OPPORTUNISTIC *EFFERIA* N. SP. INVENTORY IN THE SOUTH OKANAGAN, 2009

By

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EXECUTIVE SUMMARY

Okanagan Efferia has not yet been officially described or named, but is on the Committee on the Status of Endangered Wildlife in Canada's (COSEWIC) Candidate List, where it is referred to as *Efferia* n. sp. This species is known only from the Okanagan and Thompson valleys, BC, Canada, where it occurs in bluebunch wheatgrass (*Pseudoroegneria spicata*) and antelope-brush (*Purshia tridentata*) habitats. In 2009, the BC Ministry of Environment, in cooperation with the BC Conservation Corps (BCCC) and the BC Conservation Foundation (BCCF), began a multi-species inventory initiative to increase the amount of inventory data for several species in the Okanagan. BCCC crew members were trained to identify robber flies and searched for *Efferia* n. sp. while conducting multi-species surveys in antelope-brush habitats. This was done on five different parcels of antelope-brush habitat during the species' flight period of May and early June. Nine *Efferia* n. sp. were detected during the field training day; no other *Efferia* n. sp. were observed in 2009.

ACKNOWLEDGMENTS

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INTRODUCTION

Okanagan Efferia has not yet been officially described or named, but a manuscript is in preparation (COSEWIC 2009). Okanagan Efferia is on the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) Candidate List, where it is referred to as *Efferia* n. sp. (this report will also refer to the species in this way). The production of a status report for this species is a high priority and will appear on the next call for bids (COSEWIC 2009). The species is known only from the Okanagan and Thompson valleys, BC, Canada, with records from Kamloops, Vernon, Vaseux Lake and Oliver (COSEWIC 2009). It occurs in habitats with bluebunch wheatgrass (*Pseudoroegnia spicata*), especially in antelope-brush (*Purshia tridentata*) habitats with sandy soils (R.A. Cannings, pers. comm.). Antelope-brush ecosystems are Red-listed in British Columbia (BC CDC 2009). *Efferia* n. sp. is thought to be more common than records suggest, and more inventories are required to improve distributional information and to assist with conservation status ranking (COSEWIC 2009).

In 2009, the BC Ministry of Environment, in cooperation with the BC Conservation Corps and the BC Conservation Foundation, began a multi-species inventory initiative. This project was designed to increase the amount of inventory data for several species in the Okanagan including tiger beetles (*Cicindela* spp.), several butterflies, Nuttall's Cottontail (*Sylvilagus nuttallii*), Lark Sparrow (*Chondestes grammacus*), and Grasshopper Sparrow (*Ammodramus savannarum*). A multi-species approach allowed surveyors to detect the presence of more than one target species while in the field. While conducting these surveys in May and early June, surveyors also included *Efferia* n. sp. in their search.

The objective for the *Efferia* n. sp. portion of the surveys was to search for the species while surveying in grassland habitats during the species' flight period of May-early June.

STUDY AREA

The multi-species inventories were conducted in the Okanagan valley and Boundary region, on selected provincial Crown lands including parks and protected areas, as well as on privately protected properties owned by the Nature Trust of BC (TNT). *Efferia* n. sp. was surveyed for on select antelope-brush / bluebunch wheatgrass habitat parcels in the south Okanagan valley, British Columbia; from Okanagan Falls to Oliver (Figure 1).

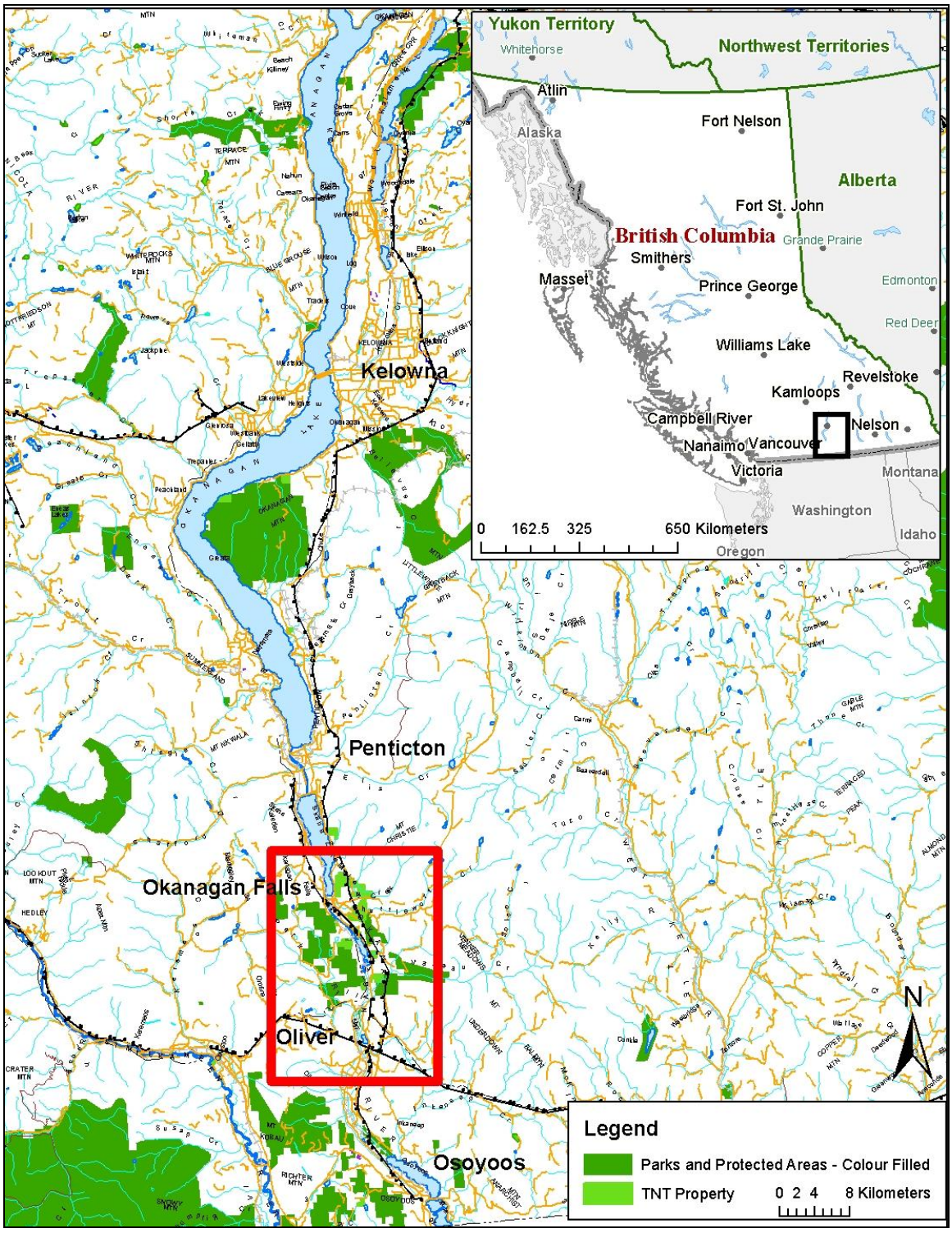

Figure 1. Study area within the south Okanagan Valley, British Columbia, where BCCC crew conducted searches for *Efferia* n. sp. during May and June 2009.

METHODS

BC Conservation Corps crew members were provided training in insect diversity and

inventory methods, voucher collection and pinning, and *Efferia* identification and catching by Rob Cannings, Curator of Entomology, Royal British Columbia Museum (RBCM). Notes on the identification characteristics of *Efferia* robber flies are presented in Appendix 1.

Inventory for *Efferia* n. sp. was conducted within a multi-species framework which allowed surveyors to target and detect multiple species at once. Wandering transects were used to inventory grassland habitats in the south Okanagan for a number of species. Wandering transects have no fixed direction, distance or speed, and allow surveyors to change course to target potentially suitable habitat that occurs sporadically across the landscape. While performing wandering transects targeting at-risk butterflies, tiger beetles and Nuttall's Cottontail pellets, surveyors also scanned for *Efferia* n. sp.. Inventories were not conducted during inclement weather.

Wandering transects and detections were recorded using handheld Garmin GPS (geographic positioning system) units (GPSmap 60Cx and GPSmap76Cx). Tracks, which consisted of a point placed automatically every 10 metres, were recorded for each surveyor and represent where surveyors searched within the larger site area. Weather conditions were also noted.

GPS waypoints and tracks were uploaded into Garmin MapSource Version 6.15 to be converted to Excel spreadsheets. These were then turned into shapefiles in ESRI ArcMap 9.2.

Surveyors used physical and behavioural characteristics described for robber flies to help detect them in the field. Robber flies have raptorial legs and prominent eyes which assist them in their predatory pursuit of flying insects (Cannings 1998). *Efferia* robber flies are strong fliers, but tend to not fly for great distances and can often be seen resting on the ground or on vegetation (R.A. Cannings, pers. comm.). As a robber fly is approached it will generally take off in flight and can be followed visually until it lands again. Robber flies make a buzzing sound while flying which can alert surveyors to their presence.

Surveyors targeted medium sized, grey/brown robber flies and used butterfly nets to catch them for closer examination. Surveyors were instructed to look for the presence of gold coloured hairs on the head of the robber fly, a characteristic of *Efferia* n. sp.. *Efferia* n. sp. could also be identified to sex in the field because of the obvious difference between the genitalia of the sexes (Cannings 1998); the end of the male's abdomen is club-like and rounded (Figure 3), while the female's is pointed (Figure 2). Furthermore, males have three white terminal abdominal segments. Robber flies that could not be identified in the field were photographed or collected as voucher specimens. These were later identified by R.A. Cannings.

RESULTS

Nine *Efferia* n. sp. were detected in 2009. These were all detected on the first training day, May 11, 2009, while surveyors were accompanied by Rob Cannings (Curator of

Entomology, RBCM), Orville Dyer (Wildlife Biologist, MoE) and other MoE employees for invertebrate inventory training. These detections included four females and five males. One of the females and three of the males were collected as voucher specimens that will be housed at the RBCM in Victoria, British Columbia (Figures 2-4).

Figure 2. Female *Efferia* n. sp. collected May 11, 2009. Specimen housed at the RBCM. Note the gold/brown coloured hairs on the top of the head, the long hairs on the front half of the thorax and the pointed end of the abdomen.

Figure 3. Male *Efferia* n. sp. collected May 11, 2009. Specimen housed at the RBCM. Note the gold/brown coloured hairs on the top of the head, the long hairs on the front half of the thorax, the rounded end of the abdomen and the three white segments at the end of the abdomen.

Figure 4. Male *Efferia* n. sp. collected May 11, 2009. Specimen housed at the RBCM. Note the gold/brown coloured hairs on the top of the head, the long hairs on the front half of the thorax, the rounded end of the abdomen and the three white segments at the end of the abdomen.

The training was conducted on a parcel of antelope brush habitat owned and protected by the Nature Trust of British Columbia (TNT) (Figure 5). The target *Efferia* were observed on a south facing slope above Vaseux Creek (Irrigation Creek) around the following location: 11/317513E/5459139N (NAD 83). Vegetation in the area included bluebunch wheatgrass (*Pseudoroegneria spicata*), antelope-brush (*Purshia tridentata*), sumac (*Rhus* sp.) and buckwheat (*Eriogonum* sp.).

Surveyors were in antelope-brush dominated habitats on four additional dates during *Efferia* n. sp.'s flight period (Figure 5). Details for these surveys are presented in Table 1. Other surveys in the multi-species approach were in sage (*Artemisia*) – bluebunch wheatgrass (*Pseudoroegneria spicata*) habitats (Table 2). These habitats are more commonly known for *E. coulei* during the timing of these surveys, and later for *E. benedicti*, nevertheless, surveyors were prepared to record any *Efferia* n. sp. encountered in these habitats.

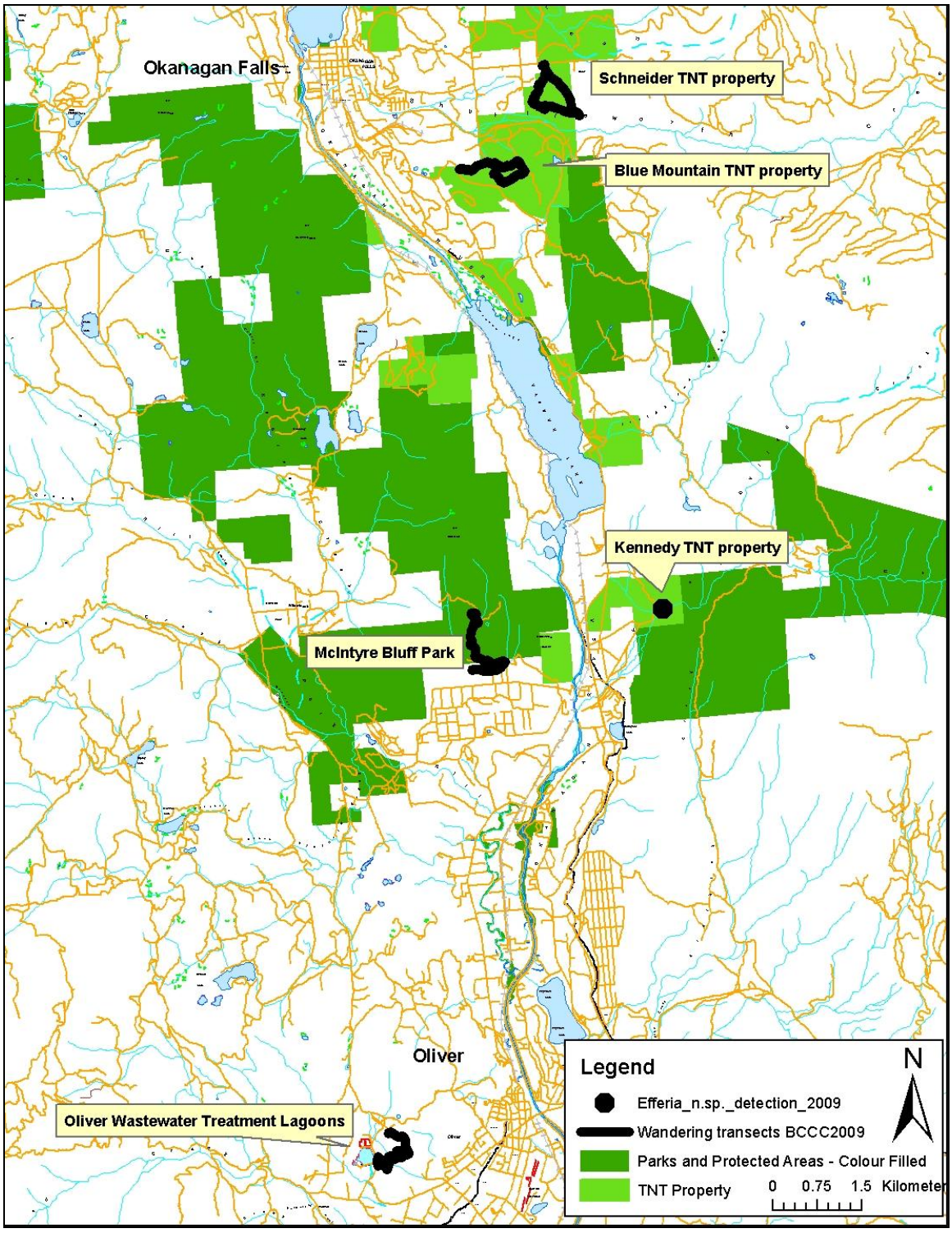

Figure 5. Wandering tracks of BCCC crew within antelope-brush habitats between May-June 2009. The training location where *Efferia* n. sp. was detected is also presented.

Table 1. Areas with Antelope-brush dominated habitats visited during May to early June (flight period of *Efferia* n. sp.).

Survey site name	**Date**	**Track length***	**Start Time**	**End Time**	**Weather** * at Start**	**Weather at End**	**Comments**
Schneider TNT property	May 20, 2009	2.9 km	12:35	16:30	Temp: 16 Wind: 1 Cloud: 3		Training day for Nuttall's Cottontail pellet surveys. Accompanied by Orville Dyer.
McIntrye Bluff	May 27, 2009	2.8 km	9:30	13:00	Wind: 2 Cloud: 2	Wind: 3 Cloud: 2	Multi-species search focused on Tiger Beetles. Accompanied by Leah Ramsay.
Blue Mountain TNT property	May 29, 2009	2.6 km	10:15	13:25	Temp: 24 Wind: 3 Cloud: 1	Temp: 30 Wind: 4 Cloud: 1	Multi-species search focused on Tiger Beetles. Accompanied by Orville Dyer and Leah Ramsay.
Oliver Wastewater Treatment Lagoons area	June 2, 2009	2.1 km	11:40	13:55	Temp: 27 Wind: 3 Cloud:1	Temp: 29 Wind: 3 Cloud: 1	Multi-species search focused on Immaculate Green Hairstreak and Nuttall's Cottontail.

* Track length indicates the length of the wandering transect of a single surveyor. At least two surveyors were always present.
** Temperature is measured in degrees Celsius. Cloud codes: 1 = clear; 2 = scattered clouds (<50%); 3 = scattered clouds (>50%); 4 = unbroken clouds.
Wind codes: 1 = light air; 2 = light breeze, leaves rustle; 3 = gentle breeze, leaves and twigs constantly move; 4 = moderate breeze, small branches move, dust rise; 5 = fresh breeze, small trees sway; 6 = strong breeze, large branches moving, wind whistling.

Table 2. Surveys within sagebrush – bluebunch wheatgrass grasslands as part of the multi-species approach during May to early June.

Survey Site Name	Date	Comments
White Lake Basin	12-May-09	Training day for invertebrate surveys. Accompanied by Rob Cannings, Orville Dyer and Jerry Mitchell.
	21-May-09	Immaculate Green Hairstreak (*Callophrys affinis*) survey.
	12-Jun-09	Surveys for Half-moon Hairstreak (*Satyrium semiluna*) were conducted on this date.
East Skaha Lake TNT	15-May-09	Surveys for tiger beetles were conducted on these dates.
	25-May-09	
SOGPA - North Kilpoola	01-Jun-09	Surveys for sparrows, Nuttall's Cottontail (*Sylvilagus nuttallii*), and Immaculate Green Hairstreak (*Callophrys affinis*) were conducted on this date.
SOGPA - East Chopaka	9,10-Jun-09	Population counts for Grand Coulee Owl-clover (*Orthocarpus barbatus*) were conducted on these dates
Osoyoos West Bench	11-Jun-09	

DISCUSSION

Efferia n. sp. were only detected on the field training day where surveyors were accompanied by an expert in an area known to be suitable habitat. These surveys were strictly presence/not detected; absence cannot be inferred, especially considering the multiple species targeted during the surveys. Additionally, surveys did not target all available antelope-brush habitats in the south Okanagan. The success of the surveys also was affected by the relative inexperience of the surveyors with robber flies and their preferred habitats.

Due to the multi-species nature of these surveys it is not possible to provide an accurate search effort for *Efferia* n. sp.. The distances and times presented in Table 1 include the entire survey time and make no attempt to separate area and time spent on this species alone.

These surveys were valuable in providing additional inventory effort for a species for which little is known. Nevertheless it is important to note that search effort was not systematic or intense for this species during the 2009 BCCC project.

RECOMMENDATIONS OR CONCLUSION

Given the paucity of data for this species and its association with an endangered ecosystem, further inventories are highly recommended. Future inventories should be conducted on more than one occasion within the flight period of *Efferia* n. sp..

REFERENCES

Cannings, Robert A. 1998. Robber Flies (Insecta: Diptera: Asilidae) *in* Smith, I.M., and G.G.E. Scudder, eds. Assessment of species diversity in the Montane Cordillera Ecozone. Burlington: Ecological Monitoring and Assessment Network, 1998. http://www.naturewatch.ca/eman/reports/publications/99_montane/robber_f/intro.html (accessed December 15, 2009).

B.C. Conservation Data Centre (BC CDC). 2009. BC Species and Ecosystems Explorer. B.C. Ministry of Environment. Victoria, B.C. http://a100.gov.bc.ca/pub/eswp (accessed December 29, 2009).

COSEWIC. 2009. Candidate Wildlife Species: The Prioritized Candidate Species List. http://www.cosewic.gc.ca/eng/sct3/index_e.cfm#p3 (accessed December 15, 2009).

Appendix 1. Efferia Robberfly identification notes from BCCC 2009 training

*These notes were taken during training provided by R. Cannings, Curator of Entomology, Royal British Columbia Museum (RBCM) on the identification characteristics of *Efferia* robber flies and other similar robber flies to the targeted *Efferia* n. sp. and from Cannings (1998) This should be used only as a guideline and is not meant to be an authoritative work.

Subfamily ASILINAE

Efferia robberflies
- very bristly
- pretty strong fliers (but don't often fly for a very long time)
- make a buzzing sound while flying
- can be observed perching on the ground

Efferia n. sp.
- found in sandy soil habitats of Antelope brush/Bluebunch wheatgrass grassland
- May and June – then flight period often over
- golden brown bristles on head.
- long bristles on the front of thorax.
- final three abdominal segments are white on the male

Efferia coulei
- common in May in cooler grassland benchlands – sagebrush
- less common in *Purshia* habitats
- grayer in colour
- the top, front half of thorax when viewed from the side, has long hairs
- black spines at back of head
- male has two main white abdominal segments

Efferia benedicti
- sagebrush habitats and all sorts of places
- mid summer (mid June to end of July), very common
- the top of the front half of the thorax does not have long hairs
- Male has long, white hairs on abdomen; on the basal segments (towards the head) these long hairs look parted and bend out to the sides.

Efferia harveyi
- doesn't emerge until August (active Aug through Sept)
- also has long hairs on the front of the thorax
- Last two abdominal segments are white on the male
- Looks similar to *coulei* but they don't fly at the same time

Efferia staminea

- less common
- also has long hairs like *bennedicti* but tends to be browner
- in sandier bluebunch wheatgrass and Ponderosa pine habitat (vs clay and sagebrush)

Efferia albibarbis

- "White beard"
- sandy *Purshia* habitat; Oliver, Osoyoos, Haynes' Lease; very common in US
- Less hairy, especially abdomen
- Very distinctive abdomen
- male has white on last two abdominal segments
- Black on other abdominal segments, looks checkered

Machimus occidentalis

- very common species
- found in grassland and also in open dry forests
- flies in June

From Subfamily STENOPOGONINAE *Stenopogon inquinatus* – large and red, one of the most common and noticeable species in the Montane Cordillera. –observed throughout surveys but not marked.

Appendix 2. Selected photographs of non-target robber flies encountered in 2009.

Male *Machimus occidentalis*. Photograph taken at North Kilpoola, a site dominated by sage and bluebunch wheatgrass on June 1, 2009. Although this robber fly possesses gold-coloured hairs on its head, it does not have the long hairs on the front of the thorax or white abdomen segements that *Efferia* n. sp. would have.

Female *Machimus occidentalis*. Photograph taken at North Kilpoola, a site dominated by sage and bluebunch wheatgrass on June 1, 2009.

Male *Efferia benedicti*. Note the white on all abdominal segments and the long bristles of the basal segments. Photograph taken from South Okanagan Grasslands Protected Area – East Chopaka, sage – bluebunch wheatgrass habitat, June 10, 2009.

Female *Efferia benedicti*. Photograph taken from South Okanagan Grasslands Protected Area – East Chopaka, sage – bluebunch wheatgrass habitat, June 26, 2009.

Male *Stenopogon inquinatus* being devoured by *Phidippus purpuratus*. Photograph taken at South Okanagan Grasslands Protected Area – East Chopaka, June 26, 2009. Surveyors were in the area to survey for Half-moon Hairstreak (*Semiluna satyrium*), one of which can be seen in the upper right portion of this photograph.