

Common Nighthawk Inventory in the Pend d'Oreille and Fort Shepherd Conservancy Area



Prepared For:

**Fish & Wildlife Compensation Program
Columbia Basin
Nelson, BC**

Prepared By:

**Doris Hausleitner
Seepanee Ecological Consulting, Nelson BC**

**Jakob Dulisse
Jakob Dulisse Consulting, Nelson BC**

September 2008

Executive Summary

In 2008, inventory was conducted for the threatened Common Nighthawk (*Chordeiles minor*) in the Fort Shepherd Conservancy and Pend d'Oreille Valley of the West Kootenay Region. Seventeen transects were surveyed between 16 June and 26 June for a total of 13 hours survey time. The numbers of nighthawks enumerated were not influenced by the use of call playbacks, sampling time or visual versus aural means. These results should be viewed cautiously as sample sizes were small.

A total of 400 nighthawks were detected during this inventory. The number of Common Nighthawks observed at Fort Shepherd was much higher (7.0 per sample station) than in the Pend d'Oreille (0.8 per station). One nest site was located at Waneta. The nest was on bare ground at the crest of a south facing hillside and successfully fledged one young.

Due to the short sampling window for this species, care should be taken to address sampling protocol issues. Data sets available for the region do not accurately depict long-term population trends. Future research should evaluate and create a long-term monitoring protocol and plan. The potential impacts of landscape management activities (such as prescribed burning and thinning, habitat restoration, and power line corridor clearing) on the Common Nighthawk should be investigated.

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1.0. Introduction

1.1. Species Information

The Common Nighthawk is a neotropical migrant, spending its winters in South America and breeding in Canada and the United States (Poulin et al. 1996). The species was recently assessed federally as threatened due to a 50% population decline in three years (COSEWIC 2007). It is becoming a species of conservation concern in British Columbia because observers and long-term bird surveyors have noted stable to declining trends in the province (Campbell 2006). In Nakusp, the average number of sightings declined from 6.3 (1976-1985) to 4.0 (1988-1994) to 2.3 (1997-2005) (Campbell 2006). Locally, some populations appear to have declined markedly (pers. obs.). A decline in insect abundance across their range has been hypothesised as the main factor limiting Common Nighthawks (Campbell 2006). Habitat fragmentation and alteration, mortality due to terrestrial predators and vehicles, and climatic fluctuation during the breeding period may be additive factors in the decline (Poulin et al. 1996, COSEWIC 2007).

1.2. Goals and Objectives

Specific objectives of this project were to:

- 1) Assess habitat suitability for the species in the region, particularly on Fish and Wildlife Compensation Program (FWCP) properties
- 2) Assess efficacy of the BC Resources Inventory Committee inventory methods for nighthawks (RIC 1998) and provide feedback
- 3) Establish survey routes for long term monitoring of burned areas
- 4) Provide recommendations for expanded inventory, reproductive monitoring and conservation management

2.0. Study Area

Inventory was restricted to the Fort Shepherd Conservancy Area and the north side of the Pend d'Oreille Valley (Figure 1). The Fort Shepherd Conservancy is located on the west side of the Columbia River, 6 km south of Trail in southeastern B.C. (Figure 2). At 964 ha, it is the largest continuous parcel of land in BC within the very dry, warm Interior Cedar Hemlock (ICHxw) biogeoclimatic subzone (Machmer 2008). Inventory in the Pend d'Oreille Valley was along south facing slopes ranging from the valley bottom (470 m) to mid elevation (950 m). Inventory efforts included coverage of the area impacted by the August 2007 forest fire on the north side of the Pend d'Oreille River (Figure 3).

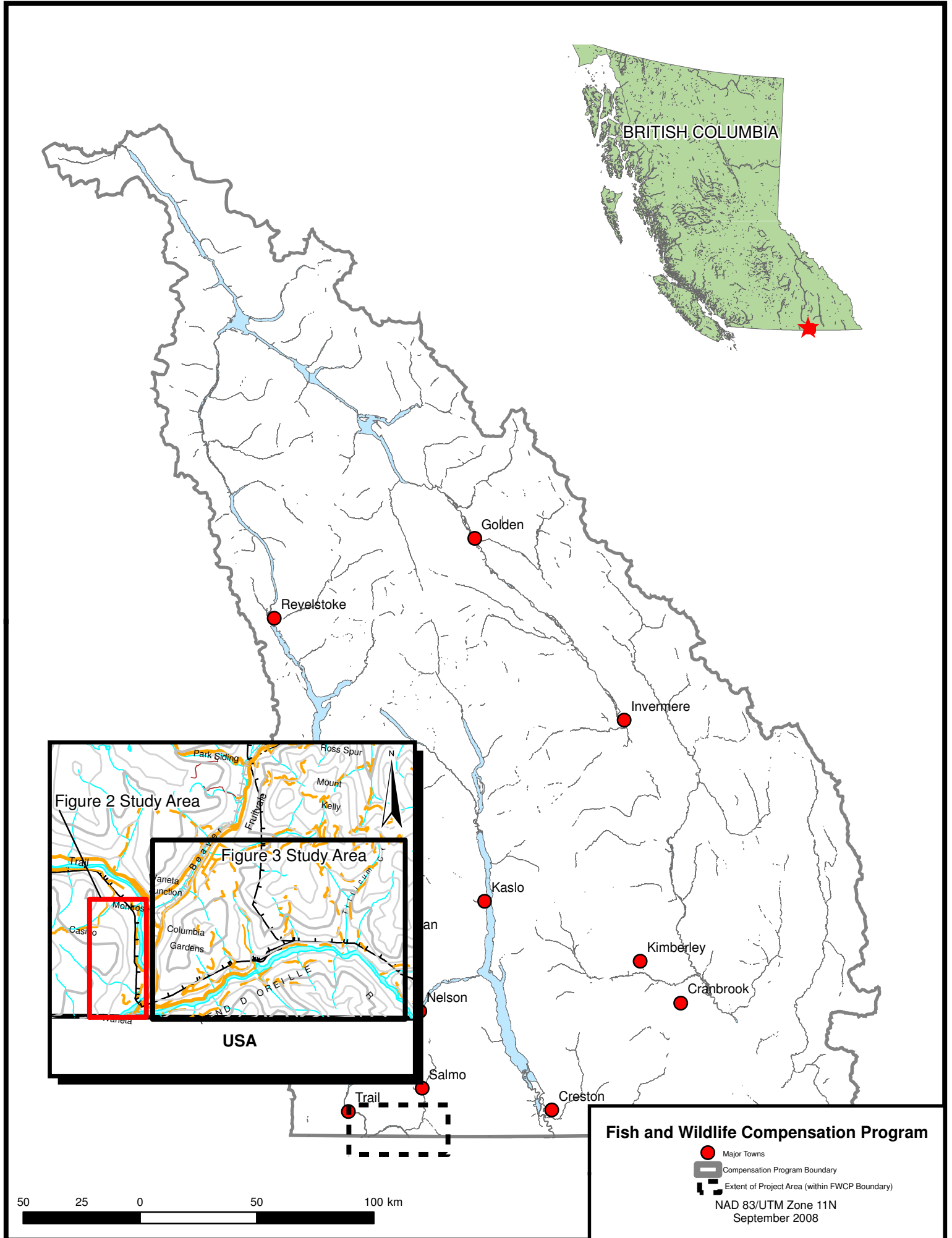
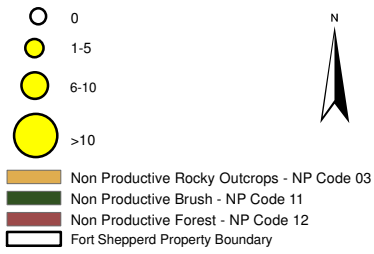
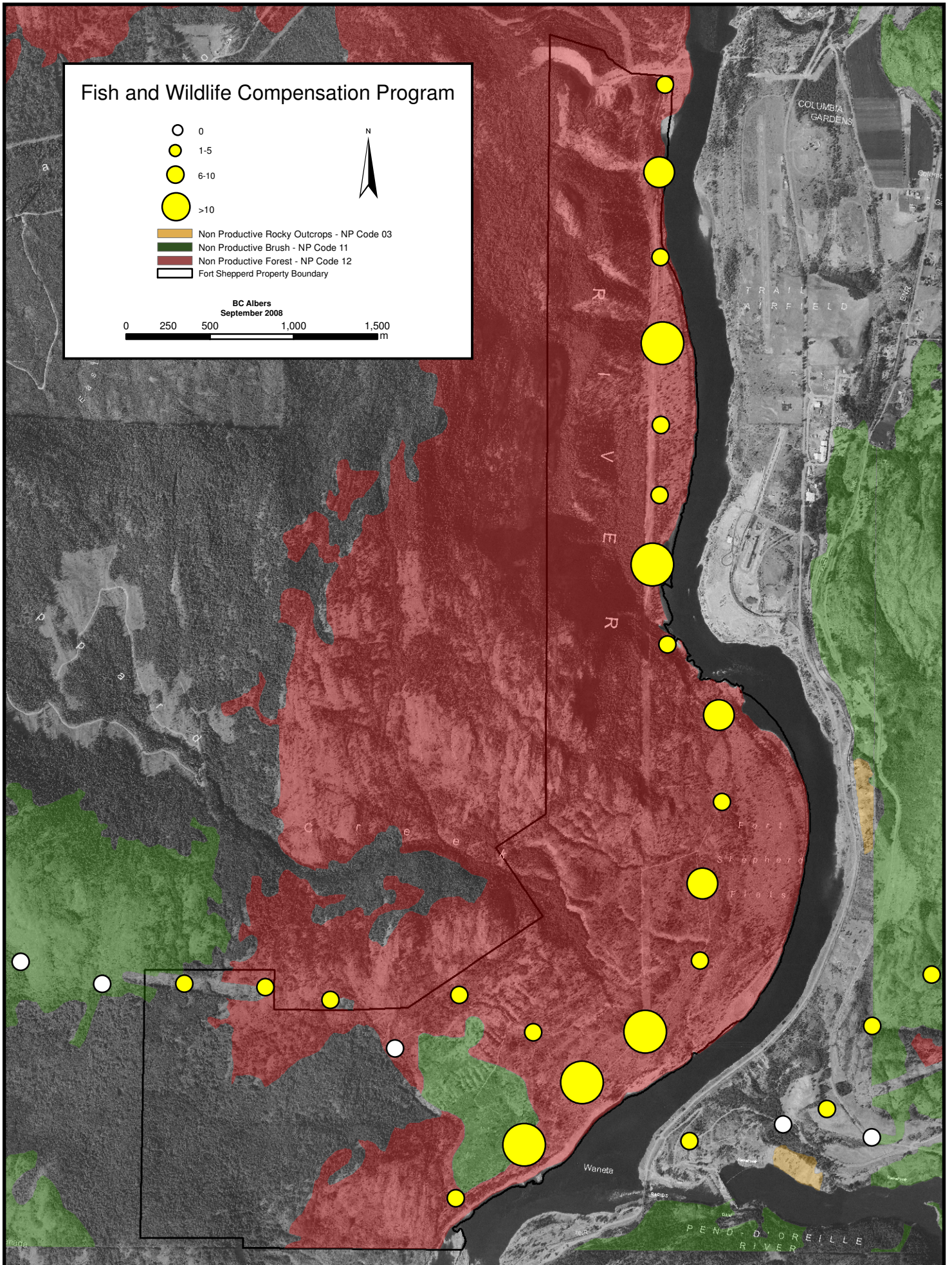


Figure 1. Overview Map of CONI Study Areas

Fish and Wildlife Compensation Program



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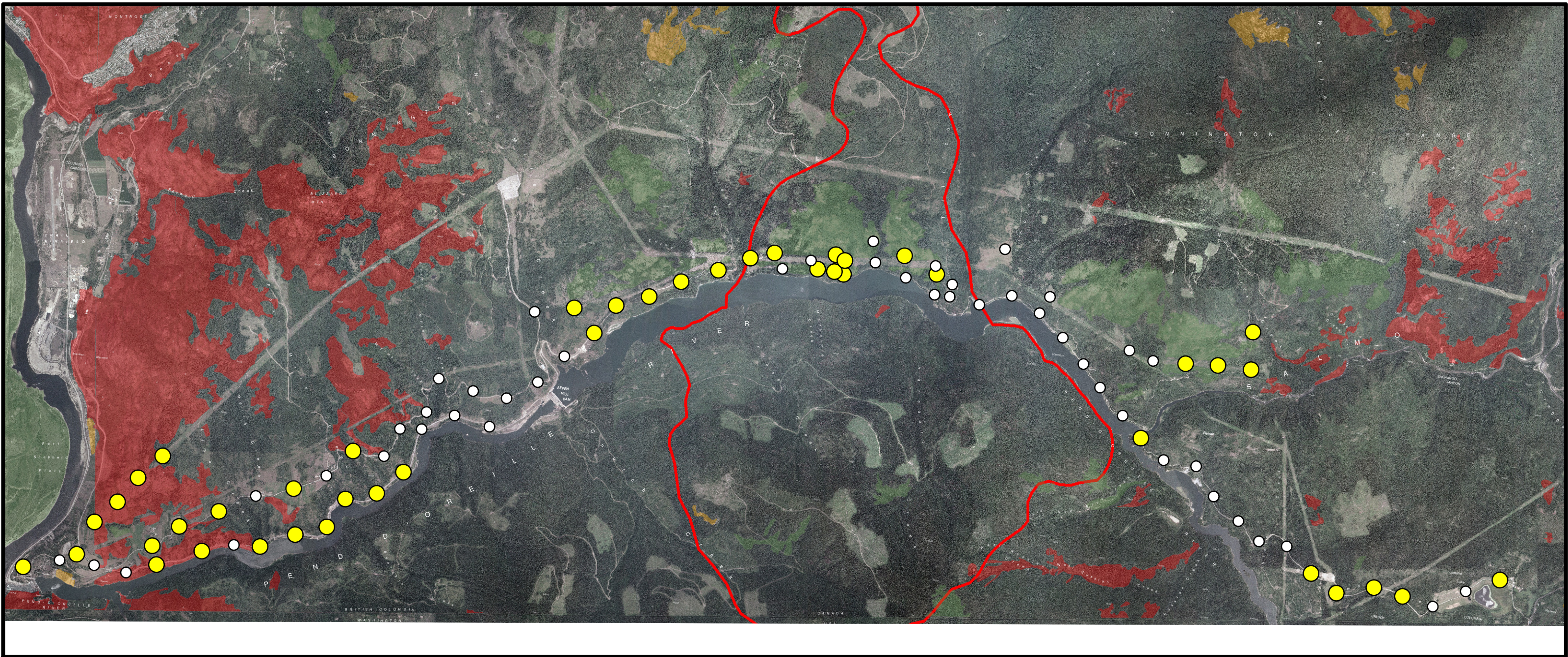
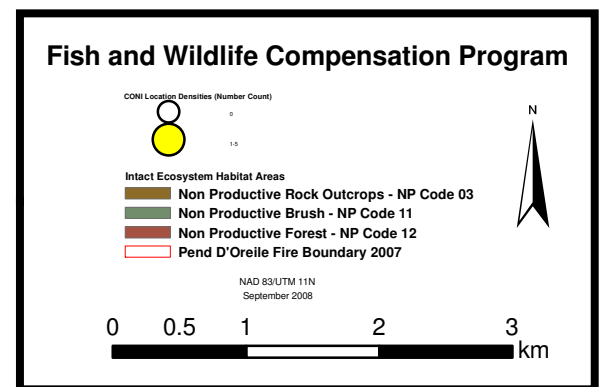


 Figure 3. Pend D'Oreille Study Area



3.0. Methods

Nighthawks were surveyed using provincial call-playback protocols along pre-determined routes (RIC 1998). Sample stations were placed along roadsides, trails and power lines and accessed by truck, bicycle or foot early in the breeding season (16-26 June) when nighthawks are considered most territorial. Some stations received three repetitions during this time frame. Daytime reconnaissance was conducted prior to each survey to mark survey points, enhance survey safety and optimize acoustics.

Although we experimented with start times, we consistently ended surveys at the end of the crepuscular period, 1.5 hours after sunset (RIC 1998). Transects consisted of 5-13 survey points placed approximately 500 m apart covering a maximum linear distance of 7 km (RIC 1998). An MP3 was created for playbacks consisting of the following five tracks:

- 1) Six calls and two booms (23 seconds)
- 2) 30 seconds of silence
- 3) Six calls and two booms (23 seconds)
- 4) 60 seconds of silence
- 5) Six calls and two booms (23 seconds)

Calls were broadcast using a megaphone attached to a MP3 player. A minimum time of 5 min was spent broadcasting and listening at each station. "Calls" are vocalisations made by both sexes whereas "booms" are non-vocal sounds (created when wind rushes over the primary feathers) assumed to be made by males only (Poulin et al. 1996).

To our knowledge provincial protocols have never been field-tested. Thus we looked at the efficacy of the call playbacks and time of inventory. At ten stations we compared the differences in the number of nighthawks observed with and without broadcasting the territorial call. At the same stations we also experimented with the starting times of call playback surveys. Stations were sampled before and after sunset. For both of these experiments we used the non-parametric Wilcoxin signed rank test to compare the means due to the small sample sizes. Additionally we documented the number of nighthawks seen versus heard during inventory. These data were analysed using a paired t-test. All data analysis was conducted in SPSS 11.5 and data were considered significant at $\alpha < 0.05$.

In addition to inventory, a request for Common Nighthawk sighting data was filed with the Biodiversity Centre for Wildlife Studies.

4.0. Results

4.1. Call Playback Surveys

Surveys were conducted from 16 – 26 June 2008. Seventeen transects and 160 sample stations were surveyed for a total sampling time of 13 hours (Table 1). Four hundred one nighthawk detections were made over the sampling period, the majority of those (82%) occurring in Fort Shepherd. It is important to note, however, that all survey repetitions occurred at Fort Shepherd (Table 2). Taking the high count from these repetitions, the number of nighthawks observed in Fort Shepherd per sample station was 7.0 versus 0.8 per station in the Pend d'Oreille.

Table 1. Common Nighthawk survey effort including number of transect and sample stations, listening hours and detections in the Fort Shepherd Conservancy and Pend d'Oreille Valley 16-26 June 2008.

	Transects	Unique Sample Stations	Call Playbacks	Survey Time (hours)	Nighthawk Observations
Fort Shepherd	7	24	70	5.83	329 (167 ^a)
Pend d'Oreille	10	90	90	7.5	72
Total	17	114	160	13.33	401

^a Nighthawk numbers using only the high count from sample stations surveyed ≥ 2 times

Table 2. Common Nighthawk detections during survey repetitions 16-26 June 2008 in Fort Shepherd Conservancy.

Sample Station	Rep 1	Rep 2	Rep 3	High count (date)
FS1	5	4 ^a	3	5 (17 June)
FS2	9	30 ^a	7	30 (18 June)
FS3	3	32 ^a	4	32 (18 June)
FS4	3	16 ^a	7	16 (18 June)
FS5	4	4 ^a	5	5 (25 June)
FS6	5	2 ^a	6	6 (25 June)
FS7	5	3 ^a	5	5 (16, 25 June)
FS8	3	3 ^a	6	6 (25 June)
FS9	3	3 ^a	5	5 (25 June)
FS10	6	11 ^a	6	11(18 June)
FS11	3	3		3 (25 June)
FS12	3	6		6 (25 June)
FS13	3	5		5 (25 June)
FS14	2	11		11 (25 June)
FS15	1	5		5 (25 June)
FS16	4	4		4 (17,25 June)

^a High count of three repetitions conducted on June 18 (visual pre-sunset, call-playback after sunset, no call playback after sunset)

On 18 June we sampled ten stations twice; once without call playback and once with. The mean number of nighthawks counted at the sample station without call playbacks ($\mu = 3.2$, $SD = 2.8$, $n = 10$) did not differ ($Z = -0.18$, $P = 0.85$) from the sample stations where call playbacks were used ($\mu = 3.2$, $SD = 1.8$, $n = 10$). Additionally, the mean number of nighthawks counted at sample station prior to sunset ($\mu = 10.2$, $SD = 11.7$, $n = 10$) did not differ ($Z = -1.54$, $P = 0.12$) from the number counted after sunset ($\mu = 3.3$, $SD = 2.8$, $n = 10$). The mean number of nighthawks seen ($\mu = 1.55$, $n = 103$) did not differ ($t = 0.513$, $df = 102$, $P = 0.61$) from those only heard ($\mu = 1.31$, $n = 103$).

4.2. Reproductive Success

Approximately three hours were spent searching for Common Nighthawk nests. A bird was flushed off a nest while walking in the study area on another project on 2 July. One egg was discovered at that time. The nest was discovered at the top of a rocky/sandy hilltop near the Waneta sub-station on the Pend d'Oreille. The slope was 1° and aspect 160°. Elevation of the nest was 528 m. The nest micro site consisted of

small pebbles adjacent to exposed bedrock and was devoid of vegetation. The dominant adjacent shrubs species present were Saskatoon berry (*Amelanchier alnifolia*) and velvety buckbrush (*Ceanothus velutinus*). The incubating female was flushed again on 5 July and a clutch size of one was confirmed. A final visit on 16 July confirmed one young fledging under a velvety buckbrush < 2 m from nest site.

4.3. Data from Biodiversity Center for Wildlife Studies

A total of 3,136 Common Nighthawk sighting records were collected from the region (1:50,000 NTS grid 082F04) from 1960-2005 (Figure 4). The total number of Common Nighthawks counted (and reported) has declined in the past 13 years (Figure 4). The earliest sighting was 6 May and the latest was 19 September. The average group size reported from 1960-2005 does not show any declining trend (Figure 5). In fact, although fewer sightings are reported, the average group size has increased in the past 13 years (Figure 5). Specific locations were not included in this data set and thus, we were unable to use the data in the habitat modeling process prior to sampling.

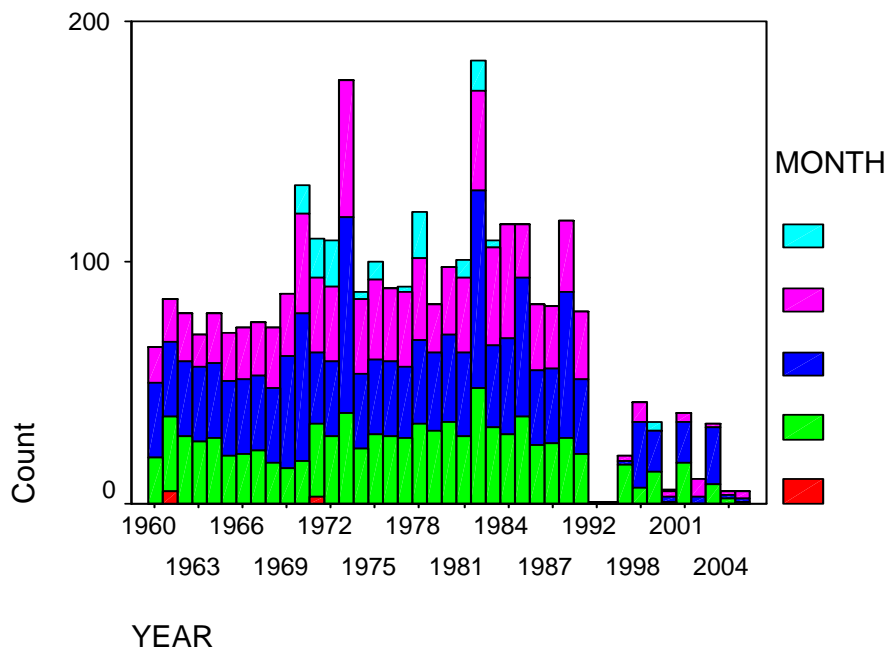


Figure 4. Records from the Biodiversity Center for Wildlife Studies of Common Nighthawks reported May-September 1960-2005 from the region (1:50,000 NTS grid 082F04).

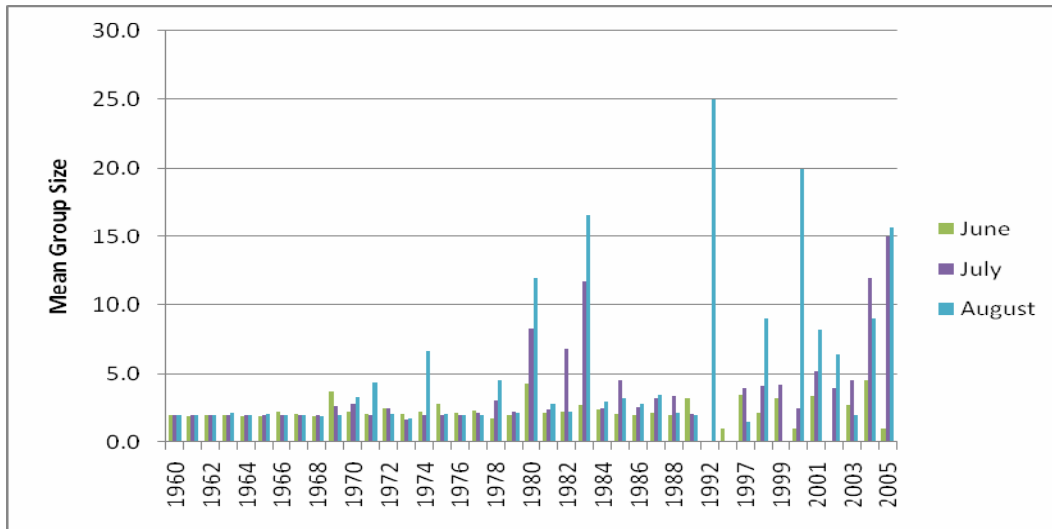


Figure 5. Records from the Biodiversity Center for Wildlife Studies showing the mean group size for Common Nighthawks reported June-August 1960-2005 from the region (1:50,000 NTS grid 082F04).

5.0. Discussion

Other than estimates provided by breeding bird surveys, few studies exist which assess the abundance of the Common Nighthawk in Canada but long-term data suggests a significant decline in abundance (COSEWIC 2007). The data set received from the B.C. Biodiversity Centre for Wildlife Studies shows no indication of this, however there are many biases associated with this data. The biggest shortcoming is that survey effort is undocumented, making trend data very difficult to analyze.

This project may be used as a start point for a long-term monitoring effort in the region. However, to provide efficient and accurate enumeration in the short survey window for the species, several issues influencing species detectability need to be addressed.

- 1) Foraging birds are highly mobile making individual birds difficult to count over the duration of an observation station.
- 2) Before dark, nighthawks were best enumerated visually as not all nighthawks were calling or booming. These birds would be missed after it is too dark to see.
- 3) Binoculars are necessary to enumerate birds foraging high.
- 4) Birds foraging below the horizon were difficult to see and were missed unless they were calling or booming; this affect will differ with differing site topography and vegetation.
- 5) After dark, most birds were only detected aurally, and it became very difficult to estimate bird numbers when there were more than four individuals.
- 6) Low to moderate background noise made inventory difficult.

- 7) Booms are much lower frequency sounds than calls and so therefore travel farther. Thus, maximum detections distances for booming individuals would likely be greater than for non-booming birds.

Analysis of ten survey points indicated no difference in the number of nighthawks enumerated before and after sunset. However, some of the points surveyed after sunset were still through visual means (not too dark to see). Thus, this experiment failed to address the disparity that might arise between enumerating prior to and after dark.

The overall number of nighthawks detected during sampling did not differ with and without broadcasting call playbacks, however we did not examine whether the number of territorial birds counted (booming males) would be affected by use of call playback. Because no differences were observed between broadcasting and not broadcasting, we stopped using call playback equipment 19-26 June.

Because the Common Nighthawk is highly territorial and males seldom cross territorial boundaries (Roth and Jones 2000), it might be of future value to count the number of males booming in addition to the number of individuals. If a regional sampling plan is developed, the number of territorial individuals (booming males) may be the best measure for modeling occupancy.

Although the two study areas are adjacent and have similar terrestrial habitat characteristics, the Fort Shepherd area appears to support a much greater density (7.0 vs 0.8/ sample station) of Common Nighthawks than the P'end d'Oreille. Many of the individuals observed in the Fort Shepherd Conservancy were foraging over the Columbia River while few individuals were detected foraging over the P'end d'Oreille reservoir. Reservoirs may provide lower quality foraging habitat for Common Nighthawks than free-flowing waterways.

6.0. Recommendations

Current provincial protocol makes recommendations for inventory that we believe may require further testing to properly assess species abundance in the region (Table 3).

Future research should:

- a) determine if the number of territorial birds detected (those booming) is influenced by the use of call playback techniques.
- b) address the timing of crepuscular surveys: is inventory more effective using visual rather than audible means (before versus after dark)?
- c) explore the use of thermal infrared photography, radio-telemetry or radar to evaluate detectability of nighthawks.
- d) provide a long-term sampling plan for a set study area. Consider using territorial birds (boomers) as the method of enumeration. Our observations

support the assumption that booming behaviour is limited to territorial males.

Common Nighthawks appear to exhibit some nest site fidelity (Brigham 1989). Thus, it would be of interest to do thorough nest searches in target study areas and describe habitat use and nest success. Additionally, because nighthawks use open areas for nesting, it would be of considerable management interest to assess how commonly used practices such as prescribed burning, thinning and herbicide application influence abundance and reproduction (Table 3). Continued monitoring in the Pend d'Oreille burn should give some indication of how nighthawk occupancy changes as forest succession progresses.

Many of the nighthawk detections were above power lines in both study areas. One nest was found incidentally within a power line corridor in Fort Shepherd in 2007 (M. Machmer, pers. com), however it is unknown how extensively this habitat is used for nesting. Some power line rights of way were subject to herbicide treatment during our project which suggests an overlap with Common Nighthawk breeding chronology. We recommend researching the use of power line corridors by Common Nighthawks and other shrub and ground-nesting species to address the potential impacts of associated management activities on wildlife. This would result in the creation of best management practices for power line corridors in our area.

Density of Common Nighthawks varied considerably between the two study areas. We recommend future research incorporate aerial invertebrate sampling to determine if insect communities differ between the Columbia River and the Pend d'Oreille Reservoir (Table 3).

Table 3. Recommendations and future strategies for the study of Common Nighthawks in the West Kootenay.

Objectives	Action
Make recommendations for Provincial Inventory protocols	1) Evaluate the influence of call playback techniques on territorial birds 2) Determine the best survey window
Long term monitoring	1) Create a sample plan for the region 2) Evaluate the effects of natural and prescribed burns on abundance and reproduction 3) Evaluate the effects of thinning on abundance
Create best management practices for Common Nighthawks (and possibly other wildlife species) using power line corridors	1) Evaluate occurrence and reproductive effort on power lines 2) Assess potential impacts of vegetation removal techniques on Common Nighthawk reproductive success 3) Evaluate the timing of vegetation removal on Common Nighthawk reproductive success
Determine factors influencing lower Common Nighthawk abundance in the Pend d'Oreille	1) Compare insect abundance between Columbia River and Pend d'Oreille reservoir

7.0. Acknowledgements

We wish to thank Irene Manley for her continued support administering this project, collecting valuable local knowledge and for her assistance in the field. Thank you to Claire Schadeli for assisting in the field. Thank you to Angus Glass, Lynne Betts and Beth Woodbridge for facilitating public outreach and administration. A special thanks to Darin Welch who provided maps and GIS support. Additional thanks to Thomas Hill and Marlene Machmer for information on nighthawks nesting in the region. Thanks to Michael Preston at the Biodiversity Centre for Wildlife Studies for processing our data request.

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9.0. Appendix 1. 2008 Common Nighthawk Data Sheet.

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2008 CONI Surveys

Wind (0-6): 0 = calm (<2 km/h); 1 = light air (2-5 km/h); 2 = light breeze, leaves rustle (6-12 km/h); 3 = gentle breeze, leaves and twigs constantly move (13-19 km/h); 4 = moderate breeze, small branches move, dust rises (20-29 km/h); 5 = fresh breeze, small trees sway (30-39 km/h); 6 = strong breeze, large branches moving, wind whistling (40-50 km/h).

Cloud Cover: 1. Clear 2. <50% 3. >50% 4. 100%:

Precipitation: N=None; F= fog; M= Misty drizzle; LR=Light Rain; HR= Heavy Rain; S=Snow 4.

Noise (1-4): 1= None or slight; 2= Moderate: some interference with broadcast and/or listening; 3= High: substantial interference with broadcast and/or listening; 4=Excessive noise: extreme interference with broadcast or listening.

Study Area: P= Pend d'Oreille or F= Ft. Shepherd