6.2 Waterfowl and Passerine Birds

While the term "waterfowl" is used throughout the text to describe the following VEC, shorebirds and other water-associated birds such as sandpipers and gulls are also included. Common and scientific names of waterfowl and passerine birds discussed in the text are provided in Appendix F. Original research and a review of available information were compiled in a Waterfowl Component Study (JW and LMSS 2003b) associated with this assessment. Passerine birds (songbirds) will be considered in terms of those expected to occupy potential habitat within the region and within the proposed right-of-way of the highway. To establish a baseline for possible future monitoring, WST will conduct breeding bird surveys for passerine birds prior to construction in 2003.

6.2.1 Boundaries

Project boundaries for waterfowl and passerine birds are defined by the spatial and temporal extent of the anticipated physical, visual and auditory influences of the project in the area surrounding the proposed highway route.

In terms of ecological boundaries, waterfowl and passerine birds in the study area are widely distributed, with the majority being migratory. Waterfowl populations in eastern North America tend to be more stable as nesting success tends to depend on spring temperatures rather than availability of water. Conversely, in western North America, particularly in the prairie region, annual variation in water availability can create greater fluctuation in waterfowl breeding success (P. Garrettson, pers. comm.). Given this northern location, most species discussed in this chapter use the study area only for the purpose of staging and/or breeding. Ecological boundaries vary between species, although there are similar life history strategies. During the nesting season, passerine birds and, to a lesser extent waterfowl (i.e., for a shorter period of time as young are born precocious), movements of attentive parental birds are restricted around a natal area (i.e., nest structure) of some kind. In some species, one, and eventually both, adults may move elsewhere during the breeding season, to moult for example. Even during staging in spring, only a small proportion of any waterfowl or passerine bird population would be located at any one time within the project area. However, given the migratory nature of these species, the spatial environmental assessment boundary for waterfowl and passerine birds is large, extending to the range of waterfowl and passerine bird populations occurring in southern Labrador. Temporal boundaries for waterfowl and passerine birds extend through project construction and operation, generally during April to November for most species, although there are exceptions.

Depending on the species, waterfowl and passerine birds in North America are managed by Canada through CWS and/or the United States. Applicable legislation and agreements include the *Migratory Birds Convention (1916)*, *Migratory Birds Convention Act* and the *North American Waterfowl Management Plan* (CWS and USFWS 1986; CWS, USFWS and SEMARNAP 1998). Waterfowl are managed according to flyways denoting wintering and breeding habitat connected by international migration corridors. The study area and Labrador occur within the Atlantic Flyway. Recent legislation in the United States (July 2000), the *Neotropical Migratory Bird Conservation Act*, is designed to conserve migratory bird habitat in that country, Latin America and the Caribbean (Ducks Unlimited 2000). Additional provincial, federal, and international management initiatives are focused on the protection of specific breeding colonies.

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) examines less abundant species including those of waterfowl and passerine birds. Of relevance for this assessment is the harlequin duck, recently downlisted (2001) from endangered status to a species of special concern by COSEWIC. The Canadian Wildlife Service has developed a priority-setting system for Canadian landbirds (Dunn 1997). Of relevance for this chapter are species currently rated "high" (i.e., 5) as a Canadian concern, including blackpoll warbler, black-backed woodpecker, boreal chickadee, white-throated sparrow, rusty blackbird, and purple finch. Blackpoll warbler is also listed as "5", the highest priority, in the Newfoundland and Labrador responsibility category. It should be noted that having a high national or provincial priority does not necessarily mean that a species is currently in decline. Often, high national priority species are abundant and widespread in Canada, but are identified as priorities because of their dependence on habitat in Canada (Dunn 1997).

6.2.2 Methods

The survey area comprised areas of wetland and waterbodies within a 5 km corridor on either side (i.e., 10 km wide) of the TLH- Phase III route (Figure 6.3). Rivers were surveyed for 10 km on either side of watercourse crossings. In terms of original research for this assessment, five aerial surveys, specifically for waterfowl, were conducted between early May and late August 2002 (JW and LMSS 2003b). The surveys were completed on May 9, 2002 (spring staging), May 21, 2002 (breeding - Canada geese and dabbling ducks), June 1 to 2, 2002 (breeding - diving ducks), July 18, 2002 (brood/moult), and August 28 to 29, 2002 (fall staging). Potential harlequin duck habitat was searched during each survey. Each aerial survey was timed to search during important periods of waterfowl activity (JW and LMSS 2003b).

Aerial survey techniques for waterfowl have been developed by JW over the last 15 years in consultation with the Newfoundland and Labrador Wildlife Division and the CWS Using either a Bell 206 L or Aerospatiale (A Star) helicopter. Survey speed was approximately 100 km\hr at an altitude not greater than 30 m above ground level. Areas of open water and wetland habitat were identified by the navigator/recorder, who directed the pilot and two other observers over the route of each survey. Communication through an intercom system on the aircraft allowed observers, using the 12-hour clock for orientation, to locate and identify birds according to species and sex. All sightings were plotted directly onto 1:50,000 NTS map sheets (with the route plotted in advance) and verified using the aircraft's GPS. Other wildlife signs and sightings during aerial surveys were also recorded.

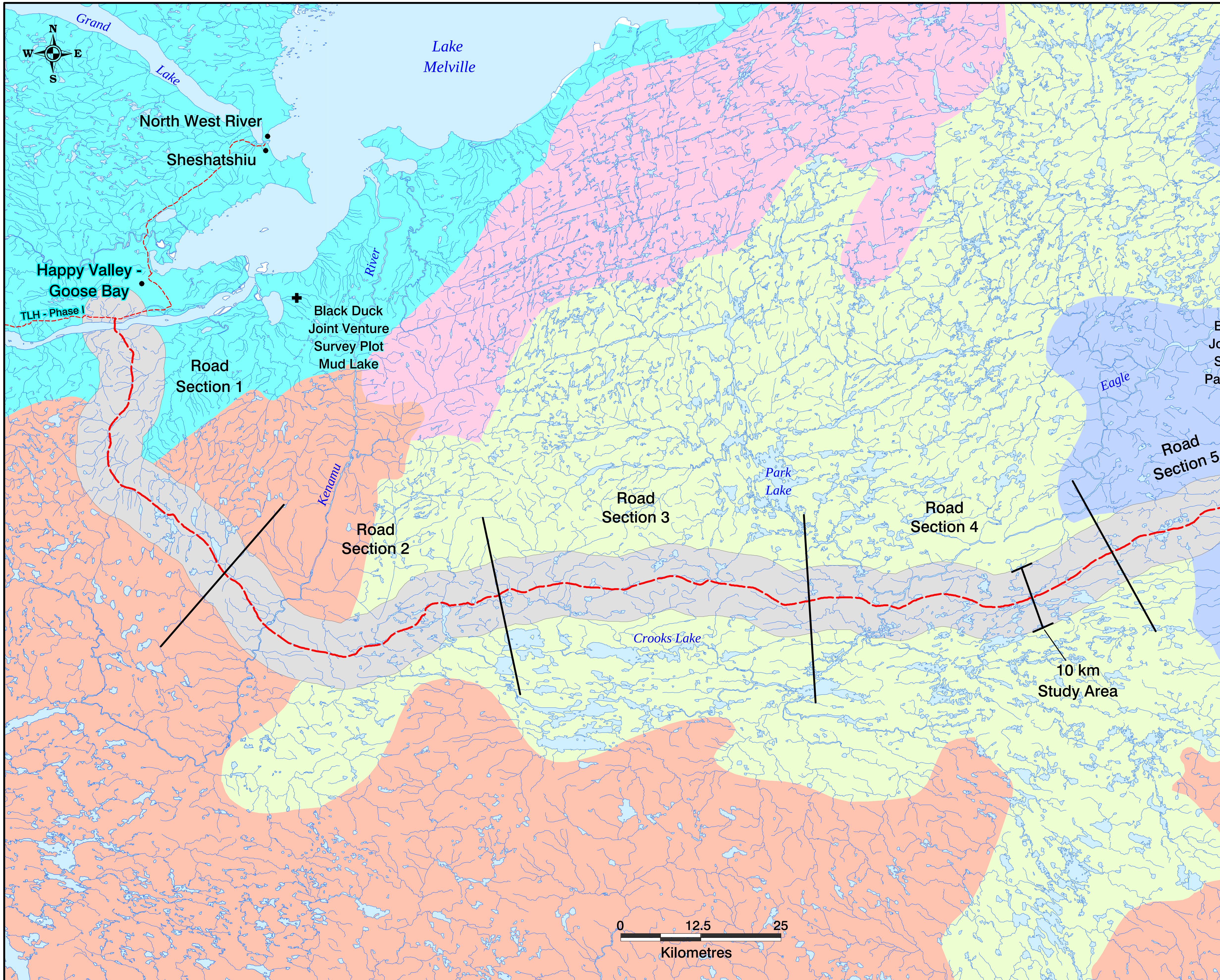

Figure 6.3

Waterfowl Study Area
and Ecoregions
TLH - Phase III

Jacques Whitford
Environment Limited
Environmental Scientists
Consulting Engineers

Waterfowl data have been graphically presented through a series of contour maps that show relative numbers of waterfowl along the proposed highway route and give an overview of areas of bird concentration. The waterfowl contour maps were created by dividing the 10-km study area surrounding the proposed highway route into equal areas of 250 m. For each survey, the total number of waterfowl observed within each 250-m block was calculated and applied. Contours were generated using Surfer, a grid-based contour program. Gridding uses original data points (observations) in an XYZ data file (x,y = center of each block, z = the # of observations) to generate calculated data points on a regularly spaced grid (a grid [.GRD] file). Interpolation schemes estimate the value of the surface at locations where no original data exists, based on the known data values (observations). Surfer then uses the grid to generate the contour map or surface plot. Once the contours were generated in the Surfer program, they were grouped into categories, such as 0 birds, 1-5 birds and 6-10 birds, based on the number of bird observations they represented. All non-surveyed areas were rated as having zero birds even though there were no data collected during surveys. In order to ensure that only surveyed areas were represented in the final presentation of data, the contours were corrected to represent the actual survey routes. This was done by creating a 1-km buffer along each survey route (500 m on either side based on assumption that this is the visibility distance of observers during the surveys). Areas surveyed outside the 10-km zone were not included in the contouring process. However, notable observations outside the 10-km zone were also indicated in the final presentation of data. Details of the survey results are provided in the Waterfowl Component Study (JW and LMSS 2003b).

Additional baseline information was obtained from available literature (published and unpublished sources) and consultation with CWS.

6.2.3 Existing Environment

6.2.3.1 Waterfowl

A summary of selected waterfowl species that were observed during each survey along the proposed TLH-Phase III route is provided, by highway section, in Figure 6.4. Species diversity and numbers were fairly low during the May 9, 2002 survey as much of the survey area was still ice or snow-covered. Species diversity and numbers peaked during the June survey, with large numbers of ducks being observed, particularly in highway sections 3 and 4 (Figure 6.4). American black ducks were observed in all highway sections during most of the surveys and were among the most commonly observed species during breeding surveys (Figure 6.4).

Similarly, Canada geese were observed in all highway sections during most surveys, with the greatest number consistently seen along highway section 4 (Figure 6.4). Ring-necked ducks were, by far, the most abundant ducks during the fall staging survey, with concentrations in highway sections 2 and 3 (Figure 6.4). Observations of other species such as scoters and green-winged teals varied between surveys (Figure 6.4).

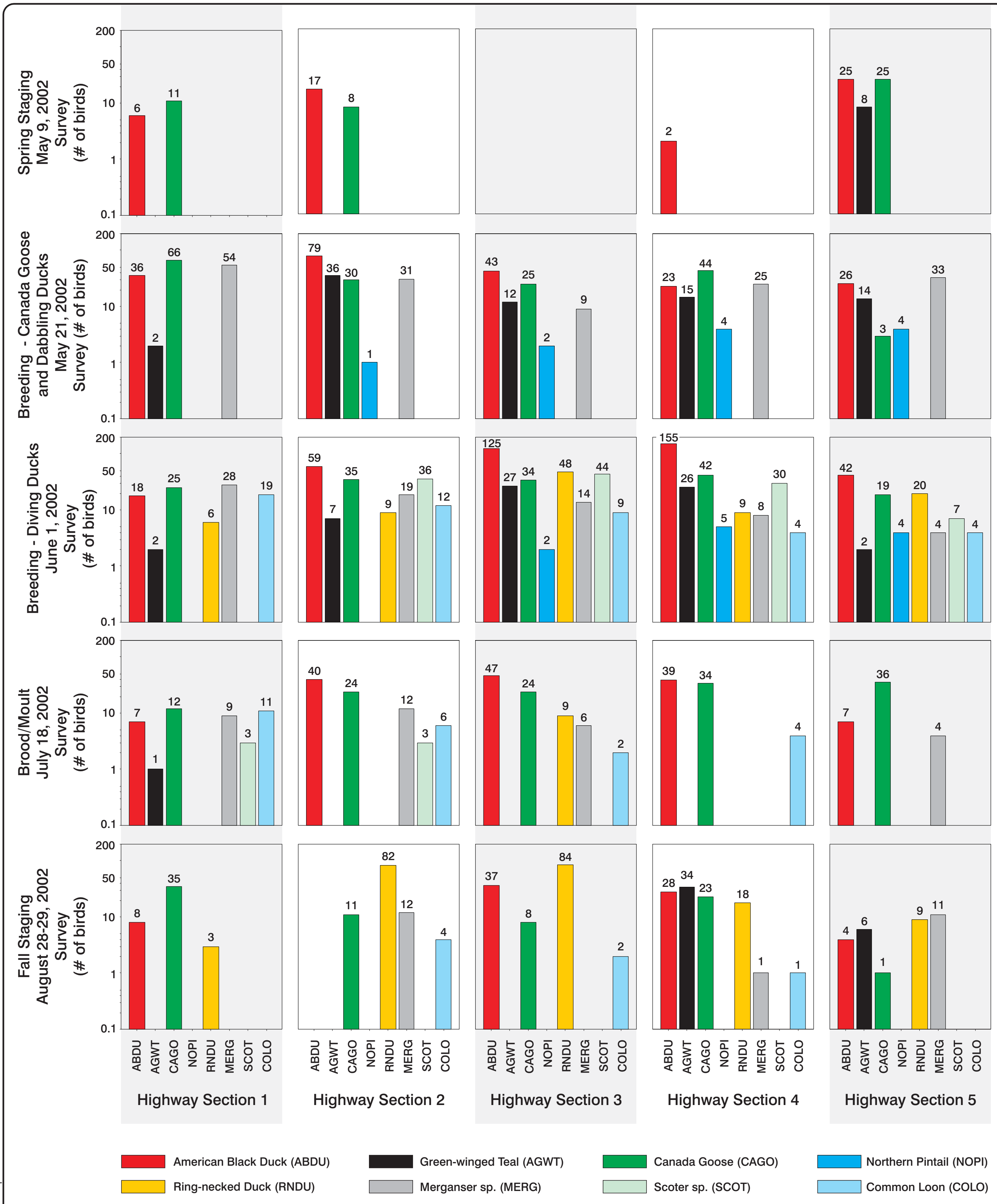

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Figure 6.4

Selected Waterfowl Observations by Highway Section and Survey Date

American Black Duck

There has been concern regarding declining populations of American black duck in North America (CWS 2000). Mid-winter inventories in the Atlantic and Mississippi flyways have shown a decline in the continental population of black ducks from approximately 750,000 birds in 1955 to approximately 250,000 birds in 1997 (CWS 2000). In recent years, surveys in breeding areas have indicated the number of breeding pairs of black ducks has increased considerably over the 1990 to 2000 period. The study area is located within the Boreal Shield - Eastern region (i.e., Newfoundland and Labrador and southeastern Québec), where the estimated number of black duck breeding pairs in this strata has risen through the 1990s from less than 20,000 pairs in 1995 to approximately 40,000 pairs in 1999 (CWS 2000). Trend data for the Boreal Shield - Eastern region indicate that the annual percentage change in observations of black duck breeding pairs has increased by 9.3 percent for the 1990 to 2000 period (CWS 2000). The black duck population appears to be stable in Atlantic Canada but is, overall, in decline (G. Finney, pers. comm.). During surveys of the study area in 2002, black ducks were among the most commonly observed species (29 percent of observations). While observations were made over only one year, the number of black ducks observed support the contention that this species is widespread in the region. Black ducks rely on shallow wetlands with emergent vegetation and were generally found associated with peatlands, ribbed fens and fen-marsh complexes during the breeding period, although they were also found using small river systems with dense nearshore vegetation, particularly early in the season (i.e., mid to late May). Several congregations of greater than 10 black ducks were observed during the surveys in May and early June (Figures 6.5 to 6.7) and a group of greater than 40 moulting black ducks was observed west of Crooks Lake in July (Figure 6.8). Congregations of greater than 10 black ducks were observed during the late August survey (Figure 6.9) During all surveys, groupings of two to five black ducks were widespread in the surveyed area.

Mallard Duck

Compared to other abundant inland duck species in the Boreal Shield - Eastern region, observations of breeding pairs of mallard are fairly low, with less than 400 pairs observed each year from 1990 to 2000, with the exception of 1995, when 602 pairs were observed. In 1990 and 1994, no breeding pairs of mallards were observed during surveys (CWS 2000). Within the entire survey area for eastern Canada (eastern Ontario, southern Québec and Atlantic Canada), the breeding population of mallards was estimated at 127,800 ± 25,000 pairs in 2000 (CWS 2000) and the population is considered to be increasing (G. Finney, pers. comm.). Only 13 mallards were observed, all during the June 1 to 2, 2002 aerial survey (JW and LMSS 2003b). All occurred singularly or in groups of two on wetlands to the southeast of Park Lake.

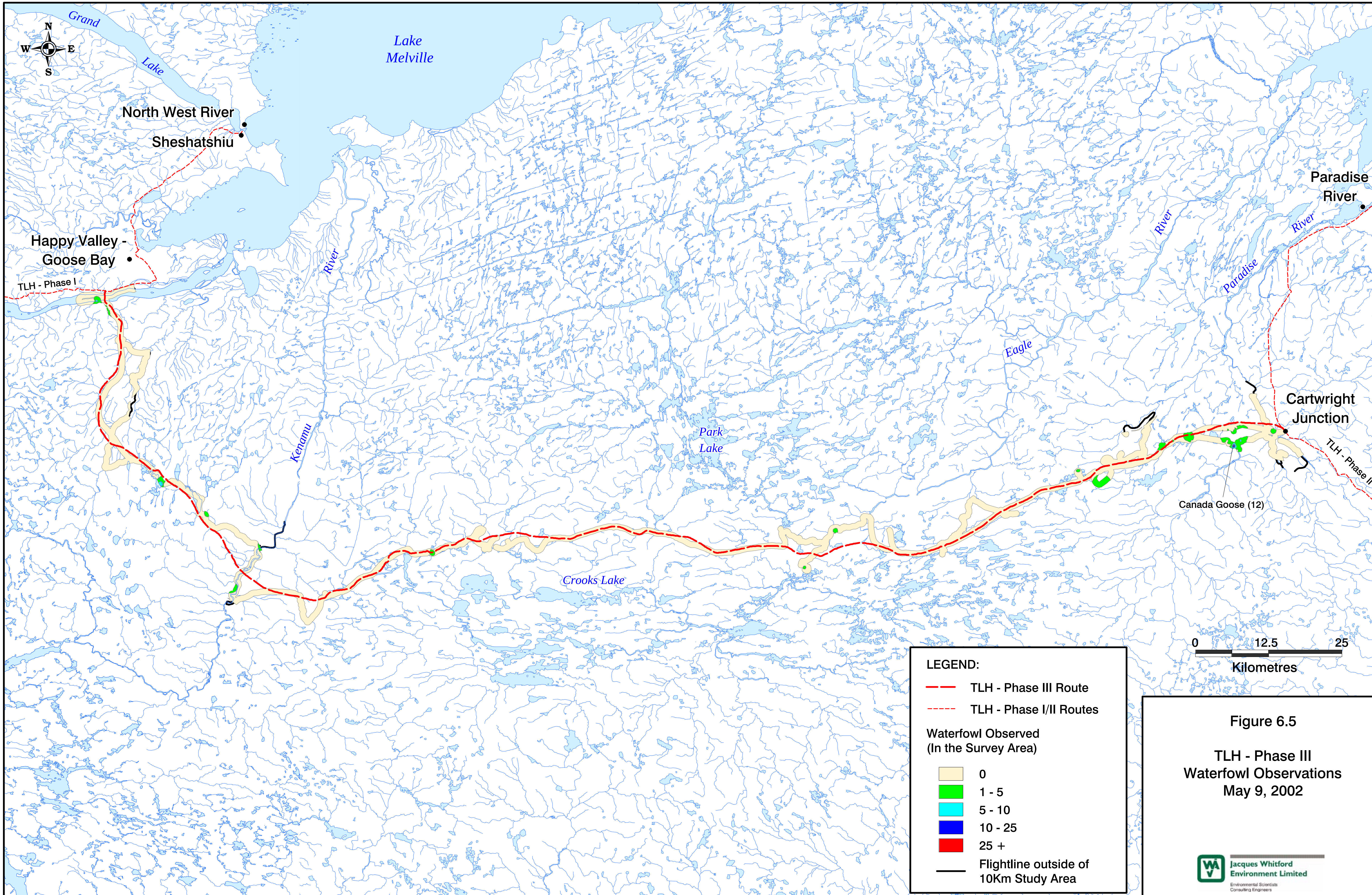


Figure 6.5

TLH - Phase III
Waterfowl Observations
May 9, 2002

Jacques Whitford Environment Limited
Environmental Scientists
Consulting Engineers

NFS08243-11.WOR 29NOV02 3:35pm

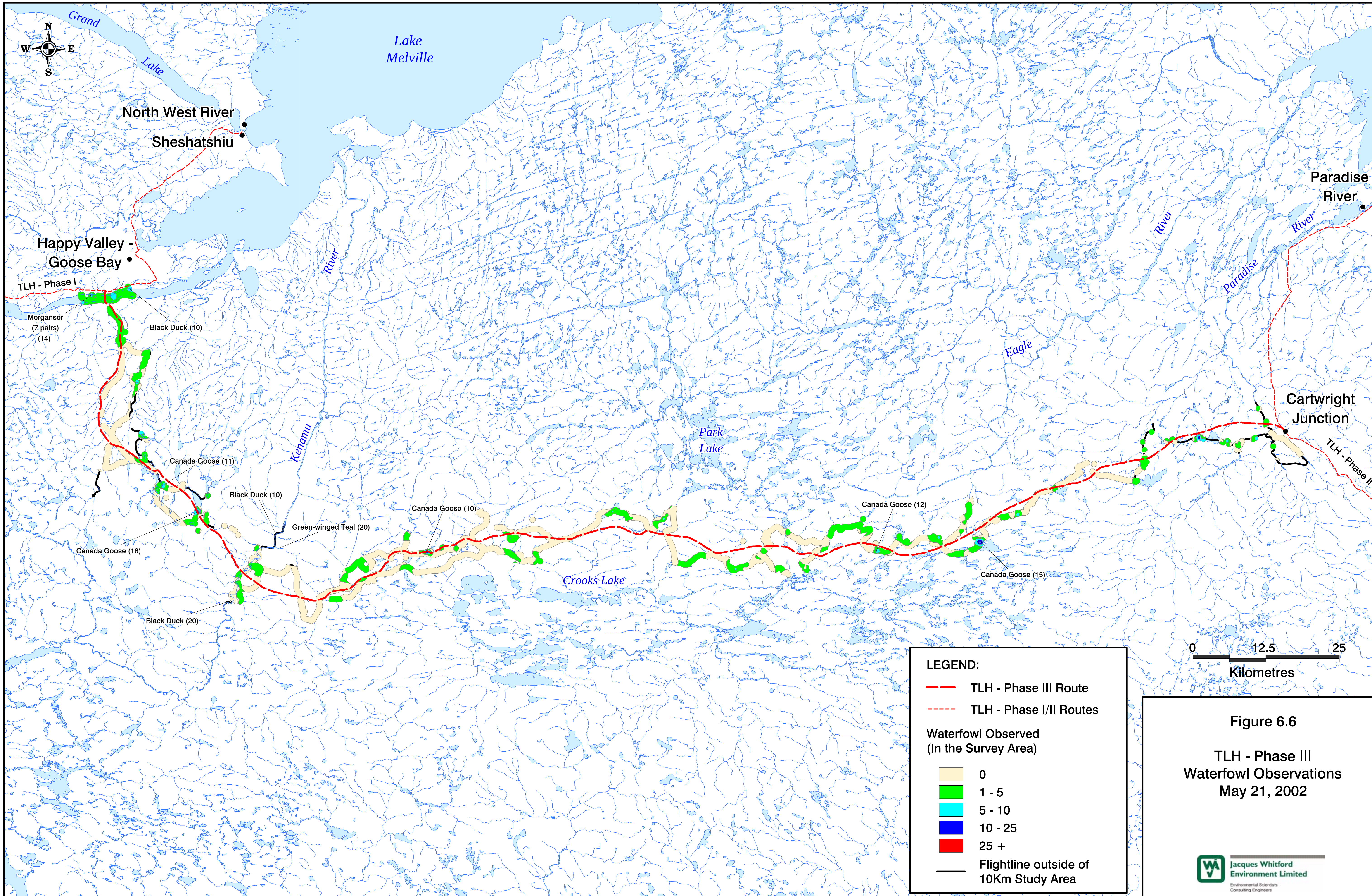


Figure 6.6

TLH - Phase III
Waterfowl Observations
May 21, 2002

NFS08243-12.WOR 29NOV02 3:45pm

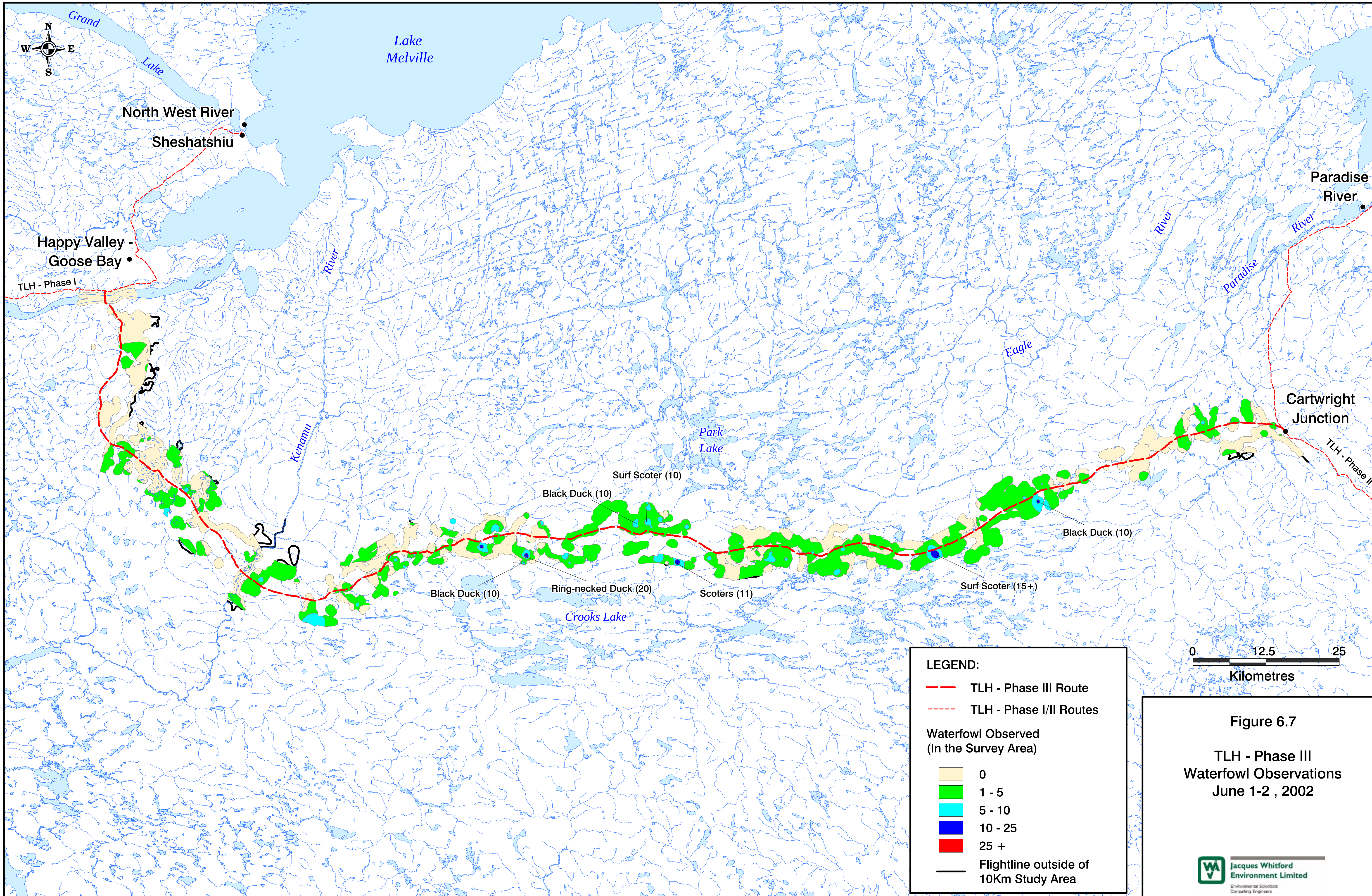
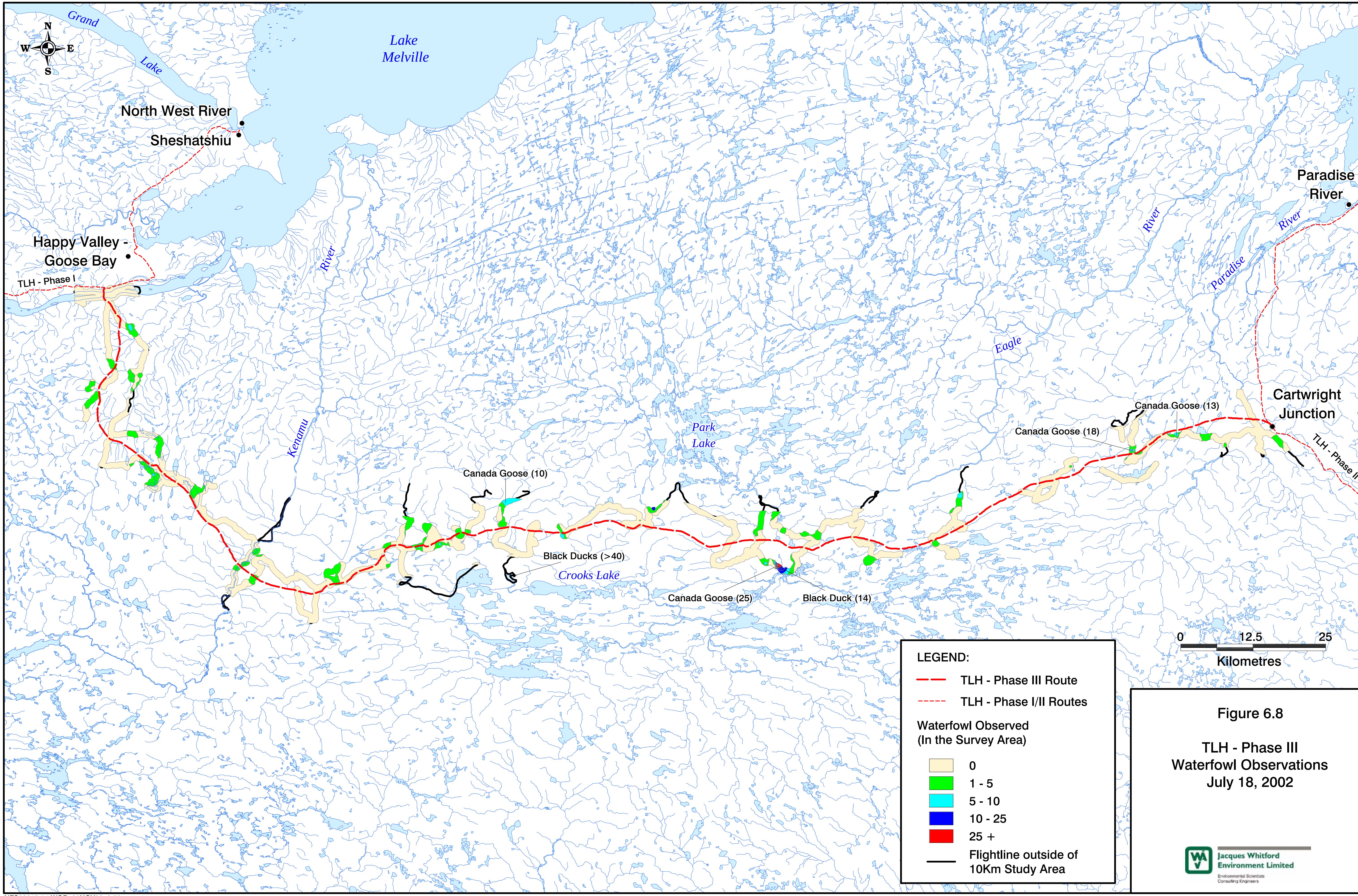
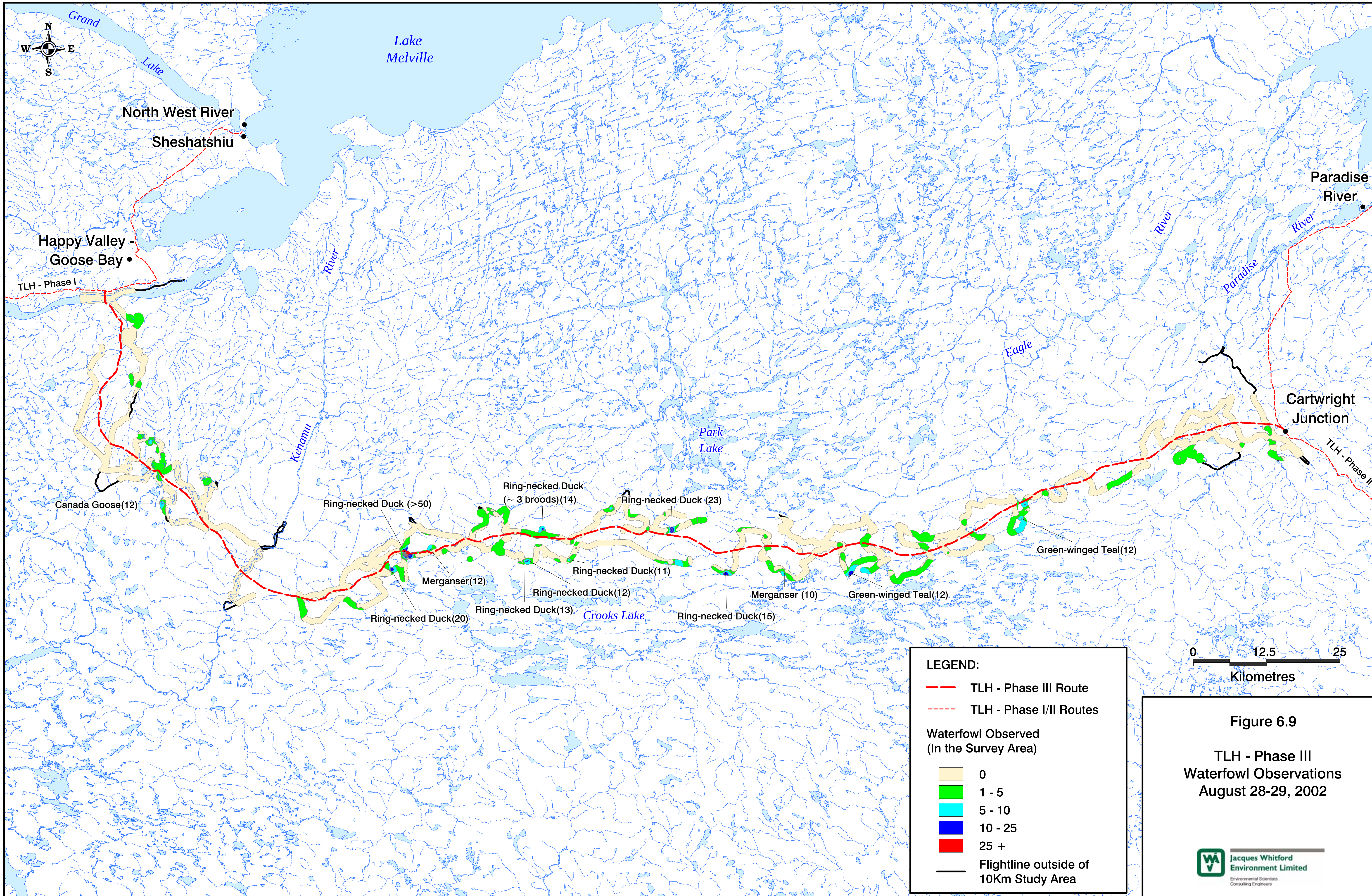


Figure 6.7

TLH - Phase III
Waterfowl Observations
June 1-2 , 2002

NFS08243-13.WOR 29NOV02 3:50pm


N
S
W
E
Grand
Lake
Lake
Melville
North West River
Sheshatshiu
Happy Valley -
Goose Bay
TLH - Phase I
River
Kenamu
Park
Lake
Eagle
River
River
Paradise
Paradise
River
Cartwright
Junction
TLH - Phase II
Canada Goose (13)
Canada Goose (18)
Canada Goose (10)
Black Ducks (>40)
Crooks Lake
Canada Goose (25)
Black Duck (14)
0
12.5
25
Kilometres
LEGEND:
TLH - Phase III Route
TLH - Phase I/II Routes
Waterfowl Observed
(In the Survey Area)
0
1 - 5
5 - 10
10 - 25
25 +
Flightline outside of
10Km Study Area
Figure 6.8
TLH - Phase III
Waterfowl Observations
July 18, 2002
Jacques Whitford
Environment Limited
NFS08243-14.WOR 29NOV02 3:50pm



NFS08243-15.WOR 29NOV02 3:55pm

Green-winged Teal

The number of breeding pairs of green-winged teal observed annually increased 0.3 percent over the period 1990 to 2000, with just over 6,000 pairs observed in the Boreal Shield - Eastern region in 2000. The total population of green-winged teal within the Boreal Shield - Eastern region survey area was estimated to be 68,000 ± 7,900 (CWS 2000) and the population is considered to be increasing (P. Garrettson, pers. comm.). A total of 192 green-winged teal were observed during the surveys conducted in 2002. During the May 9, 2002 survey, two groups of four green-winged teal were observed approximately 5 km south of the highway route, 10 km west of Cartwright Junction. During the May 21, 2002 survey, numerous groups of two to four green-winged teal were distributed along the highway route and one group of 20 was identified on a small tributary of the Kenamu River (Figure 6.6). Similarly, during the June and July surveys, numerous groups of one to three green-winged teal were observed. During the late August survey, two groups of 12 teal were observed along the eastern section of the highway, one group nearly 10 km south of the highway, the second approximately 3 km south of the highway (Figure 6.9).

Ring-necked Duck

Ring-necked duck is another species in which the breeding pair population has apparently increased, with annual observations increasing 2.9 percent in the period 1990 to 2000. Approximately 20,000 pairs of ring-necked ducks were counted in the Boreal Shield - Eastern region in 2000, almost double the number of pairs counted in 1999 (CWS 2000), suggesting the population is increasing. Ring-necked ducks were generally associated with peatland or peatland-marsh habitat during breeding and were often found associated with beaver activity in late August. In 2000, the population of ring-necked ducks within the eastern Canada survey area was estimated to be 144,700 ± 12,700 (CWS 2000). Nearly 100 ring-necked ducks were observed during the June 2002 breeding pair survey and almost 200 individuals were observed during the fall staging survey, supporting the contention that numbers of this species is abundant in the region. No ring-necked ducks were observed during the May surveys. Numerous groups of one or two ring-necked ducks were observed during the June survey, with one group of 20 observed northwest of Crooks Lake (Figure 6.7). A group of nine ducks was observed north of Crooks Lake during the July survey (Figure 6.8). Several large groups of ring-necked ducks were distributed in the survey area during the late August survey, some groups being obvious amalgamations of broods (Figure 6.9). Groups tended to be concentrated in the area between Park Lake and Crooks Lake.

Canada Geese

Approximately 70 percent of the North Atlantic population of Canada geese breeds in Labrador, insular Newfoundland and eastern Québec. Breeding ground surveys for Canada geese, conducted in Labrador by CWS in 1993 and 1994 indicated a stable population compared to surveys in the early 1980s (CWS 2000). The surveys of the 1980s estimated six Canada geese/100 km^2 in the Eagle Plateau ecoregion, 20 geese/100 km^2 in the Paradise River ecoregion, and two geese/100 km^2 in the Lake Melville ecoregion. Estimates of total waterfowl densities were highest in the Eagle Plateau ecoregion (42 ducks/100 km^2) (Goudie and Whitman 1987). In the surveys of the early 1990s, the Eagle Plateau ecoregion was also identified as having the highest average density of Canada geese at 20 to 40 birds/100 km^2. The Paradise ecoregion was estimated to have 10 to 20 geese/100 km^2 and the Lake Melville ecoregion, 0.1 to 10 geese/100 km^2

(Bateman and Hicks 1995). The surveys were repeated in 1998 and 1999 and suggested an increasing population (M. Bateman, pers. comm, cited in CWS 2000). The population was estimated at 175,800 Canada geese in Newfoundland and Labrador in 2000. However, it was felt this number may be an underestimate as the survey in Newfoundland and Labrador in 2000 was conducted early, with more geese observed in small flocks rather than in pairs (Bidwell and Drut 2000, cited in CWS 2000). The North Atlantic Canada goose population is considered stable or increasing (P. Garrettson, pers. comm.). Canada geese were recorded during each survey in 2002, usually associated with string bogs, ribbed fens, and along the grassy shorelines of small rivers. Aggregations of 10 or more Canada geese were observed during the two May surveys (Figures 6.5 and 6.6). However, by the early June survey, geese were observed most frequently in pairs or singularly. By July, aggregations of Canada geese were again evident (Figure 6.8) and during the late August survey, groups of three or more birds were most common, with only one grouping of 10 or more birds observed (Figure 6.9).

Scoters

Sea duck species tend to breed in low densities in remote areas and often cover a broad geographic area, making it difficult to gather information on ecology and population dynamics. This, coupled with low reproductive rates relative to other duck species, often causes concern regarding population status. Overall, most indices of sea duck abundance indicate depressed or declining populations (G. Finney, pers. comm.). Scoters as a group appear to have declined in North America over the long term (Savard et al. 1998) and populations are considered stable or declining (P. Garrettson, pers. comm.). In eastern North America, breeding population estimates declined considerably at an approximate average annual rate of 1 percent between 1955 and 1992 (USFWS 1993). The overall scoter population was estimated to be 940,800 individuals in 2000 (CWS 2000). Scoters were not observed during the May 2002 surveys but were fairly common during the June surveys. Over 100 scoters (mostly surf scoters) were observed during the June breeding survey, most in groups of four or less. Several aggregations of 10 or more scoters were observed as well. The largest group of 15+ individuals was located 2.5 km south of the highway route approximately 50 km west of Cartwright Junction (Figure 6.7). However, by the time of the July survey, the number of scoters observed in the study area markedly declined and none were observed during the late August survey (Figure 6.4). Surf scoters and black scoters were generally seen on rocky shored lakes and ponds where they are known to breed. White-winged scoters are not commonly observed in interior Labrador (CWS 2000) and none were seen during the 2002 surveys.

Long-tailed Duck

Long-tailed duck populations in eastern North America appear to be stable (P. Garrettson, pers. comm.). Two long-tailed ducks were recorded during the late August survey, the only observation of this species recorded during the 2002 surveys. The birds were observed on a small pond 5 km south of the proposed highway, approximately 30 km northeast of Crooks Lake.

Mergansers

Breeding pairs of common and hooded merganser have also showed an increase in the Boreal Shield - Eastern region during the 1990 to 2000 period (data from Black Duck Breeding Ground Surveys), with an annual increase of 6.5 percent and 25.8 percent, respectively. Mergansers were observed on all five surveys in 2002 and were associated with forested rivers and lakes. Mergansers were seen in pairs or singularly and only one aggregation of 10 birds was observed during the late August survey (Figure 6.9). Common goldeneye also showed an annual increase in breeding pair observations of 5.2 percent in this region (CWS 2000). Relatively few common goldeneye were observed during the 2002 surveys, and similar to mergansers, they were usually associated with rivers and lakes, rather than wetland areas. Only one common goldeneye was observed near Cartwright Junction during the May 9 survey. A total of 48 were observed during the June survey, all in pairs or singularly. No common goldeneye were observed during the late May, July, or August surveys.

Harlequin Duck

The eastern population of harlequin ducks are listed as a species of special concern by COSEWIC. The eastern population appears to winter in two distinct areas, coastal Greenland and Atlantic Canada south to Maine. The current estimate of the eastern North America wintering population is approximately 1,500 birds (Robertson and Goudie 1999) and 6,200 moulting harlequin ducks were counted along the western coast of Greenland during surveys in 1999 (Boertmann and Mosbech, cited in CWS 2000). However, it is not known how many of the birds that winter in Greenland actually originate in Canada.

While harlequin ducks are present on rivers in the Churchill River watershed to the west of the project region, and apparently suitable habitat exists along several rivers crossing the highway route (i.e., Traverspine River, Eagle River and Paradise River), no harlequin ducks were observed during the 2002 surveys (JW and LMSS 2003b) or during previous surveys in this region. Only one pair has been observed in southern Labrador, on St. Paul's River in May 1998 (JW 1998b). Surveys conducted between 1995 and 1998 on the Traverspine River (1995 and 1996), Kenamu River (1995 and 1996), Brennan Lake Brook (1996), St. Augustin River (1997), Petit Mecatina River (1995 and 1996), Paradise River (1998) and Eagle River (1997) found no harlequin ducks (JW 1998b). Similarly, no harlequin ducks were observed during another survey of the Traverspine River in 1998 as part of the Churchill River Power Project (AGRA 1999). Also in July 1998, a dedicated harlequin duck survey was completed along the Churchill River, encompassing the area of the proposed highway crossing. No harlequin ducks were observed on the main stem of the river and all harlequin duck observations were made along tributaries west of Gull Island (AGRA 1999).

While it appears that harlequin ducks do not breed or breed at extremely low densities in the project region, it is known that southern Labrador is a migration route for birds returning from wintering grounds off Newfoundland and further south along the eastern seaboard (Brodeur 1997). Refer to Section 6.6, Species at Risk, for further discussion on harlequin ducks.

Barrow's Goldeneye

The breeding and wintering range of Barrow's goldeneye, a species listed as endangered by COSEWIC, is not known to fall within Labrador at this time. However, the core breeding area for this species does appear to be the north shore of the St. Lawrence Estuary and Gulf and a few moulting sites are known in northern Labrador (Robert et al. 2000). The population estimate of this species is 4,500 birds (M. Robert, pers. comm., cited in CWS 2000). No Barrow's goldeneye were observed during the 2002 surveys.

Shorebirds and Other Water-associated Birds

In general, most shorebird populations appear to be stable or declining, with few increasing. Previously, the best information available was for the Atlantic seaboard of Canada, where statistical analysis of count data showed declines in a number of species during the period 1974 to 1991 (Morrison et al. 1994). At that time, although the status of many shorebird populations was uncertain, population trends assessed for the eastern region of Canada indicated that of 23 commonly occurring shorebird species, 14 were considered stable and nine were considered to be in decline (Morrison et al. 1994). Commonly occurring species considered to be stable or declining included: least sandpiper, greater yellowlegs and spotted sandpiper. However, as noted above, most designations were uncertain. Breeding Bird Survey (BBS) trend data from 1980 to 2000 for Newfoundland and Labrador indicate a 7.8 percent decrease in observations of spotted sandpiper[1] (CWS 2002) and a declining trend for solitary sandpiper (-26.9 percent) (Sauer et al. 2002).

Yellowlegs were commonly observed during the 2002 surveys. Population estimates for Canada range from 100,000 greater yellowlegs to 500,000 lesser yellow legs, based on survey data (Morrison et al. 2001).

Common Snipe show a 3.6 percent decline from 1980 to 2000 from BBS trend data for Newfoundland and Labrador (CWS 2002). The Canadian population is estimated to be 2 million birds, although the accuracy of the estimate is considered poor (Morrison et al. 2001). More recent estimates of shorebird populations have been developed by Morrison et al. (2001). Spotted sandpiper numbers in Canada are estimated to be 113,000 individuals while solitary sandpipers are estimated to number 25, 000 individuals (Morrison et al. 2001). The accuracy rating on both estimates is considered poor, meaning it is based on an educated guess (Morrison et al. 2001). The semipalmated sandpiper is considered abundant in Canada, but its status in the east is also uncertain and populations are thought to be stable or declining (Morrison et al. 1994). The Canadian semi-palmated sandpiper population is estimated to be approximately 3.5 million birds, an estimate based on surveys and considered to be in the right order of magnitude (Morrison et al. 2001). Sandpiper species were regularly seen during the 2002 surveys, usually along shorelines of rivers and lakes.

[1] Caution must be exercised when using BBS trend data due to small sample sizes, low relative abundance on survey routes, imprecise trends, and missing data. Data for Newfoundland and Labrador are presented with important deficiencies related to the above issues.

The eskimo curlew, listed as endangered by COSEWIC, was once numerous, numbering in the hundreds of thousands in the 1800s. By 1900, the species was almost extinct and, since that time, there have been only a few sightings. A1978 estimate indicated that fewer than 20 individuals remained (Environment Canada 2002a). The known breeding range included the Northwest Territories and, possibly, Yukon and Alaska. During fall migration, large numbers moved down the Labrador coast, feeding on crowberry barrens and intertidal flats. Wintering occurred in South America. Uncontrolled hunting during spring and fall migration is likely the main reason for the decline in eskimo curlew numbers (Environment Canada 2002a). While it is possible that some individuals remain, it is unlikely that the species is currently using habitat in the project region during migration.

Newfoundland BBS data analyzed by the United States Geological Survey (USGS) indicate a positive trend for common loon (2.7 percent) and greater yellowlegs (18.5 percent) from 1966 to 2001. Herring gull, great black-backed gull and common tern all exhibited declining trends during the same period in Newfoundland with the ring-billed gull showing an increasing trend (Sauer et al. 2002). Note that the USGS data refer to Newfoundland trend results only; it is unlikely any data are derived from Labrador and similar cautions as those noted for CWS BBS data apply. During the 2002 surveys, common loons, herring gulls and other gulls were generally associated with medium and large waterbodies and greater yellowlegs were commonly observed in wetland areas. Loons were not recorded during the surveys until June, when the majority of lakes were ice-free.

The results of surveys conducted in 2002 further indicate the importance of the Eagle Plateau area for waterfowl breeding, with 76 percent of waterfowl observations during the June breeding survey occurring within this ecoregion.

6.2.3.2 Passerine Birds

In 2001, the Institute for Environmental Monitoring (IEMR) conducted songbird surveys along two large rivers in Labrador, the Little Mecatina River and St. Augustin River. The rivers, located approximately 160 km south of Happy Valley-Goose Bay, flow through southern Labrador and eastern Québec into the Gulf of St. Lawrence (IEMR 2002).

A total of 53 species were detected during the surveys. The most common species detected were slate-colored (dark-eyed) junco, Swainson's thrush and ruby-crowned kinglet (IEMR 2002). The species identified during the IEMR songbird surveys, and the BBS trend data for the species, where such information are available, are indicated in Table 6.3. Habitat suitable for all of these species is found in the project region and it is likely that most species are present at some time of the year.

Table 6.3 Bird Species Identified at Little Mecatina River and St. Augustin River, Labrador in 2001 and Breeding Bird Survey Trend Data for Newfoundland and Labrador

Species Observed	BBS Trend (mean annual increase or decrease in observations)		Species Observed	BBS Trend (mean annual increase or decrease in observations)	
	1980-2000	1966-2001		1998-2000	1966-2001
Ruffed Grouse[1]	n/a[2]	n/a	Cedar Waxwing	n/a	13
Spruce Grouse	n/a	n/a	Tennessee Warbler	-5.4	-7
Spotted Sandpiper	-7.8	-4.4	Magnolia Warbler	2	0.4
Common Nighthawk[3]	n/a	n/a	Yellow-rumped Warbler	-4.8	5
Belted Kingfisher	n/a	21.9	Black and White Warbler[1]	7.2	-2.5
Northern Flicker	n/a	-1.2	Blackburnian Warbler	n/a	n/a
Hairy Woodpecker[1]	n/a	-8.4	Black-throated Green Warbler	n/a	-10.4
Three-toed Woodpecker[3]	n/a	0.5	Bay-breasted Warbler	n/a	n/a
Black-backed Woodpecker[3]	n/a	-8.1	Blackpoll Warbler	-4.5	-6
Olive-sided Flycatcher[1]	n/a	-4.8	Palm Warbler	n/a	4.9
Yellow-bellied Flycatcher	0.4	-1.7	Yellow Warbler	-2.5	0.2
Alder Flycatcher[3]	n/a	9.5	Wilson's Warbler	-0.8	3.1
Philadelphia Vireo[3]	n/a	10.1	Ovenbird[3]	n/a	-15.4
Blue-headed Vireo	n/a	-16.1	Northern Waterthrush	-3.8	-4.7
Blue Jay[3]	n/a	-5.7	American Redstart[3]	1.7	10.3
Canada Jay	n/a	-0.2	Chipping Sparrow	n/a	-16.1
Common Raven[1]	1.6	-6.6	Fox Sparrow	-0.9	3.5
Tree Swallow[1]	-8.6	-5	White-throated Sparrow	0.3	-0.1
Boreal Chickadee	-6.7	-10.8	White-crowned Sparrow	n/a	-3.7
Red-breasted Nuthatch	n/a	n/a	Lincoln's Sparrow[1]	-3.9	-0.2
Winter Wren	n/a	35.7	Slate-colored (Dark-eyed) Junco	0.6	0.9
Golden-crowned Kinglet	n/a	85.2	Rusty Blackbird[1]	n/a	-13.3
Ruby-crowned Kinglet	3.4	4.3	Purple Finch[3]	n/a	12.9
Swainson's Thrush	-0.4	10.6	White-winged Crossbill	n/a	-25.4
Hermit Thrush	4.7	5.4	Pine Grosbeak[3]	0.7	17.2
American Robin	2	-1.8	Pine Siskin	n/a	-1.9
Bohemian Waxwing	n/a	n/a			

[1] Only detected at Little Mecatina River
[2] BBS trend data not available
[3] Only detected at St. Augustin River

Source: IEMR 2002; CWS 2002; Sauer et al. 2002.

Blackpoll warblers (Table 6.3) are currently rated "high" as a Canadian concern and as "5", the highest priority, in the Newfoundland and Labrador responsibility category (Dunn 1997). The BBS data also indicate a declining trend for this species (Table 6.3). Other species with a "high" Canadian concern include black-backed woodpecker, boreal chickadee, white-throated sparrow, rusty blackbird, and purple finch. With the exception of purple finch, all of these species have experienced a decline (Table 6.3). The three most commonly seen species during the IEMR surveys, slate-colored junco, Swainson's thrush and ruby-crowned Kinglet, all exhibit a generally increasing trend (Table 6.3).

Currently, there are no passerine birds with known distributions in Labrador listed by COSEWIC (COSEWIC 2002).

6.2.4 Potential Interactions

During construction, the clearing of vegetation may result in the loss of nesting habitat for waterfowl and passerine birds. Noise and general disturbance including use of lights, blasting activities and vehicular movement, during construction of the highway and at watercourse crossings, may also disturb nesting or foraging birds. During operation, noise and regular vehicular activity may also cause disturbance, resulting in avoidance of habitat in the vicinity of the highway.

The presence of the highway will result in improved access to areas previously difficult to reach except by air, boat in the summer or snowmobile in winter. This may lead to increased hunting pressure on waterfowl in the region.

An accidental event such as a forest fire may cause waterfowl and passerine birds to avoid areas previously inhabited. Contamination of waterbodies resulting from spills of fuel or other hazardous materials could lead to oiling of waterfowl and other water-related birds, as well as reduced foraging opportunities for aquatic feeders. Similarly, siltation of waterbodies during construction could also result in reduced foraging opportunities. Collisions with vehicles may cause mortality to waterfowl and passerine birds.

6.2.5 Issues and Concerns

Issue and concerns related to waterfowl and passerine birds include:

- loss of nesting and foraging habitat due to vegetation removal or accidental event such as a forest fire;
- avoidance of habitat due to project-related disturbances (i.e., noise);
- increased hunting pressure on waterfowl due to improved access;
- reduced foraging opportunities as a result of spills of fuel or other hazardous materials or siltation of waterbodies; and
- mortality through vehicle collisions or spills of fuel or other hazardous materials.

6.2.6 Existing Knowledge

6.2.6.1 Waterfowl

While waterfowl may not avoid areas of human activity during breeding, they have been noted to avoid these areas during early brood-rearing (Kuchel 1977). Reduced reproductive success has been reported in the vicinity of human activity (Bengtson 1972; Dzubin 1984; Cassirer and Groves 1990), with the greatest disturbance occurring during nesting, incubation and brood rearing. Following disturbance, a nest can be more susceptible to predation and this effect has been reported for a number of species of waterfowl and seabirds (Todd 1963; Burger 1981).

Noise from project activities may interfere with vocal communication or with the detection of predators. For example, flocks of waterfowl in open areas detect predators by visual clues, whereas individuals in dense vegetation depend more on noise cues to detect predators. A general conclusion regarding noise disturbance and wildlife is that noise levels under 90 dBA or of a continuous or predictable nature have little environmental effect and lead to habituation (Gladwin et al. 1988).

The presence of a highway itself does not typically cause a disturbance response, rather, it is human presence on the highway that causes the greater effect. A study on the effects of human disturbance on trumpeter swans found that regular aircraft overflights and passing highway traffic alerted nesting trumpeter swans, but did not cause incubating females to leave the nest. However, while the swans did not react to passing highway traffic, stopped vehicles and pedestrians caused birds to leave their nests more often (Henson and Grant 1991). Similarly, colonial waterbirds such as great blue heron exhibit greater than average flush distances in reaction to walking approaches than to motorized approaches (Klein 1993). While trumpeter swans and great heron do not nest in Labrador, these species can be expected to exhibit responses to disturbance that are similar to those of related species that do nest in Labrador.

Behavioural investigations of harlequin ducks in western Canada found that during white-water rafting activities, the ducks spent less of their loafing time sleeping and more time just resting as they had to remain vigilant to avoid disturbances. The ducks also showed a measurable shift in habitat use within the area once rafting began (Hunt 1995). Another study found that American black ducks curtailed feeding and increased time spent in alert and locomotion behaviour in response to human disturbance (Morton et al. 1989).

Monitoring of highway traffic conducted for the Northumberland Strait Crossing project suggests that the abundance of scoters, common eiders, long-tailed ducks and red-breasted mergansers was not negatively affected by the construction and initial months of operation of the Confederation Bridge (JW 1998d). Other species such as Canada goose and American black duck appear to be able to tolerate human activity, as evidenced by the presence of Canada goose and black duck broods in many urban parks. However, in Washington, Canada goose broods avoided areas of human activity within their home range, particularly during the first few weeks after hatching (Eberhardt et al. 1989), indicating that the ability to tolerate disturbance is likely the result of habituation to predictable disturbances. In England, pink-footed geese used fields next to heavily-travelled highways considerably less than fields adjacent to highways with little traffic (Gill et al. 1996). Similarly, Keller (1991) found that geese wintering in northeast Scotland tended to avoid fields close to highways. In contrast, in the prairie pothole region of North America, blue-winged teal frequently use highway rights-of-way (Greenwood et al. 1995).

Linear developments provide access for hunters. In a study of ruffed grouse hunting in Alberta, harvesting along highways accounted for 96 percent of the birds killed (Fischer and Keith 1974). Generally, it may be expected that waterfowl hunters are likely to access wetlands and waterbodies that can be reached along a disturbance corridor such as a trail or highway.

Ducks may be killed along highways. A highway mortality study in prairie habitats of North and South Dakota found average annual mortality ranged from 0.156 ducks/km for an interstate highway (7,600 vehicles/day) to 0.005 ducks/km on unsurfaced highway (72 vehicles/day). Eighty-seven percent of the ducks found were killed on surfaced highways in contrast to 17 percent along unsurfaced highways. Differences in traffic volume and speed affected the number of ducks that were killed (Sargeant 1981).

Individual ducks are highly vulnerable to oiling, but due to their wide distribution, a single accidental fuel or chemical spill at an interior location is unlikely to seriously affect populations (Lock et al. 1994).

6.2.6.2 Passerine Birds

The fragmentation of habitat is a potential concern with respect to declining neotropical bird populations (Simberloff 1993). Fragmentation has been widely considered to be the cause of reduced ecosystem stability and increased risk of species extinctions (Perry 1994). Nest predation may increase greatly in a fragmented landscape. Wilcove (1985; 1990, cited in Simberloff 1994) placed artificial nests with quail eggs in eastern US forests of different size, ranging from small woodlots to the continuous forest of the Great Smoky Mountains National Park. In the latter case, only 2 percent of nests were preyed upon within one week, while nests in stands between 4 to 10 ha averaged 48 percent predation. Migrant bird species that nest on or near the ground are most vulnerable to the increased predation occurring in small forest patches (Perry 1994).

In a survey of breeding bird populations in deciduous forest of the eastern United States, Whitcomb et al. (1981, cited in Perry 1994) found that migrant birds accounted for 80 to 90 percent of breeding individuals in large forest tracts but less than one half of breeding individuals in small tracts. Similarly, in Newfoundland, interior forest birds were rare in riparian buffer strips 40 to 50 m in width and three of six species of interior forest birds were not observed in any buffer strips (Whitaker and Montevecchi 1999). Interior-forest birds breeding along the right-of-way of a highway may incur increased nest predation by a variety of avian and mammalian predators (Leimgruber et al. 1994; Robinson et al. 1995) as predators may have access into areas that they did not previously travel (Robinson and Wilcove 1994; Rich et al. 1994). In general, when a corridor is cut through a forested area, birds that are considered habitat generalists become more common along the corridor (Hanowski and Niemi 1995; Ferris 1979). Miller et al. (1998) also found a similar pattern when looking at trails. Habitat edge species such as American robin and blue jay were more abundant at sites with trails than on sites without trails. At a landscape scale, the presence of narrow forest-dividing disturbance corridors (as narrow as 8 m) may have a cumulatively measurable effect on the abundance of forest-interior bird species (Rich et al. 1994). However, other bird species, particularly mixed habitat and early successional species, tend to increase in numbers (Askins 1994).

Although fragmentation is a concern, it is important to understand the ecology of local ecosystems and landscapes, and evaluate disturbances in terms of their "foreignness" within a given system (Freemark 1989). The study area is characterized by a naturally fragmented landscape of densely forested areas interspersed with open lichen forest, bogs, barrens, and wetlands. The mix of species living within this system are adapted to this natural fragmentation and the more variable landscapes produced by fire (Perry 1994).

Dispersal patterns of birds can be affected by linear developments. Male willow warblers breeding next to a heavily travelled highway were found to disperse in a directed route away from the highway and breeding dispersal distances of yearling males along the highway was larger than at further distances from the highway (Foppen and Reijnen 1994). A study of breeding birds in the Netherlands found that 60 percent of woodland bird species showed a reduced density adjacent to highways; however, habituation to traffic did appear to occur over time (Reijnen et al. 1995). Another study in the Netherlands found that at 5,000 cars per day, most species of passerine birds decreased from 12 percent to 56 percent within 100 m of the highway. At 50,000 cars per day, populations decreased from 12 percent to 56 percent up to 500 m from the highway (Reijnen et al. 1996), indicating that traffic volume affects the degree to which birds avoid highways.

During the construction of the Confederation Bridge, songbird abundance decreased in the area during construction but stabilized once the bridge was operational. This suggests that resident birds became habituated to the higher but more constant flow of traffic associated with the operational phase of the project, and were less affected than by the more episodic disturbance events associated with construction activity (JW 1998d).

Mortality to passerine birds as a result of linear development may occur as a result of vehicle collisions on highways. For example, in British Columbia, pine siskins are attracted to the highway in large numbers in winter and hundreds may be killed by a single vehicle (Woods and Munroe 1996).

6.2.7 Mitigation

WST has attempted to reduce the project's potential effects on waterfowl and passerine birds through project design and planning. Specific mitigative measures include the following:

- vegetation removal restricted to 30 m in the right-of-way, with removal of forest vegetation in areas where active nests are identified, occurring outside of the nesting period in sensitive areas;
- blasting activities coordinated to avoid sensitive areas such as incubation and early brood rearing areas;
- reduction or avoidance of in-stream activity;
- use of accepted practices for erosion control and slope stabilization;
- drainage to and through wetlands will be maintained to prevent loss of water supply to downslope areas;
- no harassment or feeding of waterfowl by project personnel;
- construction vehicles will remain in the right-of-way and all-terrain vehicles will use designated routes, avoiding wetland areas wherever possible;
- all construction personnel will be required to follow all applicable legislation for hunting and using and storing firearms;
- at locations along the highway where active migratory bird nests are present or suspected, maintenance activities will be restricted until eggs have hatched and broods are mobile; and
- design and implementation of fuel and other hazardous material spill contingency plans and emergency response in the event of an accident.

Many of the potential adverse effects of the project stem from the improved access provided by the highway, and the associated increase in human presence and activities in this previously remote area. Mitigating these potential effects is, for the most part, beyond the ability and responsibility of WST. Managing these actions and their potential effects will require the efforts of regulatory and resource management agencies, in order to ensure that applicable legislation and regulations are adequately enforced, and that future activities are undertaken in a responsible and sustainable manner. In this regard, the purpose of the environmental assessment is to identify these potential issues well in advance of their occurrence, so that appropriate measures can be identified and implemented by the appropriate agencies in an effective and timely manner.

6.2.8 Environmental Effects Assessment

6.2.8.1 Construction

There will be a direct loss of potential foraging and nesting habitat through vegetation removal along the highway right-of-way. The amount of forest vegetation that will be removed as a result of highway construction is approximately 496 ha (includes spruce/fir and spruce/lichen forest). The amount of wetland or otherwise unforested area that will be removed is approximately 230 ha. However, the vegetation types that will be affected by construction are not considered unique within the region, and are well represented in the surrounding area.

The total area that will be disturbed by the highway right-of-way is 7.5 km^2 and primary road density in Labrador is .004 km/km^2. It is generally accepted that highway density is a key predictor that can be used to estimate the effects of disturbance and habitat fragmentation. Therefore, in the project region, the proposed highway will be the only existing highway and the effects of the 30-m wide corridor on fragmentation of forest or wetland habitat will be restricted to the local area. A minimum 20 m buffer will be maintained around waterbodies, where possible. Also, the area is a natural mosiac of forested and non-forested patches and the species living in the area are adapted to this variable pattern of vegetation distribution. There may be a change in the distribution of forest-interior birds in areas where the highway travels through contiguous forest. However, bird densities in the region are relatively low, inferring the number of birds affected by the creation of forest edge as a result of highway construction is likely to also be low. Thus, there will likely be no measurable effect on any species at the population level.

During the June 1 to 2, 2002 breeding pair survey, 138 wetlands with areas ranging from 4.5 to 3,418.7 h/a were surveyed for waterfowl (Figure 6.10). Where several wetland areas merged with separation by a river or small line of forest type vegetation, a single polygon was assigned (i.e., considered one wetland out of the 138). The observations from this survey of over 1,200 waterfowl were used to compare wetland area with the abundance of waterfowl (JW and LMSS 2003b).

Nine wetlands were identified to have a relatively high density of waterfowl (density > 0.10 birds/ha) (Table 6.4 and Figure 6.10). Three of the wetlands are <1 km from the centreline, with one, located at the eastern end of the highway near Cartwright Junction, only 100 m away from the right-of-way (Figure 6.10). Wetlands 66 and 68 have large numbers of waterfowl relative to their size, as well as a waterfowl density greater than 0.10 birds/ha (Table 6.4). However, Wetland 44 exhibits the highest density of waterfowl, even though the absolute number of birds is relatively low (Table 6.4). As density is perhaps the most ecologically relevant factor to consider with respect to waterfowl use of an area, Wetland 44 may be of particular importance to waterfowl. Wetland 44 is 500 m from the centreline of the proposed highway (Figure 6.10). None of these wetlands will be physically altered by highway construction.

Table 6.4 Wetlands with Waterfowl Densities > 0.10 birds/ha

Wetland No.	Area (ha)	Distance from RoW (m)	No. of Waterfowl	Density (#birds/ha)
4	27.91	3000	4	0.14
10	18.38	900	3	0.16
44	13.58	500	8	0.59
66	436.81	2300	47	0.11
68	189.85	2800	33	0.17
79	66	3100	7	0.11
94	44.76	1800	5	0.11
111	18.52	1300	2	0.11
138	16.94	100	2	0.12

Analysis of the June survey results also indicated that the probability of the occurrence of waterfowl increases with wetland area, suggesting support for the hypothesis that, in this region, suitable waterfowl habitat is widespread although not highly productive. Few areas were identified that had waterfowl densities suggestive of more productive habitat.

Noise and human disturbance during construction may cause waterfowl and passerine birds to avoid habitat in the vicinity of the activity. Waterfowl are particularly sensitive during the nesting and brood-rearing period from mid-May through mid-August. However, following construction, waterfowl will use suitable habitat in close proximity to the operating highway as long as traffic is moving along the highway in a predictable manner and birds habituate to the activity. Similarly, passerine birds are likely to habituate to highway-related activities following construction.

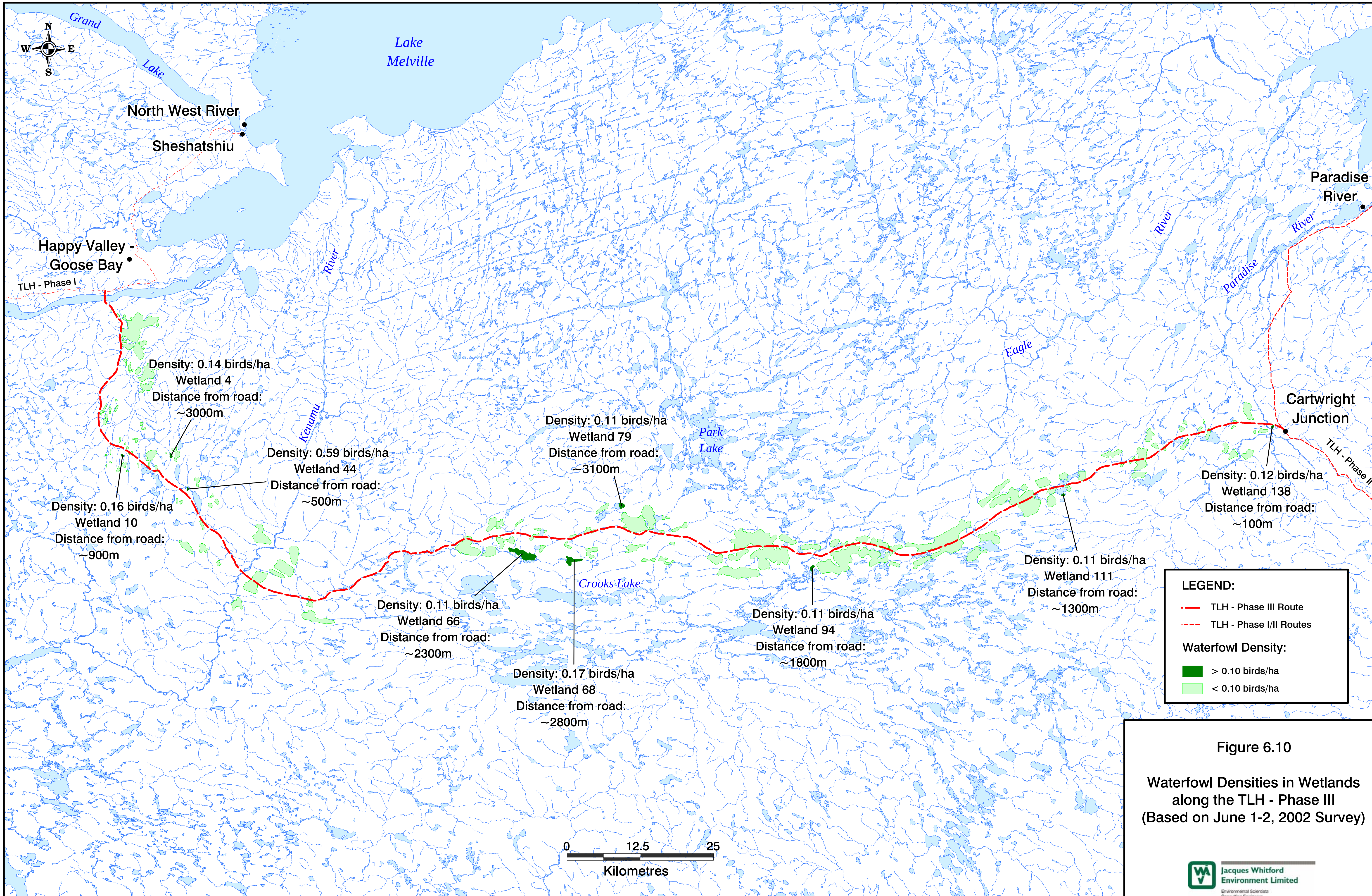


Figure 6.10

Waterfowl Densities in Wetlands along the TLH - Phase III (Based on June 1-2, 2002 Survey)

Jacques Whitford Environment Limited

NFS08243-43.WOR 29NOV02 4:00pm

6.2.8.2 Operation

No further habitat will be altered during operation. As noted above, waterfowl and passerine birds will likely become habituated to non-threatening activity along the highway, specifically vehicle traffic; therefore, the potential disturbance effects is negligible. During operation, increased hunter access will likely affect waterfowl using habitat in proximity to the highway. A decline in waterfowl density within 1 km of the highway is likely to occur as a result of increased hunting activity, although the number of waterfowl affected represents only a small portion of the Labrador population. As noted previously, it is beyond the ability of WST to regulate hunting activity. Appropriate measures to regulate hunting activity can be identified and should be implemented by resource management agencies.

6.2.8.3 Accidental and/or Unplanned Events

An accidental spill of fuel or other hazardous materials into waterbodies or in riparian zones in the project area could cause mortality to waterfowl and other avifauna. Contamination of waterbodies from fuel or oil spills or siltation could result in reduced foraging opportunities that influence survival and reproductive success. However, any such event that would arise from a highway accident or leak from equipment would be relatively small and localized and will not have a significant effect on populations of waterfowl or other avifauna. The use of accepted practices for erosion control and slope stabilization will limit the likelihood of siltation of waterbodies during construction.

A forest fire could destroy habitat for passerine birds and some cavity nesting ducks such as common goldeneye and common merganser. As well, a loss of vegetation around wetlands and other waterbodies may cause waterfowl and shorebirds to abandon these areas. A large fire may destroy hundreds of hectares of vegetation, which could result in a decrease in densities within the affected region. However, birds, like many boreal species, have adapted to a cycle of naturally occurring fires and the proportion of the population affected during any one fire would be small. Wetland habitats are also less susceptible to fire due to the moisture regime.

With implementation of environmental protection planning, the potential for such accidental events occurring is extremely low. If such an accident should occur, the importance of its potential effects will depend on event location, timing, nature and magnitude. WST’s contingency planning and emergency response plans will ensure that any adverse effects are reduced.

Mortality induced through collisions with vehicles may occur and studies have shown that such mortality is influenced by the number of vehicles that travel the highway daily. The volume of traffic anticipated to occur on the proposed highway is relatively low. Therefore, it is likely that the number of individual birds killed as a result of vehicle collisions will be low.

A summary of the environmental effects associated with each project phase is presented in Section 6.2.9.

6.2.9 Environmental Effects Evaluation

The key potential interactions between project activities and waterfowl and passerine birds include direct disturbance, habitat loss and increased hunting of waterfowl. The following definitions are used to rate the significance of the predicted residual environmental effects of the project on waterfowl and passerine birds.

A **major (significant) environmental effect** is one affecting a waterfowl or passerine population in such a way as to cause a change in abundance and/or distribution beyond which natural recruitment (reproduction and in migration from unaffected areas) would not return that population, or any populations or species dependent upon it, to its former level within several generations. The effect is not reversible.

A **moderate (significant) environmental effect** is one affecting a portion of a waterfowl or passerine population in such a way as to cause a change in the abundance and/or distribution of that portion of the population or any populations or species dependent upon it over one or more generations, but does not change the integrity of any population as a whole. The effect may not be reversible.

A **minor (not significant) environmental effect** is one affecting a specific group of individuals of a species of waterfowl and passerine in such a way as to cause a change in abundance and/or distribution in a localized area and/or over a short period (one generation or less), but not affecting other trophic levels or the integrity of the population itself. The effect is reversible.

A **negligible (not significant) environmental effect** is one affecting a specific group of individuals of a species of waterfowl and passerine in such a way as to cause a change in abundance and/or distribution in a localized area and/or over a short period (one generation or less) in a manner similar to small random changes in the population due to natural irregularities, but having no measurable effect on the population as a whole. The effect is reversible.

The proposed highway is a linear development that will avoid wetland areas, where feasible. Therefore, interactions with waterfowl will be reduced. For waterfowl, the environmental effects will be restricted to removal of habitat in the immediate highway corridor and the indirect effect of improved access to areas along the highway. For passerine birds, the environmental effects will be restricted to removal of habitat in the immediate highway corridor. Based on the preceding discussion and proposed mitigations, the residual effects of the project on waterfowl and passerine birds are assessed as minor (not significant) for construction and operation (Tables 6.5 and 6.6). The residual effects of an accidental event on waterfowl is also considered minor (Table 6.5). However, an accidental forest fire may remove large areas of habitat for passerine birds. Therefore, the residual effects of an accidental event on passerine birds is considered moderate (significant) (Table 6.6). Overall, the project is not likely to result in significant adverse environmental effects on waterfowl or passerine birds.

Table 6.5 Environmental Effects Summary - Waterfowl

<table>
<tr><th></th><th>Construction</th><th>Operation</th><th>Accidental/Unplanned Events</th></tr>
<tr><td colspan="4">Mitigation:
• vegetation removal restricted to 30 m in the right-of-way, with removal of forest vegetation in areas where active nests are identified, occurring outside of the nesting period in sensitive areas;
• blasting activities coordinated to avoid sensitive areas such as incubation and early brood rearing areas;
• reduction or avoidance of in-stream activity;
• use of accepted practices for erosion control and slope stabilization;
• drainage to and through wetlands will be maintained to prevent loss of water supply to downslope areas;
• no harassment or feeding of waterfowl by project personnel;
• construction vehicles will remain in the right-of-way and all-terrain vehicles will use designated routes, avoiding wetland areas wherever possible;
• all construction personnel will be required to follow all applicable legislation for hunting and using and storing firearms;
• at locations along the highway where active migratory bird nests are present or suspected, maintenance activities will be restricted until eggs have hatched and broods are mobile; and
• design and implementation of fuel and other hazardous material spill contingency plans and emergency response in the event of an accident.</td></tr>
<tr><td colspan="4">Environmental Effects Criteria Ratings</td></tr>
<tr><td>Magnitude</td><td>Low</td><td>Low</td><td>Unknown</td></tr>
<tr><td>Geographic Extent</td><td><1 km^2</td><td>1-10 km^2</td><td>100 km^2</td></tr>
<tr><td>Frequency</td><td>Continuous</td><td>Continuous</td><td><10</td></tr>
<tr><td>Duration</td><td>72</td><td>>72</td><td>>72</td></tr>
<tr><td>Reversibility</td><td>Irreversible</td><td>Irreversible</td><td>Unknown</td></tr>
<tr><td>Ecological/Socio-economic Context</td><td colspan="3">Low/May be affected by effects to water and fish and fish habitat and influence resource use and users.</td></tr>
<tr><td colspan="4">Environmental Effects Evaluation</td></tr>
<tr><td>Significance</td><td>Not Significant (Minor)</td><td>Not Significant (Minor)</td><td>Not Significant (Minor)</td></tr>
<tr><td>Level of Confidence</td><td>High</td><td>High</td><td>High</td></tr>
<tr><td>Likelihood[1]</td><td>n/a</td><td>n/a</td><td>n/a</td></tr>
<tr><td>Sustainable Use of Resources[1]</td><td>n/a</td><td>n/a</td><td>n/a</td></tr>
<tr><td colspan="4">[1] Likelihood is only defined for effects rated as significant, and Sustainable Use of Resources is only defined for those effects rated as significant and likely (Canadian Environmental Assessment Agency 1994).</td></tr>
<tr><td colspan="4">Environmental Monitoring and Follow-up:
No monitoring is proposed for waterfowl</td></tr>
<tr><td colspan="4">Key:

Magnitude: High, Medium, Low, Nil or Unknown
Geographic Extent (km^2): <1, 1-10, 11-100, 101-1,000, 1,001-10,000, >10,000 or Unknown
Frequency (events/year): <10, 11-50, 51-100, 101-200, >200, Continuous or Unknown
Duration (months): <1, 1-12, 13-36, 37-72, >72 or Unknown
Reversibility: Reversible, Irreversible or Unknown
Context: Existing Disturbance (High, Medium, Low, Nil or Unknown)
Significance: Minor, Moderate, High
Level of Confidence: High, Medium, Low
Likelihood: High, Medium, Low or Unknown
Sustainable Use of Resources: High, Medium, Low or Unknown</td></tr>
</table>

Table 6.6 Environmental Effects Summary - Passerine Birds

	Construction	Operation	Accidental/Unplanned Events
Mitigation: • vegetation removal restricted to 30 m in the right-of-way, with removal of forest vegetation in areas where active nests are identified occurring outside of the nesting period (May 15 to August 1); • blasting activities coordinated to avoid sensitive areas such as incubation and early brood rearing areas; • reduction or avoidance of in-stream activity; • use of accepted practices for erosion control and slope stabilization; • drainage to and through wetlands will be maintained to prevent loss of water supply to downslope areas; • no harassment or feeding of birds by project personnel; • construction vehicles will remain in the right-of-way and all-terrain vehicles will use designated routes, avoiding wetland areas wherever possible; • at locations along the highway where active migratory bird nests are present or suspected, maintenance activities will be restricted until eggs have hatched and young have fledged; and • design and implementation of fuel and other hazardous material spill contingency plans and emergency response in the event of an accident.			
Environmental Effects Criteria Ratings			
Magnitude	Low	Low	Unknown
Geographic Extent	<1 km^2	1-10 km^2	100 km^2
Frequency	Continuous	Continuous	<10
Duration	72	>72	>72
Reversibility	Irreversible	Irreversible	Irreversible
Ecological/Socio-economic Context	Nil		
Environmental Effects Evaluation			
Significance	Not Significant (Minor)	Not Significant (Minor)	Significant (Moderate)
Level of Confidence	High	High	High
Likelihood[1]	n/a	n/a	Low
Sustainable Use of Resources[1]	n/a	n/a	n/a

[1] Likelihood is only defined for effects rated as significant, and Sustainable Use of Resources is only defined for those effects rated as significant and likely (Canadian Environmental Assessment Agency 1994).

Environmental Monitoring and Follow-up:
WST will conduct breeding songbirds surveys in representative habitat types along the proposed highway route in 2003 in order to document the occurrence of birds prior to construction of the highway.

Key:

Magnitude:	High, Medium, Low, Nil or Unknown
Geographic Extent (km^2):	<1, 1-10, 11-100, 101-1,000, 1,001-10,000, >10,000 or Unknown
Frequency (events/year):	<10, 11-50, 51-100, 101-200, >200, Continuous or Unknown
Duration (months):	<1, 1-12, 13-36, 37-72, >72 or Unknown
Reversibility:	Reversible, Irreversible or Unknown
Context:	Existing Disturbance (High, Medium, Low, Nil or Unknown)
Significance:	Minor, Moderate, High
Level of Confidence:	High, Medium, Low
Likelihood:	High, Medium, Low or Unknown
Sustainable Use of Resources:	High, Medium, Low or Unknown

6.2.10 Cumulative Environmental Effects

Angling, hunting and trapping have been ongoing in the project region for many years. These activities tend to be localized and of short duration at any given time, with the result that the region is essentially pristine and undisturbed by human activity. Low-level flying of military aircraft has been occurring in the region since the 1980s. A portion (approximately 92 km) of the proposed highway route would occur within the existing LLTA. The existing sections of the Trans Labrador Highway represent additional habitat loss to waterfowl and passerine populations in Labrador. Similarly, the development of the Voisey's Bay Mine/Mill project will also result in additional habitat loss and disturbance to these species groups. Snowmobile trails are found throughout the region. However, waterfowl are not likely to interact with snowmobile activity, as all species are migratory.

In addition to these local activities, migratory waterfowl and passerine birds may be affected by a range of activities and associated disturbances within their often extensive ranges, such as vegetation clearing, pesticides and other pollution. The extent to which these factors influence the Labrador population of migratory birds, and particularly, those which use the proposed project area, is unknown and very difficult to predict. The United States and Mexico, where many migratory birds winter, are signatory to the Migratory Bird Convention which provides protection to these species. Hunting regulations are enforced in the United States, along with pesticide and pollution control measures. However, extensive development and human activity on wintering grounds (i.e., New England, the southern United States, Central America) is considered to be an important influence on migratory waterfowl and passerine bird populations.

The most important development activity that is likely to occur following highway construction is commercial forestry. Forestry results in the loss of mature stands of coniferous forest that alters habitat, particularly for forest-associated passerine birds, and the noise and other disturbances associated with these activities may cause waterfowl and passerines to avoid these areas. Potential indirect effects include changes to water table levels, which may subsequently alter the attributes of neighbouring wetlands, ponds and bogs. However, forestry guidelines stipulate that a minimum 20 m vegetation buffer be maintained along waterbodies following forest harvesting. This would provide a measure of protection to nesting and foraging habitat of waterfowl. Other land and resource activities, such as mineral exploration, hunting and angling are also likely to increase due to enhanced access provided by the proposed highway. Cabin development along the highway may also occur, creating areas of permanent human disturbance that may cause waterfowl and passerine birds to alter habitat use patterns in an area. Legislation and regulations are in place to control these various activities.

Details such as the likelihood, nature, location and timing of any actions induced by the TLH - Phase III are not known and the control of most potential induced actions and their related effects are beyond the jurisdiction of WST. Control depends on interagency planning and cooperation. As a result, assumptions are made for assessing cumulative effects of induced actions, including:

- other projects and activities will be subject to appropriate planning and management;
- other projects and activities will be subject to the appropriate government requirements (e.g., legislation, regulations and guidelines) for protecting crown resources;
- relevant government agencies will have adequate resources to effectively carry out their mandate with respect to enforcement;
- the level of adherence to existing regulatory requirements will not measurably change; and
- the TLH - Phase III will be designated a protected road and subject to the *Protected Road Zoning Regulations* administered by MAPA.

The creation of the Akamiuapishku/Mealy Mountains National Park, which would encompass approximately half of the highway route, would afford protection to waterfowl from hunting and would protect habitat from activities such as cabin development and forest harvesting.

With the implementation of the mitigation measures, appropriate planning and enforcement, the proposed project is not likely to result in significant cumulative environmental effects in combination with other projects and activities that have been or will be carried out.

6.2.11 Environmental Monitoring and Follow-up

WST will conduct breeding songbirds surveys in representative habitat types along the proposed highway route in 2003 in order to collect baseline data on the species of birds using the area prior to construction of the highway.