Newfoundland and Labrador Refinery Project

Environmental Effects Assessment
Component Study

MIGRATORY BIRDS COMPONENT STUDY

Prepared For:
Newfoundland and Labrador Refining Corporation
87 Water St
Harvey Building, 2nd Floor
St. John's, NL
A1C 1A5

Prepared By:
LGL Ltd.

LGL LIMITED
environmental research associates

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MIGRATORY BIRD COMPONENT STUDY
PLACENTIA BAY, NEWFOUNDLAND

Submitted To:

BAE-Newplan Group Limited

A Division of

SNC-Lavalin
87 Water St.
Harvey Building, 2nd Floor
St. John's, NL
A1C 1A5

Submitted By:

LGL Ltd.
Environmental Research Associates
388 Kenmount Rd.
P.O. Box 13248, Stn A
St. John's, NL
A1B 4A5

July 2007

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EXECUTIVE SUMMARY

Newfoundland and Labrador Refinery Corporation (NLRC, "the Proponent") has proposed an oil refinery for Southern Head, Placentia Bay. SNC Lavalin, Project Engineers, retained LGL Limited to conduct surveys in Placentia Bay as part of a baseline data collection program in support of the environmental assessment. Placentia Bay is the site of active commercial fisheries, several shipyards, a refinery, an oil terminal, and a ferry terminal. The level of industrial activity is likely to increase with recent regulatory applications for a nickel processing plant in Long Harbour, a liquefied natural gas terminal at Grassy Point, and the proposed oil refinery at Southern Head.

A diversity of marine-associated birds uses the pelagic and coastal areas of inner Placentia Bay. LGL biologists recorded 34 species during pelagic bird surveys and 43 species during coastal surveys from August 2006 to April 2007. Gulls were more commonly observed than any other seabird species on all three of the pelagic survey routes. Herring Gulls and Great Black-backed Gulls were the most numerous gulls recorded during the monthly pelagic bird survey program in Placentia Bay from August 2006 to April 2007; they were recorded on all 15 surveys. The survey area supports a variety of shoreline habitats ranging from bedrock with moderate wave exposure to estuaries, bar lagoons and pockets of cobble beach. Highlights of findings were the Black Ducks staging and wintering in and around the bar lagoons in Arnold's Cove and Come By Chance. These represent large winter aggregations for this species in the province. There was a strong presence of Black-headed Gulls at Arnold's Cove, a species of localized occurrence in the province. Other seabirds were uncommon in this inshore area except some pelagic species being evident following storms with strong onshore winds and fog. Seventeen species of shorebirds were recorded in late summer-early fall with notable aggregations of Greater Yellowlegs (some Lesser Yellowlegs), Semipalmated Sandpipers, Semipalmated Plovers, and Ruddy Turnstones. Some shorebird species recorded by LGL were uncommon or rare for the province, notably Red Knot and Baird's Sandpiper, respectively.

The shorebird, waterfowl and Black-headed Gull and, to a lesser degree, tern concentrations occurring at intertidal flats at Arnold's Cove and Come By Chance lagoon are of regional importance and some of these wetlands have been identified under the wetland stewardship programs for Newfoundland and Labrador. These shoreline types are rare in Placentia Bay and relatively sensitive to oil contamination. Additional freshwater wetlands at the headwaters of Watson's Brook and in the 'footprint' of the proposed oil refinery have been under consideration for inclusion in the Come By Chance wetland stewardship program by the Eastern Habitat Joint Venture.

Ring-necked Duck and Black Duck nest on wetland scattered throughout Southern Head with the former species more noticeably associated with oligotrophic sites. A pair of black ducks was associated with a wetland enriched by active beaver impoundment. These species are expected on wetlands in this ecoregion of insular Newfoundland (Goudie 1987). The Canada Goose was not observed nesting in the survey area despite extensive peatlands and other wetland sites that appear suitable. Nevertheless, large numbers ($n \sim 400$) were observed staging in March 2007 at the bar lagoon in Come By Chance.

A high number of Bald Eagles were recorded in the inner area of Placentia Bay. Placentia Bay is reported to support one of the highest densities of Bald Eagles in eastern North America. LGL detected up to twenty individuals in one day during coastal surveys, and this suggests that a large proportion of the Placentia Bay population may over-winter in this area. A nest site is located on the east side of the headland near Goat Point, and breeding was successful there in 2007.

In 2001, the eastern population of Harlequin Ducks was re-listed as *species of concern*. Using Standard Operating Procedures defined by Canadian Wildlife Service, experienced LGL Limited biologists conducted low-level helicopter searches of marine archipelago and headland areas in western Placentia Bay and southern Burin

Peninsula of Newfoundland. Areas searched included sites that were reported to have wintering Harlequin Ducks in the past. Only one isolated group of twelve Harlequin Ducks was located in proximity to Morgan's Island ("The Breadbox"), adjacent to Allan's Island near Lamaline, Burin Peninsula. The sighting of a group of twelve Harlequin Ducks in March and again in April suggests that the group is likely resident to this area in winter-spring. Shore-based standardized Harlequin Duck surveys were undertaken at representative sites and yielded significant numbers ($n > 100$) for the sites representative of the Cape St. Mary's area whereas small, but consistent, numbers were detected at all other sites. Harlequin Ducks were previously observed at most sites in the early 2000's, and the recent data suggest that modest increases may have occurred at all sites.

Twenty species of landbirds were recorded as confirmed or probable breeders in the proposed oil refinery footprint at Southern Head. The four most numerous species observed were Swamp Sparrow, White-throated Sparrow, Blackpoll Warbler and Savannah Sparrow with 16-40 pairs of each recorded. Within the refinery footprint area, 14 of the 20 species confirmed as breeding or probable breeding occurred within the black spruce scrub and forest habitat.

The observation of caribou on in the footprint of the proposed oil refinery, and on Sall the Maid Island, adjacent to the west side of Southern Head peninsula is indicative of calving and use of the general survey area by this ungulate. This observation confirms local knowledge of a small herd in the Watson's Brook area and may represent some dispersal from herds to the west (Middle Ridge). Caribou have also been observed over the last ten to fifteen years in the general area of Half Moon Pond and Watson's Pond in the area of Watson's Brook on Southern Head (D. Slade, retired Wildlife Technician, pers. comm.). The extensive peatlands, heath, and interspersed forests of the Southern Head are suitable habitat for this species. Smaller numbers (four or five) have also been observed in the area of North Harbour Head, and regularly on Sound Island.

1.0 INTRODUCTION

Newfoundland and Labrador Refinery Corporation (NLRC, "the Proponent") is proposing to develop an oil refinery at Southern Head, Placentia Bay. As such, the Government of Newfoundland and Labrador requested the preparation of several Component Studies, one of which was a Component Study on migratory birds (presented here) under the Guidelines for the Environmental Impact Statement/Comprehensive Study Report issued in June 2007.

1.1 Objectives and Rationale

This document presents results of "baseline" data collected during surveys of marine-associated birds (coastal and pelagic), landbirds, and waterfowl. Biologists from LGL Limited conducted pelagic and coastal surveys in Placentia Bay from August 2006 to April 2007, breeding waterfowl surveys in September 2006 and June 2007, and landbird surveys at the proposed site of the oil refinery in June 2007. It is important to document the occurrence, distribution, and abundance of migratory bird species, especially those considered at risk, in and near the proposed refinery site to assess and minimize potential impacts on this Valued Ecosystem Component (VEC). This is especially important given existing industrial activity (commercial fisheries, several shipyards, an oil refinery, an oil transhipment facility, and a ferry terminal) in Placentia Bay and the potential for increased activity with recent regulatory applications for a nickel processing plant in Long Harbour, a liquefied natural gas terminal at Grassy Point, and the proposed oil refinery at Southern Head.

1.2 Study Area

The Study Area for this Component Study is Placentia Bay with focus on the inner portion of the bay, near the site (Southern Head) of the proposed oil refinery. The land component includes the area of the peninsula generally referred to as Southern Head that separates Come By Chance Bay from North Harbour. Placentia Bay is the richest bay in coastal Newfoundland for marine birds. Ninety-two species of marine-associated birds were identified as possibly occurring in and near the proposed refinery area although some are rare and others are pelagic in distribution, being observed inshore only in or following inclement conditions such as heavy fog and winds (Table 1.1). Most species have either a coastal or pelagic distribution, but there are some species that spend time in both habitats. The large colonies of Northern Gannets, Common Murres and Black-legged Kittiwakes at Cape St. Mary's in summer are supported by the rich adjacent marine waters that also host large numbers of Greater and Sooty Shearwaters that breed in the Southern Hemisphere during the North Atlantic winter. These seabirds are supplanted in winter by large aggregations of sea ducks, such as Common Eiders, the most northerly wintering distribution of Black Scoters, and the eastern Harlequin Duck, currently listed as a species of *special concern* by the Committee on Species of Endangered Wildlife in Canada (COSEWIC) and *vulnerable* under the *Endangered Species Act* of Newfoundland and Labrador. There are over 365 islands in Placentia Bay, many of which support small colonies of seabirds, such as gulls (mostly *Larus marinus, L. argentatus,* some *L. delawarensis*), Black-legged Kittiwakes, terns and Black Guillemots. During late summer and early fall, shorebirds migrate through the general area from breeding grounds in the Arctic, and concentrations occur at suitable intertidal flats and beaches, including some near the proposed refinery site.

Landbirds occur within the oil refinery footprint area in all months of the year. Forty-seven species of landbirds likely occur in the proposed oil refinery footprint at Southern Head and many of these species breed there (Table 1.2). The species of landbirds known or expected to occur in the proposed area for the oil refinery and its access roads are typical of those that occur in much of eastern Newfoundland, as much of the habitat is similar. It is

possible that species considered at risk (Short-eared Owl, Grey-cheeked Thrush, Rusty Blackbird and Red Crossbill) may occur in the refinery footprint area.

1.3 Pelagic Birds

Information on seabirds in Placentia Bay is limited. The major breeding colonies have been identified and censused (Cairns et al.. 1989; Lock et al. 1994; Chardine 2000). Aerial surveys of smaller breeding colonies of seabirds such as gulls, terns and cormorants have been conducted for Placentia Bay as recently as 2005 by the Canadian Wildlife Service (CWS, unpubl. data). An aerial survey of wintering eiders in Placentia Bay was conducted as recently as February 2006 (CWS, unpubl. data). However, the abundance and distribution of seabirds at sea distant from the breeding colonies in summer especially during the non-breeding season are poorly understood. The CWS has collected shipboard observations conducted in a systematic method (PIROP) for Atlantic Canada. The 1969-1983 results have been mapped in the Revised Atlas of Eastern Canadian Seabirds (Brown 1986), but there is very little coverage for the Placentia Bay area. To fill some of the information gaps, monthly surveys for seabirds at sea in Placentia Bay were planned over a one-year period. This report presents data for August 2006 to April 2007; surveys are on-going and results will be presented in a final report at a later date.

1.4 Coastal Birds

Despite the biological richness of Placentia Bay, there is a paucity of systematically collected data on coastal bird distribution and abundance. There have been some ongoing surveys in the area of Long Harbour and eastern Placentia Bay related to the proposed nickel processing plant at Long Harbour (Goudie and Mactavish 2007; Goudie and Jones 2007). Some of that work repeats the study initiated by Memorial University (MUN) and the CWS in the mid 1970's and early 1980's (see Goudie 1981; Threlfall and Goudie 1986). Shore-based surveys were designed to sample accessible coastal areas of Placentia Bay in the area of the proposed oil refinery, and provide data on relative species abundances throughout the year. The information presented here substantially augments previous data on coastal marine birds, including seabirds, waterfowl and shorebirds.

1.5 Breeding Waterfowl

There is little information on breeding waterfowl associated with wetlands on Southern Head. Wetlands potential suitable to breeding waterfowl were previously identified in the Southern Head area. The municipality of Come By Chance entered into a municipal wetland stewardship agreement with the Government of Newfoundland and Labrador on 20 January 1995. The Wetland Stewardship Program is part of the Eastern Habitat Joint Venture (EHJV) that is a focal program under the Canada-United States North American Waterfowl Management Plan. In accordance with this agreement, the Town of Come By Chance manages the wetlands within its municipal boundaries with technical advice provided by the Wildlife Division (Department of Environment and Conservation). A Habitat Management Plan was prepared and officially signed to guide activities within designated stewardship zones. Enhancement and protective measures recommended that wetlands should be protected from any drainage, burning or filling (EHJV 1995, p. 16). The conservation strategy noted that the protection and management of both wetland and upland habitats are fundamental tools in maintaining and enhancing waterfowl populations. Because many species of ducks nest in upland habitats the surrounding wetlands and recruitment of waterfowl are closely linked. To restore and maintain the natural integrity of the Stewardship Zone, the Habitat Management Plan recommended that a municipal boundary extension to include Southern Head in order to include both upland and wetland communities.

Waterfowl breed in low densities throughout interior Newfoundland and these vary by ecoregion (Goudie 1987) with relatively low numbers expected in the study area. The survey area is part of the Maritime Barrens Ecoregion and wetlands are typically acidic and dominated by peatland formations. Species such as the Ring-

necked Duck (*Aythya collaris*) and to a lesser extent the Black Duck (*Anas rubripes*) that exploit these oligotrophic habitats are expected to occur. Aerial helicopter surveys were conducted in early September 2006 and June 2007 as part of reconnaissance for vegetation and wetlands and biologists participating in these surveys recorded the presence of waterfowl broods and indicated pairs.

1.6 Harlequin Ducks

At the time of listing of Harlequin Ducks as *endangered* by COSEWIC in 1990, there was anecdotal information to support a significant number of sites historically utilized by this species in eastern, western and south-western Placentia Bay (Appendix 1 in Goudie 1991)**.** In 2001, the eastern population of Harlequin Ducks was re-listed as *special concern*, and the population has generally been increasing along the eastern seaboard (COSEWIC 2001). Despite the listing of Harlequin Ducks under the *Species At Risk Act*, there has never been exploratory surveys undertaken to confirm the status of Harlequin Ducks at traditional sites along western Placentia Bay, and surveys along eastern Placentia Bay have been intermittent. Virtually all information on population status of Harlequin Ducks wintering in coastal Newfoundland is based on the single (one day per year) annual Audubon Christmas Bird Count at Cape St. Mary's. This site supported many hundreds to thousands of Harlequin Ducks historically and has increased from 12 in 1990, at the time of listing as *endangered*, to 200 in 2006 (http://audubon2.org/birds/cbc/hr/count_table.html; Figure 1.1). The highest historical counts of Harlequin Ducks were recorded along the eastern seaboard in 2006, supporting that numbers are recovering from over-hunting. There is a need to identify areas in coastal Newfoundland suitable for long-term population monitoring in addition to Cape St. Mary's (P. Thomas, CWS, pers. comm.). This project provides valuable new information on this species at risk.

Aerial and ground-based surveys for the eastern Harlequin Duck in coastal areas of eastern and western Placentia Bay, Newfoundland were conducted in January to April 2007. These data were integrated with historical information in order to provide a synopsis of the past and present winter utilization of Placentia Bay by Harlequin Ducks.

1.7 Landbirds

There are no systematic data available for landbirds in the footprint of the proposed refinery. As already mentioned, the species of landbirds known or expected to occur in refinery footprint are typical of those that occur in much of eastern Newfoundland, as much of the habitat is similar. The habitat of Southern Head are described in detail in a study designed to document vegetation types, lichens, and wetlands of the refinery site and its access roads (Goudie and Munier 2007). Vegetation types were classified into three main habitat groups. The three groups with percentage of area covered on Southern Head are black spruce forest and scrub (36.8%), bog and fen (25.3%) and balsam fir (20.8%). A ground-based survey of landbirds in the refinery footprint at Southern Head was conducted on 28 June 2007.

1.8 Incidental Observations

During surveys for vegetation, lichens, wetlands and river otters in support of the oil refinery EIS and Comprehensive Study, incidental observations of migratory birds were made by LGL biologists. Those observations provide some qualitative information which supports the quantitative data collected during dedicated bird surveys.

Table 1.1 List of marine-associated bird species known to occur in the Placentia Bay Area, including the areas where they occur and their relative monthly abundance.

Species	Scientific Name	Status[1]	Occur[2]	Abundance[3]	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Canada Goose	*Branta canadensis*	B	C	Uncommon												
Gadwall	*Anas strepera*	U	C	Rare												
American Wigeon	*Anas americana*	U	C	Scarce												
American Black Duck	*Anas rubripes*	BW	C	Common												
Mallard	*Anas platyrhynchos*	BW	C	Scarce												
Blue-winged Teal	*Anas discors*	M	C	Scarce												
Northern Pintail	*Anas acuta*	B	C	Uncommon												
Green-winged Teal	*Anas crecca*	B	C	Uncommon												
Ring-necked Duck	*Aythya collaris*	B	C	Uncommon												
Greater Scaup	*Aythya marila*	W	C	Uncommon												
Lesser Scaup	*Aythya affinis*	M	C	Scarce												
King Eider	*Somateria spectabilis*	M	C, P	Scarce												
Common Eider	*Somateria mollissima*	W	C, P	Common												
Harlequin Duck	*Histrionicus histrionicus*	W	C	Scarce												
Surf Scoter	*Melanitta perspicillata*	W	C, P	Uncommon												
White-winged Scoter	*Melanitta fusca*	W	C, P	Uncommon												
Black Scoter	*Melanitta nigra*	W	C, P	Uncommon												
Long-tailed Duck	*Clangula hyemalis*	W	C, P	Common												
Bufflehead	*Bucephala albeola*	M	C	Scarce												
Common Goldeneye	*Bucephala clangula*	BW	C	Uncommon												
Barrow's Goldeneye	*Bucephala islandica*	W	C	Rare												
Hooded Merganser	*Lophodytes cucullatus*	W	C	Rare												
Common Merganser	*Mergus merganser*	B	C	Uncommon												
Red-breasted Merganser	*Mergus serrator*	BW	C, P	Common												
Red-throated Loon	*Gavia stellata*	M	C	Uncommon												
Common Loon	*Gavia immer*	BW	C	Common												
Horned Grebe	*Podiceps auritus*	M	C	Scarce												
Red-necked Grebe	*Podiceps grisegena*	W	C	Uncommon												
Northern Fulmar	*Fulmarus glacialis*	M	P	Common												

Table 1.1 Continued.

Species	Scientific Name	Status[1]	Occur[2]	Abundance[3]	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Greater Shearwater	*Puffinus gravis*	M	P	Common					■	■	■	■	■	■		
Sooty Shearwater	*Puffinus griseus*	M	P	Common					■	■	■	■	■	■		
Manx Shearwater	*Puffinus puffinus*	M	P	Uncommon					■	■	■	■	■	■		
Wilson's Storm-Petrel	*Oceanites oceanicus*	M	P	Scarce						■	■	■	■			
Leach's Storm-Petrel	*Oceanodroma leucorhoa*	B	P	Common				■	■	■	■	■	■	■		
Northern Gannet	*Morus bassanus*	B	P	Common			■	■	■	■	■	■	■	■	■	
Double-crested Cormorant	*Phalacrocorax auritus*	B	C, P	Common				■	■	■	■	■	■	■	■	
Great Cormorant	*Phalacrocorax carbo*	B	C, P	Common	■	■	■	■	■	■	■	■	■	■	■	■
American Bittern	*Botaurus lentiginosus*	B	C	Uncommon				■	■	■	■	■	■	■		
Great Blue Heron	*Ardea herodias*	M	C	Rare				■	■				■	■	■	
Osprey	*Pandion haliaetus*	B	C	Common				■	■	■	■	■	■	■		
Bald Eagle	*Haliaeetus leucocephalus*	BW	C	Common	■	■	■	■	■	■	■	■	■	■	■	■
Black-bellied Plover	*Pluvialis squatarola*	M	C	Common							■	■	■	■	■	
American Golden-Plover	*Pluvialis dominica*	M	C	Common							■	■	■	■		
Semipalmated Plover	*Charadrius semipalmatus*	M	C	Common					■	■	■	■	■	■		
Spotted Sandpiper	*Actitis macularius*	BM	C	Common					■	■	■	■	■			
Solitary Sandpiper	*Tringa solitaria*	M	C	Scarce								■	■			
Greater Yellowlegs	*Tringa melanoleuca*	BM	C	Common				■	■	■	■	■	■	■	■	
Lesser Yellowlegs	*Tringa flavipes*	M	C	Scarce							■	■	■	■		
Whimbrel	*Numenius phaeopus*	M	C	Common							■	■	■			
Hudsonian Godwit	*Limosa haemastica*	M	C	Scarce								■	■	■		
Ruddy Turnstone	*Arenaria interpres*	M	C	Common							■	■	■	■	■	
Red Knot	*Calidris canutus*	M	C	Scarce							■	■	■	■		
Sanderling	*Calidris alba*	M	C	Uncommon							■	■	■	■	■	
Semipalmated Sandpiper	*Calidris pusilla*	M	C	Common					■		■	■	■	■		
Least Sandpiper	*Calidris minutilla*	M	C	Common					■	■	■	■	■	■		
White-rumped Sandpiper	*Calidris fuscicollis*	M	C	Common							■	■	■	■	■	
Baird's Sandpiper	*Calidris bairdii*	M	C	Rare								■	■			
Pectoral Sandpiper	*Calidris melanotos*	M	C	Uncommon							■	■	■	■		
Purple Sandpiper	*Calidris maritima*	M	C	Common	■	■	■	■	■					■	■	■

Table 1.1 Continued.

Species	Scientific Name	Status[1]	Occur[2]	Abundance[3]	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Dunlin	*Calidris alpina*	M	C	Uncommon												
Short-billed Dowitcher	*Limnodromus griseus*	M	C	Uncommon												
Wilson's Snipe	*Gallinago delicata*	B	C	Common												
Red-necked Phalarope	*Phalaropus lobatus*	M	P	Uncommon												
Red Phalarope	*Phalaropus fulicarius*	M	P	Common												
Black-headed Gull	*Larus ridibundus*	W	C	Common												
Bonaparte's Gull	*Larus philadelphia*	M	C, P	Rare												
Mew Gull	*Larus canus*	M	C, P	Rare												
Ring-billed Gull	*Larus delawarensis*	B	C, P	Common												
Herring Gull	*Larus argentatus*	BW	C, P	Common												
Iceland Gull	*Larus glaucoides*	BW	C, P	Common												
Lesser Black-backed Gull	*Larus fuscus*	M	C, P	Scarce												
Glaucous Gull	*Larus hyperboreus*	W	C, P	Uncommon												
Great Black-backed Gull	*Larus marinus*	BW	C, P	Common												
Sabine's Gull	*Xema sabini*	M	C, P	Rare												
Black-legged Kittiwake	*Rissa tridactyla*	BW	C, P	Common												
Caspian Tern	*Hydroprogne caspia*	U	C, P	Rare												
Common Tern	*Sterna hirundo*	B	C, P	Common												
Arctic Tern	*Sterna paradisaea*	B	C, P	Common												
Great Skua	*Stercorarius skua*	M	P	Scarce												
South Polar Skua	*Stercorarius maccormicki*	M	P	Scarce												
Pomarine Jaeger	*Stercorarius pomarinus*	M	P	Uncommon												
Parasitic Jaeger	*Stercorarius parasiticus*	M	P	Uncommon												
Long-tailed Jaeger	*Stercorarius longicaudus*	M	P	Scarce												
Dovekie	*Alle alle*	W	P	Common												
Common Murre	*Uria aalge*	BW	P	Common												
Thick-billed Murre	*Uria lomvia*	BW	P	Common												
Razorbill	*Alca torda*	BW	P	Common												
Black Guillemot	*Cepphus grylle*	BW	P	Common												
Atlantic Puffin	*Fratercula arctica*	BW	P	Common												

Table 1.1 Continued.

Species	Scientific Name	Status[1]	Occur[2]	Abundance[3]	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Belted Kingfisher	*Ceryle alcyon*	B	C	Uncommon												
American Crow	*Corvus brachyrhynchos*	BW	C	Common												
Common Raven	*Corvus corax*	BW	C	Common												

Notes: Shaded areas represent the months when species may be expected

[1] B = Breeding, W = Wintering, M = Migratory, U = Uncertain

[2] C = Coastal, P = Pelagic

[3] Common = likely present daily in moderate to high numbers; Uncommon = likely present daily in small numbers; Scarce = likely present regularly in very small numbers; Rare = usually absent, individuals occasionally present. Dark highlighted fields indicate presence of species in the area during that month.

Source: Brown (1986); Lock et al. (1994); B. Mactavish, LGL, pers. obs.

Table 1.2 Seasonal occurrence and abundance of landbirds predicted to occur regularly on the refinery footprint area.

Species	Scientific Name	Status[1]	Abundance[2]	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Ruffed Grouse	*Bonasa umbellus*	B	*Uncommon*												
Northern Harrier	*Circus cyaneus*	M	*Scarce*												
Sharp-shinned Hawk	*Accipiter striatus*	M	*Scarce*												
Northern Goshawk	*Accipiter gentilis*	B?, W	*Scarce*												
Rough-legged Hawk	*Buteo lagopus*	M	*Scarce*												
Merlin	*Falco columbarius*	B, M	*Scarce*												
Great Horned Owl	*Bubo virginianus*	B?, M	*Scarce*												
Boreal Owl	*Aegolius funereus*	B?	*Scarce*												
Downy Woodpecker	*Picoides pubescens*	B	*Scarce*												
Hairy Woodpecker	*Picoides villosus*	B	*Scarce*												
Black-backed Woodpecker	*Picoides arcticus*	B?	*Scarce*												
Northern Flicker	*Colaptes auratus*	B?, M	*Scarce*												
Yellow-bellied Flycatcher	*Empidonax flaviventris*	B	*Common*												
Northern Shrike	*Lanius excubitor*	W	*Scarce*												
Gray Jay	*Perisoreus canadensis*	B	*Uncommon*												
Blue Jay	*Cyanocitta cristata*	M	*Scarce*												
Horned Lark	*Eremophila alpestris*	M	*Scarce*												
Tree Swallow	*Tachycineta bicolor*	B?, M	*Scarce*												

Species	Scientific Name	Status[1]	Abundance[2]	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Bank Swallow	*Riparia riparia*	M	*Scarce*					■	■	■	■	■			
Black-capped Chickadee	*Poecile atricapillus*	B	*Uncommon*	■	■	■	■	■	■	■	■	■	■	■	■
Boreal Chickadee	*Poecile hudsonica*	B	*Uncommon*	■	■	■	■	■	■	■	■	■	■	■	■
Red-breasted Nuthatch	*Sitta canadensis*	B	*Scarce*	■	■	■	■	■	■	■	■	■	■	■	■
Golden-crowned Kinglet	*Regulus satrapa*	B	*Uncommon*	■	■	■	■	■	■	■	■	■	■	■	■
Ruby-crowned Kinglet	*Regulus calendula*	B	*Common*				■	■	■	■	■	■	■		
Gray-cheeked Thrush	*Catharus minimus*	B?, M	*Scarce*					■	■	■	■	■			
Hermit Thrush	*Catharus guttatus*	B	*Uncommon*					■	■	■	■	■	■		
American Robin	*Turdus migratorius*	B	*Uncommon*				■	■	■	■	■	■	■	■	■
American Pipit	*Anthus rubescens*	M	*Scarce*				■	■				■	■		
Yellow Warbler	*Dendroica petechia*	M	*Scarce*					■	■	■	■	■			
Yellow-rumped Warbler	*Dendroica coronata*	B	*Common*					■	■	■	■	■	■		
Blackpoll Warbler	*Dendroica striata*	B	*Common*					■	■	■	■	■			
Black-and-white Warbler	*Mniotilta varia*	B	*Uncommon*					■	■	■	■	■			
Northern Waterthrush	*Seiurus noveboracensis*	B	*Uncommon*					■	■	■	■	■			
Common Yellowthroat	*Geothlypis trichas*	B?, M	*Scarce*					■	■	■	■	■	■		
Wilson's Warbler	*Wilsonia pusilla*	B	*Uncommon*					■	■	■	■	■			
Savannah Sparrow	*Passerculus sandwichensis*	B	*Common*				■	■	■	■	■	■	■		
Fox Sparrow	*Passerella iliaca*	B	*Common*				■	■	■	■	■	■	■	■	
Swamp Sparrow	*Melospiza georgiana*	B	*Common*					■	■	■	■	■	■		
Dark-eyed Junco	*Junco hyemalis*	B	*Uncommon*	■	■	■	■	■	■	■	■	■	■	■	■
Snow Bunting	*Plectrophenax nivalis*	W	*Scarce*	■	■	■	■						■	■	■
Pine Grosbeak	*Pinicola enucleator*	B? W	*Scarce*	■	■	■	■	■	■	■	■	■	■	■	■
Purple Finch	*Carpodacus purpureus*	B? M	*Scarce*	■	■	■	■	■	■	■	■	■	■	■	■
Red Crossbill	*Loxia curvirostra*	B?, M	*Scarce*	■	■	■	■	■	■	■	■	■	■	■	■
White-winged Crossbill	*Loxia leucoptera*	B, M	*Scarce*	■	■	■	■	■	■	■	■	■	■	■	■
Common Redpoll	*Carduelis flammea*	M, W	*Scarce*	■	■	■	■	■					■	■	■
Pine Siskin	*Carduelis pinus*	B?, M	*Scarce*	■	■	■	■	■	■	■	■	■	■	■	■
American Goldfinch	*Carduelis tristis*	M	*Scarce*	■	■	■	■	■	■	■	■	■	■	■	■
Evening Grosbeak	*Coccothraustes vespertinus*	M	*Scarce*	■	■	■	■					■	■	■	■

[1] Status in refinery footprint area, B = Breeding, W = Wintering, M = Migrant

[2] Common = likely present daily in moderate to high numbers; Uncommon = likely present daily in small numbers; Scarce = likely present regularly in very small numbers may be absent. Dark highlighted fields indicate presence of species in the area during that month.

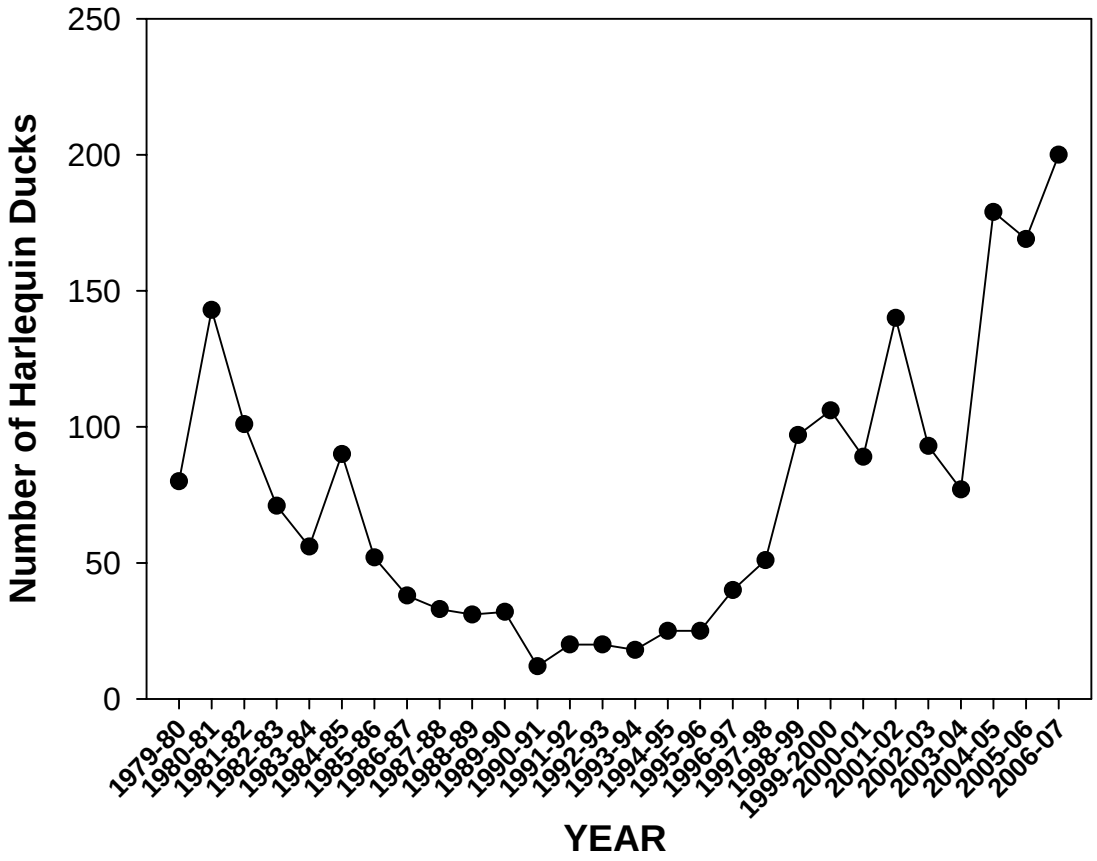

Figure 1.1 **Numbers of Harlequin Ducks recorded at Cape St. Mary's on Annual Audubon Christmas Bird Counts, 1979-2006.**

2.0 METHODOLOGY

2.1 Pelagic Birds

Systematic boat-based surveys for marine-associated birds were conducted in Placentia Bay (in conjunction with marine mammal surveys) to document their distribution and abundance. Three "survey routes" (transects A, B, and C) were sampled every month (weather permitting) typically from a longliner (Figure 2.1). Each survey route normally required 7-8 hours to complete at a boat speed of approximately eight knots (14.8 km/hr), and a single survey route was normally completed per day. The survey periods were quite weather dependent as observers had to ensure optimal marine mammal sighting conditions of visibility > one km and a sea state of five or less. Weather conditions were less constrictive for marine bird surveys, only requiring a minimum visibility of 300 m.

Boat-based surveys started in early August 2006. The surveys were conducted from Placentia in August, using the *William Margaret* as survey platform (Figure 2.2A); this vessel is ~10.7 m in length. In August, survey routes B and C were completed but logistical issues prevented completion of Route A. All other monthly surveys were conducted out of Mount Arlington Heights, using the *Keating Brothers* (Figure 2.2B) which is 13.7 m in length. Because of weather conditions that limited the number of survey opportunities, November – December and March - April surveys were combined into single survey periods, while no surveys were conducted in January or February. A summary of the monthly surveys conducted is provided in Table 2.1.

Table 2.1 Summary of marine bird surveys conducted monthly in Placentia Bay, August 2006-April 2007.

Month (survey effort)	Survey Vessel	Survey Route		
		A	B	C
August (222 km)	*William Margaret*	-	3 August *	4 August *
September (291 km)	*Keating Brothers*	22 September	28 September	26 September
October (312 km)	*Keating Brothers*	18 October	20 October	23 October
Nov – Dec (312 km)	*Keating Brothers*	4 December	20 December	19 December
March – April (411 km)	*Keating Brothers*	13 April	1 March	2 and 29 March

* Modified versions of survey routes B and C (to account for the survey vessel departing from Placentia) were conducted on these days.

Overall, 15 survey routes, totaling 1,548 km, were surveyed between 3 August 2006 and 13 April 2007. Two modified versions of survey routes B and C were surveyed in August, resulting in 222 km of survey effort (Table 2.1). Survey routes A, B, and C were completed in October, and November – December, totaling 312 km per month. In September, survey route A was abbreviated due to poor sea state conditions; survey effort in this month totaled 291 km (Table 2.1). Survey route C was completed twice in March –April due to poor weather that prevented the surveying of other routes on those days (sea conditions are calmer on route C as it is partly sheltered by islands).

Three observers (biologists from or representing LGL Limited), two seabird observers (SBO) and one marine mammal observer (MMO), were onboard the vessel during each survey. The flying bridge of each

vessel (*William Margaret*: 2.4 m asl; *Keating Brothers*: 3.4 m asl) served as the platform from which the marine mammal observers (MMOs) typically conducted their watches. Observers could see a complete arc around the vessel. Observations were conducted from the bridge of the vessel when heavy rain, or blowing snow, limited outdoor observations. The bridge offered good visibility at the bow and the 90º arc survey area required for marine bird surveys.

The survey method was based on the 'Tasker Method' in Tasker et al. (1984) with slight changes and recommendations from Moulton and Mactavish (2004) and CWS (unpublished). This method allows for densities of birds at sea to be calculated. The survey consisted of continuous consecutive ten-minute survey periods from the beginning to end of the entire survey route. The transect area is a 300 m-wide band from the bow beam to 90° off one side of the ship. Ideally, all the birds on the water and flying within the entire length of the transect (the distance the vessel travels in 10 min) would be counted with one instantaneous count. In practice, all birds on the water within the 300 m-wide band are counted as on transect, but only flying birds counted with a snap shot count every time the boat travels 300 m are included as on transect. The survey boat traveled at an average of eight knots (14.8 km/hr) which calculates to the boat travels 300 m every 75 seconds. A continuous running countdown timer watch with an alarm sounding every 75 seconds alerted the observer when to conduct a snap shot count of flying birds within the 300 m width transect band. The start time and position for each ten minute count was written down. A handheld GPS (Garmin® eTrex Legend® Cx) recorded the vessel's position every 15 second.

Birds were identified to species and age when possible. Activities such as flying, feeding or swimming were recorded. Birds flying over transect zone between snapshot counts were also recorded with proper designations. Environmental conditions such as sea state, wind and visibility were also recorded. Two observers took one hour shifts in order to maintain observer freshness. Binoculars were used to identify birds when necessary and to occasionally scan the water ahead for difficult-to-see species.

2.2 Coastal Birds

LGL personnel undertook day-long reconnaissance of selected sites in inner Placentia Bay during August 2006 to April 2007. Sites extended from Southern Harbour to North Harbour and included Arnold's Cove and Come By Chance Bay (Figure 2.3). For shorebirds, coverage coincided with low tide when the estuarine-intertidal habitats were most extensive. These sites provided for representative coverage of the inner Placentia Bay area.

For these ground-based surveys, each site was visited for twenty to thirty minutes and all wildlife observed was recorded. Sites were scanned using 8x and 10x power binoculars, and, if needed, 20x - 45x 200 m spotting scope on a tripod. In some cases, bird songs or tracks, were interpreted as indicative of species' presence.

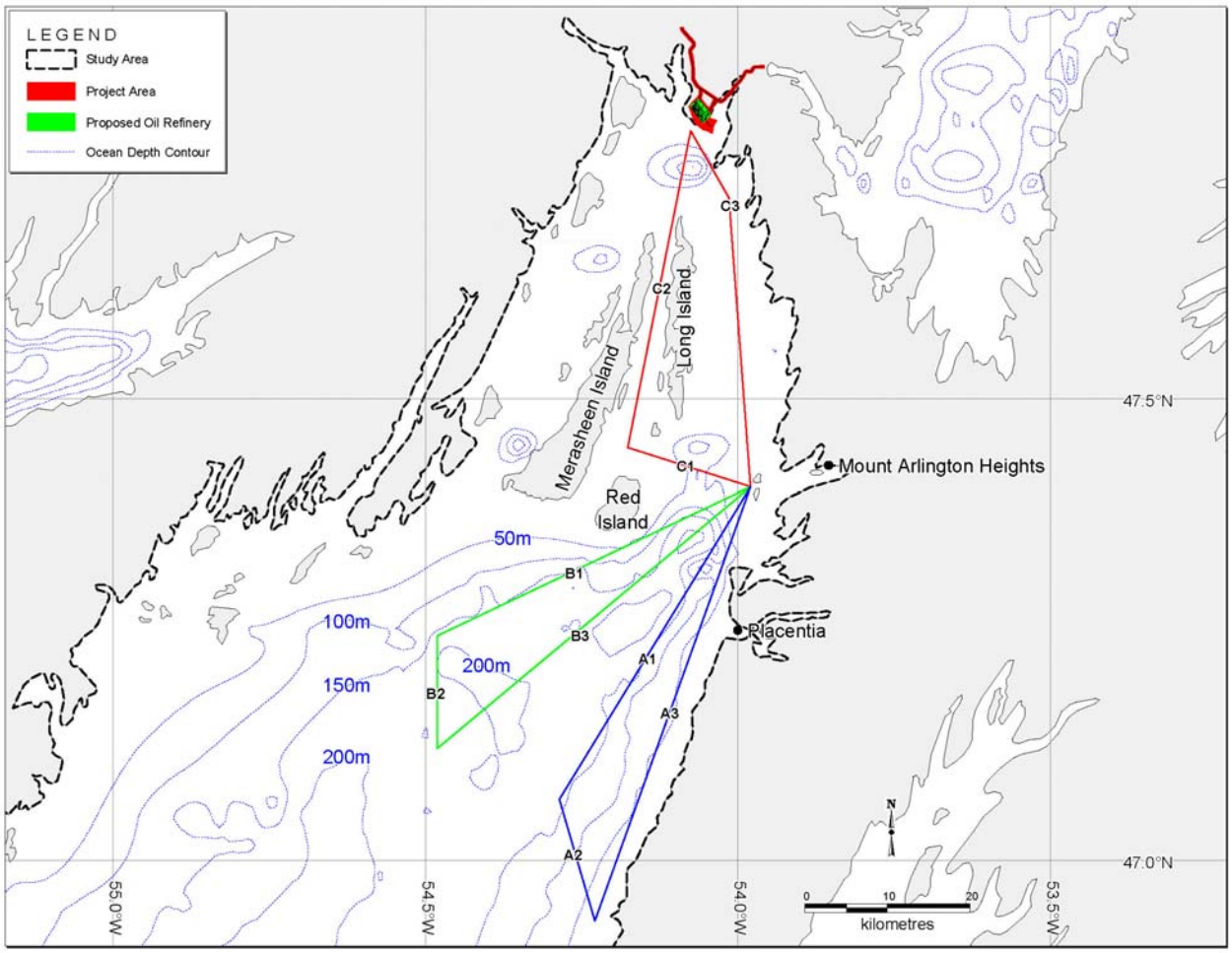

Figure 2.1 Seabird survey transects in Placentia Bay, August 2006 to April 2007.

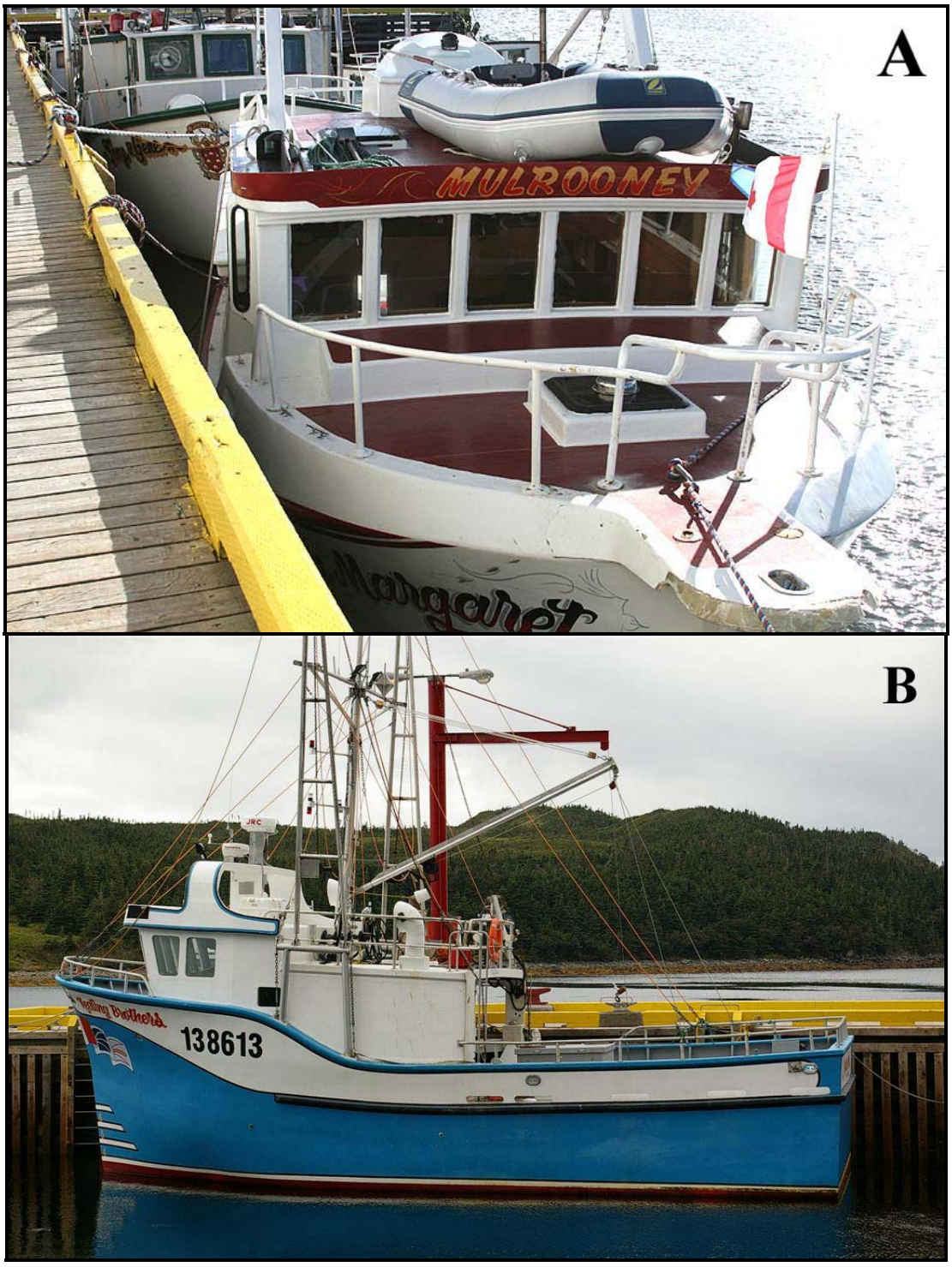

Figure 2.2 The *William Margaret* (A) and *Keating Brothers* (B) used out of Placentia and Mount Arlington Heights, respectively during the 2006-2007 Placentia Bay pelagic bird and mammal surveys (photographs by LGL).

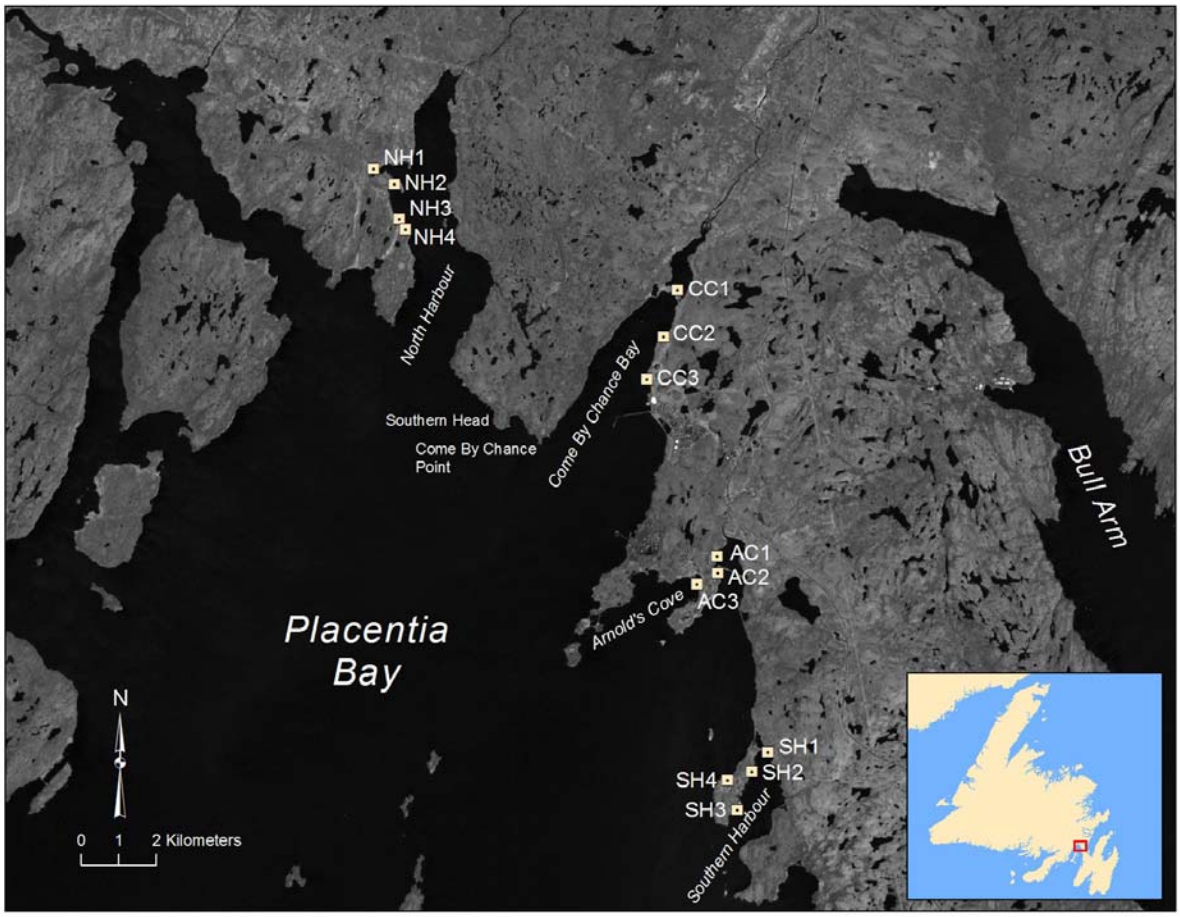

Figure 2.3 Location of observation sites for coastal birds at Southern Harbour (SH1, SH2, SH3, SH4), Arnold's Cove (AC1, AC2, AC3), Come By Chance (CC1, CC2, CC3) and North Harbour (NH1, NH2, NH3, NH4) surveyed by LGL in inner Placentia Bay, Newfoundland.

2.3 Breeding Waterfowl

Indicated breeding pairs of waterfowl and waterfowl broods were surveyed using Standard Operating Procedures (SOP) as applied for Black Duck Joint Venture (BDJV) surveys under the North American Waterfowl Management Plan (NAWMP). Surveys were conducted from a Bell 206-L helicopter. The survey team comprised of three observers and the pilot, and followed a SOP for conducting helicopter indicated pair surveys for waterfowl, namely, surveys were flown at 15 to 45 m AGL with ground speeds averaging 80 to 112 kph. The front observer served as a navigator and recorded locations on topographic map sheets. A rear observer recorded observations as waypoints and tracked the aircraft flight path via a handheld GPS.

When inventorying sample plots, the aircraft onboard GPS navigation system was used in conjunction with 1:50,000 topographic map sheets and hand-held GPS units to ensure accurate orientation. All water bodies within the project "footprint" and along the proposed access routes were searched and all waterfowl and incidental wildlife observations were recorded on the NTS maps. Observations were also geo-referenced with the hand-held GPS units as unique waypoints. Waterfowl were recorded by American Ornithologists Union (AOU) acronyms as pairs, single male, single female, or groups. Weather conditions for surveys were ideal with light to moderate winds (< 15 knots) and partial cloud cover.

2.4 Harlequin Ducks

Both land-based and helicopter surveys of Harlequin Ducks were conducted.

2.4.1 Land-Based Survey

In an effort to monitor populations of marine birds in Placentia Bay, NLRC supported shore-based marine bird surveys in the eastern Placentia Bay (Cape Shore) to Cape St. Mary's-Point Lance area. This greatly enhanced the existing bird studies funded by NLRC. The land-based component of this survey was undertaken in January to April 2007, and repeated shore-based surveys led by the Newfoundland and Labrador Environmental Association (NLEA; Stan Tobin). Hence this research encompassed sites that had historically been used by wintering Harlequin Ducks that have not been included in other monitoring surveys in eastern Placentia Bay, such as the annual Christmas Bird Count for the Cape St. Mary's area (Figure 2.4), namely:

1. Cat's Cove and Diamond Gulch at the southeast terminus of Golden Bay
2. Redland Point near the Southwest terminus of Redland Cove
3. Sunkers Point near Gooseberry Cove
4. Little Halfway Gully between Patrick's Cove and Angels Cove
5. Cahoon's Point between Angels Cove and Custlett
6. Paint Point near Northern Head, north of Cape St. Mary's
7. Lily's Point (The Grandfather) northeast of Point Lance

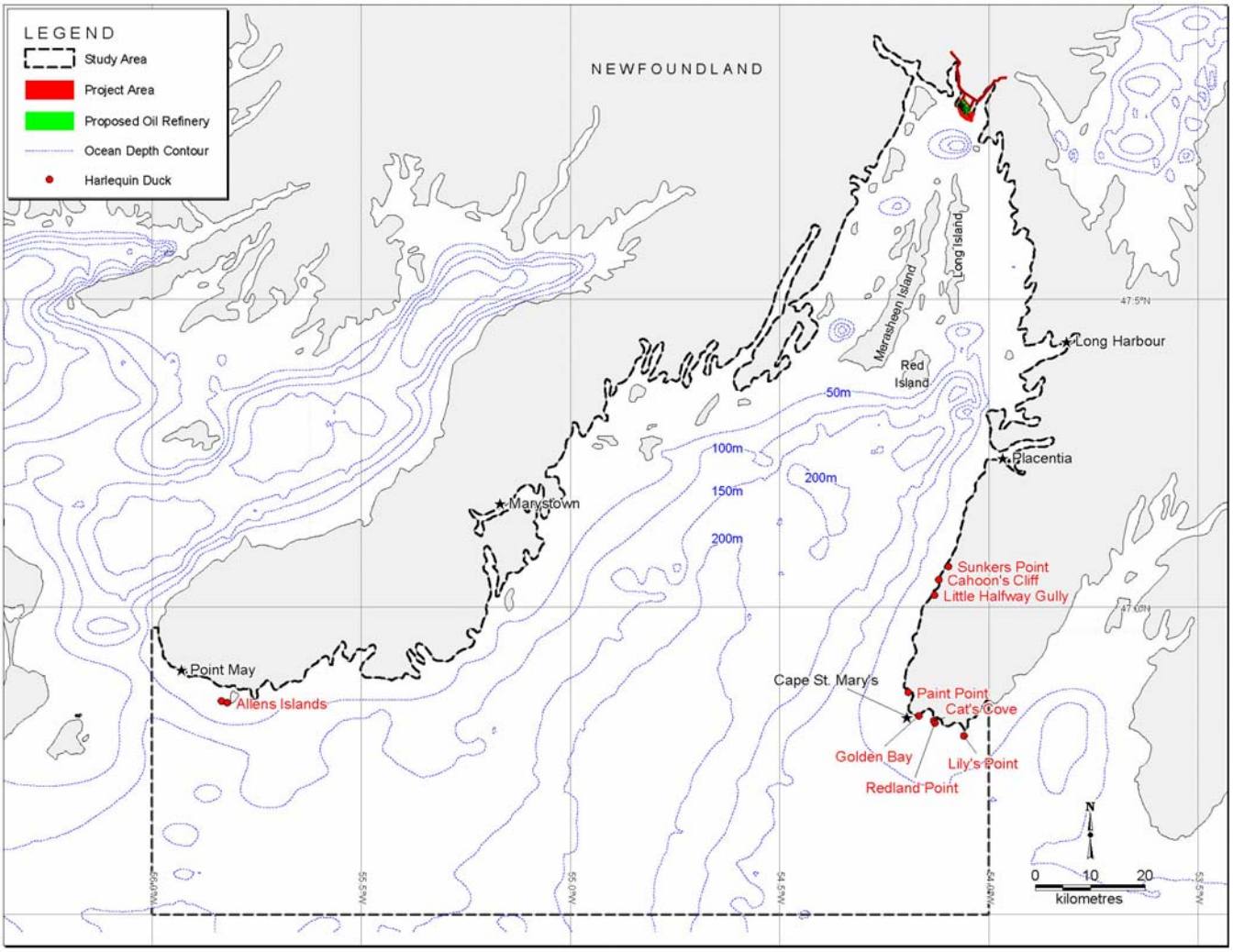

Figure 2.4 Sites accessed for wintering Harlequin Duck ground-based surveys in Placentia Bay, Newfoundland.

The Cat's Cove (including Diamond Gulch) and Redland Point sites were representative of the Cape St. Mary's area where Harlequin Ducks have been traditionally monitored by the Audubon Christmas Bird Counts. The Sunkers Point, Little Halfway Gully and Cahoon's Point represented the Cape Shore area, and Paint Point and Lily's Point represent sites on the periphery of the traditional wintering area at Cape St. Mary's.

2.4.2 Aerial Survey

Helicopter surveys were undertaken in the first efforts to locate Harlequin Ducks in areas of western Placentia Bay reported to have historical concentrations, particularly adjacent to Burin Peninsula (Appendix 2 of Goudie 1991). LGL conducted two surveys during the winter period (27 February and 13 March 2007; Figure 2.5) and a third survey on 21 April 2007 (Figure 2.6) using a Jet Long Ranger helicopter. Low-level coverage was achieved from Fair Haven in eastern Placentia Bay, south over the Iona islands, west across the south ends of Red Island, Merasheen Island, Long Island, and Marticot Island (see Figure 2.4). Focus was on the archipelagos of Marticot Island, Jude Island, Flat Islands and Oderin Islands, and farther south to Burin-Lamaline area. Due to inclement weather, an earlier survey in February was terminated at Whitbourne due to heavy snow flurries. The survey on 27 February 2007 was unable to proceed farther south from the Jude Island area because cached fuel in

Winterland/Marystown area was not accessible (buried under snow). The 27 February 2007 survey searched the area north of Isle Valen, including the Whale Back Rocks, Grandmother Rocks, and White Islands west of the Ragged Island that were small archipelagos that superficially appeared to have potential for concentrations of sea ducks. Impending snow flurries on 13 March 2007 pre-empted the surveys of the latter sites after refuelling at Wintertown, whereas LGL was successful at repeating this coverage on 20 April 2007. The Jude Island-Flat Islands archipelagos were surveyed on all three surveys, whereas the Iona Islands to Fair Haven area was most effectively covered on 27 February 2007 (Figures 2.5 and 2.6). Aerial surveys followed Standard Operating Procedures (SOP) as defined by the CWS.

Data on other sea ducks, notably eider ducks, and marine birds as well as mammals were recorded and compiled, and are also reported here. Navigated routes were time logged on hand-held GPS units and observations were linked to waypoints. Routes and waypoints were downloaded into spreadsheets and observations were transferred from notebooks to appropriate geo-references locations.

2.5 Landbirds

A survey of the breeding birds of the refinery footprint area was conducted on 28 June 2007. The objective of the survey was to acquire a list of species that breed in the refinery footprint area. The survey route traveled by foot by an LGL biologist (B. Mactavish) is shown in Figure 2.7. The observer was in the refinery footprint area from 08:30-15:30. During this time, several areas representative of the three main habitats (black spruce forest and scrub, bog and fen and balsam fir) in the refinery footprint were surveyed by listening, observing and attempting to attract breeding birds to an alarm note called "phishing" produced by the biologist. The biologist conducting the survey was aware of the four species of landbirds considered at risk either provincially and/or federally that could potentially occur in the area during the breeding season and searched proper habitats for these species.

All birds were recorded and listed as being in one of the three general habitats of black spruce and scrub/forest, balsam fir and bog and fen. Activities of all birds were recorded. The protocols used by the Ontario Breeding Bird Atlas for determining the breeding status of birds were adapted for the survey in the refinery footprint area (http://www.birdsontario.org/atlas/atlasmain.html).

A bird was considered "Confirmed Breeding" if one or more of the following was observed:

- Nest with eggs or young
- Recently fledged young
- Adults carrying food
- Distraction display

A bird was considered as "Probable Breeding" if one or more of the following was observed:

- Singing male
- Pair (male and female) observed together
- Agitated behavior or anxiety calls of an adult

A bird was considered as "Not Breeding" if one or more of the following was observed:

- Flying over the refinery footprint area.
- Visiting the refinery footprint area to feed but breeding habitat is not suitable.

All bird species observed and the estimated numbers of pairs or individuals were recorded. An individual or pair exhibiting one of the behaviours indicating Confirmed Breeding or Probably Breeding is listed as a pair because breeding birds require a male and female bird. Birds observed without exhibiting a behaviour indicating Confirmed or Probable Breeding are listed as single birds in the category of No Breeding Evidence.

2.6 Incidental Observations

Aerial, ground-based and boat-based surveys of the Southern Head area were conducted intermittently through the fall, winter and spring of 2006-2007 in conjunction with LGL studies of vegetation, lichens and otters (see Goudie 2007). LGL biologists recorded all wildlife observed during these surveys, including mammals and avifauna. All marine-associated birds observed during land-based avifauna surveys were also recorded.

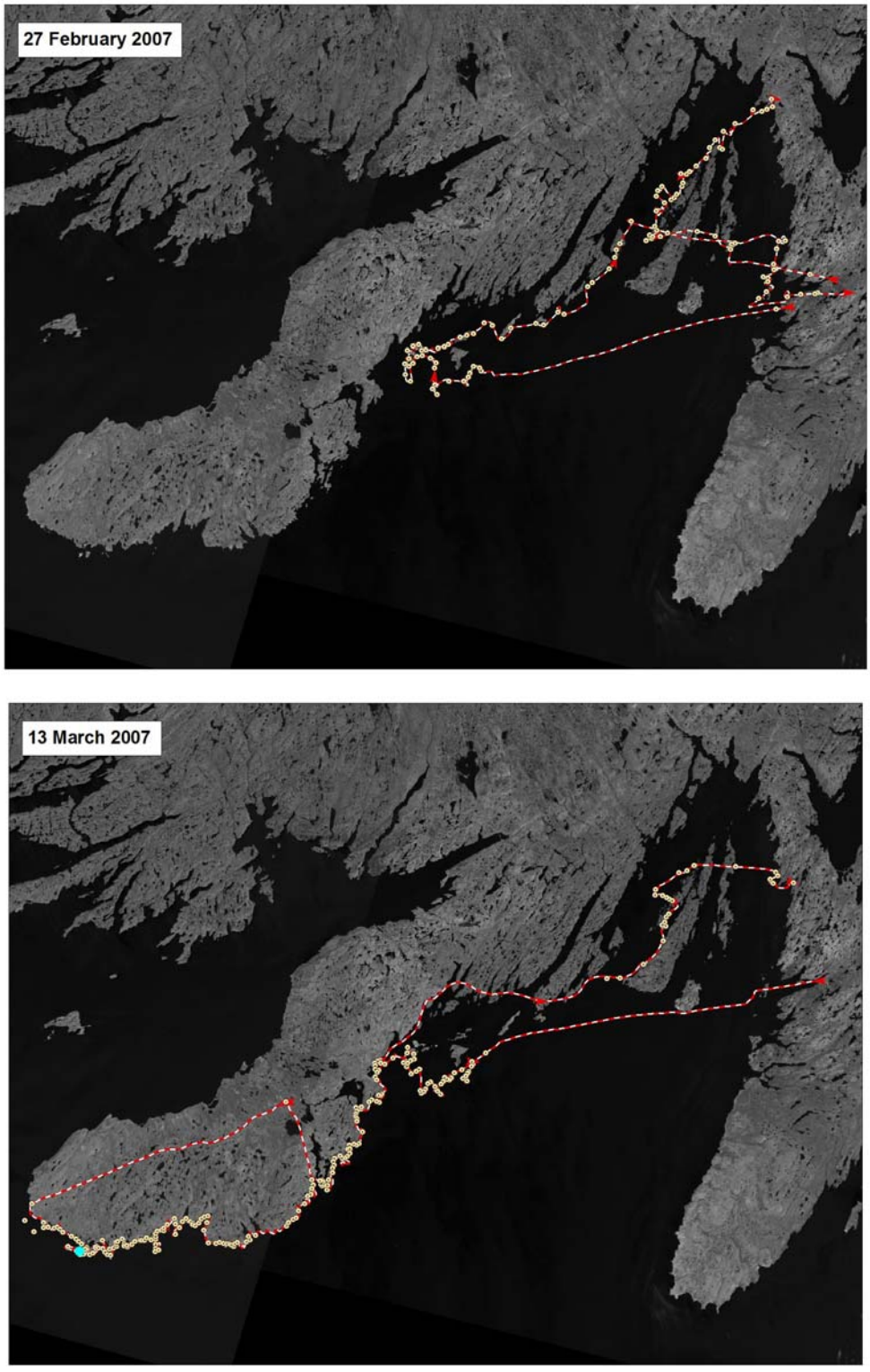

Figure 2.5 Routes of aerial helicopter surveys for sea ducks undertaken by LGL on 27 February and 13 March 2007 (blue dot indicates location of Harlequin Duck observation).

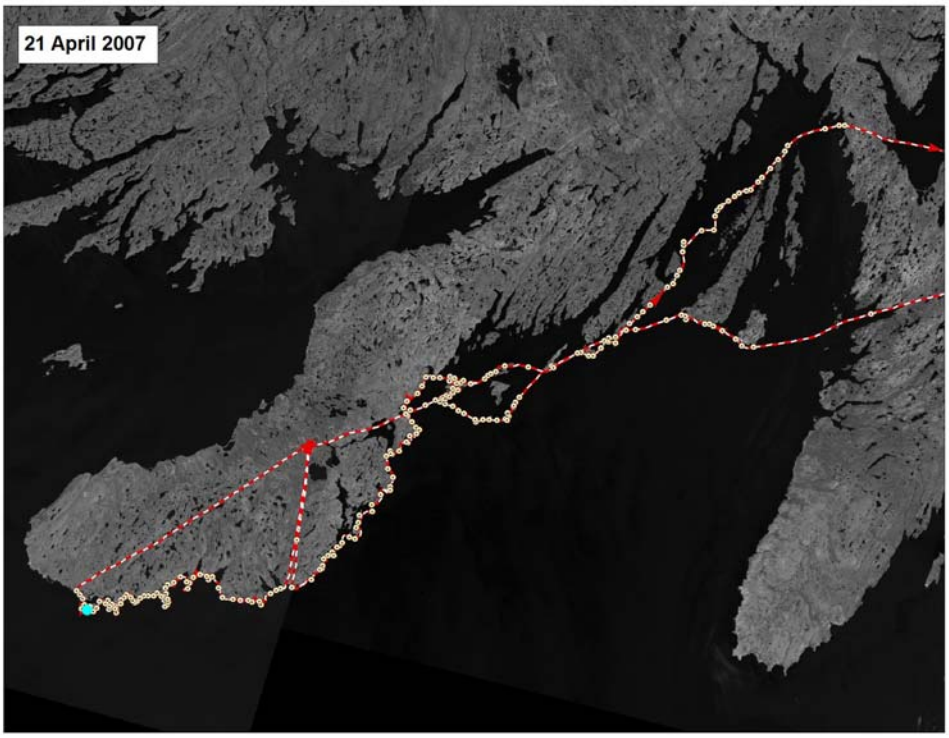

Figure 2.6 **Routes of aerial helicopter surveys for sea ducks undertaken by LGL on 21 April 2007 (blue dot indicates location of Harlequin Duck observation).**

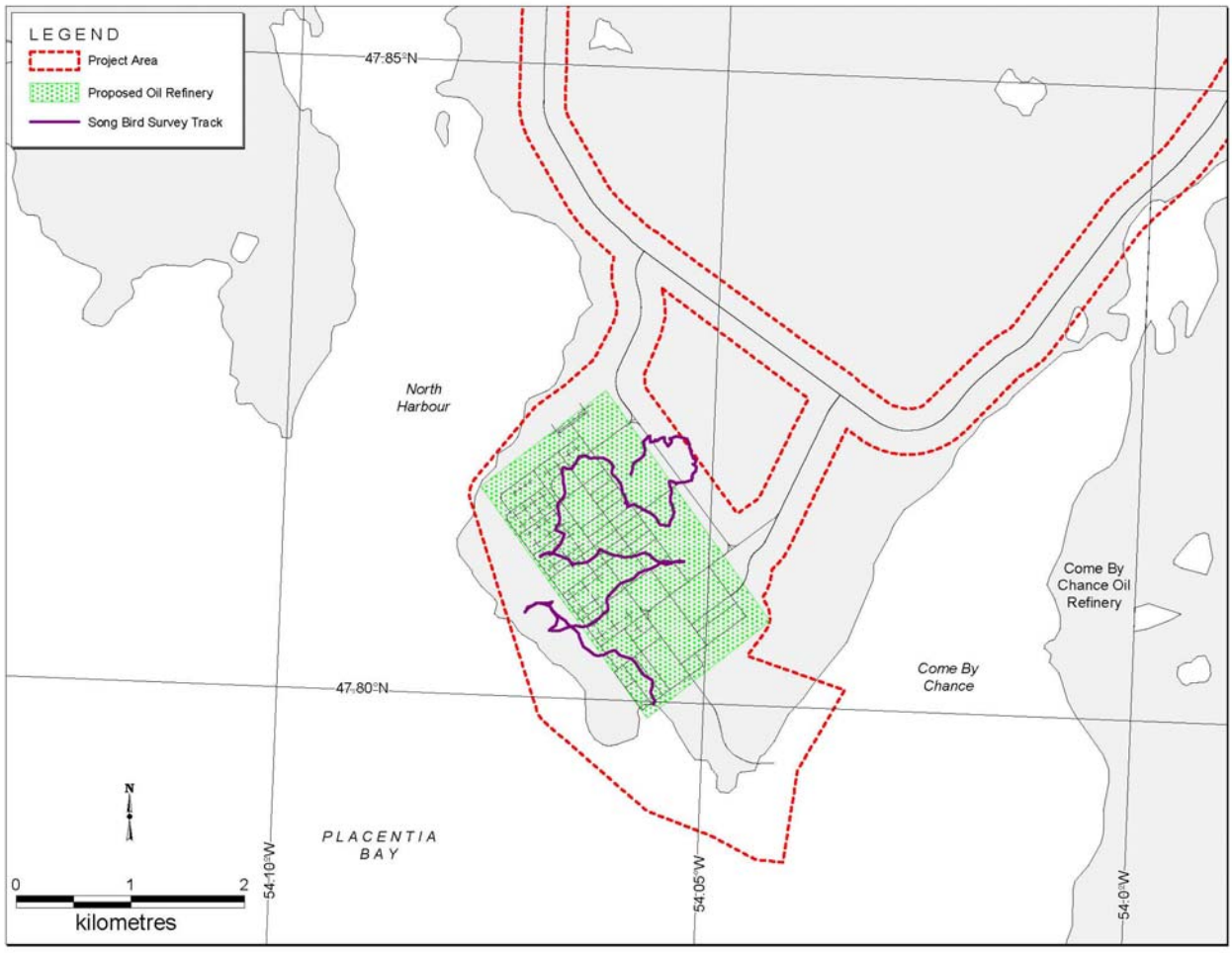

Figure 2.7 **Location of the songbird survey route (28 June 2007) within the proposed oil refinery footprint.**

3.0 STUDY OUTPUT

3.1 Pelagic Birds

Northern Fulmar

The Northern Fulmar is probably scarce to common in the outer reaches of Placentia Bay throughout the year (Table 1.1). During the monthly pelagic bird survey program in Placentia Bay from August 2006 to April 2007, only four Northern Fulmars were observed, including three in September and one in December (Table 3.1). All sightings occurred along the southern portions of survey routes A and B. A Northern Fulmar was also recorded by LGL observers at Southern Harbour during coastal surveys following an intense southerly storm.

Shearwaters

Greater Shearwaters nest in the South Atlantic from November to March and most of the world population summer in the North Atlantic (Lock et al. 1994). The Grand Banks off Newfoundland are thought to be the main summering area for a significant portion of the population (Lock et al. 1994). During the monthly pelagic bird survey program in Placentia Bay from August 2006 to April 2007, the only Greater Shearwaters recorded were of single birds seen in August and October (Table 3.1).

The Sooty Shearwater also breeds in the Southern Hemisphere from November to March. A large percentage of the population migrates to the Northern Hemisphere and is present from May through October (Table 1.1). Only three Sooty Shearwaters were recorded and these birds were seen in August (Table 3.1).

Manx Shearwater is the smallest shearwater species regularly occurring in Newfoundland. It is an uncommon species in Atlantic Canada from May through October (Table 1.1). A single Manx Shearwater was observed on transect B in August (Table 3.1).

Storm-Petrels

Leach's Storm-Petrels are common and widespread at sea. They probably occur regularly in moderate numbers in the outer parts of Placentia Bay from April through at least the end of October. A single Leach's Storm-Petrel was observed on transect on the southern end of survey route B on 20 October 2006 (Table 3.1).

No Wilson's Storm-Petrels were observed during the monthly pelagic bird survey program in Placentia Bay from August 2006 to April 2007 (Table 3.1). This species is generally considered scarce in Newfoundland waters. Small numbers probably occur annually in the outer reaches of Placentia Bay.

Northern Gannet

Northen Gannets are common in Placentia Bay from late March to mid November with a few individuals remaining until early December (Table 1.1). During the monthly pelagic bird survey program in Placentia Bay, Northern Gannets were observed in low to moderate numbers in August, September, and October, with a few late individuals observed on 4 December along survey route A (Table 3.1). Densities on survey routes A and B ranged from 0.18 to 1.50 individuals per km^2 during August to October (Table 3.1). Returning spring migrants were observed along route A on 13 April with 0.14 individuals per km^2 (Table 3.1). The least numbers of Northern Gannets were recorded on survey route C in upper Placentia Bay with densities of 0.02 and 0.04 individuals per km^2 on 4 August and 26 September, respectively.

Phalaropes

The only phalaropes observed during the monthly pelagic bird survey program in Placentia Bay were two Red Phalaropes sighted along survey route C on 26 September 2006 and two unidentified phalaropes sighted along survey route A on 18 October 2006 (Table 3.1). On 4 December 2006, three Red Phalaropes were observed from boat by LGL observers while in transit to Southern Head from Northern Harbour (see Table 3.15 in Section 3.6.3).

Gulls

At least eleven species of gulls are likely to occur annually in Placentia Bay (Table 1.1). The Black-legged Kittiwake is the only truly pelagic gull species in Newfoundland. Herring Gulls and Great Black-backed Gulls were the most numerous gulls recorded during the monthly pelagic bird survey program in Placentia Bay from August 2006 to April 2007; they were recorded on all 15 surveys (Table 3.1). The Herring Gull was slightly less numerous on the survey C route through Merasheen Island and Long Island than on survey routes A and B in more open waters of Placentia Bay (Table 3.1). Herring Gull numbers peaked in October for all three survey routes with averages of 1.02, 1.11 and 0.77 individuals per km^2 for routes A, B and C, respectively (Table 3.1). Numbers were generally lower in winter. Great Black-backed Gull densities were about one third that of Herring Gull densities with a similar trend in monthly abundance. The Black-legged Kittiwake was not observed on three of the 15 pelagic boat surveys from August 2006 to April 2007. It was generally less numerous than Herring and Great Black-backed Gull, but sometimes occurred in small flocks. On 21 April 2007 while conducting an aerial survey for Harlequin Ducks, a relatively large concentration of Black-legged Kittiwakes (estimated at 800 and presumed to be breeding) was observed by LGL observers at on the Columbier Islands southwest of Lawn on the Burin Peninsula (see Table 3.17 in Section 3.6.3). In winter, some Glaucous Gulls and Iceland Gulls from breeding areas in the low Arctic also winter at sea in Newfoundland and are expected in low densities in Placentia Bay; however, only the Iceland Gull was recorded during the 2006-2007 pelagic boat-based seabird surveys (Table 3.1). During aerial surveys focused on Harlequin Ducks in western Placentia Bay extending to the southern Burin Peninsula, LGL observers recorded a few Glaucous Gulls on 27 February 2007 and especially 13 March 2007 whereas Iceland Gulls were relatively common along the southern Burin Peninsula on 13 March 2007. Ring-billed Gulls are present near shore in Placentia Bay from April through October (Table 1.1). The only Ring-billed Gulls recorded during the monthly boat-based pelagic bird survey program in Placentia Bay from August 2006 to April 2007 were singles observed on 4 August 2006 and 13 April 2007 (Table 3.1). There was a strong presence of Black-headed Gulls detected during coastal surveys by LGL observers at Arnold's Cove and Come By Chance (Table 3.3), and this species is uncommon and localized in occurrence in the province.

Terns

A few individual Arctic Terns and Common Terns were recorded in August during the monthly pelagic bird survey program in Placentia Bay (Table 3.1). Caspian Tern was observed at Arnold's Cove and Southern Harbour (Table 3.3) and this uncommon species, formerly listed as Special Concern but recently re-assessed as Not at Risk by COSEWIC, occurs in Placentia Bay.

Skuas

The Great Skua and South Polar Skua are very uncommon seabirds in eastern Canadian waters. Both species of skua have been recorded in Placentia Bay in the summer. They are likely regular visitors in small numbers in the outer reaches of Placentia Bay from May through October (Table 1.1), although none were observed during the monthly pelagic bird survey program in Placentia Bay from August 2006 to April 2007 (Table 3.1).

Jaegers

In Placentia Bay, jaegers are expected to be scarce to uncommon in the middle and outer portions of the bay between May and October (Table 1.1). During the monthly pelagic bird survey program in Placentia Bay, only three Parasitic and five Pomarine Jaegers were observed in August, September, and October (Table 3.1). These species were also recorded by LGL observers during coastal surveys on 25 October 2007 at Southern Harbour, Placentia Bay following a strong coastal storm.

Dovekie

Dovekies can be common in Placentia Bay from October through April (Table 1.1). Dovekies were recorded in low numbers in October, December, and March during the monthly pelagic bird survey program in Placentia Bay from August 2006 to April 2007 (Table 3.1). Peak numbers occurred in December with average densities of 0.54 individuals per km^2 along survey route A and 0.41 individuals per km^2 along survey route B (Table 3.1).

Common Murre

In the spring and summer, March to July, the Common Murre can be common in Placentia Bay depending in part on food availability. In fall and winter, it is expected to be scarce in Placentia Bay. The Common Murre was recorded in low numbers during the monthly pelagic bird survey program in Placentia Bay from August 2006 to April 2007 (Table 3.1). Peak numbers were recorded in late winter (March) and early spring (April) and were possibly spring migrants returning to Cape St. Mary's breeding colony. Common murres were not observed during August and September surveys (Table 3.1). On 15 May 2007, flocks of up to 25 Common Murres were observed from boat while LGL observers were in transit from Bordeaux Island (near Arnolds Cove) to North Harbour.

Thick-billed Murre

The Thick-billed Murre is the main species taken during the traditional winter murre hunt in Newfoundland. The Thick-billed Murre is expected to be scarce to common in Placentia Bay throughout the year, but most numerous in winter. During the monthly pelagic bird survey program in Placentia Bay from August 2006 to April 2007, it was found in low numbers in October, December, March, and April; densities were greatest on survey routes A and B (Table 3.1). Average densities on route A were 0.48 and 0.57 individuals per km^2 on 4 December 2006 and 13 April 2007, respectively, and 0.22 and 0.99 individuals per km^2 on 20 December 2006 and 13 April 2007 on route B, respectively (Table 3.1). Densities of Thick-billed Murres were highest during the March and April 2007 surveys for all three survey routes (Table 3.1).

Razorbill

The Razorbill is expected to be scarce in Placentia Bay throughout the year, but least numerous in winter. During the monthly pelagic bird survey program in Placentia Bay from August 2006 to April 2007, the Razorbill was observed only once in October and March (Table 3.1).

Black Guillemot

Black Guillemot is expected to be fairly common year-round near shore around the entire coastline of Placentia Bay, including the islands. Black Guillemots were observed in low numbers in all months surveyed (Table 3.1). Black Guillemots were more regularly observed on routes A and C than route B (Table 3.1).

Atlantic Puffin

Atlantic Puffins occur in Placentia Bay during migration and in small numbers in summer and winter. During the monthly pelagic bird survey program in Placentia Bay from August 2006 to April 2007, Atlantic Puffins were observed in low numbers in all months surveyed, supporting that the species over-winters in Placentia Bay. Atlantic Puffins were more regularly observed on route B than route A or C (Table 3.1). Overall, the peak Atlantic Puffin numbers for each of the three routes occurred in December (Table 3.1).

Table 3.1 Average density of marine-associated birds (per km^2) per 10-minute survey in Placentia Bay, August 2006 to April 2007.

	Survey Route A				Survey Route B					Survey Route C					
Species	**22 Sep**	**18 Oct**	**4 Dec**	**13 Apr**	**3 Aug**	**28 Sep**	**20 Oct**	**20 Dec**	**1 Mar**	**4 Aug**	**26 Sep**	**23 Oct**	**19 Dec**	**2 Mar**	**29 Mar**
American Black duck	0	0	0	0	0	0	0	0	0	0	0	0.02	X	0	0
King Eider	0	0	0	0	0	0	0	0.02	0	0	0	0	0	0	0
Common Eider	0	X	X	X	0	0	0	0.02	4.58	0	0	0.04	1.64	0	0
Long-tailed Duck	0	0	0.04	0.04	0	0	0	1.44	0.63	0	0	0	0.33	2.13	0.04
Red-breasted Merganser	0	0	0	0	0	0	0	0	0	0	0	0	0	X	0
Common Loon	X	0	0	0	0	0	0	0	0	0	0	0	X	0	0
Red-necked Grebe	0	0	0	0.02	0	0	0	0	0	0	0	X	0	0	0
Northern Fulmar	X	0	0.02	0	0	X	0	0	0	0	0	0	0	0	0
Greater Shearwater	0	0	0	0	X	0	X	0	0	0	0	0	0	0	0
Sooty Shearwater	0	0	0	0	0.04	0	0	0	0	0	0	0	0	0	0
Manx Shearwater	0	0	0	0	0.02	0	0	0	0	0	0	0	0	0	0
Leach's Storm-Petrel	X	0	0	0	0	0	0.02	0	0	0	0	0	0	0	0
Northern Gannet	X	0.46	0.08	0.14	0.18	1.50	0.38	0	0	0.02	0.04	0	0	0	0
Double-crested Cormorant	X	0	0	0	0.09	X	0	0	0	0	X	0	0	0	0
Great Cormorant	0	X	X	0.02	0	0	0.91	0.30	X	X	0	0.04	0.02	0.02	X
unidentified cormorant	0	0	0	0	0	0	0	0	0	0	0	X	X	0	X
Bald Eagle	0	X	X	X	0	X	0	0	X	X	X	X	0.13	0.02	X
Sanderling	0	0	0	0	0	0	0.04	0	0	0	0	0	0	0	0
Purple Sandpiper	0	0	0	0	0	0	0.02	0	0.32	0	0	0	0	0.06	0
Red Phalarope	0	0	0	0	0	0	0	0	0	0	0.02	0	0	0	0
unidentified phalarope	0	0.02	0	0	0	0	0	0	0	0	0	0	0	0	0
Ring-billed Gull	0	0	0	0.02	0	0	0	0	0	0.05	0	0	0	0	0
Herring Gull	X	1.02	0.39	0.26	0.83	1.07	1.11	0.08	0.04	0.18	0.43	0.77	0.61	X	0.26
Iceland Gull	0	0	0.04	0	0	0	0	0.06	0.02	0	0	0	0.20	0	0
Great Black-backed Gull	X	0.16	0.10	0.02	0.11	0.10	0.24	X	0.12	0.02	X	0.15	0.11	0.02	X
Black-legged Kittiwake	0	0.02	0.15	0.02	0.9	0	0.06	0.02	0.55	0.08	0	0.46	X	0.32	0.17
Common Tern	0	0	0	0	0.14	0	0	0	0	0.10	0	0	0	0	0
Arctic Tern	0	0	0	0	0.16	0	0	0	0	0.02	0	0	0	0	0
Pomarine Jaeger	0	0	0	0	X	0	0	0	0	0	X	0.04	0	0	0
Parasitic Jaeger	0	0	0	0	X	0	0	0	0	0	0	0.02	0	0	0
Dovekie	0	0.16	0.54	0	0	0	0.04	0.41	0.12	0	0	0	X	0.02	0.02
Common Murre	0	X	0	0.38	0.07	0	0	0.06	0.14	0.02	0	0	0	0.11	0.11

Species	Survey Route A				Survey Route B					Survey Route C					
	22 Sep	18 Oct	4 Dec	13 Apr	3 Aug	28 Sep	20 Oct	20 Dec	1 Mar	4 Aug	26 Sep	23 Oct	19 Dec	2 Mar	29 Mar
Thick-billed Murre	0	0	0.48	0.57	X	0	0	0.22	0.99	0	0	0	0.04	0.30	0.38
Unidentified Murre	0	0.02	0	0.10	0	0	X	X	0.04	0	0.02	0	0	0	0.15
Razorbill	0	0	0	0	0	0	0	0	X	0	0	X	0	0	0
Black Guillemot	0	0.12	0	0.18	X	0	0	X	0.04	0.13	0.02	0	X	0.09	0.02
Atlantic Puffin	0	0	0.12	0	0.25	0.02	0.12	0.47	0.10	X	0	0	0.02	0	0
All Species Combined	X	1.95	1.97	1.78	2.84	2.71	2.96	3.1	7.7	0.6	0.53	1.54	3.1	3.15	1.15

Notes: X = recorded off transect only.

3.2 Coastal Birds

Weekly or bimonthly surveys were conducted from August 2006 to April 2007. American Black Ducks were the most commonly observed waterfowl (Table 3.2). There was a strong presence of Black Ducks staging and wintering in and around the bar lagoons in Arnold's Cove and Come By Chance (Table 3.2). Domestic Ducks were commonly observed during all seasons in Arnold's Cove (Table 3.2). Canada Goose was commonly observed during the spring at Come By Chance; up to 400 Canada Geese staged at Come By Chance lagoon during migration during late March and early April 2007 (Table 3.2). There were observations of Red-breasted Merganser at all four surveyed sites, but mainly during the spring in Arnold's Cove and in the winter at North Harbour (Table 3.2). Mallard and Green-winged Teal were observed in low numbers at Arnold's Cove and on a single occasion at Come By Chance (Table 3.2). Common Loon, along with Red-breasted Merganser, was the only other waterfowl species observed at all four sites. It was, however, only observed in small numbers (Table 3.2).

Seven species of gulls (including Black-legged Kittiwake) and three species of terns were observed during surveys from August 2006 to April 2007 (Table 3.3). Herring Gulls were the most commonly observed gulls. Herring Gulls were observed at all four sites and in all four seasons, but were most common at Arnold's Cove, North Harbour, and South Harbour during fall months (Table 3.3). There was a strong presence of Great Black-backed Gulls at Arnold's Cove, North Harbour, and South Harbour, mainly during fall months (Table 3.3). Ring-billed Gulls and Iceland Gulls were observed at all four sites, mainly during spring months in the case of the Ring-bill Gull and almost exclusively during winter months in the case of the Iceland Gull (Table 3.3). Black-headed Gulls were mainly observed at Arnold's Cove and Come By Chance, but also at Southern Harbour (Table 3.3). Glaucous Gulls were only rarely seen at all sites, except Come By Chance, and Black-legged Kittiwakes were only observed at Southern Harbour, usually in low numbers (Table 3.3). Caspian Terns were observed at Arnold's Cove and Southern Harbour during summer months and this uncommon species, formerly listed as *special concern* by COSEWIC, occurs in the survey area. Common Terns and Arctic Terns were regularly observed in low numbers, exclusively during summer months (Table 3.3).

Some species of raptors (birds of prey) were common. Bald Eagles were the most commonly observed species of raptors in all study sites and were observed in relatively high density (Table 3.4). There were 14 Bald Eagles observed at the Come By Chance site on 4 December 2006, and adults and immatures were common. Osprey, Sharp-shinned Hawk, Northern Goshawk, and Merlin were recorded in low numbers (Table 3.4). Bald Eagle and Osprey were confirmed as nesting on Southern Head incidental to aerial surveys in May and June 2007 in the area of Goat Point. There were notable numbers of Osprey (n = 4) at the bar lagoon (barachois) in Come By Chance on 3 August 2006 (Table 3.4).

Some species of shorebirds were common during summer months. The Black-bellied Plover, Semipalmated Plover, Greater Yellowlegs and Semipalmated Sandpiper were occasionally observed in high numbers, mainly at Arnold's Cove and Come By Chance (Table 3.5). Other species of shorebirds were uncommonly observed in low numbers, almost exclusively during summer months, but occasionally during fall months (Table 3.5). No species of shorebirds were observed during winter months and only Greater Yellowlegs were observed during spring months, once at Come By Chance and North Harbour (Table 3.5), and they were observed as territorial pairs (assumed nesting) on Southern Head in June 2007. Spotted Sandpipers and Common Snipe also occur in spring-summer and likely nest locally.

Table 3.2 Mean numbers (maximum numbers [a]) of waterfowl commonly observed in inner Placentia Bay by LGL Limited in August 2006-April 2007.

Site / Season	Canada Goose	American Black Duck	Mallard	Green-winged Teal	Red-breasted Merganser	Domestic Duck	Common Loon
Arnold's Cove							
Summer (*n* = 16)	0 (0)	37.63 (137)	0.50 (6)	0.06 (1)	0 (0)	9.19 (33)	0.19 (1)
Fall (*n* = 15)	0 (0)	83.73 (280)	0.47 (3)	0.73 (9)	0 (0)	12.07 (64)	0.07 (1)
Winter (*n* = 15)	0 (0)	57.20 (235)	0.53 (2)	0.20 (2)	2.20 (15)	15.93 (57)	0 (0)
Spring (*n* = 9)	0 (0)	11.11 (45)	0.33 (3)	0 (0)	6.22 (28)	11.78 (43)	0 (0)
All Seasons	**0**	**51.20**	**0.47**	**0.27**	**1.62**	**12.24**	**0.07**
Come By Chance							
Summer (*n* = 18)	0 (0)	0.11 (2)	0 (0)	0.22 (4)	0 (0)	0 (0)	0.44 (4)
Fall (*n* = 15)	0 (0)	0 (0)	0 (0)	0 (0)	0.13 (2)	0 (0)	0 (0)
Winter (*n* = 15)	4.47 (67)	54.73 (233)	0.07 (1)	0 (0)	1.53 (14)	0 (0)	0 (0)
Spring (*n* = 9)	45.56 (397)	9.78 (49)	0 (0)	0 (0)	2.67 (16)	0 (0)	0 (0)
All Seasons	**8.37**	**15.98**	**0.02**	**0.07**	**0.86**	**0**	**0.14**
North Harbour							
Summer (*n* = 6)	1.67 (5)	0.33 (2)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Fall (*n* = 3)	0 (0)	1.67 (5)	0 (0)	0 (0)	0.33 (1)	0 (0)	0 (0)
Winter (*n* = 11)	0 (0)	2.27 (13)	0 (0)	0 (0)	8.82 (45)	0 (0)	0.09 (1)
Spring (*n* = 12)	0 (0)	0 (0)	0 (0)	0 (0)	1.42 (10)	0 (0)	0 (0)
All Seasons	**0.31**	**1.00**	**0**	**0**	**3.59**	**0**	**0.03**
Southern Harbour							
Summer (*n* = 12)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Fall (*n* = 16)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0.06 (1)
Winter (*n* = 15)	0 (0)	0 (0)	0 (0)	0 (0)	0.53 (7)	0 (0)	0 (0)
Spring (*n* = 12)	0 (0)	0 (0)	0 (0)	0 (0)	0.17 (2)	0 (0)	0 (0)
All Seasons	**0**	**0**	**0**	**0**	**0.18**	**0**	**0.02**

[a] All minimum numbers = 0

Table 3.3 Mean numbers (maximum numbers [a]) of Gulls and Terns Observed in inner Placentia Bay by LGL Limited in August 2006-April 2007.

Site / Season	Black-headed Gull	Ring-billed Gull	Herring Gull	Iceland Gull	Glaucous Gull	Great Black-backed Gull	Black-legged Kittiwake	Caspian Tern	Arctic Tern	Common Tern	Tern spp.
Arnold's Cove											
Summer (*n* = 16)	0 (0)	3.75 (12)	56.94 (327)	0 (0)	0 (0)	17.94 (72)	0 (0)	0.06 (1)	0.06 (1)	3.81 (31)	1.88 (12)
Fall (*n* = 15)	4.87(50)	0.60 (9)	136.53 (700)	0 (0)	0 (0)	28.67 (100)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Winter (*n* = 15)	3.27 (14)	0.27 (3)	24.20 (62)	7.87 (55)	0.13 (1)	11.87 (48)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Spring (*n* = 9)	3.44 (13)	27.33 (114)	41.00 (101)[b]	1.33 (5)	0 (0)	3.89 (11)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
All Seasons	**2.78**	**5.80**	**67.11**	**2.36**	**0.04**	**16.91**	**0**	**0.02**	**0.02**	**1.11**	**0.55**
Come By Chance											
Summer (*n* = 18)	0.11 (2)	2.50 (16)	4.44 (45)	0 (0)	0 (0)	0.44 (4)	0 (0)	0 (0)	1.00 (11)	2.33 (8)	5.44 (30)
Fall (*n* = 15)	0.33 (4)	0.07 (1)	4.87 (44)	0 (0)	0 (0)	0.73 (6)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Winter (*n* = 15)	5.40 (43)	0.40 (4)	1.47 (6)	0.20 (2)	0 (0)	0.07 (1)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Spring (*n* = 9)	9.44 (37)	17.56 (127)	10.00 (49) [c]	0 (0)	0 (0)	0.33 (1)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
All Seasons	**3.04**	**3.68**	**4.65**	**0.05**	**0**	**0.40**	**0**	**0**	**0.32**	**0.74**	**1.72**
North Harbour											
Summer (*n* = 6)	0 (0)	1.17 (4)	39.67 (152) [d]	0 (0)	0.33 (1)	9.00 (41) [g]	0 (0)	0 (0)	0.17 (1)	1.00 (5)	0 (0)
Fall (*n* = 3)	0 (0)	0 (0)	86.67 (208) [e]	0 (0)	0.33 (1)	21.67 (47) [h]	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Winter (*n* = 11)	0 (0)	0.64 (5)	27.82 (125)	3.55 (26)	0.09 (1)	5.18 (27)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Spring (*n* = 12)	0 (0)	4.25 (25)	35.33 (133)	0.08 (1)	0 (0)	2.17 (12)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
All Seasons	**0**	**2.03**	**38.38**	**1.25**	**0.13**	**6.31**	**0**	**0**	**0.03**	**0.19**	**0**
Southern Harbour											
Summer (*n* = 12)	0 (0)	5.42 (54)	10.92 (40)	0 (0)	0.25 (3)	1.00 (8)	0.08 (1)	0.08 (1)	0.17 (2)	2.25 (19)	1.50 (12)
Fall (*n* = 16)	0.06 (1)	0 (0)	42.81 (500)	0.63 (10)	0 (0)	12.00 (150)	5.88 (50)	0 (0)	0 (0)	0 (0)	0 (0)
Winter (*n* = 15)	1.07 (4)	0 (0)	17.27 (53)	6.00 (33)	0.53 (4)	4.07 (17)	0.07 (1)	0 (0)	0 (0)	0 (0)	0 (0)
Spring (*n* = 12)	0.17 (1)	2.25 (14)	14.83 (40) [f]	0.50 (3)	0.17 (1)	2.42 (6)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
All Seasons	**0.35**	**1.67**	**22.78**	**1.93**	**0.24**	**5.35**	**1.75**	**0.02**	**0.04**	**0.49**	**0.33**

[a] All minimum numbers = 0 with the exception of:
[b] Minimum = 6
[c] Minimum = 1
[d] Minimum = 8
[e] Minimum = 7
[f] Minimum = 3
[g] Minimum = 1
[h] Minimum = 5

Table 3.4 Mean numbers (maximum numbers [a]) of Birds of Prey Observed in inner Placentia Bay by LGL Limited in August 2006-April 2007.

Site / Season	Osprey	Bald Eagle	Sharp-shinned Hawk	Northern Goshawk	Merlin
Arnold's Cove					
Summer (*n* = 16)	0.13 (1)	0 (0)	0 (0)	0 (0)	0 (0)
Fall (*n* = 15)	0 (0)	0.20 (1)	0 (0)	0 (0)	0 (0)
Winter (*n* = 15)	0 (0)	0.13 (1)	0 (0)	0 (0)	0 (0)
Spring (*n* = 9)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
All Seasons	**0.04**	**0.09**	**0**	**0**	**0**
Come By Chance					
Summer (*n* = 18)	0.44 (4)	0.44 (2)	0 (0)	0 (0)	0.11 (1)
Fall (*n* = 15)	0 (0)	1.13 (9)	0.07 (1)	0 (0)	0 (0)
Winter (*n* = 15)	0 (0)	0.40 (1)	0 (0)	0 (0)	0 (0)
Spring (*n* = 9)	0.11 (1)	0.67 (2)	0 (0)	0 (0)	0 (0)
All Seasons	**0.16**	**0.65**	**0.02**	**0**	**0.04**
North Harbour					
Summer (*n* = 6)	0.17 (1)	0 (0)	0 (0)	0 (0)	0 (0)
Fall (*n* = 3)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Winter (*n* = 11)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Spring (*n* = 12)	0 (0)	0.25 (1)	0 (0)	0 (0)	0 (0)
All Seasons	**0.03**	**0.09**	**0**	**0**	**0**
Southern Harbour					
Summer (*n* = 12)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Fall (*n* = 16)	0 (0)	0.38 (2)	0 (0)	0.06 (1)	0.06 (1)
Winter (*n* = 15)	0 (0)	0.73 (3)	0.07 (1)	0 (0)	0 (0)
Spring (*n* = 12)	0 (0)	0.17 (2)	0 (0)	0 (0)	0 (0)
All Seasons	**0**	**0.35**	**0.02**	**0.02**	**0.02**

[a] All minimum numbers = 0

Table 3.5 Mean numbers (maximum numbers [a]) of shorebirds observed in inner Placentia Bay by LGL Limited in August – December 2006.

Site / Season	Black-bellied Plover	American Golden-Plover	Semipalmated Plover	Spotted Sandpiper	Greater Yellowlegs	Lesser Yellowlegs	Yellowlegs sp.	Ruddy Turnstone	Red Knot	Sanderling
Arnold's Cove										
Summer (*n* = 16)	0.38 (2)	0 (0)	5.81 (39)	0.06 (1)	8.63 (45)	0.13 (2)	1.38 (22)	0.13 (2)	0 (0)	0.06 (1)
Fall (*n* = 15)	0.13 (1)	0 (0)	0.93 (14)	0 (0)	1.33 (14)	0 (0)	0 (0)	0 (0)	0 (0)	0.13 (2)
Winter (*n* = 15)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Spring (*n* = 9)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
All Seasons	**0.15**	**0**	**1.95**	**0.02**	**2.87**	**0.04**	**0.40**	**0.04**	**0**	**0.05**
Come By Chance										
Summer (*n* = 18)	3.78 (48)	0.22 (4)	0.28 (4)	0.06 (1)	9.83 (55)	0.06 (1)	1.11 (20)	0.89 (12)	0.22 (4)	0.06 (1)
Fall (*n* = 15)	0.80 (8)	0 (0)	0 (0)	0 (0)	2.20 (31)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Winter (*n* = 15)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Spring (*n* = 9)	0 (0)	0 (0)	0 (0)	0 (0)	0.11 (1)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
All Seasons	**1.40**	**0.07**	**0.09**	**0.02**	**3.70**	**0.02**	**0.35**	**0.28**	**0.07**	**0.02**
North Harbour										
Summer (*n* = 6)	0 (0)	0 (0)	0 (0)	0 (0)	3.50 (9) [b]	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Fall (*n* = 3)	0 (0)	0 (0)	0 (0)	0 (0)	1.00 (3)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Winter (*n* = 11)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Spring (*n* = 12)	0 (0)	0 (0)	0 (0)	0 (0)	0.17 (2)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
All Seasons	**0**	**0**	**0**	**0**	**0.81**	**0**	**0**	**0**	**0**	**0**
Southern Harbour										
Summer (*n* = 12)	0 (0)	0 (0)	3.83 (28)	0.42 (2)	1.25 (11)	0.33 (4)	0 (0)	0.58 (7)	0.17 (2)	0 (0)
Fall (*n* = 16)	0 (0)	0 (0)	0.31 (5)	0 (0)	0.13 (2)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Winter (*n* = 15)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Spring (*n* = 12)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
All Seasons	**0**	**0**	**0.93**	**0.09**	**0.31**	**0.07**	**0**	**0.13**	**0.04**	**0**

[a] All minimum numbers = 0

[b] Minimum = 1

Table 3.5 Continued.

Site / Season	Least Sandpiper	Semipalmated Sandpiper	White-rumped Sandpiper	Baird's Sandpiper	Dunlin	Short-billed Dowitcher	Wilson's Snipe	Shorebird sp.	Red Phalarope
Arnold's Cove									
Summer (*n* = 16)	0.25 (2)	3.94 (42)	0.13 (2)	0.31 (5)	0.19 (3)	0.50 (4)	0 (0)	0 (0)	0 (0)
Fall (*n* = 15)	0 (0)	0 (0)	0.07 (1)	0 (0)	0.20 (2)	0 (0)	0 (0)	0 (0)	0 (0)
Winter (*n* = 15)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Spring (*n* = 9)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
All Seasons	0.07	1.15	0.05	0.09	0.11	0.15	0	0	0
Come By Chance									
Summer (*n* = 18)	0.22 (4)	0.33 (6)	0 (0)	0 (0)	0 (0)	0.11 (1)	0 (0)	0.06 (1)	0 (0)
Fall (*n* = 15)	0.07 (1)	0 (0)	0.40 (5)	0 (0)	0.80 (8)	0 (0)	0 (0)	0 (0)	0 (0)
Winter (*n* = 15)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Spring (*n* = 9)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
All Seasons	0.09	0.11	0.11	0	0.21	0.04	0	0.02	0
North Harbour									
Summer (*n* = 6)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Fall (*n* = 3)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Winter (*n* = 11)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Spring (*n* = 12)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
All Seasons	0	0	0	0	0	0	0	0	0
Southern Harbour									
Summer (*n* = 12)	0.08 (1)	1.08 (12)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0.17 (2)
Fall (*n* = 16)	0 (0)	0 (0)	0.06 (1)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Winter (*n* = 15)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Spring (*n* = 12)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
All Seasons	0.02	0.24	0.02	0	0	0	0	0	0.04

3.3 Breeding Waterfowl

Aerial surveys of the Southern Head area in early September 2006 confirmed the presence of broods of Ring-necked Ducks on wetlands in and immediately north of the footprint of the proposed oil refinery. A single Black Duck was observed at this time and believed to be a hatch-year bird (that is hatched in 2006 and possibly local) On 28 June 2007, male and a lone female Ring-necked Duck were observed on four wetlands, and a pair and single female Black Duck were observed on two wetlands in the survey area (Table 3.6, Figure 3.1). Incidental observations included Greater Yellowlegs (suspected to be breeding), Spotted Sandpipers (coastal and suspected to be breeding) and a pair of Common Terns on a nest with 3 eggs on 28 June 2007 on a lake in the upper watershed of Watson's Brook.

Table 3.6 Observations of breeding waterfowl detected during aerial surveys of the Southern Head area, Placentia Bay, Newfoundland.

Date	Ring-necked Duck		Black Duck	
	Adult	Brood	Adult	Brood
6 September 2006	4 ♂, 1 ♀	2 @ class 3 (n = 3 & 8)		1 @ class 3f
28 June 2007	2 ♂, 2♂, 2♂, 1♀, 4♂		1 pair, 1 ♀	

NOTE: Broods assigned to age classes based on Gollop and Marshall 1954.

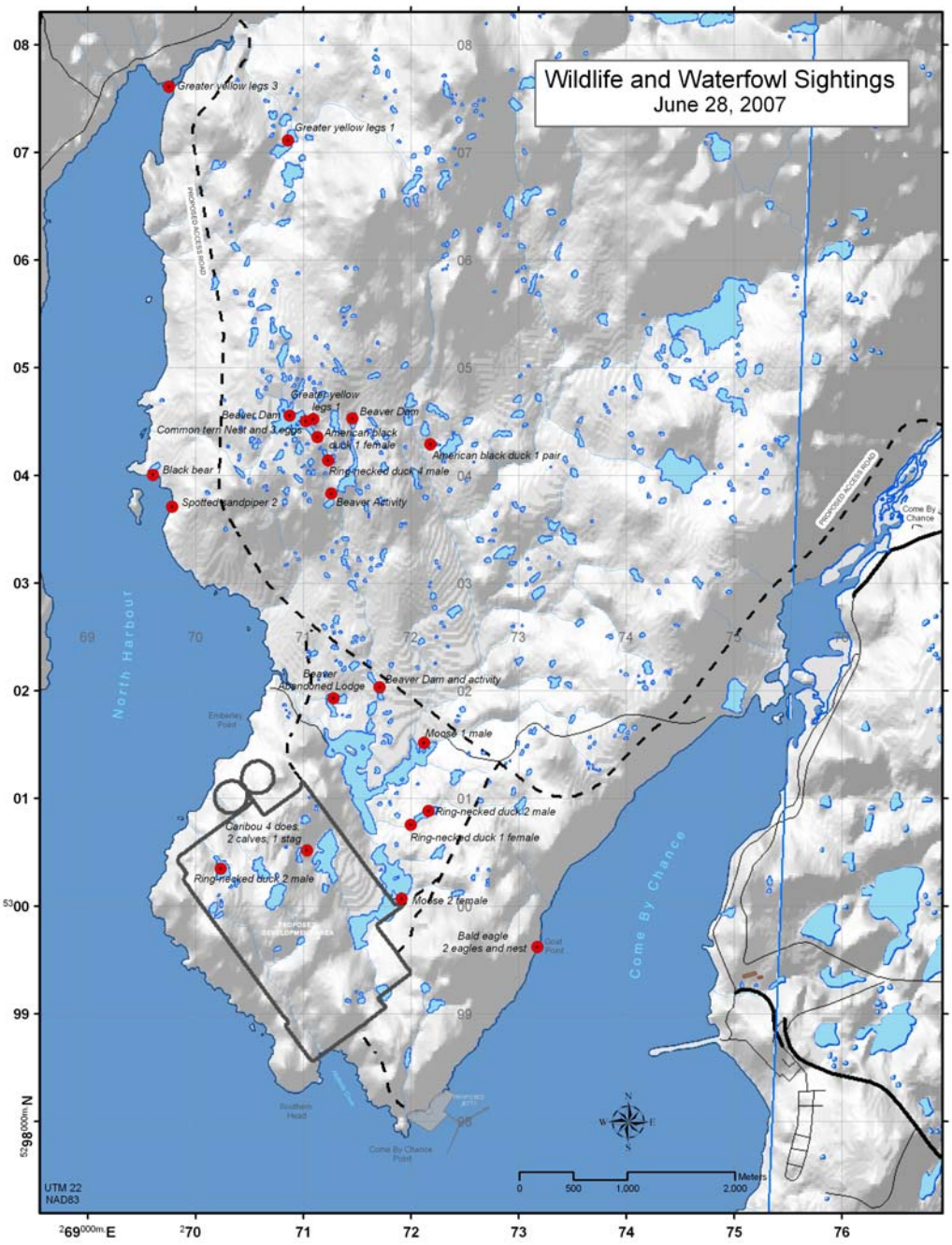

Figure 3.1 Observations of Waterfowl and incidental wildlife recorded by LGL Limited during aerial surveys on June 28, 2007.

3.4 Harlequin Ducks

3.4.1 Land-Based Survey

The ground-based counts consistently yielded significant numbers of Harlequin Ducks (n >100) for the sites representative of the Cape St. Mary's area (Table 3.7). Small, but consistent, numbers were detected at all other sites (Tables 3.8 and 3.9). Harlequin Ducks were previously observed at most sites in the early 2000's (Table 3.10). The data suggest that modest increases may have occurred at all sites (Table 3.11).

3.4.2 Aerial Survey

Relatively few Harlequin Ducks were observed during aerial surveys. A group of 12 Harlequin Ducks was observed adjacent to Morgan's Island ("The Breadbox"), a small island near Allan's Island/Lamaline area on the tip of the Burin Peninsula on 13 March 2007, and again on 21 April 2007 (Table 3.12; Figures 2.5 and 2.6).

Table 3.7 Observations of Harlequin Ducks recorded at Golden Bay, Cat's Cove, and Redland Point in the area of Cape St. Mary's, Newfoundland, from January to April 2007.

Date	Adult Male	Female-like	Total
16 January 2007	15	19	34
30 January 2007	45	39	84
3 February 2007	24	37	61
10 February 2007	24	33	57
14 February 2007	58	80	138
26 February 2007	54	73	127
2 March 2007	36	59	95
8 March 2007	30	42	72
23 March 2007	28	37	65
28 March 2007	35	50	85
5 April 2007	54	65	119
11 April 2007	27	37	64
17 April 2007	12	12	24
21 April 2007	14	18	32
30 April 2007	0	2	2

Note:
Data are segregated in adult male and female-like individuals. The female-like cohort would therefore include immature birds.

Table 3.8 Observations of Harlequin Ducks recorded at Cahoon's Cliff (Patrick's Cove), Little Half Way Gully, and Sunkers Point (Goose Berry Cove) on the Cape Shore, Placentia Bay, Newfoundland, from January to April 2007.

Date	Adult Male	Female-like	Total
17 January 2007	2	1	3
26 January 2007	0	0	0
1 February 2007	2	2	4
8 February 2007	0	4	4
13 February 2007	2	4	6
25 February 2007	0	0	0
6 March 2007	0	0	0
17 March 2007	1	2	3
21 March 2007	0	0	0
30 March 2007	1	1	2
4 April 2007	2	4	6
9 April 2007	6	6	12
21 April 2007	2	4	6
27 April 2007	4	4	8

Note:
Data are segregated in adult male and female-like individuals. The female-like cohort would therefore include immature birds.

Table 3.9 Observations of Harlequin Ducks recorded at Paint Point (Northern Head) and Lily Point (Point Lance), Newfoundland, from January to April 2007.

DATE	Adult Male	Female-like	Total
16 January 2007	3	4	7
26 January 2007	1	1	2
3 February 2007	1	2	3
10 February 2007	1	1	2
14 February 2007	3	6	9
26 February 2007	0	0	0
2 March 2007	0	3	3
8 March 2007	0	0	0
23 March 2007	4	4	8
28 March 2007	0	0	0
5 April 2007	3	3	6
11 April 2007	0	0	0
21 April 2007	0	0	0
27 April 2007	1	1	2
30 April 2007	0	0	0

Note:
Data are segregated in adult male and female-like individuals. The female-like cohort would therefore include immature birds.

Table 3.10 Historical data collected from similar sites at Cape St. Mary's and the Cape Shore in 2000-2001.

Site	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.[a]	Mar.[a]
Within Cape St. Mary's Reserve							
Golden Bay	0	27	49	68	54	.	.
Cat's Cove	3	11	21	.	.	.	.
Golden Bay-Cat's Cove subtotal	3	38	70	68	54		
Paint Point	0	2	4	1	.	0	5
Lily's Point	.	1	0	3	3	3	4
Peripheral Sites at Cape St. Mary's subtotal	0	3	4	4	3	3	9
Outside Cape St. Mary's Reserve							
Sunkers Point	0	0	1	3	3	2	4
Little Halfway Gully	0	0	2	2	1	0	3
Cahoon's Point	0	0	0	1	2	0	0
Cape Shore subtotal	0	0	3	6	6	2	7
The Chimney	.	.	.	.	4	3	6

Note:
[a]Some sites were inaccessible in February and March 2001 due to heavy snow accumulation on Cape St. Mary's road.

Table 3.11 Comparison of maximum numbers of Harlequin Ducks observed at designated sites in the area of the Cape Shore - Cape St. Mary's - Point Lance, Newfoundland, 2001 vs. to 2007.

Sites	January[a]		February[a]		March[a]	
	2001	2007	2001	2007	2001	2007
Golden Bay-Cat's Cove subtotal	**54**	**69**	nc	124	nc	69
Peripheral Sites at Cape St. Mary's subtotal	**3**	**7**	**3**	**9**	9	8
Cape Shore subtotal	6	3	**2**	**6**	7	3

Notes:
[a] Highest counts are presented for months with multiple field visits.
nc = no coverage as some sites were inaccessible in February and March 2001 due to heavy snow accumulation on Cape St. Mary's road.
Bold indicates an apparent increase in maximum observed numbers.

Table 3.12 Total numbers of waterfowl observed by LGL during aerial surveys of Placentia Bay in winter-spring 2007.

Species	27 February 2007	13 March 2007	21 April 2007
Common Loon	1	10	4
Canada Goose			28
American Black Duck	106	16	11
Mallard	1		
Northern Pintail			2
Green-winged Teal			2
White-winged Scoter		3	
Black Scoter		8	
Long-tailed Duck	165	255	224
Harlequin Duck		12	12
Common Eider	634	3366	3990
Greater Scaup	10		
Common Goldeneye	5	15	
Red-breasted Merganser	43	26	15
Merganser Sp.		10	11

3.5 Landbirds

A total of 20 species showed signs of breeding in the refinery footprint (Table 3.13). The four most numerous species observed on the refinery footprint area were Swamp Sparrow, White-throated Sparrow, Blackpoll Warbler and Savannah Sparrow with 16-40 pairs of each recorded. Yellow-bellied Flycatcher, Gray Jay, Yellow-rumped Warbler and Dark-eyed Junco were moderately common with 6-15 pairs recorded. One to five pairs of Wilson's Snipe, Common Tern, Downy Woodpecker, Black-capped Chickadee, Boreal Chickadee, Ruby-crowned Kinglet, Hermit Thrush, American Robin, Black-and-white Warbler, Northern Waterthrush, Wilson's Warbler and Fox Sparrow were also recorded. Since the survey effort was not distributed uniformly over the three habitat types only very general relative abundance comparisons between the 20 species of Confirmed Breeding or Probable Breeding species can be made. Bald Eagle, Spotted Sandpiper, Ring-billed Gull, Herring Gull, Great Black-backed Gull, American Crow and Common Raven were observed flying over the refinery footprint and are not expected to breed on the refinery footprint site but probably breed nearby.

Black spruce scrub and forest habitat covers 36.8% of Southern Head. Within the refinery footprint area, 14 of the 20 species confirmed as breeding or probable breeding occurred within the black spruce scrub and forest habitat. All species found in the black spruce scrub and forest habitat were also found in the balsam fir habitat (along with three additional species). The only species obviously more numerous in the black spruce scrub and forest habitat was the Swamp Sparrow. The Swamp Sparrow preferred the black spruce scrub vs. taller black spruce treesand the balsam fir trees. Balsam fir forest covers 25.3% of Southern Head. This habitat contained 17 of the 20 species confirmed as breeding or probably breeding. The species composition was similar to the black spruce forest and scrub. A Downy Woodpecker nest and a single pairs of Black-capped and Boreal Chickadees were exclusive to balsam fir forest. Yellow-rumped Warbler was more numerous in the balsam fir than the black spruce habitat.

Table 3.13 The estimated number of pairs of breeding birds found at the refinery footprint area during the breeding bird survey on 28 June 2007.

	Black Spruce Scrub & Forest			Balsam Fir			Bog and Fen		
Common Name	Confirmed Breeding	Probable Breeding	No Breeding Evidence	Confirmed Breeding	Probable Breeding	No Breeding Evidence	Confirmec Breeding	Probable Breeding	No Breeding Evidence
Bald Eagle									2
Spotted Sandpiper									2
Wilson's Snipe*								1 pr	1
Ring-billed Gull									1
Herring Gull									8
Great Black-backed Gull									2
Common Tern*								1 pr	
Downy Woodpecker*				1 pr					
Yellow-bellied Flycatcher*		4 pr			9 pr				
Gray Jay*	1 pr	2 pr			3 pr				
American Crow									8
Common Raven									2
Black-capped Chickadee*				1 pr					
Boreal Chickadee*					1 pr				
Ruby-crowned Kinglet*		1 pr			2 pr				
Hermit Thrush*		2 pr		1 pr	2 pr				
American Robin*		1 pr	1		1 pr				2
Yellow-rumped Warbler*		1 pr			7 pr				
Blackpoll Warbler*		10 pr			13 pr				
Black-and-white Warbler*		1 pr			3 pr				
Northern Waterthrush*		2 pr			2 pr				
Wilson's Warbler*		3 pr			2 pr				
Savannah Sparrow*							1 pr	18 pr	
Fox Sparrow*		3 pr			1 pr				
Swamp Sparrow*		20 pr	5		6 pr	2		13 pr	4
White-throated Sparrow*		12 pr	1		12 pr	1			
Dark-eyed Junco*		3 pr			5 pr				

* Indicates the Confirmed Breeding or Probable Breeding in the refinery footprint.

The Southern Head area is comprised of 20.8% of bog and fen habitat. Only four species were confirmed breeding or probably breeding in this habitat. However, three of these species were found exclusively in this habitat. They were Wilson's Snipe (one pair and one single bird), Common Tern (one pair showing anxiety over a small island in a small pond) and Savannah Sparrow. The latter was numerous with 19 pairs of confirmed breeding and probable breeding birds encountered. Swamp Sparrow was the only species ubiquitous across all habitats in the refinery footprint area.

In addition to the species found during the 28 June 2007 survey other species were observed incidentally by biologists conducting lichen surveys on Southern Head. They were Ruffed Grouse, Hairy Woodpecker, Northern Flicker and Golden-crowned Kinglet. The habitat of the refinery footprint is suitable for all these species and they likely occur regularly in small numbers. A list of species expected to occur regularly in the refinery footprint and their seasonal occurrence and predicted abundance are shown in Table 1.2.

Species at Risk

No evidence indicating the presence of the four species of landbirds considered at risk either provincially and/or federally (Short-eared Owl, Rusty Blackbird, Gray-cheeked Thrush, Red Crossbill) on the refinery footprint area during the breeding season was found. However, all four species probably occur occasionally in the refinery footprint area. Short-eared Owl may migrate through Southern Head in spring and fall. The extensive blanket bogs may provide suitable foraging habitat for this species. Although Gray-cheeked Thrush was not found on the 28 June 2007 survey, suitable breeding habitat appeared to be present. It is possible a few Gray-cheeked Thrush do breed in the refinery footprint area but none were detected. This species tends to sing very early in the morning so it is possible that the biologist conducting the survey would not have detected this species as surveying did not commence until 08:30. However, five Hermit Thrushes were observed and this species is also known to sing early in the morning. Ponds with suitable characteristics for Rusty Blackbird breeding exist in the refinery footprint but this species was not encountered during the 28 June 2007 survey. Red Crossbills generally prefer richer forest than that in the refinery footprint. Red Crossbills probably occur briefly in the refinery footprint area on occasion.

3.6 Incidental Observations

3.6.1 Pelagic Birds

The following incidental observations of pelagic birds were recorded during coastal bird surveys:

- A Northern Fulmar was recorded by LGL observers at Southern Harbour during coastal surveys following an intense southerly storm (Goudie et al. 2007).
- On 4 December 2006, three Red Phalaropes were observed from boat by LGL observers while in transit to Southern Head from Northern Harbour.
- There was a strong presence of Black-headed Gulls detected during coastal surveys by LGL observers at Arnold's Cove and Come By Chance. This species is uncommon and localized in occurrence in the province.

- Caspian Tern was observed at Arnold's Cove and Southern Harbour. This uncommon species, formerly listed as *special concern* by COSEWIC, occurs in the survey area.
- Jaegers were also recorded by LGL observers during coastal surveys on 25 October 2006 at Southern Harbour, Placentia Bay following a strong coastal storm (Goudie et al. 2007).
- On 15 May 2007, flocks of up to 25 Common Murres were observed from boat while LGL observers were in transit from Bordeau Island (near Arnolds Cove) to North Harbour.

Relatively few seabirds were observed during Harlequin Duck aerial surveys. Black Guillemots were scattered in small numbers. Some murres were recorded during the more pelagic coverage while in transit across open water areas of Placentia Bay when moving between archipelago areas. Northern Gannets were detected on 21 April 2007 survey only whereas cormorants were observed on all three surveys. All cormorants identified to species were Great Cormorants (Table 3.14).

Table 3.14 Total numbers of alcids, gannets and cormorants observed by LGL during aerial surveys of Placentia Bay in winter-spring 2007.

Species	27 February 2007	13 March 2007	21 April 2007
Murres	68	50	
Dovekie	3	3	
Black-headed Gull	24	11	21
Alcids			82
Northern Gannet			4
Great Cormorants	197	74	162

3.6.2 Coastal Birds

During a helicopter survey, and subsequent ground-based work on Southern Head on 6 September 2006, 38 species of birds were observed (Table 3.15). Seventeen species of shorebirds were recorded in late summer-fall 2007 with notable aggregations of Greater Yellowlegs (with some Lesser Yellowlegs), Semipalmated Sandpipers, Semipalmated Plovers, and Ruddy Turnstones (Table 3.5). Some shorebird species recorded by LGL were uncommon or rare for the province, notably Red Knot and Baird's Sandpiper, respectively (Table 3.5). The observation of three Red Phalaropes while enroute to Southern Head by boat from North Harbour on 4 December 2006 is relatively late for this species (Table 3.15). The Willet had been previously observed in Come By Chance area (Eastern Habitat Joint Venture 1995) and three whimbrel were observed in the area of the footprint of the proposed oil refinery during an aerial survey on 6 September 2007. Observations of Corvids were mainly the American Crow with lesser numbers of Common Raven, and Gray Jay (Table 3.15). Ruffed Grouse were common in forested habitats on Southern Head; however, no Willow Ptarmigan were observed on the peatland and/or heathland sites. Belted Kingfishers were recorded, as were Northern Flickers and Hairy Woodpeckers. Species of passerine bird were recorded incidental to the coastal monitoring and included various species of warblers and sparrows (Table 3.15).

Eight Bald Eagles (seven adult and one immature) were identified during the 6 September 2006 aerial survey along the coastal area of Southern Head from Winging Head to Cooper's Cove on the east side of Come By Chance Bay. On 22 March 2007, LGL biologists observed three adults and one immature Bald Eagle, and a nest site on the east side of the headland near Goat Point incidental to ground surveys for lichens. Breeding was successful at this site with two large eaglets present on 28 June 2007. Also during the same survey, an osprey was observed incubating at a inland nest site adjacent to Goat Point previously assumed to be an inactive Bald Eagle nest discovered during lichen research on 28 March 2007. On 19 December 2007, while enroute from Southern

Head to North Harbour, biologists recorded six (three adult, two subadult, and one immature) Bald Eagles following a fishing vessel, and seizing fish entrails being discarded into the vessel's wake.

3.6.3 Sea Ducks and Raptors

Sea ducks, such as Common Eider, Black Scoter, Long-tailed Ducks (formerly called Oldsquaw), and Red-breasted Mergansers were observed during Harlequin Duck land-based surveys. Relatively large aggregations of Common Eiders were consistently recorded in the coastal area adjacent to the southern Burin Peninsula whereas numbers were variable in the Jude Island archipelago perhaps.

"The "Breadbox", adjacent to Morgan's Island, had some low thousands of eiders observed during Harlequin Duck aerial surveys. The observation of twelve Harlequin Ducks here is the first official documentation of this uncommon sea duck in the coastal area of the Burin Peninsula. Aggregations of Common Eiders in the low thousands were observed. The 634 observed on 27 February 2007 compared to 3,366 and 3,990 on 13 March 2007 and 20 April 2007, respectively, was attributed to the concentrations observed in the St. Lawrence to Point May area of the Burin Peninsula as this area was not covered on 27 February 2007. We observed active hunting activity (decoy sets and speed boats) in the Jude Island-Flat Islands area on 27 February 2007 (second last day of sea duck hunting season), and not surprising, we observed more eiders there on the subsequent aerial surveys on 13 March and 20 April 2007. Long-tailed Ducks were widely distributed in low numbers and the low hundreds tend to co-occur with eider concentrations. There were small numbers of Red-breasted Mergansers, and only incidental numbers of White-winged Scoters and Black Scoters. Black Ducks were observed, including the larger group at Arnold's Cove lagoon observed on 13 March 2007. Scoters were rare, and Common Goldeneye, and Common Loons were noted only occasionally (Table 3.12).

Significant numbers of Bald Eagles were observed on all Harlequin Duck aerial surveys, notably 36 on 27 February, 30 on 13 March and 15 on 21 April 2007. The larger count on 27 February 2007 was influenced by a large group (n = 16) observed at the Iona Islands off Long Harbour. Ravens were ubiquitous in small numbers and, occasionally, American Crows were recorded (Table 3.16).

Table 3.15 Bird species observed during ground-based, aerial, and boat-based fieldwork at Southern Head on 6, 11, and 12 September 2006, 4 and 19 December 2006, and 22 March 2007.

Species	Ground-based	Aerial	Boat-based
Raptors			
Bald Eagle	1 adult	9 adult, 1 immature	17 adult, 3 subadult, 6 immature
Northern Harrier	1		
Cormorants			
Great Cormorant	4		4
Cormorant Sp.			1
Alcids			
Black Guillemot	5		6
Murre Sp.			2
Gulls and Terns			
Large Gulls		30	
Herring Gull	15 adult, 4 imm	26	653
Great Black-backed Gull	1 adult	1	80
Iceland Gull			10
Ring-billed Gull		2	3
Black-legged Kittiwake			1
Terns		6	
Shorebirds			
Yellowlegs (not speciated)	13	3	2
Greater Yellowlegs	8	31	
Spotted Sandpiper		8	5
Semipalmated Sandpiper	2		
Semipalmated Plover	11 (tidal flats)		5
Back-bellied Plover	9 (tidal flats)	11 (tidal flats)	
Dunlin	1		
Whimbrel	1	3	
Red Phalarope			3
Shorebirds (not speciated)		95	2
Waterfowl			
Canada Goose			19
Long-tailed Duck			7
Red-breasted Merganser			1
American Black Duck		24	9 (North Hr.)
Ring-necked Duck		8+ 2 broods (1 of 3, 1 of 8)	
Upland Gamebirds			
Ruffed Grouse	2		4
Kingfishers			
Belted Kingfisher			1
Corvids			
American Crow	7		7
Northern Raven	5		3
Grey Jay	1		
Woodpeckers			
Northern Flicker	1		
Hairy Woodpecker			2
Passerines			
Black-and-white Warbler	3		
Blackpoll Warbler	1		

Table 3.15 Continued.

Species	Ground-based	Aerial	Boat-based
Yellow-rumped Warbler	1		1
Boreal Chickadee	4		
Black-capped Chickadee	7		
Red-breasted Nuthatch	6		
Golden-crowned Kinglet	3		
Ruby-crowned Kinglet	1		
Savannah Sparrow	1		
Swamp Sparrow	5		
White-throated Sparrow	7		
Fox Sparrow	2		
Dark-eyed Junco	1		

Table 3.16 Total numbers of corvids, raptors and unidentified birds observed by LGL during aerial surveys of Placentia Bay in winter-spring 2007.

Species	27 February 2007	13 March 2007	21 April 2007
Bald Eagle (adult)	28	17	12
Bald Eagle (immature)	8	13	3
Bald Eagle (unknown age)		16	
American Crow	2	9	12
Northern Raven	26	6	11
Unidentified	2		

Large gulls were ubiquitous throughout the surveyed area. Herring Gulls were most abundant followed by Greater Black-backed Gulls. More Iceland Gulls were recorded on the 13 March 2007 survey, especially in the southern Burin Peninsula area, and Ring-billed Gulls were not detected until the 21 April 2007 survey. The larger numbers of Herring Gulls, Greater Black-backed Gulls and Black-legged Kittiwakes detected on 21 April 2007 were related to pre-breeding occupation of nesting colonies (Table 3.17).

Purple Sandpipers were relatively common and ubiquitous. Flocks were detected along the wave wash and intertidal areas where seaweeds were abundant. The distribution varied from survey to survey with the 386, 270, and 515 observed on 27 February, 13 March, and 21 April, 2007, respectively (Table 3.17).

Table 3.17 Total numbers of gulls, and Purple Sandpipers observed by LGL during aerial surveys of Placentia Bay in winter-spring 2007.

Species	27 February 2007	13 March 2007	21 April 2007
Glaucous gull	1	1	1
Iceland Gull	1	182	
Herring Gull	503	363	4639
Ring-billed Gull			706
Great Black-backed Gull	192	57	476
Gull Sp.	277	47	12
Black-legged Kittiwake	5	12	954
Purple Sandpiper	386	270	515

3.6.4 Harlequin Ducks

No Harlequin Ducks were observed during other LGL surveys.

3.6.5 Mammals

During coastal bird and aerial surveys, LGL biologists recorded the presence or signs of moose (*Alces alces*), caribou (*Rangifer tarandus caribou*), black bear (*Ursus americanus*), red fox (*Vulpes vulpes*), otter (*Lutra canadensis*), mink (*Mustela vison*), red squirrel (*Tamiasciurus hudsonicus*), and snowshoe hare (*Lepus americanus*) in the survey area. Some of these species were abundant on or near the Southern Head survey area. Incidental to fieldwork on vegetation in and around the greenfield site at Southern Head, there was extensive evidence of use of the area by otters as there were frequent coastal haul-outs (rubs) and well worn trails linking some of these sites to the interior lakes and brooks. A small herd of Caribou including one stag, four does and two calves were observed within the footprint of the proposed oil refinery on 28 June 2007 indicating that this group likely calves in the local area. Ten moose were observed during aerial surveys on 28 June 2007, and moose densities appeared especially high on the eastern side of the Southern Head peninsula. In this area there was considerable windfall of previously insect-damaged forest, and regenerating of Balsam Fir has been stymied by excessive browsing (Goudie 2007). During research on lichens on 22 March 2007, LGL biologists discovered a moose-yarding area adjacent to Goat Cove (Goat Point) on the eastern side of Southern Head. Two caribou were observed on Sall the Maid Island on September 8, 2006. There was considerable sign of black bear in the area of Hollett's Cove, and incidental areas along or proximate to the unnamed brook and adjacent peatlands extending inland through the greenfield site, and an adult was observed on the shoreline adjacent to Sall The Maid Island on 28 June 2007. Tracks of red squirrels and snowshoe hares were frequently observed. Tracks of red fox were observed on only one occasion, and two separate adults were observed at Come By Chance coastal Lagoon and at the wharf near the existing refinery on 27 June and 28 June 2007, respectively. Tracks of mink were observed on only one occasion each near Watson's Brook. The coyote (*Canis latrans*) is expanding in numbers since its colonization of insular Newfoundland in the mid 1980's. LGL biologists did not confirm its presence on the Southern Head study area but scats observed along some of the peatlands and heathlands may have been of this species. There was considerable evidence of active beaver lodges and dams observed on wetlands surveyed on 28 June 2007. During the 28 June 2007 landbird survey of the refinery footprint, a minke whale was observed swimming 100 m offshore near Hollets Cove.

3.6.6 Habitat Observations

The area of Southern Head lies within the Avalon Isthmus Coastal Ecosection that encompasses the shore-zone on both the Trinity and Placentia Bay sides of the Isthmus of the Avalon (Hiscock 1981). Only small portions of this coastal zone experience high or very high wave energy. Most of the exposed locations have moderate wave energy, and there are considerable tracts with minimal or low wave energy. Bar lagoons occur in association with estuaries and moderate wave energy, notably Come By Chance Harbour and Arnold's Cove Harbour where there are extensive cobble and pebble beaches with saltmarsh cordgrass (*Spartina alterniflora*) and intertidal flats. Pocket beaches with cobbles, boulders and some sand are common, for example, at Emberley Cove near Watson's Brook. Some of these sites also support Saltmarsh Cordgrass. The backshores tend to be intermediate in slope, and steeper slopes are confined to consolidated material.

LGL identified a number of coastal habitats of interest that are uncommon and/or relatively sensitive to disturbance. The bar lagoons of Arnold's Cove and Come By Chance are extensive, and provide intertidal flats and estuarine habitats uncommon in this general area of Placentia Bay (Hiscock 1981). These sites and to a lesser degree the intertidal flats of Southern Harbour offer ideal habitat for staging shorebirds. The bar lagoons at Arnold's Cove and Come By Chance support relatively large concentrations of waterfowl, primarily Black Ducks. In part, this is due to their protected status (i.e., areas are closed to hunting). The sites support extensive eelgrass (*Zostera maritima*) beds. Saltmarsh cordgrass occurs in association with much of the pebble and cobble beach substrates in this area, perhaps expanding its range in Newfoundland (Goudie 2007). Unconsolidated beaches with cobbles, pebbles and sand, and associated saltmarsh are highly sensitive coastal marine habitats (Catto et al. 2003).

Wetlands were classified in the project footprint area of Southern Head, Placentia Bay (Goudie and Munier 2007) and included basin marshes, basin water, riparian delta marshes, bogs (basin and domed) and stream fens. Relatively rich wetlands were noted at the delta of Half Moon Pond on Watson's Brook and this general area had been highlighted in a previous Wetland Habitat Management Plan (EHJV 1995).

4.0 DISCUSSION

A diversity of marine-associated birds use the pelagic and coastal areas of inner Placentia Bay. LGL biologists recorded 34 species during pelagic bird surveys and 43 species during coastal surveys from August 2006 to April 2007. During pelagic surveys, seabirds were, as a group, observed in greater numbers on Survey Route B covering the middle of Placentia Bay (Figure 2.1). Gulls were more commonly observed than any other seabird species on all three of the pelagic survey routes. Herring Gulls and Great Black-backed Gulls were the most numerous gulls recorded during the monthly pelagic bird survey program in Placentia Bay from August 2006 to April 2007; they were recorded on all 15 surveys.

The Southern Head survey area supports a diversity of shoreline habitats ranging from bedrock with moderate wave exposure to estuaries, bar lagoons and pockets of cobble beach. The shorebird, waterfowl and Black-headed Gull and, to a lesser degree, tern concentrations occurring at intertidal flats at Arnold's Cove and Come By Chance lagoon are of regional importance and some of these wetlands have been identified under the wetland stewardship programs for Newfoundland and Labrador. More specifically, the estuary-bar lagoon area at Come By Chance is identified as a management unit under an existing wetland stewardship agreement between the municipality of Come By Chance and the Government of Newfoundland and Labrador. An additional wetland area, including the headwater lake of Watson's Brook and wetlands within the "footprint" of the proposed oil refinery had been under consideration for inclusion in that program (see Goudie and Munier 2007). Waterfowl were confirmed as nesting in these wetlands.

The estuary-bar lagoon at Arnold's Cove is an area closed to hunting under the *Wildlife Act* of the Government of Newfoundland and Labrador. It apparently is not incorporated into the Municipal Wetland Stewardship Program of EHJV although the community was approached in the past (G. Yetman, Department of Environment and Conservation, pers. comm.). The Arnold's Cove municipality promotes the area as a wildlife sanctuary and there are signage and pull-off areas for tourist traffic and bird watchers.

The greatest diversity of coastal birds in inner Placentia Bay clearly occurs in association with the barrier beaches and associated bar lagoons enclosing river estuaries. These sheltered habitats are relatively sensitive to contamination from oil. These habitats are estuarine habitats protected from the open ocean by barrier beaches (hence the name bar lagoon). The enclosed lagoons are shallow and receive extensive silt and sediments from the riverine input. Intertidal flats expose during mid and low tides and these habitats support an abundance of eelgrass, creating ideal waterfowl and shorebird habitats. Four outer beaches along Placentia Bay are marked by energy levels. Sediment transport is dominantly onshore with less transporting offshore with the backwash. This implies that contaminants once introduced into a beach-cove system remain within the system for a considerable period of time (Catto et al. 1997).

The number of Bald Eagles using the inner area of Placentia Bay is noteworthy. Placentia Bay is reported to support one of the highest densities of Bald Eagles in eastern North America (Dominquez et al. 2002). A population estimate for Placentia Bay of 125 individuals, including immatures, and 30 nests was provided by the provincial Wildlife Division (J. Brazil, Department of Environment and Conservation, pers. comm.). LGL biologists detected up to twenty individuals on 4 December 2006 during coastal surveys suggesting that a large proportion of the Placentia Bay population over-winters in this area. A nest site is located on the east side of the headland near Goat Point and reproduction was successful there in 2007. Bald Eagles forage extensively by scavenging thereby increasing potential contact with contaminated wildlife prey, notably oiled seabirds (Dominguez et al. 2002; Wiese and Ryan 2003). Osprey were confirmed nesting near Goat Point, and there were other raptors observed in the survey area in small numbers. The Short-eared owl (*special concern* under *Species*

At Risk Act) was not detected although the open blanket bog and heath habitat on Southern Head appears suitable for this species. The Northern Harrier was observed here, and these species share similar open heath and peatland habitats.

Ring-necked Duck and Black Duck nest on wetland scattered throughout Southern Head with the former species more noticeably associated with oligotrophic sites. A pair of black ducks was associated with a wetland enriched by active beaver impoundment. These species are expected on wetlands in this ecoregion of insular Newfoundland (Goudie 1987). The Canada Goose was not observed nesting in the survey area despite extensive peatlands and other wetland sites that appear suitable. Nevertheless, large numbers ($n \sim 400$) were observed staging in March 2007 at the bar lagoon in Come By Chance.

The ground-based surveys for Harlequin Duck yielded new information across a range of sites known to support Harlequin Ducks historically. In general, the data suggest slight increases in numbers since 2001, and this pattern was more evident for the January and February observations. Hence, the ground observations for Cape St. Mary's area (Golden Bay to Cat's Cove) in this study corroborate the increasing trend indicated in the Audubon Christmas Bird count (Figure 1.1).

The aerial surveys conducted from February to April 2007 for western Placentia Bay and the Burin Peninsula provided in-depth coverage of this poorly studied coastal area. LGL biologists noted high quality wintering habitat for sea ducks in the Jude Island-Flat Island archipelago, and the coastal area of the Burin Peninsula adjacent to St. Lawrence-west to Point May. Despite extensive searching, Harlequin Ducks were located only at one site adjacent to Morgan's Island ("The Breadbox"), off Allan's Island near Lamaline. The separate sightings of a group of twelve Harlequin Ducks in March and April 2007 about 500m apart is suggestive that it was the same group sighted on both occasions. This strongly indicates a wintering group and is important for conservation.

Harlequin Ducks are known to be highly philopatric to their wintering locations, i.e., they are highly site fidelic (Robertson et al. 2000). Pair bonding is known to occur on the wintering grounds where courtship begins in October, and they exhibit long-term monogamy (Robertson and Goudie 1999). For a population with low population sizes and few wintering sites, winter site fidelity becomes a driving force in the demographics of the population. Since winter site fidelity is close to absolute in adults, the site will not be reoccupied if a wintering population goes extinct. By continuing to monitor these small groups along the coast, both population growth and expansion can be monitored. Understanding and protecting these smaller groups of Harlequins Ducks is essential to preserve geographic diversity and therefore, population stability.

The lack of observations of Harlequin Ducks at other locations, especially the archipelagos off southern Jude Island and Flat Islands, may be problematic because this area was reported to support substantial numbers historically (Appendix 2 *in* Goudie 1991). LGL observers detected a strong presence of sea ducks in this area, and these species generally do overlap in productive habitat areas. Hence, observations of eiders and Long-tailed Ducks are often indicative of the potential presence of Harlequin Ducks. Hunting activity was noted in this area on 27 February 2007, and the incidental mortality of Harlequin Ducks attributed to past and present hunting of this area has likely extirpated the traditional use of this area by this rare sea duck. Local hunters also reported Harlequin Ducks in the area of Allan's Island (Appendix 2 *in* Goudie 1991), and perhaps a remnant group has survived to maintain the traditional use of this area.

Three to four thousand Common Eiders were observed in the archipelagos off southern Jude Island and Flat Islands and along the southern Burin Peninsula. This represents a substantial wintering population for which there is very little information. Other sea ducks were observed in low numbers, and the lack of scoters was notable (only three white-winged Scoters and seven Black Scoters observed). Audubon Christmas Bird Count

data for Common Eiders and Black Scoters indicate that these species are in long-term decline in Placentia Bay, whereas Long-tailed Ducks are more or less stable.

The aerial survey resulted in valuable data on Purple Sandpipers with 515 recorded on 21 April 2007. This species is thought to be in long-term decline and has been proposed for status review under the Species At Risk Act (P. Thomas, CWS, pers. comm.). The distribution of these wintering birds seemed to be affected by the degree of wave wash in that fewer were observed in outer archipelago areas on 13 March 2007 when there were very large sea swells inundating the low islets. There was a consistent present of Great Cormorants in the survey area, and this species breeds locally. Purple Sandpipers were also recorded during three separate pelagic bird surveys.

Twenty species of landbirds were recorded as confirmed or probable breeders in the proposed oil refinery footprint at Southern Head. The four most numerous species observed were Swamp Sparrow, White-throated Sparrow, Blackpoll Warbler and Savannah Sparrow with 16-40 pairs of each recorded. Within the refinery footprint area, 14 of the 20 species confirmed as breeding or probable breeding occurred within the black spruce scrub and forest habitat. All species found in the black spruce scrub and forest habitat were also found in the balsam fir habitat (along with three additional species). Species composition and habitat type were representative of eastern Newfoundland. There were no observations of species considered at risk (Short-eared Owl, Red Crossbill, Gray-cheeked Thrush, Rusty Blackbird) but there is potential that these species could occur in the refinery footprint.

The observation of caribou on in the footprint of the proposed oil refinery, and on Sall the Maid Island, adjacent to the west side of Southern Head peninsula is indicative of calving and use of the general survey area by this ungulate. This observation confirms local knowledge of a small herd in the Watson's Brook area and may represent some dispersal from herds to the west (Middle Ridge). Caribou have also been observed over the last ten to fifteen years in the general area of Half Moon Pond and Watson's Pond in the area of Watson's Brook on Southern Head (D. Slade, retired Wildlife Technician, pers. comm.). The extensive peatlands, heath, and interspersed forests of the Southern Head are suitable habitat for this species. Smaller numbers (four or five) have also been observed in the area of North Harbour Head, and regularly on Sound Island.

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