Fish & Wildlife Division

BIODIVERSITY AND SPECIES AT RISK SECTION

Conservation Overview of Butterflies in the Southern Headwaters at Risk Project (SHARP) Area

Alberta Species at Risk Report No. 80

Alberta
SUSTAINABLE RESOURCE DEVELOPMENT

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Norbert G. Kondla

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EXECUTIVE SUMMARY

An overview was conducted of the butterflies of the Southern Headwaters at Risk Project (SHARP) area in extreme southwestern Alberta. The project resulted in compilation of a preliminary bibliography and a table of species known from the study area as well as those that may yet be found in the study area. Distribution and general habitat association is presented within a natural regions mapping framework. Peak flight periods are provided in summary form to aid future field surveys for target species.

The SHARP area is the most productive area in the province in terms of butterfly species diversity, with 78 % of all known Alberta species known from this small corner of the province. The area is comparable to other butterfly diversity 'hotspots' in Canada in terms of the diversity of species. The area is also home to 9 species that are not known from any other area of Alberta and 31 species that are considered to be species at risk. The area is therefore highly significant both provincially and nationally.

Existing butterfly conservation status ranks were reviewed in light of established criteria and existing information. Those species deemed to be at risk are placed in three priority groups for further attention. Ecosystem management and management of areas with high diversity, coupled with focused attention to individual species at risk will most likely conserve the present butterfly diversity of the area.

A brief introduction to key variables important for butterfly habitat is provided and a strategic, decision-making paradigm for butterfly conservation is suggested. A number of specific recommendations for future initiatives on butterfly conservation are provided.

1.0 INTRODUCTION

This report provides an overview, from a conservation perspective, of butterflies in the Southern Headwaters at Risk Project (SHARP) area (Figure 1), situated in the extreme southwest corner of Alberta. Butterflies are among the few groups of invertebrate animals that are relatively well known in Alberta. But 'relatively well known' is exactly that, and the amount of information on butterfly distribution, ecology, taxonomy, habitat needs and conservation issues in the province pales in comparison to what we know about animal groups that have historically had more people engaged in their study, such as mammals and birds.

2.0 METHODS

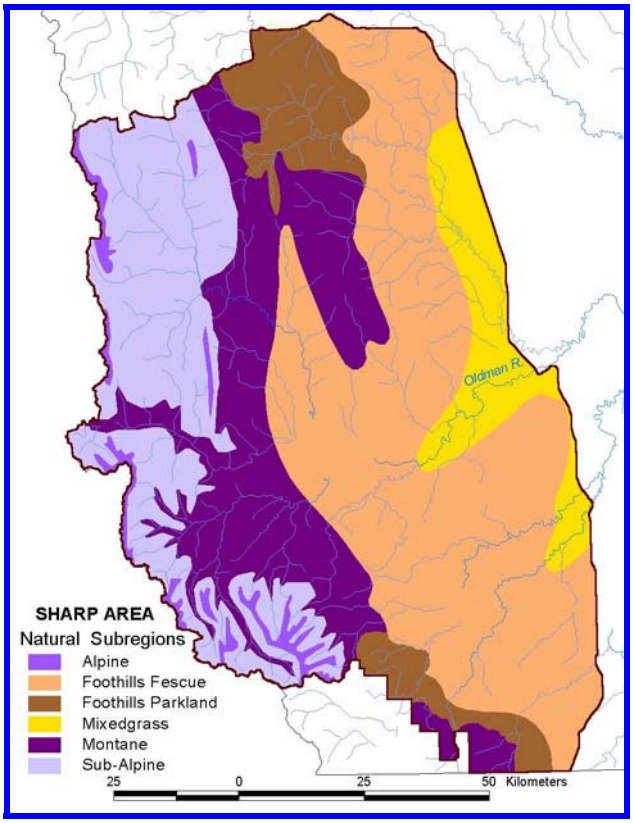
I primarily used Bird et al. (1995) and the page size distribution maps I created for that book plus extensive personal file information from field work in Alberta to develop a list of butterfly species for the SHARP area. I also consulted the periodical literature, reports and other relevant books in my personal library.

I used Bird et al. (1995) as the base for common and zoological names and updated the taxonomy and nomenclature in light of new information, both published and as yet unpublished.

I reviewed conservation status ranks provided by the Alberta Natural Heritage Information Centre (ANHIC), the Alberta government Species at Risk Program and the federal general status of species initiative on the respective web sites as of August 2003. There was no agreement between these sources on the most appropriate status ranks for a number of taxa so I invoked the precautionary principle and included in the Appendix the most conservative status ranks as developed by the Alberta Natural Heritage Information Centre. I subsequently examined these status ranks in relation to the official ranking criteria of the Nature Conservancy (quoted in the Appendix) and in relation to published information and file information.

In both the text and Appendix, I organized species alphabetically to make the material more 'user friendly' for non-specialists rather than using a taxonomic sequencing as is normally done in books and other faunal publications. A reasonably comprehensive bibliography of literature directly relevant to the SHARP area was compiled, although it is not complete. The scope of this project did not provide time to formally review the contents but the citations are provided herein as a base for future butterfly work in the area. Specific literature citations have essentially been avoided to enhance readability and due to the amount of time available to compile this overview.

Figure 1. Map of the SHARP area showing the natural regions used to describe general butterfly species distributions in the Appendix.



3.0 RESULTS

3.1 Study Area Species

To date I have been able to confirm the presence of 135 species of butterflies within the SHARP area. A summary table of confirmed and hypothetical species is presented in the Appendix.

The SHARP area is the 'biodiversity central' of the Alberta butterfly world. The number of butterfly species and subspecies reported as present in Alberta varies with the taxonomic preferences of the authors who write on this animal group. Our knowledge of butterfly distribution and taxonomy is not static and this is another source of variability in the names that we see in various books and lists. For the purposes of this project I recognize 174 species as having been reliably reported in Alberta. An amazing 78 % of these are known from the very small part of the province dealt with in this document and thus demonstrates that the SHARP area is highly significant from the perspective of butterflies in Alberta. The area also compares favorably with other areas of high butterfly species diversity in Canada and thus is also of national significance.

3.2 Butterflies of Conservation Concern

Due to the biogeographic history of the SHARP area and the historical evolution of political boundaries, the study area includes a substantial number of species ranked as being of conservation concern by the Alberta Natural Heritage Information Centre. Comments on these species follow. These comments should not be viewed as being critical of the rankings provided by Centre staff. They should be treated as information to prompt additional data collection and reconsideration of current status ranks to develop a more robust ranking of those butterflies most likely to be of conservation concern.

Aricia icarioides - Icarioides Blue

This species is currently ranked as S2S3 –Imperiled/Vulnerable but this should be reconsidered. This is a very abundant and widespread butterfly where lupines grow at a variety of elevations. In order to qualify for S2 ranking this species would have to be known from only 6 to 20 occurrences or have a total provincial population of between 1000 and 3000. I am aware of approximately 80 occurrences and anticipate that many more occurrences can be easily documented with some field work. By using a conservative figure of 250 individuals for a small lycaenid population and applying this to just the known occurrences, the provincial population is very conservatively estimated to be in excess of 20,000 individuals and thus a status rank of S4 – Apparently Secure appears to be more appropriate.

Aricia shasta - Shasta Blue

This species is currently ranked as S2 – Imperiled but this ranking should be reconsidered. The species is indeed locally distributed in specialized habitats but I am aware of more than 20 occurrences and a conservative population estimate for just the known occurrences is in excess of 6000, thus suggesting that a ranking of S3 –Vulnerable is more appropriate.

Boloria astarte - Astarte Fritillary

This species is currently ranked as S2 – Imperiled but this also should be reconsidered in light of existing information. I am aware of 32 occurrences and the resulting conservative population estimate is 8000. So using only known occurrences and the numerical criteria would result in S3 – Vulnerable as a more appropriate status rank. However, the species is not confined to known occurrences, is not rare or uncommon, and there are no factors that make it vulnerable to extinction so I do not consider it to be a species of conservation concern.

Boloria epithore - Western Meadow Fritillary

This species is currently ranked as S2 – Imperiled and I consider this to be a prudent interim status rank, based solely on the number of known occurrences until some field surveys are undertaken to provide more robust information for a review of the status rank. I do note however that a conservative population estimate for known occurrences is over 3000 individuals and that there are no known factors that make the species very vulnerable to extirpation.

Callophrys sheridani - Sheridan's Hairstreak

This species is currently ranked as S1 – Critically Imperiled and I view this as being a reasonable interim status rank on the basis of the number of known occurrences only.

Celastrina echo - Purple Azure

This species is currently ranked as S1 – Critically Imperiled and I agree with this as an interim status rank pending the results of field surveys.

Chlosyne gorgone - Gorgone Checkerspot

This species is currently ranked as S2 – Imperiled but this ranking is inconsistent with the number of known occurrences. Existing information supports a status rank of S3 – Vulnerable.

Colias alexandra - Alexandra Sulphur

This species is currently ranked as S2S3 – Imperiled/Vulnerable. However, there are more than 50 known occurrences over a substantial area of southern Alberta so a rank of S3 – Vulnerable appears to be more appropriate.

Deciduphagus mossii - Moss' Elfin

This species is currently ranked as S1 – Critically Imperiled. This is a prudent rank to assign to a species known from only two occurrences. The Whistler and Windsor Mtn. sites are treated as one occurrence herein, due to their proximity.

Epargyreus clarus - Silverspotted Skipper

This species is currently ranked as S2S3 – Imperiled/Vulnerable but the number of known occurrences (more than 30) only supports a rank of S3 – Vulnerable. The larval food plant this species utilizes does well on disturbed ground and there is nothing about the known biology of *Epargyreus clarus* that makes it very vulnerable to extirpation.

Erynnis afranius - Afranius Duskywing

The current rank of S3 – Vulnerable fits the ranking criteria on the basis of known occurrences; however it should be noted that there are significant taxonomic issues and identification challenges associated with this nominal species as treated in recent literature.

Euchloe olympia - Olympia Marble

The current rank of S2S3 – Imperiled/Vulnerable is not supported by existing information. The number of known occurrences supports a rank of S3 – Vulnerable. The species uses larval food plants in the mustard family and the largest population I have observed in southern Alberta was on a site that had been very heavily grazed by livestock.

Euphydryas gillettii - Gillett's Checkerspot

The current rank of S3 – Vulnerable is supported by the number of known occurrences. However, Alberta contains much of the global population of this species and it has a highly specialized biology in narrowly confined portions of the cordilleran landscape which renders the species susceptible to a number of threats from human activity and natural processes. The species in Alberta is known to use only one host plant (*Lonicera involucrata*) which occurs primarily in riparian zones and it requires nearby trees for mating and roosting. Egg laying requires host plants exposed to sunshine. The eggs are laid in clusters and thus a significant portion of potential population recruitment can be removed by a single bite from a browsing ungulate or domestic livestock. Consideration should be given to a status rank of S2 – Imperiled.

Glaucopsyche piasus daunia - Arrowhead Blue

This species is currently ranked as S2 – Imperiled. This ranking is supported by the known number of occurrences and the well-known phenomenon that although it feeds on lupines and is widely sympatric with the very common *P. icarioides*, it is most often seen in very small numbers in comparison to *P. icarioides*.

Hesperia nevada - Nevada Skipper

This species is currently ranked as S2S3 – Imperiled/Vulnerable but existing information on known occurrences only supports a status rank of S3 - Vulnerable.

Hesperia uncas - Uncas Skipper

This species is currently ranked as S2S3 – Imperiled/Vulnerable but existing information on the number of known occurrences only supports a status rank of S3 – Vulnerable.

Limenitis lorquini itelkae - Lorquin's Admiral

This species is currently ranked as S1S2 – Critically Imperiled/Imperiled but the number of known occurrences only supports a status rank of S2 – Imperiled.

Lycaena cuprea henryae - Lustrous Copper

This species is currently ranked as S2 – Imperiled but existing occurrence information only supports a status rank of S3 – Vulnerable. But it should be noted that the steep, high elevation rocky habitat of this species renders it immune from any plausible threat that would cause its extirpation in Alberta. The great majority of the habitat and distribution of this butterfly is within National Parks and other protected areas.

Lycaena dione - Dione Copper

This butterfly is currently ranked as S3 – Vulnerable. While this is compliant with the one criteria of number of known occurrences, the ranking provides a misleading perspective of the

conservation needs of this species. It is a widespread and common butterfly in southern Alberta and elsewhere. It has healthy populations in agricultural areas, including irrigated lands, and uses a larval food plant (*Rumex* spp.) that responds favorably to the land-disturbing activities of our culture. There is no apparent reason to consider this as being a species of conservation concern with a status rank the same as *Euphydryas gillettii*.

Lycaena hyllus - Bronze Copper

This species is currently ranked as S2 – Imperiled. This ranking is not supported by the number of known occurrences, which only supports a rank of S3 – Vulnerable. It should be noted however that this species is more widespread in Alberta than *L. dione*, which is currently ranked S3 and has substantial habitat similarity. I do not consider this species to be of conservation concern.

Lycaena mariposa penroseae - Mariposa Copper

Although the number of known occurrences support the current status rank of S3 - Vulnerable; this butterfly is in fact widespread and abundant in the province and uses larval host plants, *Vaccinium*, that often respond favorably to forest clearing. There are no plausible threats to this species.

Lycaena phlaeas arethusa - Little Copper

The current status rank of S2 – Imperiled is not supported by the number of known occurrences, which instead support a status rank of S3 – Vulnerable on the basis of that one criterion. The butterfly is widespread in the Alberta mountains and there are no threats that would plausibly lead to extirpation of the species.

Lycaena rubida sirius - Ruddy Copper

The number of known occurrences supports the current status rank of S2 – Imperiled.

Mitoura spinetorum - Thicket Hairstreak

This species is currently ranked as S1S2 – Critically Imperiled/Imperiled. The number of known occurrences supports a ranking of S1. An S1 ranking is further supported by the dependence of this butterfly on mistletoe (*Arceuthobium*) for its larval food plant. Mistletoe is routinely removed from the environment for forestry purposes so there is an on-going and real threat to the butterfly.

Neominois ridingsii minimus - Ridings' Satyr

The current status rank of S2 – Imperiled is not supported by the number of known occurrences which suggests that a rank of S3 – Vulnerable is appropriate.

Ochlodes sylvanoides - Woodland Skipper

The relatively few known occurrences support the current rank of S2 – Imperiled but this is a versatile species that appears to be expanding its Alberta distribution.

Papilio bairdii dodi - Baird's Swallowtail

The current status rank of S2S3 – Imperiled/Vulnerable is not supported by the number of known occurrences, but a rank of S3 – Vulnerable is consistent with the criterion of number of occurrences. The species uses a larval food that colonizes land disturbance and primarily occurs on steep, naturally eroding terrain with no plausible threats to its future existence.

Papilio eurymedon - Pale Swallowtail

The paucity of existing occurrences of this conspicuous species supports the current status rank of S2 – Imperiled.

Papilio multicaudatus pusillus - Two-tailed Swallowtail

The few known occurrences support the current status rank of S1 – Critically Imperiled.

Parnassius clodius - Clodius Parnassian

The current status rank of S1 – Critically Imperiled is consistent with known information.

Polites peckius - Peck's Skipper

The current status rank of S3S4 – Vulnerable/Apparently Secure should be reconsidered. Using the sole criterion of number of known occurrences results in a clear S3 – Vulnerable rank but application of other criteria would likely result in a rank of S4 – Apparently Secure.

Polygonia oreas threatfuli - Oreas Anglewing

The current status rank of S2 – Imperiled is not supported by the number of known occurrences, which do support a rank of S1 – Critically Imperiled

Pyrgus ruralis - Two-banded Checkered Skipper

The present status rank of S2S3 – Imperiled/Vulnerable is not supported by the number of known occurrences which point to an S2 – Imperiled Status, but it is likely that further field work will locate sufficient additional occurrences to support an S3 – Vulnerable rank in the future.

Satyrium sylvinum nootka - Sylvan Hairstreak

The present status rank of S1 – Critically Imperiled is consistent with the known number of occurrences.

Speyeria edwardsii - Edward's Fritillary

The present status rank of S3 – Vulnerable is consistent with the number of known occurrences. Unlike the other *Speyeria* species, *S. edwardsii* has not been encountered in large numbers in Alberta.

Speyeria egleis - Egleis Fritillary

The present status rank of S1 – Critically Imperiled is appropriate to the known information.

Lycaena heteronea - Blue Copper

An additional species that I could not find in the ANHIC listings that I consider to be of conservation concern is *Lycaena heteronea*. It has a far more restricted range than several species that are currently ranked as being of conservation concern and it occurs in habitats and areas subject to substantial human activity. A status rank of S2 – Imperiled for *Lycaena heteronea* is consistent with the number of known occurrences.

Pontia sisymbrii flavitincta - California White

Another taxon that is not included in current ANHIC listings is *Pontia sisymbrii flavitincta*. This is a different taxon from *Pontia sisymbrii beringiensis* which occurs in extreme northern Alberta and thus both are separate wildlife species under the federal Species at Risk Act. I know of only 14 sites for subspecies *flavitincta* in Alberta and thus it warrants a status rank of S2 – Imperiled.

4.0 DISCUSSION AND RECOMMENDATIONS

4.1 Butterfly Conservation

Butterfly conservation needs to be approached with the understanding that butterflies are insects and not birds or mammals. This apparently obvious statement needs to be remembered to avoid use of principles, practices and decision-making paradigms that are significant for birds or mammals but inappropriate for very small organisms that have high fecundity, a more complex life cycle and frequently more specialized habitat needs in comparison to the larger animals. Mortality levels and impacts on larger animals that are a serious concern should not necessarily be viewed with the same or even any concern with respect to small insects. In contrast, an amount of habitat alteration that would be insignificant for birds and mammals can easily extirpate an entire population of a butterfly species of conservation concern.

4.2 Important Species

Review of existing conservation status ranks, independent application of Nature Conservancy criteria, consideration of where human activity is most pervasive, and the biology of the organisms suggests that the following taxa are highest priority for attention: *Callophrys sheridanii*, *Celastrina echo*, *Deciduphagus mossii*, *Euphydryas gillettii*, *Mitoura spinetorum*, *Parnassius clodius, Polygonia oreas*, *Satyrium sylvinum*, *Speyeria egleis* in the mountains and

foothills. Prairie butterflies of highest priority for attention are *Chlosyne gorgone* and *Lycaena rubida*. Two species, *Colias alexandra* and *Glaucopsyche piasus*, occur in both the prairie and foothills area and are considered to be conservation priorities. Conservation status is not static and needs to be periodically reconsidered for all species as better information becomes available and land use intensity changes. My current assessment of conservation priorities from the species perspective is summarized in Table 1. This view from the species perspective should not be construed as reducing the importance of conserving areas with high species diversity and abundance even if they do not contain species currently recognized as being at risk.

The following species are known in Alberta only from the SHARP area and thus their fate will be completely determined by land use and management decisions within this area: *Celastrina echo*, *Deciduphagus mossii*, *Limenitis lorquini*, *Papilio eurymedon*, *Papilio rutulus*, *Parnassius clodius*, *Polygonia oreas*, *Satyrium fuliginosum* and *Satyrium sylvinum*.

Table 1. Relative butterfly species priorities for conservation action.

Priority 1	Priority 2	Priority 3
Callophrys sheridanii	*Chlosyne gorgone*	*Aricia shasta*
Celastrina echo	*Colias alexandra*	*Boloria epithore*
Deciduphagus mossii	*Glaucopsyche piasus*	*Epargyreus clarus*
Euphydryas gillettii	*Limenitis lorquini*	*Erynnis afranius*
Mitoura spinetorum	*Lycaena heteronea*	*Euchloe olympia*
Parnassius clodius	*Lycaena rubida*	*Hesperia nevada*
Polygonia oreas	*Papilio eurymedon*	*Hesperia uncas*
Satyrium fuliginosum	*Papilio multicaudatus*	*Neominois ridingsii*
Satyrium sylvinum	*Papilio rutulus*	*Ochlodes sylvanoides*
	Pontia sisymbrii flavitincta	*Pyrgus ruralis*
	Speyeria egleis	*Speyeria edwardsii*

4.3 Important Areas and Habitats

Important butterfly areas and habitats can be identified from more than one approach. Places that support populations of species at risk are certainly important from a conservation perspective. Known locations of the priority species should be examined to confirm that the species are still present there and to determine likely threats to their continued viability as well as conservation actions to mitigate or remove the threats.

Places that are known to support an exceptional diversity of butterfly species are also important from a conservation perspective. Both unpublished field observations and published studies show that butterfly species diversity is, at the landscape scale, correlated with topography, habitat diversity and the climatic consequences of elevation differences. The result is that warmer and lower elevation areas have higher species diversity while colder and higher elevations have lower diversity, other factors being equal. Increased topographic variety at the local and landscape scale is clearly correlated with species diversity. Those portions of the landscape that have higher topographic diversity (increased elevation relief and varied slope exposures) provide a greater variety of habitats and microhabitats that support a far larger diversity of butterfly

species than an equivalent area of flat ground. As an example, a flat area of prairie dominated by grass species with minimal inclusion of forbs will support only a fraction of the species diversity supported by a prairie valley with its variety of habitats from the valley crest to the willow stands on the point bar deposits. The same phenomenon is manifested in the mountains. An area of fire-succession lodgepole pine forest, without riparian or other habitat inclusions supports only a fraction of the butterfly diversity on a mountainside that has the conifer forest matrix interrupted by rock outcrops, dry to mesic grassy and herbaceous openings, stands of deciduous forest and riparian zones adjacent the streams.

Hilltops and ridge tops, which need not be particularly large or high, are valuable butterfly habitat for a number of species that use hilltops as part of their mate locating behavior or which depend on patches of larval food plants that do not compete well with native grasses, shrubs or forest. Old growth forests are not known to be an important habitat feature for the great majority of butterfly species at these latitudes. The majority of butterfly species in the SHARP area are dependent on early succession habitats and habitats without closed-canopy forest structure.

Wet and moist habitats, regardless of landscape position and surrounding matrix environment, are also critical to the survival of some butterfly species and contribute to the overall quality of habitat available to those species that are not purely dependent on such habitat patches.

Historical and current land use patterns in the SHARP area suggest that patches of natural or semi-natural habitat in the prairie/agricultural zone are especially important for conservation because such habitats are only a small fraction of what was available prior to agricultural settlement of the area. Land use changes are less dramatic in the foothills and mountains of the SHARP area and consequently there is less urgency in fostering management regimes that are supportive of biodiversity maintenance.

Two areas in the mountains are known to me as having significant butterfly diversity: the Plateau Mountain-Hailstone Pass area and the South Castle River valley associated with Windsor Mountain and Whistler Mountain. The former area may not be any more diverse or important than other areas with similar habitat diversity and the known diversity is likely a consequence of a long history of volunteer documentation in that area. The South Castle River area is more likely a ‘real’ area of significance due to the combination of representative and unique habitats available there.

Availability of larval food plants is the primary determinant of the presence or absence of butterfly species within a given area at the local or regional scale. The range of such food plants used by all species known from the study area is substantial. However there are some noteworthy groups of plants that need to be retained on the landscape in order to ensure the continued presence of the butterfly species that depend on them. Native and introduced mustards are important to a number of butterfly species. Legumes such as *Lupinus*, *Astragalus* and *Hedysarum* are also popular butterfly food plants. *Eriogonum* species are necessary for the presence of several butterfly species. Various grasses support a number of butterfly species, as do *Salix* and *Populus*. *Vaccinium* and *Aster* are necessary for others. Nectar sources for adults are an important habitat feature for most butterflies. These need not be native species. Introduced

alfalfa, clovers, dandelions and thistles are popular and important nectar sources for many butterfly species.

4.4 Knowledge Gaps

More than 99% of what is known about the butterflies of the SHARP area is the result of volunteer work by biologists and naturalists. This means that our existing information is opportunistic rather than the result of systematic and targeted data collection to define the distribution of particular species. No field work has been done to explore or define particular management issues and potential solutions. The egg, larval and pupal stages of most butterfly species are poorly known. Many lycaenid butterfly species are known to have variously facultative or obligate relationships with ants (myrmecophyly). The significance of these relationships in managing for the continued presence of particular species on a given piece of land is not known except that we can say with confidence that some butterfly species need ants as part of suitable habitat for their continued existence.

What we do not know far exceeds what we do know. However we will never have full scientific certainty nor will we ever have sufficient information to satisfy everyone that we know enough to make decisions about butterfly conservation. A full listing of knowledge gaps would be a large undertaking that would be of questionable priority as a call on scarce expertise and funding. Knowledge gaps should be filled on a priority basis driven by well-known conservation imperatives such as retention of species at risk and supportive management of representative ecosystems across the overall landscape. We do know enough to identify those species that are of conservation concern and thus should receive priority attention to address species-specific knowledge gaps. We also know enough to identify those ecosystems that have been most modified by human activity and thus should receive priority attention to address ecosystem-specific knowledge gaps.

4.5 Strategic Approach to Butterfly Conservation

Butterfly conservation in the SHARP area should proceed on both an opportunistic basis and through a systematic and strategic approach that applies limited resources on a priority basis. Specific opportunities should be seized as they become apparent but care should be taken to ensure that this does not detract from the development and implementation of a planned, strategic approach. The butterfly conservation agenda should not be driven by the interests or expertise of individual researchers or by the individual agendas of any interest group. A robust conservation agenda would however take advantage of other interests and agendas, or even conflicting interests, where they can contribute to the full conservation agenda. It is understood that conservation needs of butterflies will, on occasion, conflict with the conservation needs of other biodiversity elements and also with the needs and aspirations of human society. In those unavoidable situations the best that can be expected is that the decision makers will make their best effort to integrate legal requirements, the public interest, the interests of individual citizens and the interests of biodiversity conservation.

A decision-making paradigm is favored as the most efficient and effective strategic approach to butterfly conservation. This should proceed with recognition that there needs to be attention to

individual species and to ecosystems. The two approaches are not mutually exclusive. A combination of attention to the needs of individual species at risk and attention to ecosystem management is most likely to result in the conservation of present butterfly diversity in the SHARP area.

4.6 Specific Recommendations

A number of actions are recommended as 'the next steps' for butterfly conservation in the SHARP area:

- Compile available data on collections/observations of species listed in Table 1, in order of priority
- Determine if historically known sites of species listed in Table 1 are still occupied, in order of priority. Sites where the species are still extant should be examined with respect to site condition and possible threats to population persistence
- Produce management guidelines/impact mitigation guidelines for those species in Table 1 that are sufficiently well known to provide substantive guidance. *Euphydryas gillettii* is sufficiently well known in terms of its biology to be the logical first candidate for guideline development
- Undertake landowner/leaseholder/land manager contact to flag the known sites of species at risk and solicit the cooperation of the relevant decision makers in helping to conserve them
- Conduct field surveys to locate additional populations of species listed in Table 1. The results will allow reconsideration of current conservation status ranks and thus ensure that future work and scarce funding is clearly focused on those species most in need of attention. The results will also provide information to help define areas that are especially important for butterfly species that are not at risk and determine if hypothetical species are actually present in the SHARP area.
- Write a formal butterfly conservation plan that would elaborate on initiatives in a systematic manner and also provide preliminary cost estimates for implementation
- Consider allocation of a small fund to pay travel expenses and modest report preparation fees for volunteer work by biologists and naturalists to better define the full distribution and habitat relationships of species at risk and to help define areas with exceptional diversity or large populations of species that are not at risk. It is very unlikely that the necessary work will ever get done through total reliance on completely free volunteer work and fully paid work.
- Produce a brochure that provides guidance to landowners on what they can do to help conserve butterflies
- Review other wildlife and habitat management initiatives in relation to the needs of butterfly species at risk to ensure that management actions for other species do not accidentally contribute to the extirpation of butterfly species at risk
- Review other wildlife, habitat management and conservation initiatives to identify opportunities for integrating the needs of butterfly conservation
- Ensure that known sites of species at risk are registered in the interdepartmental referral system as a 'red flag' that a significant conservation issue is present on such lands
- Focus on practical actions for butterfly conservation and use literature reviews and research projects only as needed to support specified decisions. Information is necessary

but information will not conserve butterflies. However, informed decisions by people will make a difference and thus the conservation focus should remain on decisions and decision support.

5.0 BIBLIOGRAPHY AND LITERATURE CITED

Acorn, J. 1993. Butterflies of Alberta. Lone Pine Publishing, Edmonton and Vancouver. 143 pp.

Andriuk, C., H. White and G. White. 1980. 82H-2 Police Outpost Provincial Park. P. 89 in Spalding, D.A.(senior editor). A Nature Guide to Alberta. Provincial Museum of Alberta Pub. No. 5, 368 pp.

Austin, G.T. 1986. A review of the genus *Neominois*, with descriptions of three new subspecies. Bulletin of the Allyn Museum 107:1-27.

Beck, B., J. Beck, & N. Kondla, editors. 2002. Northern Rocky Mountain Region, pp. 13 –21 in A.B. Swengel & P.A. Opler. NABA Butterfly Counts. 2001 Report. North American Butterfly Association Inc., Morristown, NJ.

Bird, C.D. 1975. A calendar of the butterflies and skippers of the alpine area of Plateau Mountain. Alberta Naturalist 5:26-28.

Bird, C.D. and C.D. Ferris. 1979. Type locality of *Epidemia dorcas florus* (Lepidoptera: Lycaenidae). The Canadian Entomologist 111:637-639.

Bird, C.D., G.J. Hilchie, N.G. Kondla, E.M. Pike and F.A. Sperling. 1995. Alberta Butterflies. Provincial Museum of Alberta. 349 pp.

Bowman, K. 1951. An annotated list of the Lepidoptera of Alberta. *Canadian Journal of Zoology* 29:121-165.

Brown, F.M. 1955. Studies of Nearctic *Coenonympha tullia* (Rhopalocera, Satyridae), *Coenonympha tullia inornata* Edwards. Bulletin of the American Museum of Natural History 105:359-410.

Brown, F.M. 1971. The “Arrowhead Blue”, *Glaucopsyche piasus* Boisduval (Lycaenidae: Plebejinae). Journal of the Lepidopterists' Society 25:240-246.

Brower, L.P. 1959. Speciation in butterflies of the *Papilio glaucus* group - I. Morphological relationships and hybridization. Evolution 13:40-63.

Byers, J.R., B.T. Roth, R.D. Thomson and A.K. Topinka. 1984. Contamination of mustard and canola seed by frass of painted lady caterpillars, *Vanessa cardui* (Lepidoptera: Nymphalidae). The Canadian Entomologist 116:1431-1432.

Curtis, N.S. and C.D. Ferris. 1985. A review of *Colias meadii* W.H. Edwards with a description of a new subspecies from Idaho (Pieridae: Coliadinae). Bulletin of the Allyn Museum 91:1-9.

dos Passos, C.F. 1943. Some new subspecies of *Incisalia* from North America (Lepidoptera, Lycaenidae). American Museum Novitates No. 1230 5 p.

Ehrlich, P.R. 1955. The distribution and subspeciation of *Erebia epipsodea* Butler (Lepidoptera: Satyridae). University of Kansas Science Bulletin 37:175-194.

Emmel, T.C. 1969. Taxonomy, distribution and biology of the genus *Cercyonis* (Satyridae). I. Characteristics of the genus. Journal of the Lepidopterists' Society 23:165-175.

Ferris, C.D. 1972. Notes on certain species of *Colias* (Lepidoptera: Pieridae) found in Wyoming and associated regions. Bulletin of the Allyn Museum 5:1-23.

Ferris, C.D. 1974. Distribution of Arctic-Alpine *Lycaena phlaeas* L. (Lycaenidae) in North America with designation of a new subspecies. Bulletin of the Allyn Museum 18:1-13.

Ferris, C.D. 1976. A proposed revision of non-arctic *Parnassius phoebus* Fabricius in North America (Papilionidae). Journal of Research on the Lepidoptera 15:1-22.

Ferris, C.D. 1973. A revision of the *Colias alexandra* complex (Pieridae) aided by ultraviolet reflectance photography with designation of a new subspecies. Journal of the Lepidopterists' Society 27:57-73.

Ferris, C.D. 1976. Revisionary notes on *Plebejus* (*Icaricia*) *shasta* (Edwards). Bulletin of the Allyn Museum 36:1-16.

Ferris, C.D. 1977. Taxonomic revision of the species *dorcas* Kirby and *helloides* Boisduval in the genus *Epidemia* Scudder (Lycaenidae: Lycaeninae). Bulletin of the Allyn Museum 45:1-42.

Ferris, C.D. 1987. A revision of the North American *Salix*-feeding *Colias* species (Pieridae: Coliadinae). Bulletin of the Allyn Museum 112:1-25.

Ferris, C.D. 1988. Revision of several Leguminosae-feeding *Colias* species, with description of a new subspecies (Pieridae: Coliadinae). Bulletin of the Allyn Museum 116:1-28.

Ferris, C.D. 1988. Revision of the North American Ericaciae [sic]-feeding *Colias* species (Pieridae: Coliadinae). Bulletin of the Allyn Museum 122:1-34.

Ferris, C.D. and F.M. Brown. 1981. (Editors) Butterflies of the Rocky Mountain States. University of Oklahoma Press, Norman 442 p.

Ferris, C.D. and M.S. Fisher. 1973. *Callophrys* (*Incisalia*) *polios* (Lycaenidae): distribution in North America and description of a new subspecies. Journal of the Lepidopterists' Society 27:112-118.

Gautreau, E.J. and J.C.E. Melvin. 1974. Forest insects collected in Waterton National Park 1948-1971. Northern Forest Research Centre Report NOR-X-120 37 p.

Ferris, C.D. 1993. Reassessment of the *Colias alexandra* group, the legume feeding species, and preliminary cladistic analysis of the North American *Colias* (Pieridae: Coliadinae). Bulletin of the Allyn Museum 138:1-91.

Goodpasture, C. 1973. Biology and systematics of the *Plebejus* (*Icaricia*) *acmon* group (Lepidoptera: Lycaenidae). I. Review of the group. Journal of the Kansas Entomological Society 6:468-455.

Guppy, C.S. and J.H. Shepard. 2001. Butterflies of British Columbia. Royal BC Museum. 414 pp

Hovanitz, W. 1950. The biology of *Colias* butterflies. I. The distribution of the North American species. Wasmann Journal of Biology 8:49-75.

Hovanitz, W. 1950. The biology of *Colias* butterflies. II. Parallel geographical variation of dimorphic color phases in North American species. Wasmann Journal of Biology 8:197-219.

Hovanitz, W. 1962. The distribution of the species of the genus *Pieris* in North America. Journal of Research on the Lepidoptera 1:73-83.

Hovanitz, W. 1965. *Colias christina - alexandra* intergradation. Journal of Research on the Lepidoptera 4: cover illustration with caption.

Janz, L.J. 1990. A fortunate bit of collecting. News of the Lepidopterists' Society 1990 No. 2 p. 37.

Kohler, S. 1977. Revision of North American *Boloria selene* (Nymphalidae) with description of a new subspecies. Journal of the Lepidopterists' Society 31:243-268.

Kondla, N.G. 1980. 82G-1. Beauvais Lake Provincial Park. p. 95 in Spalding, D.A.(senior editor). A Nature Guide to Alberta. Provincial Museum of Alberta Pub. No. 5, 368 pp.

Kondla, N.G. 1993. The *Colias alexandra* complex in Alberta. Alberta Naturalist 23:57-61.

Kondla, N.G. 1995. Sulphur butterflies of the *Colias alexandra* complex in Alberta. Blue Jay 53:15-27.

Kondla, N.G. 1998. Alberta butterflies of conservation interest: an overview. Alberta Natural Heritage Information Centre. 15 pp plus maps

Kondla, N.G. 2001. Butterfly Conservation in Alberta. Paper presented at Annual Fish and Wildlife Management Division Conference, Alberta Environment. Medicine Hat, Alberta. 3-6 April 2001. 15 pp.

Kondla, N.G. 2001. Some noteworthy Alberta butterfly records. Alberta Naturalist 30:70-71.

Kondla, N.G. 2001. Clarification of and comments on northern *Speyeria hydaspe* subspecies (Lepidoptera:Nymphalidae). Taxonomic Report 3(1):1-5.

Kondla, N.G. 2003. Preliminary field survey for the Sooty Hairstreak (*Satyrium fuliginosum*) in Waterton Lakes National Park. Report for Parks Canada. 20 pp.

Kondla, N.G. and C.S. Guppy. 2002. Nomenclatural correctness of *Phyciodes pratensis* vs *Phyciodes pulchellus* (Lepidoptera: Nymphalidae). Journal of the Lepidopterists' Society 56:171-172.

Kondla, N.G. and C.S. Guppy. 2002. Name-bearing types and taxonomic synopsis of three Lycaenid butterfly taxa from western Canada (Lepidoptera: Lycaenidae). Taxonomic Report 3(6):1-11.

Kondla, N.G., C.S. Guppy and J.H. Shepard. 2000. Butterflies of conservation interest in Alberta, British Columbia, and Yukon. Pp. 95-100 in Darling, L.M. (ed.). Proceedings of a Conference on the Biology and Management of Species and Habitats at Risk. Volume 1. BC Ministry of Environment, Lands and Parks and University College of the Caribou. 490 pp

Layberry, R.A., P.W. Hall and J.D. Lafontaine. 1998. The Butterflies of Canada. University of Toronto Press. 280 pp & 32 plates.

Leech, H.B. 1946. Flights of *Nymphalis californica* Bdv. in British Columbia and Alberta in 1945. The Canadian Entomologist 77:203.

MacNeil, C.D. 1964. The skippers of the genus *Hesperia* in western North America with special reference to California (Lepidoptera: Hesperiidae). University of California Publications in Entomology 35 230 pp.

McDunnough, J.H. 1928. Notes on Canadian diurnal Lepidoptera. The Canadian Entomologist 60:266-275.

Moeck, A.H. 1957. Geographic variability in *Speyeria*. A 1975 reprint by Entomological Reprint Specialists of a paper presented to and sponsored by the Milwaukee Entomological Society 48 p.

Opler, P.A. 1968. Studies on Nearctic *Euchloe*. Part 5. Distribution. Journal of Research on the Lepidoptera 7:65-86.

Pinel, H.W. 1983. Skippers and butterflies of the Indian Grave Campground area, Alberta. Blue Jay 41:71-77.

Pinel, H.W. and N.G. Kondla. 1995. Butterflies and Skippers of Plateau Mountain, Alberta. Blue Jay 53:28-41.

Remington, C.L. 1968. Suture-zones of hybrid interaction between recently joined biotas. Evolutionary Biology 2:321-428.

Schmidt, B.C., D.A. Macaulay, N.G. Kondla, D. Lawrie and G. Anweiler. 2003. Additional butterfly records from Alberta, 1999-2002. Blue Jay 61:110-124.

Scott, J.A. 1978. The identity of the Rocky Mountain *Lycaena dorcas - helloides* complex (Lycaenidae). Journal of Research on the Lepidoptera 17:40-50.

Scott, J.A. 1984. A review of *Polygonia progne* (*oreas*) and *P. gracilis* (*zephyrus*) (Nymphalidae), including a new subspecies from the southern Rocky Mountains. Journal of Research on the Lepidoptera 23:197-210.

Scott, J.A. 1986. The Butterflies of North America: A Natural History and Field Guide. Stanford University Press, 583 pp.

Scott, J.A., N.G. Kondla and S.M. Spomer. 1998. *Speyeria hesperis and Speyeria atlantis* are distinct species. Papilio(New Series) 8:1-26.

Shields, O. and J.C. Montgomery. 1966. The distribution and bionomics of Arctic-Alpine *Lycaena phlaeas* subspecies in North America. Journal of Research on the Lepidoptera 5:231-242.

Sperling, F.A.H. 1986. Evolution of the *Papilio machaon* species group in western Canada. M.Sc. Thesis. University of Alberta. 285 pp.

Sperling, F.A.H. 1987. Evolution of the *Papilio machaon* species group in western Canada. Quaestiones Entomologicae 23:198-315.

Sperling, F.A.H. and N.G. Kondla. 1991. Alberta swallowtails and parnassians: natural history, keys and distribution. Blue Jay 49:183-192.

Thormin, T. 1980. 82G-2 Crowsnest Pass area. Pp.96-97 in Spalding, D.A.(senior editor). A Nature Guide to Alberta. Provincial Museum of Alberta Pub. No. 5, 368 pp.

Williams, E.H. 1988. Habitat and range of *Euphydryas gillettii*. Journal of the Lepidopterists' Society 42:37-45.

APPENDIX A

Status Rank Acronyms and Summary Table of Butterfly Species Known From the SHARP Area

The table consists of all butterfly species that I have been able to confirm as having been found within the study area. Taxonomic ranks are derived from pertinent published and unpublished information. For ease of reference I have provided in square brackets the zoological names used in Bird et al. (1995) where they differ from this more up to date listing. Zoological names are believed to be compliant with the International Code of Zoological Nomenclature. Common names are mostly compliant with Alberta Butterflies (Bird et al. 1995). Entries in the conservation concern column are derived from review of government status ranking processes and my own extensive experience with application of these same methodologies.

Specified status ranks are from the Alberta Natural Heritage Information Centre as found on their web site in August 2003. Status rank acronyms are defined as follows:

Source: **http://www.natureserve.org/explorer/nsranks.htm**

S1 - **Critically Imperiled**—Critically imperiled in the nation or subnation* because of extreme rarity or because of some factor(s) making it especially vulnerable to extirpation from the subnation. Typically 5 or fewer occurrences or very few remaining individuals (<1,000).
S2 - **Imperiled**—Imperiled in the nation or subnation* because of rarity or because of some factor(s) making it very vulnerable to extirpation from the nation or subnation. Typically 6 to 20 occurrences or few remaining individuals (1,000 to 3,000).
S3 - **Vulnerable**—Vulnerable in the nation or subnation* either because rare and uncommon, or found only in a restricted range (even if abundant at some locations), or because of other factors making it vulnerable to extirpation. Typically 21 to 100 occurrences or between 3,000 and 10,000 individuals.
S4 - **Apparently Secure**—Uncommon but not rare, and usually widespread in the nation or subnation*. Possible cause of long-term concern. Usually more than 100 occurrences and more than 10,000 individuals.
SH - **Possibly Extirpated** (Historical)—Element occurred historically in the nation or subnation*, and there is some expectation that it may be rediscovered. Its presence may not have been verified in the past 20 years. An element would become NH or SH without such a 20-year delay if the only known occurrences in a nation or subnation were destroyed or if it had been extensively and unsuccessfully looked for. Upon verification of an extant occurrence, NH or SH-ranked elements would typically receive an N1 or S1 rank. The NH or SH rank should be reserved for elements for which some effort has been made to relocate occurrences, rather than simply using this rank for all elements not known from verified extant occurrences.

The distribution/habitat column summarizes the known and inferred distribution both geographically and in terms of coarse habitat types. Geographic referencing is provided through use of the natural subregions classification available on the website of the Alberta Natural Heritage Information Centre. Coarse habitat types are deliberately general because the specific range of habitat types used by populations of most species is not known and for the purpose of

providing a non-technical description that is easily understood by non-specialists. The flight period column lists the normal peak flight period for the species in the study area such as we know it from available data. It is a generalization and peak flights can and do vary from one year to another in response to climatic variables. Those species which are widely distributed from low to higher elevations also have earlier peak flights at lower elevations and later peak flights at higher elevations.

Zoological Name	Common Name	Conservation Concern	Distribution/Habitat	Normal Peak Flight Period
Species Confirmed from the SHARP area				
Aglais milberti	Milbert's Tortoise Shell	No	All subregions and habitats	July-August
Agriades megalo [*Plebejus rusticus megalo*]	Mountain Blue	No	Drier non-forested habitats of the alpine, subalpine and montane subregions	July
Agriades rusticus [*Plebejus rusticus rusticus*]	Rustic Blue	No	Lower elevation dry, non-forested grassy areas of the montane, foothills parkland, foothills fescue and mixedgrass subregions	June
Amblyscirtes vialis	Roadside Skipper	No	Wide variety of habitats at lower elevations of the montane, foothills fescue, foothills parkland and mixedgrass subregions	June
Anthocharis stella [*Anthocharis sara stella*]	Stella Orange Tip	No	Open-canopy forest and forest openings in the subalpine and montane subregions	June
Aricia lupini [*Plebejus acmon*]	'Acmon' Blue	No	Locally distributed in drier non-forested areas at low to high elevations with *Eriogonum* present in the alpine, subalpine, montane, foothills parkland, foothills fescue and mixedgrass subregions	June-July
Aricia icarioides [*Plebejus icarioides*]	Icarioides Blue	S2S3	Widely distributed at low to high elevations where *Lupinus* is present in all subregions	June-July
Aricia saepiolus [*Plebejus saepiolus*]	Greenish Blue	No	Widespread from low to high elevations in all subregions although not resident in closed-canopy forests	June-July
Aricia shasta [*Plebejus shasta*]	Shasta Blue	S2	Locally distributed in azonal habitat patches of the subregions on sparsely vegetated slopes and hill tops or ridge tops	July

Zoological Name	Common Name	Conservation Concern	Distribution/Habitat	Normal Peak Flight Period
Boloria alberta	Alberta Fritillary	No	Present on scree slopes and rocky habitats of the alpine and subalpine subregions	July
Boloria astarte	Astarte Fritillary	S2	Present on scree slopes and rocky habitats of the alpine and subalpine subregions	July
Boloria bellona	Meadow Fritillary	No	Meadows and other forest openings of the subalpine and montane subregions and also moister habitats of the foothills parkland, foothills fescue and mixedgrass subregions	June + August
Boloria epithore	Western Meadow Fritillary	S2	Typically seen in forest openings of the subalpine and montane subregions	July
Boloria eunomia	Bog Fritillary	No	Locally distributed in fens and bogs of the montane and foothills parkland subregions; more widespread in moist habitats of the alpine and subalpine subregions	June-July
Boloria freija	Freija Fritillary	No	Widespread in forest openings and open-canopy forest of the subalpine and montane subregions; more local in the foothills parkland and foothills fescue subregions	May
Boloria frigga	Frigga Fritillary	No	Locally distributed in moist to wet willow habitats of the subalpine, montane and foothills parkland subregions	June
Boloria grandis [*Boloria chariclea*]	Purple Fritillary	No	Widespread in various habitats of the subalpine and montane subregions	July-August
Boloria myrina [*Boloria selene*]	Silver-bordered Fritillary	No	Locally distributed in moist areas and fens or bogs of the subalpine, montane, foothills parkland and foothills fescue subregions	June + August
Callophrys sheridanii	Sheridan's Hairstreak	S1	Locally distributed in meadows and other open habitats of montane and subalpine subregions supporting stands of *Eriogonum*	May

Zoological Name	Common Name	Conservation Concern	Distribution/Habitat	Normal Peak Flight Period
Carterocephalus palaemon	Arctic Skipper	No	Widespread in subalpine, montane, and foothills parkland subregions	June-July
Celastrina echo nigrescens [*Celastrina ladon nigrescens*]	Purple Azure	S1	Known only from Windsor Mtn. and Police Outpost Provincial Park.	May-June
Celastrina lucia [*Celastrina ladon lucia*]	Boreal Azure	No	Widespread in forested and shrubby habitats of subalpine, montane, foothills parkland subregions and riparian shrubbery of foothills fescue and mixedgrass subregions	May-June
Cercyonis oetus	Dark Wood Nymph	No	Widespread in grassy situations of all but alpine subregion	July-August
Cercyonis pegala ino	Common Wood Nymph	No	Widespread in grassy situations of all but alpine subregion; prefers moister habitat than previous species	July-August
Chlosyne damoetas altalus [*Chlosyne damoetas damoetas*]	Rockslide Checkerspot	No	The common name nicely describes the habitat of this butterfly in the alpine and subalpine subregions	July
Chlosyne gorgone	Gorgone Checkerspot	S2	Habitat preference really not known and very locally distributed in foothills fescue and mixedgrass subregions	June
Chlosyne palla	Northern Checkerspot	No	Widespread in subalpine and montane subregions	July
Coenonympha inornata benjamini	Inornate Ringlet	No	Widespread in grassy habitats, mostly at lower elevations in all but alpine subregion	June-mid July
Colias alexandra	Alexandra Sulphur	S2S3	Locally distributed in foothills fescue and mixedgrass subregions	Late May-mid June + late July-mid August

Zoological Name	Common Name	Conservation Concern	Distribution/Habitat	Normal Peak Flight Period
Colias christina	Christina Sulphur	No	Widely distributed in subalpine, montane, foothills parkland subregions and locally in foothill fescue and mixedgrass habitat	July-August
Colias eurytheme	Alfalfa Butterfly	No	A highly vagile non-resident that does breed in alfalfa fields in the summer and can show up in all subregions	July-August
Colias gigantea	Giant Sulphur	No	Locally distributed in willow fens of the subalpine, montane, parkland and mixedgrass subregions	Mid June-mid July
Colias interior	Pink-edged Sulphur	No	Widely distributed in forested areas with blueberries in the subalpine and montane subregions	Late July-August
Colias meadii elis	Mead's Sulphur	No	Widely distributed in the alpine, and subalpine subregions in forest openings and meadows	July-August
Colias nastes streckeri	Nastes Sulphur	No	Widely distributed in meadows, tundra and other open habitats of the alpine and subalpine subregions	July-August
Colias philodice	Clouded Sulphur	No	Widely distributed in numerous non-forested habitats in all subregions	July-August
Colias skinneri [*Colias pelidne skinneri*]	Skinner's Sulphur	No	Locally distributed in the subalpine suregion	July
Cupido amyntula albrighti [*Everes amyntula albrighti*]	Western Tailed Blue	No	Widely distributed in numerous habitats from low to high elevations of all but the alpine subregion	June-mid July
Deciduphagus augustinus	Brown Elfin	No	In areas with *Arctostaphylos uva-ursi* in the subalpine and montane subregions but distribution in SHARP area unstudied	May-June

Zoological Name	Common Name	Conservation Concern	Distribution/Habitat	Normal Peak Flight Period
Deciduphagus iroides [*Incisalia augustinus augustinus* in part]	Western Elfin	Unknown	Possibly widely distributed at lower elevations of subalpine and montane subregions but distribution unstudied due to taxonomic lumping with *D. augustinus*	May-June
Deciduphagus mossii	Moss' Elfin	S1	Known only from Windsor Mtn. and Prairie Bluff Mtn.	May-early June
Deciduphagus polios obscurus [*Incisalia polia obscura*]	Hoary Elfin	No	Widely distributed at low to moderate elevations where Arctostaphylos uva-ursi is present in subalpine and montane subregions	May-June
Epargyreus clarus	Silverspotted Skipper	S2S3	Locally distributed in shrubby/wooded habitats in riparian situations of mixedgrass and foothills fescue subregions	Early June-mid July
Erebia discoidalis	Red-disked Alpine	No	Widely distributed in open grassy habitats at lower elevations of the subalpine, montane and foothills parkland subregions	May-early June
Erebia epipsodea	Common Alpine	No	Widely distributed in grassy habitats of all subregions although not abundant in alpine subregion	June-July
Erynnis afranius	Afranius Duskywing	S3	Locally distributed in prairie grassland and riparian situations of mixedgrass subregion and possibly foothills fescue. Full distribution in Alberta poorly documented due to identification challenges in comparison to *E. persius*	May and August
Erynnis icelus	Dreamy Duskywing	No	Widely distributed in forested and shrubby habitats in all but alpine subregion	Mid May to early June

Zoological Name	Common Name	Conservation Concern	Distribution/Habitat	Normal Peak Flight Period
Erynnis persius	Persius Duskywing	No	Widely distributed in variety of habitats other than closed-canopy forest. All subregions except alpine but more localized in grassland subregions	Early June to early July
Euchloe ausonides	Large Marble	No	Widespread in open habitats of subalpine and montane subregions; more localized in foothills parkland, foothills fescue and mixedgrass subregions	Jun-July
Euchloe creusa	Northern Marble	No	Locally distributed in open areas of subalpine and montane subregions	June-July
Euchloe olympia	Olympia Marble	S2S3	A prairie butterfly in Alberta with one record from a mid-elevation grassland adjacent mountains near Prairie Bluff	Mid May to early June
Euphydryas anicia	Anicia Checkerspot	No	Widespread in non-forest habitats at low to high elevations in all subregions except mixedgrass	June and July
Euphydryas editha beani	Edith's Checkerspot	No	Locally distributed in alpine subregion and non-forested upper elevations of subalpine subregions	July
Euphydryas gillettii	Gillett's Checkerspot	S3	Locally distributed in riparian situations where *Lonicera involucrata* is present in the subalpine and montane subregions	Late June to mid July
Euptoieta claudia	Variegated Fritillary	No	Irregular migrant that can show up in various habitats of all subregions	summer
Glaucopsyche lygdamus	Silvery Blue	No	Widespread in numerous open habitats of all subregions although seldom seen in alpine subregion	May-July depending on elevation
Glaucopsyche piasus daunia	Arrowhead Blue	S2	Very localized at low to mid elevations where Lupinus grows in montane, foothills parkland and foothills fescue subregions	June

Zoological Name	Common Name	Conservation Concern	Distribution/Habitat	Normal Peak Flight Period
Hesperia assiniboia [*Hesperia comma assiniboia*]	Assiniboia Skipper	No	Widespread in dry grasslands at lower elevations in montane, foothills fescue and mixedgrass subregions	August
Hesperia manitoba [*Hesperia comma manitoba*]	Manitoba Skipper	No	Widespread at low to high elevations in open and lightly forested areas of subalpine and montane subregions	July
Hesperia nevada	Nevada Skipper	S2S3	Locally distributed in low to mid elevation grasslands of subalpine and montane subregions. Distribution poorly known in foothills fescue and mixedgrass subregions.	June
Hesperia uncas	Uncas Skipper	S2S3	Locally distributed in mixedgrass, foothills fescue and montane subregions	June
Incisalia eryphon	Western Pine Elfin	No	Widely distributed at low to moderate elevations of montane and subalpine subregions	Late May-mid June
Limenitis archippus	Viceroy	No	Not well known in the SHARP area but likely locally distributed in riparian areas of mixedgrass, foothills fescue and montane subregions	July
Limenitis arthemis rubrofasciata	White Admiral	No	Widely distributed in subalpine, montane and foothills parkland subregions; more locally distributed in riparian situations of foothills fescue and mixedgrass subregion; absent from alpine subregion except as a vagrant	July
Limenitis lorquini itelkae [*Limenitis lorquini burrisoni*]	Lorquin's Admiral	S1S2	Locally distributed in riparian situations at low to moderate elevations of subalpine and montane subregions	July
Lycaena cuprea henryae	Lustrous Copper	S2	Widely distributed in high elevation rocky habitats of alpine and subalpine subregions	July-early August
Lycaena dione	Dione Copper	S3	Associated with a variety of wet to dry habitats where *Rumex* is present	July

Zoological Name	Common Name	Conservation Concern	Distribution/Habitat	Normal Peak Flight Period
Lycaena florus [*Lycaena dorcas florus*]	Florus Copper	Unknown	Locally distributed in moist to mesic meadows of subalpine, montane and foothills fescue subregions	July-early August
Lycaena helloides	Purplish Copper	No	Widely distributed in moist and weedy habitats at lower elevations in all subregions except alpine	May-June and August-early September
Lycaena heteronea	Blue Copper	Unknown	Locally distributed in association with *Eriogonum* at low to high elevations in montane and subalpine subregions	July-early August
Lycaena hyllus	Bronze Copper	S2	Locally distributed in wet to moist areas with Rumex present. Distribution in SHARP area poorly known	July
Lycaena mariposa penroseae	Mariposa Copper	S3	Widely distributed in coniferous forest with Vaccinium of subalpine and montane subregions	July
Lycaena phlaeas arethusa	Little Copper	S2	Widely distributed in higher elevation open areas of subalpine subregion and also alpine subregion	July-early August
Lycaena rubida sirius	Ruddy Copper	S2	Dry prairie habitats, often in association with riparian situations. Localized distribution and poorly documented	July
Mitoura spinetorum	Thicket Hairstreak	S1S2	Locally distributed in forests with *Arceuthobium*. Poorly documented and difficult to document due to cryptic behaviour	June
Neominois ridingsii minimus	Ridings' Satyr	S2	Locally distributed in dry grassland situations of mixedgrass, foothills fescue and montane subregions. One record from alpine subregion	June
Nymphalis antiopa	Mourning Cloak	No	Widely distributed where deciduous trees and shrubs are present in all subregions except alpine.	April-June and August-September

Zoological Name	Common Name	Conservation Concern	Distribution/Habitat	Normal Peak Flight Period
Nymphalis californica	California Tortoise Shell	No	Rare vagrant that can show up in any habitat and subregion	No clear flight period
Oarisma garita	Garita Skipper	No	Widespread in moister grassland sites of all subregions except alpine	Mid June-early July
Ochlodes sylvanoides	Woodland Skipper	S2	Locally distributed in grassy sites of subalpine, montane and foothills fescue subregions	August
Oeneis alaskensis chermocki [*Oeneis jutta chermocki*]	Alaskan Arctic	No	Locally distributed in fens and moist forest near openings at low to high elevations	June-mid July
Oeneis alberta alberta	Alberta Arctic	No	Locally distributed in grassland habitats of montane and foothills fescue subregions	May
Oeneis chryxus chryxus	Chryxus Arctic	No	Widely distributed in open forest and forest openings at low to high elevations of subalpine and montane subregions	June-July
Oeneis beanii [*Oeneis melissa beanii*]	Bean's Arctic	No	Locally distributed in alpine subregion and higher elevation rocky sites of subalpine subregion	July
Oeneis uhleri	Uhler's Arctic	No	Widely distributed in grassy habitats of all subregions including semi-alpine sites.	June
Papilio bairdii [*Papilio machaon dodi*]	Baird's Swallowtail	S2S3	Locally distributed in association with *Artemisia dracunculus* along eroding slopes of stream valleys of foothills fescue and mixedgrass subregions	June
Papilio canadensis	Canadian Tiger Swallowtail	No	Widely distributed where deciduous trees are present in all subregions except alpine	June
Papilio eurymedon	Pale Swallowtail	S2	Locally distributed in montane and subalpine subregions	July

Zoological Name	Common Name	Conservation Concern	Distribution/Habitat	Normal Peak Flight Period
Papilio multicaudatus pusillus	Two-tailed Swallowtail	S1	Known only from Waterton Lakes NP in this study area	July
Papilio rutulus	Western Tiger Swallowtail	Unknown	Distribution not known; only recently confirmed as present in Alberta from the South Castle River and West Castle River areas. Possibly more widespread in deciduous shrubbery and forest of the montane subregion	July
Papilio zelicaon	Anise Swallowtail	No	Widespread in many habitats of all subregions including presence of hilltopping males in the alpine subregion.	June-July
Parnassius clodius	Clodius Parnassian	S1	Known only from two specimens collected in Waterton Lakes National Park many years ago.	Mid July-mid August
Parnassius smintheus	Smintheus Parnassian	No	Widespread in non-forested habitats with Sedum present at all elevations in the alpine, subalpine, montane subregions	July
Phyciodes batesii	Tawny Crescent	No	Known only from a few records in riparian situations of the montane, foothills fescue and mixedgrass subregions	June
Phyciodes cocyta	Northern Pearl Crescent	No	Widespread in many shrubby, forested and grassland environments where Aster species grow in the subalpine, montane, foothills parkland, foothills fescue and mixedgrass subregions	July
Phyciodes pulchellus owimba	Field Crescent	No	Widespread in a variety of habitats of the subalpine and montane subregions	July-early August
Pieris marginalis	Margined White	No	Locally distributed in forested habitats of subalpine and montane subregions	June + August

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Pieris oleracea	Mustard White	?	Known from only one historical collection at Hillcrest; may be more widely distributed	June + August
Pieris rapae	Cabbage Butterfly	No	A widespread 'weedy' species that can be seen in almost any habitat of all subregions.	Multiple broods through warm season
Plebejus melissa [*Lycaeides melissa*]	Melissa Blue	No	Widespread in lower elevation grassland habitats but also ascending to higher elevations along the front range in the Prairie Bluff area. Distribution in subregions poorly known due to unreliable identifications associated with historical records	Late May-June and also abundant in some locations in July and also late August
Plebejus scudderii [*Lycaeides idas*]	Northern Blue	No	Widespread in various open and forested habitats of subalpine and montane subregions	July-mid August
Polites draco	Draco Skipper	No	Locally distributed in foret openings and open forest of subalpine, montane and foothills parkland subregions	July
Polites mystic	Long Dash Skipper	No	Widely distributed in mesic grassy habitats of all except alpine subregion	Mid June-mid July
Polites peckius	Peck's Skipper	S3S4	Locally distributed in mesic to moist grassy habitat patches. Distribution poorly known	July
Polites themistocles	Tawny-edged Skipper	No	Locally distributed in mesic to moist grassy habitat patches. Distribution poorly known	July
Polygonia faunus	Green Comma	No	Widespread in forested habitats of the subalpine and montane subregions	Early spring and late summer
Polygonia gracilis	Hoary Comma	No	Widespread in forested habitats of the subalpine and montane subregions	Early spring and late summer

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Polygonia l-album [*Nymphalis vaualbum*]	Compton's Tortoise Shell	No	Only a few known records from subalpine and montane subregions	Early spring and late summer
Polygonia oreas threatfuli [*Polygonia oreas silenus*]	Oreas Anglewing	S2	Known from only a few records in forested habitats north of Waterton Lakes National Park in subalpine and montane subregions	Early spring and late summer
Polygonia progne	Gray Comma	No	Known from only two locations in the southern montane subregion and riparian habitat of the mixedgrass subregion near Fort Macleod	Early spring and late summer
Polygonia satyrus	Satyr Anglewing	No	Widespread in forested habitats of the subalpine and montane subregions	Early spring and late summer
Pontia occidentalis	Western White	No	Widespread in all subregions and can be seen in most habitats except dense forests.	Throughout warm season
Pontia sisymbrii flavitincta	California White	No	Known only from few records in the West Castle,South Castle and Crowsnest Pass areas in subalpine and montane subregions.	May- early June
Pyrgus centaureae	Grizzled Skipper	No	Most often encountered at higher elevations in alpine and montane subregions but can also turn up at lower elevations. Habitat needs are poorly known.	July-early August
Pyrgus ruralis	Two-banded Checkered Skipper	S2S3	Locally distributed in lower elevation forest openings of montane and subalpine subregions	May-June
Satyrium fuliginosum semiluna	Sooty Hairstreak	SH	Known only from one population in Waterton Lakes National Park	July

Zoological Name	Common Name	Conservation Concern	Distribution/Habitat	Normal Peak Flight Period
Satyrium sylvinum nootka	Sylvan Hairstreak	S1	Only recently confirmed as being present in Alberta. Known from West Castle, Beaver Mines and Victoria Mtn. in subalpine and montane subregions.	July
Satyrium titus immaculosus	Coral Hairstreak	No	Widespread at lower elevations where *Amelanchier* is present in all subregions except alpine	July
Speyeria aphrodite	Aphrodite Fritillary	No	Locally distributed in non-forest and open forest habitats at lower elevations of all but alpine subregion	Late July-mid August
Speyeria atlantis hollandi	Atlantis Fritillary	No	Widely distributed in moist meadows, willow fens, and mesic forests of subalpine, montane and foothills parkland subregions	Late June-July
Speyeria callippe ssp *calgariana* and ssp *semivirida*	Callippe Fritillary	No	Ssp semivirida present in and near Crowsnest pass in montane subregion; ssp callippe more widespread in subalpine, montane, foothills parkland, foothills fescue and mixedgrass subregions	June-July
Speyeria edwardsii	Edwards' Fritillary	S3	Locally distributed and habitat poorly known in subalpine and montane subregions; likely also present in other subregions except alpine	July
Speyeria egleis	Egleis Fritillary	S1	Only recently reported from Alberta from near Pincher Creek. Habitat and distribution not known	July
Speyeria hesperis beani	Northwestern Fritillary	No	Widely distributed in shrubby and forested habitat types of subalpine, montane and foothills fescue subregions; more locally distributed in mixedgrass subregion	July
Speyeria hydaspe rhodope [*Speyeria hydaspe sakuntala*]	Hydaspe Fritillary	No	Widespread in forested habitats of subalpine and montane subregions	July

Zoological Name	Common Name	Conservation Concern	Distribution/Habitat	Normal Peak Flight Period
Speyeria leto [*Speyeria cybele leto*]	Leto Fritillary	Unknown	Locally distributed in shrubby and forested habitats of subalpine, montane, foothills parkland subregion. Locally present in riparian habitat patches of foothills fescue subregion	July
Speyeria mormonia eurynome	Mormon Fritillary	No	Widespread in variety of habitats in all subregions	July-August
Speyeria zerene garretti	Zerene Fritillary	No	Widespread in variety of habitats in all subregions	July-August
Strymon melinus	Gray Hairstreak	No	A widespread and weedy species in North America but only known from two locations in study area in subalpine and montane subregion	Insufficient data
Thorybes pylades	Northern Cloudywing	No	Locally distributed in shrubby and open forested habitats at low to mid elevations of subalpine and montane subregions	ejun-ejul
Thymelicus lineola	European Skipper	No	An introduced weedy species only recently found in the study area near Tent Mtn.	July
Vanessa annabella	West Coast Lady	No	An infrequent migrant that has shown up in the subalpine and montane subregions	No clear pattern
Vanessa atalanta	Red Admiral	No	Few historical records but can show up in all habitats of all subregions	No clear pattern
Vanessa cardui	Painted Lady	No	An irregular migrant that can establish large breeding populations and can be seen in all habitats of all subregions	July-August
Hypothetical Species				
Anatrytone logan	Delaware Skipper	S2	May be found in riparian habitats of the prairie portion of the study area	July
Amblyscirtes oslari	Oslar's Roadside Skipper	S1	May be found in grassy areas of stream valleys in the prairie portion of the study area	Late May-mid June

Zoological Name	Common Name	Conservation Concern	Distribution/Habitat	Normal Peak Flight Period
Callophrys affinis	Immaculate Hairstreak	?	Potential addition to the provincial fauna, may be found in open habitats of the foothills and lower elvation mountain area with *Eriogonum*	June
Danaus plexippus	Monarch	No	Could show up in most habitats as an irregular migrant	No peak
Erynnis pacuvius	Pacuvius Duskywing	?	Possible addition to the provincial fauna that should be searched for where *Ceanothus velutinous* is present.	June
Euphilotes battoides	Square-spotted Blue	?	Potential addition to the provincial fauna, most likely to be found in low to moderate elevation areas in the extreme southwest cordillera with *Eriogonum*	July
Euphilotes ancilla	Dotted Blue	S2	May be found in association with *Eriogonum* on hillsides and valley sides of the prairie portion of the study area	June
Lycaena editha	Edith's Copper	?	Known from one historical record north of the study area and also occurs to the south of the study area	July
Mitoura barryi	Barry's Hairstreak	?	Potential addition to the provincial fauna. Most likely to be found in association with *Juniperus scopulorum* in the Crowsnest Pass	June
Neophasia menapia	Pine White	SH	May be found in warm and dry low elevation forests, especially with pine.	August
Phyciodes tharos	Pearl Crescent	No	Likely to be found in the prairie portion of the study area, in grassy and shrubby habitats with *Aster*	May-June and August
Pontia protodice	Checkered White	No	Likely to be found as an irregular migrant in the prairie portion of the study area	July-September

Zoological Name	Common Name	Conservation Concern	Distribution/Habitat	Normal Peak Flight Period
Satyrium acadicum	Acadian Hairstreak	S2	May be present in riparian willows associated with the larger streams of the prairie portion of the study area	July
Satyrium liparops	Striped Hairstreak	No	May be present in shrubby habitat patches on the prairie portion of the study area	July
Satyrium saepium	Hedgerow Hairstreak	?	A potential addition to the provincial fauna in low elevation cordilleran areas with *Ceanothus*	July