Species at Risk Act Recovery Strategy Series Adopted under Section 44 of SARA

Recovery Strategy for the Mormon Metalmark (*Apodemia mormo*), Southern Mountain Population, in Canada

Mormon Metalmark





Government of Canada

Gouvernement du Canada



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For copies of the recovery strategy, or for additional information on species at risk, including the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) Status Reports, residence descriptions, action plans, and other related recovery documents, please visit the <u>Species at Risk (SAR) Public Registry</u>¹.

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¹ <u>http://sararegistry.gc.ca/default.asp?lang=En&n=24F7211B-1</u>

RECOVERY STRATEGY FOR THE MORMON METALMARK (Apodemia mormo), SOUTHERN MOUNTAIN POPULATION, IN CANADA

2017

Under the Accord for the Protection of Species at Risk (1996), the federal, provincial, and territorial governments agreed to work together on legislation, programs, and policies to protect wildlife species at risk throughout Canada.

In the spirit of cooperation of the Accord, the Government of British Columbia has given permission to the Government of Canada to adopt the *Recovery Strategy for the Mormon Metalmark (*Apodemia mormo*), Southern Mountain Population in British Columbia* (Part 2) under Section 44 of the *Species at Risk Act* (SARA). Environment and Climate Change Canada has included a federal addition (Part 1) which completes the SARA requirements for this recovery strategy.

The federal recovery strategy for the Mormon Metalmark in Canada consists of two parts:

- Part 1 Federal Addition to the *Recovery Strategy for the Mormon Metalmark* (Apodemia mormo), *Southern Mountain Population in British Columbia*, prepared by Environment and Climate Change Canada.
- Part 2 Recovery Strategy for the Mormon Metalmark (Apodemia mormo), Southern Mountain Population in British Columbia, prepared by the Southern Interior Invertebrates Recovery Team for the British Columbia Ministry of Environment.

Table of Contents

Part 1 – Federal Addition to the *Recovery Strategy for the Mormon Metalmark* (Apodemia mormo), *Southern Mountain Population in British Columbia*, prepared by Environment and Climate Change Canada

Preface	2
Acknowledgements	3
Additions and Modifications to the Adopted Document	4
Executive Summary	5
Recovery Feasibility Summary	6
1. COSEWIC Species Assessment Information	7
2. Species Status Information	8
3. Species Information	8
3.1 Species Population and Distribution	8
4. Threats	10
4.1 Threat Assessment	10
4.2 Description of Threats	11
5. Population and Distribution Objective	14
6. Broad Strategies and General Approaches to Meet Objectives	14
6.1 Actions Already Completed or Currently Underway	14
6.2 Strategic Direction for Recovery	15
6.3 Narrative to Support the Recovery Planning Table	18
7. Critical Habitat	18
7.1 Identification of the Species' Critical Habitat	18
7.2 Schedule of Studies to Identify Critical Habitat	30
7.3 Activities Likely to Result in the Destruction of Critical Habitat	30
8. Measuring Progress	33
9. Statement on Action Plans	33
10. Effects on the Environment and Other Species	33
11. References	34

Part 2 – *Recovery Strategy for the Mormon Metalmark (*Apodemia mormo), *Southern Mountain Population in British Columbia*, prepared by the Southern Interior Invertebrates Recovery Team for the British Columbia Ministry of Environment

Part 1 – Federal Addition to the Recovery Strategy for the Mormon Metalmark (Apodemia mormo), Southern Mountain Population in British Columbia, prepared by Environment and Climate Change Canada

Preface

The federal, provincial, and territorial government signatories under the <u>Accord for the</u> <u>Protection of Species at Risk (1996)</u>² agreed to establish complementary legislation and programs that provide for effective protection of species at risk throughout Canada. Under the *Species at Risk Act* (S.C. 2002, c.29) (SARA), the federal competent ministers are responsible for the preparation of recovery strategies for listed Extirpated, Endangered, and Threatened species and are required to report on progress within five years after the publication of the final document on the SAR Public Registry.

The Minister of Environment and Climate Change is the competent minister under SARA for the Mormon Metalmark Southern Mountain population and has prepared the federal component of this recovery strategy (Part 1), as per section 37 of SARA. To the extent possible, it has been prepared in cooperation with the Province of British Columbia, as per section 39(1) of SARA. SARA section 44 allows the Minister to adopt all or part of an existing plan for the species if it meets the requirements under SARA for content (sub-sections 41(1) or (2)). The Province of British Columbia provided the attached recovery strategy for the Mormon Metalmark Southern Mountain population (Part 2) as science advice to the jurisdictions responsible for managing the species in British Columbia. It was prepared in cooperation with Environment and Climate Change Canada.

Success in the recovery of this species depends on the commitment and cooperation of many different constituencies that will be involved in implementing the directions set out in this strategy and will not be achieved by Environment and Climate Change Canada, or any other jurisdiction alone. All Canadians are invited to join in supporting and implementing this strategy for the benefit of the Mormon Metalmark Southern Mountain population and Canadian society as a whole.

This recovery strategy will be followed by one or more action plans that will provide information on recovery measures to be taken by Environment and Climate Change Canada and other jurisdictions and/or organizations involved in the conservation of the species. Implementation of this strategy is subject to appropriations, priorities, and budgetary constraints of the participating jurisdictions and organizations.

The recovery strategy sets the strategic direction to arrest or reverse the decline of the species, including identification of critical habitat to the extent possible. It provides all Canadians with information to help take action on species conservation. When critical habitat is identified, either in a recovery strategy or an action plan, SARA requires that critical habitat then be protected.

² <u>http://registrelep-sararegistry.gc.ca/default.asp?lang=en&n=6B319869-1#2</u>

Recovery Strategy for the Mormon Metalmark Southern Mountain population Part 1: Federal Addition

In the case of critical habitat identified for terrestrial species including migratory birds SARA requires that critical habitat identified in a federally protected area³ be described in the *Canada Gazette* within 90 days after the recovery strategy or action plan that identified the critical habitat is included in the public registry. A prohibition against destruction of critical habitat under ss. 58(1) will apply 90 days after the description of the critical habitat is published in the *Canada Gazette*.

For critical habitat located on other federal lands, the competent minister must either make a statement on existing legal protection or make an order so that the prohibition against destruction of critical habitat applies.

If the critical habitat for a migratory bird is not within a federal protected area and is not on federal land, within the exclusive economic zone or on the continental shelf of Canada, the prohibition against destruction can only apply to those portions of the critical habitat that are habitat to which the *Migratory Birds Convention Act, 1994* applies as per SARA ss. 58(5.1) and ss. 58(5.2).

For any part of critical habitat located on non-federal lands, if the competent minister forms the opinion that any portion of critical habitat is not protected by provisions in or measures under SARA or other Acts of Parliament, or the laws of the province or territory, SARA requires that the Minister recommend that the Governor in Council make an order to prohibit destruction of critical habitat. The discretion to protect critical habitat on non-federal lands that is not otherwise protected rests with the Governor in Council.

Acknowledgements

Development of this recovery strategy was coordinated by Kella Sadler and Matt Huntley (Environment and Climate Change Canada, Canadian Wildlife Service – Pacific Region (ECCC CWS-PAC). Paul Johanson (ECCC CWS-National Capital Region), Jennifer Heron (British Columbia (B.C.) Ministry of Environment (MoE)), Dave Trotter (B.C. Ministry of Agriculture), Peter Fielder (B.C. MoE) provided helpful editorial advice and comment. Nick Page and Claudia Schaefer (Raincoast Applied Ecology) compiled information for the first draft of this recovery strategy. Jennifer Heron (B.C. MoE), and Katrina Stipec with the B.C. Conservation Data Centre provided supporting data and background documents. Danielle Yu (ECCC CWS-PAC) provided additional assistance with mapping and figure preparation.

³ These federally protected areas are: a national park of Canada named and described in Schedule 1 to the *Canada National Parks Act*, The Rouge National Park established by the *Rouge National Urban Park Act*, a marine protected area under the *Oceans Act*, a migratory bird sanctuary under the *Migratory Bird Convention Act*, 1994 or a national wildlife area under the *Canada Wildlife Act* see ss. 58(2) of SARA.

Additions and Modifications to the Adopted Document

The following sections have been included to address specific requirements of the federal *Species at Risk Act* (SARA) that are not addressed in the *Recovery Strategy for the Mormon Metalmark* (Apodemia mormo), *Southern Mountain Population in British Columbia* (Part 2 of this document, referred to henceforth as "the provincial recovery strategy"). In some cases, these sections may also include updated information or modifications to the provincial recovery strategy for adoption by Environment and Climate Change Canada.

Under SARA, there are specific requirements and processes set out regarding the protection of critical habitat. The section "Existing and Recommended Approaches to Habitat Protection", and other statements in the provincial recovery strategy referring to protection of survival/recovery habitat may not directly correspond to federal requirements. Recovery measures dealing with the protection of habitat are adopted; however, whether these measures will result in protection of critical habitat under SARA will be assessed following publication of the final federal recovery strategy.

The provincial recovery strategy contains a short statement on socio-economic considerations. As a socio-economic analysis is not required under Section 41(1) of SARA, the Socio-economic Considerations section of the provincial recovery strategy is not considered part of the federal Minister of Environment and Climate Change's recovery strategy for this species.

Executive Summary

This section replaces the "Executive Summary" section in the provincial recovery strategy.

Mormon Metalmark (*Apodemia mormo*) is a medium-sized butterfly, with a 25- to 35-mm wingspan. In Canada, the species has two separate populations: the Southern Mountain population in British Columbia and the Prairie population in Saskatchewan. This recovery strategy is for the Southern Mountain population only. The Southern Mountain population was designated by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as Endangered in 2003, re-examined and confirmed in May 2014 and listed on Schedule 1 of the *Species at Risk Act* in January 2005.

The Southern Mountain population of the Mormon Metalmark occurs in the lower Similkameen valley near the town of Keremeos and in the south Okanagan Valley near Osoyoos in south-central British Columbia. Habitat for the species includes hillsides, slopes, and embankments with sandy or gravelly soils and moderate to high densities of Stinking Rabbitbrush (*Ericameria nauseosus*) and Snow Buckwheat (*Eriogonum niveum*) plants. Mormon Metalmark larvae require Snow Buckwheat for feeding and may require the stems or leaf litter for hibernating. Adults require mature Snow Buckwheat for egg laying, and flowering Snow Buckwheat and Stinking Rabbitbrush for nectaring. The Southern Mountain population is > 2000 individuals, confined to approximately 50 ha of habitat, and appears to be isolated from the closest known populations, in the United States.

The main threats to the Southern Mountain population of Mormon Metalmark are mining and quarrying, and roads and railroads (construction and/or maintenance activities, and road mortalities). Livestock and ranching, and fire and fire suppression are secondary threats.

The Population and Distribution Objective is to ensure the persistence of Mormon Metalmark Southern Mountain population at all known extant locations (and any new locations) within the species' range in Canada.

One or more action plans will be completed by 2022.

Recovery Feasibility Summary

This section replaces the "Recovery Feasibility" section in the provincial recovery strategy.

Based on the following four criteria that Environment and Climate Change Canada uses to establish recovery feasibility, recovery of the Mormon Metalmark Southern Mountain population has been deemed technically and biologically feasible:

1. Individuals of the wildlife species that are capable of reproduction are available now or in the foreseeable future to sustain the population or improve its abundance.

Yes, there are individuals capable of reproduction available now to sustain the population and/or improve its abundance, present at multiple sites in the Similkameen and South Okanagan valleys. There are, however, knowledge gaps concerning population structure, and reproductive capability of this species.

2. Sufficient suitable habitat is available to support the species or could be made available through habitat management or restoration.

Yes, there is sufficient suitable habitat available to support the species. The species' potential range is restricted to that of its larval host plant, Snow Buckwheat. Snow Buckwheat is restricted to the lower Similkameen and Okanagan valleys as far north as Vernon (Klinkenberg 2015). Mormon Metalmarks occupy a small portion of the range of Snow Buckwheat and there appears to be suitable but unoccupied habitat near or adjacent to several occupied sites.

3. The primary threats to the species or its habitat (including threats outside Canada) can be avoided or mitigated.

Yes, the primary threats (mining and quarrying, and construction and maintenance activities along transportation and utility corridors) can be avoided or mitigated in cooperation with landowners and land-managers, through the actions identified in the provincial recovery strategy.

4. Recovery techniques exist to achieve the population and distribution objectives or can be expected to be developed within a reasonable timeframe.

Yes, general recovery methods and techniques to achieve the population and distribution objectives are known. Over the short term, recovery techniques will focus on mitigation and avoidance of primary threats. Conducting further research to address knowledge gaps regarding the life history and habitat requirements of Mormon Metalmark will facilitate implementation of future recovery efforts.

1. COSEWIC* Species Assessment Information

This section replaces the "Species Assessment Information from COSEWIC" section in the provincial recovery strategy.

Date of Assessment: May 2014

Common Name (population): Mormon Metalmark - Southern Mountain population

Scientific Name: Apodemia mormo

COSEWIC Status: Endangered

Reason for Designation: This butterfly is found in very small numbers within small habitat patches in the narrow valley bottoms of the Similkameen and Okanagan valleys of southern British Columbia. The valley bottoms are also an important transportation and utility corridor, and the butterfly is threatened by road maintenance and other land development activities, as well as the growth of invasive plants that shade out their host plants.

Canadian Occurrence: British Columbia

COSEWIC Status History: Designated Endangered in May 2003. Status re-examined and confirmed in May 2014.

* COSEWIC (Committee on the Status of Endangered Wildlife in Canada)

The Canadian range of Mormon Metalmark is represented by two disjunct populations. The Southern Mountain population is restricted to south-central British Columbia (B.C.), and the Prairie population is restricted to southwestern Saskatchewan. All references to "Mormon Metalmark" in this document imply the "Mormon Metalmark Southern Mountain population", i.e., wherever population name is not specifically stated.

2. Species Status Information

Legal Designation: SARA Schedule 1 (Endangered) (2003).

Table 1. Conservation Status of Mormon Metalmark Southern Mountain population (fromNatureServe 2015 and B.C. Conservation Framework 2015).

Global National (G) (N) Rank* Rank*	Sub-national (S) Rank*	COSEWIC Status	B.C. List	B.C. Conservation Framework
G5 Canada (N1)*** U.S.A. (N5)	Canada: British Columbia (S1) U.S.A: Arizona (SNR), California (SNR), Colorado (S5), Idaho (SNR), Montana (S3S5), Nevada (SNR), New Mexico (SNR), North Dakota (SNR), Oregon (SNR), South Dakota (SNR), Texas (SNR), Utah (SNR), Washington (S4), Wyoming	Endangered (2014)	Red List	Highest priority: 1, under Goal 3**

*Rank 1– critically imperiled; 2– imperiled; 3- vulnerable to extirpation or extinction; 4- apparently secure; 5– secure; H– possibly extirpated; NR – status not ranked

** The three goals of the B.C. Conservation Framework are: 1. Contribute to global efforts for species and ecosystem conservation; 2. Prevent species and ecosystems from becoming at risk; 3. Maintain the diversity of native species and ecosystems

*** indicates the status of infraspecific taxa (i.e. Southern Mountain population).

It is estimated that the percent of the global range and population of this species in Canada is less than 1% (COSEWIC 2014).

3. Species Information

3.1 Species Population and Distribution

The information summary below (Table 2) provides additional information to the "Populations and Distribution" section in the provincial recovery strategy.

Since the publication of the provincial recovery strategy, known and potential localities in the Similkameen River Valley and adjacent areas have been surveyed as part of a COSEWIC status report update (2014). In total, there are 16 reported locations⁴ for

⁴ Locations are based on the biological parameters of the butterfly (e.g. dispersal distance and habitat connectivity between known occurrences, and whether the individuals mix between locations) and are in alignment with COSEWIC (2014) sites. The definition of location for recovery of the species is defined as a stand-alone population occupying a contiguous patch of suitable habitat. Locations are defined to match provincial recovery strategy descriptions as closely as possible.

Mormon Metalmark in B.C. Of these, 12 locations are confirmed or presumed extant⁵. Mormon Metalmark has not been observed at one location (#4, West of Richter Mountain) since 1995 despite surveys in 2003, 2005, and 2012, and its current status is unknown. Details pertaining to the geographic information for two locations (#8 and #11) near Keremeos remain unknown at this time. There is a historic record (1929) from the Okanagan valley near Oliver and Okanagan Falls; specific geographic information at this location (#17) was not reported.

Table 2. Summary of Mormon Metalmark Southern Mountain population locations in Canada, as of 2015. Location numbers align with those provided by COSEWIC (2014), with the addition of location 17 (not numbered by COSEWIC); with last observation (Last Obs.) and status shown for each site.

Location #	Site name	Last Obs.	Status ^a
2	Keremeos	2012	Extant
3	Richter Mountain, SW of	2006	Extant
4	Richter Mountain, W of (Chopaka N)	1995	Unknown (failed to find)
5	Similkameen River - Goat View	2012	Extant
6	Keremeos - Suncatchers	2008	Extant
7	Olalla	2009	Extant
8	unknown; near Keremeos	Unknown	Unknown
9	Bullock Creek, N of	2012	Extant
10	Keremeos - Gravel Pit	2012	Extant
11	unknown; near Keremeos	Unknown	Unknown
12	Paul Creek, N of	2012	Extant
13	Cawston, W of	2008	Extant
14	Frank Lake, N of	2012	Extant
15	Spotted Lake	2012	Extant
16 ^b	Keremeos, southwest of - Riverside Estates	2012	Extant
17	Vaseux Lake	1929	Historical

^a As per NatureServe (2015) the status of Mormon Metalmark Southern Mountain population locations is as follows: Extant – Population has been recently verified (<20 years); Historical – Recent information verifying the continued existence of the population is lacking (i.e. records are >20 years); Unknown (failed to find) – The population has not been found despite a search by an experienced observer but appropriate habitat still remains at the site.

^b Location #1 was referenced as location #16 in the COSEWIC status report (2014); the number is retained here for simplicity, and therefore there is no location #1 included in the above summary table.

⁵ The British Columbia Conservation Data Centre and NatureServe databases define "extant" as all observations made within the last 20 years, provided the habitat has not been substantially altered or degraded.

4. Threats

This section replaces the "Threats" section in the provincial recovery strategy. It now includes updated information on threats (COSEWIC 2014) using the IUCN-CMP (World Conservation Union–Conservation Measures Partnership) unified threats classification system.

Threats are defined as the proximate activities or processes that have caused, are causing, or may cause in the future the destruction, degradation, and/or impairment of the entity being assessed (population, species, community, or ecosystem) in the area of interest (global, national, or subnational) (Salafsky et al. 2008). Threats presented here do not include biological features of the species or population which are considered limiting factors.

4.1 Threat Assessment

The threat classification used in this document was completed for the COSEWIC status report (2014) and is based on the IUCN-CMP unified threats classification system. It is consistent with methods used by the B.C. Conservation Data Centre and the B.C. Conservation Framework. For a detailed description of the threat classification system, see the <u>Conservation Measures Partnership website</u> (CMP 2010). For purposes of threat assessment, only present and future threats are considered. Threats may be observed, inferred, or projected to occur in the near term. Threats are characterized in terms of scope, severity, and timing. Threat "impact" is calculated from scope and severity. For information on how the values are assigned, see Master et al. (2012).

Threat Classification	Impact ^a	Scope ^b	Severity ^c	Timing ^d
1 - Residential & commercial development	Negligible	Negligible	Moderate	Low
1.1 - Housing & urban areas	Negligible	Negligible	Moderate	Low
1.2 - Commercial & industrial areas	Negligible	Negligible	Moderate	Low
1.3 - Tourism & recreation areas	Negligible	Negligible	Moderate	Low
2 - Agriculture & aquaculture	Low	Small	Slight	Moderate
2.3 - Livestock farming & ranching	Low	Small	Slight	Moderate
3 - Energy production & mining	Medium	Large	Moderate	High
3.2 - Mining & quarrying	Medium	Large	Moderate	High
4 - Transportation & service corridors	Medium	Large	Moderate	Moderate
4.1 - Roads & railroads	Medium	Large	Moderate	Moderate
7 - Natural system modifications	Low	Pervasive	Slight	Unknown
7.1 - Fire & fire suppression	Low	Pervasive	Slight	Moderate
8 - Invasive & other problematic species & genes	Unknown	Pervasive	Unknown	High
8.1 - Invasive non-native/alien species	Unknown	Pervasive	Unknown	High
8.2 - Problematic native species	Unknown	Pervasive	Unknown	High

Table 3. IUCN-CMP threats classification for Mormon Metalmark Southern Mountain population.

Threat Classification	Impact ^a	Scope ^b	Severity ^c	Timing ^d
9 - Pollution	Unknown	Small	Unknown	Moderate
9.3 - Agricultural & forestry effluents	Unknown	Small	Unknown	Moderate

^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 threat 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 the impact cannot be determined (e.g., if values for either scope or severity are unknown); Not Calculated: impact not calculated as threat is outside the assessment timeframe (e.g., timing is insignificant/negligible or low as threat is only considered to be in the past); Negligible: when scope or severity is negligible; Not a Threat: when severity is scored as neutral or potential benefit.

^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%; Negligible < 1%)

^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%; Negligible < 1%; Neutral or Potential Benefit $\ge 0\%$) ^d Timing – High = continuing; Moderate = only in the future (could happen in the short term [< 10 years or 3

^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.

4.2 Description of Threats

The calculated overall threat impact⁶ to Mormon Metalmark Southern Mountain population is High. The threat descriptions provided below are adapted from the COSEWIC (2014) status report and correspond to the threats assessment above (Table 3). Currently the primary threats are mining and quarrying (#3.2), and roads and railroads (#4.1; construction and/or maintenance activities, and road mortalities). Livestock and ranching (#2.3), and fire and fire suppression (#7.1) are secondary threats. All other threats are of currently negligible or unknown impact.

IUCN-CMP Threat #1: Residential & Commercial Development

1.1 Housing & urban areas; 1.2 Commercial & industrial areas and 1.3 Tourism & recreation areas

Residential and commercial development is mainly a historical threat. Most remaining sites are on steep, eroding slopes and not desirable sites for development; however this activity may still occur in the future. Recent landscaping and planting of ornamental trees and shrubs in the town of Keremeos (location #2) for aesthetic purposes resulted in the loss of approximately 80-100 m² of habitat before these activities were stopped (COSEWIC 2003; Dyer pers. comm. in COSEWIC 2014).

⁶ The overall threat impact was calculated following Master et al. (2012) using the number of Level 1 Threats assigned to this species where timing = High or Moderate, which included 0 Very High, 0 High, 2 Medium, and 2 Low (Table 3). The overall threat impact considers the cumulative impacts of multiple threats.

IUCN-CMP Threat #2: Agriculture & Aquaculture

2.3 Livestock farming & ranching

Grazing and ranching is prevalent in the Okanagan and Similkameen valleys, and is known or suspected to be ongoing at many of the known locations for Mormon Metalmark. Under drought conditions when alternate forage is limited, cattle grazing on Snow Buckwheat (USDA-NRCS 2016) could result in increased mortality or reduced fitness of Mormon Metalmarks (COSEWIC 2014). These activities may permanently or temporarily destroy habitat, including plants that provide food or egg-laying sites, and may destroy adults, eggs, or larvae (Southern Interior Invertebrates Recovery Team 2008).

IUCN-CMP Threat #3: Energy Production & Mining

3.2 Mining & Quarrying

Gravel extraction is a primary threat to Mormon Metalmark. Gravel extraction operations can destroy natural habitat and/or host plants required by the species. However, depending on the scope and severity of the development, this threat may be mitigated in part; some types of gravel extraction operations can produce a disturbed habitat that promotes the growth of Snow Buckwheat (which is a larval and nectar host plant for the species). For example, an active gravel pit in Keremeos (location #2) has remained active since first observation of the species in 2003, and some of the highest abundance counts have been recorded there (222 in 2006). Less extensive gravel extractions in B.C. (#6,9,10,16).

IUCN-CMP Threat #4: Transportation & Service Corridors

4.1 Roads & Railroads

Construction and maintenance activities along transportation and utility corridors are primary threats to the species and apply to most occupied habitat patches, including locations with the highest population densities. Activities such as natural gas line installment or repair, ditch maintenance to remove eroded debris and re-contour ditch slopes, vegetation mowing or herbicide spraying for noxious weed control (related to threat 8.1), and vegetation removal around power poles to reduce wildfire concerns (related to threat 7.1) may destroy eggs or larvae, or permanently or temporarily remove plants that provide food or egg-laying sites.

At least nine Mormon Metalmark locations along the Highway 3 road allowances of the Similkameen Valley corridor may experience the threat of mortality from road traffic. Statistics for Highway 3 west of Keremeos (between locations #2 and #9) show a summer (July-August) average daily traffic volume of 6166 vehicles in 2013 (B.C. MoTI 2015). Summer average traffic volumes along Highway 3 have remained relatively constant from 2006-2013 (~5000-6000 vehicles per day) and may represent a low-level but relatively constant source of mortality for adult Mormon Metalmarks. Vehicle traffic

was found to kill significant numbers of butterflies in an Illinois study (McKenna et al. 2001), and although roads were not a serious barrier to butterfly movement, vehicles killed up to 7% of adult butterflies from some populations in the United Kingdom (Munguira and Thomas 1992).

IUCN-CMP Threat #7: Natural System Modifications

7.1 Fire and Fire suppression

Wildfire is considered a threat, potentially reducing host and/or nectar plants (Snow Buckwheat and Stinking Rabbitbrush), but it is unlikely to have widespread effects as most occupied areas are sparsely vegetated. Fires are actively suppressed in the heavily developed Similkameen Valley and some disturbance by wildfire may actually benefit metalmarks by reducing competing woody vegetation. Vegetation removal along roadsides to reduce wildfire concerns may destroy eggs or larvae, or permanently or temporarily remove plants that provide food or egg-laying sites (related to threat 4.1).

IUCN-CMP Threat # 8: Invasive & Other Problematic Species & Genes

8.1 Invasive non-native/alien species

Eurasian weeds such as Diffuse Knapweed (*Centaurea diffusa*), Dalmation Toadflax (*Linaria dalmatica*) and Downy Brome (*Bromus tectorum*) occur in many locations. The establishment and proliferation of these species may reduce the size and density of native larval and nectar host plants required by Mormon Metalmark (COSEWIC 2003). Herbicide spraying for noxious weed control (at roadsides or elsewhere – related to threat 4.1, 9.3) may destroy eggs or larvae, or permanently or temporarily remove plants that provide food or egg-laying sites.

8.2 Problematic native species

In the absence of disturbance, native woody vegetation (trees and shrubs) may encroach upon habitats with larval host and/or nectar plants, owing to succession (Turner and Krannitz 2001). The impact level is unknown, but succession is expected to be a lower threat in areas with ongoing natural disturbance (e.g., slopes with natural erosion), and a greater threat in areas which lack types of natural disturbance. This threat is related to Threat 7.1 (fire suppression).

IUCN-CMP Threat #9: Pollution

9.3 Agricultural & forestry effluents

Nearly half of the locations (#2,3,9,10,12,13) are directly adjacent to agricultural fields (orchards and/or vineyards) where pesticides are annually applied (Kuo et al. 2012). Pesticide drift is a potential risk that may result in mortality or reduced fitness in adults, larvae or food plants (Longley and Sotherton 1997; Longley et al. 1997) as has been noted by Pruss et al. (2008), and references therein, for the Prairie population.

5. Population and Distribution Objective

This section replaces the "Recovery Goal" and "Rationale for Recovery Goal and Objectives" sections in the provincial recovery strategy.

Environment and Climate Change Canada has determined the Population and Distribution Objective for Mormon Metalmark Southern Mountain population to be:

To ensure the persistence of Mormon Metalmark Southern Mountain population at all known extant locations (and any new locations) within the species' range in Canada.

Rationale:

Occurrence information for Mormon Metalmark Southern Mountain population shows it is extant at 12 known locations in southern B.C. Information at two locations on Indian Reserve lands is not currently available to Environment and Climate Change Canada. An additional unknown location has not been re-observed since 1995 though potential habitat remains at the site. There is also a historical record from 1929 at Vaseux Lake in the South Okanagan Valley, B.C. (specific location, and current status unknown; it is possible this is represented by one of the current known locations). Population numbers, including abundance trends, are unknown. Currently there is insufficient information about numbers needed to support a viable population long-term , and recolonization capabilities are unknown. Likewise there is no information to indicate that the species was previously more widespread, therefore an objective to actively increase the number of populations, which may allow for down-listing of the species, is not appropriate at this time. However, if additional naturally occurring populations are discovered, their persistence should also be ensured. Future population and distribution data may indicate that deliberate attempts to increase abundance would be warranted at one or more locations (for example, where either or both of abundance and/or species' range shows a documented decline).

6. Broad Strategies and General Approaches to Meet Objectives

6.1 Actions Already Completed or Currently Underway

This section replaces the "Actions Already Completed or Underway" section in the provincial recovery strategy.

The provincial recovery strategy lists a number of actions that had been completed at that time. The table below (Table 4) amends and updates this list to include additional details on actions completed for the purpose of meeting recovery objectives identified in this recovery strategy.

Purpose	Project Proponent	Recovery-related Action(s)
Inventory & monitoring	St. John (1996)	Surveyed for rare butterflies, including Mormon Metalmarks, in the south Okanagan and Lower Similkameen Valleys
Inventory & Monitoring	B.C. & WA (USA) biologists (2001-2007)	Joint survey for Mormon Metalmarks within the known B.C. range
Habitat Conservation	South Okanagan– Similkameen Conservation Program (SOSCP) (2000)	SOSCP established, taking a partnership approach to habitat conservation in the area
Inventory, Threat Mitigation	Inland Pacific Connector Gas Pipeline Project (2002)	Environmental impact assessment, included surveys and mitigation recommendations for Mormon Metalmark
Habitat Conservation, Outreach	The Land Conservancy (2005)	Landowner contact initiated on key private land habitats
Habitat Conservation, Outreach	Lower Similkameen Indian Band and The Okanagan Similkameen Conservation Alliance (2005)	Community festival highlighting Mormon Metalmarks was held
Threat Mitigation	B.C. Ministry of Environment (2005)	Preliminary discussions were initiated with the B.C. Ministry of Transportation
Inventory & Monitoring, Address Knowledge Gaps	UBC Okanagan (2005-2007)	Mark-recapture and genetic studies have been conducted (S. Desjardins. unpubl. data, 2007 in Southern Interior Invertebrates Recovery Team 2008)
Address Knowledge Gaps	Okanagan College (2007)	A preliminary population viability analysis was conducted (H. Richardson. unpubl. data, 2007 in Southern Interior Invertebrates Recovery Team 2008)
Habitat Conservation	Village of Keremeos (2013)	Designated a portion of the grassland slope where Mormon Metalmarks are found (location #2) as an Environmentally Sensitive Area (Sagebrush Steppe Grassland) where new development may be limited or prohibited (MMM Group 2013)
Inventory & Monitoring	Foster (COSEWIC 2014)	Foster surveyed known and potential localities in 2012 in the Similkameen River valley and adjacent areas as part of the COSEWIC status report update

Table 4. Summary of ongoing	recovery-related Mormon	Metalmark work completed	l as of 2015.
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6.2 Strategic Direction for Recovery

This section replaces (recombines, and updates) portions of the "Knowledge Gaps", "Approaches to Meet Recovery Objectives", and "Recommended Approach for Recovery Implementation" sections in the provincial recovery strategy.

The strategic direction for Mormon Metalmark recovery is summarized in Table 5.

Table 5. Recovery planning table for Mormon Metalmark Southern Mountain population in Canada. Threats are according to the IUCN-CMP classification (refer to Table 3). Priority is characterized as essential (urgent and important, needs to start immediately), necessary (important but not urgent, action can start in 2-5 years), or beneficial (action would be beneficial at any time that it was feasible to start).

Threat or Limitation	Priority ^a	Broad Strategy to Recovery	General Description of Research and Management Approaches
1 Residential & commercial development; 2.3 Livestock farming & ranching; 3.2 Mining & quarrying; 4.1 Roads & railroads; 8.1 Invasive non-native/alien species; 9.3 Agricultural and forestry effluents; 7.1 Fire & fire suppression	Essential	Threat Mitigation, Habitat Conservation	 Develop/apply Best Management Practices to avoid, minimize, or mitigate losses owing to known and potential threats (individual or cumulative effects of land development and/or habitat degradation) Engage in communications and outreach activities to increase public understanding of the species, its status, and how they can contribute to protection and recovery (including habitat stewardship on private lands) Encourage protection under provincial government regulations (e.g., update the Identified Wildlife account under the Forest and Range Practises Act (FRPA); identify areas on provincial crown land that could be protected by Wildlife Habitat Areas under FRPA; establish Section 16 land reserves under the Land Act on provincial crown locations) Encourage protection under local government policies (e.g., incorporate consideration of habitat stewardship into planning processes, including zoning, development permits, pesticide use and ornamental landscaping of natural areas) Work with First Nations to identify and implement opportunities for cooperative habitat conservation projects both on and off reserves. Work with utility companies and the B.C. Ministry of Transportation and Infrastructure to avoid, minimize, or mitigate losses owing to construction and maintenance activities along transportation and utility corridors
Knowledge Gap – Population & distribution	Necessary	Inventory & Monitoring	 Undertake inventories of population size and distribution (surveys at known and potential sites). Establish and implement a long-term monitoring program to collect species information about fluctuations in population size, immigration, recruitment, persistence, and dispersal distance (from mark-recapture studies) Undertake research to determine population structure within each site as well as the connectivity between isolated and disjunct population Undertake research to assess the potential impacts of predation, parasitism, climatic variation, small population size, and population isolation Work with aboriginal groups to identify traditional knowledge of this species Continue to exchange information with Saskatchewan and Washington State, and coordinate survey/monitoring activities

Knowledge Gap – Habitat requirements	Beneficial	Habitat Conservation	 Refine mapping and population estimates of food plants at known and potential localities Quantify the density of Mormon Metalmark in relation to food plants (sparse vs. dense; flowering vs. non-flowering) Assess the use of sparse, non-flowering patches of snow buckwheat for reproduction and larval growth Implement research on Mormon Metalmark habitat restoration in the Similkameen River Valley and south Okanagan Valley, including methods to reduce stabilizing vegetation and increase host-plant resources
			 Research and refine understanding of ongoing and potential threats to all life stages of Mormon Metalmark in relation to its habitat requirements

^a "Priority" reflects the degree to which the broad strategy contributes directly to the recovery of the species or is an essential precursor to an approach that contributes to the recovery of the species.

6.3 Narrative to Support the Recovery Planning Table

The recovery planning table (Table 5) addresses the main threats from mining and quarrying, and construction and maintenance activities along transportation and utility corridors. It also addresses the knowledge gaps and/or limitations relating to lack of detailed information about population size and abundance trends, distribution at known and potential sites, dispersal ability, and specificity of habitat requirements, as well as additional (known or potential) threats that may cause cumulative effects and/or localized impacts contributing to Mormon Metalmark mortality.

7. Critical Habitat

This section replaces the "Critical Habitat" section in the provincial recovery strategy.

Section 41 (1)(c) of SARA requires that recovery strategies include an identification of the species' critical habitat, to the extent possible, as well as examples of activities that are likely to result in its destruction. The 2008 provincial recovery strategy for the Mormon Metalmark does not include an identification of critical habitat, nor is it required in the provincial process. Environment and Climate Change Canada has reviewed the available information and concluded that sufficient information is available to partially identify critical habitat for Mormon Metalmark Southern Mountain population at this time.

Critical habitat can only be partially identified at this time. A schedule of studies (section 7.2) has been included to provide the information necessary to complete the identification of critical habitat for Mormon Metalmark. The identification of critical habitat will be updated when the information becomes available, either in a revised recovery strategy or action plan(s).

Critical habitat for Mormon Metalmark is identified in this document to the extent possible; as responsible jurisdictions and/or other interested parties conduct research to address knowledge gaps, the existing critical habitat methodology and identification may be modified and/or refined to reflect new knowledge.

7.1 Identification of the Species' Critical Habitat

Geospatial location of areas containing critical habitat

Critical habitat for Mormon Metalmark Southern Mountain population is identified at 12 locations in the Similkameen River valley and adjacent areas within the south Okanagan region of British Columbia, Canada (Figures 1-8):

- Location 2: Keremeos (Figure 1)
- Location 3: Richter Mountain, SW of (Figure 2)
- Location 5: Similkameen River Goat view (Figure 3)
- Location 6: Keremeos Suncatchers (Figure 4)
- Location 7: Olalla (Figure 5)

Recovery Strategy for the Mormon Metalmark Southern Mountain population Part 1: Federal Addition

- Location 9: Bullock Creek, N of (Figure 1)
- Location 10: Keremeos Gravel Pit (Figure 6)
- Location 12: Paul Creek, N of (Figure 7)
- Location 13: Cawston, W of (Figure 6)
- Location 14: Frank Lake, N of (Figure 2)
- Location 15: Spotted Lake (Figure 8)
- Location 16: Keremeos, SW of Riverside Estates (Figure 1)

The areas containing critical habitat for Mormon Metalmark Southern Mountain population are identified based on a combination of (1) recent (<20 years old) documented occurrences⁷ (2) an estimate of the seasonal dispersal capabilities of adult Mormon Metalmark Southern Mountain population, applied as a 620 m distance around each documented occurrence, and (3) refinement to select only the distinct ecological features⁸ (i.e., habitat types) that are known to support Mormon Metalmark Southern Mountain population, occurring within the dispersal distance area.

The dispersal ability of Mormon Metalmark Southern Mountain population is not known. However, based on studies of biologically similar species, best available information indicates a dispersal estimate of approximately 620 m. Mormon Metalmarks do not migrate and appear to have limited colonization potential primarily due to high site fidelity, short adult lifespan and single annual flight period (COSEWIC 2014). Genetic studies appear to support this in B.C. (Crawford et al 2011; Crawford 2013) having found that there is restricted gene flow, indicating limited dispersal. In a mark-recapture study of the Mormon Metalmark Prairie population, 99.5% of recaptured individuals travelled less than 1 km from the point of initial capture (Wick unpubl. data in COSEWIC 2014; Wick pers. comm. 2015). In California, a mark-recapture study of the Mormon Metalmark *langei* subspecies recorded the maximum lifetime (adults live approximately 10 days) dispersal distance observed at 617 m (Arnold and Powell 1983). NatureServe (2015) suggests an approximate spatial requirement buffer of 500 m for Riodinid butterflies⁹ when the actual extent is unknown. Given the limited dispersal capability and localized nature of the habitats occupied by Mormon Metalmark Southern Mountain population, a 620 m dispersal distance was considered to be an appropriate distance to use in delineating area containing critical habitat.

Mormon Metalmark Southern Mountain population is found in non-forested, grassland or shrub-steppe habitats within the Ponderosa Pine very hot (PPxh1), Bunchgrass very hot (BGxh1) and Interior Douglas-fir very hot (IDFxh1) biogeoclimatic subzones (Lloyd

⁷ An occurrence is defined as the occupied habitat patch at which an individual(s) was observed. Many of the occurrences consist of multiple individuals over multiple years from a spatially distinct site that were obtained during surveys or research projects.

⁸ Distinct ecological features are those that are distinguishable at a scale relevant to the critical habitat identification (through use of detailed ecosystem mapping and/or aerial photos), which, at that scale, appear as ecologically contiguous features with relatively distinct boundaries (e.g., distinct vegetation assemblages and/or habitat types). Mormon Metalmark Southern Mountain population has been identified at a "site" level scale (1:15,000 scale of reference).

⁹ Mormon Metalmark belongs to the Lepidoptera family Riodinidae.

et al. 1990) at elevations below 800 m. The dispersal distance areas potentially containing critical habitat for Mormon Metalmark Southern Mountain population were geospatially refined using Terrestrial Ecosystems Mapping information (Iverson and Haney 2012) to select only ecosystem units known to support the species and/or its larval host plants (see Biophysical attributes of critical habitat below). Detailed methods and decision-making processes relating to critical habitat identification are archived in a supporting document.

Biophysical attributes of critical habitat

Within the areas identified as containing critical habitat, critical habitat is identified wherever any of the following habitat types occur:

- Sagebrush Needle-and-thread grass habitat, Bluebunch Wheatgrass Sandburg's Bluegrass habitat, Antelope-brush – Needle-and-thread grass habitat
- Areas with minimal understory (no developed tree or shrub layer), and/or with minimal ground cover (high concentrations of bare soil or gravel) that are natural or anthropogenic in origin; e.g., barren habitats, hillsides, eroding slopes, and embankments with sandy or gravelly soils, dry pastures, gravel pits

Within the habitat types mentioned above. Mormon Metalmark uses Snow Buckwheat plants and surrounding soils/litter (within 2 m of plants) for overwintering and larval feeding/development. Oviposition behaviour for Mormon Metalmark - Southern Mountain populations has not been observed, but they either lay eggs on Snow Buckwheat leaves, as has been reported for adjacent Washington populations (Pyle 2002), or directly into cracks in the soil or under small rocks near (<2 m) the host plant, as observed in the Prairie population in Saskatchewan (Wick et al. 2012). Eggs or larvae overwinter on Snow Buckwheat stems, in leaf litter or in the substrate beneath Snow Buckwheat plants within the surrounding leaf fall zone (Arnold and Powell 1983; Wick et al. 2012). During the flight period (typically mid-July to late September) adults primarily nectar on Snow Buckwheat and Stinking Rabbitbrush. Snow Buckwheat begins flowering mid-August so Mormon Metalmarks that emerge earlier must depend upon other nectar sources, particularly Stinking Rabbitbrush. Mormon Metalmarks have occasionally been observed nectaring on White Clematis (Clematis ligusticifolia), knapweed (Centaurea spp.), Big Sagebrush (Artemisia tridentata), and Common Yarrow (Achillea millefolium; COSEWIC 2014). Mormon Metalkmark may use additional structural elements of its habitat for resting and hiding from predators.

Detailed information about the composition and spatial relationship of individual biophysical attributes required by Mormon Metalmark at particular locations, and the relative required amount, condition, and density of individual biophysical attributes within areas identified as containing critical habitat are currently unknown, although larval host plants must be present.

The areas containing critical habitat for Mormon Metalmark Southern Mountain population (totaling 1349.5 ha) are presented in Figures 1-8. Critical habitat for Mormon Metalmark Southern Mountain population is identified within the shaded yellow polygons

shown on each map where the habitats described in this section occur. The identified habitat types comprise the biophysical attributes of critical habitat for this species, and therefore the shaded yellow polygons (units) shown on the map represent a close approximation of actual critical habitat.

Within these polygons, clearly unsuitable habitats that do not support the species and/or its larval host plants, such as: (i) forested and dense-shrub communities (ii) rivers, ponds, lakes and/or wetland communities; (iii) steep landscapes (maximum grade of 105% [46.4°]; Klinkenberg 2015), and (iv) existing permanent infrastructure (e.g., running surface of paved roads, buildings) and/or existing modified habitats lacking suitable attributes (e.g., cultivated fields, orchards, vineyards) are not identified as critical habitat. Detailed methods and decision-making processes relating to critical habitat identification are archived in a supporting document.



Figure 1. Critical habitat for Mormon Metalmark at Keremeos (location #2), Bullock Creek, N (location #9), and Keremeos, SW – Riverside Estates (location #16), B.C. is represented by the yellow shaded polygons (unit(s)), in accordance with the criteria set out in Section 7.1. The detailed polygons show a total of 328.6 ha containing critical habitat at these locations (16.7 ha at #2 and 311.8 ha at #9 & #16).



2017

Figure 2. Critical habitat for Mormon Metalmark at Richter Mountain, SW (location #3) and Frank Lake, N (location #14), B.C. is represented by the yellow shaded polygons (unit(s)), in accordance with the criteria set out in Section 7.1. The detailed polygons show a total of 300.2 ha containing critical habitat at these locations (224.3 ha at #3 and 75.9 ha at #14).



Figure 3. Critical habitat for Mormon Metalmark at Similkameen River – Goat view, B.C. (location #5) is represented by the yellow shaded polygon (unit), in accordance with the criteria set out in Section 7.1. The detailed polygon shows a total of 130.3 ha containing critical habitat at this location.



Figure 4. Critical habitat for Mormon Metalmark at Keremeos-Suncatchers, B.C. (location #6) is represented by the yellow shaded polygon (unit), in accordance with the criteria set out in Section 7.1. The detailed polygon shows a total of 74.6 ha containing critical habitat at this location.



Figure 5. Critical habitat for Mormon Metalmark at Olalla, B.C. (location #7) is represented by the yellow shaded polygons (unit(s)), in accordance with the criteria set out in Section 7.1. The detailed polygons show a total of 94.9 ha containing critical habitat at this location.



Figure 6. Critical habitat for Mormon Metalmark at Keremeos – Gravel Pit (location #10) and Cawston, W of (location #13), B.C. are represented by the yellow shaded polygons (unit(s)), in accordance with the criteria set out in Section 7.1. The detailed polygons show a total of 246.2 ha containing critical habitat at these locations (75.9 ha at #10 and 170.3 ha at #13).



Figure 7. Critical habitat for Mormon Metalmark Southern Mountain population at Paul Creek, North, B.C. (location #12) is represented by the yellow shaded polygon (unit), in accordance with the criteria set out in Section 7.1. The detailed polygon shows a total of 61.1 ha containing critical habitat at this location.



Figure 8. Critical habitat for Mormon Metalmark Southern Mountain population at Spotted Lake, B.C. (location #15) is represented by the yellow shaded polygon (unit), in accordance with the criteria set out in Section 7.1. The detailed polygon shows a total of 113.7 ha containing critical habitat at this location.

7.2 Schedule of Studies to Identify Critical Habitat

This section replaces the "Recommended schedule of studies to identify critical habitat" section in the provincial recovery plan.

The following schedule of studies (Table 6) outlines the activities required to complete the identification of critical habitat for Mormon Metalmark Southern Mountain population in Canada.

Table 6. Schedule of studies to identify cr	itical habitat.
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Description of Activity	Outcome/Rationale	Timeline
Targeted survey at location #4 to determine if suitable habitat is still present for the species, and whether the species is still extant at this location.	Ensure critical habitat is identified to support all extant locations of Mormon Metalmark Southern Mountain population in Canada.	2017–2022
Work with applicable organizations to complete the identification of critical habitat for Mormon Metalmark.	Critical habitat has not been identified at two sites near Keremeos, B.C. This activity is required such that sufficient critical habitat is identified to meet the population and distribution objectives.	2017–2022

7.3 Activities Likely to Result in the Destruction of Critical Habitat

Understanding what constitutes destruction of critical habitat is necessary for the protection and management of critical habitat. Destruction is determined on a case by case basis. Destruction would result if part of the critical habitat were degraded, either permanently or temporarily, such that it would not serve its function when needed by Mormon Metalmark. Destruction may result from a single or multiple activities, at one point in time, or from the cumulative effects of one or more activities over time. Activities described in Table 7 include those likely to cause destruction of critical habitat for Mormon Metalmark; however, destructive activities are not limited to those listed.

The provincial recovery plan contains a section describing specific human activities likely to damage survival/recovery habitat. This science advice was used to inform the description of activities likely to result in the destruction of critical habitat in this federal recovery strategy.

Table 7. Activities likely to result in the destruction of critical habitat for Mormon Metalmark Southern Mountain population. IUCN¹⁰ Threat numbers are in accordance with the IUCN-CMP (World Conservation Union–Conservation Measures Partnership) unified threats classification system (<u>CMP 2010</u>).

Description of Activity	Description of effect (biophysical attribute or other) in relation to habitat function loss	Details and relationship to identified threats
Conversion of the natural landscape for transportation (i.e., roads & railroads), industry (i.e., mining & quarrying), and/or residential & commercial development	Results in the direct loss of critical habitat through larval host or nectar plant disturbance, removal, or replacement; substrate burial, disturbance, or compaction; and/or related indirect effects which cause damage to, or destruction of, the biophysical attributes required by Mormon Metalmark	Related IUCN-CMP threat #1.1, #1.2, #3.2, #4.1 Habitat loss due to construction of transportation corridors, and mining/quarrying are primary threats to the species. Further cumulative loss may be caused by local residential or commercial developments.
Construction and maintenance activities along transportation and utility corridors (e.g., natural gas line installment or repair, ditch maintenance to remove eroded debris and re-contour ditch slopes, vegetation mowing or herbicide spraying for noxious weed control, and/or vegetation removal to reduce wildfire concerns)	Results in the temporary or permanent loss of larval host plants, nectar plants, and/or substrates that are required for Mormon Metalmark.	Related IUCN-CMP threat #4.1, #8.1, #7.1 Construction and maintenance activities occur along Highway 3 and potentially affect at least nine sites, including those with the highest population densities. These threats potentially occur all along this transportation and utility corridor.
 At any time and in all seasons: Grazing regimes that result in the damage or degradation of larval host plants During the adult flight phase (July-September inclusive): Grazing regimes that result in the destruction of nectar host plants and/or other structural elements identified as essential to Mormon Metalmark 	Inappropriate livestock management can result in disturbance, removal, and/or compaction of vegetation and ground layer (via grazing or trampling), causing the loss of larval host plants, nectar plants and/or substrate habitat required by Mormon Metalmark.	Related IUCN-CMP threat #2.3 Grazing and ranching is prevalent in the Similkameen River Valley and Okanagan Valley, and is known at some of the known locations for Mormon Metalmark. Thresholds for impacting biophysical attributes are unknown, but destruction is more likely in conditions where there are high numbers of cattle, and/or in drought conditions when alternate forage is limited.

¹⁰ International Union for Conservation of Nature

Description of Activity	Description of effect (biophysical attribute or other) in relation to habitat function loss	Details and relationship to identified threats
Fire suppression and/or human-caused fire resulting in destruction to existing biophysical attributes of critical habitat	Continued active fire suppression results in loss of grassland and shrub steppe habitat due to tree encroachment (succession), and alteration of plant community composition such that it no longer contains the biophysical attributes required by Mormon Metalmark. Conversely, where these biophysical attributes do exist, human-caused fire resulting in the loss of larval host plants at any time and/or the loss of nectar plants during the flight period can result in the destruction of critical habitat.	Related IUCN-CMP threat #7.1 Fire suppression by wildfire protection programs is an ecosystem-level threat to the persistence grassland and shrub steppe habitats in B.C.
Activities related to the control of invertebrate pests and/or invasive plant species (mechanical or chemical) that are not in accordance with provincial best management practices, where available. This may include on-site activities, and/or drift from adjacent areas.	Efforts to control invertebrate pests or invasive plants through chemical means (pesticides or herbicides) or by physical means can result in destruction of critical habitat by degrading or removing larval host plants, nectar plants, and/or substrates required for survival (as a consequence of weed-pulling), or microhabitat toxicity resulting from the application of pesticides (Longley and Sotherton 1997).	Related IUCN-CMP threat #9.3, #8.1, #4.1 Nearly half of the locations are directly adjacent to agricultural fields and pesticide drift is a potential risk in those areas. Also related to threat #4.1, (application of herbicides for roadside weed control).

8. Measuring Progress

This section replaces the "Performance Measures" section in the provincial recovery strategy.

The performance indicator presented below provides a way to define and measure progress toward achieving the population and distribution objectives. Every five years, success of recovery strategy implementation will be measured against the following performance indicator:

The persistence and distribution of Mormon Metalmark Southern Mountain population at all known extant locations (including any newly identified locations) have been maintained, i.e., population size and extent of occurrence or area of occupancy at each site is stable and/or naturally increasing.

9. Statement on Action Plans

This section replaces the "Statement on Action Plans" section in the provincial recovery strategy.

One or more action plans will be posted on the Species at Risk Public Registry by 2022.

10. Effects on the Environment and Other Species

This section replaces the "Effects on Other Species" section in the provincial recovery strategy.

A strategic environmental assessment (SEA) is conducted on all SARA recovery planning documents, in accordance with the Cabinet Directive on the Environmental Assessment of Policy, Plan and Program Proposals¹¹. The purpose of a SEA is to incorporate environmental considerations into the development of public policies, plans, and program proposals to support environmentally sound decision-making and to evaluate whether the outcomes of a recovery planning document could affect any component of the environment or any of the Federal Sustainable Development Strategy's¹² (FSDS) goals and targets.

Recovery planning is intended to benefit species at risk and biodiversity in general. However, it is recognized that strategies may also inadvertently lead to environmental effects beyond the intended benefits. The planning process based on national guidelines directly incorporates consideration of all environmental effects, with a particular focus on possible impacts upon non-target species or habitats. The results of

 ¹¹ www.ceaa.gc.ca/default.asp?lang=En&n=B3186435-1
 ¹² www.ec.gc.ca/dd-sd/default.asp?lang=En&n=CD30F295-1

the SEA are incorporated directly into the strategy itself, but are also summarized below in this statement.

The ranges of several other species at risk overlap the range and habitat of Mormon Metalmark Southern Mountain population. Federally-listed species at risk that may overlap with Mormon Metalmark Southern Mountain population habitat in B.C. include (but are not limited to): Behr's Hairstreak (*Satyrium behrii*; Threatened), Spotted Bat (*Euderma maculatum*; Special Concern), Pallid Bat (*Antrozous pallidus*; Threatened), American Badger (*Taxidea taxus jeffersonii*; Endangered), Lewis's Woodpecker (*Melanerpes lewis*; Threatened) and Great Basin Spadefoot (*Spea intermontana*; Threatened).

Recovery efforts for Mormon Metalmark Southern Mountain population may indirectly benefit other species at risk in the area. Increased public education and awareness may reduce habitat loss at these locations, and conservation actions to restore and protect grasslands may be beneficial to all co-occurring species that rely on these threatened ecosystems. Likewise, conservation actions underway or proposed to protect the other co-occurring species at risk may be beneficial to Mormon Metalmark Southern Mountain population – a multi-species approach to conservation planning is recommended.

In acknowledgement of the high potential for shared habitat among local species at risk, large-scale management actions, such as invasive species removal, fire management, or the use of herbicides or pesticides, should be planned and implemented carefully. All on-site activities (surveys, research, and management), to aid recovery may pose a threat to co-occurring species (e.g., via trampling, increased herbivory via incidental creation of trails, or inadvertent dispersal of alien species during disposal), unless care is taken to avoid damage. Recovery planning activities for the Mormon Metalmark Southern Mountain population will be implemented with consideration of all co-occurring species at risk, to avoid or minimize negative impacts to these species or their habitats.

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Part 2 – Recovery Strategy for the Mormon Metalmark (Apodemia mormo), Southern Mountain Population in British Columbia, prepared by the Southern Interior Invertebrates Recovery Team for the British Columbia Ministry of Environment

Recovery Strategy for the Mormon Metalmark (Apodemia mormo), Southern Mountain Population in British Columbia



Prepared by the Southern Interior Invertebrates Recovery Team



February 2008

About the British Columbia Recovery Strategy Series

This series presents the recovery strategies that are prepared as advice to the Province of British Columbia on the general strategic approach required to recover species at risk. The Province prepares recovery strategies to meet our commitments to recover species at risk under the *Accord for the Protection of Species at Risk in Canada*, and the *Canada – British Columbia Agreement on Species at Risk*.

What is recovery?

Species at risk recovery is the process by which the decline of an endangered, threatened, or extirpated species is arrested or reversed, and threats are removed or reduced to improve the likelihood of a species' persistence in the wild.

What is a recovery strategy?

A recovery strategy represents the best available scientific knowledge on what is required to achieve recovery of a species or ecosystem. A recovery strategy outlines what is and what is not known about a species or ecosystem; it also identifies threats to the species or ecosystem, and what should be done to mitigate those threats. Recovery strategies set recovery goals and objectives, and recommend approaches to recover the species or ecosystem.

Recovery strategies are usually prepared by a recovery team with members from agencies responsible for the management of the species or ecosystem, experts from other agencies, universities, conservation groups, aboriginal groups, and stakeholder groups as appropriate.

What's next?

In most cases, one or more action plan(s) will be developed to define and guide implementation of the recovery strategy. Action plans include more detailed information about what needs to be done to meet the objectives of the recovery strategy. However, the recovery strategy provides valuable information on threats to the species and their recovery needs that may be used by individuals, communities, land users, and conservationists interested in species at risk recovery.

For more information

To learn more about species at risk recovery in British Columbia, please visit the Ministry of Environment Recovery Planning webpage at:

<http://www.env.gov.bc.ca/wld/recoveryplans/rcvry1.htm>

Recovery Strategy for the Mormon Metalmark (*Apodemia mormo*), Southern Mountain Population in British Columbia

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Disclaimer

This recovery strategy has been prepared by the Southern Interior Invertebrates Recovery Team, as advice to the responsible jurisdictions and organizations that may be involved in recovering the species. The British Columbia Ministry of Environment has received this advice as part of fulfilling its commitments under the *Accord for the Protection of Species at Risk in Canada*, and the *Canada - British Columbia Agreement on Species at Risk*.

This document identifies the recovery strategies that are deemed necessary, based on the best available scientific and traditional information, to recover Mormon Metalmark (Southern Mountain population) in British Columbia. Recovery actions to achieve the goals and objectives identified herein are subject to the priorities and budgetary constraints of participatory agencies and organizations. These goals, objectives, and recovery approaches may be modified in the future to accommodate new objectives and findings.

The responsible jurisdictions and all members of the recovery team have had an opportunity to review this document. However, this document does not necessarily represent the official positions of the agencies or the personal views of all individuals on the recovery team.

Success in the recovery of this species depends on the commitment and cooperation of many different constituencies that may be involved in implementing the directions set out in this strategy. The Ministry of Environment encourages all British Columbians to participate in the recovery of the Mormon Metalmark (Southern Mountain population).

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Southern Interior Invertebrates Recovery Team

	•
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The British Columbia Ministry of Environment is responsible for producing a recovery strategy for the Mormon Metalmark (Southern Mountain population) under the *Accord for the Protection of Species at Risk in Canada*. The B.C. Ministry of Transportation and Environment Canada's Canadian Wildlife Service participated in the preparation of this recovery strategy.

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EXECUTIVE SUMMARY

Mormon Metalmark is a medium-sized butterfly, with a 25- to 35-mm wingspan. In Canada, the species has two separate populations: the Southern Mountain population in British Columbia and the Prairie population in Saskatchewan. This recovery strategy is for the Southern Mountain population only. The Southern Mountain population was designated by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as Endangered in 2003 and listed on Schedule 1 of the *Species at Risk Act* in January 2005.

The Southern Mountain population of the Mormon Metalmark occurs in the lower Similkameen valley near the town of Keremeos in south-central British Columbia. It is extirpated from the south Okanagan valley, based on historical records from the early 1900s. Habitat for the species includes hillsides, slopes, and embankments with sandy or gravelly soils and moderate to high densities of rabbitbrush (*Ericameria nauseosus*) and snow buckwheat (*Eriogonum niveum*) plants. Metalmark larvae require snow buckwheat for feeding and may require the stems or leaf litter for hibernating. Adults require mature snow buckwheat for egg laying, and flowering snow buckwheat and rabbitbrush for nectaring. The Southern Mountain population is > 2000 individuals, confined to approximately 15 ha of unsecured habitat, and appears to be isolated from the closest known populations, in the United States.

The main broad threats to the species are habitat loss and degradation, due to maintenance activities on transportation and utility corridors, urban and agricultural development, agricultural practices, all-terrain vehicle traffic, and wildfire.

The recovery goal for the Mormon Metalmark, Southern Mountain population, is to maintain at least one viable population in secure habitat within the species' historic range in British Columbia.

Secure habitat is Mormon Metalmark habitat that is managed to maintain the species over a long term (>100 years). Habitat securement will require a stewardship approach that engages the voluntary cooperation of landowners and managers on a variety of land tenures to protect this species and the habitat it relies on.

Suitable information to quantify long-term population and habitat requirements, critical habitat, and life history is currently not available. These knowledge gaps will be addressed through research and a schedule of studies to identify critical habitat.

The recovery objectives are to:

- 1. Secure a minimum of 13.5 ha (90%) of the known, currently occupied habitat in the Similkameen area by 2012.
- 2. Develop and initiate a prioritized research program by 2009 and complete research by 2012 to address important knowledge gaps including population size and distribution, habitat requirements, dispersal capabilities and potential threats.

3. Determine the feasibility of re-establishing at least one viable population of Mormon Metalmarks in secure habitat in the Okanagan valley by 2011. If feasible, a reintroduction program will be included in a recovery action plan for the species by 2012.

One or more recovery action plans will be completed by 2012.

TABLE OF CONTENTS

RECOVERY TEAM MEMBERS	.iii
AUTHORS	.iii
RESPONSIBLE JURISDICTIONS	.iii
ACKNOWLEDGEMENTS	.iii
EXECUTIVE SUMMARY	iv
BACKGROUND	. 1
Species Assessment Information from COSEWIC	. 1
Description of the Species	. 1
Populations and Distribution	. 2
Needs of the Mormon Metalmark	. 5
Habitat and biological needs	. 5
Ecological role	. 5
Limiting factors	. 6
Threats	. 6
Description of the threats	. 6
Actions Already Completed or Underway	.7
Knowledge Gaps	.7
RECOVERY	. 8
Recovery Feasibility	. 8
Recovery Goal	. 9
Rationale for the Recovery Goal and Objectives	. 9
Recovery Objectives (2008 to 2012)	10
Approaches Recommended to Meet Recovery Objectives	10
Recovery planning table	10
Performance Measures	11
Critical Habitat	11
Identification of the species' critical habitat	11
Recommended schedule of studies to identify critical habitat	12
Existing and Recommended Approaches to Habitat Protection	12
Effects on Other Species	12
Socioeconomic Considerations	13
Recommended Approach for Recovery Implementation	13
Statement on Action Plans	13
REFERENCES	14

LIST OF TABLES

Table 1. Recovery criteria used to assess the technical and ecological feasibility of recovery of the	
Mormon Metalmark	9
Table 2. Strategies and approaches to achieve recovery objectives	10
Table 3. Schedule of studies	12

LIST OF FIGURES

Figure 1. Mormon Metalmark ventral wing surface	. 1
Figure 2. Mormon Metalmark dorsal wing surface	.1
Figure 3. North American range of Apodemia mormo.	. 3
Figure 4. Range of the Mormon Metalmark within the Southern Mountain population	.4

BACKGROUND

Species Assessment Information from COSEWIC

Date of Assessment: May 2003 (new)

Common Name (population): Mormon Metalmark (Southern Mountain population) **Scientific Name:** *Apodemia mormo*

COSEWIC Status: Endangered

Reason for Designation: The Southern Mountain population of this species is a very small, disjunct, northern outlier of a species whose main range occurs in the southwestern United States. The butterflies are confined to a very small area in a narrow valley in a populated area in southern British Columbia. The valley bottom is also an important transportation and utility corridor. The butterfly is vulnerable to natural stochastic events, and human activity can easily cause the extirpation of colonies.

Canadian Occurrence: British Columbia

COSEWIC Status History: Designated Endangered in May 2003. Assessment based on a new status report.

Description of the Species

Mormon Metalmark butterflies (Figures 1 and 2) have a 25- to 35-mm wingspan. The dorsal wing surfaces have a dark brown background; the ventral wing surfaces have an overall grey background. The front wings have a reddish-brown patch covering about two-thirds of the inner portion on both the dorsal and ventral surfaces. White spots cover both wing surfaces. The body is grey with white markings along the sides and segment separations. The antennae have alternating black and white rings and the eyes are green (COSEWIC 2003). Adult butterflies can be seen from early August to late September with peak activity from mid August (Guppy and Shepherd 2001; S. Desjardins pers. comm. 2007).



Figure 1. Mormon Metalmark ventral wing surface.



Figure 2. Mormon Metalmark dorsal wing surface.

Populations and Distribution

The Mormon Metalmark ranges from northern Mexico, through the western United States to southern British Columbia and Saskatchewan in Canada (Figure 3) (COSEWIC 2003).

A global population estimate is not available. The Mormon Metalmark species as a whole is ranked G5 (Globally Secure). National ranks are N5 (Secure) for the United States and N1 (Imperiled) for Canada. The species' status is not ranked (SNR) for the states of Arizona, Idaho, Nevada, New Mexico, North and South Dakota, Oregon, Texas, Wyoming, and Utah. Ranks for other states include S5 (Secure) in California and Colorado; S4 (Apparently Secure) in Washington and Vulnerable to Secure (S3S5) in Montana. Ranks in Canadian provinces include S1 (Imperiled) in British Columbia and S3 (Vulnerable) in Saskatchewan (NatureServe 2007).

The Southern Mountain population in Canada has less than 1% of the Mormon Metalmark's global population, based on species distribution. The Canadian range of this species includes two separate populations (COSEWIC 2003). The Prairie population (not addressed in this strategy) is found within and adjacent to Grasslands National Park in southwestern Saskatchewan. The Southern Mountain population occurs in south-central British Columbia near the town of Keremeos in the lower Similkameen River valley and is extirpated from the southern Okanagan valley (Figure 4). The extant population in the lower Similkameen occurs in several small patches of habitat, totaling 15 ha, from near the U.S. border, north along the Similkameen River to Keremeos; two new, unconfirmed sites were recently reported about 6 km north of Olalla (C.S. Guppy, pers. comm., 2005). Additional occupied habitat likely exists but is not known due to incomplete knowledge of the species' distribution.



Figure 3. North American range of *Apodemia mormo*. Populations in regions shown in grey removed from *Apodemia mormo* by Opler (1999). Map adapted from Opler (1999) and Pyle (2002).



Figure 4. Range of the Mormon Metalmark within the Southern Mountain population.

The distribution trend for the Southern Mountain population is not well documented. It is extirpated from the southern Okanagan valley, suggesting a reduction of >50% in the extent of occurrence, based on potential habitat mapping (BCMOE 2004) and historic sightings. Distribution trends in the lower Similkameen River valley are not known but may have expanded to occupy habitat created during transportation corridor construction (COSEWIC 2003). Despite this potential range expansion, due to initial corridor construction, populations may be adversely impacted during maintenance activities.

The Southern Mountain population likely varies from year to year, and was previously estimated to be <250 individuals (COSEWIC 2003). However, recent unpublished information suggests that the Southern Mountain population is > 2000 individuals (S. Desjardins pers. comm. 2007).

The population trend for the Southern Mountain population has not been thoroughly documented. The species is extirpated from the south Okanagan River valley suggesting a long term decline in the overall population. The current population likely fluctuates annually. No clear trend is available due to limited data.

Preliminary RAMAS GIS simulations for Mormon Metalmarks around Keremeos support the contention that the Southern Mountain population is viable, even with high variability in the

carrying capacity and reproductive rates, if habitat is protected. The long-term (100 year) predictions using the most-probable demographic and habitat parameter values, is for the total population to fluctuate around as few as 1500 individuals (Richardson, unpubl. data).

Mormon Metalmarks in habitat south of Cawston, in Olalla, and the most westerly site along the Similkameen River are only viable in the long term if they are assumed to be much larger than seems reasonable, based on current data, or if dispersal rates are much greater than mark-recapture tagging suggests (Desjardin, unpubl. data 2007; Richardson, unpubl. data 2007). Population viability analysis of Mormon Metalmark will continue (Richardson, pers. comm. 2007).

Needs of the Mormon Metalmark

Habitat and biological needs

Mormon Metalmark habitat includes hillsides, eroding slopes, and embankments with sandy or gravelly soils and moderate to high densities of rabbitbrush (*Ericameria nauseosus*) and snow buckwheat (*Eriogonum niveum*). Larvae require snow buckwheat for feeding and may require snow buckwheat stems or leaf litter for hibernating. Adults require mature snow buckwheat for egg laying, and flowering snow buckwheat and rabbitbrush for nectaring (COSEWIC 2003). These larval and nectar plants are widely distributed but only a few sites where they occur are occupied by metalmarks. This suggests an incomplete understanding of habitat needs. All known sites occur in the Bunchgrass biogeoclimatic zone at elevations below 520 m above sea level (BCMOE 2004). Metalmarks depend on a network of well-connected habitat patches. Occupied patches in BC are areas of contiguous habitat, generally >0.1 ha.

Habitat trends are not clear. This species currently uses microsites within three types of natural biophysical habitat units (Lea *et al.* 1998). Two units, "barren" habitat and "sagebrush – needle-and-thread grass" habitat, have decreased in area by 45% and 54%, respectively, due to habitat loss and alteration (Lea *et al.*, unpubl. data 2007). The third unit, "bluebunch wheatgrass – Sandberg's bluegrass deep soil" habitat, has not decreased significantly. This species is extirpated from the Okanagan drainage, where it likely occurred mainly in "antelope-brush – needle-and-thread grass" habitat, which has decreased in area by 62%. Metalmarks also occur in two human-modified units, "gravel pit" and "dry pasture," which have increased in area slightly. Many of the known colonies use disturbed microsites along transportation and utility corridors. These microsites may have increased in abundance due to initial corridor construction, but can be adversely impacted during maintenance activities or additional, new construction. Habitat quality and fragmentation have not been quantified but likely influence distribution.

Ecological role

The ecological role of Mormon Metalmark has not been researched, but is an important component of the conservation value of BC's native ecosystems. It is considered a focal species for the conservation of butterflies in the southern interior and its reliance on a few host-plants highlights the complexity of these ecosystems. While it is not considered an essential pollinator of yellow rabbitbrush or snow buckwheat nor to have other crucial ecological roles such as food-

web dynamics, the butterfly is often locally abundant and both larvae and adults may be used by bats, small mammals, and birds for food. Larval feeding damages snow buckwheat plants but does not cause plant mortality. All life stages likely host insect parasites.

Limiting factors

The following are the biologically limiting factors for the Mormon Metalmark, although many of these factors are not fully understood.

Food plant specificity: Adult Mormon Metalmarks in British Columbia nectar on very few plants. Known nectar plants include rabbitbrush (*Ericameria nauseosus*), white clematis (*Clematis ligusticifolia*), and snow buckwheat (*Eriogonum niveum*). Larvae depend solely on snow buckwheat for food (Guppy and Shepard 2001).

Flowering period of the food plant: The flowering period of the food plant must coincide with the emergence of the butterfly to ensure nectar is available. If the timing of flowering is delayed or changed, the senescence of the plant could impact adult survival or cause the extirpation of the species at a given site. The species is at the northern extent of its range and may be affected by climatic factors that influence the blooming period of nectar plants.

Dispersal capability: This species has limited dispersal capability (max. 4 km), a short adult lifespan (up to 21 days), and only one annual flight period, limiting colonization potential in a fragmented landscape (COSEWIC 2003; S. Desjardins, unpubl. data, 2007). Many of the occupied sites are separated by relatively long distances. Populations are vulnerable to natural stochastic events and extirpations, and recolonization is probably limited at some sites.

Soil, slope, and aspect habitat requirements: Most known sites occur on eroding, gravely, south-facing slopes. These sites are uncommon on the landscape and appear to be important habitat characteristics. The apparent requirement for these habitat characteristics is not understood but may be limiting.

Threats

Description of the threats

Clarification of threats to the Mormon Metalmark will be addressed in the action plan for this species. The following threats to Mormon Metalmark populations are listed in order of severity.

Habitat loss or degradation: Construction and maintenance activities along transportation and utility corridors are the primary threats to the species and apply to most occupied habitat patches, including sites with the highest population densities. Activities such as natural gas line installment or repair, ditch maintenance to remove eroded debris and re-contour ditch slopes, vegetation mowing or herbicide spraying for noxious weed control, and vegetation removal around power poles to reduce wildfire concerns may destroy eggs or larvae, or permanently or temporarily remove plants that provide food or egg-laying sites. All of these potential threats

occur in the general area occupied by Mormon Metalmarks but the probability of impacts at specific sites is not known.

Agricultural or urban development, gravel quarrying, all-terrain vehicle traffic, disposal of agricultural debris, wildfire, landscaping and irrigation of ornamental plants, and intensive grazing or trampling by livestock are secondary threats. Each of these general threats affects only one or two sites, but collectively they could significantly impact most of the known habitat. These activities may permanently or temporarily destroy habitat, including plants that provide food or egg-laying sites, and may destroy adults, eggs, or larvae.

The following are potential broad threats that are not clearly understood and require clarification:

- Changes to ecological dynamics or natural processes related to climate change and variability may cause premature nectar plant senescence, flowering delay, or failure;
- Introduced exotic plant species may compete with food plants or cause habitat alteration; and
- Pollution related to pesticide or herbicide use may result in mortality or reduced fitness in adults, larvae, or food plants (COSEWIC 2003).

Actions Already Completed or Underway

- St. John (1996) surveyed for rare butterflies, including Mormon Metalmarks, in the south Okanagan and Lower Similkameen Valleys.
- Inventory and monitoring for Mormon Metalmarks within the known BC range was conducted most years between 2001 and 2007 including a joint survey with Washington State biologists.
- The South Okanagan–Similkameen Conservation Program was established in 2000, taking a partnership approach to habitat conservation in the study area.
- The Inland Pacific Connector Gas Pipeline Project environmental impact assessment, including surveys and mitigation recommendations for Mormon Metalmark, was completed in 2002.
- Landowner contact was initiated on key private land habitats in 2005 by The Land Conservancy.
- A community festival highlighting Mormon Metalmarks was held in 2005 by The Lower Similkameen Indian Band and The Okanagan Similkameen Conservation Alliance.
- Preliminary discussions were initiated with the B.C. Ministry of Transportation in 2005 by the Ministry of Environment.
- Mark-recapture and genetic studies have been conducted by UBC Okanagan from 2005 to 2007 (S. Desjardins. unpubl.data.2007.).
- A preliminary population viability analysis was conducted by Okanagan College 2007 (H. Richardson. unpubl. data.2007.).

Knowledge Gaps

1. Population and distribution estimates for the known sites and quantification of the density of butterflies in relation to food plants (sparse vs. dense; flowering vs. non-flowering);

- 2. Inventory of potential habitat, population size, and distribution is incomplete and requires additional surveys. Monitoring of population parameters including fluctuations in size, immigration, recruitment, persistence, and dispersal distance is not available. A long term monitoring program should be established and implemented.
- 3. Refined mapping and population estimates of food plants at known and potential localities;
- 4. Determination of dispersal ability of Mormon Metalmark adults from mark-recapture studies;
- 5. Determination of population structure within each site as well as the connectivity between isolated and disjunct populations;
- 6. Assessment of the use of sparse, nonflowering patches of snow buckwheat for reproduction and larval growth;
- 7. Expansion of research on habitat restoration of Mormon Metalmark populations in the south Okanagan River valley, including methods to reduce stabilizing vegetation and increase host-plant resources.
- 8. Threat Clarification Research Requirements: Research is required to assess the potential threats to habitat from utility and transportation corridor expansion and maintenance, aggregate quarrying, invasive weeds, adjacent property management, and wild fire. Research is also required to assess potential threats from pesticide use and livestock impacts on all life stages.
- 9. Additional research to assess the potential impacts of predation, parasitism, climatic variation, small population size, and population isolation may also be needed.
- 10. Traditional Aboriginal knowledge is not available.

RECOVERY

Recovery Feasibility

Recovery is defined by Environment Canada as "the process by which the decline of an endangered, threatened or extirpated species is arrested or reversed, and threats removed or reduced to improve the likelihood of the species' persistence in the wild. A species will be considered *recovered* when its long-term persistence in the wild has been secured." For the Mormon Metalmark, the feasibility of recovery depends mainly on ensuring the survival of the existing populations and the elimination of threats.

Recovery of the Mormon Metalmark is technically and biologically feasible with low to moderate effort. An existing population is available to support recovery. A reasonable amount of habitat appears to be available based on biophysical mapping and preliminary field checking. Most known threats can be addressed through cooperative management agreements. Recovery does not depend on experimental techniques. Recovery will require population inventory, monitoring, research, and potentially reintroduction as well as habitat research, stewardship, management, and possibly restoration. The recovery criteria used to assess the technical and ecological feasibility for recovery of the Mormon Metalmark are listed in Table 1 and discussed in the following sections.

Recovery criteria	Mormon Metalmark
1. Are individuals capable of reproduction currently available to	Ves
improve the population growth rate or population abundance?	103
2. Is sufficient habitat available to support the species or could it be	Vas
made available through habitat management or restoration?	105
3. Can significant threats to the species or its habitat be avoided or	Vas
mitigated through recovery actions?	105
4. Do the necessary recovery techniques exist and are they known to	Vas
be effective?	105

Table 1. Recovery criteria used to assess the technical and ecological feasibility of recovery of the Mormon Metalmark.

- 1. **Species' inherent capability to reproduce:** We estimate that there are >2000 Mormon Metalmarks in British Columbia. This population has persisted for over 20 years within the existing habitat indicating that there are individuals capable of reproduction. Whether these individuals can repopulate habitats quickly (e.g., within 25 years, 50 years) is unknown. Little information exists on population structure, and reproductive capability of this species.
- 2. Current availability of quality habitat: The currently occupied sites appear to be capable of supporting the species for a minimum of 20 years, based on available data.
- 3. **Feasibility of removing or mitigating threats:** Removing or mitigating most threats to habitat through stewardship agreements appears possible, based on preliminary discussions with key land managers.
- 4. **Effective recovery techniques:** Stewardship agreements will be the main recovery technique used. Stewardship agreements are extensively used and can be effective. Reestablishment of a second population in the Okanagan valley must be assessed for feasibility.

Recovery Goal

To maintain a viable population of Mormon Metalmarks in secure¹ habitat within the species' historic range in the South Okanagan and Lower Similkameen valleys of British Columbia.

Rationale for the Recovery Goal and Objectives

As with many other rare butterfly species, we lack adequate information about the historical distribution of the Mormon Metalmark. There is no evidence to indicate that this species was ever abundant or widespread in British Columbia. Suitable information to quantify long-term population and habitat targets is not available.

Recovery should focus first on improving the probability of persistence in the wild, at occupied sites. Secondly, it is advisable, but may not be necessary for recovery, to restore the extirpated

¹ Secure habitat is Mormon Metalmark habitat (see "Habitat and biological needs") that is managed to maintain the species for a long term (>100 years). Habitat securement will require a stewardship approach that engages the voluntary cooperation of landowners and managers on various land tenures to protect this species and the habitat it relies on.

population in the Okanagan to maintain two separate populations within the historic range, if possible, to reduce risks of extirpation from catastrophic impacts to one population. However, it is not known whether historically occupied habitat in the Okanagan Valley is still functional or could be restored. Short-term objectives recommend clarification of this and other knowledge gaps. Species reintroductions may be considered in the future if suitable, secure habitat exists. Knowledge gaps will be addressed through the action plan for this species to clarify recovery goals in the future. It is necessary to maintain the species in the short term while knowledge gaps are addressed. An interim habitat securement target to maintain the species is presented in the objectives below. The objective of securing 13.5 ha is believed to be necessary to support the species in the short-term and achievable in the next 5 years, based on recovery team consensus in the absence of strong scientific support. Selected sites will generally be larger in area and population and will be spatially well connected. Targets are subject to change as more information becomes available.

Recovery Objectives (2008 to 2012)

- 1. Secure a minimum of 13.5 ha (90%) of the known, currently occupied habitat in the Similkameen area by 2012.
- 2. Develop and initiate a prioritized research program by 2009 and complete research by 2012 to address important knowledge gaps including population size and distribution, habitat requirements, dispersal capabilities and potential threats.
- 3. Determine the feasibility of re-establishing a viable population of Mormon Metalmarks in secure habitat in the Okanagan valley by 2011. If feasible, a reintroduction program will be included in a recovery action plan for the species by 2012.

Approaches Recommended to Meet Recovery Objectives

Broad strategies to implement recovery will include habitat securement through voluntary stewardship and acquisition, research, and public outreach (Table 2).

Recovery planning table

Objective	Broad approach/ strategy	Threat or concern addressed	Recommended approaches for to meet recovery objectives	Priority
			Prioritize occupied sites for habitat stewardship.	Urgent
1 Stewardship			Work with the B.C. Ministry of Transportation (MOT) to develop a stewardship agreement.	Urgent
	Habitat loss	Work with utilities to steward habitat on rights of way.	Urgent	
	Stewardship	rdship or degradation	Implement landowner contact and encourage stewardship at occupied sites on private land.	Urgent
			Work with municipal and regional governments to develop Best Management Practices or Guidelines (BMP) and incorporate	
			consideration of habitat stewardship into planning processes,	Urgent
			including zoning, development permits, pesticide use and	<u>U</u>
			ornamental landscaping of natural areas.	

Table 2. Strategies and approaches to achieve recovery objectives

Objective	Broad approach/ strategy	Threat or concern addressed	Recommended approaches for to meet recovery objectives	Priority
			Work with First Nations to identify and implement opportunities for cooperative habitat conservation projects both on and off reserves.	Urgent
			Develop a communication plan to identify target audiences and key messages to improve community-based conservation.	Beneficial
			Develop and begin implementation of a detailed research strategy including prioritized biological and ecological research needs, threat clarification, and identification of implementation partnerships.	Urgent
			Develop and begin implementation of an inventory and monitoring strategy.	Necessary
2, 3	Research	Knowledge	Assess potential habitat and habitat connectivity in the South Okanagan Valley in relation to potential re-introductions.	Necessary
, - ,		gaps	Assess potential re-introduction techniques, if Okanagan Valley habitat proves suitable.	Necessary after habitat is assessed
			Work with aboriginal groups to identify traditional knowledge of this species.	Necessary
			Continue to exchange information with Saskatchewan and Washington State and coordinate activities.	Beneficial

Performance Measures

- Have 13.5 ha of occupied habitat been protected by 2012?
- Has a prioritized research program been developed by 2009?
- Has habitat suitability and connectivity been assessed in the Okanagan Valley by 2011?
- Has re-introduction strategy been developed by 2012, if Okanagan habitat is determined to be suitable?
- Have key knowledge gaps been addressed by 2012?

Critical Habitat

Identification of the species' critical habitat

No critical habitat, as defined under the federal *Species at Risk Act* [S.2], is proposed for identification at this time. While much is known about the habitat needs of the Mormon Metalmark, more definitive work must be completed before any specific sites can be formally proposed as critical habitat. It is expected that critical habitat for the Mormon Metalmark will be identified to the extent possible in the action plan(s) as appropriate. A schedule of studies outlining the work necessary to identify critical habitat is found below.

Table 3. Schedule of studies		
Description of activity	Outcome	Timeline
Conduct research to quantify habitat	Quantification of habitat quality and quantity	2008 to 2012
requirements and use	requirements, dispersal distance, nectaring, egg-laying	
	and dispersal habitats, optimal patch size, and habitat	
	connectivity requirements.	
Inventory and monitor species distribution,	Clarification of population size, distribution, persistence,	2008 to 2012
abundance, occupied nabital, and potential	throats	
	uneats.	
Develop a population viability model	Identification of options for establishing a network of managed sites to support a viable population over a long term (>100 years).	2008 to 2012

Recommended schedule of studies to identify critical habitat

Existing and Recommended Approaches to Habitat Protection

None of the known, occupied sites are protected. Habitat ownership has not been accurately determined but appears to include land owned or managed by the Government of BC (primarily the B.C. Ministry of Transportation), Regional District Okanagan–Similkameen, utility companies, private land, and Indian Reserve land (BCMOE 2004).

Habitat protection for this species will require a stewardship approach that engages the voluntary cooperation of landowners and managers on various land tenures. This approach may include following best management practices or guidelines; land use designations on Crown lands; protection in federal, provincial, and local government protected areas; conservation agreements; covenants; eco-gifts; sale of private land for conservation by willing vendors; and other options.

The preamble to the federal *Species at Risk Act* (SARA) recognizes that "stewardship activities contributing to the conservation of wildlife species and their habitat should be supported" and that "all Canadians have a role to play in the conservation of wildlife in this country, including the prevention of wildlife species from becoming extirpated or extinct." In addition, the Bilateral Agreement on Species at Risk between British Columbia and Canada specifies that "stewardship by land and water owners and users is fundamental to preventing species from becoming at risk and in protecting and recovering species that are at risk" and that "cooperative, voluntary measures are the first approach to securing the protection and recovery of species at risk."

Effects on Other Species

Potential impacts on other species or ecological processes are not known. There are no known species at risk that significantly overlap with the specific habitat of the Mormon Metalmark, including both provincial and locally known species at risk. Impacts, if any, are expected to be positive through maintenance of ecological processes and habitat.

Socioeconomic Considerations

The Mormon Metalmark is used indirectly for research and viewing by professional and amateur BC lepidopterists. The small populations in British Columbia are important to these interest groups because they are the only nearby examples of this species in Canada. These populations are at the northern extent of the species' range, possibly possessing unique genetic material and behaviours that may be of academic interest. Information on the traditional importance of this species to aboriginal people is not available at this time.

The greatest challenge for recovery of the Southern Mountain population is our limited knowledge of its distribution and ecology. Other challenges include the potential for uncontrollable climatic impacts on the small and fragmented population and limited public awareness of this species. Potential conflicts may arise at specific sites relating to land development, adverse property management, and transportation and utility corridor maintenance. A proposed utility corridor expansion has the potential to impact most of the larger, known sites. The proposal is now delayed but, if it is reactivated, the proponent has worked through environmental assessment processes to identify options for mitigation and enhancement with the potential to protect these populations and increase the total available habitat.

Recovery of the Mormon Metalmark will contribute to biodiversity, health, and functioning of the environment and enhance opportunities for appreciation of special places and species, thereby contributing to the overall social value in the Southern Interior of British Columbia. The natural beauty of grassland–shrub-steppe ecosystems in the Southern Interior is an important resource for British Columbians that supports the tourism and recreation industries, providing value to the local economy. Recovery actions could affect the recreation, land development, utilities, and transportation sectors. The magnitude of these effects is expected to be low as the total known occupied area is approximately 15 ha.

Recommended Approach for Recovery Implementation

Successful recovery will depend on a combination of research investigations, stewardship activities including habitat protection and management, and long-term population monitoring. A single-species approach is currently recommended to recover the Mormon Metalmark. Habitats used by the Mormon Metalmark do not overlap greatly with other species at risk but coordination with recovery activities for the Threatened Behr's Hairstreak (*Satyrium behrii columbia*) butterfly, such as stewardship and public education, will save cost and time. Recovery will be accomplished through partnerships within the South Okanagan–Similkameen Conservation Program and through voluntary stewardship with specific landowners or managers.

Statement on Action Plans

One or more recovery action plans will be completed by 2012.

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