JWEL PROJECT NO. NFS08243

RAPTOR COMPONENT STUDY
TRANS LABRADOR HIGHWAY
(HAPPY VALLEY-GOOSE BAY
TO CARTWRIGHT JUNCTION)

JANUARY 2003

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RAPTOR COMPONENT STUDY
TRANS LABRADOR HIGHWAY
(HAPPY VALLEY-GOOSE BAY
TO CARTWRIGHT JUNCTION)

SUBMITTED TO

DEPARTMENT OF WORKS, SERVICES AND TRANSPORTATION
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JANUARY 16, 2003

EXECUTIVE SUMMARY

The Department of Works, Services and Transportation (WST) is proposing to construct a 250 km, two-lane gravel surface highway from Cartwright Junction to Happy Valley-Goose Bay. The proposed alignment for the Trans Labrador Highway (TLH) will intersect areas expected to be used by breeding osprey, bald eagle, and other raptors, potentially resulting in habitat alteration or disturbance.

In anticipation of requirements for environmental assessment, WST contracted Jacques Whitford Environment Limited (JW) and the Innu-owned firm, Land Management and Survey Systems Inc., to prepare the following raptor component study. The objective of this study was to conduct original research and compile available information to describe raptor and raptor habitat within the proposed route of the TLH from Happy Valley-Goose Bay to Cartwright Junction. The results of this component study will be used to predict the local and regional impacts of the proposed project on raptors and to suggest mitigative measures in the Environmental Impact Statement (WST 2003).

The study area consisted of a 2 km-wide corridor centered on the proposed highway route. Original survey data for this assessment was collected either directly during specific surveys designed for raptors or incidentally during waterfowl surveys within the same area. Specific raptor surveys followed a predetermined route on 1:50,000 topographic map sheets at approximately 500 m on each side of the highway right-of-way. The route was variable in some locations of greater potential habitat such as river valleys and lake/pond networks within the 2 km-wide survey corridor.

The specific aerial survey for raptors was conducted on 17 June 2002. The 206L Bell helicopter was maintained at a height of 50-100 m above ground. Flights were conducted at a speed of approximately 100 km/h and particular attention was placed on higher points of land within the coverage area and on trees adjacent to smaller tributary steams. All observations were recorded directly onto 1:50,000 topographic maps and confirmed using the aircraft GPS.

A total of 35 raptor nests were identified within the 2-km study area, 33 osprey, one bald eagle and one cliff nest. Eighteen of the 33 osprey nests were active. The bald eagle nest and cliff nest were empty. Osprey nests tended to be concentrated in complexes of wetlands and waterbodies associated with a tributary of the Kenamu River, west of the main stem, in complexes of wetlands and waterbodies around Crooks Lake, and in complexes of wetlands and waterbodies along the Eagle River and tributaries south of Park Lake.

The Government of Newfoundland and Labrador has guidelines recommending no construction within 800 m of an active osprey or bald eagle nest during the nesting period. Outside of the nesting period, a 200 m vegetation buffer is to be maintained around the nest. Twenty-five osprey nests fall within 800 m of the centre line of the proposed highway. Eight of these nests fall within 200 m of the centre line of the proposed highway route and, of those, five fall within 50 m of the centre line of the highway and may be within the right of way. No bald eagle nests fall within 800 m of the centre line.

KATAKUAPEKASHT TIPATSHIMUN MASHINEIKAN

Ntshent meshkinanu kanakituatak (Department of Works, Services, and Transportation) nantuenitamuat tshetshi tutakinit ussi meshkinanu tshetshi aitu pampinitshi utapana. Ne meshkinau nete tshika itimu uta Apipani nuash nete Nutapineuant. Nte tshetutakant meshkinau miam nta tshikapiniaueut mitshishut, kushimesheut, kie nitshineueshut kie tshent kassinu kapiniauet.. Tshipa tshi mamashiakanut uapiniauetau nte miam uatutakanit meshkinanu netshent aueshishat.

Ntshent meshkinanu kanakituatak (Department of Works, Services, and Transportation) kuetshimepant nenua kaitusseshitshi kie aueshisha kanantussenimantshi, Jacques Whitford Environment Limited (JW), mak Innuat katipenitak assinu, mak katipeikau assinu kaitusset. Eukuant umue kaitusset tshe nantussenimat, kushimesheu, kie nitshineueshu kie mitshishut. Nantussenimakanut aueshishat (kushimesheut, kie nitshineueshut, kie mitshishut) tan eshiniuit nte miam tshetutakanit meshkinanu kie mamushatinikanu ne tshekuan tsheishimishkakant. Ne tshekuan tshemishkakant tshika uitshikut kaitushkatak meshkinanu tshetshika nitu itutuat aueshisha.

Ne assi kanantussenitakant nete tshe pimimut meshkinau - aitu nete meshkinant nantussenitakanipa. Kassinu tshent aueshshat kaupauit miam mate kushimesheut, kie nitshineueshut, kie mitshishut nantussenimakanipant. Assiu mashineikan nitapishtatan tshetshi uitshikuiat ne nentussenitamat assi, nete tshetutakant meshkinau. Nte pisse kanantussenitakant assi tshika tikunua shipua, kie shakeikina nte miam tshetutakant meshkinau.

Uapukun Pishum 17 etshishtauakantshi pishum 2002 mishte tshitashun Kauauashtetshesht apitshiakinipan nentussenitakant assi. Ne kauauashtetshesht tipatakushipan kie metinu pamipanipan nentussenitakau assinu. Nenu mishtukua pessish katshimishutshent shakeikant eukunua minu nantussenitamupant assinu. Kassinu meshkakant tshekuan mishinatekeikanu nte assiu mashineikant.

Nishtunu ashu patetat mishkakinishipini kushimesheu kie nutshineueshu uisht, peik peik mitshishu uisht (apu apishtanikue) mak peik uisht nte utshit iat apu apishtanikue. Kutunu ashu nishuaush apishtakinua uisht (ne kushimesheu kie nutshineueshu uisht). Mitshet kushimesheu kie nutshineueshu uishta mishkakinua nete Tshenuameshipit, Kauauatshikimat, Nutapineuant shipit mak Iatuekipat.

Tshisheutshimau apu tapuetuakant tshetshi tshimitat tshekuanu nte miam uapiniauent aueshisha miam mate nutshineueshu, kushimesheu, kie mitshishu. Patush kauetuassimintau kie ma kapiniauetau tshika ueueshtakanu nenu pessish tekunit uisht. Pisse pessish takunua nenu uisht.

TABLE OF CONTENTS

LIST OF APPENDICES

LIST OF TABLES

LIST OF FIGURES

1.0 INTRODUCTION

The Department of Works, Services and Transportation (WST) is proposing to construct a 250 km, two-lane gravel surface highway from Cartwright Junction to Happy Valley-Goose Bay. This highway represents the final link of an all season ground transportation route between the Labrador Straits, southern Labrador, Upper Lake Melville, western Labrador and Quebec (Figure 1.1). In particular, this proposed highway would connect southern Labrador coastal communities to Upper Lake Melville and western Labrador. Past issues such as social isolation, limited access to economic and business development opportunities, limited access to health, education and recreational services and facilities and greater costs of living will be ameliorated by construction of this final link. In the same respect, the construction of this highway will have an equally profound effect on the future of these communities and the development of a natural resource-based economy in this region.

In anticipation of requirements for environmental assessment, WST contracted Jacques Whitford Environment Limited (JW) to prepare the following raptor component study. The proposed alignment for the Trans Labrador Highway (TLH) will intersect areas expected to be used by breeding osprey, bald eagle, and other raptors, potentially resulting in habitat alteration or disturbance. The Government of Newfoundland and Labrador has guidelines recommending no construction within 800 m of an active osprey or bald eagle nest during the nesting period. Outside of the nesting period, a 200 m vegetation buffer is to be maintained around the nest.

The Ungava Peninsula supports a wide variety of raptor species near the northern extent of their range (e.g., bald eagle, osprey), southern extent of their range (e.g., gyrfalcon, snowy owl), or typical of northern boreal forest (e.g., rough-legged hawk, great-horned owl) (Godfrey 1986). These species can be divided into two groups according to the type of nesting habitat they use: cliff-nesting or tree-nesting. Both groups tend to be sensitive to disturbance, but the latter are of course more susceptible to habitat loss or alteration from linear developments. These species tend to range over large areas centred around a nest site, making them susceptible to activities in the vicinity of the nest site (Trimper *et al.* 1998). Common and scientific names of raptors discussed in this report are provided in Appendix A.

Subsequent to initiation of the field program, draft and final Terms of Reference (TOR) were received from the Department of Environment. Additional requirements identified in the TOR were incorporated into the field program.

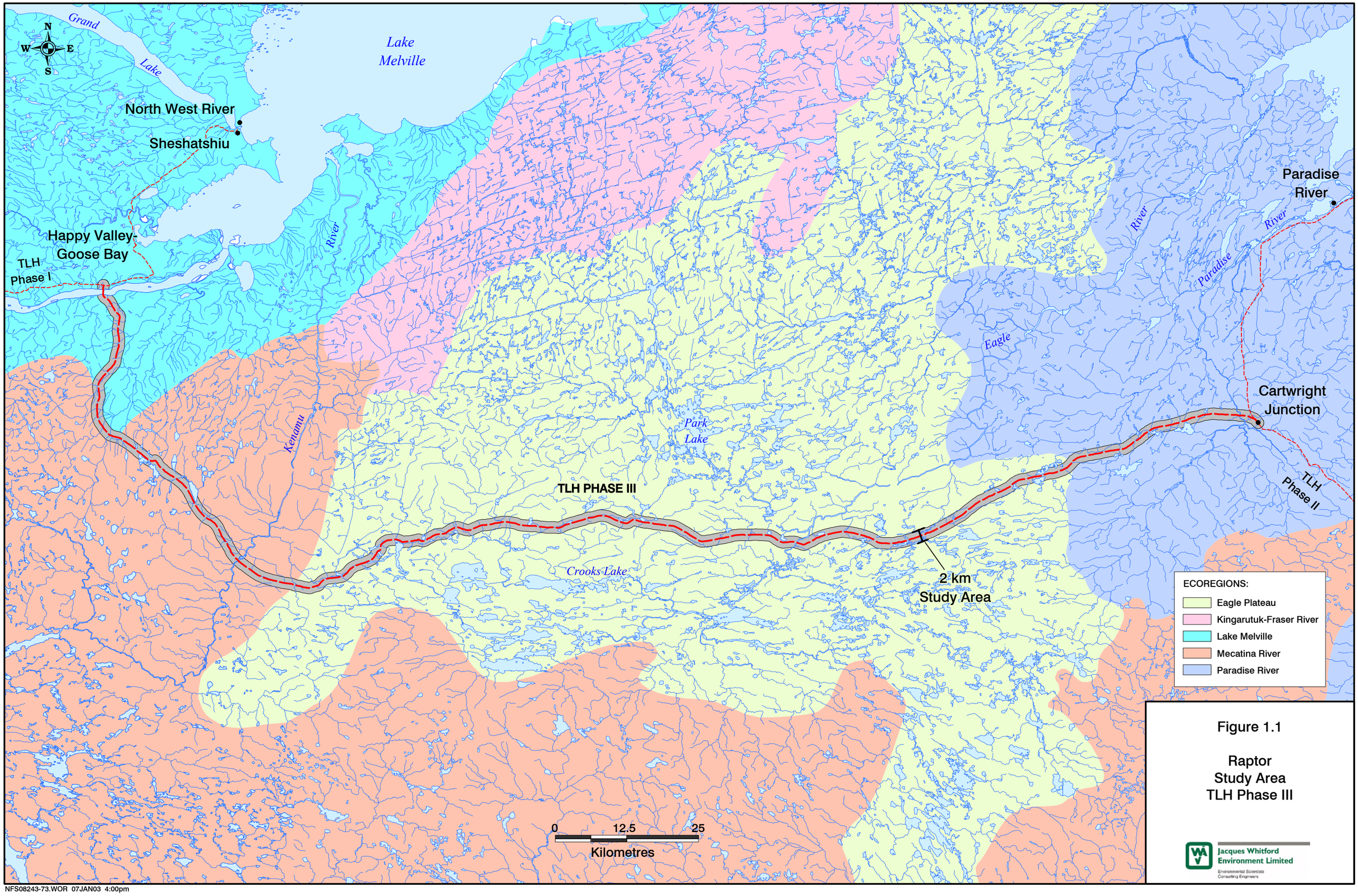

Figure 1.1

Raptor
Study Area
TLH Phase III

Jacques Whitford
Environment Limited
Environmental Scientists
Consulting Engineers

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1.1 Objectives

The objective of this study was to conduct original research and compile available information to describe raptor and raptor habitat within the proposed route of the TLH from Happy Valley-Goose Bay to Cartwright Junction. The results of this component study will be used to predict the local and regional impacts of the proposed project on raptors and to suggest mitigative measures in the Environmental Impact Statement (WST 2003).

Within the proposed study area, this Raptor Component Study is to:

- review literature regarding raptors in Labrador;
- consult with Innu Nation, CWS and other organizations and individuals knowledgeable about raptors in the area;
- describe nesting habitat potential for raptors;
- determine breeding activity of raptors;
- determine the species abundance and the temporal and spatial distribution of raptors; and
- quantify raptor habitat that is likely to be physically affected by the project.

With this background on the environment of the study area as relates to raptors, potential interactions of the proposed project will be described as effects predictions in the assessment (WST 2003).

1.3 Study Team

Jacques Whitford is an environmental consulting company with offices throughout Canada, and over 15 years of relevant experience in Labrador. Staff from Happy Valley-Goose Bay and St. John's participated in this Component Study. Perry Trimper was the project manager and was involved in the design and conduct of the field survey and report review. Kathy Knox also participated in the field survey, data compilation and report preparation. Dave Kearsey compiled the MapINFO files for all collected data.

The Innu-owned firm Land Management and Survey Systems Inc., worked closely with Jacques Whitford in all data collection exercises such as the aerial survey, literature review, and consultation with knowledgeable persons and translation to Innu-eimun. Max Penashue led this activity with additional observer positions occupied by Neil Parrott and Sean Sharpe. Kanani Penashue, an Innu communication expert, assisted with report preparation and translation. Jim Maloney of Universal Helicopters Newfoundland Limited was the pilot for the aerial survey and also assisted with observations.

1.4 Study Area

The study area lies within the boundaries of four ecoregions in central Labrador: Lake Melville at the western boundary, Mecatina River, Eagle Plateau, and Paradise River at the eastern boundary (ESWG 1996) (Figure 1.1). The Lake Melville ecoregion, at the western portion of the study area, has a low-lying (i.e essentially at or near sea-level) undulating upland topography with flat river terraces and generally experiences warmer summers and shorter winters than surrounding regions. A relatively productive closed-crown black spruce forest is the dominant vegetation (Meades 1990). The Mecatina River ecoregion, to the southeast, is dominated by fairly open black spruce forest with ribbed fens and string bogs covering extensive areas. The climate is typically subarctic and continental with warm summers and cold winters (Meades 1990). The Eagle Plateau ecoregion encompasses much of the proposed highway route and is characterized by a flat to rolling upland plateau where extensive string bogs dominate the landscape. Lichen woodland occurs on eskers and areas of course till. The climate is subarctic with cool summers and cold winters (Meades 1990). The Paradise River ecoregion, at the eastern portion of the study area, has a boreal climate with cool summers and short cold winters. It is characterized by an undulating topography that supports closed-crown forest and domed bogs (Meades 1990).

The study area consisted of a 2 km-wide corridor centered on the proposed highway route (Figure 1.1). Original survey data for this assessment was collected either directly during specific surveys designed for raptors or incidentally during waterfowl surveys within the same area. Specific raptor surveys followed a predetermined route on 1:50,000 topographic map sheets at approximately 500 m on each side of the highway right-of-way. The route was variable in some locations of greater potential habitat such as river valleys and lake/pond networks within the 2 km-wide survey corridor. As well, there is an extensive existing database of raptor nests, particularly those of osprey, developed for this area by JW for DND. Known nest sites in the 2 km-wide survey corridor were also checked during the survey.

2.0 FIELD METHODOLOGY

2.1 Aerial Survey

The specific aerial survey for raptors was conducted on 17 June 2002 following methods developed previously by the study team (JW 1999, 2000). The 206L Bell helicopter was maintained at a height of 50-100 m AGL. Flights were conducted at a speed of approximately 100 km/h. Consistent with Wetmore and Gillespie (1976) and professional experience, attention was placed on higher points of land within the coverage area and on trees adjacent to smaller tributary steams, searching for large (1-2 m diameter) stick nests. All observations were recorded directly onto 1:50,000 topographic maps and confirmed using the aircraft GPS. Observations of all other wildlife were also recorded. Osprey and bald eagle were also observed during five surveys completed for waterfowl from May thru August 2002. Appendix C presents all observations of raptors and nests made during these surveys. It should be noted that since the five waterfowl surveys covered a similar area each time, sightings of raptor nests were often recorded more than once. Thus, there will be a duplication of nest structures in the databases of observations for each survey.

Potential habitat for raptors was assessed from ecological land classification maps (Meades 1990; ESWG 1996), previous experience of the study team in the area, and during aerial surveys for waterfowl and raptors.

Spatial survey data (survey lines, species sightings, habitat features) were taken from 1:50,000 scale NTS map sheets and digitized on 1:250,000 scale NTS map sheets using MapInfo (version 6.0). Data management, analysis and representation was also completed using MapInfo.

2.2 Consultation with Innu

Based on guidelines "Conducting Research in Innu Territory" provided to Jacques Whitford by Innu Nation, an outline of the proposed study was provided to Innu Nation.

2.3 Other Permits

Prior to conducting aerial surveys, the Inland Fish and Wildlife Division of the Department of Tourism, Culture and Recreation were notified of the proposed study and the methodology that would be employed to collect data on raptors.

3.0 LITERATURE REVIEW

Wetmore and Gillespie (1976) conducted aerial surveys for osprey and bald eagles in a 46,600 km^2 study area in east-central Labrador from 1969 to 1973. The survey area included the entire proposed Trans Labrador Highway route from Happy Valley-Goose Bay to Cartwright Junction.

The Department of National Defence (DND) has conducted an annual Monitoring Program for cliff-nesting and woodland raptors since 1991 within the Low-Level Training Area (LLTA) in Labrador and since 1997, a control area to the east. The LLTA and the control area encompass most of the proposed highway route (except the easternmost 30 km of the proposed highway). As an example of the research completed through these annual surveys, 543 osprey nest sites had been identified in the LLTA and control area by 1998 (JW 1999).

Plot counts have been conducted by CWS as part of the Black Duck Joint Venture Surveys since 1990. Data is available from 1990 to 2000 for two plots that fall within the general area of the proposed highway route, Plot 24 - Mud Lake and Plot 22 - Paradise River (CWS unpublished data) (Figure 4.1). Plot size from 1990 to 1996 was 100 km^2 , from 1996 onward plot size was 25 km^2 . The surveys were targeted at waterfowl however observations of raptors were also recorded opportunistically.

Table 3.3 details general life history characteristics of species observed in the study area.

Table 3.3 Life History and Habitat Preferences of Raptors in the Study Area

Species	Nesting and Brood Rearing	Diet and Foraging	Preferred Habitat
Osprey	**Nest:** nest bowl on top of standing, dominant spruce or larch trees, sometimes rocks, usually not far from water; nests re-used year after year **Clutch Initiation:** late May to early June **Clutch Size:** usually 3 **Incubation:** 32-43 days **Fledge:** 48-59 days	**Diet:** primarily fish, occasionally small mammals **Foraging**: scans water from 10-30 m high, dives and grasps	mosiac of black spruce forest and open water
Bald Eagle	**Nest:** large and bulky, in large trees (sometimes in the crotch of a dying tree) or on rocks or the ground on islands; nests re-used year after year **Clutch Initiation:** mid to late May **Clutch Size:** usually 2, sometimes 3 **Incubation:** 34-36 days **Fledge:** 70-98 days	**Diet:** largely fish, self caught or stolen from ospreys; opportunistic hunter who will feed on mammals, birds and carrion **Foraging:** scans from perch or sky	areas of open water with suitable nest sites available nearby

Species	Nesting and Brood Rearing	Diet and Foraging	Preferred Habitat
Northern Goshawk	**Nest:** bulky, usually on horizontal branch next to trunk; usually in aspen or birch tree, less often in spruce or fir **Clutch Initiation:** mid to late May **Clutch Size:** 2-4 **Incubation:** 36-38 days **Fledge:** 35-42 days	**Diet:** primarily birds, lesser quantities of small mammals **Foraging:** often an ambush hunter, drops from trees	mixed mature stands of hardwood and conifer
Red-tailed Hawk	**Nest:** large and bulky, usually in crotch of branch at trunk**,** 1 to 3 m from the top, in a dominant tree; in open areas may nest on cliff ledge **Clutch Initiation:** late May **Clutch Size:** 1-3 **Incubation:** 30-35 days **Fledge:** 45-46 days	**Diet:** primarily small mammals, occasionally reptiles, amphibians, birds **Foraging:** scans from perch, soaring or hovering	open areas interspersed with forest
Northern Harrier	**Nest:** ground nest near low shrubs or in tall weeds, usually near on or near a swamp, bog or meadow **Clutch Initiation:** late May **Clutch Size:** 4-6, commonly 5 **Incubation:** 31-32 days **Fledge:** 30-35	**Diet:** small mammals, reptiles, amphibians, birds **Foraging:** hovering low over the ground - 3 -10 m, drops quickly	open areas - marshes, bogs
Merlin	**Nest:** often uses old nests of crows or hawks, also may use natural hollows of trees or woodpecker holes, sometimes cliff ledges **Clutch Initiation:** late May **Incubation:** 28-32 days **Clutch Size:** 4-6 **Fledge:** 30-35 days	**Diet:** almost exclusively birds, sometimes small mammals and insects **Foraging:** watches for prey from perch, overtakes birds in flight	coniferous forest, shrubby barrens, bogs; hunts in forest openings and along edges of waterbodies
American Kestrel	**Nest:** old cavity nests of other birds, woodpecker holes **Clutch Initiation:** late May **Clutch Size:** 3-5 **Incubation:** 29-31 days **Fledge:** 30-31 days **Young:** Precocial	**Diet:** mostly insects and small mammals **Foraging:** watches for prey from perch, flies/hovers over open country**,** swoops to ground for prey	forest, forest edges, open areas
Great Horned Owl	**Nest:** Usually nests of other birds such as red-tailed hawk, osprey or crow **Clutch Initiation:** early-mid April **Clutch Size:** 1-4 **Incubation:** 26-35 days **Fledge:** 35 days	**Diet:** mostly small mammals (including hares), sometimes birds, reptiles, amphibians **Foraging:** mainly nocturnal, flies silently and swoops down on prey	forest, marshes and bogs

Species	Nesting and Brood Rearing	Diet and Foraging	Preferred Habitat
Short-eared Owl	**Nest:** ground nest usually in a slight depression in open field or marsh, often at base of shrub **Clutch Initiation:** early June **Clutch Size:** 4-9 **Incubation:** 26-28 days **Fledge:** 31-36 days	**Diet:** mostly small mammals, may eat insects **Foraging:** circles and glides close to ground	grassland, tundra, marshes
Boreal Owl	**Nest:** tree cavity, old woodpecker hole **Clutch Initiation:** March **Clutch Size:** 3-10, usually 4-6 **Incubation:** 27-28 days **Fledge:** 28-33 days	**Diet:** mostly small mammals and insects, occasionally birds **Foraging:** watches for prey from perch, swoops down	coniferous forest
Note:	Incubation - time from egg-laying to hatching Fledge - time from hatching to fledging		
Sources:	Ehrlich et al. 1988; Terres 1991; Chubbs and Trimper 1998; Trimper et al. 1998; JW unpublished data		

Breeding Bird Survey (BBS) results are used to develop long-term trends in raptor populations for Canada as a whole and by various ecozones. Two ecozones cover Labrador, the Boreal Softwood Shield ecozone, encompassing southern Labrador and the Taiga Shield & Hudson Plains ecozone which represents the remainder of Labrador in the BBS database. Currently there is not enough data on raptors from BBS to develop trends for the Taiga Shield & Hudson Plains ecozone (CWS 2002). There are limitations to the use of BBS data for raptors: (1) BBS routes are concentrated in southern Canada and there are few in the Boreal or Arctic regions. (2) Large raptors such as osprey and bald eagle are more conspicuous and thus more likely to be counted. In contrast, smaller species including ground - or- cavity-nesting raptors which have smaller nests and are more secretive, are likely under- represented by the surveys. (3) Surveys are usually conducted in June when a number of raptors such as great-horned owl will have already completed breeding.

4.0 RESULTS AND DISCUSSION

4.1 Survey Results

Table 4.2 summarizes the structures and status of nests found within the 2-km wide study area. Several nest were identified (as a result of the surveys or known by the study team from work for DND)outside the 2-km wide study area. Figure 4.1 graphically indicates the general locations of the nests within the study area and also indicates nests in the surrounding region that have been identified from the DND databases or through waterfowl surveys conducted from May to August 2002.

Table 4.1 Raptor Nest Structures and Status Within the 2 Km-wide Study Area - June 18, 2002

Nest Type	# Nest Structures	# Active	# Empty	# Status Unknown
Osprey	33	13	18[1]	2[2]
Bald Eagle	1	0	1	0
Cliff Nest	1	0	1	0

[1] Five empty nests were considered "old" meaning that they had deteriorated to the point of being unavailable for nesting.
[2] Following an adjustment in the proposed Phase III route, two additional nests were identified in August.

Osprey nests tended to be concentrated in three distinct areas along the proposed highway route (Figure 4.1):

1. complexes of wetlands and waterbodies associated with a tributary of the Kenamu River, west of the main stem;
2. complexes of wetlands and waterbodies around Crooks Lake; and
3. complexes of wetlands and waterbodies along the Eagle River and tributaries south of Park Lake.

These areas provide suitable nesting habitat for osprey in the form of dominant spruce trees along large lakes and rivers and along hillside tributaries overlooking lakes and wetland complexes. The large amount of open water in these areas, coupled with suitable nesting habitat makes these areas attractive to species such as osprey.

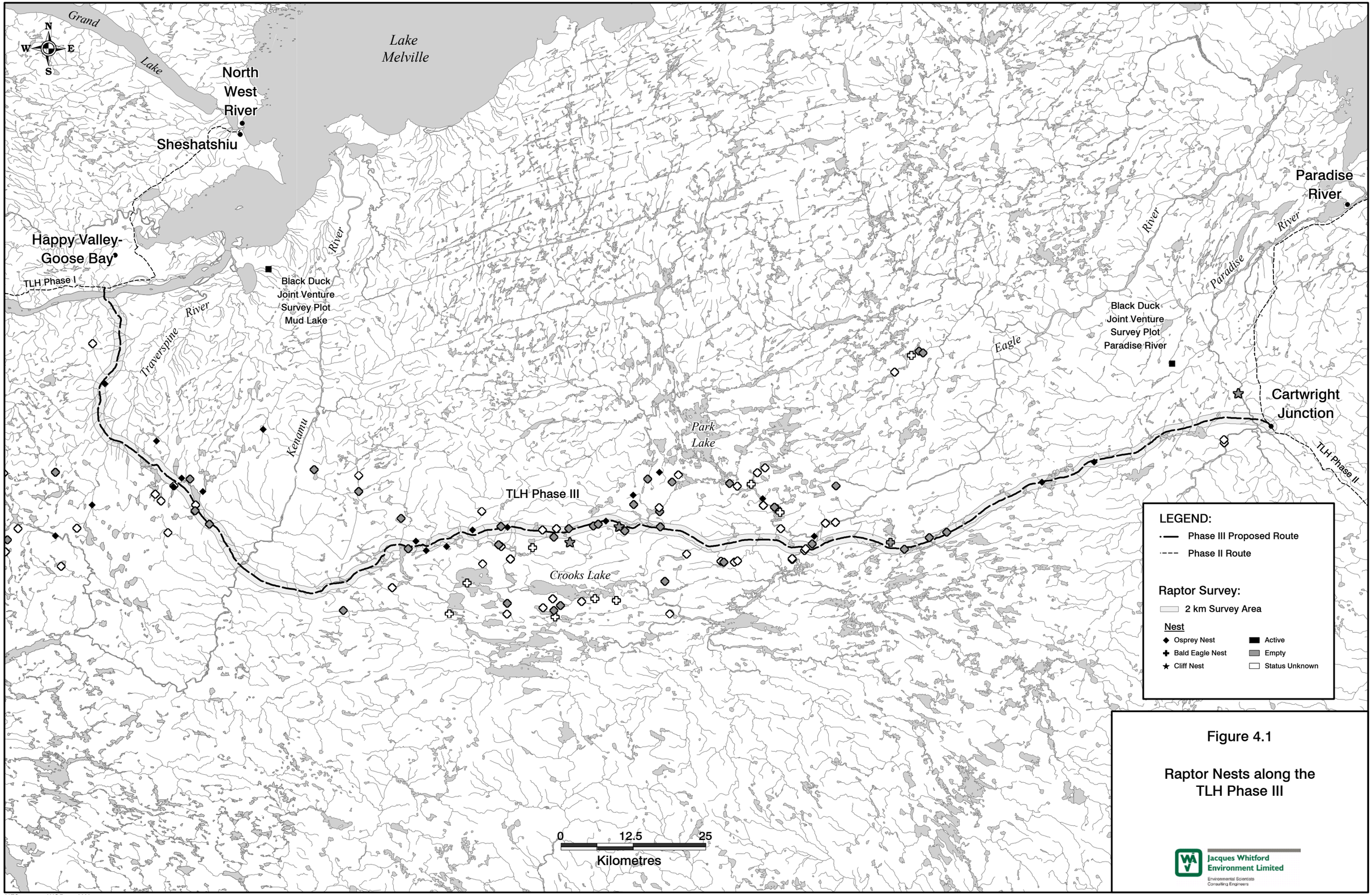

Figure 4.1

Raptor Nests along the
TLH Phase III

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Environmental Scientists
Consulting Engineers

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Recruitment surveys conducted during the pre-fledging period (mid-August in Labrador) provide an indication of population trends for osprey within an area. Indices developed for New England calculate the number of young per adult female that must be fledged to maintain a stable population (i.e., Henny and Wight 1969 (0.95-1.30 young/female) and Spitzer et al. 1983 (0.80 young/female)). Although a similar indice has not been developed for the extreme northern edge of their range, the indices were used in a relative fashion to compare results annually within the study area. During 1994 and 1995, monitoring surveys indicated 1.34 osprey fledged/female and 1.46 osprey fledged/female, respectively, indicative of an increasing population in these years. Conversely in 1996, the rate was 0.32, indicating a declining trend for that year. Rates for 1997 and 1998 were 0.87 and 1.54, respectively (JW 1999) . These values highlight the variability of osprey nesting success from one year to the next in this region. Similar observations were made by Wetmore and Gillespie (1976). Productivity estimates of osprey for a 5-year period varied greatly between years with an average of 1.0 young/per occupied nest produced during the 5-year period (nests with known outcomes) (Wetmore and Gillespie 1976). One area of osprey nest concentration identified in the study was in a portion of the headwaters of the Eagle River where 3.8 territories/259 km^2 were observed in 1973. Subsequent surveys, including this study, have confirmed that this area continues to support relatively high densities of osprey, compared to other areas of Labrador.

Long-term trends from Canada -wide BBS results (1966-1994) indicate that osprey have significantly increased by two percent annually ($p < 0.05$) during this period (Kirk and Hyslop 1998). At the regional level, there was also a significant increase of 2.88 percent annually in osprey observations in the Boreal Softwood Shield ecozone from 1966 to 1994. The most recent trend information indicates a 6.8 percent mean annual increase (not significant) in the number of ospreys observed during Canada-wide BBS from 1991-2000 (CWS 2002).

Bald eagle nests are much less common in this region and only one nest was identified within the 2-km study area. However, suitable nesting habitat does not appear to be a limiting factor. Wetmore and Gillespie (1976) also noted the relatively lower number of bald eagle nests in the study region, having identified only five nests in the east-central Labrador survey area during the five-year study (Wetmore and Gillespie 1976). Most bald eagle nest observations were concentrated in the western Labrador study area centred around Smallwood Reservoir. As with osprey, bald eagle productivity fluctuated over four breeding seasons (Wetmore and Gillespie 1976). Surveys conducted by DND have found 500 osprey nests compared to less than 50 bald eagle nests in this region (DND unpublished data).

Bald eagle populations also significantly increased in Canada during the 1966-1994 period (6.88 mean annual percent change, $p < 0.05$); no trends are available for eastern ecozones (Kirk and Hyslop 1998). The Canada-wide trend for bald eagles for the period 1991-2000 shows an annual percent increase of 1.7 (not significant)(CWS 2002).

The interspersion of wetland complexes, rivers, lakes and mature black spruce forest also provide suitable habitat for other tree-nesting species such as red-tailed hawk, northern goshawk, boreal owl and great horned owl and ground-nesting species such as northern harrier and short-eared owl. The following species were observed during waterfowl surveys conducted along a 10 km-wide corridor centred on the proposed highway:

- red-tailed hawk (10) - flying or perched;
- northern goshawk (1) - flying;
- merlin (1) - flying;
- rough-legged hawk (3) - flying;
- great horned owl - one young sitting in an osprey nest in early May; and
- short-eared owl (1) - flying.

Species such as rough-legged hawk exhibit annual fluctuations in breeding populations based on prey availability. For example in 1987 and 1989, rough-legged hawks were the most numerous raptor observed during aerial surveys conducted by CWS. However, no rough-legged hawks were observed 1988, a year during which it appears there was a small rodent population crash (Goudie et al. 1994). Three rough-legged hawks were observed during surveys along the proposed highway route in 2002, indicative that 2002 is not a year of high rough-legged hawk abundance in Labrador. In comparison, 10 red-tailed hawks were observed during surveys in 2002 compared to none observed during the CWS surveys from 1987 to 1989. This appears to mirror the apparent increase in red-tailed hawk numbers seen from Canada-wide BBS (Table 3.2).

BBS data also showed increasing population trends for other raptor species including sharp-shinned hawk, red-tailed hawk, American kestrel, merlin and northern goshawk. Species that showed a declining trend include northern harrier, great-horned owl and short-eared owl. The BBS trends for these raptors are provided in Table 4.1.

Table 4.2 BBS Raptor Trends for Canada (1966-1994 and 1991-2000) and for the Boreal Softwood Shield Ecozone (1966-1994)

Species	Mean Annual Percent Change in Populations[1]			General Trend
	Canada-Wide		Boreal Shield	
	1966-1994	1991-2000	1966-1994	
Northern Harrier	-0.4	-2.9	-1.46	Decreasing
Sharp-shinned Hawk	0.69**	n/a[2]	0.89*	Increasing
Northern Goshawk	0.13	n/a	n/a	Unknown
Red-tailed Hawk	2.65****	1.5	1.26*	Increasing
American Kestrel	1.12*	0.6	2.27***	Increasing
Merlin	1.08**	3.1	2.09*	Increasing
Great-horned Owl	-0.21	n/a	-1.76**	Decreasing
Short-eared Owl	-2.57****	n/a	n/a	Decreasing
Rough-legged Hawk	n/a	n/a	n/a	Unknown
Boreal Owl	n/a	n/a	n/a	Unknown

[1] Statistical significance: no asterik = not significant,* $0.05<p<0.1$, ** $p<0.05$, *** $p<0.01$, **** $p<0.001$

[2] Trends not available

Sources: CWS 2000; Kirk and Hyslop 1998

Gyrfalcon and snowy owl are Arctic nesters. However, they may occur infrequently in the study area. These species are known to move to more southern latitudes in winter and spring in search of prey during periods of low prey densities.

Low numbers of raptors were observed during Black Duck Joint Venture surveys from 1990 to 2000. For example, at the Mud Lake and Paradise River plots, only 15 observations of raptors were made in all years combined and eight of these observations were of rough-legged hawk at the Paradise River plot in 1991 (CWS unpublished data). While these surveys were not dedicated to raptors, the low number of raptor observations on the plots serve to illustrate the overall low densities of raptors in the region.

4.2 Species of Special Concern

Short-eared owls were listed as a species of special concern by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) in 1994 and are considered vulnerable under the provincial *Endangered Species Act*. As noted (Table 4.1), the species has significantly declined in Canada since the 1960s. However, it appears that much of the decline is related to habitat loss in western Canada and it is for this reason that the species was designated as being of special concern. The Atlantic Canadian population is considered stable (Environment Canada 2002).

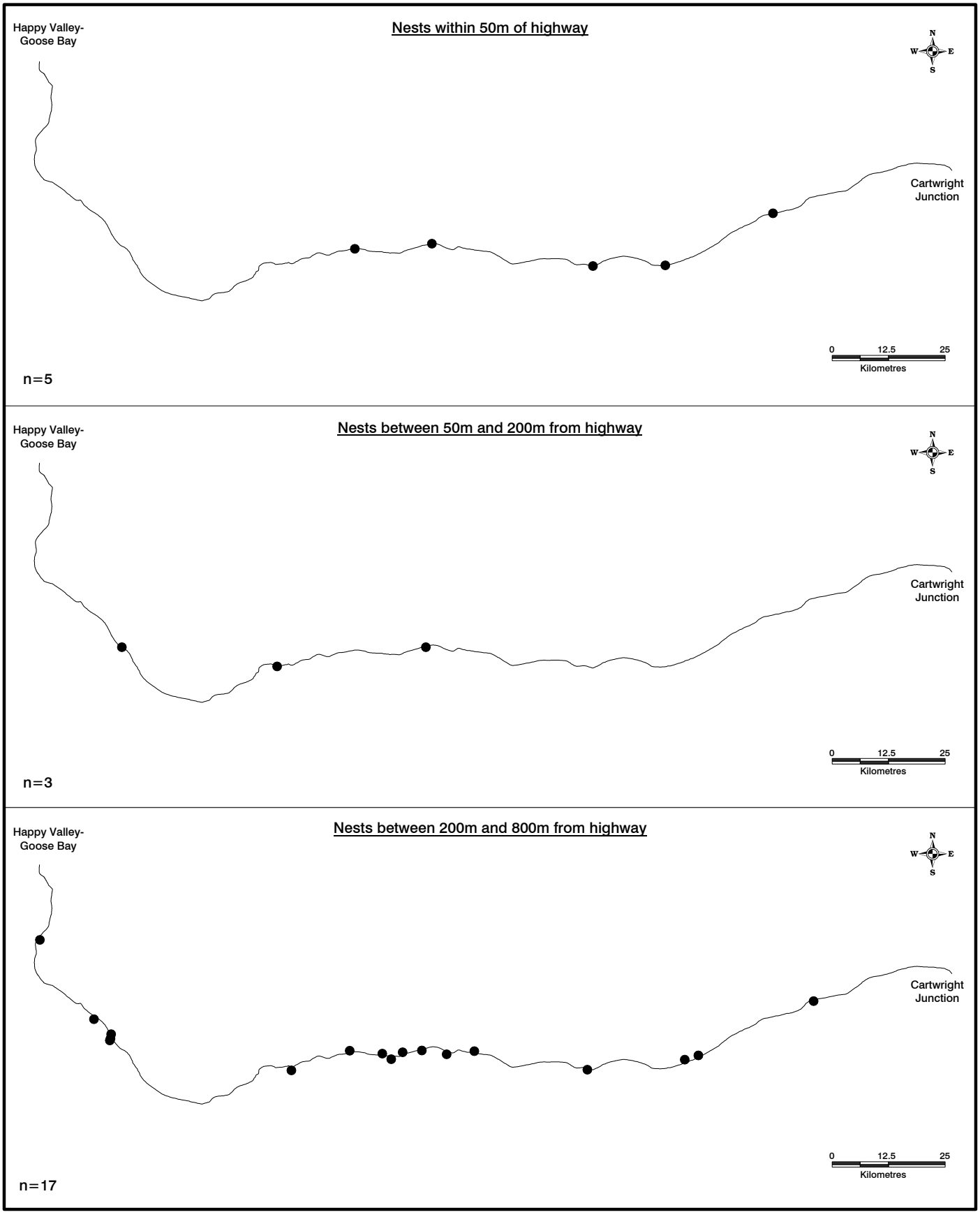
Short-eared owls inhabits open grassland, marshes, bogs and tundra where it hunts small mammals and nests on the ground. During a waterfowl survey on 2 June 2002, one short-eared owl was observed flying over an area of open wetland complexes approximately 30 km west of Cartwright Junction. Open wetland complexes and bogs are the dominant feature in this area, providing typical habitat for this species.

The *anatum* population of peregrine falcons are listed as threatened by COSEWIC and the *tundra* population are considered vulnerable (COSEWIC 2002). Under the provincial *Endangered Species Act*, both *anatum* and *tundra* populations are considered threatened due to the difficulty of distinguishing the two groups, the possibility the two may inter-breed and the fact that their ranges may overlap (DTCR 2002). Peregrine falcons are known to breed along the Labrador coast and inland along river valleys in northern Labrador. No breeding peregrine falcons have been recorded in south-central Labrador, however, some birds may move through the study area during spring and fall migration.

4.3 Important Areas

Osprey nests are widely distributed in suitable habitat within the study area. A lessor number of bald eagle nests are also present in the region. As noted earlier, the Government of Newfoundland and Labrador has guidelines recommending no construction within 800 m of an active osprey or bald eagle nest during the nesting period. Outside of the nesting period, a 200 m vegetation buffer is to be maintained around the nest.

Twenty-five osprey nests fall within 800 m of the centre line of the proposed highway (Figure 4.2). Of these, four are considered "old" and have not likely been used in recent years. Eight of these nests falls within 200 m of the centre line of the proposed highway route (one considered "old", seven considered in good condition) (Figure 4.2). Finally, five of those nests fall within 50 m of the centre line of the highway and may be within the ROW (Figure 4.2). No bald eagle nests fall within 800 m of the centre line.



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Environmental Scientists
Consulting Engineers

Figure 4.2

Raptor Nests Within 800m of
the Highway Centre Line

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APPENDIX A

Common Names and Scientific Names of Raptors

Appendix A Common and Scientific Name of Raptors

Common Name	Scientific Name
Northern Harrier	*Circus cyaneus*
Osprey	*Pandion haliaetus*
Bald Eagle	*Haliaetus leucocephalus*
Northern Goshawk	*Accipter gentillis*
Red-tailed Hawk	*Buteo jamaicensis*
Merlin	*Falco columbarius*
Sharp-shinned Hawk	*Accipter striatus*
Rough-legged Hawk	*Buteo lagopus*
American Kestrel	*Falco sparverius*
Peregrine Falcon	*Falco peregrinus*
Gyrfalcon	*Falco rusticolus*
Boreal Owl	*Aegolius funereus*
Great Horned Owl	*Bubo virginianus*
Short-eared Owl	*Asio flammeus*
Snowy Owl	*Nyctea scandiaca*
Northern Hawk Owl	*Surnia ulula*