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Nalcor Energy Lower Churchill Project, Environmental Effects Monitoring Program – 2016 Furbearer

Furbearer Environmental Effects Monitoring Program – River Otter Component

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Interim Report

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OVERVIEW OF THE FURBEARER EEMP

As part of monitoring requirements and commitments made in the Environmental Impact Statement (EIS) for the Lower Churchill Project (LCP) (Nalcor 2009a, b), a series of Environmental Effects Monitoring Programs (EEMPs) were designed to monitor potential environmental effects of Project construction on wildlife. The Furbearer EEMP represents one component in this series.

The Furbearer EEMP was carried out over the three-year period from 2014 to 2016, inclusive, and focused on four species of interest (Nalcor 2009a, b): American marten (*Martes americana*), porcupine (*Erethizon dorsatum*), river otter (*Lontra canadensis*), and American beaver (*Castor canadensis*). This report is the final submission in a series of field, interim and annual reports associated with the otter component of the Furbearer EEMP.

In accordance with the Furbearer EEMP workscope (dated April 7, 2014), this report is organized in a format suitable for publication and includes background information on otter in the LCP study area, a description of the study area, and a map of hair snag locations and success rates.

River Otter (*Lontra canadensis*) Hair Sampling in Labrador, Canada

Abstract – River otter (*Lontra canadensis*) are widely distributed along shorelines of river valleys and other habitats in the interior of Labrador, Canada. We used a non-invasive method of collecting hair samples from river otter along the lower Churchill River in central Labrador. Sixteen modified body-snares (traps) were activated at seven tributaries along the river in 2014. Nine traps (56%) were successful in capturing hairs. DNA analysis confirmed only one individual river otter among the samples. The overall capture rate for river otter in our study (one capture per 219 trap-nights) was lower than reported in the literature.

1.0 INTRODUCTION

River otter (*Lontra canadensis*) is an aquatic member of the weasel family that occurs throughout Canada from Newfoundland to Vancouver Island and north to Yukon Territory (Banfield 1974). They are widely distributed along shorelines of deep lakes, rivers, large marshes, and ocean bays. Strong (1930) reported their presence throughout the interior of Labrador along the many forested river valleys.

Similar to other amphibious mammals, river otters have a thick pelage consisting of dense underfur and guard hairs (Banfield 1974). The underfur is shed seasonally from May to August, and the guard hairs seasonally from August to November (Ben-David et al. 2000, 2005). Hair has been extensively used for monitoring methylmercury contamination in otter as there are high correlations between mercury levels in hair and methylmercury levels in liver and brain tissue (Mierle et al. 2000; Fortin et al. 2001). Here we report on the success of a non-invasive river otter hair sampling program in Labrador that supported a methylmercury risk assessment in the region.

2.0 STUDY AREA AND METHODS

2.1 Study Area

The study was conducted in Labrador, Canada, along the lower Churchill River between Happy Valley-Goose Bay (N53.29844, W60.35586) and Churchill Falls (N53.53084, W64.00772) (Figure 2-1). The central Labrador area is described as an irregular lowland dissected by river valleys, where elevations range from near sea level to 500 m above sea level (Ecological Stratification Working Group 1995). Black spruce (*Picea mariana*) is ubiquitous throughout the region, and typically dominates upland areas (PAA 2008). Balsam fir (*Abies balsamea*), birch (*Betula* sp.), and aspen (*Populus* sp.) dominate along richer slopes (PAA 2008) of the Churchill River.

Otter hair sampling focused on seven tributaries along the lower Churchill River (Figure 2-1), where evidence of river otter (i.e., slides, tracks) had been documented in early 2014, during aerial surveys in support of other monitoring initiatives in the region.

Figure 2-1 River Otter Study Area

2.2 Hair Collection and Identification

Modified body-snares (or traps) were used to collect hair samples from otter. The modified design allowed the animal to easily escape while snagging a sample of hair before disengaging (Depue and Ben-David 2007, Johnson et al. 2013). This design is considered relatively noninvasive, so animals do not develop an immediate aversion to the trap (Depue and Ben-David 2007). Modified body-snares have also been shown to be more effective at collecting hair from otter, when compared to other trap designs (Depue and Ben-David 2007, Johnson et al. 2013).

One to three traps were set at each tributary (16 traps total) between June 23 and July 7. This season was targeted as optimal as it would most likely result in the collection of longer guard hairs. All traps were set on the ground and baited using castor oil. Traps were checked twice during the study, on June 29 and July 7.

Hair samples were removed using rubber gloves and sticky tape, and placed in paper envelopes. Samples were analyzed for species using a sequence-based analysis of the mitochondrial 16S rRNA gene (Johnson and O'Brien 1997). The sequence profile generated was compared to the laboratory reference data of over 130 mammal species. Genotyping started with the analyses of up to 15 microsatellite markers (including gender) that have been used for individual identification in river otters from northern British Columbia, and marker variability was assessed using the program Cervus 3.0. Based on this assessment, a group of strong and variable markers were used to complete the analysis of individual identification. All data were error checked (Paetkau 2003) and mismatched markers in similar genotypes reanalyzed to check for genotyping error.

3.0 RESULTS

Nine traps (56%) were successful in obtaining a hair sample over 219 trap nights (Table 3.1), where one trap-night equals one trap open for one night, adjusted for traps sprung by otter and non-target animals (Beauvais and Buskirk 1999). Samples that did not contain any guard hair roots and had less than five underfur samples were excluded from DNA analysis.

Table 3.1 Capture Effort and Success Rates for River Otter Hair from Tributaries of the Lower Churchill River, Labrador

Tributary Area	Traps Set	Trap-nights	# Captures	Hair Type	# River Otter	Captures / Trap-night	Nights / Capture
Pinus River	2	27	3	Guard hair and underfur	1	0.04	27
Diver Brook	2	28	0	-	-	0	-
Beaver Brook	2	28	0	-	-	0	-
Cache River	3	42	0	-	-	0	-
Fig River	3	27	3	Underfur	0	0	-
Elizabeth River	2	27	2	Guard hair and unconfirmed	0	0	-
Metchin River	2	42	1	Guard hair	-	0	-
Total	**16**	**219**	**9**		**1**	**0.005**	**219**

One river otter was confirmed among the samples (Table 3.1). The remaining samples consisted of one muskrat (*Ondatra zibethicus*) and two snowshoe hare (*Lepus americanus*). One other sample failed to produce a usable DNA sequence and the species was unconfirmed. The single confirmed river otter was captured at Pinus River, over 27 trap-nights (0.04 captures per trap-night).

4.0 DISCUSSION

The modified body-snare has been shown to be a successful, non-invasive method of collecting guard hairs and underfur from river otter (Depue and Ben-David 2007, Johnson et al. 2013). The site-specific capture rate at Pinus River (one otter per 27 trap-nights) was within the range of values reported by Depue and Ben-David (2007) for body-snares (one otter per 4 to 228 trap-nights). However, the overall capture efficiency (i.e., for the entire study area) in our study (one otter per 219 trap-nights) was much lower than overall values reported by Depue and Ben-David (2007) (one otter per 16 trap-nights). In addition, the total number of hairs snagged by traps deployed in our study was low, with typically only 1-2 hairs (guard and underfur) within a sample. In contrast, Depue and Ben-David (2007) reported between three and twenty guard hairs per capture and zero to over a hundred underfur samples.

Traps were set in locations where otter or their tracks had previously been identified during aerial surveys, and for at least three of the tributaries (Pinus River, Cache River, and Elizabeth River), otter slides were evident, suggesting that otter do occur in the locations sampled. The low success rate in this study is likely due to a combination of factors, including trap design and/or trap placement. As underfur was the dominant type of hair collected in this study, the pattern and degree of twisting of the bristles, or 'snags', on the traps may have affected the ability of the trap to snag and retain guard hairs (Depue and Ben-David 2007). Other factors that may have contributed to a low success rate include the placement of traps relative to key habitat features for otter (e.g., latrines), and local population.

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