Use by Wintering Waterbirds of Digby Neck and Adjacent Coastal Waters of Southwestern Nova Scotia

prepared for

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by

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PURPOSE

This report attempts to assemble and present, within a regional context, current information concerning the use of coastal waters by wintering waterbirds (mainly waterfowl) in the vicinity of a proposed quarry site near Little River, Digby Neck, Digby County, Nova Scotia.

PROPOSED QUARRY SITE

The proposed quarry site is a 155-ha property located on Digby Neck, Digby county, Nova Scotia, just north of the community of Little River on the west-facing slope of the North Mountain (Figure 1). The west boundary of the property extends for 2.8 km along the Bay of Fundy shoreline. The property is, for the most part, forested; however, in 2002 a 25-ha section along the property's east line was clear-cut as was a 4-ha site adjacent to the coast in Whites Cove.

The entire coastline of the property is basaltic rock. To the south of Whites Point are small (< 10 m) coastal cliffs, rock outcrops and large boulders. North of Whites Point the shoreline is more gentle. Immediately east of the cove north of Whites Point is a small (1.5 ha) freshwater wetland. Four very small, and presumably seasonal, streams flow from or across the property into the Bay of Fundy.

INTRODUCTION

In recent years both the Nova Scotia Department of Natural Resources (NSDNR) and the Canadian Wildlife Service (CWS) have conducted waterfowl surveys of coastal waters that include the proposed quarry site and adjacent areas. These surveys have focused mainly on documenting the distribution and numbers of wintering waterfowl. Most of these surveys have been conducted from aircraft, both fixed- and rotary-winged. Surveys from land and by boat have been used by the CWS in their efforts to locate and monitor wintering areas of the Harlequin Duck: a species at risk.

Between 1992 and 2000, NSDNR conducted annual mid-winter aerial waterfowl surveys in which they attempted to cover the entire coastline of Nova Scotia. These surveys were conducted by helicopter. In addition to these surveys, mainly during the mid-1990's, NSDNR also conducted a number of surveys using fixed-wing aircraft. These surveys were opportunistic and conducted at various times of the year.

Figure 1. The Whites Point quarry property (2001 aerial photograph).

While helicopter surveys dedicated to censusing wintering Harlequin Duck populations were conducted by the CWS in 1988 (Hicklin and Barrow, 1988), it was not until 2000 that annual land and boat surveys were instituted. Land-based surveys were conducted in 2000 and 2001. Boat surveys were conducted in 2002 and subsequent years.

During the CWS winter boat surveys for Harlequin Ducks in 2004 and 2005, Mr. Bernard Forsythe and I were guests of Andrew Boyne (Wildlife Biologist - Species at Risk, CWS); during these surveys we also gathered information on the distribution of other waterbird species.

From our land-based studies conducted in 2005 on behalf of Bilcon of Nova Scotia Corp. on wintering Harlequin Ducks (Alliston, 2005), Mr. Forsythe and I were able to gather some additional information on the distribution of waterbirds, particularly in the waters adjacent to the Whites Point property.

In this report all species are referred to by their common names. The scientific names of these species are presented alphabetically in Appendix 1.

SURVEY METHODS

General Waterfowl Surveys

Aerial Surveys

All aerial surveys reported here were conducted by NSDNR staff using either a twin-engine fixed-wing (Aztec) or a rotary-winged (Hughes 500) aircraft. Surveys were flown seaward of the coastline at altitudes of from 30 to 100 m at speeds from 80 to 100 knots. Rotary-winged aircraft could fly at slower speeds and follow indented coastlines more readily than fixed-wing aircraft but, for safety considerations, could not venture more than a few hundred metres seaward of shoreline.

On all surveys, the pilot was accompanied by one or two observers. Waterbirds observed were counted or, in the case of large flocks, estimated and recorded within survey “blocks”. The survey “blocks” conformed to those used historically by the CWS for their mid-winter surveys and, in the area being considered, varied in length from a 8.5 km to 53.5 km.

Harlequin Duck Surveys

In recent years the CWS has been identifying and monitoring wintering areas used by the eastern population of the Harlequin Duck, a population that is considered to be of

"Special Concern" by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and designated as "Endangered" under the Nova Scotia Endangered Species Act. Since aerial surveys are not particularly effective in censusing this species (see below), other methods, namely land-based and boat surveys, have been employed.

Land-based Surveys

These surveys consist simply of two or more observers approaching known Harlequin Duck wintering areas from the land and attempting to count the birds using these areas with binoculars and telescopes. In none of the land-based work did the observers attempt to conceal themselves.

Boat Surveys

In the Digby Neck – Long Island area surveys were conducted from a lobster boat and used two or more observers in addition to the boat captain. The boat followed parallel to and within about 150 m of shoreline at speeds of from 12 to 18 km/hr. When Harlequin Ducks were observed, or at known Harlequin Duck wintering areas, the boat was slowed and either the birds or the shoreline approached more closely. A closer approach permits more accurate identification (species, age, sex) and counting of birds, particularly when the sea state is less than optimal for surveys.

Survey Method Limitations

Aerial Surveys

Aerial surveys are generally not successful in identifying all birds present in the surveyed area. While surveys of birds using aquatic habitats are considerably more successful than similar surveys in terrestrial habitats, the proportion of the birds detected depends upon a number of factors including the size and coloration of the birds, the general behaviour of the birds (widely distributed individuals, small flocks, large flocks) and their response to the approaching aircraft (early flush, late flush, don't flush, dive) as well as visibility at the time of the survey (e.g. sun glare, fog, sea state, presence of ice), the visual acuity and experience of the observers and the pilot. The results of aerial surveys are best considered indices of abundance which for some species could approach the actual numbers present but for others could fall far short.

Surveys flown under similar visibility conditions and using the same observers or observers of similar experience and ability can provide useful comparative information on the relative abundance of a species at different times, areas or habitats.

Aerial surveys are not particularly effective in censusing Harlequin Ducks. The small body size of these birds and their tendency to form compact flocks that flush at considerable distances from an approaching aircraft make them difficult to detect and count.

Furthermore, species that are quite similar in appearance such as Greater and Lesser Scaup, and Common and Barrow's Goldeneye, cannot be differentiated during aerial surveys.

It should be noted that the purpose of these aerial surveys was to census waterfowl (ducks, geese and swans) and the recording of other waterbird species (loons, grebes, cormorants, alcids, shorebirds, gulls, etc.) was incidental and, hence, not necessarily of the same quality as the data obtained for waterfowl.

Land-based Surveys

Land-based surveys can be used to census known Harlequin Duck wintering areas that are accessible from land. While more effective than aerial surveys, these surveys are sometimes not effective in getting complete counts. These birds frequent high-energy rocky shoreline habitats and tend to form tight flocks that are constantly diving making the gathering of the required metrics difficult if the flock size is large. Land-based vantage points from which all birds might be seen are not always available.

Boat Surveys

Perhaps the most effective way of surveying Harlequin Duck wintering areas is from a boat. If the sea state is favourable, a boat traveling slowly and close to shore should provide a platform form which most Harlequin Ducks present can be seen. Furthermore, on being closely approached by a boat, Harlequins cease their diving and assume an alert pose thus making easier the gathering of the required metrics.

Rough seas would, of course, reduce the effectiveness of this platform. However, even in relatively rough seas, surveys of known or suspected wintering areas can be quite effective if boat speed is reduced and the shoreline is approached as closely as safety allows.

Boat surveys are also more effective than aerial surveys as a means of censusing wintering waterbirds such as loons, grebes, and alcids. In winter these birds tend to occur singly or in small loose flocks, spend a considerable portion of their time diving and, if on the water surface, may respond to an approaching aircraft by diving.

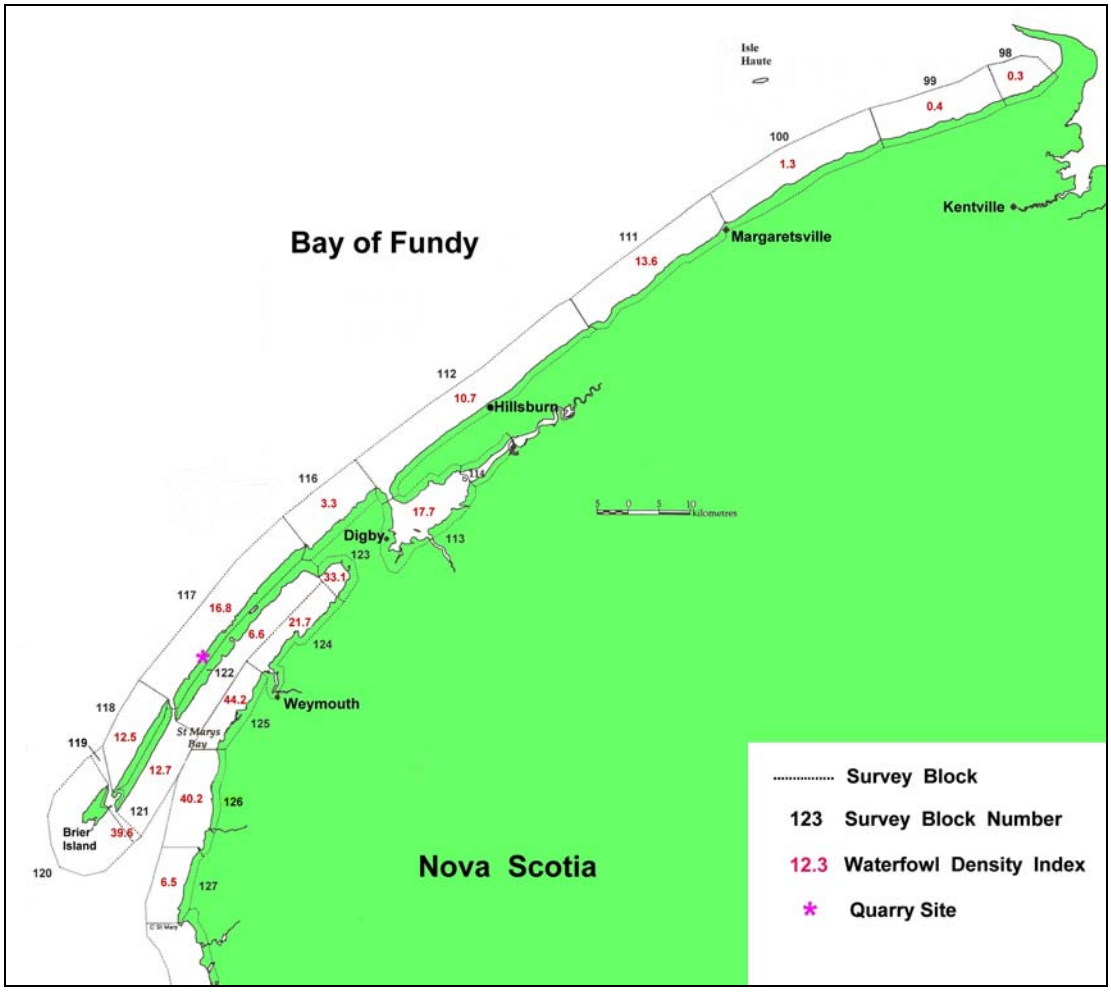
SURVEY RESULTS

Mid-winter Helicopter Surveys; 1992-2000

A summary of the results of midwinter helicopter surveys conducted by NSDNR in St. Marys Bay and the southern shoreline of the Bay of Fundy during the period from 1992 through 2000 is presented in Appendix 2. These data differ from those provided by NSDNR only in that I have excluded the often numerous observations of gulls recorded on some of these surveys.

Since the survey blocks are of differing lengths, to allow a comparison of the abundance of species among blocks, I have divided the mean number of each species observed during surveys of the block by the length of the coastline in that block to derive a "density-index". Strictly speaking, since different species are not necessarily equally observable (see above), "density-indices" should only be used for intra-specific comparisons. However, to allow a rough comparison of the relative importance of the various blocks to waterfowl, I have calculated waterfowl density-indices for each block based on the assumption of equal observability and present this information in Figure 2. Since the observability of the waterfowl species that constitute most of the observations (American Black Duck, Scaup, Goldeneyes, Scoters, Common Eider) should not be markedly different, I believe this index allows a rough but legitimate comparison of survey blocks.

Figure 2. Mean density-indices of wintering waterfowl from helicopter surveys of the southern Bay of Fundy and St. Marys Bay: 1992-2000.



The mid-winter surveys suggest that, within the area being considered, the head and south shore of St. Marys Bay and the coastal waters of Brier Island have the highest density-indices of wintering waterfowl. Moderate densities of waterfowl were found along the coasts of Long Island and the Bay of Fundy coast of Digby Neck, the Annapolis Basin and in the two survey blocks NE of Digby Gut (blocks 111 and 112). The coastal waters of the Bay of Fundy NE of Margaretsville, as well as the coastal waters just west of Digby Gut (block 116) support low density-indices of wintering waterfowl. In contrast to the remainder of St. Marys Bay, the south coast of Digby Neck and the coast between Meteghan and Cape St. Marys supported relatively low densities of waterfowl.

NSDNR has mapped known significant wildlife habitats in Nova Scotia (see http://gis1.gov.ns.ca/website/nssighabpub/viewer.htm) and they designate most of St. Marys Bay, including Petite Passage that separates Digby Neck from Long Island, the waters around Brier Island, and, in particular, Grand Passage that separates Brier Island from Long Island, and a section of the coast of the Bay of Fundy from Margaretsville west to Hillsburn, as being significant habitats for migratory birds. While aerial surveys indicate only moderate waterfowl density-indices, the blocks that contain the latter area (blocks 111 and 112) support densities of wintering Scoters an order of magnitude greater than anywhere else in the area being reviewed. The coastal waters adjacent to the proposed quarry site have not been identified as providing significant habitat for migratory birds.

Survey block 117 includes approximately 36 km of coastline extending from Boars Head light in Petite Passage to Gullivers Head on Digby Neck. A 2.8 km section of this coastline is the proposed quarry site. Mid-winter aerial surveys of this block recorded nine waterfowl species and two waterfowl species groups (Scaup and Goldeneye). Of these species, by far the most numerous was the Common Eider with a density-index of 14.2 birds/km out of a total waterfowl density-index of 16.8 birds/km for this block. While the density-index for Common Eiders in block 117 is relatively high, somewhat similar densities were recorded along the south coast of Long Island (block 121: 11.6 birds/km) and the southeast coast of St. Marys Bay (block 124: 10.4 birds/km). However, these densities are eclipsed by those found around Brier Island (23.2 birds/km) and particularly those along the southwest coast of St. Marys Bay (block 125: 34.7 birds/km; block 126: 36.2 birds/km).

Other waterfowl species / species groups observed at low densities within block 117 were American Black Duck (0.7 birds/km), Goldeneye species (0.6 birds/km) and Long-tailed Duck (0.5 birds/km). Very low densities of Mallards; White-winged, Black and Surf Scoters; Buffleheads and Common Mergansers were also recorded. While not recorded during aerial surveys, Harlequin Ducks also winter within this survey block (see below).

During these aerial surveys the only waterbird species recorded other than waterfowl and gulls were Great Cormorants and Purple Sandpipers. Great Cormorants were recorded in block 117 and their density-index (0.8 birds/km) was the second highest recorded in the area under consideration. The highest density-index recorded for this species was on the south coast of Long Island (block 121: 1.8 birds/km). Similar densities to those found along the north coast of Digby Neck (block 117) were also found along the south coast of Digby Neck (block 122: 0.7 birds/km) and around Brier Island (0.7 birds/km). There is a Great Cormorant colony on the cliffs of the south shore of Long Island (R. Milton, *pers. comm.*).

The numbers of waterfowl observed using block 117 varied greatly among years. During the seven years between 1992 and 2000 that helicopter surveys of this block were conducted, waterfowl numbers varied from a high of 1,853 in 1992 to a low of 123 in 1999 (see Appendix 2). In four years, the total count was 200 waterfowl or less. The high count of 1,853 birds is more than two and one-half times the next highest count (751 in 1997). Among-year variations approaching this magnitude occur in many of the survey blocks. Those blocks having the highest waterfowl density-indices generally seemed to exhibit the least among-year variation (e.g. Brier Island, block 124, and, particularly, block 125).

Fixed-wing Aircraft Surveys: "Winter" 1993-1994

During the period from 8 November 1993 through 26 April 1994, several fixed-wing aircraft surveys were conducted in the Digby Neck, St. Marys Bay area (see Appendix 3). During that "winter", when seven surveys of block 117 were conducted, it appeared that waterfowl populations using this block were consistently low with a maximum count of 202 birds on 7 March 1994 and no birds observed on the 24 March 1994 survey. One hundred and fifty Common Eiders were observed in this block on both 8 November 1993 and 2 February 1994. Field notes indicated that all birds observed on these two dates were in Petite Passage.

These surveys suggest that wintering waterfowl were present on their main wintering areas (Brier Island, south shore of St. Marys Bay) by early November and that most had left for their breeding grounds by late April 1994. Again there was considerable survey-to-survey variation in the numbers of birds found within most survey blocks as might be expected of such mobile species.

Spring Surveys: 1994-2000

During the period from 1994 to 2000, NSDNR conducted several surveys using fixed-winged aircraft during the period between late March and late May, an interval that covers the peak migration period for most waterfowl species (see Appendix 4). Common Eiders may begin their migration to nesting areas as early as late February;

however, their main movements occur in April (Erskine and Smith, 1986). Some other waterfowl species, particularly those that nest in boreal and arctic regions, can still be in migration well into May. Most of these surveys were conducted in May by which time most of the migration to their nesting grounds (none of which are in the area under consideration) by breeding Common Eiders would have been completed.

Of the six spring surveys flown in block 117, no waterfowl were observed on three surveys, three Common Eiders were observed on one survey and thirty Common Eiders were observed on each of the remaining two surveys. No waterfowl species other than Common Eiders were observed on these surveys. Although based on rather few surveys during the peak migration period, the available information does not suggest that block 117 is particularly important to spring migrant waterfowl.

Other than Brant that were observed at Brier Island (max.550; 26 April 1994) and Scoters and Common Eiders in block 100 (max 2,337; 16 May 2000), no concentrations of migrating waterfowl could be identified within the area being considered. It would not be expected that the southern Bay of Fundy coast would be a significant part of a major migration route for waterfowl moving north from wintering areas along the eastern seaboard.

Winter Boat Surveys - 2004 and 2005

Annual winter boat surveys for Harlequin Ducks have been conducted by CWS in the Digby Neck – Long Island area since 2002. In 2004 and 2005, Mr. Bernard Forsythe and I were guests of Andrew Boyne (Wildlife Biologist - Species at Risk, CWS) on these surveys. Also participating in the surveys were CWS personnel Josh Pennell (2004) and Julie McKnight (2005). Since boat surveys began in this area, they have been conducted from a “Cape Islander” lobster/tour boat, the “Georgie Porgie”, skippered by Tim Crocker. Surveys were conducted on 24 February 2004 and on 9 February 2005. The coastline covered in these surveys extended from Bear Cove on Long Island to Shingle Cove on Digby Neck in 2004 and, in 2005, an additional 2.3 km of coastline was surveyed at both ends of the survey route (Figure 3).

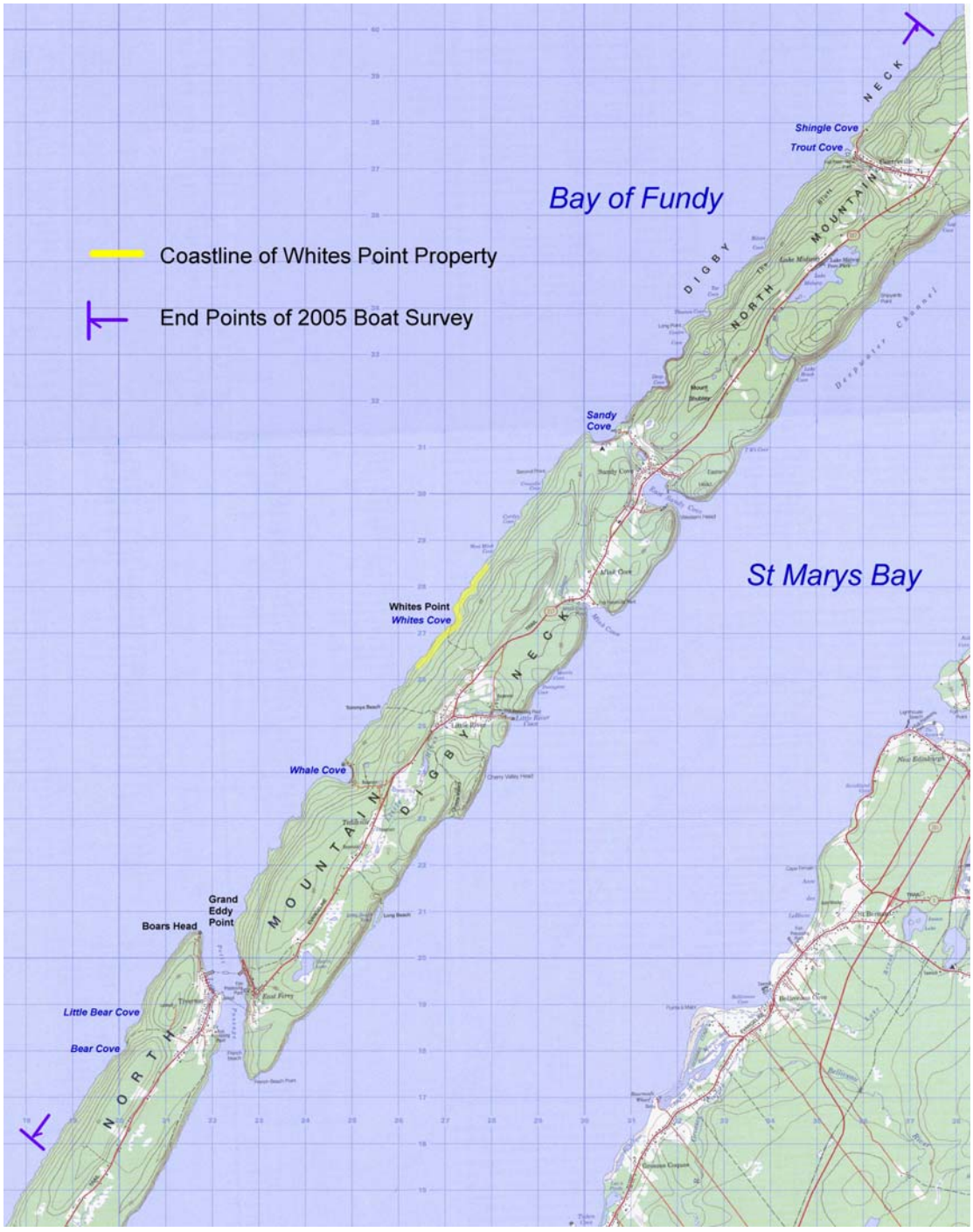


Figure 3. Coastline of Long Island and Digby Neck censused during the CWS boat survey for Harlequin Ducks, 9 February 2005.

During the surveys the boat proceeded at speeds of from 12 to 18 kph on a course parallel to and within about 150 m of shoreline. The course of the boat was recorded using a global positioning system (Garmin GPS76) and, in 2005, a digital recorder with time-stamping was used to record observations so that each observation could be related to a GPS position.

When Harlequins were seen, or when areas were approached where Harlequins had been observed in previous years, the boat was slowed and the area or flock cautiously approached. When Harlequins were present, information concerning numbers, sex and, where possible, age of the birds was recorded. In addition to the information on Harlequin Ducks, Mr. Forsythe and I recorded information on the species and numbers of all other waterbirds observed except gulls.

During both surveys skies were clear and temperatures were just a few degrees below freezing. However, the sea state was markedly different for the two surveys. In 2004 the sea state was Beaufort 4 making the observation of birds on the water, particularly those that were scattered and in relatively small numbers, very difficult. Conditions were too rough to effectively use optical equipment (binoculars, telescopes). Only when the boat was slowed and specific sites approached and circled could a reasonable view be obtained of birds on the water. In contrast to 2004, during the 2005 survey the sea was calm and visibility of birds on the water was excellent.

Immediately before starting the boat surveys, Mr. Forsythe and I conducted a brief land-based survey of waterbirds in Petite Passage from observation points in East Ferry and Tiverton.

The results of the 2004 and 2005 surveys are presented in Table 1.

Table 1. Waterbird species recorded during CWS boat surveys of portions of Digby Neck and Long Island, Nova Scotia: 24 February 2004 and 9 February 2005.

					Digby Neck									
	Petite Passage *		Long Island		Grand Eddy Point to Whites Point Property		Whites Point Property		NE of Whites Point		Total Digby Neck		TOTAL	
Species	2004	2005	2004	2005	2004	2005	2004	2005	2004	2005	2004	2005	2004	2005
Common Loon	0	0	0	3	0	0	0	9	1	26	1	35	1	38
Red-necked Grebe	0	0	2	1	0	23	0	2	3	36	3	61	5	62
Great Cormorant	6	2	1	1	0	3	1	2	11	8	12	13	19	16
American Black Duck	0	0	0	2	0	10	0	0	2	2	2	12	2	14
Mallard	0	0	0	1	0	0	0	0	0	0	0	0	0	1
Common Eider	700	623	0	12	7	418	1	46	8	83	16	547	716	1,182
Harlequin Duck	0	0	48	49	0	2	0	0	17	67	17	69	65	118
Long-tailed Duck	0	0	21	5	12	73	0	24	39	141	51	238	72	243
Surf Scoter	0	0	0	0	0	0		4	30	40	30	44	30	44
White-winged Scoter	0	0	0	0	0	0	0	0	1	7	1	7	1	7
Common Goldeneye	0	0	0	12	0	51	2	12	0	0	2	63	2	75
Bufflehead	0	0	0	0	0	1	0	0	1	0	1	1	1	1
Red-breasted Merganser	0	2	2	0	0	17	0	0	3	26	3	43	5	45
Duck *sp.*	0	0	0	0	0	0	0	0	5	0	5	0	5	0
Purple Sandpiper	0	0	0	15	0	0	0	0	0	5	0	5	0	20
Common Murre	0	0	0	1	0	0	0	0	0	1	0	1	0	2
Murre *sp.*	0	2	0	0	0	2	0	1	1	6	1	9	1	11
Black Guillemot	0	0	6	5	0	7	0	2	1	23	1	32	7	37
Atlantic Puffin	0	0	0	0	0	0	0	1	0	1	0	2	0	2
Total	**706**	**629**	**80**	**107**	**19**	**607**	**4**	**103**	**123**	**472**	**146**	**1,182**	**932**	**1,918**
Length of coastline surveyed (km)			3.8	6.1	8.2	8.2	2.8	2.8	14.0	16.3	25.0	27.3		

* includes land-based observations

Seventeen species of waterbirds, including 10 waterfowl species, were identified during the boat surveys. All 17 species were observed in 2005; however, only 12 of these species were observed in 2004. Species not observed in 2004 were American Black Duck, Mallard, Purple Sandpiper, Common Murre and Atlantic Puffin.

More than twice as many waterbirds were observed in 2005 (1,918) as in 2004 (932). While comparable numbers of birds were observed in Petite Passage and along the coast of Long Island (where Common Eiders and Harlequin Ducks, respectively, were the dominant species), more than eight times as many waterbirds were recorded in the coastal waters of Digby Neck in 2005 compared to 2004.

During both years, by far the most numerous species present was the Common Eider with large numbers of this species being present in Petite Passage in both years (700 in 2004 and 623 in 2005). (Note: Estimates of Common Eiders in Petite Passage were

also made on 1 February 2005 (800+) and 2 February 2005 (600+) by Bernard Forsythe during his commute to Bear Cove for Harlequin Duck observations.) However, in 2005, almost equally large numbers (547) of Common Eiders were found along Digby Neck. On the day of the survey, most of these birds (418) were found between Grand Eddy Point and the southern boundary of the Whites Point property and only 46 Common Eiders were recorded in the coastal waters of the Whites Point property. (Two days before the 2005 boat survey, 467 Common Eiders had been counted during our land-based survey between Whites Cove and the northern boundary of the Whites Point property.)

The second most numerous species observed during the boat surveys of 2004 (72) and 2005 (238) was the Long-tailed Duck. Although more than three times as many Long-tailed Ducks were observed in 2005, these additional birds were distributed along the coast of Digby Neck with fewer of this species being observed along the coast of Long Island in 2005. In 2005, Long-tailed Ducks were distributed more or less evenly along the coast of Digby Neck.

With the exception of the Great Cormorant, where similar numbers were observed during the 2004 and 2005 surveys, greater numbers of the more numerous species were observed in 2005. To what extent these apparent differences are real or are artifacts of the different survey conditions (sea state) between the two years cannot be determined. Certainly species that are distributed as scattered individuals or small, loose flocks (e.g. Common Loon, Red-necked Grebe, Black Guillemot, Murres) and tend to dive or remain at the water surface when approached by a boat would be significantly less observable under unfavourable sea state conditions than species that form large flocks (e.g. Common Eiders) or flush when approached by a boat (most waterfowl).

The purpose of these boat surveys was to document wintering Harlequin Ducks and the methods used appeared to be quite effective even under adverse sea state conditions as experienced in 2004. Thus, in these surveys, particularly the 2004 survey, Harlequin Ducks would tend to be overrepresented. It should also be noted that, while the number of Harlequin Ducks observed in 2005 (118) is almost double that observed in 2004 (65), if the 2.3 km “extensions” at either end of the 2005 survey are eliminated, then the number of Harlequins counted in 2005 would have been 61: quite comparable to the 2004 number (see Alliston, 2005).

From the aerial surveys we have seen that the numbers of waterfowl using particular areas can vary greatly from year to year. During seven winter surveys of block 117 (which contains the proposed quarry site), the numbers of waterfowl observed varied from 123 (in 1999) to 1,853 (in 1992) (see Appendix 2). Petite Passage and the coastline of Digby Neck covered by the 2005 boat survey covers more than 75 % of the coastal waters of block 117. If we exclude Harlequin Ducks (not observed in the

aerial surveys), then the 1,578 waterfowl observed during the 2005 boat survey of Petite Passage and Digby Neck compares favourably with the maximum number of waterfowl (1,853) counted in recent aerial surveys of block 117. Although comparisons of data obtained using different methodologies must be done with caution, it appears that in 2005 the numbers of waterfowl using the Bay of Fundy shore of Digby Neck were at the high end of what might be expected for this area. We have no means of determining whether the same is true for other waterbird species (loons, grebes, alcids).

Six of the 17 waterbird species identified during boat surveys have been designated by one or another qualified agency as being at risk. These species are included in species accounts in a following section.

Winter Land-based Survey of Whites Point Property Coastline - 2005

On 7 February 2005, the author and Bernard Forsythe conducted a survey of the coastal waters of the Whites Point property from Whites Cove to the northeastern boundary of the property. Although the primary objective of this survey was to record any Harlequin Ducks in this area, we also recorded all other waterbirds encountered excepting gulls. For a complete description of the methods used in this survey, see Alliston, 2005.

These data were collected between 0810h and 1223h as we traversed the shoreline between Whites Cove and the northern boundary of the Whites Point property. During the survey, the seas was glassy calm and visibility was excellent allowing waterbirds that were considerable distances from shore to be identified and counted. Lobster boats were busy hauling traps in the area throughout the period when the survey was being conducted but did not directly affect the waterbirds being censused until the last hour of the survey. During our survey the lobster boats were hauling traps and proceeding slowly from the southwest to northeast (as were the surveyors). Waterfowl generally reacted to the boats by flushing, flying in the direction the boats were proceeding and landing. Other waterbirds were much less prone to flushing than waterfowl and those that did appeared to disperse in “random” directions rather than being “herded” in one direction as were many of the waterfowl. Of the waterbirds that did not flush with the close approach of the boats, those nearest tended to dive in response to the boat while those a bit further from the boats assumed an alert pose and appeared to remain at the surface for longer periods of time.

Although there was some disturbance of waterbirds (particularly waterfowl) during our survey at the northern extremity of the Whites Point property, we believe that the data collected were not unduly biased by this activity. The species and numbers of waterbirds observed using these coastal waters (waterbirds observed flying over these waters but not landing were not included) are presented in Table 2.

A total of 672 waterbirds was recorded along the 1.9 km of the Whites Point property that was surveyed. By far the most numerous species recorded was the Common Eider which accounted for 467 or 69 % of all birds observed. A single flock of 275 Common Eiders was observed near the southwestern extremity of Whites Cove. The second most common species observed was the Long-tailed Duck. This species was scattered along the coast and generally found in small flocks (maximum flock size observed was 15 birds).

Significant numbers of three species considered at risk by ACCDC and one (Common Loon) yellow-listed by Nova Scotia DNR were observed using these coastal waters: Common Loon (14), Red-necked Grebe (32), Black Guillemot (18). These birds were distributed along the coast either singly or in small (≥ 6) loose flocks (see species accounts below).

There is no information collected by similar methods from adjacent coastal areas with which these data can be compared.

Table 2. Numbers* of waterbirds observed using the coastal waters of the Whites Point property (from Whites Cove to NE boundary) on 7 February 2005.

Species	**Numbers**
Common Loon	14
Red-necked Grebe	32
Great Cormorant	6
American Black Duck	12
Common Eider	467
Long-tailed Duck	68
Black Scoter	4
Surf Scoter	23
White-winged Scoter	20
Bufflehead	4
Red-breasted Merganser	3
Thick-billed Murre	1
Black Guillemot	18
TOTAL	**672**

* These numbers include only birds observed swimming/diving in coastal waters. Birds observed flying past but not landing are not included.

SPECIES AT RISK

Definitions

In this report "species at risk" refers to any wintering or migratory waterbird that is designated as "Endangered", "Threatened" or "Vulnerable" under the Nova Scotia Endangered Species Act, colour rank Red (at risk) or Yellow (sensitive to human activities or natural events) by the Province of Nova Scotia; or those that are ranked as being "extremely rare" (S1), "rare" (S2) or 'uncommon" (S3) in the Province of Nova Scotia by the Atlantic Canada Conservation Data Centre (ACCDC); and those species that occur in Nova Scotia that have been designated as "Endangered", "Threatened", or of "Special Concern" by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). The definitions of the rankings by these agencies have been presented in my report of 12 January 2004 entitled "Faunal Analysis of the Proposed Whites Point Quarry site, Digby Neck, Digby County, Nova Scotia", (pages 11-13).

While my previous report dealt only with breeding birds, this report deals with non-breeding (wintering/migratory) birds. Only the ACCDC separates the provincial status of breeding and non-breeding birds. In my previous report, the only ACCDC breeding status "qualifier" considered was "B" (for breeding); in this report, two other qualifiers are considered:

M Non-breeding, Migratory: Basic rank refers to the non-breeding, migratory population of the element in the Province.

N Non-breeding: Basic rank refers to the non-breeding population of the element in the Province.

Waterbird Species at Risk

Ten waterbird species at risk, including five species of waterfowl, are known to use the coastal waters of the Digby Neck area for wintering or during migration (Table 3). Two of these, the eastern populations of the Harlequin Duck and Barrow's Goldeneye, are designated as being of Special Concern by COSEWIC and are colour-ranked Red and Yellow, respectively, by the Province of Nova Scotia and S2N and S1N by ACCDC. The Harlequin Duck was classified as "Endangered" in 2000 under the Nova Scotia Endangered Species Act. (Atlantic) Brant are colour-ranked Yellow by the Province of Nova Scotia and S2M by ACCDC. The Common Loon is designated colour-rank Yellow by the Province of Nova Scotia but is not considered at risk by either ACCDC or COSEWIC. The Atlantic Puffin is colour-ranked Yellow

by the Province of Nova Scotia and designated S1B by ACCDC. The remaining five species receive at risk designations only from ACCDC.

Table 3. Waterbird species at risk known to use the coastal waters of the Digby Neck area during winter or migration.

	Province of	ACCDC		COSEWIC
	Nova Scotia	Nova Scotia	Canadian	Canadian
Species	**Colour Rank**	**S Rank**	**N Rank**	**Ranking**
Harlequin Duck (eastern population)	Red*	S2N	N?	Special Concern
Common Loon	Yellow	S4N	N5	NAR
Barrow's Goldeneye (eastern population)	Yellow	S1N	N5	Special Concern
Brant	Yellow	S2M	N4	-
Atlantic Puffin	Yellow	S1B	N5	-
Red-necked Grebe	Green	S3S4M	N5	NAR
Greater Scaup	Green	S3N	N5	-
Lesser Scaup	Green	S2N	N5	-
Purple Sandpiper	Green	S3N	N5	-
Black Guillemot	Green	S3	N5	-

* classified as Endangered under the Nova Scotia Endangered Species Act

Harlequin Duck

There are two major populations of Harlequin Ducks in North America – a relatively large western population and a much smaller eastern population. The eastern population was designated as "Endangered" by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) in April of 1990 but was downgraded to "Special Concern" in May 2001. In 2000, this same population was designated as "Endangered" under the Nova Scotia Endangered Species Act.

The eastern population is further divided into two sub-populations that are defined by their wintering areas: one in Greenland and the other along the eastern seaboard of North America. The population that winters in Greenland breeds in northern Québec and Labrador. The population that winters along the eastern seaboard of North America breeds in northern New Brunswick, the Gaspé Peninsula, Newfoundland and

southern Labrador. It is not known if the breeding grounds of these two populations have some overlap (Sea Duck Joint Venture, Continental Technical Team, 2003; Canadian Wildlife Service Waterfowl Committee, 2002). Preliminary genetic studies appear to confirm reproductive isolation between these two eastern North American populations (Scribner *et al.*, 1999). Of the two eastern populations, the eastern seaboard population is believed to be the smaller with a wintering population currently (pre-2005) estimated at between 1,800 and 2,000 birds (A. Boyne, *pers. comm.*).

Prior to 2005 the estimated numbers of Harlequin Ducks wintering along the coast of Nova Scotia was about 600. There are indications that the numbers of Harlequin Ducks wintering along Nova Scotia's coast have increased during the past five years (A. Boyne, *in press*).

Wintering Harlequin Ducks have been recorded at several locations along the northern coasts of Digby Neck and Long Island and the coast of Brier Island. The Canadian Wildlife Service (CWS) began annual winter surveys in this area in 2000, conducting land-based surveys in 2000 and 2001 and boat surveys in subsequent years. The highest count prior to 2005 was 86 Harlequin Ducks recorded in 2003, a significant portion (~ 14 %) of the Nova Scotia wintering population.

At only two locations, Bear Cove, Long Island, and the vicinity of Trout Cove, Digby Neck, have wintering Harlequin Ducks been found consistently and in good numbers. Harlequins have also been recorded at Sandy Cove and Whale Cove on Digby Neck and at Peajack Cove and Western Light on Brier Island. Only very small numbers of Harlequins have been recorded at these latter sites and these sites are apparently not used consistently.

Studies of wintering Harlequin Ducks suggest that this species has very specific winter habitat requirements and have shown that individual birds, particularly females, show very strong site tenacity, even to specific sites within locally favourable habitat. Movement of birds among traditional wintering areas does sometimes occur, particularly by unpaired males (Robertson *et al.*, 1999). However, given their site tenacity, and presumed specific habitat requirements, widespread use of coastal areas by this species would not be expected. Recent work by CWS has focused on identifying and monitoring traditional Harlequin Duck wintering areas. CWS's boat surveys during the past four winters have included the shoreline of the proposed quarry site and no Harlequin Ducks have been observed there. Our own land-based survey in February 2005 of the coastline from Whites Cove to the northern boundary of the property revealed no Harlequin Ducks. This suggests that the coastal waters of the quarry property do not contain traditional wintering habitat for this species. Furthermore, investigations conducted in February 2005 (see Alliston, 2005) strongly suggest that there is little or no movement of Harlequin

Ducks between their traditional wintering areas centered around Bear Cove, Long Island, and Trout Cove, Digby Neck, even though these areas are only 25 km apart.

Common Loon

The Common Loon breeds across the northern mainland of North America from northern Alaska to Labrador and on Newfoundland and southern Baffin Island as well as Greenland and Iceland. Its breeding range extends south through most of the northern tier states from northeastern California to Maine. The world population of Common Loons, most of which breed in Canada, is between 500,000 and 700,000 birds (Rose and Scott, 1996, cited in McIntyre and Barr, 1997). With European settlement, development, and active persecution, Common Loon numbers were reduced in the southern portions of their range. In recent years, however, north American populations have been increasing.

Common Loons winter mainly in coastal marine waters on both the Atlantic and Pacific coasts of North America as well as in Europe. In eastern North America, Common Loons winter from Newfoundland to the Gulf of Mexico with the greatest concentrations occurring along the South Carolina coast, on the Florida panhandle and along the Atlantic seaboard from Maine to Massachusetts (Root, 1988). Like waterfowl, and several other waterbird species, Common Loons have a "catastrophic" moult during which they simultaneously lose all their flight feathers and become flightless for about a month. Unlike most waterfowl and other waterbirds, in adult Common Loons this moult occurs during winter (January to March) thus rendering these birds less mobile (more vulnerable) during this period (McIntyre, 1988; Woolfenden, 1972).

Tufts (1986) described the Common Loon as a "common transient, fairly common in summer and winter". Erskine (1992) estimated the Nova Scotia breeding population at about 1,200 pairs. Clay and Clay (1998), using Christmas Bird Count data, have concluded that in recent years the numbers of wintering Common Loons using the Bay of Fundy have increased along the New Brunswick shore but there has been no detectable increase on the Nova Scotia shore. However, there is little information concerning the distribution of Common Loons in Nova Scotia coastal waters during winter.

The Nova Scotia government has assigned the Common Loon a colour rank Yellow (sensitive) based mainly on the fact that the Nova Scotia breeding population appears to have a lower reproductive rate than breeding populations in other areas of eastern Canada (Kerekes, 1992). (ACCDC, on the other hand, ranks the Nova Scotia breeding population as S4B (apparently secure).) Since Common Loons are migratory, birds wintering along the coast of Nova Scotia are unlikely to be part of the Nova Scotia breeding population.

Although no Common Loons were recorded during the aerial waterfowl surveys of the southern Bay of Fundy – St. Marys Bay area during the period 1992 – 2000, and only one was recorded during the 2004 boat survey of parts of Digby Neck and Long Island (which was conducted during unfavourable sea state conditions), the 2005 boat survey of this area produced 38 sightings. Of these, nine were found in waters adjacent to the Whites Point property and eight of the nine sightings were made between Whites Cove and the northern boundary of the property. Our land-based survey of this latter area made two days prior to the boat survey produced 14 observations of Common Loons. A comparison of density-indices (# birds/km shoreline) of Common Loons observed along the coast of the Whites Point property (3.2/km) during the 2005 boat survey with those areas surveyed on Digby Neck to the northeast (1.6/km) and south (0.0/km) indicates that the highest densities observed were along the coastline of the Whites Point property. Whether density-indices in each of these areas might vary over the course of a winter is unknown.

While densities of Common Loons using coastal areas might well vary from winter to winter, I would expect that the variation is considerably less than the results of our 2004 survey (when compared to the 2005 survey) would suggest (only one common loon observed in 2004). I believe that the unfavourable sea state conditions under which the 2004 survey was conducted severely limited our ability to detect Common Loons (and other divers) thereby providing a highly biased indication of use by this species.

Brant

Based on genetic differentiation, and breeding and wintering areas, there are four distinct breeding populations of Brant in North America. The Atlantic Brant population nests in the low arctic near Foxe Basin and winters along the Atlantic coast from Massachusetts to North Carolina (Reed *et al.*, 1998). The 2002 winter population estimate for Atlantic Brant was just over 180,000 birds. While Brant populations can be subject to greater annual fluctuations than most other goose species, from 1992 to 2002 Atlantic Brant populations increased (CWS Waterfowl Committee, 2002).

While few Atlantic Brant winter in Nova Scotia, their spring and autumn migrations take many of them through the Bay of Fundy (Lincon *et al.*, 1998; Erskine, 1988). Most of these birds appear to follow the north coast of the Bay of Fundy, along the coasts of Maine and New Brunswick where there are important staging areas (Point Lepreau / Maces Bay area) (Dietz and Chaisson, 2000). All observations of Brant made in winter and spring surveys of the area under consideration were in the coastal waters of Brier Island. Small groups of Brant (20 and 55) were observed during two

winter surveys. More substantial numbers (between 90 and 550) were recorded on four spring surveys conducted between 19 April and 2 May). Brant have very specific habitat (food) requirements and the complete lack of observation of this highly visible species in the survey block containing the proposed quarry site would seem to confirm that this area does not contain suitable Brant habitat.

Barrow's Goldeneye

In November 2000, COSEWIC designated the eastern North American population of Barrow's Goldeneye as being of Special Concern. The distribution, numbers and habitat requirements of this population are not well understood (Savard and Dupuis, 1999).

The breeding grounds of the eastern population of Barrow's Goldeneye have not been well defined but are believed to be entirely within Canada with the only confirmed breeding being in southeastern Québec. The total wintering population is currently estimated at about 4,500 birds of which about 4,000 winter in Québec (St. Lawrence Estuary and Gulf of St. Lawrence) and approximately 400 in the Atlantic Provinces and Maine. There are currently no known winter concentrations of this species anywhere in Atlantic Canada (Sea Duck Joint Venture, Continental Technical Team, 2003b; CWS Waterfowl Committee, 2002).

The closest known location to the proposed quarry site where wintering Barrow's Goldeneyes can regularly be found is in the Annapolis Basin and relatively few birds (<10) are found here. A comparison of the density-indices (and numbers) of Goldeneye species (Barrow's and Common) recorded during winter aerial surveys (Appendix 2) of the Annapolis Basin with those found in the survey block containing the proposed quarry site shows that Goldeneye densities were more than six times greater in the Annapolis Basin (3.8 birds/km) than in block 117 (0.6 birds/km). While direct information is lacking, it would seem unlikely that block 117, in general, (where the maximum number of Goldeneye species recorded during winter aerial surveys was 56 birds) and the proposed quarry site, in particular, would support a minor concentration of Barrow's Goldeneyes. No Barrow's Goldeneyes have been observed during CWS winter boat surveys of this area (A. Boyne, *pers. comm.*).

Red-necked Grebe

The North American population of the Red-necked Grebe breeds north to near tree line in Alaska, Yukon and Northwest Territories, east to southwestern Québec and south to Oregon, Idaho, Wyoming, Montana, South Dakota, Minnesota, Wisconsin and southern Ontario. There are no reliable population estimates for Red-necked Grebes. Little is known of the life of this species on its wintering grounds (Stout and Nuechterlein, 1999).

Red-necked Grebes are known to be highly maritime in winter, frequenting coastal marine waters, particularly bays, inlets and estuaries on both the Atlantic and Pacific coasts of North America. These birds are also known to use shallows in offshore waters. Along the Atlantic coast Red-necked Grebes winter from Newfoundland south to North Carolina but mostly in Nova Scotia and New Brunswick south to Long Island, New York. By analyzing Christmas Bird Count data, Root (1988) concluded that the Atlantic wintering population is centered along the coast of the Bay of Fundy. Most wintering birds reach the Atlantic coast in October – November. During winter these birds are generally observed as individuals, pairs or small loose flocks. Red-necked Grebes begin staging for spring migration in March and April. During spring migration several hundred birds are known to occur at some migratory staging areas (Stout and Nuechterlein, 1999).

There is little information available concerning the winter distribution of Red-necked Grebes in Nova Scotia. Tufts (1986) indicates that Red-necked Grebes are "uncommon in winter" but "Migrants gather at assembly points from mid-March to late April". Tufts (1986) does not indicate the location of any of these spring assembly points.

No Red-necked Grebes were recorded on any of the winter or spring aerial waterfowl surveys. Although these surveys were focused on waterfowl, if concentrations of Red-necked Grebes were to have occurred in any of the surveyed areas, the likelihood of their being detected would also have increased. Scattered individuals or small groups, that might respond to an approaching aircraft by diving, could prove to be very difficult to detect.

In the winter of 2005 two areas on Digby Neck were identified where concentrations of Red-necked Grebes did occur: Whale Cove and Sandy Cove. Visits to Whale Cove on 16 January 2005 (32 birds), 9 February 2005 (20 birds – CWS boat survey), and 24 February 2005 (50 birds – B. Forsythe) and Sandy Cove on 16 January 2005 (57 birds) and 9 February 2005 (35 birds) all revealed single, tight flocks of sleeping or resting Red-necked Grebes in the southwestern portions of these coves. The formation of relatively large tight flocks by sleeping/resting Red-necked Grebes contrasts with their distribution when feeding as scattered individuals or small, loose (≤ 6) flocks. Obviously these large flocks that remain at the water surface are more likely to be counted during a census than scattered individuals or small, loose flocks that are feeding and, hence, spending a considerable portion of their time under water.

During the 2005 CWS boat survey a total of 62 Red-necked Grebes was recorded, 55 of which were in two large flocks of resting birds. During the 2004 boat survey, when sea state conditions were not favourable for obtaining accurate counts of this species,

only six Red-necked Grebes were recorded. No Red-necked Grebes were recorded in waters adjacent to the Whites Point property in 2004 and only two were recorded during the 2005 boat survey. However, just two days prior to the 2005 boat survey, in our land-based survey of the coast of the Whites Point property from Whites Cove to the northern boundary, we counted 32 Red-necked Grebes. It would be expected that the greater length of time required to complete the land-based survey (4 hours, 13 minutes) would result in a greater portion of the total numbers of feeding Red-necked Grebes, which spend much of their time out of sight of observers under the water surface, being seen than during a boat survey which passes quickly (~ 8 minutes) through the surveyed area and may elicit avoidance behaviours by the birds. However, the differences in the results of these two surveys would appear to be much greater than what could be explained by the differences in survey methodologies alone. We can only suggest that, like some species of waterfowl, Red-necked Grebes may show considerable day-to-day movements among favoured feeding areas.

In British Columbia and Norway, Red-necked Grebes are known to form commensural feeding associations with Scoters, presumably feeding on organisms disturbed by bottom-feeding Scoters (Byrkjedal *et al.*, 1997). If such associations occur on the Atlantic coast, then higher densities of Red-necked Grebes might be associated with areas preferred by Scoters which, in the area considered in this report, would be blocks 111 and 112.

Although we now know that numbers of Red-necked Grebes may at times use the coastal waters of the Whites Point property, we do not know how this use may vary from day to day or from year to year or how it compares with usage of adjacent coastal waters.

Scaup

The combined breeding population of Greater and Lesser Scaup is larger than any other diving duck species and greater than most dabbling duck species in North America. Scaup are also the most widespread of diving ducks with summer ranges extending through tundra, boreal forest and prairie pothole areas of western North America and wintering areas along both the east and west coasts of the continent and on large lakes in the interior. On the east coast of North America, where approximately 80 % of the populations of these species winter, Scaup can be found from Newfoundland to Central America (Austin *et al.*, 1999). While considerable overlap occurs, Greater Scaup tend to occupy the more northerly portions of this range and Lesser Scaup the more southerly areas. Greater Scaup winter from Newfoundland to northern Florida with 70 % in the Long Island Sound region (Kessel *et al.*, 2002). Most Lesser Scaup wintering on the eastern seaboard are found along the Gulf coasts of Louisiana, Florida and Mexico (Austin *et al.*, 1998).

Scaup populations, which in the early 1970's reached a peak of almost eight million wintering birds, have been in an almost steady decline for more than 20 years. By 1998, Scaup populations had decreased to approximately 3.5 million birds consisting of about three million Lesser Scaup and 500,000 Greater Scaup. It is the Lesser Scaup population that has suffered by far the greater decline. Reasons for this decline are not well understood but speculation includes global climate change and it effects on boreal forest ecosystems, and chemical contamination and changes in food supply on the migration and wintering grounds (Austin *et al.*, 1999).

There is only one small isolated breeding population of Greater Scaup (~ 100 pairs) nesting in the Maritime Provinces. This populations became established on an island in the lower St. John river Valley in New Brunswick. There are no records of breeding Lesser Scaup in the Maritime Provinces (Erskine, 1992.) Tufts (1986) describes the Greater Scaup as "a common transient, uncommon in winter" and the Lesser Scaup an "uncommon transient, very rare in winter". It is likely that the great majority of Scaup recorded during coastal winter surveys in Nova Scotia would be Greater Scaup.

The highest density-indices of Scaup found in the area being considered were at the head of St. Marys Bay (block 123; 10.6 birds/km) and the Annapolis Basin (block 113: 4.3 birds/km). This is consistent with the reputation of these species for favouring large bays and inlets as wintering areas.

Density-indices of Scaup in block 117 where the proposed quarry site is located were very low (0.1 birds/km). Indeed only a total of 29 Scaup were counted during the seven winter surveys of this block. The aerial surveys suggest that insignificant numbers of Scaup winter in the block that contains the proposed quarry site. No Scaup were observed during the CWS boat surveys of part of this block in February 2004 and 2005. No Scaup were recorded using coastal waters in spring in any of the survey blocks under consideration.

Purple Sandpiper

The Purple Sandpiper has the most northerly wintering distribution of the shorebirds that inhabit the Atlantic coasts of North America and Europe. Birds that breed in the Canadian arctic migrate to wintering areas in both North America and Europe. While population estimates for this species are somewhat tentative, it is believed that of a global population of about 65,000 birds, about 15,000 winter along the east coast of North America. Wintering birds occupy ice-free rocky coastal areas from Newfoundland south to Maryland. Wintering birds occur in flocks, generally numbering less than 100 (Morrison *et al.*, 2001).

The distribution and numbers of wintering Purple Sandpipers in Nova Scotia is not well known. Purple Sandpipers were recorded on three of the survey blocks under consideration during the mid-winter surveys. Although none was observed in the block containing the proposed quarry site (block 117), they were recorded on the north coast of adjacent Long Island (block 118: 1.0/km) and on Brier Island (blocks 119 and 120: 2.5/km).

During each of our land-based visits to Little Bear Cove in 2005, Purple Sandpipers were observed (16 January 2005 – 6, 1 February 2005 – 25, 2 February 2005 – 15 and 6). A flock of 15 Purple Sandpipers was also observed near Little Bear Cove during the 2005 CWS boat survey. No Purple Sandpipers were observed along the shoreline of the Whites Point property during the 2004 and 2005 CWS boat surveys or the 2005 land-based survey. The only observation of Purple Sandpipers along the coastline of Digby Neck was a flock of five recorded about 7.5 km northeast of the Whites Point property during the 2005 boat survey.

While it would appear that the main wintering area for Purple Sandpipers in the Digby Neck – Long Island – Brier Island area is on the coast of Brier Island, secondary concentrations are found on the coast of Long Island, particularly in the vicinity of Little Bear Cove. Small numbers might be expected along the Fundy coast of Digby Neck, possibly including the Whites Point property.

Black Guillemot

The Black Guillemot is the most widely distributed member of the Auk family having an almost circumpolar arctic distribution. Recent estimates set the global breeding population of Black Guillemots at between 250,000 and 500,000 pairs (Gaston and Jones, 1998, cited in Buckley, 2002). Estimates from the 1970's and 1980's suggested that the southernmost populations on each side of the Atlantic were stable or increasing slightly; however, current census data are inadequate to document any possible population fluctuations (Buckley, 2002).

In eastern North America, Black Guillemots reach the southern limit of their breeding range in Maine and are most abundant north of the Gulf of St. Lawrence. Erskine (1992) estimated the Nova Scotia breeding population at 750 pairs. Buckley (2002) reports an estimated 120 breeding pairs in the Bay of Fundy, most of which were in the Grand Manan Archipelago. Erskine (1992) notes several observations of *possible* breeding birds along the southern coast of the Bay of Fundy; all of these observations were to the northeast of the Digby Gut.

In the southern portions of its range, Black Guillemots prefer inshore waters. Typically they nest as isolated pairs or in small colonies close to the shallow waters they use as their feeding grounds. Where ice conditions permit, Black Guillemots

tend to remain close to their breeding areas even in winter (Buckley, 2002). It is thus most likely that birds seen wintering along the coast of Nova Scotia include birds that breed in this region.

Black Guillemots were not recorded during winter and spring waterfowl surveys of the area under consideration although they were recorded during similar surveys conducted in other parts of the province. As indicated elsewhere, winter and spring aerial surveys were to census waterfowl; seabird observations were incidental. However, if concentrations of Black Guillemots were to occur in these areas, they would likely have been observed.

Only seven Black Guillemots were observed during the 2004 CWS boat survey when the sea state was unfavourable for censusing diving birds. During the 2005 CWS boat survey, when survey conditions were excellent, 37 Black Guillemots were observed. Density-indices derived from the 2005 boat survey indicate similar densities of Black Guillemots along the coastline of Long Island (0.8/km), Digby Neck between Grand Eddy Point and the Whites Point property (0.8/km), and the Whites Point property (0.7/km). North of the Whites Point property, the density-index increased somewhat (1.4/km).

While only two Black Guillemots were observed along the Whites Point property shoreline during the 2005 boat survey, a total of 18 birds was observed during a land-based census of the coastal waters of this property between Whites Cove and the north property boundary just two days prior to the boat survey. As with other diving birds (Common Loons, Red-necked Grebes, Murres), it would be expected that a land-based survey conducted over a longer period (4 hours, 13 minutes) would result in a greater portion of the total number of feeding Black Guillemots, which spend a great portion of the time under water and out of sight of the observers, being seen than during the boat survey which passed through the area in about eight minutes. The boat may also elicit avoidance behaviours. However, the large differences in results of the two surveys would appear to be greater than what could be explained by the differences in survey methodology alone. It would thus appear that Black Guillemots might also exhibit considerable day-to-day movements between favoured feeding areas.

Atlantic Puffin

Worldwide, the Atlantic Puffin is a relatively common species with an estimated 5.7 to 6.0 million pairs breeding at colonies in northwest Russia, Norway, Iceland, the Faeroe Islands, Ireland, the United Kingdom, northwestern France, Greenland and eastern North America. Half of these birds breed in Iceland. The total world population of Atlantic Puffins, including the non-breeding cohort, is about 20 million birds (Chardine, 1999; Nettleship and Evans, 1985).

In North America about 375,000 pairs breed at 80 colonies that stretch from the high Arctic to Maine with about 90 % of the population in Newfoundland and Labrador (Chardine, 1999).

In the 1800's and early 1900's populations were drastically reduced, by egging and hunting, to the point of extirpation of some colonies (Nettleship and Evans, 1985). Currently the North American population is probably growing although trends may vary among colonies (Lowther *et al.*, 2002).

Although the colonies at the southern limit of the range of this species, in Nova Scotia, New Brunswick and Maine, are relatively small, they appear to be growing and expanding. The number of colonies in Nova Scotia has increased from three to six in recent years and these colonies appear to be growing (T. D'Eon *cited in* Lowther *et al.*, 2002). These colonies are located off Cape Breton and along the south shore of Nova Scotia. A new colony was reported in New Brunswick in 2002 (Lowther *et al.*, 2002). The colony at Machias Seal Island in the Gulf of Maine which was estimated to contain 60 birds in 1883 (Palmer, 1949) contained about 3,000 pairs in 1999 (Lowther *et al.*, 2002). A colony at Matinicus Rock, Maine, increased from one pair in 1902 to more than 200 pairs in 2002 (Lowther *et al.*, 2002). Restoration efforts by the National Audubon Society that began in the 1970's have resulted in two colonies in the Gulf of Maine (totaling 231 breeding pairs in 2002) having been reestablished after being vacated in the 1800's (Kress and Nettleship, 1988; Lowther *et al.*, 2002). The gains made by these small peripheral colonies have been in part due to the implementation in recent decades of progressive stewardship policies, not the least of which has been the protection of these colonies from human disturbance and severe predation (Chardine, 1999).

It is because of the small number and size of these peripheral breeding colonies of Atlantic Puffins off the Nova Scotia coast and their vulnerability during the breeding season to accidents (e.g. oil spills), disturbance and predation that the Nova Scotia government has colour-ranked this species as "Yellow" (sensitive). The Nova Scotia ACCDC designation is S1B which indicates that their concerns are also for these small peripheral breeding colonies.

While gregarious during the breeding season, outside the breeding season Atlantic Puffins are generally seen in "ones and twos", are pelagic in their distribution, and hence much less vulnerable than when attending their breeding colonies. Since most winter in the north Atlantic Ocean far from shore where they are rarely observed, little is known about wintering areas (Gaston and Jones, 1998). Tufts (1986) considers the Atlantic Puffin an "Uncommon transient, rare in winter and summer … common in summer … only around its remaining breeding colonies …".

During the 2005 CWS winter boat survey, two Atlantic Puffins were observed in the coastal waters of Digby Neck: one off Trout Cove and the other off the north boundary of the Whites Point property. I view these sightings simply as relatively rare occurrences of a species that is widely distributed in winter and, in general, shows a marked preference for offshore wintering areas.

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Nature Serve – http://www.natureserve.org

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APPENDIX 1

COMMON AND SCIENTIFIC NAMES OF BIRDS CITED IN THIS REPORT

Common Name	Scientific Name
American Black Duck	*Anas rubripes*
Atlantic Puffin	*Fratercula arctica*
Barrow's Goldeneye	*Bucephala islandica*
Black Guillemot	*Cepphus grylle*
Black Scoter	*Melanitta nigra*
Brant	*Branta bernicla*
Bufflehead	*Bucephala albeola*
Common Eider	*Somateria mollissima*
Common Goldeneye	*Bucephala clangula*
Common Loon	*Gavia immer*
Common Merganser	*Mergus merganser*
Common Murre	*Uria aalge*
Great Cormorant	*Phalacrocorax carbo*
Greater Scaup	*Aythya marila*
Harlequin Duck	*Histrionicus histrionicus*
Lesser Scaup	*Aythya affinis*
Long-tailed Duck	*Clangula hyemalis*
Mallard	*Anas platyrhynchos*
Purple Sandpiper	*Calidris maritima*
Red-breasted Merganser	*Mergus serrator*
Red-necked Grebe	*Podiceps grisegena*
Surf Scoter	*Melanitta perspicillata*
Thick-billed Murre	*Uria lomvia*
White-winged Scoter	*Melanitta fusca*