

WILDLIFE INVESTIGATIONS FOR 2004-2005

In Support of Blue Lake Project (FERC No. 2230) Relicensing

Prepared by:

Kent Bovee, Sitka, AK

Prepared for:

City and Borough of Sitka Electric Department

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INTRODUCTION AND BACKGROUND

This report documents the results of wildlife surveys conducted from June 2004 to February 2005, as part of the process for relicensing of the City and Borough of Sitka's Blue Lake hydroelectric project (FERC No. 2230). The project's FERC license will expire on March 31, 2008. Relicensing the project requires an environmental data base sufficient to allow FERC, as lead agency under the National Environmental Policy Act to evaluate existing environments, potential impacts, and mitigation measures associated with reauthorization of the project. The focal objective of this study was to inventory and document wildlife species present in the project area. This report includes descriptions of study areas and methods and results of surveys to date.

STUDY AREAS

Wildlife surveys during 2004 and early 2005 were conducted in four primary areas: 1) Sawmill Creek, 2) Blue Lake Road, 3) Blue Lake, and 4) transmission lines and corridors, as described in the following sections (Figure 1).

SAWMILL CREEK STUDY AREA

The Sawmill Creek study area included Sawmill Creek and its stream banks and other areas approximately 10-25 yards from the water's edge. Sawmill Creek surveys were conducted from the base of the Blue Lake Project dam to tidewater.

The stream was divided into seven Reaches (subareas SMC0-6) based on reaches assigned for the aquatic resources studies conducted by Karl Wolfe (Wolfe 2002-2005) (Table *****, Figure 1 and 2).

Much of the Sawmill Creek study area consisted of steep canyons where adjacent riparian areas were not accessible or too hazardous to traverse. In other areas, such as much of subareas four and five, the riparian area was flat or moderately sloped and allowed for additional area to be surveyed. The study area also included locations of birds heard or seen from the stream,

including birds flying overhead or in trees upslope from stream. However, priority was placed on the area of stream and stream banks directly affected by the Project features or operation.

BLUE LAKE ROAD STUDY AREA

Blue Lake is accessed by an approximately two mile, unpaved road that parallels Sawmill Creek (Figure 1 and 2). This allowed access points down to the creek in several places, as well as, good visibility of the river canyons below in areas of steep terrain. The road was divided into four subareas (R1-4). Visibility along the road was limited in some subareas to 50 yards on either side while other areas had much better visibility.

The road is used heavily by the public to access Heart Lake, Sawmill Creek Campground, Beaver Lake trail, and recreation along the stream and on Blue Lake. The road is also a popular spot for walking dogs, jogging, bike riding, and cross-country skiing. It is closed in the winter season, typically from December to April, due to avalanche hazards.

BLUE LAKE STUDY AREA

The Blue Lake study area included the immediate shoreline of the lake and areas visible from a boat or kayak on Blue Lake. Depending on species and habitat, the actual boundary was quite variable. For instance, bald eagles were often seen flying overhead or were perched in trees 500 ft or more upslope from the lake shore. Mountain goats or brown bears were seen in the alpine areas 1500 ft or more upslope from the lake shore. All of these observations were included during shoreline surveys.

The lake was divided into four subareas (BL1-4) based on similar habitat types (Figure 2).

TRANSMISSION LINE STUDY AREAS

The study boundary for the Transmission Line included the area directly under the transmission lines, the cleared area below the line (approximately 10 yards on either side of the line), and forest edge near the clearing (Figure 1 and 2). This area was essentially the Thimbleberry Lake to Heart Lake trail, with the exception of several hundred yards on either end of the transmission line where the line continues beyond the trail.

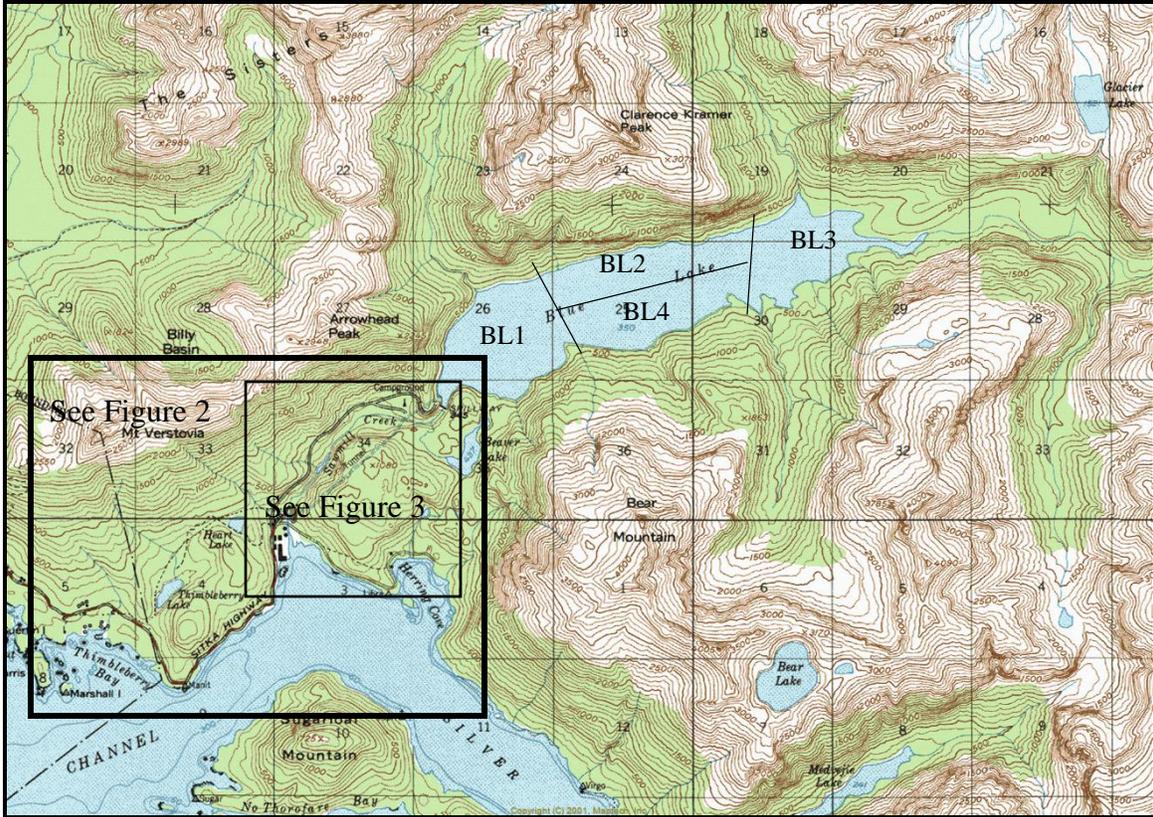


Figure 1 Wildlife Study Areas – Blue Lake Subareas (BL1-4)

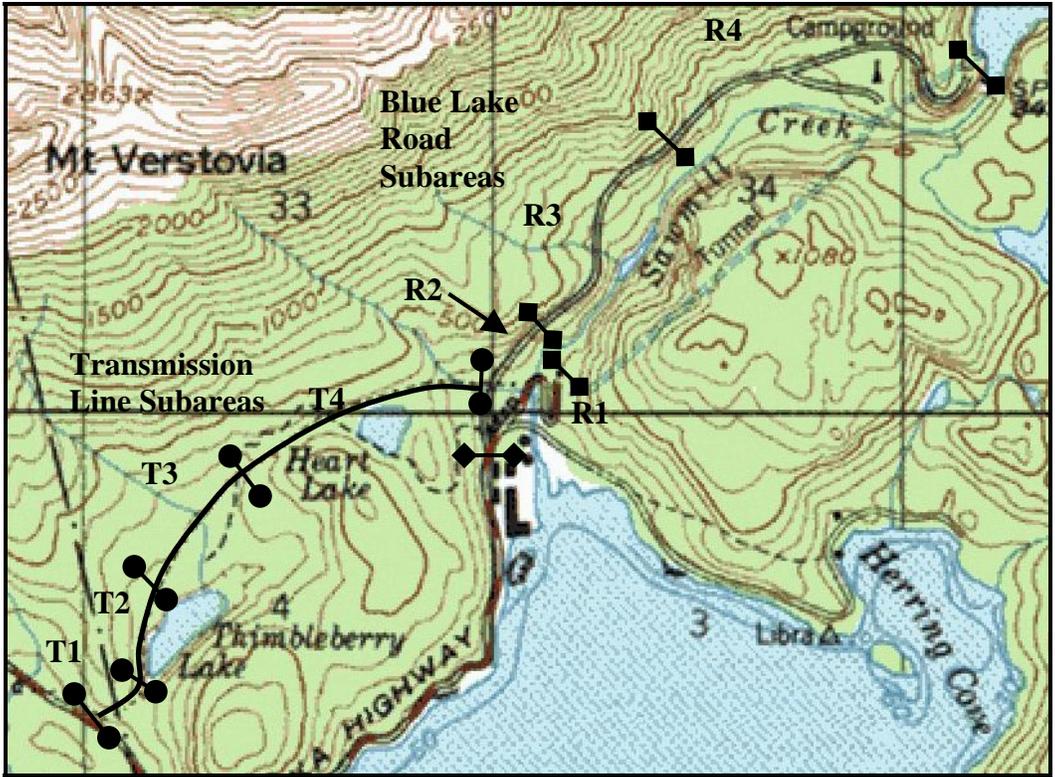


Figure 2 Wildlife Study Areas – Transmission Line Subareas (T1-4) and Blue Lake Road Subareas (R1-4)

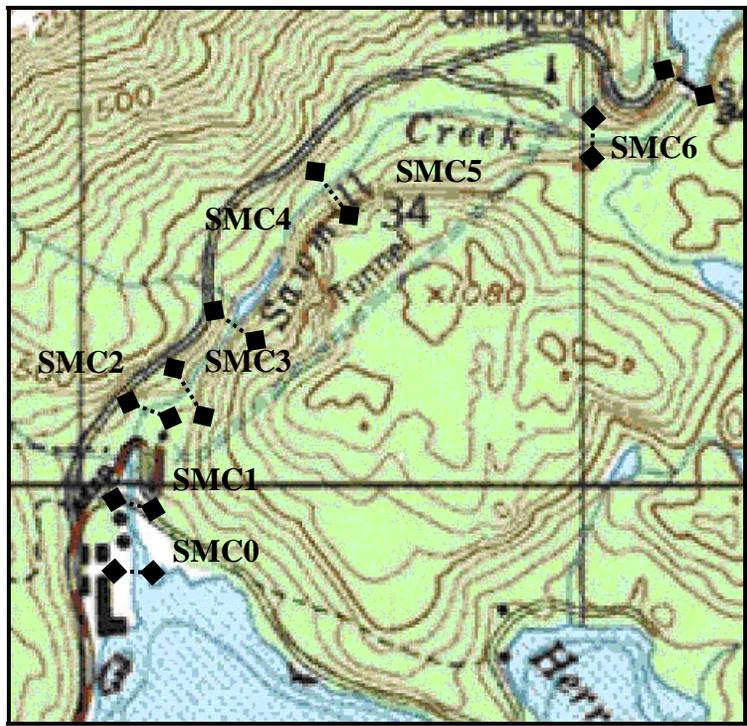


Figure 3 Sawmill Creek Subareas (SMC0-6)

METHODS

Six surveys methods were employed within the various study areas. These were:

1. Foot Transect Surveys;
2. Shoreline Transect Surveys;
3. Small Mammal Surveys;
4. Deer Winter Range Assessment;
5. Owl Inventory Surveys; and
6. Goshawk Inventory

FOOT TRANSECT SURVEYS

Foot surveys were performed on Sawmill Creek, the transmission lines and on inlet streams to Blue Lake. Random surveys near each of these areas were conducted to provide general inventories, or to investigate snags or other areas of interest. All wildlife sign was noted in a field journal, including actual sightings, behavior, numbers of individuals, sex and age (if identifiable), scat, tracks, browse, nests, habitat, etc. Birds were often identified by calls. Locations were noted in a field journal or on maps and, when appropriate, for observations such as bird nests and bear beds, GPS coordinates were included. Other data recorded included weather, human sign and activity and level of neighboring water body. Repeat counts and observations were minimized by keeping track of which direction animals were traveling and how many were in the group.

SHORELINE TRANSECT SURVEYS

Surveys of the Blue Lake area were similar to the foot transect surveys except that a motor boat or kayak was used for transportation. Distance from shore varied to allow for observing wildlife close to shore, as well as further up the slope.

SMALL MAMMAL SURVEYS

Small mammals were collected using Victor snap traps, Sherman live traps, and pit-fall traps. Traps were set in a variety of habitats and locations to maximize the variety of species caught and baited with peanut butter and oats mixture. Trap sites were flagged and locations were marked on a map. Traps were typically set for one to two nights and checked daily.

Data collected included: trap number, date and time set and checked, latitude and longitude trap type, habitat, microhabitat, elevation, weather, species and sex caught. Live animals were dispatched and all animals were placed in separate Ziploc bags with the above data labeled on bag. Specimens were frozen and then shipped to University of Alaska Museum of the North, Mammals Collection, Fairbanks for species identification confirmation, other pertinent information, and deposition into their museum collection.

DEER WINTER RANGE ASSESSMENT

Deer winter range was assessed using standard procedures by ADF&G and USFS in Southeast Alaska (Kirchoff and Hanley 1992) (see appendix).

Equipment required for the assessment included compass, clinometer, altimeter, cruising gauge, data forms, field maps and photos, and forest plant association key.

Each sample site was assigned a site ID number. Latitude and longitude, volume class, plant association was recorded. The actual assessment included two main sections, forage and snow conditions, with each section having numerical scores of various parameters (Table 1). Forage parameters included shrubs cover and height, forbs, overstory canopy percent, and high value species. Snow condition parameters included elevation, distance from coast, snow interception, snow melt (slope multiplied by aspect) and shading. Subtotals were then calculated for each section along with a total score for the site.

Table 1 Deer Winter Range Assessment Parameters

Forage	Snow condition
Shrubs cover and height	Elevation
Forbs	Distance from coast
Over story canopy %	Snow interception
High value species	Snow melt (slope x aspect)
	Shading

OWL SURVEYS

The method for surveying owls was a modified protocol for “presence/not detected” sampling which was based on methods from Southeast Alaska Owl Network (Kissling and Lewis 2005) and Inventory Methods for Raptors (RIC 2001). Because of the potentially broad list of owls in the Sitka area priority had to be placed on owls most likely to be present. Owls with abundance ratings of occasional or rare had a priority of one and were included in all call survey stations. Those with abundance ratings of uncommon, very rare or accidental had a priority of two and were included in every other station (Table 2).

Table 2 Owl Species, Expected Abundance and Survey Priority

Owl species (from smallest to largest)	Abundance	Priority
Northern Pygmy Owl	Occasional	1
Northern Saw-whet owl	Rare	1
Western Screech Owl	Rare	1
Boreal Owl	Accidental/Very Rare	2
Short-eared Owl	Uncommon	2
Long-eared Owl	Accidental	2
Northern Hawk Owl	Very Rare	2

Barred Owl	Occasional	1
Great Horned Owl	Rare	1
Snowy Owl	Very Rare	2
Great Grey Owl	Accidental	2

Owl survey stations were located in areas with a) low ambient noise, b) low traffic levels, and c) at least 25% forest within 500 m of the station. Distance between stations was approximately ½ mile.

Although surveys were conducted seasonally (once per season) throughout the year, more effort (once or twice per month) was placed on surveying during the breeding season, February through April, due to higher probability of responses.

Surveys were conducted half an hour after sunset until midnight. Data collection included: location, habitat, time, temperature, cloud cover, precipitation, snow cover, moon phase, wind conditions, and noise level.

Broadcast calls were played for owl species based on the table above. Calling equipment consisted of mp3 player connected to a NiteLite 15 watt speaker and amplifier, producing 100-110 dB output, one meter from speaker.

The order of calling was always from smallest to largest owl, since some species of larger owls are known to prey on smaller owls and their calls may influence response by smaller owls.

For each species, the broadcast series consisted of three calls (20 seconds each) followed by a 30 second listening period. The first recording was broadcast at 60° from the transect line (i.e. direction of travel on road, trail, etc.), the second at 120° from the transect line, and the third at 240° from the transect line. After each series of calls, the observer listened and watched for five minutes.

Data collected for each owl response included detection number, species and time; estimated distance to nearest 50 m, and direction.

The procedure was repeated for each owl species at each station.

GOSHAWK SURVEYS

The Goshawk Inventory Protocol (Barton 1992) was used to survey for goshawks. It consisted of a broadcast call, point sampling technique which included the following:

- Sampling stations were set up approximately 300 m apart and were located where background noise from streams or other noise would be minimized.
- Calling equipment consisted of an mp3 player connected to a NiteLite 15 watt speaker and amplifier, producing 100-110 dB output, one meter from speaker.

- Juvenile begging (wail) calls were used during the fledgling dependency period during early July to mid-August. Adult alarm calls were used during the nestling period during late May to early July and other times during the year.
- Calling was conducted from ½ hour before sunrise up to ½ hour after sunset.
- On the arrival at each calling station, at least one minute was allowed for listening for any calls. From any random direction (designated as 0 degrees), calls were broadcast at 60 degrees for 10 seconds, then listening and watching for 30 seconds. This was repeated at 180 degrees and 300 degrees for a total of two minutes. The entire two minute procedure was repeated again.
- Surveying during times of heavy rain or winds exceeding 15 mph were avoided.
- Data recorded included station number, location description, latitude/longitude, date, time, habitat, responses to call, direction and distance of responses, visual sightings, age and sex of birds, behavior, and other birds in area.

SAMPLING DATES

Sampling reported in this document was conducted with varying intensity from June, 2004, through February, 2005 (Table 3). Sampling frequency was highest in July, 2004 and decreased over the fall and winter months due to access restrictions and reduced animal activity.

Table 3 Dates and Areas of 2004-2005 Blue Lake Project Relicensing Wildlife Surveys

Survey Date	Areas Surveyed	Survey Type
June 19, 2004	Sawmill Creek	Foot survey
July 8, 2004	Blue Lake	Motor boat survey
July 8, 2004	Sawmill Creek	Foot survey
July 16, 2004	Blue Lake	Kayak survey
July 22 – 24, 2004	Blue Lake	Motor boat survey and overnight camp, raptor calling, small mammal trapping
August 5, 2004	Blue Lake	Kayak survey, overnight camp, small mammal trapping, and raptor calling
August 23, 2004	Blue Lake Road	Goshawk survey
August 28, 2004	Sawmill Creek	Foot survey
September 11, 2004	Blue Lake Creek	Foot survey
September 18, 2004	Brady Creek	Foot survey (incidental)
September 25, 2004	Blue Lake Road	Owl survey
October 2-3, 2004	Thimbleberry/Heart Lake Trail	Foot survey and small mammal trapping

November 12-14, 2004	Sawmill Creek (and some Blue Lake Road observations)	Foot survey and small mammal trapping
January 23, 2005	Blue Lake	Kayak survey
February 5, 2005	SMC	Foot survey

RESULTS

The 2004-2005 Blue Lake Project wildlife surveys resulted in the observation or capture of 62 wildlife species. In addition, the surveys and evaluation techniques provided an assessment of associated habitats and insights into life history and migratory timing for many wildlife species. In this section, we present summarized results of the surveys described in the Methods section, above. Raw numbers of species captured or observed by date, sampling technique, and area are presented in Appendix I.

WILDLIFE SPECIES SAMPLED DURING 2004-2005 SURVEYS

In this section, we present results of wildlife surveys, aggregated by wildlife type, including:

- Large Mammals
- Small Mammals
- Furbearers
- Raptors
- Songbirds
- Shorebirds
- Waterfowl

For each species, we present the number of observations to date (direct and indirect), sampling techniques, primary associated habitat and subareas used, and species designation (ADF&G 2005). Direct observations included actual sightings of animals, identifiable sound of animal (i.e. bird call), trapped individual, or mortality. Indirect observations included sign left by the animal, including tracks, scat, nest, hair, bed, and food remains. The species designation information is taken from two sources, Alaska Department of Fish and Game, Wildlife Conservation, Alaska's Statewide Strategy (<http://www.sf.adfg.state.ak.us/statewide/ngplan/>) and Alaska Natural Heritage Program, University of Alaska, (http://aknhp.uaa.alaska.edu/zooology/Zoology_Home.htm). These designations were developed to have a consistent method for evaluating the relative imperilment of species of wildlife. The conservation status of a species is designated by a number from 1 to 5, preceded by a letter reflecting the appropriate geographic scale of the assessment or breeding status. Table 4 summarizes these designations.

Table 4 Species Designation Rankings

Geographic or Breeding Assessment	Conservation Status
G = Global Status (throughout its range)	5 = widespread, abundant, secure
S = Subnational Status (status in Alaska)	4 = not rare, long-term concern
B = Breeding	3 = rare or uncommon
N = Nonbreeding	2 = imperiled
SAN = State Accidental, Non-breeding-accidental or casual in the state	1 = critically imperiled

Large Mammals

Large mammal species present in the overall study area, included Sitka black-tailed deer, mountain goats and brown bears (Table 5, Appendix I).

Table 5 Results of 2004-2005 Wildlife Surveys for Large Mammals, Blue Lake Project Wildlife Study Area

Large Mammal Species	Number of Observations			Sampling Techniques Used	Highest Observations		Species Designationⁱ
	Directⁱⁱ	Indirectⁱⁱⁱ	Total		Habitat	Subarea	
Sitka Black-Tailed Deer	14	65	79	Foot and boat surveys	Forested areas	BL3	none
Mountain Goats	15	4	19	Foot and boat surveys	Alpine	BL2 and BL3	none
Brown Bear	3	9	12	Foot and boat surveys	Forested areas	BL2 and BL3	none

ⁱ Species Designation as determined by Alaska Department of Fish and Game, Wildlife Conservation, Alaska's Statewide Strategy, <http://www.sf.adfg.state.ak.us/statewide/ngplan/H> and Alaska Natural Heritage Program, University of Alaska, http://aknhp.uaa.alaska.edu/zoology/Zoology_Home.htm

ⁱⁱ Includes actual sightings

ⁱⁱⁱ Includes tracks, scat, beds, and browsed areas

Sitka Black-tailed Deer. Sitka black-tailed deer (*Odocoileus hemionus sitkensis*) were the most frequently-observed large mammal species in the Project area, with a total of 79 observations. Black-tailed deer were observed in the entire study area (Blue Lake, Road, Sawmill Creek and Transmission Line areas), but the highest number of observations occurred in the BL3 area (Appendix I). Most of the deer observations were made from foot surveys and consisted mainly of deer tracks. Of the 79 deer observations, 14 were actual sightings, mostly in the winter months, while 65 were tracks and other sign.

Much of the study area is densely forested down to the shoreline, so actual sightings were uncommon. Other sign, such as browsed areas and scat, were used along with tracks, to

determine high-use areas. These areas were mostly found in the medium to high volume timbered areas, specifically BL3 and BL4.

Mountain Goat. Next to Sitka black-tailed deer, mountain goats (*Oreamnos americanus*) were the most frequently-observed large mammals in the Blue Lake Project area (Table 6, Appendix I). Mountain goats were observed primarily in the areas upslope from Blue Lake in the alpine during boat or kayak surveys, although some were observed at lower elevations in the winter. This included tracks (four sets total) along the shoreline in the snow and a nanny and kid feeding on a steep slope several hundred yards up from the shoreline. A total of 19 goat observations were made, which included 15 sightings.

Brown Bear. Brown bears (*Ursus arctos*) were the least observed large mammal during the Project wildlife surveys and resulted in 12 observations (three sightings and nine tracks and other sign (Table 6, Appendix I). Most of the sign observed occurred along the shoreline or at stream crossings, however, one well used day bed area was found in a steep forested area in Subarea BL2, upslope from lake several hundred yards.

Small Mammals

Two species of small mammals were captured in the Project area surveys, the forest deer mouse and common shrew (Table 6, Appendix II). Results in Table 6 show total number trapped, number of trapnights (TN), and number per 10 TN. The only subareas that have been trapped to date are BL3, SMC0-6, and T1-4 (Figures 1-3). All specimens collected will be sent to the University of Alaska Museum for species identification confirmation, other pertinent information, and deposition into their museum collection.

Table 6 Results of 2004-2005 Wildlife Surveys for Small Mammals, Blue Lake Project Wildlife Study Area.

Small Mammal Species	Results by area									Species Designation ^{iv}
	BL3			SMC			T-line			
	#	# TN	#/ 10TN	#	# TN	#/ 10TN	#	# TN	#/ 10TN	
Forest Deer Mouse	2	12	1.67	12	62	1.94	2	24	0.83	G5, S3
Common Shrew	1	12	0.83	0	62	0	0	24	0	none

^{iv} G = Global Status (throughout its range)

S = Subnational Status (status in Alaska)

B = Breeding

N = Nonbreeding

SAN = State Accidental, Non-breeding-accidental or casual in the state

5 = widespread, abundant, secure

4 = not rare, long-term concern

3 = rare or uncommon

2 = imperiled

1 = critically imperiled

Forest Deer Mouse. The most common small mammal captured was the forest deer mouse (*Peromyscus keenii*). The highest number captured per unit effort was along Sawmill Creek, with 12 mice trapped in 62 TN for a 1.94/10TN catch rate. BL3 had a catch rate of 1.67/10TN and

the T-line resulted in a 0.83/10TN. Tracks in the snow (assumed to be from deer mice) were quite common in BL3 in open areas along the shore, as well as along Blue Lake road.

The species designation of deer mice by National Heritage Network and The Nature Conservancy is a bit perplexing in that they are ranked “widespread, abundant, secure” (GRANK) for throughout its range, yet in Alaska ranked “rare or uncommon” (SRANK). This is contrary to local and statewide research, which has found forest deer mice to be quite common (MacDonald and Cook 1999).

Common Shrew. The only other small mammal captured was the common shrew (*Sorex cinereus*). Only one individual was captured in the BL3 Subarea, which is a 0.83/10TN catch rate.

Furbearers

A total of 58 furbearer observations were made during the 2004-2005 wildlife surveys and included red squirrel, marten, mink, and river otter (Table 7, Appendix III). Even though red squirrels are not commonly harvested for their fur, they were included with the furbearers rather than small mammals because of similar observation methods used.

Table 7 Results of 2004-2005 Wildlife Surveys for Furbearers, Blue Lake Project Wildlife Study Area.

Furbearer Species	Number of Observations			Sampling Techniques Used	Highest Observations		Species Designation
	Direct ^v	Indirect ^{vi}	Total		Habitat	Subarea	
Red Squirrel	23	20	43	Foot and boat surveys	Forested areas	R4	none
Marten	0	10	10	Foot and boat surveys	Forested areas	BL3	none
Mink	0	3	3	Foot and boat surveys	Shoreline	SMC	none
River Otter	1	1	2	Foot surveys	Shoreline	SMC	none

^v Includes actual sightings or sounds

^{vi} Includes tracks, scat, and hair

Red Squirrel. By far the most numerous furbearer species observed was the red squirrel (*Tamiasciurus hudsonicus*). Although only three were actually seen, there were 20 observations of squirrels heard, 20 observations of tracks, for a total of 43 observations. Squirrels were most commonly observed in forested areas with the highest observations being made in R4.

Marten. Marten (*Martes americana*) were observed on 10 occasions, consisting of nine sets of tracks and one scat. Most marten observations were made in forested habitat in several of the subareas, with the most observations being made in BL3.

Mink. Only three mink (*Mustela vison*) observations were made, occurring in the SMC areas along the shoreline. No mink were observed in the Blue Lake area.

River Otter. Observations of river otters (*Lontra canadensis*) occurred twice in a lower reach of SMC. One was a sighting of an otter by Karl Wolfe doing a fish survey and the other was a set of tracks along the same stretch of the river at a later date.

Raptors

A total of three raptor species were observed during the 2004-2005 wildlife surveys (Table 8, Appendix IV).

Table 8 Results of 2004-2005 Wildlife Surveys for Raptors, Blue Lake Project Wildlife Study Area.

Raptor Species	Number of Observations ^{vii}	Sampling Techniques Used	Highest Observations		Species Designation ^{viii}
			Habitat	Subarea	
Bald Eagle	31	Foot and boat surveys	In flight Forested	BL2 and BL4	G4, S3B, S3N
Northern Saw-whet Owl	1	Owl surveys	Forested	BL3	none
Unknown Hawk	1	Foot survey	In flight	SMC4	none

^{vii} Includes actual sightings or sounds

^{viii} G = Global Status (throughout its range)

S = Subnational Status (status in Alaska)

B = Breeding

N = Nonbreeding

SAN = State Accidental, Non-breeding-accidental or casual in the state

5 = widespread, abundant, secure

4 = not rare, long-term concern

3 = rare or uncommon

2 = imperiled

1 = critically imperiled

Bald Eagle. Bald eagles (*Haliaeetus leucocephalus*) were the most numerous of all raptors in the area. They were often seen flying overhead or perched in trees in forested areas. Two areas on Blue Lake had the most observations, BL2 and BL4. Both adult and immature birds were observed, although no nests were found in the study area.

Northern Saw-whet Owl. One northern saw-whet owl (*Aegolius acadicus*) responded to owl playback surveys.

The only other raptor observed in the study area was a medium to large unknown hawk, which was seen in the SMC4 area. It was most likely a goshawk, but positive identification was not possible.

Songbirds

A total of at least 22 songbird species were observed during the 2004-2005 wildlife surveys (Table 9, Appendix V). Sampling techniques for all observations were foot and boat surveys.

Table 9 Results of 2004-2005 Wildlife Surveys for Songbirds, Blue Lake Project Wildlife Study Area.

Songbird Species	# of Obs. ^{ix}	Highest Observations		Species Designation ^x
		Habitat	Subarea	
American Robin	2	n/a	n/a	G5, S5B, S3N
Brown Creeper	1	Forested	SMC5	G5, S4
Cedar Waxwing	1	Second growth edge	n/a	G5, S3B, SAN
Common Raven	37	in flight	all areas	G5, S5
Common Redpoll	9	Road, red alder	R2	G5, S5B, S5N
Dark-eyed Junco	18	Shoreline, alder	BL3	G5, S5B, S3N
Fox Sparrow	20	Road	R1, R2, R3	G5, S5N, S3N
Golden-crowned Kinglet	3	Red alder, second growth	SMC5	G5, S5
Hermit Thrush	5	Sitka and red alder	n/a	G5, S4B
Northwestern Crow	1	n/a	n/a	G5, S5
Northern Flicker	1	Forested	T2	S5B, SAN
Pine Siskin	30	Road	R2	G5S5
Red-breasted Sapsucker	3	Forested	SMC4	G5, S3B
Song Sparrow	1	n/a	n/a	G5, S5
Steller's Jay	5	Forested	T2	G5, S5
Swainson's Thrush	10	Forested	BL3	G5, S3B
unknown chickadee ^{xi}	52	Sitka alder	BL3, BL1	-
unknown hummingbird	1	in flight	n/a	-
unknown sparrow	2	n/a	n/a	-
unknown swallow	31	in flight	BL3, SMC4	-
unknown thrush	6	Forested	n/a	-
unknown warbler	70	Sitka alder	BL2, BL3	-
unknown woodpecker	1	Forested	n/a	-
Varied Thrush	5	Forested	BL3	G5, S5
Wilson's Warbler	3	n/a	n/a	G5, S3B
Winter Wren	19	Forested	SMC4, SMC5	G5, S5
Yellow-rumped Warbler	1	n/a	n/a	G5, S5B, SAN

^{ix} Includes actual sightings or sounds

^x G = Global Status (throughout its range)

S = Subnational Status (status in Alaska)

B = Breeding

N = Nonbreeding

SAN = State Accidental, Non-breeding-accidental or casual in the state

^{xi} most likely chestnut-backed chickadee

5 = widespread, abundant, secure

4 = not rare, long-term concern

3 = rare or uncommon

2 = imperiled

1 = critically imperiled

The songbird observations below are grouped by similarities in bird behavior and/or habitat rather than individual species.

Warblers and Chickadees. The most commonly observed songbirds were warblers, with a total of 74 observations - 70 unknown warbler species, three Wilson's warbler (*Wilsonia pusilla*), and one yellow-rumped warbler (*Denroica coronata*). Chickadees (most likely black-capped chickadee, *Poecile atricapilla*), made up the second most commonly observed species with 52 observations. These birds made extensive use of the Sitka alders growing along the shoreline of Blue Lake and up talus slopes, feeding on insects and seeds. Warblers were observed more in BL2 and BL3, while chickadee observations were highest in BL1 and BL3. Positive identification was not usually possible due to bird behavior and distance from observer.

Ravens, Crows and Jays. The common raven (*Corvus corax*) was seen in almost all subareas of the project area with a total of 37 observations. It was typically seen in flight associated with forest habitat. Steller's jays (*Cyanocitta stelleri*) were observed five times, mostly in the T2 area and one northwestern crow (*Corvus caurinus*) was observed in SMC2 area.

Swallows, Pine Siskins, and Common Redpolls. There were 31 observations of swallows (unknown species), which really were estimates from only two sightings of birds feeding in flight above areas BL3 and SMC4 in mid-July. Positive identification was not possible and no other swallows were seen other than those two sightings. This is one example, in addition to the pine siskin and common redpoll observations, where one or two sightings of large groups will not truly reflect relative numbers. Pine siskins (*Carduelis pinus*) were only seen once, when a flock of approximately 30 were feeding in area R2 on what appeared to be alder seeds. Similarly, a flock of common redpolls (*Carduelis flammea*) were only seen once and consisted of nine birds in area R2.

Juncos and Sparrows. Two other types of birds commonly seen, but in fewer numbers, were juncos and sparrows. The dark-eyed junco (*Junco hyemalis*) was observed 18 times along the shoreline and in the alders, mostly in the BL3 area. Fox sparrows (*Passerella iliaca*) were most generally seen along the road (R1-3), for a total of 20 observations. Other sparrow observations included one song sparrow (*Melospiza melodia*) and two unknown sparrows.

Thrushes, wrens, and other forest birds. Several species of forest-dwelling birds were observed, although the numbers would most likely be below what is actually present due to low visibility from the boat, road or trail route. Many of these were identified by song rather than by sight. Four species of thrushes were observed with the following totals - 10 Swainson's thrush (*Catharus ustulatus*), five hermit thrush (*Catharus guttatus*), five varied thrush (*Ixoreus naevius*), and two American robin (*Turdus migratorius*), along with six unidentified thrushes. These were mostly observed in the forested areas of BL3.

Winter wrens (*Troglodytes troglodytes*) are easily identified by their song and 19 observations were made, with the highest number being in the forested areas in SMC4 and five. Other forest birds with only a few observations each included - one brown creeper (*Certhia americana*), one cedar waxwing (*Bombycilla cedrorum*), three golden-crowned kinglets (*Regulus satrapa*),

Two species of woodpeckers were observed - three observations of red-breasted sapsucker (*Sphyrapicus ruber*) in SMC4 and BL4 and one observation of northern flicker (*Colaptes*

auratus) in T2. One unknown woodpecker, most likely a red-breasted sapsucker, was also seen in BL2

One hummingbird, probably a rufous hummingbird (*Selasphorus rufus*), was seen in flight at SMC5.

Shorebirds

A total of four shorebird species were observed during the 2004-2005 wildlife surveys (Table 10, Appendix VI). Although American dipper and belted kingfishers are not shorebirds they are included here because of their similar behavior and habitat use. The majority of these observations were made with boat surveys.

Table 10 Results of 2004-2005 Wildlife Surveys for Shorebirds, Blue Lake Project Wildlife Study Area.

Shorebird Species	# of Obs. ^{xii}	Highest Observations		Species Designation ^{xiii}
		Habitat	Subarea	
American Dipper	27	Shoreline	SMC3	G5, S5
Belted Kingfisher	19	Shoreline	BL1, BL4	G5, S5
Common Snipe	8	Shoreline	BL3	G5, S5B, S3N
Spotted Sandpiper	24	Shoreline	BL3	G5, S5B
unknown sandpiper ^{xiv}	9	Shoreline	BL3	-

^{xii} Includes actual sightings or sounds

^{xiii} G = Global Status (throughout its range)

S = Subnational Status (status in Alaska)

B = Breeding

N = Nonbreeding

SAN = State Accidental, Non-breeding-accidental or casual in the state

^{xiv} most likely spotted sandpiper

5 = widespread, abundant, secure

4 = not rare, long-term concern

3 = rare or uncommon

2 = imperiled

1 = critically imperiled

American Dippers. A total of 27 observations of American dippers (*Cinclus mexicanus*) were made, with the majority being along SMC3. Dippers were commonly seen feeding along SMC shoreline, including some young of the year.

Belted Kingfishers. Belted kingfishers (*Ceryle alcyon*) were seen the most in areas BL1 and BL4, with a total of 19 observations. There was an active kingfisher nest in a cutbank burrow in BL4 and individual birds were often seen flying between BL1 and BL4. Both dippers and kingfishers are examples of birds that were obviously double counted in the same day, since they both tended to fly back and forth along the shoreline.

Common Snipe. Common snipe (*Gallinago gallinago*) were observed on two occasions in February, when four individuals were seen twice, a week apart in BL3. The birds were making use the mud flats area which was caused by the winter season low water.

Spotted Sandpipers. A shorebird commonly seen in the summer months along the shoreline of Blue Lake was the spotted sandpiper (*Actitis macularia*). A total of 24 observations were made with the majority of them being seen in BL3. Many of these observations included a family of

two adults and three young. An additional nine observations of unknown sandpipers, most likely spotted, were also recorded.

Waterfowl

A total of 14 waterfowl species were observed and/or captured during the 2004-2005 wildlife surveys (Table 11, Appendix VI). Gulls and murrelets were also included with waterfowl due to similar behavior and habitat use. All observations were made by boat survey and birds were either on or near the water or in flight.

Table 11 Results of 2004-2005 Wildlife Surveys for Waterfowl, Blue Lake Project Wildlife Study Area.

Shorebird Species	# of Obs. ^{xv}	Highest Observations	Species Designation ^{xvi}
		Subarea	
Bufflehead	25	BL3	G5, S3?B, S3?N
Canada Goose	54	BL3	G5, S5
Common Merganser	12	SMC0	G5, S5B, S5N
Glaucous-winged Gull	25	SMC1	G5, S5B
Harlequin Duck	16	BL3	G4, S3S4B, S3S4N
Herring Gull	5	SMC0	G5, S5
Mallard	23	BL3	G5, S5
Marbled Murrelet	16	BL4	G3G4, S2S3
Ring-necked Duck	58	BL3	G5S2N, S3B
Trumpeter Swan	77	BL3	G4, S3S4B
unknown duck	28	BL3	-
unknown goldeneye (Barrow's or Common)	14	BL3	S3?B,S3?N
unknown gull	1	n/a	-
unknown merganser	7	BL1	-

^{xv} Includes actual sightings or sounds

^{xvi} G = Global Status (throughout its range)

S = Subnational Status (status in Alaska)

B = Breeding

N = Nonbreeding

SAN = State Accidental, Non-breeding-accidental or casual in the state

? = insufficient data;

5 = widespread, abundant, secure

4 = not rare, long-term concern

3 = rare or uncommon

2 = imperiled

1 = critically imperiled

Marbled murrelet. Although not the most numerous, one of the more notable bird observations were those of marbled murrelets (*Brachyramphus marmoratus*). A pair of birds was seen in early July out towards the middle of the lake in BL4. A second observation of murrelets was made late July when 14 birds were seen in approximately the same area. Birds were resting on the water and no feeding or other behavior was observed. This species has the highest species designation rankings, S2S3 - rare, uncommon and/or imperiled, for any species in the study area.

Trumpeter Swan. The highest number of observations for a waterfowl species was for trumpeter swans (*Cygnus buccinator*). The 77 observations were all made in the winter period in BL3 and consisted of sighting of groups of birds from one to 38. The inlet area to Swan Lake appears to be a well-used wintering area. Tracks and scat were common along the mud and sandy exposed lake bottom. One swan mortality was located along the shore, which consisted of fresh skeletal remains. Marten scat was found at site but no cause of death was determined. Swans also used Thimbleberry Lake during the same time period, evidenced by numerous scat deposits found on the ice. One wounded swan in this area was found by a local resident and given to the local bird center, but needed to be euthanized.

Ring-necked Duck. Ring-necked ducks (*Aythya collaris*) were observed at Heart Lake (one individual) and at Blue Lake (BL3). Two occurrences of three birds and a group of approximately 50 birds were seen at BL3. The latter observations occurred in the winter months. An observation of 28 unknown ducks was made in February and was likely ring-necked ducks. This species is ranked rare, uncommon and/or imperiled.

Canada Goose. A small flock of six or less Canada geese (*Branta canadensis*) were observed several times during the summer. The observations were made too late in the summer to determine young of the year present, but this was most likely a family unit. Observations of two to 16 geese in the winter were made in the BL3 area. Sign of geese using shoreline in this area, both summer and winter, was common.

Bufflehead. Groups of two to six buffleheads (*Bucephala albeola*) were seen in the inlet stream area (BL3) and on the pond inside one of the old mill's settling tanks (R2). It wasn't determined whether these were the same birds but there appeared to be at least up to six buffleheads using these areas during the winter period.

Glaucous-winged Gull and Herring Gull. The lower reaches of Sawmill Creek were regularly used by glaucous-winged gulls (*Larus glaucescens*) and herring gulls (*Larus argentatus*) during the summer. The furthest upstream gulls were observed was SMC3. One unknown gull was observed on Blue Lake (BL1).

Mallard. Mallards (*Anas platyrhynchos*) were seen several times during the summer and consisted of one group of three to seven birds. One early July sighting included a hen with six young and a early August sighting was of a hen with three full grown young. Several other observations of groups for one to five birds occurred in fall and winter months.

Harlequin duck. Two sightings of a single female harlequin duck (*Histrionicus histrionicus*) were made in July and two more sightings of seven ducks were made in August. Some of the birds appeared to be young of the year. This species is of interest to biologists in Alaska due to its nesting habits along pristine inland streams.

Goldeneye. One female goldeneye was seen regularly throughout the summer and was assumed to be the same female each time. It was most likely a Barrow's goldeneye (*Bucephala islandica*) but the females of both the Barrow's and common goldeneye are difficult to distinguish. One interesting observation was that this female often accompanied the female harlequin discussed above. In addition, on a couple of occasions this female goldeneye was seen circling right above some large trees adjacent to the shoreline, suggesting a possible nest cavity. No other goldeneye ducks were seen however until the winter, when two sightings of four to five goldeneyes were made. All goldeneye observations were in the BL3 area.

Common Merganser. Common mergansers (*Mergus merganser*) were seen in groups of one to four throughout the summer and fall on Blue, Heart, and Thimbleberry Lakes, as well as, on Sawmill Creek. They were seen more frequently at the mouth of Sawmill Creek (SMC0), along with the gulls, feeding on fish and salmon eggs.

DISCUSSION

OVERALL SPECIES REPRESENTATION AND ABUNDANCE.

The 2004-2005 Blue Lake Project area wildlife surveys were intended to document presence/absence of wildlife species in the Project area and, to the extent possible given survey techniques, evaluate relative abundance. Study results are thought to be generally reliable in terms of presence/absence; surveys were intensive and well-distributed within the Project area. Reported species of large or small mammals, furbearers, raptors or waterfowl are probably quite accurate and it is unlikely that species were missed.

Songbirds, while quite diverse, are much more difficult to sample, and it may take more years of study to determine the total number or species which use the area. The large number of songbird species documented in 2004-2005, compared with lists of songbirds found throughout southeast Alaska, however, indicates that most birds using the area were probably documented.

Sampling techniques for the 2004-2005 surveys, while intensive and widespread, were not to be considered quantitative. In many instances, particularly where scat, tracks, fur or call responses were the only evidence of a species, the survey information was impossible to interpret in terms of either absolute or relative abundance. In other cases, difficult terrain or vegetation precluded complete surveys of areas, particularly near Sawmill Creek or along the Blue Lake shoreline. In successive years of study, more quantitative population abundance estimates may be sought, but it is generally felt that comparisons of relative abundance will be the best that can be obtained.

Finally, wildlife surveys during 2004-2005 were not meant to document life history for the various species observed. Field notations included life history or activities if they were observed, such as nesting, denning, breeding or migrating, but, at the time of this report, these notations have not been analyzed. Analysis of life history for the various observed wildlife species will be addressed more thoroughly in next year's report.

SPECIES OF SPECIAL CONCERN

No federally-listed threatened or endangered species were encountered during the 2004-2005 surveys. Several species, however, were categorized as "rare" according to Species Designation criteria. These were:

Forest Deer Mouse;
Bald Eagle;
Several Songbird species;
Harlequin Duck;
Trumpeter Swan; and
Marbled Murrelet.

One species, ring-necked duck, was categorized as "imperiled" or "quite rare".

HABITAT ASSOCIATIONS

General habitat associations are presented in the species accounts in the Results section. While habitat associations were documented for many wildlife species during the 2004-2005 surveys, the author believes that, due to difficulties in establishing study areas, analysis of these associations would best be done after a second year of study. Next year's surveys and analyses will focus on synthesis of both years of habitat notations.

WILDLIFE SURVEY WORK FOR 2005-2006.

Consultation for the Blue Lake Project relicensing studies suggested that at least two years of wildlife surveys be conducted to establish a reliable baseline and as part of the ongoing monitoring of the new license. The author expects to continue wildlife surveys through spring, 2006, at a minimum, using the same general techniques, time frames and study areas documented in the report. Reviewers are asked to provide any suggestions on ways in which the 2004-2005 surveys might be improved in the coming year.

LITERATURE CITED

Alaska Department of Fish and Game. 2005. Wildlife Conservation: Alaska's Statewide Strategy. Barton, Michael. 1992. Goshawk inventory protocol. USDA Forest Service, Alaska Region unpublished letter June 24, 1992, 8 pp.

Kirchoff, Matthew D. and Thomas A. Hanley. 1992. A Quick-Cruise Method for Assessing Deer Winter Range in Southeast Alaska. Habitat Hotline, Issue No. 92-1. Juneau, Alaska.

Kissling, Michelle and Steve Lewis. 7 January 2005. Owl survey protocol. Southeast Alaska Owl Network, U.S. Fish and Wildlife Service and Alaska Department of Fish and Game, Juneau, Alaska. Unpublished document.

MacDonald, Stephen O. and Joseph A. Cook. 1999. The Mammal Fauna of Southeast Alaska. University of Alaska Museum, Fairbanks, Alaska, 145 pp.

Resources Inventory Committee. 2001. Inventory Methods for Raptors: Standards for Components of British Columbia's Biodiversity No. 11. Version 2.0. Ministry of Sustainable Resource Management, Environment Inventory Branch, Victoria, BC. Website: http://srmwww.gov.bc.ca/risc/pubs/tebiodiv/raptors/version2/rapt_ml_v2.pdf

Appendix I. Field Notations of All 2004-2005 Blue Lake Project Wildlife Surveys

Date	Time	Species¹	Type of obs.²	Min. # ind. Obsd.	Observer³	Unit or Reach⁴	Habitat⁵
19-Jun-04	1030	WIWR	S	1	KB	SMC4	RA
19-Jun-04	1030	UNWA	V	1	KB	SMC4	RA
19-Jun-04	1030	RESA	V	1	KB	SMC4	SH
19-Jun-04	1115	AMDI	V	1	KB	SMC3	S
19-Jun-04	1120	SIDE	M	1	KB	SMC3	
19-Jun-04	1130	AMDI	N	1	KW	SMC3	S
?		RIOT	V	1	KW	SMC2	S, RA
late June04		BRBE	V	1	Bevan	BL3	S
late June04		UNME	M	1	Chadwick	BL?	W
8-Jul-04	830	MA	V	7	KB, PM	BL1	W
8-Jul-04	900	BAEA	M	1	KB, PM	BL2	S
8-Jul-04	930	UNSA	V	1	KB, PM	BL2	S
8-Jul-04	930	UNME	V	1	KB, PM	BL2	W
8-Jul-04	1000	UNME	V	2	KB, PM	BL3	W
8-Jul-04	1030	UNSW	V	20	KB, PM	BL3	F
8-Jul-04	1030	BRBE	V	1	PM	BL3	SA, S
8-Jul-04	1100	CORA	V	2	KB, PM	BL3	RA, SH
8-Jul-04	1100	WIWR	S	1	KB, PM	BL3	SH
8-Jul-04	1115	MAMU	V	2	KB, PM	BL4	W
8-Jul-04	1130	BEKI	N	6	KB, PM	BL4	S
8-Jul-04	1130	UNWA	V	2	KB	BL4	S, SA
8-Jul-04	1140	BAEA	V	1	KB, PM	BL4	SG
8-Jul-04	1150	UNSA	V	1	KB	BL4	S
8-Jul-04	1155	SIDE	V	1	PM	BL1	SH
8-Jul-04	1200	UNME	V	3	KB, PM	BL1	S
8-Jul-04	1200	BEKI	S	1	KB	BL1	
8-Jul-04	1240	WIWR	S	1	KB	SMC5	
8-Jul-04	1240	HETH	S	1	KB	SMC5	SA, SB
8-Jul-04	1245	SWTH	S	1	KB	SMC5	RA
8-Jul-04	1305	BAEA	V	1	KB	SMC5	F
8-Jul-04	1320	BRBE	T	1	KB	SMC5	S
8-Jul-04	1320	SIDE	T	1	KB	SMC5	S
8-Jul-04	1352	UNWA	V	3	KB	SMC5	SA
8-Jul-04	1352	AMRO	S	1	KB	SMC5	RA
8-Jul-04	1400	VATH	V	1	KB	SMC5	S
8-Jul-04	1410	AMDI	V	1	KB	SMC5	S
8-Jul-04	1430	SIDE	T	2	KB	SMC4	SH, LV
8-Jul-04	1430	WIWA	V	1	KB	SMC4	SH, LV
8-Jul-04	1452	SIDE	T	2	KB	SMC4	S
8-Jul-04	1508	RESA	F	1	KB	SMC4	SH

8-Jul-04	1522	AMDI	V	2	KB	SMC4	S
8-Jul-04	1545	UNHU	V	1	KB	SMC4	SA
8-Jul-04	1545	UNSW	V	10	KB	SMC4	F
16-Jul-04	1109	BAEA	V	1	KB	BL1	F
16-Jul-04	1130	UNGU	V	1	KB	BL1	F
16-Jul-04	1142	UNSA	V	1	KB	BL2	S
16-Jul-04	1150	RESQ	S	1	KB	BL2	SH
16-Jul-04	1152	SWTH	S	1	KB	BL2	
16-Jul-04	1156	UNCH	S	1	KB	BL2	SA
16-Jul-04	1230	AMDI	V	1	KB	BL3	S
16-Jul-04	1300	CAGO	V	6	KB	BL3	W
16-Jul-04	1300	UNSA	V	1	KB	BL3	S
16-Jul-04	1310	CAGO	Sc	3	KB	BL3	S
16-Jul-04	1310	SPSA	V	5	KB	BL3	S
16-Jul-04	1310	SWTH	S	1	KB	BL3	SH
16-Jul-04	1404	HETH	S	1	KB	BL3	SH
16-Jul-04	1413	DAJU	V	2	KB	BL3	SA
16-Jul-04	1413	BRBE	T	1	KB	BL3	S
16-Jul-04	1413	SIDE	T	1	KB	BL3	S
16-Jul-04	1413	BRBE	Sc	1	KB	BL3	S
16-Jul-04	1435	SPSA	V	1	KB	BL3	S
16-Jul-04	1443	UNCH	V	1	KB	BL3	SA
16-Jul-04	1449	SPSA	V	1	KB	BL3	S
16-Jul-04	1449	SWTH	V	1	KB	BL3	SA
16-Jul-04	1449	DAJU	V	1	KB	BL3	S
16-Jul-04	1449	UNSW	V	1	KB	BL3	F
16-Jul-04	1500	HADU	V	1	KB	BL3	W
16-Jul-04	1500	UNGO	V	1	KB	BL3	W
16-Jul-04	1531	UNWA	V	1	KB	BL3	SA
16-Jul-04	1531	BAEA	V	1	KB	BL3	SH
16-Jul-04	1600	UNGO	V	1	KB	BL4	F
16-Jul-04	1634	WIWR	S	1	KB	BL4	SG
16-Jul-04	1641	BEKI	V	1	KB	BL4	F
16-Jul-04	1730	SIDE	V, I	1	KB	R1	R
21-Jul-04		SIDE	V, I	1	Dawn	R2	R
22-Jul-04	1600	MOGO	V	8	KB	BL2	AP
22-Jul-04	1700	BAEA	V	1	KB	BL2	SH
22-Jul-04	2000	SWTH	S	1	KB	BL3	SG
22-Jul-04	2000	RESQ	S	1	KB	BL3	SG
22-Jul-04	2000	SIDE	T	2	KB	BL3	S
22-Jul-04	2000	CAGO	Sc	1	KB	BL3	S
22-Jul-04	2030	HADU	V	1	KB	BL3	W
22-Jul-04	2030	UNGO	V	1	KB	BL3	W
22-Jul-04	2100	BRBE	T	1	KB	BL3	S
22-Jul-04	2100	BAEA	V	1	KB	BL3	F, HV

22-Jul-04	2220	SPSA	V	3	KB	BL3	S
23-Jul-04	0400	SWTH	S	3	KB	BL3	SH
23-Jul-04	0400	VATH	S	3	KB	BL3	SH
23-Jul-04	0400	NSOW	S	1	KB	BL3	SH
23-Jul-04	0450	AMRO	S	1	KB	BL3	SH
23-Jul-04	0450	RESQ	S	1	KB	BL3	SH
23-Jul-04	0450	UNSH	V	1	KB	BL3	S
23-Jul-04	0450	SPSA	V	3	KB	BL3	S
23-Jul-04	0530	DAJU	V	1	KB	BL3	S
23-Jul-04	0630	CORA	V	2	KB	BL3	F
23-Jul-04	0715	UNCH	H	3	KB	BL3	SG
23-Jul-04	1920	SIDE	V	2	KB	BL3	MV
24-Jul-04	0600	SWTH	S	2	KB	BL3	SH
24-Jul-04	0600	UNCH	S	2	KB	BL3	SH
24-Jul-04	0600	DAJU	V	1	KB	BL3	SH
24-Jul-04	0600	BEKI	V	1	KB	BL3	S
24-Jul-04	0630	MAMU	V	14	KB	BL4	W
5-Aug-04	1430	STJA	V	1	KB	R1	RA
5-Aug-04	1430	DAJU	V	1	KB	R1	R
5-Aug-04	1430	WIWR	S	1	KB	R3	RA
5-Aug-04	1500	BEKI	V	1	KB	BL1	W
5-Aug-04	1500	BAEA	V	1	KB	BL1	F
5-Aug-04	1600	BAEA	V	1	KB	BL4	SG
5-Aug-04	1615	BAEA	V	1	KB	BL4	SG, HV
5-Aug-04	1700	CEWA	V	1	KB	BL3	SG
5-Aug-04	1700	DAJU	V	1	KB	BL3	SG
5-Aug-04	1730	SIDE	T	3	KB	BL3	S
5-Aug-04	1800	SIDE	T	1	KB	BL3	M
5-Aug-04	1800	UNCH	S	1	KB	BL3	M
5-Aug-04	1800	UNWA	V	1	KB	BL3	M
5-Aug-04	1818	DAJU	V	1	KB	BL3	SG, S
5-Aug-04	1818	SPSA	V	1	KB	BL3	S
5-Aug-04	1818	CAGO	V	1	KB	BL3	F, S
5-Aug-04	1818	SPSA	V	1	KB	BL3	S
5-Aug-04	2010	UNGO	V	1	KB	BL3	F
5-Aug-04	2200	SPSA	V	2	KB	BL3	S
6-Aug-04	0730	MA	V	4	KB	BL3	S,W
6-Aug-04	0900	DAJU	V	2	KB	BL3	S
6-Aug-04	0900	UNWA	V	2	KB	BL3	S
6-Aug-04	0900	UNSP	V	2	KB	BL3	SA
6-Aug-04	0900	RESQ	V	1	KB	BL3	S,SA
6-Aug-04	0930	WIWA	V	1	KB	BL3	SA,SH
6-Aug-04	0930	UNWA	V	2	KB	BL3	SA,SH
6-Aug-04	0930	UNCH	V	2	KB	BL3	SA,SH
6-Aug-04	0930	SPSA	V	2	KB	BL3	S

6-Aug-04	0940	HADU	V	7	KB	BL3	W
6-Aug-04	1024	UNWA	V	2	KB	BL3	SA
6-Aug-04	1024	UNCH	V	2	KB	BL3	SA
6-Aug-04	1033	RESQ	S	1	KB	BL3	SA
6-Aug-04	1033	BEKI	V	1	KB	BL3	F
6-Aug-04	1033	UNWA	V	2	KB	BL3	SA
6-Aug-04	1033	UNCH	V	2	KB	BL3	SA
6-Aug-04	1055	UNWA	V	4	KB	BL2	SA
6-Aug-04	1100	MA	V	3	KB	BL2	F
6-Aug-04	1130	SIDE	T	1	KB	BL2	MV
6-Aug-04	1130	BRBE	T	1	KB	BL2	MV
6-Aug-04	1130	PIMI	Sc	1	KB	BL2	MV
6-Aug-04	1143	UNWA	V	2	KB	BL2	SA
6-Aug-04	1143	UNCH	V	2	KB	BL2	SA
6-Aug-04	1200	UNWA	V	4	KB	BL2	SA
6-Aug-04	1210	UNTH	V	1	KB	BL2	SH
6-Aug-04	1216	UNWA	V	1	KB	BL2	SA
6-Aug-04	1221	UNWA	V	1	KB	BL2	SA
6-Aug-04	1245	BRBE	B,Sc	1	KB	BL2	MV
6-Aug-04	1318	UNWA	V	4	KB	BL2	SA
6-Aug-04	1338	UNCH	V	2	KB	BL1	SA, HV
6-Aug-04	1345	UNCH	V	6	KB	BL1	SA
6-Aug-04	1345	UNWA	V	2	KB	BL1	SA
6-Aug-04	1345	WIWA	V	1	KB	BL1	SA
6-Aug-04	1410	SIDE	T	3	KB	BL1	S,HV
6-Aug-04	1419	CORA	V	2	KB	BL1	SH
6-Aug-04	1426	UNWA	V	8	KB	BL1	SA, SH
6-Aug-04	1500	FOSP	V	1	KB	BL1	BB
6-Aug-04	1520	SIDE	T	2	KB	BL1	BB
6-Aug-04	1530	UNCH	V	2	KB	BL1	SH
6-Aug-04	1547	UNSA	V	1	KB	BL1	S
6-Aug-04	1547	BEKI	V	1	KB	BL1	F
6-Aug-04	1600	BAEA	V	1	KB	BL2	SG
6-Aug-04	1613	SIDE	T	2	KB	BL2	S
6-Aug-04	1613	UNWA	V	1	KB	BL2	BB
6-Aug-04	1618	SIDE	T	2	KB	BL2	S
6-Aug-04	1618	BEKI	N	2	KB	BL2	S
6-Aug-04	1658	RESQ	V	1	KB	BL2	SA
6-Aug-04	1709	SOSP	V	1	KB	BL2	S
6-Aug-04	1715	RESQ	S	2	KB	BL2	SH
6-Aug-04	1726	HADU	V	7	KB	BL3	W
6-Aug-04	1726	UNWA	V	2	KB	BL3	SA
6-Aug-04	1726	UNSA	V	3	KB	BL3	S
6-Aug-04	1726	RESQ	H	1	KB	BL3	SH
6-Aug-04	1726	UNGO	V	1	KB	BL3	W,F

6-Aug-04	1743	DAJU	V	2	KB	BL3	S, BB, A
6-Aug-04	1743	UNWA	V	2	KB	BL3	S, BB, A
6-Aug-04	1753	UNWA	V	6	KB	BLC1	SA
6-Aug-04	1753	UNCH	V	6	KB	BLC1	SA
6-Aug-04	1806	RESQ	V	1	KB	BL3	S,D
10-Aug-04	1300	REHA	V, I	2	KB	Verst.	F
21-Aug-04	1130	HEGU	V	5	KB	SMC0	W
21-Aug-04	1200	AMDI	V	1	KB	SMC1	S
21-Aug-04	1200	UNSA	V	1	KB	SMC1	S
21-Aug-04	1200	GLGU	V	2	KB	SMC1	S
21-Aug-04	1242	WIWR	V	1	KB	SMC1	RA
21-Aug-04	1242	AMDI	V	1	KB	SMC1	S
21-Aug-04	1242	SIDE	T	2	KB	SMC1	S
23-Aug-04	0645	DAJU	S	2	KB	R1	RA
23-Aug-04	0645	SIDE	T	1	KB	R1	RA
23-Aug-04	0723	GLGU	V	6	KB	SMC1	W
23-Aug-04	0730	FOSP	V	4	KB	R2	R
23-Aug-04	0730	DAJU	V	1	KB	R2	R
23-Aug-04	0756	WIWR	V	1	KB	R2	RA
23-Aug-04	0756	UNWA	V	1	KB	R2	RA
23-Aug-04	0800	FOSP	V	2	KB	R3	SB,EB
23-Aug-04	0800	UNCH	V	2	KB	R3	RA
23-Aug-04	0800	UNWA	V	1	KB	R3	RA
23-Aug-04	0800	STJA	V	1	KB	R3	SH
23-Aug-04	0821	FOSP	V	2	KB	R3	R
23-Aug-04	0821	HETH	V	1	KB	R3	RA
23-Aug-04	0910	BEKI	V	1	KB	R4	F,SH
23-Aug-04	0942	UNWA	V	2	KB	R4	RA
23-Aug-04	0942	HETH	V	2	KB	R4	SA
23-Aug-04	0942	RESQ	S	1	KB	R4	SH
23-Aug-04	1001	FOSP	V	10	KB	R1	R
28-Aug-04	1154	GLGU	V	3	KB	SMC0	W
28-Aug-04	1154	COME	V	2	KB	SMC0	W
28-Aug-04	1154	UNWA	V	1	KB	SMC0	RA
28-Aug-04	1201	GLGU	V	12	KB	SMC1	S,W
28-Aug-04	1201	SPSA	V	1	KB	SMC1	S
28-Aug-04	1212	AMDI	V	1	KB	SMC2	S
28-Aug-04	1215	GLGU	V	2	KB	SMC3	S
28-Aug-04	1215	AMDI	V	4	KB	SMC3	S
28-Aug-04	1230	BEKI	V	1	KB	SMC4	F
28-Aug-04	1230	AMDI	V	2	KB	SMC4	S
28-Aug-04	1230	UNWA	V	2	KB	SMC4	RA
28-Aug-04	1230	SPSA	V	1	KB	SMC3	S
28-Aug-04	1230	UNCH	V	1	KB	SMC3	SA
lateAug04		UNOW	V	1	Buckmstr	SMC1	R

11-Sep-04	0900	BRBE	V	1	KB	BL2	AP
11-Sep-04	0941	UNWA	V	4	KB	BLC1	A,SH
11-Sep-04	0941	UNCH	V	4	KB	BLC1	A,SH
11-Sep-04	0941	SIDE	T	2	KB	BLC1	S
11-Sep-04	0941	MOGO	V	2	KB	BL3	AP
11-Sep-04	0941	AMDI	V	4	KB	BLC2	S
11-Sep-04	0941	SIDE	T	2	KB	BLC2	S
11-Sep-04	0941	SPSA	V	1	KB	BLC2	S
11-Sep-04	1035	MOGO	V	2	KB	BLC3	AP
11-Sep-04	1051	SIDE	T	2	KB	BLC3	S
11-Sep-04	1051	DAJU	V	1	KB	BLC3	SA
11-Sep-04	1110	SPSA	V	2	KB	BLC3	S
11-Sep-04	1110	UNWA	V	4	KB	BLC3	SB
11-Sep-04	1146	RESA	V	1	KB	BLC4	SH, MV
11-Sep-04	1146	UNTH	V	3	KB	BLC4	SH, EB
11-Sep-04	1146	UNCH	V	3	KB	BLC4	SH, EB
11-Sep-04	1330	MOGO	V	1	KB	BLC5	AP
11-Sep-04	1330	YRWA	V	1	KB	BLC3	SA
11-Sep-04	1330	UNWA	V	2	KB	BLC3	SA
11-Sep-04	1330	UNTH	V	2	KB	BLC3	SA
11-Sep-04	1445	BAEA	V	1	KB	BL3	S
11-Sep-04	1520	CAGO	V	6	KB	BL3	W
11-Sep-04	1526	BAEA	V	1	KB	BL2	SH
2-Oct-04	0858	BRBE	Sc	1	KB	T1	SA,SH
2-Oct-04	0858	SIDE	T	1	KB	T1	SA,SH
2-Oct-04	0858	RESQ	S	1	KB	T1	SH
2-Oct-04	0916	BEKI	V	1	KB	T2	S
2-Oct-04	0916	NOFL	V	1	KB	T2	SH
2-Oct-04	0937	RESQ	S	1	KB	T2	SH
2-Oct-04	1020	AMDI	V	1	KB	T2	S
2-Oct-04	1020	STJA	V	2	KB	T2	SH
2-Oct-04	1055	FOSP	V	1	KB	T2	SA,SB
2-Oct-04	1055	DAJU	V	1	KB	T2	SA,SB
2-Oct-04	1055	WIWR	S	1	KB	T2	SA,SB
2-Oct-04	1205	RESQ	S	1	KB	T3	SH
2-Oct-04	1205	UNCH	S	4	KB	T3	SH,SA
2-Oct-04	1205	RIDU	V	1	KB	T4	W
2-Oct-04	1205	COME	V	1	KB	T4	W
3-Oct-04	1420	BAEA	V	1	KB	T2	F
3-Oct-04	1420	COME	V	4	KB	T2	W
3-Oct-04	1420	RESQ	S	2	KB	T2	SH
3-Oct-04	1420	STJA	V	1	KB	T2	SH
3-Oct-04	1447	RESQ	S	1	KB	T2	SH
3-Oct-04	1513	RESQ	S	1	KB	T3	SH
3-Oct-04	1513	RESQ	S	2	KB	T3	SH

3-Oct-04	1513	WIWR	S	1	KB	T3	SH
3-Oct-04	1524	WIWR	S	1	KB	T3	SH
3-Oct-04	1524	AMDI	V	1	KB	T3	S
3-Oct-04	1524	BAEA	V	1	KB	T3	F,SH
3-Oct-04	1524	BRBE	H	1	KB	T3	SA
3-Oct-04	1524	BRBE	H	1	KB	T3	SA
3-Oct-04	1615	RIDU	V	1	KB	T4	W
3-Oct-04	1630	WIWR	S	1	KB	T4	SB
12-Nov-04	1455	AMDI	V	1	KB	SMC5	S
12-Nov-04	1455	BAEA	V	1	KB	SMC5	F
12-Nov-04	1540	SIDE	T	1	KB	SMC5	S
13-Nov-04	0930	CORA	V	8	KB	R2	F
13-Nov-04	0930	BUFF	V	3	KB	R2	W
13-Nov-04	0930	WIWR	V	1	KB	R3	SB
13-Nov-04	0930	RESQ	S	1	KB	R3	SH
13-Nov-04	0930	UNCH	S	4	KB	R3	SH
13-Nov-04	0930	SIDE	T	2	KB	SMC4	SH
13-Nov-04	0930	WIWR	V	1	KB	SMC4	SH
13-Nov-04	0930	COME	V	1	KB	SMC4	W
13-Nov-04	0930	SIDE	T	2	KB	SMC4	SH
13-Nov-04	0930	SIDE	T	1	KB	SMC4	RA
13-Nov-04	0930	UNHA	V	1	KB	SMC4	F
13-Nov-04	1217	CORA	V	2	KB	SMC3	F
13-Nov-04	1217	WIWR	S	1	KB	SMC3	SB
13-Nov-04	1233	AMDI	V	1	KB	SMC3	S
13-Nov-04	1245	MINK	Sc	1	KB	SMC3	S
13-Nov-04	1345	BAEA	V	2	KB	R3	F
13-Nov-04	1352	MA	V	1	KB	R2	W
13-Nov-04	1352	PISI	V	30	KB	R2	R
13-Nov-04	1400	CORA	V	2	KB	SMC1	F
13-Nov-04	1400	NOCR	V	1	KB	SMC1	F
13-Nov-04	1423	BEKI	S	1	KB	SMC0	RA
13-Nov-04	1444	AMDI	V	1	KB	SMC1	S
13-Nov-04	1505	MINK	T	1	KB	SMC1	S
13-Nov-04	1505	RIOT	T	1	KB	SMC1	S
13-Nov-04	1505	AMDI	V	1	KB	SMC2	S
13-Nov-04	1530	COME	V	4	KB	SMC0	W
14-Nov-04	0900	VATH	V	1	KB	SMC5	AH
14-Nov-04	0940	CORA	V	1	KB	SMC6	F
14-Nov-04	0954	GOKI	V	3	KB	SMC5	RA, SG
14-Nov-04	1018	BRCR	V	1	KB	SMC5	SH
14-Nov-04	1030	WIWR	V	1	KB	SMC5	SH
14-Nov-04	1037	WIWR	V	1	KB	SMC5	SH
14-Nov-04	1118	RESQ	S	1	KB	SMC5	SH
14-Nov-04	1136	CORA	V	1	KB	SMC5	RA

14-Nov-04	1140	BAEA	V	1	KB	R3	SH
14-Nov-04	1140	CORA	V	2	KB	R3	F
14-Nov-04	1153	BAEA	V	1	KB	SMC4	F
14-Nov-04	1212	WIWR	S	1	KB	SMC4	SH
14-Nov-04	1212	CORA	V	6	KB	SMC4	F
14-Nov-04	1212	BAEA	V	2	KB	SMC4	SH
14-Nov-04	1259	BUFF	V	3	KB	R2	W
21-Nov-04	1020	BAEA	V	1	KB	BL4	SH
21-Nov-04	1025	BAEA	V	1	KB	BL4	F
21-Nov-04	1100	SIDE	T	4	KB	BL3	SH, HV
21-Nov-04	1345	BUFF	V	5	KB	BL3	W
21-Nov-04	1417	BAEA	V	1	KB	BL2	SH
21-Nov-04	1430	BUFF	V	2	KB	R2	W
28-Dec-04	1030	SIDE	V	4	KB	BL3	SH,MV
28-Dec-04	1300	TRSW	V	4	KB	BL3	W
28-Dec-04	1300	BUFF	V	2	KB	BL3	W
31-Dec-04	1130	SHWE	T	1	KB	BvrLk	M
9-Jan-05	1400	TRSW	Sc	3	KB	T2	W
15-Jan-05	1141	SIDE	T	2	KB	R4	R
15-Jan-05	1215	RESQ	T	4	KB	R4	R
15-Jan-05	1200	BAEA	V	1	KB	BL4	F
15-Jan-05	1300	CORA	V	4	KB	R2	F,RA
15-Jan-05	1316	SIDE	V	1	KB	BL4	SH
15-Jan-05	1330	SIDE	T	2	KB	R4	R
15-Jan-05	1440	SIDE	T	2	KB	SMC5	RA
15-Jan-05	1500	RESQ	T	4	KB	SMC5	RA,SH
15-Jan-05	1546	WIWR	V	2	KB	SMC5	SH
15-Jan-05	1617	UNMO	T	2	KB	SMC5	RA,S
23-Jan-05	0900	BEKI	V	1	KB	SMC1	S
23-Jan-05	1400	TRSW	M	1	KB	BL3	S
23-Jan-05	1400	PIMA	Sc	1	KB	BL3	S
23-Jan-05	1550	BAEA	V	1	KB	BL2	SH
29-Jan-05	1550	CAGO	V	15	KB	BL3	W
29-Jan-05	1550	TRSW	V	4	KB	BL3	W
29-Jan-05	1550	MA	V	3	KB	BL3	W
29-Jan-05	1550	UNGO	V	5	KB	BL3	W
29-Jan-05	1550	RIDU	V	3	KB	BL3	W
29-Jan-05	1550	PIMA	T	1	KB	BL1	SH
29-Jan-05	1550	MINK	T	1	KB	SMC5	S
5-Feb-05	0948	CORE	V	9	KB	R2	R, RA
5-Feb-05	1008	UNMO	T	4	KB	BL1	R
5-Feb-05	1008	RESQ	T	1	KB	BL1	R
5-Feb-05	1008	SIDE	T	3	KB	R4	R
5-Feb-05	1008	RESQ	T	10	KB	R4	R
5-Feb-05	1030	PIMA	T	1	KB	SMC5	S

5-Feb-05	1030	SIDE	T	3	KB	SMC5	R
6-Feb-05	1000	SIDE	T	2	KB	BL1	S
6-Feb-05	1000	CORA	S	1	KB	BL1	SH
6-Feb-05	1019	SIDE	T	2	KB	BL2	S
6-Feb-05	1019	BAEA	S	1	KB	BL2	SH
6-Feb-05	1042	PIMA	T	1	KB	BL2	SH
6-Feb-05	1042	CORA	V	2	KB	BL2	SH
6-Feb-05	1042	BAEA	V	1	KB	BL2	SH
6-Feb-05	1042	SIDE	T	1	KB	BL2	S
6-Feb-05	1042	RESQ	S	1	KB	BL2	SH
6-Feb-05	1054	UNWO	S	1	KB	BL2	SH
6-Feb-05	1131	SIDE	T	1	KB	BL2	S
6-Feb-05	1147	RESQ	S	1	KB	BL2	SH
6-Feb-05	1203	MOGO	V	2	KB	BL3	SH,SL
6-Feb-05	1203	BAEA	V	1	KB	BL3	SH
6-Feb-05	1203	CORA	V	1	KB	BL3	F
6-Feb-05	1203	SIDE	V	1	KB	BL3	SH
6-Feb-05	1203	SIDE	V	1	KB	BL3	S
6-Feb-05	1216	CAGO	V	16	KB	BL3	W
6-Feb-05	1230	TRSW	V	38	KB	BL3	W
6-Feb-05	1230	BUFF	V	4	KB	BL3	W
6-Feb-05	1230	RIDU	V	3	KB	BL3	W
6-Feb-05	1253	MOGO	T	4	KB	BL3	S
6-Feb-05	1253	SIDE	T	2	KB	BL3	SB,S
6-Feb-05	1416	COSN	V	4	KB	BL3	S
6-Feb-05	1416	TRSW	T	4	KB	BL3	S
6-Feb-05	1416	CAGO	T	4	KB	BL3	S
6-Feb-05	1416	SIDE	T	1	KB	BL3	S
6-Feb-05	1416	UNMO	T	4	KB	BL3	S
6-Feb-05	1416	PIMA	T	1	KB	BL3	SG
6-Feb-05	1537	RIDU	V	50	KB	BL3	W
6-Feb-05	1537	MA	V	5	KB	BL3	W
6-Feb-05	1537	PIMA	T	1	KB	BL3	SH
6-Feb-05	1537	PIMA	T	1	KB	BL3	SH
13-Feb-05	0930	AMDI	V	1	KB	BL1	S
13-Feb-05	0930	PIMA	T	1	KB	BL1	SH
13-Feb-05	1037	SIDE	T	1	KB	BL1	S
13-Feb-05	1045	PIMA	T	1	KB	BL2	SH
13-Feb-05	1045	CORA	S	1	KB	BL2	SH
13-Feb-05	1045	UNCH	S	2	KB	BL2	SH
13-Feb-05	1111	AMDI	V	1	KB	BL2	S
13-Feb-05	1130	TRSW	V	20	KB	BL3	W
13-Feb-05	1205	UNGO	V	4	KB	BL3	W
13-Feb-05	1205	BUFF	V	6	KB	BL3	W
13-Feb-05	1230	PIMA	T	1	KB	BL3	SH

13-Feb-05	1230	COSN	V	4	KB	BL3	S
13-Feb-05	1230	DAJU	V	1	KB	BL3	S
13-Feb-05	1230	TRSW	T	1	KB	BL3	S
13-Feb-05	1417	SIDE	T	1	KB	BL3	S
13-Feb-05	1417	TRSW	T	2	KB	BL3	S
13-Feb-05	1417	CAGO	T	2	KB	BL3	S
13-Feb-05	1417	UNDU	V	28	KB	BL3	W
13-Feb-05	1519	SIDE	V	1	KB	BL3	SH

1Species Codes

AMDI = American Dipper
AMRO = American Robin
BAEA = Bald Eagle
BEKI = Belted Kingfisher
BRBE = Brown Bear
BRCR = Brown Creeper
BUFF = Bufflehead
CAGO = Canada Goose
CEWA = Cedar Waxwing
COME = Common Merganser
CORE = Common Redpoll
CORA = Common Raven
COSN = Common Snipe
DAJU = Darkeyed Junco
FOSP = Fox Sparrow
GLGU = Glaucous-Winged Gull
GOKI = Golden-crowned Kinglet
HADU = Harlequin Duck
HEGU = Herring Gull
HETH = Hermit Thrush
MA = Mallard
MAMU = Marbled Murrelet
MINK = Mink
MOGO = Mountain Goat
NOCR = Northwestern Crow
NOFL = Northern Flicker
NSOW = Northern Saw-whet Owl
PIMA = Pine Marten
PISI = Pine Siskins
RIDU = Ring-necked duck
RIOT = River Otter
REHA = Red-tailed Hawk
RESA = Red-breasted Sapsucker

RESQ = Red squirrel
RIOT = River Otter
SHWE = Short-tailed Weasel?
SIDE = Sitka Black tailed Deer
SOSP = Song Sparrow
SPSA = Spotted Sandpiper
STJA = Steller's Jay
SWTH = Swainson's Thrush
TRSW = Trumpeter Swan
UNCH = unknown chickadees (Most likely all were Chestnut-backed chickadees)
UNDU = unknown duck
UNHA = unknown hawk
UNHU = unknown hummingbird
UNGO = unknown goldeneye
UNGU = Unknown gull
UNME = unknown merganser
UNMO = unknown mouse/vole
UNOW = unknown owl
UNSA = unknown sandpiper
UNSH = unknown shrew
UNSP = unknown sparrow
UNSW = unknown swallows
UNTH = unknown thrush
UNWA = unknown warbler
UNWO = unknown woodpecker
VATH = Varied Thrush
WIWA = Wilson's warbler
WIWR = Winter Wren
YRWA = Yellow-rumped Warbler

²Type of Observation Codes³Observer Codes⁴Unit or Reach Codes

B = bed	KB = Kent Bovee	BL = Blue Lake
F = food remains	KW = Karl Wolfe	BLC = Blue Lake Creek
H = hair	PM = Phil Mooney	R = Blue Lake Road
I = incidental		SMC = Sawmill Creek
M = mortality		T = T-line
N = nest		
S = sound		
Sc = scat		
T = track		
V = visual		

⁵Habitat Codes

AP = alpine
BB = blueberry
D = drift wood, logs
EB = elderberry
F = flying, not associated with vegetation
M = muskeg
R = road
RA = red alder
S = shoreline
SA = Sitka alder SB = salmonberry
SG = second growth
SH = spruce-hemlock forest
LV = low volume
MV = medium volume
HV = high volume
SL = slide area
W = on water, river or lake