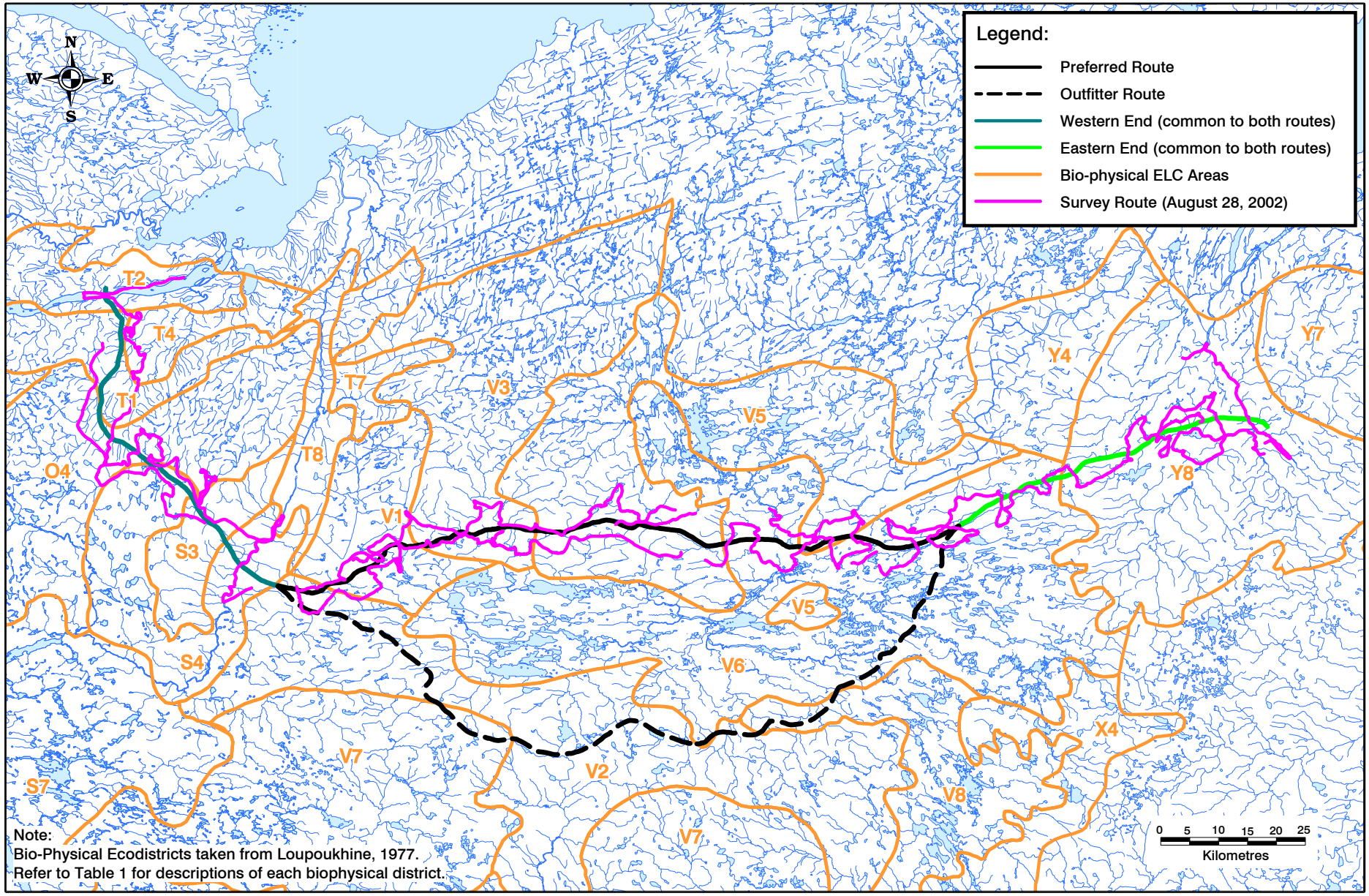

Note:
Bio-Physical Ecodistricts taken from Loupoukhine, 1977.
Refer to Table 1 for descriptions of each biophysical district.

NFS09308-ES-75.WOR 12JAN04 2:45pm

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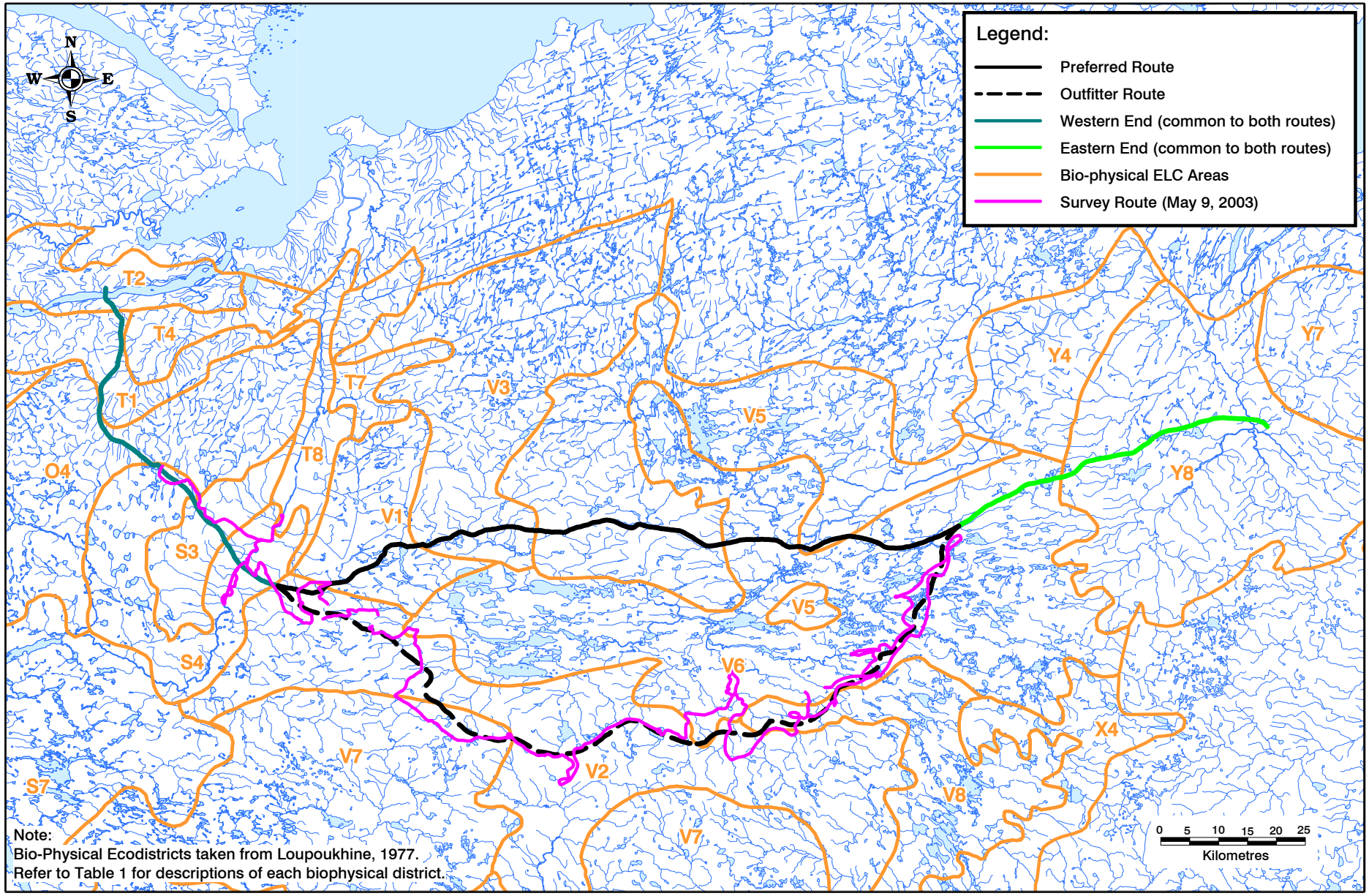
Figure 6

ECODISTRICTS AND AERIAL SURVEY ROUTE, AUGUST 28, 2002



Note:
Bio-Physical Ecodistricts taken from Loupoukhine, 1977.
Refer to Table 1 for descriptions of each biophysical district.

NFS09308-ES-66.WOR 12JAN04 3:15pm

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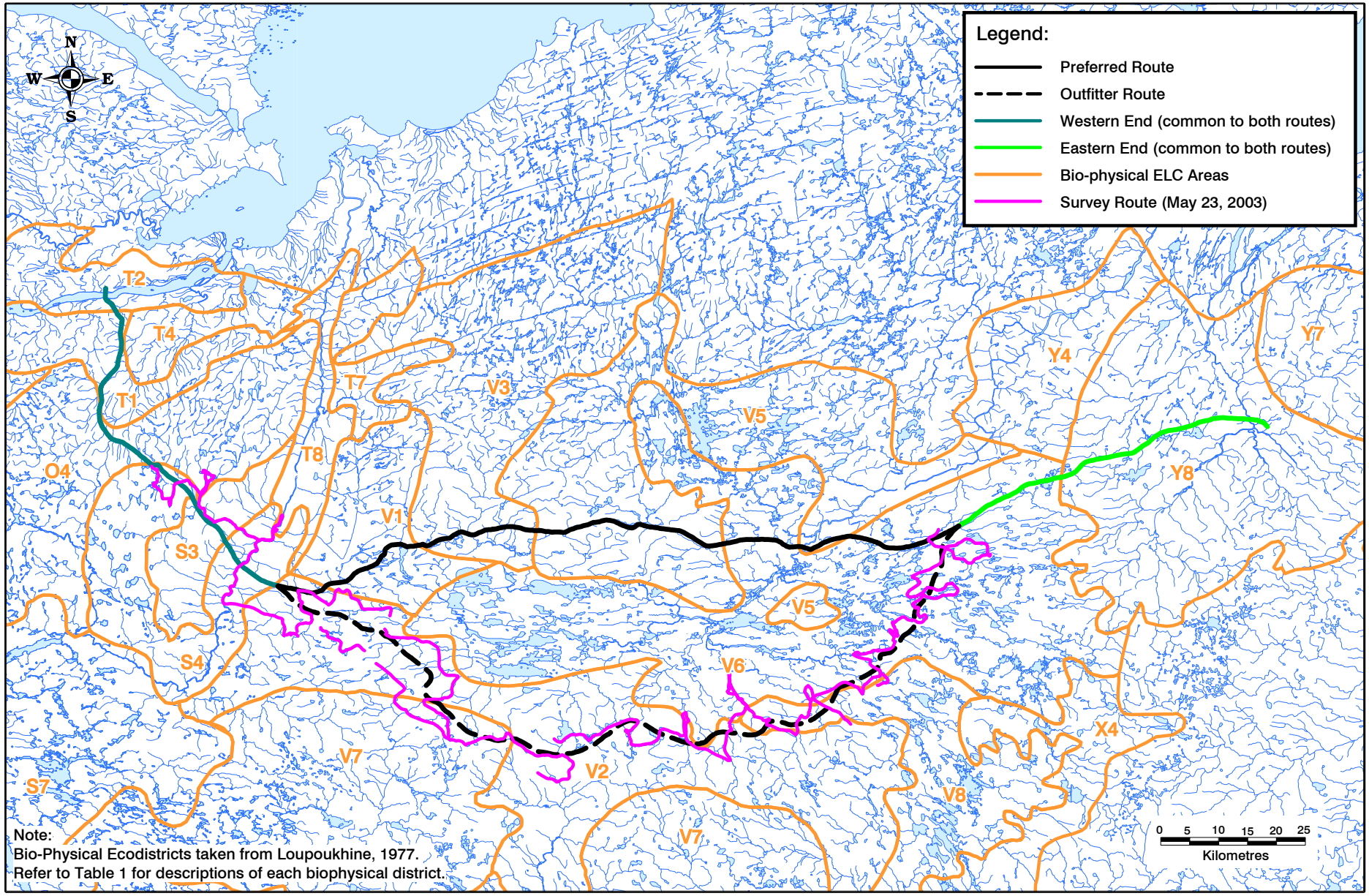
Figure 7

ECODISTRICTS AND AERIAL SURVEY ROUTE, MAY 9, 2003



Note:
Bio-Physical Ecodistricts taken from Loupoukhine, 1977.
Refer to Table 1 for descriptions of each biophysical district.

NFS09308-ES-67.WOR 12JAN04 3:25pm

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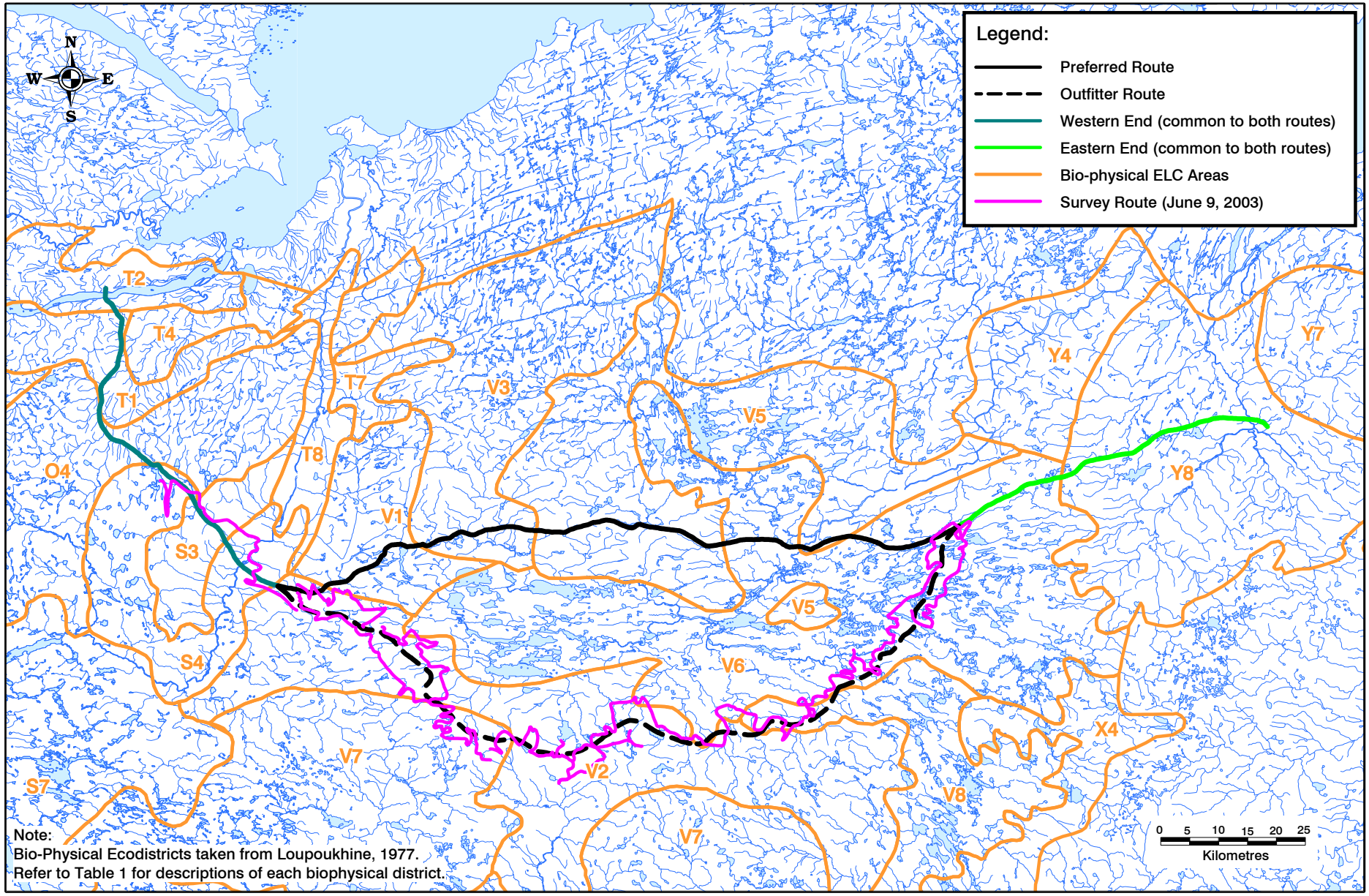
Figure 8

ECODISTRICTS AND AERIAL SURVEY ROUTE, MAY 23, 2003



Note:
Bio-Physical Ecodistricts taken from Loupoukhine, 1977.
Refer to Table 1 for descriptions of each biophysical district.

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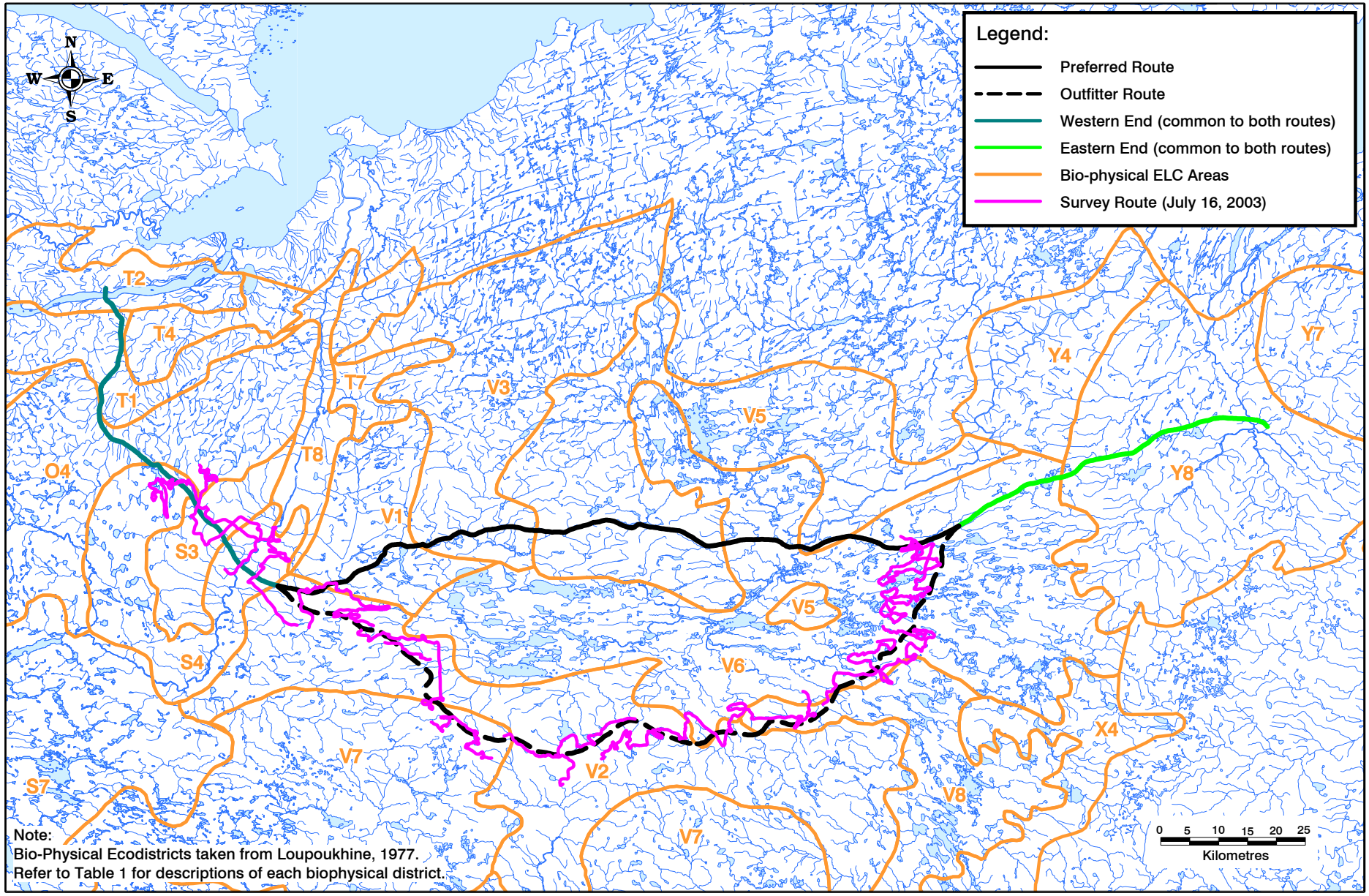
Figure 9

ECODISTRICTS AND AERIAL SURVEY ROUTE, JUNE 9, 2003

NFS09308-ES-68.WOR 12JAN04 3:25pm



Note:
Bio-Physical Ecodistricts taken from Loupoukhine, 1977.
Refer to Table 1 for descriptions of each biophysical district.

NFS09308-ES-69.WOR 12JAN04 3:30pm

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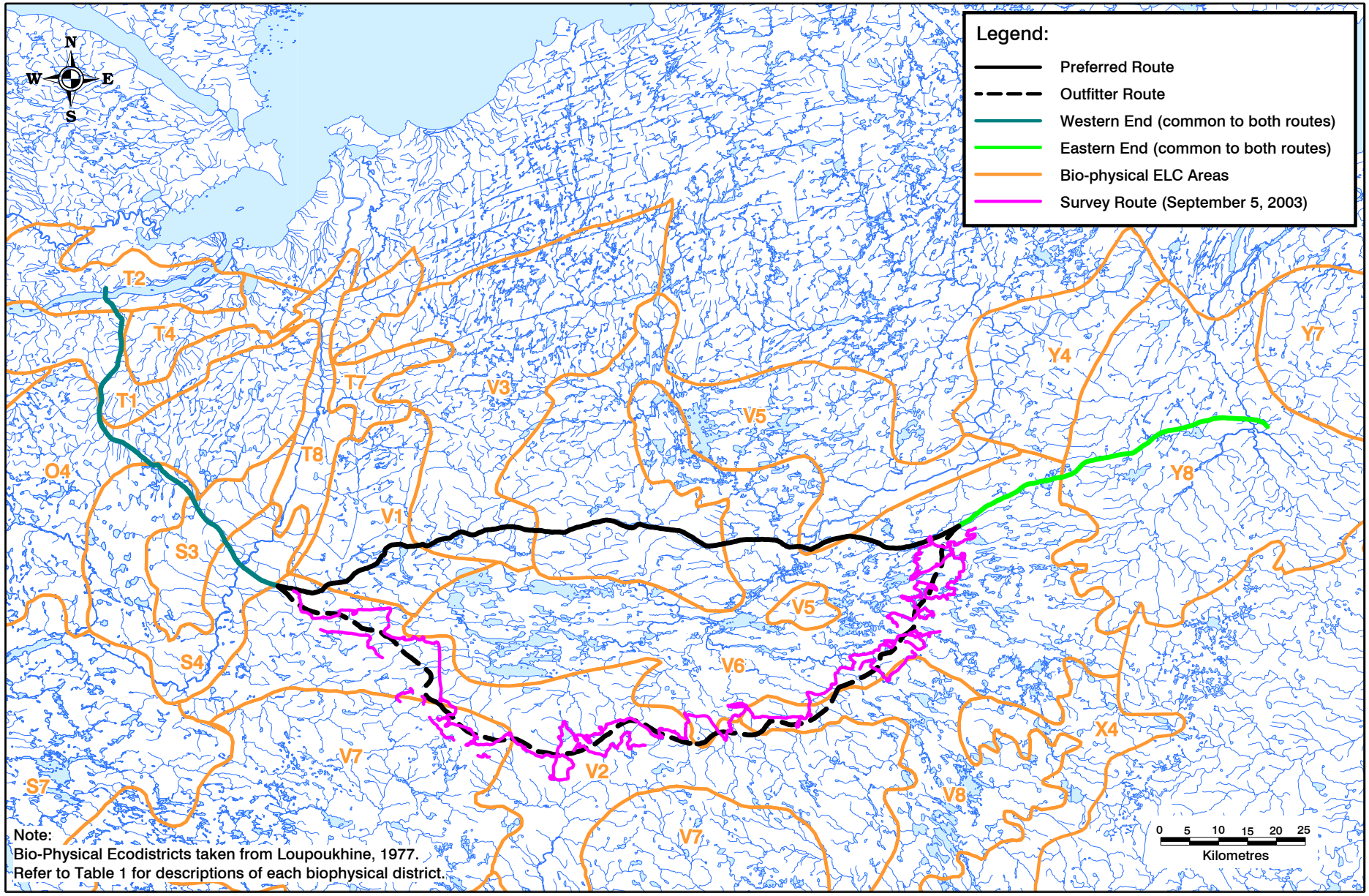
Figure 10

ECODISTRICTS AND AERIAL SURVEY ROUTE, JULY 16, 2003



Note:
Bio-Physical Ecodistricts taken from Loupoukhine, 1977.
Refer to Table 1 for descriptions of each biophysical district.

NFS09308-ES-70.WOR 12JAN04 3:35pm

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Figure 11

ECODISTRICTS AND AERIAL SURVEY ROUTE, SEPTEMBER 5, 2003

Table 1 Description of Biophysical Ecodistricts Encompassing the Preferred and Alternative (Outfitter) Route

Eco-Region	Eco-District	Description
O	O4	Topography is corrugated/fluted. Genetic material is morainal deposits with a veneer, drumlinized surface expression, organic deposits and bedrock with a hummocky surface expression. Vegetation is of medium density and is comprised of lichen, moss, trees and sedges. 11% to 20% of the district is comprised of open freshwater bodies.
	O5	Topography is corrugated/fluted. Genetic material is mainly morainal deposits with a veneer surface expression and bedrock with a hummocky surface expression. Vegetation is of medium density and is comprised of lichen, trees, moss and sedges. 11% to 20% of the district is comprised of open freshwater bodies.
S	S3	Topography is dissected upland. Genetic material is mainly morainal deposits with a veneer, drumlinized surface expression and bedrock with a hummocky surface expression. Considerably less organic deposits are present. Vegetation is dense and is comprised of trees, lichens and moss. 11% to 20% of the district is comprised of open freshwater bodies.
	S4	Topography is corrugated/fluted. Genetic material is mainly organic deposits and glaciofluvial deposits with a terraced surface expression. Morainal deposits with a veneer surface expression are considerably less abundant. Vegetation is dense and is comprised of moss, lichens and trees. 11% to 20% of the district is comprised of open freshwater bodies.
	S7	Topography is corrugated/fluted. Genetic material is predominantly morainal deposits with a veneer surface expression. Glaciofluvial deposits with a level surface expression are considerably less abundant. Vegetation is dense and is comprised of trees and lichens. 11% to 20% of the district is comprised of open freshwater bodies.
T	T1	Topography is a V-shaped valley or gorge. Genetic material is mainly morainal deposits with a veneer, drumlinized surface expression, colluvial deposits with a veneer, fan surface expression and alluvial deposits with a level surface expression. Vegetation is very dense and is comprised of trees, lichens, moss and shrubs. Less than 10% of the district is open freshwater bodies.
	T2	Topography is level with eroded channels. Genetic material is predominantly alluvial with a terraced surface expression. Morainal deposits with a level, veneer surface expression and aoelian deposits are considerably less abundant. Vegetation is dense and is comprised of trees, lichens, and shrubs. Less than 10% of the district is open freshwater bodies.
	T4	Topography is level with eroded channels. Genetic material is organic deposits, marine deposits with an eroded, level surface expression and alluvial deposits with a level surface expression. Vegetation is very dense and is comprised of moss, trees and shrubs. Less than 10% of the district is open freshwater bodies.
	T7	Topography is a V-shaped valley or gorge. Genetic material is morainal deposits with a veneer surface expression and colluvial deposits with a veneer surface expression. Vegetation is dense and is comprised of trees, moss and shrubs. Less than 10% of the district is open freshwater bodies.
	T8	Topography is a V-shaped valley or gorge. Genetic material is mainly lacustrine deposits with an eroded, level surface expression and morainal deposits with a veneer surface expression. Glaciofluvial deposits with a level surface expression are considerably less abundant. Vegetation is very dense and is comprised of trees, moss and shrubs. Less than 10% of the district is open freshwater bodies.
V	V1	Topography is an incised plateau. Genetic material is predominantly morainal deposits with a veneer surface expression. Colluvium with a veneer surface expression and bedrock with a hummocky surface expression are considerably less abundant. Vegetation is dense and is comprised of trees, moss and lichens. Less than 10% of the district is open freshwater bodies.
	V2	Topography is corrugated/fluted. Genetic material is predominantly morainal with a veneer, hummocky surface expression. Glaciofluvial deposits with a ridged surface expression and alluvial deposits with a level surface expression are considerably less abundant. Vegetation is of medium density and is comprised of trees, moss and lichens. Less than 10% of the district is open freshwater bodies.

Eco-Region	Eco-District	Description
V Cont.	V3	Topography is an incised plateau. Genetic material is predominantly morainal deposits with a veneer surface expression. Organic deposits and glaciofluvial deposits with a terraced surface expression are considerably less abundant. Vegetation is of medium density and is comprised of moss, shrubs, lichens and trees. Less than 10% of the district is open freshwater bodies.
	V5	Topography is corrugated/fluted. Genetic material is predominantly morainal with a veneer, level surface expression. Bedrock with a hummocky surface expression is considerably less abundant. Vegetation is of medium density and is comprised of trees, lichens and moss. Less than 10% of the district is open freshwater bodies.
	V6	Topography is level. Genetic material is predominantly organic. Glaciofluvial deposits with a ridged surface expression are considerably less abundant. Vegetation is dense and is comprised of moss, trees, shrubs and lichens. 21% to 30% of the district is open freshwater bodies.
	V7	Topography is corrugated/fluted. Genetic material is predominantly morainal with a veneer, level surface expression. Glaciofluvial deposits with a level surface expression are considerably less abundant. Vegetation is of medium density and is comprised of trees, moss and lichens. Less than 10% of the district is open freshwater bodies.
	V8	Topography is corrugated/fluted. Genetic material is predominantly morainal with a level surface expression. Glaciofluvial deposits with a terraced surface expression and organic deposits are considerably less abundant. Vegetation is dense and is comprised of moss, lichens, trees and shrubs. 11% to 20% of the district is open freshwater bodies.
X	X4	Topography is corrugated/fluted. Genetic material is predominantly morainal with a veneer, level surface expression. Colluvium with a complex surface expression is less abundant. Vegetation is dense and is comprised of trees, shrubs, lichens and moss. Less than 10% of the district is open freshwater bodies.
Y	Y4	Topography is a rounded valley. Genetic material is predominantly morainal with a veneer, level surface expression. Glaciofluvial deposits with a terraced surface expression are considerably less abundant. Vegetation is dense and is comprised of trees, lichens, moss and sedges. Less than 10% of the district is open freshwater bodies.
	Y7	Topography is dissected upland. Genetic material is morainal with a veneer surface expression, bedrock with a hummocky surface expression and colluvium with a veneer surface expression. Vegetation is of medium density and is comprised of lichens, trees and moss. Less than 10% of the district is open freshwater bodies.
	Y8	Topography is corrugated/fluted. Genetic material is morainal with a veneer, hummocky surface expression and colluvial with a veneer surface expression. Glaciofluvial deposits with a level surface expression are considerably less abundant. Vegetation is dense and is comprised of moss, trees and lichens. Less than 10% of the district is open freshwater bodies.

2.0 Comment 2 – Waterfowl Densities

Comment 2: An analysis of waterfowl breeding population, staging and moulting densities in each of these districts. The current analysis offers no such insights.

Waterfowl densities for each survey and biophysical ecodistrict are presented in Table 2. It should be noted that while the proposed highway routes (preferred and outfitter) do not pass through some biophysical districts (i.e., T4 and T8), the route is nearby and areas in these biophysical districts were surveyed. That is why there is no indication of highway length within these districts even though waterfowl observations are indicated (Table 2).

Densities were calculated for three species groups of waterfowl: (1) Canada geese and black ducks; (2) diving ducks (common and red-breasted mergansers, ring-necked ducks, scoters (surf, black and sp.), common goldeneye, scaup, common loons and "unidentified divers"); and (3) other dabblers (green-winged teal, mallard, northern pintail and long-tailed duck).

Densities for each biophysical ecodistrict were also calculated for each of five surveys conducted along the preferred route and the outfitter route (Table 2). For the following discussion, densities of the three species groups were averaged over the five surveys for each ecodistrict on each route (Table 3). Surveys were also grouped according to differing life history stages, specifically breeding, moulting and staging (spring and fall) (Table 4). For those life history stages with more than one survey, densities were averaged. Following is an indication of the survey groupings:

Preferred Route:

- May 9 and May 21, 2002 surveys represent spring staging;
- June 1, 2002 survey represents breeding;
- July 18, 2002 survey represents moulting; and
- August 28, 2002 represents fall staging.

Outfitter Route:

- May 9, 2003 survey represents spring staging;
- May 23 and June 9, 2003 surveys represent breeding;
- July 16, 2003 survey represents moulting; and
- September 5, 2003 represents fall staging.

Table 2 - Total Densities of Waterfowl Groups by Survey and Biophysical Ecodistrict Along the Preferred and Outfitter Routes

Biophysical Ecodistrict	Highway Length (km)	2002 Surveys																																			
		May 9								May 21								June								July								August					
		CAGO/ BLDU*		Divers		Dabblers		Survey Length (km)	Survey Area (km^2)	CAGO/ BLDU		Divers		Dabblers		Survey Length (km)	Survey Area (km^2)	CAGO/ BLDU		Divers		Dabblers		Survey Length (km)	Survey Area (km^2)	CAGO/ BLDU		Divers		Dabblers		Survey Length (km)	Survey Area (km^2)	CAGO/ BLDU		Divers		Dabblers		Survey Length (km)
		#	Density	#	Density	#	Density			#	Density	#	Density	#	Density			#	Density	#	Density	#	Density			#	Density	#	Density	#	Density			#	Density	#	Density	#	Density	
PREFERRED ROUTE																																					
O4	14.3							27.7	13.8	9.0	0.4	2.0	0.1			42.7	21.4	7.0	0.1	20.0	0.3			119.8	59.9	4.0	0.2	3.0	0.1	1.0	0.0	44.8	22.4	20.0	0.5					75.8
O5																																							
S3	9.5							10.8	5.4	26.0	5.4					9.6	4.8	10.0	0.5	9.0	0.4	2.0	0.1	40.7	20.4							13.9	7.0							19.4
S4	21.7	25.0	1.2	4.0	0.2			42.4	21.2	71.0	2.5	19.0	0.7	37.0	1.3	57.5	28.7	72.0	1.2	53.0	0.9	6.0	0.1	121.5	60.8	27.0	0.6	7.0	0.2			90.7	45.3	13.0	0.4	3.0	0.1			65.9
S7																																							
T1	18.2							29.7	14.9	2.0	0.1	1.0	0.1			27.8	13.9			6.0	0.2			49.0	24.5	16.0	1.1	5.0	0.4			28.2	14.1	5.0	0.5					20.9
T2	4.6	7.0	0.7					18.9	9.4	26.0	3.2	45.0	5.6	2.0	0.2	16.0	8.0							21.4	10.7	1.0	0.1					33.2	16.6							26.7
T4								13.6	6.8	18.0	2.6	6.0	0.9			13.6	6.8	5.0	0.1	8.0	0.2			77.3	38.6	5.0	0.7	2.0	0.3			15.1	7.6	6.0	0.5					26.2
T7																																							
T8		5.0	3.3	10.0	6.7			3.0	1.5	15.0	7.3	8.0	3.9			4.1	2.1							6.5	3.2							12.4	6.2							26.2
V1	19.3							19.0	9.5	17.0	0.6	2.0	0.1			55.6	27.8	24.0	0.5	45.0	0.9	2.0	0.0	95.7	47.8	43.0	1.2	21.0	0.6			69.3	34.7	10.0	0.3	82.0	2.3			70.2
V2	9.4	1.0	0.1					15.7	7.8	2.0	0.3					15.5	7.7	10.0	0.6	9.0	0.5			35.3	17.6							21.0	10.5							21.0
V3	21.4	4.0	0.3					29.4	14.7	57.0	2.0	4.0	0.1	3.0	0.1	56.2	28.1	73.0	1.3	60.0	1.1	15.0	0.3	110.1	55.0	31.0	0.9	17.0	0.5			71.3	35.7	15.0	0.4	68.0	2.0			68.2
V5	43.3	2.0	0.1					56.3	28.1	45.0	1.2	19.0	0.5	15.0	0.4	75.9	37.9	110.0	1.0	90.0	0.8	18.0	0.2	211.8	105.9	12.0	0.3	10.0	0.2			91.4	45.7	30.0	0.5	67.0	1.1	2.0	0.0	116.7
V6	53.7							86.3	43.1	68.0	1.3	16.0	0.3	16.0	0.3	100.7	50.4	214.0	1.4	84.0	0.5	44.0	0.3	314.1	157.0	120.0	1.7	6.0	0.1			138.9	69.4	51.0	0.6	35.0	0.4	40.0	0.5	164.4
V7																																							
V8																																							
X4																																							
Y4																																0.2	0.1						
Y7																0.4	0.2																						
Y8	38.7	50.0	0.8	12.0	0.2	8.0	0.1	121.3	60.7	26.0	0.7	39.0	1.1	18.0	0.5	73.3	36.6	28.0	0.3	39.0	0.4			185.5	92.8	50.0	1.0	4.0	0.1			98.2	49.1	7.0	0.1	16.0	0.2			155.2
OUTFITTER ROUTE																																							
Biophysical Ecodistrict	**Highway Length (km)**	**2003 Surveys**																																					
		May 9								**May 23**								**June**								**July**								**September**					
O4								1.0	0.5	1.0	0.1	1.0	0.1			13.4	6.7							1.1	0.6	4.0	0.5	2.0	0.2			16.9	8.5							
O5																																							
S3				1.0	0.2	1.0	0.2	11.1	5.5							11.0	5.5			5.0	1.0			10.2	5.1			13.0	0.8			32.6	16.3							
S4		6.0	0.2	13.0	0.5	2.0	0.1	52.8	26.4	4.0	0.2	6.0	0.2	1.0	0.0	50.9	25.4	14.0	0.7	6.0	0.3			38.6	19.3	31.0	0.7	23.0	0.5	4.0	0.1	88.7	44.3							
S7																																							
T1																																							
T2																																							
T4																																							
T7																																							
T8								3.1	1.5			3.0	0.9			6.7	3.3															0.9	0.4							
V1								3.8	1.9			1.0	0.6			3.4	1.7			1.0	0.6			3.6	1.8							6.8	3.4							
V2	81.5							131.0	65.5	21.0	0.2	62.0	0.7	10.0	0.1	173.1	86.5	77.0	0.8	85.0	0.8	2.0	0.0	204.3	102.1	138.0	1.5	101.0	1.1			188.3	94.1	96.0	1.1	153.0	1.7	13.0	0.1	175.1
V3																																							
V5																																							
V6	42.5	9.0	0.1					138.2	69.1	20.0	0.3	62.0	0.9	7.0	0.1	140.9	70.4	99.0	1.4	26.0	0.4	15.0	0.2	136.7	68.3	114.0	1.2	100.0	1.0	10.0	0.1	192.6	96.3	93.0	1.0	151.0	1.7	21.0	0.2	179.9
V7	15.1							25.1	12.6	6.0	0.3	7.0	0.4	1.0	0.1	34.6	17.3	30.0	1.2	18.0	0.7			48.1	24.0	24.0	1.3	19.0	1.0			37.3	18.6	12.0	0.6	46.0	2.4	4.0	0.2	38.0
V8	17.1					2.0	0.2	23.8	11.9	2.0	0.2			1.0	0.1	26.6	13.3	16.0	1.4	2.0	0.2	6.0	0.5	23.3	11.6	7.0	0.4	2.0	0.1	2.0	0.1	31.4	15.7	6.0	0.3	9.0	0.5	3.0	0.2	38.0
X4																																							
Y4																																							
Y7																																							
Y8																																							

* CAGO/BLDU - Canada Goose/Black Ducks

Table 3 Average Densities of Waterfowl Groups by Biophysical Ecodistrict

Biophysical Ecodistrict	Highway Length (km)	Average Canada Geese/Black Duck Density	Average Diver Density	Average Dabbler Density
PREFERRED ROUTE				
O4	14.3	0.2	0.1	0.0
O5				
S3	9.5	1.2	0.1	0.0
S4	21.7	1.2	0.4	0.3
S7				
T1	18.2	0.4	0.1	
T2	4.6	0.8	1.1	0.0
T4		0.8	0.3	
T7				
T8		2.1	2.1	
V1	19.3	0.5	0.8	0.0
V2	9.4	0.2	0.1	
V3	21.4	1.0	0.7	0.1
V5	43.3	0.6	0.5	0.1
V6	53.7	1.0	0.3	0.2
V7				
V8				
X4				
Y4				
Y7				
Y8	38.7	0.6	0.4	0.1
OUTFITTER ROUTE				
O4		0.1	0.1	
O5				
S3			0.4	0.0
S4		0.4	0.3	0.0
S7				
T1				
T2				
T4				
T7				
T8			0.2	
V1			0.2	
V2	81.5	0.7	0.9	0.1
V3				
V5				
V6	42.5	0.8	0.8	0.1
V7	15.1	0.7	0.9	0.1
V8	17.1	0.5	0.2	0.2
X4				
Y4				
Y7				
Y8				

Table 4 Average Densities of Waterfowl Groups by Life History Stage and Biophysical Ecodistrict

Biophysical Ecodistrict	Preferred Highway Length (km)	SPRING STAGING			BREEDING			MOULTING			FALL STAGING		
		Average Densities			Average Densities			Average Densities			Average Densities		
		CAGO/ BLDU*	Divers	Dabblers	CAGO/ BLDU	Divers	Dabblers	CAGO/ BLDU	Divers	Dabblers	CAGO/ BLDU	Divers	Dabblers
PREFERRED ROUTE													
O4	14.3	0.2	0.0		0.1	0.3		0.2	0.1	0.0	0.5		
O5													
S3	9.5	2.7			0.5	0.4	0.1						
S4	21.7	1.8	0.4	0.6	1.2	0.9	0.1	0.6	0.2		0.4	0.1	
S7													
T1	18.2	0.1	0.0			0.2		1.1	0.4		0.5		
T2	4.6	2.0	2.8	0.1				0.1					
T4		1.3	0.4		0.1	0.2		0.7	0.3		0.5		
T7													
T8		5.3	5.3										
V1	19.3	0.3	0.0		0.5	0.9	0.0	1.2	0.6		0.3	2.3	
V2	9.4	0.2			0.6	0.5							
V3	21.4	1.2	0.1	0.1	1.3	1.1	0.3	0.9	0.5		0.4	2.0	
V5	43.3	0.6	0.3	0.2	1.0	0.8	0.2	0.3	0.2		0.5	1.1	0.0
V6	53.7	0.7	0.2	0.2	1.4	0.5	0.3	1.7	0.1		0.6	0.4	0.5
V7													
V8													
X4													
Y4													
Y7													
Y8	38.7	0.8	0.6	0.3	0.3	0.4		1.0	0.1		0.1	0.2	

Biophysical Ecodistrict	Preferred Highway Length (km)	SPRING STAGING			BREEDING			MOULTING			FALL STAGING		
		Average Densities			Average Densities			Average Densities			Average Densities		
		CAGO/ BLDU*	Divers	Dabblers	CAGO/ BLDU	Divers	Dabblers	CAGO/ BLDU	Divers	Dabblers	CAGO/ BLDU	Divers	Dabblers
OUTFITTER ROUTE													
O4					0.1	0.1		0.5	0.2				
O5													
S3			0.2	0.2		0.5			0.8				
S4		0.2	0.5	0.1	0.4	0.3	0.0	0.7	0.5	0.1			
S7													
T1													
T2													
T4													
T7													
T8						0.4							
V1						0.6							
V2	81.5				0.5	0.8	0.1	1.5	1.1		1.1	1.7	0.1
V3													
V5													
V6	42.5	0.1			0.9	0.6	0.2	1.2	1.0	0.1	1.0	1.7	0.2
V7	15.1				0.8	0.6	0.0	1.3	1.0		0.6	2.4	0.2
V8	17.1			0.2	0.8	0.1	0.3	0.4	0.1	0.1	0.3	0.5	0.2
X4													
Y4													
Y7													
Y8													

* CAGO/BLDU - Canada Goose/Black Ducks

As the proposed highway routing at the western and eastern ends of both the preferred and outfitter routes is common to both routes, the waterfowl surveys conducted in 2002 along this common routing apply to both the preferred and outfitter routes. Therefore, densities from the 2002 surveys are applied to the discussion of the areal extent of the highway and its effects on waterfowl populations pertaining to the common sections of the preferred and outfitter routes. Densities for the breeding surveys will be used to assess effects of the areal footprint of the highway.

For a comparison of the two routing options, the discussion focuses on those biophysical ecodistricts through which the routing is not common. These include: Preferred Route: V1, V2, V3, V5, and V6; and Outfitter Route: V2, V6, V7, and V8.

2.1 Average Waterfowl Densities Along the Preferred and Outfitter Routes

2.1.1 Canada Geese/Black Ducks

As expected, the highest average density of Canada goose/black duck (CAGO/BLDU) along the preferred route was in V6 at 1.0 birds/km^2 (Table 3). The next highest density (0.9 birds/km^2) was recorded in V3, an ecodistrict with less than 10 percent open water but with vegetation cover of predominantly moss and shrubs. Densities in the remaining ecodistricts were less than 0.6 birds/km^2.

Along the outfitter route, the average density of CAGO/BLDU was also highest in V6 at 0.8 birds/km^2. In the remaining ecodistricts, densities averaged 0.7 birds/km^2 or less (Table 3).

2.1.2 Diving Ducks

Along the preferred route, densities of diving ducks (divers) ranged from 0.1 to 0.8 birds/km^2. The density of divers in V6 was relatively low compared to V1 and V3 (Table 3). This may reflect the fact that diving ducks are often observed using rivers and rocky lakes rather than wetland areas. Rivers may flow through forested areas with variable topography and may still provide suitable habitat for diving ducks. Similarly, waterbodies surrounded by forest and rugged topography may also provide habitat to divers.

Average diver densities were generally higher on the outfitter route, ranging from 0.1 birds/km^2 in V8 to 0.9 birds/km^2 in V7 (Table 3). Biophysical ecodistrict V8 has between 11 and 20 percent open water and is predominantly moss and lichens, while V7 has less than 10 percent open water and is predominantly treed. This pattern again likely reflects the use of non-wetland type habitats by this species group.

2.1.3 Other Dabblers

Densities of other dabblers (dabblers) along both routes were generally low, likely due to the relatively low numbers of individuals within this grouping that were observed during surveys. However, along the preferred route, the highest density of dabblers observed was in V6 at 0.2 birds/km^2.

Along the outfitter route, the density of dabblers in V6 was half that observed along the preferred route, at 0.1 birds/km^2. The highest density of dabblers observed along the outfitter route was in V8 at 0.2 birds/km^2. As noted above, this biophysical ecodistrict has the second most abundant open water supply at 11 to 20 percent.

2.2 Waterfowl Densities – Breeding, Moulting and Staging

2.2.1 Breeding

Canada Geese/Black Ducks

During the breeding period, the highest densities of CAGO/BLDU occurred in V6 along both the outfitter route and the preferred route (approximately 1.4 birds/km^2 along both routes) (Table 4). The same density (1.4 birds/km^2) was observed in V8 along the outfitter route. In the remaining biophysical ecodistricts along the outfitter route, densities ranged from 0.7 birds/km^{2}in V2 to 1.2 birds/km^2 in V7 (Table 4).

Densities in V5 and V3 along the preferred route were also relatively high (1.0 and 1.3 birds/km^2, respectively). In V1 and V2, both biophysical ecodistricts with less than 10 percent open water and predominately treed, densities were 0.5 birds/km^2 (Table 4).

Fixed-wing transect surveys in 1993 and 1994 indicated densities of Canada geese within the project area (Eagle Plateau Ecoregion) to range from 0.2 to 0.4 birds/km^2 (Bateman and Hicks 1995). While these Canada goose densities represented some of the highest seen in Labrador, they are generally lower than those observed during surveys for the TLH in 2002 and 2003. However, the survey methodology used in 2002 and 2003 targeted waterfowl habitat along the proposed highway route, rather than the method used by Bateman and Hicks (1995), which flew random straight line north-south transects. This may account for the higher densities observed. Also, the above calculations include observations of black ducks. Goudie and Whitman (1987), from aerial surveys conducted in 1980, reported even lower densities of Canada geese in the Eagle Plateau Ecoregion, with 0.1 birds/km^2 over a 241 km^2 survey area. Again, Goudie and Whitman (1987) surveyed random plots and densities were not based on a methodology that targeted suitable waterfowl habitat.

Diving Ducks

Densities of divers observed during the breeding surveys were lower than those observed for CAGO/BLDU in most biophysical districts along both routes. Along the preferred route, densities ranged from 0.5 birds/km^2 (V6 and V2) to 1.0 birds/km^2 (V3), with the highest densities occurring in V1, V3 and V5 (Table 4), biophysical ecodistricts with less than 10 percent open water and, in the case of V1 and V5, predominantly treed.

Along the outfitter route, a similar pattern was observed in that the highest densities of divers were observed in V2 and V7, biophysical ecodistricts with less than 10 percent open water and predominantly treed (0.8 and 0.7 birds/km^2, respectively) (Table 4). The densities of divers in V6 and V8 along the outfitter route were only 0.4 and 0.2 birds/km^2, respectively.

Other Dabblers

As noted above, the number of other dabblers (i.e., not Canada geese and black ducks) that were observed during all surveys along both route options was generally low. Along the preferred route, densities in all biophysical ecodistricts were ≤ 0.3birds/km^2 (Table 4). As expected, the highest densities occurred in V6 and in V3 (both at 0.3 birds/km^2). Even though V3 has less than 10 percent open water, moss, shrubs and lichen predominate over tree cover. No dabblers were observed in V2. This might be expected because only a small portion of the preferred route travels through biophysical ecodistrict V2.

Along the outfitter route, the highest dabbler density was observed in V8 at 0.5 birds/km^2. V6 exhibited a density of 0.2 birds/km^2, slightly less than observed in V6 along the preferred routing. Densities in V2 and V7 were < 0.1 birds/km^2 (Table 4).

2.2.2 Moulting

Canada Geese/Black Ducks

The density of moulting CAGO/BLDU was highest in V6 along the preferred route (1.7 birds/km^2). V1 also exhibited a fairly high density at 1.2 birds/km^2. V1 had less than 10 percent open water and is predominantly treed. However, unlike during the breeding period, aggregations of CAGO/BLDU were observed during the moulting surveys and the relatively high density in this biophysical district could be related to one or more aggregations in an area. The densities in the remaining biophysical ecodistricts along the preferred route ranged from 0.0 birds/km^2 in V2 and 0.3 birds/km^2 in V5 to 0.9 birds/km^2 in V3 (Table 4).

Along the outfitter route, relatively high densities of moulting CAGO/BLDU were also observed in three of four biophysical ecodistricts. The density in V6 was 1.2 birds/km^2, 1.3 birds/km^2 in V7 and 1.5 birds/km^2 in V2. Both V7 and V2 have less than 10 percent open water and are predominantly treed. As noted above, the relatively high densities in these two biophysical ecodistricts are likely the result of aggregations of moulting birds over a limited area. The fourth biophysical ecodistrict along the outfitter route, V8, had a density of 0.4 birds/km^2 (Table 4).

Diving Ducks

Along the preferred route, densities of moulting divers ranged from 0.1 birds/km^2 in V6 to 0.6 birds/km^2 in V1. The biophysical ecodistrict with the highest density (V1) has less than 10 percent open water and is predominantly treed. The relatively high density of divers in this biophysical ecodistrict likely results from observations of aggregations of ring-neck ducks that were often observed in rocky ponds, rather than in wetland areas. Where divers were observed, the lowest density along the preferred route was in V6, the biophysical ecodistrict that generally exhibited the highest densities of waterfowl during the surveys. No divers were observed in V2.

With the exception of V8, all biophysical ecodistricts along the outfitter route exhibited higher densities of divers than were observed along the preferred route. Densities ranged from 0.1 birds/km^2 in V8 to 1.0 birds/km^2 in V6 and V7 and 1.1 birds/km^2 in V2 (Table 4).

Other Dabblers

No dabblers (outside of Canada geese and black ducks) were identified during the moulting survey along the preferred route. Along the outfitter route, dabbler densities were also low, with none being recorded in V2 or V7. Densities in V6 and V8 were 0.1 birds/km^2 (Table 4).

2.2.3 Spring Staging

Canada Geese/Black Ducks

Along the preferred route, the highest density of CAGO/BLDU observed was in V3 at 1.1 birds/km^2. The next highest density observed was in V6 at 0.7 birds/km^2. Densities ranged from 0.2 birds/km^2 to 0.6 birds/km^2 in the remaining biophysical ecodistricts (Table 4). Along the outfitter route, densities were generally higher than those observed along the preferred routing, with the highest density being 0.9 birds/km^2 in V6. Densities in other biophysical ecodistricts ranged from 0.5 birds/km^2 in V2 to 0.8 birds/km^2 in both V7 and V8 (Table 4).

Diving Ducks

Densities of divers along the preferred route were generally low, ranging from a high of 0.2 birds/km^2 in V5 and 0.1 birds/km^2 in both V3 and V6 to <0.1 birds/km^2 in V1 (Table 4). Densities of divers were higher along the outfitter route, ranging from a high of 0.8 birds/km^2 in V2 and 0.6 birds/km^2 in V6 and V7 to 0.1 birds/km^2 in V8 (Table 4).

It should be noted that the higher densities of CAGO/BLDU and divers observed along the outfitter route during spring staging may reflect differences in advance of season between 2002 and 2003. The late spring break up in 2002 likely caused birds to delay movement into some areas. Thus, during the spring staging survey conducted along the preferred route in 2002, less birds were seen. In 2003, the spring season advanced earlier and more birds were seen during the staging survey along the outfitter route. This is supported by the fact that in V6, the biophysical ecodistrict with the greatest amount of potential waterfowl habitat, densities along the two routes within this district differed during the spring staging surveys but were the same for the breeding surveys. By the time of the breeding surveys in each year, CAGO/BLDU appear to have moved into breeding areas.

Other Dabbler

As with all surveys conducted, dabbler densities (not including Canada geese and black ducks) tended to be uniformly low. Along the preferred route, spring staging densities ranged from no birds observed in V1 and <0.1 birds/km^2 in V3 to 0.1 birds/km^2 in V6 and 0.2 birds/km^2 in V5 (Table 4). Along the outfitter route, dabbler densities ranged from 0.3 birds/km^2 in V8 and 0.1 birds/km^2 in both V6 and V2 to <0.1 birds/km^2 in V7 (Table 4).

2.2.4 Fall Staging

Canada Geese/Black Ducks

Along the preferred route, the fall staging density of CAGO/BLDU was highest in V6 at 0.6 birds/km^2. In the remainder of the biophysical ecodistricts along the preferred route, densities ranged from 0.5 birds/km^2 in V5 and 0.4 birds/km^2 in V3 to 0.3 birds/km^2 in V1. No CAGO/BLDU were observed in V2 (Table 4).

The highest densities of fall staging CAGO/BLDU were observed along the outfitter route. Densities in V2 and V6 were 1.1 and 1.0 birds/km^2, respectively (Table 4). The density in V7 was 0.6 birds/km^2 and in V8, 0.3 birds/km^2.

Diving Ducks

Along the preferred route, fall staging densities of divers ranged from 0.4 birds/km^2 in V6 to 1.9 birds/km^2 in V3 and 2.3 birds/km^2 in V1 (Table 4). Similar to the pattern observed in previous surveys on the distribution of divers, biophysical ecodistrict V6 (with 20 to 30 percent open water) had the lowest densities while biophysical ecodistricts such as V1, V3 and V5 (with less than 10 percent surface water), had the highest densities (Table 4).

Similarly, along the outfitter route, some of the highest densities were observed in V2 (1.7 birds/km^2) and V7 (2.4 birds/km^2), both biophysical ecodistricts with less than 10 percent water and predominantly treed. The density of divers in V6 was also relatively high at 1.7 birds/km^2 (Table 4).

Other Dabblers

During the fall staging survey along the preferred route, dabblers were recorded only in V5 and V6 biophysical ecodistricts at <0.1 and 0.5 birds/km^2, respectively (Table 4). Along the outfitter route, all densities were ≤0.2 birds/km^2, specifically 0.1 birds/km^2 in V2 and V8 and 0.2 birds/km^2 in V6 and V7 (Table 4).

As noted for spring staging, the higher densities of CAGO/BLDU and divers observed along the outfitter route during fall staging may reflect differences in advance of season between 2002 and 2003. The onset of breeding in 2002 likely occurred later than in 2003 due to the late spring break up. Thus, during the fall staging survey conducted along the preferred route in 2002, some birds may not have yet moved to inland staging areas. In 2003, the spring season advanced earlier and by the time of the fall staging survey along the outfitter route, it is possible that most birds had arrived at inland staging areas.

3.0 Comments 3 and 4 - Highway Footprint and Effects on Populations

Comment 3: An estimate of areal extent of the highway footprint and, based on observed densities, the estimate of impact on populations for both routes. For reference purposes Bateman (1995), Goudie and Whitman (1985) and Erskine (1987) will be useful to assess relative impacts at a local, regional and flyway level.

Comment 4: Based on the above results, provide a textual discussion and assessment of the findings, focusing on each of the habitat requirements of waterfowl for each of the above-noted life history stages and the relative impacts on populations.

The areal extent of the highway for each routing option (preferred and outfitter) was calculated. Then based on densities of CAGO/BLDU, divers and other dabblers observed during breeding surveys in 2002 and 2003, the number of birds that may be affected (i.e., displaced) by clearing of the highway right-of-way was calculated (Table 5). It should be noted that while the width of right-of-way clearing was assumed to be 40 m for the calculations, this is a conservative estimate as WST has committed to a right-of-way clearing of 30 m wherever possible. The density estimates used were from breeding surveys conducted in 2002 and 2003. As noted above, spring and fall staging survey results may have varied between 2002 and 2003 because of differences in season advance between those two years. However, densities from the breeding surveys were comparable, particularly in the important V6 region, where the density of CAGO/BLDU was the same in 2002 and 2003 (1.4 birds/km^2).

Along the preferred route, a total of 82 CAGO/BLDU may potentially be displaced by highway construction. The total divers and dabblers that may be displaced are 62 and 14 birds, respectively. The total birds that could be affected along the preferred route could be 158 (Table 5). Along the outfitter route, a total of 93 CAGO/BLDU may potentially be displaced by highway construction. The total divers and dabblers that may be displaced are 54 and 12 birds, respectively. The total birds that could be affected along the outfitter route could be 159 (Table 5).

As was noted above, in previous surveys (Goudie and Whitman 1987; Bateman and Hicks 1995) the relative densities of waterfowl observed in ecoregions along the proposed highway route tended to be lower than those observed in the same ecoregions during surveys in 2002 and 2003. However, the methodologies used for these surveys were not the same and the grouping of species to determine densities also generally differed. As well, the surveys conducted by Goudie and Whitman (1987) concentrated on the breeding period only and staging and moulting surveys reported by Bateman and Hicks (1995) contained no data for the current study area. Finally, none of the data from these previous surveys were calculated on a biophysical ecodistrict level, so comparisons at this level of detail cannot be made.

Table 5 Proposed Highway Footprint in Each Biophysical Ecodistrict (Preferred and Outfitter Route Options) and Estimated Number of Waterfowl Potentially Affected by Highway Construction

Biophysical Ecodistrict	Highway Length (km)	Areal Footprint of Highway (km^2)[1]	Canada Geese/Black Ducks		Divers		Other Dabblers	
			Average Density ($birds/km^2$)[2]	# Birds	Average Density ($birds/km^2$)	# Birds	Average Density ($birds/km^2$)	# Birds
TOTAL PREFERRED ROUTE								
Y8	38.7	15.5	0.3	4.6	0.4	6.2	0.0	0.0
V6	53.7	21.5	1.4	30.1	0.5	10.7	0.3	6.4
V1	19.3	7.7	0.5	3.8	0.9	6.9	0.0	0.0
V3	21.4	8.6	1.3	11.1	1.1	9.5	0.3	2.6
V5	43.3	17.3	1.0	17.3	0.8	13.8	0.2	3.5
V2	9.3	3.7	0.6	2.2	0.5	1.8	0.0	0.0
T1	18.2	7.3	0.0	0.0	0.2	1.5	0.0	0.0
T2	4.6	1.8	0.0	0.0	0.0	0.0	0.0	0.0
S4	21.7	8.7	1.2	10.4	0.9	7.8	0.1	0.8
S3	9.5	3.8	0.5	1.9	0.4	1.5	0.1	0.4
O4	14.3	5.7	0.1	0.6	0.3	1.7	0.0	0.0
			Total Birds:	**82.0**	**Total Birds**	**62.0**	**Total Birds**	**14.0**
TOTAL OUTFITTER ROUTE								
Y8	38.7	15.5	0.3	4.6	0.4	6.2	0.0	0.0
V6	62.4	25.0	1.4	35.0	0.5	12.5	0.3	7.5
V2	82.2	32.9	0.7	23.0	0.5	16.4	0.0	0.0
V7	15.1	6.3	1.2	7.6	0.7	4.4	0.0	0.0
V8	17.1	6.8	1.4	9.5	0.2	1.4	0.5	3.4
T1	18.2	7.3	0.0	0.0	0.2	1.5	0.0	0.0
T2	4.6	1.8	0.0	0.0	0.0	0.0	0.0	0.0
S4	21.7	8.7	1.2	10.4	0.9	7.8	0.1	0.8
S3	9.5	3.8	0.5	1.9	0.4	1.5	0.1	0.4
O4	14.3	5.7	0.1	0.6	0.3	1.7	0.0	0.0
			Total Birds:	**93.0**	**Total Birds:**	**54.0**	**Total Birds:**	**12.0**

Total Birds Potentially Affected Along Preferred Route: 158
Total Birds Potentially Affected Along Outfitter Route: 159

[1] Assumes 40-m right-of-way, including all vegetation types including forest, barren, bog and burnt areas.
[2] Densities from 2002 breeding surveys for highway sections Y8, T1, T2, S4, S3, V2 and O4.

Biophysical ecodistrict V6 exhibited the highest densities of waterfowl during surveys in 2002 and 2003 and, where V6 interacted with the preferred and outfitter routes, the density of birds was the same. The overall number of birds that may potentially be affected by highway construction is the same regardless of the route option selected. While more CAGO/BLDU may be displaced along the outfitter route (93 versus 82), this is offset by there being more divers and other dabblers potentially displaced along the preferred route (62 versus 54 and 14 versus 12, respectively). As the outfitter route is actually 30 km longer than the preferred routing, the overall waterfowl habitat quality may be somewhat better along the preferred route, although this is apparently offset by the increased area that will be affected along the outfitter route. As well, the amount of V6 that occurs along the outfitter highway route is greater than

the amount of V6 that is intersected by the preferred route option (42 km versus 34 km; an additional 20 km of V6 is common to both routes).

There are no recent waterfowl population estimates for Labrador. However, Goudie and Whitman (1987) estimated the population of Canada geese on the Eagle Plateau to be 1,150 ± 940 and the total ducks to be 7,480 ± 2,370. The total production for Labrador at that time was estimated to be 153,000 Canada geese and 420,000 ducks. The number of geese and ducks that may be displaced by highway construction is small compared to the potential regional population. As well, there is nothing to indicate that waterfowl habitat is particularly limited in Labrador and it is unlikely that any waterfowl displaced as a result of construction will be unable to find alternate suitable habitat in the area.

As has been indicated in the environmental impact statement/comprehensive study report prepared for the Happy Valley-Goose Bay to Cartwright Junction TLH, the construction of the highway itself is predicted to have a minor effect on waterfowl populations in the region. And as the above exercise has shown, the effects will be similar regardless of which routing option is selected.

4.0 References

Bateman, M.C. and A.H. Hicks. 1995. *Waterfowl Populations in Labrador – Data Compilation and Analysis*. Report prepared for Department of National Defence by Canadian Wildlife Service, Environment Canada, Sackville, NB.

Goudie, R.J. and W.R. Whitman. 1987. Waterfowl Populations in Labrador, 1980-82. Pp. 45-63. In: A.J. Erskine (ed.). *Waterfowl Breeding Population Surveys, Atlantic Provinces.* Occasional Paper No. 60. Canadian Wildlife Service, Ottawa, ON.

Lands Directorate. 1977. *Ecological (Biophysical) Land Classification of Labrador*. Map (1:1,000,000 Scale) prepared by the Atlantic Region, Lands Directorate, Environmental Management Service, Canada Department of Fisheries and Environment, March 1977.

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JWEL Project No. NFS09308-0004

February 10, 2004

Mr. Roger Pottle
Senior Environmental Planner
Department of Works, Services and Transportation
5th Floor, Confederation Building West
P.O. Box 8700
St. John's, NL A1B 4J6

Dear Mr. Pottle:

Re: Response to Follow-up Questions on Waterfowl Component Study Addendum – Cartwright Junction to Happy Valley-Goose Bay Trans Labrador Highway

The attached excel table provides the additional information requested by Mr. Bruce Turner of Environment Canada on February 4, 2004. The table separates the density data for Canada geese and black ducks, provides dabbler and diver densities, and the total number of ducks seen by ecodistrict within each of four road segments (western end common to both routes, preferred routing, outfitter routing, and eastern end common to both routes). The area surveyed within each ecodistrict and the amount of the proposed highway routings within each ecodistrict is also included.

Further to a discussion I had with Mr. Turner about clarifications related to survey methodology, the survey height was maintained at approximately 30 m above ground level (100 ft). It was assumed that there was a 250 m viewing radius from either side of the helicopter, in which it was considered reasonable that the majority of waterfowl species would be observed and identified. This estimate (linear distance flown by 0.5 km wide viewing diameter) was used to determine survey area when calculating waterfowl densities.

If you have any questions or require further information, please contact me at 709-576-1458.

Yours truly,

JACQUES WHITFORD ENVIRONMENT LIMITED

Kathy Knox
Wildlife Biologist

Attachment

Bio_Physical ELC	Preferred Highway Length (Middle Only) (km)	May 9, 2002									
		CAGO and Density		BLDU and Density		DIVERS and Density		DABBLERS and Density		Survey Length (km)	Survey Area (km2)
V1	19.3109									18.9999201	9.499960051
V2	8.65563			1	0.127561679					15.6786898	7.839344898
V3	21.4285			4	0.272167061					29.39371125	14.69685563
V5	43.3348			2	0.071066625					56.28521098	28.14260549
V6	33.7617									86.28182997	43.14091498

Bio_Physical ELC	Eastern Common Route Length (km)	May 9, 2002									
		CAGO and Density		BLDU and Density		DIVERS and Density		DABBLERS and Density		Survey Length (km)	Survey Area (km2)
V6	19.9535									32.3266	16.1633
Y8	38.6998	25	0.412150188	25	0.412150188	12		8		121.315	60.6575

Bio_Physical ELC	Western Common Route Length (km)	May 9, 2002									
		CAGO and Density		BLDU and Density		DIVERS and Density		DABBLERS and Density		Survey Length (km)	Survey Area (km2)
O4	14.3429									27.6863	13.84315
S3	9.47866									10.825	5.4125
S4	21.7135	14	0.660883932	11	0.519265947	4	0.188824			42.3675	21.18375
T1	18.1968									29.749	14.8745
T2	4.60826	5	0.529136925	2	0.21165477					18.8987	9.44935
V2	0.731207									0.80864	0.40432
T8				5	3.347930309	10	6.6958606			2.98692	1.49346
T4										13.6459	6.82295

Bio_Physical ELC	Outfitter Highway Length (km)	May 9, 2003									
		CAGO and Density		BLDU and Density		DIVERS and Density		DABBLERS and Density		Survey Length (km)	Survey Area (km2)
O4										0.974222518	0.487111259
S3						1	0.18037	1	0.180370039	11.08831606	5.544158028
S4				6	0.227470454	13	0.4928526	2	0.075823485	52.75410413	26.37705207
T8										3.069358284	1.534679142
V1										3.798287637	1.899143819
V2	81.5125									130.988165	65.49408248
V6	42.5433			9	0.130281041					138.1628503	69.08142516
V7	15.0758									25.11956418	12.55978209
V8	17.1074							2	0.16776167	23.84334867	11.92167434

Bio_Physical ELC	Preferred Highway Length (Middle Only) (km)	May 21, 2002								
		CAGO and	BLDU and Density		DIVERS and Density		DABBLERS and Density		Survey Length (km)	Survey Area (km2)
V1	19.3109		17	0.6116164	2	0.0719549			55.59039955	27.79519977
V2	8.65563		2	0.25816659					15.49387177	7.746935884
V3	21.4285	1.423412151	17	0.60495016	4	0.1423412	3	0.106755911	56.20297673	28.10148837
V5	43.3348	0.289858115	34	0.89592508	19	0.500664	15	0.395261066	75.89920328	37.94960164
V6	33.7617	0.456604383	18	0.35734256	16	0.3176378	12	0.317637832	100.7436672	50.3718336

Bio_Physical ELC	Eastern Common Route Length (km)	May 21, 2002								
		CAGO and	BLDU and Density		DIVERS and Density		DABBLERS and Density		Survey Length (km)	Survey Area (km2)
V6	19.9535	1.537674702	4	0.26742169			4	0.267421687	29.9153	14.95765
Y8	38.6998	0.02728822	25	0.68220549	39	1.0642406	18	0.491187952	73.2917	36.64585

Bio_Physical ELC	Western Common Route Length (km)	May 21, 2002								
		CAGO and	BLDU and Density		DIVERS and Density		DABBLERS and Density		Survey Length (km)	Survey Area (km2)
O4	14.3429	0.374591461	1	0.04682393	2	0.0936479			42.7132	21.3566
S3	9.47866	4.590908332	4	0.83471061					9.58416	4.79208
S4	21.7135	0.90063639	46	1.65717096	19	0.6844837	37	1.332941857	55.5163	27.75815
T1	18.1968	0.144142066			1	0.072071			27.7504	13.8752
T2	4.60826	0.999525226	18	2.24893176	45	5.6223294	2	0.249881306	16.0076	8.0038
V2	0.731207									
T8		1.623686336	13	10.5539612	8	6.4947453			2.46353	1.231765
T4		0.439692508	15	2.19846254	6	0.879385			13.6459	6.82295

Bio_Physical ELC	Outfitter Highway Length (km)	May 23, 2003								
		CAGO and	BLDU and Density		DIVERS and Density		DABBLERS and Density		Survey Length (km)	Survey Area (km2)
O4			1	0.14976012	1	0.1497601			13.35469018	6.677345091
S3									10.96268735	5.481343673
S4			4	0.15717761	6	0.2357664	1	0.039294403	50.89783384	25.44891692
T8					3	0.8970703			6.688439069	3.344219535
V1					1	0.590832			3.385057056	1.692528528
V2	81.5125	0.104008523	12	0.13867803	62	0.7165032	10	0.115565026	173.0627398	86.53136989
V6	42.5433	0.113559796	12	0.17033969	62	0.8800884	7	0.099364822	140.8949341	70.44746704
V7	15.0758	0.115591442	4	0.23118288	7	0.40457	1	0.057795721	34.60463782	17.30231891
V8	17.1074	0.150219895					1	0.075109948	26.62763144	13.31381572

Bio_Physical ELC	Preferred Highway Length (Middle Only) (km)	June 1-2, 2002									
		CAGO and Density		BLDU and Density		DIVERS and Density		DABBLERS and Density		Survey Length (km)	Survey Area (km2)
V1	19.3109	11	0.229962778	13	0.271774193	45	0.94075682	2	0.041811414	95.6676561	47.83382805
V2	8.65563	1	0.056711077	9	0.510399692	9	0.51039969			35.26647899	17.6332395
V3	21.4285	22	0.399801109	51	0.926811661	60	1.09036666	15	0.272591665	110.0547223	55.02736116
V5	43.3348	16	0.151071756	94	0.887546567	90	0.84977863	18	0.169955726	211.8198717	105.9099358
V6	33.7617	37	0.235612216	129	0.821458807	55	0.53490341	33	0.2801875	314.0753959	157.0376979

Bio_Physical ELC	Eastern Common Route Length (km)	June 1-2, 2002									
		CAGO and Density		BLDU and Density		DIVERS and Density		DABBLERS and Density		Survey Length (km)	Survey Area (km2)
V6	19.9535	12	0.208724692	36	0.626174076	29	0.50441801	11	0.191330968	114.984	57.492
Y8	38.6998	12	0.129358436	16	0.172477915	39	0.42041492			185.531	92.7655

Bio_Physical ELC	Western Common Route Length (km)	June 1-2, 2002									
		CAGO and Density		BLDU and Density		DIVERS and Density		DABBLERS and Density		Survey Length (km)	Survey Area (km2)
O4	14.3429	7	0.116823405			20	0.33378116			119.839	59.9195
S3	9.47866	3	0.147364026	7	0.343849394	9	0.44209208	2	0.098242684	40.7155	20.35775
S4	21.7135	30	0.493745885	42	0.69124424	53	0.8722844	6	0.098749177	121.52	60.76
T1	18.1968					6	0.24499296			48.981	24.4905
T2	4.60826									21.3918	10.6959
V2	0.731207										
T8										6.46649	3.233245
T4		3	0.077660755	2	0.051773836	8	0.20709535			77.2591	38.62955

Bio_Physical ELC	Outfitter Highway Length (km)	June 9-10, 2003									
		CAGO and Density		BLDU and Density		DIVERS and Density		DABBLERS and Density		Survey Length (km)	Survey Area (km2)
O4										1.111688112	0.555844056
S3						5	0.97831364			10.22167079	5.110835396
S4		7	0.362988394	7	0.362988394	6	0.31113291			38.56872629	19.28436315
T8											
V1						1	0.55942979			3.575068832	1.787534416
V2	81.5125	31	0.303523243	46	0.450389328	85	0.83224115	2	0.019582145	204.2677175	102.1338587
V6	42.5433	33	0.482850437	66	0.965700874	26	0.38042762	15	0.219477471	136.6882888	68.34414439
V7	15.0758	10	0.416224851	20	0.832449701	18	0.74920473			48.05095124	24.02547562
V8	17.1074	6	0.515585258	10	0.859308764	2	0.17186175	6	0.515585258	23.27452115	11.63726058

Bio_Physical ELC	Preferred Highway Length (Middle Only) (km)	July 18, 2002									
		CAGO and Density		BLDU and Density		DIVERS and Density		DABBLERS and Density		Survey Length (km)	Survey Area (km2)
V1	19.3109	10	0.288496745	33	0.95203926	21	0.60584317			69.32487218	34.66243609
V2	8.65563									20.97658372	10.48829186
V3	21.4285	24	0.673127988	7	0.196328997	17	0.47679899			71.30887564	35.65443782
V5	43.3348	10	0.218752284	2	0.043750457	10	0.21875228			91.42761699	45.7138085
V6	33.7617	26	0.374466114	88	1.267423772	6	0.08641526			138.8643672	69.43218359

Bio_Physical ELC	Eastern Common Route Length (km)	July 18, 2002									
		CAGO and Density		BLDU and Density		DIVERS and Density		DABBLERS and Density		Survey Length (km)	Survey Area (km2)
V6	19.9535	6	0.457784628							26.2132	13.1066
Y8	38.6998	36	0.732993035	14	0.285052847	4	0.08144367			98.2274	49.1137

Bio_Physical ELC	Western Common Route Length (km)	July 18, 2002									
		CAGO and Density		BLDU and Density		DIVERS and Density		DABBLERS and Density		Survey Length (km)	Survey Area (km2)
O4	14.3429			4	0.178494134	3	0.1338706	1	0.044623534	44.8194	22.4097
S3	9.47866									13.9484	6.9742
S4	21.7135	26	0.573469746	1	0.022056529	4	0.08822611			90.6761	45.33805
T1	18.1968	16	1.134015869			5	0.35437996			28.2183	14.10915
T2	4.60826					1	0.06023516			33.2032	16.6016
V2	0.731207										
T8										12.4175	6.20875
T4		3	0.396275015	2	0.264183343	2	0.26418334			15.141	7.5705

Bio_Physical ELC	Outfitter Highway Length (km)	July 16-17, 2003									
		CAGO and Density		BLDU and Density		DIVERS and Density		DABBLERS and Density		Survey Length (km)	Survey Area (km2)
O4		4	0.472257806			2	0.2361289			16.9399	8.46995
S3						13	0.79816055			32.5749	16.28745
S4		16	0.360813816	15	0.338262952	23	0.51866986	4	0.090203454	88.6884	44.3442
T8										0.892127	0.4460635
V1										6.7564	3.3782
V2	81.5125	53	0.563036236	85	0.902982642	101	1.07295585			188.26497	94.132485
V6	42.5433	19	0.197346333	95	0.986731663	100	1.03866491	10	0.103866491	192.554883	96.2774415
V7	15.0758	8	0.429362836	16	0.858725673	19	1.01973674			37.26452	18.63226
V8	17.1074	3	0.191006704	4	0.254675605	2	0.1273378	2	0.127337803	31.41251	15.706255

Bio_Physical ELC	Preferred Highway Length (Middle Only) (km)	August 28-29, 2002									
		CAGO and Density		BLDU and Density		DIVERS and Density		DABBLERS and Density		Survey Length (km)	Survey Area (km2)
V1	19.3109	10	0.284994428			82	2.33695431			70.17681051	35.08840525
V2	8.65563									20.99726958	10.49863479
V3	21.4285	5	0.146552935	10	0.29310587	68	1.99311991			68.23473042	34.11736521
V5	43.3348	3	0.051395141	27	0.462556268	67	1.14782481	2	0.034263427	116.7425538	58.3712769
V6	33.7617	23	0.279836043	25	0.304169611	23	0.42583746	16	0.486671378	164.3819702	82.19098509

Bio_Physical ELC	Eastern Common Route Length (km)	August 28-29, 2002									
		CAGO and Density		BLDU and Density		DIVERS and Density		DABBLERS and Density		Survey Length (km)	Survey Area (km2)
V6	19.9535	1	0.041488009	3	0.124464027	12	0.49785611	24	0.995712214	48.2067	24.10335
Y8	38.6998	3	0.038656058	4	0.05154141	16	0.20616564			155.215	77.6075

Bio_Physical ELC	Western Common Route Length (km)	August 28-29, 2002									
		CAGO and Density		BLDU and Density		DIVERS and Density		DABBLERS and Density		Survey Length (km)	Survey Area (km2)
O4	14.3429	12	0.316534162	8	0.211022775					75.8212	37.9106
S3	9.47866									19.3575	9.67875
S4	21.7135	13	0.394239852			3	0.09097843			65.9497	32.97485
T1	18.1968	5	0.47949672							20.8552	10.4276
T2	4.60826									26.7456	13.3728
V2	0.731207										
T8										6.22292	3.11146
T4		6	0.45864722							26.1639	13.08195

Bio_Physical ELC	Outfitter Highway Length (km)	September 4-5, 2003									
		CAGO and Density		BLDU and Density		DIVERS and Density		DABBLERS and Density		Survey Length (km)	Survey Area (km2)
O4											
S3											
S4											
T8											
V1											
V2	81.5125	42	0.479730048	54	0.616795775	153	1.74758803	13	0.148487872	175.0984755	87.54923777
V6	42.5433	32	0.355675889	61	0.678007164	151	1.6783456	21	0.233412302	179.9391017	89.96955085
V7	15.0758	5	0.263150955	7	0.368411337	46	2.42098879	4	0.210520764	38.00100213	19.00050107
V8	17.1074	5	0.263150955	1	0.052630191	9	0.47367172	3	0.157890573	38.00100213	19.00050107