

Clowhom Project Water Use Plan

Monitor of Aquatic Wildlife in Wetlands Affected by Dam Operations

Implementation Year 13

Reference: COMMON-1

Clowhom Lake Reservoir Wildlife Census

Study Period: Date: April 2018 to March 2019

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June 30, 2020

Executive Summary

Wildlife census of a small wetland complex at the north end of Clowhom Lake Reservoir was developed by BC Hydro and implemented by the shíshálh Nation, in 2006. This project is part of the BC Hydro Watershed Use Planning process. The wetland complex, selected for its proximity to the upper reservoir changes with managed water levels from reservoir operation. The intent of the project is track and record area use, by wildlife, over a 20-year period.

Data collected in 2018 are provided in this summary report and submitted to BC Hydro for inclusion in a master database. The data from the census surveys will be used in future analysis of reservoir operations, using changes in wildlife use of the area as the metric.

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1.0 Introduction

In 2018/2019 the shíshálh First Nation and BC Hydro started the 13th Year of a 20-year monitoring program intended to document wildlife utilization adjacent to the upper Clowhom Lake Reservoir wetland complex. This complex, located at the head of the reservoir, floods and “dries” during operation of hydro plant. This data report presents the survey data collected during the first year of the fourth “rotation” in the survey cycle. Each “rotation” consisting of a 4-year period.

This monitoring program, as originally implemented through recommendations made in BC Hydro’s Water Use Planning (WUP) process, documents wildlife presence and use at various times in the year. The census uses a travelling count process on predetermined transect(s). The purpose of the survey data collection is a review of area use against operational change in the reservoir.

This report presents the results of the 2018/2019 field-sampling season.

2.0 Study Area

The study area for the census remained unchanged and was first delineated in 2006. The census area targets a wetland complex, that floods and drains with reservoir levels change. The wetland is located at the northeastern end of Clowhom Lake Reservoir, approximately 500 meters upstream from the lake and adjacent to the Clowhom River mainstem (**Figure 1**). The census area is located in low elevation Coastal Western Hemlock Dry Maritime (CWHdm) biogeoclimatic subzone, which has a climate consisting of cool summers and mild winters. Back-flooding of the area is a result of storage needs and changes in lake stage height. This results in the inundation of water into the treed shoreline. Natural inundation also occurs in the spring and fall following freshet events that occur in the upper Clowhom River drainage.

The study area is approximately 40 hectares in size and is characterized by a mix of deciduous and conifer forest of various seral stages, a diverse shrub and herbaceous understory, and a large area of wetland grasses and sedges along the reservoir’s shoreline. Vegetation cover has been undisturbed since the census began in 2006 and details of the polygons are reported in *Bates* (2008).

3.0 Methods

3.1 Wildlife Census

A biologist and technician from the shíshálh Nation conduct the wildlife census following a predetermined schedule (**Table I**). The census area has remained unchanged and is referenced in *Bates* (2007).

Survey dates target a time from mid to late month and are completed within a 3 to 4-hour period post-sunrise. The date, time and reservoirs stage height at the start of each survey is provided in **Table II**.

As previously reported, the field crew follows geo-referenced transects (*Bates, 2007*) starting at Transect-T1. The crew walks a predetermined route, noting the following information:

- Wildlife species present;
- Habitat type detected in; and
- Type of detection.

Data collection relies on wildlife sounds and observed presence and/or use.

Three to four censuses are conducted annually at different months. The sample months are pre-determined using a seasonal rotating schedule (**Table I**). Staggered monthly survey times provide seasonal representation of the wetland over the project's life, ensuring each calendar year is completed. The 20-year study duration will provide a total of five completed census years with each calendar month represented per year. In the event weather prevents access to the area the schedule is adjusted in an attempt to ensure that over a rotation period, all months are sampled.

Data is recorded in the field then translated into an Excel® spreadsheet and attached to the annual data report.

Table I. Schedule for the fourth rotation (2018-2022) of the Clowhom Lake Reservoir wildlife census surveys.

Field Census	Sample Rotation (4th) (Year)			
	1 (2018/2019)	2 (2019/2020)	3 (2020/2021)	4 (2021/2022)
1	April	May	June	July
2	August	September	October	November
3	December	January	February	March

The objective within each rotation block, is to have samples that represent each season at least 3 times ensuring each month is represented. All census/surveys use the same transects approximated and shown in *Bates (2007)*. These transects were reconciled with new more accurate data in 2018 and the re-aligned transects are shown in (**Figure 2**).



Figure 1: The approximate location of Clowhom Lake Reservoir wetland complex census area.

Table II. The date, time and reservoir stage height for each census survey conducted in the 2018/2019-field season.

Census	Date	Start time (am)	Finish Time (am)	Reservoir Stage (m)
1	April 13, 2018	0700		
2	August 17, 2018	0600		
3	December 15, 2018	Cancelled		

3.2 Data Entry

Data is entered into a spreadsheet for future analysis. The spreadsheet format remains the same as previous years and is based on a format reported by *Bates* (2007, 2008). Data will eventually be collated as a time series in order to analyze for any temporal trends in species diversity.

For each species identified during a wildlife survey, supplementary data was also collected, documenting general vegetation community type and associated structure in and around the detection (*Bates*, 2008).

4.0 Results

4.1 Wildlife Census

Two census surveys were conducted in 2018/2019. These were; April 13, 2018 and August 17, 2018. The scheduled December survey was cancelled because of logistical issues. This date would be re-scheduled in the next rotation. Data spreadsheets detailing the results are included in the attached Appendix (**Appendix 1**).

5.0 Discussion

5.1 Wildlife Census

With the exception of the December date, the 2018/2019 wildlife census surveys were successfully completed.

The original Terms of Reference (ToR) called for the completion of the census mid-month (*BC Hydro*, 2005) but over the course of the sample years the schedule has changed. In 2018 the field crew attempted to realign the timing to meet the ToR.

The important component for the study's success is the continued involvement of field staff familiar with the methodology. The pairing of a skilled biologist (biologist is the same individual that started the project in 2006) and technician continues to allow capacity building among the technical staff and consistency in the data collection. It is anticipated that the crew will remain the same for the completion of the fourth "rotation".

In 2017/2018 it was also noted that the area surveyed has had nesting boxes placed at various locations. These boxes appear to be utilized and the presence of Tree Swallow was documented in the boxes outside the transect census areas. This effort to encourage use of the area by various avian species is a component of another BC Hydro funded project and will also continue into the 2018/2019 season.

6.0 Conclusion

In conclusion, the 2018/2019 season was completed with relatively few problems. The missed December date was proposed for the next year of sampling. In order to capture these time periods, the schedule in 2019/2020 will be realigned. Components of the repeated wildlife use-monitoring program continue to yield data adjacent to and within the wetland complex and polygons.

7.0 Broad Review Recommendations

The 2018/2019 census, while successful has raised new questions. The largest being the limited area initially included, and the possibility of not detecting species presence and potential impacts to species that are dependent on wetlands for various life stages. In particular, the concern has been raised about direct effects of wetland changes from reservoir operations on area amphibians of concern (Western Toad) and various wetland specific nesting avian species. As a result of these recent questions, it has been proposed that changes to the census design may be appropriate in the future field activities. The result is reflected in the following recommendation.

- The Year-1 census in the “Fourth Rotation” of the wildlife use monitoring should end the current data collection design. In future census periods, it may provide more important data if the census dates focus on the spring period using the nesting bird and amphibian egg laying periods to direct census dates. This would focus efforts on the wetland from February to July of each year for the remainder of the 20-year study has been completed using a modified schedule. In 2018/2019 the study transects should be ground truthed and realigned using more accurate spatial data.
- Revisit the current ToR and realign the objectives to coincide with a new census schedule. The area of focus would increase to include the larger wetland complex and areas inundated through reservoir operations.
- Increase effort on documented nesting birds and amphibian egg laying habitats.
- Provide updated aerial mapping of the wetland at low reservoir levels in order to provide a basis for delineating, in detail, area of ponded water at low reservoir periods, and important habitats for wetland dependent bird species. The new mapping should be LiDAR based to allow the determination of topographic features of the complex.

- Efforts to document activities funded by the Coastal Bridge Compensation Program and creation of habitats under this program should be included in future data reporting. In particular activities at Swallow nest boxes.
- Revisit the sample design, abandoning the current transects and re-establishing either new transects of random plot criteria.

8.0 *References*

Bates, D.J. 2007. Clowhom Lake Water Use Plan - Clowhom Lake wildlife census - Year 1. Resource Management Department, shíshálh Nation, Sechelt, BC.

Bates, D.J. 2008. Clowhom Lake Water Use Plan - Clowhom Lake wildlife census - Year 2. Resource Management Department, shíshálh Nation, Sechelt, BC.

BC Hydro, 2005. Clowhom Lake Water Use Plan - Monitoring Program Terms of Reference. BC Hydro, Burnaby, BC.

BC Ministry of Environment. 2017. BC Species and Ecosystems Explorer. BC Conservation Data Centre.

9.0 *Appendices*

Appendix 1. Data collected from wildlife census in 2018/2019

Clowhom Wildlife Survey		
Date	17/08/2018 (i.e., 17 August 2018)	
Weather	Cloud Cover: 0; Precipitation: 0; Wind: 0 (calm).	
Site Conditions	Lake/reservoir high. Wetland area moist with areas of standing water (water table likely high due to reservoir level). Water in forested area low/drier. Little to no snow on surrounding mountains.	
Surveyors	Greg Ferguson, Jerry Johnson	
Time Started	6:22 AM	
Time Finished	8:47 AM	
Sunrise	6:09 AM	
Temperature	14 °C	
Transect 1 (T1A to T1B) Runs East/West		Time Start: 6:22 Time Finish: 6:56
Species and Number/Habitat ()	Habitat	Observation of behaviour
Band-tailed Pigeon (5)	Second growth forest ~20m tall, brushed, sloped, dry (spruce, hemlock, cedar)	Visual (flying over forest and road heading south)
Steller's Jay (5)	Upland mixed deciduous/coniferous forest (hemlock, cedar, maple)	Calling
Western Tanager (1)	Flat mixed deciduous/coniferous wetland forest with Skunk Cabbage	Calling
Belted Kingfisher (2)	Flat mixed deciduous/coniferous wetland forest with Skunk Cabbage, Lake	Calling, visual (flying over forested area to northeast)
Red Crossbill (2)	Flat mixed deciduous/coniferous wetland forest with Skunk Cabbage	Calling
Canada Goose (8)	Lake	Visual (a long north shore of reservoir)
Hairy Woodpecker (1)	Flat mixed deciduous/coniferous wetland forest with Skunk Cabbage	Calling, drumming
Transect 2 (T2A to T2B) Runs North/South		Time Start: 6:57 Time Finish: 7:29
Species and Number/Habitat ()	Habitat	Observation of behaviour
Finch sp. - likely juvenile Purple Finch (1)	Flat wetland/lake transition zone (bog orchid, sphagnum, bog cranberry)	Visual, calling
Sharp-shinned Hawk (2)	Flat mixed deciduous/coniferous wetland forest with Skunk Cabbage	Visual, calling
Northern Flicker (1)	Flat mixed deciduous/coniferous wetland forest with Skunk Cabbage	Visual
Song Sparrow (1)	Flat wetland/lake transition zone (bog orchid, sphagnum, bog cranberry)	Calling
Common Yellowthroat (2)	Flat wetland/lake transition zone (bog orchid, sphagnum, bog cranberry)	Calling
Steller's Jay (6)	Flat mixed deciduous/coniferous wetland forest with Skunk Cabbage	Visual, calling
Transect 4 (T4B to T4A) Runs East/West		Time Start: 7:30 Time Finish: 7:58
Species and Number/Habitat ()	Habitat	Observation of behaviour
Pacific Wren (2)	Flat mixed deciduous/coniferous wetland forest with Skunk Cabbage	Calling
Western Tanager (1)	Flat mixed deciduous/coniferous wetland forest with Skunk Cabbage	Calling

Golden-crowned Kinglet (1) Chestnut-backed Chickadee (7)	Flat mixed deciduous/coniferous wetland forest with Skunk Cabbage Second growth forest ~20m tall, brushed, sloped, dry (spruce, hemlock, cedar)	Calling Visual, calling
Transect 5 (T5A to T5B) Runs North/South		Time Start: 7:59 Time Finish: 8:15
Species and Number/Habitat ()	Habitat	Observation of behaviour
Black bear (1)	Second growth forest ~20m tall, brushed, sloped, dry (spruce, hemlock, cedar)	Scat, foraging
Golden-crowned Kinglet (2)	Second growth forest ~20m tall, brushed, sloped, dry (spruce, hemlock, cedar)	Calling
Cedar Waxwing (2)	Second growth forest ~20m tall, brushed, sloped, dry (spruce, hemlock, cedar)	Calling
Northern Flicker (1)	Second growth forest ~20m tall, brushed, sloped, dry (spruce, hemlock, cedar)	Calling
Hutton's Vireo (1)	Second growth forest ~20m tall, brushed, sloped, dry (spruce, hemlock, cedar)	Calling
Transect 3 (T3A to T3B) Runs West/East		Time Start: 8:16 Time Finish: 8:47
Species and Number/Habitat ()	Habitat	Observation of behaviour
black bear (1)	Second growth forest ~20m tall, brushed, sloped, dry (spruce, hemlock, cedar)	Scat, foraging
Banana Slug (1)	Second growth forest ~20m tall, brushed, sloped, dry (spruce, hemlock, cedar)	Visual
Pacific Wren (1)	Flat mixed deciduous/coniferous wetland forest with Skunk Cabbage	Calling
Steller's' Jay (3)	Flat mixed deciduous/coniferous wetland forest with Skunk Cabbage	Visual, calling
Pine Siskin (1)	Flat mixed deciduous/coniferous wetland forest with Skunk Cabbage	Calling
Chestnut-backed Chickadee (1)	Flat mixed deciduous/coniferous wetland forest with Skunk Cabbage	Calling
Douglas Squirrel (1)	Flat mixed deciduous/coniferous wetland forest with Skunk Cabbage	Calling
Cougar (1) - older	Flat wetland/lake transition zone (bog orchid, sphagnum, bog cranberry)	Tracks
Total Number of Species	23	
Species List	Note: Includes all sign: feeding, scat, tracks, hair, calling, etc.	Additional Note: Some individual species observed on transects were likely repeat sightings on other transects.
Band-tailed Pigeon Steller's Jay Western Tanager Belted Kingfisher Red Crossbill Canada Goose		

Hairy Woodpecker
 Finch sp. - likely juvenile Purple Finch
 Sharp-shinned Hawk
 Song Sparrow
 Common Yellowthroat
 Pacific Wren
 Golden-crowned Kinglet
 Chestnut-backed Chickadee
 black bear
 Golden-crowned Kinglet
 Cedar Waxwing
 Northern Flicker
 Hutton's Vireo
 Banana Slug
 Pine Siskin
 Douglas Squirrel
 Cougar

Total Number of Species by Habitat Type

Number of Species	Habitat Type
9	Second growth forest ~20m tall, brushed, sloped, dry (spruce, hemlock, cedar)
1	Upland mixed deciduous/coniferous forest (hemlock, cedar, maple)
15	Flat mixed deciduous/coniferous wetland forest with Skunk Cabbage
4	Flat wetland/lake transition zone (bog orchid, sphagnum, bog cranberry)
2	Lake

Other Species Observed or Reported in Area (i.e., greater than 100m from plot area or not on transects)

Spotted Towhee (1)	Along west side of Clowhom Main	Calling
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