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A SURVEY OF THE SPOTTED OWL  
IN THE SKAGIT RIVER REGION OF  
BRITISH COLUMBIA

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## Introduction

The southwest mainland of British Columbia is the only area in Canada where the spotted owl (Strix occidentalis) is known to occur (Bent 1938, Campbell and Campbell 1984). An initial field survey in 1985 revealed that the spotted owl was very uncommon in this region (Forsman and Dunbar, in prep.). Although the spotted owl may never have been particularly abundant in British Columbia, it is suspected that the low number of sightings in recent years may reflect a population decline precipitated by habitat loss.

Because more information is needed on the distribution and abundance of the spotted owl in British Columbia, we conducted an additional spotted owl survey in 1986. Unlike the 1985 survey, which was designed to sample areas scattered throughout the southwest mainland, the 1986 survey was restricted primarily to the Skagit River and its associated tributaries. The objective of the 1986 survey was to inventory as much of the potential owl habitat within the latter area as possible, thereby obtaining a rough estimate of the number of spotted owls within the area. Only three nights were spent searching for owls in areas other than the Skagit River area.

## Study Area

### Skagit River Area

From its source near Allison Pass in Manning Park, the Skagit River flows northwest approximately 20 km before turning south and meandering another 30 km to the International Border (Fig. 1). Major tributaries that flow into the Skagit include the Skaist, Sumallo, and Klesilkwa

Rivers and numerous creeks. The Skagit River area is characterized by steep, mountainous terrain. Higher peaks bordering the river typically range from 1900 to 2300 m tall. At elevations below 1200 m in the study area, the predominant vegetative cover is forests of Douglas-fir (Pseudotsuga menziesii), western hemlock (Tsuga heterophylla), and western redcedar (Thuja plicata). Areas above 1100 m are typically covered by forests of Pacific silver fir (Abies amabilis), western hemlock, and western redcedar, or by rocky alpine habitat. Although considerable areas of mature and old-growth forest remain within the Skagit River drainage, much of the area has been clear-cut within the last 80 years. Harvest has been concentrated in lower elevation areas in the more accessible drainage bottoms where the terrain is generally more moderate and where the most commercially valuable stands are located. As a result, much of the remaining old-growth and mature forest is concentrated in the steepest, least accessible subdrainages.

Vegetation on older cutover areas, which are concentrated in the broad valley bottom bordering the lower Skagit and lower Klesilkwa Rivers, varies depending on site moisture conditions. Low-lying riparian areas are mostly covered by young stands of black cottonwood (Populus trichocarpa), western hemlock, and western redcedar. Drier upland areas are dominated by young stands of Douglas-fir and western hemlock. Some drainages (e.g. Maselpalik Creek, Shawatum Creek, upper Sumallo River) have been almost entirely clear-cut in recent years and are presently covered by extensive areas of bare soil, brush, and young conifer seedlings.

### Other Areas

Other areas surveyed in 1986 included the Soo River drainage 22 km southwest of Pemberton, Foley Creek drainage 25 km east of Vedder Crossing, and Kakila Creek on the west side of Lillooet Lake. These areas were all characterized by mountainous terrain and vegetative cover consisting of a mosaic of recent clear-cuts and old-growth and mature stands of Douglas-fir, western hemlock, western redcedar, and Pacific silver fir.

### Methods

To survey spotted owls, we walked continuous transects along forest roads or trails at night, while alternately playing tape-recorded spotted owl calls and listening for responses (Forsman 1983). All surveys were conducted between 9 May and 6 June 1986 except that upper Nepopekum Creek was surveyed from 12-14 August. Surveys were conducted between 20 minutes after sunset and 30 minutes before sunrise, and were discontinued if precipitation exceeded a light rain or if it became too windy to hear effectively.

Distances at which an observer can hear and be heard by spotted owls vary depending on terrain and weather conditions. In this survey, we estimated that the effective detection distance for spotted owls ranged from 0.5 to 2.0 km on each side of the transect.

Transects were selected such that we could survey inventory as much of the study area as possible during the study period. In areas where there were no roads or trails, we sometimes hiked in during the day, set up camp on a vantage point overlooking a drainage, and then called from

the vicinity of our camp during the evening hours. One area (Nepopekum Creek) that was too rugged to transverse at night was surveyed from a series of campsites and also from a cross-country transect that was called during the day. Spotted owls will often respond vocally during the day if they hear the calls of another spotted owl (Forsman 1983). Some transects on roads and trails were called twice (on different nights) to reduce the chance that owls were overlooked. Because of a persistent snowpack and the absence of suitable habitat for spotted owls at higher elevations, all surveys were conducted in areas below 1250 m elevation.

To determine the total time spent calling owls, we summed the time intervals spent calling individual transects. Travel time to and from transects was not included in the total. When using the leapfrog method of surveying transects (Forsman 1983), we multiplied the transect time by 2 to determine the number of person-hours spent surveying the transect. For calculation of response rates, each response was treated as a single response, regardless of whether a single bird or a pair responded. If an individual or pair responded at a site on different nights, then each night was treated as a separate response. This made the data comparable with previous surveys in which transects were only surveyed one time (e.g., Forsman et al. 1977; Marcot and Gardetto, 1980; Postovit 1975).

### Results

In the Skagit River area, two observers spent 20 nights (40 person-nights) calling owls and surveyed 224.9 km of transect. A total of 159 man-hours were spent on the survey. Owls responding during the survey included 3 spotted owls, 27 barred owls, 18 saw-whet owls, a

was located (Appendix 1). The total number of responses from barred owls was 23, for an average response rate of 0.10/km. Barred owls that responded to our tape-recorded versions of spotted owl calls often responded in a very aggressive manner, flying from tree to tree overhead and calling loudly. It appeared that they were searching for the suspected intruder with the intent of driving it from the area.

Barred owls responded in a variety of forest types, ranging from stands of black cottonwood and western redcedar adjacent to the Klesilkwa and lower Skagit Rivers to old-growth stands of silver fir and western hemlock at relatively high elevations (Appendix 1). The density of barred owls appeared highest in and adjacent to the broad valley bottom bordering the lower Skagit and lower Klesilkwa Rivers, where pairs were spaced at 2-4 km intervals (Fig. 1). The mixed stands of cottonwoods, western redcedar and Douglas-fir that predominated on older cutovers in the latter areas were apparently a preferred habitat for barred owls. The nest area that was located was in an old-growth stand of Douglas-fir and western hemlock adjacent to a riparian stand of cottonwood, western redcedar, and western hemlock on an old cutover area bordering the Klesilkwa River.

#### Other Areas Surveyed

Three nights were spent surveying areas other than the Skagit River area. Total time spent calling owls in these areas was 18.5 hours and total transect length was 39.5 km. The only owls responding during these surveys were a male barred owl and a male saw-whet owl in the Soo River drainage (Appendix 1). If the data from these surveys are combined with

male great-horned owl, and a pair of pygmy owls. (Appendix I). The three spotted owls that responded included a male near the mouth of McNaught Creek, a male on Nepopekum Creek in Manning Park, and a male near the Sumallo Grove, also in Manning Park (Fig. 1). The male at McNaught Creek responded on 2 different surveys while the other males responded only once. The overall response rate for spotted owls was 0.018 responses/km, or approximately one response for every 56 km of transect that was surveyed.

Although we were not able to survey every drainage within the study area during the study period, we did survey most of the drainages that contained good spotted owl habitat, notable exceptions being St. Alice Creek and the upper reaches of McNaught Creek. We believe, therefore, that the number of pairs of spotted owls in the study area was not much greater than indicated by the survey.

The 3 sites where spotted owls responded were all characterized by old-growth forests of Douglas-fir, western hemlock, western redcedar, and silver fir (Appendix 1). The response near the Sumallo grove was located 5 km from a site on Snass Creek where a male responded during the 1985 survey (unpub. data, B.C. Ministry of Environment). During the 1986 survey, a barred owl, but no spotted owls, responded at the Snass Creek site (Fig. 1). The other two sites where spotted owls responded in 1986 both had a history of occupancy by spotted owls (Thacker and Thacker 1929, Mark 1984) but the exact location of the historical sightings was unknown.

Barred owls that responded in the Skagit River area included 8 pairs and 11 birds that responded singly. The nest area of one of the pairs



the data from the Skagit River area, the overall response rate for spotted owls during the 1986 survey was 0.015 responses/km, or approximately 1 response per 66 km of transect. An average of 44 hours was spent calling owls for every response that was elicited from spotted owls. By comparison, the overall response rate for barred owls was 0.087 responses/km, or approximately 1 response per 11 km of transect.

#### Summary and Discussion

The low response rate for spotted owls indicates that the spotted owl is extremely rare in the Skagit River area. By comparison, the barred owl is relatively common for a large bird of prey. Because the historical data are so limited, it is impossible to determine if the spotted owl was always rare in the Skagit River drainage or has become so as a result of logging and the invasion of the barred owl. If anything, however, the population has probably declined from historical levels as the barred owl has proliferated and areas of suitable habitat have shrunk. Surveys in other areas of British Columbia suggest that this is probably the case throughout the range of the spotted owl in the Province (Forsman and Dunbar, in prep.).

It appears that the only way to manage for spotted owls within the Skagit River drainage is to protect as much of the remaining old-growth and mature forest as possible, especially stands of Douglas-fir, western hemlock, and western redcedar. There is no guarantee that this will work, however, because barred owls may eventually displace spotted owls from these stands regardless of whether they are preserved or not. This is a particularly perplexing situation for a manager to be in, because no matter what is done, there is a good chance of failure.

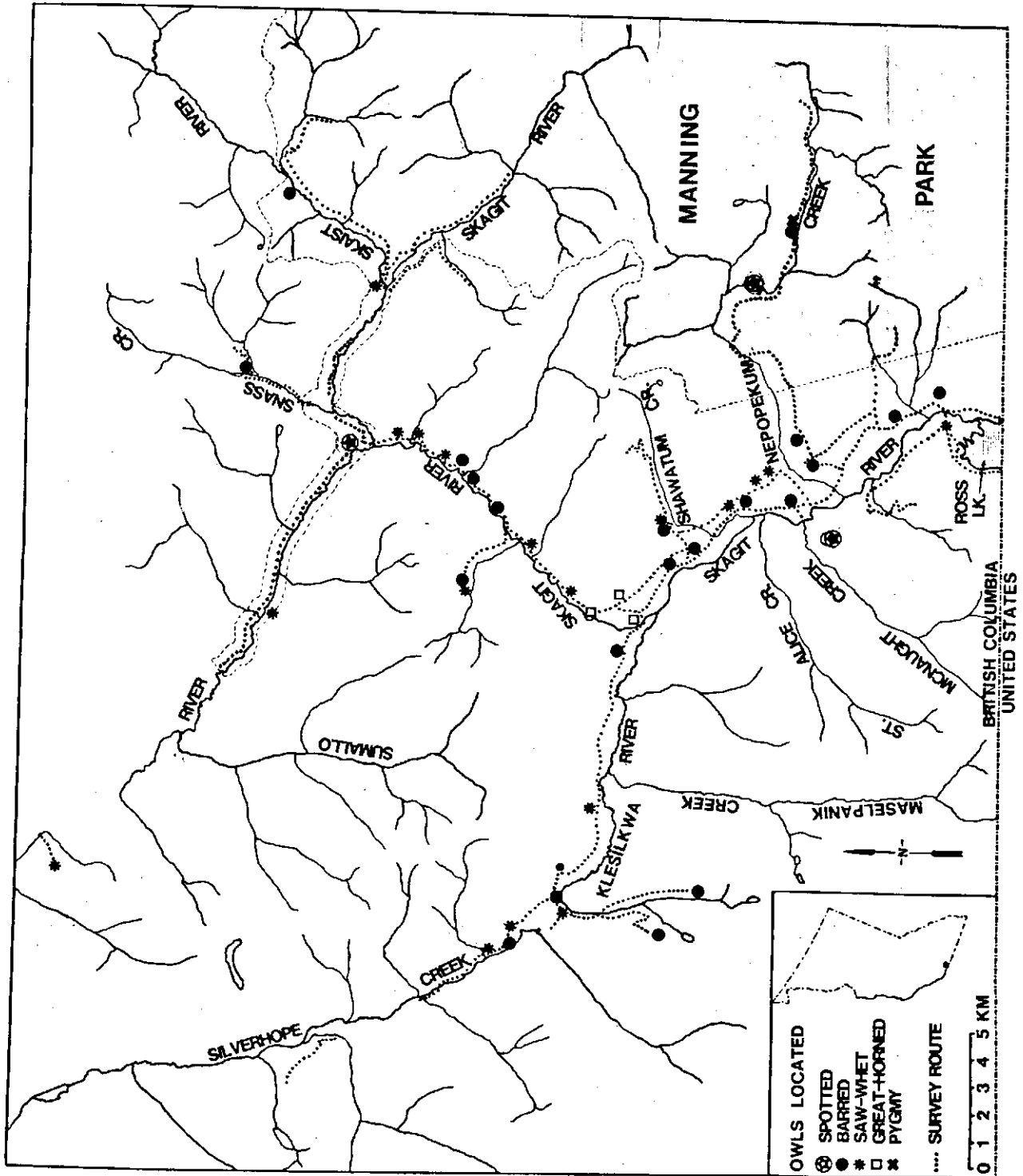
In conversations with others, we have several times been asked if we would recommend a barred owl eradication program within the areas occupied by spotted owls. From a practical and philosophical point, we are opposed to such a program. For one thing, barred owls have become so well established in British Columbia that they would continue to recolonize areas where they were being eradicated. Eradication would, therefore, end up being a never-ending and very expensive process. From a philosophical standpoint, we feel that the barred owl invasion of western Canada and the western United States should be viewed as a natural ecological phenomenon that is neither good nor bad. Although it could be argued that the invasion of the barred owl is a result of habitat alteration by man, there is no clear proof that this is the case. To launch into a barred owl control program without proof that the range expansion is a result of man's activities could be to interfere in a natural phenomenon that would have occurred regardless of man's influence. It would be wise, therefore, to avoid becoming judgmental about the invasion of the barred owl until the cause-effect relationships are better understood.

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Figure 1. Locations of owls and survey routes in the Skagit River study area, 1986.



Appendix 1. Response data for 1986 spotted owl survey, British Columbia.

Transect number	Date	Survey duration (hours)	Transect length (km)	Owls responding <sup>b/</sup>	Mercator coordinates	Elev. (m)	Coverage type	Standage
1	05/09	7:10	8.9	Barred owl male #1 Barred owl male #2 Great horned owl #1	637754477 638954485 633654437	610 670 550	CotFCH FHC FHCCot	1 2&1 2&1
2	05/10	5:47	9.7	Saw-whet owl #1	543126412	500	FGotCH	3
3	05/11	12:38	13.7	Saw-whet owl #2 Barred owl male #3 Spotted owl male #1	544166374 544006365 543546370	610 550 1000	PH FHCCot FHBC	1 2&1 1&2
4	05/12	3:30	4.0	None				
5	05/13	11:46	18.7	Barred owl male #4 Barred owl male #5 Spotted owl male #1 (R)	543176427 543306415 543536371	550 550 1000	FHCCot FHCCot FHBC	3&2 3&2 1&2
6	05/14	8:40	11.0	Barred owl male #6 Barred owl male #7 Barred owl pair #8 Saw-whet owl #3	544116222 544516236 544476245 544466228	1340 580 580 640	BHC CotFCH FCHCot FHC	1&2 3 1 1&2
7a	05/15	7:30	12.9	Barred owl male #3 (R) Great-horned owl #1 (R) Barred owl pair #9 Saw-whet owl #4	544126358 544306338 544286334 544386269	550 550 575 610	FHCCot FHCCot CotHCF FHC	2&1 2&1 3 2
7b	05/15	1:16	3.1	None				
8a	05/18	7:22	9.7	Spotted owl male #2	545286400	750	FHC	1
8b	05/18	0:56	2.4	None				
8c	05/18	3:50	6.1	None				
9	05/19	3:06	4.8	Barred owl #10	545676424	850	FHC	1
10a	05/20	2:20	4.9	None				
10b	05/20	4:00	6.1	Saw-whet owl #5	545586336	700	FHC	1

## Appendix 1. (continued).

Transect <sup>a</sup> number	Date	Survey duration (hours)	Transect length (km)	Owls responding <sup>b</sup>	Mercator coordinates	Elev. (m)	Cover <sup>c</sup> type	Stand <sup>d</sup> age
11a	05/21	1:47	3.2	None				
11b	05/21	5:10	7.3	Saw-whet owl #6 Saw-whet owl #7 Barred owl #11	543816391 543766395 543706412	600 625 700	FHC FHC FH	2&1 2&1 2&1
11c	05/21	2:59	4.8	None				
11d	05/21	1:30	2.9	None				
12a	05/22	3:20	9.7	None				
12b	05/22	3:40	8.1	None				
13a	05/23	3:20	4.9	Barred owl #11 Barred owl pair #12 Barred owl #3 (R)	543656410 543576402 544146374	700 575 550	FH FH FHCCot	2&3 2&1 2&1
14a	05/24	2:40	4.0	None				
14b	05/24	2:02	4.7	Barred owl pair #13 Saw-whet owl #8 Saw-whet owl #9	544656216 544736215 544656224	550 580 610	CotHCF FHC FHC	3 2 2
15a	05/25	4:34	8.9	Barred owl pair #14 Saw-whet owl #10	545556495 545236459	925 800	CotFHC FHC	2 2&1
15b	05/25	6:00	13.7	Saw-whet owl #11 Saw-whet owl #12 Saw-whet owl #13 Saw-whet owl #14 Saw-whet owl #15 Great-horned owl #1 (R)	545126405 545066405 544946398 544646365 544486349 544236340	625 750 675 675 625 550	FHCCot FHC FHC FHC FHC FHC FHCCot	3 1&2 1&2 1&2 1&2 2&1
16	05/29	6:15	3.2	Saw-whet owl #16	546356242	1340	BHCF	1
17a	05/30	3:05	6.4	Barred owl #15	543976238	1220	BH	1
17b	05/30	5:30	5.7	Barred owl pair #16 Saw-whet owl #17	543876386 543916383	610 580	FHC FHC	2&1 2&1
18	05/31	2:30	0.6	Barred owl pair #17 Saw-whet owl #18	544876349 544876349	1100 1100	BHCCY BHCCY	1 1

Appendix 1. (continued).

Transect <sup>a</sup> number	Date	Survey duration (hours)	Transect length (km)	Owls responding <sup>b</sup>	Mercator coordinates	Elev. (m)	Cover <sup>c</sup> type	Stand <sup>d</sup> age
19	06/01	1:10	1.0	None				
20a*	06/02	5:35	8.7	None				
20b*	06/02	3:00	6.1	None				
21a*	06/05	2:00	2.0	None				
21b*	06/05	1:30	1.0	None				
22*	06/06	6:30	21.8	Barred owl #18 Saw-whet owl #19	556504990 556405063	760 670	HCFB FHC	1 1&2
23	08/11	1:15	0.9	Barred owl #19	543686383	525	FHCCot	2
24	08/12-14	10:00	12.9	Barred owl pair #20 Pygmy owl pair #1 Spotted owl male #3	543696482 543696482 543846464	1125 1125 1000	BHCF BHCF FHC	1 1 1

Summary of appendix 1:

	Skagit area	Other areas	All areas combined
Total hours of survey	151:33	18:35	170:08
Total km of transect	225.8	39.6	265.4
Total no. of responses			
Spotted owl	4	0	4
Barred owl	22	1	23
Great-horned owl	3	0	3
Saw-whet owl	18	1	19
Pygmy owl	1	0	1

<sup>a</sup>/Transects in areas other than the Skagit River area are indicated by astrices.

<sup>b</sup>/Repeat responses at a site (resulting from multiple surveys) are indicated by an "R" in parentheses.

<sup>c</sup>/F = Douglas-fir, H = western hemlock, C = western redcedar, B = Pacific silver fir, Cot = black cottonwood, Cy = Alaskan yellow cedar.

<sup>d</sup>/1 = old-growth, 2 = 80-200-year-old mature stands, 3 = 30-80-year-old stands on cutover areas.



Appendix 2. Survey of spotted owls on the Skagit River area, 1986.  
Description of transects.

Transect code	Route description	Length (km)
1	Skagit River Trail beginning at Twentysix Mile Creek and continuing southwest to the 26 Mile Bridge on the Silver Skagit Forest Road. Forsman and Booth.	8.9
2	Galen Creek Trail, beginning at point approximately 9.7 km up trail and continuing back to the Silver Skagit Road. Estimated starting point was UTM 543206388. Forsman and Booth.	9.7
3	Shawatum Creek Road. From point where road enters mouth of creek, we walked about 2 km to second major switchback (UTM - 544226411). From that point, we then called back down the road to the Silver Skagit Road, then continued south on the Silver Skagit Road to Milepost 51. Forsman and Booth.	13.7
4	Skyline Trail. Began at UTM 543386437 and then called back down trail to Silver Skagit Road. Forsman and Booth.	4.0
5	Silver Skagit Road from MP 51 south to a point 2 km south of the international border. Also, one observer branched off and went across the Skagit River foot-bridge and south to the mouth of International Creek, then called back to the footbridge. Forsman and Booth.	18.7
6	Begin at end of spur road overlooking Clerf Lake and call back down the spur to the Silver Skagit Road, then continue south on the Silver Skagit Road 3.7 km. In the upper Klesilkwa, one observer also called the spur that stays on the south side of the drainage instead of going up Clerf Lake. Forsman and Booth.	11.0
7a	Begin on Silver Skagit Road at Shawatum Creek Jct. and call north on Silver Skagit Road to MP 37. Forsman and Booth.	12.9
7b	Begin on Silver Skagit Road at spur junction to Clerf Lake and continue north on Silver Skagit Road to MP 27. Forsman and Booth.	3.1
8a	Manning Highway. Begin 1 km east of West Gate and continue east on highway for 9.7 km. Forsman and Booth.	9.7
8b	Manning Highway. Begin on highway at first corner east of turnoff into gravel storage area at head of Snass Creek (Dewdney) Trail. Continue east on highway for 2.4 km. Forsman and Booth.	2.4

## Appendix 2. continued

Transect code	Route description	Length (km)
8c	Manning Highway. Begin on highway 0.3 km west of Cayuse Flat pullout and continue east 6.1 km to edge of Big Burn. Forsman and Booth.	6.1
9	Snass Creek. Begin 2.0 km up Whatcom Trail from Junction with Dewdney Trail. Call back out to the Manning Highway. Forsman and Booth.	4.8
10a	Silverdaisey Creek in Manning Park. Begin at 5 km marker on lower spur that goes up Silverdaisey Creek. Call back out to Manning Highway. Forsman and Booth.	4.9
10b	Begin at Sumallo Grove on Manning Highway and continue west to snow closure gate. Forsman and Booth.	6.1
11a	Centennial Trail from junction with Skagit River Trail south to Shawatum Creek Road. Booth.	3.2
11b	Centennial Trail from Shawatum Creek Road south to point where trail drops steeply into Nepopekum Creek, then west across country to Silver Skagit Road. Forsman.	7.3
11c	Silver Skagit Road from Skyline II trailhead south on road to Ross Lake. Booth.	4.8
11d	Silver Skagit Road from a point 0.8 km south to Nepopekum Creek south to Skyline II trailhead. Forsman.	2.9
12a	Galene Trail. Same route as 2. Forsman.	
12b	Skyline II Trail. Same route as 4a except went up 8.1 km (UTM = 543316445) before calling back out to Silver Skagit Road. Booth.	8.1
13a	Centennial Trail. Walked north on Centennial Trail almost as far as Nepopekum Creek, then uphill to a knob (UTM = 543666402). Waited until dark and then called back to the south along the trail to Skyline II Trail and then west on the Skyline to the Silver Skagit. Forsman and Booth.	4.9
13b	Shawatum Creek Road. Begin at switchback in spur road near ridge at top end of Star Group Creek (UTM = 544286404) and call back down spur to a point 1.3 km east of Silver Skagit Road. Forsman.	6.9

## Appendix 2. continued

Transect code	Route description	Length (km)
14a	Swanee Creek. Walked up logging spur that forks off of lower Yola Creek and climbs up towards Swanee Creek, then went cross-country to the north and around into Swanee Creek. Stopped when reached an exposed cliff overlooking the drainage (UTM = 545466163). Stayed there until dark, then called back down to Yola Creek Road. Forsman and Booth.	4.0
14b	Silver Skagit Road from MP 23 to MP 27.6. Forsman and Booth.	4.7
15a	Skaist River. Begin at Nicomen Lake Trail at point where trail crosses the first major tributary to Grainger Creek (UTM = 545416520). Call back down trail to Manning Highway. Forsman.	8.9
15b	Skagit River Trail from Sumallo Grove on Manning Highway to Silver Skagit Road. Booth.	13.7
16	Hope Slide Old-Growth. From a point about 2.2 km northwest of Hope Slide, walked southwest up into the steep subdrainage that faces the highway. Walked uphill to approximately UTM = 546316241, and then called back downhill to highway. Spent half the night trying to find our way back down through the cliffs and devils club. Forsman and Booth.	3.2
17a	Head of Klesilkwa River. Went to end of spur that goes up south fork of Klesilkwa River headwaters, and then continued on upriver through the timber paralleling the river for another 0.5 km. Went to UTM = 543976238. Waited until dark and then called back out to Silver Skagit Road. Forsman.	6.4
17b	Centennial Trail from Nepopekum Creek north to Shawatum Creek Road. Booth.	5.7
18	Marmotte Creek. Hiked approximately 3.3 km up Marmotte Creek, staying on the north side of the creek and 300-400 m above the creek. Set up camp at UTM = 544876349. Called in area around camp from 2030-2300 hrs. Forsman, Booth, and Wilson.	0.4
19	Silver Skagit Road. Begin on Silver Skagit Road 1.4 km north of Nepopekum Creek bridge and call to the south along the road for 0.8 km. Then back to starting point and called to end of dirt spur that runs west off Silver Skagit Road towards the mouth of McNaught Creek. Forsman, Booth, Dunbar, Wilson, et al.	1.0

## Appendix 2. continued

Transect code	Route description	Length (km)
20a	Foley Creek on Chilliwack River drainage. Begin at unnamed lake at upper end of Foley Creek Road (UTM = 544716075) and call back to Foley Lake, then leapfrog 1.0 km down the road from the lake. Also did a branch route off of this transect that went up through a series of switchbacks through a recent unit to some old-growth timber at the top of the unit. Did not have photos, but believe the latter branch ended at UTM = 544426078. Forsman and Booth.	8.7
20b	Chilliwack Lake. Begin 0.3 km south of Provincial Campground on east side of lake and call south on the road to Paleface Creek. Forsman and Booth.	6.1
21a	Kakila Creek on west side of Lillooet Lake. Drove up spur to a point overlooking the confluence of the two principal forks of the creek. Then walked approximately 2 km up the road that parallels the north fork of the creek. Called on the way up the road as well as while walking back down. Forsman, Booth, Dunbar, and Wilson.	2.0
21b	West side of Lillooet Lake. Called along the road that parallels the lakeshore from approximately UTM 555445352 to UTM 555345346. Forsman, Booth, Dunbar, and Wilson.	1.0
22	Soo River. From point where Soo River Road forks and crosses thr river, one team went 12.4 km up the road on the north side of the river and the other person was dropped off 9.4 km up the road on the south bank of the river. Both teams then called back down the river to the point where the two roads met. Forsman, Booth, and Wilson.	21.8
23	Same route as 19.	0.9
24	Nepopekum Creek. Hike into head of Nepopekum Creek from Gibson Pass and camp at UTM = 543706481. Called around camp in the evening. The next day, conducted a diurnal transect down the creek, staying far enough above creek so that I could hear well. At dusk, dropped downslope to the creek bottom and camped beside the creek at UTM 543296441. Next day climbed back upslope on south side of creek and continued west, staying about 300-500 m above creek and calling as I went along. Finally reached Skagit Valley and came out on Silver Skagit Road at UTM = 543476405. Forsman.	12.9