
Some aspects of the ecology of the Columbia National Wildlife Area

With emphasis on Species at Risk

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Pacific and Yukon Region 2012
Canadian Wildlife Service
Environmental Conservation Branch



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Cover Mosaic (spiralling clockwise from upper-left): Black Tern; Western Toad; Osprey; Hooker's Townsendia; White-tailed Deer; Greater Bladderwort; Panorama: Ken Brock and Darrell Smith viewing Goose Lake with Wilmer Bluffs (centre-left), Beaver Run levees (lush green running from bottom to centre) and Goose and Eagle islands (centre-right); Western Meadowhawk; Columbian Ground-Squirrel; A quiet backwater on the Spillimacheen Unit looking west toward the Purcell Mountains; Early Blue Violet; and Red-naped Sapsucker in nest cavity entrance (*all photographs by Neil K. Dawe*).

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Abstract

In fiscal year 2003-2004, Canadian Wildlife Service, Pacific and Yukon Region, began a program of developing inventories for priority federal lands in order to meet the requirements of the Species At Risk Act on those lands.

This report documents the results of one summer's fieldwork in 2004 gathering inventory data (with special reference to species at risk) on the Columbia National Wildlife Area. Our focus was on vascular plants and vertebrates, particularly birds.

We recorded a total of 4 species of fungi, 268 species of plants, 34 species of invertebrates, 2 amphibian species, 1 reptile species, 112 bird species, and 17 species of mammals on the Columbia National Wildlife Area over the period May through the end of August, 2004. All these are listed taxonomically with annotations

and form the main body of this report.

5 SARA species (Western Toad, Western Painted Turtle, Lewis's Woodpecker, Olive-sided Flycatcher, American Badger), 2 provincially Red-listed species (Hooker's Townsendia, Lewis's Woodpecker, American Badger), and 6 Blue-listed species (Lakeshore Sedge, Water Marigold, Western Toad, Western Painted Turtle, Great Blue Heron, Olive-sided Flycatcher) were found on the Columbia National Wildlife area. We also found 2 potential Red-listed plant communities (Black cottonwood/ Red-osier Dogwood/ Nootka Rose; Bluebunch Wheatgrass/ Junegrass) and 2 potential Blue-listed plant community (Swamp Horsetail/ Beaked Sedge; Common Cattail Marsh) on the National Wildlife Area all of which require verification.

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Introduction

The Species At Risk Act (SARA) was proclaimed into law on 5 June 2003. The purposes under Section 6 of SARA are:

to prevent wildlife species from being extirpated or becoming extinct, to provide for the recovery of wildlife species that are extirpated, endangered or threatened as a result of human activity and to manage species of special concern to prevent them from becoming endangered or threatened.

Thus, in fiscal year 2003–2004, Canadian Wildlife Service, Pacific and Yukon Region, began a program of developing inventories for priority federal lands in order to meet the requirements of SARA on those lands.

One part of this program was to develop criteria for prioritizing federal lands that require more detailed inventories, particularly Environment Canada's Alaksen, Vaseux-Bighorn, Qualicum, and Columbia National Wildlife Areas (NWA). Other federal lands with active management, large federal properties, and properties where species at risk, as they appeared in the most recent Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assessment results, are likely to occur were also considered.

Once the properties had been prioritized, the next step was to provide habitat and species inventories of the priority lands with particular reference to rare habitats and species at risk.

Because the NWAs were already considered high priority lands, known to contain some species at risk, our initial focus was placed on these federal lands.

This report documents the results of one summer's fieldwork (2004) gathering inventory data, with special reference to species at risk, on the Columbia National Wildlife Area (CNWA).

Study Area

The CNWA is situated in the Southern Rocky Mountain Trench (hereafter, the Trench) and consists of 4 units: Wilmer, Brisco, Spillimacheen, and Harrogate (ca. 5 km, 38 km, 49 km and 54 km north of Invermere, respectively; Figure 1).

The Trench, formed primarily as a result of

Cenozoic-aged, geologic faulting and erosion and some deposition by lakes, rivers and glaciers, extends from Flathead Lake, Montana, some 1,600 km north to the Liard River, just south of the British Columbia-Yukon border.¹ It is bounded on the west by the Eastern Purcell Mountains that slope eastward relatively gradually to the valley floor and ends at the abruptly rising Southern Continental Ranges of the Rocky Mountains to the east (Campbell et al. 1990:109).

During the last glaciation, a main ice-mass developed in the Purcell and Selkirk mountains and ultimately flowed eastward through the Spillimacheen River valley to the Trench, then southward to Montana. The oldest Pleistocene deposits on the CNWA at Wilmer were left by the retreat of this glacier where, at the Canada-USA border, it reached a width of 19 km and was 1,500 m thick. A post-glacial lake, covering a distance some 130 km north from Canal Flats, allowed deep silt deposits to form over much of this area of the Trench. On the Wilmer Unit, drumlinized glacial tills form the higher elevation areas to the west, grading eastward to glacio-lacustrine deposits of silts and clay-silts left by the post-glacial lake. These deposits have formed terraces, which are often gullied, and make up much of the upland areas of the unit.

The Horsethief Creek alluvial fan, at the northern limits of the Wilmer Unit, consists of a series of dissected fans. Along the southern edge of the fan complex, a fairly extensive post glacial fluvial terrace occurs that is about 45 m high at its southern end grading down to Ritchie's Point and into the present fan. On the southeastern corner of the unit lies a portion of the Toby Creek fan. Goose Lake and the attendant marshes have formed in the backwaters of the Toby Creek fan.

The floodplain on the Wilmer Unit has an extensive system of levees, channels, open water areas, marshes, and islands. The channels were former creek beds whose banks have formed levees through the vertical deposition of silts and coarser materials during periods of flooding. Levees adjacent to the Columbia River have built up to nearly 1 m above the floodplain. Two islands in Goose Lake rise 6–8 m above the current floodplain and are likely remnants of an earlier, elevated floodplain. Extensive areas of open water and marshes occur, with relatively flat

¹ The geological and terrain descriptions of the CNWA are based primarily on Keller (1978) and Jamieson et al. (2009).

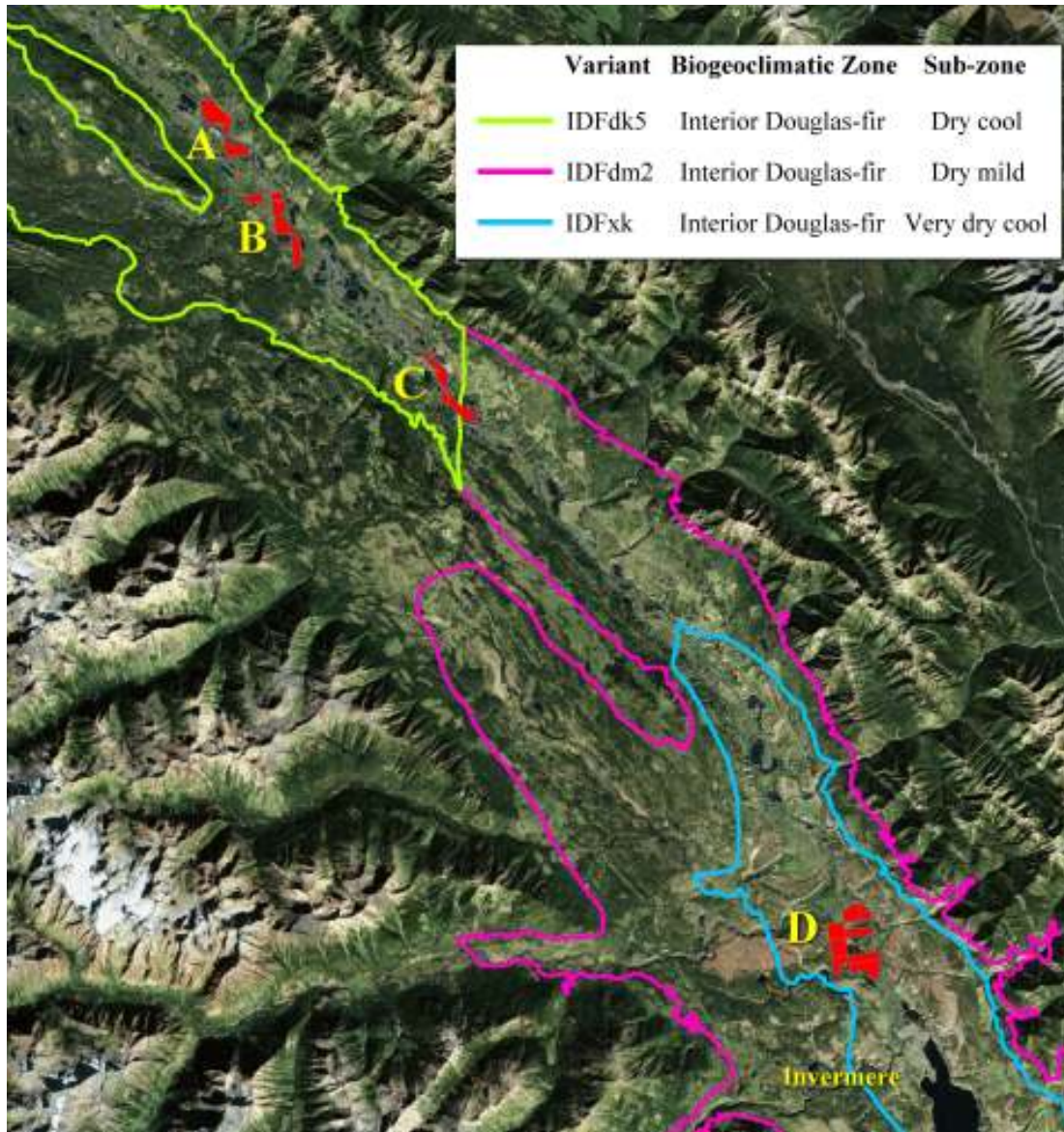


Figure 1. Map showing locations of the four units of the Columbia National Wildlife Area: A - Harrogate, B - Spillimacheen, C - Brisco, and D - Wilmer. Their respective Biogeoclimatic Zones and Sub-zones are also shown.

and shallow bottom contours; all but Wilmer Slough are connected in some way to the Columbia River. These areas are subject to frequent flooding, high siltation rates (Figure 2) and high turbidity. Figure 3 shows the daily water levels for the Columbia River at Athalmer. In June, median water levels rise more than a metre from the winter norm.

The CNWA is situated within the Southern Interior Mountains Ecoprovince in the Interior Douglas-fir Biogeoclimatic Zone (Figure 1). The Wilmer Unit lies within the Very Dry Cool Sub-zone (IDF_{xk}; formerly IDF_{un} and IDF_{dm2}; Braumandl et al. 2002). This variant has hot, dry summers and cool winters with little snow and lies beyond the northern contiguous limit of ponderosa pine in the Rocky Mountain Trench.

Two of the units, Harrogate and Spillimacheen, lie within the Dry Cool Sub-zone (IDF_{dk5}) and Brisco lies at the boundary between the Dry Cool and Dry Mild Subzones (IDF_{dk5} and IDF_{dm2}). These units of the NWA all lie within the floodplain of the Columbia River; their major habitat types are the lowland deciduous forest and wetlands. More work needs to be done on these units in order to define their respective biophysical habitats.

Table 1 shows some climate variables for the Rocky Mountain Trench area in the vicinity of Radium Hot Springs and Invermere.

Methods

Since the focus of this inventory work was species at risk and, by definition, these species are relatively rare, we chose to systematically search the NWA both on foot and by canoe.

Preparatory work began by obtaining rare element occurrence records from the BC Conservation Data Centre (BCCDC). These records included species at risk known from the study area as well as



Figure 2. Open water area south of Ritchie's Point (treed area on left) looking north with the Rocky Mountains on the right, 8 June 2004. Note the silt-covered leaves of the yellow water-lily, a result of the silt-laden Columbia River in flood. In these backwater areas, high silt-deposition rates occur.

Table 1. Some climate variables from Kootenay National Park (Radium Hot Springs), 1968–2004, with comparative data from Invermere, 1943–1949 (the most recent period of long-term data).

	Kootenay National Park (West Gate; Station 1154410)			Invermere (Station 1163655)
	Period			
	1968–2004	1968–1986	1987–2004	1943–1949
Mean annual precipitation (mm)	417.1 ⁴	399.1 ¹	438.6 ³	352.7 ³
Mean annual snowfall (cm)	108.7 ⁴	108.2 ¹	109.4 ³	74.0 ³
Max mean precipitation (mm; June)	58.4	56.2	60.6	54.9
Min mean precipitation (mm; March)	19.3	16.7	17.8 ¹²	12.2
Mean temperature (°C)	5.5 ⁵	5.2 ¹	5.8 ⁴	4.3 ¹
Mean max temperature (Jun–Aug)	24.2 ²	24.1 ¹	24.3 ¹	23.8 ¹
Mean min temperature (Dec–Feb)	-10.0 ²	-10.8 ¹	-9.3 ¹	-13.5 ¹
Extreme summer temperature	37.5 ⁶	36.1 ⁸	37.5 ⁶	35.0 ¹⁰
Extreme winter temperature	-37.8 ⁷	-37.8 ⁷	-35.5 ⁹	-37.2 ¹¹

¹ 1 year missing; ² 2 years missing; ³ 3 years missing; ⁴ 4 years missing;

⁵ 5 years missing; ⁶ 5 August 1998; ⁷ 30 December 1968; ⁸ 1 & 2 August 1971;

⁹ 12 January 1998; ¹⁰ 28 July 1945; ¹¹ 24 January 1949; ¹² February over this period.

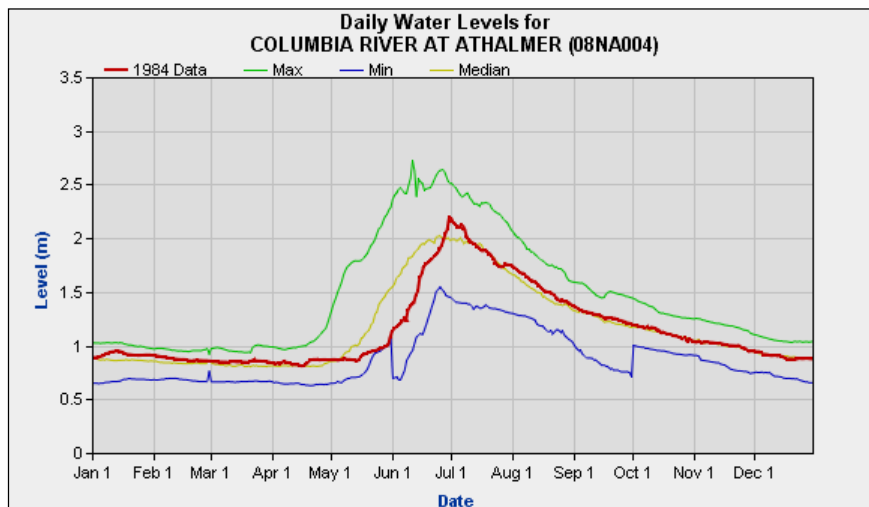


Figure 3. Daily waterlevels for the Columbia River at Athalmer (Station 08NA004). These Statistics correspond to 42 years of data recorded from 1912 to 1984. This station was discontinued after 1984.

those known from the region. These preliminary records were sorted according to the phenology of the species so that we had an idea of the most appropriate time to conduct our surveys in a particular habitat type. We also gathered descriptions, illustrations, key characters and photographs, where available, for those species at risk we were likely to encounter based on the preparatory lists.

In addition, we used available resources such as air photos and orthophotos of the NWA as well as reviewing previous works, such as Keller (1978) to locate general, relatively broad habitat classes from which to begin our searches.

Since rare species are not easily found using traditional quantitative methods, more subjective, but systematic, searches were conducted. For instance, rare plants are often associated with relatively unusual features such as calcareous substrates, ephemeral seepages, or other special microhabitats. These rarer features were targeted and therefore the study area was likely surveyed more thoroughly and at a finer scale than would be done using the usual quantitative methods. In addition, more widespread community types such as emergent vegetation of the wetlands and forested riparian gullies were also

identified as possible sites for rare plants. Detailed inspections of the entire study area were not possible, so search effort was focused on those areas with a higher probability of finding species at risk based on the available data.

We spent a total of 33 days over 3 time-periods conducting fieldwork on the NWA: 25 May—7 June; 12—20 July and 17—26 August. Due to the size of the areas in question and our time constraints, the main focus of our efforts was on the Wilmer Unit, although we did spend some time getting to know the northern units anticipating future fieldwork on the NWA (Table 2).

During searches, all plant and animal species we encountered were recorded along with other useful information such as the organism's sex, location (including UTM coordinates), or flowering stage, for example. Vegetation and some animals, such as butterflies, that could not be readily identified in the field were either photographed or collected for later examination.

Whenever we encountered a SARA listed species or a provincial Red- or Blue-listed species, specific UTM coordinates were taken with a hand-held Garmin® XL-12 Global Positioning System receiver. For other, relatively common species, general UTM coordinates were taken within the habitat in which the species was seen or heard. BCCDC field observation forms were also completed when rare vegetation was encountered.

Place names mentioned in the text are shown in Figure 4.

Collected vegetation was pressed and specimen identification was carried out according to the RISC standards for vouchering (British Columbia Ministry of Environment, Lands and Parks 1999). The vouchered specimens were deposited in the her-

Table 2. Dates spent surveying the various units of the Columbia National Wildlife Area, spring and summer, 2004.

Unit	Survey dates
Wilmer	25 – 31 May; 1, 6 and 7 June; 12, 13, 15, 16 and 20 July; 17, 19, 24, and 26 August
Brisco	3 June, 19 July
Spillimacheen	4 June; 14 and 18 July; 21 August
Harrogate	20 and 23 August

barium at the Royal British Columbia Museum.

Where possible, digital photographs were taken of all species at risk as well as other interesting or unique features of the landscape that we encountered. The camera used was a Canon® PowerShot Pro 90IS. Unless otherwise noted, all photographs were taken by the senior author.

The focus of our efforts was on the vascular plants and higher vertebrates that we could find without reliance on traps. Thus, small mammals were not adequately sampled; however, Simpson and Kelsall (1978) had previously sampled the area and we've supplemented their work in describing the mammal fauna of the CNWA. We did spend some time netting butterflies and dragonflies and recording other invertebrates to augment the fieldwork but substantially more work needs to be done with these taxa.

We completed a number of quick vegetation plots on the NWA in order to ground-truth some of the biophysical habitat units that had been defined by Keller (1978). We recorded the vegetation within an approximately 5m radius while standing in a distinct habitat. Dominant and sub-dominant species were noted.

The guide to site identification by Braumandl et

al. (2002) was useful in helping interpret the plant communities and identify the site series, although the newer IDFxk and IDFd5 site series were without much supporting documentation.

Field data were subsequently entered into a Microsoft Access® database. Digital photographs were downloaded to a laptop computer at the end of the field day and the images, along with copies of the databases, were burned onto compact disks as backups to the computer files. Comments were subsequently added to each image in Picasa (Anonymous 2012)

This methodology provided another geo-referenced data layer which allows the mapping of the distribution of each species within the NWA boundaries and its surroundings when required.

Taxonomy

Taxonomy in this report follows Douglas et al. (1998–2002) for plants; Cannings (2002) for dragonflies; Glassberg (2001) and Beccaloni et al. (2003) for butterflies; Crother (2008) for amphibians and reptiles; American Ornithologists' Union (2012) for birds; and Wilson and Reeder (2005) for mammals. Taxonomy of other taxa follows ITIS (2012).



Figure 4. Wilmer Unit of the Columbia National Wildlife Area showing place names mentioned in the text.

Results

Habitats, Flora, and Fauna

We recorded a total of 4 species of fungi, 271 species of plants, 34 species of invertebrates, 2 amphibian species, 1 reptile species, 112 bird species, and 17 species of mammals on the Columbia National Wildlife Area over the period May through the end of August, 2004.

Five SARA species, 3 Red-listed species, and 6 Blue-listed species were found dependent on the habitats of the Columbia National Wildlife Area (Table 1). We also found, based on BCCDC (2012) descriptions, what may be 2 Red-listed and 2 Blue-listed plant communities on the NWA; however, these remain to be verified.

Biophysical Habitat Units

Keller (1978) describes a number of Biophysical Map Units, for the Wilmer Unit of the Columbia National Wildlife Area and we have followed his preliminary habitat classification with some modifications (Figure 5). While describing the biophysical units of the CNWA was not a focus of this study, we were able to verify some of Keller's (1978) descriptions and modify others according to the changes we found some quarter of a century later. Time and management decisions would affect the trajectory of habitat changes. For example, Keller (1978:17,32) discusses a number of impacts associated with overgrazing, vehicle use, and hang gliding within the Wilmer Unit. By the mid-1990s, much of the rangeland had been fenced (Dave Smith, personal communication) and, although we found cattle accessing a few areas of the Wilmer Unit, serious attempts to exclude cattle had been made. In addition, activities such as off-road vehicle access and hang-gliding had been reduced or eliminated, although off-road vehicle damage was still evident on the

NWA west of the access road where the habitat is badly scarred and eroding. These management practices would have aided in the recovery of the habitat units of the NWA, allowing damaged native vegetation communities to recover, at least somewhat. Changes have also occurred in the riparian habitat that grew on the Beaver Run levee that cuts through Goose Lake (see Scrub Willow Thicket, below).

It will be important to build on Keller's (1978) work by continuing it at a larger scale on the Wilmer Unit and defining the habitats of the northern units, which will further refine the habitat boundaries of the NWA. This will better aid in implementing any management practices carried out on these lands.

Following is a brief discussion of the major, natural, biophysical habitat classes of the Wilmer Unit of the NWA taken directly from Keller (1978) with some modifications based on our fieldwork. They are listed from the wettest to the driest habitat units.

Table 1. SARA species at risk and species on the provincial Red and Blue Lists found on the Columbia National Wildlife Area, May – August 2004.

Species	SARA ¹	Red	Blue
Lakeshore Sedge ²			•
Hooker's Townsendia		•	
Water Marigold			•
Western Toad	SC ³		•
Painted Turtle	SC		•
Great Blue Heron (<i>herodias</i> ssp.)			•
Lewis's Woodpecker	T ⁴	•	
Olive-sided Flycatcher	T		•
American Badger	E ⁵	•	
Total number of taxa	5	3	6

¹ Species at Risk Act

² See account, p. 16

³ Special Concern

⁴ Threatened

⁵ Endangered

Shallow-water (Keller's Map Unit 7)

Keller (1978) included this and the next unit together as Low Insulation Floodplain Basins. In areas of shallow-water, *Nuphar lutea*, *Myriophyllum sibiricum*, *Hippuris vulgaris*, several *Potamogeton* spp.

and *Stuckenia pectinata* were common. Much of Goose Lake consisted of this habitat class (Figure 6).

Marshes (Keller's Map Unit 7)

Soils in this habitat class, and the shallow water habitat, were silty gleyed regosols and vegetation was stratified along the basin's gentle slope. Sedges, in particular *Carex utriculata*, occupied the higher portion of the slope, while *Equisetum fluviatile* grew closer to the permanently flooded level. Where the basin was too shallow to allow for open water, *E. fluviatile* (Figure 7) formed a dense cover over the entire marsh or formed extensive marsh areas as a co-dominant with *C. utriculata*. The *Equisetum fluviatile* - *Carex utriculata* marsh community has been Blue-listed by the Conservation Data Centre (BCCDC 2012). Other species, such as *Schoenoplectus tabernaemontani*, *Typha latifolia* (community also Blue-listed by the CDC), and *Eleocharis palustris*, often formed extensive marshes along the shore or occurred in various admixtures with the *Carex* and *Equisetum*. *Sium suave* was often found growing amongst the other emergent species.

Keller also describes a Map Unit 8, an area restricted to floodplain basins with a soil or pond



Figure 6. Much of Goose Lake habitat on the Wilmer Unit is shallow open water with large areas of submergent aquatic plants such as fennel-leaved pondweed or floating aquatic plants such as yellow pond-lily, which covers much of the nearshore surface of the lake in this image (17 August 2004).

water conductivity greater than 500 $\mu\text{mhos/cm}$ at 25°C. In all cases, these areas were not directly connected to the river or creeks. Soils were regosolic with considerable organic inclusion. Where there



Figure 5. Preliminary Biophysical Habitat Units of the Wilmer Unit of the Columbia National Wildlife Area. SW - Shallow Water; M - Marsh; WT - Scrub Willow Thicket; HCM - Horseshief Creek Meadow; LDF - Lowland Deciduous Forest; AD - Aspen Draws (not shown) form at the base of the North-aspect Forests; NAF - North-aspect Forest; OF - Open Douglas-fir Forest; G - Xeric Grassland; Gs - South-aspect Slope; Ge - East-aspect Slope.



Figure 7. Ken Brock surveying a swamp horsetail marsh, Wilmer Unit, 19 August 2004.

was permanent standing water, mats of black organic muck had built up.

Carex aquatilis dominated the highest land while *Typha latifolia* and *Eleocharis palustris* grew on the shoreline and in the water. *Equisetum fluviatile* was not present and the generally widespread *C. utriculata* was sparsely represented.

Two small *Carex* fens (Sub-unit 8F; not verified by us but reported in Keller 1978) occurred on the north side of Ritchie's Point. The surface of the fens was composed of a thick mat of organic material at water level. The surface 'quaked' when walked on. Vegetation was almost 100% *C. aquatilis*. However, a small number of other plants, particularly *T. latifolia*, were associated with the standing water in the centre of the fen.



Figure 8. Scrub willow thicket cutting across wet meadows on the Horsethief Creek alluvial fan, 30 May 2004.

Scrub willow thicket (Keller's Map Unit 6)

Scrub willows occurred on levees and fans where soils were too close to the water line to permit tree growth (Figure 8). Soils were regosolic with strong mottling. The major cover was generally provided by *Salix lasiandra* and *S. bebbiana* (Figure 8). However, in some areas *Betula glandulosa* formed a dense single species canopy. *Carex utriculata* and *C. aquatilis* were common.

Noticeable changes have occurred to the riparian habitat on the Beaver Run levees that cut through Goose Lake (Figure 9), perhaps due to changing water levels. Virtually all the shrubs that formerly inhabited much of the levees were no longer growing there, replaced by grasses such as *Phalaris arundinaceae*, *Agrostis gigantea*, and *Glyceria grandis* on the higher elevations. The lower edges of the former levees were lined with various admixtures of *T. latifolia*, *S. tabernaemontani*, *E. fluviatile*, and *C. utriculata*.

The Horsethief Creek meadow (Keller's Map Unit 4)

This area consisted of an extensive wet meadow



Figure 9. Change in vegetation of the scrub willow riparian habitat on the Beaver Run levees in Goose Lake with Goose Island in the background. The riparian shrub habitat, extant for at least 30 years, was lost sometime between 1978 and 2004, perhaps due to changing waterlevels. Top photo: Gary W. Kaiser, 1977, bottom photo: 7 June 2004.

formed on the Horsethief Creek alluvial fan (Figure 10). Relief was generally flat, but the meadow was dissected by longitudinal swales and channels characteristic of an abandoned, braided fan. Those swales and channels provided drainage for the fine silt loams of the meadow. Soils were mottled.

Vegetation of the drained areas was composed of grasses such as *Agrostis alba* var. *alba* and sedges. *Carex viridula* was specific (within the Wildlife area) to the meadow. In addition there were many shrub willows, *Rosa acicularis*, *Cornus stolonifera*, some small *Picea glauca* x *engelmannii* and the occasional arborescent *Salix bebbiana*. *Populus balsamifera* subsp. *trichocarpa* was the only tall tree species common to the area. Common herbs included *Equisetum arvense*, *Potentilla anserina*, *Sonchus arvensis*, *Maianthemum stellatum*, and *Spiranthes romanzoffiana*.

The swales and channels generally contain rushes, such as *Juncus balticus*, and sedges such as *Carex utriculata* and *C. aquatilis*.

Lowland deciduous forest (Keller's Map Unit 5)

This unit was found on river banks, levees and alluvial fans (Figure 11). Soils were drained silty regosols and ground water was always available. The major overstory species were *Populus balsamifera* ssp. *trichocarpa* on the river's edge and *Populus tremuloides* on the higher ground. *Picea glauca* x *engelmannii*, and *Betula papyrifera* were occasional species. The understory was composed of a wide variety of shrubs and herbs, the most common being *Cornus stolonifera*, *Rosa acicularis*, *Equisetum palustre*, *Betula glandulosa*, *B. occidentalis*, *Amelanchier alnifolia*, *Eleagnus commutata*, *Viola adunca* and *Maianthemum stellatum*. Possible Red-listed communities, such as *Populus balsamifera* subsp. *trichocarpa*-*Cornus stolonifera*-*Rosa nutkana* (BCCDC 2012) may form part of this biophysical habitat unit; further study is warranted.



Figure 11. Lowland deciduous forest (centre of photo) on the Horsethief Creek alluvial fan, Wilmer Unit, 19 August 2004.

Deciduous draw (Keller's map unit 1)

Found at the base of moist draws with *Populus tremuloides* dominating the overstory (Figure 12). Other trees include *Picea glauca* x *engelmannii*, *Pseudotsuga menziesii*, and *Betula occidentalis*. Many shrubs occur here including *Juniperus scopulorum*, *Arctostaphylos uva-ursi*, *Rosa acicularis*, *Symphoricarpos occidentalis*, *Amelanchier alnifolia*, and *Eleagnus commutata*. The herb layer is dominated by grasses including *Poa pratensis* and *Calamagrostis rubescens*. Other herbs include *Fragaria virginiana*, *Galium boreale* and non-native species, such as *Taraxacum officinale*, *Medicago sativa*, and *Sonchus arvensis*.

North aspect, closed-canopy forest (Keller's Map Unit 2)

These forested areas are found primarily on the northerly-facing slopes of draws and occasionally terraces. The closed-canopy forest consists of dense stands of spindly, poorly-branched, second growth *Pseudotsuga menziesii* (Figure 13).



Figure 10. Horsethief Creek alluvial fan looking east with the Rocky Mountains in the background, Wilmer Unit, 7 June 2004. On the far right of the image is the terraced upland that slopes down to Ritchie's Point. Horsethief Creek can just be seen through the trees on the left. Some of the extensive wet meadows of the fan can be seen across the centre and right of the image.



Figure 12. Aspen draw at base of north-facing forested slope, Wilmer Unit, 30 May 2004.



Figure 14. Open Douglas-fir forest, Wilmer Unit, 27 May 2004.

Tree growth is stagnant and shading often precludes all but the most shade tolerant understory. Mosses, such as *Hylocomium splendens*, are common on the forest floor. Shrub cover is sparse but often contains *Juniperus scopulorum*, *Spirea betulifolia*, *Rosa* spp., *Arctostaphylos uva-ursi* and *Shepherdia canadensis*. The herb layer is dominated by *Calamagrostis rubescens* often in association with *Aster conspicuus* and *Galium boreale*.

Open Douglas-fir forest (Keller's Map Unit 1)

This unit occurs on drumlinized till, fluvial terraces and eroded depressions of glacio-lacustrine deposits. Soils are generally eutric brunisols. The upper soil horizons have a multitude of ant tunnels and galleries suggesting that ant activity plays a major part in incorporating carbon into the solum.

On the flatter areas or gentle slopes and knolls of the terraces where drainage is good, the overstory consists of open *Pseudotsuga menziesii* and *Juniperus scopulorum* with a sparse shrub layer of *P. menziesii*, *Ericameria nauseosus* (Figure 14). *Koeleria macrantha* is the dominant herb with varying admixtures of *Anemone patens*, *Antennaria parvifolia*, *Antennaria neglecta*, *Artemisia frigida*, *Achillea millefolium*, *Allium cernuum* and *Astragalus collinus*.

Xeric Grasslands (Keller's Map Unit 3)

Grasslands (Figure 15) are confined to glacio-lacustrine deposits and fluvial terraces; relief is flat to gently sloping and soils are generally well to imperfectly drained. Many areas are alkaline, precluding vegetation that is intolerant to calcium or high osmotic potential. On well drained, droughty soils, the vegetation is dominated by shrubs, such as *E. nauseosus* and *J.*



Figure 13. North aspect, closed-canopy Douglas-fir forest, Wilmer Unit, 30 May 2004.



Figure 15. Junegrass grassland, Wilmer Unit, 17 August 2004. The trails are primarily human-created or are remnant cattle trails.

scopulorum and herbs such as *Koeleria macrantha* and *Artemisia frigida*. Other vegetation included dry site species such as *Hesperostipa comata*, *Antennaria parvifolia*, *A. neglecta*, *Gaillardia aristata*, *J. communis* and *J. horizontalis*. *P. menziesii* is the only tree and is found sporadically in this unit.

Also included are the south and southeast aspect slopes (Figure 16) that graded steeply from the open, sparsely-vegetated grasslands and draws, to the bluff and gully bottoms. Dominant vegetation included *Hesperostipa comata* and/or *Pseudoroegneria spicata* and, to a lesser extent, *Koeleria macrantha*, along with *Artemisia frigida*, *Ericameria nauseosus*, and *Lappula* spp. A Red-listed plant community, such as the *Pseudoroegneria spicata*-*Koeleria macrantha* (BCCDC 20120 may form part of this biophysical habitat unit; further study is warranted.



Figure 16. Bunchgrass-dominated, south aspect slope habitat on the Wilmer Unit, 30 May 2004.

FUNGI

Four species of lichens were recorded on the Columbia National Wildlife Area as an adjunct to the vascular plant surveys. Surveys to specifically document fungi were not conducted as part of this fieldwork.

Ascomycota

PARMELIACEAE

Hammered Crottle

Parmelia sulcata Taylor

Found 27 May on the Wilmer Unit, growing beneath dense, closed canopy Douglas-fir, on a north slope amongst heavy moss cover.

Dog Pelt

Peltigera canina (L.) Willd.

Dog pelt was found growing on a north slope amongst heavy moss growth under the closed canopy, Douglas-fir forest.

PELTIGERACEAE

Felt Lichen

Peltigera sp. Willd.

Felt lichen was common on the forested, closed-canopy, north slopes of the Wilmer Unit.

THELOTREMATACEAE

Soft Cowpie

Diploschistes muscorum (Scop.) R. Sant.

On 27 May and 13 July, this species was found on the Wilmer Unit. In both instances it was growing on a steep slope with a southeast to south aspect.

PLANTAE

A total of 271 species of plants were recorded on the Columbia National Wildlife Area. Although the results of this work does expand on Keller's (1978) non-annotated list, what follows is not an exhaustive list; further work is recommended. One plant species was found on the provincial Red-list and 2 species were on the Blue-list.

Charophyta

CHARACEAE

Musk Grass

Chara sp.

Chara was common, occurring in extensive beds in Goose Lake and other open water areas of the Wilmer Unit.

Bryophyta

BRACHYTHECIACEAE

Golden curl-moss

Homalothecium aeneum (Mitt.) Lawt.

Keller (1978) found this moss a characteristic species on the north slope, closed canopy forest habitat.

HYLOCOMIACEAE

Step Moss

Hylocomium splendens (Hedw.) B.S.G.

Keller (1978) found this moss a characteristic species on the north slope, closed canopy forest habitat.

THUIDACEAE

Wiry fern-moss

Abietinella abietina (Hedw.) Fleisch.

Keller (1978) found this moss a characteristic species on the north slope, closed canopy forest habitat.

POTTIACEAE

Tortula moss

Tortula sp.

Keller (1978) found this moss a characteristic species on the north slope, closed canopy forest habitat.

Equisetophyta

EQUISETACEAE

Common Horsetail

Equisetum arvense L.

We found Common Horsetail on all the units of the NWA, usually in the cottonwood or willow riparian habitats, including moister areas of the lowland deciduous forest and on the river banks and sand/silt bars. In some areas of the Horsethief Creek fan, it was a dominant species.

Swamp Horsetail

Equisetum fluviatile L.

Swamp Horsetail was a common species on all the units of the NWA. It was a dominant wetland



Figure 17. *Equisetum fluviatile* marsh, Brisco Unit, 3 June 2004.

species, forming extensive, essentially monospecific, stands (Figure 17) as well as being a co-dominant with *Carex utriculata*, where it often formed extensive *Carex-Equisetum* marshes. Pied-billed Grebes often built their nests in the large *Equisetum* marshes.

Smooth Scouring-rush

Equisetum laevigatum A. Br.

On 14 July, we found this species in 2 proximate locations in riparian habitat on the Spillimacheen Unit.

Marsh Horsetail

Equisetum palustre L.

This species was found on 15 July at Wilmer in 2 wetland locations and on 19 July, it was found on the higher reaches of a river bar on the Brisco Unit.

Meadow Horsetail

Equisetum pratense Ehrh.

On 15 July, this species was found in an aspen-birch stand on the Wilmer Unit growing with *Carex parryana*.

Northern Scouring-rush

Equisetum variegatum Schleicher

On 20 August, this species was found amongst riparian vegetation along the river bank on the Harrogate Unit.

Coniferophyta

CUPRESSACEAE

Common Juniper

Juniperus communis L.

Common Juniper was occasionally found in the closed Douglas-fir forest and the north slope of draws, the open Douglas-fir forest, and open rangeland of the Wilmer Unit.

Creeping Juniper

Juniperus horizontalis Moench

Creeping Juniper was found in similar abundance and habitat as Common Juniper.

Rocky Mountain Juniper

Juniperus scopulorum Sarg.

A common, dominant species on the Wilmer Unit in the closed Douglas-fir forest including the north-aspect slopes of draws (Figure 18), aspen draws, the open Douglas-fir forest, and the xeric grassland habitats. A dominant tree on Goose Island, providing nesting cover for Canada Geese; sub-dominant to Douglas-fir on Eagle Island.

PINACEAE

White Spruce hybrid

Picea glauca x engelmannii

Hybrid spruce was found on all the units of the NWA. It was associated with the lowland deciduous cottonwood and aspen forests and the aspen draw habitats. Small trees were also found on the Horsethief Creek meadows.

Douglas-fir

Pseudotsuga menziesii (Mirb.) Franco

Douglas-fir (Figure 18) was the most common tree at the higher elevation upland habitats of the Wilmer Unit. It was a dominant species in the open Douglas-fir forest and the north aspect-closed canopy forest habitats. It was also found occasionally in aspen draws and was scattered sporadically on the grasslands. It is an important wildlife tree for foraging and nesting songbirds and other nesting guilds such as woodpeckers and waterfowl.

Magnoliophyta

ALISMATACEAE

American Water-plantain

Alisma triviale Pursh

This species was recorded only at Spillimacheen and Brisco, although it likely occurs on all the units. It frequented the quiet backwaters of the river in the open water of sloughs, channels and ponds or along the edges of wetlands and amongst the emergent



Figure 18. Douglas-fir and Rocky Mountain juniper (lower right foreground) are common species in the closed canopy, north aspect slopes on the Wilmer Unit, 27 May 2004. The cavity opening in the fir was a Bufflehead nest site.

vegetation. Recorded in bloom from early June through mid-July. Also known as *Alsima plantago-aquatica*.

Arum-leaved Arrowhead

Sagittaria cuneata Sheldon

This species was found on all but the Harrogate Unit. It had a patchy distribution in the shallow-water along the marsh edge (Figure 19) or amongst the open *Equisetum fluviatile* marsh. Recorded in bloom from mid-July through late August.

HYDROCHARITACEAE

Canadian Waterweed

Elodea canadensis Michx.

Large beds were found in the shallow-water areas of the Spillimacheen, Brisco and Wilmer units.

JUNCAGINACEAE

Seaside Arrow-grass

Triglochin maritima L.

Seaside arrow-grass was found only on the Wilmer and Harrogate units. It was a relatively uncommon species along the edges of shorelines, in association with the *Carex-Equisetum* marshes, and on the meadows and deciduous forest openings on the Horsethief Creek fan. At Harrogate, it was found where riparian habitats grade to marshes along the river bank.

POTAMOGETONACEAE

Curled Pondweed

Potamogeton crispus L.

On 2 June, a small patch of this species was found in the shallow-waters of the Wilmer Unit adjacent to the Beaver Run levees that bisect Goose Lake near the south end of the lake.

Closed-leaved Pondweed

Potamogeton foliosus Raf.

Found at Spillimacheen, Brisco, and Wilmer. Associated with shallow-water, often forming large submerged beds in the open waters and along the marsh edges (Figure 20). Flowers were blooming in mid-July.

Grass-leaved Pondweed

Potamogeton gramineus L.

Recorded in shallow-water and amongst emergent marsh vegetation only at Harrogate and Spillimacheen in late August.

Floating-leaved Pondweed

Potamogeton natans L.

Reported from all the units of the NWA. This species was associated with shallow-water and the more open marshes, such as *Equisetum fluviatile* marshes. Blooms were noted in mid-July.

Small Pondweed

Potamogeton pusillus L.

Large beds of this species were found in the shallow-waters of the Wilmer Unit and at Spillimacheen.

Richardson's Pondweed

Potamogeton richardsonii (A. Benn.) Rydb.

This species was found on all the units except Harrogate. A common species in the shallow-water and associated open marshes of the NWA.

Eel-grass Pondweed

Potamogeton zosteriformis Fern.

Found in a few locations at Spillimacheen, Brisco and Wilmer in the shallow-waters of the NWA. Not as common as some of the other pondweeds. In bloom by mid-July.

Fennel-leaved pondweed

Stuckenia pectinata (L.) Borner

This common pondweed of shallow-water habitats was found at Spillimacheen and Wilmer. Flowering occurred from mid-July to late August.



Figure 19. Arum-leaved arrowhead in bloom on the Wilmer Unit, 16 July 2004.

LEMNACEAE

Common Duckweed

Lemna minor L.

Common duckweed was an uncommon species on the shallow-waters of the Wilmer Unit on the NWA, at least during the periods of our fieldwork.

CYPERACEAE

Water Sedge

Carex aquatilis Wahlenb.

Water sedge was found at Wilmer, Brisco, and Harrogate. This was a common species along the Columbia River levees, deciduous forest edges that grade into wetlands, and along slough and open water edges where taller emergents such as *Schoenoplectus* and *Typha* occur. In some locations along the Beaver Run levees that cut through Goose Lake, it was noted as a dominant plant. It was in bloom from early June through mid-July.

Northern Cluster Sedge

Carex arcta Boott

On 14 July, Northern Cluster Sedge was found in bloom on the Spillimacheen Unit along the fringe of

a cattle-grazed wetland; it was growing with *C. saxatilis* and *C. lenticularis*.



Figure 20. Closed-leaved pondweed forms large beds in the shallow open waters of the Wilmer Unit (foreground). A yellow pond-lily bed is in the background. Goose (left) and Eagle (right) islands can be seen in the background. 16 July 2004.

Bebb's Sedge

Carex bebbii (Bailey) Fern.

This species was found in 2 locations on the Spillimacheen Unit on 14 July (in bloom) and 21 August. It was found growing upland from the marsh amongst the riparian shrubs and herbs.

Dewey's Sedge

Carex deweyana Schwein.

On 13 July, this species was found along the west-central shoreline of Goose Lake, growing with Bluejoint Reedgrass and Slender Sedge.

Inflated Sedge

Carex exsiccata Bailey

On 18 July, this species was found in bloom on the Spillimacheen Unit, growing along with the dominant species, Beaked Sedge and Common Spike-rush.

Threadleaf Sedge

Carex filifolia Nutt.

On 12 July, this species was found in bloom on the Wilmer Unit, along the Ridge Trail to Walker's Point. It was growing in the sparsely vegetated grassland along with Needle-and-thread Grass. Fairly common throughout the grassland, especially where disturbance has occurred.

Yellow Sedge

Carex flava L.

Yellow sedge was found in bloom in scattered locations at Wilmer and Spillimacheen. It seemed to prefer those areas near the shoreline, especially wherever muddy sites occur. In bloom early to mid-July.

Garber's Sedge

Carex garberi Fern.

On 14 July, this species was found in bloom in a cottonwood riparian wooded area on the Spillimacheen Unit.

Slender Sedge

Carex lasiocarpa Ehrh.

Recorded only occasionally on the Wilmer Unit in mid-July growing in the marsh areas along the shore.

Lakeshore Sedge

Carex lenticularis s.l.

Recorded once at Harrogate (20 August) in the associated wetlands; the specimen went missing thus the sedge needs verification as it is a Blue-listed species (BCCDC 2012).

Parry's Sedge

Carex parryana Dewey

This species was recorded once (15 July, in bloom) on the Wilmer Unit, in an *Agrostis gigantea* - *C. scirpoidea* - *Equisetum palustre* wetland adjacent to the lowland deciduous forest on the Horsethief Creek fan.

Field Sedge

Carex praegracilis W. Boott

On 12 July, this species was found on the Wilmer Unit in an alkaline wetland with *Glaux maritima*, *Smilacina stellata*, *Distichlis spicata*, *Potentilla anserina*, *Muhlenbergia asperifolia*, and *Symphyotrichum ciliatum*.

Russet Sedge

Carex saxatilis L.

Fairly common on all units of the NWA. This sedge frequented the fringes and drier edges of *Carex utriculata*-*Equisetum fluviatile* wetlands, often between the woodlands and wetlands amongst the *Salix* sp. It was also found on the river levees and sandbars. In bloom throughout much of July.

Dryspike Sedge

Carex siccata Dewey

On 14 July, this sedge was found in bloom on the fringe of a cattle-grazed wetland on the Spillimacheen Unit of the NWA.

Beaked Sedge

Carex utriculata Boott

Abundant on all units of the CNWA forming extensive marshes (Figure 21) where it was a co-dominant with Swamp Horsetail and occasionally with Common Spike-rush. Often in association with Common Cattail and Soft-stemmed Bulrush. It was also associated with the aspen riparian habitats growing at the aspen-marsh interface or along the edges of bays and Beaver Run levees that cross Goose Lake as well as river banks and bars. Blooms recorded from early June through mid-July. Formerly known as *C. rostrata* var. *utriculata*.



Figure 21. The marshes between Ritchie's Point (left) and Walker's Point on the Wilmer Unit, Columbia National Wildlife Area, 17 August 2004. Beaked sedge is the dominant sedge of the wildlife area marshes.

Green Sedge

Carex viridula ssp. viridula Michx.

On 12 July, Green Sedge was found in bloom on the Wilmer Unit along a drying alkaline shoreline and in the water. This sedge was also found on the river bank at the Brisco Unit on 19 July and later on the drier meadows of the Horsethief Creek fan on 19 August. There, it was growing with Common Silverweed, Baltic Rush, Hooded Ladies' Tresses, and Silverberry.

Needle Spike-rush

Eleocharis acicularis (L.) Roem. & Schult.

Found on the Spillimacheen Unit on 21 August growing with Little Meadow-foxtail, Grass-leaved Pondweed and Stinkweed sp.

Common Spike-rush

Eleocharis palustris (L.) Roem. & J.A. Schult.

A common sedge on all the units of the NWA. It occurs in monospecific patches, amongst other taller emergents such as Common Cattail, Common Reed, and Soft-stemmed Bulrush, along channel edges, and amongst the riparian vegetation on river levees and sandbars. In some areas at Wilmer and Spillimacheen, it forms extensive marsh areas with Beaked Sedge and can be the dominant vegetation. Blooming reported throughout much of July.

Scheuchzer's Cotton-grass

Eriophorum scheuchzeri Hoppe

Found at the Harrogate and Wilmer units of the NWA. Most common on sandbars of sidechannels of the Columbia River and Horsethief Creek. Also found in moist areas of the aspen forest on Horsethief Creek fan. Blooming reported from late May through the third week of August (Figure 22).

Low Clubrush

Isolepis cernua (Vahl) Roem. & J.A. Schult.

Two records in early June, 1 at Spillimacheen and another at Wilmer; associated with marsh habitats.

American Bulrush

Schoenoplectus pungens var. *longispicatus* (Britt.) S.G. Smith

Recorded from 3 locations on the Wilmer Unit of the NWA, 2 along the old levees that cross Goose



Figure 22. Scheuchzer's Cotton-grass, growing on a sandbar along a sidechannel of Horsethief Creek (top) and close-up of the sedge heads (bottom), 2 June 2004.

Lake and 1 at the base of a steep, salt-exposed slope on the southwest shore of the lake. Formerly known as *Scirpus americanus*.

Soft-stemmed Bulrush

Schoenoplectus tabernaemontani (K.C. Gmel.) Palla

This was the dominant bulrush of the NWA, found on all the units, often forming extensive marshes along the shore, such as those on the western shoreline of Goose Lake (Figure 23), where it is common, or in deeper water where it can form large, single species stands. Terns, coots, grebes and Yellow-headed Black-birds often nest in these habitats. This species also grew as a sub-dominant with Swamp Horsetail, Beaked Sedge or Common Cattail. Recorded in bloom from early June through mid-July.

POACEAE

Crested Wheatgrass

Agropyron cristatum ssp. *pectinatum* (L.) Gaertn

Commonly scattered throughout the open grassland habitat of the Wilmer Unit; in some areas it can become a dominant species. In bloom through much of June and July.

Redtop

Agrostis gigantea Roth

Fairly comon on all units of the NWA. Fre-

quents riparian habitats at the shrub-marsh edges, including the drier edges of the *Equisetum fluviatile*-*Carex utriculata* marshes and on sandbars of the river side channels and higher on the river levees. Blooming reported through much of July.

Little Meadow-foxtail

Alopecurus aequalis Sobol.

On 21 August, this aquatic species was found on the Spillimacheen Unit, growing in large beds in shallow-water habitat with Floating-leaved Pondweed and some Narrow-leaved Bur-reed in 60 cm of water.

Smooth Brome

Bromus inermis Leys.

Found as a dominant species at the Wilmer Unit in 2 disturbed sites. One was a former homestead site and there it was found growing with other dominants including Quackgrass, Western Snowberry, and Spreading Dogbane. The other was a steep, disturbed north aspect slope where it grew with Quackgrass and Thickspike Wildrye.

Cheatgrass

Bromus tectorum L.

Found occasionally on the Wilmer Unit in disturbed sites.



Figure 23. Soft-stemmed bulrush marshes are fairly common along the western shore of Goose Lake (dark-green band across upper-centre of photograph), 17 August 2004. Yellow pond-lily covers the shallow nearshore waters in the lower left of the image

Bluejoint Reedgrass

Calamagrostis canadensis (Michx.) Beauv.

Recorded from all the units of the NWA. Frequents the riparian edges of the lowland deciduous forest and along shorelines such as the south shore of Ritchie's Point and sporadically along the southwest shore of Goose Lake.

Pine Grass

Calamagrostis rubescens Buckl.

Pine grass was found only on the Wilmer Unit of the NWA. It was common in the north aspect, closed-canopy Douglas-fir forest and aspen draws. Occasionally found in the open Douglas-fir forest.

Tufted Hairgrass

Deschampsia cespitosa (L.) Beauv.

This species was found in suitable habitats on all units of the NWA. Fairly common along the drier marsh edges between the riparian habitat and the marsh. Also grew on river sand bars and levees often associated with willows, Hemlock Water-parsnip, Reed Canarygrass, sedges, and Fowl Bluegrass. At Wilmer, it was only found on the Horsethief Creek alluvial fan. In bloom from early June through mid-July.

Western Witchgrass

Dichanthelium acuminatum (Sw.) Gould & C.A. Clark

On 12 July, this species was found near the south end of the small bay north of Walker's Point growing at the base of a riparian swale near a marsh.

Alkali Saltgrass

Distichlis spicata var. *stricta* (L.) Greene

Found only in the more alkaline areas of the Wilmer Unit of the NWA. Uncommon; associated with species such as Sea-milkwort, Common Silverweed, and Alkali Muhly.

Blue Wildrye

Elymus glaucus Buckl.

On 18 August, this species was found on the old homestead site on the Wilmer Unit of the NWA.

Thickspike Wildrye

Elymus lanceolatus (Scribn. & J.G. Sm.) Gould

On 13 July, this species was found on a fairly disturbed, north aspect slope on the Wilmer Unit of the NWA.

Quackgrass

Elymus repens (L.) Gould

Fairly common, primarily on disturbed sites at the Wilmer Unit. Found associated in the north aspect, closed-canopy forest, at the base of south aspect slopes, in the open grassland, and on the Horsethief Creek fan.

Slender Wheatgrass

Elymus trachycaulus (Link) Gould exShinners

Recorded twice from the Wilmer Unit in mid-June. This is another species that frequents areas of higher alkalinity. It was associated with Alkali Saltgrass, Seaside Arrow-grass, Sea-milkwort, and Alkali Muhly.

Idaho Fescue

Festuca idahoensis Elmer

This fescue occurred in the open grassland habitat of the Wilmer Unit although apparently not to the extent that Keller (1978) found it. He also noted it in the open Douglas-fir forest and Aspen draws. This difference may simply be due to the reduction in grazing on the NWA or it could be an artefact of the methodologies we used as we were focusing on species at risk and not studying the defining species of specific habitat types.

Reed Mannagrass

Glyceria grandis S. Wats. ex A. Gray

We noted this only on the Wilmer Unit of the NWA. Occasionally, it occurred in large stands along with Common Cattail, principally on the outer edge of the marsh vegetation that grew alongside the Beaver Run levees that crossed Goose Lake (Figure 24). Blooming was recorded in mid-July.

Needle-and-thread Grass

Hesperostipa comata (Trin. & Rupr.) Barkw.

Common on steep, south aspect slopes of the Wilmer Unit where it is often a dominant species. It was also found in the terraced grassland amongst the Junegrass or as a dominant in sparsely-vegetated areas with a south aspect on the terraced upland. Usually growing in association with Prairie Sagewort, Common Rabbit-brush, and occasionally Bluebunch Wheatgrass, Junegrass, and Western Stickseed.



Figure 24. Reed mannagrass, growing along the eastern edge of the Beaver Run levees, 16 July 2004.

Alpine Sweetgrass

Hierochloa alpina (Swartz) Roem. & J.A. Schult.

On 13 July, we found this species on a river sandbank on the Brisco Unit of the NWA.

Common Sweetgrass

Hierochloa hirta ssp. *Arctica* (Schrank) Borbas

On 18 July, we found this species on the Spillimacheen Unit of the NWA. It was growing along the drier edge of a *Carex utriculata*-*Equisetum fluviatile* marsh along with a dominant grass, Redtop.



Figure 25. Giant Wildrye (right foreground) along with Prairie Sagewort and Common Rabbitbrush. Needle and thread grass was also common on these south aspect slopes along with Bluebunch Wheatgrass, which tended to dominate on steeper portions of the slopes. Part of an old car body dumped over the bluff is a remnant from earlier days.

Foxtail Barley

Hordeum jubatum L.

This species was recorded on 13 July from 2 locations at the base of the Wilmer Bluffs, 1 below an extremely steep, slumping, alkaline area and another site, which had been heavily damaged by cattle.

Junegrass

Koeleria macrantha (Ledeb.) J.A. Schult.

This was the dominant grass of the xeric grasslands on the Wilmer Unit and was also found in the open Douglas-fir forest. Junegrass was occasionally found in aspen draws and on the south aspect slopes. Blooms recorded in late May and Early June.

Giant Wildrye

Leymus cinereus (Scrib. & Merr.) A. Love

Found occasionally along the base of the Wilmer Bluffs (Figure 25) and on Goose and Eagle islands.

Alkali Muhly

Muhlenbergia asperifolia (Nees & Meyen ex Trin.) Parodi

On 12 July, this species was found in an alkaline area on the Wilmer Unit, growing with Seamilkwort, Alkali Saltgrass, Common Silverweed, and Slender Wheatgrass.

Rough-leaved Rice-grass

Oryzopsis asperifolia Michx.

On 12 July, this species was found on the Wilmer Unit in a disturbed, sandy site in xeric grassland habitat.

Reed Canarygrass

Phalaris arundinaceae L.

We found Reed canarygrass on all but the Harrogate Unit of the CNWA. It was an occasional species that grew in stands along the edges of *Equisetum fluviatile*-*Carex utriculata* and other marsh types, riparian habitats, sloughs, and river levees.

Common Timothy

Phleum pratense L.

It was found growing on the Wilmer Unit on 15 July in the lowland aspen forest.

Common Reed

Phragmites australis (Cav.) Trin. ex Steud.

Found on the Brisco and Wilmer units of the NWA. At Wilmer, common reed was found occasionally along the edges of Goose Lake (e.g., near Walker's Point), on the shore of Eagle Island and along some slough edges. At Brisco, it was found along the river levees and bars occasionally forming extensive marsh areas with Common Spike-rush, Swamp Horsetail, and Hemlock Water-parsnip growing amongst the reed.

Fowl Bluegrass

Poa palustris L.

Found in suitable habitat at Spillimacheen, Brisco and Wilmer units of the NWA. This plant was usually found between the riparian habitat and the larger marsh edges, (e.g., *Carex utriculata*-*Eleocharis palustris* or *Equisetum fluviatile*-*Carex utriculata* marshes), amongst the marsh vegetation, itself, or along the river or side channel levees. It was recorded in bloom in mid-July.

Kentucky Bluegrass

Poa pratensis L.

Recorded only at the Wilmer Unit of the NWA, primarily from the north aspect, Douglas-fir forests, aspen draws, and disturbed sites, such as the old homestead site at the southwest edge of Goose Lake near Wilmer.

Sandberg's Bluegrass

Poa secunda J. Presl

In mid-July, this grass was found on the Wilmer Unit in the xeric grassland with some Douglas-fir and nearby horse and cattle sign. Keller (1978) also found it in the open Douglas-fir forest and aspen draws.

Rough Bluegrass

Poa trivialis L.

On 14 July, this species was found at Spillimacheen on the fringe of a cattle-grazed wetland.

Bluebunch Wheatgrass

Pseudoroegneria spicata (Pursh) A. Love

Fairly common on the Wilmer Unit. This species formed the dominant cover on some areas of the xeric grasslands, especially the steep east and south as-

pect slopes of the bluffs and draws. Also found in the open Douglas-fir forest.

Pacific Alkaligrass

Puccinellia nutkaensis (J.S. Presl) Fern. & Weath.

Found once on the Wilmer Unit on 13 July in an alkaline area at the base of the southernmost bluffs in an area heavily damaged by cattle.

Nuttall's Alkaligrass

Puccinellia nuttalliana (J.A. Schult.) A.S. Hitchc.

Found in 2 locations on 13 July, both near the base of the bluffs in areas that were obviously alkaline, judging from the salts leaching out of the bank. In both areas it was found growing with Alkali Cordgrass, Tufted White Prairie-aster, and Common Sow-thistle.

Alkali Cordgrass

Spartina gracilis Trin.

Alkali Cordgrass was found in 3 locations on the Wilmer Unit of the NWA, all at the base of the Wilmer Bluffs in areas of obviously higher alkalinity with some exposed salts.

JUNCACEAE

Alpine Rush

Juncus alpinoarticulatus Chaix

On 19 July, this species was found on a sandbar in a river side channel of the Brisco Unit growing with *Carex aquatilis*, *Senecio pauperculus*, *Salix* sp., *Agrostis gigantea*, and *Juncus articulatus*.

Jointed Rush

Juncus articulatus L.

On 19 July, this species was found on the Brisco Unit in 2 locations: along a swiftly moving channel of the river and on a silt bar with *Carex aquatilis*, *Senecio pauperculus*, *Salix* sp., *Agrostis gigantea*, and *Juncus alpinoarticulatus*.

Baltic Rush

Juncus balticus Willd.

This rush was found on the Harrogate, Brisco, and Wilmer units of the NWA. It frequented the up-

per reaches of marsh habitats and the higher meadows, such as those found on the Horsethief Creek fan, including the outer riparian edges down to the marsh. It was also found in some alkaline areas at Wilmer. In bloom from early June to mid-July.

Dagger-leaf Rush

Juncus ensifolius Wikstr.

Found on the Harrogate Unit in late August growing on a river bar with Beaked Sedge and Redtop.

Tuberous Rush

Juncus nodosus L.

Found on the Wilmer (12 July) and Harrogate (20 August) units growing with emergents such as Slender Sedge, Beaked Sedge and Swamp Horsetail.

Pointed Rush

Juncus oxymeris Engelm.

Found on the Harrogate Unit in late August growing on a river bar along with Baltic and Dagger-leaf rushes.

SPARGANIACEAE

Narrow-leaved Bur-reed

Sparganium angustifolium Michx.

Found on the Wilmer, Spillimacheen, and Brisco units of the NWA in channels, ponds, along slough edges and along the edges of other emergent vegeta-

tion towards the deeper water. Occasionally occurred in thick beds. Recorded in bloom from mid-July through mid-August.

Emerald Bur-reed

Sparganium emersum Rehm.

On 20 July, this species was found in bloom on the Wilmer Unit, in the waters adjacent to a Common Cattail stand just north of Ritchie's Point.

Small Bur-reed

Sparganium natans L.

On 18 July, this bur-reed was found in bloom on the Spillimacheen Unit, submersed and floating in the quiet backwater channels of the river.

TYPHACEAE

Common Cattail

Typha latifolia L.

Found at Brisco and Harrogate but most common on the Wilmer Unit of the NWA. Associated with the *Equisetum fluviatile*-*Carex utriculata* marshes but also occurs in large, extensive stands in open water and along slough and levee edges.

IRIDACEAE

Idaho Blue-eyed-grass

Sisyrinchium idahoense Bickn.

Found only on the Horsethief Creek alluvial fan on the Wilmer Unit in open meadows near the creek and amongst the lowland aspen forest. Often found in association with Common Silverweed, Early Blue Violet, Hooded Ladies' Tresses, and willows. Blooms reported from late-May (Figure 26) through mid-July.

LILIACEAE

Nodding Onion

Allium cernuum Roth

A common but scattered species in the xeric grassland, open Douglas-fir forest, the steep east



Figure 26. Idaho Blue-eyed-grass on the Horsethief Creek alluvial fan on the Wilmer Unit of the wildlife area, 27 May 2004.

and southeast aspect slopes and on the edges of the north aspect, closed Douglas-fir slopes of the Wilmer Unit. Blooms reported from late May through mid-July.

Sagebrush Mariposa Lily

Calochortus macrocarpus var. *macrocarpus* Dougl.

Rare on the xeric grassland, open Douglas-fir forest, steep east and southeast aspect slopes and on the edges of the north aspect, closed Douglas-fir slopes of the Wilmer Unit. Blooming in mid-July.

Star-flowered False Solomon's Seal

Maianthemum stellatum (L.) Link

This species was fairly common in the open shrub areas and deciduous forested areas of the Horsethief Creek fan. It was also found in the moister areas of the terraced upland such as in aspen draws, moist areas of the open Douglas-fir forest and, in 2 instances, at the base of the bluffs in alkaline areas. It was also found on the top of Eagle and Goose islands and along the perimeter of the latter near the shore. Recorded in bloom from late-May through mid-July.

Clasping Twistedstalk

Streptopus amplexifolius (L.) DC.

On 13 July, this species was found in bloom in a birch draw on the Wilmer Unit of the NWA.

Rosy Twistedstalk

Streptopus lanceolatus (Ait.) Reveal

On 15 July, this species was found in bloom along the aspen forest-marsh interface on the Horsethief Creek fan.

Small Twistedstalk

Streptopus streptopoides (Ledeb.) Frye & Rigg.

On 7 June, this species was found in bloom on the Wilmer Unit in an aspen draw.

Sticky False Asphodel

Triantha glutinosa (Michx.) Baker

On 19 August, this species was found in bloom in an open meadow near Horsethief Creek growing with Common Silverweed, Baltic Rush, Hooded Ladies' Tresses, and Silverberry.

Meadow Death-camas

Zigadenus venenosus S. Wats.

A rare species, found in bloom on 27 May in an aspen draw and in the xeric grassland habitat at Ritchie's Point where "lots" were found.

ORCHIDACEAE

Great Lakes Rein Orchid

Platanthera huronensis (Nutt.) Lindl.

Found in bloom on 15 July, in the aspen forest habitat on the Horsethief Creek fan and on 19 July on a levee at the Brisco Unit. This identification was based on floral characteristics as they appear in a photograph but a collection was not taken to verify the species.

Hooded Ladies' Tresses

Spiranthes romanzoffiana Cham.

Found on the Spillimacheen, Brisco, and Wilmer units of the NWA. At Wilmer, it was only found on the Horsethief Creek fan in the open riparian habitat associated with willows and Common Silverweed near the creek or in the aspen forest. On the other 2 units it was found in riparian habitat amongst the willows along the sloughs or on the levees. Blooms reported from mid-July (Figure 27) through mid-August.

ASTERACEAE

Yarrow

Achillea millefolium L.

Fairly common on the Wilmer Unit in the open Douglas-fir forests, grasslands and the north aspect fir slopes, especially where disturbance has occurred. Also found on Eagle Island. Recorded in bloom from late-May through mid-July.

White Pussytoes

Antennaria microphylla Rydb.

Found in bloom on the Wilmer Unit on 15 July in a large opening in the open Douglas-fir forest; horse and cattle sign were evident.



Figure 27. Hooded Ladies' Tresses orchid on the Horsethief Creek alluvial fan on the Wilmer Unit of the wildlife area, 18 July 2004.

Field Pussytoes

Antennaria neglecta Greene

Fairly common in the grassland and open Douglas-fir forests on the Wilmer Unit. Occasionally found on the north-aspect slopes. Also found on Eagle Island. Recorded in bloom from late-May through mid-July.

Nuttall's Pussytoes

Antennaria parvifolia Nutt.

Nuttall's Pussytoes was fairly common in the grassland and open Douglas-fir forests of the Wilmer Unit of the NWA. It was also found on Eagle Island. Blooms recorded from late-May through mid-July.

Showy Pussytoes

Antennaria pulcherrima (Hook.) Greene

Showy Pussytoes was found only on the Horsethief Creek fan along the aspen forest edge and the low riparian-meadow areas near the creek. Blooms recorded from early June through late-August.

Rosy Pussytoes

Antennaria rosea Greene

Rosy Pussytoes was found in the grassland and open Douglas-fir forest habitats, in similar sites to where Field and Nuttall's pussytoes were found. It was also recorded on Eagle Island. Blooms were reported from late-May through mid-July.

Meadow Arnica

Arnica chamissonis Less.

On 27 July, a few plants were found in bloom in the grassland habitat, just off the Ridge Trail on the Wilmer Unit of the NWA.



Figure 28. Orange Arnica in bloom (below) and a large patch of this arnica in the grassland habitat of Ritchie's Point (left) on the Wilmer Unit of the Columbia National Wildlife Area, 27 May 2004.



Heart-leaved Arnica

Arnica cordifolia Hook.

On 7 June, this species was found in bloom on the open grasslands between Walker's Point and Ritchie's Point on the Wilmer Unit of the NWA.

Orange Arnica

Arnica fulgens Pursh

Uncommon in the grassland and open Douglas-fir forests of the Wilmer Unit. Recorded in bloom in late May (Figure 28) and early June.

Absinthe

Artemisia absinthium L.

Found on 23 August at the Harrogate Unit. It was on a river levee with Western Mountain Aster in the typical Columbia River riparian habitat.

Northern Wormwood

Artemisia campestris L.

This species was not obvious until the summer when, by late August, it became noticeable on the grasslands in association with Junegrass, Needle and Thread Grass and Prairie Sagewort. Although commonly found at that time, it had a patchy distribution and was never as common as Prairie Sagewort.

Prairie Sagewort

Artemisia frigida Willd

A common species in the open Douglas-fir forest and the grassland of the Wilmer Unit, including the east and south aspect slopes. Also occasionally found on the north aspect slopes.

Rayless Alkali Aster

Aster brachyactis Blake

On 12 July, this species was found on the Wilmer Unit in an alkaline wetland along with Sea Milkwort, Alkali Saltgrass, Common Silverweed, and Alkali Muhly.

Showy Aster

Aster conspicuus Lindl.

Only recorded on the Wilmer Unit from the north aspect, closed Douglas fir forest and the aspen draws.



Figure 29. Tufted White Prairie Aster at Ritchie's Point on the Wilmer Unit of the NWA, 26 August 2004.

Tufted White Prairie Aster

Aster ericoides ssp. *pansus* (Blake) A.G. Jones

Found on the Wilmer Unit associated with grassland habitats, especially around Ritchie's Point, and alkaline areas at the base of the Wilmer Bluffs. Also found at Spillimacheen associated with wetlands. Blooming recorded from mid-July through late August (Figure 29).

Western Mountain Aster

Aster occidentalis var. *occidentalis* (Nutt.) T. & G.

Western Mountain Aster was recorded on 19 July on the Brisco Unit on a silt bar with *Carex* sp, *Senecio pauperculus*, *Salix* sp, *Juncus alpinoarticulatus*, and *J. articulatus* and on 20 August at Harrogate in a marshy area south of the river channel.

Douglas' Aster

Aster subspicatus Nees

On 14 July, this species was recorded in a moist to dry meadow along river channel with *Castilleja thompsonii* and on 18 July along swiftly moving channel of river. On 19 July it was found at Brisco on a silt bar.

Canada Thistle

Cirsium arvense (L.) Scop

On 21 August, this species was recorded on the Spillimacheen Unit on a silt bar amongst willows on a back channel of the river.

Wavy-leaved Thistle

Cirsium undulatum (Nutt.) Spreng.

Recorded on a south-aspect slope on 1 June on the Wilmer Unit of the NWA.

Canadian Fleabane

Conyza canadensis var. *glabrata* L. (Cronq.)

On 16 July, this species was found amongst the shoreline vegetation of Goose Island on the Wilmer Unit.



Figure 30. Common Rabbitbrush on a steep, southeast-aspect slope on the Wilmer Unit (top) and close-up of blossoms, 13 July 2004.

Slender Hawksbeard

Crepis atribarba A. Heller

This was an uncommon species in the open Douglas-fir forest, grassland, and north aspect slopes. Recorded in bloom from early June through mid-July.

Dandelion Hawksbeard

Crepis runcinata A. Heller

Found in the aspen lowland forest on the Horsethief Creek fan of the Wilmer Unit (15 July) and on a river levee at the Brisco Unit (19 July).

Common Rabbit-brush

Ericameria nauseosa (Pall. ex Pursh) Nesom & Baird

This was a very common shrub on the grasslands, including the steep, east to south-aspect slopes (Figure 30), and open Douglas-fir forests of the Wilmer Unit. Also, often found on the north-aspect, closed canopy Douglas-fir forests. Found on both Eagle and Goose islands. Blooms recorded from mid-July through the end of August.

Cut-leaved Daisy

Erigeron compositus Pursh

This species was found on 15 July on a north-aspect, Douglas-fir forested slope on the Wilmer Unit of the NWA.

Long-leaved Fleabane

Erigeron corymbosus Nutt.

This species was found in 2 locations on the Wilmer Unit of the NWA. It frequented the open grassland habitat, including the steep, xeric slopes. Blooms were recorded from early June to mid-July.

Thread-leaved Fleabane

Erigeron filifolius var. *filifolius* Nutt.

On 12 July this species was found in bloom on a silty (alkaline?) north-facing slope above the shoreline on the Wilmer Unit. On 15 July, it was also found blooming in the closed canopy Douglas-fir forest and the grassland habitats.

Philadelphia Fleabane

Erigeron philadelphicus L.

Found only on the Harrogate and Spillimacheen units of the NWA, associated with the drier marsh

areas and the riparian habitat on the river levees. Blooms recorded mid-July to late August.

Shaggy Fleabane

Erigeron pumilus Nutt.

Fairly common on the open grasslands of the Wilmer Unit including disturbed and grazed sites. Blooms were recorded from late May to early June.

Woolly Eriophyllum

Eriophyllum lanatum var. *leucophyllum* (Pursh) Forbes (DC.) W.R. Carter

On 15 July, this species was found on the Wilmer Unit, growing along the edge of the lowland deciduous forest at the aspen-marsh interface.

Brown-eyed Susan

Gaillardia aristata Pursh

Fairly common in the open Douglas-fir and grassland habitats of the Wilmer Unit; occasional on the forested north-aspect slopes. Blooms recorded from late May through mid-July.

Golden-Aster

Heterotheca villosa var. *hispida* (Pursh) Shinnars

Occurs in the grassland and open Douglas-fir habitats of the Wilmer Unit. Occasionally, blooms were found from early July on; however, it became a common bloom on the grasslands by late August.

Oxeye Daisy

Leucanthemum vulgare Lam.

On 23 August, this species was found in bloom on a river levee in the typical Columbia River riparian habitat of the Harrogate Unit.

Water Marigold

Megalodonta beckii [Torr. ex Spreng.] Greene

On 19 July, Water Marigold was found on the Brisco Unit submersed and floating in a quiet backwater channel of the river, along with Narrow-leaved Bur-reed and Celery-leaved Buttercup. The species has been Blue-listed by the BCCDC (2012).

Sweet Coltsfoot

Petasites frigidus (L.) Fr.

On 23 August, this species was found on the Har-

rogate Unit in a riparian Black Cottonwood forest, associated with Paper Birch, Hybrid Spruce, Cowparsnip and Common Horsetail.

Woolly Groundsel

Senecio canus Hook.

On 15 July, this species was found on a north-aspect forested slope of the Wilmer Unit.

Canadian Butterweed

Senecio pauperculus Michx.

On 19 July, this Butterweed was found on the Brisco Unit on a back channel silt bar with willow, sedges, Redtop, and Alpine and Jointed rushes.

Canada Goldenrod

Solidago canadensis L.

Found occasionally on the Wilmer Unit of the NWA; in bloom, early to mid-July in the lowland aspen forest and birch draws.

Spikelike Goldenrod

Solidago spathulata DC.

Occasional in the open Douglas-fir forest and the forested north-aspect slopes. Blooms recorded from early June through mid-August (Figure 31).

Perennial Sow-thistle

Sonchus arvensis L.

Fairly common in disturbed sites such as those at the base of the steep, east-aspect slopes of the Wilmer Bluffs the old homestead site and disturbed areas of the grasslands and draws. Often associated with alkaline sites. Blooms were recorded from early June through late August.

Narrow-leaved Stephanomeria

Stephanomeria tenuifolia (Torr.) Hall

On 12 July, this species was found in bloom on a silty south-aspect slope above the shoreline of the bay just north of Walker's Point.

Common Dandelion

Taraxacum officinale G.H. Weber ex Wiggers

Common on the Wilmer Unit of the NWA in the open Douglas-fir forest, north-aspect, closed-canopy forested slopes, aspen draws, the lowland decidu-



Figure 31. Spikelike Goldenrod on the Wilmer Unit, 16 July 2004.

ous forest and on the xeric grassland habitats. Blooms were reported from late May through late August.

Hooker's Townsendia

Townsendia hookerii Beaman

Hooker's Townsendia (Figure 32) was a fairly common species on the open grasslands of the Wilmer Unit; it also occasionally grew in the open Douglas-fir forest habitat. This provincially red-listed species (BCCDC 2012) was found as a single plant growing in 1 location to clusters of over 25 plants within a small area. Blooms were recorded as early as 9 May (LH) but by the time we began our fieldwork on 25 May, most plants had gone to seed. Occasional blooms were found until 1 June.

Yellow Salsify

Tragopogon dubius Scop.

Yellow Salsify was found on the grassland habitat, including the steep, east- and south-aspect slopes of the Wilmer Unit. Frequent disturbed sites. Recorded in bloom from late May through late August.



Figure 32. Hooker's Townsendia is a provincially red-listed species. Clockwise, from lower left; Small cluster with flower and seed-heads (1 June 2004); close-up of flower; and orthophoto of the Wilmer Unit, Columbia National Wildlife Area, showing the plant's known distribution on the wildlife area.

CALLITRICHACEAE

Spring Water-starwort

Callitriche palustris L.

Found in bloom on 19 July at the Brisco Unit. The plant was growing in open water along with Celery-leaved Buttercup and Verticillate Water-milfoil. On 20 July, another plant was found in bloom on the Wilmer Unit of the NWA. There, it was growing with Celery-leaved Buttercup and Common Mare's-tail.

Pond Water-starwort

Callitriche stagnalis Scop.

On 20 July, this species was found in bloom on the west bank of the small bay at the southern heel of Ritchie's point.

HIPPURIDACEAE

Common Mare's-tail

Hippuris vulgaris L.

This was a common aquatic species in the shallow open waters of all 4 units of the NWA. It was also found in standing waters of ephemeral wetlands, ponds, along marsh edges, and the quiet back-channels of the river.

CAMPANULACEAE

Common Harebell

Campanula rotundifolia L.

Uncommon on the north-aspect forested slopes, the east-aspect slopes and the grassland habitats of the Wilmer Unit. Blooms recorded from early June through mid-July.

CAPRIFOLIACEAE

Twinflower

Linnaea borealis L.

On 30 May, Twinflower was found in a north-aspect, closed-canopy Douglas-fir forest and a birch

deciduous grove just west of Ritchie's Point on the Wilmer Unit of the NWA.

Western Trumpet

Lonicera ciliosa (Pursh) Poir. ex DC.

On 27 May, this vine was found in an aspen draw on the Wilmer Unit of the NWA.

Common Snowberry

Symphoricarpos albus (L.) Blake

This species was fairly common on the Wilmer Unit of the NWA. It frequented a range of habitats from the lowland deciduous forest and north-aspect Douglas-fir forests to the open Douglas-fir forests and grasslands, including the base of the steep, south-aspect slopes. It was also found on Eagle Island.

Western Snowberry

Symphoricarpos occidentalis Hook.

Western Snowberry (Figure 33), like its congener, frequented a wide variety of habitats on the Wilmer Unit. This shrub was in flower from early June through late August.

American Bush-cranberry

Viburnum opulus var. *americanum* L.

This species was recorded from the Brisco and Harrogate units of the NWA (Figure 34). It frequented the riparian habitat that grew along the river levees in association with Paper and Water birch, Prickly Rose, Red-osier Dogwood, and Mountain Alder.



Figure 33. Western snowberry grew on a variety of habitats on the Wilmer Unit, 12 July 2004. Inset is a close-up of the flower.



Figure 34. American Bush-cranberry was found along the riparian levees of the Brisco Unit, 3 June 2004. Inset: bush-cranberry fruit on the Harrogate Unit, 20 August 2004.

Blooms were reported from early June through mid-July with fruit on the shrub by late August.

APOCYNACEAE

Spreading Dogbane

Apocynum androsaemifolium L.

Found in 2 locations on the Wilmer Unit of the NWA: in an aspen draw (27 May) and at the old homestead site (18 August) where it was a sub-dominant shrub.

Hemp

Apocynum cannabinum L.

This species was found twice (7 June and 12 July; Figure 35) on the Wilmer Unit of the NWA.



Figure 35. Northern Crescent nectaring at Hemp on the Wilmer Unit, 12 July 2004.

Both records from the base of a south-aspect slope near the north shore of the small bay north of Walker's Point. Blooms were recorded on both dates.

GENTIANACEAE

Northern Gentian

Gentianella amarella (L.) Borner

On 19 August, this species was found in bloom in a meadow on the Horsethief Creek fan in association with Showy Pussytoes, Common Silverweed, Baltic Rush, Hooded Ladies' Tresses, and Silverberry.

BORAGINACEAE

Small-flowered Fiddleneck

Amsinckia menziesii (Lehm.) Nels. & J.F. Macbr.

This species was found on 20 August on the Harrogate Unit of the NWA in a marsh area near the river.

Western Stickseed

Lappula occidentalis (S. Wats.) Greene

Western Stickseed was a fairly common species on the south-aspect slopes of the Wilmer Unit. There, it grew in association with Needle and Thread Grass and/or Bluebunch Wheatgrass. Bloom reported from late May and early June.

Bristly Stickseed

Lappula squarrosa [Retz.] Dumort.

This species was not as common as Western Stickseed but favoured the same habitats. In fact, we always found Bristly Stickseed with its congener. Blooms were recorded from late May and early June.

Lemonweed

Lithospermum ruderale Dougl. ex Lehm.

Fairly common in the open Douglas-fir forest; occasional in the north-aspect, closed-canopy forest, deciduous draws and grasslands of the Wilmer Unit. Recorded in flower from late May through mid-July.

LAMIACEAE

Field Mint

Mentha arvensis L.

Recorded on all the units of the NWA. Fairly common around marsh edges, in wet meadows, and in riparian habitats such as the cottonwood woodlands and river levees. Recorded in bloom from mid-July through late August.

Purple Dragonhead

Physostegia parviflora Nutt. ex A. Gray

Found in bloom on the Spillimacheen Unit on 14 and 18 July on the upper margins of the marsh.

Self-heal

Prunella vulgaris L.

Self Heal was found on all the units of the NWA. On the northern units, it frequented riparian habitats along the river levees and the cottonwood riparian. At Wilmer, it was found in the lowland deciduous forest and the Horsethief Creek meadows. Blooms were recorded from mid-July through late August.

Marsh Skullcap

Scutellaria galericulata L.

Found in bloom on the Wilmer Unit along the western edge of Goose Lake below the bluffs (13 July) and along the shore of Goose Island (16 July; Figure 36).

PLANTAGINACEAE

Common Plantain

Plantago major L.

On 13 July, this non-native species was found on the Wilmer Unit along a cattle trail at the base of the bluffs on the southwest shore of Goose Lake.

Hoary Plantain

Plantago media L.

On 15 July, this species was found in bloom in the lowland aspen forest of the Wilmer Unit as well as on the grasslands. By late August, it could be commonly found in patches over the grassland habitat.



Figure 36. Marsh Skullcap growing in the gravels along the shore of Goose Island, 16 July 2004. Inset: flower close-up.

Woolly Plantain

Plantago patagonica Jacq.

On 26 August, this species was found along the old road access to Ritchie's Point.

RUBIACEAE

Northern Bedstraw

Galium boreale L.

Recorded from all but the Brisco Unit of the NWA. On the northern units of the NWA this bedstraw was found in the cottonwood or willow riparian habitats. On the Wilmer Unit, it was a common species on the steep, north-aspect, closed-canopy Douglas-fir forests and the aspen draws. It was also found on the Horsethief Creek meadow and at the old homestead site. Blooms were reported from early June through Mid-July.

Small bedstraw

Galium trifidum L. ssp. *subbiflorum* (Wieg.) Puff

Found on the Wilmer Unit on 13 July in *Carex aquatilis* - *Carex utriculata* - *Mentha arvensis* wetland along the shore of Goose Lake.

Fragrant Bedstraw

Galium triflorum L.

On 14 July, this species was found in bloom at the Spillimacheen Unit on the fringe of a cattle-grazed wetland.



Figure 37. The carnivorous, Greater Bladderwort growing in the shallow waters amongst a Common Cattail stand on the Wilmer Unit, 16 July 2004. Inset: close-up of the flower.

LENTIBULARIACEAE

Flatleaf Bladderwort

Utricularia intermedia Hayne

On 20 July, this species was found in bloom on the Wilmer Unit submersed and floating in the shallow open waters north of Ritchie's Point.

Greater Bladderwort

Utricularia macrorhiza Le Conte

Recorded from the Spillimacheen and Wilmer units of the NWA and likely occurs at Brisco and Harrogate, as well. This carnivorous plant was very common in the shallow open waters of the NWA,



Figure 38. Scarlet Paintbrush and willows near the Horsethief Creek mouth, 8 June 2004.

where it was often a dominant species (Figure 37). Flowers recorded from mid- to late July.

Lesser Bladderwort

Utricularia minor L.

Found in the shallow open waters of the Spillimacheen and Wilmer units of the NWA in July and August.

OLEACEAE

Common Lilac

Syringa vulgaris L.

On 18 August, this species was found at the old homestead site on the Wilmer Unit of the NWA.

SCROPHULARIACEAE

Scarlet Paintbrush

Castilleja miniata Dougl. ex Hook.

A large area of Scarlet Paintbrush and scrub willow occurred on a meadow in the Wilmer Unit of the NWA near the mouth of Horsethief Creek (Figure 38).

Thompson's Paintbrush

Castilleja thompsonii Pennell

Fairly common on the Wilmer, Spillimacheen and Harrogate units of the NWA from the end of May through the end of August. Found in a variety of habitats from the open Douglas-fir forest to riparian areas by the river.

Yellow Penstemon

Penstemon confertus Dougl. ex :indl.

Found in bloom in late May and early June on the Wilmer Unit west of the main road in an aspen draw and open shrub meadow.

Fuzzy-tongued Penstemon

Penstemon eriantherus Pursh

Fairly common in the open forest, grassland and slope habitats of the Wilmer Unit. Blooms recorded from late May through early June (Figure 39).

Littleflower Penstemon

Penstemon procerus Douglas ex Graham

Found on 12 July in sparsely vegetated *Hesperostipa comata* grassland en route to Ritchie Point.

POLEMONIACEAE

Narrow-leaved Collomia

Collomia linearis Nutt.

On 18 August, this species was found on a ridge near the southern boundary of the Wilmer Unit.

CARYOPHYLLACEAE

Field Chickweed

Cerastium arvense L.

Found in late May and early June on the dry, open areas of the Wilmer Unit.

Birdeye Pearlwort

Sagina procumbens L.

On 21 August, this species was found growing with *Alopecurus aequalis*, *Potamogeton natans* and *Chara* sp. on the Spillimacheen Unit.

Northern Starwort

Stellaria borealis Bigelow

On 18 August, this species was found in the open forest habitat near the southwestern corner of the Wilmer Unit, just outside the NWA boundary.

CHENOPODIACEAE

Lamb's-quarters

Chenopodium album L.

Found 3-times between 30 May and 18 August in disturbed sites on the Wilmer Unit.

Russian Thistle

Salsola kali L.

On 16 July, this species was found amongst the shore-line vegetation of Goose Island on the Wilmer Unit.



Figure 39. Fuzzy-tongued Penstemon is a fairly common sight on the dry, open forest, grassland and slope habitats on the Wilmer Unit, 28 May 2004.

POLYGONACEAE

Snow Buckwheat

Eriogonum niveum Dougl. ex Benth.

Reported on 15 July, from the open forest habitat of the Wilmer Unit.

Marshpepper Smartweed

Polygonum hydropiper L.

On 21 August, this species was found on the Spillimacheen Unit in a small, dry channel-bottom with *Carex*, *Schoenoplectus*, *Equisetum*, and *Sparganium*.

BRASSICACEAE

Holboell's Rockcress

Arabis holboellii Hornem.

Reported in bloom from 27 May through 15 July on the Wilmer Unit. Frequented the dry open forest and grassland habitat.

Western Tansay Mustard

Descurainia pinnata (Walt.) Britt.

Found in the open forest and grassland habitat of the Wilmer Unit. Reported in bloom in late May and early June.

Prairie Pepper-grass

Lepidium densiflorum Schrad.

On 13 July, this species was found in bloom on an extremely steep, slumping, salt exposed slope on the Wilmer Unit.

Columbia Bladderpod

Lesquerella douglasii S. Wats.

Found in the open forest, grassland and dry slopes of the Wilmer Unit. In bloom, early June.

Marsh Yellow Cress

Rorippa palustris (L.) Bess.

Found in marsh and aquatic habitats on all the units of the NWA. Blooms recorded from mid-July to late August.

Tall Tumble-mustard

Sisymbrium altissimum L.

Found in bloom in 2 areas of the Wilmer Unit, both on the dry slope habitat, on 13 July.

Kinnikinnick

Arctostaphylos uva-ursi (L.) Spreng.

Common on the Wilmer Unit of the NWA, where it was found in the north slope, open forest, grassland and aspen draw habitats.

PRIMULACEAE

Shootingstar

Dodecatheon sp.

This species was found twice (1 and 7 June; both times the plant was in seed) on the dry grassland and open forest habitats of the Wilmer Unit.

Sea-milkwort

Glaux maritima L.

Found in bloom in 2 locations on the Wilmer Unit on 12 July. The plants were found on a silty hillside (soil pH - 8.8) and in an alkaline wetland growing with *Distichlis stricta* and *Muhlenbergia asperifolia*.

Tufted Loosestrife

Lysimachia thyrsiflora L.

On 20 July, this species was found in bloom at the southeast end of Ritchie's Point submersed and floating at the edge of *Typha* stands.

ERICACEAE

SALICACEAE



Figure 40. Bald Eagle nest with young in Black Cottonwood tree on the Horsethief Creek fan, Wilmer Unit, 2 June 2004.

Black Cottonwood

Populus balsamifera ssp. *trichocarpa* L.

This is a dominant, large, deciduous tree on all the units of the NWA and important nesting habitat for the Bald Eagle (Figure 40) and Great Blue Heron. It is a common species on the Horsethief Creek fan and amongst the riparian habitat along the river banks where it is usually further back from the river edges behind the riparian shrubs.

Trembling Aspen

Populus tremuloides Michx.

A common deciduous tree in the lowland deciduous forest and draw habitats of the Wilmer Unit. It also formed part of a deciduous forested area on the Brisco Unit of the NWA.

Bebb's Willow

Salix bebbiana Sarg.

On 14 July, this species was found on the Spillamacheen Unit along with *Salix drummondiana*.

Short-fruited Willow

Salix brachycarpa Nutt.

On 15 July, one was identified on the Horsethief Creek fan of the Wilmer Unit.

Drummond's willow

Salix drummondiana J. Barratt ex Hook.

Found on the Spillamacheen Unit on 14 July with *Salix bebbiana*.

Pacific Willow

Salix lucida Muhl.

On 14 July, this species was found on the Spillamacheen Unit of the NWA.

Mackenzie Willow

Salix prolixa Andersson

On 14 July, this species was found on the Spillamacheen Unit of the NWA.

Scouler's Willow

Salix scouleriana J. Barratt ex Hook.

On 14 July, this species was found on the Spillamacheen Unit of the NWA.

Mountain Alder

Alnus incana [L.] Moench

A fairly common deciduous shrub in the riparian habitats of all the units of the NWA.

Water Birch

Betula occidentalis Hook.

Although recorded on all but the Harrogate Unit, it is likely a fairly common shrub in riparian habitats of all the NWA units.

Paper Birch

Betula papyrifera Marsh.

An uncommon tree in riparian habitats of all the NWA units.



Figure 41. Early Blue Violet, a fairly common species in the deciduous lowland forest on the Horsethief Creek fan, Wilmer Unit, 30 May 2004.

VIOLACEAE

Early Blue Violet

Viola adunca J.E. Smith

Fairly common on the Wilmer Unit in the deciduous lowland forest on the Horsethief Creek fan (Figure 41); also found on the Horsethief Creek meadow and in riparian habitat east of Eagle Island. Recorded in bloom from late May to mid-July.

BETULACEAE



Figure 42. Yellow Pond-lily, is a common aquatic species in the shallow open water areas of the National Wildlife Area. Wilmer Unit, 16 July 2004.

NYMPHAEACEAE

Yellow Pond-lily

Nuphar lutea (L.) Sm.

A common aquatic species in deeper portions of the shallow open water areas of the NWA (Figure 42); abundant in Goose Lake (see also Figure 6) on the Wilmer Unit. Important habitat for nesting grebes. Not recorded at Harrogate. Blooms recorded from late May through mid-July.

RANUNCULACEAE

Prairie Crocus

Anemone patens L.

Common on the dry open forest and grassland habitats and the north and east slopes of the Wilmer Unit. Blooms recorded in late May.

Columbia Virgin's Bower

Clematis occidentalis (Hornem.) DC.

On 27 May this species was found in an aspen draw on the Wilmer Unit.

White Water-buttercup

Ranunculus aquatilis L.

This aquatic buttercup was fairly common along the edges of the shallow open water habitat on the Wilmer, Spillimacheen and Brisco units of the NWA. Blooms were reported from early June through late August.

Shore Buttercup

Ranunculus cymbalaria Pursh

Found occasionally on the Wilmer and Harrogate units of the NWA. Blooms reported from mid-June through late August.

Lesser Spearwort

Ranunculus flammula L.

On 20 August, this species was found in bloom on the edge of small ponded area of a side channel of the Columbia River on the Harrogate Unit.

Small Yellow Water-buttercup

Ranunculus gmelinii DC.

On 25 May, this species was found in bloom in a small ponded area in a *Carex* marsh on the Horsethief Creek fan just west of the Wilmer Unit boundary.

Celery-leaved Buttercup

Ranunculus scleratus L.

Recorded in bloom in mid-July from both the Wilmer and Brisco units of the NWA; it was growing in the marsh areas along a *Typha* edge and amongst an *Equisetum fluviatile* marsh.

APIACEAE

Cow-parsnip

Heracleum maximum Bartr.

On 23 August, this species was found in the cottonwood riparian habitat of the Harrogate Unit.

Fern-leaved Desert-parsley

Lomatium dissectum (Nutt.) Mathias & Const.

Found in bloom in early June in the dry, grassland habitat of the Wilmer Unit.

Nine-leaved Desert-parsley

Lomatium triternatum (Pursh) Coult. & Rose

This species was fairly common in the grassland, aspen draw, and north slope habitats of the Wilmer Unit. Recorded blooming from late May through mid-July.

Hemlock Water-parsnip

Sium suave Walt.

This was a common marsh species on all the units of the NWA. It grew along the edges of shallow open water areas usually amongst the taller emergents such as *Typha* and *Phragmites* as well as amongst the *Carex-Equisetum* and *Equisetum fluviatile* marshes. Blooms reported from early July through late August.

ARALIACEAE

Wild Sarsaparilla

Aralia nudicaulis L.

On 13 July, this species was found in an aspen draw on the Wilmer Unit

CELASTRACEAE

Marsh Grass-of-Parnassus

Parnassia palustris L.

This species was found on the Horsethief Creek fan of the Wilmer Unit. It was in bloom in mid-July.

Small-flowered Grass-of-Parnassus

Parnassia parviflora DC.

Found in 2 riparian habitats, 1 on the Horsethief Crfeek fan and another along the aspen edge of a small wetland along the southwestern shore of Goose Lake. It was also found on a river levee on the Brisco Unit. Reported in bloom in mid-July.

CORNACEAE

Red-osier Dogwood

Cornus stolonifera Michx.

Red-osier Dogwood was a common shrub in riparian habitats on all the units of the NWA. Blooms were recorded in late May and early June.

FABACEAE

Hillside Milk-vetch

Astragalus collinus (Dougl. ex Hook.) G. Don

A common species on the dry open forest and grassland habitats (Figure 43) and slopes and occasionally in the aspen draws of the Wilmer Unit. Fairly common on Eagle Island. Blooms reported in late May and early June.

Timber Milk-vetch

Astragalus miser Dougl. ex Hook.

Found with less frequency than Hillside Milk-vetch but occurred in similar habitats on the Wilmer Unit of the NWA. Blooms reported in late May and early June.

Purple Peavine

Lathyrus nevadensis S. Wats.

On 15 July, this species was found in bloom in the deciduous lowland forest of the Horsethief Creek fan.



Figure 43. Hillside Milk-vetch, is a common species on the dry open forest and grassland habitats of the Wilmer Unit, 27 May 2004.

Creamy Peavine

Lathyrus ochroleucus Hook.

Fairly common on the north aspect slopes and aspen draws of the Wilmer Unit. Blooming reported from late May through mid-July.

Alfalfa

Medicago sativa L.

Common in the dry open forest and grassland habitats of the Wilmer Unit, often associated with disturbed areas or where horse or cattle sign was evident. Also found in aspen draws. Blooms reported from early June through mid-July.

White Sweet-clover

Melilotus alba Desr.

Found sporadically on the Wilmer Unit often in fairly disturbed sites. Blooms were reported from mid-July through mid-August.

Yellow Sweet-clover

Melilotus officinalis (L.) Lam.

This species was found on 18 August growing with White Sweet-clover at the old homestead site on the southwestern shore of Goose Lake.

Field Locoweed

Oxytropis campestris (L.) DC.

Found in the dry grassland habitat on the Wilmer Unit of the NWA. Blooms reported in mid-July.

Red Clover

Trifolium pratense L.

Found in bloom on the Horsethief Creek meadow and by the old homestead site in mid-August.

White Clover

Trifolium repens L.

Found in bloom on the Horsethief Creek meadow in mid-August.

American Vetch

Vicia americana Muhl. ex Willd.

On 27 May and 7 June American Vetch was found in bloom in aspen draw habitats on the Wilmer Unit.

Tufted Vetch

Vicia cracca L.

On 18 August, Tufted Vetch was found in bloom at the old homestead site on the Wilmer Unit.

Common Vetch

Vicia sativa L.

Found in bloom in the lowland deciduous forest habitat on 15 July.

HALORAGACEAE

Siberian Water-milfoil

Myriophyllum sibiricum Kom.

This aquatic species was found on the Wilmer, Brisco, and Spillimacheen units of the NWA in the shallow, open water habitat. It was commonly noted in Goose Lake and in the backwater channels at Spillimacheen.

Verticillate Water-milfoil

Myriophyllum verticillatum L.

Collected at both Wilmer and Brisco units in the shallow open water habitat. Flowering recorded on 20 July.

LINACEAE

Western Blue Flax

Linum lewisii Pursh

Fairly common on the dry grassland habitat of the Wilmer Unit including the south and east slopes. Recorded in bloom from late May through mid-July.

ELAEAGNACEAE

Silverberry

Elaeagnus commutata Bernh. ex Rydb.

This is a fairly common shrub on the Wilmer Unit. It was found on the Horsethief Creek fan near the creek mouth and in the lowland deciduous forest with other shrubs such as water birch, prickly

rose and common snowberry (Figure 44). It was also found along the shore of Goose Lake, at the base of steep slopes; Ritchie's Point; and Goose and Eagle islands. Blooms were recorded in late May and early June.

Soopolallie

Shepherdia canadensis (L.) Nutt.

Found on the Wilmer Unit on north aspect slopes, aspen draws and occasionally in the open Douglas-fir forest.

CRASSULACEAE

Pigmyweed

Crassula aquatica (L.) Schoeni.

Pigmyweed was found on the Spillimacheen Unit of the NWA on 24 September and was relayed to JP by Frank Lomer.

GROSSULARIACEAE

White-stemmed Gooseberry

Ribes inerme Rydb.

On 13 July, this species was found in an aspen draw and on a north aspect, closed canopy forested slope habitat on the Wilmer Unit.

Northern Gooseberry

Ribes oxycanthoides L.

Uncommon in the north aspect, closed canopy forested slope and aspen draw habitats of the Wilmer Unit.

ROSACEAE

Saskatoon

Amelanchier alnifolia Nutt.

This was a fairly common shrub on the Wilmer Unit of the NWA. It frequented the north aspect, closed canopy forest, lowland deciduous forest, and aspen draw habitats. It was also found on Goose Island. In bloom through late May.



Figure 44. Silverberry, a fairly common species on the Horsethief Creek fan of the Wilmer Unit, 25 May 2004.

Marsh Cinquefoil

Comarum palustre L.

This species was found twice, only on the Spillimacheen Unit of the NWA. Blooms recorded in mid-July and late August.

Red Hawthorn

Crataegus columbiana Howell

On 14 July, this species was found in a wooded area on the Spillimacheen Unit of the NWA.

Wild Strawberry

Fragaria virginiana Duchesne

Fairly common on the terraces, gullies and portions of the Horsethief Creek fan of the Wilmer Unit including the aspen draw, north aspect, closed canopy forest, lowland deciduous forests and, occasionally, the open grassland habitats. Blooms recorded from late May through early June.

Old Man's Whiskers

Geum triflorum Pursh

Fairly common in the open grassland and occasional in the north aspect, close forest; aspen draw, and open Douglas-fir forest of the Wilmer Unit. Also found on Goose Island. Fading blooms recorded by the end of May; most had gone to seed.

Cultivated Apple

Malus pumila Mill.

Two trees were found on 18 August at the old homestead site on the Wilmer Unit of the NWA.



Figure 45. Shrubby Cinquefoil, found in the lowland deciduous forest on the Horsethief Creek fan of the Wilmer Unit, 15 July 2004.

Shrubby Cinquefoil

Pentaphylloides floribunda (Pursh) A. Love

Restricted to openings in the lowland deciduous forest on the Horsethief Creek fan. Blooms recorded in mid-July (Figure 45).



Figure 46. Common Silverweed (top; 25 May 2004), a fairly common species in openings in the lowland deciduous forest bottom; 30 May 2004) on the Horsethief Creek fan of the Wilmer Unit.

Common Silverweed

Potentilla anserina L.

Found mainly on the Wilmer Unit of the NWA, although recorded once at Brisco. Common on the Horsethief Creek fan in the open meadows and riparian edges near Horsethief Creek and openings in the lowland deciduous forest (Figure 46), where it occurred in large numbers. This species was also found at the base of cliffs along the shoreline north of Walker's Point including Ritchie's Point and along the east edge of Eagle Island. Occasionally it was found in alkaline areas, together with *Glaux* and *Distichlis*. Blooms were recorded from late May through the end of August.

Bipinnate Cinquefoil

Potentilla bipinnatifida Dougl. Ex Hook.

Uncommon on the open grassland habitat of the Wilmer Unit. Blooms recorded in mid-July.

Sticky Cinquefoil

Potentilla glandulosa Lindl.

A plant found in bloom at Walker's Point in early June on the Wilmer Unit.

Norwegian Cinquefoil

Potentilla norvegica L.

On 15 July, this species was found in bloom in 2 locations in the lowland deciduous forest of the Wilmer Unit.

Prickly Rose

Rosa acicularis Lindl.

Very common on all the units of the NWA. Frequents a variety of habitats including the riparian along the river and Beaver Run levees, north aspect, closed canopy forest; aspen draw; lowland deciduous forest; open Douglas-fir forest, grassland and slope habitats. Blooms reported from late May through mid-July (Figure 47).

Nootka Rose

Rosa nutkana Presl

Fairly common on the Wilmer Unit of the NWA frequenting habitats similar to that of the Prickly Rose. Blooms recorded in late May.

Prairie Rose

Rosa woodsii Lindl.

Uncommon compared with the other 2 rose species. Found on the Wilmer and Brisco units of the NWA. Habitat included open areas of the lowland deciduous forest, the steep east slopes adjacent to Goose Lake (1 quite alkaline) and the riparian river levees. Blooms recorded in mid-July.

Dwarf Red Blackberry

Rubus pubescens Raf.

On 23 August, this species was recorded at 2 locations in cottonwood riparian habitat on the Harrogate Unit of the NWA.

Birch-leaved Spirea

Spirea betulifolia Pall.

Recorded only on the Wilmer Unit, primarily from the north aspect, closed canopy forest; also found in aspen draws and the open Douglas-fir forest.



Figure 47. Prickly Rose is a very common species on all the units of the Columbia National Wildlife Area, 28 May 2004, Wilmer Unit.

SAXIFRAGACEAE

Round-leaved Alumroot

Heuchera cylindrica Dougl. ex Hook.

Uncommon in the north aspect, closed canopy forests of the Wilmer Unit.

SANTALACEAE

Pale Comandra

Comandra umbellata (L.) Nutt.

Uncommon in the aspen draws, open Douglas-fir forest, and at the base of south slopes. Also found on Eagle Island. Blooms reported in late May.

VISCACEAE

Western Dwarf Mistletoe

Arceuthobium campylopodium Engelm.

Western Dwarf Mistletoe was a fairly common parasite on Rocky Mountain Juniper on the Wilmer Unit of the NWA.

ANIMALIA

Over 160 animal species were found on the Columbia National Wildlife Area during the summer of 2004. Of those, 4 were listed as SARA species in the Endangered, Threatened, or Special Concern categories and 5 were on the provincial Red- or Blue-lists.

Arthropoda

INSECTA

The following 34 species of insects were recorded from the Columbia National Wildlife Area. During this study, insects were not systematically searched for. The following species were recorded over the study period. Significantly more inventory work needs to be done with this phylum.

Pacific Forktail

Ischnura cervula Selys

Reported from the Wilmer Unit on 12 June.

Lyre-tipped Spreadwing

Lestes unguiculatus Hagen

Recorded on the Wilmer Unit on 12 July.

Common Spreadwing

Lestes disjunctus Selys

This species was identified at the Wilmer Unit on 12 and 15 July.



Figure 48. A young female *Lestes* sp., probably *disjunctus* on the Wilmer Unit of the NWA, 15 July 2004.

Boreal Bluet

Enallagma boreale Selys

On 12 July, this species was seen on the Wilmer Unit of the NWA.

Northern Bluet

Enallagma annexum (Hagen)

On 12 July, a Northern Bluet was observed on the Wilmer Unit.

Marsh Bluet

Enallagma ebrium (Hagen)

Found on the Wilmer Unit in low area at base of riparian swale near a marsh on 12 July.

Darner

Aeshna spp.

Common in mid-July on the Spillimacheen and Wilmer units of the NWA.

American Emerald

Cordulia shurtleffii Scudder

This species was observed at the Wilmer and Spillimacheen units from late May to early June.

Four-spotted Skimmer

Libellula quadrimaculata L.

A common dragonfly on the Wilmer and Spillimacheen units of the NWA in late May and early June (Figure 49).

Variegated Meadowhawk

Sympetrum corruptum (Hagen)

Found on the Wilmer Unit from late May to mid-July.

Saffron-winged Meadowhawk

Sympetrum costiferum (Hagen)

Observed on the Wilmer Unit on 13 July (Figure 49).



Figure 49. Some dragonflies of the Columbia National Wildlife Area: a) male *Libellula quadrimaculata*, 25 May 2004; b) male *Leucorrhinia hudsonica*, 26 May 2004; c) young female *Sympetrum costiferum* caught in a spider web, 13 July 2004; d) *Leucorrhinia intacta*, 16 July 2004; e) male *Sympetrum internum*, 19 August 2004; f) young female *Sympetrum occidentale*, 18 July 2004.

Western Meadowhawk

Sympetrum occidentale Barteneff

Recorded on the Wilmer and Spillimacheen units around mid-July (Figure 49).

Cherry-faced Meadowhawk

Sympetrum internum Montgomery

Reported from the Harrogate and Wilmer units from mid-July to the latter half of August (Figure 48).



Figure 50. Water scorpion found along the western edge of Goose Lake on the Wilmer Unit, 12 July 2004.

Hudsonian Whiteface

Leucorrhinia hudsonica (Selys)

The Hudsonian Whiteface was recorded on the Wilmer Unit from late May through mid-July (Figure 49).

Red-waisted Whiteface

Leucorrhinia proxima Calvert

Found at the Wilmer and Spillimacheen units in early June.

Dot-tailed Whiteface

Leucorrhinia intacta (Hagen)

The Dot-tailed Whiteface was a common species on the Wilmer Unit from late May through mid-July (Figure 49). Also reported from the Brisco Unit on 3 June.



Figure 51. Canadian Tiger Swallowtail nectaring on Hillside Milk-vetch.

Water Scorpion

Ranatra sp.

One found on 12 July along the western edge of Goose Lake (Figure 50).

Ants

(Formicidae)

We noted a number of thatching ant mounds and entrances to soil galleries in the Open Douglas-fir forest. Keller (1978) found "The upper soil horizons [of this habitat unit] have a multitude of ant tunnels and galleries suggesting that ant activity plays a major part in incorporating carbon into the solum."

Canadian Tiger Swallowtail

Papilio canadensis Rothschild and Jordan

We have records of this species from late May to early June (Figure 51); recorded at the Wilmer and Spillimacheen units.

Cabbage White

Pieris rapae L.

On 7 June, one was recorded from the Wilmer Unit of the NWA.

Pine White

Neophasia menapia (C. Felder and R. Felder)

Reported from the Wilmer Unit on 29 and 30 May, nectaring on Dandelion on the latter date.

Clouded Sulpher

Colius philodice Godart

Recorded on the Wilmer Unit on 30 May and 17 August.

Orange Sulphur

Colias eurytheme Boisduval

Found on the Wilmer Unit on 12 July.

Western Tailed-Blue

Everes amyntula (Boisduval)

This species was tentatively identified from the Wilmer Unit on 30 May.

Mormon Fritillary

Speyeria mormonia (Boisduval)

Observed on the Wilmer Unit of the NWA on 19 August.

Meadow Fritillary

Boloria bellona (Fabricius)

Found on the Wilmer Unit on 2 June.

Northern Crescent

Phyciodes selenis (W. Kirby)

A common butterfly on the Wilmer Unit from early June through mid-July). Also recorded on the Spillimacheen Unit on 14 July. Noted nectaring on Hemp Dogbane (Figure 52).



Figure 52. Northern Crescent nectaring on Hemp Dogbane on the Wilmer Unit, 12 July 2004.

Comma

Polygonia sp.

Recorded from the Brisco Unit on 3 June.

Mourning Cloak

Nymphalis antiopa (L.)

This was a fairly common species, reported from the Brisco, Spillimacheen, and Wilmer units of the NWA in late May and early June.

Common Wood-Nymph

Cercyonis pegala (Fabricius)

Observed at the Wilmer Unit on 12 July (Figure 53).

Great Basin Wood-Nymph

Cercyonis sthenele (Boisduval)

Found at Wilmer from mid-July to late August.

Common Alpine

Erebia epipsodea Butler

Observed at the Wilmer Unit on 26 May.

Common Branded Skipper

Hesperia comma (L.)

Recorded from the Wilmer Unit on 12 July.

Robber Fly

Stenopogon inquinatus Loew

A male of this species was photographed at the Wilmer Unit on 6 June (Figure 54) and 15 July.

Machimus sp. probably *occidentalis*

A female was photographed at the Wilmer Unit on 7 June (Figure 54).



Figure 53. Common Wood-nymph on the Wilmer Unit, 12 July 2004.



Figure 54. Two robberfly species found on the Wilmer Unit of the Columbia National Wildlife Area: *Stenopogon inquinatus*, 6 June 2004 (left) and *Machimus* sp., likely *occidentalis*, 7 June 2004 (right).

Chordata

AMPHIBIA

Two species of amphibians were found on the Columbia National Wildlife Area, 1 a SARA species of Special Concern.

Western Toad

Anaxyrus boreas (Baird and Girard, 1852)

The Western Toad (Figure 55) was reported only from the Spillimacheen unit of the NWA but likely occurs on all the units. On 4 June, hundreds of Western Toad tadpoles were found in the shallows of a pond on

the Spillimacheen Unit. The first toadlets were found on 8 June some 2.8 km downstream of the Wilmer Unit and later on the Spillimacheen Unit on 18 July. The Western Toad is a SARA species of Special Concern and is on the provincial Blue list (BCCDC 2012).

Columbia Spotted Frog

Rana luteiventris Thompson

The Columbia Spotted Frog (Figure 55) was observed on 14 July (5 individuals) and 18 July (1 animal) on the Spillimacheen Unit of the NWA. Eight individuals were recorded on the Wilmer Unit on 19 August.



Figure 55. Western Toad (left), 8 June 2004, was found only on the Spillimacheen Unit and Columbia Spotted Frog (right), 19 August 2004, was found on both the Wilmer and Spillimacheen units of the National Wildlife Area.



Figure 56. Locations of Western Painted Turtle sightings (left) and a sunning Western Painted Turtle (right; photo: Larry Halverson) on the Wilmer Unit of the Columbia National Wildlife Area, summer 2004.

REPTILIA

One reptile was found on the National Wildlife Area; it was a SARA species of Special Concern.

Western Painted Turtle

Chrysemys picta bellii (Gray)

The Western Painted Turtle was a fairly common reptile along the northern and western shores of Goose Lake and the Beaver Run levees (Figure 56). It was recorded from 26 May through 17 August. We also had a record of an individual from ponds just east of the Spillimacheen unit on 14 July. This turtle is part of the Intermountain - Rocky Mountain Population and is a SARA species of Special Concern; it is also on the provincial Blue list (BCCDC 2012).

At Wilmer, the vegetation on Goose Island appeared to be severely overgrazed. On 26 May, 8 empty but recently-used nests were found on the island and a bird was flushed from a nest containing 4 eggs. Two pairs of geese were also found in the waters adjacent to Goose Island with 3 and 5 downy young respectively. On 7 June a pair with 7 older young of the year was observed in the *Carex-Equisetum* marsh just northeast of Walker's Point.

Largest numbers occurred at Wilmer: 27 May-40; 30 May-40 (Figure 57); 20 July-42. On 23 August, 25 birds were at Harrogate.

Wood Duck

Aix sponsa (Linnaeus)

From late May through late August, the Wood Duck was found on all the units of the NWA but

AVES

A total of 112 species of birds were recorded on the Columbia National Wildlife Area over the study period.

Canada Goose

Branta canadensis (Linnaeus)

The Canada Goose was most often reported from the Wilmer Unit of the NWA between late May and late August. It was usually found on Goose Lake and in the marshes north of Ritchie's Point.

It was occasionally observed at Harrogate and Spillimacheen; however, there was considerable evidence of goose use in the form of droppings and tracks on both these units.



Figure 57. Canada Geese feeding in a *Carex-Equisetum* meadow on the Wilmer Unit of the NWA, 30 May 2004.



Figure 58. Blue-winged teal drakes courting a hen on the Wilmer Unit, 2 June 2004.

Spillimacheen. Numbers normally ranged between 1 and 7 birds but on 19 August a flock of 35 birds was flushed from the small bay just north of Walker's Point, which may have been part of an autumn movement.

On 12 July, 3 young of the year were observed along the south shore of Ritchie's Point.

Gadwall

Anas strepera Linnaeus

On 27 May, a pair was observed just off the eastern end of Ritchie's Point.

American Wigeon

Anas americana Gmelin

Small numbers were recorded only on the Wilmer Unit from 26 May to 8 June, likely stragglers on their way north. Wigeon were recorded there again on 19 August as the autumn movement was beginning. Largest numbers: 26 May-3 pairs.

Mallard

Anas platyrhynchos Linnaeus

The Mallard was a fairly common species, recorded primarily from the edges of the shallow-water habitats or the river edge on all the units of the NWA throughout the study period.

An autumn movement was discernable on 19 August when 334 Mallards were counted; however, a larger number of Mallards was also in the area that went unrecorded because of the difficulty of assessing their numbers.

On 8 June and 20 July, a hen with 6 and 5 young, respectively, were recorded from the Wilmer Unit.

Blue-winged Teal

Anas discors Linnaeus

Small numbers of this species (up to 6) were observed on the Wilmer (Figure 58), Brisco, and Spillimacheen units of the NWA from 26 May through 4 June. This teal frequented the shallow-water and river edge habitat.

Cinnamon Teal

Anas cyanoptera Vieillot

The Cinnamon Teal was found on the Wilmer and Brisco units of the NWA between 25 May and 3 June. A maximum of 6 birds was seen at any one time.

Northern Shoveler

Anas clypeata Linnaeus

A pair of Northern Shoveler was seen on the Wilmer Unit on 26 May.

Northern Pintail

Anas acuta Linnaeus

One bird was observed flying over the Harrogate Unit on 23 August.

Green-winged Teal

Anas crecca Linnaeus

The Green-winged Teal was an uncommon species, recorded at Wilmer, Brisco, and Spillimacheen units between 26 May and 19 August. Highest numbers: 19 August-5.

Canvasback

Aythya valisineria (A. Wilson)

A pair of Canvasback was seen on Goose Lake on 2 June.

Ring-necked Duck

Aythya collaris (Donovan)

We recorded the Ring-necked Duck in small numbers on the Wilmer and Brisco units from 26 May to 20 July. Highest number: 4 pair at Brisco on 3 June.

On 19 August, a pair with 8 young of the year were seen on the Wilmer Unit.

The species frequented the shallow open water habitats of the units.

Lesser Scaup

Aythya affinis (Eyton)

We have 2 records of this species from the Wilmer Unit. On 2 June, 3 males and a female were seen on Goose Lake and later the same day a pair flew over Wilmer Slough.

Bufflehead

Bucephala albeola (Linnaeus)

The Bufflehead was an uncommon species on the Wilmer and Brisco units of the NWA from 27 May through 20 July frequenting the shallow-open water habitat.

On 27 May, we flushed a female from a nest cavity in a Douglas-fir (Figure 59; see also Figure 18) along the north shore of Ritchie's Point. Later, on 3 June, we found a female with one small young at Brisco.

Common Goldeneye

Bucephala clangula (Linnaeus)

Small numbers of this species were seen on the Wilmer Unit from 26 May to 16 July. Highest numbers: 8 June-3 females.

On 26 May, a female and 4 young were found in the Wilmer Slough (Figure 60).

Hooded Merganser

Lophodytes cucullatus (Linnaeus)

One or 2 birds were occasionally seen on the Wilmer Unit from 26 May to 19 August. This species was most often found along the edges of the shallow open water habitat of Goose Lake.

Common Merganser

Mergus merganser Linnaeus

The Common Merganser was recorded on the Wilmer Unit, 4-times between 1 and 2 June.

On 2 June, a female was observed with 4 downy young riding on her back.

Ruddy Duck

Oxyura jamaicensis (Gmelin)

Recorded 4-times between 26 May and 13 July, mainly along the edges of the shallow waters of Goose Lake. Highest numbers: 26 May-a pair plus 3 females.



Figure 59. Entrance to Bufflehead nest cavity in Douglas-fir on the Wilmer Unit. A female was flushed from the cavity on 27 May 2004.

Ruffed Grouse

Bonasa umbellus (Linnaeus)

Heard drumming twice and observed once between 25 and 30 May. The rufous-phase bird we observed was flushed at close range while dust bathing.



Figure 60. Female Common Goldeneye and downy young on Wilmer Slough, 26 May 2004.



Figure 60. Pair of Common Loons and downy young (just behind adult on left), Wilmer Unit, 2 June 2004.

Spruce Grouse

Falci pennis canadensis (Linnaeus)

Observed on the Harrogate Unit on 20 August.

Dusky Grouse

Dendragapus obscurus (Say)

We heard the hooting of this grouse on the Wilmer Unit on 26 May.

Common Loon

Gavia immer (Brünnich)

From 2 June through 19 August, the Common Loon was occasionally seen in the shallow open waters of the Wilmer Unit, including Goose Lake and Wilmer Slough. On 21 August we recorded a

loon flying over the Spillimacheen Unit.

A pair nested in Wilmer Slough and raised 1 young: 2 June-pair with 1 recently-hatched young (Figure 60); 20 July-adults with three-quarter grown young.

Pied-billed Grebe

Podilymbus podiceps (Linnaeus)

The Pied-billed Grebe (Figure 61) was a common nesting species at Wilmer, recorded from 26 May through 17 August. It was also heard at Brisco on 19 July and seen at Harrogate on 23 August. This grebe frequented the shallow open waters of the NWA.

Seven floating nests 30–45 cm in diameter were found in shallow open water 55–97 cm deep, often amongst pond-lily pads and *Equisetum* or *Schoenoplectus* marshes. Nest materials included *Nuphar*-7 nests; *Potamogeton*-3; *Equisetum*-3; *Utricularia*-3; *Schoenoplectus*-2; *Myriophyllum*-1; *Sparganium*-1. Clutches held from 1–6 eggs (1E-1; 4E-1; 5E-2; 6E-3; Figure 61). Some eggs appeared to be near hatching (floatation test) on 8 June although young were not seen until 13 July.

Red-necked Grebe

Podiceps grisegena (Boddaert)

The Red-necked Grebe was a fairly common, nesting bird on the open water habitats of the Wilmer Unit from 26 May through 19 August. Also found nesting on the Brisco Unit of the NWA.

On 1 June, a semi-colonial grouping of 17 nests, some with birds sitting and others under construction, were found near the southwestern end of Goose Lake. From a sampling of 10 of 30 solitary nests on



Figure 61. Pied-billed Grebe in *Nuphar polysepalum* bed (left), 13 June 2004 and Pied-billed Grebe nest with 6-egg clutch, 2 June 2004; both images are from the Wilmer Unit of the NWA.



Figure 62. Red-necked Grebe (left), and its nest with 4-eggs (right), on the Brisco Unit of the NWA, 19 July 2004.

8 June, the nests were floating over shallow open water 80–130 cm deep; nest diameters ranged from 42–60 cm. Nest material included the following: *Nuphar*-10 nests; *Utricularia*-9; *Schoenoplectus*-6; *Chara*-5; *Myriophyllum*-2; *Sparganium*-2; *Potamogeton*-1; *Hippurus*-1. Clutches held from 1–5 eggs (1E-2; 2E-1; 3E-4; 4E-2; 5E-1) but it was likely that a number of clutches were incomplete as floatation testing suggested the eggs were fresh. On 19 July, a Red-necked Grebe nest with 4 eggs was found in a small open water area on the Brisco Unit (Figure 62).

Great Blue Heron

Ardea herodias Linnaeus

The Great Blue Heron was a common species on all units of the NWA throughout the survey period. Herons frequented the shallow open waters and channels and the river bars and levees of the NWA.

A heronry with at least 15 active nests was located about 400 m east of Eagle Island, adjacent to the Wilmer Unit (Figure 63). Machmer and Steeger (2004) report a Wilmer heronry with 40 active nests



Figure 63. Looking east from Eagle Island on the Wilmer Unit of the NWA toward a Great Blue Heron colony in the tall cottonwoods at the centre-right of the image, 26 May 2004. Note the pair of nesting Bald Eagles on the left side of the image.



Figure 64. Nesting Bald Eagles on the Spillimacheen Unit: (left) adult returning to the nest with a fish to feed two nestlings, one of which can be seen in the image, 4 June 2004, and (right) Jenifer Penny watching a recently-fledged young from the nest, 18 July 2004.

in 1995 and 11 active nests in 2003. They expressed concern about beaver activity at the heronry as well as the presence of nesting Bald Eagles in the heronry, noting that eagle-heron interactions were frequently observed. In 2003, 10 of the 11 active nests were abandoned, thought due to Bald Eagle disturbance and predation on heron nestlings. In 2004, a Bald Eagle pair was still nesting proximate to the heron colony (Figure 63).

Turkey Vulture

Cathartes aura (Linnaeus)

This vulture was an uncommon species throughout the study period, usually seen flying overhead.

Osprey

Pandion haliaetus (Linnaeus)

The Osprey was a fairly common raptor on the NWA from late May through mid-August.

Bald Eagle

Haliaeetus leucocephalus (Linnaeus)

The Bald Eagle was a common bird of prey on the NWA throughout the study period.

Evidence of nesting was found on all the units of the NWA and active nests were found at Wilmer (2) and Spillimacheen (1). One nest on the Wilmer Unit was adjacent to a Great Blue Heron colony in a large cottonwood tree (see Figure 63) while the other was on the Horsethief Creek fan in a small (17.7 m) cottonwood (DBH: 49.9 cm; nest height: 12.2 m). On

2 June, the latter nest contained 1 feathered nestling. Two nests were found on the Spillimacheen Unit, at least 1 of which was active. The latter was situated in a 24.3 m cottonwood (DBH: 86.5 cm; nest height: 20.5 m) and contained 2 feathered nestlings on 4 June (Figure 64). Two nests were also found on the Harrogate Unit but we saw no sign of activity at either nest. An old and partially collapsed nest was found in a cottonwood on the Brisco Unit.

Northern Harrier

Circus cyaneus (Linnaeus)

We have but 3 observations of individual Northern Harriers: 25 May-male; 2 Jun-male, and 19 August-female or immature, all from the Wilmer Unit.

Sharp-shinned Hawk

Accipiter striatus Vieillot

We have 2 observations of this small accipiter from the Wilmer Unit of the NWA: 25 May-adult flying and soaring over aspen canopy heading north and 2 June-adult male perched in tree top beside river.

Cooper's Hawk

Accipiter cooperii (Bonaparte)

The Cooper's Hawk was seen on the Wilmer Unit 3-times in late May and early June and twice in late August. On 2 June, an adult male was seen hunting in riparian willows, which suggests nesting on or near the Wilmer Unit.

Red-tailed Hawk

Buteo jamaicensis (Gmelin)

We saw this buteo only 4-times between 25 May and 8 June, all on the Wilmer Unit.

American Kestrel

Falco sparverius Linnaeus

A fairly common raptor seen throughout the study period on the Wilmer Unit of the NWA. We have one record from the Brisco Unit.

Nesting was suspected but not confirmed.

Merlin

Falco columbarius Linnaeus

We have 3 records of the Merlin, all from the Wilmer Unit: 27 May, 2 June (Figure 65), and 24 August.

Virginia Rail

Rallus limicola Vieillot

The Virginia Rail was heard sporadically between 26 May and 20 July on the Wilmer Unit.

Sora

Porzana carolina (Linnaeus)

The Sora was the more common of the 2 rails; it was recorded between 25 May and 20 July only on the Wilmer Unit. Most records came from the marshes adjacent to the Beaver Run levees; it was also heard in the marshes of the Horsethief Creek fan.

American Coot

Fulica americana Gmelin

The American Coot was rather uncommon and found only on the Wilmer Unit of the NWA. Largest numbers occurred in late spring (26 May-90; 29 May-87) on Goose Lake.

On 8 June, 4 coot nests were found floating on the shallow open water (68–96 cm deep) amongst *Schoenoplectus* stands; they held 2, 6, 7, and 8 eggs, respectively. Nests were constructed of *Schoenoplectus tabernaemontani*, and usually had a ramp; diameters of 3 of the nests ranged from 33 to 50 cm. On 13 July, broods of 3 and 5 young were found.



Figure 65. Merlin plucking a small passerine in dead aspen at Ritchie's Point, 2 June 2004.

Sandhill Crane

Grus canadensis (Linnaeus)

A pair of Sandhill Cranes was observed on the Wilmer Unit of the NWA between 25 May and 2 June. They spent most of their time foraging in the marshes north of Ritchie's Point.

Killdeer

Charadrius vociferus Linnaeus

Our only record is from 26 May: a bird calling in the vicinity of Eagle Island on the Wilmer Unit.

Spotted Sandpiper

Actitis macularius (Linnaeus)

This is the common summer shorebird of the wildlife area, recorded regularly from 26 May through 23 August. It was found on all the units of the NWA, frequenting the shorelines of marshes and levees.

Western Sandpiper

Calidris mauri (Cabanis)

Two records of single birds were recorded: 19 August at Wilmer and 20 August at Harrogate.

Bonaparte's Gull

Larus philadelphia (Ord)

This gull was seen sporadically throughout the study period in numbers no higher than 3 birds. All



Figure 66. Immature California Gull loafing on a log beside the Beaver Run levees at Wilmer, 26 May 2004.

but 1 record are from the Wilmer Unit, the exception being 2 birds recorded at Spillimacheen on 21 August. Bonaparte Gulls frequented the shallow open waters of Goose Lake.

California Gull

Larus californicus Lawrence

At least 9 California Gulls (1 adult and 8 immatures) were recorded on 26 May loafing along the eastern edge of the Beaver Run levees of the Wilmer Unit (Figure 66).

Black Tern

Chlidonias niger (Linnaeus)

With the exception of 4 birds seen at Spillimacheen on 4 June, all records were from

the Wilmer Unit of the NWA and there it was a fairly common species, seen throughout the study period.

Two nests were found, each with a single egg, one on 8 June (Figure 67) and the other on 16 July. On the latter date a brood of 3 recently-fledged young was also seen. The nests, made entirely of dead *Schoenoplectus* stems, were floating on shallow open water in the midst of a *Schoenoplectus* marsh; 1 nest was floating on water 95 cm deep and had a diameter of 30 cm.

Mourning Dove

Zenaida macroura (Linnaeus)

Two Mourning Doves were seen along a riparian levee of the Columbia River at the Wilmer Unit on 19 August.

Barred Owl

Strix varia Barton

A body feather of this owl was found on 6 June in the forested southwest corner of the Wilmer Unit west of the road.

Common Nighthawk

Chordeiles minor (J.R. Forster)

The Common Nighthawk was an uncommon species in the skies over the Wilmer Unit throughout the study period. Largest numbers occurred on 7 June when 6 birds were recorded. On 26 August, a bird was found roosting along the old road edge that formerly ran down to Ritchie's Point.



Figure 67. Black tern on the nest (left) and a tern nest and egg (right), on the Wilmer Unit of the NWA, 8 June 2004.



Figure 68. Belted Kingfisher perched over a *Typha* marsh, 20 July 2004 (left) and an exposed kingfisher burrow in a sloughed clay-silt bank showing the burrow cross-section, 2 June 2004 (right), both on the Wilmer Unit of the NWA.

Black Swift

Cypseloides niger (Gmelin)

On 26 May, 'several' Black Swifts were observed over the Wilmer Unit.

Calliope Hummingbird

Stellula calliope (Gould)

On 8 June, this hummingbird was seen just outside the Wilmer Unit of the NWA near the Horsethief Creek mouth.

Rufous Hummingbird

Selasphorus rufus (Gmelin)

The Rufous Hummingbird was seen twice on the Wilmer Unit: 30 May, on the Horsethief Creek fan, and 13 July at the base of the Wilmer Bluffs.

Belted Kingfisher

Ceryle alcyon (Linnaeus)

The Belted Kingfisher (Figure 68) was a fairly common species on all the units of the NWA throughout the study period.

On 3 June, a kingfisher was seen entering a nest burrow in a low silt bank of the Columbia River at Brisco. The entrance was located about 1 m above the river. Old burrows were also found on the Wilmer Unit (Figure 68).

Lewis's Woodpecker

Melanerpes lewis (Gray)

We have 4 records of this woodpecker from the Wilmer Unit: 26 May-a pair on Eagle Island; 28

May- an individual flying past Walker's Point; 2 June-hawking insects from perch on Eagle Island; 19 August-on East bank of Columbia River opposite Horsethief Creek mouth, just outside the NWA. The Lewis's Woodpecker is a SARA species of Threatened status and is on the provincial Red list (BCCDC 2012).

Red-naped Sapsucker

Sphyrapicus nuchalis Baird

A fairly common woodpecker on the Wilmer Unit throughout the study period; also recorded from the Brisco Unit on 19 July. At Wilmer, this species was most often found in the lowland deciduous forests of the Horsethief Creek fan as well as the deciduous draws.

On 30 May, a pair was seen at a nest cavity in an aspen copse on the Horsethief Creek fan. The



Figure 69. Red-naped Sapsucker near nest cavity entrance in a trembling aspen, Wilmer Unit, 30 May 2004.

cavity entrance was 4 m high in a trembling aspen (Figure 69).

Downy Woodpecker

Picoides pubescens (Linnaeus)

The Downy Woodpecker was a fairly common species on all the units of the NWA throughout the study period. It was found mainly in the deciduous lowland forest on the Horsethief Creek fan and the riparian habitats of the river banks and levees.

Hairy Woodpecker

Picoides villosus (Linnaeus)

The Hairy Woodpecker was recorded only 4 times over the study period; all observations were from the Wilmer Unit of the NWA.

Northern Flicker

Colaptes auratus (Linnaeus)

A common woodpecker of the NWA over the study period, recorded from all but the Harrogate Unit. The flicker was found most often in the open Douglas-fir forest and the lowland deciduous forest.

Three nests were found. On 29 May, a pair was seen at a cavity entrance about 5 m high in a Douglas-fir. On 2 June, several young were heard 'buzzing' from a cavity, 4 m high in a black cottonwood. Later, on 7 June, an adult was seen at an unidentified nest tree. All nests were on the Wilmer Unit.



Figure 70. Least Flycatcher in the deciduous lowland forest on the Wilmer Unit, 30 May 2004.

Pileated Woodpecker

Dryocopus pileatus (Linnaeus)

This large woodpecker was recorded sporadically throughout the study period from all but the Brisco Unit of the NWA. It occurred primarily in the open Douglas-fir forest and the lowland deciduous forest habitats.

Olive-sided Flycatcher

Contopus cooperi (Nuttall)

On 7 June, this flycatcher was found about a kilometre northwest of the Wilmer Unit boundary along the Wilmer access road. The Olive-sided Flycatcher is a Threatened SARA species and is on the provincial Blue List (BCCDC 2012).

Western Wood-Pewee

Contopus sordidulus Sclater

The Western Wood-Pewee was found throughout the study period on all the units of the NWA but Harrogate. It was most often found in the lowland deciduous forest habitat.

Willow Flycatcher

Empidonax traillii (Audubon)

This flycatcher was seen or heard on all units of the NWA but Harrogate. The Willow Flycatcher was found most often in the scrub willow thickets and riparian habitats of the levees and river banks.

Least Flycatcher

Empidonax minimus (W.M. Baird & F.S. Baird)

The Least Flycatcher was, by far, the most common empidonex flycatcher of the NWA and was recorded from all the units with the exception of Harrogate. It was reported from 25 May through 19 July (Figure 70), after which singing stopped, making it more difficult to detect.

Hammond's Flycatcher

Empidonax hammondi (Xantus de Vesey)

On 30 May, this species was heard on the Wilmer Unit in an area where a deciduous draw and closed canopy forest habitats met.

Dusky Flycatcher

Empidonax oberholseri Phillips

The Dusky Flycatcher was most often found in the open Douglas-fir forests of the Wilmer Unit; occasionally in the lowland deciduous forests there as well as 1 record from Spillimacheen. It was recorded from 27 May through to 15 July, after which singing stopped.

Eastern Kingbird

Tyrannus tyrannus (Linnaeus)

The Eastern Kingbird was first observed at Wilmer on 1 June and was a very common species on all units of the NWA through to 23 August. It favoured the riparian habitats of the river banks and levees.

Five nests were found between 3 June and 19 July: 4 at Brisco and 1 at Spillimacheen. All of the nests were in mountain alder on branches that were overhanging water. Nest heights above the water ranged from 1.4 to 2.5 m. Of the 3 nests checked, all had young (3Y-2; 2Y-1).

Cassin's Vireo

Vireo cassinii Xantus

Cassin's Vireo was recorded at both the Wilmer and Brisco units between 25 May and 19 July. It frequented the open Douglas-fir forests, lowland deciduous forests of Horsethief Creek fan and the river banks and levees, and deciduous draws. It was the least common of the vireos.

Warbling Vireo

Vireo gilvus (Vieillot)

The Warbling Vireo was seen or heard on all the units of the NWA but Harrogate. It was fairly common, recorded from 29 May to 19 August, although all but 1 report occurred before 19 July. It was most often found in the deciduous lowland forests of the Horsethief Creek fan and the river banks.

Red-eyed Vireo

Vireo olivaceus (Linnaeus)

This vireo was reported from 3 June to 23 August at all the units of the NWA. It was found in habitat similar to that of the Warbling Vireo and occurred in similar numbers.



Figure 71. Eastern Kingbird on nest with two young in a mountain alder, Brisco Unit, 18 July 2004.

Clark's Nutcracker

Nucifraga columbiana (Wilson)

On 17 August, an individual Clark's Nutcracker was recorded on the Wilmer Unit of the NWA near Dead Dog Bluff.

Black-billed Magpie

Pica hudsonia (Sabine)

The Black-billed Magpie was seen on all units but Harrogate between 26 May and 26 August. Largest numbers: 13 July-12; 26 May-10. The magpie was found associated mainly with riparian edges of Goose Lake including those associated with Eagle Island.

American Crow

Corvus brachyrhynchos Brehm

We have only 3 records of this crow, 2 from Wilmer, both in late August and one from Spillimacheen in early June.

Common Raven

Corvus corax Linnaeus

The Common Raven occurred sporadically at Wilmer from 26 May through 26 August. We have one record from Harrogate on 20 August.

On 1 June a nest with an unknown number of young was found on the Wilmer Unit; it was constructed of coarse sticks in a large Douglas-fir. On 6 June, an old or abandoned nest was found in a small cave in the Wilmer Bluffs (Figure 72).



Figure 72. An old, abandoned Common Raven nest cave in Wilmer Bluffs (left; centre of image) and close up of nest in the cave (right), Wilmer Unit, 6 June 2004.

Tree Swallow

Tachycineta bicolor Vieillot

The Tree Swallow was recorded sporadically on all units but Harrogate from 25 May through 20 July.

On 14 July, a nest cavity with at least 1 young was found on the Spillimacheen Unit, about 12 m from the ground in a black cottonwood snag.

Violet-green Swallow

Tachycineta thalassina Swainson

We have 2 records of the Violet-green Swallow: 1 and 2 June—an individual flying along the bluffs at the Wilmer Unit of the NWA.

Northern Rough-winged Swallow

Stelgidopteryx serripennis (Audubon)

The Northern Rough-winged Swallow was commonly recorded from 26 May through 19 August only from the Wilmer and Brisco units of the NWA. It was regularly seen foraging along the Wilmer Bluffs or perched along the riparian habitats of the river banks and the along the shoreline of Goose Lake.

On 26 May and 2 June, individual swallows on the Wilmer Unit were observed carrying nesting material into separate nest burrows in a bank. On 3 June at Brisco, a nest burrow was found in a bank about 1 m above the river.



Figure 73. Active Bank Swallow colony just north of Walker's Point on the Wilmer Unit, 2 June 2004 (left) and an old abandoned colony in the Wilmer Bluffs with Walker's Point in the centre background, 1 June 2004 (right).

Bank Swallow

Riparia riparia (Linnaeus)

The Bank Swallow was recorded only on the Wilmer Unit from 2 June through 20 July.

A colony of at least 50 birds was found in a silt-clay bank at the small point just north of Walker's Point. On 2 June the birds were in the early stages of nesting (Figure 73); on our 17 August visit all swallows had gone from the colony. On 2 June, Bank Swallows were also seen inspecting burrow entrances in a cliff on Eagle Island. An old, abandoned colony was still evident on the Wimer Bluffs (Figure 73).

Cliff Swallow

Petrochelidon pyrrhonota (Vieillot)

We have 2 records of the Cliff Swallow: 1 June-1 flying along the Wilmer Bluffs and 3 June-6 gathering mud from the shoreline on the Brisco Unit.

Black-capped Chickadee

Poecile atricapillus (Linnaeus)

The Black-capped Chickadee was a common species over the study period, found on all the units of the NWA. It was most often associated with the lowland deciduous forests and draws.

Mountain Chickadee

Poecile gambeli (Ridgeway)

With the exception of a bird seen at Harrogate on 20 August, all records are from the Wilmer Unit. This chickadee was fairly common in the open Douglas-fir forest and the lowland deciduous forest and draws throughout the study period.

Red-breasted Nuthatch

Sitta canadensis Linnaeus

The Red-breasted Nuthatch was seen and heard sporadically throughout the study period on the Wilmer Unit. It was found most often in the open Douglas-fir forest and the closed canopy, north slope forest. We have 1 record from Spillimacheen on 14 July.

On 30 May, this nuthatch was seen excavating a cavity in a paper birch just outside the NWA boundary at Wilmer (Figure 74).



Figure 74. Red-breasted Nuthatch excavating a nest cavity in a paper birch near the Wilmer Unit, 30 May 2004. The cavity entrance is just behind the bird; note an old cavity in the lower left of the image, below the bird.

House Wren

Troglodytes aedon Vieillot

On 30 May, 1 was heard on the Wilmer Unit in the lowland deciduous forest.

Marsh Wren

Cistothorus palustris (Wilson)

The Marsh Wren was a fairly common species in the NWA marshes at Wilmer throughout the study period. It was primarily associated with the *Typha* stands.

On 16 July, an adult was seen feeding recently-fledged young on the Beaver Run levee.

Ruby-crowned Kinglet

Regulus calendula Linnaeus

The Ruby-crowned Kinglet was fairly common in the open Douglas-fir forest and lowland deciduous forest and draws of the Wilmer Unit from 27 May to 15 July. We have 2 records from Brisco: 3 June-1 and 19 July-1.

Mountain Bluebird

Sialia currucoides (Bechstein)

We have 1 record of this species from the Wilmer Unit of the NWA; a female was flushed from a nestbox on 27 May; the male was seen nearby.



Figure 75. American Robin on nest, which had been constructed between two trembling aspens on Horsethief Creek fan of the Wilmer Unit, 30 May 2004.

Veery

Catharus fuscescens (Stephens)

The Veery was heard singing at the Wilmer and Spillimacheen units between 4 June and 20 July. All records were from the lowland deciduous forest adjacent to the Columbia River.

Swainson's Thrush

Catharus ustulatus (Nuttall)

This thrush was commonly heard or seen on all units of the NWA throughout the study period. It was most often heard in the lowland deciduous forest on the Horsethief Creek fan or along the river. Occasionally it was found in the deciduous draws of the Wilmer Unit.

On 15 July a young of the year was seen on the Wilmer Unit.

American Robin

Turdus migratorius Linnaeus

The American Robin was a common bird on all units of the NWA over the study period. The robin was most often recorded from the lowland deciduous forest and draws.

Three nests were found: 30 May-female on nest that was built at the intersection of 2 aspen trees (Figure 75); 3 June-an abandoned nest in a water birch overhanging river bank at Brisco contained 2 eggs, 1 had been preyed upon; 14 July-nest with 5 eggs in a black cottonwood was found at Spillimacheen. The nests ranged in height from 1.5 to 5 m.

Gray Catbird

Dumetella carolinensis (Linnaeus)

The Gray Catbird was occasionally seen or heard in suitable habitat at the Wilmer, Brisco, and Spillimacheen units over the study period. It was found amongst the riparian shrub habitat along the river banks.

European Starling

Sturnus vulgaris Linnaeus

We have 2 records of this species: 26 May and 2 June, both from the Wilmer Unit of the NWA.

Cedar Waxwing

Bombcilla cedrorum Vieillot

The Cedar Waxwing was a common species on all units of the NWA from 2 June to 23 August. This species was most often reported from the deciduous draws and lowland deciduous forest on the Horsethief Creek fan and the riparian habitats along the Columbia River banks.

Orange-crowned Warbler

Vermivora celata (Say)

Seen or heard sporadically throughout the study period on the Wilmer Unit; seen once at Harrogate on 20 August.

Yellow Warbler

Dendroica petechia (Linnaeus)

The Yellow Warbler was, by far, the most common warbler occurring on every unit of the NWA between 25 May and 23 August. It was found in the lowland deciduous forest and scrub willow thickets of the Horsethief Creek fan but especially amongst the riparian vegetation along the Columbia River.

Yellow-rumped Warbler

Dendroica coronata (Linnaeus)

The Yellow-rumped Warbler was fairly common on the Wilmer Unit throughout the study period; it was recorded once at Spillimacheen on 4 June. This warbler was found in the north aspect, closed canopy forests, deciduous draws, the lowland deciduous forest and occasionally in the riparian willow thickets and open Douglas-fir forest, including Goose Island.

Townsend's Warbler

Dendroica townsendi (Townsend)

This warbler was recorded only twice, both observations from the Wilmer Unit: on 17 and 26 August.

American Redstart

Setophaga ruticilla (Linnaeus)

The redstart was recorded only at Wilmer and Brisco between 3 and 8 June in the riparian habitat along the river.

Northern Waterthrush

Seiurus noveboracensis (Gmelin)

The Northern Waterthrush was recorded between 3 June and 19 July, primarily from the Brisco and Spillimacheen units. It was recorded once at Wilmer on 8 June. It was found only in the riparian habitats along the Columbia River banks.

Common Yellowthroat

Geothlypis trichas (Linnaeus)

The Common Yellowthroat was reported only from the Wilmer Unit between 25 May and 20 July. It was found in the marsh habitats of Goose Lake including those along the Beaver Run levees, and the marshes on the Horsethief Creek fan.

Wilson's Warbler

Wilsonia pusilla (Wilson)

This warbler was seen sporadically between 27 May and 14 July on the Wilmer, Spillimacheen, and Brisco units of the NWA. It was found in the aspen draws and the riparian habitats along the river.

Western Tanager

Piranga ludoviciana (Wilson)

The Western Tanager was seen or heard spordically throughout the study period on all but the Spillimacheen Unit of the NWA. It was found in the open Douglas-fir forest, deciduous draws, and the lowland deciduous forest along the Columbia River.

Chipping Sparrow

Spizella passerina (Bechstein)

All but 2 records for this species were from the Wilmer Unit; we recorded Chipping Sparrows from



Figure 76. Chipping Sparrow nest with eggs on the Wilmer Unit, 27 May 2004. The nest was in a Rocky Mountain Juniper.

Brisco twice on 3 June. This sparrow was very common from 25 May through 7 June, after which time we have only 1 record. The Chipping Sparrow was found most often in the dry, open Douglas-fir forest followed by the open grassland habitats. It was occasionally found in the lowland deciduous forest.

Four nests were found: 1) 27 May-adult flushed from nest with 2 eggs in *Juniperus scopulorum* (Figure 76); 2) 28 May-nest under construction in *Juniperus scopulorum*, adult nearby with hair in bill; 3) 7 June-nest with 4 eggs found in *Juniperus horizontalis*; 4) 12 July-nest with 4 eggs in *Rosa nutkana* shrub amongst branches. Two nest heights were between 60 and 100 cm.

Clay-colored Sparrow

Spizella pallida (Swainson)

The Clay-colored Sparrow occasionally was seen and heard from 25 May to 8 June, mainly on the



Figure 77. Clay-colored Sparrow on the Horsethief Creek meadow of the Wilmer Unit, 2 June 2004.



Figure 78. Vesper Sparrow nest with eggs (lower left of image) on the Wilmer Unit, 27 May 2004. The nest was under a common rabbit-brush shrub.

Horsethief Creek meadow near the creek. It was also heard along the south edge of Ritchie's Point.

Vesper Sparrow

Poocetes gramineus (Gmelin)

The Vesper Sparrow was a fairly common species recorded only on the Wilmer Unit between 27 May and 13 July. It was most often found in the grassland and open Douglas-fir forests.

On 27 May an adult was flushed from a ground

nest with 4 eggs; the nest was located under an *Ericameria nauseosa* shrub (Figure 78).

Savannah Sparrow

Passerculus sandwichensis (Gmelin)

The Savannah Sparrow was seen once during spring migration (28 May-2 birds at Wilmer) and 4 times during autumn migration (19 August-3 birds in separate locations at Wilmer; 21 August-1 bird at Spillimacheen).

Song Sparrow

Melospiza melodia (Wilson)

This was the most commonly found sparrow on all the units of the NWA throughout the study period. It was most often found in the lowland forest, especially along the river banks, and the scrub willow habitats of the levees and the Horsethief Creek fan. It was occasionally found in the draws and north aspect, closed forest; rarely in the open Douglas-fir forest or grasslands.

At Wilmer, an adult with recently-fledged young was seen on 26 May and on 16 July an adult was seen feeding a recently-fledged Brown-headed Cowbird. On 3 June at Brisco, a nest with 4 Song Sparrow eggs and 2 Brown-headed Cowbird eggs was found in a clump of reed canary grass (Figure 79).



Figure 79. Song Sparrow nest with 4 sparrow eggs and 2 Brown-headed Cowbird eggs in a reed canary grass clump on the Brisco Unit, 3 June 2004.

Dark-eyed Junco

Junco hyemalis (Linnaeus)

All records for this species, with the exception of 1 from Brisco on 3 June, were from the Wilmer Unit of the NWA. The junco was fairly common from 25 May through 7 June after which we have but 2 records. The Dark-eyed Junco was most frequently found in the open Douglas-fir forest. All observations were of the Oregon race.

On 6 June an agitated junco was seen, suggesting a nest or young nearby.

Black-headed Grosbeak

Pheucticus melanocephalus (Swainson)

The Black-headed Grosbeak was an uncommon species found on all but the Harrogate Unit of the NWA. All records occurred between 25 May and 19 July. This species frequented the lowland deciduous forest and riparian habitats, especially along the river banks.

Red-winged Blackbird

Agelaius phoeniceus Linnaeus)

The Red-winged Blackbird was recorded only from the Wilmer and Brisco units of the NWA. It was a fairly common species throughout the study period and was closely associated with the marsh habitats of the NWA.

Some nesting birds were noted in the marshes along the Wilmer Slough on 2 June and on 20 July, a female was seen feeding 4 fully-fledged young that were following her around.

Western Meadowlark

Sturnella neglecta Audubon

On 27 May, a male was found singing along the north edge of Ritchie's Point on the Wilmer Unit of the NWA. His agitated behaviour suggested a possible nest in the area. This was our only record for this species.

Yellow-headed Blackbird

Xanthocephalus xanthocephalus (Bonaparte)

This was an uncommon species throughout the study period. It was found on all but the Harrogate Unit of the NWA and was associated with marsh habitats. Largest numbers: 19 August-12; 26 August-28, both from Wilmer.

On 8 June, 2 nests at Wilmer, consisting of deep cups of dead *Schoenoplectus* woven to living *Schoenoplectus*, held 2 and 4 eggs, respectively.

Brown-headed Cowbird

Molothrus ater (Boddaert)

The cowbird was a common species on the NWA between 26 May and 19 July; it was recorded from all but the Harrogate Unit. It was found mainly in the open Douglas-fir forest.

The Song Sparrow was the only cowbird host we recorded.

Bullock's Oriole

Icterus bullockii (Swainson)

We have 3 records of this species: 26 May-1 male singing in top of cottonwoods at Wilmer; 3 June-2 separate males singing in riparian habitats along the river.

Baltimore Oriole

Icterus galbula (Linnaeus)

We have 4 records of the Baltimore Oriole: 25 May, 30 May, 2 June, all individual males at Wilmer; and 3 June- 1 male at Brisco. Campbell et al. (2001) note that the "Baltimore and Bullock's orioles may occur sympatrically in the Rocky Mountain Trench near Nicholson," and our records appear to support their statement, extending the zone of sympatry some 100 km south.

Pine Siskin

Carduelis pinus (Wilson)

An uncommon species recorded between 1 June and 26 August 4-times from Wilmer and once from the Brisco unit.

MAMMALIA

We recorded a total of 17 species of mammals on the Columbia National Wildlife Area, including 1 SARA species. Two species of domestic mammals were also recorded on the NWA from the Wilmer Unit.

Domestic Cattle

Bos primigenius (Linnaeus)

We recorded domestic cattle or their sign on the Wilmer Unit of the NWA a number of times. In a number of places, particularly along the edge of Goose Lake considerable damage to the habitat is taking place (Figure 80).

Moose

Alces alces (Linnaeus)

We found some moose sign such as winter browsing activity in the form of bent over and clipped, willow stems and old, dried droppings at the Wilmer and Harrogate units.

Elk

Cervus canadensis (Erxleben)

Elk sign, in the form of hoof prints on river bars, winter pellets, and antler rubbings were found on all but the Brisco Unit of the NWA. Elk sign was most common in the open Douglas-fir



Figure 80. Domestic cattle inside the NWA fencing on the Wilmer Unit (left) and an example of the damage cattle were doing to the vegetation along the shore of Goose Lake (right), 13 July 2004. Damage from cattle was also noted in the drier habitats where erosion caused by the cattle was evident.

forest and grassland of the Wilmer Unit, including Eagle Island.

Mule Deer

Odocoileus hemionus (Rafinesque)

One mule deer was seen on 26 August on the Wilmer Unit of the NWA.

White-tailed Deer

Odocoileus virginianus (Zimmermann)

We have 4 records of White-tailed Deer from Wilmer (30 May-1), Spillimacheen (4 June-1), and Harrogate (23 August-2) units of the NWA. In addition, evidence in the form of tracks and droppings was abundant.

Coyote

Canis latrans Say

Coyote evidence was found on all units of the NWA, principally tracks in the silt and sands of river bars. On 30 May, we found a Coyote skull on the Wilmer Unit and later, on 23 August, while we were sitting on some logs eating lunch along the river flats at Harrogate, a Coyote trotted up to within less than 100 m of us oblivious of our presence. Once it had seen us, it promptly took off in the direction from which it had just come.

North American River Otter

Lontra canadensis (Schreber)

On 26 May, otter scat was found on the Wilmer Unit along the edge of the Beaver Run levee.

Short-tailed Weasel

Mustela erminea Linnaeus

The carcass of a Short-tailed Weasel was found on the road edge of the Spillimacheen Unit on 14 July 2004.

American Badger

Taxidea taxus (Schreber)

We found a number of older badger diggings on the Wilmer Unit of the NWA but no recent ones; however, Nancy Newhouse and Trevor Kinley (personal communication) found 2 recent burrows on a specific search for badgers on the NWA in 2004. The American Badger is a SARA species with Endangered status.

Northern Raccoon

Procyon lotor (Linnaeus)

On 21 August, raccoon tracks were recorded on a silt bar at the east end of a pond on the Spillimacheen Unit.

American Black Bear

Ursus americanus Pallas

Black bear sign, in the form of tracks and droppings, were found on the Brisco, Spillimacheen, and Harrogate units of the NWA over the study period.

Domestic Horse

Equus caballus Linnaeus

Old (wintering?) domestic horse sign was evident on the Wilmer Unit of the NWA, especially on Ritchie's Point and the open forested area north of Ridge Trail. Evidence was also found on Eagle Island.

American Beaver

Castor canadensis Kuhl

American Beaver sign, in the form of lodges, dams, and cuttings, was very common on all units of the NWA over the study period.

Muskrat

Ondatra zibethicus (Linnaeus)

We have 3 observations of muskrat on the Wilmer Unit of the NWA: 26 May-1 and 2 June-2.

Yellow-Pine Chipmunk

Neotamias amoenus Allen

On 24 August, a Yellow-Pine Chipmunk was recorded amidst some discarded junk in the open Douglas-fir forest of the Wilmer Unit (Figure 81).

Columbian Ground-Squirrel

Spermophilus columbianus (Ord)

The Columbian Ground-Squirrel was regularly seen on the Wilmer Unit of the NWA from 1 June to 15 July adjacent to the access road just after entering the southwest corner of the Wilmer Unit (Figure 82). Hundreds of old and recent burrows, were found in this area. The majority were located west of the access road. Nancy Newhouse and Trevor Kinley (personal communication) found 417 recent burrows during a specific search for these ground-squirrels in 2004. There were also at least 100 burrows on the



Figure 81. Yellow-Pine Chipmunk amidst discarded junk on the Wilmer Unit of the NWA, 24 August 2004.

Harrogate Unit in an alfalfa field adjacent to the highway. One animal was seen on 14 July along the road that cuts through the Spillimacheen Unit

This species is a favoured prey item of the American badger (Kinley and Newhouse 2008).

Red Squirrel

Tamiasciurus hudsonicus (Erxleben)

The Red Squirrel was a fairly common small mammal of the NWA and was heard or seen or its sign was evident on all the NWA units over the study period.



Figure 82. Columbian Ground-Squirrel at burrow entrance on the Wilmer Unit of the NWA, 24 August 2004.

Literature Cited

- American Ornithologists' Union. 2012. Check-List of North American Birds. <<http://www.aou.org/checklist/north/full.php>>. Accessed 28 Feb 2012.
- Anonymous. 2006. IDfxk March 2006.indd. <<http://www.docstoc.com/docs/74412842/IDfxk-March-2006indd>>. Accessed 22 Feb 2012.
- Anonymous. 2012. Picasa. <<http://picasa.google.com/>>. Accessed 27 Feb 2012.
- Beccaloni, G., M. Scoble, L. Kitching, T. Simonsen, G. Robinson, B. Pitkin, A. Hine, and C. Lyal. (Eds.). 2003. The Global Lepidoptera Names Index (LepIndex). World Wide Web electronic publication. <<http://www.nhm.ac.uk/research-curation/research/projects/lepindex/>>. Accessed 29 Feb 2012.
- Braumandl, T. F., M. P. Curran, British Columbia. Ministry of Forests., and British Columbia. Forest Science Program. 2002. A field guide for site identification and interpretation for the Nelson Forest Region. British Columbia, Ministry of Forests, Forest Science Program, Victoria. <<http://www.for.gov.bc.ca/hfd/pubs/Docs/Lmh/Lmh20-p1.pdf>>. Accessed 6 Feb 2012.
- Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. The birds of British Columbia: Volume I, Nonpasserines, Introduction and Loons through Waterfowl. Royal British Columbia Museum; Environment Canada, Canadian Wildlife Service, Victoria, B.C.; [Ottawa, Ont.].
- Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, A. C. Stewart, and M. C. E. McNall. 2001. The birds of British Columbia: Volume IV, Passerines, Wood-warblers through Old World Sparrows. UBC Press, Vancouver, BC.
- Cannings, R. A. 2002. Introducing the dragonflies of British Columbia and the Yukon. Royal British Columbia Museum,, Victoria, B.C.
- Conservation Data Centre. 2012. BC Species and Ecosystems Explorer. <<http://a100.gov.bc.ca/pub/eswp/>>. Accessed 19 Mar 2012.
- Crother, B. I., (ed.). 2008. Scientific and Standard English Names of Amphibians and Reptiles of North America North of Mexico. SSAR Herpetological Circular 37. <http://www.ssarherps.org/pages/comm_names/Index.php>. Accessed 23 Jul 2012.
- Douglas, G. W., G. B. Straley, D. V. Meidinger, and J. Pojar. (Eds). 1998. Illustrated flora of British Columbia. Eight volumes. Ministry of Environment, Lands and Parks, Victoria.
- Environment Canada. 2012. Climate Data Online | Canada's National Climate Archive. National Climate Data and Information Archive. <http://climate.weatheroffice.gc.ca/climateData/canada_e.html>. Accessed 7 Feb 2012.
- Glassberg, J. 2001. Butterflies through binoculars/: the West/: a field guide to the butterflies of western North America. Oxford University Press, Oxford; New York, N.Y.
- Google Earth. 2012. Google Earth. <<http://www.google.com/earth/index.html>>. Accessed 6 Feb 2012.
- ITIS. 2012. Integrated Taxonomic Information System. <<http://www.itis.gov/>>. Accessed 29 Feb 2012.
- Jamieson, B., M. Thomas, T. Kinley, and M. Worgan. 2009. A Management Strategy For Species At Risk In A Semi-Urban Landscape On The Shuswap Reserve Lands At Invermere, B.C. Kinbasket Development Corporation And The Shuswap Indian Band, Invermere, B.C. <http://www.shuswapband.net/_pdfs/docs/Shuswap_Species_at_Risk.doc>. Accessed 24 Feb 2012.
- Keller, R. A. 1978. Geomorphology and Botany of the Wilmer National Wildlife Area. Unpublished Report, Canadian Wildlife Service, Delta, B.C.
- Kinley, T. A., and N. J. Newhouse. 2008. Ecology and Translocation-Aided Recovery of an Endangered Badger Population. *Journal of Wildlife Management* 72:113–122.
- Klinkenberg, B. (Ed. 2012. E-Flora BC: Electronic Atlas of the Plants of British Columbia [eflora.bc.ca]. Lab for Advanced Spatial Analysis, Department of Geography, University of British Columbia, Vancouver. <<http://www.geog.ubc.ca/biodiversity/eflora/>>. Accessed 29 Feb 2012.
- Machmer, M., and C. Steeger. 2004. Great Blue Heron Breeding Inventory and Habitat Assessment in the Columbia River Basin. *Columbia Basin Fish &*

- Wildlife Compensation Program, Nelson, BC. <http://www.fwpcolumbia.ca/version2/reports/pdfs/Great_Blue_Heron_Breeding_Inventory_and_Habitat_Assessment.pdf>. Accessed 13 Aug 2012.
- Simpson, K., and J. P. Kelsall. 1978. The Wilmer National Wildlife Area; Wildlife and Habitats. Unpublished Report, Canadian Wildlife Service, Delta, B.C.
- USDA, NRCS. 2012. The PLANTS Database. National Plant Data Team, Greensboro, NC 27401-4901 USA. <<http://plants.usda.gov/java/>>. Accessed 29 Feb 2012.
- Water Survey of Canada. 2012. Water Survey of Canada - Archived Hydrometric Data. Environment Canada. <<http://www.wsc.ec.gc.ca/applications/H2O/index-eng.cfm>>. Accessed 2 Mar 2012.
- Wilson, D. E., and D. M. Reeder. (Eds.). 2005. Mammal species of the world/: a taxonomic and geographic reference. Johns Hopkins University Press, Baltimore. Also online at: <<http://www.vertebrates.si.edu/msw/mswcfapp/msw/index.cfm>>. Accessed 29 Feb 2012.

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