MINASKUAT PROJECT NO. M2

FINAL REPORT ON

2003 OSPREY MONITORING PROGRAM IN THE LOW-LEVEL TRAINING AREA OF LABRADOR

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PREPARED FOR

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1. INTRODUCTION

The following report documents the efforts of Minaskuat Inc. (Minaskuat) regarding the monitoring of Osprey (*Pandion haliaetus*) within the Low-level Training Area (LLTA) of Labrador and north-eastern Québec during 2003. Following the completion of extensive monitoring by the Department of National Defence (DND) since 1991(Trimper *et al.* 2004, LFA 1992, JWE 1992, 1994, 1995, JWEL 1996, 1997, 1998, 1999, 2001), the Institute for Environmental Monitoring and Research (IEMR) decided to continue the annual program. The main objective of the 2003 program was to monitor the reproductive success of Osprey inside (Experimental) and outside (Control) the LLTA, and to examine potential linkages between breeding success and local climactic conditions within these areas.

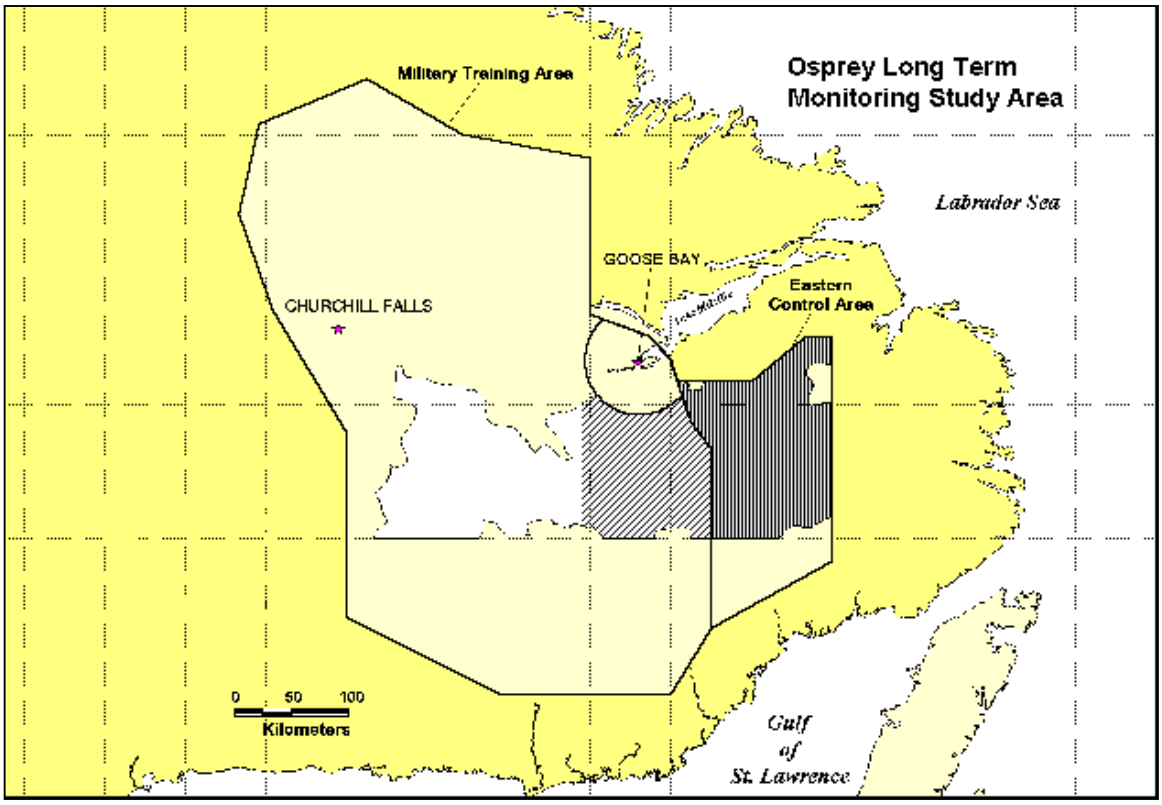
2. STUDY TEAM

Mr. Perry Trimper (Jacques Whitford) was the project manager, lead field researcher, and assisted with the compilation of this report. Ms. Karen Gosse was involved in the field program and served as primary author. Ms. MaryAnn Aylward, Ms. Shirley Hill and Mr. Corey Cooney (Minaskuat) assisted with data collection (field surveys) and analyses. Mr. Geoff Goodyear and Mr. Peter Jefford (Universal Helicopters Newfoundland Limited), alternated as pilots during aerial surveys.

3. METHODS

The approach to monitoring Osprey during 2003 was identical to Trimper *et al.* (2004). Briefly, a minimum sample of 23 active nests was needed (to achieve a power of 0.8) from both the LLTA and Control areas, although a larger sample (i.e. 30) would further increase statistical power and was the objective. Due to the variability of Osprey reproductive success in previous years in any given area (with or without treatment), regulatory agencies, the proponent and consultants decided at a meeting in December 1998 to establish an alpha of 0.2 (DND/Jacques Whitford unpublished data). This was a conscious decision by those establishing the experimental design to avoid a Type II error (*i.e.* accepting the null hypothesis when it was in fact false and there was an effect). A sample of known Osprey nests (DND/Jacques Whitford unpublished data) were surveyed during early June (corresponding to the early incubation period) in the LLTA (n = 30) and a Control area (n = 30) to determine nesting activity (Figure 1). These nests were re-visited in mid- August to determine reproductive success (Appendix A).

Figure 1. Study area for the 2003 Osprey Monitoring Program



Aerial surveys were conducted using a Bell 206 L helicopter with the navigator/observer seated beside the pilot. A hand-held GPS was programmed with nest co-ordinates to enhance survey efficiency and data recording. Potential candidate nest sites and their nest history, were identified from an extensive database developed by the study team since 1991. Field data sheets (with previous observations) were generated to facilitate relocation and accurate recording of nest activity in areas previously surveyed (Jacques Whitford unpublished data).

Osprey nests were considered active if eggs or young were observed or suspected during the June survey (i.e. adults exhibited aggressive behaviour) in the nest (Van Daele and Van Daele 1982, Poole 1989). Occasionally, nests considered as occupied (one or more adults observed in the vicinity but no eggs or young detected) were also included. Pairs of raptors (adult male and female of the same species), displays of aggressive behaviour by individuals, or an apparent reluctance to leave an area were considered as evidence of an occupied nest whether or not nest contents were observed. Based on continued nestling mortality until fledging observed previously in the study area (Jacques Whitford unpublished data) and elsewhere (Hagan 1986, Ewins and Miller 1995), a nest was considered successful if one or more young were observed immediately prior to fledging in mid-August (Appendix A).

When active nests were identified during the first survey, the study team immediately left the area to reduce unnecessary disturbance to the nesting raptors. During the second, pre-fledging survey in August, the helicopter approached within 30-50 m to determine the number of nestlings and their condition (i.e. alive or dead).

For the first time since the monitoring program began in 1991, mobile weather monitoring stations were established within the study area and used to collect information on temperature, precipitation, wind speed and direction. The results are presented as an IEMR report elsewhere (SGE Acres 2004).

4. RESULTS

Osprey reproductive success in the LLTA during 2003 was the highest ever observed (93.3%) (Table 1) since this parameter was first examined in 1994 (Trimper *et al.* 2004). In comparison, reproductive success in the Control Area was lower (83.3%) but exhibited a higher reproductive output per successful nest (2.28 vs. 1.86). However, this difference in productivity was not significant at the 20% level (p=0.237) (Table 2). Significant differences were observed in nest activity between areas (p=0.109, α=0.20), with nest activity higher in the LLTA (75%) than in the Control (60.4%) (Table 2). As the spring break up was estimated to be approximately 7-10 days earlier than the previous year, nesting activity in both the Control and Experimental Areas were the highest ever recorded (Table 1).

Table 1. 2003 Osprey Survey Results compared (shown in bold) to 1999-2002 DND Surveys (Trimper *et al.* 2004).

	1999		2000		2001		2002		**2003**	
Parameters	LLTA	Control	LLTA	Control	LLTA	Control	LLTA	Control	**LLTA**	**Control**
# Surveyed	99	98	77	82	75	74	81	112	**40**	**53**
# Active (%)	57 (57.6)	59 (60.2)	35 (45.4)	32 (39.0)	31 (41.3)	35 (47.3)	34 (42.0)	35 (31.3)	**30 (75.0)**	**32 (60.4)**
Active Sample	30	30	30	30	30	30	30	30	**30**	**30**
# Successful	27	25	16	10	9	13	15	13	**28**	**25**
# Young Fledged	53	47	31	17	18	21	30	28	**52**	**57**
# Young Fledged/ Active Nest	1.77	1.57	1.03	0.57	0.60	0.70	1.00	0.93	**1.73**	**1.90**
# Young Fledged/ Successful Nest	1.96	1.88	1.94	1.70	2.00	1.62	2.00	2.15	**1.86**	**2.28**
% Successful (#Successful/Active Sample)	90.0	83.3	53.3	33.3	30.0	43.3	50.0	43.3	**93.3**	**83.3**

Reproductive output (young fledged per active nest) and success of the nests sampled was the highest observed since this program started in 1999 (Table 1) and indeed the highest ever observed since these parameters were first collected in 1994 (Trimper *et al.* submitted). Neither of these differences were significant (Table 2). The results from 2003 represented the third of the last five years in which reproductive output per active nest was higher in the sample from the LLTA. Conversely, reproductive success has higher in the LLTA than the Control in 2003 and for all years except 2001. These inconsistent differences and apparent contradictions between reproductive output and success infer that LLF activity is not related to Osprey reproductive success over these large areas (Table 2).

Table 2. 2003 Osprey nesting activity, nesting success and productivity in the Low-Level Training Area of Labrador, as compared to 1999-2002 (Trimper *et. al* 2004).

Nesting Activity								
	Low-level Training Area			Control				
Year	Nests Available	Nests Active	P_1	Nests Available	Nests Active	P_2	P Value of Fishers Exact Test	Reject at 20 %
1999	99	57	0.576	98	59	0.602	0.409	No
2000	77	35	0.455	82	32	0.390	0.837	No
2001	75	31	0.413	74	35	0.473	0.285	No
2002	81	34	0.420	112	35	0.313	0.954	No
2003	**40**	**30**	**0.750**	**53**	**32**	**0.604**	**0.109**	**Yes**
Nesting Success								
	Low-level Training Area			Control				
Year	Nests Available	Nests Successful	P_1	Nests Available	Nests Successful	P_2	P Value of Fishers Exact Test	Reject at 20 %
1999	30	27	0.900	30	25	0.833	0.873	No
2000	30	16	0.533	30	10	0.333	0.966	No
2001	30	9	0.300	30	13	0.433	0.211	No
2002	30	15	0.500	30	13	0.433	0.698	No
2003	**30**	**28**	**0.933**	**30**	**25**	**0.833**	**0.795**	**No**
Productivity								
	Low-level Training Area			Control				
Year	Nests Available	Young Fledged	Standard Deviation	Nests Available	Young Fledged	Standard Deviation	P Value of Two-sample t-test	Reject at 20 %
1999	30	53	0.897	30	47	0.935	0.799	No
2000	30	31	1.129	30	17	0.898	0.959	No
2001	30	18	1.037	30	21	0.877	0.344	No
2002	30	30	1.140	30	28	1.170	0.588	No
2003	**30**	**52**	**1.047**	**30**	**57**	**0.751**	**0.237**	**No**

Consistent with previous years (Trimper *et al.* 2004) eggs that failed to hatch were detected in Osprey nests during the mid-August surveys. An attempt was made to collect these eggs for contaminant assessment during early September but the two nests in the Control Area had been apparently predated and were empty. The two nests in the LLTA still had adults and/or young present at that time, preventing the helicopter from accessing the nests (Table 3).

Table 3. Osprey nests with unhatched eggs in the Study Area, August 2003.

Area	Nest Code	First Observed	Latitude	Longitude	Date of August Visit	# Young	Nest Fate	# Unhatched Eggs
Control	13G/2-38	17.06.03	53 01.58	-58 54.73	19.08.03	0	Failed	1
Control	13G/3-33	17.06.03	53 02.394	-59 12.786	19.08.03	0	Failed	1
LLTA	13C/16-14	19.06.03	52 58.72	-60 16.32	18.08.03	2	Success	1
LLTA	13C/16-17	19.06.03	52 57.67	-60 14.54	18.08.03	1	Success	2

5. SUMMARY AND CONCLUSIONS

The number of young reared per successful nest was similar in both the control and experimental areas between 1999-2003, indicating that when a nest was successful, the pair managed to achieve similar productivity. Variability in nesting activity and nesting success during each of the five years, however, suggests the possibility of a 3-4 year high/low trend in these parameters. Reproductive success has been higher in the LLTA in three of the last five years further emphasizing this variability (within a given year) but also the lack of evidence that LLF is affecting Osprey in this regard.

Variation in Osprey nesting success and reproductive output may occur over a large geographic area such as the LLTA. Researchers have documented differences in population growth between adjacent or nearby colonies (Bowman *et al.* 1989; Steeger *et al.* 1992; Castellanos and Ortega-Rubio 1995) as influenced by a variety of regional habitat factors. Results of the 1999-2003 investigations and the findings of others indicate that Osprey nesting success may be more closely tied to factors other than low-level jet aircraft training. Preliminary investigations of the potential linkages between Osprey nesting success and weather were investigated during 2003 and have been documented in a separate memo submitted to the IEMR (SGE Acres 2004).

Osprey reproduction since the removal of exclusion zones in the LLTA starting in 1999, appears consistent with a Control area not subjected to LLF. Annual productivity monitoring by DND between 1999-2002, and by the IEMR in 2003, has suggested that reproductive success is related more to other external factors in Labrador and northeastern Québec.

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Appendix A

Summary of active Osprey nests used to assess nesting activity, success and productivity within and outside of the military Low-Level Training Area (LLTA) of Labrador, June- August 2003.

Area	Observation	Initial Sampling Date	Nest Latitude	Nest Longitude	Status	Final Sampling Date	Number of Young	Nest Fate	Comments
Control	13B/13-19	17.06.03	52 51.07	-59 30.75	active	18.08.03	2	success	
Control	13B/14-41*	17.06.03	52.57.240	59.08.123	Active	19.08.03	3	success	
Control	13B/14-06	17.06.03	52.51.47	-59.27.04	Active	18.08.03	3	success	
Control	13B/14-26	17.06.03	52.46.32	-59.27.73	Active	18.08.03	1	success	
Control	13B/14-28*	17.06.03	52.51.33	-59.27.20	Active	19.08.03	3	success	
Control	13B/14-31	17.06.03	52.47.13	-59.19.46	Active	18.08.03	2	success	
Control	13B/14-34	17.06.03	52.59.26	-59.01.64	Active	18.08.03	3	success	
Control	13B/14-35	17.06.03	52.47.86	-59.21.56	Active	18.08.03	2	success	
Control	13B/14-44	17.06.03	52.49.47	-59./03.11	Active	18.08.03	3	success	
Control	13B/14-46	17.06.03	52.56.49	-59./03.99	Active	18.08.03	2	success	
Control	13B/14-48	17.06.03	52.57.33	-59.08.07	Active	18.08.03	2	success	
Control	13B/14-50	17.06.03	52.58.97	-59.05.89	Active	18.08.03	0	failed	
Control	13B/14-51	17.06.03	52.59.44	-59.04.08	Active	18.08.03	3	success	
Control	13B/14-56	17.06.03	52.55.05	-59.12.04	Active	18.08.03	2	success	
Control	13B/15-59	19.06.03	52.55.033	58.35.956	Active	19.08.03	0	failed	
Control	13B/15-58	19.06.03	52.53.747	58.44.398	Active	19.08.03	2	success	
Control	13B/15-01	17.06.03	52.59.94	-58.47.62	Active	19.08.03	0	failed	
Control	13B/15-/03	17.06.03	52.59.57	-58.48.90	Active	19.08.03	2	success	
Control	13B/15-12	19.06.03	52.53.50	-58.40.20	Active	19.08.03	3	success	
Control	13B/15-46	19.06.03	52.52.90	-58.40.20	Active	19.08.03	2	success	
Control	13B/15-47	19.06.03	52.52.20	-58.41.60	Active	19.08.03	2	success	
Control	13B/15-51	19.06.03	52.51.50	-58.43.30	Active	19.08.03	3	success	
Control	13G/2-24	17.06.03	53.00.40	-58.54.81	Active	19.08.03	2	success	
Control	13G/2-38	17.06.03	53.01.58	-58.54.73	Active	19.08.03	0	failed	1 egg in nest
Control	13G/3-55	17.06.03	53.02.394	59.12.786	Active	19.08.03	0	failed	1 egg in nest
Control	13G/3-02	17.06.03	53.07.30	-59.13.68	Active	19.08.03	3	success	
Control	13G/3-21	17.06.03	53./03.84	-59.12.56	Active	19.08.03	2	success	

* Not included in statistical analysis of Productivity or Nesting Success.

Area	Observation	Initial Sampling Date	Nest Latitude	Nest Longitude	Status	Final Sampling Date	Number of Young	Nest Fate	Comments
Control	13G/3-24	17.06.03	53./03.51	-59.09.53	Active	19.08.03	2	success	
Control	13G/3-29	17.06.03	53.05.594	-59.16.690	Active	19.08.03	2	success	
Control	13G/3-48	17.06.03	53./03.75	-59.05.60	Active	19.08.03	3	success	
Control	13G/3-50	17.06.03	53.05.52	-59.17.73	Active	19.08.03	1	success	
Control	13G/3-54	17.06.03	53./03.19	-59.02.15	Active	19.08.03	3	success	
MTA	13B/12-04	17.06.03	52.39.51	-59.39.64	Active	18.08.03	3	success	
MTA	13B/13-17	19.06.03	52.59.71	-59.57.40	Active	18.08.03	1	success	
MTA	13C/10-02	17.06.03	52.39.64	-60.38.20	Active	18.08.03	2	success	
MTA	13C/10-16	17.06.03	52.37.04	-60.54.45	Active	18.08.03	2	success	
MTA	13C/10-21	17.06.03	52.44.70	-60.54.71	Active	18.08.03	1	success	
MTA	13C/10-26	17.06.03	52.42.12	-60.36.07	Active	18.08.03	2	success	
MTA	13C/11-04	23.06.03	52.37.34	-61.26.67	Active	18.08.03	0	failed	
MTA	13C/12-06	13.06.03	52.56.15	-61.37.28	Active	18.08.03	1	success	
MTA	13C/12-04	23.06.03	52.44.02	-61.44.60	Active	18.08.03	2	success	
MTA	13C/12-05	23.06.03	52.40.10	-61.35.49	Active	18.08.03	2	success	
MTA	13C/15-23	23.06.03	52.52.98	60.45.65	Active	18.08.03	2	success	
MTA	13C/15-21	17.06.03	52.56.418	60.38.666	Active	18.08.03	2	success	
MTA	13C/15-22	17.06.03	52.58.339	60.37.188	Active	18.08.03	2	success	
MTA	13C/15-/03	22.06.03	52.54.20	-60.43./03	Active	18.08.03	3	success	
MTA	13C/15-08	22.06.03	52.59.66	-60.37.39	Active	18.08.03	2	success	
MTA	13C/15-12	22.06.o3	52.50.79	-60.36.38	Active	18.08.03	1	success	
MTA	13C/15-13	22.06.03	52.52.12	-60.45.04	Active	18.08.03	3	success	
MTA	13C/15-14	22.06.03	52.54.36	-60.33.97	Active	18.08.03	2	success	
MTA	13C/15-16	22.06.03	52.53.47	-60.37.30	Active	18.08.03	2	success	
MTA	13C/15-19	22.06.03	52.56.81	-60.31.68	Active	18.08.03	2	success	
MTA	13C/15-20	22.06.03	52.59.34	-60.4483	Active	18.08.03	2	success	
MTA	13C/16-32	19.06.03	52.57.621	60.22.243	Active	18.08.03	1	success	
MTA	13C/16-/03	19.06.03	52.55.77	-60.15.94	Active	18.08.03	2	success	
MTA	13C/16-14	19.06.03	52.58.72	-60.16.32	Active	18.08.03	2	success	1 egg in nest
MTA	13C/16-15	19.06.03	52.53.94	-60.20.00	Active	18.08.03	1	success	
MTA	13C/16-17	19.06.03	52.57.67	-60.14.54	Active	18.08.03	1	success	2 eggs in nest
MTA	13C/16-22	19.06.03	52.46./03	-60.13.80	Active	18.08.03	0	failed	

Area	Observation	Initial Sampling Date	Nest Latitude	Nest Longitude	Status	Final Sampling Date	Number of Young	Nest Fate	Comments
MTA	13C/7-08	22.06.03	52.26.021	-60.42.992	Active	19.08.03	3	success	
MTA	13C/9-/03	17.06.03	52.35.54	-60.27.45	Active	18.08.03	2	success	
MTA	13C/9-10	17.06.03	52.36.52	-60.19.37	Active	18.08.03	2	success	