

COSEWIC **Assessment and Status Report**

on the

Oregon Branded Skipper *Hesperia colorado oregonia*

in Canada



ENDANGERED
2013

COSEWIC
Committee on the Status
of Endangered Wildlife
in Canada



COSEPAC
Comité sur la situation
des espèces en péril
au Canada

COSEWIC status reports are working documents used in assigning the status of wildlife species suspected of being at risk. This report may be cited as follows:

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Production note:

COSEWIC would like to acknowledge Jennifer Heron for writing the status report on the Oregon Branded Skipper, *Hesperia colorado oregonia*, in Canada, prepared under contract with Environment Canada. This report was overseen and edited by Dr. Laurence Packer, Co-chair of the COSEWIC Arthropods Specialist Subcommittee and Donna Hurlburt, Co-chair of the COSEWIC Aboriginal Traditional Knowledge Subcommittee.

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COSEWIC Assessment Summary

Assessment Summary – November 2013

Common name

Oregon Branded Skipper

Scientific name

Hesperia colorado oregonia

Status

Endangered

Reason for designation

This species inhabits sparsely vegetated Garry Oak and coastal sand spit ecosystems that have undergone enormous historic losses. The populations of this skipper have likely undergone similar declines and only four of sixteen sites totalling less than 16 km² remain extant. This habitat is fragmented and disjunct. The greatest threats this skipper faces at present, however, are the application of Btk pesticide, used to control the invasive Gypsy Moth, and vegetation succession in the open habitats.

Occurrence

British Columbia

Status history

Designated Endangered in November 2013.



COSEWIC Executive Summary

Oregon Branded Skipper *Hesperia colorado oregonia*

Wildlife Species Description and Significance

The Oregon Branded Skipper (*Hesperia colorado oregonia*) is a small butterfly-like insect (wingspan 25 – 37 mm) in the family HesperIIDae. The dorsal wing surfaces are an overall reddish-orange with broad, dark brown wing margins and orange angular spots. The ventral wing surfaces are greenish grey with a rich brown background to the hindwing. Sexes are similar.

Oregon Branded Skipper eggs are hemispherical and dull, chalky white. Larvae (2 – 30mm) have jet black heads, a body that is pale beige or putty colour (early moult) to brownish-purple (final moult). In the last instar, larvae are reddish with black spiracles, turning brownish-purple just prior to pupation.

Pupae have bluish-black wing cases, dull pink abdominal segments and a double row of transverse brownish dashes along the sides. Prior to pupation the transverse abdominal markings become much darker in colour.

The Oregon Branded Skipper occurs in dry Garry Oak (scrub oak ecosystem type) and coastal sand spit ecosystems, both of which are rare in southeastern British Columbia (B.C.). Conservation organizations use the skipper as an interpretive tool to represent the importance of these ecosystems.

Distribution

The Oregon Branded Skipper is at the northernmost extent of its global range on southeastern Vancouver Island, ranging south through the Puget Trough of southwest Washington State, through west-central Oregon to Trinity County in northern California. In B.C., the subspecies is recorded from southeastern Vancouver Island, from Victoria north to Shawnigan Lake and the Cowichan Valley. There are 16 known Oregon Branded Skipper sites on southeastern Vancouver Island, four of which remain extant. Based on known records the current extent of occurrence is estimated at 66 km² and the historical and present (combined) extent of occurrence is < 250 km².

Habitat

Oregon Branded Skipper habitat can be grouped into two types: 1) sparsely vegetated areas, including coastal sand and gravel spits and 2) scrub oak habitats.

Biology

Adults have been recorded from mid-July to late September with one generation per year. Oviposition has not been observed in the field, although in captivity adults laid less than 40 eggs within a two-day span. Larvae feed for approximately four months in spring and summer and construct small tent-like structures at the base of, or in close proximity to host plants, which are thought to be native bunchgrasses such as Red Fescue and Roemer's Fescue. The pupal stage lasts from early July to late August.

Population Sizes and Trends

The Canadian population probably contains fewer than 1000 individuals, but supporting documentation is lacking. The skipper has disappeared from at least three and probably twelve historical sites in the past decades. Surveys have been primarily by wandering transects through suitable habitat.

Threats and Limiting Factors

The greatest threat to individuals is deemed to be the application of Btk insecticide to control introduced Gypsy Moth. Threats to habitat include habitat conversion and loss, fire suppression, invasive non-native plant species, natural vegetative succession and storms and flooding associated with climate change.

Protection, Status, and Ranks

Most records are from private land, including five local government parks. These sites include Cordova Spit (partly a Central Saanich Park) (extant site); Goldstream, Mount Wells (Capital Regional District) (extirpated site); Mount Manuel Quimper within Sooke Hills Regional Park Reserve (extant site); Island View Beach (extirpated site); and Mount Douglas (Saanich Park) (extirpated site).

The private landowner of one site, Camas Hill, is an active steward and there is a conservation covenant on the property. A portion of Cordova Spit is within Tsawout East Saanich Indian Reserve 2 and the Tsawout First Nation has developed a *Land Code*, which identifies important natural features including the spit where Oregon Branded Skipper occurs. The B.C. *Park Act* and *Ecological Reserves Act* protects species at risk in protected areas, of which there is one historical record at Goldstream Provincial Park.

Oregon Branded Skipper is Red-listed in B.C. (S1, Critically Imperilled), nationally ranked N1 (Critically Imperilled) and globally ranked G5T3T4 (rounded to T3, Vulnerable).

TECHNICAL SUMMARY

Hesperia colorado oregonia

Oregon Branded Skipper

Hespérie du Colorado

Range of occurrence in Canada (province/territory/ocean): British Columbia

Demographic Information

Generation time (usually average age of parents in the population; indicate if another method of estimating generation time indicated in the IUCN guidelines(2008) is being used)	1 yr
Is there an [observed, inferred, or projected] continuing decline in number of mature individuals?	Inferred, based on habitat loss
Estimated percent of continuing decline in total number of mature individuals within [5 years or 2 generations]	Magnitude of decline unknown
[Observed, estimated, inferred, or suspected] percent [reduction or increase] in total number of mature individuals over the last [10 years, or 3 generations]. - inferred reduction, based on habitat loss, in the last 10 years	Magnitude of decline unknown
[Projected or suspected] percent [reduction or increase] in total number of mature individuals over the next [10 years, or 3 generations].	Magnitude of decline unknown
[Observed, estimated, inferred, or suspected] percent [reduction or increase] in total number of mature individuals over any [10 years, or 3 generations] period, over a time period including both the past and the future. - inferred decline, based on habitat loss over ten years	Magnitude of decline unknown
Are the causes of the decline clearly reversible and understood and ceased?	No
Are there extreme fluctuations in number of mature individuals?	No

Extent and Occupancy Information

Estimated extent of occurrence Extant confirmed 66 km ² Historical <250km ²	66 km ²
Index of area of occupancy (IAO) (Always report 2x2 grid value). 16 km ² ≤ 28 km ² if unsearched sites still have the species	16 km ²

Is the total population severely fragmented?	Possible, but not documented
Number of locations* - 4 based on the threat of Gypsy Moth spray at the extant sites	4
Is there an [observed, inferred, or projected] continuing decline in extent of occurrence?	Inferred, based on habitat loss
Is there an [observed, inferred, or projected] continuing decline in index of area of occupancy?	Inferred, based on habitat loss
Is there an [observed, inferred, or projected] continuing decline in number of populations?	Inferred, based on habitat loss
Is there an [observed, inferred, or projected] continuing decline in number of locations*?	Inferred, based on habitat loss
Is there an [observed, inferred, or projected] continuing decline in [area, extent and/or quality] of habitat?	Inferred, based on habitat loss
Are there extreme fluctuations in number of populations?	Probably not. Observations at a few of the known sites do not vary greatly from year to year
Are there extreme fluctuations in number of locations*?	No
Are there extreme fluctuations in extent of occurrence?	No
Are there extreme fluctuations in index of area of occupancy?	No

Number of Mature Individuals (in each population)

Population	N Mature Individuals
Camas Hill	Unknown, but probably <250
Cordova Shore	Unknown, but probably <250
Goldstream	Unknown, but probably <250
Mount Manuel Quimper	Unknown, but probably <250
Total	Unknown, but likely fewer than 1000

Quantitative Analysis

Probability of extinction in the wild is at least [20% within 20 years or 5 generations, or 10% within 100 years].	Unknown
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Threats (actual or imminent, to populations or habitats)

The greatest threat to individuals is deemed to be the application of Btk insecticide to control introduced Gypsy Moth. Threats to habitat include habitat conversion and loss, fire suppression, invasive non-native plant species, natural vegetative succession and storms and flooding associated with climate change.
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Rescue Effect (immigration from outside Canada)

Status of outside population(s)? Unknown. Very few populations recorded from within Washington State (Potter pers. comm. 2013).	
Is immigration known or possible?	Not likely. Closest population about 40 km south on Orcas Island, Washington State, across ocean water.

* See Definitions and Abbreviations on [COSEWIC website](#) and [IUCN 2010](#) for more information on this term.

Would immigrants be adapted to survive in Canada?	Likely yes
Is there sufficient habitat for immigrants in Canada?	Yes
Is rescue from outside populations likely?	Unknown

Status History

COSEWIC: Designated Endangered in November 2013.

Status and Reasons for Designation

Status: Endangered	Alpha-numeric code: B1ab(iii)+2ab(iii)
Reasons for designation: This species inhabits sparsely vegetated Garry Oak and coastal sand spit ecosystems that have undergone enormous historical losses. The populations of this skipper have likely undergone similar declines and only four of sixteen sites totalling less than 16 km ² remain extant. This habitat is fragmented and disjunct. The greatest threats this skipper faces at present, however, are the application of Btk pesticide, used to control the invasive Gypsy Moth, and vegetation succession in the open habitats.	

Applicability of Criteria

Criterion A (Decline in Total Number of Mature Individuals): Not applicable. No data available.
Criterion B (Small Distribution Range and Decline or Fluctuation): Meets Endangered B1ab(iii)+2ab(iii) because EO is less than 5,000 km ² , IAO is less than 500 km ² , there are fewer than 5 locations, and there is continuing decline in the quality of habitat. Severe fragmentation is possible, but not demonstrated, since three of the populations are close together and there is no information to suggest that each population is non-viable.
Criterion C (Small and Declining Number of Mature Individuals): Not applicable. No precise population data exist, but likely meets Endangered C2a(i), since the total population is probably well under 2500 mature individuals, the number of mature individuals in each of the four populations is likely fewer than 250, and there is an inferred, ongoing decline.
Criterion D (Very Small or Restricted Total Population): Meets D2 Threatened because there are fewer than 5 sites and there are ongoing inferred declines and a high threat level. Likely meets D1 Threatened because there are probably fewer than 1000 mature individuals.
Criterion E (Quantitative Analysis): No data available.



COSEWIC HISTORY

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) was created in 1977 as a result of a recommendation at the Federal-Provincial Wildlife Conference held in 1976. It arose from the need for a single, official, scientifically sound, national listing of wildlife species at risk. In 1978, COSEWIC designated its first species and produced its first list of Canadian species at risk. Species designated at meetings of the full committee are added to the list. On June 5, 2003, the *Species at Risk Act* (SARA) was proclaimed. SARA establishes COSEWIC as an advisory body ensuring that species will continue to be assessed under a rigorous and independent scientific process.

COSEWIC MANDATE

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assesses the national status of wild species, subspecies, varieties, or other designatable units that are considered to be at risk in Canada. Designations are made on native species for the following taxonomic groups: mammals, birds, reptiles, amphibians, fishes, arthropods, molluscs, vascular plants, mosses, and lichens.

COSEWIC MEMBERSHIP

COSEWIC comprises members from each provincial and territorial government wildlife agency, four federal entities (Canadian Wildlife Service, Parks Canada Agency, Department of Fisheries and Oceans, and the Federal Biodiversity Information Partnership, chaired by the Canadian Museum of Nature), three non-government science members and the co-chairs of the species specialist subcommittees and the Aboriginal Traditional Knowledge subcommittee. The Committee meets to consider status reports on candidate species.

DEFINITIONS (2013)

Wildlife Species	A species, subspecies, variety, or geographically or genetically distinct population of animal, plant or other organism, other than a bacterium or virus, that is wild by nature and is either native to Canada or has extended its range into Canada without human intervention and has been present in Canada for at least 50 years.
Extinct (X)	A wildlife species that no longer exists.
Extirpated (XT)	A wildlife species no longer existing in the wild in Canada, but occurring elsewhere.
Endangered (E)	A wildlife species facing imminent extirpation or extinction.
Threatened (T)	A wildlife species likely to become endangered if limiting factors are not reversed.
Special Concern (SC)*	A wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats.
Not at Risk (NAR)**	A wildlife species that has been evaluated and found to be not at risk of extinction given the current circumstances.
Data Deficient (DD)***	A category that applies when the available information is insufficient (a) to resolve a species' eligibility for assessment or (b) to permit an assessment of the species' risk of extinction.

* Formerly described as "Vulnerable" from 1990 to 1999, or "Rare" prior to 1990.

** Formerly described as "Not In Any Category", or "No Designation Required."

*** Formerly described as "Indeterminate" from 1994 to 1999 or "ISIBD" (insufficient scientific information on which to base a designation) prior to 1994. Definition of the (DD) category revised in 2006.



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The Canadian Wildlife Service, Environment Canada, provides full administrative and financial support to the COSEWIC Secretariat.

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Oregon Branded Skipper

Hesperia colorado oregonia

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WILDLIFE SPECIES DESCRIPTION AND SIGNIFICANCE

Name and Classification

Scientific Name: *Hesperia colorado oregonia* (W. H. Edwards 1883)

Classification:	Kingdom	Animalia
	Phylum	Arthropoda
	Class	Insecta
	Order	Lepidoptera
	Family	Hesperiidae Latreille 1809
	Subfamily	Hesperiinae Latreille 1809
	Genus	Hesperia Fabricius 1793
	Species	<i>H. colorado</i> (Scudder 1874)
	Subspecies	<i>H. colorado oregonia</i> (W. H. Edwards 1883)

Synonyms: *Pamphila oregonia*, *Hesperia comma oregonia*

English Names: Oregon Branded Skipper
Western Branded Skipper (subspecies *oregonia*)

French Name: Hespérie du Colorado

Taxonomic Background and Similarities: Until recently, west coast populations of Western Branded Skipper (*Hesperia colorado*) were thought to represent one subspecies, found in Canada from sea level to the alpine zone on Vancouver Island, British Columbia. Recent work comparing low and high elevation specimens, however, suggests that those from higher elevations are the more widespread Common Branded Skipper (*Hesperia comma*) (Miskelly 2009) and those at low elevations are as of yet unnamed (Guppy pers. comm. 2013), but these low elevation populations on Vancouver Island are currently considered to be *Hesperia colorado oregonia*, following the taxonomy of Pelham (2008). Compared to the Oregon Branded Skipper, the Common Branded Skipper has hindwings with darker undersides and upper sides with wider and darker medial markings, wider and darker brown margins, and smaller marginal apical spots (Miskelly 2009). In addition to morphological distinctiveness, the Oregon Branded Skipper also uses different habitats and host plants (Guppy pers. comm. 2013).

At present, at least ten subspecies of *H. colorado* are recognized in North America and more remain to be described (Layberry *et al.* 1998; Guppy and Shepard 2001; Pyle 2002; Pelham 2008; Guppy pers. comm. 2013). At least three subspecies may be found in Canada. A taxonomic revision of *Hesperia* is underway that will probably change the species and/or subspecies names applicable to these populations, but it is important to understand that this revision will not change the known distribution or conservation status of the Vancouver Island taxon (Guppy pers. comm. 2013).

Subspecies occurring in Canada are *H. c. oregonia* (Layberry *et al.* 1998), the undescribed subspecies noted above and *H. c. harpalus*. Pelham (2008) suggests that *H. c. harpalus* occurs in the southwestern interior of B.C. with no records in southern Alberta but a few in the Cypress Hills of southwestern Saskatchewan (Layberry *et al.* 1998). The geographic boundaries of the other, undescribed subspecies remain unknown until further genetic and morphological work is completed (Guppy pers. comm. 2013).

The earliest known record for the Oregon Branded Skipper in Canada was in 1894 from Shawnigan Lake, British Columbia (Table 1).

Table 1. Oregon Branded Skipper collection records, observations and sites. RBCM Collection = Royal British Columbia Museum, Victoria. All records are also housed with the B.C. Conservation Data Centre 2012.

Site Number	Site Name	Number of Observations	Sex & Life History Stage	Year	Month	Date	Location of Specimen	Reference
1	Camas Hill, Metchosin	1	Adult	2011	August	no data	observation	Milne pers. comm. 2011
2	Cordova Spit [Shore], Saanich	1	Male	1952	September	10	RBCM Specimen	RBCM Collection
2	Cordova Spit [Shore], Saanich	1	Male	1952	September	20	RBCM Specimen	RBCM Collection
2	Cordova Spit [Shore], Saanich	1	Female	1952	September	20	RBCM Specimen	RBCM Collection
2ab	Cordova Spit, [Shore], Tsawout Indian Reserve 2, Saanich	13	Adult	2011	August	16	observation	Gatten pers. comm. 2011
2ab	Cordova Spit, [Shore], Tsawout Indian Reserve 2, Saanich	43	Adult	2011	August	17	observation	Heron pers. data 2011
2c	Island View Beach Park [Cordova Shore]	1	no data	1963	no data	no data	no data	Miskelly 2009; RBCM Collection
3c	Goldstream; Railroad tracks outside of Goldstream Provincial Park; Humpback Road area	1	Adult	2009	July	27	observation	Gatten pers. comm. 2011
3b	Goldstream Provincial Park	1	Female	1902	August	10	RBCM Specimen	RBCM Collection
3b	Goldstream Provincial Park	1	Adult	1951	July	11	RBCM Specimen	RBCM Collection
3b	Goldstream Provincial Park	1	Male	1952	August	31	RBCM Specimen	RBCM Collection
3b	Goldstream Provincial Park	1	Male	no data	no data	no data	RBCM Specimen	RBCM Collection

Site Number	Site Name	Number of Observations	Sex & Life History Stage	Year	Month	Date	Location of Specimen	Reference
3a	Goldstream; Mount Wells	1	Male	1953	August	11	RBCM Specimen	RBCM Collection
4	Mount Manuel Quimper Capital Regional District Park; Site 1	1	Adult	2011	August	1	observation	Gatten pers. comm. 2011
4	Mount Manuel Quimper Capital Regional District Park; Site 1	2	Adult	2011	August	8	RBCM Specimen; observation	Miskelly pers. comm. 2012
4	Mount Manuel Quimper Capital Regional District Park; Site 2	1	Adult	2011	August	8	RBCM Specimen	Miskelly pers. comm. 2012
4	Mount Manuel Quimper Capital Regional District Park; Site 3	1	Adult	2011	August	8	RBCM Specimen	Miskelly pers. comm. 2012
4	Mt. Manuel Quimper Capital Regional District Park	1	Adult	2011	August	1	-	Heron pers. data 2011
4	Mt. Manuel Quimper Capital Regional District Park	5	Adult	2011	August	10	RBCM Specimen	Heron pers. data 2011
5	Rithet's Bog Saanich Park	2	Adult	1951	August	29	RBCM Specimen	RBCM Collection
5	Rithet's Bog Saanich Park	4	Male	1952	August	19	RBCM Specimen	RBCM Collection
5	Rithet's Bog Saanich Park	1	Adult	1952	September	5	RBCM Specimen	RBCM Collection
5	Rithet's Bog Saanich Park	1	Adult	1954	September	9	RBCM Specimen	RBCM Collection
5	Rithet's Bog Saanich Park	1	Male	1954	September	9	RBCM Specimen	RBCM Collection
5	Rithet's Bog Saanich Park	1	Adult	1956	August	10	RBCM Specimen	RBCM Collection
6	Mount Douglas Saanich Park	1	no data	1953	no data	no data	no data	no data
8	Blenkinsop Lake = Lost Lake, Saanich	1	Male	1951	August	17	RBCM Specimen	RBCM Collection
9	Braefoot, Saanich	1	Adult	1951	September	3	RBCM Specimen	RBCM Collection
9	Braefoot, Saanich	1	Male	1951	September	6	RBCM Specimen	RBCM Collection
9	Braefoot, Saanich	1	Adult	1953	September	19	RBCM Specimen	RBCM Collection
9	Braefoot, Saanich	1	Adult; (egg oviposited 19520919, adult emerged 19530919)	no data	no data	no data	RBCM Specimen	RBCM Collection
9	Braefoot, Saanich	1	Immature; larvae laid on grass (immature collected)	no data	no data	no data	RBCM Specimen	RBCM Collection

Site Number	Site Name	Number of Observations	Sex & Life History Stage	Year	Month	Date	Location of Specimen	Reference
7	Uplands Park, Hudson Bay Woods, Saanich	1	Male	1952	September	22	RBCM Specimen	RBCM Collection
7	Uplands Park, Hudson Bay Woods, Saanich	1	Male	1953	August	23	RBCM Specimen	RBCM Collection
7	Uplands Park, Hudson Bay Woods, Saanich	1	Male	1953	August	27	RBCM Specimen	RBCM Collection
7	Uplands Park, Hudson Bay Woods, Saanich	1	Male	1953	September	2	RBCM Specimen	RBCM Collection
7	Uplands Park, Hudson Bay Woods, Saanich	1	Adult	1953	September	3	RBCM Specimen	RBCM Collection
10	Maple Bay	1	Male	1916	July	30	RBCM Specimen	RBCM Collection
10	Maple Bay	1	Adult	1935	August	9	RBCM Specimen	RBCM Collection
11	Langford, Millstream Road	1	Adult	1955	July	21	RBCM Specimen	RBCM Collection
12	Royal Oak, Saanich	1	Male	1955	September	4	RBCM Specimen	RBCM Collection
13	Duncan	1	Adult	1926	August	1	RBCM Specimen	RBCM Collection
13	Duncan	1	Adult	1926	August	18	RBCM Specimen	RBCM Collection
13	Duncan	1	Adult	1926	September	7	RBCM Specimen	RBCM Collection
14	Malahat	1	Adult	1920	August	10	RBCM Specimen	RBCM Collection
15	Quamichan Lake	1	no data	no data	no data	no data	no data	no data
16	Shawnigan Lake	1	no data	1894	no data	no data	RBCM Specimen	RBCM Collection
no data	no data	1	Immature	no data	no data	no data	RBCM Specimen	RBCM Collection
no data	no data	1	Adult	no data	no data	no data	RBCM Specimen	RBCM Collection
Unknown	Saanich	1	Male	1951	August	22	RBCM Specimen	RBCM Collection
Unknown	Saanich	1	Female	1951	August	24	RBCM Specimen	RBCM Collection
Unknown	Saanich	1	Male	1951	August	24	RBCM Specimen	RBCM Collection

Morphological Description

Adults:

Oregon Branded Skipper (*Hesperia colorado oregonia*) (Figure 1) is a small skipper (wingspan 25 – 37 mm) with tawny, reddish-brown dorsal wing surfaces surrounded by broad dark brown margins and with orange spots in the middle of the wing (Layberry *et al.* 1998; Guppy and Shepard 2001). Ventral wing surfaces appear greenish-grey in flight (Figure 2). The ventral hindwing has a postmedian line of distinctive, sharp, yellowish, silver-white spots that are regularly aligned on a rich brown base colour (Layberry *et al.* 1998; Guppy and Shepard 2001; Pyle 2002). Spots on the ventral wing surfaces are small in proportion to the overall wing size (Layberry *et al.* 1998; Guppy and Shepard 2001). The males have a dart-like stigmata on the dorsal forewing (Pyle 2002). Antenna have long clubs and are less than 1/3 the wing length (Pyle 2002).



Figure 1. Oregon Branded Skipper adult (dorsal surface); specimen from the Royal B.C. Museum. Photograph by Jennifer Heron.



Figure 2. Oregon Branded Skipper adult (ventral surface), observed August 8, 2011 at Mount Manuel Quimper within Sooke Hills Wilderness Regional Park Reserve (Capital Regional District Parks). Photograph by Jayme Brooks and Laura Parkinson.

When *H. c. oregonia* is compared with other subspecies of *H. colorado*, the dorsal wing coloration is “warmly reddish above and has an olive disk with light yellowish spots (or white on the females) without a pearly luster” (Pyle 2002).

Oregon Branded Skipper eggs were collected and reared, and the life stages of the skipper described by Hardy (1954). The information below is summarized from this publication.

Eggs:

Eggs are hemispherical (1 mm by 0.8 mm), dull chalky white, changing to pink and then to pearly grey as they age, with fine microscopic reticulations and a smooth, slightly depressed micropylar area.

Larvae:

When first hatched, larvae (2 mm in length) have large and jet black heads. The first instar larvae are pale beige or putty coloured, and have a spindle-shaped, fairly stout body. As larvae grow and moult, their head colour becomes tan to black and the body colour green to tan (Guppy and Shepard 2001). Larvae grow larger through a series of up to six instars, reaching 30 mm in length and 6 mm in width. In the last instar, they are reddish with black spiracles, turning brownish-purple just prior to pupation.

Pupae:

Pupae are approximately 20 mm long and 6 mm wide, have bluish-black wing cases, dull pink abdominal segments and a double row of transverse fuscous dashes along the sides. Prior to emerging as an adult, the transverse abdominal markings become much darker in colour.

The Oregon Branded Skipper may be confused with three other skippers within its B.C. range that have similar morphological characteristics, size, colouration, flight period and flight behaviour (based on descriptions in Pyle 2002):

1. The Woodland Skipper (*Ochlodes sylvanoides*): In this species, the ventral surface of both wings has a sharply defined darker brown border, the forewing has a sharply defined brown zigzag mark, and the ventral hindwing has distinct large yellow spots.
2. The European Skipper (*Thymelicus lineola*): This species lacks spots on the dorsal and ventral wing surfaces and has thick black wing margins, and has dorsal wing surfaces with a brownish border.
3. Dun Skipper (*Euphyes vestris*): This species has an overall dark brown ventral wing colouration, and does not have any white markings.

Genetic description

Populations of Oregon Branded Skipper in California were found to be genetically distinct from populations of Common Branded Skipper in western North America (Forister *et al.* 2004) and do not show distinct mtDNA lineages within California (Shapiro and Forister 2005).

Genetic variation in the mitochondrial gene CO1 has recently been analyzed in a variety of skipper species as part of the *All Leps Barcode of Life* project (Biodiversity Institute of Ontario 2011).

Population Spatial Structure and Variability

The spatial structure and variability of the Oregon Branded Skipper in Canada has not been studied other than for subspecies status as discussed above.

Designatable Units

The Oregon Branded Skipper has one designatable unit within Canada. The subspecies occurs entirely in the Pacific National Ecological Area (COSEWIC 2011). There is no information on population genetic structure among sites, or discreteness or evolutionary significance among populations.

Special Significance

The Oregon Branded Skipper occurs within Garry Oak and associated ecosystems and coastal sand ecosystems, both of which are considered rare and endangered within Canada.

The Oregon Branded Skipper is used as an interpretive tool by conservation organizations to represent the importance of rare and endangered species throughout the low elevation coastal meadow and sand ecosystems of southeastern Vancouver Island. Conservation organizations such as the Garry Oak Ecosystems Recovery Team (Junck pers. comm. 2011; Smith pers. comm. 2011) use this skipper as a broad umbrella for protection of habitats associated with this and other species, when informing private landowners about stewardship opportunities.

In Canada, the Oregon Branded Skipper occurs at the northern limits of its range and may therefore hold distinctive adaptations and be of special scientific and conservation interest, as do other peripheral species in the region (Scudder 1989). It is of interest to entomologists and taxonomists owing to its rarity throughout its range, as well as the taxonomic uncertainty and challenge around delineating species and subspecies in this group (Guppy pers. comm. 2013; Miskelly pers. comm. 2013).

The Blue-listed Small-flowered Fescue, *Festuca minutiflora* (not assessed by COSEWIC), is within the range of Oregon Branded Skipper and is a potential host plant (see **Habitat**) (British Columbia Conservation Data Centre 2013). In addition to the Oregon Branded Skipper, 341 provincially listed species at risk inhabit the coastal lowlands of southeastern Vancouver Island and more than 121 have been assessed by COSEWIC (British Columbia Conservation Data Centre 2012).

DISTRIBUTION

Global Range

The Oregon Branded Skipper is at the northernmost extent of its range on southeastern Vancouver Island, British Columbia. It ranges southward into the Puget Trough of Washington State, through west-central Oregon to northern California (Figure 3).

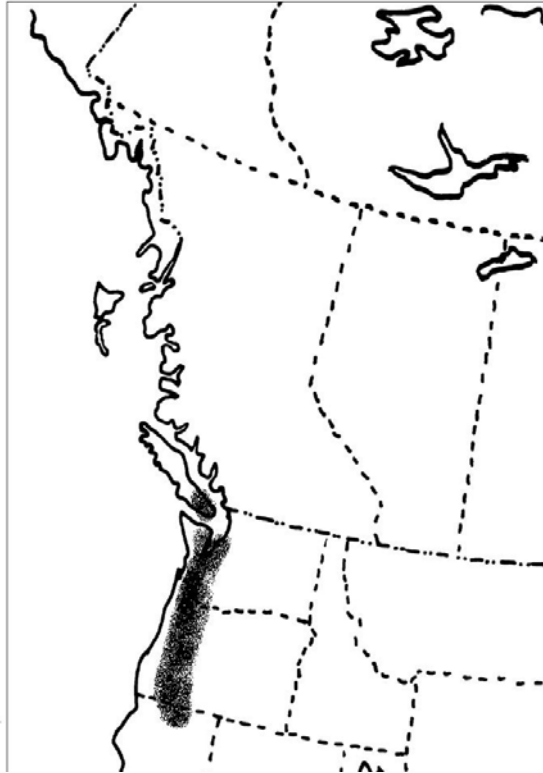


Figure 3. Estimated global range of Oregon Branded Skipper. The taxonomy of Oregon Branded Skipper is complex and this map depicts a possible range which may change pending changes to taxonomy.

Canadian Range

Within Canada, the Oregon Branded Skipper is restricted to the coastal lowlands of southeastern Vancouver Island, British Columbia from the Victoria area north to the Cowichan Valley (Figure 4) (British Columbia Conservation Data Centre 2013).

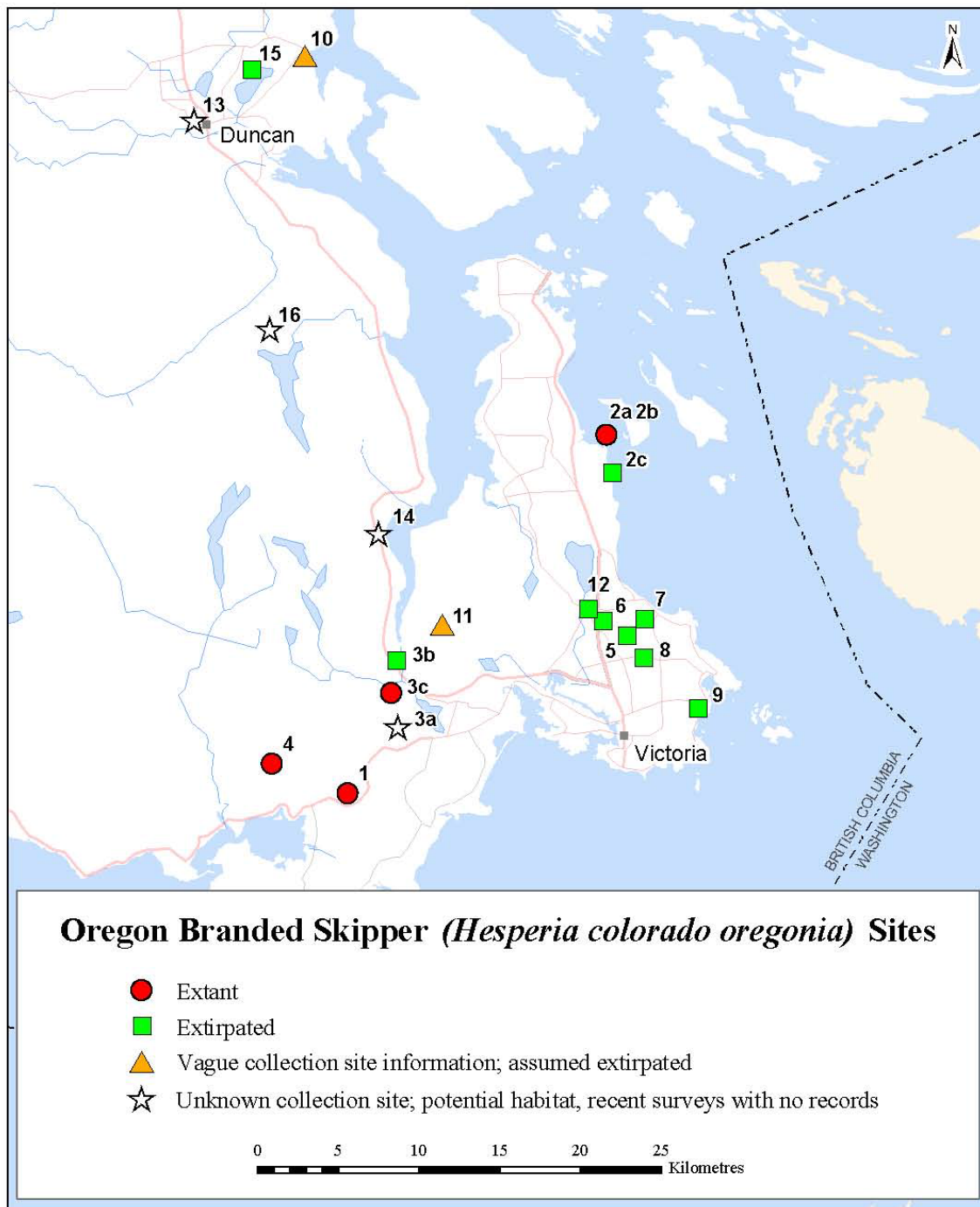


Figure 4. Canadian range of Oregon Branded Skipper showing extant, extirpated, and assumed extirpated sites (see Table 1 for site names, and associated data). Map completed by Jenny Wu.



Figure 5. Range of Garry Oak and associated ecosystems in B.C. (Garry Oak Ecosystem Recovery Team 2012).

Oregon Branded Skipper records in British Columbia date from 1894 to 2013 (Table 1). In total, 115 museum or sight records for Oregon Branded Skipper (Table 1) can be grouped into 16 sites (Table 2). The specific sites and status of three additional specimens cannot be confirmed because geographic collection data were not available (C. Copley pers. comm. 2011). The 17 sites are categorized as:

- Four extant sites: 1) Camas Hill; 2) Cordova Shore (two landowners—2a Tsawout First Nation, 2b Central Saanich park); 3) Goldstream (three landowners); 4) Mount Manuel Quimper within Sooke Hills Regional Park Reserve (one landowner);
- Three known extirpated sites: 5) Rithet's Bog (surveyed 2011); 6) Mount Douglas Saanich Park (surveyed 2011); and 7) Uplands Park (surveyed 2004). Additionally, the subspecies is deemed extirpated from the Island View Beach Regional Park portion of Site 2) Cordova Shore (surveyed 2013).
- Nine presumed extirpated sites with no specific collection information and in geographic areas with extensive urban development and little remaining habitat: 8) Blenkinsop Lake; 9) Braefoot; 10) Maple Bay; 11) Langford, Millstream Road; 12) Royal Oak; 13) Duncan; 14) Malahat; 15) Quamichan Lake; 16) Shawnigan Lake (some of these areas surveyed in 2010 and 2011).

Table 2. Oregon Branded Skipper sites, status, land ownership and ecosystem classification.

Site Number	Site Name	Site Status and Most Recent Year Observed	Most Recent Year Surveyed	Land Ownership	Number of Landowners	Ecosystem Information	Approximate Area (hectares)
1	Camas Hill	Extant (2011)	2011	Private	1	Garry Oak Ecosystem	5
2a	Cordova Shore	Extant (2011)	2011	Tsawout First Nation	1	Coastal Sand Ecosystem (see Cordova Shore Conservation Partnership 2010)	33
2b		Extant (2011)	2011	District of Saanich Parks	1		
2c		Extirpated (1963)	2011	Island View Beach Capital Regional District Park	1		5
3a	Goldstream Area, Mount Wells (now a Capital Regional District Park)	Extirpated (1953); exact collection site unknown	2011	Private; Capital Regional District Park	1	Garry Oak Ecosystem; park was established in 1994	> 121.07
3b	Goldstream Provincial Park	Extirpated (1951)	2011	B.C. Crown	1	Garry Oak Ecosystem	N/A
3c	Goldstream Area, railway tracks	Extant (2011)	2011	Private (likely)	1	Found adjacent to railway tracks outside of park, but Garry Oak habitat within close proximity (< 500metres) up nearby Mount Wells	N/A
4	Sooke Hills Wilderness Regional Park Reserve, Mount Manuel Quimper Capital Regional District Park	Extant (2011)	2011	Local Government, Capital Regional District	1	Garry Oak Ecosystem; sparsely vegetated meadow	N/A
5	Rithet's Bog; Saanich	Extirpated (1951)	2011	Local Government, District of Saanich	1	Garry Oak Ecosystem	38.4
6	Mount Douglas Saanich Park	Extirpated (1953)	2011	Local Government, District of Saanich	1	Garry Oak Ecosystem	181.5
7	Uplands Park; Hudson Bay Woods; Oak Bay	Extirpated (1953)	2004 (Miskelly pers. comm. 2012)	Oak Bay	1	Garry Oak Ecosystem	31
8	Blenkinsop Lake = Lost Lake; Saanich	Extirpated (1951)	Collection site unknown; general area searched by naturalists in the past decade	Unknown, likely private land	1	Garry Oak Ecosystem	N/A
9	Braefoot; Saanich	Extirpated (1953) Collection site unknown, likely extirpated based on past development since collection date	Collection site unknown; general area searched by naturalists in the past decade	Unknown, likely private land	1	Garry Oak Ecosystem	N/A
10	Maple Bay	Extirpated (1916) Collection site unknown, likely extirpated based on past development since collection date	Lack of collection site information makes targeted surveys difficult	Unknown, likely private land	1	Unknown collection site; Garry Oak Ecosystems nearby	N/A
11	Langford, Millstream Road	Extirpated (1955) Collection site unknown, likely extirpated based on past development since collection date	Lack of collection site information makes targeted surveys difficult	Unknown, likely private land	1	Unknown collection site; Garry Oak Ecosystems nearby	N/A

Site Number	Site Name	Site Status and Most Recent Year Observed	Most Recent Year Surveyed	Land Ownership	Number of Landowners	Ecosystem Information	Approximate Area (hectares)
12	Royal Oak; Royal Oak	Extirpated (1955) Collection site unknown, likely extirpated based on past development since collection date	Lack of collection site information makes targeted surveys difficult	Unknown, likely private land	1	Garry Oak Ecosystem	N/A
13	Duncan	Extirpated (1926) Collection site unknown, likely extirpated based on past development since collection date	Lack of collection site information makes targeted surveys difficult	Unknown, likely private land	1	Unknown, but known for many collection records from Garry Oak Ecosystems	N/A
14	Malahat	Extirpated (1920) Collection site unknown, likely extirpated based on past development since collection date	Lack of collection site information makes targeted surveys difficult	Unknown, likely private land	1	Unknown, but known for many collection records from Garry Oak Ecosystems	N/A
15	Quamichan Lake	Extirpated (1917) Collection site unknown, likely extirpated based on past development since collection date	Lack of collection site information makes targeted surveys difficult	Unknown, likely private land	1	Unknown, but known for many collection records from Garry Oak Ecosystems	N/A
16	Shawnigan Lake	Extirpated (1894) Collection site unknown, likely extirpated habitat	Lack of collection site information makes targeted surveys difficult	Unknown, likely private land	1	Unknown, but known for many collection records from Garry Oak Ecosystems	N/A

For further discussion on the extant or extirpated status of populations at various sites see **Search Effort** and **Fluctuations and Trends**.

The present extent of occurrence (extant sites 1 – 4) is 66 km². The extent of occurrence when historical sites are included (all 16 sites) is approximately 250 km². The index of area of occupancy for extant sites is 16 km².

Number of Locations

Should European Gypsy Moth (*Lymantria dispar*) be found in significant numbers within the range of the Oregon Branded Skipper, there is the possibility of ground and aerial spray of the bacterial pesticide Btk (*Bacillus thuringiensis kurstaki*) (see **Threats**). The possibility of simultaneous Btk spray event across all Oregon Branded Skipper sites is unlikely. The four extant sites suggest four locations for Oregon Branded Skipper.

Search Effort

There has been a combination of quantified and unquantified search effort in known current habitat of the Oregon Branded Skipper and within the known Canadian distribution of the Skipper via general butterfly surveys (Table 3).

Table 3. Additional search effort within the potential Canadian range of Oregon Branded Skipper. Although some of these studies were not specifically targeting Oregon Branded Skipper, the species would have been reported had it occurred.

General Survey Site and Date	Person-Hours Searched During Oregon Branded Skipper Flight Season	Distance Searched	Known Oregon Branded Skipper Recorded During Survey	Known Historic Sites Included in This Survey	Reference
2001, southern Vancouver Island and Gulf Islands	N/A	N/A	None	Unknown	Guppy and Fisher 2001
2007, Gulf Islands National Park Reserve (May through August)	90.7 hours	18 sites (total area 1589 ha); 4 visits to each site	None	No historic records known from these survey sites	Fenneman 2008
2008, Gulf Islands National Park Reserve (federal) May through August	N/A	18 sites (total area 1589 ha); 4 visits to each site	None	No historic records known from these survey sites	Guppy 2008
2009, Courtenay, Comox and other areas on southern Vancouver Island 2009 (private land) May 21 - August 26, 2009	104.2 hours	380.7 km	None	Courtenay and Comox areas (although specific site of historic record is unknown)	Page <i>et al.</i> 2009
2010, butterfly surveys in southeastern Vancouver Island	106.2 hours	332.2 km	None	None	Page <i>et al.</i> 2010
2011, Oregon Branded Skipper surveys on southeastern Vancouver Island	117.5 hours	203.7 km	Cordova Spit (site 1) and Sooke Hills Regional Park Reserve (site 4)	None, but did include some areas where species was observed without confidence	Heron unpubl. data
2004-2009, academic butterfly study on southern Vancouver Island	Unknown	Unknown	Unknown; butterfly research in Garry Oak ecosystems at a minimum of nine sites		Hellmann pers. comm. 2010
2004-2009, academic butterfly study on Salt Spring Island	Unknown	Unknown	Unknown	Unknown	Clements pers. comm. 2011
2004-2009, pollinator research in Garry Oak ecosystems on southern Vancouver Island	Unknown	Unknown	Unknown	Unknown	Elle pers. comm. 2011
2003-2005, butterfly research in Garry Oak ecosystems on southern Vancouver Island	Unknown	Unknown	Unknown	Unknown	Hallstrom pers. comm. 2009
2001-2004, academic butterfly study on southern Vancouver Island	Unknown	Unknown	None	Searched some historic sites	Miskelly pers. comm. 2013

Table 4. Yearly life cycle of Oregon Branded Skipper in British Columbia (British Columbia Conservation Data Centre 2011).

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Eggs	_____							_____				
Larvae											
Pupae (brief)						_____						
Adults							_____					

Table 5. Gypsy Moth treatment history in B.C. (British Columbia Ministry of Forests, Lands and Natural Resource Operations 2012).

General Geographic Area of Gypsy Moth Treatment	Year of Detection	Year of Treatment	Aerial Spray	Ground Spray	Mass Trapping	Unknown	Host Removal
Kitsilano*, Vancouver (Mainland)	1978	1979		x		x	
Ft. Langley (Mainland)	1982	1984				x	
Courtenay (Vancouver Island)	1983	1984				x	
Courtenay (Vancouver Island)	1983	1985				x	
Canadian Forces Base Chilliwack (Mainland)	1983	1985		x			
Canadian Forces Base Chilliwack (Mainland)	1983	1986		x			
Canadian Forces Base Chilliwack (Mainland)	1983	1987	x				
Kelowna (Mainland)	1986	1988	x	x			
Canadian Forces Base Colwood, Vancouver Island	1986	1988	x				
North Parksville (Vancouver Island)	1987	1988		x			
Parksville (Vancouver Island)	1987	1990	x	x			
North Saanich (Vancouver Island)	1990	1991	x	x			
Belmont Park (Vancouver Island)	1990	1992	x				
South Parksville (Vancouver Island)	1991	1992		x			
Richmond (Mainland)	1991	1993	x				
Burnaby (Mainland)	1992	1993	x				
Salt Spring Island (Gulf Island)	1991	1993		x			
Victoria (Vancouver Island)	1992	1993	x				
Hope (Mainland)	1992	1993	x				
South Vancouver (Mainland)	1991	1994		x			
Victoria (Vancouver Island)	1992	1994	x				

General Geographic Area of Gypsy Moth Treatment	Year of Detection	Year of Treatment	Aerial Spray	Ground Spray	Mass Trapping	Unknown	Host Removal
Beban Park, Nanaimo (Vancouver Island)	1992	1994	x				
Whiskey Creek (Vancouver Island)	1992	1994	x				
Hope (Mainland)	1992	1994	x				
Chilliwack (Mainland)	1992	1995	x	x			
Hope (Mainland)	1992	1996	x				
New Westminster (Mainland)	1995	1997					x
Victoria (Vancouver Island)	1996	1998		x			
Colwood (Vancouver Island)	1996	1998		x			
Esquimalt (Vancouver Island)	1996	1998		x			
Victoria (Vancouver Island)	1996	1999	x				
Colwood (Vancouver Island)	1996	1999	x				
Esquimalt (Vancouver Island)	1996	1999	x				
Duncan (Vancouver Island)	1998	1999	x				
Nanaimo (Vancouver Island)	1998	1999	x				
Brentwood Bay (Vancouver Island)	1998	1999	x				
Tsawwassen (Mainland)	1998	1999	x				
Metchosin (Vancouver Island)	1998	1999	x				
Burnaby (Mainland)	1999	2000	x				
Sechelt (Mainland)	1999	2000			x		
Sechelt (Mainland)	2000	2001			x		
Sechelt (Mainland)	2001	2001			x		
Delta (Mainland)	1998	2001		x			
Delta (Mainland)	1999	2001		x			
Delta (Mainland)	2000	2001		x			
North Delta (Mainland)	2001	2002			x		
Saanich (Vancouver Island)	2001	2002			x		
North Delta (Mainland)	2002	2003			x		
Saanich (Vancouver Island)	2002	2003			x		
North Delta (Mainland)	2003	2004	x		x		
Saanich (Vancouver Island)	2003	2004	x		x		
Abbotsford (Mainland)	2003	2004			x		
Duncan (Vancouver Island)	2003	2004			x		

General Geographic Area of Gypsy Moth Treatment	Year of Detection	Year of Treatment	Aerial Spray	Ground Spray	Mass Trapping	Unknown	Host Removal
Gabriola Island (Gulf Island)	2003	2004			x		
Duncan (Vancouver Island)	2003	2005			x		
Duncan (Vancouver Island)	2004	2005			x		
Gabriola Island (Mainland)	2003	2005			x		
Gabriola Island (Mainland)	2004	2005			x		
Saanich (Vancouver Island)	2003	2005			x		
Saanich (Vancouver Island)	2004	2005			x		
Langley (Mainland)	2003	2005			x		
Langley (Mainland)	2004	2005			x		
Nanaimo (Vancouver Island)	2003	2006					
Nanaimo (Vancouver Island)	2004	2006					
Nanaimo (Vancouver Island)	2005	2006		x	x		
Salt Spring Island (Gulf Island)	2003	2006					
Salt Spring Island (Gulf Island)	2004	2006					
Salt Spring Island (Gulf Island)	2005	2006		x	x		
Saanich (Vancouver Island)	2003	2006					
Saanich (Vancouver Island)	2004	2006					
Saanich (Vancouver Island)	2005	2006		x			
Courtenay (Vancouver Island)	2006	2007	x				
Salt Spring Island (Gulf Island)	2006	2007	x	x	x		
Cedar Hill Golf Course (Vancouver Island)	2006	2007		x	x		
Belmont Park, Colwood (Vancouver Island)	2006	2007		x	x		
Salt Spring Island (Southern Gulf Island)	2004	2008		x			
Saltair, near Ladysmith (Vancouver Island)	2007	2008		x			
Lake Cowichan (Vancouver Island)	2007	2008			x		
Harrison (Mainland)	2009	2009	x				
Harrison (Mainland)	2010	2010		x			
Richmond (Mainland)	2010	2010	x				

* 1979 treatments did not use Btk. All remaining aerial and ground spray treatments used Btk.

Aerial spray treatments involve aerial applications using aircraft over a pre-determined spray zone. Treatments are typically applied three times on three separate dates within the larval activity period for Gypsy Moth, April and May. Ground spray treatments involve hand held hydraulic sprayers that directly spray foliage within treatment zone. Mass trapping involves a grid of pheromone baited traps within a treatment zone. Host tree removal involves removal of vegetation thought to be the prime source of the initial introduction.

From 2009-2011, skipper-specific search effort in known habitat totalled 221.7 hrs over 585.40 km of transects, including 104.2 hrs over 380.7 km of transect in the Courtenay and Comox sites in 2009, and 117.5 hrs over 203 km in Cordova Spit and Sooke Hills Regional Park Reserve in 2011 (Heron unpubl. data). Surveys at Cordova Shore in 2013 recorded 15 observations (Gelling pers. comm. 2013).

There have been considerable non-quantified surveys for the Oregon Branded Skipper at some historical sites over the past ten years (Table 3), including the Victoria Natural History Society Butterfly Count at Rithet's Bog and Mount Douglas Park where volunteers have visited sites once a month from April through September over the last 20 years (Miskelly pers. comm. 2013). These surveys have not reported Oregon Branded Skipper during this period. They note that the extensive areas of native grassland and oak savannah surrounding Rithet's Bog no longer exist and have been converted to a residential landscape (Gatten pers. comm. 2013; Miskelly pers. comm. 2013), and that only 1 ha of Mount Douglas Park contains abundant native bunchgrasses (Miskelly pers. comm. 2013). The Shawnigan Lake area has also been surveyed by butterfly enthusiasts and experts in the past 10 years, but there have been no records reported. In mid-August 2012, the Mount Baldy area of the Shawnigan Lake site was searched without success (Heron pers. comm. 2013). For most historical sites classified as "presumably extirpated", little remnant habitat has persisted in the face of development.

Additional search effort for butterflies and pollinators has occurred within the Canadian range of the Oregon Branded Skipper in butterfly habitat, although this has occurred outside known extant or historical sites of the Skipper. Conservancy groups actively looking for the skipper include the Salt Spring Island Conservancy (Annschild pers. comm. 2011), Denman Island Conservancy Association (Fyson pers. comm. 2011), Conservancy Hornby (Law pers. comm. 2011), Mayne Island Conservancy (Dunn pers. comm. 2011) and Galiano Island Conservancy (Crowe pers. comm. 2011). Search effort focused on southeastern Vancouver Island, Salt Spring Island, Galiano Island, Mayne Island and Gulf Islands National Park Reserve.

The Oregon Branded Skipper is one of few small butterflies active in the last weeks of summer in southeastern Vancouver Island (Guppy and Shepard 2001; British Columbia Conservation Data Centre 2013). The species is not likely to be overlooked by lepidopterists, naturalists or specialists keenly looking for it; however, it may be confused with similar species (see Morphological Description). The two most recent sightings (Site 3 Mount Manuel Quimper and Site 4 Goldstream; Table 1) were incidental observations (Gatten pers. comm. 2011; British Columbia Conservation Data Centre 2013).

HABITAT

Habitat Requirements

The Oregon Branded Skipper is recorded from two habitat types: 1) sparsely vegetated coastal sand ecosystems (two sites), and 2) scrub oak ecosystems, which are a subgroup of Garry Oak and associated ecosystems (nine sites) (Table 2). Both habitat types are within the Coastal Douglas-fir biogeoclimatic zone, an ecosystem classification system developed by the British Columbia Ministry of Forests (2009).

General habitat descriptors present at Oregon Branded Skipper sites include:

- Significant areas of exposed bare ground, dry well-drained soil and open soil patches (MacNeil 1964; Thomas 1983a; Thomas *et al.* 1986; Dennis 2010). This is shown to be important in other related skippers (e.g., *Hesperia comma* in Britain [Thomas *et al.* 1986], *Polites mardon* in south Puget Sound [Pyle 2002], and *Hesperia assiniboia* in Alberta (Schmidt pers. comm. 2012).
- Presence of short turf grasses and bunchgrasses (MacNeil 1964). Bunchgrasses are important for larvae, as the species constructs larval shelters using these types of grass species.
- Presence of larval host plants. The specific host plants for the Oregon Branded Skipper are unknown but are expected to be bunchgrasses such as Red Fescue (*Festuca rubra*) and Roemer's Fescue (*Festuca roemer*). Other non-native grass species, such as ryegrasses (*Lolium* spp.) and bromes (*Bromus* spp.), have been utilized in captivity.

Sparsely vegetated habitats (Site 2 Cordova Shore, Table 2)

Oregon Branded Skipper is recorded from sparsely vegetated habitats at 2ab) Cordova Shore (extant portions) (Figure 6) and 2c) Island View Beach Capital Regional Park (extirpated portion). Sparsely vegetated habitats include coastal sand and gravel spits and coastal sand dunes (Ward *et al.* 1998). These areas are characterized by gravel, exposed bedrock, sand and shallow soils that do not allow for significant tree and shrub growth, are interspersed with patches of low-lying vegetation, and tend to have significant moss and herbaceous plant growth. In particular, coastal sand spit vegetation establishes slowly due to the shifting soil, erratic winds, salt spray, intense exposure to summer heat and drought, and overall shortage of nutrients and fresh water (Ward *et al.* 1998).



Figure 6. Oregon Branded Skipper sand spit habitat at Cordova Spit, August 11, 2011. Photograph by Jennifer Heron.

At 2ab) Cordova Shore, the Oregon Branded Skipper has been observed nectaring on American Searocket (*Cakile edentula*) and Puget Sound Gumweed (*Grindelia stricta integrifolia*) (Costanzo pers. comm. 2011; Heron unpubl. data). These plants occur in five of the sparsely vegetated ecosystem units described from Cordova Shore (see Stacey and Filatow 2009).

American Searocket is mainly found in two ecosystem units at Cordova Shore: 1) *Beach ecosystem unit* and 2) *Dune Wildrye - Beach pea ecosystem unit*. This member of the mustard family grows in the sand among the driftwood on the upper beach area where the *Dune wildrye - Beach pea ecosystem unit* occurs. American Searocket is a common native species found along coastal shorelines (secure) (British Columbia Conservation Data Centre 2013) that flowers from June through September (Hitchcock *et al.* 1964). Oregon Branded Skippers was observed utilizing the nectaries at the base of each of the four petals of the plant (Costanzo pers. comm. 2011; Heron unpubl. data).

The Puget Sound Gumweed is a component of three ecosystem units at Cordova Shore:

1. The *Large-headed Sedge ecosystem unit* (red-listed plant community) is found on rapidly drained sites having low soil moisture and poor nutrient availability, with introduced grasses being common. This ecosystem unit has dominant species that include Large-headed Sedge (*Carex macrocephala*), Red Fescue (suspected host plant), and Puget Sound Gumweed. Associated species include Beach Bindweed (*Convolvulus soldanella*), Yellow Sand-verbena (*Abronia latifolia*), Black Knotweed (*Polygonum paronychia*), Sea Thrift (*Armeria maritima*), and Dune Wildrye (*Leymus mollis* ssp. *mollis*).
2. The *Dune Wildrye-Beach Pea ecosystem unit* (red-listed plant community) is found on moderately well drained, sandy soils with moderate soil moisture and soil nutrient availability. Dominant species include Dune Wildrye and Red Fescue. Associated species include Puget Sound Gumweed, Yarrow (*Achillea millefolium*), Dune Beach Pea (*Lathyrus japonicus*), and Cascara (*Rhamnus purshiana*).
3. The *Black Knotweed-Yellow Sand-verbena ecosystem unit* is found on sites with active erosion and deposition by wind and waves. Dominant species include Black Knotweed. Associate species include Beach Carrot (*Glehnia littoralis*), Beach Bindweed, Dune Wildrye, Large-headed Sedge, Barestem Desert-parsley (*Lomatium nudicaule*), Sea Thrift, Silver Burweed (*Ambrosia chamissonis*), California Broomrape (*Orobanche californica*), Red Fescue, Yellow-sand Verbena and Puget Sound Gumweed.

Garry Oak and associated ecosystems (nine sites, Table 2)

Oregon Branded Skipper is recorded from at least ten sites characterized as Garry Oak and associated ecosystems. Two of the four extant sites are Garry Oak ecosystems: 2) Mount Manuel Quimper (Figure 7) and 4) Camas Hill. The most recent record of Oregon Branded Skipper at site 3) Goldstream (2009) is from weedy disturbed grassy vegetation adjacent to a railway right-of-way. However, the observed skipper likely originated from the Garry Oak ecosystem within the nearby Mount Wells Capital Regional District Park. This park is also a historical collection site for the skipper (Table 3).



Figure 7. Oregon Branded Skipper inland bluff habitat at Mount Manuel Quimper within Sooke Hills Wilderness Regional Park Reserve (Capital Regional District). August 8, 2011. Photograph by Jayme Brooks and Laura Parkinson.

Components of Garry Oak and associated ecosystems have been described in detail by Roemer (1972) and Erickson (1993, 1995), and further grouped into two major ecosystem types: parkland Garry Oak ecosystems and scrub Garry Oak ecosystems (Pojar 1980a,b). The Oregon Branded Skipper has been recorded from the scrub oak ecosystem type, which is characterized by shallow soils and shorter, scrubby oak trees typically growing on rock outcrops and benches. In general, inland cliffs, bluffs and rocky outcrops are formed by erosion, the collapse of rock faces or riverbanks, and cumulative deposition of organic matter over time (Ward *et al.* 1998). Soils on these cliffs and bluffs form within the ledges, bedrock fissures and crevices, which then support grasses, mosses, lichens, and stunted trees and shrubs (Ward *et al.* 1998). Detailed vegetative components of scrub oak habitat types have not formally been described and may only contain a partial suite of species commonly found in other Garry oak woodlands, such as maritime meadows and vernal pool ecosystems (Lea 2011).

The larval host plants are unknown in B.C., although native bunchgrasses such as Red Fescue and Roemer's Fescue are suspected (Miskelly pers. comm. 2013). Red Fescue grows within dry, disturbed areas such as roadsides and fields, stream banks, meadows, gravelly sites and beaches (Douglas *et al.* 2001). Roemer's Fescue is a mid- to late succession plant that grows in fine to medium textured mineral soil under moderately acid to slightly alkaline conditions (Darris *et al.* 2007). The plant has extensive roots and is drought resistant, yet grows in the range of moderately dry to wet meadows, grassy areas, and open habitats. Neither Red Fescue (S5) nor Roemer's Fescue (S4) is at risk in British Columbia (British Columbia Conservation Data Centre 2013).

Elsewhere within the species' range, such as the Puget Sound prairies of Washington State, females oviposit on Long-stoloned Sedge (*Carex inops*) and California Oatgrass (*Danthonia californica*) (Pyle 2002). Both these plants grow throughout southeastern Vancouver Island (and elsewhere in B.C.) in lowland, moist to dry rock outcrops, meadows and open woodlands (Douglas *et al.* 2001). In B.C. the Long-stoloned Sedge is ranked vulnerable (S3S4) and the California Oatgrass secure (S5) (British Columbia Conservation Data Centre 2013). Oviposition substrate is not good evidence of larval food plant, because *Hesperia* will oviposit on other substrates near the host, including fence posts and tree trunks (MacNeill 1964; Pyle 2002).

Habitat Trends

Most low elevation open forest and meadow ecosystems throughout the known range of the Oregon Branded Skipper in Canada have been extensively modified over the past 100 years. Cumulative impacts from intensive recreational activity, construction of urban and commercial buildings, roads and transportation corridors, the spread of invasive plants, fire suppression and natural forest succession, have contributed to the overall decline in the quantity and quality of the ecosystems from which the Oregon Branded Skipper has been recorded. For ownership and protection information, see **Protection Status and Ranks**.

The most recent information on habitat trends for the two Oregon Branded Skipper ecosystem types comes from the Sensitive Ecosystem Inventory (SEI)¹ project on southeastern Vancouver Island carried out between 1993 and 1997 (Ward *et al.* 1998) and again in 2002 (Canadian Wildlife Service and British Columbia Ministry of Environment 2002; Kirkby and Cake 2004). Sparsely vegetated ecosystems cover less than 0.1% (335 ha) of the east coast of Vancouver Island and adjacent Gulf Islands, and are the rarest of the sensitive ecosystem types. Most of these areas are small, each less than five hectares. There are 26 coastal spits (111.3 ha), eight dunes (39.5 ha) and 52 inland cliffs and bluffs (184.2 ha) (Ward *et al.* 1998). Unmodified examples are extremely rare as most are close to human population centres ([e.g., site 2) Cordova Shore) and thus highly disturbed by introduced species such as Scotch Broom (*Cytisus scoparius*), recreational trails, fragmentation and other impacts (Ward *et al.* 1998) (see **Threats and Limiting Factors**).

Vegetation stabilization may have contributed to the decline in number of and connectivity between sites available to the Oregon Branded Skipper. Habitat trend information for sparsely vegetated habitats comes mainly from the reduction in both quality and quantity of host plant resources as a result of changes and loss to the open meadow habitats, including the spread of invasive plants (see **Threat 8.1 Invasive non-native/alien species**). Overall, sparsely vegetated plant communities are susceptible to colonization by invasive plants such as Scotch Broom. Exotic grasses such as Cheatgrass (*Bromus tectorum*), European Beachgrass (*Ammophila arenaria*), Orchardgrass (*Dactylis glomerata*), Common Velvetgrass (*Holcus lanatus*), Soft Brome (*Bromus hordeaceus*), Rat-tail Fescue (*Vulpia myuros*), and Annual Vernalgrass (*Anthoxanthum odoratum*) may be accelerating vegetation stabilization at numerous Oregon Branded Skipper sites (e.g., sites 2, 6, 7, 8). Scotch Broom is known to fix nitrogen in low fertility sand soils and rapidly take over sand-dominated areas (Parker 2002).

Much historical Garry Oak ecosystem habitat (Figure 5) has been lost to development or has been degraded owing to invasive species and human activities (see **Threats and Limiting Factors**). Large Garry Oak trees are often preserved during development (both historic and recent) but the natural plant communities under these trees are no longer intact (Lea 2006; Garry Oak Ecosystems Recovery Team 2011).

The introduction and gradual spread of non-native plants has led to further decline in the quality and composition of Garry Oak plant communities (see **Threats and Limiting Factors**). Invasive plants dominate most of the remaining Garry Oak ecosystems. Habitat remnants that contain near-natural Garry Oak ecosystem understory vegetation comprise less than five percent of the original ecosystem area (Lea 2006; Garry Oak Ecosystems Recovery Team 2011).

¹ SEI is an ecosystem classification system used in BC to identify sensitive ecosystem types using a standardized methodology (<http://www.env.gov.bc.ca/sei/>). The resulting classification can be used for land use decisions. Biologists and planners in the area of the Oregon Branded Skipper are likely to recognize the term SEI, hence the utility of calling the method by its identifiable, capitalized name.

Lea (2006) mapped historical Garry Oak ecosystems, focusing on the five major geographic areas known to contain them (Greater Victoria, Cowichan Valley, Comox Valley, Nanaimo, and Nanoose, as well as Salt Spring and Hornby islands). Mapping was completed for both parkland and scrub oak ecosystem types (see Habitat) at a 1:20,000 scale and based on the original land surveys completed in the 1850s and 1860s, and recent forest stand history field observations. The historical ecology of an area was based on information in Egan and Howell (2001).

Approximately ten percent of the original scrub oak ecosystem type remains on southeastern Vancouver Island; this remnant has been spared primarily because it occurs on shallow soils, rocky bluffs and areas that are difficult to develop for agricultural and other purposes (Lea 2006). More specifically, in pre-European times, scrub oak habitat comprised 13,579 ha within the Oregon Branded Skipper's geographic range, but as of 2006 made up only 1187 ha (Lea 2006).

Historically, low intensity, frequent fire played an important role in the maintenance of Garry Oak ecosystems (Daubenmire 1968; Agee 1993; McPherson 1997; Fuchs 2000). Before European contact, fires originated with lightning and First Nations cultural burning practices within the region (see Fuchs 2000). Following European contact, cultural burning practices were banned and fire suppression has been in place for over 150 years. Fire exclusion has resulted in gradual changes to plant community composition (McCoy 2006). The Oregon Branded Skipper requires sparsely vegetated ground cover (see Habitat), and fire would have kept bare ground open.

Climate change may allow the expansion of the area within which Garry Oak ecosystems are found on southern Vancouver Island (Hebda 2004). However, although it is likely that the Garry Oak will be able to expand its geographic range, its associated understory plant communities will be less likely to do so (Lea 2006) (see **Threats and Limiting Factors**).

BIOLOGY

Life Cycle and Reproduction

Museum and observation records for Oregon Branded Skipper reveal an adult flight period from late July (earliest record July 21) through mid-September (latest record September 22) with one generation per year (British Columbia Conservation Data Centre 2013). Hardy (1954) captured and bred the species from egg through to adult. Females lay up to 40 eggs (one female laid 40 eggs, another group of three females laid 50 eggs total) within a two-day span when confined to an enclosure, ovipositing on grass, twigs or the net enclosure. The species overwinters from mid-September to spring (approximately seven months) as an egg, hatching sometime between March and mid-April. Larvae feed for four months through the spring and summer; construct small tent-like structures for refuge between feeding and leave the structures to eat or construct new shelters elsewhere when host plant resources diminish. The tents are likely made close to the base of bunchgrass tussocks. Larvae go through six instars before pupation from early July to late August.

In captivity, Oregon Branded Skipper caterpillars feed on non-native grasses such as bromes (*Bromus* spp.) and ryegrasses (*Lolium* spp.) (Hardy 1954; MacNeill 1964). Nectar sources for the Oregon Branded Skipper include American Sea Rocket and Puget Sound Gumweed, which could also be considered limiting factors (see **Habitat**).

Dispersal and Migration

The Oregon Branded Skipper is not migratory. The maximum dispersal distance is unknown, although the skipper appears to be a good and quick flier, especially when disturbed. Dispersal among currently known extant sites, which are separated by at least 8 km, is considered to be rare at best.

Interspecific Interactions

At Cordova Shore (site 2), adult skippers have been observed nectaring on American Searocket and Puget Sound Gumweed (Costanzo pers. comm. 2011; Heron unpubl. data). The Oregon Branded Skipper is not known to have any specific mutualistic, parasite-host or symbiotic relationship with other species.

POPULATION SIZES AND TRENDS

Sampling Effort and Methods

Population sizes and trends are not available for Oregon Branded Skipper in B.C. or elsewhere in its global range. Surveys have been primarily by wandering transects through suitable habitat with the main objective to record habitat information and new sites for the species (Table 3).

Abundance

There is insufficient information to estimate Oregon Branded Skipper abundance in Canada. Populations at each of the four extant sites are probably on the order of 100-150 mature individuals each, suggesting less than 1000 individuals in Canada, but this is speculation at best.

Fluctuations and Trends

There is minimal information on population fluctuations and trends for the Oregon Branded Skipper. The skipper has been observed multiple years at some sites (dates indicate first and last year observed): 1) Camas Hill (1950s, 2011); 2abc) Cordova Shore (1952, 2013) and 3) Goldstream area (1902, 2011—although the exact sites of early to mid-century records are unknown).

At least nine sites are deemed extirpated (Table 2) based on information from surveys completed over the past ten years (Table 3) and information from the Victoria Natural History Society butterfly counts (D. Copley pers. comm. 2011; Miskelly pers. comm. 2013).

Historically, the Oregon Branded Skipper probably exhibited a larger metapopulation structure in areas containing suitable habitat, as is often the case with butterflies (Saccheri *et al.* 1998). Habitat has since become more fragmented and movement among extant sites is likely rare at best. Isolation combined with threats and limiting factors have likely led to its extirpation in some areas of suitable habitat.

Rescue Effect

The nearest known Oregon Branded Skipper site in Washington State is an extant population on Orcas Island, approximately 40 km south of Cordova Shore (Miskelly pers. comm. 2013). Populations on San Juan Island (WA) are now extirpated (Miskelly pers. comm. 2013). Washington State has not been tracking the conservation status of the skipper, nor is there much survey data on the species (Potter pers. comm. 2011).

THREATS AND LIMITING FACTORS

Historical Threats to the Oregon Branded Skipper

The Oregon Branded Skipper is considered extirpated at thirteen sites (Table 1). The threats that caused these local extirpations are speculative at best, but may include habitat conversion related to crops, livestock grazing and other activities related to human settlement.

Current Threats to the Oregon Branded Skipper and Threats Assessment

An IUCN threats calculation assessment (Salafsky *et al.* 2008; Master *et al.* 2009) identified one high threat (9.3 - Agricultural and forestry effluents - Pollution) and five low level threats (6.1 - Recreational activities, 7.1 - Fire and fire suppression, 8.1 - Invasive non-native/alien species, 8.2 - Problematic native species and 11.4 - Storms and flooding) that are predicted to affect the Oregon Branded Skipper population over the next ten years, with the overall threat impact rated as high (Appendix 1).

Other threats that may impact Oregon Branded Skipper outside the time frame assessed for threats included: Residential and commercial development, annual and perennial non-timber crops (associated with land clearing and may have occurred extensively in the past), livestock farming and ranching, and habitat shifting and alteration due to storm surges at Cordova Spit. Details on these potential threats are provided in Appendix 1.

Btk Spraying for Gypsy Moths (9.3 Agricultural and forestry effluents - Pollution)

Southeastern Vancouver Island is within the range of potential invasion by European Gypsy Moth and traps to detect outbreaks of this moth have been set up in systematic grids throughout the area (Burleigh pers. comm. 2012; Table 6; Figure 8). Should Gypsy Moths be found in significant numbers there is the possibility of ground and aerial spray of Btk (*Bacillus thuringiensis kurstaki*). Btk is a component of commercial pesticide products that uses spores of a naturally occurring pathogenic bacterium to control defoliating caterpillars, although the bacterium also affects most non-target butterfly and moth larvae.

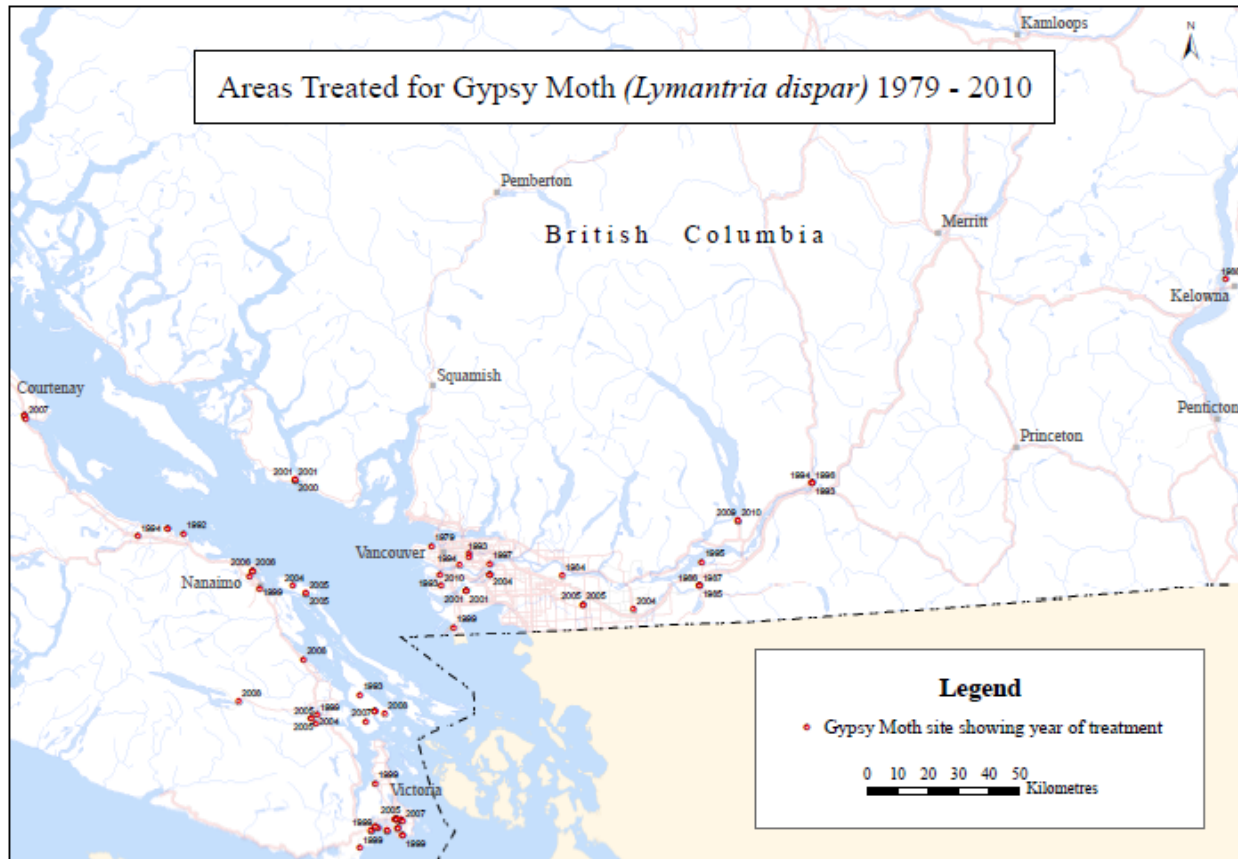


Figure 8. Gypsy Moth treatment areas 1979 - 2010. Note: data points are not exact and do not show the entire treatment area. See Table 6. Map completed by Byron Woods.

According to October 2012 trap results, Btk is not likely to be aerially sprayed on southeastern Vancouver Island in 2013 (Burleigh pers. comm. 2012); however, Oregon Branded Skipper sites are along prominent points of entry for Gypsy Moth and are within close proximity of past capture sites. Btk for Gypsy Moth control is typically applied in early April to early May, which coincides with Oregon Branded Skipper larval activity. No spraying for Gypsy Moth has occurred within close proximity to Oregon Branded Skipper sites in the last five years, although all extant sites are within potential future spray zones.

Gypsy Moth trap results are compiled over at least two years before responding to a potential outbreak. Thus should Gypsy Moth be recorded within proximity to Oregon Branded Skipper sites there would likely be time to consider treatment options rather than aerial broadcast spraying. Ground treatment from backpack or truck could eradicate Gypsy Moth while minimizing impact on the Oregon Branded Skipper by impacting less available habitat if the outbreak is localized and involves areas approximately 1 km² (Nealis 2009). Treated areas often range from ten to hundreds of hectares.

The potential for the four extant sites to be simultaneously sprayed is low. The two sites with highest likelihood of Gypsy Moth are Cordova Shore (site 2) due to proximity to shipping paths and campsite proximity, and Goldstream (site 3) due to campsite proximity.

Habitat conversion and loss (6.1 Human intrusions and disturbance - Recreational activities)

There has been extensive habitat loss in the Oregon Branded Skipper's Canadian range from activities such as logging (and subsequent tree planting and forest in-growth), agriculture, and urbanization (see **Habitat Trends**). Ongoing habitat conversion combined with a scattered distribution pattern suggests that B.C. populations of Oregon Branded Skipper are becoming increasingly fragmented. Oregon Branded Skipper may be severely fragmented under the COSEWIC definition, but evidence of movement among sites and the viability of each site is lacking. The smallest distance between two extant sites is approximately 8 km (Site 1 Camas Hill to site 4 Mount Manuel Quimper).

Two extant sites (Sites 2 and 4) are in parks and protected areas. Site 2 (Cordova Shore) experiences high recreational use, including dog walking, campfires, and other day-use activities. Site 4 (Sooke Hills CRD Reserve) is more remote, although hiking and some mountain biking occurs on designated trails.

Four extirpated sites were within protected areas, although it is not known if extirpation of the Oregon Branded Skipper from these areas was a result of past (pre-2000) recreational development: Rithet's Bog (Site 5), Mount Douglas Park (Saanich; Site 6) and Uplands Park (Oak Bay; Site 7). Sites in Mount Wells CRD Park (Goldstream area; Site 3a) and Goldstream Provincial Park (Site 3b) were also considered extirpated, although a recent record within the vicinity (site 3a) suggests there is a population within unchecked habitat. Despite surveys (mainly since 2003), the skipper has not been recorded from these sites.

Fire suppression (7.1 Natural system modifications – Fire and fire suppression)

Ongoing fire suppression programs enable natural succession within Skipper habitats (McCoy 2006) and make these areas less suitable. Historically, low intensity, frequent fires played an important role in the maintenance of Garry Oak ecosystems (Daubenmire 1968, Agee 1993, McPherson 1997 as cited in Fuchs 2000). Prior to European contact, fires originated with lightning and First Nations cultural burning practices (Fuchs 2000). At one time, fire would have been one of the primary disturbance factors that maintained the open habitat and host plants for Oregon Branded Skipper.

The main limiting factors for Oregon Branded Skipper are likely larval host plant availability and appropriate edaphic conditions for adult activity and survival of the juvenile stages. The latter includes the availability of bare ground and nectar sources. *Hesperia* species (in general) prefer warm and exposed habitats (Guppy and Shepard 2001; Pyle 2002). The related Silver-spotted Skipper (*H. comma*) is known to select oviposition sites with bare ground and shorter, hotter turf (Thomas 1983a, Thomas *et al.* 1986, Dennis 2010). In early spring, host plants are just beginning to grow and thus host plant phenology likely influences larval occupancy and preference. As natural shrub and forest succession occurs these resources diminish (see **Habitat Trends** and **Threats**).

The threat of both accidental and lightning-caused wildfires at existing sites is ongoing. The careless use of cigarettes or campfires is ongoing at Sites 2 (Cordova Shore) and 3b (Goldstream Provincial Park). Site 2 is a popular area for beach campfires and many visitors ignore fire bans. Site 3b and the surrounding private campground adhere to campfire bans, although cigarettes are still permitted. Site 1 Camas Hill and Site 4 Mount Manuel Quimper within Sooke Hills Wilderness Park Reserve are not likely to have recreational fires, although lightning-caused fires are still possible.

Invasive plants (8.1 Invasive and other problematic species - Invasive non-native/alien species)

Introduced plant and invertebrate species have been recorded from all Oregon Branded Skipper sites, although the scope of introduction and the suite of introduced species present is not completely known.

Invasive plant species are known to change the vegetation and soil structure leading to vegetation stabilization and subsequent decline in number and connectivity between sites available to the Oregon Branded Skipper. They also give greater ground cover, removing the bare patches of ground that the skippers seem to require. Long-term ecosystem impacts from invasive species and increased nitrogen availability in the soil encourage exotic species growth in native grasslands (Huenneke *et al.* 1990; Maron and Connors 1996). Overall, sparsely vegetated plant communities are susceptible to the colonization of invasive plants. Scotch Broom, Gorse (*Ulex europaeus*) and Laurel-leaved Daphne (*Daphne laureola*) are likely to invade disturbed areas. Scotch Broom grows quickly and can fix nitrogen in low fertility, sandy soils (Parker 2002; Haubensak and Parker 2004), enabling it to invade the sparsely vegetated ecosystems where Oregon Branded Skipper occurs.

Scotch Broom is associated with suppressed native species richness (Rook *et al.* 2011). Three Oregon Branded Skipper sites contain large patches of Scotch Broom: 2) Cordova Spit and 3abc) Goldstream; and 6) Mount Douglas (Heron unpubl. data); whereas the 4) Mount Manuel Quimper site has much smaller patches. Only one extant site, 1) Camas Hill, appears to have no established Scotch Broom (Costanzo pers. comm. 2011; Heron unpubl. data).

English Ivy (*Hedera helix*), English Holly (*Ilex aquifolium*) and Himalayan Blackberry (*Rubus armeniacus*) are also widespread invasive plants within native ecosystems on southern Vancouver Island, and are known to displace native vegetation. Numerous introduced grasses (e.g., *A. arenaria*, *A. odoratum*, *B. hordeaceus*, *B. tectorum*, *Dactylis glomerata*, *Holcus lanatus*, and *Vulpia myuros*) are also present within the sparsely vegetated and Garry Oak ecosystems. These invasive plants are known from Oregon Branded Skipper sites, although the scope and density of their impacts have not been studied.

Herbivory by a variety of native and introduced mammals is considered a minor threat, and parasitism by tachinid flies that may be introduced to control Gypsy Moth (*Lymantria dispar* L.), is considered a potential threat.

Natural vegetative succession (8.2 Invasive and other problematic species and genes - Problematic native species)

Natural forest succession of native trees, shrubs and herbaceous vegetation will eventually decrease the size and quality of known Oregon Branded Skipper habitats at some sites. The rate of habitat creation is likely not as fast as habitat loss due to natural succession. Potential larval host plants, adult nectar sources and adult activity require open habitat with abundant light and moisture (see Pojar and McKinnon (1994) for associated habitat information on potential host plants) (see **Habitat Requirements and Life Cycle and Reproduction**).

Climate change and severe weather (11.4 Storms and flooding)

Storms and flooding (Threat 11.4) applies to one extant site, Cordova Spit (Site 2) as it is about 2 m above sea level and is subject to periodic winter storms. Cordova Spit experiences ongoing sand deposition and/or erosion of the ecosystem, especially when storm surges impact beach areas with logs and erosion. Process is partially natural, and partially a likely result of climate change.

Limiting Factors

The main limiting factors for the Oregon Branded Skipper are likely larval host plant availability and appropriate edaphic conditions for adult activity and survival of the juvenile stages. The latter includes the availability of bare ground and nectar sources. *Hesperia* species in general prefer warm and exposed habitats (Guppy and Shepard 2001; Pyle 2002). The related Silver-spotted Skipper (*Hesperia comma*) is known to select oviposition sites with bare ground and shorter, hotter turf (Thomas 1983; Thomas *et al.* 1986; Dennis 2010).

In early spring, host plants are just beginning to grow and thus host plant phenology likely influences larval occupancy and preference. As natural shrub and forest succession occurs these resources diminish (see **Habitat Trends and Threats**).

PROTECTION, STATUS, AND RANKS

Legal Protection and Status

The Oregon Branded Skipper is currently not protected by provincial legislation in B.C. Arthropods placed on Schedule 1 of the federal *Species at Risk Act* (SARA) may be protected through the British Columbia *Wildlife Act* and *Wildlife Amendment Act* once the regulations listing these species are completed.

The B.C. *Parks Act* protects species at risk in provincial parks and protected areas. When species at risk and the habitats they require are known to occur within a protected area, provisions for management are incorporated into the park master plan. Further, the B.C. *Ecological Reserves Act* provides protection for species occurring within ecological reserves in B.C.

Non-Legal Status and Ranks

The Oregon Branded Skipper is Red-listed (S1; Critically Imperilled) in British Columbia (British Columbia Conservation Data Centre 2013), and nationally ranked as Critically Imperilled (N1) (NatureServe 2013). Because it is not a full species, it is not ranked by the General Status of Species in Canada (National General Status Working Group 2011). The global conservation status rank is Vulnerable to Apparently Secure (G5T3T4) (NatureServe 2013). In Washington State, the subspecies is considered Imperilled (S2) (NatureServe 2013).

The Oregon Branded Skipper is a priority two species under goal three (maintain the diversity of native species and ecosystems) of the B.C. Conservation Framework (British Columbia Ministry of Environment 2011).

Numerous conservancies on southern Vancouver Island and the Gulf Islands search for the Oregon Branded Skipper and work towards protecting Garry Oak habitat and the low elevation Coastal Douglas-fir ecosystem. Conservancies include the Salt Spring Conservancy (Annschild pers. comm. 2011), Mayne Island Conservancy (Dunn pers. comm. 2011), Denman Island Conservancy (Fyson pers. comm. 2011) and Galiano Conservancy (Crowe pers. comm. 2010).

Habitat Protection and Ownership

There is no legislated habitat protection specifically for the Oregon Branded Skipper in B.C. Because its host plant is unknown and skipper is cryptic by nature, habitat identification and protection for this butterfly is difficult. Habitat protection and ownership of extant sites are summarized below:

Site 1 Camas Hill is privately owned by an active steward of the property, and with an environmental covenant registered on title.

Site 2 Cordova Shore spans properties owned and managed by three separate landowners: 2a) Tsawout First Nation, 2b) Central Saanich municipal government, and 2c) Capital Regional District (Island View Beach CRD Park) regional government. The Cordova Shore Conservation Strategy (page 2010) is a collaborative document developed in partnership among these three landowners, and outlines actions to restore, recover and protect ecosystem values within this area, including those important for Oregon Branded Skipper. Lands managers working for these jurisdictions are aware of the skipper (Cossey pers. comm. 2011 [Tsawout First Nation]; Fuchs pers. comm. 2011 [CRD]; Pollard pers. comm. 2011 (District of Saanich)).

In addition, the Tsawout First Nation has developed the *Land Code* (Tsawout First Nation 2006), which identifies important natural features and conservation values within the Tsawout Indian Reserve 2, including the spit where the Oregon Branded Skipper occurs. Details on the protection policies and community plans for the reserve are outlined in the Comprehensive Community Plan (Tsawout First Nation 2010) as well as summarized in the Cordova Shore Conservation Strategy (page 2010). These conservation plans assist to mitigate impacts from threats such as land development, recreational development and invasive species.

Site 3 Goldstream is composed of properties owned and managed by three separate landowners: 3a) Mount Wells Capital Regional District Park (contains suitable Garry Oak habitat), 3b) Goldstream Provincial Park (historical site, natural succession has decreased available habitat) and 3c) private railway line (unlikely habitat). There may be additional small sites within this area with habitat for the skipper, although most of this land is privately owned.

Site 4 Mount Manuel Quimper is within Sooke Hills Capital Regional District Park, which is owned by Capital Regional District. The park is managed for natural ecological values.

Local government bylaws that protect environmental values on private lands differ among local governments. Currently, there are no bylaws that specifically protect the skipper. However, numerous local governments recognize the importance of rare ecosystems and use the Sensitive Ecosystem Inventory information (Ward *et al.* 1998) to guide and limit the type of development within certain areas. Depending on the jurisdiction, development permit applications may require environmental assessments that include wildlife values and consider impacts to natural habitats as part of the approval process. For example, the District of Saanich Official Community Plan includes provisions to protect sensitive environmental areas within several development permit areas, including coastal sand spits and inland bluff habitats (page 2010). Cordova Spit and Island View Beach CRD Park are considered regionally significant by the District of Saanich.

Much of the low elevation, natural habitat on southeastern Vancouver Island and Gulf Islands that is suitable for this skipper is privately owned by individual landowners (e.g., farms or rural properties), private forest companies (e.g., for timber production), and development companies (e.g., with future plans for urban housing or industrial real estate use), or is within local government ownership (e.g., watersheds and natural areas or future urban/commercial real estate development). The Oregon Branded Skipper has not been recorded from any designated private conservation areas.

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BIOGRAPHICAL SUMMARY OF REPORT WRITER(S)

Jennifer Heron is the provincial invertebrate specialist with the British Columbia Ministry of Environment. She directs and manages the provincial approach to invertebrate conservation, including the development and implementation of provincial legislation, policy, procedures, and standards for the conservation, and recovery of invertebrate species at risk, their habitats and ecosystems, and to keep these species from becoming at risk. She works with other invertebrate specialists to develop recovery-planning approaches and assign conservation status ranks to invertebrate groups. She works with local conservation and stewardship groups to achieve common public outreach goals.

COLLECTIONS EXAMINED

Royal British Columbia Museum, Victoria, B.C. (Claudia Copley, Entomology Collections Manager pers. comm. 2011) (see Table 1).

University of British Columbia Beaty Biodiversity Museum Spencer Entomological Collection at the University of British Columbia (Karen Needham, Entomology Collections Manager pers. comm. 2011). No specimens.

Appendix 1. Threat Assessment

Threat classification table for Oregon Branded Skipper. The threat classification below is based on the IUCN unified threats classification system and is consistent with methods used by COSEWIC, B.C. Conservation Data Centre and B.C. Conservation Framework (British Columbia Ministry of Environment 2011). For a detailed description of the threat classification system, see Conservation Measures Partnership (2006). For information on how the values are assigned, see Master *et al.* (2009) and table footnotes for details. Threats for Oregon Branded Skipper were assessed across the species geographic range in Canada (Table 1).

Date of Assessment:: 2013-12-15			
Assessor(s): Jennifer Heron, Syd Cannings, Donna Hurlburt			
		Level 1 Threat Impact Counts	
Threat Impact		high range	low range
A	Very High	0	0
B	High	1	1
C	Medium	0	0
D	Low	5	5
Calculated Overall Threat Impact:		High	High
Impact Adjustment Reasons:		Oregon Branded Skipper occurs in four extant sites and 11 historic sites in the Greater Victoria area. Sites are owned by local government (Site 2 Cordova Shore - portions owned by the Municipality of Saanich and Capital Regional District) and Site 4 Sooke Hills Regional Park - owned by Capital Regional District); Tsawout First Nation (portion of Site 2 Cordova Shore); and a private citizens (Site 3 Goldstream - unknown land ownership, likely private; private campsite; and Site 1 Camas Hill is owned by a private citizen).	

Threat		Impact (calculated)	Scope (next 10 Yrs)	Severity (10 Yrs or 3 Gen.)	Timing	Comments
1	<u>Residential & commercial development</u>	Not a Threat (in the assessed timeframe)	Small (1-10%)	Moderate (11-30%)	Moderate (Possibly in the short term, < 10 yrs)	Development has potential to impact 1/4 sites (Site 3 - Goldstream area), mainly because of private land development in the surrounding areas and the site being within close proximity to large areas of private land.
1.1	Housing & urban areas	Not a Threat (in the assessed timeframe)	Small (1-10%)	Moderate (11-30%)	Low (Possibly in the long term, >10 yrs)	The Oregon Branded Skipper (Site 3c near Goldstream, and potential surrounding unchecked habitat) is at risk of land development (undetermined category). The Skipper was recorded along a railway right-of-way; however, the surrounding habitat is privately owned, except for Goldstream Provincial Park, which does not have abundant suitable habitat, and Mount Wells CRD Park, which does have suitable habitat. Site 1 is privately owned, although the property is not likely to be developed because there is a conservation covenant on the natural parts of the property. Unsurveyed and unoccupied Oregon Branded Skipper habitats, and natural areas that contain extant and historical sites for the species are within the local government jurisdictions of Greater Victoria (13 municipal governments), Nanaimo and Duncan. Most of the large, intact natural habitats within the range of the Oregon Branded Skipper are privately owned (by the local government, and by forestry or development companies) and urban planning projections designate many of these areas as future housing and commercial areas. The uncertainty surrounding land use and the frequently changing land ownership increases the potential threat of habitat conversion.

Threat		Impact (calculated)	Scope (next 10 Yrs)	Severity (10 Yrs or 3 Gen.)	Timing	Comments
1.2	Commercial & industrial areas	Not a Threat (in the assessed timeframe)	Small (1-10%)	Moderate (11-30%)	Low (Possibly in the long term, >10 yrs)	At a minimum, there are twelve large-scale urban housing, commercial (e.g., shopping complex) or recreational facility (e.g., golf courses) developments on natural habitat suitable for the Oregon Branded Skipper underway or planned for immediate development. These total more than 1550 ha within the municipalities of Greater Victoria, the majority within Colwood, Langford and Saanich (Victoria Real Estate Team 2011). These urban developments include large-scale new communities accompanied by new infrastructure, such as schools and roads.
1.3	Tourism & recreation areas	Not a Threat (in the assessed timeframe)	Small (1-10%)	Moderate (11-30%)	Low (Possibly in the long term, >10 yrs)	<p>Recreational development potential to 3/4 sites: Cordova Shore (site 1) is a popular walking (dogs and people), sunbathing and camping area (portion), Goldstream Area (site 3) is within close proximity to a campsite and other areas of potential recreation; Sooke Hills (Site 4) is only impacted (likely) from hiking, potential dog walking and potential mountain bike trails.</p> <p>The demand for tourism and recreational areas within southeastern Vancouver Island is projected to increase within the next decade. Natural areas continue to be developed into golf courses (e.g., Bear Mountain development [Victoria Real Estate Team 2011], campgrounds (e.g., expansion of camping facilities at Island View Beach Capital Regional District Park (CRD) near Cordova Spit (site 2) (Fuchs pers. comm. 2011)), and parks and recreation facilities (e.g., private campgrounds outside the boundaries of Goldstream Provincial Park, [site 3c]). Within existing parks, as well as regional and municipal properties, habitat conservation and recreational development may potentially conflict with Oregon Branded Skipper conservation. This threat is likely to impact two of the four extant sites (site 2c and 3c), although the extent of the threat at these sites is likely less than 5% of the overall habitat.</p> <p>Expansion of recreational areas increases the frequency of road and trail building which may act as corridors (into natural habitats) that facilitate the rapid spread of introduced species (e.g., plant seeds attach to car tires, and become dislodged at new sites) (Trombulak and Frissell 2000).</p>
2	<u>Agriculture & aquaculture</u>	Not a Threat (in the assessed timeframe)			Insignificant/Negligible (Past or no direct effect)	May have impacted 11 historic sites with vague site/collection information.
2.1	Annual & perennial non-timber crops	Not a Threat (in the assessed timeframe)			Insignificant/Negligible (Past or no direct effect)	Considered more of a historic threat and currently not applicable. If land is cleared, it is usually for housing/commercial development, because the land is very valuable.
2.2	Wood & pulp plantations					N/A
2.3	Livestock farming & ranching	Not a Threat (in the assessed timeframe)	Unknown	Unknown	Insignificant/Negligible (Past or no direct effect)	Historic livestock grazing but many grassland areas have since been converted to urban use and/or have ongoing intensive agriculture (e.g., crops). Not considered a present-day threat.
2.4	Marine & freshwater aquaculture					N/A
3	<u>Energy production & mining</u>					
3.1	Oil & gas drilling					N/A

Threat		Impact (calculated)	Scope (next 10 Yrs)	Severity (10 Yrs or 3 Gen.)	Timing	Comments
3.2	Mining & quarrying					N/A
3.3	Renewable energy					N/A
4	<u>Transportation & service corridors</u>	Not a Threat (in the assessed timeframe)			Insignificant/Negligible (Past or no direct effect)	
4.1	Roads & railroads	Not a Threat (in the assessed timeframe)			Insignificant/Negligible (Past or no direct effect)	A gated access road runs through a portion of Cordova Shore (Site 2) but there are no plans for expansion. Site 3 (Goldstream) is within a railroad right-of-way, although no future expansion is currently planned. Not likely to impact sites.
4.2	Utility & service lines					N/A
4.3	Shipping lanes					N/A
4.4	Flight paths					N/A
5	<u>Biological resource use</u>	Not a Threat (in the assessed timeframe)	Unknown	Unknown	Insignificant/Negligible (Past or no direct effect)	
5.1	Hunting & collecting terrestrial animals					N/A
5.2	Gathering terrestrial plants	Not a Threat (in the assessed timeframe)	Unknown	Unknown	Insignificant/Negligible (Past or no direct effect)	Considered at Cordova Spit site only. Negligible impacts. Cordova Spit is of cultural significance to First Nations and there are culturally significant plants growing throughout the habitat. Impacts from gathering are considered negligible.
5.3	Logging & wood harvesting					N/A
5.4	Fishing & harvesting aquatic resources					N/A
6	<u>Human intrusions & disturbance</u>	Low	Restricted (11-30%)	Slight (1-10%)	High (Continuing)	
6.1	Recreational activities	Low	Restricted (11-30%)	Slight (1-10%)	High (Continuing)	Potential impact to 3/4 known sites (Site 2 - Cordova Shore, Site 3 - Goldstream area, and Site 4 Sooke Hills CRD Park). Not likely to impact Mount Manuel Quimper significantly. Recreational use to 3 sites: Cordova Shore (site 1) is a popular walking (dogs and people), sunbathing and camping area (portion), Goldstream Area (site 3) is within close proximity to a campsite and other areas of potential recreation.
6.2	War, civil unrest & military exercises					N/A
6.3	Work & other activities					N/A
7	<u>Natural system modifications</u>	Low	Pervasive (71-100%)	Slight (1-10%)	Moderate (Possibly in the short term, < 10 yrs)	

Threat		Impact (calculated)	Scope (next 10 Yrs)	Severity (10 Yrs or 3 Gen.)	Timing	Comments
7.1	Fire & fire suppression	Low	Pervasive (71-100%)	Slight (1-10%)	Moderate (Possibly in the short term, < 10 yrs)	Fire suppression is ongoing throughout the area at all known sites, and has been in place for > 100 years. Fire and fire suppression are both threats to Oregon Branded Skipper habitat.
7.2	Dams & water management/ use					N/A
7.3	Other ecosystem modifications					N/A
8	<u>Invasive & other problematic species & genes</u>	Low	Pervasive (71-100%)	Slight (1-10%)	Moderate (Possibly in the short term, < 10 yrs)	
8.1	Invasive non-native/alien species	Low	Pervasive (71-100%)	Slight (1-10%)	Moderate (Possibly in the short term, < 10 yrs)	Applicable at all sites: Scotch Broom and other invasive plants are throughout sites.
8.2	Problematic native species	Low	Small (1-10%)	Slight (1-10%)	Moderate (Possibly in the short term, < 10 yrs)	Native vegetation growth is evident. Growth is slow, but applicable to some areas of the habitat.
8.3	Introduced genetic material					N/A
9	<u>Pollution</u>	High	Large (31-70%)	Serious (31-70%)	Moderate (Possibly in the short term, < 10 yrs)	
9.1	Household sewage & urban waste water					N/A
9.2	Industrial & military effluents					N/A
9.3	Agricultural & forestry effluents	High	Large (31-70%)	Serious (31-70%)	Moderate (Possibly in the short term, < 10 yrs)	Gypsy Moth spray, monitoring throughout the area. Site 1 (Camas Hill) and Site 4 (Sooke Hills) are not within high Gypsy Moth detection zones. Site 2 (Cordova Shore) has a high number of recreational users, a campsite, people launch boats from the area and the potential for Gypsy Moth detection is high. Site 3 (Goldstream) is also within close proximity to a campsite and adjacent to the Vancouver Island Highway where boat and vehicle traffic is high. Herbicides are an additional probable threat, although unlikely to be significant – all sites are within areas where herbicide application is unlikely.
9.4	Garbage & solid waste					N/A
9.5	Air-borne pollutants					N/A
9.6	Excess energy					N/A
10	<u>Geological events</u>					
10.1	Volcanoes					N/A
10.2	Earthquakes/ tsunamis					1/4 known sites are within tsunami zone. Sand spit at or only slightly above sea level (< 10m elevation).

Threat		Impact (calculated)	Scope (next 10 Yrs)	Severity (10 Yrs or 3 Gen.)	Timing	Comments
10.3	Avalanches/ landslides					N/A
11	<u>Climate change & severe weather</u>	Low	Small (1-10%)	Moderate (11-30%)	Moderate (Possibly in the short term, < 10 yrs)	
11.1	Habitat shifting & alteration	Not a Threat (in the assessed timeframe)	Pervasive (71-100%)	Unknown	Low (Possibly in the long term, >10 yrs)	Applicable to Cordova Spit, which has experienced loss and/or erosion in the last ten years (due to storms and waves washing habitat away). Applicable to all sites, as climate change shifts plant species composition.
11.2	Droughts					N/A
11.3	Temperature extremes					N/A
11.4	Storms & flooding	Low	Small (1-10%)	Moderate (11-30%)	Moderate (Possibly in the short term, < 10 yrs)	<p>Cordova Spit sites are within flood zone and subject to periodic winter storms. Sand spit at or only slightly above sea level (< 10m elevation). Projected increase in precipitation within the region due to climate change; however, it is unknown if increase will be periodically severe or intense rather than evenly spread over the year.</p> <p>Within the Pacific Maritime Ecozone, mean temperatures increased by 1.71 °C from 1960-2006 (Coristine and Kerr 2011). In addition, recent analysis of global observations from 1925-1999 showed that precipitation increased by 6.2 mm per decade in the latitude band of 50 to 70 degrees north, which includes almost all of B.C. (Zhang <i>et al.</i> 2007). Projections suggest winter precipitation on southeastern Vancouver Island could increase 10-25% by the middle of the 21st century (2041- 2071) relative to historical records (1961-1990) and summer precipitation is projected to increase 0 -10% (Environmental Trends in British Columbia 2007). As the strongest population of Oregon Branded Skipper, Cordova Spit (Site 2), is a comparatively dry habitat, it is possible that increased precipitation will render this site less suitable; however, the timing of this threat is long-term.</p>

^a Impact – The degree to which a species is observed, inferred, or suspected to be directly or indirectly threatened in the area of interest. The impact of each stress is based on Severity and Scope rating and considers only present and future threats. Threat impact reflects a reduction of a species population or decline/degradation of the area of an ecosystem. The median rate of population reduction or area decline for each combination of scope and severity corresponds to the following classes of threat impact: very high (75% declines), high (40%), medium (15%), and low (3%). Unknown: used when impact cannot be determined (e.g., if values for either scope or severity is unknown).

^b Scope – Proportion of the species that can reasonably be expected to be affected by the threat within 10 years. Usually measured as a proportion of the species' population in the area of interest. (Pervasive = 71–100%; Large = 31–70%; Restricted = 11–30%; Small = 1–10%)

^c Severity – Within the scope, the level of damage to the species from the threat that can reasonably be expected to be affected by the threat within a 10-year or three-generation timeframe. Usually measured as the degree of reduction of the species' population (Extreme = 71–100%; Serious = 31–70%; Moderate = 11–30%; Slight = 1–10%).

^d Timing – High = continuing; Moderate = only in the future (could happen in the short term [< 10 years or 3 generations]) or now suspended (could come back in the short term); Low = only in the future (could happen in the long term) or now suspended (could come back in the long term); Insignificant/Negligible = only in the past and unlikely to return, or no direct effect but limiting.

^e Locations – See Table 1 and Table 2 for site names.