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

Prepared by the Southern Interior Invertebrates Recovery Team

BRITISH COLUMBIA
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Ministry of Environment

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>

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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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RESPONSIBLE JURISDICTIONS

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.

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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 and east to Shoemaker Creek. An apparently disjunct site is known at Olalla, 6 km north of 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).

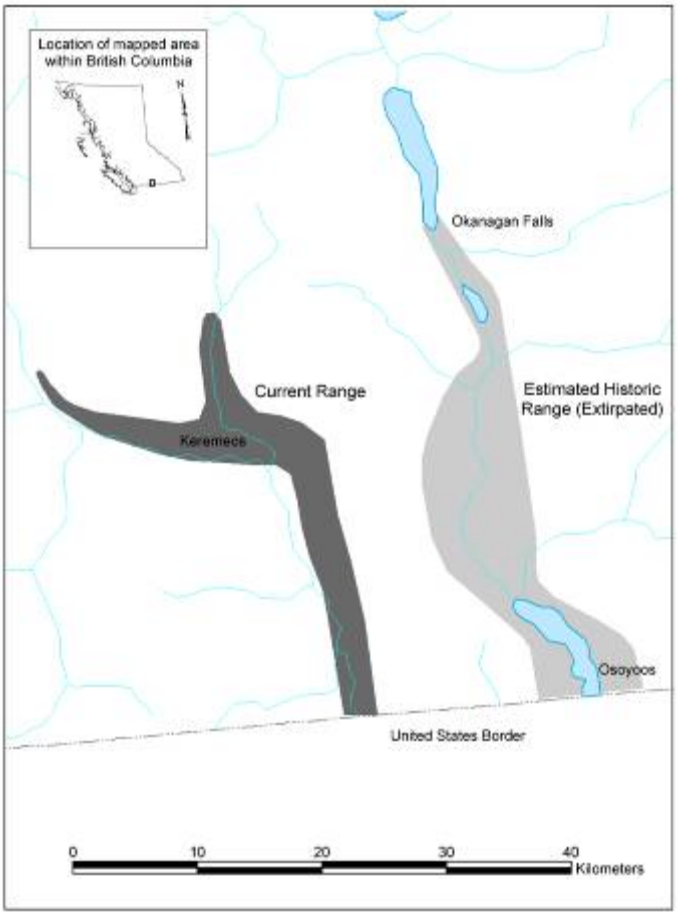

Figure 4. Range of the Mormon Metalmark within the Southern Mountain population.

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.

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

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

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. Re-establishment of a second population in the Okanagan valley must be assessed for feasibility.

Recovery Goal

To maintain a viable population of Mormon Metalmarks in secure[1] 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

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
1	Stewardship	Habitat loss or degradation	Prioritize occupied sites for habitat stewardship.	Urgent
			Work with the B.C. Ministry of Transportation (MOT) to develop a stewardship agreement.	Urgent
			Work with utilities to steward habitat on rights of way.	Urgent
			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, including zoning, development permits, pesticide use and ornamental landscaping of natural areas.	Urgent

Objective	Broad approach/ strategy	Threat or concern addressed	Recommended approaches for to meet recovery objectives	Priority
2, 3	Research	Knowledge gaps	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
			Assess potential habitat and habitat connectivity in the South Okanagan Valley in relation to potential re-introductions.	Necessary
			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.

Recommended schedule of studies to identify critical habitat

Table 3. Schedule of studies

Description of activity	Outcome	Timeline
Conduct research to quantify habitat requirements and use	Quantification of habitat quality and quantity requirements, dispersal distance, nectaring, egg-laying and dispersal habitats, optimal patch size, and habitat connectivity requirements.	2008 to 2012
Inventory and monitor species distribution, abundance, occupied habitat, and potential recovery habitat	Clarification of population size, distribution, persistence, movement barriers, land ownership, and site-specific threats.	2008 to 2012
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

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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