AN OVERVIEW OF BUTTERFLIES AND SKIPPERS IN THE MOUNTAIN, PARKLAND AND BOREAL NATIONAL PARKS OF ALBERTA AND BRITISH COLUMBIA

Satyrium titus in Waterton Lakes National Park

Prepared for
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Parks Canada Agency
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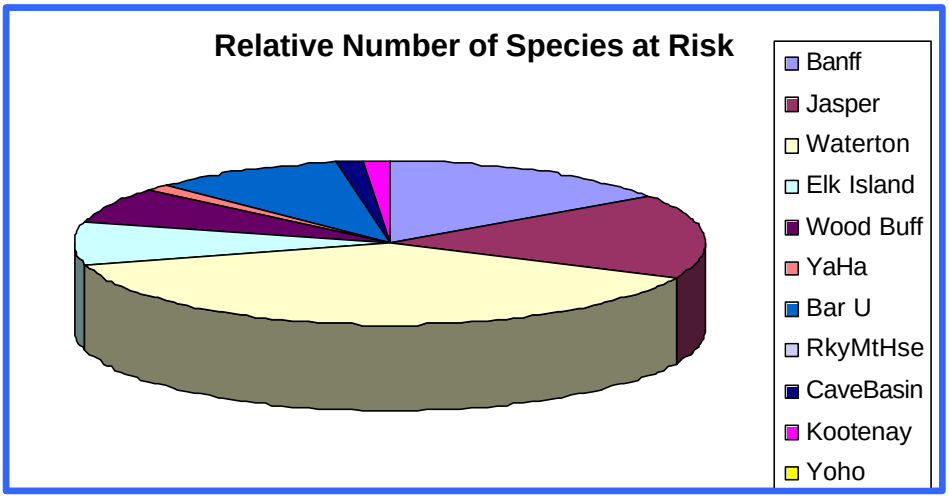
Executive Summary

A large volume of existing information on butterflies was examined to extract information pertinent to the administrative units listed in the chart below. A total of 184 taxa are projected or confirmed for these areas. The largest amount of data and documentation is for Waterton and Banff National Parks. Priority species for further work are the 44 taxa currently holding conservation status ranks of S1 to S3.

Species lists for individual administrative units are provided, along with databases of transcribed specimen information. A robust bibliography of pertinent literature is also presented. A series of recommendations are presented for consideration in moving forward from this compilation of existing information.



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Introduction

This report was commissioned by David Poll, Species at Risk Coordinator for Western Canada Service Centre of Parks Canada Agency. The overall project purpose is to assemble and consolidate readily available information on butterflies and skippers for the following areas administered by the agency:

- Banff National Park
- Jasper National Park
- Kootenay National Park
- Yoho National Park
- Waterton Lakes National Park
- Wood Buffalo National Park
- Elk Island National Park
- Bar U Ranch National Historic Site
- Rocky Mountain House National Historic Site
- Cave and Basin National Historic Site
- Ya Ha Tinda Ranch.

The project is further intended to emphasize species at risk and lay the foundation for further consideration of management and conservation of this taxonomic group of animals in the said geographic areas. The taxonomic boundaries are defined by the insect families Hesperiidae, Papilionidae, Pieridae, Lycaenidae, and Nymphalidae of the order Lepidoptera. These families are commonly referred to as the butterflies and skippers, with the skippers being confined to the family Hesperiidae.

Methods

I conducted bounding box searches for park areas with the Canadian Biodiversity Information Facility to identify specific butterfly records from the collections of participating institutions and individuals. More detailed information was provided by several institutions that had more detailed data in digital format. Requests for sight and specimen data was also solicited on two western Canada Lepidoptera email discussion groups. I also used digital and hard copy data previously in my files.

Reports and published literature in my personal research library were examined for pertinent historical information. This material consists of more than 1000 reprints, journals, photocopies of journal articles, reports and books. It is more up to date and comprehensive than institutional library holdings and far more efficient to search because it is in one convenient physical location.

I accessed conservation status ranks available on the world wide web as of 15 January 2004 from the website of the British Columbia Conservation Data Centre

and also examined Guppy et al. (1994) and Guppy and Kondla (2000). Alberta status ranks were taken from a list provided by Wayne Nordstrom of the Alberta Natural Heritage Information Centre. Ranks were reviewed from the perspective of established criteria, extensive conservation status ranking experience and the most recent available information, and changed where deemed to be technically appropriate. Updated recommended status ranks from Kondla (2004) were used for included Alberta taxa.

Full lists of species and subspecies were compiled, that have been both reported as being present in the park lands and which may be found in the park lands when focused searches are done. This used all available published and unpublished information as well as expert judgment gained from 32 years of butterfly study in western Canada. The presence or inferred presence of suitable habitat within a reasonable distance of known occurrences was a major criterion in identifying taxa likely to be present but not yet documented as such.

Butterfly taxonomy continues to be under active review and research. It is also entirely open to the taxonomic concepts and information available to individual researchers. For western Canada, there is no single listing of butterfly names that is both completely up to date and agreeable to all butterfly researchers. It would be very unusual to see any two books or lists using exactly the same taxonomic interpretations and resulting names. I have selected taxonomic interpretations and resulting name solutions (as governed by the International Code of Zoological Nomenclature) that are largely similar to the interpretations of other recent authors but which differ in some cases from the already variable interpretations used in recent books. All differing interpretations are supported by published literature and review of pertinent study specimens. Additional changes will be proposed to commonly used contemporary interpretations as a result of work underway but these are not used in this report. Table 1 lists the names I use in this report and databases along with equivalents used in recent Canadian books, in those cases where there is a difference. I list species in alphabetical order in this report, rather than the traditional inferred taxonomic order that is commonly used in butterfly books and technical articles. Taxonomic order is essentially meaningless for non-specialists and it is far more practical for report users to locate species entries in alphabetical order. Nomenclature strictly follows the International Code of Zoological Nomenclature, including the gender congruence provisions which some recent authors have chosen to disregard.

Table 1. Butterfly names used in this report and their equivalents per Bird et al. (1995), Guppy and Shepard (2001) or Layberry et al. (1998).

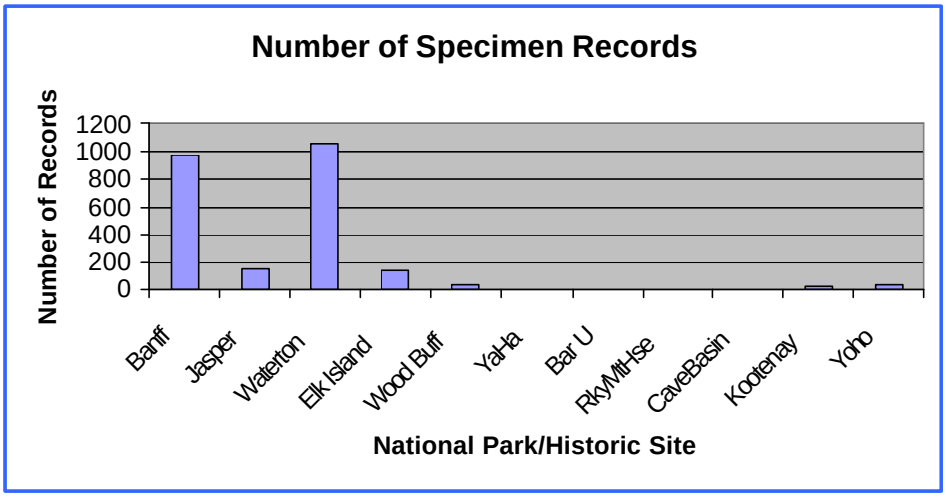
Names used in this report	Equivalents from some recent books
Aglais milberti	*Nymphalis milberti*
Agriades megalo	*Agriades glandon in part*
Agriades rusticus	*Agriades glandon in part*
Albulina optilete	*Vacciniina optilete*
Aricia icarioides	*Icaricia icarioides*
Aricia lupini	*Icaricia acmon*
Aricia saepiolus	*Plebejus saepiolus, Plebeius saepiolus*
Boloria alaskensis	*Boloria napaea*
Boloria alberta	*Clossiana alberta*
Boloria astarte	*Clossiana tritonia*
Boloria bellona	*Clossiana bellona*
Boloria epithore	*Clossiana epithore*
Boloria eunomia	*Clossiana eunomia*
Boloria freija	*Clossiana freija*
Boloria frigga	*Clossiana frigga*
Boloria grandis	*Clossiana chariclea in part*
Boloria improba	*Clossiana improba*
Celastrina echo	*Celastrina ladon in part*
Celastrina lucia	*Celastrina ladon in part*
Chlosyne damoetas	*Charydryas damoetas, Charidryas whitneyi*
Chlosyne gorgone	*Charydryas gorgone*
Chlosyne palla	*Charydryas palla*
Coenonympha california	*Coenonympha tullia in part*
Coenonympha inornata	*Coenonympha tullia in part*
Coenonympha ochracea	*Coenonympha tullia in part*
Colias chippewa	*Colias palaeno*
Colias skinneri	*Colias pelidne*
Cupido amyntula	*Everes amyntula*
Deciduphagus augustinus	*Callophrys augustinus, Incisalia augustinus*
Deciduphagus iroides	*Callophrys augustinus in part, Incisalia iroides*
Deciduphagus mossii	*Callophrys mossii, Incisalia mossii*
Deciduphagus polios	*Callophrys polia, Incisalia polia*
Erebia mancinus	*Erebia disa*
Euphydryas anicia	*Euphydryas chalcedona in part*
Hesperia assiniboia	*Hesperia comma assiniboia*
Hesperia manitoba	*Hesperia comma manitoba*
Incisalia eryphon	*Callophrys eryphon*
Incisalia niphon	*Callophrys niphon*
Lycaena florus	*Lycaena dorcas in part, Lycaena helloides in part*
Mitoura barryi	*Mitoura siva barryi, Callophrys barryi*
Mitoura rosneri	*Callophrys rosneri*
Oeneis alaskensis	*Oeneis jutta*
Oeneis beanii	*Oeneis melissa*
Oeneis taygete	*Oeneis bore*
Papilio bairdii	*Papilio machaon in part*
Phyciodes cocyta	*Phyciodes tharos in part*
Phyciodes pulchellus	*Phyciodes pratensis, Phyciodes pulchella*
Plebejus anna	*Lycaeides idas in part*
Plebejus scudderii	*Lycaeides idas in part*
Polygonia gracilis	*Polygonia zephyrus in part*
Polygonia l-album	*Nymphalis vaualbum, Roddia l-album*
Speyeria hesperis	*Speyeria electa*
Speyeria leto	*Speyeria cybele in part*

Results and Discussion

Specimen data is captured in Excel spreadsheet format and provided to Parks Canada in digital format only. Each record indicates that one or more specimens exist in the identified collection or that one or more individuals were sighted. Available information was not sufficiently robust to identify with consistent certainty how many specimens or live individuals each record represents. All that can be said is that museum databases normally deal with individual specimens rather than field-oriented butterfly records, which normally consist of all specimens of a given species collected at a given location on a given date. I do not consider this to be a problem within the context of the project. Locational details were in most cases not very definitive, especially for older museum specimens. Where geographic coordinates are given, these should not be interpreted as being as definitive as they appear. In most cases they are simply the standard coordinates for named geographic features as these are lodged in government data files. For example, a specimen labeled Banff can have the standard coordinates assigned to it but it is not known where within day use distance person X collected specimen Y in the long distant or even more recent past. Another example is the use of mountain names or names of passes. It is not known where on the said mountain or pass particular specimens were taken.

A total of 2459 specimen records were extracted from a review of more than 60,000 available specimen records. By far the most records are for Waterton and Banff national parks as shown in Figure 1. Many of the earliest known butterfly collections in Alberta are from the Lake Louise area of Banff National Park due to the construction of the Canadian Pacific Railway and consequent public access to this area. Only one record was found for Cave and Basin and none were found for Ya Ha Tinda, Bar U Ranch and Rocky Mountain House National Historic Site.

Figure 1. Number of specimen records by administrative unit.



A total of 184 taxa were confirmed as being present in at least one of the parks included in this review.

Species lists for each individual administrative unit are provided in Appendix A in table format. Table 2 shows the number of taxa projected to be present in each administrative unit and the number of confirmed taxa. Figure 2 shows the same information in graphic format. Table 3 provides the overview taxa listing.

Table 2. Number of taxa projected to be present in administrative units and number of taxa confirmed to be present.

	Banff	Jasper	Waterton	Elk Island	Wood Buff	YaHa	Bar U	RkyMtHse	CaveBasin	Kootenay	Yoho
projected	105	96	133	82	77	73	64	40	67	101	92
confirmed	78	57	93	42	19	0	0	0	1	21	30

Figure 2. Chart of projected and confirmed taxa by administrative unit.

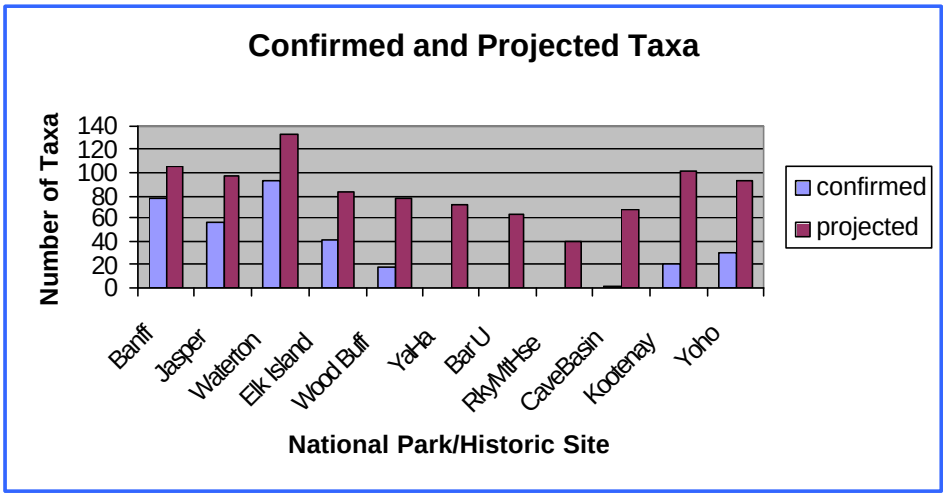


Table 3. Detailed listing of projected and confirmed taxa by administrative unit.

Confirmed and projected taxa			Banff	Jasper	Kootenay	Yoho	Waterton	Elk Island	Wood Buffalo	YaHa	Bar U	RkyMtnHse	Cave&Basin	AB Rank-official	AB Rank-recommend	BC Rank-official	BC Rank-recommend
Aglais	*milberti*		x	x	x	x	x	x	x	x	x	x	x	S5		S5	
Agriades	*megalo*	*lacustris*							x								
Agriades	*megalo*		x	x	x	x	x			x						S5	
Agriades	*rusticus*						x	x								S3	
Albulina	*optilete*	*yukona*						x	x					S2S3	S3	S3	
Amblyscirtes	*vialis*		x	x	x	x	x	x	x	x	x	x	x	S4		S5	
Anthocharis	*stella*		x	x	x	x	x							S3	S3	S5	
Aricia	*icarioides*	*pembina*	x		x	x	x							S2S3	S4	S5	
Aricia	*lupini*		x		x	x	x	x		x				S3	S4	S4	
Aricia	*saepiolus*		x	x	x	x	x	x	x	x	x	x	x	S5		S5	
Aricia	*shasta*	*minnehaha*	x				x				x			S3	S3		
Boloria	*alaskensis*			x										S2	S2	S4	
Boloria	*alberta*		x	x	x	x	x							S2S3	S4	S3	
Boloria	*astarte*		x	x	x	x	x							S2	S4	S5	
Boloria	*bellona*	*jenistae*	x	x	x	x	x	x	x	x	x	x	x	S5		S5	
Boloria	*epithore*	*uslui*	x	x	x	x	x							S2	S2	S5	
Boloria	*eunomia*	*dawsoni*	x	x	x	x	x	x	x	x			x	S5		S5	
Boloria	*eunomia*	*nichollae*	x	x										S2	S3		
Boloria	*freija*		x	x	x	x	x	x	x	x			x	S5		S5	
Boloria	*frigga*	*saga*	x	x	x	x	x	x	x	x			x	S5		S5	
Boloria	*grandis*		x	x	x	x	x	x	x	x		x	x	S5		S5	
Boloria	*improba*	*nunatak*		x										S2	S2	S4	
Boloria	*myrina*		x	x	x	x	x	x	x	x	x		x	S5		S5	

Confirmed and projected taxa			Banff	Jasper	Kootenay	Yoho	Waterton	Elk Island	Wood Buffalo	YaHa	Bar U	RkyMtnHse	Cave&Basin	AB Rank-official	AB Rank-recommend	BC Rank-official	BC Rank-recommend
Callophrys	*sheridanii*	*neoperplexa*					x							S1	S1	S4	
Carterocephalus	*palaemon*	*magnus*	x	x	x	x	x			x			x			S5	
Carterocephalus	*palaemon*	*mandan*						x	x		x	x		S5		S3	
Celastrina	*echo*	*nigrescens*			x	x	x							S1	S1		S4
Celastrina	*lucia*		x	x	x	x	x	x	x	x		x	x	S5		S5	
Celastrina	*neglecta*							x	x					SU			
Cercyonis	*oetus*		x	x	x	x	x			x	x		x	S5		S5	
Cercyonis	*pegala*	*ariane*			x	x										S5	
Cercyonis	*pegala*	*ino*	x				x	x		x	x	x	x	S5		S3S4	
Chlosyne	*damoetas*	*altalus*	x	x	x	x	x							S3S4	S4		S4
Chlosyne	*gorgone*	*carlota*					x	x						S2	S3		
Chlosyne	*palla*	*calydon*	x	x	x	x	x							S3S4	S4	S5	
Chlosyne	*palla*	*Peace ssp*							x								
Coenonympha	*california*	*columbiana*			x	x										S5	
Coenonympha	*inornata*	*benjamini*	x	x			x	x	x	x	x	x	x	S5		S3	
Coenonympha	*ochracea*	*mackenziei*							x					S1	S1		
Colias	*alexandra*	*nr alexandra*					x				x			S2S3	S3		
Colias	*alexandra*	*pseudocolumbiensis*			x											S5	
Colias	*canadensis*		x	x					x					S3S4		S4S5	
Colias	*chippewa*								x					S1S2	S3	S5	
Colias	*christina*	*christina*						x	x				x	S5		S5	
Colias	*christina*	*cordilleran ssp*	x	x	x	x	x			x	x						
Colias	*eurytheme*		x	x	x	x	x	x	x	x	x	x	x	SZB		SZB	
Colias	*gigantea*		x	x			x	x	x	x			x	S3S4	S5	S5	

Confirmed and projected taxa			Banff	Jasper	Kootenay	Yoho	Waterton	Elk Island	Wood Buffalo	YaHa	Bar U	RkyMtnHse	Cave&Basin	AB Rank-official	AB Rank-recommend	BC Rank-official	BC Rank-recommend
Colias	*interior*		x	x	x	x	x	x	x	x			x	S5		S5	
Colias	*meadii*	*elis*	x	x	x	x	x							S3	S4	S3	S3S4
Colias	*nastes*	*streckeri*	x	x	x	x	x							S4		S5	
Colias	*philodice*	*hagenii*	x				x	x	x	x	x	x		S5			
Colias	*philodice*	*vitabunda*							x								
Colias	*philodice*	*eriphyle*	x	x	x	x							x			S5	
Colias	*skinneri*		x	x	x	x	x							S3S4	S4	S3	S3
Cupido	*amyntula*		x	x	x	x	x	x	x	x	x	x	x	S5		S5	
Deciduphagus	*augustinus*		x	x	x	x		x	x	x			x	S5			
Deciduphagus	*iroides*				x	x	x										
Deciduphagus	*mossii*	*schryveri*					x							S1	S1	S4	
Deciduphagus	*polios*	*obscurus*	x	x	x	x	x	x	x	x			x	S5		S5	
Enodia	*anthedon*	*borealis*						x						S1	S2S3		
Epargyreus	*clarus*							x						S2S3	S3	S4	
Erebia	*discoidalis*		x	x			x	x	x	x	x	x	x	S4S5		S3S4	S4
Erebia	*epipsodea*	*epipsodea*	x	x	x	x	x			x	x		x	S4S5		S5	
Erebia	*epipsodea*	*freemani*						x	x			x		S4S5		S4	
Erebia	*magdalena*	*saxicola*		x										S1	S1	S3S4	S3S4
Erebia	*mancinus*		x	x				x	x				x	S5		S5	
Erynnis	*afranius*						x				x			S3	S3	S1	
Erynnis	*icelus*		x	x	x	x	x	x	x	x	x	x	x	S5		S5	
Erynnis	*persius*		x	x	x	x	x	x	x	x	x	x	x	S4		S5	
Euchloe	*ausonides*		x	x	x	x	x	x	x	x	x			S5		S4S5	
Euchloe	*creusa*		x	x	x	x	x		x	x				S4		S5	
Euchloe	*lotta*				x											S4	S3S4

Confirmed and projected taxa			Banff	Jasper	Kootenay	Yoho	Waterton	Elk Island	Wood Buffalo	YaHa	Bar U	RkyMtnHse	Cave&Basin	AB Rank-official	AB Rank-recommend	BC Rank-official	BC Rank-recommend
Euchloe	*olympia*						x							S2S3	S3		
Euphilotes	*battoides*						x									S4	
Euphydryas	*anicia*		x	x	x	x	x			x	x			S5		S5	
Euphydryas	*editha*	*beani*	x	x	x	x	x							S4			
Euphydryas	*gillettii*		x				x							S2	S2	S2S3	S2S3
Euphyes	*vestris*							x						SU		S3	
Euptoieta	*claudia*		x	x	x	x	x	x	x	x	x	x	x	SZB		SA	
Glaucopsyche	*lygdamus*	*columbia*			x	x										S5	
Glaucopsyche	*lygdamus*	*couperi*	x	x			x	x	x	x	x	x	x	S5		S5	
Glaucopsyche	*lygdamus*	*ssp*							x								
Glaucopsyche	*piasus*	*daunia*					x							S2	S2		
Hesperia	*assiniboia*						x	x			x			S5		S3	
Hesperia	*manitoba*		x	x	x	x	x		x	x			x	S5		S5	
Hesperia	*nevada*						x	x		x	x			S2S3	S3	S4	
Hesperia	*uncas*						x							S2S3	S3		
Incisalia	*eryphon*		x	x	x	x	x		x	x			x	S4		S5	
Incisalia	*niphon*	*clarki*							x					S3	S3S4	S1S3	
Limenitis	*archippus*							x	x		x			S3S4	S4	SX	
Limenitis	*arthemis*	*rubrofasciata*	x	x	x	x	x	x	x	x	x	x	x	S5		S5	
Limenitis	*lorquini*	*itelkae*			x	x								S1S2	S2	S5	
Lycaena	*cuprea*	*henryae*	x	x	x	x	x							S2	S4	S5	
Lycaena	*dione*						x	x			x			S3	S4	S1	
Lycaena	*dorcas*		x	x	x	x		x	x	x			x	S4		S5	
Lycaena	*florus*						x				x				S2S3		
Lycaena	*helloides*		x				x	x		x	x	x	x	S5		S5	

Confirmed and projected taxa			Banff	Jasper	Kootenay	Yoho	Waterton	Elk Island	Wood Buffalo	YaHa	Bar U	RkyMtnHse	Cave&Basin	AB Rank-official	AB Rank-recommend	BC Rank-official	BC Rank-recommend
Lycaena	*heteronea*	*klotsi*					x							S2	S2	S4	
Lycaena	*hyllus*						x	x	x	x	x			S2	S4	S3	
Lycaena	*mariposa*	*penroseae*	x	x	x	x	x	x	x	x			x	S3	S4	S5	
Lycaena	*phlaeas*	*arethusa*	x	x	x	x	x							S2	S4	S4	
Mitoura	*barryi*				x											S4	
Mitoura	*rosneri*				x											S5	
Mitoura	*spinetorum*		x	x	x	x	x						x	S1S2	S1	S4	
Neophasia	*menapia*		x		x	x	x							SH	SH	S5	
Nymphalis	*antiopa*		x	x	x	x	x	x	x	x	x	x	x	S5		S5	
Nymphalis	*californica*		x	x	x	x	x							S3	SZB	S4B, SZN	
Oarisma	*garita*		x	x	x	x	x	x		x	x		x	S4		S4	
Ochlodes	*sylvanoides*		x		x	x	x				x		x	S2	S2S3	S5	
Oeneis	*alaskensis*		x	x	x	x		x	x				x	S4		S5	
Oeneis	*alberta*						x	x		x	x			S3S4		S2S3	
Oeneis	*beanii*		x	x	x	x	x							S3S4		S5	
Oeneis	*chryxus*	*chryxus*	x	x	x	x	x		x	x			x	S5		S5	
Oeneis	*chryxus*	*caryi*							x					S1S2	S1S2		
Oeneis	*macounii*		x	x					x	x			x	S4		S5	
Oeneis	*polixenes*		x	x	x	x			x					S3	S4	S5	
Oeneis	*taygete*		x	x	x	x								S2	S3	S5	
Oeneis	*uhleri*	*varuna*					x	x		x	x			S5		S3	
Papilio	*canadensis*		x	x	x	x	x	x	x	x	x	x	x	S5		S5	
Papilio	*eurymedon*				x		x							S2	S2	S5	
Papilio	*bairdii*	*dodi*					x							S2S3	S4		
Papilio	*machaon*	*hudsonianus*							x					S2S3	S4		

Confirmed and projected taxa			Banff	Jasper	Kootenay	Yoho	Waterton	Elk Island	Wood Buffalo	YaHa	Bar U	RkyMtnHse	Cave&Basin	AB Rank-official	AB Rank-recommend	BC Rank-official	BC Rank-recommend
Papilio	*multicaudatus*	*minimus*			x	x	x							S1	S1	S4?	
Papilio	*rutulus*						x							SA		S5	
Papilio	*zelicaon*		x	x	x	x	x	x		x	x		x	S5		S5	
Parnassius	*clodius*	*altaurus*					x							SH	S1	S3S4	S3S4
Parnassius	*smintheus*		x	x	x	x	x			x				S4			
Phyciodes	*batesii*	*lakota*						x	x		x	x		S4		S3	
Phyciodes	*cocyta*		x	x	x	x	x	x	x	x	x	x	x	S5		S5	
Phyciodes	*pulchellus*	*owimba*	x	x	x	x	x			x			x	S5		S5	
Phyciodes	*tharos*						x				x			S4			
Pieris	*marginalis*	*reicheli*	x	x	x	x	x							S3	S3		S4
Pieris	*marginalis*	*tremblayi*		x											S2		S4
Pieris	*oleracea*		x	x				x	x	x		x	x	S5		S4S5	
Pieris	*rapae*		x	x	x	x	x	x	x	x	x	x	x	SE		SE	
Plebejus	*anna*	*ssp*		x	x	x											S3
Plebejus	*melissa*						x				x			S5		S4	
Plebejus	*scudderii*		x	x				x	x	x			x	S5		S5	
Poanes	*hobomok*							x						S2	S2S3		
Polites	*draco*		x	x			x			x			x	S3	S4	S3	
Polites	*mystic*		x	x			x	x	x	x	x	x	x	S5		S4	
Polites	*peckius*		x		x	x	x	x	x	x	x	x	x	S3S4	S4	S4	
Polites	*themistocles*		x				x	x		x	x			S3	S4	S4	
Polygonia	*faunus*		x	x	x	x	x	x	x	x	x	x	x	S5		S5	
Polygonia	*gracilis*		x	x	x	x	x		x	x		x	x	S3S4		S5	
Polygonia	*l-album*		x	x	x	x	x	x	x	x	x	x	x	S4S5		S5	
Polygonia	*oreas*	*threatfuli*			x	x	x							S2	S1	S4	
Polygonia	*progne*							x	x			x		S5		S5	

Confirmed and projected taxa			Banff	Jasper	Kootenay	Yoho	Waterton	Elk Island	Wood Buffalo	YaHa	Bar U	RkyMtnHse	Cave&Basin	AB Rank-official	AB Rank-recommend	BC Rank-official	BC Rank-recommend
Polygonia	*satyrus*		x	x	x	x	x	x	x	x	x	x	x	S5			
Pontia	*occidentalis*		x	x	x	x	x	x	x	x	x	x	x	S5		S5	
Pontia	*sisymbrii*	*flavitincta*	x	x	x		x							S3	S3	S4	
Pontia	*sisymbrii*	*beringiensis*							x						S1S2		
Pyrgus	*centaureae*	*freija*						x	x					S2S3	S4	S4S5	
Pyrgus	*centaureae*	*loki*	x	x	x	x	x							S4		S5	
Pyrgus	*communis*				x		x	x			x			S4		S3	S3
Pyrgus	*ruralis*		x	x	x		x							S2S3	S3	S5	
Satyrium	*fuliginosum*						x							SH	S1	S1	S1
Satyrium	*liparops*							x						S2S3	S3S4		
Satyrium	*sylvinum*	*nootka*			x	x	x							S1	S1	S5	
Satyrium	*titus*	*immaculosus*					x	x						S3S4	S4	S4	
Satyrodes	*eurydice*								x					SH			
Speyeria	*aphrodite*	*manitoba*					x	x	x					S5		S3	
Speyeria	*aphrodite*	*whitehousei*			x												S3
Speyeria	*atlantis*	*hollandi*	x	x	x	x	x	x	x	x			x	S4		S5	
Speyeria	*callippe*	*calgariana*	x				x			x	x			S4			
Speyeria	*callippe*	*semivirida*			x											S5	
Speyeria	*cybele*	*pseudocarpenteri*	x					x						S4		S3	
Speyeria	*edwardsii*						x				x			S3	S3		
Speyeria	*egleis*						x							S1	S1		
Speyeria	*hesperis*	*beani*	x	x			x			x	x	x	x	S5			
Speyeria	*hesperis*	*brico*	x	x	x	x	x									S5	
Speyeria	*hesperis*	*helena*						x	x		x	x		S5			
Speyeria	*hydaspe*	*rhodope*	x	x	x	x	x						x	S3S4	S3S4	S5	

Confirmed and projected taxa			Banff	Jasper	Kootenay	Yoho	Waterton	Elk Island	Wood Buffalo	YaHa	Bar U	RkyMtnHse	Cave&Basin	AB Rank-official	AB Rank-recommend	BC Rank-official	BC Rank-recommend
Speyeria	*leto*						x									S5	
Speyeria	*mormonia*	*eurynome*	x	x	x	x	x	x		x	x		x	S5		S5	
Speyeria	*mormonia*	*opis*		x													
Speyeria	*zerene*	*garretti*	x	x	x	x	x			x	x		x	S4		S4	
Strymon	*melinus*						x				x			S3	S4	S5	
Thorybes	*pylades*		x	x			x	x	x	x	x	x	x	S5		S5	
Thymelicus	*lineola*				x	x		x						SE		SE	
Vanessa	*annabella*		x		x	x	x				x		x	SZB		S?	
Vanessa	*atalanta*		x	x	x	x	x	x	x	x	x	x	x	S5		S5	
Vanessa	*cardui*		x	x	x	x	x	x	x	x	x	x	x	SZB		S5	

Type Localities

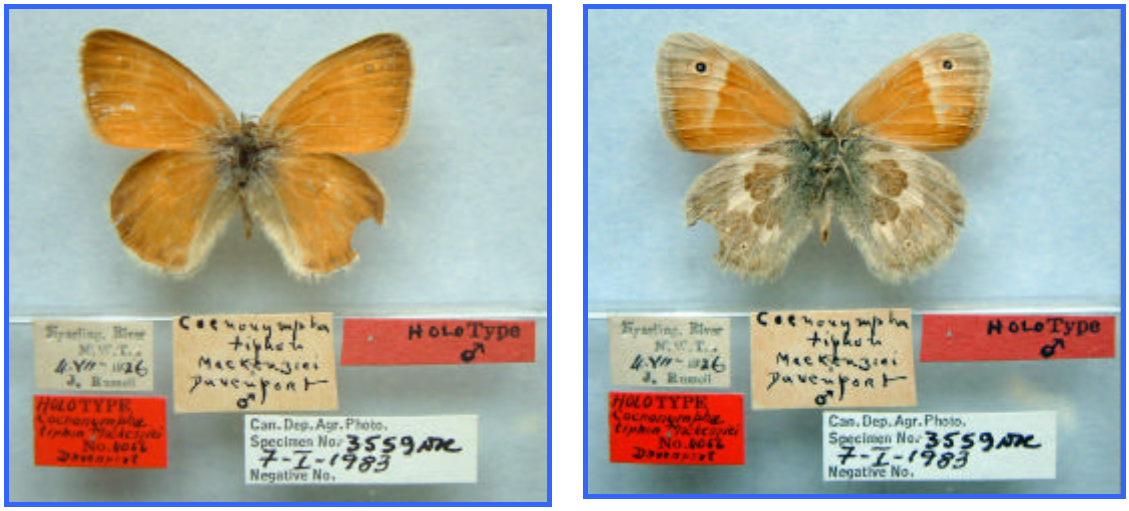
A number of butterfly taxa were named from places within national parks. This is part of the bio-history of these parks. Type localities are also important from the perspective of taxonomic science because they are the geographic localities where butterflies typical of a particular named taxon can be found (if the population there is still extant). The gene pools of these butterflies at these type localities are thus of significant scientific value.

Boloria alberta was described by Edwards (1890) with a type locality near Lake Louise (Kondla 1996).

Boloria eunomia nichollae was described by Barnes and Benjamin (1926) with a type locality in the Columbia Icefields/Wilcox Pass area (Pike 1980)

Coenonympha mackenziei - This butterfly, which in subsequent literature has been placed as a subspecies of *C. tullia* or *C. ochracea*, was described by Davenport (1936) from the Nyarling River. This is rather vague as a type locality. I conducted historical research and concluded that the type locality is the Nyarling River, 0.8 km from its confluence with the Little Buffalo River (Kondla 1995). It is not known which side of the river the specimens were collected on but this area within Wood Buffalo National Park is where butterflies typical of the taxon mackenziei have been found.

Figure 3. Holotype of *Coenonympha mackenziei*.



Coenonympha inornata benjamini was described by McDunnough (1928) with a type locality of Waterton Lakes

Figure 4. Holotype of *Coenonympha inornata benjamini*.

Chlosyne damoetas altalus was described by Scott (1998) with a type locality of Nigel Pass

Colias meadii elis was described by Strecker (1885). The type locality is certainly Kicking Horse Pass; however different views have been published as to whether the name bearing types were collected on the British Columbia or Alberta side of the pass (eg. Kondla 1996, Guppy and Shepard 2001).

Colias nastes streckeri was described by Grum-Grshimaïlo (1895) with a type locality in the Lake Louise area (Kondla 1996)

Euphydryas editha beani was described by Skinner (1897) with a type locality in the Lake Louise area (Kondla 1996)

Oeneis alaskensis chermocki was described by Wyatt (1965) with a type locality of Banff.

Oeneis beanii was described by Elwes and Edwards (1893) with a type locality in the Lake Louise area.

Speyeria hesperis beani was described by Barnes and Benjamin (1926) with a type locality of Banff.

A number of additional taxa have their type locality as Rock Lake (Kondla 1996, Shepard 1984); very near the northeastern boundary of Jasper National Park and thus the nearby park populations have the same significance as mentioned above. These taxa are: *Boloria astarte*, *Erebia epipsodea*, *Erebia mancinus*, *Euchloe creusa*, *Euphydryas anicia*, *Oeneis chryxus*, and *Parnassius smintheus*.

Species At Risk

A total of 44 taxa were identified as having conservation status ranks of S1 to S3. Table 4 shows the detailed distribution of these taxa among the administrative units. Figure 5 shows the relative distribution of species at risk among the administrative units.

Taxa ranked as S1 to S3 in Alberta are more widespread and abundant in British Columbia and consequently have lower conservation status ranks in that province. This explains the dearth of such taxa in Kootenay and Yoho National Parks; with only *Polygonia oreas threatfuli* being officially ranked as being of conservation concern in British Columbia. But Parks Canada is a national agency with a national conservation mandate. From this national perspective, most of the Alberta S1 to S3 taxa are still a matter for conservation attention in British Columbia parks since many of them have very restricted ranges at the national scale.

Waterton Lakes National Park is clearly the most important of the areas considered in this project from the perspective of butterfly species of conservation concern. The butterfly faunas of Ya Ha Tinda, Bar U Ranch, Rocky Mountain House National Historic Site and Cave & Basin are unconfirmed at this time.

Knowledge of butterfly distribution and abundance in western Canada is still in its infancy in comparison to vertebrate animals. It is likely that some of the taxa presently ranked as being of conservation concern will be able to be ‘downlisted’ as more field work is done and our knowledge improves over time. It is equally likely that some taxa may be ‘uplisted’ through this very same additional field work. New taxa will appear on the lists as a result of gradual improvement in taxonomic knowledge.

Lack of taxonomic consensus and clarity with respect to species and subspecies boundaries is not an obstacle to further action. The Species At Risk Act does not differentiate between species and subspecies for the purpose of defining species at risk. This is a prudent and progressive approach that encourages conservation of biological entities, regardless of the various interpretations of their taxonomic

rank. There are many outstanding questions on the taxonomic front, most of which do not materially affect the list of priority taxa.

There is however, enough known about butterflies that this group of animals should be included in environmental reviews for development projects in national parks and historic sites. Ongoing resource management decisions should also begin to include the needs of butterflies, both those at risk and those not at risk. Ecosystem management will contribute substantially to the maintenance of butterfly species diversity and species at risk. However, some taxa have specialized habitat requirements that may require site specific intervention to protect them from management actions that are otherwise of benefit to the broader landscape they exist in. An ecosystem approach to management is no guarantee that all organisms will benefit from the results and fine-filter attention to species at risk is a prudent safety net as part of the overall management strategy.

Figure 5. Distribution of species at risk among administrative units.

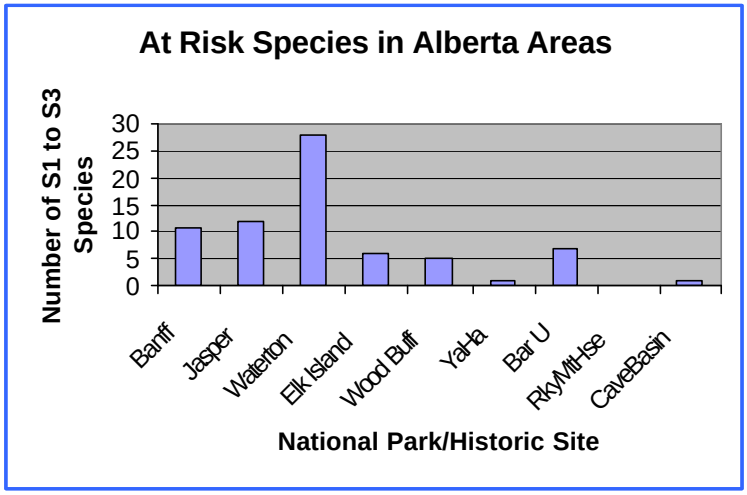


Table 4. Distribution of S1 to S3 taxa among administrative units.

Taxa			Banff	Jasper	Waterton	Elk Island	Wood Buffalo	YaHa	Bar U	RkyMtnHse	Cave&Basin	AB Rank-official	AB Rank-recommend	Kootenay	Yoho	BC Rank-official
Callophrys	*sheridanii*	*neoperplexa*			x							S1	S1			
Celastrina	*echo*	*nigrescens*			x							S1	S1	x	x	
Coenonympha	*ochracea*	*mackenziei*					x					S1	S1			
Deciduphagus	*mossii*	*schryveri*			x							S1	S1			
Erebia	*magdalena*	*saxicola*		x								S1	S1			
Mitoura	*spinetorum*		x	x	x						x	S1S2	S1	x	x	
Papilio	*multicaudatus*	*minimus*			x							S1	S1	x	x	
Papilio	*rutulus*				x								S1			
Parnassius	*clodius*	*altaurus*			x							SH	S1			
Polygonia	*oreas*	*threatfuli*			x							S2	S1	x	x	S3S4
Satyrium	*sylvinum*	*nootka*			x							S1	S1	x	x	
Speyeria	*egleis*				x							S1	S1			
Oeneis	*chryxus*	*caryi*					x					S1S2	S1S2			
Pontia	*sisymbrii*	*beringiensis*					x						S1S2			
Boloria	*alaskensis*			x								S2	S2			
Boloria	*epithore*	*uslui*	x	x	x							S2	S2	x	x	
Boloria	*improba*	*nunatak*		x								S2	S2			
Euphydryas	*gillettii*		x		x							S2	S2			
Glaucopsyche	*piasus*	*daunia*			x							S2	S2			
Limenitis	*lorquini*	*itelkae*										S1S2	S2	x	x	
Lycaena	*heteronea*	*klotsi*			x							S2	S2			
Papilio	*eurymedon*				x							S2	S2	x		
Pieris	*marginalis*	*tremblayi*		x									S2			

Taxa			Banff	Jasper	Waterton	Elk Island	Wood Buffalo	YaHa	Bar U	RkyMtnHse	Cave&Basin	AB Rank-official	AB Rank-recommend	Kootenay	Yoho	BC Rank-official
Enodia	*anthedon*	*borealis*				x						S1	S2S3			
Lycaena	*florus*				x				x				S2S3			
Ochlodes	*sylvanoides*		x		x				x		x	S2	S2S3	x	x	
Poanes	*hobomok*					x						S2	S2S3			
Albulina	*optilete*	*yukona*				x	x					S2S3	S3			
Anthocharis	*stella*		x	x	x							S3	S3	x	x	
Aricia	*shasta*	*minnehaha*	x		x				x			S3	S3			
Boloria	*eunomia*	*nichollae*	x	x								S2	S3			
Chlosyne	*gorgone*	*carlota*			x	x						S2	S3			
Colias	*alexandra*	*nr alexandra*			x				x			S2S3	S3			
Colias	*chippewa*						x					S1S2	S3			
Epargyreus	*clarus*					x						S2S3	S3			
Erynnis	*afranius*				x				x			S3	S3			
Euchloe	*olympia*				x							S2S3	S3			
Hesperia	*nevada*				x	x		x	x			S2S3	S3			
Hesperia	*uncas*				x							S2S3	S3			
Oeneis	*taygete*		x	x								S2	S3	x	x	
Pieris	*marginalis*	*reicheli*	x	x	x							S3	S3	x	x	
Pontia	*sisymbrii*	*flavitincta*	x	x	x							S3	S3	x		
Pyrgus	*ruralis*		x	x	x							S2S3	S3	x		
Speyeria	*edwardsii*				x				x			S3	S3			

There are presently no taxa in these administrative units that are designated under the Species At Risk Act but one is under review and will likely be legally confirmed as being at risk (*Satyrium fuliginosum*).

Some species (eg. *Boloria alberta*, *Boloria astarte*) that are officially ranked as being of conservation concern are widely distributed in the Alberta Rocky Mountains and the relatively small number of known locations is certainly a reflection of the little field work that has been done on the steep, high elevation rocky habitats that they occupy. These dynamic habitats are subjected to very low human use levels. From a risk assessment perspective, I do not consider these to be at risk.

Recommendations

- A systematic approach to inventory of species at risk is an essential foundation for future management. Priorities for inventory implementation should be determined through a considered review of current conservation status rank, combined with proximity of known or likely populations to established and future park facilities. An explicit risk management approach is preferred to ensure that scarce funds are directed at the clearest priorities. In some cases it will be possible to maximize returns due to the likely presence of more than one species in a given area during a given seasonal time window. Step one in managing for species at risk is to know if they are or are likely to be present in a given administrative unit. Step two is to know exactly where they are located in a given administrative unit. Step three is to begin compiling and adding to biological information. Step three can be undertaken concurrent with step two.
- The low elevation dry-belt habitats near Radium in Kootenay National Park should be inventoried for butterflies. Although none of the anticipated taxa are deemed to be at risk within the province of British Columbia; some have an extremely restricted distribution in Canada and this will be the only existing national park where some of these species would occur and be afforded the protection of the National Parks Act.
- Any park or historic site lands that are known to have undergone significant natural succession from grassland/forb habitat types to shrubby and treed habitats over the past 100 years should be examined for residual populations of butterflies that depend on the non-forested habitats, most especially those that are currently ranked as being at risk.
- Butterflies, especially species at risk, are now sufficiently well known that they should become a routine component of decision making with respect to park development and use management.
- The Ya Ha Tinda Ranch should receive attention with respect to butterflies and possible impacts from horse grazing.
- Additional work is recommended on *Satyrium fuliginosum* in Waterton Lakes National Park, firstly to better define the detailed distribution in the

park. A practical monitoring program should also be developed and implemented.

- Large concentrations of wintering ungulates can cause as much habitat damage as concentrations of domestic livestock. Consideration of the potentially deleterious effects on butterfly populations is warranted to ensure that conservation of extremely robust ungulate populations does not have unintended consequences for other groups of plants and animals.
- Maximum butterfly species diversity in a given area is usually associated with those portions of the landscape that exhibit the highest diversity of habitats. Such areas are ecologically important for butterflies and other organisms and should be identified and given priority management attention. It may be possible to use GIS technology and existing ecosystem datasets to approximate the candidate areas which could then be confirmed (or not) with focussed field sampling.
- I also recommend use of GIS technology and spatial ecosystem datasets as a tool to predict the spatial deployment of butterflies, especially species at risk, within the parks. This would help clarify the status of species within a given park and also help to focus inventory on areas most likely to sustain target organisms. I recommend a pilot project, perhaps using Waterton Lakes National Park and its species at risk, to develop practical and meaningful species/polygon correlations.
- Existing biological information, especially habitat use and larval food plants, should be compiled for use in subsequent modeling, inventory and management activities.

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Literature Cited and Annotated Bibliography

The bibliography consists of items directly pertinent to individual parks but also includes entries for documents that deal with butterflies in areas very near a park. Following the citation are abbreviations that indicate which park the citation is pertinent to. Entries without abbreviations are of general application to the study area. The abbreviations used and full names are:
B=Banff National Park
BU=Bar U National Historic Site
C=Cave & Basin National Historic Site
E=Elk Island National Park
J=Jasper National Park
K=Kootenay National Park
R=Rocky Mountain House National Historic Site
W=Waterton Lakes National Park
WB=Wood Buffalo National Park
YH=Ya Ha Tinda Ranch
Y=Yoho National Park

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Appendix A

Table 5. Banff National Park species list

Genus	Species	Subspecies	Projected presence	Confirmed presence
Aglais	*milberti*		x	x
Agriades	*megalo*		x	x
Amblyscirtes	*vialis*		x	
Anthocharis	*stella*		x	
Aricia	*icarioides*	*pembina*	x	
Aricia	*lupini*		x	
Aricia	*saepiolus*		x	x
Aricia	*shasta*	*minnehaha*	x	
Boloria	*alberta*		x	x
Boloria	*astarte*		x	x
Boloria	*bellona*	*jenistae*	x	x
Boloria	*epithore*	*uslui*	x	x
Boloria	*eunomia*	*dawsoni*	x	x
Boloria	*eunomia*	*nichollae*	x	x
Boloria	*freija*		x	x
Boloria	*frigga*	*saga*	x	x
Boloria	*grandis*		x	x
Boloria	*myrina*		x	x
Carterocephalus	*palaemon*	*magnus*	x	x
Celastrina	*lucia*		x	x
Cercyonis	*oetus*		x	x
Cercyonis	*pegala*	*ino*	x	
Chlosyne	*damoetas*	*altalus*	x	x
Chlosyne	*palla*	*calydon*	x	
Coenonympha	*inornata*	*benjamini*	x	x
Colias	*canadensis*		x	
Colias	*christina*	*cordilleran ssp*	x	x
Colias	*eurytheme*		x	x
Colias	*gigantea*		x	x
Colias	*interior*		x	x
Colias	*meadii*	*elis*	x	x
Colias	*nastes*	*streckeri*	x	x
Colias	*philodice*	*hagenii*	x	
Colias	*philodice*	*eriphyle*	x	x
Colias	*skinneri*		x	x
Cupido	*amyntula*		x	x
Deciduphagus	*augustinus*		x	
Deciduphagus	*polios*	*obscurus*	x	x
Erebia	*discoidalis*		x	x
Erebia	*epipsodea*	*epipsodea*	x	x

Genus	Species	Subspecies	Projected presence	Confirmed presence
Erebia	*mancinus*		x	x
Erynnis	*icelus*		x	x
Erynnis	*persius*		x	x
Euchloe	*ausonides*		x	x
Euchloe	*creusa*		x	x
Euphydryas	*anicia*		x	x
Euphydryas	*editha*	*beani*	x	x
Euphydryas	*gillettii*		x	
Euptoieta	*claudia*		x	
Glaucopsyche	*lygdamus*	*couperi*	x	x
Hesperia	*manitoba*		x	x
Incisalia	*eryphon*		x	x
Limenitis	*arthemis*	*rubrofasciata*	x	x
Lycaena	*cuprea*	*henryae*	x	x
Lycaena	*dorcas*		x	x
Lycaena	*helloides*		x	
Lycaena	*mariposa*	*penroseae*	x	x
Lycaena	*phlaeas*	*arethusa*	x	
Mitoura	*spinetorum*		x	
Neophasia	*menapia*		x	x
Nymphalis	*antiopa*		x	x
Nymphalis	*californica*		x	x
Oarisma	*garita*		x	x
Ochlodes	*sylvanoides*		x	
Oeneis	*alaskensis*		x	x
Oeneis	*beanii*		x	x
Oeneis	*chryxus*	*chryxus*	x	x
Oeneis	*macounii*		x	
Oeneis	*polixenes*		x	x
Oeneis	*taygete*		x	
Papilio	*canadensis*		x	x
Papilio	*zelicaon*		x	
Parnassius	*smintheus*		x	x
Phyciodes	*cocyta*		x	x
Phyciodes	*pulchellus*	*owimba*	x	x
Pieris	*marginalis*	*reicheli*	x	x
Pieris	*oleracea*		x	x
Pieris	*rapae*		x	x
Plebejus	*scudderii*		x	x
Polites	*draco*		x	x
Polites	*mystic*		x	
Polites	*peckius*		x	
Polites	*themistocles*		x	x
Polygonia	*faunus*		x	x
Polygonia	*gracilis*		x	x

Genus	Species	Subspecies	Projected presence	Confirmed presence
Polygonia	*l-album*		x	x
Polygonia	*satyrus*		x	x
Pontia	*occidentalis*		x	x
Pontia	*sisymbrii*	*flavitincta*	x	x
Pyrgus	*centaureae*	*loki*	x	x
Pyrgus	*ruralis*		x	x
Speyeria	*aphrodite*		x	x
Speyeria	*atlantis*	*hollandi*	x	x
Speyeria	*callippe*	*calgariana*	x	
Speyeria	*cybele*	*pseudocarpenteri*	x	x
Speyeria	*hesperis*	*beani*	x	x
Speyeria	*hesperis*	*brico*	x	
Speyeria	*hydaspe*	*rhodope*	x	x
Speyeria	*mormonia*	*eurynome*	x	x
Speyeria	*zerene*	*garretti*	x	
Thorybes	*pylades*		x	
Vanessa	*annabella*		x	
Vanessa	*atalanta*		x	
Vanessa	*cardui*		x	x

Table 6. Bar U Ranch species list

Genus	Species	Subspecies	Projected presence	Confirmed presence
Aglais	*milberti*		x	
Amblyscirtes	*vialis*		x	
Aricia	*saepiolus*		x	
Aricia	*shasta*	*minnehaha*	x	
Boloria	*bellona*	*jenistae*	x	
Boloria	*myrina*		x	
Carterocephalus	*palaemon*	*mandan*	x	
Cercyonis	*oetus*		x	
Cercyonis	*pegala*	*ino*	x	
Coenonympha	*inornata*	*benjamini*	x	
Colias	*alexandra*	*nr alexandra*	x	
Colias	*christina*	*cordilleran ssp*	x	
Colias	*eurytheme*		x	
Colias	*philodice*	*hagenii*	x	
Cupido	*amyntula*		x	
Erebia	*discoidalis*		x	
Erebia	*epipsodea*	*epipsodea*	x	
Erynnis	*afranius*		x	
Erynnis	*icelus*		x	
Erynnis	*persius*		x	
Euchloe	*ausonides*		x	
Euphydryas	*anicia*		x	
Euptoieta	*claudia*		x	
Glaucopsyche	*lygdamus*	*couperi*	x	
Hesperia	*assiniboia*		x	
Hesperia	*nevada*		x	
Limenitis	*archippus*		x	
Limenitis	*arthemis*	*rubrofasciata*	x	
Lycaena	*dione*		x	
Lycaena	*florus*		x	
Lycaena	*helloides*		x	
Lycaena	*hyllus*		x	
Nymphalis	*antiopa*		x	
Oarisma	*garita*		x	
Ochlodes	*sylvanoides*		x	
Oeneis	*alberta*		x	
Oeneis	*uhleri*	*varuna*	x	
Papilio	*canadensis*		x	
Papilio	*zelicaon*		x	
Phyciodes	*batesii*	*lakota*	x	

Genus	Species	Subspecies	Projected presence	Confirmed presence
Phyciodes	*cocyta*		x	
Phyciodes	*tharos*		x	
Pieris	*rapae*		x	
Plebejus	*melissa*		x	
Polites	*mystic*		x	
Polites	*peckius*		x	
Polites	*themistocles*		x	
Polygonia	*faunus*		x	
Polygonia	*l-album*		x	
Polygonia	*satyrus*		x	
Pontia	*occidentalis*		x	
Pyrgus	*communis*		x	
Speyeria	*callippe*	*calgariana*	x	
Speyeria	*edwardsii*		x	
Speyeria	*hesperis*	*beani*	x	
Speyeria	*hesperis*	*helena*	x	
Speyeria	*mormonia*	*eurynome*	x	
Speyeria	*zerene*	*garretti*	x	
Strymon	*melinus*		x	
Thorybes	*pylades*		x	
Vanessa	*annabella*		x	
Vanessa	*atalanta*		x	
Vanessa	*cardui*		x	

Table 7. Cave and Basin species list

Genus	Species	Subspecies	Projected presence	Confirmed presence
Aglais	*milberti*		x	
Amblyscirtes	*vialis*		x	
Aricia	*saepiolus*		x	
Boloria	*bellona*	*jenistae*	x	
Boloria	*eunomia*	*dawsoni*	x	
Boloria	*freija*		x	
Boloria	*frigga*	*saga*	x	
Boloria	*grandis*		x	
Boloria	*myrina*		x	
Carterocephalus	*palaemon*	*magnus*	x	
Celastrina	*lucia*		x	
Cercyonis	*oetus*		x	
Cercyonis	*pegala*	*ino*	x	
Coenonympha	*inornata*	*benjamini*	x	
Colias	*christina*	*christina*	x	
Colias	*eurytheme*		x	
Colias	*gigantea*		x	
Colias	*interior*		x	
Colias	*philodice*	*eriphyle*	x	
Cupido	*amyntula*		x	
Deciduphagus	*augustinus*		x	
Deciduphagus	*polios*	*obscurus*	x	
Erebia	*discoidalis*		x	
Erebia	*epipsodea*	*epipsodea*	x	
Erebia	*mancinus*		x	
Erynnis	*icelus*		x	
Erynnis	*persius*		x	
Euptoieta	*claudia*		x	
Glaucopsyche	*lygdamus*	*couperi*	x	
Hesperia	*manitoba*		x	
Incisalia	*eryphon*		x	
Limenitis	*arthemis*	*rubrofasciata*	x	
Lycaena	*dorcas*		x	
Lycaena	*helloides*		x	
Lycaena	*mariposa*	*penroseae*	x	
Mitoura	*spinetorum*		x	
Nymphalis	*antiopa*		x	
Oarisma	*garita*		x	
Ochlodes	*sylvanoides*		x	
Oeneis	*alaskensis*		x	
Oeneis	*chryxus*	*chryxus*	x	

Genus	Species	Subspecies	Projected presence	Confirmed presence
Oeneis	*macounii*		x	
Papilio	*canadensis*		x	*x*
Papilio	*zelicaon*		x	
Phyciodes	*cocyta*		x	
Phyciodes	*pulchellus*	*owimba*	x	
Pieris	*oleracea*		x	
Pieris	*rapae*		x	
Plebejus	*scudderii*		x	
Polites	*draco*		x	
Polites	*mystic*		x	
Polites	*peckius*		x	
Polygonia	*faunus*		x	
Polygonia	*gracilis*		x	
Polygonia	*l-album*		x	
Polygonia	*satyrus*		x	
Pontia	*occidentalis*		x	
Speyeria	*atlantis*	*hollandi*	x	
Speyeria	*hesperis*	*beani*	x	
Speyeria	*hydaspe*	*rhodope*	x	
Speyeria	*mormonia*	*eurynome*	x	
Speyeria	*zerene*	*garretti*	x	
Thorybes	*pylades*		x	
Vanessa	*annabella*		x	
Vanessa	*atalanta*		x	
Vanessa	*cardui*		x	

Table 8. Elk Island National Park species list

Genus	Species	Subspecies	Projected presence	Confirmed presence
Aglais	*milberti*		x	
Agriades	*rusticus*		x	x
Albulina	*optilete*	*yukona*	x	x
Amblyscirtes	*vialis*		x	
Aricia	*lupini*		x	
Aricia	*saepiolus*		x	x
Boloria	*bellona*	*jenistae*	x	x
Boloria	*eunomia*	*dawsoni*	x	x
Boloria	*freija*		x	
Boloria	*frigga*	*saga*	x	
Boloria	*grandis*		x	x
Boloria	*myrina*		x	x
Carterocephalus	*palaemon*	*mandan*	x	
Celastrina	*lucia*		x	
Celastrina	*neglecta*		x	
Cercyonis	*pegala*	*ino*	x	x
Chlosyne	*gorgone*	*carlota*	x	
Coenonympha	*inornata*	*benjamini*	x	x
Colias	*christina*	*christina*	x	
Colias	*eurytheme*		x	x
Colias	*gigantea*		x	x
Colias	*interior*		x	x
Colias	*philodice*	*hagenii*	x	x
Cupido	*amyntula*		x	x
Deciduphagus	*augustinus*		x	
Deciduphagus	*polios*	*obscurus*	x	
Enodia	*anthedon*	*borealis*	x	x
Epargyreus	*clarus*		x	
Erebia	*discoidalis*		x	
Erebia	*epipsodea*	*freemani*	x	x
Erebia	*mancinus*		x	
Erynnis	*icelus*		x	
Erynnis	*persius*		x	
Euchloe	*ausonides*		x	
Euphyes	*vestris*		x	
Euptoieta	*claudia*		x	x
Glaucopsyche	*lygdamus*	*couperi*	x	x
Hesperia	*assiniboia*		x	
Hesperia	*nevada*		x	
Limenitis	*archippus*		x	
Limenitis	*arthemis*	*rubrofasciata*	x	x

Genus	Species	Subspecies	Projected presence	Confirmed presence
Lycaena	*dione*		x	
Lycaena	*dorcas*		x	
Lycaena	*helloides*		x	
Lycaena	*hyllus*		x	x
Lycaena	*mariposa*	*penroseae*	x	
Nymphalis	*antiopa*		x	
Oarisma	*garita*		x	x
Oeneis	*alaskensis*		x	
Oeneis	*alberta*		x	
Oeneis	*uhleri*	*varuna*	x	
Papilio	*canadensis*		x	x
Papilio	*zelicaon*		x	
Phyciodes	*batesii*	*lakota*	x	x
Phyciodes	*cocyta*		x	x
Pieris	*oleracea*		x	x
Pieris	*rapae*		x	x
Plebejus	*melissa*		x	x
Plebejus	*scudderii*		x	
Poanes	*hobomok*		x	
Polites	*mystic*		x	x
Polites	*peckius*		x	x
Polites	*themistocles*		x	x
Polygonia	*faunus*		x	
Polygonia	*l-album*		x	
Polygonia	*progne*		x	x
Polygonia	*satyrus*		x	x
Pontia	*occidentalis*		x	x
Pyrgus	*centaureae*	*freija*	x	
Pyrgus	*communis*		x	
Satyrium	*liparops*		x	
Satyrium	*titus*	*immaculosus*	x	
Speyeria	*aphrodite*	*manitoba*	x	x
Speyeria	*atlantis*	*hollandi*	x	x
Speyeria	*cybele*	*pseudocarpenteri*	x	x
Speyeria	*hesperis*	*helena*	x	x
Speyeria	*mormonia*	*eurynome*	x	
Thorybes	*pylades*		x	x
Thymelicus	*lineola*		x	x
Vanessa	*atalanta*		x	x
Vanessa	*cardui*		x	x

Table 9. Jasper National Park species list

Genus	Species	Subspecies	Projected presence	Confirmed presence
Aglais	*milberti*		x	x
Agriades	*megalo*		x	x
Amblyscirtes	*vialis*		x	
Anthocharis	*stella*		x	
Aricia	*saepiolus*		x	x
Boloria	*alaskensis*		x	
Boloria	*alberta*		x	x
Boloria	*astarte*		x	
Boloria	*bellona*	*jenistae*	x	
Boloria	*epithore*	*uslui*	x	
Boloria	*eunomia*	*dawsoni*	x	x
Boloria	*eunomia*	*nichollae*	x	x
Boloria	*freija*		x	x
Boloria	*frigga*	*saga*	x	x
Boloria	*grandis*		x	x
Boloria	*improba*	*nunatak*	x	
Boloria	*myrina*		x	x
Carterocephalus	*palaemon*	*magnus*	x	x
Celastrina	*lucia*		x	x
Cercyonis	*oetus*		x	
Chlosyne	*damoetas*	*altalus*	x	x
Chlosyne	*palla*	*calydon*	x	
Coenonympha	*inornata*	*benjamini*	x	x
Colias	*canadensis*		x	
Colias	*christina*	*cordilleran ssp*	x	x
Colias	*eurytheme*		x	
Colias	*gigantea*		x	
Colias	*interior*		x	x
Colias	*meadii*	*elis*	x	x
Colias	*nastes*	*streckeri*	x	x
Colias	*philodice*	*eriphyle*	x	x
Colias	*skinneri*		x	x
Cupido	*amyntula*		x	x
Deciduphagus	*augustinus*		x	x
Deciduphagus	*polios*	*obscurus*	x	x
Erebia	*discoidalis*		x	
Erebia	*epipsodea*	*epipsodea*	x	x
Erebia	*magdalena*	*saxicola*	x	
Erebia	*mancinus*		x	
Erynnis	*icelus*		x	

Genus	Species	Subspecies	Projected presence	Confirmed presence
Erynnis	*persius*		x	x
Euchloe	*ausonides*		x	
Euchloe	*creusa*		x	x
Euphydryas	*anicia*		x	x
Euphydryas	*editha*	*beani*	x	x
Euptoieta	*claudia*		x	x
Glaucopsyche	*lygdamus*	*couperi*	x	x
Hesperia	*manitoba*		x	x
Incisalia	*eryphon*		x	x
Limenitis	*arthemis*	*rubrofasciata*	x	x
Lycaena	*cuprea*	*henryae*	x	x
Lycaena	*dorcas*		x	
Lycaena	*mariposa*	*penroseae*	x	
Lycaena	*phlaeas*	*arethusa*	x	
Mitoura	*spinetorum*		x	
Nymphalis	*antiopa*		x	
Nymphalis	*californica*		x	
Oarisma	*garita*		x	
Oeneis	*alaskensis*		x	x
Oeneis	*beanii*		x	x
Oeneis	*chryxus*	*chryxus*	x	x
Oeneis	*macounii*		x	
Oeneis	*polixenes*		x	x
Oeneis	*taygete*		x	
Papilio	*canadensis*		x	x
Papilio	*zelicaon*		x	x
Parnassius	*smintheus*		x	x
Phyciodes	*cocyta*		x	x
Phyciodes	*pulchellus*	*owimba*	x	x
Pieris	*marginalis*	*reicheli*	x	
Pieris	*marginalis*	*tremblayi*	x	
Pieris	*oleracea*		x	
Pieris	*rapae*		x	x
Plebejus	*anna*	*ssp*	x	
Plebejus	*scudderii*		x	x
Polites	*draco*		x	
Polites	*mystic*		x	
Polygonia	*faunus*		x	x
Polygonia	*gracilis*		x	
Polygonia	*l-album*		x	
Polygonia	*satyrus*		x	
Pontia	*occidentalis*		x	x
Pontia	*sisymbrii*	*flavitincta*	x	
Pyrgus	*centaureae*	*loki*	x	x
Pyrgus	*ruralis*		x	

Genus	Species	Subspecies	Projected presence	Confirmed presence
Speyeria	*atlantis*	*hollandi*	x	x
Speyeria	*hesperis*	*beani*	x	x
Speyeria	*hesperis*	*brico*	x	x
Speyeria	*hydaspe*	*rhodope*	x	x
Speyeria	*mormonia*	*eurynome*	x	x
Speyeria	*mormonia*	*opis*	x	x
Speyeria	*zerene*	*garretti*	x	
Thorybes	*pylades*		x	
Vanessa	*atalanta*		x	x
Vanessa	*cardui*		x	x

Table 10. Kootenay National Park species list

Genus	Species	Subspecies	Projected presence	Confirmed presence
Aglais	*milberti*		x	
Agriades	*megalo*		x	
Amblyscirtes	*vialis*		x	
Anthocharis	*stella*		x	
Aricia	*icarioides*	*pembina*	x	
Aricia	*lupini*		x	
Aricia	*saepiolus*		x	x
Boloria	*alberta*		x	
Boloria	*astarte*		x	
Boloria	*bellona*	*jenistae*	x	
Boloria	*epithore*	*uslui*	x	
Boloria	*eunomia*	*dawsoni*	x	
Boloria	*freija*		x	
Boloria	*frigga*	*saga*	x	
Boloria	*grandis*		x	
Boloria	*myrina*		x	x
Carterocephalus	*palaemon*	*magnus*	x	x
Celastrina	*echo*	*nigrescens*	x	
Celastrina	*lucia*		x	
Cercyonis	*oetus*		x	
Cercyonis	*pegala*	*ariane*	x	
Chlosyne	*damoetas*	*altalus*	x	
Chlosyne	*palla*	*calydon*	x	
Coenonympha	*california*	*columbiana*	x	
Colias	*alexandra*	*pseudocolumbiensis*	x	x
Colias	*christina*	*cordilleran ssp*	x	
Colias	*eurytheme*		x	
Colias	*interior*		x	
Colias	*meadii*	*elis*	x	
Colias	*nastes*	*streckeri*	x	
Colias	*philodice*	*eriphyle*	x	
Colias	*skinneri*		x	
Cupido	*amyntula*		x	x
Deciduphagus	*augustinus*		x	
Deciduphagus	*iroides*		x	
Deciduphagus	*polios*	*obscurus*	x	
Erebia	*epipsodea*	*epipsodea*	x	x
Erynnis	*icelus*		x	
Erynnis	*persius*		x	
Euchloe	*ausonides*		x	
Euchloe	*creusa*		x	x

Genus	Species	Subspecies	Projected presence	Confirmed presence
Euchloe	*lotta*		x	
Euphydryas	*anicia*		x	
Euphydryas	*editha*	*beani*	x	
Euptoieta	*claudia*		x	
Glaucopsyche	*lygdamus*	*columbia*	x	x
Hesperia	*manitoba*		x	
Incisalia	*eryphon*		x	
Limenitis	*arthemis*	*rubrofasciata*	x	
Limenitis	*lorquini*	*itelkae*	x	
Lycaena	*cuprea*	*henryae*	x	
Lycaena	*dorcas*		x	
Lycaena	*mariposa*	*penroseae*	x	x
Lycaena	*phlaeas*	*arethusa*	x	
Mitoura	*barryi*		x	
Mitoura	*rosneri*		x	
Mitoura	*spinetorum*		x	x
Neophasia	*menapia*		x	
Nymphalis	*antiopa*		x	
Nymphalis	*californica*		x	
Oarisma	*garita*		x	
Ochlodes	*sylvanoides*		x	
Oeneis	*alaskensis*		x	x
Oeneis	*beanii*		x	
Oeneis	*chryxus*	*chryxus*	x	x
Oeneis	*polixenes*		x	
Oeneis	*taygete*		x	
Papilio	*canadensis*		x	
Papilio	*eurymedon*		x	
Papilio	*multicaudatus*	*minimus*	x	
Papilio	*zelicaon*		x	x
Parnassius	*smintheus*		x	
Phyciodes	*cocyta*		x	x
Phyciodes	*pulchellus*	*owimba*	x	x
Pieris	*marginalis*	*reicheli*	x	x
Pieris	*rapae*		x	
Plebejus	*anna*	*ssp*	x	
Polites	*peckius*		x	
Polygonia	*faunus*		x	x
Polygonia	*gracilis*		x	x
Polygonia	*l-album*		x	x
Polygonia	*oreas*	*threatfuli*	x	
Polygonia	*satyrus*		x	
Pontia	*occidentalis*		x	
Pontia	*sisymbrii*	*flavitincta*	x	
Pyrgus	*centaureae*	*loki*	x	

Genus	Species	Subspecies	Projected presence	Confirmed presence
Pyrgus	*communis*		x	
Pyrgus	*ruralis*		x	
Satyrium	*sylvinum*	*nootka*	x	
Speyeria	*aphrodite*	*whitehousei*	x	
Speyeria	*atlantis*	*hollandi*	x	
Speyeria	*callippe*	*semivirida*	x	
Speyeria	*hesperis*	*brico*	x	x
Speyeria	*hydaspe*	*rhodope*	x	
Speyeria	*mormonia*	*eurynome*	x	
Speyeria	*zerene*	*garretti*	x	
Thymelicus	*lineola*		x	
Vanessa	*annabella*		x	
Vanessa	*atalanta*		x	
Vanessa	*cardui*		x	

Table 11. Rocky Mountain House National Historic Site species list

Genus	Species	Subspecies	Projected presence	Confirmed presence
Aglais	*milberti*		x	
Amblyscirtes	*vialis*		x	
Aricia	*saepiolus*		x	
Boloria	*bellona*	*jenistae*	x	
Boloria	*grandis*		x	
Carterocephalus	*palaemon*	*mandan*	x	
Celastrina	*lucia*		x	
Cercyonis	*pegala*	*ino*	x	
Coenonympha	*inornata*	*benjamini*	x	
Colias	*eurytheme*		x	
Colias	*philodice*	*hagenii*	x	
Cupido	*amyntula*		x	
Erebia	*discoidalis*		x	
Erebia	*epipsodea*	*freemani*	x	
Erynnis	*icelus*		x	
Erynnis	*persius*		x	
Euptoieta	*claudia*		x	
Glaucopsyche	*lygdamus*	*couperi*	x	
Limenitis	*arthemis*	*rubrofasciata*	x	
Lycaena	*helloides*		x	
Nymphalis	*antiopa*		x	
Papilio	*canadensis*		x	
Phyciodes	*batesii*	*lakota*	x	
Phyciodes	*cocyta*		x	
Pieris	*oleracea*		x	
Pieris	*rapae*		x	
Polites	*mystic*		x	
Polites	*peckius*		x	
Polygonia	*faunus*		x	
Polygonia	*gracilis*		x	
Polygonia	*l-album*		x	
Polygonia	*progne*		x	
Polygonia	*satyrus*		x	
Pontia	*occidentalis*		x	
Speyeria	*hesperis*	*beani*	x	
Speyeria	*hesperis*	*helena*	x	
Thorybes	*pylades*		x	
Vanessa	*atalanta*		x	
Vanessa	*cardui*		x	

Table 12. Waterton Lakes National Park species list

Genus	Species	Subspecies	Projected presence	Confirmed presence
Aglais	*milberti*		x	x
Agriades	*megalo*		x	x
Agriades	*rusticus*		x	
Amblyscirtes	*vialis*		x	x
Anthocharis	*stella*		x	x
Aricia	*icarioides*	*pembina*	x	x
Aricia	*lupini*		x	x
Aricia	*saepiolus*		x	x
Aricia	*shasta*	*minnehaha*	x	
Boloria	*alberta*		x	
Boloria	*astarte*		x	
Boloria	*bellona*	*jenistae*	x	x
Boloria	*epithore*	*uslui*	x	x
Boloria	*eunomia*	*dawsoni*	x	
Boloria	*freija*		x	x
Boloria	*frigga*	*saga*	x	
Boloria	*grandis*		x	
Boloria	*myrina*		x	
Callophrys	*sheridanii*	*neoperplexa*	x	x
Carterocephalus	*palaemon*	*magnus*	x	x
Celastrina	*echo*	*nigrescens*	x	?
Celastrina	*lucia*		x	x
Cercyonis	*oetus*		x	x
Cercyonis	*pegala*	*ino*	x	x
Chlosyne	*damoetas*	*altalus*	x	x
Chlosyne	*gorgone*	*carlota*	x	
Chlosyne	*palla*	*calydon*	x	x
Coenonympha	*inornata*	*benjamini*	x	x
Colias	*alexandra*	*nr alexandra*	x	
Colias	*christina*	*cordilleran ssp*	x	x
Colias	*eurytheme*		x	x
Colias	*gigantea*		x	
Colias	*interior*		x	x
Colias	*meadii*	*elis*	x	x
Colias	*nastes*	*streckeri*	x	
Colias	*philodice*	*hagenii*	x	x
Colias	*skinneri*		x	x
Cupido	*amyntula*		x	x
Deciduphagus	*iroides*		x	x
Deciduphagus	*mossii*	*schryveri*	x	
Deciduphagus	*polios*	*obscurus*	x	x
Erebia	*discoidalis*		x	x

Genus	Species	Subspecies	Projected presence	Confirmed presence
Erebia	*epipsodea*	*epipsodea*	x	x
Erynnis	*afranius*		x	
Erynnis	*icelus*		x	x
Erynnis	*persius*		x	x
Euchloe	*ausonides*		x	x
Euchloe	*creusa*		x	x
Euchloe	*olympia*		x	
Euphilotes	*battoides*		x	
Euphydryas	*anicia*		x	x
Euphydryas	*editha*	*beani*	x	x
Euphydryas	*gillettii*		x	
Euptoieta	*claudia*		x	
Glaucopsyche	*lygdamus*	*couperi*	x	x
Glaucopsyche	*piasus*	*daunia*	x	x
Hesperia	*assiniboia*		x	
Hesperia	*manitoba*		x	x
Hesperia	*nevada*		x	x
Hesperia	*uncas*		x	
Incisalia	*eryphon*		x	x
Limenitis	*arthemis*	*rubrofasciata*	x	x
Limenitis	*lorquini*	*itelkae*	x	x
Lycaena	*cuprea*	*henryae*	x	x
Lycaena	*dione*		x	x
Lycaena	*florus*		x	x
Lycaena	*helloides*		x	x
Lycaena	*heteronea*	*klotsi*	x	x
Lycaena	*hyllus*		x	
Lycaena	*mariposa*	*penroseae*	x	x
Lycaena	*phlaeas*	*arethusa*	x	
Mitoura	*spinetorum*		x	
Neophasia	*menapia*		x	
Nymphalis	*antiopa*		x	x
Nymphalis	*californica*		x	
Oarisma	*garita*		x	x
Ochlodes	*sylvanoides*		x	x
Oeneis	*alberta*		x	
Oeneis	*beanii*		x	
Oeneis	*chryxus*	*chryxus*	x	x
Oeneis	*uhleri*	*varuna*	x	
Papilio	*canadensis*		x	x
Papilio	*eurymedon*		x	x
Papilio	*bairdii*	*dodi*	x	x
Papilio	*multicaudatus*	*minimus*	x	x
Papilio	*rutulus*		x	x
Papilio	*zelicaon*		x	x

Genus	Species	Subspecies	Projected presence	Confirmed presence
Parnassius	*clodius*	*altaurus*	x	x
Parnassius	*smintheus*		x	x
Phyciodes	*batesii*		x	x
Phyciodes	*cocyta*		x	x
Phyciodes	*pulchellus*	*owimba*	x	x
Phyciodes	*tharos*		x	
Pieris	*marginalis*	*reicheli*	x	x
Pieris	*oleracea*		x	x
Pieris	*rapae*		x	x
Plebejus	*melissa*		x	x
Plebejus	*scudderii*		x	x
Polites	*draco*		x	x
Polites	*mystic*		x	x
Polites	*peckius*		x	
Polites	*themistocles*		x	x
Polygonia	*faunus*		x	x
Polygonia	*gracilis*		x	x
Polygonia	*l-album*		x	
Polygonia	*oreas*	*threatfuli*	x	x
Polygonia	*progne*		x	x
Polygonia	*satyrus*		x	x
Pontia	*occidentalis*		x	x
Pontia	*sisymbrii*	*flavitincta*	x	
Pyrgus	*centaureae*	*loki*	x	x
Pyrgus	*communis*		x	
Pyrgus	*ruralis*		x	x
Satyrium	*fuliginosum*		x	x
Satyrium	*sylvinum*	*nootka*	x	
Satyrium	*titus*	*immaculosus*	x	x
Speyeria	*aphrodite*	*manitoba*	x	x
Speyeria	*atlantis*	*hollandi*	x	x
Speyeria	*callippe*	*calgariana*	x	x
Speyeria	*edwardsii*		x	x
Speyeria	*egleis*		x	
Speyeria	*hesperis*	*beani*	x	x
Speyeria	*hesperis*	*brico*	x	
Speyeria	*hydaspe*	*rhodope*	x	x
Speyeria	*leto*		x	x
Speyeria	*mormonia*	*eurynome*	x	x
Speyeria	*zerene*	*garretti*	x	x
Strymon	*melinus*		x	
Thorybes	*pylades*		x	
Vanessa	*annabella*		x	
Vanessa	*atalanta*		x	
Vanessa	*cardui*		x	x

Table 13. Wood Buffalo National Park species list

Genus	Species	Subspecies	Projected presence	Confirmed presence
Aglais	*milberti*		x	
Agriades	*megalo*	*lacustris*	x	
Albulina	*optilete*	*yukona*	x	
Amblyscirtes	*vialis*		x	
Aricia	*saepiolus*		x	
Boloria	*bellona*	*jenistae*	x	
Boloria	*eunomia*	*dawsoni*	x	
Boloria	*freija*		x	*x*
Boloria	*frigga*	*saga*	x	*x*
Boloria	*grandis*		x	
Boloria	*myrina*		x	
Carterocephalus	*palaemon*	*mandan*	x	*x*
Celastrina	*lucia*		x	*x*
Celastrina	*neglecta*		x	
Chlosyne	*palla*	*Peace ssp*	x	
Coenonympha	*inornata*	*benjamini*	x	
Coenonympha	*ochracea*	*mackenziei*	x	*x*
Colias	*canadensis*		x	
Colias	*chippewa*		x	
Colias	*christina*	*christina*	x	
Colias	*eurytheme*		x	
Colias	*gigantea*		x	
Colias	*interior*		x	
Colias	*philodice*	*hagenii*	x	
Colias	*philodice*	*vitabunda*	x	
Cupido	*amyntula*		x	
Deciduphagus	*augustinus*		x	*x*
Deciduphagus	*polios*	*obscurus*	x	*x*
Erebia	*discoidalis*		x	
Erebia	*epipsodea*	*freemani*	x	
Erebia	*mancinus*		x	*x*
Erynnis	*icelus*		x	*x*
Erynnis	*persius*		x	*x*
Euchloe	*ausonides*		x	*x*
Euchloe	*creusa*		x	*x*
Euptoieta	*claudia*		x	
Glaucopsyche	*lygdamus*	*couperi*	x	*x*
Glaucopsyche	*lygdamus*	*ssp*	x	
Hesperia	*manitoba*		x	
Incisalia	*eryphon*		x	
Incisalia	*niphon*	*clarki*	x	*x*

Genus	Species	Subspecies	Projected presence	Confirmed presence
Limenitis	*archippus*		x	
Limenitis	*arthemis*	*rubrofasciata*	x	
Lycaena	*dorcas*		x	
Lycaena	*hyllus*		x	
Lycaena	*mariposa*	*penroseae*	x	
Nymphalis	*antiopa*		x	
Oeneis	*alaskensis*		x	
Oeneis	*chryxus*	*chryxus*	x	
Oeneis	*chryxus*	*caryi*	x	
Oeneis	*macounii*		x	
Oeneis	*polixenes*		x	
Papilio	*canadensis*		x	*x*
Papilio	*machaon*	*hudsonianus*	x	
Phyciodes	*batesii*	*lakota*	x	
Phyciodes	*cocyta*		x	
Pieris	*oleracea*		x	*x*
Pieris	*rapae*		x	
Plebejus	*scudderii*		x	
Polites	*mystic*		x	
Polites	*peckius*		x	
Polygonia	*faunus*		x	
Polygonia	*gracilis*		x	
Polygonia	*l-album*		x	
Polygonia	*progne*		x	
Polygonia	*satyrus*		x	*x*
Pontia	*occidentalis*		x	
Pontia	*sisymbrii*	*beringiensis*	x	*x*
Pyrgus	*centaureae*	*freija*	x	
Satyrodes	*eurydice*		x	
Speyeria	*aphrodite*	*manitoba*	x	
Speyeria	*atlantis*	*hollandi*	x	
Speyeria	*hesperis*	*helena*	x	
Thorybes	*pylades*		x	
Vanessa	*atalanta*		x	
Vanessa	*cardui*		x	

Table 14. Ya Ha Tinda Ranch species list

Genus	Species	Subspecies	Projected presence	Confirmed presence
Aglais	*milberti*		x	
Agriades	*megalo*		x	
Amblyscirtes	*vialis*		x	
Aricia	*lupini*		x	
Aricia	*saepiolus*		x	
Boloria	*bellona*	*jenistae*	x	
Boloria	*eunomia*	*dawsoni*	x	
Boloria	*freija*		x	
Boloria	*frigga*	*saga*	x	
Boloria	*grandis*		x	
Boloria	*myrina*		x	
Carterocephalus	*palaemon*	*magnus*	x	
Celastrina	*lucia*		x	
Cercyonis	*oetus*		x	
Cercyonis	*pegala*	*ino*	x	
Coenonympha	*inornata*	*benjamini*	x	
Colias	*christina*	*cordilleran ssp*	x	
Colias	*eurytheme*		x	
Colias	*gigantea*		x	
Colias	*interior*		x	
Colias	*philodice*	*hagenii*	x	
Cupido	*amyntula*		x	
Deciduphagus	*augustinus*		x	
Deciduphagus	*polios*	*obscurus*	x	
Erebia	*discoidalis*		x	
Erebia	*epipsodea*	*epipsodea*	x	
Erynnis	*icelus*		x	
Erynnis	*persius*		x	
Euchloe	*ausonides*		x	
Euchloe	*creusa*		x	
Euphydryas	*anicia*		x	
Euptoieta	*claudia*		x	
Glaucopsyche	*lygdamus*	*couperi*	x	
Hesperia	*manitoba*		x	
Hesperia	*nevada*		x	
Incisalia	*eryphon*		x	
Limenitis	*arthemis*	*rubrofasciata*	x	
Lycaena	*dorcas*		x	
Lycaena	*helloides*		x	
Lycaena	*hyllus*		x	

Genus	Species	Subspecies	Projected presence	Confirmed presence
Lycaena	*mariposa*	*penroseae*	x	
Nymphalis	*antiopa*		x	
Oarisma	*garita*		x	
Oeneis	*alberta*		x	
Oeneis	*chryxus*	*chryxus*	x	
Oeneis	*macounii*		x	
Oeneis	*uhleri*	*varuna*	x	
Papilio	*canadensis*		x	
Papilio	*zelicaon*		x	
Parnassius	*smintheus*		x	
Phyciodes	*cocyta*		x	
Phyciodes	*pulchellus*	*owimba*	x	
Pieris	*oleracea*		x	
Pieris	*rapae*		x	
Plebejus	*scudderii*		x	
Polites	*draco*		x	
Polites	*mystic*		x	
Polites	*peckius*		x	
Polites	*themistocles*		x	
Polygonia	*faunus*		x	
Polygonia	*gracilis*		x	
Polygonia	*l-album*		x	
Polygonia	*satyrus*		x	
Pontia	*occidentalis*		x	
Speyeria	*atlantis*	*hollandi*	x	
Speyeria	*callippe*	*calgariana*	x	
Speyeria	*hesperis*	*beani*	x	
Speyeria	*mormonia*	*eurynome*	x	
Speyeria	*zerene*	*garretti*	x	
Thorybes	*pylades*		x	
Vanessa	*atalanta*		x	
Vanessa	*cardui*		x	

Table 15. Yoho National Park species list

Genus	Species	Subspecies	Projected presence	Confirmed presence
Aglais	*milberti*		x	
Agriades	*megalo*		x	*x*
Amblyscirtes	*vialis*		x	
Anthocharis	*stella*		x	
Aricia	*icarioides*	*pembina*	x	
Aricia	*lupini*		x	
Aricia	*saepiolus*		x	*x*
Boloria	*alberta*		x	
Boloria	*astarte*		x	*x*
Boloria	*bellona*	*jenistae*	x	
Boloria	*epithore*	*uslui*	x	
Boloria	*eunomia*	*dawsoni*	x	
Boloria	*freija*		x	
Boloria	*frigga*	*saga*	x	*x*
Boloria	*grandis*		x	*x*
Boloria	*myrina*		x	
Carterocephalus	*palaemon*	*magnus*	x	*x*
Celastrina	*echo*	*nigrescens*	x	*x*
Celastrina	*lucia*		x	
Cercyonis	*oetus*		x	
Cercyonis	*pegala*	*ariane*	x	
Chlosyne	*damoetas*	*altalus*	x	
Chlosyne	*palla*	*calydon*	x	
Coenonympha	*california*	*columbiana*	x	
Colias	*christina*	*cordilleran ssp*	x	*x*
Colias	*eurytheme*		x	
Colias	*interior*		x	
Colias	*meadii*	*elis*	x	*x*
Colias	*nastes*	*streckeri*	x	
Colias	*philodice*	*eriphyle*	x	
Colias	*skinneri*		x	*x*
Cupido	*amyntula*		x	*x*
Deciduphagus	*augustinus*		x	
Deciduphagus	*iroides*		x	
Deciduphagus	*polios*	*obscurus*	x	
Erebia	*epipsodea*	*epipsodea*	x	
Erynnis	*icelus*		x	
Erynnis	*persius*		x	
Euchloe	*ausonides*		x	
Euchloe	*creusa*		x	

Genus	Species	Subspecies	Projected presence	Confirmed presence
Euphydryas	*anicia*		x	*x*
Euphydryas	*editha*	*beani*	x	
Euptoieta	*claudia*		x	
Glaucopsyche	*lygdamus*	*columbia*	x	*x*
Hesperia	*manitoba*		x	*x*
Incisalia	*eryphon*		x	*x*
Limenitis	*arthemis*	*rubrofasciata*	x	
Limenitis	*lorquini*	*itelkae*	x	
Lycaena	*cuprea*	*henryae*	x	*x*
Lycaena	*dorcas*		x	*x*
Lycaena	*mariposa*	*penroseae*	x	*x*
Lycaena	*phlaeas*	*arethusa*	x	
Mitoura	*spinetorum*		x	
Neophasia	*menapia*		x	
Nymphalis	*antiopa*		x	
Nymphalis	*californica*		x	
Oarisma	*garita*		x	
Ochlodes	*sylvanoides*		x	
Oeneis	*alaskensis*		x	*x*
Oeneis	*beanii*		x	*x*
Oeneis	*chryxus*	*chryxus*	x	*x*
Oeneis	*polixenes*		x	
Oeneis	*taygete*		x	
Papilio	*canadensis*		x	
Papilio	*multicaudatus*	*minimus*	x	
Papilio	*zelicaon*		x	*x*
Parnassius	*smintheus*		x	
Phyciodes	*cocyta*		x	*x*
Phyciodes	*pulchellus*	*owimba*	x	*x*
Pieris	*marginalis*	*reicheli*	x	
Pieris	*rapae*		x	
Plebejus	*anna*	*ssp*	x	
Polites	*peckius*		x	
Polygonia	*faunus*		x	*x*
Polygonia	*gracilis*		x	
Polygonia	*l-album*		x	
Polygonia	*oreas*	*threatfuli*	x	
Polygonia	*satyrus*		x	
Pontia	*occidentalis*		x	*x*
Pyrgus	*centaureae*	*loki*	x	
Pyrgus	*ruralis*		x	*x*
Satyrium	*sylvinum*	*nootka*	x	
Speyeria	*atlantis*	*hollandi*	x	
Speyeria	*hesperis*	*brico*	x	*x*
Speyeria	*hydaspe*	*rhodope*	x	

Genus	Species	Subspecies	Projected presence	Confirmed presence
Speyeria	*mormonia*	*eurynome*	x	*x*
Speyeria	*zerene*	*garretti*	x	
Thymelicus	*lineola*		x	
Vanessa	*annabella*		x	
Vanessa	*atalanta*		x	
Vanessa	*cardui*		x	

Appendix X Specific butterfly occurrence records by park area