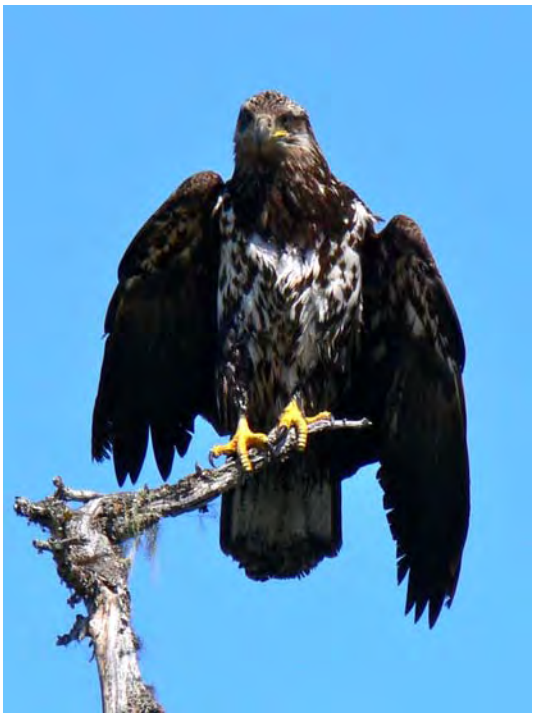
COEUR ALASKA KENSINGTON PROJECT

USFS Annual Report 2010

Terrestrial Wildlife Monitoring
Slate Lakes Basin



Aquatic Science Inc
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1.0 Introduction

This report describes monitoring conducted during 2010 in accordance with the Kensington Project Terrestrial Wildlife Monitoring Plan. This plan was designed to ensure that environmental impacts to wildlife resources in the Slate Lakes basin area are mitigated during both construction and operation of the Kensington Project and that the reclamation process includes a plan to support and encourage use by local wildlife species.

The occurrence of wildlife species in the Slate Lakes basin prior to construction activity was summarized in the Kensington Gold Project Final Supplemental Environmental Impact Statement (FSEIS) (USFS 2004) and a baseline survey conducted in 2005 (Living System Designs 2005). Management indicator species in the Berners Bay area include black and brown bear, Sitka black-tailed deer, Alexander Archipelago wolf, bald eagle, red squirrel, river otter, marten, red-breasted sapsucker, brown creeper and Vancouver Canada goose. Sightings of wildlife or their sign within the Slate Lakes basin include moose, black bear, Canada geese, ducks, red squirrels, porcupine, river otter, old beaver cuttings, bald eagles, boreal toads, and various mustelid species. A lack of prey, including Sitka black-tailed deer, is suspected to limit use of the Slate Lakes area by wolves. Wildlife monitoring was conducted in 2006 and 2007 during the first phase of construction. There was no construction activity during 2008 and no wildlife monitoring was conducted during this period. Wildlife monitoring was resumed in early September 2009 at the start-up of construction activity at the Tailings Treatment Facility (TTF) and continued through 2010 when mine tailings were first placed in the TTF.

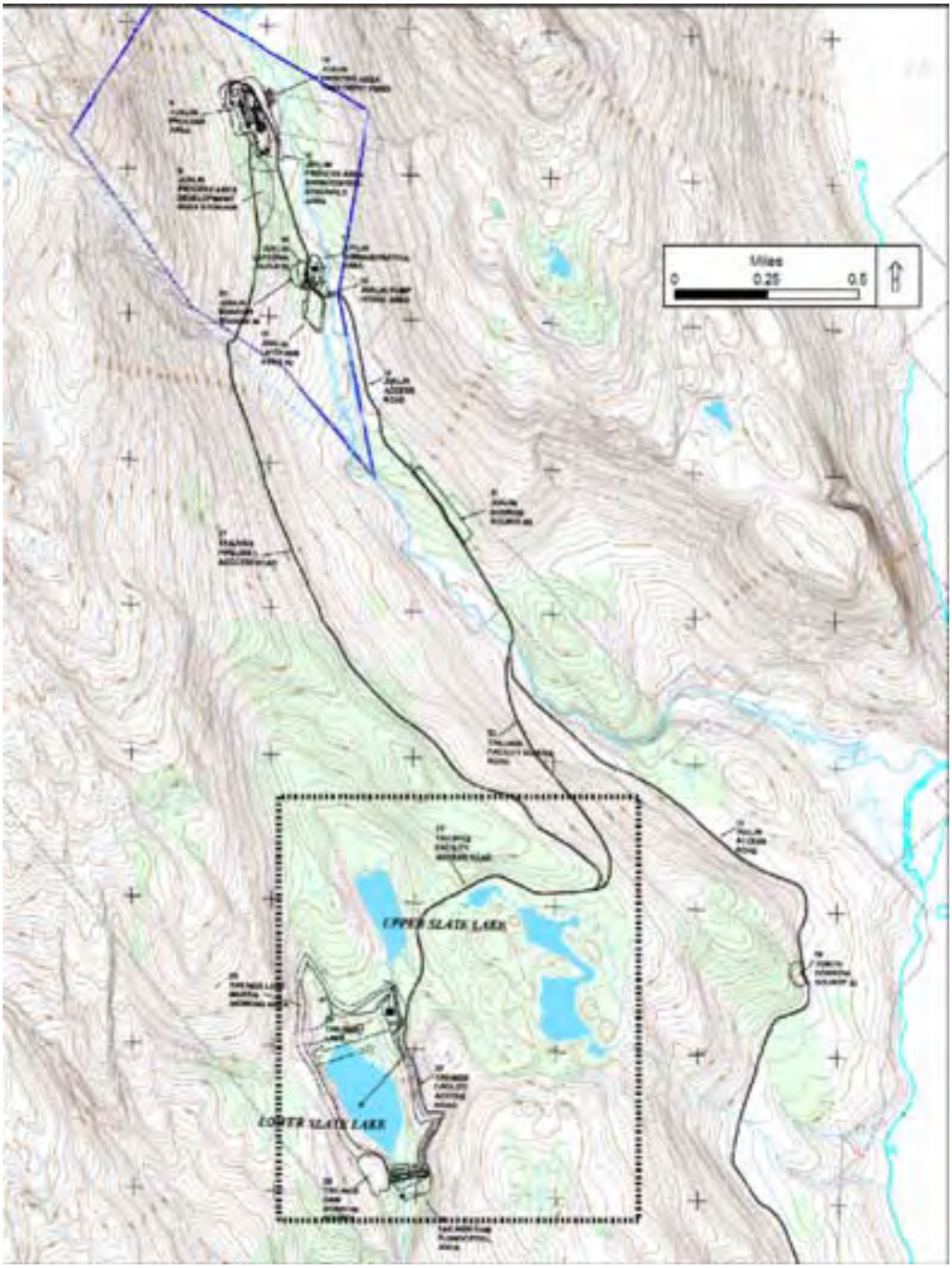

Figure 1: Slate Lakes Basin in relation to access roads and proposed tailings facility. The access road to the tailings facility was constructed in 2006. The tailings dam was constructed between August 2009 and August 2010.

1.1 Wildlife Monitoring Objectives

The objectives of the Kensington Project Wildlife Monitoring Plan are to:

- Supplement the regional resource knowledge base with site-specific data.
- Gather new information on specific wildlife habitats and species that could be affected by increased activity at the project site with specific attention to sensitive species.
- Identify concentrations of wildlife near specific resources (e.g., stream mouth marshes, anadromous streams, lakes, wetlands, bird nesting/feeding areas, large mammal crossing areas, etc.).
- Conduct wildlife observations along an established route surrounding the Slate Lakes basin on a frequent basis from spring through fall and intermittently through the remainder of the year.
- Collect data and other information that can be used to shape the subsequent year's studies and long-term monitoring.

Figure 2: The Slate Lakes Basin in 2005, prior to construction of the access road.

2.0 Survey Area

The survey area covered by the wildlife monitoring project lies within the confines of the Slate Lake basin, an area of approximately 2 sq km, ranging in elevation from 200m at the mouth of Lower Slate Lake to 300m on the ridge to the west of Lower Slate Lake (Figure 1). Water bodies within the basin include Lower and Upper Slate Lakes to the west and the Spectacle Lakes complex to the east. Both Lower and Upper Slate Lake have steep western slopes, but much of the remaining area around Upper Slate Lake is flat with a mild slope to the east. The area around Spectacle Lake is also fairly flat. There is drainage from the southeast corner of Spectacle Lake into Berners Bay, while Fat-Rat Lake drains into Upper Slate Lake (Figure 2). Upper Slate Lake drains to Lower Slate Lake via Mid-Lake Slate Creek and Lower Slate Lake drains to East Fork Slate Creek.

Prior to construction, terrestrial vegetation types around Upper and Lower Slate Lake were fairly similar and included mixed spruce and hemlock forest to the west of both lakes and to the southeast of Lower Slate Lake. The north and east shores of both lakes are characterized by wetlands containing sedge meadow and scrub muskeg. The periphery of Lower Slate Lake was clear-cut by September 2005 and the TTF access road along the north of Spectacle Lakes was constructed by August 2006. The immediate vicinity of Upper Slate Lake has not been impacted by the project. The vegetation structure around the Spectacle Lake complex includes sphagnum bogs and sedge fens with brushy, scrub forest in elevated areas. All of the lakes contained various species of aquatic vegetation, though not in high volume (Living System Designs 2005). Spectacle Lake contains the greatest concentration of aquatic vegetation, mainly in the three sloughs and in Fat Rat Lake.

3.0 Methods

Kate Savage, who conducted wildlife monitoring in 2006 and 2007, came to the site in early September 2009 to re-establish the same transects that were used in previous surveys. There are 21 transects around the basin, each 50m long and running in a north-south direction (Figure 4). The transects provide a systematic method for recording

wildlife sign throughout the year. The north and south ends of each transect are marked with long stakes with survey flagging and GPS co-ordinates. Each transect was visited two to three times a month during 2010 when the area was free from snow cover and once a month when snow covered the ground. The following methodology is followed during each survey. The north stake of a transect is located and a 50m measuring tape is strung out to reach the south stake. Trained field technicians then walk the length of the tape examining the ground within 1m either side of it. Signs such as tracks, scat or digging are recorded along with their position along the tape to the nearest 0.1m and whether they lay on the east or west side of the transect. In this way the precise location of wildlife sign is recorded so that fresh wildlife sign can more easily separated from older, previously recorded sign. Three motion-sensor cameras (Bushnell Trail Sentry, Model 11-9300) were also placed in areas where wildlife utilization or travel appeared especially high (heavily used trails) to provide information on the number of individuals using an area (A-C, Figure 4).

Figure 3: Spectacle Lake basin with access road to the Tailings Facility 2010.

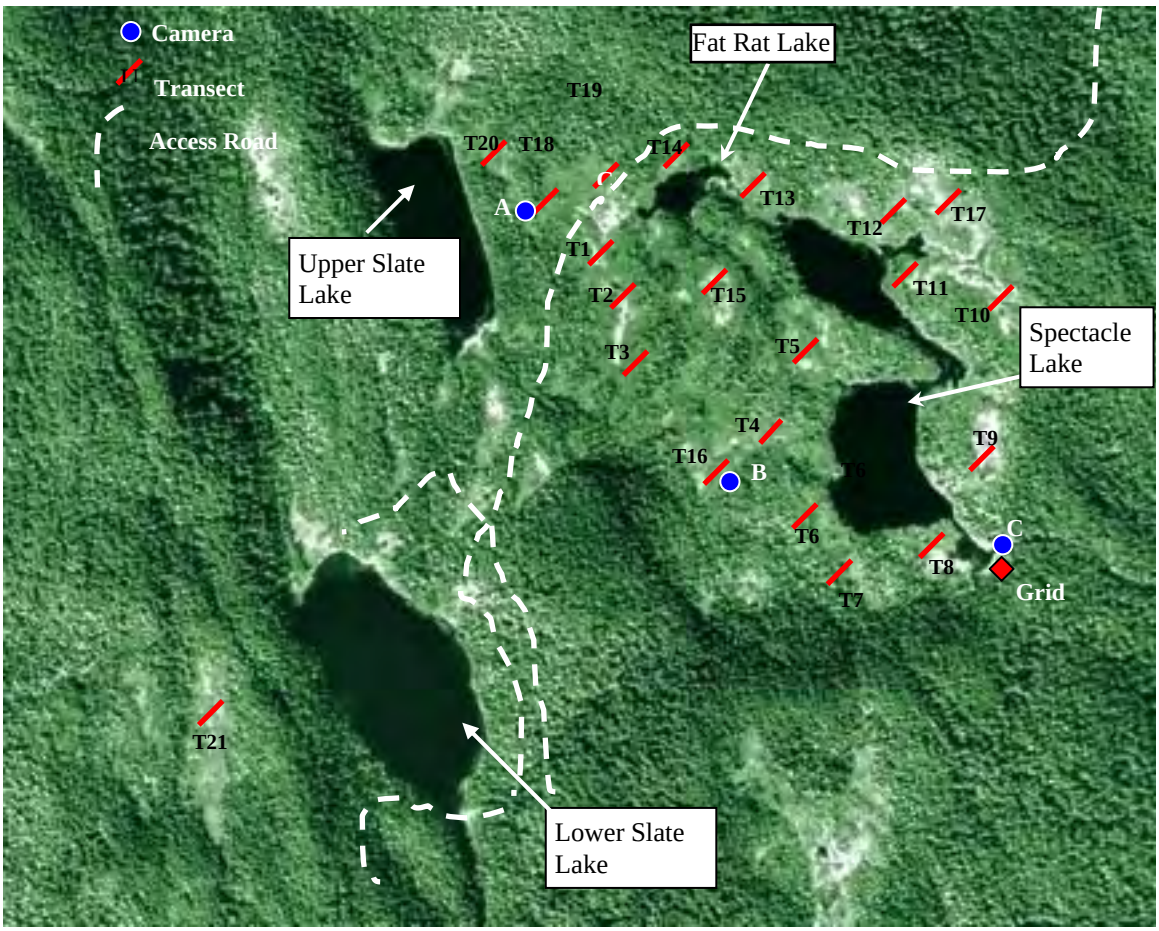

Figure 4: Wildlife transects camera locations in the Slate Lakes Basin.

Scans with binoculars were also made from established locations to detect the presence of wildlife from afar. This method is most effective for observing waterfowl on the lakes. Lower Slate Lake is easily visible from almost any aspect and was observed on route to Transect 21 accessed by walked around the south end of the Tailings Treatment Facility. Upper Slate Lake scans for waterfowl were made from both the southern meadow and the north- eastern muskeg. Viewing locations were optimum in the Spectacle Lakes area from the western edge of Lower Spectacle Lake, the southern tip of lower Spectacle Lake, which also afforded a good view of the adjacent southern slough, and the northern tip of upper Spectacle Lake.

An experienced field biologist as well as one of three trained technicians collected data on wildlife sign along transects to ensure that observations and data collection were as standardized and unbiased as possible. Other information collected included weather conditions and visibility and any human activity in the area. Tracks and other sign were identified using field guides eg. Elbroch (2003), Murie and Elbroch (2005), National Geographic Society (1987). Species of special interest include herons, waterfowl such as Vancouver Canada Geese, and raptors such as eagles and goshawks. No special surveys to detect the presence of goshawks using standard broadcast methods were conducted in 2010.

4.0 Survey Results

The presence of wildlife within the Slate Lakes basin was determined through actual sightings, motion-sensor camera photography as well as identification of signs. Data collected during surveys included direct observations of wildlife species with photographs where possible and the time of day, location and behavior. Images were also collected from the three motion-sensor cameras set up around the survey area. All three cameras displayed technical problems in early July, but were functioning again by July 29. They were removed from the field at the end of October to avoid problems with freezing. Images captured on camera are listed in Table 1. The table includes occasions when a camera was triggered by some unseen movement such as the wind blowing branches or people walking by. All images were studied in attempt to identify the same animals appearing on more than one occasion. Wildlife sign recorded included perennial sign such as well used game trails, dens or middens, scratching posts and stripped bark as well as ephemeral sign such as tracks, scat, browsing or digs. The colored tables (Tables 2-5) summarize wildlife sign by the main species present after snow cover melted from the Slate Lakes basin (bear, moose, goose).

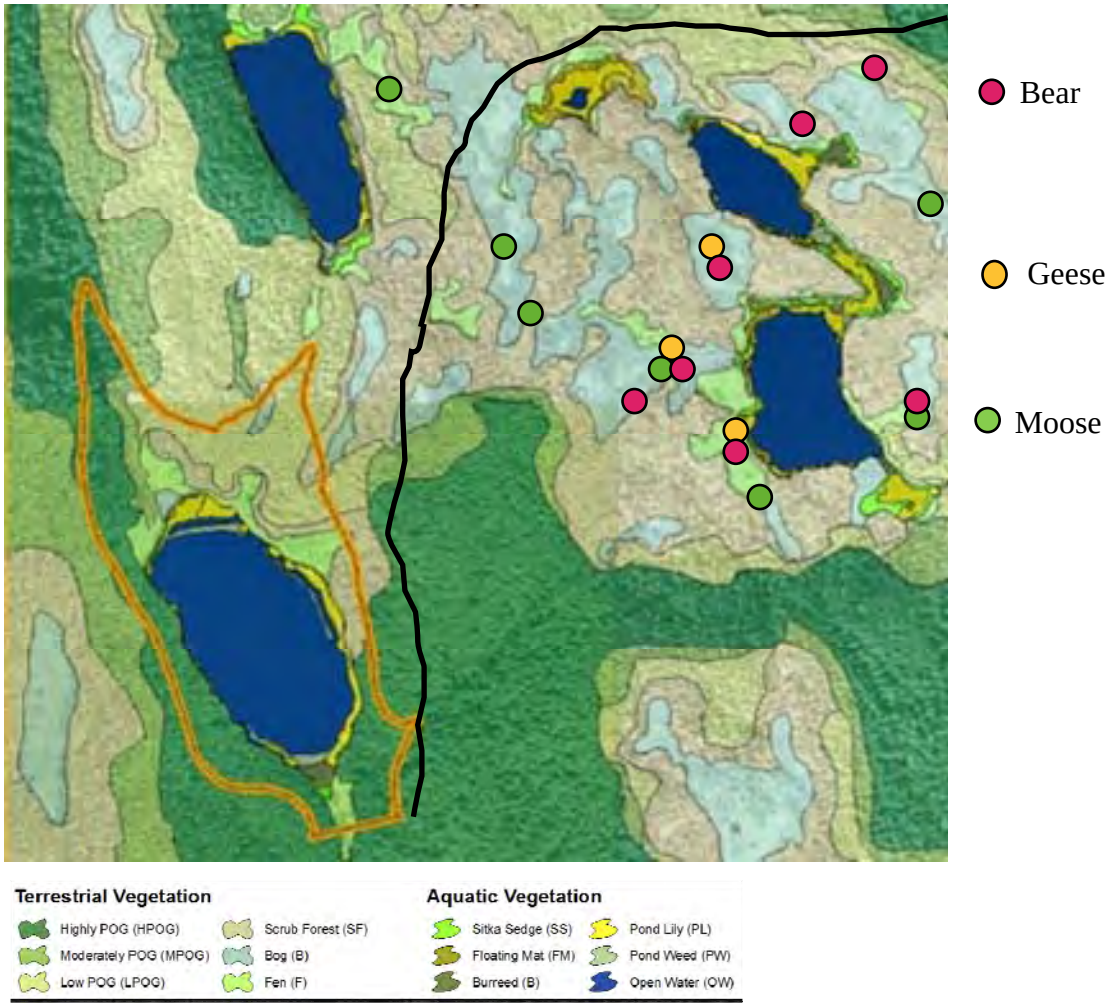

Figure 5: Locations with the greatest amounts of wildlife sign recorded in 2010 laid over the vegetation map. Vegetation was mapped in August 2005 and remains little changed except for the area disturbed within the orange boundary around Lower Slate Lake. This was clearcut in September 2005.

Location	Date	Time	Species	Description
Beaver Dam	5/23/10	02:59pm	Black bear	#1 Fat black
T16	5/27/10	01:54am	Moose	#1 cow
T16	5/28/10	03:08am	Moose	#1 Bull
Beaver Dam	6/4/10	2:14pm	Moose	#2 Bull
Beaver Dam	6/6/10	1:33pm	Black bear	#2 cinnamon
Beaver Dam	6/8/10	12:32pm	Moose	#3 Bull (smallest rack)
T16	6/9/10	3:00pm	Moose	#1 Bull
Beaver Dam	6/11/10	11:26am	Bald eagle	Mature (white head)
Beaver Dam	6/12/10	11:29am	Black bear	#1 Fat black
Beaver Dam	6/13/10	1:06pm	Bald eagle	Immature (mottled)
Beaver Dam	6/13/10	6:12pm	Bald eagle	Immature (mottled)
Beaver Dam	6/18/10	12:54pm	Black bear	#1 Fat black
Beaver Dam	6/18/10	3:46pm	Bald eagle	Mature (white head)
Beaver Dam	6/18/10	10:39pm	Moose	#2 Bull
Beaver Dam	6/19/10	11:01am	2 Black bears	#3 bi-color, #1 fat
T16	6/20/10	9:13am	Black bear	#4 scraggy
Beaver Dam	6/23/10	10:38pm	Moose	#1 Bull
Beaver Dam	7/29/10	12:46pm	Black bear	#5 black w/light snout
Beaver Dam	7/29/10	5:00pm	Black bear	#6 skinny
T20	8/6/10	3:12pm	Homo sapiens	
Beaver Dam	8/6/10	4:40pm	2 Black bears	#3 bi-color, #6 smaller black
Beaver Dam	8/8/10	7:22am	Moose	#4 Bull
Beaver Dam	8/14/10	12:26pm	Black bear	#5 black w/light snout
Beaver Dam	8/16/10	2:58pm	None	
Beaver Dam	8/24/10	1:14pm	Bald eagle	Mature (white head)
Beaver Dam	8/25/10	8:29am	None	
Beaver Dam	8/26/10	8:48 AM	Homo sapiens	
Beaver Dam	8/26/10	7:35pm	None	
Beaver Dam	9/6/10	5:56am	None	
Beaver Dam	9/6/10	11:41am	None	
Beaver Dam	9/7/10	9:12 AM	None	
Beaver Dam	9/7/10	6:50am	Homo sapiens	
Beaver Dam	9/13/10	9:31am	None	
Beaver Dam	9/15/10	10:02pm	Moose	#5 Bull
T16	9/18/10	11:49am	Homo sapiens	
T20	9/18/10	2:39pm	Homo sapiens	
Beaver Dam	9/22/10	8:03am	None	
T20	9/24/10	10:16pm	Moose	#6 Bull
T20	9/27/10	12:01am	Moose	Cow or calf
Beaver Dam	10/2/10	3:30pm	Moose	#6 Bull
Beaver Dam	10/2/10	3:31pm	Moose	#6 Bull
Beaver Dam	10/13/10	6:34pm	Moose	Cow and calf
Beaver Dam	10/16/10	1:28pm	None	
Beaver Dam	10/24/10	7:57am	Moose	#2 cow
Beaver Dam	10/24/10	10:26am	Moose	#7 Bull (largest rack)
T16	10/27/10	12:31pm	Homo sapiens	

Table 1: Images captured on motion-sensor trail cameras during 2010. Cameras were not functioning from early July to July 29 and were removed on October 27. Cameras were sometimes triggered by unseen motion eg. wind. No pics captured Jan-April.

4.1 Mammals

Black Bear (*Ursus americanus*):

Indications of bear activity were in the form of tracks, scats and "digs", which were most prevalent from mid-July to the end of September (Table 2). The greatest amount of bear sign was noted at transects 4, 5 and 6, on the west side of Spectacle Lake and at T9, T12, T16 and T17 which are located on the east side of Spectacle Lake, (Figure 4). There was less sign at transects closer to Upper and Lower Slate Lakes.

There were several sightings of black bear around the Spectacle Lake basin between late May and late October 2010. It can be difficult to recognize the same animal appearing in different motion-sensor images, but size and coloring helped to identify what as thought to be six different bears in the Spectacle Lake basin. Three different bears were photographed on the same day (July 20) at the motion-sensor trail camera near T16 (Figure 6). Two of these bears (a fat, black-colored bear and a smaller, cinnamon-colored bear) often seemed to travel together. The third bear may have been the same "bi-colored bear observed in 2009 with a lighter cinnamon back and darker face and forefront. A black bear with two cubs was also observed throughout the year around the Spectacle Lake basin. There was one report from mine personnel of a large brown bear at the tailings facility (Lower Slate Lake) in 2010.

Moose (*Alces alces*):

Moose indices in the form of either tracks, scat, browse or bedding sites were present at all transects, with the greatest concentration found at transects 2, 3, 4 and 7, on the west side of Spectacle Lake, T9 and T10 on the east of Spectacle Lake and T18 towards Upper Slate Lake (Figure 4). Moose tracks can form deep depressions in soft, wet ground that persist for month to years. A single moose can also leave a large number of signs by simply walking parallel with a transect. These factors were taken into consideration when making any conclusions about levels of activity over time. No tracks or other sign were observed in the survey area between January and April. Some of the first moose signs recorded after snow cover left the area in May were almost certainly made the previous year, however, both a cow and bull were pictured separately on

camera near T16 at the end of May confirming their presence at this time (Figure 8). Careful study was made of moose antlers in motion sensor images to distinguish between animals and recognize the same animals in some cases. It was determined to be too difficult to recognize the same animal in fall from images captured in May when antlers were small and covered in velvet. There were still three different bulls photographed in spring, with one at least be present for at least a month (Figure 9). Four separate bulls were captured on camera between August 8 and October 24, but it was not possible to say if they were the same moose observed in spring. Bulls #4-7 in Table 1 could be the same animals as bulls #1-3, but there is no way to be sure. The bull with the largest rack photographed on October 24 had two brow tines on each side of his rack. A cow moose was captured on camera at T16 in May and a cow with calf was observed near T20 (Upper Slate Lake) in September and at the beaver dam in October. A moose calf was seen frequently near the TTF during May (Figure 6).

Figure 6: Moose calf explores the Tailings Treatment area.

Figure 7: Trail cam bears: Fat black bear near beaver dam on May 23 (A) and the near T16 on June 20 (B); Cinnamon black bear at beaver dam June 6 (C) and near T16 on June 20 (D); A 4th bear followed by possibly same fat bear as in A, B, June 19 (E). Bear #4 at T16 (F).

Figure 8, from top left to right: A trail camera in position; Bull moose with large rack; Bi-colored black bear; same bear with a friend; cow moose then bull moose a day later in May at T16.

Figure 9: Waterfowl: 19 Canada geese, July 24 (A); Red-throated loon, Spectacle Lake, July 24 (B); Geese near access road (C); Canada geese Spectacle; (D): Greater yellowlegs appeared to be nesting (E). Blue-winged teal observed in May (F).

Figure 10: Bull moose captured on trail monitors in June with small velvet antlers (A, B); perhaps one of same moose in September near T19 (C) and at beaver dam (D). A moose and calf (E) and large bull (D) at beaver dam in October.

Figure 11: More wildlife and signs: Western toad in muskeg pond in July (A,B); An ermine below the tailings impoundment dam (C); Goose scat (D); Lots of moose tracks in wet ground (E); Bear dig (F).

Figure 12: Spectacle Lake still frozen on May 14 (A); Bald eagle at the beaver dam in August (B); Mature red-railed hawk at Lower Slate Lake, April 15 (C); Immature red-tailed hawk Spectacle Lake May 22 (D).

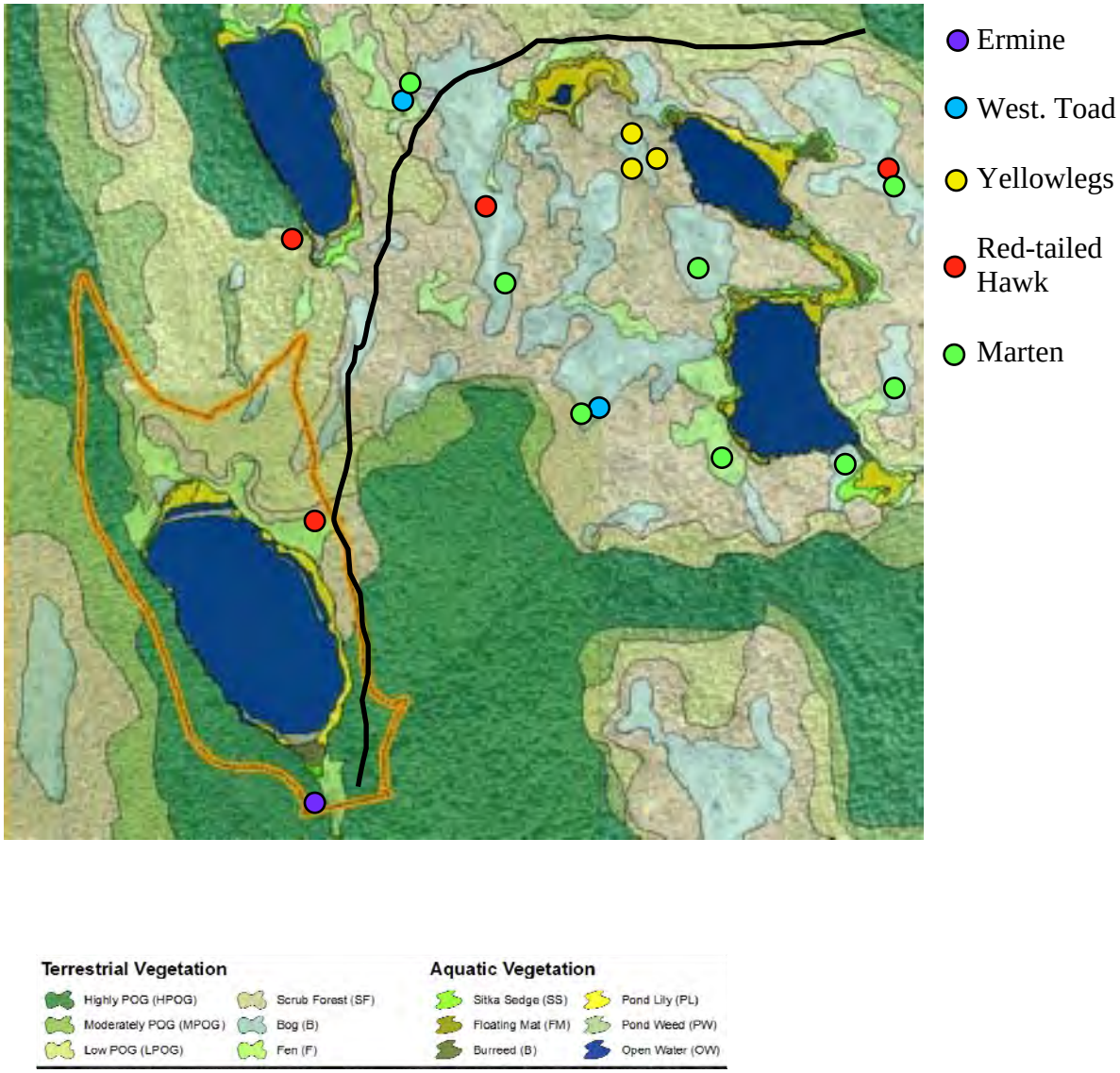

Figure 13: Location of other mammal sign in Slate Lakes Basin.

Other sightings:

A western toad (*Bufo boreas*) was found in a muskeg pond near T16 (Figure 11) in early July and a two-inch long wood frog (*Rana luteiventris*) was found near T19 in late July. No wood frogs had been observed since 2004 when one was spotted at the outlet of Lower Slate Lake. A wolverine was spotted in December 2009 and tracks were observed near Bridge 2 on the main road and T16 in January. Coyote (*Canis latrans*) tracks were not observed at any transects in 2010 as they had been in fall 2009, but a coyote was observed near the mouth of Johnson Creek in May 2010.

Small vole-like trails, perhaps made by the deer mouse (*Peromyscus maniculatus*), were found at T16 in May 2010 and also September and October 2009. A small burrow in the snow was also found in January and March and when the snow melted it uncovered a discarded moose antler nearby that looked to have been gnawed upon recently perhaps by the same rodent. Small rodent tracks were also found at T17 near the access road in May with a small nest of grass next to them. Most small mammal tracks are only visible in snow, but can be very difficult to discern depending on the consistency of the snow (eg. very small tracks are indistinct in powder or with melting). Unidentified small mammal tracks that could have been either deer mice or ermine (*Mustela erminea* - otherwise know as short-tailed weasel) were found at T3, T4, T5, T16, T18 and T19 in January-March 2010. Small burrows in the snow were found at T3 and T16 and could have been made by mice or ermine. Ermine are quite comfortable moving out in the open and will tunnel in deep snow (Elbroch 2003). An all-white ermine was observed near the outlet of Lower Slate Lake (below the dam) in late October and observed at the personnel camp in December (Figures 11,13). Marten (*Martes americana*) are fairly commonly spotted around the personnel camp and tracks were visible at T7, 8, 9, 10 on snow in January through April. Porcupine were often spotted along roadsides and tend to be more forest dwellers. It is likely the smaller mammals are just as active (if not more so) in summer, but their sign (tracks) show up more in winter in the snow.

4.2 Avian Species

The avian species identified through direct sightings or indirectly through songs or calls included both resident and migratory wading birds, non-passerine land birds, passerines and species of special interest, which include waterfowl, raptors and herons. Waterfowl were noted only on Spectacle Lake and Fat Rat Lake. In previous years, a group of 29 Canada geese were observed on Spectacle Lake in summer, but only 19 were counted in 2010. The geese arrived shortly after lake ice melted in late May and were observed until early August. A pair of blue-winged teal were sighted on Spectacle Lake on May 22 and a red-throated loon was spotted on July 24. Three Lesser Scaup, 6 ring-necked ducks were observed in August /September. A female mallard was seen with at least two chicks in July and five adult mallards were observed on Spectacle in October. Ducks appear to make some use of Spectacle Lakes right up to icing over.

A pair of lesser yellowlegs appeared to be nesting near T13 between June 19 and July 24. At least two different red-tailed hawks were observed around the survey area between April 15 and August 15. A great blue heron was observed flying overhead at T19 in mid-July and a belted kingfisher was observed in September. No herons were observed feeding at any of the lakes, but have been observed at the mouths of Sherman and Sweeny Creeks and in lower Johnson Creek.

Four bald eagles were sighted near Alpine Corner in mid-July and an eagle was captured on the trail monitor at the beaver dam on August 24. A bald eagle nest is present in Slate Cove about 1/2 mile from the dock, but it did not appear to be active in the spring of 2010. About ten eagles were observed at the mouth of Slate Creeks in August particularly the pink salmon run. At least two different red-tailed hawks were observed between April and mid-August, one being still in juvenile colors. Other bird species observed during 2010 included dark-eyed juncos, Stellers jays, American robins, varied thrushes, hermit thrushes, yellow-rumped warbler, chestnut-backed chickadees, belted kingfisher, dipper, the common raven and Savannah sparrows (Table 6).

Table 2: Number of wildlife signs on each transect after snowmelt (all species). Colored cells show highest density of sign.

Transect	5/22/10	6/8/10	6/19/10	6/26/10	7/2/10	7/9/10	7/16/10	7/24/10	8/15/10	8/26/10	9/18/10	10/27/10	TOTAL
T1	7	7	6	10	13	13	17	9	7	16	18	19	142
T2	13	17	14	20	15	29	18	11	13	8	12	21	191
T3	12	13	13	21	21	27	23	11	11	22	29	14	217
T4	9	25	14	13	30	19	14	13	14	20	22	18	211
T5	18	15	11	19	26	26	25	15	17	20	14	27	233
T6	13	11	12	11	23	24	20	11	10	9	7	12	163
T7	15	12	11	11	18	18	13	12	7	6	2	11	136
T8	5	5	22	7	11	16	15	14	10	7	16	17	145
T9	27	8	11	13	15	14	28	19	12	14	8	34	203
T10	3	5	8	6	20	20	19	9	22	6	6	29	153
T11	3	3	5	5	8	10	8	3	1	3	1	4	54
T12	0	0	0	9	8	9	9	9	7	7	11	15	84
T13	0	0	0	0	0	0	3	12	14	10	6	12	57
T14	0	0	0	0	2	3	14	9	6	5	5	8	52
T15	0	5	4	6	6	5	4	5	9	6	4	9	63
T16	11	14	3	8	6	9	7	6	5	8	7	10	94
T17	6	5	10	8	12	18	12	13	11	15	8	17	135
T18	12	30	15	18	18	24	10	12	10	7	4	10	170
T19	4	5	8	6	5	12	19	6	10	4	8	20	107
T20	0	15	9	8	10	14	11	18	10	5	10	14	124
T21	0	12	9	12	9	29	12	12	14	14	8	0	131
TOTAL	158	207	185	211	276	339	301	229	220	212	206	321	2865

Table 3: Number of signs of bear activity at each transect after snowmelt. Colored cells show highest density of sign.

Transect	5/22/10	6/8/10	6/19/10	6/26/10	7/2/10	7/9/10	7/16/10	7/24/10	8/15/10	8/26/10	9/18/10	10/27/10	TOTAL
T1	0	0	0	2	2	2	3	2	2	2	2	2	19
T2	0	0	0	1	0	1	0	0	0	2	2	2	8
T3	2	2	2	3	3	1	2	3	3	1	4	0	26
T4	0	0	0	1	2	2	3	5	3	6	8	5	35
T5	0	0	1	3	3	3	10	2	0	3	3	1	29
T6	0	0	0	1	3	3	7	3	4	2	3	2	28
T7	0	0	1	1	1	0	2	0	0	0	0	1	6
T8	0	0	0	1	0	1	3	3	3	5	5	3	24
T9	0	0	1	4	3	1	10	6	2	7	7	8	49
T10	0	0	0	0	1	0	0	1	3	2	2	3	12
T11	0	0	0	1	0	1	0	0	0	2	0	0	4
T12	0	0	0	5	4	5	5	7	7	5	8	9	55
T13	0	0	0	0	0	0	1	4	3	2	4	4	18
T14	0	0	0	0	0	0	1	3	6	4	4	5	23
T15	0	0	2	2	1	1	1	1	4	4	2	2	20
T16	0	1	1	1	2	2	4	4	5	5	5	5	35
T17	0	0	1	2	1	2	2	7	10	11	8	9	53
T18	0	0	0	0	1	1	1	3	2	4	2	2	16
T19	0	0	0	0	0	0	1	1	0	0	0	2	4
T20	0	1	0	0	0	0	0	7	2	1	3	1	15
T21	0	2	0	0	0	7	2	9	3	1	1	0	25
TOTAL	2	6	9	28	27	33	58	71	62	69	73	66	504

Table 4: Number of signs of moose activity at each transect after snowmelt. Colored cells show highest density of sign.

Transect	5/22/10	6/8/10	6/19/10	6/26/10	7/2/10	7/9/10	7/16/10	7/24/10	8/15/10	8/26/10	9/18/10	10/27/10	TOTAL
T1	7	7	6	8	11	11	14	7	5	14	16	17	123
T2	13	17	14	19	15	28	18	11	13	6	10	19	183
T3	10	11	11	18	18	26	21	8	8	21	25	13	190
T4	9	25	14	12	14	11	4	4	6	11	12	11	133
T5	11	8	7	6	10	10	3	9	11	8	5	18	106
T6	13	11	12	10	10	19	9	6	6	6	4	10	116
T7	15	12	10	10	17	18	11	12	7	6	2	10	130
T8	5	5	22	6	11	15	12	11	7	2	11	13	120
T9	27	8	11	9	12	12	17	13	9	7	1	26	152
T10	3	5	8	6	19	20	19	8	19	4	4	25	140
T11	3	3	5	4	1	9	8	3	1	1	1	4	43
T12	0	0	0	4	4	4	4	2	0	2	3	5	28
T13	0	0	0	0	0	0	2	8	11	8	2	7	38
T14	0	0	0	0	2	3	13	2	0	1	1	3	25
T15	0	5	2	4	5	4	3	4	5	2	2	7	43
T16	0	1	1	1	2	2	4	4	5	5	5	5	35
T17	5	5	8	6	11	17	10	6	0	4	0	8	80
T18	12	30	15	18	17	23	9	8	8	3	2	8	153
T19	4	5	7	6	5	12	18	5	10	4	8	18	102
T20	0	13	9	8	10	14	11	11	8	4	7	13	108
T21	0	10	9	12	9	22	10	3	11	13	7	0	106
TOTAL	10	10	9	12	9	22	10	3	11	13	7	0	116

Table 5: Number of signs of goose activity at each transect after snowmelt. Colored cells show highest density of sign.

Transect	5/22/10	6/8/10	6/19/10	6/26/10	7/2/10	7/9/10	7/16/10	7/24/10	8/15/10	8/26/10	9/18/10	10/27/10	TOTAL
T1	0	0	0	0	0	0	0	0	0	0	0	0	0
T2	0	0	0	0	0	0	0	0	0	0	0	0	0
T3	0	0	0	0	0	0	0	0	0	0	0	0	0
T4	0	0	0	0	14	7	7	4	5	3	2	2	44
T5	7	7	5	10	13	13	11	4	6	9	6	8	99
T6	0	0	0	0	7	2	4	2	0	1	0	0	16
T7	0	0	0	0	0	0	0	0	0	0	0	0	0
T8	0	0	0	0	0	0	1	0	0	0	0	1	2
T9	0	0	0	0	0	1	1	0	1	0	0	0	3
T10	0	0	0	0	0	0	0	0	0	0	0	1	1
T11	0	0	0	0	0	0	0	0	0	0	0	0	0
T12	0	0	0	0	0	0	0	0	0	0	0	1	1
T13	0	0	0	0	0	0	0	1	0	0	0	1	2
T14	0	0	0	0	0	0	0	4	0	0	0	0	4
T15	0	0	0	0	0	0	0	0	0	0	0	0	0
T16	0	0	0	0	0	0	0	0	0	2	0	0	2
T17	0	0	1	0	0	0	0	0	1	0	0	0	2
T18	0	0	0	0	0	0	0	0	0	0	0	0	0
T19	0	0	0	0	0	0	0	0	0	0	0	0	0
T20	1	0	0	0	0	0	0	0	0	0	0	0	1
T21	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	8	7	6	10	34	23	24	15	13	15	8	14	177

4.3 Human activity

Construction activity began at the tailings dam in August 2009 and continued until August 2010. Noise from construction traffic such as haul trucks and trenching work along the access road was most noticeable at T10, 11, 13, 17. Vehicle traffic was considerably lighter on the TTF access road from September to the end of the year.

5.0 Discussion

The transects are all located in open bog and fen areas around the lakes as opposed to thick brush for ease of finding wildlife sign. These flat, open areas tend to be soft and wet and the tracks of larger mammals may persist for several months. Recording tracks along a measuring tape to the nearest 0.1m enables fresh sign to be distinguished from sign recorded previously. Smaller, lighter mammals do not leave visible tracks in firmer ground, but their tracks are often visible in snow. This leads to some bias with apparent abundance of large mammals relative to smaller animals, but evaluating signs over time gives a better indication of mammal activity. The combination of sign evaluation and capture of images with motion-sensor cameras also helps confirm recent animal presence. There was an increase both bear and moose sign recorded (tracks, scat) and images captured after snow left the area in late May. Bear sightings seemed to decline after the middle of August, unlike 2009 when more bears were sighted in September/October. Fall is a time when bears are typically moving from stream mouths where they feed on salmon to upland areas to feed on roots and berries before they hibernate for the winter, but few bears were observed at the streams in 2010 possibly due to 2010 seeming an exceptionally good berry year. The same bears were captured on camera several times in May and June as they traveled their route, but by late August they appeared to change their travel pattern. Bears were still sighted along the road up to early November, but were likely feeding in thick blueberries. Moose sightings also seemed to drop off in mid-August, but picked up again in mid-September. Moose are likely following females around in fall and also actively feeding before winter sets in.

The spatial range of bears and moose overlapped considerably, although transects T17 and T11 (eastern) had more bear sign while transects T20, T2 and T3 (west) had more moose sign. Most of the bear sign found in fall 2009 and 2010 was in the form of scat, tracks and digging and was concentrated toward the north-east and south-west of Spectacle Lake whereas moose were concentrated to the north-west and south-west. Transects towards the south, furthest from the road had a significant amount of both bear and moose sign. The motion-sensor cameras at these locations (T16, Beaver Dam) showed some temporal separation with moose being captured more at night (though not exclusively) and bears during the day. As was found in 2007 (Savage 2007), the presence of bear digs and scat indicates that bears forage in the area, but there is little in the way of moose browse sign or scat suggesting that moose are transiting through the area rather than actively browsing there. Moose activity is likely curtailed in the basin in winter by heavy snowfall. A large amount of moose sign has been observed in early spring along the forest fringe near the mouth of Johnson Creek so this is likely one area where moose spend the winter. A little moose sign was encountered on the north shore of Lower Slate Lake in 2005. Part of this area has been filled during construction activity, but moose were still using the Spectacle Lake area in 2010.

The major game trail along the northwestern portion of Lower Slate Lake received use by both moose and bear during 2006/2007 and 2009/2010 indicating wildlife presence in this area close to construction activity. Water treatment plant operators reported a large brown bear emerging from this trail in spring 2010. Unfortunately, the motion-sensor camera here broke down in 2010 without capturing any wildlife. Abundant evidence of both moose and bear was also noted along the eastern muskeg of Upper Slate Lake in 2007, 2009 and 2010. No wildlife surveys were conducted in 2008 due to lack of construction activity.

One of the most significant signs of wildlife use in the basin are those from molting geese particularly in areas close to floating mats of vegetation near lake shores. These may be preferred for roosting, as they would not support the weight of large predators. Use of the Spectacle basin as a refuge for Canada geese was previously documented in 2000 (ABR 2000), 2004 (USFS 2004), in 2005 (Living System Designs

2005), 2006, 2007 (Savage 2007) with no surveys conducted in 2008. The lakes are typically frozen over from mid-November until mid-May and geese are thought to be present from the end of May or early June until some time in August. Construction activity was well underway in May when geese arrived, although numbers were down by a third. It is unknown whether some geese were discouraged from staying in the area or whether simply fewer geese arrived this year. It will be interesting to see if numbers are back up in 2011 now that heavy equipment has left the area. Geese still had some refuge from disturbance toward the narrow "bridge" of Spectacle Lake and towards the beaver dam away from the road. Use of heavy equipment on the TTF access road in September and October did not appear to discourage use of the area by large mammals. Moose and bears apparently frequented the area just as often in 2006 and 2007 (Savage 2007). Some wetland and forested habitat around Lower Slate Lake was of course lost, but the main geese refuge areas around Spectacle Lake remains intact. It will be interesting to see if geese return in 2010 while heavy equipment remains in operation. Geese may still find refuge at the south-east corner of Spectacle Lake furthest away from construction activity. The no-fly zone over the Spectacle Lake basin, instigated through Coastal helicopters in 2007 to minimize disturbance to geese, should continue to be implemented again in May 2011.

6.0 Summary

At first glance it may appear that there was more wildlife activity in 2010 than 2009, but monitoring in 2009 was not begun until August whereas in 2010 monitoring was conducted throughout the year. Perhaps the most important use of the area is as a summer refuge for molting geese. Approximately 1/3 fewer Canada geese were present in 2010 than prior years, but it is impossible to say if some were discouraged from remaining in the area or if fewer arrived on site to begin with. Bear activity seemed lower in the fall of 2010 than 2009, but this coincided with a decline in construction activity, so it was more likely due to their pursuit of other food sources. Moose activity remained high during fall 2010. Other species of special interest recorded in 2009 were the great blue heron and bald eagle.

Table 6: Wildlife Observations 2010.

DATE	LOCATION	NO.	SPECIES	OBSERVER	H=heard, S=saw B=both	COMMENTS
			MAMMALS			
1/22/10			No tracks or signs at transects	JM		
1/27/10	SP		No tracks or signs at transects	GW		Camera removed from T16
2/1/10	SP		No tracks or signs at transects	JM		
2/13/10	SP	na	No tracks or signs at transects	GW		
3/3/10	SH	1	Wolverine	GW		On Sherman Creek near SH113
3/20/10	SP	na	No tracks or signs at transects	GW		Downloaded 33 pics T20 (no wildlife)
4/14/10	SP		No tracks or signs at transects	GW		Camera pulled from Beaver Dam
5/22/10	SP	?	Ground churned up by rodents	GW	S	Near T16
6/15/10	SSG	2	Hoary marmots	GW	S	In rockpile at Snowslide Gulch
6/25/10	SP	?	Lots of bear sign at T16 but no pics	GW	S	Camera removed for repair
7/15/10	SP	1	Black bear	GW	S	Cinnamon bear seen from road
7/18/10	C	1	Black bear	GW	S	Scraggy black bear in camp
7/19/20	SP	1	Black bear	GW	S	Bi-color bear near road
7/22/10	C	1	Black bear	GW, LF	S	Scraggy black bear in camp
7/23/10	SP	2	Black bear	LF	S	Black bear plus bi-color between road and lake
7/24/10	SP	2 to 3	Black bear with 1-2 cubs	LF	S	Met in blueberries near T2
8/10/10	C	1	Black bear	GW	S	Scraggy black bear in camp
10/27/10	SP	3	Black bear with 2 cubs	LF	S	Near Alpine corner
			WATERFOWL			
5/22/10	SP	2	A pair of blue-winged teal	GW	S	Photograph
5/22/10	SP	1	Merganser	GW	S	At beaver dam
5/22/10	SP	4	Mallards	GW	S	Observed from T11 about 11am.
6/25/10	SP	19	Canada Geese	GW	S	On lake
6/27/10	SP	19	Canada Geese	GW	S	Near beaver dam. 9 geese obs later nr T11
7/2/10	SP	14	Canada Geese	GW	S	Near T11
7/9/10	SP	16	Canada Geese	GW	S	At beaver dam
7/23/10	SP	1	Red-throated loon	LF	S	On South Spectacle
7/24/10	SP	19	Canada Geese	LF	S	Near bridge of spectacle then on land near T13
7/24/10	SP	3	Mallard with 2 chicks	LF	S	May have been more chicks (obs from T4)
8/7/10	SP	9	Canada Geese	GW	S	Near Fat Rat lake
8/15/10	SP	3	Greater Scaup	LF	S	On North Spectacle
9/18/10	SP	6	Ring-necked ducks	KS	S	On South Spectacle
10/27/10	SP	4	Lesser Scaup	LF	S	On North Spectacle
10/28/10	SP	5	Mallards	LF	S	4 males, 1 female north Spectacle
11/2/10	USL	8	Mallards	LF	S	Flying over Upper Slate
			FOREST/SHORE/SONG BIRDS			
3/22/10	USL	1	Blue Grouse	GW	H	Heard at T18
5/14/10	SP	1	Yellow-rumped warbler	GW	B	near T17
6/19/10	SP	2	Lesser yellowlegs	GW	B	Appear to be nesting near T13
7/16/10	SP	1	Great bue heron	GW	S	Flying over T19
7/23/10	SP	1	Lesser yellowlegs	LF	B	Near T8
7/24/10	SP	2	Greater yellowlegs	LF	B	Dive-bombing near T13
7/24/10	SP	multi	American robins	LF	S	Near T5
7/24/10	SP	multi	Chickadees	LF	B	Near T5
7/24/10	SP	3	Common raven	LF	S	Near T15
7/24/10	SP	1	Hermit thrush	LF	B	Near T2
7/24/10	SP	1	Junco	LF	B	Near T2
8/10/10	SH	1	Great blue heron	LF	S	Mouth of Sherman Creek
9/18/10	SP	1	Belted kingfisher	KS	S	Near T8
10/28/10	USL	2	Dippers	LF	B	One dived into lake after stickleback?
			RAPTORS			
4/15/10	LSL	1	Red-tailed hawk	LF	S	Perched near Lower Slate Lake, photo
5/22/10	SP	1	Red-tailed hawk	GW	S	Immature at Spectacle
7/16/10	SP	4	Bald eagle	GW	S	Near T17
7/19/10	SP	1	Red-tailed hawk	GW	S	Near road, Spectacle
7/24/10	SP	2	Bald eagle	LF	S	Circling over T20
8/7/10	SP	1	Red-tailed hawk	GW	S	Near road, Spectacle
8/15/10	USL	1	Red-tailed hawk	LF	B	Upper Slate Lake
			AMPHIBIANS			
7/9/10	SP	1	Western toad	GW	S	In muskeg pond near T16
7/24/10	USL	1	Wood frog	LF	S	Near small pond T18 South

Table 7: GPS points for the north end of each transect

T1N - 58.81712N / 135.03537W
T2N - 58.81631N / 135.03036W
T3N - 58.81509N / 135.03416W
T4N - 58.81410N / 135.03052W
T5N - 58.81537N / 135.02911W
T6N - 58.81288N / 135.02849W
T7N - 58.81182N / 135.02705W
T8N - 58.81250N / 135.02470W
T9N - 58.81377N / 135.02370W
T10N - 58.81657N / 135.02342W
T11N - 58.81678N / 135.02596W
T12N - 58.81763N / 135.02682W
T13N - 58.81788N / 135.03061W
T14N - 58.81834N / 135.03325W
T15N - 58.81660N / 135.03181W
T16N - 58.81410N / 135.03157W
T17N - 58.81782N / 135.02492W
T18N - 58.81820N / 135.03523W
T19N - 58.81812N / 135.03630W
T20N - 58.81844N / 135.03839W
T21N - 58.80974N / 135.04633W

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Appendix 1. Updated Avian Species List for Slate Lakes Basin

Waterfowl

1. White-winged Scoter (*Melanitta fusca*)
2. Greater Scaup (*Aytha marila*)
3. Mallard (*Anas platyrhynchos*)
4. Canada Goose (*Branta canadensis*)
5. Ring-necked Duck (*Aythya collaris*)
6. Red-throated Loon (*Gavia stellata*)
7. Hooded Merganser (*Lophodytes cucullatus*)
8. Common Goldeneye (*Bucephala clangula*)
9. American wigeon *(Anas Americana)*
10. **Blue-winged teal (*Anas discors)-S 2010***

Common = multiple sightings through season
S = identified through sighting
C/S = identified through call or song
B = both sighted and heard

Raptors

1. Bald Eagle (*Haliaeetus leucocephalus*) – Common, B
2. Red-tailed Hawk (*Buteo jamaicensis*)
3. Sharp-shinned Hawk (*Accipiter striatus*)
4. Northern Pygmy Owl (*Glaucidium gnoma*) – C/S
5. Northern harrier *(Circus cyaneus)* - C/S

Other

1. Belted Kingfisher (*Ceryle alcyon*) – Common, B
2. Steller's Jay (*Cyanocitta stelleri*) – Common, B
3. Common Raven (*Corvus corax*) – Common, B
4. Chestnut-backed Chickadee (*Poecile rufescens*) – Common, B
5. Dark-eyed Junco (*Junco hyemalis*) – Common, B
6. Winter Wren (*Troglodytes troglodytes*) – Common C/S
7. Savannah Sparrow (*Passerculus sandwichesis*) - B
8. Varied Thrush (*Ixoreus naevius*) - B
9. Pine Grosbeak (*Pinicola enucleator*) - S
10. Northwestern Crow (*Corvus caurinus*) - B
11. Red-breasted Sapsucker (*Sphyrapicus rubber*) –Common, B
12. Bohemian Waxwing (*Bombycilla garrulous*) - B
13. Least Sandpiper (*Calidris minutilla*) – S
14. Blue Grouse (*Dendragapus obscurus*)
15. Lesser Yellowlegs (*Tringa flavipes*)
16. Ruby-crowned Kinglet (*Regulus calendula*)
17. Wilson's Warbler (*Wilsonia canadensis*)
18. White-crowned Sparrow (*Zonotrichia albicollis*)
19. Rufous Hummingbird (*Selasphorus rufus*)
20. Tree Swallow (*Tachycineta bicolor*)
21. Orange-crowned Warbler (*Vermivora celata*)
22. Hermit Thrush (*Catharus guttatus*)
23. Cedar Waxwing (*Bombycilla cedrorum*)
24. Olive-sided Flycatcher (*Contopus borea*lis)
25. Solitary Sandpiper (*Tringa solitaria*)
27. Song Sparrow *(Melospiza melodia*)
28. Great blue heron *(Ardea herodias)*
29. **Yellow-rumped warbler (*Dendroidica coronata*) – B 2010**