North Cascades National Park
Ross Lake and Lake Chelan National Recreation Areas
Sedro Woolley, Washington

BALD EAGLE DENSITY AND DISTRIBUTION ON THE SKAGIT RIVER BETWEEN MARBLEMOUNT AND NEWHALEM, WINTER 1982-83.

Misc. Research Paper NCT-19

Prepared by:

Jonathan Björklund
Biological Technician

May 25, 1983

Introduction

Bald eagles winter in large numbers in the Skagit River drainage, exploiting the usually abundant salmon carcasses. Eagle numbers and distribution have been well documented in the area of greatest concentration, between the Sauk River mouth at River Mile (RM) 67.0 and Marblemount (RM-78.0). This section, which includes the Skagit River Bald Eagle Natural Area (SRBENA, managed jointly by the Nature Conservancy and Washington Game Department), has received extensive censusing almost annually since 1973. Conversely, the river section from Marblemount to Newhalem (R-93.0), part of which lies in the North Cascades National Park Service Complex, has received less study. National Park Service personnel have conducted an annual census since 1972, but only on a single day each year, in cooperation with a nationwide mid-winter bald eagle survey. Until recently the only extensive study of this section occurred in 1973-74 and 1974-75 as part of a graduate research project.

The most thorough studies of the river segment between Marblemount and Newhalem were carried out in 1979-80 and 1980-81 as part of contract investigations for Seattle City Light (BioSystems Analysis Inc. 1980, 1981) in relation to a proposed hydroelectric dam at Copper Creek (RM-84.0). These studies provided valuable baseline data. They showed that a significant number of bald eagles use this river segment, and that it provides important alternate feeding sites, particularly in years when chum salmon carcass availability is low in the SRBENA. The alternate food consists primarily of coho salmon which spawn at County-line Ponds and some tributary streams (Diobsud, Bacon, and Goodell creeks).

Bald eagles, which are classified as Threatened in Washington state, traverse a wide range of regions and habitats during movements between breeding and wintering grounds. In many locations man-caused habitat loss and deterioration have impacted bald eagle populations. Additionally, intense pressure on salmon populations from commercial, tribal, and sport fisheries, combined with impacts on spawning habitat and other prey species, pose serious threats to the well being of bald eagles.

The primary requirement of managing bald eagles is to maintain or enhance the density; distribution, and viability of populations and habitat that currently exist. Annual long-term censusing of eagles on the Skagit River permits detection of significant changes in density and distribution when compared with previous winters.

To fulfill this requirement, the park complex initiated an annual census of the 15-mile river segment between Marblemount and Newhalem during the 1982-83 winter. This supplements the annual censusing carried out in the SRBENA. This report summarizes the results of the census and compares them with previous years.

Dan Allen and Dave Drummond provided valuable assistance during this study for which I am grateful.

Methods

The study area encompassed the Skagit River from Marblemount to Newhalem and 4 off-river sites (Diobsud, Bacon, and Goodell creeks; and 2 Aggregate Ponds). Censusing methods were adapted from BioSystems Analysis Inc. (1980). Censuses were taken on 1 day per week (Thursday or Friday) between 18 November 1982 and 31 March 1983, totalling 20 days. Two people with binoculars began the route (see Appendix 1) in the morning. They drove slowly along State Highway 20, intermittently stopping and walking to viewpoints. The route took 1.5 - 2.5 hours.

The principle data included the location, side of river, and age of each eagle. Behavior, time, weather, perch characteristics and presence of coho and chum salmon also were noted. A sample data sheet is shown in Appendix 2.

Results

Figure 1 shows the chronology of eagle occurrence during the 1982 - 83 winter. Numbers of birds seen on the censuses varied considerably, ranging from 0 on 9 December 1982 to 26 on 18 February 1983. The peak population occurred much later than the mid-January peak usually found in the SRBENA. The distribution approximates a normal curve, showing few eagles present in November, and late March.

Table 1 shows the number of eagles and 2 age classes (adults and subadults) seen in each 0.5-mile section of the main river, and in 4 off-river locations. BioSystems Analysis Inc. (1980) determined that the visibility to observers of the 0.5-mile segments varied due to heterogeneity of vegetation along the census route and proximity to the river. Consequently I calculated the projected mean number of eagles expected to be present based on their visibility coefficients for each 0.5-mile segment. Additionally, BioSystems Analysis Inc. (1980) found that perched subadults were less visible than adults, and that counts underestimated the actual numbers by about 10%. Using their methods I added 10% to the projected mean number of eagles to get the subadult correction shown in Table 1.

Figure 1. Chronology of bald eagle occurrence along the Skagit River between Marblemount and Newhalem during the 1982-83 winter.

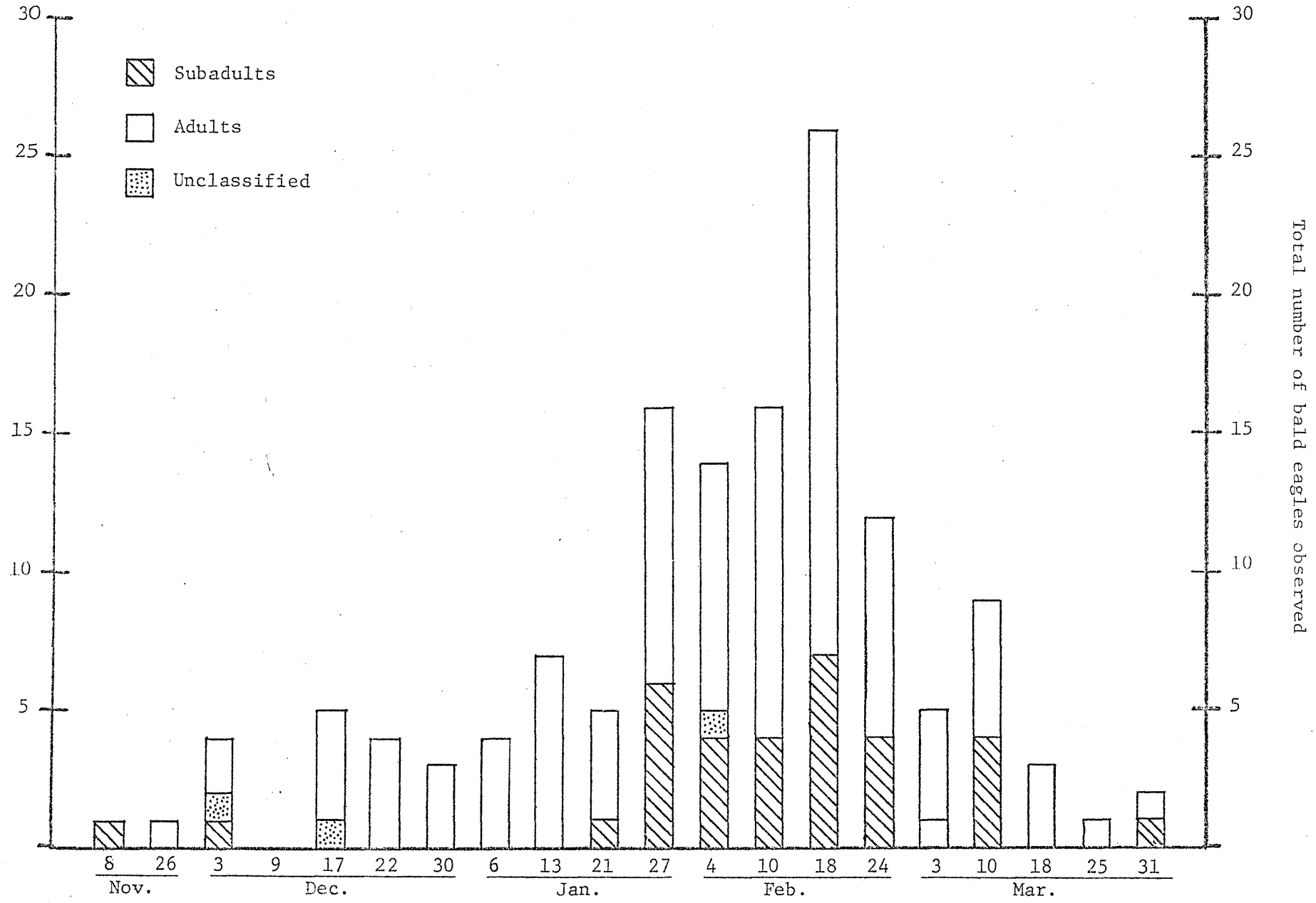

Table 1. Numbers and distribution of bald eagles along the Skagit River between Marblemount and Newhalem observed during 20 weekly censuses from 11/18/82 to 3/31/83. The visibility to the observers of each 0.5 mile segment of river were used to compute projected average numbers of eagles per day in each segment. Because perched subadults are evidently less visible than perched adults, about 10% more eagles would otherwise be counted in a given segment. Census methods, 0.5 mile visibility coefficients, and subadult visibility correction factor were adapted from Biosystems Analysis Inc. (1980).

0.5 mile river segment	Location	Adults	Sub-adults	Unclassified	Total Eagles	Mean Eagles Per Day (N=20)	Census Visibility Coefficient	Projected Mean Eagles Per Day	Projected with Subadult Correction
78.5		6	2	2	10	0.50	1.00	0.50	0.55
79.0		4	1	0	5	0.25	1.00	0.25	0.28
79.5		3	0	0	3	0.15	1.00	0.15	0.17
80.0		0	0	0	0	0.00	0.37	-	-
80.5	Diobsud Crk. Mouth	0	0	0	0	0.00	0.75	-	-
81.0		2	0	0	2	0.10	0.50	0.20	0.22
81.5		7	4	0	11	0.55	1.00	0.55	0.65
82.0		5	0	0	5	0.25	0.62	0.40	0.44
82.5	Bacon Crk. Mouth	7	2	0	9	0.45	0.87	0.52	0.57
83.0		3	0	0	3	0.15	0.35	0.43	0.47
83.5		1	1	0	2	0.10	0.37	0.27	0.30
84.0	Copper Crk. Mouth	4	2	1	7	0.30	0.67	0.44	0.48
84.5		3	1	0	4	0.20	1.00	0.20	0.22
85.0		2	0	0	2	0.10	0.52	0.19	0.21
85.5		3	0	0	3	0.15	0.47	0.32	0.35
86.0	Missing Bridge Gorge	0	0	0	0	0.00	1.00	-	-
86.5		0	0	0	0	0.00	1.00	-	-
87.0		4	0	0	4	0.20	0.97	0.21	0.23
87.5		2	0	0	2	0.10	0.15	0.67	0.74
88.0		1	1	0	2	0.10	1.00	0.10	0.11
88.5		13	6	0	19	0.95	0.92	1.03	1.14
89.0	County Line Ponds	12	8	0	20	1.00	0.75	1.33	1.47
89.5		3	1	0	4	0.20	0.25	0.80	0.88
90.0	Thornton Crk. Mouth	0	0	0	0	0.00	0.30	-	-
90.5		2	0	0	2	0.10	0.62	0.16	0.18
91.0		0	3	0	3	0.15	0.27	0.56	0.62
91.5		1	0	0	1	0.05	0.37	0.14	0.15
92.0		0	0	0	0	0.00	0.35	-	-
92.5		3	2	0	5	0.25	0.77	0.32	0.35
	Sub-Total	91	34	3	128	6.35	-	9.74	10.78
	Diobsud Crk.	4	0	0	4	0.20			
	Bacon Crk.	2	1	0	3	0.15			
	Aggregate ponds	1	0	0	1	0.05			
	Goodell Crk.	3	0	0	3	0.15			
	Total	101	35	3	139	6.90	-	-	-

The values in Table 1 are not directly comparable to the 2 winters of study by BioSystems Analysis Inc. because the 1982-83 study covered a greater time period. Table 2 shows eagle numbers and distribution summarized by 3-mile sections for equivalent times, and are comparable.

In all 3 winters the greatest density occurred in the river section 87.0 - 90.0, which includes County-line Ponds. In all winters eagles distributed themselves more evenly through the other 3-mile sections.

For all 3 winters, eagle numbers during the second 2-month period were significantly greater than during the first 2-month period (Wilcoxon's signed rank test: $P < 0.001$). Among the 3 winters, the fewest eagles occurred during the first 2-month period of 1982-83. However, in the second 2-month period numbers were similar to 1980-81. Neither 1980-81 nor 1982-83 showed average numbers of eagles as great as in 1979-80.

In previous winters, eagles more frequently perched on the southeast side of the Skagit River. Similarly, during the 1982-83 winter approximately 73% perched on that side.

Discussion

The difference in distribution and numbers of eagles among the 3 winters of censusing can be attributed to the availability of salmon carcasses. In normal years, chum carcasses are abundant in the SRBENA until about the end of January, by which time they have decomposed, been consumed, washed away, or become covered by sand and gravel. Coho salmon normally are much less abundant, but actively spawn longer, in County-line Ponds and tributaries, sometimes into mid-March. Eagles apparently concentrate in the SRBENA as long as chum carcasses are available, and then disperse upstream between Marblemount and Newhalem or leave the area entirely. This is supported by the fact that the peak in eagle numbers occurred much later in the study area (18 November 1982) than in the SRBENA (mid-January), and that during all 3 winters eagle numbers were significantly higher during the second 2-month period than the first 2-month period.

The low eagle numbers present in the study area during the first 2-month period of the 1982-83 winter were probably attributable to the high availability of chum salmon in the SRBENA at that time, minimizing the need for early dispersal. In contrast, both winters of the BioSystems Analysis Inc. studies had catastrophic floods and lower escapement, making chum salmon carcasses scarce. The comparatively high numbers of eagles in the study area during the first 2-month period of these winters probably was due to earlier

Table 2. Comparison of numbers and distribution of bald eagles along the Skagit River between Marblemount and Newhalem during two previous winters (1979-80, 1980-81; BioSystems Analysis Inc. 1981) and the past winter (1982-83). Values show the average number of eagles per day per three-mile segment of river for two-month periods. Off-river locations (Diobsud Creek, Bacon Creek, Aggregate Ponds, and Goodell Creek) are not included.

	River mile segments					
Dates	78.0-81.0	81.0-84.0	84.0-87.0	87.0-90.0	90.0 93.0	Total average/day
1979-80						
11/24 - 1/18	1.9	0.9	1.1	3.8	1.1	8.8
1/18 - 3/14	3.3	1.8	1.5	10.4	1.9	18.9
1980-81						
11/24 - 1/18	0.6	1.1	0.8	1.7	0.8	5.0
1/18 - 3/14	2.4	1.0	2.1	3.9	2.0	11.4
1982-83						
11/24 - 1/18	1.3	0.4	0.4	1.1	0.3	3.5
1/18 - 3/4	2.1	2.1	1.8	4.5	1.0	11.5

dispersal from the SRBENA.

The differences in eagle numbers in the second 2-month period of the 3 winters apparently was influenced by the number and duration of spawning coho. During the 1979-80 winter coho salmon spawned until mid-March, longest of the 3 winters. That winter also experienced the greatest number of eagles in the study area. Conversely, the 1980-81 winter had minimal coho salmon spawning, with few observed past the end of December. That winter had the fewest number of eagles during the second 2-month period. The 1982-83 winter was intermediate in respect to the duration of coho spawning and in the number of eagles present during the second 2-month period.

The greater number (73%) of eagles observed on the southeast side of the Skagit River in comparison to those observed on the northwest side may be due to several factors. State Highway 20, the majority of buildings, and greater human activity occur on the northwest side. Additionally removal and disturbance to vegetation has increased the amount of second-growth on the northwest side, apparently reducing the availability of suitable perches.

This study provided an important initial step in involving the National Park Service with management of the Skagit River drainage bald eagles. Future censusing should ensure that significant changes in bald eagle density and distribution can be detected.

References Cited

BioSystems Analysis Inc. 1980. Impacts of a proposed Copper Creek dam on bald eagles. Contract for Seattle City Light, Office of Environmental Affairs; Seattle, Washington.

_____. 1981. Impacts of a proposed Copper Creek dam on bald eagles: second winter study. Contract for Seattle City Light, Office of Environmental Affairs; Seattle, Washington.

Appendix I

Description of Census route
(From: BioSystems Analysis Inc. 1980)

MARBLEMOUNT SLIDE (RM segment viewed: 78.3-80.0)

Beginning just upstream from Marblemount Bridge, drive slowly on Hwy 20 while looking in trees on both sides of river (driver of the vehicle may be able to scan trees on highway side of river while observer surveys opposite side). End slide ca. 2.5 km from bridge, where highway leaves river. Continue driving on Hwy. 20.

DIOBSUD CREEK BRIDGE

Stop at point (ca. 0.8 km from end of last slide) where Hwy. 20 crosses Diobsud Creek. Scan trees up and down creek as far as visibility allows.

DIOBSUD CREEK CONFLUENCE (RM segment viewed: 80.5-81.1)

Pull off and park vehicle ca. 20 m east of bridge on south side of highway. Walk toward river on dirt road paralleling Diobsud Creek. Cross through large clearing and enter riverside woods on trail (ca. 20 m east of creek). At river cautiously look in all visible trees up and downstream, paying particular attention to large cottonwoods at Diobsud confluence and ca. 50 m farther downriver.

SNUFFY SMITH SLIDE (RM segment viewed: 81.2-82.2)

Continue east on Hwy. 20 to point where road closely parallels river ca. 0.7 km east of Diobsud Creek. Drive slowly, scanning trees on both sides of river. Slide ends in vicinity of Stewart Siding (see Marblemount topo quad), where Hwy. 20 leaves river at bluff overlooking water at ca. RM 82.0. From this point look up and downstream in all visible trees.

BACON CREEK SLIDE (RM segment viewed: 82.4-83.1)

At a point on Hwy. 20 ca. 0.7 km east of east end Snuffy Smith Slide, the road closely parallels a slough. Begin driving slowly here, scanning visible trees on both sides of road. Continue this procedure to guardrail, where it is advised to stop vehicle at several places to carefully survey gravel bars and riverside trees downstream of bars. Continue driving slowly to bridge crossing Bacon Creek. While doing so scan riverside begetation as far upriver as possible.

BACON CREEK BRIDGE

Stop vehicle on shoulder at bridge. Scan the trees bordering and the gravel bar in Bacon Creek to a point not more than several hundred meters upstream. Also look downstream to Skagit from here and thoroughly view as much river as possible upstream.

COPPER CREEK CONFLUENCE (RM segment viewed: 83.7-84.2)

Continue driving east on Hwy. 20. At a point ca. 1.1 km east of Bacon Creek turn south (right) on dirt road (four-wheel drive vehicle preferable during winter months) that angles east, then south to river. Drive into the boat ramp at river's edge. If possible, drive down ramp to water. Survey all visible trees up and downstream. Weather conditions and river level may prevent driving down ramp. In this case walk to water's edge or scan trees from higher bank just downstream of ramp. Return to Hwy. 20.

ALMA CREEK SLIDE (RM segment viewed: 84.5-85.3)

Begin slide on Hwy. 20 ca. 0.7 km east of turn-in to Copper Creek Confluence. The highway closely parallels the river here; look in all visible riverside trees. Within 0.5 km river bends sharply toward south. At this point scan trees on island and as far up river as can be viewed. Some scanning may have to be done through thin vegetated buffer at east end of slide.

MISSING BRIDGE TO SHOVELSPUR SLIDE (RM sgment viewed: 85.9-87.3

This slide begins ca. 0.7 km east of east end of Alma Creek Slide, at a point where Hwy. 20 again closely parallels the river. Slowly drive along this reach, looking in all riverside trees, for ca. 1.7 km, ending at roadside, pull-off just downstream of a large gravel bar (locally called Shovelspur) at RM 87.2. From pull-of scan gravel bar and trees bordering river upstream of Shovelspur.

SKY CREEK SLIDE (RM segment viewed: 87.8-88.7)

Hwy. 20 leaves river for ca. 1 km after Shovelspur. When it again approaches the river's edge (RM 88.0) look in visible trees and continue sliding for ca. 0.7 km. Stop momentarily at each roadside pull-of along this stretch of river to better look in bordering trees. End slide at last pull-over before road leaves river (RM 88.6). From this point pay special attention to class A deciduous perch trees in the County Line Ponds area (RM 88.5).

COUNTY LINE PONDS (Area viewed: RM 89.0-89.7 and Seattle City Light borrow pits adjacent to Skagit RM 89.0)

The Skagit/Whatcom County Line occurs ca. 0.7 km east of the east end of the Sky Creek Slide. A locked gate (Seattle City Light) on the south side of Hwy. 20, barricades a dirt road that leads to the river. Proceed in vehicle through gate and drive slowly toward river. Approximately 0.2 km from the highway the access road makes a rather sharp left turn, winding between two ponds. Look carefully in pondside trees and in trees along river upstream from here. Continue driving west on access road as it forms a "levee" between river and pond. Stop at widest part of road (marked by a sign warning "caution" to river recreationists) and take time to scan all visible trees. If no eagles are present leave vehicle and get better view of river and gravel bars downstream by walking a few steps to river's edge. Turn vehicle around here and return to highway.

THORNTON CREEK (RM segment viewed: 89.7-90.3)

Park vehicle at pull-off on south side of Hwy. 20 at highway mile marker 117 (just west of bridge crossing Thornton Creek). Two viewpoints are used here: 1) Enter riverside woods ca. 75 m west of bridge (directly across road from powerline tower). Follow path 30 m to water. For best view climb down steep bank and onto fallen alder with root system still in water. Look upstream and downstream and especially across river beyond vegetated island. 2) Cross Thornton Creek Bridge in vehicle or on foot. (Climb onto rocky dirt bank if on foot). View river from east side of bridge as thoroughly as possible.

AGGREGATE PONDS (Area viewed: Seattle City Light borrow pits adjacent to river miles 90.2-91.3)

Enter locked Seattle City Light gate ca. 3 km west of Newhalem on gravel access road paralleling north bank of Skagit River. Drive on main gravel road and stop at large pond west of road, ca. 0.8 km from gate. Look in trees surrounding pond. Drive ca. .2 km further to second pond, this one on east side of road. Again, look in surrounding trees. Continue ca. 0.2 km to next census point.

CITY LIGHT BOAT RAMP (RM segment viewed: 90.3-90.8)

Drive down boat ramp to water's edge if conditions allow. Look in trees upstream and downstream as far as possible from census point. Remain in vehicle if eagles are present and if river level is low enough to allow good visibility of riversides. If water is high and no eagles are in vicinity, get out of vehicle to get better view in both directions.

BABCOCK "SLIDE" (RM segment viewed: 91.2-91.7)

Begin "slide" just east of gate to Aggregate Ponds. Slowly (less than 10 mph) proceed east on gravel access road, allowing passenger to view south side of river and gravel bars through trees bordering north side of river. Gravel bar island is best seen from Babcock "Slough". Continue "sliding" for ca. .5 km, ending at a point ca. 2.6 km downstream of Goodell Creek/Skagit River confluence.

"TWO BOXES" WALK-IN (RM segment viewed: 91.9-92.6)

Continue driving on gravel access road downstream of mouth of Goodell Creek. (Currently this point is marked by the presence of two "microwave" boxes, gray in color, standing side-by-side at South side of the road). Enter woods bordering river here and walk on game trails and through natural clearings to river. At a steep bank ca. 30 m upstream of a large partly submerged boulder look through vegetation in both directions at trees on south side of river. Return to Highway 20 at Goodell Creek Campground turn-off.

GOODELL CREEK BRIDGE (RM segment viewed: 0.3 mi of Goodell Creek)

Continue on Hwy. 20 to point where it crosses Goodell Creek. Stop on bridge. Look up creek as far as possible and down creek to Skagit River.

WEST NEWHALEM BRIDGE (RM segment viewed 92.7 - 93)

Continue on Highway 20 to point just west of town of Newhalem where bridge crosses Skagit River. Walk, or drive if possible, to center of bridge. Look upstream and downstream as far as is visible.

Appendix II

Example of census data sheet

Bald eagle census (Marblemount to Newhalem) data sheet

Date _____ Observer (s) _____

Starting time _____ Ending time _____

Observation number									
Time									
Weather									
Location									
Age									
Behavior									
Other									

JB/82