
Some aspects of the ecology of the Vaseux-Bighorn National Wildlife Area

With emphasis on Species at Risk

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Pacific and Yukon Region 2004
Canadian Wildlife Service
Environmental Conservation Branch



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This report may be cited as:

Dawe, N.K., R. Buechert, A.C. Stewart, J. Penny, K.A. Brock, and F. Russell. 2004. Some aspects of the ecology of Vaseux-Bighorn National Wildlife Area with emphasis on species at risk. Unpublished. Canadian Wildlife Service, Pacific and Yukon Region, British Columbia.

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Cover Mosaic (clockwise from upper-left): Canyon Wren, Bighorn Sheep, Thick-leaved Thelypody, Yellow-headed Blackbird, Western Painted Turtle, Vaseux Lake panorama from the Southeast Unit looking west, First Nation pictographs on the West Unit, Behr's Hairstreak, Northern Pacific Rattlesnake, Bitterroot (*all images 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 2003 gathering inventory data (with special reference to species at risk) on the Vaseux-Bighorn National Wildlife Area. Our focus was on vascular plants and vertebrates, particularly birds.

We recorded a total of 5 species of fungi, 260 species of plants, 30 species of invertebrates, 5 fish species, 2 amphibian species, 8 reptile species, 132 bird species, and 17 species of mammals on the Vaseux-Bighorn National Wildlife Area over the period May through the end of August, 2003. All these species are listed taxonomically with annotations and form the main body of this report.

Seven COSEWIC species (Behr's Hairstreak, Great Basin Spadefoot, Northern Pacific Rattlesnake, Desert Nightsnake, Great Basin Gophersnake,

Lewis's Woodpecker, Nuttall's Cottontail), 7 provincially Red-listed species (Short-rayed Aster, Columbia Goldenweed, Blue Vervain, Behr's Hairstreak, Desert Nightsnake, American White Pelican, Double-crested Cormorant), and 22 Blue-listed species (Big-leaf Sedge, Bearded Sedge, Porcupine Sedge, Fox Sedge, Richardson's Penstemon, Thick-leaved Thelyopody, California Hairstreak, Great Basin Spadefoot, Western Skink, Western Yellow-bellied Racer, Northern Pacific Rattlesnake, Great Basin Gophersnake, Western Painted Turtle, American Bittern, Great Blue Heron, Sandhill Crane, Caspian Tern, White-throated Swift, Lewis's Woodpecker, Canyon Wren, Bighorn Sheep, Nuttall's Cottontail) were found on the Vaseux-Bighorn National Wildlife area. We also found 3 Red-listed plant communities (antelope-brush – needle-and-thread grass, water birch – red-osier dogwood, bluebunch wheatgrass – arrow-leaved balsamroot) and 1 Blue-listed plant community (ponderosa pine – bluebunch wheatgrass) on the NWA.

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Acknowledgements

We thank the following people who helped throughout various phases of this study: Adolf Ceska and S. Frank Lonmer provided their expert opinions on a number of the plants we collected and photographed.

Marta Donovan, Conservation Data Centre provided the Red and Blue list shape files.

Orville Dyer, Ministry of Water, Land and Air Protection, Penticton, provided helpful advice about the Vaseux area. Of special import was his telephone call shortly after the senior author's arrival telling of a nightsnake capture which allowed NKD to see and photograph this beautiful animal.

Andrew Harcombe, Conservation Data Centre, provided substantial support by providing Stewart, Penny, and Russell with field-time to aid in the inventories.

Jim Hope and Carl MacNaughton, The Nature Trust of British Columbia, facilitated our summer "field camp." MacNaughton also took time from his busy schedule to freely share with us his extensive knowledge of the Vaseux Lake area.

Ted Lea, Ministry of Water, Land and Air protection, Victoria, provided his unpublished report, which

describes the biophysical habitat classes. He also provided the GIS theme for the biophysical habitat classes.

Stephen Hureau and Steven Shisko, Canadian Wildlife Service, provided logistical support in the early stages of the project.

Dave Smith, Canadian Wildlife Service, accompanied the senior author on the initial visit to the National Wildlife Area and helped with setting up the summer quarters and counting the nesting Canada Geese on Hatfield's Island.

Jim Long, local rancher, generously provided access to the West Unit of the National Wildlife Area through his property.

Dave Nagorsen, Mammalia Biological Consulting, offered his expert opinion on some of our small mammal identifications.

Mike Sarell, Ophiuchus Consulting, kindly shared some of his extensive knowledge of the reptiles of the Vaseux Lake area.

Lisa Scott provided us with information on Columbian Goldenweed.

Chris Charlesworth provided us with some bird information from his field notes and the Okanagan Valley (BC) Rare Bird Alert.

Introduction

On 5 June 2003, the Species At Risk Act (SARA) was proclaimed into law. 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 gathering inventory data, with special reference to species at risk, on the Vaseux-Bighorn National Wildlife Area.

Study Area

The Vaseux-Bighorn National Wildlife Area (Figure 2) is situated in the southern Okanagan valley some 25 km south of Penticton and 13 km north of Oliver, British Columbia. It is situated on both sides of Vaseux Lake, a federal Migratory Bird Sanctuary.

Lying in the rain shadow of the Coast and Cascade mountains, the Okanagan valley contains some of the warmest and driest areas of the province. The

mean annual precipitation at Oliver (Station 1125760) is 313 mm (n=30) of which a mean of 25 cm falls as snow (Environment Canada 2000). Although temperatures at Oliver have reached extremes of 42.8° C in summer (27 July 1939) and -30.6° C in winter (18 January 1950; 3 February 1950), the mean maximum summer temperature (June-August) is 27.8° C (n=38) and the mean minimum winter temperature (January-March) is -3.3° C (n=38).

Keller (1977) and Cannings et al. (1987) give interesting summaries of the formation and geology of the valley. The valley was eroded and modified by the Okanagan lobe of a large piedmont glacier. At the close of the Pleistocene, some 10,000 years ago, the glacier melted in a downward fashion, leaving large masses of stagnant ice in the main valley. Many of the landforms we see here today resulted in this deglaciation period when outwash terraces, kettled topography (Figure 1), and meltwater channels were formed.

In recent times, new floodplains and alluvial fans have been created by the Okanagan River and smaller streams. For example, the orchards adjacent to Highway 97 on the southeastern shore of Vaseux Lake appear to be situated on the Irrigation Creek alluvial fan. Vaseux Lake is also a recent feature, having been created when the alluvial fan formed by Vaseux Creek partially dammed the Okanagan River, at one of the narrowest stretches of the valley. At the southwestern end of Vaseux Lake,



Figure 1. Vaseux Lagoons near the Vaseux Lake outlet are partially submerged kettles formed during the last glaciation when blocks of ice were buried under outwash sediments. The photograph was taken from the Southeast Unit, Vaseux-Bighorn National Wildlife Area (29 June 2003).

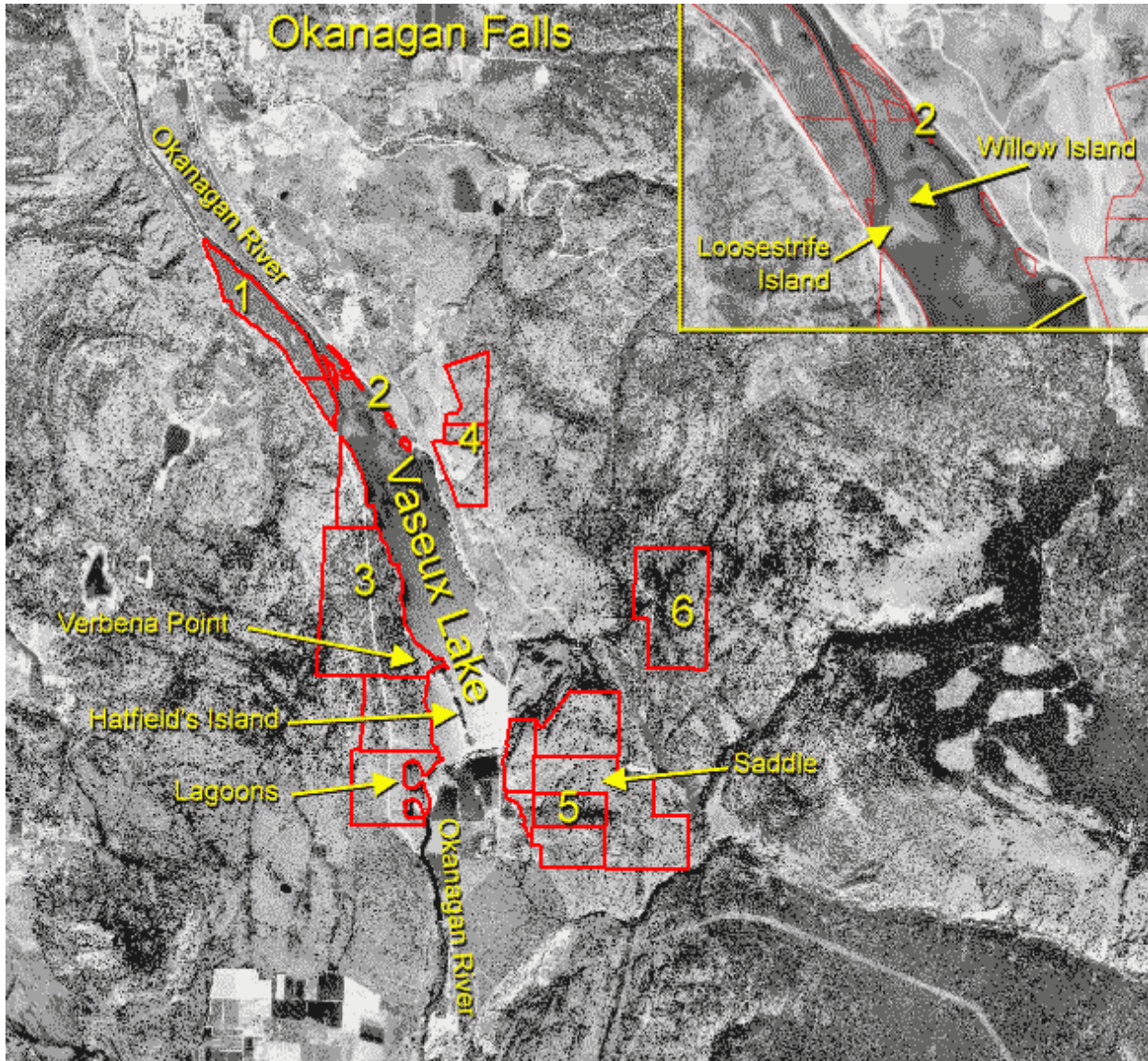


Figure 2. The Vaseux-Bighorn National Wildlife Area showing the six units of the national wildlife area outlined in red: 1) Northwest Marsh, 2) Northeast Riparian, 3) West, 4) Northeast, 5) Southeast, and 6) Irrigation Creek. Some place names mentioned in the text are also shown.

2 lagoons, formed as the kettled outwash was subsequently flooded, lie adjacent to the river (Figure 1).

The wildlife area lies within the Okanagan Basin ecoregion (Southern Interior ecoprovince) through which the Okanagan River flows. Today the river has been severely channelized and no longer meanders its way through the valley bottom, except for a small stretch just south of Vaseux Lake.

The wildlife area consists of a number of contiguous and separate lots (Retfalvi 1986) forming 6, geographically defined units that lie on both sides of Vaseux Lake and at the north end of the lake (Figure 2). For convenience, we have named them

(from west to east) as follows: Northwest Marsh Unit, Northeast Riparian Unit, West Unit, Northeast Unit, Southeast Unit, and Irrigation Creek Unit.

Vegetation of the NWA ranges from the cattail and bulrush marshes and riparian habitats of the creek, slough, and lake edges to the drier open grasslands and rocky bluffs and outcrops. The NWA lies within 2 major biogeoclimatic zones, the hottest and driest zone in the province (Lloyd et al. 1990a), the Bunchgrass zone (BG) and the Ponderosa Pine Zone (PP). On the NWA, these zones are represented by 2 variants. The Okanagan Very Dry Hot Bunchgrass variant (BGxh1) extends from the Vaseux Lake edge at 326 m elevation to around 560

m elevation on parts of the Southeast Unit. The Okanagan Very Dry Hot Ponderosa Pine Variant (PPxh1), extends from around 360 m elevation on the West Unit to 820 m elevation in the Southeast and Irrigation Creek units.

The BGxh1 zone on the NWA is characterized by grasslands of Bluebunch Wheatgrass and Needle-and-thread Grass; Antelope-brush dominates the shrub layer. Common Rabbit-brush, Pasture Sage, Prickly-pear Cactus and scattered Ponderosa Pine also occur in the zone. Big Sagebrush occurs sporadically on some of the upper benches. Because the area is only just starting to recover from overgrazing, Bluebunch Wheatgrass often has low cover. Cheatgrass and Dalmation Toadflax are common invasive species. Compact Selaginella dominates the rocky outcrops. Riparian habitats are dominated by Water Birch, Mountain Alder, and willow species with Nootka Rose and Red-osier Dogwood also occurring. Wetlands are dominated by Common Cattail, Hard-stemmed Bulrush and sedges. Purple Loosestrife is a common invasive species.

The PPxh1 zone is characterized by open, parkland stands of Ponderosa Pine with a minor component of Douglas-fir. Bluebunch Wheatgrass and fescues dominate the herb layer with some Arrow-leaf Balsamroot occurring. In the drier sites, Bluebunch Wheatgrass and Antelope-brush can occur along with Common Rabbit-brush while the cooler, north-facing slopes often have Douglas-fir with Tall Oregon-grape and Pinegrass. In wetter sites, Trembling Aspen, Saskatoon, willow species, and Water Birch occur.

A diversity of habitat types occurs on the NWA

that attracts a wide and diverse fauna. Included are some of the Great Basin fauna that extends into the Okanagan valley from the dry plateaus and valleys of the western United States (Cannings et al. 1987). Thus the Okanagan valley supports the highest number of breeding bird species in the province (Cowan et al. 2001; Cannings et al. 1987) and is one of the most biodiverse regions in Canada.

The first European settlers of the early 1800s and the people who came after them left a legacy of, among other things, filled wetlands, overgrazed grasslands, and a channelized river, which lie as a stark contrast to the legacy of the aboriginal peoples that used the lands surrounding Vaseux Lake. Pictographs drawn by the Okanagan aboriginal peoples occur in a number of places on the NWA. One of the largest sites is on the West Unit above the 2 lagoons. The site faces east, which is, apparently, a most uncommon setting for pictographs (Corner 1968). Corner calls this site 'Three Winged Bird' the panel of which is 5 m high by 30 m long (Figure 3).

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, primarily on foot or, where necessary, by canoe.

Preparatory work began by obtaining rare element occurrence records from the BC Conservation Data Centre. These records included species at risk known from the study area as well as those known from the region. These preliminary records were sorted according to the phenology of the species so



Figure 3. Pictographs from the 'Three-winged Bird' panel on the Vaseux-Bighorn National Wildlife Area (10 May 2003). This site on the West Unit of the NWA, faces east which is an uncommon setting for Okanagan pictographs.

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, biophysical habitat classes of most of the NWA had previously been prepared (Lea and Maxwell, unpublished) and we used these data in ArcView® layered with orthophotos of the NWA 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 lakeshore and forested riparian areas were also identified as possible sites for rare plants. Detailed inspections of the entire study area were not possible, so search effort was focussed on those areas with a higher probability of finding species at risk based on the data we had at hand.

Greater success in the field came about when habitats believed to support rare species were visited more than once during the study. Important but much less successful was re-visiting known rare plants sites. When we focussed our field day on surveying animals, we might encounter and thus record a rare plant; likewise a plant survey might encounter a rattlesnake which would also be recorded.

During the searches, all plant and animal species we encountered were recorded along with other useful information such as the organism's sex, location, and flowering stage, for example. Organisms that could not be readily identified in the field were photographed or collected, for later examination.

Whenever we encountered a COSEWIC species or a provincial Red- or Blue-listed species, exact UTM coordinates were taken with a hand-held Garmin® XL-12 Global Positioning System receiver. For other, relatively common species, only 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.

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 herbarium 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.

The focus of our efforts was on the vascular plants and higher vertebrates that we could find without having to depend on the use of traps or nets. Thus, small mammals were not adequately sampled. We did, however, spend some time netting butterflies and dragonflies and setting a series of minnow traps at the north end of Vaseux Lake and in the Northwest Marsh to augment our other fieldwork.

We also completed a number of vegetation plots on the NWA, following the methodology used by the Conservation Data Centre, in order to ground-truth some of the biophysical habitat units that had been defined. The guide to site identification by Lloyd et al. (1990) was useful in helping interpret the plant communities and identify the site series.

The field data were subsequently entered into a Microsoft Access® database. Digital photographs were downloaded to a laptop computer. Comments were added to each image and the images along with copies of the databases were burned onto compact disks as a backup to the computer files.

This methodology provided another geo-referenced data layer which allowed us to map the distribution of each species within the NWA boundaries and its surroundings.

Taxonomy

Taxonomy in this report follows Douglas et al. 1998, 1999, and United States Department of Agriculture (2004) for plants; Cannings (2002) for dragonflies; Glassberg (2001) and Beccaloni et al. (2004) for butterflies; Crother et al. (2000) and Crother et al. (2003) for amphibians and reptiles; American Ornithologists' Union (1998; 2000; 2002; 2003) for birds; and Wilson and Reeder (1993) for mammals. Taxonomy of other taxa follows ITIS (2004).

Results

Habitats, Flora, and Fauna

We recorded a total of 5 species of fungi, 260 species of plants, 30 species of invertebrates, 5 fish species, 2 amphibian species, 8 reptile species, 132 bird species, and 17 species of mammals on the Vaseux-Bighorn National Wildlife Area over the period May through the end of August, 2003.

Seven COSEWIC species (Figure 4), 7 Red-listed species, and 22 Blue-listed species were found using the habitats of the Vaseux-Bighorn National Wildlife area (Table 1). We also found 3 Red-listed and 1 Blue-listed plant communities on the NWA.

The Canadian distribution of Big-leaf Sedge, Short-rayed Aster, and Thick-leaved Thelypody, is

restricted to British Columbia. These species are also found in areas considered under threat from development and exist as single taxonomic entities which could make them high-priority taxa for COSEWIC listing.

Table 1. COSEWIC Species at Risk and species on the provincial Red and Blue lists found on the Vaseux-Bighorn National Wildlife Area, May – August 2003.

Species	COSEWIC ¹	Red	Blue
Big-leaf Sedge			●
Bearded Sedge			●
Porcupine Sedge			●
Fox Sedge			●
Short-rayed Aster		●	
Columbia Goldenweed		●	
Blue Vervain		●	
Richardson's Penstemon			●
Thick-leaved Thelypody			●
Behr's Hairstreak	T ²	●	
California Hairstreak			●
Great Basin Spadefoot	T		●
Western Skink			●
Western Yellow-bellied Racer			●
Northern Pacific Rattlesnake	T		●
Desert Nightsnake	E ³	●	
Great Basin Gophersnake	T		●
Western Painted Turtle			●
American White Pelican		●	
Double-crested Cormorant		●	
American Bittern			●
Great Blue Heron			●
Sandhill Crane			●
Caspian Tern			●
White-throated Swift			●
Lewis's Woodpecker	SC ⁴		●
Canyon Wren			●
Bighorn Sheep			●
Nuttall's Cottontail	SC		●
Total number of taxa	7	7	22

¹ Committee on the status of Endangered Wildlife in Canada

² Threatened

³ Endangered

⁴ Special Concern



Figure 4. Two COSEWIC Species at Risk that frequent the Vaseux-Bighorn National Wildlife Area: (top) the endangered Desert Nightsnake (9 May 2003) and (bottom) the threatened Great Basin Gophersnake (9 June 2003).

BIOPHYSICAL HABITAT CLASSES

A number of biophysical habitat classes (BHC) have been described for the Vaseux Lake area including most of the major units of the Vaseux-Bighorn National Wildlife Area (Lea and Maxwell, unpublished) (Table 2; Figure 6). We ground-truthed a number of these areas and, for the most part, the habitat class descriptions were fairly accurate at the scale at which they were defined. But see, for example, Big Sagebrush – Selaginella, below.

It would be important to build on the work of Lea and Maxwell by continuing it at a larger scale, which would further refine the habitat boundaries of the NWA and better aid in any management practices carried out on these lands. Following is a brief discussion of only the major natural biophysical habitat classes of the NWA.

Antelope-brush – Needle-and-thread Grass

The antelope-brush – needle-and-thread grass BHC (Figure 5) is primarily a shrub/grassland with a moderate shrub layer of Antelope-brush and Common Rabbit-brush. Needle-and-thread Grass dominates the herb layer and Brittle Prickly-pear Cactus, Bluebunch Wheatgrass, Sand Dropseed, Compact Selaginella, and Cheatgrass may occur in varying amounts. Scattered Ponderosa Pines occasionally occur.

This BHC contains 1 of the 4 most endangered ecosystems in Canada. The antelope-brush – needle-and-thread grass community has been Red-listed by the provincial government (Schluter et al. 1995; BC Conservation Data Centre 2003).

Water Birch – Red-osier Dogwood

The water birch – red-osier dogwood BHC is, in most places, simply a narrow riparian band. It lies along



Figure 5. The Antelope-brush – needle-and-thread grass habitat unit (West Unit, Vaseux-Bighorn National Wildlife Area, 29 June 2003).

much of the lakeshore of the West Unit, including the river channel and lagoons at the south end of the lake and along the slough edges of the Northwest and Northeast Riparian units.

It is characterized by a fairly dense cover of Water Birch, Mountain Alder and Red-osier Dogwood with lesser and varying amounts of Prickly Rose, Poison Ivy, Trembling Aspen, willow, Nootka Rose, and Snowberry. The herb layer often has Star-flowered False Solomon’s-seal and Scouring Rush as major components.

This rare plant community has been Red-listed by the province (BCCDC 2003), with particular reference to where it occurs extensively on floodplains.

Table 2. Biophysical Habitat Units and their codes for the Vaseux-Bighorn National Wildlife Area (see Figure 6).

Code	Biophysical Habitat Class ¹
AN ²	antelope-brush – needle-and-thread grass
BD ²	water birch – red-osier dogwood riparian
CA	canal
CF	cultivated field
CL	cliff, high
CM	cliff, moderate
CO	cultivated orchard
CT	common cattail marsh
LA	large lake
OW	shallow open water
PA	ponderosa pine – antelope-brush
PD	pasture, dry
PM	pasture, moist
PO	pond
PS	ponderosa pine – selaginella
PW ³	ponderosa pine – bluebunch wheatgrass
RO	rock outcrop – lichen
SO	saskatoon – mock-orange talus
SS	big sagebrush – selaginella
TA	talus
TC	transportation corridor
WA ²	bluebunch wheatgrass – arrow-leaved balsamroot
WS	bluebunch wheatgrass – selaginella

¹ Following Lea and Maxwell, unpublished.

² Red-listed Plant Community

³ Blue-listed Plant Community

Common Cattail Marsh

The Common Cattail Marsh BHC (Figure 7) occurred extensively in the Northwest Unit of the NWA, at the north end of Vaseux Lake; it is also found as a smaller component in the Northeast Riparian Unit.

This BHC is characterized by extensive stands of Common Cattail with admixtures of Hard-stemmed Bulrush, sedges, and Purple Loosestrife. The attendant sloughs are choked with Greater Bladderwort, pondweeds, Water Smartweed, duckweeds and Yellow Pond-lily.



Figure 7. Common cattail marsh habitat (Northwest Unit, Vaseux-Bighorn National Wildlife Area, 21 May 2003).

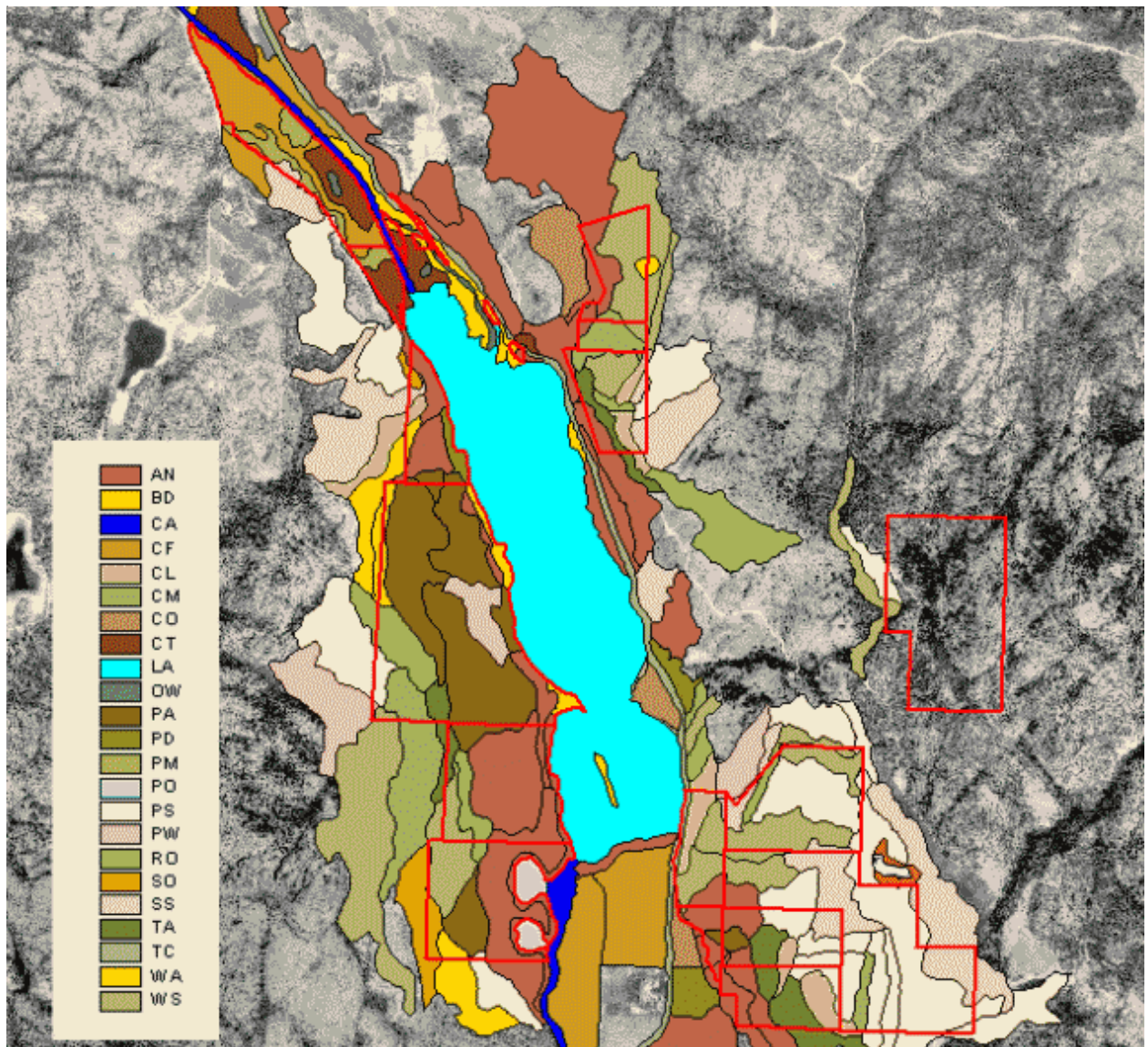


Figure 6. Biophysical habitat units of the Vaseux-Bighorn National Wildlife Area after Lea and Maxwell (unpublished). Refer to Table 2 for full names of the legend abbreviations. The national wildlife area property lines are shown in red.



Figure 8. Ponderosa pine – antelope-brush habitat (West Unit, Vaseux-Bighorn National Wildlife Area, 29 June 2003).

Ponderosa Pine – Antelope-brush

This biophysical habitat class (Figure 8) occurs extensively on the West Unit of the NWA; a small area also occurs on the Southeast Unit.

It is characterized by an open Ponderosa Pine forest with some Douglas-fir, particularly in areas with a northern aspect. The shrub layer is principally composed of Antelope-brush with lesser amounts of Saskatoon. The herb layer is dominated by Arrow-leaved Balsamroot and Bluebunch Wheatgrass with varying amounts of Cheatgrass.

Ponderosa Pine – Selaginella

The ponderosa pine – selaginella BHC (Figure 9) occurs extensively on the Southeast Unit of the NWA; elsewhere, it is principally a secondary component of the bluebunch wheatgrass – selaginella BHC.



Figure 9. Ponderosa pine – selaginella habitat (Southeast Unit, Vaseux-Bighorn National Wildlife Area, 27 June 2003).

This BHC consists of open Ponderosa Pine forest with small amounts of Douglas-fir scattered throughout, particularly on slopes with a northern aspect. The shrub layer is dominated by Antelope-brush and Saskatoon with varying amounts of Squaw Current, Common Rabbit-brush, and Big Sagebrush. The herb layer is dominated by Bluebunch Wheatgrass, Arrow-leaved Balsamroot, and Compact Selaginella.

Ponderosa Pine – Bluebunch Wheatgrass

There is a small area of ponderosa pine – bluebunch wheatgrass on the West Unit of the NWA. In other areas it is usually a secondary component of the ponderosa pine – selaginella or bluebunch wheatgrass – antelope-brush biophysical habitat units.

This BHC consists of open to parkland Ponderosa Pine forest with some Douglas-fir. The shrub layer includes Big Sagebrush, Saskatoon, and Common Snowberry. The herb layer holds Bluebunch Wheatgrass, Arrow-leaved Balsamroot, Cheatgrass, and varying amounts of Pinegrass, Rough Fescue, and Stiff Needle-grass depending on the aspect. This BHC likely supports a blue-listed plant community of the same name (BCCDC 2003).



Figure 10. Saskatoon – Mock-orange habitat (Northeast Unit, Vaseux-Bighorn National Wildlife Area, 18 June 2003).

Saskatoon – Mock-orange Talus

The saskatoon – mock-orange talus habitat (Figure 10) occurs amongst the colluvium at the base of cliffs throughout much of the NWA.

In this biphysical habitat unit, dominants include a sparse shrub cover of Saskatoon, Mock-orange, Smooth Sumac, Poison Ivy, White Clematis, Antelope-brush, Douglas Maple, Blue Elderberry, and Choke Cherry in varying amounts depending on the aspect. The herb layer includes Bluebunch Wheatgrass, Cheatgrass, and Oregon Woodsia.

Big Sagebrush – Selaginella

The big sagebrush – selaginella BHC (Figure 11) occurs primarily on the east side of the lake, on the Northeast and Southeast units of the NWA. It is a secondary component of some of the ponderosa pine – selaginella and the bluebunch wheatgrass – selaginella habitat.

For the most part, this habitat class occurs on the NWA only as small components of other habitats. Its extent on the NWA needs to be refined. For example, a large area of the “Saddle” that has been described as this habitat class is likely better described as bluebunch wheatgrass – arrow-leaved balsamroot habitat (see below).

The Big Sagebrush – Selaginella habitat class is a sparse shrub/steppe consisting primarily of Big Sagebrush and Common Rabbit-brush, with a herb layer of Bluebunch Wheatgrass, Needle-and-thread Grass, Cheatgrass, Sand Dropseed, and Compact Selaginella.

Bluebunch Wheatgrass – Arrow-leaved Balsamroot

This biophysical habitat class occurs only as small patches in all the units of the NWA; it also occurs as a secondary component of the ponderosa pine – arrow-leaved balsamroot and ponderosa pine – Idaho fescue habitats. An exception occurs on the Southeast Unit, where the “Saddle” area may hold a significant component of bluebunch wheatgrass – arrow-leaved balsamroot habitat (Figure 12), which likely represents a red-listed plant community of the same name (BCCDC 2003).

This BHC is a shrubb/steppe of Bluebunch Wheatgrass and Arrow-leaved Balsamroot with varying admixtures of Silky Lupine, pussytoes, Cheatgrass, and a sparse growth of Big Sagebrush.



Figure 11. Big sagebrush – selaginella habitat on the rocky bluffs of the Northeast Unit (Vaseux-Bighorn National Wildlife Area, 17 June 2003). In the background, marshes of the Northwest Unit, “Willow Island,” and the Northeast Riparian Unit are visible.

Bluebunch Wheatgrass – Selaginella

The bluebunch wheatgrass – selaginella BHC covers large areas of the Northeast, Southeast, and West units of the NWA. It also occurs as a secondary component of the ponderosa pine – selaginella habitat, particularly on the Southeast Unit and is also associated with the base of cliffs and rocky outcrops.

This shrub/steppe habitat consists of scattered Big Sagebrush and Common Rabbit-brush with a herb layer dominated by Bluebunch Wheatgrass, selaginella, Sand Dropseed, Cheatgrass and Needle-and-thread Grass.



Figure 12. Bluebunch wheatgrass – arrow-leaved balsamroot habitat (Southeast Unit, Vaseux-Bighorn National Wildlife Area, 18 June 2003).

FUNGI

Five species or genera of lichens were incidentally recorded on the Vaseux-Bighorn National Wildlife Area as an adjunct to vascular plant surveys. Surveys designed specifically to document lichens were not conducted as part of this fieldwork.

Ascomycota

CLADONIACEAE

Cladonia Lichen

Cladonia sp. Hill ex P. Browne

On 27 June, a lichen of this genus was found in our vegetation plots on the Southeast Unit of the NWA. Later, on 29 June, *Cladonia* sp. was also found on the West Unit. *Cladonia* sp. occurred in both open grassland and in the denser understory of the open ponderosa pine forest

UMBILICARIACEAE

Rocktripe Lichen

Umbilicaria sp. Hoffm.

In late June, a lichen of this genus was found growing on rock surfaces on the Southeast and Northeast units of the NWA. *Umbilicaria* sp. occurred on a talus slope and in rocky outcrop – selaginella areas of bluebunch wheatgrass – selaginella habitats.

PELTIGERACEAE

Dog Pelt

Peltigera canina (L.) Willd.

On 27 June, this species was found in the middle of a talus slope on the Southeast Unit of the NWA.

Felt Pelt

Peltigera rufescens (Weis) Humb.

On 29 June, this species was found in a number of vegetation plots in the open Ponderosa Pine forests of the West Unit of the NWA.

TELOSCHISTACEAE

Caloplaca Lichen

Caloplaca sp. Th. Fr.

On 28 June, we found this lichen growing on rock surfaces in a vegetation plot on the Northeast Unit of the NWA in rock outcrop-selaginella habitat.

PLANTAE

Two hundred and sixty species of plants were recorded on the Vaseux-Bighorn National Wildlife Area. However, what follows is not an exhaustive list and more work needs to be done in this regard. It does, however, update and expand on Keller's (1978) non-annotated list. Three plant species are on the provincial Red List and 6 species are on the Blue List.

Charophyta

CHARACEAE

Musk Grass

Chara sp.

Extensive beds of this algae occurred in the small lagoon of the West Unit of the NWA. It was also found at the mouth of the Northeast Slough where it meets Vaseux Lake.

Bryophyta

DICRANACEAE

Curly Heron's-bill Moss

Dicranum fuscescens Turn.

On 29 June, this species was found on the West Unit of the NWA in the denser understory of a Ponderosa Pine forest.

GRIMMIACEAE

Grey Rock-moss

Racomitrium canescens (Hedw.) Brid.

On 27 June, this moss was found in our vegetation plots on the Southeast Unit of the NWA where antelope-brush and bluebunch wheatgrass occurred with rocky outcrops. On 28 June, this moss occurred in our vegetation plots on the Northeast Unit of the NWA in areas of rocky outcrops.

Common Beard Moss

Schistidium apocarpum (Hedw.) Bruch & Schimp.
(*Grimmia apocarpa*)

On 28 June, this species was noted in a few vegetation plots on the Northeast Unit of the NWA. It grew on big sagebrush – selaginella grassland habitat and areas where rock outcrop – selaginella occurred.

BRACHYTHECIACEAE

Lawn Moss

Brachythecium albicans

On 27 and 29 June, this species was found on the Southeast and West units of the NWA respectively. Habitats included the open Ponderosa Pine forests and talus slopes.

Equisetophyta

EQUISETACEAE

Scouring-rush

Equisetum hyemale L.

Scouring-rush was a fairly common species in the moister riparian areas along the West Unit lakeshore and in the riparian habitats alongside the sloughs and agricultural fields of the valley bottom properties at the north end of Vaseux Lake.

Lycopodiophyta

SELAGINACEAE

Compact Selaginella

Selaginella densa Rydb.

Compact Selaginella was found growing on shallow soils in all the major units of the NWA and constituted a dominant species in a number of major habitats such as the bluebunch wheatgrass – selaginella, big sagebrush – selaginella and ponderosa pine – selaginella habitats.

It was also recorded in the ponderosa pine – bluebunch wheatgrass, moderate cliff, saskatoon – mock-orange talus, and the antelope-brush – needle-and-thread grass habitats, particularly where rock outcrops formed a significant component of the site.

Pteridophyta

DRYOPTERIDACEAE

Fragile Fern

Cystopteris fragilis (L.) Bernh.

On 27 June, this species was found on the Southeast Unit growing mid-way up a 75% talus slope.

Western Cliff Fern

Woodsia oregana D.C. Eaton

This fern was fairly common in dry rocky areas, talus slopes, and cliffs of the NWA

Coniferophyta

CUPRESSACEAE

Common Juniper

Juniperus communis L.

We have only 1 record of this species from the Irrigation Creek Unit of the NWA.

Rocky Mountain Juniper

Juniperus scopulorum Sarg.

Rocky Mountain Juniper was found on both the Northeast and Southeast units of the NWA. It was scattered amongst the rock outcrops and shallow soil slopes in the PPxh1 variant.

It occurred in the saskatoon – mock-orange talus and bluebunch wheatgrass – selaginella where rock outcrops form an important component of the habitat class. This is the more common of the 2 species of *Juniperus* present on the NWA.

PINACEAE

Ponderosa Pine

Pinus ponderosa Dougl. ex P.& C. Lawson

The ponderosa pine is the dominant conifer that occurs throughout the NWA.

This pine has a relatively sparse and scattered distribution in the antelope-brush – needle-and-thread grass habitat (Figure 13) and water birch – red-osier dogwood riparian habitat of the BGxh1 variant or the bluebunch wheatgrass – selaginella and big sagebrush – selaginella habitats of the PPxh1 variant. On gentle to moderate slopes and moister areas of the PPxh1 variant, it becomes more dominant where it forms the open ponderosa pine – antelope-brush and the more parkland-like forest habitat of ponderosa pine – selaginella.

One Ponderosa Pine we found growing on TNT conservation lands, adjacent to the Southeast Unit of the NWA, falls within the range of some of the largest ponderosa pines in the province (BCCDC 2004). The tree was approximately 44.5 m tall and had a circumference of 4.03 m (128.3 cm DBH).

Douglas-fir

Pseudotsuga menziesii (Mirbel) Franco

The Douglas-fir is another common conifer on the NWA and is closely associated with the distribution of ponderosa pine, although it was not as abundant.

It was more common in the PPxh1 than in the BGxh1 variants. In the former it was most often found in the ponderosa pine – antelope-brush and ponderosa pine – selaginella habitats; it also occurred in rock outcrop and talus associated habitats including saskatoon – mock-orange habitat classes. In the

BGxh1 variant, it was found in the ponderosa pine – bluebunch wheatgrass and the antelope-brush – needle-and-thread grass habitat with ponderosa pine – antelope-brush as a secondary component.

A few, fire-scarred veterans were found, particularly on the Northeast and Southeast units.

Magnoliophyta

HYDROCHARITACEAE

Canadian Waterweed

Elodea canadensis Michx.

(*Anacharis canadensis*)

Canadian Waterweed was noted in Vaseux Lake and the sloughs in the Northwest Marshes.



Figure 13. The ponderosa pine—here in the antelope-brush – needle-and-thread grass habitat of the West Unit—is the dominant coniferous tree of the Vaseux-Bighorn National Wildlife Area (14 May 2003).

POTAMOGETONACEAE

Northern Pondweed

Potamogeton alpinus Balbis

This pondweed was common in Vaseux Lake, parts of the Okanagan River and the lagoons.

Curled Pondweed

Potamogeton crispus L.

Curled Pondweed was common in Vaseux Lake, the Okanagan River and along the shallows of the small lagoon.

Grass-leaved Pondweed

Potamogeton gramineus L.

Around the end of June, we found this species to have a sporadic occurrence near the shore of the large lagoon.

Floating-leaved Pondweed

Potamogeton natans L.

This pondweed was fairly common at the north end of the lake adjacent to the marsh edge, in the Northwest Marsh, in both lagoons, and in the Okanagan River near the lake outlet.

Blooms were noted near the end of June.

Richardson's Pondweed

Potamogeton richardsonii (A. Benn) Rydb.

Around the end of June, we found a number of plants in Vaseux Lake between Hatfield's Island and "Verbena Point."

Fennel-leaved Pondweed

Stuckenia pectinata (L.) Börner

(*Potamogeton pectinatus*)

This pondweed was found in the shallows of the small lagoon, especially in the small bay south of the lagoon mouth. It was also found along the edges of the north-east *Typha* marsh at the north end of Vaseux Lake.

LEMNACEAE

Ivy-leaved Duckweed

Lemna trisulca L.

Ivy-leaved Duckweed was uncommon in the channels and sloughs of the Northwest Marsh and the Northeast Sloughs until at least the end of June. By early August, however, this species became a dominant in the same areas with *L. minor* being far less common.

Common Duckweed

Lemna minor L.

This duckweed was common to abundant in the sloughs of the Northwest Marsh and the Northeast Sloughs north of the wildlife viewing area until at least early July. By early August, however, *L. trisulca* became the dominant duckweed species.

CYPERACEAE

Big-leaf Sedge

Carex amplifolia Boott

On 6 June, this species was found in a forested riparian zone on the Irrigation Creek Unit. *C. amplifolia* is on the provincial Blue-list (BCSEE 2004).

Awneled Sedge

Carex atherodes Spreng.

Awneled Sedge is a co-dominant along with *Carex lasiocarpa* in marshes on both sides of the Okanagan River north of Vaseux Lake.

Bebb's Sedge

Carex bebbii (Bailey) Fern.

We found this sedge growing sporadically along the shore of the small lagoon.

Bearded Sedge

Carex comosa Boott

A number of plants of this provincially Blue-listed species were found on the West Unit (Figure 14) along the shore of the river near the lake outlet and around the northwest edge of the large lagoon.

We recorded *Carex comosa* in bloom through the latter half of June.

Inflated Sedge

Carex exsiccata Bailey

On 2 June, we found this species in the large *Carex* meadow just west of the "Northeast Sloughs."

Thread-leaved Sedge

Carex filifolia Nutt.

On 4 June, this species was found in the antelope-brush shrub-steppe habitat of the Southeast Unit.

Porcupine Sedge

Carex hystericina Schkuhr. Ex Willd.

We found a number of plants of this provincially Blue-listed species along the lakeshore of the West Unit from "Verbena Point" south along the river edge including the shores of both lagoons.

This species was recorded in bloom through the latter half of June.

Slender Sedge

Carex lasiocarpa Ehrh.

This sedge was found as a co-dominant in the north-east *Carex* meadow along with *C. atherodes*; it was also found along the east edge of the small lagoon.

Long-bracted Sedge

Carex retrorsa Schwein.

On 24 June, this species was found along the river edge just south of the lake outlet.

Awl-fruited Sedge

Carex stipata Muhl. ex Willd.

On 24 June, we found this sedge at 2 locations along the edge of the large lagoon.

Beaked Sedge

Carex utriculata Boott

This was the dominant sedge in the large *Carex* meadow west of the northeast sloughs. It was also observed in some areas of the Northwest Marsh.

Fox Sedge

Carex vulpinoidea Michx.

On 24 and 26 June, this provincial Blue-listed species was found in both the large and small lagoons.



Figure 14. Ron Buechert checking clump of the provincially Blue-listed sedge, *Carex comosa*, growing on the bank of the large lagoon (left) and close-up (right) of *Carex comosa* seed heads (West Unit, Vaseux-Bighorn National Wildlife Area, 24 June 2003).

Common Spike-rush

Eleocharis palustris (L.) Roem. & J.A. Schult.
Common Spike-rush was found in the Northwest Marsh and along the banks of both the large and small lagoons.

Low Clubrush

Isolepis cernua (Vahl) Roem. & J.A. Schultes
(*Scirpus cernuus*)
This clubrush was a dominant species, forming a dense carpet in the open areas of "Loosestrife Island" (see Figure 42) and a on small area of exposed sand and mud east of "Willow Island."

Hard-stemmed Bulrush

Schoenoplectus acutus (Muhl. ex Bigelow) A. & D. Löve
(*Scirpus lacustris*)
This was a dominant species in the marshes at the north end of Vaseux Lake, where it occurred primarily along the shore backed landward by an admixture of *Typha* and *Lythrum*, and in the Northwest Marsh where it was a co-dominant with *Typha*. It also was recorded at "Verbena Point," along the riverbank southwest of the lake outlet and in the large lagoon.

Olney's Bulrush

Schoenoplectus americanus (Pers.) Volk. ex Schinz & R. Keller
(*Scirpus americanus*)
This bulrush was found on "Loosestrife Island" and along the eastern lakeshore near the provincial park.

Small-flowered Bulrush

Scirpus microcarpus J. & K. Presl
On 2 July, this species was found growing at the water's edge on the west side of "Willow Island."

POACEAE

Stiff Needlegrass

Achnatherum occidentale (Thurber) Barkw.
(*Stipa occidentalis*)
On 29 June, this species was found in 2 vegetation plots on the West Unit of the NWA. The plots were in the open ponderosa pine – antelope-brush habitat class.

Crested Wheatgrass

Agropyron cristatum (L.) Gaertn.
This introduced grass was scattered throughout the dry grasslands and in disturbed areas such as roadsides and dikes in the NWA.

Hair Bentgrass

Agrostis scabra Willd.
On 16 May we found this species in a vegetation plot on the Southeast Unit of the NWA. It was situated in the bluebunch wheatgrass – selaginella habitat class with rock outcrops as a secondary component.

Red Three-awn

Aristida purpurea var. *longiseta* (Steud.) Vasey
Red Three-awn had a scattered distribution throughout the dry grasslands on the NWA, often where shallow soils and rock outcrops occurred.
It was found in the antelope-brush – needle-and-thread grass, ponderosa pine – antelope-brush, bluebunch wheatgrass – selaginella, and big sagebrush – selaginella habitat classes, in many cases with rock outcrops as important components.

Soft Brome

Bromus hordeaceus L.
On 4 June, this introduced plant was found in a vegetation plot on the Southeast Unit of the NWA. It was in the antelope-brush – needle-and-thread grass habitat class.



Figure 15. A cluster of Cheatgrass beneath a Ponderosa Pine on the West Unit; Arrowleaf Balsamroot and Antelope-brush are in the background (Vaseux-Bighorn National Wildlife Area, 13 May 2003).

Cheatgrass

Bromus tectorum L.

This abundant, invasive, introduced, annual grass (Figure 15) has a widespread distribution throughout all the units of the NWA.

While a few wildlife species do make use of this plant as a food source, it is considered only poor to fair forage (Utah State University 2004).

According to the Idaho National Engineering and Environmental Laboratory (2004):

Once cheatgrass begins to invade, the end result is often a rangeland that is dominated by this species and one that no longer provides healthy habitat.

Cheatgrass, although an annual, can have more than 1 generation a year because of its rapid maturity. This trait creates an abundance of highly flammable fuel that, if ignited, can burn large expanses, more frequently than occurs in the natural grassland. The conversion of native shrub-steppe to cheatgrass is considered irreversible by natural processes (INEEL 2004).

Studies in Utah have shown that “the best management has been to ensure perennial herbaceous plants are managed to dominate the site” (USU 2004).

Bluejoint Reedgrass

Calamagrostis canadensis (Michx.) Beauv.

On 2 June, this grass was found growing in the large *Carex* meadow of the Northeast Riparian area at the north end of Vaseux Lake.



Figure 16. Neil Dawe checking vegetation in a Pinegrass meadow on the Southeast Unit (Vaseux-Bighorn National Wildlife Area, 13 May 2003; Photo: Ron Buechert).

Pinegrass

Calamagrostis rubescens Buckl.

Pinegrass (Figure 16) was recorded on the east side of the lake in the Irrigation Creek, Northeast and Southeast units of the NWA.

Pinegrass was usually associated with the open Ponderosa Pine forest; it never seemed to be directly exposed, being either shaded under the open forest canopy or having a somewhat northern aspect.

Timber Oatgrass

Danthonia intermedia Vasey

On 27 and 28 June, this oatgrass was found in vegetation plots on the Southeast and Northeast units respectively.

It occurred in the ponderosa pine – selaginella with an antelope-brush component, big sagebrush – selaginella with a bluebunch wheatgrass component, and bluebunch wheatgrass – selaginella habitat classes.

Blue Wildrye

Elymus glaucus Buckl.

On 29 June, this grass was found in a vegetation plot on the West Unit of the NWA. It was found in the water birch – red-osier dogwood riparian habitat along the lake edge.

Quackgrass

Elymus repens (L.) Gould

(*Agropyron repens*)

Quackgrass, an introduced species, made up a significant component of the Northeast Riparian meadow.

Northern Rough Fescue

Festuca altaica Trin.

(*Festuca scabrella*)

On 27, 28, and 29 June, this fescue was found in vegetation plots in the Southeast, Northeast, and West units of the NWA, respectively.

It occurred in the big sagebrush – selaginella, the bluebunch wheatgrass – selaginella (with both Ponderosa Pine and Big Sagebrush components), and the ponderosa pine – antelope-brush (with Bluebunch Wheatgrass as a secondary component) habitats.

Western Fescue

Festuca occidentalis Hook.

On 27 June, this grass was found in a vegetation plot on the Southeast Unit of the NWA. It occurred in a narrow band of open Ponderosa Pine forest adjacent to big sagebrush – selaginella habitat.

Needle-and-thread Grass

Hesperostipa comata (Trin. & Rupr.) Barkw.
(*Stipa comata*)

Needle-and-thread Grass was found on the Northeast, Southeast and West units of the NWA.

It formed a major component of the antelopebrush – needle-and-thread grass habitat class, a provincially Red-listed plant community (BCSEE 2004). It was also found in the bluebunch wheatgrass – selaginella, big sagebrush – selaginella and ponderosa pine – selaginella habitat classes.

Foxtail Barley

Hordeum jubatum L.

On 28 and 29 August, Foxtail Barley was found growing on “Loosestrife Island.”

Giant Wildrye

Leymus cinereus (Scribn. & Merr.) A. Löve
(*Elymus cinereus*)

We have records of this species from 3 locations on the West Unit of the NWA. All clusters of this grass were found on dry sites adjacent to riparian habitat along the lakeshore or just west of “Verbena Point.”

Reed Canarygrass

Phalaris arundinacea L.

Reed Canarygrass had a fairly common but patchy distribution in the valley bottom properties at the north end of Vaseux Lake. It was also found as a dominant species at “Verbena Point,” which may indicate the presence of the invasive variety there. It was also found to some extent along the river bank by the lake outlet and at the north shore of the large lagoon.

Common Timothy

Phleum pratense L.

On 2 July, this introduced species was found in the Northeastern Riparian Unit meadow west of the slough.

Common Reed

Phragmites australis (Cav.) Trin. ex Steud.

(*Phragmites communis*)

Some fairly extensive, monospecific stands of this species were found on the valley bottom properties at the north end of Vaseux Lake. The plants were most often on sites that had been degraded or disturbed by humans such as alongside dike and slough edges. On the east dike, in the Northeastern Riparian Unit, a large clump of Common Reed appears to be encroaching into the adjacent meadow (Figure 17).

Bulbous Bluegrass

Poa bulbosa L.

This introduced and invasive bunchgrass was found scattered throughout the NWA in waste places, shrub-grasslands, and open Ponderosa Pine forests.

Kentucky Bluegrass

Poa pratensis L.

Kentucky Bluegrass was found associated with riparian habitats along the lake edge and on the dikes north of Vaseux Lake.

Sandberg’s Bluegrass

Poa secunda J. Presl

(*Poa sandbergii*)

On 29 June, this grass was found in vegetation plots in the antelope-brush – needle-and-thread grass habitat north of the large lagoon.



Figure 17. Common Reed growing alongside the east dike of the Okanagan River with the open meadow and Northeastern Riparian areas in the background (Vaseux-Bighorn National Wildlife Area, 16 May 2003).

Bluebunch Wheatgrass

Pseudoroegneria spicata (Pursh) A. Love
(*Agropyron spicatum*)
(*Elymus spicatus*)

Bluebunch Wheatgrass was found in every unit of the NWA with the exception of those properties in the valley bottom north of Vaseux Lake.

It is a dominant species in the bluebunch wheatgrass – selaginella and bluebunch wheatgrass



Figure 18. Two plants that occurred at the edge of the open water: Broad-fruited Bur-reed (top; 1 July 2003) and Yellow Iris (bottom; 3 June 2003) on the Vaseux-Bighorn National Wildlife Area.

– antelope-brush habitat classes and forms a sub-dominant component of the ponderosa pine – selaginella and big sagebrush – selaginella habitats. It is also common in the antelope-brush – needle-and-thread grass, ponderosa pine – antelope-brush, and moderate cliff habitat classes.

Sand Dropseed

Sporobolus cryptandrus (Torr.) A. Gray

On 28 June, this species was found in a number of areas, including 2 vegetation plots, at the higher elevations of the Northeast Unit of the NWA.

Six-weeks Grass

Vulpia octoflora (Walt.) Rydb.
(*Festuca octoflora*)

On 28 June, this grass was found in 2 vegetation plots in the bluebunch wheatgrass – selaginella habitat at the higher elevations of the Northeast unit of the NWA.

JUNCACEAE

Baltic Rush

Juncus balticus Willd.

Baltic Rush was found in the wetter areas of the valley bottom properties at the north end of Vaseux Lake, on “Loosestrife Island,” and around the shallows of both lagoons on the West Unit.

Toad Rush

Juncus bufonius L.

On 29 August, Toad Rush was found to be a fairly common species on “Loosestrife Island.”

SPARGANIACEAE

Broad-fruited Bur-reed

Sparganium eurycarpum Engelm.

This bur-reed (Figure 18) occurred along the marsh edge at the northeast end of Vaseux Lake where it grew out into the lake as far as did *Schoenoplectus*; both species were backed by *Typha* which grew closer to the shallows. Bur-reed was also found growing sporadically along the slough edges in the Northwest Marsh.

Blooms were recorded from early June to July.

TYPHACEAE

Common Cattail

Typha latifolia L.

Common Cattail was a dominant species in the marshes at the north end of Vaseux Lake including "Willow" and "Loosestrife" islands. It was also found at "Verbena Point," in the shallows of the large lagoon, and along the Okanagan River shallows south of the lake outlet.

IRIDACEAE

Yellow Iris

Iris pseudacorus L.

This introduced species (Figure 18) was recorded from the northwest end of Vaseux Lake, near the lake outlet, and in the shallows of the large lagoon. It is a fast-spreading, invasive that can form impenetrable thickets and outcompete native wetland species including, perhaps, several species of Blue-listed *Carex* which share similar habitat.

Currently, Yellow Iris does not have an extensive distribution on the NWA and would be relatively easy to remove. If left to expand, it may require machines, or possibly fire, for management (CAIP 2004).

Blooms were noted in early June (Figure 18).

LILIACEAE

Nodding Onion

Allium cernuum Roth

On 25 June, this onion was found in bloom on a small, dry slope just west of "Verbena Point" and on a slope along the south edge of the small lagoon. Both sites were in the antelope-brush – needle-and-thread grass habitat class.

Garden Asparagus

Asparagus officinalis L.

Garden Asparagus was recorded growing along the east river dike by the Northeast Riparian meadow, on a small, dry slope just west of "Verbena Point" and near the lakeshore in the same general area, as well as near the mouth of the small lagoon.

Sagebrush Mariposa Lily

Calochortus macrocarpus Dougl.

The Sagebrush Mariposa Lily was recorded from the Northeast, Southeast and West units of the NWA. It was found in the antelope-brush – needle-and-thread grass, bluebunch wheatgrass – selaginella, and big sagebrush – selaginella habitat classes.

Blooms were noted from mid-June (Figure 19) through early July.

Chocolate Lily

Fritillaria affinis (Schult.) Sealy

(*Fritillaria lanceolata*)

Chocolate Lily was recorded from the Southeast and West units of the NWA.

This lily was found in both the BGxh1 and PPxh1 variants. It grew in the bluebunch wheatgrass – selaginella, antelope-brush – needle-and-thread grass, saskatoon – mock-orange, and the ponderosa pine – selaginella habitat classes.

Most blooms were over by mid-May.

False Solomon's-seal

Maianthemum racemosum (L.) Link

(*Smilacina racemosa*)

In late June, this species was found growing in the riparian habitat just west of "Verbena Point" and along the riparian edge on the south side of the large lagoon.



Figure 19. Sagebrush Mariposa Lily on the Northeast Unit, Vaseux-Bighorn National Wildlife Area (18 June 2003).

Star-flowered False Solomon's Seal

Maianthemum stellatum (L.) Link
(*Smilacina stellata*)

This species was recorded only from the West Unit of the NWA. It was found in the water birch – red-osier dogwood riparian habitat along the lake edge and on Hatfield's Island. It was also found in the saskatoon – mock-orange and bluebunch wheatgrass – selaginella habitat classes.

Mountain Death-camas

Zigadenus elegans Pursh

On 27 June, we found this species in a vegetation plot in big sagebrush – selaginella habitat on the Southeast Unit of the NWA. This species is rare in south-central British Columbia.

Meadow Death-camas

Zigadenus venenosus S. Wats.

Meadow Death-camas (Figure 20) was recorded from all the major units of the NWA with the exception of the valley bottom properties at the north end of Vaseux Lake.

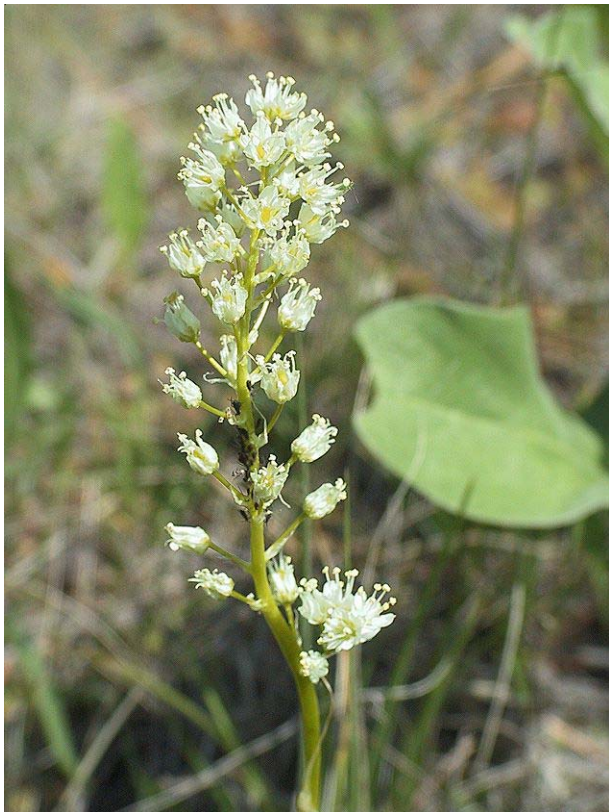


Figure 20. Meadow Death-camas on the West Unit, Vaseux-Bighorn National Wildlife Area (13 May 2003).

It was found in the BGxh1 and PPxh1 variants. In the former it occurred in the antelope-brush – needle-and-thread grass habitat class. In the PPxh1 variant, its presence was sporadic in the bluebunch wheatgrass – selaginella, big sagebrush – selaginella, ponderosa pine – selaginella, and the ponderosa pine – antelope-brush habitat classes, and occurred occasionally where those classes met the saskatoon – mock-orange talus and areas of rock outcrop.

Blooms were noted from mid-May to early July.

PONTEDERIACEAE

Water Star-grass

Zosterella dubia (Jacq.) Small

On 7 August, this species was found growing in exposed mud on the west bank of the river near the lake outlet.

ORCHIDACEAE

Hooded Ladies' Tresses

Spiranthes romanzoffiana Cham.

On 2 and 4 July, this orchid was found in bloom in the open Ponderosa Pine forest and grassland in the Irrigation Creek Unit of the NWA.

ASTERACEAE

Yarrow

Achillea millefolium L.

A common plant of the NWA occurring in a wide variety of habitat types including road edges and dike tops through the shrub-grasslands (Figure 21) to open Ponderosa Pine forests.

In bloom from at least 14 May through 4 July.

Short-beaked Agoseris

Agoseris glauca (Pursh) Raf.

Found sporadically in the Irrigation Creek (Figure 22) and Southeast units of the NWA, frequenting the bluebunch wheatgrass – selaginella shrub-grasslands and the open ponderosa pine – selaginella forests where bluebunch wheatgrass is a secondary component. In some areas this species can become locally dominant.

It was in bloom through mid-May.

Pearly Everlasting

Anaphalis margaritacea (L.) Benth. & Hook. f. ex C.B. Clarke
Found at the base of talus slopes near the antelope-brush – needle-and-thread shrub-grassland and along the lake and lagoon edges.

White Pussytoes

Antennaria microphylla Rydb.
The most common of the *Antennaria* species on the NWA; it was scattered throughout the open Ponderosa Pine forests and, to a lesser degree, the shrub-grasslands.

Nuttall's Pussytoes

Antennaria parvifolia Nutt.
One plant was found on 13 June on West Unit in open ponderosa pine – antelope-brush habitat.

Umber Pussytoes

Antennaria umbrinella Rydb.
One plant was found on 13 June on the West Unit in open antelope-brush – needle-and-thread grass habitat just west of the lagoons.

Northern Wormwood

Artemisia campestris L.
One plant was found on 13 June in a habitat plot on the West Unit of the NWA, just above the lagoons.

Prairie Sagewort

Artemisia frigida (Steud.) Vasey
One plant was found on 28 June in a habitat plot on the Northeast Unit of the NWA in an antelope-brush – needle-and-thread grass grassland.

Tarragon

Artemisia dracunculus L.
On 29 June, a plant was found in a vegetation plot in an open pine forest on the West Unit of the NWA.

Big Sagebrush

Artemisia tridentata Nutt.
Big Sagebrush was found only on the east side of the lake in both the Northeast and Southeast Units of the NWA. It formed an important component of the big sagebrush – selaginella habitat classes, which



Figure 21. Juba Skipper on Yarrow on the Northeast Unit, Vaseux-Bighorn National Wildlife Area (16 June 2003).

occur primarily on the Southeast Unit with smaller amounts on the Northeast Unit.

Big Sagebrush was also found in lesser amounts as a secondary or tertiary component of bluebunch wheatgrass – selaginella and ponderosa pine – selaginella habitat classes.



Figure 22. Short-beaked Agoseris on the Irrigation Creek Unit, Vaseux-Bighorn National Wildlife Area (15 May 2003).



Figure 23. (Clockwise from left) Short-rayed Aster habitat along beach of Vaseux Lake Bird Sanctuary and Vaseux Lake Provincial Park; habit of plant; and close-up of flower (29 August 2003). The Short-rayed Aster is a provincially Red-listed species.

Lindley's Aster

Aster ciliolatus Lindl.

This species was recorded on 5 June in a forested riparian zone of the Northeast Unit.

Tufted White Prairie Aster

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

Plants were found on 7 August at "Verbena Point" on the West Unit.

Leafy Aster

Aster foliaceus Lindl.

Some plants were found on 29 June in riparian-birch-dogwood-rose-horsetail habitat on the West Unit.

Short-rayed Aster

Aster frondosus (Nutt.) T. & G.

This aster was found on 28 August scattered along a 70 m length of beach at Vaseux Lake Provincial Park (Figure 23).

Short-rayed Aster is on the provincial Red-list.

Arrowleaf Balsamroot

Balsamorhiza sagittata (Pursh) Nutt.

Arrowleaf Balsamroot was found on all the units of the NWA with the exception of the bottomland properties north of Vaseux Lake.

It occurred in both the BGxh1 and PPxh1 variants and was very common in the antelope-brush –



Figure 24. Arrowleaf Balsamroot in bloom on the "Saddle" of the Southeast Unit, Vaseux-Bighorn National Wildlife Area (16 May 2003).

needle-and-thread grass, the open forests (ponderosa pine - antelope-brush, ponderosa pine – selaginella habitat classes), and the big sagebrush – selaginella habitat class of the “Saddle” (Figure 24).

Balsamroot was in bloom when we arrived in early May; most of the bloom was over by early June.

Nodding Beggarticks

Bidens cernua L.

Nodding Beggarticks (Figure 25) was found in moist or wet habitats in both the NWA and the bird sanctuary: “Loosestrife Island,” “Verbena Point,” and near the lake outlet on the West Unit.

Blooms for this weedy species were noted from 1 July through 28 August.

Common Beggarticks

Bidens frondosa L.

Plants were found at “Verbena Point” and near the lake outlet, both on the West Unit of the NWA.

Blooms were noted throughout August.

Spotted Knapweed

Centaurea biebersteinii DC.

(*Centaurea maculosa*)

A non-native, noxious species that is established throughout the NWA, especially in waste places.

Diffuse Knapweed

Centaurea diffusa Lam.

A non-native, noxious, invasive that has established throughout much of the NWA, especially in waste places such as along the river dikes at the north end of Vaseux Lake.

Chicory

Cichorium intybus L.

On 21 June some of these introduced weeds were found in the shrub-grasslands of the Northeast Unit near the edge of Highway 97. Introduced.

Canada Thistle

Cirsium arvense (L.) Scop.

The introduced Canada Thistle was found throughout the summer in the moister habitats of the valley bottom such as along the riparian sloughs at the



Figure 25. Nodding beggarticks surrounded by Purple Loosestrife (“Loosestrife Island,” Vaseux Lake Bird Sanctuary, 29 August 2003).

northeast end of Vaseux Lake and the field just to the west where it was a dominant species. It was also found in the “Verbena Point” area of the West Unit and on “Loosestrife Island.”

Both white and purple blooms were noted throughout July and into early August.

Bull Thistle

Cirsium vulgare (Savi) Tenore

This introduced thistle was found along both dikes at the north end of Vaseux Lake and on the West Unit at “Verbena Point” and the east side of the small lagoon.

Blooms were noticed from early July through August.

Wavy-leaved Thistle

Cirsium undulatum (Nutt.) Spreng.

This native thistle was observed sporadically on the Northeast Unit and the Irrigation Creek Unit.

Slender Hawksbeard

Crepis atribarba Heller

Crepis atribarba ssp. *originalis* Heller

Slender Hawksbeard was found scattered throughout all the units of the NWA, in both the BGxh1 and PPxh1 variants, with the exception of the bottomland properties north of Vaseux Lake.

It occurred on a wide range of habitats, from the open antelope-brush – needle-and-thread grass shrub grassland to the open ponderosa pine parkland forest as well as rocky outcrop areas.

Slender Hawksbeard was in bloom throughout June and July.

Common Rabbit-brush

Ericameria nauseosus var. *speciosa* (Nutt.) Nesom & Baird

(*Chrysothamnus nauseosus*)

A fairly common shrub found on the Northeast, Southeast, and West units of the NWA.

This species was common where Antelope-brush and Big Sagebrush were growing and, in some areas, it replaced either of them as the dominant shrub.

It was most often found in the shrub-steppe grassland habitats such as the bluebunch wheatgrass – selaginella habitat with associated rocky outcrops, the big sagebrush – selaginella, and the antelope-brush – needle-and-thread grass habitats. It was also found in open ponderosa pine – selaginella habitats that were associated with Bluebunch Wheatgrass, Big Sagebrush and rocky outcrop areas.



Figure 26. Fine-leaved Daisy on the Southeast Unit of the Vaseux-Bighorn National Wildlife Area (16 May 2003).

Long-leaved Fleabane

Erigeron corymbosus Nutt.

This fleabane was sparsely scattered over much of the NWA, although we did not record it on the Irrigation Creek Unit. It was found in both the BGxh1 and PPxh1 variants.

Habitats included bluebunch wheatgrass grassland and big sagebrush-bunchgrass shrub grassland, open ponderosa pine and pine–Douglas-fir forest, as well as cracks and hollows among bedrock outcrops where pockets of soil had formed.

It was found in bloom throughout June.

Thread-leaved Fleabane

Erigeron filifolius Nutt.

Thread-leaved Fleabane was found only twice: once amongst the open ponderosa pine – Douglas-fir – bunchgrass habitat at the top of the Northeast Unit and once in the “Saddle” area of the Southeast Unit.

It was in bloom at the end of June.

Fine-leaved Daisy

Erigeron linearis (Hook.) Piper

The Fine-leaved Daisy (Figure 26) was found on the Northeast Unit (bluebunch wheatgrass – selaginella habitat class) and Southeast Unit (ponderosa pine – selaginella habitat class) of the NWA. In both those habitat types, rocky outcrops and big sagebrush – selaginella were important components.

It was recorded in bloom from mid-May through the end of June.

Philadelphia Fleabane

Erigeron philadelphicus L.

Philadelphia Fleabane was found in 3 separate locations on the NWA. On 2 June, this plant was observed in bloom in the Northeast Riparian Unit and on 6 June a plant was found in a small riparian draw in the Irrigation Creek Unit. Later it was found on “Loosestrife Island” at the north end of Vaseux Lake on 8 and 28 August (Figure 27).

It was recorded in bloom from early June through to the end of August.

Showy Daisy

Erigeron speciosus (Lindl.) DC.

Found twice: once on the Irrigation Creek Unit in open Ponderosa Pine forest and once on the South-

east Unit in the big sagebrush – selaginella habitat.

It was reported in bloom near the end of June and into July.

Brown-eyed Susan

Gaillardia aristata Pursh

Brown-eyed Susan was scattered throughout all the units of the NWA in dry shrub-grassland (antelope-brush – needle-and-thread grass) and open Ponderosa Pine forest and occasionally at the base of the saskatoon – mock-orange talus habitat.

Recorded in bloom throughout June and into early July.

Narrow-leaved Hawkweed

Hieracium umbellatum L.

Narrow-leaved Hawkweed was common amongst the open Ponderosa Pine forests of the NWA outnumbering *Crepis* sp. by about 10:1. However, in some open shrub-grassland areas, *Crepis* was more abundant.

The yellow flowers of this hawkweed were recorded in bloom near the end of June and early July.

Hairy Cat's-ear

Hypochaeris radicata L.

This species was recorded only on the West Unit of the NWA.

Columbian Goldenweed

Pyrrhoma carthamoides Hook. var. *carthamoides*

On 3 July, a small patch of this Red-listed species was noted by Lisa Scott under a large ponderosa pine in shrub-steppe habitat just outside the north end of the West Unit of the NWA.

Woolly Groundsel

Senecio canus Hook.

This species was found on the West and Northeast units of the NWA principally in the antelope-brush – needle-and-thread grass shrub-steppe habitat.

Blooms were recorded between 13 May and mid-June.



Figure 27. Philadelphia Fleabane on "Loosestrife Island," Vaseux Lake Bird Sanctuary, 8 August 2003).

Canada Goldenrod

Solidago canadensis L.

Canada Goldenrod was a common species along the shoreline of the West Unit of the NWA including the lagoons.

It was recorded in bloom from 26 June through to early August.

Perennial Sow-thistle

Sonchus arvensis L.

Perennial Sow Thistle, an introduced, noxious weed, was found in bloom throughout July and August on the bottomland sites north of Vaseux Lake and in the "Verbena Point" area in the West Unit of the NWA.

Prickly Sow-thistle

Sonchus asper (L.) Hill

On 11 August, we found this species growing at the higher elevations of the Northeast Unit of the NWA.

Common Dandelion

Taraxacum officinale G.H. Weber ex Wiggers

We recorded the introduced dandelion on the Northeast, Southeast, and West units of the NWA in open Ponderosa Pine forest and shrub-steppe grasslands.

Blooms were noted throughout June.

Yellow Salsify

Tragopogon dubius Scop.

Yellow Salsify was scattered throughout the open shrub-steppe grasslands of the NWA.

It was recorded in bloom throughout June.

Meadow Salsify

Tragopogon pratensis L.

Scattered throughout the shrub-steppe grassland and open pine forests of the Northeast, Southeast, and West Units of the NWA.

It was recorded in bloom throughout June.

CAMPANULACEAE

Heterocodon

Heterocodon rariflorum Nutt.

This species was found on 4 June on the Southeast Unit growing in a seepage area in a rich *Lotus denticulatus* meadow in ponderosa pine parkland.



Figure 28. Hemp Dogbane along "Verbena Beach" on the West Unit (Vaseux-Bighorn National Wildlife Area, 25 June 2003).

CAPRIFOLIACEAE

Blue Elderberry

Sambucus cerulea Raf. var. *cerulea*

Blue Elderberry was a fairly common shrub in riparian habitat along the lake edge and occasionally slough edges of the NWA. It was also fairly common in drier sites such as at the base of cliffs and talus slopes where some seepage or surface runoff might be expected.

Blooms noted from mid-May through early June.

Common Snowberry

Symphoricarpos albus (L.) Blake

This shrub occurred in both the BGxh1 and PPxh1 variants and in every unit of the NWA.

It was a fairly common component of a variety of habitat types throughout the NWA occurring as part of the riparian lakeshore, including the lagoons and slough edges. It also occurred in drier sites such as in a canyon amongst boulders and talus and at the base of talus slopes as well as in the antelopebrush – needle-and-thread grass and the open, and Ponderosa Pine forests that range in density from open parkland to relatively closed.

APOCYNACEAE

Hemp Dogbane

Apocynum cannabinum L.

This dogbane occurred sporadically along the lakeshore of the West Unit, including the "Verbena Point" area (Figure 28) and around the lagoons, where some plants grew to a height of nearly 2 metres. A large cluster of this species was found growing near the south end of the east dike, where the river enters Vaseux Lake.

It was in bloom by early July.

Spreading Dogbane

Apocynum androsaemifolium L.

This species has a scattered distribution on the dry, open hillsides and open forests of the NWA.

ASCLEPIADACEAE

Showy Milkweed

Asclepias speciosa Torr.

Milkweed had a sporadic occurrence along the shoreline of the West Unit, including the "Verbena Point" and lagoon areas as well as along slough edges at the north end of the lake. Also in ditches along roadsides.

Blossoms were noted during the last half of June; pods formed by early August, and seeds dispersed toward the latter half of that month (Figure 29).



GENTIANACEAE

Northern Gentian

Gentianella amarella (L.) Borner

On 27 June, we found a plant in the ponderosa pine – selaginella and rock outcrop habitat of the Southeast Unit of the NWA.

BORAGINACEAE

Fiddleneck

Amsinckia sp.

This species, likely *A. retrorsa*, was recorded on 2 occasions: once on the Southeast Unit (27 June), in the open ponderosa pine – selaginella habitat and once on the West Unit (29 June), in the antelope-brush – needle-and-thread grass shrub-grassland habitat.

Common Hound's-tongue

Cynoglossum officinale L.

Fairly common along both the east and west dikes of the Okanagan River north of Vaseux Lake and near the mouth of the small lagoon.

Blooms were noted through June and early July.

Western Stickseed

Lappula occidentalis var. *occidentalis* (S.Wats.) Greene
(*Lappula redowski*)

This species was scattered across the dry grasslands of the NWA, particularly on the Southeast Unit.



Figure 29. (Top) Western Tiger Swallowtails feeding at Showy Milkweed blossoms at "Verbena Beach," Vaseux-Bighorn National Wildlife Area (26 June 2003). (Bottom) Seeds of Showy Milkweed being released from the ripe pods alongside the Okanagan River by the lagoons on the West Unit, Vaseux-Bighorn National Wildlife Area (28 August 2003).

Lemonweed

Lithospermum ruderale Dougl. ex Lehm.

This species was fairly common throughout much of the NWA in the open shrub-grasslands and open Ponderosa Pine forests.

Blooms were recorded from 10 May through to at least 2 July.

Small-flowered Forget-me-not

Myosotis laxa Lehm.

We have 2 records of Small-flowered Forget-me-not: 1 from 6 June on the Irrigation Creek unit in forested riparian habitat and another from 8 August on "Loosestrife Island."

Blue Forget-me-not

Myosotis stricta Link ex Roemer & Schultes

Blue Forget-me-not was found on the West Unit, mainly in the antelope-brush – needle-and-thread grass habitat and to a minor extent in the open ponderosa pine – antelope-brush habitat.

Blooms were noted from mid-May through mid-June.

LAMIACEAE

Wild Basil Savory

Clinopodium vulgare L.

On 24 June we recorded Wild Basil Savory along the east edge of the large lagoon.

Rough Water Horehound

Lycopus asper Greene

Rough Water Horehound was found scattered sporadically in moist areas around Vaseux Lake including "Loosestrife Island."

Blooms were recorded throughout August.

Common Horehound

Marrubium vulgare L.

On 6 June, 1 plant of Common Horehound was found by JP on a cliff overlooking Highway 97 on TNT Emery property.

Field Mint

Mentha arvensis L.

Field Mint was recorded 3 times, all from moist sites in the area of "Verbena Point" on the West Unit of the NWA.

Blooms were reported from 25 June through 28 August.

Catnip

Nepeta cataria L.

Catnip was a fairly common species at the southern ends of both the east and west dikes of the Okanagan River north of Vaseux Lake.

Blooms were recorded from 2 June through 2 July.

Marsh Skullcap

Scutellaria galericulata L.

Marsh Skullcap was relatively common at the water's edge where there is a zone of wet soil; it was specifically recorded at both lagoons, along the shoreline of the West Unit, in the "Verbena Point" area, and on Hatfield's Island.

Blooms were noted from 23 June through 8 August.

Mexican Hedge-nettle

Stachys mexicana Benth.

Mexican Hedge-nettle was found once, on 25 June, in the "Verbena Point" area of the West Unit of the NWA.

VERBENACEAE

Blue Vervain

Verbena hastata var. *scabra* Moldenke

Blue Vervain (Figure 30) was found in relatively moist areas on the NWA such as on the bank of the west dike of the Okanagan River at the north end of Vaseux Lake, on "Loosestrife Island," at "Verbena Point," and on the west bank of the river near the lake outlet.

At "Verbena Point," a few Blue Vervain plants occurred along the south shoreline ("Verbena Beach"); however, a large patch of Blue Vervain was



Figure 30. (Clockwise from upper left) Blue Vervain stalk and flowers at “Verbena Beach;” close-up of flower; flowers and seed heads near lake outlet; and Ron Buechert checking large Blue Vervain patch at “Verbena Point. This large patch extends from Buechert to the arrow and covered roughly a 6 m x 14 m area (Vaseux-Bighorn National Wildlife Area, 26 June 2003).

found in the central, marshy area of the point (Figure 30). This latter patch was approximately 6 m x 14 m with a density of about 6 stalks/m².

Blooms were noted from 25 June through 8

August, although by the latter date most of the bloom was over and nutlets had formed.

Blue Vervain is a provincially Red-listed species (BCSEE 2004).



Figure 31. The carnivorous Greater Bladderwort in bloom in the Northwest Marsh, Vaseux-Bighorn National Wildlife Area (12 June 2003).

PLANTAGINACEAE

Woolly Plantain

Plantago patagonica Jacq.

This plantain was common on dry slopes especially in open or sparsely wooded areas. It was observed on north-facing slopes of the Northeast and Southeast Units of NWA.

RUBIACEAE

Northern Bedstraw

Galium boreale L.

This species was locally common in association with the water birch – red-osier dogwood riparian habitat along the West Unit shoreline. It was also found

in the transition zone between the riparian forest of “Verbena Point” and the dry Antelope-brush – Arrow-leaved Balsamroot slope to the west.

LENTIBULARIACEAE

Greater Bladderwort

Utricularia macrorhiza Le Conte

(*Utricularia vulgaris*)

This carnivorous plant was often a dominant in the sloughs of the Northwest Marshes; it was also found along the marsh edges at the north end of Vaseux Lake on both the east and west sides.

Flowers were observed from 10 June through 9 August (Figure 31).

SCROPHULARIACEAE

Thompson’s Paintbrush

Castilleja thompsonii Pennell

On 18 May, plants were found in the bluebunch wheatgrass – selaginella habitat of the Southeast Unit.

Small-flowered Blue-eyed Mary

Collinsia parviflora Dougl. ex Lindl.

We found Small-flowered Blue-eyed Mary on all the units of the NWA with the exception of the valley bottom properties at the north end of Vaseux Lake. In the BGxh1 variant, it was found in the antelope-brush – needle-and-thread grass habitat.

In the PPxh1 variant, it frequented a range of habitat types from the open forests of ponderosa pine – antelope-brush, ponderosa pine – selaginella, and ponderosa pine – Idaho fescue habitats to the bluebunch wheatgrass – selaginella and big sagebrush – selaginella shrub-grasslands.

It was in bloom from early May through mid-June.

Water Mudwort

Limosella aquatica L.

Plants were found throughout August on a small sandbar on the east side of “Willow Island.”

They were in bloom at the end of August.

Dalmation Toadflax

Linaria genistifolia ssp. *dalmatica* (L.) Maire & Petitmengin
(*Linaria dalmatica*)

This invasive species was very common on disturbed and dry sites and in some areas formed the dominant species. More plants were noted on the Northeast and West units of the NWA than in the other units.

Dalmation Toadflax was most often found in the antelope-brush – needle-and-thread grass habitats of the BGxh1 variant.

Attempts to control this invasive through the release of biological control agents have been made over the years and some results of these actions were noted on the NWA.

Blooms were recorded from mid-May through the end of June.

Purple-stemmed Monkey-flower

Mimulus floribundus Lindl.

On 17 June, a few plants were noted in crevices and small depressions where lichens and soils had accumulated in rock outcrops on the moderate cliff habitat of the Northeast Unit (Figure 32).



Figure 32. Purple-stemmed Monkey-flower on the Northeast Unit (Vaseux-Bighorn National Wildlife Area, 17 June 2003).

Yellow Owl-clover

Orthocarpus luteus Nutt.

On 27 June, this species was noted in a vegetation plot in the big sagebrush – selaginella (bluebunch wheatgrass component) on the Southeast Unit of the NWA.

Yellow Penstemon

Penstemon confertus Dougl. ex Lindl.

This species was found at the higher elevations of the West, Northeast and Southeast units and on the Irrigation Creek Unit of the NWA.

It occurred on the bluebunch wheatgrass – selaginella, big sagebrush – selaginella, ponderosa pine – antelope-brush, and ponderosa pine – selaginella habitats and occasionally on the moderate cliff habitats where suitable conditions occurred.

Blooms were recorded from mid-June through early July.

Shrubby Penstemon

Penstemon fruticosus (Pursh) Greene

This species was fairly common on cliff faces and dry rocky slopes of the NWA.

It blooms early in May.

Small-flowered Penstemon

Penstemon procerus Dougl. ex Graham

Small-flowered Penstemon was found in the Irrigation Creek and Northeast units of the NWA. It occurred in the bluebunch wheatgrass – selaginella and ponderosa pine – selaginella habitats where rock outcrops were a secondary component.

Blooms were noted from mid-May through early July.

Chelan Penstemon

Penstemon pruinosus Dougl. ex Lindl.

On 18 May, 1 plant was found in rock outcrop habitat on the Southeast Unit of the NWA.

Richardson's Penstemon

Penstemon richardsonii var. *richardsonii* Dougl. Ex Lindl.

We have records of this provincially Blue-listed species from the Northeast, Southeast and West units of the NWA.

It was found on cliffs and rock bluffs or rock outcrop areas and at the base of cliffs growing in the fine-grained colluvium.

It was in bloom in early August.

Great Mullein

Verbascum thapsus L.

Great Mullein was a fairly common species in waste places, such as dikes and road edges, on the NWA. It was also sometimes found scattered over the bluebunch wheatgrass – selaginella, big sagebrush – selaginella, and antelope-brush – needle-and-thread grass habitat classes, especially where rock outcrops were an important component of the habitat.

Blooms were noted from mid-June to early July.

Blue Water Speedwell

Veronica anagallis-aquatica L.

In August, Blue Water Speedwell was found on “Willow Island” and “Loosestrife Island” at the north end of Vaseux Lake.

American Speedwell

Veronica beccabunga ssp. *americana* (Raf.) Sellers

On 29 August, this species was found growing in exposed mud beside “Willow Island.”

HYDROPHYLLACEAE

Thread-leaved Phacelia

Phacelia linearis (Pursh) Holz.

This Phacelia (Figure 33) was found scattered sporadically through the Southeast, Northeast, and



Figure 33. Thread-leaved Phacelia in bloom in the West Unit, Vaseux-Bighorn National Wildlife Area (23 May 2003).

West units of the NWA. It occurred in the antelope-brush – needle-and-thread grass and bluebunch wheatgrass – selaginella habitat classes.

Thread-leaved Phacelia was recorded in bloom from 23 May through 17 June.

POLEMONIACEAE

Narrow-leaved Collomia

Collomia linearis Nutt.

On 27 June, a plant was found on the “Saddle” of the Southeast Unit of the NWA. It was growing in the bluebunch wheatgrass-selaginella grassland habitat.

Scarlet Gilia

Ipomopsis aggregata (Pursh) V. Grant
(*Gilia aggregata*)

We have 2 observations of this species. On 13 June, 1 plant was found on the Southeast Unit in the ponderosa pine – selaginella habitat with rock outcrop as a major component. On 27 June, another plant was found on the West Unit in the antelope-brush – needle-and-thread grass habitat.

Prickly Phlox

Leptodactylon pungens (Torr.) Nutt.

A few shrubs of this species were found in 1 general location of the Northeast Unit of the NWA. They were associated with the bluebunch wheatgrass – selaginella habitat with a rock outcrop component.

Spreading Phlox

Phlox diffusa Benth.

Spreading Phlox was fairly common in the antelope-brush – needle-and-thread grass and bluebunch wheatgrass – selaginella habitats of the Northeast, Southeast and West units of the NWA.

Blooms were noted throughout May.

Pink Twink

Phlox gracilis (Hook.) Greene
(*Microsteris gracilis*)

On 28 June, a plant was found in a vegetation plot in the antelope-brush – needle-and-thread grass grassland of the Northeast Unit of the NWA.

Long-leaved Phlox

Phlox longifolia Nutt.

On 4 June, a plant was found in the antelope-brush – needle-and-thread grass habitat near the southern boundary of the Southeast Unit of the NWA.

SOLANACEAE

European Bittersweet

Solanum dulcamara L.

European Bittersweet was found most often in moist areas associated with riparian habitat such as along the river dikes and slough edges, in the marshy area of “Verbena Point,” and the riparian habitat along the lake edge of the West Unit. Its climbing habit allowed it to rise above overhanging and emergent vegetation at the water’s edge.

Blooms were noted from mid-June through the end of August.

CACTACEAE

Brittle Prickly-pear Cactus

Opuntia fragilis (Nutt.) Haw.

This cactus was relatively common in suitable habitat at lower elevations in all units of the NWA with the exception of the valley-bottom properties north of Vaseux Lake.

It frequented both the BGxh1 and PPxh1 vari-

ants and was most often found in the antelope-brush – needle-and-thread grass shrub-steppe and the bluebunch wheatgrass – selaginella grassland. It was also found sporadically in the open ponderosa pine – antelope-brush habitat class.

Brittle Prickly-pear Cactus appeared to have been severely impacted by the wildfire that ravaged the NWA in August (Figure 34).

Cactus blooms were noted in early June (Figure 34).

CARYOPHYLLACEAE

Blunt-leaved Sandwort

Moehringia lateriflora L.

On 27 June, this species was found on the Southeast Unit in the BGxh1 variant; it occurred mid-way up a talus slope.

Thread-leaved Sandwort

Arenaria capillaris Poir.

On 27 June, this species was found on the Southeast Unit in the PPxh1 variant; it occurred in the bluebunch wheatgrass – selaginella grassland.

Field Chickweed

Cerastium arvense L.

On 27 June, this species was found on the Southeast Unit in the PPxh1 variant; it occurred in the open ponderosa pine – selaginella component of the bluebunch wheatgrass – selaginella habitat class.



Figure 34. Brittle Prickly-pear Cactus in bloom in the Northeast Unit (5 June 2003) and the remains of a cactus following a flash fire that burned through the same area (27 August 2003), Vaseux-Bighorn National Wildlife Area.

Baby's Breath

Gypsophila paniculata L.

We have 2 records of this introduced species: 1 on 18 June alongside the west river-dike just south of the entrance gate at the north end of the NWA and another on 10 August from an open slope of the Northeast Unit in the antelope-brush – needle-and-thread grass habitat.

Night-flowering Catchfly

Silene noctiflora L.

This introduced species was found in bloom in early July on the Irrigation Creek Unit in the open Ponderosa Pine forest. Another was found in the Northeast Riparian Unit on the east dike edge at the edge of the adjacent meadow.

Bladder Campion

Silene vulgaris (Moench) Garcke

On 29 June, this introduced species was found in 2 locations on the West Unit, both in the open Ponderosa Pine forest of the PPxh1 variant.



Figure 35. Bitterroot in the Irrigation Creek Unit, Vaseux-Bighorn National Wildlife Area (6 June 2003).

CHENOPODIACEAE

Lamb's-quarters

Chenopodium album L.

On 10 June, a large patch of Lamb's Quarters was found in the centre of a marshy field in the Northwest Marsh Unit along with some scattered plants near the dike. On 28 August, another plant was found on "Loosestrife Island."

Fremont's Goosefoot

Chenopodium fremontii var. *fremontii* S. Wats.

On 3 June, plants were found on the Northeast Unit growing with *Thelypodium laciniatum* var. *laciniatum* on cliffs in fine-grained colluvium.

MOLLUGINACEAE

Common Carpetweed

Mollugo verticillata L.

On 9 August, we found this species growing on a newly-exposed sand bar just east of "Willow Island."

PORTULACACEAE

Miner's-Lettuce

Claytonia perfoliata Donn ex Willd.

(*Montia perfoliata*)

Miner's Lettuce was found on the Southeast, Irrigation Creek and West units of the NWA. It occurred in the antelope-brush – needle-and-thread grass and the open ponderosa pine – antelope-brush habitat classes.

Blooms were recorded in early May.

Bitterroot

Lewisia rediviva Pursh

Bitterroot (Figure 35), dubbed "Rock Rose" by some, was found on every unit of the NWA with the exception of the valley bottom properties north of Vaseux Lake.

It appeared to be most common on the mid-to-higher reaches of the Southeast and Northeast units of the NWA, particularly where the bluebunch

wheatgrass – selaginella habitat had a significant rock outcrop component. Other habitats where Bitterroot occurred included the antelope-brush – needle-and-thread grass, big sagebrush – selaginella and the saskatoon – mock-orange talus habitats. In the Irrigation Creek Unit it was found in the ponderosa pine – Idaho fescue habitat class.

Blooms were recorded from 9 May through 17 June.

POLYGONACEAE

Parsnip-flowered Buckwheat

Eriogonum heracleoides Nutt.

Fairly common in the Northeast, Southeast, and West units of the NWA frequenting the antelope-brush – needle-and-thread grass habitat class. It was also found in the bluebunch wheatgrass – selaginella habitat and at the base of talus slopes in the saskatoon – mock-orange habitat.

It was in bloom throughout June.

Sulphur Buckwheat

Eriogonum umbellatum Torr.

A few plants were noted in the antelope-brush – needle-and-thread grass habitats of the Northeast and Southeast units of the NWA.

Blooms were noted in early June.

Water Smartweed

Polygonum amphibium L.

Fairly common in open sloughs of the Northwest Marsh Unit (Figure 36).

It was in bloom in early August.

Common Knotweed

Polygonum aviculare L.

Plants were observed in waste places along the west dike in early August.

American Bistort

Polygonum bistortoides Pursh

We found this species in 3 vegetation plots on 27 and 28 June on the Northeast and Southeast units of the NWA. It occurred in open Ponderosa Pine forest where rock outcrops and Big Sagebrush were components as well as in the bluebunch wheatgrass – selaginella habitat class.



Figure 36. Water Smartweed in the Northwest Marsh, Vaseux-Bighorn National Wildlife Area (9 August 2003).

Black Bindweed

Polygonum convolvulus L.

On 12 June, this species was noted at the base of high cliffs near the north road entrance into the Northeast Unit of the NWA. Later, on 28 June, it was recorded high in the Northeast Unit, near the crest of a slope near the base of a north-facing rock outcrop.

Marshpepper Smartweed

Polygonum hydropiper L.

On 28 August, a plant was found on the West Unit of the NWA near the lake outlet.

Lady's-thumb

Polygonum persicaria L.

On 28 and 29 August, plants were found along "Verbena Beach" and on "Loosestrife Island" respectively.

Sheep Sorrel

Rumex acetosella L.

On 2 July, a few plants were found along the edge of the east dike and near the north end of the Northeast Riparian Unit.

BRASSICACEAE

Tall Tumble-mustard

Sisymbrium altissimum L.

This species was commonly seen throughout the NWA on disturbed soils.



Figure 37. Thick-leaved Thelypody, a blue-listed species, was found growing on cliff faces and at the base of cliffs amongst the colluvium, as it is here on the West Unit (Vaseux-Bighorn National Wildlife Area, 3 June 2003).

Thick-leaved Thelypody

Thelypodium laciniatum (Hook.) Endl. ex Valp. var. *laciniatum*
Thick-leaved Thelypody (Figure 37) was found on the Northeast and West units of the NWA. It grew in crevices and small ledges on cliff faces or amongst the colluvium at the base of cliffs.

Thick-leaved Thelypody was recorded in bloom from 10 May through 5 June. It is on the provincial Blue-list as a species of special concern.

ERICACEAE

Kinnikinnick

Arctostaphylos uva-ursi (L.) Spreng.
Kinnikinnick was found growing sporadically throughout the open Ponderosa Pine forest on the West and Irrigation Creek units of the NWA.

MALVACEAE

Dwarf Mallow

Malva neglecta Wallr.
On 4 June, JP found a few plants along the base of a cliff above a large talus slope on the Southeast Unit of the NWA. However, this species was very common alongside the TNT Emery property driveway and is likely more common on the NWA than our data indicate.

PRIMULACEAE

Fringed Loosestrife

Lysimachia ciliata L.
On 24 June, a plant was found along the southeast edge of the large lagoon.

Tufted Loosestrife

Lysimachia thyrsiflora L.
On 23 June, this plant was occasionally noted along the river shoreline between the lagoons and on the banks of the small lagoon.

SALICACEAE

Black Cottonwood

Populus balsamifera ssp. *trichocarpa* L.
Black Cottonwood was fairly common along the riparian lake edge of the West Unit. It also occurred along the west edge of the Northwest Marsh Unit, adjacent to the old agricultural field where fencing had been erected to encourage growth of this and other riparian species east into the field in an attempt to increase the areal extent of the riparian habitat (Figure 38).



Figure 38. Black Cottonwood encroaching from the riparian edge of the Northwest Marsh Unit, Vaseux-Bighorn National Wildlife Area (26 May 2003). The fence (left edge of image) was erected to encourage this riparian encroachment into the field.

Trembling Aspen

Populus tremuloides Michx.

Trembling Aspen was a fairly common species in riparian habitats of the valley bottom, much as was Black Cottonwood. Aspen was also found associated with riparian areas in the Irrigation Creek and Northeast units of the NWA.

Willow

Salix sp.

Willows were common to locally abundant in riparian habitats of the valley bottom such as along the slough edges at the northeast end of the lake, the riparian edge of the Northwest Marsh Unit and along the lake and lagoon edges of the West Unit of the NWA.

Narrow-leaf Willow

Salix exigua Nutt.

On 28 June, Narrow-leaf Willow was identified along the north edge of the large lagoon. Later on 1 July, this species was found with seed capsules bursting around the edges of "Willow Island."

Pacific Willow

Salix lucida Muhl.

On 1 July, a few were found towards the centre of "Willow Island" rising above the other willows.

Scouler's Willow

Salix scouleriana J. Barratt ex Hook.

On 4 July, a single plant was found on the Irrigation Creek Unit in open Ponderosa Pine forest.

LOASACEAE

Blazing Star

Mentzelia laevicaulis (Dougl. ex Hook.) T. & G.

On 2 July, a number of plants were found in bloom along McIntyre Creek Road edge in the Northeast Unit of the NWA (Figure 39).



Figure 39. Blazing Star alongside McIntyre Creek Road edge on the Northeast Unit (Vaseux-Bighorn national Wildlife Area, 4 July 2003).

VIOLACEAE

Small White Violet

Viola macloskeyi Lloyd.

On 6 June, this violet was found in forested riparian habitat of the Irrigation Creek Unit.

BETULACEAE

Mountain Alder

Alnus incana L.

Mountain Alder was a common riparian shrub around the lake and slough edges, including the lagoons southwest of Vaseux Lake. It was also found in the riparian habitat adjacent to the old agricultural fields in the Northwest Unit of the NWA. It also occurred on "Willow Island" at the north end of Vaseux Lake.

Water Birch

Betula occidentalis Hook.

Water Birch had essentially the same distribution on the NWA as did Mountain Alder. It was restricted to the riparian habitats adjacent to the lake and sloughs of the valley bottom.

ULMACEAE

Siberian Elm

Ulmus pumila L.

Scattered individuals of this invasive exotic species had established on lower slopes of BC Parks land upslope from Highway 97 and possibly on the NWA; the trees had been recently girdled as a control measure.

URTICACEAE

Pennsylvania Pellitory

Parietaria pennsylvanica Muhl. Ex Willd.

On 5 June, this species was noted on the cliffs of the Northeast Unit overlooking Highway 97.

Stinging Nettle

Urtica dioica L.

Stinging Nettle was usually found in the moister areas near disturbance, such as along dikes, or in moist fields and riparian areas.

NYMPHAEACEAE

Yellow Pond-lily

Nuphar lutea ssp. *polysepala* (Engelm.) Beal
(*Nuphar polysepalum*)

A number of patches of Yellow Pond-lily were found along the east shore, at the north end of Vaseux Lake.



Figure 40. White Water-buttercup on "Loosestrife Island," Vaseux Bird Sanctuary (8 August 2003).

BERBERIDACEAE

Tall Oregon-grape

Mahonia aquifolium (Pursh) Nutt.

Tall Oregon-grape was found in all but the Southeast units of the NWA.

We found it associated primarily with riparian areas along the lakeshore (e.g. it was the dominant shrub on Hatfield's Island) or on the moist areas of the properties at the north end of Vaseux Lake. It was also found in a canyon with large boulders and talus, in a lush gully, in antelope-brush – needle-and-thread grass shrub-grassland and in open Ponderosa Pine forest.

RANUNCULACEAE

White Clematis

Clematis ligusticifolia Nutt.

White Clematis had a scattered distribution through the Northeast and West units of the NWA. It was most common along the riparian edge of the West Unit, including the lagoon edges, but was also found amongst the large boulder and talus habitats.

Blooms were noted around the end of June and it had gone to seed by early August.

Upland Larkspur

Delphinium nuttallianum Pritz. ex Walpers

Upland Larkspur had a relatively scattered distribution on all but the Northeast Unit and the valley bottom properties north of Vaseux Lake.

It occurred in both the BGxh1 and PPxh1 variants. In the former, it frequented the antelope-brush – needle-and-thread grass habitats, often with a ponderosa pine – antelope-brush component. In the PPxh1 variant, it was found in the ponderosa pine – antelope-brush, bluebunch wheatgrass – selaginella, and the big sagebrush – selaginella habitats.

It was in bloom from early May to mid-June.

White Water-buttercup

Ranunculus aquatilis var. *diffusus* With.

This aquatic buttercup was fairly common in the shallow waters at the north end of Vaseux Lake around "Loosestrife" (Figure 40) and "Willow" islands and along the Typha marsh edge and channels to the northeast. Occasionally, large beds were noted.

Blooms were recorded from late June to early August.

Shore Buttercup

Ranunculus cymbalaria Pursh

Shore Buttercup was found on "Loosestrife Island" and on tiny, goose-grazed sand bars around both "Loosestrife" and "Willow" islands that had been recently inundated.

Blooms were noted in early July.

Celery-leaved Buttercup

Ranunculus sceleratus L.

On 8 August, a few plants were found on a small sandy islet to the east of "Willow Island."

APIACEAE

Fern-leaved Desert-parsley

Lomatium dissectum var. *multifidum* (Nutt.) Mathias & Const.

We noted 2 occurrences of this species; 1 from the West Unit in open Ponderosa Pine forest and the other from the Southeast Unit amongst the rock outcrops in the ponderosa pine – selaginella habitat class.

Large-fruited Desert-parsley

Lomatium macrocarpum (Nutt. ex T. & G.) Coult. & Rose

This species was found once on 27 June on the Southeast Unit amongst rock outcrops of the ponderosa pine – selaginella habitat class.

Narrow-leaved Desert-parsley

Lomatium triternatum ssp. *triternatum* (Pursh) Coult. & Rose

This species was relatively more common on the NWA than the other *Lomatium* species.

It was found on the dry, open slopes of the grassland and open forest habitats as well as in areas of rock outcrops and talus.

Blooms were noted throughout May (Figure 41).

Water-parsnip

Sium suave Walt.

On 7 August, this species was found along the north bank of the small lagoon.

CORNACEAE

Red-osier Dogwood

Cornus stolonifera Michx.

(*Cornus sericea*)

Red-osier Dogwood was a common shrub of the West Unit and the properties at the north end of Vaseux Lake.

It occurred along the riparian edge of the lake and sloughs and in the moister areas of Hatfield's Island. It also occasionally occurred in moist draws and riparian areas in the open Ponderosa Pine forest or amongst boulders and talus at the base of cool canyons.

FABACEAE

Standing Milk-vetch

Astragalus laxmannii Jacq. var. *robustior* (Hook) Barneby & Welsh

On 25 June, a plant was found growing along the shoreline of the West Unit of the NWA.

Timber Milk-vetch

Astragalus miser Dougl. ex Hook.

We have 2 records of this species: 1 in bloom on 10 August from the bluebunch wheatgrass – selaginella habitat of the Northeast Unit and the other on 29 June from the ponderosa pine – antelope-brush habitat of the West Unit.



Figure 41. Narrow-leaved Desert-parsley on the West Unit (Vaseux-Bighorn National Wildlife Area (13 May 2003).

Woollypod Milk-vetch

Astragalus purshii Dougl. ex Hook.

This milkvetch had a scattered distribution over the exposed shrub-grasslands in the BGxh1 variant of the NWA. It was locally common on exposed grassy areas with deeper soils on the Northeast Unit of the NWA.

It was in bloom through early June; ripe seed pods were recorded in the latter half of that month.

Meadow Birds-foot Trefoil

Lotus denticulatus (Drew) Greene

This trefoil was found only on the Southeast Unit of the NWA in the PPxh1 variant. It was dominant in a rich meadow with seepage in ponderosa pine parkland with *Bromus hordeaceus* that was a component of big sagebrush – selaginella habitat. It also frequented the ponderosa pine – selaginella and the bluebunch wheatgrass – selaginella habitat classes.

Blooms were recorded from mid-May through to at least the end of June.

Silky Lupine

Lupinus sericeus Pursh

On 27 June, a few plants were found on the “Saddle” of the Southeast Unit of the NWA.

Alfalfa

Medicago sativa L.

A weedy species that was scattered along road edges and at disturbed sites. A few plants were found in the relatively natural areas of the NWA.



Figure 42. Ken Brock beside Purple Loosestrife stand on “Loosestrife Island” (Vaseux Lake Bird Sanctuary, 8 August 2003). The green “carpet” is Low Clubrush.

White Sweet-clover

Melilotus alba Desr.

This introduced species was sporadic to common along road edges, agricultural fields, and in waste or disturbed sites; it was occasionally found along the lakeshore.

It was in bloom from early July through early August.

Black Locust

Robinia pseudoacacia L.

One tree was found at the south end of the west dike by the Northwest Marsh Unit of the NWA.

GERANIACEAE

Common Stork’s-bill

Erodium cicutarium (L.) L’Hér.

Fairly common introduced species along the east dike adjacent to the Northeast Riparian Unit.

HALORAGACEAE

Siberian Water-milfoil

Myriophyllum sibiricum Kom.

This milfoil was relatively common in Vaseux Lake, the lagoons and river and in the sloughs in the northwest *Typha* marsh.

Keller (1978) reported Eurasian Water-milfoil (*M. spicatum*) on the NWA — and it may still be there — but the methodology we used would not necessarily have allowed us to detect it. However, declines of Eurasian Water-milfoil have been documented in the Okanagan valley since 1978 (including Vaseux Lake) as well as elsewhere in North America (Creed 1998). Creed suggests that a native, herbivorous weevil (*Euhrychiopsis lecontei*) may be an important agent in promoting or causing these declines.

LINACEAE

Western Blue Flax

Linum lewisii ssp. *lewisii* Pursh

(*Linum perenne*)

This introduced species had a sporadic distribution on the Southeast Unit of the NWA; we found it once in the open parkland forest of ponderosa pine – Doug-

las-fir – pinegrass and once in the open ponderosa pine – selaginella habitat with an antelope-brush – bluebunch wheatgrass component.

LYTHRACEAE

Purple Loosestrife

Lythrum salicaria L.

This abundant, invasive wetland species grows along the lake, lagoons and river edges, including dikes, and across moist, low-lying areas and islands (Figure 42) where tree cover is absent; likely in competition with some emergent vegetation such as *Typha latifolia*.

By 22 May, loosestrife shoots, with their multi-angled stems, were up to 30 cm tall amongst the *Typha* stands; blossoms were recorded from 24 June through 28 August.

ONAGRACEAE

Tall Annual Willowherb

Epilobium brachycarpum Presl.

On 5 June a plant was found on the Northeast Unit of the NWA on a west-facing, weedy slope.

Swamp Willowherb

Epilobium palustre L.

This plant was found in 3 locations between 1 July and 28 August: “Loosestrife Island,” just east of “Willow Island” on a newly-formed sandbar, and along the shore of the West Unit near the lake outlet.

It was in bloom throughout July and August.

Yellow Evening-primrose

Oenothera villosa Thunb.

On 1 July, a plant was found growing on the east dike, just above the waterline.

RHAMNACEAE

Snowbrush

Ceanothus velutinus Dougl. ex Hook.

A number of Snowbrush shrubs were found in the open Ponderosa Pine forest of the Irrigation Creek Unit; occasional plants were found on the talus slopes of the West Unit.

CRASSULACEAE

Stonecrop

Sedum lanceolatum Torr.

On 17 June, about 20 plants were observed scattered over a north-facing slope on the Northeast Unit of the NWA.

GROSSULARIACEAE

Squaw Current

Ribes cereum Dougl.

Squaw Current was a fairly common shrub on the NWA occurring in both the BGxh1 and PPxh1 variants. It was reported from all but the valley bottom properties at the north end of Vaseux Lake.

Squaw Current was most commonly found in the open, dry, rocky areas of the NWA, particularly at the base of talus slopes and amongst the antelope-brush – needle-and-thread grass and the bluebunch wheatgrass–selaginella habitats that contained rock outcrops as important components. It was also found in the open Ponderosa Pine forests with both Antelope-brush or Selaginella as strong components.

Blossoms were recorded from 18 May through 13 June and fruit was noted between 2 and 27 June.

HYDRANGEACEAE

Mock-orange

Philadelphus lewisii Pursh

We recorded Mock-orange in all but the Irrigation Creek Unit of the NWA. It was a fairly common riparian shrub along lake and slough edges as well as at the base of talus slopes in the drier, open areas of the NWA.

In the BGxh1 variant, it occurred in the antelope-brush – needle-and-thread grass and the saskatoon – mock-orange talus habitat classes. In the PPxh1 variant, Mock-orange was reported most often in the bluebunch wheatgrass – selaginella habitat with rock outcrops as an important component; other habitat types included ponderosa pine – selaginella and cliff and talus habitats with saskatoon – mock-orange as an important component.

Mock-orange blossoms were recorded from early May through mid-June (see Figure 50).



Figure 43. Sticky Cinquefoil in crevice of rock outcrop on Southeast Unit (Vaseux-Bighorn National Wildlife Area, 4 June 2003).

ROSACEAE

Saskatoon

Amelanchier alnifolia Nutt.

Saskatoon had a scattered and widespread distribution in a variety of habitats through all the units in the NWA in both the BGxh1 and PPxh1 variants.

In the BGxh1 it was found from the moister water birch – red-osier dogwood riparian areas along the lake edge to the dry antelope-brush – needle-and-thread grass, ponderosa pine – antelope-brush, and saskatoon – mock-orange talus habitats.

In the PPxh1 variant, saskatoon was found in the ponderosa pine – antelope-brush, ponderosa pine – selaginella, bluebunch wheatgrass – selaginella, and the saskatoon – mock-orange components of the moderate cliff habitats.

Blooms were noted through much of May and the fruit was being consumed by birds such as Cedar Waxwings by early June.

Wild Strawberry

Fragaria virginiana Duchesne

On 2 July, a few plants were found in the open Ponderosa Pine forest of the Irrigation Creek Unit of the NWA.

Large-leaved Avens

Geum macrophyllum Willd.

Large-leaved Avens was associated with riparian habitats at the north end of Vaseux Lake, such as along the sloughs of the northeastern properties and on “Willow Island,” as well as at “Verbena Point.”

Blooms were recorded from early May to the end of August.

Old Man’s Whiskers

Geum triflorum Pursh

On 27 June, a single plant was found in 1 of the vegetation plots on the Southeast Unit in the open Ponderosa Pine forest.

Oceanspray

Holodiscus discolor (Pursh) Maxim.

Ocean Spray was found on the Northeast Unit, on an open slope dominated by grasses and shrubs, and in the open Ponderosa Pine forests of the Irrigation Creek Unit.

Mallow Ninebark

Physocarpus malvaceus (Pursh) Kuntze

On 10 June, this shrub was recorded on an open site near the crest of a north-facing slope above a draw in the Northeast Unit of the NWA. Later, on 2 July, 1 was found in the open Ponderosa Pine forests of the Irrigation Creek Unit.

Common Silverweed

Potentilla anserina L.

Common Silverweed had a fairly common distribution in the Northwest Marsh and on “Loosestrife Island.”

It was in bloom in early August.

Sticky Cinquefoil

Potentilla glandulosa Lindl.

Sticky Cinquefoil was found on the Irrigation Creek, Southeast, and West units of the NWA. It

was most often found in the open Ponderosa Pine forests with Antelope-brush or Selaginella or in the Antelope-brush and Bluebunch Wheatgrass shrub-grasslands where rock outcrops were a component (Figure 43).

Blooms were recorded throughout June and into early July.

Sulphur Cinquefoil

Potentilla recta L.

This invasive exotic species had a sporadic distribution on the NWA and occurred mainly on disturbed sites.

Choke Cherry

Prunus virginiana L.

Choke Cherry was recorded from the Northeast, Southeast and West units of the NWA in both the BGxh1 and PPxh1 variants. In the former variant it was found in the antelope-brush – needle-and-thread grass habitat, often with a ponderosa pine – antelope-brush component. It was also found in the water birch – red-osier dogwood riparian habitat along the lakeshore and in the saskatoon – mock-orange habitat at the base of talus slopes.

In the PPxh1 variant, Choke Cherry was found in the ponderosa pine – antelope-brush and bluebunch wheatgrass – selaginella habitats, often with rock outcrop as an important component.

Blooms were recorded from mid-May through Mid-June



Figure 45. View of the Red-listed antelope-brush – needle-and-thread grass community and adjacent vineyards to the left, which were at one time, the same community (Northeast Unit, Vaseux-Bighorn National Wildlife Area; 5 June 2003).

Antelope-brush

Purshia tridentata (Pursh) DC.

Antelope-brush was a very common shrub in all the major units of the NWA, occurring in both the BGxh1 and PPxh1 variants.

Antelope-brush was a dominant species in the antelope-brush – needle-and-thread grass habitat class (Figure 44), which constitutes a majority of the BGxh1 variant on the Vaseux-Bighorn NWA. Antelope-brush – needle-and-thread grass is a provincially Red-listed plant community (BCSEE 2004) which has been lost primarily to urban and agricultural development (Figure 45).



Figure 44. Antelope-brush – needle-and-thread grass, a Red-listed community, on the West Unit (left; 29 June 2003) and the same type of community on the Northeast Unit (right; 27 August 2003) following the August 2003 fire on the Vaseux-Bighorn National Wildlife Area.



Figure 46. Small-flowered Woodland Star on the Southeast Unit, Vaseux-Bighorn National Wildlife Area (13 May 2003).

In the PPxh1 variant, Antelope-brush dominated in the ponderosa pine – antelope-brush, and bluebunch wheatgrass – antelope-brush habitats. It was also found in the bluebunch wheatgrass – selaginella, ponderosa pine – selaginella, and big sagebrush – selaginella habitats.

Antelope-brush is also important as a host species for the Behr's Hairstreak Butterfly, a COSEWIC species in the Threatened Category.

Antelope-brush was in bloom throughout much of May.

Prickly Rose

Rosa acicularis Lindl.

Prickly Rose was found in similar habitats as was Nootka Rose; however, it did not appear to be as common.

Nootka Rose

Rosa nutkana Presl

Nootka Rose had a fairly common but scattered distribution on all the units of the NWA. It was most common in the water birch – red-osier dogwood riparian habitat along the lake and lagoon edges of the West Unit and the riparian areas in the valley bottom north of Vaseux Lake. The Nootka Rose was also found associated with the saskatoon – mock-orange and ponderosa pine – selaginella habitat classes.

Blooms were reported around mid-May.

Red Raspberry

Rubus idaeus L.

On 2 July we found some plants in the Northeast Riparian Unit north of Vaseux Lake.

Blackcap Raspberry

Rubus leucodermis Dougl. ex T. & G.

On 2 July, we found some plants at the north end of the main slough in the Northeast Riparian Unit.

Thimbleberry

Rubus parviflorus Nutt.

On 20 May, we found a number of plants growing amongst large boulders and talus in a canyon on the south edge of the Northeast Unit.

SAXIFRAGACEAE

Round-leaved Alumroot

Heuchera cylindrica Dougl. ex Hook.

This alumroot was fairly common on the Northeast, Southeast, and West units of the NWA. It occurred on deep-soil slopes and near the base of rocky outcrops, in soil pockets mid-way up talus slopes, in the open antelope-brush – needle-and-thread grass shrub-grassland, and in the bluebunch wheatgrass – selaginella habitat with Big Sagebrush and rock outcrops as components.

Blooms were noted through much of May and by 12 June most flowers had already dried out.

Small-flowered Woodland Star

Lithophragma parviflorum (Hook.) Nutt. ex Torr.

This species was fairly common on all the units of the NWA with the exception of the bottomland properties at the north end of Vaseux Lake. In the BGxh1 variant, it was found only in the antelope-brush – needle-and-thread grass habitat. In the PPxh1, it was found in the ponderosa pine – selaginella (with Bluebunch Wheatgrass and rock outcrop components), ponderosa pine – antelope-brush, bluebunch wheatgrass – selaginella, and big sagebrush – selaginella habitats.

Blooms were noted from early May through mid-June (Figure 46).

VISCACEAE

Western Dwarf Mistletoe

Arceuthobium campylopodium Engelm.

This species was found growing on the branches of Douglas-fir throughout much of the NWA.

SANTALACEAE

Pale Comandra

Comandra umbellata (L.) Nutt.

On 28 June, a plant was found in a vegetation plot in antelope-brush – needle-and-thread grass grassland in the Northeast Unit of the NWA.

ACERACEAE

Douglas Maple

Acer glabrum Torr.

We noted this species specifically on rocky slopes of the northeast Unit of the NWA.

ANACARDIACEAE

Smooth Sumac

Rhus glabra L.

A common shrub along the lake edge and on the drier benches of the NWA as well as amongst and at the base of talus, on dry dike banks overhanging the river, and along dry roadsides and draws. The highest upland densities of Smooth Sumac were found on the Northeast Unit of the NWA.

Flowers were noted from 17 June; most had gone to seed by early August. We observed this to be an important nectar source for the Behr's Hairstreak Butterfly.

Poison Ivy

Toxicodendron rydbergii (Small ex Rydb.) Erskine (*Rhus radicans*)

Poison Ivy was a common shrub along the lake edge and other riparian habitats as well as along the dry bases of cliffs or at the base of talus slopes, and amongst rock outcrops (Figure 47), particularly on the Northeast Unit.

It was in bloom in late May and early June.



Figure 47. Poison Ivy on rock outcrop habitat of the Northeast Unit, Vaseux-Bighorn National Wildlife Area (14 May 2003).

ANIMALIA

Over 190 animal species were found on the Vaseux-Bighorn National Wildlife Area during the summer of 2003. Of those, 8 were listed as COSEWIC species in the Endangered, Threatened, or Special Concern categories and 19 were on the provincial Red- or Blue-lists.

Arthropoda

INSECTA

The following 30 insect species were found on the National Wildlife Area; 1 is a COSEWIC Threatened species and 2 are on the provincial Red or Blue Lists. With the exception of Behr's Hairstreak, which we made a concerted effort to find, these species were recorded only fortuitously.

Giant Mayfly

Hexagenia sp. Walsh

On 28 June, large numbers of the Giant Mayfly (Figure 48) were flying on the Northeast Unit at around 550 m elevation. The species is likely *H. limbata* (Serville).

California Darner

Aeshna californica Calvert

This dragonfly was fairly common throughout May, particularly near riparian and open grassy areas of the West Unit.



Figure 48. Giant Mayfly in the Northeast Unit of the Vaseux-Bighorn National Wildlife Area (28 June 2003).

Eight-spotted Skimmer

Libellula forensis Hagen

The Eight-spotted Skimmer was recorded from early June through early August in the marsh of the Northeast Unit, on "Loosestrife Island," and along the riparian shore and lagoons of the West Unit.

Variegated Meadowhawk

Sympetrum corruptum (Hagen)

On 21 June, a Variegated Meadowhawk (Figure 49) was recorded on the Northeast Unit of the NWA.



Figure 49. Variegated Meadowhawk (top; Northeast Unit; 21 June 2003) and Western Meadowhawk female (bottom; Northeast Unit; 11 August 2003) on the Vaseux-Bighorn National Wildlife Area.

Western Meadowhawk

Sympetrum occidentale Barteneff

The Western Meadowhawk (Figure 49) was recorded twice: 11 August on the northeast Unit and 28 August on the West Unit.

Dot-tailed Whiteface

Leucorrhinia intacta (Hagen)

On 19 June, a Dot-tailed Whiteface was seen on the West Unit of NWA in the small lagoon.

Western Tiger Swallowtail

Papilio rutulus Lucas

We have records of the Western Tiger Swallowtail from early June through the end of that month from the Northeast and West units of the NWA. This butterfly was seen nectaring on Mock Orange (Figure 50) and Showy Milkweed (see Figure 29).

Pale Swallowtail

Papilio eurymedon Lucas

The Pale Swallowtail was recorded from late May through the end of June in a field in the Northeast Riparian Unit and on the West Unit.

Spring White

Pontia sisymbrii Boisduval

On 16 May, a Spring White was found dead on the Southeast Unit of the NWA, following a brief but heavy hailstorm.

Becker's White

Pontia beckerii

Becker's White was recorded from the Northeast and West units of the NWA between 21 June and 28 August.

Sara Orangetip

Anthocharis sara Boisduval

Sara Orangetip was recorded between 10 and 23 May on the West and Irrigation Creek units of the NWA.

Clouded Sulphur

Colias philodice Godart

A Clouded Sulphur (Figure 51) was seen on 29 June on the West Unit of the NWA.

Behr's Hairstreak

Satyrium behrii (Edwards)

Ten Behr's Hairstreak adults were found between 16 and 29 June, all but 1 from the Northeast Unit of the NWA; a lone individual was found on the Southeast Unit.

We surveyed a number of areas of, what appeared to be, entirely suitable habitat on the West Unit over an 11-day period; however, no Behr's Hairstreaks were observed.

Little is known about the ecology of this species in British Columbia (Shepard 2000). In California, it overwinters in the egg stage. In British Columbia, a caterpillar has been found feeding on antelope-



Figure 50. Western Tiger Swallowtail Butterfly nectaring on Mock-orange on the Northeast Unit, Vaseux-Bighorn National Wildlife Area (10 June 2003).



Figure 51. Clouded Sulphur along the KVR right-of-way on the West Unit, Vaseux-Bighorn National Wildlife Area (29 June 2003).



Figure 52. Behr's Hairstreak butterflies nectaring on Smooth Sumac on the Northeast Unit of the Vaseux-Bighorn National Wildlife Area (left: 21 June 2003; right: 16 June 2003). Behr's Hairstreak is a Threatened species under COSEWIC.

brush and the adults are invariably found flying in the antelope-brush-bluebunch wheatgrass habitat, a Red-listed plant community (BCSEE 2004) and 1 of the most endangered ecosystems in Canada (Schluter et al. 1995).

In all but 1 instance, we found the Behr's Hairstreak adult (Figure 52) nectaring on Smooth Sumac. A lone individual was seen nectaring on Yarrow. In each of those cases, Antelope-brush occurred in significant amounts proximate to the nectaring sites.

The Behr's Hairstreak is a COSEWIC species in the Threatened Category (COSEWIC 2003); it also occurs on the provincial Red-list (BCSEE 2003).

California Hairstreak

Satyrium californica

On 27 June, we recorded a California Hairstreak nectaring on Yarrow (Figure 53) on the Southeast Unit of the NWA. The California Hairstreak also occurs on the provincial Blue-list (BCSEE 2004).

Gray Hairstreak

Strymon melinus Hübner

On 11 August, we recorded a Gray Hairstreak on the Northeast Unit of the NWA.

Spring Azure

Celastrina ladon (Cramer)

On 26 June, we recorded a Spring Azure on the West Unit of the NWA.

Northern Blue

Agriades glandon (Prunner)

On 4 June, a number of Northern Blues (Figure 54) were recorded on the "Saddle" of the Southeast Unit.

Arctic Blue

Lycæides idas (Linnaeus)

On 4 June, a few Arctic Blues were recorded on the "Saddle" of the Southeast Unit of the NWA.

Variable Checkerspot

Euphydryas chalcedona

We recorded the Variable Checkerspot on a number of occasions between 17 and 27 June in the Northeast and Southeast units.



Figure 53. California Hairstreak nectaring on Yarrow on the Southeast Unit, Vaseux-Bighorn National Wildlife Area (27 June 2003). The California Hairstreak is a Blue-listed species.



Figure 54. Male (top) and female Northern Blue on arrowleaf balsamroot leaf, Southeast Unit, Vaseux-Bighorn National Wildlife Area (4 June 2003).

Mylitta Crescent

Phyciodes mylitta

On 13 May and 4 June, we recorded a Mylitta Crescent on the West and Southeast units of the NWA, respectively.

Mourning Cloak

Nymphalis antiopa (Linnaeus)

The Mourning Cloak was recorded on the NWA between 10 May and 2 June. It was found on the West and Northwest units of the NWA.

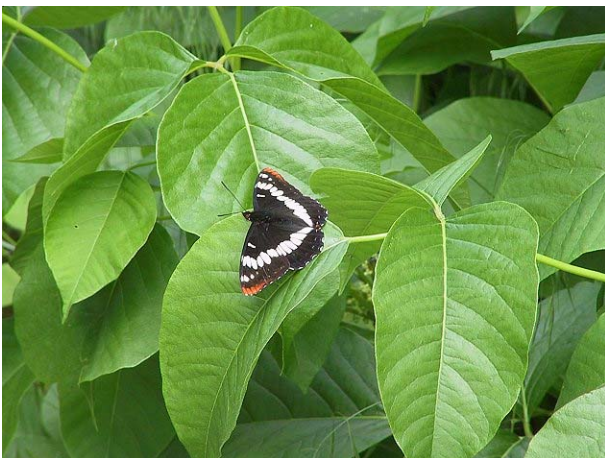


Figure 55. Lorquin's Admiral on poison ivy in the Northwest Unit of the Vaseux-Bighorn National Wildlife Area (2 June 2003).

Red Admiral

Vanessa atalanta (Linnaeus)

The Red Admiral was recorded on 2 occasions; both occurrences were in the first week of July. One was found in the Northeast Riparian Unit and another was seen in Vaseux Lake Provincial Park.

Lorquin's Admiral

Limenitis lorquini (Boisduval)

On 2 June, we recorded a Lorquin's Admiral resting on a Poison Ivy shrub on the Northwest Unit of the NWA (Figure 55).

Common Wood-Nymph

Cercyonis pegala Fabricius

The Common Wood-Nymph was recorded commonly throughout the latter half of June, particularly on the West and Northeast units of the NWA.

Great Basin Wood-Nymph

Cercyonis sthenele Boisduval

We recorded the Great Basin Wood-Nymph on 25 and 29 June on the West Unit of the NWA (Figure 56).

Common Ringlet

Coenonympha tullia Müller

On 12 June, a Common Ringlet was recorded nectaring on yarrow on the Southeast Unit of the NWA.



Figure 56. Great Basin Wood-nymph on the West Unit of the Vaseux-Bighorn National Wildlife Area (29 June 2003).



Figure 57. Praying Mantis on the Northeast Unit of the Vaseux-Bighorn National Wildlife Area (11 August 2003).

Common Alpine

Erebia epipsodea Butler

We recorded the Common Alpine on 14 and 26 May on the West and Northwest units, respectively.

Common Branded Skipper

Hesperia comma Linnaeus

On 27 June, we recorded a Common Branded Skipper on the Southeast Unit of the NWA.

Juba Skipper

Hesperia juba (Scudder)

On 16 June, one was found nectaring on Yarrow (see Figure 21) just south of the Northeast Unit.



Figure 58. Black Bullhead found dead in the main slough of the marsh in the Northwest Unit, Vaseux-Bighorn National Wildlife Area (12 June 2003).

Tawny-edged Skipper

Polites themistocoles (Latreille)

Throughout much of August, we recorded this species on the West and Northwest units of the NWA.

Praying Mantis

Mantis religiosa

On 11 August, a Praying Mantis was recorded just outside the Northeast Unit of the NWA (Figure 57).

Chordata

ACTINOPTERYGII

Five fish species were observed on the NWA during our fieldwork. Again, these animals were recorded fortuitously.

Black Bullhead

Ameiurus melas (Rafinesque)

On 12 June, a dead Black Bullhead (Figure 58) was found in the main slough in the marsh of the Northwest Unit of the NWA.

Common Carp

Cyprinus carpio Linnaeus

The Common Carp is an abundant fish of Vaseux Lake and the Okanagan River. It also occurs in the lagoons; however, it was not seen there as often as it was in the lake or the river channel.

On 3 June, hundreds of carp were observed spawning over "Loosestrife Island" during a period of high water when much of the island was inundated (Figure 59).

Peamouth

Mylocheilus caurinus (Richardson)

On 7 August, a dead Peamouth was found near the lake outlet.

Pumpkinseed

Lepomis gibbosus (Linnaeus)

The Pumpkinseed was commonly observed in the sloughs of the Northwest and Northeast Riparian units and particularly in the lagoons.



Figure 59. Spawning Common Carp on “Loosestrife Island.” (3 June 2003). Clockwise from lower left: ideal carp breeding habitat – heavily vegetated shallows; an adult carp in the shallows; several males and a female – males nudge the female with their head and fins to encourage spawning; egg laying and fertilization is accompanied by much thrashing and splashing as the adhesive eggs are scattered by the female.

During our visits to the lagoons in late-May and June, male Pumpkinseed would often be seen guarding the nests they had cleared amongst the algae on the lagoon bottom. They would dart away upon our approach but would quickly return to the centre of the nest, a circular patch of gravel, as they waited for the eggs to hatch.

Largemouth Bass

Micropterus salmoides (Lacepede)

The Largemouth Bass was a common sight during each of our visits to the lagoons throughout the study period.

AMPHIBIA

Only 2 species of amphibians were found on the National Wildlife Area, 1 a COSEWIC species in the threatened category.

Great Basin Spadefoot

Spea intermontana (Cope)

A Great Basin Spadefoot was heard calling from the northwest meadow on the evenings of 9 May and 12 June.

The Great Basin Spadefoot is listed in the Threatened Category by COSEWIC; it is also on the provincial Blue-list (BCSEE 2004).

Pacific Treefrog

Pseudacris regilla (Baird and Girard)

Hundreds of Pacific Treefrogs were heard in the evenings from 9 May through at least 12 June in the northwest marshes and the southern portions of the northwest meadow.

This species likely occurs throughout the north-east riparian habitat as well.

REPTILIA

Eight reptile species were found on the Vaseux-Bighorn National Wildlife Area during our fieldwork. Reptiles were encountered on every unit of the NWA with the exception of the Irrigation Creek Unit. Four of the species are listed by COSEWIC and 6 are on the provincial Red- or Blue-lists.



Figure 60. Western Yellow-bellied Racer in the Northeast Unit of the Vaseux-Bighorn National Wildlife Area (28 August 2003).

Western Skink

Eumeces skiltonianus (Baird and Girard)

We have 2 observations of the Western Skink, from or near the Southeast Unit of the National Wildlife Area.

The first was recorded on 9 May 2003 by Mike Sarell during a routine search for reptiles in the bluebunch wheatgrass – selaginella habitat class of the BGxh1.

The second sighting was of the mummified remains of an animal found underneath a rock on TNT property just adjacent to the NWA. This rock outcrop habitat was in the selaginella – big sagebrush habitat class of the PPxh1.

The Western Skink is listed in the Special Concern category by COSEWIC; it is also on the provincial Blue List (BCSEE 2004).

Western Yellow-bellied Racer

Coluber constrictor mormon Baird and Girard

Eleven occurrences of the Western Yellow-bellied Racer (Figure 60) were recorded from a variety of habitats within the National Wildlife Area. All but 2 were from the BGxh1 variant.

This fast-moving reptile was found in the following BGxh1 habitat classes: antelope brush – needle-and-thread grass (4 individuals), talus (2), water birch – red-osier dogwood riparian (1), cultivated field dyke edge (2); in the PPxh1, rock outcrops (1) and bluebunch wheatgrass – selaginella (1) habitat classes were used.

The Western Yellow-bellied Racer is on the Provincial Blue List due to the loss of low-elevation grasslands. Cannings et al. (1999) note that much of the habitat for this species consists of cattle-grazed grasslands. Thus the National Wildlife Area and the adjacent conservation lands provide habitat that is free from domestic grazers. These lands are important for both summering areas and hibernacula.

Northern Pacific Rattlesnake

Crotalis oreganus oreganus Holbrook

We have 11 sightings of the Northern Pacific Rattlesnake from every unit of the National Wildlife Area with the exception of Irrigation Creek.

Six individuals were found in the BGxh1 variant. Four were found in the antelope brush – needle-and-thread grass habitat class – one on a gravel road (Figure 61), 1 under an Antelope-brush shrub amongst the Cheatgrass, and 2 under a Giant Wildrye clump. One was found in the bluebunch wheatgrass



Figure 61. Large female Northern Pacific Rattlesnake (left) amongst talus in the southeast unit (Vaseux-Bighorn National Wildlife Area, 4 June 2003) and a smaller individual (right) on a gravel road near the northeast unit (Vaseux-Bighorn National Wildlife Area, 10 June 2003). The latter rattlesnake had been struck by a vehicle and died shortly after this photo was taken.

– selaginella habitat class under a rock; and 1 was found under a large boulder situated on a cross-dyke dividing a cattail marsh. Four more individuals were observed in the PPxh1 variant. Two were found in the ponderosa pine – selaginella habitat class, both in an area of talus (Figure 61); 1 in the saskatoon – mock-orange talus habitat class and 1 in the bluebunch wheatgrass – selaginella habitat class, the latter 2 were in rocky outcrop areas.

This snake ranged in elevation from the valley bottom near the lake to a talus slope in the southeast unit at about 744 m elevation. The latter site had an aspect of 320°.

Most of the snakes we found ranged between 40 and 60 cm in length. At the extremes, we had 1 young individual about 15 cm in length and a large female about 80 – 90 cm in length.

There are a number of hibernacula on the National Wildlife Area (M. Sarell, pers. comm.)

Direct persecution, road mortality (Figure 61), and habitat loss are the major threats to these animals. The Northern Pacific Rattlesnake is on the provincial Blue List and was listed by COSEWIC (2004) as Threatened in May 2004.

Desert Nightsnake

Hypsiglena torquata deserticola Tanner

Two Desert Nightsnakes were found on the National Wildlife Area by Mike Sarell. Both snakes were in the BGxh1 variant in a rocky outcrop area (selaginella – big sage habitat class) (Figure 62).

This is 1 of the least-often seen snakes in British Columbia due to its secretive, nocturnal habits. Agricultural and urban development, road mortality, talus removal, and direct persecution are the major threats to this species. Collectors are also a concern (M. Sarell, pers. comm.).

The Desert Nightsnake (Figure 63) is on the COSEWIC Endangered list; it is also on the provincial Red List (BCSEE 2004).

Great Basin Gophersnake

Pituophis catenifer deserticola Stejneger

We recorded the Great Basin Gophersnake (Figure 64) 3-times during our fieldwork; twice on the Na-



Figure 62. Desert Nightsnake habitat on the Vaseux-Bighorn National Wildlife Area (9 May 2003).



Figure 63. The Desert Nightsnake is a secretive, nocturnal reptile on the Vaseux-Bighorn National Wildlife Area (9 May 2003). The nightsnake is a nationally endangered species.

tional Wildlife Area and once on adjoining TNT conservation lands.

The gophersnake was found in both the BGxh1 (antelope brush – needle-and-thread grass and dry pasture habitat class) and PPxh1 (bluebunch wheatgrass – arrow-leaved balsamroot habitat class) variants.

On 1 occasion, one of us (FR) startled a gophersnake that was resting on a needle accumulation underneath a *Ponderosa* Pine; the snake took cover in adjacent water birch – red-osier dogwood riparian habitat by the lakeshore.

The gophersnake is listed in the Threatened category by COSEWIC and is pending public consultation for addition to Schedule 1 under the Species at Risk Act; it is also on the provincial Blue List (BCSEE 2004).

Intermountain Wandering Gartersnake

Thamnophis elegans vagrans Baird and Girard

We have 4 observations of this gartersnake on the National Wildlife Area, all from the area at the north end of Vaseux Lake. Three animals were found on the west side of the dyke adjacent to the northwest meadow and marsh and 1 was in a small open meadow adjacent to the water birch – red-osier dogwood riparian habitat.

The Intermountain Wandering Gartersnake is normally found near water where it forages for a variety of foods, including fish, amphibians, small mammals, and birds, all of which frequent the above fields and marshes.



Figure 64. The Great Basin Gophersnake is a nationally threatened species (The Nature Trust Emery property, 9 June 2003).

Valley Gartersnake

Thamnophis sirtalis fitchi Fox

The Valley Gartersnake (Figure 65) was recorded only twice, both times along the west edge of the dyke adjacent to the northwest meadow and marsh. This gartersnake also frequents aquatic areas to prey primarily upon amphibians.

Both this snake and the Intermountain Wandering Gartersnake were found together on the dyke edge along with the Western Yellow-bellied Racer. In each case, the snakes were basking in the mid-morning sun.



Figure 65. The Valley Gartersnake frequents the marshes and adjacent habitats of the Vaseux-Bighorn National Wildlife Area (9 June 2003).

Western Painted Turtle

Chrysemys picta bellii (Gray)

The Western Painted Turtle is a common denizen of the marshes at the north end of Vaseux Lake and the lagoons to the south. It was most often observed basking on logs (Figure 66) or branches along the lagoon edges or at the base of cattails adjacent to open water (Figure 67).

We have 36 records of the Western Painted Turtle totalling 54 individuals. Largest concentrations were in the small lagoon (29 animals) followed by the northwest marshes (14) (Figure 68).

St. John (2002) notes that ideal habitat for this animal includes “shallow aquatic areas with a muddy bottom and abundant plant growth, along with logs.

exposed cattail mats (Figure 67) and open banks for basking.” This is essentially a description of the marshes and lagoons frequented by the turtle on the NWA.

The animals we observed ranged from around 4 cm to an estimated 20 - 25 cm. We did not observe any hatchlings nor did we find any nest sites.

The Western Painted Turtle is on the Provincial Blue List, due primarily to loss of both their pond and nesting habitats (Cannings et al. 1999).



Figure 66. Four Western Painted Turtles basking in the large lagoon, southwest of Vaseux Lake (21 May 2003).



Figure 67. Western Painted Turtle basking at the base of cattails in the Northeast Riparian Unit marshes (Vaseux-Bighorn National Wildlife Area, 21 May 2003).

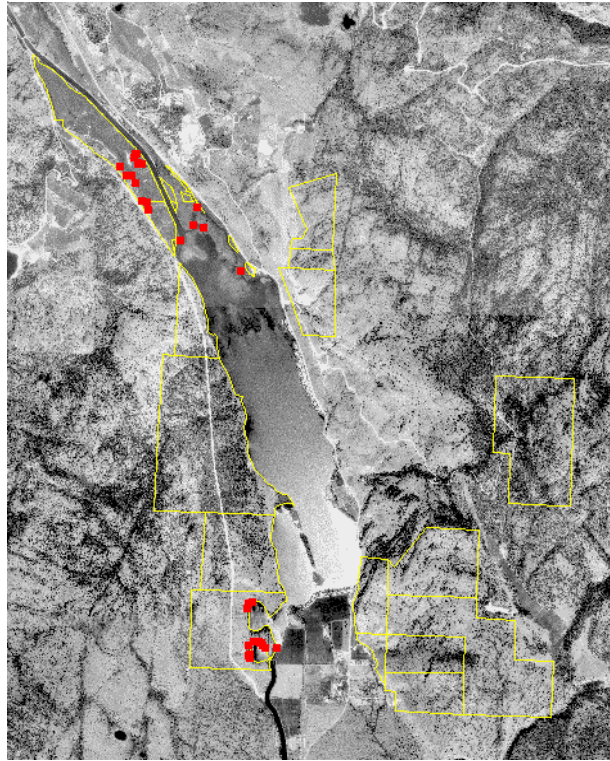


Figure 68. Locations of Western Painted Turtles observed during wildlife surveys on the Vaseux-Bighorn National Wildlife Area, 2003.

AVES

We recorded a total of 132 species of birds on the Vaseux-Bighorn National Wildlife Area during our fieldwork. Of those, 1 was a COSEWIC species of Special Concern, 2 were on the provincial Red-list, and 7 were on the provincial Blue-list (BCSEE 2004).

Common Loon

Gavia immer (Brünnich)

We have a number of observations of either 1 or 2 Common Loons on Vaseux Lake over the period 8 June through 29 August. Whenever 2 birds were seen they were obviously paired. Neither a nest nor young was found. The Common Loon was most often seen or heard near the north or south ends of the lake.

Pied-billed Grebe

Podilymbus podiceps (Linnaeus)

The Pied-billed Grebe was recorded on the NWA between 21 May and 29 August. All birds were seen or heard in the *Typha*-associated marshes and sloughs

at the north end of Vaseux Lake. On 8 August, a pair of grebes with 5 young-of-the year was seen.

Horned Grebe

Podiceps auritus (Linnaeus)

On 29 August, a single Horned Grebe was observed just south of "Loosestrife Island."

Red-necked Grebe

Podiceps grisegena (Boddaert)

Our first observation of a Red-necked Grebe was on 23 June although a pair was obviously on the lake well before that date.

A single adult bird, with a recently-hatched young on its back (Figure 69), was seen in a patch of Yellow pond-lily just south of the wildlife viewing area near Highway 97. This suggests that first eggs were laid around 1 June. On 9 July, an adult was observed flying to the south end of the lake and returning to the pond-lily patch with fish in its bill.



Figure 69. Red-necked Grebe with young in Yellow Pond-lily patch at Vaseux Lake (21 May 2003).

Cannings et al. (1987) note that lakes with fluctuating water levels, such as Vaseux Lake, are used less by this grebe than are lakes with more stable waterlevels.

Birds were reported up to 9 August.

American White Pelican

Pelicanus erythrorhynchos Gmelin

On the morning of 21 May, ACS and NKD observed 29 pelicans that had staged at the north end of Vaseux Lake. Shortly after the birds were observed, they lifted off the water and circled over the lake gaining altitude (Figure 70), then flew in a northerly direction. Undoubtedly these birds were on their way to Stum Lake in the Chilcotin Plateau. Later in the summer, on the morning of 14 August, 12 American White Pelicans were seen flying south over Vaseux Lake (Charlesworth 2003).

The American White Pelican is on the provincial Red-list.

Double-crested Cormorant

Phalacrocorax auritus (Lesson)

On 7 August, NKD and KB saw a solitary individual roosting on the small spit at "Verbena Point" on the West Unit of the NWA.

The Double-crested Cormorant is on the provincial Red-list.

American Bittern

Botaurus lentiginosus (Rackett)

On 8 May, NKD heard a bittern "booming" in the *Typha* marsh at the northwest end of the lake adjacent



Figure 70. Eight of a flock of 29 American White Pelicans shortly after leaving the north end of Vaseux Lake (21 May 2003).

to the old Kettle Valley Railway (KVR) right-of-way. This was the only time the species was recorded, despite attempts to elicit their response to recorded playbacks later in the season.

The American Bittern is on the provincial Blue-list (BCSEE 2004).



Figure 71. Great Blue Heron resting in the Northwest Marsh (Vaseux-Bighorn National Wildlife Area, 21 May 2003).



Figure 72. Great Egrets resting on “Loosestrife Island” at the north end of Vaseux Lake (29 August 2003).

Great Blue Heron

Ardea herodias herodias Linnaeus

The Great Blue Heron was seen fairly often from 6 May through 28 August, although not in large numbers. The most we saw at any one time was 2 individuals, although 6 herons were reported from the north end of Vaseux Lake on 14 August (Charlesworth 2003).

This heron was most often found in and around the *Typha* marshes at the north end of the lake (Figure 71) and near “Loosestrife Island.” It occurred less often along the shore of the West Unit, by the spit at “Verbena Point,” or the lagoons.

The Great Blue Heron is on the provincial Blue-list BCSEE 2004).

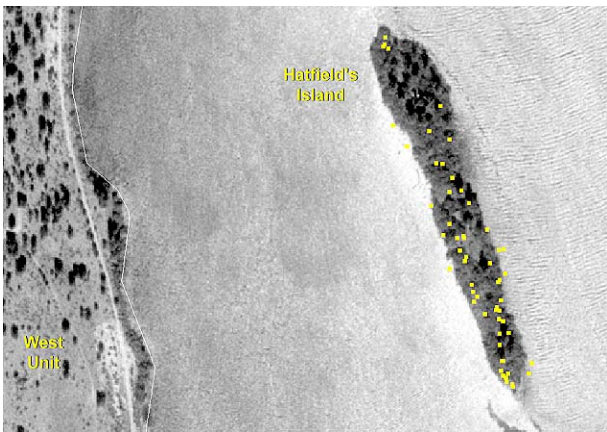


Figure 73. Approximate distribution of Canada Goose nests on Hatfield's Island, Vaseux Lake (8 May 2003).

Great Egret

Ardea alba Linnaeus

On 29 August, NKD and RB saw 2 Great Egrets at the north end of Vaseux Lake loafing on the north-west side of “Loosestrife Island” (Figure 72).

We were able to land our canoe on the south side of the island and crawl through the vegetation to get 5 photographs of the birds. Eventually, we were noticed and the egrets left the area flying north along the river.

Between 22 and 30 August, up to 4 Great Egrets had been reported from the Vaseux Lake area (Charlesworth 2003).

Black-crowned Night-Heron

Nycticorax nycticorax (Linnaeus)

Although we failed to record this species, an individual was reported on 10 July along the Okanagan River west dyke about half-way between the pumphouse and the lake (Charlesworth 2003).

The bird was seen by a number of people and remained in the area until at least 18 August.

Turkey Vulture

Cathartes aura (Linnaeus)

We have but 4 records of Turkey Vultures on the National Wildlife Area, all between 22 May and 5 June. Three were of birds soaring over the cliffs of the NWA units near the lake; 1 bird was seen over the north-west marsh.

Canada Goose

Branta canadensis (Linnaeus)

The Canada Goose is a common bird on Vaseux Lake and was found primarily at the north and south ends of the lake; it was also found in the river and along the river dykes as well as in the northwest fields and marshes.

The Canada Goose nests semi-collonially on Hatfield's Island, a 1.5 ha island at the south end of Vaseux Lake (Figure 73). The dominant vegetation is Ponderosa Pine with Water Birch, Red-osier Dogwood, Mountain Alder, and Wild Rose along the shore. The understory is dominated by Tall Oregon-grape with some Saskatoon and Common Snowberry.

On 8 May, NKD and Dave Smith, CWS, surveyed the Island and found a total of 55 nests (36 nests/ha) (Figures 73 and 74). Cannings et al. (1987) report a nesting density on the island as high as 96 nests/ha. All nests were found on the ground, despite the



Figure 74. The Canada Goose is a common species on Vaseux Lake; it nests semi-colonially on Hatfield's Island. Clockwise from upper left: an incubating hen on the nest amongst the dominant understory shrub on the island, tall oregon-grape (*Mahonia aquifolium*) (8 May 2003); a nest near the shore composed primarily of twigs, dead leaves and down (8 May 2003); an inland nest composed primarily of pine needles, bark, leaves and down (8 May 2003); 2-pairs with a mixed-brood of 28 mixed-aged young near the lake outlet (23 May 2003); 5-adult Canada Geese (only 4 clearly visible) and 26 young (one barely visible just above the second bird from the left) taking refuge from us and our canoe amongst the tall shrubs and grasses landward of the large lagoon (23 May 2003); adults and young-of-the-year near the southwest end of Hatfield's Island (28 August 2003).



Figure 75. Three Mallard young-of-the-year in the large lagoon southwest of Vaseux Lake (7 August 2003).

availability of a few, albeit dilapidated, nest platforms that had been installed in the trees. Nests close to the shore were composed primarily of twigs, dead leaves and down while inland nests were composed mainly of pine needles, leaves, bark and down (Figure 74).

Of those nests, 21 held clutches ranging from 1 to 10 eggs (1E-1; 2E-2; 3E-4; 4E-2; 5E-6; 6E-4; 7E-1; 10E-1), 10 of which had likely been abandoned. One nest held an incubating hen (Figure 74), which we did not bump from the nest. Thirty-three nests had already produced young.

One other nest was found on 13 May on the West Unit near the small spit at "Verbena Point." The nest had been depredated.

Adults and young frequented the dykes and fields at the north end of Vaseux Lake or the south end of the lake near Hatfield's Island, the lake outlet, and the large lagoon (Figure 74).



Figure 76. Hen mallard and 7 young with a drake Green-winged Teal in lagoon at the southwest end of Vaseux Lake (8 June 2003).

Wood Duck

Aix sponsa (Linnaeus)

We have 2 observations of this duck. On 8 June, a hen and 4 young around 2-weeks of age were seen in the main slough of the Northeast Riparian Unit. Another solitary bird was seen on 29 August near the *Typha* marshes by the Vaseux Wildlife Viewing Centre.

Gadwall

Anas strepera Linnaeus

On 15 May, 4 birds were seen in open water west of the observation tower at the north end of Vaseux Lake.

American Wigeon

Anas americana Gmelin

Wigeon were seen on 4 occasions (3 June-2; 8 Aug-2; 9 Aug-3; 29 Aug-2), all at the north end of Vaseux Lake. For the most part, the birds frequented the south end of "Loosestrife Island."

Mallard

Anas platyrhynchos Linnaeus

The Mallard was a common species often seen around the lake from early May through the end of August. Highest numbers were found in August (8 Aug-34; 29 Aug-25).

Between 21 May and 7 July we recorded 8 broods consisting of 2, 3, 4, 6, 7 (Figures 75 and 76), 8, 10, and 13 young.

Mallards were most often seen in and near the



Figure 77. Drake Blue-winged Teal and drake Green-winged Teal in the Northeast Riparian Unit slough, Vaseux Lake (8 June 2003).

Typha marshes at the north end of the lake and in the lagoons (Figure 75).

Blue-winged Teal

Anas discors Linnaeus

Through the study period, the Blue-winged Teal (Figure 77) was recorded 4-times, all from the north end of Vaseux Lake. Three of the sightings were of solitary birds in the sloughs on both sides of the river; 1 large flock of 20 birds was seen near "Loosestrife Island" on 29 August.

Cinnamon Teal

Anas cyanoptera Vieillot

We had 3-sightings of the Cinnamon Teal from the sloughs on both sides of the river north of Vaseux Lake. Five birds seen on 6 June in the sloughs east of the river was the largest number recorded.

Northern Shoveler

Anas clypeata Linnaeus

Seven Northern Shoveler drakes were seen near "Loosestrife Island" on 3 June.

Green-winged Teal

Anas crecca Linnaeus

The Green-winged Teal (Figure 77) is the more common of the 3 teal species that frequent the Vaseux Lake area. Most birds were seen at the north end of the lake in the riparian- and marsh-associated sloughs; they were occasionally found on the lagoons.

On 8 June, a nest with 9 eggs was found under a clump of Reed Canary Grass beside a dead wild rose stem (Figure 78). The nest in the Northeast Riparian Unit, was about 10 m from the slough near its northern terminus. A check of the nest on 2 July revealed that all eggs had hatched.

Redhead

Aythya americana (Eyton)

The Redhead was seen throughout the summer. It associated primarily with the marshes and sloughs at the north end of Vaseux Lake.

On 8 August, a female and 3 young-of-the-year were seen on Vaseux Lake just south of the wildlife viewing centre picnic area.

Lesser Scaup

Aythya affinis (Eyton)

On 15 May, 14 Lesser Scaup were seen at the north end of Vaseux Lake.



Figure 78. Green-winged Teal nest site on the Vaseux-Bighorn National Wildlife Area (8 June 2003). The nest was located at the base of a clump of reed canary grass (*Phalaris arundinaceae*) (top and middle) and contained 9 eggs (bottom)



Figure 79. The Osprey (top) is a common sight in the Vaseux Lake area (29 August 2003). Power poles were used by the Osprey as nest sites at both the north (bottom) and south ends of the lake (26 May 2003).

Hooded Merganser

Lophodytes cucullatus (Linnaeus)

A lone female was seen on 10 August in a small slough on the NW Unit near Jim Long's property.

Common Merganser

Mergus merganser Linnaeus

We have 3-observations of this merganser: 3 June: 5-drakes near the lake outlet; 25 June: drake and 2 hens at south end of Hatfield's Island; 10 August: 3 hens in river near entrance gate to NW Unit.

Ruddy Duck

Oxyura jamaicensis (Gmelin)

On 21 May, a drake Ruddy Duck was seen in the Northwest Marsh Unit.

Osprey

Pandion haliaetus (Linnaeus)

The Osprey (Figure 79) is a common raptor of the Vaseux Lake area and was seen throughout the summer from 13 May through 29 August.

Two active nests were found, both on power pole platforms (Figure 79).

Bald Eagle

Haliaeetus leucocephalis (Linnaeus)

The Bald Eagle was recorded from 10 May through 7 July; none were recorded after that date.

On 13 May, from some distance, ACS saw a lone adult break a branch off a ponderosa pine and take it



Figure 80. Inactive Bald Eagle nest on the West Unit of the Vaseux-Bighorn National Wildlife Area (left) and branches and debris below the nest (right) (14 May 2003).

to a nest south of the lagoons. We visited the nest on 23 May, which was 24 m up in a 24.6 m ponderosa pine (DBH 62 cm). The nest was inactive, although we did find 2 moulted eagle feathers and carp bones on the ground below the nest.

On 14 May, we found an older inactive nest on the West Unit (Figure 80). This nest was 27.4 m off the ground in a 30.4 m ponderosa pine (DBH 71.2 cm).

The Bald Eagle was seen mainly around the southern end of Vaseux Lake and the 2 lagoons further to the southwest.

Northern Harrier

Circus cyaneus (Linnaeus)

The Northern Harrier was seen on 3 occasions between 21 May and 3 June over the *Typha* marshes at the north end of Vaseux Lake.

Sharp-shinned Hawk

Accipiter striatus Vieillot

On 18 May, a Sharp-shinned Hawk, likely the same individual, was seen twice on the Southeast Unit of the NWA.

Cooper's Hawk

Accipiter cooperii (Bonaparte)

A Cooper's Hawk was seen on 4 occasions between 14 and 23 May. Sightings occurred twice on the West Unit of the NWA and once each on the Northeast and Southeast Units.

On 14 May an adult Cooper's Hawk was observed chasing after a low-flying Bald Eagle in the West Unit, suggesting the hawk may have been nesting nearby.

Red-tailed Hawk

Buteo jamaicensis (Gmelin)

The Red-tailed Hawk was seen on 4 occasions between 13 May and 5 June and again on 28 August.

This raptor was seen 3 times on the West Unit and once each on the Northeast and Southeast units.

Golden Eagle

Aquila chrysaetos (Linnaeus)

The Golden Eagle was seen on 3 occasions: 14 May-1 adult soaring over the cliff face at the north end of the West Unit; 4 June-1 adult being harrassed by American Crows over a cliff face on the Southeast

Unit; and 27 August-1 adult soaring over the Northeast Unit of the NWA.

American Kestrel

Falco sparverius Linnaeus

We recorded the American Kestrel in all units of the NWA with the exception of Irrigation Creek. Birds were noted between 10 May and 28 June. Nesting was not documented.

Chukar

Alectoris chukar (Gray)

The Chukar was only recorded on 3 occasions, all from or near the bluffs of the Northeast Unit of the NWA.

This introduced species appears to have declined in numbers, at least locally. Keller (1977) notes that the Chukar was 1 of the vertebrates he "consistently observed" in his "open range unit," which roughly equates to the BGxh1 variant: antelope-brush - needle and thread grass habitat class. We, in no way, "consistently observed" this species during our summer fieldwork in the Vaseux Lake area.



Figure 81. The California Quail is a common bird of the lower elevations on the Vaseux-Bighorn National Wildlife Area and the adjacent conservation areas (TNT Emery lands, 2 June 2003).



Figure 82. California Quail with 18 young on the TNT Emery conservation lands (2 June 2003).

Ring-necked Pheasant

Phasianus colchicus Linnaeus

We recorded the Ring-necked Pheasant 3-times, all from the West Unit of the NWA: 2 sightings from "Verbena Point" (15 May-1 bird; 25 June-2) and 1 from near the large lagoon (29 June-1).



Figure 83. Virginia Rail in the Northwest Marsh (26 May 2003). This adult bird was very agitated; however, a brief search for a nest or young turned out to be futile.

Ruffed Grouse

Bonasa umbellus (Linnaeus)

The Ruffed Grouse was heard "drumming" on 2 occasions, both from the Irrigation Creek Unit (15 May-1; 27 Aug-1).

Blue Grouse

Dendragapus obscurus (Say)

The Blue Grouse was recorded 3-times, twice from the Southeast Unit (16 May-evidence of a kill under Big Sagebrush shrub; 4 June-1) and once from the West Unit (25 June-adult with 2-half-grown young).

California Quail

Callipepla californica (Shaw)

The California Quail (Figure 81) is a common inhabitant of the Vaseux-Bighorn National Wildlife Area. We recorded the species a number of times between 13 May and 29 June from the West Unit and Northeast Unit and the adjacent conservation properties.

The California Quail was most often found in the BGxh1 variant associated with Antelope-brush.

On 6 June, a pair with 18 young were seen on the TNT conservation lands (Figure 82). Later, on 29 June we saw a quail pair with 15 young on the KVR right-of-way near the north end of the West Unit.

Virginia Rail

Rallus limicola Vieillot

The Virginia Rail (Figure 83) was a common inhabitant of the *Typha* marshes at the north end of the lake including the sloughs north of the wildlife viewing centre.

We have 14 records of 22 birds that we heard or saw over the period 8 May through 29 August.

On 21 May we found at least 1 young away from the nest and heard young amongst the *Typha* stands on a number of other occasions.

Sora

Porzana carolina (Linnaeus)

The Sora was also an inhabitant of the *Typha* marshes at the north end of the lake, although we have more records of the Virginia Rail than of this species.

Our records range between 8 May and 2 July. Although we have no records of young, this species undoubtedly nests on the NWA.



Figure 84. The American Coot favoured the marshes and open waters at the north end of Vaseux Lake (left) where it fed, loafed, nested and reared a number of young (8 August 2003). A young-of-the-year (right), feeding amongst the *Utricularia*-choked sloughs of the Northwest Marsh (9 August 2003).

American Coot

Fulicia americana Gmelin

The American Coot was commonly reported between 14 May and 29 August, primarily from the *Typha* marshes and open water at the north end of Vaseux Lake (Figure 84)

We have 5 breeding records for the American Coot in the Vaseux Lake area. On 21 May, ACS found a nest with 7 eggs and later that day NKD and ACS saw a pair of adults with 1 young recently out of the nest in the westernmost slough of the marsh. On 26 May, a young just out of the nest was found dead in the marshes and on 27 May an adult with young was recorded. On 9 August, an adult with 13 half-

grown young was seen in the westernmost slough of the northwest marsh (Figure 84).

Largest numbers were seen at the end of the summer: 29 August-137 birds around "Loosestrife Island."

Sandhill Crane

Grus canadensis (Linnaeus)

We have 2 records of the Sandhill Crane over the Vaseux Lake area, both of migrating birds.

On 23 May, a solitary bird was seen heading north over the lake (ACS; NKD). Later on 28 August, 24 cranes were seen flying south, high over the eastern units of the NWA (Figure 85) (NKD; RB).

The Sandhill Crane is on the provincial Blue-list.



Figure 85. A flock of 24 Sandhill Cranes flying south high over the eastern units of the Vaseux-Bighorn National Wildlife Area (28 August 2003).



Figure 86. The Killdeer is a fairly common summer bird of the Vaseux Lake area ("Loosestrife Island" 8 August 2003).



Figure 87. One of 3 Lesser Yellowlegs observed on “Loosestrife Island” at the north end of Vaseux Lake (8 August 2003).

Killdeer

Charadrius vociferus Linnaeus

The Killdeer (Figure 86) was seen throughout much of the summer between 26 May and 29 August.

With the exception of a solitary bird observed flying over the Northwest Marsh Unit, all sightings were from the “Loosestrife Island” mudflats.



Figure 88. Pectoral Sandpiper (left) and a Lesser Yellowlegs at the north end of Vaseux Lake (“Loosestrife Island” 8 August 2003).

Lesser Yellowlegs

Tringa flavipes (Gmelin)

Our only record of this species was on 8 August when 3 birds were seen on “Loosestrife Island” (Figures 87 and 88).

Spotted Sandpiper

Actitis macularia (Linnaeus)

The Spotted Sandpiper is a common summer bird around Vaseux Lake and was reported from 8 May through 7 August.

On 26 May, a bird was flushed from the dyke near the north end of the Northwest Marsh Unit and a fresh scrape was found on the dyke edge suggesting the bird was preparing to nest.

The Spotted Sandpiper was most often found near the lake or river shore, particularly north of the lake and along the western shoreline, including the lagoons.

Least Sandpiper

Calidris minutilla (Vieillot)

We have 1 record of 2 birds seen on “Loosestrife Island” on 8 August.

Pectoral Sandpiper

Calidris melanotos (Vieillot)

We have a record of 2 birds near “Loosestrife Island” on 8 August (Figure 88).

Long-billed Dowitcher

Limnodromus scolopaceus (Say)

On 8 August, 1 bird was seen at the north end of “Loosestrife Island.”

Wilson’s Snipe

Gallinago delicata

The Wilson’s Snipe was seen and heard regularly between 22 May and 11 June, “winnowing” over the northwest fields and marshes.

Bonaparte’s Gull

Larus philadelphia (Ord)

On 23 May, we saw 5-birds on Vaseux Lake near its northern end.

Ring-billed Gull

Larus delawarensis Ord

The Ring-billed Gull was seen regularly between 3 June and 29 August as 1 or 2 birds or in flocks of from 10 to 20 birds.

This gull was most often reported from the north end of Vaseux Lake, loafing on mudflats exposed by fluctuating lake levels.

Caspian Tern

Sterna caspia Pallas

The Caspian Tern was reported on 2 occasions: 19 June-1 (NKD; RB) flying over the river near the lagoons; 7 July-1 (NKD; Renate Sutherland) flying over Vaseux Lake near the provincial park.

The Caspian Tern is on the provincial Blue-list.

Rock Pigeon

Columba livia Gmelin

The Rock Pigeon was often seen throughout the summer flying over the bluffs on the Northeast and Southeast units of the NWA and occasionally on the exposed mud around "Loosestrife Island."

These feral birds undoubtedly nest on the bluffs; however, potential nest sites that we saw were inaccessible.

Mourning Dove

Zenaidura macroura (Linnaeus)

The Mourning Dove was a common species seen and heard throughout the summer in all the units of the NWA. It occurred in both the BGxh1 and PPxh1 variants, favouring the open Ponderosa Pine forests; it also frequented the Water Birch and Trembling Aspen riparian habitat along the lake edge and the former agricultural lands of the Northwest Unit.

Although no nests were found, the Mourning Dove undoubtedly nests on the NWA, particularly on the West Unit where most birds were reported.

Common Nighthawk

Chordeiles minor (Forester)

Our first record of a Common Nighthawk was on 3 June when a bird was heard calling from a Ponderosa Pine on the TNT's Emery property where we were

staying. We located the bird roosting on a branch directly above the deck of the old Emery house.

From then through 11 August, the Common Nighthawk was seen, or its nasal *peeent* heard, virtually every late afternoon and, at times, from every unit of the NWA.

Throughout the day, particularly at higher elevations, nighthawks would often be heard or seen in male-female chases or roosting on the branch of a Ponderosa Pine (Figure 89) or Douglas-fir. Their loud *vroooooom*ing display dives were also heard on a number of occasions during the day.

On 27 June, while climbing the bluffs on the Southeast Unit, we (NKD; RB; FR) were harrassed by a female Common Nighthawk as we reached an area just beyond the top of the bluff (Figure 90). We rested in the hopes that the female would return to the nest, which she subsequently did. Occasionally, a male would appear and chase the female for a few minutes. Then he would alight on a branch and call (Figure 90); however, all the defense of the nest seemed to be done by the female, including feigning injury to lure us away (Figure 90). When the female finally settled down, we went over to check the site and found she had been brooding 2 downy young. The young were about 3-4 days old suggesting that eggs were laid about 4 June.

The young were simply sitting on grasses that had bent to the ground (Figure 90). The site was protected by a grass clump to the east and a large rock to the west. It was relatively open to the north and south.



Figure 89. Common Nighthawk roosting on ponderosa pine branch on the Northeast Unit of the Vaseux-Bighorn National Wildlife Area (11 August 2003).



Figure 90. Common Nighthawk nesting habitat on the Southeast Unit (circle shows nest location) (top-left); Close-up of general nest site with two downy young just visible (centre-left in circle) (top-right); female Common Nighthawk feigning injured wing in an attempt to lure the observers away from the nest site (centre-left); male Common Nighthawk closely watching our actions near nest (centre-right); Common Nighthawk chicks in the nest (bottom-left and right) (Vaseux-Bighorn National Wildlife Area 27 June 2003).

Most Common Nighthawk sightings, other than observations of flyovers, were generally from open areas with scattered Ponderosa Pine and rock out-

crocks, such as bluebunch wheatgrass–selaginella or ponderosa pine – selaginella habitat classes common in the Northeast and Southeast units of the NWA.



Figure 91. Towering cliffs of the Northeast Unit of the Vaseux-Bighorn National Wildlife Area; “Loosestrife Island” is in the foreground (8 August 2003). White-throated Swifts are a common sight along these cliff faces as they wheel and dive in pursuit of their aerial prey or disappear into their nesting crevices.

Common Poorwill

Phalaenoptilus nuttallii (Audubon)

On the evening of 21 May, NKD and ACS saw a Common Poorwill on the drive leading to the Emery house on TNT Emery property.

White-throated Swift

Aeronautes saxatalis (Woodhouse)

We first recorded the White-throated Swift on 10 May and it remained a common sight and sound near the towering cliffs of both the Northeast (Figure 91) and Southeast units of the Vaseux-Bighorn National Wildlife Area; it was also found in smaller numbers along the cliff faces of the West Unit.

This swift nests in crevices in the cliffs around Vaseux Lake; however, few nests have been found (Cannings et al. 1987).

The White-throated Swift is on the provincial Blue-list (BCSEE 2004).

Black-chinned Hummingbird

Archilochus alexandri (Bourcier and Mulsant)

This hummingbird was seen occasionally throughout the summer at the feeders we had set up on the deck of the Emery House on the TNT conservation lands.

We did not record it on the NWA lands.

Calliope Hummingbird

Stellula calliope (Gould)

The Calliope Hummingbird was seen throughout much of the summer in all the NWA units with the exception of Irrigation Creek. It was most often seen on the Northeast Unit.

It came regularly to the feeders we had set up on the deck of the house on TNT Emery conservation lands (Figure 92).

Rufous Hummingbird

Selasphorus rufus (Gmelin)

The Rufous Hummingbird was seen sporadically from 14 May through 27 June. It, too, was reported



Figure 92. The Calliope Hummingbird occurred throughout much of the Vaseux-Bighorn National Wildlife Area. It was regularly attracted to feeders we had established (15 June 2003).



Figure 93. The Rufous Hummingbird was seen sporadically throughout the summer on the Vaseux-Bighorn National Wildlife Area. It was a fairly common visitor to the feeders we had established on the adjacent Nature Trust conservation lands (15 June 2003).



from all but the Irrigation Creek Unit of the NWA.

The Rufous Hummingbird was also attracted to the feeders we had set up on the TNT Emery property (Figure 93), although it was not as frequent a visitor as was the Calliope Hummingbird.

Belted Kingfisher

Ceryle alcyon (Linnaeus)

The Belted Kingfisher was a common sight from 8 May through 29 August. It was usually seen hovering or flying over the open waters of Vaseux Lake or perched along the riparian shore of the West Unit and the 2 lagoons southwest of Vaseux Lake. It also commonly occurred along the shores adjacent to the sloughs and marshes at the north end of Vaseux Lake and on Hatfield's Island.



Figure 94. Lewis's Woodpecker on nesting tree in the West Unit of the Vaseux-Bighorn National Wildlife Area (13 May 2003).

Lewis's Woodpecker

Melanerpes lewis (Gray)

We recorded this woodpecker from 13 May through 28 August. The Lewis's Woodpecker (Figure 94) was



Figure 95. This dead-topped Ponderosa Pine in the Antelope-brush grassland habitat of the West Unit served as a Lewis's Woodpecker nesting site (Vaseux-Bighorn National Wildlife Area 13 May 2003).

a fairly common species on the Vaseux-Bighorn NWA throughout the summer.

It was found in all but the Irrigation Creek Unit, preferring open parkland forest with rocky outcrops (ponderosa pine – selaginella habitat class) or shrub grassland (antelope-brush – needle-and-thread grass and bluebunch wheatgrass – selaginella habitat classes) with mature Ponderosa Pine for nesting or their flycatching perches.

We found 3 nesting sites, 2 on the NWA and 1 on adjacent conservation lands. All nests were in cavities in Ponderosa Pine trees; 1 in a living pine (15 m high), 1 in a dead-topped pine (7.6 m) (Figure 95) and 1 in a pine snag (22 m).

The Lewis's Woodpecker is considered of Special Concern by COSEWIC and is on Schedule 1 of the Species at Risk Act; it is also on the provincial Blue-list (BCSEE 2004).

Red-naped Sapsucker

Sphyrapicus nuchalis Baird

We have only 1 sighting of this woodpecker, that of an individual in the Irrigation Creek Unit on 4 July.

Downy Woodpecker

Picoides pubescens (Linnaeus)

We have only 2 sightings of the Downy Woodpecker, both in early May from the Northwest Unit of the NWA. One (22 May) was in the riparian habitat bordering the westernmost slough in the *Typha* marsh and the other was in the riparian habitat near the northwest end of the unit.

Northern Flicker

Colaptes auratus (Linnaeus)

The Northern Flicker was the most common woodpecker in the Vaseux Lake area. We recorded this woodpecker from 10 May through 28 August on all the units of the NWA.

In the PPxh1 variant, it favoured the parkland forest (ponderosa pine – antelope-brush and ponderosa pine – selaginella habitat classes) as well as the shrub grassland areas (bluebunch wheatgrass – selaginella and big sagebrush – selaginella habitat classes). Moist gulleys associated with the shrub grassland containing Trembling Aspen and Common Snowberry were also used. The flicker was also associated with cliffs in the saskatoon – mock-orange talus habitat class.

In the BGxh1 variant, the flicker was found most often in the antelope-brush – needle-and-thread grass habitat class but also used the talus areas (saskatoon – mock-orange habitat class) and the water birch – red-osier dogwood riparian habitats.

On 28 June, we found a pair of Northern Flickers entering a cavity that was about 2 m off the ground in a 3.7 m Douglas-fir snag. The birds were not carrying food and we could hear no sounds from the cavity entrance.

Western Wood-Pee wee

Contopus sordidulus Sclater

The Western Wood-Pee wee is the most common flycatcher on the Vaseux-Bighorn National Wildlife Area. It was seen or heard from 22 May through 28 August in all but the Irrigation Creek Unit.

In the BGxh1 variant, it was most often found in the antelope-brush – needle-and-thread grass habitat class; it was also found in the water birch – red-osier dogwood riparian habitat class.

In the PPxh1, it was most often found in the parkland forest (ponderosa pine – antelope-brush and ponderosa pine – selaginella habitat classes) followed by the bluebunch wheatgrass – selaginella and the bluebunch wheatgrass – arrow-leaved balsamroot shrub grassland habitat classes. The saskatoon – mock-orange talus habitat class was also used by this flycatcher.

On 30 June, we found a Western Wood-Pee wee on the nest (Figure 96) in a Ponderosa Pine by the Emery house on TNT conservation lands.



Figure 96. Western Wood-Pee wee on the nest on TNT conservation lands adjacent to the Vaseux-Bighorn National Wildlife Area (30 June 2003).

Willow Flycatcher

Empidonax trailii (Audubon)

The Willow Flycatcher was first heard on 2 June and was found regularly after that until 2 July.

This flycatcher was most closely associated with the riparian thickets alongside the slough running north from the northeast end of the lake. It was also heard regularly in the riparian habitat at "Verbena Point."

On 10 August, a Willow Flycatcher was seen feeding a fledged Brown-headed Cowbird young in the riparian thickets just north of the viewing area parking lot.

Hammond's Flycatcher

Empidonax hammondi (Xantus de Vesey)

We have 2 records of this flycatcher: 15 May-1 on the Irrigation Creek Unit and 20 May-1 on the Northeast Unit.

Dusky Flycatcher

Empidonax oberholseri Phillips

The Dusky Flycatcher was seen and heard from 14 May through 4 July. Most records were from the higher elevation, open ponderosa pine forests on the Irrigation Creek Unit; we had 2 observations from the lower elevation forests of the West Unit.

Pacific-slope Flycatcher

Empidonax difficilis Baird

One bird was heard on 2 June along the lakeshore near the northern end of the West Unit.

Say's Phoebe

Sayornis saya (Bonaparte)

The Say's Phoebe was an uncommon species on the NWA through the summer; it was reported between 16 May and 28 August.

On 20 May, ACS found an active phoebe nest that was built on a small rock ledge under a rock overhang (Figure 97). The nest was about 3 m above the ground; we were unable to determine its contents. It appeared to be constructed primarily of grasses and plant stems.

Most observations of this species were from the Southeast Unit of the NWA in the PPxh1 variant, including the nesting pair. The Bluebunch wheatgrass – selaginella and big sagebrush – selaginella habitat classes were used. We also have single reports of the Say's Phoebe from the Northeast Unit (saskatoon – mock-orange talus habitat) and West Unit (antelope-brush – needle-and-thread grass habitat).

Western Kingbird

Tyrannus verticalis Say

The Western Kingbird was seen occasionally between 26 May and 27 August in every unit with the exception of Irrigation Creek.

On 19 June, a female was seen on a nest in the top fork of a 36 m Ponderosa Pine. It was situated in the Antelope-brush grassland of the West Unit by the small lagoon.

This kingbird was most-often found in the antelope-brush – needle-and-thread grass habitat classes of the NWA. It also frequented the big sagebrush – selaginella and rock-talus habitats.



Figure 97. Say's Phoebe general nesting habitat (left; arrow points to nest ledge) and bird on the nest (right) on the Southeast Unit of the Vaseux-Bighorn National Wildlife Area (18 May 2003).

Eastern Kingbird

Tyrannus tyrannus (Linnaeus)

The Eastern Kingbird (Figure 98) was a common sight, principally on the valley floor, from 26 May through 28 August.

It was found primarily in the BGxh1 variant. There, riparian habitat and dyke edges at the north end of Vaseux Lake as well as the riparian habitat along the lake edge of the West Unit were its favorite haunts. It was also found in the big sagebrush – selaginella and saskatoon – mock-orange talus habitat classes.

We found a total of 5 nests. Four nests held eggs (3E-2; 4E-2); 1 nest had 3 young. All the nests were situated in sumac shrubs (Figure 98) and were built on horizontal branches overhanging the Okanagan River, 1 – 2 m above the water. Nests were constructed primarily of grasses, plant stems, and twigs. Two nests had some polypropylene string woven into the cup.

Cassin's Vireo

Vireo cassinii Xántus

The Cassin's Vireo was seen or heard from 10 May through 4 July, mainly from the West Unit and, to a lesser degree, the Irrigation Creek Unit of the NWA. It was heard once in the Southeast Unit.

This vireo frequented the open Ponderosa Pine forests in the PPxh1 variant. It was most often found in the ponderosa pine – antelope-brush habitat-dominated areas, although it also occurred in the ponderosa pine – selaginella and ponderosa pine – Idaho fescue habitats to a lesser extent. A few were found in the saskatoon – mock-orange talus, bluebunch wheatgrass – arrow-leaved balsamroot, and bluebunch wheatgrass – selaginella habitat classes.

Warbling Vireo

Vireo gilvus (Vieillot)

The Warbling Vireo was seen or heard in the study area from 15 May through 2 July in the West, North-west and Irrigation Creek units.

Unlike the Cassin's Vireo, which frequented the open pine forests, the Warbling Vireo preferred the deciduous riparian habitats such as those found at the north end of Vaseux Lake. It was also found in moist gullies that occurred in the open forest and the Antelope-brush grassland.

Steller's Jay

Cyanocitta stelleri (Gmelin)

The raucous call and dark blue flash of the Steller's Jay was heard or seen on the study area from 13 May to 28 August. It was found on all but the Southeast Unit of the NWA although the West Unit was used disproportionately more than any other unit.



Figure 98. The Eastern Kingbird (top) was a common nesting species in riparian habitats around Vaseux Lake. Sumac shrubs (bottom) were important nesting sites for this flycatcher (Vaseux-Bighorn National Wildlife Area, 26 June 2003).



Figure 99. The Clark's Nutcracker frequents the open ponderosa pine forests of the Vaseux-Bighorn National Wildlife Area (11 August 2003).

The Steller's Jay was reported from both the BGxh1 and PPxh1 variants, with the latter yielding more observations.

In the BGxh1 variant, it frequented the riparian birch – red-osier dogwood, the saskatoon – mock-orange talus and the antelope-brush – needle-and-thread grass habitat classes.

In the PPxh1 variant, the ponderosa pine – antelope-brush and ponderosa pine – selaginella habitat classes were most often used. Other habitat classes in the variant used less frequently included the

saskatoon – red-osier dogwood, antelope-brush – needle-and-thread grass, bluebunch wheatgrass – arrow-leaved balsamroot, and bluebunch wheatgrass – antelope-brush habitat classes.

Clark's Nutcracker

Nucifraga columbiana (Wilson)

The Clark's Nutcracker (Figure 99) was found in all the units of the NWA from 13 May through 11 August.

This species depends on large pine seeds, and thus its distribution within the NWA is tied closely to the Ponderosa Pine. It was found in both the BGxh1 and PPxh1 variants. In the former, it frequented the antelope-brush – needle-and-thread grass habitat classes; in the PPxh1 variant, the ponderosa pine – antelope-brush, ponderosa pine – selaginella, big sagebrush – selaginella, and bluebunch wheatgrass – selaginella habitat classes were used.

Black-billed Magpie

Pica pica (Linnaeus)

The Black-billed Magpie was a fairly common species, recorded on the NWA from 13 May through 27 August. It was found in all but the Irrigation Creek Unit.

The Black-billed Magpie was found in both the BGxh1 and PPxh1 variants. In the BGxh1 variant, it was observed most often in the antelope-brush – needle-and-thread grass habitat class; other habitat classes used by the magpie included water birch – red-osier dogwood riparian and saskatoon – mock-orange talus. In the PPxh1 variant, saskatoon – mock-orange talus, bluebunch wheatgrass – selaginella, big sagebrush – selaginella, and ponderosa pine – antelope-brush habitat classes were used.



Figure 100. The Black-billed Magpie (left) was a common sight on all but the Irrigation Creek Unit of the Vaseux-Bighorn National Wildlife Area (14 May 2003). Magpies nested throughout much of the area and recently-fledged young were seen as early as 26 May (right).



Figure 101. Nests of the Black-billed Magpie are bulky masses of twigs and sticks (Vaseux-Bighorn National Wildlife Area, 7 August 2003).

A number of active and old nests were found on the NWA. Three recently-fledged young (Figure 100) were found near 1 nest. Nests were a huge, domed mass of sticks and twigs up to 1 m high (Figure 101) and ranged from 2 to 5 m above then ground.



Figure 102. Recently-fledged Tree Swallow young (left) on the West Unit of the Vaseux-Bighorn National Wildlife Area (26 June 2003) and adult Tree Swallow (right) leaving nest cavity in a living Rocky Mountain Juniper (Vaseux Lake Provincial Park, 8 July 2003).

American Crow

Corvus brachyrhynchos Brehm

The American Crow was observed on the NWA from 8 May through 29 August, although it occurred in smaller numbers than the Black-billed Magpie.

Our records are mainly from the riparian areas at the north end of Vaseux Lake and on the small spit, Hatfield's Island, and the lagoon edges of the West Unit.

Common Raven

Corvus corax Linnaeus

The Common Raven was uncommon on the NWA over the study period. We have only 2 observations of this species: 13 May-2 near the large lagoon and 5 June-1 flying over the Northeast unit.

Tree Swallow

Tachycineta bicolor Vieillot

The Tree Swallow was seen between 6 May and 7 July, although in nowhere near the numbers of the Violet-green Swallow.



This swallow was most often found in riparian habitat near the valley bottom. We also found 2 nests. The first was on 25 June: a pair feeding an unknown number of young in a nestbox on Hatfield's Island. The second was on 8 July: a pair feeding 3-young in a cavity in a Rocky Mountain Juniper along the riparian shore of Vaseux Provincial Park (Figure 102). On 26 June, we found 2 recently-fledged young perched near the riparian habitat on the West Unit by the lake outlet (Figure 102).

Violet-green Swallow

Tachycineta thalassina Swainson

From 10 May through 2 July we found the Violet-green Swallow a very common species on the NWA.

It was occasionally seen in its aerial habitat foraging low over the Northwest Marsh Unit, "Verbena Point" and the lagoons of the West Unit, and Hatfield's Island. It was most often found around the rocky bluffs and cliff faces of the Southeast, West and, especially, the Northeast units where it was often in the company of White-throated Swifts.

On 5 June, a bird was seen carrying grasses to a crevice in a cliff face.

Northern Rough-winged Swallow

Stelgidopteryx serripennis (Audubon)

We have 1 record of this swallow: 19 June-1 bird flying over the river near the lagoons.

This species is common around Vaseux Lake especially during spring migration (Cannings et al. 1987); however, nesting habitat is the Vaseux Lake area appears to be somewhat limited.

Cliff Swallow

Petrochelidon pyrrhonota (Vieillot)

We recorded the Cliff Swallow only once: 28 August-1 flying over the south end of the lake, although they likely occur in this area more frequently than our findings (Cannings et al. 1987).

Barn Swallow

Hirundo rustica Linnaeus

The Barn Swallow was reported in small numbers from 26 May through 11 August near the agricultural areas near both ends of the lake; occasionally birds would be seen away from the valley bottom.

Black-capped Chickadee

Poecile atricapillus (Linnaeus)

The Black-capped Chickadee was a very common species on all the units of the NWA; it was regularly observed from 8 May through 28 August.

Most observations were from the riparian habitats of the BBxh1 variant associated with the sloughs at the north end of Vaseux Lake or those on the west side of the lake that formed part of the antelope-brush – needle-and-thread grass habitat class along the lake edge. Other habitat classes that were used quite frequently were the ponderosa pine – antelope-brush and the ponderosa pine – selaginella units. This chickadee was also found in the bluebunch wheatgrass – selaginella grassland and the saskatoon – mock-orange habitat classes.

On 29 June, we found adults bringing food to at least 2 nestlings; the nest cavity was in a birch stub about 1.8 m from the ground along the lakeshore of the West Unit.

Mountain Chickadee

Poecile gambeli (Ridgway)

We recorded the Mountain Chickadee between 14 May and 17 June in all but the Northwest Unit of the NWA.

The Mountain Chickadee was generally found at higher elevations than the Black-capped Chickadee; we have but 1 record of the Mountain Chickadee from the BGxh1 variant (antelope-brush – needle-and-thread grass habitat class). The rest were from the PPxh1 variant including the bluebunch wheatgrass – selaginella and big sagebrush – selaginella habitat classes followed by the ponderosa pine – antelope-brush and ponderosa pine – selaginella habitat classes. This chickadee was also found in the saskatoon – mock-orange talus habitat class.

Red-breasted Nuthatch

Sitta canadensis Linnaeus

The Red-breasted Nuthatch was recorded from 10 May through 27 August only in the PPxh1 variant of the Irrigation Creek and West units of the NWA, with 1 exception. A single bird was heard on Hatfield's Island. Most of the observations came from the West Unit.

Most birds were found in the open ponderosa pine parkland forests (ponderosa pine – antelope-brush habitat classes) and grassland (bluebunch wheatgrass – arrow-leaved balsamroot habitat class).

The saskatoon – mock-orange and the water birch – red-osier dogwood habitat classes were also used.

White-breasted Nuthatch

Sitta carolinensis Latham

The White-breasted Nuthatch was reported in smaller numbers than the Red-breasted Nuthatch. It was seen from 10 May through 28 August.

This nuthatch frequented much the same NWA units and habitats as did the Red-Breasted Nuthatch.

Pygmy Nuthatch

Sitta pygmaea Vigors

The Pygmy Nuthatch was the most common of the 3 nuthatches. It was found from 6 May through 28 August on all but the Northwest Unit of the NWA. It seemed to particularly favour the Southeast Unit of the NWA.

It was reported mainly from the PPxh1 variant where it frequented the parkland forests (ponderosa pine – antelope-brush and the ponderosa pine – selaginella habitat classes) and the shrub-grasslands (bluebunch wheatgrass - selaginella and big sagebrush – selaginella) in similar proportions. It was also reported from the saskatoon – mock-orange talus habitat classes.

In the BGxh1 variant, the antelope-brush – needle-and-thread grass habitat class was most often used.

We found 4 pygmy nuthatch nests; 2 with adults carrying food to the nest and 2 with adults entering and leaving the cavity. Three of the nests were in Ponderosa Pine snags (Figure 103) and 1 was in the dead top of a living Ponderosa Pine. Cavity entrance ranged from 4.3 to 18.3 m off the ground.

Rock Wren

Salpinctes obsoletus (Say)

The Rock Wren (Figure 104) was found from 20 May through 27 August only on the Northeast Unit of the NWA.

It was mainly associated with the cliff habitat classes as well as the bluebunch wheatgrass – selaginella habitat classes; both habitat classes had rock outcrops as important components.

Canyon Wren

Catherpes mexicanus (Swainson)

The Canyon Wren (Figure 105) was recorded from 10 May through 27 August in all but the Irrigation Creek and Northwest units of the NWA, anywhere



Figure 103. Pygmy Nuthatch at nest cavity entrance in ponderosa pine snag (Vaseux-Bighorn National Wildlife Area, 14 May 2003).

fractured cliff faces and large talus occurred. It was most common in the Northeast and West units where its cascading song was often heard ringing from the bluffs and cliffsides.

The Canyon Wren occurred in both the BGxh1 and PPxh1 variants, but principally in the latter. There, it was prominent in the cliff moderate, cliff high, and saskatoon – mock-orange talus, and talus habitat classes. The ponderosa pine – arrow-leaved



Figure 104. The Rock Wren was only found on the Northeast Unit of the Vaseux-Bighorn National Wildlife Area (20 May 2003).



Figure 105. Adult Canyon Wren (top left; 16 May 2003) on the Southeast Unit and two recently-fledged young (top right; 5 June 2003) on the Northeast Unit, Vaseux-Bighorn National Wildlife Area. A Canyon Wren nest was located in a crevice (yellow box) on this cliff face (bottom left) on the Northeast Unit. The nest (bottom right) was made primarily of twigs and mosses; arrow points to the bill of one of three young in the nest (20 May 2003).

balsamroot and the bluebunch wheatgrass – selaginella habitat classes were also used, where rocky outcrops had eroded or fractured into rubble, creating suitable habitat.

One nest with young and 2 families of recently-fledged young (Figure 105) were found, all on the Northeast Unit. The nest containing 3 young was found on 20 May in a crevice on a cliff face (Figure 105) in what appeared to be an old glacial meltwater

channel. The nest was 6 m off the ravine floor and was composed primarily of mosses and twigs (Figure 105). Also on 20 May, we found an adult feeding 3 recently-fledged young amongst large boulders at the base of the northeast cliffs. Later, on 5 June, we found a pair feeding 4 recently-fledged young amongst some large boulder rubble.

The Canyon Wren is on the provincial Blue-list (BCSEE 2004).

House Wren

Troglodytes aedon Vieillot

The House Wren was heard sporadically between 23 May and 4 June, primarily in the West Unit; we have 1 report from the Southeast Unit.

It occurred primarily in the PPxh1 variant using the ponderosa pine – antelope-brush and the saskatoon – mock-orange talus habitat classes. It was also recorded in the bluebunch wheatgrass – selaginella habitat class. In the BGxh1, the antelope-brush – needle-and-thread grass habitat class was used.

Marsh Wren

Cistothorus palustris (Wilson)

The Marsh Wren was only reported from the sloughs and *Typha* marshes on both sides of the river at the north end of Vaseux Lake. It was a common denizen there from 15 May through 1 July after which its loud chatterings were seldom heard.

Many nests of this species were observed; only a few were checked. On 21 May, 6 nests were checked. Two nests had eggs (5E-1; 6E-1), 1 nest had 4 young, and 3 newly-constructed nests were empty and may have been dummy nests. Another nest was checked on 1 July, which held 4 young; the young left the nest on our approach. All the nests were constructed in *Typha* or *Scirpus* stands (Figure 106) and were about 1 m off the water. Nest materials included primarily *Typha* leaves; *Typha* down was used for the nest lining.

Ruby-crowned Kinglet

Regulus calendula Linnaeus

The Ruby-crowned Kinglet is primarily a migrant through the Vaseux-Bighorn National Wildlife Area. It was only reported between 6 and 18 May and only from the higher elevations of the Southeast and Irrigation Creek units.

Western Bluebird

Siala mexicana Swainson

The Western Bluebird was an uncommon species on the NWA, found only on the Southeast Unit of the NWA in the PPxh1 variant. It was recorded between 16 May and 27 June.

It frequented the big sagebrush – selaginella and bluebunch wheatgrass – selaginella habitat classes in the shrub-grassland as well as the parkland forest habitat classes of ponderosa pine – selaginella with associated bluebunch wheatgrass – selaginella habi-



Figure 106. Marsh Wren nest in a *Typha* stand at the north end of Vaseux Lake (21 May 2003).

tat. All the habitat classes were also associated with rock outcrop – lichen habitat.

On 15 May, 6 young were found in a nestbox on the Irrigation Creek Unit (Figure 107).

Townsend's Solitaire

Myadestes townsendi (Audubon)

The Townsend's Solitaire was another uncommon species on the NWA, although we have sporadic



Figure 107. Western Bluebird young in nestbox on the Irrigation Creek Unit, Vaseux-Bighorn National Wildlife Area (15 May 2003).



Figure 108. The Cedar Waxwing was a common species in the riparian and saskatoon – mock orange habitats where an abundant source of fruit and berry shrubs such as Saskatoon and Squaw Current occurred. (Vaseux-Bighorn National Wildlife Area, 1 July 2003).

records of it from 15 May through 11 August and evidence of potential nesting. It was reported from the Irrigation Creek, Northeast, Southeast and West units of the NWA.

The Townsend's Solitaire was mainly found in the PPxh1 variant. There it utilized the bluebunch wheatgrass – selaginella and the big sagebrush – selaginella habitat classes. Rock outcrops were associated with some of those units. The ponderosa pine – selaginella habitat classes were also used.

On 7 July, a juvenile was seen in the BGxh1 variant (antelope-brush – needle-and-thread grass habitat class) associated with the riparian edge of the lagoons.

Veery

Catharus fuscescens (Stephens)

The Veery was heard from 6 June through 4 July in the Black Cottonwood, Red-osier Dogwood, willow riparian habitat at the north end of Vaseux Lake and by a riparian gully in the Irrigation Creek Unit.

American Robin

Turdus migratorius Linnaeus

The American Robin was a fairly common sight in every unit of the NWA from 6 May through 27 August.

It occurred in both the BGxh1 and PPxh1 variants. In the BGxh1 variant, it occupied the riparian habitat of the slough and lake edges, the antelope-brush – needle-and-thread grass and saskatoon – mock-orange talus habitat classes, and agricultural

fields. In the PPxh1, the robin used the ponderosa pine – antelope-brush, ponderosa pine – selaginella, and the big sagebrush – selaginella habitat classes.

On 20 May, a robin nest was found on a small shelf under a rock overhang on an open cliff face; the nest was about 8 m off the ground. An adult bird was pulling dried grasses from the nest and “throwing” them over the edge.

Gray Catbird

Dumetella carolinensis (Linnaeus)

The Gray Catbird was recorded on the NWA from 26 May through 9 August. It was a fairly common species in the riparian thickets along the sloughs and field edges at the north end of Vaseux Lake and in the West Unit in the riparian habitat adjacent to the lake, river, and lagoons.

European Starling

Sturnus vulgaris Linnaeus

The starling was recorded between 6 May and 7 August in all the units of the NWA, although not in large numbers.

It occurred in the BGxh1 (riparian and antelope-brush – needle-and-thread grass habitat classes) and the PPxh1 (ponderosa pine – selaginella, bluebunch wheatgrass – selaginella, and saskatoon – mock-orange habitat classes) variants.

On 18 May, an adult with fecal sac was observed leaving a cavity situated about 8 m from the ground in a Ponderosa Pine. Three other active nest cavities were found, 2 in a Ponderosa Pine and 1 in a Black Cottonwood.

American Pipit

Anthus rubescens (Tunstall)

On 13 May, 1 bird was seen by NKD and ACS on the West Unit at the small spit at “Verbena Point.”

Cedar Waxwing

Bombycilla cedrorum Vieillot

The Cedar Waxwing was found in all but the Irrigation Creek Unit of the NWA over the period 27 May through 7 August.

This waxwing was found primarily in the BGxh1 variant using riparian thickets along the sloughs and lake edge and the saskatoon – mock-orange talus where it was often seen feeding on Saskatoon and gooseberry fruits. The antelope-brush – needle-and-

thread grass habitat class was also used. In the PPxh1 variant, the big sagebrush – selaginella, bluebunch wheatgrass – selaginella, ponderosa pine – selaginella, and talus habitat classes were used.

Orange-crowned Warbler

Vermivora celata (Say)

We have only 2 records of this warbler, perhaps the same individual. Both observations were on 28 August from the small spit at “Verbena Point.”

Nashville Warbler

Vermivora ruficapilla (Wilson)

The Nashville Warbler was recorded from every unit of the NWA with the exception of the valley bottomland north of Vaseux Lake. Most of the records were between 6 and 20 May as birds moved through the valley.

This warbler was found mainly in the PPxh1 variant, using a variety of habitat classes including big sagebrush – selaginella and bluebunch wheatgrass – selaginella with associated rock outcrops.

Yellow Warbler

Dendroica petechia (Linnaeus)

The Yellow Warbler was a common species on the NWA, recorded from 14 May through 9 August. With the exception of 1 bird observed at the base of a cliff in the ponderosa pine – arrow-leaved balsamroot habitat class of the PPxh1 variant (West Unit), all observations of this warbler came from the BGxh1 variant.

Water birch – red-osier dogwood riparian habitats at the north end of Vaseux Lake and the riparian edges of the West Unit near the lake, including Hatfield’s Island and the river and lagoons were the dominant habitats used.

Yellow-rumped Warbler

Dendroica coronata (Linnaeus)

The Yellow-rumped Warbler was reported from all but the Northwest Marsh Unit and other areas north of Vaseux Lake and Northeast Unit of the NWA. It was seen or heard fairly regularly between 6 and 18 May after which we have 3 records from the end of June and 1 on 28 August.

This warbler was reported from both the BGxh1 and PPxh1 variants. In the BGxh1, the antelope-brush – needle-and-thread grass habitat class and particularly its associated water birch – red-osier dogwood

riparian habitat classes were used. In the PPxh1, the ponderosa pine – arrow-leaved balsamroot, ponderosa pine – selaginella, bluebunch wheatgrass – selaginella, and big sagebrush – selaginella habitat classes were used.

Townsend’s Warbler

Dendroica townsendi (Townsend)

The Townsend’s Warbler was seen or heard on all the NWA units except those bottomland areas north of Vaseux Lake. It was reported from 10 May through 5 June.

This warbler was prominent in the PPxh1 variant where it was found primarily in the ponderosa pine – antelope-brush, and ponderosa pine – Idaho fescue habitat classes. It was also found in the bluebunch wheatgrass – selaginella, big sagebrush – selaginella, and the saskatoon – mock-orange talus habitat classes.

A few records were from the BGxh1 variant (ponderosa pine – antelope-brush and ponderosa pine – bluebunch wheatgrass habitat classes).

Northern Waterthrush

Seiurus noveboracensis (Gmelin)

We have a few records of this warbler in early June, all from the water birch – red osier dogwood riparian habitat along the main slough of the Northeast Riparian Unit.

Common Yellowthroat

Geothlypis trichas (Linnaeus)

The Common Yellowthroat was seen or their *witchety-witchety-witchety* songs heard regularly between 22 May and 2 July. It was usually found in the *Typha* marshes and sloughs north of Vaseux Lake (Figure 109); occasionally it was found on “Willow Island.”

Wilson’s Warbler

Wilsonia pusilla (Wilson)

The Wilson’s Warbler was seen or heard from 15 May through 3 June, primarily in the riparian habitats at the north end of Vaseux Lake or along the lakeshore of the West Unit. It was also recorded in the riparian habitat adjacent to Irrigation Creek.

Three birds were also found in the drier areas of the West Unit in the ponderosa pine – antelope-brush, ponderosa pine – selaginella, and antelope-brush – needle-and-thread grass habitat classes.



Figure 109. Common Yellowthroat in the northwest *Typha* marshes, Vaseux-Bighorn National Wildlife Area (22 May 2003).

Western Tanager

Piranga ludoviciana (Wilson)

The Western Tanager (Figure 110) was a common summer bird on the Vaseux-Bighorn National Wildlife Area and was recorded from 14 May through 11 August.

It frequented all but the lowland properties north of Vaseux Lake but was most common in the parkland forests of the West Unit. There it favoured the ponderosa pine – antelope-brush habitat class of the PPxh1 variant. Other habitats there included the ponderosa pine – selaginella and, occasionally, the saskatoon – mock-orange talus habitat classes.



Figure 110. The Western Tanager is a common summer bird of the Vaseux-Bighorn National Wildlife Area (14 May 2003).

In the BGxh1 variant of the West Unit, the tanager was found in the antelope-brush – needle-and-thread grass, the water birch – red-osier dogwood riparian and the ponderosa pine – antelope-brush habitat classes.

On the east side units of the NWA, the Western Tanager was found in the bluebunch wheatgrass – selaginella, ponderosa pine – Idaho fescue, big sagebrush – selaginella, saskatoon – mock-orange talus, and the paper birch – common snowberry habitat classes of the PPxh1 variant. In the BGxh1, it was only found in the saskatoon – mock-orange talus habitat class.

Although nests or recently-fledged young were not found, the Western Tanager undoubtedly nests on the NWA.

Spotted Towhee

Pipilo maculatus (Swainson)

The Spotted Towhee was another common summer bird on the Vaseux-Bighorn National Wildlife Area. It was recorded between 10 May and 28 August from every unit of the NWA. It frequented both the BGxh1 and PPxh1 variants in about equal numbers.

In the BGxh1 variant, the Spotted Towhee was most often found in the water birch – red-osier dogwood riparian habitat class along the lake edge, particularly on the West Unit, followed by the antelope-brush – needle-and-thread grass, saskatoon – mock-orange talus, and the ponderosa pine – antelope-brush habitat classes.

In the PPxh1 variant it was most often found in the shrub-grassland habitats (bluebunch wheatgrass – selaginella and big sagebrush – selaginella habitat classes), followed by the ponderosa pine – antelope-brush, saskatoon – mock-orange, ponderosa pine – selaginella, and the bluebunch wheatgrass – antelope-brush habitat classes.

On 4 June, an adult male was found feeding 2 recently-fledged young on the Southeast Unit of the NWA and a young-of-the-year was seen on 19 June near the mouth of the small lagoon in the West Unit.

Chipping Sparrow

Spizella passerina (Bechstein)

The Chipping Sparrow, another common summer inhabitant of the NWA, was found on all but the properties in the valley bottom north of Vaseux Lake. It was recorded between 10 May and 4 July.

It was found in both the BGxh1 and PPxh1 variants although we have more than twice as many records from the latter variant.

In the BGxh1, it was found mainly in the antelope-brush – needle -and-thread grass habitat class followed by the ponderosa pine – antelope-brush and the ponderosa pine – bluebunch wheatgrass habitat classes.

In the PPxh1 variant, it was most often found in the ponderosa pine – antelope-brush and ponderosa pine – selaginella habitat classes followed by the bluebunch wheatgrass – selaginella and big sagebrush – selaginella habitat classes; a few were found in the saskatoon – mock-orange talus habitat class.

On 4 July in the Irrigation Creek Unit, an adult Chipping Sparrow was seen feeding a young-of-the-year.

Vesper Sparrow

Pooecetes gramineus (Gmelin)

We have but 1 record of this sparrow: an adult male was seen and heard on 4 June on the “Saddle” area of the Southeast Unit. The bird was found in the big sagebrush – selaginella habitat type of the PPxh1 variant.

It may seem unusual to have recorded so few Vesper Sparrows. Two reasons may account for this: 1) our arrival was well after the main Vesper Sparrow movement through the valley bottom (Cannings et al. 1987; Campbell et al. 2001) and 2) the big sagebrush grassland habitat that this sparrow seems to prefer for nesting in the Southern Interior is absent from most of the NWA. The only extensive area is the above noted “Saddle,” which is about 20 ha in areal extent and considerably moister than the drier and more extensive Big Sagebrush areas further south in the Oliver area or west in the White Lake basin. The next largest site on the NWA that holds any amounts of big sagebrush is just over 3 ha in size.

Savannah Sparrow

Passerculus sandwichensis (Gmelin)

The Savannah Sparrow appears to be primarily a spring and autumn migrant through the valley bottom as we recorded this species only on 26 May, 11 August and 29 August.

Song Sparrow

Melospiza melodia (Wilson)

The Song Sparrow is a common bird of riparian habitats on the Vaseux-Bighorn National Wildlife Area.

We have only 2 records of this sparrow away from the BGxh1 variant: 1) an individual frequent-

ing the saskatoon – mock-orange talus habitat type on the West Unit and 2) another using the big sagebrush – selaginella habitat type on the Southeast Unit.

The main habitat type used by this sparrow was the brushy water birch – red-osier dogwood riparian habitats found mainly along the sloughs north of Vaseux Lake and along the lakeshore of the West Unit. The Song Sparrow also used the former agricultural fields, river channel edges, and marsh edges of the Northwest Marsh Unit of the NWA.

On 22 May, an adult was seen carrying food (Figure 111) and on 25 June an adult feeding a recently-fledged young was found on Hatfield’s Island. Later, on 8 August, an adult was recorded along the west dyke near the northwest marshes, feeding a recently-fledged Brown-headed Cowbird.

Lincoln’s Sparrow

Melospiza lincolni (Audubon)

We have only 3 observations of this sparrow, all from May: 8 May-1 skulking along the north riparian edge of the large lagoon; 16 May-1 in the big sagebrush – selaginella habitat at the “Saddle” in the Southeast Unit; 26 May-1 at the extreme northern end of the riparian habitat on the west side of the northwest agricultural fields.

White-crowned Sparrow

Zonotrichia leucophrys (Forster)

We have but 1 record for the White-crowned Sparrow: 15 May-1 in the Irrigation Creek Unit of the NWA.

This sparrow moves through the valley bottoms the last 2-weeks of April and the first 2-weeks of May



Figure 111. A Song Sparrow with a beakful of larvae in a *Typha* stand on the Northwest Marsh (Vaseux-Bighorn National Wildlife Area, 22 May 2003).



Figure 112. A male Lazuli Bunting that frequented the Northeast Unit of the Vaseux-Bighorn National Wildlife Area (22 May 2003).

(Cannings et al. 1987). Since they do not regularly breed at low elevations here, and most had moved through the valley by the time of our field studies, it is not surprising that we didn't record more of these birds.

Dark-eyed Junco

Junco hyemalis (Linnaeus)

We have 3 records of juncos from the NWA: 14 May-2 on the West Unit; 15 May-2 on the Irrigation Creek Unit; and 20 May-1 on the Northeast Unit.

Most juncos that winter in the valley leave for higher elevations in March and April; only a few remain to breed at the lower elevations (Cannings et al. 1987).

There may be a few birds breeding on the NWA as 1 of the Irrigation Creek birds was seen carrying food.



Figure 113. The Red-winged Blackbird (female shown) is a common sight in the *Typha* stands of the Northwest Marsh (Vaseux-Bighorn National Wildlife Area, 29 August 2003).

Black-headed Grosbeak

Pheucticus melanocephalus (Swainson)

The Black-headed Grosbeak was recorded from 23 May through 2 July.

It was most often found in the BGxh1 variant. Habitat there included the water birch – red-osier dogwood riparian adjacent to the sloughs northeast of Vaseux Lake and the riparian lakeshore of the West Unit, particularly at “Verbena Point” and around the small lagoon.

A few birds were also found in the PPxh1 variant of the Northeast Unit in the bluebunch wheatgrass – selaginella and saskatoon – mock-orange talus habitat classes.

On 23 May, a pair of grosbeaks were observed on the West Unit along the west edge of the small lagoon; the female was carrying nesting material.

Lazuli Bunting

Passerina amoena (Say)

We recorded but 1 pair of Lazuli Buntings on the NWA, all from the antelope-brush – needle-and-thread grass and adjacent cliff moderate habitat classes of the Northeast Unit (Figure 112). The birds were only seen or heard from 20 May through 5 June.

Red-winged Blackbird

Agelaius phoeniceus (Linnaeus)

The Red-winged Blackbird was observed on the NWA between 15 May and 2 July.

This species was most commonly found in the *Typha* marshes and sloughs on both sides of the river at the north end of Vaseux Lake (Figures 113 and 114). Largest numbers occurred in the marshes west of the river: on 26 May, 21 birds were counted there. A small number of birds also frequented the *Typha* stands near the lake outlet and around portions of the large lagoon.

We found 22 nests over the period 8 May through 24 June. Most nest sites were in *Typha* stands, 1 was in a patch of *Phragmites communis*, 1 was in a mixed *Iris pseudachorus* and *Typha* cluster and 1 was in a *Scirpus* clump. Most nests were constructed of dried and shredded *Typha*; a few nests were constructed mainly of grasses. Nests were built an average of 0.85 m over water (range: 0.3 - 1.0 m).

We found 9 newly-constructed but empty nests, 12 nests with eggs (1E-4; 2E-4; 3E-2; 4E-1; 5E-1) and 1 nest with both eggs and young (2E-3Y).

Western Meadowlark

Sturnella neglecta Audubon

The Western Meadowlark was recorded on the NWA from 13 May through 29 June. This highly-vocal species could always be found in 2 or 3 places on the NWA but in very small numbers.

All but 1 record were of birds associated with the BGxh1 variant frequenting the antelope-brush – needle-and-thread grass habitat class. Most of those observations were from the Northeast Unit; 2 reports were from the West Unit, just north of the large lagoon. The 1 record from the PPxh1 was from the “Saddle” area of the Southeast Unit in the big sagebrush – selaginella habitat class.

While the Western Meadowlark is a common bird in the native grasslands of the Okanagan valley, they seem to prefer areas where scattered Big Sagebrush and Ponderosa Pine provide important singing perches. Big Sagebrush grasslands are a rare habitat type on the Vaseux-Bighorn National Wildlife Area.

Yellow-headed Blackbird

Xanthocephalus xanthocephalus (Bonaparte)

The Yellow-headed Blackbird (Figure 115) was a common denizen of the *Typha* marshes north of Vaseux Lake, particularly those west of the river. Birds were recorded from 10 May through 29 August.

“Yellowheads” were more abundant on the NWA than were “Redwings.” On 26 May, a scan over the main *Typha* marsh revealed a total of 21 male Yellow-headed Blackbirds. Their numbers notably increased throughout the summer as young birds were added to the population. On 29 June, many recently-fledged young were observed.

On 21 May, a Yellow-headed Blackbird nest was found in a small *Scirpus* stand north of the main *Typha* marsh. The nest was about 1 m above the water and was made of shredded *Scirpus*. It had just been completed and was empty.

Brewer’s Blackbird

Euphagus cyanocephalus (Wagler)

We have only 3 records of this blackbird from the NWA, all of solitary birds: 13 May-1 near the large lagoon of the West Unit; 2 June-1 by the marsh in the Northeast Riparian Unit; and 3 June-1 at “Verbena Point” on the West Unit.



Figure 114. Male Red-winged Blackbird on territory in the *Typha* stands of the Northwest Marsh (Vaseux-Bighorn National Wildlife Area, 19 June 2003).

Brown-headed Cowbird

Molothrus ater (Boddaert)

The Brown-headed Cowbird was first noted on 14 May and was a fairly common sight on the NWA



Figure 115. Male Yellow-headed Blackbird on territory in a *Scirpus* stand (Vaseux-Bighorn National Wildlife Area, 26 May 2003).



Figure 116. A newly completed Bullock's Oriole nest in a dead Douglas-fir in a dry gulch, an atypical nest site for this oriole on the Vaseux-Bighorn National Wildlife Area (5 June 2003).

through 4 July. It was found in all the units of the NWA where its host species were common.

On 8 August, a Song Sparrow was observed feeding a recently-fledged cowbird along the dyke in the Northwest Marsh Unit. Later, on 10 August, a Willow Flycatcher was seen feeding a recently-fledged cowbird in the riparian habitat adjacent to the sloughs northeast of Vaseux Lake.

Bullock's Oriole

Icterus bullockii (Swainson)

The Bullock's Oriole was a fairly common sight on the NWA from 14 May through 29 June. It frequented the water birch – red-osier dogwood riparian habitats at the north end of Vaseux Lake and along the lakeshore of the West Unit, particularly around the edges of both lagoons.

On 23 May, we found 5 newly-completed nests, 4 in Water Birch and 1 in a Mountain Alder, around the lagoons. Most nests were built 3 to 4 m overhanging water. On 5 June, a female was seen constructing a nest (Figure 116) on the Northeast Unit of the NWA. This nest was constructed in a dead Douglas-fir in a dry gulch, an atypical nesting site.

On 19 June, adults were seen by the lagoons feeding an unknown number of young in 2 nests. Both nests were built in water birches and were 7 and 8 m above the water. On 24 June, a female was seen leaving a nest that was 2 m above the river near the lagoons. The nest contained 3 eggs.

Cassin's Finch

Carpodacus cassinii (Baird)

The Cassin's Finch was a common summer bird on the NWA and was recorded from 16 May through 28 August.

It was most often found near the 2 lagoons on the West Unit but was also reported from the North-east and Southeast Units.

It frequented both the BGxh1 and PPxh1 variants. In the former the antelope-brush – needle-and-thread grass habitat class with its scattered pines was most often used. In the PPxh1 variant, the bluebunch wheatgrass – selaginella habitat type with subdominant areas of ponderosa pine – selaginella was most often used; other habitat types included ponderosa pine – antelope-brush and big sagebrush – selaginella.

On 17 June, a pair of adults was seen feeding 3 recently-fledged young in the Northeast Unit.

Red Crossbill

Loxia curvirostra Linnaeus

The Red Crossbill was found on all the NWA properties with the exception of those directly north of Vaseux Lake. It was recorded from 15 May through 27 August.

This nomadic species was found in both the BGxh1 and PPxh1 variants of the NWA. In the BGxh1, it frequented the ponderosa pine – selaginella habitat type as well as the scattered pines in the antelope-brush – needle-and-thread grass habitats.

In the BGxh1, this crossbill was most often found in the ponderosa pine – selaginella habitat types; other habitats included ponderosa pine – Idaho fescue, and the scattered pines in the bluebunch wheatgrass – selaginella and the big sagebrush – selaginella habitats.

On 18 May, 4 crossbills were seen feeding on the ripe seeds of Arrowleaf Balsamroot by landing on the stem and then "walking" up towards the flower head. On 23 May, a pair with 1 young-of-the-year was seen in the West Unit of the NWA.

Pine Siskin

Carduelis pinus (Wilson)

This erratic species was only seen from 14 to 23 May on the Vaseux-Bighorn National Wildlife Area. It is most common in the subalpine forests at higher el-

evations (Cannings et al. 1987), although a few do nest in the valley bottom. While here, the siskin was found only in the West, Southeast, and Irrigation Creek units of the NWA. It was found most often in the ponderosa pine – selaginella habitat classes.

American Goldfinch

Carduelis tristis (Linnaeus)

The American Goldfinch was a common summer bird on the NWA; it was recorded from 14 May through 28 August.

The American Goldfinch favoured the water birch – red-osier dogwood riparian habitats at the north end of Vaseux Lake and along the riparian lakeshore of the West Unit, including the lagoon areas and Hatfield's Island. It was occasionally found in the ponderosa pine – antelope-brush habitat of the BGxh1 variant and the ponderosa pine – selaginella and big sagebrush – selaginella habitat classes of the PPxh1 variant.

MAMMALIA

We recorded a total of 17 species of mammals on the Vaseux-Bighorn National Wildlife Area during our fieldwork. Of these, 1 was a COSEWIC species of Special Concern and 1 was on the provincial Blue-list.

Bighorn Sheep

Ovis canadensis Shaw

Bighorn Sheep were a fairly common sight throughout May and early June and again in August on the

Northeast and Southeast units of the National Wildlife Area and the adjoining conservation lands.

Ewes and lambs were often seen on the lambing cliffs of the Northeast Unit as well as on TNT's Emery property. On 18 May a bachelor herd of 5 rams was seen on the Southeast Unit just below (west of) the "Saddle" and on 24 May a herd of 12 rams was seen on TNT's Emery property (Figure 117). The largest number we recorded was a band of 17 ewes and lambs on 9 August on TNT's Emery property.

The Bighorn Sheep is on the provincial Blue List (BCSEE 2004).

Mule Deer

Odocoileus hemionus (Rafinesque)

The Mule Deer (Figure 118) and its sign, in the form of its oval bedding areas and its droppings, were a common sight throughout all the units of the NWA, from the islands in Vaseux Lake to the heights surrounding Eagle Bluff. Does and fawns were evident in June (Figure 119).

On 25 June, as we (NKD; RB) were paddling from Hatfield's Island to the small spit at "Verbena Point" to the northwest, we saw a doe Mule Deer running west along the shore. When she was about half-way along the shore, she stopped, turned, and began walking slowly back toward the east, eventually stopping behind some willows. Her gaze was fixed intently towards the spit. Within a few minutes of seeing the doe, an aircraft flew over, and despite the noise from the plane, we heard a loud cry from the shore just northwest of the spit. Shortly after, we saw 3 coyotes running along the shore to the northwest; the lead animal was carrying a fawn. As



Figure 117. Part of a bachelor herd of 12 Bighorn rams on The NatureTrust's Emery property, adjacent to the Southeast Unit of the Vaseux-Bighorn National Wildlife Area (24 May 2003).



Figure 118. Mule Deer buck in velvet on The NatureTrust's Emery property, adjacent to the Southeast Unit of the Vaseux-Bighorn National Wildlife Area (5 July 2003).



Figure 119. Mule Deer doe and fawns on The NatureTrust's Emery property, adjacent to the Southeast Unit of the Vaseux-Bighorn National Wildlife Area, 10 July 2003).

the coyotes moved along the shore, 3 American Crows began harassing the animals. The coyotes stopped along the shore for a moment while the crows continued their harassment from a Ponderosa Pine. Subsequently, there was a final cry from the fawn. As we paddled near, RB saw 2 of the coyotes running west up the hillside from the lakeshore. We landed and walked the shore edge to see if we could see signs of this drama but found nothing.

On 7 July, a partially eaten deer carcass was found under a Ponderosa Pine near the entrance to the small lagoon.

White-tailed Deer

Odocoileus virginianus (Zimmermann)

We did not see this species at all during our summer fieldwork. Keller (1977), however, notes that "O.



Figure 120. Bobcat looking down on Jenifer Penny who is about 15 m directly below the cat on the Northeast Unit (Vaseux-Bighorn National Wildlife Area, 5 June 2003).

virginianus frequented Unit 7 constantly."

Kellers "Unit 7," or his "Dry Bluff," occurred only on the east side of the lake and covered parts of both the Northeast and Southeast units of the NWA, specifically, the cliff, saskatoon – mock orange talus, big sagebrush – selaginella, bluebunch wheatgrass – sellaginella, antelope-brush – needle-and-thread grass, and ponderosa pine – selaginella habitat types of our study.

Moose

Alces alces

On 15 May, ACS noted some moose sign in the Irrigation Creek Unit of the NWA.

Mountain Lion

Puma concolor (Linnaeus)

On 16 May, ACS heard what he thought was the scream of a Mountain Lion coming from the forested area of Eagle Bluff, just above the "Saddle" of the Southeast Unit.

Bobcat

Lynx rufus (Schreber)

On 5 June, we (NKD; JP) heard a California Quail giving alarm calls from a brushy draw near the cliffs along the northwest edge of the Northeast Unit and thought perhaps a snake was in the area. As we moved toward the quail calls, a bobcat sprang up out of the brush and ran directly ahead taking cover amongst some shrubs.

JP was able to keep the bobcat in sight for some time while NKD lost sight of the animal amongst the shrubbery and could not locate the cat.

JP moved back to the base of the cliff to resume her search for plants; however, something caught NKD's eye directly over JP on the cliff bench above. It turned out to be another bobcat. This animal sat looking down at JP for a few moments (Figure 120) and then slowly ambled up the cliff, stopping every once in a while to look back at the photographer (Figure 121).

Northern River Otter

Lontra canadensis (Schreber)

The Northern River Otter was not seen during our summer fieldwork; however, its sign in the form of the characteristic spraints (Figure 122), tracks, and rolling sites (Figure 122), were evident, particularly along the dykes on both sides of the river at the north end of

Vaseux Lake. Sign was also recorded on the small spit at “Verbena Point” on the West Unit of the NWA.

The River Otter likely frequents much of the lakeshore including the 2 lagoons.

American Black Bear

Ursus americanus Pallas

The American Black Bear or its sign in the form of scat, overturned rocks, diggings at ant colonies, and claw marks on trees (Figure 123), were seen in every unit of the NWA between 14 May and 10 August. There were significantly more observations from the West Unit of the NWA than from any other unit.

We have 3 observations of the bear, all from the West Unit of the NWA. On 14 May, NKD saw a cinnamon bear just west of the KVR right-of-way. On 3 June, as NKD and JP were climbing up a steep talus slope, NKD saw a black bear looking down on them from the top of the slope. Hand clapping did not seem to affect the bear but after we yelled and waved, the bear quickly left the area. Our last bear sighting was of an individual seen by NKD and KB on 10 August (Figure 123) near the large lagoon. The bear was on a trail that runs from the KVR right-of-way to the large lagoon. We later saw this same individual near our vehicle on the KVR right-of-way upon returning from our fieldwork.

Coyote

Canis latrans Say

Coyote or its scats were found in every unit of the NWA from 13 May through 2 July.

Most observations were of sign; however, we



Figure 121. Bobcat stopping to look back at the photographer as it slowly ambled up the cliff face on the Northeast Unit of the Vaseux-Bighorn National Wildlife Area (5 June 2003).

did see coyotes on 2 occasions. On 13 May, NKD and ACS saw a coyote being harassed on the hillside north of the large lagoon by 4 Black-billed Magpies. Then, on 25 June, NKD and RB saw 3 coyotes with a fawn kill on the West Unit (see the Mule Deer account for details).



Figure 122. Characteristic Northern River Otter sign in the form of spraints (left) (half-way along west dyke north of Vaseux Lake, 26 May 2003) and rolling sites (right) (at south end of east dyke north of Vaseux Lake, 8 June 2003).

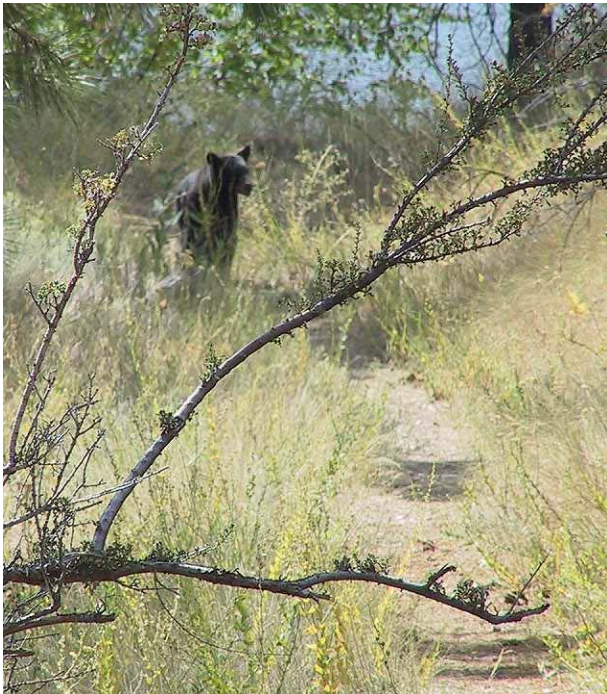


Figure 123. American Black Bear sign in the form of claw marks on a Ponderosa Pine (top) and diggings at ant colony (middle) (both 14 May 2003). Black bear along the trail from the KVR right-of-way to the large lagoon (Vaseux-Bighorn National Wildlife Area, 10 August 2003).

Deer Mouse

Peromyscus maniculatus (Wagner)

We trapped a number of Deer Mice from The Nature Trust house on the Emery property and it is likely they frequent grassland and woodland habitats of the NWA as well.

Meadow Vole

Microtus pennsylvanicus (Ord)

The Meadow Vole appeared to be confined to the marshes and meadows at the north end of Vaseux Lake, where runways, a nest, and individual animals were seen, although none was trapped.

Montane Vole

Microtus montanus

One individual, likely of this species (Dave Nagorsen, pers. comm.), was seen and photographed (Figure 124) on 16 May 2003 in the big sagebrush – selaginella habitat of the Southeast Unit of the NWA.

Common Muskrat

Ondatra zibethicus (Linnaeus)

The Common Muskrat or its sign was seen throughout the marshes at the north end of Vaseux Lake from 21 May through 29 August.

Most observations were of muskrat sign in the form of their lodges and fresh cut *Typha* and *Scirpus* stems floating on the surface of the water. One animal was seen at the south end of the lake near the lake outlet.



Figure 124. A vole, likely *Microtus montanus* in the big sagebrush – selaginella habitat of the Southeast Unit, Vaseux-Bighorn National Wildlife Area (16 May 2003).



Figure 125. Northern Pocket Gopher soil mound with burrow entrance plug discernable (Vaseux-Bighorn National Wildlife Area, 26 May 2003).



Figure 126. Yellow Pine Chipmunk on the West Unit of the Vaseux-Bighorn National Wildlife Area (23 May 2003). This individual, along with 3 others, were found in the ponderosa pine – selaginella habitat that held rocky outcrops as a sub-dominant habitat type.

American Beaver

Castor canadensis Kuhl

American Beaver and its sign were found from 8 May through 29 August on the NWA; most sightings were from the north end of Vaseux Lake.

Four lodges were found, 1 in the east bank of the river near its south end by the lake, another along the west shoreline near the north end of the lake and 1 in each of the large and small lagoons. Beaver sign was fairly common along the west shore of the lake and lagoons and relatively abundant on both Hatfield's and "Willow" islands.

On 2 June, we (NKD; JP) found a dead beaver near the south end the west dyke that bounds the northwest marshes.

Northern Pocket Gopher

Thomomys talpoides (Richardson)

Although we never saw this underground-dwelling rodent, we saw abundant evidence of its presence throughout the NWA in the form of newly-churned soil mounds and plugged burrow entrances (Figure 125). Fresh sign was found from 16 May through 11 August.

Pocket gopher sign was found in every unit of the NWA wherever suitable soil depth and consistency occurred. Gopher sites ranged from the former agricultural fields in the valley bottom at the north end of Vaseux lake to the bluebunch wheatgrass – selaginella grassland to the higher elevations of the big sagebrush – selaginella habitat on the "Saddle" in the Southeast Unit. More gopher sign was found in the Southeast Unit than in any other unit of the NWA.

Yellow-pine Chipmunk

Tamias amoenus Allen

The Yellow Pine Chipmunk (Figure 126) was found from 14 May through 27 August on every unit of the

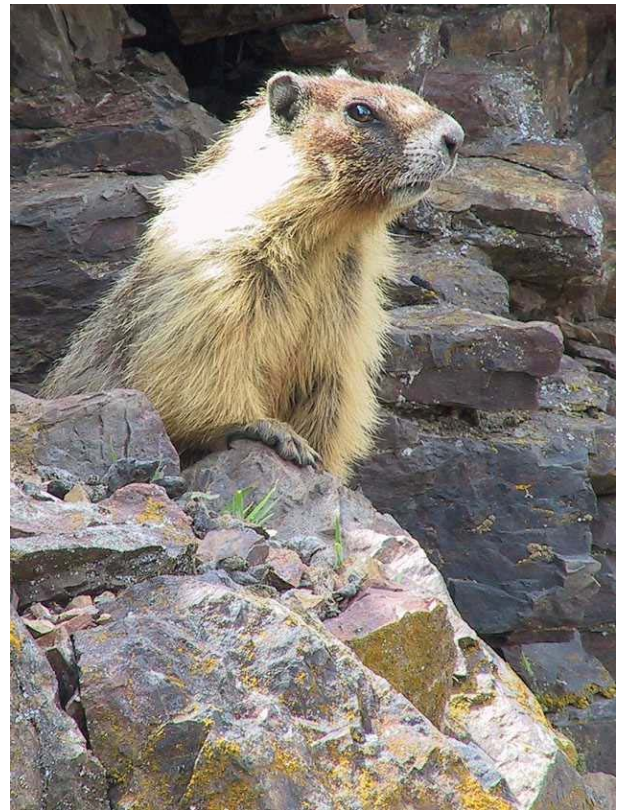


Figure 127. Yellow-bellied Marmot near the Northwest Marsh Unit of the Vaseux-Bighorn National Wildlife Area (2 June 2003). A number of individuals inhabited the rocky areas adjacent to the KVR right-of-way just south of the Long's Ranch.

NWA with the exception of those properties in the valley bottom north of Vaseux Lake.

This chipmunk frequented the ponderosa pine – selaginella, bluebunch wheatgrass – selaginella, ponderosa pine – antelope-brush, antelope brush needle-and-thread grass and the big sagebrush – selaginella habitat classes.

Yellow-bellied Marmot

Marmota flaviventris (Audubon and Bachman)

We only found the Yellow-bellied Marmot in 3 locations. Marmots were observed amongst the rocky outcrops alongside the KVR right-of-way south of Jim Long's property (Figure 127). They were also fairly common in the general area near the start of the driveway to the house on TNT Emery property conserva-

tion lands and along the field edge to the south. Marmots were also observed along McIntyre Creek Road north of the Northeast Unit of the NWA.

Mountain Cottontail

Sylvilagus nuttallii (Bachman)

The Mountain Cottontail is also known as Nuttall's Cottontail (*S. n. nuttallii*). On 9 May, we saw a Nuttall's Cottontail running downslope from us as we were making our way through some antelope-brush – needle-and-thread grass habitat on the Southeast Unit.

Nuttall's Cottontail is considered of Special Concern by COSEWIC and is on Schedule 3 of the Species at Risk Act; it is also on the provincial Blue-list (BCSEE 2004).

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