Technical Data Report

Marine Birds

ENBRIDGE NORTHERN GATEWAY PROJECT

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2010

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Abbreviations

BC CDC ..... British Columbia Conservation Data Centre
BC MoE..... British Columbia Ministry of Environment
BC MWLAP..... British Columbia Ministry of Water, Lands and Air Protection
CBC..... Christmas Bird Count
CCAA..... Confined Channel Assessment Area
COSEWIC..... Committee on the Status of Endangered Wildlife in Canada
ESA ..... Environmental Socio-economic Assessment
GPS..... Global Positioning System
IBA ..... Important Bird Area
PEAA ..... Project Effects Assessment Area
PDA ..... Project Development Area
RISC ..... Resource Information Standards Committee
(formally the Resource Inventory Committee [RIC])
SARA..... *Species at Risk Act*

1 Introduction

1.1 Background

Marine birds (or seabirds) are bird species that depend on marine aquatic habitats during portions of their life cycles. Marine birds use coastal wetlands, nearshore and offshore habitats, including islands, islets and cliffs. The coastal region of British Columbia supports large populations of marine birds including:

- loons and grebes
- albatrosses, fulmars, shearwaters and storm-petrels
- cormorants
- waders
- geese and swans
- diving ducks
- dabbling ducks
- coastal raptors
- rails, coots and cranes
- shorebirds
- gulls, jaegers, skuas, and terns
- alcids
- kingfishers

In addition to the diversity and abundance of avian life that they represent, marine birds are important components of the freshwater and marine environments in which they are found (Milko et al. 2003). They are indicators of marine ecosystem health in British Columbia (Environment Canada 2004, Internet Site). Many colonial breeding marine birds in the area do not breed anywhere else in Canada (Campbell et al. 1990a). Furthermore, the coast of British Columbia is an important corridor for millions of migrating birds, especially shorebirds and waterfowl (Donaldson et al. 2000, Slattery et al. 2000, Trost and Sanders 2008). The shallow water of Hecate Strait, west of Kitimat, is an area with particularly high marine bird densities (Morgan et al. 1991).

1.2 Objectives

The purpose of this Technical Data Report (TDR) is to provide baseline data on marine birds in the study area. The following information is presented:

- Marine bird distribution and relative abundance
- Historical records providing background information on potential and existing marine bird species

2 Methods

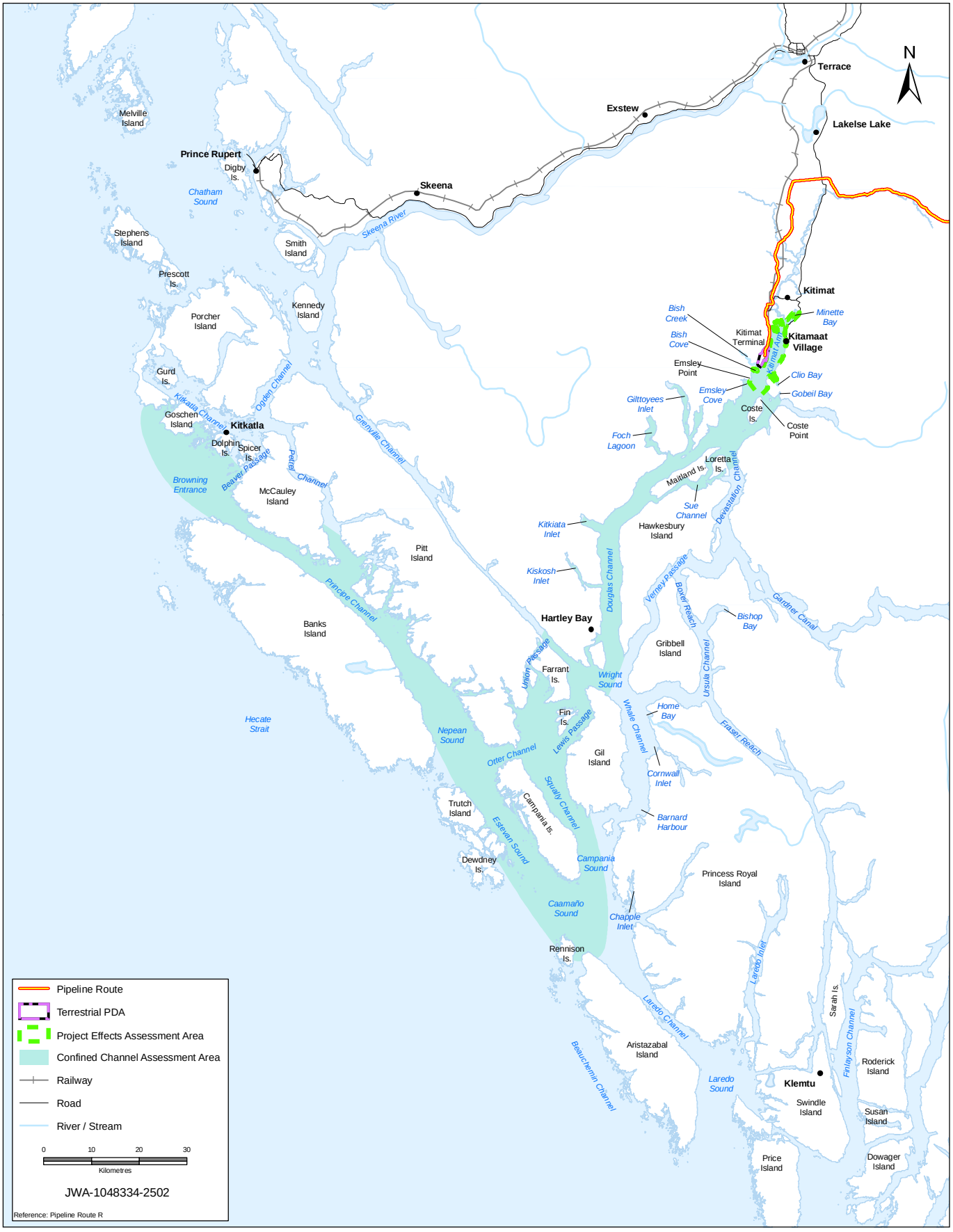
2.1 Study Area Boundaries

For comparison with the assessment analysis in the project Environment and Socio-economic Assessment (ESA), Volume 6B, Section 12 and Volume 8B, Section 11, the study area for this TDR is split into two parts (Figure 2-1):

- the area from the head of Kitimat Arm south to Emsley Point and Coste Point (referred to as the project effects assessment area [PEAA])
- confined waterways (referred to as the confined channel assessment area [CCAA]) that will be used by project-related tugs and tankers

Certain areas outside these boundaries were also included to gain additional baseline information on the distribution and seasonal abundance of marine birds in the general area. Specific confined waterways, inlets and bays included the following:

- Kitimat Arm
- Douglas Channel
- Devastation Channel
- Verney Passage
- Wright Sound
- Whale Channel
- Tuwartz Inlet
- Lewis Passage
- Heavenor Inlet
- Squally Channel
- Campania Sound
- Caamaño Sound
- McMiking Inlet
- Estavan Sound
- Otter Channel
- Napean Sound
- Principe Channel
- Petrel Channel
- Beaver Passage
- Minette Bay
- Gilttoyees Inlet
- Foch Lagoon
- Monkton Inlet
- Captain’s Cove
- Kitkiata Inlet
- Kiskosh Inlet
- Home Bay
- Weinburg Inlet
- Bernard Harbour
- Union Passage



CONTRACTOR: Jacques Whitford AXYS Ltd.

PREPARED BY: gem

PREPARED FOR: Enbridge Northern Gateway Pipelines

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Marine Birds Study Area including the PEAA and CCAA

FIGURE NUMBER:	DATE:
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PROJECTION: UTM 9	DATUM: NAD 83

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2.2 Literature and Existing Data Source Review

Background data and literature on baseline marine bird data was obtained from government, non-government and consulting reports that provided information from the PEAA and CCAA and the nearby Queen Charlotte Basin. The Queen Charlotte Basin data were included because data were readily available and considered relevant in providing regional information on use of the northern coast of British Columbia by marine birds.

The information summaries of bird guilds and Important Bird Areas (IBAs) in the PEAA and CCAA were largely collated from Hay (1976), Morgan et al. (1991), Norecol Environmental Consultants Ltd. (1991), Norecol Dames and Moore Inc. (1997), Environment Canada (2004, Internet site), British Columbia Ministry of Environment (BC MoE 2003a, 2003b, 2003c, 2003d, 2003e, Internet sites), National Audubon Society (NAS, 2008, Internet site), Bird Studies Canada (2008, Internet site) and IBA (2004, Internet site). Where applicable, descriptions of provincial and federal conservation status are included for each bird species and in Appendix A.

2.3 Field Surveys

In British Columbia, the Resources Information Standards Committee (RISC, formally known as the Resource Inventory Committee [RIC]) has standards for natural resource inventories, including collection, storage, analysis, interpretation and reporting of inventory data. For the marine bird field surveys, inventory methods for shorebirds (RISC 1997), marsh birds (RISC 1998), riverine birds (RISC 1998), waterfowl and allied species (RISC 1999), and Marbled Murrelet (*Brachyramphus marmoratus*; RISC 2001, 2006) were incorporated into the study design.

Four inventory methods were employed: 1) vessel reconnaissance surveys, 2) fixed-wing aircraft reconnaissance surveys, 3) terrestrial-based surveys and 4) radar surveys. Boat and aerial reconnaissance surveys were used to identify the distribution and relative abundance of over-wintering and resident marine birds in open water and along shorelines of the PEAA and CCAA. Terrestrial-based stationary count surveys were used to determine the occurrence (presence/not-detected) of migrating and resident marine birds in the confined waters of the PEAA and CCAA. Terrestrial surveys were also applied to linear habitat features (i.e., shorelines) and extensive areas (i.e., open ocean). Radar surveys were used to estimate the number and local habitat usage of Marbled Murrelet in the PEAA and CCAA.

2.4 Vessel Reconnaissance Surveys

Boat surveys provide an effective means of surveying marine birds in nearshore and offshore marine water. Smaller boats can circle rocky islets and follow coastlines close to shore. Experienced birders count birds as they are encountered. At an appropriate distance, surveyors can accurately document the species of bird, sex, age and total bird numbers with little disturbance to the birds.

Daily boat surveys were conducted on February 8 to 14, 2006 and February 14 to 25, 2009 (winter), April 15 to 21, 2006 and April 15 to 22, 2009 (spring), June 16 to 24, 2006 and June 16 to 23, 2009 (summer) and September 19 to 26, 2009 (fall) from a 19 m aluminum seine fishing boat (the *Silverdawn 1*). Each survey was conducted from approximately 08:00 to 18:00, but the duration of the surveys varied each day dependent on weather conditions and travel route. Approximately 600 to

1100 km of shoreline was surveyed each season to determine occurrence (presence/not detected) of marine birds, species distribution and relative abundance in the PEAA and CCAA. Boat surveys provide prolonged views of birds allowing for species identification. The area covered in boat surveys is shown in Figure 2-2.

Observations of marine birds, including Bald Eagle pairs and their nest sites, as well as incidental wildlife sightings were recorded in 10-minute intervals (transects) while the vessel was in motion, travelling at an average speed of 8 knots. Start and end locations of each transect were recorded using a hand-held Global Positioning System (GPS) device (Garmin Map76). Digital photographs were taken on several occasions to assist species identification and to document notable bird observations or congregations. Data were entered into an electronic database for subsequent analysis.

2.5 Fixed-wing Surveys

Fixed-wing aerial surveys have been used extensively in British Columbia for coarse-scale reconnaissance and habitat assessment for marine bird populations at sea, in estuaries, and on breeding wetlands (RISC 1998; RISC 2001). However, fixed-wing surveys are less useful than vessel surveys for assessing relative abundance and fine-scale habitat use. The project marine bird team conducted fixed-wing surveys on May 16 to 17, 2006 in conjunction with marine mammal surveys. Figure 2-3 illustrates the aerial survey routes. The surveys were conducted during favourable weather conditions with minimal sun-glare and with experienced observers (RISC 2001).

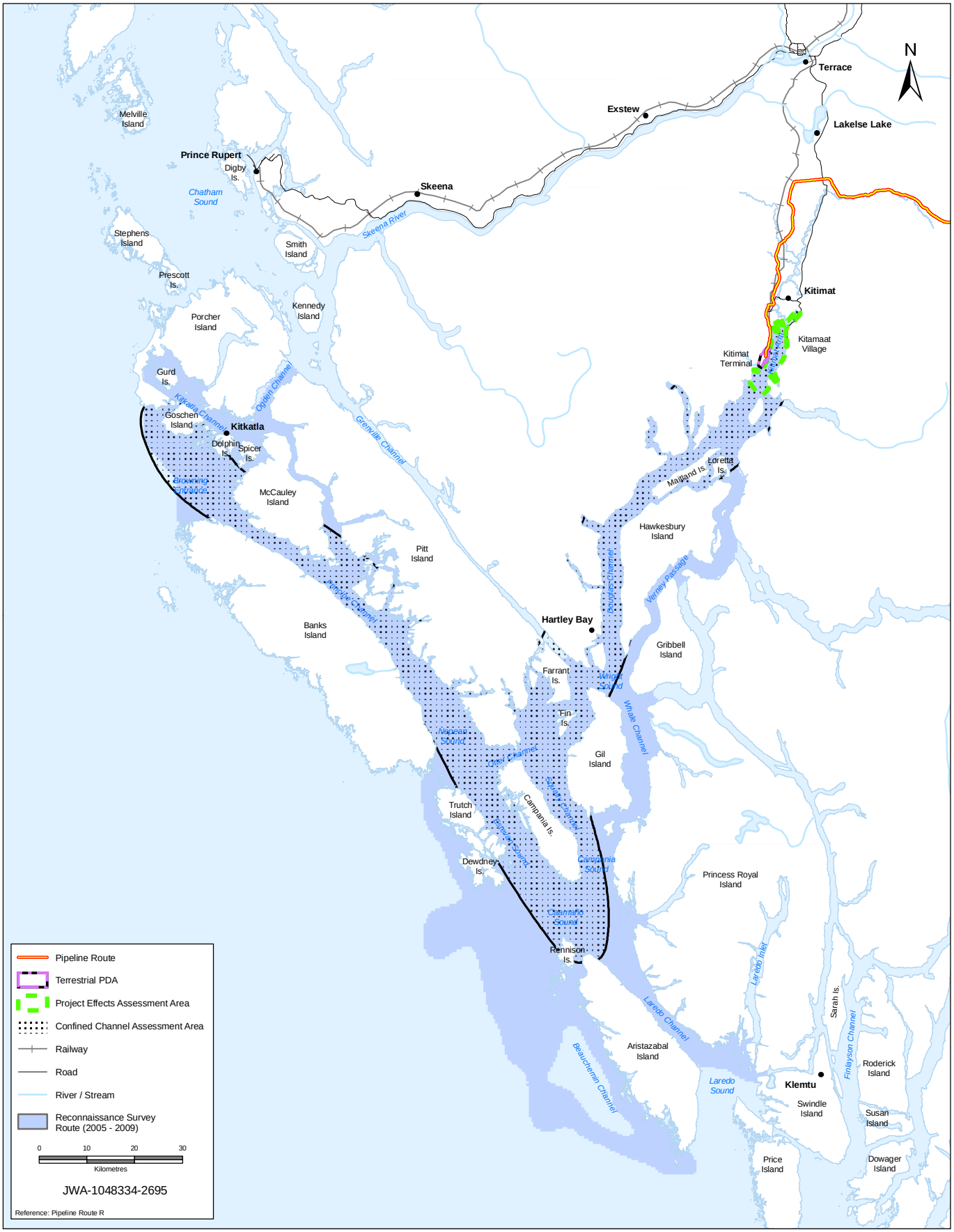
The aerial reconnaissance data provided a measure of distribution, habitat use and relative abundance in relation to the PEAA and CCAA. Areas surveyed were based on previous knowledge of marine birds in the region, points of interest and weather conditions at the time of the survey.

2.6 Terrestrial Surveys

Terrestrial surveys were conducted to obtain comprehensive details of marine bird distribution and relative abundance in proximity to the proposed Project Development Area (PDA) and PEAA. These surveys are terrestrial-based counts of birds within a 300 m radius from the point of observation on land with a clear line of sight to the water. Terrestrial surveys were conducted during October 2005; July 2008; and February, April, June and September 2009. The objectives of the surveys were to:

- Document the presence of marine birds in the study area
- Document the distribution and seasonal occurrence of marine birds in the study area

Survey points were established within the PDA using a GPS (Figure 2-4). Terrestrial surveys were conducted from approximately 09:00 and 16:00, where surveyors moved between survey points throughout the day to achieve equal sampling at each location. Where time allowed, surveyors attempted to record marine birds at each point during morning, midday and evening periods. Observers used binoculars and spotting scopes to identify and count individual marine bird species and to record their behaviour.



CONTRACTOR: Jacques Whitford AXYS Ltd.

PREPARED BY: gem

PREPARED FOR: Enbridge Northern Gateway Pipelines

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Marine Bird Vessel Reconnaissance Survey Route

FIGURE NUMBER:	DATE:
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SCALE: 1:1,100,000	AUTHOR: NP / APPROVED BY: CM
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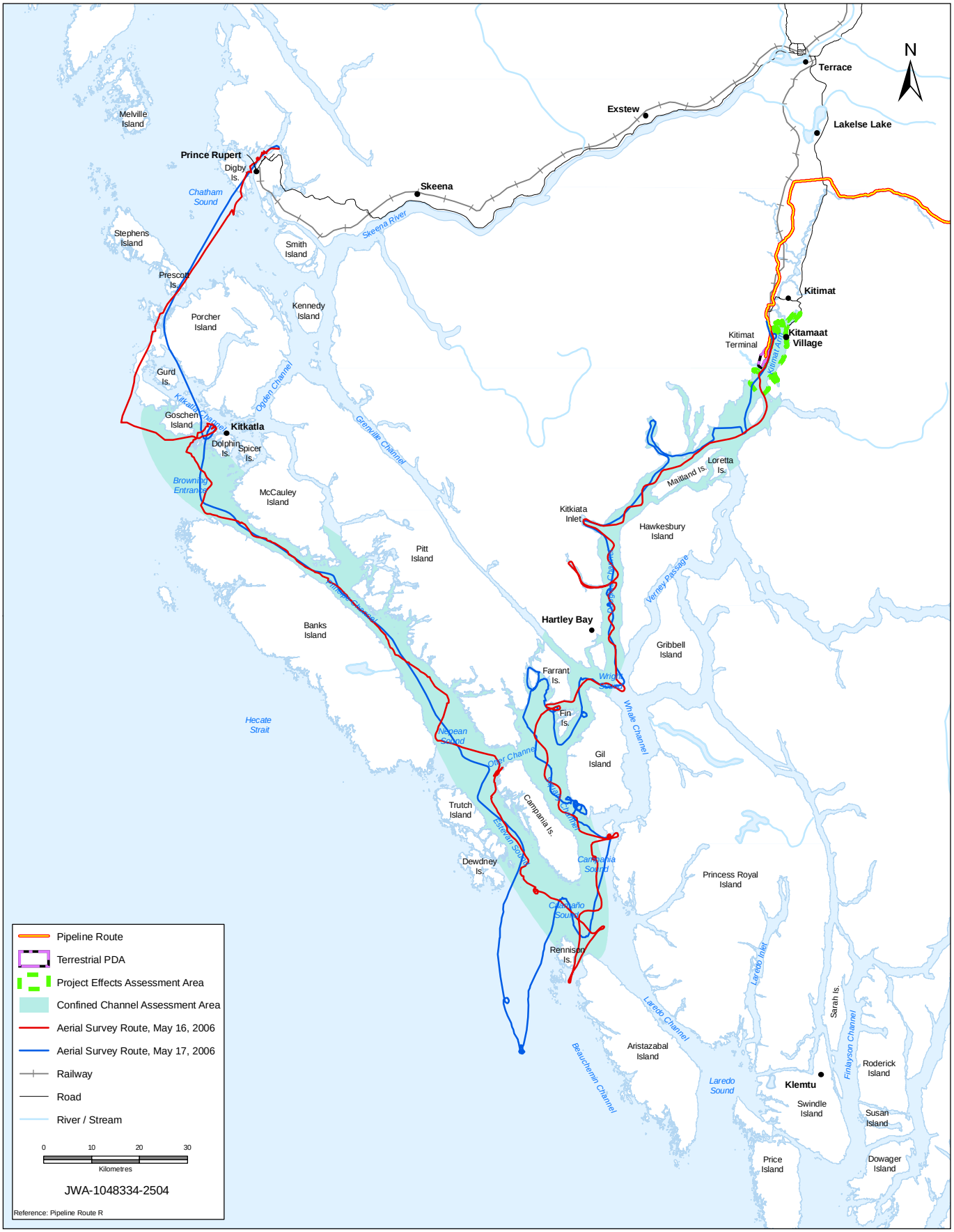

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Aerial Survey Routes over the PEAA and CCAA

FIGURE NUMBER:	DATE:
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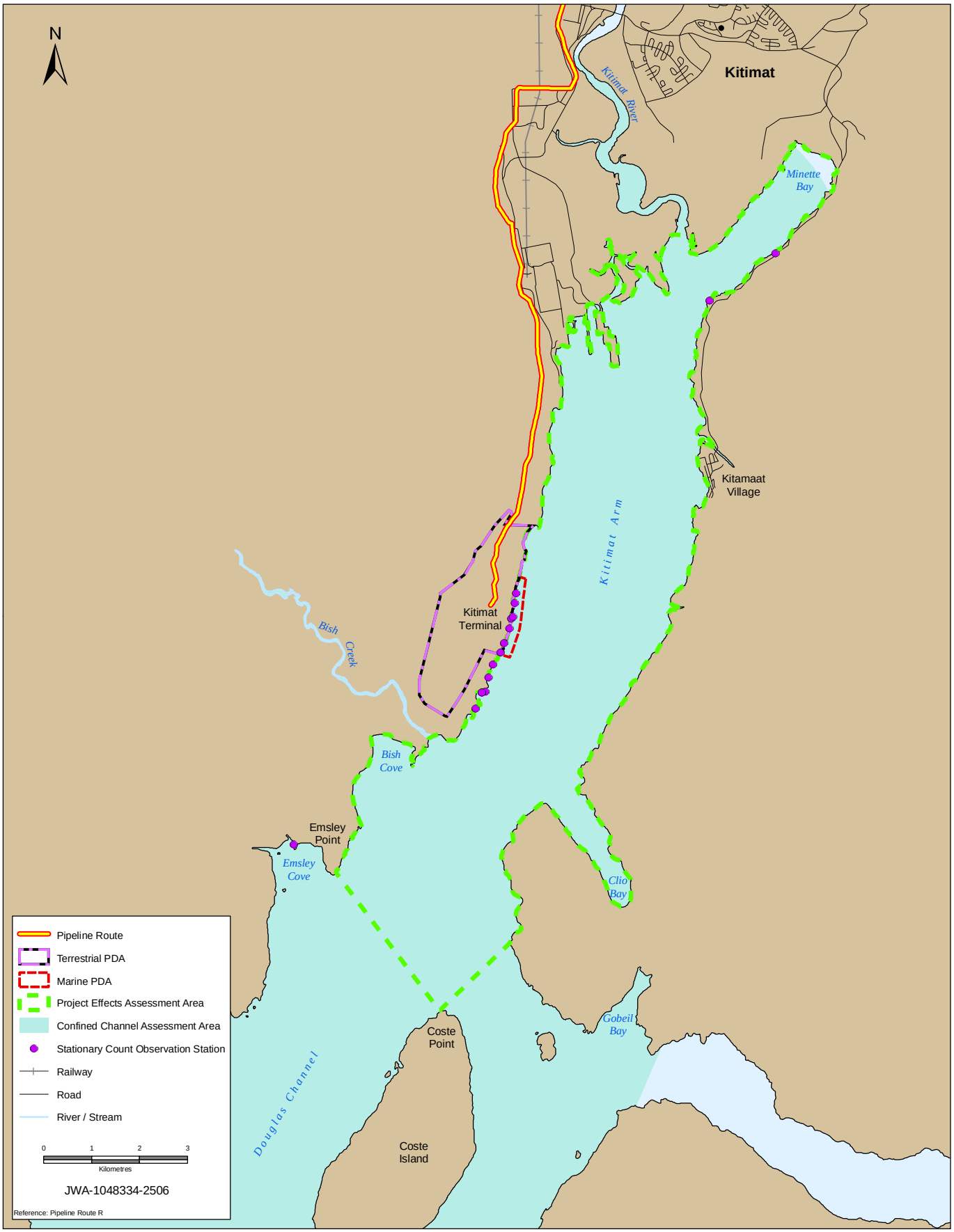

CONTRACTOR: Jacques Whitford AXYS Ltd.	**ENBRIDGE NORTHERN GATEWAY PROJECT**	FIGURE NUMBER: 2-4		DATE: 20090914
PREPARED BY: gem	Terrestrial Surveys - Stationary Count Observation Stations	SCALE: 1:1,100,000	AUTHOR: BA	APPROVED BY: CM
PREPARED FOR: Enbridge Northern Gateway Pipelines		PROJECTION: UTM 9	DATUM: NAD 83	

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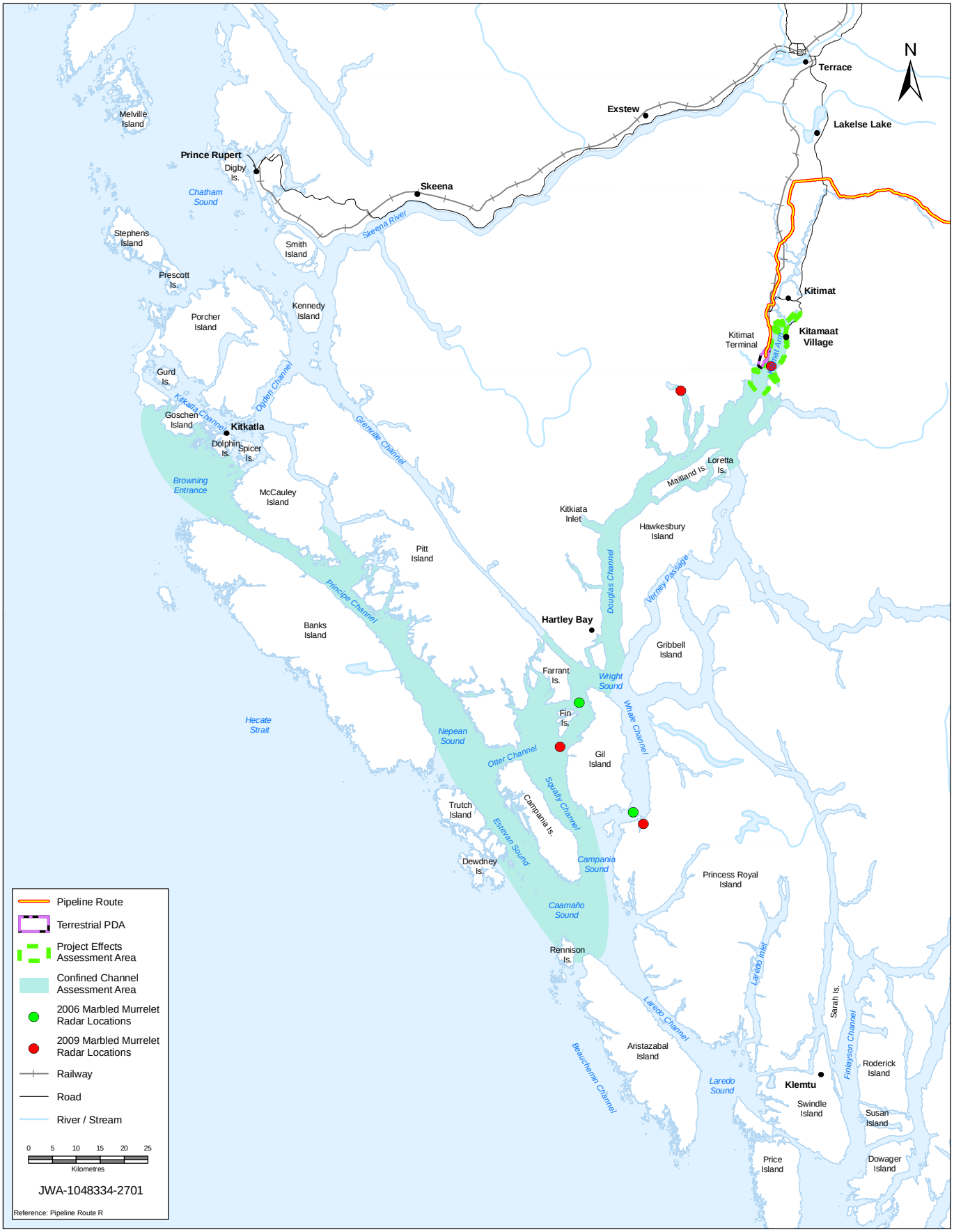
2.7 Radar Surveys for Marbled Murrelet

Marbled Murrelets are year-round residents along the coast of British Columbia. There are seasonal fluctuations in numbers due to regional migratory movement. Unlike other seabirds (which nest on the ground) Marbled Murrelets nest in coniferous trees. They arrive at nesting locations in late spring, typically located inland of sheltered inlets within 0.5km of shore. Both parents contribute to raising young, and take turns foraging while one member stays at the nest. The Marbled Murrelet is listed as a species of conservation concern federally (threatened) and provincially (red-listed) (RISC 2001). Radar surveys were conducted to more accurately determine abundance and distribution of Marbled Murrelets in the PEAA and CCAA.

The protocol for radar surveys follows the Inventory Methods for Marbled Murrelet Radar Surveys (RISC 2006). Radar surveys were conducted on June 19, 21 and 22, 2006 and June 17, 18, 22 and 23, 2009 (Figure 2-5). Surveys were conducted with a Furuno 1954C 12 kW open array unit. The radar was oriented north and scanned a vertical arc of 25 degrees, rotating through 360 degrees horizontally every 3 seconds. The scanning radius of the radar was set to 0.5 nautical miles. The radar was positioned on the *Silver Dawn I* and mounted on top of the wheel house. Surveys began approximately two hours before sunrise and continued until one hour after sunrise. For each target, observers manually recorded time, number of targets, bearing to target, distance to target, flight bearing, number of times each target appeared on screen (hits) and other general comments. In 2009, additional data was recorded including the start distance and bearing and the end distance and bearing which allowed the data to be displayed as relative density.

2.8 Incidental Observations

Incidental observations of marine birds were recorded during the vessel, aerial, and terrestrial marine bird surveys. Incidental bird observations were considered as observations occurring outside of the regular survey periods. These observations provide an indication and verification of the presence and seasonal occurrence of birds in the PEAA and CCAA.



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Locations of Marbled Murrelet Radar Locations 2006 - 2009

FIGURE NUMBER:	DATE:
2-5	20091119
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3 Review of Existing Literature and Data

Marine birds found in British Columbia can be divided into four main groups based on seasonal abundance and breeding distribution. The groups are defined as breeding resident, winter resident, summer visitor, and spring and fall migrants. British Columbia's pelagic seabirds are associated with two broad habitat classes:

1. those that occur most often and in highest number over the continental shelf
2. those that are found mostly at or beyond the shelf break

The shelf waters, especially near inshore banks, support the highest abundance and diversity of birds (Morgan et al. 1991). Appendix A outlines all marine birds that could potentially occur at the PEAA and CCAA, including their conservation status. Marine bird data have been collected and synthesized from existing literature sources and field surveys for key marine bird guilds (i.e., groups).

3.1 Important Bird Areas, Conservancies, Ecological Reserves and Parks and Protected Areas

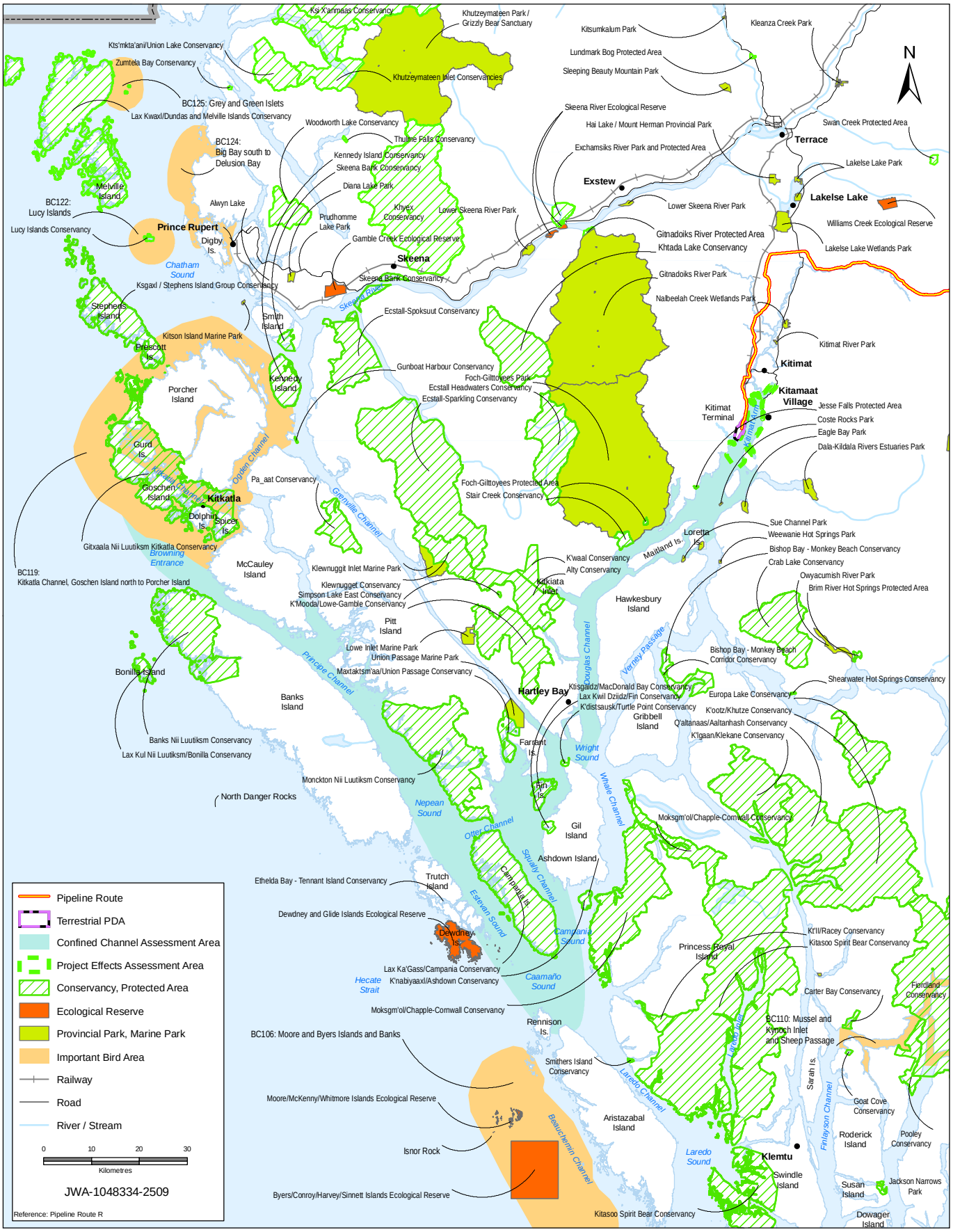
Marine birds make extensive use of coastal wetlands as well as nearshore and offshore habitats including islands, islets and cliffs. Several conservation areas near the study area have been established to assist in the preservation and management of marine bird species. Areas that are within the study area are described below.

3.1.1 Important Bird Area BC106 - Moore and Byers Islands and Banks

The Moore and Byers Islands and Banks IBA (IBA BC106) lie along the east side of Hecate Strait, between the north end of Vancouver Island and Prince Rupert. The site is approximately 100 km northwest of Bella Bella, 10 to 18 km off the west coast of Aristazabal Island, and includes all the islands, islets and reefs in this area (Figure 3-1). The northern and southern islands are separated by Wright Passage. The IBA includes the shallow marine water within a 10 km radius of the island chain. Many of the smaller islands are dominated by Sitka spruce, whereas the larger islands have grassy and herbaceous cover.

The majority of the marine-bird breeding habitat is located on 7 of the 12 islands in the IBA. Surveys conducted by Rodway and Lemon (1991) reported that 30,040 pairs of Forked-tailed Storm-petrels and 20,505 pairs of Leach's Storm-petrels nest within the IBA. Their survey also recorded 79 breeding pairs of Black Oystercatchers distributed over all 12 islands.

Three alcid species breed here in substantial numbers. These include the Rhinoceros Auklet (91,640 pairs), Cassin's Auklet (22,730 pairs) and Pigeon Guillemot (302 pairs); (Rodway and Lemon 1991). In addition, 889 pairs of Glaucous-winged Gulls bred here in 1988 (Rodway and Lemon 1991).



REFERENCES: NTDB Topographic Mapsheets provided by the Majesty the Queen in Right of Canada, Department of Natural Resources. All rights reserved.

CONTRACTOR: Jacques Whitford AXYS Ltd.	**ENBRIDGE NORTHERN GATEWAY PROJECT**	FIGURE NUMBER: 3-1	DATE: 20100120
PREPARED BY: gem	Important Bird Areas, Conservancies, Ecological Reserves, Parks and Protected Areas in and near the PEAA and CCAA	SCALE: 1:1,100,000	AUTHOR: BA / APPROVED BY: CM
PREPARED FOR: Enbridge Northern Gateway Pipelines		PROJECTION: UTM 9	DATUM: NAD 83

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Other species recorded in the IBA include: Peale's Peregrine Falcon, Bald Eagle, Tufted and Horned Puffins, Sooty and Short-tailed Shearwater, White-winged Scoter, Harlequin Duck, Marbled Murrelet, Pelagic Cormorant, Double-crested Cormorant and Brandt's Cormorant in this IBA (Rodway and Lemon 1991).

3.1.2 Important Bird Area BC119 - Kitkatla Channel, Goschen Island North to Porcher Island

The Kitkatla Channel, Goschen Island North to Porcher Island IBA (IBA BC119) includes salt and brackish marshes, tidal rivers and estuaries, mud and sand flats, inlets, coastal cliffs, rocky shores and open sea. These areas support significant populations of Surf Scoters during migration (IBA 2004, Internet site).

3.1.3 Moore, McKenney, Whitmore Islands Ecological Reserve

The Moore and Byers Islands and Banks Island Ecological Reserve support a breeding population of Ancient Murrelets on South Moore and the smaller islands (BC MoE 2003b, Internet site); however, the number of breeding pairs is unknown. The Ecological Reserve may support breeding Marbled Murrelets, but this has not been confirmed.

This Ecological Reserve is closed to the public. Research or educational activities may be conducted, but only with authorization from the province of British Columbia.

3.1.4 Dewdney and Glide Islands Ecological Reserve

This Ecological Reserve includes an extensive bog and fen ecosystem found on outer islands of the north coast. The reserve contains nesting habitat for several birds with restricted breeding ranges in British Columbia, such as Sandhill Crane and Cassin's Auklet (BC MoE 2003f, Internet site). Other coastal birds that use the reserve include Bald Eagle and Great Blue Heron.

This Ecological Reserve is closed to the public. Research or educational activities may be conducted, but only with authorization from the province of British Columbia.

3.1.5 Byers, Conroy, Harvey and Sinnett Islands Ecological Reserve

The Byers, Conroy, Harvey and Sinnett Islands Ecological Reserve was established to protect terrestrial and marine habitats and prevent the disturbance of nesting seabirds and raptors. Currently, this reserve is the only significant site documented for Tufted Puffins and the only known occurrence of peregrine falcons nesting in trees (BC MoE 2003a, Internet site). Permission from the government is required prior to landing on the islands and islets of this ecological reserve.

3.1.6 Provincial Parks and Conservancies

The Marine Provincial Parks provide habitat for waterfowl, shorebirds and alcids such as Marbled Murrelets (BC MoE 2003c, 2003d, 2003e, Internet sites). Figure 3-1 illustrates all provincial parks and conservancies found in and near the PEAA and CCAA. The recognized provincial parks and conservancies located within the PEAA and CCAA include the following:

- Eagle Bay Park
- Sue Channel Park
- Union Passage Marine Park
- K'waal Conservancy
- Kitzgaidz MacDonald Bay Conservancy
- K'distsausk/Turtle Point Conservancy
- K'nabiyaaxl/Ashdown Conservancy
- Banks Nii Luutiksm Conservancy
- Maxtakism'aa/Union Passage Conservancy
- Coste Rock Park
- Foch-Gilttoyees Park
- Klewnuggit Inlet Marine Park Stair Creek Conservancy
- Alty Conservancy
- Lax Kwil Dziidz/Fin Conservancy
- Lax Ka'Gass/Campania Conservancy
- Monkton Nii Luutiksm Conservancy
- Gitxaala Nii Luutiksm Kitkiatla Conservancy

3.1.7 Marine Bird Guilds

Below is a description of marine birds that could potentially occur in the PEAA and CCAA. The information below provides a detailed description of habitat preferences and specific locations where individuals have been observed historically. A description of each species' conservation status is included in Appendix A.

3.1.7.1 Loons and Grebes

Loons and grebes use the open, saltwater habitat of the PEAA and CCAA for feeding throughout the year, but are most abundant in winter. Four species of loon are found in British Columbia: Common Loon (*Gavia immer*), Pacific Loon (*G. pacifica*), Red-throated Loon (*G. stellata*) and Yellow-billed Loon (*G. adamsii*). Loons have been observed from the outer edge of the Kitimat Estuary, Minette Bay to Kitamaat Village. Red-throated Loons have also been sighted at Coste Rocks, Clio Bay and Walbran Point (Horwood 1992), Common Loons in the bays within Douglas Channel (Horwood 1992), and Yellow-billed Loons prefer open water, although they occur occasionally near Kitimat (Horwood 1992). All of the North American grebes have been observed in the area, except for Eared Grebe (*Podicpes nigricollis*) and Clark's Grebe (*Aechmophorus clarkii*). Pied-billed Grebe (*Podilymbus podiceps*) has been reported once, while Horned Grebe (*Podiceps auritus*), Red-necked Grebe (*P. grisegena*) and Western Grebe (*Aechmophorus occidentalis)* are found throughout Douglas and Principe Channels.

In a series of aquatic bird surveys in the Kitimat River Estuary (1974 to 1975), Hay (1976) observed a few loons in June and July, but only single birds in other months (total of 11). Grebes were more numerous during spring migration, reaching a maximum of 148 in March. The annual total of grebes was 355. Grebes accounted for an estimated 17 percent of Hay's observations (Appendix B).

Data collected at Emsley Cove (1991 to 2004) and Bish Cove (1991 to 2005) (Horwood, pers. comm.) show records of Common Loon and Western Grebe at both locations (Appendix C). In addition, a

Yellow-billed Loon was observed in Emsley Cove in May 1998 and small numbers of Horned Grebes and Red-necked Grebes have been recorded there (Appendix C) (Horwood, pers. comm.).

Between 1996 and 2005, seven Common Loons were recorded near Kitimat River Bridge during Christmas Bird Counts (CBCs). These data suggest that the Common Loon is a rare visitor to the Kitimat Estuary (National Audubon Society 2008 Internet site). Pacific Loon, Yellow-billed Loon and Red-throated Loon have not been recorded during CBCs, but they are still considered occasional visitors to the PEAA and CCAA. Horwood's observation of a Yellow-billed Loon at Emsley Cove in 1998 (Horwood 2006) suggests that this species may occur in the CCAA. Ten Red-necked Grebes and two Horned Grebes were recorded during those same CBCs. A single Pied-billed Grebe was recorded in 2005.

Results from field surveys conducted from August to September (1985) suggest that Red-throated Loons, Pacific Loons, Common Loons, Red-necked Grebes and Horned Grebes use marine and freshwater habitats at Princess Royal Island (Norecol, Dames and Moore 1997).

Common Loons and Red-throated Loons breed on coastal freshwater lakes. While Common Loons forage on lakes, the Red-throated Loon travels to saltwater habitats to collect food for its young. Loons require several years to mature and sub-adults may spend much of that time in saltwater. Pacific Loons and Common Loons in the Queen Charlotte Basin are most abundant during spring and fall migration. Yellow-billed Loon is a rare visitor to the Basin, with its greatest abundance occurring between September and June (Campbell et al. 1990b). Grebes breed on freshwater lakes east of the Coast Mountain Range and use saltwater habitat in the winter and during migration (Campbell et al. 1990a). Spring migration is generally from late April to early May with the majority of birds having departed by mid-May. Fall migration is greatest from mid-September to mid-October.

Special Status Species

Yellow-billed Loon

Regional Considerations. Breeding occurs from the MacKenzie River Delta to Hudson Bay, including islands of the Canadian Arctic. Wintering occurs irregularly along the north and southern coast of British Columbia (British Columbia Conservation Centre [BC CDC] 2009a, Internet site).

Local Considerations. Breeding occurs on Banks Island. The Yellow-billed Loon is blue-listed in British Columbia (BC CDC 2009b, Internet site)

Western Grebe

Regional Considerations. Western Grebes winter along the Pacific coast in sheltered areas (Burger 1997) and less frequently along rivers. They often congregate in large groups that may remain in one place for several months. The number of western grebes wintering on the north coast is considered very few (Vermeer et al. 1983).

Local Considerations. The Western Grebe is provincially red-listed, but is not listed under the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) or the *Species at Risk Act* (*SARA*).

3.1.7.2 Albatrosses, Fulmars, Shearwaters and Storm-Petrels

Albatrosses and shearwaters from the Southern Hemisphere gather off the coast of British Columbia during the austral winter. Black-footed Albatross (*Phoebastria nigripes*), Laysan Albatross (*P. immutabilis*) and Short-tailed Albatross (*P. albatrus*) occur in offshore waters, usually beyond the edge of the continental shelf. Short-tailed Albatross is globally very rare, with a few recent records from the Queen Charlotte Basin (LGL Limited Environmental Research Associates 2004).

Sooty Shearwater (*Puffinus griseus*) and Short-tailed Shearwater (*P. tenuirostris*) occur in Hecate Strait and use waters close to Moore, Byers, McKenny and Whitmore Islands (IBA 2004, Internet site). Non-breeding Pink-footed Shearwater (*P. creatopus*), Flesh-footed Shearwater (*P. carneipes*), and Buller's Shearwater (*P. bulleri*) prefer the offshore waters of the Queen Charlotte Basin (LGL Limited Environmental Research Associates 2004).

Northern Fulmars occur in high numbers in the Queen Charlotte Basin outside of its breeding season, but nest in Alaska (LGL Limited Environmental Research Associates 2004).

Fork-tailed (*Oceanodroma furcata*) and Leach's (*O. leucorhoa*) Storm Petrels breed in large numbers along coastal British Columbia and are often seen over open waters. Additionally, Forked-tailed Storm Petrel use inlets and were recorded at Coste Island in late September 1990 (Horwood 1992). Data from the IBA internet site indicate that Forked-tailed and Leach's Storm Petrel nest near the CCAA on the Moore Island and Byers Island IBA. This IBA is also included in provincial Ecological Reserves 23 and 103.

Special Status Species

Northern Fulmar

Global Considerations. The fulmar species breeds in the western Gulf of Alaska. The remainder of the year it is primarily pelagic with its range extending south along the western coast of North America (BC CDC 2009c, Internet site).

Regional and Local Considerations. The fulmar is red-listed in the province of British Columbia. It is considered a rare vagrant along the outer coast of British Columbia and is not likely to occur in the study area (BC CDC 2009b, Internet site).

Laysan Albatross

Global Considerations. The Laysan Albatross is the most abundant albatross in the Northern Hemisphere (ca. 2.5 million individuals). It ranges throughout much of the offshore Pacific Ocean. According to the Audubon Watch List (NAS 2002, Internet site), this pelagic seabird spends July to November at sea, returning to breed during the northern winter on a select few Hawaiian Islands.

Regional and Local Considerations. The species is blue-listed in British Columbia. It is considered a very rare vagrant along the outer coast and is not likely to occur within the PEAA and CCAA.

Black-footed Albatross

Global Considerations. The albatross breeds in the northwestern Hawaiian Islands and occurs year-round off the western US coast (BC CDC 2009d, Internet site).

Regional and Local Considerations. The Black-footed Albatross is blue-listed in British Columbia and is considered a rare vagrant along the outer coast of British Columbia. It is unlikely to occur within the PEAA and CCAA (BC CDC 2009b, Internet site).

Short-tailed Albatross

Global Considerations. The largest remaining breeding colony of Short-tailed Albatross is located on Torishima Island, a volcanic island rising out of the Pacific Ocean south of Japan. A small number of birds (fewer than 100) breed on the uninhabited island of Minami-kojima just north of Taiwan (NAS 2002, Internet site).

Regional and Local Considerations. The species is red-listed in the province. It is considered an occasional visitor to the British Columbia coast but has not been observed along the north coast (Geernaert 2006, Internet site).

Pink-footed Shearwater

Global Considerations. Pink-footed Shearwaters breed on three islands along the coastline of Chile during the northern winter. This shearwater is a species of the open ocean. It can be seen offshore over the relatively shallow waters of the continental shelf but is rarely seen over deep mid-ocean waters and is seldom seen from shore (NAS 2002, Internet site).

Regional and Local Considerations. This species is blue-listed in the province. It is known to occur as a summer visitor to the Pacific coast but tends to stay well offshore. It is rarely seen near land (Campbell et al. 1990a) and is not likely to be encountered within the PEAA or CCAA.

Flesh-footed Shearwater

Global Considerations. The Flesh-footed Shearwater has a range at sea throughout most of Pacific and Indian Ocean. It breeds on islands off the south coast of Western Australia, on Lord Howe Island, on islands off New Zealand, and on St. Paul Island in the Indian Ocean (NAS 2002, Internet site).

Regional and Local Considerations. This provincially blue-listed species is considered a rare but regular visitor off the west coast. No records of this species exist around the PEAA and CCAA. Birds that have been seen along the west coast are observed offshore (Campbell et al. 1990a).

Buller's Shearwater

Global Considerations. Buller's Shearwater can be observed in offshore waters of the Pacific coast during the late summer and fall. It breeds on a few small islands on the New Zealand coast but travels to the Pacific coast of North America during its non-breeding season.

Regional and Local Considerations. Small numbers of this provincially blue-listed pelagic seabird remain in the northeastern Pacific during the winter (NAS 2002, Internet site); however, there are no areas of

upwelling along the north coast where Buller's Shearwater congregate (Campbell 1990a). A few coastal records exist for the Queen Charlotte Islands[1], but most records are from the west coast of Vancouver Island (Campbell et al. 1990a). Buller's Shearwater is not likely to be encountered within the PEAA and CCAA.

3.1.7.3 Cormorants

Pelagic Cormorants (*Phalacrocorax* pelagicus) are year-round residents, but Brandt's (*P. penicillatus*) and Double-crested Cormorants (*P. auritus*) usually occur in the area as non-breeding winter visitors (LGL Limited Environmental Research Associates 2004, Campbell et al. 1990b). Double-crested Cormorants were reportedly common in Douglas Channel (Horwood 1992). Horwood (2006) recorded Pelagic Cormorants at Bish Cove during three separate visits in 1991, 1994 and 2004 (Appendix C). Brandt's Cormorant (*P. penicillatus*) has bred in the area in small numbers in the past. However, no breeding activity has been recorded (Horwood 2006).

Special Status Species

Pelagic Cormorant (subspecies pelagicus)

Global Considerations. The Pelagic Cormorant breeds in small colonies along the entire west coast of North America. Many nest in coastal caves where their eggs and young are protected from predation by eagles, gulls and crows. Colonies in more open areas are subject to disturbance.

Regional and Local Considerations. Pelagic Cormorants are widespread and occur along inner and outer coastal areas. A recognized subspecies of Pelagic Cormorant (*pelagicus*) breeds along the northern coast of British Columbia and is red-listed. They nest in small, dispersed colonies on rocky cliffs and headlands of small islands (Fraser et al. 1999). They rarely occur at the mouths of inlets; however, there are records of them in Kitimat (Campbell et al. 1990b). Nesting has been recorded for Pelagic Cormorant at approximately 25 sites in the Queen Charlotte Basin (LGL Limited Environmental Research Associates 2004). Furthermore, Coste Rock in the Kitimat Arm is a potential breeding site.

Double-crested Cormorant

Global Considerations. Double-crested Cormorants habitat preference includes lakes, ponds, rivers, lagoons, swamps, coastal bays, marine islands, and seacoasts (usually within sight of land). Most of the North American population breeds on large lakes or reservoirs with suitable fish populations, little disturbance, and low islands for nesting (Semenchuk 1992). Cormorants usually nest on the ground in closely-packed colonies and often in proximity to gulls, herons or pelicans (Semenchuk 1992). On average, they forage a distance of 15 km from their winter roost sites (Glahn and Stickley 1995).

Regional Considerations. This species is blue-listed in British Columbia and breeds in the Strait of Georgia, where colonies may be subject to disturbance. They are known to winter along the Pacific coast (Fraser et al. 1999).

[1] In December 2009, the Queen Charlotte Islands were renamed Haida Gwaii. The previous name is retained for consistency with reviewed literature.

Local Considerations. These cormorants occur as non-breeding winter visitors within the PEAA and CCAA.

Brandt's Cormorant

Global Considerations. Brandt's Cormorants are distributed along the Pacific coast. During the breeding season, birds are concentrated on the coast from Washington to California.

Regional Considerations. The species is red-listed in British Columbia with small local breeding populations on Vancouver Island. Brandt's Cormorants are more common during the non-breeding season in British Columbia (BC CDC 2009e, Internet site).

Local considerations. Brandt's Cormorants typically occur as a non-breeding winter visitor within the PEAA and CCAA.

3.1.7.4 Waders

Great Blue Heron (*Ardea herodias fannini*) is the only wading bird that has been recorded within or near the PEAA and CCAA. The population in Kitimat has increased since 1975 (Horwood 1992). It is regularly recorded on CBCs, and has been observed in Bish and Emsley Coves (Horwood 2006; Appendix C), Princess Royal Island (Norecol, Dames and Moore Inc. 1997) and in the Dewdney and Glide Island Ecological Reserve (BC MoE 2003f, Internet Site). While the southern British Columbia population frequently breeds in large colonies, northern birds tend to be more solitary (Campbell et al. 1990). LGL Limited Environmental Research Associates (2004) documented three non-colonial nesting sites in the Queen Charlotte Islands. According to Terrestrial Ecosystem Mapping conducted by Norecol, Dames and Moore Inc. (1997), habitats on Princess Royal Island are generally of low suitability.

The American Bittern (*Botaurus lentiginosus*) has never been abundant in British Columbia, but could potentially occur in the PEAA and CCAA.

Special Status Species

Great Blue Heron

Global Considerations. North American populations of the Great Blue Heron are often seen in shallow water at the edges of lakes, streams, rivers, ponds, sloughs, ditches, marshes and mudflats. Nesting is usually near water on lake islands, lake shorelines, or near creeks and rivers. Nesting occurs in colonies in the upper part of the main tree canopy in undisturbed mature deciduous, coniferous and mixed woodlands (e.g., aspen, balsam fir and spruce). Colony sites are used year after year if left undisturbed; however, colonies may be abandoned one year and used the next (Fraser et al. 1999). Colonies are typically within 3 to 8 km of foraging habitat (e.g., tidal mudflats, estuaries, slow-moving rivers, sloughs and marshy lakes) (NatureServe 2008, Internet site).

Regional Considerations. The population on the coast of British Columbia is a recognized subspecies (*fannini*). The *fannini* subspecies is blue-listed within British Columbia and classed as a species of Special Concern by COSEWIC and *SARA* (Schedule 3).

Local Considerations. The Great Blue Heron forages at the edges of water throughout the PEAA and CCAA in small numbers.

American Bittern

Global Considerations. The American Bittern (*Botaurus lentiginosus*) is a solitary breeder that is widespread in North America; however, it is locally and sparsely distributed. It is listed as a non-game species of management concern in the United States (Gibbs et al. 1992, Internet site). It breeds in wet areas with tall and dense emergent vegetation or tall grasses adjacent to freshwater sloughs, marshes, swamps and shallow lakes (Fraser et al. 1999). The bittern usually nests on the ground in marshy areas of tall vegetation but may occasionally use drier areas of tall grass (Priestly 2002).

Regional Considerations. The America Bittern is blue-listed in British Columbia. There are two regional records for the American Bittern: 1) at Deception Lake in October 1989 and 2) at Lakelse Lake in August 1976, where a rehabilitated bird was released (Horwood 1992).

Local Considerations. The bittern has not been observed in the PEAA or CCAA; however, this lack of observation may stem from its elusive behaviour rather than absence.

3.1.7.5 Geese and Swans

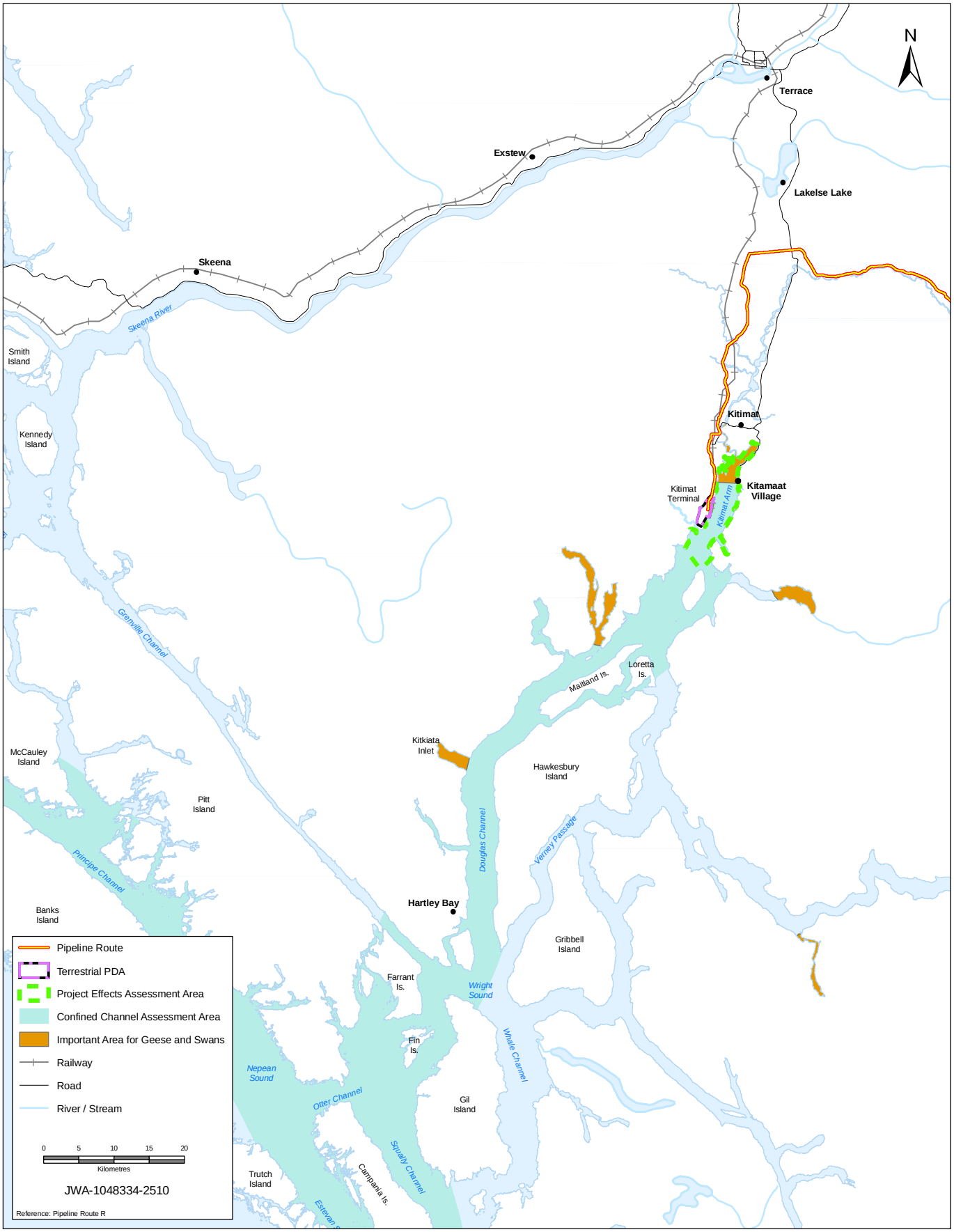
Figure 3-2 shows important areas for geese and swans in the PEAA and CCAA. Large flocks of Canada Geese (*Branta canadensis*) and Cackling Geese (*B. hutchinsii*) have been known to migrate along the north-south valley over Kitimat Arm. Horwood estimated that approximately 100 Canada Geese consistently use the estuary in winter (Norecol Environmental Consultants Ltd. 1991). CBCs report an average of 343 Canada Geese between 1996 and 2005 (NAS 2008, Internet site). Between 1991 and 2004, 95 Canada Geese were observed at Emsley Cove (Horwood 2006). Norecol Dames and Moore Inc. (1997) recorded approximately 30 Canada Geese, likely the *fulva* subspecies (i.e., Vancouver Canada Goose), at Princess Royal Island in late summer 1995.

Aquatic bird counts conducted in Kitimat Arm during 1974 and 1975 (Hay 1976) indicated that Canada Goose abundance decreased through the fall, remained relatively stable through the winter, and peaked again during spring migration.

Horwood estimates that 10 to 20 Trumpeter Swans (*Cygnus buccinator*) are present in the Kitimat Estuary in winter (Norecol Environmental Consultants Ltd. 1991). Data from Hay (1976), Horwood (1992) and CBCs (National Audubon Society 2008, Internet site) suggest that Trumpeter Swan use of the estuary may have increased since 1974 and 1975. In 1991, three adult and two immature Trumpeter Swans were observed at Emsley Cove (Horwood 2006).

Tundra Swan (*C. columbianus*) is a less-frequent visitor to the PEAA and CCAA; however, the species has been recorded at Kitimat Estuary and Minette Bay (Horwood 1992). Two Tundra Swans were recorded during the 1998 CBC (NAS 2008, Internet site).

Brant (*Branta bernicla)* and Snow Geese (*Chen caerulescens*) are likely to occur within the PEAA and CCAA during migration periods.



CONTRACTOR: Jacques Whitford AXYS Ltd.

PREPARED BY: gem

PREPARED FOR: Enbridge Northern Gateway Pipelines

ENBRIDGE NORTHERN GATEWAY PROJECT

Important Areas for Geese and Swans in and near the PEAA and CCAA

FIGURE NUMBER:	DATE:
3-2	20090914
SCALE: 1:750,000	AUTHOR: BA / APPROVED BY: CM
PROJECTION: UTM 9	DATUM: NAD 83

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Special Status Species

Aleutian Cackling Goose (subspecies B. h. leucopareia)

Global Considerations. This subspecies has three surviving populations, which breed on three Aleutian Islands. In addition, two populations have been re-introduced to the Agattu and Amchitka Islands in the Aleutian island chain (Campbell et al. 1990a).

Regional and Local Considerations. There are historic reports of the Aleutian Cackling Goose as a migrant in British Columbia, but the last confirmed record dates from 1945. This blue-listed species may occur along the coast near the CCAA during migration.

Dusky Canada Goose (subspecies B. c. occidentalis)

Global Considerations. The dusky subspecies of the Canada Goose breeds on the Copper River delta in Alaska and winters primarily in Oregon. Dusky Canada Geese migrate offshore mid-September through October, with substantial numbers staging on the Queen Charlotte Islands and Vancouver Island en route to their Oregon wintering grounds (Campbell et al. 1990b).

Regional and Local Considerations. The blue-listed dusky Canada Goose may occur along the coast near the CCAA during migration.

Brant

Regional and Local Considerations. The Brant is blue-listed in British Columbia. It is likely to occur as a migrant passing through the PEAA and CCAA, travelling to or from its breeding grounds along the coast of Alaska and Canadian territories (BC CDC 2009f, Internet site).

3.1.7.6 Diving Ducks

This guild includes the following species: Canvasback (*Aythya valisineria*), Ring-necked Duck (*A. collaris*), Greater Scaup (*A. marila*), Lesser Scaup (*A. affinis*), Harlequin Duck (*Histrionicus histrionicus*), Long-tailed Duck (*Clangula hyemalis*), Black Scoter (*Melanitta nigra*), Surf Scoter (*M. perspicillata*), White-winged Scoter (*M. fusca*), Common Goldeneye (*Bucephala clangula*), Barrow's Goldeneye (*B. islandica*), Bufflehead (*B. albeola*), Hooded Merganser (*Lophodytes cucullatus*), Common Merganser (*Mergus merganser*) and Red-breasted Merganser (*M. serrator*).

The number of diving ducks recorded during monthly counts of aquatic birds in the Kitimat River Estuary from 1974 to 1975 ranged from two in November 1974 to 429 in July 1975 (Hay 1976, Appendix B). In total, 695 individuals were reported during the 1974 to 1975 survey period. Rafts of Surf Scoters and White-winged Scoters at the north end of Kitimat Arm and Coste Island Rock between May and July 1976 (maximum 840, recorded on July 4) (Hay 1976). Several species in Kitimat Arm were most common on the open, salt-water habitat, including Harlequin Duck, White-winged Scoter, Surf Scoter and Greater Scaup. The counts suggest that diving ducks are the second most abundant group of aquatic birds, comprising 33% of the local numbers (Hay 1976).

Horwood (2006) lists 628 records of diving ducks for Bish Cove (Appendix C). The observations are from non-standardized counts conducted between October 1990 and October 2005. Observations include Barrow's Goldeneye, Bufflehead, Common Goldeneye, undifferentiated Goldeneye species, Common Merganser, Harlequin Duck, Hooded Merganser, Red-breasted Merganser, Surf Scoter, and White-winged Scoter. The higher numbers at Emsley Cove likely reflect effort rather than higher-quality habitat. Common Mergansers bred in Emsley Cove in 2004 (Horwood 2006).

CBCs between 1996 and 2008 (National Audubon Society 2008, Internet site) report Barrow's Goldeneye, Bufflehead, Common Goldeneye, Common Merganser, Greater Scaup, Harlequin Duck, Hooded Merganser, Lesser Scaup, Long-tailed Duck, Red-breasted Merganser, Ring-necked Duck, Surf Scoter and White-winged Scoter at Kitimat River Bridge (Table 3-1). Noteworthy observations include:

1. exceptionally high numbers of Greater Scaup in 2003;
2. consistent winter use of the estuary by Common Goldeneye; and
3. infrequent visits by Harlequin Duck, Lesser Scaup, Long-tailed Duck, Red-breasted Merganser, Surf Scoter or White-winged Scoter.

Table 3-1 Christmas Bird Count Diving Duck Observations near Kitimat River Bridge, 1995-96 to 2007-08

Year	96	97	98	99	00	01	02	03	04	05	06	07	08
Barrow's Goldeneye		8	15		11	3		4	1		1	2	
Bufflehead	28	17	54	84	118	85	18	47	116	61	59	203	72
Common Goldeneye	250	166	150	280	260	22	11	50	124	19	41	60	17
Common Merganser	8	8	2	7	28	17	6	15	35	9	40	136	8
Greater Scaup	60	400	500	200	200	420	250	11998	231	313		401	212
Harlequin Duck										1			
Hooded Merganser		2	7	7	14	6	8	2	8	6	7	14	4
Lesser Scaup				1									
Long-tailed Duck			2										
Red-breasted Merganser		2									11		
Ring-necked Duck	6	30	21	100	50	50	7	2	31	40	75	50	57
Surf Scoter		15										27	
White-winged Scoter			1					0					

SOURCE: National Audubon Society (2008, Internet site)

Data from Horwood (2006) and the National Audubon Society (2008, Internet site) are confirmed by Wren (2003), IBAs (2004, Internet site) and LGL Limited Environmental Research Associates (2004). These literature sources also suggest that the Black Scoter and Long-tailed Duck use the Queen Charlotte Basin. Small flocks of Surf Scoter and a single White-winged Scoter, Common Goldeneye, Common and Hooded Mergansers have been spotted at Chapple Inlet and at estuarine and coastal habitats on Princess Royal Island (Norecol Dames and Moore Inc 1997).

Special Status Species

Surf Scoter

Global Considerations. Surf Scoters nest on freshwater lakes across much of northern North America but winter along the coast. Although they are a managed game bird, their population appears to be declining rapidly.

Regional Considerations. Surf Scoters are blue-listed in British Columbia. Few nesting sites have been identified in British Columbia, but locations have been reported in the Peace River and Fort Nelson lowlands at 300–360 m elevation. Typical non-breeding habitat in the interior is usually lakes, but Surf Scoters occasionally use sloughs, ponds and rivers (Campbell et al. 1990a). On the British Columbia coast they seem to prefer relatively shallow (<6 m in depth), open waters of straits, spits and points, as well as more protected bays, harbours and lagoons.

Surf Scoters winter along the entire length of coastal British Columbia. Fall migration begins in late August, and birds arrive in the coastal wintering areas from late September through November. Spring migration begins in late March and peaks in late April to early May (Campbell et al. 1990a). Non-breeding sub-adults and moulting adults occur in coastal locations during the late summer months. In the winter and spring, very large concentrations of birds occur on the coast.

Local Considerations. Wintering populations occur in waters of both the PEAA and CCAA. During the spring, large concentrations of surf scoters will congregate at herring spawning sites within the CCAA.

Long-tailed Duck

Global Considerations. The Long-tailed Duck (formerly oldsquaw) breeds in the arctic and winters along the coasts of North America.

Regional Considerations. The Long-tailed Duck is assigned an “unknown” conservation status in British Columbia. It has a breeding range restricted to the extreme northwest of the province, near Atlin.

Wintering and migrating Long-tailed Ducks may be found throughout coastal British Columbia, but the major wintering concentrations occur in the Strait of Georgia between Comox and Victoria, and in the northern Queen Charlotte Islands (Campbell et al. 1990a). Long-tailed Ducks usually winter on deeper waters along the British Columbia coast but move into straits, bays, harbours, channels, and fjords as the season progresses. In early spring, groups gather at points, spits, peninsulas, rocky islets, or reefs. Small numbers often occur in estuaries (Campbell et al. 1990a). Spring migration begins by late February and continues through May on the south coast and early June on the north coast. Fall migration in British Columbia is concentrated in October and November (Campbell et al. 1990a).

Local Considerations. Small numbers may occur in waters of both the PEAA and CCAA during migration.

Harlequin Duck

Global Considerations. The Harlequin Duck breeds in the Russian Far East, Iceland, Labrador, British Columbia and Alaska. The population along the Atlantic Coast has been listed by COSEWIC and *SARA*

as a species of Special Concern under Schedule 1. The western population is not listed. The Canadian Wildlife Service monitors the western population closely because of the status of the birds in eastern Canada. The western population is estimated at 200,000 to 300,000 birds, whereas the eastern population has declined from historical estimates of 5,000 to 10,000 to fewer than 1,500 individuals.

Regional Considerations. Harlequin Ducks breed along fast-flowing creeks, usually east of the Coast Range but occasionally along the Pacific coast. Males return to salt water as soon as the eggs are laid and females return with the young when they are capable of flight. They typically forage close to the tideline among boulders or along cobble beaches.

Local Considerations. Some Harlequin Ducks may breed in the creeks flowing into Douglas Channel. Numbers of birds using remote parts of the PEAA and CCAA are poorly known.

3.1.7.7 Dabbling Ducks

Twenty five individuals were recorded between September 1974 and August 1975. Large flocks of Mallards (*Anas platyrhynchos*) occasionally migrate along the north-south valley over Kitimat Arm.

Based on 1991 observations, Horwood estimates that approximately 300 dabbling ducks consistently use the Kitimat Estuary in winter (Norecol Environmental Consultants Ltd. 1991). American Wigeon (*A. americana*), Green-winged Teal (*A. crecca*), Mallard, Northern Pintail (*A. acuta*) and Northern Shoveler (*A. clypeata*) were recorded at Emsley Cove, and Mallards were the only species observed at Bish Cove (Horwood 2006).

CBCs from the Kitimat Estuary are summarized in Table 3-2 (NAS 2008, Internet site) and suggest that Mallards are consistently the most abundant dabbling duck species. These counts concur with Canadian Wildlife Service data showing the Mallard is the most frequently harvested species in British Columbia (Canadian Wildlife Service [CWS] 2008, Internet site).

Table 3-2 Dabbling Duck Observations from Kitimat River Bridge, 1995-96 to 2007-08

Year	96	97	98	99	00	01	02	03	04	05	06	07	08
American Green-winged Teal		18	70	120	54	83	25	31	55	14	6	16	
American Wigeon			27	3	17	4	7	3	25		5	4	2
Gadwall					1	7		2	1				
Mallard	213	217	455	208	142	330	102	518	394	692	249	195	310
Northern Pintail		1	4	6	3	0	6	3				2	
Northern Shoveler				5	2			3	30	46		2	5
SOURCE: National Audubon Society (2008, Internet site)													

Survey data from Princess Royal Island collected in August-September 1995 showed a large flock of American Green-winged Teal and a smaller flock of American Wigeon at Cornwall Estuary. Fourteen Northern Shovelers and three Mallards were also observed on the island, but observations were restricted to freshwater habitats (Norecol Dames and Moore Inc. 1997).

3.1.8 Coastal Raptors

For this TDR, coastal raptors are defined as coastally dependant, and commonly occurring, diurnal birds of prey including Bald Eagles (*Haliaeetus leucocephalus*), Osprey (*Pandion haliaetus*), Peale's Peregrine Falcon (*Falco peregrinus pealei*), and Sharp-shinned Hawk (*Accipiter striatus*). These species occur on open salt-water and estuarine habitats in the CCAA. They have been spotted along the Kitimat Arm and are likely to occur throughout Douglas Channel. Bald Eagle and Peregrine Falcon are thought to nest in the Moore and Byers Islands IBA for nesting (IBA 2004, Internet site). The Dewdney and Glide Islands area also support breeding Bald Eagles (BC MoE 2003f, Internet site), whereas the Byers, Conroy and Harvey Sinnett Islands Ecological Reserve support the province's only known occurrence of tree-nesting Peregrine Falcons (BC MoE 2003a, Internet site).

Terrestrial Ecosystem Mapping of Princess Royal Island (Norecol, Dames and Moore Inc. 1997) suggests that this island is valuable habitat for Bald Eagle. Field surveyors on the island recorded more than 40 individuals, including adults and immature and juvenile birds. They were frequently observed feeding on salmon carcasses. No nests were observed, but observations suggest that nesting does occur here (Norecol, Dames and Moore Inc. 1997). Two Ospreys were recorded in September 1995. According to Horwood's observations, one Osprey was observed at Emsley Cove in October 2004, and many Bald Eagles were recorded at Emsley and Bish Coves (Horwood 2006). Golden Eagle (*Aquila chrysaetos*) may occur as a rare vagrant to the PEAA and CCAA during migration to summer grounds inland and in the arctic.

Special Status Species

Peale's Peregrine Falcon (subspecies pealei)

Global Considerations. Peale's Peregrine Falcon nests at scattered locations along the north coast of British Columbia and southern Alaska. It prefers inaccessible ledges on vertical rocky cliffs, especially near seabird colonies. Occasionally, it uses abandoned nests of Pelagic Cormorants or Bald Eagles. There is little or no nest construction, just a scrape or slight depression, often littered with prey remains and plant debris (Campbell et al. 1990a). Peale's Peregrine Falcon feeds primarily on colonial-nesting seabirds and has a particularly close association with the Ancient Murrelet that nests on the Queen Charlotte Islands (Campbell et al. 1990b).

Regional and Local Considerations. Peale's Peregrine Falcon is red-listed in British Columbia and of Special Concern on a national scale (i.e., COSEWIC and *SARA*). It is a species of the outer shores, but occasionally hunts shorebirds on coastal estuaries (Campbell et al. 1990b).

3.1.9 Rails, Coots and Cranes

American Coot (*Fulica americana*) and Sandhill Crane (*Grus canadensis*) have been recorded in the PEAA and CCAA. Two records exist for Sora in the Kitimat area (Horwood 1992) and it is considered an accidental species. The American Coot is a wintering species that has occasionally been recorded in high numbers between September-January (Horwood 1992) and consistently appears on CBCs (NAS 2008, Internet site). In 2003, one Sandhill Crane was recorded by Kitimat CBC observers.

Sandhill Cranes breed at many sites along the coast. Ten were observed on Princess Royal Island in August and September 1995 (Norecol Dames and Moore Inc. 1997). The large bogs and wetlands in the Hecate Lowlands have been identified as known breeding areas, with 'tufted clubrush – sphagnum' and 'tufted hairgrass meadows' site series possessing the highest value for foraging habitat (Norecol Dames and Moore Inc. 1997). The Dewdney and Glide Islands Ecological Reserves include important Sandhill Crane nesting habitat.

There are three subspecies of Sandhill Cranes: *G. canadensis canadensis*, *G.c. rowanii* and *G.c. tabida.* The Greater Sandhill Crane (*G.c. tabida*) and Canadian Sandhill Crane (*G.c. canadensis*) are known to occur on the north central coast; however, literature suggests that G.c. *rowanii* may be the prevalent coastal subspecies (Campbell et al. 1990b). Sandhill Cranes have three discrete migration routes through British Columbia: coastal, central interior and northeastern (Campbell et al. 1990b). Early spring migrants appear along the coast in February and early March, with the main portion of the migrants appearing in April. On Vancouver Island, fall migration of the coastal cranes appears to begin in September and may extend into November. However, the early stages of migration are gradual and the cranes have usually left the north coast of British Columbia long before southern observers see the peak movement in October (Campbell et al. 1990b).

3.1.10 Shorebirds

A complete list of potentially occurring shorebirds is included in Appendix A. Horwood (1992) lists the following as a subset of migrant and wintering birds in the Kitimat River Estuary:

- Black-bellied Plover (*Pluvialis squatarola*)
- American Golden Plover (*P. dominica*)
- Semipalmated Plover (*Charadrius semipalmatus*)
- Killdeer (*C. vociferous*)
- Black Oystercatcher (*Haematopus bachmani*)
- Black Turnstone (*Arenaria melanocephala*)
- Ruddy Turnstone (*Arenaria interpres*)
- Surfbird (*Aphriza virgataI)*
- Greater Yellowlegs (*Tringa melanoleuca*)
- Lesser Yellowlegs (*T. flavipes*)
- Solitary Sandpiper (*T. solitaria*)
- Wandering Tattler (*Heteroscelus incanus*)
- Spotted Sandpiper (*Actitis macularia*)
- Whimbrel (*Numenius phaeopus)*
- Sanderling (*Calidris alba*)
- Semipalmated Sandpiper (*C. pusilla*)
- Western Sandpiper (*C. mauri*)
- Least Sandpiper (*Calidris minutilla*)
- Baird's Sandpiper (*C. bairdii*)
- Pectoral Sandpiper (*C. melanotos*)
- Rock Sandpiper (*C. ptilocnemis*)

- Dunlin (*C. alpine*)
- Short-billed Dowitcher (*Limnodromus griseus*)
- Long-billed Dowitcher (*L. scolopaceus*)
- Common Snipe (*Gallinago gallinago*)
- Red-necked Pharalope (*Phalaropus lobatus*)

Within this subset, Killdeer and Spotted Sandpiper are the only species likely to breed near the Kitimat River Estuary and only the Spotted Sandpiper has been recorded nesting (Campbell et al. 1990b).

Low numbers of Common Snipe, Killdeer and Dunlin were recorded on the Kitimat Estuary between 1996 and 2008 (NAS 2008, Internet site). Dunlin frequently occur in flocks of several hundred birds at various sites along the coast; however, only 21 were reported in 1996 and 50 in 1998. Horwood (2006) has recorded Black Turnstone, Pectoral Sandpiper, Semipalmated Sandpiper, Spotted Sandpiper and Surfbird at Emsley Cove, but only the Black Turnstone was observed in flocks.

IBA (2004, Internet site) and BC MoE (2003b, Internet site) data suggest that the Moore, Byers, McKenny and Whitmore Islands support breeding populations of Black Oystercatchers. In addition, LGL Limited Environmental Research Associates (2004) indicated that small numbers of Semipalmated Plovers breed on sandy beaches in the Queen Charlotte Basin. Norecol, Dames and Moore Inc. (1997) report non-breeding Greater Yellowlegs, Spotted Sandpiper, Baird's Sandpiper and a small flock of Red-necked Phalarope using inlets of Princess Royal Island.

Special Status Species

American Golden-Plover

Global Considerations. The American Golden Plover is one of two species formerly considered as the Lesser Golden-Plover.

Regional Considerations The American Golden-Plover is blue-listed in British Columbia. According to the BC CDC (2008, Internet site), this species may occur in the Cassiar component of the Skeena-Stikine Forest District within Spruce-Willow-Birch and Alpine Tundra biogeoclimatic zones. Fraser et al. (1999) describe breeding habitat as limited to alpine tundra habitats at higher elevations (e.g., 1800 m). During migration, the American Golden-Plover uses lagoon shores, sand spits and tidal mudflats along coastal British Columbia (Campbell et al. 1990b). Spring migration occurs primarily in May. Fall migration begins in late July, peaking when the juveniles migrate in September (Campbell et al. 1990b).

Local Considerations. This species is a very rare to rare migrant throughout the province (Campbell et al. 1990a) and not likely to occur within the PEAA and CCAA.

Wandering Tattler

Global Considerations. Migrant and wintering Wandering Tattlers occur in small numbers along the entire west coast of North America. They breed in alpine areas (Campbell et al. 1990b).

Regional Considerations. The Wandering Tattler is provincially blue-listed. The extreme northeastern corner of British Columbia appears to be the southern limit for breeding by the wandering tattler (Campbell et al. 1990b).

Non-breeding habitat for Wandering Tattlers includes extremely exposed coastal areas. It migrates singly or in small flocks along reefs, rocks and peninsulas in the area of the Queen Charlotte Basin, usually avoiding the protected waters of coastal fjords.

Local Considerations. Small numbers of Wandering Tattlers may use rocky shoreline along the CCAA during migration.

Short-billed Dowitcher

Global Considerations. The Short-billed Dowitcher breeds across northern North America and migrates to coastal estuaries and wetlands.

Regional Considerations. The Short-billed Dowitcher is blue-listed in British Columbia. The breeding range appears to be limited to wet, subalpine meadows and muskeg complexes with sedges and sphagnum in the extreme northwest portion of the province (Campbell et al. 1990b). A small breeding population (i.e., 2 or 3 pairs) has been recorded near Masset on the Queen Charlotte Islands, where the nests are in a brackish estuarine marsh.

During spring migration, from mid-April to mid-May, thousands of Short-billed Dowitchers fly north along the coast of British Columbia. The fall migration occurs primarily in July and early August (Campbell et al. 1990b).

Local Considerations. In the areas under consideration, Short-billed Dowitchers are likely restricted to the Kitimat River Estuary, where they occur in small numbers.

Red-necked Phalarope

Global Considerations. Red-necked Phalaropes have a circumpolar breeding distribution (Campbell et al. 1990a) with a global population around 4 million.

Regional Considerations. Red-necked Phalaropes are blue-listed within British Columbia. They nest in the extreme northwest corner of the province. Nests are built in low vegetation at the margins of low-arctic and sub-arctic freshwater pools, small lakes, bogs, and marshes (Campbell et al. 1990b).

Mainly pelagic in winter, Red-necked Phalaropes in British Columbia can be observed in small flocks (5 to 15 individuals), increasing during migration to flocks of several thousand. Red-necked Phalaropes congregate at tide lines and at the edges of kelp beds to forage on invertebrates. More birds migrate offshore rather than near shore and along the inner coast, and fewer still migrate through the interior of British Columbia (Campbell et al. 1990b). Spring migration begins in late April or early May and peaks around mid-May. Fall migration begins in early July, continuing through early September with the arrival of juveniles. Most migrants have departed British Columbia by October (Campbell et al. 1990b).

Local Considerations. Within the CCAA, Red-necked Phalaropes occur in exposed waters in fairly small numbers during migration.

3.1.11 Gulls, Jaegers, Skuas and Terns

A complete list of potentially occurring gulls, jaegers, skuas and terns is included in Appendix A. The following paragraphs summarize documented occurrences for this guild within the PEAA and CCAA. Hay (1976) indicated that gulls were the most abundant species group (42%) in Kitimat Arm during 1974 to 1975, with numbers being high but variable over the winter and low in May and June. Several species in the Kitimat Arm were most common on open, salt-water habitat, including Glaucous-winged Gull (*Larus glaucescens*) and Mew Gull. Parasitic Jaeger (*Stercorarius parasiticus*) and Herring Gull (*L. argentatus*) occurred occasionally.

Glaucous-winged Gulls breed at Coste Island Rock and several other small sites in Kitimat Arm (Hay 1976). In some years, Mew Gull (*L. canus*) has been recorded nesting at the Alcan settling ponds in Kitimat (Horwood 1992). Nesting is rarely recorded for these two species in the deep fjords of British Columbia's northern coast except where human activities have modified the habitat and stabilized the food resources. Moore and Byers Islands IBA as well as the Moore, McKenny and Whitmore Ecological Reserve are nearby examples of typical breeding locations for Glaucous-winged Gulls (IBA 2004, Internet site; BC MoE 2003b, Internet site).

Bonaparte's Gull (*L. philadelphia*), California Gull (*L. californicus*), Glaucous-winged Gull, Herring Gull, Mew Gull and Thayer's Gull (*L. thayeri*) have been recorded at Bish and Emsley Coves. Mew Gull is the most frequently recorded species (Horwood 2006). These species were also recorded at Princess Royal Island (Norecol Dames and Moore Inc. 1997). In addition, one Ring-billed Gull (*L. delawarensis*) was recorded during the 2003 CBC (NAS 2008). Typically, the Glaucous-winged Gull is the most abundant gull during Kitimat Estuary CBCs (National Audubon Society 2008).

Jaegers tend to be solitary, offshore birds. Consequently, they have rarely been recorded in protected habitats such as Kitimat River Estuary or Bish and Emsley Coves. A single adult Parasitic Jaeger (*Stercorarius. parasiticus*) was observed flying south over the channel on July 2, 1975 (LGL Limited Environmental Research Associates 2004). Long-tailed Jaeger (*S. longicaudus*) and Pomarine Jaeger (*S. pomarinus*) prefer more pelagic habitats than Parasitic Jaeger, but all three have been observed in the Queen Charlotte Basin (Campbell et al. 1990b).

Caspian (*Sterna caspia*) and Black (*Chlidonias niger*) Terns have been reported as accidentals along Kitimat Arm during the spring and fall migration period (Horwood 1992). Caspian Tern records generally occur as offshore spring and fall migrants and can be found in small numbers closer to shore in the summer (Campbell et al. 1990b).

Special Status Species

California Gull

Global considerations. California Gull breeds across the Canadian prairies and western United States, but often migrates to the west coast over winter. It forages in a wide variety of open habitats including beaches, bays, estuaries, lagoons, open water and agricultural fields (Campbell et al. 1990b). Spring migration on the coast begins in mid-March and continues into early May, with the peak in early April.

Fall migration begins in mid-July and increases during August. Small numbers remain along the coast during summer and winter (Campbell et al. 1990b).

Regional considerations. California Gull is blue-listed in British Columbia. There is only one nesting record from Okanagan Lake (Campbell et al. 1990b). On the north coast of British Columbia, California Gull is a common species during fall migration but may be casual to very rare in spring and summer (Campbell et al. 1990b).

Local considerations. Small to moderate numbers occur throughout the PEAA and CCAA, depending on the season.

Caspian Tern

Global considerations. The Caspian Tern is an abundant breeder on the west coast of the US and eastern Canada. Caspian Terns usually nest in colonies near other terns or gulls, on sandy or rocky islands in lakes or along the coast (Godfrey 1986). Foraging habitats include beaches, tidal mudflats, and sheltered bays (Campbell et al. 1990b).

Regional considerations. In British Columbia, the Caspian Tern is blue-listed and considered to be very rare outside of the south coast (Campbell et al. 1990b). There is one breeding record in the Strait of Georgia. Migrating birds arrive in British Columbia in late April and start their return migration before the end of October (Campbell et al. 1990b). Single birds or small groups may wander north along inner and outer coasts as far north as Prince Rupert and the Queen Charlotte Islands (Campbell et al. 1990a).

Local considerations. The Caspian Tern is very rare along the north coast including Queen Charlotte Islands (Campbell et al. 1990b).

3.1.12 Alcids

In 1976, ten alcid species were recorded over a year in the Kitimat Estuary (Hay 1976). According to Horwood (1992), the Common Murre (*Uria aalge*), Pigeon Guillemot (*Cepphus columba*) and Marbled Murrelet have been recorded in the Kitimat area. Common Murre, Pigeon Guillemot, Ancient Murrelet (*Synthliboramphus antiquus*), Cassin's Auklet (*Ptychoramphus aleuticus*), Rhinoceros Auklet (*Cerorhinca monocerata*) and Tufted Puffin (*Fratercula cirrhata*) are numerous colonial breeders in the Queen Charlotte Basin. Cassin's Auklet, Rhinoceros Auklet, Pigeon Guillemot, Tufted Puffin and Horned Puffin (*F. corniculata*) have bred at Moore and Byers Islands (IBA 2004, Internet site). A single report suggests that Ancient Murrelets may nest in the Moore, McKenney and Whitmore Ecological Reserve (BC MoE 2003b, Internet site; Campbell et al. 1990b). Glide Island and Byers, Conroy and Harvey Sinnett Ecological Reserves are used for nesting by Cassin's Auklet and Tufted Puffin. Solitary Thick-billed Murres (*Uria lomvia*) occur in offshore waters but, in British Columbia, they are only known to nest on Triangle Island.

Horwood (2006) has accumulated 38 Marbled Murrelet records from Bish (20) and Emsley Coves (18). Horwood (2006) also recorded one Pigeon Guillemot in Bish Cove in January 1991, one in April 1991 at Emsley Cove and a pair in May 2004 at Emsley Cove. CBC data for areas closer to Kitimat showed two Marbled Murrelets in 1996 and then observations in 2006, 2007, and 2008. Three Common Murres were observed in 2004 (NAS 2008, Internet site).

Coste Island is a breeding site in the Kitimat Arm for Pigeon Guillemot (Hay 1976). In addition a small colony (<30 pairs) was spotted during project field surveys in Gilttoyees Inlet. Nesting is rarely recorded for these species in the deep fjords of British Columbia's northern coast. Coste Island is rarely subject to disturbance because of its remote location. Observations from a local naturalist (Horwood 2006, pers. comm.) suggest that waters to the east of Coste Island and Coste Rocks are used with greater frequency by Marbled Murrelets. During the months of June and July, he observed larger groups of Marbled Murrelets at the head of inlets such as Foch Lagoon and Gilttoyees Inlet.

In 1990, Kaiser et al. (1991) conducted a survey of coastal waters from a 10 m boat. In a series of transects, about 400 m wide, they recorded the following densities for Marbled Murrelets within areas of the CCAA:

- 2.2 birds/km at Fraser Reach
- 2.4 birds/km at Bishop Bay
- 0.6 birds/km at Boxer Reach
- 3.2 birds/km at Campania Sound
- 1.3 birds/km at Caamaño Sound

Special Status Species

Ancient Murrelet

Global Considerations. The Ancient Murrelet breeds on small islands along both the Asian and American shores of the North Pacific, (north of 52°). Similar to other colonial alcids, it nests on small offshore islands.

Regional Considerations. The Ancient Murrelet is blue-listed within the province of British Columbia and COSEWIC has listed the Ancient Murrelet as a species of special concern since 1994. It is currently on Schedule 1 of *SARA.*

The Ancient Murrelet breeds on the Queen Charlotte Islands. It selects forested islands dominated by Sitka spruce, western hemlock, and western red cedar. A record from the Moore Islands is the only one for the mainland coast (Campbell et al. 1990b).

The Ancient Murrelet nests in burrows excavated beneath the roots of trees, usually in areas of moss or bare litter that have few shrubs. Most burrows are within 400 m of shore and at less than 300 m elevation (Campbell et al. 1990b). The young leave the nest within 48 hours of hatching and head to sea with their parents.

Between March and July, at-sea concentrations of adult Ancient Murrelets are generally associated with breeding colonies, but soon after the end of breeding, they move southward to the southern British Columbia and US coasts. By September, few remain in northern waters. Ancient Murrelet prefer open areas of upwelling and mixing (Campbell et al. 1990b) and typically avoid protected waters in inlets (Campbell et al. 1990b).

Local Considerations. Family groups may occur near the outer edge of the PEAA and CCAA in June.

Marbled Murrelet

Global Considerations. Marbled Murrelet breed along the coast from Alaska to California. Unlike other alcids, it is not colonial and typically nests in large trees, often at elevations above 1000 m. Nests may be 30 to 80 km from the ocean (British Columbia Ministry of Water, Land and Air Protection [BC MWLAP] 2004). Most nests are on wide natural moss-covered platforms in old-growth conifers, but a small number have been recorded on mossy cliff-ledges and one has been found in a deciduous tree (Burger 2002). The nest is a simple depression in the moss or duff.

At sea, the Marbled Murrelet usually appears in pairs or small groups within 2 km of land and usually within 500 m of shore (British Columbia Ministry of Water, Land and Air Protection 2004). A few individuals visit lakes up to 75 km inland (Campbell et al. 1990b). Murrelets regularly travel long distances (>70 km) over protected waters and concentrations of several hundred birds may occur wherever there are unusually rich foraging areas.

Regional Considerations. Marbled Murrelets are red-listed in British Columbia and are a nationally threatened species according to COSEWIC and *SARA* (Schedule 1). They breed throughout coastal regions of British Columbia in late-April through to early September. Marbled Murrelets winter along the north coast, but concentrations rarely exceed 100 birds.

Local Considerations. Concentrations of Marbled Murrelets occur within the PEAA and CCAA where concentrations of small fish occur.

Common Murre

Global Considerations. The Common Murre breeds in dense concentrations along the coasts of the North Atlantic and North Pacific Oceans. Following breeding, it disperses widely for the winter.

Regional Considerations. The Common Murre is red-listed in British Columbia. It is a frequent victim of gill nets. On the British Columbia north coast, most Common Murres nest on cliffs in the Kerouard Islands at the south end of the Queen Charlottes and on Triangle Island in the Scott Group (Campbell et al. 1990b). No nest is constructed and the egg is laid on bare ground.

The Common Murre often forages far from shore, but will enter inlets and channels where up-welling or mixing improves foraging opportunities (Campbell et al. 1990b). Migration and dispersal patterns are poorly understood and the movement between the inner and outer coast further inhibits our understanding of their migration patterns. However, literature indicates that large numbers of Common Murres congregate at feeding grounds near the Queen Charlotte Islands in the fall (Campbell et al. 1990b).

Local Considerations. Groups of Common Murres may occur in the outer parts of the PEAA and CCAA in fall and winter.

Tufted Puffin

Global Considerations. The Tufted Puffin breeds on small islands along the American and Asian shores of the North Pacific.

Regional Considerations. The Tufted Puffin is blue-listed in British Columbia. It breeds in small numbers along the west coast of Vancouver Island and the Queen Charlotte Islands. It typically forages in deep

waters off the continental shelf, but individuals may be seen in shallower waters at any season. Most records are from the breeding period (May to August) (Campbell et al. 1990b; Fraser et al. 1999). Tufted Puffins nest on offshore islands in colonies, small groups, or as solitary pairs. Most colony sites are grassy with few trees or shrubs. Migration patterns are poorly understood. In British Columbia, most Tufted Puffins return to nesting colonies in May and leave in August. Generally, in October they disperse to offshore waters where they remain until April. There may be a general southward movement during the autumn dispersal (Campbell et al. 1990b).

Local Considerations. Tufted Puffins are unlikely to occur within the PEAA or CCAA.

3.1.13 Kingfishers

Belted Kingfishers (*Ceryle alcyon*) were commonly recorded at Bish and Emsley Coves (Horwood 2006) and have also been recorded in low numbers every year since 1996 at the Kitimat River Bridge during the CBC (NAS 2008).

4 Field Survey Results

4.1 Vessel Reconnaissance Survey

In total over seven survey seasons, vessel reconnaissance surveys included 61 days of effort over 6186 km of were travelled over seven survey seasons (Table 4-1).

Table 4-1 Survey Effort for Marine Bird Vessel Surveys in the Study Area

	Douglas Channel				Principe Channel				Total			
	2006		2009		2006		2009		2006		2009	
Survey	km	Days	km	Days	km	Days	Km	Days	km	Days	Km	Days
Winter	179.9	3	393	5	432.3	4	390	4	612.2	7	783	9
Spring	221.6	2	584	7	450.1	5	411	3	671.7	7	995	10
Summer	334.0	3	641	6	721.6	5	406	4	1055.6	8	1047	10
Fall	-	-	537	6	-	-	485	4	-	-	1022	10

Tables 4-2 through 4-16 summarize the marine bird observations for each guild recorded during the vessel surveys. In addition, the occurrence rate (birds per kilometre of coastline per day), adjusted for effort, was calculated from the survey data. Data is reported separately for the Douglas Channel and Principe Channel to represent the inner and outer coastal areas, respectively.

Table 4-2 Number and Occurrence Rates of Loon Species Recorded in Each Season During Vessel Surveys

		Red-throated Loon		Yellow-billed Loon		Pacific Loon		Common Loon		Loon Species	
Douglas Channel											
Number of Individuals		**2006**	**2009**	**2006**	**2009**	**2006**	**2009**	**2006**	**2009**	**2006**	**2009**
	Winter	0	0	0	0	0	17	5	11	0	18
	Spring	20	9	0	0	0	20	45	131	0	2
	Summer	31	20	0	0	0	1	17	21	0	6
	Fall	-	28	-	0	-	121	-	33	-	19
	Total	**51**	**57**	**0**	**0**	**0**	**159**	**67**	**196**	**0**	**45**
Occurrence Rates (birds/km/day)	Winter	0	0	0	0	0	0.0087	0.0093	0.0056	0	0.0092
	Spring	0.0451	0	0	0	0	0.0049	0.1015	0.0320	0	0.0005
	Summer	0.0309	0.0052	0	0	0	0.0003	0.0170	0.0055	0	0.0016
	Fall	-	0.0087	-	0	-	0.0376	-	0.0102	-	0.0059
Principe Channel											
Number of Individuals	Winter	36	0	0	0	12	51	33	128	0	191
	Spring	47	3	1	0	2	38	110	89	0	1
	Summer	221	165	0	1	8	0	17	14	0	17
	Fall	-	4	-	0	-	195	-	110	-	236
	Total	**304**	**172**	**1**	**1**	**22**	**284**	**160**	**341**	**0**	**445**
Occurrence Rates (birds/km/day)	Winter	0.0208	0	0	0	0.0069	0.0327	0.0191	0.0821	0	0.1224
	Spring	0.0209	0.0024	0.0004	0	0.0009	0.0308	0.0489	0.0722	0	0.0008
	Summer	0.0613	0.1016	0	0.0006	0.0022	0	0.0047	0.0086	0	0.0105
	Fall	-	0.0021	-	0	-	0.0804	-	0.0567	-	0.1216

Table 4-3 Number and Occurrence Rates of Grebe Species Recorded in Each Season During Vessel Surveys

		Red-necked Grebe		Horned Grebe		Western Grebe		Grebe Species	
Douglas Channel									
		2006	**2009**	**2006**	**2009**	**2006**	**2009**	**2006**	**2009**
Number of Individuals	Winter	11	1	16	1	1	8	0	0
	Spring	106	32	0	4	3	102	0	0
	Summer	1	0	0	0	0	0	0	0
	Fall	-	137	-	1	-	107	-	3
	Total	**118**	**170**	**16**	**6**	**4**	**217**	**0**	**3**
Occurrence Rates (birds/km/day)	Winter	0.2038	0.0005	0.0297	0.0005	0.0017	0.0041	0	0
	Spring	0.2292	0.0078	0	0.0010	0.0068	0.0250	0	0
	Summer	0.0010	0	0	0	0	0	0	0
	Fall	-	0.0425	-	0.0003	-	0.0332	-	0.0009
Principe Channel									
Number of Individuals	Winter	46	2	13	46	41	17	0	0
	Spring	45	26	11	8	6	24	0	7
	Summer	1	1	1	0	0	0	0	0
	Fall	-	56	-	17	-	54	-	6
	Total	**92**	**85**	**25**	**71**	**47**	**95**	**0**	**13**
Occurrence Rates (birds/km/day)	Winter	0.02660	0.0013	0.0075	0.0295	0.0237	0.0109	0	0
	Spring	0.0199	0.0211	0.0049	0.0065	0.0027	0.0195	0	0.0057
	Summer	0.0003	0.0006	0.0003	0	0	0	0	0
	Fall	-	0.0289	-	0.0088	-	0.0278	-	0.0031

Table 4-4 Number and Occurrence Rates of Shearwater and Storm Petrel Species Recorded in Each Season During Vessel Surveys

		Sooty Shearwater		Fork-tailed Storm-Petrel	
Douglas Channel					
		2006	**2009**	**2006**	**2009**
Number of Individuals	Winter	0	0	0	0
	Spring	0	0	0	1
	Summer	0	0	0	1
	Fall	0	0	0	0
	Total	0	0	0	2
Occurrence Rates (birds/km/day)	Winter	0	0	0	0
	Spring	0	0	0	0.0026
	Summer	0	0	0	0.0003
	Fall	0	0	0	0
Principe Channel					
Number of Individuals	Winter	0	0	0	0
	Spring	1	0	3	2
	Summer	0	0	0	1
	Fall	0	0	0	0
	Total	1	0	3	3
Occurrence Rates (birds/km/day)	Winter	0	0	0	0
	Spring	0.0004	0	0.0013	0.0016
	Summer	0	0	0	0.0006
	Fall	0	0	0	0

Table 4-5 Number and Occurrence of Cormorant Species Recorded in Each Season During Vessel Surveys

		Pelagic Cormorant		Brandt's Cormorant		Double-crested Cormorant	
Douglas Channel							
		2006	**2009**	**2006**	**2009**	**2006**	**2009**
Number of Individuals	Winter	68	52	0	0	0	2
	Spring	5	148	1	0	0	13
	Summer	0	0	0	0	0	0
	Fall	-	78	-	0	-	25
	Total	**73**	**278**	**1**	**0**	**0**	**40**
Occurrence Rates (birds/km/day)	Winter	0.1259	0.0265	0	0	0	0.0010
	Spring	0.0113	0.0362	0.0023	0	0	0.0032
	Summer	0	0	0	0	0	0
	Fall	-	0.0242	-	0	-	0.0078
Principe Channel							
Number of Individuals	Winter	417	412	8	0	100	147
	Spring	544	283	8	2	39	37
	Summer	12	0	0	0	2	0
	Fall	-	78	-	0	-	25
	Total	**973**	**773**	**16**	**2**	**141**	**209**
Occurrence Rates (birds/km/day)	Winter	0.2412	0.2641	0.0046	0	0.0578	0.0942
	Spring	0.2417	0.2295	0.0036	0.0016	0.0173	0.0300
	Summer	0.0033	0	0	0	0.0055	0
	Fall	-	0.0402	-	0	-	0.0129

Table 4-6 Number and Occurrence Rates of Wader Species Recorded in Each Season During Vessel Surveys

		Great Blue Heron	
Douglas Channel			
		2006	**2009**
Number of Individuals	Winter	2	4
	Spring	4	5
	Summer	0	0
	Fall		3
	Total	**6**	**12**
Occurrence Rates (birds/km/day)	Winter	0.0037	0.0020
	Spring	0.0090	0.0012
	Summer	0	0
	Fall	-	0.0009
Principe Channel			
Number of Individuals	Winter	2	3
	Spring	3	4
	Summer	5	1
	Fall	-	13
	Total	10	**21**
Occurrence Rates (birds/km/day)	Winter	0.0012	0.0019
	Spring	0.0013	0.0032
	Summer	0.0014	0.0006
	Fall	-	0.0067

Table 4-7 Number and Occurrence Rates of Geese and Swan Species Recorded in Each Season During Vessel Surveys

		Trumpeter Swan		Brant		Snow Goose		Canada Goose	
Douglas Channel									
		2006	**2009**	**2006**	**2009**	**2006**	**2009**	**2006**	**2009**
Number of Individuals	Winter	18	16	0	0	0	0	338	103
	Spring	0	2	0	104	180	0	38	109
	Summer	0	0	0	0	0	0	19	0
	Fall	-	0	-	0	-	0	-	83
	Total	**18**	**18**	**0**	**104**	**180**	**0**	**395**	**295**
Occurrence Rates (birds/km/day)	Winter	0.0333	0.0081	0	0	0	0	0.6263	0.0524
	Spring	0	0.0004	0	0.0254	0.4061	0	0.0857	0.0267
	Summer	0	0	0	0	0	0	0.0189	0
	Fall	-	0	-	0	-	0	-	0.0258
Principe Channel									
Number of Individuals	Winter	0	0	0	0	0	0	15	3
	Spring	0	0	0	34	0	0	174	57
	Summer	0	0	0	0	0	0	10	13
	Fall	-	0	-	0	-	0	-	403
	Total	**0**	**0**	**0**	**34**	**0**	**0**	**199**	**476**
Occurrence Rates (birds/km/day)	Winter	0	0	0	0	0	0	0.0087	0.0019
	Spring	0	0	0	0.0276	0	0	0.0773	0.0462
	Summer	0	0	0	0	0	0	0.0028	0.0080
	Fall	-	0	-	0	-	0	-	0.2077

Table 4-8 Number and Occurrence Rates of Diving Duck Species Recorded in Each 2006 Season During Vessel Surveys

		Bufflehead	Greater Scaup	Long-tailed Duck	Harlequin Duck	Hooded Merganser	Red-breasted Merganser	Common Merganser	Surf Scoter	White-winged Scoter	Scoter Species	Common Goldeneye	Barrow's Goldeneye	Goldeneye Species
Douglas Channel														
Number of Individuals	Winter	96	4	0	18	6	43	97	137	0	0	302	884	49
	Spring	96	0	0	34	0	8	139	355	0	0	1	1030	0
	Summer	0	2	0	77	0	0	22	155	11	0	0	10	0
	Total	**192**	**6**	**0**	**129**	**6**	**51**	**258**	**647**	**11**	**0**	**303**	**1924**	**49**
Occurrence Rates (birds/km/day)	Winter	0.1779	0.0074	0	0.0333	0.0111	0.0797	0.1797	0.2538	0	0	0.5600	1.6379	0.0908
	Spring	0.2166	0	0	0.0767	0	0.0181	0.3136	0.8010	0	0	0.0023	2.3240	0
	Summer	0	0.0020	0	0.0768	0	0	0.0220	0.1547	0.0110	0	0	0.0100	0
Principe Channel														
Number of Individuals	Winter	18	0	23	86	0	129	39	174	207	3	123	16	12
	Spring	51	0	0	74	0	41	366	51997	374	26	0	38	32
	Summer	0	0	0	118	0	0	19	139	159	0	0	0	25
	Total	69	0	23	278	0	170	424	52310	740	29	123	54	69
Occurrence Rates (birds/km/day)	Winter	0.0104	0	0.0133	0.0497	0	0.0746	0.0226	0.1006	0.120	0.0017	0.0711	0.0093	0.0069
	Spring	0.0227	0	0	0.0329	0	0.0182	0.1626	23.1046	0.1662	0.0116	0	0.0169	0.0142
	Summer	0	0	0	0.0327	0	0	0.0053	0.0385	0.0441	0	0	0	0.0069

Table 4-9 Number and Occurrence Rates of Diving Duck Species Recorded in Each 2009 Season During Vessel Surveys

		Bufflehead	Greater Scaup	Scaup Species	Long-tailed Duck	Harlequin Duck	Hooded Merganser	Red-breasted Merganser	Common Merganser	Merganser Species	Surf Scoter	White-winged Scoter	Scoter Species	Common Goldeneye	Barrow's Goldeneye	Goldeneye Species	Duck Species
Douglas Channel																	
Number of Individuals	Winter	80	0	6	0	84	0	7	89	0	101	22	0	1	1571	0	204
	Spring	134	7	0	5	79	0	34	148	0	2174	6	0	59	1612	0	328
	Summer	0	0	0	0	13	0	4	17	8	22	10	0	0	5	0	0
	Fall	10	0	12	0	28	3	2	29	14	1304	4	12	0	1	25	79
	Total	**224**	**7**	**18**	**5**	**204**	**3**	**47**	**283**	**22**	**3601**	**42**	**12**	**60**	**3189**	**25**	**611**
Occurrence Rates (birds/km/day)	Winter	0.0407	0	0.0031	0	0.0427	0	0	0.0453	0	0.0514	0.0112	0	0.0005	0.7995	0	0.1038
	Spring	0.0328	0.0017	0	0.0001	0.0193	0	0.01	0.0362	0	0.5318	0.0015	0	0.0144	0.3943	0	0.0802
	Summer	0	0	0	0	0.0034	0.0008	0	0.0044	0.0021	0.0057	0.0026	0.0037	0	0.0013	0	0
	Fall	0.0031	0	0.0037	0	0.0087	0	0	0.0090	0.0043	0.4047	0.0012	0	0	0.0003	0.0078	0.0245
Principe Channel																	
Number of Individuals	Winter	132	0	0	0	95	0	18	165	0	344	249	0	8	293	0	9
	Spring	22	0	0	0	25	2	74	83	2	1738	83	0	1	419	0	4
	Summer	0	0	3	0	161	0	2	0	0	88	22	0	0	0	0	17
	Fall	2	0	3	0	69	0	16	0	107	480	27	114	0	4	4	155
	Total	**156**	**0**	**6**	**0**	**350**	**2**	**110**	**248**	**109**	**2650**	**381**	**114**	**9**	**716**	**4**	**185**
Occurrence Rates (birds/km/day)	Winter	0.0846	0	0	0	0.0609	0	0.0115	0.1058	0	0.2205	0.1596	0	0.0051	0.1878	0	0.0058
	Spring	0.0178	0	0	0	0.0203	0.0016	0.0600	0.0673	0.0016	1.4096	0.0673	0	0.0008	0.3398	0	0.0032
	Summer	0	0	0.0018	0	0.0991	0	0.0012	0	0	0.0542	0.0135	0	0	0	0	0.0105
	Fall	0.0010	0	0.0015	0	0.0357	0	0.0082	0	0.0552	0.2474	0.0139	0.0588	0	0.0021	0.0021	0.0799

Table 4-10 Number and Occurrence Rate of Dabbling Duck Species Recorded in Each Season During Vessel Surveys

		Mallard		Green-winged Teal		American Wigeon		Dabbling Duck Species	
Douglas Channel									
		2006	**2009**	**2006**	**2009**	**2006**	**2009**	**2006**	**2009**
Number of Individuals	Winter	2	12	0	0	0	0	0	0
	Spring	424	65	3	0	2	0	0	0
	Summer	0	2	0	0	0	0	0	0
	Fall	-	0	-	0	-	0	-	0
	Total	**426**	**79**	**3**	**0**	**2**	**0**	**0**	**0**
Occurrence Rates (birds/km/day)	Winter	0.0037	0.0061	0	0	0	0	0	0
	Spring	0.9567	0.0159	0.0068	0	0.0045	0	0	0
	Summer	0	0.0005	0	0	0	0	0	0
	Fall	-	0	-	0	-	0	-	0
Principe Channel									
Number of Individuals	Winter	10	10	0	0	0	0	0	0
	Spring	0	220	0	0	0	0	6	0
	Summer	0	2	0	0	0	0	0	0
	Fall	-	0	-	0	-	0	-	0
	Total	**10**	**232**	**0**	**0**	**0**	**0**	**6**	**0**
Occurrence Rates (birds/km/day)	Winter	0.0058	0.0064	0	0	0	0	0	0
	Spring	0	0.1784	0	0	0	0	0.0027	0
	Summer	0	0.0012	0	0	0	0	0	0
	Fall	-	0	-	0	-	0	-	0

Table 4-11 Number and Occurrence Rates of Coastal Raptor Species Recorded in Each Season During Vessel Surveys

		Bald Eagle		Golden Eagle		Peregrine Falcon		Sharp-shined Hawk		Raptor Species	
Douglas Channel											
		2006	**2009**	**2006**	**2009**	**2006**	**2009**	**2006**	**2009**	**2006**	**2009**
Number of Individuals	Winter	63	62	0	0	0	0	0	0	0	0
	Spring	32	109	0	2	0	0	0	0	0	3
	Summer	22	67	0	0	0	0	0	0	0	0
	Fall	-	202	-	1	-	1	-	0	-	0
	Total	**117**	**440**	**0**	**3**	**0**	**1**	**0**	**0**	**0**	**3**
Occurrence Rates (birds/km/day)	Winter	0.1167	0.0316	0	0	0	0	0	0	0	0
	Spring	0.0722	0.0267	0	0.0005	0	0	0	0	0	0.0007
	Summer	0.0220	0.0174	0	0	0	0	0	0	0	0
	Fall	-	0.0627	-	0.003	-	0.003	-	0	-	0
Principe Channel											
Number of Individuals	Winter	78	165	0	0	0	0	0	0	0	0
	Spring	143	141	0	4	0	0	0	0	0	0
	Summer	198	222	0	0	0	0	0	0	0	0
	Fall	-	49	-	0	-	0	-	2	-	3
	Total	**419**	**577**	**0**	**4**	**0**	**0**	**0**	**2**	**0**	**3**
Occurrence Rates (birds/km/day)	Winter	0.0451	0.1058	0	0	0	0	0	0	0	0
	Spring	0.0635	0.1144	0	0.0032	0	0	0	0	0	0
	Summer	0.0549	0.1367	0	0	0	0	0	0	0	0
	Fall	-	0.0253	-	0	-	0	-	0.0010	-	0.0015

Table 4-12 Number and Occurrence Rates of Rails, Coots, and Crane Species Recorded in Each Season During Vessel Surveys

		Sandhill Crane	
Douglas Channel			
		2006	**2009**
Number of Individuals	Winter	0	0
	Spring	0	0
	Summer	0	0
	Fall	-	0
	Total	**0**	0
Occurrence Rates (birds/km/day)	Winter	0	0
	Spring	0	0
	Summer	0	0
	Fall	-	0
Principe Channel			
Number of Individuals	Winter	0	0
	Spring	0	0
	Summer	0	0
	Fall	0	4
	Total	**0**	4
Occurrence Rates (birds/km/day)	Winter	0	0
	Spring	0	0
	Summer	0	0
	Fall	-	0.0021

Table 4-13 Number and Occurrence Rates of Shorebird Species Recorded in Each Season During Vessel Surveys

		Black Oystercatcher		Red-necked Phalarope		Dunlin		Black Turnstone		Surfbird		Rock Sandpiper		Shorebird Species	
Douglas Channel															
		2006	**2009**	**2006**	**2009**	**2006**	**2009**	**2006**	**2009**	**2006**	**2009**	**2006**	**2009**	**2006**	**2009**
Number of Individuals	Winter	0	0	0	0	40	0	0	0	3	0	0	0	0	30
	Spring	0	0	0	1	0	0	0	39	0	0	0	0	0	42
	Summer	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Fall	-	0	-	12	-	0	-	47	-	0	-	0	-	2
	Total	0	0	0	13	40	0	0	86	3	0	0	0	0	74
Occurrence Rates (birds/km/day)	Winter	0	0	0	0	0.0741	0	0	0	0.0056	0	0	0	0	0.0153
	Spring	0	0	0	0.0002	0	0	0	0.0095	0	0	0	0	0	0.0102
	Summer	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Fall	-	0	-	0.0037	-	0	-	0.0146	-	0	-	0	-	0.0006
Principe Channel															
Number of Individuals	Winter	10	7	0	0	0	0	40	0	454	0	0	0	20	425
	Spring	2	2	96	0	0	0	0	85	1	0	0	0	102	110
	Summer	26	4	1	0	0	0	0	0	0	0	0	0	3	0
	Fall	-	1	-	32	-	0	-	0	-	0	-	72	-	0
	Total	38	14	97	32	0	0	40	85	455	0	0	72	125	535
Occurrence Rates (birds/km/day)	Winter	0.0058	0.0045	0	0	0	0	0.0231	0	0.2625	0	0	0	0.0116	0.2724
	Spring	0.0009	0.0016	0.0427	0	0	0	0	0.0689	0.0004	0	0	0	0.0453	0.0892
	Summer	0.0072	0.0025	0.0003	0	0	0	0	0	0	0	0	0	0.0008	0
	Fall	-	0.0003	-	0.0165	-	0	-	0	-	0	-	0.0371	-	0

Table 4-14 Number and Occurrence Rates of Gulls, Jaegers, Skuas, and Tern Species Recorded in Each 2006* Season During Vessel Surveys

		California Gull	Mew Gull	Bonaparte's Gull	Glaucous-winged Gull	Herring Gull	Gull Species
Douglas Channel							
Number of Individuals	Winter	0	447	3	0	0	1435
	Spring	0	712	2	1	0	2
	Summer	0	0	0	0	0	100
	Total	**0**	**1159**	**5**	**1**	**0**	**1537**
Occurrence Rates (birds/km/day)	Winter	0	0.8282	0.0056	0	0	2.6588
	Spring	0	1.606	0.0045	0.0023	0	0.0045
	Summer	0	0	0	0	0	0.0998
Principe Channel							
Number of Individuals	Winter	1	223	0	41	0	672
	Spring	0	30717	170	2	0	50
	Summer	0	0	0	0	0	280
	Total	**1**	30940	170	**43**	**0**	**1002**
Occurrence Rates (birds/km/day)	Winter	0.0058	0.1289	0.00	0.0237	0	0.3886
	Spring	0	13.6489	0.0755	0.0009	0	0.0222
	Summer	0	0	0.00	0	0	0.0776

NOTE:

* Gull, Jaeger, Skua, and Tern Species were not recorded in 2009 surveys due to the high number of individuals in the PEAA and CCAA and the impact this may have on observers' ability to collect quality data for other marine bird guilds.

Table 4-15 Number and Occurrence Rates of Alcid Species Recorded in Each Season During Vessel Surveys

		Marbled Murrelet		Ancient Murrelet		CommonMurre		Cassin's Auklet		RhinocerosAuklet		Pigeon Guillemot	
Douglas Channel													
		2006	**2009**	**2006**	**2009**	**2006**	**2009**	**2006**	**2009**	**2006**	**2009**	**2006**	**2009**
Number of Individuals	Winter	204	70	0	0	25	22	0	0	0	0	0	1
	Spring	11	51	0	0	0	0	0	0	0	0	27	55
	Summer	484	258	0	10	0	0	0	0	0	0	44	57
	Fall	-	62	-	0	-	59	-	0	-	0	-	5
	Total	699	441	0	10	25	81	0	0	0	0	71	118
Occurrence Rates (birds/km/day)	Winter	0.3779	0.0356	0	0	0.0463	0.0111	0	0	0	0	0	0.0005
	Spring	0.0248	0.0125	0	0	0	0	0	0	0	0	0.0609	0.0135
	Summer	0.4830	0.0671	0	0.0026	0	0	0	0	0	0	0.0439	0.0148
	Fall	-	0.0192	-	0	-	0.0183	-	0	-	0	-	0.0016
Principe Channel													
Number of Individuals	Winter	469	25	8	0	447	603	6	0	1	0	2	13
	Spring	18	17	1	0	15	3	0	0	10	3	36	11
	Summer	627	855	334	32	5	9	4	0	48	42	52	35
	Fall	-	62	-	7	-	59	-	0	-	0	-	5
	Total	1114	959	343	39	467	674	10	0	59	45	90	64
Occurrence Rates (birds/km/day)	Winter	0.2712	0.0160	0.0046	0	0.2585	0.3865	0.0035	0	0.0006	0	0.0012	0.0083
	Spring	0.0080	0.0138	0.0004	0	0.0067	0.0024	0	0	0.0044	0.0024	0.0160	0.0089
	Summer	0.1738	0.5265	0.0926	0.0197	0.0014	0.0055	0.0011	0	0.0133	0.0259	0.0144	0.0216
	Fall	-	0.0320	-	0.0036	-	0.0304	-	0	-	0	-	0.0026

Table 4-16 Number and Occurrence Rates of Kingfisher Species Recorded in Each Season During Vessel Surveys

Belted Kingfisher			
Douglas Channel			
		2006	**2009**
Number of Individuals	Winter	1	2
	Spring	6	3
	Summer	4	0
	Fall	-	8
	Total	**11**	**13**
Occurrence Rates (birds/km/day)	Winter	0.0018	0.0010
	Spring	0.0135	0.0007
	Summer	0.0040	0
	Fall	0	0.0025
Principe Channel			
Number of Individuals	Winter	4	14
	Spring	0	4
	Summer	2	2
	Fall	-	4
	Total	**6**	**24**
Occurrence Rates (birds/km/day)	Winter	0.0023	0.0089
	Spring	0	0.0032
	Summer	0.0006	0.0012
	Fall	-	0.0021

4.2 Aerial Surveys

On May 16, 2006 and May 17, 2009, 373 and 189 marine birds were observed respectively (Table 4-17). From the aircraft, observers were not able to identify all birds to species level so were identified to the lowest taxon level possible.

Table 4-17 Summary of Aerial Survey Marine Bird Data

Survey Date	Species or Guild	Number of Individuals
May 16, 2006	Bald Eagle	81
	Cormorant	6
	Great Blue Heron	1
	Gull	109
	Marbled Murrelet	3
	Long-tailed Duck	2
	Shorebird	75
	Surf Scoter	40
	Unknown	56
May 17, 2009	Bald Eagle	2
	Cormorant	1
	Double Crested Cormorant	1
	Gull	44
	Raptor	1
	Scoter	75
	Unknown	6
	Waterfowl	59
Total	**-**	**562**

4.3 Terrestrial-based Surveys

Terrestrial-based surveys were conducted from stationary observation locations in the PDA and PEAA (Table 4-18 and Figure 2-4). The dates for terrestrial-based surveys were:

- October 4 to 5, 2006
- July 1 to 5, 2008
- February 26 to 27, 2009
- April 23 to 24, 2009
- June 24 to 25, 2009
- September 27 to 28, 2009

Table 4-18 Terrestrial-based Survey Results

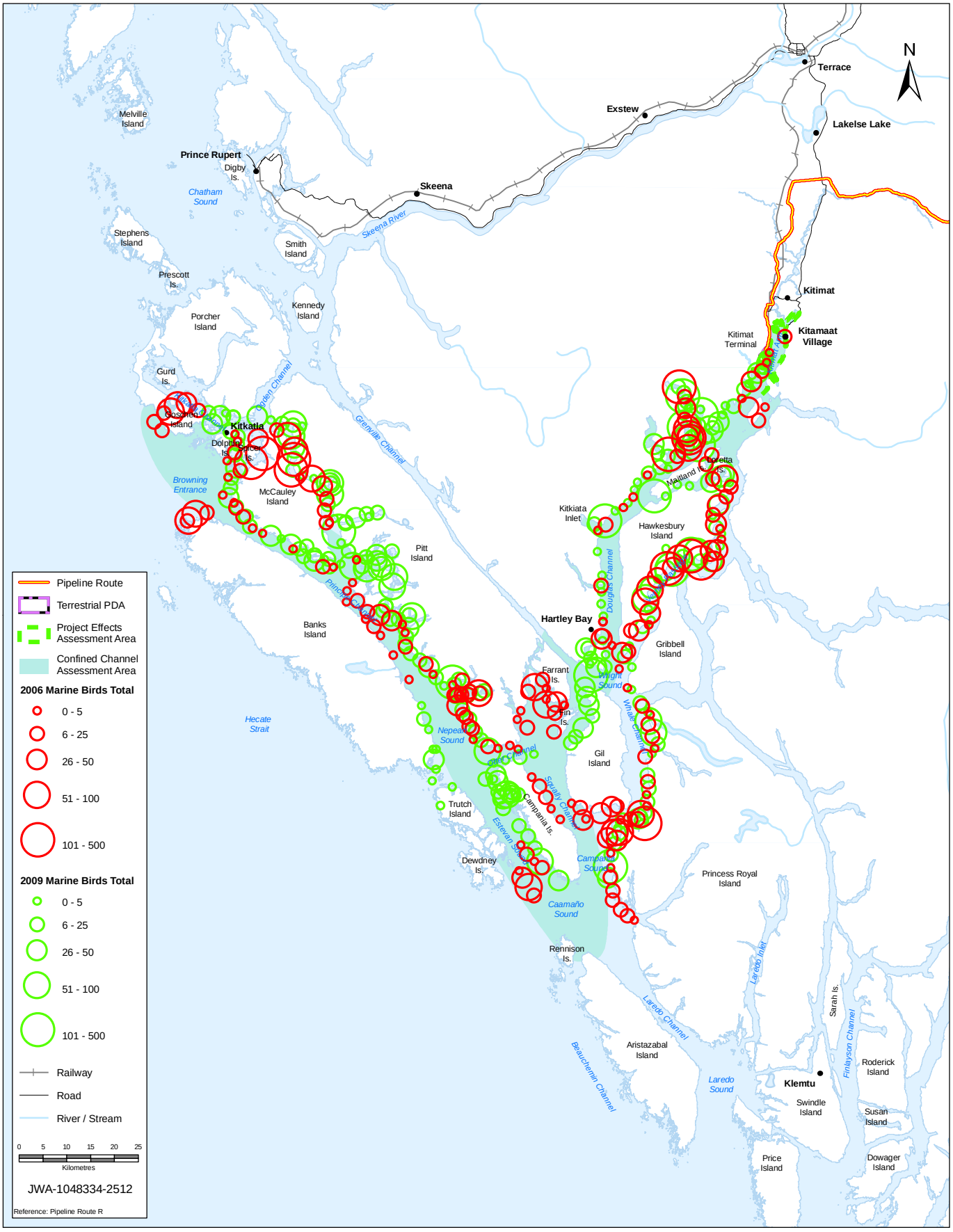
Species	Winter			Spring			Summer					Fall		
	AM	Midday	PM	AM	Midday	PM	AM		Midday		PM	AM	Midday	PM
	2009			2009			2008	2009	2008	2009	2009	2009	2009	2005
Bald Eagle	3	3					5	6	3	2		1		
Common Loon				5	3	3				2				
Red-throated Loon		1						1						
Pacific Loon		1		3										
Loon Species												2		
Common Merganser		8			2									
Red-breasted Merganser		5			1									
Red-necked Grebe				1	1							4		
Western Grebe														2
Grebe Species														1
Barrow's Goldeneye				4	2									
Harlequin Duck					3									
Bufflehead		2												
Surf Scoter				4	218							4		40
White-winged Scoter	2				10									
Mallard				4	62	2								40
Duck Species		3											1	
Ancient Murrelet											1			
Common Murre	7	6	5											
Marbled Murrelet		6		2	9	4	2	3		7	3			
Pigeon Guillemot							2	1						
Pelagic Cormorant		3			2	1								

Table 4-18 Terrestrial-based Survey Results (cont'd)

Species	Winter			Spring			Summer					Fall		
Canada Goose					2									
Belted Kingfisher						2								
Red-necked Phalarope						1								
Rufous Hummingbird				2										
Total	**12**	**38**	**6**	**26**	**315**	**13**	**9**	**11**	**3**	**11**	**4**	**11**	**1**	**83**

4.4 Abundance and Distribution of Marine Birds

Marine birds, excluding gulls, are generally concentrated in the highly productive estuaries where freshwater meets the sea (e.g., inlets and sheltered bays) and the shallow waters above the shelf. These areas are particularly important to wintering birds, and to colonial nesting seabirds conducting foraging trips to feed their young in the nesting season. Figures 4-1 to 4-4 illustrate the seasonal abundance and distribution of all marine birds recorded during baseline investigations in and near the PEAA and CCAA. In these figures, the observations of gulls are not included because their broadly pelagic habitat use can misrepresent the distribution and abundance of other species. Separate seasonal distribution figures are provided for key indicators including Marbled Murrelet (Figures 4-5 to 4-8), Surf Scoter (Figures 4-9 to 4-12) and Bald Eagle (4-13 to 4-16). Additionally, Figure 4-17 provides the location of Bald Eagle nests observed during surveys.



CONTRACTOR: Jacques Whitford AXYS Ltd.	**ENBRIDGE NORTHERN GATEWAY PROJECT**	FIGURE NUMBER: 4-1		DATE: 20091106
PREPARED BY: gem	Winter Abundance and Distribution of Marine Birds (excluding Gulls) in and near the PEAA and CCAA	SCALE: 1:1,100,000	AUTHOR: NP	APPROVED BY: CM
PREPARED FOR: Enbridge Northern Gateway Pipelines		PROJECTION: UTM 9	DATUM: NAD 83	

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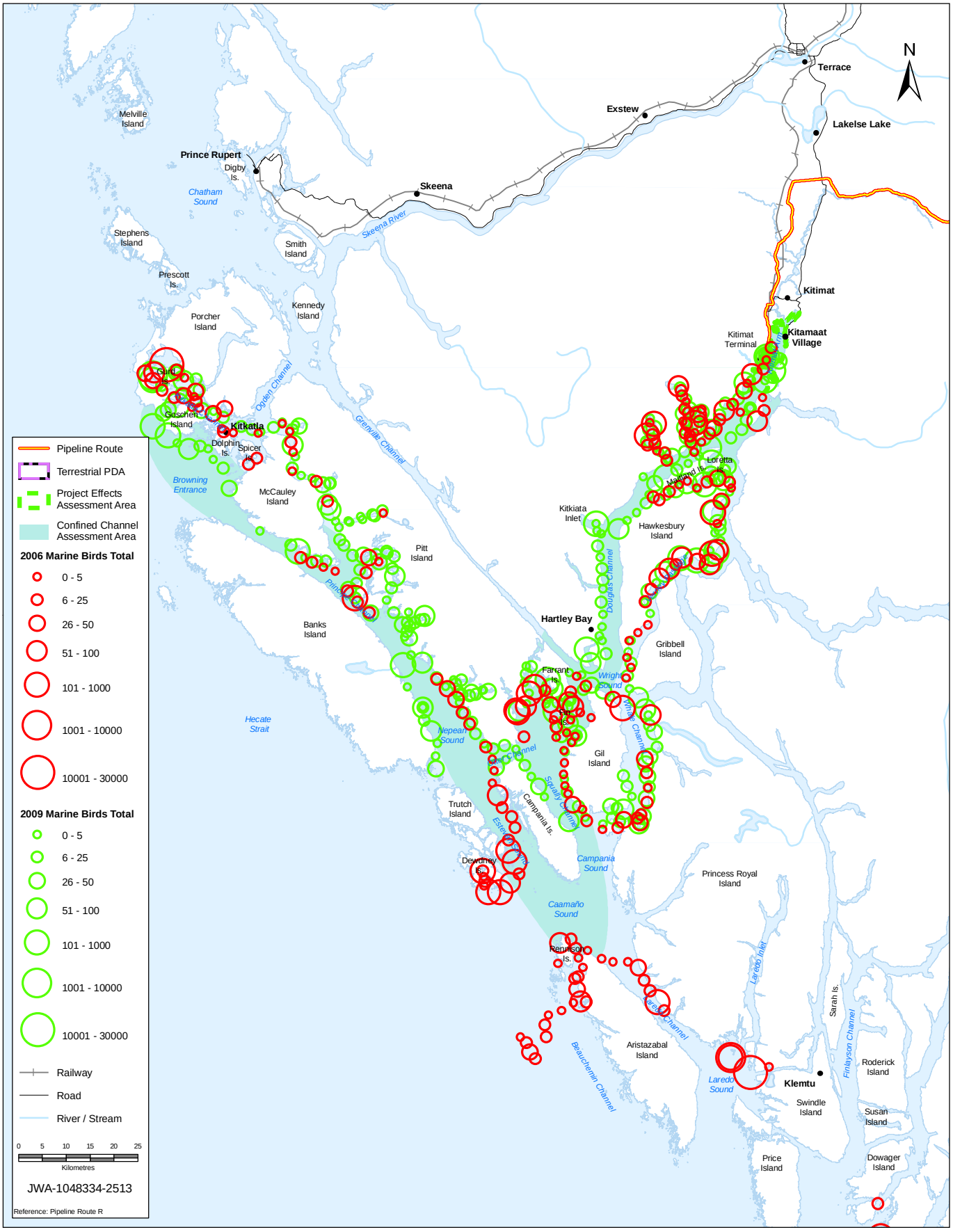

CONTRACTOR: Jacques Whitford AXYS Ltd.

PREPARED BY: gem

PREPARED FOR: Enbridge Northern Gateway Pipelines

ENBRIDGE NORTHERN GATEWAY PROJECT

Spring Abundance and Distribution of Marine Birds (excluding Gulls) in and near the PEAA and CCAA

FIGURE NUMBER:	DATE:
4-2	20091105
SCALE: 1:1,100,000	AUTHOR: BA / APPROVED BY: CM
PROJECTION: UTM 9	DATUM: NAD 83

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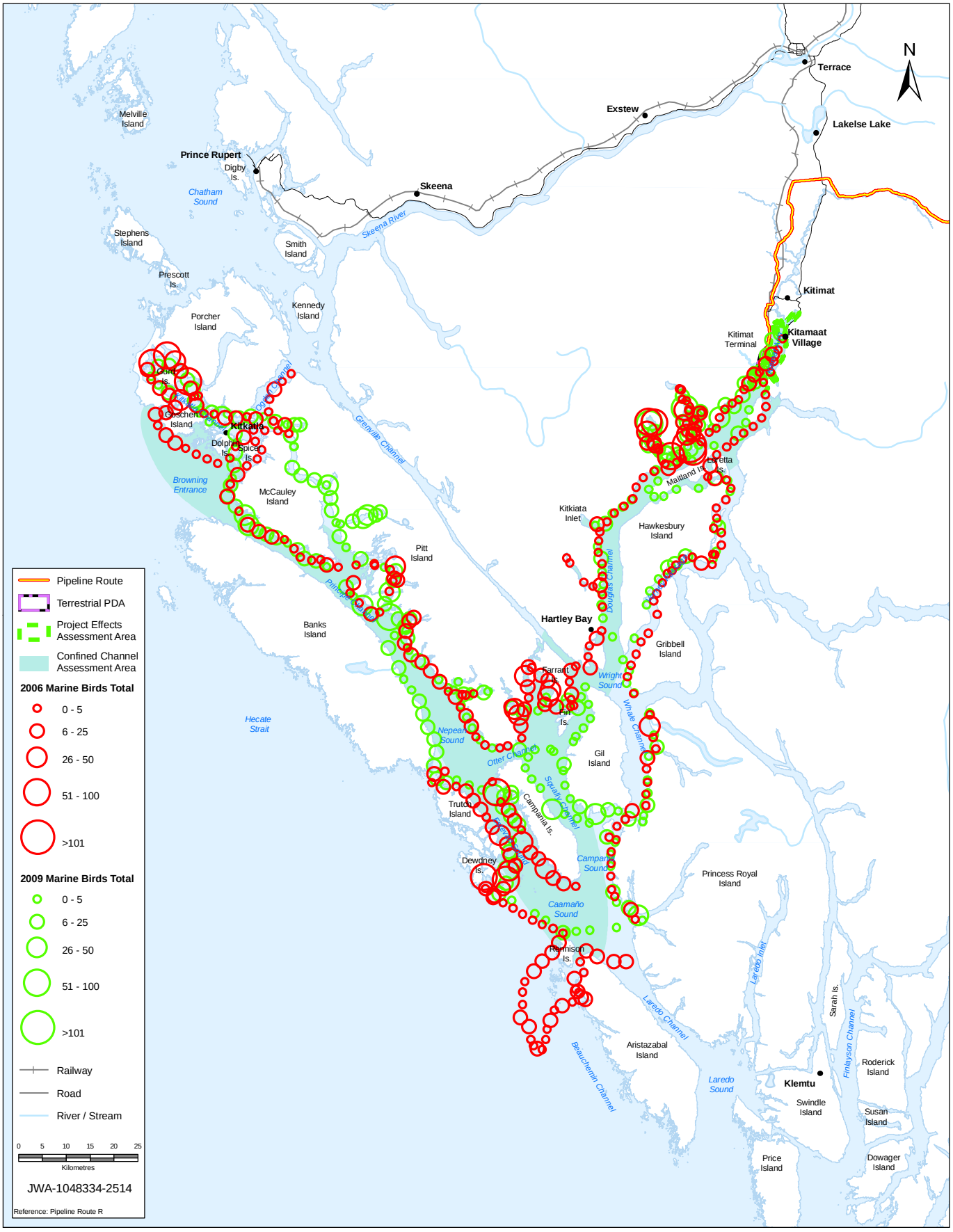

CONTRACTOR: Jacques Whitford AXYS Ltd.

PREPARED BY: gem

PREPARED FOR: Enbridge Northern Gateway Pipelines

ENBRIDGE NORTHERN GATEWAY PROJECT

Summer Abundance and Distribution of Marine Birds (excluding Gulls) in and near the PEAA and CCAA

FIGURE NUMBER:	DATE:
4-3	20091105
SCALE: 1:1,100,000	AUTHOR: BA / APPROVED BY: CM
PROJECTION: UTM 9	DATUM: NAD 83

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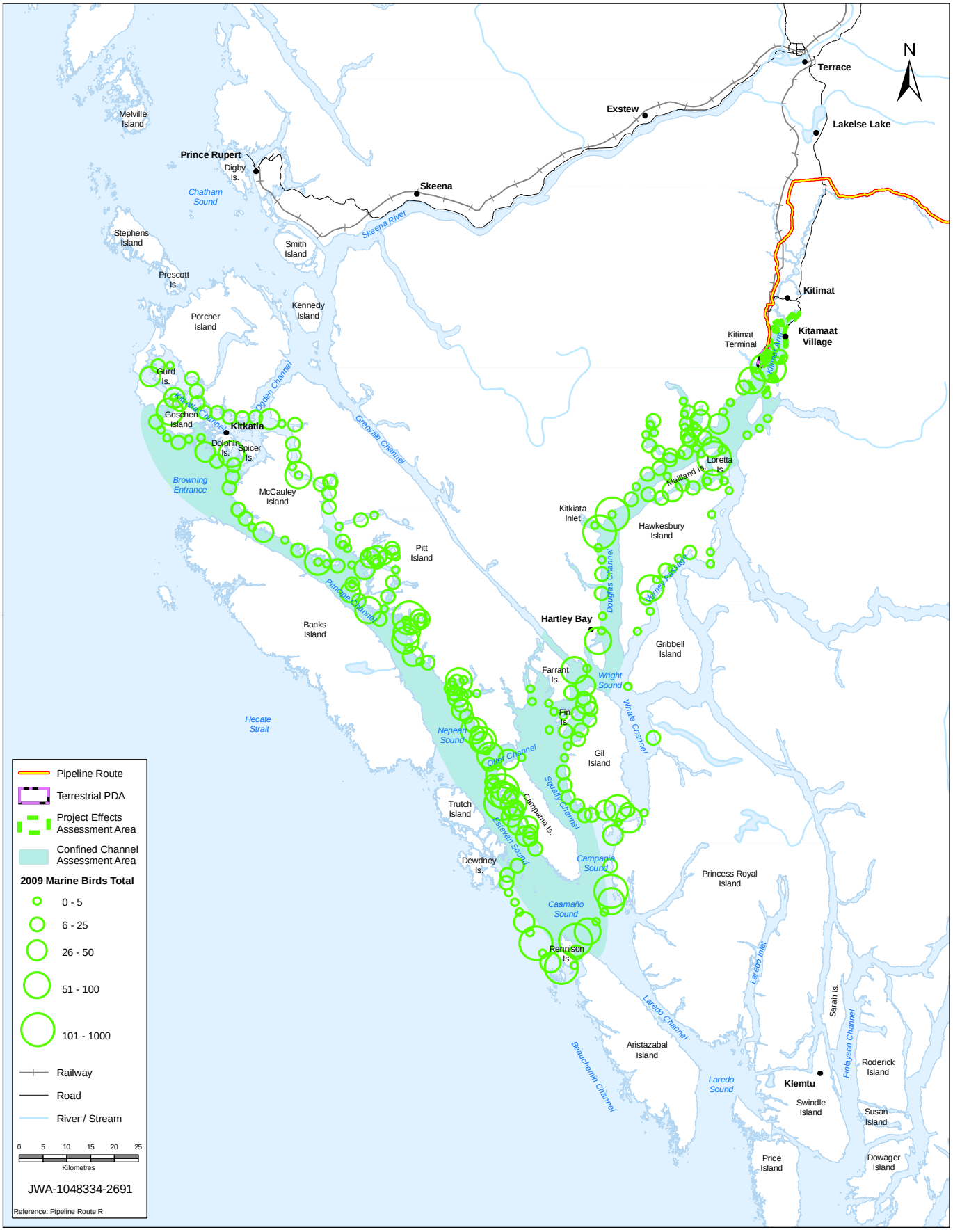

CONTRACTOR: Jacques Whitford AXYS Ltd.

PREPARED BY: gem

PREPARED FOR: Enbridge Northern Gateway Pipelines

ENBRIDGE NORTHERN GATEWAY PROJECT

Fall Abundance and Distribution of Marine Birds (excluding Gulls) in and near the PEAA and CCAA

FIGURE NUMBER:	DATE:
4-4	20091106
SCALE: 1:1,100,000	AUTHOR: NP / APPROVED BY: CM
PROJECTION: UTM 9	DATUM: NAD 83

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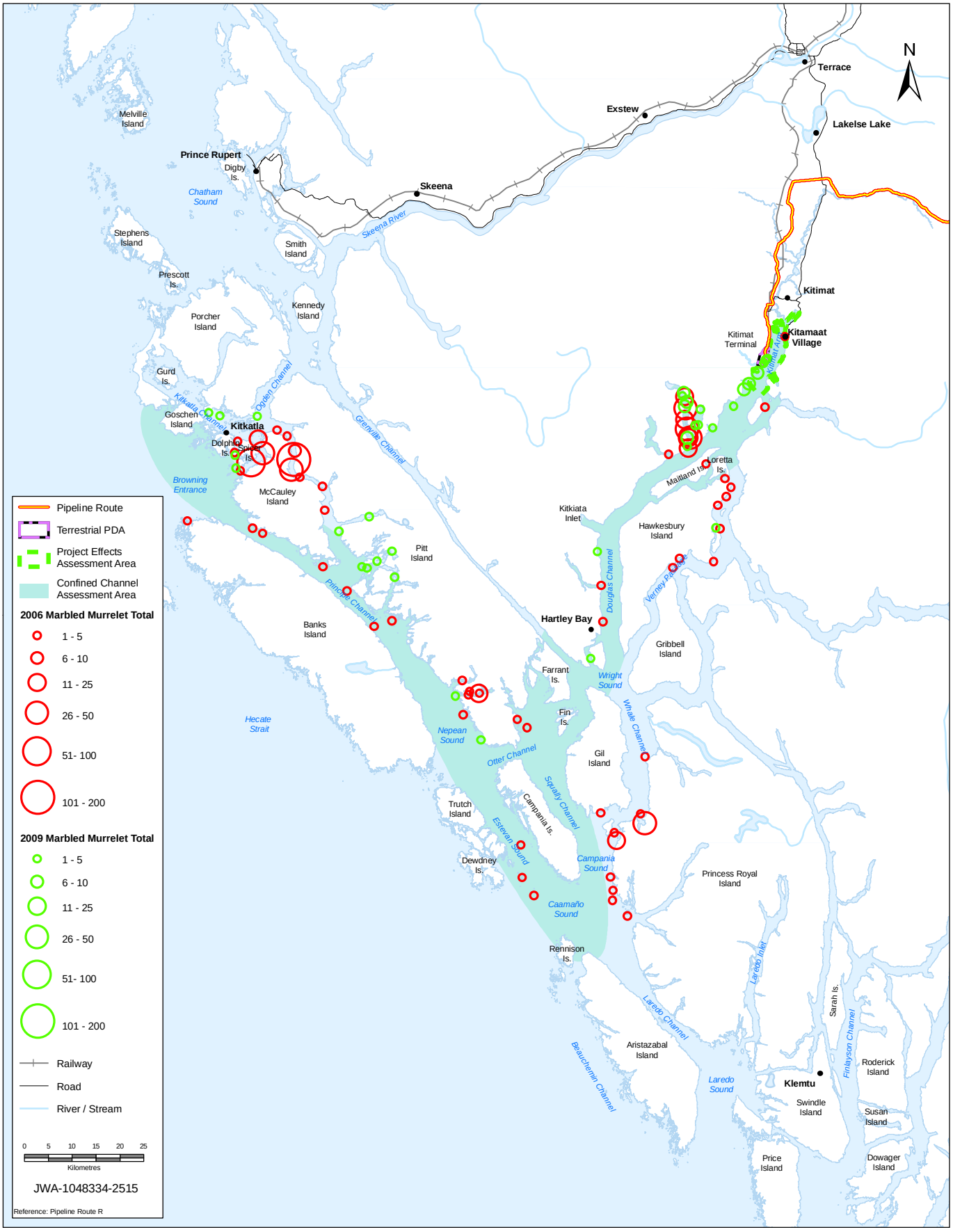

CONTRACTOR: Jacques Whitford AXYS Ltd.	**ENBRIDGE NORTHERN GATEWAY PROJECT**	FIGURE NUMBER: 4-5		DATE: 20091106
PREPARED BY: gem	Winter Abundance and Distribution of Marbled Murrelet in and near the PEAA and CCAA	SCALE: 1:1,100,000	AUTHOR: NP	APPROVED BY: CM
PREPARED FOR: Enbridge Northern Gateway Pipelines		PROJECTION: UTM 9	DATUM: NAD 83	

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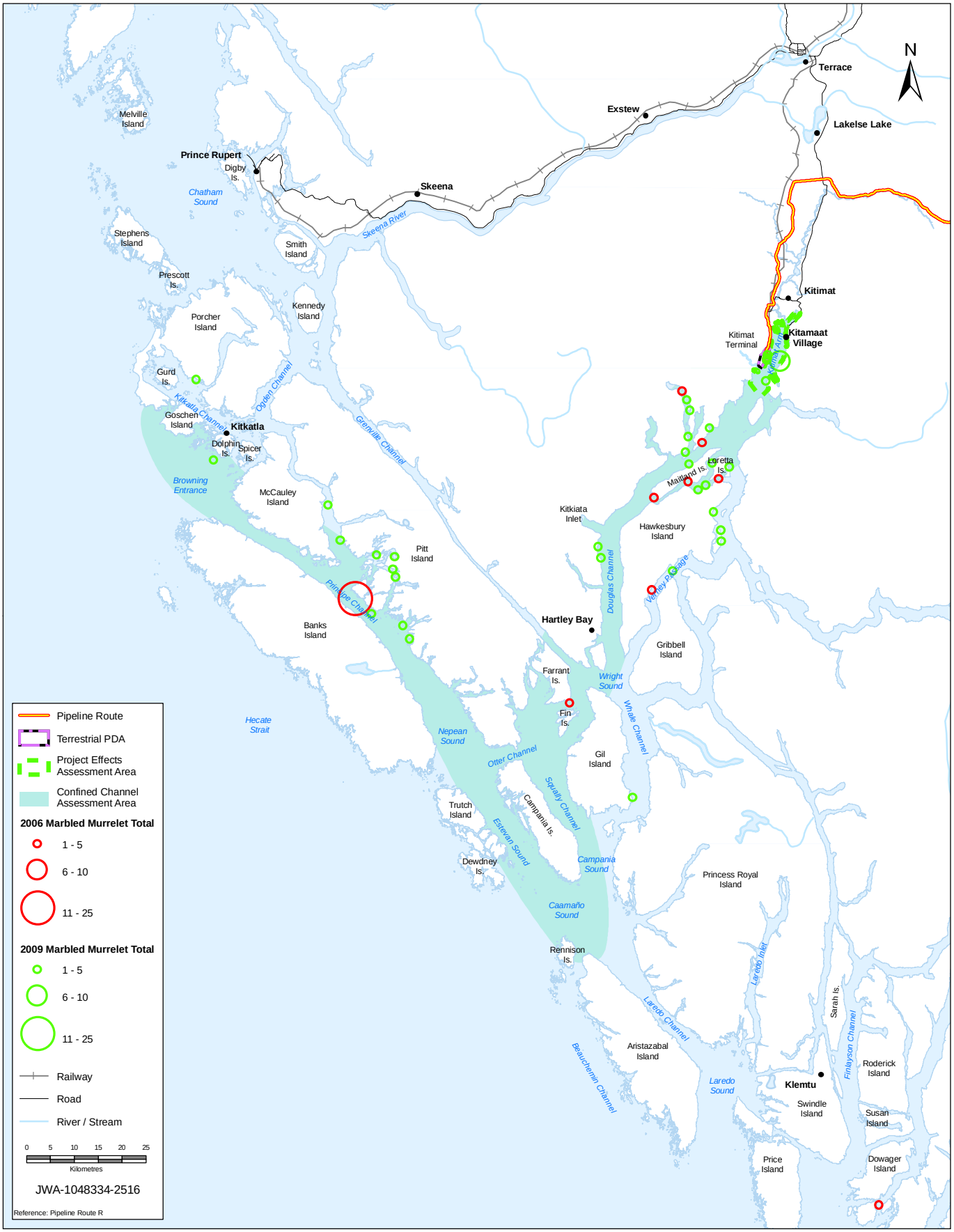

CONTRACTOR: Jacques Whitford AXYS Ltd.	**ENBRIDGE NORTHERN GATEWAY PROJECT**	FIGURE NUMBER: 4-6		DATE: 20091106
PREPARED BY: gem	Spring Abundance and Distribution of Marbled Murrelet in and near the PEAA and CCAA	SCALE: 1:1,100,000	AUTHOR: NP	APPROVED BY: CM
PREPARED FOR: Enbridge Northern Gateway Pipelines		PROJECTION: UTM 9	DATUM: NAD 83	

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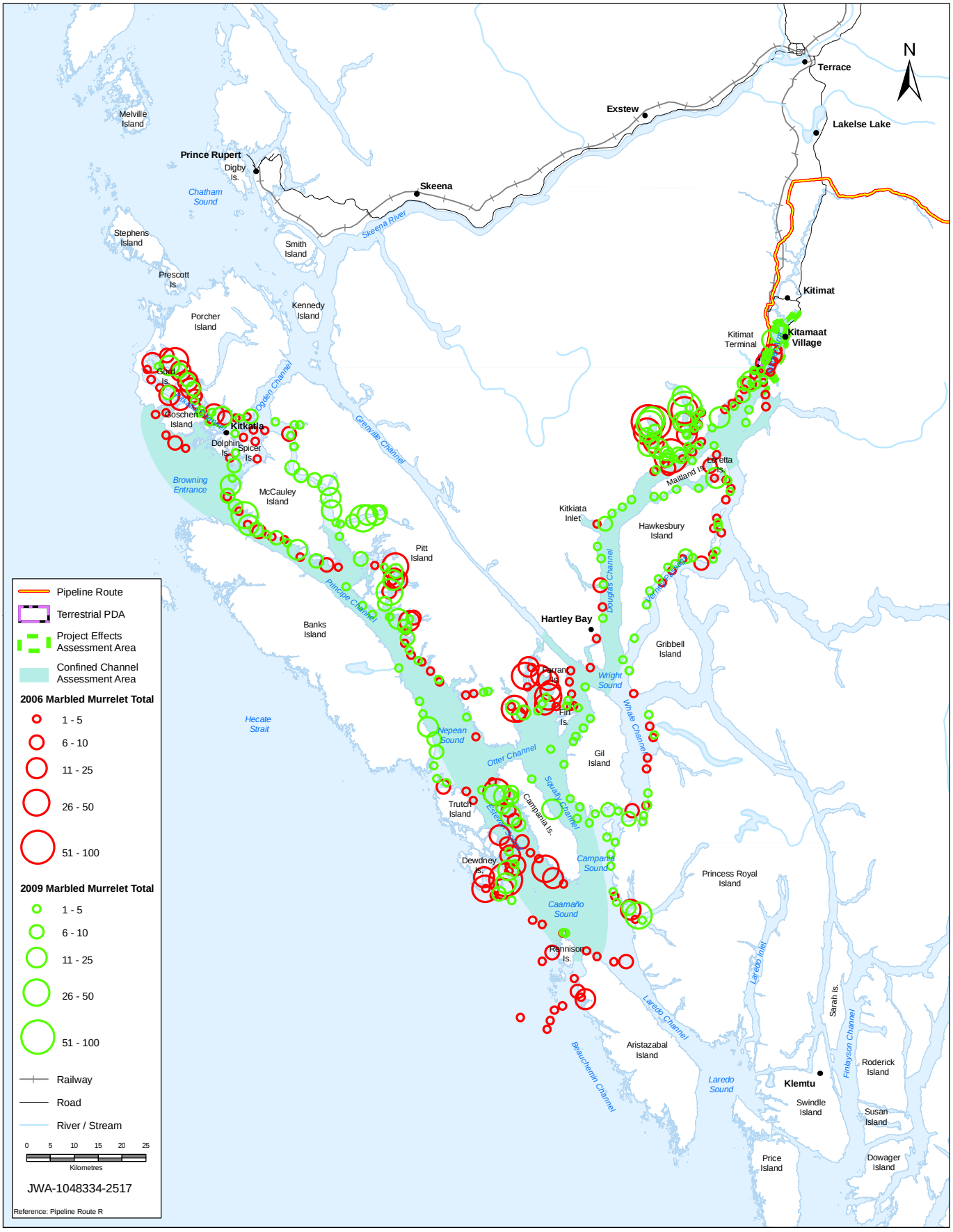

CONTRACTOR: Jacques Whitford AXYS Ltd.

PREPARED BY: gem

PREPARED FOR: Enbridge Northern Gateway Pipelines

ENBRIDGE NORTHERN GATEWAY PROJECT

Summer Abundance and Distribution of Marbled Murrelet in and near the PEAA and CCAA

FIGURE NUMBER:	DATE:
4-7	20091106
SCALE: 1:1,100,000	AUTHOR: NP / APPROVED BY: CM
PROJECTION: UTM 9	DATUM: NAD 83

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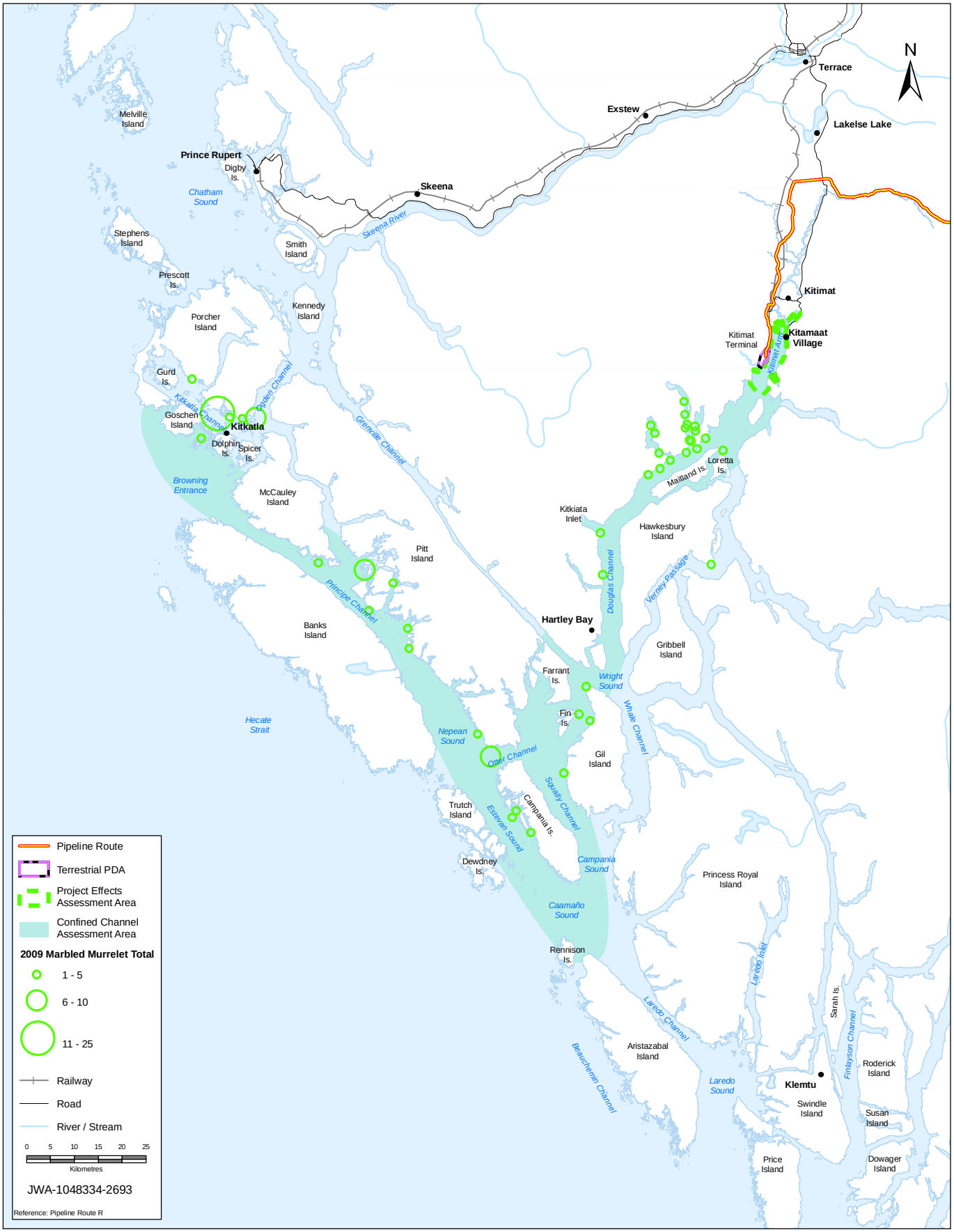

CONTRACTOR: Jacques Whitford AXYS Ltd.	**ENBRIDGE NORTHERN GATEWAY PROJECT**	FIGURE NUMBER: 4-8		DATE: 20091106
PREPARED BY: gem	Fall Abundance and Distribution of Marbled Murrelet in and near the PEAA and CCAA	SCALE: 1:1,100,000	AUTHOR: NP	APPROVED BY: CM
PREPARED FOR: Enbridge Northern Gateway Pipelines		PROJECTION: UTM 9	DATUM: NAD 83	

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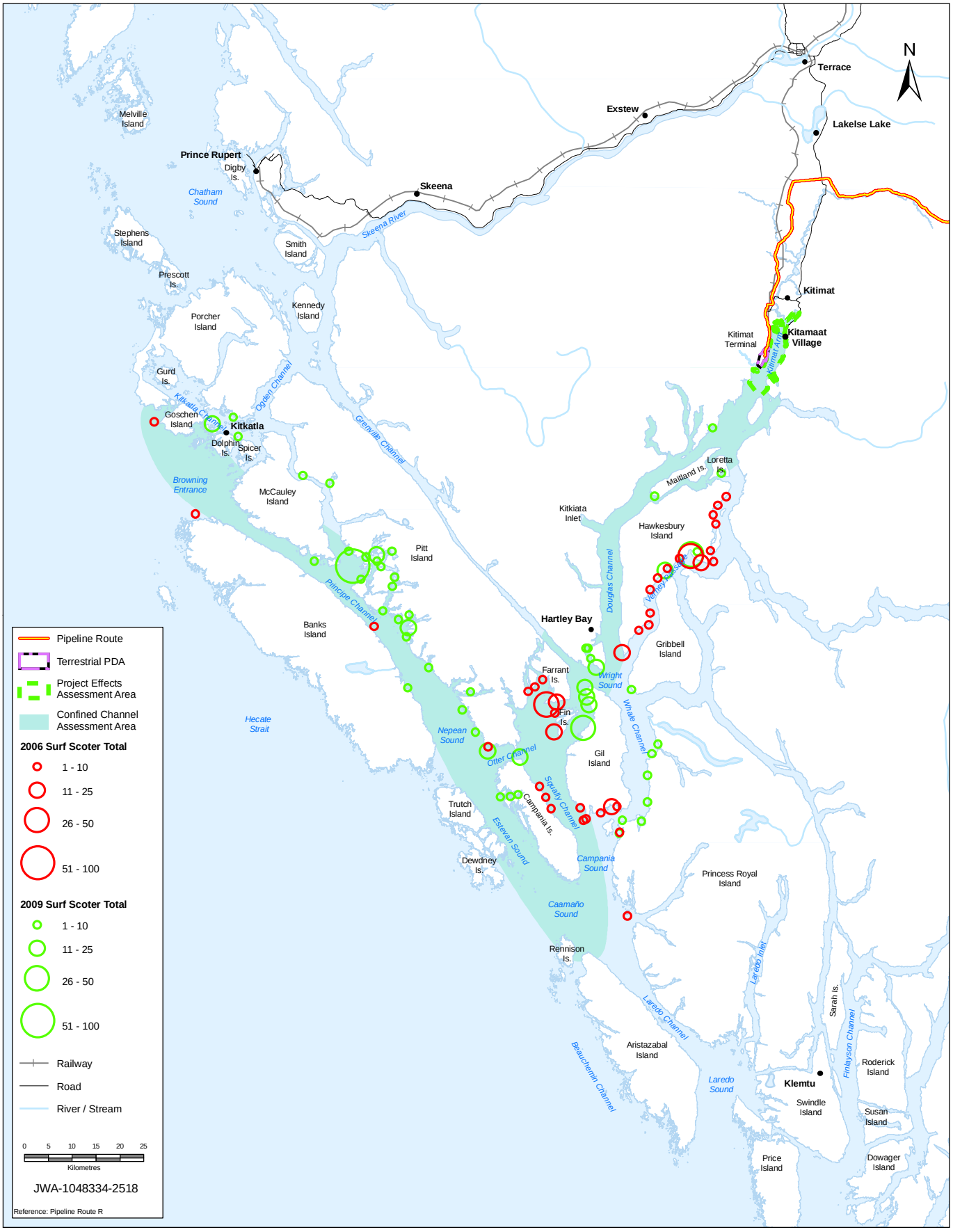

CONTRACTOR: Jacques Whitford AXYS Ltd.	**ENBRIDGE NORTHERN GATEWAY PROJECT**	FIGURE NUMBER: 4-9		DATE: 20091106
PREPARED BY: gem	Winter Abundance and Distribution of Surf Scoter in and near the PEAA and CCAA	SCALE: 1:1,100,000	AUTHOR: NP	APPROVED BY: CM
PREPARED FOR: Enbridge Northern Gateway Pipelines		PROJECTION: UTM 9	DATUM: NAD 83	

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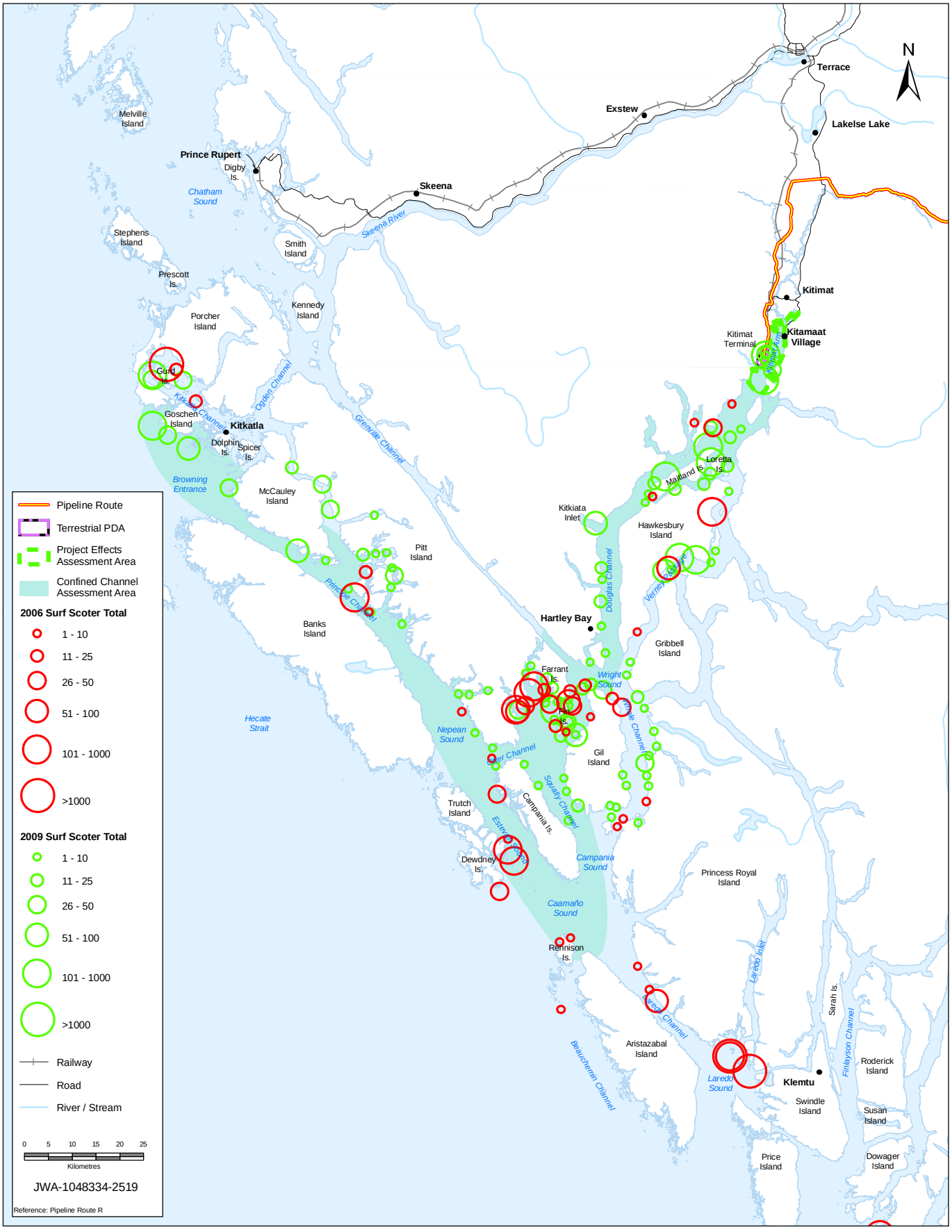

CONTRACTOR: Jacques Whitford AXYS Ltd.	**ENBRIDGE NORTHERN GATEWAY PROJECT**	FIGURE NUMBER: 4-10	DATE: 20091106
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PREPARED FOR: Enbridge Northern Gateway Pipelines			APPROVED BY: CM
		PROJECTION: UTM 9	DATUM: NAD 83

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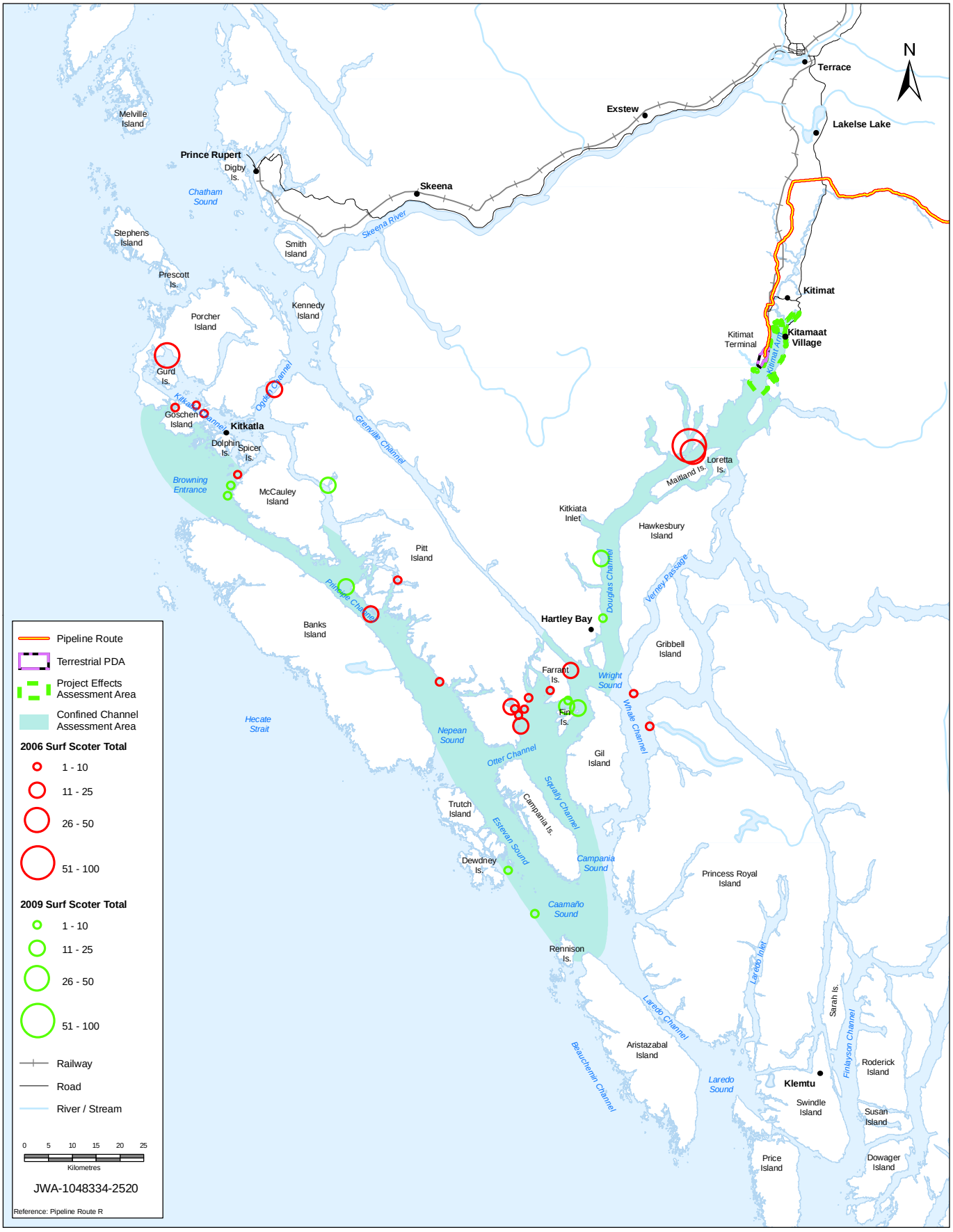

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PREPARED BY: gem	Summer Abundance and Distribution of Surf Scoter in and near the PEAA and CCAA		SCALE: 1:1,100,000	AUTHOR: NP / APPROVED BY: CM
PREPARED FOR: Enbridge Northern Gateway Pipelines			PROJECTION: UTM 9	DATUM: NAD 83

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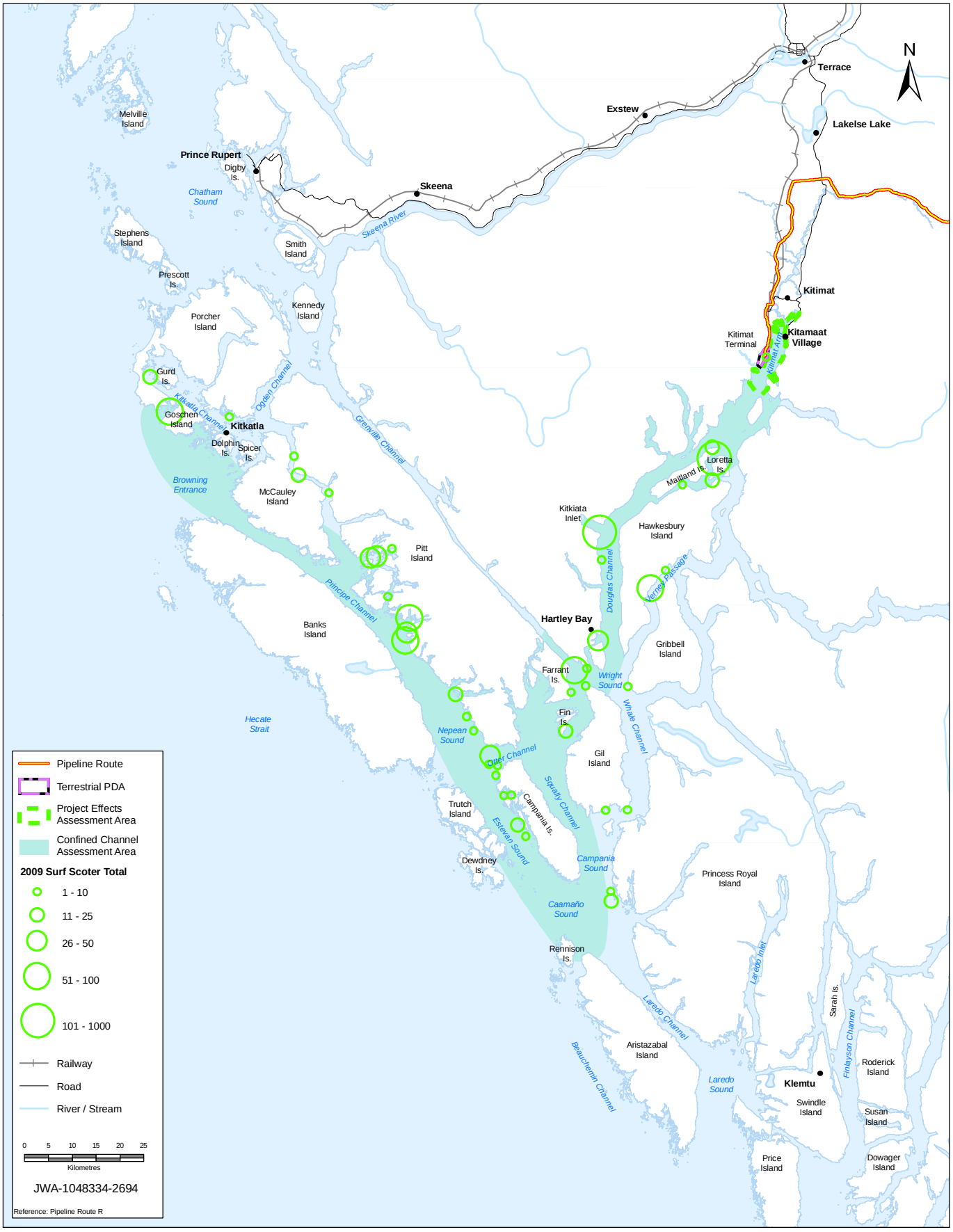

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PREPARED BY: gem	Fall Abundance and Distribution of Surf Scoter in and near the PEAA and CCAA	SCALE: 1:1,100,000	AUTHOR: NP
PREPARED FOR: Enbridge Northern Gateway Pipelines			APPROVED BY: CM
		PROJECTION: UTM 9	DATUM: NAD 83

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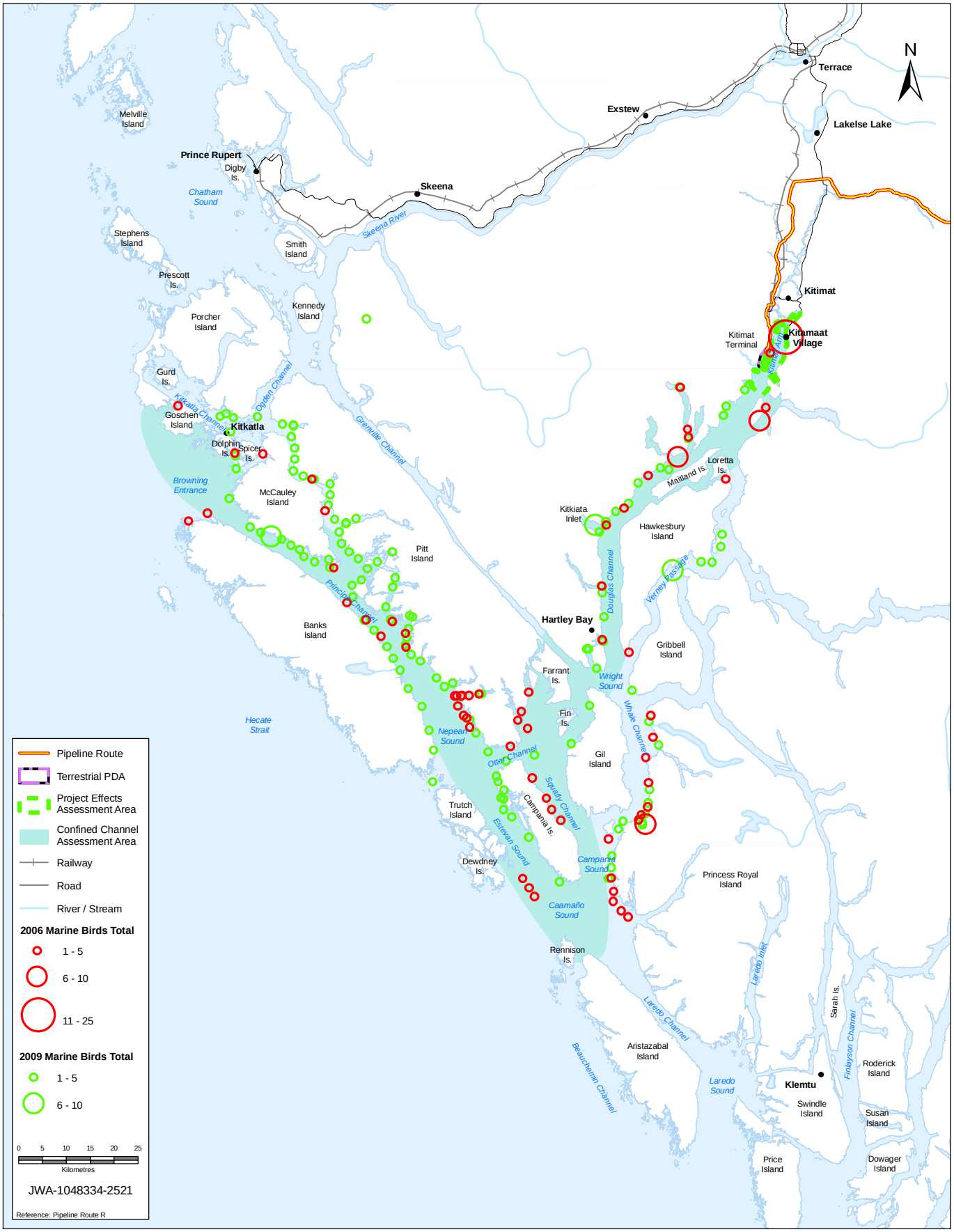

CONTRACTOR: Jacques Whitford AXYS Ltd.	**ENBRIDGE NORTHERN GATEWAY PROJECT**	FIGURE NUMBER: 4-13	DATE: 20091110
PREPARED BY: gem	Winter Abundance and Distribution of Bald Eagle in and near the PEAA and CCAA	SCALE: 1:1,100,000	AUTHOR: BA
PREPARED FOR: Enbridge Northern Gateway Pipelines			APPROVED BY: CM
		PROJECTION: UTM 9	DATUM: NAD 83

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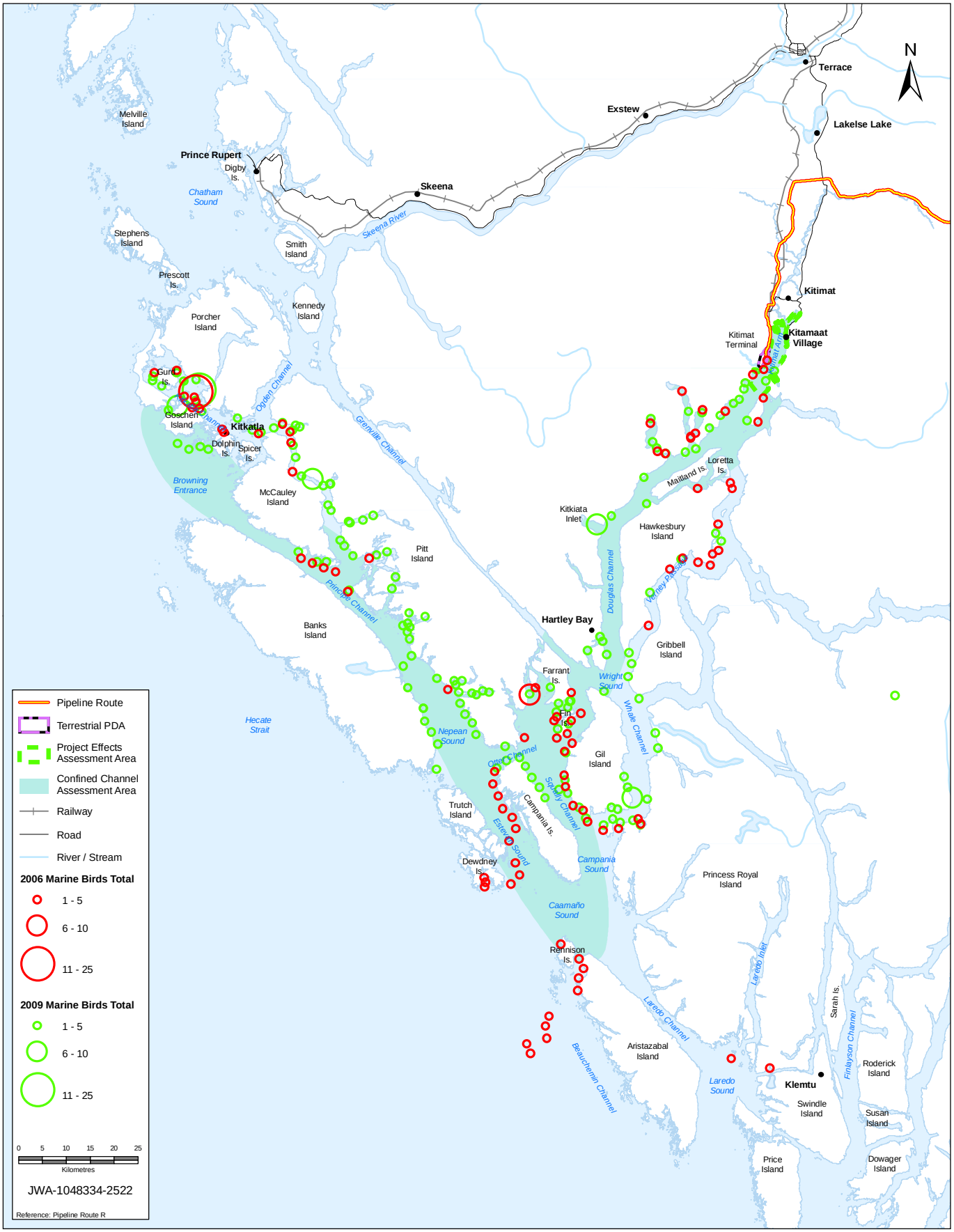

CONTRACTOR: Jacques Whitford AXYS Ltd.

PREPARED BY: gem

PREPARED FOR: Enbridge Northern Gateway Pipelines

ENBRIDGE NORTHERN GATEWAY PROJECT

Spring Abundance and Distribution of Bald Eagle in and near the PEAA and CCAA

FIGURE NUMBER:	DATE:
4-14	20091110
SCALE: 1:1,100,000	AUTHOR: BA / APPROVED BY: CM
PROJECTION: UTM 9	DATUM: NAD 83

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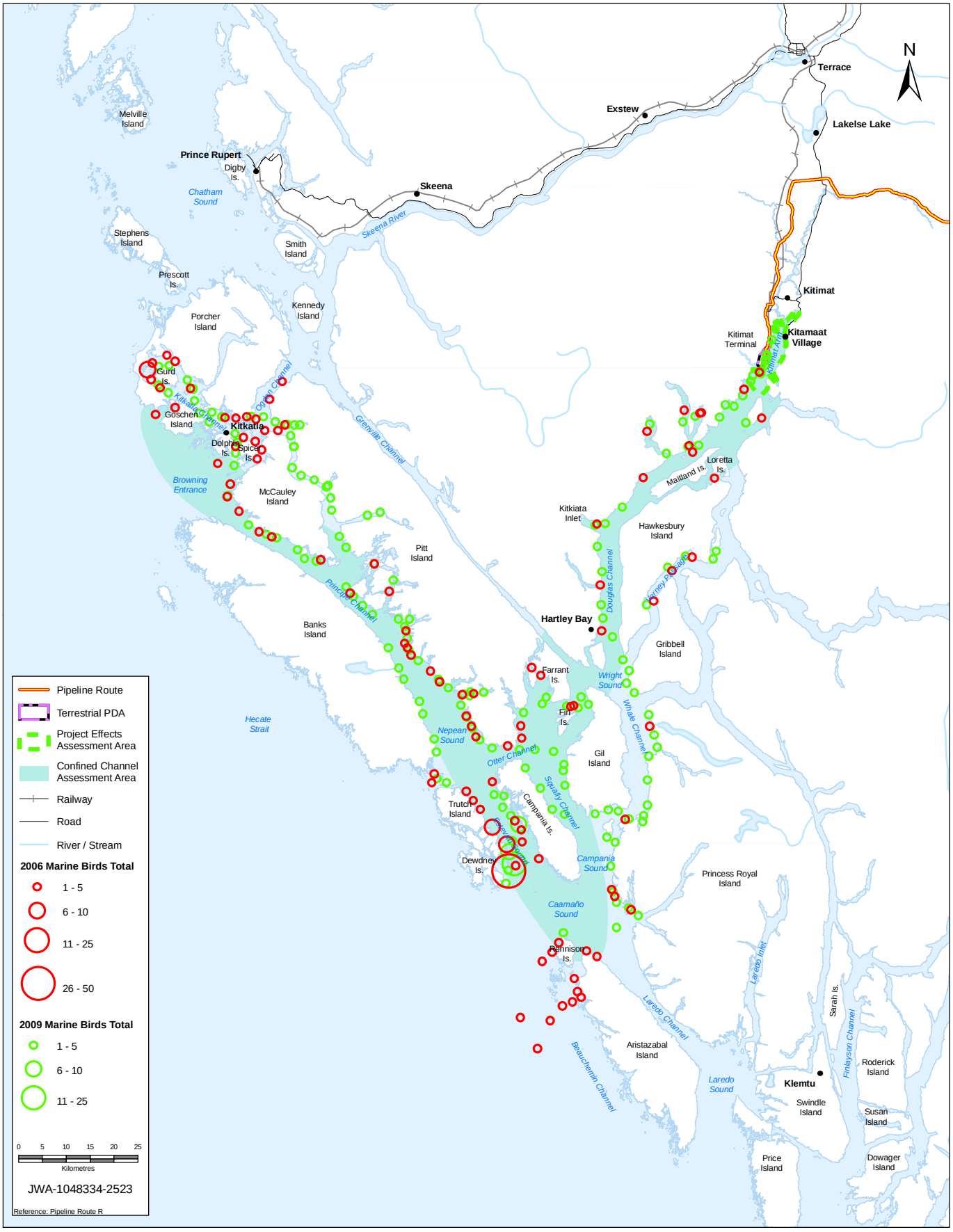

CONTRACTOR: Jacques Whitford AXYS Ltd.

PREPARED BY: gem

PREPARED FOR: Enbridge Northern Gateway Pipelines

ENBRIDGE NORTHERN GATEWAY PROJECT

Summer Abundance and Distribution of Bald Eagle in and near the PEAA and CCAA

FIGURE NUMBER:	DATE:
4-15	20091110
SCALE: 1:1,100,000	AUTHOR: BA / APPROVED BY: CM
PROJECTION: UTM 9	DATUM: NAD 83

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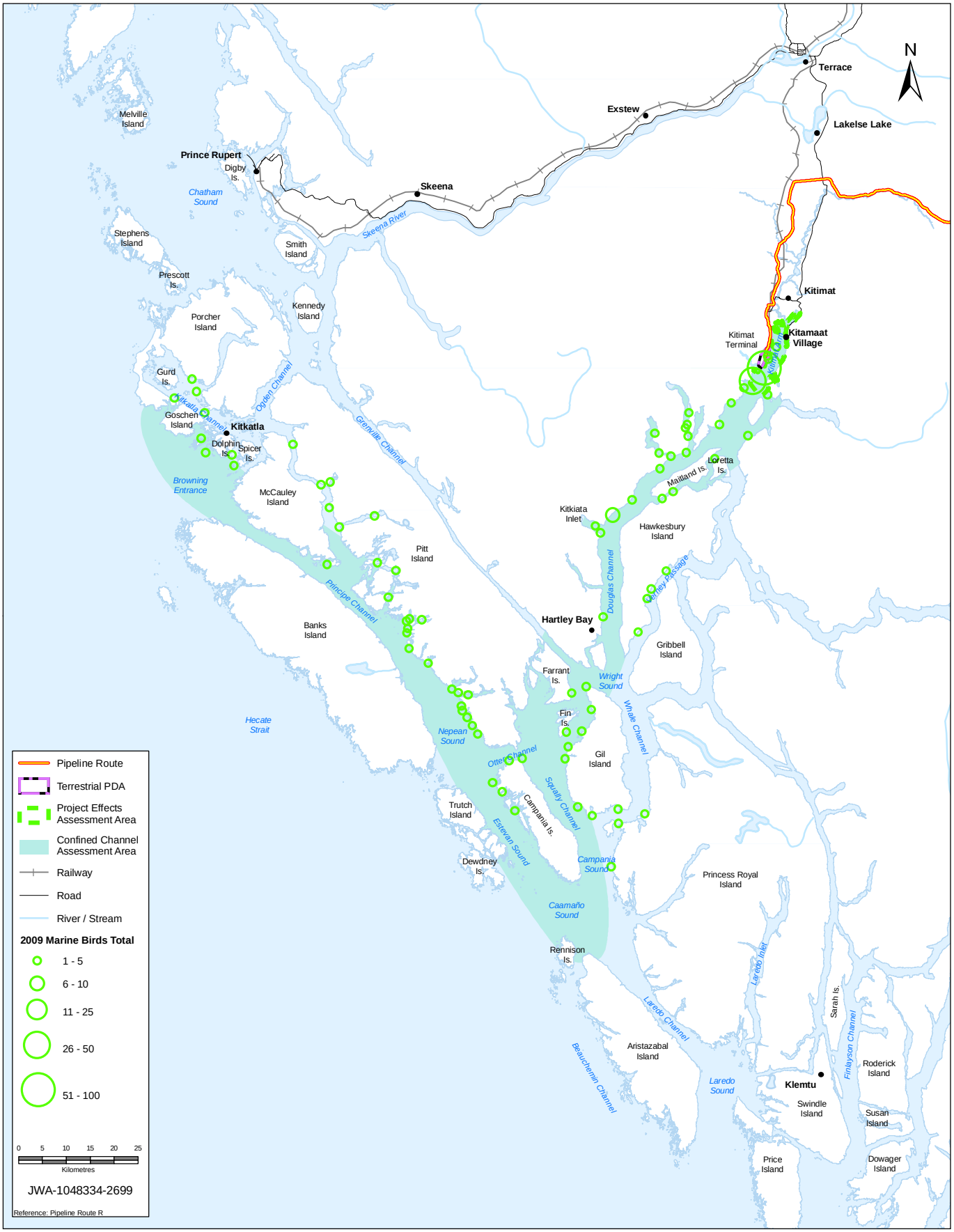

CONTRACTOR: Jacques Whitford AXYS Ltd.	ENBRIDGE NORTHERN GATEWAY PROJECT	FIGURE NUMBER: 4-16		DATE: 20091110
PREPARED BY: gem	Fall Abundance and Distribution of Bald Eagle in and near the PEAA and CCAA	SCALE: 1:1,100,000	AUTHOR: BA	APPROVED BY: CM
PREPARED FOR: Enbridge Northern Gateway Pipelines		PROJECTION: UTM 9	DATUM: NAD 83	

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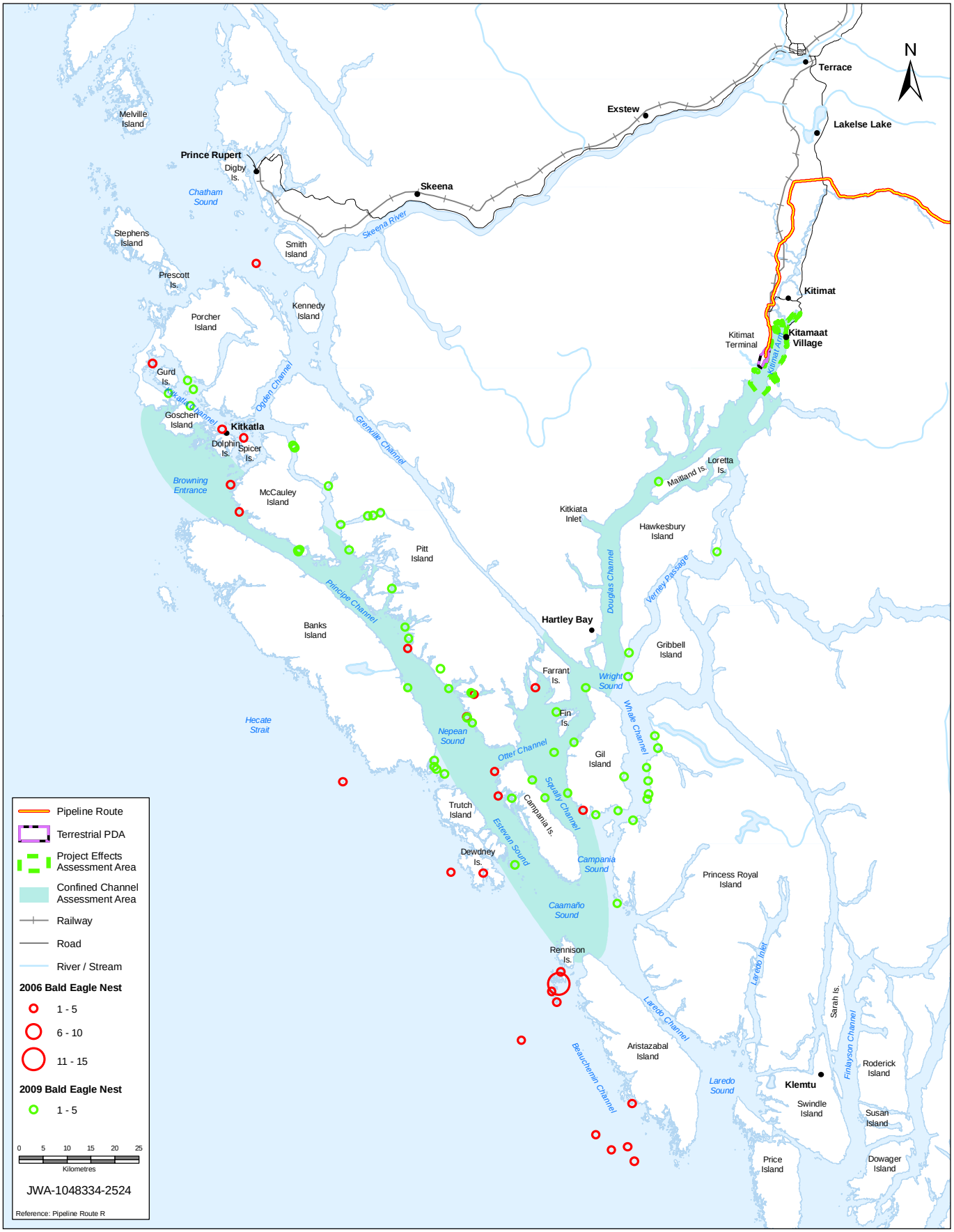

CONTRACTOR: Jacques Whitford AXYS Ltd.	**ENBRIDGE NORTHERN GATEWAY PROJECT**	FIGURE NUMBER: 4-17	DATE: 20091110
PREPARED BY: gem	Bald Eagle Nest Distribution in and near the PEAA and CCAA	SCALE: 1:1,100,000	AUTHOR: BA
PREPARED FOR: Enbridge Northern Gateway Pipelines		PROJECTION: UTM 9	APPROVED BY: CM
			DATUM: NAD 83

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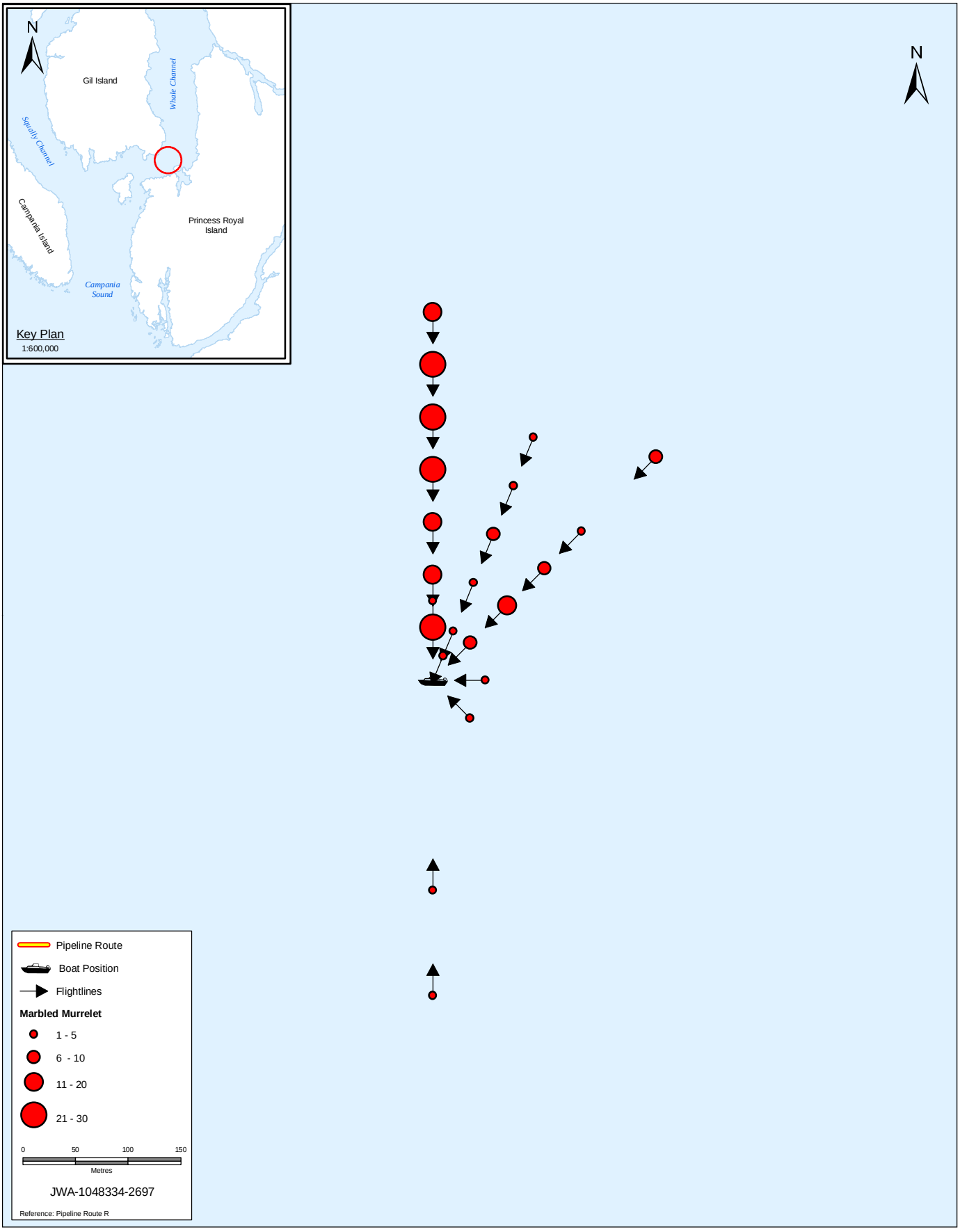
4.5 Radar Surveys for Marbled Murrelet

Radar surveys were conducted for three days in 2006 and four days in 2009, during which 1064 Marbled Murrelets were observed. Murrelet observations, including occurrence rate (number of birds per hour), are summarized in Table 4-19 by date and location.

Table 4-19 Marbled Murrelet Radar Survey Data Summary

Location	2006			2009		
	Survey Effort (hours)	Number of Birds	Occurrence Rate	Survey Effort (hours)	Number of Birds	Occurrence Rate
Bernard Harbour	2	249	124.5	3	302	100.7
Amelia Island (SW End)	2	7	3.5	-	-	-
Fin Island	1	326	326	-	-	-
Giltoyees Inlet	-	-	-	2.5	120	48
Lewis Passage	-	-	-	3.25	60	18.5
Bish Cove	-	-	-	2	0	0
Total	**5**	**582**	**-**	**10.75**	**482**	**-**

Marbled Murrelet abundance and general flight direction for radar surveys conducted in 2006 are illustrated in Figures 4-18 and 4-19. Radar surveys conducted in 2009 are illustrated by the relative density of the number of murrelets, which is consistent throughout locations (Figures 4-20 to 4-22). Density is established by the number of overlapping flight paths of individual birds and can be considered as follows: high (12 to 15 birds), moderate (6 to 9 birds) and low (1 to 3 birds). Marbled Murrelet radar survey figures also show the mean direction of flight for birds flying towards land (Incoming) or towards open water (Outgoing).



CONTRACTOR: Jacques Whitford AXYS Ltd.

PREPARED BY: gem

PREPARED FOR: Enbridge Northern Gateway Pipelines

ENBRIDGE NORTHERN GATEWAY PROJECT

Marbled Murrelet Radar Survey 2006
Bernard Harbour

FIGURE NUMBER:	DATE:
4-18	20091104
SCALE: 1:5,000	AUTHOR: NP / APPROVED BY: CM
PROJECTION: UTM 9	DATUM: NAD 83

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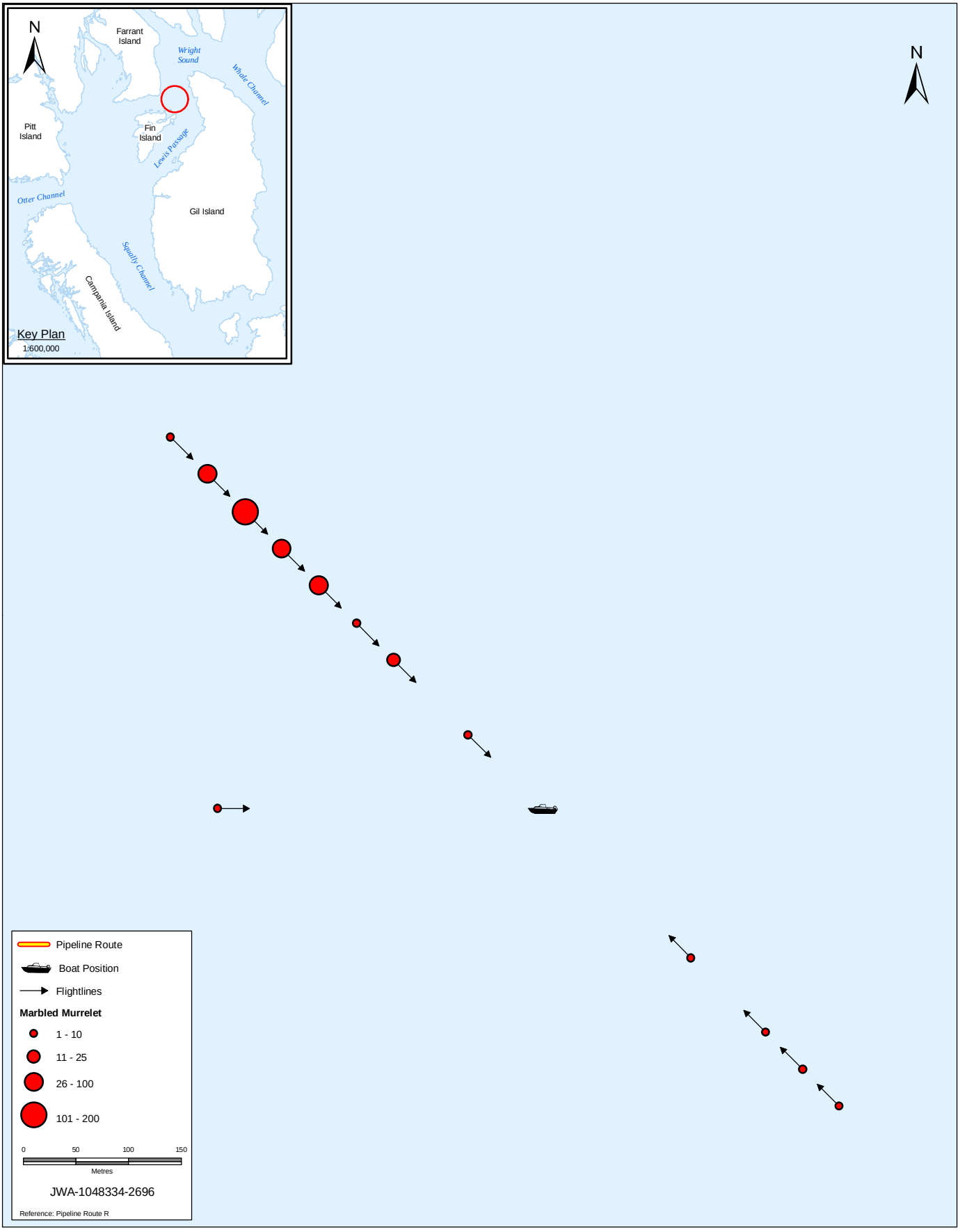

CONTRACTOR: Jacques Whitford AXYS Ltd.	**ENBRIDGE NORTHERN GATEWAY PROJECT**	FIGURE NUMBER: 4-19		DATE: 20091104
PREPARED BY: gem	Marbled Murrelet Radar Survey 2006 Fin Island	SCALE: 1:5,000	AUTHOR: NP	APPROVED BY: CM
PREPARED FOR: Enbridge Northern Gateway Pipelines		PROJECTION: UTM 9	DATUM: NAD 83	

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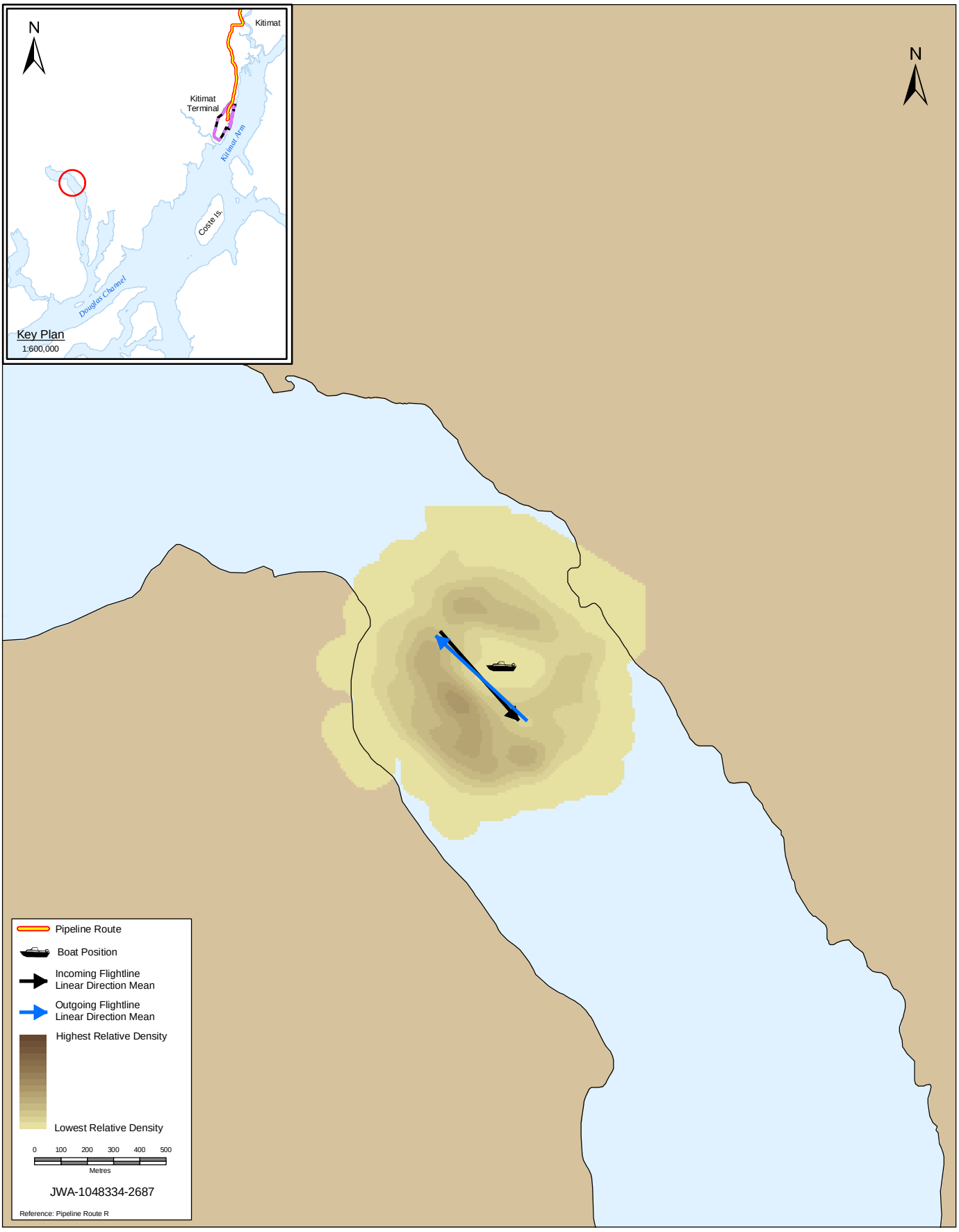

CONTRACTOR: Jacques Whitford AXYS Ltd.

PREPARED BY: gem

PREPARED FOR: Enbridge Northern Gateway Pipelines

ENBRIDGE NORTHERN GATEWAY PROJECT

Marbled Murrelet Radar Survey 2009
Giltoyees Inlet

FIGURE NUMBER:	DATE:
4-20	20091113

SCALE:	AUTHOR:	APPROVED BY:
1:20,000	NP	CM

PROJECTION:	DATUM:
UTM 9	NAD 83

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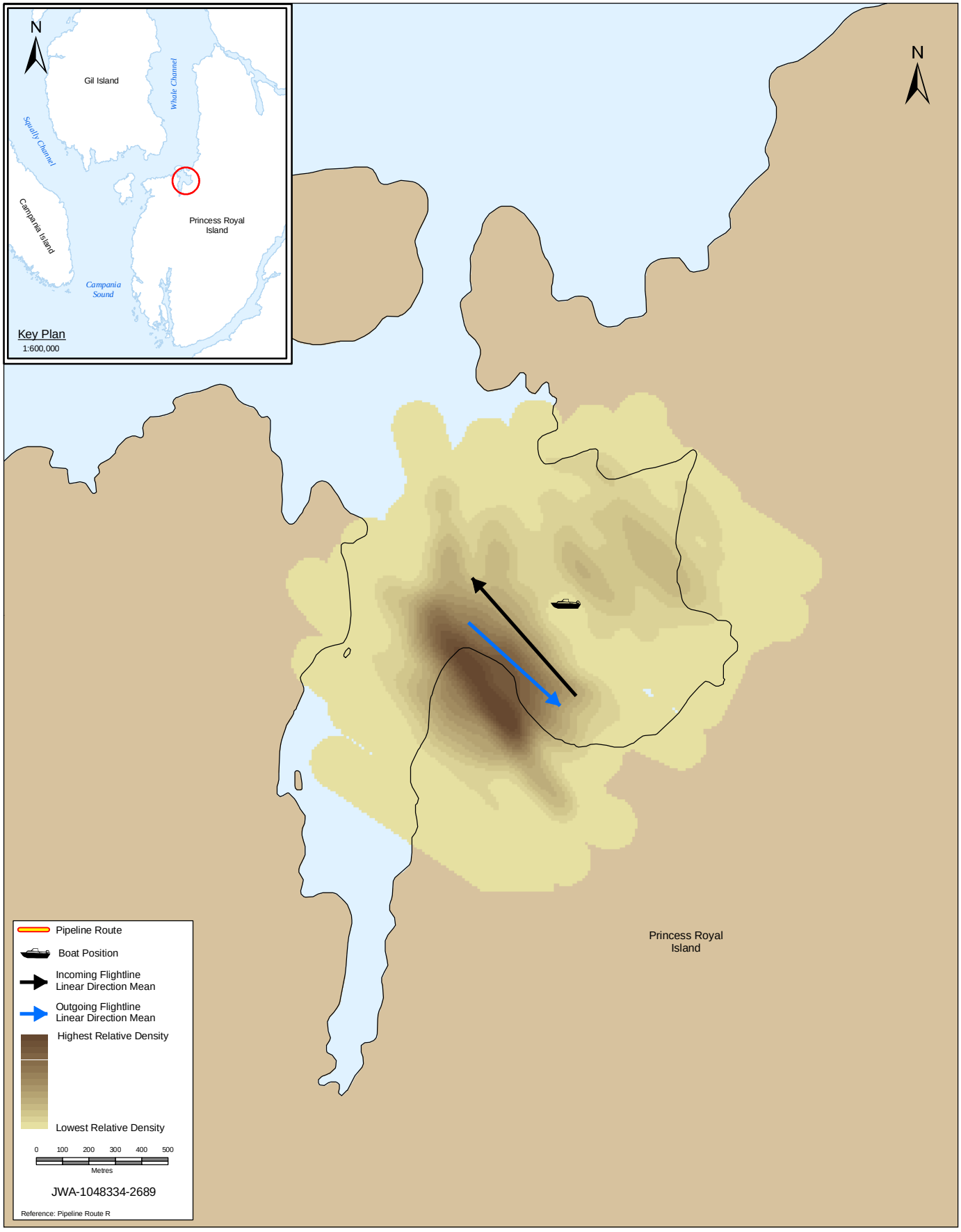

CONTRACTOR: Jacques Whitford AXYS Ltd.

PREPARED BY: gem

PREPARED FOR: Enbridge Northern Gateway Pipelines

ENBRIDGE NORTHERN GATEWAY PROJECT

Marbled Murrelet Radar Survey 2009
Bernard Harbour

FIGURE NUMBER:	DATE:
4-21	20091113

SCALE:	AUTHOR:	APPROVED BY:
1:20,000	NP	CM

PROJECTION:	DATUM:
UTM 9	NAD 83

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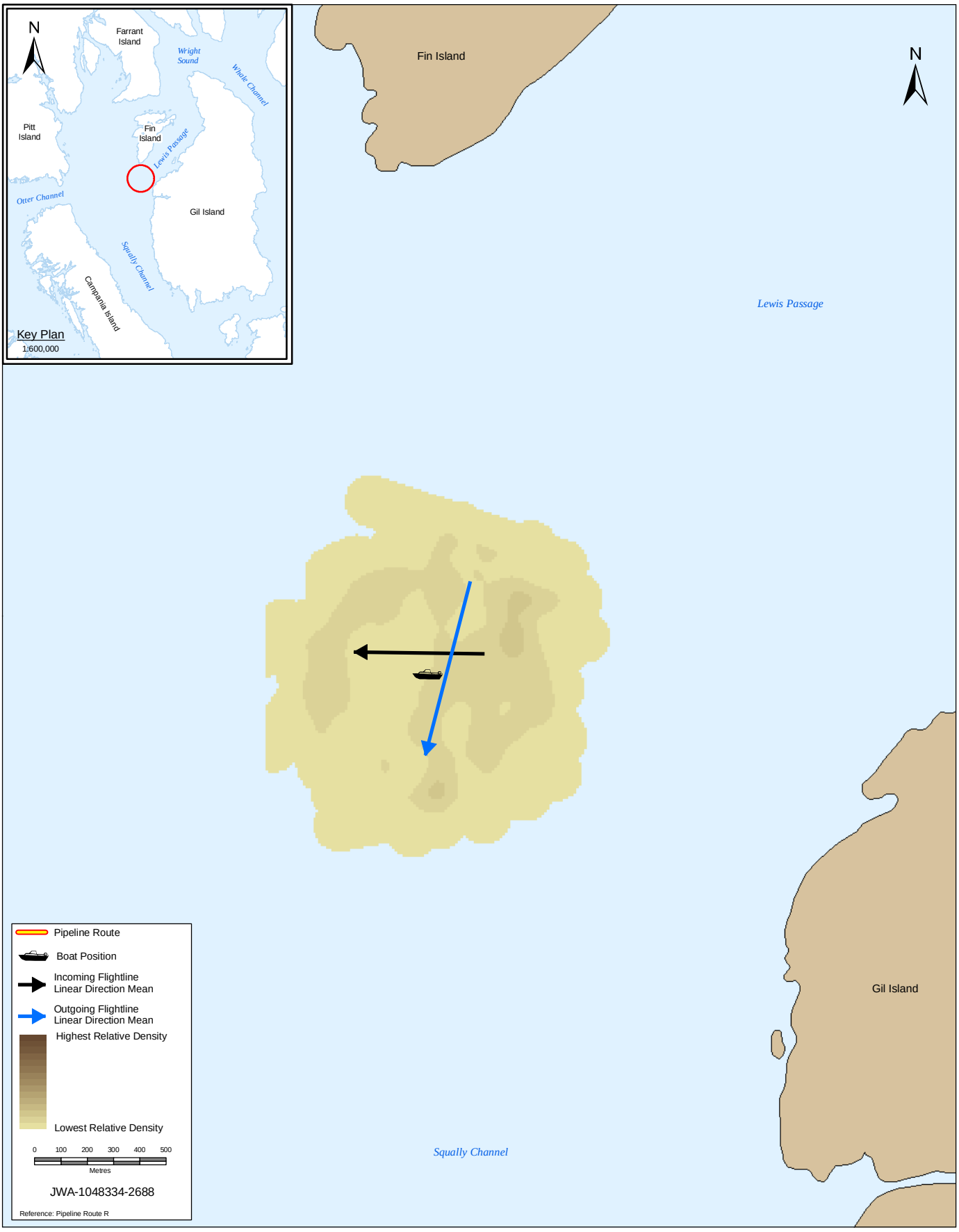

CONTRACTOR: Jacques Whitford AXYS Ltd.

PREPARED BY: gem

PREPARED FOR: Enbridge Northern Gateway Pipelines

ENBRIDGE NORTHERN GATEWAY PROJECT

Marbled Murrelet Radar Survey 2009
Lewis Passage

FIGURE NUMBER:	DATE:
4-22	20091113
SCALE: 1:20,000	AUTHOR: NP / APPROVED BY: CM
PROJECTION: UTM 9	DATUM: NAD 83

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4.6 Incidental Observations

Incidental marine bird observations were recorded from various locations throughout the PEAA and CCAA. Incidental bird observations recorded in 2006 were incorporated into the 2006 data; however, noteworthy observations included small numbers (i.e., 2 to 20) of dabbling ducks (e.g., Mallard, American Wigeon) around Minette Bay and Emsley Cove, Marbled Murrelets around the MK Bay Marina and Western Grebes in the PDA and Emsley Cove. Incidental bird observations were considered as observations occurring outside of the regular survey periods during 2009 surveys. Observations recorded during 2009 surveys are shown in Table 4-20.

Table 4-20 Incidental Bird Observations During 2009 Vessel and Terrestrial Surveys

Species	Winter	Spring	Summer	Fall
American Robin			2	
Ancient Murrelet			1	
Bald Eagle			20	
Black Turnstone				20
Brant		54		
Canada Goose		20		
Great Blue Heron				1
Geese Species		8		
Mallard		5		
Pelagic Cormorant	1	1		
Red-throated Loon			1	
Rufous Hummingbird	1	1	1	
Shorebird Species		5		
Surf Scoter		30		
Varied Thrush			1	
Western Grebe		3		
White-winged Scoter		2		
Yellow-rumped Warbler		3		
Total	**2**	**132**	**26**	**21**

5 Summary

The results of the project team marine bird surveys were consistent with the existing data on the abundance and distribution of marine birds within the PEAA and CCAA. The following is a brief summary of each guild.

5.1 Loons and Grebes

In Douglas Channel more loons were observed in spring than any other season. Winter and summer showed lower occurrence rates in both 2006 and 2009 vessel surveys. Common Loon was the most frequently observed species in Douglas Channel (n = 236), followed by Pacific Loon (n = 196). Large congregations of loons were observed during fall 2009 surveys. Notable transect observations include 17 Pacific Loons in Otter Passage at the south end of Pitt Island, 25 Pacific Loons in Betteridge Inlet, and 42 Pacific Loons in Otter Passage heading towards Fin Island.

Principe Channel supported higher numbers of loons across all seasons for 2006 and 2009 vessel surveys. Common Loon (n = 501) and Red-throated Loon (n = 476) were observed most frequently. Both 2006 and 2009 vessel surveys record high numbers of Red-throated Loon in Principe Channel during summer surveys (n = 221 and n = 165, respectively). This observation supports existing data that suggests this area is used as a foraging area by nesting loons.

Grebe abundance was highest in Douglas Channel during spring and fall vessel surveys. Red-necked and Western Grebes were observed most frequently during both seasons for 2006 and 2009 vessel surveys. Large groups of Western Grebes were recorded during spring surveys at Coste Rocks (n = 19) and Stewart Channel approaching Hartley Bay (n = 62).

In Principe Channel, grebe observations were consistent across winter, summer, and fall surveys but showed a decline in numbers during spring surveys. Red-necked Grebe was recorded most frequently (n = 177), followed by Western Grebe (n = 142). Horned Grebe was the most commonly observed grebe species during winter surveys in 2009.

5.2 Albatross, Fulmars, Shearwaters and Storm-petrels

Shearwater and storm-petrel observations were rare during 2006 and 2009 field surveys. Eight Fork-tailed Storm-Petrels were observed in 2006 and 2009 vessel surveys, with six of those observations occurring in Principe Channel. One Fork-tailed Storm Petrel was found on the vessel after a period of inclement weather. Sooty Shearwater was the only shearwater species observed during vessel surveys, and occurred in Principe Channel during spring 2006 surveys.

These observations are expected due to the pelagic nature of these birds. It is expected for rare observations to occur when species travel inshore during inclement weather. Overall, these birds are unlikely to occur within the PEAA and the CCAA. They are more likely to occur beyond the CCAA along the western shores of Banks Island.

5.3 Cormorants

Pelagic Cormorant was the most common species of cormorant observed during field surveys in Principe and Douglas Channels. Their highest occurrence rate occurred in Principe Channel in winter (0.03 birds/km/day). Large concentrations of Pelagic Cormorants were observed in Freeman Pass (n = 103) and the southwest end of McCauley Island (n = 54) in spring and fall 2009 surveys, respectively. There is a sharp decline in observations of Pelagic Cormorants in summer as they migrate to Alaska for breeding. These data agree with the existing records that indicate pelagic cormorant may breed in small colonies along the north coast.

Double-crested Cormorants were usually observed perched on rocky outcrops with Pelagic Cormorants. Their occurrence rates were much higher in Principe Channel than in Douglas Channel for both 2006 and 2009 vessel surveys. Winter surveys recorded the highest occurrence of this species averaging 0.076 birds/km/day. Summer declines in the occurrence of Double-crested Cormorants were observed in both vessel survey years.

Brandt's Cormorants were observed in winter and spring surveys in 2006 and 2009 (n = 19). The majority (95%) of observations occurred in Principe Channel. Brandt Cormorant observations in 2009 occurred at the southern entrance to Petrel Channel.

5.4 Waders

Consistent with the background information, only Great Blue Heron was observed from this group. This fact does not conclusively exclude American Bittern from the PEAA and CCAA because this species is elusive and not likely to be detected. However, distribution records of the bittern suggest it does not use this area.

Great Blue Heron observations were infrequent across all seasons in 2006 and 2009 vessel surveys. On average, occurrence rates were highest for herons in Douglas Channel during winter (0.003 birds/km/day) and spring (0.005 birds/km/day) surveys. Herons were typically recorded in sheltered inlets with beaches or estuaries.

5.5 Geese and Swans

Canada Goose was the most common large-bodied waterfowl observed within the PEAA and CCAA. Canada Geese winter in and near the CCAA and stage there during spring migration. Occurrence rates for Canada Goose were highest during winter surveys in Douglas Channel (0.34 birds/km/day). Spring occurrence rates were highest in Principe Channel, suggesting movements in birds staging for migration (0.062 birds/km/day). There are some summer records, which may indicate breeding birds in the area, but the use of the area is primarily as wintering and pre-breeding habitat. The largest concentration of Canada Geese, recorded on the southwest shore of Princess Royal Island, included 300 birds.

Observations of Trumpeter Swan, Brant, and Snow Goose were infrequent and occurred only during winter and spring vessel surveys. Most observations for these species were located in Douglas Channel, suggesting it provides important stopover habitat during spring staging and migration.

5.6 Diving Ducks

Diving ducks, except for Greater Scaup, Hooded Merganser and Long-tailed Duck, were found at relatively high occurrence rates in both Douglas and Principe Channels during 2006 and 2009 vessel surveys.

Bufflehead was mostly commonly observed in Douglas Channel during winter and spring surveys, with a decline in records during summer surveys. Harlequin Ducks, however, were recorded consistently throughout all seasons at moderate occurrence rates (0.003 to 0.100 birds/km/day).

Common and Red-breasted Mergansers were observed frequently throughout all seasons, with Common Merganser recorded in higher numbers. Common Merganser had the highest occurrence rates in 2006 during spring surveys in Douglas Channel (0.31 birds/km/day) and during winter in Principe Channel in 2009 (0.11 birds/km/day). Red-breasted Mergansers were observed most frequently in Douglas Channel during winter surveys (0.07 birds/km/day) and in Principe Channel in 2009 (0.06 birds/km/day).

Surf Scoter were the most frequently recorded scoter species across survey years and seasons with highest numbers reported in the spring. Two large concentrations of Surf Scoters was observed during spring 2006 surveys in proximity to Gurd Island (n = 21,589 and n = 28,032). High concentrations of Surf Scoters were observed near Gurd Island again in 2009 during spring surveys (n = 1,000). White-winged Scoter occurred across all seasons, but most frequently in Principe Channel in winter (0.14 birds/km/day).

Barrow's Goldeneye was recorded in higher numbers than were Common Goldeneye during project team surveys. Occurrence rates for Barrow's Goldeneye were highest during winter and spring surveys in Douglas Channel. Common Goldeneye was recorded with lower frequency but was also most often associated with Douglas Channel in winter and spring.

5.7 Dabbling Ducks

Three dabbling duck species were observed during vessel surveys: Mallard, Green-winged Teal, and American Wigeon. Mallards had the highest occurrence rate in Douglas Channel during spring 2006 surveys (0.96 birds/km/day), and a notable concentration of 200 birds occurring near Stewart Channel during spring 2009 surveys. Smaller groupings of Mallards were typically observed in estuaries at the head of an inlet or bay.

Green-winged Teal and American Wigeon were only observed during spring surveys and with occurrence rates less than 0.01 birds/km/day. These birds are unlikely to occur in the PEAA and CCAA in high occurrence rates.

5.8 Coastal Raptors

Bald Eagle was the most common raptor species observed during the project team field surveys. Eagle density was fairly consistent across survey seasons with slightly higher occurrence rates reported for Principe Channel. Bald Eagle occurrence rates were highest during spring and summer surveys in Principe Channel (0.09 birds/km/day and 0.1 birds/km/day, respectively). However, a notably high concentration of eagles (>100 birds) were observed near Emsley point during September 2009 surveys.

Between 2006 and 2009 vessel surveys, 76 Bald Eagle nests were observed. During spring surveys, many Bald Eagle pairs were often recorded near their nest, which is consistent with background information that the PEAA and CCAA provide breeding habitat for Bald Eagles.

5.9 Rails, Coots and Cranes

Birds from this guild were rarely observed across years and seasons during project team surveys. Four Sandhill Cranes were observed flying over Principe Channel during fall 2009 surveys. Although the species is likely a rare visitor to the survey area, it is possible the crane breeds on islands within or near the PEAA and CCAA but would likely be undetected as these cranes prefer thickly vegetated wetlands, away from shore.

Background data indicate that rails are accidental within the PEAA and the CCAA. American Coot are consistently observed during CBCs, but high occurrences of coot between September and January would not have been captured in the field surveys for the Project.

5.10 Shorebirds

Small flocks of shorebirds were observed within the PEAA and CCAA. Shorebirds were observed more frequently in Principe Channel than in Douglas Channel, across all seasons. Surfbirds were the most common species observed (n = 458), followed by Black Turnstones (n = 211), and Red-necked Phalaropes (n = 142). The project team also detected low numbers of Black Oystercatcher (n = 52), Dunlin (n = 40), and Rock Sandpipers (n = 72) during vessel surveys.

5.11 Gulls, Skuas, Jaegers and Terns

Gulls were common throughout the PEAA and CCAA during project team field surveys, however, the most noteworthy observation occurred during the 2006 spring surveys when extremely high numbers of Mew Gull were recorded on Principe Channel (13.6489 birds/km/day). Lower numbers of Glaucous-winged, Bonaparte's and California Gulls were observed in Douglas and Principe Channel. Skuas, jaegers and terns were not observed during 2006 vessel surveys. Skuas and jaegers are mainly pelagic birds and they are unlikely to occur within the PEAA and CCAA. Terns are more common in eastern Canada and would occur as an accidental within the PEAA and CCAA.

Gulls were not recorded during 2009 surveys except as incidentals where they occurred in high densities. The frequency of gull observations would have impaired observers' ability to accurately record numbers of birds for all other guilds. One Parasitic Jaeger was observed during fall 2009 survey in Principe Channel.

5.12 Alcids

Marbled Murrelet was the most commonly observed alcid during project team vessel surveys. The majority of Marbled Murrelet observations occurred in Principe Channel (n = 2,073). Occurrence rates were highest for murrelets during summer surveys, in both Douglas (0.28 birds/km/day) and Principe Channels (0.35 birds/km/day). The lower spring density is unexplainable but may reflect behaviour and

not absolute abundance. In spring, the birds are likely initiating nesting and only conducting foraging trips away from their inland nests at dawn and dusk. Outside nesting season, murrelets are more likely to be in small groups or pairs on the ocean.

Common Murre was recorded with the second highest occurrence rates. This species was observed most often in Principe Channel during winter surveys (0.32 birds/km/day). Occurrence rates were lower for murre during spring and summer surveys as these birds migrate north to their breeding grounds on the shores of Alaska.

Pigeon Guillemots were recorded at low densities rates across all season in 2006 and 2009. Occurrence rates for guillemots were highest in Douglas Channel during 2006 spring and summer surveys (0.06 birds/km/day and 0.04 birds/km/day, respectively). The project team located a small, previously unrecorded colony of Pigeon Guillemot in Giltoyees Inlet during 2006 surveys which was not observed during 2009 surveys.

Observations of Rhinoceros Auklet, Cassin's Auklet and Ancient Murrelet are consistent with previous records and occurred in small numbers in Principe Channel.

5.13 Kingfisher

Belted kingfisher were observed across all seasons at low density suggesting that the species breeds and winters in the area, only migrating locally. Occurrence rates were highest for kingfishers during spring surveys in Douglas Channel (0.007 birds/km/day) and winter surveys in Principe Channel (0.006 birds/km/day).

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Appendix A Potential Marine Birds of the PEAA and CCAA

Table A-1 Potential Marine Birds of the PEAA and CCAA

		Status						Seasonal Abundance					
Common Name	**Scientific Name**	**BC Lists**	***SARA***	**COSEWIC**	**S Rank**	**Abundance***	**Breeder**	**Sp**	**Su**	**Au**	**Wi**	**Observed During Baseline Surveys**	**Habitat**
Red-throated Loon	*Gavia stellata*				S5B, SZN	Y	Yes	x	x	x	x	Yes	Shallow inshore waters--bays, inlets, harbours, lagoons, estuaries; breeds on small, freshwater lakes near sea.
Pacific Loon	*Gavia pacifica*				S4S5B, S4N	y		x	X	x	x	Yes	Deeper waters, but also bays, estuaries, surge narrows, channels, coves, inlets and lagoons; breeds on freshwater lakes.
Common Loon	*Gavia immer*			NAR (1997)	S5B	y	Yes	x	x	x	x	Yes	Inshore sea coasts, and lakes and rivers.
Yellow-billed Loon	*Gavia adamsii*	Blue		NR (1997)	S2S3N	w				x	x	Yes	Sheltered coastal waters, Dixon Entrance, Hecate Strait.
Pied-billed Grebe	*Podilymbus podiceps*				S4B	r						No	Bays, ponds, and open water.
Horned Grebe	*Podiceps auritus*			SC (2009)	S4B	M		x	x	x	x	Yes	Inshore marine waters.
Red-necked Grebe	*Podiceps grisegena*			NAR (1982)	S4S5B	M		x	x	x	x	Yes	Bays, inlets, estuaries and narrows.
Western Grebe	*Aechmophorus occidentalis*	Red			S1B, S2N	M		x	x	x	x	Yes	Sheltered salt and brackish water.
Northern Fulmar	*Fulmaris glacialis*	Red			S1B	Y						No	Pelagic, nests in colonies primarily on sea cliffs, less frequently on low, flat, rocky islands. Rare occurrence in Hecate Strait amd Dixon Entrance.
Laysan Albatross	*Phoebastria immutabilis*	Blue			SNA	s			x			No	Open waters offshore.
Black-footed Albatross	*Phoebastria nigripes*	Blue		SC (2007)	SNA	s			x			No	Open waters offshore.
Short-tailed Albatross	*Phoebastria albatrus*	Red		T(2003)	S1N	r						No	Open waters offshore.
Buller's Shearwater	*Puffinus bulleri*	Blue			SNA							No	Pelagic
Pink-footed Shearwater	*Puffinus creatopus*	Blue		T (2004)	SNA	r						No	Open waters offshore.
Flesh-footed Shearwater	*Puffinus carneipes*	Blue			SNA							No	Pelagic
Short-tailed Shearwater	*Puffinus tenuirostris*				SNA	aw				x	x	No	Pelagic
Sooty Shearwater	*Puffinus griseus*				SNA	ps		x	x			Yes	Pelagic
Leach's Storm Petrel	*Oceanodrama leucorhoa*				S4B	S	Yes		x			O-could not differentiate species of storm-petrels	Pelagic; small numbers winter on open sea of B.C. coast, comes ashore only to breed; breeding along west coast of Vancouver Island and the Queen Charlotte Islands; estimated 1,400,000 breeding in BC. Single birds in channels. Probably breeding in small numbers on Moore Islands.
Fork-tailed Storm Petrel	*Oceanodroma furcata*				S4B	sa	Yes	x	x	x		Yes	Nearshore protected waters; Single birds in channels. Probably breeding in small numbers on Moore Islands.
Double-crested Cormorant	*Phalacrocorax auritus*	Blue		NAR (1978)	S3B	Y		x	x	x	x	Yes	Marine habitats: bays, inlets, harbours, lagoons, estuaries; roosts on islets, log booms, wharves, pilings, jetties, dead trees; Pacific Coast population estimated at 49 094 birds. Estimated 4 000 in BC. Mostly wandering subadult birds in assessment areas.

Table A-1 Potential Marine Birds of the PEAA and CCAA (cont'd)

		Status						Seasonal Abundance					
Common Name	**Scientific Name**	**BC Lists**	***SARA***	**COSEWIC**	**S Rank**	**Abundance***	**Breeder**	**Sp**	**Su**	**Au**	**Wi**	**Observed During Baseline Surveys**	**Habitat**
Pelagic Cormorant	*Phalacrocorax pelagicus*				S4B	Y	Yes	x	x	x	x	Yes	Rocky coasts; forages in bays, harbours, lagoons, surge narrows and coves; roosts on rocky, unvegetated islets, reefs, cliffs, mad-made structures. Mostly wandering subadult birds. Likely nesting in small numbers in assessment areas.
Brandt's Cormortant	*Phalacrocorax pencillatus*	Red			S1B, S4N	M		x			x	Yes	
American Bittern	*Botaurus lentiginosus*	Blue			S3B	S				x		No	Freshwater and estuarine marshes, sloughs, lake edges, river banks and fields. May occur in Kitimat Estuary.
Great Blue Heron	*Ardea herodias fannini*	Blue		SC (2008)	S3B	SW	Yes	x	x	x	x	Yes	Salt, brackish and freshwater environs: shallow bays, lagoons, inlets, coves, tidal mudflats, sloughs, marshes, rivers, ditches. Nesting groups of 2 or 3 pairs, scattered.
Tundra Swan	*Cygnus columbianus*	Blue			S3N	wm		x		very late	x	No	Fresh or brackish aquatic habitat; less frequent in salt water; flooded fields, sloughs, lakes, bays, estuaries, slow rivers, ponds, inlets and beaches. Kitimat Estuary.
Trumpeter Swan	*Cygnus buccinators*			NAR (1996)	S4B, S5N	sW		x	x	x	x	Yes	Sheltered, shallow, aquatic habitat; estuaries, agricultural fields, sloughs, bays, lakes, lagoons, ponds, tidal mud flats, beaches and inlets; 550 swans nesting in Yukon, northern B.C., southwestern N.W.T. and the Grande Prairie and Peace River region of Alberta. Kitimat Estuary.
Snow Goose	*Chen caerulescens*				S4M	WM		rare		rare	rare	Yes	Estuarine marshes with bullrush rhizomes, sedge rhizomes and shoots. Also feed in fields. Kitimat Estuary.
Brant	*Branta bernicla*	Blue			S3M	W		x			x	Yes	Estuaries, beaches, bays, lagoons, mud flats, cobble beaches of outer coastline only, not in channels.
Canada Goose	*Branta canadensis*				S5	Y	Yes	x	x	x	x	Yes	Anywhere with permanent water and grazing habitat; winter near airports, golf courses and farmland; breeds in inland and coastal marshes, islands in lakes, ponds, sloughs, rivers, agricultural fields, reservoirs, ditches, dykes. Kitimat Estuary and small patches of shoreline grass, flocks of 20+/-, QCI subspecies vancouverensis.
Cackling Goose	*Branta hutchinsii*	Blue			S3M	paw	No	x		x	x	O-Did not differentiate from Canada Geese	Only recognized as species in 2004. Seasonal presence has been combined with Canada Goose previously so there are data gaps.
American Green-winged Teal	*Anas crecca*				S5B, S5N	sWM		x		late	x	Yes	Tidal mudflats, sloughs, estuaries, ponds, creek mouths, slow rivers. Kitimat Estuary.
Mallard	*Anas platyrhynchos*				S5B, S5N	Y	Yes	x	x	x	x	Yes	Prefers shallow marshes, but also lakes, rivers, sloughs, estuaries, ponds, ditches, wet fields and coastal marine waters; breeds in wetlands including sloughs, marshes, lakes, swamps, islands, riparian woodlands. Kitimat Estuary, some on other small estuaries.
Northern Pintail	*Anas acuta*				S4B, S5N	sWM		x		x	x	No	Tidal marshes, shallow foreshore, estuaries, exposed eelgrass beds, mudflats, agricultural fields, lagoons
Northern Shoveler	*Anas clypeata*				S5B, S5N	Y		x		x	x	No	Sheltered bays, estuaries, shallow lakes, marshes and flooded agricultural fields
Gadwall	*Anas strepera*				S5B	Y						No	Estuaries, brackish and freshwater marshes, mudflats, flooded fields, very rare, Kitimat Estuary only.

Table A-1 Potential Marine Birds of the PEAA and CCAA (cont'd)

		Status						Seasonal Abundance					
Common Name	**Scientific Name**	**BC Lists**	***SARA***	**COSEWIC**	**S Rank**	**Abundance***	**Breeder**	**Sp**	**Su**	**Au**	**Wi**	**Observed During Baseline Surveys**	**Habitat**
American Wigeon	*Anas americana*				S5B, S5N	yWM		x			x	Yes	Estuaries, mudflats, lagoons and shallow bays with seaweeds and eelgrass. Kitimat Estuary.
Canvasback	*Aythya valisineria*				S4B	W						No	Estuaries, salt water lagoons, rivers, lakes inlets, bays, ponds, flooded fields. Now very rare, Kitimat Estuary only.
Greater Scaup	*Aythya marila*				S4N	s		x	x	x	x	Yes	Estuaries, bays, harbours, lakes, saltwater lagoons. Subadult moulting population plus wintering adults, mostly around Prince Rupert.
Lesser Scaup	*Aythya affinis*				S4S5B, S5N	sWM		x		x		No	Open waters of straits, near points, rocky islets or beaches, on bay and harbours, estuaries, lakes, pond, saltwater lagoons. Kitimat Estuary.
Harlequin Duck	*Histrionicus histrionicus*				S4B, S3N	Y	Yes	x	x	x	x	Yes	Turbulent waters adjacent to rocky islets, shores and bays; saltwater lagoons, inlets and harbours; breed in coastal and interior rivers and creeks and glacial streams. Groups of 2-6 usually associated with freshwater along channels. Need to be sorted out from other scoters. Breed in some small coastal creeks.
Long-tailed Duck	*Clangula hyemalis*	Unk			SUB, S4N	W						Yes	Deeper waters of straits, bays, harbours, channels and fiords, also estuaries, offshore waters and mudflats. Open ocean, rare elsewhere, even no spring migration.
Black Scoter	*Melanitta nigra*				S4N	W		x			x	No	Estuaries, bays, harbours, inlets, sound and lagoons <11 m and with mussel beds. Expected to be very rare.
Surf Scoter	*Melanitta perspicillata*	Blue			S3B, S4N	W		x	x	x	x	Yes	Open, shallower waters of straits adjacent to beaches, spits and points; also protected bays, harbours and lagoons, deep fiords. Subadult moulting population plus wintering adults.
White-winged Scoter	*Melanitta fusca*				S5B, SZN	W		x	x	x	x	Yes	Marine brackish waters, including bays, inlets, channels, estuaries; prefers more open, deeper waters than surf scoter; sandy gravelly bottoms with shellfish beds. Subadult moulting population plus wintering adults.
Common Goldeneye	*Bucephala clangula*				S4S5B	sWM		x	x	x	x	Yes	Estuaries, bays, harbours, lakes, lagoons. shallower waters of straits adjacent to beaches and spits; occasionally ponds, rivers, creeks. Possibly a subadult moulting population plus wintering adults.
Barrow's Goldeneye	*Bucephala islandica*				S4B	sWM		x	x	x	x	Yes	Bays, harbours, inlets, fiords with rocky shores and extensive mussel beds; often near freshwater -- creeks, waterfalls, storm outfalls. Possibly a subadult moulting population plus wintering adults.
Bufflehead	*Bucephala albeola*				S5B	WMs		x		X	x	Yes	Bays, harbours, lagoons, estuaries, lakes, ponds, rivers, inlets, coves rocky shores, flooded fields
Hooded Merganser	*Lophodytes cucullatus*				S5B	sWm		x		X	x	Yes	Estuaries, protected bays and inlets, coastal lakes, marshes, sloughs. Rare small groups, mostly Kitimat Estuary.
Common Merganser	*Mergus merganser*				S5B	Y	Yes	x	x	x	x	Yes	Fresh and brackish waters of estuaries, protected bays and inlets; also clear rivers and large sloughs; roosts in adjacent shoals, beach boulders, gravel and sand bars, logs, dry spits; breeds near fresh water along forested lakes, streams, rivers, inlets, beaver ponds, marine shores. Brood in later summer, otherwise mostly salmon stream outlets.

Table A-1 Potential Marine Birds of the PEAA and CCAA (cont'd)

		Status						Seasonal Abundance					
Common Name	**Scientific Name**	**BC Lists**	***SARA***	**COSEWIC**	**S Rank**	**Abundance***	**Breeder**	**Sp**	**Su**	**Au**	**Wi**	**Observed During Baseline Surveys**	**Habitat**
Red-breasted Merganser	*Mergus serrator*				S4B	Y		x	x	x	x	Yes	Bays, estuaries inlets, coastal lakes, rivers, large sloughs. Occasional solitary birds, except Kitimat Estuary.
Osprey	*Pandion haliaetus*				S5B	Sw	Yes?	x	x	x		No	Lakes, rivers, sloughs, protected coastal waters such as bays, lagoons, inlets. Often harassed by eagles, mostly wandering solitary pairs, prefer to breed near freshwater, huge population just over coast range.
Golden Eagle	*Aquila chrysatos*			NAR (1996)	S4S5B	M		x				Yes	Mountainous areas
Peale's Peregrine Falcon	*Falco pregrinus peali*	Blue	Schedule 1	SC (2007)	S3B	Y	Yes	x	x	X	x	Yes	Typically nests on ledges of rocky island cliffs, usually near seabird colonies. Occasionally, nests occur on mainland headland cliffs. A few nests occurred on grassy ledges on rock bluffs. More rarely, old nests of Pelagic Cormorants (*Phalacrocorax pelagicus*), Bald Eagles and Common Ravens have been used.
Sharp-shinned Hawk	*Accipiter striatus*			NAR (1997)	S5B, S5N	O				X		Yes	Mixed forests.
American Coot	*Fulica Americana*			NAR (1991)	S4B	Y				x	x	Yes	Fresh, marine and brackish waters, including lakes, ponds, marshes, lagoons, sloughs, estuaries, slow rivers, flooded fields, tidal mudflats. Winters in Prince Rupert and probably Kitimat Estuary but not abundant.
Sandhill Crane	*Grus canadensis tabida*			NAR (1979)	S4B	Y	Yes		x	x		Yes	Shallow wetlands, lakes, swamps, marshes, ponds, meadows, estuarine marshes, intertidal areas, grasslands, agricultural fields. Breeds on bogs of coastal islands, forages along cobble beaches of outer islands. Not often in salt water.
Black-bellied Plover	*Pluvialis squatarola*				S5N	W		x	x	x		No	Tidal mudflats, sandy beaches, rocky islets and beaches, short-grass uplands. Migrant on outer islands.
American Golden Plover	*Pluvialis dominica*	Blue			S3S4B	s		x	x	x		No	Lagoon shores, sandspits, tidal mudflats, rocky beaches. Migrant on outer islands.
Semipalm-ated Plover	*Charadrius semipalmatus*				S4S5B	s	Yes, small numbers	x	x			No	Tidal mudflats, sandy and gravel beaches, small estuaries and sometimes rocky beaches. Breeds on sandy beaches.
Killdeer	*Charadrius vociferous*				S4B	Y	Possible	x	x	x	x	No	Tidal mudflats and sandspits; roost on log booms and nearshore rocks; breeds in open areas with minimal ground cover, including grassy uplands, lakeshore clearings, open river banks and marine beaches. Breeds more in the interior than along coast.
Black Oystercatcher	*Haematopus bachmani*				S4	y	Yes	x	x	x	x	Yes	Rocky islets, reefs and spits, lagoons, gravel and mud flats, rocky beaches, sand bars and inlets. Outer coast, cobble beaches.
Black Oystercatcher	*Haematopus bachmani*				S4	y	Yes	x	x	x	x	Yes	Rocky islets, reefs and spits, lagoons, gravel and mud flats, rocky beaches, sand bars and inlets. Outer coast, cobble beaches.
Greater Yellowlegs	*Tringa melanoleuca*				S5B	M		x	x			No	Tidal mudflats in protected bays and estuaries, edges of tidal channels, sandy beaches and spits; prefers areas with shallow waters over mud; roosts in offshore rocks, reefs, rocky beaches. Migrant on Kitimat Estuary.
Lesser Yellowlegs	*Tringa flavipes*				S5B	M		x	x	x		No	Sheltered bays and estuaries with tidal mudflats. Migrant on Kitimat Estuary.

Table A-1 Potential Marine Birds of the PEAA and CCAA (cont'd)

		Status						Seasonal Abundance					
Common Name	**Scientific Name**	**BC Lists**	***SARA***	**COSEWIC**	**S Rank**	**Abundance***	**Breeder**	**Sp**	**Su**	**Au**	**Wi**	**Observed During Baseline Surveys**	**Habitat**
Solitary Sandpiper	*Tringa solitaria*				S5B	m		x				No	Tidal mud flats and small estuaries. Very rare, Kitimat Estuary only.
Spotted Sandpiper	*Actitus macularia*				S5B	SwM	Yes	x	x			No	Shorelines, where small streams drain into tidal mud or boulder-strewn beaches; breeds along edges of lakes, rivers and some coastal grassy beaches. Mostly Kitimat Estuary.
Wandering Tattler	*Heteroscelus incanus*	Blue			S3S4B	m		x		x		No	Surfwashed reefs and rocks of outer coast; rare in protected waters. Single birds, outer coast, cobble beaches.
Whimbrel	*Numenius phaeopus*				S4S5M	w		x	x			No	Offshore islets and rocks, mudflats, wind-swept sandy beaches and spits. Single birds, outer coast, cobble beaches.
Ruddy Turnstone	*Arenaria interpres*				S4M	w		x		x		No	Rocky shores, offshore islets and reefs or exposed peninsulas, occasionally pebble and sand beaches and mudflats. Outer coast, cobble beaches.
Black Turnstone	*Arenaria melanocephala*				S4N, S5M	w		x		x	x	Yes	Reefs, rocky beaches, jetties at mouths of rivers or along lagoons, adjacent mud flats, wet, sandy beaches, floating kelp beds. Outer coast, cobble beaches; flocks of several hundred occasionally on migration.
Surfbird	*Aphriza virgata*				S4M	W		x			x	Yes	Rocky shorelines, including islands, reefs, beaches, headlands, jetties and breakwaters; occasionally on sandy beaches, tidal mudflats, log booms and short grass areas. Single birds, outer coast, cobble beaches.
Sanderling	*Calidris alba*				S4S5M	M		x		x	x	No	Ocean beaches, sandbars, mudflats, and lake and river shores. Sandy beaches only.
Semipalmated Sandpiper	*Calidris pusilla*				SNA	M		x	x			No	Tidal mudflats in estuaries; estuaries only
Western Sandpiper	*Calidris mauri*				S4S5M	M		x	x	x		No	Estuaries, mud and sand beaches. Estuaries only.
Least Sandpiper	*Calidris minutilla*				S4?B	w		x	x			No	tidal mudflats and estuaries, around tide pools on rocky coastlines. Estuaries only.
Baird's Sandpiper	*Calidris bairdii*				SU	m		x	x			No	tidal mudflats, lagoons, estuaries. Very rare, estuaries only.
Pectoral Sandpiper	*Calidris melanotos*				S5M	M		x	x	x		No	Drier areas of tidal mudflats and estuaries. Very rare, estuaries only.
Rock Sandpiper	*Calidris ptilocnemis*				S4N	M				x	x	No	Offshore rocky islets, rocky headlands, peninsulas, beaches, occasionally mudflats. Rarely single birds, outer coast, cobble beaches.
Dunlin	*Calidris alpina*				S4N	W		x			x	Yes	Tidal mudflats; roosts on spits, dykes, beached logs, log booms, breakwaters; occasionally found on sandy beaches, rocky points. Kitimat Estuary, small numbers.
Short-billed Dowitcher	*Limnodromus griseus*	Blue			S2S4B	w		x	X			No	Tidal mudflats, farm ponds, muddy fields, golf courses, offshore rocks. Estuaries only.
Long-billed Dowitcher	*Limnodromus scolopaceus*				S5M	M		x	X	x		No	Prefers freshwater habitats, although readily uses salt water during migration; forages on tidal mudflats, roosts on offshore rocks, islands and log booms. Estuaries only.

Table A-1 Potential Marine Birds of the PEAA and CCAA (cont'd)

		Status						Seasonal Abundance					
Common Name	**Scientific Name**	**BC Lists**	***SARA***	**COSEWIC**	**S Rank**	**Abundance***	**Breeder**	**Sp**	**Su**	**Au**	**Wi**	**Observed During Baseline Surveys**	**Habitat**
Common Snipe	*Gallinago gallinago*					Y		x	x	x	x	No	Estuaries and unfrozen uplands (flooded fields) with soft soil; breeds in meadow, fen or bogs. Very rare, estuaries only, breeds on freshwater marshes.
Red-necked Phalarope	*Phalaropus lobatus*	Blue			S3S4B	m		x	x	x		Yes	Spends all its time on water, except when blown ashore; has been seen foraging on sand beaches. Possibly groups in wider channels in late summer, otherwise unlikely.
Pomarine Jaeger	*Stercorarius pomarinus*				SNA	m		x	x	x		No	Offshore habitat. Single birds, outer coast, cobble beaches.
Parasitic Jaeger	*Stercorarius parasiticus*				SNA	m			x	x		Yes	Bays, coves, estuaries, surge narrows, occasionally coastal lakes and heads of inlets. Single birds, outer coast, cobble beaches.
Long-tailed Jaeger	*Stercorarius longicaudus*				SNA	m				x		No	Highly pelagic, nearshore areas include surge narrows and bays. Single birds, outer coast, cobble beaches.
Bonaparte's Gull	*Larus philadelphia*				S5B	wM		x	x	x	x	Yes	Bays, harbours, lagoons, estuaries, areas of tidal convergence and upwelling, passages and narrows; roosts in kelp beds, offshore islets and log booms. Large flocks on migration.
Mew Gull	*Larus canus*				S5B	sWM		x	x	x	x	Yes	Bays, estuaries, surge narrows, beaches, mudflats, harbours. Small numbers, breeds on coastal lakes.
Ring-billed Gull	*Larus delawarensis*				S4B	s		x	x	x		Yes	Bays, lagoons, estuaries, freshwater and brackish lakes, large rivers, beaches, fields, dumps, parks, golf courses. Vagrant.
California Gull	*Larus californicus*	Blue			S3B	S		x	x			Yes	Beaches, bays, estuaries, lagoons, fields, airports, dumps, open ocean, brackish sloughs and freshwater lakes. Regular vagrant.
Herring Gull	*Larus argentatus*				S4S5B	w		x	x	x	x	Yes	Open ocean, beaches, bays, harbours, inlets, estuaries, dump; roosts in flooded fields, golf courses, parks, on buildings. Regular vagrant.
Thayer's Gull	*Larus thayeri*				S5M	W		x	x	x	x	No	Estuaries, bays, lagoons, harbours, spits, dumps, lakes. Regular vagrant.
Western Gull	*Larus occidentalis*				S4N	w		x				No	All marine habitats, dumps, freshwater lakes, rivers, flooded fields. Regular vagrant.
Glaucous-winged Gull	*Larus galucescens*				S5B	Y	Yes	x	x	x	x	Yes	Bays, harbours, estuaries, rivers; roosts in sheltered waters, including bays, inlets, rivers, islands, log boom; nests on small offshore islands, treeless, with patches of grasser, herbs or shrubs; Estimated population--58 000 in BC. Only colonial breeding species on coast.
Glaucous Gull	*Larus hyperboreus*				SNA	w		x		x	x	Yes	Garbage dumps, fish plants, harbours, mudflats, beaches, log booms, flooded fields, spawning areas. Regular vagrant.
Black-legged Kittiwake	*Rissa tridactyla*				SNA	w		x	x	x	x	Yes	Rocky islets and headlands, sandy beaches and spits, bays, harbours, surge narrows, estuaries, open waters. Very large flocks of non-breeders on outer coast, some single bird or small groups in channels in spring.
Caspian Tern	*Sterna caspia*	Blue		NAR (1999)	S3B	S						No	Beaches, tidal mudflats, sheltered bays; roosts on sandbars, mudflats, beaches and rocks. Single bird seen once?
Black Tern	*Chlidonias niger*			NAR (1996)	S4B							No	British Columbia, nests occurred in areas with 33% open water, 42% matted vegetation, and 25% standing vegetation. Interior freshwater species.

Table A-1 Potential Marine Birds of the PEAA and CCAA (cont'd)

		Status						Seasonal Abundance					
Common Name	**Scientific Name**	**BC Lists**	***SARA***	**COSEWIC**	**S Rank**	**Abundance***	**Breeder**	**Sp**	**Su**	**Au**	**Wi**	**Observed During Baseline Surveys**	**Habitat**
Common Murre	*Uria aalge*	Red			S2B, S4N	Y		x	x	x	x	Yes	Protected marine waters off straits, inlets, bays and channels; Estimated population - 9000 in BC. Nearest colonies: southern tip of QCI, wintering birds Hecate Strait.
Pigeon Guillemot	*Cepphus columba*				S4B	Y	Yes, small numbers	x	x	x	x	Yes	Nearshore zone along rocky shorelines, bays, inlets, channels, surge narrows, sound, coves and harbours; Estimated population--9000 in BC. Widely scattered breeding groups of 10-40. Do well in harbours, ferry terminals.
Marbled Murrelet	*Brachyramphus marmoratus*	Red	Schedule 1	T (2000)	S2B, S4N	Y	Yes, but inland	x	x	x	x	Yes	Bays, inlets, fiords, lagoons, harbours and coves, as well as exposed coastal waters; shelves at mouths of inlets and shallow banks important for foraging; Total population--617 500 (50 000 of which occur in Canada along the Pacific coastline). Local population probably between 1000 and 3000 but could be 5000. Numbers on water depend on richness of local marine resources - small herring, sandlance
Ancient Murrelet	*Synthliboramphus antiquus*	Blue	Schedule 1	SC (2004)	S2S3B, S4N	W		x	x	x		Yes	Avoids protected coastal waters unless blown in by storm, forages in areas of upwelling and mixing-- surge narrows, channels and areas with strong eddies and tidal streams. Hecate Strait only, fall and winter very unlikely.
Cassin's Auklet	*Ptychoramphus aleuticus*	Blue			S2S3B, S4N	w		x	x			Yes	Rarely inshore. Deep water of Hecate Strait only, winter unlikely.
Rhinoceros Auklet	*Cerorhinca monocerata*				S4B	y	Yes	x	x	x	x	Yes	Prefers open marine waters; seen at mouths of bays and inlets and at outer limits of estuaries; rarely in inlets, fiords and estuaries. Moore Islands (approximately 40,000 breeders), forages at channel mouths.
Tufted Puffin	*Fratercula cirrhata*	Blue			S3B, S4N	s			x			No	Prefers outer coastal waters; rarely seen in harbours and bays. Nearest colonies: southern tip of QCI, wintering birds in Hecate Strait.
Belted Kingfisher	*Megaceryle alcyon*				S4S5B	Y	Yes	x	x	x	x	Yes	Rivers, streams, marshes, lakes, coastal shorelines, lagoons, tidepools, estuaries, beaches, sloughs, beaver ponds; nests in cutbanks. Single birds in channels, very close to shore.

NOTES:
* Abundance
uppercase letter = common, very common, abundant
lower case = rare, scarce, uncommon, scattered and sporadic
Y, y = yearlong
P, p = spring (approximately March - May)
S, s = summer (approximately June-August)
A, a = autumn (approximately September-November)
W, w = winter (approximately December-February)
M, m = migratory (spring and autumn)
R, r = rare
O = unknown

SOURCES:
Hay 1976; Campbell et al. 1990, 1990a; Kaiser et al. 1991; Morgan et al. 1991; Norecol Environmental Consultants 1991; Rodway and Lemon 1991; Horwood 1992; Norecol Dames and Moore Inc. 1997; IBA 2004, Internet Site; Horwood 2006; Canadian Wildlife Service Waterfowl Committee 2007; Badzinski et al. 2008, BC CDC 2009, Internet Site; Government of Canada 2008, Internet Site, NAS 2008, Internet Site.

Appendix B Mean Monthly Counts of Aquatic Birds in the Kitimat River Estuary, 1974-75

Table B-1 Mean Monthly Counts of Aquatic Birds In the Kitimat River Estuary, 1974-75

Bird Groups	Mean Monthly Counts of Aquatic Birds in the Kitimat River Estuary, September to August, 1974–1975 Kitimat Arm (area 10) Hay, 1976												
	S	O	N	D	J	F	M	A	M	J	J	A	Total
Loons	-	-	1	-	-	-	1	1	-	4	3	1	11
Grebes	-	-	-	-	-	-	148	110	87	-	-	10	355
Cormorants	-	-	-	-	-	-	7	6	-	-	10	-	23
Herons	-	-	-	-	-	-	-	-	-	-	-	-	-
Swans	-	-	-	-	-	-	-	-	-	-	-	-	-
Geese	-	-	-	-	-	-	18	1	-	-	-	-	19
Dabbling Ducks	-	-	-	-	-	25	-	-	-	-	-	-	25
Diving Ducks	-	-	35	-	-	2	5	6	148	70	429	-	695
Mergansers	-	-	-	-	-	-	-	-	-	-	-	-	-
Shorebirds	-	-	-	-	-	-	-	-	-	-	-	-	-
Gulls, Jaegers	-	-	-	-	762	-	55	20	-	-	46	-	883
Alcids	-	-	-	-	2	1	11	21	6	-	35	2	78
Kingfishers	-	-	-	-	-	-	-	-	-	-	-	-	-

SOURCE: Kitimat Arm, Area 10 (Hay 1976)

Appendix C Marine Bird Observations from Bish and Emsley Coves, 1991-2005

Table C-1 Marine Bird Observations from Bish and Emsley Coves, 1991-2005

Common Name	Scientific Name	Bish Cove	Emsley Cove	Grand Total
American Wigeon	*Anas americana*	-	30	30
Bald Eagle	*Haliaeetus leucocephalus*	17	48	65
Barrow's Goldeneye	*Bucephala islandica*	4	53	57
Belted Kingfisher	*Ceryle alcyon*	5	4	9
Black Turnstone	*Arenaria melanocephala*	-	35	35
Bonaparte's Gull	*Larus philadelphia*	14	5	19
Bufflehead	*Bucephala albeola*	27	41	68
California Gull	*Larus californicus*	1	1	2
Canada Goose	*Branta canadensis spp.*	-	95	95
Common Goldeneye	*Bucephala clangula*	226	450	676
Common Loon	*Gavia immer*	5	12	17
Common Merganser	*Mergus merganser*	34	62	96
Glaucous-winged Gull	*Larus glaucescens*	-	1	1
Goldeneye species	*Bucephala spp.*	15	-	15
Great Blue Heron	*Ardea herodias*	1	8	9
Green-winged Teal	*Anas crecca*	-	6	6
Gull species	*Larus spp.*	250	50	300
Harlequin Duck	*Histrionicus histrionicus*	7	26	33
Herring Gull	*Larus argentatus*	31	1	32
Hooded Merganser	*Lophodytes cucullatus*	4	2	6
Horned Grebe	*Podiceps auritus*	-	13	13
Mallard	*Anas platyrhynchos*	110	29	139
Marbled Murrelet	*Brachyramphus marmoratus*	20	18	38
Mew Gull	*Larus canus*	168	100	268
Northern Pintail	*Anas acuta*	-	2	2
Northern Shoveler	*Anas clypeata*	-	2	2
Osprey	*Pandion haliaetus*	-	1	1
Pectoral Sandpiper	*Calidris melanotos*	-	1	1
Pelagic Cormorant	*Phalacrocorax pelagicus*	3	-	3
Pigeon Guillemot	*Cepphus columba*	1	3	4
Red-breasted Merganser	*Mergus serrator*	3	-	3
Red-necked Grebe	*Podiceps grisegena*	-	15	15
Semipalmated Sandpiper	*Calidris pusilla*	-	1	1
Spotted Sandpiper	*Actitis macularia*	1	4	5
Surf Scoter	*Melanitta perspicillata*	308	1020	1328
Surfbird	*Aphriza virgata*	-	4	4

Table C-1 Marine Bird Observations from Bish and Emsley Coves, 1991-2005 (cont'd)

Common Name	Scientific Name	Bish Cove	Emsley Cove	Grand Total
Thayer's Gull	*Larus thayeri*	1	1	2
Trumpeter Swan	*Cygnus buccinator*	-	3	3
Western Grebe	*Aechmophorus occidentalis*	2	6	8
White-winged Scoter	*Melanitta fusca*	-	1	1
Yellow-billed Loon	*Gavia adamsii*	-	1	1