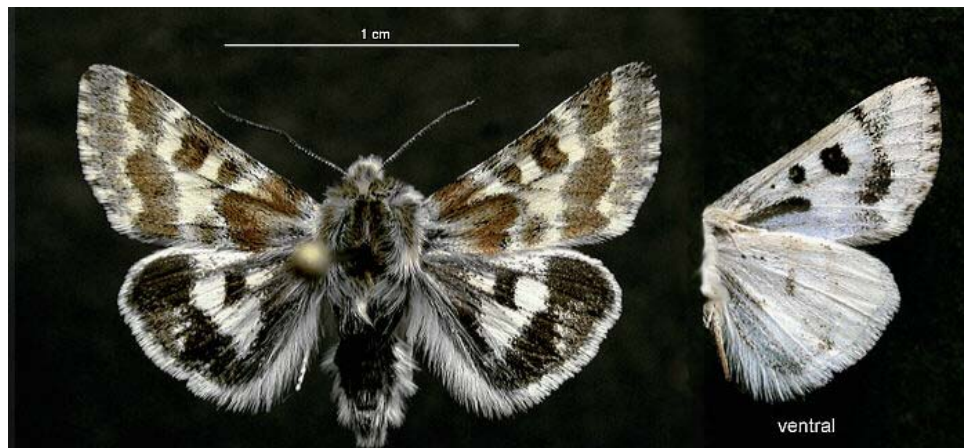


COSEWIC
Assessment and Status Report

on the

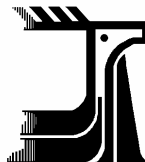
Verna's Flower Moth
Schinia verna

in Canada



THREATENED
2005

COSEWIC
COMMITTEE ON THE STATUS OF
ENDANGERED WILDLIFE
IN CANADA



COSEPAC
COMITÉ SUR LA SITUATION
DES ESPÈCES EN PÉRIL
AU CANADA

COSEWIC status reports are working documents used in assigning the status of wildlife species suspected of being at risk. This report may be cited as follows:

COSEWIC 2005. COSEWIC assessment and status report on the Verna's Flower Moth *Schinia verna* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 19 pp. (www.sararegistry.gc.ca/status/status_e.cfm).

Production note:

COSEWIC would like to acknowledge B. Christian Schmidt and Gary G. Anweiler for writing the status report on the Verna's Flower Moth *Schinia verna* prepared under contract with Environment Canada, overseen and edited by Theresa Fowler, the COSEWIC Arthropods Species Specialist Subcommittee Co-chair.

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Également disponible en français sous le titre Évaluation et Rapport de situation du COSEPAC sur l'héliotin de Verna (*Schinia verna*) au Canada.

Cover illustration:
Verna's Flower Moth — Photograph by Gary G. Anweiler.

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Catalogue No. CW69-14/447-2005E-PDF
ISBN 0-662-40658-3
HTML: CW69-14/447-2005E-HTML
0-662-40659-1



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COSEWIC Assessment Summary

Assessment Summary – May 2005

Common name

Verna's Flower Moth

Scientific name

Schinia verna

Status

Threatened

Reason for designation

This moth is found only in the Canadian prairies, with one extant site in southeastern Alberta. The species is known historically from very few locations despite its relatively large size, distinctive markings and day-flying habit. It has a small total range in suitable native prairie that is fragmented and declining in quality and extent.

Occurrence

Alberta, Saskatchewan, Manitoba

Status history

Designated Threatened in May 2005. Assessment based on a new status report.



COSEWIC
Executive Summary

Verna's Flower Moth
Schinia verna

Species information

Verna's Flower Moth is a small, day-active, owlet moth. The forewings are contrastingly marked with olive-brown and maroon on a white background. The hindwings are black and white, giving the moth an overall checkered appearance.

Owlet moths have a worldwide distribution and are one of the most speciose (having many species) moths. They are generally stout-bodied and medium-sized. Almost all owlets feed on plants and include the economically important cutworm moths.

Verna's Flower Moth was described as a new species relatively recently (1983). Not many data on its biology and distribution have accumulated. The moth's apparently restricted range and habitat requirements may explain the paucity of records.

Distribution

Verna's Flower Moth occurs in the Canadian prairie provinces from southern Manitoba to southeastern Alberta. It may be a Canadian endemic species.

Habitat

Verna's Flower Moth inhabits sparsely vegetated prairie grasslands where colonies of pussytoes, the larval foodplant, occur.

Biology

Unlike most moths, Verna's Flower Moth is active only during the day. Moths, like butterflies, have a life cycle consisting of complete metamorphosis from egg to larva to pupa to adult. This life cycle takes one year to complete. Adults have been collected from the third week of May to mid-June. Their flight period is closely synchronized with the blooming of pussytoes, the larval food plant. The larvae are known to feed only on the seeds and flowers of pussytoes. Pupae overwinter in shallow underground chambers.

Population sizes and trends

No data are currently available.

Limiting factors and threats

The occurrence of Verna's Flower Moth is undoubtedly limited by the availability of appropriate native prairie grassland with populations of the food plant. More specific data on host plant and habitat requirements are needed. Light to moderate grazing may be necessary to maintain larval food plant patches of suitable size and quality.

Special significance of the species

The known global range of Verna's Flower Moth is restricted to the Canadian prairie grassland and parkland region. There are currently four localities from which the moth has been recorded.

Existing protection or other status designations

There are no existing status designations and no specific protection for this species.



COSEWIC HISTORY

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) was created in 1977 as a result of a recommendation at the Federal-Provincial Wildlife Conference held in 1976. It arose from the need for a single, official, scientifically sound, national listing of wildlife species at risk. In 1978, COSEWIC designated its first species and produced its first list of Canadian species at risk. Species designated at meetings of the full committee are added to the list. On June 5, 2003, the *Species at Risk Act* (SARA) was proclaimed. SARA establishes COSEWIC as an advisory body ensuring that species will continue to be assessed under a rigorous and independent scientific process.

COSEWIC MANDATE

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assesses the national status of wild species, subspecies, varieties, or other designatable units that are considered to be at risk in Canada. Designations are made on native species for the following taxonomic groups: mammals, birds, reptiles, amphibians, fishes, arthropods, molluscs, vascular plants, mosses, and lichens.

COSEWIC MEMBERSHIP

COSEWIC comprises members from each provincial and territorial government wildlife agency, four federal agencies (Canadian Wildlife Service, Parks Canada Agency, Department of Fisheries and Oceans, and the Federal Biodiversity Information Partnership, chaired by the Canadian Museum of Nature), three non-government members and the co-chairs of the species specialist and the Aboriginal Traditional Knowledge subcommittees. The Committee meets to consider status reports on candidate species.

DEFINITIONS (NOVEMBER 2004)

Wildlife Species	A species, subspecies, variety, or geographically or genetically distinct population of animal, plant or other organism, other than a bacterium or virus, that is wild by nature and it is either native to Canada or has extended its range into Canada without human intervention and has been present in Canada for at least 50 years.
Extinct (X)	A wildlife species that no longer exists.
Extirpated (XT)	A wildlife species no longer existing in the wild in Canada, but occurring elsewhere.
Endangered (E)	A wildlife species facing imminent extirpation or extinction.
Threatened (T)	A wildlife species likely to become endangered if limiting factors are not reversed.
Special Concern (SC)*	A wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats.
Not at Risk (NAR)**	A wildlife species that has been evaluated and found to be not at risk of extinction given the current circumstances.
Data Deficient (DD)***	A wildlife species for which there is inadequate information to make a direct, or indirect, assessment of its risk of extinction.

* Formerly described as "Vulnerable" from 1990 to 1999, or "Rare" prior to 1990.

** Formerly described as "Not In Any Category", or "No Designation Required."

*** Formerly described as "Indeterminate" from 1994 to 1999 or "ISIBD" (insufficient scientific information on which to base a designation) prior to 1994.



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The Canadian Wildlife Service, Environment Canada, provides full administrative and financial support to the COSEWIC Secretariat.

COSEWIC Status Report

on the

Verna's Flower Moth

Schinia verna

in Canada

2005

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SPECIES INFORMATION

Name and classification

Although first collected by F.S. Carr in 1929, *Schinia verna* was described by David Hardwick in 1983, four years after he discovered it near Glenboro, Manitoba (Hardwick 1983). The type specimens are in the Canadian National Collection of Insects, Arachnids and Nematodes, Ottawa (Hardwick 1983, D. Lafontaine, pers. com.). Hooper (1996) was apparently the first to apply the common name “Verna Flower Moth”; it should be noted, however, that *S. verna* was named for Hardwick's wife Verna (Hardwick 1983). In keeping with the convention of common names honouring people, the common name is here emended to Verna's Flower Moth.

Verna's Flower Moth is one of about 150 species of flower moths (Heliiothinae) in North America, a subfamily of the owlet moths (Noctuidae) (Hardwick 1996). The genus *Schinia* contains about 120 species worldwide, the majority of which occur in temperate North America (Hardwick 1970, 1996). *Schinia* flower moths are most diverse in the arid grasslands and deserts of the western United States.

Schinia verna is closely related to *Schinia honesta*, a slightly larger, darker species that ranges from southwestern Alberta and southern British Columbia south to California and Colorado (Hardwick 1996, Anweiler 2003). A single specimen allied to *S. verna* and *S. honesta* was collected in sand-dune habitat of south-central Washington state (Appendix 1). It exhibits colouration typical of *S. verna*, yet is larger like *S. honesta* (Hardwick 1996). More work is needed to clarify the relationship between *S. verna*, *S. honesta* and the Washington population. The sole record for Washington state is widely separated from the populations of the Canadian prairie provinces and may represent a disjunct population that inhabits the intermontane grasslands of the Columbia basin. Given the difference in appearance and habitat types between prairie *S. verna* and the Washington population, in addition to the absence of intervening populations, it is premature to assign the Washington population to *S. verna*.

Description

Verna's Flower Moth is relatively small, with a wingspan of about 20 mm. The sexes are similar in appearance. The dorsal forewing is olive-brown suffused with dull maroon or red-brown with whitish patches (Figure 1). The forewing fringe is striped white and grey. The dorsal surface of the hindwing is boldly patterned in black and white; its wing margin consists of a broad black band with several faint white spots, and a black median spot adjoins the black inner margin. On the ventral side, the dark markings are greatly reduced and the hindwing is almost entirely white. The underside of the forewing is white with black markings restricted to the mid- and basal areas.

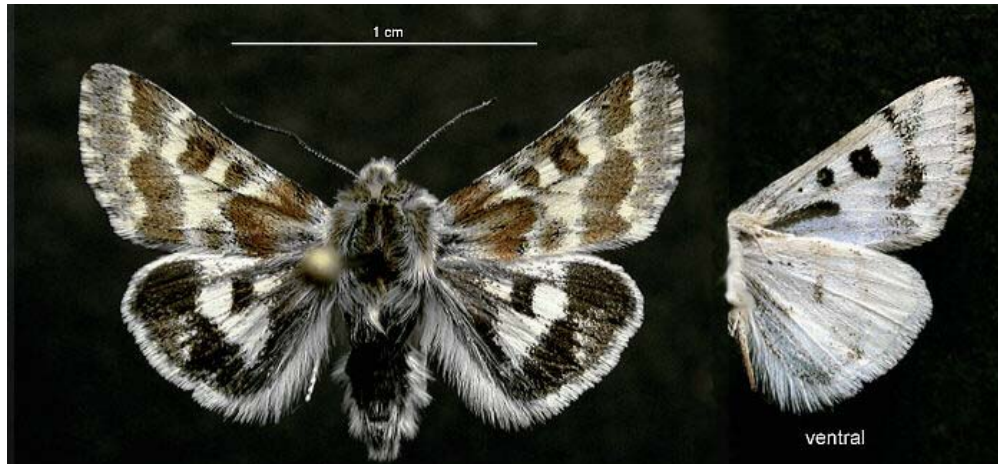


Figure 1. Verna's Flower Moth (*Schinia verna*). Red Deer R. valley north of Jenner, AB. 19 May 2000 (G. Anweiler photo).

The egg is large and translucent-white when first laid, becoming suffused with pink within two days (Hardwick 1996). The mature larva is pale greenish-white with a yellow-green transverse band across each segment. Rows of prominent black spots occur along the back and sides. The pupa is light orange in colour (Hardwick 1996).

Colour illustrations of Verna's Flower Moth adults and larvae are available in Hardwick (1983, 1996). Images of the adult are also available at the University of Alberta Strickland Entomological Museum website (<http://entomology.ualberta.ca/>) and the Agriculture and Agri-food Canada Moths of Canada website (<http://www.cbif.gc.ca/moths/noctuoidea/index.htm>). *Schinia verna* flies with, and is superficially similar to, *Eutricopis nexilis* (Morr.), but the latter is smaller and has two rather than three white patches on the hindwing. *Schinia persimilis* (Grote) is also similar to *S. verna*, and the two may fly together in the Cypress Hills of AB/SK and southwestern AB, where the montane and prairie habitats of *S. persimilis* and *S. verna* (respectively) are juxtaposed. *Schinia persimilis* can be distinguished by the evenly curved borders of the forewing postmedian band (jagged in *S. verna*) and solid black hindwing border. There are currently no published identification keys to the species of *Schinia*, and identification should be confirmed by an experienced lepidopterist through comparison to reference specimens or images.

DISTRIBUTION

Global range

Schinia verna has been collected in mid-western North America from southwestern Manitoba to southeastern Alberta (Figure 2). It may be a Canadian endemic species.



Figure 2. Known global distribution of Verna's Flower Moth, if the species is still extant at all sites from which it has been recorded.

Canadian range

All four of the reported global occurrences of Verna's Flower Moth are in the prairie provinces, from Spruce Woods Provincial Park, MB west to Jenner and Medicine Hat, AB (Figure 3), and cover a total area of approximately 128,000 km². On average, about 25% of the prairie ecoregion still supports native grasslands (Statistics Canada 1992). If no more than half of the native grasslands provide suitable *Antennaria* habitat, the area of occupancy for *S. verna* would be no greater than 16,000 km². However, the paucity of records for this moth indicates that it is highly likely that not all prairie types are inhabited by *S. verna*. Also, some remaining prairies have been degraded by such activities as overgrazing or have been invaded by shrubby vegetation or exotic weeds and no longer support the full complement of native species. Consequently, the actual area of occupancy of *S. verna* is likely very much smaller than the maximum area of native prairie supporting *Antennaria*. Given the rarity of records of the moth, it is quite possible that the actual area of occupancy is less than 2,000 km², but until the moth's precise habitat is known, a more precise estimate is not possible.

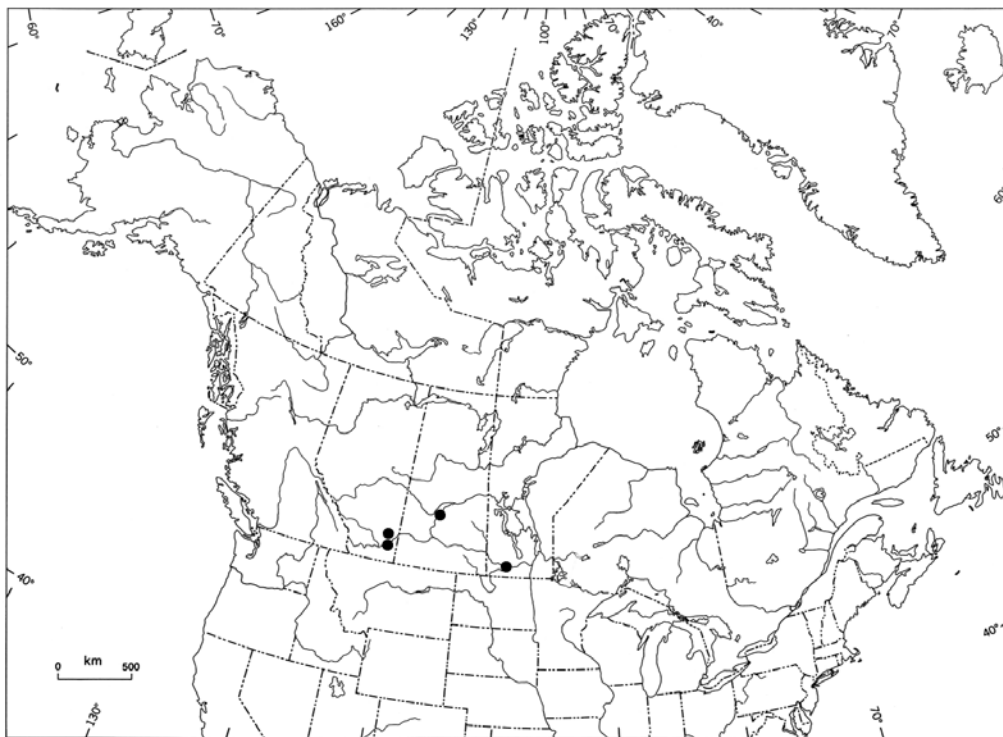


Figure 3. Canadian collection localities of Verna's Flower Moth.

The earliest record of *S. verna* is from the Medicine Hat area, AB where one specimen was collected by F.S. Carr in 1929. David and Verna Hardwick collected the type series (18 specimens) north of Glenboro, MB in 1979, and one specimen was

collected in the vicinity of Saskatoon, SK (collector unknown) in 1980 (Appendix 1). The most recent Canadian record is a single fresh specimen collected by G. Anweiler in the Red Deer River valley north of Jenner, AB in late May, 2000 (Figure 4; Appendix 1). Two of these localities (Glenboro, MB and Jenner, AB) were surveyed in 2003 and one (Jenner) in 2004. Because of the vagueness of the historical collections from the Medicine Hat and Saskatoon areas, it is impossible to determine if these sites still support *S. verna*; however, suitable native grassland habitat still exists in the general vicinity of all the historical and recent *S. verna* localities.

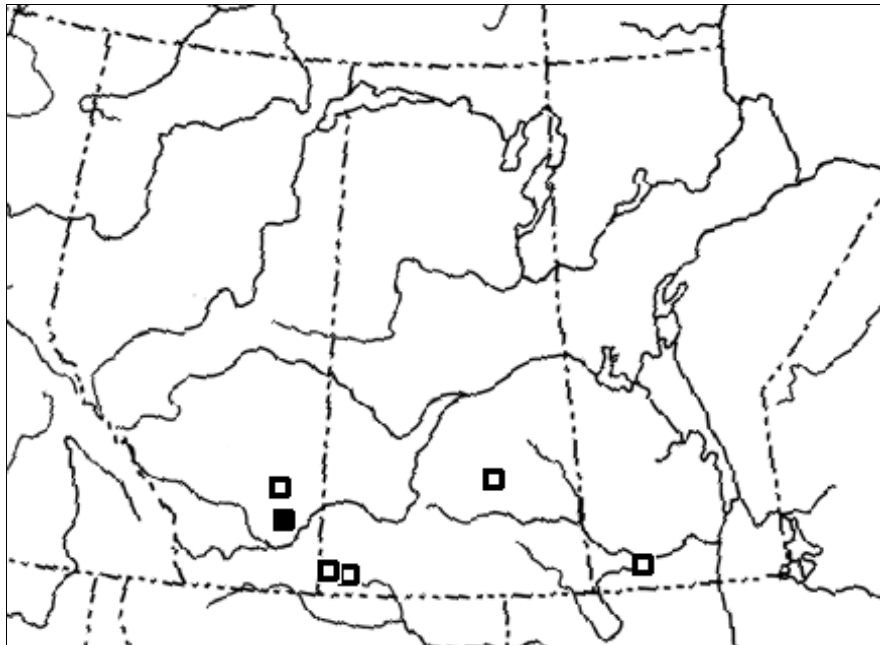


Figure 4. Sites surveyed for *S. verna* in 2003 and 2004. The solid square indicates the extant colony at the Jenner site (see Appendix 1).

HABITAT

Habitat requirements

Schinia verna occurs in sparsely vegetated prairie grassland with colonies of the larval food plant, *Antennaria* spp. (pussytoes). The habitat near Glenboro, MB was described by Hardwick (1983) as a cattle-grazed meadow supporting various spring-blooming flowers in a region partially wooded with spruce and aspen. Potentially suitable habitat in the Glenboro region was surveyed in 2003; visited sites consisted of native, sandy pastures supporting *Antennaria* spp., *Geum triflorum* (three-flowered avens), *Cerastium* sp. (chickweed), *Lithospermum* sp. (puccoon), and *Carex* sp. (sedge) (Figure 5). Near Jenner, AB, *S. verna* was found in 2000 at the base of the north-facing valley grassland slope. Subsequent surveying of this site in 2003 showed

that *Antennaria* was common on vegetated, north-facing valley sides and was growing in association with *Geum triflorum* and *Koeleria macrantha* (June grass) (Figure 6). At both the Glenboro and Jenner sites, *S. verna* flies together with another superficially similar but more widespread and common *Antennaria*-feeding flower moth, the White-spotted Midget (*Eutricopis nexilis*) (Hardwick 1983; C. Schmidt, unpubl. data). The abundance of *E. nexilis* at several of the surveyed sites (Jenner and Big Stone, AB) suggests this species has broader or slightly different *Antennaria* species preferences compared to *S. verna*, and *S. nexilis* is not necessarily an indicator of suitable *S. verna* habitat.



Figure 5. Habitat of Verna's Flower Moth, 8 km NNE of Glenboro, MB (C. Schmidt photo).



Figure 6. Habitat of Verna's Flower Moth, 10 km N of Jenner, AB (C. Schmidt photo).

Livestock grazing may be required to maintain adequately large patches of flowering *Antennaria* to support colonies of *Antennaria*-feeding flower moths such as *S. verna*. Both the Jenner and Glenboro sites were experiencing some grazing pressure (Hardwick 1983; Schmidt and Anweiler, unpubl. data). Although *Antennaria* may be present as non-blooming mats in grasslands with a thick overstory of ungrazed grasses, flowering *Antennaria* plants (flowering is induced by grazing or fire) are a prerequisite for hosting flower moths because flowers and seeds are consumed by larvae. In addition to historical collection localities, sites also surveyed in 2003 for *S. verna* were selected based primarily on the presence of *Antennaria* patches (Appendix 2). Although these sites often supported large patches of flowering *Antennaria* and/or *Eutricopis nexilis* flower moths, *S. verna* was not found at any of them. This may indicate that not all species of *Antennaria*, such as the widespread and often weedy *A. parvifolia* Nutt. (small-leaved pussytoes) found in moderately grazed and overgrazed grasslands, are suitable host plants.

Verna's Flower Moth is restricted to grassland habitats of the Prairie Ecozone, so far as is known. The Glenboro, MB and Saskatoon, SK sites are within the Aspen Parkland Ecoregion, while the Medicine Hat and Jenner, AB sites are characterized as Mixed Grassland (Gauthier *et al.* 2001). The Aspen Parkland sites are likely at the northern periphery of *S. verna's* range, and suitable habitat should also occur throughout the Moist Mixed Grassland Ecoregion situated between the Parkland and Mixed Grassland regions. Numerous *Antennaria* patches in southern Alberta have been surveyed while searching for and collecting *Eutricopis nexilis*, but *S. verna* has been encountered only once (Appendix 1). This may be a reflection of very specific habitat or food plant requirements.

Trends

Most of the potential habitat for *S. verna* remains to be surveyed. It is highly probable that the historical extent of occurrence of populations has decreased because only about 25% of Canadian prairie habitat still supports some native vegetation (Statistics Canada 1992).

Protection/ownership

The majority of suitable habitat for *S. verna* is likely to be on privately owned land as most of the arable land in the prairies and parkland is under private ownership. The Jenner locality is privately owned. Suitable habitat likely occurs upstream along the Red Deer River valley within Dinosaur Provincial Park, 15 km to the southwest. The habitat for the Glenboro population, if still extant, is also on private land; initial surveying of accessible sites within Spruce Woods Provincial Park (Appendix 2) suggests conditions are too dry and sandy to support substantial *Antennaria* patches, but further inventory work is needed in other parts of the park to determine the extent of the slightly more mesic meadows that support *Antennaria*.

BIOLOGY

General

Verna's Flower Moth, like other butterflies and moths, undergoes complete metamorphosis. The larvae hatch in three days from eggs inserted into the flower heads of the larval food plant. They grow through five (occasionally six) instars over a mean period of 17 days (Hardwick 1983, 1996). First- and second-instar larvae live within the flower head, while the larger third- and fourth-instar larvae tie together adjacent heads. Mature (fifth-instar) larvae feed externally on the flower head, resting on the plant stem (Hardwick 1996). Mature larvae burrow into the ground, constructing a shallow chamber in which they pupate and overwinter (Hardwick 1983). Adults emerge the following spring.

Reproduction

Schinia verna reproduces during the brief adult flight period between late May and mid-June. Generation time is one year. Adult flower moths are not known to live longer than seven days (Hardwick 1996). *Schinia* species lay eggs that are relatively large compared to their body size (Hardwick 1996), so a female likely produces fewer eggs than do other owl moths. The reported maximum number of eggs laid by female *Schinia* varies from 89 in *S. indiana* to 356 in *S. sueta* (Hardwick 1958). Because *S. verna* produces large eggs compared to other species in the genus (Hardwick 1996), fecundity would be in the lower end of the range, perhaps ranging from 100 to 200 eggs per female.

Survival

Because the larvae of Verna's Flower Moth are cannibalistic, usually only one larva inhabits an *Antennaria* flower head (Hardwick 1983). Larvae of *Eutricopis nexilis*, which also feed inside *Antennaria* flower heads, are attacked and eaten by *S. verna* larvae (Hardwick 1983). First-instar *S. verna* larvae abandon flower heads which are already occupied. Survival of these wandering larvae may be very low because of their small size and observed inability to penetrate a new flower head (Hardwick 1983).

No other mortality agents are known for *S. verna*, but Lepidoptera generally suffer high mortality during the larval stage as a result of predation by birds, predatory invertebrates, parasitic flies and wasps, and infection by fungal, bacterial and viral pathogens. Concealment in flower heads during feeding may be a predator/parasitoid avoidance strategy in flower moths (Hardwick 1996).

Physiology

There are no data available for *S. verna*.

Movements/dispersal

There are no data available for *S. verna*. Most *Schinia* species are strong fliers and have a rapid, buzzing flight (C. Schmidt, unpubl. data). The ability for strong flight would facilitate colonization of host plant patches separated by unsuitable habitat. Although *Schinia* species may have the ability for rapid dispersal, many species exhibit high site and host plant fidelity and are rarely observed outside of the immediate vicinity of host plants (Hardwick 1996, Swengel and Swengel 1999).

Nutrition and interspecific interactions

Hardwick (1983) observed female *S. verna* ovipositing into the flower heads of *Antennaria neglecta* Greene ([=*howellii* Greene, *neodioica* Greene]; broad-leaved pussytoes) at the Glenboro, MB locality. He states the larvae also feed on *Antennaria aprica* Greene (low pussytoes) at this site (Hardwick, 1996; Figs. 4, 6). *Antennaria aprica* is also present at the Jenner site. Both *A. neglecta* and *A. aprica* are widely distributed, although often local, over most of North America (Scoggan 1979). Because both *Antennaria* species have such a broad range and occur in several ecoregions outside of the praries, *S. verna* is not likely to be limited by the distribution of the food plant. The close synchrony of *S. verna*'s flight period with the flowering of *Antennaria* and the close host specificity of other *Schinia* species makes it highly unlikely that plants other than *Antennaria* are used as larval hosts.

Schinia verna larvae may consume the larvae of *Eutricopis nexilis* inhabiting flower heads (Hardwick 1983), a behaviour which is unusual for lepidopterans. This may confer a competitive advantage to *S. verna*, particularly if the quantity or quality of food is a limiting factor. It is unknown if *S. nexilis* also prey on *S. verna* larvae.

Although flower nectar sources are required as food for adult moths, it is unknown what flower species are suitable. Because *Eutricopis nexilis* nectars on *Antennaria* in central AB (Schmidt, unpubl. data), it is likely that adult *S. verna* do so as well.

Behaviour/adaptability

The limited available data suggest that *S. verna* is not only tolerant of moderate disturbance through cattle grazing, but that grazing may be a crucial process through which high-quality host plant patches are maintained. More data on grazing pressures in relation to *S. verna*/*Antennaria* presence and abundance are needed.

POPULATION SIZES AND TRENDS

The current status of the Canadian population size(s) and trends of *S. verna* are unknown. The most recent known record is of a single specimen collected by G. Anweiler near Jenner, AB in 2000. Given the localized geographic distribution of flower moth colonies, this record most likely represents an extant population rather than

a dispersing individual caught by chance. As the researchers were unaware of the identity of the moth when it was collected, an exhaustive search of the area for further specimens was not carried out at that time. Surveys in 2003 and 2004 of the most recent localities where *S. verna* has been recorded failed to locate extant populations (Fig. 4; Appendix 1). Although patches of the larval host plant are relatively conspicuous and can be locally abundant, the absence of *S. verna* during searches of these patches suggests that other less obvious environmental factors, such as soil type or cyclic population dynamics, may determine the abundance of *S. verna*. The paucity of occurrence records and the recent discovery of this species, however, reflect the fact that *S. verna* is possibly truly rare. More field surveys are needed before population size(s) can be evaluated.

Population size is likely to be directly dependent on the quality and availability of the larval food plant, which in turn is dependent on disturbance regimes such as livestock grazing. Data on the population dynamics of *Schinia* species are lacking; however, Swengel and Swengel (1999) show that the population levels of *Schinia indiana* (Smith) varied substantially over a five-year period. It is possible that *S. verna* exhibits similar population dynamics, escaping detection in years of low population levels.

LIMITING FACTORS AND THREATS

The most obvious potential threats to *S. verna* include those that adversely affect the larval host plant. Loss or fragmentation of habitat as a result of agricultural tillage and severe overgrazing would result in loss of native plant cover, including larval and adult food plants. Because the *Antennaria* host plants are intolerant of a thick plant overstory, tall invasive plant species may be detrimental. Because the pupae spend about 10 months in a shallow underground chamber, soil trampling by livestock in heavily grazed pastures may also be a limiting factor. Less severe disturbances, such as fires or haying, would have the greatest impact during the flowering and seeding stage of *Antennaria* when *S. verna* larvae and eggs are developing. Depending on pupation depth and fire intensity, *S. verna* may be able to survive fire events during the pupal stage (i.e., late summer to early spring).

SPECIAL SIGNIFICANCE OF THE SPECIES

Current knowledge on *S. verna* suggests the moth is a species of the northern Great Plains and has a relatively limited global distribution encompassed entirely by the southern parts of Manitoba, Saskatchewan and Alberta, making it a Canadian endemic species. Even if extant populations are discovered in the Great Plains states of the northern US, the remaining native prairie habitat supporting extant populations in Canada will be very important for the long-term persistence of this species.

EXISTING PROTECTION OR OTHER STATUS

Verna's Flower Moth currently has no specific statutory protection. The only known extant population occurs on private land, but additional colonies may exist on provincial land in Dinosaur Provincial Park, AB and possibly in Spruce Woods Provincial Park, MB, and on lands under federal jurisdiction at C.F.B. Suffield, AB and C.F.B. Shilo, MB. This moth is currently unranked through the Heritage Status system at global, national and subnational levels (NatureServe 2002).

SUMMARY OF STATUS REPORT

Verna's Flower Moth is known from only four localities globally, all of which are in the Canadian prairie grasslands. The current status and exact location of most (3 of 4) of the occurrences are unknown. Field surveys of the historical colony sites are needed, as are searches for new colonies in suitable habitats supporting the host plants *Antennaria aprica* and *A. neglecta*. Without such fieldwork, it is impossible to make any management recommendations for this range-restricted species.

The available data suggest that this species is closely dependent on lightly vegetated, xeric microhabitats where the host *Antennaria* plants are common, in grasslands of the Prairie Ecozone, including the Mixed Grassland and Aspen Parkland Ecoregions. Suitable habitats may be dependent upon natural or artificial disturbance, such as grazing or fire.

TECHNICAL SUMMARY

Schinia verna

Verna's Flower Moth
Canadian population

Héliotin de Verna

Southeastern Alberta, west-central Saskatchewan and southwestern Manitoba

Extent and Area information	
• extent of occurrence (EO)(km ²)	128,000 km ² maximum
• specify trend (decline, stable, increasing, unknown)	probably declining due to habitat loss
• are there extreme fluctuations in EO (>1 order of magnitude)?	unknown
• area of occupancy (AO) (km ²)	16,000 km ² maximum, but very likely <2000 km ²
• specify trend (decline, stable, increasing, unknown)	probably declining due to habitat loss
• are there extreme fluctuations in AO (> 1 order magnitude)?	unknown
• number of extant locations	1 known
• specify trend in # locations (decline, stable, increasing, unknown)	unknown
• are there extreme fluctuations in # locations (>1 order of magnitude)?	unknown
• habitat trend: specify declining, stable, increasing or unknown trend in area, extent or quality of habitat	probably declining
Population information	
• generation time (average age of parents in the population) (indicate years, months, days, etc.)	one year
• number of mature individuals (capable of reproduction) in the Canadian population (or, specify a range of plausible values)	unknown
• total population trend: specify declining, stable, increasing or unknown trend in number of mature individuals	unknown
• if decline, % decline over the last/next 10 years or 3 generations, whichever is greater (or specify if for shorter time period)	N/A
• are there extreme fluctuations in number of mature individuals (>1 order of magnitude)?	probably
• is the total population severely fragmented (most individuals found within small and relatively isolated (geographically or otherwise) populations between which there is little exchange, i.e., ≤ 1 successful migrant / year)?	unknown
• list each population and the number of mature individuals in each	Jenner, AB– # unknown
• specify trend in number of populations (decline, stable, increasing, unknown)	unknown
• are there extreme fluctuations in number of populations (>1 order of magnitude)?	unknown
Threats	
- loss of native grassland habitat	

Rescue Effect (immigration from an outside source)	None
• does species exist elsewhere (in Canada or outside)?	Not known outside Canada
• status of the outside population(s)?	N/A
• is immigration known or possible?	N/A
• would immigrants be adapted to survive here?	N/A
• is there sufficient habitat for immigrants here?	probably
Quantitative Analysis	insufficient data
Current Status	COSEWIC: Threatened (May 2005)

Status and Reasons for Designation

Status: Threatened	Alpha-numeric code: B2ab(iii)
<p>Reasons for Designation: This moth is found only in the Canadian prairies, with one extant site in southeastern Alberta. The species is known historically from very few locations despite its relatively large size, distinctive markings and day-flying habit. It has a small total range in suitable native prairie that is fragmented and declining in quality and extent.</p>	
<p>Applicability of Criteria</p>	
<p>Criterion A (Declining Total Population): Insufficient information</p>	
<p>Criterion B (Small Distribution, and Decline or Fluctuation): Met criterion B2ab(iii) and likely 2c(iv) for Threatened. The AO is small (<2000 km²), the species is known from <5 fragmented sites and its prairie habitat is declining. Extreme fluctuations in the number of mature individuals are likely.</p>	
<p>Criterion C (Small Total Population Size and Decline): Insufficient information</p>	
<p>Criterion D (Very Small Population or Restricted Distribution): Insufficient information</p>	
<p>Criterion E (Quantitative Analysis): Insufficient information</p>	

ACKNOWLEDGEMENTS AND AUTHORITIES CONTACTED

Acknowledgements

A number of people kindly responded to our inquiries regarding specimen data for collections in their care, for which we are grateful: Matthias Buck, Bob Byers, Jerry Fauske, Chuck Harp, Brian Harris, Martin Honey, Chris Kotecki, Don Lafontaine, Tim McCabe, Bill Miller, Mo Nielsen, Kathryn Nystrom, Mark F. O'Brien, Greg Pohl, Mark Potzler, Rob Roughley, Jeff Sloten, Jim Troubridge and David Wagner. We also thank Manitoba Conservation and Helios Hernandez for facilitating research in Spruce Woods Provincial Park. Theresa Fowler provided advice and helpful comments throughout the preparation of this report. Members of the Arthropods Specialist Subcommittee of COSEWIC provided useful comments and suggestions.

Funding for the preparation of this status report was provided by the Canadian Wildlife Service, Environment Canada.

Authorities contacted

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David Wagner – associate professor, University of Connecticut, Storrs, Connecticut, U.S.A.

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Chris Schmidt completed a master's degree at the University of Alberta in 2001, focusing on the ecology of the Forest Tent Caterpillar. Prior to this, an undergraduate program culminated in a bachelor's degree in Ecology from the University of Calgary in 1996. He spent several years working as a lab and field technician at the University of Alberta, which involved research on Lepidoptera population dynamics. Recent research interests have resulted in published articles on faunal inventories and aspects of lepidopteran biology. He is currently enrolled in a Ph.D. program at the University of Alberta, focusing on the phylogeny and taxonomy of tiger moths using molecular and morphological techniques.

Gary Anweiler is a research associate at the University of Alberta Strickland Entomological Museum. He is a sitting member of the COSEWIC Arthropods Specialist Subcommittee.

COLLECTIONS EXAMINED

Strickland Entomological Museum (University of Alberta, Edmonton, AB), Northern Forestry Centre (Edmonton, AB), Canadian National Collection of Insects (Ottawa, ON), Buffalo Museum of Science (Buffalo, NY), University of Guelph Entomology Collection (Guelph, ON), British Museum of Natural History (London, UK), Illinois State Natural History Survey (Urbana, IL), Natural History Museum of Los Angeles County (Los Angeles, CA), Michigan State University (East Lansing, MI), Great Lakes Forestry Centre (Sault Ste. Marie, ON), University of Manitoba (Winnipeg, MB), University of Michigan (Ann Arbor, MI), University of Minnesota (St. Paul, MN), New York State Museum (Albany, NY), Jim Troubridge personal collection, Chuck Harp personal collection.

Appendix 1. Summary of museum holdings of *Schinia verna* specimens.

Locality	Date	Collector	Collection ¹	Number of specimens
CAN: Man., Spruce Woods Prov. Park, N of Glenboro	Jun 1980	D. & V. Hardwick	CNCI	16
CAN: Man., Spruce Woods Prov. Park, N of Glenboro	6 Jun 1979	D. & V. Hardwick	CNCI	2
CAN: Man., Spruce Woods Prov. Park, N of Glenboro	9 Jun 1979	D. & V. Hardwick	CNCI	20
CAN: Man., Spruce Woods Prov. Park, N of Glenboro	10 Jun 1979	D. & V. Hardwick	CNCI	2
CAN: Man., Spruce Woods Prov. Park, N of Glenboro	11 Jun 1979	D. & V. Hardwick	CNCI	9
CAN: Man., Spruce Woods Prov. Park, N of Glenboro	12 Jun 1979	D. & V. Hardwick	CNCI	3
CAN: Sask., Saskatoon	23 May 1980	Unknown	CNCI	1
CAN: Alta., Medicine Hat	1 Jun 1929	F.S. Carr	USNM	1
CAN: Alta., Red Deer R. N of Jenner	19 May 2000	G.G Anweiler	UASM	1
USA: Wash., Franklin Co, Juniper Dunes ²	25 Apr 1992	J. Pelham	CNCI	1

¹Museum acronyms used in Appendix 1: UASM - University of Alberta Strickland Entomological Museum, NOFC - Canadian Forest Service Northern Forestry Centre, UMWM - University of Manitoba J.B. Wallis Museum, CNCI - Canadian National Collection of Insects, BMNH - British Museum of Natural History, LACM - Los Angeles County Museum, UM - University of Michigan, BMS - Buffalo Museum of Science, NYSM - New York State Museum, USNM

²The species identity of this population is uncertain.

Appendix 2. Sites surveyed for *Schinia verna* in 2003 and 2004.

Locality	Date	<i>S. verna</i> present?	Search effort (person-hours)	Observer	<i>Antennaria</i>
CAN: MB, NNE of Glenboro	26-27 May 2003	N	10 hrs.	C. Schmidt	common
CAN: MB, N of Glenboro, Spruce Woods Prov. Park – Site A	26 May 2003	N	2 hrs.	C. Schmidt	none found
CAN: MB, N of Glenboro	26 May 2003	N	2 hrs.	C. Schmidt	common
CAN: MB, N of Glenboro, Spirit Dunes, Spruce Woods Prov. Park – Site B	26 May 2003	N	3 hrs.	C. Schmidt	none found
CAN: SK, Cypress Hills, NNE Eastend	29 May 2003	N	2.5 hrs.	C. Schmidt	abundant
CAN: SK, Cypress Hills, SSW Maple Creek	30 May 2003	N	4 hrs.	C. Schmidt	common
CAN: SK, ESE Guernsey	22 May 2003	N	1 hr.	G. Anweiler	common
CAN: AB, Red Deer R. N of Jenner – Site A	4 Jun 2004	N	6 hrs.	C. Schmidt & G. Anweiler	common
CAN: AB, Red Deer R. N of Jenner – Site B	31 May 2003	N	7 hrs.	C. Schmidt	common
CAN: AB, N of Big Stone	1 Jun 2003	N	0.5 hrs.	C. Schmidt	common