

2015

Environmental Assessment Document for the Middle McIntyre Creek



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EXECUTIVE SUMMARY

The region known as Middle McIntyre Creek is an area of interest, for both the biological values of the area, as well as the development potential, as an extension of the Porter Creek subdivision. To support the park planning and city planning process, the Yukon Conservation Society sought to gather site-specific ecological information and engage with citizen scientists in the collection of that information.

Over the weekend of July 4th and 5th, 2015, the Yukon Conservation Society organized a Bioblitz, a period of intense and concentrated biological survey in the Middle McIntyre Creek area. The weekend was led by a number of professional biologists, specializing in mammals, birds, plants, terrestrial and aquatic insects, and fish. Participants were able to join these biologists in surveying for the various taxa at pre-designated survey locations. These survey stations were delineated based on habitat or landscape types represented in the area, so that each landscape type would be receive multiple taxa inventory.

Surveys for plants, birds, mammals, plants, insects, and fish, all followed approved methods for these survey types. Ecological and vegetation surveys were based on duplicate plot-based inventories within representative areas of each landscape type (RISC 2007). Surveys for birds included encounter transects and variable radius point count stations (RISC 1999a). Surveys for mammals followed those approved methods for pellet counts and encounter transects (RISC 1998a). Surveys for terrestrial insects employed sweep netting and pre-set malaise traps (RISC 1998b). Inventories for stream benthic invertebrates as per the sampling standards of the Canadian Aquatic Biomonitoring Inventory Network (CABIN, EC 2012). Inventories for fish and fish habitat assessments followed the standardized methods for minnow trapping and seine netting (RISC 1999b).

Based on the data collected from the pre-designated survey stations in the area, over 160 species were recorded. In summary, over 60 species of plants, 26 species of birds, six species of mammals, 35 species of terrestrial insects, 42 aquatic invertebrate taxa and three species of fish. Overall, the most commonly encountered species included red squirrel, yellow-rumped warblers, northern blue butterfly, and chinook salmon.

Overall, the event of the Bioblitz was an effective tool in engaging community members in the collection of biological information from the Middle McIntyre Creek area. One of the biggest challenges encountered this year, was the coordination of the event in the most optimal seasonal time to adequately capture each taxa. The final section of this report provides recommendations for future years and future events, not only to promote engagement of the community and citizen scientists, but to also target the most ideal timing for each taxa.

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INTRODUCTION

In the summer of 2015, the first annual Bioblitz saw a crew of expert and budding biologists converged in the parking lot of the Pumphouse below the Yukon College in the Middle McIntyre Creek area. A Bioblitz is a period of intense and focused biological assessments and surveys that are geared to including volunteers, families, students and the general community! In our case, this will be a two-day event.

Middle McIntyre Creek and surrounding area, continues to be an area of interest, both from a biological perspective, as well as a City-growth potential perspective. To support the park planning process presently occurring with the City of Whitehorse, YCS is hoping to begin a community-based biological assessment program, using the bioblitz as the resource.

SITE BACKGROUND

McIntyre Creek runs from the subalpine and upper boreal slopes of Mount McIntyre down to the Yukon River. For planning and environmental assessment purposes, the creek is typically referred to in four sections: upper, canyon, middle and lower. The Upper and Canyon sections of McIntyre Creek run from the creek headwaters to the Alaska Highway, the Middle section of the watershed runs between the Alaska Highway and Mountainview Drive, and the Lower section runs from Mountainview Drive into the Yukon River.

PROJECT BACKGROUND

This report represents an additional component to the on-going gathering of ecological and wildlife data for the Middle McIntyre Creek area. This area has received attention in the past due to the proposed Porter Creek 'D' subdivision and the extension of Pine Street. This report serves to provide data collected from a community event, known as the 2015 Bioblitz, where professional biologists and members of the public spent two days inventorying plants, birds, mammals, insects, and fish.

PROJECT OBJECTIVES

The objectives of this study was to complete a wildlife and vegetation inventory for birds, mammals, invertebrates, terrestrial and benthic invertebrates, fish, and plants, within the Middle McIntyre Creek area. The intent is for this event to be repeatable on an annual basis and for the data to be compiled and used to support YCS and the City in their future planning.

For all surveys conducted throughout the area, Biologists and participants recorded species observations, locations and habitat types. Surveys allowed for the recording of incidental observations, those from transect-surveys, as well as those from point-count surveys. The specific objectives of the surveys were to gather baseline information on the presence of all taxa of flora and fauna and plant communities.

The objectives of the vegetation assessment was to provide greater resolution to the vegetation resource inventory (VRI) data presently available for the Middle McIntyre Creek area. This existing data identified major tree species within delineated polygons, but little information on the shrub or forb layers of the forest. The vegetation inventory served to begin to collect information about the understory of these different areas.

The objectives of the bird surveys was to capture species composition of resident and seasonal birds within the Middle McIntyre Creek. Surveys focused on Passerines, or those birds in the Order Passeriformes. Songbirds belong to the Order Passeriformes and are also known as the perching birds or passerines (Gill 1990). They have unique adaptations such as distinctive feet (three toes pointed forward, one toe pointed backward), oil glands, and a

reduced number of neck vertebrae. The group consists of five broad ecological forms: thrushes, flycatchers, warblers, and sparrows. In the Yukon, passerines make up 40% of the avifauna ranging in size from the common raven (*Corvus corax*) to the ruby-crowned kinglet (*Regulus calendula*). Passerines can be found during the breeding season in almost all terrestrial habitats.

The objectives for the mammal surveys and habitat assessment was to begin to quantify the available habitats and the value of these habitats within the area. Collecting site-specific information provides greater resolution on how various species of mammals use the habitats in the area, how they may move through the area, and begin to understand the browse and forage opportunities offered by the habitats within the area.

The objectives of the terrestrial invertebrate inventories were to attempt to capture and identify the various grasshopper, dragonfly, and other insects that are seasonally using the various ecosystems in the Area. These inventories were opportunistic, and simply provided an inventory of the diversity of insects in the area.

The objectives of the fish and benthic invertebrate inventories and surveys were to characterize the structural habitats offered by McIntyre Creek within the bounds of the area, and how these habitats supported the aquatic environments. Fish and benthic invertebrates are both useful indicators of the status of an aquatic system and can provide insight into the overall health and functioning of a system.

PROJECT LOCATION

The Middle McIntyre Creek area is located within the City of Whitehorse, within the traditional territories of both the Kwanlin Dun First Nation and the Ta'an Kwäch'än First Nation. The Area is bound by the Alaska Highway to the west, the neighbourhood of Porter Creek to the north, Mountainview Drive and Range Road to the west, and the Yukon College Whitehorse Campus (Figure 1). Survey stations for the various survey types is illustrated in Figure 2.

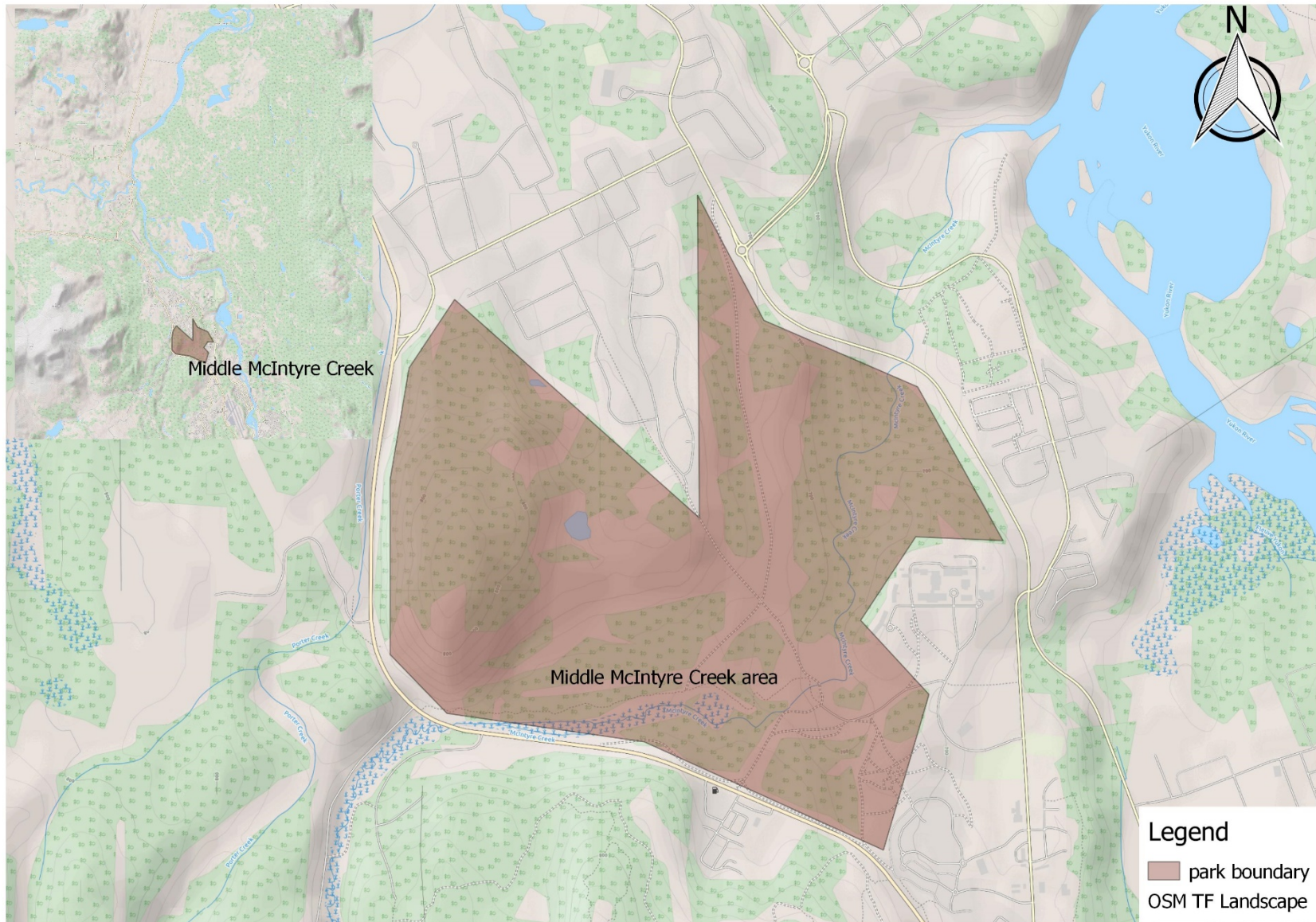


Figure 1 Project Location



Figure 2 Terrestrial Inventory Stations



Figure 3 Aquatic Inventory Stations

METHODS

Terrestrial surveys followed pre-determined transects and waypoint locations selected in order to achieve proportional representation of the various landscape types in the area. These waypoints and transect routes are indicated in Figure 2, previously.

Aquatic surveys, specifically the benthic surveys and the fish inventories, selected sampling locations along McIntyre Creek that were safe and accessible by volunteers and participants, and represented habitat structure best representing the general habitats offered in McIntyre Creek within the boundaries of the Area. These points are represented in Figure 3, above.

PLANTS AND ECOLOGY

Plant and ecological biological inventories were completed using a quadrat or plot technique in order to better understand the distribution of plants within the larger landscape of Middle McIntyre Creek Area. This method was particularly useful because it allowed for application in the various landscape types in the area, from regenerating shrub areas in power line rights-of-ways, to open aspen forests or mature and dense spruce forests.

Quadrats were 1m² and made of PVC tubing, supplied by the Yukon Research Centre. Upon arriving at the point location, surveyors placed the first quadrat randomly at the site, and recorded plant species noted both within the quadrat or overhanging the quadrat. Percent cover was recorded for all species occurring within the plot, and these species were also noted if they were “in” the plot or “out” of the plot. Further, leaf litter, woody debris, exposed earth or rock, was also recorded based on percent cover.

Once the first quadrat was completed, the quadrat was physically flipped on a corner, into an area kitty-corner to the first quadrat location, and the same collection methods were repeated.

BIRD SURVEYS

Point Counts

Simple point counts were used in conjunction with the encounter transects, where the first point count station was at the start of each transect. Point count locations were spaced approximately 200m apart, so that any observations were independent from the other stations. Upon arrival, a wait period of one minute was employed to allow for the birds to become accustomed to our presence. After one minute, all birds detected within a five minute period were recorded, and categorized according to when they were detected (in first 3 minutes, between 3 and 5 minutes and after 5 minutes).

Encounter Transects

Using a prepared base map, the start point of each transect was determined randomly, though was associated with a fixed waypoint. The transect was then walked at a rate of approximately 0.5 km/hr to 2 km/hr, with counts occurring approximately every 30 seconds to identify and quantify the birds heard or observed. Surveyors also recorded the distance at which each bird was detected.

MAMMAL SURVEYS

Mammal surveys focused on incidental observations and records mammal use of the habitats within the Area. These ranged from recording sign of mammals in the form of wildlife movement corridors or trails, scat or other material left over from an animal passing through the area, evidence of browsing by ungulates on shrubs and small trees, to seed caches or middens indicating seasonal and localized use of an area.

Surveys and assessments were completed using two distinct methods, being: 1) pellet group counts, and 2) detection transects. Pellet group counts were completed within 10m circular plots at each of the waypoints in the various landscape types. Within this plot, all pellets and other mammal sign were noted, including ungulate pellets, scurvid and lagomorph pellets, carnivores, as well as, other signs of mammal activity. Pellet groups were also identified to relative age, identifying if the pellet group had been deposited in a previous year or previous season based on weathering, level of desiccation, or presence of mold, moss or lichen growth. This type of inventory is generally applied for relative abundance surveys; however, due to the large area surveyed and the apparent low densities of visible mammal use, this survey type served as a presence / non-detected method as well.

Detection transects served to record incidental observations of mammal sign between waypoint locations, along existing recreational trails within the Area. Location along the transect, type of sign, and age of sign, were all noted and recorded by field surveyors.

Habitat potential for the various landscape types assessed within the Area, were characterized based on potential for various seasonal activities by mammals.

TERRESTRIAL ARTHROPODS

Inventory methods for terrestrial arthropods included sweep netting at a microhabitat scale, and the setting of malaise traps systematically throughout the Area at a macrohabitat scale. Malaise traps are an effective macrohabitat sampling method serving to intercept the flight routes of winged insects. Traps were placed systematically along transect lines in the various landscape types, set approximately 50 m apart. Traps were set for approximately 10 days including the period of the Bioblitz weekend, so that the potential for capture of winged insects was increased, and Biologists could provide demonstrations to participants, and speak to the insects in hand. Samples from these traps were then sent to Guelph University's Barcode of Life Laboratory for identification.

Sweep netting occurred throughout the Area in all landscape types, with three participants sweeping simultaneously in any given landscape. Sweeping occurred along a transect between waypoint locations, deploying 20 sweeps, repeated five times within each habitat type. Captured insects were either placed into plastic vials with preservatives for identification purposes, or live-captured for educational purposes.

BENTHIC SURVEYS

Benthic macroinvertebrate sampling is frequently used in aquatic biomonitoring because they are common inhabitants of lakes and streams, inhabiting bottom sediments, and the species composition in these environments can provide insight into the overall health of an aquatic system (Environment Canada 2011).

Five monitoring stations were established on McIntyre Creek within the bounds of the Area, with safety of access and diversity of habitat being the two primary parameters for site selection. At each of these stations, water quality parameters, riparian habitat, and instream habitat structures were characterized.

Within a 10 m area at each station, various methods of sampling and assessment were employed, in accordance with the Canadian Aquatic Biomonitoring Inventory Network (CABIN) accepted methods for benthic sampling. Survey types included using a kick-net to stir up invertebrates in stream sediments, where surveyors progress downstream, shuffling their feet, dislodging detritus and invertebrates into the water, allowing the current of the stream to disburse these samples into the net and into the collection jar. A Surber sampler was also used where the stream bed material within the one square foot frame was stirred to dislodge any invertebrates which were then captured in the net. Also, rocks were picked up, turned over and any clinging invertebrates were removed by tweezers and added to the collection jar. The water column, including the surface, was sampled separately by sweeping the nets through the water. This method was particularly useful at Site BIBI #4, the wetland, to capture dragon and damselfly larvae. Invertebrates collected by these methods were transported back to the field lab set-up in the parking lot of the pumphouse. Invertebrates in the collected material were then sorted into identification trays based on general taxa for display and educational purposes. Scopes and invertebrate keys were on hand to aid in identification.

In addition, at each site a separate sample was collected for taxonomic identification. The CABIN kick-net method described above was employed where the sampler would disturb the stream sediments traversing in a zigzag pattern downstream for a total of three minutes. All detritus and captured organisms were placed in a one liter Nalgene container and preserved with buffered 10% formalin. These samples were then sent to an Environment Canada-approved benthic taxonomist, Thibault Doix with Living Streams Environmental Consulting for sorting and identification.

FISH SURVEY

For the purpose of evaluating fish utilization in the lower reaches of McIntyre Creek, seven separate sites in McIntyre Creek were identified. The sites were chosen to reflect on the effects of anthropogenic infrastructure such as road crossings (culverts) and the pump house pond.

The physical attributes of each site including creek width, depth, velocity, substrates, and ecological context was recorded on field sheets. Each site was evaluated for fish presence using a suite of five to eight Gee-type Minnow traps each baited with Yukon River origin salmon roe. The traps were set in a variety of habitats and velocities (maximum velocity of 0.5 m/sec) and left for an overnight soak period of approximately 24 hours. The number of each species of fish captured was recorded and a sub sample of each species, up to a maximum of 20 per site were measured for fork length, all fish captured were released back to the water of capture.

RESULTS

VEGETATION INVENTORY

The area is made up of five distinct landscape types, which are illustrated in Figure 4. A detailed species list is provided in Appendix A.

1. Anthropogenic disturbed areas (ES)
2. Tall shrub, closed (Tsc)
3. Mixedwood forest (Fm)
4. Tall shrub, open (Tso)
5. Coniferous forest (Fc)

Each of these landscape types is distinct in the composition of the vegetation in these areas, and are discussed below.

Areas of anthropogenic disturbance (ES) includes access roads, powerline rights-of-ways, parking lots, and other recreational areas. Many of these areas are largely denuded of vegetation, with bare earth and sporadic ground cover of lichen, lingonberry (*Vaccinium vitis-idea*), and yarrow (*Achillea millifolium*). In regenerating ES areas such as the powerline rights-of-ways, several species of willow are establishing in the area, with ground covers of kinnikinnik (*Arctostaphylos uva-ursi*), Arctic lupine (*Lupin arcticus*), northern bedstraw (*Galium boreale*), and fireweed (*Chamerion angustifolium*).

The two shrub habitat areas (Tsc, Tso), are associated with wetland, pond and lake riparian habitats. In the Tsc areas, these areas have a higher density of which the willows and other small trees are growing, limiting the density of ground cover in the area. Various willow species are well established, along with scrub birch (*Betula nana*), Labrador tea (*Ledum groenlandicum*), and highbush cranberry (*Viburnum trilobum*). In the understory, and largely restricted to more open patches in this habitat type, herbaceous species such as twinflower (*Linnea borealis*), oval-leaf blueberry (*Vaccinium ovalifolium*), kinnikinnik, bunchberry (*Cornus canadensis*); as well as, a variety of grasses, rushes, and moss species. These areas are represented by a similar vegetation composition as the Tsc areas, with the more open structure allowing a greater diversity and abundance of understory vegetation. In these areas, pixiecup lichen (*Cladonia pyxidata*) dominates the groundcover, with some prickly rose (*Rosa acicularis*) and field locoweed (*Oxytropis campestris*).

The mixedwood forest landscape type (Fm), is represented by two vegetation communities, being a pine / aspen (P/A) forest, and, aspen/pine (A/P) forest. The distinction here, is the dominant tree species varies, with lodgepole pine (*Pinus contorta*) being the dominant tree species in the former, and trembling aspen (*Populus tremuloides*) being dominant in the latter. In the pine / aspen forest, kinnikinnik is the dominant groundcover, with twinflower, and pixie cup lichen also occurring in high frequency. The aspen / pine forest understory is dominated by soopalalie (*Shepherdia canadensis*), lingonberry and twinflower, with some prickly rose, and kinnikinnik. The former vegetation community is most often found mid-slope in east-facing slopes with well-established mesic soils. The latter vegetation community more often occurs in drier, south-facing slopes and hillsides with shallow and more xeric soils.

There are three distinct vegetation communities that compose the Fc areas, being white spruce / lodgepole pine (W/P), pine (P), and pine / white spruce (P/W) forest types. The understory varies in each of these, with different shrubs, groundcovers, lichens and moss species, depending on canopy closure, aspect, slope, and stand density. In the white spruce / pine forest type, white spruce is the dominant tree species, with lodgepole pine comprising less than fifty-percent of the canopy. The understory in this community is virtually entirely covered by step moss (*Hylocomium splendens*), with the occasional Arctic lupine, small patches of twinflower, and lingonberry. In the pine

forests, pine is the dominant tree species, with very few if any other coniferous tree species being present. In the understory, shrub species are virtually absent, and the groundcover being dominated by grey reindeer lichen (*Cladina rangiferina*), with herbaceous species such as crowberry (*Empetrum nigrum*), kinnikinnik, and bastard toadflax (*Geocaulon lividum*) being less commonly occurring. In the pine / white spruce forest type, the soil moisture regime is drier than the white spruce / pine forest type, resulting in the dominant groundcover being grey reindeer lichen, with step moss being less frequent and less common. Other herbaceous plants are similar, such as lingonberry, twinflower, and bastard toadflax.

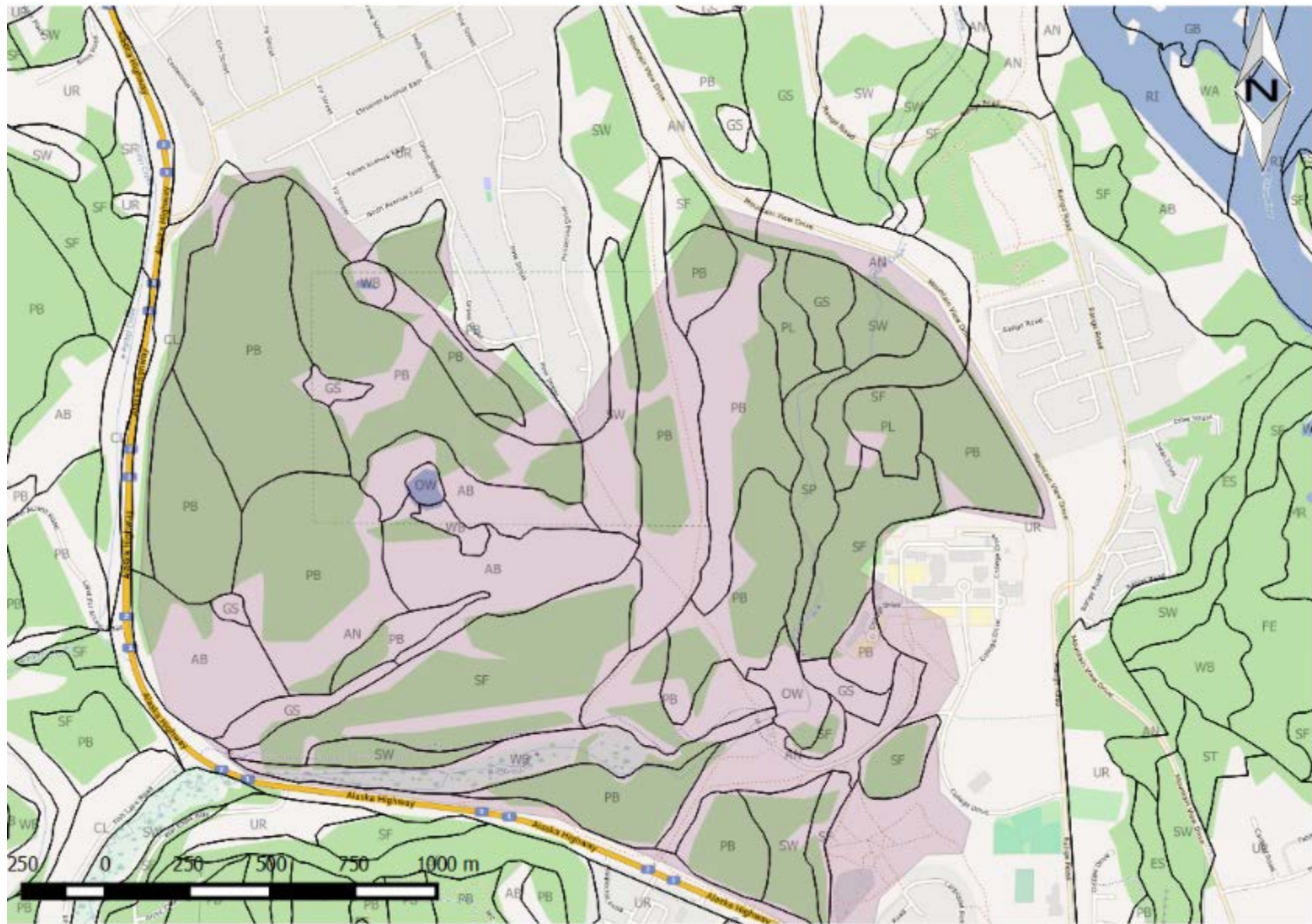


Figure 4 Landscape Types in the Middle McIntyre Creek area

MAMMALS

Mammal surveys were only completed on the first day of the Bioblitz weekend (July 4, 2015), largely due to the lack of findings being a challenge to engage with participants. Surveys included both encounter transects, which served to record observations of sign or animals in between stations, and pellet counts, which served to record scat or pellet density and diversity at each station. All data is provided in Appendix B.

Encounter Transects

The encounter transects yielded mainly observations of canine scat, likely due to the transects following the recreational trails and access roads within the area. These areas are frequently used by resident dog walkers, and this may influence the use by native species.

Other interesting incidental observations in the various habitats within the area were a wood frog (*Lithobates sylvatica*) in the tall shrub habitats around Stinky Lake, and a large and active ant hill in the aspen / pine forest habitats on the hillside above Stinky Lake.

Pellet Counts

Pellet counts at each station yielded numerous observations of scurvid activity, largely in the form of red squirrel (*Sciurus vulgaris*) seed caches and middens. Minimal pellets were discernable in these areas, likely due to their very small size and the difficulty in which they would be seen in areas with dense groundcover.

At station #1 in the disturbed and regenerating habitats of the powerline right-of-way, arctic ground squirrel (*Spermophilus parryii*) activity was observed, in the form of small dig areas, one burrow opening, and a few trails. Two red squirrel seed caches and middens were noted within this area as well. Lastly, a small pile of old canid scat, likely from a red fox (*Vulpes vulpes*), was found.

At station #2 in the tall shrub habitats of Stinky Lake, canid scat was noted, likely from a domestic dog. As surveyors were traveling around the Lake, a wood frog was discovered.

At station #5 in the white spruce / pine forest habitats, a high concentration of red squirrel activity was noted, once again in the form of seed caches, middens, burrows and scat. A single red squirrel also sent out a few alarm calls during the survey period. Five distinct piles of snowshoe hare (*Lepus americanus*) pellets were also noted at this station, all deposited likely since the winter months. Additionally, a pile of canid scat was noted, likely from a domestic dog based on the composition and lack of hair or bone remains, commonly observed in fox or wolf scat. Lastly, a recently deposited pile of grouse droppings were noted at this station. No animal was observed, so species was not possible to identify.

At station #6, a recently deposited pile of grouse droppings were recorded, and again, without the animal present, it was not possible to determine what species was in the area. Additional observations included four separate piles of canine droppings, again, likely from domestic dogs using the area. It was in this area that a large ant hill was also noted during the encounter transects.

No other stations were surveyed for the purposes of this assessment.

BIRD SURVEYS

Point Counts

Bird point count surveys were completed at each of the pre-determined waypoint locations (Figure 2). A total of 26 species, and 143 individual sightings were recorded over the course of the July 4-5, 2015 weekend. A summary of the number of individuals and number of species observed at each station is illustrated in Figure 5 and 6, respectively, and a detailed list of species is provided in Appendix C.

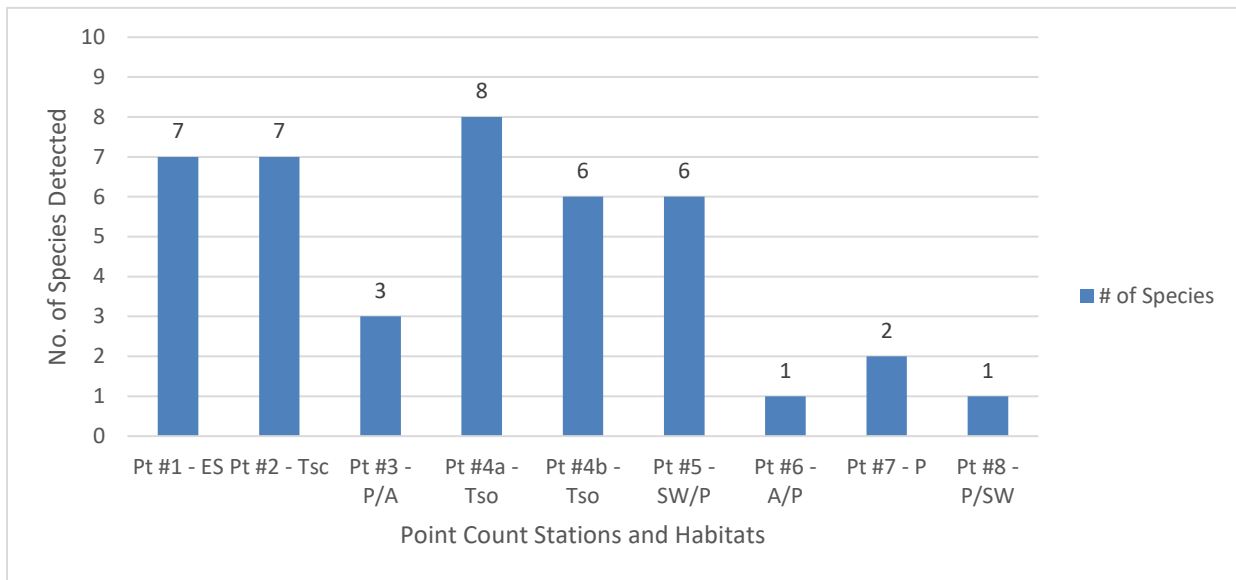


Figure 5 *Number of Bird Species Recorded at each Point Count Station.*

Based on the point count surveys completed during this period, the open shrub habitats had the highest number of distinct species, with eight species detected. The landscape types with the second-highest number of species were the closed tall shrub and the disturbed habitats. It should be noted that the disturbed habitats are slowly regenerating, and structurally, resemble the habitats offered in the tall shrub landscape types. Surveys in the closed shrub habitat area and the disturbed landscape areas both recorded seven distinct species.

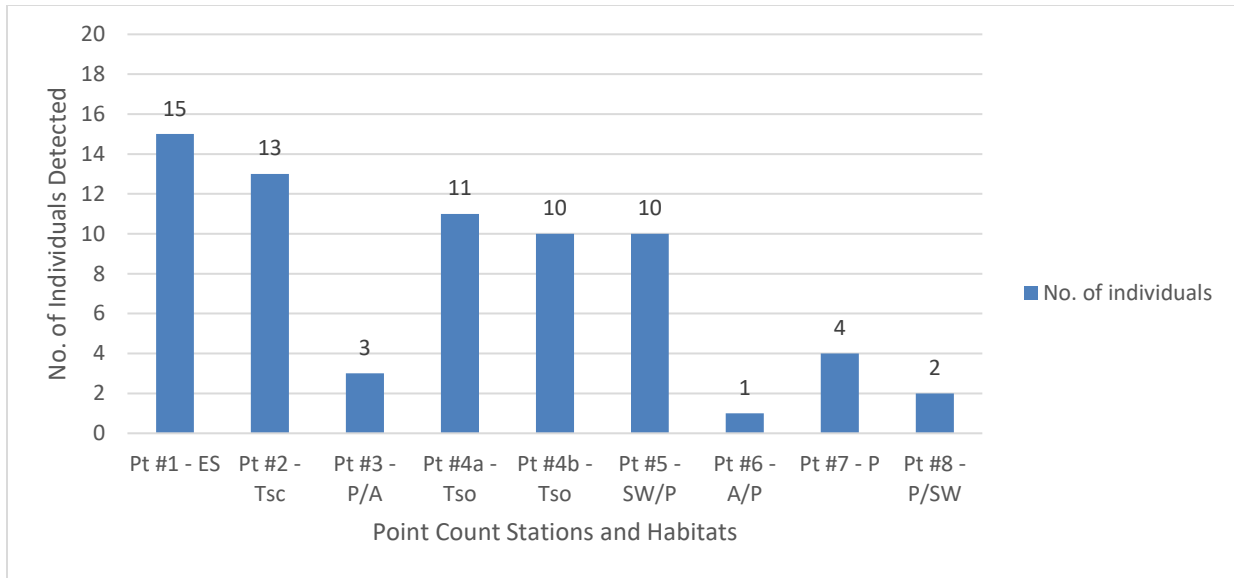


Figure 6 *Number of Individuals Recorded at each Point Count Station.*

The point count which occurred in the disturbed landscape type (waypoint #1) recorded the highest number of individual birds over all other point count stations, with a total of 15 individual observations. This may be reflecting the fact that this was the first point count station of the day, occurring in the earliest time period over the weekend, and may reflect the fact that birds may be more active during these earlier hours. The second highest concentration of birds was recorded at waypoint #2, in closed tall shrub habitats, with 13 individuals recorded. The lowest recorded number of individuals was recorded in the aspen/pine mixedwood forest habitats, with only one bird detected.

Encounter Transects

Encounter transects strived to capture birds between point count stations, in transition habitats, and those moving between habitats or point count stations. In total, 20 species (Figure 7), and 71 individuals were recorded during the three encounter transects (Figure 8).

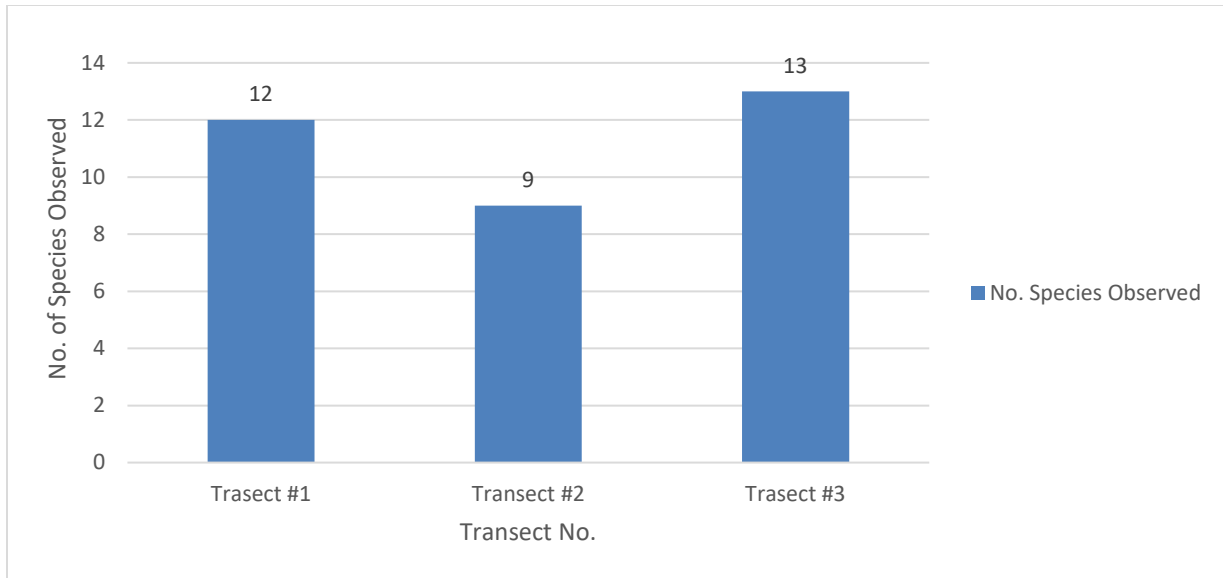


Figure 7 *Number of Species Recorded in each Transect.*

Transect #1 included an area from the pumphouse and along trails and the powerline right-of-way to point count station #1 in disturbed habitats, tracking back to point count station #5 in white spruce / pine forest, to point count station #3 in pine / aspen mixedwood forest, and then once again returning to the pumphouse by way of various trails and access roads. A total of 12 species were observed during this transect.

Transect #2 began at the pumphouse and headed up the trails towards the hills around Stinky Lake to point count station #6 in aspen / pine forest, down to the tall shrub habitats around Stinky Lake at point count station #2, and then along the trail back down towards the powerline right-of-way and returning to the pumphouse. A total of 9 species were observed during this transect.

Transect #3 saw surveyors start at the pumphouse and walk through various habitats to point count station #4, onwards to point count station #8, back through the pumphouse area and on to point count station #3, and ending once again at the pumphouse. This transect recorded the highest number of species, with 13 species recorded.

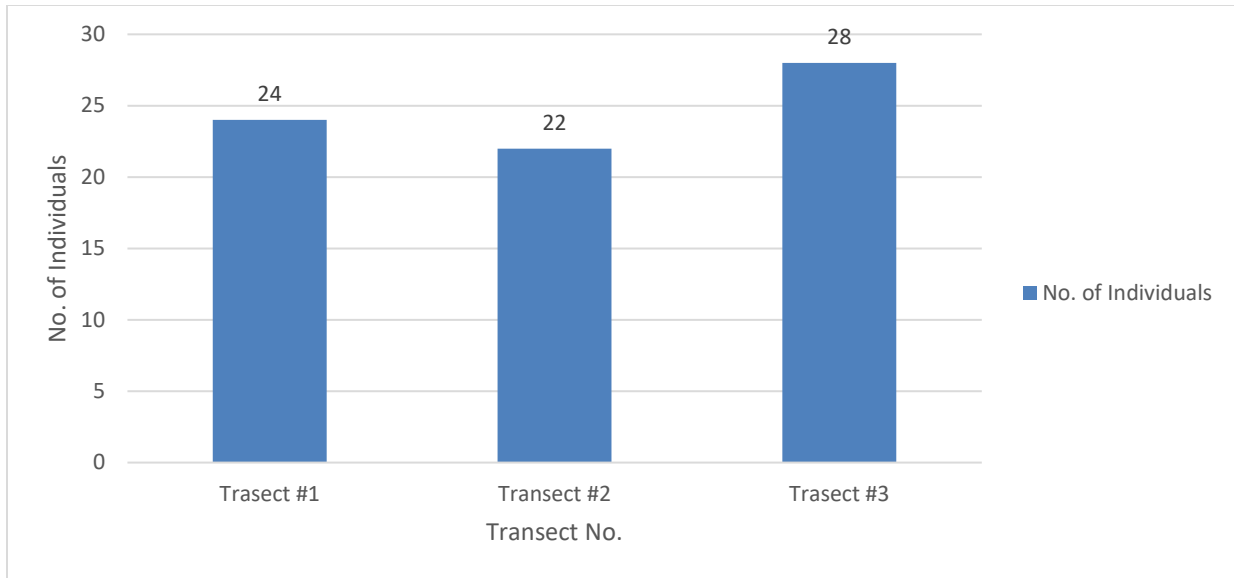


Figure 8 *Number of Individuals Recorded at each Transect.*

Transects completed in the area recorded higher species diversity and individual abundance when compared with the results of the point count surveys. This is because the transects were completed through multiple landscape types as captured by the point count stations; but also served to capture bird activity in transitional habitats, or those areas between distinct landscape types, which would not be captured by static point count stations. It is often these transitional areas or “edge habitats” offer a blend of habitat structures and species characteristic of adjacent landscapes.

Transect #1 recorded a total of 24 individuals and 12 species. Violet green swallow (*Tachycineta thalassina*) and boreal chickadee (*Poecile hudsonicus*) were the most commonly noted, with four individuals of each recorded. Other species noted were largely singles or paired individuals. Appendix C provides a detailed list of species, numbers and locations.

Transect #2 recorded a total of 22 individuals and nine species. Yellow-rumped warbler (*Setophaga coronata*) was the most commonly noted species, with six individuals recorded through this transect. The second most commonly noted species was violet green swallows, with four individuals recorded.

Transect #3 recorded a total of 28 individuals and 13 species, with common yellowthroat (*Geothlypis trichas*) being the most commonly observed species with six recorded observations. The second most commonly recorded species was Swainson’s thrush (*Catharus ustulatus*), with four recorded observations.

Survey Results Summary

The bird surveys in 2015 observed a total of 20 passerine species, one raptor species, two species of waterbirds, two species of waterfowl, one shorebird, but no game birds. A complete list of all bird species observe in the surveys are provided in Appendix C.

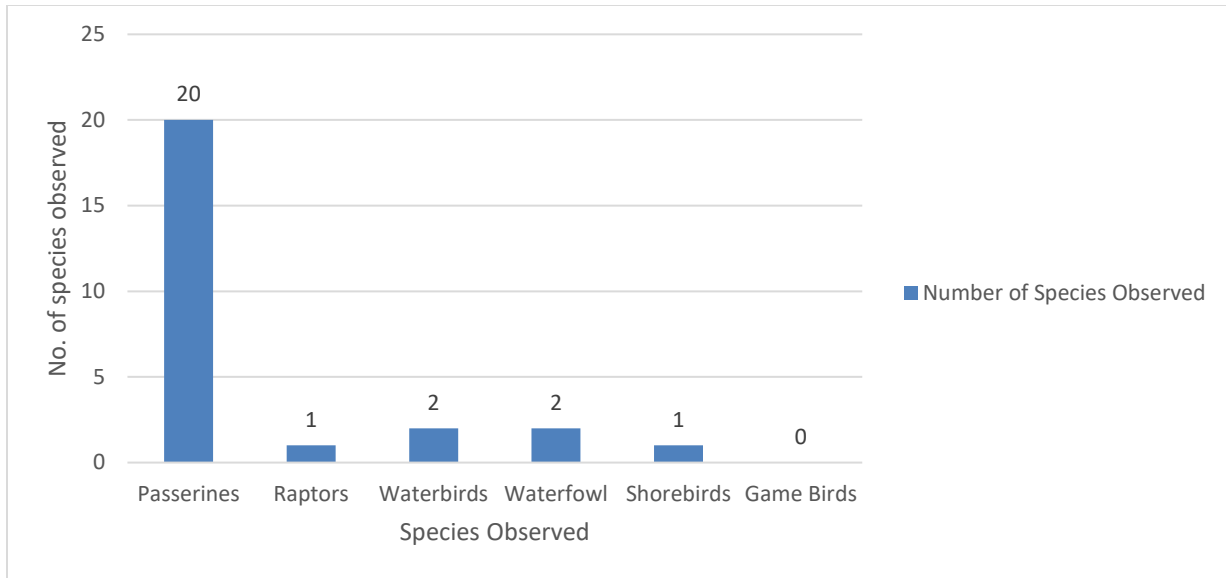


Figure 9 Number of Species Observed in each Group.

From all the data collected in both encounter transects and in the point count stations, yellow-rumped warblers (*Setophaga coronata*) were the most commonly encountered, with 17 individuals observed out of the 143 birds observed (Figure 10, below). The yellow-rumped warbler is a summer migrant to the Yukon, breeding in mature coniferous forests and mixed coniferous-deciduous woodlands (Sibley 2003). The majority of the observations during this survey period were recorded in either disturbed shrub, or tall shrub habitats, potentially a result of the surveys being completed later in the breeding season, where parents are venturing further from the coniferous nesting habitats into deciduous habitats, where winged insect abundance and diversity may be higher during the early hours of the day, and at this point in the summer season.

The second most commonly occurring species was violet-green swallow, with a total of 16 individuals counted during the encounter transects and the point count stations. It should be noted however, that swallows are a colonial species, and it is common for large groupings to be encountered, rather than more solitary sightings, and thus may be localized to one or two habitat types, rather than being common in all habitat types, as may be the case with yellow-rumped warblers.

The third most commonly observed species was the common yellowthroat (*Geothlypis trichas*), with 14 individual sightings. However, it should be noted that point count station #4 was repeated twice, and the same individuals may have been counted twice.

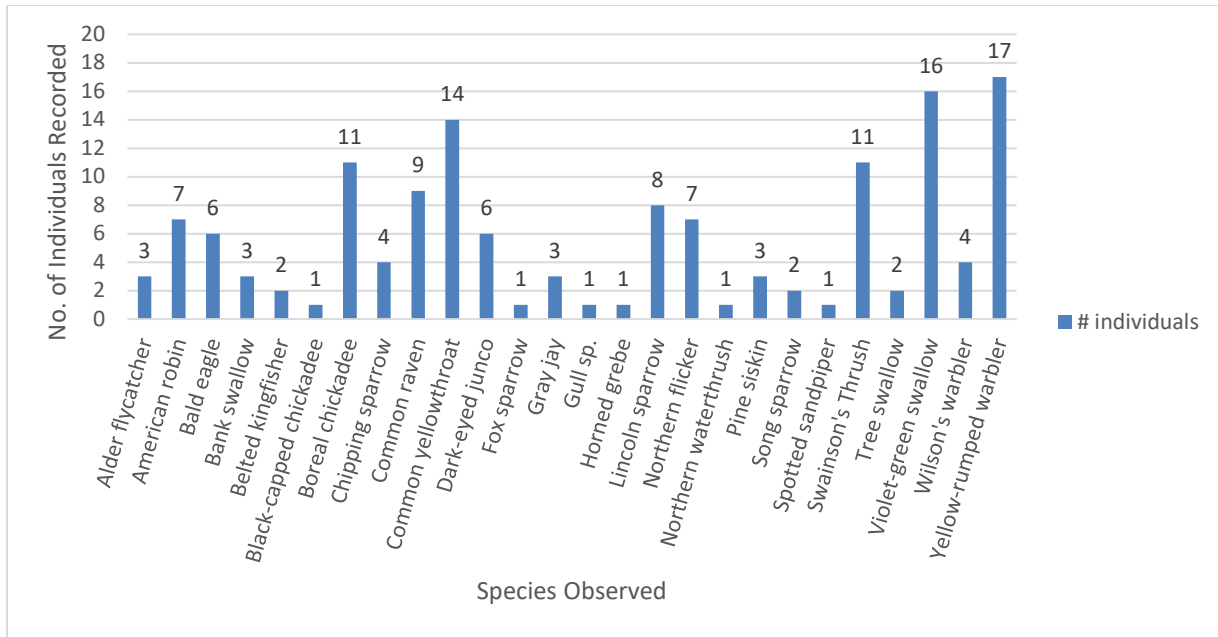


Figure 10 Species Diversity Recorded in all Transects and Point Counts.

TERRESTRIAL ARTHROPODS

Sweep netting throughout the area yielded 35 species and 47 individuals of insects, ranging from butterflies, to bumblebees, wasps, and snails. Table 1, below, provides a synopsis of the species and number of each encountered during the sweep netting, with a complete list of species, locations, and taxonomic information provided in Appendix D.

Table 1 Terrestrial Arthropods Collected and Identified

COMMON NAME	SCIENTIFIC NAME	MALES	FEMALES	UNSEXED	Total
a parasitic yellowjacket	<i>Dolichovespula adulterina</i>	0	0	1	1
a species of biting midge	<i>Ceratopogon bilobatus</i>	0	0	1	1
a species of cuckoo bumblebee	<i>Bombus flavidus</i>	0	0	1	1
American Emerald	<i>Cordulia shurtleffii</i>	0	0	1	1
Aspen Serpentine Leafminer	<i>Phyllocnistis populiella</i>	0	0	1	1
Black-notched Bumblebee	<i>Bombus bifarius</i>	0	0	1	1
Boreal Bluet	<i>Enallagma boreale</i>	0	0	1	1
Boreal Carpenter Ant	<i>Camponotus herculeanus</i>	0	0	1	1
Boreal Long-lipped Tiger Beetle	<i>Cicindela longilabris</i>	0	0	1	1

COMMON NAME	SCIENTIFIC NAME	MALES	FEMALES	UNSEXED	Total
Christina Sulphur	<i>Colias christina</i>	3	0	0	3
Clouded Sulphur	<i>Colias philodice</i>	2	1	1	4
Common Aerial Yellowjacket	<i>Dolichovespula arenaria</i>	0	0	1	1
Common Branded Skipper	<i>Hesperia comma</i>	1	0	0	1
Common Hawker	<i>Aeshna juncea</i>	0	0	1	1
Field Crescent	<i>Phyciodes pratensis</i>	1	0	0	1
Four-spotted Skimmer	<i>Libellula quadrimaculata</i>	0	0	1	1
Great Pond Snail	<i>Lymnaea stagnalis</i>	0	0	1	1
Greenish Blue	<i>Plebejus saepiolus</i>	2	0	0	2
Hudsonian Whiteface	<i>Leucorrhinia hudsonica</i>	0	0	1	1
Hudsonian Whiteface	<i>Leucorrhinia hudsonica</i>	0	0	1	1
Lake Darner	<i>Aeshna eremita</i>	0	0	1	1
Nevada Bumblebee	<i>Bombus nevadensis</i>	0	0	1	1
Northern Blue	<i>Lycaeides idas</i>	2	2	3	7
Northern Bluet	<i>Enallagma annexum</i>	0	0	1	1
Orange-Belted Bumble Bee	<i>Bombus mixtus</i>	0	0	1	1
Red Admiral	<i>Vanessa atalanta</i>	0	1	0	1
Red-waisted Whiteface	<i>Leucorrhinia proxima</i>	0	0	1	1
Ringed Emerald	<i>Somatochlora albicincta</i>	0	0	1	1
Soldier Fly	<i>Stratiomys barbata</i>	0	0	1	1
Spruce Sawyer Beetle	<i>Monochamus scutellatus</i>	0	0	1	1
Taiga Bluet	<i>Coenagrion resolutum</i>	0	0	1	1
Variable Darner	<i>Aeshna interrupta</i>	0	0	1	1
Western Bumblebee	<i>Bombus occidentalis</i>	0	0	1	1
White Admiral	<i>Limenitis arthemis</i>	0	0	1	1

COMMON NAME	SCIENTIFIC NAME	MALES	FEMALES	UNSEXED	Total
Yellowhead Bumblebee	<i>Bombus flavifrons</i>	0	0	1	1
<i>Total Species = 35</i>	<i>Total Individuals =</i>	<i>11</i>	<i>4</i>	<i>32</i>	<i>47</i>

The most commonly occurring species was the northern blue (*Lycaeides idas*), which is in the order Lepidoptera, or butterflies, with seven individuals captured, two males, two females, and three whose sex could not be determined. Northern blue is a common species in coniferous forests, bogs, wet meadows, and seepage areas with a range extending through most of the central and northern regions of North America (Danks and Downes 1997).

The second most commonly encountered species was the clouded Sulphur, also in the order Lepidoptera, with two males, one female, and one unsexed specimen recorded. A commonly occurring species throughout North America, this butterfly is more typical of open field habitats and disturbed or regenerating habitats where plant species such as clovers, alfalfa, and other sweet plants are often in abundance (Danks and Downes 1997).

The results of the malaise traps have not yet been received from the University of Guelph, but when these results are available, this information will be provided as an addendum to this report.

BENTHIC SURVEYS

Five benthic survey stations were established along McIntyre Creek within the boundaries of the area, and at each station, water quality parameters (pH, temperature, conductivity), riparian habitats (species, canopy closure), and instream habitats (substrate), were quantified and characterized. A complete account of these parameters, methods employed, habitat results, and sampling results are included in Appendix E. Table 2, below, provides a summary of the results of the benthic sampling.

Sites BIBI #1, BIBI #3 and BIBI #5 were all located on McIntyre Creek and represent lotic (running water) habitat. BIBI #2 is located in the freshwater spring area and BIBI #4 is located in the wetland upstream of the pumphouse, and are more representative of lentic (still water) environments. Thus the community structure is somewhat different between these two habitat types. These are further described in Table 2, below.

Table 2 Benthic Invertebrate Sampling Results

STATION NUMBER	SUBSTRATE CHARACTERISTICS	RIPARIAN HABITATS	SAMPLING METHOD	BENTHIC INVERTEBRATE ORDER, SPECIES
BIBI #1	Large gravels, small cobbles, few boulders, fines and sands	Tall shrub – willow sp., sapling poplar, herbaceous understory	Kick net, Surber, rock picking	Ephemeroptera - Ephemerellidae, Trichoptera - Brachycentridae & Hydropsychida, Plecoptera, Diptera, Oligochaeta, Gastropoda - Lymnaeidae.
BIBI #2	Cobbles and large gravels, no fines	Tall shrub – willow, horsetail	Kick net, rock picking, sweep netting	Trichoptera - Limnephillidae and Rhyacophillidae

STATION NUMBER	SUBSTRATE CHARACTERISTICS	RIPARIAN HABITATS	SAMPLING METHOD	BENTHIC INVERTEBRATE ORDER, SPECIES
BIBI #3	Small gravels, large gravels, cobbles	Tall shrub – willow, grasses, horsetail	Kick net, rock and twig picking, sweep netting	Oligochaeta – Lumbriculidae, Perilidae
BIBI #4	Organics, fines	Herbaceous – grass, sedges	Kick net, sweep netting	adult and larvae of dragon flies and damsel flies, water striders, water boatmen, water mite
BIBI #5	Gravels, cobbles, sand	Tall shrub – willow, horsetail, grasses	Kick net, Surber	Gastropoda, mayflies, stoneflies and caddisflies.

The set of CABIN samples were identified by Living Streams Environmental Services out of Vancouver, BC. The complete taxonomic list of the benthic macroinvertebrates can be found in Appendix E.

Overall, three phyla were identified within the Middle McIntyre Creek study area: Annelida, Mollusca and Arthropoda, representing a total of 42 different genus. The communities on McIntyre Creek were very diverse. Twenty-eight different types of invertebrates were identified at BIBI #1 and 20 taxa were documented at both BIBI #3 and BIBI #5. The communities were dominated by insects with strong representation from the pollution sensitive orders Ephemeroptera (mayflies), Plecoptera (stoneflies) and Trichoptera (caddisflies).

The community in the freshwater springs, BIBI #2, was dominated by Dipterans (true flies), with the vast majority belonging to the family Chironomidae (midges). Chironomids can be found in most types of habitat. There was representation by the sensitive orders but not as great as at the main-stem sites on McIntyre Creek.

The community in the substrate of the wetland (BIBI #5) was comprised of only two general types of invertebrates, gastropods (snails) and chironomids. This is reflective of the habitat here; muddy fine-grained sediments. Note that during the sweeps of the water column, dragonflies, damselflies, water striders and water boatmen (see Table 2) were also captured here.

In summary, based on the aquatic invertebrate biomonitoring data, middle McIntyre Creek appears to be a healthy ecosystem.

FISH AND FISH HABITAT SURVEYS

Fish habitat assessments and fish inventories were completed at seven sites on McIntyre Creek within the bounds of Middle McIntyre Creek. Species inventory, abundance, fish habitat, and structures impeding fish movement, were assessed and determined through these assessments and surveys. A summary of the results is provided in Table 3, below. Full details on the fish habitat assessment, stream characteristics, and fish captured during the surveys, are provided in Appendix E.

Table 3 Fish Habitat and Fish Inventory Results.

STATION #	CHANNEL CHARACTERISTICS	RIPARIAN HABITAT	INVENTORY METHOD	SPECIES	AGE CLASS	NUMBER OF INDIVIDUALS
F#1	90% rapid, 10% glide 5% boulder, 50% cobble, 20% gravel, 10% sand, 15% fines	mature white spruce, willow sp., equisitem, grasses	Minnow trapping	Slimy sculpin	Adult	3
				Burbot	Adult	1
				Chinook	juvenile	144
F#2	90% rapid, 10% glide gravel 60%, 10% cobble, 30% fines	mature white spruce, willow sp., equisitem, grasses	minnow trapping	Chinook	juvenile	39
				Rainbow trout	Adult	1
				Rainbow trout	Juvenile	1
F#3	50% rapid, 50% fast run 60% gravel, 30% cobble, 10% sand and fines	mature white spruce, alder	Minnow trapping	Slimy sculpin	Adult	2
				Chinook	Juvenile	2
				Chinook	Parr (+1)	1
				Rainbow trout	Juvenile	1
F#4	50% rapid, 30% riffle, 20% pool 5% boulder, 60% cobble, 30% gravel, 5% fines	Willow sp.	Minnow trapping	Slimy sculpin	Adult	2
				Chinook	juvenile	31
				Chinook	parr (+1)	2
				Rainbow trout	Juvenile	1
				Rainbow trout	Adult	1
F#5	100% glide through reach, riffling at upstream end	mature spruce and pine	Minnow trapping	Slimy sculpin	Adult	1

STATION #	CHANNEL CHARACTERISTICS	RIPARIAN HABITAT	INVENTORY METHOD	SPECIES	AGE CLASS	NUMBER OF INDIVIDUALS
	10% gravel, 80% sand, 10% fines, 1 large boulder					
F#6	50% pool, 40% glide, 10% riffle 80% cobble, 15% gravel, 5 % sand with occasional boulder	Willow sp.	Minnow trapping	Slimy sculpin	Adult	8
F#7	80% glide, 20% pool Shifting silt and sand	Sedges sp.	Minnow trapping	Slimy sculpin	Adult	6

A total of 242 fish were captured via minnow trapping during the course of the weekend, and consisted of Chinook (*Oncorhynchus tshawytscha*), slimy sculpin (*Cottus cognatus*), and burbot (*Lota lota*). The most common fish species captured was juvenile chinook salmon (JCS), with the occasional rainbow trout (RBT). JCS and RBT were not recorded upstream of the pump house pond area (Site F4). Slimy sculpin were recorded throughout the study area and the occasional burbot were found in the lower reaches. In total, 22 slimy sculpin, 219 chinook, and one burbot were captured through over 24 hours of minnow trapping within the length of McIntyre Creek bound within the area.

Additionally, numerous Arctic grayling (*Thymallus arcticus*) were found in the outlet to the pumphouse pond via seine netting. This area also had the most abundant and diverse fish community out of the entire area.

Based on these results, and the diversity of age classes and fish presence at the various stations, it does not appear that either Range Road or Mountainview Road culverts impede fish movement in McIntyre creek.

DISCUSSION AND RECOMMENDATIONS

Over the course of the weekend, biologists and Citizen Scientists recorded over 160 species of various plants, mammals, birds, terrestrial and benthic invertebrates, fish and amphibian. In total, observers recorded 61 species of plants, including tree, shrub, herbaceous and non-herbaceous species, six species of mammal, 26 species of birds, 34 species of terrestrial insects in six distinct Orders, and three species of fish. At the time of writing this report, the results of the Malaise traps and the benthic invertebrate taxonomic analysis were not yet complete. Therefore, there are likely species not captured within this report that were collected over the course of the weekend.

Based on the results from this first Bioblitz, the following recommendations are provided for consideration in future years.

1. Consider adding seasonally-appropriate and targeted surveys for the various taxa captured within this event, specifically:
 - a. Monthly bird surveys using both the point count method at plot locations, and encounter transects through the various landscape types within the area, capturing all migratory, resident and breeding birds that use the habitats in all seasons.

- b. Rare plant surveys in early to mid-July to capture flowering plants, wildflowers, and rare occurrences.
 - c. Semi-annual mammal surveys, to capture potential seasonal use by ungulates and furbearers, as well as small mammals. This would include snow tracking surveys carried out as encounter transects and pellet counts at designated stations; as well as, encounter transects and pellet counts completed in spring and summer months, when foraging and movement between landscape types is potentially increased.
 - d. Semi-annual terrestrial insect surveys and permanent malaise traps scattered throughout the area in targeted landscape types to gather information on the abundance, diversity, and the potential seasonal fluctuations of terrestrial insects in the area.
2. Consider hosting the annual Bioblitz event closer to the solstice (June 21) to capture periods of potentially higher wildlife activity within the area, with options for earlier and later timeframes for surveys. In other words, hold bird watching in the early hours (0500 hrs – 0900 hrs), insect surveys in the later hours (1300 hrs – 1600 hrs).
3. Consider adding bat and owl surveys with the use of remote activity detectors and mist netting for bats, and call playback surveys for owls, to capture more nocturnal species. This may also enable community members to participate in the evenings, allowing for more diversity of timeframes and increased participation.
4. Consider the addition of habitat suitability rankings for various indicator species as part of the mammal survey and inventories. This will require a knowledgeable mammal biologist, however, this level of information is useful in supporting future planning and development initiatives within the area.

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Appendix A

Plant Species and Ecology in the Middle McIntyre Creek

Waypoint #	Plot #	Date	Ecosite	Common Name	Scientific Name	% Cover	In plot	Out of Plot	Incidental	CWD	LL	Rock / Soil
Pt - 1	1A	04-07-2015	Disturbed (powerline ROW)	Kinnikinik	<i>Arctostaphylos uva-ursi</i>	80	X			10	5	0
				Arctic lupine	<i>Lupin arcticus</i>	20	X					
				Fireweed	<i>Chamerion angustifolium</i>	5	X					
				Bastard toadflax	<i>Comandra umbellata</i>	5	X					
				Grass #1	-	5	X					
				Grass #2	-	5	X					
				Lichen #1	-	8	X					
				Lichen #2	-	8	X					
				Lichen #3	-	8	X					
				lichen #4	-	8	X					
	Lichen #5	-	8	X								
	Stair-step moss	<i>Hylocomium splendens</i>	15	X								
	Low-bush cranberry	<i>Vaccinium vitis-idea</i>	5	X								
	Willow sp.	<i>Salix sp.</i>	5	X								
	Northern bedstraw	<i>Galium boreale</i>	2	X								
	Yarrow	<i>Achillea millifolium</i>	1	X								
	1B				Lichen sp.	-	90	X			60	5
Grass					-	1	X					
Sedge #1					<i>Carex sp.</i>	1	X					
Willow sp.					<i>Salix sp.</i>	10		X				
Kinnikinik					<i>Arctostaphylos uva-ursi</i>	7	X					
Arctic lupine					<i>Lupin arcticus</i>	20	X					
Fireweed					<i>Chamerion angustifolium</i>	1	X					
Pt - 2	2A	04-07-2015	Tall Shrub (closed)	Moss sp.	-	40	X			10	30	0
				Wolf lichen	<i>Letharia vulpina</i>	10	X					
				Grass sp.	-	70	X					
				Rush sp.	-	5	X					
				Dwarf birch	<i>Betula nana</i>	20	X					
				Labrador Tea	<i>Ledum groenlandicum</i>	30	X					
				Shrubby cinquefoil	<i>Potentilla fruticosa</i>	10	X					
				Low-bush cranberry	<i>Vaccinium vitis-idea</i>	5	X					
				Prickly rose	<i>Rosa acicularis</i>	1	X					
				Fireweed	<i>Chamerion angustifolium</i>	1	X					
	Northern gentian	<i>Gentianella amarella</i>	1	X								
	Twinflower	<i>Linnea borealis</i>	1	X								
	Pink wintergreen	<i>Pyrola asarifolia*</i>	1	X								
	Willow sp.	<i>Salix sp.</i>	20	X								
	Highbush cranberry	<i>Viburnum trilobum</i>	10		X							
	Willow sp.	<i>Salix sp.</i>	10	X			0	40	0			
	Dwarf birch	<i>Betula nana</i>	5		X							
	Shrubby cinquefoil	<i>Potentilla fruticosa</i>	10	X								
	Highbush cranberry	<i>Viburnum trilobum</i>	5	X								
	Oval leaf blueberry	<i>Vaccinium ovalifolium</i>	20	X								
2B				Labrador Tea	<i>Ledum groenlandicum</i>	10	X					
				Bunchberry	<i>Cornus canadensis</i>	1	X					
				Kinnikinik	<i>Arctostaphylos uva-ursi</i>	30	X					
				Grass	-	60	X					

			Rush sp.	-		X							
			Moss sp.	-	80	X							
Pt - 3	3A	04-07-2015	Pine / Aspen	Locoweed	<i>Oxytropis campestris</i>	10	X						
				Pasqueflower	<i>Anemone patens</i>	10	X						
				Kinnikinnik	<i>Arctostaphylos uva-ursi</i>	5	X						
				Twinflower	<i>Linnaea borealis</i>	10	X						
				Yarrow	<i>Achillea millifolium</i>	15	X						
				Grass	-	1	X						
		3B	04-07-2015	Pine / Aspen	Sedge	-	1	X					
	Showy Jacob's ladder				<i>Polemonium pulcherrimum</i>	1	X						
	Lichen				-	10	X						
	Pixie-cup lichen				<i>Cladonia pyxidata</i>	1	X						
	Grass				-	1	X						
	Kinnikinnik				<i>Arctostaphylos uva-ursi</i>	75	X						
	Pasqueflower				<i>Anemone patens</i>	15	X						
	Pt-4	04/07/2015	Tall Shrub (open)	Yarrow	<i>Achillea millifolium</i>	5	X						
Lance-leaved stonecrop				<i>Sedum lanceolatum</i>	5	X							
Pixie-cup lichen				<i>Cladonia pyxidata</i>	5	X							
Grey reindeer lichen				<i>Cladina rangiferina</i>	20	X							
Sidewalk moss				<i>Tortula rualis</i>	5	X							
Prickly rose				<i>Rosa acicularis</i>	20	X							
Pasqueflower				<i>Anemone patens</i>	1	X							
Field locoweed				<i>Oxytropis campestris</i>	1	X							
Grass				-	15	X							
Common dandelion				<i>Taraxacum officinale</i>	1	X							
Goldenrod				<i>Solidago canadensis</i>	10	X							
				4B	04/07/2015	Tall Shrub (open)	Sidewalk moss	<i>Tortula rualis</i>	20	X			
Pixie-cup lichen							<i>Cladonia pyxidata</i>	50	X				
Grey reindeer lichen	<i>Cladina rangiferina</i>	15	X										
Common dandelion	<i>Taraxacum officinale</i>	1	X										
Field locoweed	<i>Oxytropis campestris</i>	30	X										
Pasqueflower	<i>Anemone patens</i>	2	X										
Prickly rose	<i>Rosa acicularis</i>	4	X										
	Pt-5	04/07/2015	White spruce / Lodgepole pine	Grass	-	1	X						
Trembling aspen				<i>Populus tremuloides</i>	2	X							
White spruce				<i>Picea glauca</i>	40	X							
Step moss				<i>Hylocomium splendens</i>	100	X							
Moss sp.				-	10	X							
Arctic lupine				<i>Lupin arcticus</i>	40	X							
Twinflower				<i>Linnaea borealis</i>	40	X							
Lingonberry				<i>Vaccinium vitis-idaea</i>	30	X							
				5A	04/07/2015	White spruce / Lodgepole pine	Step moss	<i>Hylocomium splendens</i>	100	X	0	20	0
Arctic lupine							<i>Lupin arcticus</i>	30	X				
Bastard toadflax							<i>Linnaea borealis</i>	10	X				
Lingonberry							<i>Vaccinium vitis-idaea</i>	50	X				
Twinflower							<i>Linnaea borealis</i>	40	X				
White spruce	<i>Picea glauca</i>	20	X										
	5B	04/07/2015	White spruce / Lodgepole pine	Soopalalie	<i>Shepherdia canadensis</i>	1	X						

		Lichen sp.	-	1	X				
		Soopalalie	<i>Shepherdia canadensis</i>	80	X		15	20	0
		Trembling aspen	<i>Populus tremuloides</i>	15	X				
		Bastard toadflax	<i>Geocaulon lividum</i>	10	X				
		Lingonberry	<i>Vaccinium vitis-idaea</i>	80	X				
		Twinflower	<i>Linnaea borealis</i>	20	X				
		Fireweed	<i>Chamerion angustifolium</i>	1	X				
	6A	Prickly rose	<i>Rosa acicularis</i>	2	X				
		Pasqueflower	<i>Anemone patens</i>	1	X				
		Grass sp.	-	1	X				
		Mountain death camus	<i>Zygadenus elegans</i>	1	X				
		Red-stem Feathermoss	<i>Pleurozium schreberi</i>	1	X				
		Wolf lichen	<i>Letharia vulpina</i>	1	X				
Pt-6	_____	Aspen / Pine	Freckled pelt	<i>Peltigera aphthosa</i>	1	X			
		Soopalalie	<i>Shepherdia canadensis</i>	70	X				
		Trembling aspen	<i>Populus tremuloides</i>	2		X	1	70	0
		Prickly rose	<i>Rosa acicularis</i>	15	X				
		Meadow death camus	<i>Zygadenus elegans</i>	1	X				
		Grass sp.	-	20	X				
		Kinnikinnik	<i>Arctostaphylos uva-ursi</i>	20	X				
	6B	Lingonberry	<i>Vaccinium vitis-idaea</i>	10	X				
		Twinflower	<i>Linnaea borealis</i>	50	X				
		Yarrow	<i>Achillea millifolium</i>	1	X				
		Pasture sage	<i>Artemisia frigida</i>	1	X				
		Pixie-cup lichen	<i>Cladonia pyxidata</i>	1	X				
		Wolf lichen	<i>Letharia vulpina</i>	1	X				
		Four-parted gentian	<i>Gentianella amarella</i>	1	X				
		Lichen sp.	-	40	X		5	80	0
		Grey reindeer lichen	<i>Cladina rangiferina</i>	30	X				
		Bastard toadflax	<i>Geocaulon lividum</i>	20	X				
		Twinflower	<i>Linnaea borealis</i>	10	X				
		Kinnikinnik	<i>Arctostaphylos uva-ursi</i>	35	X				
		Lingonberry	<i>Vaccinium vitis-idaea</i>	10	X				
		Crowberry	<i>Empetrum nigrum</i>	60	X				
		Sidewalk moss	<i>Tortula rualis</i>	10	X				
Pt-7	_____	Pine	Red-stem Feathermoss	<i>Pleurozium schreberi</i>	3	X			
		Grey reindeer lichen	<i>Cladina rangiferina</i>	90	X		1	50	0
		Bastard toadflax	<i>Geocaulon lividum</i>	15	X				
		Lingonberry	<i>Vaccinium vitis-idaea</i>	5	X				
		Twinflower	<i>Linnaea borealis</i>	10	X				
		Kinnikinnik	<i>Arctostaphylos uva-ursi</i>	15	X				
		Lodgepole pine	<i>Pinus contorta</i>	1	X				
		Grass sp.	-	1	X				
		Common horsetail	<i>Equisitem arvense</i>	1	X				
		Reindeer lichen	<i>Cladina rangiferina</i>	35	X		5	40	5
		Dog pelt	<i>Peltigera canina</i>	5	X				
		Step moss	<i>Hylocomium splendens</i>	20	X				
		Sidewalk moss	<i>Tortula rualis</i>	3	X				

Pt-8	8A	Pine / White spruce	Twinflower	<i>Linnaea borealis</i>	2	X			
			Lingonberry	<i>Vaccinium vitis-idaea</i>	40	X			
			Kinnikinnik	<i>Arctostaphylos uva-ursi</i>	15	X			
			Bastard toadflax	<i>Geocaulon lividum</i>	15	X			
			Arctic lupine	<i>Lupin arcticus</i>	35	X			
			Crowberry	<i>Empetrum nigrum</i>	10	X			
			Grass sp.	-	1	X			
			Reindeer lichen	<i>Cladina rangiferina</i>	25	X	5	15	0
			Pixie-cup lichen	<i>Cladonia pyxidata</i>	3	X			
			Step moss	<i>Hylocomium splendens</i>	60	X			
Pt-8	8B	Pine / White spruce	Twinflower	<i>Linnaea borealis</i>	20	X			
			Lingonberry	<i>Vaccinium vitis-idaea</i>	40	X			
			Crowberry	<i>Empetrum nigrum</i>	5	X			
			Bastard toadflax	<i>Geocaulon lividum</i>	20	X			
			Arctic lupine	<i>Lupin arcticus</i>	20	X			
			Pink wintergreen	<i>Pyrola asarifolia*</i>	15	X			
			Lodgepole pine	<i>Pinus contorta</i>	2	X			
			Grass sp.	-	5	X			

Appendix B
Mammal Survey and Inventory Results

Waypoint #	Date	Start time	End time	Ecosite	Obs. Type	Common Name	Scientific Name	Sign Type	Comments
Pt #1	04-Jul-15	1102	1125	ES	Sign	Arctic ground squirrel	<i>Spermophilus parryii</i>	Dig, trail	
					Sign	Red squirrel	<i>Sciurus vulgaris</i>	seeds, tracks cache	
					Sign	Fox	<i>Vulpes vulpes</i>	Scat	*old
					Sign	Red squirrel	<i>Sciurus vulgaris</i>	seeds, tracks cache	
Pt #2	04-Jul-15	1413	1458	Tsc	Animal	Wood frog	<i>Lithobates sylvaticus</i>	-	
					Sign	Canine (domestic dog?)	<i>Canus domesticus</i>	scat	3 individual piles of droppings
Pt #5	04-Jul-15	1002	1039	SW/P	Residence	unkn mammal	-	den	~ 20 cm in diameter, likely unused for past year
					Animal	Red squirrel	<i>Sciurus vulgaris</i>	call / sound	
					Sign	Red squirrel	<i>Sciurus vulgaris</i>	cache, burrow	old
					Sign	Canine (domestic dog?)	<i>Canus domesticus</i>	scat	
					Sign	unkn mammal	-	Scat	young droppings
					Sign	Red squirrel	<i>Sciurus vulgaris</i>	seeds, tracks cache	recent
					Sign	snowshoe hare	<i>Lepus americanus</i>	scat / pellets	young droppings
					Residence	Arctic ground squirrel	<i>Spermophilus parryii</i>	burrow	
					Sign	snowshoe hare	<i>Lepus americanus</i>	scat / pellets	3 distinct piles of droppings
					Sign	snowshoe hare	<i>Lepus americanus</i>	pellets	young droppings
Pt #6	04-Jul-15	1351	1413	A/P	Sign	Grouse sp.	-	pellets	young droppings
					Sign	Canine (domestic dog?)	<i>Canus domesticus</i>	scat	
					Sign	Canine (domestic dog?)	<i>Canus domesticus</i>	scat	3 distinct piles of droppings
					Residence	Ant (sp.)	-	nest	

Appendix C
Avifauna Inventory Data

Wypt / Transc #	Date	Start Time	End Time	Common Name	Latin Name	# individuals	Distance	V/C/S	Sex	Age Class	Activity	Comments
Trasect #1 (Pumphouse --> Pt 1 --> Pt 5 --> #3 --> pumphouse)	04/07/2015	930	1130	American robin	<i>Turdus migratorius</i>	3	5	V	unkn	A		
				Chipping sparrow	<i>Spizella passerina</i>	2	3	V/C	M,F	A		
				Swainson's Thrush	<i>Catharus ustulatus</i>	1	6	S	M	A		
				Violet-green swallow	<i>Tachycineta thalassina</i>	4	10	V	unkn	A		
				Lincoln sparrow	<i>Melospiza lincolni</i>	2	4	V/S	M,F	A		
				Fox sparrow	<i>Passerella iliaca</i>	1	12	V/S	M	A		
				Dark-eyed junco	<i>Junco hyemalis</i>	2	20	V/C	unkn	A		
				Boreal chickadee	<i>Poecile hudsonicus</i>	4	4	V/S	unkn	A		
				Yellow-rumped warbler	<i>Setophaga coronata</i>	1	2	V	M	A		
				Northern flicker	<i>Colaptes auratus</i>	1	6	V/C	M	A		
				Wilson's warbler	<i>Cardellina pusilla</i>	1	10	V	M	A		
				Gray jay	<i>Perisoreus canadensis</i>	2	12	V/C	unkn	A		
Transect #2 (Pumphouse --> Pt #6 --> Pt #2)	04/07/2015	1330	1530	Yellow-rumped warbler	<i>Setophaga coronata</i>	6	3	V	M	A		
				Dark-eyed junco	<i>Junco hyemalis</i>	2	5	V	unkn	A		
				Boreal chickadee	<i>Poecile hudsonicus</i>	3	2	V/S	unkn	A		
				Black-capped chickadee	<i>Poecile atricapillus</i>	1	6	V/S	unkn	A		
				Northern flicker	<i>Colaptes auratus</i>	1	2	V/C	F	A		
				Swainson's Thrush	<i>Catharus ustulatus</i>	3	10	V/S	M	A		
				Violet-green swallow	<i>Tachycineta thalassina</i>	4	6	V	unkn	A		
				Tree swallow	<i>Tachycineta bicolor</i>	1	6	V	unkn	A		
				Horned grebe	<i>Podiceps auritus</i>	1	12	V	F	A		
				Transect #3 (Pumphouse --> Pt #4 --> Pt #8 --> pumphouse --> Pt #3 --> pumphouse)	05/07/2015	930	1130	Common yellowthroat	<i>Geothlypis trichas</i>	6	2	V/S
Wilson's warbler	<i>Cardellina pusilla</i>	2	2					V	M,F	A		
Lincoln sparrow	<i>Melospiza lincolni</i>	3	4					V	2M, 1F	A		
Yellow-rumped warbler	<i>Setophaga coronata</i>	2	6					V/S	M,F	A		
Swainson's Thrush	<i>Catharus ustulatus</i>	4	10 - 15					V/S	2M, 2F	A		
Dark-eyed junco	<i>Junco hyemalis</i>	1	2					V	unkn	A		
American robin	<i>Turdus migratorius</i>	2	3					V/C	unkn	A		
Belted kingfisher	<i>Megasceryle alcyon</i>	1	15					V/C	M	A		
Song sparrow	<i>Melospiza melodia</i>	2	5					V/S	M,F	A		
Northern flicker	<i>Colaptes auratus</i>	1	10					V	M	A		
Bank swallow	<i>Riparia riparia</i>	1	20					V	unkn	A		
Alder flycatcher	<i>Empidonax alnorum</i>	1	15					V/S	M	A		
Violet-green swallow	<i>Tachycineta thalassina</i>	2	10					V	unkn	A		
Pt #1	04/07/2015	1034	1039					Pine siskin	<i>Carduelis pinus</i>	3	20	V/C
				Bald eagle	<i>Haliaeetus leucocephalus</i>	6	>40	V	unkn	A, J	Fly-over	
				American robin	<i>Turdus migratorius</i>	1	60	V	unkn	A		*after transect period
				Northern waterthrush	<i>Parkesia noveboracensis</i>	1	>75	V	unkn	A		
				Northern flicker	<i>Colaptes auratus</i>	2	60, 75	V/C	unkn	A		
				Yellow-rumped warbler	<i>Setophaga coronata</i>	1	60	V/S	M	A		
				Chipping sparrow	<i>Spizella passerina</i>	1	45	V/S	M	A		
Pt #2	04/07/2015	1444	1449	Common raven	<i>Corvus corax</i>	1	> 50	V	unkn	A	Fly-over	
				Tree swallow	<i>Tachycineta bicolor</i>	1	> 75	V	unkn	A		
				Violet-green swallow	<i>Tachycineta thalassina</i>	4	>75	V	unkn	A		
				Yellow-rumped warbler	<i>Setophaga coronata</i>	2	35, >75	V	unkn	A		
				Swainson's Thrush	<i>Catharus ustulatus</i>	2	60, > 75	S	M	A		
				Boreal chickadee	<i>Poecile hudsonicus</i>	2	40, 60	S	unkn	A		
				Northern flicker	<i>Colaptes auratus</i>	1	60	C	unkn	A		
Pt #3	05/07/2015	1110	1115	Violet-green swallow	<i>Tachycineta thalassina</i>	1	> 75	V	unkn	A	Fly-over	
				Common raven	<i>Corvus corax</i>	1	> 75	V	unkn	A	Fly-over	
				American robin	<i>Turdus migratorius</i>	1	45	V	unkn	A		gathering food, and flew threw pt, heading south
Pt #4	05/07/2015	954	959	Bank swallow	<i>Riparia riparia</i>	1	> 50	V	unkn	A	Fly-over	
				Spotted sandpiper	<i>Actitis macularius</i>	1	> 75	V	unkn	A		
				Belted kingfisher	<i>Megasceryle alcyon</i>	1	> 75	V/C	unkn	A		
				Wilson's warbler	<i>Cardellina pusilla</i>	1	> 75	V/S	M	A		
				Alder flycatcher	<i>Empidonax alnorum</i>	1	> 75	V/S	M	A		
				Lincoln sparrow	<i>Melospiza lincolni</i>	2	> 75	V/S	M	A		
				Common yellowthroat	<i>Geothlypis trichas</i>	3	60, 55, 20	V/S	M	A		
				Yellow-rumped warbler	<i>Setophaga coronata</i>	1	50	V/S	M	A		
				Bank swallow	<i>Riparia riparia</i>	1	>75	V	unkn	A	Fly-over	
				Violet-green swallow	<i>Tachycineta thalassina</i>	1	>75	V	unkn	A	Fly-over	

Pt #4 (second survey)	05/07/2015	1332	1337	Common yellowthroat	<i>Geothlypis trichas</i>	5	60 - > 75	V/S	4M, 1F	A		Pair observed ~ 75 m, southwest of surveyors
				Dark-eyed junco	<i>Junco hyemalis</i>	1	60	V/C	unkn	A		
				Lincoln sparrow	<i>Melospiza lincolni</i>	1	75	V/S	M	A		
				Alder flycatcher	<i>Empidonax alnorum</i>	1	60	V/S	M	A		
Pt #5	05/07/2015	1105	1110	Boreal chickadee	<i>Paecile hudsonicus</i>	2	75	V/C	unkn	A		
				Gray jay	<i>Perisoreus canadensis</i>	1	>75	V	unkn	A		
				Yellow-rumped warbler	<i>Setophaga coronata</i>	4	45	V/C	2M, 2F	A		
				Swainson's Thrush	<i>Catharus ustulatus</i>	1	60	V/S	M	A		
				Chipping sparrow	<i>Spizella passerina</i>	1	> 75	V/C	M	A		
Northern flicker	<i>Colaptes auratus</i>	1	> 75	V/C	unkn	A						
Pt #6	04/07/2015	1412	1417	Common raven	<i>Corvus corax</i>	1	> 75	V	unkn	A		wind = 2, likely reduced efficiency of detections
Pt #7	05/07/2015	1432	1437	Common raven	<i>Corvus corax</i>	3	> 75	V	unkn	A	Fly-over	
				Gull sp.	-	1	> 75	V	unkn	A	Fly-over	
Pt #8	05/07/2015	1026	1031	Common raven	<i>Corvus corax</i>	2	> 200 m	V	unkn	unkn	Fly-over	* no birds observed at station

Total Species

26

Total Individuals

143

Appendix D
Terrestrial Insect Inventory Data

Class	Order	Family	SpeciesName	CommonName	Males	Females	Unsexed	Elevation	Latitude	Longitude	Date	Collector
Gastropoda	Hydrophila	Lymnaeidae	Lymnaea stagnalis	Great Pond Snail	0	0	1		60.75204	-135.12599	20150704	Cannings, Sydney G.
Insecta	Coleoptera	Carabidae	Cicindela longilabris	Boreal Long-lipped Tiger Beetle	0	0	1		60.74671	-135.10836	20150705	Guppy, Crispin S.
Insecta	Coleoptera	Cerambycidae	Monochamus scutellatus	Spruce Sawyer Beetle	0	0	1	737	60.75056	-135.11482	20150705	Guppy, Crispin S.
Insecta	Diptera	Ceratopogonidae	Ceratopogon bilobatus	a species of biting midge	0	0	1		60.75378	-135.11066	20150705	Guppy, Crispin S.
Insecta	Diptera	Stratiomyidae	Stratiomys barbata	Soldier Fly	0	0	1				20150704	Cannings, Sydney G.
Insecta	Hymenoptera	Apidae	Bombus bifarius	Black-notched Bumblebee	0	0	1				20150704	Cannings, Sydney G.
Insecta	Hymenoptera	Apidae	Bombus flavidus	a species of cuckoo bumblebee	0	0	1				20150704	Cannings, Sydney G.
Insecta	Hymenoptera	Apidae	Bombus flavifrons	Yellowhead Bumblebee	0	0	1				20150704	Cannings, Sydney G.
Insecta	Hymenoptera	Apidae	Bombus mixtus	Orange-Belted Bumble Bee	0	0	1				20150704	Cannings, Sydney G.
Insecta	Hymenoptera	Apidae	Bombus nevadensis	Nevada Bumblebee	0	0	1				20150704	Cannings, Sydney G.
Insecta	Hymenoptera	Apidae	Bombus occidentalis	Western Bumblebee	0	0	1				20150704	Cannings, Sydney G.
Insecta	Hymenoptera	Formicidae	Camponotus herculeanus	Boreal Carpenter Ant	0	0	1	737	60.75056	-135.11482	20150705	Guppy, Crispin S.
Insecta	Hymenoptera	Vespididae	Dolichovespula adulterina	a parasitic yellowjacket	0	0	1				20150704	Cannings, Sydney G.
Insecta	Hymenoptera	Vespididae	Dolichovespula arenaria	Common Aerial Yellowjacket	0	0	1				20150704	Cannings, Sydney G.
Insecta	Lepidoptera	Gracillariidae	Phyllocnistis populiella	Aspen Serpentine Leafminer	0	0	1		60.75172	-135.11832	20150705	Guppy, Crispin S.
Insecta	Lepidoptera	Hesperiidae	Hesperia comma	Common Branded Skipper	1	0	0	715	60.74924	-135.11140	20150704	Guppy, Crispin S.
Insecta	Lepidoptera	Lycaenidae	Lycaeides idas	Northern Blue	0	1	0	729	60.74672	-135.11995	20150704	Guppy, Crispin S.
Insecta	Lepidoptera	Lycaenidae	Lycaeides idas	Northern Blue	0	1	0	729	60.74664	-135.12096	20150704	Guppy, Crispin S.
Insecta	Lepidoptera	Lycaenidae	Lycaeides idas	Northern Blue	1	0	0	727	60.74588	-135.13086	20150704	Guppy, Crispin S.
Insecta	Lepidoptera	Lycaenidae	Lycaeides idas	Northern Blue	0	0	1	719	60.74915	-135.11131	20150705	Guppy, Crispin S.
Insecta	Lepidoptera	Lycaenidae	Lycaeides idas	Northern Blue	1	0	0	733	60.75615	-135.11240	20150704	Guppy, Crispin S.
Insecta	Lepidoptera	Lycaenidae	Lycaeides idas	Northern Blue	0	0	1	723	60.74932	-135.11150	20150705	Guppy, Crispin S.
Insecta	Lepidoptera	Lycaenidae	Lycaeides idas	Northern Blue	0	0	1	726	60.75036	-135.11155	20150705	Guppy, Crispin S.
Insecta	Lepidoptera	Lycaenidae	Plebejus saepiolus	Greenish Blue	1	0	0	734	60.74573	-135.13278	20150704	Guppy, Crispin S.
Insecta	Lepidoptera	Lycaenidae	Plebejus saepiolus	Greenish Blue	1	0	0	715	60.74866	-135.11389	20150704	Guppy, Crispin S.
Insecta	Lepidoptera	Nymphalidae	Limnitis arthemis	White Admiral	0	0	1	700	60.74639	-135.10747	20150705	Guppy, Crispin S.
Insecta	Lepidoptera	Nymphalidae	Phyciodes pratensis	Field Crescent	1	0	0	727	60.74588	-135.13086	20150704	Guppy, Crispin S.
Insecta	Lepidoptera	Nymphalidae	Vanessa atalanta	Red Admiral	0	1	0	696	60.74656	-135.10602	20150704	Guppy, Crispin S.
Insecta	Lepidoptera	Pieridae	Colias christina	Christina Sulphur	1	0	0	724	60.74965	-135.11232	20150704	Guppy, Crispin S.
Insecta	Lepidoptera	Pieridae	Colias christina	Christina Sulphur	1	0	0	757	60.75172	-135.12572	20150705	Guppy, Crispin S.
Insecta	Lepidoptera	Pieridae	Colias christina	Christina Sulphur	1	0	0		60.75172	-135.11832	20150705	Guppy, Crispin S.
Insecta	Lepidoptera	Pieridae	Colias philodice	Clouded Sulphur	1	0	0	734	60.74573	-135.13278	20150704	Guppy, Crispin S.
Insecta	Lepidoptera	Pieridae	Colias philodice	Clouded Sulphur	1	0	0	710	60.74792	-135.10979	20150704	Guppy, Crispin S.
Insecta	Lepidoptera	Pieridae	Colias philodice	Clouded Sulphur	0	1	0	733	60.75615	-135.11240	20150704	Guppy, Crispin S.
Insecta	Lepidoptera	Pieridae	Colias philodice	Clouded Sulphur	0	0	1	728	60.75639	-135.11255	20150705	Guppy, Crispin S.
Insecta	Odonata	Aeshnidae	Aeshna eremita	Lake Darner	0	0	1	706	60.74697	-135.10875	20150704	Guppy, Crispin S.
Insecta	Odonata	Aeshnidae	Aeshna interrupta	Variable Darner	0	0	1	696	60.74656	-135.10602	20150704	Guppy, Crispin S.
Insecta	Odonata	Aeshnidae	Aeshna juncea	Common Hawker	0	0	1	696	60.74656	-135.10602	20150704	Guppy, Crispin S.
Insecta	Odonata	Coenagrionidae	Enallagma annexum	Northern Bluet	0	0	1	791	60.75260	-135.12512	20150704	Guppy, Crispin S.
Insecta	Odonata	Coenagrionidae	Enallagma boreale	Boreal Bluet	0	0	1	696	60.74656	-135.10602	20150704	Guppy, Crispin S.
Insecta	Odonata	Coenagrionidae	Coenagrion resolutum	Taiga Bluet	0	0	1	696	60.74656	-135.10602	20150704	Guppy, Crispin S.
Insecta	Odonata	Corduliidae	Cordulia shurtleffi	American Emerald	0	0	1	737	60.75208	-135.11127	20150705	Guppy, Crispin S.
Insecta	Odonata	Corduliidae	Somatochlora albicincta	Ringed Emerald	1	0	0	696	60.74656	-135.10602	20150704	Guppy, Crispin S.
Insecta	Odonata	Corduliidae	Somatochlora albicincta	Ringed Emerald	0	0	1		60.75200	-135.12600	20150705	Guppy, Crispin S.
Insecta	Odonata	Libellulidae	Leucorrhinia hudsonica	Hudsonian Whiteface	0	0	1	715	60.74826	-135.11017	20150705	Guppy, Crispin S.
Insecta	Odonata	Libellulidae	Leucorrhinia hudsonica	Hudsonian Whiteface	0	0	1	757	60.75172	-135.12572	20150705	Guppy, Crispin S.
Insecta	Odonata	Libellulidae	Leucorrhinia proxima	Red-waisted Whiteface	0	0	1	757	60.75172	-135.12572	20150705	Guppy, Crispin S.
Insecta	Odonata	Libellulidae	Libellula quadrimaculata	Four-spotted Skimmer	0	0	1	757	60.75172	-135.12572	20150705	Guppy, Crispin S.

NOTE: malaise trap samples from Stinky Lake have been sent to Guelph University's Barcode of Life Laboratory for identification. This should eventually result in another 30 species or so, mostly flies.

NOTE: The season was a bit late for the the maximum diversity of insects. This was a result of the hot May in 2015; in a normal year the date would have been fine.

APPENDIX E
BENTHIC INVERTEBRATE INVENTORY DATA



Living Streams Environmental Services
 401-1150 West 8th Ave. Vancouver, B.C. V6H3Z5
 E-mail: livingstreams@live.ca
 Cell: (778)-385-1447

McIntyre Creek Watershed

						Date Sampled		Date processed:		Date processed:	
						ND	04-Jul-15	ND	05-Jul-15	ND	ND
						29-Nov-15	11-Dec-15	12-Dec-14	14-Dec-15	14-Dec-15	14-Dec-15
						# of cells picked:	100	5	18	100	37
Phylum	Class	Order	Family	Genus/Species		Site A	Site B	Site C	Site D	Site E	
P. ANNELIDA	Cl. CLITELLATA	O. Lumbriculida	F. Lumbriculidae							1	
			F. Lumbricidae		18		1				
P. MOLLUSCA	Cl. GASTROPODA	O. Basommatophora	F. Lymnaeidae		23				1	2	
			F. Hydrobiidae		1						
			F. Physidae		1						
			F. Planorbidae		42					4	
			O. Heterostropha	F. Valvatidae		25			3	1	2
			Cl. BIVALVIA	O. Veneroida	F. Pisidiidae	<i>Pisidium</i> sp.	154			8	
P. ARTHROPODA	Cl. ARACHNIDA	O. Prostigmata	F. Dryphyphantidae	<i>Protzia</i> sp.	2		5				
			F. Lebertiidae	<i>Lebertia</i> sp.		1				1	
P. ARTHROPODA	Cl. INSECTA	O. Ephemeroptera	F. Ameletidae	<i>Ameletus</i> sp.	1					1	
			F. Baetidae	<i>Acentrella</i> sp.					2	4	
				<i>Baetis</i> sp.	816	24	82			49	
			F. Ephemerellidae	(early instar)					1	5	
				<i>Drunella</i> sp.	9					5	
				<i>Serratella</i> sp.	21		12			4	
			F. Heptageniidae	<i>Cinygmula</i> sp.				1	1	2	
			F. Leptophlebiidae	<i>Paraleptophlebia</i> sp.	19						
			O. Plecoptera	F. Chloroperlidae	<i>Swetlsa</i> sp.	11	17	4			
				F. Nemouridae	<i>Zapada</i> sp.		4				
				F. Perlidae	<i>Hesperoperla</i> sp.	8					
			O. Trichoptera	F. Apataniidae	<i>Allomyia</i> sp.		2				
				F. Glossosomatidae	<i>Glossosoma</i> sp.	72		32		4	
				F. Brachycentridae	<i>Brachycentrus</i> sp.	19		1			
					<i>Micrasema</i> sp.			1			
				F. Hydroptilidae	<i>Ochrotrichia</i> sp.	61		8		4	
				F. Hydropsychidae	<i>Hydropsyche</i> sp.	2					
				F. Limnephilidae	<i>Hesperophylax</i> sp.	1					
					<i>Onocosmoecus</i> sp.					1	
					<i>Psychoglypha</i> sp.			2		1	
	F. Rhyacophilidae	<i>Rhyacophila</i> sp.	5		2						
O. Coleoptera	F. Dytiscidae	<i>Oreodytes</i> sp.	2		1						
O. Diptera	F. Chironomidae		110	283	158	3	132				
	F. Ceratopogonidae	<i>Probezzia</i> sp.			1						
	F. Empididae	<i>Metachela</i> sp.	1								
		<i>Neoplasta</i> sp.			3						
		<i>Oreogeton</i> sp.	1								
	F. Muscidae			2							
	F. Psychodidae	<i>Pericoma/Telmatoscopus</i>	3								
	F. Simuliidae	<i>Simulium</i> sp.			4		1				
	F. Tipulidae	<i>Antocha</i> sp.	7								
		<i>Dicranota</i> sp.	38		3		25				
Total Number of Organisms						1473	341	328	5	330	
Total Number of Taxa						28	10	20	3	20	

Wgt#	Date	Zone	Easting	Northing	Elevation	Water Temp	pH	Conductivity	Ave water depth	% Canopy	Weather	AP Temp	CANN method	Substrate	Riparian Vegetation	Smiths Order	General Comments
BIB 41	July 4, 2015	BV	494139	6794544	693	11.7	7.92	229	19.5	0	partly cloudy, slight breeze	14	Kick net, Surber, rock picking	clean washed large gravel to small cobbles, few boulders, fine sand	soft silt, grasses, clover (2), ribwort's aster, primrose, fireweed, sedges, rose, plantain, buttercup, equisetum, bog orchid, mosses	Ephemeroptera - Ephemerellidae, Trichoptera - Hydropsychidae & Hydropsychinae, Pteropoda, Odonata, Diptera, Coleoptera, Lymnaeidae	1 sculpin caught and released, heavy rain previous day, kingfisher few d/.
BIB 42	July 4, 2015	BV	494139	6794606	685	5	7.04	302	12.4	0	sunny, drifting hotter, light breeze	18	Kick net, rock picking, sweep with net	general algae covered, some cobble and large boulders, no apple trees	monkey flower, moss, fireweed, equisetum, willow, occasional spruce, gooseberry (1), single delight (1), blackberry, silt, willow leaf flower (1/2)	Trichoptera - Limnephilidae & Rhyacophilidae, plus others	adult dragon flies flying around, a robin sighted
BIB 43	July 4, 2015	BV	493148	6794293	715	13.7	7.67	225	24.8	0	sunny, calm	22	Kick net, rock and twig picking, sweep with net	gravel close to shore than larger gravels and cobbles further in stream	grasses, willow, clover, yellow, dandelions, sweet clover, equisetum,	Oligochaeta - Lumbriculidae - several, pinkish in colour, and many kinds of mayflies and caddisflies plus a very large stonefly, Perlidae	Caught and released 4 sculpins
BIB 44	July 5, 2015	BV	494200	6794544	696	16.1	8.1	257	26.2	0	sunny, calm	23	Kick net, sweep with net	black mud, high in organic - roots etc	sedges, soft yellow flowered plant that looks horsetail	adult and larval of dragon flies and damselflies, water striders, water boatman, water mite	wood frog sighted, plus several yellow throated warblers
BIB 45	July 5, 2015	BV	490048	6793775	723	13.9	7.43	231	31.9	0 - 5	mostly sunny, calm	19	Kick net, Surber	clean washed gravel with cobbles and sand	equisetum, fireweed, willow, grasses, yellow, dandelion	Gastropoda, mayflies, stoneflies and caddisflies.	Open area at ford, old mine workings just upstream,

Appendix F
Fisheries Inventory Data

Wyp#	Zone	Easting	Northing	Elevation	Location Comments	Slope	Aspect	Surveyed Length (m)	Channel Width (m)	Wetted Width (m)	Ave. Depth (m)	Ave. Velocity (m/s)	% Pool / Riffle / Run	Side Channels	Debris	Cover	Crown Closure	Riparian Vegetation	Stream bed substrate	Species	Age Class	Number	Survey Method	Comments
F #1	8V	494454	6734395	702	downstream of Range Road culvert	> 3%	East	30	10	10	0.5	> 1	90% rapid, 10% glide	culvert side channel	LOD	boulders, rapids	5%	mature white spruce, willow sp., equisetum, grasses	Angular boulder rip rap at culvert, away from culvert 5% boulder, 50% cobble, 20% gravel, 10%	Slimy sculpin	Adult	3	Minnow trapping	
																				Burbot	Adult	1	Minnow trapping	
																				Chinook	juvenile	144	Minnow trapping	
F #2	8V	494450	6736231	706	upstream of Range Road culvert	> 1%	East	60	8	7.5	0.5	> 1	90% rapid, 10% glide	culvert side channel	LOD	boulders, rapids	5%	mature white spruce, willow sp., equisetum, grasses	loosely embedded gravel 60%, 10% cobble, 30% fines	Chinook	juvenile	39	Minnow trapping	
F #3	8V	494451	6735900	677	upstream of Mountain View Road culvert	> 2%	North east	80	3.8	3.8	0.45	> 1	50% rapid, 50% fast run	none	none	10% undercut banks, in-stream vegetation (15%)	25%	mature white spruce, alder	60% gravel, 30% cobble, 10% sand and fines	Slimy sculpin	Adult	2	Minnow trapping	
																				Chinook	juvenile	2	Minnow trapping	
																				Chinook	parr (+1)	1	Minnow trapping	
F #4	8V	494125	6734540	655	upstream of Pumphouse Pond	1 - 2 %	East	70	7	6.5	0.2	0.75	50% rapid, 30% riffle, 20% pool	none	none	grassy banks, perched cobbles	5%	Willow sp.	5% boulder, 60% cobble, 30% gravel, 5% fines	Slimy sculpin	Adult	2	Minnow trapping	* trap #5 had deceased water shrew
																				Chinook	juvenile	31	Minnow trapping	
																				Chinook	parr (+1)	2	Minnow trapping	
F #5	8V	493735	6734459	680	beaver pond, ~ 500 m upstream of pumphouse	< 1%	East	50	15	11	0.45	0.4	100% glide through reach, riffling at upstream end	none	none	limited	2%	mature spruce and pine	10% gravel, 80% sand, 10% fines, 1 large boulder	Slimy sculpin	Adult	1	Minnow trapping	
F #6	8V	493107	6734328	680	300 m downstream of the Alaska Highway	> 0%	East south-east	60	4	3	0.4	0.8	50% pool, 40% glide, 10% riffle	none	LWD from old beaver dam	woody debris, overhanging grass banks	15%	Willow sp.	80% cobble, 15% gravel, 5% sand with occasional boulder	Slimy sculpin	Adult	8	Minnow trapping	
F #7	8V	492218	6734245	680	500 m upstream of the Alaska Highway	> 0%	East	50	10	8	> 1	> 0.5	80% glide, 20% pool	occasional and small	old LWD	cut banks, depth and LWD	0%	sedges	Shifting silt and sand	Slimy sculpin	Adult	6	Minnow trapping	

Sculpin 22
Chinook 219
Burbot 1
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