

MORMON FRITILLARY (*Speyeria mormonia erinna*) INVENTORY
IN THE OKANAGAN AND BOUNDARY REGIONS
OF SOUTHERN BRITISH COLUMBIA, 2009



Photos courtesy of Vicky Young BCCC - Top and bottom left photos: Mormon Fritillary *erinna* subspecies. Right photo: Unidentified Fritillary on thistle plant, W Johnstone Creek Rd.

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Cover illustration: Photos courtesy of Vicky Young BCCC - Top and bottom left photos: Mormon Fritillary *erinna* subspecies. Right photo: Unidentified Fritillary on thistle plant, W Johnstone Creek Rd, August 5, 2009.

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EXECUTIVE SUMMARY

The Mormon Fritillary, *erinna* subspecies (*Speyeria mormonia erinna*) is Red-listed in British Columbia (BC CDC 2009). The BC Conservation Framework ranks it Priority 1 in Goal 3 (Maintain the diversity of native species and ecosystems) and recommends Planning, Habitat Protection and Private Land Stewardship (2009). Inventory data currently is limited and new inventory data is required to support Planning, Habitat Protection and Stewardship. In 2009, a BC Conservation Corps crew conducted a presence/not detected inventory for this species in the Anarchist Mountain area and Boundary region, east of Osoyoos, in south central BC.

Surveys began about 2 weeks after the first observation date, reported by Dennis St. John on July 21, to ensure reasonable detectability. Eighty (80) search stations were inventoried for *S. m. erinna* during 9 field days between August 5 and 26, 2009. One or more *S. m. erinna* was detected at nine (9) of eighty stations. Detailed counts were not made at each station, since the purpose of the inventory was to identify as many locations as possible. The elevation range of detections was approximately 1030m to 1530m Above Sea Level. Before this survey, three (3) *S. m. erinna* locations were known for the Anarchist Mountain area. This survey identified 3 additional locations.

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INTRODUCTION

Two sub-species of Mormon Fritillary occur in the southern interior region of British Columbia (BC), *Speyeria mormonia erinna* and *Speyeria mormonia opis*. The *opsis* sub-species occurs throughout most of BC but *erinna* has been documented only in the Anarchist Mountain area, east of Osoyoos, near Mt Baldy, Bridesville and Rock Creek (detection data N. Kondla 1998 – 2002) and in the south end of the west Kootenay Valley (Guppy and Shepard (2001).

The *erinna* subspecies, hereafter referred to as *S. m. erinna*, is not listed by the Species at Risk Act in Canada (BC CDC 2009). However, it is a Group 1 High Priority Candidate for COSEWIC status assessment (COSEWIC 2009). In British Columbia it is Red-listed (S1S2) by the BC Conservation Data Centre (2009). The BC Conservation Framework (2009) ranks it Priority 1 in Goal 3 (Maintain the diversity of native species and ecosystems) and recommends Planning, Habitat Protection and Private Land Stewardship. Inventory data currently is limited and additional data is required to support Planning, Habitat Protection and Stewardship.

Opler et al. (2009) describe the species' habitat as "mountain meadows and fell-fields, moist prairie valleys, subarctic forest openings." *S. m. erinna* has been reported in BC from mid-July to late August and may fly into September (Guppy and Shepard 2001).

Eggs and larvae depend on violets (*Viola* sp.). The specific host species is not known. Eflora maps (Klinkenberg 2008) reports several species of violet with ranges that overlap that of the Mormon Fritillary: *Viola adunca* var. *adunca* (early blue violet); *Viola canadensis* var. *rugulosa* (Canada violet); *Viola glabella* (stream violet); *Viola nephrophylla* (northern bog violet); *Viola orbiculata* (round-leaved violet); *Viola renifolia* (kidney-leaved violet). In addition, the following violets may occur in the Anarchist area but appear to be less likely: *Viola macloskeyi* (small white violet); *Viola sempervirens* (trailing yellow violet).

The BC Conservation Corps grassland species inventory crew conducted presence/not detected surveys for *S. m. erinna* within its known area of occurrence. The purposes of this inventory were to:

- Clearly identify and document occurrences, including flight dates, and habitat information.
- Collect photographs and voucher specimens to assist with identification of subspecies for future monitoring.
- Identify potential sites for presence/not detected monitoring in future years.
- Contribute to clarification of population extent of occurrence, area of occupancy and provincial/national status.
- Identify important sites for future protection.

This document summarizes the inventory effort to help address the above issues.

STUDY AREA

The study area (Figure 1) is in south-central BC, just north of the United States border, between Osoyoos and Midway (Boundary Region), in the Anarchist Mountain and Baldy Mountain area.

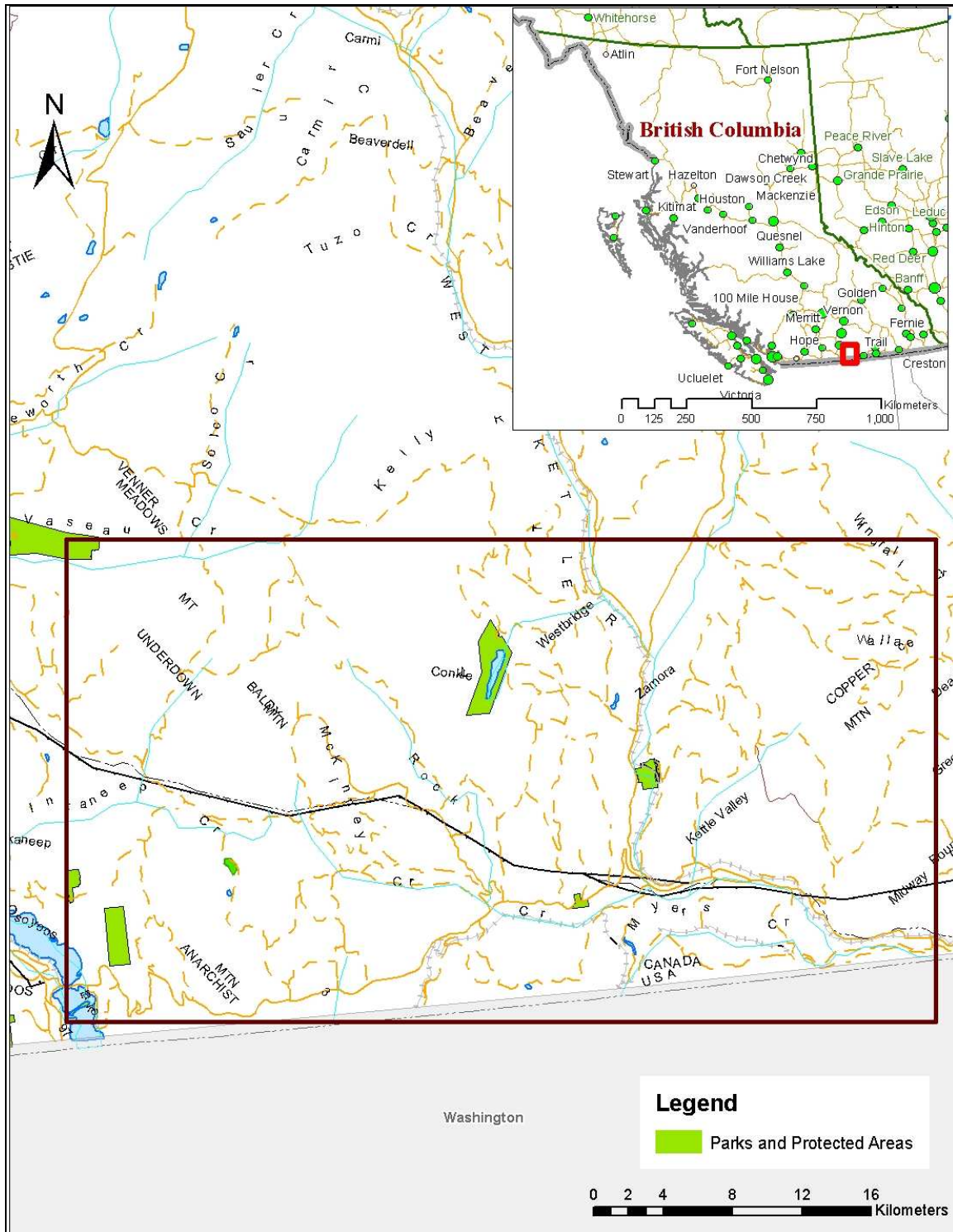


Figure 1. Study Area

METHODS

The crew received training from Dennis St. John, local lepidopterist, in identification of *S. m. erinna* and its habitat. Surveyors visited sites previously surveyed by Norbert Kondla and Dennis St. John where the *erinna* subspecies of Mormon Fritillary was known to occur. The crew were advised of when and where to survey by Dennis St. John, who had been monitoring sites where Mormon Fritillaries were known to occur, to determine when their flight period began.

Mormon Fritillaries were distinguished from other fritillaries by a variety of diagnostic characteristics. These included size, ground colour of fore and hind wing, wing patterning and eye colour. A detailed description and comparison of diagnostic features used to identify *S. m. erinna* is presented in Appendix A. Location also was an indication of subspecies. Mormon Fritillaries found in the past near Conkle Lake, in the Rock Creek area and South and East of Mt Baldy had been confirmed by Norbert Kondla as being *S. m. erinna*.

Surveys were conducted between 0900 and 1600 hours on warm, sunny days during the peak of *S. m. erinna*'s flight period (August). Surveys were not attempted during inclement weather and were cut short, if necessary.

Search stations were placed in locations deemed potential suitable habitat. These were openings within denser forest canopy (larch, lodgepole pine, ponderosa pine) that contained medium to large patches of nectaring plants such as pearly everlasting (*Anaphalis margaritacea*), yarrow (*Achillea millefolium*), and thistle species. Search criteria were based on areas where *Speyeria* butterflies, including *S. m. erinna*, had been found either in the past or during training in 2009.

Surveyors drove along roads to locate potential survey stations. These were paved and dirt roads that branched north or south off Hwy 3 and the Camp McKinney/Mt. Baldy road between Anarchist Mountain and Midway (Figure 1). Surveyors stopped at locations with potentially suitable habitat where fritillaries were observed flying and/or where patches of nectar plants were found. Not all patches of potentially suitable habitat were searched. Surveyors chose patches to survey randomly and often targeted larger patches of nectar plants. This was done to optimize search time and survey more area within the short flight period window.

Sites searched were marked as search stations. These consisted of small openings (0.5-2 hectares) and surveyors wandered randomly back and forth within these openings to catch and identify fritillaries.

Most fritillaries observed had to be caught at first until surveyors became confident with separating Mormon Fritillaries and other fritillary species. Surveyors noted the presence of other butterflies and listed them to subfamily but did not identify them to species. Surveyors collected specimens and took pictures of Mormon Fritillaries to verify identification. Collected specimens were verified by Dennis St. John, local lepidopterist and deposited with Rob Cannings of the Royal British Columbia Museum.

When a *S. m. erinna* was observed, the following information was recorded: date, time, location (Universal Transvers Mercator (UTM), North American Datum (NAD) 83), elevation, presence of flowering nectar plants and general habitat notes. A count of *erinna* was not attempted at sites because there often were many fritillaries of various species flying in an area, making an accurate count difficult to obtain. All records were reported as a count of 1.

Surveyors used handheld Garmin GPS units (GPSmap 60Cx and GPSmap76Cx) to record stations and detections. All UTM locations were downloaded to a .txt file using the Garmin MapSource 6.15 mapping program and entered into a Microsoft Excel spreadsheet. The Excel files were then converted to a shapefile using ESRI ArcMap 9.2. The 2009 *erinna* results were mapped and compared with Mormon Fritillary detection databases from Crispin Guppy (2006 data), Norbert Kondla (1998 – 2002 data) and Dennis St. John (D. St. John, pers. comm). Guppy and Kondla data was kindly provided to the BC Conservation Data Centre, which provided it to us for this report. This was used to identify the study area for surveys in 2009.

Detections or clusters of detections were identified as a separate location if they were >3km from another detection. Each location was given a name based on road names and/or nearby gazetted features. We identified land ownership (Crown or private) at each detection site, from digital ownership data available from the BC Land Resource and Data Warehouse.

All results, including spreadsheets and reports, were submitted to the Ministry of Environment's Wildlife Species Inventory database.

RESULTS

The first *S. m. erinna* of 2009, observed by D. St. John were on the W Johnstone Crk Rd. (Conkle Lk Rd) on July 21st. Previous visits to this site were July 1st, no *Speyeria* species were observed that day, and July 2nd where *S. callipe*, *S. atlantis* and *S. hydaspe* were observed but no *S. m. erinna*. D. St. John returned to this area on July 29th and August 2nd, 5th and 19th and observed *S. m. erinna*. The Rock Creek-Bridesville Road area also was visited on August 5th during training but no *S. m. erinna* were observed. D. St. John also visited this area on the week of the 16th of August and detected *erinna*. The Conservation Corps crew revisited this road on August 25th and also detected *S. m. erinna*.

Surveys were conducted between August 5th and 26th for a total of 9 survey days. This resulted in 80 search stations, 9 of which had *S. m. erinna* detections (Figure 2). All *S. m. erinna* were flying when detected.

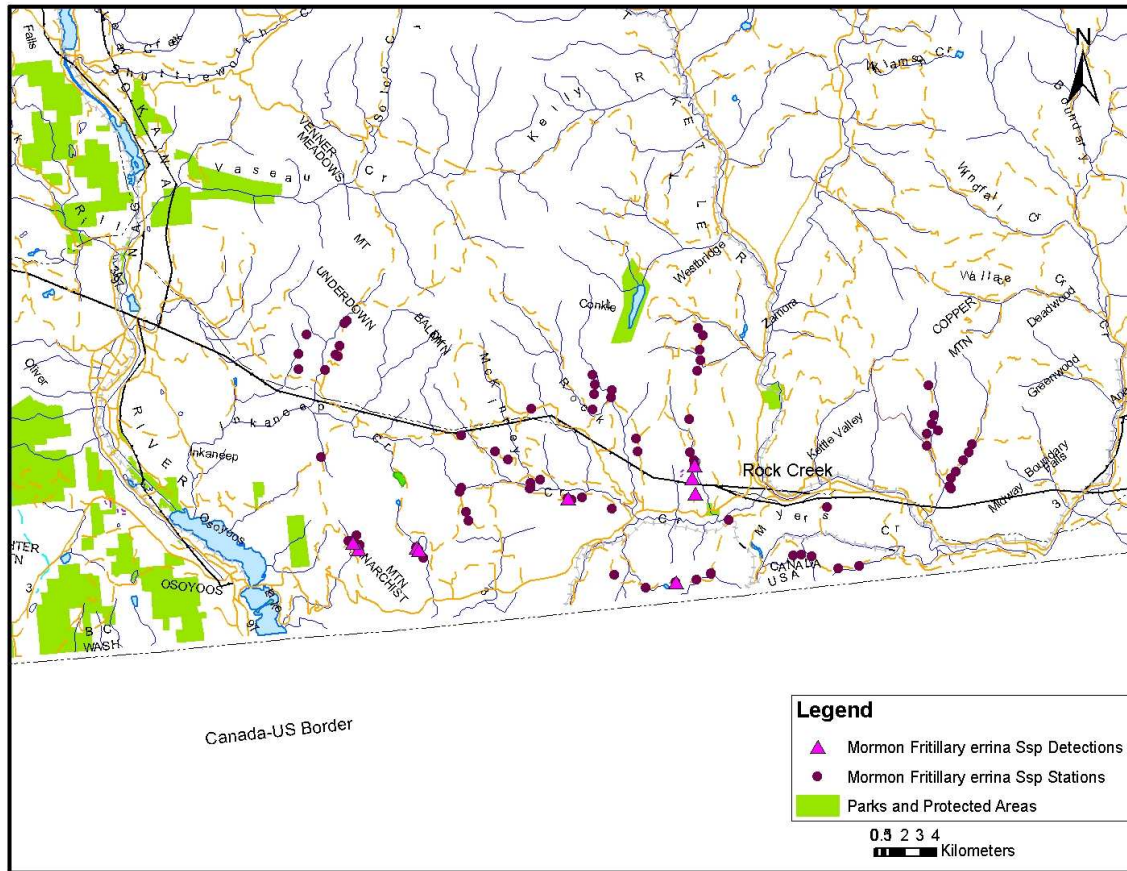


Figure 2. Survey stations and detections of *Speyeria mormonia erinna* in the Okanagan and Boundary region from BC Conservation Corps 2009 surveys.

Three *erinna* locations were known in BC prior to 2009 (Figure 3) based on data from Norbert Kondla (2003) and supported by data from Dennis St. John (D. St. John, pers. comm.). One additional record from Guppy (2006) on Baldy Mountain was considered but it did not identify the subspecies and is in a zone of potential overlap between subspecies (D. St. John, pers. comm.) so was not displayed here or considered an *erinna* location. Similarly, on the north side of Baldy Mountain, Dennis St. John had three records of *S. mormonia* which were not confidently identified as *erinna* (D. St. John, pers. comm.). If confirmed as *erinna*, these would constitute an additional two locations. Additional work is required in this area to determine the northern extent of the subspecies.

Two of the 3 previously known locations were confirmed by the BC Conservation Corps crew in 2009 (Conkle Lake Road, Rock Creek-Bridesville Road). The third location was not checked by the BC Conservation Corps crew, but was confirmed by Dennis St. John (D. St. John, pers. comm.). Three new locations were identified in 2009 (McKinney Cr., Raven Hill, Bull Moose). A total of 6 locations for *erinna* have been identified in BC between 1998 and 2009 (Figure 3).

Ownership varies for the 6 locations, with 2 on Crown land, 2 on private property and 2

with detections on Crown and private land (Table 1).

The elevation range of detections was approximately 1030m to 1740m Above Sea Level.

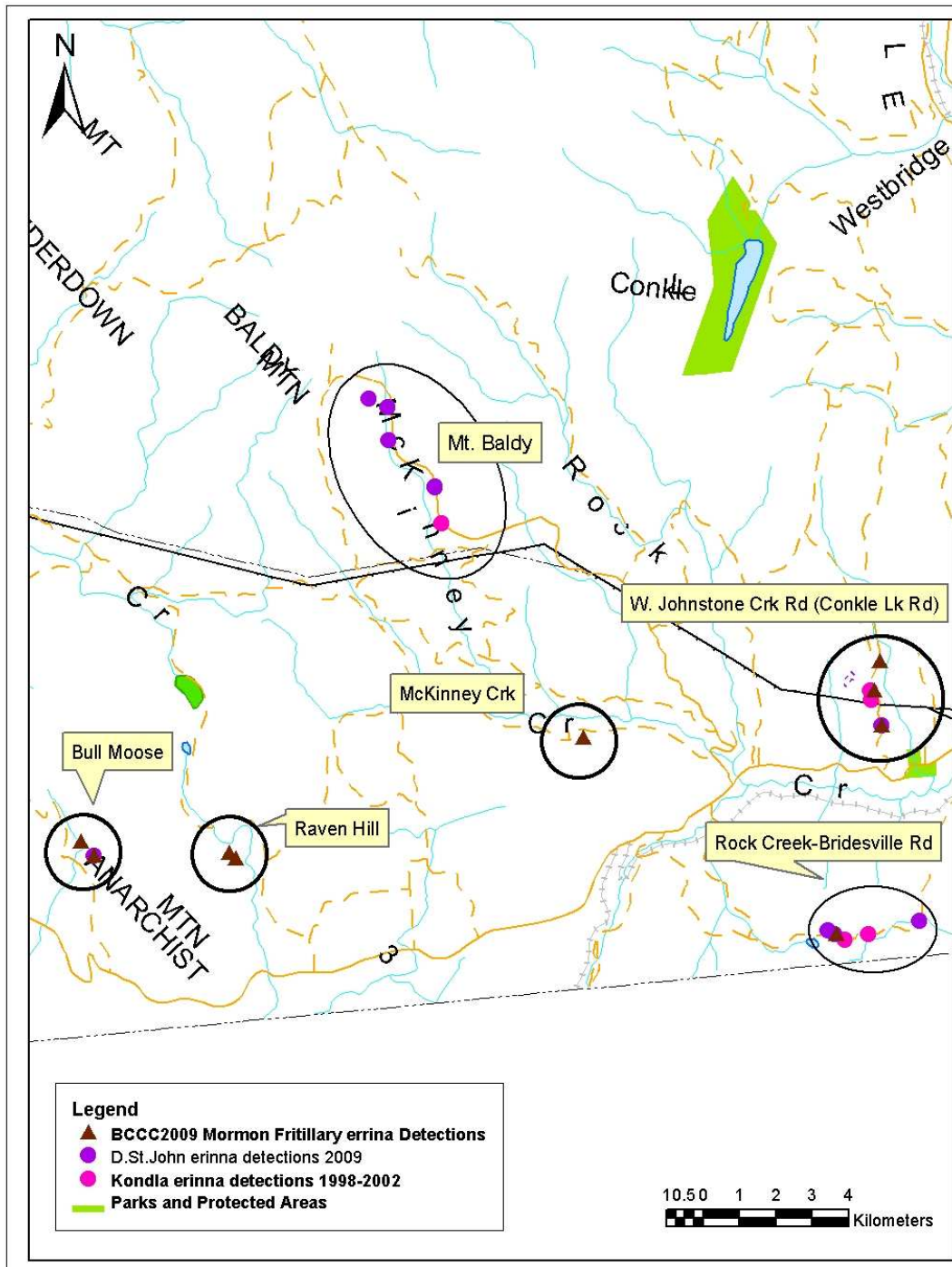


Figure 3: Locations and detections of *Speyeria mormonia* ssp. *erinna* from 1998 to 2009

Table 1. Locations and detections of *Speyeria mormonia* ssp. *erinna* (1998 to 2009)

Location and status	Date	UTM of <i>S. m. erinna</i> detections	Elev. (m)*	Ownership	Voucher #	Habitat/Comments
Location of previous detections by N. Kondla	5-Aug-09	11/349386/5435925	1031	Crown Land (NOI Transportation)		Open area on side of rd with patches of thistle, yarrow, St. John's wart surrounded by Larch and lodgepole pine forest
	Summer 2009	11/349386/5435925	1031	Crown Land (NOI Transportation)		Dennis St. John collected ~30 <i>S. m. erinna</i> specimens from this site over the course of the summer (dates include July 21, 29, Aug 2, 5 and 19).
	5-Aug-09	11/349313/5436904	1039	Crown Land		Open area on side of rd with a few small patches of yarrow surrounded by Larch and lodgepole pine forest.
	18-Aug-09	11/349577/5437705	1044	Crown Land		Dirt roadside clearing in larch/lodgepole pine (Figure 4). Weedy. A few thistles.
Location of previous detections by N. Kondla	25-Aug-09	11/347445/5430382	1275	Private Property		Roadside with thistles and mustard. Open fields on each side of road.
	Week of Aug 16 2009	11/347402/5430376	1275 approx	Private Property		Dennis St. John observed <i>S. m. erinna</i> at this UTM.
	Week of Aug 16 2009	11/347215/5430526	1275 approx	Private Property		Dennis St. John observed <i>S. m. erinna</i> at this UTM.
	Week of Aug 16 2009	11/349746/5430452	1050 approx	Private Property		Dennis St. John collected an <i>S. m. erinna</i> specimen from this location.
New Location	6-Aug-09	11/327456/5435073	1160	Private Property	BCCC 09-20, BCCC 09-21	Small opening at road junction with yarrow and pearly everlast in larch, lodgepole pine and trembling aspen forest.
	19-Aug-09	11/327456/5435073	1160	Private Property		Dennis St. John collected a <i>S. m. erinna</i> specimen confirming the location.
	6-Aug-09	11/327141/5435501	1156	Crown Land	BCCC 09-22	Small opening at road junction with yarrow and pearly everlast in larch, lodgepole pine and trembling aspen forest.
New Location	17-Aug-09	11/341213/5436615	1147	Crown Land (Forest Management Unit)	BCCC 09-23	Opening along road with yarrow and thistles and pearly everlasting.

Location and status	Date	UTM of <i>S. m. erinna</i> detections	Elev. (m)*	Ownership	Voucher #	Habitat/Comments
Raven Hill Rd (Regal Ridge) New Location	19-Aug-09	11/331145/5434694	1248	Private Property	BCCC 09-25	Old clearcut area, very open with large patches of thistle, grasses, cheatgrass, houndstongue, yarrow and mullein throughout.
	19-Aug-09	11/331308/5434508	1227	Private Property	BCCC 09-26	
Mt. Baldy – Previous detection by Kondla. BCCC did not survey in 2009 (see note in paragraph above). 2009 detections are from Dennis St. John	Aug 2002	N490706 W1191309	1538 approx	Crown Land (Forest Management Unit)		Recorded by Kondla.
	2-Aug-2009	11/338030/5443992	1500 approx	Crown Land (Forest Management Unit)		Multiple specimens recorded from this site. (Collected a specimen here on July 25, 2009 identified as possible <i>erinna</i> ; however, it is suspicious because it's early for the elevation and was both unsilvered and brown/yellow rather than blue eyed).
		11/336932/5445436	1600 approx	Crown Land (Forest Management Unit)		
		11/336516/5446635	1740 approx	Private Property		
		11/337010/5446340	1680 approx	Crown Land (Forest Management Unit)		

*elevation was taken by two different GPS units. Elevation for detections by Dennis St. John and Kondla were estimated from map.



Figure 4. Habitat in which *S. m. erinna* was detected August 18, 2009, W Johnstone Creek Rd. (aka Conkle Lake Rd). This was the northern-most detection along this road in 2009 (11/349577/ 5437705). Photo courtesy of Vicky Young, BCCC.

Other butterflies were observed at all search stations during the surveys. These were mostly identified to Subfamily and included: *Coliadinae* (Sulphurs), *Lycaeninae* (Coppers), *Polyommatae* (Blues), *Melitaeinae* (Crescents), *Hesperiinae* (Grass Skippers), *Pierinae* (Whites), *Satyrinae* (Satyrs). Other fritillaries observed were grouped as “larger fritillaries or *Speyeria*” and could have included: *S. zerene*, *S. callipe*, *S. atlantis*, *S. hesperis* and *S. hydaspes*. *S. cybele* (Great Spangled Fritillary) was also observed in the Boundary region on the Rock Creek-Bridesville Rd and Ingram Crk Rd. These were based on identification of *Speyeria* butterflies found in the area during training with D. St. John.

DISCUSSION

This inventory covered the majority of accessible roads from Anarchist Mountain to Midway, north and south of Hwy 3, and resulted in a focused search of *S. m. erinna*. It succeeded in documenting the occurrence of *S. m. erinna* at 3 new locations and reconfirming their presence at 2 known locations. Dennis St. John’s visits confirmed *erinna* presence at the final known location. This was based on previous known locations as detected by N. Kondla (1998 – 2002) and Dennis St. John (D. St. John, pers. comm.). Crispin Guppy’s Mormon Fritillary detections (2006) were not included in our results

because they were not separated by subspecies in the data provided and only one of Guppy's Mormon Fritillary detections occurred in our study area near Mt. Baldy.

Although surveyors searched a large area it was difficult to determine the attributes of suitable *S. m. erinna* habitat based on this year's findings. *S. m. erinna* seemed to occur in isolated patches. Searching roadside patches of thistle, pearly everlasting and yarrow proved an effective way to target habitats inhabited by fritillaries in general, but surveyors were not able to predict the presence of suitable *S. m. erinna* habitat with confidence or accuracy. To optimize search time surveyors did not search every area encountered that had nectar plants or fritillaries present. Although these areas were not uniform throughout the landscape they were encountered more often than search stations reflect. Fritillaries also were observed flying along roads while driving and identification of these was done when possible.

Habitat attributes at detection sites did not seem to differ from other searched areas with no detections. This observation is based on surveyor perceptions of general habitat attributes recorded at each station. See Table 1 and associated data spreadsheet for general habitat descriptions. *S. m. erinna* distribution could be linked to that of its host larval plant species (violets but species unknown). Violets were no longer visible in late August when adults were in flight and so were not noted during these surveys. Most violet species that occur in *S. m. erinna*'s range are flowering from May to July depending on weather (D. St. John, pers. comm.). Searching known sites for and identifying potential larval host plants while they are flowering may help clarify *S. m. erinna* associated habitat and distribution questions.

Specimens and pictures taken during the inventory could help address questions around the separation and identification of the *opis* and *erinna* subspecies for future surveyors. It should be noted, however, that photographs of specimens may have a limited use. They can be time consuming to take, and it can be very difficult to obtain a clear focused photograph of the butterfly. Handling is required and can obscure important diagnostic characteristics. Furthermore, silvering on the wings is not always obvious in photographs (D. St. John, pers. comm.). Voucher specimens are recommended when required. Voucher specimens could also be used for future DNA analysis if needed.

The information gathered during these surveys was limited to presence/not detected but can be used to inform future inventory efforts and help implement Conservation Framework actions. Further inventory and research is recommended to inform management decisions and help clarify species ranking.

RECOMMENDATIONS

- Ensure surveyors receive expert training in species and habitat recognition.
- Ensure that surveyors have continued access to expert advice to facilitate correct species identifications.
- Collect material for genetic analysis for comparison of the *opis* and *erinna* subspecies.
- Conduct additional inventories in habitat that is not road side to get better estimate of distribution.
- Continue to search for the eastern and northernmost boundaries of *S. m. erinna* occurrence in Canada.
- Map distribution of host plant violet species and adult distribution to try to resolve potential habitat association.

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Appendix A

Mormon Fritillary Identification

There can be much variation within a butterfly species' diagnostic characteristics. The characteristics listed below were used to identify Mormon Fritillary *erinna* ssp. in the southern interior of BC.

Identification characteristics between Mormon Fritillaries and other fritillaries.

Mormon Fritillaries:

- Generally smaller than other fritillaries.
- Background colour on the dorsal wings lacks darker patch near the body. (The circled area in the photo would be much darker on other fritillaries that occur within *erinna*'s range).



Photo courtesy of Vicky Young, BCCC.

Diagnostic characteristics for the Mormon Fritillary *erinna* and *opis** sub-species of Mormon Fritillary

Photographs courtesy of Vicky Young and Dawn Marks, BCCC. Collected specimens provided for photographing courtesy of Dennis St. John.

*(The specimen used for the *opis* pictures was collected at Apex Mountain)



erinna ssp.

Generally lighter ground colouring on ventral hindwing with very little, to no green colouring near the body (circled area). If green does occur, it never spreads to include the whole discal region as generally occurs in *opis* of the Okanagan.



opis ssp.

Darker ground colouring on ventral hindwing with green colouring covering most of ventral hindwing. Green colouring does not show up very well in photographs.



Variation in ground colouring of *erinna* ssp. – this *erinna* specimen has more solid red-brown ground colouring on its ventral hindwing than the one above yet has less than other fritillaries. There is also no green colouring on its ventral hindwing like the *opis* ssp. would.

Both subspecies can occur as silvered or unsilvered but a higher percentage of *erinna* individuals are silvered. *Opis* is referred to as “silvered” and *erinna* is referred to as “unsilvered” by Guppy and Shepard, but this is thought to be an error, as field observations indicate that *erinna* are more consistently silvered than *opis* (D. St. John, pers. comm.). Silvering is the somewhat reflective, silvery colouring of the large, light spots on the ventral hind wing. The spots on unsilvered butterflies are less reflective and whitish. This characteristic does not always show up well in photographs.



Silvered *erinna* ssp.



Silvered *opis* ssp.



Unsilvered *erinna* ssp.



Unsilvered *opis* ssp.

Mormon Fritillary *erinna* ssp. often has blue eyes, when alive. *Opis* ssp. eye colour is variable from site to site, either blue or yellow/brown. This can be difficult to determine in the field and does not apply to collected specimens, since the blue eye colour becomes darker, closer to brown, after death (Dennis St. John, pers. comm.).



erinna ssp.