

**Harlequin Duck
Population Surveys in Labrador and Northern Newfoundland**

Field Report



Submitted to:

**Institute for Environmental Monitoring and Research
114 Hamilton River Road, Northstar Building
P.O. Box 1859, Stn. B
Happy Valley-Goose Bay, NL
A0P 1E0**

Submitted by:

**C. Jones and I. Goudie
LGL Limited
Environmental Research Associates
P.O. Box 13248, Stn. A
388 Kenmount Road
St. John's, NL
A1B 4A5**

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Executive Summary

Between late May and early June 2009, LGL Limited environmental research associates completed aerial helicopter surveys for Harlequin Duck (*Histrionicus histrionicus*) on forty-three river segments in Labrador and the Great Northern Peninsula of insular Newfoundland. The 2009 surveys represent the fourth year of a project originally designed by Canadian Wildlife Service to assess the population trend of the Harlequin Duck in Labrador while also measuring any population level effects that may be a result of low-level aircraft training activity. The eastern population of Harlequin Duck is presently designated as *special concern* by the Committee on the Status of Wildlife in Canada (COSEWIC) and is a high profile species due to low numbers relative to other waterfowl species and susceptibility to large-scale threats (e.g., marine oil pollution).

On a regional basis, total numbers of Harlequin Ducks observed in 2009 were the highest recorded since the initial 2005 surveys. Total number of individuals exceeded the 2008 results (the previous highest totals), for all three regions of investigation: (1) northern Newfoundland (+5), (2) central Labrador (+130) and (3) northern Labrador (+13). Survey conditions were ideal as the spring melt had not advanced to the stage where high water levels make waterfowl less visible. Rivers of northern Labrador were surveyed over a week later than last year as a result of a delayed spring. The most productive rivers, in terms of Harlequin Duck numbers, were the Upper Humber and Torrent Rivers (Great Northern Peninsula), North Shipiskan River and Shapio Lake outlet (central Labrador), and Anaktalik and Ikadlivik Brooks (northern Labrador).

Repeatability surveys were conducted on five river systems of central Labrador including segments of the Crooked, Red Wine, Fig, Cache, and Minipi Rivers. Surveys were repeated by an independent field crew within a twenty-four hour interval. Numbers obtained for the replicate survey team were greatly reduced for all segments except the Crooked River. The large discrepancies may be a result of survey bias related to differing aircraft configuration (lack of 'bubble' windows configuration). The Minipi River was surveyed a third time in an attempt to account for the large difference in total number of Harlequin Ducks observed between the initial two surveys.

1.0 Introduction

Labrador supports a large component of sea ducks that are currently of international conservation concern. The sea ducks include Harlequin Duck (*Histrionicus histrionicus*) and Barrow's Goldeneye (*Bucephala islandica*) that have small disjunct populations in eastern North America, and are currently listed as species of *special concern* by the Committee On the Status of Endangered Wildlife In Canada (COSEWIC) and the federal *Species at Risk Act (SARA)*, and *vulnerable* by the Newfoundland and Labrador *Endangered Species Act (ESA)*.

Species listed under the *SARA* and/or the *ESA* are priority components when undertaking environmental impact assessments and mitigations. Harlequin Ducks that occur in the Military Training Area (MTA) of Labrador originate from two subpopulations, Greenland and eastern North America, which have been indicated on the basis of winter ground affinity. Nevertheless, the populations are currently treated as one population by COSEWIC. This species is unique in its exploitation of fast moving rivers and streams and requires designated surveys and special Standard Operating Procedures (SOPs).

In order to separate the effects of military flight training on population growth from intrinsic changes, it is necessary to monitor populations of Harlequin Ducks within and outside the MTA. Canadian Wildlife Service (CWS) developed a survey protocol commencing in 2005 that segregated the surveys into a south-central Labrador (includes MTA), northern Labrador and northern Newfoundland region (Thomas 2006). The data arising from the 2008 and 2009 field seasons will permit the first analyses of trends in numbers of indicated pairs and Harlequin Duck subpopulations occurring within and outside the MTA airspace.

This field report presents preliminary results of the Harlequin Duck surveys conducted by LGL Limited between late May and early June 2009. All protocols, survey methodology, and river segments remained identical to those employed during late spring 2008.

2.0 Methods

2.1 Location

The total study area was divided among three landscape units of Newfoundland and Labrador: (1) the Great Northern Peninsula, (2) central Labrador (includes river segments inside and outside the MTA boundary), and (3) an area of northern Labrador west of Nain (Figure 1). All river routes investigated were previously surveyed by CWS in 2006, with the exception of the English River, and route reductions on the Fig, Crooked, Goose, and Red Wine Rivers; this resulted in a total of 43 rivers or river stretches that were surveyed.

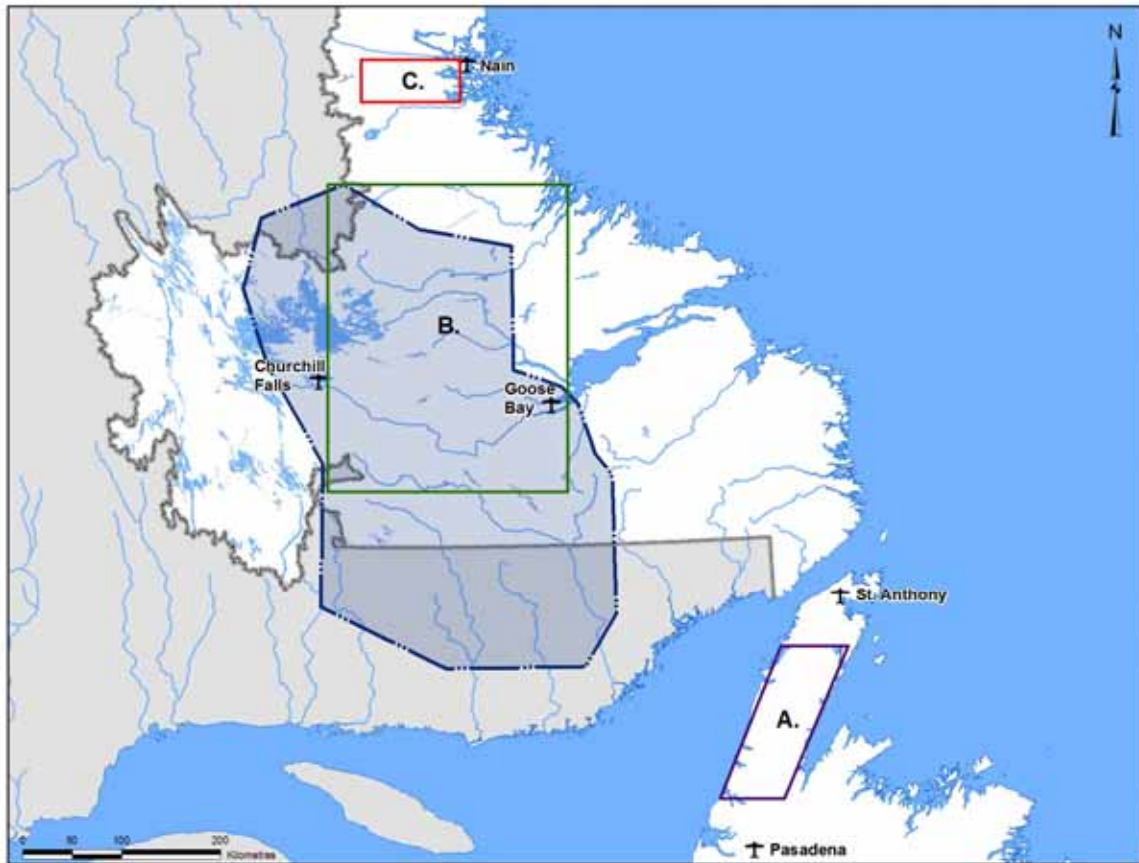


Figure 1. Location of Survey Areas, in Relation to MTA, Inventoried by LGL Limited for Harlequin Duck, 20-25 May & 5 June 2009. A) Great Northern Peninsula (11 Rivers), B) Central Labrador (23 Rivers), and C) Voisey's Bay (9 Rivers).

2.2 Techniques

Surveys were conducted from a Bell 206-L helicopter equipped with 'bubble' windows during 20-25 May 2009 and 5 June 2009. The survey team comprised three observers and the pilot and followed a SOP for conducting helicopter indicated pair surveys for Harlequin Duck. The front observer (I. Goudie or B. Mactavish) served as a navigator and recorded locations on topographic map sheets. A rear observer was also tasked with recording observations on datasheets and as waypoints, and tracked the aircraft flight path via a handheld GPS. An aboriginal observer (J. Andrew, A. Phillips, or E. Ford) was present on flights within Labrador. Refer to Table 1 for specific survey team configurations over the duration of the field programme.

Table 1. Survey Team Configurations for Dedicated Harlequin Duck Surveys in Labrador and Northern Newfoundland Conducted by LGL Limited, 20-25 May & 5 June 2009.

Team Config.	Date	Aircraft	Navigator	Left Rear	Right Rear	Pilot
A	20, 21 May 2009	Bell 206-L	Goudie	Jones (R)	Mactavish	Burse
B	23, 24 May 2009	Bell 206-L	Goudie	Andrew	Jones (R)	Burse
C	23 May 2009	Bell 206-L	Mactavish	A. Phillips (R)	F. Phillips	Lethbridge
D	25 May 2009	Bell 206-L	Mactavish	Andrew	Jones (R)	Burse
E	5 June 2009	Bell 206-L	Mactavish	Ford ^A	Jones (R)	Burse
Note:	Data Recorder for each survey team configuration indicated by (R). ^A Environmental Monitor (Nunatsiavut Government representative).					

When inventorying river segments, the aircraft onboard GPS navigation system and handheld GPS units were used in conjunction with 1:50,000 topographic map sheets to establish survey coverage and exact position. All rivers were surveyed at approximately 15 m above water level and at speeds averaging 70 km per hour. All waterfowl and incidental wildlife observations were recorded on topographical maps and as a handheld GPS-derived waypoint. Observations of waterfowl were recorded by American Ornithologists Union (AOU) acronyms as pairs, single male, single female, or flocks (five or more birds, sexed where possible). Weather conditions, snow and ice conditions, and time were recorded at the start and end of surveyed rivers following the protocol outlined by Thomas (2006). Data were immediately backed-up and safely stored after each field day.

An assessment of survey repeatability was performed with a secondary crew on five river systems of central Labrador: (1) Crooked, (2) Red Wine, (3) Fig, (4) Cache, and (5) Minipi rivers. Repeat surveys were conducted the following day of initial coverage (up to a maximum of 48 hours) and at approximately the same time of day to minimize diurnal effects. The second field crew also conducted surveys in a Bell 206-L but lacked the ‘bubble’ window configuration. Unexpected logistical problems required the replicate survey crew to utilize a Bell 206-L from another charter company, with the short notice preventing a change in window configuration. To maintain independence of observations, results from the initial survey investigation were not relayed to the secondary field crew.

Five of the Great Northern Peninsula rivers investigated are located within the boundary of Gros Morne National Park and a Scientific Research Permit was obtained from Parks Canada to conduct research inside the park. The northern Labrador rivers are located on Labrador Inuit lands, and as such, permission was obtained from the Nunatsiavut Government prior to conducting research activities in this area. A Nunatsavut Government representative (E. Ford, Environmental Monitor) participated in surveys of all nine river segments in northern Labrador.

Weather conditions during surveys were ideal, resulting in optimal viewing conditions. Surveys were not flown on 22 May 2009 due to inclement weather and high winds. River segments of

northern Labrador were surveyed over a week later than in 2008 as a result of delayed spring thaw relative to 2008, which was an ‘early’ year.

3.0 Results and Discussion

Approximately 55 hours of flight time were required to inventory the forty-three total river segments and repeat surveys. Survey conditions on the river systems of the Great Northern Peninsula were ideal with open water primarily limited to a confined meltwater channel. Snow and ice were present at higher elevations. River segments located in the backcountry of Gros Morne National Park had a greater composition of ice cover as compared to the 2008 surveys. For example, extensive stretches of the Upper Humber River (SW branch) were ice laden and numbers of recorded Harlequin Duck observations were lower than historical numbers. Harlequin Ducks were observed on 10 of the 11 river segments in this region in 2009 with 5 additional individuals observed compared to the total number obtained in 2008 (Table 2).

Conditions in central Labrador were ideal for aerial Harlequin Duck surveys, having occurred prior to the peak freshet of spring melt. River channels were more confined relative to the same segments surveyed in 2008, having the desired effect of concentrating birds at areas of preferred habitat and limiting hiding opportunities (e.g. among flooded backshores). Harlequin Ducks were observed on 19 of 23 river segments in central Labrador and 130 additional individuals were observed compared to 2008 (Table 2). In comparison to the 2008 results, the largest changes were observed on the North Shipiskan River and Shapio Lake Outlet with additions in total observed individuals of 22 and 40 ducks, respectively. Numbers of individuals on the Fig, Red Wine and Crooked Rivers were comparable to the numbers observed in 2006. This supports the claim that individuals were likely missed on these segments in 2008 as a result of high water levels providing greater opportunities for birds to escape detection than reduction in actual numbers (Jones and Goudie 2008).

Repeatability surveys of the Minipi, Crooked, Fig, Red Wine and Cache rivers resulted in observed variation ranging from zero to 19 individuals (or between zero and eleven indicated breeding pairs; Table 3). Initial Harlequin Duck observations on Minipi River, Fig River, and Red Wine River differed considerably with totals recorded during subsequent replicate surveys of the same river segments (Table 3). Numbers obtained by the secondary survey crew (Team Configuration ‘C’; Tables 1 and 3) were lower for all river segments except Crooked River, suggesting a strong survey bias. At Red Wine River, 17 Harlequin Ducks were observed during the initial survey as compared to 33 during the repeat survey approximately twenty four hours later. The discrepancy was more pronounced for Fig River where survey team configurations C and B observed 5 versus 23 individuals, respectively. An additional replicate of the Minipi River was flown to address the large variations observed between initial and repeat surveys. Surveys of the Minipi segment were conducted on 21, 23, and 25 May 2009 resulting in total Harlequin Duck observations of 26, 7, and 19 individuals, respectively. Harlequin numbers obtained during

Table 2. Comparison of Harlequin Duck Survey Observations Recorded by LGL Limited, 20-25 May & 5 June 2009 With Results Obtained From Identical River Segments Inventoried 21-27 May 2008.

River Segment	MTA In/Out	2009						2008						Rel. Change ^B Indiv. (IBP)
		Groups	P	♂	♀	Total	IBP ^A	Groups	P	♂	♀	Total	IBP ^A	
<i>Northern Newfoundland: Great Northern Peninsula</i>														
Black Brook	Out	3	3	1	–	7	4	2	2	–	–	4	2	3 (2)
Brians Pond River	Out	1	1	1	–	3	2	1	1	–	–	2	1	1 (1)
Castor River (West)	Out	4	4	–	–	8	4	3	1	2	–	4	3	4 (1)
Cloud River	Out	3	2	–	1	5	2	3	3	–	–	6	3	-1 (-1)
Crow Gulch	Out	5	5	1	–	11	6	2	1	3	–	5	4	6 (2)
Doctors Brook	Out	–	–	–	–	–	–	–	–	–	–	–	–	0
Upper Humber River (NW)	Out	4	4	1	–	9	5	5	4	1	–	9	5	0
Upper Humber River (SW)	Out	1	1	1	–	3	2	6	4	1	1	10	5	-7 (-3)
Parson Pond River	Out	5	4	2	–	10	6	3	3	–	–	6	3	4 (3)
Torrent River	Out	8	6	4	–	16	10	10	9	3	–	21	12	-5 (-2)
Western Brook	Out	2	2	–	–	4	2	2	2	–	–	4	2	0
Regional Totals		36	32	11	1	76	43	37	30	10	1	71	40	+5 (+3)
<i>Central Labrador</i>														
Adlatok River	Out	11	13	4	–	30	17	9	10	2	–	22	12	8 (5)
Beaver Brook	In	2	2	–	–	4	2	–	–	–	–	–	–	4 (2)
Cache River	In	2	2	–	–	4	2	4	3	1	1	8	4	-4 (-2)
Crooked River	Out	8	6	2	1	15	8	5	4	1	–	9	5	6 (3)
Elizabeth River	In	3	2	1	–	5	3	1	1	–	–	2	1	3 (2)
Fig River	In	10	10	1	2	23	11	5	5	1	2	13	6	10 (5)
Goose River	In	5	4	1	–	9	5	4	3	2	–	8	5	1 (0)
Harp Lake Outlet	Out	2	1	1	1	4	2	–	–	–	–	–	–	4 (2)
Metchin River	In	4	1	1	2	5	2	1	–	1	–	1	1	4 (1)
Minipi River	In	10	11	4	0	26	15	9	9	2	–	20	11	6 (4)
Minisinakwa Lake Outlet	Out	–	–	–	–	–	–	1	1	–	–	2	1	-2 (-1)
Mistinippi Lake Tributary	In	–	–	–	–	–	–	–	–	–	–	–	–	0

River Segment	MTA In/Out	2009						2008						Rel. Change ^B Indiv. (IBP)
		Groups	P	♂	♀	Total	IBP ^A	Groups	P	♂	♀	Total	IBP ^A	
Mistinippi River North	In	10	9	3	1	22	12	10	9	3	–	21	12	1 (0)
Mistinippi River South	In	2	2	–	–	4	2	3	3	2	–	8	5	-4 (-3)
Naskaupi River	In	6	10	1	1	22	11	6	6	1	–	13	7	9 (4)
North Shipiskan River	In	12	16	2	2	36	18	9	5	4	–	14	9	22 (9)
Pinus River	In	–	–	–	–	–	–	1	1	–	–	2	1	-2 (-1)
Red Wine River	In	16	14	5	0	33	19	11	10	2	–	22	12	11 (7)
Shapio Lake Outlet	Out	13	25	2	1	53	27	4	6	1	–	13	7	40 (20)
Shapio Lake Tributary	Out	2	1	2	0	4	3	2	1	1	–	3	2	1 (1)
Thomas River	In	5	6	0	1	13	6	2	1	1	–	3	2	10 (4)
Traverspine River	In	–	–	–	–	–	–	–	–	–	–	–	–	0
Washkagama Lake Outlet	Out	1	1	0	0	2	1	–	–	–	–	–	–	2 (1)
Regional Totals		124	136	30	12	314	166	87	78	25	3	184	103	+130 (+63)
<i>Northern Labrador: Voisey's Bay/Nain</i>														
Anaktalak Brook	Out	6	7	–	–	14	7	2	3	–	–	6 ^C	3	8 (4)
Anaktalik Brook	Out	14	17	–	1	35	17	22	21	3	–	45	24	-10 (-7)
Igluvigaluk Brook	Out	–	–	–	–	–	–	2	3	–	1	7	3	-7 (-3)
Ikadlivik Brook	Out	18	19	4	1	43	23	15	14	3	1	32	17	11 (6)
Kogluktokoluk Brook	Out	6	6	1	–	13	7	4	3	1	–	7	4	6 (3)
Makhavinekh Brook	Out	–	–	–	–	–	–	2	2	–	–	4	2	-4 (-2)
Option 4:Kangeklualuk Bay	Out	1	1	–	–	2	1	–	–	–	–	–	–	2 (1)
Option 5:Kangeklukuluk Bay	Out	–	–	–	–	–	–	–	–	–	–	–	–	0
Reid Brook	Out	5	5	2	–	12	7	3	2	1	–	5	3	7 (4)
Regional Totals		50	55	7	2	119	62	50	48	8	2	106	56	+13 (+6)
Notes:	^A Number of indicated breeding pairs (IBP). ^B Change presented relative to 2008 aerial survey results in terms of number of individuals and indicated breeding pairs (in parentheses). ^C In 2008, prior to the start of Anaktalik Brook segment, 12 pairs + 1♀ were observed in a saltwater cove, approximately 250 m from mouth of survey river.													

Table 3. Survey Parameters for Dedicated Harlequin Duck Repeatability Surveys Conducted by LGL Limited on Five River Systems Within a 48 Hour Period in Central Labrador.

River Segment	MTA In/Out	Team Config.	Date	Start Time ^A	Total Time ^A	Groups	P	♂	♀	Total ^B	IBP ^C
Minipi River	In	A	21 May 2009	16:39:42	0:59:46	10	11	4	–	26	15
		C	23 May 2009	15:27:25	1:06:31	3	3	1	–	7	4
		D	25 May 2009	15:01:37	0:55:04	8	7	5	–	19	12
Difference (23 May – 21 May)				46:47:43	+ 0:06:45	-7	-8	-3	0	-19	-11
Difference (25 May – 21 May)				94:21:55	+ 0:04:42	-2	-4	1	0	-7	-3
Crooked River	Out	C	23 May 2009	8:57:15	0:45:41	5	7	1	–	15	8
		B	24 May 2009	8:53:09	0:53:44	8	6	2	1	15	8
Difference				23:55:54	+ 0:08:03	3	-1	1	1	0	0
Red Wine River	In	C	23 May 2009	10:13:59	1:05:18	8	8	1	–	17	9
		B	24 May 2009	10:23:57	1:14:06	16	14	5	–	33	19
Difference				24:09:58	+ 0:08:48	8	6	4	0	16	10
Fig River	In	C	23 May 2009	13:06:39	0:39:57	2	2	1	–	5	3
		B	24 May 2009	16:50:01	0:44:07	10	10	1	2	23	11
Difference				27:43:22	+ 0:04:10	8	8	0	2	18	8
Cache River	In	C	23 May 2009	14:05:21	0:19:11	–	–	–	–	0	0
		B	24 May 2009	17:56:57	0:15:32	2	2	–	–	4	2
Difference				27:51:36	0:03:39	2	2	0	0	4	2
Notes:	^A Time format in (hh:mm:ss) ^B Total number of individuals. ^C Number of indicated breeding pairs (IBP).										

the second replicate were comparable to the initial survey and support the notion of an introduced survey bias. Three surveys on this particular segment (although not all independent) will allow an estimate of the variation among recorded counts.

Similar to the rivers of central Labrador, rivers in northern Labrador were surveyed at optimal conditions prior to their maximum spring freshets. A total of 119 Harlequin Ducks were observed on six of nine river segments; an increase of 13 individuals compared to results for 2008 (Table 2). During the 2009 surveys, Ikadlivik and Anaktalik Brooks remain the segments supporting the highest numbers of Harlequins Ducks, among the northern Labrador rivers investigated. Ikadlivik Brook accounted for 36% of individuals, whereas 29% were located along the Anaktalik Brook segment.

As a component of their ongoing Environmental Monitoring Program, Vale Inco (Voisey's Bay Project) flew an independent survey of river segments in the immediate vicinity of their mining operation on 10 June 2009 (P. Blanchard, EH&S Supervisor, Vale Inco NL Ltd., pers. comm.). Some of these river segments include those flown during this work and may provide data for repeatability comparison.

No additional observations of Harlequin Ducks were made during transit between surveyed river segments. Other observations of note within central Labrador and the confines of the MTA include a small group of nine caribou (*Rangifer tarandus*), numerous moose (*Alces americana*), black bear (*Ursus Americanus*), and raptors and their nest locations (Appendix 1).

4.0 References Cited

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Appendix 1. Incidental Observations of Ungulates, Black Bears and Raptor Nest Sites Recorded in Central Labrador During Aerial Surveys by LGL Limited, 21-25 May 2009.

Date	Observation	River Segment / General Area	Latitude (DD)	Longitude (DD)
24 May 2009	Caribou (group of 9)	East of Metchin River ^A	53.487038	-63.149151
21 May 2009	Moose (cow + yearling)	Traverspine River	53.037661	-60.488415
21 May 2009	Moose (cow + twin yrsl)	Traverspine River	53.068025	-60.471758
21 May 2009	Moose (adult bull)	Upper Brook wetlands ^A	53.159099	-60.982308
21 May 2009	Moose (cow + yearling)	Pinus River	53.047501	-61.320314
21 May 2009	Moose (adult bull)	Beaver Brook	52.811132	-61.830425
21 May 2009	Moose (lone animal)	Minipi River	52.665540	-61.400274
23 May 2009	Moose (lone animal) ^B	Fig River	53.088247	-63.071176
24 May 2009	Moose (lone animal)	Crooked River	54.093597	-60.800097
24 May 2009	Moose (adult bull)	Goose River	53.433145	-61.465038
24 May 2009	Moose (cow + twins)	Elizabeth River	53.238882	-63.298806
24 May 2009	Moose (adult cow)	Metchin River	53.386418	-63.312633
24 May 2009	Moose (lone animal)	Fig River	53.103343	-63.182209
24 May 2009	Moose (adult bull) ^B	Fig River	53.070402	-63.062910
25 May 2009	Moose (adult bull mortality)	Minipi River	52.829838	-61.627455
25 May 2009	Moose (lone animal)	Minipi River	52.776216	-61.580792
25 May 2009	Moose (lone animal)	Minipi River	52.600274	-61.286914
23 May 2009	Black Bear (lone animal)	Thomas River	54.218267	-62.101023
23 May 2009	Black Bear (lone animal)	North Shipiskan River	54.662214	-62.367785
23 May 2009	Black Bear (lone animal)	Mistinippi River South	54.682885	-61.457716
23 May 2009	Black Bear (lone animal)	Red Wine River	53.966319	-61.735026
23 May 2009	Black Bear (lone animal) ^B	Minipi River	52.829340	-61.626823
24 May 2009	Black Bear (lone animal)	Red Wine River	54.088022	-62.096211
25 May 2009	Black Bear (2, moose kill) ^B	Minipi River	52.829838	-61.627455
23 May 2009	Osprey nest (pair)	Red Wine River	53.961497	-61.716459
24 May 2009	Osprey nest (1 adult)	Crooked River	53.987476	-60.787350
24 May 2009	Osprey nest (1 adult)	Crooked River	54.007889	-60.769944
24 May 2009	Osprey nest (1 adult)	Elizabeth River	53.413216	-63.799495
24 May 2009	Osprey nest (1 adult)	Fig River	53.093010	-63.152280
24 May 2009	Bald Eagle nest (pair)	Metchin River	53.316742	-63.367699
21 May 2009	Unk raptor nest (abandoned)	Churchill R. (Slackwaters) ^A	52.904655	-61.807969
24 May 2009	Unk raptor nest (abandoned)	Goose River	53.439452	-61.610495
Notes:	^A Observed during transit between surveyed river segments. ^B Possible duplicated observation made on subsequent surveys.			