

# **Inventory and Monitoring of the Northern Spotted, Western Screech and Flammulated Owls**



November 2005  
Project # 05.W.Br.04

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Prepared with Financial Support of BC Hydro Bridge Coastal Fish and Wildlife Restoration Program

## Executive Summary

The Bridge Coastal Fish and Wildlife Restoration Program's (BCRP) strategic plan emphasizes the importance of improving the knowledge base on rare, endangered and threatened species and their habitat use. Identification of species distribution and habitat use is imperative to the conservation of biodiversity and enhanced production. Thus, in 2005, call playback techniques were used to assess active territories of 3 threatened/endangered species, the Northern Spotted (*Strix occidentalis caurina*), Western Screech (*Megascops kennicottii*) and Flammulated Owl (*Otus flammeolus*) in the Coquitlam, Seton and Bridge watersheds.

Sixteen Northern Spotted Owl transects were surveyed in the Coquitlam watershed, Bridge River and on Carpenter, Seton and Anderson lakes. Five Flammulated Owl transects were surveyed on Carpenter lake, and 3 Western Screech-owl surveys were conducted on Seton and Bridge River, and near the town sites of Lillooet and Gold Bridge. Transects were replicated 3 times and surveyed by road, boat or on foot in accordance with protocols delineated by the Ministry of Environment. Financial support was secured through BCRP with contributions from the Ministry of Environment and N'Quaqua First Nations.

All owl species detected were recorded, resulting in a total of 132 owl observations. The Barred (*Strix varia*) was the most common owl detected (39%,  $n = 51$ ) followed by Flammulated (26%,  $n = 34$ ) and the Great Horned Owl (*Bubo virginianus*) (22%,  $n = 29$ ). The Northern Saw-whet (*Aegolius acadicus*) (7%,  $n = 9$ ) and Western Screech-owl (7%,  $n = 9$ ) were uncommon detections. There were no Northern Spotted Owl detections. Of the targeted species, 18 active Flammulated and 6 Western Screech-owl territories were defined.

Of the 6 active Western Screech-owl sites, 3 were found in the Coquitlam watershed and are known to be the *O. k. kennicottii* sub-species. The remaining 3 active sites, on Anderson and Seton Lakes fall between the distribution of either sub-species and it is speculated they are the *O. k. macfarlanei* sub-species. This would represent an important breeding record and extension of the sub-species range. The *kennicottii* and *macfarlanei* sub-species are listed as species of concern and endangered, respectively, under the Species at Risk Act.

Eighteen active Flammulated Owl territories on Carpenter Lake contribute to an extension of the known species range. Prior to this study, a single detection was noted during a Northern Spotted Owl survey in 2004. The failure to detect any Northern Spotted Owls in an area that encompassed 7 historical active sites and a male detection in 2004 emphasizes the precipitous population declines this species is facing in British Columbia.

A public outreach intern hired from the N'Quaqua Band office sent out press releases, organized presentation schedules and created and presented a program within two communities. As a result of this work, educational articles appeared in the Bridge River Valley Economic Development Society Newsletter, Pemberton Community Bulletin, Bridge River-Lillooet News, Whistler Question and the Pique. Audio-visual presentations on identification and ecology of local threatened owl species were given in D'arcy, Seton-Portage, Squamish, Whistler, Pemberton and Lillooet reaching 300 people. The public outreach raised awareness for conservation efforts concerning local threatened/endangered owl species and how BCRP facilitates these efforts.

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# Introduction

## 1.1. Species Information

### 1.1.1. Northern Spotted Owl

The Northern Spotted Owl (*Strix occidentalis caurina*) was designated as endangered by the Committee on the Status of Endangered Wildlife in Canada in 1986 (COSEWIC 2000) and is currently listed as endangered on Schedule 1 of Canada's Species at Risk Act (SARA), and red-listed provincially by the British Columbia Conservation Data Center (CDC). In Canada they occur only in southwest British Columbia and are at the northern most range limit for the species. Monitoring between 1992 and 2001 showed a population decline of 49% (Blackburn et al. 2002) and, in 2004, only 17 active sites were detected (Hobbs 2005). One of these active sites was found in a BCRP sponsored inventory on the east side of Anderson Lake (Young 2004). Historically, the population of Northern Spotted Owls in B.C. may have been as large as 500 pairs (Blackburn et al. 2002).

According to Forsman et al (1984), the main limiting factors for the Northern Spotted Owl are habitat availability (old-growth and late successional forest) and food supply. Since European settlement, mature and old growth forest in the range of the Northern Spotted Owl has been reduced by at least 28% through urban development, agriculture, natural events and resource extraction (Thomas et al 1990).

Northern Spotted Owl habitat (nesting, roosting, foraging and dispersal) can generally be described as late seral stage, low-to-mid elevation, coniferous forest stands greater than 140 years of age. The forest canopy is multi-layered with a high incidence of large trees containing tree deformities (cavities, deformed limbs or forked tops) and snags (Thomas et al. 1990). Northern Spotted Owls in B.C. occupy habitat at elevations less than 1100 m within the mountain hemlock and cedar-western hemlock, Coastal and interior Douglas fir biogeoclimatic zones (SOMIT, 1997).

### 1.1.2. Western Screech-owl

Under COSEWIC and SARA, the interior subspecies of the Western Screech-owl (*Megascops kennicottii macfarlanei*) was listed as endangered. Provincially, it has been red-listed and is managed under the Identified Wildlife Management Strategy (IWMS) (MWLAP 2004). The coastal subspecies (*M. k. kennicottii*) has been listed as a Species of Special Concern under SARA and blue-listed provincially by the CDC. Two historical records of Western Screech-owls were noted in the study area in 1999/2000 (K. Wright, personal communication) and are suspected to be the endangered interior sub-species.

The distribution center of the interior sub-species of Western Screech-owl in B.C. is in the Okanagan. They can be found in low elevation forests (<600m), frequently close to water. They breed in either deciduous or mixed deciduous-coniferous forests. Mature black cottonwood (*Populus trichocarpa*) trees characterize nest sites (Cannings et al. 1987). The coastal sub-species is found along the Pacific Coast ranges from Alaska to Oregon and prefers mixed forests of big leaf maple (*Acer macrophyllum*), red alder (*Alnus rubra*), Douglas fir (*Pseudotsuga menziesii*) and western hemlock (*Tsuga heterophylla*) (Cannings and Angell 2001). Both sub-species are cavity nesting and their diet varies from insects to small mammals.

### 1.1.3. Flammulated Owl

The Flammulated Owl (*Otus flammeolus*) was designated as a Species of Special Concern by COSEWIC in 2001 and listed on Schedule 1 of SARA. Provincially the owl is blue-listed by CDC. In 2004, a Flammulated Owl responded to a Northern-Spotted Owl call playback survey on Carpenter Lake (Young 2004).

Typical Flammulated Owl breeding habitat is mature Interior Douglas fir (IDF) forest with scattered large ponderosa pine (*Pinus ponderosa*) (McCallum 1994). Multiage-class stands with snags containing pre-existing woodpecker cavities are chosen for nesting and roosting. Regenerating thickets of Douglas fir with

adjacent shrub or grassy areas provide forage habitat (Cannings and van Woudenberg 2004). As the Flammulated Owl is an insectivore, it migrates south in the winter to follow its food supply (McCallum 1994). The distribution of Flammulated Owls in British Columbia is found in the southern and central interior of the province with some observations in the East Kootenays (van Woudenberg 2004).

## 1.2. Hydroelectric Impacts

The implementation of the Coquitlam (1903), Mission/Terzaghi Dam (1948) and the Seton Dam (1956) and subsequent water diversions created loss of habitat and habitat alterations. According to the BCRP strategic plans, the Coquitlam Dam resulted in the flooding of 17 ha of river and lowland forests and 177 km of upland deciduous and coniferous forests. The Mission Dam, and later, the Terzaghi Dam, created Carpenter Reservoir and loss of 4,437 ha of the original Bridge River valley and 232 ha of adjacent hillsides. Seton Reservoir was raised by 2 m, resulting in a loss of 27 ha of terrestrial land (BCRP 2004).

Periodic spill over events at the Terzaghi Dam and fluctuating water levels in Coquitlam, Carpenter and Seton Reservoirs have affected establishment of riparian habitat (Figure 1). Additionally, hydroelectric wires, steep gradients, barriers, development of train tracks and roads have limited establishment of riparian and upland habitat. Flooding events resulted not only in removal of suitable habitat for riparian specialists such as the cavity nesting Western Screech-owl, but also diminished the amount of suitable habitat available for the Flammulated and Northern Spotted Owl. In accordance with BCRP objectives, funding was awarded in 2005 to survey for endangered and threatened owl species within the Seton, Bridge River and Coquitlam hydroelectric footprint areas.

## 1.3. Goals and Objectives

Our research objective was to inventory and monitor three endangered and/or threatened species, the Northern Spotted, Western Screech and Flammulated Owl within the Bridge River, Seton and Coquitlam watersheds. Selected survey areas contained suitable habitat and/or historical records providing justification for intensive, species-specific surveys. Monitoring to determine breeding status and habitat use was a secondary objective. Knowledge of the distribution and habitat needs of rare and endangered species has been identified as a strategic objective of BCRP and the Lillooet Land Resources Management Plan (LLRMP 2004).

Figure 1. Carpenter Lake Reservoir near Gold Bridge, July 2005. Fluctuating water levels impede establishment of riparian vegetation and deciduous trees.





## 2. Study Area

The Bridge River and Seton watersheds are situated in the Cascades Forest District. Lower elevation slopes in the study area were characterized by IDF biogeoclimatic (BEC) zone. Engleman-Spruce-Subalpine-Fir and Montane Spruce zones were typical of upper elevation slopes (>1100 m) (Young 2004). South facing slopes presented a mixture of IDF and ponderosa pine. The riparian within the study area would be classified primarily as low and middle bench flood classes (MacKenzie and Moran 2004). The Cascades Forest District is in a rain shadow; average annual precipitation in Lillooet is 33 cm. Mean temperature from April-August is 17 °C (Environment Canada 2004).

The Coquitlam watershed lies within the Chilliwack Forest District in the Pacific Ranges of the Coast Mountains. The Reservoir is part of the Greater Vancouver Regional District, whose primary use is to provide drinking water for the Vancouver area. The BEC zones surveyed within the Coquitlam watershed included the Coastal Douglas fir, Coastal Western Hemlock and Mountain Hemlock zones. Peaks range from 900-1300 m and are characterized by steep, rocky slopes at upper elevations. Vegetation at lower elevations included western hemlock, amabilis fir (*Abies amabilis*), western red cedar (*Thuja plicata*), Sitka spruce (*Picea sitchensis*) and Douglas fir. Average annual precipitation is 192 cm (Environment Canada 2004).

Environmental effects such as fire and insect infestation coupled with anthropogenic disturbances due to timber harvest and hydroelectric development have created a mosaic of different aged forest stands within the study area.

## 3. Methods

### 3.1. General Methods

Owl populations were inventoried using provincial protocols, which include call-playback methods (Hobbs et al. 2004, RISC 2001) along pre-determined routes. The territorial calls of the targeted species were broadcast at stations along roadsides using vehicles, on the lake by boat or along walking transects during the breeding season (April-August) when owls are most territorial. Remote transects on the east side of Anderson Lake were accessed by helicopter. Daytime reconnaissance was conducted prior to each survey to mark survey points, enhance survey safety and optimize acoustics.

Call playback surveys began at sunset and continued until the area was covered. The average road transect consisted of approximately 17 survey points placed approximately 500 m apart covering a linear distance of 8 km. Walking transects covered between 2-6 km and stations were placed 200-400 m apart. At each station the surveyor would listen for 2-3 min, and then broadcast the territorial call of the targeted species for 2-3 distinct bouts. Each bout lasted 1.0-1.5 min and was broadcast using a megaphone attached to a portable CD player. A minimum time of 15 min was spent broadcasting and listening at each station. Additional time was added to survey stations to identify unknown sounds or compensate for loud background noises.

Owl observation numbers do not reflect the actual number of owl territories/sites detected as resident owls were likely to be detected more than once during the three repetitions conducted along each transect. In addition, transects for Flammulated and Northern Spotted Owls overlapped resulting in additional time spent within the same territory. To correct this territory numbers were estimated based on owl home range sizes and simultaneous call events.

### 3.2. Transect Descriptions

Survey locations were determined using Terrain Resource Information Management (TRIM) data, habitat suitability modeling and existing known owl detections within the identified watersheds. Twenty-four

transects were surveyed, 3 Western Screech, 5 Flammulated, and 16 Northern Spotted Owl (Table 1). Twelve of the Northern Spotted Owl transects were also surveyed in 2004. To estimate Northern Spotted Owl occupancy, 3 replicate surveys must be conducted within 2 subsequent years (Hobbs et al. 2004). The 2005 survey efforts in the Bridge and Seton watersheds represent the completion of that requirement. The transects descriptions are as follows:

## Northern Spotted Owl Transects

**Carpenter Lake:** Five transects were located along the Gold Bridge-Lillooet road on the north side of Carpenter Lake. The first 5 km of Marshall Lake road were included in this survey. Call-playbacks broadcast on both sides of the lake. These were surveyed in 2004 (Young 2004).

**Bridge River:** A single transect was located on Bridge River extending from the confluence with the Yalakom to the Terzaghi Dam. This was also surveyed in 2004.

**Anderson Lake:** There were a total of 6 transects on Anderson Lake; 2 on the Highline road from D'arcy to 3 km southwest of Seton-Portage, 1 between Seton-Portage and Lost Valley, 1 in Lost Valley, covering 3 km from the creek confluence up both valleys, and 2 on the steep slopes of the east side of Anderson Lake. The Upper Anderson survey on the east side was the location of the 2004 Northern Spotted Owl detection (Young 2004). All but the transect from Seton-Portage to Lost Valley was surveyed in 2004.

**Seton Lake:** The initial survey of Seton Lake was on foot following a transect laid out in 2004. This survey was modified as fires on Seton Lake in 2004 destroyed much of the suitable Northern Spotted Owl habitat along this transect. Subsequent repetitions were surveyed by boat. The survey extended from the powerhouse near Shalath to the BC Hydro picnic area near the Seton Dam. Broadcasts covered habitat on either side of the lake.

**Coquitlam:** Three nocturnal transects were surveyed within the Coquitlam watershed along with daytime spot-checks. Transects covered the Coquitlam mainline road up Coquitlam river and 5 km of the Flynn spur road, the west Coquitlam road, 10 km of the east and west drainages of the 500 spur road, 5 km of the 600 spur road and several check points on the 100 spur road. Broadcasts reached habitat on either side of Coquitlam Reservoir and river.

## Flammulated Owl Transects

**Carpenter Lake:** Five transects were located along the Gold Bridge-Lillooet road on the north side of Carpenter Lake. Call-playbacks broadcast on the north sides of the lake only.

## Western Screech-owl Transects

**Gold Bridge:** Transect targeted cottonwoods near the town site of Gold Bridge and included coverage on the Hurley Forest service road towards Pemberton (< 2 km before Gold Bridge-Lillooet road), points on the Gold Bridge Dam road towards turn off to La Joie Dam, and on Carpenter Lake road towards Gun Creek.

**Seton-Portage/Bridge River:** Transect started on Seton River at the north end of Anderson Lake and continued through Seton-Portage with 3 points on Spyder Creek road and 2 points on the Seton-Portage Road. Additional call points were located on the road towards Shalath (1 north of school, and 1 at the turn off to Shalath). Three additional points were located on Bridge River, between the Terzaghi Dam and the canyon. Transect targeted large cottonwoods on Seton River and big-leaf maple drainages.

**Lillooet:** Transect started south of BC Hydro Campground and followed a trail along Cayoosh creek east towards Lillooet. The transect continued on the Duffy Lake road north of Seton/Cayoosh creek bridge to and end point south of the Lightfoot gas station. Survey was only conducted once as a public outreach, field component.

### **3.3. Monitoring**

When logistically possible, daytime surveys were conducted to follow up nighttime responses. This was to determine habitat use, pair and breeding status. The Northern Spotted Owl and Western Screech Owl are responsive in the daytime, whereas the Flammulated is less so (Hobbs, personal correspondence). This influenced the success of the daytime follow-ups for these species.

### **3.4. Data Collected**

Data for owl surveys were collected in accordance with provincial protocols (Hobbs et al. 2004, RISC 2001). A survey description included start and end Universal Transverse Mercator Units (UTM's), habitat and driving or route access descriptions. At each survey station we recorded survey name, surveyors present, date, station coordinates (NAD 83 UTM), time of sunset, and start and end times of broadcast. Additionally we recorded wind speed using the Beaufort scale, precipitation (none, drizzle, light rain, heavy rain) and temperature (°C) (RISC 2001). Incidental observations recorded were extraneous noise, and any raptor or wildlife observations.

When an owl was detected at any point in the survey we recorded the species, gender, age (adult or juvenile), response time (exact time elapsed between the first broadcasted call and the first detected owl response), type of detection (visual or acoustic), type of call, duration of each calling bout (bouts are defined as a series of calls with no more than 2 minutes of silence between calls), direction of call, and estimated distance to the owl. With this information coordinates could be projected for owls that could not be safely approached at night. Additionally, any movements of owls and simultaneous owl calls were recorded.

Table 1. Survey dates and responses of study species at transects surveyed in the BC Hydro footprint April-August 2005.

Transect Name	Survey Date			Target species	Individual responses
	Rep 1	Rep 2	Rep 3		
Highline lower (HL)	April 29	June 13	July 11	SPOW <sup>a</sup>	
Highline upper (HU)	April 30	June 22	July 19	SPOW	1 WSOW
3Mile Anderson (3M)	June 6	July 12	Aug 8	SPOW	
Lower Anderson (AL)	May 3	May 21	July 27	SPOW	
Upper Anderson (AU)	May 3	May 21	July 27	SPOW	
Lost Valley (LV)	May 3	May 21	July 27	SPOW	
Carpenter Lake 1 (CA)	May 18	July 2	Aug 10	SPOW	
Carpenter Lake 2 (CB)	May 19	June 10	Aug 9	SPOW	
Carpenter Lake 3 (CC)	May 20	July 1	Aug 8	SPOW	
Carpenter Lake 4 (CD)	May 28	Aug 6	Aug 12	SPOW	
Carpenter Lake 5 (CE)	May 27	July 26	Aug 7	SPOW	1 FLOW
Bridge River (BR)	June 12	July 17	Aug 11	SPOW	
Seton Lake (SL)	June 7	July 16	Aug 4	SPOW	1 WSOW
West Coquitlam (WC)	June 14	July 15	July 29	SPOW	1 WSOW
Upper Coquitlam (UC)	June 15	July 13	July 31	SPOW	1 WSOW
Lower Coquitlam (LC)	July 14	July 28	Aug 3	SPOW	
Coquitlam spot checks	July 14	July 30	Aug 3	SPOW	1 WSOW
Carpenter Lake1 1-18	June 1	June 29	July 18	FLOW <sup>b</sup>	5 FLOW
Carpenter Lake2 19-35	June 2	June 10	June 30	FLOW	3 FLOW
Carpenter Lake3 36-51	June 3	June 28	July 10	FLOW	4 FLOW
Carpenter Lake4 52-67	June 4	June 27	July 09	FLOW	4 FLOW
Carpenter Lake5 68-83	-	June 26	July 08	FLOW	2 FLOW
Goldbridge (GB)	May 29	June 25	July 21	WSOW <sup>c</sup>	
Seton/Bridge (SB)	May 30	June 11	July 20	WSOW	3 WSOW
Lillooet (LS) field trip	June 6	-	-	WSOW	

<sup>a</sup> Northern Spotted Owl

<sup>b</sup> Flammulated Owl

<sup>c</sup> Western Screech-owl

## 4. Results

### 4.1 Call Playback Surveys

Surveys conducted included 16 Northern Spotted, 5 Flammulated and 3 Western Screech-owl transects between 29 April and 12 August. Three repetitions of each survey transect were conducted to estimate owl occupancy, with the exception of the Flammulated Owl (Carpenter Lake5) and Lillooet Western Screech-owl transects (Table 1). Due to the high success rate of the first repetition of Flammulated Owl surveys, we modified existing transects to intensify survey efforts on Carpenter Lake. Initially we surveyed 4 transects with call points 800 m apart. We increased survey efforts by adding an additional transect and compressing call points to only 500 m apart. The single Western Screech-owl transect in Lillooet was surveyed as part of a local educational field trip and was not repeated.

Survey efforts resulted in a total of 998 stations visited with 251 hours of inventory (Table 2). From these observations, 132 owls were detected, with the highest owl observations per listening time attributed to the Flammulated Owl surveys (0.7 owl/hour).

Additionally, daytime Northern Spotted Owl spot checks were conducted on the northeast end of Carpenter lake (1.5 hours), Mowson, and Pearson Ponds (2 hours), Marshall Creek Valley (4 hours), Bridge River (2 hours), north end of Seton Lake along train tracks (2 hours) and Jewel Creek (3 hours).

Table 2. Species-specific playback surveys indicating transect and station numbers, listening hours and owl observations in the BC Hydro footprint, April-August 2005.

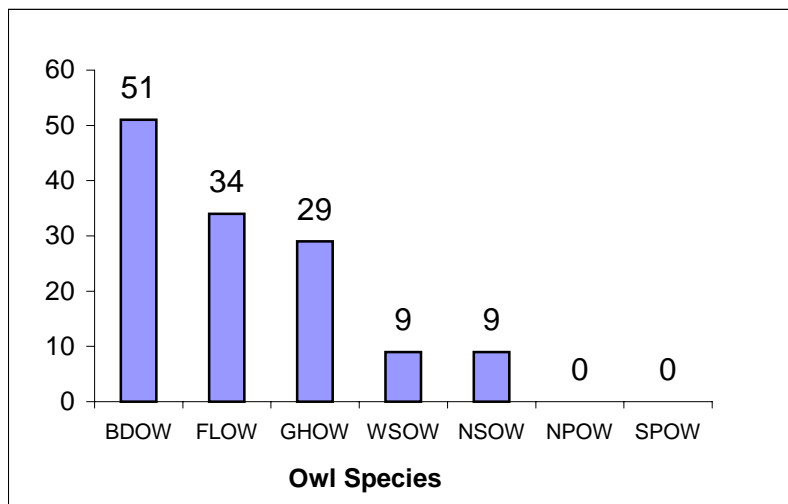
Owl Species	Transects	Stations	Listening Time (hours)	Owl Observations
Northern Spotted	16	705	176.5	0
Flammulated	5	224	57	42
Western Screech	3	69	17.6	5
Totals	24	998	251.1	47*

\* Includes incidental observations

### 4.2 Owl Observations

All owl species detected were recorded regardless of whether or not they were targeted. This gives an estimate of the distribution of all owl species within the study area. However, it should be noted that for an accurate inventory of non-targeted species, conspecific playback methods for each owl species would be required (RISC 2001). Of the 132 owl observations, the Barred (*Strix varia*) was the most common owl detected (39%,  $n = 51$ ) followed by Flammulated (26%,  $n = 34$ ) and the Great Horned Owl (*Bubo virginianus*) (22%,  $n = 29$ ). The Northern Saw-whet (*Aegolius acadicus*) (7%,  $n = 9$ ) and Western Screech-owl (7%,  $n = 9$ ) were uncommon detections. There were no Northern Spotted or Pygmy Owl (*Glaucidium gnoma*) detections (Figure 2).

Figure 2. Species-specific owl observations within the BC Hydro Footprint, April-August, 2005.



### 4.3 Owl Active Sites

Active owl sites were estimated assuming a certain amount of territoriality during the breeding season and using knowledge of species-specific home range sizes. In some instances multiple owls at a single station could be distinguished as they called simultaneously. The assumptions we used in this analysis are that owls did not move greater distances than their typical home range size between repetitions and conspecifics were not found within a the same territory. Given these assumptions, we defined 24 Barred, 18 Flammulated, 13 Great Horned, 6 Western Screech, and 2 Northern Saw-whet active sites in 2005. An active site could represent a single bird or non-breeding or breeding pair. Daytime follow-ups to confirm these territories were conducted for the targeted taxa, yet proved largely unsuccessful. No daytime follow-ups were conducted for other species. Often presence of young were a good indicator of territoriality

### 4.4 Monitoring/Habitat Use

Daytime follow-ups were conducted when logistically possible. On 4 June at 1330 we were able to elicit a territorial call from a Flammulated Owl near Carol Lake, however were not able to get a visual location. The habitat was typical of other Flammulated Owl projected locations we visited; west or southwest aspects in primarily old growth IDF with a scattering of ponderosa pine. The understory was fairly sparse with Soopolallie (*Shepherdia Canadensis*) and common snowberry (*Symphoricarpos albus*) as the main shrub species. Pine grass (*Calamagrostis rubescens*) and heart leaved arnica (*Arnica cordifolia*) were the main forb species (Figure 3).

Two daytime follow-ups were conducted on Western Screech active sites along Anderson Lake and near Shalath. Although no owls responded, habitat assessment was conducted. The site on Anderson Lake was revisited on 1 May. The projected location was in a dry draw that was primarily IDF with some big leaf maple and white birch (*Betula papyrifera*) interspersed. The second site was near Shalath, where we had had a night visual of two juvenile Western Screech-owls. The location was in a dry creek bed with the main tree species being big leaf maple, willow (*Salix* spp.), white birch and ponderosa pine. Bordering the draw was a typical IDF BEC zone.

Figure 3. Breeding territory of a Flammulated owl near Carol Lake, June 2005.



## **4.5 Incidental Observations**

Noteworthy incidental species observations included the COSEWIC species of special concern the grizzly bear (*Ursos arctos*) on Carpenter Lake near Gold Bridge and the yellow-listed gray wolf (*Canis lupus*) on Marshall Creek Road.

## **5. Community Outreach**

### **5.1. Public Outreach Internship**

The public awareness component of the project involved partnering with the D'arcy N'Quaqua band to hire an intern, Jolene Patrick, to assist with the public outreach facet of the project. The N'Quaqua First Nations provided an office space for Jolene and Chris Thevarg acted as her supervisor. The internship ran from 7 July to 20 July and Jolene was responsible for writing and releasing a press release (Appendix III), coordinating presentation times in September and producing a presentation on the identification and ecology of local owl species. The presentation was advertised in the local communities by posters and presented in D'arcy and Seton-Portage (Appendix III).

Additionally, as part of our reporting process, monthly progress reports were submitted to First Nations Bands within the study area, MOE personnel, and BC Conservation Foundation.

### **5.2. Published Articles**

Press releases were submitted to the Province, Vancouver Sun, Lillooet-Bridge River News, Whistler Question and the Pique (Appendix III). An article appeared in the August edition of the Bridge River Valley Economic Development Society newsletter introducing the project to the local residence (Appendix III). Articles also appeared in the Whistler Question, Pique, Lillooet Bridge River News and the Pemberton Community Bulletin (Appendix III).

### **5.3. Presentations**

Presentations on the "Ecology and Conservation of Threatened and Endangered Local Owls" were given by Jolene at the Community Center in D'arcy 19 July 2005 and at the Elder's Complex in Seton-Portage on 20



July 2005. Approximately 60-70 people were in attendance. Presentations were hosted by the Squamish Environmental Society, Whistler Naturalists, Pemberton Community Center and BC Federation of Naturalists on 26, 27, 28 and 30 September. Doris Hausleitner delivered these presentations and approximately 230-250 people attended.

## 5.4. Volunteer Nights

Jolene and Chris were present for 2 Northern Spotted Owl surveys, on 11 July and 4 August 2005. Additionally, following the presentation in Seton-Portage we brought a volunteer with us for a Western Screech-owl survey in Seton. We attempted to organize a volunteer night for the Lillooet Naturalist but were forced to cancel due to inclement weather.

## 6. Discussion

### 6.1. Northern Spotted Owl

The 2005 Northern Spotted Owl surveys, coupled with last year's efforts (Young 2004) represent the completion of occupancy surveys in the Bridge River and Seton watersheds. These efforts meet the protocol demands for two subsequent seasons of survey (Hobbs et al. 2004). Historically, there were 7 Northern Spotted Owl active sites within the Coquitlam, Bridge River and Seton Lake watersheds. The fact that no Northern Spotted Owls were detected within the study area this year further emphasizes the precipitous population declines the species is experiencing province-wide.

The Northern Spotted Owl detected on Anderson Lake in 2004 was not detected again in 2005. Despite the lack of current active sites the habitat in the Anderson Lake watershed has been previously demonstrated as important to Northern Spotted Owls as a movement corridor (Hobbs 2005). Based on suitability, it is likely that this area could also provide sufficient habitat for several breeding pairs in the event of species recovery. The Lillooet Land Resources Management Plan (LLRMP 2004) has identified maintenance of connectivity and dispersal routes between long term activity centers as a management objective. It is known that Anderson and Seton Lakes have been used as movement corridors in the past by dispersing juvenile owls (Hobbs 2005). This area may prove to be important for future Northern Spotted Owl management decisions as it contains areas of highly suitable Northern Spotted Owl habitat. Additionally, sites unoccupied for several years may become re-occupied (Forsman et al. 2002). Habitat loss and fragmentation are the greatest threats to the Northern Spotted Owl (Forsman et al 1984), rivaled only recently by the arrival of the Barred owl (Godwin 2003), and concerns of inbreeding depression (Courtney et al. 2004). The surveyed watersheds in the Bridge area are also at threat of being impacted by future forestry, hydro and urban developments.

### 6.2. Western Screech-owl

Six active Western Screech-owl sites were detected; 3 in the Coquitlam watershed and 3 on Anderson and Seton Lakes. The owls detected in Coquitlam were likely the coastal *M. k. kennicottii* sub-species. Currently, the majority of breeding records for the *M. k. macfarlanei* are from the Okanagan Valley (Cannings 2004, Beucher and Dulisse 2004). Based on the associated habitat it is likely that the 3 active Western Screech-Owl sites detected on Anderson and Seton Lakes are the red listed *M. k. macfarlanei* sub-species (Hobbs, personal correspondence). At 2 sites only a single adult territorial call was heard. At the third site near Shalath we had a visual on 2 juvenile owls and heard the territorial call of an adult owl. If our detections can be proven to belong to the *M. k. macfarlanei* sub-species these occurrences would represent an extension of the sub-species range and a successful breeding pair outside of the Okanagan Valley.

Threats to the Western Screech-owl also include habitat fragmentation and alteration. The Western Screech-owl is particularly vulnerable as it resides in low elevation riparian zones often slated for development. Home range size for this species has not been well documented (Cannings and Angell 2001) but is suspected to vary between 3 and 60 ha (Lewis 2005). This species' habitat was largely affected by initial flooding in the study area and continues to be influenced by spill over events that hinder establishment of riparian habitat (Figure 1).

### **6.3. Flammulated Owl**

The presence of 18 Flammulated Owl active sites indicates an extension of the known species range within British Columbia. According to Cannings and van Wouderenberg (2004), there is little information regarding Flammulated Owl population sizes and trends for the province. Hence, our inventory efforts offered valuable information regarding this owl's distribution in British Columbia. Threats to the Flammulated Owl also include habitat loss primarily due to timber harvest and the removal of nesting cavities. Breeding home range-size estimate from British Columbia are poorly documented. Home ranges sizes from 2 nests were estimated at 2.2 and 3.7 ha (Cannings and van Wouderenberg 2004). Home range estimates from Colorado and Oregon are approximately 16 ha (McCallum 1994). As an insectivore, pesticide use has also become a secondary threat (McCallum 1994).

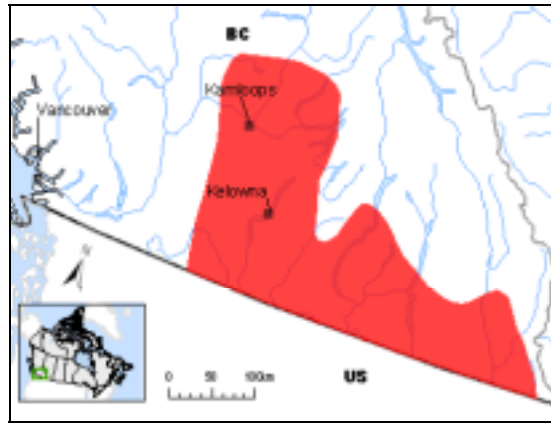
### **6.4. Limiting Factors**

The most significant threat all three owls face is habitat removal and alteration. Secondly, predation and competitive exclusion by Barred and Great Horned Owls are of increasing. Both the Barred and Great Horned Owls are adaptable and aggressive and do well in fragmented habitat (Godwin 2003). Some authors speculate that their distribution numbers are increasing (Houston et al. 1998). Indeed, comparing the same transects surveyed in 2004 (Young 2004) to those surveyed in 2005 within the Bridge and Seton watershed, Great Horned Owl observations increased from 6 to 15. Barred Owl observations remained stable (24 vs 25 in 2004 and 2005, respectively).

In addition to hybridization with Northern Spotted Owls (Kelly and Forsman 2004), the Barred Owl is known to out-compete the Northern Spotted Owl for resources (Courtney et al. 2004). The Northern Spotted, Western Screech and Flammulated Owls are at risk of predation by both the Barred and Great Horned Owls. Anecdotal evidence suggests the Barred owl is responsible for population declines of the coastal Western Screech-owl populations (COSEWIC 2002).

Species inventories are an important tool in helping formulate management guidelines, as well as a stepping-stone for conservation initiatives especially when dealing with species at risk. This inventory project has provided further knowledge regarding the distribution of these at-risk owls in British Columbia and more importantly within the BC Hydro footprint area. This information will provide guidance to developing provincial and St'át'imc land use plans (LLRMP 2004, SLRA 2004).

Figure 4. Distribution of the Western Screech-owl *M. k. macfarlanei* sub-species in Canada (COSEWIC 2002).



## 7. Recommendations

The inventory conducted by BCRP in 2004 (Young 2004), this year's study and confirmation from the Ministry of Environment (Hobbs 2005) indicate use of the Bridge and Seton watersheds for the 3 threatened and endangered owl species, the Northern Spotted, Western Screech and Flammulated owls. These owls are separated by niche, with 1 item in common: the requirement for old growth habitat.

Given the relative paucity of Northern Spotted Owls in the province, and the fragmentation of habitat in the province, the IDF BEC zone on Anderson Lake should be considered as a movement corridor in future management plans for species recovery. The Coquitlam watershed should be surveyed again in 2006 to meet inventory protocols (Hobbs et al. 2004).

Low elevation, riparian habitat has suffered the greatest disruption due to hydroelectric operations, affecting distribution of the Western Screech-owl. The interior sub-species population size is suspected to be between 50-200 individuals (COSEWIC 2002). Conservation of known active sites is recommended with a minimum of 60 ha, protected for each territory. Habitat restoration and the building and implementation of nest boxes could facilitate breeding pairs known to be in the area. Further survey and monitoring of this unknown population in addition to confirmation of sub-species is recommended.

Flammulated Owl surveys were restricted to the North side of Carpenter Lake. Further inventory could be conducted on Anderson and Seton Lakes for a thorough examination of the distribution of this species within the watersheds. Additionally, protection of IDF old-growth forests would further aid this species. The Flammulated Owl will also take to artificial cavities such as nest boxes. Placement of nest boxes in active Flammulated Owl territories may further facilitate breeding in areas where cavities may be limiting. Conservation of known active sites is recommended with a minimum of 16 ha protected for each territory.

Habitat use and home ranges of both the Flammulated and Western Screech-Owls are poorly understood, particularly in this segment of their distribution (previously unknown). We recommend a thorough habitat assessment conducted together with intensive survey.

## 8. Acknowledgements

The research activities, public outreach and report were executed with financial support from Bridge Coastal Fish and Wildlife Restoration Program. Thank you to the British Columbia Conservation Foundation and in particular Deb McNicol who had the arduous task of handling all administration tasks as well as providing us with a safety check-in service. We wish to thank the St'at'imc First Nations for allowing us access to their lands, welcoming us into their communities, and providing letters of support for the project. Thank you to the N'Quaqua First Nations and in particular Chris Thevarge, Internship Supervisor, and intern Jolene Patrick. Jolene worked efficiently with very little direction and produced a superior product. The local

knowledge and friendship we gained through the internship was a highlight for us. Thank you to Cliff Casper for the night trips in his boat and accommodating our schedule.

The Ministry of Environment provided GIS support, safety equipment, topographical maps and financial support for the survey of Seton Lake by boat. We wish to thank Ian Blackburn of the Ministry of Environment for helping lay out transects within the Coquitlam watershed, lending us a VHF and providing valuable insight and advice. Thank you to Jared Hobbs, Ministry of Environment, for field and logistical support in addition to the use of photos for presentations and comments and reviews on manuscripts. Remote survey of transect would not have been possible without the hard work of technicians on this project; Joel, Kali, Erica, Janine, Katie, Lindsay, and Erin.

Thank you to Tom Abraham and Aurelia Adventures for technical support and donation of Audio Visual Equipment for the public outreach component of the project. Thank you also to Rachel Shepard, Squamish Environmental Conservation Society, Bob Brett and Kristina Swerhun of Whistler Naturalists, Linda Brown from the Pemberton Community Center and Vivian Birch-Jones of Lillooet Naturalists for organizing and helping execute public outreach. Finally, we wish to thank Greater Vancouver Regional District and security team for safe access to the watersheds and accommodating our nocturnal schedule.

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Appendix I - Financial Statement

	<b>BUDGET</b>		<b>ACTUAL</b>	
	<b>BCRP</b>	<b>Other</b>	<b>BCRP</b>	<b>Other</b>
<b>INCOME</b>				
<i>Total Income by Source</i>	\$74,400.00	\$12,348.00	\$71,137.73	\$12,476.21
<b>Grand Total Income (BCRP + Other)</b>	\$86,748.00		\$83,613.94	
<b>EXPENSES</b>				
	Note: Expenses must be entered as negative numbers (e.g. - 1000, etc.) in order for the formulas to calculate correctly			
<i>Project Personnel</i>				
Biologist (contractor)	(\$24,600.00)		(\$24,600.00)	
Biologist (contractor)	(\$22,200.00)		(\$21,825.00)	
Technicians (employee)	(\$2,700.00)		(\$2,700.00)	
Outreach Coordinator (intern-contract)	(\$1,250.00)		(\$1,250.00)	
Biologist (MWLAP)		(\$4,400.00)		(\$4,400.00)
MWLAP GIS support		(\$3,600.00)		(\$3,600.00)
Volunteer		(\$160.00)		(\$160.00)
<i>Materials &amp; Equipment</i>				
Vehicle and Fuel	(\$5,940.00)		(\$5,936.33)	
Helicopter and Fuel	(\$11,824.00)		(\$8,992.22)	
Field Materials and Supplies	(\$300.00)	(\$600.00)	(\$430.05)	(\$600.00)
Safety Equipment		(\$100.00)		(\$100.00)
Survey Maps		(\$150.00)		(\$150.00)
Boat Rental				(\$200.00)
<i>Administration</i>				
BCCF Administration	(\$5,586.00)	(\$3,213.00)	(\$5,404.13)	(\$3,141.21)
First Nations Band Office Admin		(\$125.00)		(\$125.00)
<i>Total Expenses</i>	(\$74,400.00)	(\$12,348.00)	(\$71,137.73)	(\$12,476.21)
<b>Grand Total Expenses (BCRP + Other)</b>	(\$86,748.00)		(\$83,613.94)	

<b>BALANCE</b> <b>(Grand Total Income -</b> <b>Grand Total Expenses)</b>	\$0.00		\$0.00	
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Appendix II  
Performance Measures-Actual Outcomes

**Project # 05.W.Br.04**

Performance Measures

Using the performance measures applicable to your project, please indicate the amount of habitat actually restored/enhanced for each of the specified areas (e.g. riparian, tributary, mainstream).

Performance Measures – Target Outcomes												
Project Type	Primary habitat benefit targeted of project (sq.m.)	Primary Target Species	Estuarine	In-stream Habitat – Mainstream	In-stream Habitat – Tributary	Riparian	Reservoir Shoreline Complexes	Riverine	Lowland Deciduous	Lowland Coniferous	Upland	Wetland
Impact Mitigation												
Fish passage technologies	Area of habitat made available to target species											
Drawdown zone revegetation/stabilization	Area turned into productive habitat											
Wildlife migration improvement	Area of habitat made available to target species											
Prevention of drowning of nests, nestlings	Area of wetland habitat created outside expected flood level (1:10 year)											
Habitat Conservation												
Habitat conserved – general	Functional habitat conserved/replaced through acquisition and management	Western Screech/ Flammulated/ Spotted Owl			*		*		*	*	*	
	Functional habitat conserved by other measures (e.g. riprapping)											
Designated rare/special habitat (subset)	Rare/special habitat protected	Western Screech/ Flammulated/ Spotted Owl			*		*		*	*	*	
Maintain or Restore Habitat forming process												
Artificial gravel recruitment	Area of stream habitat improved by gravel placement											
Artificial wood debris recruitment	Area of stream habitat improved by LWD placement											
Small-scale complexing in existing habitats	Area increase in functional habitat through complexing											
Prescribed burns or other upland habitat enhancement for wildlife	Functional area of habitat improved											
Habitat Development												
New habitat created	Functional area created											

\* Due to the socio-economic impacts associated with targeted species, consultation between various government and non-government agencies is required prior to management decisions that lead to habitat conservation. Performance measures will not be achieved in the short term. The recommendation is to protect 3,200 ha to accommodate the Spotted Owl territory identified in 2004 and 60 ha and 16 ha for Western Screech and Flammulated Owl breeding territories identified in 2005, respectively (See Recommendations).

## Owl Surveys being done on three Owl species in Our Area

By Jolene Patrick  
Public Outreach Intern

D'Arcy BC, July, 19, 2005

The future of British Columbian owls looks bleak if actions are not taken.

BC hydro Bridge Coastal Fish and Wildlife Restoration Program (BCRP), recognizes the negative affects hydroelectric operations such as damming and flooding have on the critical habitats of our owls. An ongoing study, funded by BCRP and contributions from the Ministry of Environment, British Columbia Conservation Fund (BCCF) and the N'Quatqua First Nation, is part of an effort by the BCRP, to address footprint impacts, on wildlife, as a result of BC hydroelectric developments. The results of the study will be able to inform future beneficial hydroelectric management in wildlife habitat.

Doris Hausleitner and Vicky Young are the project managers of a team that is surveying Northern Spotted *Strix occidentalis caurina*, Western Screech *Megascops kennicottii* and Flammulated owls *Otus flammeolus* in BC. Areas being inventoried include Seton, Anderson, Carpenter Lake and Bridge River watersheds.

In Canada, Northern Spotted and a sub-species of Western Screech-owl (*kennicottii*) are designated as endangered species, while Flammulated owls are considered a species of special concern. It is known that there are fewer than 20 Northern spotted-owls left in our Province and this season only one pair bred successfully. All three species rely on old growth riparian and old growth forested areas.

Through inventory, population monitoring and habitat assessment the goal of the study is to locate and examine the owls in their active and historical sites. By utilising call-playback methods, within the surveying sites, occupancy and activities of the owls are determined. The project began on April 15 2005 and is a continuous effort from the researchers as well as community partnerships. Local First Nations collaboration and input has allowed for greater awareness and support for the study. Public awareness and education are key factors in ongoing conservation efforts within communities.

Hausleitner is with Seepanee Ecological Consulting. She has a MSc. in Fish and Wildlife Resources from the University of Idaho, and has extensive experience working with owls. Young is the proprietor of Eco Vision Consulting. In 2003, Young played a vital role in the success of the Spotted Owl inventory and nest location.

Hausleitner will be presenting, "The Ecology of Threatened and Endangered Local Owls" to the public at several locations in September. Presentations are scheduled in:

Squamish- September 26, hosted by Squamish Environmental Conservation Society  
Whistler- September 27, hosted by the Whistler Naturalists  
Lillooet- September 30 -- 2-4 pm, hosted by the Lillooet Naturalists

Check local listings for locations and times.

The talks will summarize her research on the endangered owls as well as habitat management and conservation discussions pertaining to hydroelectric developments. It is through studies and partnerships such as this one, that future survival for British Columbian owls is possible. ###

For more information on the presentation or inventory efforts contact:

Doris by e-mail: [dorishaus@shaw.ca](mailto:dorishaus@shaw.ca)





# Ecology of Threatened and Endangered local Owls

**Presentation by Jolene Patrick  
Biologists Doris Hausleitner and Vicky Young will  
answer questions.**

**Learn how to identify local owl species, the threats  
they face and what is being done to help them**

**Where: Community Hall, D'Arcy**

**When: Tuesday July 20<sup>th</sup>, 2005**

For Further Information contact:  
Jolene Patrick- Public Outreach Intern  
D'Arcy B.C.  
Phone: #####

### Appendix III

#### Article in the Bridge River Economic Development Society August Newsletter

The last rays of light scatter and shimmer across Carpenter Lake as the hermit thrush belts out a dizzying, escalating song. The notes twirl upward and linger on the air. “Pink sky at night...” Vicky sings as she untangles a mess of gear; the GPS, the “hooter”, and the “ripper”. For us, sunset marks the start of each workday.

We joke about being professional hooters, but the term actually best describes our work. Our contract, secured through BC Hydro’s Bridge-Coastal Fish and Wildlife Restoration program is to inventory for three threatened or endangered species of owls; the flammulated, western-screech and spotted owl. We are searching in the BC Hydro footprint; land affected by the implementation of the La Joie, Tezraghi, and Seton Lake dams. Most of our work consists of calling at stations along roadside transects, but we also access remote areas on foot, by boat and by helicopter.

Our research allows us an intimate relationship with the mountains, river valleys and wildlife, something we hold in common with the people in the valley. We have successfully found what we were looking for in our inventory, and have received an additional benefit. We have been allowed a glimpse into the fiery spirit of the people residing here. Thank you to everyone who has welcomed us so warmly and passed on invaluable local knowledge.

Doris Hausleitner (30) is a wildlife biologist for Seepanee Ecological Consulting and when not hooting, resides for most of the year in Nelson, BC.

Vicky Young (29) is an ecologist for Eco-Vision Consulting and lives in Victoria, BC with her boyfriend and two pet ferrets.

Appendix III  
Links to articles that appeared in local newspapers

Link to an article appearing in the Whistler Question August 4, 2005

<http://www.squamishchief.com/madison/WQuestion.nsf/c33bf978454e566d8825682e006f95ef/d30fa67caecd48ed88257053006e4514?OpenDocument&Highlight=0,hausleitner>

Link to article appearing in the Pique, Whistler BC, September 22, 2005

<http://www.piquenewsmagazine.com/pique/index.php?content=naturespeak+1238>

Link to article appearing in the Bridge River Lillooet News, October 3, 2005

<http://www.lillooetnews.net/madison/WQuestion.nsf/LNnews/F63CCD94D252D01A8825709000708A06?OpenDocument>

### Appendix III

This slide acknowledged BCRP contributions and was in the opening sequence for presentations in D'arcy, Seton-Portage, Squamish, Whistler, Pemberton and Lillooet

## *Sponsors*

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**FISH & WILDLIFE**  
BRIDGE COASTAL RESTORATION PROGRAM

- BC hydro contributes to fish and wildlife projects annually
- **Partnership:**
  - BC Conservation Foundation 
  - Seepanee Ecological Consulting/ Eco-Vision Consulting
- **Contributions by:**
  - Ministry of Environment 
  - N'Quatqua First Nation 