Vermont Butterfly Survey 2002 – 2007

Vermont Butterfly Survey

Final Report to the Natural Heritage Information Project of the Vermont Department of Fish and Wildlife

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VERMONT CENTER FOR ECOSTUDIES
UNITING PEOPLE & SCIENCE FOR CONSERVATION

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Contributors

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"But of the great majority of insects scarcely anything is known either good or evil."
Zadock Thompson, 1842, Vermont's first naturalist.

We dedicate the Vermont Butterfly Survey to Julie Nicholson, a longtime friend and dedicated VBS volunteer, whose extraordinary passion and commitment to wildlife conservation inspired us all. Julie's many years of tireless work as a citizen scientist left a conservation legacy for generations to come.

Introduction and Methodology

Butterflies, among the most familiar and showy of insects, are silent messengers of environmental health. They can speak volumes about the state of the environment under forces of changing land-use practices and other human-induced and natural pressures. In the last 200 years, Vermont and other areas in the Northeast have undergone both extensive and intensive landscape changes that have undoubtedly affected butterfly populations. Since 1950, for example, we have witnessed a 60 percent decline of hay fields, pasture lands and other grasslands in the Northeast due to loss and consolidation of farming and sprawl development. Unfortunately, we have few historic data with which to understand or evaluate changes that may have followed in butterfly populations.

The most recent faunal checklist of Vermont Lepidoptera listed 89 butterfly species in 48 genera (Grehan et al. 1995), with two new butterfly species recorded for Vermont: Broad-winged Skipper (scientific names listed in appendix 2) and Jutta Arctic. The report documented identifications primarily from specimens held at the University of Vermont Entomology Research Laboratory, the Carl T. Parsons Collection, state agencies, and private collections held by the authors. Most of the records were from collections made in northwestern Vermont. Of the 22 collecting localities, only three sites were located in the Northeastern Highlands, one in the southern third of the state, with the remainder in northwestern Vermont. The authors noted that their work should be augmented by searching for Vermont records in regional collections, as well as developing a database to document distribution, seasonality, habitat and food plants in Vermont; such information could be used by regional planners and others.

The main objectives of the Vermont Butterfly Survey (VBS) were to: (1) educate and involve people in the discovery and protection of Vermont's natural heritage; (2) determine the current and historic distribution of Vermont butterfly species; (3) obtain baseline information on butterfly distribution and populations in Vermont at the beginning of this century for conservation today and comparison in the future; (4) assess the conservation status of Vermont butterfly species; (5) identify habitats of statewide and regional importance; and (6) investigate the status of Vermont butterfly Species of Greatest Conservation Need (SGCN) as designated in Vermont's Wildlife Action Plan (Kart et al. 2005).

From students to landowners, butterfly enthusiasts to conservation biologists, this project provides essential information about the butterflies of Vermont to help us both enjoy and conserve our natural heritage now and for future generations.

Project Planning and Management

Initial planning for VBS took place in the fall of 2000 when co-founders Kent McFarland and Bryan Pfeiffer began to elicit the support of other biologists and explore funding opportunities. In 2001 an ad hoc advisory committee consisting of representatives from federal and state agencies and interested NGOs met and formed a Steering Committee to help develop the survey. Jane O'Donnell, coordinator for the Connecticut Butterfly Atlas Project, joined the group to provide experienced advice on study design and logistics. The Steering Committee met several times during the fall and winter of 2001-2002 and before the field season of 2003 to provide guidance to the project director. Design, planning and field execution of VBS were completed at the Vermont Institute of Natural Science; the project and associated staff moved to the Vermont Center for Ecostudies in 2007.

Data collection protocols generally followed those of other biological atlases. Because this was the first insect atlas ever conducted in Vermont, we planned for one trial year (2002), followed by five additional field seasons

(2003-2007). Field biologists were hired in some years to augment survey coverage in areas lacking adequate volunteer coverage, including blocks in the Northeastern Highlands, Franklin County, and Windham County, as well as special habitats such as wetlands. Volunteers were recruited through local organizations, presentations by project staff, news media, and the internet. Volunteers were encouraged to adopt priority blocks in their region and were provided with atlas materials, including a manual (Appendix 5), priority block maps, data forms (Figure 2) and glassine envelopes for specimens. From 2002-2004, regional training sessions were held for new volunteers. All volunteers and cooperators received a quarterly newsletter, *Chrysalis*, which detailed preliminary VBS findings, offered field work and data tips, and provided other pertinent information. The VTLEPS email list serve for volunteers was launched; it continues to serve as a conduit for communications between butterfly and moth enthusiasts throughout Vermont and beyond (see http://list.uvm.edu/cgi-bin/wa?A0=VTLEPS).

Recording Methods and Data Collection

The Vermont Butterfly Survey was a six-year (2002-2007) census to document the relative abundance and distribution of butterflies and giant silkmoths (*Saturniinae*) across Vermont. VBS was closely modeled after the Massachusetts Butterfly Atlas (1986-1990), Connecticut Butterfly Atlas Project (1995-1999) and Breeding Bird Atlas of Vermont (Laughlin and Kibbe 1985). The Maine Butterfly Survey (2009-2013) and the Maritimes Butterfly Survey (2010-2014) were, in turn, modeled after VBS. When these projects are completed, a network of butterfly atlas data will extend from southern New England to the Gulf of Saint Lawrence, allowing for both current and future regionwide comparisons.

VBS accepted butterfly and silkmoth records from anywhere in Vermont, but to ensure thorough coverage, we surveyed butterflies evenly and systematically across the state. We adopted a grid-based sampling scheme from the Atlas of Breeding Birds of Vermont (Laughlin and Kibbe 1985). This system relied on the 184 U.S. Geological Survey 1:24,000, 7½-minute quadrangle topographic maps (7.5 minutes = 1/8 of 1 degree of latitude or longitude) that cover Vermont. Quadrangles were divided into 6 blocks with each block covering about 25 km^2. Because it would have been impossible to adequately survey all 1,177 blocks in Vermont, we randomly selected one priority survey block from each quadrangle for a total of 184 priority survey blocks scattered across the state. All data from both priority and non-priority blocks were accepted by VBS. Priority blocks constituted the *minimum* set of blocks requiring full surveys in order to obtain a valid sample of butterflies for the entire state.

Table 1. The number of priority survey blocks in each biophysical region of Vermont. A survey block was assigned a biophysical region based on the majority of area in which it occurred.

Biophysical Region	Non-priority Block	Priority Block	Total	Percent Covered by Priority Blocks
Champlain Valley	203	35	238	18.2
Northeastern Highlands	90	19	109	18.9
Northern Green Mountains	172	35	207	21.7
Northern Vermont Piedmont	178	31	209	16.6
Southern Green Mountains	140	25	165	19.8
Southern Vermont Piedmont	115	22	137	20.4
Taconic Mountains	76	11	87	17.7
Vermont Valley	19	6	25	19.4
State of Vermont	993	184	1177[a]	16.7

[a] Not all blocks were located completely within Vermont, however all surveys were.

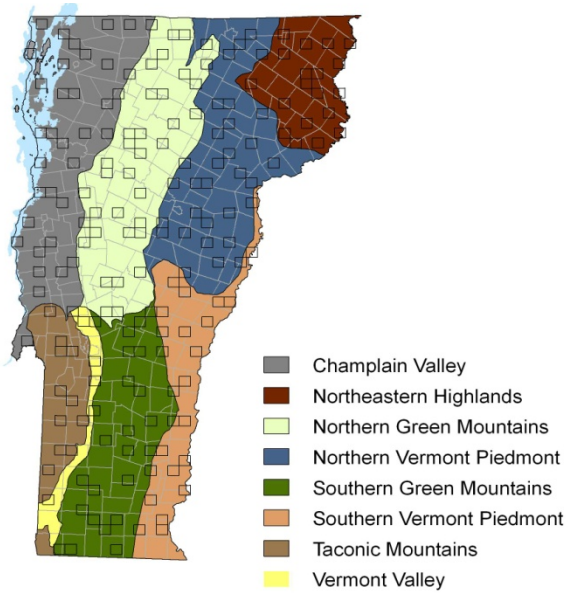


Figure 1. Vermont biophysical regions and the locations of 184 priority survey blocks scattered across the landscape. The percent of each biophysical region covered by a priority block was very similar between blocks, ranging from 16.6% in the Northern Vermont Piedmont to 21.7% in the Northern Green Mountains.

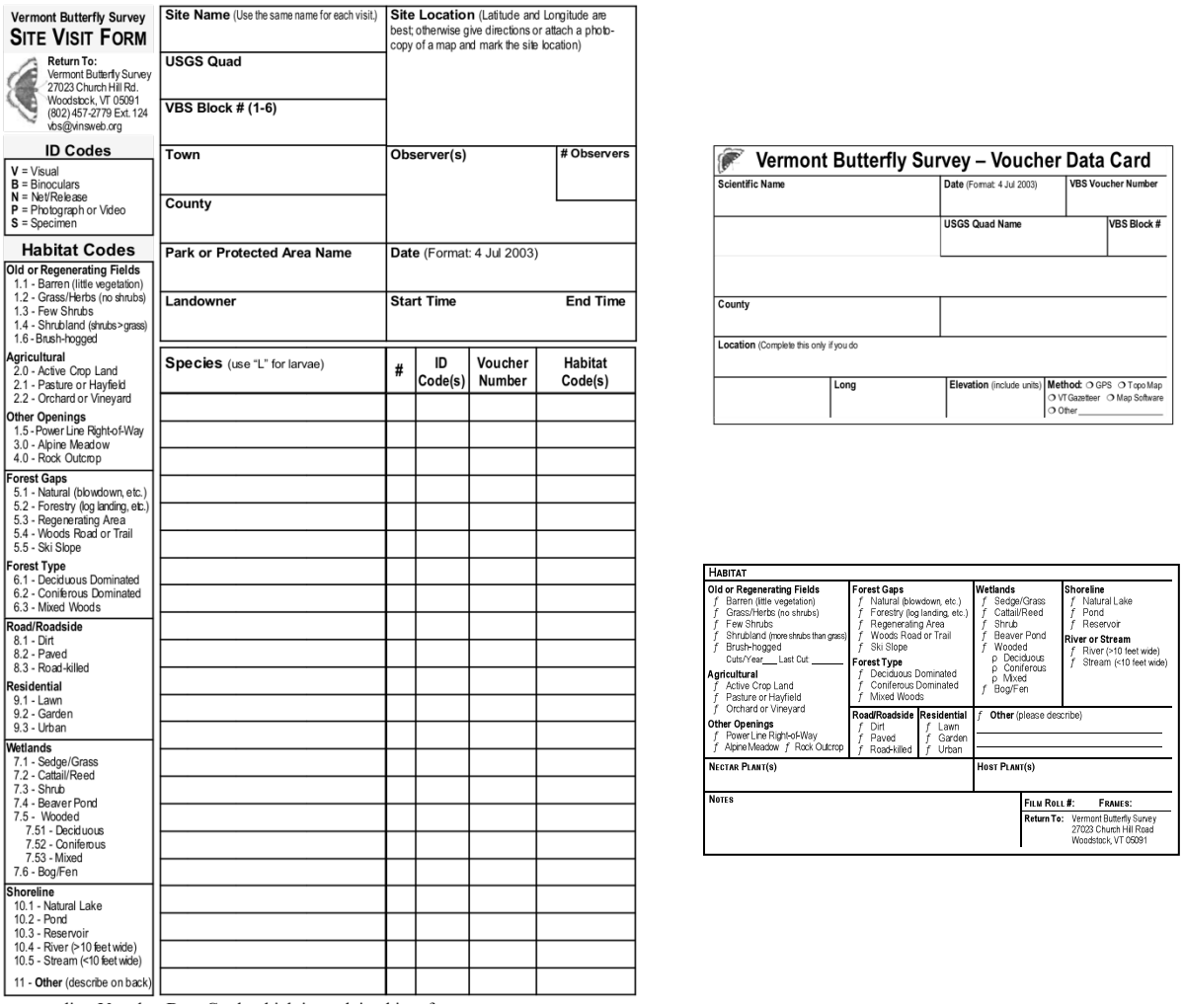
Butterflies and silkmoths were recorded as either voucher specimens (collection or photograph) or sight records (net-release, binoculars, visual-no aid). In the field each collected specimen was assigned a uniquely numbered voucher card (Figure 2) and placed in a glassine envelope. Printed photographs were also handled in this manner after development. Digital photograph files were assigned a voucher card number and electronically transferred to VBS. An attempt was made to secure one voucher of each species in each priority block.

Data collection fell under two categories: site surveys and casual observations. Site survey forms (Figure 2) were completed when a field worker visited a location specifically to conduct a timed survey and count of all butterflies observed, as well as to record habitat types in which they were found. Casual sightings did not require measures of time or counts of individuals seen, but simply denoted that a given species was present at a particular location on a certain date.

Field workers were asked to visit potential butterfly habitats in their adopted priority blocks at least once per month during the growing season (May-Sept). Many breeding bird atlases adopt minimum time and total species requirements; these define when a block was adequately surveyed (Smith 1982). Because we had no prior data to examine for VBS, we collected data for two field seasons before setting our standards. We ranked the detectability of each species on the checklist and calculated the minimum total number of species likely to be found in each block with a reasonable amount of fieldwork (Table 2). The minimum standard was set at 30 species per block, with a preferred target of 40 species or more.

Table 2. Estimation of the minimum number of species potentially recorded on each priority block.

	No. Species	Percent Likely Found/ Block	Total Expected
Likely present in most VBS blocks and easily vouchered	**32**	80%	25.6
Likely present in most VBS blocks but possibly overlooked by some investigators	**10**	25%	2.5
Likely present in half the VBS blocks and easily vouchered	**11**	25%	2.75
Likely present in half the VBS blocks but possibly overlooked by some investigators	**7**	10%	0.7
Present in a limited number of VBS blocks and easily vouchered	**14**	0	0
Rare and highly limited and generally difficult to voucher	**14**	0	0



Vermont Butterfly Survey
SITE VISIT FORM

Return To:
Vermont Butterfly Survey
27023 Church Hill Rd.
Woodstock, VT 05091
(802) 457-2779 Ext. 124
vbs@vinsweb.org

ID Codes
V = Visual
B = Binoculars
N = Net/Release
P = Photograph or Video
S = Specimen

Habitat Codes
Old or Regenerating Fields
1.1 - Barren (little vegetation)
1.2 - Grass/Herbs (no shrubs)
1.3 - Few Shrubs
1.4 - Shrubland (shrubs>grass)
1.6 - Brush-hogged
Agricultural
2.0 - Active Crop Land
2.1 - Pasture or Hayfield
2.2 - Orchard or Vineyard
Other Openings
1.5 - Power Line Right-of-Way
3.0 - Alpine Meadow
4.0 - Rock Outcrop
Forest Gaps
5.1 - Natural (blowdown, etc.)
5.2 - Forestry (log landing, etc.)
5.3 - Regenerating Area
5.4 - Woods Road or Trail
5.5 - Ski Slope
Forest Type
6.1 - Deciduous Dominated
6.2 - Coniferous Dominated
6.3 - Mixed Woods
Road/Roadside
8.1 - Dirt
8.2 - Paved
8.3 - Road-killed
Residential
9.1 - Lawn
9.2 - Garden
9.3 - Urban
Wetlands
7.1 - Sedge/Grass
7.2 - Cattail/Reed
7.3 - Shrub
7.4 - Beaver Pond
7.5 - Wooded
7.51 - Deciduous
7.52 - Coniferous
7.53 - Mixed
7.6 - Bog/Fen
Shoreline
10.1 - Natural Lake
10.2 - Pond
10.3 - Reservoir
10.4 - River (>10 feet wide)
10.5 - Stream (<10 feet wide)
11 - Other (describe on back)

Site Name (Use the same name for each visit.)
Site Location (Latitude and Longitude are best; otherwise give directions or attach a photo-copy of a map and mark the site location)
USGS Quad
VBS Block # (1-6)
Town
Observer(s)
# Observers
County
Park or Protected Area Name
Date (Format: 4 Jul 2003)
Landowner
Start Time
End Time

Species (use "L" for larvae)	#	ID Code(s)	Voucher Number	Habitat Code(s)

Vermont Butterfly Survey – Voucher Data Card

Scientific Name
Date (Format: 4 Jul 2003)
VBS Voucher Number
USGS Quad Name
VBS Block #
County
Location (Complete this only if you do
Long
Elevation (include units)
Method: ❍ GPS ❍ Topo Map ❍ VT Gazetteer ❍ Map Software ❍ Other

HABITAT
Old or Regenerating Fields
ƒ Barren (little vegetation)
ƒ Grass/Herbs (no shrubs)
ƒ Few Shrubs
ƒ Shrubland (more shrubs than grass)
ƒ Brush-hogged
Cuts/Year___ Last Cut: _____
Agricultural
ƒ Active Crop Land
ƒ Pasture or Hayfield
ƒ Orchard or Vineyard
Other Openings
ƒ Power Line Right-of-Way
ƒ Alpine Meadow ƒ Rock Outcrop
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ƒ Paved
ƒ Road-killed
Residential
ƒ Lawn
ƒ Garden
ƒ Urban
Wetlands
ƒ Sedge/Grass
ƒ Cattail/Reed
ƒ Shrub
ƒ Beaver Pond
ƒ Wooded
p Deciduous
p Coniferous
p Mixed
ƒ Bog/Fen
Shoreline
ƒ Natural Lake
ƒ Pond
ƒ Reservoir
River or Stream
ƒ River (>10 feet wide)
ƒ Stream (<10 feet wide)
ƒ Other (please describe)
NECTAR PLANT(S)
HOST PLANT(S)
NOTES
FILM ROLL #:
FRAMES:
Return To: Vermont Butterfly Survey 27023 Church Hill Road Woodstock, VT 05091

Figure 2. Site survey form and front and back of field voucher cards used in VBS field surveys. The forms shown here are those that were modified slightly after the first field season for more effective data recording in the field.

Data Processing

A data processing and retention protocol was outlined prior to the first field season (Figure 3). All data sheets were initially examined for completeness, matching codes and records, and other simple quality assurance and control (QA/QC) procedures. Site survey forms, casual observation forms and voucher card data were entered into the database and filed.

VBS staff and volunteers completed most voucher determinations. For difficult species and specimens (e.g., *Celastrina, Papilio glaucus* and *P. canadensis, Phyciodes,* and *Erynnis*), experts were consulted for final identification. Because visual records yielded no physical material for determination, they were simply examined for potential errors in field identification by searching for any possible out of season dates, or odd locations and habitats. Any obvious mistakes resulted in deletions of records from the database or assignment to the genus level only. Vouchers with photographs that were not acceptable for determination were changed to visual records if the observer indicated a field identification. Vouchers will be permanently stored and available to researchers at the University of Connecticut Biological Collections facility, where the Connecticut Butterfly Atlas Project material is also archived.

A Microsoft Access database was designed and tested after all variables to be collected were finalized prior to the first field season. The database was adjusted after the first field season to allow for easier data entry and to help prevent common data entry errors. The database was dynamically joined to ArcGIS 9.3 to allow for mapping and spatial analysis. The database was provisionally screened for errors before each field season so that field workers could gain internet access to a list of species found on each block for reference.

Final QA/QC was conducted after all data were entered. Although detailed priority block maps provided guidance to observers, most errors detected resulted from georeferencing mistakes made by observers, such as incorrect latitude and longitude or incorrect block names. Because we wanted records to be spatially referenced to a point and not just the block if possible, these corrections were very time consuming. Ambiguous records were only spatially referenced at the block level or higher (town, county or even state in rare cases). Exact reference points for each record will allow for more detailed analysis and modeling of species in the future.

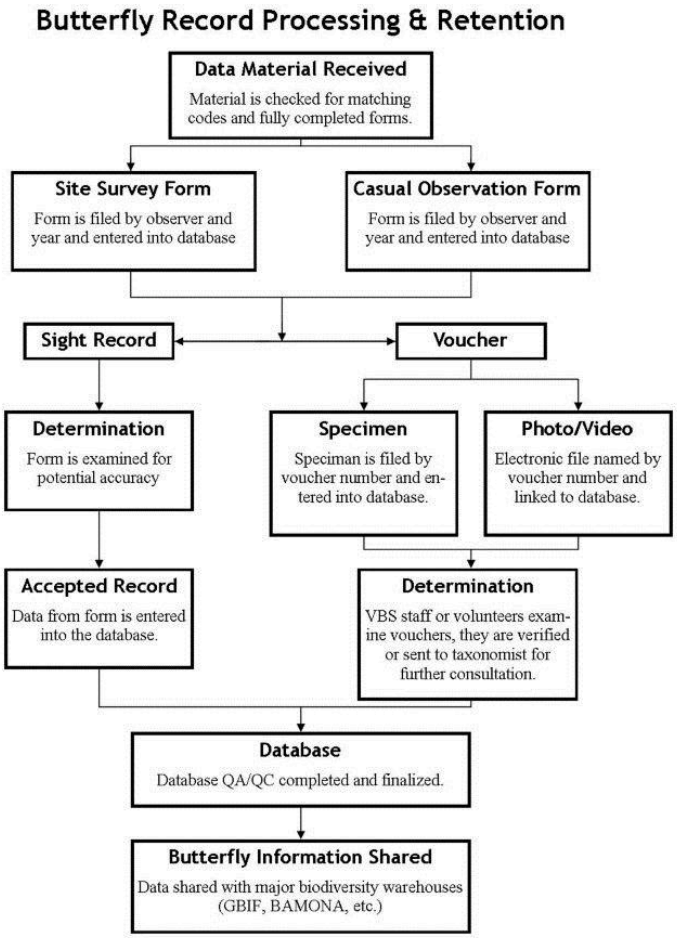


Figure 3. Flow chart depicting data processing and retention for records submitted to VBS.

After extensive QA/QC, the entire database was moved to Specify 6 software (http://specifysoftware.org/), which has an intuitive user interface and customizable data forms aimed at streamlining routine collections data tasks while preparing and validating collection information for research analysis. Specify has numerous features including file attachments (photographs, audio, etc.), hierarchical storage locations, data upload through the Specify Workbench via MS Excel, and many additional functions. Specify 6 supports the use of record sets for various types of processing, such as georeferencing with GEOLocate, report printing, and importing and exporting data. Of additional importance is the interoperability with the Global Biodiversity Information Facility

(GBIF) through the Integrated Publishing Toolkit (IPT), which will allow us to share these data directly via GBIF with any potential user in the world.

Pre-Project Records

More than 16 private and institutional collections, as well as published and unpublished literature and field notebooks, were searched for Vermont butterfly and giant silkmoth records. An historic or pre-project record (before 2002) was accepted if it contained at least the year of collection or sighting and a location description that placed it with certainty in Vermont. Geographic information for each record was determined at the town scale when possible rather than at the VBS survey block scale because of lack of specific point or descriptive information for most records.

Despite their potential importance, butterfly specimens in the UVM Zadock Thompson Natural History Collection had never been catalogued systematically. In January of 2004 we obtained permission to bring 40 volunteers into the collection for a one-day sorting and determination workshop. Volunteers worked in teams, first sorting pinned specimens by family and then to genus and species. After sorting, volunteers worked in pairs to add a unique identification number to each pinned specimen on a separate label, identify each to species, and enter the label data into a spreadsheet. Only people with experience in species identification made determinations, and any difficult or questionable determinations were referred to experts.

Summary of Results

After six years of surveys the VBS database contained 36,121 records representing 103 species of butterflies and four giant silkmoths. Of these, 12,329 (34%) were vouchers (5,886 specimens and 6,443 photographs) and 23,792 were sight records. A total of 149 people contributed records to VBS. The top 20 observers submitted nearly 80% of all records (n= 31,691 records), with 13 individuals tallying over 1,000 records and four observers compiling over 2,000 records: Roy Pilcher (2,634), David Hoag (2,470), Kevin Hemeon (2,406), and Bryan Pfeiffer (2,174) (Figure 4).

At least one record was submitted from all 184 USGS quadrangles, and from 624 (53%) blocks. Each block was visited at 3-71 specific sites ($\bar{x}$= 15 ± 9 SD) for a total of 2,806 sites scattered throughout the state (Figures 5, 6, and 7). Observers found 30 or more species on 140 (76%) of the priority blocks (Figure 5). With 18 more blocks recording 29 species, 169 (92%) nearly or actually reached the survey goal of 30 species per block. Only 13 priority blocks yielded 25 or fewer species, with the lowest number of species being 19. Most priority blocks registering fewer than 25 species occurred in the Northeastern Highlands, where there were few observers. Nearly half (47%) of the priority blocks in the Northeast Highlands had 30 or more species. The Northern Green Mountains had 66% of its priority blocks with 30 or more species, followed by the Champlain Valley (71%), Northern Vermont Piedmont (77%), Southern Green Mountains (88%), Taconic Mountains (91%), Southern Vermont Piedmont (95%), and the Vermont Valley (100%).

The Taconic Mountains biophysical region supported the highest butterfly diversity (89 species), followed by the Southern Vermont Piedmont (88), Southern Green Mountains and Champlain Valley (84), Vermont Valley (83), Northern Vermont Piedmont and Northern Green Mountains (75), and the Northeast Highlands (70). Two factors may have reduced the number of species recorded in the Northeast Highlands, high forest cover coupled with fewer field visits and hours.

Over half of the butterfly species were found in all 8 biophysical regions (Figure 8). Five species were found in just a single region: Edwards' Hairstreak (Southern Vermont Piedmont), the vagrant Fiery Skipper (Champlain Valley), Frosted Elfin (Vermont Valley), Horace's Duskywing (Southern Vermont Piedmont), and Jutta Arctic (Northern Highlands). An additional five species were recorded in only two biophysical regions: Cobweb Skipper (Taconic Mountains, Vermont Valley), Columbine Duskywing and Juniper Hairstreak (Champlain Valley, Taconic Mountains), Dusted Skipper and the vagrant Little Yellow (Southern Vermont Piedmont, Taconic Mountains), and Southern Cloudywing (Southern Vermont Piedmont, Vermont Valley).

Label data from 2,377 specimens, 161 literature records and 208 visual sightings from field notebooks representing 94 species of butterflies and five giant silkmoths were found in 16 private and institutional collections, as well as in published literature, unpublished reports and field notebooks. Most records came from the UVM Zadock Thompson Natural History Collection (727), the UVM Entomological Research Laboratory (531) Scott Griggs' personal collection (398), James Hedbor's personal collection (263), Peabody Museum of Natural History (149; partially completed) and unpublished reports by Donald Miller (106). Hartland Nature Club, the oldest such club in Vermont, had the oldest specimens, dating back to 1892, which probably survived because of sealed Ricker mounts.

At least one pre-project record was found in 155 (65%) Vermont towns. The number of records per town was highly variable. The northwest region - Grand Isle, Colchester and Burlington - accounted for nearly half of all records. The influence of academic institutions (UVM and Saint Michael's College) as well as the influence of collector's "home range" was apparent (Grehan et al. 1995, Dennis and Thomas 2000).

Six species with known historic occurrences were not documented by VBS. Four of these were of unknown origin or vagrants and were not expected to be recorded. These included (1) a Gulf Fritillary specimen in a collection at St. Michael's College found road killed in Burlington on 5 May 1995 by J. Leonard; (2) A specimen of the introduced Ailanthus Silkmoth taken in Post Mills, Vermont on 15 July 1970; (3) a Long-tailed Skipper found nectaring on scarlet runner bean in a garden in South Hero on 6 September 1994 by James Hedbor (personal collection); and (4) a California Tortoiseshell found in southern Vermont (date unknown) by P. Opler (Scott 1986).

Two formerly extant species, Regal Fritillary and Persius Duskywing, are apparently now extirpated in Vermont. The last known Regal Fritillary was a female collected on 17 July 1941 by O.M. Calloway in Pomfret, Vermont (Grehan 1995). We found the specimen in the Peabody Museum of Natural History collection. It was originally housed in the Dartmouth College collections. We also uncovered two males and a female of this species collected on 14 July 1939 in Dorset in the Peabody collection and three specimens from North Hartland (1894 and 1899, exact dates unknown) in the Hartland Nature Club collection. There is only one known Vermont record for Persius Duskywing, from an unknown location in 1983 by P.A. Opler (Grehan et al. 1995). There are no other details available. This species was historically confused with Wild Indigo Duskywing, which was described in 1936, and is only reliably determined by dissection of male genitalia of a voucher specimen. The species is now extremely rare overall and known only from a few locations in the Northeast in dry, open oak woodlands and pine barrens (Cech and Tudor 2005, O'Donnell et al. 2007). Despite its confusing identification, credible records suggest that this species has undergone a significant range contraction (Cech and Tudor 2005) and it is unlikely to occur in Vermont now.

VBS observers added 12 butterfly species to the Vermont faunal list (Table 4). Three of these were only recorded as visual records and require further documentation: Cobweb Skipper, Henry's Elfin, and Edwards' Hairstreak. Most of the new records were obtained from the southernmost region of Vermont where little collecting had been done historically. However, both the Hackberry and Tawny emperors were found in the northwestern region of Vermont where most historic collecting occurred. Because they were found only in a few flood plain

forests within the Vermont range of Hackberry (*Celtis occidentalis*), the two species may have simply been previously missed rather than recently immigrated into Vermont. Either way, Vermont is on the northern edge of the range of both emperors and their hostplant. Six of the 12 new species are now included as Species of Greatest Conservation Need in Vermont, 7 have been assigned a conservation rank of S1 (most imperiled; see Appendix 3 for definitions), and 2 are designated conservation status unknown (SU) until further targeted surveys are complete.

One additional vagrant has been added to the Vermont butterfly list since VBS. A Giant Swallowtail was first photographed in a garden in Addison on 30 July 2010 by A. Fisher. Several days later a sighting was reported from a garden just 10 miles north in Charlotte by H. Kaestner.

The 15 most commonly recorded species accounted for 55% of all VBS records (Table 5). This was comparable to the Connecticut Butterfly Atlas Project (49%; O'Donnell et al. 2007). The most commonly recorded species was Common Ringlet (2,018 records). This species only recently became established in Vermont from the north, apparently first appearing in 1980 (25 June 1980, Grafton, S. Parren). Silvery Blue, another species that has recently expanded, probably due to the widespread use of Cow Vetch (*Vicia cracca*) on which it can feed, was also frequently reported (708 records). As with the Connecticut atlas, two non-native introduced species, Cabbage White and European Skipper, are at times extremely abundant in locations and were reported 1,870 and 1,113 times, respectively. In contrast, 19 species yielded 10 or fewer records each, while 13 provided fewer than five records (Table 6). Generally, these species were either species of conservation concern or southern vagrants that only rarely stray into Vermont.

One species that was expected, but not found, was Bog Elfin. A concerted effort was made during (and after) the five-year survey period to visit Black Spruce (*Picea mariana*) bogs that appeared to provide suitable habitat for Bog Elfin based on regional descriptions (Cech and Tudor 2005). Despite repeated searches during its known flight period, the VBS located no colonies in Vermont.

Four species of silkmoths were reported during VBS: Cecropia Silkmoth (18 records), Promethea Silkmoth (7 records), Polyphemus Moth (10 records), and Luna Moth (28 records). Columbia Silkmoth (no historic records in Vermont, but found nearby in Quebec) and the exotic Ailanthus Silkmoth (one historic record) were not reported. It is difficult to determine if these species are truly rare or if the paucity of records simply reflected observers focusing on butterflies.

Giant silkmoth populations in the Northeast have apparently been in decline for years. One possible explanation is aerial spraying of *Bacillus thuringiensis* (Bt) to combat gypsy moths. This insecticide likely harms native insects as well. Recent research in Massachusetts found that an introduced parasitic fly, *Compsilura concinnata*, attacks and kills giant silkmoth caterpillars (Boettner et al. 2000). The fly was repeatedly introduced from 1906 to 1986 to control approximately 13 pest species, including a related silkmoth species. Concerns about the effect of this fly on native moths were expressed as early as 1919.

Table 3. Comparison of VBS efforts to other butterfly atlases in the region.

	Connecticut (1995-99)	Massachusetts (1986-90)	Vermont (2002-07)
No. Contributors	351	154	149
Total Vouchers	8,465	7,369	12,329 (36,121 total records)
No. Quads. Visited	112 (97%)	186 (100%)	184 (100%)
No. Blocks Visited	543 (79%)	723 (65%)	624 (53%)
No. Species	110	102	103

Table 4. New species additions to the Vermont butterfly faunal list found during VBS. The first date recorded is indicated for species with more than 5 records.

Species	No. of Records (dates)	Town(s)	Observer(s)
Edwards' Hairstreak	1, (22 July 2005)	Dummerston	S. Harris
Frosted Elfin	2 (28 May 2007, 3 July 2006)	Sunderland	K. Hemeon, N. Osborne
Henry's Elfin	3, (22-29 April 2005)	Dummerston	K. Hemeon
Common Buckeye	4, (26 May 2004, 11 & 23 Aug. 2006, 15 Sept 2006)	Brandon, Chester Pownal	J. Bush, K. Hemeon, M. Reiter
Hackberry Emperor	11, (19 Aug 2002)	9 towns	C. Gifford, 9 others
Tawny Emperor	14, (20 July 2002)	8 towns	L. Berrin, 8 others.
Horace's Duskywing	1, (18 Aug 2007)	Dummerston	
Common Checkered-skipper	4, (25 Aug. 2005, 8 Sept 2007, 25-26 Sept 2007)	Bennington, Pownal, Shaftsbury, Whitingham	K. Hemeon, T. Armata
Wild Indigo Duskywing	15, (18 May 2004)	9 southern towns	5 independent observers
Common Sootywing	8, (24 May 2004)	Bennington, Pownal, Vernon, Woodford	K. Hemeon, B. Pfeiffer
Cobweb Skipper	2, (5 June 2004, 11 June 2005)	Sunderland, Pownal	K. Hemeon
Black Dash	13, (4 July 2002)	6 southern towns	J. Doyle, 4 others.
Dusted Skipper	8, (27 May 2004)	Arlington, Brattleboro, Dummerston, Pownal	S. Harris, 3 others.

Table 5. The 15 most commonly recorded butterfly species during the Vermont Butterfly Survey.

Common Name	Scientific Name	No. Records
Common Ringlet	Coenonympha tullia	2018
Clouded Sulphur	Colias philodice	1906
Cabbage White	Pieris rapae	1870
White Admiral	Limenitis arthemis	1622
Canadian Tiger Swallowtail	Papilio canadensis	1615
Monarch	Danaus plexippus	1263
European Skipper	Thymelicus lineola	1113
Viceroy	Limenitis archippus	1106
Common Wood Nymph	Cercyonis pegala	1102
Hobomok Skipper	Poanes hobomok	863
Black Swallowtail	Papilio polyxenes	822
Great Spangled Fritillary	Speyeria cybele	789
Orange Sulphur	Colias eurytheme	720
Dun Skipper	Euphyes vestris	719

Table 6. The 15 most uncommonly reported butterfly species during the Vermont Butterfly Survey.

Common Name	Scientific Name	No. Records
Jutta Arctic	Oeneis jutta	7
Silvery Checkerspot	Chlosyne nycteis	7
American Snout	Libytheana carinenta	5
Pipevine Swallowtail	Battus philenor	4
Common Buckeye	Junonia coenia	4
Common Checkered-skipper	Pyrgus communis	4
Henry's Elifin	Callophrys henrici	3
Cobweb Skipper	Hesperia metea	2
Little Yellow	Pyrisitia lisa	2
Southern Cloudywing	Thorbyes bathyllus	2
Columbine Duskywing	Erynnis lucilius	2
Fiery Skipper	Hylephila phyleus	1
Frosted Elfin	Callophrys irus	1
Horace's Duskywing	Erynnis horatius	1
Edwards' Hairstreak	Satyrium edwardsii	1

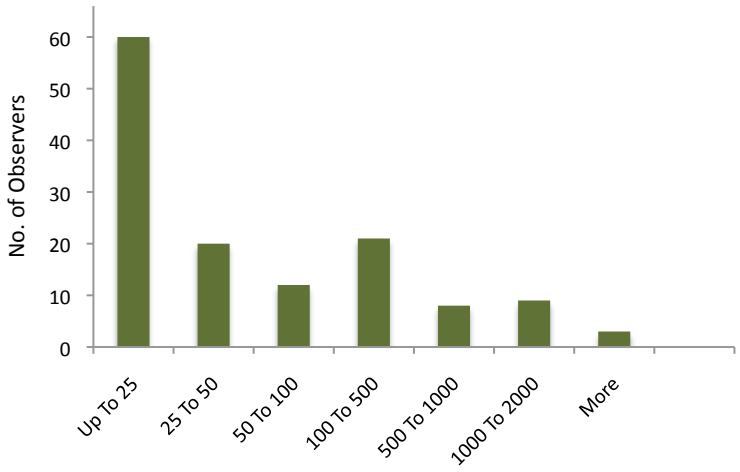


Figure 4. Histogram of the number of records reported by each VBS observer (2002-2007).

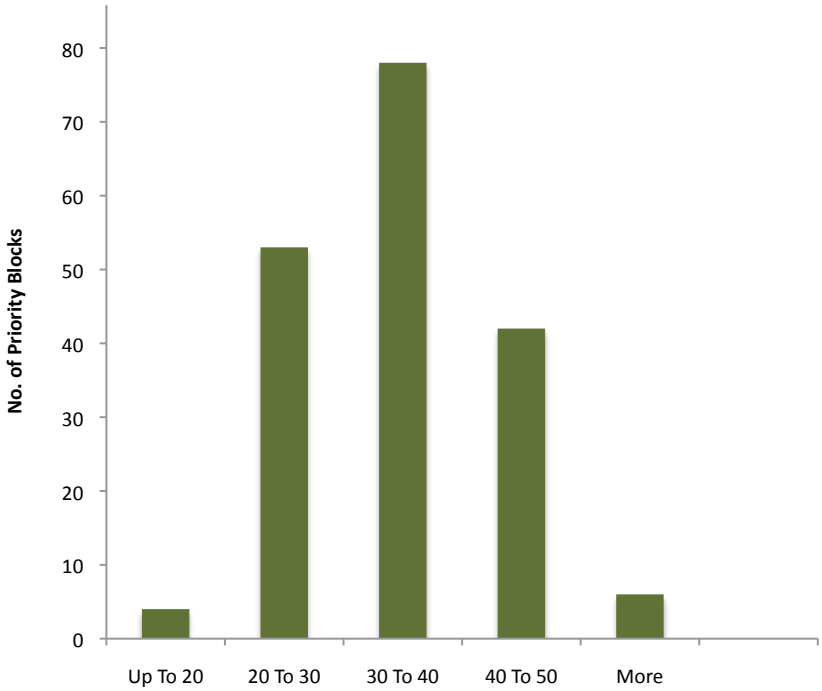


Figure 5. Histogram of the number of records reported in each of the 184 priority survey block.

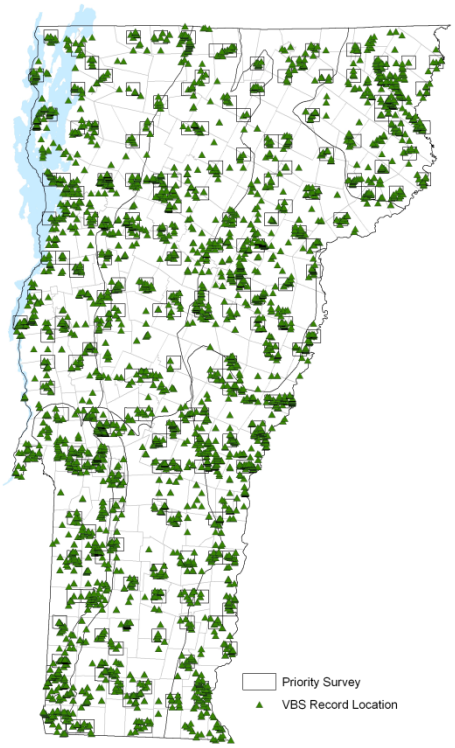


Figure 6. Sites where at least one butterfly was recorded during the Vermont Butterfly Survey.

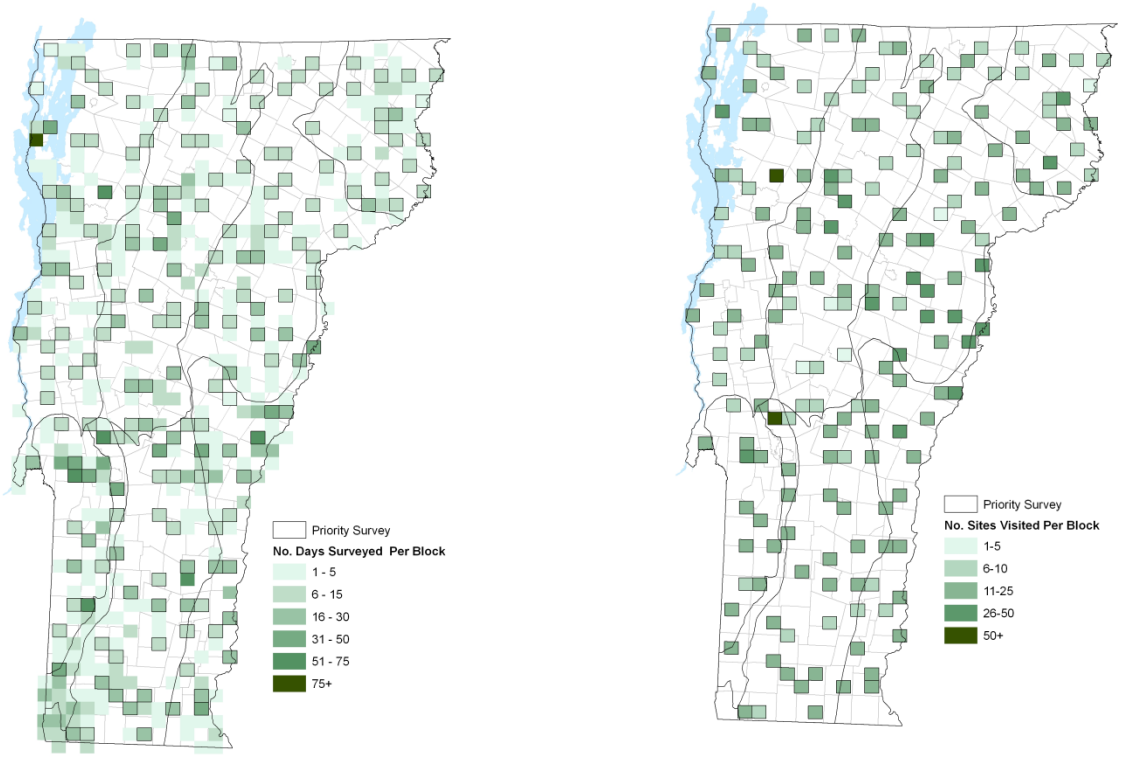


Figure 7. The number of days a block was surveyed for butterflies (A), and the number of different sites within each priority block that were surveyed (B).

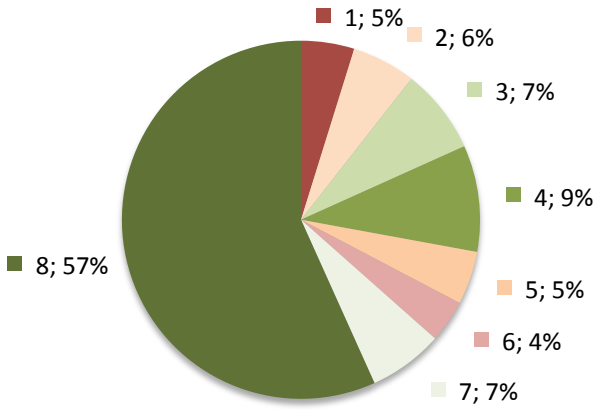


Figure 8. The number of biophysical regions in which each butterfly species was found during VBS (number of regions; percent of total species).

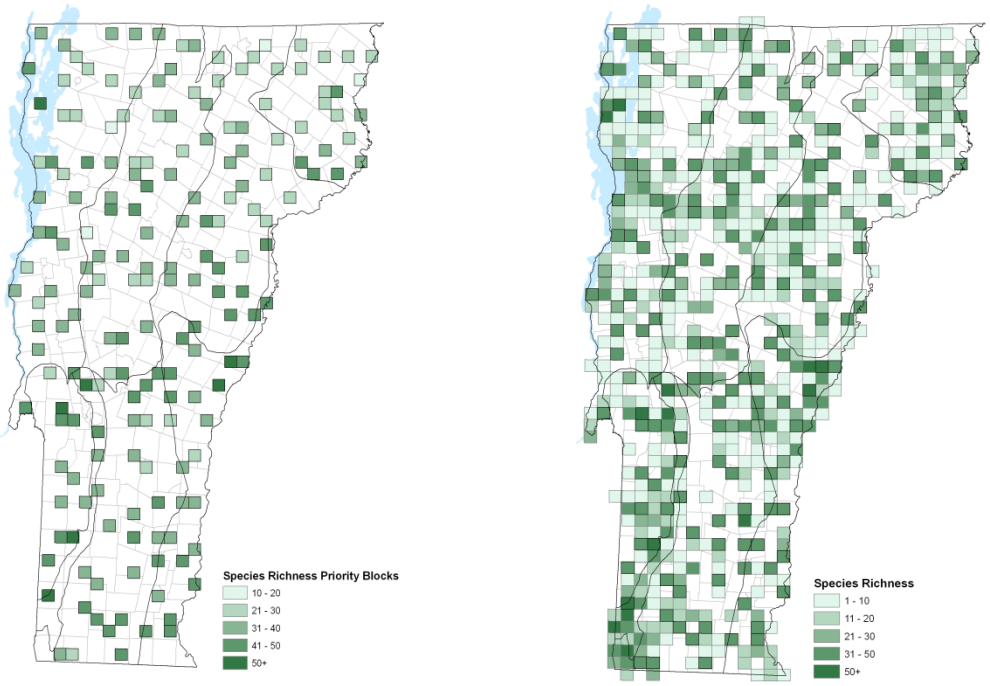


Figure 9. Number of species recorded in (A) each priority block, and (B) all blocks.

Conservation of Vermont Butterflies

Vermont's landscape has undergone drastic changes over the last several hundred years, due mainly to human activities (Klyza and Trombulak 1999). The forests that covered 95% or more of Vermont when Europeans first arrived were reduced by 1880 to only about 37% of the land area. Vermont's forests have since recovered to their current extent of over 85% of the landscape. The state's butterfly populations must have experienced similarly dramatic changes. For example, some of Vermont's earliest records of butterflies include documentation of Regal Fritillary during the 1890s in North Hartland. This species requires large expanses of grasslands that were plentiful throughout Vermont and the entire region during this pastoral period. As farming moved westward and fields yielded to forests, Regal Fritillary populations must have slowly contracted until by 1950, they had disappeared from Vermont. How other species fared in the wake of such profound land use changes will never be known, but these surely underlie some of the patterns in butterfly populations and distribution that exist today.

A principal goal of VBS was to evaluate historic occurrence records to assess the conservation status of each butterfly and giant silkmoth species found in Vermont today, and to establish a baseline for understanding future changes. Of the 103 butterfly species and four giant silkmoths documented by VBS (Appendix 2), two were introduced, and seven were considered vagrants that only occasionally or rarely visit the state. The remaining 94 butterflies and all four silkmoths were found to be either residents or probable residents. It is this group that constitutes the conservation focus for Vermont.

Determining which butterflies are thriving and which are rare or declining is crucial to target and prioritize conservation efforts for those species in greatest need. Currently, three evaluation systems are employed to assign conservation status to wildlife in Vermont: legal status, species of greatest conservation need (SGCN), and Natural Heritage conservation status ranks.

Legal protection is afforded under the Vermont Endangered Species Law (10 V.S.A. Chap. 123) for species that are listed as: endangered (in immediate danger of becoming extirpated from the state) or threatened (those with a high possibility of becoming endangered in the near future). As of 1990, two butterfly species, West Virginia White and the extirpated Regal Fritillary, were listed as Special Concern in Vermont (a designation which affords no legal protection).

The State Wildlife Grant program was created by Congress in 2001, as a means to provide federal conservation funds to prevent fish and wildlife populations from becoming endangered. Per Congressional requirements, each state created a Wildlife Action Plan that focused on the identification and conservation of "Species of Greatest Conservation Need" (SGCN).

To assist in developing Vermont's Wildlife Action Plan, an Invertebrate Species Team was assembled to identify invertebrate SGCN. This team employed assessment criteria developed by the interdisciplinary Wildlife Action Plan Integration Team to advise and standardize SGCN selection. Criteria for each species included the degree of rarity, population trends, vulnerability to habitat loss or fragmentation, extent of known habitat conversion or successional changes, threats from exotic plants or animals, and overall evaluation of conservation risk. We used the first 3 years of VBS data as well as historic records to inform this process for the butterfly fauna. The Vermont Wildlife Action Plan, completed in 2005, will be revised every 10 years.

Vermont's list of Species of Greatest Conservation Need includes 192 invertebrate species (of an estimated 15,000-36,000). Three ecological groups of butterflies comprising 16 species were listed as SGCN (Table 7). These broad ecological groups included wetlands, grasslands, and hardwood forests.

The wetland group consists of 7 species with 3 occupying peatlands and 4 found predominantly in sedge wetlands. Because of the number of conservation concern species found in wetlands, we conducted targeted surveys of these areas whenever possible during VBS. For example, VBS observers visited over 79 bogs and fens throughout the state during the survey. Seven Bog Copper and 4 Two-spotted Skipper colonies were located. We did not encounter Bog Elfin. Continued surveys of wetlands for this group are warranted. All colonies should be protected and land managers informed and educated about these colonies.

Two of the grassland species are extirpated (Regal Fritillary and Persius Duskywing) in Vermont. The other two species, Cobweb Skipper and Dusted Skipper, are found only in southern Vermont and utilize Little Bluestem (Schizachyrium scoparium) and Big Bluestem (Adropogon gerardi) as hostplants. Dusted Skipper colonies with relatively high populations were found during VBS along Interstate 91 from the Vermont-Massachusetts border to exit 3 in areas where the Vermont Agency of Transportation planted Bluestem. Planting of other areas such as airports and other open areas could provide further grassland habitat for these and other species.

The hardwood forest group consists of 5 species occupying 3 distinct forest types. West Virginia White requires mature, maple-beech-birch forests that contain large populations (hundreds or thousands of individuals) of the larval foodplant, apparently only toothwort (Dentaria diphylla) in the northern part of its range. Early Hairstreak requires stands of American Beech; failure of the beechnut crop, even for a single year, may seriously impact populations. As forest-dependent species, both logging activities and pest control spraying are possible threats to these two species. Both Hackberry and Tawny emperors are only found in floodplain forests with Hackberry trees. Edwards's Hairstreak was observed only on a small pitch-pine-oak-heath rocky summit. Its populations need further clarification in Vermont.

Natural heritage conservation status ranks are assigned by NatureServe (www.natureserve.org) and state natural heritage programs, often with collaborators such as VBS, incorporating factors that examine rarity, population trends and threats. Assessments lead to the designation of conservation status ranks for each species; these provide an estimate of conservation need and, ultimately, extinction or extirpation risk. Conservation status ranks are based on a one to five scale, ranging from critically imperiled (1) to demonstrably secure (5). Status is assessed and documented at three distinct geographic scales: global (G), national (N), and state (S). A state rank cannot imply that a species is more secure than a national or global rank indicates (i.e., a combined ranking of G1 and S3 is invalid). The methodology developed to assign conservation status ranks is uniform allowing for comparison of the vulnerability of a species across its range. These ranks have no legal status, but can be an indicator to decision makers on the need for conservation actions.

Based on available historic information and records, VBS data, and consultation with experts, VBS collaborated with the Vermont Natural Heritage Information Project in assigning S-ranks for all Vermont butterfly species (Table 7, Appendix 2). Rankings will be incorporated into the Vermont Natural Heritage Database and ultimately shared with NatureServe.

There were 34 butterfly species and 3 giant silkmoth species ranked S3 to S1 (vulnerable to critically imperiled), SU (status uncertain), or SX (extirpated) in Vermont (Table 7). Nearly half (16) of these occur at the edge of their ranges in Vermont, and all of these but one (Jutta Arctic) reach their northernmost distributional limits. Four butterfly species (Persius and Columbine Duskywings, Frosted Elfin, and Silvery Checkerspot) and all three giant silkmoths appear to be declining regionally, while two butterflies (Wild Indigo Duskywing and Broad-winged Skipper) are increasing throughout the region, mainly due to introduction of exotic plants that can be used as hosts. Species richness was highest for conservation concern species in the southwestern corner of the state as well as the Champlain Islands. The Northeast Highlands also contained a number of boreal and peatland associated species (Figure 10).

Some of the major threats to butterfly populations in Vermont include: habitat succession from land use change, development, invasive plant species, non-target impacts of biological control agents, herbicide and pesticide use, and climate change (O'Donnell et al. 2007). Climate change will affect butterfly species in many ways, as it has in the past, but rapid and potentially extensive anthropogenic climate change may have unprecedented effects on their populations (Forister et al. 2010, Parmesan 2006, Pöyry et al. 2009). Ongoing and projected climate change in the Northeast differs from that experienced by butterfly species in recent evolutionary history in a number of critical ways: the magnitude of change is expected to be larger, the rate of change will be more rapid and directional (warmer and wetter), and the variability of weather is expected to increase, increasing the likelihood of extreme events (Hayhoe et al. 2007). Change will also occur in all seasons, and the phenology of weather events will shift. Even short-term weather conditions, a few good days or bad months, can have significant and lasting effects on butterfly populations. Past studies and reviews of the observed and potential effects of climate change on butterflies have highlighted the relationships between butterfly distributions and climate (Parmesan and Yohe 1993, Warren et al. 2001). As a result, conservation biologists and natural resource managers need to understand which species are most vulnerable to climate change so that they can begin to plan management actions accordingly. Determining which species to focus on is difficult in part because assessing exposure to climatic factors is complex and species are expected to respond quite differently to these changes.

We used the NatureServe Climate Change Vulnerability Index to evaluate each butterfly SGCN based on our current understanding of their natural history and predicted climate change within Vermont (Young et al. 2010). This Microsoft Excel-based tool facilitates a fairly rapid assessment of the vulnerability of species to climate change in a user-defined geographic area. The Index indicates both relative vulnerability and the relative importance of factors contributing to that vulnerability. The Index examines vulnerability to climate change by approximately the year 2050.

In accordance with well-established practices (Schneider et al. 2007, Williams et al. 2008), the Index divides vulnerability into two components, the exposure to climate change across the range of the species within the assessment area and the sensitivity of the species to climate change. A highly sensitive species will not suffer if the climate where it occurs remains stable. Similarly, an adaptable species may not decline even in the face of significant changes in temperature and/or precipitation. In addition, the Index considers the results of studies documenting or modeling vulnerability to climate change if research of this nature has been conducted on the species.

We examined exposure to climate change based on: the magnitude of predicted temperature change using data from Vermont between the years 2040-2069 from Northeast Climate Data (http://www.northeastclimatedata.org/), and moisture change from the Climate Wizard (http://climatewizard.org). For the range within the assessment area where the species occurred, we estimated the percentage of the range of that species that fell into predicted change categories for both temperature and moisture.

Sensitivity was assessed by scoring species against 20 factors divided into two categories: indirect exposure to climate change and species-specific sensitivity. For each factor, species were scored on a sliding scale from greatly increasing, to having no effect, to decreasing vulnerability (Table 8). Responses were not required for all factors. The index will calculate a score with as few as 13 responses. The combined information on exposure and sensitivity was used by the index to produce a numerical sum. The sum was then converted into a categorical score by comparing it to threshold values. The six possible scores were Extremely Vulnerable, Highly Vulnerable, Moderately Vulnerable, Not Vulnerable/Presumed Stable, Not Vulnerable/Increase Likely, and Insufficient Evidence. The index also calculated a numerical sum and corresponding categorical score for four factors relating to documented or modeled response to climate change if any of these factors are scored. The final

Index score represented just the exposure/sensitivity result if there is no information on documented/modeled responses, and an average of the two sections if documented/modeled response information was available. See Young et al. (in press) for more details on the scoring mechanics and definitions. We calculated a vulnerability score for 14 extant Species of Greatest Conservation Need.

Three species were found to be extremely vulnerable, 5 highly vulnerable, 1 moderately vulnerable, 3 presumed stable and 2 increase likely (Table 9). The species likely to increase, Hackberry and Tawny emperors, are both reliant on Hackberry trees, a southern species currently only found in climatically warm, floodplain woodlands in some areas of Vermont. The other 3 species in the SGCN forest group are all extremely or highly vulnerable, each occupies different forested habitats. Of the 7 SGCN species in the wetland group, all are vulnerable to some degree except for Broad-winged Skipper, which could remain stable. This species has been expanding in the region due to the spread of invasive Common Reed Grass in wetlands. Only 2 of the SCGN grassland species group were assessed as the other two are presumed extirpated from Vermont. Both were presumed to remain stable. These two species are on the northern limit of their range in southern Vermont and rely on hostplants that have a more southern and warmer climatic envelope. We recommend vulnerability assessments be completed for the entire Vermont butterfly fauna to aid with conservation and management decisions.

Future Work

Species Niche Modeling and Monitoring

Species distribution data are of central importance to documenting and conserving biodiversity. Niche models that are used to predict potential ranges of species have been calibrated using atlas data (Osborne & Tigar 1992; Cumming 2000, Robertson et al. 2004). These models have been valuable for mapping species richness, understanding factors that limit distributions, managing invasive species, and exploring the potential impacts of climate change. These models can also be used to select the priority areas most critical for future protection and may guide further field surveys to accelerate the discovery of unknown populations. Over time, modeling and monitoring comprise a feedback system (Urban 2002), co-adapting toward the goal of precisely locating sites for management action (Sexton et al. 2006).

Using VBS data and spatially explicit covariates that are believed to be potentially important for a species (i.e., GIS coverage of American Beech stands for Early Hairstreak; as well as general biophysical data such as elevation, land cover, climatic data, etc.), we plan to create predictive niche models for at least the SGCN species, using Maxent (Phillips and Dudik 2008). Maxent allows us to model species geographic distributions using presence-only data. The Maxent algorithm estimates a realized niche by finding the probability distribution of a species, which can then be used to help uncover new populations, implement conservation and management planning and predict and monitor for future changes.

We have identified over 30 species of butterflies that are of conservation concern (Table 7), yet there is little or no data for assessing population trends for these species. This may be due to three problems. First, there has been little recognition of butterfly conservation issues in Vermont, an issue that VBS helped address. Second, many large-scale, long-term wildlife population monitoring projects rely on citizen science participation, such as knowledgable bird watchers for avian population monioring. There were very few knowledgeable butterfly watchers in Vermont prior to VBS to help complete rigorous annual population monitoring. Finally, butterfly monitoring presents a problem that monitoring programs for other groups, such as birds, do not need to consider. Butterflies eclose over many days to weeks in what is referred to as the adult flight period, whereas individual birds are all presumed to be present and available for detection at the same time.

Detection probabilities are used to account for individual butterflies that are present but not detected by the observer during surveys. Most butterfly monitoring schemes in the past have relied on simple counts or indices. This assumes that detection probabilities are constant across time and space. It is now widely suspected that this assumption is violated in a number of ways (Thompson 2002). If so, comparisons of index data obtained at different times and places may lead to erroneous conclusions. Adoption of monitoring methods that accurately estimate or account for detection probabilities would alleviate this concern. To obtain a butterfly population count, a site must be visited many times over the flight period and the counts have to be adjusted by using both detection probability for each visit, as well as survivorship probability to adjust for variation in eclosure (adult flight period), to obtain an annual population estimate.

Several studies have recently been published that examine the robustness and uncertainty in estimating butterfly abundance for rare species. Marschalek and Deutschman (2008) compared the robustness and statistical power of three population indices of population size from Pollard-Yates (1993) transects: 1) largest single day count, 2) Pollard-Yates cumulative count, and 3) estimates based on program INCA (2002; Zonneveld 1991) from all counts for a rare coastal sage scrub butterfly in southern California, Hermes Copper (*Lycaena hermes*). The Pollard-Yates cumulative count estimate was the most robust to sampling error and had the most statistical power to detect trends over time. INCA performed poorly. Haddad et al. (2008) used monitoring data from the endangered St. Francis Satyr (*Neonympha mitchelli francisci*) to evaluate two approaches: MRR and Pollard-Yates transect data. The transect data were analyzed using Pollard-Yates indices and INCA. MRR and Pollard-Yates indices had the least amount of statistical variability. INCA was found to perform poorly (Haddad et al. 2008, Gross et al. 2007, and Canner unpub. report). They reported that the optimal sampling strategy may be to use two sampling methods together – limited MRR to estimate survival and detection probabilities, and frequent transect counts.

Given the difficulties and costs associated with abundance or density estimates in butterfly monitoring, we recommend that for at least some of the SCGN species, that monitoring using site-occupancy models are implemented using a sampling frame derived from Maxent modeling. Site-occupancy models represent a generalisation of classical metapopulation models to account for imperfect detection (MacKenzie et al. 2005). They estimate the probability of sites to be occupied, as well as changes over time via colonization and extinction rates, while taking into account imperfect detection of a species. The models require presence - absence data from replicated visits for a number of sites or colonies.

Future Statewide Butterfly Survey

It is recommended that atlases be repeated at 20-year intervals (NORAC 1995). The Vermont Butterfly Survey should be repeated beginning in 2022. Considerations should be given to repeating VBS in conjunction with other state and provincial butterfly atlases in the Northeast to obtain a snapshot of butterfly distribution across a wider landscape.

Towards a Regional Butterfly Conservation Concept

We propose to create a cooperative effort for butterfly conservation in the Northeast modeled after the highly successful program for bird conservation called Partners in Flight (PIF). PIF was launched in 1990 by the National Fish and Wildlife Foundation to halt the declining populations of many land bird species, and in order to conserve birds not covered by existing conservation initiatives (see http://www.partnersinflight.org). It is a cooperative effort involving partnerships between federal, state and local government agencies, philanthropic foundations, professional organizations, conservation groups, the academic community, and private individuals. Its goal is to focus resources on the improvement of monitoring and inventory, research, management, and educational programs involving birds and their habitats through cooperative public and private sector efforts.

The new Northeast Butterfly Conservation Cooperative (NBCC), would have three goals similar to PIF: 1) ensure an active scientifically-based conservation design process that identifies and develops solutions to threats and risks to native butterfly populations; 2) create a coordinated network of conservation partners to plan and implement the objectives of butterfly conservation at multiple scales across the Northeast; and 3) secure sufficient commitment and resources to support vigorous implementation of these butterfly conservation objectives.

With atlas projects recently completed in Massachusetts, Connecticut and Vermont, in progress in Maine and the Canadian Maritime Provinces, and in the planning stages in New Hampshire, the need and timing could not be better. Cooperators from these atlasing efforts, as well as local and regional butterfly clubs, state and federal wildlife agencies, and non-government conservation organizations could join forces to begin the Northeast Butterfly Conservation Cooperative.

Table 7. Vermont butterflies and giant silkmoths of conservation concern, including conservation status ranks and potential threats.

Common Name	Wildlife Action Plan Status	Vermont Endangered Species Law	State Conservation Rank	Global Conservation Rank	Potential Threats	Comments
Eastern Tiger Swallowtail			S1	G5	None known	Northern edge of range
Spicebush Swallowtail			S1	G4?	Expanding threat from Laurel Wilt Disease. It is suspected, but not known that impacts will be less severe northward and perhaps spicebush and sassafras will not be as vulnerable as Persea spp.	Northern edge of range
Frosted Elfin	SGCN		S1	G3	Loss of early successional habitat.	Declining regionally
Jutta Arctic	SGCN		S1	G5	Isolated populations, climate change, loss of habitat.	Southern edge of range
Common Sootywing			S1	G5	None known	Northern edge of range
Cobweb Skipper	SGCN		S1	G4	Loss of grassland habitat.	
Black Dash	SGCN		S1	G4	Loss of wetland habitat	Northern edge of range
Dusted Skipper	SGCN		S1	G4G5	Loss of grassland habitat.	Northern edge of range
Silvery Checkerspot			S1S2	G5	Regional decline and threats not understood.	
Hackberry Emperor	SGCN		S1S2	G5	Loss of floodplain forest.	Edge of range
Tawny Emperor	SGCN		S1S2	G5	Loss of floodplain forest.	Edge of range
Appalachian Brown			S1S2	G4	Loss of wetland habitat	
Two-spotted Skipper	SGCN		S1S2	G4	Invasive wetland plants and loss of habitat.	Isolated populations in Vermont.
Bog Copper	SGCN		S2	G4G5	Loss of restricted bog/fen habitat.	Isolated colonies in highly specialized habitat.
Mulberry Wing	SGCN		S2	G4	Loss of sedge marsh habitat.	Northern edge of range
Dion Skipper	SGCN		S2	G4	Loss of sedge marsh habitat.	
Gray Hairstreak			S2S3	G5	Loss of open areas.	
Early Hairstreak	SGCN		S2S3	GU	Loss of host plant from beech bark disease.	
Broad-winged Skipper	SGCN		S2S3	G5	Loss of wetland habitat	Coastal populations expanding range with invasive Common Reed (Phragmites communis), Vermont populations possibly using it too.
Pink-edged Sulphur			S3	G5	None known	Restricted range in Vermont
Hickory Hairstreak			S3	G4	Loss of forested habitat.	Northern edge of range
Juniper Hairstreak			S3	G5	Loss of habitat from succession and development.	Restricted range in Vermont
Brown Elfin			S3	G5	None known	Isolated populations in Vermont
Crossline Skipper			S3	G4G5	Loss of grassland habitat.	Northern edge of range
West Virgina White	SGCN	Special Concern	S3S4	G3G4	Introduced Garlic Mustard (Alliaria petiolata) and parasites, loss and fragmentation of forest habitat.	Rich, deciduious forest of southern Vermont is probably a regionally significant habitat.
Bog Elfin	SGCN		SU	G3G4	Limited range and islolated colonies. Loss of bog/fen habitat.	Despite targeted searched, they appear to be absent from seemingly suitable bog habitats in Vermont. There are probably undiscovered colonies in Vermont.
Edward's Hairstreak	SGCN		SU	G4	Loss of rare Scrub Oak (Quercus ilicifolia) habitat.	Targeted surveys in Vermont needed.
Henry's Elfin			SU	G5	None known	Northern edge of range, targeted surveys in Vermont needed.
Common Buckeye			SU	G5	None known	Northern edge of range, possibly only a vagrant in Vermont, with occassional breeding.
Southern Cloudywing			SU	G5	None known	Northern edge of range
Horace's Duskywing			SU	G5	Loss of rare, open oak woodlands.	Northern edge of range
Columbine Duskywing			SU	G4	Loss of forest habitat.	Edge of range, declining regionally.
Wild Indigo Duskywing			SU	G5	None known	Northern edge of range, expanding range with adoption of Crowned Vetch (Cornilla varia) as host plant.
Persius Duskywing	SGCN		SU	G5	Not known	Probably extirpated in Vermont. Only one known record from 1983. Declining or extirpated throughout region.
Regal Fritillary	SGCN	Special Concern	SX	G3	Loss of expansive meadow habitat	Extirpated in region. Last known record in Vermont was 1941 in Pomfret.
Cecropia Silkmoth			S3	G5	Population decline due to introduced biocontrol agents for Gypsy Moths.	Declining regionally.
Promethea Silkmoth			S3	G5	Population decline due to introduced biocontrol agents for Gypsy Moths.	Declining regionally.
Polyphemus Moth			S3	G5	Population decline due to introduced biocontrol agents for Gypsy Moths.	Declining regionally.

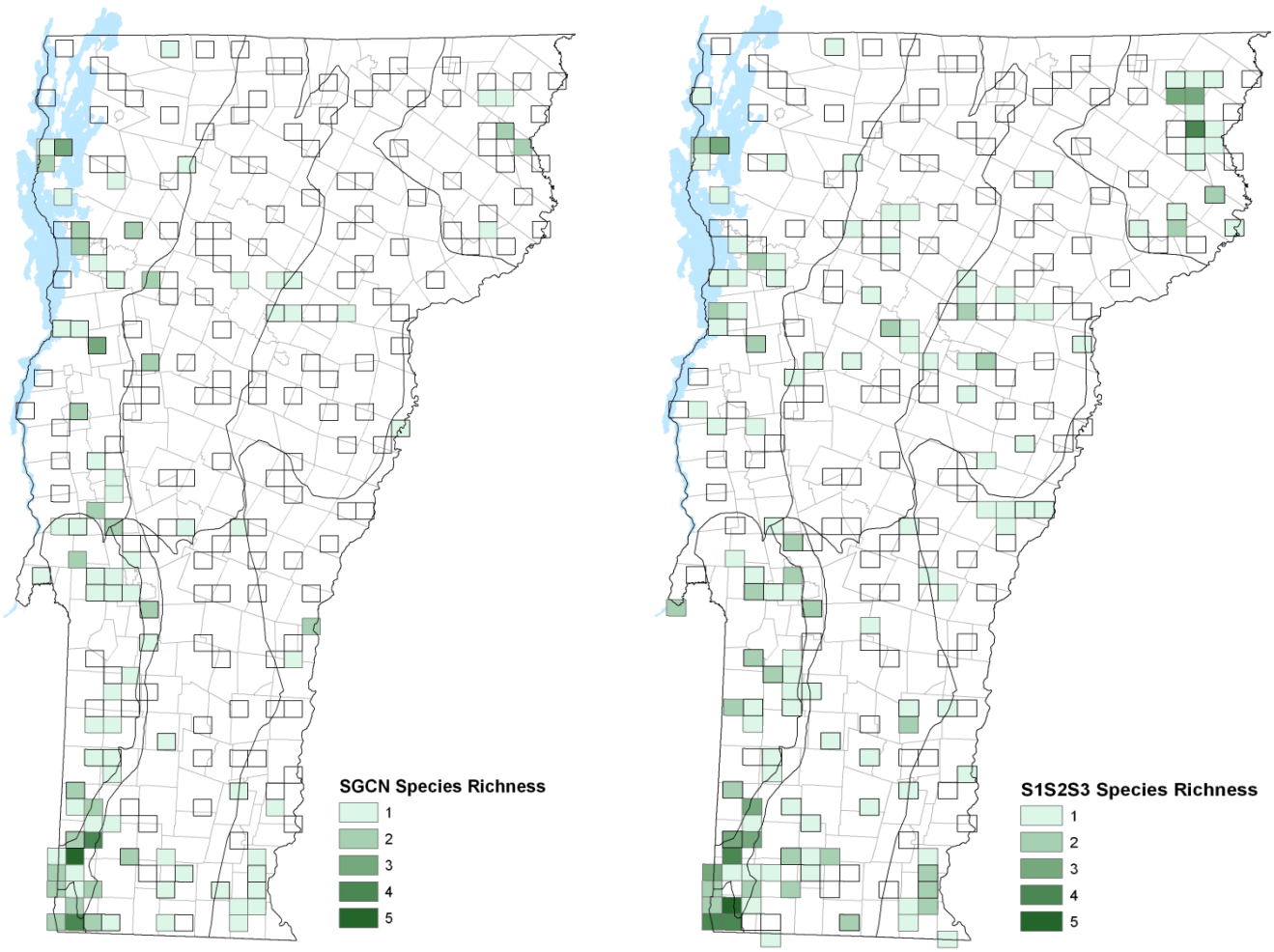


Figure 10. Conservation concern species richness estimated from the Vermont Butterfly Survey.

Table 8. Factors contributing to vulnerability status of SGCN butterflies in Vermont. Species are scored on how a factor affects its vulnerability (GI, Greatly Increase; Inc, Increase; SI, Somewhat Increase; N, Neutral; SD, Somewhat Decrease; Dec, Decrease; U, Unknown).

		Temperature Scope (% of Range)					Hamon AET:PET Moisture Metric Scope (% of Range)					
Common Name	**Range Relationship**	**>5.5F**	**5.1F**	**4.5F**	**3.9F**	**<3.9F**	**< -0.119**	**-0.119**	**-0.096**	**-0.073**	**-0.05**	**>-0.028**
West Virginia White	Northern edge of range	30	50		20					10	60	30
Bog Copper	Center of range	40			30	30					40	60
Edwards' Hairstreak	Northern edge of range	100									100	
Early Hairstreak	Northern edge of range	20		30		50					50	50
Hackberry Emperor	Northern edge of range	90	10							20	80	
Tawny Emperor	Northern edge of range	20	80								70	30
Jutta Arctic	Southern edge of range					100					10	90
Cobweb Skipper	Northern edge of range	50	50								100	
Mulberry Wing	Northern edge of range		30		45	25					100	
Broad-winged Skipper	Northern edge of range	15		45		40				10	55	35
Black Dash	Northern edge of range		40	60							100	
Dion Skipper	Northern edge of range	50		40		10				10	90	
Two-spotted Skipper	Northern edge of range	30			25	45				25		75
Dusted Skipper	Northern edge of range	85		5		10					90	10

Common Name	**Sea level**	**Natl barriers**	**Anth barriers**	**CC mitigation**	**Dispersal/Movement**	**historical thermal niche**	**physiological thermal niche**	**historical hydrological niche**	**physiological hydrological niche**	**Disturbance**	**Ice/snow**	**Phys habitat**	**Other spp for hab**	**Diet**	**Other spp disp**	**Other spp interaction**	**Genetic var**	**Gen bottleneck**	**Phenol response**	**Doc response**	**Modeled change**	**Modeled overlap**	**Protected Areas**
West Virginia White	N	N	GI	N	SD	U	Inc	U	Inc	N	N	SI	N	Inc	N	N	U	U	U	U	U	U	U
Bog Copper	N	GI	SI	U	SI	U	Inc	U	GI	N	N	Inc	SI	Inc	N	N	U	U	U	U	U	U	U
Edwards' Hairstreak	N	SI	SI	U	SD	U	Inc	U	N	N	N	SI	SI	SI	N	Inc	U	U	U	U	U	U	U
Early Hairstreak	N	SI	N	U	N	U	Inc	U	SI	N	N	N	SI	Inc	N	N	U	U	U	U	U	U	U
Hackberry Emperor	N	N	N	U	SD	U	SD	U	SD	N	N	SD	SI	SI	N	N	U	U	U	U	U	U	U
Tawny Emperor	N	N	N	U	SD	U	SD	U	SD	N	N	SD	SI	SI	N	N	U	U	U	U	U	U	U
Jutta Arctic	N	GI	N	U	N	U	GI	U	GI	N	N	Inc	SI	Inc	N	N	U	U	U	U	U	U	U
Cobweb Skipper	N	SI	SI	U	SI	U	SD	U	SD	SD	N	Inc-SI	N	SI	N	N	U	U	U	U	U	U	U
Mulberry Wing	N	SI	Inc	U	SD	U	Inc	U	GI	N	N	Inc	SI	SI	N	N	U	U	U	U	U	U	U
Broad-winged Skipper	N	N	N	U	SD	U	SI	U	N	N	N	N	N	SI	N	N	U	U	U	U	U	U	U
Black Dash	N	SI	Inc	U	SD	U	SI	U	GI	N	N	SI	SI	SI	N	N	U	U	U	U	U	U	U
Dion Skipper	N	Inc	SI	U	SD	U	SI	U	GI	N	N	SI	SI	SI	N	N	U	U	U	U	U	U	U
Two-spotted Skipper	N	SI	Inc	U	SD	U	Inc	U	GI	N	N	SI	SI	SI	N	N	U	U	U	U	U	U	U
Dusted Skipper	N	SI	SI	U	SD	U	SD	U	SD	SD	N	N	SI	SI	N	N	U	U	U	U	U	U	U

Table 9. Results of a climate change vulnerability index for SGCN butterflies in Vermont.

Common Name	**Climate Change Vulnerability Index**	**Confidence**	**GRank**	**SRank**
West Virginia White	Extremely Vulnerable	Very High	G4	S3S4
Bog Copper	Extremely Vulnerable	Very High	G4	S2
Edwards' Hairstreak	Extremely Vulnerable	Very High	G4	SU
Early Hairstreak	Highly Vulnerable	Very High	G4	S2S3
Hackberry Emperor	Increase Likely	Very High	G5	S2
Tawny Emperor	Increase Likely	Very High	G5	S2
Jutta Arctic	Moderately Vulnerable	Very High	G5	S1
Cobweb Skipper	Presumed Stable	Low	G4	S1
Mulberry Wing	Highly Vulnerable	Very High	G4	S2
Broad-winged Skipper	Presumed Stable	Very High	G5	S2
Black Dash	Highly Vulnerable	Very High	G4	S1S2
Dion Skipper	Highly Vulnerable	Very High	G4	S2
Two-spotted Skipper	Highly Vulnerable	Very High	G4	S2
Dusted Skipper	Presumed Stable	Very High	G4	S1

Species Accounts

Interpreting Species Accounts

This section presents detailed accounts of the butterflies and giant silkmoths of Vermont, including results of VBS work and summaries of recent studies and natural history information. Each family and subfamily begins with a general overview of the taxonomic group. Each account generally follows the same layout.

Key references We used these for nearly all of the species accounts for basic natural history information from and other regional information.

Cech, R. and G. Tudor. Butterflies of the East Coast: An Observer's Guide. 2005. Princeton University Press, Princeton, NJ. 345 pp.

Krizek, G. and P. Opler. 1984. Butterflies East of the Great Plains: An Illustrated Natural History. John Hopkins Univ. Press. 294 pp.

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

Leahy, C.W., B. Cassie, and R. K. Walton (eds). 2006. Massachusetts Butterfly Atlas 1986-1990, Massachusetts Audubon Society (www.massaudubon.org/butterflyatlas).

O'Donnell, J., L. Gall, and D. Wagner, eds. 2007. The Connecticut Butterfly Atlas. State Geologic and Natural History Survey Bulletin No. 118. 376 pp.

Opler, Paul A., Kelly Lotts, and Thomas Naberhaus, coordinators. 2010. Butterflies and Moths of North America. Bozeman, MT: Big Sky Institute. http://www.butterfliesandmoths.org/.

Shapiro, A.M. 1974. Butterflies and Skippers of New York State. Search 4(3): 1-60.

Species Name Vernacular, scientific names and taxonomic order generally follow Pelham (2008). (see Appendix 2 for a full faunal list of Vermont).

Summary box Species are classified as Resident, Extinct, Regular migrant, Rare migrant, or Introduced. Regular migrants are species that breed in Vermont, but are unable to overwinter in sufficient numbers to be regarded as resident. The status of 'rare migrant' covers a range of migrant and vagrant species for which breeding is a rare event.

Conservation Status Determining which butterflies are thriving and which are rare or declining is crucial in order to target and prioritize conservation efforts for those species in greatest need. Currently, three evaluation systems are employed to assign conservation status to wildlife in Vermont: legal status, species of greatest conservation need (SGCN), and conservation status ranks. These are applied for each species.

North American Range A brief outline of the range of the species is given, so that populations in Vermont can be put into perspective.

Introductory Paragraph A brief description of some of the noteworthy natural history, features, or distribution is given.

Identification This is not intended to be a guide to identification, as others cover this in detail, but just a quick overview sometimes highlighting local or regional differences.

Flight Period General statements about the flight period and extreme dates (date, township, observer indicated when known) both during VBS and pre-VBS data. A flight chart is presented using weekly counts over the entire 6-year period. Abrupt and large peaks and valleys during the flight period should not necessarily be interpreted to indicate actual changes in abundance. In most cases these were likely due to changes in survey effort during that time period.

Distribution and Habitat General comments about findings during VBS and historically if available.

Maps Two maps are presented for most species. One map summarizes VBS records by block. If data were available, the second map shows towns that have a pre-VBS (pre-2002) record for the species. The fact that a block or town does not contain information does not mean that the particular species did not occur there. The block may not have been adequately surveyed or the species could have escaped detection. Users should bear in mind that the survey maps represent a "snapshot" in time of Vermont butterfly distribution. This is the primary function of a biological atlas for conservation purposes—to establish a baseline against which successive future surveys can be compared.

Biophysical Regions A bar chart showing the percent of blocks within each biophysical region of Vermont in which we found the species.

Parnassians and Swallowtails: Family Papilionidae

Subfamily: Swallowtails (Papilioninae)

The Papilionidae belong to the Superfamily Papilionoidea, the true butterflies. There are no Parnassians (Parnassiinae) in eastern North America. Swallowtails are members of the Family Papilionidae. They comprise about 560 species, have a worldwide distribution, and are richest in the tropics. There are five species found in Vermont.

Many swallowtails are brilliantly colored and are favorites of butterfly enthusiasts. Many mimic other butterflies that are distasteful, while others are distasteful and cause birds and other predators to vomit. Adults are medium to large and many have tails. Adults visit flowers for nectar. Males of most species patrol for mates, while males of Black Swallowtails perch on hilltops or ridges instead of patrolling. Swallowtails overwinter as pupae.

Vermont Swallowtails:

Pipevine Swallowtail (Battus philenor)
Black Swallowtail (Papilio polyxenes)
Canadian Tiger Swallowtail (Papilio canadensis)
Eastern Tiger Swallowtail (Papilio glaucus)
Spicebush Swallowtail (Papilio troilus)

Pipevine Swallowtail *Battus philenor* (Linnaeus, 1771)

This dazzling butterfly is only a vagrant in our state; most have been reported from gardens late in the season. Partial to open habitats, they are able to protect themselves from most predators by using toxic chemicals sequestered as caterpillars from their hostplants, in the Pipevine family (Aristolochia). So successful is the Pipevine at warding off predators with their noxious taste, that several swallowtail species mimic their pattern and coloration.

Vagrant
Very rare

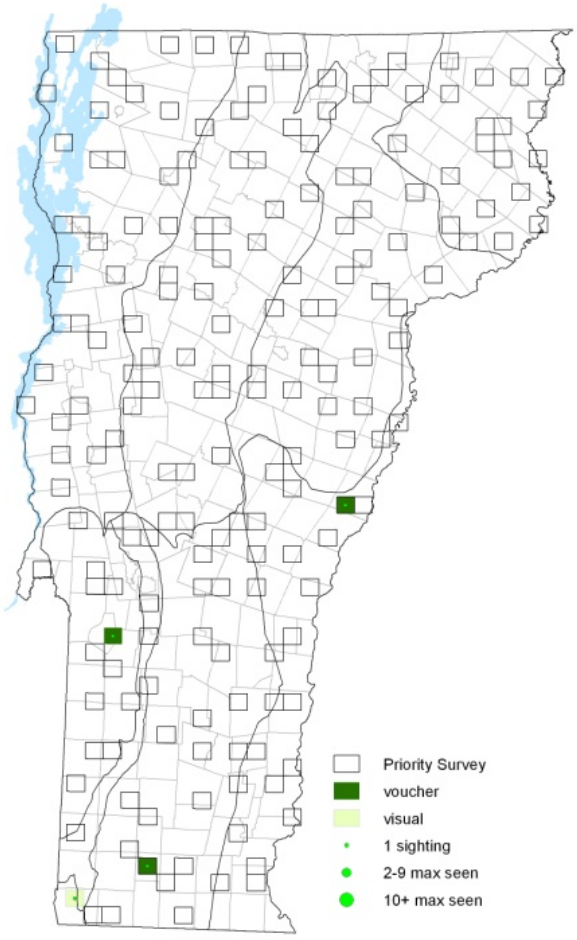
Conservation Status
Vermont SNA
Global G5

North American Range
Rare stray to Canada (s. Manitoba). Tropical lowlands south to southern Mexico.

Identification
A large butterfly, though on the smaller side for a swallowtail. Upper surface of hindwing iridescent blue or blue-green. Underside of hindwing with submarginal row of 7 round orange spots in iridescent blue field.

Flight
Vagrant. There are no historic records for Vermont, but four were reported during VBS. It was first recorded on 24 July 2003 in Pownal (K. Hemeon). Other records are 13 June 2004 in Searsburg (K. Hemeon), 2 October 2005 in Middletown (S. Martineau), and 7 October 2005 in Thetford (B. Shepard).

Distribution and Habitat
Found in a variety of open habitats including residential gardens, open woodlands and shrublands. Larvae feed on plants in the Pipevine family (Aristolochia). Adults nectar on an array of both wild and garden flowers such as lilacs (Syringa), thistle (Cirsium), and milkweeds (Asclepias).


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen

Black Swallowtail *Papilio polyxenes* (Fabricius, 1775)

Common and widespread throughout Vermont and because of their use of garden plants as hosts they are well known both as adults and caterpillars.
The female Black Swallowtail is thought to be a mimic of the distasteful Pipevine Swallowtail.

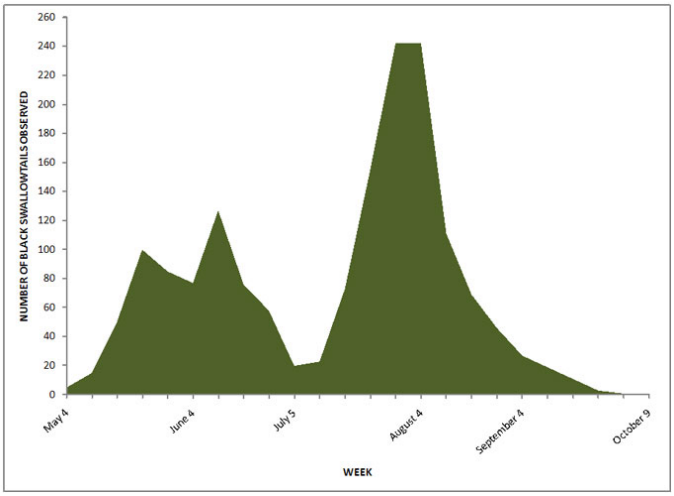
Resident
Common

Conservation Status
Vermont S5
Global G5

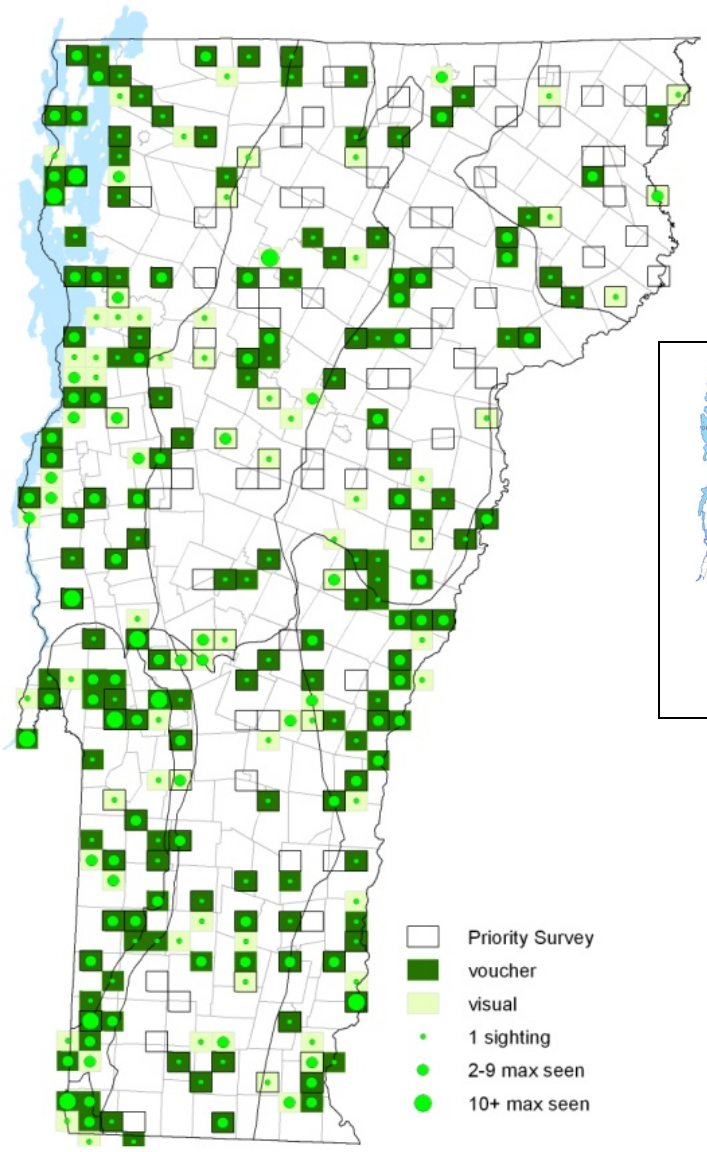
North American Range
Most of the eastern U.S., north into Quebec, west into s. Saskatchewan, Colorado and se. California; south to n. South America.

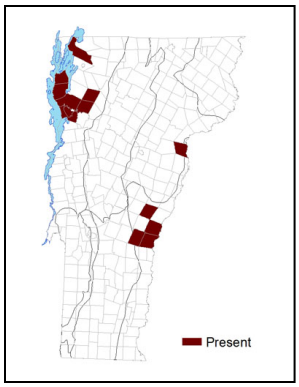
Identification
A smaller Swallowtail with upperside of wings mostly black; on inner edge of hindwing is a black spot centered in larger orange spot. Male has yellow and near edge of wings; female has row of yellow spots. Female hindwing with iridescent blue band.

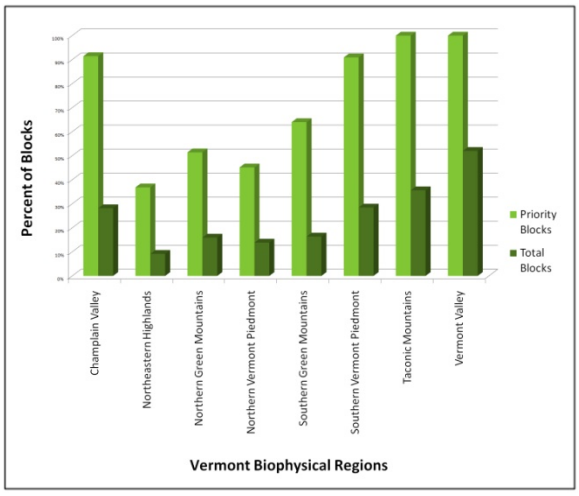
Flight
Reported to have one to two generations in the Northeast. In Vermont they appeared to have two that stretches for almost the entire growing season. Extreme dates: 1 May 2004 in West Haven (M. Elliot) and 9 October in Pownal (K. Hemeon).



Distribution and Habitat
Found throughout the Northeast in a variety of open areas - fields, gardens, roadsides, pastures and throughout suburban areas. Larval hostplants are both wild and cultivated members of the Parsley family (Apiaceae). Adults nectar on an array of blooming flowers including milkweeds (Asclepias), thistles (Cirsium), and clovers (Trifolium).


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen


Present


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Canadian Tiger Swallowtail *Papilio canadensis* (Rothschild & Jordan, 1906)

Resident
Common

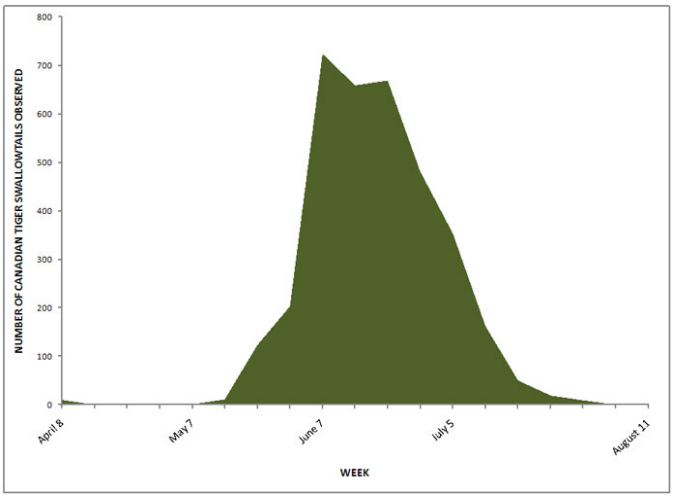
Conservation Status
Vermont S5
Global G5

North American Range
North America from central Alaska southeast across Canada and the northern Great Lakes states to northern New England.

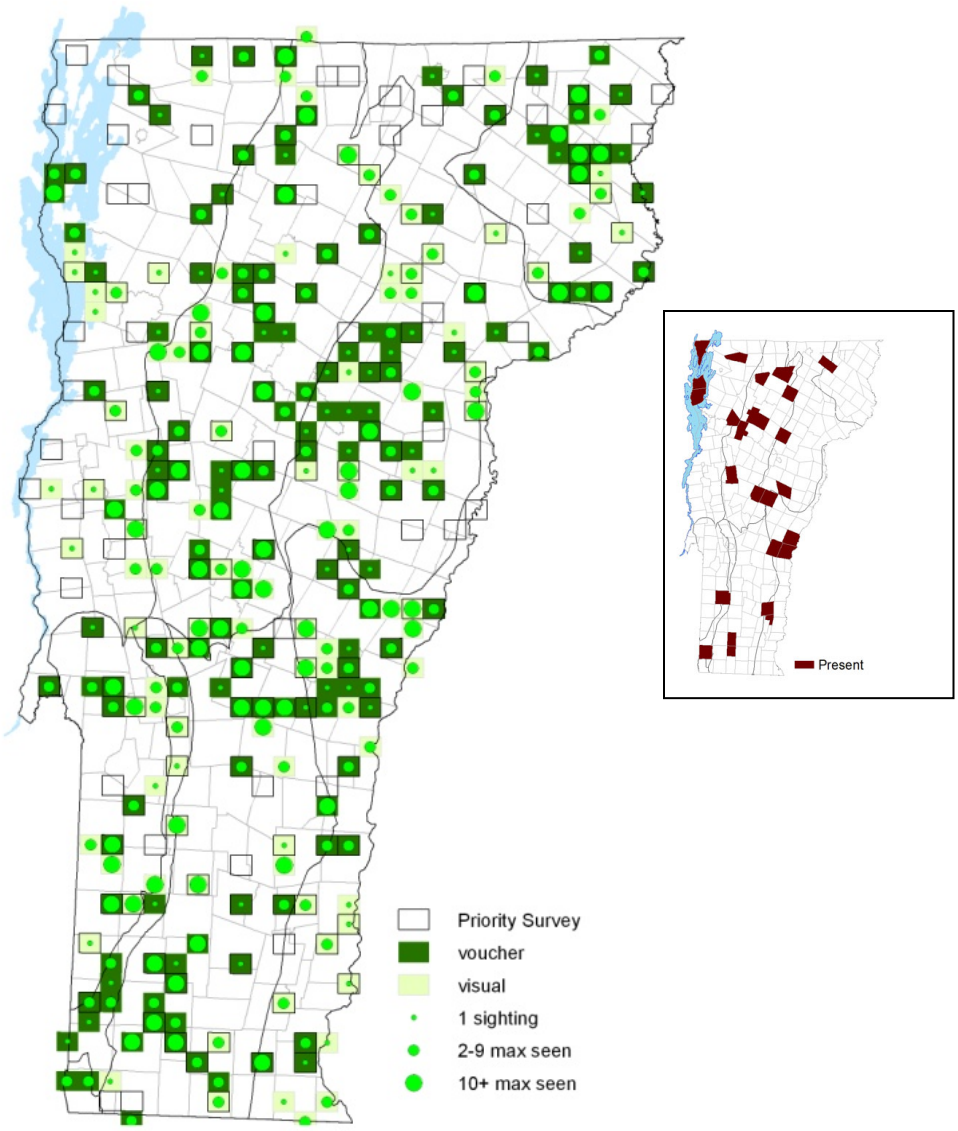
One of the most striking butterflies of the Northeast, the Canadian Tiger Swallowtail was once considered a subspecies of the Eastern Tiger Swallowtail. They are closely related have similar natural history. They are difficult to differentiate in the field, and will periodically hybridize, especially throughout central New England where their ranges overlap. The Canadian Tiger Swallowtail is an adaptive generalist, and though its range is limited to northern climates, it is able to adjust to nearly any habitat within that range. Males patrol to locate receptive females. Females lay eggs singly on surface of hostplant leaves. Caterpillars eat leaves and rest on silk mats in shelters of curled leaves. Overwinter in chrysalis.

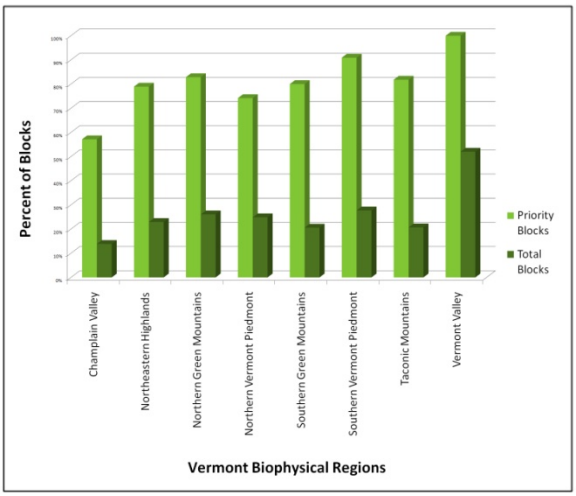
Identification
Smaller than Eastern or Western Tiger Swallowtails. Upperside of forewing with relatively broad black stripes; underside with marginal yellow spots merged into continuous band. Hindwing with numerous orange scales. Dark line next to body is much wider in this species than in the Eastern Tiger Swallowtail.

Flight
Unlike the Eastern Tiger Swallowtail, it has a single generation from May to mid-July.. Highest counts are from early June through mid July. In some years they can be extremely abundant. Extreme dates from vouchers due to difficulties of visual identification: 1 May 1998 in Grand Isle (D. Hoag) and 29 July 1980 in Grafton (S. Parren).



Distribution and Habitat
Both historic and VBS records are from across the state. Caterpillars feed on leaves of Birch (Betula), Aspen (Populus), and Black Cherry (Prunus serotina).


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen
Present


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Eastern Tiger Swallowtail *Papilio glaucus* (Linnaeus, 1758)

Resident
Uncommon

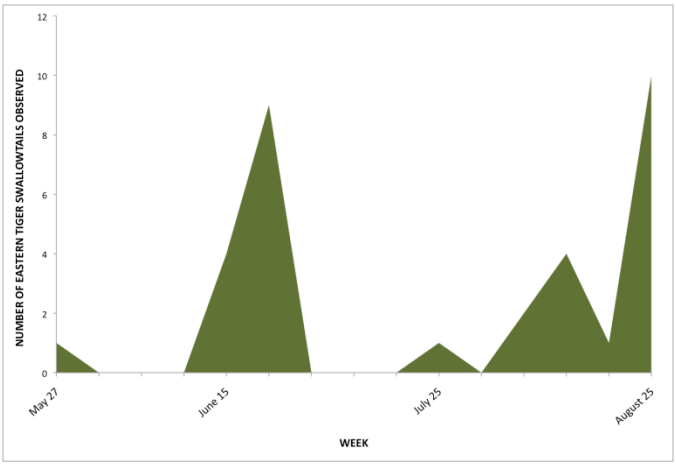
Conservation Status
Vermont S1
Global G5

North American Range
Eastern North America from Ontario south to Gulf coast, west to Colorado plains and central Texas.

The Eastern Tiger Swallowtail is far less common in Vermont than the Canadian Tiger Swallowtail, yet equally striking in appearance. It was probably the first North American butterfly to be described and drawn by Europeans in the New World. Like the Canadian Tiger Swallowtail, this butterfly is an adaptive generalist, but is apparently not as tolerant to cold climates. There are black form females caused by a gene that produces melanism and is most common in areas where the distasteful Pipevine Swallowtail populations are highest, perhaps conferring it with protection from predation. Males patrol for receptive females. Females lay eggs singly on host leaves. Caterpillars rest on silk mats in shelters of curled leaves. Overwinter in chrysalis.

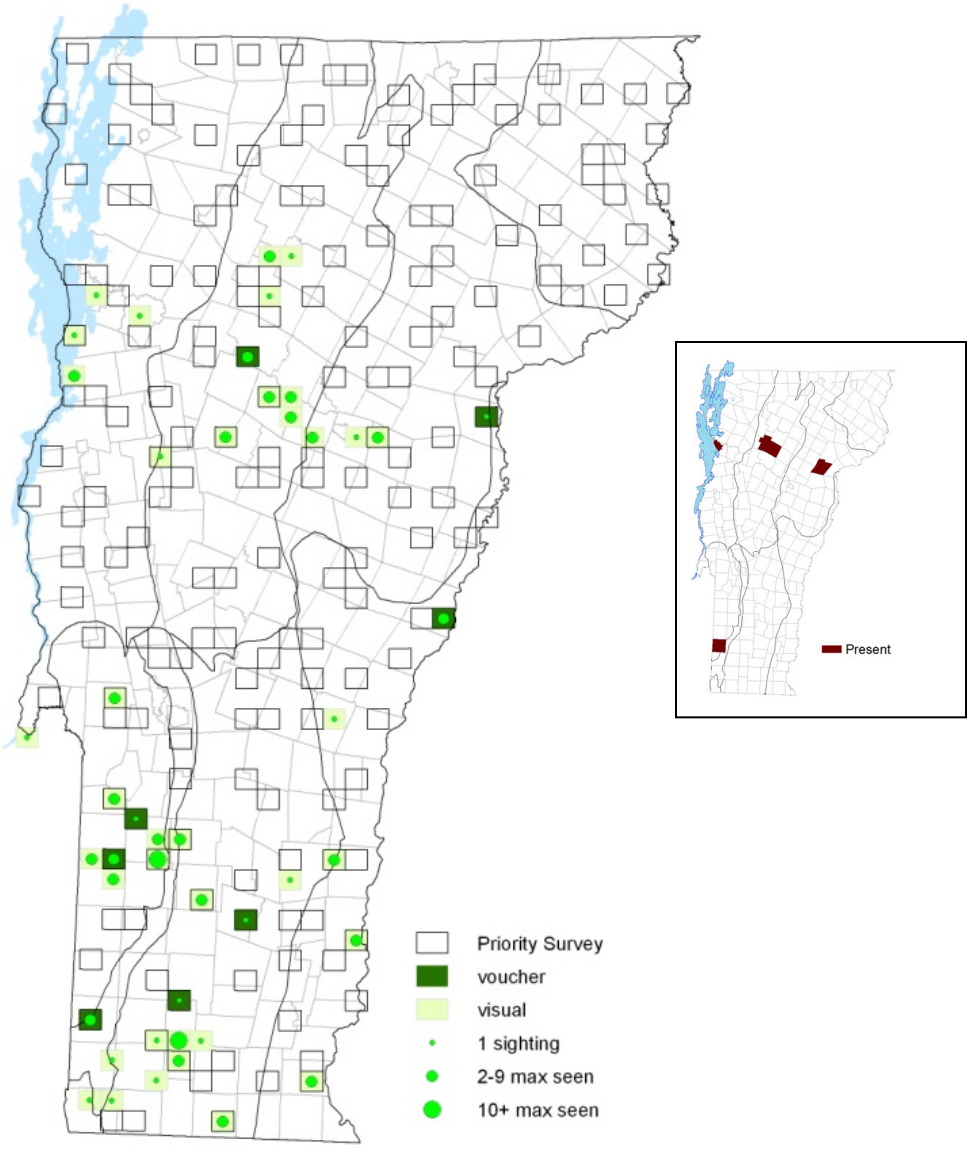
Identification
Male is yellow with dark tiger stripes. Female has 2 forms: one yellow like the male and the other black with shadows of dark stripes. Hindwing of both female forms has many iridescent blue scales and an orange marginal spot. On the underside of forewing of both female forms the row of marginal spots has merged into a continuous band.

Flight
Two generations, the first eclosing in May and the second at the end of July. Extreme dates: a dark form female on 27 May 2006 in Pownal (K. Hemeon), 6 individuals in Castleton (R. Pilcher) and 4 in Orange (A. Aversa) on 25 August 2005, 19 September 2000 in Burlington (B. Waldron).

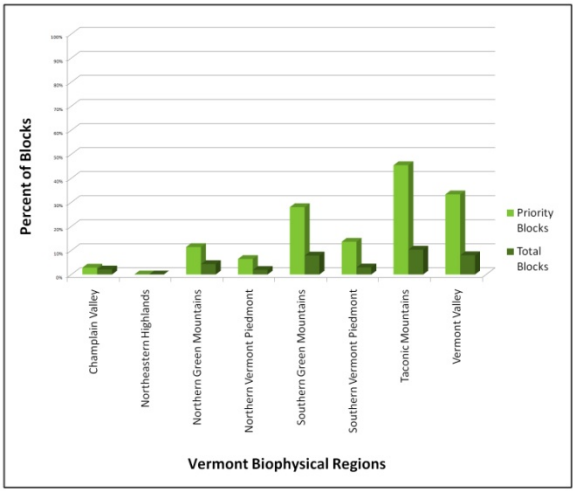


Distribution and Habitat
Not a common butterfly in Vermont and even less so in the north. A curious distribution in Vermont, with records in the southern tier expected, but the cluster of records from central Vermont is difficult to explain. A similar pattern emerges from the few historical records too.

They can be found in deciduous broadleaf woods, forest edges, river valleys, parks, and suburbs. Caterpillars feed on Birch (Betula), Ash (Fraxinus), Cottonwood (Populus), and willow (Salix). Adults nectar from a wide variety of flowering plants.


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen

Present


Percent of Blocks
Priority Blocks
Total Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Vermont Biophysical Regions

Spicebush Swallowtail *Papilio troilus* (Linnaeus, 1758)

Resident
Rare

Conservation Status
Vermont S1
Global G5

North American Range
Eastern states from southern Canada to Florida; west to Oklahoma and central Texas. Occasionally strays to North Dakota, central Colorado, and Cuba.

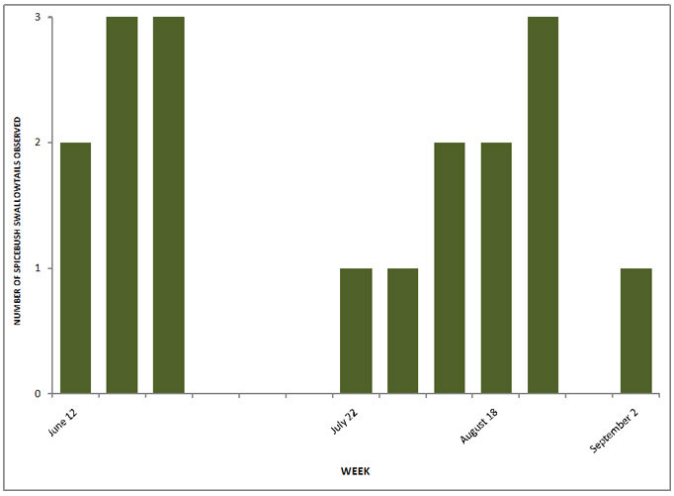
The Spicebush is one of the several Swallowtail species that is palatable, but is able to gain protection from predation through mimicry of the Pipevine Swallowtail. Patrolling males may be found in open woodlands and along woodland edges, and often found at mud puddles sipping nutrients. Both sexes nectar at wide variety of flowers.

Identification

Upper surface of forewing is mostly black with ivory spots along margin. Upper surface of hindwing has orange spot on costal margin and sheen of bluish (female) or bluish-green (male) scales. Underside of hindwing with pale green marginal spots.

Flight

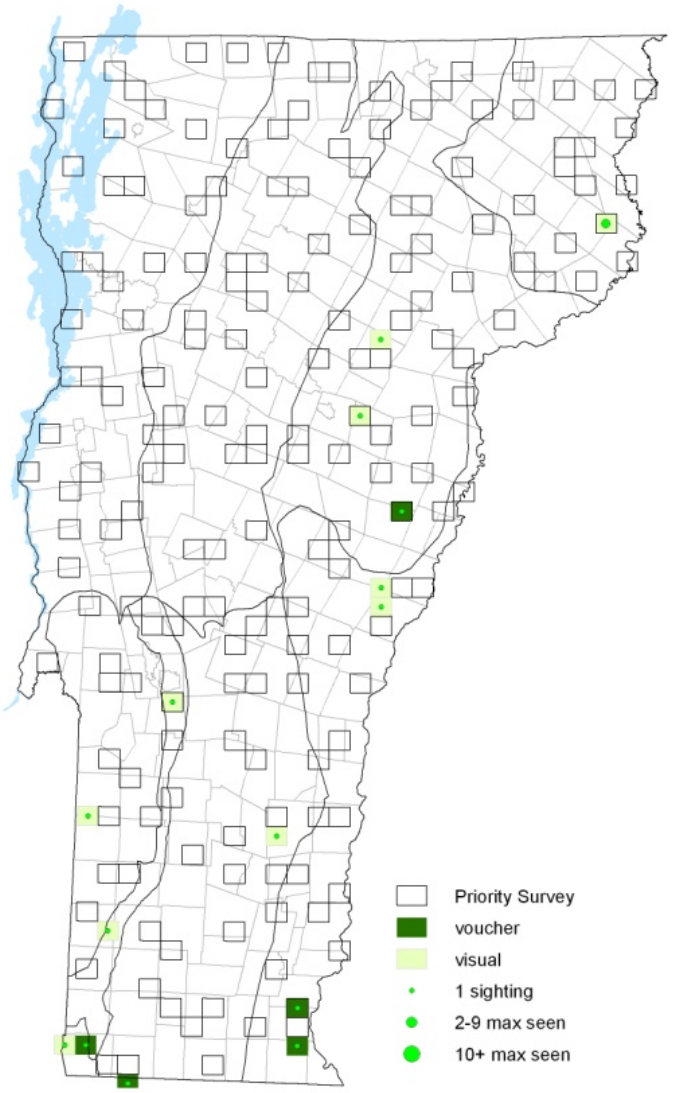
Two generations reported for other areas apparent from VBS records. Extreme dates: 10 June 2007 in Arlington (H. Romack) and 2 September 2007 in Pownal (K. Hemeon).

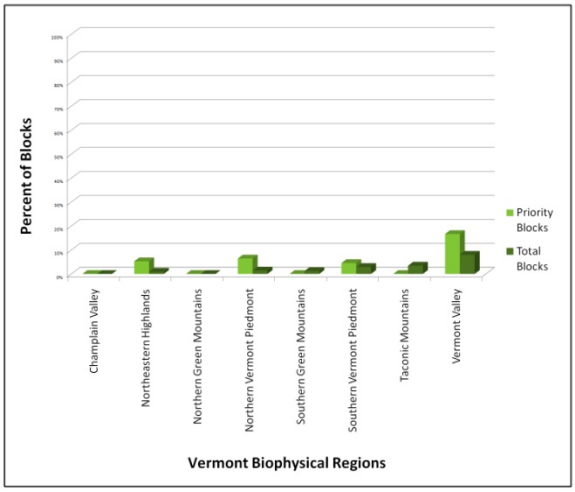


Distribution and Habitat

One historic record from Winooski in the UVM Zadock Thompson Natural History Collection, a female found on 23 July 1994 (N. Livada).

Its hostplant is Spicebush (Lindera benzoin), which is found primarily in southern Vermont. Larvae also known to use Sassafras (Sassafras albidum).


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen


Percent of Blocks
Priority Blocks
Total Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Vermont Biophysical Regions

Whites and Sulphurs: Family Pieridae

Subfamily: Sulphurs (Coliadinae)

Members of the Family Pieridae, in North America, they range from Mexico to northern Canada. There are four species found in Vermont. Sexes of most species are dimorphic. Some species are puddlers and will collect around muddy pools on dirt roads. Sulphurs overwinter as larvae.

Vermont Sulphurs:

Little Yellow (Pyrisitia lisa)
Clouded Sulphur (Colias philodice)
Orange Sulphur (Colias eurytheme)
Pink-edged Sulphur (Colias interior)

Little Yellow *Pyrisitia lisa* (Boisduval & Le Conte, 1830)

Despite appearing to be a small and delicate butterfly, Little Yellows are known to wander, sometimes converging in massive swarms and crossing over the Atlantic as far as Bermuda. It cannot survive winter temperatures in Vermont and is unable to establish breeding populations farther north than southern Connecticut.

Vagrant
Very Rare

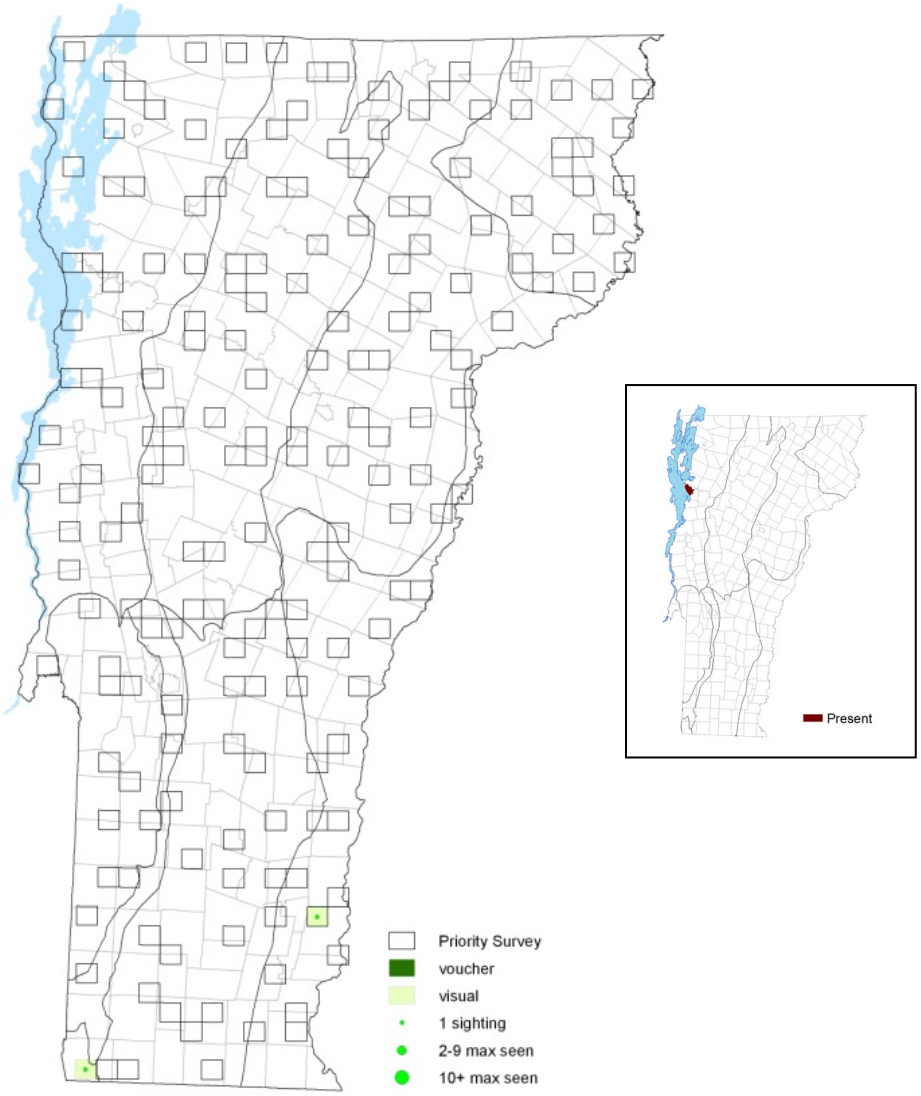
Conservation Status
Vermont SNA
Global G5

North American Range
Resident in Costa Rica north to South Texas and the Deep South; seasonally colonizes most of eastern United States and west to eastern South Dakota, central Nebraska, and eastern New Mexico.

Identification
A tiny sulphur. Upperside of male forewing yellow with wide black apex. Hindwing with black border. Female yellow or white (rare) with black borders. Both sexes with small black spot in forewing cell.

Flight
A vagrant to Vermont, with only one historic record and two records during VBS. The first record was a specimen in the UVM Zadock Thompson Natural History Collection from 17 September 1969 in Burlington (O. Royce). Other records include a sighting on 29 July 2006 in Windham (J. Holan) and another in Pownal on 2 August 2004 (K. Hemeon).

Distribution and Habitat
Found predominantly in dry and open habitats; open fields, railroads, waste areas and forest edges. Host plants are Wild Sensitive Plant (Chamaecrista nictitans) and Partridge Pea (Chamaecrista fasciculata) and adults nectar from Goldenrods (Solidago) and asters (Symphyotrichum novae-angliae).


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen
Present

Clouded Sulphur *Colias philodice* (Godart, 1819)

Previously a butterfly solely of the northeast, its range has expanded south and west with the planting of forage crops, predominantly alfalfa and other legumes. This has caused an overlap in the ranges of the Clouded and Orange Sulphurs and subsequent hybridization of the two species in areas where they are Sympatric. Unlike male Orange Sulphurs, the male Clouded Sulphur does not reflect ultraviolet light. Instead, it releases a pheromone to attract females.

Resident
Common

Conservation Status
Vermont S5
Global G5

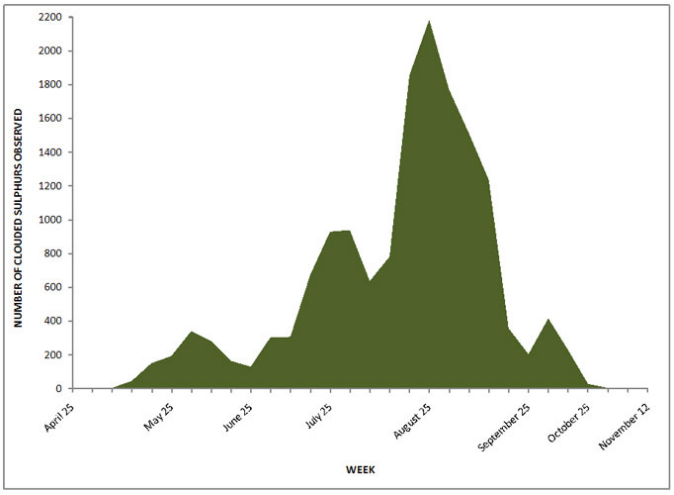
North American Range
Alaska south through central and southeast Canada, all of conterminous United states except much of California, south Texas, and most of Florida.

Identification

Upper surface of male wings bright, clear yellow with solid black edging; lower side of forewing with some dark submarginal spots; hindwing with silver cell spot rimmed with orange-pink, usually doubled. Female has two forms: yellow form with uneven black edging enclosing yellow spots, and a white form which is greenish-white rather than yellow. Spring and fall forms are smaller and less conspicuously marked.

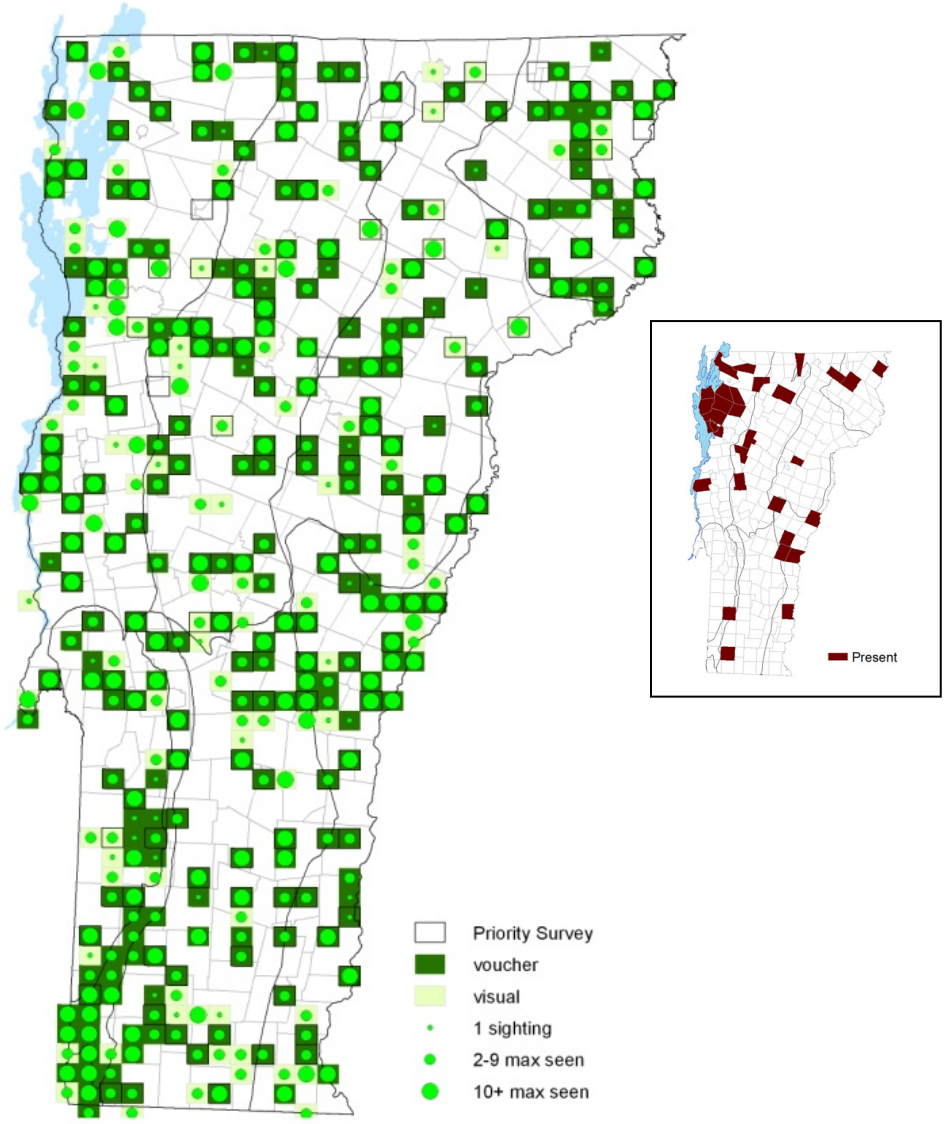
Flight

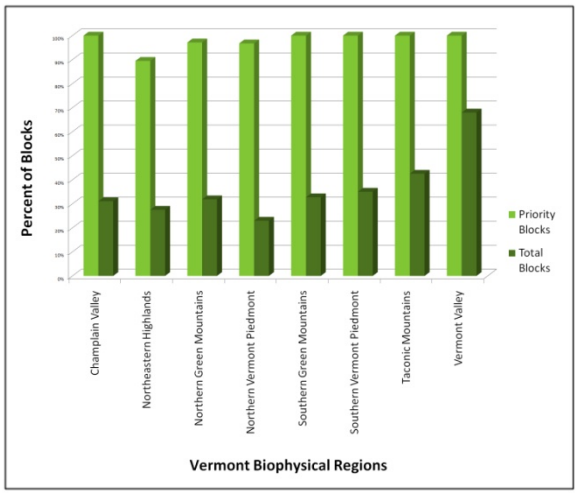
With at least two, sometimes more, overlapping generations, the Clouded Sulphur was found from the end of April through the end of October. Though its numbers in the Northeast have apparently declined, they remain abundant, especially in late summer.



Distribution and Habitat

Common and sometimes abundant throughout Vermont, preferring meadows, pastures and disturbed sites. Caterpillars feed on legumes such as White Clover (Trifolium repens), Alfalfa (Medicago sativa), and Red Clover (Trifolium pratense). Adults nectar from a wide range plants including goldenrod (Oligoneuron), milkweed (Asclepias), and Joe Pye Weed (Eupatorium purpureum).


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen
Present


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Orange Sulphur *Colias eurytheme* (Boisduval, 1852)

Resident
Common

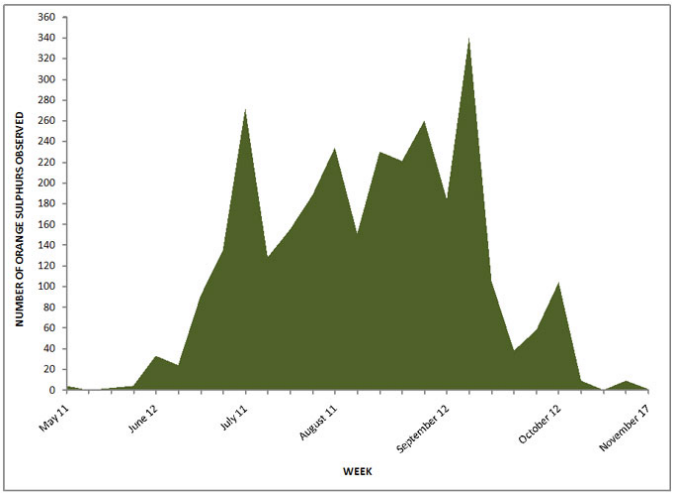
Conservation Status
Vermont S5
Global G5

North American Range
Southern Canada to central Mexico, coast to coast in the United States except for the Florida peninsula. Comments: One of the most widespread and common butterflies in North America.

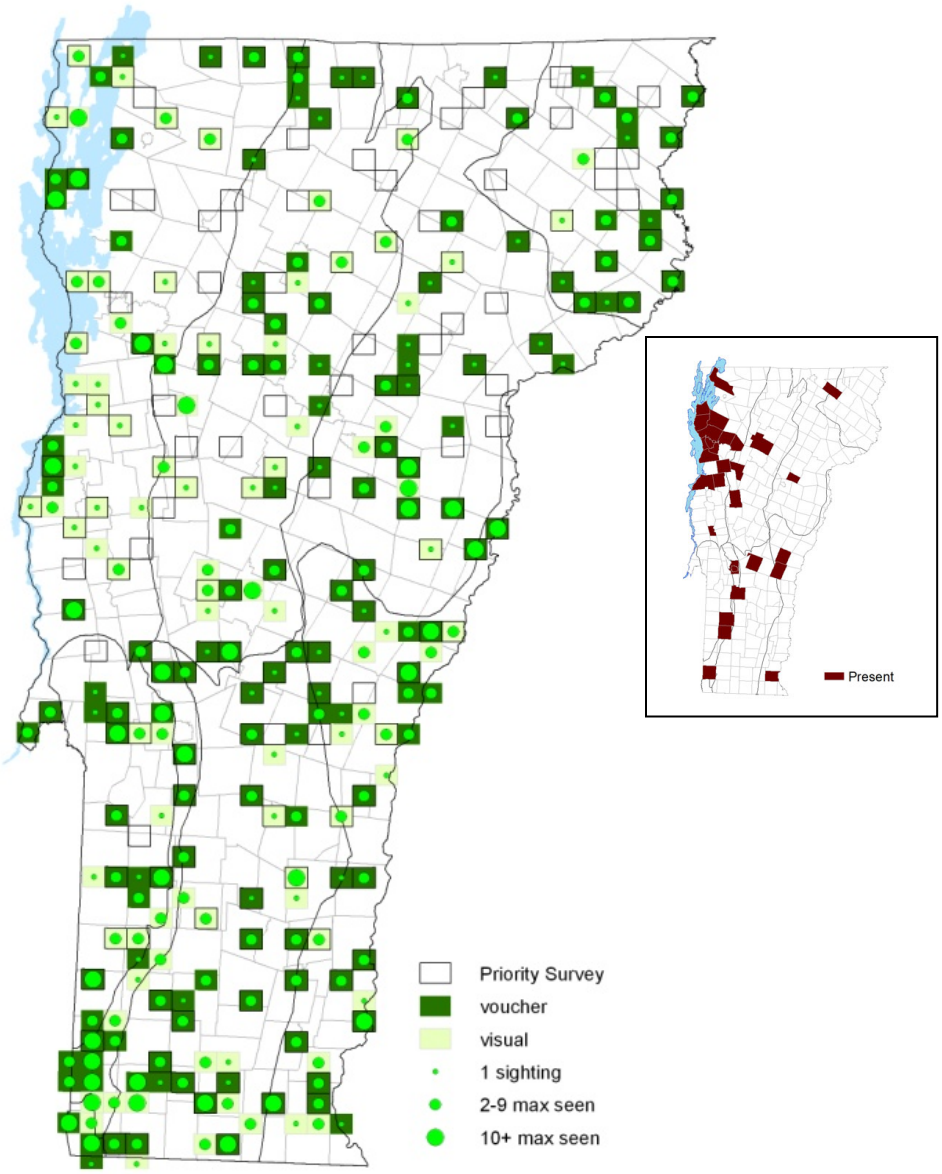
Rare throughout the northeast until the 1930's, but now very common in Vermont, the Orange Sulphur began moving eastward as its hostplant, alfalfa, became more commonly cultivated. As an adaptable generalist, these butterflies readily colonize disturbed sites and can often be found in gardens and suburban areas. Males patrol for mates and females are able to distinguish them from Clouded Sulphurs by both the ultraviolet light they reflect from their forewings, as well as a specific pheromone they release. Interestingly, male Clouded Sulphurs look almost identical to male Orange Sulphurs, but absorb ultraviolet light rather than reflecting it. Larvae feed mainly at night and can be an agricultural pest.

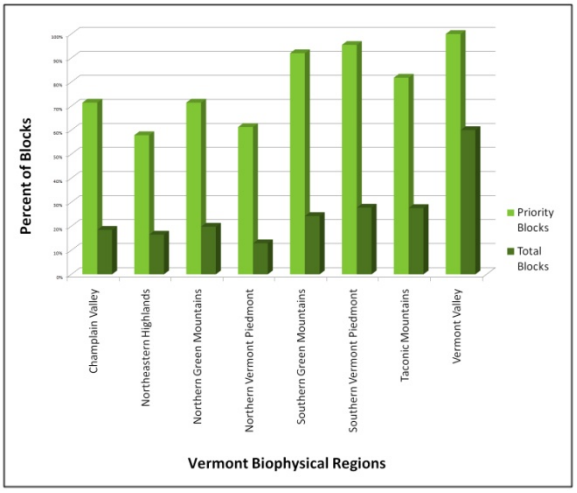
Identification
Quite variable. Upperside of male yellow with orange overlay, yellow veins, wide black border, and dark black cell spot. Female yellow or white with irregular black border surrounding light spots. Underside hindwing spot silver with two concentric dark rings, and a spot above it.

Flight
Two to three generations in Vermont. Long flight period starting in mid-May and continuing through mid- November near Lake Champlain. Extreme dates: 11 May 2003 in Springfield (B. Eldridge) and 17 November 2006 in South Hero (D. Hoag).



Distribution and Habitat
Found throughout Vermont, the Orange Sulphur utilizes a wide variety of open sites, especially clover and alfalfa fields, mowed fields, vacant lots, meadows, road edges. Host plants are Alfalfa (Medicago sativa), White Clover (Trifolium repens), and White Sweet Clover (Melilotus alba). Adults nectar from many kinds of flowers including Dandelion (Taraxacum F.H. Wigg.), Milkweeds (Asclepias L.), and Goldenrods (Oligoneuron Small).


Present
Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Pink-edged Sulphur *Colias interior* (Scudder, 1862)

Resident
Uncommon

Conservation Status
Vermont S3
Global G5

North American Range
From British Columbia and eastern Oregon east through the Great Lakes area to northern New England. Isolated population in central Appalachians of northeast Pennsylvania, western Maryland, eastern West Virginia, and northwest Virginia.

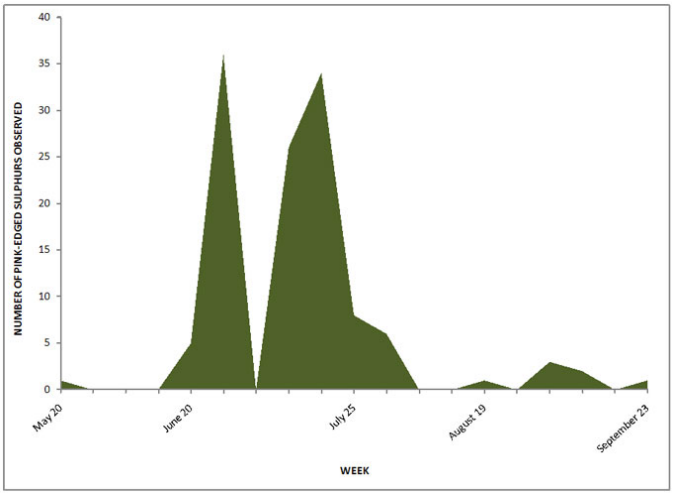
Preferring northern heathlands, its distribution essentially coincides with the Canadian Zone or Northern Coniferous Forest biome. Some authorities consider western populations as distinct species. In the Northeast it becomes common only in the boreal regions of northern New York and New England.

Identification

Difficult, but not impossible to distinguish from Clouded and Orange Sulphurs. Both sexes with conspicuous pink wing edges. Fresh Clouded Sulphurs can have more faint pink fringes. Male yellow; female yellow or white (very rarely). Upperside of male with black border; border on female may be incomplete or only seen at tip of wing. Underside of hindwing clear yellow with single silver cell spot circle in pink. Much weaker flier than other sulphurs.

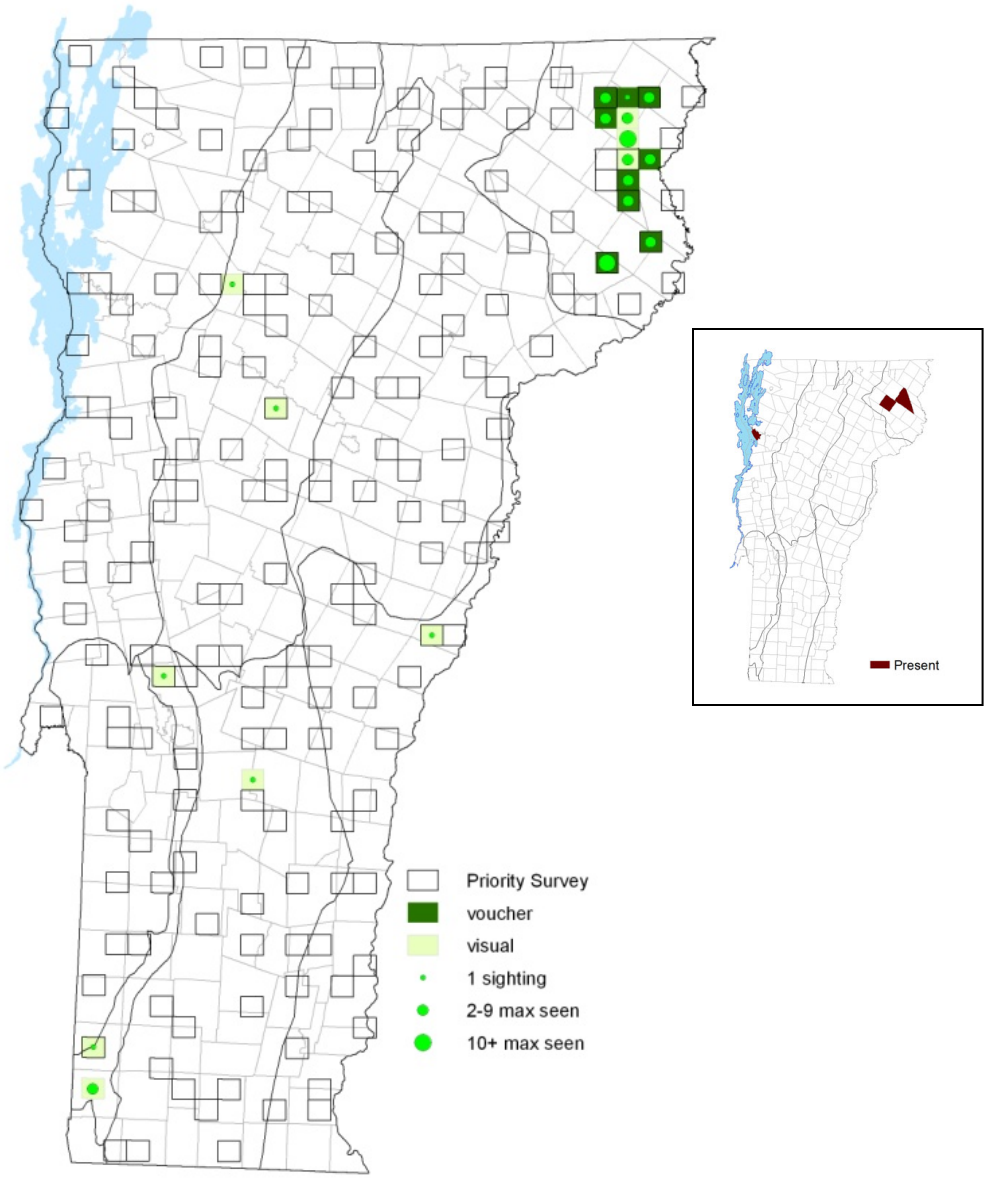
Flight

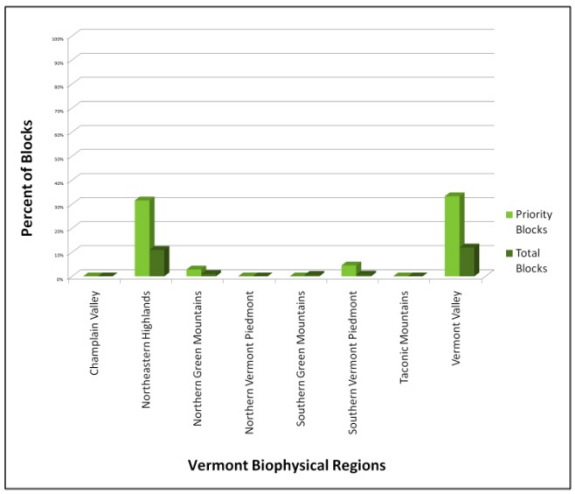
The Pink-edged Sulphur has one extended brood from mid-June through September, but is most commonly seen from late June to late July. Extreme dates: 20 June 1998 in Ferdinand (S. Griggs), 20 June 2002 in Bennington (K. Hemeon), and 23 September 2002 in Shaftsbury (T. Armata).



Distribution and Habitat

A boreal zone, northern butterfly, found mainly in the Northeastern Highlands of Vermont. Recorded from a number of blueberry (*Vaccinium*) species. In New England it appears to prefer Velvetleaf Blueberry (*V. myrtilloides*), but it has also been reported to eat Dwarf Bilberry (*V. cespitosum*), and two species of lowbush blueberries (*V. angustifolium* and *V. vacillans*). Adults nectar from Bristly Sarsaparilla (Aralia hispida) and Orange Hawkweed (Hieracium aurantiacum).


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen
Present


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Subfamily: Whites (Pierinae)

The Pieridae are members of the Superfamily Papilionoidea, the true butterflies. Worldwide in distribution, most species are found in the tropics. Species with more than one generation usually have distinct seasonal variation in appearance. There are 31 species of the subfamily Pierinae in North America with just three found in Vermont. Adults of most species are predominantly white above with some black patterns, and their hindwings often have a pattern of yellow and black scales that can appear green. All species overwinter in chrysalis.

Vermont Whites:

Mustard White (Pieris oleracea)
West Virginia White (Pieris virginiensis)
Cabbage White (Pieris rapae)

Mustard White *Pieris oleracea* Harris, 1829

A declining species in most of its range, but appears to be abundant in Vermont. The decline was thought to be caused by competition with the introduced Cabbage White, but is more likely due to the abundance of introduced mustard plants. Females will oviposit on introduced Wintercress (Barbarea vulgaris) and Garlic Mustard (Alliaria petiolata), yet larvae cannot complete development on these plants. Cabbage White larvae are able to thrive on them. Introduced wasp parasites that were imported to combat Cabbage Whites in agricultural fields have also been implicated in the decline of Mustard Whites.

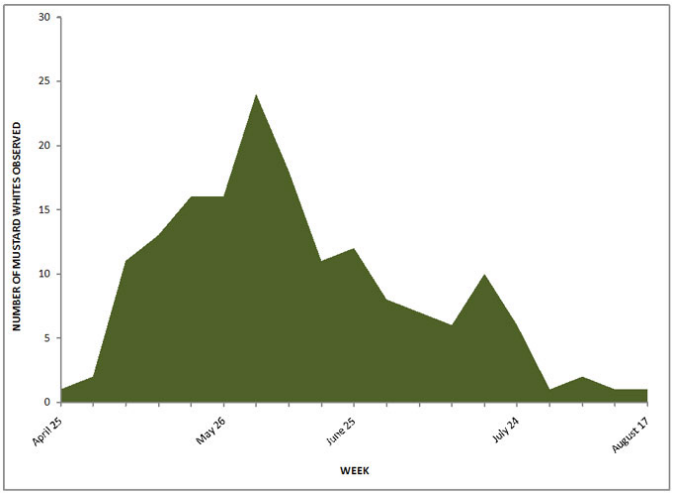
Resident
Uncommon

Conservation Status
Vermont S4S5
Global G5

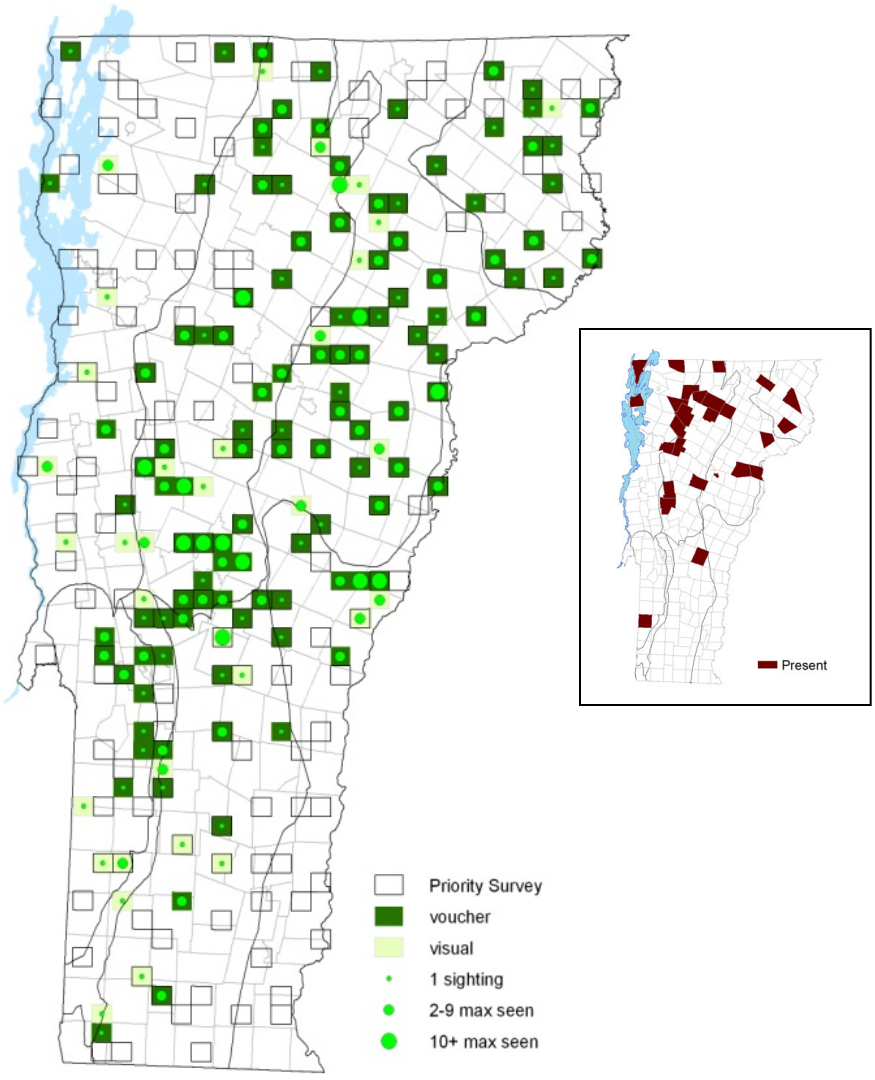
North American Range
East from the Dakotas and Canadian prairie provinces across the Great Lakes area to New England and Nova Scotia.

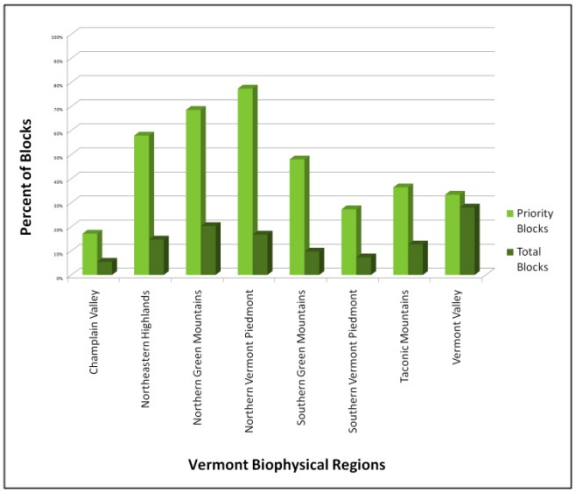
Identification
Summer form is pure white above and below; spring form has black-tipped upper forewing. Underside of hindwing and apex of forewing have veins edged with yellow-green or gray-green.

Flight
Two to three generations with differing spring and summer phenotypes. Extreme dates: 25 April 2007 in Bristol (B. Collins), 25 August 2005 in Guildhall (K. McFarland), and 11 September in Grand Isle (S. Griggs).



Distribution and Habitat
During the Massachusetts Butterfly Atlas it was only found at higher elevations west of the Connecticut River valley. This pattern appears to continue northward into southern Vermont where VBS records generally followed the Green Mountains northward into central Vermont where they appeared to be more widespread, except for the lowlands of the Champlain Valley. This elevation and latitude effect may be due to location of forest cover, climatic effects on range of introduced plants and parasites or other factors and needs further study.


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen
Present


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

West Virginia White *Pieris virginiensis* (W.H. Edwards, 1870)

Resident
Uncommon

Conservation Status
Vermont S3S4, SGCN, Special Concern
Global G3G4

North American Range
Northern Great Lakes states and from New England southwest along the Appalachians to north Georgia and northeast Alabama.

This spring gem is a butterfly of rich, deciduous woodlands. Vermont represents the northeastern most edge of its range. It has been listed as a species of special conservation concern in Vermont since 1990.

Deforestation and fragmentation of forests into small woodlots in the past probably led to a decline in this species. Colonies apparently disappear easily. Poor spring weather can cause difficulties for adults trying to mate and lay eggs. Survival of caterpillars to the 4th instar is comparable to that of the abundant Cabbage White. However, West Virgina White larvae fall victim to host plant senecence in the 4th and 5th instar and sometimes starve. The introduction of Garlic-mustard (Alliaria petiolata) to Long Island in 1868. Females are attracted to Garlic Mustard and lay eggs on it, but young larvae are poisoned by it. Additionally, build up of granulosis virus in the soil in colonies causes premature death of larvae. Once a colony has been extirpated in an isolated woodlot, adults will not recolonize because they will not fly across open areas.

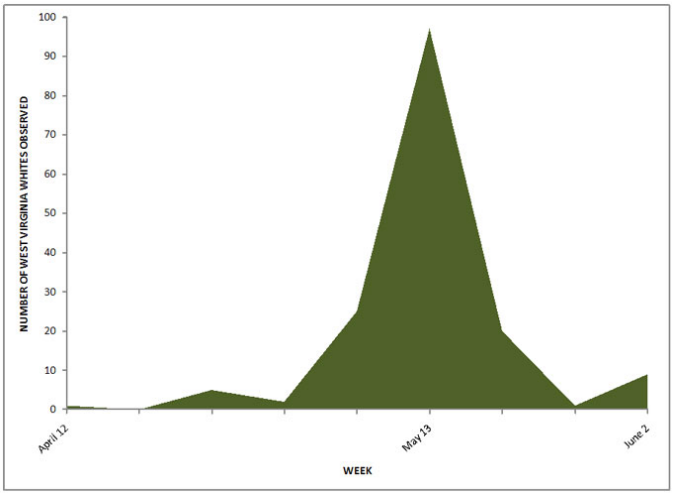
Adults have one short flight period in the spring and the entire life cycle is closely tied to the host plant. Shortly after Toothwort leaves and flower stalks emerge in April, adult West Virginia Whites eclose from winter-diapausing pupae. Mating and oviposition begin within a few days of ermergence. Eggs are laid singly on the underside of the leaves and hatch in May when leaf growth has been completed and young larvae will find plentiful food. Caterpillars in 1st to 3rd instar feed on the underside edges of the leaves, while 4th and 5th instars move to the tops of the leaves. Larvae complete their development by the beginning of June, at which time they pupate and enter diapause until the following spring. June also marks the senesence and withering of Toothwort foliage, leaving no other woodland plant suitable for West Virginia Whites. Although toothwort is a perenial, most of its biomass is underground. Above ground stalks bear relatively small and ephemeral leaves. Larvae frequently defoliate these by 4th and 5th instar at which time they are forced to search for other Toothwort plants.

Identification

Almost completely white above with some gray scaling on the forewing. Whitish below with no yellow wash. Veins on the underside of the hindwing are faintly outlined in pale gray scales. It is often confused with the Mustard White, which by contrast shows dark green-black veins on the underside of the hindwing during the spring flight.

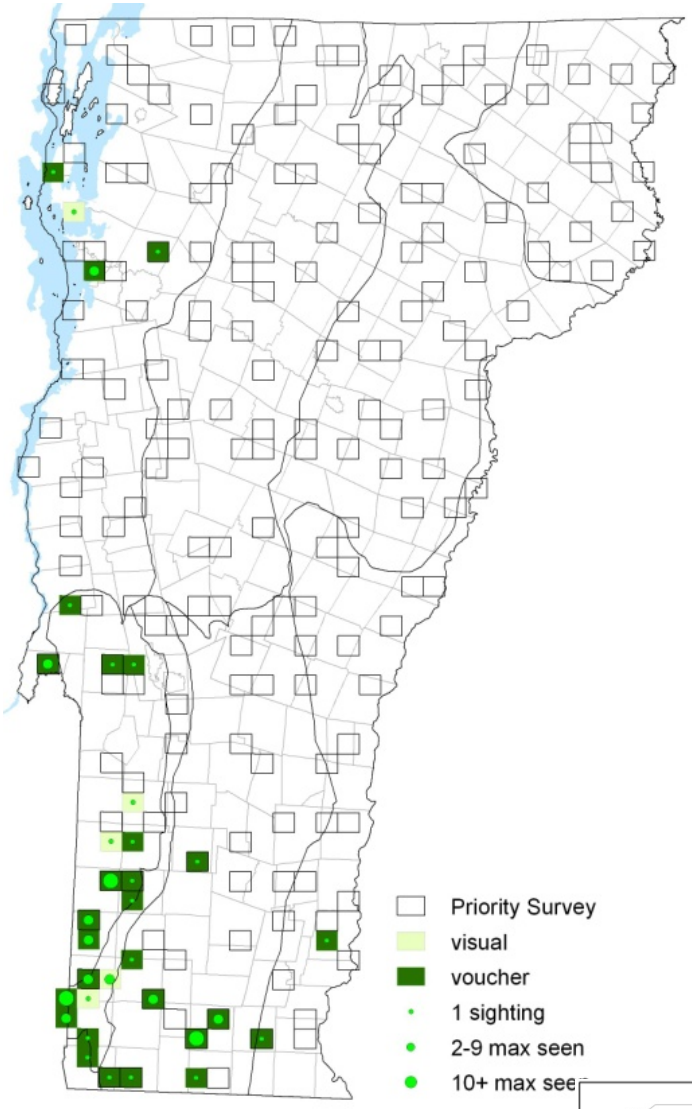
Flight

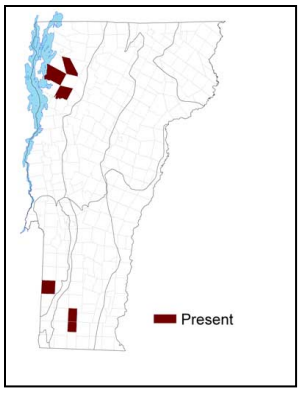
Adults only fly in spring before trees are fully leafed out. They are largely finished for the year by the second week of June. Extreme dates: 12 April 2006 in Bennington (T. Armada) and 5 June 2003 in Sandgate (D. Rolnick).

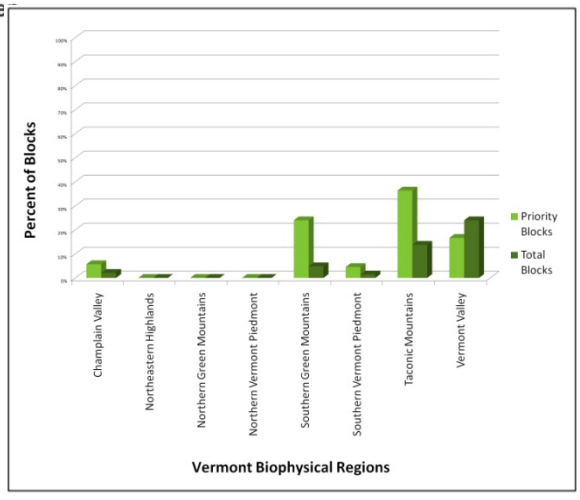


Distribution and Habitat

This butterfly relies completely on relatively undisturbed and mature rich, hardwood forests. Host plants are Crinkleroot (Cardamine diphylla) and Cut-leaved Toothwort (Cardamine concatenata). Adults nectar from Toothworts, Spring Beauty (Claytonia virginica), Violets (Viola), and other spring wildflowers.


Priority Survey
visual
voucher
1 sighting
2-9 max seen
10+ max see


Present


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Cabbage White *Pieris rapae* (Linnaeus, 1758)

Resident - Introduced
Common

Conservation Status
Vermont SNA
Global G5

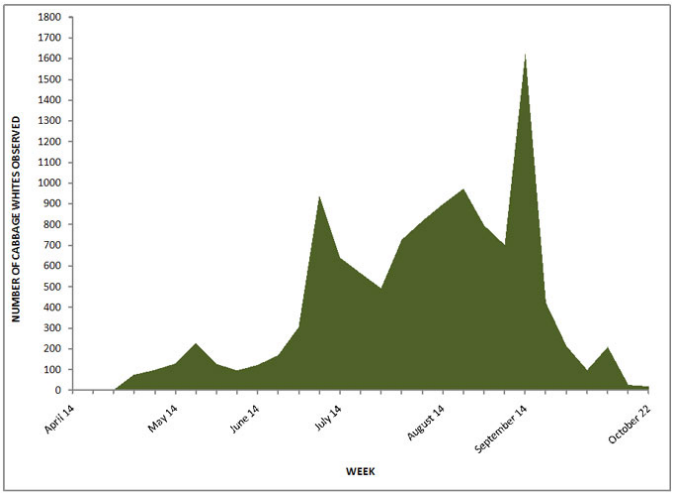
North American Range
From central Canada south through the United States (except Florida Keys, southern Louisiana, and South Texas) to northwest Mexico.

A Eurasian species first introduced in Quebec City in 1860 and in New York in 1868. The species was considered widespread in New England by 1871. The earliest record for Vermont was a specimen originally in the Dartmouth College collection and now in the Peabody Natural History Museum dated 3 August 1895 from Woodstock (A.P. Morse).

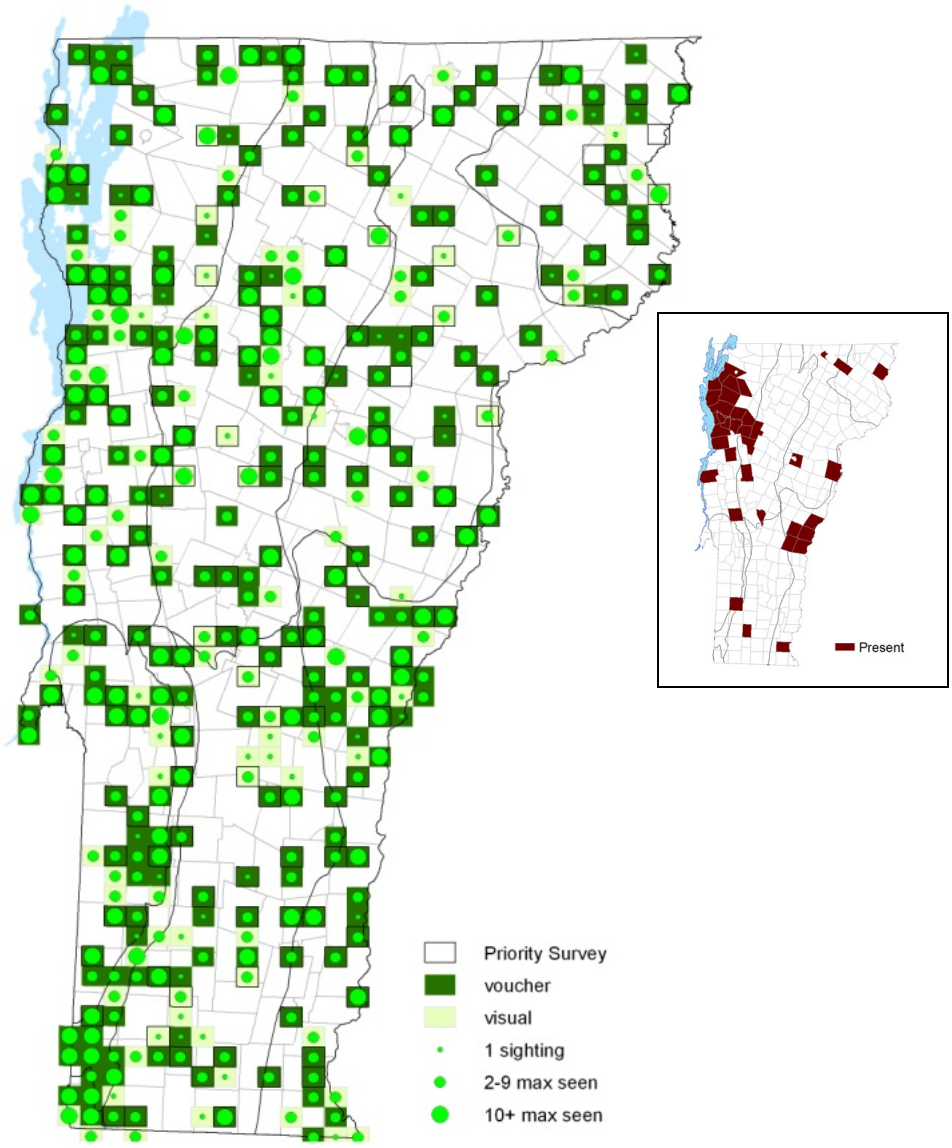
Scudder (1889) wrote that within a quarter century of its arrival, rapid and widespread colonization had resulted in massive crop losses, mainly to cabbage. Unfortunately, introduced parasites that have been used to control larvae have affected native butterfly species as well.

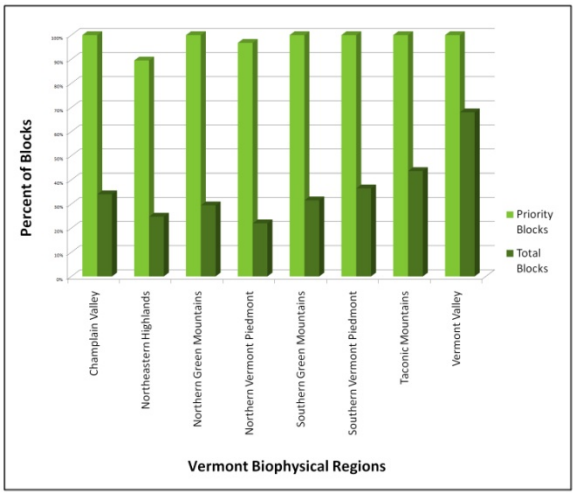
Identification
Upperside of wings white; forewing with black tip. Two submarginal black spots in female, one in male. Underside of hindwing and forewing apex evenly yellow-green or gray-green. Spring and fall short-day form is smaller, less yellow, with reduced black areas.

Flight
Two to three broods in the Northeast and multiple (continuous?) broods in the South. In Vermont Cabbage Whites fly beginning in late April through October, perhaps the longest flight period of any species in Vermont. Extreme dates: 14 April 2006 in Hartford (B. Shepard), 24 October 2002 in Grand Isle (D. Hoag).



Distribution and Habitat
This was the only butterfly found in nearly every priority survey block during VBS. Adults nectar from a very wide array of plants including Mustards (Brassicaceae), Dandelion (Taraxacum), Red Clover (Trifolium pratense), Asters (Symphyotrichum), and Mints (Mentha). Host plants are in the Mustard family (Brassicaceae) and include both native and exotic species.


Present
Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Gossamer Wings: Family Lycaenidae

Subfamily: Harvesters (Miletinae)

The Lycaenidae are members of the Superfamily Papilionoidea, the true butterflies. Worldwide in distribution, this family has approximately 4,700 species that are unevenly distributed. Miletinae is a small subfamily, and most species reside in Africa or Asia. The larvae are carnivorous, feeding on other insects. Only one species is found in North America and in Vermont.

Vermont Harvesters:

Harvester (Feniseca tarquinius)

Harvester *Feniseca tarquinius* (Fabricius, 1793)

The Harvester is the only North American butterfly that is almost exclusively carnivorous and adults eat aphid honeydew. The female Harvester lays her eggs in the midst of a colony of aphids. After hatching, the larvae crawl beneath their prey, spin a silk nest for protection, and begin feeding on aphids. The larvae cloak themselves wooly scales of their prey, camouflaging themselves as a heap of desiccated aphids in order to avoid attack from ants who harvest aphid honeydew. Males perch in sunlight on the edge of leaves, watching for females, often sallying back and forth in the area, returning to where they started.

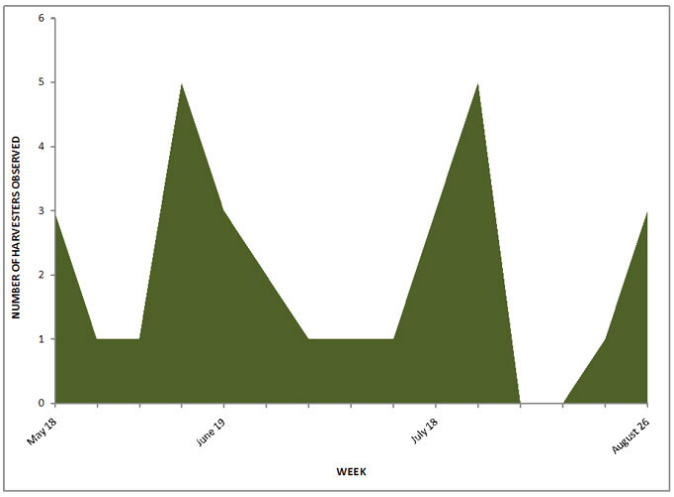
Resident
Common to Uncommon

Conservation Status
Vermont S4
Global G4

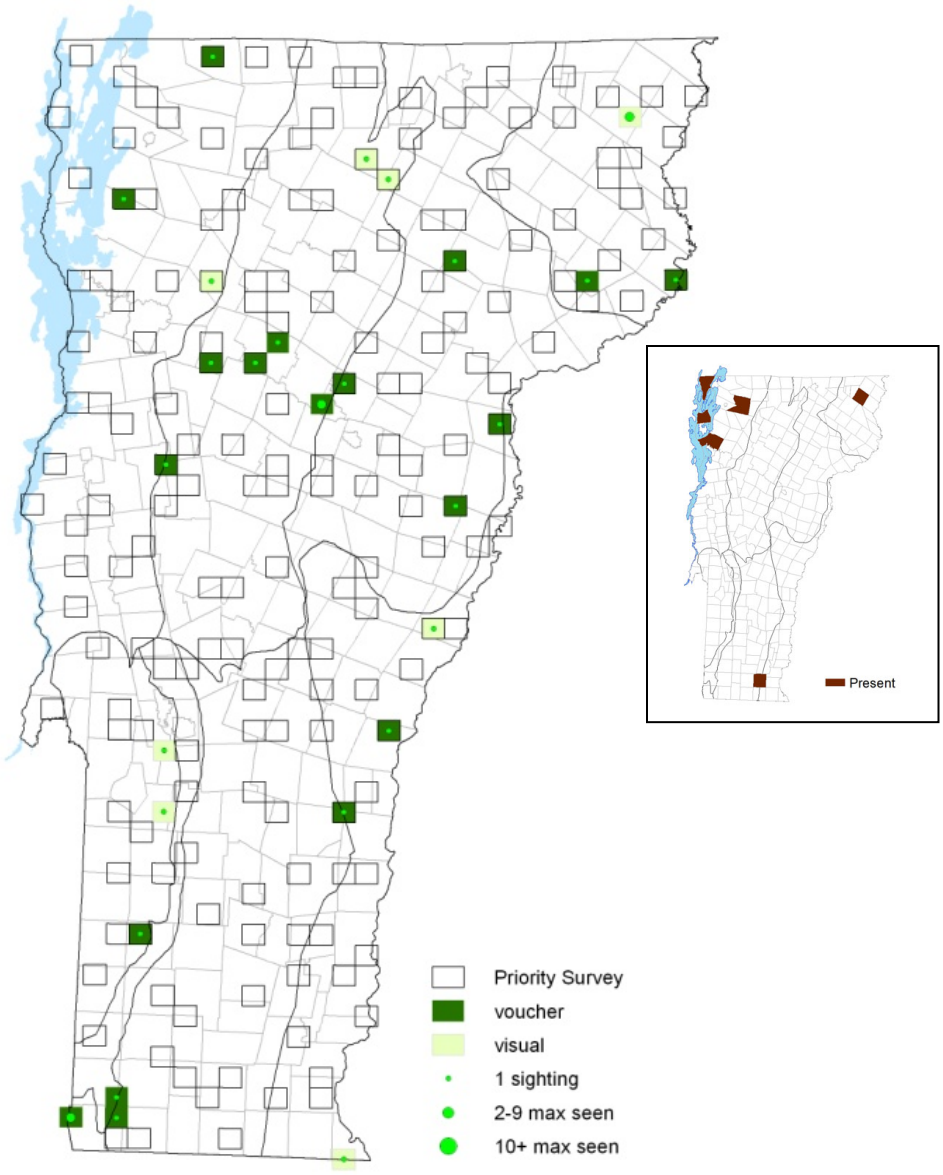
North American Range
Eastern United States west to Minnesota, south to central Texas and central Florida. Comments: Only North American butterfly species with carnivorous caterpillars.

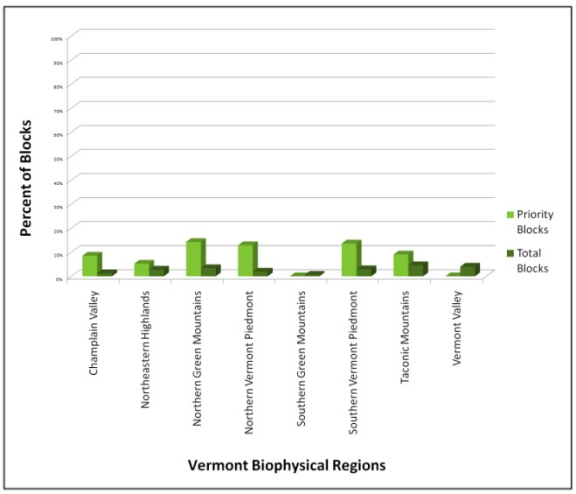
Identification
Upperside has black spots and orange-brown areas surrounded by black. Underside hindwing is orange-brown to orange-purple with small, faint white circles.

Flight
Exact number of broods unknown, probably three to four. Never found in large numbers. Extreme dates: 18 May 2003 in Manchester (R. Stewart), 20 May 2003 in Weathersfield (K. McFarland), 26 August 2005 in Pownal (T. Armata), and 27 August 1989 in Fairfield (J. Hedbor).



Distribution and Habitat
The Harvester was found throughout Vermont, predominantly in Alder (Alnus) stands in and around wetlands at lower elevations. Larval host is mainly the Woolly Alder Aphid (Prociphilus tessallatus). Adult Harvesters do not nectar, instead gaining nutrients from sap, mud, scat or harvesting honeydew from aphids.


Present
Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Subfamily: Coppers (Lycaeninae)

Coppers are members of the Family Lycaenidae. They are found in sunny, open habitats throughout the temperate zone, with 50 species found in Eurasia and North America and three found in Vermont. No species are known migrants, but several are local colonists. Coppers typically have upper wing surfaces that are iridescent purple or red-orange, but some North American species are blue, brown, or gray. Males perch and interact with other males while awaiting receptive females. Most species have a single brood and overwinter as eggs or as first instar caterpillars within the egg. The caterpillars feed docks, knotweeds, buckwheats, cinquefoils, gooseberries, currants, or redberry in North America.

Vermont Coppers:

Bronze Copper Lycaena hyllus
American Copper Lycaena phlaeas
Bog Copper Lycaena epixanthe

American Copper *Lycaena phlaeas americana* (Linnaeus, 1761)

This beautiful, fiery colored butterfly is the flashiest of our eastern Coppers. Some authorities believe that the American Copper (*Lycaena phlaeas americana*) is the same species as the Eurasian Small Copper (*Lycaena phlaeas phlaeas*), and European colonists unintentionally introduced it to the Americas. This theory is based on the fact that they feed on introduced European plant species and are partial to disturbed habitats. Males are feisty and will readily defend territory while perching in wait for females. Eggs are laid singly on host plant stems or leaves. Young caterpillars chew holes in the underside of leaves; older larvae create channels in leaf tissue.

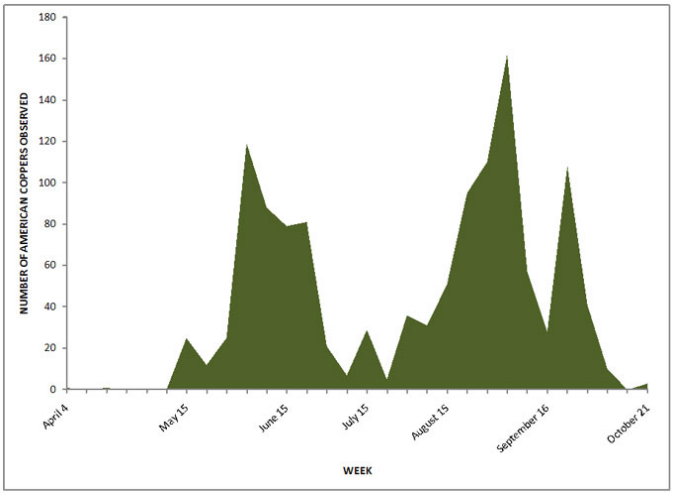
Resident
Common

Conservation Status
Vermont S5
Global G5

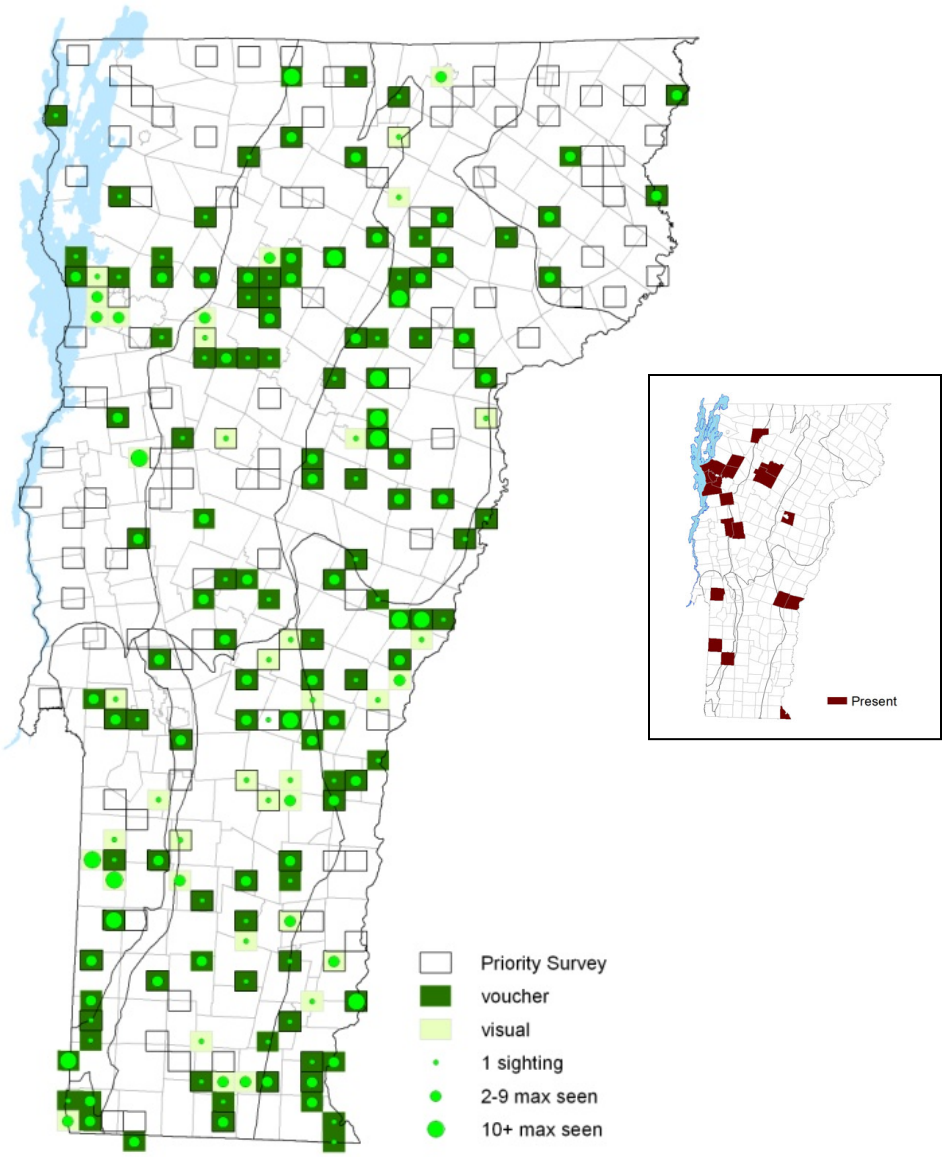
North American Range
Nova Scotia south to Georgia, Tennessee, and Arkansas; west across Great Lake states to North Dakota. Native populations found in the Arctic and the western mountains. Comments: Eastern and Midwest populations probably result from an introduction from Scandinavia during the colonial period.

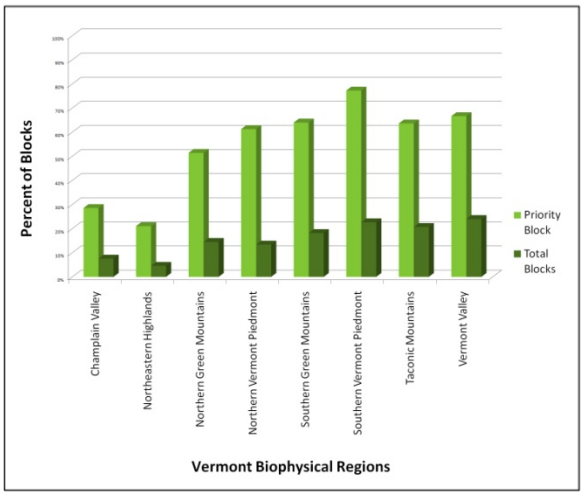
Identification
A small butterfly, only slightly larger than Bog Copper. Upper surface of forwing shiny, fiery orange-red with black spots; hindwing gray with orange-red outer margin. Underside gray; hindwing with submarginal row of orange-red zigzags.

Flight
At least two flight periods in Vermont, found from later April until widespread frost in October. Extreme dates: 4 April 2003 in Richford (J. Finkel) and 21 October 2007 in Bennington (K. Hemeon).



Distribution and Habitat
The American Copper is found throughout Vermont, but is perhaps more common southern regions. They prefer disturbed habitats and can commonly be found in urban parks, parking lots and pastures. Their primary larval host plant is the introduced European species, Sheep Sorrel (Oxyria acetosella) and they can sometimes be found on Curly Dock (Rumex crispus). Adults will nectar from a variety of flowers including White Clover (Trifolium repens) and Buttercup (Ranunculus).


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen
Present


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Block
Total Blocks
Vermont Biophysical Regions

Bronze Copper *Lycaena hyllus* (Cramer, 1775)

Bronze Coppers are dwindling in numbers, yet the conditions needed for this species to thrive are not even fully understood enough to stop their decline. Some have theorized that urbanization of their primary habitat (wetlands) is to blame and that even reclamation of previously drained areas in not enough as they may have more specialized needs than we can readily recognize. These bronze beauties can often be located flying low and lazy in the immediate vicinity of their host plants. Males perch on low growth near host plants to watch for females.

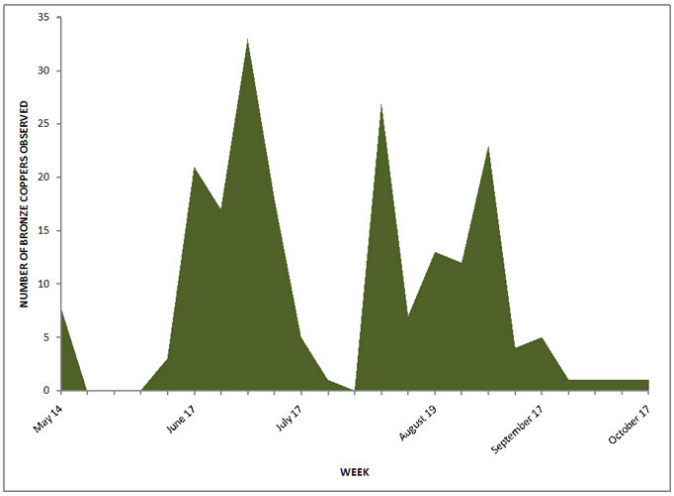
Resident
Common

Conservation Status
Vermont S5
Global G5

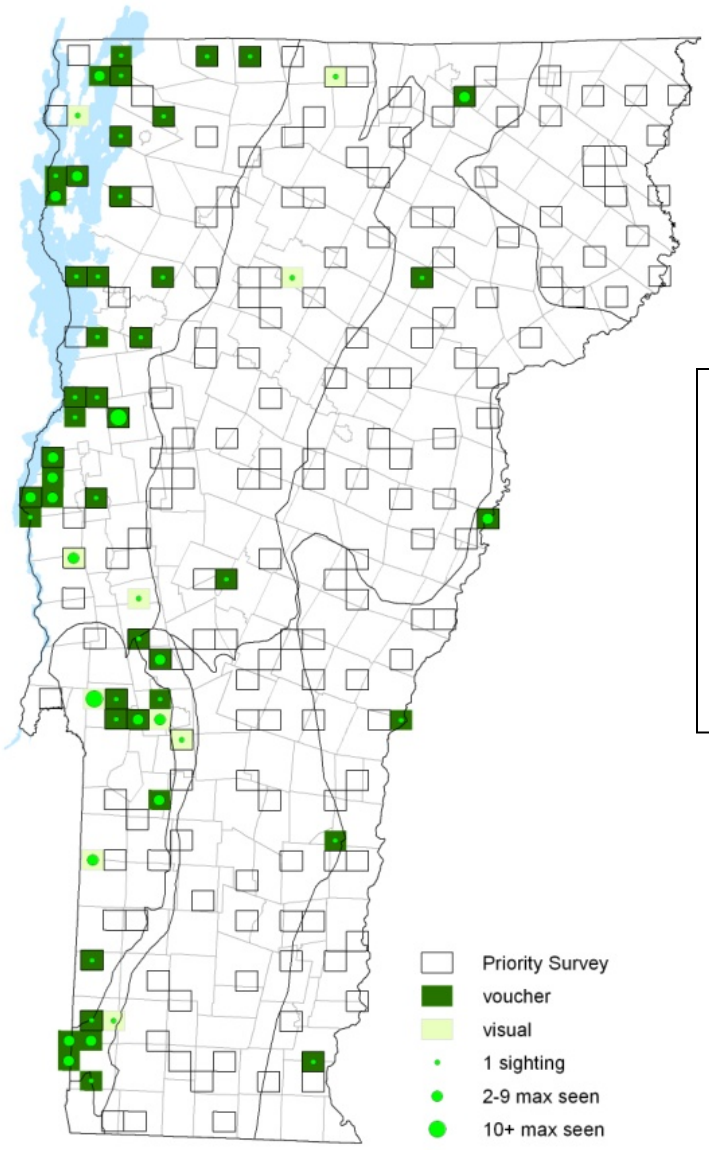
North American Range
Maine west across southern Canada and the Great Lake states to eastern Montana and central Colorado; south to Arkansas, Mississippi, West Virginia, and Maryland.

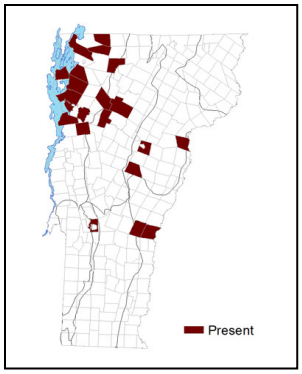
Identification
Upperside of male iridescent copper-brown; female forewing yellow-orange with black spots. Underside forewing of both sexes orange with black spots; underside hindwing is gray-white with black spots and a broad orange outer margin.

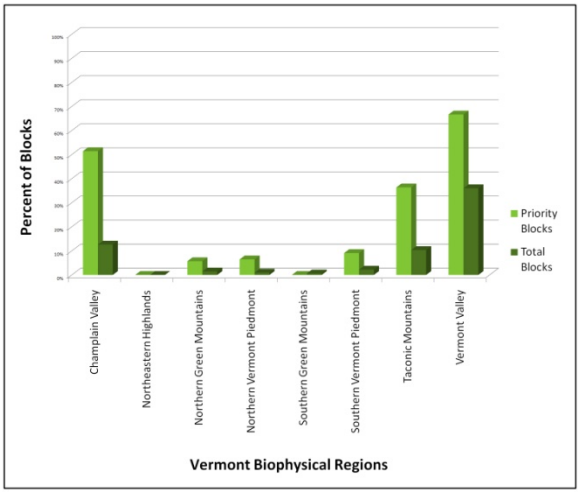
Flight
Two broods with first peak flight in the beginning of July and the second in late August to mid-September. Extreme dates: 14 May 2003 in Bennington (K. Hemeon) and 17 October 2002 in Addison (B. Pfeiffer).



Distribution and Habitat
Common west of the Green Mountains and rare to uncommon east. Bronze Copper frequents wet meadows, ditches, pond edges and other low, wet areas. There is some dispute as to how adults obtain nourishment and how often they nectar, but they have been seen nectaring at Blackberry (Rubus) and Red Clover (Trifolium pratense). Hostplants are Curly Dock (Rumex crispus) and Knotweeds (Polygonum).


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen


Present


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Bog Copper *Lycaena epixanthe* (Boisduval & Le Conte, 1835)

Resident
Uncommon

Conservation Status
Vermont S2, SGCN
Global G4G5

North American Range
Maine south to New Jersey and West Virginia; west through northern Great Lake states and Ontario.

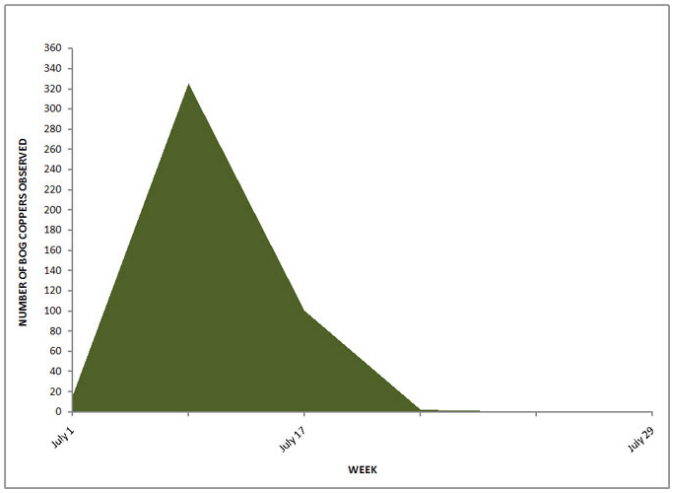
Found only in bogs with cranberries, this is one of Vermont's smallest butterflies. The Bog Copper is a weak flier and because both larval host plants and adult nectar plants are often the same, these diminutive butterflies are often able to spend their entire lives within a small area of a single bog. Although colonies are uncommon in Vermont, there can be hundreds of individuals within a bog. Males perch on low plants to watch for females. Eggs are laid singly near cranberry; caterpillars feed on shoots and leaves. They overwinter, usually underwater, as fully developed larva in eggs.

Identification

Upperside of male brownish with purple iridescence; female dull gray-brown. Underside of both sexes white or pale tan; hindwing with very small black spots and red zigzag border on outer margin.

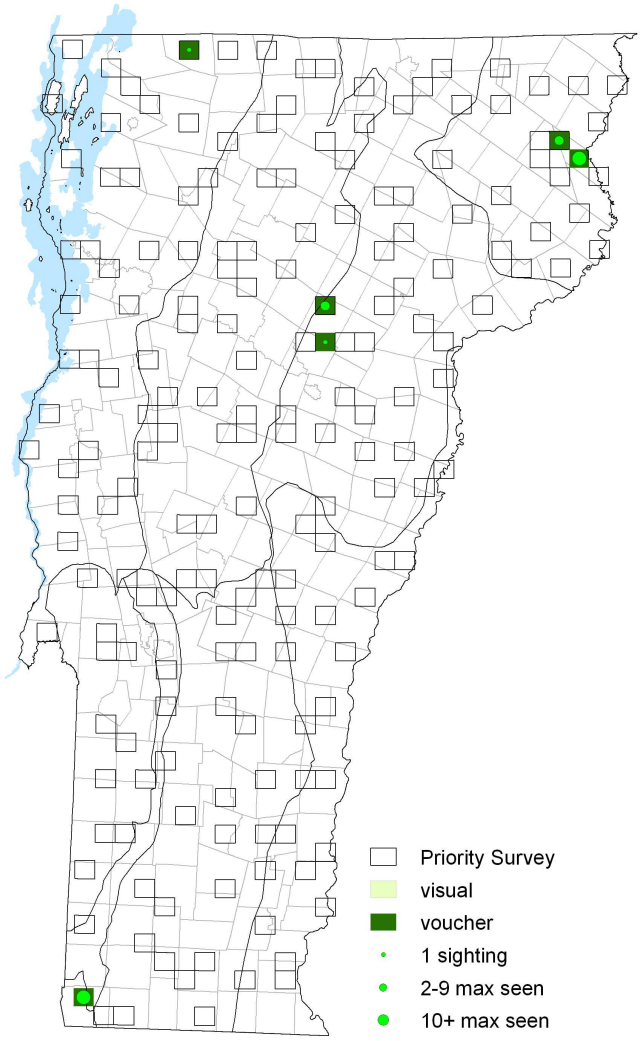
Flight

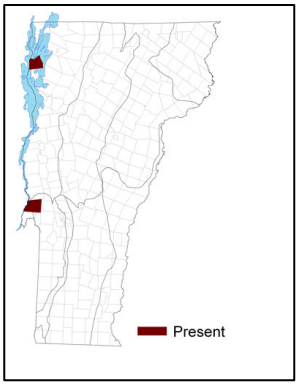
One flight beginning in early July and ending in late July. Extreme dates: 25 June 1993 in Rutland (J. Grehan, 25 June 1994 in Franklin (J. Grehan and S. Griggs), 30 June 2002 in Franklin (B. Pfeiffer), 29 July 2002 in Woodbury (B. Pfeiffer) and 1 August 1992 in Franklin (J. Grehan).

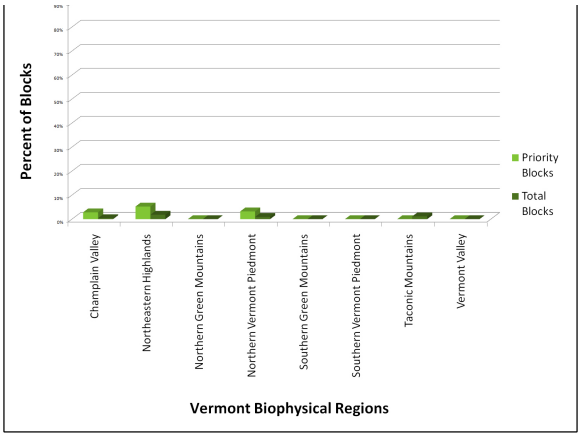


Distribution and Habitat

The Bog Copper is typically found in acid bogs with cranberries and other heath family plants, but it is not restricted to bogs. It can also occur in fens and very wet acid sedge meadows with cranberries rather than true bogs. Habitats may have some trees but are mainly open with permanently wet sunny substrates. It is important that the wetlands soils or sphagnum remain saturated for most or all of the year. Bog Copper caterpillars feed on cranberries (Vaccinium macrocarpum and V. palustris), and while cranberries can grow well on less saturated sites, Bog Coppers do not occupy such habitats. Areas can be colonized if there are sufficient populations nearby and at least small intervening 'stepping stone' habitats with hostplant that connect occupied and unoccupied areas. Populations that occur in isolated bog habitats and are not part of a large wetland complex are vulnerable to localized extinctions without recolonization.


Priority Survey
visual
voucher
1 sighting
2-9 max seen
10+ max seen


Present


Percent of Blocks
Priority Blocks
Total Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Vermont Biophysical Regions

Subfamily: Hairstreaks (Theclinae)

Hairstreaks are members of the Family Lycaenidae. Richest in tropical habitats, hairstreaks are numerous in the Americas and comprise about 1,000 species with 13 species in four genera found in Vermont. In tropical species, the upperside of small to medium-sized adults is often iridescent blue, due to reflected light from the wing scales. However, most of the North American species are brown above. Migration is rare, but a few species, like Gray Hairstreak, are good long-distance colonists. Males perch to await mates, and females lay eggs singly. Caterpillars usually feed on leaves or reproductive structures of woody trees or shrubs. The chrysalids of several species can produce sounds between their abdominal segments, likely related to their interactions with ants. Hairstreaks typically overwinter in the egg or pupal stage.

Vermont Species:

Acadian Hairstreak (Satyrium acadica)
Coral Hairstreak (Satyrium titus)
Edwards' Hairstreak (Satyrium edwardsii)
Banded Hairstreak (Satyrium calanus)
Hickory Hairstreak (Satyrium caryaevorus)
Striped Hairstreak (Satyrium liparops)
Juniper Hairstreak (Callophrys gryneus)
Brown Elfin (Callophrys augustinus)
Frosted Elfin (Callophrys irus)
Henry's Elifin (Callophrys henrici)
Eastern Pine Elfin (Callophrys niphon)
Gray Hairstreak (Strymon melinus)
Early Hairstreak (Erora laeta)

Acadian Hairstreak *Satyrium acadica* (W.H. Edwards, 1862)

One of the larger hairstreaks, yet are not known to disperse a great distance. Despite being uncommon across the landscape, these butterflies can be locally abundant in some large colonies. Males perch on low vegetation while watching and waiting for females, and patrol periodically. Eggs are laid on hostplant twigs and hatch the following spring. Caterpillars feed on the leaves and are tended by ants.

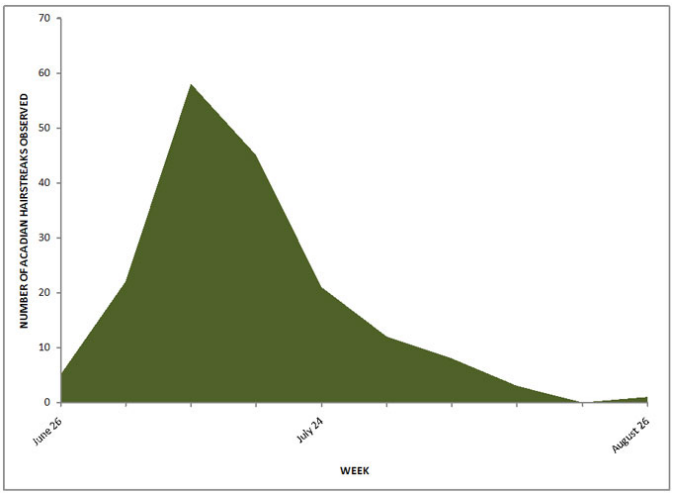
Resident
Uncommon

Conservation Status
Vermont S5
Global G5

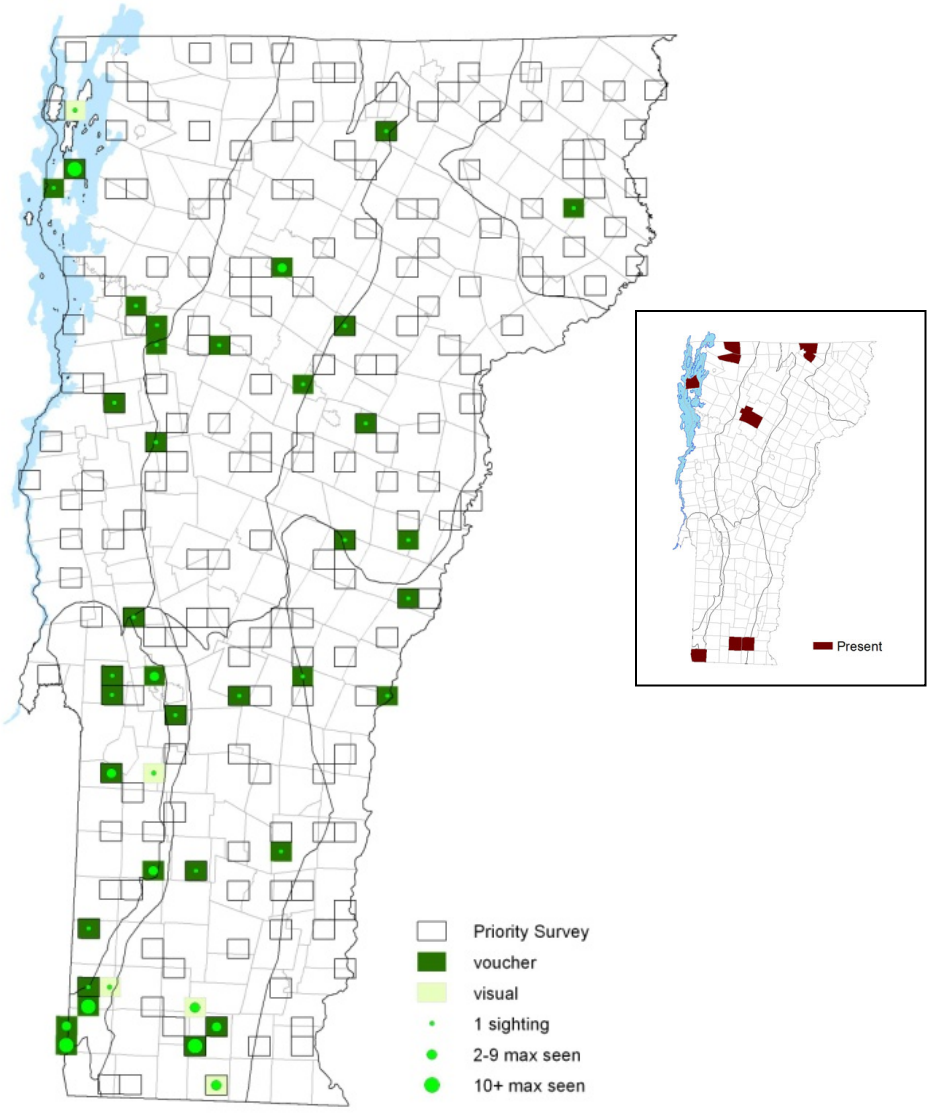
North American Range
British Columbia east to Nova Scotia; south to Idaho, Colorado, the upper Midwest, Maryland, and New Jersey.

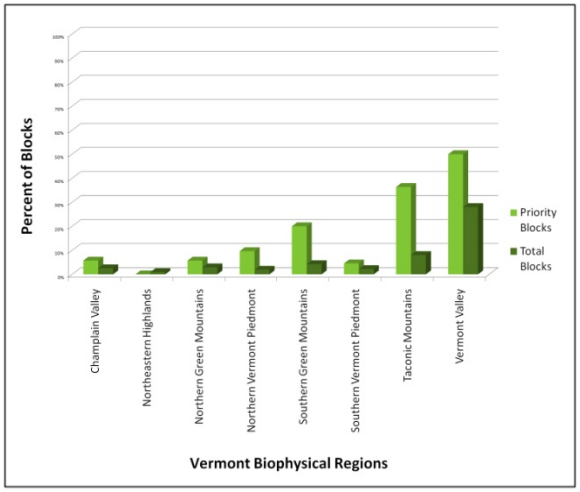
Identification
Large for a Satyrium. One tail on each hindwing. Upperside brown-gray. Underside of hindwing gray; blue marginal spot is capped with orange; row of orange submarginal spots capped with black; round black spots form postmedian row.

Flight
One brood flying from the end of June through the end of August with greatest abundance at the beginning of July. Extreme dates: 21 June 2004 in Bennington (K. Hemeon) and 22 August 2002 in Morristown (C. Gifford).



Distribution and Habitat
Acadian Hairstreak colonies were found scattered throughout Vermont, but rarely in the Northeast Highlands. The largest colonies tended to be in the Champlain islands and southwestern Vermont. Their primary habitats were damp meadows, marshes and wet woodlands. Adults nectar from a variety of sources such as Meadowsweet (*Spiraea alba*), milkweeds (*Asclepias*), New Jersey Tea (*Ceanothus americanus*), and thistles (*Cirsium*). Larval hostplants include various willow species such as Black Willow (*Salix nigra*) and Silk Willow (*Salix sericea*).


Present
Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Coral Hairstreak *Satyrium titus* (Fabricius, 1793)

This hairstreak is unique in its genus in that it has no tails. Males can be extremely aggressive when perched and watching for females and will often confront and chase rival males as well as other insects. Females lay eggs singly on host twigs or in leaf litter at the base of their host plant. They overwinter as eggs. Caterpillars hide in leaf litter during the day and emerge at night to feed on leaves and fruit. Ants that feed on honeydew excreted by the larvae diligently attend them.

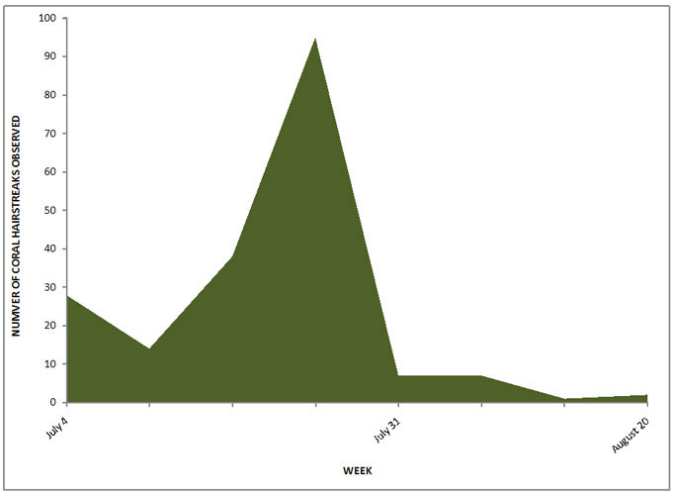
Resident
Common

Conservation Status
Vermont S5
Global G4G5

North American Range
Central Canada south to eastern California; east across southern Canada to New England; south to central New Mexico, central Texas, northern Arkansas, and central Georgia.

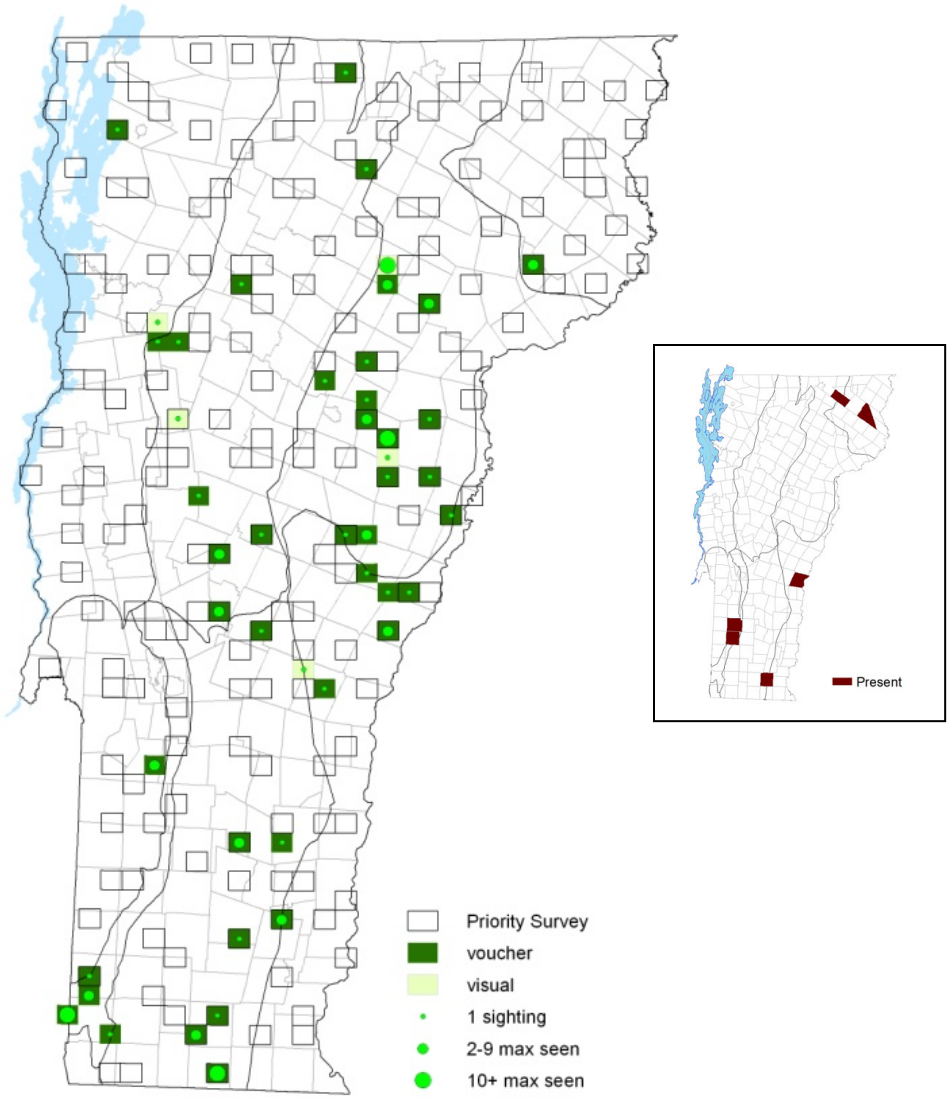
Identification
No tails. Upperside dark brown. Underside of hindwing light brown with row of coral spots at margin, and postmedian row of black spots ringed with white.

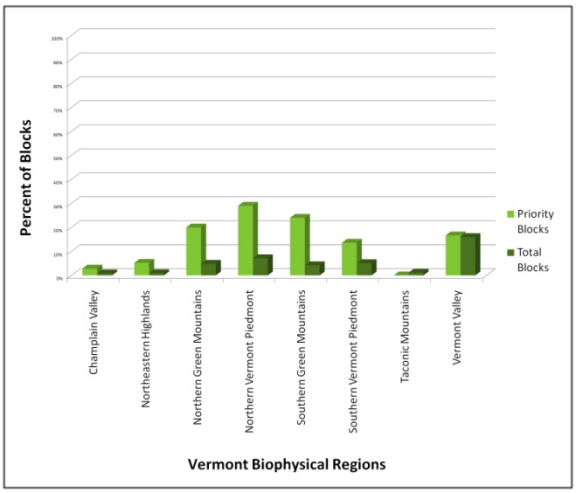
Flight
One brood, flying from beginning of July to late August with a peak mid to late July. Extreme dates: 30 June 2003 in Norwich (C. Rimmer) and 20 August 2002 in Hardwick (J. Schneider).



Distribution and Habitat
Few records were reported from the Champlain Valley during VBS. Most abundant in the Vermont Piedmont and Green Mountains regions.

Coral Hairstreak prefers weedy, open habitats in close proximity to favored nectar sources such as milkweed (Asclepias), dogbane (Apocynum), and New Jersey Tea (Ceanothus americanus). Hostplants in the Northeast are cherry (Prunus).


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen
Present


Percent of Blocks
Priority Blocks
Total Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Vermont Biophysical Regions

Edwards' Hairstreak *Satyrium edwardsii* (Grote and Robinson, 1867)

A specialized hairstreak that is restricted to habitat with its favored hostplant, Scrub Oak (*Quercus ilicifolia*). Lays eggs in bark crevices of hostplants. Young Larvae feed during the day on the oak buds. As they mature they may also feed on young leaves. Older larvae feed nocturnally. Nearby ant colonies, almost exclusively *Formica integra*, provide protection for the larvae in exchange for honeydew secretions. Ants build shelters at the base of host trees where the caterpillars rest during the day and escort the caterpillars onto the hostplant to feed at night.

Resident
Very rare

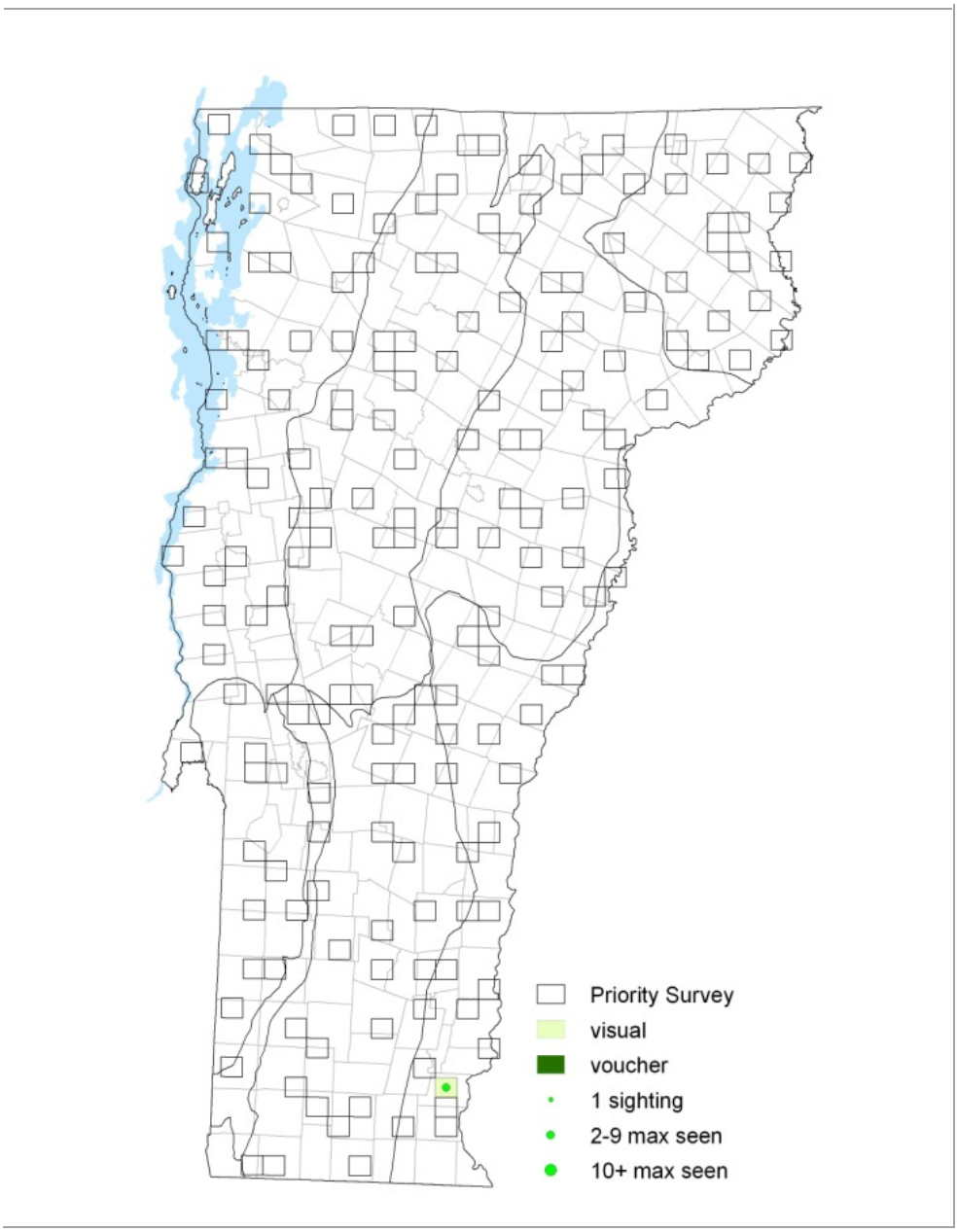
Conservation Status
Vermont SU, SGCN
Global G4

North American Range
Eastern United States from southern Canada and southern Maine south to northeast Texas, central Missouri, and northern Georgia.

Identification
One tail on the hindwing. Underside of hindwing pale brown, with postmedian band of dark brown oval spots; blue tail-spot not topped with orange.

Flight
In Massachusetts one flight, typically early July to early August. Only one visual record reported during VBS; two individuals seen on 22 July 2005 in Dummerston (S. Harris). There are no historical records known. Until further verification, this species should probably be considered as “hypothetical” in Vermont.

Distribution and Habitat
Scrub oak habitats are extremely limited in Vermont. This butterfly becomes more common southward where its habitat is more widespread, but is often restricted by its need for proximity to certain ant colonies with which its larvae has a symbiotic relationship. Hostplant is Scrub Oak (Quercus ilicifolia). Adults nectar from various flowers including dogbane (Apocynum), goldenrods (Solidago), milkweeds (Asclepias), New Jersey Tea (Ceanothus americanus), Staghorn Sumac (Rhus Typhina), and White Sweet Clover (Melilotus alba).


Priority Survey
visual
voucher
1 sighting
2-9 max seen
10+ max seen

Banded Hairstreak *Satyrium calanus* (Hübner, 1809)

The Banded Hairstreak is the most common of our eastern Satyriums, some years found in the thousands. Males of this species perch during the day and are fiercely territorial and will engage in lengthy aerial fights with other males. Eggs are laid on twigs of hostplants and hatch the following spring. Caterpillars feed on catkins and leaves.

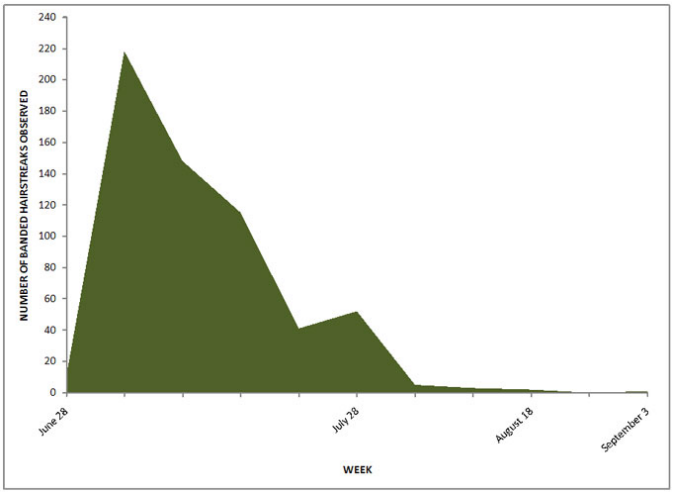
Resident
Common

Conservation Status
Vermont S5
Global G5

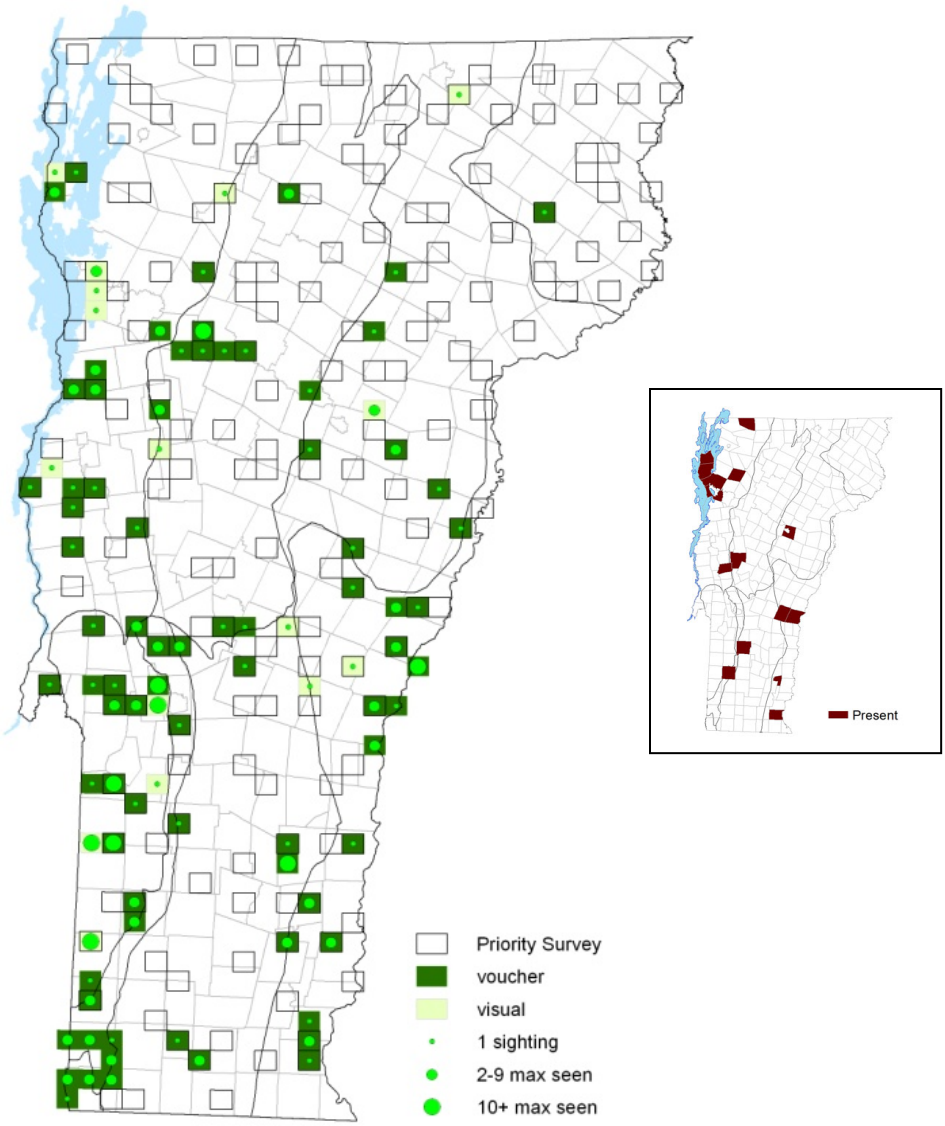
North American Range
Maine across southern Canada to North Dakota; south to central Texas and the Gulf States. Southern Rocky Mountains in Wyoming, Colorado, Utah, and New Mexico.

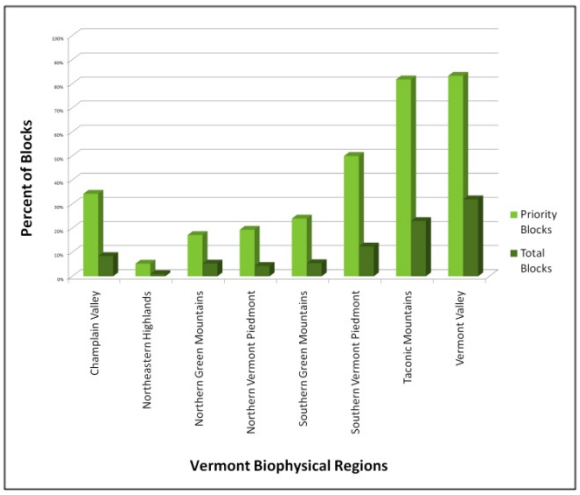
Identification
Hindwing has one long and one short tail. Upperside of both sexes dark brown. Underside of hindwing dark brown with postmedian band of dark dashes edged in white. Blue tail-spot not topped with orange.

Flight
A single flight. Extreme dates: 25 June 2007 in West Haven (R. Pilcher) and 3 September 2003 in Grand Isle (D. Hoag).



Distribution and Habitat
Commonly found throughout Vermont, except rare or absent in the northern tier and the Green Mountains. The Banded Hairstreak prefers mixed forests and edges and nearby open areas where they are often observed nectaring. Adults nectar at a wide variety of flowers including dogbane (Apocynum), milkweed (Asclepias) and New Jersey Tea (Ceanothus americanus). Hostplants include oaks (Quercus), walnut (Juglans), and hickory (Carya).


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen
Present


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Hickory Hairstreak *Satyrium caryaevorus* (McDunnough, 1942)

Elusive, little studied and sometimes misidentified, this hairstreak is uncommon in Vermont. Males perch high in trees to wait for females, sometimes engaging in lengthy battles with rival males. Both sexes descend to nectar in the morning and evening, affording opportunities for observation. They overwinter in eggs. Caterpillars feed on the lower surface of hostplant leaves.

Resident
Uncommon

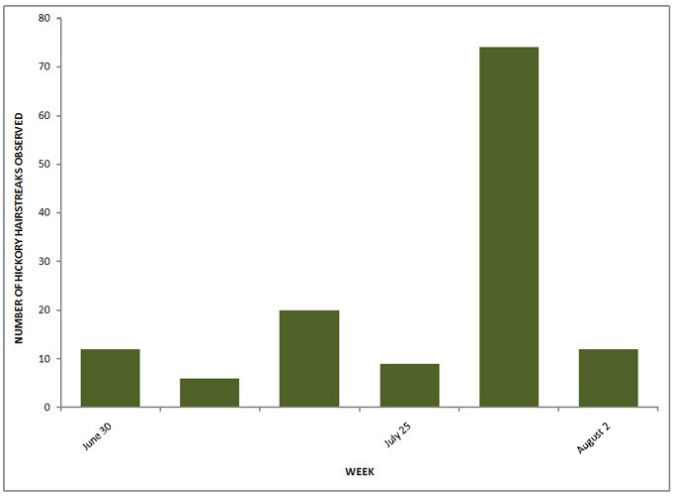
Conservation Status
Vermont S3
Global G4

North American Range
Southern New England west to Minnesota and Iowa, south in the Appalachians to eastern Tennessee.

Identification
Can be extremely difficult to separate from Banded Hairstreak. Some only identified with certainty by dissection of male genitalia. There is a pair of prominent spines projecting inward from the vinculum, which is absent in Banded.

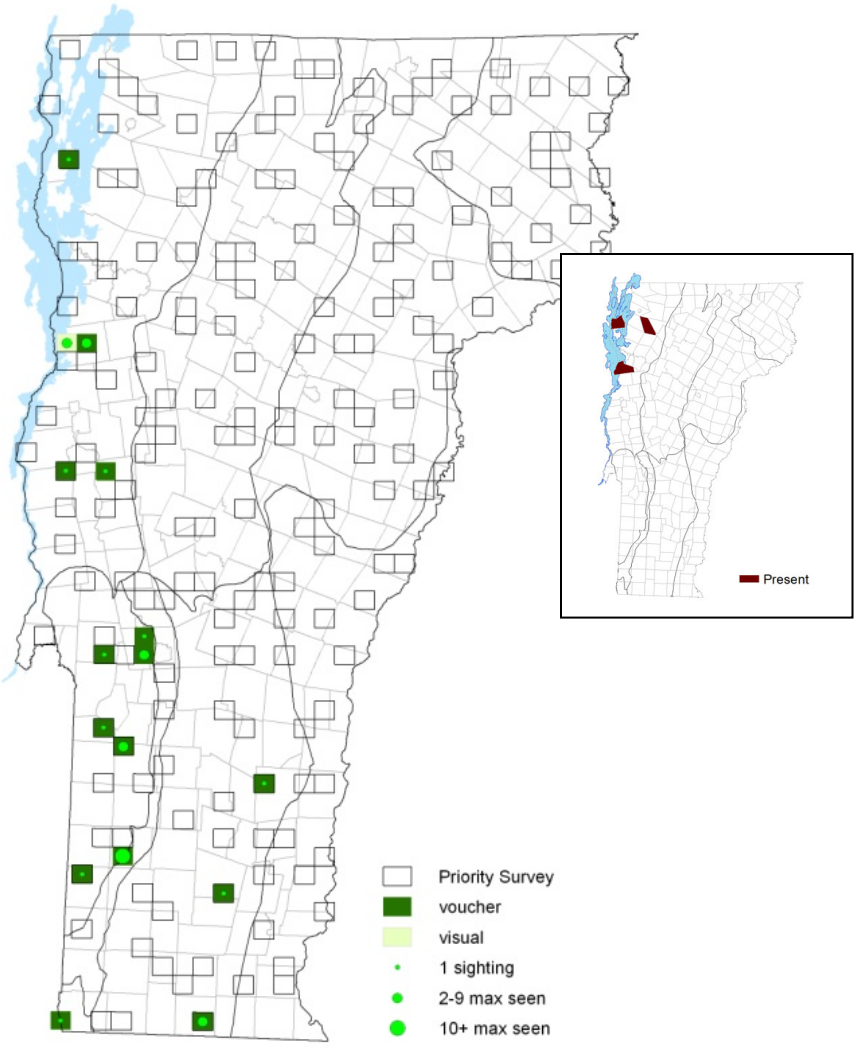
Wing characteristics cited in field guides not reliable for some specimens, but very good for others. They include:

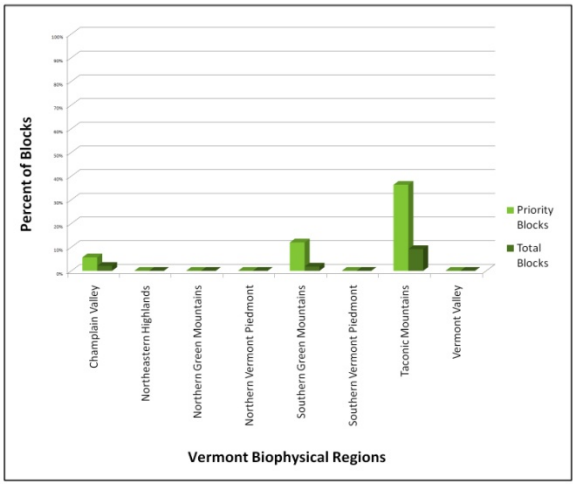
- Underwing postmedian bands are double with dark center in Hickory and usually single in Banded (if double, usually narrower).
- Thecla spot is an orange crescent relatively narrow in Hickory and not thicker than the black spot beneath it, while in Banded Hairstreak usually it is.
- Male scent pads are relatively slender in Hickory, about half the width of the discal cell. More than half the width of the discal cell in Banded.
- Both Hickory and Banded distinguished from Striped Hairstreak by the absence of an orange cap on the prominent blue spot at the lower corner of the underwing.
- Blue anal spot extends beyond marginal spots and paler blue.



Flight
One brood flying from end of June to end of August. Extreme dates: 30 June 1991 in Grand Isle (S. Griggs), 30 June 2005 in Arlington (K. Hemeon), 4 August 2006 in Manchester (M. Pfeiffer), and 20 August 1984 in Shelburne (J.R. Grehan).

Distribution and Habitat
Seldom recorded during VBS and only found west of the Green Mountains except for southern Vermont. They favor mixed deciduous forests and are most commonly found around forest edges, although this may be due to observer bias. Caterpillar hostplants are mostly hickory (Carya), but also ash (Fraxinus), and oak (Quercus) trees. Adults appear to be flexible in their choice of nectar source, including milkweed (Asclepias) dogbane (Apocynum), White Clover (Trifolium repens) and New Jersey Tea (Ceanothus americanus).


Present
Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Striped Hairstreak *Satyrium liparops* (Le Conte, 1833)

Unlike other hairstreaks, male Striped Hairstreaks rarely engage in aerial chases. Males perch on foliage up to six feet high to watch for females. Eggs are laid singly on twigs of hostplants and hatch the following spring. Caterpillars feed on buds, leaves, flowers, and young fruit.

Resident
Common

Conservation Status
Vermont S5
Global G5

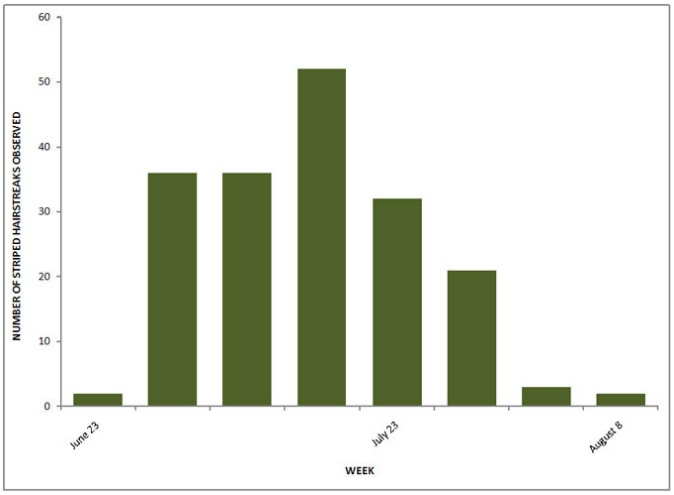
North American Range
Rocky Mountains south from southern Canada to Colorado, east to Maine, south to Florida.

Identification

Hindwing with 1 long and 1 short tail. Upperside dark brown; male with a long, oval spot along forewing costa. Underside of both wings with rows of widely separated white stripes; blue spot near tails topped with orange. Outer margin of hindwing indented above short tail.

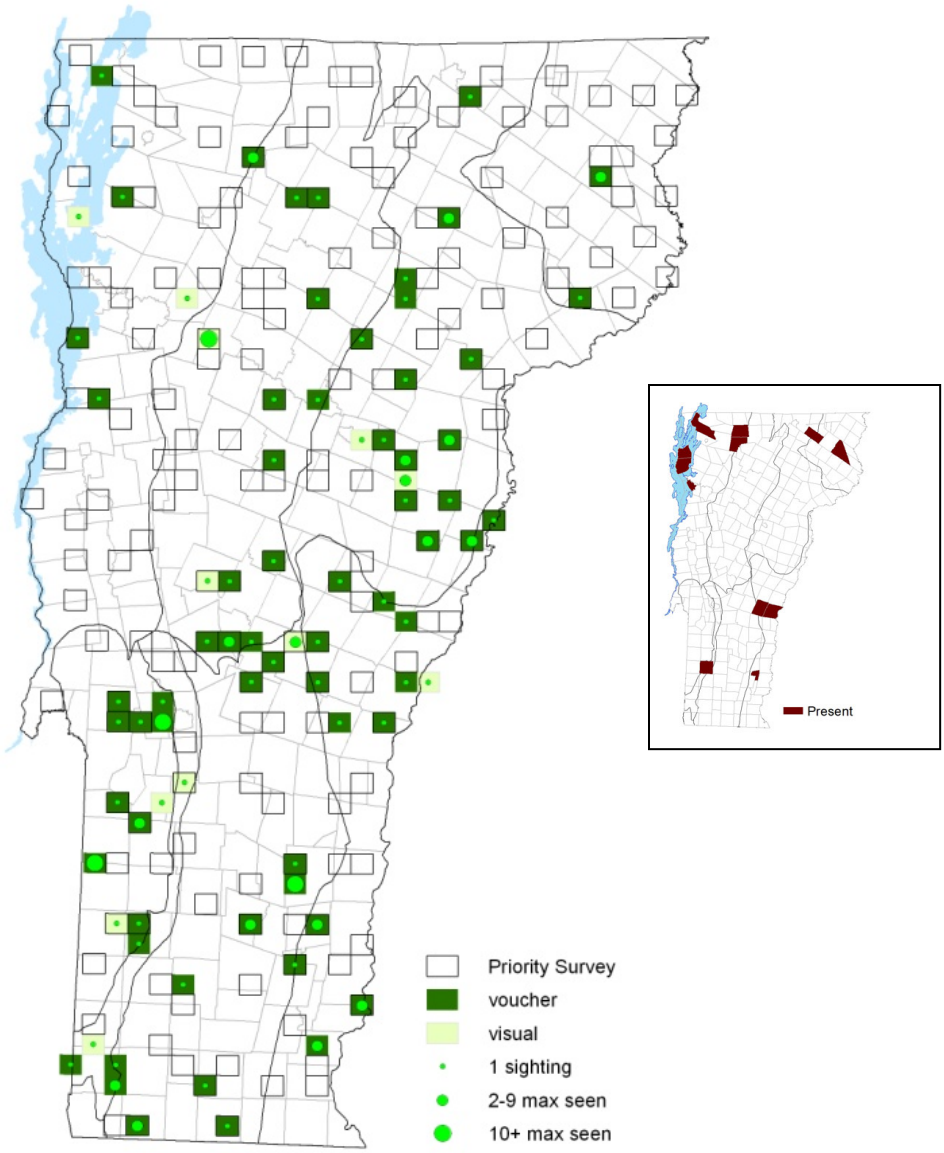
Flight

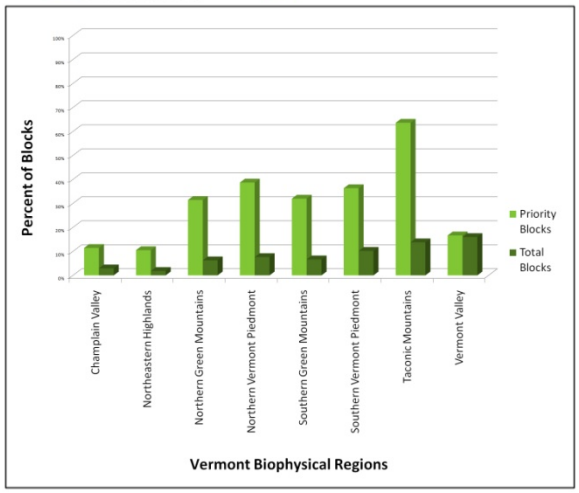
One flight. Adults begin to eclose at the end of June. Extreme dates: 23 June 2004 in Rupert (D. Rolnick) and 9 August 2004 in Braintree (G. Hanisek).



Distribution and Habitat

Scudder considered it rare in New England. During VBS is was relatively common in Vermont, though less frequently in the Champlain Valley and the Northeast Highlands. Favored habitats are deciduous forest openings and edges, streamsides and shaded swamps. Adults nectar from milkweed (Asclepias), dogbane (Apocynum), goldenrod (Oligoneuron) and New Jersey Tea (Ceanothus americanus). Reported to use a wide variety of trees and shrubs as hostplants.


Present
Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Juniper Hairstreak *Callophrys gryneus* (Hübner, 1819)

Recently combined with other western taxa of the genus *Mitoura*. Formerly widely known as the Olive Hairstreak. A small, jewel toned butterfly with long hindwing tails, the Juniper Hairstreak, though relatively common, is extremely local. Males perch on host trees and tend to be highly territorial, very active, and will pursue females throughout the day. Eggs are laid singly on the tips of host plant leaves, which the caterpillars eat. Pupae overwinter. One way to find this butterfly is to gently jiggle cedar trees while watching the tops for them to fly. They usually return to their perch soon after being gently disturbed.

Resident
Uncommon

Conservation Status
Vermont S3
Global G5

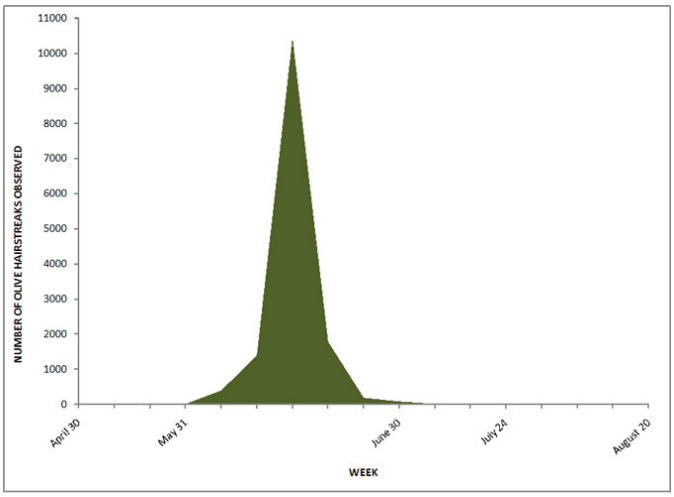
North American Range
Southernmost British Columbia east to southern Maine and south throughout most of the United States, into northwest Mexico.

Identification

Variable markings and coloration across its range. Western and eastern populations were once considered separate species. Eastern: Upperside of male dark brown with olive-colored sheen, female blackish brown. Underside green; forewing with tawny base, hindwing with two white spots near base and irregular white line edged inwardly with red-brown.

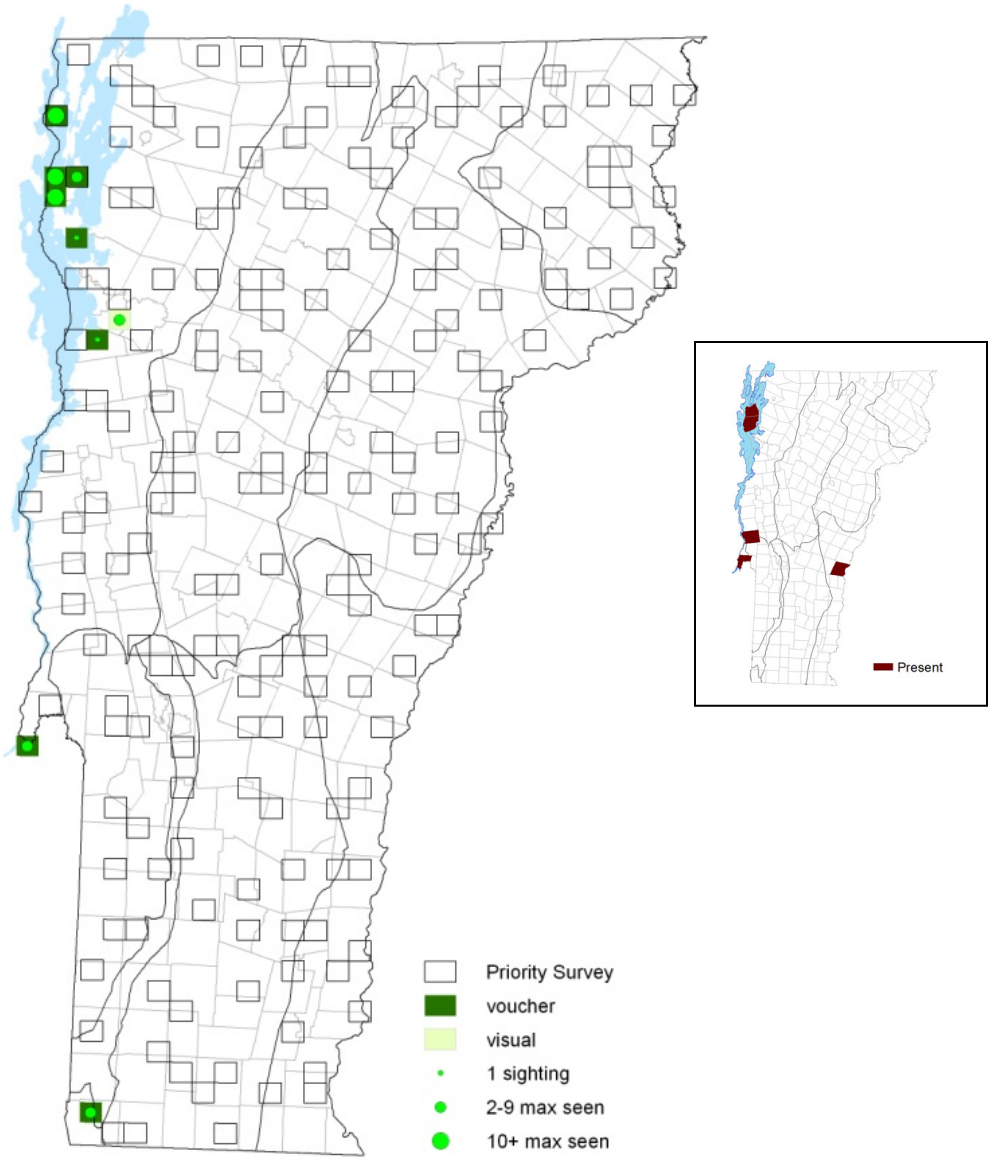
Flight

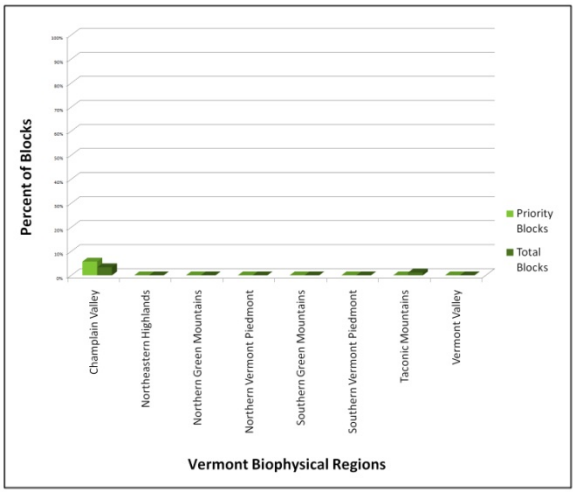
Two flight periods in Vermont with the bulk of the first cohort in June and the second and much smaller flight beginning in July and lasting through the 3rd week of August. Similar in Massachusetts, but no second flight known for Quebec (Hanfield 1999). Hyper-abundant in some locations during spring flight. Extreme dates: 30 April 2004 in West Haven (B. Pfieffer) and 20 August 2002 in Grand Isle (D. Hoag).



Distribution and Habitat

Extremely local, but widespread in the United States. Found to be locally common in extreme western Vermont in old fields colonized by Eastern Red Cedar (Juniperus virginiana). One historic record for Conneticut River valley in North Hartland (1 August 1902). Adults nectar from various flowers such as milkweeds (Asclepias), dogbane (Apocynum), and White Clover (Trifolium repens). The only caterpillar host in our region is Eastern Red Cedar.


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen
Present


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Brown Elfin *Callophrys augustinus* (Westwood, 1852)

A northern and mountain species, the Brown Elfin is the plainest of the Vermont elfins. Cryptically colored, males perch on shrubs in open areas to watch for females. Often, after flying out to meet a potential mate, they will return to the same central perch, or one close to it. Eggs are laid singly on flower buds of host plants and caterpillars feed on flowers and fruits. After hibernating in the chrysalis, pupation takes place in litter at the base of the host plant.

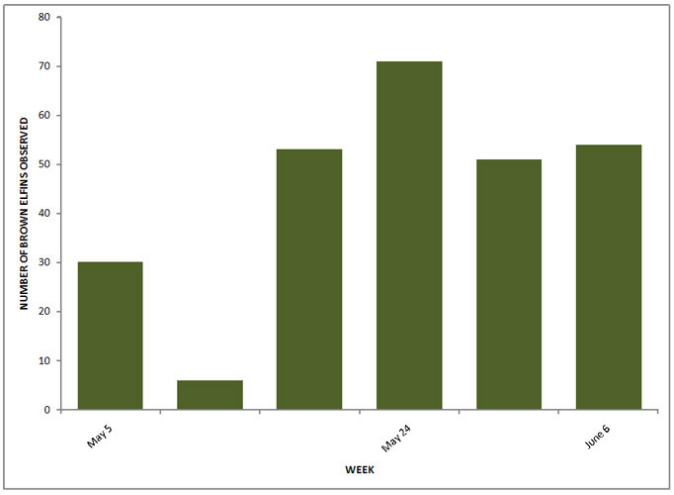
Resident
Uncommon

Conservation Status
Vermont S3
Global G5

North American Range
Newfoundland north and west through northern United States and the prairie provinces to Alaska; south in Appalachians to northern Georgia and northern Alabama; south through western mountains to northern Baja California. Does not occur on the plains or in the Midwest.

Identification
A small brown butterfly with no tails. Upperside of male gray-brown; female reddish brown. Underside chestnut brown with dark, irregular postmedian line; hindwing darker at base.

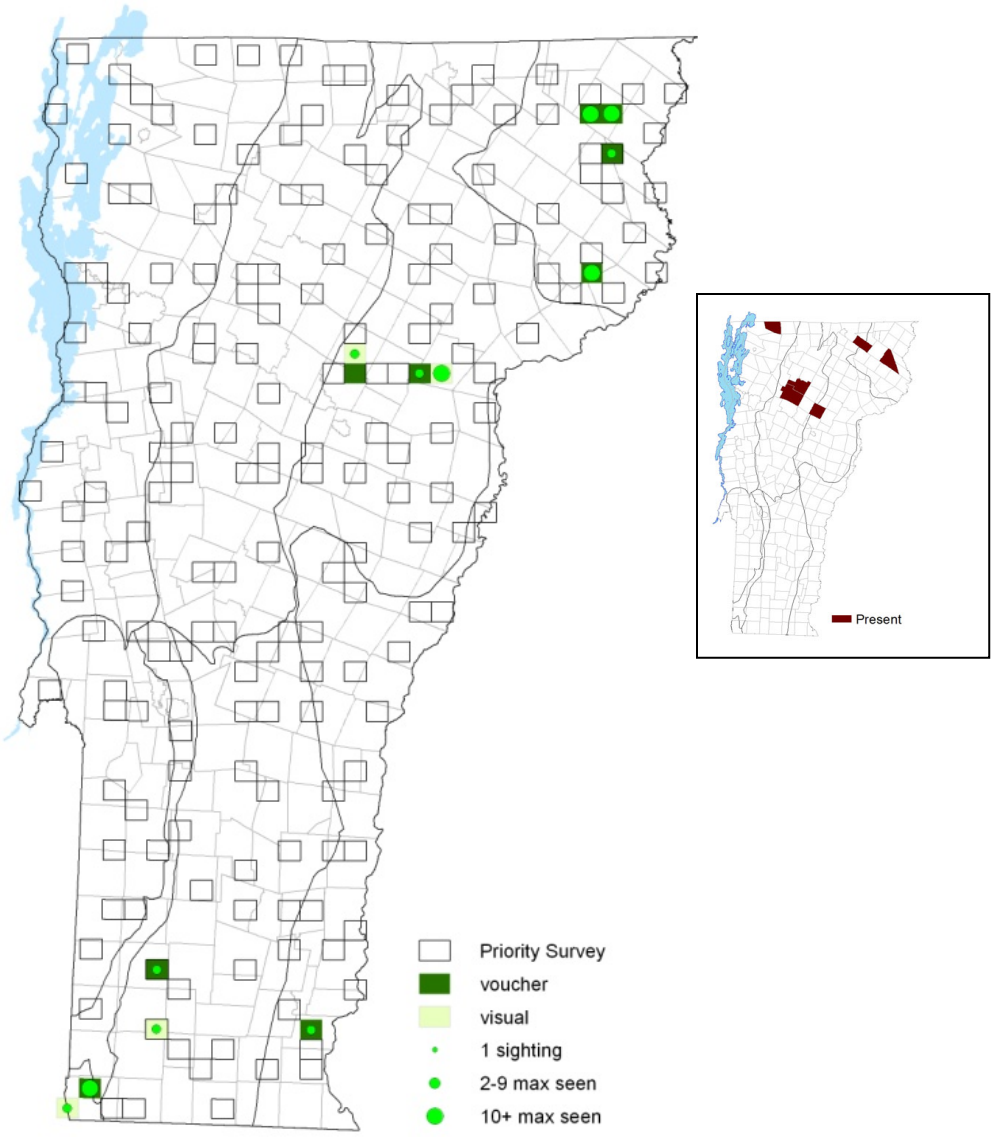
Flight
One generation from early May through early June. In other northern areas reported into July. Extreme dates: 5 May 2006 in Pownal (K. Hemeon) and 6 June 2006 in Lewis (B. Pfeiffer).



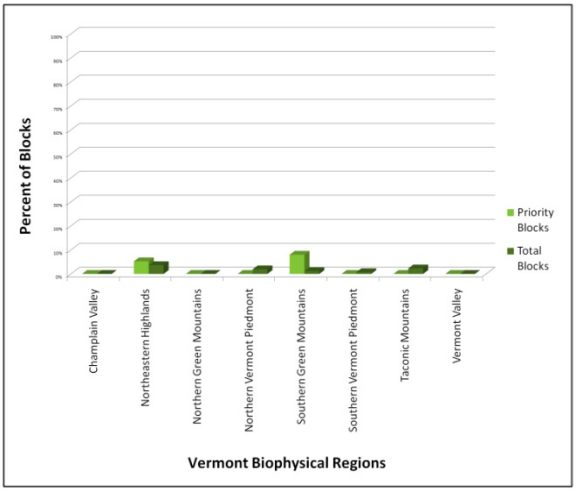
Distribution and Habitat
During VBS found only in northeastern and extreme southern Vermont. Unknown if actually not in south-central areas or if habitat undersampled during flight period.

They tend to prefer acidic, low nutrient habitats such as barrens, bogs, or dry pine-oak woods. During VBS found predominantly in spruce bogs or poor fens, but also found on pitch pine-oak-heath rocky summit (Dummerston, K.P. McFarland).

Adults nectar from flowers including blueberry (Vaccinium), Spicebush (Lindera), willows (Salix), and cherry (Prunus). Favored hostplant are species in the heath family (*Ericaceae*), prefer lowbush blueberries (*Vaccinium angustifoilum*) in Massachusetts. Also *V. vacillans* and Black Huckleberry (*Gaylussacia baccata*). Other reported hosts: Bearberry (*Arctostaphylos uva-ursi*), Leatherleaf (*Chamaedaphne calyculata*), Rhododendron and Labrador Tea (*Ledum groenlandicum*). Also known to oviposit on Sheep Laurel (*Kalmia angustifolia*), but larvae refuse it (Scott 1986).


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen

Present


Percent of Blocks
Priority Blocks
Total Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Vermont Biophysical Regions

Frosted Elfin *Callophrys irus* (Godart, 1824)

Resident
Very Rare

Conservation Status
Vermont S1
Global G3

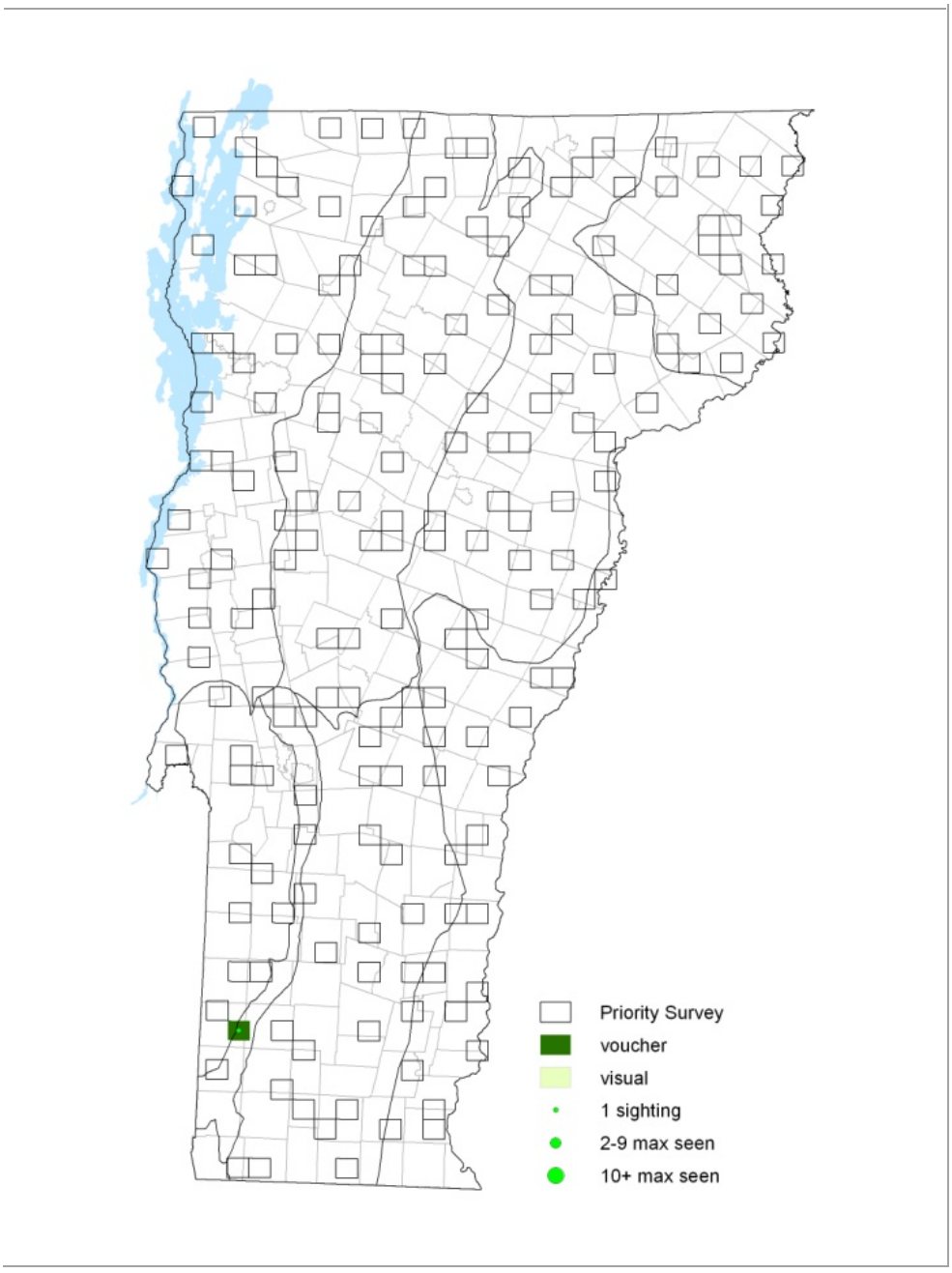
North American Range
Occurs in local colonies from Maine west across New York and southern Michigan to central Wisconsin; south along Atlantic coast and Appalachians to Alabama, Georgia, and Florida.

Their populations are often separated by large distances and they are considered specialists as far as habitat choice. The Frosted Elfin relies on disturbed environments for which periodic fires maintain early succession. They are the only butterfly we know of able to pupate below ground and it is thought they do so to survive the periodic burns. Though their penchant for disturbed environments may seem like a safe adaptation, these areas are often the first to be developed and this can destroy their hostplants making it impossible for separated populations to survive. Eggs are laid singly on flower buds of host plant; caterpillars eat flowers and developing seedpods. Chrysalids hibernate in loose cocoons in litter beneath the plant.

Identification
One short tail on the hindwing. Upperside brown; male with long oval dark spot on leading edge of forewing. Below, postmedian line of forewing is irregular; that of hindwing is faint. Hindwing with submarginal black spot above tail.

Flight
Typically has one brood and flies from May to June. There is only one record for Vermont. A specimen was taken on 28 May 2007 in Sunderland (K. Hemeon).

Distribution and Habitat
One record for Vermont from extreme southwestern Vermont. They tend to prefer dry places with poor soils like sand plains, pine barrens or disturbed areas with poor soils such as powerline right-of-ways or sand pits. Hostplants in Massachusetts reported to be Wild Indigo (Baptisia tinctoria) and Wild Lupine (Lupinus perennis). Adults nectar Bearberry (Arctostaphylos alpina), Oxeye Daisy (Leucanthemum vulgare) and probably other wildflowers.


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen

Henry's Elfin *Callophrys henrici* (Grote & Robinson, 1867)

Resident
Very rare

Conservation Status
Vermont SU
Global G5

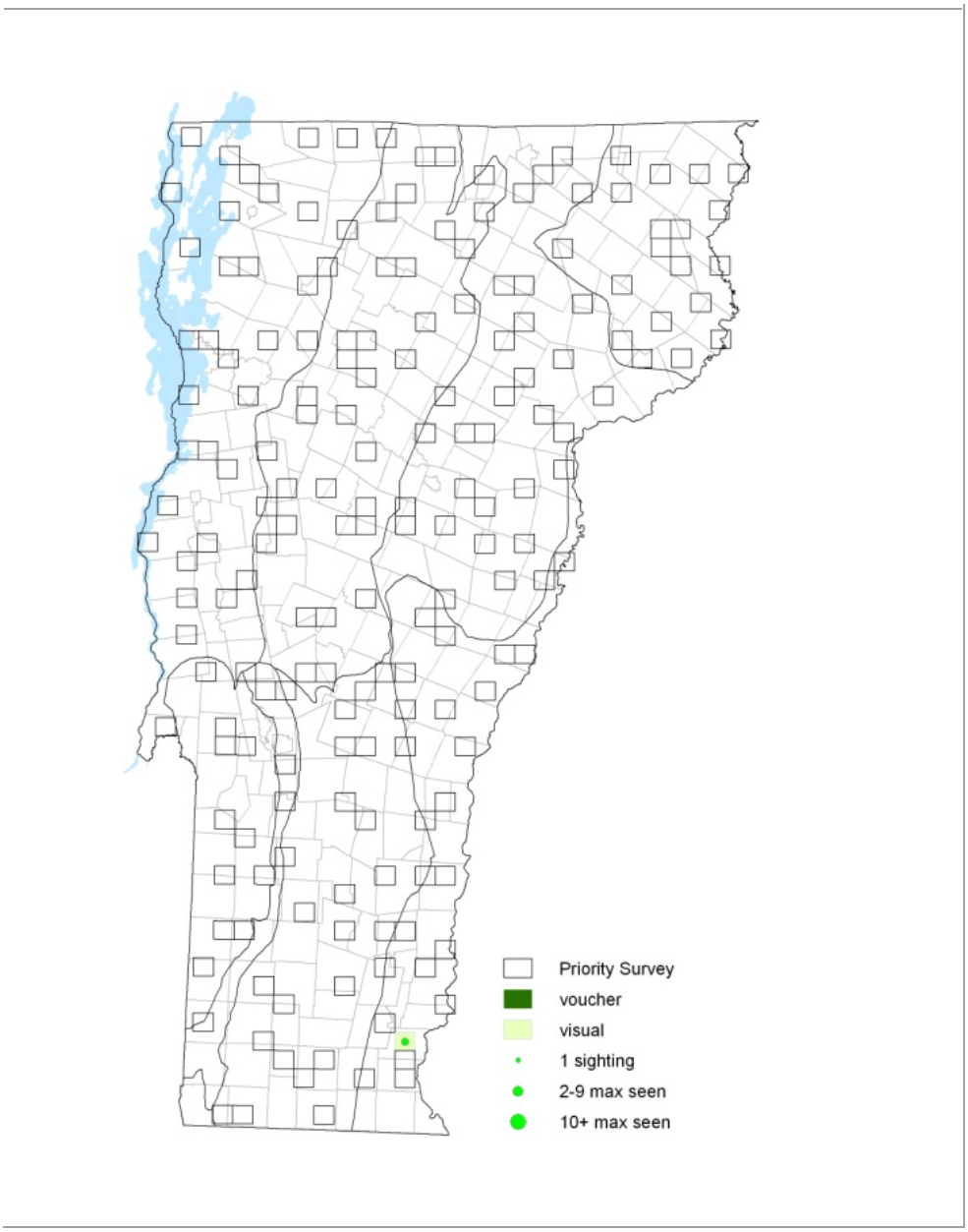
North American Range
Maine west through southern Canada to Wisconsin, south to Texas, the Gulf Coast, and central Florida.

Reported to use a number of larval hostplants from a wide range of plant families across its range, including introduced, invasive buckthorn (Rhamnus), which may allow it to expand its range in the future. Males perch on host plants during warm daylight hours. Caterpillars eat buds and young leaves, and pupate in litter at the base of the hostplant. Pupae overwinter.

Identification
Small and tailed. Upperside dark brown; male without oval spot at forewing front edge. Often a dull orange tinge at outer margin of forewing and near tail of hindwing. Underside forewing with fairly straight postmedian line; hindwing with some white in the postmedian line.

Flight
In the north one brood flies from April through early June. There were three visual records during VBS, 22-29 April 2005 in Dummerston (K. Hemeon). Repeated visits failed to relocate any individuals.

Distribution and Habitat
Able to utilize variety of habitats were its hostplants are abundant: edges of wooded swamps, upland heaths, sand plains, and open pine-oak woodlands. Only observed at one location in Vermont, Black Mountain in Dummerston, a pitch pine-oak-heath rocky summit. Potential caterpillar hosts in Vermont include huckleberries and blueberries (Vaccinium) and buckthorn (Rhamnus). During the Massachusetts Butterfly Atlas found nectaring on blueberry.


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen

Eastern Pine Elfin *Callophrys niphon* (Hübner, 1819)

One of just a few butterflies in our area to use conifers as a larval food source, this species is one of the earlier butterflies to emerge in the spring. They are not rapid fliers and when perched or basking often rub their hindwings together. Males perch on tops of pine trees in full sun to find receptive females, most active during the afternoon. Both sexes often angle their wings perpendicular to the sun while basking. Eggs are laid singly on new needles of young conifer trees; caterpillars feed on needles. Pupae overwinter.

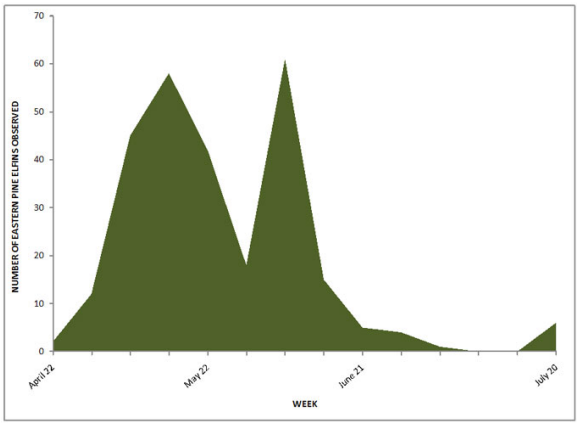
Resident
Common

Conservation Status
Vermont S5
Global G5

North American Range
Nova Scotia west to eastern Alberta; south to northern Texas, the Gulf Coast, and northern Florida.

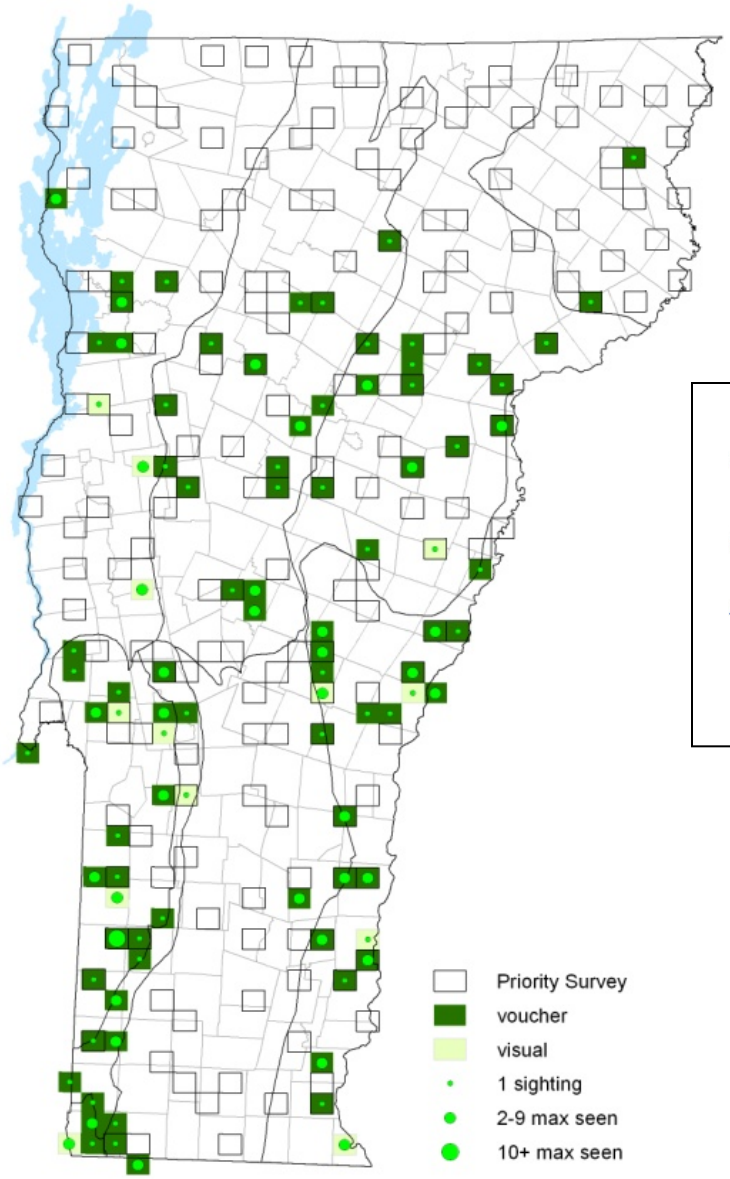
Identification
Tailless. Upperside dark brown; female with dark borders. Underside banded with dark brown; hindwing with submarginal gray band outside row of black crescents.

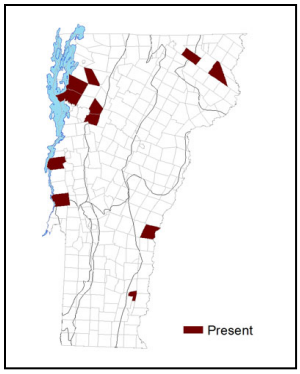
Flight
Appears earlier in the spring and flies through July. Extreme dates: 22 April 2005 in Pownal (K. Hemeon), 28 April 2003 in Pomfret (K.P. McFarland), and 20 July 2005 in Grafton (B. Eldredge).

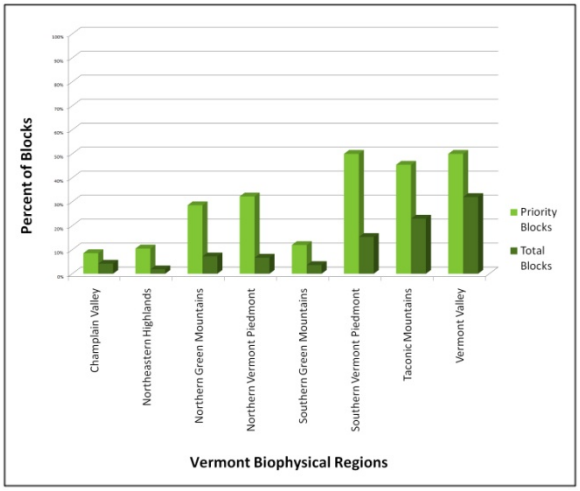


Distribution and Habitat
Found across most of Vermont during VBS, but appeared to be absent from higher elevations in the mountains as well as the Northeastern Highland region.

Found in habitats with hostplants including forests, forest openings and edges, fields, and roadsides. Scott (1986) listed all three native Vermont pines (Pitch, Red, and White) among larval hostplants. Adults nectar from many different flowers such as blueberry (Vaccinium), cinquefoil (Potentilla), and milkweeds (Asclepias).


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen


Present


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Gray Hairstreak *Strymon melinus* (Hübner, 1818)

A successful generalist, their larvae feed on the seeds and flowers of nearly 20 different plant families. They are fast, erratic fliers and males are known to engage in aerial chases. Males perch all afternoon on small trees and shrubs to seek receptive females. Opler and Krizek (1984) write that mated pairs have been seen only at night, after 10:00. However, a VBS observer reported daylight mating in a garden (26 July 2006, Newport City, O. Campbell). Eggs are laid singly on flowers of hostplant. Young caterpillars feed on flowers and fruits; late instars may eat leaves. Pupae overwinter.

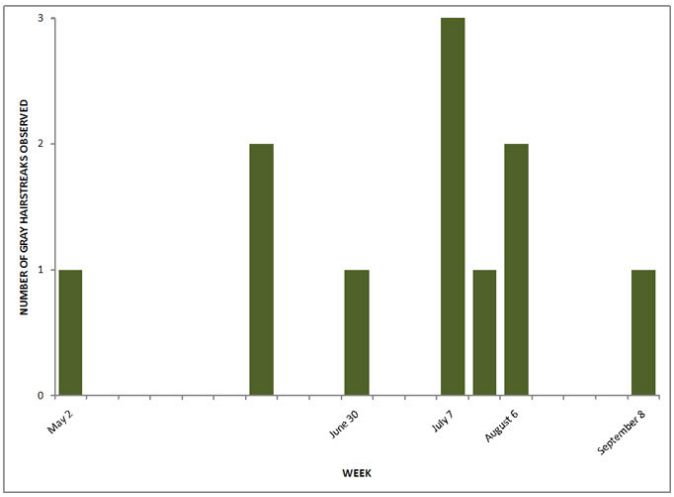
Resident
Rare to Uncommon

Conservation Status
Vermont S2S3
Global G5

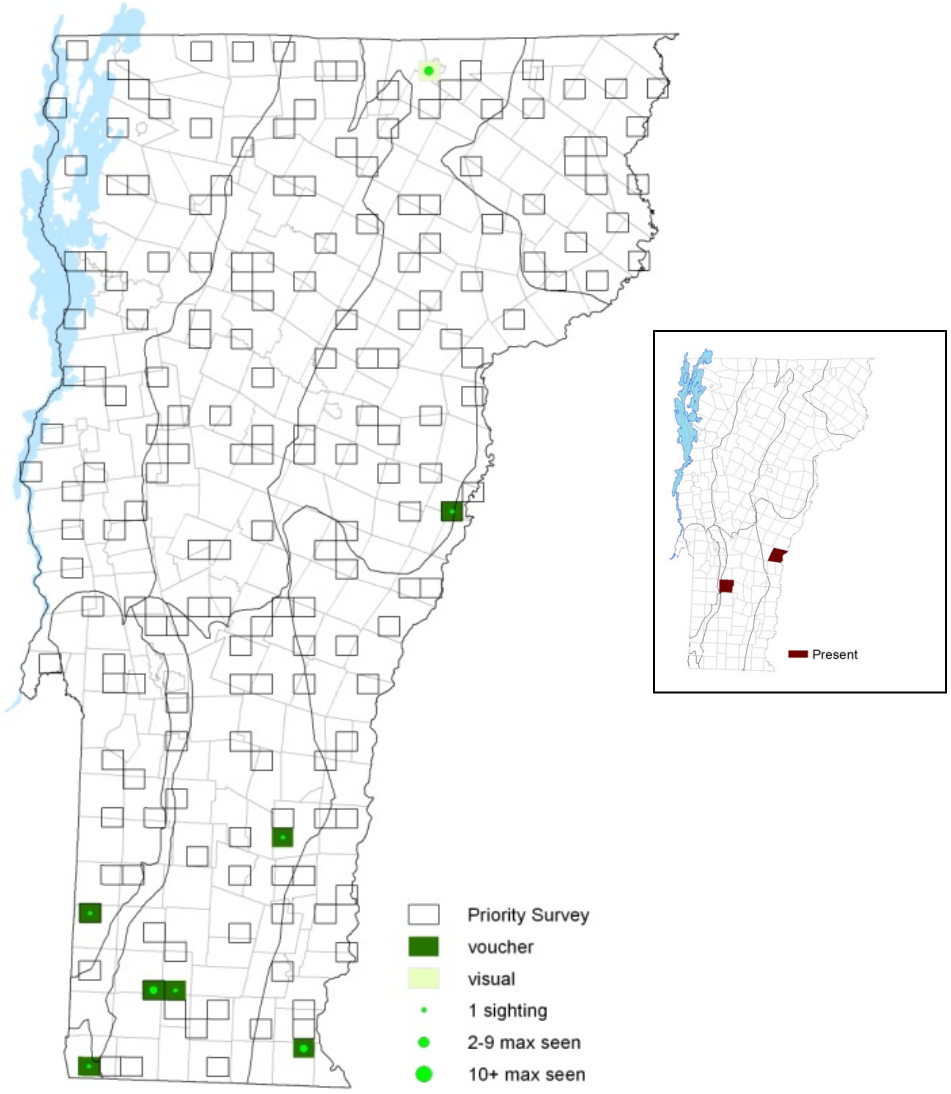
North American Range
Throughout continental United States from southern Canada south to Mexico; southward to Venezuela.
Comments: The most widespread hairstreak in North America.

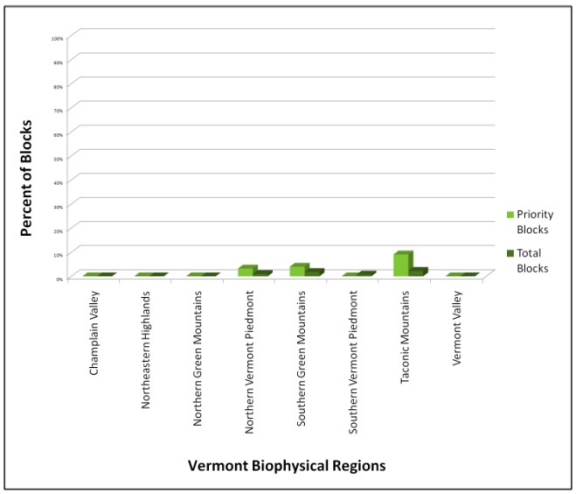
Identification
One tail on hindwing. Upperside blue-gray with large red spot near tail. Underside of spring/fall form is dark gray, summer form is paler gray. Relatively straight postmedian line is white, bordered with orange on the inside edge.

Flight
In Massachusetts two flights, first from early May to mid June and second from early July to late September. Few records for early flight in Vermont. Extreme dates: 2 May 2007 in Pownal (K. Hemeon) and 8 September 2006 in Chester (M. Reiter).



Distribution and Habitat
Most records during VBS reported from southern Vermont. Never abundant. It prefers open, nonforested habitats and is common in disturbed, weedy areas. Caterpillars eat flowers and fruits from wide variety of plants; most often from pea (Fabaceae) and mallow (Malvaceae). Adults nectar from many flower species including dogbane (Apocynum), milkweed (Asclepias), goldenrod (Solidago), and White Clover (Trifolium repens).


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen
Present


Percent of Blocks
Priority Blocks
Total Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Vermont Biophysical Regions

Early Hairstreak *Erora laeta* (W.H. Edwards, 1862)

Resident
Rare to Uncommon

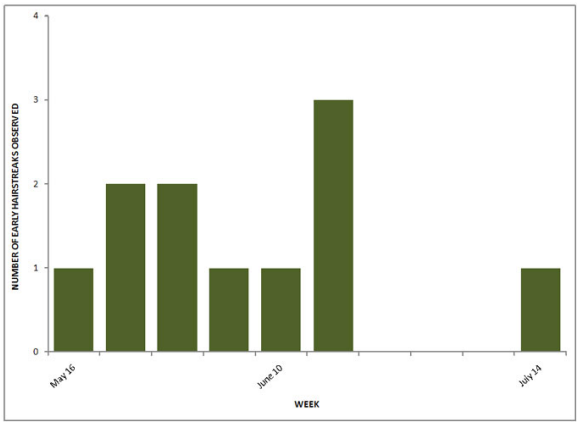
Conservation Status
Vermont S2S3, SGCN
Global GU

North American Range
Rare and local in its range. Maritime Provinces west to northern Michigan and northern Wisconsin; south through the Appalachians to Tennessee and North Carolina.

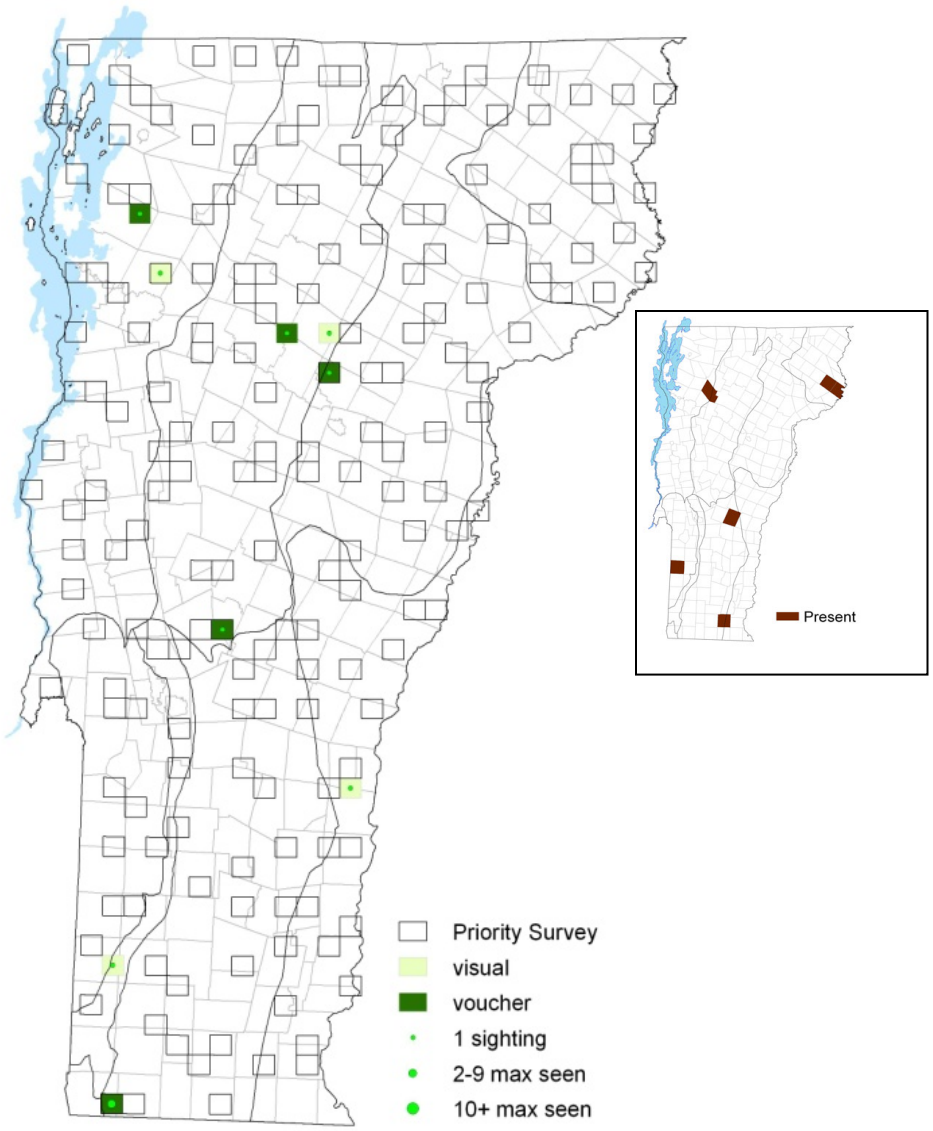
As its name implies, it is the earliest flying hairstreak in Vermont, found in May and June. Its infrequent encounters in Vermont, and elsewhere, may be because it breeds in the canopy of American Beech (Fagus grandifolia), making it difficult to find. It has been known to visit dirt roads and nectar sources near stands of its hostplant. Feeding larvae skeletonize leaves as early instars and switch to feeding on whole leaves and fruits during later instars. Populations are thought to widely fluctuate, which may be related to beech masting. Unfortunately its hostplant is threatened by disease. Beech bark disease is caused by a unique relationship between an introduced insect called the Beech Bark Scale (Cryptococcus fagisuga), and Nectria fungi (Nectria coccinea and N. galligena). It has been known in Europe since at least the 1840s, where it attacks European Beech (F. sylvatica). It was accidentally introduced to North American at Halifax, Nova Scotia in 1890 on a shipment of ornamental trees.

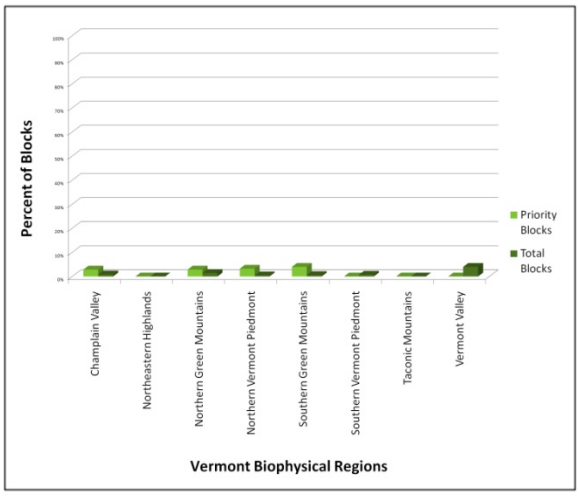
Identification
Very small and inconspicuous butterfly. No tails. Upperside blue and black; female has more blue than male. Underside turquoise blue; hindwing with 2 irregular bands of small orange spots.

Flight
As in other areas, there may actually be two flights in Vermont, but more records are needed. Extreme dates: 13 May 1992 in Underhill (J. Boone), 16 May 2006 in Milton (C. Eiseman), 14 July 2003 in East Montpelier (G.A. Lewis) and 16 July 1994 in Marlboro (S. Griggs).



Distribution and Habitat
As everywhere throughout its range, widely scattered and very local. Larval host plants are American Beech (Fagus grandifolia) and perhaps Beaked Hazelnut (Corylus cornuta) in some places. Adults nectar fleabane (Erigeron) and Ox-eyed Daisy (Chrysanthemum leucanthemum). Often found on bare ground puddling.


Present
Priority Survey
visual
voucher
1 sighting
2-9 max seen
10+ max seen


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Subfamily: Blues (Polyommatinae)

Blues are very small butterflies in the Family *Lycaenidae*. Distributed worldwide, they are most diverse in Southeast Asia, tropical Africa, and northern temperate regions. Most of the nearly 50 North American species are found in the west. There are currently 5 recognized species in Vermont.

Aptly named, adult males are predominantly blue above. Like bird feathers, this is due to reflected light rather than pigmentation. Some males and most females are mostly brown above. Below, wings of both sexes are usually gray-white with black spots or streaks. Adults in some genera (*Euphilotes, Lycaeides, Plebulina, and Icaricia*) have orange submarginal bands on their hindwings. Most adults are found near their host plants, and are poor dispersers. Adults visit flowers for nectar. Males frequently puddle at moist sand and mud. Eggs are laid singly on hostplant leaves or flowers. Larvae release sugary secretions that attract ants, and caterpillars of some species are raised inside ant nests. Most overwinter as pupae.

Celastrina in eastern North America have been a perplexing genus for years. All VBS vouchers were sent to Harry Pavulaan for determination. For now, all VBS records are placed within three species: Lucia Azure, Cherry Gall Azure and Summer Azure. However, Summer Azure appeared to have two flight periods, the first peaking in early July and the next peaking in early August. The double peak combined with some morphological differences may hint at a cryptic species within Summer Azure in Vermont that is currently undescribed. Additionally, Lucia Azure flight period suggests that it too may be comprised of two sibling species. There may be as many as five *Celstrina* species in Vermont. Further taxonomic study is urgently needed.

Vermont Blues:

- Eastern Tailed Blue (*Cupido comyntas*)
- Lucia Azure (*Celastrina lucia*)
- Cherry Gall Azure (*Celastrina serotina*)
- Summer Azure (*Celastrina neglecta*)
- Silvery Blue (Glaucopsyche lygdamus)

Eastern Tailed Blue *Cupido comyntas* (Godart, 1824)

Resident
Common

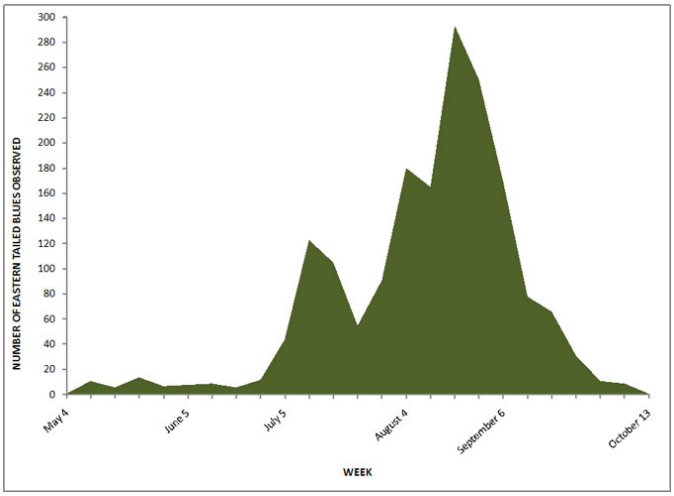
Conservation Status
Vermont S5
Global G5

North American Range
Southeast Canada and Eastern United States west to western North Dakota, central Colorado, and central Texas. Also ranges from southeastern Arizona, western New Mexico, and west Texas south to Costa Rica.

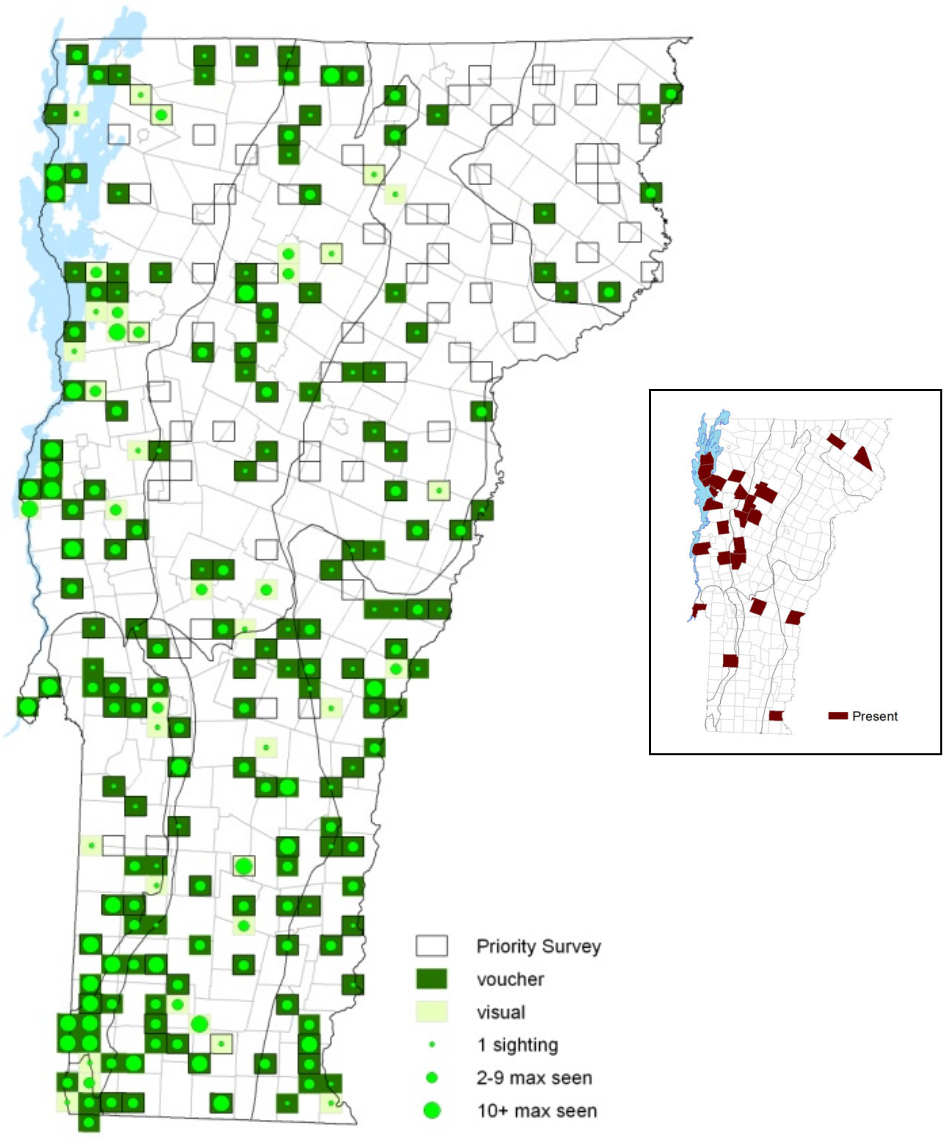
The smallest blue in Vermont, with tiny threadlike tails and a silvery hindwing fringe, is among most beautiful. Common throughout the eastern United States. While perched, these butterflies rub their hindwings together to create a distraction with their tails. Males patrol near hostplants during the day. Females lay eggs on flower buds and caterpillars eat buds, flowers, and seeds. Larvae overwinter, pupating the following spring. Although most Lycaenids do not perch with open wings, Eastern Tailed Blue sometimes bask with their wings at a 45 degree angle. Adults nectar but have a very short proboscises and are limited to nectaring from flowers close to the ground which are open and short tubed.

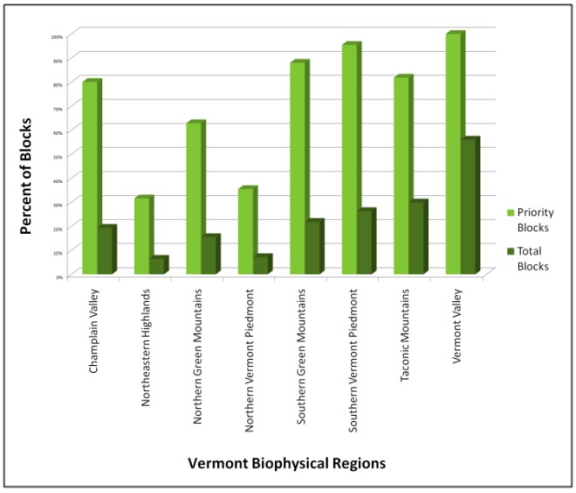
Identification
One narrow tail on hindwing. Upperside of male iridescent blue; summer females uniformly brown, spring females smaller with much blue at the wing bases. Underside of hindwing pale gray with black bar at the end of the cell, distinct black spots, and three large orange spots at outer margin near tail.

Flight
Probably three flights: early May through early June, mid July through late July, and mid August through into October. Extreme dates: 4 May 2007 in Dorset (R. Stewart), 13 October 2003 in Grand Isle (D. Hoag).



Distribution and Habitat
Scudder (1889) wrote "found throughout New England even in the White Mountain district and is everywhere a common insect, especially in the southern half". This largely remains true. Both historically and during VBS, Eastern Tailed Blue was commonly found throughout Vermont; with fewer records in Northeastern Highlands and the northern portions of Green Mountains and the Northern Piedmont. They are adaptive generalists and are able to utilize a wide array of open habitats, including disturbed areas. Caterpillar hosts include Yellow Sweet Clover (Melilotus officinalis), Alfalfa (Medicago sativa), clover (Trifolium), and others. Adults nectar at Yellow Sweet Clover (Melilotus officinalis), asters (Aster), cinquefoil (Potentilla) and other short-tubed flowers.


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen
Present


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Lucia Azure *Celastrina lucia* (W. Kirby, 1837)

The life history of this butterfly has been poorly reported as its identification has been cloaked in mystery.

The Lucia Azure seems to be our earliest emerging Celastrina in Vermont and can be seen as early as late April and the beginning of May. Due to its dark ventral blotching and its early emergence, this species, or species complex, is less difficult to identify than others in the Celastrina group. Caterpillars overwinter as pupae.

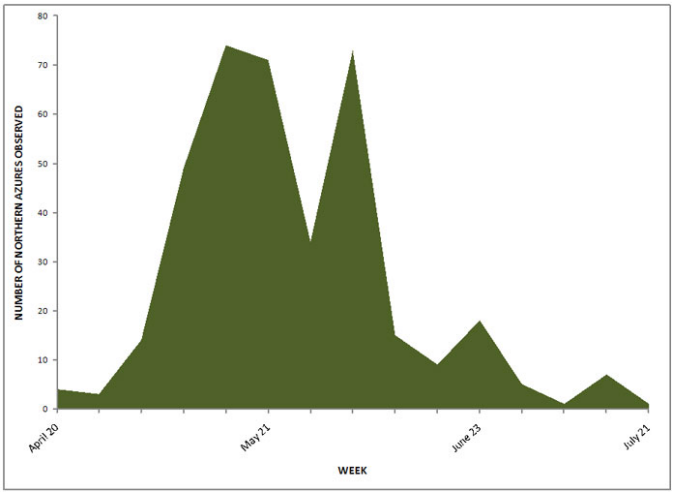
Resident
Common

Conservation Status
Vermont S5
Global G5

North American Range
Poorly defined. In Alaska and all Canadian provinces into the northern tier of eastern US. Local south of about central Maine. Common in New Jersey pine barrens.

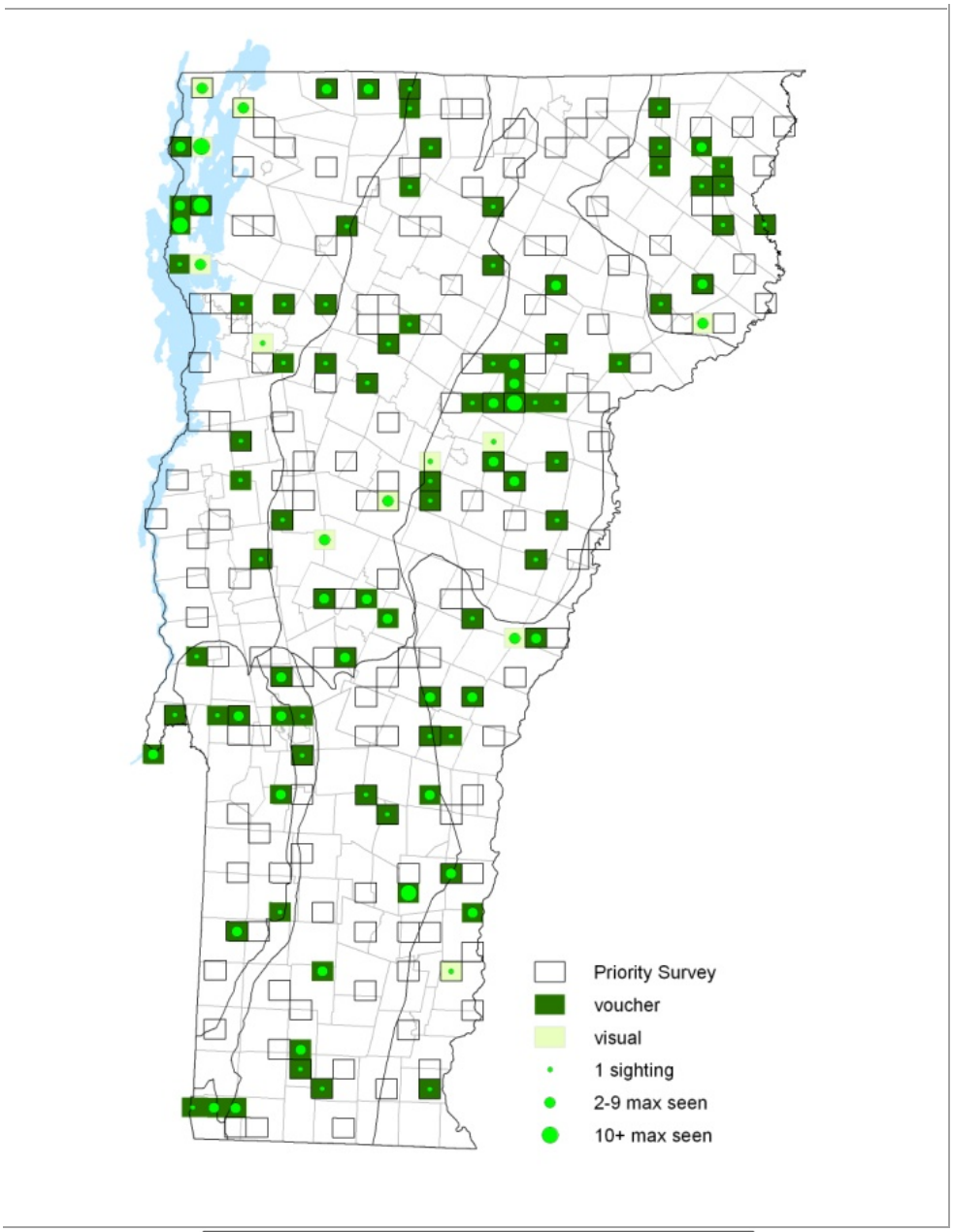
Identification

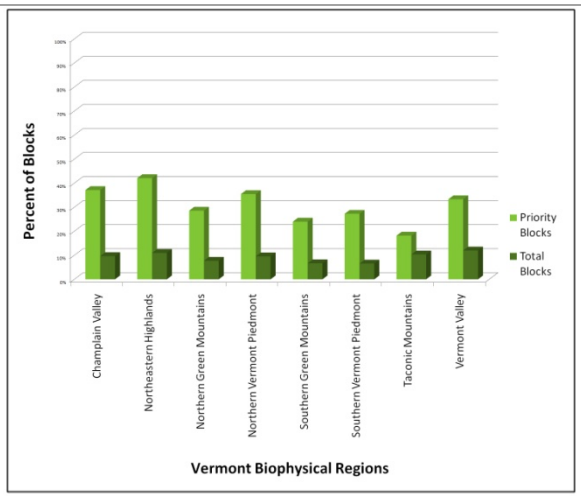
Flight
The earliest emerging Celastrina in Vermont. The prolonged flight may indicate a complex of sibling species remains hidden in Vermont. Extreme dates from specimens: 18 April 2005 in Dorset (R. Stewart) and 21 July 2004 in Vershire (B. Pfeiffer).



Distribution and Habitat
Found to be common throughout most of Vermont during VBS, but as its name suggests, perhaps less common in southern Vermont. Because of recent taxonomic changes, historic records have not been recently determined.

Found in woodland edges and scrubby habitats.
Larvae feed on flowers and buds of mostly blueberries (Vaccinium), but also cherry (Prunus) and viburnums (Viburnum). Little reported on nectar preferences regionwide. During VBS observers reported nectaring on blueberries (Vaccinium), Leatherleaf (Chamaedaphne calyculata), White Clover (*Trifolium repens*), Spring Beauty (*Claytonia caroliniana*), Robins Plantain (*Erigeron pulchellus*), and dogwood (Cornus).


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen


Percent of Blocks
Priority Blocks
Total Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Vermont Biophysical Regions

Summer Azure *Celastrina neglecta* (W.H. Edwards, 1862)

Formerly regarded as a second brood of *C. ladon*, Summer Azure, or *C. neglecta* type-2, emerges in mid-July and is phenotypically distinct. The earlier *C. neglecta* type-1, ("early summer entity"), emerges earlier than type-2 and is phenotypically very different from type-1, showing more in common with a late *C. lucia* than with the true *C. neglecta* (H. Pavulaan pers. com.). The entire complex is highly cold tolerant. Caterpillars feed on hostplant flowers. Pupae overwinter. Males patrol for females who are high fliers.

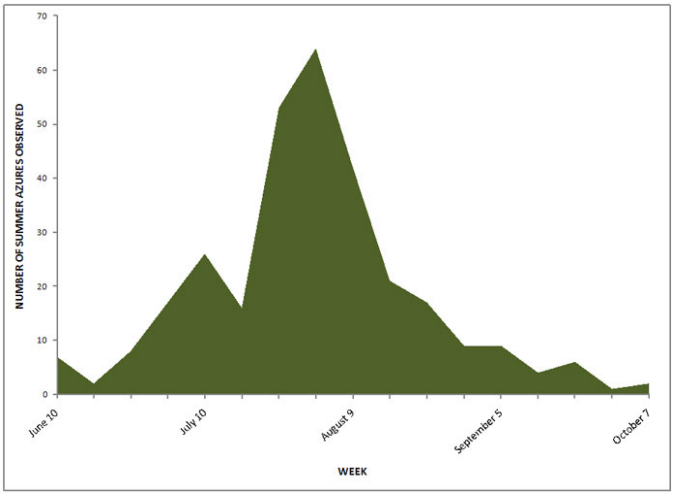
Resident
Common

Conservation Status
Vermont S5
Global G5

North American Range
Most of eastern and central United States as well as southern Canada.

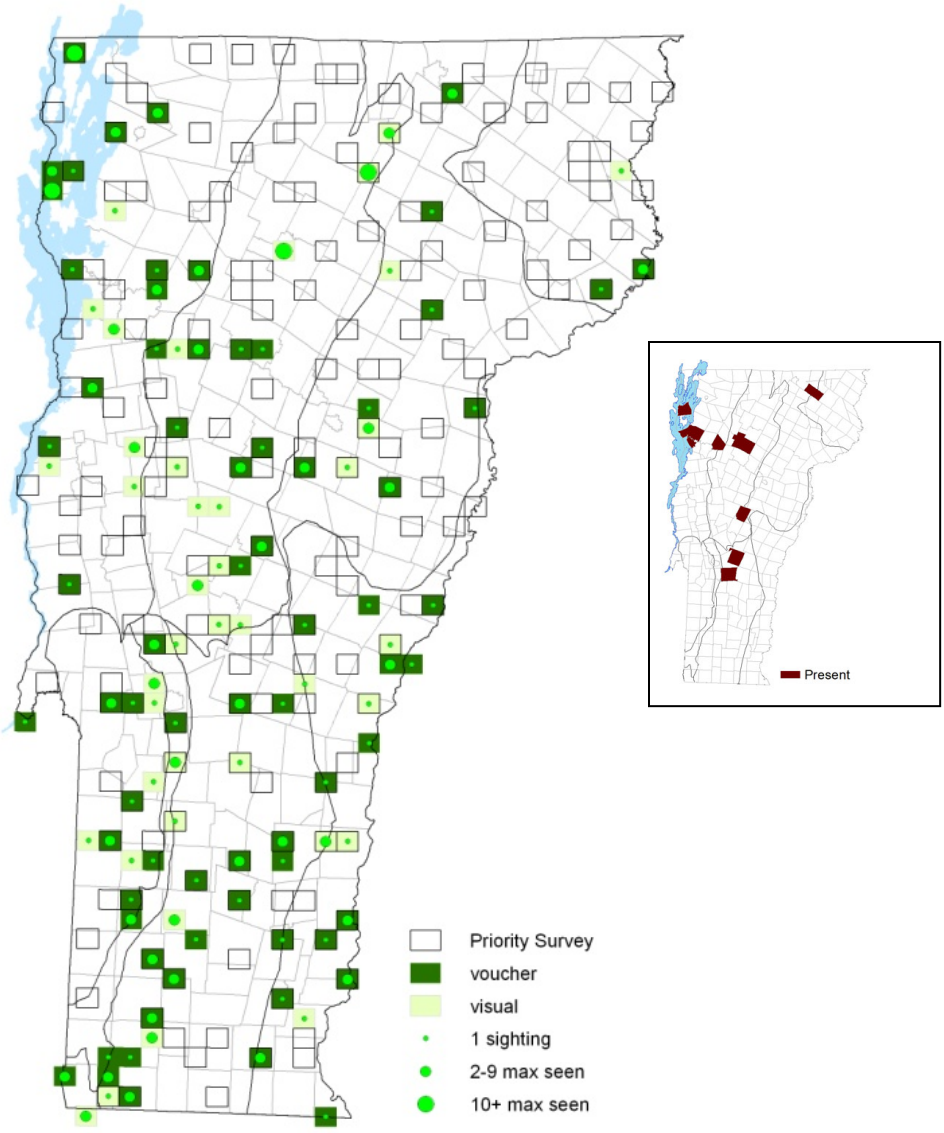
Identification
Upperside of male powdery blue often with ill-defined white patch on hindwing. Female with much white scaling on both forewings and hindwings. Underside of hindwing pale gray or white with small black dots and submarginal dark zigzag line.

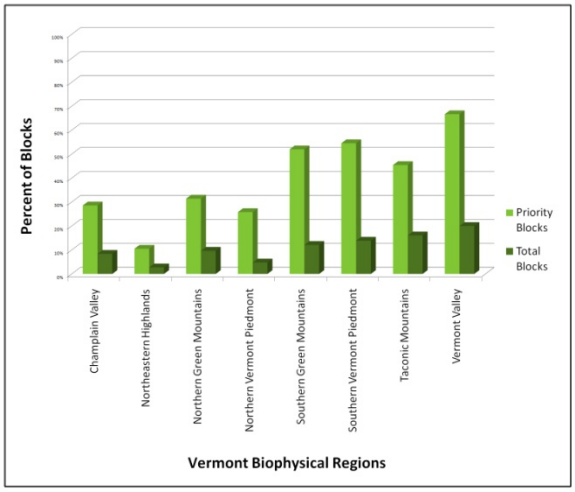
Flight
Begins flying in earnest as other Azures wane. Extreme dates: 8 June 2004 in Pawlet (R. Stewart) 8 September 2006 in Stamford (T. Armata), and a sight record on 7 October 2006 in Wallingford (T. Armata).



Distribution and Habitat
Recorded across the state during VBS, but less common in the northeast region.

Less confined to woodlands than other azures. Preferred habitats include streamsides, powerline right-of-ways, gardens, forest edges, and other partially open areas. Hostplant choice depends on location and timing of the particular brood. Known hosts are New Jersey Tea (Ceanothus americanus), dogwoods (Cornus), and Meadowsweet (Spiraea alba). Adults nectar from a wide variety of plants. VBS observers reported vetch (Vicia), Yarrow (*Achillea millefolium*), Meadowsweet, Rough-fruited Cinquefoil (*Potentilla recta*), Queen Anne's Lace (*Daucus carota*), Wild Oregano (*Origanum vulgare*), Narrow-leaved Mountain-mint (Pycnanthemum tenuifolium), Joe-pye Weed (Eupatorium purpureum) and goldenrods (*Oligoneuron*). Adult males are known to puddle at mud and excrement.


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen
Present


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Cherry Gall Azure *Celastrina serotina* (Wright and Pavulaan, 2005)

There is much yet to be learned about this newly recognized species. The Cherry Gall Azure is difficult to distinguish from other azures in the field and rather than relying solely on phenotypical characteristics for identification, it is important to take note of the date and habitat in which it was found. In addition, because its larvae feed on cherry galls, adult butterflies can often be found in the vicinity of cherry trees. Pupae overwinter.

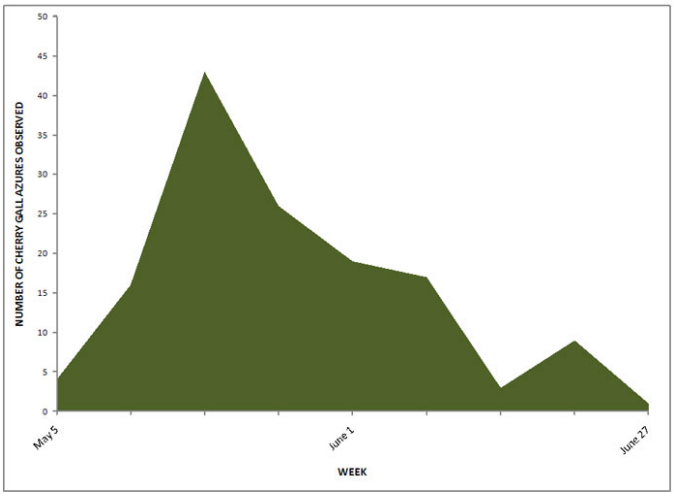
Resident
Common to Uncommon

Conservation Status
Vermont S4
Global G5

North American Range
Occurs from Nova Scotia and central and southern Ontario southward to New Jersey and West Virginia

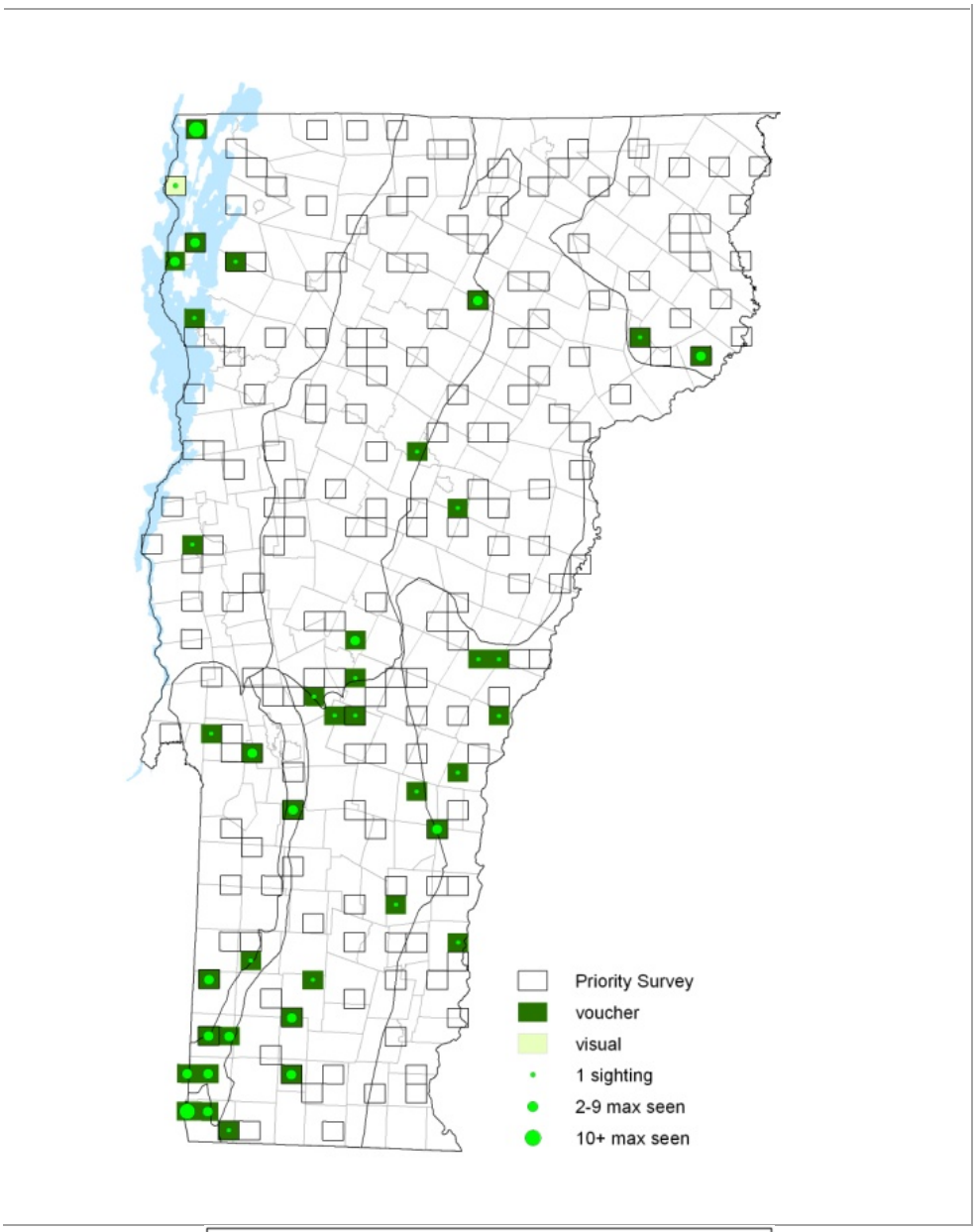
Identification
White dusting ventrally with well defined dark brown or black spots. Dorsal forewings metallic blue. Dorsal hindwings a lighter, dusty blue. Dark border on dorsal forewing more prominent in females than in males.

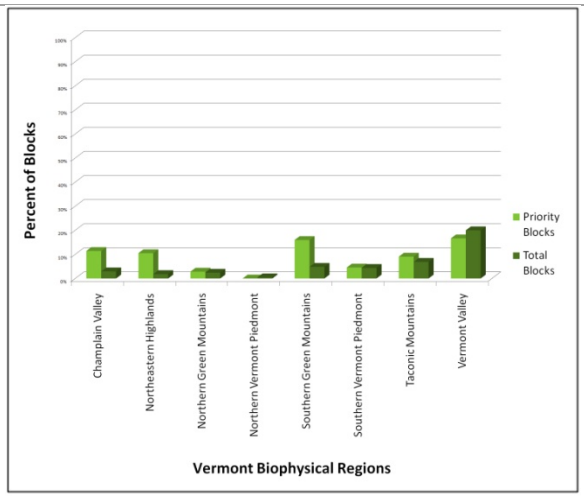
Flight
Overwintering pupae emerge in the late spring between the Northern and Summer Azure flights. Extreme dates: 5 May 2006 in Bennington and 23 June 2003 in Pownal (K. Hemeon).



Distribution and Habitat
VBS observers record it sporadically throughout Vermont. It was more common in central and southern Vermont. Because it is a newly recognized species, there are no historic records to report until specimen determinations are updated.

Habitats include open woods, abandoned fields and disturbed areas near hostplantssily. Larvae feed on the mite galls of cherry leaves, typically of Black Cherry (Prunus serotina) and Choke Cherry (Prunus virginiana). In Nova Scotia they have been reared on Bristly Sarsaparilla (Aralia hispida) and in other areas on Nannyberry (Viburnum lentago). During VBS reported nectaring at Silky Dogwood (Cornus amomum), and blackberry and dewberry (Rubus).


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Silvery Blue *Glaucopsyche lygdamus* (Doubleday, 1841)

Two allopatric races occur in eastern North America, the southern nominant race lygdamus and the northern race couperi found in Vermont. Couperi has been expanding its range southward, mostly along highway corridors as it takes advantage of vetch (Vicia) plantings, arriving in northern New England in the 1960s and northern New York in 1980s. The earliest known record for Vermont was 21 May 1989 in Colchester (J. Hedbor). They are strong fliers and males patrol near hostplants for females. Eggs are laid singly on flower buds and young leaves. Caterpillars feed on flowers, seedpods, and young leaves and are tended by ants. Pupae overwinter.

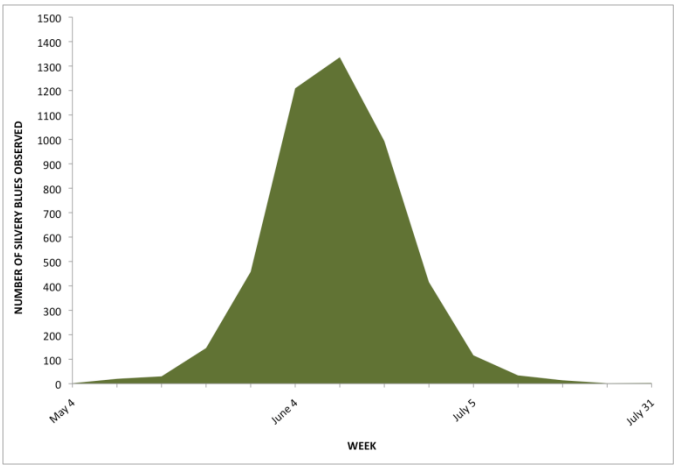
Resident
Common

Conservation Status
Vermont S5
Global G5

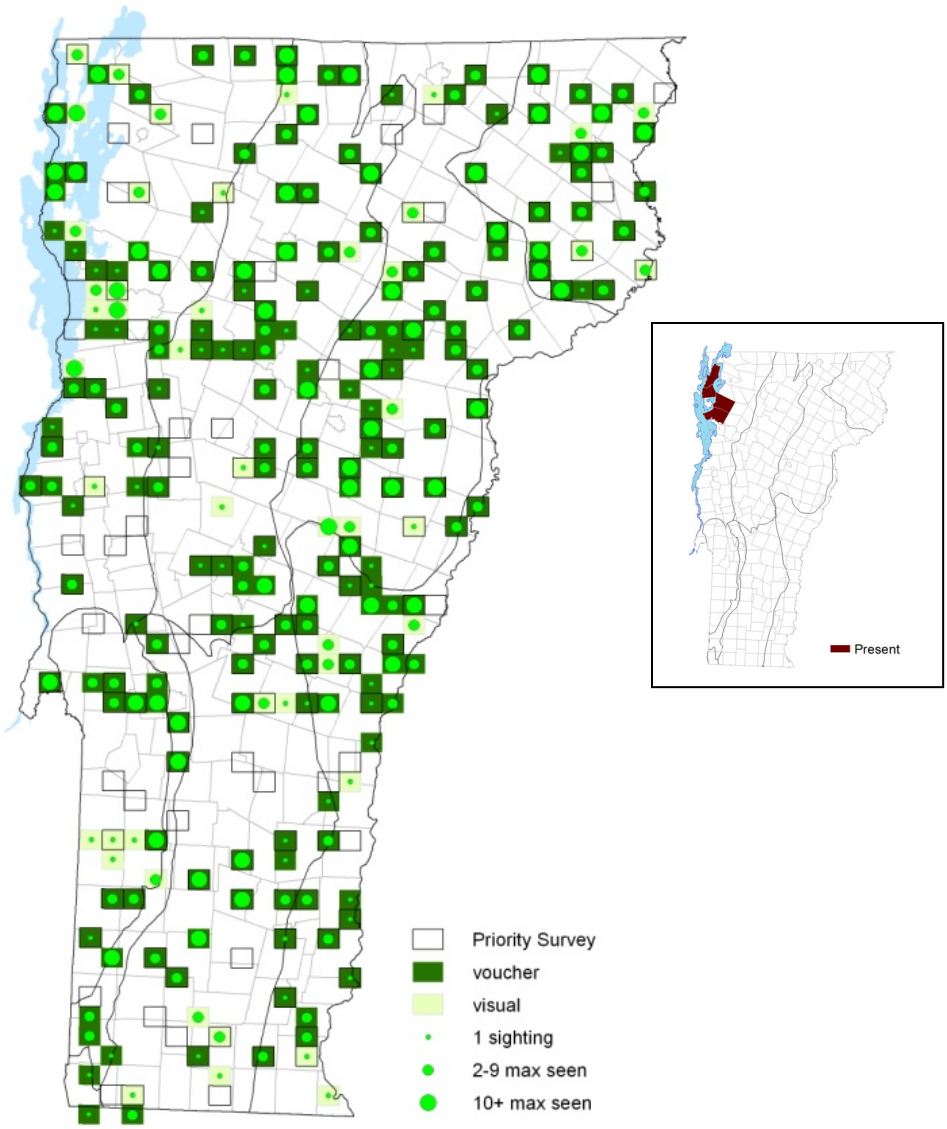
North American Range
Central Alaska south to southern California, Baja California, Arizona, New Mexico, and western Kansas. Along northern United States east to Nova Scotia and south to Georgia.

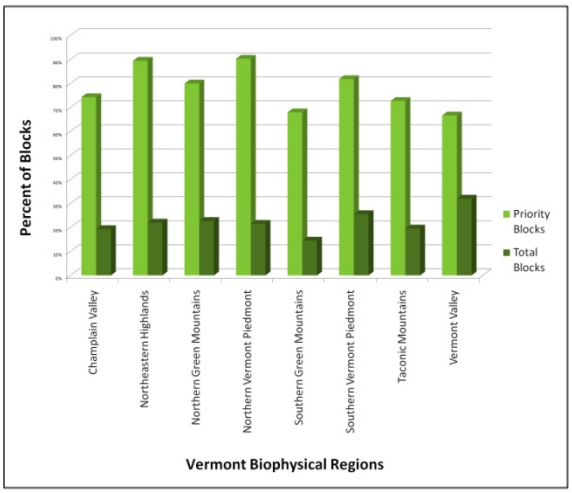
Identification
Upperside of male iridescent silvery blue with narrow dark borders; female darker blue with wide borders. Both sexes have white fringe. Underside gray-brown; both wings with row of white-ringed, round black spots.

Flight
One flight beginning in early May and becoming very abundant in June. Extreme dates: 4 May 2002 in Woodstock (K.P. McFarland), 4 May 2006 in Grand Isle (D. Hoag), and 31 July 2003 in Morristown (C. Gifford).



Distribution and Habitat
Common and abundant throughout Vermont during VBS. Uses a variety of habitats including open and damp woods, meadows, roadsides, brushy areas and waste places. Hostplants are from the family Fabacea and tend to be very common species such as Cow Vetch (Vicia cracca), Alfalfa (Medicago sativa) and White Clover (Melilotus alba). VBS observers reported egg laying and larvae on Cow Vetch. Many nectar sources reported during VBS: wild strawberry, buttercup, fleabane (Erigeron), vetch, Robin's Plantain, Red Osier Dogwood (Cornus sericea), Black Cherry, Red Clover, Raspberry, Forget-me-not (Myosotis), mustard, mint, honeysuckle, Orange Hawkweed, Common Cinquefoil (Potentilla simplex), bluets, dandelion, and blueberry (Vaccinium).


Present
Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Brush-footed Butterflies: Family Nymphalidae

The Nymphalidae are members of the Superfamily Papilionoidea, the true butterflies. Distributed worldwide, highest diversity for this family is the tropics. They are highly variable, and there are more species in this family than in any other. There are 38 species in Vermont, with one now extirpated (Regal Fritillary). Adults vary in size from small to large, and their front legs are reduced, unable to be used for walking. Adults of some groups are the longest-lived butterflies, surviving 6-11 months as they overwinter.

Subfamily: Snouts (Libytheinae)

A small subfamily of only ten species, snouts reside in temperate and tropical regions, and only one species lives in North America. Authorities disagree on placement of subfamily, with some believing it should elevated to family. Adults migrate periodically in massive numbers and visit flowers for nectar. Males have reduced front legs that are not used for walking, and they patrol host plants in search of females. Eggs are laid in small groups on host leaves. Snouts overwinter as adults.

Vermont Species:
American Snout (*Libytheana carinenta*)

American Snout *Libytheana carinenta bachmanii* (Kirtland, 1851)

Mass irruptions of this butterfly from the Southwest have been known to halt traffic, darken the sky and cause street lights to turn on. It is this behavior that has led a few vagrants into Vermont. Most authorities recognize just one species, but a few wish to elevate some forms to species status. The East Coast race is *bachmanii*. When perched on a branch they mimic a dead leaf with the "snout" appearing to be the petiole.

Vagrant
Rare

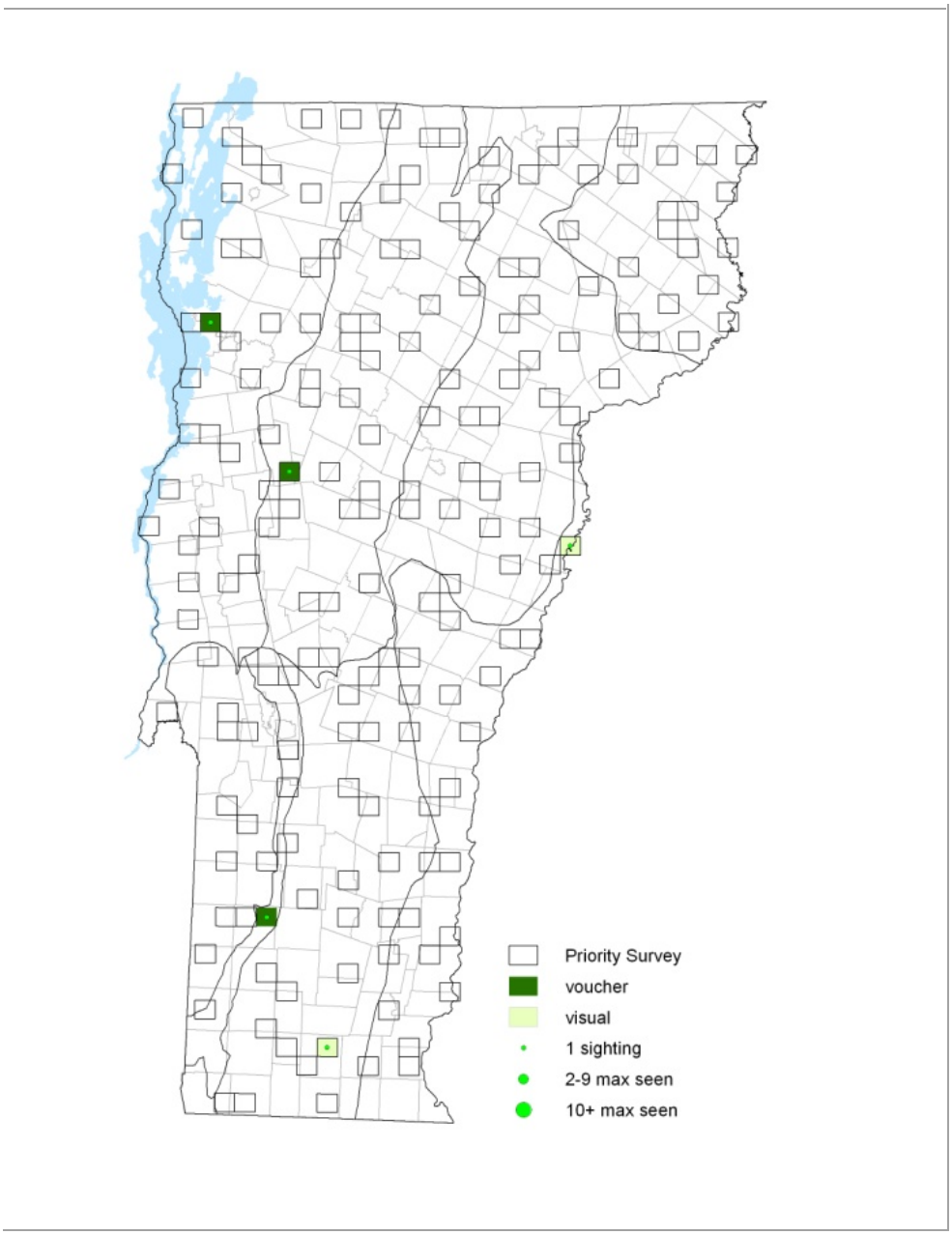
Conservation Status
Vermont SNA
Global G5

North American Range
Argentina north through Mexico and the West Indies to southern United States. Migrates to central California, southern Nevada, Colorado, and most of the eastern United States.

Identification
Labial palps long and extended forward as a "snout". Tip of forewing squared off. Upperside brown, forewing with orange at base and inner margin, and white spots on outer half. Underside of hindwing mottled or smooth violet-gray.

Flight
Two broods in the south from May to August. A vagrant to Vermont, there were no known records prior to VBS. There were four recorded in western Vermont and one in the Upper Connecticut River valley. The first state record was from 30 July 2002 in Burlington (C. Gifford). Other VBS records: 10 August 2002 Manchester (S. Griggs), 9 August 2003 Bradford (N. Osborne), 20 June 2007 Wilmington (G. Look), 17 July 2007 Starksboro (B. Collins). There have been several records since VBS.

Distribution and Habitat
As expected of a vagrant, scattered records from across the state. Larval host plants are several species of Hackberry (Celtis) and adults nectar from a variety of flowers including Dogbane (Apocynum), Goldenrod (Oligoneuron), Aster (Symphyotrichum), and others. Observed nectaring milkweed (Asclepias) during VBS.


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen

Subfamily: Monarchs and relatives (Danainae)

Species in this group are large in size. The males of many have prominent sex marks at the middle of hindwings. Most of them can fly long distance and some are migratory. Caterpillars feed Milkweed plants (family Asclepiadea). Milkweed is poisonous but the caterpillars can tolerate and store it in their body, so both the caterpillar and adult butterfly are poisonous and distasteful to predators. Caterpillars in this subfamily have two or more long dorsal filaments. They are usually banded with bright warning color; usually black, yellow and white. The pupa are smooth with brilliant colours.

Vermont Species:

Monarch (Danaus plexippus)

Monarch *Danaus plexippus* (Linnaeus, 1758)

Migrant Breeder
Uncommon

Conservation Status
Vermont S5
Global G5

North American Range
Southern Canada south through all of the United States, Central America, and most of South America. Also present in Australia, Hawaii, and other Pacific Islands.

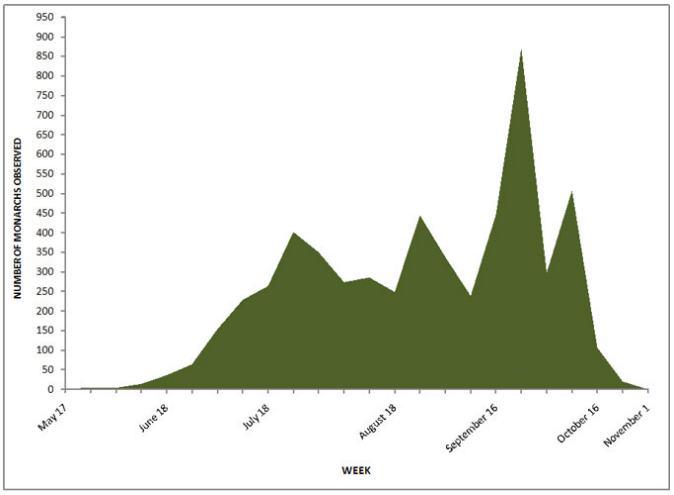
First proposed by a 5th grade class at the Cornwall Elementary School, the Vermont General Assembly declared the Monarch as the official state butterfly on July 1, 1987. Adults make massive fall migrations, flying thousands of miles south to winter in central Mexico. A few overwinter along the Gulf coast or south Atlantic coast. Along the way, Monarchs stop to feed on flower nectar and to roost together at night. Some of these roosts have been observed in the Champlain Valley. At the Mexico wintering sites, butterflies roost in trees and form huge aggregations that may have millions of individuals. Most have mated before they leave for the north in the spring, and females lay eggs along the way.

Identification

Upperside of male is bright orange with wide black borders and black veins; hindwing has a patch of scent scales. Upperside of female is orange-brown with wide black borders and blurred black veins. Both sexes have white spots on borders and apex. The Viceroy butterfly (Limenitis archippus) is a Mullerian mimic; it has similar coloration and is also distasteful.

Flight

Arriving as early as mid May in some years, Monarchs probably have two generations during the summer before migrating southward in September and October. Extreme dates: 17 May 2003 in Weybridge (D. Peterson) and 1 November 2006 in Chester (M. Reiter).

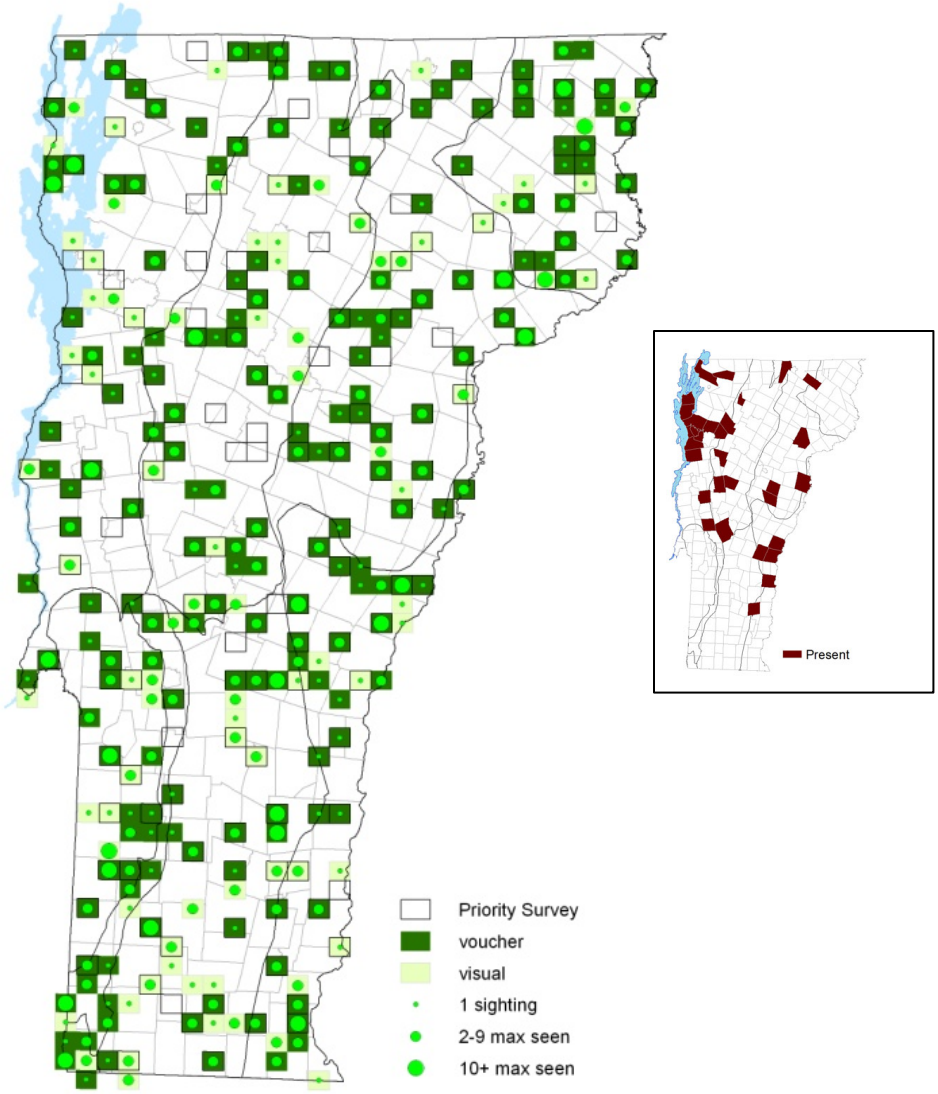


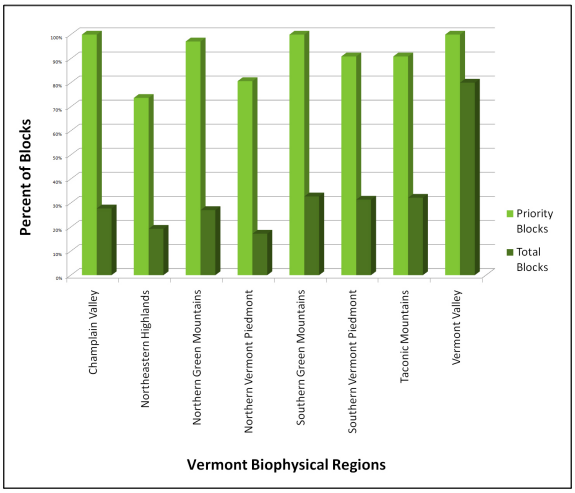
Distribution and Habitat

Monarchs are found throughout the state of Vermont. They prefer open meadows, weedy areas, marshes, roadsides and disturbed habitats with milkweed. Caterpillars feed on Common Milkweed (Asclepias syriaca), Swamp Milkweed (Asclepias incarnata), and Showy Milkweed (Asclepias speciosa). Blooming later summer/early fall clover fields have been found to be important stopover habitat in the Champlain and Connecticut valleys during VBS.

Recoveries of Monarchs Tagged in Vermont

Tagger	Tag City	Tag Date	Report Date	Report City	Report State	Reporter	Miles
Bryan Pfeiffer	Plainfield	8/29/03	3/18/05	El Rosario	MX	Raul Cruz Gonzalez	2341
Bryan Pfeiffer	Plainfield	8/29/03	3/3/04	El Rosario	MX	Claudio Cruz Garcia	2341
Deborah Gonyaw	East Monpelier	9/4/03	2/29/04	El Rosario	MX	Paulino Martinez Cruz	2331
Chris Davies	Richmond	9/20/01	3/24/03	El Rosario	MX	Maribel Garcia Vidal	2321
Nancy Smith	Essex Junction	9/20/99	3/1/00	El Rosario	MX	David Marriott	2320
Bryan Pfeiffer/Kent McFarland	VINS Quechee	9/6/03	3/3/04	El Rosario	MX	Francisco Garcia Dominguez	2311
Bryan Pfeiffer/Kent McFarland	VINS Quechee	9/6/03	3/5/04	El Rosario	MX	Laureano Garcia Garcia	2311
Nancy Smith	Essex Junction	8/18/00	9/26/00	Sagaponack	NY	David Dakers III	250
Susan Sawyer	Montpelier	10/10/03	10/14/03	Bridgeport	CT	Paul Ganim, Jr.	215
Maggie Desch	East Montpelier	9/18/96	9/22/96	Charlestown	RI	Susan Carpenter	204
Susan Carpenter	Cabot	9/8/01	9/15/01	Jefferson	NY	Danielle All	176
Danny Growald	Shelburne	9/8/99	9/13/99	Greenwich	NY	Howard Romack	90
Chris Davies	Richmond	10/5/00	10/11/00	Jericho	VT	Dan Shepard	7
Nancy Smith	Essex Junction	9/26/94	10/1/94	Essex Junction	VT	Randi McCuin	0
Nancy Smith	Essex Junction	10/4/94	10/7/94	Essex Junction	VT	Kurr Mandigo	0
Charmaine Kinton	Plymouth	9/13/99	9/18/99	Plymouth	VT	Regina Hall & Family	0
D Potter	Rutland	9/27/00	10/1/00	Rutland	VT	Jennifer Stratton	0


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen
Present


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Subfamily: Longwings and Fritillaries (Heliconiinae)

Members of the family Nymphalidae, most species are found in the tropics, but several genera are prominent in the Northern Hemisphere, including greater and lesser fritillaries. Adults of several species are distasteful, and many others are mimics. Adults are long-lived, with some as long as six months. Males patrol in search of females.

Vermont Species

- Gulf Fritillary (*Agraulis vanillae*)
- Variegated Fritillary (*Euptoieta claudia*)
- Silver-bordered Fritillary (*Boloria selene*)
- Meadow Fritillary (*Boloria bellona*)
- Great Spangled Fritillary (*Speyeria cybele*)
- Aphrodite Fritillary (*Speyeria aphrodite*)
- Regal Fritillary (*Speyeria idalia*)
- Atlantis Fritillary (*Speyeria atlantis*)

Gulf Fritillary *Agraulis vanillae* (Linnaeus, 1758)

Hypothetical Vagrant
Extremely rare

Conservation Status
Vermont SNA
Global G5

North American Range
South America north through Central America, Mexico, and the West Indies to the southern United States. Wanders north to the central United States; rare northward.

A southern species that has occasionally wandered north in some years into the central United States and southern Manitoba, Canada; especially in the fall. In the Northeast, inland sightings are extremely rare. Along the coast, even a sighting as far north as Cape May, New Jersey can cause a stir among butterfly enthusiasts. There is one record in Massachusetts from Nantucket on 5-6 October 1997. We know of no other New England records.

It was a surprise to find a specimen from Vermont in the St. Michael's College collection. The specimen was collected by J.G. Leonard on 5 May 1995 in Burlington. It was found as road kill. The deposited specimen has only hindwings, one forewing and no other material. The origin of this specimen is unknown. Given the date and the circumstances, it is possible that this individual was released or accidentally transported to the location rather than a true vagrant. Until there are further records of this species, it should be considered "hypothetical" as a vagrant to Vermont.

Variegated Fritillary *Euptoieta claudia* (Cramer, 1775)

The Variegated Fritillary is a southern butterfly and for the most part overwinters in frost-free areas, though there is a colony as far north as Quebec City on a nearby St. Lawrence River island. The first northward migrants of the year tend to be worn. Males patrol low in open areas for mates and females lay single eggs on hostplant stems and leaves. Larvae feed at night.

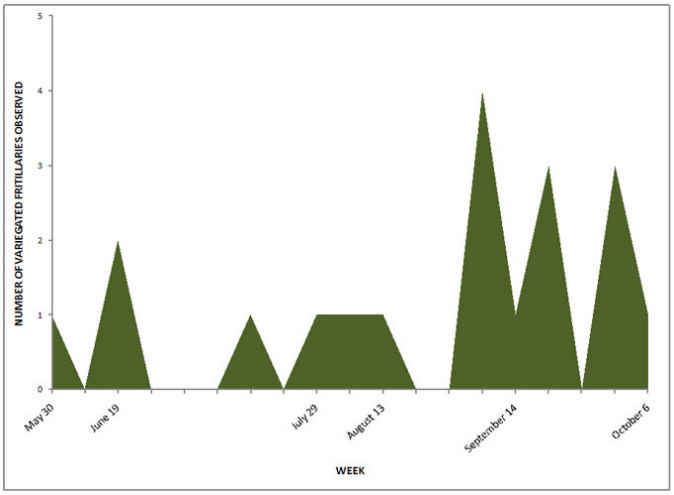
Migrant Breeder
Uncommon

Conservation Status
Vermont SNA
Global G5

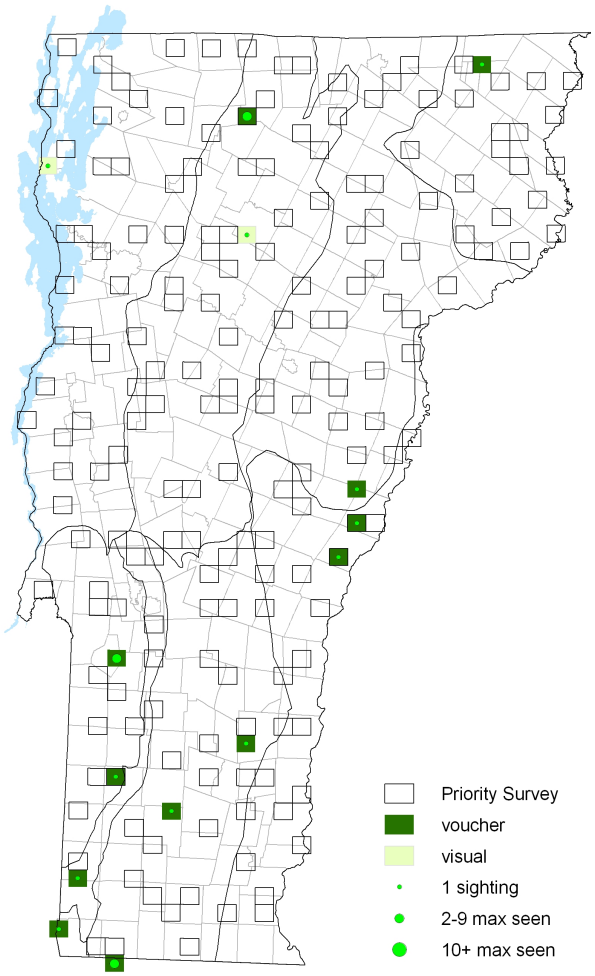
North American Range
Higher elevations of Argentina through Central America and Mexico to the southern United States; also Cuba and Jamaica. Regularly colonizes north through most of the United States except the Pacific Northwest.

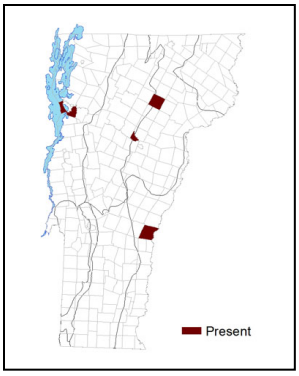
Identification
Upperside tawny orange with thick dark veins and markings; black spots near margin. Hindwing margin angled and slightly scalloped. Underside of hindwing with a mottled pattern and no silver spots.

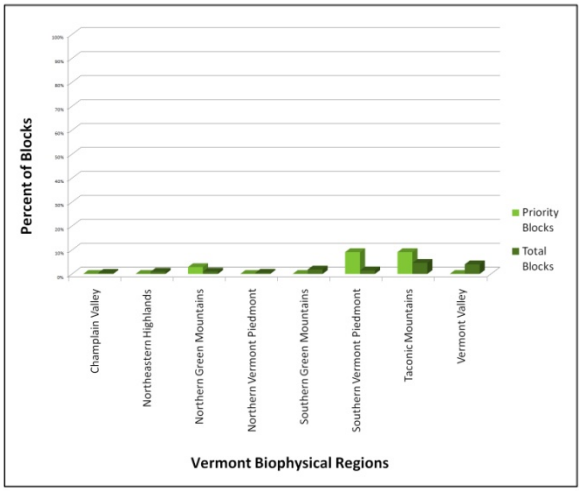
Flight
Adults fly north from their permanent southern range in spring, typically reaching New England by summer. In Massachusetts, females have been observed ovipositing from early August until late October. Two reports of larvae in Vermont suggest much earlier breeding: four larvae found on 21 July 2000 in the North Branch Nature Center butterfly garden in Montpelier (S. Sawyer) and during VBS on 13 July 2006 in Middletown (S. Martineau). Early dates suggest that breeding may occur even earlier in some years. Extreme dates: 30 May 2004 in Chester (M. Reiter) 1 June 1991 in South Burlington (J.R. Grehan), 6 October 2001 in Hardwick (J. Schneider), and 6 October 2002 in Norwich (C. Rimmer).



Distribution and Habitat
Widely scattered records throughout Vermont both historically and during VBS. They tend to be generalists, gravitating to open, disturbed habitats. Caterpillars observed feeding on a violets (Viola) in Vermont. Adults nectar on milkweed (Asclepias), dogbane (Apocynum), dandelion (Taraxacum), red clover (Trifolium pratense), and others. Males puddle.


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen


Present


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Silver-bordered Fritillary *Boloria selene* (Schiffermüller, 1775)

They have an extensive range, with many populations and races stretching around the northern hemisphere, but complex population dynamics. In Massachusetts many veteran field lepidopterists believe it has declined significantly in the last 30 years. The single brooded Maryland race appears to be extinct. Since about 1950 the species has also declined sharply in England and the Netherlands, possibly from development and intensified agriculture. Males patrol throughout the day for females and both can be seen sunning themselves periodically in open, grassy meadow areas.

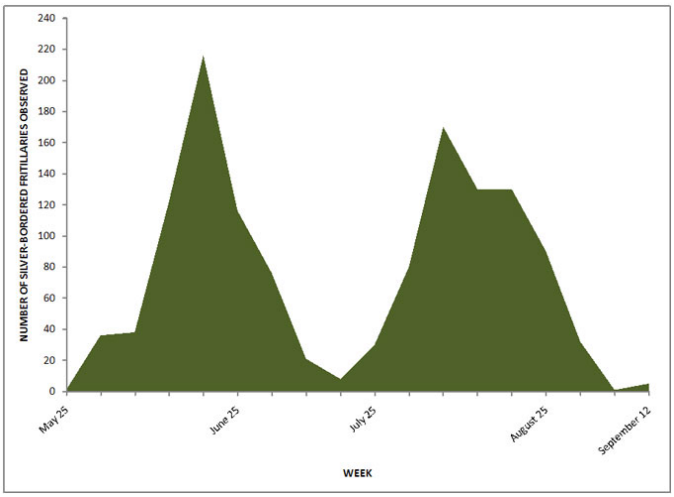
Resident
Common

Conservation Status
Vermont S5
Global G5

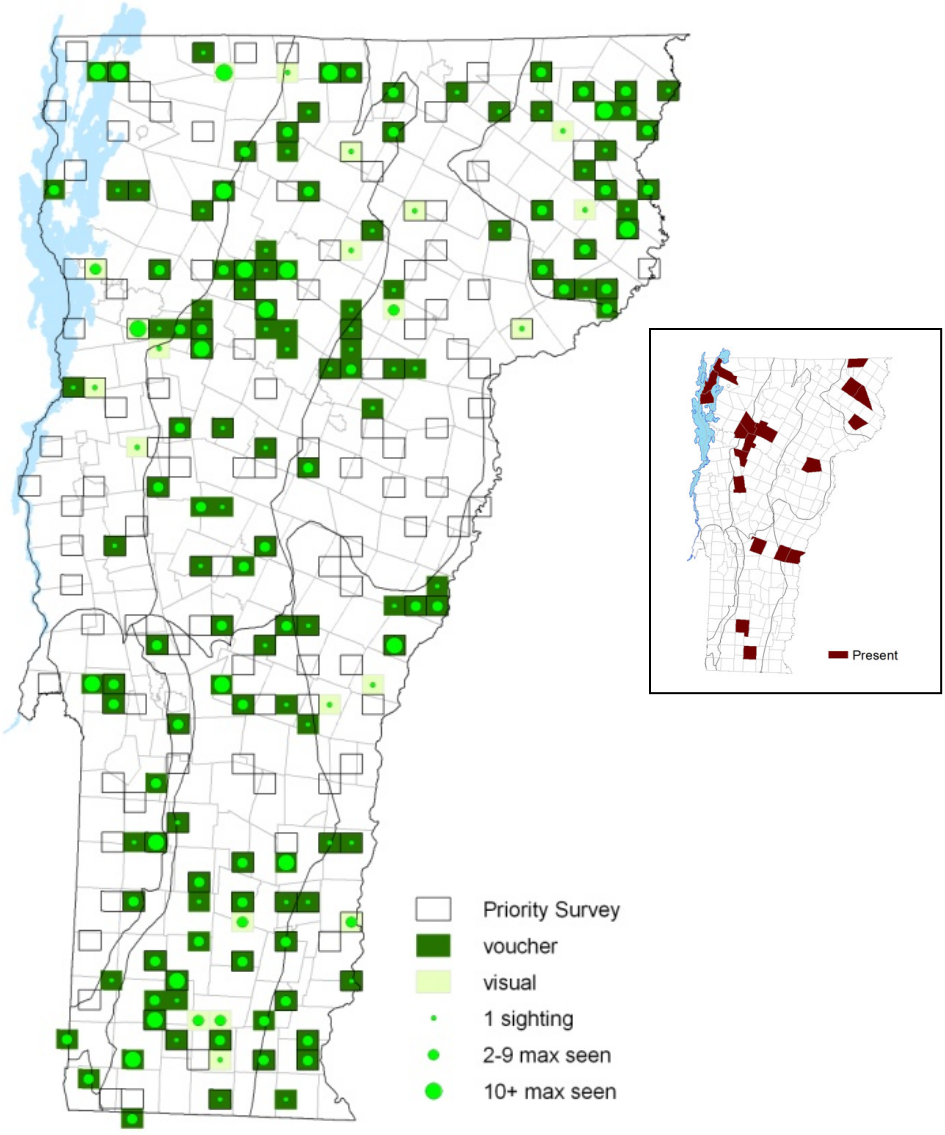
North American Range
Holarctic. Central Alaska southeast through Canada south of the taiga; northern United States from central Washington south along Rocky Mountains to northern New Mexico; east to Illinois, Virginia, and Maryland.

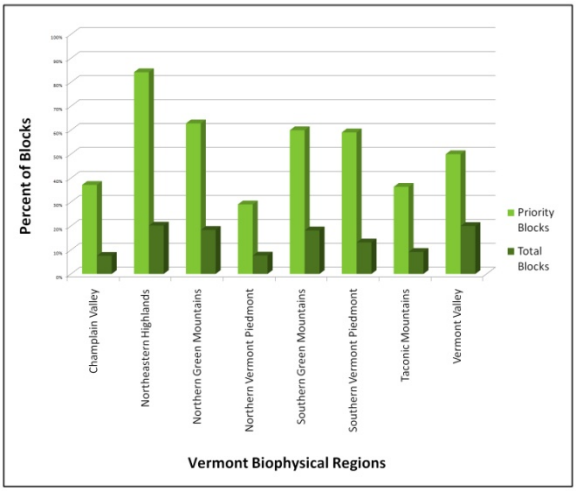
Identification
Upperside orange with black markings. Underside of hindwing with rows of metallic silver spots; postmedian spots small and black.

Flight
Two flights found in Vermont during VBS. Extreme dates: 25 May 2006 in Castleton (R. Pilcher) and 18 September 2002 in Norwich (C. Rimmer).



Distribution and Habitat
Scudder (1889) wrote that it was " found in near equal abundance throughout New England." During VBS recorded more commonly outside of valleys or in more northern biophysical region, but overall common throughout Vermont. They favor wet, open habitats such as wet meadows, bogs, and marshes. Ski slopes in the Green Mountains appear to harbor sizable populations. Hostplants include Northern Bog Violet (Viola nephrophylla) and Lance-leaved Violet (Viola lanceolata). Over a dozen species reported as nectar sources during VBS.


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen
Present


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Meadow Fritillary *Boloria bellona* (Fabricius, 1775)

Similar in size and markings to the Silver-bordered Fritillary, the Meadow Fritillary is a much more successful generalist than its relative. Though it prefers the same wet meadows as the Silver-bordered, it seems much more capable of surviving and thriving in disturbed habitats, which may explain its recent range expansion in some southeastern areas. Males patrol meadows with a low flight, during warm daytime hours. Females lay eggs on twigs and plants other than the host violets. Caterpillars feed on violet leaves and hibernate when in the third to fourth instar.

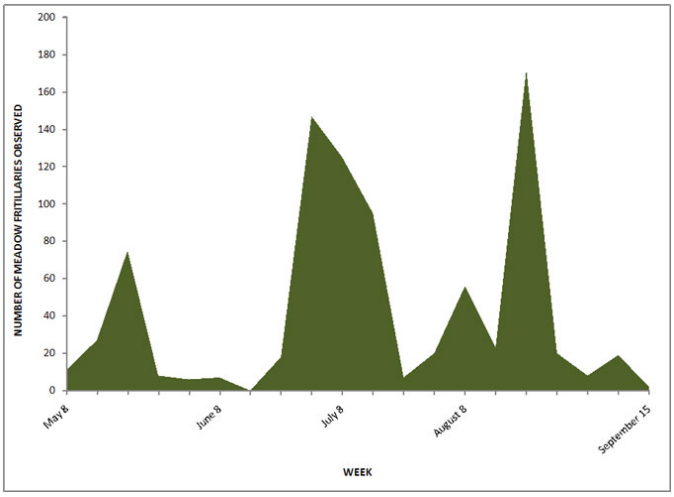
Resident
Common

Conservation Status
Vermont S5
Global G5

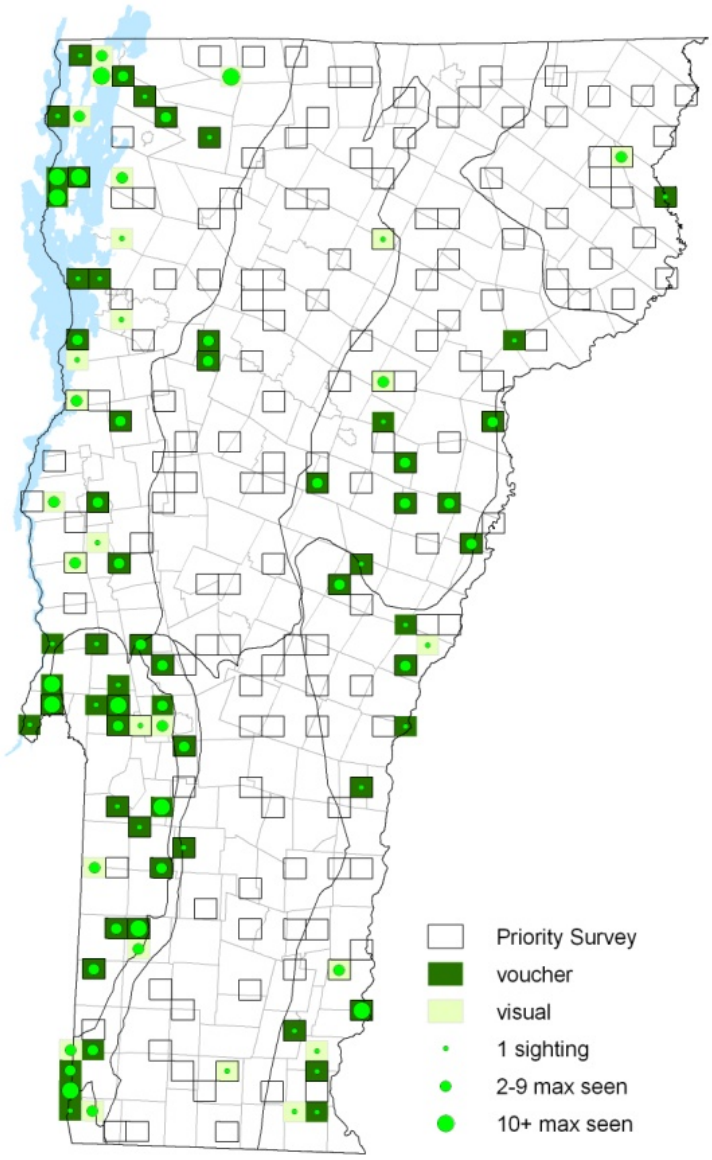
North American Range
Eastern British Columbia east through southern Canada and northern United States to Newfoundland; south to north-central Oregon, central Colorado, northeast Tennessee, and northwest North Carolina.

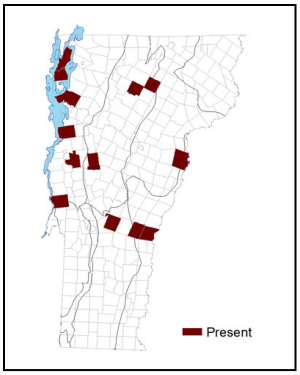
Identification
Forewing squared below tip. Upperside orange-red with heavy black markings. Underside of hindwing patterned with orange and purple-brown; off-white basal patch and metallic silver spots lacking.

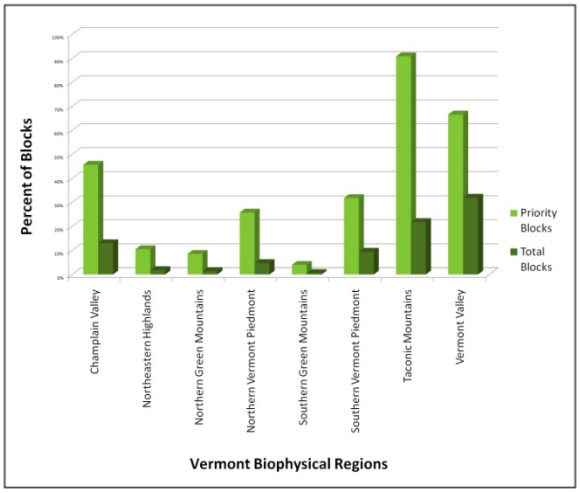
Flight
There appeared to be at least three flights during VBS, each overlapping slightly with the next. Extreme dates: 7 May 2004 in Bennington (K. Hemeon), and 15 Septemeber 2003 in Mount Tabor (J. Przypek) and in Grand Isle (D. Hoag).



Distribution and Habitat
Scudder (1889) called it "well distributed in New England. During VBS it was rarely reported from the Green Mountains or the Northeast Highlands, but was common and widespread in more southern or lower elevation areas. It prefers wet, open habitats. Hostplants are Northern White Violet (Viola pallens) and Woolly Blue Violet (Viola sororia). Eleven nectar sources were reported during VBS.


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen


Present


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Great Spangled Fritillary *Speyeria cybele* (Fabricius, 1775)

The largest greater fritillary in the region, it is often seen nectaring milkweed patches in old fields and meadows during the summer. Like other *Speyeria*, males eclose earlier than females and vigorously patrol for mates. Females probably enter reproductive diapause in mid summer, becoming active again in late August. Individuals in the late summer and fall are usually females.

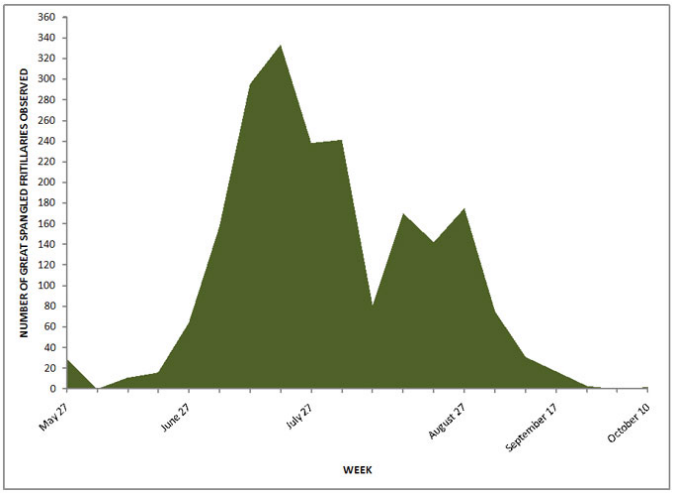
Resident
Common

Conservation Status
Vermont S5
Global G5

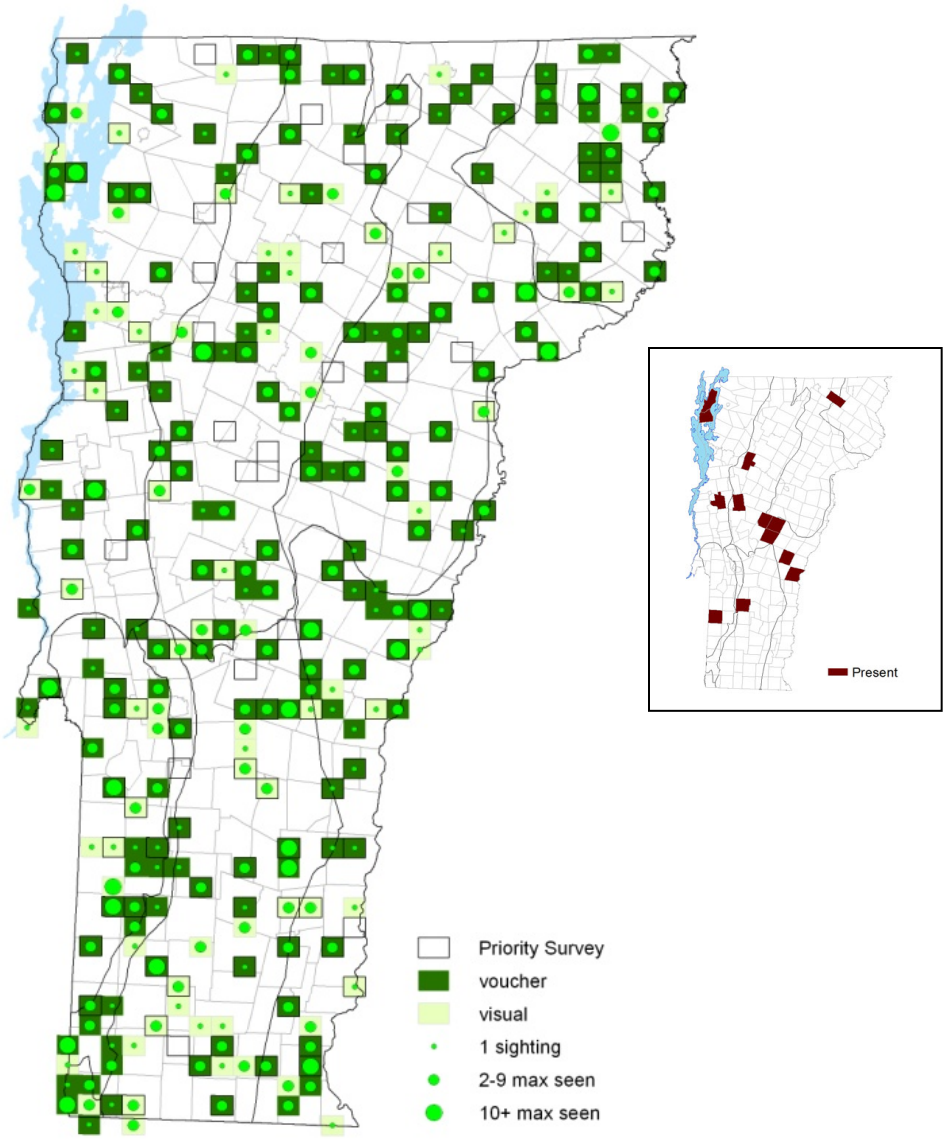
North American Range
Alberta east to Nova Scotia, south to central California, New Mexico, central Arkansas, and northern Georgia.

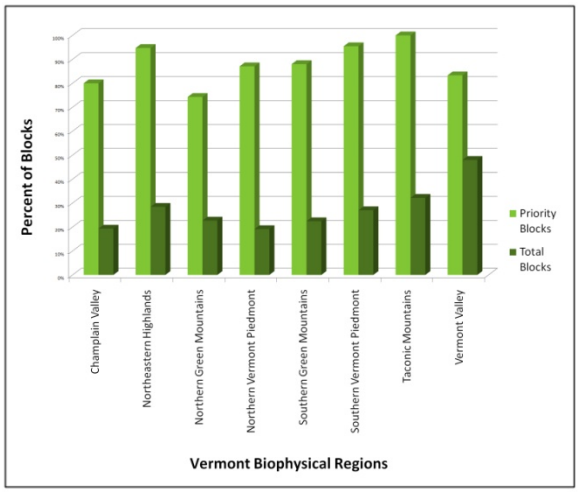
Identification
The largest of Vermont's Fritillaries. Upperside of male tan to orange with black scales on forewing veins; female tawny, darker than male. Underside of hindwing with wide, pale submarginal band and large silver spots.

Flight
A single flight period. Late July/early August decline in numbers probably signals period of female estivation. Extreme dates: 27 May 2003 in Grand Isle (D. Hoag) and 10 October 2003 in Norwich (C. Rimmer).



Distribution and Habitat
Scudder (1889) considered the Great Spangled Fritillary to be, "uncommon...in the northern half of New England...". During VBS it was commonly recorded across Vermont. Hostplants are violets (Viola), both wild and cultivated. Over 20 species of plants reported as nectar sources during VBS, with Joe Pye Weed (Eupatorium purpureum) and milkweed (Asclepias) most frequent.


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen
Present


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Aphrodite Fritillary *Speyeria aphrodite* (Fabricius, 1787)

Named for the Greek goddess of beauty, they are often found nectaring among congeners. Males patrol for females throughout the day. Females walk on the ground to lay single eggs near violets. First instar caterpillars do not feed, but overwinter until spring, when they eat young leaves of violets.

Resident
Common

Conservation Status
Vermont S5
Global G5

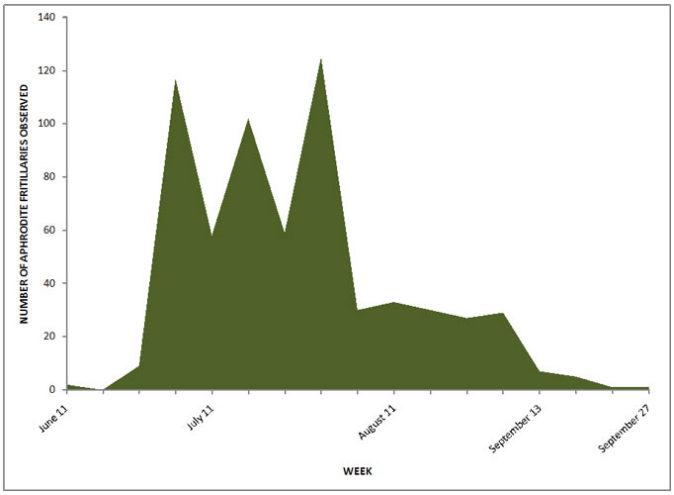
North American Range
Canada south of the taiga from Nova Scotia west through northern Midwest and Great Plains to the Rocky Mountains, then south in the mountains to east-central Arizona and northern New Mexico; south in the Appalachians to northern Georgia.

Identification

Generally intermediate in size between the larger Great Spangled Fritillary and the smaller Atlantis Fritillary. Upperside reddish orange-brown; male forewing with black spot below cell and with no black scales on veins. Underside of hindwing has pale submarginal band narrow or missing.

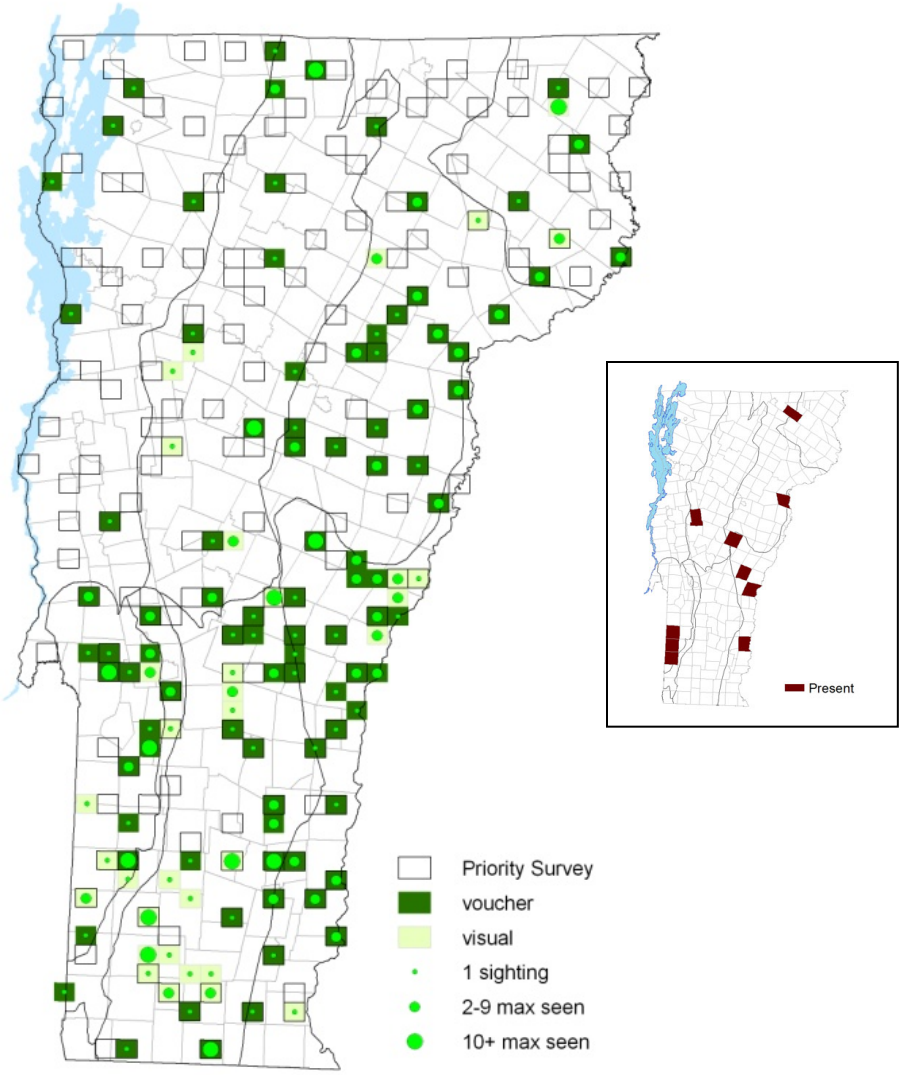
Flight

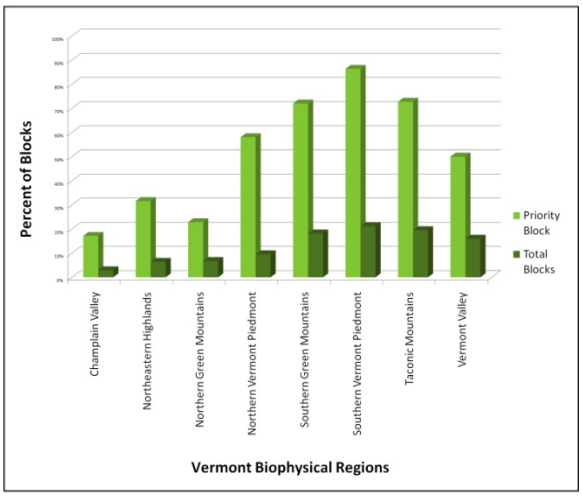
One brood flies from mid June through the end of September. Males eclose as much as three weeks earlier than females. Appears to begin flight period slightly later than Great Spangled Fritillary. Extreme dates: 11 June 2004 in Chester (M. Reiter) and 27 September 2005 in Grand Isle (D. Hoag).



Distribution and Habitat

According to Massachusetts Butterfly Atlas, observers in that state perceived a significant population decline in recent decades. During VBS found to be common and widespread in the southern four biophysical regions and the southern half of the Northern Piedmont region. Only widely scatterd records in the Champlain Valley during the survey. Hostplants are violets. Reported nectaring on 17 plant species during VBS, most often milkweed (Asclepias) and Joe Pyed Weed.


Present
Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Block
Total Blocks
Vermont Biophysical Regions

Regal Fritillary *Speyeria idalia* (Drury, 1773)

Resident
Extirpated, last observed in 1941

Conservation Status
Vermont SX, SGCN, Species of Special Concern 1992
Global G3

North American Range
Tall-grass prairie remnants in Montana and North Dakota south to Colorado, Nebraska, and Oklahoma; rare or absent from former range east of the Appalachians.

The true status of this prairie butterfly in Vermont is unknown. The last known Regal Fritillary was a female collected on 17 July 1941 by O.M. Calloway in Pomfret, Vermont (Grehan 1995). We found the specimen in the Peabody Museum of Natural History collection. It was originally in the Dartmouth College collections. We also uncovered two males and a female collected on 14 July 1939 in Dorset in the Peabody collection and three specimens from North Hartland 1894 and 1899, (exact dates unknown) in the Hartland Nature Club collection. Reasons for its decline and eventual extirpation from New England and other areas in the East are not entirely clear. Habitat destruction, changes in land management practices, alien insect parasites, pesticides, or perhaps a combination of stresses have been suggested, but evidence for any are few. Currently, only two Eastern populations remain in Pennsylvania and Western Virginia. Recent genetic studies suggest that the eastern population are relatively distinct and may warrant designation as a separate race (Williams et al. 2003).

Identification

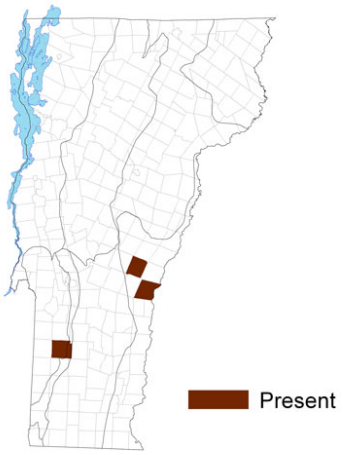
Upperside of forewing bright red-orange with black markings. Upperside of hindwing black with postmedian row of white spots; submarginal row of spots is orange in male and white in female.

Flight

Massachusetts flight was from late June (much later on the islands) to the third week in September, peaking from mid July to early September when both males and females were flying. Only two historic records with dates for Vermont: 14 and 17 July.

Distribution and Habitat

In Massachusetts Regal Fritillary seems to have preferred extensive open areas with a combination of wetlands and upland fields containing an abundance of nectaring plants. It is not known if Regal Fritillary was present in pre-colonial Vermont, which was over 90% forested. But, by the late 1890s, the time of the earliest known records, Vermont was generally a pastoral landscape with only about 35% forest cover (Foster et al. 2010). By 1941 when the last Regal Fritillary was recorded in Vermont, forest cover had nearly doubled, covering abandoned farmlands. This trend has continued during the past 60 years. Approximately 60 percent of Vermont's hay fields, pasture lands and other open grasslands were lost to succession and sprawl development.



Atlantis Fritillary *Speyeria atlantis* (W.H. Edwards, 1862)

Resident
Common

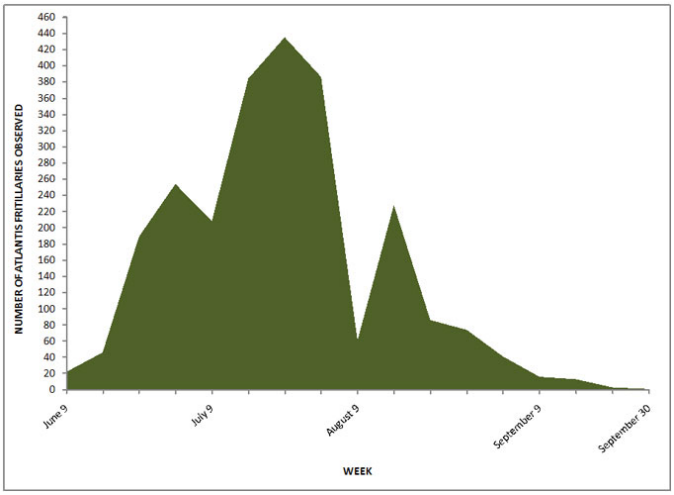
Conservation Status
Vermont S5
Global G5

North American Range
Maritime Provinces and northeast United States south to West Virginia, west through the Great Lakes region and southern Canada. South in Rocky Mountains to Colorado Front Range.

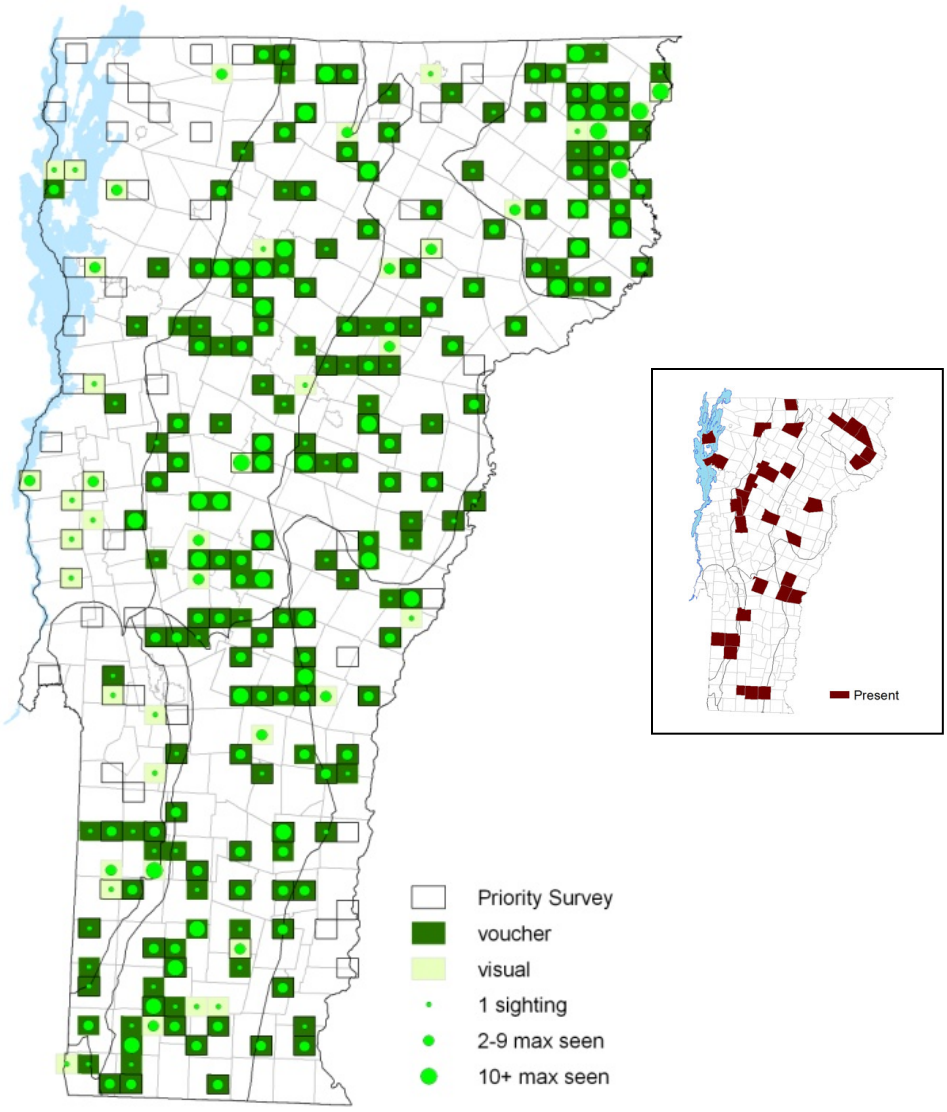
A butterfly of northern and mountain climates, this is the smallest and darkest of our three greater fritillaries. Males chase females until she lands with wings closed. The male lands near her and flicks his wings rubbing specialized scent scales (androconia) to waft pheromone to her antennae to entice mating. One of the few butterfly phermones readily detected by the human nose. Scudder (1889) described the odor and relayed a story from the hotel on Mount Mansfield, Vermont, "The male has a very perceptible odor which I found it difficult to determine; it seemed to me at first to have somewhat the fragrance of the pine woods; but on applying to Miss Soule, she at once said it was the odor of sandal-wood, which exactly describes it. She added that specimens she had brought into her room at the mountain hotel made it seem close, and a friend who called inquired on entering: 'Why! do you bring your sandal-wood box up here?'."

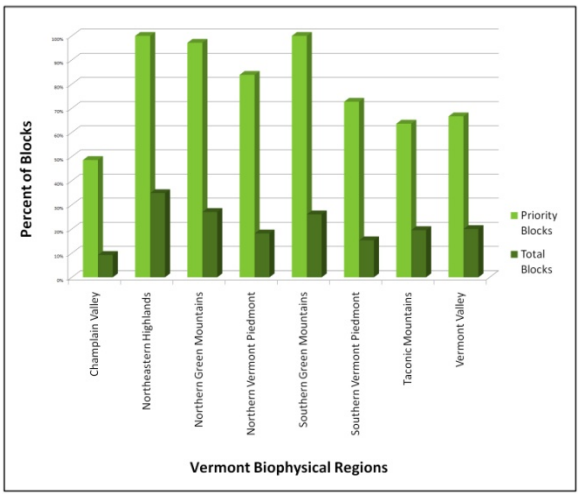
Identification
Generally smaller than Great Spangled and Aphrodite fritillaries. Upperside orange-brown, darker at base, with black outer; male has black scales on veins. Underside of hindwing with basal disk chocolate brown or purplish, hindwing spots always silvered. On live specimens, gray-blue eyes separate this from other greater fritillaries in Vermont.

Flight
One brood and flies from early June through the end of September. Scudder (1889) reported egg laying in Stowe, Vermont on 22 August. Extreme dates: 9 June 2004 in Townsend (S. Harris) and 30 September 2003 in Fayston (L. Ionson).



Distribution and Habitat
Scudder (1889) relayed reports that adults were abundant in Stowe and Lake Memphramegog in 1886, but then indicates that another observer called them "not common" on Mt. Mansfield. Found to be abundant across most of Vermont during VBS, except for the lower elevations in the Champlain Valley. Favored habitats include bogs, meadows, roadsides, ski slopes, and other open habitats, especially at higher elevations. Larval host plants are violets (Viola). Over 20 nectar plants reported during VBS, with milkweed (Asclepias) and Joe Pyed Weed most frequent.


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen
Present


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Subfamily: Admirals and Relatives (Limenitidinae)

Members of the Family Nymphalidae, this subfamily is found on most continents. Adults of most genera are characterized by their flap-and-glide flight. Caterpillar and chrysalis structure defines this group. There are just two species found in Vermont.

Vermont Species:

White Admiral (Limenitis arthemis arthemis)
Red-spotted Purple (Limenitis arthemis astyanax)
Viceroy (Limenitis archippus)

White Admiral *Limenitis arthemis arthemis* (Drury, 1773)
Red-Spotted Purple *Limenitis arthemis astyanax* (Fabricius, 1775)

Resident
Common

Conservation Status
Vermont S5
Global G5

North American Range
Alaska and subarctic Canada southeast of the Rocky Mountains to central Texas; east to New England and central Florida. Isolated populations in Arizona, New Mexico, and west Texas south into Mexico. The White Admiral usually occurs north of a line through north central New England, New York, Pennsylvania, Michigan, and Minnesota. The Red-spotted Purple is usually found south of this line. Much hybridization occurs where these forms meet.

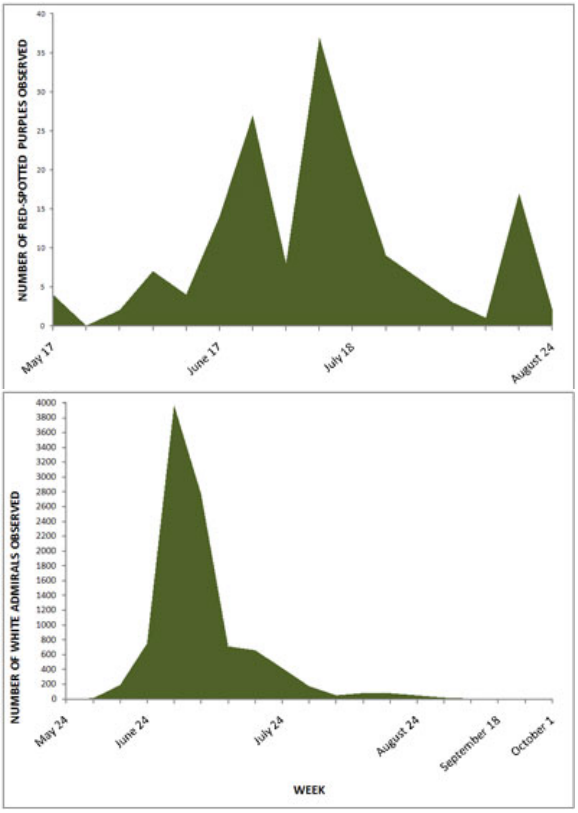
The white band is a recessive trait. It could potentially occur in any population. Both forms interbreed where their ranges overlap producing intergrades with partial bands. The Red-spotted Purple has a more southern range, and is a Batesian mimic of the Pipevine Swallowtail. Males perch 3 feet or more above the ground on trees and tall bushes and rarely patrol for females. Eggs are laid singly on tips of hostplant leaves; caterpillars eat leaves. Third instar larvae overwinter.

Identification

WHITE ADMIRAL: Upperside is black with broad white median bands on both wings; hindwing has a marginal row of blue dashes and a submarginal row of red dots. Underside is reddish-brown with white median bands as on the upperside. RED-SPOTTED PURPLE: Upperside is blue to blue-green with much iridescence on the outer part of the hindwing. Underside is dark brown. Forewing has 2 red-orange bars near the base of the leading edge; hindwing has 3 red-orange spots near the base and a submarginal row of red-orange spots. The two forms hybridize where their ranges overlap, creating various intermediate forms which may be found in or near the overlap zone.

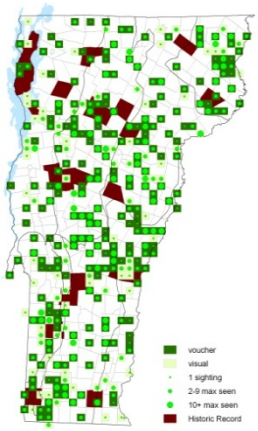
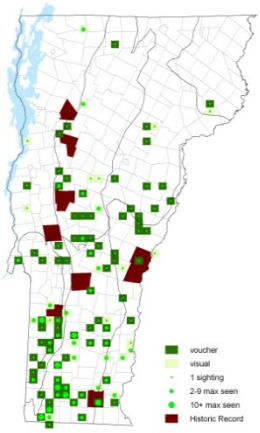
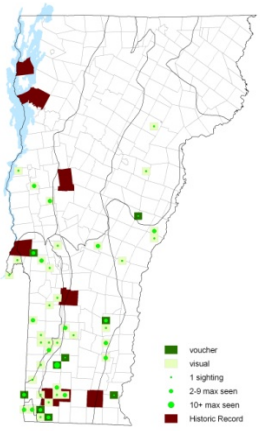
Flight

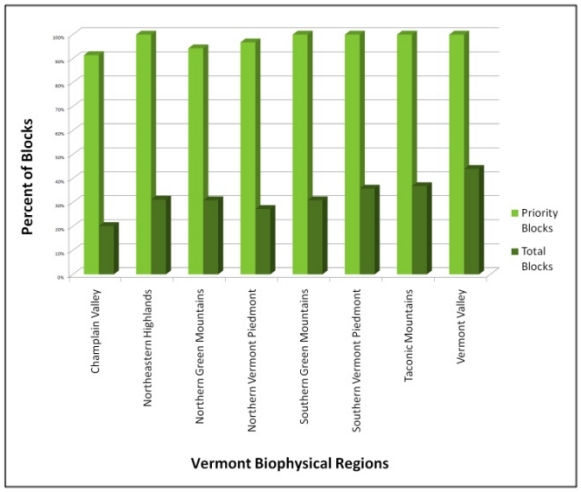
Flight periods of both forms overlap. Both appear to have a smaller second generation in August. White Admiral can be incredibly abundant in late June and early July. Extreme dates: Red-spotted Purple – 17 May 2003 in Weybridge (D. Peterson) and 25 August 2002 in Chester (M. Reiter). White Admiral – 24 May 2004 in Pownal (K. Hemeon) and 1 October 2002 in South Burlington.

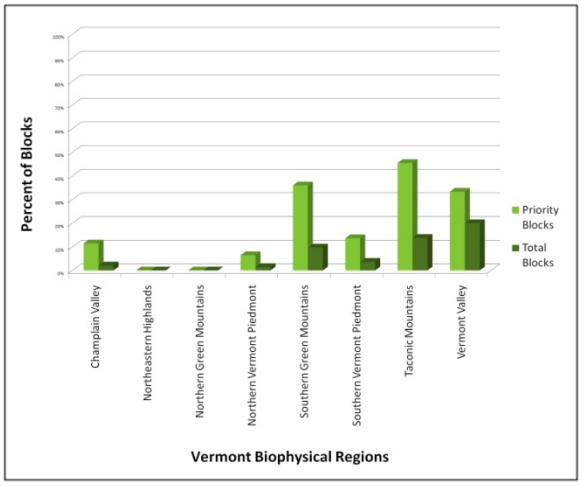


Distribution and Habitat

During VBS White Admirals were extremely abundant throughout the state. Red-spotted Purples were found primarily in southern half of Vermont. Hostplants are the leaves of many species of deciduous trees and shrubs. Adults feed from sap flows, rotting fruit, carrion, dung, and occasionally nectar from small white flowers. White Admirals also sip aphid honeydew.

White Admiral	Intergrade	Red-spotted Purple
		





Viceroy *Limenitis archippus* (Cramer, 1776)

This butterfly is a master of subtle deception. The egg mimics a gall on its hostplant. Larvae resemble bird droppings. Pupae also appear to be bird droppings or a dead leaf. Adults look strikingly like a Monarch or Queen. For many years the Viceroy was considered a palatable mimic of the Monarch. Recent research has shown it to be as noxious as the Monarch and often more so than the Queen, making it a Mullerian rather than a Batesian mimic.

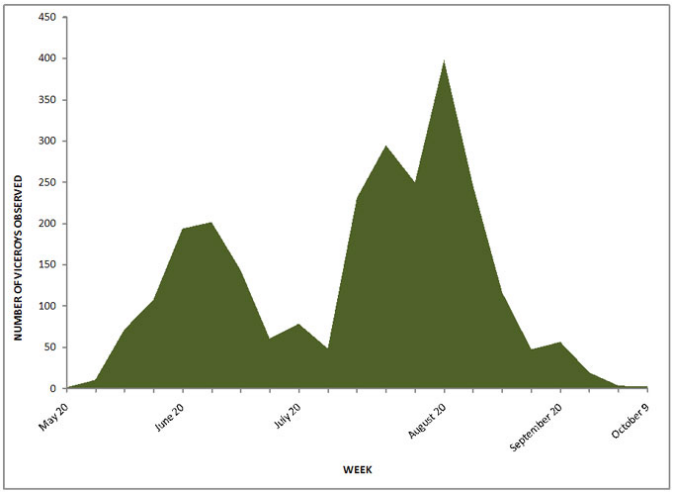
Resident
Common

Conservation Status
Vermont S5
Global G5

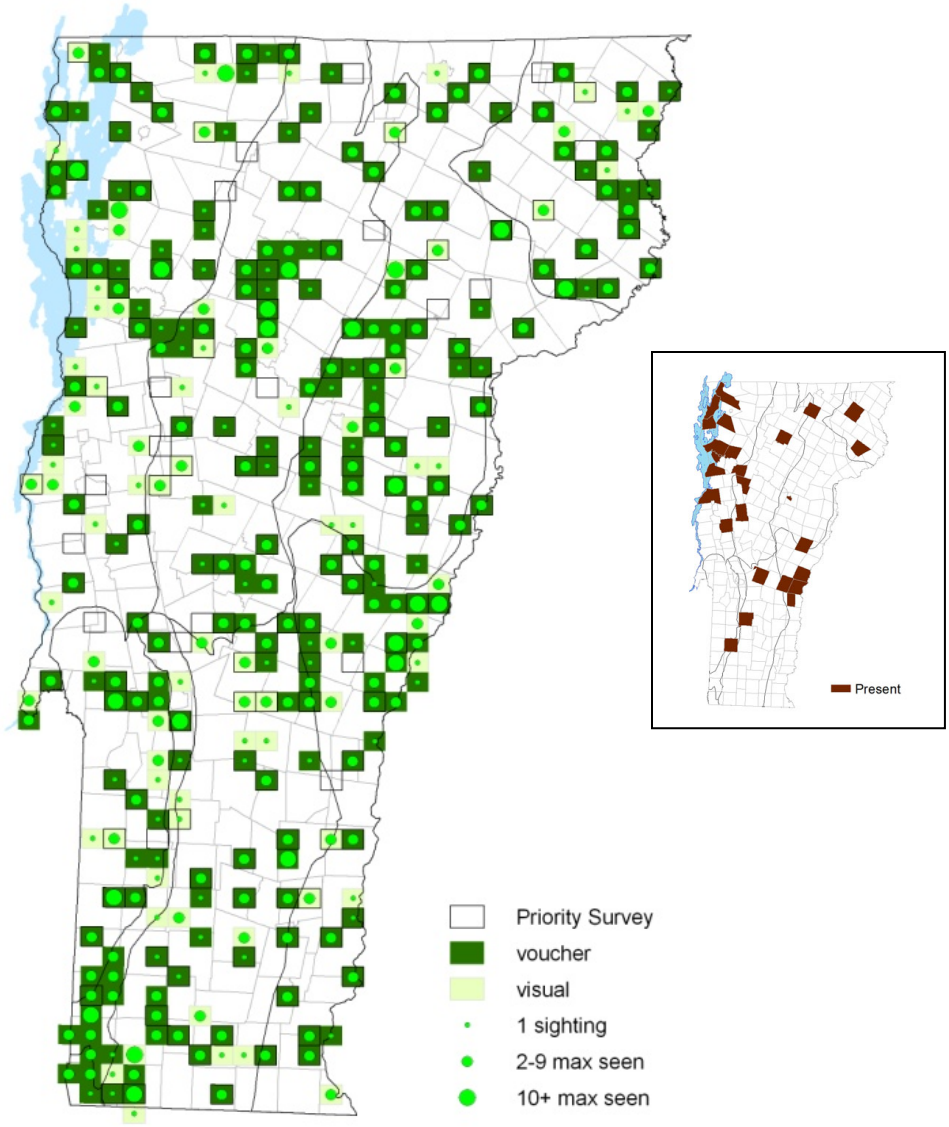
North American Range
Northwest Territories south along the eastern edges of the Cascade and Sierra Nevada mountains to central Mexico, east through all the eastern United States.

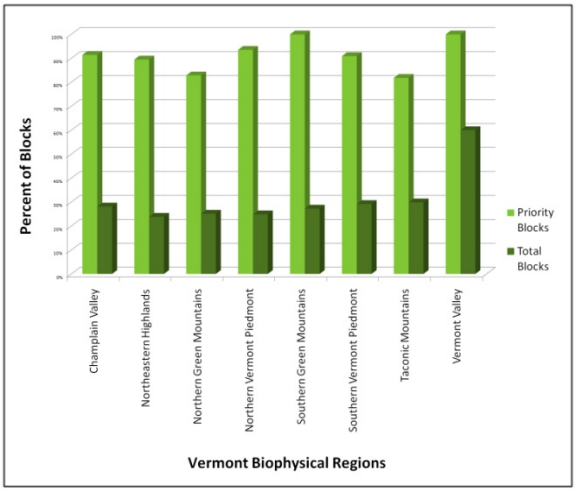
Identification
Smaller than a Monarch. Upperside is orange and black, resembling a, except the Viceroy has a black line across the hindwing and a single row of white dots in the black marginal band. Where Monarchs are rare in Florida, Georgia and the Southwest, Viceroys are more brown toned instead of orange and mimic the Queen.

Flight
Two broods during VBS. Extreme dates: 20 May 2004 in Bennington and Shaftsbury and 9 October 2006 in Bennington (K. Hemeon).



Distribution and Habitat
Found to be abundant across the entire state during VBS. They prefer moist, open or shrubby areas such as lake and swamp edges, willow thickets, valley bottoms, wet meadows and roadsides. Preferred hostplants are Pussy Willow (Salix discolor), Black Willow (Salix nigra), and cottonwoods (Populus). Early season adults feed on aphid honeydew, dung and carrion as there are few flowers from which to nectar. However, later in the season, Viceroys favor aster (Aster), goldenrod (Oligoneuron), and thistle (Carduus).


Present
Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Subfamily: Emperors (Apaturinae)

Emperors are members of the Family Nymphalidae. Found worldwide, they are a closely related group. A particularly diverse array of species occurs in eastern Asia. In North America, they are limited to the genus Asterocampa. There are two species found in Vermont

Vermont Species:

- Hackberry Emperor (Asterocampa celtis)
- Tawny Emperor (Asterocampa clyton)

Hackberry Emperor *Asterocampa celtis* (Boisduval & Leconte, 1835)

Resident
Rare

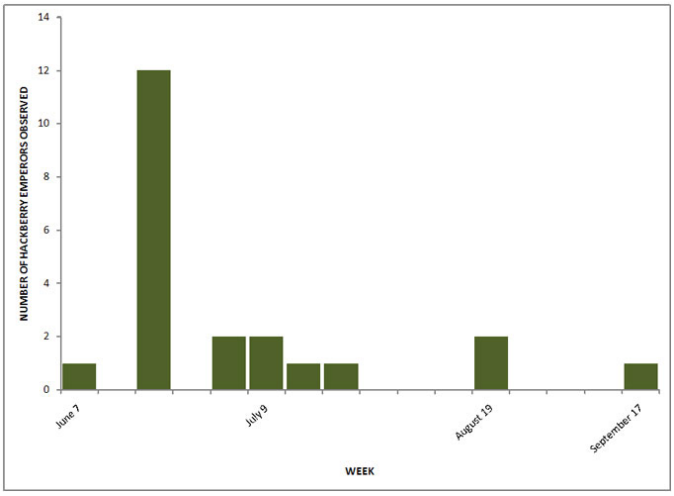
Conservation Status
Vermont S1S2, SGCN
Global G5

North American Range
Resident in most of the eastern United States, central plains states, and the southwest mountains; northern Mexico.

They fly in a fast and erratic manner, and rest upside down on tree trunks. Males perch on tall objects in sunny areas to watch for females. Some first brood larvae and all second brood larvae suspend feeding and overwinter in leaf litter at the base of hostplants. Caterpillars overwinter in groups inside dead rolled leaves. Third instar larvae, which turned brown prior to overwintering, become green as they resume feeding in the Hackberry trees.

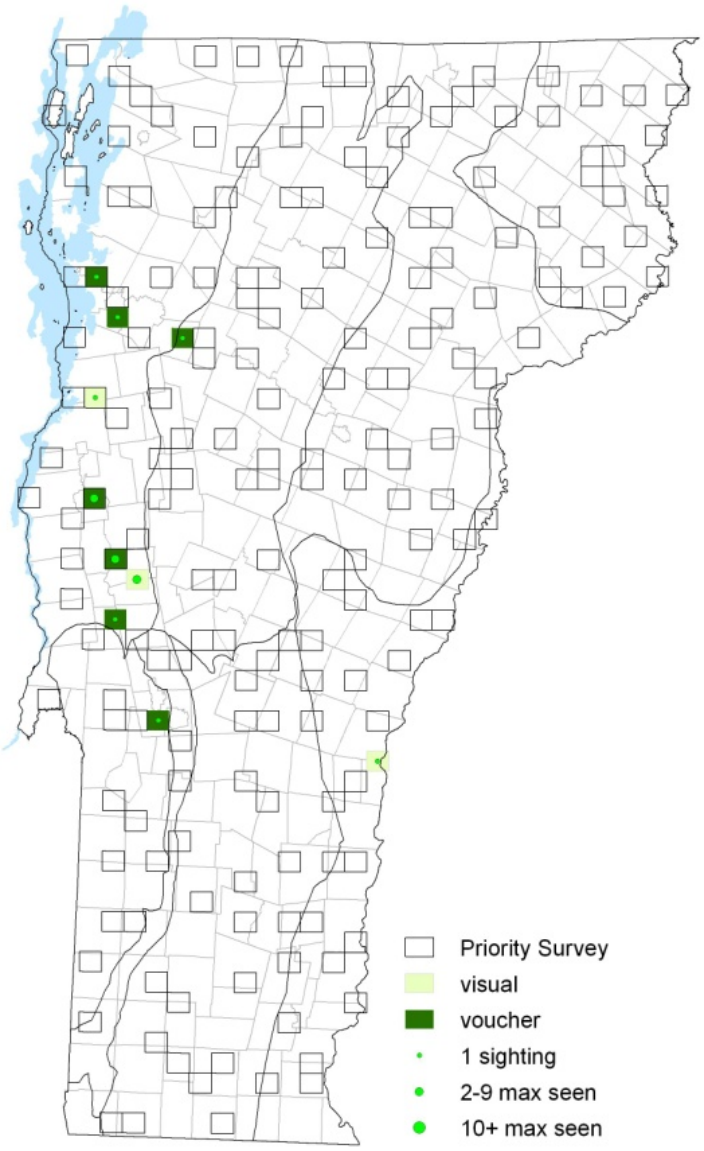
Identification
Extremely variable geographically. Upperside is reddish brown. Forewing has one submarginal eyespot, a jagged row of white spots, and the cell has one solid black bar and two separate black spots.

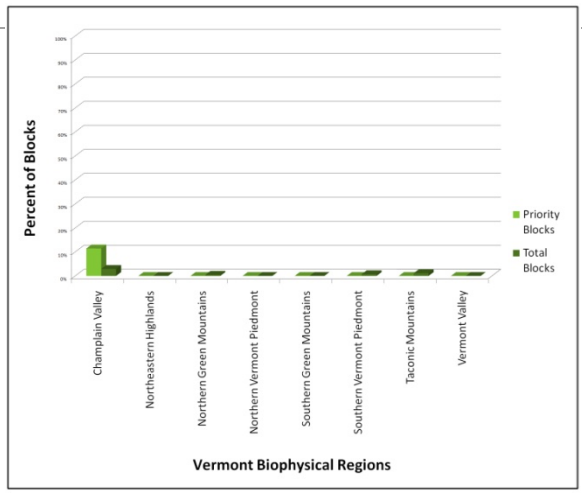
Flight
Two generations in many northern areas of its range. The limited records reported during VBS suggested an early flight in June and early July and a second generation in mid August into September. Extreme dates: 7 June 2003 in South Burlington (C. Gifferd) and 17 September 2006 in Vergennes (D. Rolnick).



Distribution and Habitat
First state record was found on 19 August 2002 in Burlington (C. Gifford). Given the amount of collecting in the Burlington area this came as somewhat of a surprise. It is found in the St. Lawrence River valley as far as Beauport, Quebec. There were 11 records reported during VBS with only one sighting outside of the Champlain Valley.

As its name implies, this butterfly's range is restricted to areas where Hackberry grows in Vermont; usually Floodplain Forests. However, Hackberry is sometimes planted in suburban areas (Burlington) where additional populations have been found. Adults feed on sap, mud, rotting fruit and excrement, which can sometimes take them outside of their regular Hackberry habitat. They are rarely seen nectaring. Larval host plant is American Hackberry (Celtis occidentalis).


Priority Survey
visual
voucher
1 sighting
2-9 max seen
10+ max seen


Percent of Blocks
Priority Blocks
Total Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Vermont Biophysical Regions

Tawny Emperor *Asterocampa clyton* (Boisduval & Leconte, 1835)

Resident
Rare

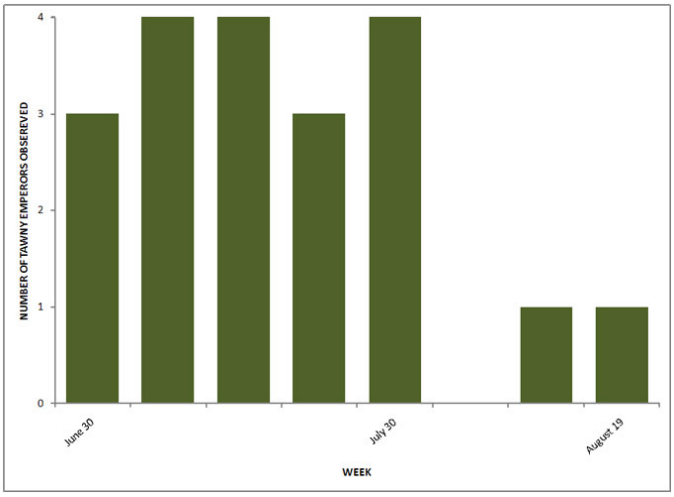
Conservation Status
Vermont S1S2, SGCN
Global G5

North American Range
North Dakota south to Texas, east to New England through most of the southeastern states. Isolated populations in Florida, southwest New Mexico, and southeastern Arizona.

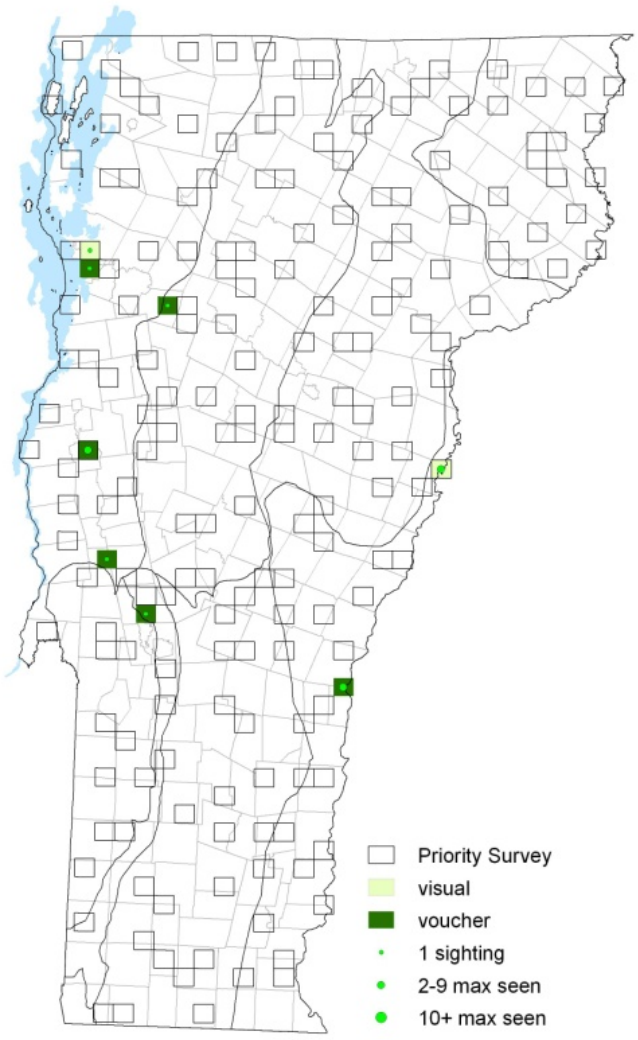
Though similar to the Hackberry Emperor physically, in range, habitat, and life history, there are two notable differences. First, it has been noted that Tawny Emperors fly earlier in the day than the Hackberry, thereby separating them temporally. Tawny larvae are gregarious and feed communally on the mature leaves of the Hackberry, whereas Hackberry larvae feed on the new leaf growth in smaller groups.

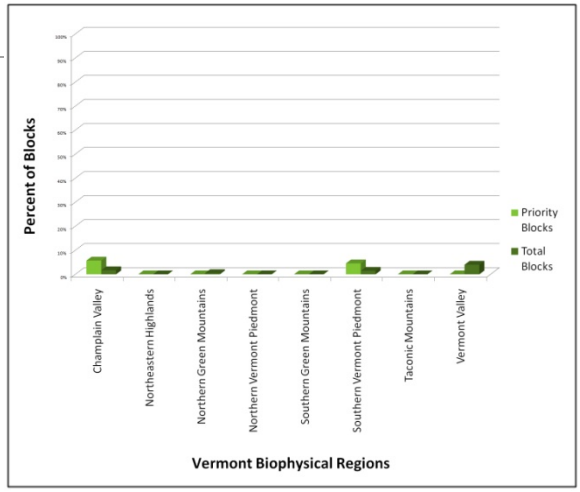
Identification
A medium sized butterfly and geographically variable. Upperside is chestnut brown; forewing with two brown bars in the cell, no white spots, and no eyespots near the outer margin. Hindwing uppersides are orange with black submarginal spots in one form, and all black in the other form.

Flight
Apparently one brood in Vermont from late June though August. Extreme dates: 30 June 2004 in Brandon (C. Darmstadt) and 19 August 2003 in Richmond (T. Fiore).



Distribution and Habitat
There are no historic records for the Tawny Emperor as it was first verified in Vermont on 20 July 2002 in Colchester (L. Berrin) during the survey. Sparsely scattered through lower Champlain Valley and Connecticut River Valley and reliant on the presence of Hackberry (Celtis occidentalis), the Tawny Emperor prefers densely wooded riparian areas in Vermont, but also reported from suburban plantings in Burlington. Adults almost never visit flowers and feed on tree sap, rotting fruit, dung and carrion. Larval host plant is the Hackberry in Vermont.


Priority Survey
visual
voucher
1 sighting
2-9 max seen
10+ max seen


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Subfamily: True Brushfoots (Nymphalinae)

Brushfoots are the most prevalent members of the Family Nymphalinae. Distributed worldwide, it has changed many times over the past decades from encompassing about half of the 6,000 species of Nymphalidae to its current, more restricted list of about 495 species. There are over 70 species recorded in North America and 17 reported from Vermont.

Adults of North American species are predominantly orange, brown, and black. Migration varies widely; some strong migrants are found in the lady butterflies, tortoiseshells, and anglewings, while other species are local in occurrence. Most species limit their host plants to a few species, but the Painted Lady has one of the most diverse of all butterflies. Brushfoots overwinter as young caterpillars or hibernating adults.

Vermont Species:

American Lady (Vanessa virginiensis)
Painted Lady (Vanessa cardui)
Red Admiral (Vanessa atalanta)
Milbert's Tortoiseshell (Aglais milberti)
Compton Tortoiseshell (Nymphalis l-album)
California Tortoiseshell (Nymphalis californica)
Mourning Cloak (Nymphalis antiopa)
Question Mark (Polygonia interrogationis)
Eastern Comma (Polygonia comma)
Gray Comma (Polygonia progne)
Green Comma (Polygonia faunus)
Northern Buckeye (Junonia coenia)
Baltimore Checkerspot (Euphydryas phaeton)
Silvery Checkerspot (Chlosyne nycteis)
Harris' Checkerspot (Chlosyne harrisii)
Pearl Crescent (Phyciodes tharos)
Northern Crescent (Phyciodes cocyta)

American Lady *Vanessa virginiensis* (Drury, 1773)

Some lepidopterists have noted that the American Lady does not clean its antennae with its legs, as do many other species. Males are territorial. They perch on hilltops or vegetation in the afternoon waiting for females. Mating occurs during the afternoon and evening. Females lay eggs singly on the top of hostplant leaves. Caterpillars are solitary living and feeding in a nest of leaves tied with silk. Some adults overwinter and emerge in early spring, while others overwinter as pupae emerging in late spring.

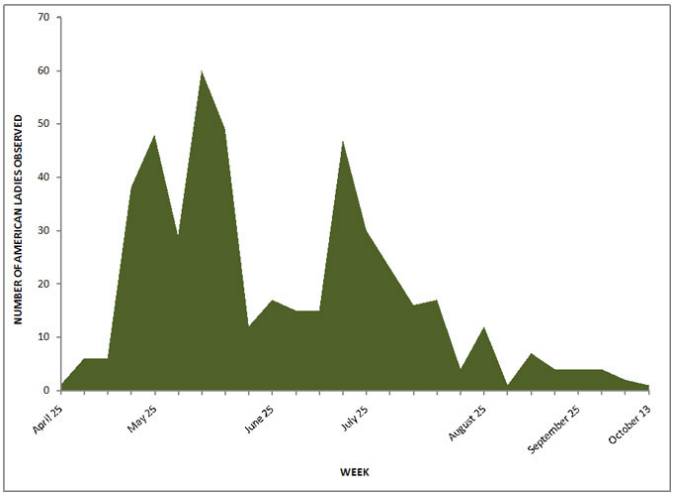
Resident
Common

Conservation Status
Vermont S5
Global G5

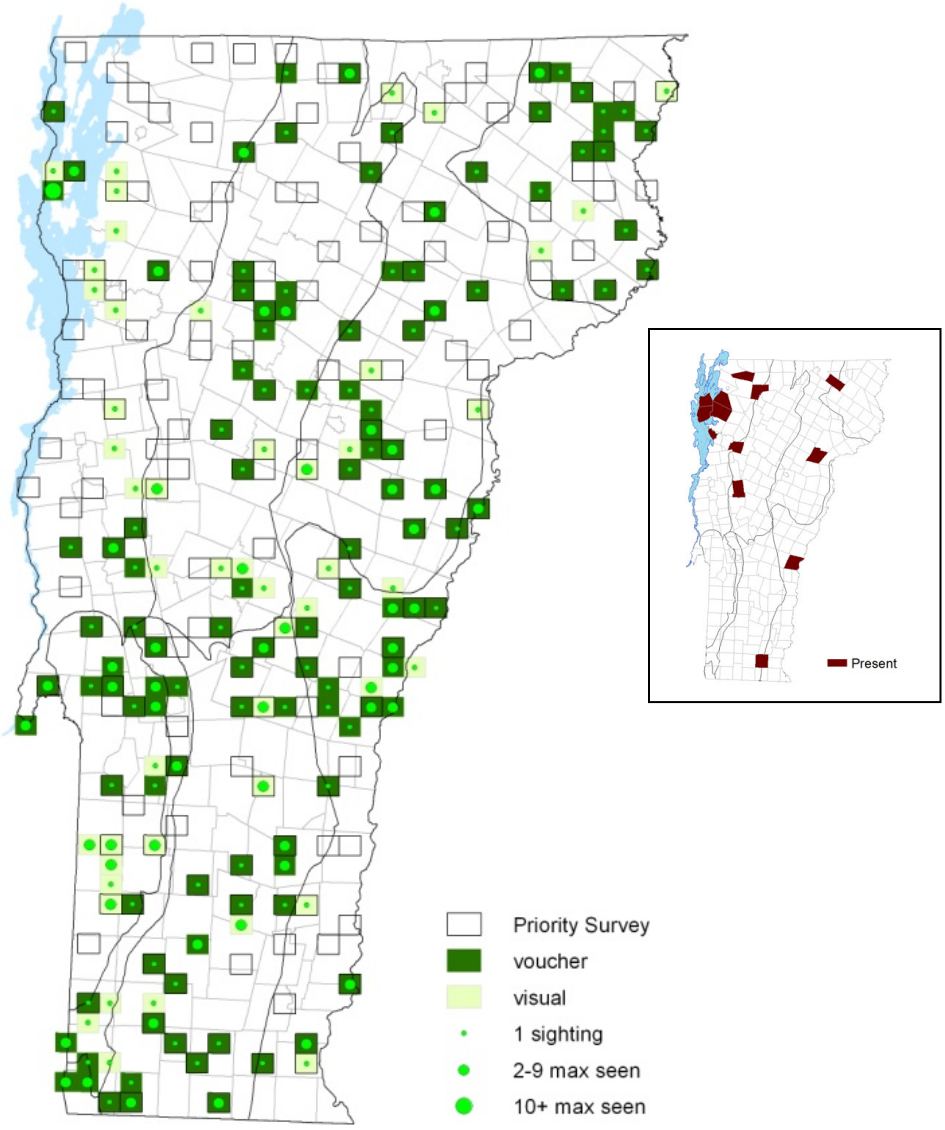
North American Range
Resident in the southern United States, Mexico, and Central America south to Colombia. Migrates to and temporarily colonizes the northern United States, southern Canada, the West Indies, and Europe. Rare stray to Newfoundland and Labrador.

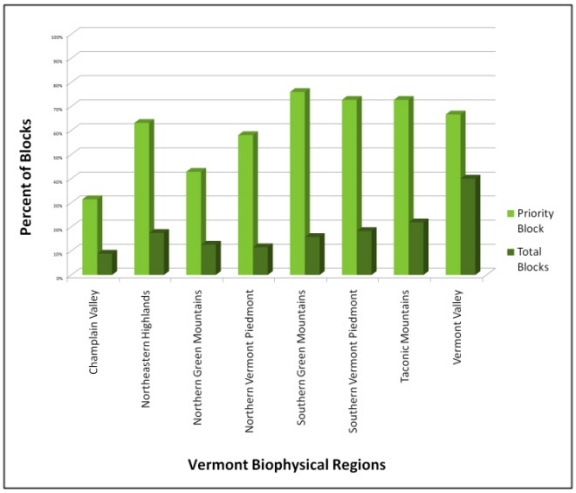
Identification
Upperside with uneven brown, yellow and orange pattern. Forewing with a black apical patch, a small white spot in the orange field below the patch, and a white bar at the leading edge fo the forewing. Underside of hindwing with two large eyespots. Winter form is smaller and paler, summer form larger with brighter coloration.

Flight
There were two overlapping generations in Vermont during VBS with 2003, 2004 and 2007 having large flights compared to other years. Extreme dates: 25 April 2007 in Bristol (B. Collins), and 13 October 2004 in Grand Isle (D. Hoag).



Distribution and Habitat
The American Lady was found throughout Vermont except less common in the Champlain Valley. Caterpillars reported to feed on Sweet Everlasting (Gnaphalium obtusifolium) and Pussytoes (Antennaria) during VBS, also known to feed many others. Adults nectar a wide variety of plants, with 21 species reported during the survey.


Present
Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Block
Total Blocks
Vermont Biophysical Regions

Painted Lady *Vanessa cardui* (Linnaeus, 1758)

Also known as the “cosmopolitan”, this species is an incredible disperser and one of the most widespread butterflies in the world. Occasional population explosions in Mexico can cause massive northward migrations in the spring. The Painted Lady is also known as the “Thistle Butterfly” because of the caterpillars' food preference. The Painted Lady is often associated with the American Lady with whom it shares a number of traits including habitat and a generalist lifestyle. It is unable to survive cold temperatures and must recolonize Vermont each year.

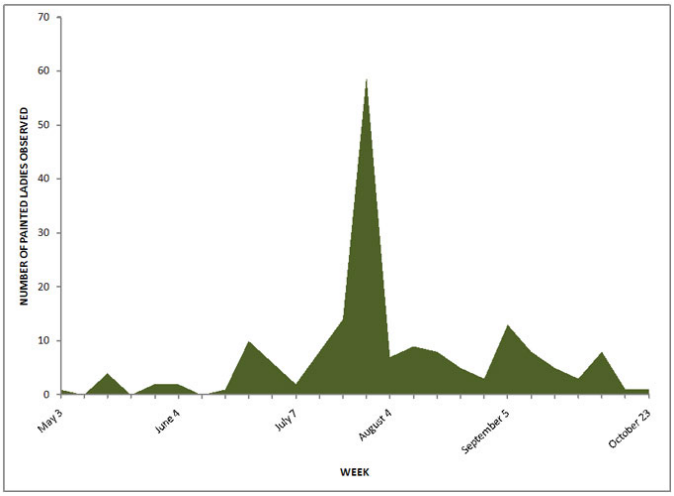
Migrant - Breeder
Common

Conservation Status
Vermont S5
Global G5

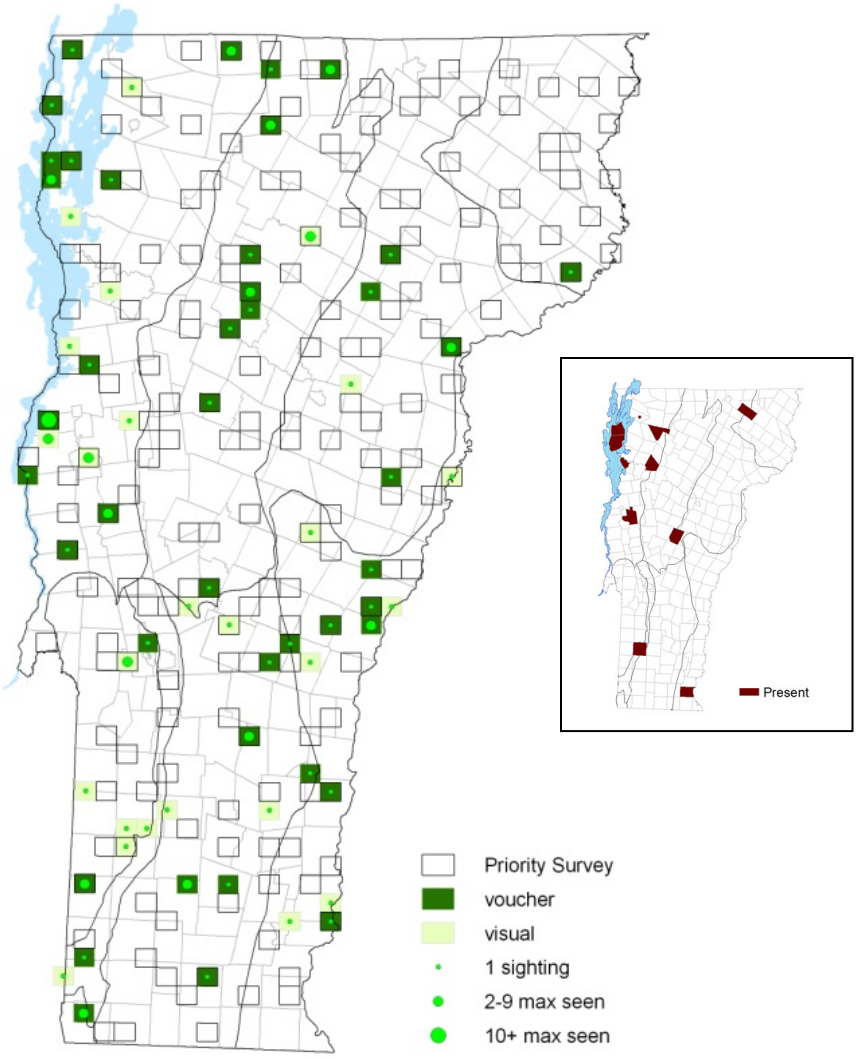
North American Range
On all continents except Australia and Antarctica. From the deserts of northern Mexico, the Painted Lady migrates and temporarily colonizes the United States and Canada south of the Arctic.

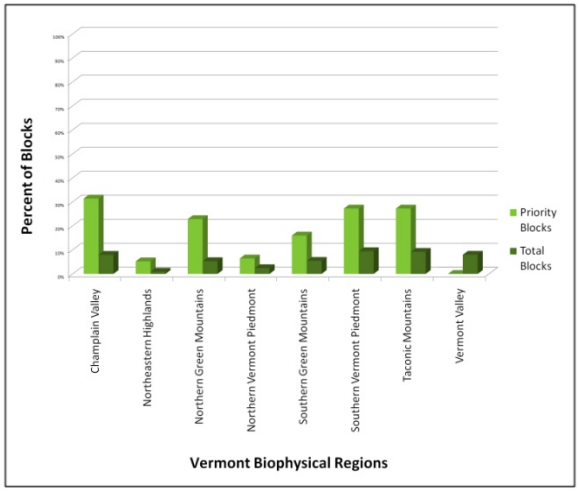
Identification
Upperside is orange-brown with darker wing bases; forewing with black apex patch and white bar on leading edge; hindwing submarginal row of five small black spots sometimes has blue scales. Underside has a black, brown, and gray pattern with four small submarginal eyespots.

Flight
It occurs cyclically throughout New England. Scudder (1889) recorded its irregular appearance in New England from 1878 to 1887: abundant in 1878, 1884, and 1886 and very scarce other years. During VBS larger flights occurred in 2003 (27% of all records) and 2005 (65%) with very few records reported in other years. Because of the irregular nature of this species, the onset of flight dates varies annually, but they fly until frost. Extreme dates: 3 May 2003 in Corinth (J. Eilertsen), 23 October 2006 in Rupert (D. Rolnick), and 27 October 1970 in Burlington (W. Roth).



Distribution and Habitat
During VBS recorded throughout Vermont except for the Northeast Highlands. Habitats are everything from deserts and dry, open prairies to woodlands, costal wetlands, urban areas and gardens. More than 100 hostplants have been noted; favorites include thistles (Cirsium), hollyhock (Alcea) (recorded during VBS in Wilmington by G. Look), and various legumes (Fabaceae). Adults prefer nectar from composites 3-6 feet high, especially thistles; also Aster (Symphyotrichum), Red Clover (Trifolium pratense) and milkweeds (Asclepias).


Present
Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Red Admiral *Vanessa atalanta* (Linnaeus, 1758)

The North American subspecies is Vanessa atalanta rubria (Fruhstorfer, 1909). The original common name in English was "Red Admirable". Fast, erratic fliers, these butterflies are known to engage in periodic mass migrations north in the spring and early summer, but the huge migrations are often followed by population crashes. Males perch on ridge and hill tops in the afternoon to wait for females, who lay eggs singly on the tops of hostplant leaves. Young caterpillars live within a shelter of folded leaves; older caterpillars make a nest of leaves tied together with silk. Because they are not tolerant of cold, most of North America must be recolonized each year from the south.

Resident
Common

Conservation Status
Vermont S5
Global G5

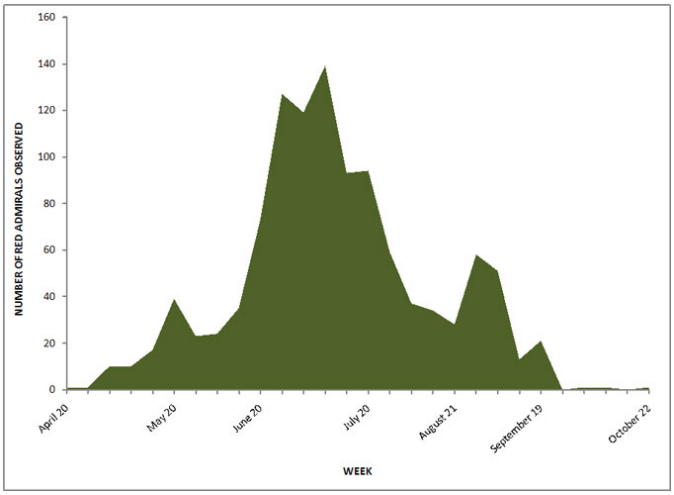
North American Range
Guatemala north through Mexico and the United States to northern Canada; Hawaii, some Caribbean Islands, New Zealand, Europe, Northern Africa, Asia.

Identification

Upperside is black with white spots near the apex; forewing with red median band, hindwing with red marginal band. The winter form is smaller and duller, summer form larger and brighter with an interrupted forewing band.

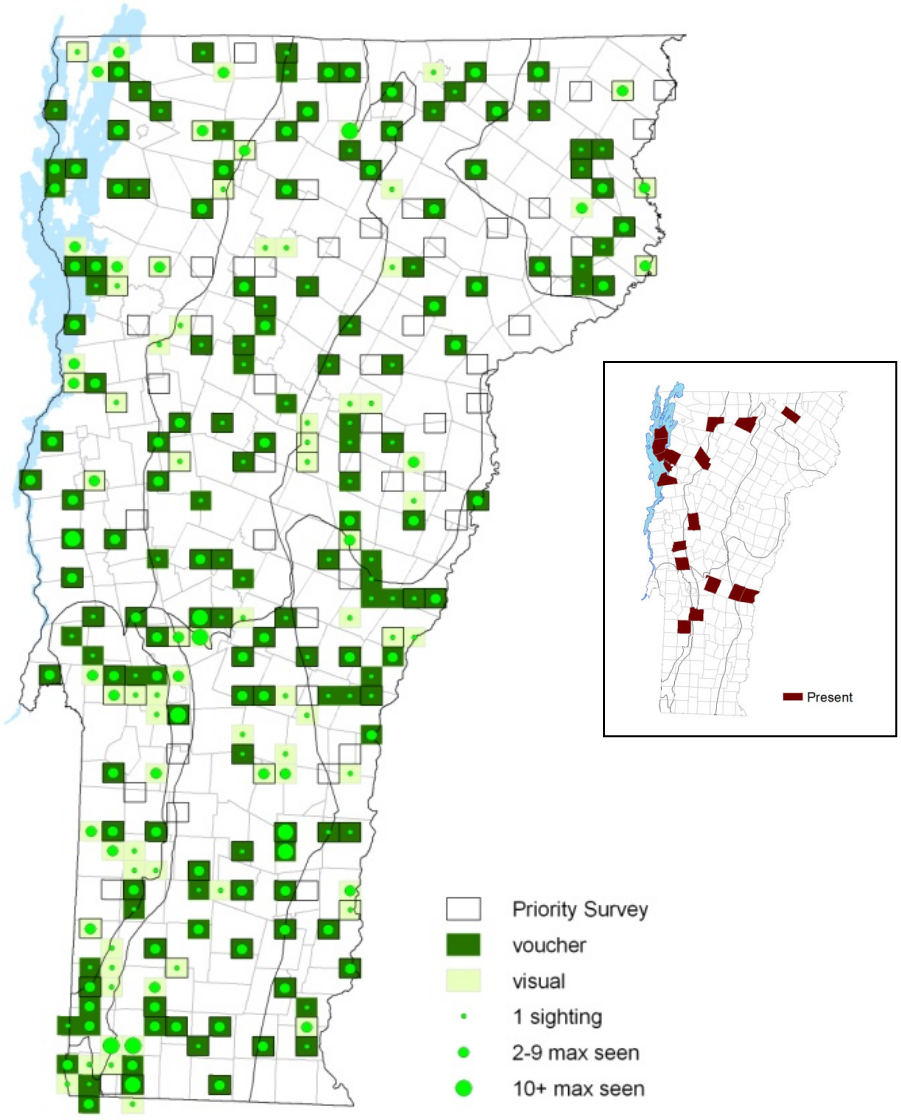
Flight

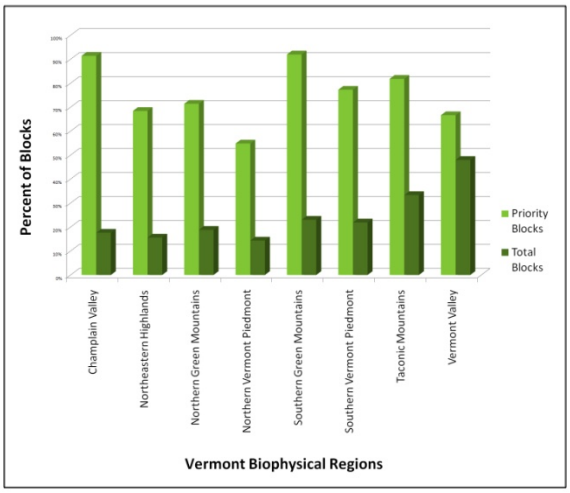
In late April migrant adults from southern populations (approximately North Carolina southward) first arrived in Vermont. Adults from the spring brood begin to appear in late June producing a third generation of adult butterflies that flies from late August into October. At least some individuals from this fall generation probably migrate south. Extreme dates: 20 April 2002 in Plainfield (B. Pfeiffer), 20 April 2003 in Berlin (A. Shambaugh), 27 October 1996 in Woodstock (K.P. McFarland), 19 November 1998 in Grand Isle (A. Horvath).



Distribution and Habitat

Because it is a migratory species, its annual abundance in the state fluctuated widely during VBS. Two years were particularly high, with 2003 reporting 23% and 2007 with 57% of the 1,550 Red Admirals reported for VBS. Over the entire survey period, observers reported them from across Vermont. Larval hostplants are in the nettle family and include Stinging Nettle (Urtica dioica), Wood Nettle (Laportea canadensis), and False Nettle (Boehmeria cylindrical). Adults will nectar, but prefer tree sap, fermenting fruit and bird droppings.


Present
Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Milbert's Tortoiseshell *Aglais milberti* (Godart, 1819)

Resident
Common

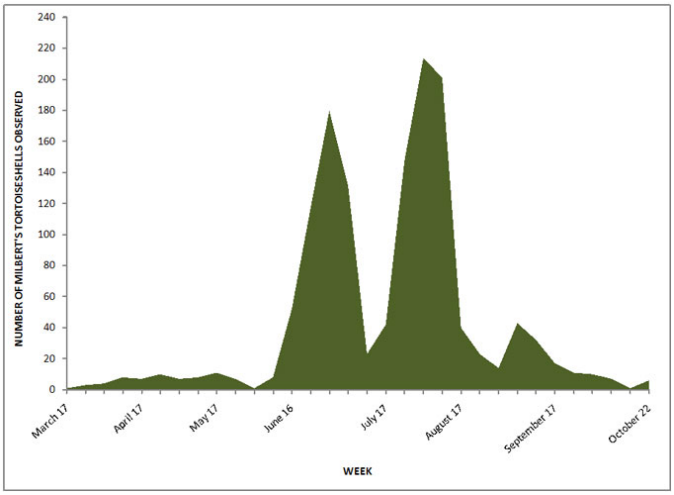
Conservation Status
Vermont S5
Global G5

North American Range
Boreal North America south of the taiga. Southern Alaska south to California, Nevada, and New Mexico; east to Newfoundland and West Virginia.

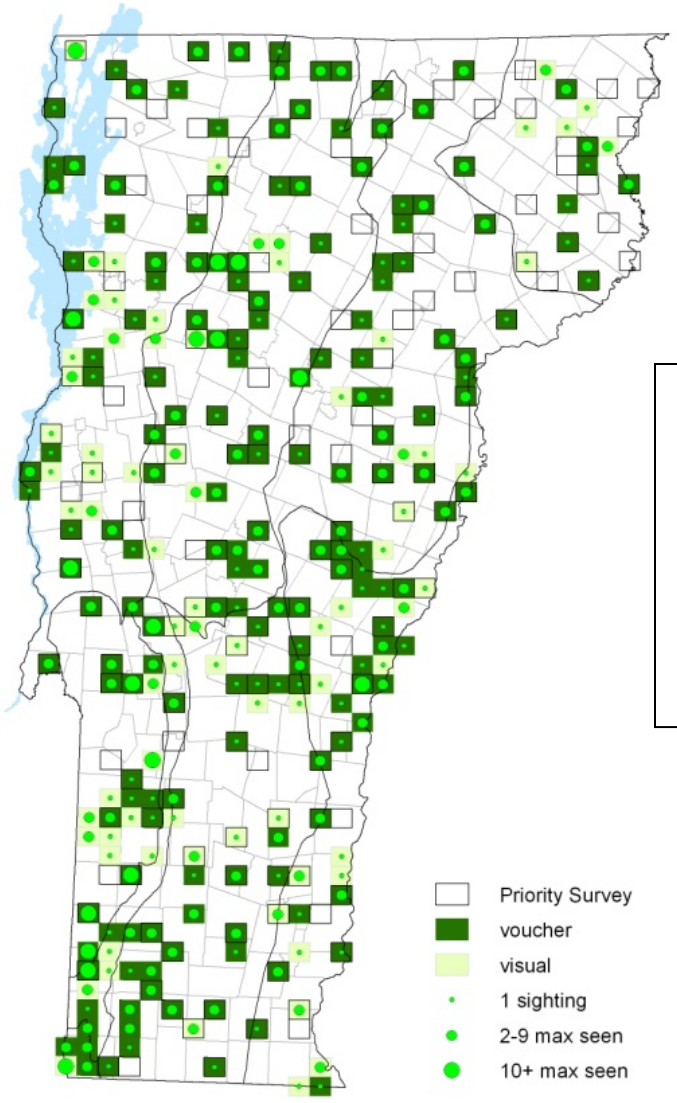
With a cryptically colored ventral surface and a colorful orange dorsal wing coloration, the Milbert's Tortoiseshell is a relatively common sight during northeastern summers. It was selected to perch on the Vermont Butterfly Survey logo in 2002. They are fast and lively fliers and actively seek nectar, but periodically feed on dung and carrion. In the afternoon, males perch on hillsides, banks, or other prominent places to watch for females. Eggs are laid in large batches of up to 900 on the underside of hostplant leaves. Young caterpillars feed together in a web, while older larvae feed alone and make shelters of folded leaves tied with silk. Adults overwinter, sometimes in groups.

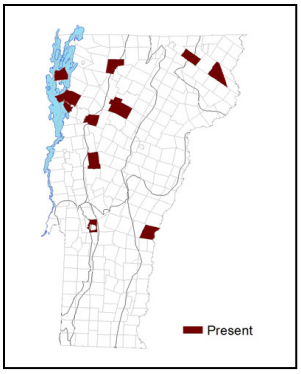
Identification
Medium to small butterfly. Forewing tip squared. Upperside is black with a wide orange submarginal band which grades to yellow at the inner edge of band. Narrow black marginal border on both wings; the hindwing border may contain some blue spots.

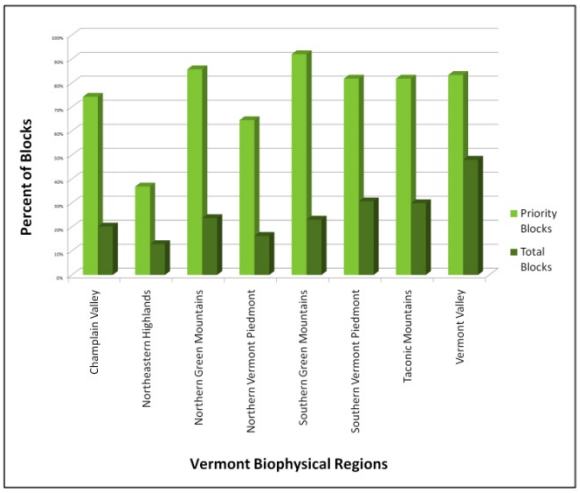
Flight
Overwintering adults begin to emerge in mid March. Apparently two broods with summer brood in June and July and and fall brood beginning in August. Extreme dates: 26 March 2004 in Richford (P. Lambert) and 23 October 2002 in Montpelier (C. Darmstadt).



Distribution and Habitat
During VBS found to be abundant across Vermont. They are boreal by nature and prefer damp areas near woodlands such as wet meadows or marshes. They can sometimes be found in urban or disturbed areas as well. During VBS larvae found on Stinging Nettle (Urtica dioica), also use reported elsewhere on Tall Nettle (Urtica procera). Reported to nectar on over 25 plants during VBS.


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen


Present


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Compton Tortoiseshell *Nymphalis i-album* (Esper, 1781)

A holarctic species, Compton Tortoiseshell (often mistakenly called Compton's) has one of the longest life spans of any butterfly in Vermont, about 10 months. Overwintering adults often huddle together in large aggregations to survive the cold. This butterfly has a rapid, dashing flight, but it occasionally alights on observers. Males perch to await females. Eggs are laid in clumps on hostplants, and caterpillars feed communally.

Resident
Common

Conservation Status
Vermont S5
Global G5

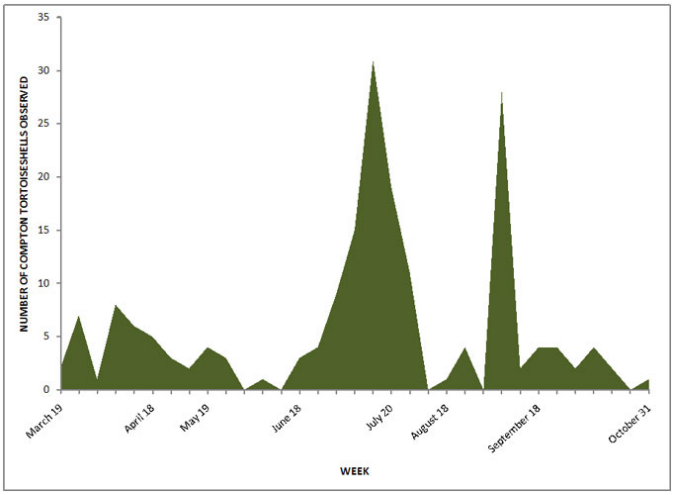
North American Range
Southeast Alaska and Canada south in the mountains to Montana and Wyoming; east across southern Canada and the northern United States to New England; south to North Carolina and Missouri. Rare migrants to Newfoundland, Nebraska, and Florida. Also found in temperate Eurasia.

Identification

Upperside is orange-brown with darker wing bases and black spots; a single white spot on leading edge of each wing. Underside is mottled gray and brown, with dark bases and borders; hindwing with small white V at outer end of cell.

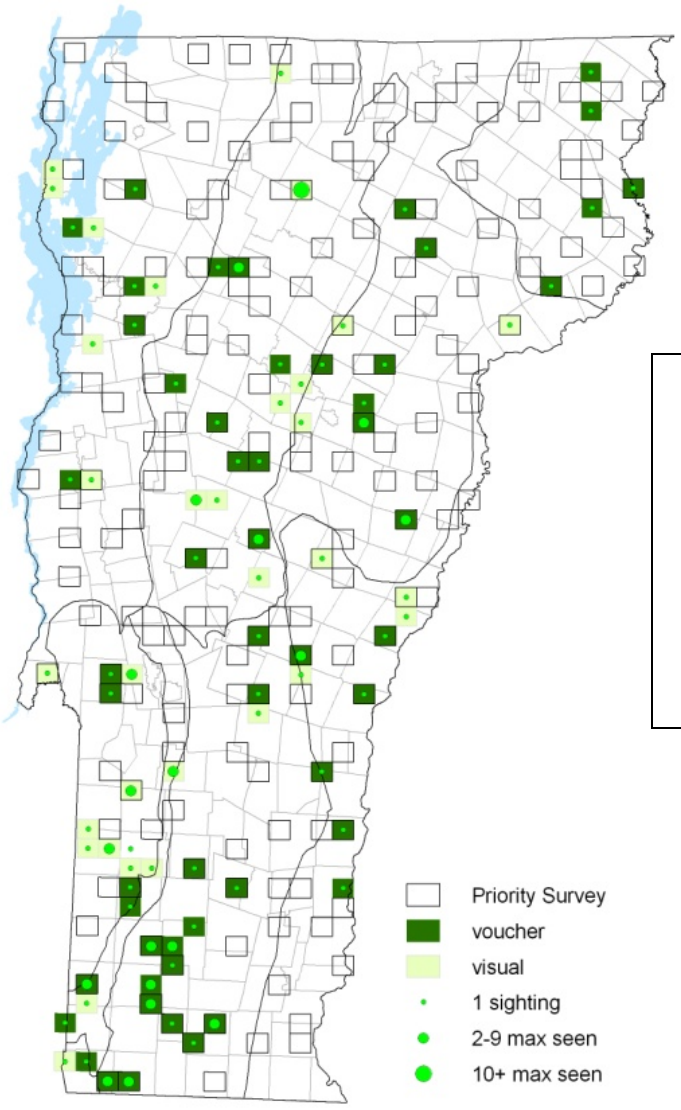
Flight

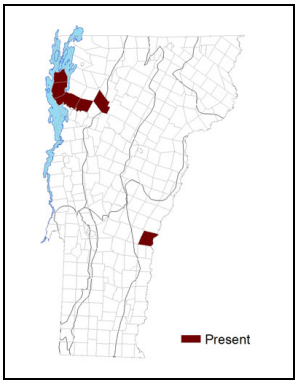
Overwintering adults emerge in spring. Summer generation begins to fly in late June and then aestivates until fall and finally overwintering. Some may migrate south. Extreme dates: 19 March 2005 in Rupert (M. Pfeiffer) and 31 October 2006 in Rupert (D. Rolnick).

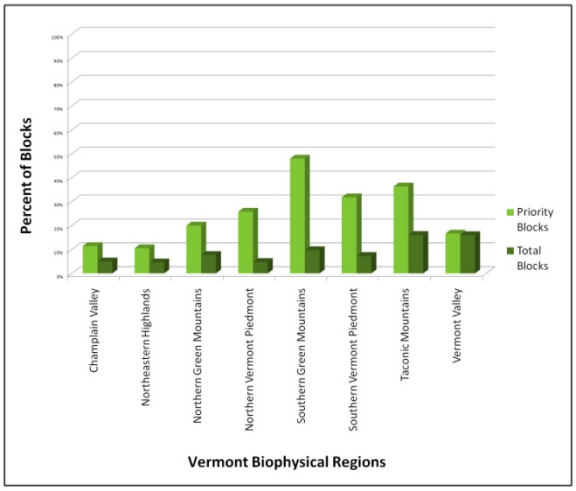


Distribution and Habitat

The Compton Tortoiseshell is found throughout Vermont, though not in abundance. They are northern climate specialists and most often make their homes in moist forests, either conifer or deciduous. They are usually seen on trails and roadsides. Caterpillars have various host plants including Cottonwood (Populus), Willows (Salix), and Gray Birch (Betula populifolia). It has been noted that adults will nectar from Willows, but more often prefer to feed on tree sap, rotting fruit, or dung.


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen


Present


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

California Tortoiseshell *Nymphalis californica* (Boisduval, 1852)

Known to stray out of range in some years. Only one record for Vermont found in 1983 by P. Opler. Reported as a vagrant in Michigan, Pennsylvania, western New York, and Vermont after periodic population explosions in Mexico.

Identification
Upperside is orange-brown with large black spots and dark wing borders. Underside looks like a dead leaf and is dark mottled brown with darker wing bases; hindwing does not have a centered silver spot.

Vagrant
Extremely rare

Conservation Status
Vermont SNA
Global G5

North American Range
British Columbia south along the Pacific Coast to Baja California, east to Montana, Wyoming, Colorado, and New Mexico. Rare migrants out of range.

Mourning Cloak *Nymphalis antiopa* (Linnaeus, 1758)

Resident
Common

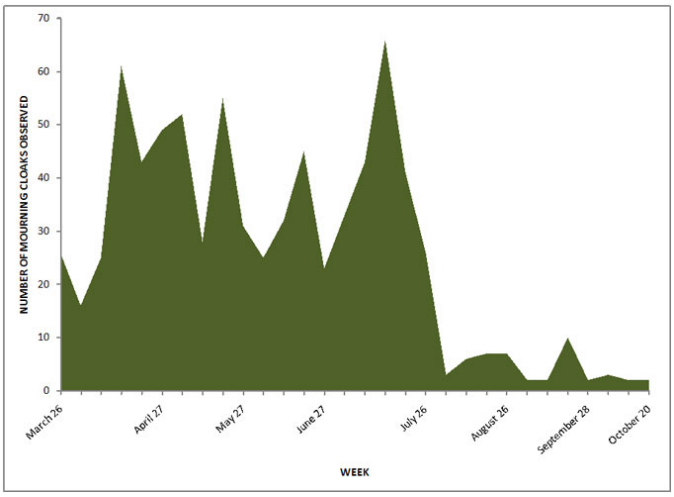
Conservation Status
Vermont S5
Global G5

North American Range
All of North America south of the tundra to central Mexico; rarely in the Gulf States and peninsular Florida. Also native to temperate Eurasia.

Though there are other butterflies that appear on early spring days, there are none that hail the coming of warm weather quite like the Mourning Cloak. Overwintering adults crawl out of crevices on the first sunny days to feed on oozing sap. To survive the cold, they produce glycerols in their blood to prevent formation of ice in their body tissues. On cold spring days, they shiver to raise their internal temperature to as much as 15 F above ambient air temperature. Overwintered adults mate in the spring, and the males perch in sunny openings during the afternoon to wait for receptive females. Eggs are laid in groups circling the twigs of the hostplant. Caterpillars live in a communal web and feed together on young leaves, then pupate and emerge as adults in June or July. After feeding briefly, the adults aestivate until fall, when they re-emerge to feed and fatten for the winter. Some adults migrate south in the fall.

Identification

Short projections on both wings, borders irregular. Upperside is purple-black with a wide, bright yellow border on outer margins, and a row of iridescent blue spots at the inner edge of the border.

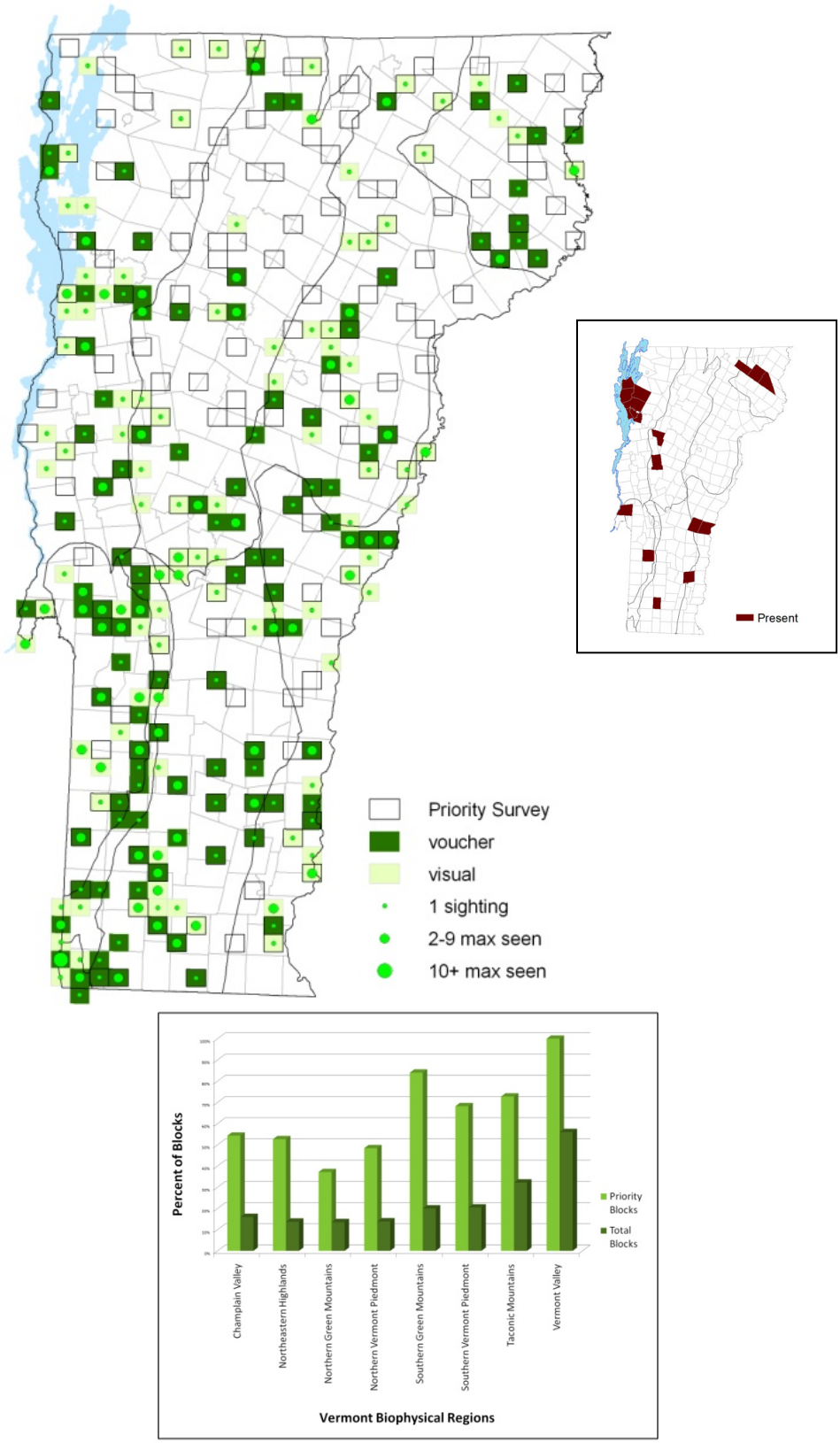


Flight

One generation. Highest numbers in July probably correspond with the mating of the overwintered adults in spring and the emergence of their brood, followed by late summer aestivation and dramatic decline in records. Apparent migration movements reported in the Champlain Valley on 12 October 2003 (S. Riley). Extreme dates: 26 March 2004 in Rupert (D. Rolnick) and 20 October 2007 in Pownal (K. Hemeon).

Distribution and Habitat

Scudder (1889) wrote that, "It is found in nearly equal abundance throughout all parts of New England…and is nearly everywhere so numerous as to become positively injurious on account of the damage done to some of our choicest ornamental trees." During VBS it was recorded throughout the state, with perhaps slightly less frequency in the northern areas. They are adaptable generalists and will choose habitats wherever their hostplants are found. Hostplants are variable and include willows (Salix), elm (Ulmus), aspen (Populus), birch (Betula), hackberry (Celtis) and others more infrequently. Larvae were found on cherry (Prunus) during VBS (J. Lam). Older caterpillars wander and may be found on plants that they do not eat.


Present
Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen
Percent of Blocks
Priority Blocks
Total Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Vermont Biophysical Regions

Question Mark *Polygonia interrogationis* (Fabricius, 1798)

A large anglewing of temperate, deciduous woodlands, its common name reflects the silver punctuation mark on the ventral hindwing. They are migrants with large flights along the coast and a more diffuse spring migration northward. Some individuals can overwinter in north.
Adults bask in the morning. Adults feed at decaying fruit, sap, carrion, mud, sap and sometimes nectar. Males very territorial and will chase after moving objects.

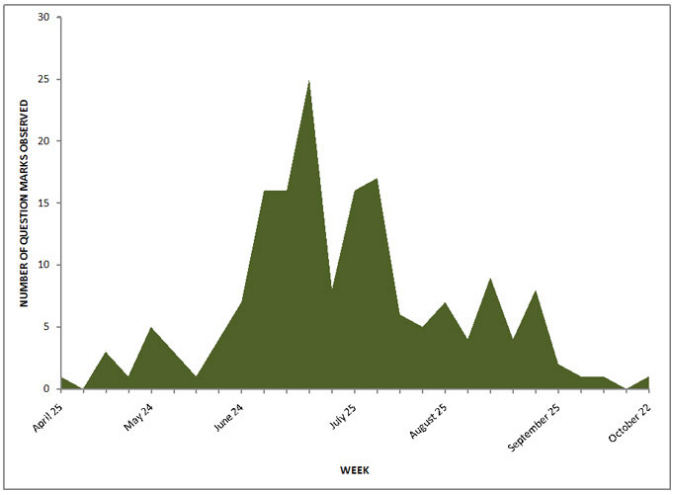
Resident
Common

Conservation Status
Vermont S5
Global G5

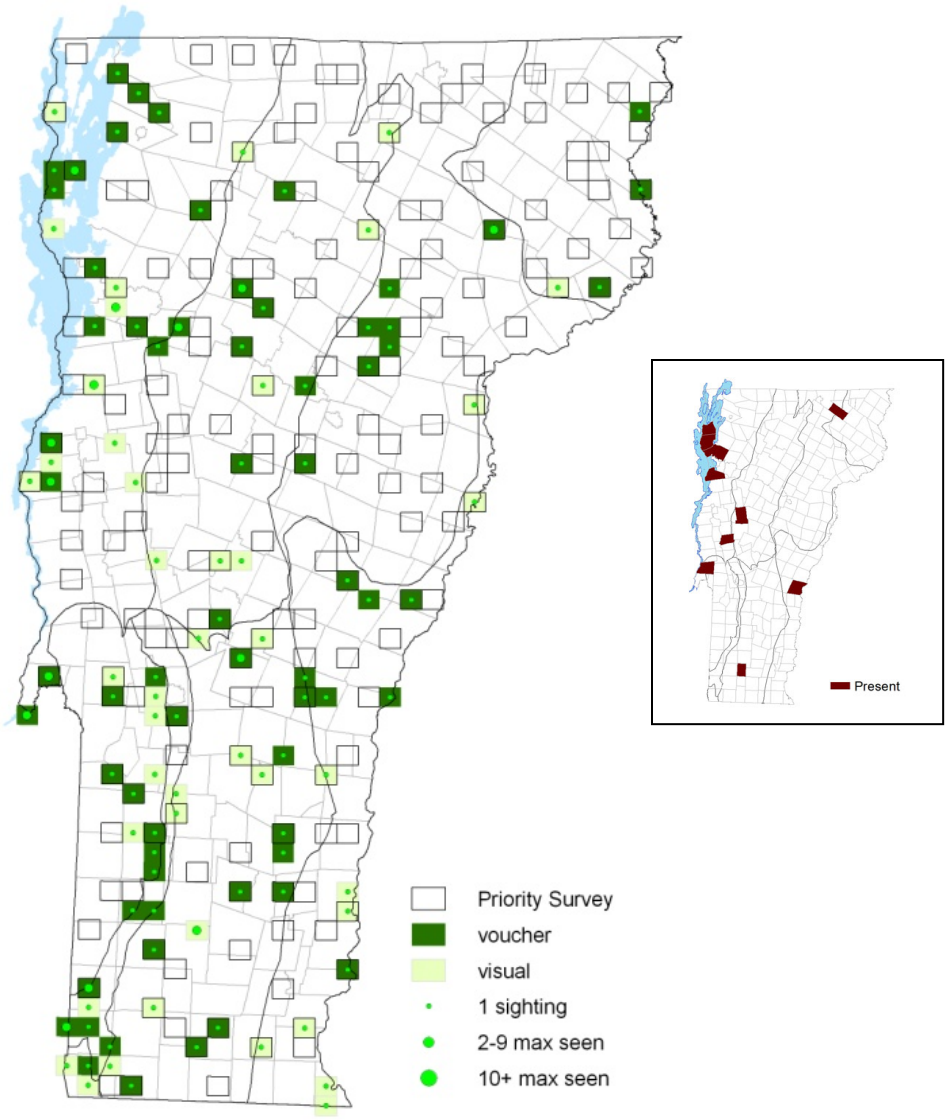
North American Range
Southern Canada and all of the eastern United States except peninsular Florida, west to the eastern edge of the Rocky Mountains, south to southern Arizona and Mexico.

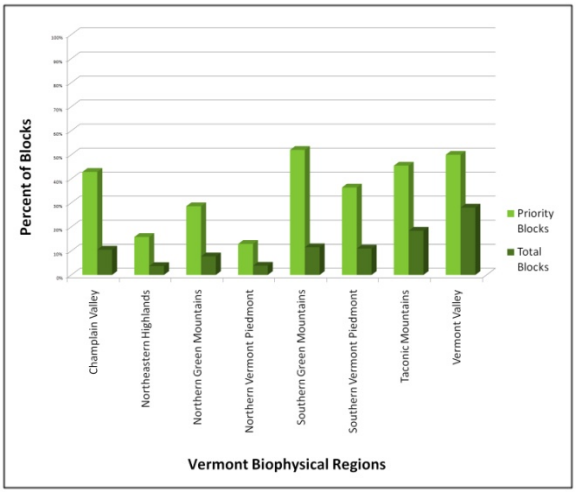
Identification
The largest anglewing. Forewing hooked; upperside is red-orange with black spots. Upperside hindwing of summer form is mostly black with a short tail; winter form has much orange and a longer, violet-tipped tail. Underside is light brown; hindwing with silver question mark in center.

Flight
Two generations each year, a summer form flies from late June through August and a winter form flies in September and October. Most Winter form individuals apparently migrate south, but some overwinter. Extreme dates: 2 May 2004 in Grand Isle (D. Hoag) and 22 October 2007 in Dummerston (K. Hemeon).



Distribution and Habitat
During VBS reported from across the state, but more prevalent in southern areas and valleys in north were more temperate, deciduous forests occur. In Northeast Highlands, for example, only found in the Connecticut River valley. They prefer open spaces near deciduous woods such as city parks, fence rows, shorelines and forest edges. Hostplants are several species of elms (Ulmus), hackberry (Celtis) and some nettles (Urtica).


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen
Present


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Eastern Comma *Polygonia comma* (T. Harris, 1842)

Resident
Common

Conservation Status
Vermont S5
Global G5

North American Range
Eastern half of the United States east of the Rocky Mountains from southern Canada to central Texas and the Gulf Coast.

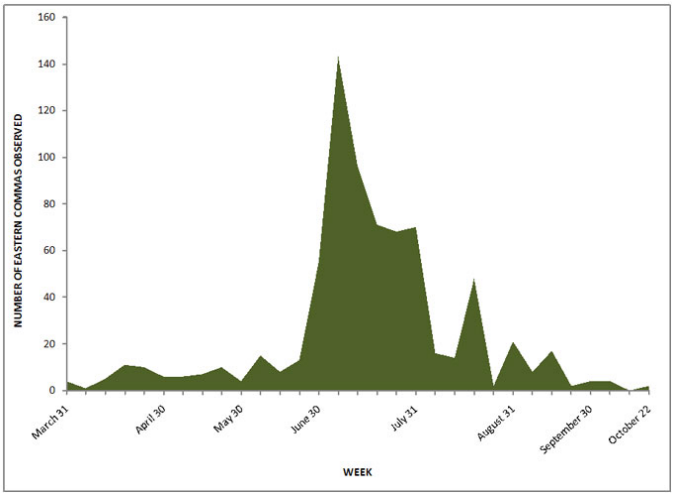
Similar in marking, habitat preference and behavior, the Eastern Comma can be difficult to differentiate from other *Polygonia*. This large, frenetic butterfly does, however, have some distinguishing characteristics that allow it to stand out. In the past, the Eastern Comma was referred to as the Hop Merchant by local Hops farmers who used the silver and gold marking of their pupa to predict how well their crops would sell; the more gold markings, the more lucrative the season was expected to be. Males tend to be incredibly aggressive when patrolling for females and are reported to attempt to chase away birds as well as other insects. Older caterpillars form daytime shelters by pulling leaves around themselves and securing it with silk. Adults overwinter and are some of the first worn butterflies seen in spring.

Identification

Usually smaller than the Question Mark with short hindwing projections. Forewing above is brownish-orange with dark spots; one dark spot at center of bottom edge. Hindwing above has two patterns: summer form is mostly black, winter form is orange with black spots; both have a dark border containing pale spots. Underside is brown; hindwing with a central silver or white comma which is swollen at both ends.

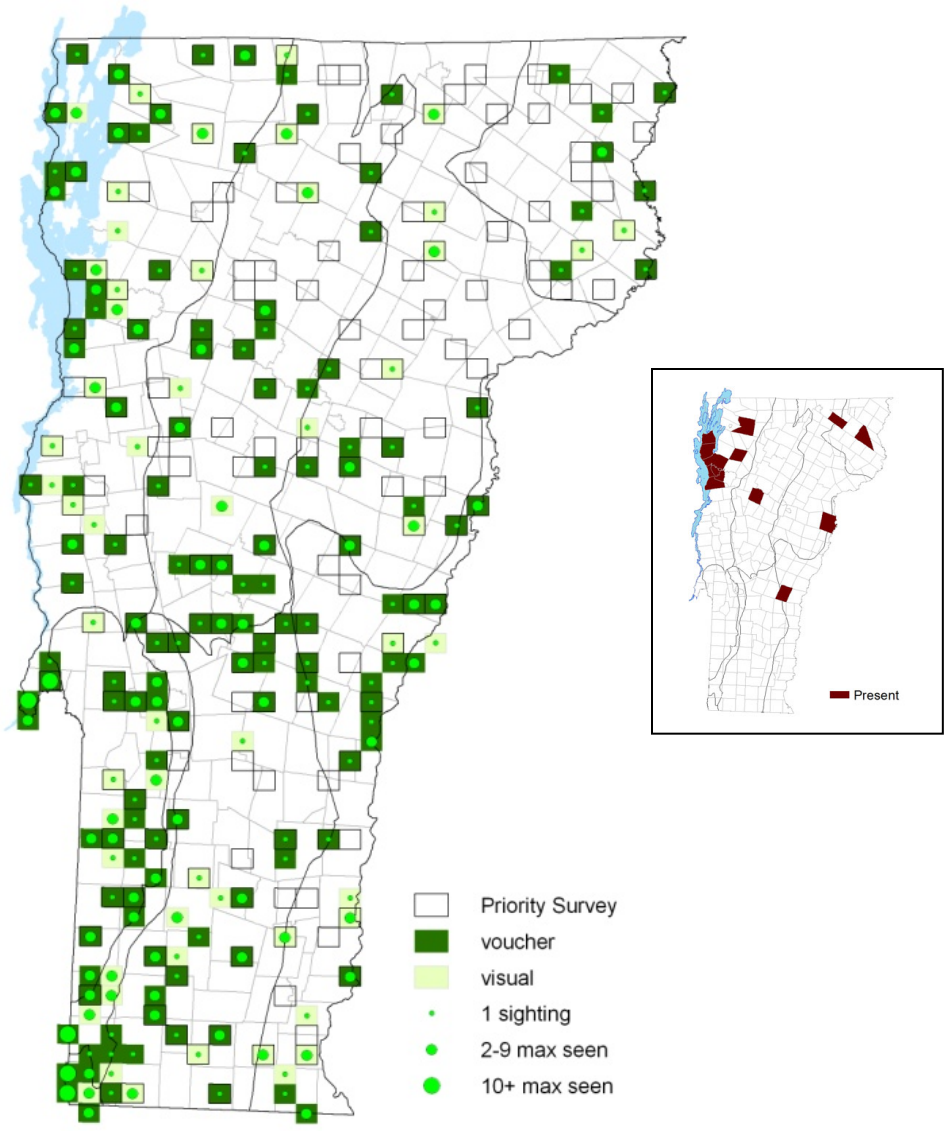
Flight

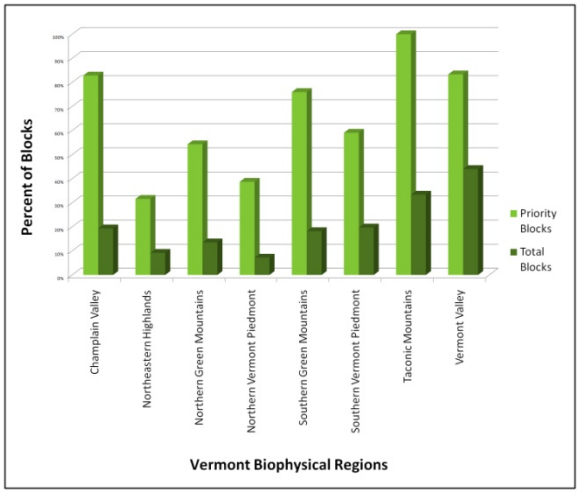
Found early in the spring and one of the last butterflies seen in the fall. Overwintered adults fly and lay eggs in the spring until the end of April. The summer form emerges and flies from May through September, laying eggs that develop into the winter form. These adults appear in September or October and soon seek shelter in which to overwinter. They are found in greatest abundance from the end of June through the end of July. Extreme dates: 31 March 2005 in Grand Isle (D. Hoag) and 22 October 2007 in Dummerston (K. Hemeon).



Distribution and Habitat

Found throughout Vermont during VBS. Unlike the Question Mark, they prefer woods and open areas near water but will utilize disturbed habitats, especially during migration. Host plants include all members of the elm and nettle families including American Elm (Ulmus americana), Hops (Humulus), nettle (Urtica), and Wood Nettle (Laportea canadensis). Adults rarely visit flowers, instead preferring rotting fruit and tree sap.


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen
Present


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Gray Comma *Polygonia progne* (Cramer, 1775)

Resident
Common

Conservation Status
Vermont S5
Global G5

North American Range
Northwest Territories and British Columbia south along Pacific coast to central California, southeast through Montana, Utah, Colorado, and the Dakotas to eastern Nebraska, central Kansas, and central Arkansas; east through southern Canada and the northern United States to Maine and the Maritimes; south in the Appalachians to North Carolina.

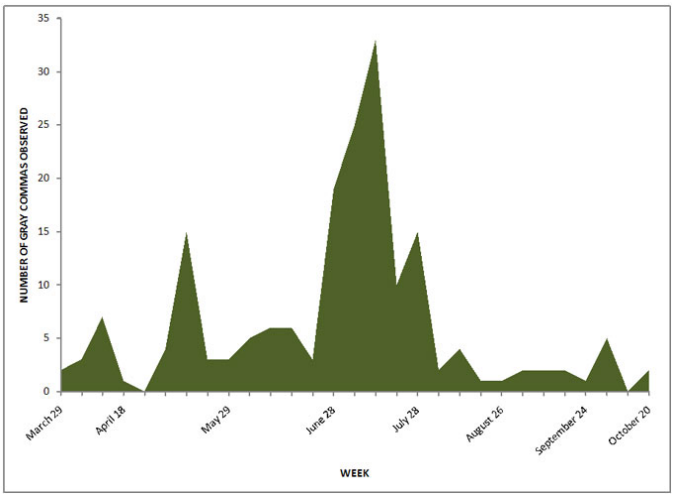
Its drab gray ventral surface belies the brightly speckled orange patterning you see once the Gray Comma opens its wings. Active well into October, adults overwinter and are one the first butterflies to emerge in the spring. They are slow fliers, but easily startled, except when sipping minerals. In mid afternoon, males perch on trees or shrubs at the edges of clearings to wait for females. Eggs are laid singly on leaves of host plants and larvae feed underneath.

Identification

A medium to small anglewing. Upperside is bright orange-brown; summer form has hindwing with a wide dark border, winter form has the border covering only about one-quarter of the wing; both enclosing a few small yellow spots. Underside is charcoal gray with fine dark striations; forewing with three to four light chevrons in a dark border. Silver mark in center of hindwing is small, slender, and L-shaped.

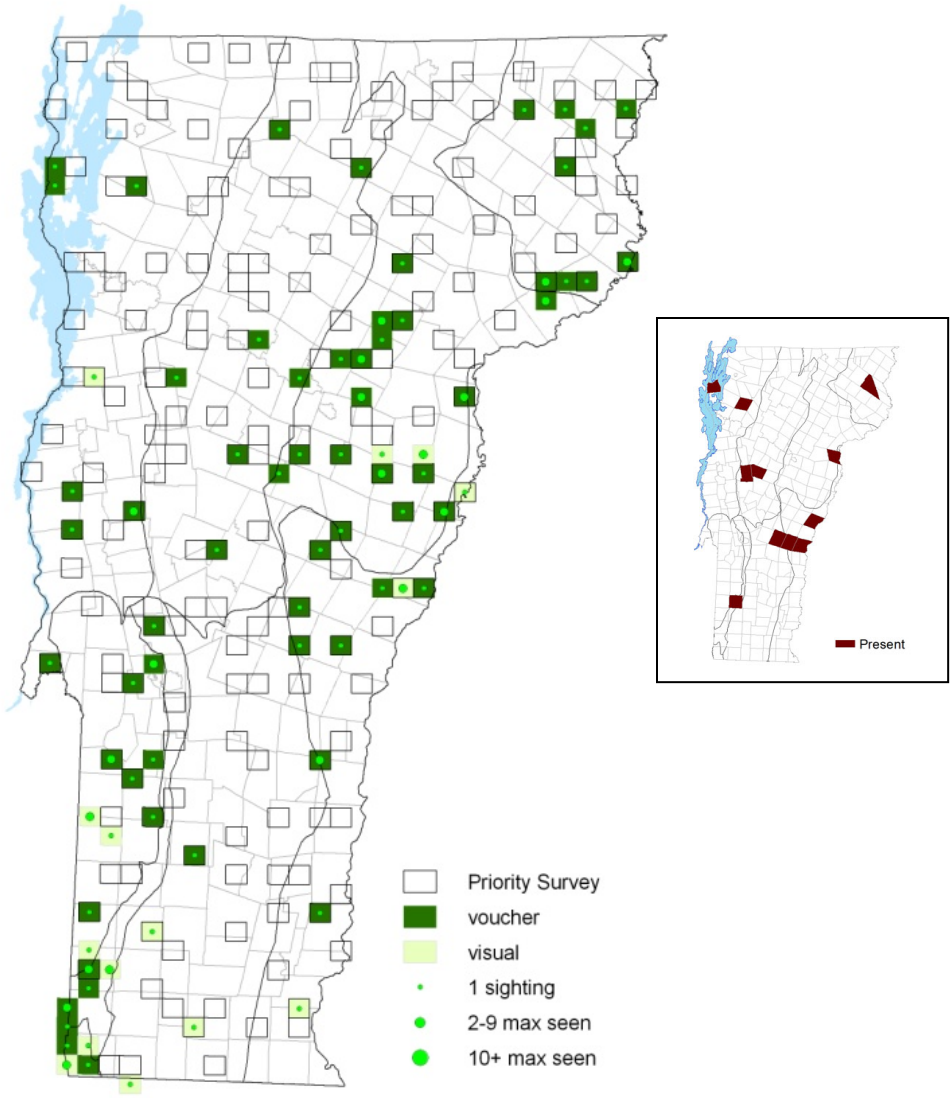
Flight

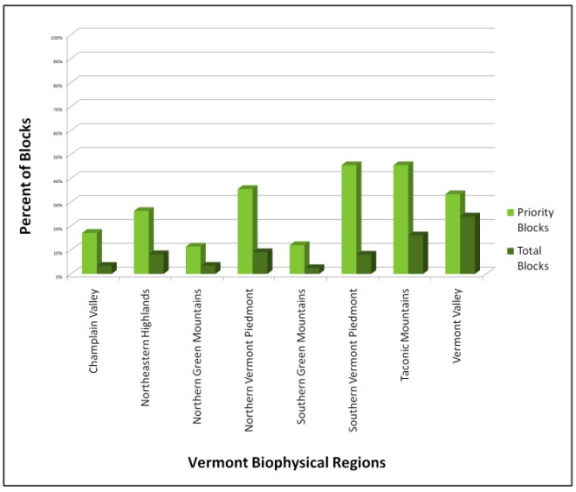
There are three generations. The overwintering adults begin to appear in the end of March. A second generation begins to emerge in May and third generation overwinters. Extreme dates: 29 March 2004 in Rupert (D. Rolnick) and 20 October 2007 in Pownal (K. Hemeon).



Distribution and Habitat

Scudder (1889) commented that, "In New England it is more generally distributed and universally common than any other species of the genus, but is somewhat more abundant in the southern half than in the northern parts." A confusing range emerged during VBS with records predominantly from west of the Green Mountains in the southern half of the state, central Vermont and the Northeastern Highlands. Adults prefer openings in northern forests and nearby open areas such as yards and gardens, roadsides, and along streams. Larval hostplants are mainly currants such as Wild Gooseberry (Ribes rotundifolium). Adults will nectar rarely and are most commonly found on sap flows, dung, or decaying matter.


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen
Present


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Green Comma *Polygonia faunus* (W.H. Edwards, 1862)

Resident
Common

Conservation Status
Vermont S5
Global G5

North American Range
Boreal North America south of the tundra. Central Alaska south to central California and northern New Mexico; east across southern Canada and the Great Lakes region to New England and the Maritimes. A separate population occurs in the southern Appalachians.

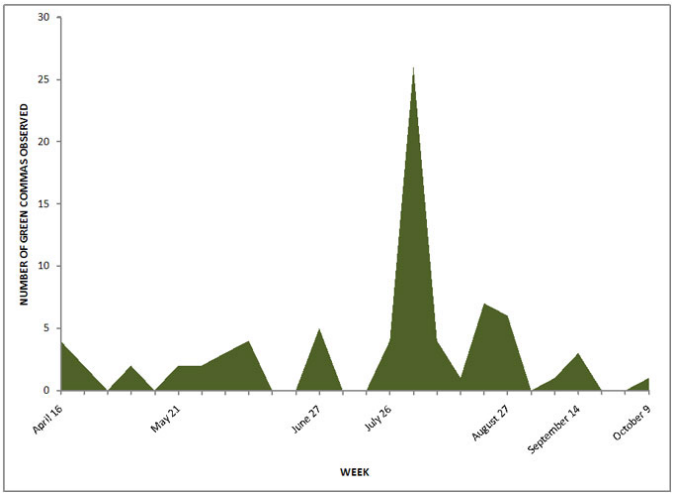
A large, cryptically colored butterfly of cold climates, like other overwintering Polygonia it is often one of the first to emerge in the spring. It tends to colonize areas erratically, with isolated pockets throughout its range, especially southward. Undergoes dramatic population swings and in some years they are extremely scarce. In late afternoon, males perch on rocks or plants in gullies to wait for females. Eggs are laid singly on upper surface of hostplant leaves, which caterpillars eat. Caterpillars are solitary and rest on the underside of leaves.

Identification

Extremely ragged wing edges. Geographically variable. Upperside is reddish brown with wide dark borders; hindwing border contains yellow spots. Underside is brown, outer half lighter; submarginal spots are greenish; hindwing with L- or C-shaped silver spot in center.

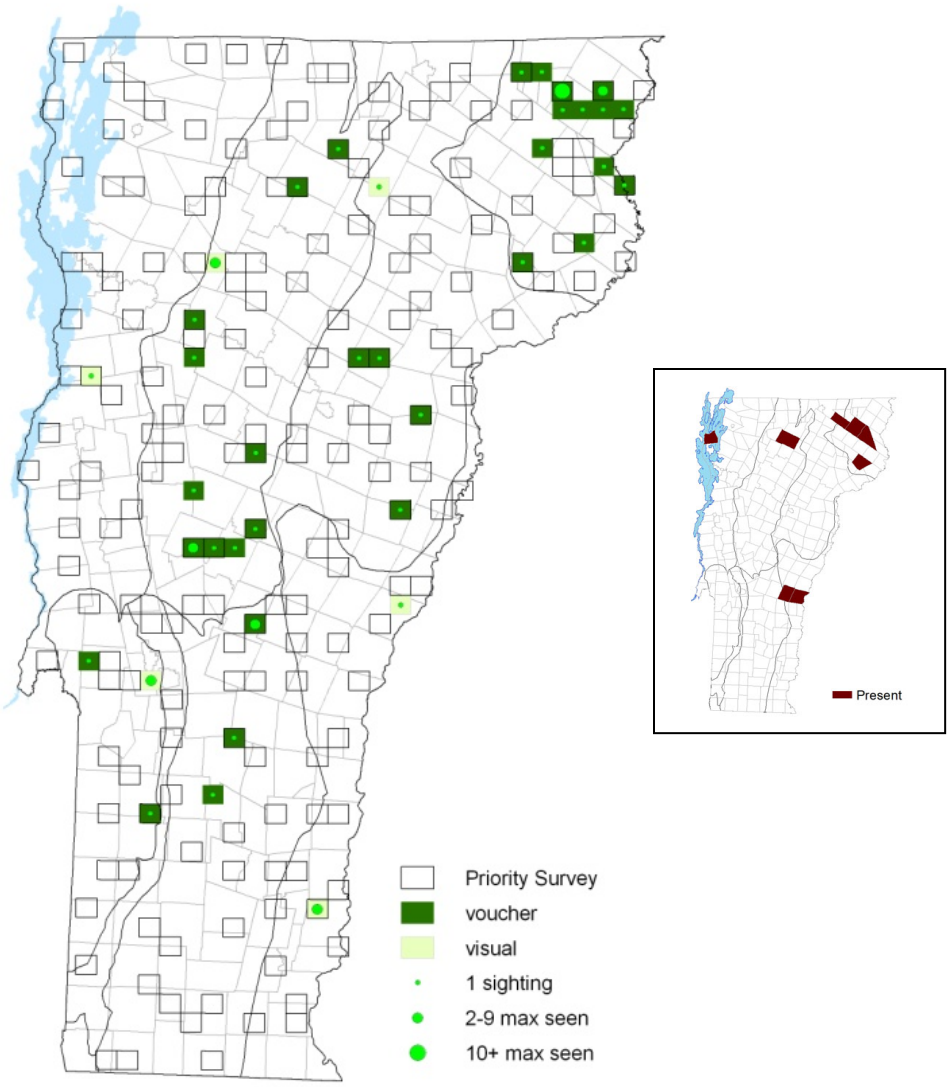
Flight

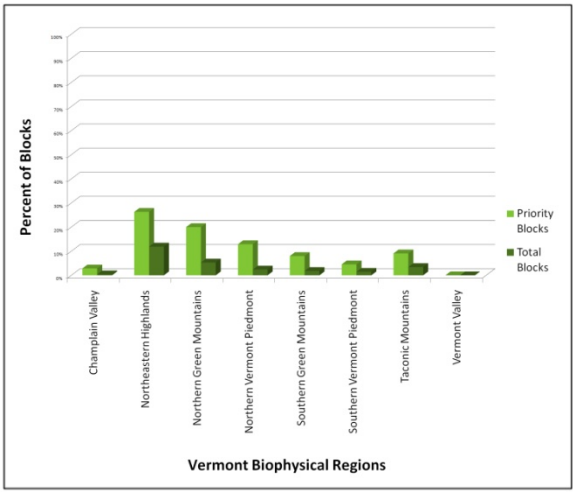
One generation with overwinter adults emerging in early spring. Extreme dates: 16 April 2002 in Marshfield (B. Pfeiffer) and 9 October 2003 in Thetford (B. Shepard).



Distribution and Habitat

A species of northern hardwood and mixed forests, during VBS mostly found in the Green Mountains and the Northeastern Highlands. Often found on dirt roads through northern forests during the survey. Larval hostplants are mainly willows (Salix), birch (Betula), and alder (Alnus), but also blueberry (Vaccinium) in some areas.


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen
Present


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Northern Buckeye *Junonia coenia* (Hübner, 1822)

Migrant – Rare Breeder?
Very rare

Conservation Status
Vermont SU
Global G5

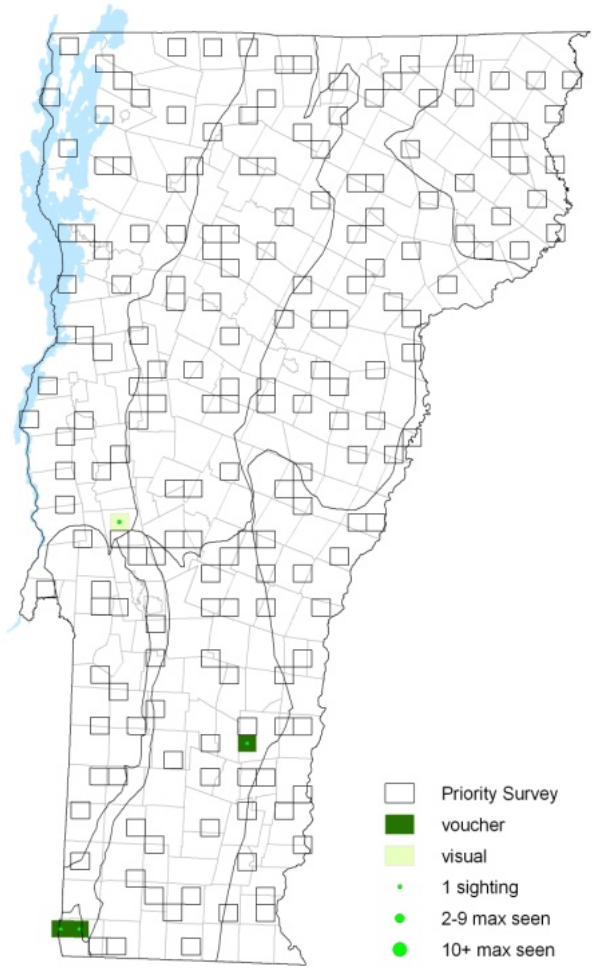
North American Range
Resident in the southern United States and north along the coasts to central California and North Carolina; south to Bermuda, Cuba, Isle of Pines, and southern Mexico. Adults from the south's first brood migrate north in late spring and summer to temporarily colonize most of the United States and parts of southern Canada. Comments: The eyespots may be used to scare away predators.

The only species in this mostly tropical genus that pushes northward in the summer to breed, often migrating along river corridors. They lack cold tolerance and cannot overwinter. Both males and females are fast fliers. Males perch during the day on low plants or bare ground to watch for females, flying periodically to patrol or to chase other flying insects. Females lay eggs singly on leaf buds or on the upper-side of hostplants leaves. Caterpillars are solitary and eat the leaves of their hostplants and sequester toxins to deter predators.

Identification
Upperside is brown. Forewing with two orange cell bars and two eyespots; part of white subapical band appears in the largest lower eyespot. Hindwing has two eyespots; upper one is largest and contains a magenta crescent. Underside of hindwing is brown or tan in the summer form and red in the fall form.

Flight
In the South they have two to four broods and fly from May through October. Four records during VBS: 26 May 2004 in Pownal (K. Hemeon), 11 August 2006 in Brandon (J. Bush), 23 August 2006 in Chester (M. Reiter), and 15 September 2006 in Pownal (K. Hemeon). The May record suggests that it may breed in Vermont in some years.

Distribution and Habitat
A southern species only rarely found in the state. There are no known historic records only four reported during our survey from the southern half of Vermont. They are found in open habitats with low vegetation and bare ground. Caterpillar hosts are Snapdragon (Antirrhinum), Toadflax (Linaria) and plantain (Plantago). Adults nectar at aster (Aster), Chickory (Cichorium intybus), Gumweed (Grindelia) and others.


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen

Baltimore Checkerspot *Euphydryas phaeton* (Drury, 1773)

Larvae sequesters chemicals from one of its hostplants, Turtlehead (*Chelone glabra*), making them unpalatable to predators. Males perch near the ground to find females. Eggs are laid in groups of 100-700 under host plant leaves. Newly-hatched caterpillars move to the tip of the plant and feed together in a web which is enlarged downward as the caterpillars consume more of the plant. Larvae often suffer high mortality rates falling off the hostplant and from parasitic wasps. Fourth-stage caterpillars overwinter in rolled leaves on the ground.

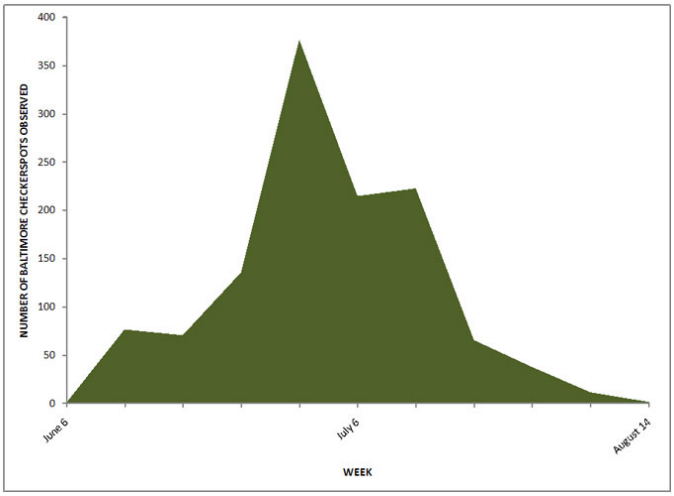
Resident
Common

Conservation Status
Vermont S4
Global G4

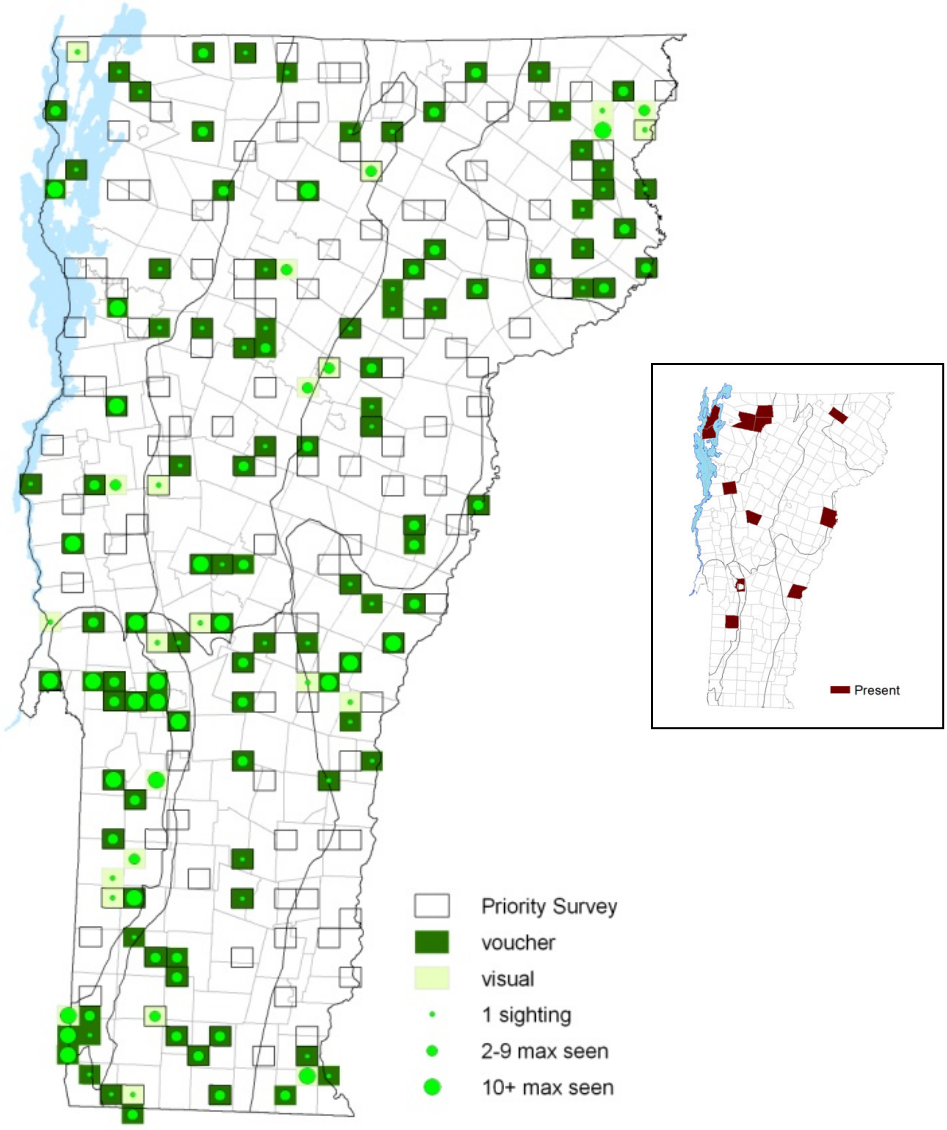
North American Range
Nova Scotia west across the Great Lakes region to southeast Manitoba; south through the eastern United States to northern Georgia, northern Mississippi, and northeast Oklahoma. Isolated records in northeast Texas and Nebraska.

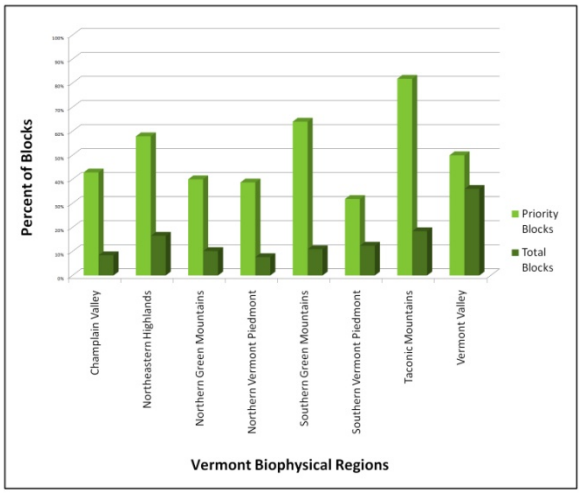
Identification
Vivid, with striking coloration and patterning. Upperside is black with red-orange crescents on outer margins of both wings and rows of creamy white spots inward. Antenna tipped with a bright orange club.

Flight
One brood typically from June to mid August. Extreme dates: 20 May 2004 in Woodford (K. Hemeon) and 14 August 2007 in Kirby (T. Armata).



Distribution and Habitat
The Baltimore Checkerspot was found throughout Vermont during VBS and was very common locally. Preferred habitats include wet meadows, shorelines, fens, bogs and marshes. Larvae reported to feed on Turtlehead (Chelone glabra), Hairy Beardtongue (Penstemon hirsutus), English Plantain (Plantago lanceolata), and False Foxglove (Aureolaria). They have also been known to leave these host plants and feed on unrelated plants such as Arrowwood (Viburnum recognitum), Common Lousewort (Pedicularis canadensis), and White Ash (Fraxinus americana). During VBS hostplants reported to be mostly Turtlehead, but also Green Ash (Fraxinus pennsylvanica) and honeysuckle (Lonicera). Nearly 20 species of plants reported as nectar source during VBS.


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen
Present


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Silvery Checkerspot *Chlosyne nycteis* (E. Doubleday, 1847)

Resident
Very Rare

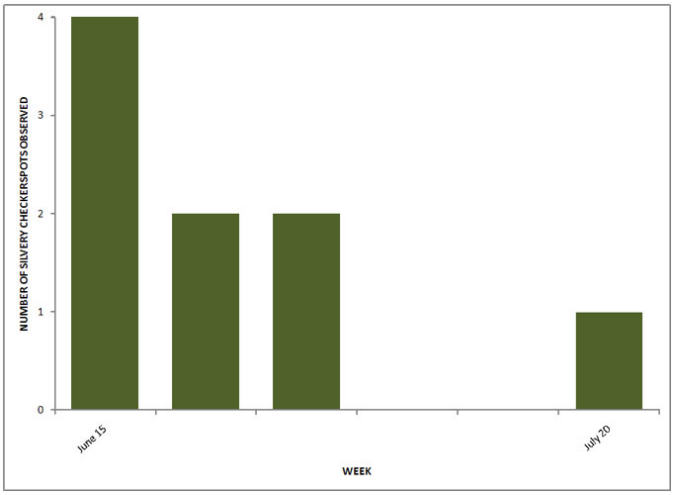
Conservation Status
Vermont S1S2
Global G5

North American Range
Maritime Provinces west to southeast Saskatchewan; south through Wyoming and Colorado to central Arizona, southern New Mexico, south-central Texas, and Mississippi.

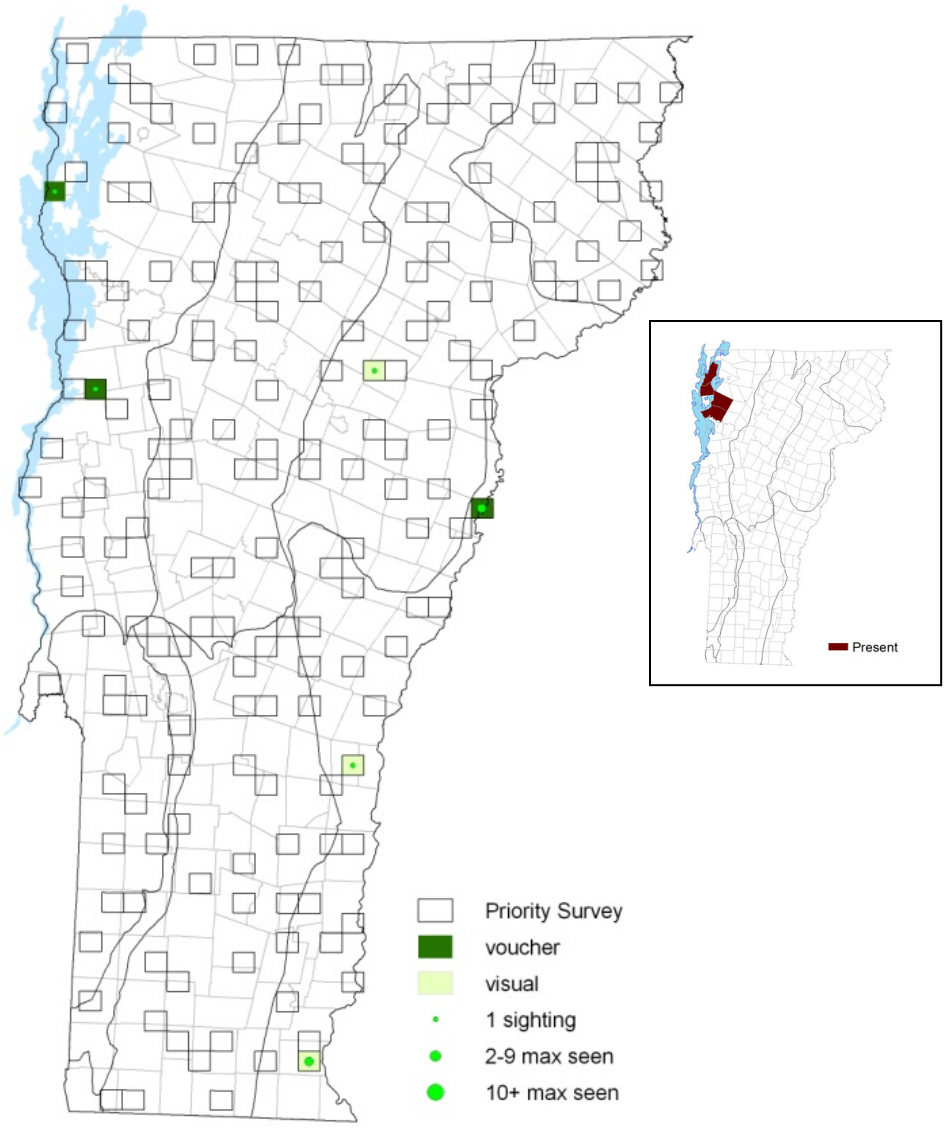
Despite being somewhat of a generalist, the Silvery Checkerspot is local, sparse and perhaps in decline in the region. Even Scudder (1889) wrote that " in New England it is a very rare insect…" and he had collected in both New Hampshire and the Adirondacks in New York. There are no theories as to its limited populations or reason for suspected decline.

Identification
The largest of the checkerspots in our region. It can be confused with Harris' Checkerspot and Pearl Crescent. Upperside is pale yellow-orange with dark borders and markings. Hindwing above and below has some white-centered submarginal spots; hindwing below is pale with a large white crescent at the margin.

Flight
Apparently June and July in New England as well as during VBS. Extreme dates: 1 June 1989 in Colchester (M. Sabourin), 4 July 1989 in North Hero (J. Hedbor), and 20 July 2002 in Marshfield (M. Schumacher).



Distribution and Habitat
Rarely recorded during VBS, but most records are from valley locations. They prefer moist, open areas such as wet meadows and streamsides, however, they are known to frequent roadsides, forests, dry ridges and even urban parks. They use composites as larval hostplants including asters (Aster), sunflowers (Helianthus), and Black-eyed Susan (Rudbeckia hirta). A specimen from Milton in 1993 reared on Wood Aster (Eurybia divaricata) (J. Hedbor). Reported nectaring White Clover and Fleabane during VBS. Also puddle and visit dung.


Present
Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen

Harris's Checkerspot *Chlosyne harrisii* (Scudder, 1863)

Resident
Common

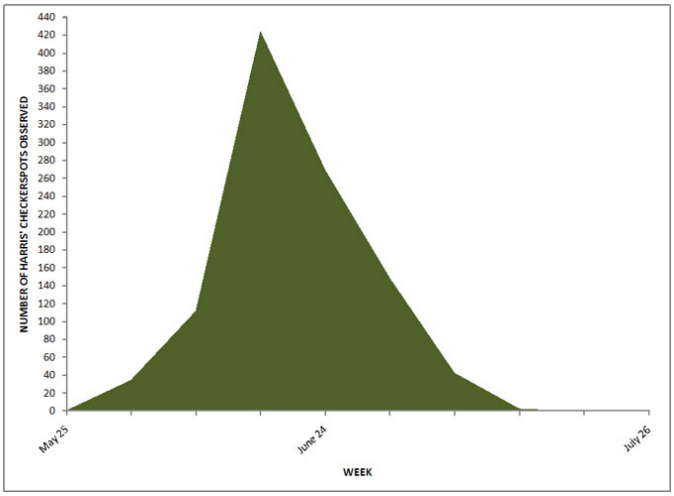
Conservation Status
Vermont S4
Global G4

North American Range
Maritime Provinces west to Manitoba, south to West Virginia, southern Ohio, and northeastern Illinois.

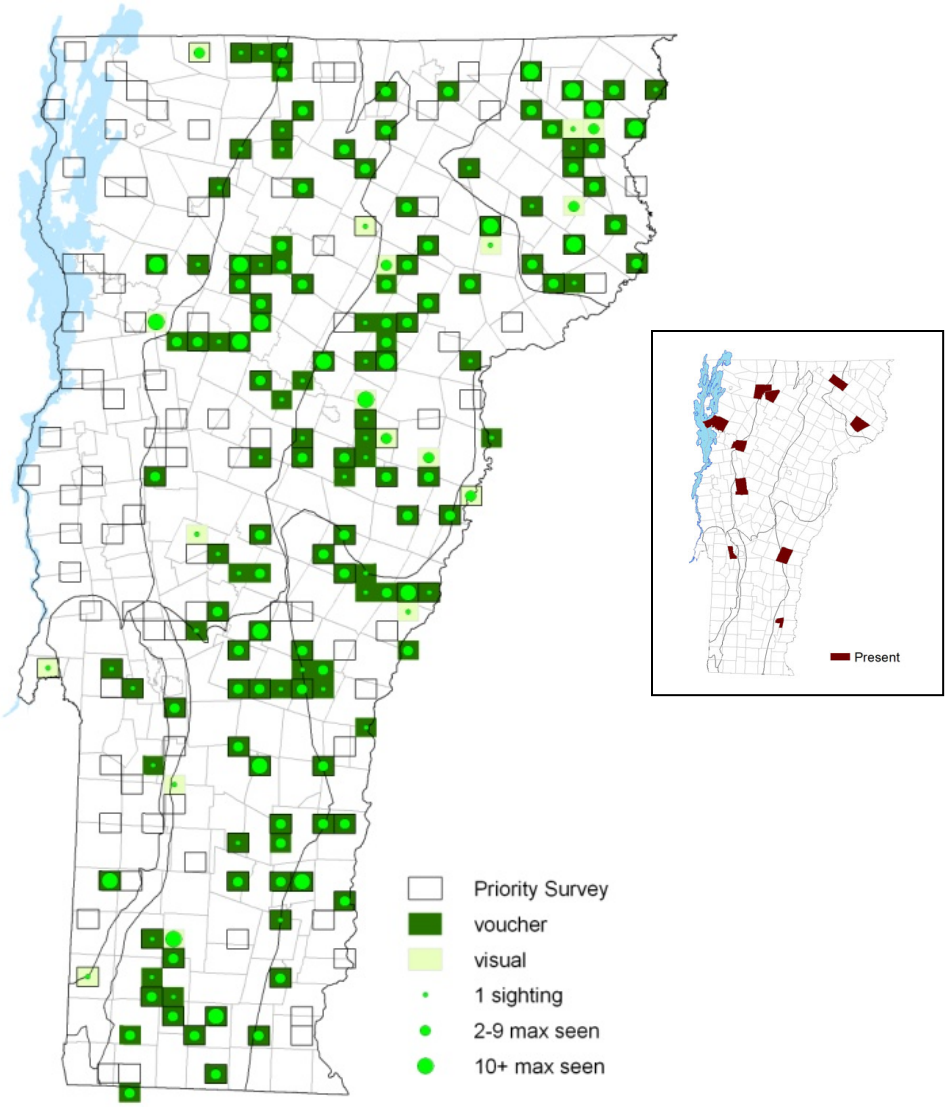
They are slow fliers and are usually found in close proximity to their larval host plant. Females lay eggs in clusters under host plant leaves. Caterpillars feed on leaves communally in a web. Partially-grown caterpillars overwinter at the base of the hostplant. Larval predation can be very high in some years, causing dramatic cyclical swings in their populations.

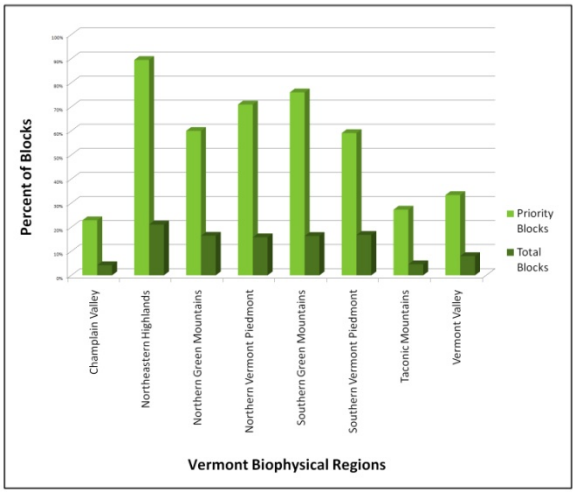
Identification
Upperside is orange with black markings. Underside of hindwing has a red-orange stripe at the margin and a red-orange, white, and black checkered pattern on remainder of wing.

Flight
One brood flying from the end of May through the beginning of July. Extreme dates: 2 June 2004 in Montpelier (C. Darmstadt), 26 July 2004 in Washington (A. Aversa), and 14 August 1980 in Grafton (S. Parren).



Distribution and Habitat
Scudder (1889) wrote that "In Vermont it is recorded only from Montpelier (Sprague) and Stow[e], 'very abundant' (Miss Soule)."
Generally found throughout Vermont during VBS, but absent or rare in western lowlands.
It is seldom found far from where its only hostplant, Flat-topped Aster (*Aster umbellatus*), grows. These include wet meadows, swales, powerline clearings, road edges, stream banks, and other open areas.


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen
Present


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Pearl Crescent *Phyciodes tharos* (Drury, 1773)

Resident
Common

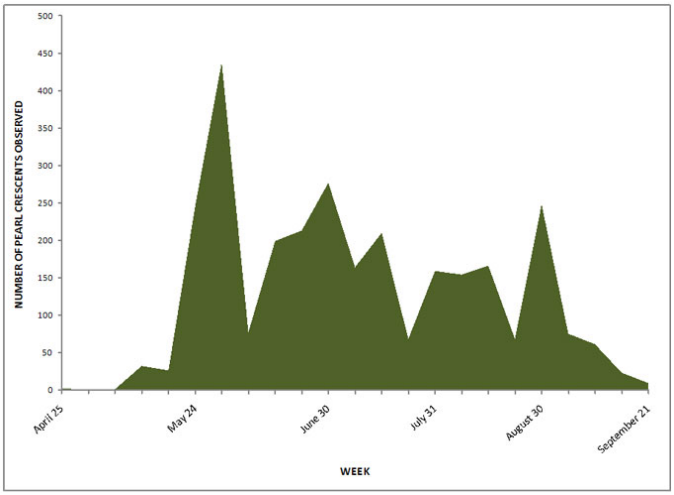
Conservation Status
Vermont S5
Global G5

North American Range
Southeastern Alberta south through Montana, Wyoming, Colorado, New Mexico, Arizona, and southeastern California to Mexico; east to southern Ontario and all the eastern United States.

Adults of the *P. tharos* group—especially single wild-caught adults — often cannot be identified to species. *Phyciodes* vouchers from VBS were sent for identification to James Scott, who has recently revised the taxonomy of this group (Scott 1986, 1994, 1998, 2006). Most photographs could not be confidently identified because key characteristics were not adequately shown (J. Scott). *P. tharos tharos* is generally small (Vermont males average 15.8 mm forewing length), the dorsal hindwing usually has a conspicuous line across the orange area in the middle of the wing, the scaleless area on the antenna club (nudum) is usually black, and the brown patch on the margin of ventral hindwing is usually rather blackish-brown and narrow (in females, the nudum is less-often black, and the brown patch is wider) (J. Scott). Most females could not be identified.

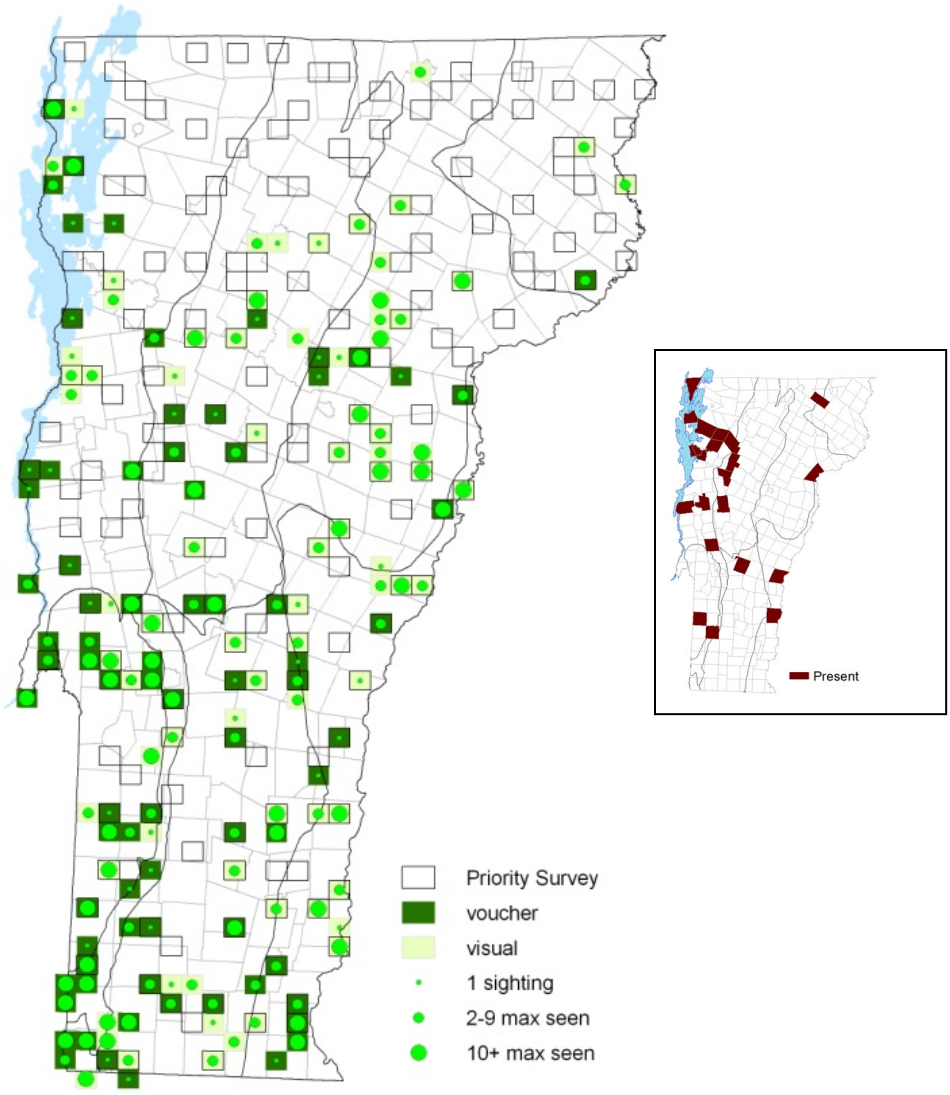
Flight

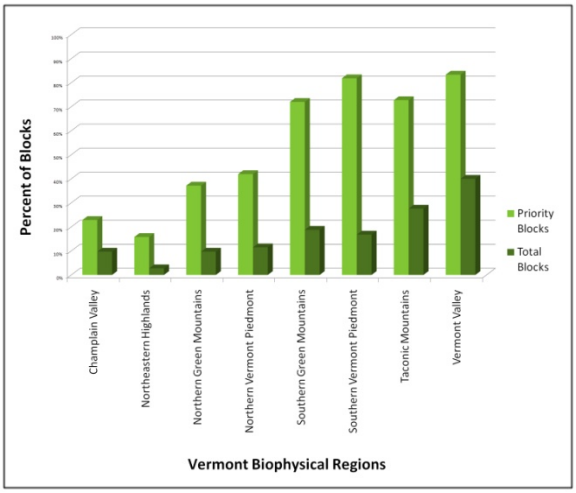
Flight times derived from confidently identified and probable *P. tharos* indicated two generations in Vermont, mostly mid May to mid June and end July to mid September in southern Vermont (Bennington & Windham counties). There may be a partial third generation in some years. The first flight is a slightly later (L May-E July and L July-M Sept.) in Windsor and Rutland counties. There are fewer records northward but the two generations evidently fly at the same time as those in Windsor and Rutland counties. Extreme dates from vouchers: 25 April 2005 and 21 September 2003 in Bennington (K. Hemeon), 2 October 1970 in Essex (P. Owen) and 4 November 1974 in Manchester (C.T. Parsons).



Distribution and Habitat

Scudder (1889) wrote, "In New England it is almost everywhere exceedingly abundant." Based on records confidently identified by James Scott, during VBS it was found in the southern two-thirds of Vermont and northwest on islands. It is a successful generalist and is capable of utilizing a wide array of open habitats, including old fields, pastures, woodland and road edges, and waste places. Caterpillar hosts are several species of smooth-leaved asters. In Vermont, *Aster pilosus*, and *Aster laevis* are used. Adults nectar at a wide variety of plants.


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen
Present


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Northern Crescent *Phyciodes cocyta* (Cramer, 1777)

Resident
Common

Conservation Status
Vermont S5
Global G5

North American Range
Newfoundland and northern New England west across the Great Lake states and southern Canada to British Columbia; south in the western mountains to Utah, southeast Arizona, and southern New Mexico; south in the Appalachians to Pennsylvania, Virginia, and West Virginia.

Phyciodes cocyta selenis is known to be a separate species from *P. tharos*, mostly based on sympatry of the two species over large regions of North America. *P. diminutor diminutor* is known to be a separate species from *P. tharos*, as they are sympatric in southern Minnesota, southern Ontario, northern Ohio, and evidently also in Vermont and Pennsylvania. Wahlberg et al. (2003) found that the mtDNA showed *tharos* to be a distinct species from the *P. cocyta*-group, and found that *P. tharos* and *P. diminutor* could be distinguished by mtDNA where they are sympatric in southern Minnesota. Until further work can be completed in Vermont, we treat both here as a *P. cocyta* group.

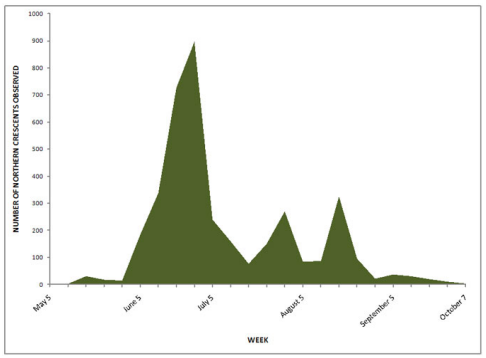
Phyciodes vouchers from VBS were sent for identification to James Scott, who has recently revised the taxonomy of this group (Scott 1986, 1994, 1998, 2006). Most photographs could not be confidently identified because key characteristics were not adequately shown (J. Scott). Most females could not be identified because *Phyciodes* females are less different between species than are males. Even many males could not be identified, because the characters of *P. tharos* and the *P. cocyta* group (including *P. c. selenis* and *P. diminutor diminutor*) vary considerably and the species overlap in the variation of characters. Only specimens confidently identified were those that contain most of the key characters in a state that is most different from the state possessed by most of the typical or most different individuals of the other species. Most of the unidentified specimens were likely to be *P. cocyta* (*P. c. selenis* or *P. d. diminutor*), because *P. cocyta* dominates the confidently identified specimens, and *P. tharos* is much less frequently found in Vermont. In areas of Vermont where *P. tharos* is evidently absent (Franklin, Lamoille, Washington, Orange, Orleans, and Essex counties, and all but the southernmost part of Caledonia County), all the unidentified specimens are probably *P. cocyta* also.

Identification

P. cocyta selenis and *P. diminutor diminutor* are generally larger than *P. tharos*, the dorsal hindwing usually has a large orange space in the middle of the wing (without a line crossing it), the scaleless area of the antenna club (nudum) is usually orange, and the brown patch on the margin of ventral hindwing is usually fairly wide (nearly as wide as long). In females, the nudum is often brown and wide).

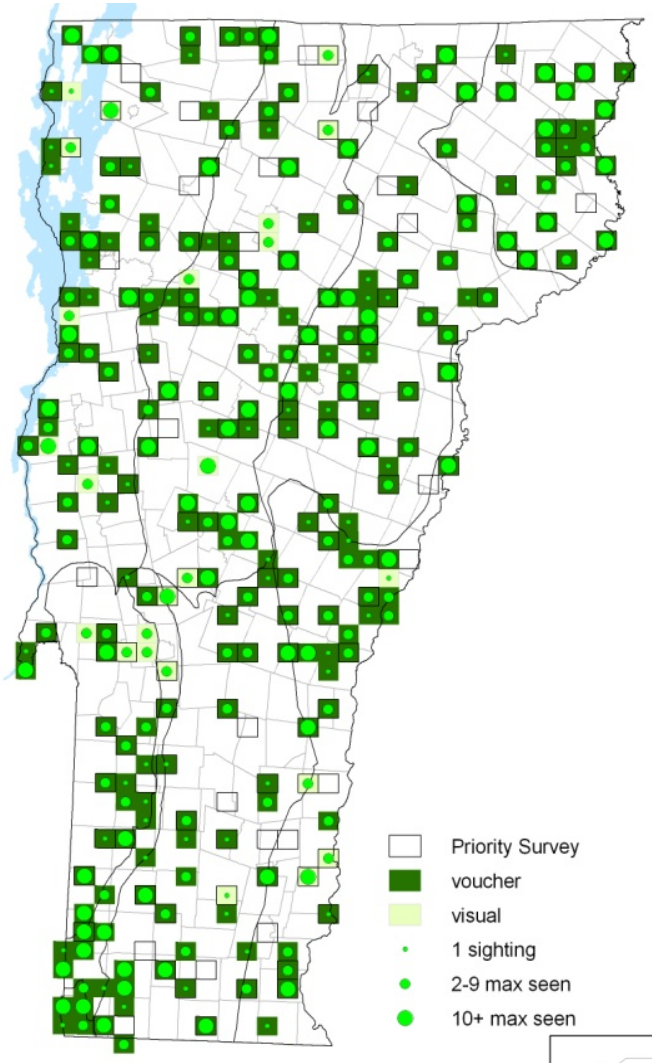
Flight

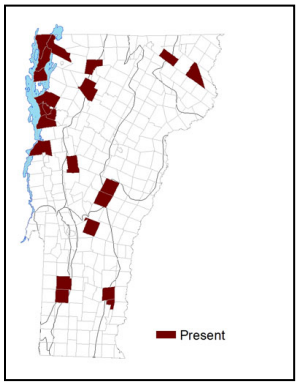
P. cocyta selenis appears to have one generation, while *P. diminutor (*or *P. cocyta*) *diminutor* has two generations.

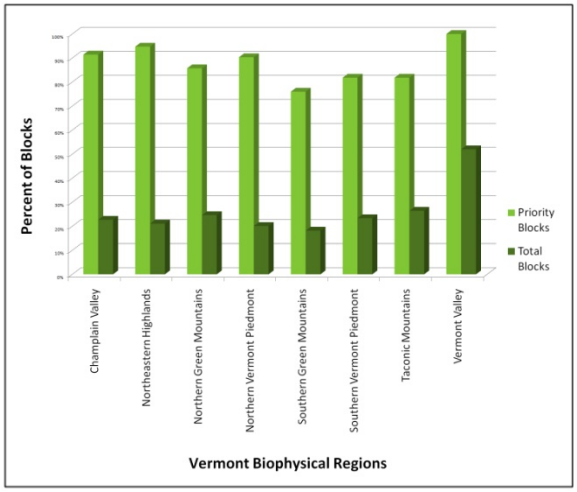


Distribution and Habitat

P. cocyta selenis evidently occurs in the cooler areas throughout Vermont except in the two southern counties, Bennington and Windham. *P. diminutor (*or *P. cocyta*) *diminutor* has two generations and evidently occurs throughout Vermont if it belongs to a separate species *P. diminutor*, or occurs just in the south if it is the conspecific taxon *P. cocyta diminutor*.


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen


Present


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Subfamily: Satyrs and Wood Nymphs (Satyrinae)

The Satyrinae are medium-sized species of the Family Nymphalidae. Members of this worldwide group are most often brown with one or more marginal eyespots. Males often have visible patches of specialized scales on the fore- or hindwings. Adults have a short proboscis and rarely visit flowers, feeding instead on rotting fruit, animal droppings, or sap flows. Nearly all species feed on gramanoids, including bamboos, rushes, and sedges. Adults usually perch with their wings closed, but open them wide when basking early in the morning or during cloudy weather. Most species have local colonies and are not migratory. Males patrol when searching for mates, flying in characteristic slow, skipping flight. Eggs are laid singly on the host leaves or stems, and caterpillars feed within shelters of several leaves sewn together with silk. Development from egg to adult can take two years in arctic and alpine species, and it is synchronized in some species. In those species, adult butterflies are only found every other year. Satyrinae typically overwinter as partially grown caterpillars.

Vermont Species:

- Northern Pearly Eye (Enodia anthedon)
- Eyed Brown (Satyrodes eurydice)
- Appalachian Brown (Satyrodes appalachia)
- Common Ringlet (Coenonympha tullia)
- Little Wood Nymph (Megisto cymela)
- Jutta Arctic (Oeneis jutta)
- Common Wood Nymph (Cercyonis pegala)

Northern Pearly-eye *Enodia anthedon* (A.H. Clark, 1936)

Resident
Common

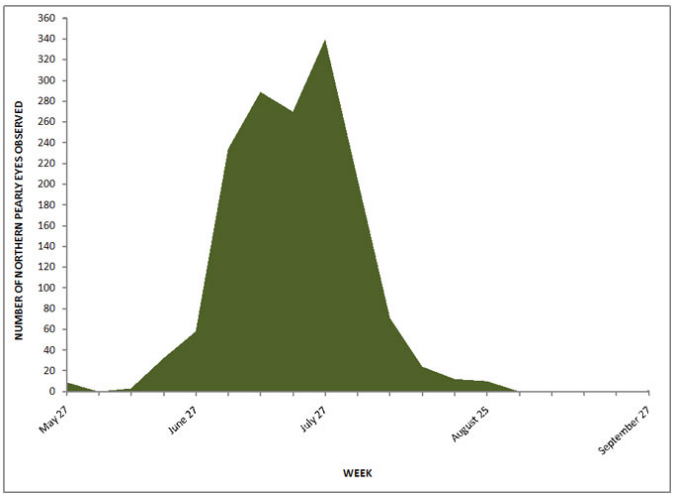
Conservation Status
Vermont S4
Global G4

North American Range
Central Saskatchewan and eastern Nebraska east to Nova Scotia, south to central Alabama and Mississippi.

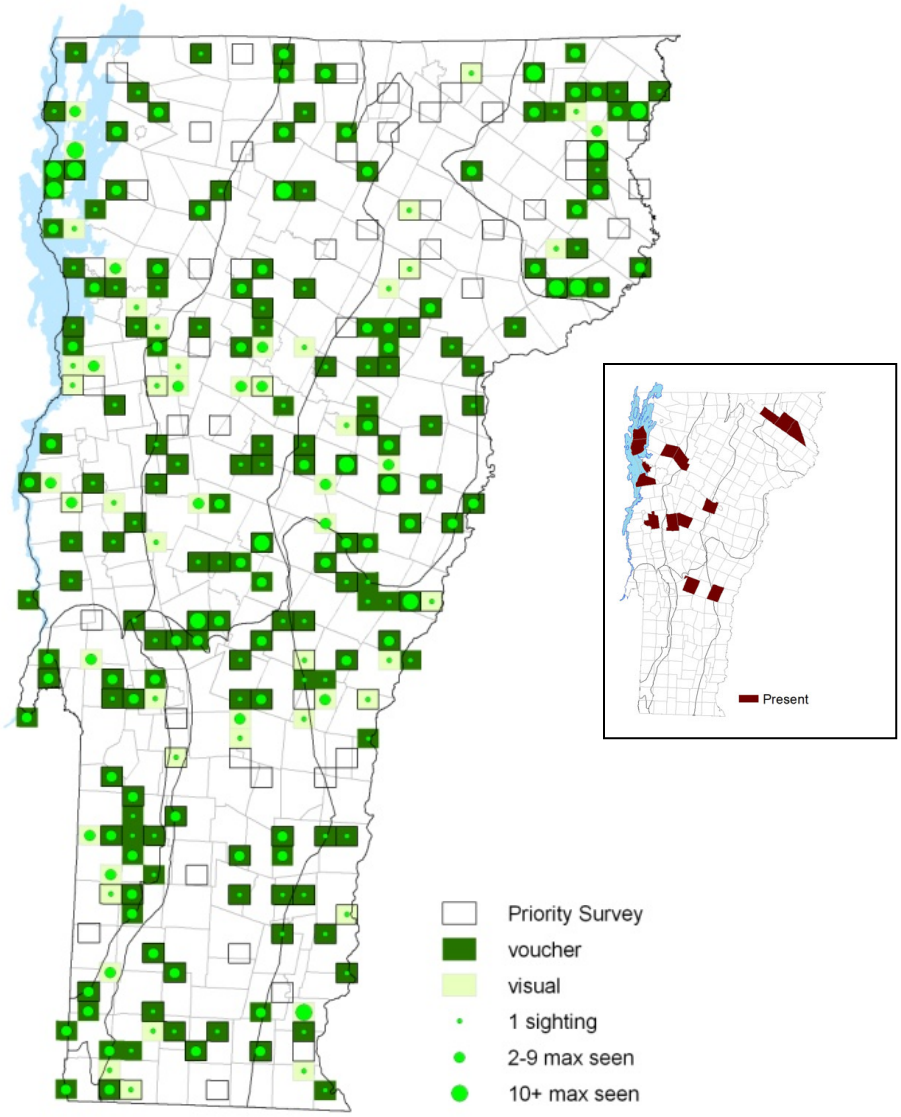
Preferring shady or low light conditions, they are crepuscular and have even been reported at mercury vapor lights after dark. They are not completely inactive during the day, on the contrary, they can be seen throughout daylight hours, however there is an obvious flight surge around dusk and this is often preceded by a period of inactivity during the afternoon while other butterflies are commonly flying. They are strong, jerky fliers and spend the bulk of their adult lives within dense woodlands rather than clearings or sunny edges. Males perch on tree trunks or vegetation up to 10 feet above ground at edges of clearings to wait for females. Eggs are laid singly on the hostplant; third- and fourth-stage caterpillars overwinter.

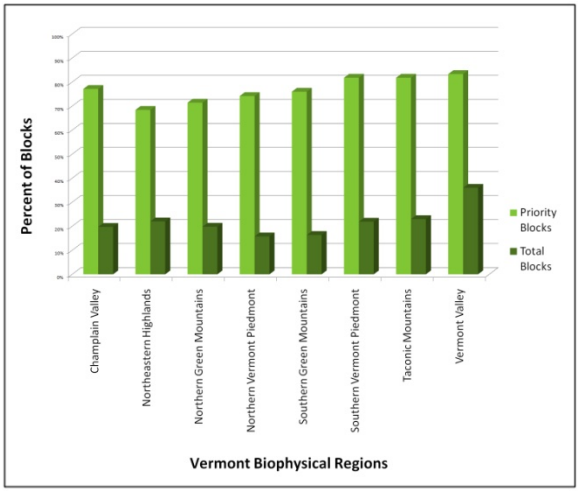
Identification
Antenna clubs are black. Upperside is brown with dark eyespots. Underside is brown; submarginal row of four black spots on forewing is straight and the dark line inside it is sinuous. Spots are not surrounded by diffuse white.

Flight
One brood. Extreme dates: 27 May 2005 in Grand Isle (D. Hoag) and 27 September 2005 in Rupert (D. Rolnick).



Distribution and Habitat
Working at the height of New England deforestation, Scudder (1889) wrote that "within the limits of New England it is very rare." It was found throughout the state during VBS. Its preferred habitats were damp, deciduous woods, usually near marshes or waterways and often in mountainous terrain. Hostplants include White Grass (Leersia virginica), Bearded Shorthusk (Brachyelytrum erectum), and Bottlebrush (Hystrix patula). Adults do not nectar from flowers, instead getting their nutrients from dung, fungi, carrion, and sap from willows, poplars, and birch. Reported at sap flows of Black Birch, maple, apples and wild grape during VBS.


Present
Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Eyed Brown *Satyrodes eurydice* (Linnaeus, 1763)

Males fly weakly over and within low plant growth while patrolling for females and occasionally perch to court them. Eggs are scattered on many different plants. Larvae overwinter in third and fourth instars. Pupate in spring and emerge in June.

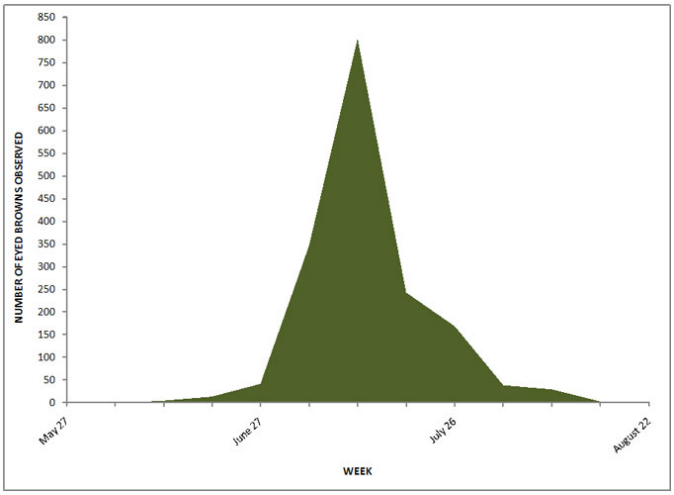
Resident
Common

Conservation Status
Vermont S4
Global G4

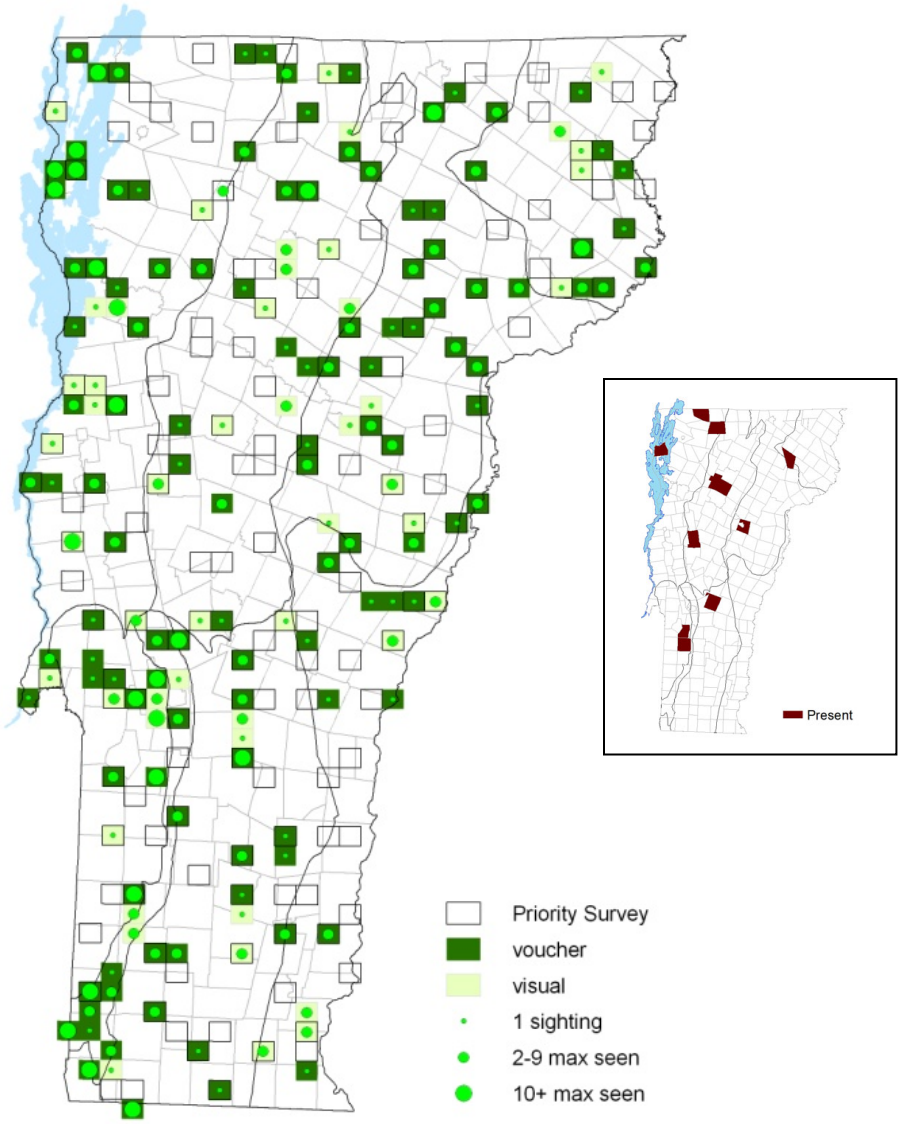
North American Range
Eastern North America from Nova Scotia south to Delaware and west to Saskatchewan and eastern Nebraska. Outlying populations in north-central Colorado, east-central Alberta, and northern Quebec.

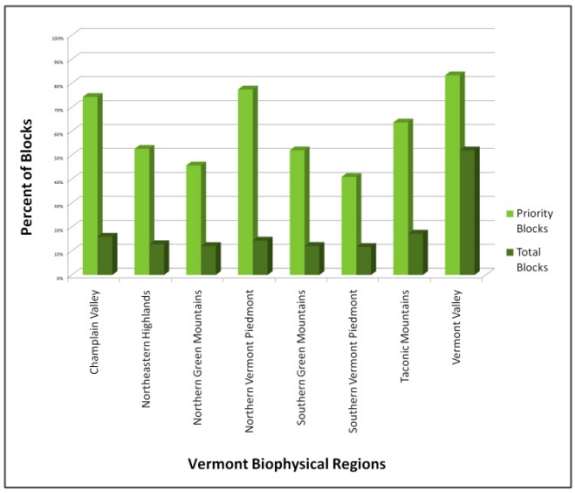
Identification
Upperside is light to medium brown with black eyespots. Underside of forewing has submarginal eyespots about the same size, usually touching or linked like a chain; dark line inside the hindwing's spot row is zigzagged.

Flight
The Eyed Brown has one brood and can be seen on the wing from late May until the end of August. This butterfly can be locally common and is found in the greatest abundance from the end of June through the end of July. Extreme dates: 27 May 2005 in Grand Isle (D. Hoag) and 22 August 2003 in Shaftsbury (T. Armata).



Distribution and Habitat
Found throughout Vermont during VBS in open sedge meadows, freshwater marshes, and open areas along slow-moving streams. Larval hostplants are in the sedge family, including Tussock Sedge (Carex stricta) and Brome-like Sedge (Carex bromoides).


Present
Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Appalachian Brown *Satyrodes appalachia* (R.L. Chemock, 1947)

Both Eyed Brown and Appalachian Brown were considered to be the same species until 1970 when it was found that the two were actually sibling species. A butterfly of wooded wetlands. When given a choice, experimentally released individuals moved into riparian forest habitat and wetland habitat (Kuefler et al. 2010). In all cases where open-field habitat was a potential choice, released butterflies rejected it in favor of the other habitats. Males patrol for females and both perch sporadically during the day. Females lay eggs singly on or near the hostplants. Larvae feed on leaves at night and hide at the base of the plant during the day.

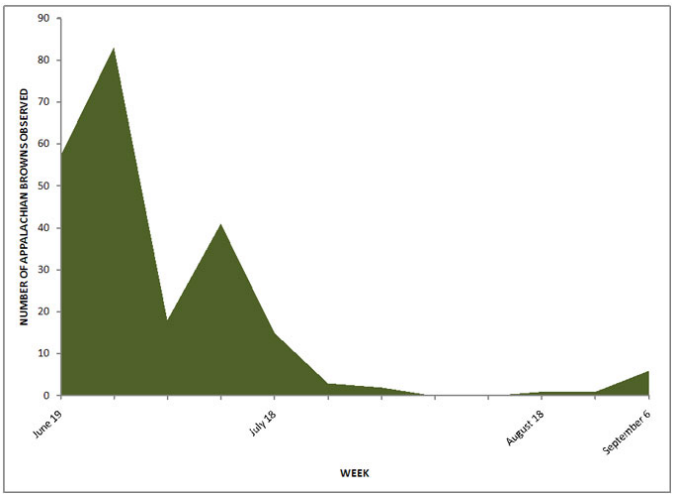
Resident
Rare

Conservation Status
Vermont S1S2
Global G4

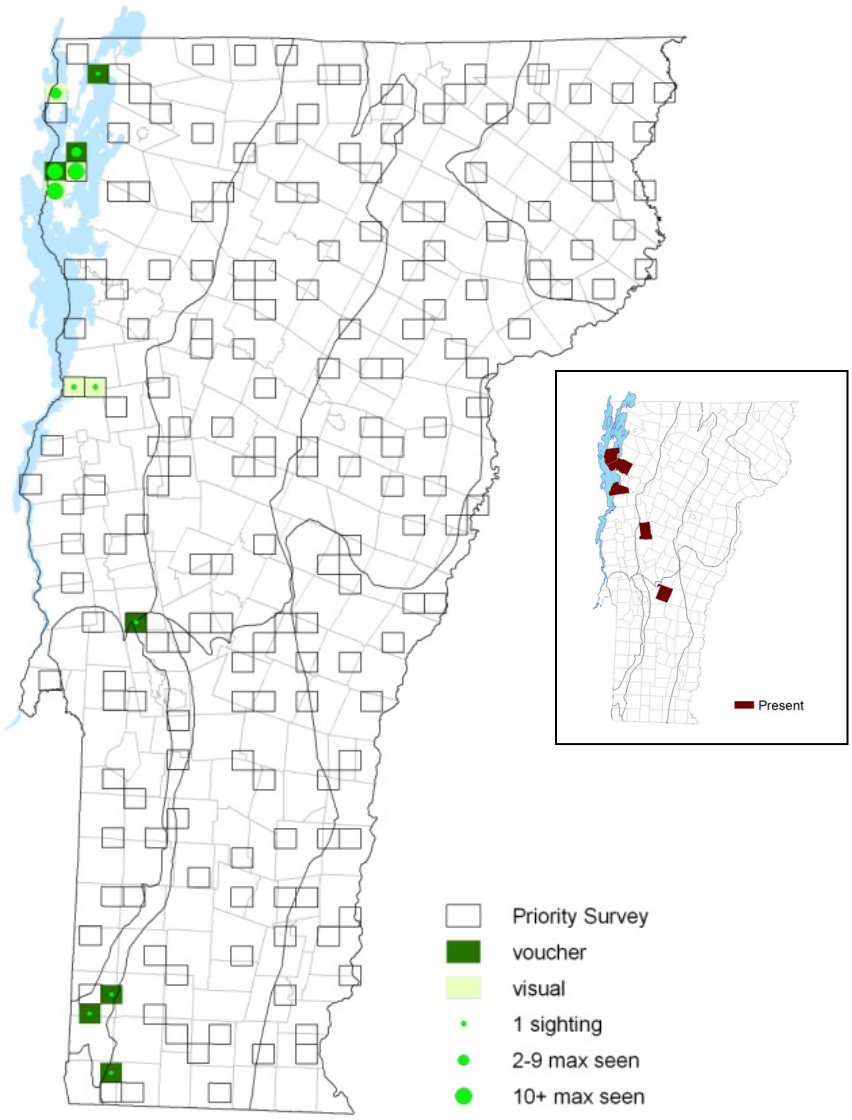
North American Range
Eastern Minnesota east to central New England and southern Quebec south through the Appalachians and coastal plain to Mississippi and Alabama. Isolated population in north peninsular Florida.

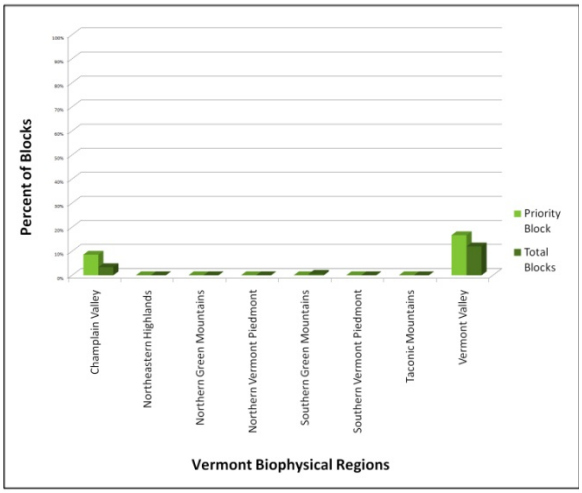
Identification
Nearly identical to the Eyed Brown. Wings are medium brown. Lower side of forewing with the two end eyespots larger than the middle two; spots may not touch. Dark line inside the hindwing row spot is sinuous, not zigzagged.

Flight
Others have reported two broods in southern range and one in north. During VBS there appeared to be two broods in Vermont, with the first from mid June to late July and a partial second brood in late August and early September. Extreme dates: 19 June 2007 and 7 September 2006 in Grand Isle (D. Hoag).



Distribution and Habitat
Found only in the Champlain and Vermont valleys during VBS, most commonly in Champlain islands and the southernmost Vermont Valley. Found in wooded and shrubby swamps, bogs, and other wetlands; also woodland openings and edges as well as fields and meadows adjacent to wetlands. Hostplants are sedges, especially Tussock Sedge (Carex stricta), but possibly other species such as C. gracillima, C. lacustris, C. languinosa and Rhynchospora inundata.


Present
Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Block
Total Blocks
Vermont Biophysical Regions

Common Ringlet *Coenonympha tullia* (Müller, 1764)

In 1931 Holland wrote that the eastern range was "northern Ontario and Quebec to Labrador and Newfoundland." They have since spread southward and arrived in Maine in 1968, Massachusetts in 1978 and were first noted in Vermont in 1980. They are now abundant throughout New England. On warm days, males patrol with a bouncy flight, but during cool northern mornings, both males and females remain perched on blades of grass. First through fourth stage caterpillars overwinter in mats of dead grass. Unlike most Satyrines, the Common Ringlet relies predominantly on nectar when feeding.

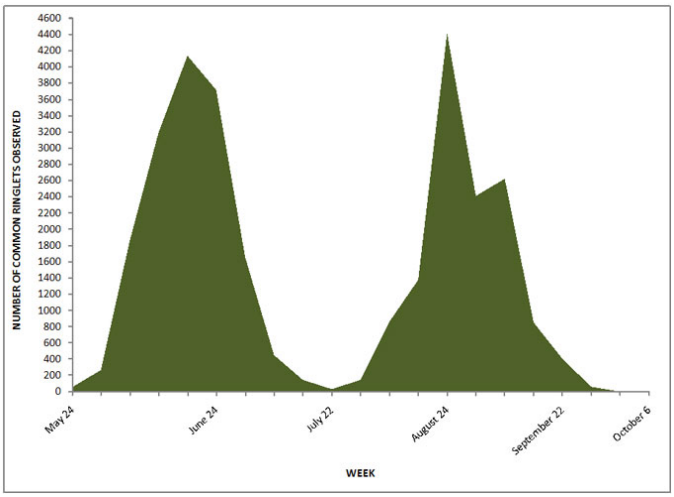
Resident
Common

Conservation Status
Vermont S5
Global G5

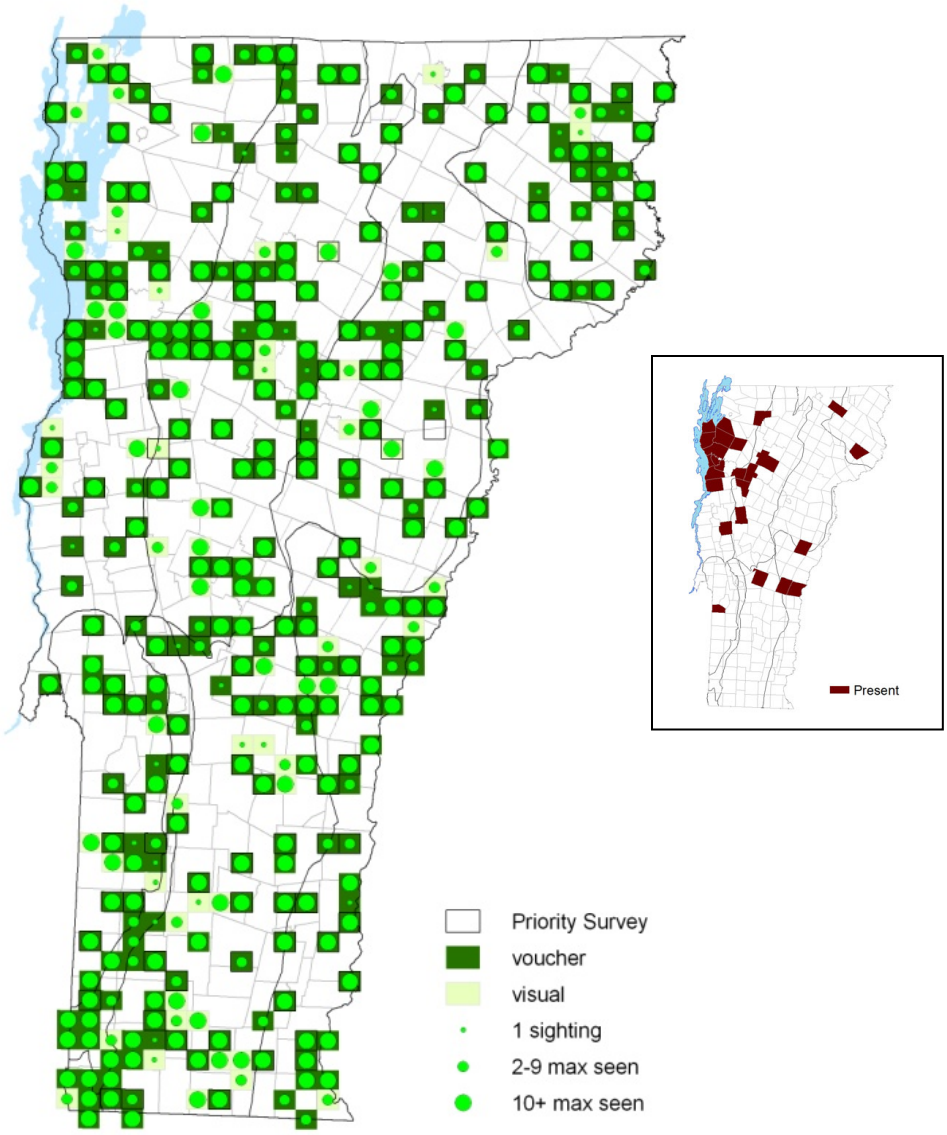
North American Range
Holarctic. In North America from Alaska south through the western mountains to Baja California Norte, southeast Arizona, and central New Mexico; across southern Canada to Quebec and New England; south to Long Island. Isolated populations in Newfoundland and New Brunswick. The range is still expanding in the East.

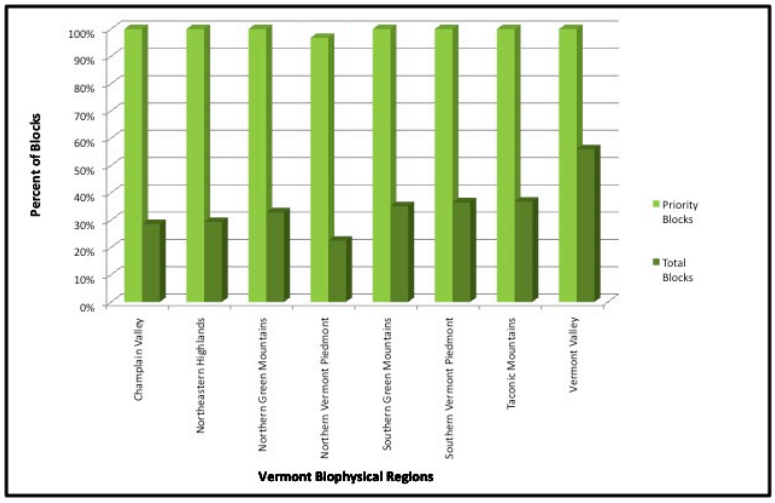
Identification
Extremely variable geographically, with at least four subspecies. Wings range from dark orange-brown to pale cream. Underside of forewing usually has a small eyespot near its tip. Underside of hindwing is gray-green with a wavy white median line.

Flight
During VBS two generations were found. They can be found in astounding abundance during the peak of both flights. Extreme dates: 16 May 2004 in Pittsford (R. Pilcher) and 6 October 2002 in Plainfield (B. Pfeiffer).



Distribution and Habitat
The earliest known record in Vermont was 25 June 1980 in Grafton (S. Parren). By the early 1990s they were common throughout the state. One of the most abundant and widespread butterflies recorded during VBS with only one priority block without a detection. They favor open, grassy habitats such as yards, fields, grasslands, roadsides and open meadows. Caterpillars feed on grasses such as Kentucky Bluegrass (Poa pratensis). Unusual for satyrids, adults regularly nectar. During VBS reported nectaring on blackberry, hawkweed, red clover, bedstraw and cinquefoil.


Present
Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen


Percent of Blocks
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Vermont Biophysical Regions
Priority Blocks
Total Blocks

Little Wood-Satyr *Megisto cymela* (Cramer, 1777)

Flight periods of populations studied in the mid Atlantic suggest that there may be two cryptic sibling species in some parts of it range. In the early morning and late afternoon, adults bask with their wings open while perched on tree leaves or on leaf litter. They have a slow bouncing flight and will rise as far as the tops of tall trees. Males patrol in the shade throughout the day to find females. Eggs are laid singly on grass blades. Fourth-stage caterpillars overwinter.

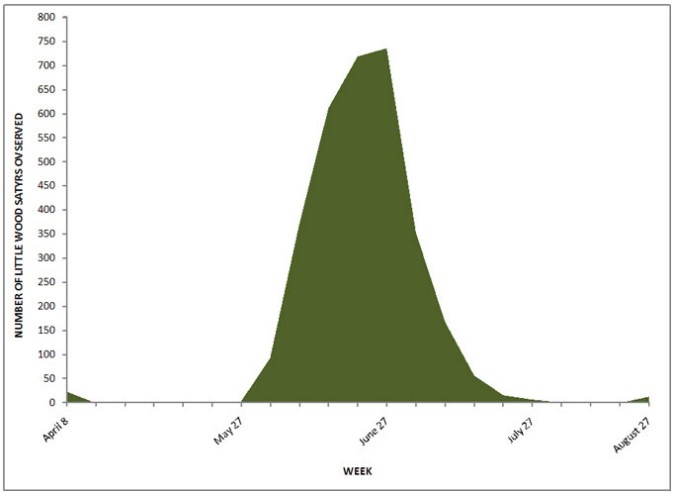
Resident
Common

Conservation Status
Vermont S5
Global G5

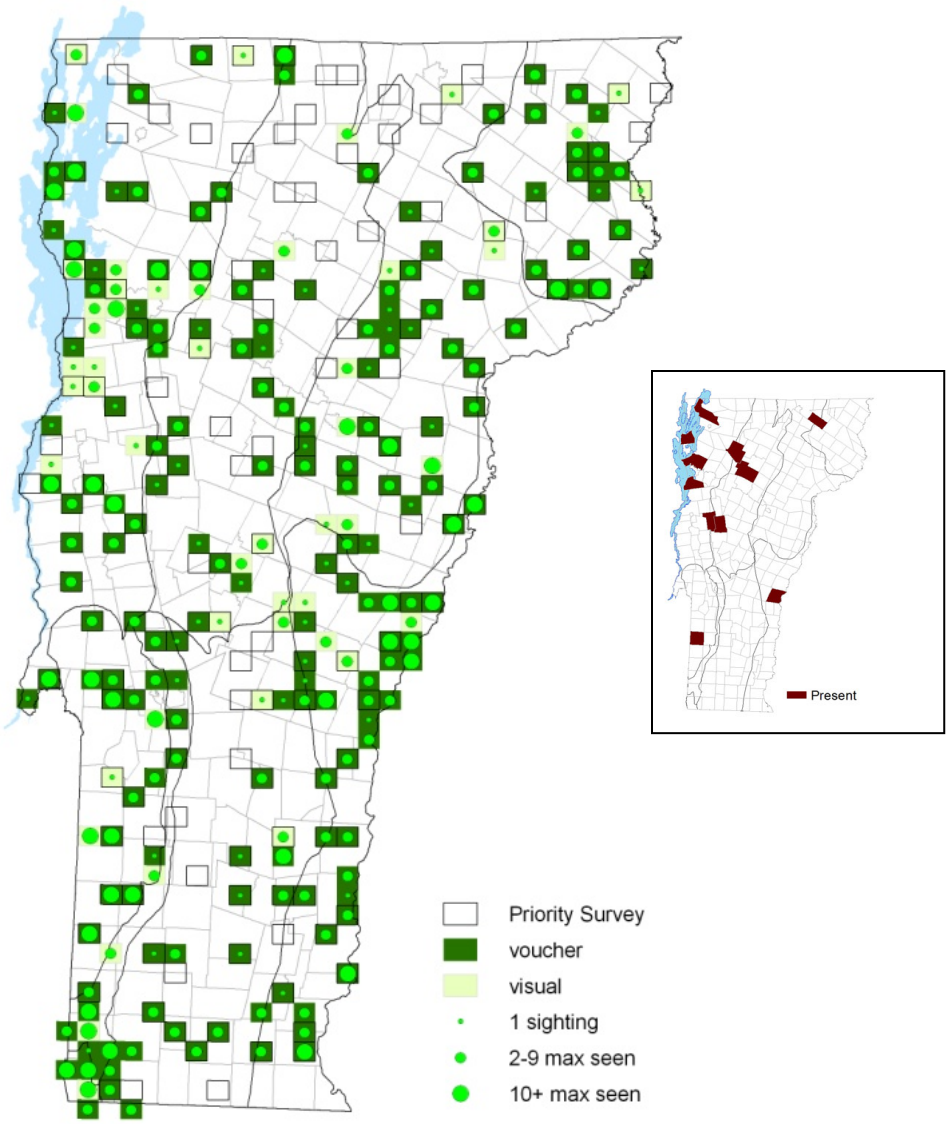
North American Range
Eastern Nebraska and northeastern Colorado south to eastern Texas; east through all of the eastern United States except northern New England, southern peninsular Florida, and coastal Louisiana.

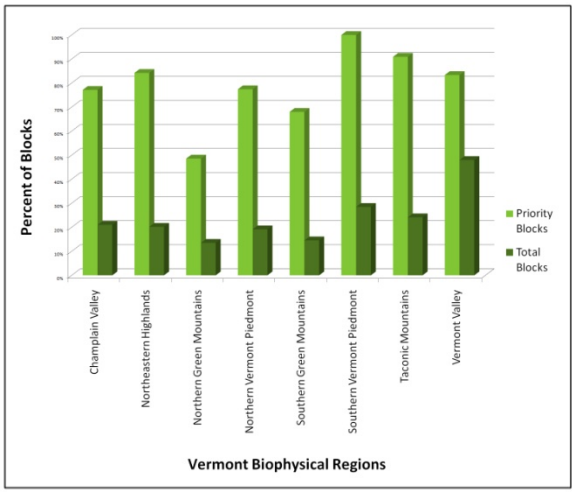
Identification
Light brown. Forewing has two yellow-rimmed black eyespots both above and below. Hindwing has two eyespots on upper side; but may have smaller spots below.

Flight
Appeared to have just one brood during VBS. Extreme dates: 24 May 2004 in Bennington and Pownal (K. Hemeon), 23 August 2003 in Manchester (R. Stewart) and 27 August 2003 in Lincoln (S. Tucker, J. Arrowsmith).



Distribution and Habitat
During VBS it was found throughout the state. Their preferred habitats are grassy woods and openings; especially in limey or basic soils. Adults rarely nectar from flowers, more often feeding on sap, aphid secretions and rotting material. Caterpillar hostplants are Orchard Grass (Dactylis glomerata) and other grasses.


Present
Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Jutta Arctic *Oeneis jutta* (Hübner, 1806)

The southern edge of its range is comprised of a few black spruce bogs in the Northeastern Highlands of Vermont. Males often perch on tree trunks, logs and other vegetation and periodically patrol for mates. If disturbed they fly very fast around and into stands of trees and almost never into the open bog, often returning to the same. With folded wings, it resembles lichen. There are eight weakly differentiated subspecies in North America, with *ascerta* found in Vermont.

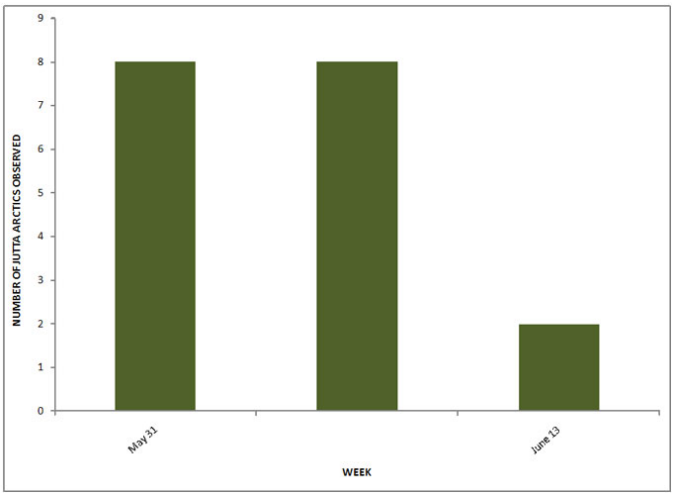
Resident
Rare

Conservation Status
Vermont S1, SGCN
Global G5

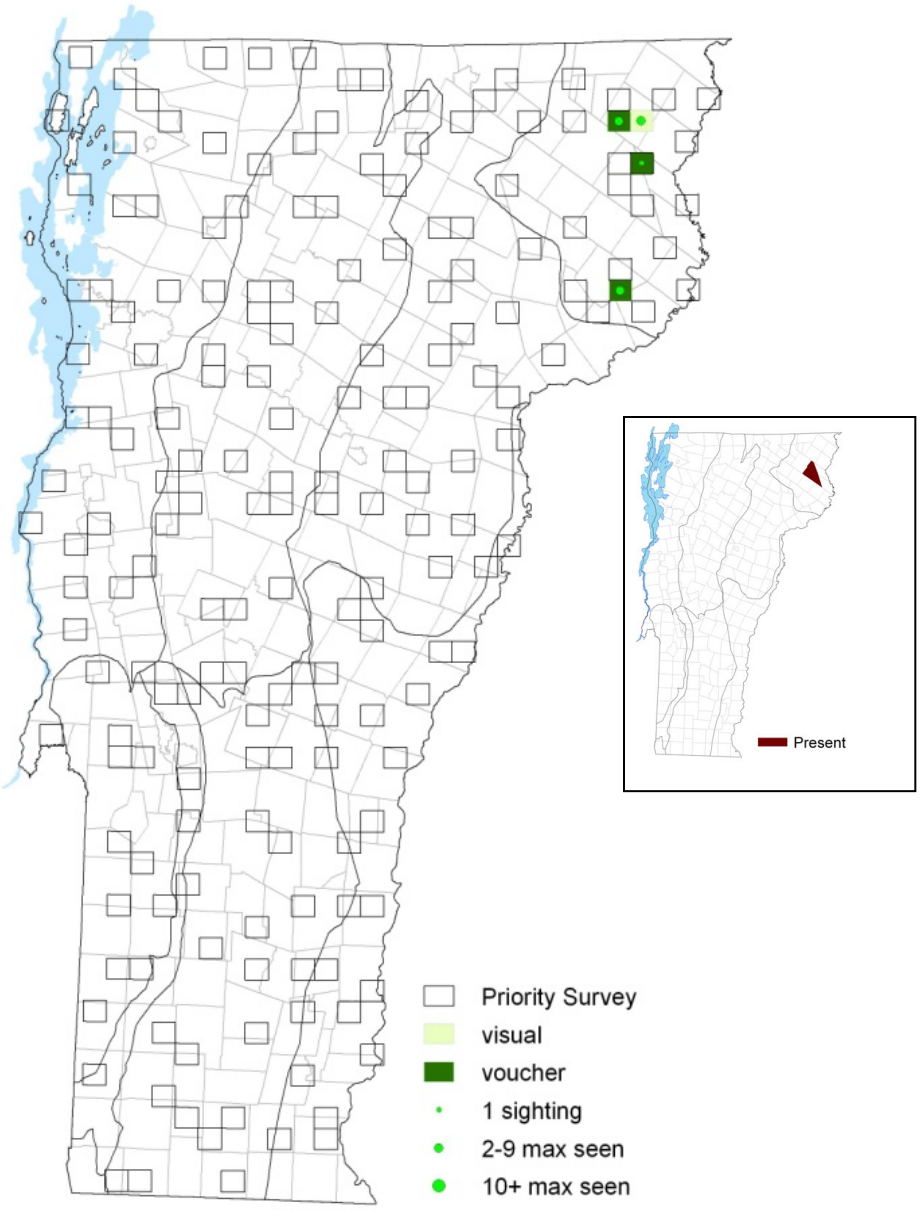
North American Range
Holarctic. In North American subarctic habitats from Alaska east across Canada and the northern Great Lakes to Maine. Isolated populations south in the Rocky Mountains to Colorado.

Identification
Large for an Arctic. Upperside is gray-brown. Both wings have a broken yellow-orange submarginal band surrounding 2-4 black spots. Underside of hindwing is mottled brown and gray with an obscure median band.

Flight
One brood. Extreme dates: 24 May 1998 in Ferdinand (S. Griggs), 29 May 2007 in Victory (B. Pfeiffer), and 16 June 1996 in Ferdinand (J. Hedbor).



Distribution and Habitat
A colony was first discovered in Vermont in Moose Bog WMA, Ferdinand on 3 June 1989 (D.H. Miller). During VBS two additional colonies were found in Victory Bog WMA in Victory (B. Pfeiffer) and Mollie Beattie Bog in Lewis (S. Holt). Restricted to the Black Spruce bogs in the Northeast Highlands of Vermont, hostplants are Dense Cottongrass (*Eriophorum spissum*), *Carex geyeri*, and *C. concinna*. Adults nectar at bog flowers such as Labrador Tea (*Ledum groenlandicum*).


Present
Priority Survey
visual
voucher
1 sighting
2-9 max seen
10+ max seen

Common Wood Nymph *Cercyonis pegala* (Fabricius, 1775)

Resident
Common

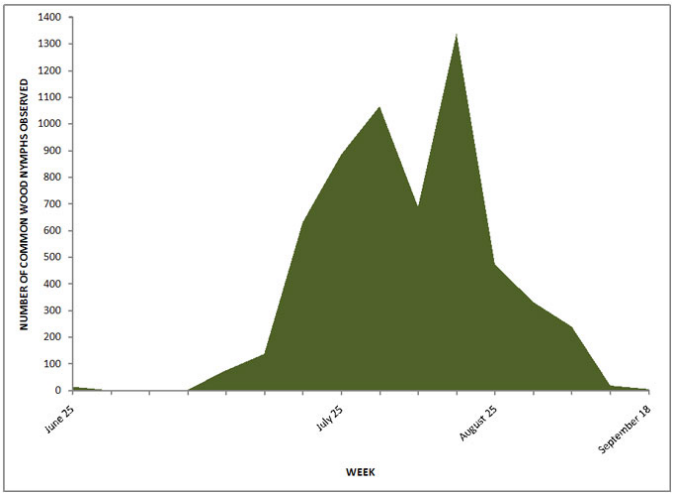
Conservation Status
Vermont S5
Global G5

North American Range
Southern Canada and the continental United States except for most of the Southwest and Texas, southern peninsular Florida, and northern Maine.

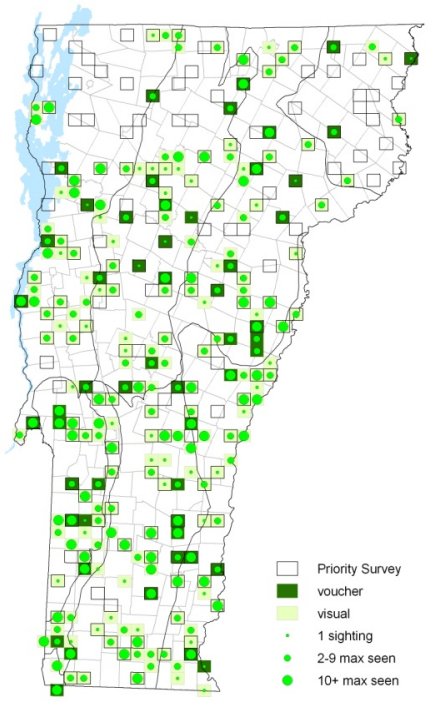
A denizen of open, scrubby habitats, the Common Wood Nymph is easy to identify, but highly variable even within its northern range. Formerly thought to be separate species, the two most common forms are those with a bright, yellow forewing patch (*C. p. pegala*), and those who lack the yellow patch (*C. p. nephele*). Males patrol for females with a dipping, erratic flight through the vegetation while females stay perched in wait. They are rarely seen feeding and die soon after mating. In late summer, females lay eggs singly on hostplant leaves. Caterpillars hatch but do not feed, instead overwintering and feeding in spring. Females emerge later than males.

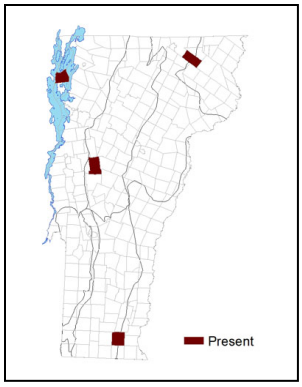
Identification
Geographically variable. Wings are brown. Upperside of forewing has two large yellow-ringed eyespots. Lowerside of hindwing has a variable number of small eyespots. Southern and coastal butterflies are larger and have a yellow or yellow-orange patch on the outer part of the forewing. Inland butterflies are smaller and have the yellow forewing patch reduced or absent.

Flight
One brood found during VBS. Extreme dates: 25 June 2006 in Rochester (G. Hanisek), 25 June 2007 in West Haven (R. Pilcher), 18 September 2002 in Thetford (J. Nicholson, A. Aversa), and 18 September 2006 in Glastenbury (T. Armata).



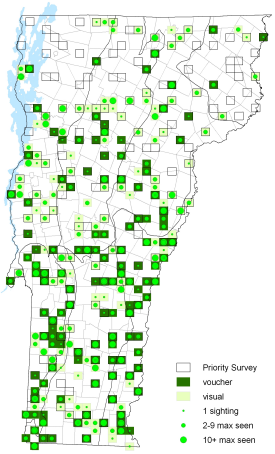
Distribution and Habitat
Found throughout Vermont during VBS, but less common in very northern areas of Champlain Valley and the Northern Green Mountains. *C. p. pegala* was found in southern Vermont and *C. p. nephele* was found in northern and northeast regions of the state, with intergrades between the two forms in many areas. Scudder (1889) wrote that the distributional limits of C. p. *nephele* and the more widespread C. p. pegala meet between the 45 F and 50 F annual temperature isotherm. *C. p. nephele* reaches the southern limit of its New England range in the highlands of northwestern Massachusetts. Common Wood Nymph prefers open, sunny habitats like fields and open meadows. Hostplants are various grasses such as Purpletop (Tridens flavus) and Kentucky Bluegrass (Poa pratensis).

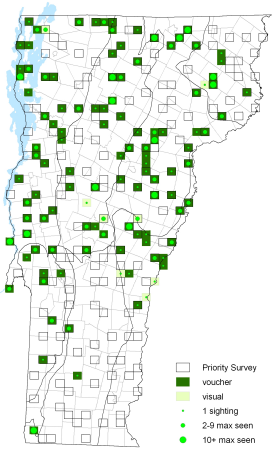


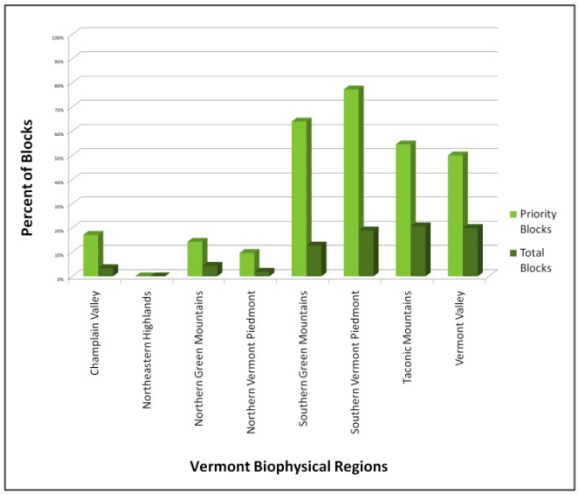


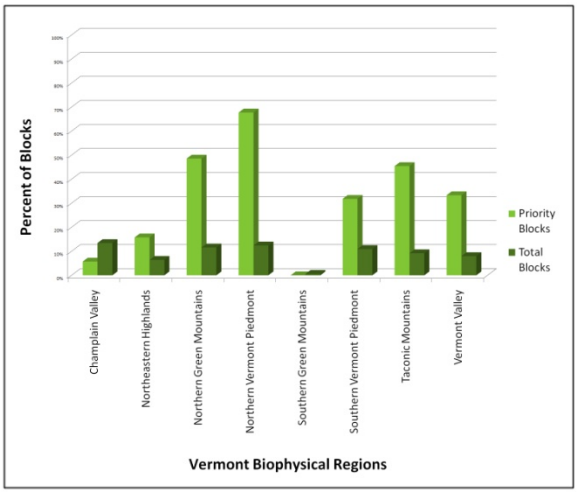
C. p. pegala

C. p. nephele









Skippers: Family Hesperiidae

Worldwide in distribution, skippers are richest in the tropics. More than 3,500 species are described, with approximately 275 in North America, many of which are found only in Arizona and Texas. In Vermont 36 species have been found. Most skippers are small to medium, usually orange, brown, black, white, or gray. A few have iridescent colors. Skippers have large eyes, short antennae with hooked clubs, stout bodies. Their rapid flight makes their wing beats appear blurred. Males have scent scales found in modified forewing patches called a stigma. Globe-shaped eggs are laid singly.

Subfamily: Spread-winged Skippers (Eudaminae)

Formerly included in subfamily Pyrginae as a tribe Eudamini. There are 55 genera with most found in the tropics.

Vermont Species:

- Silver-spotted Skipper (Epargyreus clarus)
- Long-tailed Skipper (Urbanus proteus)
- Southern Cloudywing (Thorybes bathyllus)
- Northern Cloudywing (Thorybes pylades)

Silver-spotted Skipper *Epargyreus clarus* (Cramer, 1775)

This butterfly provides welcome relief for those mired in ambiguous skipper identification. It has a strong, though erratic, flight. It is often found in open urban areas. Adults perch upside down under leaves at night and on hot or cloudy days. To seek females, males perch on branches and tall weeds, and occasionally patrol. Females lay single eggs near the host trees, and the caterpillars search for their proper host. Young caterpillars live in a folded leaf shelter; older larvae live in a nest of silk-sown leaves.

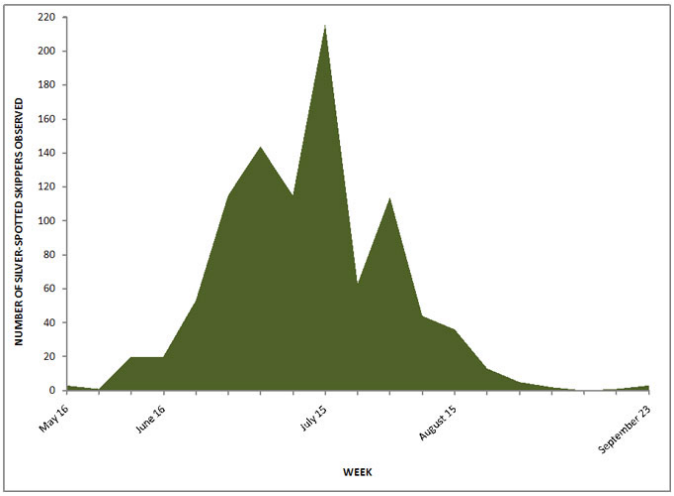
Resident
Common

Conservation Status
Vermont S5
Global G5

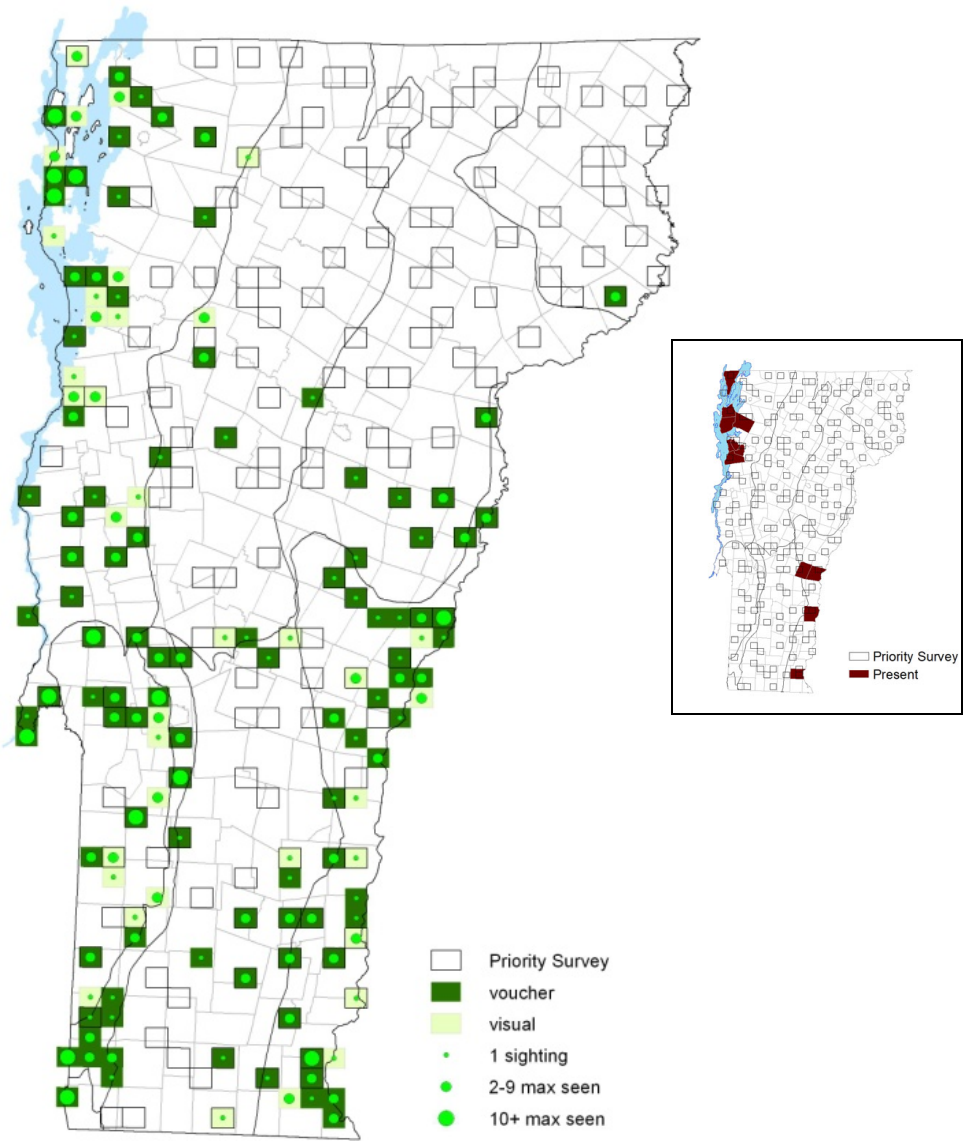
North American Range
Extreme southern Canada and most of the continental United States except the Great Basin and west Texas; northern Mexico.

Identification
Large and easy to identify. Wings are brown-black; hindwing is lobed. Forewing has transparent gold spots and is long and pointed; underside of hindwing has a metallic silver band.

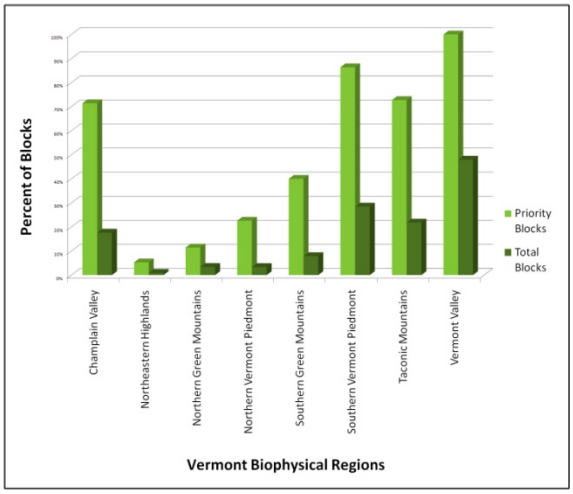
Flight
One brood. Extreme dates: 16 May 2004 in Springfield (B. Pfeiffer) and 24 September 2002 in Grand Isle (D. Hoag).



Distribution and Habitat
Conspicuously absent from the northern third of Vermont outside of the Champlain Valley. They prefer open woods. Caterpillar hostplants include a variety of woody legumes. In Vermont these may be: Black Locust (*Robinia pseudoacacia*), Tick-trefoils (*Desmodium*), and Groundnut (*Apios americana*). Apparently adults almost never visit yellow flowers, instead preferring Red Clover (*Trifolium pratense*), Thistle (*Cirsium*), Buttonbush (*Cephalanthus*) and Milkweeds (*Asclepias*).


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen

Priority Survey
Present


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Long-tailed Skipper *Urbanus proteus* (Linnaeus, 1758)

Known to stray northward in some years. Only one record for Vermont found on September 6, 1994 (J. Hedbor) in a garden nectaring scarlet runner bean in South Hero. Specimen resides in his personal collection.

Identification
Long hindwing tails. Upperside is dark black-brown; body and wing bases are iridescent blue-green. Males have a costal fold enclosing scent scales on the leading edge of the forewing. Dark row on underside of hindwing is a complete band.

Vagrant
Extremely rare

Conservation Status
Vermont SNA
Global G5

North American Range
Argentina north to peninsular Florida and South Texas. Occasionally strays and colonizes northward.

Southern Cloudywing *Thorybes bathyllus* (J.E. Smith, 1797)

Resident?
Very uncommon

Conservation Status
Vermont SU
Global G5

North American Range
Most of the eastern United States from southern Maine west across the Great Lake States to Minnesota, Nebraska, southeastern Colorado, and northern New Mexico; south to central Florida, the Gulf Coast, and Texas.

Males perch on vegetation, usually on hilltops, seeking females. Some males appear to use the same perch throughout their lives (~ 2 weeks). Females lay eggs singly on the underside of a host plant leaflet. Caterpillars feed on leaves and live in shelters of rolled or tied leaves. Fully-grown caterpillars overwinter.

Identification
Slightly smaller than Northern Cloudywing. Hindwing is elongated. Upperside is dark brown; forewing has a wide band composed of aligned transparent spots. The Southern Cloudywing differs from the Northern Cloudywing by its more prominently angular white spots on the forewing, the largest of which is hourglass-shaped, and its silvery-gray palpi (dark brown in Northern Cloudywing). Male lacks a costal fold.

Flight
Only two known records: 10 June 2004 (J. Burkert) in Bellows Falls – 2 survey block and 16 June 2006 (K. Kluge and T. Rosenmeier) in Wallingford-1.

Distribution and Habitat
This species has extended its range eastward and northward since Scudder‘s time. In Massachusetts Forbes (1960) reported it "much commoner in recent years than in the early 1900s." Larvae feed on various plants in the pea family (Fabaceae) including beggar's ticks (Desmodium), bush clover (Lespedeza), clover (Trifolium), milkvetch (Astragalus), fuzzybean (Strophostyles), and wild bean (Glycine).

Northern Cloudywing *Thorybes pylades* (Scudder, 1870)

An expert generalist that is no more tied to a northern habitat than any other butterfly in the region. The males perch on or near the ground in forest openings to wait for females. Males are fierce. If challenged by another male or different insect, they will readily give chase and try to attack. Eggs are laid singly under leaves of the host plants. Larvae feed on leaves and live in shelters of rolled or tied leaves. Last instar caterpillars hibernate.

Resident
Common

Conservation Status
Vermont S5
Global G5

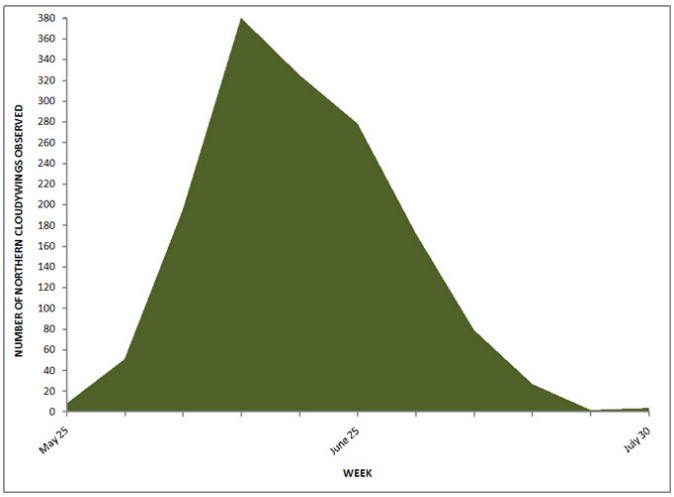
North American Range
Nova Scotia west across southern Canada to British Columbia, south through California and the Rocky Mountain states to Mexico, Texas, the Gulf states, and Florida.

Identification

A medium sized butterfly, slightly larger than the Confused or Southern Cloudywing. Upperside is dark brown; clear spots on forewing are small, triangular, and not aligned. Male forewing has a costal fold enclosing scent scales. Underside is brown with gray overscaling; hindwing has two dark bands.

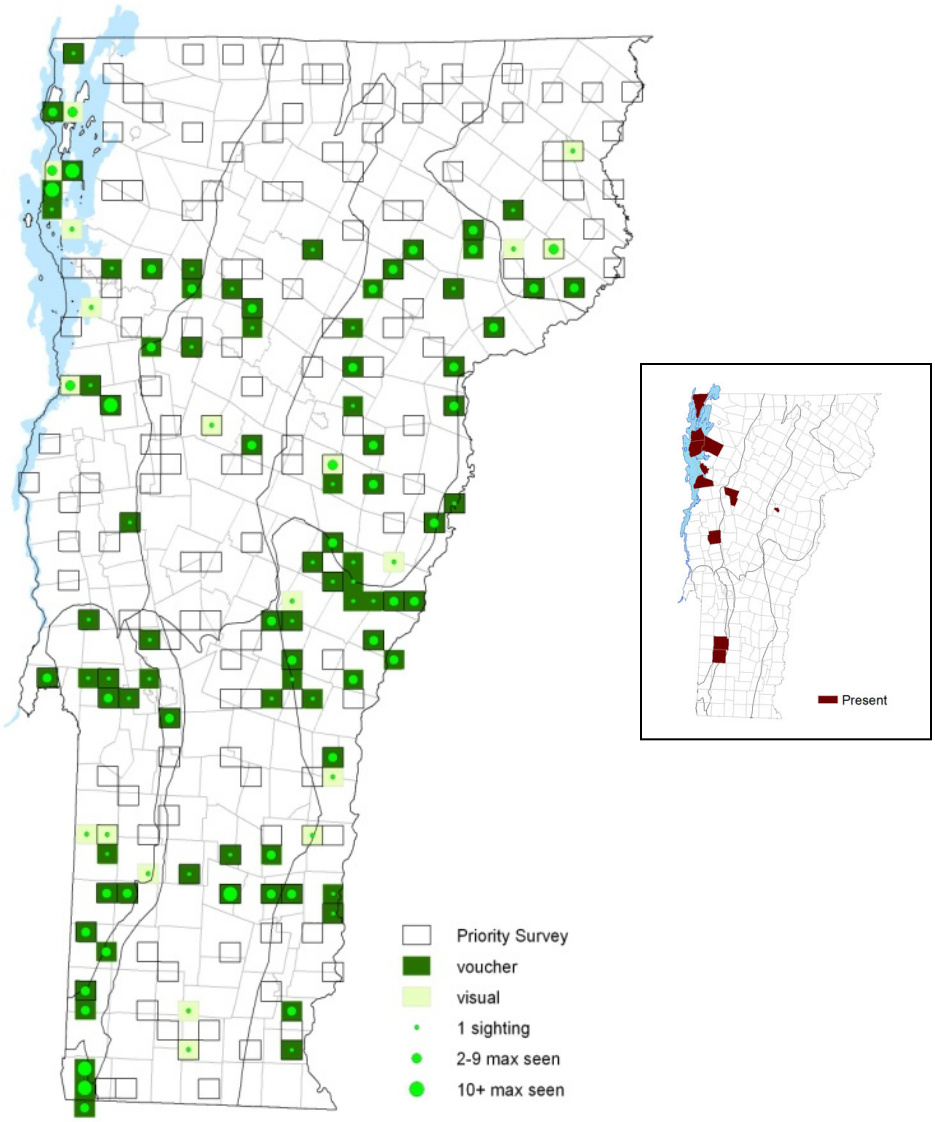
Flight

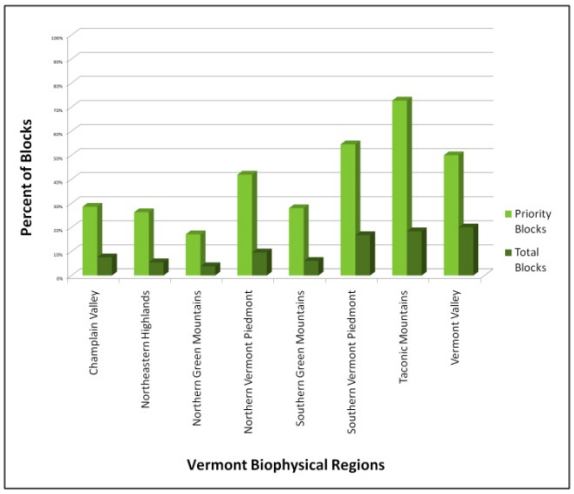
One brood in Vermont, most abundant from mid May through mid July. Extreme dates: 20 May 2004 in Rupert (R. Stewart) and 3 August 2002 in Norwich (K. Kluge), 13 September 1973 in Huntington (J. Viglione).



Distribution and Habitat

Apparently absent from far northern Vermont outside of the Champlain islands. Found in a variety of dry, open habitats including fields, roadsides, and forest edges. Adults nectar at Dogbane (*Apocynum*), Vetch (*Vicia*), Thistle (*Cirsium*) and several others. Larval host plants include various plants in the pea family, including, Clover (*Trifolium*), and Beggars Stick (*Desmodium canadense*).


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen
Present


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Subfamily: Spread-winged Skippers (Pyrginae)

Found nearly worldwide, their systematics has changed considerably in recent years, but uncertainties surrounding the evolutionary relationships are now believed to be resolved. Despite the removal of over 1,000 species from this subfamily, it still is the second-largest.

Vermont Species:

Common Sootywing (Pholisora catullus)
Dreamy Duskywing (Erynnis icelus)
Juvenal's Duskywing (Erynnis juvenalis)
Horace's Duskywing (Erynnis horatius)
Wild Indigo Duskywing (Erynnis baptisiae)
Columbine Duskywing (Erynnis lucilius)
Persius Duskywing (Erynnis perisius)
Common Checkered-skipper (Pyrgus communis)

Common Sootywing *Pholisora catullus* (Fabricius, 1793)

The Common Sootywing is anything but common in Vermont. They have a fast and jagged flight pattern close to the ground making them difficult to closely observe. Adults bask with the wings spread open. To find receptive females, males patrol near the ground in sunny places; mating takes place in the morning and afternoon. Near midday, females lay eggs singly on the tops of host plant leaves. Caterpillars live and feed within shelters of folded leaves. Second brood larvae overwinter in silk and leaf shelters and pupate within the shelter in the spring.

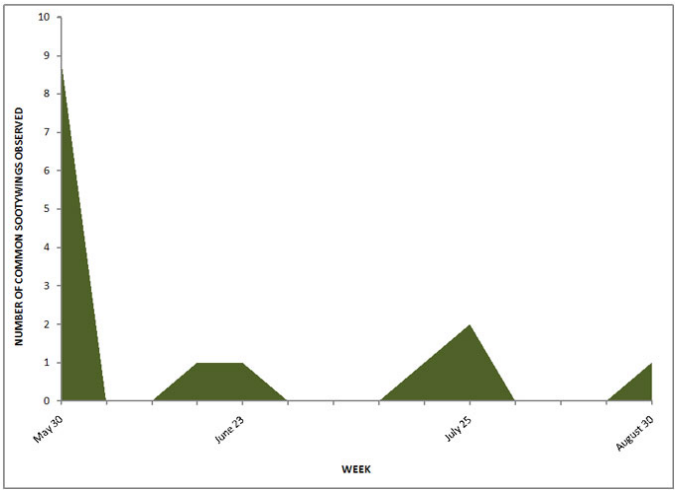
Resident
Very rare

Conservation Status
Vermont S1
Global G5

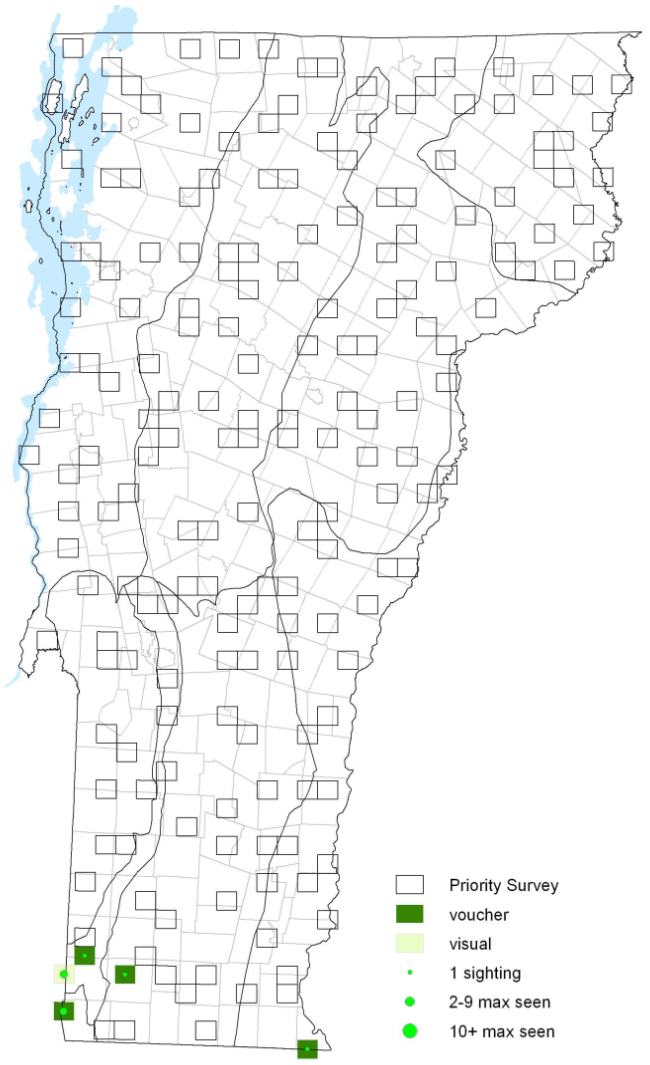
North American Range
Central United States south to central Mexico. Strays and colonizes to southern British Columbia, northern Michigan, southern Quebec, and southern Maine.

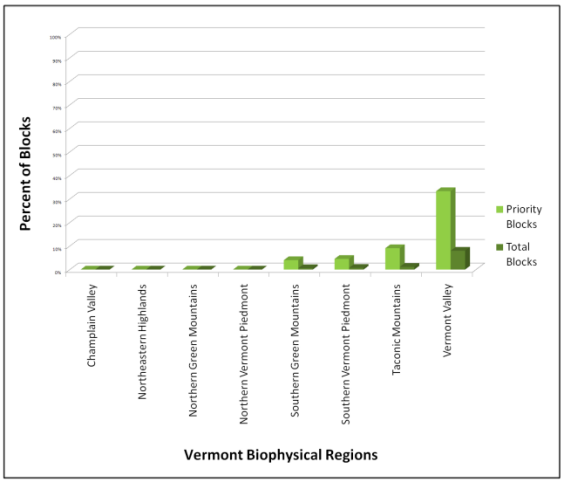
Identification
Upperside is glossy black with small white spots on outer third of forewing. Female has more white spots on the forewing than the male, and a submarginal row of spots on the hindwing. Underside of forewing repeats the upperside; hindwing is solid black.

Flight
With two broods from May through August reported in the north, they were found only very sporadically during VBS in Vermont from June though August. Extreme dates: 24 May 2004 and 30 August 2002 in Bennington (K. Hemeon).



Distribution and Habitat
Recorded only in the southernmost Vermont during VBS. There are no known historic records. Found in both developed and disturbed areas, they can thrive in old landfills, vacant lots, gardens and roadsides. Adults nectar from many different flowers including dogbane (*Apocynum*), White Clover (*Trifolium repens*) and milkweed (*Asclepias*). Caterpillar hosts include Pigweed (*Chenopodium album*), an introduced European species, and other native hosts in the Amaranth family (*Amaranthaceae*).


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Dreamy Duskywing *Erynnis icelus* (Scudder & Burgess, 1870)

How did the Dreamy Duskywing get its name? This species often lacks the multiple white forewing markings common with others in its genus. Thus it was tagged with the Dreamy moniker as if its white markings, or "eyes", are closed. They are low, fast fliers and may gather in groups to "puddle". To seek females, males perch and wait in openings near woods. Females lay eggs singly on host plant leaves. Caterpillars feed on leaves and rest in leaf nests. They overwinter in leaf shelters in last instar.

Resident
Common

Conservation Status
Vermont S5
Global G5

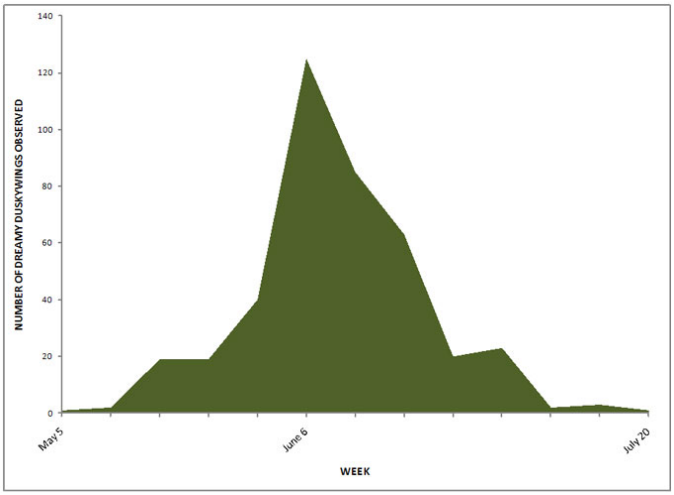
North American Range
Boreal North America from the Northwest Territories east across southern Canada to Nova Scotia; south in the western mountains to southern Arizona and New Mexico; south in the east to Arkansas, northeast Alabama, and northern Georgia.

Identification

Small for a Duskywing. Long labial palpi point forward; antennal clubs are pointed. Wings are black; forewing has no transparent spots but is dusted with gray scales and has bands of dark spots. Male has a costal fold containing yellow scent scales; female has a patch of scent scales on the 7th abdominal segment.

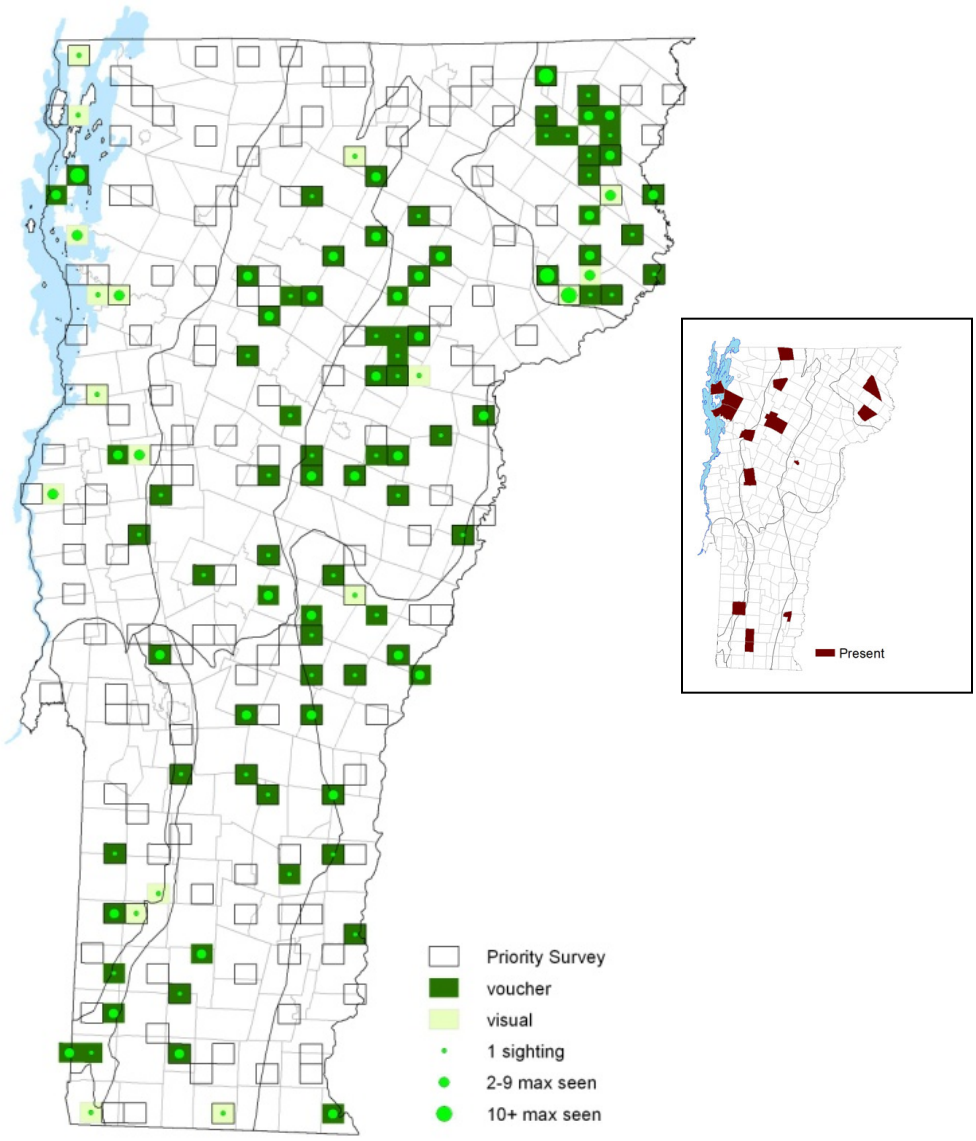
Flight

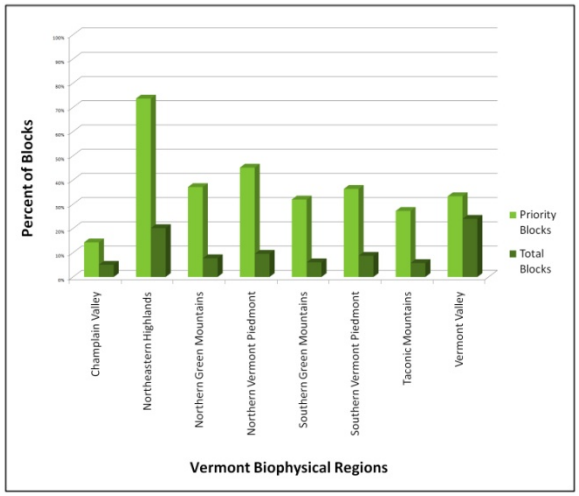
First eclose in early May and continue flying through the end of July. They have one brood and are most abundant near the beginning of June. Extreme dates: 5 May 2006 in Bennington (K. Hemeon) and 20 July 2004 in East Haven (C. Rimmer).



Distribution and Habitat

During VBS they were commonly found throughout Vermont, with the exception of the northern Champlain Valley, outside of the islands, and Northern Green Mountains. They are adaptable generalists and can be found in a variety of open habitats such as woodland openings and edges, streamsides and fields. Adults nectar blueberry (Vaccinium), dogbane (Apocynum), New Jersey Tea (Ceanothus americanus) and lupine (Lupinus). Hosts include willow (Salix), aspen (Populus) and occasionally birch (Betula).


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen
Present


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Juvenal's Duskywing *Erynnis juvenalis* (Fabricius, 1793)

This early emerging, spring butterfly is large for a Duskywing. Two light spots on the outer portion of Juvenal's ventral hindwing are diagnostic and easy to see on an unworn individual. Both males and females "puddle" and nectar. It is a fast flier and will dart away quickly when approached. To wait for females, males perch in forest clearings or edges on bare twigs about 3 to 12 feet above the ground; they will often patrol from these perches. Females lay eggs singly on young leaves and seedlings of the host plants. Larvae feed on leaves and rest in nests of rolled or tied leaves; fully-grown caterpillars hibernate.

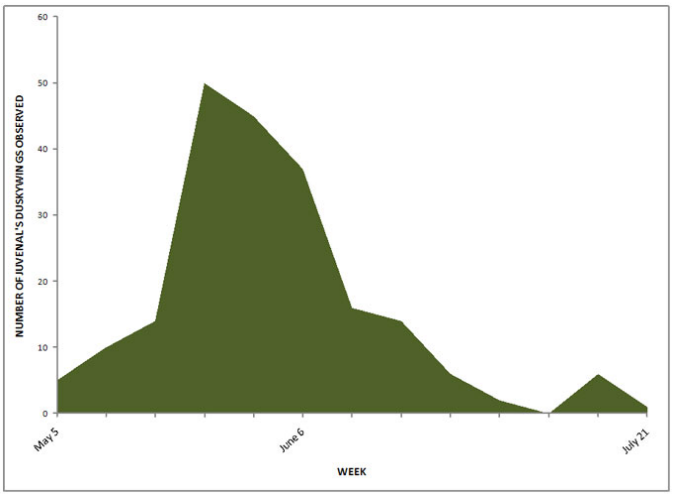
Resident
Common

Conservation Status
Vermont S5
Global G5

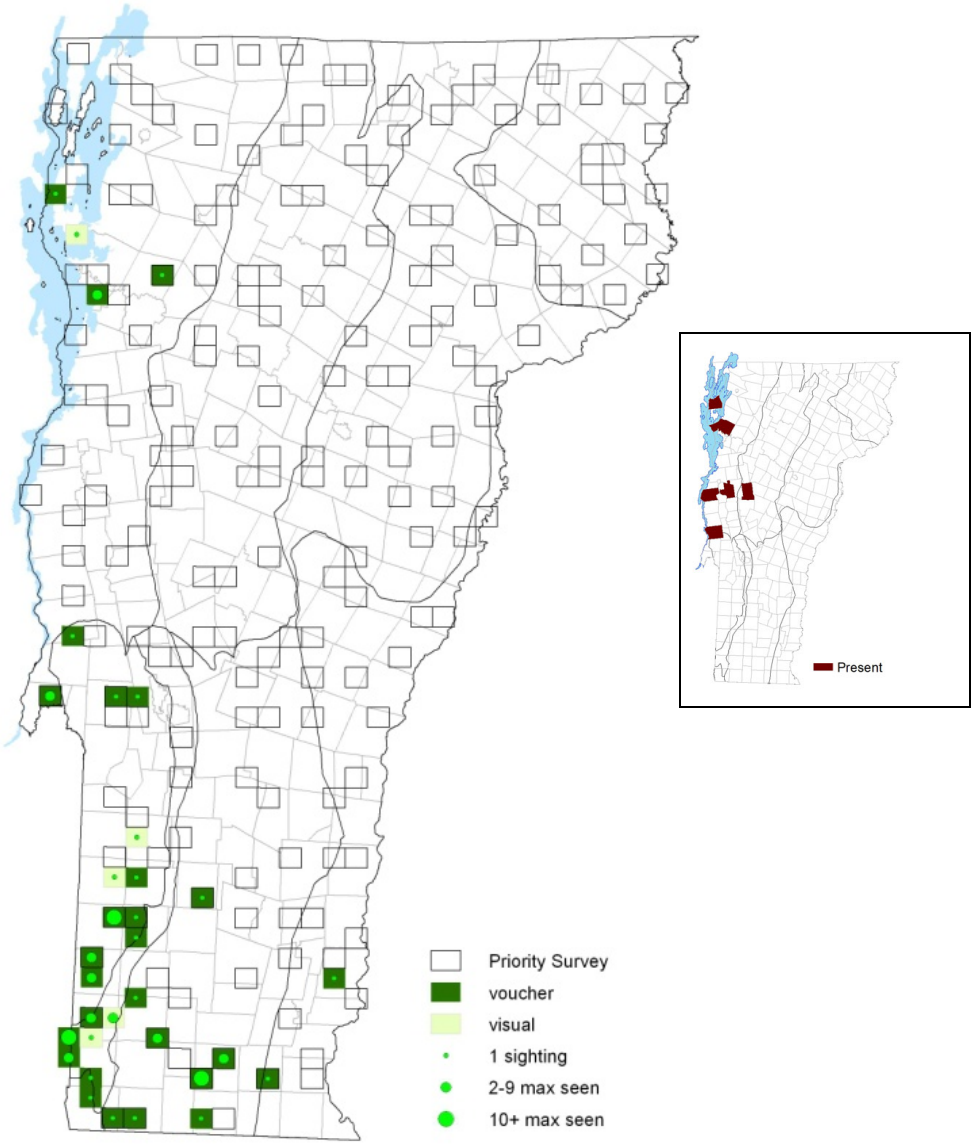
North American Range
Nova Scotia west through southern Manitoba to the Daktas and northeastern Wyoming; south through most of the eastern United States to Florida, the Gulf states, and Texas.

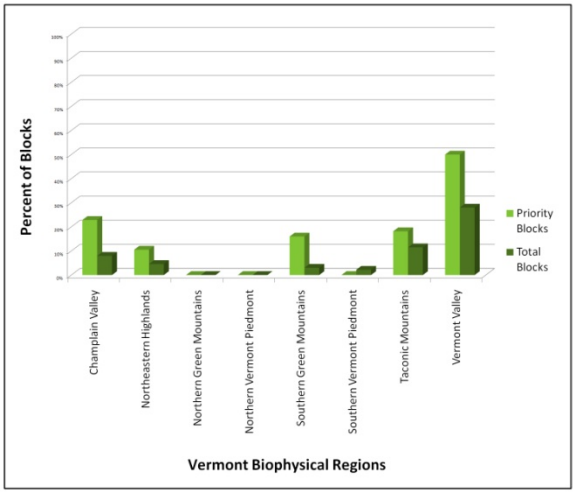
Identification
Upperside of male is brown with clear spots, indistinct dark markings, and scattered white hairs; female has larger markings and spots. Underside of hindwing has 2 round pale spots below the apex. Male has a costal fold containing yellow scent scales; female has a patch of scent scales on the 7th abdominal segment.

Flight
One brood. Adults fly from the beginning of May through mid July. Greatest abundance is near the end of May into early June. Extreme dates: 5 May 2005 in Pownal (K. Hemeon) and Grand Isle (D. Hoag), 5 May 2006 in Bennington and Shaftsbury (K. Hemeon), and 21 July 2004 in Mount Tabor (R. Stewart).



Distribution and Habitat
Juvenal's Duskywing was found predominantly west of the Green Mountains in Vermont. They are generalists and are able to utilize many different habitats including oak woods, edges and trails and scrub oak barrens. Larvae feed on a variety of oaks (*Quercus*). Adults are often seen "puddling". They nectar dandelions (*Taraxacum*), cherries (*Prunus*), wisteria (*Wisteria*), and blueberry (*Vaccinium*).


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen
Present


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Horace's Duskywing *Erynnis horatius* (Scudder & Burgess, 1870)

A common sight in the southeastern states, Horace's Duskywing becomes rare as its range approaches Vermont. This large, darkly patterned butterfly lacks the two diagnostic ventral hindwing spots of Juvenal's Duskywing, their palps are often "snowy" white, and though their flight times overlap, Horace's Duskywing can be seen much later in the season. Males will nectar and puddle. To seek females, they will perch at the ends of twigs on hilltops or slopes about one foot above the ground. Mating has been observed around midday. Females deposit eggs singly on new growth of the host. Caterpillars feed on young leaves and rest in leaf nests. Caterpillars of the last brood overwinter.

Resident
Very Rare

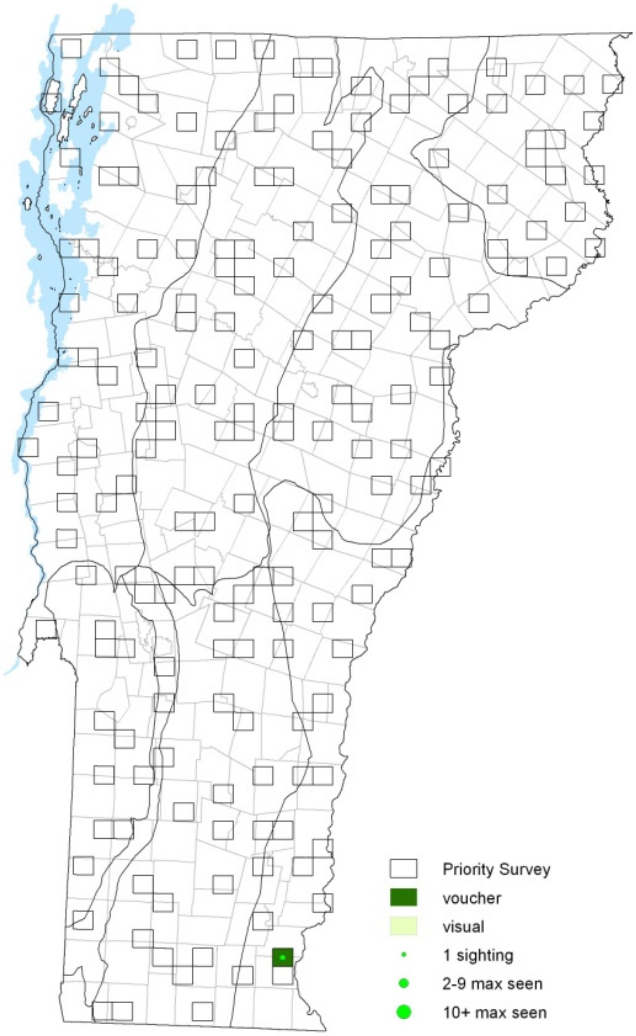
Conservation Status
Vermont SU
Global G5

North American Range
Southern New Hampshire west to eastern South Dakota; south through most of the eastern United States to Florida, the Gulf Coast, and South Texas; south in the west through southeastern Utah, Colorado, northeastern Arizona, and New Mexico.

Identification
Fringes are brown. Upperside of male forewing is dark brown with little contrast and no white overscaling. Upperside of female forewing is light brown with a contrasting pattern and large transparent spots. Underside of hindwing is usually without two spots below the apex. Male has a costal fold containing yellow scent scales; female has a patch of scent scales on the 7th abdominal segment.

Flight
There are no known historic records. The first and only record in Vermont was recorded on August 18, 2007 (K. Hemeon). They are double brooded in other parts of the Northeast, flying from April into September.

Distribution and Habitat
A single record reported from a field in Dummerston, Vermont. Favored habitats are open woodlands and edges, wooded swamps, power-line right-of-ways, open fields, and roadsides. Larvae feed on oaks (Quercus). Potential host plants in Vermont include, Northern Red Oak (*Quercus velutina*), and Scrub Oak (*Quercus ilicifolia*). Adults will nectar from Observed nectaring on Wild Oregano (*Origanum vulgare*) in Vermont. Also reported to nectar on dogbane (*Apocynum*), goldenrod (*Salidago*) and others.


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen

Wild Indigo Duskywing *Erynnis baptisiae* (Forbes, 1936)

The Wild Indigo, Columbine and Persius duskywings belong to the "Persius complex," a confusing group of very similar butterflies. It is rapidly expanding its range and abundance by colonizing plantings of crown vetch (*Coronilla varia*) along roadways and railroads over the past 30 years. Males perch in open areas on low shrubs to wait for females and will vigorously defend their territory from intruders. Eggs are deposited singly on the host plant. Last instar caterpillars from the second brood overwinter.

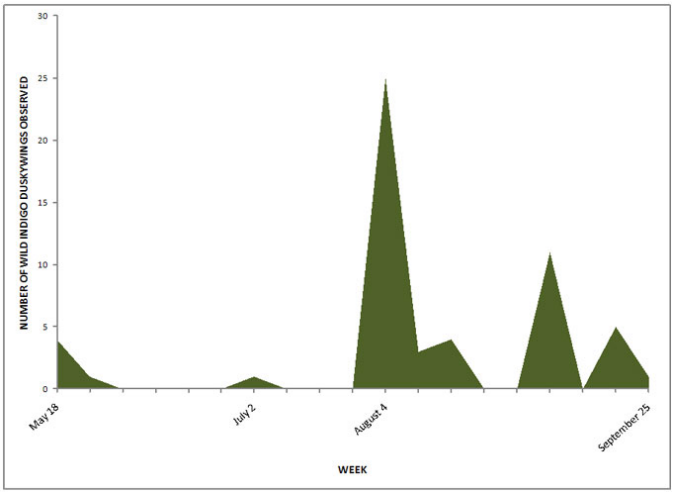
Resident
Uncommon

Conservation Status
Vermont SU
Global G5

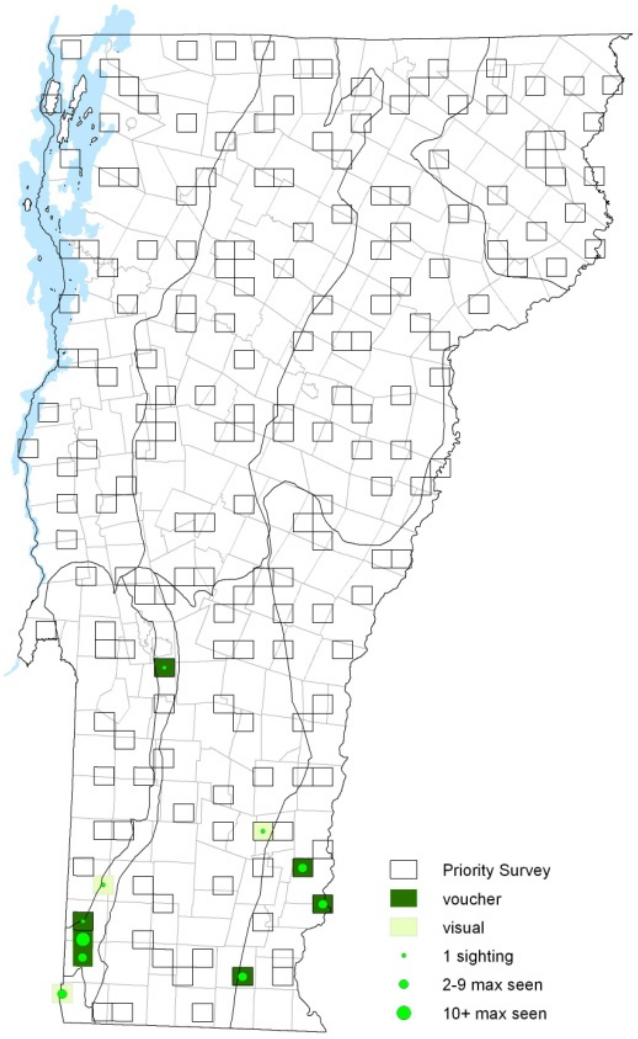
North American Range
Southern New England and southern Ontario west to central Nebraska; south to Georgia, the Gulf Coast, and south-central Texas.

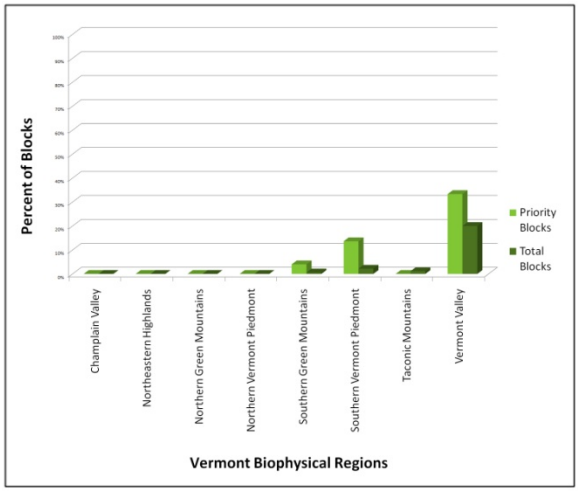
Identification
On average, smaller than other duskywings. Upperside of forewing is dark on the basal half and lighter on the outer half, with a distinct orange-brown patch at the end of the cell. Male has a costal fold containing yellow scent scales; female has a patch of scent scales on the 7th abdominal segment.

Flight
Usually two broods. Found in Vermont from the mid May through September. Highest abundance recorded in early August. Extreme dates: 18 May 2004 in Sunderland (K. Hemeon) and 25 September 2007 in Shaftsbury (K. Hemeon).



Distribution and Habitat
It was found only sporadically in southern Vermont during VBS. They are generalists and prefer open habitats such as barrens, fields and railroad beds. Adults will nectar from a wide array of flowers including dogbane (*Apocynum*), clover (*Trifolium*) and Blackberry (*Rubus*). Host plants include Wild Indigo (*Baptisia tinctoria*), Lupine (*Lupinus perennis*), and now commonly, introduced Crown Vetch (*Coronilla varia*) plantings. No historic records for Vermont were obtained.


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Columbine Duskywing *Erynnis lucilius* (Scudder & Burgess, 1870)

Resident
Very rare

Conservation Status
Vermont SU
Global G4

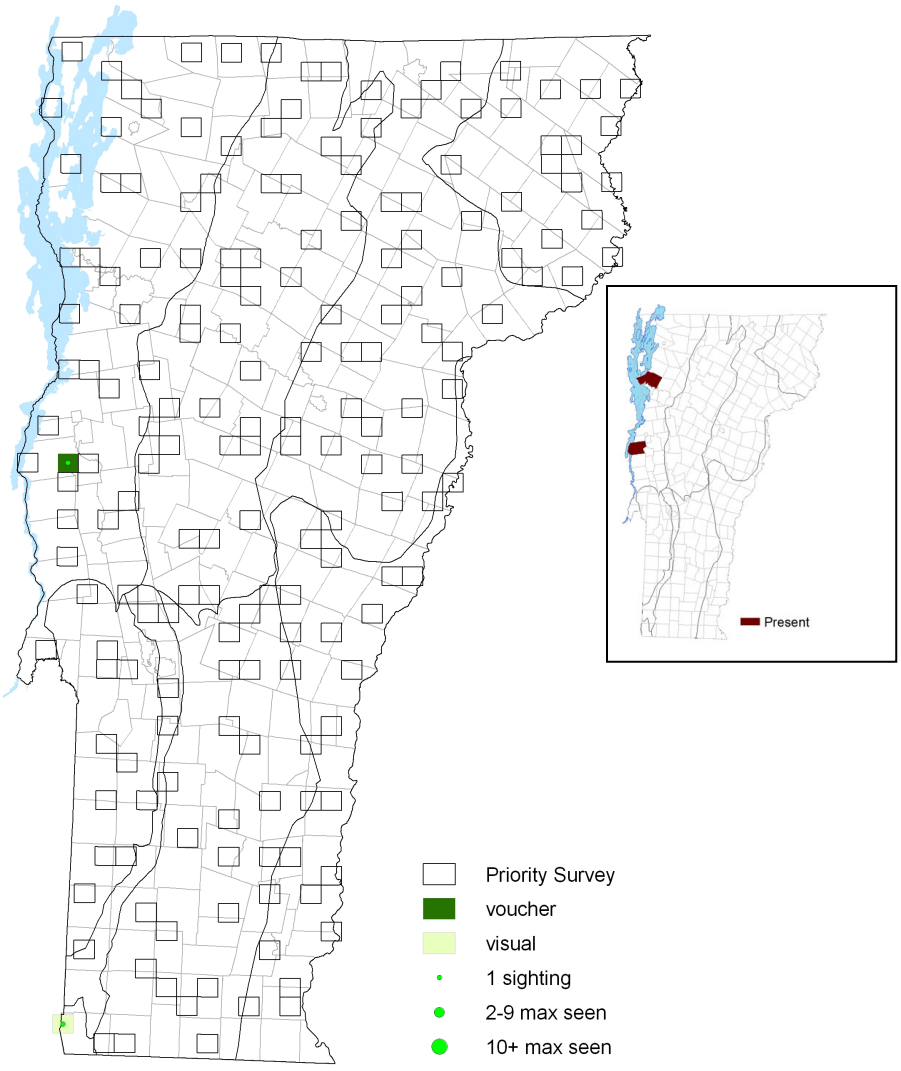
North American Range
Southern Quebec and southern New England west to Minnesota; south to New Jersey and Pennsylvania; south along the Appalachians to Virginia and Kentucky.

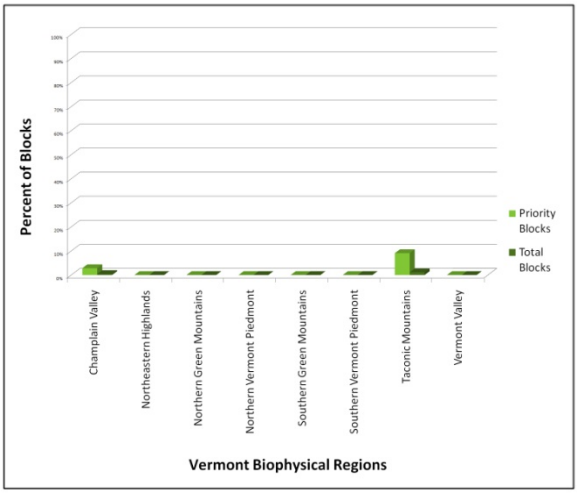
One of our smaller Duskywings and, as is common within this genus, nearly impossible to differentiate from other *Erynnis*, in particular, the Wild Indigo Duskywing. Perhaps the most reliable field identification tactic for differentiating these two species is that the Columbine Duskywing is usually found near its host plant, Wild Columbine (*Aquilegia canadensis*). This butterfly also has a very limited and fragmented range, existing almost exclusively in the northeastern portion of the country. Unlike its congeners, the Columbine Duskywing is often seen nectaring in addition to puddling. They are quick fliers who startle easily and can be difficult to examine closely without netting. Females deposit eggs singly under leaves of the host plant. Caterpillars feed on leaves and rest in shelters of leaves. Last instar larvae from the second brood overwinter.

Identification
Upperside is dark brown; brown patch at end of forewing cell is indistinct. Underside of hindwing has marginal and submarginal rows of well-defined pale spots. Male has a costal fold containing yellow scent scales; female has a patch of scent scales on the 7th abdominal segment. In the field, perhaps best identified by host plant.

Flight
In other parts of their range they have two broods and fly from April through September. The two records from the survey are from May 25 and May 30.

Distribution and Habitat
It is difficult to gauge the range of the Columbine Duskywing within Vermont as we have only two recent and two historic records, but only found west of the Green Mountains. These butterflies favor rocky deciduous or mixed woodland and edges, especially in ravines or gullies. Caterpillar hosts are wild, and sometimes cultivated, columbine. Adults nectar at Wild Columbine and possibly others.


Present
Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Persius Duskywing *Erynnis persius* (Scudder, 1863)

The Persius duskywing is found coast-to-coast, with its major population in the western states and a disjunct eastern subspecies, *E. p. persius*, scattered sparsely across the northern states from Wisconsin to the Atlantic coast. This subspecies is locally frequent, at best, and rare in most of its range. It is in severe decline across its range and apparently extirpated in Ontario. It has Endangered status under state laws in Connecticut, Massachusetts, Minnesota, New Hampshire, New York, and Ohio and is listed as threatened in Michigan, which may be its global stronghold. West of Pennsylvania, Persius Duskywing is found mostly with, but is rarer than, the Karner Blue (Lycaeides melissa samuelis), a federally endangered butterfly.

Resident
Extirpated?

Conservation Status
Vermont SU, SGCN
Global G4

North American Range
In the west, from Alaska and the McKenzie River delta south to southeastern Manitoba; south through the western mountains to southern California, southern Arizona, and southeast New Mexico. In the east, northern New England west to Wisconsin; south in the Appalachians to Virginia.

Identification
Upperside is brown-black. Forewing has few clear dots and very dim markings; patch at end of cell is grayish. Male forewing has many raised white hairs. Hindwing fringes are dark. Male has a costal fold containing yellow scent scales; female has a patch of scent scales on the 7th abdominal segment. The Columbine, Wild Indigo, and Persius dusky wings belong to the "Persius complex," a confusing group of very similar butterflies.

Flight
Unknown for Vermont. One brood in eastern range flying from May to early June.

Distribution and Habitat
One record known from Vermont in 1983 (exact date unknown) from Bennington County by P. Opler (Grehan et al. 1995). This species has apparently undergone a drastic range contraction recently throughout the Northeast. In New England it is currently only known from about a dozen locations in CT, MA, and NH. Host plant in Northeast is Wild Indigo (*Baptisia tinctoria*).

Common Checkered-skipper *Pyrgus communis* (Grote, 1872)

This dazzlingly skipper periodically immigrates into central New England late in the season. They cannot survive very cold winters and may not be permanent residents north of about the 40th parallel, well south of Vermont. Adults roost exposed on a tall plant beginning in late afternoon.

Vagrant?
Very rare

Conservation Status
Vermont SU
Global G5

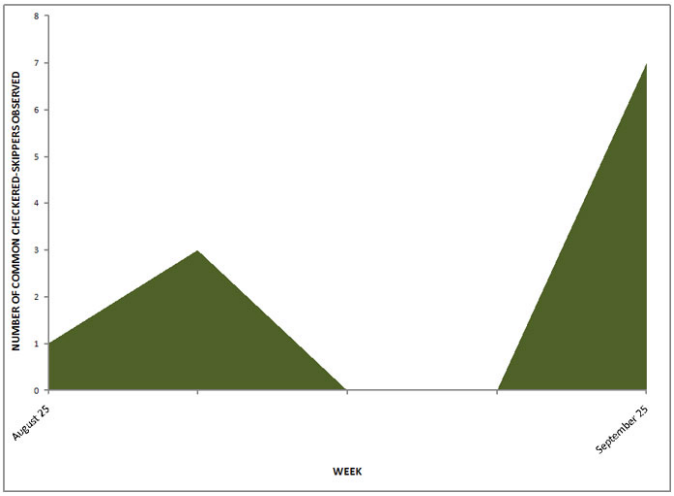
North American Range
Most of the temperate United States south to Gulf coast, west Texas, southeast Arizona, southern California, and mountains of northern Mexico. Colonizes as far north as central Alberta, southern Ontario, and southern New England.

Identification

Upperside of male is blue-gray; female is black. Both sexes have large white spots, which form median bands across both wings. Fringes of male checkered but black checks often reach only halfway to edge of fringe. Male has a costal fold enclosing scent scales on the upperside of the forewing. Underside is dull white with dark gray or olive bands. Spots of the hindwing marginal row are very small; spots of the submarginal row are larger. This species is separated from the White checkered-skipper (*Pyrgus albescens*) with confidence only by dissection and examination of the male genitalia.

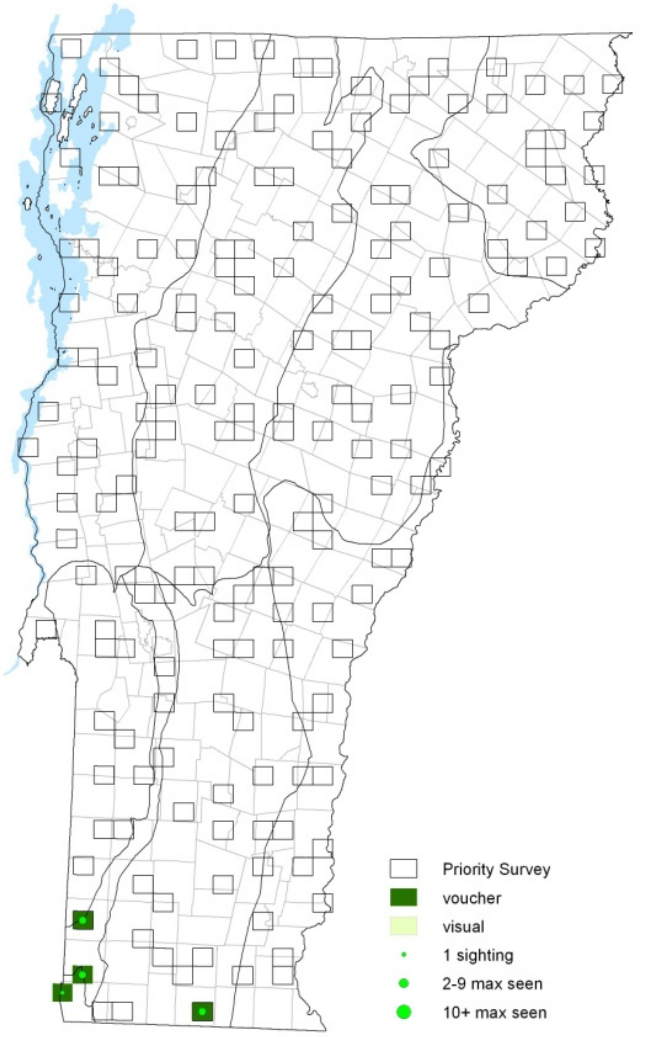
Flight

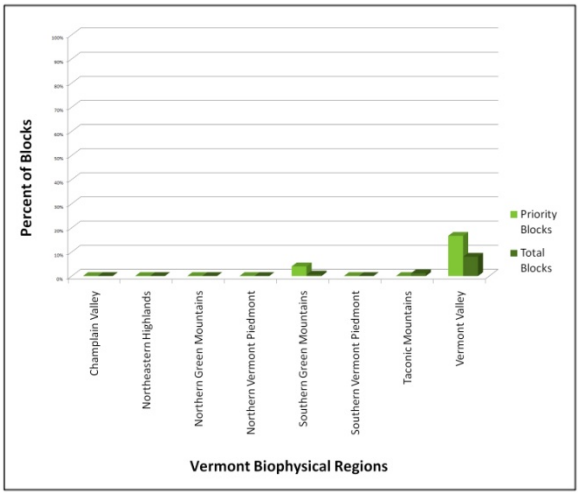
Adults found from March to September in the north, it is only a late season vagrant in Vermont only found in later August and September. Extreme dates: 25 August 2005 in Pownal (K. Hemeon) and 26 Septemeber 2007 in Bennington (T. Armata).



Distribution and Habitat

Probably a vagrant or regular migrant in Vermont, it was only found in the southwest region of the state during VBS. There were four records. Preferred habitats are open areas with low vegetation and bare soil, and they can be found in gardens and yards. Adults nectar at fleabane (*Erigeron*), aster (*Aster*), Red Clover (*Trifolium pratense*) and knapweed (*Centaurea*). Host plants include several species in the mallow family (*Malvaceae*) including Globemallows (*Sphaeralcea*) and Hollyhock (*Alcea*).


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Subfamily: Skipperlings (Heteropterinae)

A small subfamily with only about 150 described species, and one in Vermont.

Vermont Species:

Arctic Skipperling (Cartericephalus palaemon)

Arctic Skipperling *Cartericephalus palaemon* (Pallas, 1771)

It is the only native Vermont skipper that also occurs into Eurasia. Small, dainty and beautifully patterned, the Arctic Skipperling is a boreal butterfly, but not arctic as its name implies. Its flight is low and weak. Males perch on low grasses and wait for females, seldom do they actually patrol in openings. Don't let this butterfly's perching behavior confuse you when you encounter it in the field; it will both bask with its wings spread like a spread-winged skipper, and perch with wings folded like a grass skipper.

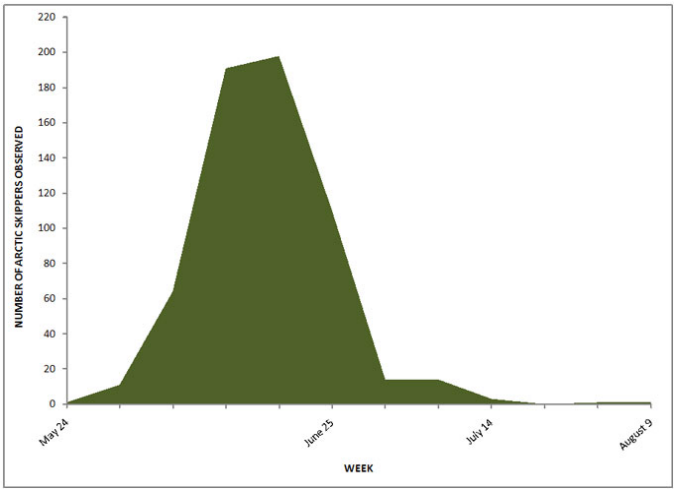
Resident
Common

Conservation Status
Vermont S5
Global G5

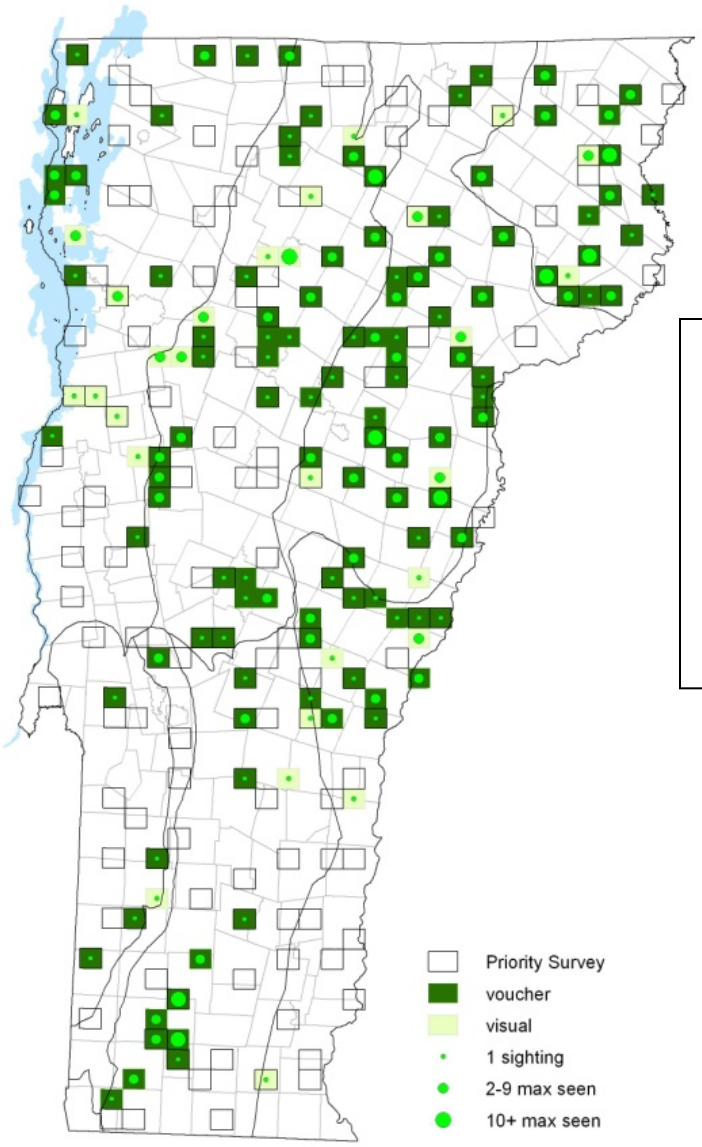
North American Range
Central Alaska south to central California, south in the Rocky Mountains to northwest Wyoming, east across the Great Lakes states to New England.

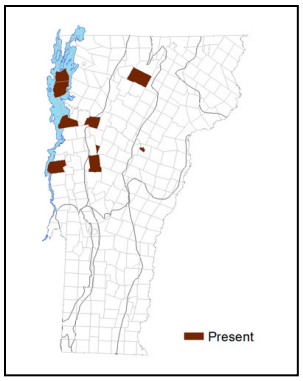
Identification
Small and easy to identify. Upperside is black with squared orange spots. Underside of the forewing is orange with black spots; underside of hindwing is red-orange with cream to whitish spots outlined in black.

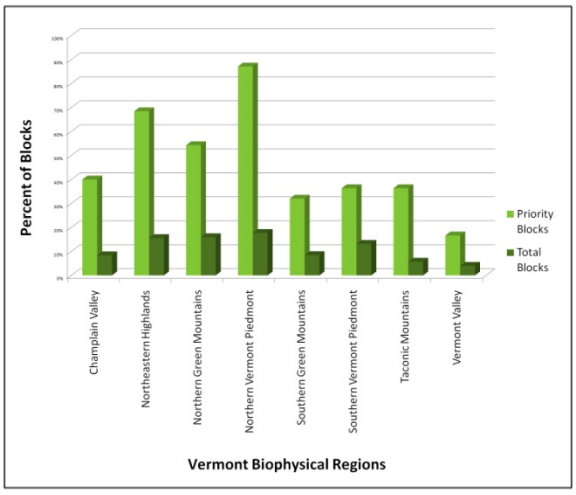
Flight
One brood found from the end of May through the middle of July with peak flight occurring the third week of June during VBS. Extreme dates: Extreme dates: 23 May 1998 in Addison (S. Griggs), 24 May 2006 in Bristol (B. Collins) and 9 August 2006 in Glover (J. Hart).



Distribution and Habitat
Widespread in central and northern Vermont during VBS, but only found above valley floors in southern Vermont. It is often located in glades and openings near heavily forested areas, moist meadows and streamsides. Host plants are grasses including species of *Calamagrostis* and *Panicum*. Adults nectar on Blackberry (*Rubus*) and Iris (*Iris*) as well as others.


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen


Present


Percent of Blocks
Priority Blocks
Total Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Vermont Biophysical Regions

Subfamily: Grass Skippers (Hesperiinae)

Distributed worldwide, they comprise more than 2,000 species, most of which are found in the American tropics. There are 24 species known from Vermont. The small to medium-sized adults usually have abruptly angled antennae. Adults of many temperate species are predominantly orange. Male forewings usually have a stigma with specialized scales. Most species have long proboscises for nectaring. Adult flight is rapid, and perching posture is unique, with the hindwings opened at a wider angle than the forewings. Males of most species perch to search for females. Caterpillars feed on grasses and sedges (monocotyledons) and live in silk and leaf nests that sometimes extend underground. They typically overwinter as caterpillars within their shelters.

Vermont Species:

- Least Skipper (Ancyloxypha numitor)
- European Skipper (Thymelicus lineola)
- Pepper and Salt Skipper (Amblyscirtes hegon)
- Common Roadside-Skipper (Amblyscirtes vialis)
- Fiery Skipper (Hylephila phyleus)
- Common Branded Skipper (Hesperia comma)
- Leonard's Skipper (Hesperia leonardus)
- Cobweb Skipper (Hesperia metea)
- Indian Skipper (Hesperia sassacus)
- Peck's Skipper (Polites peckius)
- Tawny-edged Skipper (Polites themistocles)
- Crossline Skipper (Polites origenes)
- Long Dash (Polites mystic)
- Northern Broken-Dash (Wallengrenia egeremet)
- Little Glassywing (Pompeius verna)
- Hobomok Skipper (Poanes hobomok)
- Mulberry Wing (Poanes massasoit)
- Broad-winged Skipper (Poanes viator)
- Delaware Skipper (Anatrytone logan)
- Black Dash (Euphyes conspicua)
- Dion Skipper (Euphyes dion)
- Two-spotted Skipper (Euphyes bimacula)
- Dun Skipper (Euphyes vestries)
- Dusted Skipper (Atrytonopsis hianna)

Least Skipper *Ancyloxypha numitor* (Fabricius, 1793)

Smaller than the majority of skippers and truly dwarfed by most butterflies in Vermont, this delicate butterfly's size should not be cause to overlook the Least Skipper. Though sometimes mistaken for the European Skipper, a close look at its size and broad, dark, dorsal forewing band should clear up any confusion. Unlike most grass skippers, the male of this species will usually patrol for mates with a low, wavy flight through tall grasses. Females will lay single eggs on the blades of their host grasses and the caterpillars feed on and rest in rolled or tied leaves.

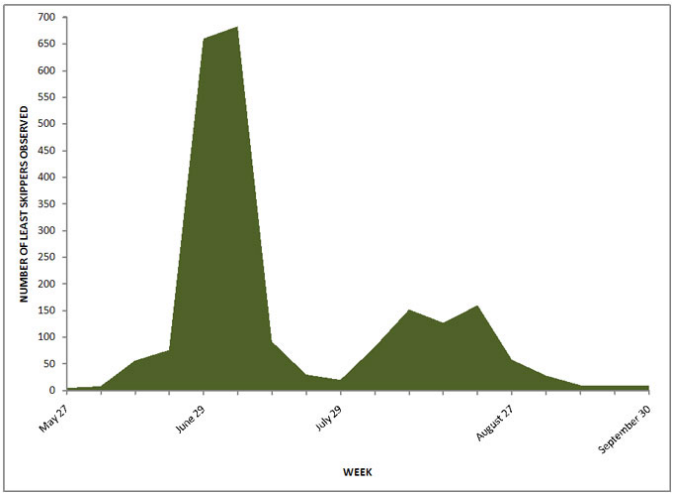
Resident
Common

Conservation Status
Vermont S5
Global G5

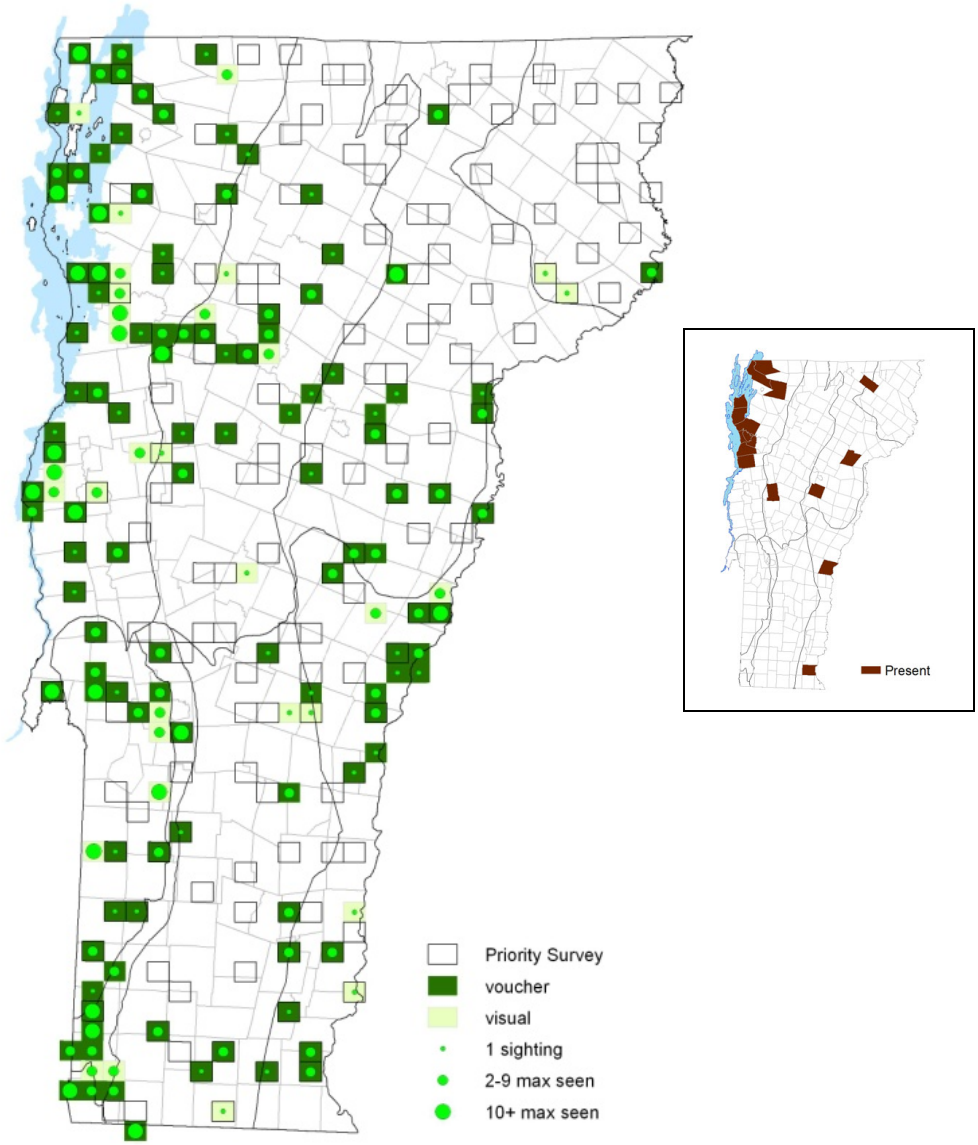
North American Range
Nova Scotia west to southern Saskatchewan; south through the eastern states to Florida, the Gulf states and southeastern Arizona. Strays to Colorado.

Identification
A very small butterfly. Antennae are short. Upperside of forewing is orange with a wide, diffuse black border at the outer margin; hindwing is yellow-orange with a wide black margin. Underside of forewing is black with orange borders at the tip and leading edge; hindwing is yellow-orange.

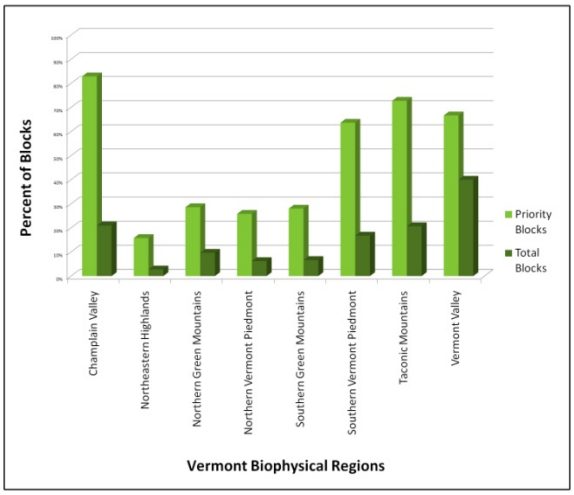
Flight
During VBS it had a long flight period with two to four broods (probably no more than two this far north). Extreme dates: 27 May 2004 in Grand Isle (D. Hoag), 30 September 2006 in Waterbury (M. Ferguson) and 15 October 1996 in Burlington (K.M. Amcek).



Distribution and Habitat
Found throughout Vermont except for the Northeast Highlands during VBS. A highly adaptable species and can be found in various habitats with moist to wet soils and tall grasses including; marshes, ditches, hillsides, fields, slow stream banks. Host plants are Rice Cutgrass (Leersia oryzoides), Bluegrass (Poa), Foxtail Grass (Setaria), and Cordgrass (Spartina). Adults nectar on a variety of flowering plants such as Cow Vetch (Vicia), Ox-eye Daisy (Leucanthemum vulgare), and Clover (Trifolium).


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen

Present


Percent of Blocks
Priority Blocks
Total Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Vermont Biophysical Regions

European Skipper *Thymelicus lineola* (Ochsenheimer, 1808)

A native to Eurasia, it was accidentally introduced in North America in 1910 in London, Ontario. It rapidly expanded its range 20 miles per year, probably aided at times by hay shipments containing eggs. The first known record for Vermont was 18 June 1979 in Burlington (T. Jones).

Females lay their eggs in long stringy clusters on their hostplant; the eggs overwinter and hatch the following spring. In Vermont, it is not uncommon for the European Skipper to outnumber all other species combined in and around hay fields during their peak flight period.

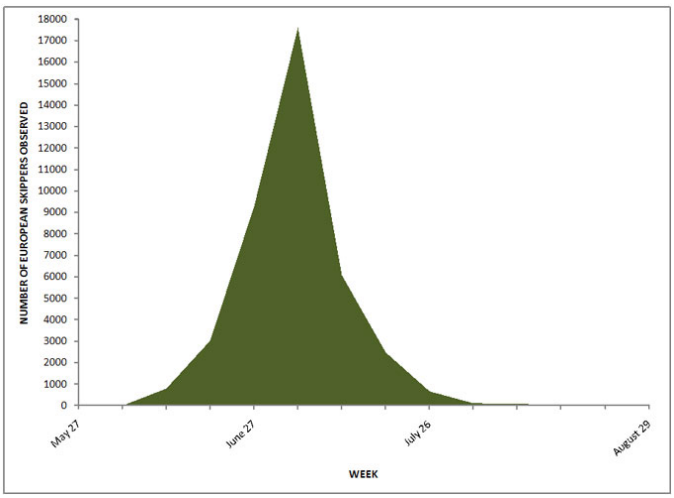
Resident - Introduced
Common

Conservation Status
Vermont SNA
Global G5

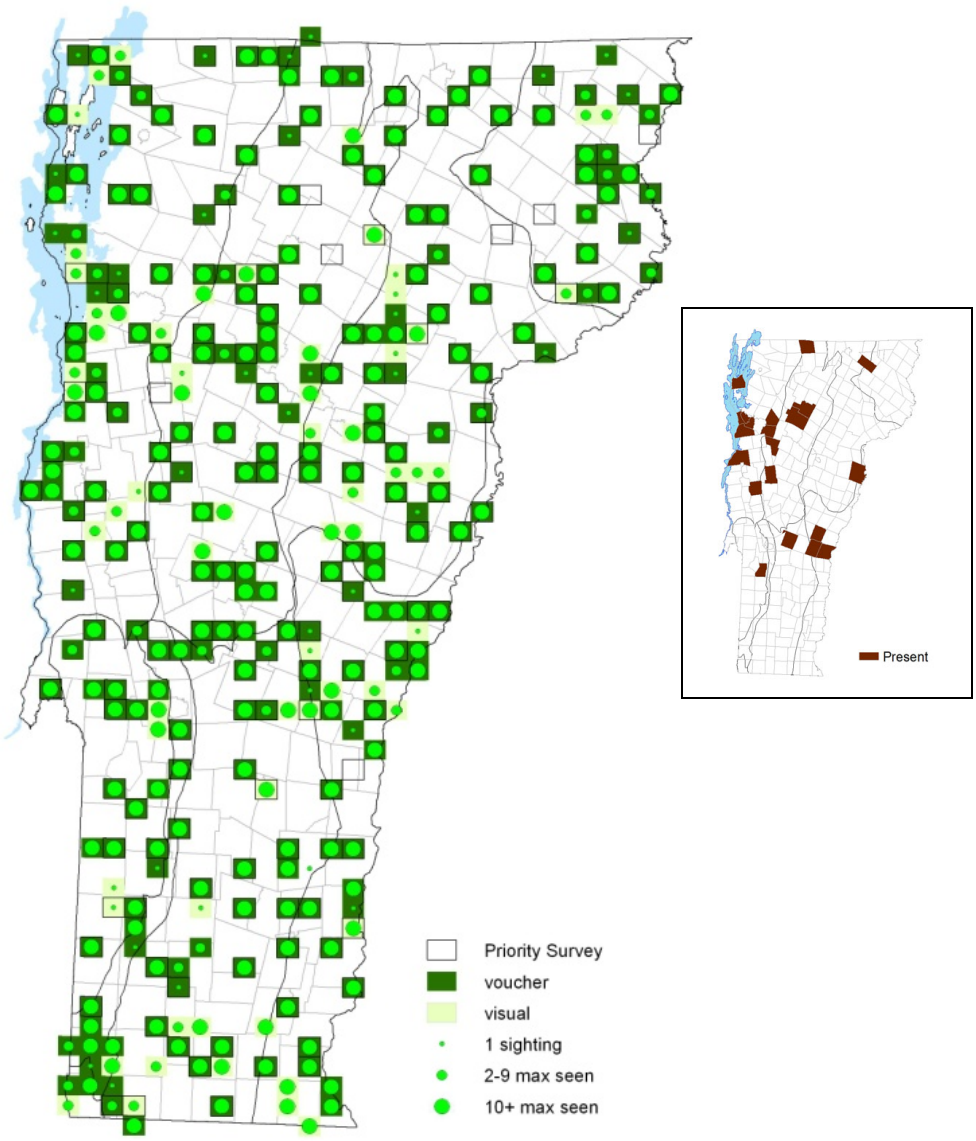
North American Range
Eastern population: Newfoundland west to eastern North Dakota, south to southern Illinois and western South Carolina. Western population: western Colorado, Idaho, Montana, and British Columbia. The range is still expanding, perhaps due to the relocation of eggs in hay shipments.

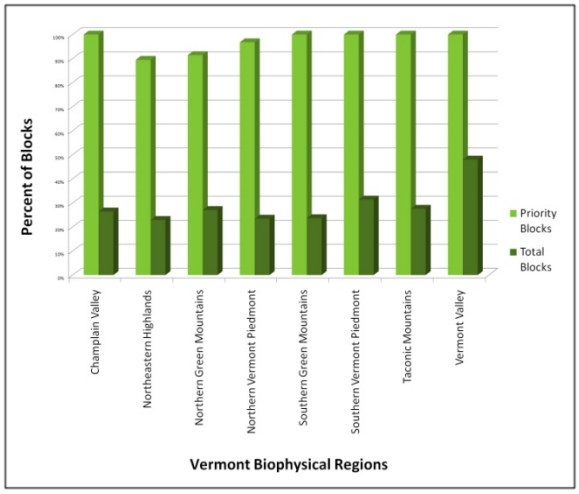
Identification
Very small. Wings are brassy burnt orange; upperside of both wings with black borders and black on the outer portions of the veins. The male forewing has a narrow black stigma. A pale form (*T. l. pallida*) is very rare.

Flight
A relatively short but hyperabundant flight, European Skippers can be found from early June through mid-July with numbers dropping precipitously by the end of July. In Vermont, they are gone by mid August. Extreme dates: 25 May 2005 in Grand Isle (D. Hoag) and 29 August 2007 in Jay (J. Hart).



Distribution and Habitat
Found in nearly every survey block during VBS in open, grassy meadows, hayfields, pastures, abandoned homesteads, damp fields, road edges and even gardens. Their host plants are grasses, mainly Timothy grass (Phleum pratense) and adults nectar from low growing flowers and seem to prefer those with high sugar content and also often introduced including; hawkweeds (Hieracium), thistles (Cirsium), milkweeds (Asclepias) and clovers (Trifolium) and others.


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen
Present


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Pepper and Salt Skipper *Amblyscirtes hegon* (Scudder, 1863)

A dainty, white-fringed skipper with distinctive markings making it easy to identify in the field. Males can be found perching on flat leaves in the sun, lying in wait for a receptive female. Though adult Pepper and Salt Skippers do nectar from flowers, more often they can be found sipping minerals from small puddles or damp ground. Little is reported about the life history of this Hesperid, but they can often be found with Common Roadside-Skippers. Adaptable generalists, there has been a reported decline in populations that appear to coincide with spraying for gypsy moths.

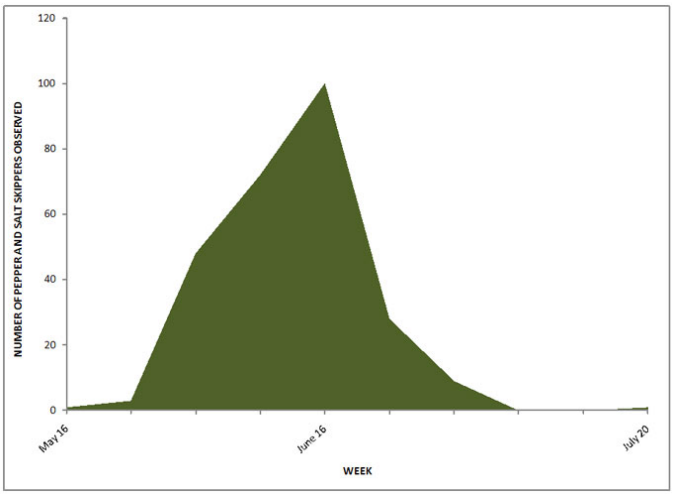
Resident
Common

Conservation Status
Vermont S4
Global G4

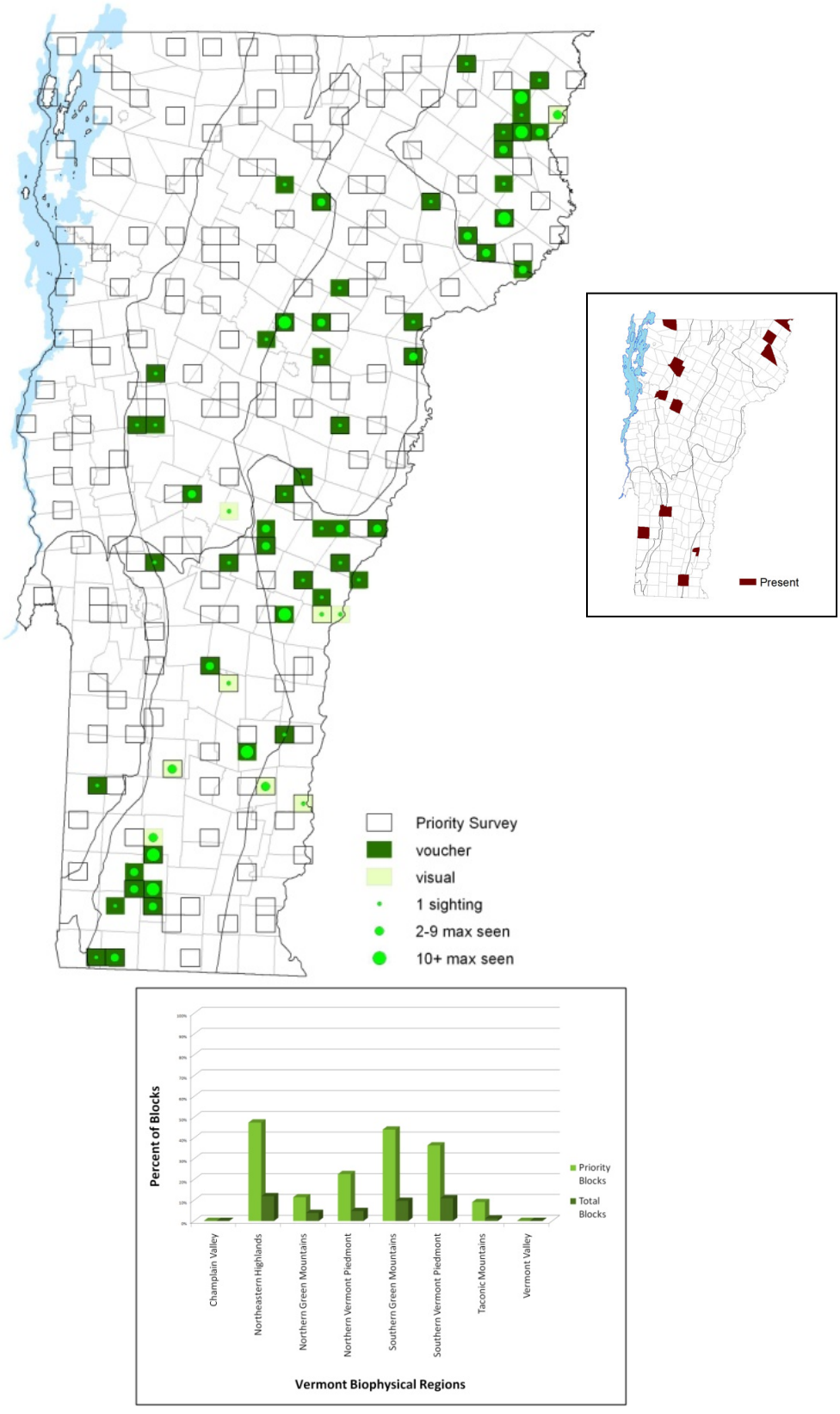
North American Range
Nova Scotia and Maine west to southern Manitoba; south to Georgia, north Florida, and southeastern Texas.

Identification
A very small butterfly. Upperside is reddish brown with pale spots; male forewing has a black stigma. Underside of hindwing is light gray-green with a pale postmedian band.

Flight
One generation with highest counts in mid June during VBS. Extreme dates: 16 May 2004 in Springfield (B. Pfeiffer) and 20 July 2003 in Hartland (T. Rosenmeier and K. Kluge).



Distribution and Habitat
Often found near streams and in forest glades and wet meadows. Conspicuously absent from western Vermont outside of the Green Mountains during VBS. Adults are rarely seen visiting flowers. Hostplants are Kentucky Blue Grass (Poa pratensis) and Indian Grass (Sorghastrum nutans).


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen
Present
Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Common Roadside-Skipper *Amblyscirtes vialis* (W.H. Edwards, 1862)

The Common Roadside-skipper is neither common nor necessarily roadside, though it does tend to take minerals and moisture from bare soil areas like roadsides. These butterflies have a widespread range, but are uncommon throughout it; they are generalists and utilize many different habitats, but are rare within their favored environments. It may be more common than we suspect, but it is inconspicuous and a fast flier and it is possible that many are missed. To await receptive females, males perch on the ground or low plants in forest openings or edges, waving their antennae in small circles. Females deposit eggs singly on the host plants; caterpillars eat leaves, and make shelters of rolled and tied leaves. Caterpillars overwinter.

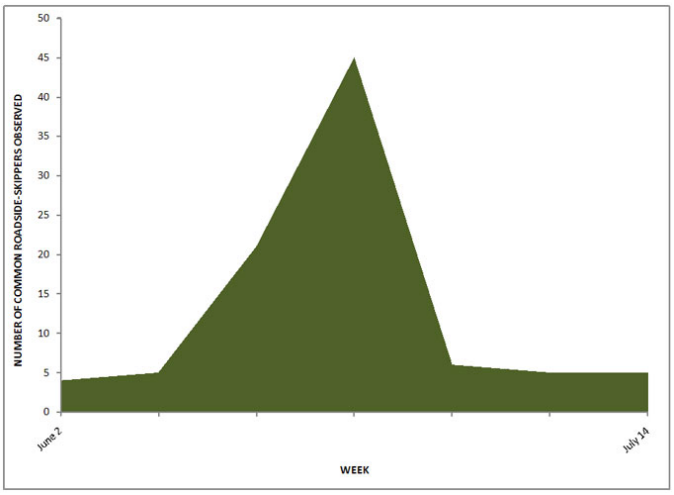
Resident
Common

Conservation Status
Vermont S4
Global G4

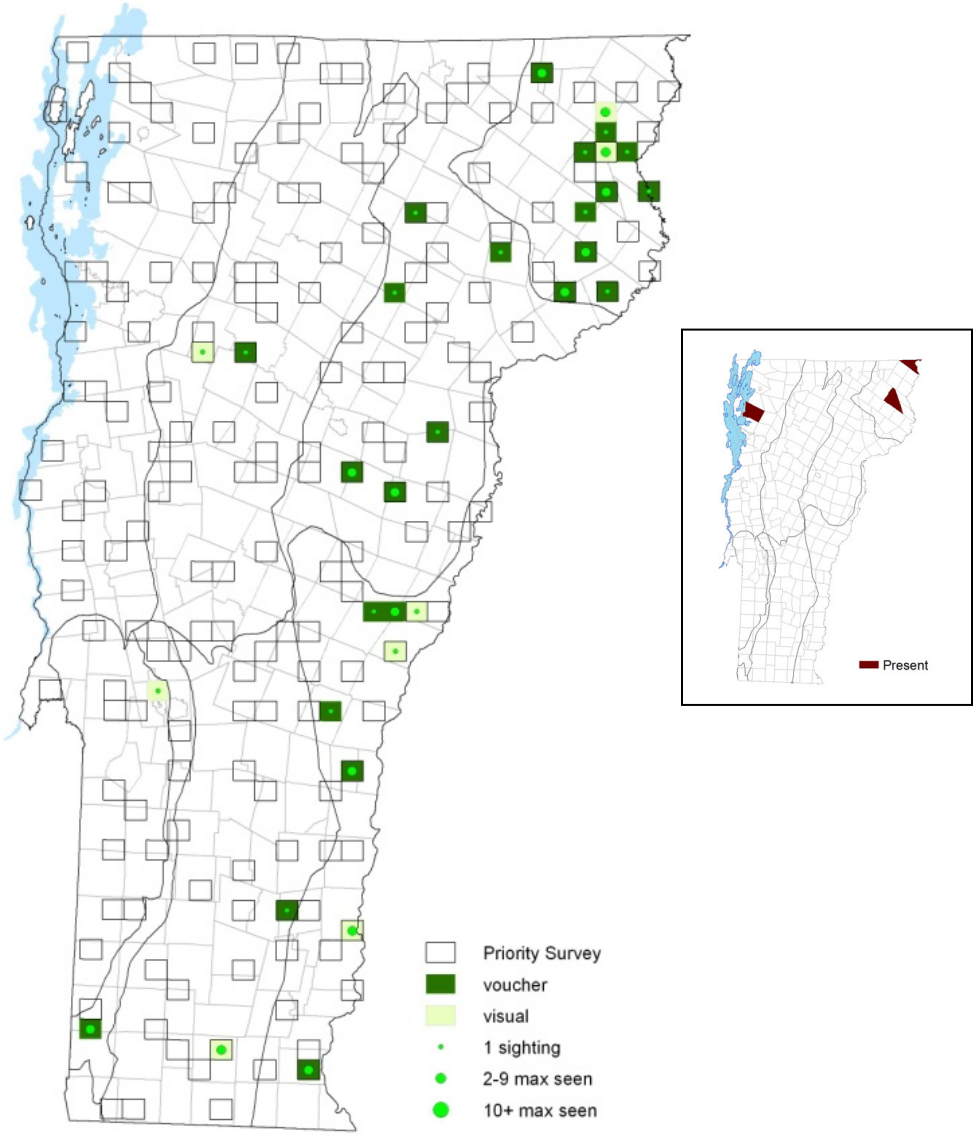
North American Range
The Roadside Skipper is the most widespread skipper in North America. It occurs from British Columbia east across southern Canada to Maine and Nova Scotia; south to central California, northern New Mexico, Texas, the Gulf states, and northern Florida.

Identification
A very small skipper. Upperside is black with a few small white spots at the tip of the forewing. Underside is dark brown with violet-gray at the forewing tip and the outer half of the hindwing.

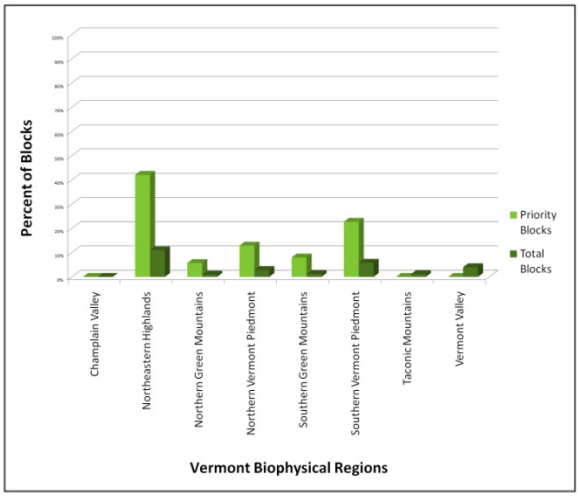
Flight
Like other grass skippers, it had a short flight period beginning in June and lasting through the middle of July during VBS. Extreme dates: 24 May 1995 in Milton (S. Griggs), 31 May 2004 in Bloomfield (B. Pfeiffer) and 14 July 2007 in Lunenburg (A. Aversa).



Distribution and Habitat
Many field guide range maps depict it across Vermont. But the Common Roadside Skipper was only found a predominantly east of the Green Mountains. Their preferred habitats tend to be open areas near woodlands, often close to streams. They can also be found on barrens and in dry disturbed areas. Host plants are various grasses including Wild Oats (Avena), Bent Grass (Agrostis), Bluegrass (Poa), and Bermuda Grass (Cynodon dactylon). Adults prefer to nectar from low growing blue flowers like Selfheal (Prunella), but are not often seen nectaring.


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen

Present


Percent of Blocks
Priority Blocks
Total Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Vermont Biophysical Regions

Fiery Skipper *Hylephila phyleus* (Drury, 1773)

The Fiery Skipper, a southern species, is a vagrant to northern New England. Its breeding range is expanding northward however. Their generalist lifestyle allows them the flexibility to live in a wide array of natural and disturbed habitats. They are rapid fliers, active throughout the daylight hours and constantly seeking flowers to nectar. Males perch in lawns and grassy swales to wait for receptive females. Eggs are laid singly under hostplant leaves and also on other plants and objects. Caterpillars eat leaves and roll and tie them to make shelters, which lie horizontally in the sod.

Vagrant
Very rare

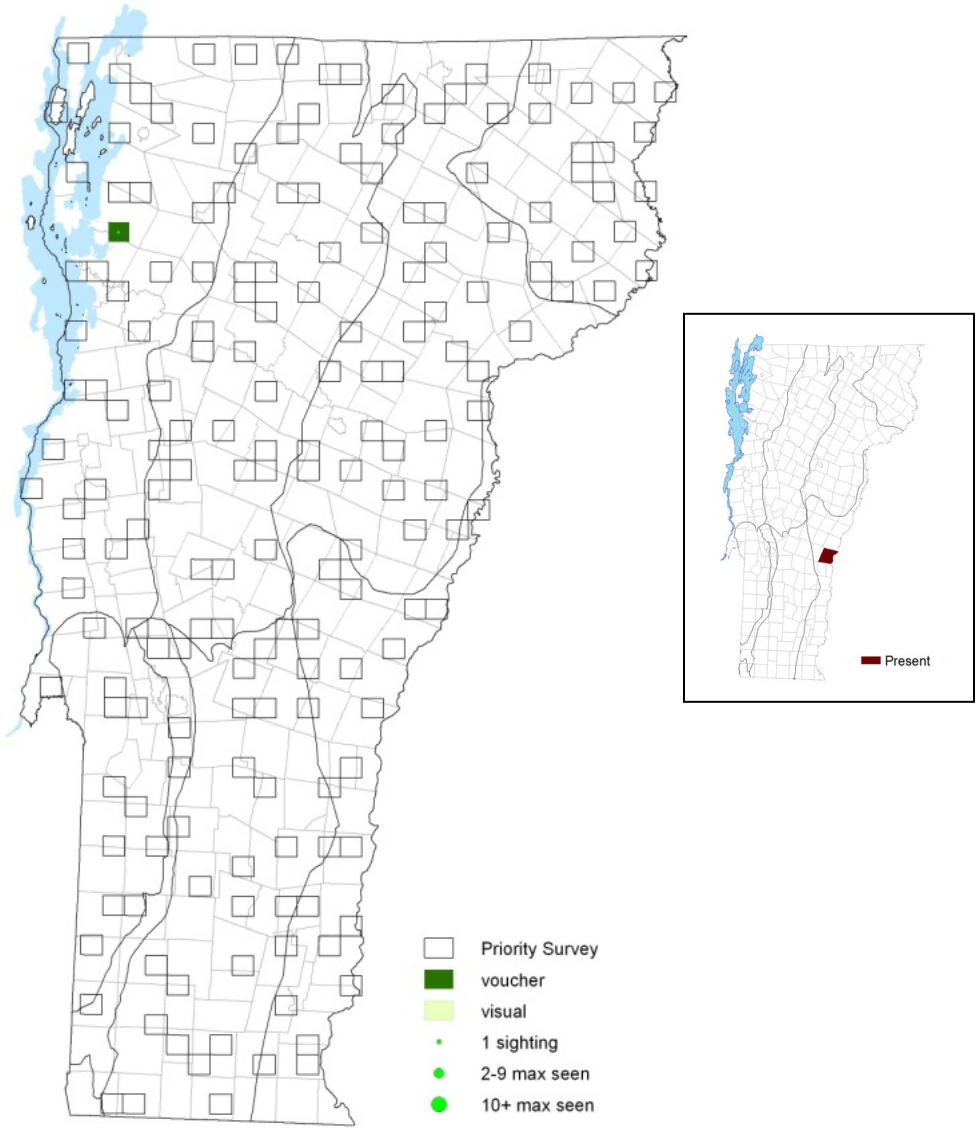
Conservation Status
Vermont SNA
Global G5

North American Range
Southern United States south through the West Indies and Central America to Argentina. Cannot survive harsh winters; each summer this skipper may stray and re-colonize north to northern California, southern Minnesota, southern Ontario, and southern New England.

Identification
Antennae are very short. Male wide black stigma. Underside of the hindwing is scattered with small black spots. Female: Upperside is dark brown with a very irregular orange band. Underside of hindwing is pale brown with paler checks.

Flight
Multiple broods in the south with northern records usually occurring in late summer or early fall. Two records known for Vermont. A male specimen in the Hartland Nature Club collection in North Hartland in 1899 and a second record during VBS on 18 September 2002 in Colchester (M. Gifford).

Distribution and Habitat
As a vagrant, they could be found just about anywhere if you are lucky enough to have a chance encounter. They prefer sunny, open areas such as lawns, fields and gardens. Caterpillar hosts are Bermuda Grass (Cynodon dactylon), Crabgrass (Digitaria) and St. Augustine Grass (Stenotaphrum secundatum). Adults will nectar from a variety of flowers including Milkweed (Asclepias), Aster (Aster), Thistle (Cirsium), and Knapweed (Centaurea).


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen
Present

Common Branded Skipper *Hesperia comma* (Linnaeus, 1758)

The only *Hesperia* not confined to North America, it is a highly variable species with several different races across its range. They are fast fliers and incredibly difficult to approach, often disappearing completely after being roused from their perch. To await receptive females, males perch near the hostplant or hilltop, usually with their wings closed. They use pheromones to attract mates. Females scatter eggs on or near the host; caterpillars eat leaves and live in nests of tied leaves. In the arctic, pupa or older caterpillars hibernate; elsewhere eggs overwinter.

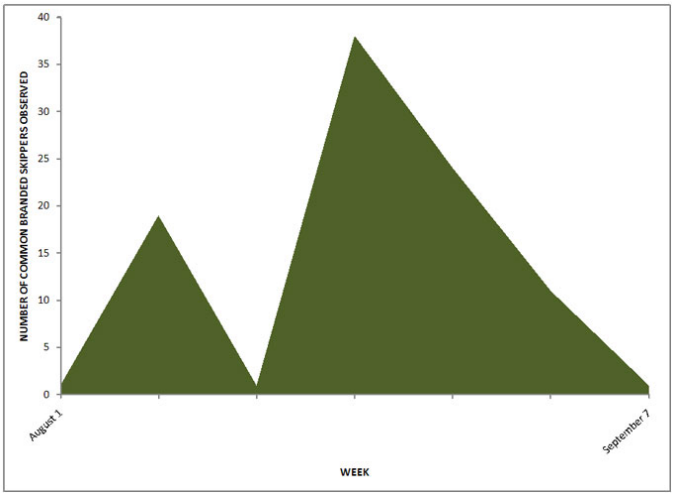
Resident
Common to Uncommon

Conservation Status
Vermont S4
Global G5

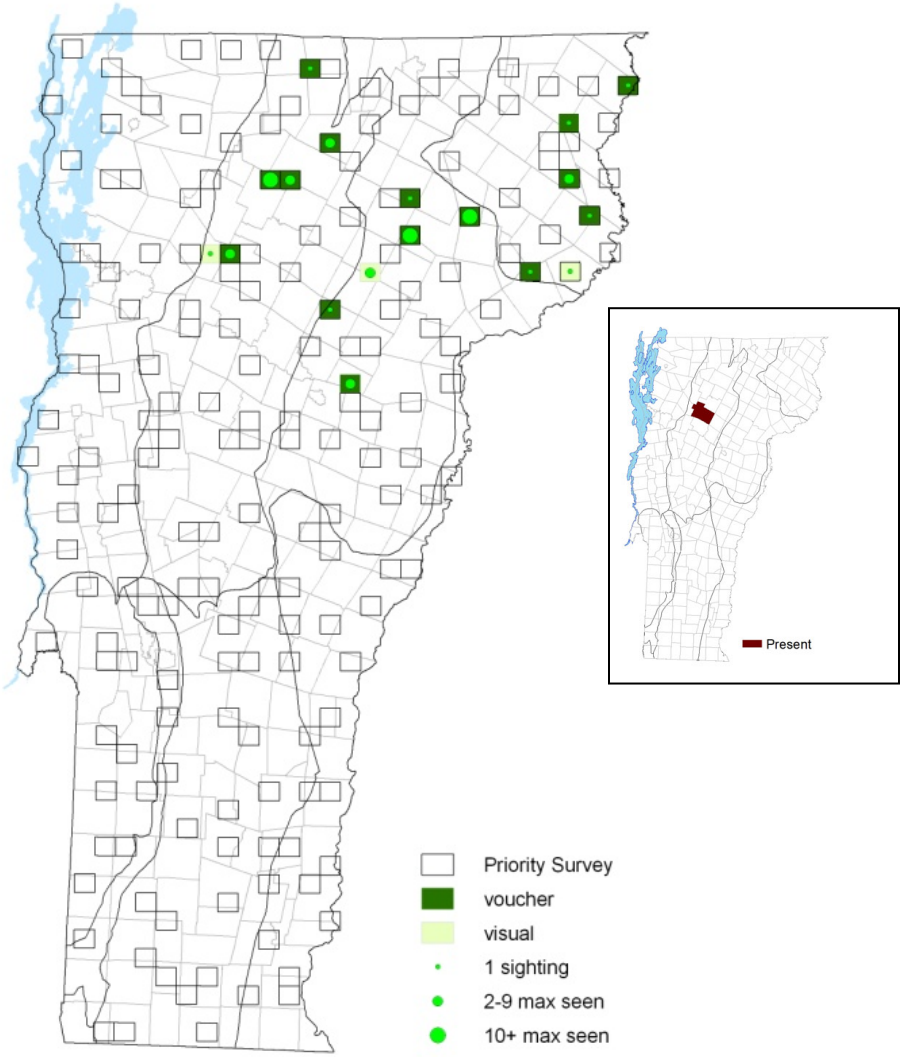
North American Range
Holarctic. In North America from central Alaska east to Labrador; south to northern Rockies, Great Lakes states, and Maine.

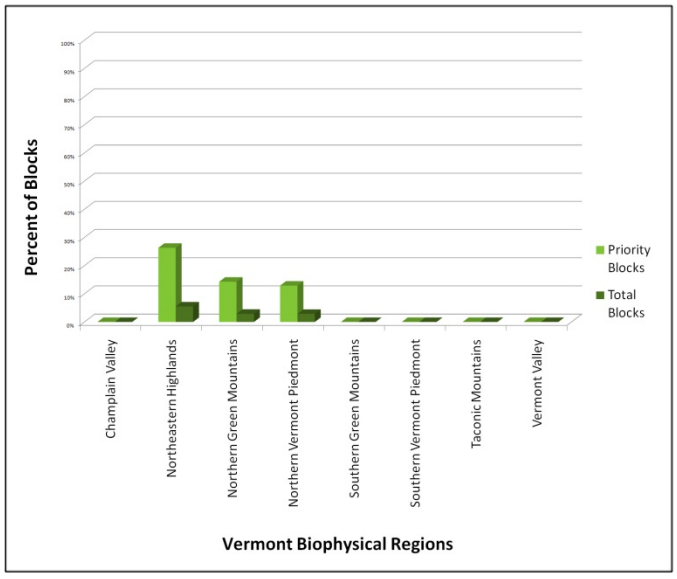
Identification
Highly variable. Wings relatively short with rounded forewing tips. A northern form (*H. c. laurentina*) is dark above and below. Band on hindwing underside usually lustrous, spots separate, basal-most spot often set inward.

Flight
An extremely short and late flight period, like Leonard's Skipper. They have one brood and fly from the very beginning of August until the first week of September. Extreme dates: 1 August 2007 in Glover (A. Aversa) and 7 September 2003 in Plainfield (B. Pfieffer).



Distribution and Habitat
The Common Branded Skipper was only found in the northeastern third of Vermont during VBS. They can be locally common, preferring sunny, open areas, usually near forest openings. Larval hostplants include various grasses such as Fescue (Festuca) and oat grasses (Arrhenatherum). Adults nectar from many flowers including asters (Aster), goldenrods (Oligoneuron), and Blazing Star (Liatris Gaertn).


Present
Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen


Percent of Blocks
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Leonard's Skipper *Hesperia leonardus* (Harris, 1862)

Resident
Common to Uncommon

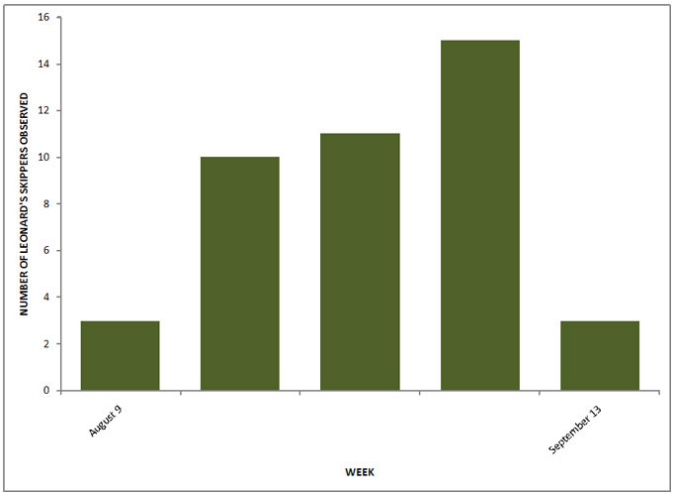
Conservation Status
Vermont S4
Global G4

North American Range
Leonard's Skipper ranges from Nova Scotia and Maine west through southern Ontario and the Great Lakes region to Minnesota, south to North Carolina, Louisiana, and Missouri.

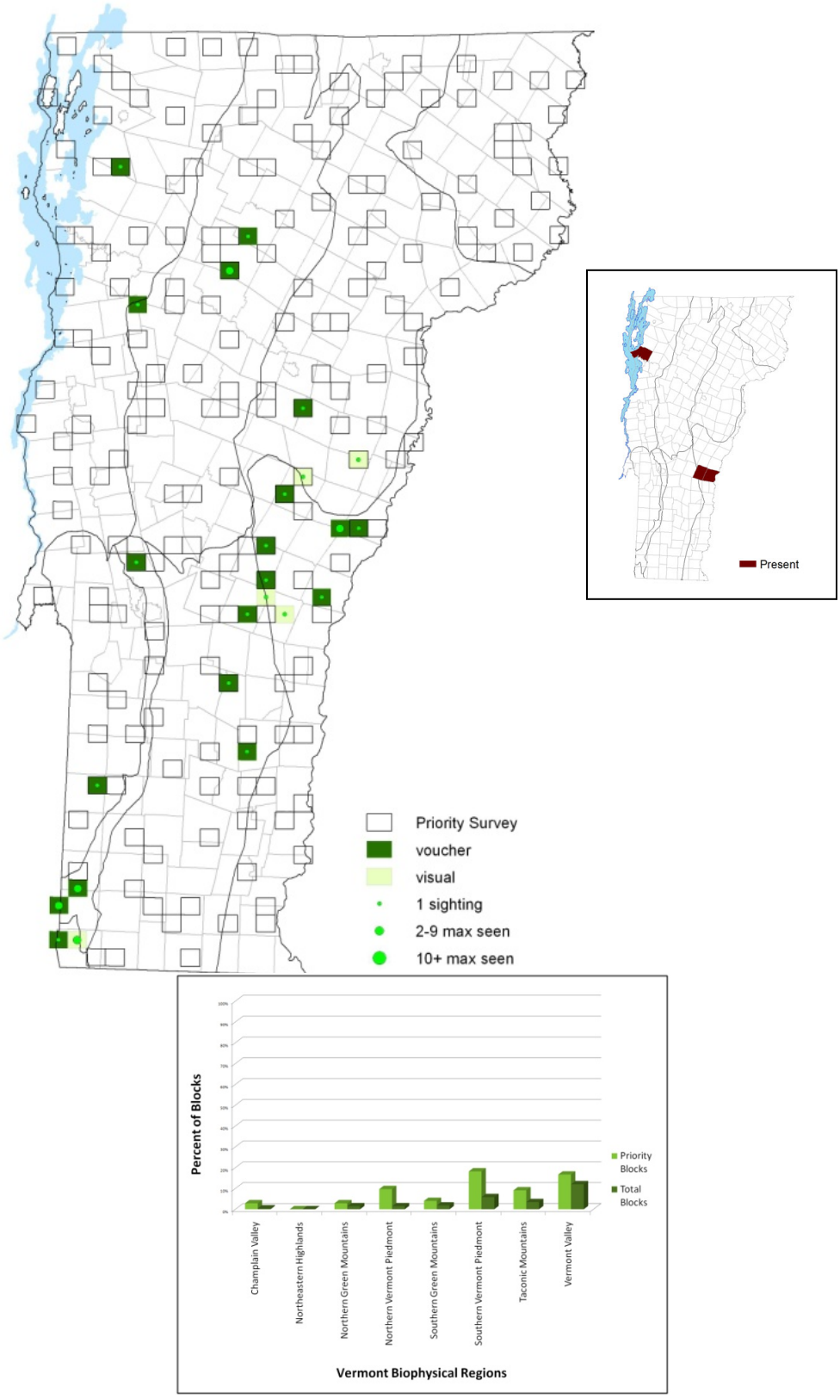
As summer in Vermont comes to a close and the flight period of many of our most common butterflies is ending, Leonard's Skipper is just emerging for the season finale in mid-August. A medium sized skipper with no markings to confuse it with other species, this butterfly's flight time also helps to differentiate it from potential lookalikes. There are three subspecies (*H.l. leonardus, H.l. montanus and H. l. pawnee*), with leonardus found in our region. H. l. montanus exists only within a small range in Colorado and is critically endangered. Males perch or patrol near nectar plants to find receptive females. Eggs are scattered on or near the host plants. Caterpillars feed on leaves and live in shelters of tied leaves. First instar caterpillars overwinter.

Identification
Includes three dissimilar subspecies; all have yellow inside the male's forewing stigma. Leonard's Skipper (H. l. leonardus) upperside is red-orange with wide black borders. Underside of hindwing is brick red with a band of white, cream, or yellow spots.

Flight
Leonard's Skipper has a very short and a very late flight period for a hesperid, lasting from mid-August until mid-September during VBS. In the South, they fly later, beginning in September and flying until the middle of October. Extreme dates: 9 August 2004 in Washington (A. Aversa) and 13 September 2003 in Sandgate (K. Hemeon).



Distribution and Habitat
During VBS it was found outside of the northeastern third of Vermont, where it is replaced by the Common Branded Skipper. Populations may be declining in the east. Their habitat is variable, but they tend to favor open grassy areas including native prairies, fields, and meadows. Host plants are various perennial grasses including Little Bluestem (Andropogon scoparius), and Bent Grass (Agrostis). Adults' favorite nectar source is Blazing Star (Liatris punctata), but they will also nectar from thistles (Carduus), asters (Aster), and others.


Present
Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen
Percent of Blocks
Priority Blocks
Total Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Vermont Biophysical Regions

Cobweb Skipper *Hesperia metea* (Scudder, 1863)

This is one of our earliest emerging Hesperid, but vanishes quickly after a brief spring flight. Since this butterfly experiences many cool, spring days, it can often be found sunning itself on rocks or large grass patches. It often flies knee-high at the tops of Little Bluestem grass.

Resident
Very Rare

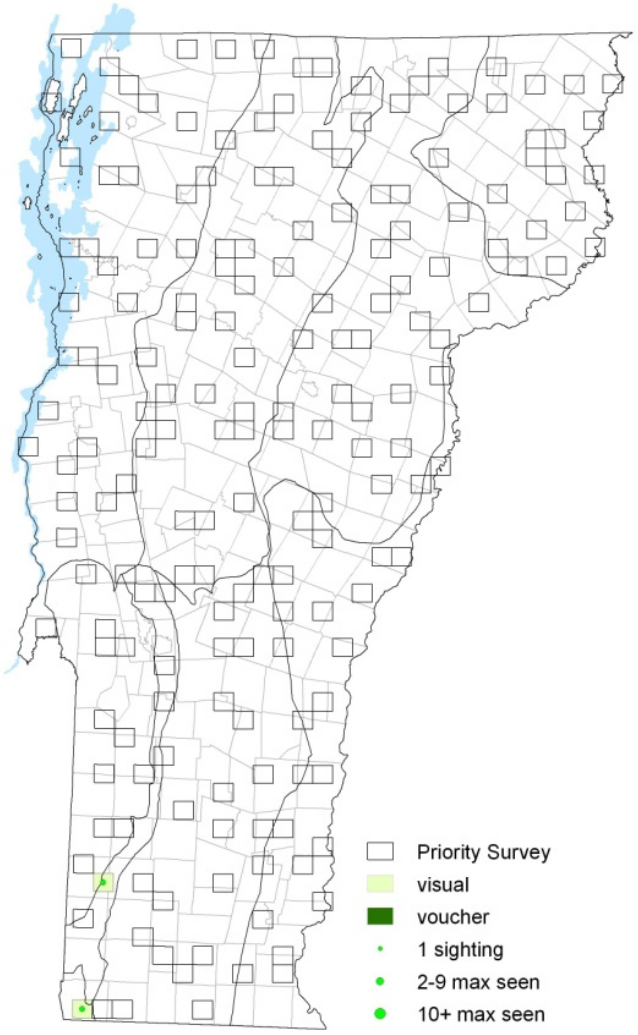
Conservation Status
Vermont S1, SGCN
Global G4

North American Range
Patchy distribution from southern Maine west to Wisconsin; south to central Georgia, the Gulf States, and central Texas.

Identification
A small but conspicuous skipper. Wings are dark brown or blackish with few light areas. Underside of hindwing has a cobwebbed appearance due to white spots extending along the veins.

Flight
Typically one brood. Two records from Vermont were from early June, though their peak flight period in Massachusetts is early May into early June.

Distribution and Habitat
There were only two records during VBS and no historic records for this butterfly in extreme southwestern Vermont. The Cobweb Skipper was first documented in Vermont on 5 June 2004 in Pownal (K. Hemeon) during the survey. Found in grasslands, old dry fields and open waste places. Host plants are Little Bluestem (Schizachyrium scoparius), and Big Bluestem (Andropogon gerardi). Adult Cobweb Skippers prefer nectar from flowers of low-growing plants such as Labrador Tea (Ledum groenlandicum), Wild Strawberry (Fragaria virginiana), Blackberry (Rubus allegheniensis), Winter Cress (Barbarea vulgaris), and Red Clover (Trifolium pratense).


Priority Survey
visual
voucher
1 sighting
2-9 max seen
10+ max seen

Indian Skipper *Hesperia sassacus* (Harris, 1862)

Easy to confuse with the Long Dash, this medium sized Hesperid is common in the Northeast, yet little has been reported on its natural history. Look for the chevron pattern on the ventral hindwing for field identification, though this is not always clearly defined, especially in males. The Indian Skipper is a medium generalist, capable of utilizing a wide array of common habitats and hostplants. They are fast fliers and startle easily when approached. Males perch all day to await receptive females. Caterpillars live in silken tubes at the base of grass clumps and leave them to feed. Older caterpillars overwinter and pupate in the spring.

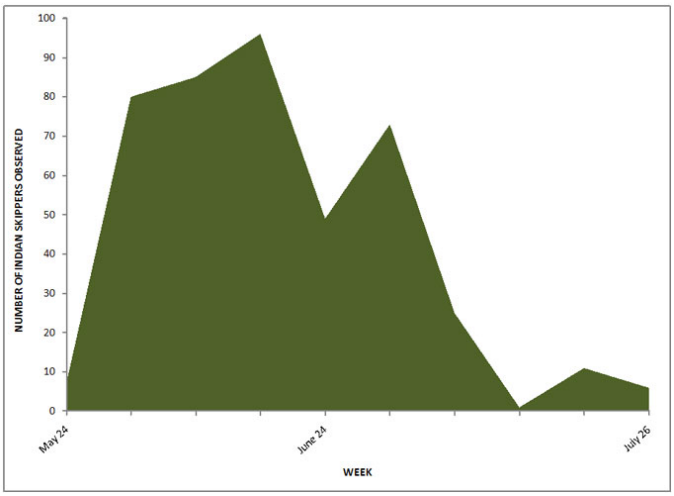
Resident
Common

Conservation Status
Vermont S5
Global G4G5

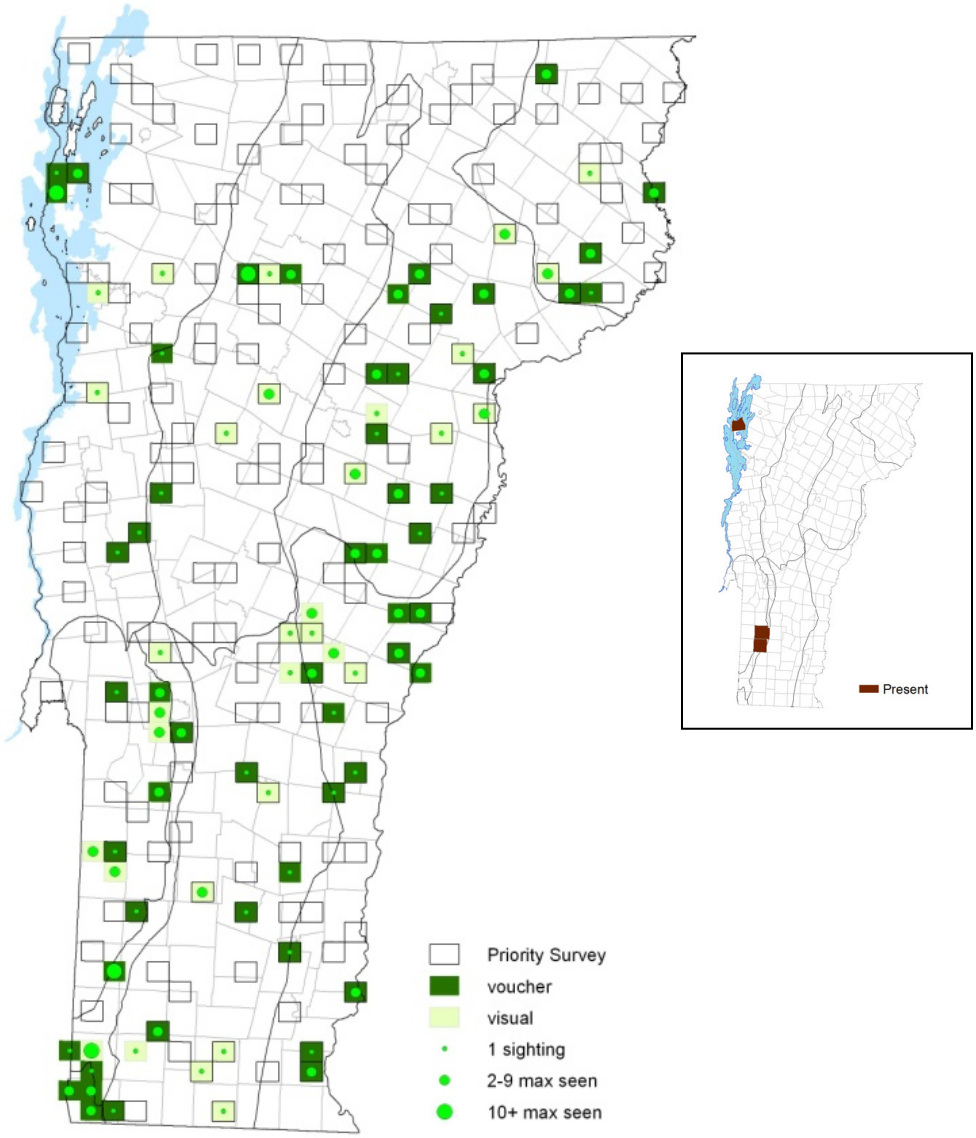
North American Range
Maine west across southern Ontario to southeast Manitoba and Minnesota; south to western North Carolina, southern Ohio, and northern Indiana.

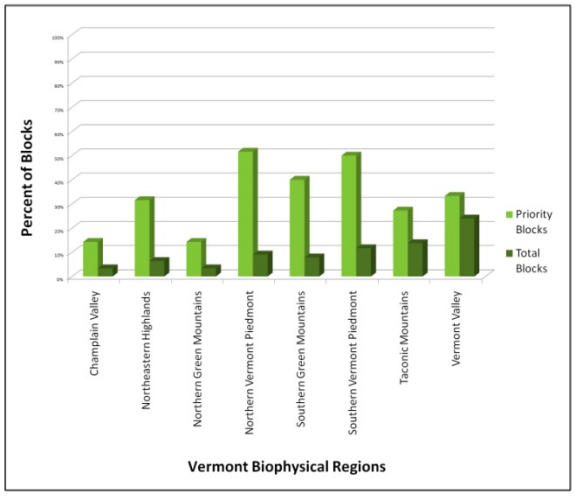
Identification
Upperside is yellow-orange with well-defined black markings. Black border of the hindwing is often toothed. Underside of hindwing is yellow-orange with a band of yellow spots that barely contrasts with the background.

Flight
The Indian Skipper had one brood from the end of May through the end of July. They were most abundant near mid-June. Extreme dates: 24 May 2004 in Pownal (K. Hemeon) and 27 July 2007 in Hardwick (J. Schneider)



Distribution and Habitat
Found throughout most of Vermont with the exception of the northern most portion of the state where it was absent or very rare. Their favored habitats are old fields and grasslands. Caterpillar hosts are various grasses including Little Bluestem (Andropogon scoparius), and panic grasses (Panicum). Adults nectar from flowers such as blackberry (Rubus), phlox (Phlox), and bugloss (Echium).


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen
Present


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Peck's Skipper *Polites peckius* (W. Kirby, 1837)

A long flight period coupled with a broad range across the entire state, Peck's Skipper can be found on most observer's daily checklist. With rapid flight, both males and females nectar throughout the day. Males perch in sunny, open areas to await receptive females, and courtship takes place all day. Females lay eggs singly; caterpillars eat leaves and live in leaf shelters. Caterpillars and pupa overwinter.

Resident
Common

Conservation Status
Vermont S5
Global G5

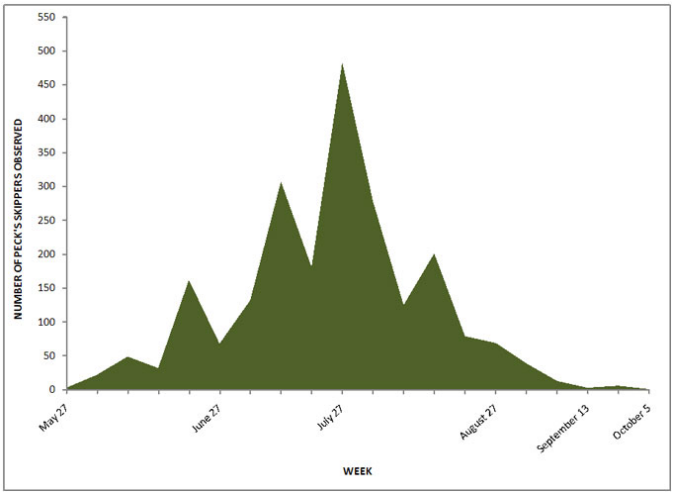
North American Range
British Columbia east across southern Canada to Nova Scotia; south to northeastern Oregon, southern Colorado, northwest Arkansas, and northern Georgia.

Identification

Upperside of male is brown with reddish-orange patches; forewing has a sinuous stigma. Female is darker with no stigma. Underside of hindwing of both sexes has a patch of large yellow spots in the center surrounded by dark brown.

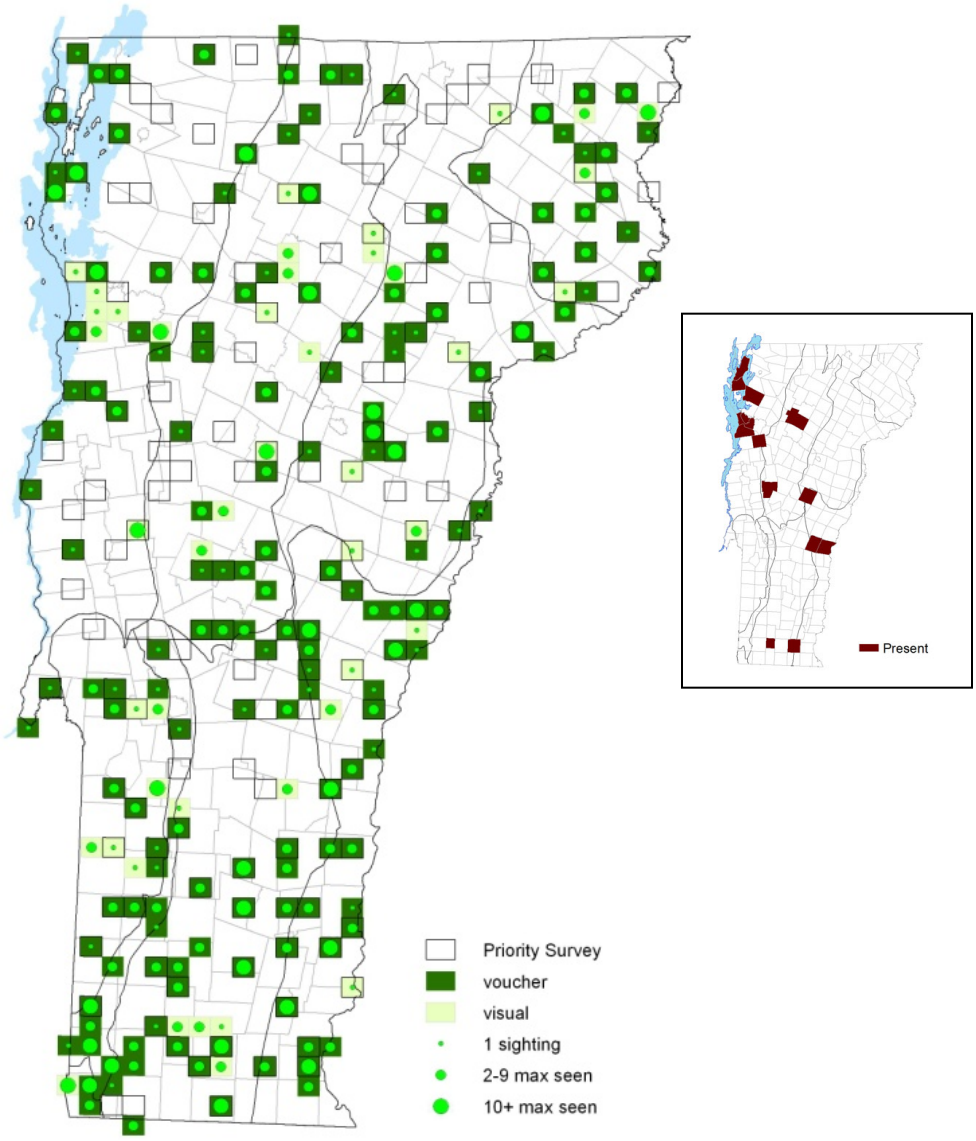
Flight

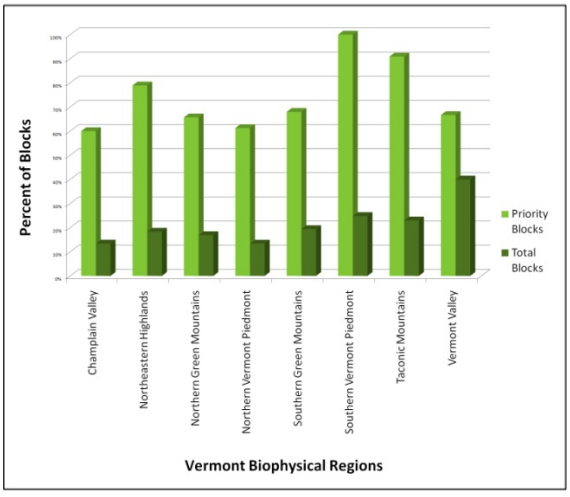
As with many of the meadow skippers, the Peck's Skipper had a long flight period in Vermont, first appearing in the end of May and flying until the end of September. Reported to have one to two brood in the north, they appear to have had just one in Vermont during VBS. Extreme dates: 22 May 2007 in Bennington (T. Aramata) and 5 October 2007 in Stamford.



Distribution and Habitat

Common across the Northeast, Peck's Skipper was found throughout Vermont. They are generalists and will colonize just about any grassy habitat such as meadows, gardens, parks, fields and roadsides. Adult nectar from a number of flowers including, milkweeds (Asclepias), dogbanes (Apocynum), Red Clover (Trifolium pratense) and many others. Hostplants are Rice Cutgrass (Leersia oryzoides) and Kentucky Bluegrass (Poa pratensis).


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen
Present


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Tawny-edged Skipper *Polites themistocles* (Latreille, 1824)

This common meadow skipper is relatively widespread and able to adapt to just about any damp, grassy habitat. They are fairly easy to identify in the field due to the tawny color of the costal margin on the forewing. Though still common in the Northeast, the Tawny-edged Skipper is declining and is no longer considered common in the southern part of its range. To await receptive females, males perch all day in grassy valley bottoms and swales. Mating takes place during mid-afternoon. Females lay eggs singly on or near the host plant. Caterpillars feed on leaves and live in shelters of tied leaves. Pupae hibernate.

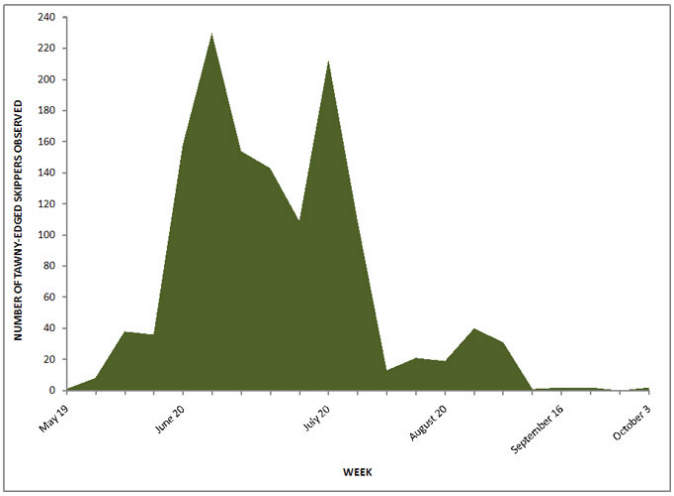
Resident
Common

Conservation Status
Vermont S5
Global G5

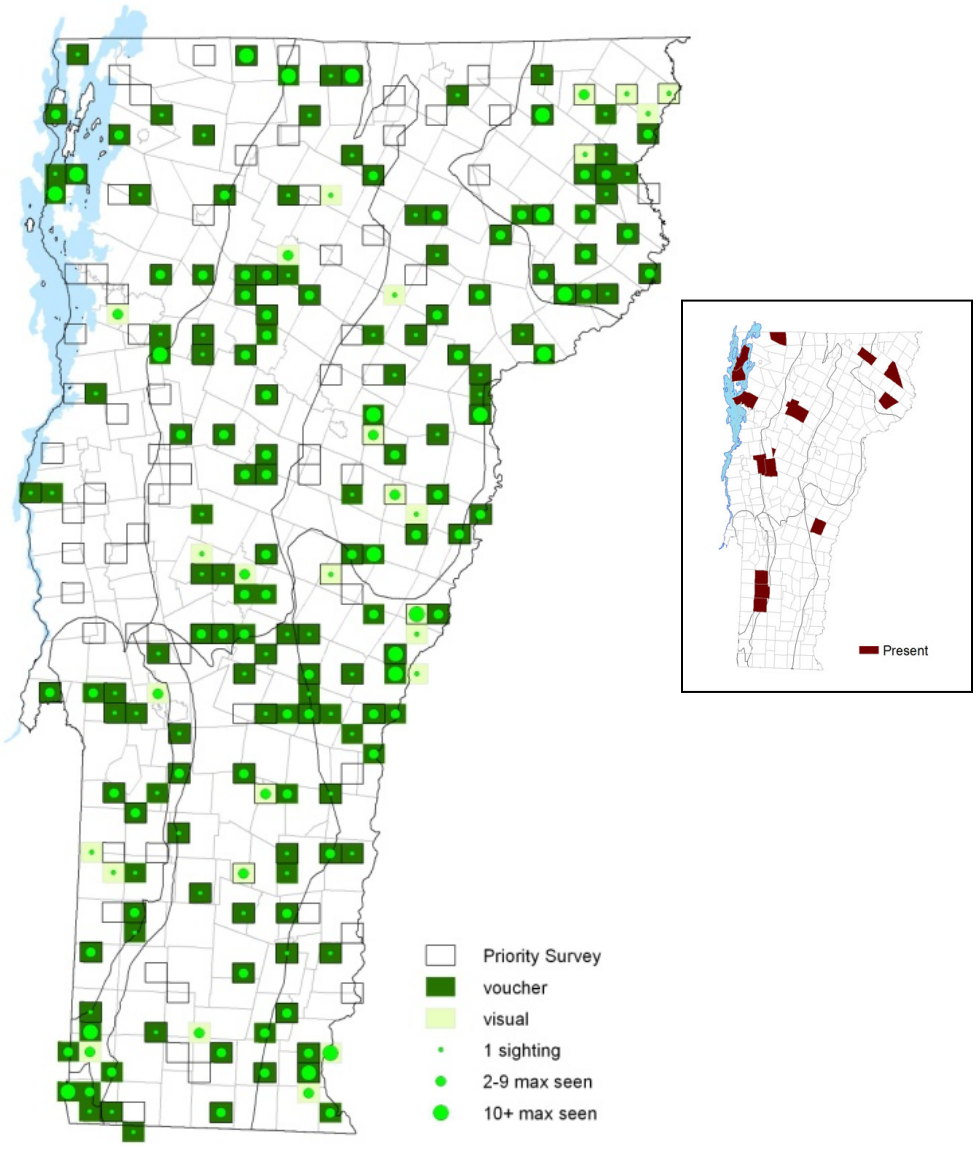
North American Range
Southern British Columbia east across southern Canada to Nova Scotia; south to northern California, central Arizona, central Texas, the Gulf states, and central Florida.

Identification
Upperside is dark brown with orange markings; orange along the costal edge of forewing enters the end of the cell. Male has a sinuous forewing stigma. Underside of hindwing is brassy with no markings.

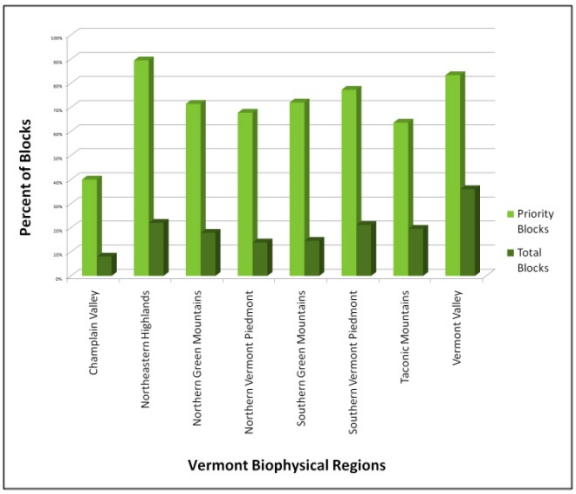
Flight
The Tawny-edged Skipper flight period was long compared to many other meadow skippers during VBS. They had one brood and were seen beginning in mid-May through the beginning of September with a few stragglers into October in some years. Extreme dates: 19 May 2004 in Pownal (K. Hemeon) and 3 October 2005 in Norwich (C. Rimmer).



Distribution and Habitat
The Tawny-edged Skipper was found throughout Vermont, both historically and during VBS. They are generalists and utilize a wide range of grassy, open habitats including damp meadows, prairie swales, lawns and vacant lots. Caterpillar hosts are panic grasses (Panicum), Bluegrass (Poa pratensis) and Crabgrass (Digitaria filiformis). Adults nectar a number of flowers including, Red Clover (Trifolium pratense), Cow Vetch (Vicia cracca), thistles (Cirsium) and dogbanes (Apocynum).


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen

Present


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Crossline Skipper *Polites origenes* (Fabricius, 1793)

One of the least understood of the meadow skippers, there are conflicting reports on favored habitats, from exclusively choosing dry grasslands, to associations with Tawny-edged skippers who favor moist over dry habitats. Populations in Canada appear to prefer sedge habitats. Perhaps the Crossline Skipper is far more adaptable than anyone suspects, and only more research into this apparently uncommon species will uncover more natural history. Males perch in open grassy areas most of the day to await receptive females. Courtship occurs from midday to mid-afternoon. Third and fourth instar larva overwinter.

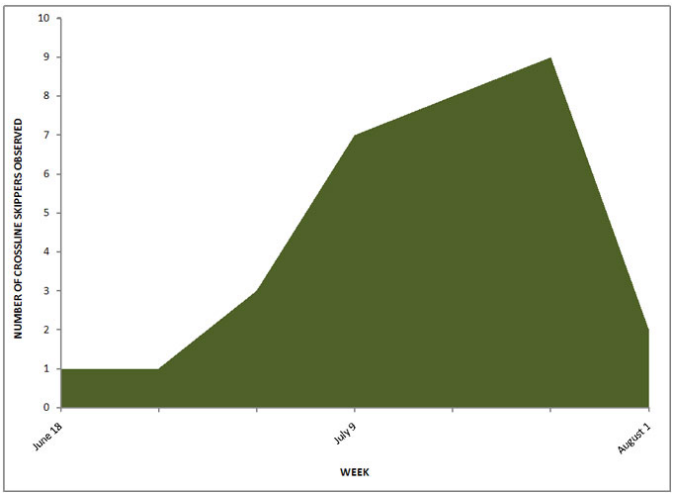
Resident
Uncommon

Conservation Status
Vermont S3
Global G4G5

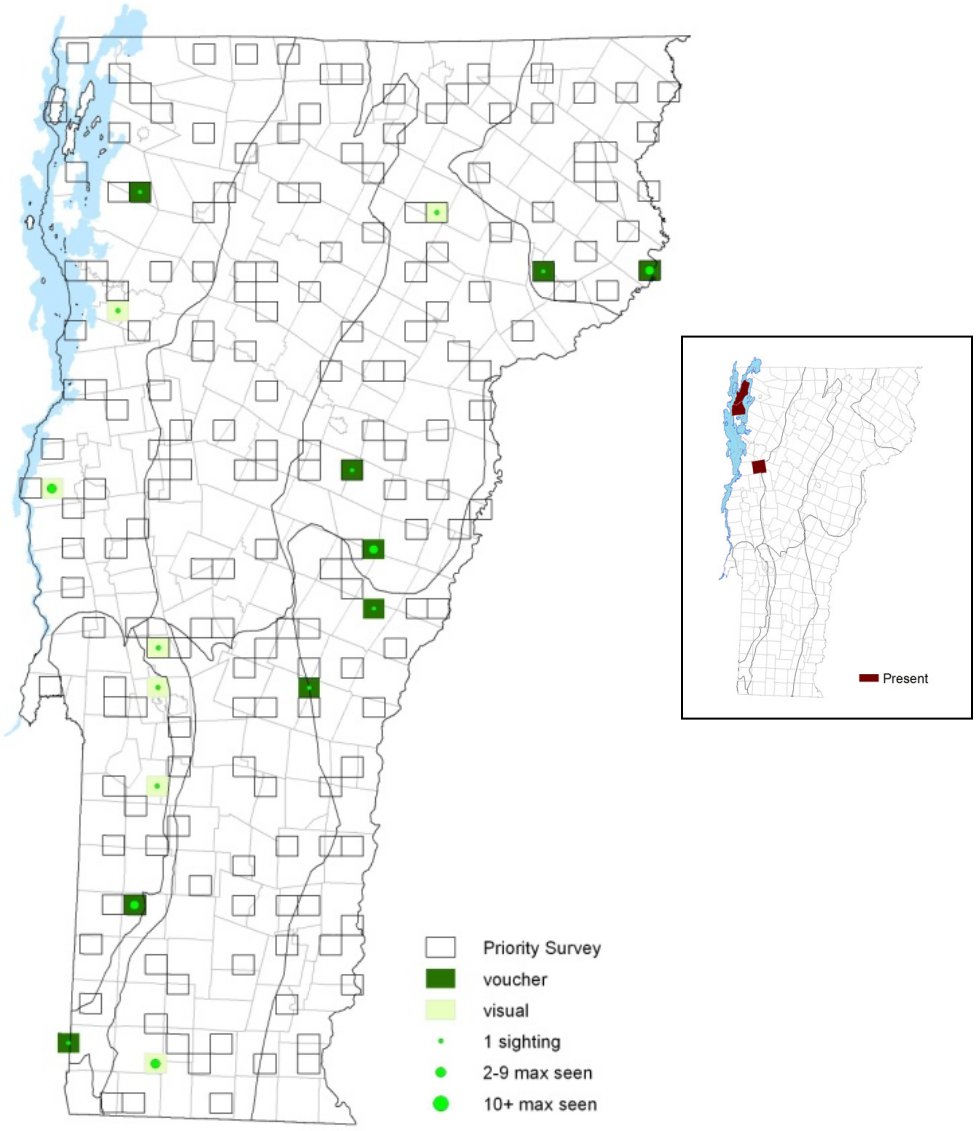
North American Range
Western North Dakota east across central Minnesota, southern Ontario, and southern Quebec to central Maine; south to northeast Texas, the Gulf Coast, and northern Florida.

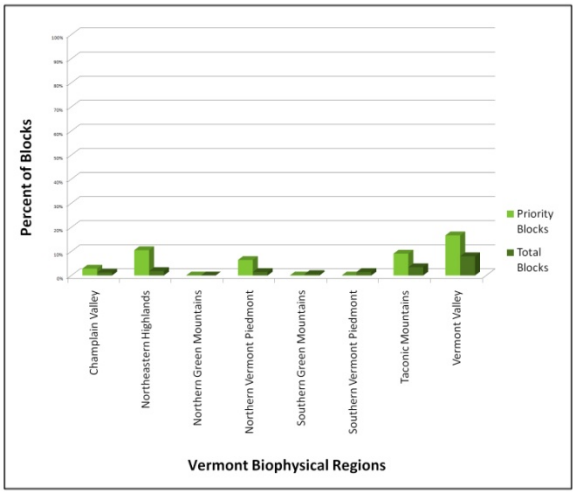
Identification
Upperside is dark brown with orange markings. Female usually lacks orange along the forewing costa and has a square spot below the end of the cell; male has a long straight forewing stigma. Underside of hindwing is orange-brown with a faint band of spots.

Flight
A true summertime meadow skipper, it had one brood and flew from the mid-June until the beginning of August. During VBS the peak of their flight period was near the end of July. Extreme dates: 18 June 2007 in Kirby (A. Aversa), 1 August 2007 in Glover (A. Aversa), and 17 September 1994 in Hinesburg (S. Griggs).



Distribution and Habitat
Crossline Skipper populations were found only sporadically throughout Vermont. Hostplants are Purpletop (Tridens flavus) and Little bluestem (Andropogon scoparius) and adults will nectar on just about any flower blooming within their habitat including Red Clover (Trifolium pratense), dogbane (Apocynum) and New Jersey Tea (Ceanothus americanus).


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen
Present


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Long Dash *Polites mystic* (W.H. Edwards, 1863)

Usually restricted to more northern climates compared to the other meadow skippers, males have a long stigma running across the forewing. This dark, notched line, partly covered in black scales emits pheromones to attract females during courtship. Males perch in low grassy areas, streambeds, or swales during most of the day. Courtship occurs in mid to late afternoon. Females deposit eggs singly on or near the host plant. They often nectar with other meadow skippers. Caterpillars feed on leaves and live in shelters of tied leaves. Fourth instar larva overwinter.

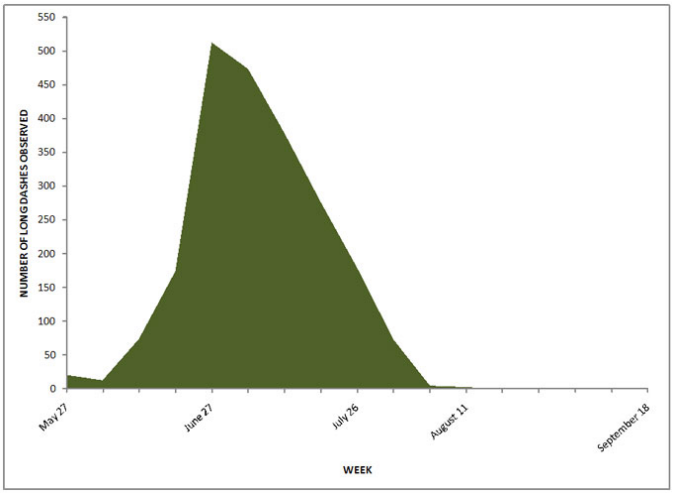
Resident
Common

Conservation Status
Vermont S5
Global G5

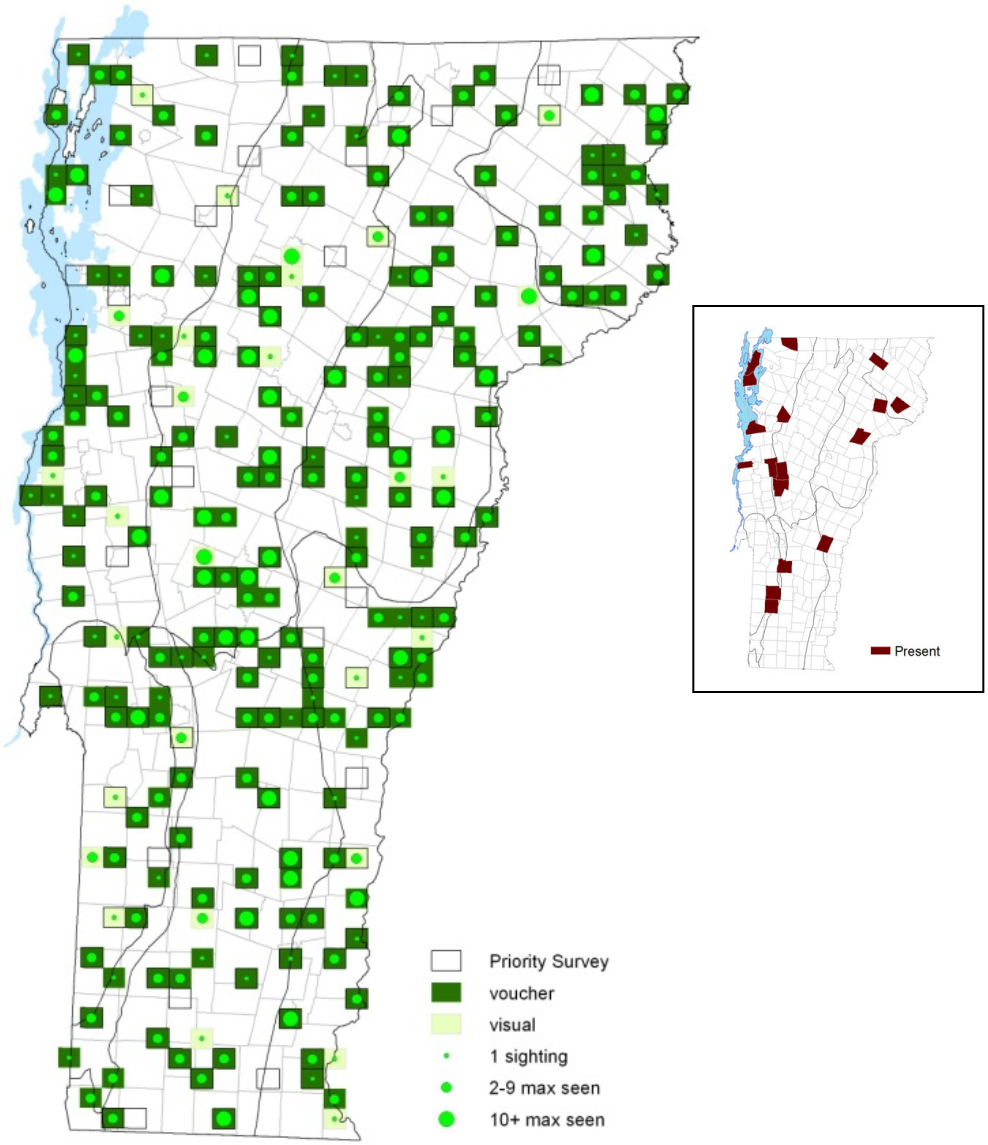
North American Range
Southern British Columbia east to Nova Scotia; south to Washington, Idaho, Colorado, Nebraska, Iowa, northern Illinois, West Virginia, Virginia, and New Jersey.

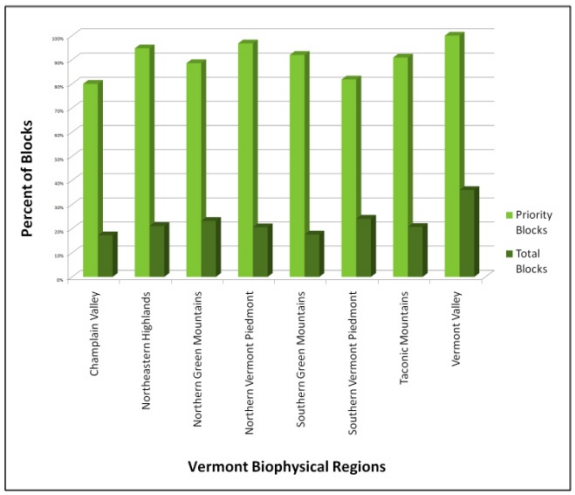
Identification
Large for a grass skipper. Upperside is dark brown with reddish to yellowish orange markings. Forewing of female has a broad black patch at the base; male forewing has a long, slightly curved stigma, which may be connected to the dash near the apex (creating a "long dash"). Underside of hindwing is orange-brown with a curved band of equal-sized yellow spots.

Flight
The Long Dash had a much shorter flight period than some of the other meadow skippers. It had one brood and flies from the end of May until early August. Highest counts occurred near the end of June. Extreme dates: 27 May 2004 in Sandgate (R. Stewart) and 18 September 2003 in Colchester (B. Pfeiffer).



Distribution and Habitat
The Long Dash was found throughout Vermont. Like most meadow skippers, it utilizes many different habitats and can be found in nearly any open, wet, grassy area. Though other grasses may be used, the only documented host plant are blue grasses (Poa). As with others of their genus, the adult Long Dash will nectar on just about any flowering plant in their habitat including, milkweeds (Asclepias), Cow Vetch (Vicia cracca) and Oxeye Daisy (Leucanthemum vulgare).


Present
Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Northern Broken-Dash *Wallengrenia egeremet* (Scudder, 1863)

Resident
Common

Conservation Status
Vermont S5
Global G5

North American Range
Southern Maine and southern Ontario west across the Great Lakes states to southeastern North Dakota; south to central Florida, the Gulf Coast, and southeast Texas.

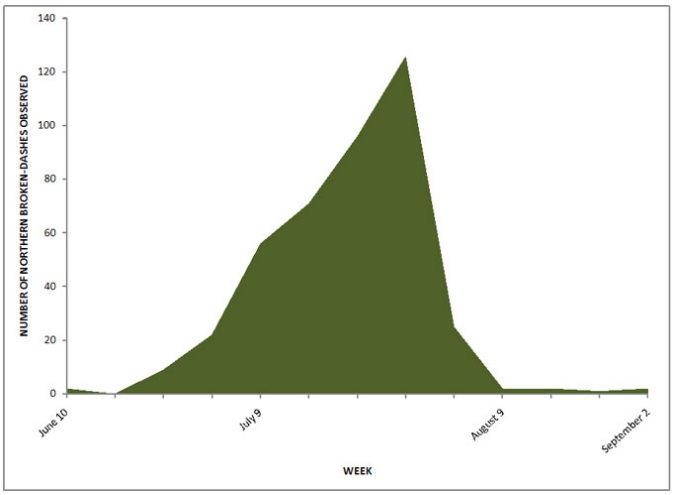
Once considered a northern subspecies of *Wallengrenia otho*, which is now called Southern Broken-Dash. Adults have a slow flight. Males perch up to six feet high on exposed twigs to wait for females, usually in the early morning. Caterpillars eat leaves; half-grown caterpillars overwinter.

Identification

Upperside is dark brown. Male forewing has a cream spot at the end of the cell, and a divided stigma (the "broken dash"); female forewing has a few elongated cream spots. Underside is dark brown or purple-brown; hindwing has a pale band of spots. Often confused with Dun Skipper or Little Glassywing, look for the “backward 3” shaped spots on the ventral hindwing

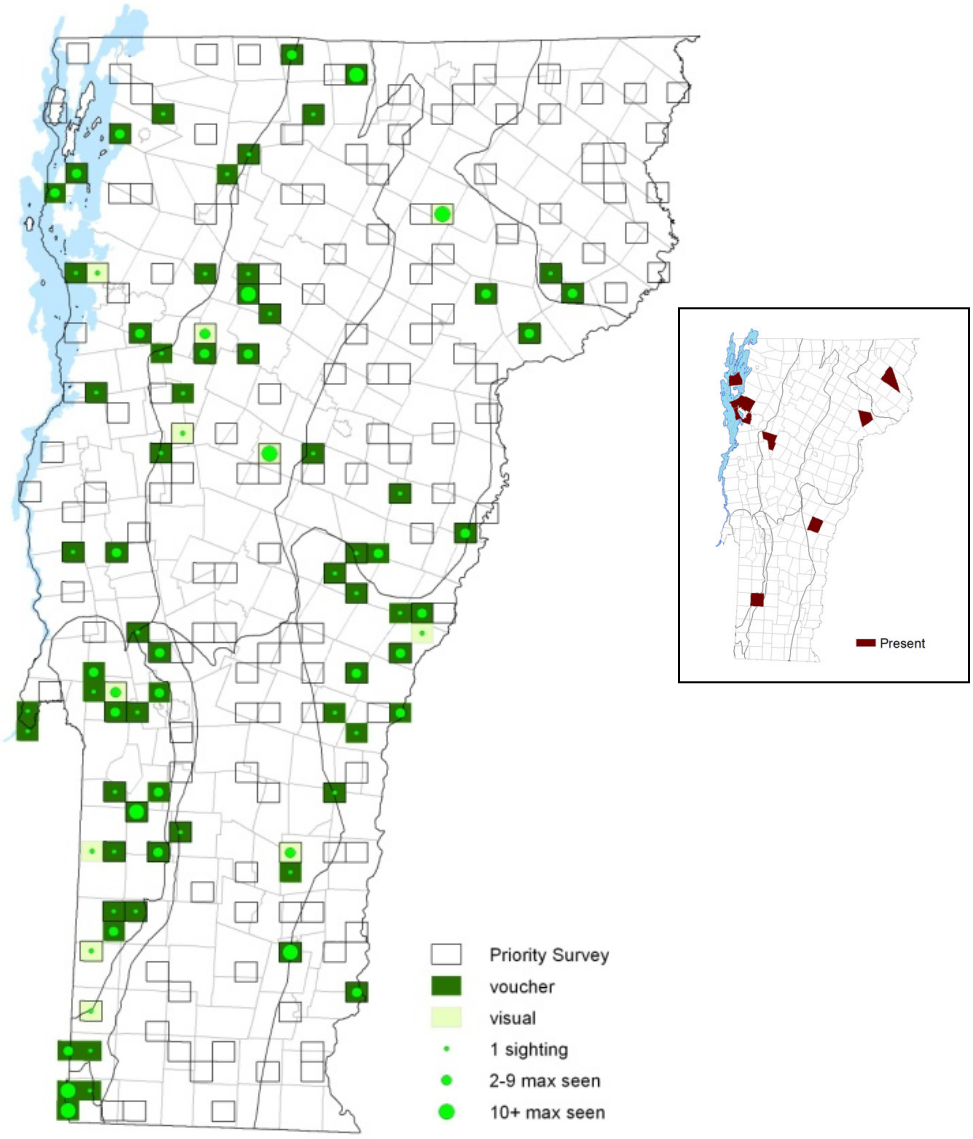
Flight

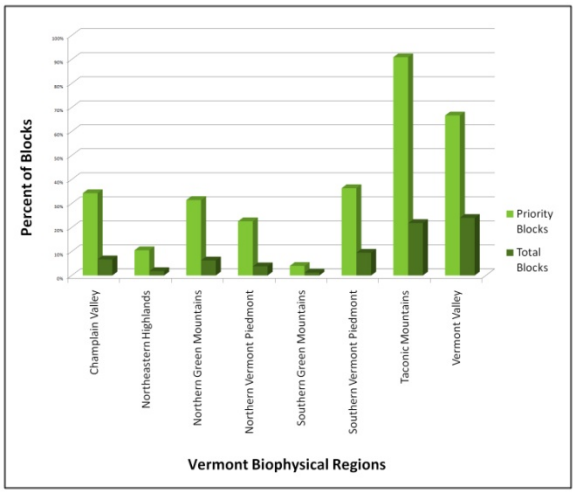
Like many of our meadow skippers, Northern Broken-Dash had a short flight period. During VBS they had one brood and flew from mid-June through the beginning of September, peaking near the end of July. Extreme dates: 10 June 2005 in Manchester (B. Pfeiffer) and 2 September 2003 in Burlington (C. Gifford).



Distribution and Habitat

Found throughout Vermont during VBS, except in the extreme northeast. Their preferred habitats are open areas near woods such as grasslands, old fields and roadsides. Larval hostplants include Deertongue Grass (Panicum clandestinum) and Cypress Panic grass(Panicum dichotomum). Adults favor white, pink or purple flowers for nectar and will nectar from milkweed (Asclepias), dogbane (Apocynum), Red Clover (Trifolium pratense) and New Jersey Tea (Ceanothus americanus).


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen
Present


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Little Glassywing *Pompeius verna* (W.H. Edwards, 1862)

Resident
Common

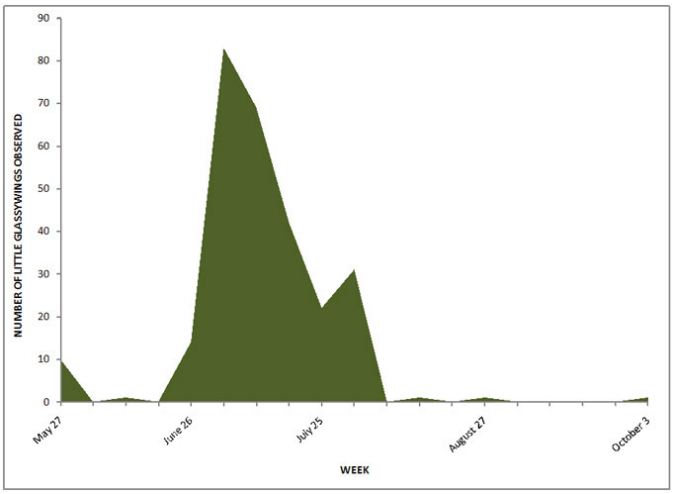
Conservation Status
Vermont S5
Global G5

North American Range
Central New England west to central Nebraska; south to northern Florida, the Gulf Coast, and South Texas.

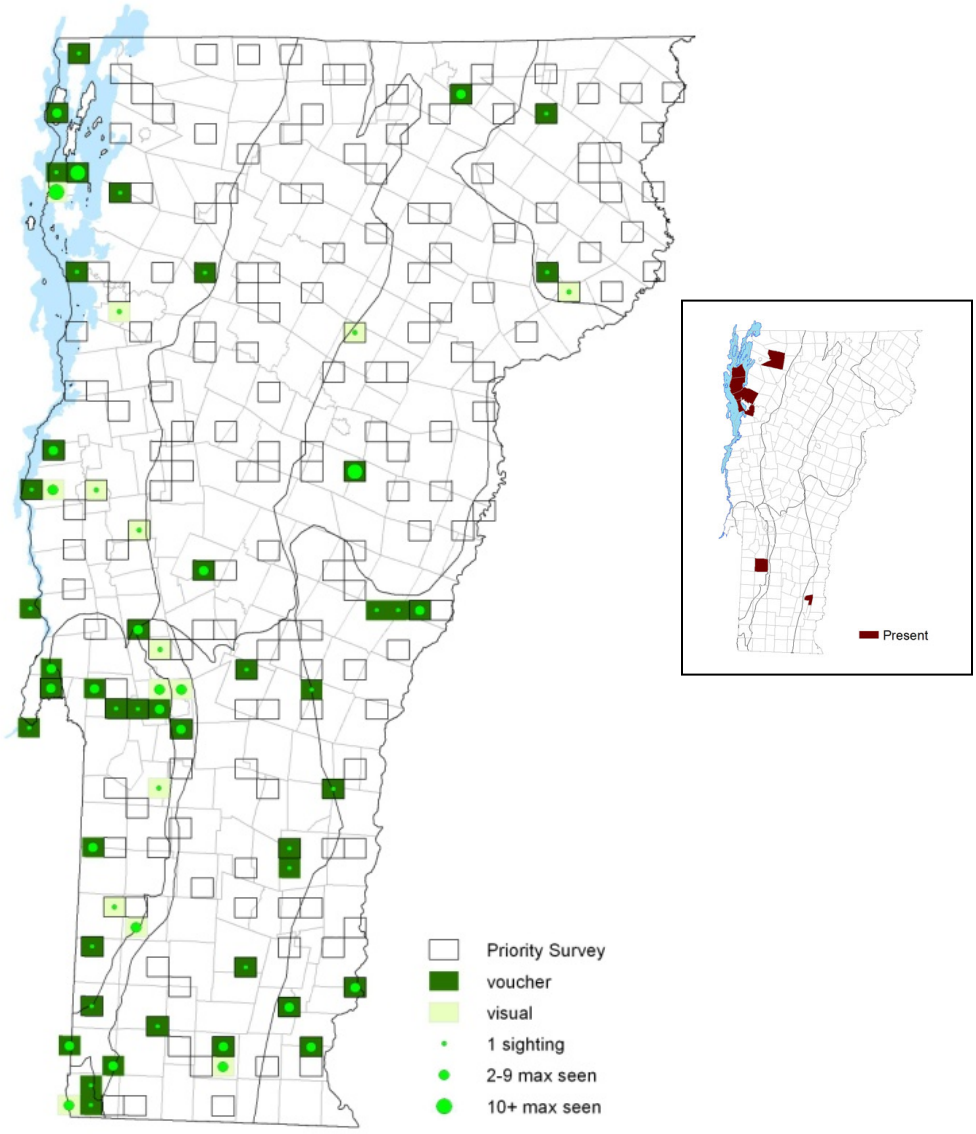
The sole representative of the genus *Pompeius* in the Northeast, the Little Glassywing was for years mistakenly classified in the genus *Polites*. These medium sized skippers are notable for their use of only one hostplant, Purpletop (Tridens flavus). Males perch on low vegetation in sunny clearings to wait for females; courtship usually occurs around noon and both adults are known to nectar throughout the day. This butterfly is both adaptable and widespread throughout the eastern United States. It seems to have undergone a notable change in status over the last century as Scudder (1889) regarded it as "everywhere exceedingly rare".

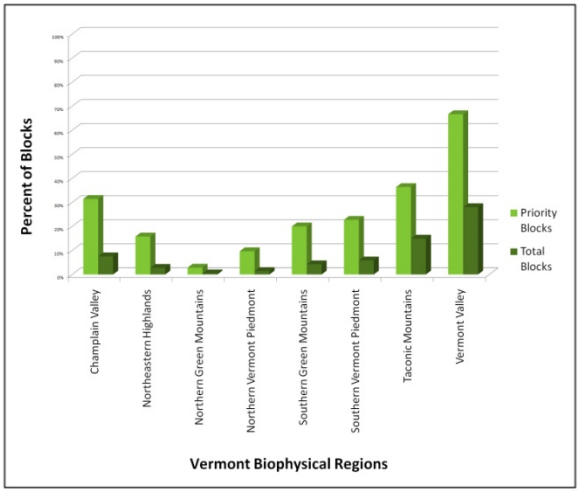
Identification
Wings are black or blackish brown. Upperside of male forewing has a large transparent white spot below the end of the black stigma and several other spots above and below it. Female forewing has a transparent square spot at the end of the cell. Underside of both sexes is black, sometimes with a purple sheen, and often has a few distinct pale spots.

Flight
One brood with highest counts in early July during VBS. Extreme dates: 27 May 2005 in Grand Isle (D. Hoag) and 3 October 2003 in Pownal (K. Hemeon).



Distribution and Habitat
Rarely found in the northeastern third of the state during VBS. Found most often in moist fields near woods, but periodically in drier habitats in close proximity to its hostplant, Purpletop. Adults nectar predominantly on Common Milkweed (Asclepias syriaca) and Dogbane (Apocynum).


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen
Present


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Hobomok Skipper *Poanes hobomok* (Harris, 1862)

Resident
Common

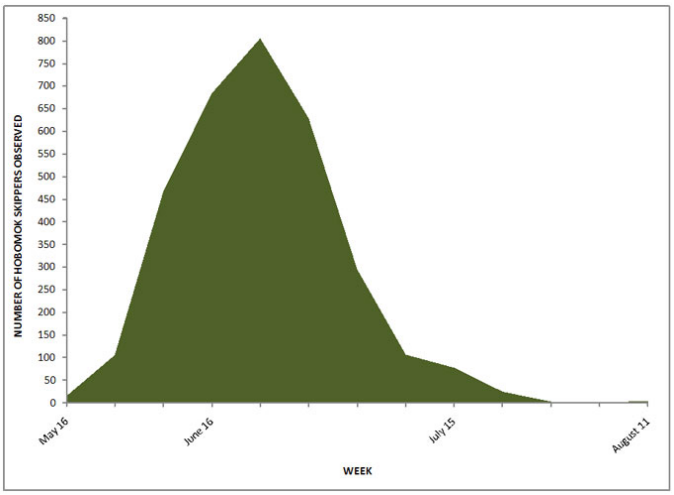
Conservation Status
Vermont S5
Global G5

North American Range
Nova Scotia west across southern Canada to central Alberta; south to New Jersey, northern Georgia, Arkansas, central Kansas, and eastern Oklahoma.

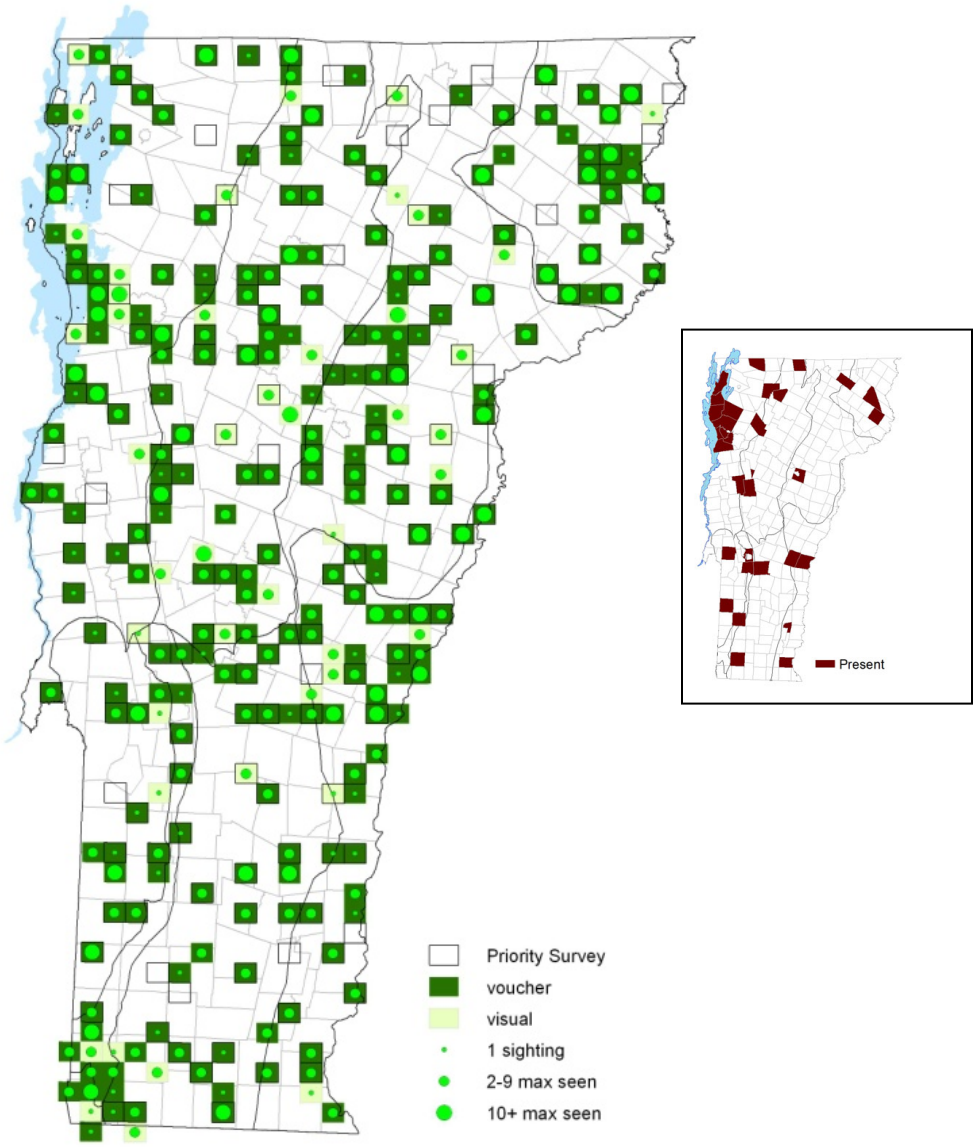
As with many skippers, there is also a dark brown female form called “Pocahontas”. To await receptive females, males perch about six feet high on vegetation in woodland clearings and edges. Females deposit eggs singly on or near the host grass leaves.

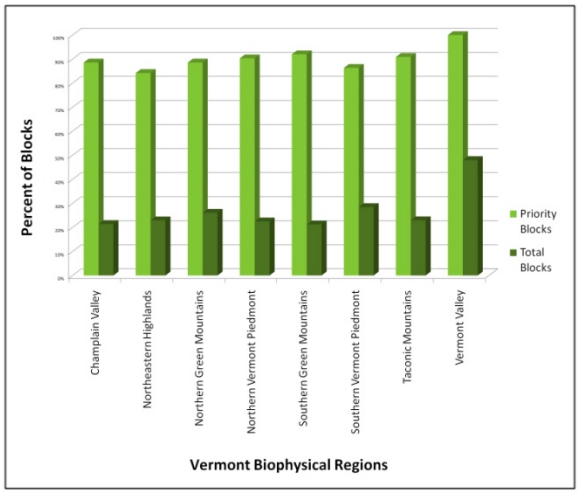
Identification
Wings are rounded. Upperside of male is yellow-orange with irregular black borders and no stigma; underside of hindwing has purple-gray on the inner margin. Female has two forms: Upperside of normal form is duller and has less orange than the male; underside of hindwing is orange with purple-gray at the inner margin. Upperside of "pocahontas" form is purple-black with some dull white spots on the forewing; underside is purple-black with the pattern obscured.

Flight
A long flight period beginning in May and lasting into late July during VBS. Extreme dates: 16 May 2004 in Springfield (B. Pfeiffer), 11 August 1968 in Brattleboro (M. Pullerton), and 11 August 2003 in Londonderry (A. Close).



Distribution and Habitat
The Hobomok Skipper was common and found throughout Vermont during VBS. They prefer woodland habitats and are often seen in clearings or openings and edges, especially in damp areas. Hostplants are various grasses including, panic grasses (Panicum) and bluegrasses (Poa). Adults nectar from many different flowers including milkweed (Asclepias), Red Clover (Trifolium pratense) and blackberry (Rubus).


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen
Present


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Mulberry Wing *Poanes massasoit* (Scudder, 1863)

Resident
Rare

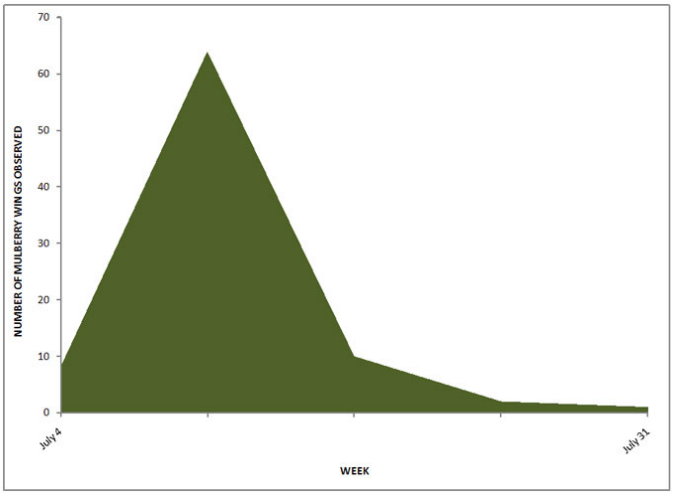
Conservation Status
Vermont S2, SGCN
Global G4

North American Range
New York and Massachusetts west across the Great Lakes states to southern Minnesota and North Dakota. A coastal population ranges from southern New Hampshire south to Maryland.

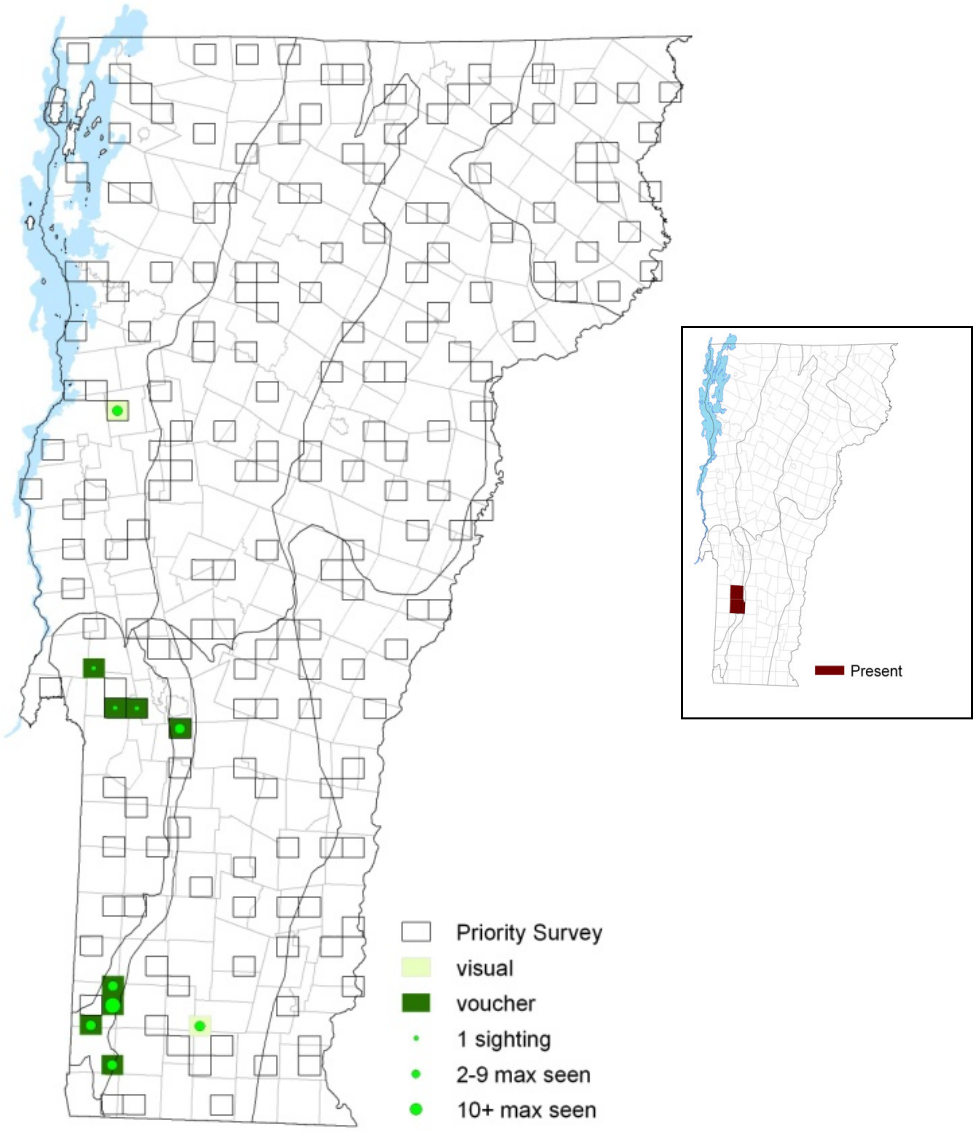
It is often associated with Black Dash as they have similar ranges, flight times, habitats and host plants. It has a low and weak flight. If you're leaving a path through a sedge wetland in pursuit of this butterfly, turn and look behind you — the Mulberry Wing might be using your path as a highway. Its airplane-shaped marking on the underside of the hindwing is unmistakable and an easy way to identify this skipper.

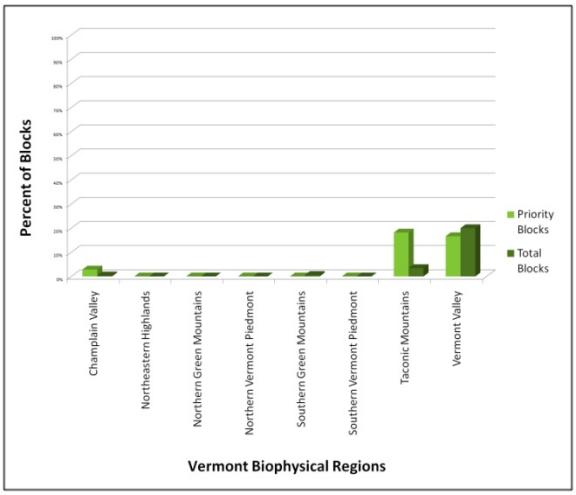
Identification
This is a small skipper and males lack a stigma. Wings are dark brown to black, relatively short and rounded. Upperside has small (male) or larger (female) yellow spots. Underside of hindwing has a large irregular yellow patch; rare individuals are rust colored and have no patch.

Flight
During VBS it had one brood and was only found in July. In Massachusetts, however, its flight period has been documented from the second week of July through early August. Extreme dates: 4 July 2002 in Dover (J. Parker) and 31 July 200 in 2006 in Castleton (R. Pilcher).



Distribution and Habitat
Found both historically and during VBS in southwestern Vermont. It inhabits sedge wetlands, often with the Black Dash and Dion Skipper, and can sometimes be found in bogs, fens and wet meadows. Only know hostplant is Tussock or Upright Sedge (Carex stricta), but it is likely that there are others. Adults nectar on Swamp Milkweed (Asclepias incarnata), Common Milkweed (Asclepias syriaca), and possibly other wetland flowers.


Present
Priority Survey
visual
voucher
1 sighting
2-9 max seen
10+ max seen


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Broad-winged Skipper *Poanes viator* (W.H. Edwards, 1865)

There are two subspecies recognized, "inland" *P. v. viator* ranges eastward into western New York and possibly Vermont, while the "coastal" *P. v. zizaniae* ranges from Massachusetts south along the Atlantic coastal plain to northern Florida and along the Gulf coast to eastern Texas. A 1992 specimen from Vermont was assigned to *P. v. viator* (Grehan et al. 1995). However, a population in Grand Isle appeared to be *P.v. zizaniae* (D. Hoag). Coastal populations have been expanding with the introduced Common Reed Grass (*Phragmites australis*).

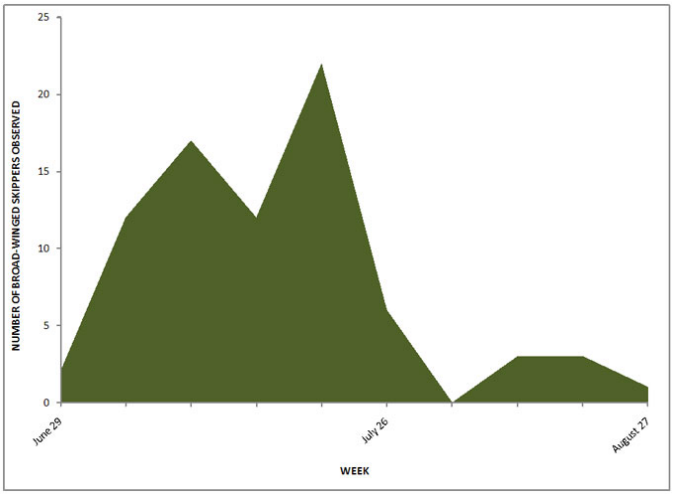
Resident
Rare

Conservation Status
Vermont S2S3, SGCN
Global G5

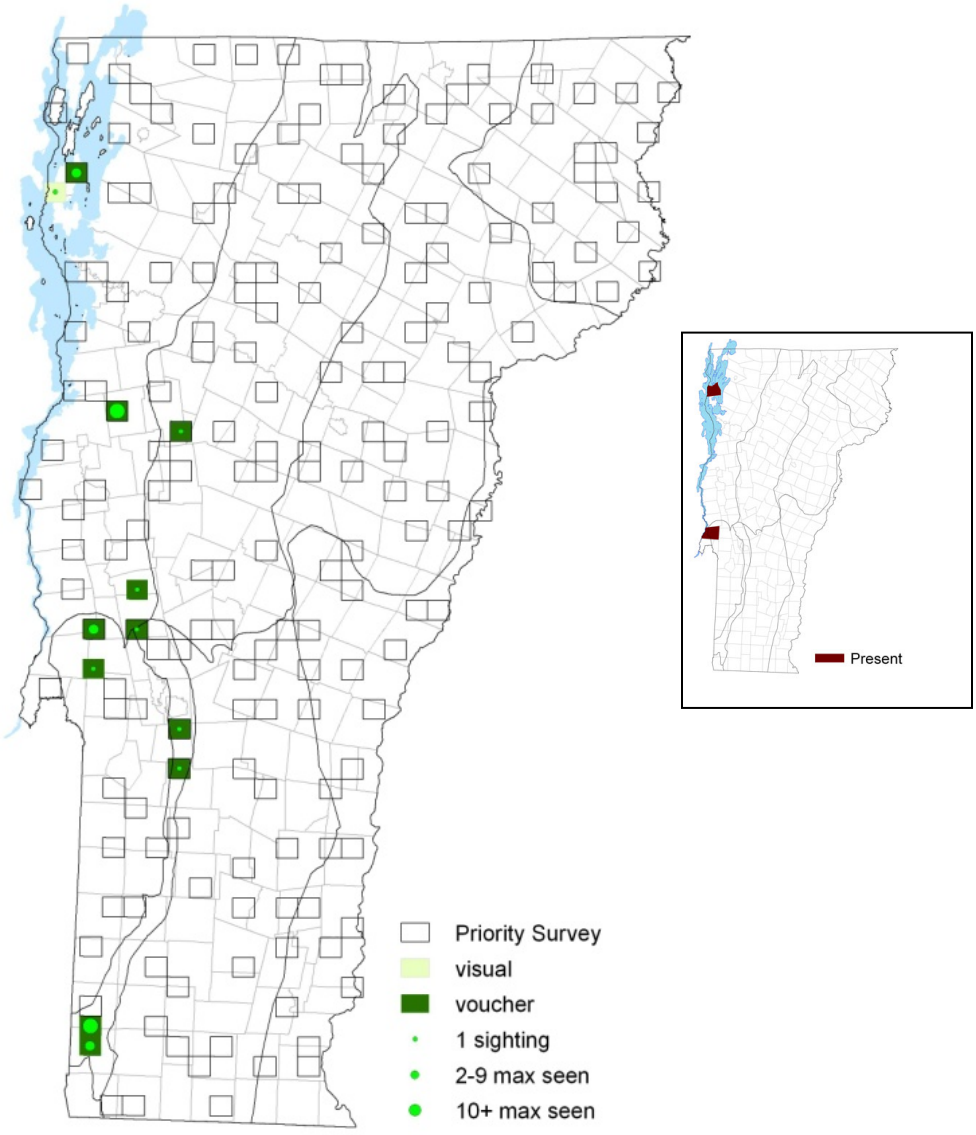
North American Range
Inland populations range from the eastern Dakotas east to south Quebec and central New York.

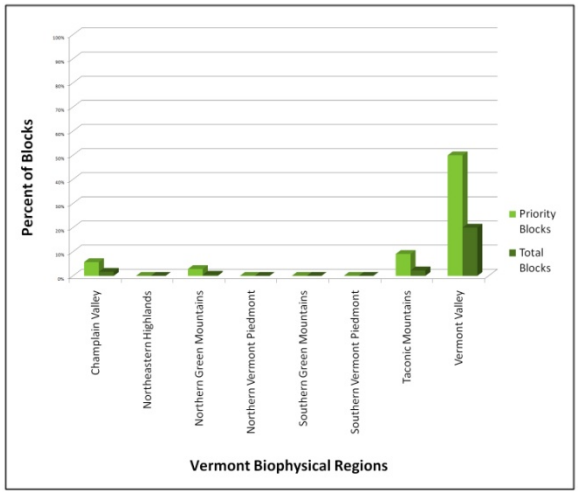
Identification
A large skipper. Forewings are rounded. Upperside of forewing is dark brown with a small yellow-orange area and small cream spots. Hindwing is mostly orange with a black border and black veins. Underside of hindwing is orange-brown with a yellow-orange streak running from the wingbase and a median band of squarish yellow-orange spots.

Flight
One brood from late June through August during VBS. Extreme dates: 28 June 2003 in Grand Isle (D. Hoag) and 27 August 2003 in Bennington (K. Hemeon).



Distribution and Habitat
Found only in western Vermont during VBS and historically. Found in sedge wetlands, often with Common Reed (*Phragmites australis*), it is known to wander outside the wetlands for nectar. Larval host plants are Carex sedges (i.e. Hairy sedge, Carex Common Reed (*Phragmites australis*), Wild Rice (Zizania), and Marsh Millet (Zizaniopsis miliacea). Adult nectar Swamp Milkweed (Asclepias incarnata), Purple Loosestrife (Lythrum salicaria), and Blue Vervain (Verbena hastate).


Priority Survey
visual
voucher
1 sighting
2-9 max seen
10+ max seen
Present


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Delaware Skipper *Anatrytone logan* (W.H. Edwards, 1863)

Once a member of the genus Atrytone, now belonging to Anatrytone, Delaware Skipper is generalist and while not widespread, seems adaptable to nearly any environment. It is a rapid, erratic flier, but is usually easy to identify in the field due to its bold and striking coloration. Males perch within two feet of the ground in open, grassy areas or along streams to await receptive females and mating has been observed in the early afternoon. Females deposit eggs singly on host plant leaves. Caterpillars make nests of leaves.

Resident
Common

Conservation Status
Vermont S5
Global G5

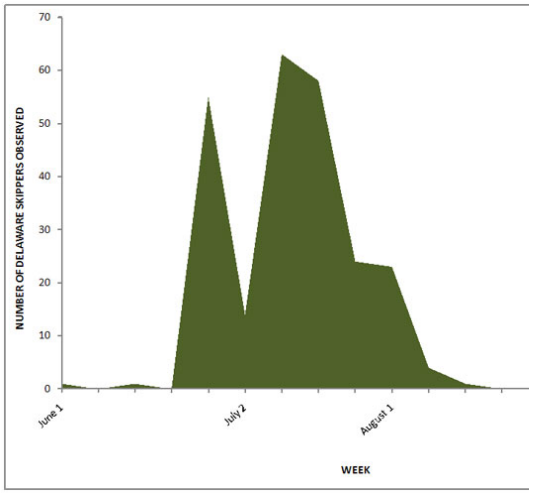
North American Range
Southern Maine west across the Great Lakes states and southern Canada to central Montana; south to Florida, the Gulf states, Texas, northeastern New Mexico, and the Mexican highlands to El Salvador.

Identification

Small, but average size for a skipper. Wings are bright yellow-orange. Upperside has black borders and black veins near the margins; forewing has a black bar at the end of the cell. Females have wider borders and darker markings than males. Underside has no markings but may have darker orange veins.

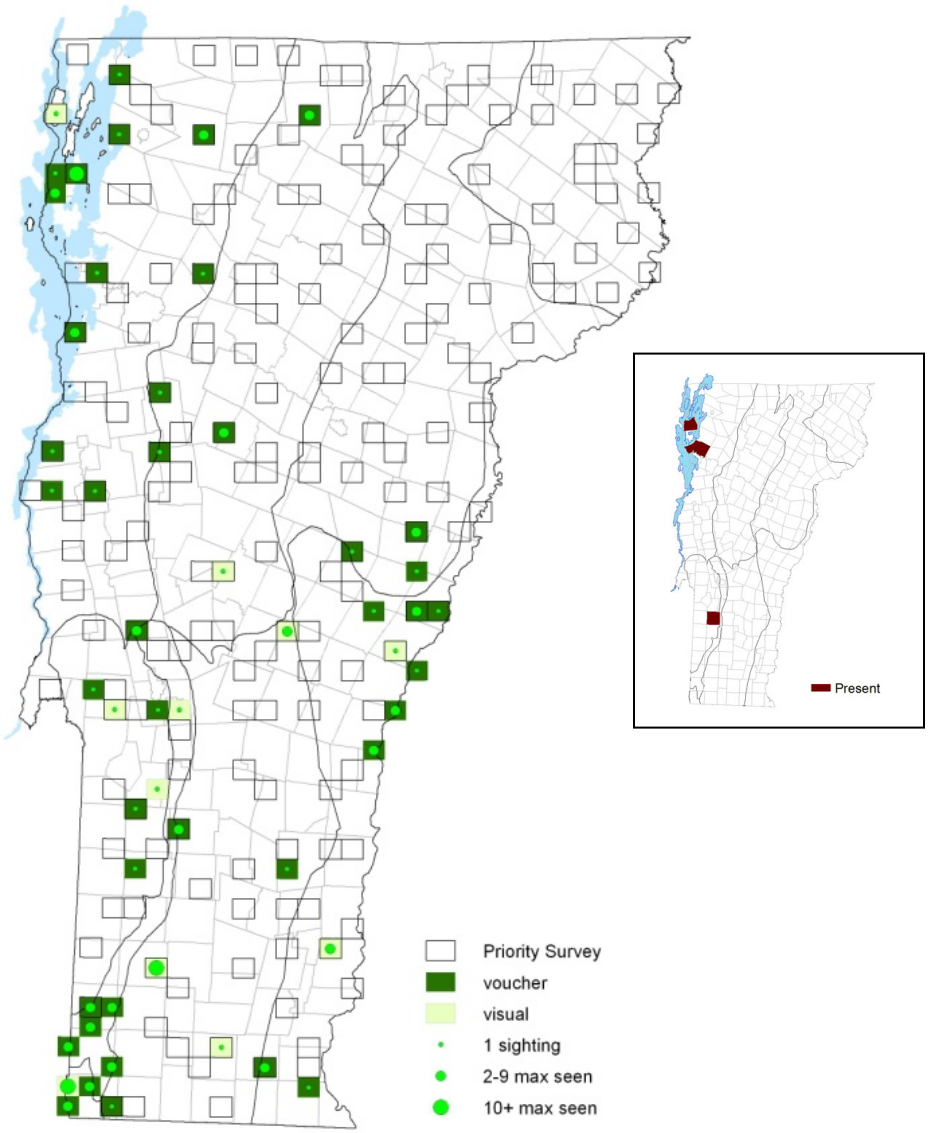
Flight

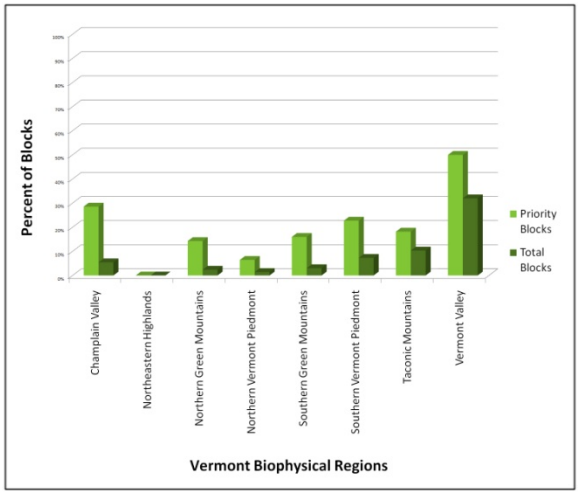
One brood from late June into August during VBS. Extreme dates: 1 June 2007 in Castleton (R. Pilcher) and 14 August 2003 in Burlington (C. Gifford).



Distribution and Habitat

Found throughout most of Vermont during VBS, but becoming uncommon northward in Northern Green Mountains, the Northern Peidmont, and the Northeastern Highland regions. They use a wide range of habitats. Hostplants are Big Bluestem (Andropogon gerardi) and Switchgrass (Panicum virgatum). Adults nectar from pink and white flowers including milkweeds (Asclepias), mint (Pycnanthemum), Sweet Pepperbush (Clethra), thistles (Cirsium), and Pickerelweed (Pontederia).


Present
Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Black Dash *Euphyes conspicua* (W.H. Edwards, 1863)

The Black Dash is often associated with another Hesperid, the Mullberry Wing. Though the two species are relatively easy to distinguish, they utilize similar habitats, host plants, and their ranges in the eastern United States match up almost exactly. In Vermont, however, the Black Dash is more confined to the southern part of the state than Mulberry Wing. First found in Vermont during VBS on 20 July 2003 in Guilford (A Grkovich).

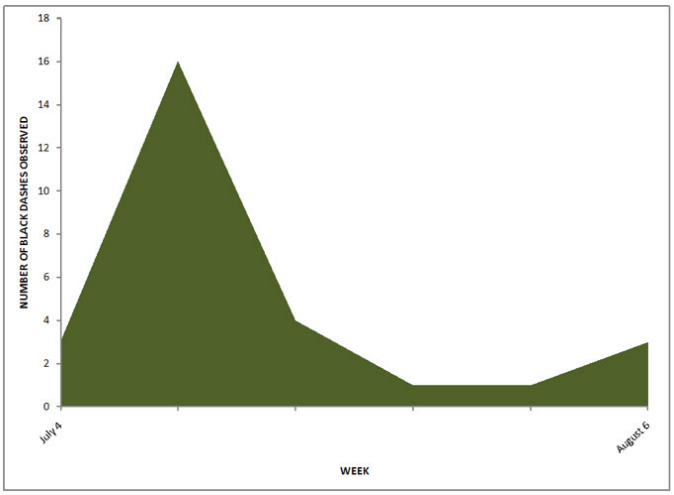
Resident
Very rare

Conservation Status
Vermont S1, SGCN
Global G4

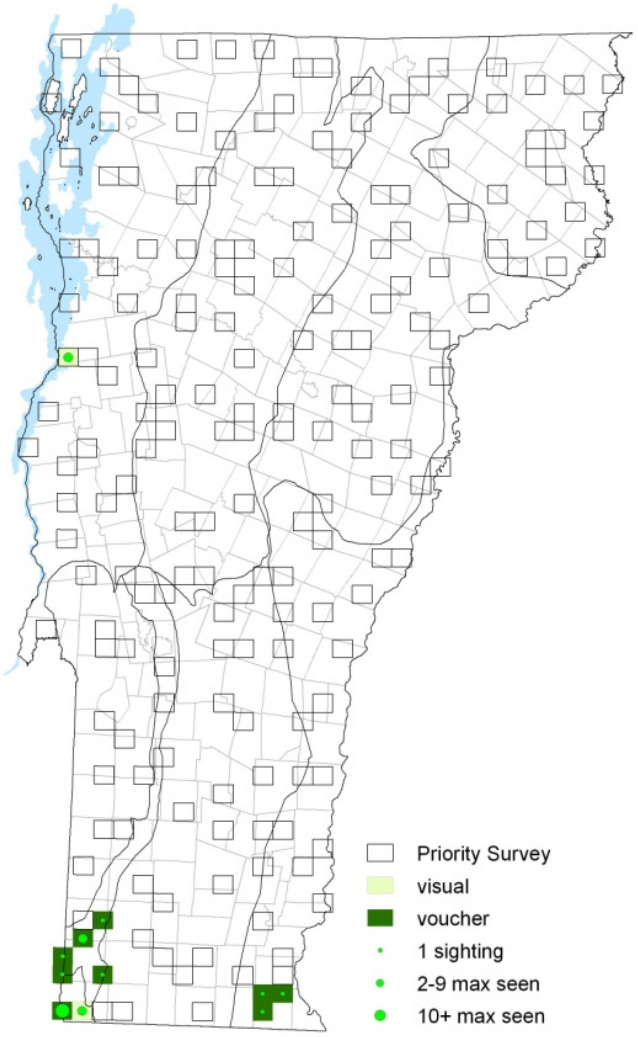
North American Range
The upper Midwest from eastern Nebraska east to southern Ontario; the central Atlantic Coast from Massachusetts south to southeast Virginia.

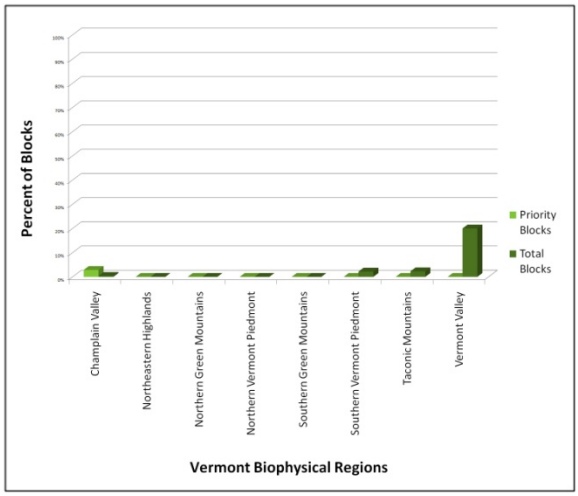
Identification
A small Skipper, the male Black Dash has an overall warm, rusty brown appearance. Male forewing with a heavy stigma; female wings with some pale spots. Underside of hindwing is red-brown with a curved band of yellow spots that is thickest at its center.

Flight
One brood and flying from mid to late summer during VBS, with its peak flight occurring in early to mid July. Extreme dates: 4 July 2004 in Ferrisburg (J. Doyle) and 6 August 2004 in Brattleboro (K. Hemeon).



Distribution and Habitat
In Vermont, the Black Dash was found solely in southern sedge wetlands during VBS, except for one colony found in the Champlain Valley. Hostplants are narrow-leaved sedges, predominantly Tussock Sedge (Carex stricta), though others are possible. Adults rely on nectar from Buttonbush (Cephalanthus occidentalis), Jewelweed (Impatiens) and Swamp Thistle (Cirsium pumilum).


Priority Survey
visual
voucher
1 sighting
2-9 max seen
10+ max seen


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Dion Skipper *Euphyes dion* (W.H. Edwards, 1879)

An elusive skipper of calcareous wetlands, Dion Skipper colonies are rare in Vermont. It is a powerful flier making this species a good short distance colonizer. It is, however, almost never numerous, so local extirpations may occur frequently. Males are territorial and perch in marshes, generally in the afternoon, looking for females.

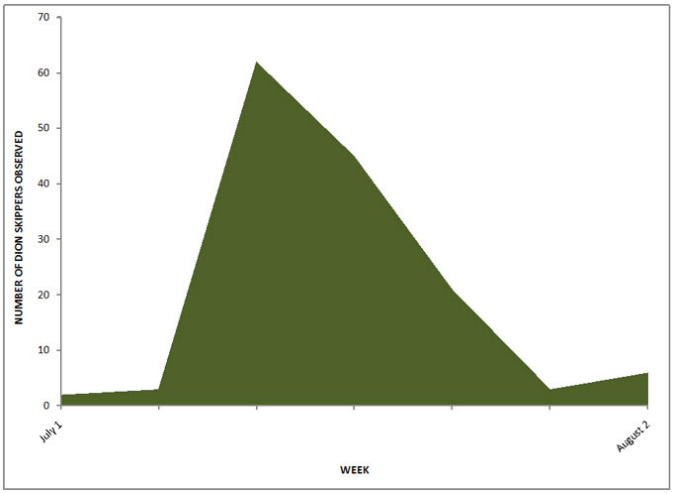
Resident
Rare

Conservation Status
Vermont S2, SGCN
Global G4

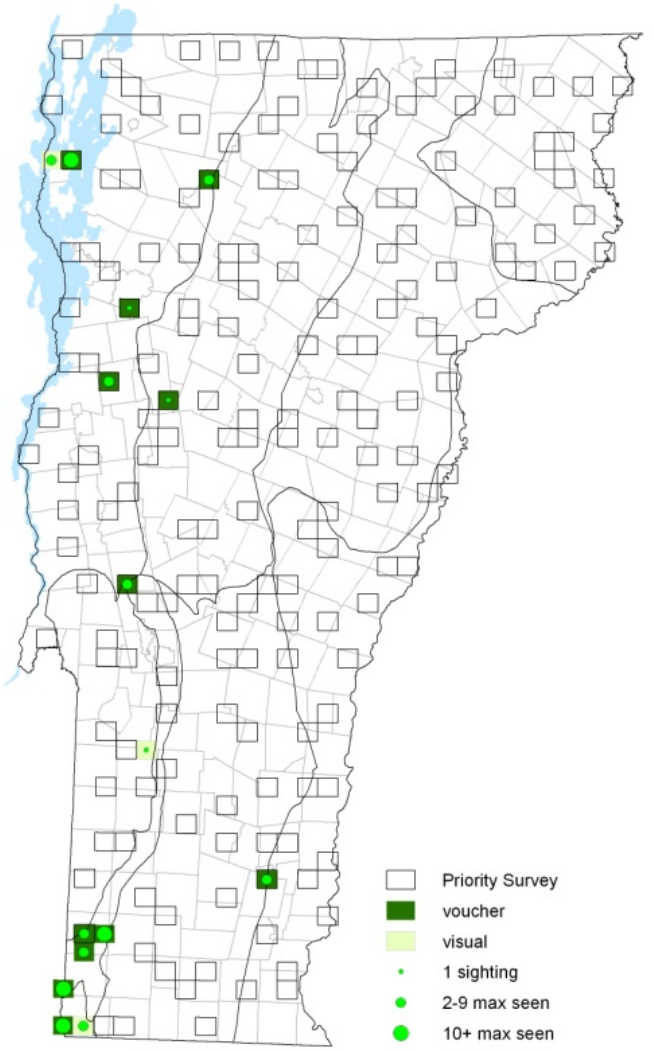
North American Range
Scattered populations along the Atlantic coast from western Massachusetts and southeastern New York south to northeastern Florida, west to northeast Texas, and north to southeastern North Dakota, northern Wisconsin, southern Ontario, and southern Quebec.

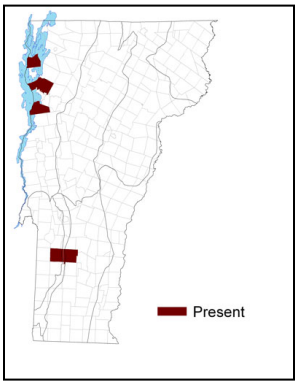
Identification
A large skipper. Upperside of male forewing is dark brown with a central orange area and a black stigma; female forewing is dark brown with light orange spots. Hindwing is dark brown with a wide orange streak. Underside of hindwing.

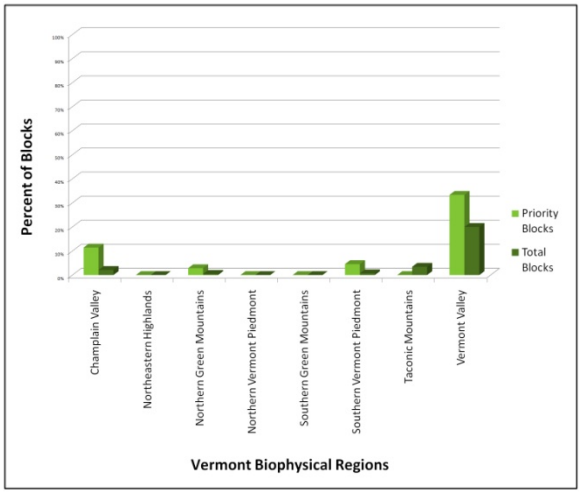
Flight
One brood in the north, and two to three south of New Jersey. One flight with peak in mid July during VBS. Extreme dates: 1 July 2006 and 2 August 2004 in Grand Isle (D. Hoag).



Distribution and Habitat
Widespread throughout the eastern United States, it was only found west of the Green Mountains during VBS with the exception of one colony in southeastern Vermont. Only found in calcareous sedge wetlands, its host plants are narrow-leaved sedges such as Tussock Sedge (Carex stricta) and adults nectar on Buttonbush (Cephalanthus occidentalis), Jewelweed (Impatiens), and Swamp Thistle (Cirsium muticum).


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen


Present


Percent of Blocks
Priority Blocks
Total Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Vermont Biophysical Regions

Two-spotted Skipper *Euphyes bimacula* (Grote & Robinson, 1867)

A poorly studied skipper, it is rare throughout most of its range. This species sometimes seems to disappear from known locations for several years, and then reappears. Males perch within 3 feet of the ground in sedge marshes to watch for females. Caterpillars eat leaves and live in nests of rolled or tied leaves. Overwinters as partially grown larvae.

Resident
Rare to Very Rare

Conservation Status
Vermont S1S2, SGCN
Global G4

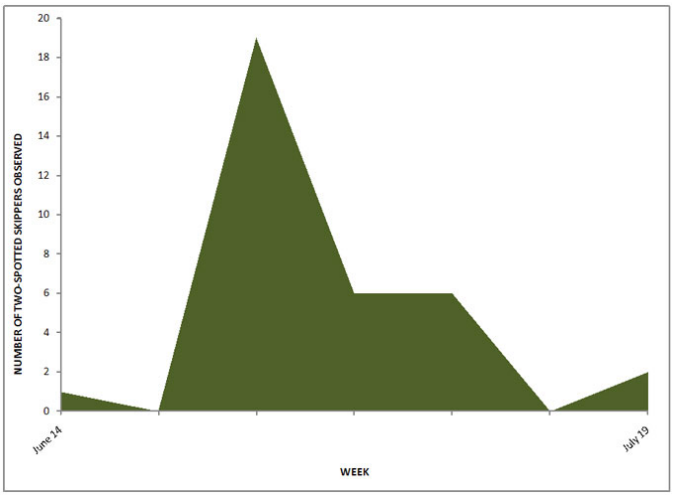
North American Range
Northeast Colorado and western Nebraska; eastern Nebraska east to southern Quebec; southern Maine south to central Virginia; coastal plain south to Georgia; the Gulf Coast.

Identification

Small, especially for a marsh skipper. Forewings are pointed, fringe is white. Underside of head and body are white. Upperside is dark brown; male forewing with reddish orange patch, female forewing with 2 pale spots. Underside of hindwing is orange-brown with pale veins and a white anal fold.

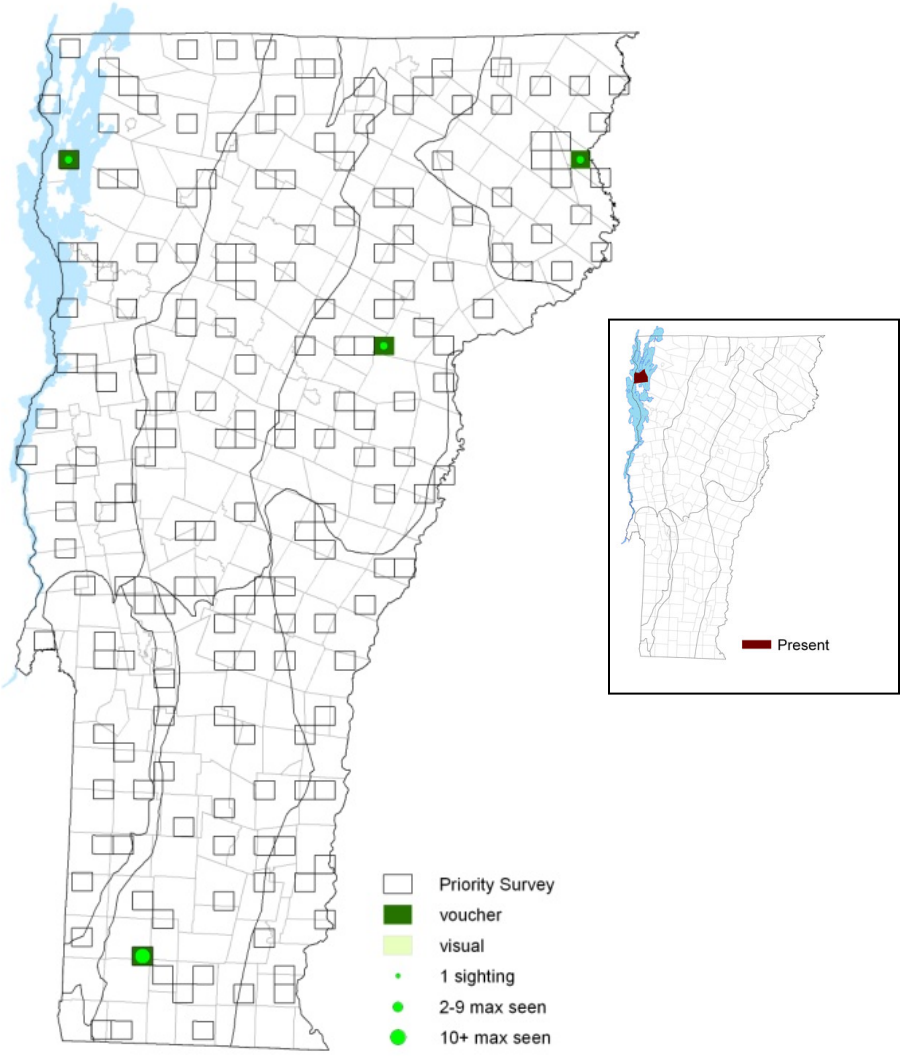
Flight

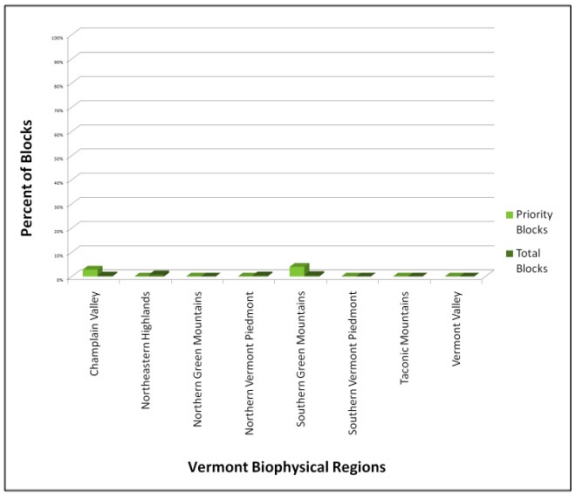
One generation flying from the middle of June through the middle of July during VBS. Even during its peak flight period, it was not abundant. Extreme dates: 14 June 2007 and 19 July 2004 in Grand Isle (D. Hoag).



Distribution and Habitat

Colonies were found widely scattered throughout Vermont during the survey, and in low densities within those colonies. Habitat preferences are spruce bogs and sedge wetlands. Larval host plants are sedges, especially Hairy-fruited sedge (Carex trichocarpa) and Tussock Sedge (Carex stricta). Adults nectar from Pickerelweed (Pontederia cordata), Blue Flag (Iris), Common Milkweed (Asclepias syriaca), and Spireas (Spirea).


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen
Present


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Dun Skipper *Euphyes vestris* (Boisduval, 1852)

The Dun Skipper flies quickly and erratically and is almost completely dark brown. A generalists, they are widespread and adaptable and will colonize disturbed habitats as well as fields and meadows. To find receptive females, males perch less than three feet above the ground. Females lay eggs singly on the leaves of hostplants. Caterpillars feed on leaves and make shelters of rolled or tied leaves. Third instar caterpillars overwinter, and emerge in the spring to complete development, and pupate in silken tubes at the base of the hostplants.

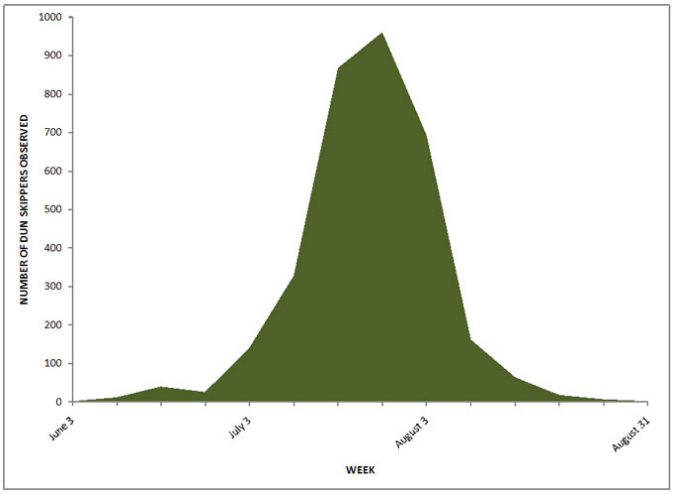
Resident
Common

Conservation Status
Vermont S5
Global G5

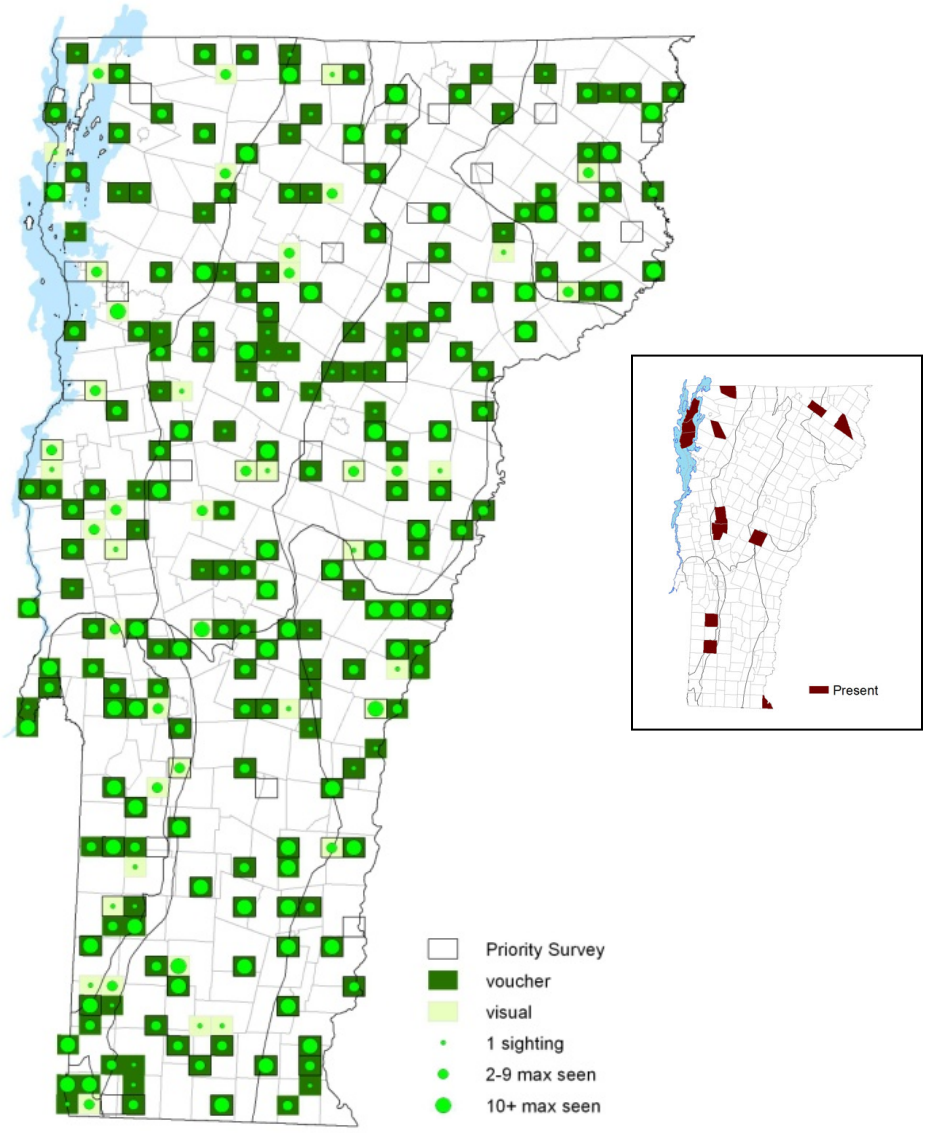
North American Range
Nova Scotia west across southern Canada to southern Alberta; south to Florida, the Gulf Coast, and eastern Texas.

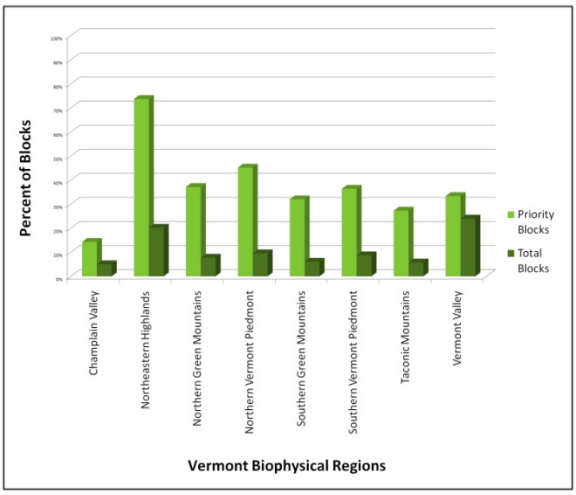
Identification
A tiny skipper. upperside of head and thorax is yellow-orange. Wings are brown-black; male forewing has a black stigma, female forewing has very small cloudy white spots.

Flight
One brood and a short flight period during VBS. They were on the wing from early June through late August, with their peak flight time occurring toward the end of July into August. Extreme dates: 3 June 2005 in Castleton (R. Pilcher) and 31 August 2003 in Bennington (K. Hemeon).



Distribution and Habitat
A common skipper found throughout Vermont during the survey. Their primary habitats are wet areas near deciduous woods such as meadows, seeps, swamp edges, and streams. Adults will nectar a wide variety of flowers within their habitat; this includes milkweeds (Asclepias), New Jersey Tea (Ceanothus americanus) and Dogbane (Apocynum). Larval hostplants include various sedges.


Present
Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Dusted Skipper *Atrytonopsis hianna* (Scudder, 1868)

A large and distinctive grassland skipper at the very northern edge of its range in Vermont, it is often found in the same habitat as the Cobweb Skipper with which it shares its habitat, food preferences and early flight period. Males perch on the ground or low vegetation, often the dead stems of grass from the previous year, during the day to watch for females and fly actively when disturbed.

Resident
Very Rare

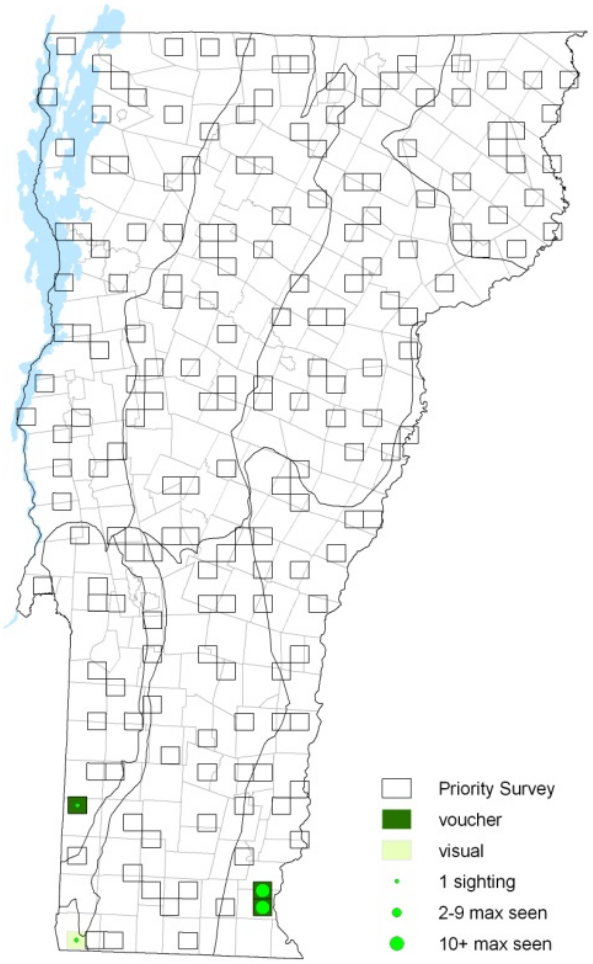
Conservation Status
Vermont S1, SGCN
Global G4G5

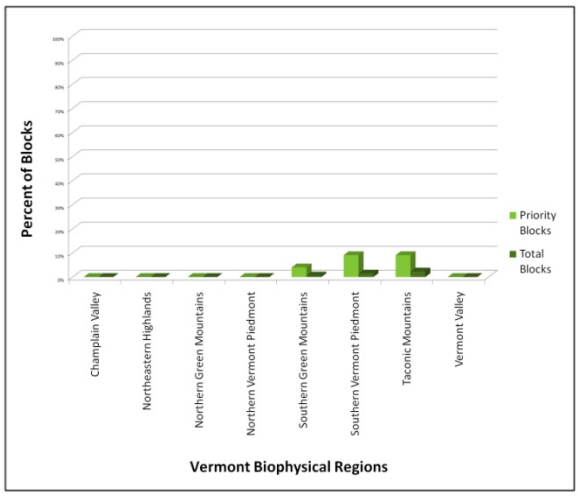
North American Range
Local. Eastern Wyoming, central Colorado, northern New Mexico, and central Texas east to New Hampshire and Massachusetts; south to peninsular Florida and the Gulf Coast.

Identification
Fringes are brown with a few white spots. Upperside is gray-black; male forewing has a tiny stigma. Underside of hindwing is gray with white dusting outwardly and usually at least one white dot at the wing base.

Flight
One generation from late May through early June in northern part of range. Eight records for Vermont from 27 May to 7 June. Extreme dates: 27 May 2004 in Dummerston (S. Harris) and 7 June 2007 in Brattleboro (K.P. McFarland, K. Hemeon and B. Pfeiffer).

Distribution and Habitat
This butterfly was only found in open, dry habitats in far southern Vermont valleys with bluestem during VBS. There were no historic records. Colonies with relatively high populations were found along Interstate 91 from the Vermont-Massachusetts border to exit 3 in areas were the Vermont Agency of Transportation planted Little Bluestem. Hostplants are Big Bluestem (Andropogon gerardi) and Little Bluestem (Schizachyrium). Adults nectar from flowers including Japanese Honeysuckle (Lonicera japonica), Wild Strawberry (Fragaria virginiana), Blackberry (Rubus allegheniensis), Phlox (Phlox), Vervain (Verbena) and Red Clover (Trifolium pratense). Dusted Skipper was first found in Vermont during VBS on 27 May 2004 in Dummerston (S. Harris).


Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen


Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Wild Silk Moths: Family Saturniidae

Subfamily: Giant Silkmoths (Saturniinae)

Giant silkmoths are members of the Family Saturniidae. As their common name suggests, these are medium to very large moths, with adult wingspans ranging from 7.5 to 15 cm. They have hairy bodies and relatively small heads. Caterpillars feed on a wide range of native and ornamental trees and shrubs. Caterpillars pupate in a well-built silken cocoon. There are four species known from Vermont.

Vermont Species:

- Cecropia Silkmoth (Hyalophora cecropia)
- Promethea Silkmoth (Callosamia promethean)
- Polyphemus Moth (Antheraea polyphemus)
- Luna Moth (Actias luna)
- Ailanthus Silkmoth (Samia cynthia)

Cecropia Silkmoth *Hyalophora cecropia* (Linnaeus, 1758)

Resident
Uncommon

Conservation Status
Vermont S3
Global G5

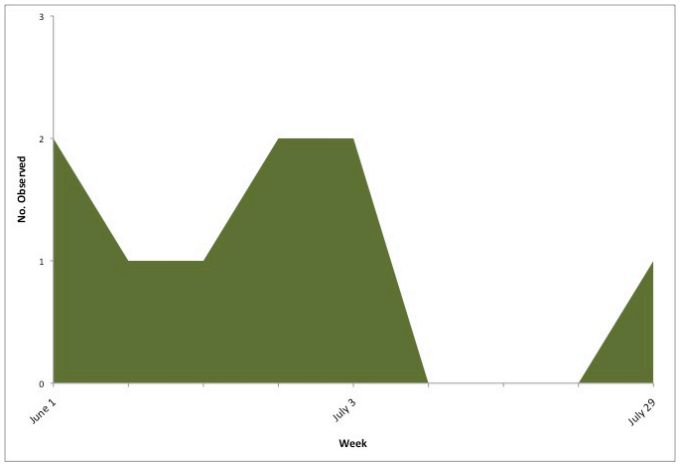
North American Range
Nova Scotia and Maine south to Florida; west across southern Canada and the eastern United States to the Rocky Mountains.

This richly colored, nocturnal beauty is North America's largest silkmoth. Zadock Thompson, Vermont's first naturalist, described this species in Vermont as a "butterfly" when he found a cocoon in March 1840 in a "pine plain" in Burlington and watched it eclose in captivity (Thompson 1842).

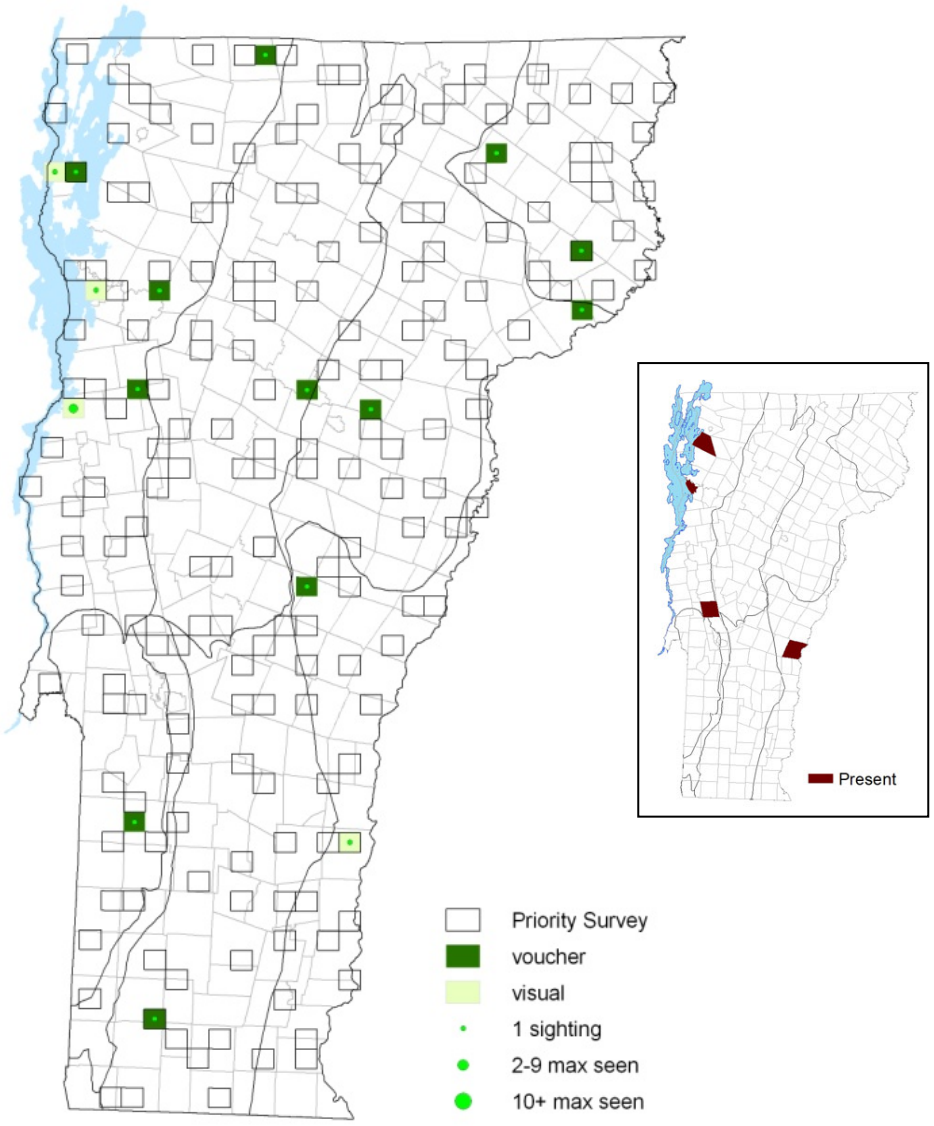
Females release an airborne pheromone that is capable of attracting males from miles. Mating occurs during the early morning hours after midnight. Females lay rows of 2-6 eggs on both sides of the leaves of small host trees or shrubs. Eggs hatch in 10-14 days. Young caterpillars feed in groups on leaves; older caterpillars are solitary. The cocoon is attached along its full length to a twig; to escape predation by rodents and birds, the cocoon is usually constructed in a dark, protected area. In Vermont cocoon observed on American Beech, Buttonbush, and Apple. Overwinters as pupae. One eclosure date reported in Vermont: 7 June 2007, Royalton (S. Faccio). Thompson (1842) found a cocoon on a bush in a "pine plain" in Burlington in March 1840. It eclosed on 20 April after being kept in a warm room. The female laid 200 eggs over its 7-day lifespan.

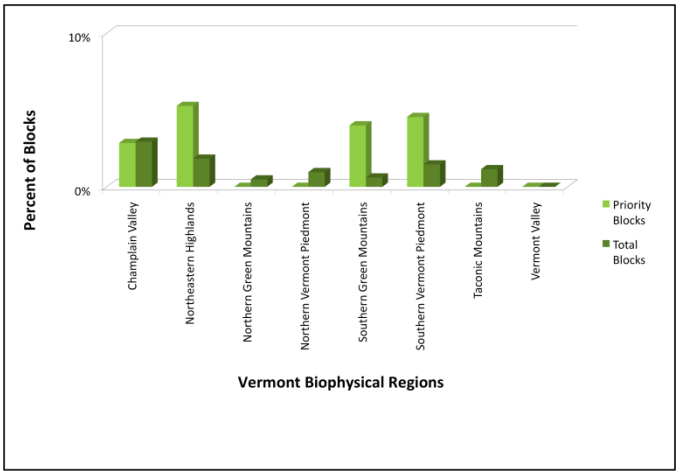
Identification: A large moth. Body is red with a white collar and white bands on the abdomen. Wings are dark brown with white hair-like scales giving a frosted appearance; forewings are red at the base. Crescent spots and the area outside the postmedian line are red on all wings.

Flight Period: One brood found from the beginning of March through the end of July in most of its range. Vermont: One flight. Found from the beginning of June through July. Extreme Dates: 1 June 2005, Essex (B. Pfeiffer); 29 July 2003, Burlington (S. Morrical).



Distribution and Habitat: Adaptable and can be found in a variety of successional habitats including urban and suburban environments as well as deciduous woodlands. Caterpillars feed on various trees and shrubs including Box Elder (*Acer negundo*), Sugar Maple (*Acer saccharum*), Apples (*Malus*), Willows (*Salix*) and many others. Found sporadically throughout Vermont, the Cecropia Silkmoth appears to be neither common nor abundant.


Present
Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen


10%
0%
Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Promethea Silkmoth *Callosamia promethean* (Drury, 1773)

Resident
Uncommon

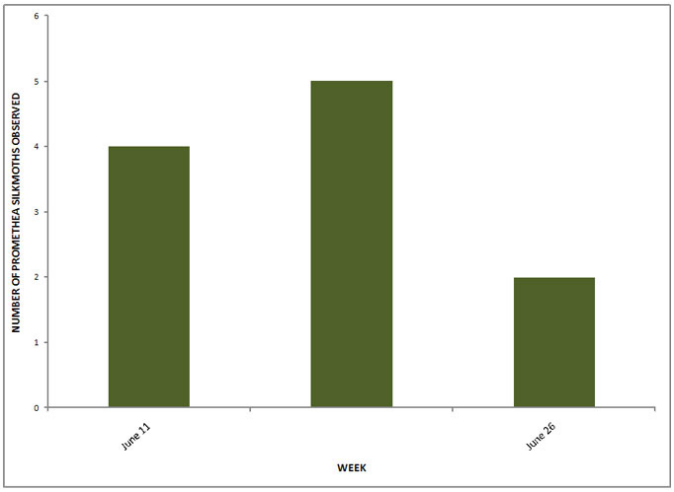
Conservation Status
Vermont S3
Global G5

North American Range
Eastern United States to the Great Plains and Maine west through southern Quebec and Wisconsin to Minnesota; south to the Florida panhandle, the Gulf coast, and east Texas.

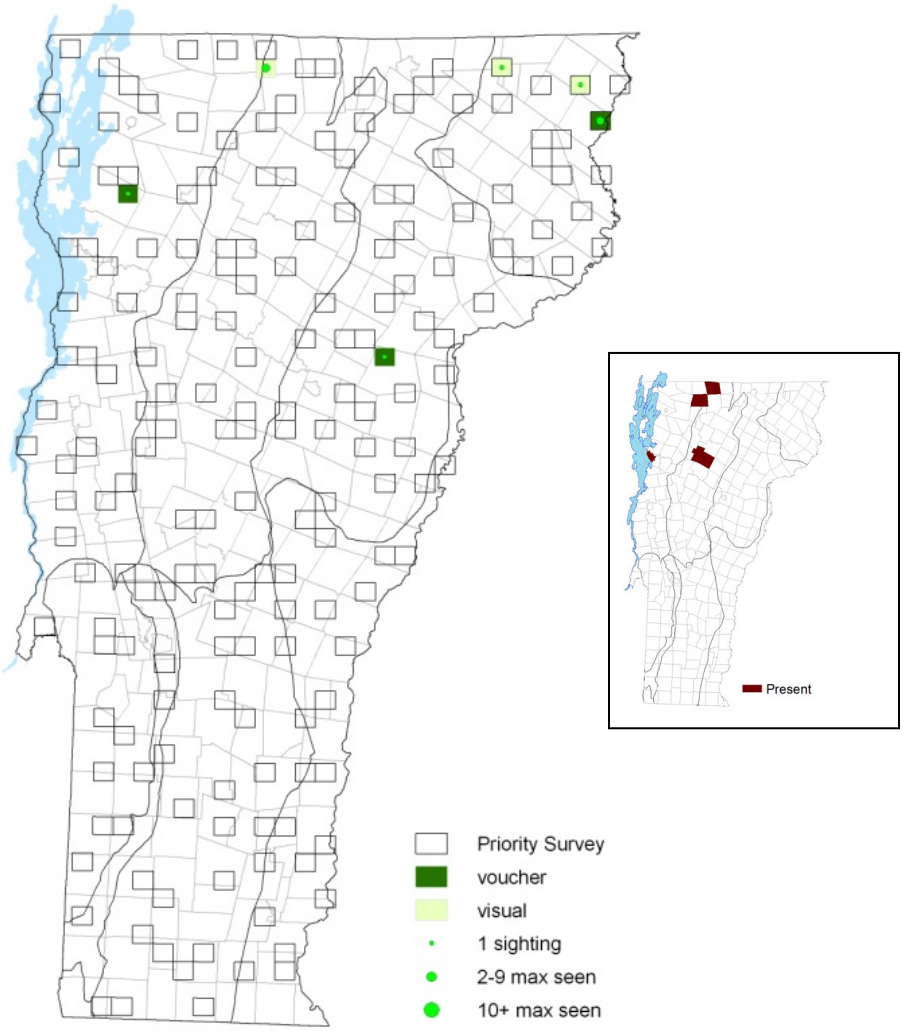
A large, rusty colored and strikingly patterned moth of the eastern United States, the Promethea Silkmoth seems to be in decline across much of its range; perhaps due to the introduction of a tachinid fly to control Gypsy Moth populations. Males seek females in the afternoon and early evening, with most mating occurring from 4 PM to sunset. At night, females lay rows of 4-10 eggs on the upperside of host plant leaves in a single cluster. Young caterpillars feed together while older caterpillars are solitary. Older caterpillars do not eat the leaf midvein, but cut the leaf petiole at the base so it falls to the ground, perhaps a defensive measure eliminating visual or olfactory signs of feeding. A caterpillar ready to pupate strengthens a leaf petiole with silk and then spins its cocoon inside the curled leaf. The cocoon hangs from the host plant throughout the winter.

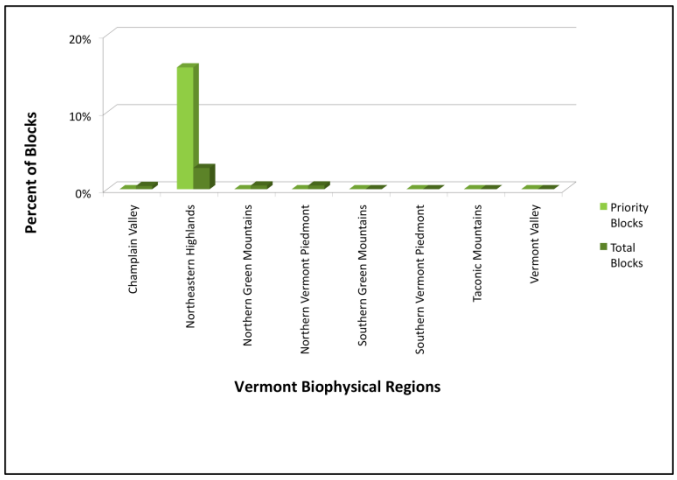
Identification
Males and females differ. Male body is black; wings are black with tan borders, faint tan postmedian lines, and pink near the eyespots on the forewing tips. Female wings are dark brown to reddish-brown with tan borders and well-developed tan cell spots on all wings.

Flight
The Promethea Silkmoth has one brood and flies from May through July. In Vermont all known records are from June. Extreme dates: 25 May 1991 in Enosburg (J. Hedbor), 11 June 2007 in Richford (P. Lambert) and 26 June 2007 in Averill (K.P. McFarland), 22 August 1991 in Burlington (R. Kim).



Distribution and Habitat
Though this moth was only found in the northern part of Vermont during our survey, this does not mean its range does not extend further south in our state. In fact, our lack of records for the Promethea Silkmoth probably has more to do with our primary attention being focused on butterflies rather than nocturnal insects. Their preferred habitat is deciduous woodlands and caterpillars feed on a broad range of plants including Spicebush (*Lindera benzoin*), Sassafras (*Sassafras albidum*), White Ash (*Fraxinus americana*), Lilac (*Syringa vulgaris*), and many others. Adults do not feed.


Present
Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen


20%
10%
0%
Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Polyphemus Moth *Antheraea polyphemus* (Cramer, 1776)

Resident
Uncommon

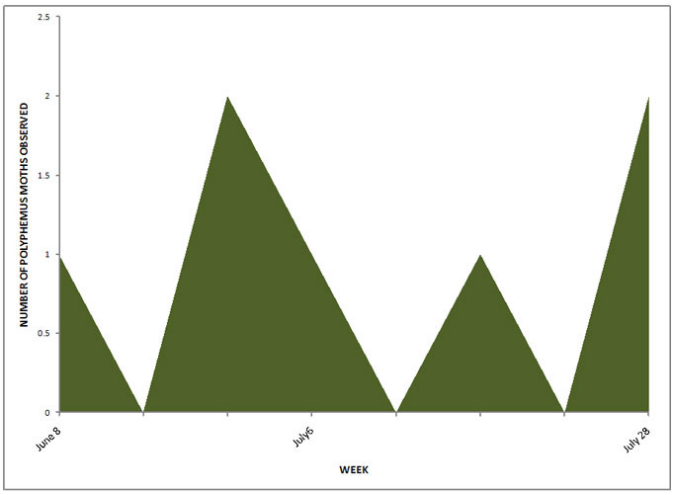
Conservation Status
Vermont S3
Global G5

North American Range
Locally common in its broad range province except Newfoundland and Prince Edward Island; in the United States, every state except Arizona and Nevada; and Mexico.

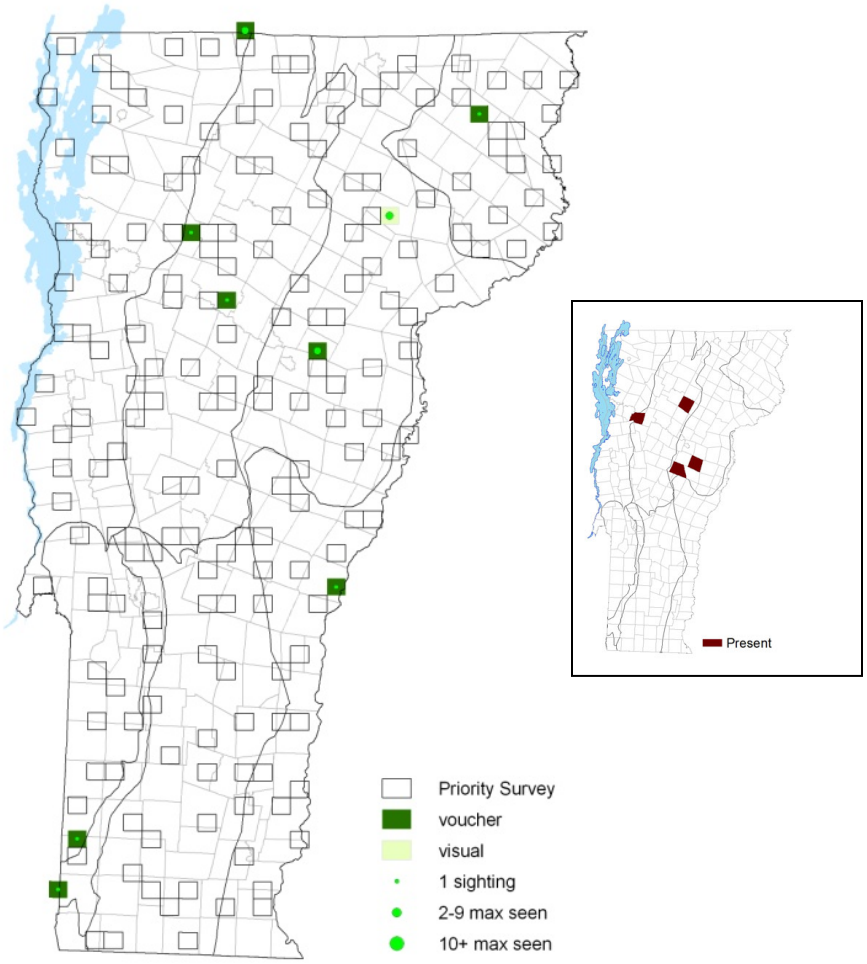
With a wingspan of up to 5 ½ inches, the Polyphemus moth is one of the largest and most striking Lepidoptera in Vermont. Due to its enormous hindwing eyespots, this moth was named after the Greek myth of the Cyclops Polyphemus. Adults emerge from their cocoons in the late afternoon, and mating occurs the same day, from late evening to early morning. After hatching, females begin releasing a pheromone in order to attract males and mate. They lay their eggs that evening, singly or in groups of 2 or 3 on leaves of the host plant. Newly hatched caterpillars eat their eggshells, and caterpillars of all ages are solitary. Older caterpillars eat an entire leaf and then cut the leaf petiole at the base so it falls to the ground, perhaps a defensive measure to eliminate signs of feeding.

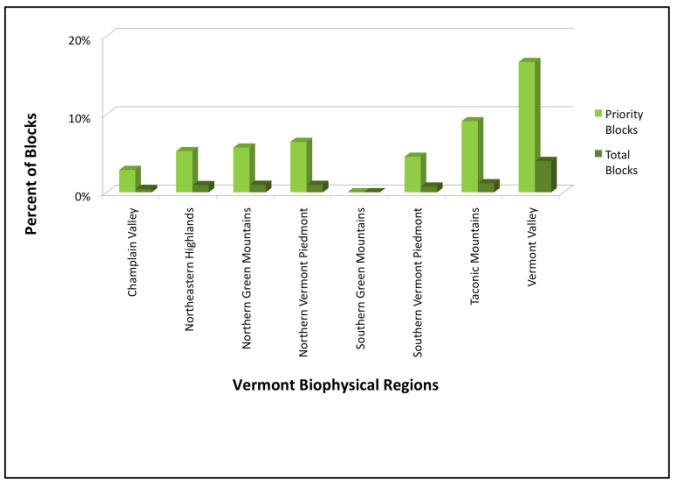
Identification
Upperside is reddish to yellowish brown; forewing margin is usually lighter than the basal area; forewing submarginal line is pink, or black and pink. Clear oval eyespots are ringed with yellow, blue, and black; hindwing eyespot is separated from the basal area of the wing by a thin pink line. Underside has rust, brown, and pink markings.

Flight
The Polyphemus Moth has one brood in the north from May through July. Though we have few records for this moth, it was seen during our survey from the beginning of June through the end of July. Extreme dates: 8 June 2003 in Plainfield (B. Pfeiffer) and 28 July 2004 in Bennington (K. Hemeon).



Distribution and Habitat
Found very sporadically, and predominantly in northern Vermont. Preferred habitats are deciduous hardwood forests, urban areas, orchards, and wetlands. Caterpillars feed on a wide variety of trees and shrubs including Oak (Quercus), Willow (Salix), Maple (Acer), and Birch (Betula).


Present
Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen


20%
10%
0%
Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Priority Blocks
Total Blocks
Vermont Biophysical Regions

Luna Moth *Actias luna* (Linnaeus, 1758)

Resident
Common

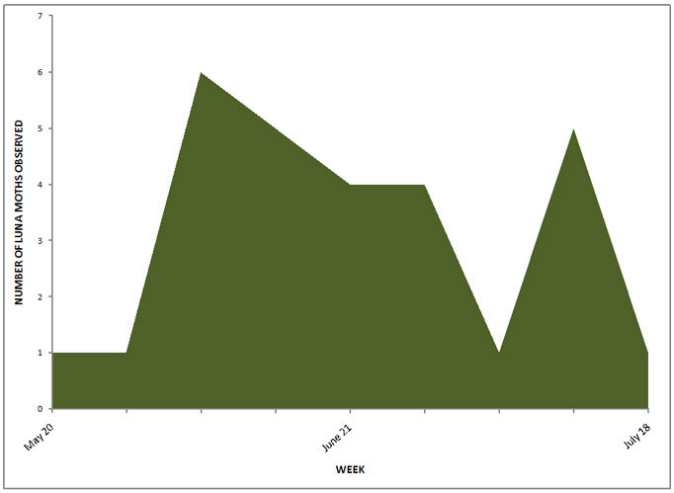
Conservation Status
Vermont S5
Global G5

North American Range
Nova Scotia west to Saskatchewan and eastern North Dakota; south to central Florida, the Gulf Coast, and eastern Texas.

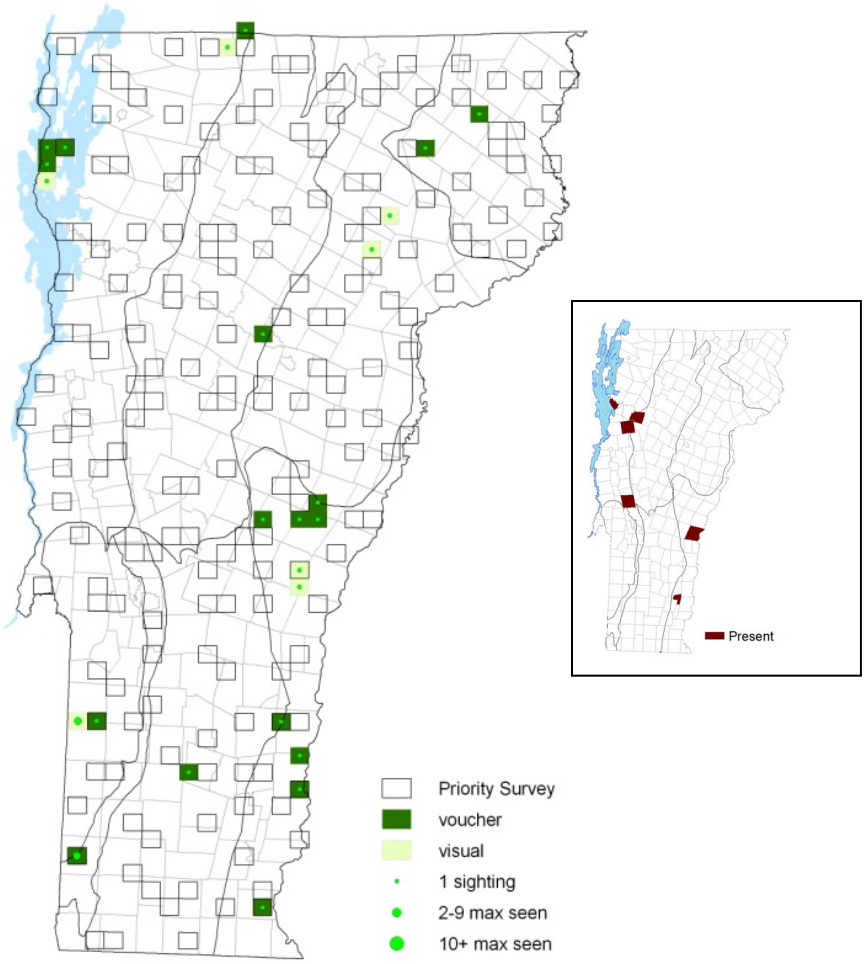
Perhaps the most visually spectacular moth in the northeast, the Luna Moth's otherworldly aura has made it perhaps the most famous and beloved member of the nocturnal insect world. Luckily, they are common in this region. Adults are very strong fliers and are attracted to lights. Mating takes place after midnight, and egg laying begins that evening. Females release a pheromone attracting males and lay eggs in small groups or singly on both surfaces of host plant leaves. Both adults die soon after mating. The eggs hatch in about one week and the caterpillars are sedentary and solitary feeders. Leaves and silk are used to spin papery brown cocoons in leaf litter under the host plant.

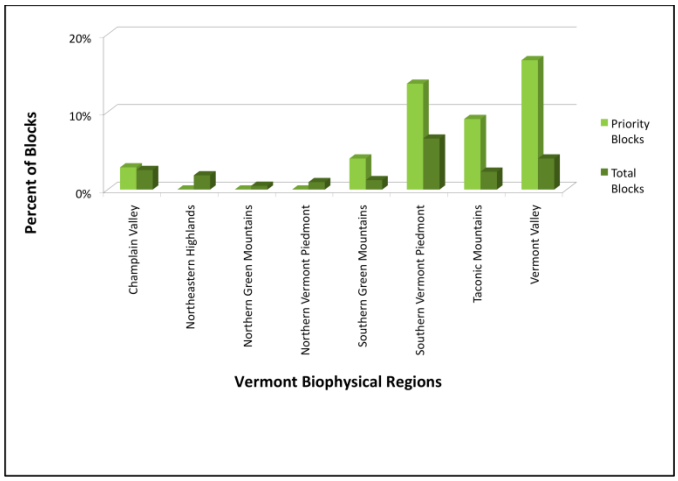
Identification
Unmistakable. Wings are pale green, each with a transparent eyespot. Hindwings have long twisted and curved tails. Outer margins can be either pink or yellow in Vermont.

Flight
Apparently only one brood in Vermont (2-3 broods south). Their flight period is from the end of May through mid July, but the best chance to catch a glimpse of this wondrous insect in Vermont is near the beginning of June. Extreme dates: 20 May 2004 in Bethel (B. Pfieffer), 21 September 2003 in Pomfret, and 12 October 1998 in Hinesburg (S.L. Gauthier).



Distribution and Habitat
Found throughout Vermont in hardwood forests. Larvae utilize a variety of hostplants including White Birch (Betula papyrifera) and Hickories (Carya).


Present
Priority Survey
voucher
visual
1 sighting
2-9 max seen
10+ max seen


20%
10%
0%
Percent of Blocks
Champlain Valley
Northeastern Highlands
Northern Green Mountains
Northern Vermont Piedmont
Southern Green Mountains
Southern Vermont Piedmont
Taconic Mountains
Vermont Valley
Vermont Biophysical Regions
Priority Blocks
Total Blocks

Literature Cited

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Appendices

Appendix 1. VBS priority blocks (#) for USGS 1:24,000 quadrangles (USGS Quad Name)

USGS Quad Name	#
Albany	4
Andover	5
Arlington	1
Averill Lake	6
Bakersfield	6
Barnet	2
Barre East	5
Barre West	3
Bellows Falls	3
Bennington	1
Benson	3
Bethel	6
Bloomfield	3
Bolton Mountain	4
Bomoseen	6
Brandon	3
Brattleboro	1
Bread Loaf	6
Bridport	5
Bristol	6
Brookfield	1
Burke Mountain	6
Burlington	4
Cabot	6
Caspian Lake	6
Cavendish	5
Charlotte	6
Chelsea	2
Chester	5
Chittenden	1
Colchester	3
Colchester Point	6
Cold Hollow Mts.	5
Concord	3
Cornwall	5
Craftsbury	6
Crystal Lake	3
Danby	1
Delectable Mtn.	1
Dorset	5
East Alburg	5
East Corinth	2
East Middlebury	1
Eden	2
Enosburg Falls	4
Essex Center	6
Essex Junction	3
Fairfield	5
Fairlee	4
Gallup Mills	5
Georgia Plains	5
Gilman	1
Gilson Mountain	6
Governors Mtn.	1
Groton	2
Groveton	3
Hancock	3
Hanover	1
Hartland	4
Hazens Notch	1
Highgate Center	3
Hinesburg	6
Huntington	4
Irasburg	2
Island Pond	4
Jacksonville	3
Jamaica	5
Jay Peak	5
Jeffersonville	2
Joes Pond	2
Johnson	5
Juniper Island	6
Killington Peak	4
Knox Mountain	3
Lincoln	1
Londonderry	5
Lowell	3
Ludlow	2
Lyme	2
Lyndonville	4
Maidstone Lake	2
Manchester	2
Marshfield	2
Middlebury	2
Middlesex	3
Middletown Spngs	3
Miles Pond	1
Milton	2
Monadnock Mtn.	6
Monkton	4
Montpelier	5
Morgan Center	5
Morrisville	5
Mount Carmel	6
Mount Ellen	2
Mount Holly	4
Mount Mansfield	6
Mount Philo	3
Mount Snow	3
Mount Worcester	1
Newbury	3
Newfane	4
Newport	6
Newport Center	3
North Hero	1
North Troy	2
Northfield	3
Norton Pond	6
Orleans	1
Orwell	4
Pawlet	5
Peacham	4
Peru	4
Pico Peak	5
Plainfield	5
Plymouth	1
Port Henry	5
Poultney	4
Pownal	6
Proctor	4
Putney	3
Quechee	2
Randolph	2
Randolph Center	6
Readsboro	4
Richford	4
Richmond	6
Rochester	3
Rouses Point	4
Roxbury	1
Rutland	2
Saxtons River	2
Seneca Mountain	4
Sharon	1
Sheldon Springs	4
Snake Mountain	6
South Hero	4
South Mountain	5
South Royalton	3
South Strafford	5
Spectacle Pond	6
Springfield	2
St. Albans	4
St. Albans Bay	5
St. Johnsbury	1
Stamford	3
Stannard	2
Sterling Mountain	3
Stone Mountain	4
Stowe	2
Stratford	2
Stratton Mtn.	3
Sudbury	3
Sunderland	5
Sutton	1
Tinkerville	2
Townshend	4
Underhill	5
Vergennes West	3
Vershire	4
Waitsfield	2
Wallingford	1
Walpole	3
Warren	4
Washington	1
Waterbury	4
Wells	5
West Burke	6
West Charleston	2
West Dover	3
West Rupert	5
West Rutland	1
West Topsham	2
Westminster West	3
Westmore	4
Weston	6
Windham	5
Windsor	1
Wolcott	4
Woodbury	3
Woodford	5
Woodstock North	2
Woodstock South	1
Woodsville	1

USGS Map Key N ↑

1	4
2	5
3	6

Appendix 2. Annotated Checklist of Vermont Butterflies.

Nomenclature & taxonomy follows Pelham (2008).

Order	Family	Subfamily	Common Name	Genus	Species	Subspecies	Author	Status	Wildlife Action Plan Species	Vermont Endangered Species Law	State Conservation Rank	Global Conservation Rank	No. VBS Records	No. Pre-VBS Records
1	Papilionidae	Papilioninae	Pipevine Swallowtail	Battus	philenor	philenor	Linnaeus, 1771	rare migrant			SNA	G5	4	0
2	Papilionidae	Papilioninae	Black Swallowtail	Papilio	polyxenes	asterius	Fabricius, 1775	resident			S5	G5	822	38
3	Papilionidae	Papilioninae	Canadian Tiger Swallowtail	Papilio	canadensis		Rothschild & Jordan, 1906	resident			S5	G5	714	63
4	Papilionidae	Papilioninae	Eastern Tiger Swallowtail	Papilio	glaucus	glaucus	Linnaeus, 1758	resident			S1	G5	70	5
5	Papilionidae	Papilioninae	Spicebush	Papilio	troilus	troilus	Linnaeus, 1758	resident			S1	G4?	17	1
6	Papilionidae	Papilioninae	Giant Swallowtail	Papilio	cresphontes		Cramer, 1777	rare migrant			SNA	G5	0	0
7	Pieridae	Coliadinae	Little Yellow	Pyrisitia	lisa	lisa	Boisduval & Le Conte, 1830	rare migrant			SNA	G5	2	1
8	Pieridae	Coliadinae	Clouded Sulphur	Colias	philodice		Godart, 1819	resident			S5	G5	1906	87
9	Pieridae	Coliadinae	Orange Sulphur	Colias	eurytheme		Boisduval, 1832	resident			S5	G5	720	118
10	Pieridae	Coliadinae	Pink-edged Sulphur	Colias	interior		Scudder, 1862	resident			S3	G5	28	11
11	Pieridae	Pierinae	Mustard White	Pieris	oleracea	oleracea	T. Harris, 1829	resident			S4S5	G5	295	57
12	Pieridae	Pierinae	West Virginia White	Pieris	virginiensis	virginiensis	W. H. Edwards, 1870	resident	SGCN	SC	S3S4	G3G4	47	10
13	Pieridae	Pierinae	Cabbage White	Pieris	rapae	rapae	Linnaeus, 1758	resident			SNA	G5	1870	176
14	Lycaenidae	Miletinae	Harvester	Feniseca	tarquinius		Fabricius, 1793	resident			S4	G4	29	10
15	Lycaenidae	Lycaeninae	American Copper	*Lycaena*	phlaeas		Boisduval, 1852	resident			S5	G5	399	41
16	Lycaenidae	Lycaeninae	Bronze Copper	Lycaena	hyllus		Cramer, 1775	resident			S5	G4G5	109	47
17	Lycaenidae	Lycaeninae	Bog Copper	*Lycaena*	*epixanthe*		Boisduval & Le Conte,1835	resident	SGCN		S2	G4G5	9	22
18	Lycaenidae	Theclinae	Acadian Hairstreak	*Satyrium*	*acadica*		W. H. Edwards, 1862	resident			S5	G5	59	21
19	Lycaenidae	Theclinae	Coral Hairstreak	Satyrium	titus		Fabricius, 1793	resident			S5	G4G5	72	6
20	Lycaenidae	Theclinae	Edwards' Hairstreak	Satyrium	edwardsii		Grote & Robinson, 1867	resident	SGCN		SU	G4	1	0
21	Lycaenidae	Theclinae	Banded Hairstreak	Satyrium	calanus		Hübner, 1809	resident			S5	G5	186	33
22	Lycaenidae	Theclinae	Hickory Hairstreak	Satyrium	caryaevorus		McDunnough, 1942	resident			S3	G4	25	6
23	Lycaenidae	Theclinae	Striped Hairstreak	Satyrium	liparops		Le Conte, 1833	resident			S5	G5	108	16
24	Lycaenidae	Theclinae	Juniper Hairstreak	Callophrys	gryneus		Hübner, 1819	resident			S3	G5	68	19
25	Lycaenidae	Theclinae	Brown Elfin	Callophrys	augustinus		Westwood, 1852	resident			S3	G5	28	36
26	Lycaenidae	Theclinae	Frosted Elfin	Callophrys	irus		Godart, 1824	resident			S1	G3	1	0
27	Lycaenidae	Theclinae	Henry's Elfin	Callophrys	henrici		Grote & Robinson, 1867	resident			SU	G5	3	0
28	Lycaenidae	Theclinae	Bog Elfin	Callophrys	lanoraieensis		Sheppard, 1934	unknown	SGCN		SU	G3	0	0
29	Lycaenidae	Theclinae	Eastern Pine Elfin	Callophrys	niphon		Hübner, 1819	resident			S5	G5	150	34
30	Lycaenidae	Theclinae	Gray Hairstreak	Strymon	melinus		Hübner, 1818	resident			S2S3	G5	9	3
31	Lycaenidae	Theclinae	Early Hairstreak	Erora	laeta		W. H. Edwards, 1862	resident	SGCN		S2S3	GU	11	21
32	Lycaenidae	Polyommatinae	Eastern Tailed Blue	Cupido	comyntas		Godart, 1824	resident			S5	G5	526	63
33	Lycaenidae	Polyommatinae	Lucia Azure	Celastrina	lucia		W. Kirby, 1837	resident			S5	G5	218	
34	Lycaenidae	Polyommatinae	Cherry Gall Azure	Celastrina	serotina		Pavulaan & D. Wright, 2005	resident			S4	G5	55	
35	Lycaenidae	Polyommatinae	Summer Azure	Celastrina	neglecta		W. H. Edwards, 1862	resident			S5	G5	348	10
36	Lycaenidae	Polyommatinae	Silvery Blue	Glaucopsyche	lygdamus		E. Doubleday, 1841	resident			S5	G5	708	27
37	Nymphalidae	Libytheinae	American Snout	Libytheana	carinenta	bachmanii	Kirtland, 1851	rare migrant			SNA	G5	5	1
38	Nymphalidae	Danainae	Monarch	Danaus	plexippus		Linnaeus, 1758	resident			S5	G5	1263	130
39	Nymphalidae	Heliconiinae	Gulf Fritillary	Agraulis	vanillae		Linnaeus, 1758	rare migrant			SNA	G5	0	1
40	Nymphalidae	Heliconiinae	Variegated Fritillary	Euptoieta	claudia		Cramer, 1775	regular migrant			SNA	G5	16	4
41	Nymphalidae	Heliconiinae	Silver-bordered Fritillary	Boloria	selene		Schiffermüller,1775	resident			S5	G5	333	44
42	Nymphalidae	Heliconiinae	Meadow Fritillary	Boloria	bellona		Fabricius, 1775	resident			S5	G5	223	34
43	Nymphalidae	Heliconiinae	Great Spangled Fritillary	Speyeria	cybele		Fabricius, 1775	resident			S5	G5	789	38
44	Nymphalidae	Heliconiinae	Aphrodite Friitllary	Speyeria	aphrodite		Fabricius, 1787	resident			S5	G5	240	13
45	Nymphalidae	Heliconiinae	Regal Fritillary	Speyeria	idalia		Drury, 1773	extirpated	SGCN	SC	SX	G3	0	6
46	Nymphalidae	Heliconiinae	Atlantis Fritillary	Speyeria	atlantis		W. H. Edwards, 1862	resident			S5	G5	677	56
47	Nymphalidae	Limenitidinae	White Admiral	Limenitis	arthemis	arthemis	Drury, 1773	resident			S5	G5	1621	62
47.1	Nymphalidae	Limenitidinae	White Admiral	Limenitis	arthemis	arthemis	Drury, 1773	resident			S5	G5	1386	10
47.2	Nymphalidae	Limenitidinae	Red-spotted Purple	Limenitis	arthemis	astyanax	Fabricius, 1775	resident			S5	G5	72	46
48	Nymphalidae	Limenitidinae	Viceroy	Limenitis	archippus		Cramer, 1775	resident			S5	G5	1106	65
49	Nymphalidae	Apaturinae	Hackberry Emperor	Asterocampa	celtis		Boisduval & Le Conte,1835	resident	SGCN		S1S2	G5	11	0
50	Nymphalidae	Apaturinae	Tawny Emperor	Asterocampa	clyton		Boisduval & Le Conte,1835	resident	SGCN		S1S2	G5	14	0
51	Nymphalidae	Nymphalinae	American Lady	Vanessa	virginiensis		Drury, 1773	resident			S5	G5	336	24
52	Nymphalidae	Nymphalinae	Painted Lady	Vanessa	cardui		Linnaeus, 1758	resident			S5	G5	105	26
53	Nymphalidae	Nymphalinae	Red Admiral	Vanessa	atalanta		Linnaeus, 1758	resident			S5	G5	587	46
54	Nymphalidae	Nymphalinae	Milbert's Tortoiseshell	Aglais	milberti		Godart, 1819	resident			S5	G5	622	37
55	Nymphalidae	Nymphalinae	Compton's Tortoiseshell	Nymphalis	l-album		Esper, 1781	resident			S5	G5	131	20
56	Nymphalidae	Nymphalinae	California Tortoiseshell	Nymphalis	californica		Boisduval, 1852	rare migrant			SNA	G5	0	1
57	Nymphalidae	Nymphalinae	Mourning Cloak	Nymphalis	antiopa		Linnaeus, 1758	resident			S5	G5	536	44
58	Nymphalidae	Nymphalinae	Question Mark	Polygonia	interrogationis		Fabricius, 1798	resident			S5	G5	159	39
59	Nymphalidae	Nymphalinae	Eastern Comma	Polygonia	comma		T. Harris, 1841	resident			S5	G5	412	43
60	Nymphalidae	Nymphalinae	Gray Comma	Polygonia	progne		Cramer, 1775	resident			S5	G5	125	15
61	Nymphalidae	Nymphalinae	Green Comma	Polygonia	faunus		W. H. Edwards, 1862	resident			S5	G5	48	10
62	Nymphalidae	Nymphalinae	Northern Buckeye	Junonia	coenia	coenia	Hübner, 1822	regular migrant			SU	G5	4	0
63	Nymphalidae	Nymphalinae	Baltimore Checkerspot	Euphydryas	phaeton		Drury, 1773	resident			S4	G4	235	23
64	Nymphalidae	Nymphalinae	Silvery Checkerspot	Chlosyne	nycteis		E. Doubleday, 1847	resident			S1S2	G5	7	7
65	Nymphalidae	Nymphalinae	Harris's Checkerspot	Chlosyne	harrisii		Scudder, 1863	resident			S4	G4	297	15
66	Nymphalidae	Nymphalinae	Pearl Crescent	Phyciodes	tharos		Drury, 1773	resident			S5	G5	470	39
67	Nymphalidae	Nymphalinae	Northern Crescent	Phyciodes	cocyta		Cramer, 1777	resident			S5	G5	713	38
68	Nymphalidae	Satyrinae	Northern Pearly-eye	Lethe	anthedon		A. Clark, 1936	resident			S4	G4	480	34
69	Nymphalidae	Satyrinae	Eyed Brown	Lethe	eurydice		Linnaeus, 1763	resident			S4	G4	353	23
70	Nymphalidae	Satyrinae	Appalachian Brown	Lethe	appalachia		R. Chemock, 1947	resident			S1S2	G4	51	12
71	Nymphalidae	Satyrinae	Common Ringlet	Coenonympha	tullia		Müller, 1764	resident			S5	G5	2018	81
72	Nymphalidae	Satyrinae	Little Wood-Satyr	Megisto	cymela		Cramer, 1777	resident			S5	G5	665	27
73	Nymphalidae	Satyrinae	Jutta Arctic	Oeneis	jutta		Hübner, 1806	resident	SGCN		S1	G5	7	5
74	Nymphalidae	Satyrinae	Common Wood Nymph	Cercyonis	pegala		Fabricius, 1775	resident			S5	G5	1102	49
74.1	Nymphalidae	Satyrinae	Clouded Wood Nymph	Cercyonis	pegala	nephele	W. Kirby, 1837	resident			S5	G5	151	16
74.2	Nymphalidae	Satyrinae	Common Wood Nymph	Cercyonis	pegala	pegala	Fabricius, 1775	resident			S5	G5	133	11
75	Hesperiidae	Eudaminae	Silver-spotted Skipper	Epargyreus	clarus		Cramer, 1775	resident			S5	G5	409	19
76	Hesperiidae	Eudaminae	Long-tailed Skipper	Urbanus	proteus		Linnaeus, 1758	rare migrant			SNA	G5	0	1
77	Hesperiidae	Eudaminae	Southern Cloudywing	Thorybes	bathyllus		J.E. Smith, 1797	resident?			SU	G5	2	0
78	Hesperiidae	Eudaminae	Northern Cloudywing	Thorybes	pylades		Scudder, 1870	resident			S5	G5	259	24
79	Hesperiidae	Pyrginae	Common Sootywing	Pholisora	catullus		Fabricius, 1793	resident			S1	G5	8	0
80	Hesperiidae	Pyrginae	Dreamy Duskywing	Erynnis	icelus		Scudder & Burgess, 1870	resident			S5	G5	199	36
81	Hesperiidae	Pyrginae	Juvenal's Duskywing	Erynnis	juvenalis		Fabricius, 1793	resident			S5	G5	112	20
82	Hesperiidae	Pyrginae	Horace's Duskywing	Erynnis	horatius		Scudder & Burgess, 1870	resident?			SU	G5	3	0
83	Hesperiidae	Pyrginae	Wild Indigo Duskywing	Erynnis	baptisiae		W. Forbes, 1936	resident			SU	G5	26	0
84	Hesperiidae	Pyrginae	Columbine Duskywing	Erynnis	lucillius		Scudder & Burgess, 1870	resident			SU	G4	2	2
85	Hesperiidae	Pyrginae	Persius Duskywing	Erynnis	persius		Scudder, 1863	extirpated?	SGCN		SU	G5	0	1
86	Hesperiidae	Pyrginae	Common Checkered-Skipper	Pyrgus	communis		Grote, 1872	regular migrant			SU	G5	4	0
87	Hesperiidae	Heteropterinae	Arctic Skipperling	Carterocephalus	palaemon		Pallas, 1771	resident			S5	G5	253	22
88	Hesperiidae	Hesperiinae	Least Skipper	Ancyloxypha	numitor		Fabricius, 1793	resident			S5	G5	355	42
89	Hesperiidae	Hesperiinae	European Skipper	Thymelicus	lineola		Ochsenheimer, 1808	introduced			SNA	G5	1113	44
90	Hesperiidae	Hesperiinae	Pepper and Salt Skipper	Amblyscirtes	hegon		Scudder, 1863	resident			S4	G4	83	16
91	Hesperiidae	Hesperiinae	Common Roadside-Skipper	Amblyscirtes	vialis		W. H. Edwards, 1862	resident			S4	G4	40	8
92	Hesperiidae	Hesperiinae	Fiery Skipper	Hylephila	phyleus		Drury, 1773	rare migrant			SNA	G5	1	1
93	Hesperiidae	Hesperiinae	Common Branded Skipper	Hesperia	comma		Linnaeus, 1758	resident			S4	G5	23	11
94	Hesperiidae	Hesperiinae	Leonard's Skipper	Hesperia	leonardus		T. Harris, 1862	resident			S4	G4	33	3
95	Hesperiidae	Hesperiinae	Cobweb Skipper	Hesperia	metea		Scudder, 1863	resident?	SGCN		S1	G4	2	0
96	Hesperiidae	Hesperiinae	Indian Skipper	Hesperia	sassacus		T. Harris, 1862	resident			S5	G4G5	163	5
97	Hesperiidae	Hesperiinae	Peck's Skipper	Polites	peckius		W. Kirby, 1837	resident			S5	G5	513	23
98	Hesperiidae	Hesperiinae	Tawny-edged Skipper	Polites	themistocles		Latreille, 1824	resident			S5	G5	424	27
99	Hesperiidae	Hesperiinae	Crossline Skipper	Polites	origenes		Fabricius, 1793	resident			S3	G4G5	16	3
100	Hesperiidae	Hesperiinae	Long Dash	Polites	mystic		W. H. Edwards, 1863	resident			S5	G5	665	45
101	Hesperiidae	Hesperiinae	Northern Broken-Dash	Wallengrenia	egeremet		Scudder, 1863	resident			S5	G5	161	12
102	Hesperiidae	Hesperiinae	Little Glassywing	Pompeius	verna		W. H. Edwards, 1862	resident			S5	G5	101	17
103	Hesperiidae	Hesperiinae	Hobomok Skipper	Poanes	hobomok		T. Harris, 1862	resident			S5	G5	863	66
104	Hesperiidae	Hesperiinae	Mulberrywing	Poanes	massasoit		Scudder, 1863	resident	SGCN		S2	G4	20	3
105	Hesperiidae	Hesperiinae	Broad-winged Skipper	Poanes	viator		W. H. Edwards, 1865	resident	SGCN		S2S3	G5	28	8
106	Hesperiidae	Hesperiinae	Delaware Skipper	Anatrytone	logan		W. H. Edwards, 1863	resident			S5	G5	80	10
107	Hesperiidae	Hesperiinae	Black Dash	Euphyes	conspicua		W. H. Edwards, 1863	resident	SGCN		S1	G4	13	0
108	Hesperiidae	Hesperiinae	Dion Skipper	Euphyes	dion		W. H. Edwards, 1879	resident	SGCN		S2	G4	33	17
109	Hesperiidae	Hesperiinae	Two-spotted Skipper	Euphyes	bimacula		Grote & Robinson, 1867	resident	SGCN		S1S2	G4	15	3
110	Hesperiidae	Hesperiinae	Dun Skipper	Euphyes	vestris		Boisduval, 1852	resident			S5	G5	719	27
111	Hesperiidae	Hesperiinae	Dusted Skipper	Atrytonopsis	hianna		Scudder, 1868	resident	SGCN		S1	G4G5	8	0

Appendix 3. Definitions of Conservation Information Ranks and Legal Status.

State ranks (S) were originally developed by the Science Division of The Nature Conservancy and are assigned by the Nongame & Natural Heritage Program and other biologists based on the best available information. This value attempts to objectively characterize the relative rarity (abundance) or endangerment of a taxon within Vermont. Ranks are reviewed annually.

Global Rank (G) - Value that best characterizes the relative rarity (abundance) or endangerment of a taxon throughout its range.

1 - Very rare (Critically imperiled): At very high risk of extinction or extirpation due to extreme rarity (often 5 or fewer populations or occurrences), very steep declines, or other factors
2 - Rare (Imperiled): At high risk of extinction or extirpation due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors
3 - Uncommon (Vulnerable): At moderate risk of extinction or extirpation due to restricted range, relatively few populations or occurrences (often 80 or fewer), recent and widespread declines, or other factors
4 - Common to uncommon (Apparently secure): locally common or widely scattered to uncommon, but not rare; some cause for long-term concern due to declines or other factors; or stable over many decades and not threatened but of restricted distribution or other factors
5 - Common (Secure): widespread and abundant
H - Possibly extinct/extirpated: Missing; known from only historical occurrences but still some hope of rediscovery
X - Presumed extinct/extirpated: Not located despite intensive searches and virtually no likelihood of rediscovery
U - Unrankable: Currently unrankable due to lack of information or due to substantially conflicting information about status or trends
NR - Not ranked: Not yet assessed
NA - Not applicable. Element is not a suitable target for conservation for one of the following reasons: Hybrid, Exotic Origin, Accidental/Non-regular, Not Confidently Present, No Definable Occurrences
B - Indicates the preceding rank is for breeding populations
N - Indicates the preceding rank is for nonbreeding populations
M - Indicates the preceding rank is for migratory populations
T - For global ranks only, indicates an infraspecies.
Q - For global ranks only, indicates questionable taxonomy.
? - Indicates uncertainty about the rank, uncertainty may also be expressed in the form of a range rank (e.g. S1S3)

State Status - Legal protection under Vermont Endangered Species Law (10 V.S.A. Chap. 123) or informational category. E = Endangered: in immediate danger of becoming extirpated in the state T = Threatened: with high possibility of becoming endangered in the near future, PDL = Proposed for Delisting, PE = Proposed for Endangered Status (not legally protected), PT = Proposed for Threatened Status (not legally protected), SC = Special Concern: status should be watched (not legally protected).

Federal Status - Designation under the federal Endangered Species Act, U.S. Fish & Wildlife Service. LE = Listed Endangered, LT = Listed Threatened, PDL = Proposed for Delisting, C = Candidate for Listing (not legally protected), SC = Species of Concern (not legally protected).

Appendix 4. The Lepidopterists' Society Collecting Guidelines

The Lepidopterists' Society's
Statement on Collecting Lepidoptera

The Lepidopterists' Society affirms that collecting Lepidoptera is one of many legitimate activities enabling professional and avocational lepidopterists to further the scientifically sound and progressive study of Lepidoptera and education about Lepidoptera as well as encouraging interaction between professional and avocational lepidopterists.

The foregoing Statement of The Lepidopterists' Society is accompanied by the following Collecting Guidelines. The Guidelines elucidate the manner in which collecting should be conducted. Practitioners are encouraged to adopt these Guidelines and to use the Guidelines for the instruction of others.

Collecting Guidelines

PREAMBLE

Our responsibility to assess and preserve natural resources, for the increase of knowledge, and for the maintenance of biological diversity in perpetuity, requires that lepidopterists examine the practices of collecting Lepidoptera for the purpose of governing their own activities. To this end, the following guidelines are outlined, based on these premises:

0.1 Lepidoptera is one of the largest order of insects. Lepidopterans are an important component of biological diversity.

0.2 Lepidoptera are conspicuous and scientifically well known, thus they are frequently used as indicator groups for conservation programs.

0.3 The collection of Lepidoptera

0.31 is a means of introducing children and adults to awareness and study of their natural environment;

0.32 has an essential role in the elucidation of scientific information, both for its own sake and as a basis from which to develop rational means for protecting the environment, its resources, human health, and the world food supply;

0.33 is an educational activity which generally can be pursued in a manner not detrimental to the resource involved.

GUIDELINES

PURPOSES OF COLLECTING (CONSISTENT WITH THE ABOVE):

1.1 To create a reference collection for study and appreciation.

1.2 To document regional diversity, frequency, and variability of species, and as voucher material for published records.

1.3 To document faunal representation in environments undergoing or threatened with alteration by humans or natural forces.

1.4 To participate in development of regional checklists and institutional reference collections.

1.5 To complement a planned research endeavor.

1.6 To aid in dissemination of educational information.

1.7 To augment understanding of taxonomic and ecologic relationships for medical and economic purposes.

COLLECTING METHODS:

2.1 Collecting adults or immature stages should be limited to sampling, not depleting, the population concerned. Numbers collected should be consistent with the purposes outlined in sections 1.1 through 1.7.

2.2 Where the extent and/or the fragility of the population is unknown, caution and restraint should be exercised.

DATA SHARING:

3.1 All data should be recorded, and the data should be made available to appropriate interested parties.

LIVE MATERIAL:

4.1 Rearing to elucidate life histories and to obtain series of immature stages and adults is to be encouraged, provided that collection of the rearing stock is in keeping with these guidelines.

4.2 Reared material in excess of need should be released only in the region where it originated, and in suitable habitat.

ENVIRONMENTAL:

5.1 Protection of the supporting habitat must be recognized as the sine qua non of protection of a species.

5.2 Collecting should be performed in a manner such as to minimize trampling or other damage to the habitat or to specific foodplants.

5.3 Property rights and sensibilities of others must be respected.

5.4 Collectors must comply with regulations relating to publicly controlled areas, to individual species, and to habitats.

RESPONSIBILITY FOR COLLECTED MATERIAL:

6.1 All material should be preserved with all known data attached.

6.2 All material should be protected from physical damage and deterioration, e.g. light, molds, and museum pests.

6.3 Collections should be made available for examination by qualified researchers.

6.4 Collections or specimens, and their associated written and photographic records, should be willed or offered to the care of an appropriate scientific institution, if the collector lacks space or loses interest, or in anticipation of death.

6.5 Type specimens, especially holotype or allotype, should be deposited in appropriate scientific institutions.

RELATED ACTIVITIES OF COLLECTORS:

7.1 Collecting should include permanently recorded field notes regarding habitat, conditions, and other pertinent information.

7.2 Recording of observations of behavior and of biological interactions should receive as high priority as collecting.

7.3 Photographic records, with full data, are to be encouraged.

7.4 Education of the public regarding collecting and conservation, as reciprocally beneficial activities, should be undertaken whenever possible.

7.5 All known data should be recorded with the specimens, e.g. date, location, collector, habitat, larval host plant data, and parentage of immatures, when known.

TRAFFIC IN LEPIDOPTERAN SPECIMENS:

8.1 Collection of specimens for exchange or sale should be performed in accordance with these guidelines.

8.2 Rearing of specimens for exchange or sale should be from stock obtained in a manner consistent with these guidelines, and so documented.

8.3 Mass collecting of Lepidoptera for commercial purposes and collection of specimens for creation of saleable artifacts are not included among the purposes of the Society.

LEGAL CONSIDERATIONS:

9.1 Collectors should comply with local, state or provincial, federal and national, and international laws and regulations that govern collecting and possession, commerce and exchange, import and export, and protection of species. Collectors should comply with additional local, state or provincial, federal and national, and international laws and regulations governing live material.

Adopted by the Executive Council, June 13, 1996 in Houston, Texas.

Source: http://www.lepsoc.org/statement_on_collecting.php

Vermont Butterfly Survey

Discovering and Conserving Insect Biodiversity

2002-2006

MANUAL FOR PARTICIPANTS

A project of the Vermont Institute of Natural Science

Sponsors and Supporters

The Vermont Butterfly Survey (VBS) is sponsored by the **Vermont Institute of Natural Science** (VINS) with cooperation from the following organizations or institutions:

Antioch New England Graduate School

Green Mountain National Forest

The Nature Conservancy of Vermont

Nongame and Natural Heritage Program of the Vermont Department of Fish and Wildlife

University of Vermont

Vermont Bird Tours

Vermont Entomological Society

VBS Founding Steering Committee

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Vermont Butterfly Survey

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Manual Version 2.2 – April 2007

The Vermont Butterfly Survey owes gratitude and its very existence to the foresight and support of its major funding organizations: The Vermont Fish and Wildlife Department, The William P. Wharton Trust, and the members and trustees of the Vermont Institute of Natural Science.

Project Overview

The Vermont Butterfly Survey (VBS) is a five-year (2002-2006) census to document the relative abundance and distribution of butterflies across Vermont. The results, in the form of data tables and distribution maps for each species encountered in the project, will be published and available free of charge on the Internet. Field work will rely heavily on volunteers, for whom this manual has been prepared. Participants need little experience to join the survey – only an interest in butterflies.

Butterflies, familiar and flashy insects, are silent messengers of environmental conditions. They respond to changing land use practices and other human-induced pressures. Yet we know so little about the butterflies of Vermont. There is no statewide data bank, no atlas of their distribution, no scientific assessment of the threats they face, and no conservation concept for butterfly species statewide. With this in mind, the Vermont Institute of Natural Science (VINS) initiated the Vermont Butterfly Survey in 2002. The project's major objectives are to:

- Publish on the Internet maps and data about the distribution of Vermont butterfly species.
- Obtain a baseline of butterfly distribution at the beginning of this century for comparison to distributions in the future.
- Assess the conservation status and needs of Vermont butterfly species.
- Identify habitats of statewide and regional importance.
- Educate and involve more people in the discovery and protection of Vermont's natural heritage.

The survey will make essential data available to landowners, land-use planners, policy-makers, municipalities, and other individuals or organizations making conservation and management decisions. It will allow Vermonters to contribute to a greater understanding of the nature of their state. VBS is closely modeled after recently completed butterfly atlas projects in Connecticut and Massachusetts. Our results will allow direct comparisons among states, with scientific and conservation implications extending throughout the Northeast. In short, this project offers the opportunity for individuals, either professional or amateur, to make a significant contribution to the greater understanding Vermont's natural heritage.

Survey Instructions

What follows in this manual are step-by-step instructions for participation in the Vermont Butterfly Survey. Before beginning any work, you should read this manual carefully, particularly advice on accurate record-keeping. You'll find two options for contributing to the survey. Many of you will use both options:

- Option 1: **The Full Survey** (page 4) **–** This option involves your choosing one or more specific sites to survey once or, preferably, regularly from spring through fall. This is the most meaningful way to contribute to VBS. It requires three steps:
  1. Choosing survey site(s)
  2. Visiting your site(s) and documenting butterflies
  3. Submitting your data to the VBS office
- Option 2: **The Casual Survey** (page 9) **–** This option allows you to document butterflies on a more casual basis. Rather than choosing a specific site to monitor regularly, the Casual Survey allows you report butterfly presence on an incidental basis – during a visit to a state park, for example, or even on your way to work. VBS provides a special form (included with this package of materials) for these spontaneous encounters with butterflies.

The Full Survey

This is the most active way to participate in the Vermont Butterfly Survey. You visit your own survey site regularly to document the butterfly species and abundance. (For a more casual approach to the survey see page 9.)

Step 1: Choosing A VBS Map and Sampling Site

VBS will accept butterfly records from anywhere in Vermont – your front yard, your workplace or a remote spruce bog. But to make sure we survey butterflies evenly and systematically across the state, the project has adopted a grid mapping system. The system relies on the 184 U.S. Geological Survey 1:24,000 topographic maps ("7½-minute maps") that cover Vermont. We've divided each of these maps into six blocks of equal size (roughly 3 miles x 3 miles) and numbered them according to the example diagram below. That's a total of 1,104 survey blocks (184 maps x 6 blocks per map = 1,104 blocks).

Since we don't have the person-power to sample for butterflies in each and every block, VBS has randomly selected 184 of these blocks (one per USGS map) for the focus of our work. We call these blocks "**priority blocks**" (you'll be hearing a lot about them). The 184 priority blocks make up a representative sample of the Vermont landscape; they're the minimum number of blocks that must be surveyed in order to obtain a statistically valid sample of butterflies for the entire state. (They're the same blocks used for the Vermont Breeding Bird Atlas <www.uvm.edu/~vbba>.)

Although data on any butterflies anywhere in the state are important, VBS prefers that you survey regularly in one of the 184 priority blocks. No one in Vermont is far from a priority block. Contact VBS and tell us where you'd like to survey. We'll assign you your very own a priority block. You can then visit the VBS web site <*www.vinsweb.org/vbs*> to download a map of your block. If you don't have Internet access, we can send you a map of the priority block.

Of course, you may survey for butterflies outside of a priority block. Perhaps your home or favorite butterflying spot is not located in one of the VBS priority blocks. In those instances, you'll still need to determine the VBS block in which you are surveying. To do this, obtain the United States Geological Survey (USGS) 1:24,000 topographic map ("7½-minute map") that covers your survey area. (These are available at outdoor shops and some office supply stores. A list of locations to buy maps in Vermont is on our web site.) With a pencil, carefully divide your map into six equal blocks and number them according to the diagram to the right. These represent the six VBS blocks for that particular map. So, in this example, if you're surveying in the upper right corner of this map, you'd be in the KNOX MOUNTAIN-4 block.

USGS Map
KNOX MOUNTAIN

1	4
2	5
3	6

For this particular map, the priority block happens to be KNOX MOUNTAIN-3. To locate the priority block for any USGS map in Vermont, consult Appendix II. It tells you which of a map's six blocks is the one VBS priority block. The map title (which you'll need to look up in Appendix II) is at your map's upper right corner.

Selecting Your Survey Site

Once you've chosen or been assigned a block and have a map, you are ready to choose specific **Survey Sites** within that block. Topographic maps provide considerable information about potential sites in a block. Before visiting a block look over the map and note the location of forest openings and other sunny areas (often in white); these tend to have higher butterfly diversity. A survey site is generally defined as an area of similar habitat bound by physical features. Potential sites include: wetlands, overgrown fields, flower gardens, woodland clearings, wide woods roads or trails, and recreation paths.

Some blocks may offer only one or two potential sites, others many more. Don't feel you must survey every potential site within a block. If you survey two or more sites within a block, try to select different habitats for each. It's best to visit various sites and habitats because you will find a greater diversity of butterfly species. But it's up to you.

Step 2: The Site Visit

The **Site Visit** is the heart of your survey work. (It's also the fun part.) Here are some suggestions on when to go surveying:

Before Your Site Visit

- **Pick a Nice Day** – Butterflies are solar-powered creatures, most active between 10 a.m. and 4 p.m. They're inactive and hard to find on cold, rainy, heavily overcast or extremely windy days.
- **Go as Often as You Can** – Since different butterfly species are active during different periods of the year (we call these "flight periods"), try to make regular trips to your survey site(s). Every two to three weeks from late April through October would be ideal. A site visit usually takes a couple hours. If you spread visits to a given site over more than one year, go at different months each year so that you'll cover all potential flight periods.
- **Get Permission –** Consult the landowner before visiting private property. If you explain the survey, you'll probably get permission to visit. If you intend to collect butterfly specimens on lands owned or managed by the Vermont Agency of Natural Resources (state parks, wildlife management areas, state forest land) bring along the permit included with your VBS materials. For town or city property get permission before your visit. Some private land – reserves owned by The Nature Conservancy, for example – are fragile and require permits or permission to visit. When in doubt, contact the VBS office. If you intend to survey on federal land other than the Green Mountain National Forest you must obtain permission from the proper agency.

At The Site: Counting and Documenting Butterflies

Walk your site and find butterflies, keeping careful track of everything you encounter. You'll be using the **Site Visit Form** to record information about your site (site name, site location, date of visit, time at the site, etc.) and to keep a count of the butterflies you find.

The Site Visit Form

The Site Visit Form allows you to describe a site and note all butterfly species you encounter there. Complete a separate form every time you visit a site. Below is an explanation of the Site Visit form. (A sample form is on the next page.)

Site Name: Give the site a recognizable name or use the commonly used name of the area (if there is one) from the map. Use the same name for all future visits to the site.

USGS Quad Name: Enter the proper USGS quadrangle map name, which should be on the priority block map we provide you or at the upper right corner of any USGS topographic map that you use.

Block#: Record the VBS block number (1-6) in which you are surveying. It will be on the map we provide you. Or you can determine which block you're in by consulting page 4 of this manual and Appendix II.

Town and County: The town and county where the site is located (check a map if necessary).

Park or Protected Area: Include the name of the area if applicable.

Land Owner: Write in the name if you know it.

Site Location: Describe the site location as best as possible. Latitude and Longitude are best. Otherwise, use street names and distances from major intersections. E-911 addresses can also pinpoint the location of a site. On your **first visit only** to the site, attach a copy from the map and draw a rough outline of the site.

Observer(s): Include the names and total number of all people actively observing butterflies. If someone along is not helping, do not record that person's name.

Date: Fill in the date of the site visit using the format: day month year (Example: 4 Jul 2003). **Don't use numerals for the month (so we don't confuse days and months during data entry).**

Time Start/Finish: Record the time you begin observing, the time you finish (in 24-hour format, i.e., 13:15 for 1:15 p.m.).

Species: Record all the butterflies you observe. If you are only able to identify an individual to a group record it as such ("hairstreak" or "skipper"). Use either the common or scientific name from the Vermont Butterfly Daily Field Card included in this package of materials.

– Record the number of individuals for that species. Don't write "many" or "too many to count". If you can't really count them, give your best estimate.

ID Code(s) – Record the method you used to identify the species (V=Visual, B=Binoculars, N=Net and Release, P=Photo or Video, S=Specimen). These codes are listed on the form.

Voucher Number – If you verify the sighting with a voucher (photographic or by taking a specimen) include the Voucher Number from the corresponding Voucher Data Card, which is explained in a few pages.

Vermont Butterfly Survey

SITE VISIT FORM

Return To:
Vermont Butterfly Survey
27023 Church Hill Rd.
Woodstock, VT 05091
(802) 457-2779 Ext. 124
vbs@vinsweb.org

ID Codes

V = Visual
B = Binoculars
N = Net/Release
P = Photograph or Video
S = Specimen

Habitat Codes

Old or Regenerating Fields
1.1 - Barren (little vegetation)
1.2 - Grass/Herbs (no shrubs)
1.3 - Few Shrubs
1.4 - Shrubland (shrubs>grass)
1.6 - Brush-hogged

Agricultural
2.0 - Active Crop Land
2.1 - Pasture or Hayfield
2.2 - Orchard or Vineyard

Other Openings
1.5 - Power Line Right-of-Way
3.0 - Alpine Meadow
4.0 - Rock Outcrop

Forest Gaps
5.1 - Natural (blowdown, etc.)
5.2 - Forestry (log landing, etc.)
5.3 - Regenerating Area
5.4 - Woods Road or Trail
5.5 - Ski Slope

Forest Type
6.1 - Deciduous Dominated
6.2 - Coniferous Dominated
6.3 - Mixed Woods

Road/Roadside
8.1 - Dirt
8.2 - Paved
8.3 - Road-killed

Residential
9.1 - Lawn
9.2 - Garden
9.3 - Urban

Wetlands
7.1 - Sedge/Grass
7.2 - Cattail/Reed
7.3 - Shrub
7.4 - Beaver Pond
7.5 - Wooded
7.51 - Deciduous
7.52 - Coniferous
7.53 - Mixed
7.6 - Bog/Fen

Shoreline
10.1 - Natural Lake
10.2 - Pond
10.3 - Reservoir
10.4 - River (>10 feet wide)
10.5 - Stream (<10 feet wide)

11 - **Other** (describe on back)

Site Name (Use the same name for each visit.)	**Site Location** (Latitude and Longitude are best; otherwise give directions or attach a photo-copy of a map and mark the site location)	
USGS Quad		
VBS Block # (1-6)		
Town	**Observer(s)**	**# Observers**
County		
Park or Protected Area Name	**Date** (Format: 4 Jul 2003)	
Landowner	**Start Time**	**End Time**

Species (use "L" for larvae)	#	ID Code(s)	Voucher Number	Habitat Code(s)

Habitat Code(s) – If you've filled out a Voucher Data Card for a butterfly specimen or photo, you don't need to enter the habitat code here (because you provide that on the Voucher Data Card). But do indeed record the habitat codes for any butterflies you list as sight records (those you don't voucher). You can list more than one code to define a species' habitat. The codes are listed on the form.

Comments: Use the back of the Site Visit Form for any additional information you wish to provide.

Verifying Butterflies During a Site Visit

As you survey for butterflies, your objective is to obtain the strongest defendable evidence for each species. VBS recognizes three ways to document butterfly presence as you search a site: **Visual Identification** – a butterfly sighting; **Photographic or Video Vouchers** – capturing a butterfly on film; **Voucher Specimens** – collecting a butterfly specimen as incontrovertible evidence of its presence. Each is described below.

Visual Identification

The most important thing about a visual identification is that you must be absolutely sure you have identified the species correctly. That's because VBS has no way of verifying these sightings. Identification by sight can be difficult for some species. Or an individual butterfly may be positioned in a way making identification challenging or even impossible. Knowledge of key field marks and distinguishing features are always critical. We highly recommend studying and using the your butterfly field guide. If you can only identify it as, say, a skipper or one of the "lady" species (Painted Lady or American Lady), for example, then indicate that on your checklist.

Photographic or Video Voucher

A photograph or videotape can be used to document a butterfly's presence. This physical evidence is called a voucher. Because you produce a physical record of the species – a photograph or video – **you must also complete a Voucher Data Card in the field for each species you photograph** (explained below). Pre-numbered Voucher Data Cards are included with this package of materials. Carry a stack of Voucher Data Cards with you during site visits. Photo vouchers will be accepted for larvae, pupae, and adults.

Voucher Specimen

One way to obtain indisputable evidence of a butterfly's presence is to collect a specimen. The collecting of voucher specimens for scientific studies, including this butterfly survey, is appropriate and ethical if the collecting guidelines are consistent with those established by the Lepidopterist's Society. (These guidelines are at: www.furman.edu/~snyder/snyder/lep/collect.html.)

Tips for Photographers

For easy record keeping, photograph the Site Visit Form as the first frame on the roll of film. After developing, any photo following that initial shot of the form will be easily identified as coming from that site. While you're at a site, as you photograph a butterfly species, include the roll number and frame number(s) for that species on the back of the Voucher Data Card. That will help you match Voucher Data Cards with the photos once they're developed. (More advice on photography is in Appendix IV.)

Digital images of butterflies make fine vouchers. Save them as JPEG files. They can be submitted on disk or emailed to VBS. **The file name must be the voucher number only and nothing else** (i.e. 6789.jpg). If you include multiple digital shots, add letters to the voucher number (i.e. 6789a.jpg, 6789b.jpg, 6789c.jpg).

A good way to sort video vouchers is to add your voice, reciting the voucher number, to the tape. For example, as you're filming a Canadian Tiger Swallowtail, you might say: "Voucher Number 1234; Canadian Tiger Swallowtail nectaring on red clover." In that way, it will be easier for you and the VBS office to match the film of the individual with its correct Voucher Data Card information.

There is no evidence of collectors driving any species to extinction. A far greater threat to butterflies is habitat loss, which this survey project can help prevent with accurate documentation of butterfly presence. For various hard-to-identify species, a voucher specimen provides **the most reliable** evidence of their presence. And without a voucher there will be no physical evidence of your sighting for future study and analysis (such as a change in taxonomy of a species). **You need to collect only a single voucher specimen to verify a species' presence in a given block.** List all subsequent encounters with that species in that block as "sight records" on your Site Visit Forms.

As you collect specimens during your site visit, fill out a Voucher Data Card **before** moving on to the next species. Place the specimen, with its **wings folded closed over the thorax**, in a 3"x5"glassine envelope with its corresponding Voucher Data Card. Keep your specimens in a safe place (such as a crush-proof box in your pocket or daypack). Don't forget to list the species on the Site Visit Form with its corresponding Voucher Number from the Voucher Data Card. Advice on collecting voucher specimens is in Appendix III.

We recognize that some project participants are uncomfortable with the taking of butterfly specimens – even for scientific inquiries such as this survey. That's why VBS also accepts recognizable photographic vouchers. Road-killed butterflies are also (unfortunately) common, and can be spotted while walking or riding a bicycle; larger species can be spotted while driving. These can make perfectly acceptable vouchers. Please note on the Voucher Data Card if the specimen is road-killed.

The Voucher Data Card

A Voucher Data Card **must** accompany any photograph or specimen. Carry a supply of Voucher Data Cards and glassine envelopes into the field with you. As you photograph butterflies, fill out a card for each individual and write the photograph frame number(s) in the space provided on the back of the card. Or as you collect specimens, fill out a card and place it with the specimen in a glassine envelope. Do not store specimens and Voucher Data Cards separately. Instructions for completing the Voucher Data Card are below.

Scientific Name: Enter the butterfly's scientific name from the Vermont Butterfly Daily Field Card (included). If you don't know the species leave this blank.

Common Name: Write the common name from the Vermont Butterfly Daily Field Card (included). If you don't know the species leave this blank.

Town and County: The town and county where the voucher was collected (check map if necessary).

Vermont Butterfly Survey – Voucher Data Card

Scientific Name	Date (Format: 4 Jul 2003)	VBS Voucher Number

Common Name	USGS Quad Name	VBS Block #

Town	Site Name

County	Observer

Location (Complete this only if you do not include Latitude and Longitude coordinates below.)

Latitude	Longitude	Elevation (include units)	Method: ❍ GPS ❍ Topo Map ❍ VT Gazetteer ❍ Map Software ❍ Other_____

Date: The date the voucher was collected, using the format: day month year (example: 4 Jul 2003). **Do not use numerals for the month.**

Quad Name: Record the proper USGS quadrangle map name – either from the map we provide you or from the name at the upper right corner of your own USGS map.

Block #: Record the VBS block number (1-6) in which you are surveying – either from the map we provide you or by determining the block yourself. (See page 4 and Appendix II)

Site Name: The name you assigned to this site on the Site Visit Form. If you're casually collecting data and not doing a site visit at the time, leave this blank.

Observer: The name of the person who collected the voucher data.

Location: If you cannot provide the latitude and longitude, describe the location of the voucher evidence as specifically as possible. Use intersections of major routes and measure distances in miles. Other landmarks may also be used. E-911 street addresses (when available) can also help pinpoint a location. (Please note that the map and block number do not pinpoint a locality.)

Latitude/Longitude: VBS recognizes three methods to indicate the exact location of the vouchered butterfly; we prefer the first two:

1) If possible, using a GPS unit, record the coordinates from exact spot where you photographed or collected the butterfly. GPS units are as cheap as $150 and provide reasonably accurate locations. If you're using a GPS, make sure you set the map datum to "NAD83". (Ask VBS for help.)

2) Use the map provided to you by VBS to determine the latitude and longitude for the spot you collected or photographed the voucher. Our maps are in Vermont State Plane Meters, a grid system that differs from traditional latitude and longitude, which means your coordinates will look something like this: 156789 x 456789. (See the VBS web page for details or ask us for help.)

3) Send a photocopy of the map we give you with the locations of each voucher clearly marked with a dot and its voucher number.

Elevation: Record the elevation from your GPS unit or from your map. Be sure to include the units (meters or feet); we prefer meters. **Leave this space blank if you are unable to accurately determine the elevation.**

Method: Check the method you used to determine the latitude, longitude and elevation.

Habitat: Check the appropriate box or boxes on the card. Be aware that more than one habitat type might apply for a given voucher. (See the example card.)

Nectar Plant(s): Be as specific as possible. If you don't know the plant species, record its family (i.e. composite, rose, etc.). If possible, document the plant with photographs. Remember to write the Voucher Number on each photograph.

Host Plant(s): Note the plant if you see an adult laying eggs on it or a larva or larvae eating it. If you don't know the plant species, record its family (i.e. composite, rose, etc.). If possible, document the plant with photographs. Remember to write the Voucher Number on each photograph.

HABITAT

Old or Regenerating Fields
- ❍ Barren (little vegetation)
- ❍ Grass/Herbs (no shrubs)
- ❍ Few Shrubs
- ❍ Shrubland (more shrubs than grass)
- ❍ Brush-hogged
  Cuts/Year ___ Last Cut: _____

Agricultural
- ❍ Active Crop Land
- ❍ Pasture or Hayfield
- ❍ Orchard or Vineyard

Other Openings
- ❍ Power Line Right-of-Way
- ❍ Alpine Meadow ❍ Rock Outcrop

Forest Gaps
- ❍ Natural (blowdown, etc.)
- ❍ Forestry (log landing, etc.)
- ❍ Regenerating Area
- ❍ Woods Road or Trail
- ❍ Ski Slope

Forest Type
- ❍ Deciduous Dominated
- ❍ Coniferous Dominated
- ❍ Mixed Woods

Road/Roadside
- ❍ Dirt
- ❍ Paved
- ❍ Road-killed

Residential
- ❍ Lawn
- ❍ Garden
- ❍ Urban

Wetlands
- ❍ Sedge/Grass
- ❍ Cattail/Reed
- ❍ Shrub
- ❍ Beaver Pond
- ❍ Wooded
  - ❒ Deciduous
  - ❒ Coniferous
  - ❒ Mixed
- ❍ Bog/Fen

Shoreline
- ❍ Natural Lake
- ❍ Pond
- ❍ Reservoir

River or Stream
- ❍ River (>10 feet wide)
- ❍ Stream (<10 feet wide)

❍ **Other** (please describe)

NECTAR PLANT(S)

HOST PLANT(S)

NOTES

FILM ROLL #: **FRAMES:**

Return To: Vermont Butterfly Survey
27023 Church Hill Road
Woodstock, VT 05091

Notes: Use this space for any additional information. Make special note of evidence for breeding at the site or other observations.

Film Roll# and Frames: Photographers should use this spot to note the roll of film and the frame numbers corresponding to the voucher. This will help you match the Voucher Data Card with the photographic image once your film is developed.

Digital Vouchers: Digital images of butterflies make fine vouchers. Save them as JPEG files. They can be submitted on disk or emailed to VBS. **The file name must be the voucher number only and nothing else** (i.e. 6789.jpg). If you include multiple digital shots, add letters to the voucher number (i.e. 6789a.jpg, 6789b.jpg, 6789c.jpg). Don't label the files with any prefixes (such as "No. 6789.jpg" or "Voucher 6789.jpg").

The Casual Survey

While we prefer that participants select sites to survey regularly (or even once), we also understand that many people encounter butterflies more spontaneously. This can happen during a lunch break at work, a weekend at camp, a hike up a mountain, or even your daily bicycle ride. For these casual sightings you can use the VBS **Casual Sightings Form**. A few of these forms are included in this package of materials; feel free to make copies – keep one in the car, one on the refrigerator, one in your daypack, so that you can record butterflies as you encounter them. Participants in the Full Survey can also use this form for chance butterfly sightings away from established survey sites.

Step 3: Submitting Survey Data

No survey work is complete until results are submitted to the VBS office. Prompt submission of accurate data is critical to the project's success. After each site visit, stop to make sure your Site Visit Form and any Voucher Data Cards are complete. **Resist the temptation to finish data forms after you've left the site.**

Organizing Your Data

When you return home from a site visit, keep your Site Visit Form and Voucher Data Cards in a safe place. When your developed film comes back (if you're a photographer), match each print or slide with its corresponding Voucher Data Card.

- Any print, slide or videotape must be labeled with its corresponding Voucher Number from the Voucher Data Card so that each can be matched with the correct data if they are somehow separated.
- Place slides or photographs with their Voucher Data Card into a glassine envelope. All photos must be in color. Prints are not to exceed 3" by 5" in size, and so must be trimmed to fit into the envelope. You need not send every photo; pick your best one or two shots that sufficiently identify the species.
- Save digital images as JPEG files. They can be submitted on disk or emailed to VBS. The file name must be the voucher number only and nothing else (i.e. 6789.jpg). If you include multiple digital shots, add letters to the voucher number (i.e. 6789a.jpg, 6789b.jpg, 6789c.jpg). Don't label the files with any prefixes (i.e. "No. 6789.jpg" or "Voucher 6789.jpg").
- For videotape, place all the Voucher Data Cards for all the species you filed on that tape into a single glassine envelope and tape it to the videocassette.

The cost of film, developing, and printing will be the responsibility of the volunteer. Because it would be impossible to copy and return every photograph or video we receive, please send us a duplicate of one-of-a-kind shots you wish to retain.

Protecting and Submitting Your Voucher Specimens

Anyone who collects voucher specimens must handle them properly and carefully so that they can become useful data. See Appendix III for advice on collecting and handling voucher specimens. If you pin and mount a specimen, include its Voucher Number on the label.

To ship specimens safely, pack them (in their glassine envelopes with their Voucher Data Cards) in a small, sturdy container (plastic or cardboard) along with their corresponding Site Visit Forms. Place this container inside a larger box and pad it with crumpled newspaper or foam "peanuts."

If you are an active photographer or collector, send your specimens to the survey office regularly (at least once a month). **Do not wait until the end of the field season to send everything in.** Mail or deliver data to VBS offices at:

Vermont Butterfly Survey
Vermont Institute of Natural Science
Conservation Biology Dept.
6565 Woodstock Rd.
PO Box 1281
Quechee, VT 05059

Appendix I

Resources

Field Guides and Books

- *Butterflies Through Binoculars: The East*, by Jeffrey Glassberg, Oxford University Press, 1999.
- *Butterflies of North America* by Jim P. Brock and Kenn Kaufman, 2003 (in the Kaufman focus Guides series)
- *A Field Guide to Eastern Butterflies*, by Paul A. Opler and V. Malikul, Houghton Mifflin Company, 1992.
- *Peterson's First Guide to Caterpillars of North America*, by Amy Bartlett Wright, Houghton Mifflin Co.,1993.
- *Newcomb's Wildflower Guide*, by Lawrence Newcomb, Little, Brown and Co., 1977.
- *The Butterflies East of the Great Plains: An Illustrated Natural History*, by Paul A. Opler and G.O. Krisek, Johns Hopkins University Press, 1984
- *Handbook for Butterfly Watchers*, by Robert Michael Pyle, Houghton Mifflin Company, 1992.
- *The Butterflies of North America: A Natural History and Field Guide*, by James A. Scott, Stanford University Press, 1986.
- *Basic Techniques for Observing and Studying Moths and Butterflies*, by William D. Winter Jr., The Lepidopterists' Society, Memoir No. 5, 2000.

Internet Sites

Butterflies and Moths of North America	www.butterfliesandmoths.org/
Butterfly Gardening book	www.newfs.org/books.htm
Connecticut Butterfly Atlas	www.yale.edu/peabody/collections/ent/ent_cbap.html
Massachusetts Butterfly Atlas	www.massaudubon.org/butterflyatlas/
Maine Butterfly Atlas	www.**maine**.gov/ifw/pdf/**mainebutterflyatlas**report.pdf

Web Sites About Binoculars

- www.naba.org/binocs.html
- www.eagleoptics.com/
- www.betterviewdesired.com

Entomology Equipment

BioQuip Products
2321 Gladwick Street
Rancho Dominguez, CA 90220

Telephone:	(310) 667-8800
Fax:	(310) 667-8808
E-mail	bioquip@aol.com
Web Site:	www.bioquip.com

Organizations

Vermont Entomological Society
49 Lover's Lane
Grand Isle, VT 05458
www.vermontinsects.org/

Lepidopterists' Society
www.lepsoc.org/

North American Butterfly Association
4 Delaware Rd.
Morristown, NJ 07960
www.naba.org

Xerces Society
4828 SE Hawthorne Blvd.
Portland, OR 97215
www.xerces.org (503) 232-6639

Appendix II

Vermont Butterfly Survey Priority Block Numbers (#) for Selected USGS 1:24,000 Quadrangles (USGS Quad Name)

USGS Quad Name	#
Albany	4
Andover	5
Arlington	1
Averill Lake	6
Bakersfield	6
Barnet	2
Barre East	5
Barre West	3
Bellows Falls	3
Bennington	1
Benson	3
Bethel	6
Bloomfield	3
Bolton Mountain	4
Bomoseen	6
Brandon	3
Brattleboro	1
Bread Loaf	6
Bridport	5
Bristol	6
Brookfield	1
Burke Mountain	6
Burlington	4
Cabot	6
Caspian Lake	6
Cavendish	5
Charlotte	6
Chelsea	2
Chester	5
Chittenden	1
Colchester	3
Colchester Point	6
Cold Hollow Mts.	5
Concord	3
Cornwall	5
Craftsbury	6
Crystal Lake	3
Danby	1
Delectable Mtn.	1
Dorset	5
East Alburg	5
East Corinth	2
East Middlebury	1
Eden	2
Enosburg Falls	4
Essex Center	6
Essex Junction	3
Fairfield	5
Fairlee	4

USGS Quad Name	#
Gallup Mills	5
Georgia Plains	5
Gilman	1
Gilson Mountain	6
Governors Mtn.	1
Groton	2
Groveton	3
Hancock	3
Hanover	1
Hartland	4
Hazens Notch	1
Highgate Center	3
Hinesburg	6
Huntington	4
Irasburg	2
Island Pond	4
Jacksonville	3
Jamaica	5
Jay Peak	5
Jeffersonville	2
Joes Pond	2
Johnson	5
Juniper Island	6
Killington Peak	4
Knox Mountain	3
Lincoln	1
Londonderry	5
Lowell	3
Ludlow	2
Lyme	2
Lyndonville	4
Maidstone Lake	2
Manchester	2
Marshfield	2
Middlebury	2
Middlesex	3
Middletown Spngs	3
Miles Pond	1
Milton	2
Monadnock Mtn.	6
Monkton	4
Montpelier	5
Morgan Center	5
Morrisville	5
Mount Carmel	6
Mount Ellen	2
Mount Holly	4
Mount Mansfield	6
Mount Philo	3

USGS Quad Name	#
Mount Snow	3
Mount Worcester	1
Newbury	3
Newfane	4
Newport	6
Newport Center	3
North Hero	1
North Troy	2
Northfield	3
Norton Pond	6
Orleans	1
Orwell	4
Pawlet	5
Peacham	4
Peru	4
Pico Peak	5
Plainfield	5
Plymouth	1
Port Henry	5
Poultney	4
Pownal	6
Proctor	4
Putney	3
Quechee	2
Randolph	2
Randolph Center	6
Readsboro	4
Richford	4
Richmond	6
Rochester	3
Rouses Point	4
Roxbury	1
Rutland	2
Saxtons River	2
Seneca Mountain	4
Sharon	1
Sheldon Springs	4
Snake Mountain	6
South Hero	4
South Mountain	5
South Royalton	3
South Strafford	5
Spectacle Pond	6
Springfield	2
St. Albans	4
St. Albans Bay	5
St. Johnsbury	1
Stamford	3
Stannard	2

USGS Quad Name	#
Sterling Mountain	3
Stone Mountain	4
Stowe	2
Stratford	2
Stratton Mtn.	3
Sudbury	3
Sunderland	5
Sutton	1
Tinkerville	2
Townshend	4
Underhill	5
Vergennes West	3
Vershire	4
Waitsfield	2
Wallingford	1
Walpole	3
Warren	4
Washington	1
Waterbury	4
Wells	5
West Burke	6
West Charleston	2
West Dover	3
West Rupert	5
West Rutland	1
West Topsham	2
Westminster West	3
Westmore	4
Weston	6
Windham	5
Windsor	1
Wolcott	4
Woodbury	3
Woodford	5
Woodstock North	2
Woodstock South	1
Woodsville	1

USGS Map Key N ↑

1	4
2	5
3	6

Appendix III

Field Technique and Specimen Preservation

Although each volunteer will bring or develop his or her own skills and style in the field, below are some tips for project participants. For more details on field techniques consult the following two excellent books:

- *Basic Techniques for Observing and Studying Moths and Butterflies*, by William D. Winter Jr., published by the Lepidopterists' Society. Specify Memoir 5, Basic Techniques Manual.
- *Handbook for Butterfly Watchers,* by Robert M. Pyle, published by Houghton Mifflin Co.

Binoculars – Close-focusing binoculars are great observing and identifying butterflies and will probably save you a lot of work.

Field Supplies – The following equipment is helpful or essential for collecting butterfly specimens in the field for this survey project (suppliers are listed in Appendix I):

- Butterfly net
- Broad-tipped forceps (tweezers) or stamp tongs
- Killing jar
- Field guide and field note book
- 3"x5" Glassine envelopes
- Site Visit Forms, Voucher Data Cards
- Pencils
- A crush-proof box for storing specimens in their glassine envelopes (VCR boxes with the spindles cut out work well)
- Map and GPS unit; compass
- Wristwatch
- State butterfly checklist

Clothing and Other Supplies – Wear muted colors. Pack sunscreen, drinking water, and food. Keeping everything in a field pack, equipment vest, or shoulder bag will make your efforts more convenient and enjoyable.

Netting – Butterflies are visually-oriented insects. The most successful field workers move steadily and slowly. Always keep your shadow from passing over a perched butterfly (unless you want it to fly away). Trying to net a flying butterfly is often difficult. So make your attempt on a butterfly that has settled on a surface or nectar source. Once a specimen is in the net, immediately flip the purse of the net over the metal ring to keep the butterfly from escaping.

Handling Voucher Specimens – Once a butterfly is in the net, be careful to protect and preserve the specimen. One way to collect a butterfly is to transfer it from the net to a jar with Plaster of Paris and a killing agent such as ethyl acetate. Bring the open container beneath the butterfly inside the net and once it drops in cover the jar with the lid. For best results, add tissue to the jar to keep the butterfly from abrading its scales. The tissue may have to be replaced periodically if it absorbs the killing agent or other insects. Remove the butterfly from the killing jar as soon as it is dead; if you can, carefully fold the wings up and over the back of the thorax. Place the butterfly in a 3"x5" glassine envelope with the completed Voucher Data Card.

A non-chemical collection method involves pinching the thorax to immediately kill the butterfly. Apply the pinch precisely to the thorax to kill the butterfly but not crush it. (It takes a little practice.) Pinching is difficult with skippers, hairstreaks and other small species, but best accomplished by positioning the butterfly so that it can be pinched in the net through the netting. This is the most effective way to dispatch specimens for this survey.

Beetle Damage – Dermestid beetles (carpet beetles) will devour your specimens in no time. **Always store your specimens in a sealed Tupperware-like container in a freezer or with a deterrent such as naphthalene (mothballs).** Waste no time in sending your specimens to the VBS office.

Appendix IV

Photography

With a modest expense of time and money, most anyone can capture butterflies on film. Even inexpensive point-and-shoot cameras can produce decent results. But a 35mm camera with a close-focusing macro lens works best. For lighting, some people prefer to use a flash. While a flash can render an unnatural dark background in your pictures, it does help to reduce exposure times and increase depth of field. Fortunately, butterflies are usually found in the presence of sunshine. Here is some advice for documenting butterfly presence with a camera:

1. Choose a film speed that offers both sharpness and enough depth of field to keep the entire butterfly in focus. If you're using a flash, films with a speed of 64 or 100 ASA will perform well. If you're relying on sunlight only, use faster film – in the range of 200 to 400 ASA – so that your shutter speeds exceed 1/125 (1/60 if you're steady) and your lens opening is better than f4.
2. Tripods are too cumbersome for butterfly work. Approach the butterfly from behind with a steady, stealthy, smooth pace. Avoid sudden movements (even when lifting the camera to your eye). And **do not let your shadow pass over the butterfly** – that will usually send it into flight.
3. Fill the frame as much as possible with the butterfly's image (in focus, of course). Close focusing macro-type or telephoto lenses are most appropriate for this type of photography, but even a common 50mm lens can be used to take adequate pictures of larger species.
4. Color print film is the easiest for most photographers to use. It is forgiving of mistakes in exposure. Standard print sizes are 3½" by 5" or 4" by 6" – so remember to trim your prints to 3" by 5" to fit in the glassine envelopes along with the Voucher Data Card.
5. Color slides usually give more accurate color but they require more precise exposure times for best results. They must be submitted in standard cardboard or plastic mounts and placed in a glassine envelope with the Voucher Data Card.
6. Any print or slide submitted as a photographic voucher must have written on it the Voucher Number from the accompanying Voucher Data Card.
7. Digital images of butterflies make fine vouchers. Save them as JPEG files. They can be submitted on disk or emailed to VBS. The file name must be the voucher number only and nothing else (i.e. 6789.jpg). If you include multiple digital shots, add letters to the voucher number (i.e. 6789a.jpg, 6789b.jpg, 6789c.jpg). Don't label the files with any prefixes (such as "No. 6789.jpg" or "Voucher 6789.jpg").
8. Photos of nectar and larval host plants are valuable to the survey. So are shots of the habitats surveyed. Record the butterfly's Voucher Number from the Voucher Data Card on the appropriate plant shot and the Site Name (from the Site Visit Form) on habitat shots.
9. Finally, before sending in a photo voucher, have a second person try to identify the butterfly from the photo (no hints!). If that person can arrive at the correct identification (it's fine to use a field guide) then the photo is probably acceptable.

Appendix V

VBS Equipment Suggestions

VBS volunteers often ask about equipment they might purchase for survey work. Below are some suggestions – not only for survey work, but to make your butterfly watching even more rewarding. Please understand that VBS does not officially endorse these products; they're merely suggestions.

NETS

Most lepidopterists use 15-inch diameter nets. The next step up is 18 inches, which can help in netting more elusive species (including dragonflies) but is a bit more awkward to handle. The nets are often sold separately from the handle and the net ring or loop (which holds the net). If we were to suggest a single set-up it would be from BioQuip Products of California:

BioQuip Item	Item #	Price
Extendable Handle	7303X	$17.95
15-inch Standard White Aerial Net Bag	7215NA	$6.20
15-inch Net Ring	7352	$4.60

BioQuip Products
2321 Gladwick Street
Rancho Dominguez, CA 90220
Telephone: (310) 667-8800
E-mail bioquip@aol.com
Web Site: www.bioquip.com

BioQuip sells other nets and supplies. Its vast catalogue is difficult to view on-line, but you can order one from the company. (Don't wait until spring, when they get a run on orders.) We also like the nets available from Rose Entomology (www.roseentomology.com), but they're quite expensive.

GPS UNITS

A Global Positioning System (GPS) unit is a nice tool for folks who work or play outside. It makes survey work (and navigating) quicker and easier. Fine GPS units are available for between $120 and $200. Most brand names (Garmin, Magellen) perform well. Check your local outdoor or electronics shop or look for discounts on-line. VBS staff use the following models by Garmin: GPS72, GPS76, or 12XL.

BINOCULARS

Don't skimp on the quality of binoculars if you believe butterflies (or birds) will be a big part of your life. Critical for butterfly watching are "close-focusing" binos, which can focus on butterflies only five or six feet away. Models are constantly changing. So make sure you take any prospective purchase for a test drive. Web sites to consider are: www.betterviewdesired.com, www.eagleoptics.com, or www.naba.org/binocs.html.

FIELD BAG

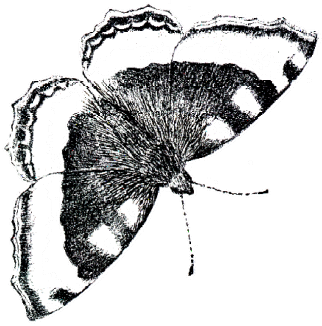
Most entomologists use a shoulder bag or waist pouch for their supplies during field work. (It's a lot easier than taking off your daypack each time you voucher a butterfly.) Consider a pouch that hangs from a belt and can hold a field guide, field forms, and a box for specimens. One option is the "Pa'jaro" (www.pajaro.com) or something similar. Field or fishing vests (with lots of pockets) also work well, but can be hot on those sweltering summer days.

FIELD GUIDES

- *Butterflies Through Binoculars: The East* – By Jeffrey Glassberg
- *Butterflies of North America (Kaufman Focus Guides)* – By Kenn Kaufman and Jim Brock
- *Eastern Butterflies (Peterson Field Guide)* – Paul Opler and Vichai Malikul

MISCELLANEOUS GEAR

Flat-tipped forceps (tweezers) allow you (with some practice) to remove a butterfly safely from a net for a quick photograph and release. Some survey volunteers use killing jars and a chemical agent to dispatch butterflies collected for voucher specimens. These and other insect supplies are available from BioQuip. Those of you who collect voucher specimens will need a crush-proof box to hold the specimens in the field. Jo-Ann Fabrics sells various **plastic boxes**, including one that's just right for VBS glassine envelopes. Better yet, use an old VCR box with the spindles cut out. Finally, don't forget a lightweight sun-hat and loose-fitting protective clothing so that you don't bake in the summer sun.



Vermont Butterfly Survey
Vermont Institute of Natural Science
6565 Woodstock Rd
PO Box 1281
Quechee, VT 05059
Tel: 802-359-5000
vbs@vinsweb.org
www.vinsweb.org/vbs

Appendix 6. Policy on the Release, Use and Publication of VBS Data by Outside Users

It is the Vermont Butterfly Survey (VBS) policy to encourage the publication of important research findings based on VBS data, and to encourage the use of VBS data by land management authorities, planners, naturalists and others. It is also the VBS policy that appropriate credit be given to VBS and cooperating organizations for their contributions to the publication of such findings based on VBS data.

The following organizations/agencies are the official VBS cooperators with the Vermont Center for Ecostudies (VCE):
Nongame and Natural Heritage Program of the Vermont Department of Fish and Wildlife
Vermont Institute of Natural Science

Disclaimer
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Acknowledgements
Researchers/authors using atlas data agree to use the following acknowledgement:
"Thanks to the Vermont Center for Ecostudies and the Nongame and Natural Heritage Program of the Vermont Department of Fish and Wildlife for supplying data, and to the hundreds of volunteer participants who gathered data for the project."

Review of manuscripts (or parts thereof) by VCE staff before submission to scientific journals is requested as a courtesy.

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Requests for data should be made to:
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Appendix 7. Monthly Climate Summaries (2002-2007)

The major climatic parameters displayed below are sequential "Time Biased Corrected" climatic division monthly average temperatures (degrees F) and precipitation (inches) for each year of VBS (2002-2007). The data was obtained from NOAA (2010).

Monthly averages within a climatic division have been calculated by giving equal weight to stations reporting both temperature and precipitation within a division. In the U.S., observers at cooperative stations often take one observation per day, and the ending time of the climatological day at any station can vary from station-to-station as well as year-to-year. Differences of the 24-hour period over which each observer reports his or her maximum and minimum temperature as well as the average temperature [(max + min)/2] affects the calculated monthly mean temperature. These potential biases were rectified by adjusting for varying observation times.

The three climatic divisions in Vermont are the entire region west of the Green Mountains and east of the Green Mountains split into the Northeast, and the Southeast.

Monthly average temperature (left) and precipitation (right) by climatic region (top to bottom: northeast, west, southeast) in Vermont (2002-2007).