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# **Propertius Duskywing Study**

## ***Erynnis propertius***

Prepared for  
Skagit Environmental Endowment Commission  
c/o 1610 Mount Seymour Road  
North Vancouver, BC  
V7G 1L3

Prepared by  
Denis H. Knopp and Lee K. Larkin  
B.C.'s Wild Heritage Consultants  
47330 Extrom Road  
Sardis, B.C.  
V2R 4V1

In association with  
David L. Threatful  
Vernon, BC

November 2001

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## Propertius Duskywing (*Erynnis propertius*) Study in the Upper Skagit Valley Watershed

### Acknowledgements

This study would not have been possible without the financial assistance of the Skagit Environment Endowment Committee (SEEC) and their commitment to preserve the biological integrity of the upper Skagit Valley watershed.

We would like to extend our thanks to the many individuals with whom we corresponded regarding *Erynnis propertius*. Not all are mentioned here. David Threatful of Vernon provided invaluable expert field research assistance, advice and identified specimens and photographs. Crispin Guppy (Quesnel, BC) and Norbert Kondla (Castlegar, BC) provided invaluable assistance on old records, biology, information on rearing and helped identify specimens and photographs. Robert Pyle (WA) and Jonathan Pelham (Seattle, WA) reviewed photographs and commented on larval host plants. Jon Shepard (Nelson, BC) provided information on genitalia identification and likely host plants. Paul Opler (Loveland, Co.) and Ann Swengel (North American Butterfly Association) helped in the attempt to locate photographs of larva. Robert Cannings (Royal BC Museum) viewed photographs. Wayne Hallstrom (University of Alberta, Calgary) discussed radar tagging experiments and observations with oak-dependent *E. propertius* egg-laying and larva on Vancouver Island. Cris Schmidt discussed radio tagging versus observation techniques for locating host plants. Don Eastman (University of Victoria) discussed specifics of the life cycle in oak stands on Vancouver Island. Dick Beard (West Vancouver, BC), and Harold Reesor (Vancouver, BC) provided information on rearing, distribution and food plants. Potential host plant distribution was discussed with Cris Guppy, Norbert Kondla, Linda Dupius (Squamish, BC) and Bert Brink (Vancouver, BC).

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### Summary

A study to investigate the occurrence of a breeding population of *Erynnis propertius* (Propertius Duskywings), their preferred habitat and larval host plant in the upper Skagit Valley watershed was undertaken from April to August, 2001. During the study, it was confirmed that male and female *E. propertius* occurred in the valley. Fresh individual specimens were located throughout the flight period indicating that the *E. propertius* population was indeed a resident population. Literature searches and field searches did not reveal the presence of the known host foodplant of *E. propertius*, *Quercus* species (Oak species). Attempts were made to track female *E. propertius* observed to a larval host plant, but were unsuccessful.

Because of the difficulty in finding a specific host foodplant for the Skagit Valley population, the searches focused on identifying vegetation, soil and climatic conditions that were associated with the occurrence of *E. propertius* individuals. Preferred or critical microhabitats were identified as open, dry to moderately-dry, water shedding microhabitats characterized by the occurrence of *Ceanothus sanguineus* (Redstem Ceanothus) and its relative *Ceanothus velutinus* (Snowbrush).

Consequently, the findings of this study have resulted in new questions from the scientific community. All *E. propertius* populations found to date use *Quercus* spp. exclusively as a host foodplant, but no *Quercus* spp. have been located in the upper Skagit Valley. The absence of *Quercus* spp. host foodplants has several experts asking what the host foodplant of this population could be and whether this population could possibly be a new, unnamed species for British Columbia and Washington State. The only way to clarify this is conduct further study on the host plant and to collect 10-20 male and female specimens for genitalia dissection and expert taxonomic work.

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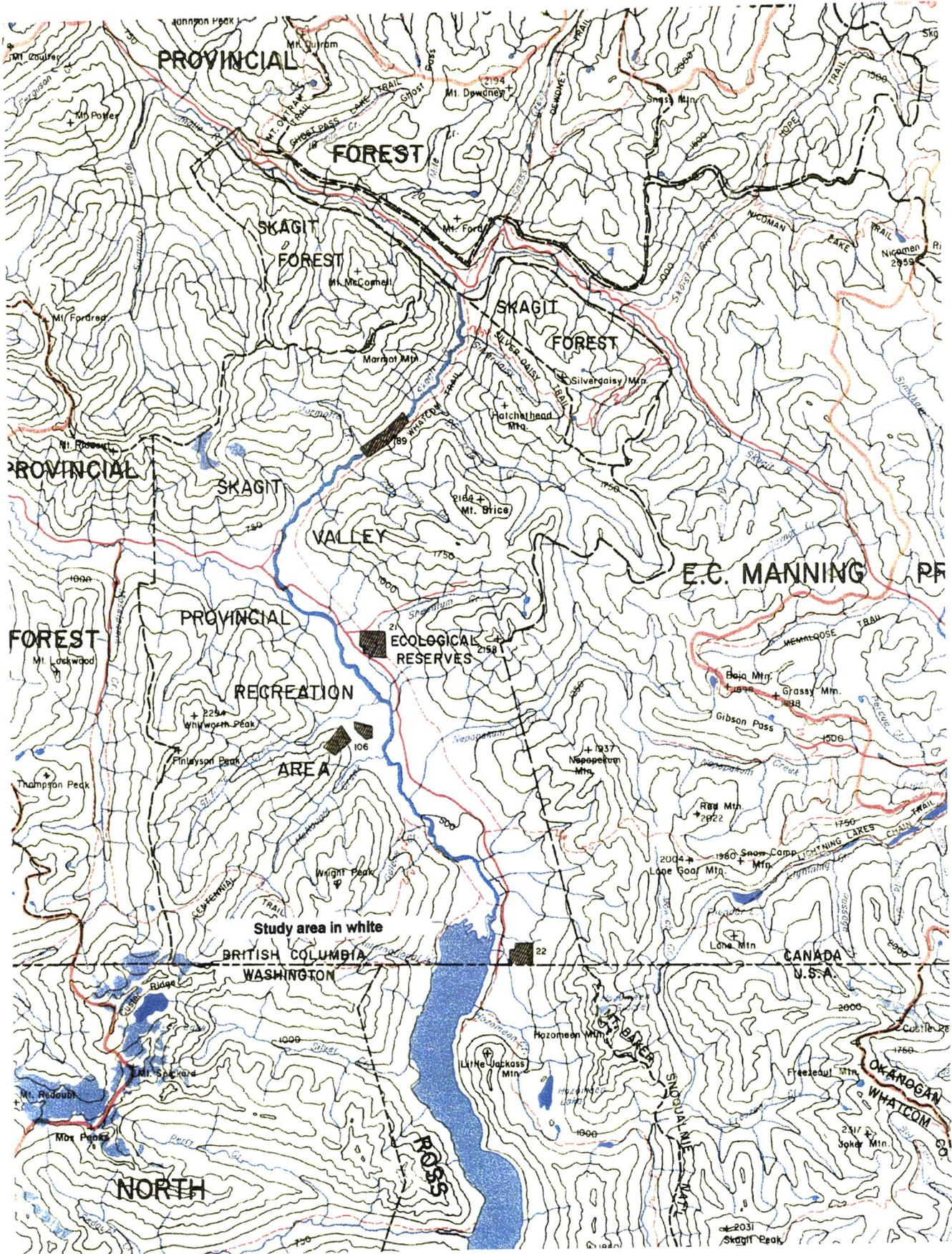
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Figure 1.0 Study Area



## Introduction

A study of *Erynnis propertius*, Propertius Duskywing, was conducted in the upper Skagit Valley watershed between April and August 2001. The study area extended from the Skagit Valley Provincial Park Boundary in British Columbia to the Mount Hozameen area in Washington State (Figure 1.0). *Erynnis propertius* is a large greyish-brown butterfly found along the entire Pacific Coast from southern Vancouver Island to northern Baja California. *E. propertius* is a shade-intolerant species that occurs in dry to moderately dry areas in British Columbia (BC). In BC, *E. propertius* is at the periphery of its northern range. It is Blue-listed in BC and is a state monitored species in Washington (WA). The records of occurrence of *E. propertius* in the Skagit watershed are very unusual as all known populations are associated with oak species, specifically *Quercus garryana* (Garry Oak) in BC. As *Quercus garryana* and other oak species associated with more southerly *E. propertius* populations do not occur in the upper Skagit Valley watershed, the specimens previously recorded in the Skagit Valley were thought to be strays (Guppy and Shepard, 2001).

This study was undertaken to verify whether the individuals identified to date as *E. propertius* in the upper Skagit Valley watershed were strays or whether they formed a separate population. The field research focused on (1) identifying locations where *E. propertius* occurred, (2) confirming the presence of both male and female individuals of a potential breeding population and (3) searching for the larval host plants.

## Methodology

The background research for this project began on 1 April 2001. Prior to initiation of field surveys, forest cover maps and aerial photographs were reviewed. Interviews were conducted with forestry personnel and specialists in the field of lepidoptera. A research review of ecological data was also conducted.

Field investigations for *E. propertius* were conducted between 21 May 2001 to 26 August 2001. Sampling targeted sunny, relatively cloudless days with light to no wind conditions. The first day of suitable weather to conduct field investigations for *E. propertius* after persistent, cool, wet conditions in late April/May was 21 May 2001. A total of 25 days were spent in the field identifying locations of occurrence, photographing, sexing captured and resting individuals, searching for larva and host plants and analyzing preferred habitats. The field work was conducted and supervised by Denis Knopp and David Threatful with volunteer naturalists and biologists joining in field investigations on 15 of the 25 days of field investigations. As the National Park System research permit for net and release of *E. propertius* took longer to process than expected, arriving at the end of the flight period, only habitat was assessed in the North Cascades National Park System near the Hozameen Campground.

Initially introductory investigations for the distribution of the species began by travelling south (at ~20 km./hr.) from Silver Lake Provincial Park, BC along the Silver-Skagit Road corridor south to Ross Lake for a period of 8 hours. When *E. propertius* were located,

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the vehicle was stopped and the time spent at each site within the study area was variable (generally 15 min.) and based on the amount of butterfly activity. At each stop, the highest number of *E. propertius* observed at one time were recorded. Stops were made at sites where *E. propertius* was observed in flight, found nectaring or imbibing minerals from moist gravel and moist soil on the Silver-Skagit Road or road allowance and the UTM for each site was recorded using a hand held Global Positioning Unit (GPS). As temperatures rose and moist sites disappeared, puddles were created in previously identified microhabitats by making depressions and filling them with water. This attracted specimens for photographic documentation of external features and provided opportunities to track females.

Initially a net and release program was conducted but this methodology was modified as *E. propertius* were fast fliers, difficult to approach, and if captured, immediately left the area upon release. The use of binoculars and a high powered scope (38x power scope focusing to within 1.61 m.) allowed for sexing of individuals and it allowed one to follow female individuals without frightening them away. When possible, specimens were captured or photographed to confirm the presence of male and female individuals.

Aside from locating and sexing *E. propertius*, surveys were conducted to locate the larval host plant. A specific search for the known host plant of coastal populations, *Quercus garryana* (Garry Oak) was conducted in the provincial park and in the Hozameen Campground area. Forest cover maps and past documents containing vegetation information on the upper Skagit Valley watershed were reviewed for the presence of *Quercus garryana* (refer to bibliography). Suitable habitat for *Quercus garryana* was surveyed by hiking into areas and by scanning vegetation with binoculars and a high-powered scope. In addition to the search for *Quercus garryana*, a list of host foodplants utilized by the genus *Erynnis* was compiled. Special attention was denoted to the potential host foodplants when recording vegetation in the Silver-Skagit Road transects.

Female *E. propertius* were visually tracked and followed for as long as possible in microhabitats along the road in hopes of observing them ovipositing (egg laying) on a host plant. At locations where numerous individuals were captured or observed linear transects recording the vegetation for 100 m. north and south of the location and 5 m. wide on both sides of the Silver-Skagit Road were conducted. A total of nine linear transects were completed along both sides of the Silver-Skagit Road. The vegetation was rated as to its occurrence and abundance at each transect - absent (0 m<sup>2</sup>); rare (<1 m<sup>2</sup>); common (1-10 m<sup>2</sup>); abundant (>10 m<sup>2</sup>). The vegetation recorded in the Silver-Skagit Road transects was compared with vegetation along the Silver-Skagit Road and within the ecosystem where *E. propertius* did not occur. The vegetation transects were also analyzed for any similarities with other reports on the mainland of BC where *E. propertius* has been recorded (i.e. Hope, Yale and Mt. Currie, BC). All habitats associated with the occurrence of *E. propertius* were recorded with a GPS unit.

Surveys for the immature larva, or signs of larva, on potential host plants began in mid-July and were conducted into August. Intensive searches were conducted within the vegetation transects for larva.

During the survey, several adult *E. propertius* voucher specimens were collected just north of the park boundary for scientific confirmation (Appendix 2.0, scanned image).

## Results

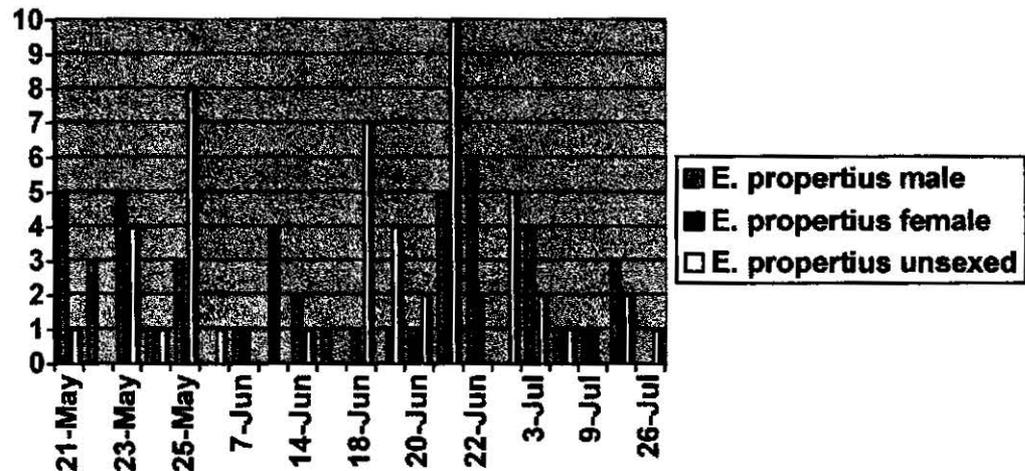
### Population Observations

Visual identification with binoculars, a high-powered scope, and the net and release program confirmed that both male and female *E. propertius* were present in the upper Skagit Valley watershed throughout the flight period from May to July 2001. The UTM (NAD 27) for each sighting was recorded with a hand-held GPS unit (Appendix 1.0). Both male and female *E. propertius* were located in microhabitat patches along the Silver-Skagit Road and on some drier hillsides and knolls with similar vegetation associations. Photographs were taken of specimens captured, nectaring or puddling to document male and female presence in the upper Skagit watershed (Appendix 2.0). The wings and color of many individuals photographed throughout the flight season were not worn or faded.

Chart 1.0 (below) illustrates the counts from the twenty-one days when *E. propertius* was observed flying. The number of individuals counted during these eight-hour surveys represents the highest number of individuals observed at one time at each stop. The counts were influenced by factors such as weather conditions, the amount of visitor traffic on the Silver-Skagit Road, and the amount of hiking conducted to get to suitable microhabitats.

During the flight period, the highest number of individuals counted along the Silver-Skagit Road in one day totaled twelve adult *E. propertius* on 25 May 2001 and fifteen adult butterflies on 21 June 2001. Female *E. propertius* were confirmed on nine of the twenty-one survey days and their occurrence was spread throughout the flight period (Chart 1.0). Many of the unsexed individuals of the *E. propertius* observed were presumed to be touring males that were flying along the roadside in search of females. These unsexed individuals generally passed through the microhabitats too quickly to be sexed.

Chart 1.0 *E. propertius* numbers and flight dates, 2001



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### Distribution

The current extent of *E. propertius* covers a patchy distribution along the Silver-Skagit Road from Kilometer 27 through to Ross Lake in suitable habitat. *E. propertius* were also located on several water-shedding hilltops (Figure 2.0). The two hilltops investigated included the lower slopes of Mount Hozameen in Ecological Reserve #22 and at Shawatum Creek in BC. Potential habitat was also located on the Hozameen campground roadway halfway between the Campground and the Hozameen Lake trailhead in Washington State (Appendix 5.0).

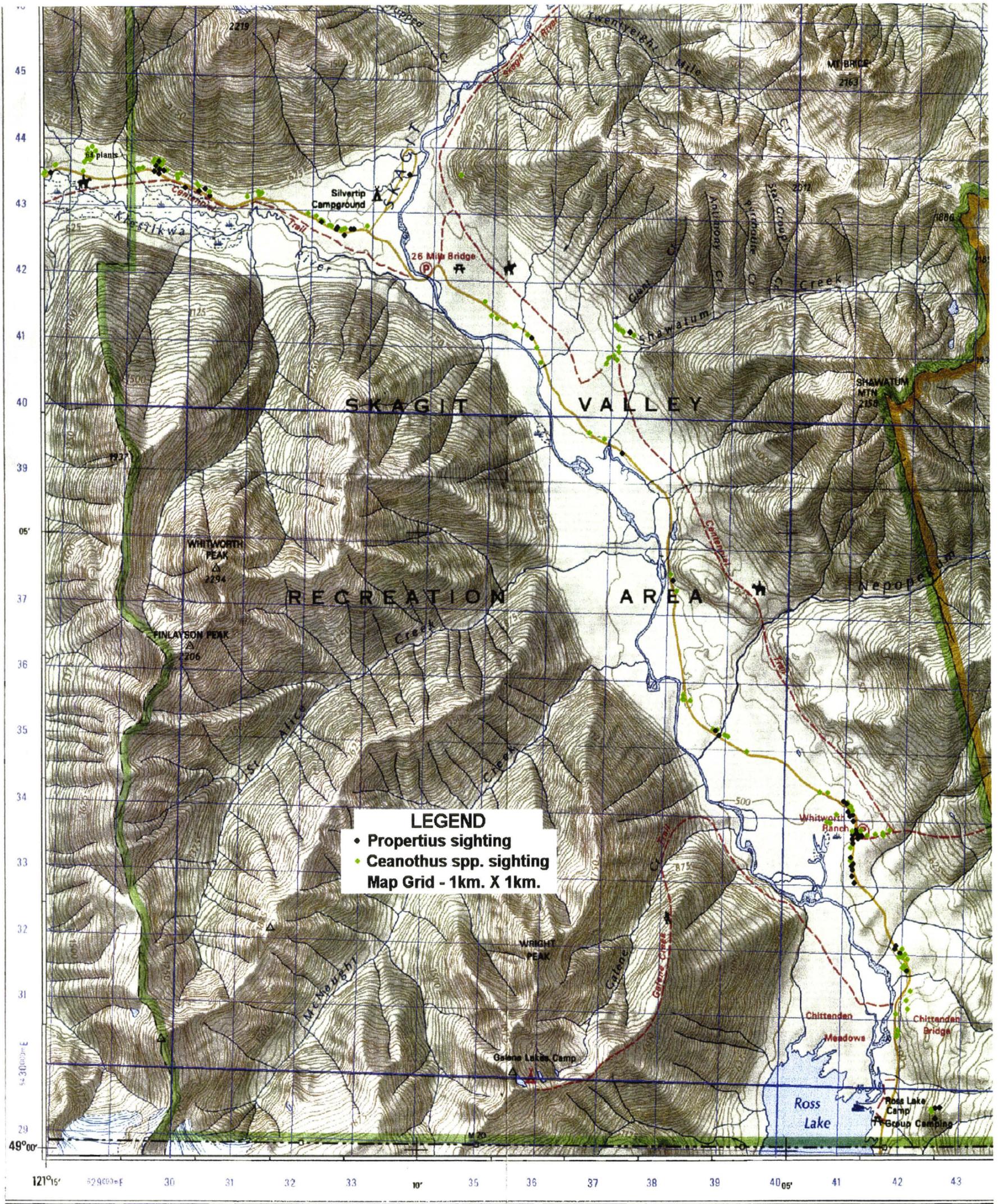
### Preferred Microhabitat

*E. propertius* occurred from Kilometer 27 to Ross Lake along the Silver-Skagit Road, yet they were indubitably absent from some sections of the road (Figure 2.0). The occurrence of *E. propertius* was observed to be tightly restricted to areas of what could be termed 'suitable habitat' and it did not occur in areas of 'unsuitable habitat' (areas where *E. propertius* did not fly). In order to gain an understanding of the habitat preference of *E. propertius*, nine vegetation transects were recorded along the Silver-Skagit Road where female and male *E. propertius* occurred in concentrations. The plants listed were given a rating indicating their abundance (absent, rare, common, abundant) and occurrence at each transect (Appendix 3.0). The most commonly occurring trees in these nine transects were *Pseudotsuga menziesii* (Douglas Fir), *Populus balsamifera* ssp. *trichocarpa* (Black Cottonwood) and *Alnus rubra* (Red Alder). The shrub layer was most often characterized by *Pachistima myrsinites* (False Box), *Acer circinatum* (Vine Maple), *Salix* sp. (Willow species), *Ceanothus sanguineus* (Redstem Ceanothus), *Rubus parviflorus* (Thimbleberry) and *Amelanchier alnifolia* (Saskatoon). Dominant herbs included *Gramineae* family (grass sp.), *Fragaria* spp. (Strawberry spp.), *Lilium columbianum* (Tiger Lily) and *Apocynum androsaemifolium* (Spreading Dogbane). In two transects where *Ceanothus sanguineus* (a shade-intolerant species) was absent, it was replaced by its relative *Ceanothus velutinus* (Snowbrush).

When the transects were compared to areas of unsuitable habitat, it was found that like *Quercus garryana* habitat the preferred microhabitats of *E. propertius* occurred in open, often rocky, water-shedding sites in very dry to moderately-dry areas. Vegetation, listed above, that required moist habitat was the result of wetlands adjacent to transects.

When the vegetation within the transects was compared with vegetation within the Interior Douglas Fir Wet-Warm (IDFww) and the Coastal Western Hemlock Moist-Maritime Southern (CWHms1) biogeoclimatic subzone, *Ceanothus* spp. were found to be the only plants that did not overlap in areas of unsuitable habitat. A strong correlation was found between the occurrence of *Ceanothus sanguineus* and *C. velutinus* in water-shedding, very dry to moderately-dry habitats and the occurrence of *E. propertius* (Appendix 4.0). This correlation using dry microhabitats characterized by *Ceanothus* spp. was useful during expanded investigations along the roadside and on the hillside areas of Shawatum and Mount Hozameen (ER #22) in locating further *E. propertius* individuals (Figure 2.0). Two isolated patches of this microhabitat (consisting of three plants) were located in the North Cascades National Park on the Hozameen Campground roadway halfway between the campground and the Hozameen Lake trailhead in Washington State. In addition, potential habitat was observed from ER #22 with a high powered scope outside of the survey area on Jackass Mountain, WA.

Figure 2.0 Distribution of *Erynnis propertius* and Preferred Habitat Locations Characterized by *Ceanothus* spp.



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### Potential Host Plants

Forest cover maps, aerial photographs, interviews with forestry personnel, and a review of documents containing vegetation lists and plots for the upper Skagit Valley watershed did not identify any stands of *Quercus garryana* (see bibliography). Areas containing potential suitable habitat were surveyed for the presence of *Quercus garryana*, but none were located. The majority of field investigations focused on vegetation found within preferred microhabitat habitat presently used by the upper Skagit watershed population of *E. propertius*.

Vegetation within the preferred microhabitats was analyzed for the potential of supporting larva of *E. propertius*. Vegetation without characteristics able to support larva (i.e. large enough leaf to provide larval cover) and plants that were abundant over an extensive area in the province were not considered indicative of *E. propertius* habitat. Visual larval searches concentrated on vegetation representative of the water-shedding microhabitats. Because the analysis of the vegetation indicated that the occurrence of *E. propertius* was strongly associated with the occurrence of *Ceanothus* species in preferred microhabitats, repeated surveys for signs of larvae were conducted on the leaves of *Ceanothus sanguineus* and *C. velutinus* in the transects. All vegetation within transects were searched (up to 2 m. height) with specific attention given to host species of the genus *Erynnis*. Aside from *Ceanothus sanguineus* and *C. velutinus* this included *Aquilegia formosa* (Red Columbine), *Lupinus arcticus* (Arctic Lupine), *Betula papyrifera* (Paper Birch), *Salix* species and *Populus balsamifera*. Although numerous larvae and eggs were located on *Ceanothus sanguineus* and other vegetation within the transects, none were identified as *E. propertius*.

In addition to larval searches, individual adult female *E. propertius* were visually tracked. The female *E. propertius* were observed nectaring and imbibing mineral salts at puddles but they did not oviposit or show preference for any specific host plant. *E. propertius* females, when not nectaring, were only observed landing twice on the leaves of *Corylus cornuta* (Beaked Hazelnut) and once on the leaves of a *Rubus parviflorus* (Thimbleberry), but no eggs were found when the plants were inspected. When approached, the female *E. propertius* typically flew quickly out of sight.

### Incidental Observations

#### Nectar Plants

Both male and female *E. propertius* were observed nectaring and imbibing minerals from damp areas on and beside the Silver-Skagit Road. Nectar plants used included introduced and native plants. Weedy species used as nectar sources included *Crepis* sp. (Hawksbeard), *Trifolium praetense* (Alsike Clover), *Trifolium repens* (White Clover), *Trifolium pratense* (Red Clover) and *Leucanthemum vulgare* (Oxeye Daisy). *Prunella vulgaris* (Heal-all), *Antennaria neglecta* (Field Pussytoes) and *Apocynum androsaemifolium* (Spreading Dogbane) were three native species used as nectar plants by adult *E. propertius*.

## Discussion

Prior to this survey, historic records for *E. propertius* in the upper Skagit Valley watershed occurred late in the flight period. The lack of records and the fact that no *Quercus garryana* are known to occur in the Skagit Valley, led to the speculation that the Skagit Valley individuals were strays (Guppy and Shepard 2001).

During the field survey D. Threatful and D. Knopp located both male and female individuals of *E. propertius* throughout the flight period from May to July 2001. Individuals captured or at rest were photographed to document male and female presence (Appendix 2.0). These photographs of the wing patterns of *Erynnis* species were sent to several lepidoptera specialists (see Acknowledgements). Although there was not complete agreement on the identification of all of the photographed specimens, it was agreed that *E. propertius* was definitely present in the Skagit Valley. In reviewing the photographs, C. Guppy (pers com) stated that in previous investigations, he had found that there was little difference between the wing patterns of three specimens of *E. propertius* collected from Ross Lake, and his specimens from Oregon and Vancouver Island.

In addition, fresh individuals (i.e. wings were not flight-worn or faded) were observed and photographed throughout the flight period from May to July 2001. This indicates that the *E. propertius* observed had not traveled long distances and that the host plant was likely nearby. Generally, female butterflies tend to stay within several meters to several kilometers of the larval host foodplant, rarely traveling long distances (Fuchs, 2001). These new records of a population spread throughout the flight season and of freshly emerged individuals is evidence of a resident breeding population of *E. propertius* in the upper Skagit watershed.

Field surveys, literature searches, and personal interviews did not lead to the confirmation of any *Quercus garryana* stands in the upper Skagit Valley watershed. However, like the *Quercus garryana* ecosystem, it was found that the Skagit Valley *E. propertius* showed a definite preference for open, dry to moderately-dry, water shedding microhabitats (Klinka *et. al.*, 1989). This type of microhabitat in the Skagit Valley was characterized by the presence of *Ceanothus sanguineus* and *C. velutinus*. In addition, *Ceanothus sanguineus* and *C. velutinus* were the only plants distinct to the preferred microhabitats of *E. propertius* in the Skagit Valley.

Until the larval foodplant can be confirmed, the open dry to moderately-dry, water shedding sites characterized by *Ceanothus* species identified in this survey should be considered as critical habitat for the upper Skagit Valley population of *E. propertius* (Appendix 5.0).

## Further Work

During this study, the preferred microhabitats of *E. propertius* were identified from Km 22 to Mount Hozameen in the North Cascades National Park System, WA. Further investigation of habitat just south of this study area on Jackass Mountain should be conducted as it is likely that the preferred microhabitat for *E. propertius* is located there as

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well. In addition, work needs to be conducted during the flight period in the North Cascades National Park system to confirm the species use of these habitats.

As there is no known population of *E. propertius* that is not oak-dependent, further work should also include more investigations into identifying an alternate larval foodplant. As known populations of *E. propertius* are associated with one specific host plant, this work is critical to managing habitat.

Although the physical wing-pattern characteristics of the *E. propertius* in the upper Skagit Valley watershed resemble that of oak-dependent *E. propertius*, many experts contacted felt that further work to confirm the taxonomic status of the upper Skagit Valley *E. propertius* should be conducted as the presence of this population is an exception to the norm. Genitalia dissection and taxonomic work should be conducted on male and female *E. propertius* to identify whether this is a possibly new, unnamed species.

### Recommendations

Habitat protection is the primary cause of the loss of butterfly diversity (Guppy & Shepard, 2001). The upper Skagit Valley population of *E. propertius* was identified with microhabitats along the Silver-Skagit Road and on Mount Shawatum and northwest slopes of Mount Hozameen. Potential microhabitat was also located on the Hozameen Campground roadway halfway between the campground and the Hozameen Lake trailhead in Washington State. Although the roadway likely provides an important corridor for dispersal of this species between patches of microhabitats, it can also be a cause of high mortality. Interim protective measure should include the following:

- The identification of open, dry to moderately-dry, water-shedding sites that are characterized by *Ceanothus* species as critical habitat for the Blue-listed *E. propertius*;
- Protection of the critical microhabitats from recreational and road maintenance activities such as road widening;
- Steps should be taken to reduce speeds on the road to reduce mortality of this species. Consider informative signage, speed sign reduction and marked drainage swales along the road, especially if the road is paved and visitor travel and speeds increase; and
- Enhance this type of microhabitat away from the roadway.

Due to the fact that the population of *E. propertius* in the Skagit Valley does not appear to be associated with *Quercus garyana* ecosystems, further investigations should be conducted:

- to confirm the host plant; and
- to conduct genitalia work and taxonomic work on the Skagit Valley population.

## Bibliography

Burns, J.M. 1964. Evolution in Skipper Butterflies of the Genus Erynnis, University of California Press, Publication in Entomology Vol. 37.

Fuchs, M. A. 2001. Towards a Recovery Strategy for Garry Oak and Associated Ecosystems in Canada: Ecological Assessment and Literature Review, Technical Report GBEI/ EC-00-030. Environment Canada, Canadian Wildlife Service, Pacific and Yukon Region.

Guppy, C.S. and J. H. Shepard 2001. Butterflies of British Columbia, Royal BC Museum and UBC Press, Victoria, BC

Klinka, K. V.J. Krajina, A. Ceska, & A.M. Scagel 1989. Indicator Plants of Coastal British Columbia, University of British Columbia Press, Vancouver, BC.

Knopp, D.H. and L.K. Larkin 2000. Ecological Study of the Skagit Valley Provincial Park Lowlands, Skagit Environmental Endowment Commission, North Vancouver, BC, 92pp.

Layberry, R.A., P.W. Hall, and J. D. Lafontaine 1998. The Butterflies of Canada, University of Toronto Press, Toronto, Ontario.

Pyle, R.M. 1988. The Audubon Field Guide to North American Butterflies, Alfred A. Knopf, Inc, New York.

Scott, J.A. 1986. Butterflies of North America, A Natural History and Field Guide, Stanford University Press, California.

Ministry of Water, Land and Air Protection 1999. Rare Butterflies of Southeastern Vancouver island and the Gulf Islands, Wildlife at Risk, WLAP, Victoria.

### Documents reviewed for vegetation information:

Schilberg K. and S. Barrett, ed. 1993. Vegetation and Wildlife Findings for Three Ecological Reserves in the Skagit Valley, BC Parks, Coast Region, North Vancouver.

Farr, A.C.M. 1986. A Pacific Giant Salamander Survey and List of Herpetological Records in the Skagit River Watershed. BC Ministry of Water, Land and Air Protection, Victoria.

Conservation Data Centre 1997. Vegetation Records for the Ecological Reserves of the Skagit Valley Provincial Park, fax, CDC, Victoria.

Knopp, D.H. and L.K. Larkin 2000. Ecological Study of the Skagit Valley Provincial Park Lowlands, Skagit Environmental Endowment Commission, North Vancouver, BC, 92pp.

Ogilvie, R. T., & A. Ceska 1988. Rare Vascular Plants of the Skagit Valley, British Columbia, Royal BC Museum, Vic.

Parsons H. and C. Sherlock 1997. Environmental Impact Assessment for a proposed Horse Corral Development, BC Parks, North Vancouver

**Propertius Duskywing (*Erynnis propertius*) Study in the Upper Skagit Valley Watershed**

**Fuhr, B. 1988. Biophysical Wildlife Habitat Mapping of the Skagit Valley, BC Min of Water Land and Air Protection, Victoria**

**Russel, G., ed. 1994. Quantifying Fuel Loads and Classifying Vegetation in the Skagit Valley Recreation Area, BC Parks, North Vancouver**

**Banard, T. 1986. Current Status of Deer Spring Ranges at Whitworth and Ponderosa Meadows, Lower Skagit Valley, BC Ministry of Water, Land and Air Protection, Victoria.**

# Appendices

Appendix 1.0 *Erynnis propertius*, UTM Locations in the Upper Skagit Valley Watershed

| Date      | <i>E. propertius</i><br>Numbers | Site Name + Notes<br>Enter Park at 0629000m.E 5443500m.N                            | UTMm.E<br>NAD 27 | UTMm.N<br>NAD 27 |
|-----------|---------------------------------|---|------------------|------------------|
| 5-21-2001 | 2                               | courtship chase at burn   | 0629519          | 5443523          |
| 5-21-2001 | 1                               | male  | 0630346          | 5443184          |
| 5-21-2001 | 1                               | male  | 0627651          | 5443480          |
| 5-21-2001 | 1                               | female  | 0624970          | 5443802          |
| 5-21-2001 | 3                               | male  | 0624567          | 5444111          |
| 5-22-2001 | 2                               | male at horse camp at rd  | 0641217          | 5433660          |
| 5-22-2001 | 1                               | male at horse camp at rd  | 0641217          | 5433660          |
| 5-23-2001 | 4                               | 3 males nectaring on dandelion  | 0624424          | 5444602          |
| 5-23-2001 | 1                               | flying at our meadow  | 0626551          | 5443537          |
| 5-23-2001 | 2                               | Whitworth meadow  | 0624424          | 5444602          |
| 5-23-2001 | 1                               | male  | 0627147          | 5443457          |
| 5-23-2001 | 1                               | maybe-female  | 0626577          | 5443510          |
| 5-23-2001 | 1                               | male 4:50pm   | 0624523          | 5444181          |
| 5-24-2001 | 1                               | at Juba site, up side rd.   | 0624526          | 5444741          |
| 5-24-2001 | 1                               | male baby squirrels   | 0627298          | 5443424          |
| 5-25-2001 | 1-2                             | burn site   | 0629521          | 5443525          |
| 5-25-2001 | 2-1                             | nectaring on field pussy-toes   | 0635668          | 5441207          |
| 5-25-2001 | 1                               | female photo at horse camp 5:30pm   | 0641056          | 5434133          |
| 5-25-2001 | 1                               | male nectaring on dandelion Juba site   | 0624526          | 5444741          |
| 5-25-2001 | 2                               | male imbibing minerals  | 0624554          | 5444121          |
| 5-25-2001 | 6                               | nectaring at baby squirrel site   | 0627188          | 5443431          |
| 5-31-2001 | 1-2                             | flying along rd   | 0637252          | 5439446          |
| 6-07-2001 | 1                               | female Skyline parking  | 0641220          | 5433730          |
| 6-07-2001 | 1                               | male photo nectaring on white clover,<br>at horse camp                              | 0641056          | 5434133          |
| 6-13-2001 | 4                               | female nectaring on raspberry and<br>alsike clover, at burn site                    | 0629519          | 5443523          |
| 6-14-2001 | 3                               | 2 males Nepopekum cr.   | 0638908          | 5435228          |
| 6-17-2001 | 1                               | male nectaring on red clover at burn<br>site  | 0629519          | 5443523          |
| 6-18-2001 | 1                               | flying at burn site   | 0629519          | 5443523          |
| 6-18-2001 | 1                               | male in park  | 0632169          | 5442790          |
| 6-18-2001 | 2                               | patrolling  | 0632388          | 5442716          |
| 6-18-2001 | 1                               | patrolling  | 0632592          | 5442779          |
| 6-18-2001 | 1                               | nectaring on white clover and puddle at<br>Silvertip Campground pump                | 0633654          | 5443680          |
| 6-18-2001 | 2                               | sp. in question across river from work<br>yard                                      | 0633610          | 5447620          |
| 6-19-2001 | 1                               | Silvertip pump  | 0633654          | 5443680          |
| 6-19-2001 | 1                               | female bending abdomen under  | 0632592          | 5442729          |
| 6-19-2001 | 2                               | patrolling nectaring on heat-all  | 0632592          | 5442729          |
| 6-19-2001 | 1                               | patrolling and landing under RS<br>Ceanothus gold mine = north of<br>Shawatum creek | 0637320          | 5441330          |
| 6-20-2001 | 1                               | flying at km 27   | 0621666          | 5446797          |
| 6-20-2001 | 1                               | patrolling flying saw 3 times in 25 min   | 0632534          | 5442537          |
| 6-20-2001 | 1                               | male imbibing at damp soil  | 0638056          | 5437492          |
| 6-21-2001 | 1                               | saw twice   | 0642127          | 5431744          |
| 6-21-2001 | 2                               | patrolling, sp. in question maybe <i>E.</i>   | 0641677          | 5432561          |

Appendix 1.0 *Erynnis propertius*, UTM Locations in the Upper Skagit Valley Watershed

| Date      | <i>E. propertius</i><br>Numbers | Site Name + Notes<br>Enter Park at 0629000m.E 5443500m.N   | UTMm.E<br>NAD 27 | UTMm.N<br>NAD 27 |
|-----------|---------------------------------|--|------------------|------------------|
|           |                                 | <i>persius</i>   |                  |                  |
| 6-21-2001 | 3                               | flying sp. in question likely <i>E. persius</i>            | 0641227          | 5433050          |
| 6-21-2001 | 2                               | 1 male captured, nectarine on oxeye daisy                  | 0641139          | 5433184          |
| 6-21-2001 | 3                               |  | 0641129          | 5433306          |
| 6-21-2001 | 1                               |  | 0641161          | 5433497          |
| 6-21-2001 | 4                               | male 4 nectaring on Heal-all and Oxeye, at Skyline parking | 0641218          | 5433662          |
| 6-21-2001 | 1                               | nectaring on White Clover at Horse Camp                    | 0641056          | 5434133          |
| 6-22-2001 | 5                               | 5 males specimen captured, photo                           | 0629510          | 5443528          |
| 6-22-2001 | 2                               | 1 female on rd.  | 0629904          | 5443362          |
| 6-22-2001 | 1                               | male photo of genitalia                                    | 0630108          | 5443262          |
| 7-02-2001 | 5                               | flying at burn site  | 0629519          | 5443523          |
| 7-03-2001 | 1                               | nectaring on oxeye daisy                                   | 0641851          | 5432137          |
| 7-03-2001 | 1                               | flying   | 0641951          | 5432038          |
| 7-03-2001 | 4                               | 4 males Skyline parking                                    | 0641218          | 5433669          |
| 7-06-2001 | 1                               | male photo wings folded over it's back at Skyline parking  | 0641218          | 5433662          |
| 7-06-2001 | 1                               | sp. in question, flying                                    | 0613606          | 5491383          |
| 7-09-2001 | 1-2                             | 2, female?, at burn site                                   | 0629519          | 5443523          |
| 7-09-2001 | 1                               | sp. in question flying-fast at Mesopanick Cr.              | 0627750          | 5443497          |
| 7-10-2001 | 2                               | pair, female sunning on thimbleberry leaf                  | 0641840          | 5432131          |
| 7-10-2001 | 1                               | sp. in question mid size, Skyline Parking                  | 0641218          | 5433662          |
| 7-10-2001 | 4                               | specimen taken 3 male, 3 nectaring on Dogbane, mid size    | 0641136          | 5434084          |
| 7-26-2001 | 1                               | larva in question feeding on Ceanothus                     | 0641218          | 5433662          |
| 8-26-2001 | 0                               | 15 butterfly spp. along rd., no <i>E. propertius</i>       |                  |                  |

Appendix 2.0 *Erynnis propertius* Photographs



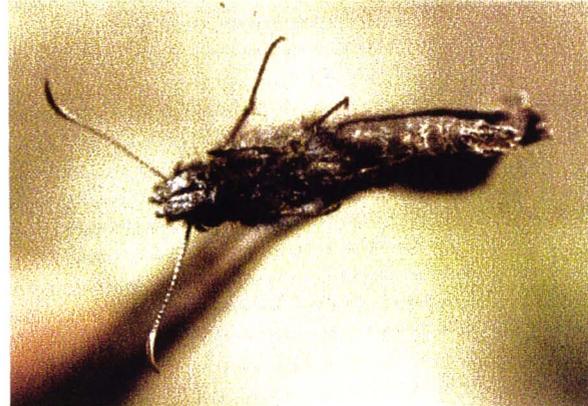
Two *Erynnis propertius* males note variation.



Flight worn male *Erynnis propertius*



Male *Erynnis propertius*



Male *Erynnis propertius*



Flight worn male *Erynnis propertius*



Male *Erynnis propertius*



Two flight worn males and one fresh *E. propertius*



Male *Erynnis propertius*



Male *Erynnis propertius*

Appendix 2.0 *Erynnis propertius* Photographs



Female *Erynnis propertius*



Male *Erynnis propertius*



Female *Erynnis propertius*



Flight worn female *Erynnis propertius*



Male *Erynnis propertius*



Female *Erynnis propertius*



Male *Erynnis persius*



Male *Erynnis pacuvius*



Male *Erynnis icelus*



*Erynnis persius*

*Erynnis propertius*

Scanned image (ventral view) of *E. propertius* and *E. persius* specimens in upper Skagit Valley Watershed.

### Appendix 3.0 Plots and Vegetation Ratings

These linear plots measured 200m (100m. on each side of UTM) x 5m. on both sides of the Silver-Skagit Road. The plots were taken at sites where an abundance of *E. propretius* were observed.

| Rating | Cover                          |
|--------|--------------------------------|
| 0      | Absent (0 m <sup>2</sup> )     |
| 1      | Rare (<1 m <sup>2</sup> )      |
| 2      | Common (1-10 m <sup>2</sup> )  |
| 3      | Abundant (>10 m <sup>2</sup> ) |

| Scientific Name                           | Plant Species             | Linear Plot Number   |   |   |   |   |   |   |   |   | Rating Total |
|---|---------------------------|----------------------|---|---|---|---|---|---|---|---|--------------|
|   |                           | 1                    | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |              |
|   |                           | <b>Cover Ratings</b> |   |   |   |   |   |   |   |   |              |
| <i>Vaccinium parvifolium</i>              | Red Huckleberry           | 0                    | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1            |
| <i>Sorbus sitchensis</i>                  | Sitka Mountain-Ash        | 0                    | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1            |
| <i>Corylus cornuta</i>                    | Beaked Hazelnut           | 0                    | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2            |
| <i>Ceanothus velutinus</i>                | Snowbrush                 | 0                    | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 3            |
| <i>Pinus monticola</i>                    | Western White Pine        | 0                    | 0 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 3            |
| <i>Rhododendron macrophyllum</i>          | Pacific Rhododendron      | 0                    | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 3            |
| <i>Aquilegia formosa</i>                  | Red Columbine             | 0                    | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 3            |
| <i>Rhamnus purshiana</i>                  | Cascara                   | 0                    | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3            |
| <i>Arctostaphylos uva-ursi</i>            | Kinnikinnick              | 0                    | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 1 | 4            |
| <i>Antennaria neglecta</i>                | Field Pussytoes           | 0                    | 0 | 1 | 2 | 0 | 1 | 0 | 0 | 0 | 4            |
| <i>Acer macrophyllum</i>                  | Big Leaf Maple            | 2                    | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4            |
| <i>Lonicera ciliosa</i>                   | Orange Honeysuckle        | 0                    | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 5            |
| <i>Betula papyrifera</i>                  | Paper Birch               | 2                    | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 5            |
| <i>Apocynum androsaemifolium</i>          | Spreading Dogbane         | 0                    | 1 | 0 | 1 | 1 | 3 | 0 | 0 | 0 | 6            |
| <i>Pinus contorta</i>                     | Lodgepole Pine            | 0                    | 0 | 2 | 2 | 0 | 2 | 0 | 1 | 0 | 7            |
| <i>Holodiscus discolor</i>                | Ocean Spray               | 2                    | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 7            |
| <i>Mahonia nervosa</i>                    | Dull Oregon-Grape         | 0                    | 1 | 1 | 1 | 0 | 1 | 0 | 2 | 1 | 7            |
| <i>Prunus emarginata</i>                  | Bitter Cherry             | 1                    | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 7            |
| <i>Rosa gymnocarpa</i>                    | Baldhip Rose              | 0                    | 1 | 1 | 1 | 1 | 1 | 0 | 2 | 1 | 8            |
| <i>Lilium columbianum</i>                 | Tiger Lily                | 2                    | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 8            |
| <i>Fragaria virginiana &amp; F. vesca</i> | Wild/ Woodland Strawberry | 1                    | 0 | 2 | 1 | 2 | 1 | 0 | 0 | 2 | 9            |
| <i>Amelanchier alnifolia</i>              | Saskatoon                 | 1                    | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 12           |
| <i>Cornus stolonifera</i>                 | Red Osier Dogwood         | 2                    | 2 | 0 | 0 | 2 | 1 | 2 | 1 | 1 | 11           |
| <i>Thuja plicata</i>                      | Western Red Cedar         | 2                    | 0 | 1 | 1 | 2 | 0 | 3 | 2 | 2 | 13           |
| <i>Rubus parviflorus</i>                  | Thimble Berry             | 2                    | 1 | 1 | 0 | 2 | 1 | 2 | 2 | 2 | 13           |
| <i>Alnus rubra</i>                        | Red Alder                 | 3                    | 2 | 1 | 0 | 2 | 0 | 2 | 2 | 2 | 14           |
| <i>Ceanothus sanguineus</i>               | Red Stem Ceanothus        | 2                    | 3 | 0 | 1 | 2 | 2 | 1 | 2 | 2 | 15           |
| <i>Acer circinatum</i>                    | Vine Maple                | 1                    | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 15           |
| <i>Salix scouleriana</i>                  | Scouler's Willow          | 2                    | 2 | 2 | 2 | 0 | 1 | 2 | 2 | 2 | 15           |
| Gramineae spp                             | Grass spp                 | 2                    | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 15           |
| <i>Pachistima myrsinites</i>              | False Box                 | 2                    | 2 | 2 | 3 | 1 | 2 | 1 | 2 | 2 | 17           |
| <i>Populus balsamifera</i>                | Black Cottonwood          | 2                    | 2 | 1 | 2 | 3 | 2 | 3 | 3 | 2 | 20           |
| <i>Pseudotsuga menziesii</i>              | Douglas Fir               | 3                    | 2 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 25           |

Appendix 3.0 Plots and Vegetation Ratings

Linear Plot Locations:

| UTM Easting<br>NAD 27 | UTM Northing<br>NAD 27 | Field Notes                                     | Linear<br>Plot # |
|-----------------------|------------------------|---|------------------|
| 0627229               | 5443240                | Near pink Broadleaf Penstemon scree             | 1                |
| 0629515               | 5443483                | burn site                                       | 2                |
| 0635668               | 5441207                | 2 nectarine on field pussytoes                  | 3                |
| 0637238               | 5439442                | 1 flying down road                              | 4                |
| 0638908               | 5435228                | 3 fresh on Dandelion-like flower Nepopekum      | 5                |
| 0641136               | 5434 084               | east of Horse Camp at road                      | 6                |
| 0641840               | 5432131                | 6 + 7 overlap, Cottonwood forest, Oxeye Daisies | 7                |
| 0641954               | 5432043                | roadside  | 8                |
| 0642127               | 5431744                | north of Ross Lk. campground                    | 9                |
|                       |                        |   |                  |

Appendix 4.0 Ceanothus spp. and Habitat Photographs



Photo A: *Ceanothus sanguineus* – Redstem Ceanothus



Photo B: *Ceanothus velutinus* - Snowbrush

Appendix 4.0 *Ceanothus* spp. and Habitat Photographs



Photo C: Hilltop microhabitat at Ecological Reserve #22



Photo D: Slide area illustrating water-shedding habitat colonized by *Ceanothus sanguineus*.

Appendix 4.0 *Ceanothus* spp. and Habitat Photographs



Photo E: Intermittent streams in spring form moist sites for imbibing minerals for *Erynnis* species.



Photo F: Typical roadside microhabitat characterized by *Ceanothus sanguineus*.

Appendix 5.0 *Ceanothus* spp. UTM Locations

| Date<br>2001  | Plant<br>Numbers | <i>Ceanothus</i> Species<br>Enter Park @ 0629000mE 5443500mN | UTMm.E.<br>NAD 27 | UTMm.N.<br>NAD 27 |
|---------------|------------------|--|-------------------|-------------------|
| May 21-Aug 26 | 45               | Redstem <i>Ceanothus</i>                                     | 0612777           | 5490666           |
|               | 3                | Redstem <i>Ceanothus</i>                                     | 0613606           | 5491383           |
|               | 15               | Redstem <i>Ceanothus</i>                                     | 0623255           | 5445406           |
|               | 3                | Snowbrush <i>Ceanothus</i>                                   | 0623579           | 5445028           |
|               | 79               | Redstem <i>Ceanothus</i>                                     | 0624526           | 5444741           |
|               | 1                | Redstem <i>Ceanothus</i>                                     | 0625416           | 5443508           |
|               | 2                | Redstem <i>Ceanothus</i>                                     | 0625726           | 5443468           |
|               | 4                | Redstem <i>Ceanothus</i>                                     | 0627113           | 5443702           |
|               | 2                | Redstem <i>Ceanothus</i>                                     | 0627161           | 5443538           |
|               | 6                | Redstem <i>Ceanothus</i>                                     | 0627186           | 5443422           |
|               | 11               | Redstem <i>Ceanothus</i>                                     | 0627203           | 5443437           |
|               | 2                | Redstem <i>Ceanothus</i>                                     | 0627538           | 5443415           |
|               | 1                | Redstem <i>Ceanothus</i>                                     | 0627544           | 5443434           |
|               | 2                | Redstem <i>Ceanothus</i>                                     | 0627743           | 5443511           |
|               | 10               | Redstem <i>Ceanothus</i>                                     | 0628281           | 5443491           |
|               | 10+              | Redstem <i>Ceanothus</i>                                     | 0628303           | 5443779           |
|               | 18               | Redstem <i>Ceanothus</i>                                     | 0628314           | 5443778           |
|               | 6                | Redstem <i>Ceanothus</i>                                     | 0628331           | 5443968           |
|               | 10               | Redstem <i>Ceanothus</i>                                     | 0628343           | 5443854           |
|               | 1                | Redstem <i>Ceanothus</i>                                     | 0629344           | 5443425           |
|               | 79+              | Redstem <i>Ceanothus</i>                                     | 0629519           | 5443523           |
|               | 1                | Redstem <i>Ceanothus</i>                                     | 0629591           | 5443464           |
|               | 4                | Redstem <i>Ceanothus</i>                                     | 0630104           | 5443271           |
|               | 2                | Redstem <i>Ceanothus</i>                                     | 0630194           | 5443233           |
|               | 1                | Redstem <i>Ceanothus</i>                                     | 0630213           | 5443253           |
|               | 1                | Redstem <i>Ceanothus</i>                                     | 0630351           | 5443185           |
|               | 1                | Redstem <i>Ceanothus</i>                                     | 0630941           | 5443161           |
|               | 7                | Redstem <i>Ceanothus</i>                                     | 0631118           | 5443239           |
|               | 2                | Redstem <i>Ceanothus</i>                                     | 0631905           | 5442955           |
|               | 2                | Redstem <i>Ceanothus</i>                                     | 0631907           | 5431142           |
|               | 1                | Snowbrush <i>Ceanothus</i>                                   | 0632044           | 5442887           |
|               | 7                | Snowbrush <i>Ceanothus</i>                                   | 0632169           | 5442790           |
|               | 1                | Snowbrush <i>Ceanothus</i>                                   | 0632388           | 5442716           |
|               | 3                | Snowbrush and Redstem  | 0632559           | 5442754           |
|               | 4                | Snowbrush and Redstem just north of                          | 0632559           | 5442754           |
|               | 5                | Snowbrush <i>Ceanothus</i>                                   | 0632592           | 5442779           |
|               | ?                | Snowbrush <i>Ceanothus</i>                                   | 0632920           | 5442310           |
|               | 3                | Snowbrush <i>Ceanothus</i>                                   | 0634885           | 5441629           |
|               | 3                | Snowbrush <i>Ceanothus</i>                                   | 0634962           | 5441576           |
|               | 1                | Snowbrush <i>Ceanothus</i>                                   | 0635125           | 5441504           |
|               | 2                | Snowbrush <i>Ceanothus</i>                                   | 0635419           | 5441344           |
|               | 1                | Snowbrush <i>Ceanothus</i>                                   | 0635431           | 5441349           |
|               | 2                | Snowbrush <i>Ceanothus</i>                                   | 0635658           | 5441199           |
|               | 1                | Snowbrush <i>Ceanothus</i>                                   | 0635776           | 5441023           |
|               | 3                | Snowbrush <i>Ceanothus</i>                                   | 0635860           | 5440723           |
|               | 2                | Snowbrush <i>Ceanothus</i>                                   | 0636651           | 5439772           |
|               | 1                | Redstem <i>Ceanothus</i>                                     | 0636920           | 5439636           |
|               | 1                | Redstem <i>Ceanothus</i>                                     | 0638003           | 5437698           |
|               | 2                | Redstem <i>Ceanothus</i>                                     | 0638090           | 5437414           |

Appendix 5.0 *Ceanothus* spp. UTM Locations

| Date<br>2001 | Plant<br>Numbers | <i>Ceanothus</i> Species<br>Enter Park @ 0629000mE 5443500mN | UTMm.E.<br>NAD 27 | UTMm.N.<br>NAD 27 |
|--------------|------------------|--|-------------------|-------------------|
|              | 7                | Redstem Ceanothus  | 0638270           | 5435820           |
|              | 4                | Redstem Ceanothus  | 0638270           | 5435820           |
|              | 5                | Redstem Ceanothus  | 0638296           | 5435773           |
|              | 6                | Redstem Ceanothus  | 0638925           | 5435210           |
|              | 3                | Redstem Ceanothus  | 0639401           | 5434928           |
|              | 2                | Redstem Ceanothus  | 0640510           | 5434444           |
|              | 7                | Redstem Ceanothus  | 0640602           | 5434417           |
|              | 1                | Redstem Ceanothus  | 0640800           | 5434100           |
|              | 10               | Snowbrush Ceanothus  | 0640800           | 5434100           |
|              | 18               | Redstem Ceanothus  | 0641190           | 5434210           |
|              | 1                | Redstem Ceanothus  | 0641200           | 5433750           |
|              | 2                | Redstem Ceanothus  | 0641275           | 5427619           |
|              | 1                | Redstem Ceanothus  | 0641343           | 5428041           |
|              | 2                | Redstem Ceanothus  | 0641400           | 5433760           |
|              | 5                | Redstem Ceanothus  | 0641656           | 5433753           |
|              | 14               | Redstem Ceanothus  | 0641912           | 5430796           |
|              | 6                | Redstem Ceanothus  | 0641990           | 5431750           |
|              | 9                | Redstem Ceanothus  | 0641999           | 5431978           |
|              | 16               | Redstem Ceanothus  | 0642079           | 5431871           |
|              | 2                | Redstem Ceanothus  | 0642156           | 5431545           |
|              | 1                | Redstem Ceanothus in WA. State                               | 0641343           | 5428041           |
|              | 2                | Redstem Ceanothus in WA. State                               | 0641275           | 5427619           |