was most frequently detected at CAM-01 (wetland) and CAM-02 (wetland).  
11 Pacific marten was detected once at CAM-10 (wetland) in January 2022.

12 A group of mallards were detected using the estuary in Whiskey Bay in February 2022. Sandhill crane  
13 was detected at three wetland sites during July and August 2021, and April 2022, and may breed in  
14 wetlands on Pearse Island, although no young were detected. Both mallard and sandhill crane are  
15 migratory birds listed under the MBCA.



## 1 **4.7 BAT ACOUSTIC RECORDER SURVEYS**

2 Bat acoustic recorder surveys were undertaken to collect information on the presence and habitat use of  
3 bat species within the Terrestrial Wildlife LSA. There are 10 bat species likely to occur within the  
4 Terrestrial Wildlife LSA (Appendix A), including five species of conservation concern: silver-haired bat,  
5 hoary bat, northern myotis, little brown myotis, and Yuma myotis.

### 6 **4.7.1 Methods**

7 Survey methods were consistent with provincial standards for bat inventory (RISC 1998b; RISC 2022).  
8 Five Wildlife Acoustics SM3 ultrasonic bat UARUs were in operation in June, July, and August 2021 to  
9 coincide with the breeding and roosting periods of bats potentially occurring in the area. The UARUs were  
10 installed in habitat expected to support bat foraging (e.g., riparian areas, wetlands, ponds), movement  
11 (e.g., tree lines, riparian areas, watercourses, forest edges), or roosting (e.g., older age class forest  
12 stands with large diameter trees, or dead or dying trees with peeling bark, crevices, and cavities)  
13 (Nagorsen and Birgham 1993; COSEWIC 2013b; BC MOE 2016; ECCC 2018). Extendable poles were  
14 used to mount microphones to improve the likelihood of recording bats. Deployment sites were  
15 pre-selected based on satellite imagery and were refined in the field based on professional judgment of  
16 the field biologists.

17 Acoustic files recorded during the surveys were processed using Kaleidoscope Pro Software  
18 Version 5.4.2 (Wildlife Acoustics, Inc., Maynard, Maryland). Ambient sound files were filtered from files  
19 containing bat echolocations prior to analysis. Echolocations were classified using Kaleidoscope Pro's  
20 auto-identification algorithm in conjunction with the Bats of North America 5.4.0 classifier refined to the  
21 BC region to include the nine potentially occurring species. A conservative program setting (i.e., "+1  
22 More Accurate") was used as an acceptance threshold for species determination to reduce the potential  
23 for misclassification of acoustic files. The positive predictive value (i.e., percentage of input files correctly  
24 classified to species) for the Kaleidoscope Pro Bats of North America 5.4.0 classifier is: 69% for big brown  
25 bat, 70% for eastern red bat, 81% for hoary bat, 67% for silver-haired bat, 73% for Californian myotis,  
26 87% for long-eared myotis, 76% for little brown myotis, 78% for long-legged myotis, and 86% for  
27 Yuma myotis (Wildlife Acoustics, Inc. 2022). Accuracy of classification of files identified to species using  
28 the automated processing should consider these species-specific positive predictive values. Only files  
29 with more than three echolocation pulses were included in the final dataset.

30 To refine classification of acoustic files and reduce the potential for classification errors, output files from  
31 the auto-identification algorithm and classifier were manually reviewed by a Registered Professional  
32 Biologist with experience in the analysis of bat acoustic data. Because of the number of acoustic files  
33 recorded during the 2021 bat acoustic recorder survey, only those files with a match ratio of less than 0.5  
34 from the automated processing were manually reviewed, with one exception (each file classified as  
35 eastern red bat was manually reviewed).<sup>3</sup>

---

<sup>3</sup> The match ratio is the ratio of the number of echolocation pulses matching the result of the auto classification to the number of echolocation pulses detected in a file (Wildlife Acoustics, Inc. 2021).





Field Studies  
June 2024

1 Bat echolocations (or passes) were identified to species where possible; however, several of the  
2 bat species that may occur within the Terrestrial Wildlife LSA can be difficult to differentiate acoustically  
3 due to overlapping minimum and characteristic frequencies.<sup>4</sup> For example, little brown myotis and  
4 long-legged myotis are difficult to differentiate acoustically, as are Yuma myotis and Californian myotis.  
5 As such, files with a match ratio of less than 0.5 that were classified using the automated processing as  
6 little brown myotis, long-legged myotis, Yuma myotis, or Californian myotis are reported as part of a  
7 species group (i.e., the high frequency myotis group, the little brown myotis/long-legged myotis group, or  
8 the Yuma myotis/Californian myotis group) (Table 4.7–1). Files with a match ratio of 0.5 or greater that  
9 were classified to species using the automated processing, including little brown myotis, long-legged  
10 myotis, Yuma myotis, or Californian myotis, were not manually reviewed and classifications were  
11 maintained to individual species. Where identification to species was not feasible for other species, bat  
12 passes were identified as a species group (Table 4.7–1).

**Table 4.7–1 Bat Species Group Determination**

<b>Group Name</b>	<b>Species</b>	<b>Group Determination<sup>a</sup></b>
Myotis	Yuma myotis Californian myotis Little brown myotis Long-legged myotis Long-eared myotis	Echolocation pulses with a characteristic frequency of 30-50 kHz but too steep in slope or too fragmented for species determination
High frequency myotis	Yuma myotis Californian myotis Little brown myotis Long-legged myotis	Echolocation pulses with a characteristic frequency >46.5 kHz but too steep in slope (i.e., >100 octaves per second (OPS)) or too fragmented for species determination; potentially Yuma myotis or Californian myotis but could include high-frequency echolocations from little brown myotis or long-legged myotis
Yuma myotis/ Californian myotis	Yuma myotis Californian myotis	Search phase pulses <sup>b</sup> with a characteristic frequency >46.5 kHz but too steep in slope (i.e., >100 OPS) or too fragmented for species determination
Little brown myotis/ Long-legged myotis	Little brown myotis Long-legged myotis	Echolocation pulses with a characteristic frequency of approximately 36-46.5 kHz but too steep in slope (i.e., >100 OPS) or too fragmented for species determination
Little brown myotis/ Eastern red bat	Little brown myotis Eastern red bat	Echolocation pulses with a characteristic frequency of approximately 32-46.5 kHz but too steep in slope (i.e., >50 OPS) or lacking fluctuating minimum frequencies for species determination
Little brown myotis/ Long-eared myotis	Little brown myotis Long-eared myotis	Echolocation pulses with a characteristic frequency of approximately 30-35 kHz; probably long-eared myotis but could include low-frequency echolocations from little brown myotis

<sup>4</sup> The minimum frequency is the lowest frequency (kilohertz [kHz]) of the echolocation pulses and the characteristic frequency is the frequency at the end or flattest portion of the echolocation pulses.



Field Studies  
June 2024

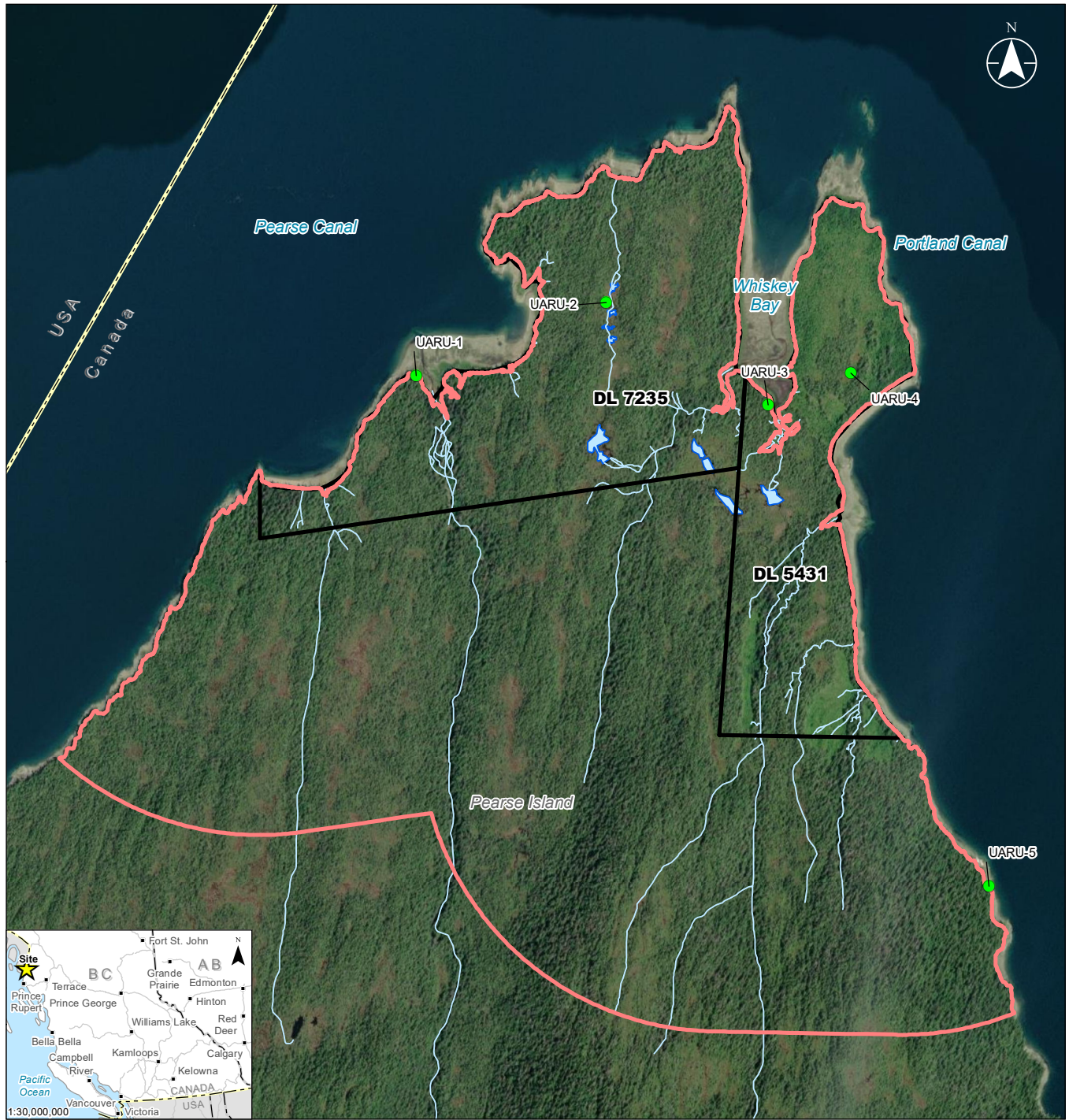
**Table 4.7–1 Bat Species Group Determination**

Group Name	Species	Group Determination <sup>a</sup>
Big brown bat/ Silver-haired bat	Big brown bat Silver-haired bat	Echolocation pulses with a minimum frequency $\geq 23$ kHz and $< 30$ kHz but lacking diagnostic characteristics for species determination
Low frequency bat	Big brown bat Silver-haired bat Hoary bat	Fragmented low-frequency echolocation pulses too short in duration or too fragmented for species determination
<p>NOTES:</p> <p><sup>a</sup> Sources: Britzke and Murray (2000); Lausen (2018)</p> <p><sup>b</sup> Not feeding buzzes or echolocation calls made in high-clutter environments</p>		

1 **4.7.2 Results**

2 The assembly at Site UARU-1 was deployed in an estuarine tidal area along the edge of mature  
3 coniferous forest with the potential to support bat roosting (Figure 4.7–1; Table 4.7–2). The estuarine  
4 habitat at this location has the potential to support bat foraging and the forest edge may act as a travel  
5 corridor for bats commuting between foraging and roosting sites. The assembly at Site UARU-2 was  
6 deployed in a wetland with open water with the potential to support bat foraging. The assembly at  
7 Site UARU-3 was deployed in an estuarine tidal area along the edge of mature coniferous forest with the  
8 potential to support bat roosting. The estuarine habitat at this location has the potential to support bat  
9 foraging and the forest edge may act as a travel corridor for bats commuting between foraging and  
10 roosting sites. The assembly at Site UARU-4 was deployed in a wetland bog complex with the potential to  
11 support bat foraging. The surrounding mature coniferous forest at this location has the potential to  
12 support bat roosting. The assembly at Site UARU-5 was deployed along the rocky shoreline at the edge  
13 of mature coniferous forest with the potential to support bat roosting. The forest edge has the potential to  
14 support bat foraging and to provide a travel corridor for bats commuting between foraging and roosting  
15 sites.

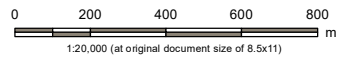




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- Ultrasonic Acoustic Recorder Location
- Boundaries of District Lots 7235 and 5431
- Terrestrial Wildlife Local Study Area
- International Boundary
- Project Mapped Stream
- Waterbody



**Notes**  
 1. Coordinate System: NAD 1983 UTM Zone 9N  
 2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada, Stantec, Rockies LNG, Maxar

**Stantec**  
 Project Location: Pearse Island, BC  
 Project Number: 123221820  
 Prepared by SPARKER on 20220707  
 Requested by CBALL on 20220623  
 Checked by TQUILICHINI on 20220712

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 Natural Gas Liquefaction and Marine Terminal  
 Technical Data Report – Wildlife and Wildlife Habitat

Figure No.  
**4.7-1**  
 Title  
**Ultrasonic Acoustic Recorder Deployment Locations**

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Field Studies  
June 2024

1 **Table 4.7–2 Ultrasonic Acoustic Recording Unit Deployment Locations**

Site	UTM (zone 9)		Potential Habitat Use by Bats
	Easting	Northing	
UARU-1	422935	6098252	Foraging and roosting
UARU-2	423573	6098498	Foraging
UARU-3	424117	6098154	Foraging and roosting
UARU-4	424394	6098261	Foraging
UARU-5	424858	6096537	Foraging and roosting

2 During the bat acoustic recorder surveys, 24,236 audio files containing bat passes were recorded  
3 across 291 detector nights from the five sites between June 9 and August 18, 2021. A bat “pass” is  
4 defined as a recording of a single bat. The number of bat passes, however, does not necessarily  
5 correspond to the number of individual bats at a site because the same individual bat can be recorded as  
6 multiple passes.

7 To determine the potential for false negatives (i.e., an acoustic file auto-classified as ambient sound but  
8 which was actually a bat detection) in classification of acoustic files filtered as ambient sound, a subset of  
9 25 noise files per month from each UARU was manually reviewed by a Registered Professional biologist  
10 experienced in the analysis of bat acoustic data. Of the 375 ambient sound files checked manually, there  
11 were no false negatives (i.e., none of the ambient sound files checked manually contained bat passes  
12 with three or more high frequency pulses, the minimum required to confirm the call came from a bat).

13 Recording success (i.e., the percentage of survey nights during which a UARU recorded acoustic files  
14 [bat passes or ambient sound]) ranged from 74.1% to 95.5% and averaged 86.3% over the survey period  
15 (Table 4.7–3).

16 **Table 4.7–3 2021 Survey Effort and Recording Success Rate by Site**

Site	Recording Period	Survey Nights	Survey Nights with Detections	Detection Rate (%)
UARU-1	June 16 – August 18	67	64	95.5
UARU-2	June 18 – August 15	67	59	88.1
UARU-3	June 19 – July 28 <sup>a</sup>	54	40	74.1
UARU-4	June 9 – August 15	75	68	90.7
UARU-5	June 10 – August 14	72	60	83.3

NOTE:

<sup>a</sup> The UARU at Site UARU-3 did not record after the night of July 28. This may have been due to low battery voltage or an error in the recording start schedule





Field Studies  
June 2024

- 1 Nightly bat activity was highest at UARU-1 with 19,201 bat passes recorded over 67 survey nights.
- 2 Bat activity was second highest at UARU-5 (3,145 bat passes recorded over 72 survey nights), followed
- 3 by UARU-4 (840 bat passes recorded over 75 survey nights), UARU-3 (593 bat passes recorded over
- 4 54 survey nights), and UARU-2 (457 bat passes recorded over 67 survey nights).
  
- 5 Eight bat species were recorded over the monitoring period. Little brown myotis was the most frequently
- 6 detected bat species, accounting for 56.2% of total detections. The group identified as either
- 7 little brown myotis or long-legged myotis comprised 27.6% of total detections, followed by little brown
- 8 myotis/eastern red bat with 4.9% of detections, and long-legged myotis with 4.2% of detections.
- 9 Percentage of detections by species for each UARU site are summarized in Table 4.7–4.





Field Studies  
June 2024

1 **Table 4.7–4 Percentage of Bat Passes by Survey Site**

Site	Total Number of Bat Passes	Percentage (%) of Bat Passes															
		Long-Eared Myotis	Little Brown Myotis	Long-Legged Myotis	Little Brown Myotis/Long-Legged Myotis	Little Brown Myotis/Eastern Red Bat	Little Brown Myotis/Long-Eared Myotis	Yuma Myotis	Californi Myotis	Yuma/Californian Myotis	Big Brown Bat	Silver-Haired Bat	Big Brown Bat/Silver-Haired Bat	Hoary Bat	Myotis sp.	High Frequency Myotis	Low Frequency Bat
UARU-1	19,201	<0.1	65.8	1.6	23.8	0.6	0.1	0.3	0.6	<0.1	<0.1	1.3	0.4	<0.1	<0.1	<0.1	0.1
UARU-2	457	5.3	25.2	4.8	36.5	1.1	1.1	0.4	0.7	0.2	0.4	8.1	3.7	0.2	0.2	10.7	1.3
UARU-3	593	7.4	8.3	23.1	23.9	1.3	1.3	0.5	1.7	0.0	0.0	14.0	2.0	0.0	0.0	16.2	0.2
UARU-4	840	10.8	10.4	14.2	47.0	1.1	3.8	0.0	0.1	0.0	0.0	7.1	2.5	1.7	0.0	1.0	0.4
UARU-5	3,145	2.4	23.3	13.9	45.2	0.8	0.4	0.4	0.8	0.2	0.1	3.1	0.9	<0.1	0.1	8.5	<0.1
<b>Total</b>	<b>24,236</b>	<b>0.9</b>	<b>56.2</b>	<b>4.2</b>	<b>27.6</b>	<b>4.9</b>	<b>0.3</b>	<b>0.3</b>	<b>0.6</b>	<b>&lt;0.1</b>	<b>&lt;0.1</b>	<b>2.2</b>	<b>0.6</b>	<b>0.1</b>	<b>&lt;0.1</b>	<b>1.7</b>	<b>0.1</b>

2





## 1 4.8 POND-DWELLING AMPHIBIAN SURVEYS

2 Pond-dwelling amphibian surveys were completed within the Terrestrial Wildlife LSA to collect information  
3 on species presence, relative abundance, diversity, and breeding locations. There are five amphibian  
4 species likely to occur within the Terrestrial Wildlife LSA: western toad, Columbia spotted frog, long-toed  
5 salamander, northwestern salamander, and roughskin newt. Western toad is listed on Schedule 1 of  
6 SARA as Special Concern (SRPR 2024).

### 7 4.8.1 Methods

8 Potential pond-dwelling amphibian survey sites were pre-selected using satellite imagery and freshwater  
9 atlas mapping (Freshwater Atlas 2022). Target areas included bogs, swamps, and open water areas with  
10 the potential to provide suitable breeding habitat for amphibians.

11 Surveys followed provincial standards and inventory methods for time constrained systematic visual  
12 searches of pond-breeding amphibians (RISC 1998b), although each wetland was only surveyed once  
13 during the field program. Surveys were completed by two biologists surveying transects along the  
14 perimeter of the survey site. Surveyors walked parallel to the edge scanning for amphibians. Dip nets  
15 were used to capture individuals for identification under General Wildlife Permit SM21-623342. At each  
16 site, survey timing and effort, habitat characteristics and weather, species detected, and number of  
17 individuals and life stage, were recorded. Surveys were undertaken in fair weather with little to no  
18 precipitation and low wind (i.e., less than 4 on the Beaufort scale, winds less than 19 km/h).

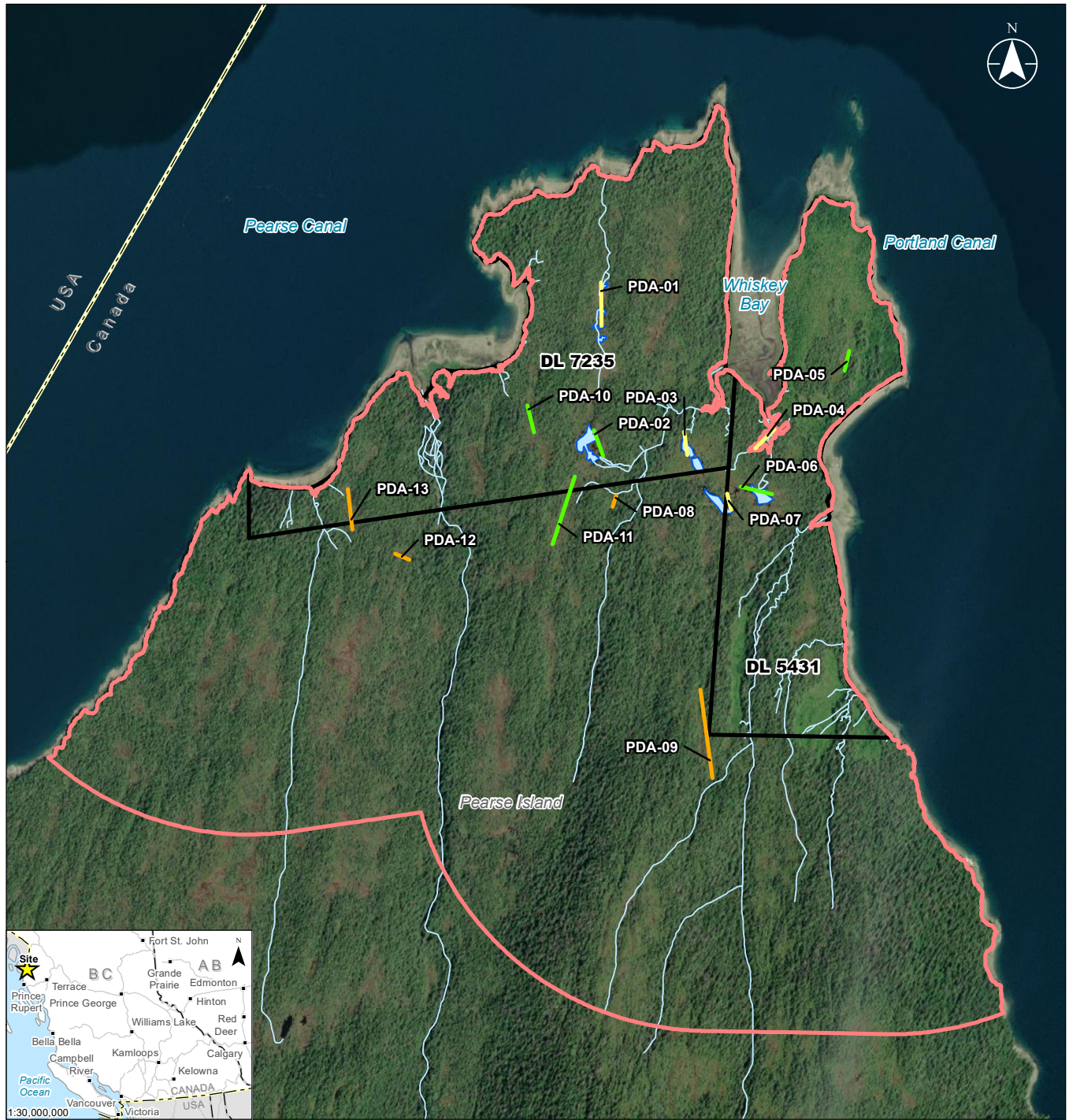
19 Amphibians detected outside of formal surveys or during other field programs were recorded as incidental  
20 observations and are reported in Section 4.9.

### 21 4.8.2 Results

22 Surveys were completed between June 9, 2021 and June 29, 2021 at 13 sites within the  
23 Terrestrial Wildlife LSA (Figure 4.8–1). There are 85 ha of bog (Wb51 and Wb53), 50 ha of swamp  
24 (Ws00 and Ws54), and 2 ha of open water wetland in the Terrestrial Wildlife LSA. Surveys were  
25 completed in bogs (10 sites), open water (1 site), estuaries (1 site), and at one terrestrial site with small  
26 ponds. Survey effort at each site ranged from 26 to 62 minutes. Bog sites were characterized by  
27 multiple small to large ponds with steep edges, and deep, darkly coloured waters with little emergent  
28 vegetation. The estuarine site was located adjacent to Whiskey Bay in an area of small shallow ponds  
29 connected to a freshwater drainage flowing through the estuary.

30 Two amphibian species, western toad and northwestern salamander, were detected at nine survey sites  
31 (Figure 4.8–1; Table 4.8–1), and no amphibians were detected at four survey sites. In total, 61  
32 western toad and 13 northwestern salamander were detected (Table 4.8–1). Most western toad survey  
33 detections were of juveniles (57 toadlets) and most detections were from shallow water. Detections of  
34 northwestern salamander were of larvae (2) and egg masses (11) in shallow water. Evidence of  
35 amphibian breeding (i.e., eggs, tadpoles, or juveniles) was detected at six wetlands.

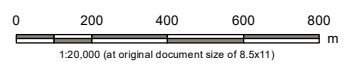




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- Pond-dwelling Amphibian Surveys**
- None Detected
  - Western Toad, Northwestern Salamander Detected
  - Western Toad Detected
  - Boundaries of District Lots 7235 and 5431
  - Terrestrial Wildlife Local Study Area
- International Boundary
  - Project Mapped Stream
  - Waterbody



Project Location: Pearse Island, BC  
 Project Number: 123221820  
 Prepared by TQUILICHINI on 20220118  
 Requested by CBALL on 20220112  
 Checked by NFORRESTER on 20220118

Client/Project/Report  
 Ksi Lisims LNG  
 Natural Gas Liquefaction and Marine Terminal  
 Technical Data Report – Wildlife and Wildlife Habitat

Figure No.  
**4.8-1**

Title  
**Amphibian Survey and Detection Locations**

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Field Studies  
June 2024

1 **Table 4.8–1** Detections of Amphibians During Surveys within the Terrestrial Wildlife Local  
2 Study Area

Species and Survey Site	Life Stage				Total
	Adult	Juvenile	Larvae	Eggs <sup>1</sup>	
<b>Western toad</b>					
PDA-02	1	-	-	-	1
PDA-05	1	-	-	-	1
PDA-06	1	2	-	-	3
PDA-08	1	24	-	-	25
PDA-09	-	1	-	-	1
PDA-10	-	3	-	-	3
PDA-11	-	5	-	-	5
PDA-12	-	12	-	-	12
PDA-13	-	10	-	-	10
<b>Total</b>	<b>4</b>	<b>57</b>	<b>-</b>	<b>-</b>	<b>61</b>
<b>Northwestern salamander</b>					
PDA-08	-	-	-	1	1
PDA-09	-	-	-	2	2
PDA-12	-	-	1	2	3
PDA-13	-	-	1	6	7
<b>Total</b>	<b>-</b>	<b>-</b>	<b>2</b>	<b>11</b>	<b>13</b>
NOTE: <sup>1</sup> Egg masses were counted as one detection.					

3 **4.9 INCIDENTALS**

4 **4.9.1 Methods**

5 Incidental observations are detections of wildlife species or wildlife habitat features made by field crews  
6 outside of formal survey periods, including when traveling between sites during surveys. Species were  
7 identified through visual and aural detections, by the presence of tracks or other sign, or by habitat  
8 features such as nests or dens. Each detection was identified to species or species group and as  
9 applicable the number of individuals detected was recorded, and where possible age and sex was  
10 recorded.



Field Studies  
June 2024

## 1 4.9.2 Results

2 Incidental wildlife observations were documented by the wildlife, vegetation, fisheries, and marine field  
3 crews between May 13, 2021 and June 4, 2022. A total of 365 incidental observations were recorded.  
4 Location coordinates were recorded for 124 of the records, and only general location information was  
5 provided for the remaining 241 records. Only those records with location coordinates are included in  
6 Figure 4.9–1.

7 Eight mammal species or species groups were detected incidentally, including American beaver, moose,  
8 Sitka black-tailed deer, North American river otter, grey wolf, black bear, grizzly bear, and unknown bear  
9 species. The only species of conservation concern detected was grizzly bear; grizzly bear is also a  
10 species of Indigenous cultural use and value (Figure 4.9–1). Additionally, moose, Sitka black-tailed deer,  
11 American beaver, North American river otter, grey wolf, and black bear are not species of conservation  
12 concern, but are species of Indigenous cultural use and value (Figure 4.9–1). No bear dens, wallows,  
13 mineral licks, or bat roosts were detected within the Terrestrial Wildlife LSA.

- 14 • Grizzly bear was observed three times foraging along the shoreline of Whiskey Bay, once in forest  
15 near the eastern shoreline of Pearse Island, and once along the eastern shoreline of Pearse Island
- 16 • Black bear was observed twice, once foraging along the shoreline of Whiskey Bay and once in a  
17 forested area on the eastern side of Pearse Island
- 18 • Grey wolf sign was observed twice. Tracks were observed on the shoreline on the western side of the  
19 island near a large watercourse. Scat was also observed once in the interior of Pearse Island
- 20 • Moose (pellets) was detected once near the edge of a wetland on the western side of Pearse Island.  
21 No tracks or signs of browse were detected
- 22 • Sitka black-tailed deer was detected six times. Most detections were of pellets or tracks; there was  
23 one detection of a deer swimming in the water near the mouth of Observatory Inlet
- 24 • American beaver was detected three times. A lodge with signs of recent activity, an old, overgrown  
25 beaver dam, and fresh beaver sign were observed at three separate wetlands in the  
26 Terrestrial Wildlife LSA
- 27 • North American river otter was detected five times, primarily from vessels

28 A total of 77 bird species or species groups were detected incidentally. Nine bird species of conservation  
29 concern were detected. Additionally, several species of Indigenous cultural use and value, such as  
30 bald eagle and sooty grouse, were detected (Figure 4.9–1). A summary of detection information for these  
31 11 species or species groups is provided below.

- 32 • Black swift was detected once on the eastern side of Pearse Island when two adults were observed  
33 flying over the hillside



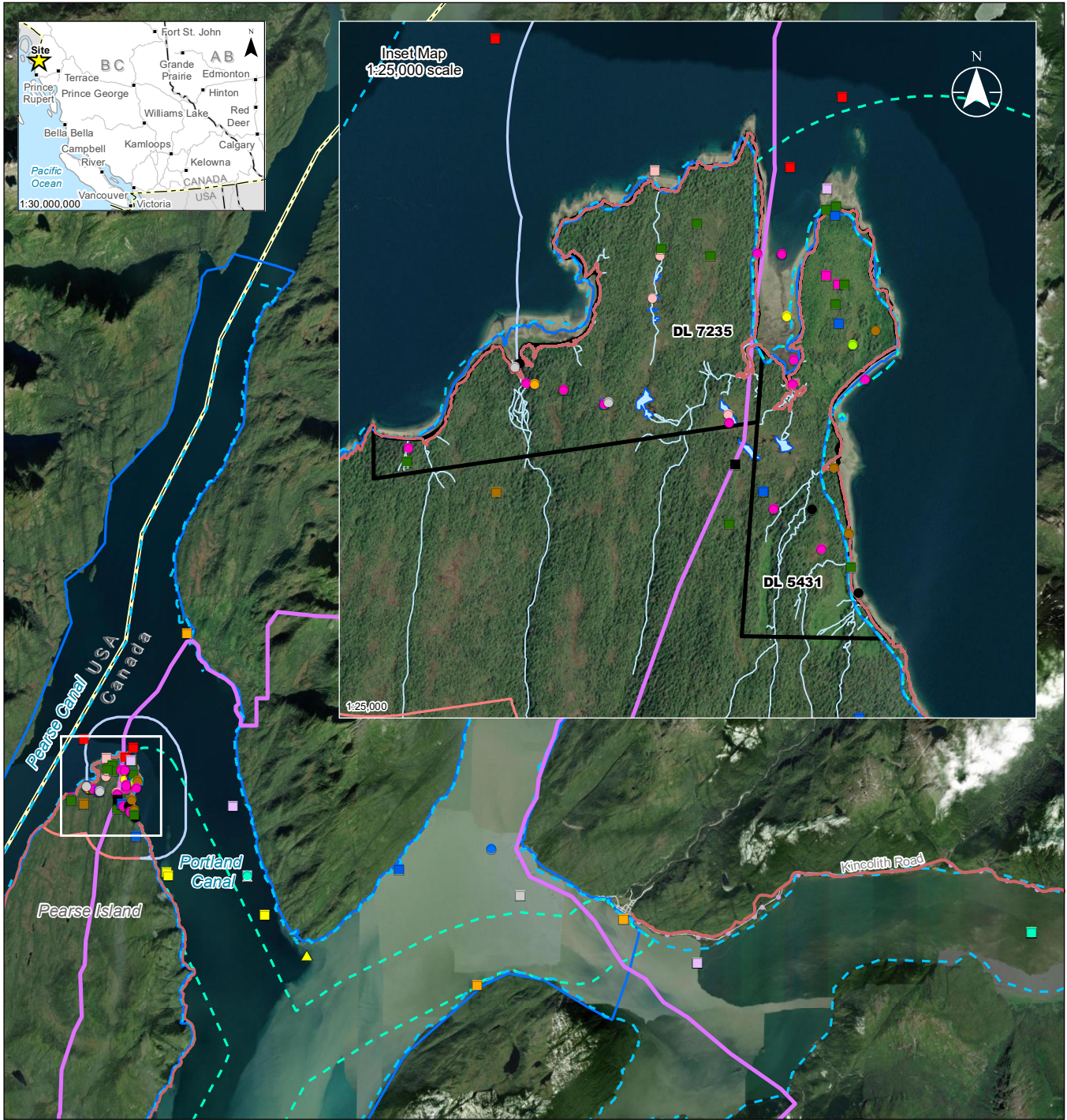


Field Studies  
June 2024

- 1 • Five gull species, California gull, glaucous-winged gull, Iceland gull, ring-billed gull, and short-billed  
2 gull, were detected incidentally. California gull was observed three times, including a large group  
3 (1,000 birds) of birds observed near Gingolx and a group of 2,500 birds observed east of Gingolx.  
4 Large groups of short-billed gull (30,000) and glaucous-winged gull (30,000) were observed near  
5 Gingolx in March 2022 during the eulachon spawning period
- 6 • Two dabbling duck species, American wigeon (1 bird) and mallard (4 birds), were observed in  
7 nearshore marine waters in the Marine Terminal RSA. Canada goose was also observed five times  
8 along the shoreline and in the Marine Terminal RSA
- 9 • Several diving duck species (common merganser, surf scoter, Barrow's goldeneye, common  
10 goldeneye, harlequin duck, and white-winged scoter) were observed in the Marine Terminal RSA.  
11 A group of 1,500 surf scoter was observed near Gingolx in March 2022 and a group of 135 surf scoter  
12 was observed in Portland Canal in October 2021
- 13 • Two alcids, common murre and marbled murrelet, were detected. Common murre was observed four  
14 times in the Marine Terminal RSA, however the precise locations of the detections were not recorded.  
15 Marbled murrelet was observed 16 times, including a group of 50 adults observed near Gingolx and a  
16 group of 20 adults foraging near Whiskey Bay. The locations of 12 of the detections were not  
17 recorded
- 18 • Yellow-billed loon was observed once at the intersection of Portland Canal and Portland Inlet. A pair  
19 of red-throated loon was observed on wetlands in the Terrestrial Wildlife LSA. Based on the time of  
20 year (June 2021) it is likely that the pair was nesting
- 21 • Western grebe was observed twice, including a group of 20 birds near Gingolx, and a group of  
22 32 birds in Portland Canal. The locations of one of the detections was not recorded
- 23 • Great blue heron was observed 10 times either foraging along the shoreline or flying overhead.  
24 The locations of all 10 detections were not recorded
- 25 • Red-necked phalarope was observed three times swimming in Portland Canal
- 26 • Bald eagle was detected incidentally 24 times. The locations of 20 of the detections were not  
27 recorded. Three bald eagle nests were also identified along the eastern side of Pearse Island. Based  
28 on observations of adult bald eagles on the nest, one of the nests was assumed to be active in 2021  
29 and one nest was assumed to be active in 2022
- 30 • Sooty grouse was detected once, however the location of the detection was not recorded
- 31 • Two potential rufous hummingbird (*Selasphorus rufus*) nests were detected in the  
32 Terrestrial Wildlife LSA
- 33 Three amphibian species, western toad (11 detections), northwestern salamander (2 detections), and  
34 roughskin newt (4 detections), were detected incidentally. Only western toad is a species of conservation  
35 concern. Western toad detections included adults and juveniles in both wetland and upland areas  
36 (Figure 4.9–1). Evidence of breeding amphibians (i.e., eggs, tadpoles, or juveniles) was detected  
37 incidentally at three wetlands.

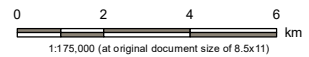


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**Notes**  
 1. Coordinate System: NAD 1983 UTM Zone 9N  
 2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada, Stantec, Rockies LNG, Maxar

- |  |  |  |
|--|--|--|
| <p><b>Mammals</b></p> <ul style="list-style-type: none"> <li>● American beaver</li> <li>● Black bear</li> <li>● Grizzly bear</li> <li>● Grey wolf</li> <li>● Moose</li> <li>● Sitka black-tailed deer</li> <li>● North American river otter</li> </ul> <p><b>Birds</b></p> <ul style="list-style-type: none"> <li>● American wigeon</li> <li>● Surf scoter</li> <li>△ White-winged scoter</li> <li>● Common merganser</li> <li>● Barrow's goldeneye</li> </ul> | <ul style="list-style-type: none"> <li>□ Western grebe</li> <li>● Black swift</li> <li>● Rufous hummingbird nest</li> <li>● Red-necked phalarope</li> <li>● Common murre</li> <li>● Marbled murrelet</li> <li>● Short-billed gull</li> <li>● Ring-billed gull</li> <li>● California gull</li> <li>● Iceland gull</li> <li>● Glaucous-winged gull</li> <li>● Red-throated loon nest</li> <li>● Yellow-billed loon</li> <li>● Bald eagle</li> <li>● Bald eagle nest</li> </ul> | <p><b>Amphibians</b></p> <ul style="list-style-type: none"> <li>■ Western toad</li> </ul> <p>--- International Boundary</p> <p>▭ Boundaries of District Lots 7235 and 5431</p> <ul style="list-style-type: none"> <li>▭ Marine Shipping Local Study Area</li> <li>▭ Marine Shipping Regional Study Area</li> <li>▭ Marine Terminal Local Study Area</li> <li>▭ Marine Terminal Regional Study Area</li> <li>▭ Terrestrial Wildlife Local Study Area</li> <li>▭ Terrestrial Wildlife Regional Study Area</li> <li>▭ Transmission Line Study Area</li> </ul> |
|--|--|--|



Project Location: Pearce Island, BC  
 Project Number: 123221820  
 Prepared by SPARKER on 20220705  
 Requested by CBALL on 20220623  
 Checked by TQULICHINI on 20220712

Client/Project/Report  
 Ksi Lisims LNG  
 Natural Gas Liquefaction and Marine Terminal  
 Technical Data Report – Wildlife and Wildlife Habitat

Figure No.  
**4.9-1**

**Locations of Incidental Detections of Wildlife Species of Conservation Concern or Indigenous Importance**

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Field Studies  
June 2024

## 1 4.10 HABITAT SUITABILITY ASSESSMENTS

### 2 4.10.1 Methods

3 Field-based wildlife habitat suitability ratings were completed within the Terrestrial Wildlife LSA to support  
4 the development of wildlife habitat suitability models (see Section 5.0). Habitat suitability for nine of  
5 10 key species or species groups (Table 4.10–1) was rated in the field following *Wildlife Habitat Rating*  
6 *Standards* (RISC 1999c) and indicator-specific habitat ratings assumptions developed for the Project  
7 (see Section 5.5). Habitat suitability was rated using a four or six-class scale depending on the level of  
8 knowledge of the habitat requirements and use by a species for a particular life requisite.

9 The wildlife biologist rated the suitability of each site for each species-life requisite combination using their  
10 knowledge of the species' habitat requirements, their interpretation of Site-specific conditions, and a  
11 summary of key habitat characteristics. The summary was developed using geographically relevant  
12 information from scientific and technical reports, IK where available, and expert knowledge.

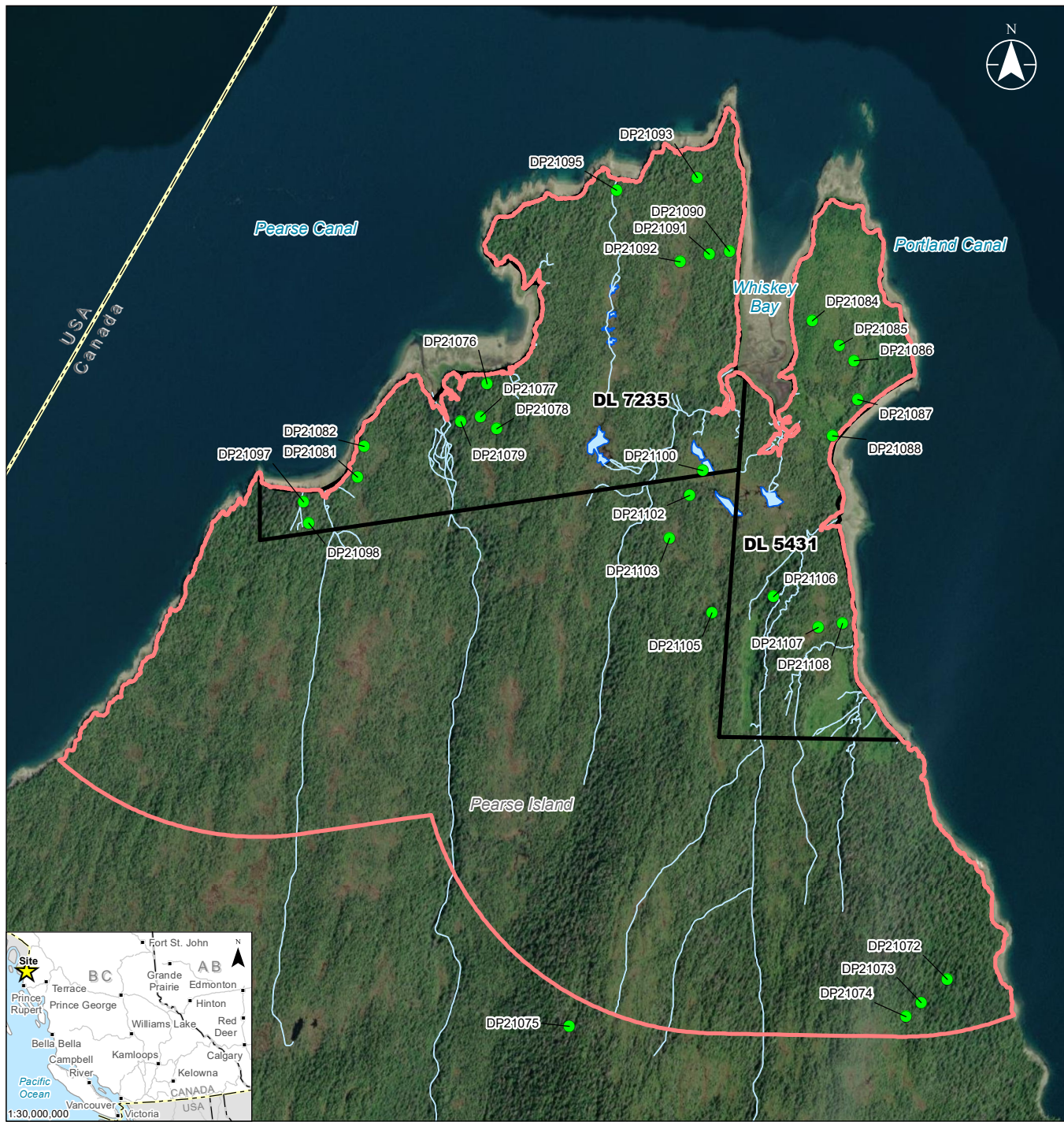
13 **Table 4.10–1 Key Species and Species Groups Assessed in the Field**

Key Species or Species Group	Season	Life Requisite	Rating Scale
Grizzly bear	Spring	Foraging	6-class
	Fall	Foraging	6-class
Pacific marten	Year-round	Living	4-class
Moose	Winter	Shelter	6-class
		Forage	6-class
Marbled murrelet	Growing	Breeding	4-class
Western screech-owl	Growing	Breeding	4-class
Northern goshawk	Growing	Breeding	4-class
Old Forest Bird Community	Growing	Breeding	4-class
Young Forest Bird Community	Growing	Breeding	4-class
Wetland Bird Community	Growing	Breeding	4-class

### 14 4.10.2 Results

15 Habitat assessments were completed from July 15 to 20, 2021 concurrent with terrestrial ecosystem  
16 mapping (TEM) and rare plant surveys. Habitat assessments were completed at 29 sites within the LSA  
17 (Figure 4.10–1). Results of the habitat assessments were used to fine tune the wildlife habitat suitability  
18 models; see Section 5.0.

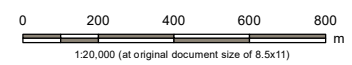




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- Wildlife Habitat Suitability Assessment Site
- Boundaries of District Lots 7235 and 5431
- Terrestrial Wildlife Local Study Area
- International Boundary
- Project Mapped Stream
- Waterbody



Project Location: Pearse Island, BC  
 Project Number: 123221820  
 Prepared by SPARKER on 20220707  
 Requested by CBALL on 20220623  
 Checked by TQUILICHINI on 20220712

Client/Project/Report  
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 Natural Gas Liquefaction and Marine Terminal  
 Technical Data Report – Wildlife and Wildlife Habitat

Figure No.  
**4.10-1**  
 Title  
**Wildlife Habitat Suitability Assessment Sites**

**Notes**  
 1. Coordinate System: NAD 1983 UTM Zone 9N  
 2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada, Stantec, Rockies LNG, Maxar

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## 1 5.0 WILDLIFE HABITAT MODELLING

2 The following sections describe the methods used to develop wildlife habitat suitability models. Models  
3 were created for 10 key species or species groups to inform the assessment of potential Project effects  
4 on wildlife and wildlife habitat.

### 5 5.1 APPROACH

6 Wildlife habitat suitability models were created to quantify wildlife habitat within the Terrestrial Wildlife  
7 LSA for ten key species or species groups (Table 5.1–1). Wildlife models were developed for reference  
8 Case and Project Case. The Reference Case models the existing habitat suitability for each indicator.  
9 The Project Case models incorporate Project facilities and infrastructure and is used to quantify Project  
10 effects on habitat.

11 The wildlife habitat models are based primarily on provincial standards for wildlife habitat suitability  
12 ratings (RISC 1999c) and primarily use either TEM or vegetation resource inventory (VRI) data. Habitat  
13 mapping of marbled murrelet marine foraging habitat is based on the description of marine habitat in the  
14 recovery strategy (ECCC 2023) and on comments received from ECCC (e.g., ECCC-045, see  
15 Appendix G of the Application). Key species or species groups were selected for habitat modelling from  
16 the list of Key Species and Species Groups (Section 3.5) developed through a review of existing  
17 information and feedback from Nisga’a Nation. Habitat modelling focused on the critical seasons and life  
18 requisites identified for each key species or species group.

19 **Table 5.1–1 Key Species or Species Group Selected for Wildlife Habitat Modelling**

Key Species or Species Group	Season(s)	Life Requisite	Vegetation Data Source	Model Type
Grizzly bear	Spring	Foraging	TEM	6-class
	Fall	Foraging	TEM	6-class
Moose	Winter	Foraging	TEM	6-class
		Shelter	TEM	6-class
Pacific marten	Year-round	Living	TEM	4-class
Marbled murrelet	Growing	Breeding	TEM	4-class
Western screech-owl	Growing	Breeding	TEM	4-class
Northern goshawk	Growing	Breeding	VRI	Habitat Suitability Index (HSI)
Old Forest Bird Community	Growing	Breeding	TEM	4-class
Young Forest Bird Community	Growing	Breeding	TEM	4-class
Wetland Bird Community	Growing	Breeding	TEM	4-class
Western toad	Growing	Breeding	TEM	4-class

20





1 Habitat suitability modelling is an expert opinion-based modelling process where knowledgeable  
2 biologists and species experts assign ratings to mapped ecological units for the species of interest  
3 (RISC 1999c). Suitability ratings reflect the relative value of habitat units to a species under current  
4 habitat conditions and are based on the expected use of habitats (RISC 1999c). Habitat suitability modes  
5 do not include factors such as predation or disease (RISC 1999c).

6 Habitat models can use either discrete rating classes (e.g., 4- or 6-class ratings) or continuous ratings  
7 (e.g., habitat suitability index (HSI) models). In both cases, ratings assumptions are first developed based  
8 on a review of species-specific habitat needs for the stated season and life requisite. For TEM-based  
9 models, the ratings assumptions are then applied to each unique TEM unit occurring within the modelling  
10 area. For HSI models the assumptions are applied to the vegetation data using a species-specific model  
11 equation.

12 Results of the desktop exercise are supplemented and supported by results from field-based wildlife  
13 habitat suitability assessments (see Section 4.10). The field program provides habitat ratings based on  
14 field conditions, which can be used to address inconsistencies and provide a semi-quantitative measure  
15 of confidence in the model outputs. To improve the consistency in which ratings were applied to  
16 ecosystem units, both field and office personnel were provided with the same guidance from which to  
17 determine ratings.

## 18 **5.2 VEGETATION MAPPING DATA**

19 Habitat ratings are assigned to mapped ecosystem or habitat units. Most of the models used TEM data as  
20 the model basis (Table 5.1–1). Ecosystem units were delineated for the Terrestrial Wildlife LSA following  
21 provincial TEM standards (RISC 1998). Ecosystem units are described for each mapped polygon in the  
22 map product, and each polygon may contain either one, two, or three ecosystem units. Each ecosystem  
23 unit is defined primarily by site series, structural stage,<sup>5</sup> and site modifiers. A detailed description of the  
24 TEM mapping product and the methods used to prepare it are provided in the Vegetation TDR  
25 (Ksi Lisims 2022b). Vegetation resource inventory mapping was used to develop a HSI model for  
26 northern goshawk based on Mahon et al. (2019). Vegetation resource inventory mapping is similar to  
27 TEM in that they both delineate the landscape into polygons that contain similar habitat attributes  
28 (RISC 2012). The VRI mapping product for a portion of the Terrestrial Wildlife LSA was obtained from  
29 GeoBC.

---

<sup>5</sup> Structural stages describe the stage of structural development that an ecosystem unit is in and are described in detail in *Standards for Terrestrial Ecosystem Mapping in British Columbia* (RISC 1998). The structural stages are: 1 (sparse/bryoid), 2 (herb), 3 (shrub/herb), 3a (low shrub), 3b (tall shrub), 4 (pole/sapling), 5 (young forest), 6 (mature forest), 7 (old forest).





Wildlife Habitat Modelling  
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### 5.3 MODEL DEVELOPMENT

Development of a ratings scheme for the models and field-based habitat ratings takes into consideration the habitat uses and requirements for each life requisite for each key species or species group. Information on a key species' or species group's ecology and habitat requirements was used to rate the expected suitability of each ecosystem unit for the chosen season and life requisite. Model ratings are based on assumptions, such as preferred vegetation assemblage or stand age, relating to the known preferred habitat for the species.

For TEM-based models, habitat suitability was rated for each ecosystem unit based on the ratings assumptions for that indicators' season and life requisite (e.g., fall foraging). TEM-based habitat suitability models used either a 6-class or 4-class model. A 6-class model was used for indicators where there is more information known for specific habitat relationships (RISC 1999c). A 4-class model was used for species or species groups where less detailed information on habitat associations was available.

For simple polygons made up of only one ecosystem unit, the habitat suitability rating for that ecosystem unit applies to the entire polygon. For complex polygons that are made up of two or three ecosystem units, a weighted average is used to determine the final rating for the polygon. The weighted average is calculated by multiplying the percent occurrence of each ecosystem unit in a polygon by the habitat suitability midpoint applicable to the rating given to that ecosystem unit (Table 5.3–1).

**Table 5.3–1 Rating Scheme used for Assessing Habitat Suitability for Key Species and Species Groups**

Species	Habitat Suitability Class		Percent Suitability	Suitability Midpoint
Grizzly bear Moose	1	High	100 – 76	88%
	2	Moderately-high	75 – 51	63%
	3	Moderate	50 – 26	38%
	4	Low	25 – 6	15%
	5	Very Low	5 – 1	3%
	6	Nil	0 - 0.9	0%
Pacific marten Marbled murrelet Western screech-owl Old Forest Bird Community Young Forest Bird Community Wetland Bird Community Western toad	1	High	100 – 76	88%
	2	Moderate	75 – 26	50%
	3	Low	25 – 1	13%
	4	Nil	0 – 0.9	0%





Wildlife Habitat Modelling  
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1 There are no existing disturbance features within the Terrestrial Wildlife LSA and so adjustments to the  
2 models to account for existing disturbances were not required. Adjustments were made to some species'  
3 models if the use of a given habitat may be influenced by adjacent habitat or distance to other suitable  
4 habitat. These adjustments are described in the rating adjustments section for each species-life requisite.

5 Indirect effects from Project disturbances on habitat suitability are included in the operations models using  
6 'zones of influence' (ZOI) and 'disturbance coefficients' to adjust ratings to account for Project-related  
7 sensory disturbance. For example, otherwise suitable habitat adjacent to a road may be used less often  
8 than expected if individuals choose to avoid the road.

9 Once the ecosystem units have been rated, and adjustments, if applicable, have been applied, the area  
10 of suitable habitat for a species' season and life requisite is determined. The area of habitat that  
11 represents the upper 75th percentile of suitability (i.e., 25–100% suitable) is considered 'effective'  
12 (e.g., high and moderate in a 4-class model, and high, moderately-high, and moderate in a 6-class model)  
13 and forms the basis for assessing Project effects on habitat (i.e., the change between the Reference  
14 Case (existing conditions) and Project Case (operations)).

15 An HSI model for northern goshawk was developed using VRI data and by assigning ratings on a scale of  
16 zero to one, where zero equals nil, to specific habitat variables (e.g., canopy cover, tree species)  
17 (USFWS 1981). The HSI is a numerical index that represents the relative suitability of habitat. The  
18 HIS model framework for northern goshawk is based on a model developed for coastal northern goshawk  
19 (Mahon et al. 2019). The final HSI values were converted to a 4-class scale, where HSI values of 0.749 to  
20 1 were considered high (1), HSI values of 0.499 to 0.748 were considered moderate (2), HSI values of  
21 0.249 to 0.498 were considered low (3), and HSI values of 0 to 0.248 were considered nil (4). The area of  
22 habitat considered high (1) or moderate (2) was considered effective habitat.

## 23 **5.4 MODEL RELIABILITY AND CONFIDENCE**

24 The reliability of a wildlife habitat model depends on the level of information available to describe the  
25 habitat associations for each species' life requisites. As defined in RISC (1999c), low reliability models  
26 are based on information sourced from other jurisdictions with no field verification; moderate reliability  
27 models are based on information sourced mainly from within BC, but not necessarily from ecosystems  
28 represented within the study area with no or limited field verification; and high reliability models are based  
29 on detailed information sourced from BC which pertains to the ecosystems represented within the study  
30 area and has been field verified.

31 Confidence in the wildlife habitat models was assessed qualitatively by comparing the field-based habitat  
32 suitability ratings to the desktop ratings. Where consistent, large differences existed between field and  
33 desktop ratings (i.e., more than one suitability class) field data and TEM site series information was  
34 carefully reviewed, and a decision was made as to whether the desktop rating required adjusting prior to  
35 the model being run.





## 1 **5.5 MODELLING ASSUMPTIONS**

2 The following sections describe the model assumptions and adjustments used to develop habitat  
3 suitability models for grizzly bear, moose, Pacific marten, western screech-owl, northern goshawk,  
4 marbled murrelet, old forest bird community, young forest bird community, wetland bird community, and  
5 western toad. Species accounts for key species or species groups are provided Appendix D.

### 6 **5.5.1 Grizzly Bear**

7 Habitat suitability modelling within the Terrestrial Wildlife LSA focused on two grizzly bear life requisites:  
8 spring foraging and fall foraging. Key spring foraging habitat includes lower elevation, open areas such as  
9 estuaries, drainages, wetlands, and meadows. Sites that support spring-forage species (e.g., sedges,  
10 skunk cabbage, shrub roots, and horsetails) are preferred. Intertidal areas may be used to forage  
11 opportunistically on clams, mussels, and barnacles. Key fall foraging habitat includes salmon-bearing  
12 streams and estuaries. Moist, rich sites that support an abundance of berry-producing shrubs  
13 (e.g., salmonberry, huckleberry, blueberries, devil's club, red elderberry, and stink current) and other  
14 forage plants (e.g., cow parsnip, horsetail, and nettles) are preferred. A species account for grizzly bear is  
15 provided in Appendix D.

16 The grizzly bear habitat model was developed using information from the Skeena region and other parts  
17 of BC and are considered moderately reliable.

#### 18 **5.5.1.1 Ratings Assumptions**

##### 19 ***Spring Foraging Habitat***

20 A six-class rating scheme was used to rate spring foraging habitat suitability for grizzly bear. The ratings  
21 assumptions used to define habitat suitability are provided below and in Table 5.5–1:

- 22 • Non-vegetated units (e.g., rock) and open water wetlands (e.g., lakes, ponds) were rated nil (6)
- 23 • Wetlands were rated high (1) to moderate (3) based on the presence of preferred forage species  
24 (e.g., sedges, skunk cabbage, horsetails, and forbs), shrub cover, and structural stage:
  - 25 – swamps were rated high (1) to moderately-high (2)
  - 26 – bogs were rated moderately-high (2) to low (5)
- 27 • Structural stage 2 (herb) to 7 (old forest) were rated high (1) to low (5) based on the presence of  
28 forage species, shrub cover, structural stage, and moisture regime:
  - 29 – Units with preferred forage species (e.g., sedges, skunk cabbage, horsetails, and forbs) were  
30 rated higher than units without preferred forage species
  - 31 – Units with less than 50% shrub cover were rated lower than units with more than  
32 50% shrub cover
  - 33 – Moist or open canopy units were rated higher than dry or closed canopy units





Wildlife Habitat Modelling  
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1 **Table 5.5–1 Grizzly Bear Spring Foraging Habitat Ratings Assumptions**

Structural Stage	Ratings Assumptions		
	Dry Forest	Moist Forest	Wetland
1	6	6	–
2 – 3	2 – 4	1 – 3	1 – 5
4 – 5 (open canopy)	4 – 5	2 – 4	2 – 4
4 – 5 (closed canopy)	5	4	–
6 – 7 (open canopy)	2 – 4	1 – 3	1 – 3
6 – 7 (closed canopy)	3 – 5	2 – 4	–

2 **Fall Foraging Habitat**

3 A six-class rating scheme was used to rate fall foraging habitat suitability for grizzly bear. The ratings  
4 assumptions used to define habitat suitability are provided below and in Table 5.5–2.

- 5 • Non-vegetated units (e.g., rock) and open water wetlands (e.g., lakes, ponds) were rated nil (6)
- 6 • Salmon-bearing streams were rated high (1)
- 7 • Units with preferred forage species were rated higher than units without preferred forage species.
- 8 • Moist, open units were rated higher than dry, closed units
- 9 • Units with less than 50% shrub cover were rated lower than units with more than 50% shrub cover
- 10 • Structural stage 3 (shrub) to 7 (old forest) were rated high (1) to low (5) based on the presence of
- 11 forage species, shrub cover, structural stage, and moisture regime

12 **Table 5.5–2 Grizzly Bear Fall Foraging Habitat Ratings Assumptions**

Structural Stage	Ratings Assumptions		
	Dry Forest	Moist Forest	Wetland
1	6	6	–
2	4 – 5	4 – 5	4 – 5
3 – 3b	3 – 4	1 – 3	2 – 3
4 – 5 (open canopy)	4	3 – 4	3 – 4
4 – 5 (closed canopy)	5	4	–
6 – 7 (open canopy)	2 – 3	1 – 2	1 – 3
6 – 7 (closed canopy)	4 – 5	2 – 3	–



Wildlife Habitat Modelling  
June 2024

1 **5.5.1.2 Ratings Adjustments**

2 ***Spring Foraging Habitat***

3 *Existing Conditions*

4 No ratings adjustments were made to the Reference Case model. No disturbance coefficients or ZOIs  
5 were applied to the Reference Case model as there are no existing disturbances in the Terrestrial Wildlife  
6 LSA.

7 *Operations*

8 The footprint of the terrestrial Project facilities was rated nil (6) in the operations model. Grizzly bear has  
9 been shown to avoid areas near roads due (Kasworm and Manley 1990). Roads with more traffic elicit a  
10 stronger avoidance response (Mace et al. 1996; Northrup et al 2012). To account for sensory disturbance  
11 from Project components ZOIs and disturbance coefficients were applied to the operations model  
12 (Table 5.5–3).

13 **Table 5.5–3 Zones of Influence and Disturbance Coefficients Applied to the Grizzly Bear Spring**  
14 **and Fall Foraging Operations Model**

<b>Disturbance Feature Type</b>	<b>ZOI (m)</b>	<b>Disturbance Coefficient</b>
Tertiary roads	50	-1
Overburden area	100	-1
Permanent facility	200	-2

15 ***Fall Foraging Habitat***

16 *Existing Conditions*

17 Ecosystem units located within 500 m of a salmon-bearing watercourse were upgraded by two classes  
18 (to a maximum of high (1)). No disturbance coefficients or ZOIs were applied to the Reference Case  
19 model as there are no existing disturbances in the Terrestrial Wildlife LSA.

20 *Operations*

21 Ecosystem units located within 500 m of a salmon-bearing watercourse were upgraded by two classes  
22 (to a maximum of high (1)). The footprint of the terrestrial Project facilities was reduced to nil (6) in the  
23 operations model. The same ZOIs and disturbance coefficients used in the spring model were used in the  
24 fall model.





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1 **5.5.2 Moose**

2 Habitat suitability modelling within the Terrestrial Wildlife LSA focused on two moose life requisites: winter  
3 foraging and winter shelter. Key winter foraging habitat includes habitat with abundant forage species,  
4 particularly shrub forest and open mature to old forest. Key winter shelter habitat includes forested areas  
5 with closed canopies, particularly coniferous stands, near suitable foraging areas. A species account for  
6 moose is provided in Appendix D.

7 The moose habitat models were developed using information from the Skeena region and other parts of  
8 BC and are considered moderately reliable.

9 **5.5.2.1 Ratings Assumptions**

10 ***Winter Foraging Habitat***

11 A six-class rating scheme was used to rate winter foraging habitat suitability for moose. The ratings  
12 assumptions used to define habitat suitability are provided below and in Table 5.5–4.

- 13 • Non-vegetated units (e.g., rock) were rated nil (6)
- 14 • Ecosystem units with slopes greater than 45° (z or q site modifier) were rated nil (6)
- 15 • Sites with preferred winter forage species (e.g., willows, cottonwood, red-osier dogwood) were rated  
16 higher than sites without preferred winter forage species
- 17 • Shrubby (structural stage 3, 3b) and open-canopy structural stage 6 (mature forest) and structural  
18 stage 7 (old forest) with ample cover of preferred forage species were rated highest
- 19 • Deciduous and mixedwood units were rated higher than coniferous units
- 20 • Bog (e.g., Wb51, Wb53) and swamp units (e.g., Ws54) wetlands were rated moderate (2) to low (5)  
21 based on expected presence of forage species and structural stage
- 22 • Open water wetlands (e.g., lakes, ponds) were rated nil (6)
- 23 • Floodplain units were rated moderately high (2) to moderate (3) based on expected presence of  
24 forage species and structural stage

25 **Table 5.5–4 Moose Winter Foraging Habitat Ratings Assumptions**

Structural Stage	Ratings Assumptions		
	Deciduous Forest	Mixedwood Forest	Coniferous Forest
1 – 2	6	6	6
3a	5	5	5
3, 3b	1 – 3	1 – 3	2 – 4
4 – 5	3 – 4	3 – 4	4 – 5
6 – 7 (open canopy)	1 – 2	1 – 3	2 – 4
6 – 7 (closed canopy)	3 – 4	3 – 4	4 – 5





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1 **Winter Sheltering Habitat**

2 A six-class rating scheme was used to rate winter shelter habitat suitability for moose. The ratings  
3 assumptions used to define habitat suitability are provided below and in Table 5.5–5.

- 4 • Non-vegetated units (e.g., rock) were rated nil (6)
- 5 • Ecosystem units with slopes greater than 45° (z or q site modifier) were rated nil (6)
- 6 • Ecosystem units in structural stage 1 (sparse/bryoid), 2 (herb), 3 (shrub) were rated nil (6)
- 7 • Ecosystem units with closed canopies (>60% closure) were rated higher than open canopy units
- 8 • Deciduous and mixedwood units were rated lower than then coniferous units
- 9 • Ecosystem units with spruce were rated higher than units without spruce
- 10 • Open water wetlands (e.g., lakes, ponds) were rated nil (6)

11 **Table 5.5–5 Moose Winter Shelter Habitat Ratings Assumptions**

Structural Stage	Ratings Assumptions		
	Deciduous Forest	Mixedwood Forest	Coniferous Forest
1 – 3, 3a, 3b	6	6	6
4	5	4	4
5	4	4	3
6 – 7 (open canopy)	3	3	2 – 3
6 – 7 (closed canopy)	3	2 – 3	1 – 2

12 **5.5.2.2 Ratings Adjustments**

13 **Winter Foraging**

14 *Existing Conditions*

15 A distance-based rule was used adjust the moose winter foraging model based on distance to shelter  
16 habitat. Effective shelter habitat are units rated high (1) to moderate (3). Ratings were adjusted based on  
17 the distance between foraging habitat and shelter habitat as follows:

- 18 • 0 m to 100 m from shelter habitat - retain foraging habitat value
- 19 • 100 m to 200 m from shelter habitat - decrease feeding habitat value by one class, but no lower than  
20 low (5)
- 21 • Greater than 200 m from shelter habitat - decrease feeding habitat value by 2 classes, but no lower  
22 than low (5)

23 No disturbance coefficients or ZOIs were applied to the Reference Case model as there are no existing  
24 disturbances in the Terrestrial Wildlife LSA.



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1 *Operations*

2 The footprint of the terrestrial Project facilities was rated nil (6) in the operations model. Moose are known  
3 to avoid roads, including lower-use forestry roads. Laurian et al. (2008) found that moose avoid habitat  
4 within 500 m of roads, while Wasser et al. (2011) found that effects of roads on moose habitat use  
5 extended up to 250 m. To account for sensory disturbance from Project components ZOIs and  
6 disturbance coefficients were applied to the operations model (Table 5.5–6).

7 **Table 5.5–6 Zones of Influence and Disturbance Coefficients Applied to the Moose Winter**  
8 **Foraging and Winter Shelter Operations Models**

Disturbance Feature Type	ZOI (m)	Disturbance Coefficient
Tertiary roads	250	-1
Overburden area	100	-1
Permanent facility	250	-1

9 **Winter Shelter**

10 *Existing Conditions*

11 A distance-based rule was used adjust the moose winter shelter model based on distance to foraging  
12 habitat. Effective foraging habitat are units rated high (1) to moderate (3). Shelter ratings were adjusted  
13 based on the distance between foraging habitat and shelter habitat as follows:

- 14
- 15 • 0 m to 100 m from foraging habitat - retain shelter habitat value
  - 16 • 100 m to 200 m from foraging habitat - decrease shelter habitat value by one class, but no lower than low (5)
  - 17 • Greater than 200 m from foraging habitat - decrease shelter habitat value by 2 classes, but no lower than low (5)
- 18

19 No disturbance coefficients or ZOIs were applied to the Reference Case model as there are no existing  
20 disturbances in the Terrestrial Wildlife LSA.

21 *Operations*

22 The footprint of the terrestrial Project facilities was reduced to nil (6) in the operations model. The same  
23 ZOIs and disturbance coefficients used in the spring model were used in the fall model.





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1 **5.5.3 Pacific Marten**

2 The life requisite modeled for Pacific marten is year-round living. Key habitat for marten includes sites  
3 with high shrub and herbaceous cover, areas with complex physical structure (e.g., log piles,  
4 coarse woody debris), and security habitat with canopy closure greater than 30%. A species account for  
5 Pacific marten is provided in Appendix D.

6 The Pacific marten habitat model was developed using information from BC, provinces other than BC,  
7 and from the United States of America and is considered to have moderate reliability.

8 **5.5.3.1 Ratings Assumptions**

9 A four-class rating scheme was used to rate year-round living habitat suitability for Pacific marten.  
10 The ratings assumptions used to define habitat suitability are provided below and in Table 5.5–7.

- 11 • Non-vegetated units (e.g., rock) and structural stages 1 to 4 were rated nil (4)
- 12 • Old growth (structural stage 7) and mature (structural stage 6) forest was rated higher than young  
13 forest (structural stage 5)
- 14 • Coniferous forests were rated higher than mixedwood forest or deciduous forest
- 15 • Forested ecosystems with high canopy cover were rated higher than forested units with low or open  
16 canopy cover
- 17 • Forested ecosystem units with high ground cover were rated higher than units with sparse ground  
18 cover
- 19 • Forested wetlands (e.g., forested bogs or swamps) were rated low (3) to moderate (2)

20 **Table 5.5–7 Pacific Marten Year-Round Living Habitat Ratings Assumptions**

Structural Stage	Ratings Assumptions			
	Coniferous Forest	Mixedwood Forest	Deciduous Forest	Wetlands
1 – 4	4	4	4	4
5 (open canopy)	3	3	3	3
5 (closed canopy)	2 – 3	3	3	–
6 – 7 (open canopy)	2 – 3	2 – 3	3	2 – 3
6 – 7 (closed canopy)	1 - 2	2 – 3	3	–



1 **5.5.3.2 Ratings Adjustments**

2 **Existing Conditions**

3 No ratings adjustments were made to the Reference Case model. No disturbance coefficients or ZOIs  
4 were applied to the Reference Case model as there are no existing disturbances in the Terrestrial Wildlife  
5 LSA.

6 **Operations**

7 The footprint of the terrestrial Project facilities was rated nil (4) in the operations model. Marten have been  
8 shown to be sensitive to noise generated by road traffic (Zielinski et al. 2008); as such, sensory  
9 disturbance ZOIs and disturbance coefficients were applied to the operations model. Habitat suitability  
10 was reduced by one class within 100 m of high intensity disturbance features (e.g., permanent facilities)  
11 and by one class within 50 m of moderate to low intensity disturbance features (e.g., overburden areas)  
12 (Table 5.5–8).

13 **Table 5.5–8 Zones of Influence and Disturbance Coefficients Applied to the Pacific Marten**  
14 **Year-round Living Operations Model**

Disturbance Feature Type	ZOI (m)	Disturbance Coefficient
Tertiary roads	50	-1
Overburden area	50	-1
Permanent facility	100	-1

15 **5.5.4 Western Screech-Owl**

16 The life requisite modeled for western screech-owl is breeding. Key breeding habitat is primarily low-  
17 elevation mature-to-old (i.e., structural stages 5 to 7) coniferous or mixedwood forest, typically near  
18 watercourses or wetland areas. Western screech-owl requires large diameter trees with existing cavities  
19 for nesting, either naturally formed or excavated by primary cavity nesters. A species account for western  
20 screech-owl is provided in Appendix D.

21 The western screech-owl habitat model was developed using information collected in BC, southern  
22 Alaska, and other jurisdictions and is considered to have moderate reliability.

23 **5.5.4.1 Ratings Assumptions**

24 A four-class rating scheme was used to rate breeding habitat suitability for western screech-owl. The  
25 ratings assumptions used to define habitat suitability are provided below and in Table 5.5–9.

- 26
- Non-vegetated units (e.g., rock) and structural stages 1 to 4 were rated nil (4)
  - 27 • High elevation (>600 m) units were rated nil (4)





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- 1 • Mixedwood forest and open canopy coniferous forest were rated higher than deciduous forest and
- 2 closed canopy coniferous forest
- 3 • Forested bog and forested swamp units in structural stage 5, 6, and 7 were rated moderate (2) to
- 4 low (3)
- 5 • Floodplain units in structural stage 6 or 7 were rated high (1) to moderate (2)

6 **Table 5.5–9 Western Screech-owl Breeding Habitat Ratings Assumptions**

Structural Stage	Ratings Assumptions		
	Coniferous Forest	Mixedwood Forest	Deciduous Forest
1 – 4	4	4	4
5 (open canopy)	2	2	3
5 (closed canopy)	3	2	3
6 – 7 (open canopy)	1	1	2
6 – 7 (closed canopy)	2	1	2

7 **5.5.4.2 Ratings Adjustments**

8 **Existing Conditions**

9 Western screech-owl prefers habitat near freshwater. Habitat ratings were reduced by one class for  
 10 habitat greater than 300 m from water (e.g., streams, wetlands), but was not reduced to nil (4). No  
 11 disturbance coefficients or ZOIs were applied to the Reference Case model as there are no existing  
 12 disturbances in the Terrestrial Wildlife LSA.

13 **Operations**

14 Habitat ratings were reduced by one class for habitat greater than 300 m from water (e.g., streams,  
 15 wetlands), but was not reduced to nil (4). The footprint of the terrestrial Project facilities was rated nil (4) in  
 16 the operations model.

17 Limited information is available on the effect of sensory disturbance on western screech-owl. Some birds  
 18 nest in suburban areas (Cannings et al. 2020), and thus may be generally tolerant of humans close to the  
 19 nest. However, they are prone to collisions with vehicles when crossing or foraging along roads  
 20 (Preston and Powers 2006; Cannings et al. 2020). As a conservative approach, habitat ratings were  
 21 reduced by one class within 100 m of permanent Project facilities, and by one class within 50 m of other  
 22 disturbances (e.g., tertiary roads) (Table 5.5–10).



1 **Table 5.5–10 Zones of Influence and Disturbance Coefficients Applied to the**  
2 **Western Screech-owl Breeding Operations Model**

Disturbance Feature Type	ZOI (m)	Disturbance Coefficient
Tertiary roads	50	-1
Overburden area	50	-1
Permanent facility	100	-1

### 3 **5.5.5 Northern Goshawk**

4 The life requisite modeled for northern goshawk is breeding. Key breeding habitat characteristics are  
5 based on structural attributes. Breeding habitat is characterized as mature and old coniferous forest with  
6 relatively closed canopies. Nest stands are generally dominated by western hemlock, or a mix of western  
7 redcedar and western hemlock. A species account for northern goshawk is provided in Appendix D.

#### 8 **5.5.5.1 Ratings Assumptions**

9 Northern goshawk breeding habitat suitability was modeled for the Terrestrial Wildlife LSA using VRI data  
10 and an HSI model based on Mahon et al. (2019) and PRGT (2014). Key variables included in the model  
11 are stand age and height, distance from edge, forest composition, elevation, slope, and biogeoclimatic  
12 variant. Each variable was rated from 0 to 1, the assumptions for which are described in the following  
13 sections.

14 The northern goshawk habitat model was developed using information collected in coastal BC and  
15 supported by information on identified nests in coastal BC. The reliability of the model is considered high.

#### 16 ***Stand Age and Height***

17 Stand age and height are used as predictors of stand maturity and the suitability of nesting platforms and  
18 subcanopy flyways. Individual trees must have branches large enough to support a nest, and the stand  
19 must provide open flyways (Mahon et al. 2019). Using the average of both variables accounts for  
20 variability in stand structure related to site productivity. On poor sites suitability may be overestimated if  
21 just age is used, and underestimated if just height is used. For age, suitability increases linearly from 0 at  
22 40 years to 1 at 90 years and then plateaus. For height, suitability increases from 0 at 14 m to 1 at 32 m  
23 (Mahon et al. 2019).

#### 24 ***Distance from Edge***

25 Research in BC suggests that northern goshawk tends to avoid nesting near edges. In coastal BC there  
26 are significantly fewer nests within 200 m of cutblocks compared to random points (Mahon et al. 2019).  
27 This pattern occurs with ‘hard’ edges, where mature forest meets non-forested or early seral habitats and  
28 the difference in height is more than 12 m. Edges were grouped into two categories because  
29 observations suggest goshawks responded differently to anthropogenic (e.g., edges resulting primarily





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1 from cutblocks), and natural edges such as those adjacent to wetlands. Ratings for each edge distance  
2 are provided in Table 5.5–11. A stronger edge effect is applied for 0 to 100 m compared to 100 to 200 m  
3 (Mahon et al. 2019).

4 **Table 5.5–11 Northern Goshawk Nesting Habitat Suitability Ratings for Distance from**  
5 **Forest Edge**

Edge Distance (m)	Edge Type	
	Anthropogenic	Natural
0-100	0.4	0.6
100-200	0.8	0.9
>200	1.0	1.0

6 **Forest Composition**

7 Nest stand suitability depends on the structural elements of the stand, which are determined, in part, by  
8 tree species composition. Suitability ratings for tree species are based on observed nest associations  
9 (Mahon et al., 2019). In coastal areas, nests are usually found in western hemlock dominated or  
10 western hemlock/amabilis fir co-dominated stands (Mahon et al. 2019). Stands that are dominated by  
11 western redcedar or amabilis fir, are less suitable as they tend to have more broken canopies, more  
12 cluttered subcanopy flyways, and poorer branch structures for nests. Yellow cedar and lodgepole pine  
13 stands are least suitable due to both tree form and having multi-storied canopies with low canopy closure  
14 (Mahon et al. 2019). Overall suitability ratings for a forest stand are calculated by multiplying the tree  
15 species rating by its percentage composition (0 to 1) and summing the individual tree species ratings for  
16 all types in the stand.

**Table 5.5–12 Northern Goshawk Nesting Habitat Suitability Ratings for Tree Species**

Tree Species	Composition	Rating
Western redcedar	> 80%	0.45
Western redcedar	< 80%	0.65
Yellow cedar	-	0.4
Douglas fir	-	1
Subalpine fir	-	0.6
Amabilis fir	-	0.8
Western hemlock	-	1
Mountain hemlock	-	0.8
Lodgepole pine	-	0.5
Other pines	-	0.7
Spruce	-	1
Black spruce	-	0.5





**Table 5.5–12 Northern Goshawk Nesting Habitat Suitability Ratings for Tree Species**

Tree Species	Composition	Rating
Red alder	-	0.7
Aspen	-	0.7
Cottonwood	-	0.7
Birch	-	0.7
SOURCE: Mahon et al. 2019		

1 **Elevation**

2 Northern goshawk appears to avoid nesting in higher elevation areas. This likely results from a correlation  
3 between elevation and tree species, such as subalpine fir, and higher elevation Biogeoclimatic  
4 Ecosystem Classification (BEC) variants, which generally provide suboptimal nesting habitat. Suitability is  
5 rated 1.0 from 0 m to 600 m elevation. Suitability decreases linearly from 1.0 at 600 m elevation to 0.5 at  
6 1,300 m elevation, and then plateaus (Mahon et al. 2019).

7 **Slope**

8 All known northern goshawk nest sites in coastal BC occur on slopes that are less than 45 degrees, and  
9 the majority were located on slopes that are less than 31 degrees (Mahon et al. 2019). Nests on  
10 31-to-45-degree slopes typically occur in areas with broken slopes with small benches, as opposed to  
11 areas of continuous slope (Table 5.5–13).

12 **Table 5.5–13 Northern Goshawk Nesting Habitat Suitability Ratings for Slope**

Slope (degrees)	Rating
0	1.0
16.7	1.0
30	1.0
45	0.8
60	0.6
75	0.55
90	0.52
SOURCE: Mahon et al. 2019	





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1 **Biogeoclimatic Variant**

2 None of the nests identified by Mahon et al. (2019) in coastal BC are located within the hypermaritime  
3 CWH or mountain hemlock BEC zone variants, suggesting that these are avoided even where otherwise  
4 suitable nesting stands occur. The BEC variant ratings used by Mahon et al. (2019) reflect a compromise  
5 between the relatively strong pattern of low use by goshawks and the poor understanding of why that  
6 occurs. The entirety of the Terrestrial Wildlife LSA occurs within the CWHvh2 BEC variant, which is  
7 rated 0.8.

8 **Model Calculation**

9 The model uses a limiting factor approach, which means that when the suitability rating of one variable  
10 decreases below its optimal range it decreases the overall suitability by that amount (Mahon et al. 2019).  
11 Additionally, suboptimal ratings in two or more variables are combined, through a multiplicative function,  
12 to decrease the overall value. Finally, the model is non-compensatory, which means that the value of one  
13 variable cannot compensate for a deficiency in another (Mahon et al. 2019).

14 The equation used to calculate the suitability ratings (see Mahon et al. 2019) is:

15 
$$\text{Nest Area Suitability} = \left( \frac{A + H}{2} \right) \times E \times F \times El \times S \times BEC$$

16 where,

17 *A* is stand age rating

18 *H* is stand height rating

19 *E* is edge rating

20 *F* is forest composition rating

21 *El* is elevation rating

22 *S* is slope rating

23 *BEC* is BEC variant rating

24 Habitat suitability index models produce continuous data; for this HSI model these continuous data were  
25 grouped within a four-class rating scheme to facilitate map theming and interpretation (Table 5.5–14).  
26 Effective habitat is the upper 50<sup>th</sup> percentile of habitat (i.e., the sum of habitat considered high (1) or  
27 moderate (2)).





1 **Table 5.5–14 Northern Goshawk Breeding Habitat Ratings Scheme**

HSI Model Suitability Ratings	Suitability Class	Interpretation
0–0.249	Nil (4)	Unsuitable habitat that fails to provide minimum requirements.
0.250–0.499	Low (3)	Suitability uncertain. Habitat provides theoretical minimum requirements for supporting a nest, but suitability of two or more habitat variables is suboptimal.
0.500–0.749	Moderate (2)	Suitable habitat where suitability of one or two habitat variables is less than optimal, but minimum requirements are still met.
0.750–1.000	High (1)	Suitable habitat where all habitat variables meet optimal conditions.
SOURCE: Mahon et al. 2019		

2 **5.5.5.2 Ratings Adjustments**

3 **Existing Conditions**

4 No ratings adjustments were made to the Reference Case model. No disturbance coefficients or ZOIs  
5 were applied to the Reference Case model as there are no existing disturbances in the Terrestrial Wildlife  
6 LSA.

7 **Operations**

8 The footprint of the terrestrial Project facilities was reduced to nil (4) in the operations model. Edge effects  
9 are incorporated directly into the HSI model which negates the need for the application of ZOIs and  
10 disturbance coefficients to the model.

11 **5.5.6 Marbled Murrelet**

12 The life requisite modeled for marbled murrelet is summer (nesting) breeding. Marine foraging habitat was  
13 not modeled and is therefore not discussed in this section. At the landscape level, suitable breeding  
14 habitat is located mostly in the CWH BEC zone within old growth coniferous forest (structural stage 7) at  
15 elevations less than 900 m, typically within 30 km of marine waters (COSEWIC 2012c; ECCC 2023). Key  
16 breeding habitat in the Central and Northern Mainland Coast is old (140 years or older) coniferous forest  
17 with tall trees (19.5 m or taller), canopy gaps, and moderate vertical canopy complexity (ECCC 2023). A  
18 species account for marbled murrelet is provided in Appendix D. Structural stage 6 forest is rated low  
19 because mature forest can be as young as 80 years (range is 80 to 250 years) and is less likely to  
20 contain stand- and tree-level attributes required by marbled murrelet than old growth forest (> 250 years).

21 The marbled murrelet nesting habitat model was developed using information collected in BC and  
22 southern Alaska and is considered to have moderate reliability. Marbled murrelet foraging habitat  
23 mapping was developed based on the habitat description provided in the recovery strategy (ECCC 2023)  
24 and comments from ECCC and is considered to have moderate reliability.



1 **5.5.6.1 Ratings Assumptions**

2 ***Terrestrial Breeding Habitat***

3 A four-class rating scheme was used to rate marbled murrelet breeding habitat suitability. The ratings  
4 assumptions used to define habitat suitability are provided below and in Table 5.5–15.

- 5 • Non-vegetated units (e.g., rock) were rated nil (4)
- 6 • Marbled murrelet typically nests on coniferous trees. Deciduous-dominated stands were rated nil (4)  
7 and mixedwood forests were rated low (3)
- 8 • Marbled murrelet nests in old growth coniferous forest (structural stage 7) and may nest in mature  
9 forest (structural stage 6) stands if there are individual trees or tree patches that are suitable.  
10 Old growth coniferous forests were rated high (1) or moderate (2) depending on canopy closure and  
11 mature coniferous forests were rated low (3).
- 12 • Non-forested units to young forest (structural stages 1 to 5) were rated nil (4)
- 13 • Marbled murrelet requires canopy gaps. Structural stage 7 coniferous forests with open canopies  
14 were rated higher than forests with closed canopies
- 15 • Higher elevation units were rated lower than lower elevation units. Units above 900 m elevation units  
16 were rated low (3)
- 17 • Forested bogs and swamps were rated moderate (2) to low (3)

18 **Table 5.5–15 Marbled Murrelet Breeding Habitat Ratings Assumptions**

Structural Stage	Ratings Assumptions		
	Coniferous Forest	Mixedwood Forest	Deciduous Forest
1 – 5	4	4	4
6	3	3	4
7 (closed canopy)	2	3	4
7 (open canopy)	1-3	3	4

19 ***Marine Foraging Habitat***

20 Marine foraging habitat mapping was developed for marbled murrelet based on the description of marine  
21 habitat in the recovery strategy (ECCC 2023) and on comments provided by ECCC (ECCC-045; see  
22 Appendix G of the Application). Marine waters less than 100 m in depth and within 2 km of marbled  
23 murrelet terrestrial critical habitat polygons within the Marine Shipping RSA, Marine Terminal LSA, and  
24 OWAA were mapped as potential marine foraging habitat. Canadian Hydrographic Service bathymetric  
25 data were used to define a lower depth boundary of 100 m because an 80m depth contour was not  
26 available. In some areas where the 100 m depth contour was not available, the 91 m depth contour was  
27 used.



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1 **5.5.6.2 Ratings Adjustments**

2 ***Terrestrial Breeding Habitat***

3 *Existing Conditions*

4 No ratings adjustments were made to the Reference Case model. No disturbance coefficients or ZOIs  
5 were applied to the Reference Case model as there are no existing disturbances in the Terrestrial Wildlife  
6 LSA.

7 *Operations*

8 The footprint of the terrestrial Project facilities was reduced to nil (4) in the operations model.

9 Limited information is available on the response of nesting marbled murrelet to sensory disturbance.  
10 Some research has found that nests located further away from forest edges are generally more likely to  
11 be successful (Hamer and Nelson 1995), however other research has found that distance to trails or  
12 paved roads is not a predictor of hatching success (Hébert and Golightly 2006). Noise from low-volume  
13 vehicle traffic does not appear to elicit an adverse response by actively nesting marbled murrelet  
14 (Long and Ralph 1998). Experimental disturbance of incubating marbled murrelets to an operating  
15 chainsaw did not cause the bird to flush from the nest but did elicit birds to spend more time with their  
16 head raised and bill up (Hébert and Golightly 2006). Habitat suitability was reduced by one class within  
17 50 m of low-disturbance Project components, and by two classes for high-disturbance Project  
18 components (Table 5.5–16).

19 **Table 5.5–16 Zones of Influence and Disturbance Coefficients Applied to the Marbled Murrelet**  
20 **Breeding Habitat Operations Model**

Disturbance Feature Type	ZOI (m)	Disturbance Coefficient
Tertiary roads	50	-1
Overburden area	50	-1
Permanent facility	50	-2

21 ***Marine Foraging Habitat***

22 *Existing Conditions*

23 No ratings adjustments were made to the Reference Case habitat mapping.

24 *Operations*

25 The footprint of the marine Project components was reduced to nil in the Operations habitat mapping.





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1 **5.5.7 Old Forest Bird Community**

2 The life requisite modeled for the old forest bird community is breeding. Key habitat for the old forest bird  
3 community is old (structural stage 6 to 7), lower elevation forest. Forested units that are moist and/or  
4 open canopied typically have a more well-developed shrub layer, which typically supports higher bird  
5 diversity and abundance than closed canopy forests with a poorly developed shrub layer. A community  
6 account for the old forest bird community is provided in Appendix D.

7 The old forest bird community habitat model was developed using information from BC and other  
8 jurisdictions and is considered moderately reliable.

9 **5.5.7.1 Ratings Assumptions**

10 A four-class rating scheme was used to rate old forest bird community breeding habitat suitability.  
11 The ratings assumptions used to define habitat suitability are provided below and in Table 5.5–17:

- 12 • Non-vegetated units (e.g., rock) and structural stages 1 to 4 were rated nil (4)
- 13 • Forested ecosystem units in structural stage 5 were rated low (3)
- 14 • Forested ecosystem units in structural stage 6 or 7 were rated high (1) to low (3) depending on stand  
15 type, elevation, and moisture regime
- 16 • Mixedwood forest, and multi-species coniferous and deciduous forest, were rated higher than single  
17 species coniferous and deciduous forest
- 18 • Higher elevation units (> 900 m) were rated lower than lower elevation units
- 19 • Moist units were rated higher than dry units
- 20 • Treed wetlands (bogs, swamps) in structural stage 5 to 7 were rated low (3). Open wetlands  
21 (fens, marsh, ponds) were rated nil (4)
- 22 • Floodplain and riparian units in structural stage 5 to 7 were rated moderate (2) to low (3)

23 **Table 5.5–17 Old Forest Bird Community Breeding Habitat Ratings Assumptions**

Structural Stage	Ratings Assumptions				
	Mixedwood Forest	Deciduous Forest		Coniferous Forest	
		Single Species	Multi-species	Single Species	Multi-species
1 – 4	4	4	4	4	4
5	3	3	3	3	3
6 – 7	1 – 2	2 – 3	1 – 3	2 – 3	1 – 3



1 **5.5.7.2 Ratings Adjustments**

2 **Existing Conditions**

3 No ratings adjustments were made to the Reference Case model. No disturbance coefficients or ZOIs  
4 were applied to the Reference Case model as there are no existing disturbances in the Terrestrial Wildlife  
5 LSA.

6 **Operations**

7 The footprint of the terrestrial Project facilities was reduced to nil (4) in the operations model.  
8 Anthropogenic noise is known to have an adverse effect on habitat use by and reproductive success of  
9 songbirds, up to 250 m from a disturbance (Habib et al. 2007; Williams 2018). Habitat suitability was  
10 reduced by one class within 250 m of high-disturbance project components, and by one class within 50 m  
11 of lower-disturbance features (Table 5.5–18).

12 **Table 5.5–18 Zones of Influence and Disturbance Coefficients Applied to the Old Forest Bird**  
13 **Community Breeding Habitat Operations Model**

Disturbance Feature Type	ZOI (m)	Disturbance Coefficient
Tertiary roads	50	-1
Overburden area	50	-1
Permanent facility	250	-1

14 **5.5.8 Young Forest Bird Community**

15 The life requisite modeled for the young forest bird community is breeding. Young forest birds use  
16 mid-seral stands that are generally 15 to 100 years post disturbance and structural stages 4 and 5, with  
17 moderate to high canopy cover. Insectivores are especially reliant on young forests for their high insect  
18 production, which is typically highest in mixedwood forests with a large amount of deciduous cover  
19 (Betts et al. 2012). A community account for the young forest bird community is provided in Appendix D.

20 The young forest bird community habitat model was developed using information from BC and other  
21 jurisdictions and is considered moderately reliable.

22 **5.5.8.1 Ratings Assumptions**

23 A four-class rating scheme was used to rate young forest bird community breeding habitat suitability.  
24 The ratings assumptions used to define habitat suitability are provided below and in Table 5.5–19.

- 25 • Non-forested ecosystem units (e.g., alpine tundra) and non-vegetated units (e.g., rock, glacier) were  
26 rated nil (4)
- 27 • Wetland ecosystem units were rated nil (4). Flood units were rated low (3)





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- 1 • Forested units in structural stages 1 (sparse/bryoid), 2 (herb) and 3a (low shrub) (open habitats) were
- 2 rated nil (4). Forested units in structural stage 6 (mature forest) or 7 (old forest) were rated nil (4)
- 3 • Forested units in structural stage 3 (shrub/herb) and 3b (tall shrub) were rated low (3)
- 4 • Forested units in structural stage 4 (pole/sapling) and 5 (young forest) were rated high (1) to low (3)
- 5 depending on moisture regime, tree species compensation, and elevation
- 6 • Mixedwood forest units were rated highest. Multi-species forest units were rated higher than single
- 7 species forest units

8 **Table 5.5–19 Young Forest Bird Community Breeding Habitat Ratings Assumptions**

Structural Stage	Ratings Assumptions				
	Deciduous Forest		Mixedwood Forest	Coniferous Forest	
	Multi-species	Single species		Multi-species	Single species
1, 2, 3a	4	4	4	4	4
3, 3b	3	3	3	3	3
4, 5 (moist site)	1-2	2-3	1-2	1-2	2-3
4, 5 (dry site)	2-3	3	2-3	2-3	3
6, 7	4	4	4	4	4

9 **5.5.8.2 Ratings Adjustments**

10 **Existing Conditions**

11 No ratings adjustments were made to the Reference Case model. No disturbance coefficients or ZOIs  
 12 were applied to the Reference Case model as there are no existing disturbances in the Terrestrial Wildlife  
 13 LSA.

14 **Operations**

15 The footprint of the terrestrial Project facilities was reduced to nil (4) in the operations model. The footprint  
 16 of the terrestrial Project facilities was reduced to nil (4) in the operations model. Anthropogenic noise is  
 17 known to have an adverse effect on habitat use by and reproductive success of songbirds, up to 250 m  
 18 from a disturbance (Habib et al. 2007; Williams 2018). Habitat suitability was reduced by one class within  
 19 250 m of high-disturbance Project components, and by one class within 50 m of lower-disturbance  
 20 features (Table 5.5–20).





1 **Table 5.5–20 Zones of Influence and Disturbance Coefficients Applied to the Young Forest Bird**  
2 **Community Breeding Habitat Operations Model**

Disturbance Feature Type	ZOI (m)	Disturbance Coefficient
Tertiary roads	50	-1
Overburden area	50	-1
Permanent facility	250	-1

3 **5.5.9 Wetland Bird Community**

4 The life requisite modeled for the wetland bird community is breeding. The key habitat requirement used  
5 by the wetland bird community is habitat types with some degree of water inundation (e.g., wetlands,  
6 estuaries, flood units, shrubby riparian areas). A community account for the wetland bird community is  
7 provided in Appendix D.

8 The wetland bird community habitat model was developed using information from BC and other  
9 jurisdictions and is considered moderately reliable.

10 **5.5.9.1 Ratings Assumptions**

11 A four-class rating scheme was used to rate wetland bird community breeding habitat suitability. The  
12 ratings assumptions used to define habitat suitability are provided below.

- 13 • Non-vegetated units (e.g., rock, glacier) were rated nil (4) as were all forest ecosystem units. Only  
14 wetland ecosystem units were rated
- 15 • Flood units were rated moderate (2) to low (3)
- 16 • Wetlands associated with permanent open water were rated high (1) to moderate (2). Ephemeral  
17 wetlands were rated moderate (2)
- 18 • Fens, marshes, and shallow open water were rated higher than bogs.

19 **5.5.9.2 Ratings Adjustments**

20 **Existing Conditions**

21 No ratings adjustments were made to the Reference Case model. No disturbance coefficients or ZOIs  
22 were applied to the Reference Case model as there are no existing disturbances in the Terrestrial Wildlife  
23 LSA.





1 **Project Case**

2 The footprint of the terrestrial Project facilities was reduced to nil (4) in the Project Case model. The  
3 footprint of the terrestrial Project facilities was reduced to nil (4) in the Project Case model. Anthropogenic  
4 noise is known to have an adverse effect on habitat use by and reproductive success of songbirds up to  
5 250 m from a disturbance (Habib et al. 2007; Williams 2018). Habitat suitability was reduced by one class  
6 within 250 m of high-disturbance Project components, and by one class within 50 m of lower-disturbance  
7 features (Table 5.5–21).

8 **Table 5.5–21 Project Case Zones of Influence and Disturbance Coefficients Applied to the**  
9 **Wetland Bird Community Breeding Habitat Model**

Disturbance Feature Type	ZOI (m)	Disturbance Coefficient
Tertiary roads	50	-1
Overburden area	50	-1
Permanent facility	250	-1

10 **5.5.10 Western Toad**

11 The life requisite modeled for western toad is breeding. Western toad requires open, standing water that  
12 persists for the duration of the aquatic development period (i.e., water is present from the time of  
13 egg-laying until juvenile dispersal occurs). Tadpoles prefer waterbodies with a range of depths; tadpoles  
14 aggregate in deeper areas during cooler periods and come into shallow waters to bask in the sun.  
15 Wetlands with natural complexity are preferred (i.e., native submergent vegetation, woody debris) and  
16 provide more stable water temperatures, food sources, and areas for refuge from prey. However, western  
17 toad is an opportunistic breeder and will lay eggs in puddles, waste treatment ponds, or other  
18 anthropogenic features that hold water (COSEWIC 2012d). A species account for western toad is  
19 provided in Appendix D.

20 The western toad habitat model was developed using information from BC and other jurisdictions and is  
21 considered moderately reliable.

22 **5.5.10.1 Ratings Assumptions**

23 A four-class rating scheme was used to rate western toad breeding habitat suitability. The ratings  
24 assumptions used to define habitat suitability are provided below:

- 25 • Non-vegetated ecosystem units (e.g., rock) were rated nil (4). Non-wetland ecosystem units were  
26 rated nil (4)
- 27 • Rivers and streams were rated nil (4)
- 28 • Low-bench flood plain units were rated low (3). High and mid-bench floodplain units were rated nil (4)





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- 1 • Lakes, ponds, and open water units were rated high (1) if less than 5 ha and were otherwise rated
- 2 moderate (2)
- 3 • Bogs units were rated low (3)
- 4 • Marshes were rated high (1)
- 5 • Fens were rated high (1) to moderate (2) depending on typical availability of standing water
- 6 • Swamps were rated moderate (2) to low (3)

7 **5.5.10.2 Ratings Adjustments**

8 **Existing Condition**

9 No ratings adjustments were made to the Reference Case model. No disturbance coefficients or ZOIs  
10 were applied to the Reference Case model as there are no existing disturbances in the Terrestrial Wildlife  
11 LSA.

12 **Project Case**

13 The footprint of the terrestrial Project facilities was reduced to nil (4) in the Project Case model.

14 Several amphibian species have been shown to be sensitive to changes in ambient lighting  
15 (Longcore and Rich 2004), as well as to noise and vibrations (Narins 1990) resulting from industrial and  
16 commercial activities. Western toad breeding habitat suitability was reduced by one class (but not to nil)  
17 when within 100 m of high intensity disturbances and by one class (but not to nil) when within 50 m of low  
18 intensity disturbances (Table 5.5–22).

19 **Table 5.5–22 Project Case Zones of Influence and Disturbance Coefficients Applied to the**  
20 **Western Toad Breeding Habitat Model**

Disturbance Feature Type	ZOI (m)	Disturbance Coefficient
Tertiary roads	50	-1
Overburden area	50	-1
Permanent facility	100	-1

21 **5.6 RESULTS**

22 The following sections present the results of the Reference Case wildlife habitat suitability models. The  
23 term ‘effective habitat’ is used and for 6-class models is the sum of high (1), moderately-high (2), and  
24 moderate (3) suitability habitat, and for 4-class models is the sum of high (1) and moderate (2) suitability  
25 habitat. Effective northern goshawk habitat is the upper 50<sup>th</sup> percentile of habitat (i.e., the sum of high (1)  
26 and moderate (2) habitat (see Section 5.5.5)).The total area of the Terrestrial Wildlife LSA is 516.4 ha.



Wildlife Habitat Modelling  
June 2024

1 **5.6.1 Grizzly Bear**

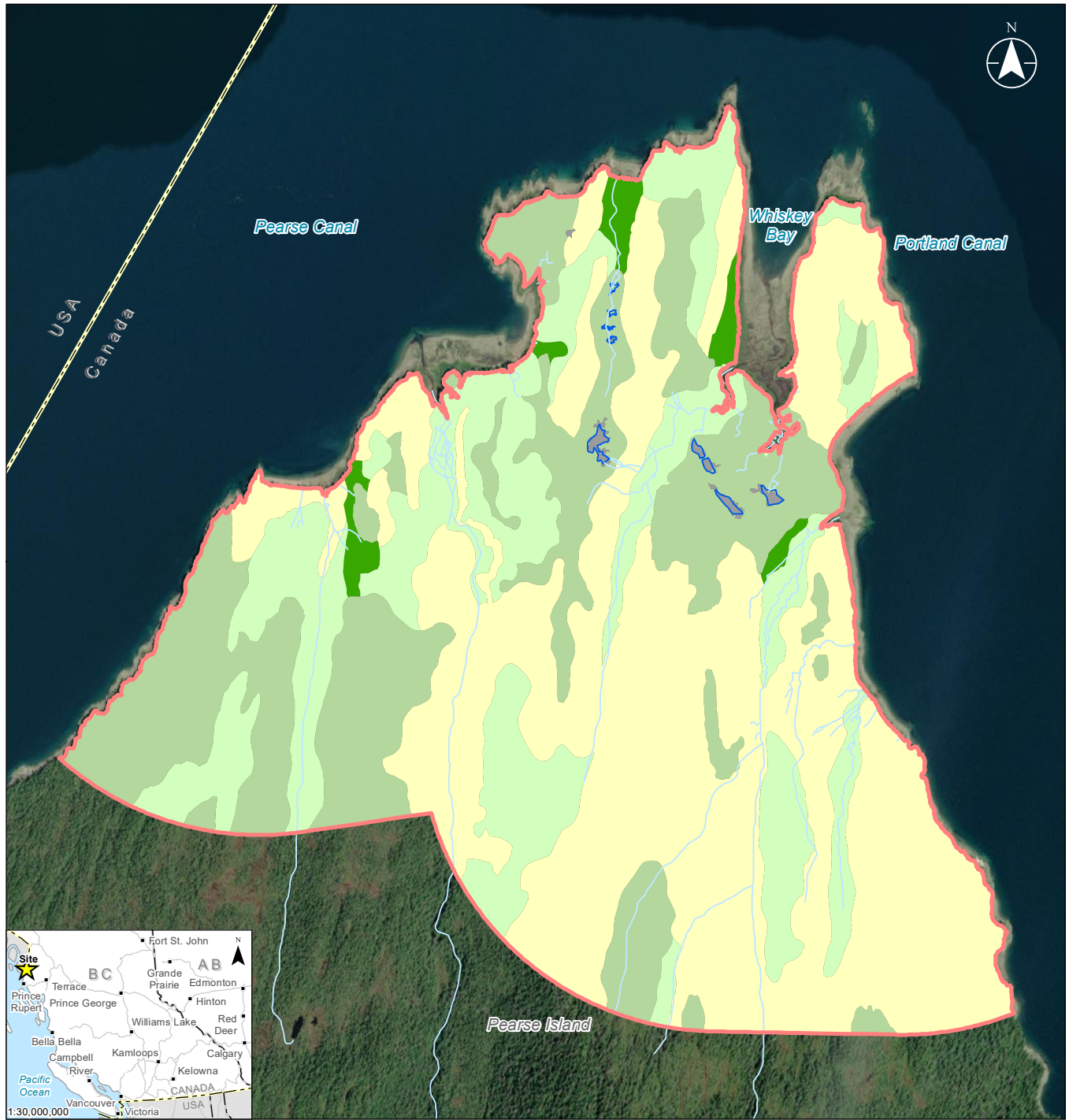
2 There is 265.6 ha of effective grizzly bear spring foraging habitat in the Terrestrial Wildlife LSA  
3 (Table 5.6–1; Figure 5.6–1). This represents 51.4% of the Terrestrial Wildlife LSA. Effective spring  
4 foraging habitat is concentrated in the northern and western portions of the Terrestrial Wildlife LSA.  
5 Higher quality foraging habitat tends to be associated with streams, wetlands, and adjacent upland areas.  
6 Model reliability for grizzly bear spring foraging habitat is considered moderate.

7 There are 486.6 ha of effective grizzly bear fall foraging habitat in the Terrestrial Wildlife LSA  
8 (Table 5.6–1; Figure 5.6–2). This represents 94.2% of the Terrestrial Wildlife LSA. Effective fall foraging  
9 habitat is concentrated in the northern and western portions of the Terrestrial Wildlife LSA. Higher quality  
10 foraging habitat tends to be associated with salmon-bearing streams, wetlands, and adjacent upland  
11 areas. Model reliability for grizzly bear fall foraging habitat is considered moderate.

12 **Table 5.6–1 Area (hectares) of Grizzly Bear Spring Foraging and Fall Foraging Habitat in the**  
13 **Terrestrial Wildlife Local Study Area**

Suitability Class	Area (ha)	
	Spring Foraging	Fall Foraging
1 (high)	9.1	239.8
2	135.7	74.5
3	120.8	172.3
4	249.3	26.8
5	0.0	1.4
6 (nil)	1.5	1.5





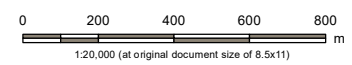
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**Grizzly Bear Spring Foraging Habitat**

- High
- Moderately High
- Moderate
- Low
- Very Low
- Nil

- International Boundary
- Project Mapped Stream
- Terrestrial Wildlife Local Study Area
- Waterbody



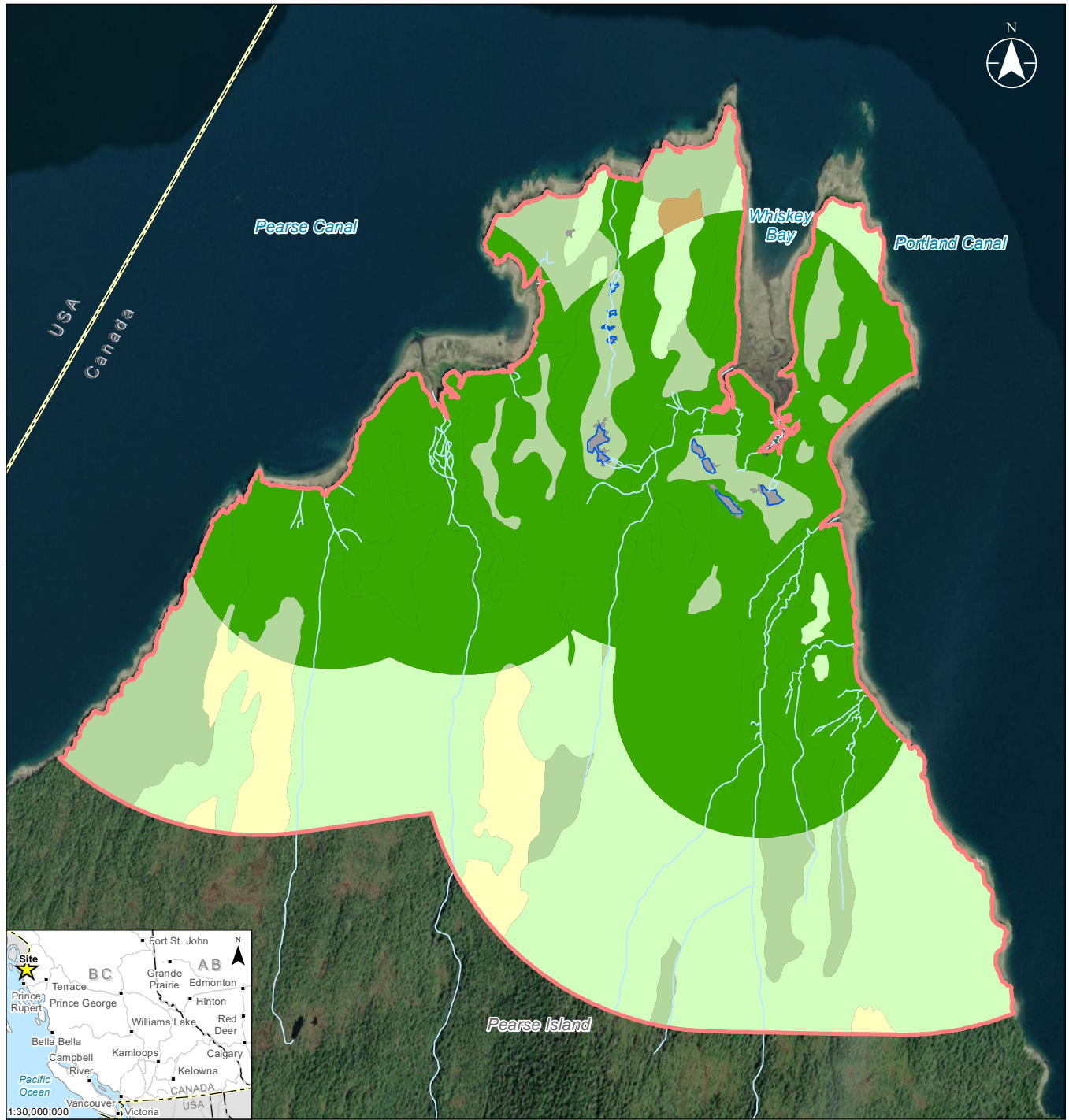
Project Location: Pearse Island, BC  
 Project Number: 123221820  
 Prepared by SPARKER on 20220623  
 Requested by CBALL on 20220623  
 Checked by TQUILICHINI on 20220712

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Figure No.  
**5.6-1**

Title  
**Reference Case Grizzly Bear Spring Foraging Habitat within the Terrestrial Wildlife Local Study Area**

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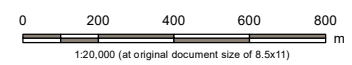
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**Grizzly Bear Fall Foraging Habitat**

- High
- Moderately High
- Moderate
- Low
- Very Low
- Nil

- International Boundary
- Project Mapped Stream
- Terrestrial Wildlife Local Study
- Waterbody



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 Project Number: 123221820  
 Prepared by SPARKER on 20220623  
 Requested by CBALL on 20220623  
 Checked by TQUILICHINI on 20220712

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Figure No.  
**5.6-2**

Title  
**Reference Case Grizzly Bear Fall Foraging  
 Habitat within the Terrestrial Wildlife  
 Local Study Area**

**Notes**  
 1. Coordinate System: NAD 1983 UTM Zone 9N  
 2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada, Stantec, Rockies LNG, Maxar

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Wildlife Habitat Modelling  
June 2024

1 **5.6.2 Moose**

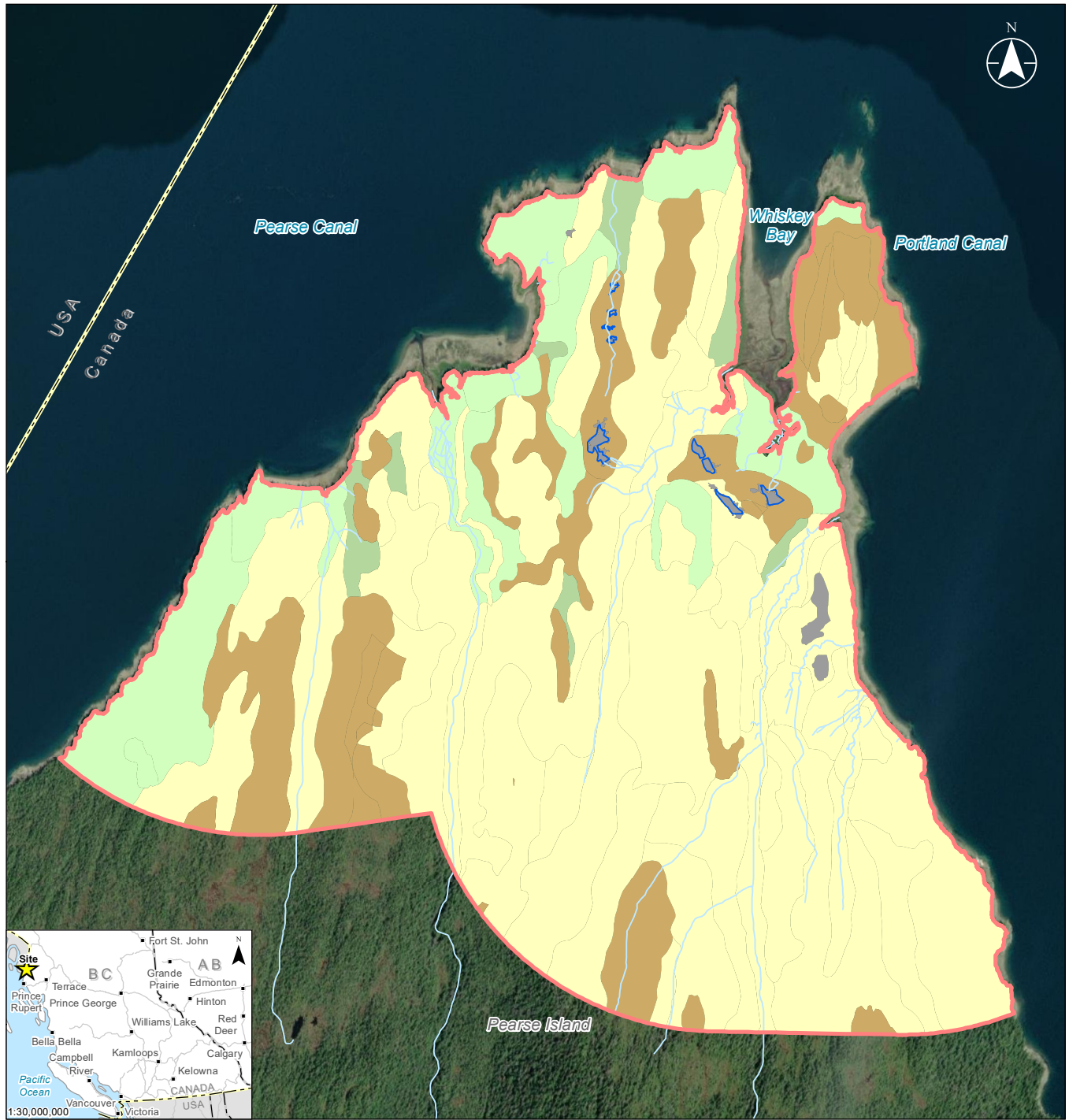
2 The Reference Case model has 82.3 ha of effective moose winter foraging habitat in the Terrestrial  
3 Wildlife LSA (Table 5.6–2; Figure 5.6–3). This represents 15.9% of the Terrestrial Wildlife LSA. Effective  
4 winter foraging habitat is concentrated on the western and northern portion of the Terrestrial Wildlife LSA.  
5 Higher quality winter foraging habitat is associated with some wetland classes. Model reliability for moose  
6 winter foraging is considered moderate.

7 There are 172.4 ha of effective moose winter shelter habitat in the Terrestrial Wildlife LSA (Table 5.6–2;  
8 Figure 5.6–4). This represents 33.4% of the Terrestrial Wildlife LSA. Effective winter shelter habitat is  
9 concentrated on the western and northern portion of the Terrestrial Wildlife LSA. Higher quality winter  
10 shelter habitat is associated with some wetland classes and closed canopy old forest. Model reliability for  
11 moose winter shelter is considered moderate.

12 **Table 5.6–2 Area (hectares) of Moose Winter Foraging and Winter Shelter Habitat in the**  
13 **Terrestrial Wildlife Local Study Area**

Suitability Class	Area (ha)	
	Winter Foraging	Winter Shelter
1 (high)	0.0	7.0
2	11.0	8.0
3	71.3	157.4
4	340.1	76.5
5	90.9	241.7
6 (nil)	3.0	25.8

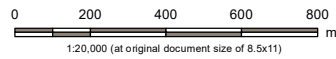




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- |   |   |
|---|---|
| <b>Moose Winter Foraging Habitat</b>  | --- International Boundary  |
| <span style="display: inline-block; width: 15px; height: 15px; background-color: #008000; border: 1px solid black;"></span> High            | — Project Mapped Stream   |
| <span style="display: inline-block; width: 15px; height: 15px; background-color: #90EE90; border: 1px solid black;"></span> Moderately High | <span style="display: inline-block; width: 15px; height: 15px; border: 2px solid red;"></span> Terrestrial Wildlife Local Study |
| <span style="display: inline-block; width: 15px; height: 15px; background-color: #90EE90; border: 1px solid black;"></span> Moderate        | <span style="display: inline-block; width: 15px; height: 15px; border: 1px solid blue;"></span> Waterbody                       |
| <span style="display: inline-block; width: 15px; height: 15px; background-color: #FFFF00; border: 1px solid black;"></span> Low             |   |
| <span style="display: inline-block; width: 15px; height: 15px; background-color: #D2B48C; border: 1px solid black;"></span> Very Low        |   |
| <span style="display: inline-block; width: 15px; height: 15px; background-color: #808080; border: 1px solid black;"></span> Nil             |   |



Project Location: Pearse Island, BC  
 Project Number: 12321820  
 Prepared by SPARKER on 20220805  
 Requested by CBALL on 20220802  
 Checked by TQUILICHINI on 202208xx

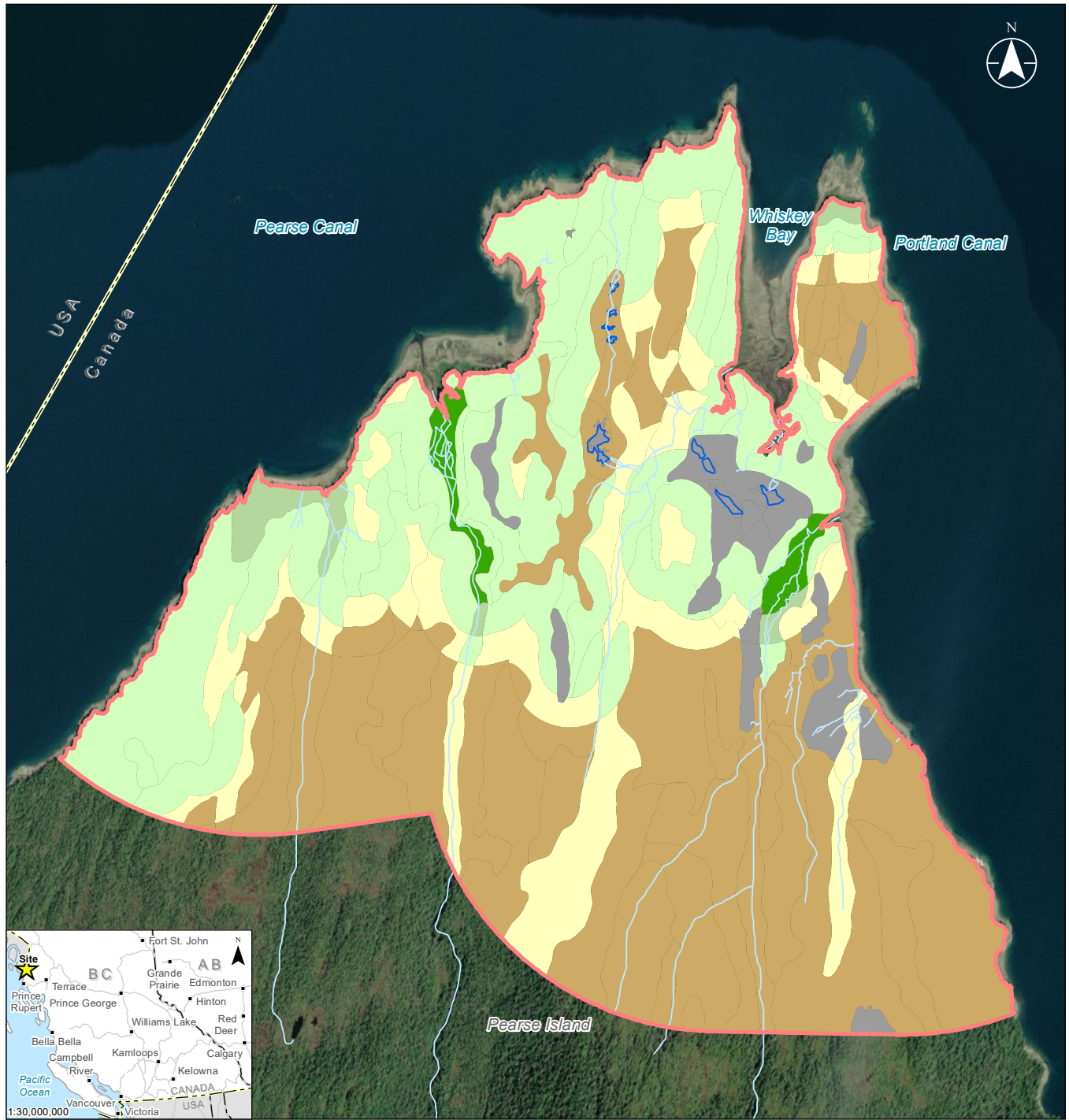
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Figure No.  
**5.6-3**

Title  
**Reference Case Moose Winter Foraging  
 Habitat within the Terrestrial Wildlife  
 Local Study Area**

**Notes**  
 1. Coordinate System: NAD 1983 UTM Zone 9N  
 2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada, Stantec, Rockies LNG, Maxar

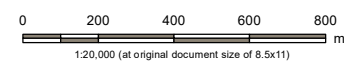
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- Moose Winter Shelter Habitat**
- High
  - Moderately High
  - Moderate
  - Low
  - Very Low
  - Nil
- International Boundary
  - Project Mapped Stream
  - Terrestrial Wildlife Local Study Area
  - Waterbody



Project Location: Pearse Island, BC  
 Project Number: 123221820  
 Prepared by SPARKER on 20220805  
 Requested by CBALL on 20220802  
 Checked by TQUILICHINI on 202208xx

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Figure No.  
**5.6-4**

Title  
**Reference Case Moose Winter Shelter  
 Habitat within the Terrestrial Wildlife  
 Local Study Area**

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1 **5.6.3 Pacific Marten**

2 The Reference Case model has 348.8 ha of effective Pacific marten year-round living habitat in the  
3 Terrestrial Wildlife LSA (Table 5.6–3; Figure 5.6–5). This represents 67.5% of the Terrestrial Wildlife LSA.  
4 Effective year-round living habitat occurs throughout the Terrestrial Wildlife LSA, primarily in the forested  
5 areas adjacent to streams. Model reliability for Pacific marten year-round living habitat is considered  
6 moderate.

7 **Table 5.6–3 Area (hectares) of Pacific Marten Year-round Living Habitat in the Terrestrial**  
8 **Wildlife Local Study Area**

Suitability Class	Area (ha)
1 (high)	0.0
2 (moderate)	348.8
3 (low)	115.9
4 (nil)	51.7

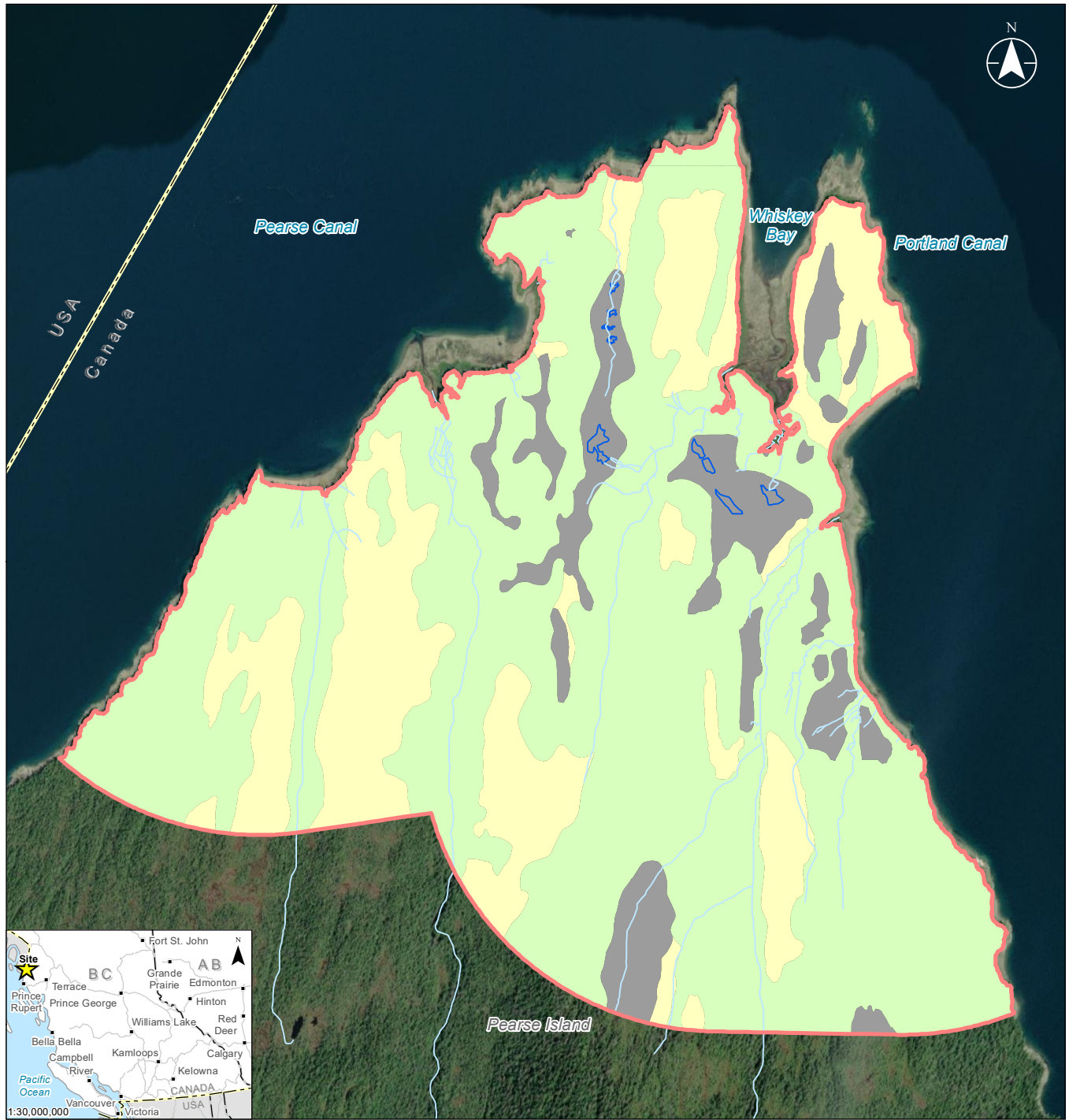
9 **5.6.4 Western Screech-owl**

10 The Reference Case model has 399.6 ha of effective western screech-owl breeding habitat in the  
11 Terrestrial Wildlife LSA (Table 5.6–4; Figure 5.6–6). This represents 77.4% of the Terrestrial Wildlife LSA.  
12 Effective year-round living habitat occurs throughout the Terrestrial Wildlife LSA. Model reliability for  
13 western screech-owl living habitat is considered moderate.

14 **Table 5.6–4 Area (hectares) of Western Screech-owl Breeding Habitat in the Terrestrial Wildlife**  
15 **Local Study Area**

Suitability Class	Area (ha)
1 (high)	0.9
2 (moderate)	398.7
3 (low)	87.1
4 (nil)	29.7

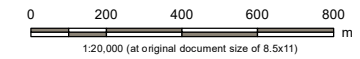




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- Pacific Marten Year-round Living Habitat**
- High
  - Moderate
  - Low
  - Nil
- International Boundary
  - Project Mapped Stream
  - Terrestrial Wildlife Local Study Area
  - Waterbody



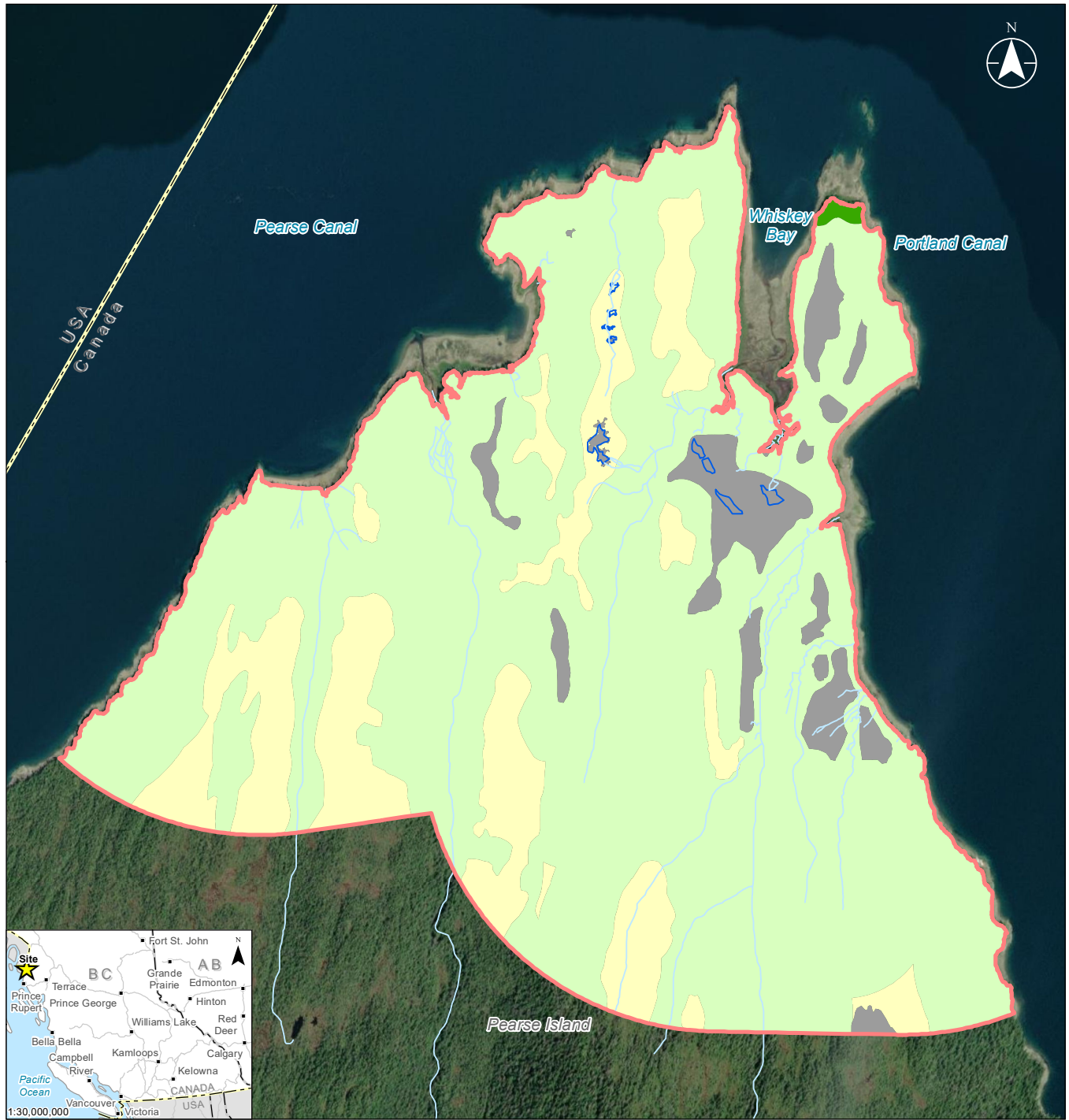
Project Location: Pearse Island, BC  
 Project Number: 123221820  
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 Requested by CBALL on 20220623  
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Figure No.  
**5.6-5**

Title  
**Reference Case Pacific Marten Year-round Living Habitat within the Terrestrial Wildlife Local Study Area**

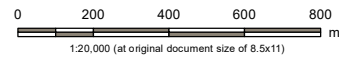
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**Western Screech-Owl Breeding Habitat**

- High
- Moderate
- Low
- Nil

- International Boundary
- Project Mapped Stream
- Terrestrial Wildlife Local Study Area
- Waterbody



Project Location: Pearce Island, BC  
 Project Number: 123221820  
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 Requested by CBALL on 20220623  
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Figure No.

**5.6-6**

Title

**Reference Case Western Screech-Owl Breeding Habitat within the Terrestrial Wildlife Local Study Area**

- Notes**
1. Coordinate System: NAD 1983 UTM Zone 9N
  2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada, Stantec, Rockies LNG, Maxar

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1 **5.6.5 Northern Goshawk**

2 The Reference Case model has 75.2 ha of effective northern goshawk, *laingii* subspecies, breeding  
3 habitat in the Terrestrial Wildlife LSA (Table 5.6–5; Figure 5.6–7). This represents 14.6% of the  
4 Terrestrial Wildlife LSA. Effective habitat occurs in four discrete patches, primarily along two drainages  
5 (Figure 5.6–7). Model reliability for northern goshawk, *laingii* subspecies, breeding habitat is considered  
6 moderate.

7 **Table 5.6–5 Area (hectares) of Northern Goshawk Breeding Habitat in the Terrestrial Wildlife**  
8 **Local Study Area**

Suitability Class	Area (ha)
1 (high)	0.0
2	75.2
3	135.2
4 (nil)	296.5

9 **5.6.6 Marbled Murrelet**

10 The Reference Case model has 291.0 ha of effective marbled murrelet breeding habitat in the  
11 Terrestrial Wildlife LSA (Table 5.6–6; Table 5.6–5; Figure 5.6–8). This represents 56.4% of the  
12 Terrestrial Wildlife LSA. Effective breeding habitat is concentrated in the northern, central, and eastern  
13 portions of the Terrestrial Wildlife LSA. Model reliability for marbled murrelet breeding habitat is  
14 considered moderate.

15 The spatial overlap between effective marbled murrelet breeding habitat predicted by the Project-specific  
16 TEM-based model and ECCC Geographic Location Polygons that may contain critical (nesting) habitat for  
17 marbled murrelet is shown on Figure 5.6–8. The TEM-based model predicted 291.0 ha of effective  
18 marbled murrelet breeding habitat and there are 202.0 ha of ECCC polygon in the Terrestrial Wildlife  
19 LSA, a difference of 89 ha. This discrepancy is caused by the different methods used to develop each  
20 area estimate: the TEM-based model was developed using Project-specific TEM, supported by wildlife  
21 habitat assessment ground plots (Section 5.0), while ECCC Geographic Location Polygons were  
22 delineated using multiple mapping approaches, records of known nest sites, and known occupied  
23 detections (ECCC 2023). Overall, ECCC Geographic Location Polygons overlap with TEM polygons rated  
24 as moderate and low suitability. The TEM model also identified areas outside of the ECCC Geographic  
25 Location Polygons as effective habitat.



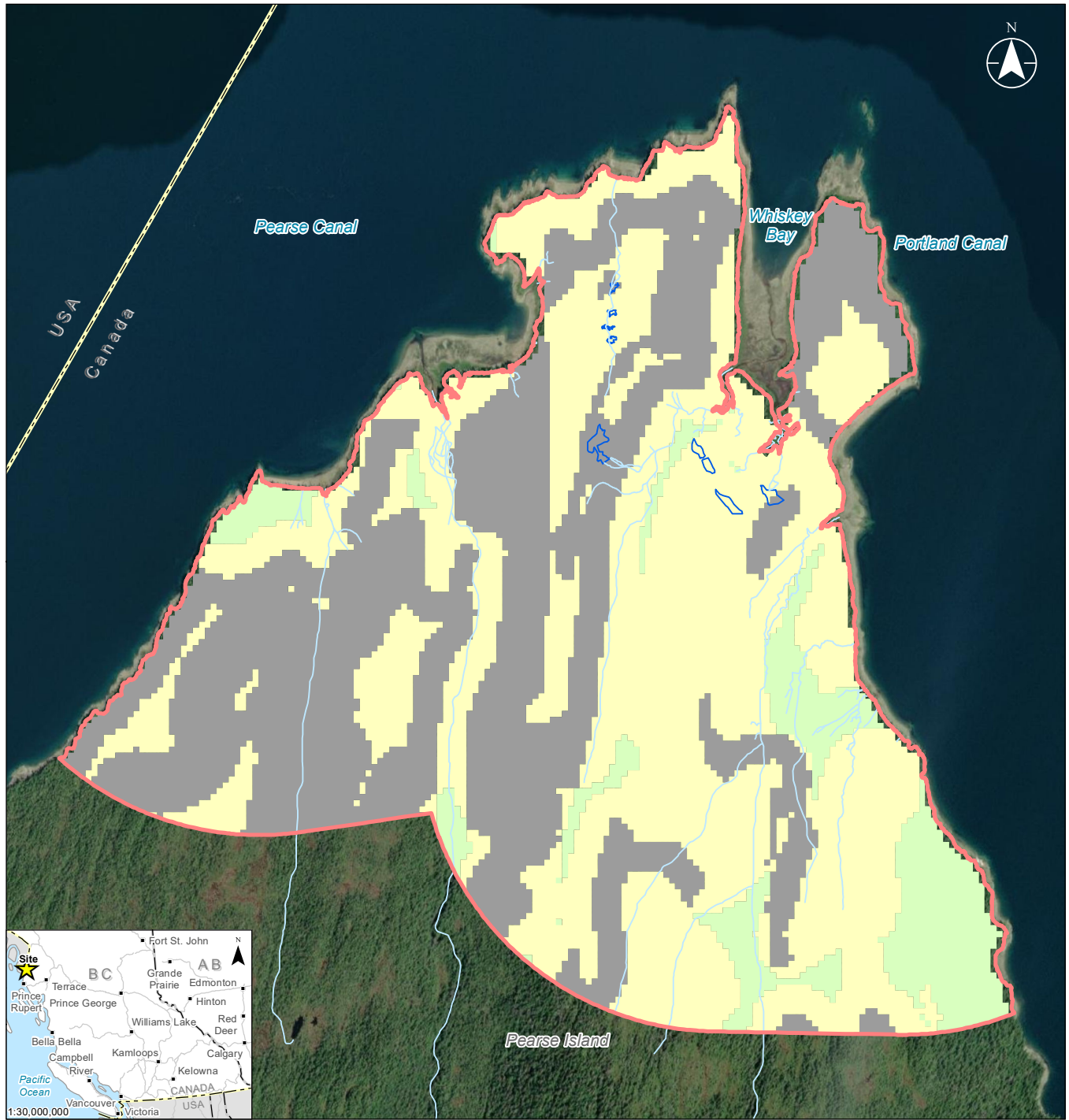


1 **Table 5.6–6 Area (hectares) of Marbled Murrelet Breeding Habitat in the Terrestrial Wildlife**  
2 **Local Study Area**

Suitability Class	Area (ha)		
	Within Critical Habitat	Outside Critical Habitat	Total
1 (high)	0.0	0.0	0.0
2	165.4	125.6	291.0
3	20.8	113.0	133.8
4 (nil)	7.1	84.5	91.6

3 There are 344 ha of marbled murrelet marine habitat within the Marine Terminal LSA at Reference Case  
4 (Figure 5.6–9). This represents 49.3% of the Marine Terminal LSA. There are 3,796 ha of marbled  
5 murrelet marine habitat within the Marine Shipping LSA. This represents 5.4% of the Marine Shipping  
6 LSA. Portland Inlet is a steep fjord containing relatively little marine habitat. Most marbled murrelet marine  
7 habitat in the Marine Shipping LSA occurs in Chatham Sound (Figure 5.6–10). There are 17,952 ha of  
8 marbled murrelet marine habitat in the OWAA representing 2.9% of the OWAA.





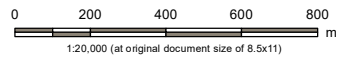
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**Northern Goshawk Breeding Habitat**

- High
- Moderate
- Low
- Nil

- International Boundary
- Project Mapped Stream
- Terrestrial Wildlife Local Study Area
- Waterbody



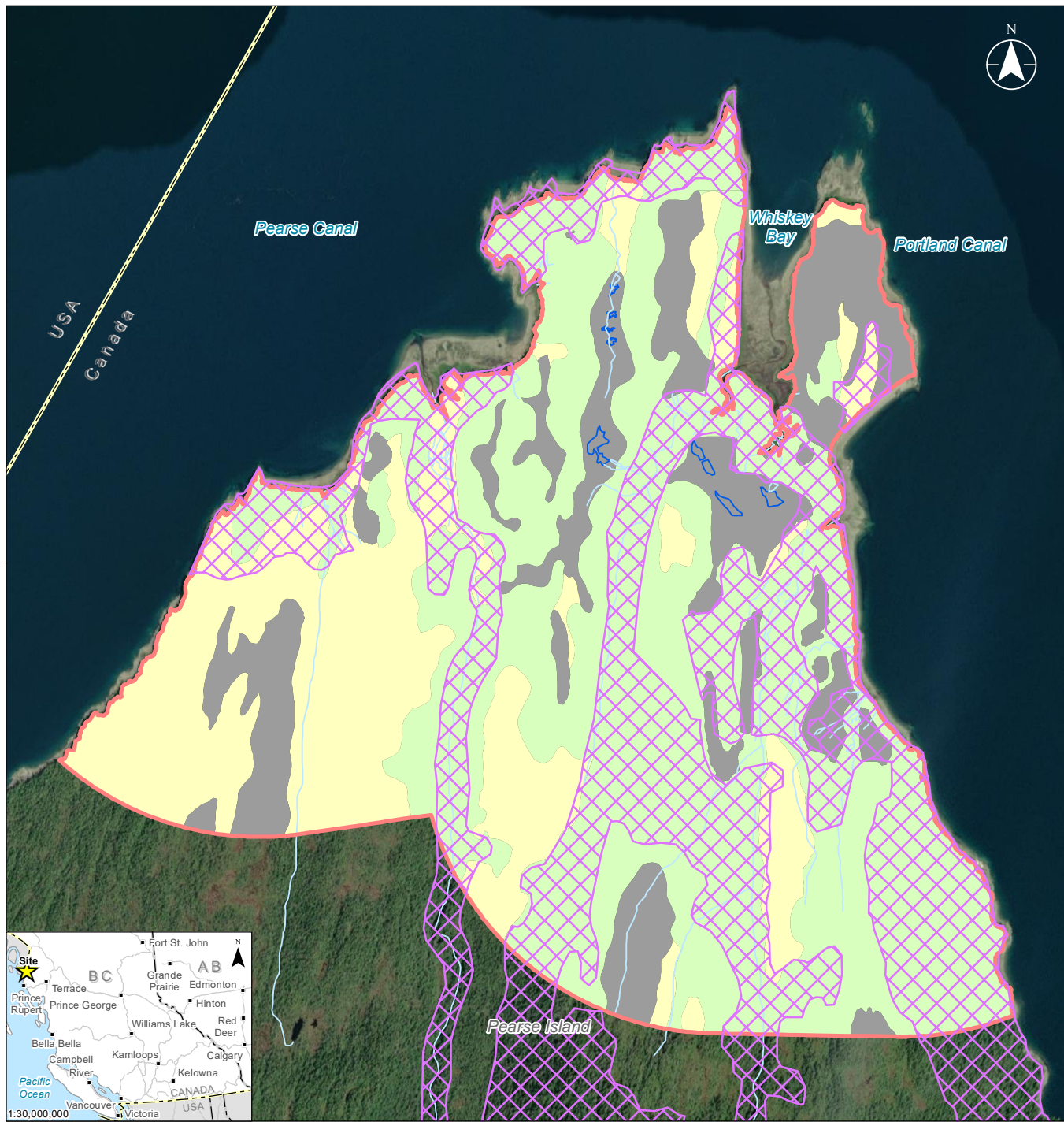
Project Location: Pearce Island, BC  
 Project Number: 123221820  
 Prepared by SPARKER on 20220623  
 Requested by CBALL on 20220623  
 Checked by TQUILICHINI on 20220712

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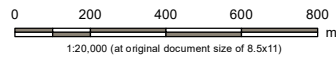
Figure No.  
**5.6-7**

Title  
**Reference Case Northern Goshawk Breeding Habitat within the Terrestrial Wildlife Local Study Area**

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- International Boundary
- Project Mapped Stream
- Terrestrial Wildlife Local Study Area
- Waterbody
- Marbled Murrelet Critical Habitat Geographic Location Polygon
- Marbled Murrelet Breeding Habitat**
- High
- Moderate
- Low
- Nil



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 Project Number: 123221820  
 Prepared by SPARKER on 20220623  
 Requested by CBALL on 20220623  
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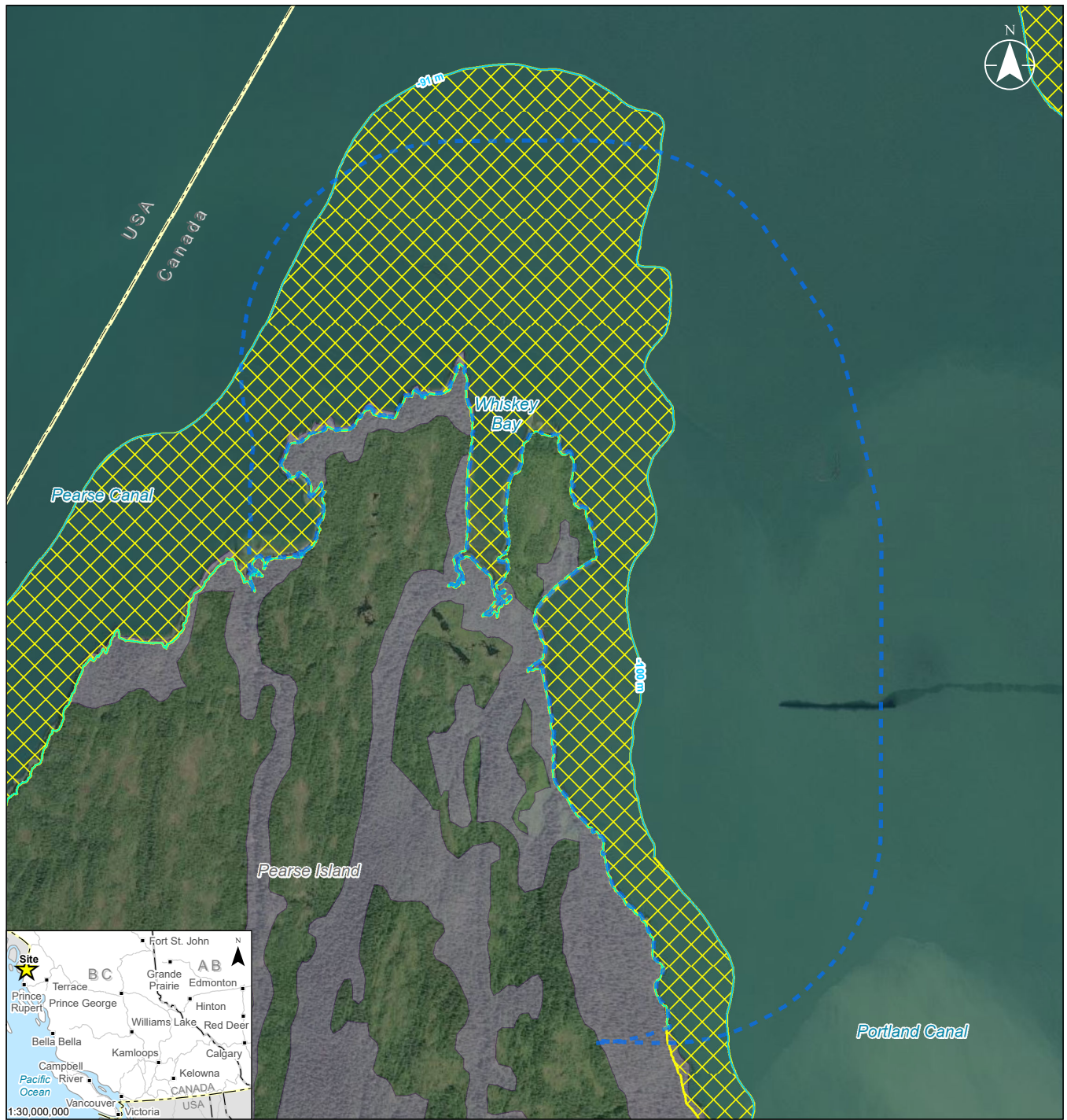
Figure No.  
**5.6-8**

Title  
**Reference Case Marbled Murrelet Breeding Habitat within the Terrestrial Wildlife Local Study Area**

- Notes**
1. Coordinate System: NAD 1983 UTM Zone 9N
  2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada, Stantec, Rockies LNG, Maxar

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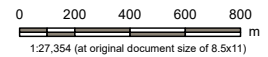
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- Bathymetric Contour
- - - High Water Mark
- Marine Terminal Local Study
- Marbled Murrelet Marine Foraging Habitat
- Marbled Murrelet Critical Habitat Geographic Location Polygon
- International Boundary



Project Location: Pearse Island, BC  
 Project Number: 123221820  
 Prepared by TQUILCHINI on 20240209  
 Requested by CBALL on 20240205  
 Checked by WHOWSE on 20240209

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 Natural Gas Liquefaction and Marine Terminal  
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Figure No.  
**5.6-9**

Title  
**Reference Case Marbled Murrelet Marine Foraging Habitat within the Marine Terminal Local Study Area**

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1 **5.6.7 Old Forest Bird Community**

2 The Reference Case model has 383.0 ha of effective old forest bird community breeding habitat in the  
3 Terrestrial Wildlife LSA (Table 5.6–7; Figure 5.6–11). This represents 74.2% of the Terrestrial Wildlife  
4 LSA. Effective old forest bird community habitat is found throughout the Terrestrial Wildlife LSA outside of  
5 wetlands. Model reliability for the old forest bird community breeding habitat model is considered  
6 moderate.

7 **Table 5.6–7 Area (hectares) of Old Forest Bird Community Breeding Habitat in the Terrestrial**  
8 **Wildlife Local Study Area**

Habitat Rating	Area (ha)
1 (high)	0.9
2	382.1
3	90.5
4 (nil)	42.8

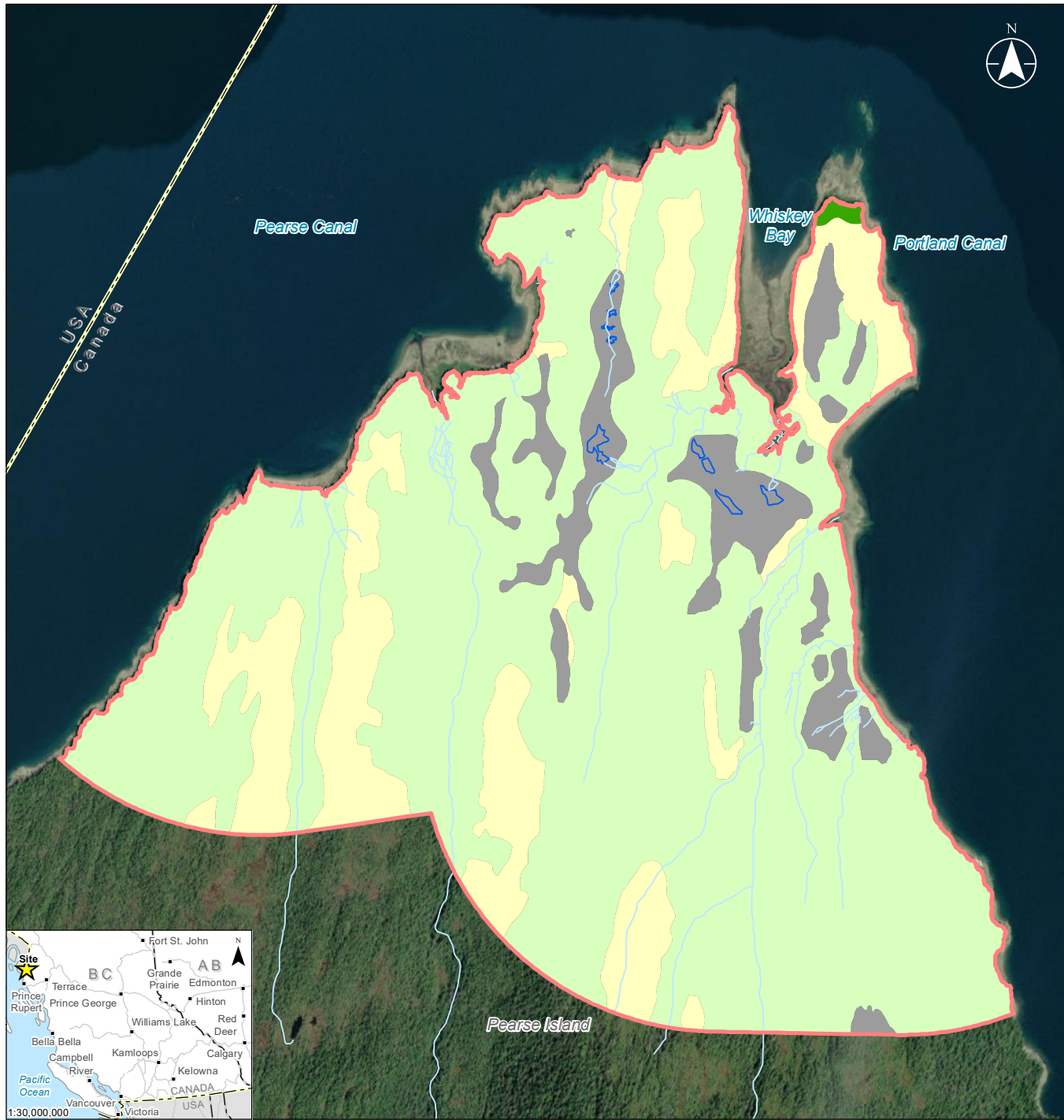
9 **5.6.8 Young Forest Bird Community**

10 The Reference Case model has 18.0 ha of effective young forest bird community breeding habitat in the  
11 Terrestrial Wildlife LSA (Table 5.6–8; Figure 5.6–12). This represents 3.5% of the Terrestrial Wildlife LSA.  
12 Young forest bird community habitat occurs primarily on the peninsula east of Whiskey Bay. Model  
13 reliability for the young forest bird community habitat model is considered moderate.

14 **Table 5.6–8 Area (hectares) of Young Forest Bird Community Breeding Habitat in the**  
15 **Terrestrial Wildlife Local Study Area**

Habitat Rating	Area (ha)
1 (high)	16.4
2	1.6
3	33.7
4 (nil)	464.7





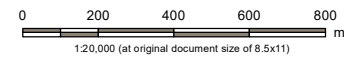
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 Revised: 2024-02-09 By: TQUILICHINI



**Old Forest Bird Community Breeding Habitat**

- High
- Moderate
- Low
- Nil

- International Boundary
- Project Mapped Stream
- Terrestrial Wildlife Local Study Area
- Waterbody



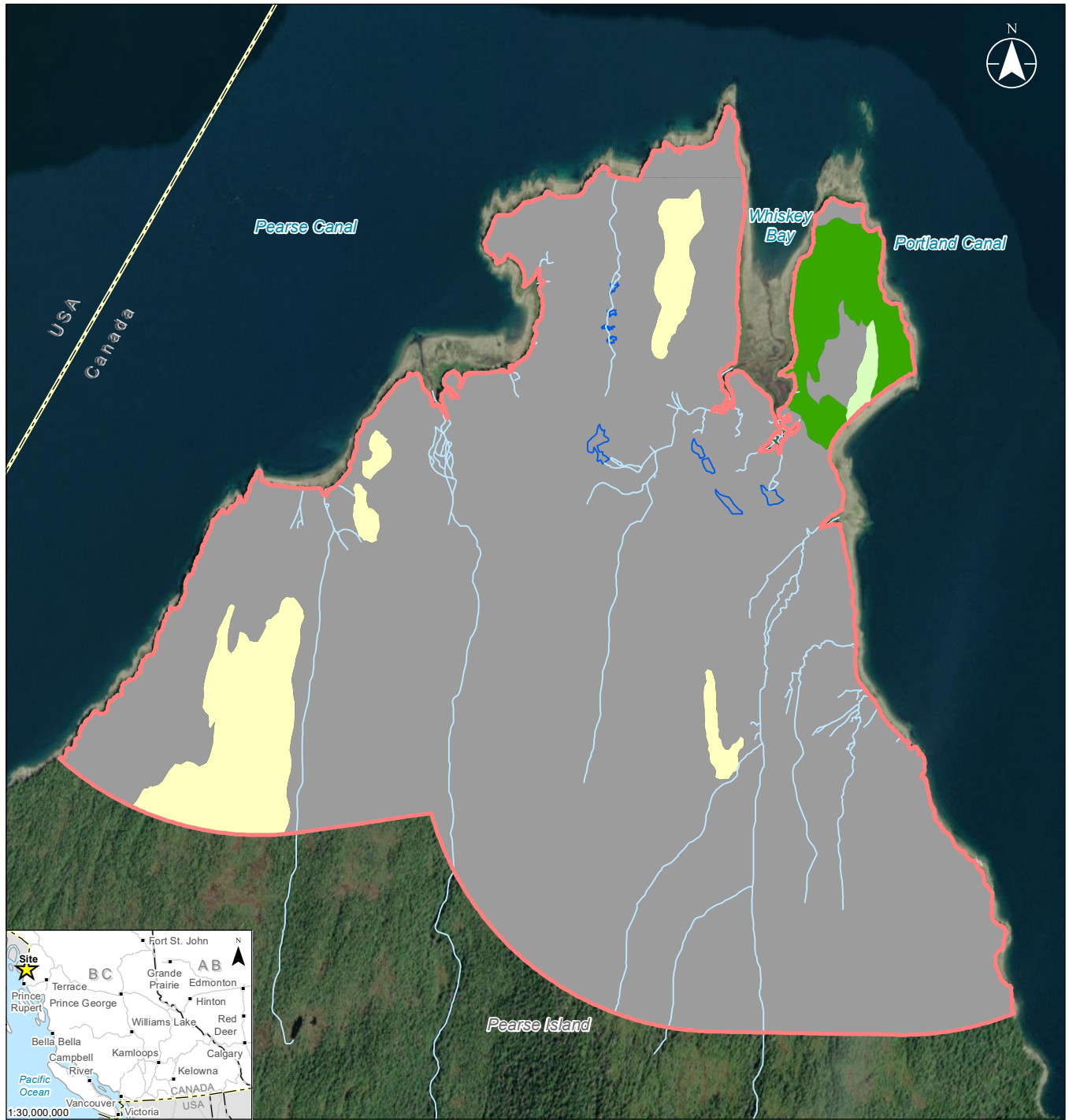
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 Project Number: 123221820  
 Prepared by SPARKER on 20220623  
 Requested by CBALL on 20220623  
 Checked by TQUILICHINI on 20220712

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Figure No.  
**5.6-11**

Title  
**Reference Case Old Forest Bird Community Breeding Habitat within the Terrestrial Wildlife Local Study Area**

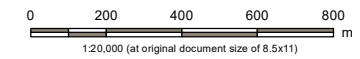
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**Young Forest Bird Community Breeding Habitat**

- High
- Moderate
- Low
- Nil

- International Boundary
- Project Mapped Stream
- Terrestrial Wildlife Local Study Area
- Waterbody



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 Project Number: 123221820  
 Prepared by SPARKER on 20220623  
 Requested by CBALL on 20220623  
 Checked by TQUILICHINI on 20220712

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 Technical Data Report – Wildlife and Wildlife Habitat

Figure No.  
**5.6-12**

Title  
**Reference Case Young Forest Bird Community Breeding Habitat within the Terrestrial Wildlife Local Study Area**

**Notes**  
 1. Coordinate System: NAD 1983 UTM Zone 9N  
 2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada, Stantec, Rockies LNG, Maxar

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1 **5.6.9 Wetland Bird Community**

2 The Reference Case model has 161.7 ha of effective wetland bird community breeding habitat in the  
3 Terrestrial Wildlife LSA (Table 5.6–9; Figure 5.6–13). This represents 31.3% of the Terrestrial Wildlife  
4 LSA. Wetland bird community habitat occurs primarily in the east and west portions of the Terrestrial  
5 Wildlife LSA. Model reliability for the wetland bird community breeding habitat model is considered  
6 moderate.

7 **Table 5.6–9 Area (hectares) of Wetland Bird Community Breeding Habitat in the**  
8 **Terrestrial Wildlife Local Study Area**

Habitat Rating	Area (ha)
1 (high)	0.1
2	161.6
3	158.7
4 (nil)	196.1

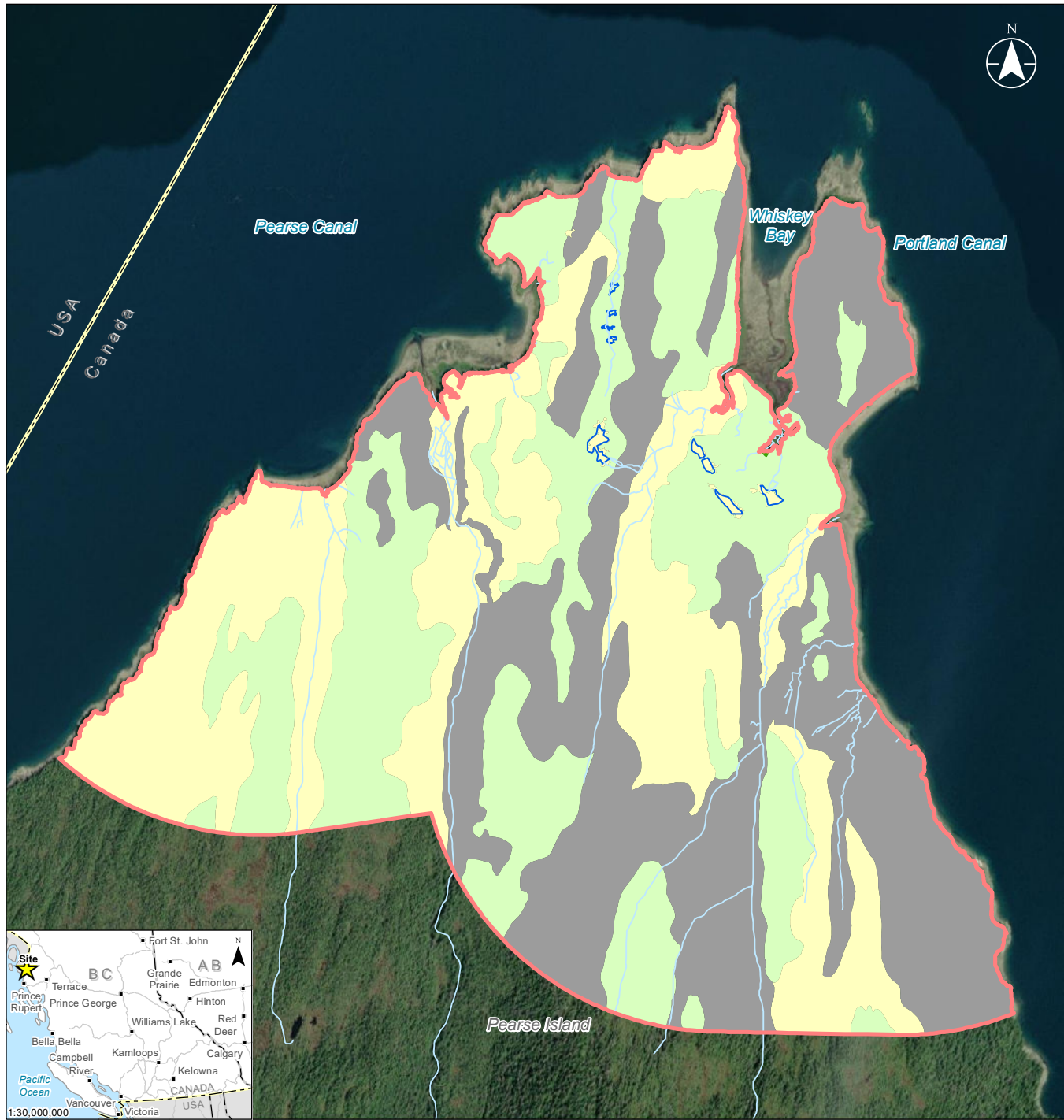
9 **5.6.10 Western Toad**

10 The Reference Case model has 132.0 ha of effective western toad breeding habitat in the  
11 Terrestrial Wildlife LSA (Table 5.6–10; Figure 5.6–14). This represents 25.6% of the Terrestrial Wildlife  
12 LSA. Model reliability for the western toad habitat model is considered moderate.

13 **Table 5.6–10 Area (hectares) of Western Toad Breeding Habitat in the Terrestrial Wildlife**  
14 **Local Study Area**

Habitat Rating	Area (ha)
1 (high)	24.6
2	107.4
3	131.4
4 (nil)	253.0





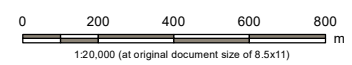
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**Wetland Bird Community Breeding Habitat**

- High
- Moderate
- Low
- Nil

- International Boundary
- Project Mapped Stream
- Terrestrial Wildlife Local Study Area
- Waterbody



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 Project Number: 123221820  
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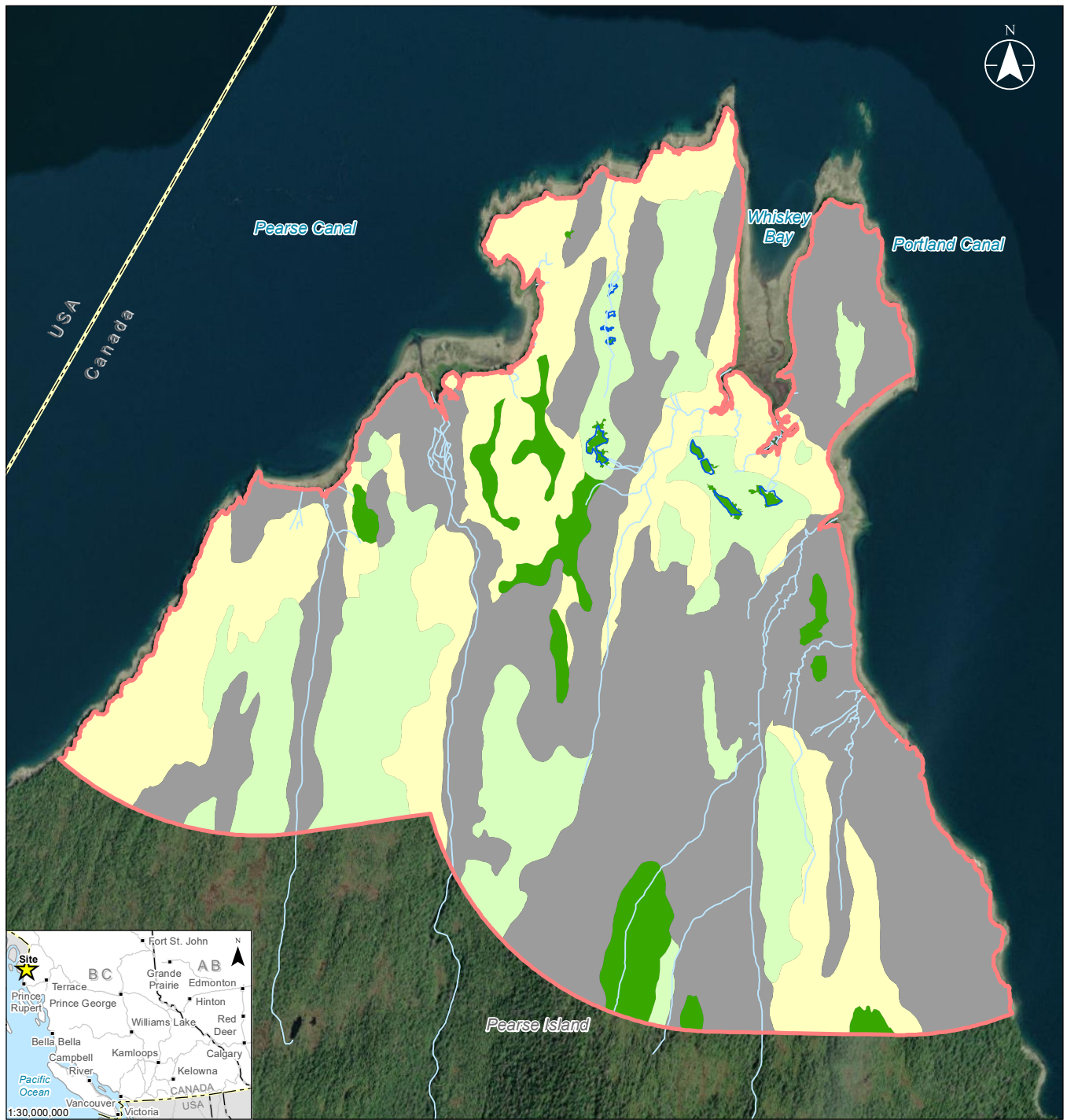
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Figure No.  
**5.6-13**

Title  
**Reference Case Wetland Bird Community Breeding Habitat within the Terrestrial Wildlife Local Study Area**

**Notes**  
 1. Coordinate System: NAD 1983 UTM Zone 9N  
 2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada, Stantec, Rockies LNG, Maxar

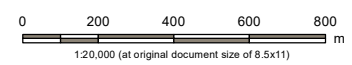
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- Western Toad Breeding Habitat**
- High
  - Moderate
  - Low
  - Nil
- International Boundary
  - Project Mapped Stream
  - Terrestrial Wildlife Local Study Area
  - Waterbody



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Figure No.  
**5.6-14**

Title  
**Reference Case Western Toad Breeding  
 Habitat within the Terrestrial Wildlife Local  
 Study Area**

**Notes**  
 1. Coordinate System: NAD 1983 UTM Zone 9N  
 2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada, Stantec, Rockies LNG, Maxar

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## 1 **6.0 KEY RESULTS AND FINDINGS**

2 This TDR describes the existing condition for wildlife resources in the Terrestrial Wildlife LSA and RSA,  
3 the Marine Terminal LSA and RSA, the Marine Shipping RSA, TLSA, and OWSA.

4 Existing publicly available data and reports, information from the Nisga'a Nation, and information from  
5 other Indigenous nations were reviewed to characterize the existing conditions within the study areas.  
6 These data provided an understanding of the presence, distribution, and relative abundance of species of  
7 conservation concern, and aided in the identification of important habitat areas. Existing information also  
8 fed into the selection of key species and species groups that will be considered in the assessment.

9 Several IBAs, parks, and conservancies were identified as overlapping the Terrestrial Wildlife and  
10 Marine Shipping RSAs and OWSA (Figure 3.4–1 and Figure 3.4–2). Geographic Location Polygons that  
11 may contain terrestrial critical habitat for marbled murrelet were identified as occurring throughout the  
12 Terrestrial Wildlife LSA and RSA. The spatial overlap between effective marbled murrelet breeding  
13 habitat predicted by the Project-specific TEM-based model and ECCC Geographic Location Polygons  
14 that may contain critical (nesting) habitat for marbled murrelet is provided in Figure 5.6–8.

15 Existing information identified 52 terrestrial mammal species known or likely to occur in the  
16 Terrestrial Wildlife, Marine Terminal, or Marine Shipping RSAs, TLSA, or OWSA. This includes  
17 10 species of conservation concern and 13 species of importance to Nisga'a Nation or other Indigenous  
18 nations (Appendix A). There are four introduced or invasive mammal species that may occur in the RSAs,  
19 TLSA, or OWSA (Appendix A). Most mammal species are expected to occur only in the Terrestrial  
20 Wildlife RSA, however Sitka black-tailed deer, grizzly bear, American black bear, grey wolf,  
21 North American river otter, Pacific marten, and mink may also occur in shoreline areas of the  
22 Marine Terminal and Marine Shipping RSAs, TLSA, and OWSA. Bats are likely to forage over nearshore  
23 areas of the Marine Terminal and Marine Shipping RSAs, TLSA, and OWSA.

24 Existing information identified 200 bird species known or likely to occur in the Terrestrial Wildlife,  
25 Marine Terminal, or Marine Shipping RSAs, TLSA, or OWSA. This includes 45 species of conservation  
26 concern and 42 species of importance to Indigenous nations (Appendix A). Most bird species (167 of 200)  
27 known or likely to occur in the Terrestrial Wildlife, Marine Terminal, or Marine Shipping RSAs, TLSA, or  
28 OWSA are migratory birds, as defined under the MBCA. There are four introduced or invasive bird  
29 species that may occur in the RSAs, TLSA, or OWSA (Appendix A).

30 Existing information identified six amphibian and one reptile species known or likely to occur in the  
31 Terrestrial Wildlife RSA (Appendix A). This includes two species of conservation concern. No amphibian  
32 or reptile species were identified as species of importance to Indigenous nations.

33 Project-specific field surveys were completed within the Terrestrial Wildlife LSA and Marine Terminal  
34 RSA. Surveys focused on species or species groups identified as Key Species or Key Species Groups.  
35 Surveys were timed to occur during key seasonal periods (e.g., songbird breeding period, shorebird  
36 migration). Incidental detections of wildlife or wildlife sign were also recorded by wildlife crews and crews





Key Results and Findings  
June 2024

1 from other disciplines. Together these data help to characterize the existing conditions within the  
2 Terrestrial Wildlife LSA and Marine Terminal RSA. The following are key results from the surveys and  
3 incidental detections:

- 4 • The occurrence of sixteen mammal species within the Terrestrial Wildlife LSA was confirmed,  
5 including five species of conservation concern and 12 species of importance to Nisga'a Nation or  
6 other Indigenous nations
- 7 • A Pacific marten was detected during remote camera surveys, confirming the presence of this  
8 difficult-to-detect species in the Terrestrial Wildlife LSA
- 9 • A beaver lodge and a beaver dam were identified in the Terrestrial Wildlife LSA
- 10 • Many bat detections were recorded at UARU-1 (19,201 detections) and UARU-5 (3,145 detections).  
11 Both sites were located at the edge of the forest adjacent to marine waters
- 12 • The occurrence of 41 bird species within the Terrestrial Wildlife LSA and 44 species in the  
13 Marine Terminal RSA was confirmed from surveys and incidental detections. Surveys and incidental  
14 detections confirmed the occurrence of 10 species of conservation concern and 22 species of  
15 importance to Indigenous nations in the Terrestrial Wildlife or Marine Terminal LSAs
- 16 • Three bald eagle nests were identified along the eastern portion of Pearse Island within the  
17 Terrestrial Wildlife LSA. Based on observations of adult bald eagles on the nest, one of the nests was  
18 assumed to be active in 2021 and a different nest was assumed to be active in 2022
- 19 • Three potential nests were detected in the Terrestrial Wildlife RSA: rufous hummingbird (two potential  
20 nests) and red-throated loon (one potential nest)
- 21 • Sandhill crane was detected incidentally and during remote camera surveys, including one detection  
22 of a pair displaying courtship behaviours suggesting this species may breed in the Terrestrial Wildlife  
23 LSA
- 24 • The occurrence of three amphibian species within the Terrestrial wildlife LSA was confirmed,  
25 including western toad, a species of conservation concern
- 26 • Breeding amphibians were identified during surveys and incidentally at nine wetlands within the  
27 Terrestrial Wildlife LSA

28 Wildlife habitat suitability models were developed for 10 species or species groups. Data from  
29 Project specific wildlife habitat suitability surveys were used to improve model reliability by confirming  
30 mapped versus in-field habitat conditions. Effective habitat exists in the Terrestrial Wildlife LSA for all  
31 modeled species and species groups. However, there is relatively little effective habitat in the Terrestrial  
32 Wildlife LSA for moose (winter foraging), northern goshawk, and the young forest bird community.



Closure  
June 2024

1 **7.0 CLOSURE**

2 This TDR was prepared for the sole benefit of the Ksi Lisims LNG Project to describe existing conditions  
3 within the Project study areas for the Wildlife and Wildlife Habitat VC. Information presented in this TDR  
4 was used to inform the assessment of potential Project and cumulative effects on the Wildlife and  
5 Wildlife Habitat VC, and to identify appropriate mitigation for avoiding or reducing adverse effects to the  
6 extent practical and safe.

7 Respectfully submitted,

8 **Stantec Consulting Ltd.**

9 Prepared by:

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**Christina Ball** BSc, RPBio  
Report Author

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**Michael Preston** MSc, RPBio  
Quality Reviewer

10



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## 27 8.2 PERSONAL COMMUNICATIONS

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1 **Appendix A WILDLIFE SPECIES KNOWN OR LIKELY TO OCCUR IN THE TERRESTRIAL WILDLIFE, MARINE TERMINAL, OR MARINE SHIPPING**  
2 **REGIONAL STUDY AREAS, OPEN WATER STUDY AREA AND TRANSMISSION LINE STUDY AREA**

Common Name	Scientific Name	MBCA	Conservation Status				Habitat Association	Seasonal Occurrence	Spatial Occurrence				
			BC Status	Provincial Conservation Status <sup>1</sup>	COSEWIC	SARA (Schedule 1)			Terrestrial Wildlife RSA	Marine Terminal RSA	Marine Shipping RSA	Open Water Study Area	Transmission Line Study Area
<b>Amphibians</b>													
Coastal tailed frog	<i>Ascaphus truei</i>	-	Yellow	S4	Special Concern	Special Concern	Permanent, cold water, fast flowing streams with rocky substrates, old growth forests with dense understory	Year-round	Likely	-	-	-	Likely
Northwestern salamander	<i>Ambystoma gracile</i>	-	Yellow	S4	-	-	Wetlands, ponds, lakes, and slow-moving streams or drainages	Year-round	Confirmed <sup>3</sup>	-	-	-	Confirmed <sup>3</sup>
Long-toed salamander	<i>Ambystoma macrodactylum</i>	-	Yellow	S4	-	-	coniferous forest, montane riparian, alpine meadows	Year-round	Likely	-	-	-	Likely
Roughskin newt	<i>Taricha granulosa</i>	-	Yellow	S4	-	-	Forest (mature to old) with abundant coarse woody debris, ponds, bogs, swamps, and slow-moving streams	Year-round	Confirmed <sup>3</sup>	-	-	-	Likely
Western toad	<i>Anaxyrus boreas</i>	-	Yellow	S4	Special Concern	Special Concern	Shallow wetlands or shallow margins with emergent vegetation, anthropogenic ponds. Overwinters in upland areas	Year-round	Confirmed <sup>3</sup>	-	-	-	Confirmed <sup>3</sup>
Columbia spotted frog	<i>Rana luteiventris</i>	-	Yellow	S4S5	-	-	Wetlands, ponds, lakes, and slow-moving streams	Year-round	Likely	-	-	-	Likely
<b>Reptiles</b>													
Common gartersnake	<i>Thamnophis sirtalis</i>	-	Yellow	S5	-	-	Grassland, forest. Commonly associated with ponds, marshes, river valleys, rocky areas.	Year-round	Uncommon	-	-	-	Likely





Common Name	Scientific Name	MBCA	Conservation Status				Habitat Association	Seasonal Occurrence	Spatial Occurrence				
			BC Status	Provincial Conservation Status <sup>1</sup>	COSEWIC	SARA (Schedule 1)			Terrestrial Wildlife RSA	Marine Terminal RSA	Marine Shipping RSA	Open Water Study Area	Transmission Line Study Area
<b>Mammals</b>													
Cinereus shrew	<i>Sorex cinereus</i>	-	Yellow	S5	-	-	Forest, open meadows, avalanche slopes, riparian	Year-round	Likely	-	-	-	Likely
Dusky shrew	<i>Sorex obscurus</i>	-	Yellow	S5	-	-	Forest, recent burns, regenerating forest	Year-round	Likely	-	-	-	Likely
Vagrant shrew	<i>Sorex vagrans</i>	-	Yellow	S5	-	-	Moist forests, open patches, swamps/bogs, grassy fields, riparian areas	Year-round	Likely	-	-	-	Likely
Western water shrew	<i>Sorex navigator</i>	-	Yellow	S5	-	-	Riparian, slow to fast flowing streams, dense riparian vegetation, low to high elevation alpine, variety of forests	Year-round	Likely	-	-	-	Likely
Big brown bat	<i>Eptesicus fuscus</i>	-	Yellow	S5	-	-	Mature forest, riparian areas, grasslands, fragmented habitat including parks, urban and suburban areas	Year-round	Confirmed <sup>3</sup>	Likely (in flight)	Likely (in flight)	-	Likely
Silver-haired bat	<i>Lasionycteris noctivagans</i>	-	Yellow	S4S5	Endangered	-	Mature forest, riparian areas with cottonwoods, mixedwood, grassland	Summer, migratory species	Confirmed <sup>3</sup>	Likely (in flight)	Likely (in flight)	-	Likely
Eastern red bat	<i>Lasiurus borealis</i>	-	Unknown	SU	-	-	All forested areas, near waterways	Summer, migratory species	Likely	Likely (in flight)	Likely (in flight)	-	Likely
Hoary bat	<i>Lasiurus cinereus</i>	-	Blue	S3S4	Endangered	-	Forest, grassland, riparian areas	Summer, migratory species	Confirmed <sup>3</sup>	Likely (in flight)	Likely (in flight)	-	Likely
Californian myotis	<i>Myotis californicus</i>	-	Yellow	S4S5	-	-	Variety of habitats including open forests, arid grasslands, humid coastal forests, and montane forests	Year-round	Confirmed <sup>3</sup>	Likely (in flight)	Likely (in flight)	Likely (in flight)	Likely
Long-eared myotis	<i>Myotis evotis</i>	-	Yellow	S4?	-	-	Mature forest, grasslands, riparian areas, slopes, and rocky outcrops	Year-round	Confirmed <sup>3</sup>	Likely (in flight)	Likely (in flight)	Likely (in flight)	Likely
Little brown myotis	<i>Myotis lucifugus</i>	-	Blue	S3S4	Endangered	Endangered	Mature forest, riparian areas, cliffs, rocky outcrops, urban and suburban areas	Year-round	Confirmed <sup>3</sup>	Likely (in flight)	Likely (in flight)	Likely (in flight)	Likely
Northern myotis	<i>Myotis septentrionalis</i>	-	Blue	S2S3	Endangered	Endangered	Mature forest, caves, mines, rocky areas near water	Year-round	Likely	Likely (in flight)	Likely (in flight)	-	Likely
Long-legged myotis	<i>Myotis volans</i>	-	Yellow	S4?	-	-	Arid range lands and humid coastal and montane forests, cliffs, rocky outcrops	Year-round	Confirmed <sup>3</sup>	Likely (in flight)	Likely (in flight)	-	Likely
Yuma myotis	<i>Myotis yumanensis</i>	-	Blue	S3	-	-	Low elevations (less than 730 m), coastal Douglas-fir forests, coastal cliffs, rocky outcrops, and bridges	Year-round	Confirmed <sup>3</sup>	Likely (in flight)	Likely (in flight)	-	Likely





Common Name	Scientific Name	MBCA	Conservation Status				Habitat Association	Seasonal Occurrence	Spatial Occurrence				
			BC Status	Provincial Conservation Status <sup>1</sup>	COSEWIC	SARA (Schedule 1)			Terrestrial Wildlife RSA	Marine Terminal RSA	Marine Shipping RSA	Open Water Study Area	Transmission Line Study Area
Snowshoe hare	<i>Lepus americanus</i>	-	Yellow	S5	-	-	Agriculture, mixed forests, grasslands, riparian, wetlands, abundant understory cover	Year-round	Likely	-	-	-	Likely
Northern flying squirrel	<i>Glaucomys sabrinus</i>	-	Yellow	S5	-	-	Mature coniferous and mixedwood forest	Year-round	Likely	-	-	-	Likely
Red squirrel <sup>2</sup>	<i>Tamiasciurus hudsonicus</i>	-	Yellow	S5	-	-	Coniferous forests; urban and suburban areas	Year-round	Likely	-	-	-	Likely
American beaver <sup>2</sup>	<i>Castor canadensis</i>	-	Yellow	S5	-	-	Lakes, ponds, wetlands, and streams	Year-round	Confirmed <sup>3</sup>	-	-	-	Likely
Southern red-backed vole	<i>Myodes gapperi</i>	-	Yellow	S5	-	-	Forests, second growth forest, marsh, muskeg, rock outcrops.	Year-round	Likely	-	-	-	Likely
Long-tailed vole	<i>Microtus longicaudus</i>	-	Yellow	S5	-	-	Coniferous forest, forest edge, meadows, marshes, alpine tundra	Year-round	Likely	-	-	-	Likely
Meadow vole	<i>Microtus pennsylvanicus</i>	-	Yellow	S5	-	-	Dry pastures, wetlands, orchards, rock outcrops	Year-round	Likely	-	-	-	-
Montane vole	<i>Microtus montanus</i>	-	Yellow	S5	-	-	Alpine meadows, mountain valleys, wetlands, croplands, grasslands	Year-round	Likely	-	-	-	Likely
Northern red-backed vole	<i>Myodes rutilus</i>	-	Yellow	S4S5	-	-	Coniferous forests, woody debris, mature forest, dense shrubs, subalpine, wetlands	Year-round	Likely	-	-	-	Likely
Root vole	<i>Microtus oeconomus</i>	-	Yellow	S4	-	-	Tundra, sedge meadows, wetlands, mixed forest	Year-round	Likely	-	-	-	Likely
Common muskrat	<i>Ondatra zibethicus</i>	-	Yellow	S5	-	-	Wetlands, lakes and ponds, riparian forests	Year-round	Likely	-	-	-	Likely
Northern bog lemming	<i>Synaptomys borealis</i>	-	Yellow	S5	-	-	Wet mixed and coniferous forests, sphagnum bogs, wet or alpine meadows	Year-round	Likely	-	-	-	Likely
Northwestern deermouse	<i>Peromyscus keeni</i>	-	Yellow	S5	-	-	Coastal forest edge, coastal and island beaches	Year-round	Likely	-	-	-	Likely
North American deermouse	<i>Peromyscus maniculatus</i>	-	Yellow	S5	-	-	Brushlands, forests, riparian	Year-round	Likely	-	-	-	Likely
Western jumping mouse	<i>Zapus princeps</i>	-	Yellow	S5	-	-	Mountain meadows, marshes, along streams and lakes, dense grass and herb cover, elevated banks	Year-round	Likely	-	-	-	Likely
House mouse	<i>Mus musculus</i>	-	Exotic	SNA (2020)	-	-	Urban, rural, agricultural areas. Nests in buildings or underground burrows.	Year-round	Likely	-	-	-	Likely
Brown rat	<i>Rattus norvegicus</i>	-	Exotic	SNA (2020)	-	-	Urban, rural, agricultural areas. Forested areas.	Year-round	Likely	-	-	-	Likely





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Roof rat	<i>Rattus rattus</i>	-	Exotic	SNA (2020)	-	-	Urban, rural, agricultural areas. Forested areas.	Year-round	Likely	-	-	-	Likely
Woodchuck	<i>Marmota monax</i>	-	Yellow	S5	-	-	Meadows, pastures, bordered wooded areas,	Year-round	Likely	-	-	-	Likely
Cougar	<i>Puma concolor</i>	-	Yellow	S4	-	-	Forest, grasslands, areas with dense shrub layer	Year-round	Likely	-	-	-	Likely
Canada lynx	<i>Lynx canadensis</i>	-	Yellow	S5	-	-	Conifer, deciduous, and mixedwood forest, krummholtz, alpine tundra, riparian areas	Year-round	Likely	-	-	-	Likely
Domestic cat (feral)	<i>Felis catus</i>	-	Exotic	SNA (2020)	-	-	Urban, rural, agricultural areas.	Year-round	Likely	-	-	-	Likely
Red fox	<i>Vulpes vulpes</i>	-	Yellow	S5	-	-	Agriculture, fields, alpine, urban areas, forests, shrublands, riparian, vegetate rock	Year-round	Likely	-	-	-	-
Coyote	<i>Canis latrans</i>	-	Yellow	S5	-	-	Agriculture, cultivated sites, forest, alpine, tundra, grasslands, shrub areas, riparian and shoreline, wetlands, urban areas	Year-round	Likely	-	-	-	-
Grey wolf <sup>2</sup>	<i>Canis lupus</i>	-	Yellow	S4S5	-	-	Shrubland, forest, treed wetlands, riparian and shoreline	Year-round	Confirmed <sup>3</sup>	Likely	Likely	-	Likely
American black bear <sup>2</sup>	<i>Ursus americanus</i>	-	Yellow	S5	-	-	Forest, wetland, shrub areas, shorelines, and riparian areas	Year-round	Confirmed <sup>3</sup>	Likely	Likely	Likely	Likely
Grizzly bear <sup>2</sup>	<i>Ursus arctos</i>	-	Blue	S3?	Special Concern	Special Concern	Forests, riparian, grasslands, subalpine, wetlands	Year-round	Confirmed <sup>3</sup>	Likely	Likely	-	Likely
Wolverine, <i>luscus</i> subspecies <sup>2</sup>	<i>Gulo gulo luscus</i>	-	Blue	S3	Special Concern	Special Concern	Forested sites, often at higher elevations with dense vegetation	Year-round	Likely	-	-	-	Likely
North American river otter <sup>2</sup>	<i>Lontra canadensis</i>	-	Yellow	S5	-	-	Shoreline, marine, lakes and wetlands, adjacent upland habitat	Year-round	Confirmed <sup>3</sup>	Likely	Likely	Likely	Likely
North American porcupine	<i>Erethizon dorsatum</i>	-	Yellow	S4S5	-	-	Alpine, tundra, forest, grassland, riparian, subterranean, caves	Year-round	Likely	-	-	-	Likely
Pacific marten <sup>2</sup>	<i>Martes caurina</i>	-	Yellow	S5?	-	-	Forest (mature coniferous)	Year-round	Confirmed <sup>3</sup>	Likely	Likely	Likely	Likely
Ermine <sup>2</sup>	<i>Mustela richardsonii</i>	-	Yellow	S5	-	-	Forest, riparian forest, agricultural fields, alpine tundra	Year-round	Likely	-	-	-	Likely
Haida Ermine	<i>Mustela haidarum</i>	-	Red	S2	Threatened	Threatened	Open tundra, forests (mature coniferous), riparian zones	Year-round	-	-	-	Likely	-





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Fisher (Columbian population)	<i>Pekania pennanti</i>	-	Red	S2	-	-	Mature-old conifer and mixedwood forest, riparian areas	Year-round	Likely	-	-	-	Likely
American mink <sup>2</sup>	<i>Neovison vison</i>	-	Yellow	S5	-	-	Forest, riparian forest, wetland	Year-round	Likely	Likely	Likely	-	Likely
Mountain goat	<i>Oreamnos americanus</i>	-	Blue	S3	-	-	Alpine and tundra, alpine grasslands, sparsely vegetated rock and cliff, subalpine and timberline coniferous forest	Year-round	-	-	-	-	Likely
Moose <sup>2</sup>	<i>Alces alces</i>	-	Yellow	S5	-	-	Forest, wetland	Year-round	Confirmed <sup>3</sup>	-	-	-	Likely
Sitka black-tailed deer <sup>2</sup>	<i>Odocoileus hemionus sitkensis</i>	-	Yellow	S5	-	-	Forest, riparian, treed wetland	Year-round	Confirmed <sup>3</sup>	Likely	Likely	-	Likely
<b>Birds</b>													
Snow goose <sup>2,8</sup>	<i>Anser caerulescens</i>	✓	Yellow	S4M	-	-	Estuary, brackish marshes, fields	Migration	-	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Likely
Greater white-fronted goose <sup>2,8</sup>	<i>Anser albifrons</i>	✓	Yellow	S4M	-	-	Wetlands, estuary, streams/rivers, marine intertidal, fields	April-May; August-December	-	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Likely
Brant <sup>2,8</sup>	<i>Branta bernicla</i>	✓	Blue	S3M	-	-	Marine waters, lagoons	Migration	-	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Likely
Cackling goose <sup>2,8</sup>	<i>Branta hutchinsii</i>	✓	Yellow	S4S5M	-	-	Wetlands, estuary, marine intertidal	Migration	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Likely	Likely
Canada goose <sup>2,8</sup>	<i>Branta canadensis</i>	✓	Yellow	S5	-	-	Wetlands, estuary, streams/rivers, marine intertidal, fields	Year-round	Confirmed <sup>4</sup>	Confirmed <sup>3,4</sup>	Confirmed <sup>3,4</sup>	Likely	Confirmed <sup>4,3</sup>
Canada goose <sup>2,8</sup> <i>occidentalis</i> subspecies	<i>Branta canadensis occidentalis</i>	✓	Red	S2M	-	-	Wetlands, marine intertidal and subtidal, grassland, agricultural lands	Migration	Likely	Likely	Likely	Likely	Likely
Trumpeter swan <sup>2,8</sup>	<i>Cygnus buccinator</i>	✓	Yellow	S4B, S5N	-	-	Wetlands, estuary, streams/rivers, marine intertidal	September–July	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Likely	Likely
Tundra swan <sup>2</sup>	<i>Cygnus columbianus</i>	✓	Blue	S3N	-	-	Estuary, brackish shorelines	Migration	-	-	Confirmed <sup>4</sup>	Likely	-
Wood duck <sup>2</sup>	<i>Aix sponsa</i>	✓	Yellow	S4B, S4N	-	-	Wooded wetlands, lakes, rivers, streams, river edges	March - October	Likely	Likely	Likely	Likely	Likely
Blue-winged teal <sup>2,6,8</sup>	<i>Spatula discors</i>	✓	Yellow	S4S5B	-	-	Coastal marsh and estuary	May; September-October	-	Likely	Confirmed <sup>4</sup>	Likely	Likely
Northern shoveler <sup>2,6,8</sup>	<i>Spatula clypeata</i>	✓	Yellow	S5B, S5N	-	-	Wetlands, estuary, streams/rivers, fields	Year-round	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Likely	Likely
American wigeon <sup>2,6,8</sup>	<i>Mareca americana</i>	✓	Yellow	S5B, S5N	-	-	Wetlands, estuary, streams/rivers, marine intertidal, fields	Year-round	Confirmed <sup>4</sup>	Confirmed <sup>3,4</sup>	Confirmed <sup>4</sup>	Likely	Confirmed <sup>3</sup>





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Mallard <sup>2,6,8</sup>	<i>Anas platyrhynchos</i>	✓	Yellow	S5B, S5N	-	-	Wetland, estuary, streams/rivers, marine intertidal, fields	Year-round	Confirmed <sup>4</sup>	Confirmed <sup>3,4</sup>	Confirmed <sup>3,4</sup>	Likely	Confirmed <sup>3</sup>
Northern pintail <sup>2,6,8</sup>	<i>Anas acuta</i>	✓	Yellow	S4B, S5N	-	-	Wetlands, estuary, marine intertidal, fields	Year-round	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Likely
Green-winged teal <sup>2,6,8</sup>	<i>Anas crecca</i>	✓	Yellow	S5B, S5N	-	-	Wetlands, estuary, streams/rivers, marine intertidal, fields	Year-round	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Likely
Ring-necked duck <sup>1,2,7,8</sup>	<i>Aythya collaris</i>	✓	Yellow	S5B, S5N	-	-	Wetlands, river floodplains, estuary, ponds, lakes	Year-round	Confirmed <sup>4</sup>	Likely	Confirmed <sup>4</sup>	Likely	Likely
Greater scaup <sup>2,7,8</sup>	<i>Aythya marila</i>	✓	Yellow	S4N	-	-	Nearshore marine waters	October–April	-	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Likely	Confirmed <sup>3</sup>
Lesser scaup <sup>2,7,8</sup>	<i>Aythya affinis</i>	✓	Yellow	S5B, S5N	-	-	Nearshore marine waters, lakes, ponds	Migration	-	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Likely	Likely
Harlequin duck <sup>2,7,8</sup>	<i>Histrionicus histrionicus</i>	✓	Yellow	S4B, S3N	-	-	Rivers, streams, rocky coastal shorelines	Year-round	-	Confirmed <sup>3,4</sup>	Confirmed <sup>3,4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>3</sup>
Surf scoter <sup>2,7,8</sup>	<i>Melanitta perspicillata</i>	✓	Blue	S3B, S4N	-	-	Estuary, sheltered marine waters	October–April	-	Confirmed <sup>3,4</sup>	Confirmed <sup>3,4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>3</sup>
White-winged scoter <sup>2,7,8</sup>	<i>Melanitta deglandi</i>	✓	Yellow	S4S5	-	-	Open coastline, bays and inlets, coastal estuaries	Overwinters and migration	-	Confirmed <sup>3,4</sup>	Confirmed <sup>3,4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>3</sup>
Black scoter <sup>2,7,8</sup>	<i>Melanitta americana</i>	✓	Blue	S3S4N	-	-	Nearshore marine waters	October–April	-	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Likely	Likely
Long-tailed duck <sup>2,7,8</sup>	<i>Clangula hyemalis</i>	✓	Blue	S2S3B, S4N	-	-	Marine, large lakes	Migration	-	Confirmed <sup>3,4</sup>	Confirmed <sup>3,4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>3</sup>
Bufflehead <sup>2,7,8</sup>	<i>Bucephala albeola</i>	✓	Yellow	S5B, SNRN	-	-	Estuary, stream/river, sheltered marine waters	September–June	Confirmed <sup>4</sup>	Confirmed <sup>3,4</sup>	Confirmed <sup>3,4</sup>	Likely	Confirmed <sup>3</sup>
Common goldeneye <sup>2,7,8</sup>	<i>Bucephala clangula</i>	✓	Yellow	S5	-	-	Wetlands, estuary, streams/rivers, sheltered marine waters	Year-round	Confirmed <sup>4</sup>	Confirmed <sup>3,4</sup>	Confirmed <sup>3,4</sup>	Likely	Likely
Barrow's goldeneye <sup>2,7,8</sup>	<i>Bucephala islandica</i>	✓	Yellow	S4S5	-	-	Wetlands, estuary, streams/rivers, sheltered marine waters	Year-round	Confirmed <sup>4</sup>	Confirmed <sup>3,4</sup>	Confirmed <sup>3,4</sup>	Likely	Likely
Hooded merganser <sup>2,7,8</sup>	<i>Lophodytes cucullatus</i>	✓	Yellow	S5	-	-	Wetlands, estuary, streams/rivers, sheltered marine waters	Year-round	Confirmed <sup>4</sup>	Confirmed <sup>3</sup>	Confirmed <sup>3</sup>	Likely	Likely
Common merganser <sup>2,7,8</sup>	<i>Mergus merganser</i>	✓	Yellow	S5	-	-	Wetlands, estuary, streams/rivers, sheltered marine waters	Year-round	Confirmed <sup>4</sup>	Confirmed <sup>3,4</sup>	Confirmed <sup>3,4</sup>	Likely	Likely
Red-breasted merganser <sup>2,7,8</sup>	<i>Mergus serrator</i>	✓	Yellow	S4B, SNRN	-	-	Wetland, estuary, streams/rivers, sheltered marine waters	Year-round	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Likely	Likely
Ruffed grouse <sup>2</sup>	<i>Bonasa umbellus</i>	-	Yellow	S5	-	-	Forest (coniferous or mixedwood), riparian forest, fields	Year-round	Confirmed <sup>4</sup>	-	-	-	Likely





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Sooty grouse <sup>2</sup>	<i>Dendragapus fuliginosus</i>	-	Yellow	S4	-	-	Forest (coniferous), riparian forest, fields, meadows	Year-round	Confirmed <sup>3,4</sup>	-	-	-	Confirmed <sup>3</sup>
Spruce grouse <sup>2</sup>	<i>Canachites canadensis</i>	-	Yellow	S5	-	-	Forest (coniferous), forest with heavy shrub	Year-round	Confirmed <sup>3</sup>	-	-	-	Likely
Pied-billed grebe <sup>7</sup>	<i>Podilymbus podiceps</i>	✓	Yellow	S4	-	-	Sheltered marine waters	September – April	Likely	Likely	Confirmed <sup>4</sup>	-	Likely
Horned grebe <sup>7</sup>	<i>Podiceps auritus</i>	✓	Yellow	S4B, SNRN	Special Concern	Special Concern	Wetlands, estuary, sheltered marine waters	August – May	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Likely
Red-necked grebe <sup>7</sup>	<i>Podiceps grisegena</i>	✓	Yellow	S5?B	-	-	Large lakes, estuary, sheltered marine, marine offshore	Year-round, primarily September – May	Confirmed <sup>4</sup>	Confirmed <sup>3,4</sup>	Confirmed <sup>3,4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>3</sup>
Western grebe <sup>7</sup>	<i>Aechmophorus occidentalis</i>	✓	Red	S1B, S2N	Special Concern	Special Concern	Wetland, estuary, sheltered marine water	September – May	Confirmed <sup>4</sup>	Confirmed <sup>3,4</sup>	Confirmed <sup>3,4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>3</sup>
Band-tailed pigeon	<i>Patagioenas fasciata</i>	✓	Blue	S3S4	Special Concern	Special Concern	Forest (coniferous, mixedwood), riparian	April–August	Likely	Likely (in flight)	Confirmed <sup>4</sup>	Likely (in flight)	Likely
Rock pigeon	<i>Columba livia</i>	-	Exotic	SNA (2015)	-	-	Most frequently in residential, urban, and agricultural areas. Also rocky seaside cliffs, open shrubby habitat.	Year-round	Confirmed <sup>4</sup>	Likely	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Likely
Eurasian collared-dove	<i>Streptopelia decaocto</i>	-	Exotic	SNA (2009)	-	-	Residential, urban, and agricultural areas. Open forest and shrubland.	Year-round	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Likely
Common nighthawk	<i>Chordeiles minor</i>	✓	Blue	S3S5B	Special Concern	Special Concern	Open habitat, open forest, meadow, grassland, sagebrush, rock outcrop, sand dunes and beaches	June - September	Confirmed <sup>4</sup>	-	-	-	-
Black swift	<i>Cypseloides niger</i>	✓	Blue	S2S4B	Endangered	Endangered	Stream/river, cliffs, wetlands	May–August	Confirmed <sup>3,4</sup>	Likely (in flight)	Confirmed <sup>4</sup>	Likely (in flight)	Confirmed <sup>3</sup>
Vaux's swift	<i>Chaetura vauxi</i>	✓	Yellow	S4S5B	-	-	Old and mature forests (coniferous, mixedwood), forest gaps	May–August	Confirmed <sup>4</sup>	Likely (in flight)	Likely (in flight)	-	Likely
Rufous hummingbird	<i>Selasphorus rufus</i>	✓	Yellow	S4?B	-	-	Wetlands, fields, meadow, shrubland, forest (coniferous, deciduous, mixedwood), riparian, urban/suburban	April–September	Confirmed <sup>3</sup>	Likely (in flight)	Confirmed <sup>4</sup>	Likely (in flight)	Confirmed <sup>3</sup>
American coot	<i>Fulica americana</i>	✓	Yellow	S4S5B	-	-	Freshwater waterbodies (ponds, lakes)	Migration	Likely	Confirmed <sup>4</sup>	Likely	Likely (in flight)	Likely
Sandhill crane <sup>5</sup>	<i>Antigone canadensis</i>	✓	Yellow	S4B	-	-	Treed wetlands, wet meadows	May –September	Confirmed <sup>3</sup>	Confirmed <sup>3,4</sup>	Confirmed <sup>4</sup>	Likely (in flight)	Confirmed <sup>3</sup>
Black oystercatcher <sup>5</sup>	<i>Haematopus bachmani</i>	✓	Yellow	S4	-	-	Rocky shorelines, gravel and sandy beaches	Year-round	-	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Likely
Black-bellied plover <sup>5</sup>	<i>Pluvialis squatarola</i>	✓	Yellow	S5N	-	-	Mudflats, estuaries, shorelines	Migration	-	Likely	Confirmed <sup>4</sup>	Likely	Likely





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American golden-plover <sup>5</sup>	<i>Pluvialis dominica</i>	✓	Blue	S3S4B	-	-	Inland and coastal mudflats, estuaries, and shorelines	Migration	-	-	Likely	Likely	-
Pacific golden-plover	<i>Pluvialis fulva</i>	✓	Not Reviewed	SNRM	-	-	Grasslands, alpine tundra, dense vegetation cover, pastures, mudflats, sandy beaches, flooded fields	Year-round	-	-	-	Likely	-
Semipalmated plover <sup>5</sup>	<i>Charadrius semipalmatus</i>	✓	Yellow	S4S5B	-	-	Shorelines, sandy beaches	Migration	-	Confirmed <sup>3</sup>	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Likely
Killdeer <sup>5</sup>	<i>Charadrius vociferus</i>	✓	Blue	S3S5B	-	-	Wetland, estuary, fields, intertidal, grassland, meadows, shrubland, industrial	Year-round	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Likely
Whimbrel <sup>5</sup>	<i>Numenius phaeopus</i>	✓	Red	S1B, SNRM	-	-	Meadows, intertidal flats, sandy beaches, estuaries, lagoons	Migration	-	-	Confirmed <sup>4</sup>	Likely	-
Marbled godwit	<i>Limosa fedoa</i>	✓	Unknown	SUM	-	-	Prairies, pools, shorelines, tideflats	Year-round	-	-	-	Likely	-
Ruddy turnstone <sup>5</sup>	<i>Arenaria interpres</i>	✓	Yellow	S4M	-	-	Rocky shorelines, mudflats, sheltered coastline	May, July – November	--	Likely	Confirmed <sup>4</sup>	Likely	Likely
Black turnstone <sup>5</sup>	<i>Arenaria melanocephala</i>	✓	Yellow	S4N, S5M	-	-	Intertidal (rocky, mudflats), estuary, salt marshes	July – May	-	Confirmed <sup>3,4</sup>	Confirmed <sup>3,4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>3</sup>
Red knot, <i>roselaari</i> subspecies <sup>5</sup>	<i>Calidris canutus roselaari</i>	✓	Blue	S3?M	Threatened	Threatened	Sandy beaches	May; September	-	-	Confirmed <sup>4</sup>	Likely	-
Surfbird <sup>5</sup>	<i>Calidris virgata</i>	✓	Yellow	S4M	-	-	Coasts with rocky shores, ledges and reefs, sheltered bays and islands, spray zone	July – May	-	Confirmed <sup>3,4</sup>	Confirmed <sup>3,4</sup>	Likely	Confirmed <sup>3</sup>
Sanderling <sup>5</sup>	<i>Calidris alba</i>	✓	Yellow	S4S5N	-	-	Estuary, intertidal	July – May	-	Confirmed <sup>3,4</sup>	Confirmed <sup>3,4</sup>	Likely	Confirmed <sup>3</sup>
Dunlin <sup>5</sup>	<i>Calidris alpina</i>	✓	Yellow	S4N	-	-	Estuary, intertidal, flooded fields	September – May	-	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Likely	Likely
Rock sandpiper <sup>5</sup>	<i>Calidris ptilocnemis</i>	✓	Yellow	S4N	-	-	Estuaries, rocky, sandy and gravel intertidal and beach	October – May	-	-	Confirmed <sup>4</sup>	Likely	-
Least sandpiper <sup>5</sup>	<i>Calidris minutilla</i>	✓	Yellow	S4?B	-	-	Wetland, estuary, field, intertidal	Migration	Likely	Confirmed <sup>3,4</sup>	Confirmed <sup>3,4</sup>	Likely	Confirmed <sup>3</sup>
Semipalmated sandpiper <sup>5</sup>	<i>Calidris pusilla</i>	✓	Unknown	SUM	-	-	Mudflats, estuaries, sandy beaches, shores of ponds and lakes	Migration	Likely	Likely	Confirmed <sup>4</sup>	Likely	Likely
Western sandpiper <sup>5</sup>	<i>Calidris mauri</i>	✓	Yellow	S4M	-	-	Estuary, streams/rivers, intertidal	Migration	-	Confirmed <sup>3,4</sup>	Confirmed <sup>3,4</sup>	Confirmed <sup>4</sup>	Likely
Short-billed dowitcher <sup>5</sup>	<i>Limnodromus griseus</i>	✓	Red	1S2B, S2S3M	-	-	Ponds, lakes, estuaries	Migration	-	Likely	Confirmed <sup>4</sup>	Likely	Likely
Long-billed dowitcher <sup>5</sup>	<i>Limnodromus scolopaceus</i>	✓	Yellow	S4N	-	-	Ponds, lakes, estuaries	Migration	-	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Likely	Likely





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Wilson's snipe	<i>Gallinago delicata</i>	✓	Yellow	S5	-	-	Wetland, wet meadow and grassland, wet shrublands	October–April	Confirmed <sup>4</sup>	Likely (in flight)	Likely (in flight)	-	Likely
Red-necked phalarope <sup>5</sup>	<i>Phalaropus lobatus</i>	✓	Blue	S3B, SNRM	Special Concern	Special Concern	Pelagic marine waters, nearshore waters,	May – October	-	Confirmed <sup>3,4</sup>	Confirmed <sup>3,4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>3</sup>
Red phalarope <sup>5</sup>	<i>Phalaropus fulicarius</i>	✓	Unknown	SUM	-	-	Pelagic marine waters	Migration,	-	-	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	-
Spotted sandpiper <sup>5</sup>	<i>Actitis macularius</i>	✓	Yellow	S5B	-	-	Grassland, fields, riparian, intertidal	May–September	Confirmed <sup>4</sup>	Confirmed <sup>3,4</sup>	Confirmed <sup>3,4</sup>	Likely	Confirmed <sup>3</sup>
Wandering tattler <sup>5</sup>	<i>Tringa incana</i>	✓	Blue	S3B	-	-	Intertidal marine, islands, alpine, alpine riparian	Migration	-	Likely	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Likely
Greater yellowlegs <sup>5</sup>	<i>Tringa melanoleuca</i>	✓	Yellow	S5B, SUN	-	-	Wetland, estuary, mudflats, wet fields	Migration	Confirmed <sup>3</sup>	Confirmed <sup>3,4</sup>	Confirmed <sup>3,4</sup>	Likely	Confirmed <sup>3</sup>
Lesser yellowlegs <sup>5</sup>	<i>Tringa flavipes</i>	✓	Blue	S3S4B	Threatened	-	Wetland, estuary, mudflats, wet fields	Migration	-	Likely	Confirmed <sup>4</sup>	Likely	Likely
South polar skua <sup>8</sup>	<i>Stercorarius maccormicki</i>	✓	Unknown	SUM	-	-	Pelagic, offshore	Non-breeding, winter	-	-	-	Confirmed <sup>4</sup>	-
Pomarine jaeger <sup>8</sup>	<i>Stercorarius pomarinus</i>	✓	Unknown	SUM	-	-	Continental shelf	Non-breeding, winter	-	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Likely
Parasitic jaeger <sup>8</sup>	<i>Stercorarius parasiticus</i>	✓	Red	S1B, SUM	-	-	Continental shelf, offshore	Migration	-	-	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	-
Common murre <sup>8</sup>	<i>Uria aalge</i>	✓	Red	S2B, S3S4N	-	-	Offshore marine	Year-round	-	Confirmed <sup>3,4</sup>	Confirmed <sup>3,4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>3</sup>
Pigeon guillemot <sup>8</sup>	<i>Cephus columba</i>	✓	Yellow	S4	-	-	Marine, rocky islets, rocky shoreline, kelp reefs	April–September	-	Confirmed <sup>3,4</sup>	Confirmed <sup>3,4</sup>	Confirmed <sup>4</sup>	Likely
Marbled murrelet <sup>8</sup>	<i>Brachyramphus marmoratus</i>	✓	Blue	S3	Threatened	Threatened	Sheltered marine waters, subtidal marine waters, old forest (coniferous)	Year-round	Confirmed <sup>4</sup>	Confirmed <sup>3,4</sup>	Confirmed <sup>3,4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>3</sup>
Ancient murrelet <sup>8</sup>	<i>Synthliboramphus antiquus</i>	✓	Blue	S2S3B, S4N	Special Concern	Special Concern	Rocky offshore islands with mature forests	March-August	-	-	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	-
Cassin's auklet <sup>8</sup>	<i>Ptychoramphus aleuticus</i>	✓	Red	S2B, S3N	Special Concern	Special Concern	Open marine waters	Year-round	-	-	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	-
Rhinoceros auklet <sup>8</sup>	<i>Cerorhinca monocerata</i>	✓	Yellow	S4	-	-	Open marine waters; nesting on sea-facing slopes, island edges, steep slopes	Year-round	-	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Likely
Horned puffin <sup>8</sup>	<i>Fratercula corniculata</i>	✓	Red	S2B	-	-	Offshore marine; breeds on rocky cliffs and islands	May-September	-	-	Likely	Confirmed <sup>4</sup>	-
Tufted puffin <sup>8</sup>	<i>Fratercula cirrhata</i>	✓	Blue	S2S3B, S4N	-	-	Offshore marine; breeds on rocky mainland cliffs and steep offshore islands	May-September	-	-	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	-
Black-legged kittiwake <sup>2,8</sup>	<i>Rissa tridactyla</i>	✓	Red	S1B, SNRN	-	-	Steep cliff ledges along coasts or islands; sometimes nests on buildings	February-September	-	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Likely





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Sabine's gull <sup>2,8</sup>	<i>Xema sabini</i>	✓	Yellow	S4M	-	-	Offshore marine waters	May, July – September	-	-	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	-
Bonaparte's gull <sup>2,8</sup>	<i>Chroicocephalus philadelphia</i>	✓	Yellow	S5?	-	-	Wetlands, coniferous forest near lakes or ponds, coastal waters, estuaries, harbors	April–October	Confirmed <sup>4</sup>	Confirmed <sup>3,4</sup>	Confirmed <sup>3,4</sup>	Confirmed <sup>4</sup>	Likely
Short-billed gull <sup>2,8</sup>	<i>Larus brachyrhynchus</i>	✓	Yellow	S4B	-	-	Lakes, intertidal, subtidal marine, estuary	Year-round	Confirmed <sup>4</sup>	Confirmed <sup>3,4</sup>	Confirmed <sup>3,4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>3</sup>
Ring-billed gull <sup>2,8</sup>	<i>Larus delawarensis</i>	✓	Yellow	S4?B	-	-	Coastal waters, beaches, mudflats, estuaries	Year-round	-	Confirmed <sup>3,4</sup>	Confirmed <sup>3,4</sup>	Likely	Confirmed <sup>3</sup>
Western gull <sup>2,8</sup>	<i>Larus occidentalis</i>	✓	Unknown	SUN	-	-	Islets, islands, intertidal areas, sandy beach	Winter	-	-	Confirmed <sup>4</sup>	Likely	-
California gull <sup>2,8</sup>	<i>Larus californicus</i>	✓	Red	S1B, SNRN	-	-	Wetland, estuary, fields, meadow, grassland, subtidal marine, sheltered marine waters, urban/suburban,	April–October	Confirmed <sup>4</sup>	Confirmed <sup>3,4</sup>	Confirmed <sup>3,4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>3</sup>
Herring gull <sup>2,8</sup>	<i>Larus argentatus</i>	✓	Yellow	S5?B	-	-	Wetland, estuary, streams/rivers, field, subtidal marine, sheltered marine waters, eelgrass and kelp beds	Year-round	Confirmed <sup>4</sup>	Confirmed <sup>3,4</sup>	Confirmed <sup>3,4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>3</sup>
Iceland gull <sup>2,8</sup>	<i>Larus glaucooides</i>	✓	Yellow	S5N	-	-	Coastal areas near shorelines, fields, urban/suburban	August–May	-	Confirmed <sup>3</sup>	Confirmed <sup>3</sup>	Confirmed <sup>4</sup>	Confirmed <sup>3</sup>
Glaucous-winged gull <sup>2,8</sup>	<i>Larus glaucescens</i>	✓	Yellow	S4S5	-	-	Small offshore islands, intertidal, estuary	Year-round	Confirmed <sup>4</sup>	Confirmed <sup>3,4</sup>	Confirmed <sup>3,4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>3</sup>
Caspian tern <sup>8</sup>	<i>Hydroprogne caspia</i>	✓	Blue	S3B	-	-	Marine, coasts, estuaries, large lakes	May - August	-	Likely	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Likely
Arctic tern <sup>8</sup>	<i>Sterna paradisaea</i>	✓	Yellow	S4B	-	-	Offshore marine	May, July – August	Likely	-	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Likely
Red-throated loon <sup>8</sup>	<i>Gavia stellata</i>	✓	Yellow	S4	-	-	Wetlands, marine	Year-round	Confirmed <sup>3,4</sup>	Confirmed <sup>3,4</sup>	Confirmed <sup>3,4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>3</sup>
Pacific loon <sup>8</sup>	<i>Gavia pacifica</i>	✓	Yellow	S4B, S3S4N	-	-	Estuary, streams/rivers, marine waters	Year-round	Likely	Confirmed <sup>3,4</sup>	Confirmed <sup>3,4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>3</sup>
Common loon <sup>8</sup>	<i>Gavia immer</i>	✓	Yellow	S5	-	-	Marine, estuaries, lakes	Year-round	Confirmed <sup>4</sup>	Confirmed <sup>3,4</sup>	Confirmed <sup>3,4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>3,4</sup>
Yellow-billed loon <sup>8</sup>	<i>Gavia adamsii</i>	✓	Blue	S2S3N	-	-	Marine, offshore	Year-round	Likely	Confirmed <sup>3,4</sup>	Confirmed <sup>3,4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>3</sup>
Short-tailed albatross <sup>8</sup>	<i>Phoebastria albatrus</i>	✓	Red	S1N	Threatened	Threatened	Pelagic, offshore	Year-round	-	-	-	Confirmed <sup>4</sup>	-
Black-footed albatross <sup>8</sup>	<i>Phoebastria nigripes</i>	✓	Blue	S3S4N	Special Concern	Special Concern	Pelagic, offshore	May – September	-	-	-	Confirmed <sup>4</sup>	-
Fork-tailed storm-petrel <sup>8</sup>	<i>Hydrobates furcatus</i>	✓	Yellow	S4B	-	-	Marine, breeds on rock crevices and talus slopes on offshore islands	April–September	-	Confirmed <sup>3,4</sup>	Confirmed <sup>3,4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>3</sup>
Leach's storm-petrel <sup>8</sup>	<i>Hydrobates leucorhous</i>	✓	Yellow	S4B	-	-	Marine, breeds on grass and treed areas on offshore islands	April–September	-	-	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	-





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Northern fulmar <sup>8</sup>	<i>Fulmarus glacialis</i>	✓	Red	S1B, S4N	-	-	Pelagic; arctic to subarctic waters; breeds on island sea cliffs in	Year-round	-	-	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	-
Pink-footed shearwater <sup>8</sup>	<i>Ardenna creatopus</i>	✓	Blue	S3N	Endangered	Endangered	Marine and pelagic; breeds on oceanic islands in South America	May-October (non-breeding)	-	-	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	-
Buller's shearwater <sup>8</sup>	<i>Ardenna bulleri</i>	✓	Blue	S3?N	-	-	Marine and pelagic; breeds on oceanic islands off New Zealand	August – October (non-breeding)	-	-	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	-
Sooty shearwater <sup>8</sup>	<i>Ardenna grisea</i>	✓	Not Reviewed	SNRM	-	-	Marine waters, breeds on coastal islands, treed or densely vegetated coastal slopes	April-October (non-breeding)	-	-	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	-
Short-tailed shearwater <sup>8</sup>	<i>Ardenna tenuirostris</i>	✓	Unknown	SUM	-	-	Pelagic, breeds on small islands or headlands	May- November (non-breeding)	-	-	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	-
Brandt's cormorant <sup>8</sup>	<i>Urile penicillatus</i>	-	Red	S1B, S4N	-	-	Inshore coastal zone, inlets, rocky shores; breeds on offshore or nearshore islands	Year-round	-	-	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	-
Pelagic cormorant <sup>8</sup>	<i>Urile pelagicus</i>	-	Yellow	S4	-	-	Marine, areas for perching (rock outcrops, small islands)	Year-round	-	Confirmed <sup>3,4</sup>	Confirmed <sup>3,4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>3</sup> .
Double-crested cormorant <sup>8</sup>	<i>Nannopterum auritum</i>	-	Blue	S3S4	-	-	Marine, areas for perching (rock outcrops, small islands)	October–April	-	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Likely
Great blue heron, <i>fannini</i> subspecies <sup>5</sup>	<i>Ardea A.11erodias fannini</i>	✓	Blue	S3B, S4N	Special Concern	Special Concern	Wetland, estuary, streams/rivers, riparian, fields, sheltered marine waters, intertidal	Year-round	Likely	Confirmed <sup>3,4</sup>	Confirmed <sup>3,4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>3,4</sup>
Osprey	<i>Pandion haliaetus</i>	-	Yellow	S5B	-	-	Lakes, marine, riparian forest (coniferous, deciduous, mixedwood)	April–October	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	-	Likely
Northern harrier	<i>Circus hudsonius</i>	-	Yellow	S4B	-	-	Saltwater marshes, meadows, open wetlands, pasture, grassland	Year-round	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Likely (in flight)	Likely
Sharp-shinned hawk	<i>Accipiter striatus</i>	-	Yellow	S5B, S5N	-	-	Dense forest (coniferous, mixedwood), forest edges	Year-round	Confirmed <sup>4</sup>	Likely (in flight)	Confirmed <sup>4</sup>	Likely (in flight)	Likely
Northern goshawk, <i>laingi</i> subspecies	<i>Accipiter gentilis laingi</i>	-	Red	S2	Threatened	Threatened	Mature coniferous forest	Year-round	Confirmed <sup>3</sup>	Likely (in flight)	Likely (in flight)	Likely (in flight)	Likely
Bald eagle <sup>2</sup>	<i>Haliaeetus leucocephalus</i>	-	Yellow	S5B, S5N	-	-	Estuary, streams/rivers, forest, marine islands, wetland, intertidal	Year-round	Confirmed <sup>3,4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>3,4</sup>
Red-tailed hawk	<i>Buteo jamaicensis</i>	-	Yellow	S5	-	-	Wetland, estuary, fields, shrubland, grassland, forest, alpine, urban/suburban	Year-round	Confirmed <sup>3,4</sup>	Likely (in flight)	Confirmed <sup>4</sup>	Likely (in flight)	Confirmed <sup>3</sup> .





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Western screech-owl, <i>kennicottii</i> subspecies	<i>Megascops kennicottii kennicottii</i>	-	Blue	S2S3	Threatened	Threatened	Riparian, mature deciduous and mixedwood forest near water	Year-round	Likely	Likely (in flight)	Likely (in flight)	-	Likely
Great horned owl	<i>Bubo virginianus</i>	-	Yellow	S5	-	-	Wetland, estuary, fields, riparian, forest (coniferous), urban/suburban	Year-round	Likely	Likely (in flight)	Likely (in flight)	-	Likely
Northern pygmy-owl	<i>Glaucidium gnoma</i>	-	Yellow	S4B	-	-	Forest (coniferous, mixedwood), clearcuts, fields, forest edges	Year-round	Confirmed <sup>4</sup>	Likely (in flight)	Likely (in flight)	-	Likely
Barred owl	<i>Strix varia</i>	-	Yellow	S5	-	-	Wetland, fields, riparian, coniferous forest, urban/suburban	Year-round	Confirmed <sup>4</sup>	Likely (in flight)	Confirmed <sup>4</sup>	-	Likely
Northern hawk owl	<i>Surnia ulula</i>	-	Yellow	S4S5	-	-	Forests, forested edges, wooded swamps, bogs, clearcuts, subalpine parkland, urban areas	Year-round	Confirmed <sup>4</sup>	-	-	-	-
Boreal owl	<i>Aegolius funereus</i>	-	Yellow	S4	-	-	Coniferous and mixedwood forest, clearcuts, fields	Year-round	Likely	Likely (in flight)	Likely (in flight)	-	Likely
Northern saw-whet owl	<i>Aegolius acadicus</i>	-	Yellow	S5B, S5N	-	-	Wetland, riparian, fields, coniferous forest, urban/suburban	Year-round	Likely	Likely (in flight)	Confirmed <sup>4</sup>	Likely (in flight)	Likely
Great gray owl	<i>Strix nebulosa</i>	-	Yellow	S4	-	-	Conifer and mixedwood forest usually near openings, mid-elevations	Year-round	Confirmed <sup>4</sup>	-	-	-	-
Short-eared owl	<i>Asio flammeus</i>	-	Blue	S3B, S1N	Threatened	Special concern	Grasslands, fields, arctic tundra, marshes	Year-round	Confirmed <sup>4</sup>	-	-	-	-
Belted kingfisher	<i>Megaceryle alcyon</i>	-	Yellow	S4S5	-	-	Wetland, estuary, intertidal, riparian	Year-round	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Likely
Red-breasted sapsucker	<i>Sphyrapicus ruber</i>	✓	Yellow	S5B	-	-	Coniferous and mixedwood forest, riparian, orchards	Year-round	Confirmed <sup>3,4</sup>	Likely (in flight)	Likely (in flight)	Likely (in flight)	Confirmed <sup>3</sup>
Downy woodpecker	<i>Dryobates pubescens</i>	✓	Yellow	S5	-	-	Deciduous and mixedwood forest, riparian forest, second growth forest.	Year-round	Confirmed <sup>3,4</sup>	Likely (in flight)	Confirmed <sup>4</sup>	-	Confirmed <sup>3</sup>
Hairy woodpecker	<i>Dryobates villosus</i>	✓	Yellow	S5	-	-	Mainly coniferous and mixedwood forest, forest edges, burned forest	Year-round	Confirmed <sup>3,4</sup>	Likely (in flight)	Confirmed <sup>4</sup>	-	Confirmed <sup>3</sup>
Pileated woodpecker	<i>Dryocopus pileatus</i>	✓	Yellow	S5	-	-	Mature and old coniferous forest, requires large snags and dead trees	Year-round	Confirmed <sup>4</sup>	-	-	-	-
Northern flicker	<i>Colaptes auratus</i>	✓	Yellow	S5	-	-	Riparian, fields, forest, urban/suburban	Year-round	Confirmed <sup>4</sup>	Likely (in flight)	Likely (in flight)	Likely (in flight)	Likely
Merlin	<i>Falco columbarius</i>	-	Yellow	S5	-	-	Open habitat, near forest edge, bogs	Year-round	Confirmed <sup>4</sup>	Likely (in flight)	Likely (in flight)	Likely (in flight)	Likely





Common Name	Scientific Name	MBCA	Conservation Status				Habitat Association	Seasonal Occurrence	Spatial Occurrence				
			BC Status	Provincial Conservation Status <sup>1</sup>	COSEWIC	SARA (Schedule 1)			Terrestrial Wildlife RSA	Marine Terminal RSA	Marine Shipping RSA	Open Water Study Area	Transmission Line Study Area
Peregrine falcon, <i>pealei</i> subspecies	<i>Falco peregrinus pealei</i>	-	Blue	S3S4	Special Concern	Special Concern	Cliffs, fields, near large lakes/rivers or coast	Year-round	Likely	Confirmed <sup>4</sup>	Likely (in flight)	Confirmed <sup>4</sup>	Likely
Olive-sided flycatcher	<i>Contopus cooperi</i>	✓	Yellow	S4B	Special Concern	Special Concern	Mature and old coniferous forest, forest edges near water	May–September	Confirmed <sup>4</sup>	Likely (in flight)	Likely (in flight)	Likely (in flight)	Likely
Western wood-pewee	<i>Contopus sordidulus</i>	✓	Yellow	S5?B	-	-	Wetlands, riparian, forest	May–August	Confirmed <sup>4</sup>	Likely (in flight)	Likely (in flight)	-	Likely
Alder flycatcher	<i>Empidonax alnorum</i>	✓	Yellow	S5B	-	-	Young shrubby deciduous forest, moist deciduous shrub thickets, near water	May–August	Confirmed <sup>4</sup>	Likely (in flight)	Confirmed <sup>4</sup>	Likely (in flight)	Likely
Hammond's flycatcher	<i>Empidonax hammondii</i>	✓	Yellow	S5B	-	-	Mature to old coniferous and mixedwood forest with continuous canopy	May–August	Confirmed <sup>4</sup>	Likely (in flight)	Likely (in flight)	-	Likely
Pacific-slope flycatcher	<i>Empidonax difficilis</i>	✓	Yellow	S5B	-	-	Mature to old coniferous and mixedwood forest, riparian habitat	May–August	Confirmed <sup>3,4</sup>	Likely (in flight)	Confirmed <sup>4</sup>	Likely (in flight)	Confirmed <sup>3</sup>
Warbling vireo	<i>Vireo gilvus</i>	✓	Yellow	S5B	-	-	Forest (deciduous, mixedwood), riparian, edge habitat, urban/suburban	May–August	Confirmed <sup>3,4</sup>	Likely (in flight)	Confirmed <sup>4</sup>	-	Confirmed <sup>3</sup>
Cassin's vireo	<i>Vireo cassinii</i>	✓	Yellow	S5B	-	-	Low to mid-elevation coniferous forests	May - September	Confirmed <sup>4</sup>	-	-	-	-
Steller's jay	<i>Cyanocitta stelleri</i>	-	Yellow	S5	-	-	Coniferous and mixedwood forest, primarily lower elevations, patchy or fragmented forest, urban/suburban habitat	Year-round	Confirmed <sup>3,4</sup>	Likely (in flight)	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Likely
Northern shrike	<i>Lanius borealis</i>	✓	Yellow	S4B, S4N	-	-	Forest edge, shrubby wetlands, riparian, shrubland	October-April	Confirmed <sup>4</sup>	Likely (in flight)	Likely (in flight)	-	Likely
Canada Jay	<i>Perisoreus canadensis</i>	-	Yellow	S5	-	-	Mid to high elevation conifer and mixedwood forests, bogs	Year-round	Confirmed <sup>4</sup>	Likely (in flight)	Likely (in flight)	-	-
American crow	<i>Corvus brachyrhynchos</i>	-	Yellow	S5	-	-	Intertidal, estuary, small coastal islands	Year-round	Confirmed <sup>3,4</sup>	Confirmed <sup>3,4</sup>	Confirmed <sup>3,4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>3</sup>
Common raven	<i>Corvus corax</i>	-	Yellow	S5	-	-	Forest, fields, meadow, cliffs, intertidal	Year-round	Confirmed <sup>3,4</sup>	Confirmed <sup>3</sup>	Confirmed <sup>3</sup>	Confirmed <sup>4</sup>	Confirmed <sup>3</sup>
Black-capped chickadee	<i>Poecile atricapillus</i>	✓	Yellow	S5	-	-	Forest, thickets, urban/suburban, edge habitat	Year-round	Confirmed <sup>4</sup>	Likely (in flight)	Confirmed <sup>4</sup>	-	Likely
Chestnut-backed chickadee	<i>Poecile rufescens</i>	✓	Yellow	S5	-	-	Riparian, forest, urban/suburban	Year-round	Confirmed <sup>3,4</sup>	Likely (in flight)	Confirmed <sup>4</sup>	Likely (in flight)	Confirmed <sup>3</sup>
Mountain chickadee	<i>Poecile gambeli</i>	✓	Yellow	S5	-	-	Mature montane conifer and mixedwood forests, riparian, cavity nester	Year-round	Likely	-	-	-	-
Tree swallow	<i>Tachycineta bicolor</i>	✓	Yellow	S5B	-	-	Wetland, estuary, riparian, fields, open forest, shoreline, urban/suburban	April–August	Confirmed <sup>3,4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Likely (in flight)	Confirmed <sup>3</sup>





Common Name	Scientific Name	MBCA	Conservation Status				Habitat Association	Seasonal Occurrence	Spatial Occurrence				
			BC Status	Provincial Conservation Status <sup>1</sup>	COSEWIC	SARA (Schedule 1)			Terrestrial Wildlife RSA	Marine Terminal RSA	Marine Shipping RSA	Open Water Study Area	Transmission Line Study Area
Violet-green swallow	<i>Tachycineta thalassina</i>	✓	Yellow	S5B	-	-	Wetland, estuary, mudflats, riparian, fields, grassland, shrubland, open forest, urban/suburban	April–August	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Likely (in flight)	Likely
Barn swallow	<i>Hirundo rustica</i>	✓	Yellow	S4B	Special Concern	Threatened	Wetland, estuary, fields, meadow, grassland, shrubland, intertidal, open forest, urban/suburban	May–August	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Likely
Northern rough-winged swallow	<i>Stelgidopteryx serripennis</i>	✓	Yellow	S4S5B	-	-	Grassland, shrubland, agricultural field, wetlands, lakes, urban/suburban	April–August	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	-	Likely
Cliff swallow	<i>Petrochelidon pyrrhonota</i>	✓	Yellow	S4S5B	-	-	Grasslands and fields, shrubland, open water areas, wetlands, mudflats. Nests on steep rock faces and anthropogenic structures	May–September	Likely	Likely (in flight)	Likely (in flight)	-	Likely
Ruby-crowned kinglet	<i>Corthylio calendula</i>	✓	Yellow	S5	-	-	Coniferous and mixedwood forest, shrub, urban/suburban	April–November	Confirmed <sup>3,4</sup>	Likely (in flight)	Confirmed <sup>4</sup>	Likely (in flight)	Confirmed <sup>3</sup>
Golden-crowned kinglet	<i>Regulus satrapa</i>	✓	Yellow	S5	-	-	Coniferous and mixedwood forest, urban/suburban	Year-round	Confirmed <sup>3,4</sup>	Likely (in flight)	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>3</sup>
Red-breasted nuthatch	<i>Sitta canadensis</i>	✓	Yellow	S5	-	-	Coniferous and mixedwood forest, orchards, riparian, urban/suburban	Year-round	Confirmed <sup>4</sup>	Likely (in flight)	Likely (in flight)	Likely (in flight)	Likely
Brown creeper	<i>Certhia americana</i>	✓	Yellow	S5	-	-	Riparian, coniferous and mixedwood forest, urban/suburban	Year-round	Confirmed <sup>4</sup>	Likely (in flight)	Likely (in flight)	Likely (in flight)	Likely
Pacific wren	<i>Troglodytes pacificus</i>	✓	Yellow	S5	-	-	Forest, particularly older moist forest, riparian habitat, often near wetlands (bogs, swamps, lakes) or streams and rivers	Year-round	Confirmed <sup>3,4</sup>	Likely (in flight)	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>3</sup>
American dipper	<i>Cinclus mexicanus</i>	✓	Yellow	S4	-	-	Fast-moving streams, stream-side banks (cliff, large rock, boulder)	Year-round	Confirmed <sup>4</sup>	Likely (in flight)	Likely (in flight)	-	Likely
European starling	<i>Sturnus vulgaris</i>	-	Exotic	SNA (2015)	-	-	Residential, urban, and agricultural areas. Avoids large, undisturbed forested areas.	Year-round	Confirmed <sup>4</sup>	Likely	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Likely
Varied thrush	<i>Ixoreus naevius</i>	✓	Yellow	S5	-	-	Coniferous and mixedwood mature to old forest, moist coastal forest	Year-round	Confirmed <sup>3,4</sup>	Likely (in flight)	Likely (in flight)	Confirmed <sup>4</sup>	Confirmed <sup>3</sup>
Veery	<i>Catharus fuscescens</i>	✓	Yellow	S5B	-	-	Wet, shrubby deciduous forest, wetland, riparian	May–September	Confirmed <sup>3,4</sup>	Likely (in flight)	Likely (in flight)	-	Confirmed <sup>3</sup>
Swainson's thrush	<i>Catharus ustulatus</i>	✓	Yellow	S5B	-	-	Low to mid-elevation coniferous or mixedwood forest, young to mature forest	May–September	Confirmed <sup>3,4</sup>	Likely (in flight)	Confirmed <sup>4</sup>	Likely (in flight)	Likely





Common Name	Scientific Name	MBCA	Conservation Status				Habitat Association	Seasonal Occurrence	Spatial Occurrence				
			BC Status	Provincial Conservation Status <sup>1</sup>	COSEWIC	SARA (Schedule 1)			Terrestrial Wildlife RSA	Marine Terminal RSA	Marine Shipping RSA	Open Water Study Area	Transmission Line Study Area
Hermit thrush	<i>Catharus guttatus</i>	✓	Yellow	S5B	-	-	Mid to higher elevation coniferous forest, forest edges	April–October	Confirmed <sup>3,4</sup>	Likely (in flight)	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Likely
Mountain bluebird	<i>Sialia currucoides</i>	✓	Yellow	S4S5B	-	-	Open country, open alpine zones, lowland prairies, avoids dense forest	April- May	Confirmed <sup>4</sup>	-	-	-	-
Townsend's solitaire	<i>Myadestes townsendi</i>	✓	Yellow	S5B	-	-	Mid to higher elevation open coniferous forest, shrublands	April–October	Confirmed <sup>4</sup>	Likely (in flight)	Likely (in flight)	-	Likely
American robin	<i>Turdus migratorius</i>	✓	Yellow	S5	-	-	Riparian, fields, meadow, forest, urban/suburban	Year-round	Confirmed <sup>3,4</sup>	Likely (in flight)	Confirmed <sup>4</sup>	Likely (in flight)	Confirmed <sup>3</sup>
Cedar waxwing	<i>Bombycilla cedrorum</i>	✓	Yellow	S5	-	-	Open woodland, orchards, urban/suburban, fields, forest edge	May–October	Confirmed <sup>4</sup>	Likely (in flight)	Confirmed <sup>4</sup>	Likely (in flight)	Likely
House sparrow	<i>Passer domesticus</i>	-	Exotic	SNA (2015)	-	-	Residential, urban, and agricultural areas. Uncommon outside of developed areas.	Year-round	Likely	Likely	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Likely
Pine grosbeak	<i>Pinicola enucleator</i>	✓	Yellow	S5	-	-	Open coniferous forest, subalpine forest and parkland	Year-round	Confirmed <sup>4</sup>	Likely (in flight)	Likely (in flight)	-	Likely
Red crossbill	<i>Loxia curvirostra</i>	✓	Yellow	S5	-	-	Mature coniferous (pine and spruce) forest, lower elevations on coast	Year-round	Confirmed <sup>3,4</sup>	Likely (in flight)	Confirmed <sup>4</sup>	Likely (in flight)	Confirmed <sup>3</sup>
White-winged crossbill	<i>Loxia leucoptera</i>	✓	Yellow	S5	-	-	Lower elevation mature coniferous forest (mainly spruces)	Year-round	Confirmed <sup>4</sup>	Likely (in flight)	Likely (in flight)	Likely (in flight)	Likely
Pine siskin	<i>Spinus pinus</i>	✓	Yellow	S5B	-	-	Riparian, forest, field, shrubland, urban/suburban	Year-round	Confirmed <sup>3,4</sup>	Likely (in flight)	Confirmed <sup>4</sup>	Likely (in flight)	Confirmed <sup>3</sup>
Purple finch	<i>Haemorhous purpureus</i>	✓	Yellow	S5B	-	-	Coniferous forest. Also, mixedwood forest, bog edges, riparian areas, agricultural and urban areas, hedges	Year-round	Confirmed <sup>4</sup>	-	-	-	-
Common redpoll	<i>Acanthis flammea</i>	✓	Yellow	S4	-	-	Open alpine and subalpine coniferous forest and scrub, stunted mixedwood woods, shrubby habitat, swamps, riparian thickets	March–October	Confirmed <sup>4</sup>	Likely (in flight)	Likely (in flight)	Likely (in flight)	Likely
Chipping sparrow	<i>Spizella passerina</i>	✓	Yellow	S5B	-	-	Open forest (coniferous), shrubland, old weedy fields	May–August	Confirmed <sup>3,4</sup>	Likely (in flight)	Likely (in flight)	-	Likely
Fox sparrow	<i>Passerella iliaca</i>	✓	Yellow	S5	-	-	Higher elevation, thickets in mature forest, dense riparian areas, subalpine meadows	Year-round	Confirmed <sup>4</sup>	Likely (in flight)	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Likely
Dark-eyed junco	<i>Junco hyemalis</i>	✓	Yellow	S5	-	-	Forest, alpine meadow, urban/suburban, old burns	Year-round	Confirmed <sup>3,4</sup>	Likely (in flight)	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>3</sup>
White-crowned sparrow	<i>Zonotrichia leucophrys</i>	✓	Yellow	S5	-	-	Grassland, shrubland, riparian	Year-round	Confirmed <sup>4</sup>	Likely (in flight)	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Likely





Common Name	Scientific Name	MBCA	Conservation Status				Habitat Association	Seasonal Occurrence	Spatial Occurrence				
			BC Status	Provincial Conservation Status <sup>1</sup>	COSEWIC	SARA (Schedule 1)			Terrestrial Wildlife RSA	Marine Terminal RSA	Marine Shipping RSA	Open Water Study Area	Transmission Line Study Area
Golden-crowned sparrow	<i>Zonotrichia atricapilla</i>	✓	Yellow	S5?B	-	-	Shrub tundra, shrubby alpine, subalpine parkland, alpine meadows, riparian willow thickets, alder and willow patches	Year-round, primarily September-May	Confirmed <sup>4</sup>	Likely (in flight)	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Likely
Savannah sparrow	<i>Passerculus sandwichensis</i>	✓	Yellow	S5B	-	-	Open grassland and shrubland, pastures, marshes, estuaries, alpine meadow, arctic tundra	April–October	Confirmed <sup>4</sup>	Likely (in flight)	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Likely
Song sparrow	<i>Melospiza melodia</i>	✓	Yellow	S5	-	-	Riparian, shrubland, forest edges, shrubby thickets, urban/suburban	Year-round	Confirmed <sup>3,4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>3</sup>
Lincoln's sparrow	<i>Melospiza lincolni</i>	✓	Yellow	S5B, SNRN	-	-	Wetlands, riparian, forest (deciduous), shrubland	April–October	Confirmed <sup>3,4</sup>	Likely	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Likely
White-throated sparrow	<i>Zonotrichia albicollis</i>	✓	Yellow	S5	-	-	Older open forest with brushy understory, recent burns or cutblocks, avoids dense conifer forest	May–October	Confirmed <sup>4</sup>	-	-	-	Likely
American pipit	<i>Anthus rubescens</i>	✓	Yellow	S5B, SNRN	-	-	Beaches, coasts, mudflats, fields alpine meadows, tundra	Migration	Confirmed <sup>3,4</sup>	Confirmed <sup>3</sup>	Confirmed <sup>3</sup>	-	Likely
Orange-crowned warbler	<i>Leiothlypis celata</i>	✓	Yellow	S5B	-	-	Riparian, forest (deciduous, mixedwood), shrubland	April–September	Confirmed <sup>3,4</sup>	Likely (in flight)	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Confirmed <sup>3</sup>
MacGillivray's warbler	<i>Geothlypis tolmiei</i>	✓	Yellow	S5B	-	-	Wetland, estuary, riparian, shrubland, forest (coniferous, mixedwood), urban/suburban	April–September	Confirmed <sup>4</sup>	Likely (in flight)	Likely (in flight)	-	Likely
Common yellowthroat	<i>Geothlypis trichas</i>	✓	Yellow	S5	-	-	Wetlands with low dense vegetation, marshes, edges of lakes and ponds	May–September	Confirmed <sup>3,4</sup>	Likely (in flight)	Likely (in flight)	-	Confirmed <sup>3</sup>
American redstart	<i>Setophaga ruticilla</i>	✓	Yellow	S5B	-	-	Riparian, forest (deciduous, mixedwood), shrubland	May–August	Confirmed <sup>3,4</sup>	Likely (in flight)	Likely (in flight)	-	Confirmed <sup>3</sup>
Yellow warbler	<i>Setophaga petechia</i>	✓	Yellow	S5B	-	-	Wetland, riparian, streams/rivers, fields, shrubland, forest, urban/suburban	April–September	Confirmed <sup>4</sup>	Likely (in flight)	Confirmed <sup>4</sup>	Confirmed <sup>4</sup>	Likely
Yellow-rumped warbler	<i>Setophaga coronata</i>	✓	Yellow	S5B	-	-	Mature coniferous and mixedwood forest, mid-elevations	April–September	Confirmed <sup>3,4</sup>	Likely (in flight)	Confirmed <sup>4</sup>	Likely (in flight)	Confirmed <sup>3</sup>
Townsend's warbler	<i>Setophaga townsendi</i>	✓	Yellow	S5B	-	-	Mature to old coniferous and mixedwood forest, often near salmon streams	May–September	Confirmed <sup>3,4</sup>	Likely (in flight)	Confirmed <sup>4</sup>	Likely (in flight)	Confirmed <sup>3</sup>
Red-winged blackbird	<i>Agelaius phoeniceus</i>	-	Yellow	S5B, S5N	-	-	Wetlands with tall emergent vegetation and willows, trees along watercourses	March- November	Confirmed <sup>4</sup>	Likely (in flight)	Likely (in flight)	Likely	Likely
Rusty blackbird	<i>Euphagus carolinus</i>	-	Blue	S3S4B	Special concern	Special concern	Anthropogenic areas, forest, wetland, open water	February-September	Likely	-	-	-	-





Common Name	Scientific Name	MBCA	Conservation Status				Habitat Association	Seasonal Occurrence	Spatial Occurrence				
			BC Status	Provincial Conservation Status <sup>1</sup>	COSEWIC	SARA (Schedule 1)			Terrestrial Wildlife RSA	Marine Terminal RSA	Marine Shipping RSA	Open Water Study Area	Transmission Line Study Area
Wilson's warbler	<i>Cardellina pusilla</i>	✓	Yellow	S5B	-	-	Wetland, riparian, meadows, shrubland, forest	May–September	Confirmed <sup>4</sup>	Likely (in flight)	Confirmed <sup>4</sup>	Likely (in flight)	Likely
Northern waterthrush	<i>Parkesia noveboracensis</i>	✓	Yellow	S5B	-	-	Lower to mid elevations, dense understory vegetation near water, wooded swamps and flooded forest	May–November	Confirmed <sup>4</sup>	-	-	-	-
Tennessee warbler	<i>Leiothlypis peregrina</i>	✓	Yellow	S5B	-	-	Lower elevation forests, shrubby forest edges, young forest, open areas with shrubs and scattered tree patches	April–November	Likely	-	-	-	-
Western tanager	<i>Piranga ludoviciana</i>	✓	Yellow	S5B	-	-	Wetlands, riparian, forest (coniferous, mixedwood), burns, subalpine meadow, urban/suburban	May–September	Confirmed <sup>3,4</sup>	Likely (in flight)	Likely (in flight)	Likely (in flight)	Confirmed <sup>3</sup>

NOTES:

<sup>1</sup> Provincial conservation status (BC CDC 2024, NatureServe 2022):  
 S1 = critically imperiled  
 S2 = imperiled  
 S3 = special concern, vulnerable to extirpation or extinction  
 S4 = apparently secure  
 S5 = demonstrably widespread, abundant, and secure  
 SU = unrankable  
 NR = not applicable; not a suitable target for conservation (e.g., long-distant migrant, non-native species, hybrids)  
 B = refers to the breeding population of the species  
 N = refers to the non-breeding population of the species  
 M = migrant occurring regularly at particular areas that may warrant conservation attention  
 ? = inexact numeric rank

<sup>2</sup> Species identified as being of importance to the Nisga'a Nation or other Indigenous nations

<sup>3</sup> Occurrence confirmed from Project-specific survey or incidental detection of species

<sup>4</sup> Occurrence confirmed using existing data (e.g., eBird, BC Breeding Bird Atlas, published data from other Projects)

<sup>5</sup> Included in the shorebird group

<sup>6</sup> Included in the dabbling duck group

<sup>7</sup> Included in the diving duck group

<sup>8</sup> Included in the marine bird group (e.g., alcids, gulls, terns, loons, cormorants, and pelagic marine birds)



1 **Appendix B BIRD SPECIES INCLUDED IN THE OLD FOREST, YOUNG FOREST, AND WETLAND BIRD COMMUNITIES**

Common Name	Scientific Name	Conservation Status				Timing of Occurrence and Habitat Description	Bird Community		
		BC Status	Provincial Conservation Status	COSEWIC	SARA (Schedule 1)		Old Forest	Young Forest	Wetland
Rufous hummingbird <sup>1</sup>	<i>Selasphorus rufus</i>	Yellow	S4?B	-	-	Occurs April–September. Habitat includes wetlands, fields, meadows, shrublands, forests (coniferous, deciduous, mixedwood), riparian areas, and urban/suburban areas	Yes	Yes	Yes
Red-breasted sapsucker <sup>1</sup>	<i>Sphyrapicus ruber</i>	Yellow	S5B	-	-	Occurs year-round. Habitat includes forest (coniferous, mixedwood), riparian areas, and orchards	Yes	Yes	-
Downy woodpecker <sup>1</sup>	<i>Dryobates pubescens</i>	Yellow	S5	-	-	Occurs year-round. Habitat includes open forests (deciduous and mixed), riparian forest, second growth forest.	-	Yes	-
Hairy woodpecker <sup>1</sup>	<i>Dryobates villosus</i>	Yellow	S5	-	-	Occurs year-round. Habitat includes mainly coniferous and mixedwood forest, forest edges, burned forest	Yes	-	-
Pileated woodpecker <sup>1</sup>	<i>Dryocopus pileatus</i>	Yellow	S5	-	-	Occurs year-round. Habitat includes mature and old coniferous forest). Requires large snags and dead trees	Yes	-	-
Northern flicker <sup>1</sup>	<i>Colaptes auratus</i>	Yellow	S5	-	-	Occurs year-round. Habitat includes riparian areas, fields, open mixedwood and coniferous forest, urban/suburban, forest edges, swamps	Yes	Yes	Yes
Olive-sided flycatcher <sup>1</sup>	<i>Contopus cooperi</i>	Yellow	S4B	Special Concern	Special Concern	Occurs May-September. Habitat includes mature and old coniferous forest, forest edges near water	Yes	-	Yes
Western wood-pewee <sup>1</sup>	<i>Contopus sordidulus</i>	Yellow	S5?B	-	-	Occurs May-August. Habitat includes wetlands, riparian, and forests	Yes	-	Yes
Alder flycatcher <sup>1</sup>	<i>Empidonax alnorum</i>	Yellow	S5B	-	-	Occurs May-August. Habitat includes young shrubby deciduous forest, moist deciduous shrub thickets, near water	-	Yes	Yes
Hammond's flycatcher <sup>1</sup>	<i>Empidonax hammondii</i>	Yellow	S5B	-	-	Occurs May-August. Habitat includes mature to old coniferous and mixedwood forest with continuous canopy	Yes	-	-
Pacific-slope flycatcher <sup>1</sup>	<i>Empidonax difficilis</i>	Yellow	S5B	-	-	Occurs May-August. Habitat includes mature to old coniferous and mixedwood forest, riparian habitat	Yes	-	-
Warbling vireo <sup>1</sup>	<i>Vireo gilvus</i>	Yellow	S5B	-	-	Occurs May-August. Habitat includes forest (deciduous, mixedwood), riparian, edge habitat, and urban/suburban areas	Yes	Yes	Yes
Cassin's vireo <sup>1</sup>	<i>Vireo cassinii</i>	Yellow	S5B	-	-	Occurs May – September. Habitat includes low to mid-elevation coniferous forests	Yes	Yes	-
Black-capped chickadee <sup>1</sup>	<i>Poecile atricapillus</i>	Yellow	S5	-	-	Occurs year-round. Habitat includes forests, thickets, urban/suburban, and edge habitat	Yes	Yes	-
Chestnut-backed chickadee <sup>1</sup>	<i>Poecile rufescens</i>	Yellow	S5	-	-	Occurs year-round. Habitat includes riparian, forest, and urban/suburban areas	Yes	Yes	-
Mountain chickadee <sup>1</sup>	<i>Poecile gambeli</i>	Yellow	S5	-	-	Occurs year-round. Habitat includes mature montane conifer and mixedwood forests, riparian, cavity nester	Yes	-	-



Common Name	Scientific Name	Conservation Status				Timing of Occurrence and Habitat Description	Bird Community		
		BC Status	Provincial Conservation Status	COSEWIC	SARA (Schedule 1)		Old Forest	Young Forest	Wetland
Tree swallow <sup>1</sup>	<i>Tachycineta bicolor</i>	Yellow	S5B	-	-	Occurs April-August. Habitat includes wetland, estuary, riparian, fields, open forest, shoreline, and urban/suburban areas	-	-	Yes
Violet-green swallow <sup>1</sup>	<i>Tachycineta thalassina</i>	Yellow	S5B	-	-	Occurs April-August. Habitat includes wetland, estuary, mudflats, riparian, fields, grassland, shrubland, open forest, and urban/suburban areas	-	-	Yes
Barn swallow <sup>1</sup>	<i>Hirundo rustica</i>	Yellow	S4B	Special Concern	Threatened	Occurs May-August. Habitat includes wetlands, estuary, fields, meadow, grassland, shrubland, intertidal, open forest, and urban/suburban areas	-	-	Yes
Northern rough-winged swallow <sup>1</sup>	<i>Stelgidopteryx serripennis</i>	Yellow	S4S5B	-	-	Occurs April-August. Habitat includes grassland, shrubland, agricultural fields, wetlands, lakes, and urban/suburban areas	-	-	Yes
Ruby-crowned kinglet <sup>1</sup>	<i>Corthylio calendula</i>	Yellow	S5	-	-	Occurs April-November. Habitat includes coniferous and mixedwood forest, shrub, and urban/suburban areas	Yes	-	Yes
Golden-crowned kinglet <sup>1</sup>	<i>Regulus satrapa</i>	Yellow	S5	-	-	Occurs year-round. Habitat includes coniferous and mixedwood forest, and urban/suburban areas	Yes	Yes	-
Red-breasted nuthatch <sup>1</sup>	<i>Sitta canadensis</i>	Yellow	S5	-	-	Occurs year-round. Habitat includes forest (coniferous, mixedwood), orchards, riparian, and urban/suburban areas	Yes	-	-
Brown creeper <sup>1</sup>	<i>Certhia americana</i>	Yellow	S5	-	-	Occurs year-round. Habitat includes riparian, forest (coniferous, mixedwood), and urban/suburban areas	Yes	-	-
Pacific wren <sup>1</sup>	<i>Troglodytes pacificus</i>	Yellow	S5	-	-	Occurs year-round. Habitat includes forest, particularly older moist forest, riparian habitat, often near wetlands (bogs, swamps, lakes) or streams and rivers	Yes	Yes	-
American dipper <sup>1</sup>	<i>Cinclus mexicanus</i>	Yellow	S4	-	-	Occurs year-round. Habitat includes fast-moving streams, and stream-side banks (cliff, large rock, boulder)	-	-	Yes
Varied thrush <sup>1</sup>	<i>Ixoreus naevius</i>	Yellow	S5	-	-	Occurs year-round. Habitat includes coniferous and mixedwood mature to old forest, moist coastal forest	Yes	Yes	-
Veery <sup>1</sup>	<i>Catharus fuscescens</i>	Yellow	S5B	-	-	Occurs May-September. Habitat includes wet, shrubby deciduous forest, wetland, and riparian	-	Yes	-
Swainson's thrush <sup>1</sup>	<i>Catharus ustulatus</i>	Yellow	S5B	-	-	Occurs May-September. Habitat includes low to mid-elevation coniferous or mixedwood forest, young to mature forest	Yes	Yes	-
Hermit thrush <sup>1</sup>	<i>Catharus guttatus</i>	Yellow	S5B	-	-	Occurs April-October. Habitat includes mid to higher elevation coniferous forest, forest edges	Yes	Yes	-
Townsend's solitaire <sup>1</sup>	<i>Myadestes townsendi</i>	Yellow	S5B	-	-	Occurs April-October. Habitat includes mid to higher elevation open coniferous forest, shrublands	Yes	Yes	-
American robin <sup>1</sup>	<i>Turdus migratorius</i>	Yellow	S5	-	-	Occurs year-round. Habitat includes riparian, fields, meadow, forest, and urban/suburban	-	Yes	Yes
Cedar waxwing <sup>1</sup>	<i>Bombycilla cedrorum</i>	Yellow	S5	-	-	Occurs in May-October. Habitat includes open woodland, orchards, urban/suburban, fields and forest edge	-	Yes	-
Pine grosbeak <sup>1</sup>	<i>Pinicola enucleator</i>	Yellow	S5	-	-	Occurs year-round. Habitat includes open coniferous forest, subalpine forest and parkland	Yes	Yes	-

Common Name	Scientific Name	Conservation Status				Timing of Occurrence and Habitat Description	Bird Community		
		BC Status	Provincial Conservation Status	COSEWIC	SARA (Schedule 1)		Old Forest	Young Forest	Wetland
Red crossbill <sup>1</sup>	<i>Loxia curvirostra</i>	Yellow	S5	-	-	Occurs year-round. Habitat includes mature coniferous (pine and spruce) forest, lower elevations on coast	Yes	-	-
White-winged crossbill <sup>1</sup>	<i>Loxia leucoptera</i>	Yellow	S5	-	-	Occurs year-round. Habitat includes lower elevation mature coniferous forest (mainly spruces)	Yes	-	-
Pine siskin <sup>1</sup>	<i>Spinus pinus</i>	Yellow	S5B	-	-	Occurs year-round. Habitat includes riparian, forest, field, shrubland, and urban/suburban	Yes	-	-
Purple finch <sup>1</sup>	<i>Haemorhous purpureus</i>	Yellow	S5B	-	-	Occurs year-round. Habitat mainly includes coniferous forest. Also, mixedwood forest, bog edges, riparian areas, agricultural and urban areas, hedges	-	Yes	Yes
Common redpoll <sup>1</sup>	<i>Acanthis flammea</i>	Yellow	S4	-	-	Occurs March-October. Habitat includes open alpine and subalpine coniferous forest and scrub, stunted mixedwood woods, shrubby habitat, swamps, riparian thickets	-	Yes	Yes
Chipping sparrow <sup>1</sup>	<i>Spizella passerina</i>	Yellow	S5B	-	-	Occurs May-August. Habitat includes open forest (coniferous), shrubland, and old weedy fields	-	Yes	Yes
Fox sparrow <sup>1</sup>	<i>Passerella iliaca</i>	Yellow	S5	-	-	Occurs year-round. Habitat includes higher elevation, thickets in mature forest, dense riparian areas, subalpine meadows	-	Yes	-
Dark-eyed junco <sup>1</sup>	<i>Junco hyemalis</i>	Yellow	S5	-	-	Occurs year-round. Habitat includes forest, alpine meadow, urban/suburban, and old burns	Yes	Yes	Yes
White-crowned sparrow <sup>1</sup>	<i>Zonotrichia leucophrys</i>	Yellow	S5	-	-	Occurs year-round. Habitat includes grassland, shrubland, and riparian	-	Yes	-
Golden-crowned sparrow <sup>1</sup>	<i>Zonotrichia atricapilla</i>	Yellow	S5?B	-	-	Occurs year-round, primarily September-May. Habitat includes shrub tundra, shrubby alpine, subalpine parkland, alpine meadows, riparian willow thickets, alder and willow patches	-	Yes	Yes
Savannah sparrow <sup>1</sup>	<i>Passerculus sandwichensis</i>	Yellow	S5B	-	-	Occurs April-October. Habitat includes open grassland and shrubland, pastures, marshes, estuaries, alpine meadow, arctic tundra	-	-	Yes
Song sparrow <sup>1</sup>	<i>Melospiza melodia</i>	Yellow	S5	-	-	Occurs year-round. Habitat includes riparian, shrubland, forest edges, shrubby thickets, and urban/suburban areas	-	Yes	Yes
Lincoln's sparrow <sup>1</sup>	<i>Melospiza lincolnii</i>	Yellow	S5B SNRN	-	-	Occurs April-October. Habitat includes wetlands, riparian, forest (deciduous), and shrubland	-	-	Yes
White-throated sparrow <sup>1</sup>	<i>Zonotrichia albicollis</i>	Yellow	S5	-	-	Occurs May-October. Habitat includes older open forest with brushy understory, recent burns or cutblocks, avoids dense conifer forest	Yes	Yes	-
Orange-crowned Warbler <sup>1</sup>	<i>Leiothlypis celata</i>	Yellow	S5B	-	-	Occurs April-September. Habitat includes riparian, forest (deciduous, mixedwood), and shrubland	-	Yes	-
MacGillivray's warbler <sup>1</sup>	<i>Geothlypis tolmiei</i>	Yellow	S5B	-	-	Occurs April-September. Habitat includes wetland, estuary, riparian, shrubland, forest (coniferous, mixedwood), and urban/suburban	-	Yes	-
Common yellowthroat <sup>1</sup>	<i>Geothlypis trichas</i>	Yellow	S5	-	-	Occurs May-September. Habitat includes wetlands with low dense vegetation, marshes, edges of lakes and ponds	-	-	Yes

Common Name	Scientific Name	Conservation Status				Timing of Occurrence and Habitat Description	Bird Community		
		BC Status	Provincial Conservation Status	COSEWIC	SARA (Schedule 1)		Old Forest	Young Forest	Wetland
American redstart <sup>1</sup>	<i>Setophaga ruticilla</i>	Yellow	S5B	-	-	Occurs May-August. Habitat includes riparian, forest (deciduous, mixedwood), and shrubland	Yes	Yes	Yes
Yellow warbler <sup>1</sup>	<i>Setophaga petechia</i>	Yellow	S5B	-	-	Occurs April-September. Habitat includes wetland, riparian, streams/rivers, fields, shrubland, forest, and urban/suburban	-	Yes	Yes
Yellow-rumped warbler <sup>1</sup>	<i>Setophaga coronata</i>	Yellow	S5B	-	-	Occurs April-September. Habitat includes mature coniferous and mixedwood forest, mid-elevations	Yes	Yes	-
Townsend's warbler <sup>1</sup>	<i>Setophaga townsendi</i>	Yellow	S5B	-	-	Occurs May-September. Habitat includes mature to old coniferous and mixedwood forest, often near salmon streams	Yes	-	-
Wilson's warbler <sup>1</sup>	<i>Cardellina pusilla</i>	Yellow	S5B	-	-	Occurs May-September. Habitat includes wetland, riparian, meadows, shrubland, and forest	Yes	Yes	Yes
Northern waterthrush <sup>1</sup>	<i>Parkesia noveboracensis</i>	Yellow	S5B	-	-	Occurs May-November. Habitat includes lower to mid elevations, dense understory vegetation near water, wooded swamps and flooded forest	-	-	Yes
Tennessee warbler <sup>1</sup>	<i>Leiothlypis peregrina</i>	Yellow	S5B	-	-	Occurs April-November. Habitat includes lower elevation forests, shrubby forest edges, young forest, open areas with shrubs and scattered tree patches	-	Yes	-
Western tanager <sup>1</sup>	<i>Piranga ludoviciana</i>	Yellow	S5B	-	-	Occurs May-September. Habitat includes wetland, riparian, forest (coniferous, mixedwood), burns, subalpine meadow, and urban/suburban	Yes	-	-

NOTES:  
<sup>1</sup> indicates species is a migratory bird under the *Migratory Birds Convention Act, 1994*  
<sup>2</sup> species identified as being of importance to the Nisga'a Nation or other Indigenous nations

Provincial conservation status (BC CDC 2024, NatureServe 2022):  
S1 = critically imperiled  
S2 = imperiled  
S3 = special concern, vulnerable to extirpation or extinction  
S4 = apparently secure  
S5 = demonstrably widespread, abundant, and secure  
SU = unrankable  
NR = not applicable; not a suitable target for conservation (e.g., long-distant migrant, non-native species, hybrids)  
B = refers to the breeding population of the species  
N = refers to the non-breeding population of the species  
M = migrant occurring regularly at particular areas that may warrant conservation attention  
? = inexact numeric rank



## 1 Appendix C REMOTE CAMERA PHOTOGRAPHS

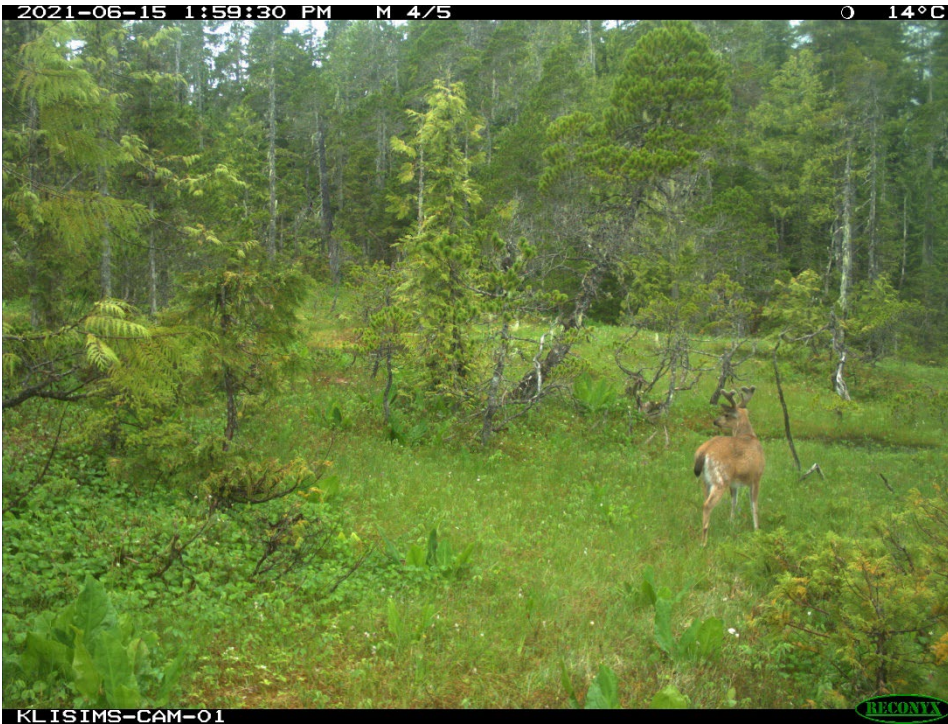


**TECHNICAL DATA REPORT—WILDLIFE AND WILDLIFE HABITAT  
KSI LISIMS LNG PROJECT**



**KSI LISIMS LNG**

**Appendix C Remote Camera Photographs  
June 2024**



**Photo C-1 Sitka black-tailed deer at Cam-01 on June 15, 2021**



**Photo C-2 Sandhill cranes at Cam-01 on April 22, 2022**



**TECHNICAL DATA REPORT—WILDLIFE AND WILDLIFE HABITAT  
KSI LISIMS LNG PROJECT**



**KSI LISIMS LNG**

**Appendix C Remote Camera Photographs  
June 2024**



**Photo C-3 Grey wolf at Cam-02 on March 9, 2022**



**Photo C-4 Black bears at Cam-04 on June 27, 2021**



**TECHNICAL DATA REPORT—WILDLIFE AND WILDLIFE HABITAT  
KSI LISIMS LNG PROJECT**



**KSI LISIMS LNG**

**Appendix C Remote Camera Photographs  
June 2024**



**Photo C-5 Grey wolf and mallards at Cam-06 on February 1, 2022**



**Photo C-6 Sitka lack-tailed deer at Cam-08 on June 17, 2021**





Appendix C Remote Camera Photographs  
June 2024

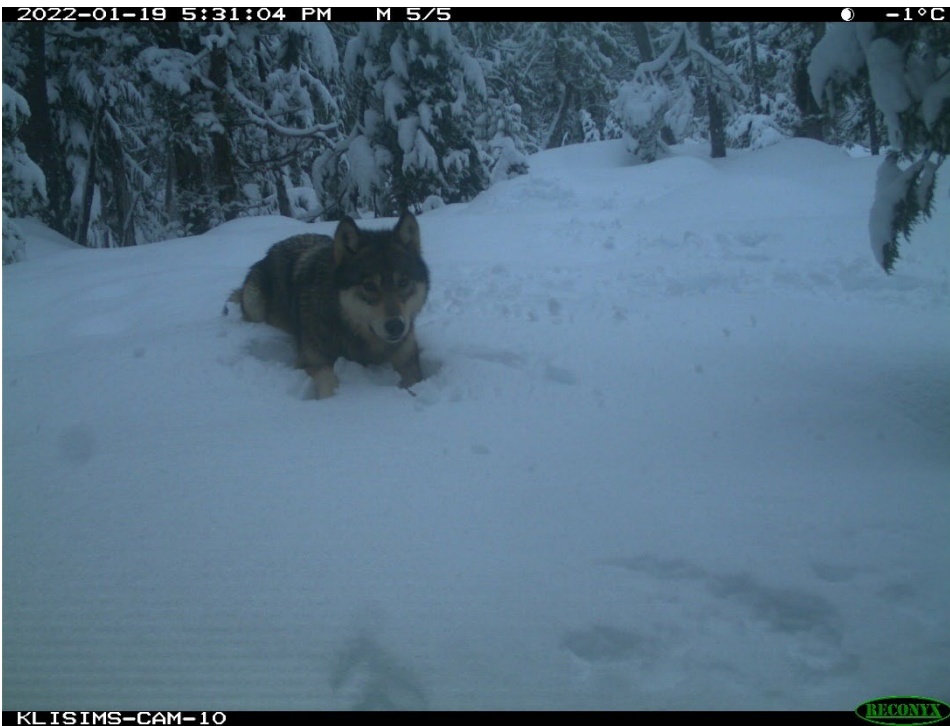


Photo C-7 Grey wolf at Cam-10 on January 19, 2022



Photo C-8 Pacific marten at Cam-10 on January 20, 2022





## 1 Appendix D SPECIES ACCOUNTS

### 2 D.1 GRIZZLY BEAR

#### 3 D.1.1 Overview

4 Grizzly bear is blue-listed in BC, designated as Special Concern by COSEWIC, and listed as  
5 Special Concern under Schedule 1 of SARA (BC CDC 2024; GOC 2024). Grizzly bear is a species of  
6 importance to the Nisga'a Nation and other Indigenous communities.

7 The grizzly bear population in BC is estimated to be 14,925 (MFLNRORD 2020). In the Nass Wildlife  
8 Area, grizzly bear is identified as a designated species under the Nisga'a Treaty for which there are  
9 specific Nisga'a allocations for harvesting (NLG 2015). Under the Treaty, the Nass Wildlife Committee  
10 has implemented a permit system to manage the harvest of designated species by Nisga'a citizens. In  
11 BC, the overall grizzly bear range is divided into 55 GBPUs for conservation and management purposes  
12 (MFLNRORD 2020). Pearse Island does not overlap a GBPU, but the Highway 113 portion of the  
13 Terrestrial Wildlife RSA overlaps a portion of the Khutzeymateen, Stewart, and Cranberry GBPUs  
14 (Environmental Reporting BC 2020). The TLSA overlaps a portion of the Khutzeymateen and Stewart  
15 GBPUs, (Environmental Reporting BC 2020). Each GBPU is assigned a local conservation ranking that  
16 reflects the GBPUs population size and trend, genetic and demographic isolation, as well as threats to  
17 bears and their habitats (Morgan et al. 2019). The Khutzeymateen and Cranberry GBPUs have a  
18 conservation ranking of low, and the Stewart GBPU has a conservation ranking of negligible  
19 (Environmental Reporting BC 2020).<sup>6</sup>

#### 20 D.1.2 Habitat Use and General Ecology

21 Grizzly bear generally has large home ranges to support foraging, denning, breeding, and shelter life  
22 requisites. Home range size and habitat use are related to habitat quality. Home ranges in high-quality  
23 regions with abundant forage, such as coastal areas, are typically smaller than in areas with less  
24 abundant forage (COSEWIC 2012). Home range size is also influenced by population density,  
25 denning availability, intra-specific interactions, and human disturbance (BC MWLAP 2004;  
26 COSEWIC 2012; Stewart et al. 2012). In the Khutzeymateen valley, home range size for adult females  
27 ranges from 22.5 km<sup>2</sup> to 115.5 km<sup>2</sup>, and for adult males ranges from 28.8 km<sup>2</sup> to 124.3 km<sup>2</sup>  
28 (MacHutchon et al. 1993). Work on Nisga'a Lands near the lower Nass found that most wildlife trails used  
29 by bears ran parallel to the shoreline or streams, and often allowed beach or stream access points  
30 through otherwise dense vegetation (Demarchi et al. 2017).

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<sup>6</sup> Grizzly bear conservation ranking is based on a combination of population size and isolation, population trend, and level of threat. Conservation ranking categories range from negligible concern to extreme concern (Morgan et al. 2019).





Appendix D Species Accounts  
June 2024

1 Grizzly bear is a habitat generalist that occupies a variety of habitats from sea level to the alpine  
2 (COSEWIC 2012). The productivity of grizzly bear populations is primarily influenced by the availability  
3 of high-quality food resources rather than by density-dependent regulating factors, such as predation,  
4 intra- and inter-specific competition, and disease (Gyug et al. 2004). Grizzly bear habitat use is generally  
5 driven by the timing of food availability such as plant phenology, ungulate calving, and salmon runs  
6 (Munro et al. 2006; COSEWIC 2012). Foraging habitat use and forage species is dependant on seasonal  
7 availability and typically follows a predictable sequence (Schwartz et al. 2003; McClelland et al. 2020).

8 In early spring, grizzly bear emerges from hibernation and begins feeding in lower elevation habitats on  
9 locally available emergent graminoids, forbs, roots, and winter-killed ungulates. Early spring foraging  
10 areas include estuaries, and lower elevation drainages, meadows, or seepage sites where snow recedes  
11 first (MacHutchon et al. 1993; Gyug et al. 2004; Turney and Roberts 2004). As spring and vegetation  
12 growth progresses, grizzly bear forages in open, non-forested areas such as wetlands, meadows,  
13 avalanche chutes and estuarine habitats with wet, rich conditions that support several forage plant  
14 species (Turney and Roberts 2004). Spring forage is predominantly sedges (*Carex* spp.), skunk cabbage,  
15 horsetail (*Equisetum* spp.), *Hedysarum* roots, and other herbaceous plants (MacHutchon et al. 1993;  
16 BC MWLAP 2004; COSEWIC 2012). Grizzly bear in Nisga'a lands are known to consume seaside  
17 plantain (*Plantago maritima*) during the spring (Demarchi et al. 2017), and grizzly bear in the  
18 Khutzymateen GBPU are known to rely heavily on early shrub shoots of salmonberry (*Rubus spectabilis*),  
19 thimbleberry (*R. parviflorus*), devil's club (*Oplopanax horridus*), and elderberry (MacHutchon et al. 1993).

20 Over the course of early and late spring, grizzly bear moves into higher elevation sites following the  
21 receding snow and vegetation green-up (Gyug et al. 2004). As the year progresses into summer,  
22 grizzly bear then descends back to lower elevation areas to use floodplains and other open habitats  
23 (MacHutchon et al. 1993; Gyug et al. 2004). During the summer grizzly bear forages on summer berry  
24 crops, horsetail, dandelion (*Taraxacum* spp.), cow parsnip (*Heracleum* spp.), and other vegetation  
25 (MacHutchon et al. 1993; Gyug et al. 2004; McClelland et al. 2020). Marine mammal carcasses that  
26 wash up onshore or are left on shore by hunters are also consumed (Demarchi et al. 2017).

27 During late summer and fall grizzly bear forage on a variety of high calorie foods in preparation for winter  
28 hibernation. Late summer and fall forage plants include cow parsnip, horsetail, nettles (*Urtica dioica*), and  
29 a variety of berry-producing species (MacHutchon et al 1993; McClelland et al. 2020). Grizzly bear will eat  
30 all coastal berry species depending on local abundance or availability, however species predominantly  
31 eaten are salmonberry, huckleberry, blueberries, devil's club, red elderberry (*Sambucus racemosa*), and  
32 stink current (*Ribes bracteosum*) (MacHutchon et al. 1993; BC MWLAP 2004). Once salmon spawning  
33 runs begin, typically in August, grizzly bear will shift focus to forage on spawning salmon or spawned out  
34 salmon carcasses until the spawn has ended in late fall (COSEWIC 2012; Demarchi et al. 2017).  
35 Grizzly bear is known to be opportunistic and will forage on carrion, grubs, and marine invertebrates  
36 including clams, mussels, and barnacles during all seasons (MacHutchon et al. 1993; Gyug et al. 2004;  
37 COSEWIC 2012).





1 Hibernation and denning occur throughout the winter, generally in high elevation areas with high snow  
2 accumulation for insulation. The denning period is a sensitive period for grizzly bear, the duration of which  
3 depends on sex, reproductive status, and body condition and is influenced by winter conditions  
4 (Hatler et al. 2008). In northern and coastal BC denning typically occurs from early November through  
5 March or April (Hatler et al. 2008). Dens are dug into slopes or hillsides with dry stable soils.  
6 Coastal bears may also den under large tree root masses or in large tree cavities (BC MWLAP 2004).  
7 No grizzly bear dens were identified in the Terrestrial Wildlife LSA during surveys or incidentally.

### 8 **D.1.3 References**

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Appendix D Species Accounts  
June 2024

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## 1 D.2 WOLVERINE

### 2 D.2.1 Overview

3 Wolverine, *luscus* subspecies, is blue-listed in BC, designated as Special Concern by COSEWIC, and  
4 listed on Schedule 1 of SARA as Special Concern (BC CDC 2024; GOC 2024). Wolverine is a species of  
5 importance to the Nisga'a Nation and other Indigenous communities. Wolverine is widely distributed in BC  
6 but less common in coastal areas and does not occur on Haida Gwaii (Weir 2004; Hatler et al. 2008).  
7 Wolverine population estimates are difficult to determine due to the species' large individual home  
8 ranges, and most estimates are based on trapping data (COSEWIC 2014). In BC the wolverine  
9 population is estimated at 2,700–4,760 based on density and broad scale habitat quality ratings  
10 (Lofroth and Krebs 2007). Human activity and anthropogenic features, such as cut blocks and reservoirs,  
11 have an effect on the movement of wolverines, causing displacement and altering daily movements and  
12 paths (Weir 2004). Habitat fragmentation, the development of linear features, and harvest are the main  
13 conservation threats to wolverine (COSEWIC 2014).

### 14 D.2.2 Habitat Use and General Ecology

15 In British Columbia, wolverine has large home ranges with female ranges from 50 km<sup>2</sup> to 400 km<sup>2</sup> and  
16 male ranges from 230 km<sup>2</sup> to 1,580 km<sup>2</sup> (COSEWIC 2014). Home ranges of males and females may  
17 overlap, but home ranges of reproductive females do not overlap with the ranges of other reproductive  
18 females (COSEWIC 2014). Wolverines are non-migratory, however dispersing yearlings are transient until  
19 they've established a home range (COSEWIC 2014). While both sexes are capable of long-distance  
20 dispersal, young females will typically establish home ranges closer to their natal ranges than males  
21 (COSEWIC 2014). Wolverines travel long distances for food, with daily movements ranging up to 65 km a  
22 day (Weir 2004). Females regularly travel up to 20 km from their natal den (Weir 2004).

23 Wolverines are habitat generalists and are found in a variety of ecosystems from open tundra to forested  
24 mountains (Hatler et al. 2008; COSEWIC 2014). In general wolverine rely upon large, contiguous tracts of  
25 mature and old forest with a diversity and abundance of prey and carrion, permeability of the landscape  
26 for movement, and un-logged forests at high elevations for the success of natal and maternal dens  
27 (Weir 2004). Adult female wolverines use higher elevation alpine habitat and steeper terrain more  
28 frequently than males or subadults (COSEWIC 2014). Male wolverines and subadults are typically found  
29 at higher elevations during the summer and lower elevations during the winter, while females remain at  
30 higher elevations throughout the year (COSEWIC 2014). Wolverines generally show little, if any, selection  
31 for habitat at the stand level, likely because they require a suite of habitat characteristics that occur at  
32 larger scales (Weir 2004). Habitat occupancy is thought to be more closely associated with food  
33 availability than habitat type (Cardinal 2004; COSEWIC 2014).

34 Wolverine is a scavenger, predated primarily on the carcasses of large ungulates such as moose  
35 (*Alces alces*), elk (*Cervus elaphus*), caribou (*Rangifer tarandus*), deer (*Odocoileus spp.*), and mountain  
36 goat (*Oreamnos americanus*) (Weir 2004; Hatler et al. 2008). As the species is a highly opportunistic  
37 feeder its diet may also include snowshoe hare (*Lepus americanus*), porcupine (*Erethizon dorsatum*),





1 squirrel, marmot, mice and voles, grouse, bird eggs and nestlings, fish, and vegetation, depending on  
2 seasonal availability (Weir 2004; Hatler et al. 2008; Environment Canada 2016). Wolverine diet varies  
3 seasonally, with fresh prey being more common in summer, and carrion more common in winter  
4 (COSEWIC 2014). Females with kits are especially opportunistic and will vary their diet considerably  
5 when larger ungulates are scarce (Weir 2004).

6 Wolverine breed in the summer and females typically birth between January and April, but occasionally  
7 as late as June or July (COSEWIC 2014). Natal dens are in alpine or subalpine habitats and are often  
8 constructed under or between boulders, along eskers, under deadfall or stumps, under logs in  
9 avalanche tracks, or in snow tunnels (Hatler et al. 2008; COSEWIC 2014). Young stay with their mother  
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## 1 **D.3 PACIFIC MARTEN**

### 2 **D.3.1 Overview**

3 Two species of marten occur in BC: Pacific marten and American marten (*Martes americana*). Both  
4 species were classified as American marten until 2012 when they were separated based on genetic and  
5 morphological differences (Dawson and Cook 2012). Pacific marten occurs in coastal BC, including  
6 Vancouver Island and some coastal islands, and is the species that occurs in the Terrestrial Wildlife RSA.

7 Pacific marten is not listed as a species of conservation concern provincially or federally (BC CDC 2024);  
8 however, it is a traditionally important species to the Nisga'a and is managed in BC as a furbearing  
9 species. It is difficult to discern abundance and population trends for Pacific marten in BC because of a  
10 lack of population monitoring in the province.

### 11 **D.3.2 Habitat Use and General Ecology**

12 Much of the available information on marten ecology and habitat use is from work undertaken on  
13 American marten. There are no known differences in ecology and habitat use between Pacific and  
14 American marten, and information from studies on American marten are included in this summary as  
15 deemed relevant to the coastal setting that the Project is within.

16 Marten habitat use is variable, but in general the species prefers mesic to moist mature and old  
17 coniferous forests (Buskirk and Ruggiero 1994; Thompson et al. 2012). Open areas, early seral stage  
18 forests, and xeric stands are low-value habitat for marten (Buskirk and Ruggiero 1994; Poole et al. 2004).  
19 Marten prefers habitats with complex physical structure near the ground for cover. Cover can be provided  
20 in the form of lower branches of living trees, tree boles, coarse woody debris, squirrel middens, log piles,  
21 shrubs, and rock piles (Buskirk and Zielinski 1997; USFWS 2018). High ground-level structural  
22 complexity, such as coarse woody debris, snags, and high shrub cover is a key habitat attribute that  
23 provides cover from predators, facilitates foraging, and provides resting and denning sites  
24 (Buskirk et al. 1994; Thompson et al. 2012). Mature and old growth forests are often structurally complex  
25 and have an abundance of dead standing trees and coarse woody debris (BC MWLAP 2004). The  
26 amount of coarse woody debris in a stand varies with stand age: it is relatively abundant in recently cut  
27 forests, less common in intermediate-aged forests (approximately 50 years old), and most abundant in  
28 stands greater than 80 years old (Sturtevant et al. 1997; Pedlar et al. 2002; Feller 2003).

29 Most den sites have been documented in structural elements such as tree cavities, rock crevices, and  
30 burrows (Hatler et al. 2008). Marten is vulnerable to heat loss in cold weather and rest sites that provide  
31 thermal protection during inclement weather are important (Hatler et al. 2008). The availability of suitable  
32 denning sites is dependent on structural complexity, with older forests tending to have more available  
33 denning sites than younger stands due to higher densities of snags and coarse woody debris  
34 (Buskirk and Ruggiero 1994). Sites that are disturbed, such as from forest harvest, fire, disease, or  
35 windthrow, can also provide adequate structural complexity for marten (Buskirk and Zielinski 1997).





1 Marten are opportunistic feeders and scavengers, and diet varies by season, year, and area. During the  
2 spring and summer months small mammals, birds, eggs, fish, insects, and carrion are common food  
3 items (Buskirk and Ruggiero 1994; Hatler et al. 2008). In late summer and fall *Vaccinium* sp. and  
4 *Rubus* sp. berries become important food items (Buskirk and Ruggiero 1994; Hatler et al. 2008). Over the  
5 winter and early spring period small mammals form much of the diet (Buskirk and Ruggiero 1994;  
6 Hatler et al. 2008).

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**TECHNICAL DATA REPORT—WILDLIFE AND WILDLIFE HABITAT  
KSI LISIMS LNG PROJECT**



**KSI LISIMS LNG**

Appendix D Species Accounts  
June 2024

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## 1 **D.4 GREY WOLF**

### 2 **D.4.1 Overview**

3 Grey wolf is yellow-listed in BC (BC CDC 2024), is a species of Indigenous cultural use and value, and is  
4 identified as a species of importance to the Nisga'a Nation.

5 Grey wolf occurs throughout BC, except for Haida Gwaii (Hatler et al. 2008). The population estimate for  
6 the Skeena region ranges from 1,600 to 3,300 (BC MFLNRO 2014). Factors that limit or regulate the grey  
7 wolf population include the abundance and distribution of ungulate prey, human-caused mortality,  
8 intraspecific competition, and disease (BC MFLNRO 2014).

### 9 **D.4.2 Habitat Use and General Ecology**

10 Grey wolf are habitat generalists and occur in nearly all habitat types found in BC including grasslands,  
11 coastal beaches, estuarine areas, rocky slopes, wetlands, and forests (Paquet and Carbyn 2003;  
12 Hatler et al. 2008). Habitat use is primarily driven by prey availability and snow depth (Hatler et al. 2008).  
13 Grey wolf is most common at lower elevations, where prey is most abundant, but may be found at all  
14 elevations (BC MFLNRO 2014). In winter in areas of heavy snowfall, grey wolf frequently uses ungulate  
15 winter ranges and closed-canopy forests, and travel along frozen lakes and waterways (Hatler et al.  
16 2008). Natal and secondary dens are important habitat features for grey wolf used to birth and raise pups.  
17 Dens are typically excavated burrows, but grey wolf will also use hollowed trees or logs, abandoned  
18 beaver lodges, or caves (Paquet and Darimont 2002; BC MFLNRO 2014). Multiple dens typically occur  
19 within a pack's home range (Paquet and Darimont 2002).

20 Grey wolf is a highly social species and lives in packs consisting of a dominant breeding pair, subordinate  
21 adults, and juveniles (BC MFLNRO 2014). Juveniles may remain with their natal pack for up to two years  
22 (BC MFLNRO 2014). Breeding occurs in late winter, with four to seven pups born in dens between  
23 April and May (Hatler et al. 2008; BC MFLNRO 2014). The female and her pups remain in the den during  
24 the first month, with pups venturing from the den in late summer (Hatler et al. 2008; BC MFLNRO 2014).  
25 Most subadult wolves will typically disperse from their natal packs during the following breeding season  
26 and are known to disperse up to 800 km (BC MFLNRO 2014).

27 Grey wolf is an opportunistic and adaptable predator. It primarily hunts ungulates such as deer, moose,  
28 caribou, and elk (Hatler et al. 2008; BC MFLNRO 2014). Grey wolf will supplement its diet with a variety  
29 of smaller prey including beaver, snowshoe hare, rodents, ground-squirrels, and ptarmigan  
30 (Hatler et al. 2008; BC MFLNRO 2014). Scat analysis found that the diet of coastal grey wolf comprised  
31 primarily black-tailed deer, but also beaver, black bear, mountain goat, birds, salmon, and other marine  
32 prey (Darimont and Paquet 2000). During the salmon spawning season, salmon may comprise most of  
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## 1 D.5 MOOSE

### 2 D.5.1 Overview

3 Moose is not a species of conservation concern, but it is a designated species under the Nisga'a Treaty  
4 and is important to other Indigenous communities. The moose population in BC is estimated to range  
5 from 110,000 to 185,000, of which 25,000 to 45,000 are in the Skeena region (BC MFLNRORD 2019).  
6 A 2017 survey in the Nass River watershed estimated the moose population to range from 1,428 to 1,886  
7 (Demarchi 2017). The Skeena region moose population was observed to have decreased 19% over the  
8 period 2013 to 2019 (BC MFLNRORD 2019).

### 9 D.5.2 Habitat Use and General Ecology

10 Moose occur throughout BC, except on Haida Gwaii and Vancouver Island, and were historically rare or  
11 absent in coastal areas (Shackleton 1999; Blood 2000). Records from European explorers, traders and  
12 travellers from the 1800's and IK from north coast Indigenous nations suggest that moose were not found  
13 in coastal areas (Darimont et al. 2005). Moose are believed to have first occurred in north coastal areas in  
14 the early 1900's (Darimont et al. 2005). Moose are now widespread, though occurring at low densities,  
15 along mainland coastal areas and some coastal islands (Darimont et al. 2005).

16 Moose are generally solitary with seasonal ranges being 10 km<sup>2</sup> to 792 km<sup>2</sup> in the Nass Wildlife Area  
17 (Demarchi 2000). Moose use a variety of habitats including shrub habitat, young and old forest, and  
18 wetlands (Poole and Stuart-Smith 2004). Disturbances such as logging, avalanches, and fire create early  
19 successional stage habitat that is important for foraging (Shackleton 1999). Dense stands of vegetation  
20 commonly found in riparian areas and on newly disturbed sites provide ideal browsing opportunities  
21 (Blood 2000). In spring and summer moose may also forage in wetlands on aquatic vegetation  
22 (Shackleton 1999).

23 Late successional forests (primarily low elevation structural stages 6 and 7) are important habitat for  
24 moose, especially in the winter months (Poole and Stuart-Smith 2004; Pollard and Casper 2009). The  
25 canopy provides thermal cover which lowers energy costs during the winter brought on by lack of forage  
26 availability (Pollard and Casper 2009). Snow interception provided by the tree canopy is also important for  
27 moose winter habitat, as deep snow will conceal forage species and snow deeper than 90 cm can be  
28 limiting for moose (Pollard and Casper 2009; Wall et al. 2011). Areas with more than one structural stage  
29 or site series can provide high value winter habitat for moose because they provide both snow  
30 interception and open areas for browse species to flourish (Pollard and Casper 2009).

31 In the spring and summer months, early seral vegetation such as shrubs and deciduous trees, as well as  
32 succulent species such as *Carex* spp., fireweed (*Epilobium angustifolium*), pondweed  
33 (*Potamogeton* spp.), and yellow pond-lily (*Nuphar* spp.) provide ideal forage for moose (Wall et al. 2011).  
34 During the winter, moose browse on accessible shrubs and tree species including fir (*Abies* spp.),  
35 birch (*Betula* spp.), cottonwood (*Populus deltoides*), red-osier dogwood (*Cornus stolonifera*), falsebox  
36 (*Paxistima myrsinites*), highbush-cranberry (*Viburnum edule*), mountain-ash (*Sorbus* spp.), *Ribes* spp.,





1 Saskatoon (*Amelanchier alnifolia*), trembling aspen, western redcedar, wild rose (*Rosa* spp.), and  
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## 1 **D.6 SITKA BLACK-TAILED DEER**

### 2 **D.6.1 Overview**

3 Sitka black-tailed deer is yellow-listed in BC (BC CDC 2024). The Sitka subspecies is found west of the  
4 Coast Mountains, from Rivers Inlet extending northward to Portland Canal, with scattered populations  
5 along the river valleys west of Mount Robertson and south of the Yukon border (Shackleton 1999). The  
6 subspecies has been introduced to Haida Gwaii (Shackleton 1999), where they have had adverse effects  
7 on vegetation (Stockton et al. 2001; Gaston et al. 2016) and the abundance of some songbird species  
8 (Allombert et al. 2005). Sitka black-tailed deer is a species of Indigenous cultural use and value and was  
9 identified as a species of importance to the Nisga'a Nation. The estimated population in BC in 1997 was  
10 65,000 (Shackleton 1999).

### 11 **D.6.2 Habitat Use and General Ecology**

12 Sitka black-tailed deer occur in dense, coastal rainforests, but also use riparian areas, subalpine and  
13 alpine areas, and early successional forest (Shackleton 1999). Habitat selection is influenced by  
14 seasonal changes and food availability (Hanley 1984; Bunnell 1990). Sitka black-tailed deer use lower  
15 elevation coastal forests in the winter, and move to more open, higher elevation ranges in summer  
16 (Schoen and Kirchhoff 1990). Sitka black-tailed deer are good swimmers and readily swim between  
17 islands (Gillingham 2008; Morton and Huettmann 2017). During marine bird surveys completed for the  
18 Project one incidental observation of a deer swimming in the waters off Pearse Island was noted.

19 In winter, coastal forests with dense canopies provide snow interception and downed lichen to forage on  
20 (Shackleton 1999). Moving through snow is energetically costly and during deep snow years old forest is  
21 particularly important for deer survival (Gillingham 2008). Deep snow also reduces forage accessibility  
22 (Bunnell 1990; Gillingham 2008) and deer use of northern-facing habitat is lower in winter than summer  
23 (Schoen and Kirchhoff 1990). Old growth forests with patches of dense shrubs and young conifers  
24 provides important thermal and security cover habitat (Bunnell 1990). Patches of more open, shrubby  
25 habitat near cover habitat provide important winter foraging habitat (Bunnell 1990). Important winter  
26 foraging species include Douglas-fir (*Pseudotsuga menziesii*), red huckleberry, salal, five-leaved bramble,  
27 bunchberry, western redcedar, deer ferns, and downed arboreal lichens (Shackleton 1999; Schoen and  
28 Kirchhoff 2007; Hanley et al. 2014).

29 As spring advances and snow recedes, Sitka black-tailed deer begin to disperse from their winter ranges  
30 (Schoen and Kirchhoff 2007). During spring deer use a variety of low to moderate elevation habitats,  
31 including shrubby and old forest (Schoen and Kirchhoff 2007). Habitat on southern-facing moderate to  
32 steep slopes are preferred as snow melt occurs earlier in these areas (Bunnell 1990). Preferred spring  
33 forage species include skunk cabbage, devil's club, *Vaccinium* spp., sword fern, alder, and many forb  
34 species (Bunnell 1990; Schoen and Kirchhoff 2007; Hanley et al. 2014).





1 Fawns are typically born in late spring or early summer (Blood 2000). Summer is an important period for  
2 deer to regain weight lost over the winter and add fat reserves (Bunnell 1990; Schoen and Kirchhoff  
3 2007). Energetic demands on nursing females are high during summer (Bunnell 1990). During summer  
4 and early fall deer forage in open forest, subalpine meadows, and harvested areas with abundant forb  
5 and shrub vegetation (Bunnell 1990; Schoen and Kirchhoff 2007). During summer deer use habitat at all  
6 elevations, but subalpine habitats are particularly productive (Schoen and Kirchhoff 2007). Preferred  
7 summer forage species include skunk cabbage, devil's club, *Vaccinium* spp. Bunchberry,  
8 trailing raspberry, ferns, and shrubs (Schoen and Kirchhoff 2007; Hanley et al. 2014).

9 In fall, the onset of frost causes deer to move to lower elevation habitats (Schoen and Kirchhoff 2007),  
10 particularly old growth hemlock-spruce stands (Schoen and Kirchhoff 2007). Important forage plants  
11 include skunk cabbage, fern rhizomes, and shrub leaves (Schoen and Kirchhoff 2007;  
12 Hanley et al. 2014).

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**TECHNICAL DATA REPORT—WILDLIFE AND WILDLIFE HABITAT  
KSI LISIMS LNG PROJECT**



**KSI LISIMS LNG**

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## 1 **D.7 BATS**

### 2 **D.7.1 Overview**

3 Ten bat species may occur within the study areas (Appendix A), including five species of conservation  
4 concern: silver-haired bat, hoary bat, yuma myotis, little brown myotis and northern myotis. Silver-haired  
5 bat is yellow-listed in BC and is designated as Endangered by COSEWIC (BC CDC 2024; GOC 2024).  
6 Hoary bat is blue-listed in BC and is designated as Endangered by COSEWIC (BC CDC 2024; GOC  
7 2024). Yuma myotis is blue-listed in BC (BC CDC 2024). Little brown myotis and northern myotis are  
8 blue-listed in BC, designated as Endangered by COSEWIC, and listed as Endangered under Schedule 1  
9 of SARA (BC CDC 2024; GOC 2024).

10 Population estimates are unknown for bats in the Skeena Region. The main conservation threats for  
11 little brown myotis and northern myotis, and bats generally, are white-nose syndrome, habitat loss,  
12 human disturbance, and climate change affecting resource abundance (Nagorsen and Brigham 1993;  
13 Garcia et al. 1995). In the Eastern US and Canada, little brown myotis and northern myotis populations  
14 have declined by hundreds of thousands of individuals because of white nose syndrome  
15 (Frick et al. 2010). White nose syndrome was detected in BC in spring 2023 and conservation efforts are  
16 focused on protecting the abundance of both species in western Canada to offset the population decline  
17 in the east (BCBAT 2021).

### 18 **D.7.2 Habitat Use and General Ecology**

19 Silver-haired bat occupies a variety of mature forest types including coastal temperate rainforests and dry  
20 interior forests, but are primarily associated with mature to old coniferous and mixedwood forests with  
21 ample dead or dying trees (BCI 2024; Lausen et. al 2022). Roosts, including maternity roosts, are  
22 typically located in trees under sloughing bark, in tree cavities and old woodpecker holes, in small spaces  
23 within building exteriors, and occasionally in rock crevices (Lausen et. al 2022). Silver-haired bat  
24 overwinters in the United States, southern BC, and sometimes in the Great Lakes region (COSEWIC  
25 2023). Silver-haired bat is a generalist insectivore with a wide variety of prey preferences. The species  
26 forages along forest edges, watercourses, or roadways, in small clearings, in valleys, and over wetlands  
27 (BCI 2024; Lausen et. al 2022).

28 Hoary bat typically inhabits mature deciduous, mixedwood, and coniferous forests. Hoary bat  
29 predominantly roosts in trees but has also been documented roosting in caves in the summer (Lausen et.  
30 al 2022). Unlike other tree-roosting species, hoary bat tends to roost in tree foliage and occasionally  
31 shrubs rather than in cavities or snags (COSEWIC 2023; Lausen et. al 2022). Females do not form  
32 specialized maternity colonies and instead raise pups on their own in typical hoary bat roosting habitat.  
33 Hoary bats is a migratory species that overwinters in the southern United States (COSEWIC 2023). The  
34 species shows a preference for feeding on moths (Lausen et. al 2022). Hoary bat forages above forest  
35 canopy and open fields, forest clearings, and over wetlands (COSEWIC 2023; Lausen et. al 2022).





1 Yuma myotis inhabits mature coastal forests, arid grasslands, and ponderosa pine-Douglas fir forests  
2 (Lausen et. al 2022). Smaller day roosts can be found in rock crevices and tree hollows. The species  
3 forms maternity colonies of up to 5,000 individuals predominantly in buildings, bat houses, and other  
4 anthropogenic structures (Lausen et. al 2022). Yuma myotis forages on flying insects over rivers and  
5 lakes, sometimes over 4 km from their roosting habitat. Yuma myotis hibernacula are largely unknown in  
6 BC, but colonies have been observed roosting over winter in buildings and Yuma myotis in Washington  
7 state have been observed hibernating in caves (Lausen et. al 2022). Little brown myotis occupies various  
8 habitats for use as day roosts, night roosts, maternity roosts, hibernacula, foraging habitat, and flight  
9 corridors. Little brown myotis typically inhabits mature forest with snags close to a freshwater source  
10 (Fenton 1980). The species will also roost in buildings and bat boxes, making them adaptable to human  
11 altered habitat (Fenton 1980). Day and night roosts are typically located in mature trees, snags, root  
12 wads, rock crevices, caves, piles of wood, and buildings. Maternity roosts are often in and around  
13 buildings or tree hollows with warmer ambient temperatures (Fenton 1980). Similarly, hibernacula are  
14 frequently found in abandoned buildings or caves, with shelter from the elements and higher ambient  
15 temperature (Fenton 1980). Foraging habitat is often near wetlands, in open areas with an abundance of  
16 insects (Nagorsen and Brigham 1993).

17 Northern myotis typically occupies mature stands of deciduous forest with snags in varying states of  
18 decay, open areas, and minimally dense understory vegetation (Vonhof and Wilkinson 1999). Roosts are  
19 often in crevices, hollows, or exfoliating bark of mature trees or snags, near or in riparian areas (Foster  
20 and Kurta 1999). Northern myotis are known to forage above wetlands, similar to little brown myotis,  
21 however they also forage in non-riparian open understory of mature forests, gleaning terrestrial insects  
22 (Brack and Whittaker 2001). Both species employ a network of roosts, with home ranges being up to 65  
23 ha (Owen et al. 2003).

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## 1 D.8 WESTERN SCREECH-OWL

### 2 D.8.1 Overview

3 There are two subspecies of western screech-owl in BC: *M.k. kennicottii* and *M.k. macfarlanei*.  
4 The *kennicottii* subspecies has potential to occur within the Terrestrial Wildlife RSA and is the subspecies  
5 that is discussed in the following sections. Western screech-owl is provincially blue-listed and listed as  
6 Threatened under SARA schedule 1 (BC CDC 2024; GOC 2024). The *kennicottii* subspecies is a year-  
7 round resident along the coast of BC, except for Haida Gwaii where it does not occur, and is concentrated  
8 in the southwestern portion of the province. Population density is thought to decrease as latitude  
9 increases, and the most northerly Canadian records for this species are from the Kitimat Valley  
10 (COSEWIC 2012b; BC MOE 2013). Populations in Southeast Alaska could provide a rescue effect,  
11 although recent declines in the Alaskan population may limit this ability (COSEWIC 2012, BC MOE 2013).

12 Population size and abundance are poorly studied in western screech-owl. The BC (and Canadian)  
13 population of western screech-owl, *kennicottii* subspecies is estimated at 1,500 to 3,000 individuals with a  
14 decline of 20–30% from 1995 to 2010 (COSEWIC 2012). Habitat loss is the main threat to the population,  
15 however there is some evidence to suggest that barred owl, which over the past four decades has  
16 expanded its range into coastal BC, may play a role in the decline of western screech-owl through  
17 predation (COSEWIC 2012).

### 18 D.8.2 Habitat Use and General Ecology

19 Western screech-owl inhabit low-elevation coniferous or mixed forest stands, often near watercourses  
20 (COSEWIC 2012). They can be found in old growth and mature second-growth forests (COSEWIC 2012;  
21 BC MOE 2013), and they are most frequently associated with riparian areas (Cannings et al. 2020).  
22 Habitat preferences include stands with large trees, low understory vegetation, and open canopy cover  
23 associated with water (Kissling and Lewis 2009; Cannings et al. 2020). The western screech-owl diet is  
24 comprised of small mammals, birds, and some invertebrates. In northern coastal areas, small mammals  
25 comprise approximately 95% of the diet (Kissling et al. 2010).

26 Successful breeding habitat is primarily in low-elevation mature-to-old coniferous or mixed forest  
27 (i.e., structural stages 5 to 7), and typically near a riparian area (COSEWIC 2012; BC MOE 2013).  
28 Western screech-owl typically nests in riparian areas near watercourses, but also known to use wetlands  
29 and other riparian edge habitat areas when hunting or foraging (BC MWLAP 2004; BC MOE 2013).

30 Western screech-owl is a secondary cavity nester, requiring suitable large trees with either natural or  
31 previously excavated cavities (e.g., by a pileated woodpecker). Generally, the largest diameter trees are  
32 selected for nesting (BC MOE 2013, Cannings et al. 2020). Nest boxes are readily accepted and have  
33 been successful on Vancouver Island in multiple locations (COSEWIC 2012). Studies are limited on tree  
34 species preference, although four nests described in southeast Alaska were in western hemlock  
35 (Kissling et al. 2010; BC MOE 2013). Cavities are also used for roosting sites, so chosen territories  
36 should have a variety of suitable cavities available (COSEWIC 2012).



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## 1 D.9 NORTHERN GOSHAWK

### 2 D.9.1 Overview

3 Northern goshawk, *laingi* subspecies, occurs on Vancouver Island, Haida Gwaii, and along the mainland  
4 coast (COSEWIC 2013a). The subspecies is listed as Threatened on Schedule 1 of SARA, designated  
5 as Threatened by COSEWIC, and is red-listed in BC (BC CDC 2024; GOC 2024). Much of BC's coast is  
6 rugged and inaccessible and has not been systematically surveyed for northern goshawk. Population  
7 estimates for BC are based on survey work completed on Haida Gwaii, Vancouver Island, and in the  
8 Kispiox Forest District. The BC population is estimated at 1,104 to 1,237 individuals, with approximately  
9 365 to 383 mature individuals occurring in the north coast area (COSEWIC 2013). Historical population  
10 information is not available, but it is believed that the *laingi* subspecies has declined (COSEWIC 2013).

### 11 D.9.2 Habitat Use and General Ecology

12 Northern goshawk is a large, forest-dwelling raptor that forages on a diversity of prey. In coastal BC  
13 primary prey items during the breeding season are red squirrel, grouse, and larger forest birds such as  
14 thrushes, jays, and woodpeckers (Mahon et al. 2019; Squires et al. 2020). The species has been reported  
15 to hunt American crow and marbled murrelet (Mahon et al. 2019). Northern goshawk primarily hunts by  
16 alternating short flights through the forest with searching for prey while perched (Squires et al. 2020). The  
17 attack may consist of a smooth, silent glide ending in a strike against unsuspecting prey. Alternatively, if  
18 spotted, the hawk will pursue the prey, recklessly crashing through shrubs and entering water  
19 (Squires et al. 2020).

20 Foraging habitat, particularly in coastal areas, is not well understood (Mahon et al. 2019). Work in  
21 different areas has found regional differences related to the selection of shoreline areas and higher  
22 elevation habitat (Mahon et al. 2019). Work completed on Nisga'a Lands detected northern goshawk in a  
23 second-growth spruce-hemlock forest (d'Entremont and McKinnon 2017; d'Entremont et al. 2018).  
24 Preferred foraging habitat may be selected based on prey availability (COSEWIC 2013). In general,  
25 northern goshawk forages in mature and old forests, with high canopy closure and an open understory  
26 that facilitates hunting of forest-dwelling mammals and birds (COSEWIC 2013a; Mahon et al. 2019).

27 The *laingi* subspecies selects breeding habitat based on stand structure, rather than stand age or  
28 tree species composition, although most nest stands are dominated by western hemlock or co-dominated  
29 by western hemlock and western redcedar (COSEWIC 2013; Mahon et al. 2019). The subspecies  
30 generally prefers to breed in mature and old growth forests with relatively closed, multi-layer canopies  
31 and open sub-canopy flyways (COSEWIC 2013; Mahon et al. 2019). The *laingi* subspecies generally  
32 breeds in larger, intact forest patches rather than smaller isolated stands (COSEWIC 2013).  
33 Northern goshawk tends to avoid nesting near edges, particularly strongly defined anthropogenic edges  
34 (Mahon et al. 2019).



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## 1 D.10 BALD EAGLE

### 2 D.10.1 Overview

3 Bald eagle is yellow-listed in BC (BC CDC 2024), is a species of Indigenous cultural use and value, and  
4 was identified as a species of importance to the Nisga'a Nation. Bald eagle is not a migratory bird under  
5 the MBCA, but it is protected under the BC *Wildlife Act*. The nest of the species is also protected  
6 year-round under the BC *Wildlife Act*, whether the nest is active or not.

7 The most recent population estimate, from 2004, was 60,000 individuals across BC (BC MFLNRO 2013)  
8 and is considered stable (Barry 2015; BC CDC 2024). Primary threats to bald eagle populations include  
9 habitat loss, especially the removal of trees suitable for nesting, alteration of wintering habitat, pesticides,  
10 collisions with powerlines, and entanglement in fishing gear (BC MFLNRO 2013; Barry 2015).

11 Bald eagle is common in coastal BC and is abundant in the lower Nass River during the eulachon  
12 spawning period (Holst et al. 2007). There are records of bald eagle in the Marine Terminal and  
13 Marine Shipping RSAs, as well as the OWSA (Birds Canada 2022; eBird 2022). Bald eagle was detected  
14 during Project surveys and three bald eagle nests were detected within the Terrestrial Wildlife LSA.  
15 Based on observed bird behaviour, one nest was assumed to be active in 2021 and a separate nest was  
16 assumed to be active in 2022. There are also records of eight bald eagle nests in the Nass Bay,  
17 Iceberg Bay, and Nasoga Gulf areas.

### 18 D.10.2 Habitat Use and General Ecology

19 Bald eagle occurs throughout BC and is abundant on the coast (BC MFLNRO 2013). Bald eagle is  
20 typically associated with aquatic ecosystems such as rivers, lakes, and coastal bays with forested  
21 shorelines, especially in the breeding season where trees suitable for nesting and food sources are  
22 abundant (Blood and Anweiler 1994). The migratory patterns of bald eagle are somewhat complex.  
23 Coastal breeding adults may be non-migratory, while non-breeding birds may migrate long distances  
24 (Blood and Anweiler 1994). Winter foraging habitat on the coast includes intertidal zones, streams that  
25 support salmon and eulachon spawning, and estuaries with large concentrations of waterfowl (Blood and  
26 Anweiler 1994).

27 Bald eagle are highly skilled predators and opportunistic foragers whose diet comprises carrion,  
28 ungulate and whale carcasses, waterfowl, marine invertebrates, small mammals, and fish (Blood and  
29 Anweiler 1994; Buehler 2002; BC MFLNRO 2013). Bald eagle forages where fish are present near the  
30 surface of the water, especially waterbodies with relatively shallow depths and within 500 m of shore  
31 (Buehler 2022). The species will also hunt waterfowl that are injured or incapable of diving to safety, but  
32 hunting success of otherwise healthy waterfowl is poor (Buehler 2022). In the non-breeding season,  
33 bald eagle will readily scavenge food from human waste facilities such as landfills and compost facilities  
34 (BC MFLNRO 2013) and are often known to harass and usurp food from each other and other species  
35 such as osprey (*Pandion haliaetus*) (Buehler 2022).





1 Breeding phenology varies with latitude (Buehler 2013). In the Skeena and coastal regions, bald eagle  
2 can begin nesting early in the spring (BC MFLNRO 2013; Buehler 2022). Nests are often reused for  
3 several years, with the same pairs returning to the same nest or nesting site annually (BC MFLNRO 2013;  
4 Buehler 2022). Nests may be built on cliffs, the ground, or in large trees (BC MFLNRO 2013). Bald eagles  
5 typically have one brood per season (Buehler 2022). Incubation typically occurs between February 5 and  
6 June 25 and nestlings can be present between April 1 and August 31 (BC MFLNRO 2013). Fledglings  
7 typically leave the nest at about 8 to 14 weeks of age but continue to receive provisioning and protection  
8 from adults until they are capable of providing for themselves (Buehler 2022).

9 Nesting habitat occurs at low elevations along major rivers, lakes, and wetland complexes. On the coast,  
10 most nests are located near the coastline on islands, in estuaries, and along the mouths of rivers, and  
11 inland on lakes, marshes, and rivers (Blood and Anweiler 1994). Nest site selection is strongly influenced  
12 by resource and food availability and nests are typically close to areas regularly used by spawning herring  
13 and eulachon or to seabird and heron nesting colonies (Blood and Anweiler 1994). The nest tree is  
14 typically the largest tree present, however size is variable and dependent on species available. On the  
15 north coast, commonly used nest trees are Douglas-fir (*Pseudotsuga menziesii*), Sitka spruce, and  
16 western hemlock, and in inland areas cottonwoods are also used (Blood and Anweiler 1994;  
17 Suring 2008). Nest trees need massive limbs in the upper crown that can support the nest but also  
18 provide enough open air space around them to allow access to the nest (Blood and Anweiler 1994).  
19 Bald eagle also sometimes nests on cliffs or rock pinnacles in inland areas (Blood and Anweiler 1994).

20 Perching and roosting habitat are an important component of winter habitat as they allow for surveillance  
21 of potential prey with low energy expenditure (Blood and Anweiler 1994). Trees are greatly preferred,  
22 and roost selection has been determined to be influenced by proximity to food sources (Blood and  
23 Anweiler 1994). Bald eagle also often select mature and old growth coniferous forests for roosts because  
24 of the advantageous microclimate afforded by these habitats (BC MFLNRO 2013).

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## 1 **D.11 OLD FOREST BIRD COMMUNITY**

### 2 **D.11.1 Overview**

3 The community-based habitat assessment approach is intended to evaluate the effects of the Project on  
4 general songbird-habitat relationships. The old forest bird community habitat model includes 34 bird  
5 species (Appendix B). The model includes one species of conservation concern, olive-sided flycatcher  
6 (*Contopus cooperi*), which is yellow-listed in BC, is designated as Special Concern by COSEWIC, and is  
7 federally listed as Special Concern under Schedule 1 of SARA (BC CDC 2024; GOC 2024). Olive-sided  
8 flycatcher is also included in the wetland bird community model as the species also uses certain kinds of  
9 treed wetlands.

10 The old forest bird community habitat model can be used as a proxy for other species that have similar  
11 habitat associations, but do not fit into the songbird group, such as sooty grouse and band-tailed pigeon  
12 (the latter is blue-listed in BC, designated as Special Concern by COSEWIC, and listed as  
13 Special Concern under Schedule 1 of SARA; BC CDC 2024; GOC 2024). The old forest bird community  
14 habitat model could also be used as a proxy for non-bird species, such as black-tailed deer, which  
15 associates strongly with older forest for winter shelter and forage (Blood 2000).

### 16 **D.11.2 Habitat Use and General Ecology**

17 The old forest bird community model includes mature (structural stage 6) and old forest  
18 (structural stage 7). The age at which a forest is considered mature varies by forest type; forests in the  
19 CWHvh2 are considered mature at 80 to 250 years old and transition into old growth at about 250 years  
20 post disturbance (BC MOFR and MOE 2010).

21 Old forests have large trees, snags, patches of shrubs and herbaceous plants, and regeneration of  
22 shade-tolerant species. There can be a wide range of ages and sizes of trees and a multi-layered canopy  
23 (Hansen et al. 1991; Yearsley and Parminter 1998). Forest stands on drier sites tend to be more open  
24 and have a sparser shrub layer, whereas stands on wetter sites tend to be less open and have a denser  
25 shrub layer (Banner et al. 1993).

26 The life history strategies of songbird species that use old forests is diverse. Some species are  
27 ground-nesters, while others nest in understory shrubs or trees, high in the canopy, or in cavities created  
28 by other species. Some species may nest in upturned roots, or in the crevices in thick bark. Some species  
29 prefer forest edges and can use small and large forest patches, whereas other species may avoid edges  
30 and be more reliant on the interior of large forest patches.

31 Pure coniferous forests tend to have lower species diversity than pure deciduous stands, while  
32 mixedwood stands have the greatest species diversity and abundance (Wilson and Comet 1996a;  
33 Easton and Martin 1998; Hobson and Bayne 2000). Elevation and understory development (e.g., shrub or  
34 herb-dominated) will also affect bird diversity in a stand; diversity and abundance are typically greater in  
35 forests with well-developed shrub layers, which provide food (e.g., berries) and nesting opportunities





1 (Wilson and Comet 1996b). Forest stands at higher elevations generally support fewer bird species and  
2 individuals compared to stands at lower elevations (Herbers et al. 2004; Amundson et al. 2018).

3 As described above, only one species of conservation concern, olive-sided flycatcher, is included in the  
4 old forest community. Olive-sided flycatcher is widespread across BC, though is most common along the  
5 south coast and interior regions of BC (Weber 2015). In BC the species prefers older, cool moist to mesic  
6 coniferous forest, but also occurs in younger forest (Weber 2015). Olive-sided flycatcher frequently  
7 breeds in forest edges adjacent to burns, bogs, marshes, and harvested areas (Altman and  
8 Sallabanks 2020). The presence of tall snags and dead treetops, used as perches, are key habitat  
9 features (Weber 2015; Altman and Sallabanks 2020).

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Appendix D Species Accounts  
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## 1 **D.12 YOUNG FOREST BIRD COMMUNITY**

### 2 **D.12.1 Overview**

3 The community-based habitat assessment approach is intended to evaluate the effects of the Project on  
4 general songbird-habitat relationships. The young forest bird community habitat model includes 35 bird  
5 species (Appendix B), each of which are migratory birds. None of the young forest bird community model  
6 species are species of conservation concern or species identified as being important to Nisga'a Nation or  
7 other Indigenous nations.

8 The young forest bird community habitat model can be used as a proxy for other bird species that use  
9 young and regenerating forests, such as ruffed grouse.

### 10 **D.12.2 Habitat Use and General Ecology**

11 Young forests are created by regeneration after a disturbance, which can be natural (i.e., fire and  
12 windthrow) or human-caused (i.e., forestry and agricultural). In general, forests in structural stage 4  
13 (pole/sapling) and 5 (young forest) are considered young forest. The time since disturbance at which  
14 forest enters the young forest phase varies, but is typically less than 40 years (BC MOFR and  
15 MOE 2010). Young forest transitions into old forest at approximately 80 years post-disturbance  
16 (BC MOFR and MOE 2010). On the north coast, small open areas caused primarily by wind or pathogens  
17 are the primary natural pathway of disturbance, resulting in a shifting mosaic of seral stages (Dorner and  
18 Wong 2003). First Nations in north coastal areas may have set fires in traditionally wet areas  
19 (e.g., Bella Bella, Kitimat Valley, Haida Gwaii) to create or maintain open areas for hunting, and to  
20 encourage growing conditions for certain shrubs (e.g., berries) (Turner 1999; Trusler and Johnson 2008;  
21 Hoffman et al. 2016; Armstrong et al. 2021).

22 Young forests are often dense with a variety of trees, shrubs, and herbaceous plant species (BC MOFR  
23 and MOE 2010). In their earlier stages, young forests tend to be densely stocked, with low herb and  
24 shrub cover (BC MOFR and MOE 2010). As the forest ages, thinning begins to occur, gaps and layering  
25 begin developing, and shrub and herb cover increases (BC MOFR and MOE 2010). The bird species that  
26 use young forest may shift over time as the structural characteristics of the forest evolve.

27 A range of habitat characteristics are needed to meet the needs of a wide variety of bird species that use  
28 young forest habitats. Ground-nesters (e.g., song sparrow and dark-eyed junco) use dense, low  
29 vegetation for nesting (i.e., in grasses and low-lying shrubs), whereas species that nest in trees or shrubs  
30 (e.g., warbling vireo, hermit thrush, or yellow warbler) use taller vegetation associated with the later forest  
31 stages (i.e., nests placed on branches, in the tree canopy, or woven into high shrubs) (BC BBA 2015).  
32 Insectivores are especially reliant on young forests for their high insect production, which is typically  
33 highest in mixedwood forests with a large amount of deciduous cover (Betts et al. 2012). Aerial  
34 insectivores (e.g., flycatchers and swallows), prey on flying insects, which are typically most dense in  
35 forest gaps with abundant shrub and herb vegetation (Altman and Hagar 2007).





1 Breeding bird species diversity is higher in forests with structural complexity and diverse vegetation  
2 species compared to simple forests (e.g., stands managed for forestry purposes; low species diversity)  
3 (Altman and Hagar 2007). Effective young forest habitat contains a variety of vegetation in heterogenous  
4 patches, including big and small trees, areas with dense shrub cover, and areas with more open  
5 understory (Altman and Hagar 2007). Mixedwood forests generally contain these elements  
6 (i.e., greater stand complexity and species diversity), and provide greater support for breeding birds, than  
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## 1 **D.13 WETLAND BIRD COMMUNITY**

### 2 **D.13.1 Overview**

3 The community-based habitat assessment approach is intended to evaluate the effects of the Project on  
4 general wetland bird-habitat relationships. The wetland bird community habitat model includes 26 bird  
5 species (Appendix B), of which two are species of conservation concern: olive-sided flycatcher and  
6 barn swallow. Olive-sided flycatcher is yellow-listed in BC, is designated as Special Concern by  
7 COSEWIC, and is federally listed as Special Concern under Schedule 1 of SARA (BC CDC 2024;  
8 GOC 2024) and barn swallow is yellow-listed in BC, is designated as Special Concern by COSEWIC, and  
9 is federally listed as Threatened under Schedule 1 of SARA (BC CDC 2024; GOC 2024). Olive-sided  
10 flycatcher is also included in the old forest bird community model as the species also uses older forest.

11 The wetland bird community habitat model can be used as a proxy for non-songbird species that use  
12 marshes and bogs, such as sandhill crane (which was detected in the Terrestrial Wildlife LSA  
13 [Section 4.6.2]), shorebirds, and dabbling ducks.

### 14 **D.13.2 Habitat Use and General Ecology**

15 Wetland habitats in the Terrestrial Wildlife LSA include treed bogs and swamps, shallow open water, and  
16 riparian habitat. Bogs are characterized by their nutrient poor and acidic soils and are typically dominated  
17 by sphagnum mosses, ericaceous shrubs, and conifers. Trees in bogs are often stunted, and sparse  
18 shrub and herb layers are common (MacKenzie and Moran 2004). In contrast, swamps are nutrient-rich  
19 wetlands with elevated microsites that allows growth of large trees and shrubs. Treed swamps often have  
20 a mix of terrestrial and wetland microsites (MacKenzie and Moran 2004). Riparian habitat occurs adjacent  
21 to wetlands and streams and is maintained by seasonal flooding (MacKenzie and Moran 2004). Riparian  
22 areas often have low tree cover and high shrub cover (MacKenzie and Moran 2004).

23 The wetland bird community requires wetland habitat for some, or all, of their life requisites (e.g., nesting,  
24 foraging, migration staging/stop-over). The type of wetland, and the life requisite it is used for, differs  
25 among wetland bird species. The focus of this model is on the use of wetland habitat by breeding  
26 songbirds and rufous hummingbird.

27 Several bird species included in the wetland bird community nest over or immediately adjacent to lentic  
28 freshwater provided by wetlands such as marshes and shallow open water (e.g., common yellowthroat  
29 [*Geothlypis trichas*]; Guzy and Ritchison 2020), while many others forage near and over wetlands  
30 because of insects associated with wetlands (e.g., barn swallow; COSEWIC 2021).



1 A summary of the habitat requirements for the two species of conservation concern included in the  
2 wetland bird community model (olive-sided flycatcher and barn swallow) are provided below:

- 3 • Olive-sided flycatcher is widespread across BC, though is most common along the south coast and  
4 interior regions of BC (Weber 2015). In BC the species prefers older, cool moist to mesic coniferous  
5 forest, but also occurs in younger forest (Weber 2015). Olive-sided flycatcher frequently breeds in  
6 forest edges adjacent to burns, bogs, marshes, and harvested areas (Altman and Sallabanks 2020).  
7 The presence of tall snags and dead treetops, used as perches, are key habitat features  
8 (Weber 2015; Altman and Sallabanks 2020).
- 9 • Barn swallow breeds throughout most of Canada and overwinters in central and south America  
10 (COSEWIC 2021). Barn swallow is an aerial insectivore that is associated with open areas, including  
11 wetlands and other waterbodies, where insect prey is abundant (COSEWIC 2021). The species also  
12 requires a source of mud provided by wet areas for nest-building (COSEWIC 2021). Anthropogenic  
13 structures (e.g., buildings, bridges, light fixtures) are common across the landscape and are now the  
14 primary structures used by barn swallow for nest attachment (COSEWIC 2021). It is estimated that  
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## 1 D.14 SHOREBIRDS

### 2 D.14.1 Overview

3 Shorebirds are a group of wading birds that use wetland edges, flooded fields, and marine shorelines for  
4 foraging, resting, and breeding. Sandhill crane and great blue heron are not shorebirds, but are included  
5 in the shorebird group because they use many of the same habitats as shorebirds. Shorebirds may occur  
6 in wetland habitat and/or along shorelines in each assessment area. There are 29 species included in the  
7 shorebird group (Appendix A) with the potential to occur within the wildlife RSAs, and each of these  
8 species are migratory birds under the MBCA. The group includes nine species of conservation concern,  
9 which are described below.

- 10 • American golden-plover is blue-listed in BC (BC CDC 2024). The species occurs in coastal BC during  
11 migration to its breeding range in Alaska, the Arctic, and a small area of northern BC (Burger 2015a).  
12 The global population is estimated at 500,000 birds (Burger 2015a), but the species is uncommon  
13 along the northern BC coast, occurring only during spring and fall migration (eBird 2023). The species  
14 occurs along the north coast during spring and fall migration (eBird 2023).
- 15 • Whimbrel is red-listed in BC (BC CDC 2024). Whimbrel occur along the BC coast during spring  
16 (mid-April to mid-May) and fall (late June to October) migration between their breeding grounds in  
17 Alaska and northern Canada and overwintering areas along the Central and South American coast  
18 (Skeel and Mallory 2020; eBird 2023). The North American population is estimated at 18,000 birds  
19 (Skeel and Mallory 2020) and is uncommon along the north coast (eBird 2023).
- 20 • Red knot, *roseaari* subspecies, is blue-listed in BC, designated as Threatened by COSEWIC, and is  
21 listed as Threatened under Schedule 1 of SARA (BC CDC 2024; GOC 2024). The species occurs  
22 along the Pacific coast during migration between breeding grounds in Alaska and overwintering  
23 grounds in South and Central America (Baker et al. 2020). The population estimate for the  
24 subspecies was approximately 3,375 adults in 2007, with an estimated decline of 70%  
25 (from 11,250 birds) over the previous 15 years (COSEWIC 2007). Red knot is uncommon along the  
26 north coast, and only occurs during spring and fall migration (eBird 2023).
- 27 • Short-billed dowitcher is red-listed in BC (BC CDC 2024). The *caurinus* subspecies breeds in Alaska,  
28 Yukon, northwestern BC, and Haida Gwaii and overwinters on the Pacific coast from California to  
29 Peru (Jehl et al. 2020). The Pacific *caurinus* subspecies is estimated at 75,000 birds (Jehl et al.  
30 2020). Short-billed dowitcher is uncommon along the north coast and occurs from spring through fall  
31 (eBird 2023).
- 32 • Red-necked phalarope is blue-listed in BC, designated as Special Concern by COSEWIC, and is  
33 federally listed as Special Concern under Schedule 1 of SARA (BC CDC 2024; GOC 2024). The  
34 species occurs in BC, primarily along the coast, during migration between their breeding grounds in  
35 the Nearctic and overwintering grounds off the coast of South America (COSEWIC 2014). Migration  
36 habitat is predominantly coastal, although inland lakes and streams may be used (COSEWIC 2014).  
37 The North American population is estimated at approximately 2.5 million birds (COSEWIC 2014).  
38 Red-necked phalarope is uncommon along the north coast of BC and occurs primarily from May  
39 through early October (eBird 2023).





- 1 • Wandering tattler is a blue-listed species in BC (BC CDC 2024) that occurs only along the coast  
2 during migration. The global population is estimated at 10,000–25,000 birds, of which more than  
3 90% breed in Alaska, Yukon, and north-western BC (Gill et al. 2020). Breeding occurs at higher  
4 elevations and in BC is limited to the extreme northwestern near Chilkat Pass and extending to near  
5 Dease lake (Di Corrado 2015). Wandering tattler is uncommon along the north coast of BC and  
6 occurs primarily from May through late September (eBird 2023).
- 7 • Lesser yellowlegs is blue-listed in BC and designated as threatened by COSEWIC (BC CDC 2024;  
8 GOC 2024). The species occurs in coastal and western BC during migration and is widespread with a  
9 breeding range extending from Alaska to northwestern Quebec (Tibbitts and Muskoff 2020). Based on  
10 data from their breeding range, migratory routes, and wintering range, there is an indication of an  
11 ongoing population decline (Burger 2015b). Lesser yellowlegs is uncommon along the north coast of  
12 BC and occurs primarily from late April through early October (eBird 2023).
- 13 • Killdeer is a blue-listed species in BC (BC CDC 2024) that occurs year-round on the coast and across  
14 much of BC during the breeding season (Jackson and Jackson 2020). Most killdeer in BC breed in  
15 the southern third of the province although they also breed along the north coast and Haida Gwaii  
16 (Burger 2015c). Throughout North America it is widely distributed, but population surveys suggest  
17 that the species is in decline in some parts (Burger 2015c). Killdeer are abundant and widespread  
18 along the north coast (eBird 2023).
- 19 • Great blue heron, *fannini* subspecies, is blue-listed in BC, designated as Special Concern by  
20 COSEWIC, and is federally listed as Special Concern under Schedule 1 of SARA (BC CDC 2024;  
21 GOC 2024). The *fannini* subspecies occurs along the Pacific coast from Washington to Alaska  
22 (COSEWIC 2008). Most breeding records are from the south coast and Georgia Depression  
23 ecoprovince, however the subspecies is known to breed on the north coast and Haida Gwaii  
24 (Butler and Vennesland 2015).

25 Shorebird habitats are some of the most threatened in the world (Iglecia and Winn 2021). Shorebirds are  
26 particularly vulnerable to threats because they are long-distance migrants and depend on habitats that  
27 are at risk from anthropogenic development and climate change (Donaldson et al. 2000;  
28 Senner et al. 2016). Threats to the shorebird group include, but are not limited to, habitat loss and  
29 degradation from anthropogenic development in their breeding, migratory, and overwintering grounds,  
30 disturbances to nesting sites, water pollution, pesticide use, and oil spills, and to climate-change related  
31 effects on habitat and food sources (Winkler et al. 2020).

## 32 **D.14.2 Habitat Use and General Ecology**

33 Shorebirds known or likely to occur in the wildlife RSAs depend on marine shoreline or freshwater aquatic  
34 environments for some or all of their life requisites such as nesting, foraging, and migration.  
35 Approximately half of the species included in the group (e.g., black-bellied plover, whimbrel) occur in the  
36 wildlife RSAs only during migration between their breeding and overwintering grounds (Appendix A).  
37 Migrating species are generally more common along the outer coast than in channels and deep coastal  
38 fjords. The beaches at Rose Spit, Haida Gwaii in IBA BC161 support large numbers of migrating  
39 shorebirds such as sanderling and semipalmated plover (IBA Canada 2022a). Many other species





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1 overwinter in the wildlife RSAs (e.g., surfbird, sanderling). Species that breed on the north coast include  
2 sandhill crane, black oystercatcher, killdeer, spotted sandpiper, and great blue heron (Appendix A).

3 Shorebird habitat in the wildlife RSAs include freshwater wetlands, such as shrubby and treed bogs and  
4 swamps, shallow open water, estuaries, tidal flats, sandy shorelines, mudflats, and intertidal habitat.  
5 Different species use different habitats, with some species preferring rocky shorelines (e.g., black  
6 oystercatcher, wandering tattler), sandy or muddy shoreline (e.g., semipalmated plover), or wetlands  
7 (e.g., Wilson’s snipe, sandhill crane). Higher suitability coastal shorebird habitat usually features a large  
8 intertidal zone with an array of sediments (sand, muds, silts) that support invertebrate populations  
9 (Iglecia and Winn 2021). Estuaries are particularly important habitats for migrating shorebirds, but make  
10 up only 2.3% of the coastline (BC MOE 2006). The Big Bay estuary near Prince Rupert is an important  
11 estuary for shorebirds (MacKenzie et al. 2000). The Nass River estuary is also used by some shorebird  
12 species (Demarchi 1997; Holst et al. 2007). Coastal and inland wetlands are also important foraging and  
13 breeding habitats (Iglecia and Winn 2021).

14 Great blue heron forages in both intertidal marine habitat and freshwater wetlands. Some species  
15 included in the shorebird group use freshwater wetland habitat. Sandhill crane nests in treed bogs,  
16 swamps, and marshes on the north coast and use wetlands and grass meadows during migration  
17 (Gerber et al. 2020). Sandhill crane were observed using wetlands in the Terrestrial Wildlife LSA during  
18 wildlife surveys (Section 4.6.2). Wilson’s snipe uses sedge bogs, fens, willow and alder swamps, and  
19 marshy riparian areas (Mueller 2020).

20 Nesting habitat varies by species, with some preferring upland rocky habitats (e.g., black oystercatcher),  
21 inland wetlands (e.g., sandhill crane), or anthropogenic clearings and structures (e.g., killdeer). Black  
22 oystercatcher is known to nest on the rock areas of IBA BC161 at Rose Spit and the rocky islets of IBA  
23 BC125 (IBA Canada 2022a,b). Shorebird nests are typically on the ground, in small depressions or  
24 scrapes. Great blue heron is one exception, which builds a stick nest in trees up to 30 m above ground, in  
25 forests, treed swamps, and riparian areas (Vennesland and Butler 2020).

26 Shorebird diets are variable by species and time of year and can include aquatic and terrestrial  
27 invertebrates, small fish, vegetation, berries, algae, and biofilm (Iglecia and Winn 2021).  
28 Western sandpiper and dunlin feed extensively on marine invertebrates and biofilms during migration  
29 (Canham et al. 2021). Great blue heron and sandhill crane forage on larger prey items including  
30 amphibians, small reptiles, fish, small mammals, nestlings, and invertebrates (Gerber et al. 2020;  
31 Vennesland and Butler 2020). The Nass River is an important spawning habitat for eulachon and herring.  
32 Surveys completed in the Nass Marine Area detected least sandpiper and great blue heron on the lower  
33 Nass River during the eulachon run (Holst et al. 2007).



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## 1 **D.15 MARBLED MURRELET**

### 2 **D.15.1 Overview**

3 Marbled murrelet is a small marine bird that occurs year-round in coastal waters from the Aleutian Islands  
4 to central California (COSEWIC 2012). Marbled murrelet is blue-listed in BC and is federally listed as  
5 Threatened under Schedule 1 of SARA (BC CDC 2024; GOC 2024). The species is listed as a  
6 conservation concern because of historic and ongoing old growth forest loss and fragmentation and  
7 human-induced effects in the marine environment, such as oil spills and disturbance from vessels, on  
8 both marbled murrelet and their prey species (COSEWIC 2012; ECCC 2023).

9 Most breeding occurs in the coastal forest habitats in areas of Alaska and BC within its range and the  
10 most recent population estimate for BC is 72,600 to 125,600 birds, of which 18,400 to 26,000 occur in the  
11 Northern Mainland Coast conservation region (COSEWIC 2012). The marbled murrelet population has  
12 declined since the early 1900's been in decline, but the extent of the population decline since the  
13 mid-1990's is uncertain (COSEWIC 2012).

### 14 **D.15.2 Habitat Use and General Ecology**

15 Marbled murrelet is associated with near-shore, sheltered waters where it forages for small schooling fish,  
16 and coastal old growth coniferous forest where it nests (COSEWIC 2012). When in the marine  
17 environment, marbled murrelets tend to forage in near-shore marine waters or in sheltered water such as  
18 bays that are less than 2 km from land (COSEWIC 2012; Lorenz et al. 2016; ECCC 2023). They generally  
19 forage in waters less than 30 m deep, but may forage in waters up to 80 m deep (COSEWIC 2012;  
20 Lorenz et al. 2016; ECCC 2023). There is limited knowledge on movement patterns (e.g., dispersal,  
21 migration) of this species, but evidence suggests that many individuals move to more sheltered marine  
22 areas for the winter months following the breeding season (ECCC 2023).

23 At the landscape scale, suitable summer breeding habitat is located mostly in the CWH BEC zone within  
24 old growth coniferous forest (structural stage 7) at elevations less than 900 m (COSEWIC 2012). Nesting  
25 can occur in forest up to 50 km inland from the ocean, but 0.5 to 30 km inland is most likely (ECCC 2023).  
26 At the forest stand-level scale, coniferous forest used for nesting in the Central and Northern Mainland  
27 Coast of BC is characterized by old age (140 years or older), tall trees (19.5 m or taller), canopy gaps,  
28 and moderate vertical canopy complexity (forest is somewhat patchy with gaps and a variation of tree  
29 heights) (ECCC 2023). These characteristics align with ECCC's list of key landscape- and stand-level  
30 biophysical attributes for marbled murrelet critical habitat (ECCC 2023).

31 At the microsite (tree) scale, marbled murrelet nests on the limbs of large, epiphyte-padded branches of  
32 coniferous trees, usually within 1 m of the tree trunk (COSEWIC 2012). Moss is the most common  
33 epiphyte found at the nest site but use of branches with lichen and vegetation litter has also been  
34 documented (Hamer and Nelson 1995; COSEWIC 2012). A nest structure is not constructed, and adults  
35 use the epiphytic cover as a soft substrate to lay their eggs on (ECCC 2023). Deciduous trees with  
36 suitable branches, as well as mossy ground, are also used for nests, but most birds seem to select large  
37 coniferous trees (Blood 1998; Burger et al. 2020). Marbled murrelet requires tall trees to enable





1 stall-landings and jump-offs near to canopy gaps for flight access, overhead branch cover for shelter from  
2 weather and predators, and a wide branch (15 to 74 cm in diameter) with thick epiphytic cover that is  
3 usually moss (ECCC 2023). These microsite characteristics align with ECCC’s list of key microhabitat  
4 biophysical attributes for marbled murrelet critical habitat (ECCC 2023).

5 Old growth coniferous forest is assumed to contain stand and tree attributes required for summer  
6 breeding. Old forests with open canopies are more likely to provide appropriate canopy gaps needed for  
7 adults to access the nest site and are therefore rated higher than those with closed canopies. Mature  
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## 1 **D.16 MARINE BIRDS**

### 2 **D.16.1 Overview**

3 Marine birds are a diverse group of birds that are dependent on the marine environment for all, or part, of  
4 their life cycle. The marine birds group includes alcids, gulls, terns, loons, cormorants, diving ducks  
5 (including mergansers), dabbling ducks, geese, swans, and pelagic species. Dabbling ducks and diving  
6 ducks, including mergansers, are a Nisga'a valued component and are important to Indigenous nations.

7 There are 72 species included in the marine birds group that are known or likely to occur in the  
8 Marine Shipping and Marine Terminal RSAs, TLISA, and OWSA (Appendix A). The group includes  
9 69 species that are migratory birds under the MBCA; the three cormorant species included in the group  
10 are not migratory birds under the MBCA. The group includes 23 species of conservation concern,  
11 including marbled murrelet that is described in Section D.16 of this appendix. The remaining 22 species  
12 of conservation concern are summarized as follows:

- 13 • Common murre is red-listed in BC (BC CDC 2024). The species occurs year-round in BC waters, but  
14 breeding is restricted to six sites in BC (Hipfner 2015a). The most recent population estimate was  
15 4,704 birds in 2005 (Hipfner 2005). This species is the most frequently caught by-catch bird species  
16 in commercial net fisheries operating in BC (Hipfner 2005; Bertram et al. 2021).
- 17 • Ancient murrelet is blue-listed in BC, is designated as Special Concern by COSEWIC, and is  
18 federally listed as Special Concern under Schedule 1 of SARA (BC CDC 2024; GOC 2024).  
19 The species occurs year-round in BC waters, but breeding is restricted to islands off Haida Gwaii  
20 (COSEWIC 2004). Population trends at some breeding colonies in Canada are increasing, while  
21 other colonies are decreasing. Overall, there are no reliable estimates for population size or trend in  
22 Canada (COSEWIC 2014a). Common murre is common and widespread year-round along the  
23 north coast (eBird 2023).
- 24 • Cassin's auklet is red-listed in BC, is designated as Special Concern by COSEWIC, and is  
25 federally listed as Special Concern under Schedule 1 of SARA (BC CDC 2024; GOC 2024).  
26 The species occurs year-round in BC, and nests on islands off Haida Gwaii, north and west  
27 Vancouver Island, and the northern mainland coast (COSEWIC 2014b). The Canadian population  
28 has declined over the past 75 years and the Canadian breeding population is estimated at  
29 approximately 2.69 million birds (COSEWIC 2014b). Cassin's auklet is common along the north coast  
30 from May through October (eBird 2023).
- 31 • Horned puffin is red-listed in BC (BC CDC 2024). The species occurs year-round in BC, but primarily  
32 from June through August (Hipfner 2015b; eBird 2023). The species is rare along the north coast and  
33 breeds in BC at only a few sites off the southern tip of Haida Gwaii (Hipfner 2015b; eBird 2023).  
34 Horned puffin generally occurs offshore and overwinters across broad areas of the central north  
35 Pacific ocean (Piatt and Kitaysky 2020).





Appendix D Species Accounts  
June 2024

- 1 • Tufted puffin is blue-listed in BC (BC CDC 2024). The species occurs year-round in BC but is not  
2 abundant. Breeding has been recorded at 31 remote islands off northern Vancouver Island and  
3 southern Haida Gwaii (Hipfner 2015c). The largest breeding colony occurs on Triangle Island and is  
4 includes approximately 25,000 pairs (Hipfner 2015c). The species is uncommon along the north  
5 coast, and primarily occurs from May through September (eBird 2023).
- 6 • Surf scoter is blue-listed in BC (BC CDC 2024). The species occurs in coastal BC during winter and  
7 migration. The overwintering population is estimated at 500,000 birds (Burger 2015). Surf scoter  
8 populations are declining, especially for those birds that overwinter on the Pacific coast, although the  
9 reasons for this decline are unclear (Burger 2015). Surf scoter is common and widespread year-round  
10 along the north coast (eBird 2023).
- 11 • Black scoter is blue-listed in BC (BC CDC 2024). The species occurs in BC primarily during winter.  
12 Black scoter is common in the waters off of Haida Gwaii and between Vancouver Island and the  
13 mainland in winter, and uncommon during the summer months (Bordage and Savard 2020;  
14 ebird 2023). Winter population estimates for BC are unavailable, however approximately  
15 102,000 birds breed in Alaska (Bordage and Savard 2020).
- 16 • Long-tailed duck is blue-listed in BC (BC CDC 2024). The species occurs in coastal BC primarily  
17 during winter (Davidson 2015). Winter population estimates for BC are unavailable, however  
18 approximately 163,000 birds overwinter in southeastern Alaska (Robertson and Savard 2020).  
19 Long-tailed duck is common along the north coast from October through late May and is rare during  
20 the summer months (eBird 2023).
- 21 • Horned grebe is yellow-listed in BC, the western population occurring in BC is designated as  
22 Special Concern by COSEWIC, and is federally listed as Special Concern under Schedule 1 of SARA  
23 (BC CDC 2024; GOC 2024). Horned grebe occurs in coastal areas of BC during the winter. The  
24 overwintering population is estimated at approximately 10,000 to 30,000 birds and is declining  
25 (COSEWIC 2009). Horned grebe is common along the north coast from September through May  
26 (eBird 2023).
- 27 • Western grebe is red-listed in BC, is designated as Special Concern by COSEWIC, and is federally  
28 listed as Special Concern under Schedule 1 of SARA (BC CDC 2024; GOC 2024). The species  
29 overwinters in coastal waters and breeds in the south-central interior (COSEWIC 2014c). There are  
30 records of western grebe in Alice Arm, Observatory Inlet, Portand Inlet, and the Nass Estuary  
31 (Section 3.4.2.3). Estimates of the overwintering population range from 2,500 to more than  
32 10,000 birds (COSEWIC 2014c). Western grebe is most common along the north coast from  
33 October through March, and is rare during the summer months (eBird 2023).
- 34 • Yellow-billed loon is blue-listed in BC (BC CDC 2024). The species nests in Arctic regions and occurs  
35 occasionally in coastal BC during the winter. The global population estimate is approximately  
36 16,000 to 32,000 birds (Uher-Koch et al. 2020). Yellow-billed loon is uncommon along the north coast  
37 (eBird 2023).





Appendix D Species Accounts  
June 2024

- 1 • Black-legged kittiwake is red-listed in BC (BC CDC 2024). The species occurs year-round in the  
2 coastal waters of BC. Most birds breed in the high Arctic, but one breeding site on Holland Rock near  
3 Prince Rupert, BC is known (Hearne 2015). The number of breeding adults observed at Holland Rock  
4 has increased from approximately 40 birds in 1993 to 238 birds in 2012 (Hearne 2015). The species  
5 is uncommon along the north coast (eBird 2023).
- 6 • California gull is red-listed in BC (BC CDC 2024). The species occurs on the north and central  
7 BC coasts during migration, when it is common (Siddle 2015a; Winkler 2020; eBird 2023). Thousands  
8 of birds migrate through BC, often in offshore areas (Siddle 2015a). Breeding occurs primarily in the  
9 prairies and parts of the Great Plains, but small numbers breed in the Okanagan region  
10 (Siddle 2015a; Winkler 2020).
- 11 • Caspian tern is blue-listed in BC (BC CDC 2024). The species occurs along the north coast primarily  
12 from May through August, and is uncommon (eBird 2023). There are no known nesting colonies in  
13 the wildlife study areas (Boyd 2015).
- 14 • Parasitic jaeger is red-listed in BC (BC CDC 2024). The species occurs along the BC coast during  
15 migration between its Arctic breeding grounds and overwinter grounds in South America (Wiley and  
16 Lee 2020). Parasitic jaeger occurs in small numbers in BC and is most common from May through  
17 late September (Wiley and Lee 2020; eBird 2023).
- 18 • Short-tailed albatross is red-listed in BC, is designated as Threatened by COSEWIC, and is federally  
19 listed as Threatened under Schedule 1 of SARA (BC CDC 2024; GOC 2024). The species occurs in  
20 offshore waters year-round in BC but does not breed in BC waters (COSEWIC 2013). During summer  
21 approximately 30 birds occur in BC waters (COSEWIC 2013).
- 22 • Black-footed albatross is blue-listed in BC, is designated as Special Concern by COSEWIC, and is  
23 federally listed as Special Concern under Schedule 1 of SARA (BC CDC 2024; GOC 2024). The  
24 species occurs in offshore waters year-round in BC but does not breed in BC (COSEWIC 2006).  
25 During summer an estimated 2,500 birds occur in BC waters (COSEWIC 2006).
- 26 • Northern fulmar is red-listed in BC (BC CDC 2024). The species occurs in offshore waters in BC and  
27 is most common in spring and fall (Hipfner 2015d). In BC, northern fulmar is only known to breed on  
28 Triangle Island where fewer than five pairs nest (Hipfner 2015d).
- 29 • Pink-footed shearwater is blue-listed in BC, is designated as Endangered by COSEWIC, and is  
30 federally listed as Endangered under Schedule 1 of SARA (BC CDC 2024; GOC 2024). The species  
31 regularly occurs in Hecate Strait and off the west coast of Haida Gwaii, and is most common from late  
32 April through August (COSEWIC 2016). Approximately 10,000 to 20,000 birds occur in BC waters  
33 from June to October each year (COSEWIC 2016).
- 34 • Buller's shearwater is blue-listed in BC (BC CDC 2024). The species nests near New Zealand and  
35 occurs in BC in August and September (Carboneras et al. 2020; eBird 2023). Buller's shearwater is  
36 uncommon along the north coast of BC (eBird 2023).





- 1 • Brandt's cormorant is red-listed in BC (BC CDC 2024). The species occurs year-round on BC's coast  
2 and is known to breed at a few sites around Vancouver Island (Hipfner 2015e). Recent BC population  
3 estimates are not available. Brandt's cormorant is uncommon along the north coast of BC  
4 (eBird 2023).
- 5 • Double-crested cormorant is blue-listed in BC (BC CDC 2024). The species occurs year-round on  
6 BC's coast, although breeding sites are known only from the south coast and interior (Butler 2015).  
7 Population estimates for the north coast are not available. Double-crested cormorant is common  
8 along the north coast of BC (eBird 2023).

## 9 **D.16.2 Habitat Use and General Ecology**

10 The marine birds group includes alcids, gulls, terns, loons, cormorants, diving ducks  
11 (including mergansers), dabbling ducks, geese, swans, and pelagic species. Dabbling ducks, geese, and  
12 swans are not typical marine birds, but are included in this group because of their use of nearshore  
13 marine waters during migration and overwintering, especially estuaries and shallow, sheltered bays. The  
14 species included in this group have a wide range of life history strategies, geographic ranges, and  
15 seasonal uses of the study areas.

16 Alcids are a group of wing-propelled diving, marine birds that include the murrelets, murrelets, auklets,  
17 guillemots, and puffins. Alcids feed on juvenile or larval fish such as eulachon, herring, and sandlance,  
18 small crustaceans such as euphausiids, amphipods, and copepods, and squid (Ainley et al. 2020;  
19 Winkler et al. 2020a). Alcids forage in marine areas where bathymetric features, such as shelf breaks,  
20 banks, and seamounts promote marine productivity (Yen et al. 2004). Cassin's auklet tends to forage in  
21 inshore waters prior to egg laying, before moving progressively further offshore as the season progresses  
22 (COSEWIC 2014b). Marbled murrelet is strongly associated with shallow, nearshore waters and are  
23 usually found within 500 m of the shore (Burger et al. 2008; COSEWIC 2012). Common murre have been  
24 confirmed on the Nass River during eulachon runs in 2007 (Holst et al. 2007). Nesting habitat is diverse  
25 and includes old coniferous forest (marbled murrelet), shrubby or forested islands (e.g., rhinoceros  
26 auklet), or barren islands and cliffs (e.g., horned puffin [*Fratercula corniculata*] (Gaston and Dechesne  
27 2020; Nelson 2020; Piatt and Kitaysky 2020). Lucy Island IBA (IBA BC122) supports a globally significant  
28 nesting population of rhinoceros auklets (IBA Canada 2022a).

29 Gulls (including kittiwake) and terns are a diverse group and were identified as a group to be of  
30 Indigenous cultural use and value. Gull eggs are traditionally harvested by some Indigenous nations.  
31 The group includes two species of conservation concern, black-legged kittiwake and California gull  
32 (Appendix A). Some species, such as black-legged kittiwake and Arctic tern, are highly pelagic and are  
33 found in offshore marine waters (Hatch et al. 2020a,b), while other species occur closer to shore. Only  
34 short-billed gull, glaucous-winged gull, herring gull, and Bonaparte's gull are expected to regularly nest  
35 within the study areas. Short-billed gull, glaucous-winged gull, and herring gull nest on rocky and treed  
36 islets in lakes and sheltered inshore waters, whereas glaucous-winged gull also nests on piers and roofs  
37 (Siddle 2015b,c; Hayward and Verbeek 2020). Most species nest on the ground, however Bonaparte's  
38 gull nests in conifer trees (Siddle 2015d). Large numbers of glaucous-winged gull nest on the Grey and  
39 Green Islets IBA (IBA Canada 2022b). Gulls are highly opportunistic foragers that consume a wide variety





1 of prey items including fish, marine and terrestrial invertebrates, worms, and food waste (Hayward and  
2 Verbeek 2020; Winkler et al. 2020b). Black-legged kittiwakes forage for fish and microzooplankton on the  
3 surface of the ocean (Hatch et al. 2020a). Artic tern forages on small fish, crustaceans, and insects by  
4 plunge-diving or dipping while in flight (Hatch et al. 2020b). Herring spawn is an important seasonal food  
5 source for glaucous-winged gull, herring gull, Iceland gull, and short-billed gull (Marston et al. 2002;  
6 Bishop and Green 2009). Several species of gull (e.g., herring gull, glaucous-winged gull) are known to  
7 frequent the Nass River to take advantage of eulachon and herring runs (Holst et al. 2007).

8 Loons are large, fish-eating birds highly adapted to diving. All four species occurring in the study areas  
9 use marine areas during winter and migration. Yellow-throated loon overwinters on the north coast where  
10 it typically uses protected, nearshore marine waters (Uher-Koch et al. 2020). Common loon uses  
11 nearshore and offshore marine habitat in the winter (Paruk et al. 2021). Red-throated loon overwinters on  
12 the coast in areas of coastal upwelling or coastal estuaries (Rizzolo et al. 2020). Pacific loon overwinters  
13 on the Pacific coast in large bays and estuaries and nearshore open ocean (Russell 2020). Common loon  
14 and red-throated loon regularly nest in the study areas, whereas Pacific loon and yellow-billed loon  
15 primarily nest in northern BC and parts of the Arctic (Di Corrado 2015; Hearne 2015; Uher-Koch et al.  
16 2020; Wright and Di Corrado 2015). Common loon nests on larger lakes with islands and irregular  
17 shorelines, and red-throated loon nests on muskeg bogs ponds, marshes, and coastal ponds  
18 (Hearne 2015; Paruk et al. 2021). Red-throated loon was observed in wetlands in the Terrestrial Wildlife  
19 LSA, and based on timing of occurrence was assumed to be breeding (Section 4.9.2).

20 Cormorants are large, diving birds that feed primarily on fish, but may also feed on crustaceans,  
21 mollusks, and cephalopods (Winkler et al. 2020c). Pelagic and Brandt's cormorant are found almost  
22 exclusively in coastal habitat, while double-crested cormorant uses both marine and freshwater habitat  
23 (Dorr et al. 2021; Hobson 2021; Wallace and Wallace 2021). All three species use shallow, inshore  
24 waters, bays with estuaries, and coastal inlets (Hipfner 2015e,f; Wallace and Wallace 2021). Only pelagic  
25 cormorant regularly nests on the north coast on steep cliffs (Hipfner 2015f). Large numbers of pelagic  
26 cormorant nest on Langara Island off Haida Gwaii (IBA Canada 2022c).

27 Grebes are diving birds with lobed toes that occur in both fresh and marine waters. All four species tend  
28 to occur in the study areas outside of the breeding period (eBird 2023). Red-necked grebe may nest on  
29 shallow, inland lakes in the Nass Valley (Howie 2015). Western, red-necked, and horned grebe  
30 overwinter in marine habitat including nearshore areas, coastal bays and estuaries, and over offshore  
31 shallows (Stedman 2020; Stout and Nuechterlein 2020). Pied-billed grebe is most common on marshes  
32 and may also use sheltered brackish estuaries in winter (Muller and Storer 2020).

33 The diving ducks include mergansers, scaups, scoters, goldeneyes, bufflehead, long-tailed duck,  
34 ring-necked duck, and harlequin duck. Seasonal use of the study areas varies by species. Some species  
35 occur year-round (e.g., surf scoter, harlequin duck), while others occur primarily during the overwintering  
36 period (e.g., ring-necked duck, bufflehead, greater scaup) (eBird 2023). Food and habitat preferences  
37 also vary by species. Habitats include coastal areas, small inland lakes, ponds, rivers, and wetlands.  
38 (Kessel et al. 2020; Pearce et al. 2020; Robertson and Savard 2020b; Winkler et al. 2020d). Common  
39 food items include larval and aquatic insects, crustaceans, fish, fish eggs, vegetation, amphibians  
40 (Kessel et al. 2020; Pearce et al. 2020; Robertson and Savard 2020b; Winkler et al. 2020d). Several





1 species of diving ducks, including goldeneyes, bufflehead, scoters, mergansers, and greater scaup have  
2 been observed on the Nass River during the eulachon run (Holst et al. 2007).

3 Dabbling ducks are shallow-water ducks that feed on the surface of the water. Seasonal use of the study  
4 areas varies by species. Some species occur year-round (e.g., mallard), primarily during the breeding  
5 season (e.g., blue-winged teal, wood duck (*Aix sponsa*)), or primarily during the overwintering period  
6 (e.g., American wigeon, northern pintail) (eBird 2023). Aquatic habitats vary by species but include  
7 marshes, lakes, wetlands, coastal inlets, estuaries, and shallow ponds usually with emergent vegetation  
8 for brooding and nearby grasslands, fields, or brush for nesting (Rohwer et al. 2020; Drilling et al. 2020;  
9 Dubowy et al. 2020; Leschack et al. 2020; Mini et al. 2020). Dabbling ducks may occur in wetlands in the  
10 Terrestrial Wildlife RSA or TLSA or in sheltered waters in the Marine Terminal or Marine Shipping RSAs,  
11 or TLSA. Dabbling ducks forage for food particles on the surface of the water or by tipping upside-down to  
12 reach food on the bottom. Diets are varied by species, but generally include aquatic invertebrates  
13 (especially for females during breeding), plants, algae, seeds, and occasionally amphibians and fish,  
14 (Drilling et al. 2020; Dubowy et al. 2020; Leschack et al. 2020; Mini et al. 2020; Rohwer et al. 2020).

15 Geese and swans occur in sheltered nearshore marine waters and freshwater wetlands. They use a  
16 variety of habitats including open ocean, lakes, ponds, wetlands, rivers, bays, and lagoons  
17 (Winkler et al. 2020d). Most species likely to occur in the wildlife study areas occur during migration or  
18 winter (Appendix A). Canada goose is the only species expected to nest in the study areas. Canada  
19 goose nests on slightly elevated sites near water. They often nest on beaver and muskrat lodges or on  
20 islands with good visibility (Mowbray et al. 2020). Canada goose and trumpeter swan have been  
21 observed feeding on the Nass River during the eulachon run (Holst et al. 2007). Geese and swans are  
22 primarily herbivorous; grazing on shoreline vegetation or feeding from the surface of the water  
23 (Winkler et al. 2020d).

24 For the purposes of this account, pelagic birds include petrels, albatrosses, shearwaters, skua, and  
25 northern fulmar. All 12 species included in the group are highly pelagic and are most likely to be  
26 encountered in Hecate Strait, Dixon Entrance, and farther offshore. South polar skua, sooty shearwater,  
27 short-tailed albatross, and black-footed albatross occur in BC waters during the summer season, but do  
28 not breed in BC (Awkerman et al. 2020; Furness et al. 2020). Leach's storm-petrel and fork-tailed  
29 storm-petrel nest on the coast of Haida Gwaii (Hipfner 2015g,h). Northern fulmar mainly eats fish,  
30 cephalopods, offal, and carrion (Mallory et al. 2020). Petrels and shearwaters are piscivorous, catching  
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## 1 **D.17 WESTERN TOAD**

### 2 **D.17.1 Overview**

3 Western toad is yellow listed in BC, designated as Special Concern by COSEWIC, and is federally listed  
4 as Special Concern under Schedule 1 of SARA (BC CDC 2024; GOC 2024). Western toad is widespread  
5 across BC and appears to be abundant across its range. However, mass aggregations during breeding  
6 and migration may suggest an inflated view of population trends, and no long-term studies have been  
7 undertaken to provide a large-scale population estimate (COSEWIC 2012).

### 8 **D.17.2 Habitat Use and General Ecology**

9 Western toad occurs in a variety of aquatic and upland habitats. It breeds in the shallow margins of lakes,  
10 ponds, streams, and other shallow wetlands, and in anthropogenic features including borrow pits and  
11 ditches (COSEWIC 2012). Although tadpoles can live in micro habitats such as tire ruts and ditches,  
12 tadpole success is limited because of the rapid evaporation of water that can occur in these typically very  
13 shallow, low water volume, sites (COSEWIC 2012). Western toad requires open, standing water that  
14 persists for the duration of the aquatic development period (i.e., water is present from the time of  
15 egg-laying until juvenile dispersal occurs).

16 Waterbodies with a range of depths provide better habitat for western toad tadpoles. Tadpoles aggregate  
17 in deeper areas during cooler periods and come into shallow waters to bask in the sun. Wetlands with  
18 natural complexity are preferred (i.e., native submergent vegetation, woody debris) and provide  
19 temperature control, sufficient food sources, and areas for refuge from prey. However, western toads are  
20 opportunistic breeders and will lay eggs in puddles, waste treatment ponds, or other anthropogenic  
21 features that hold water (COSEWIC 2012).

22 Western toad occurs over a wide range of elevations, generally from sea level to 2,500 m, but may be  
23 found as high as 3,660 m elevation (Russell and Bauer 1993; Corkran and Thoms 2006;  
24 COSEWIC 2012d). Following breeding, adults may remain in foraging habitat or may travel to other  
25 wetlands or upland sites. Western toad has a tolerance to variation in temperature and moisture  
26 availability, making them adept at travelling across open terrestrial areas (NTSARC 2014). Western toad  
27 overwinters underground below the frost line in natural crevices, decayed root channels, remnant stumps,  
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