SCIENTIFIC PUBLICATIONS OF
THE SCIENCE MUSEUM OF MINNESOTA
New Series, Vol. 8, No. 1

The Flora and Fauna of Wadena County, Minnesota Part I: The Butterflies (*Lepidoptera*: *Hesperioidea* and *Papilionoidea*) of Wadena County, Minnesota

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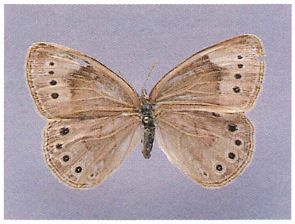
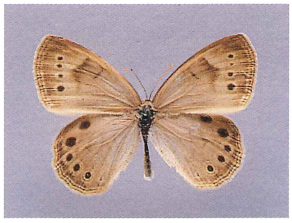
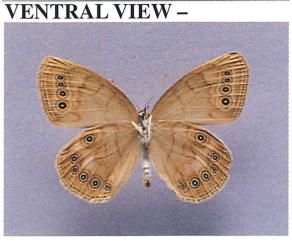
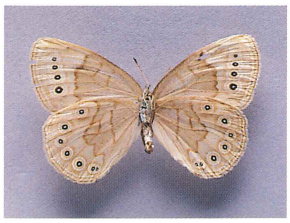
ISBN No. 0-011338-43-8

Published by
THE SCIENCE MUSEUM OF MINNESOTA
Saint Paul, Minnesota, 55102
May 2002

DORSAL VIEW – – MALES –

VENTRAL VIEW –

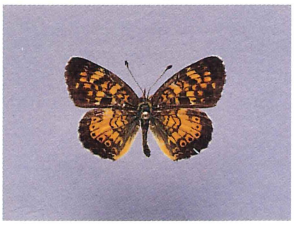
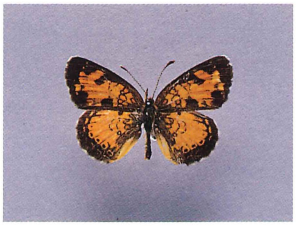




Smoky Eyed Brown:
Minnesota: Wadena Co.
T136N R33W S11 NW
6 July 1980
Wingspread = 43mm

Eyed Brown:
Minnesota: Wadena Co.
T135N R35W S27 SW SW
1 July 2001
Wingspread = 43mm

Appalachian Brown:
Minnesota: Wadena Co.
T136N R33W S11
21 July 1979
Wingspread = 44mm

DORSAL VIEW – – MALES –

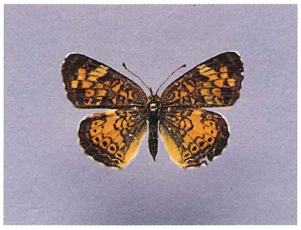
Pearl Crescent:
Minnesota: Wadena Co.
T136N R33W S33
7 July 1982
Wingspread = 33mm

Tawny Crescent:
Minnesota: Wadena Co.
T136N R33W S33
7 July 1982
Wingspread = 32mm

Northern Crescent:
Minnesota: Wadena Co.
T136N R33W S10/11
6 July 1982
Wingspread = 34mm

DORSAL VIEW – – FEMALES –





VENTRAL VIEW –

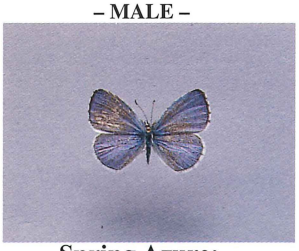


Pearl Crescent:
Minnesota: Yellow Medicine Co.
5 mi W of Canby
16 August 1975
Wingspread = 30mm

Tawny Crescent:
Minnesota: Wadena Co.
T136N R33W S33 NW NE
23 June 1991
Wingspread = 33mm

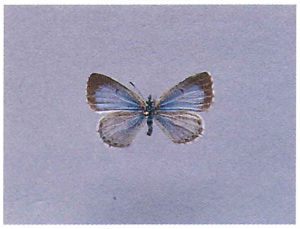
Northern Crescent:
Minnesota: Wadena Co.
T136N R33W S10/11
6 July 1982
Wingspread = 36mm

– MALE –



Spring Azure:
Minnesota: Winona Co.
2mi E of Beaver
6 May 1979
Wingspread = 24mm

– FEMALE –



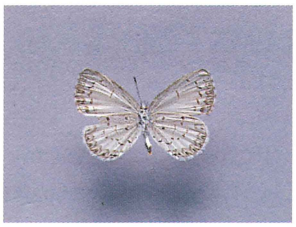
Spring Azure:
Minnesota: Isanti Co.
Cedar Creek
Natural History Area
T34N R23WS22 SW NE
11 May 1976
Wingspread = 25mm

– VENTRAL VIEW –

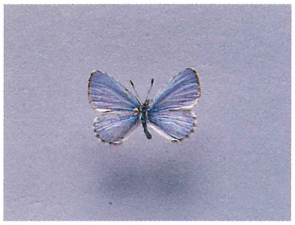
Spring Azure:
Minnesota: Ramsey Co.
1/4 mi E Co. Rd. I and
Hodgson Rd.
19 May 1980
Wingspread = 25mm

Summer Azure:
Minnesota: Anoka Co.
Carlos Avery Refuge
4 July 1973
Wingspread = 26mm

Summer Azure:
Minnesota: Houston Co.
2 mi S of Brownsville
29 July 1978
Wingspread = 28mm



Summer Azure:
Minnesota: Houston Co.
2 mi S of Brownsville
29 July 1978
Wingspread = 28mm



Northern Azure:
Minnesota: Koochiching Co.
T164N R22W S1
30 May 1982
Wingspread = 23mm

Northern Azure:
Minnesota: Cook Co.
30 m. W Grand Marais,
Squint Lake
28 May, unknown year
Wingspread = 27mm

Northern Azure:
Minnesota: Cook Co.
30 m. W Grand Marais,
Squint Lake
28 May, unknown year
Wingspread = 27mm

Frontispiece Legend:
Sibling Species of Three Congener Trios

LEFT PAGE

ROWS 1, 2 (left to right):	Smoky Eyed Brown	Eyed Brown	Appalachian Brown
(MALES, dorsal &ventral)	*Satyrodes fumosus*	*S. eurydice*	*S. appalachia*
ROW 3 (left to right):	Pearl Crescent	Tawny Crescent	Northern Crescent
(MALES, dorsal)	*Phyciodes tharos*	*P. batesii*	*P. selenis*
ROWS 4, 5 (left to right):	Pearl Crescent	Tawny Crescent	Northern Crescent
(FEMALES, dorsal & ventral)	*Phyciodes tharos*	*P. batesii*	*P. selenis*

RIGHT PAGE

COLUMN 1 (top to bottom):	Spring Azure	Summer Azure	Northern Azure
(MALES, dorsal)	*Celastrina ladon*	*C. neglecta*	*C. lucia*
COLUMNS 2,3 (top to bottom):	Spring Azure	Summer Azure	Northern Azure
(FEMALES, dorsal & ventral)	*Celastrina ladon*	*C. neglecta*	*C. lucia*

Abstract

About 164 species of butterflies are currently reported as occurring in Minnesota. The statewide status, distribution, flight periods, habitat preferences, and food plants are generally known for some of them, but these are known incompletely, if at all, for others. This paper reports on the 89 species thus far discovered in Wadena County, Minnesota over a period of 40 years. It is the first published, detailed account of lepidoptera for any county in the state. As such, it is presented as a facilitory model that will hopefully promote the exploration of other counties. Species accounts are provided summarizing the currently known status for each of the 89 species.

Keywords: butterflies (*Lepidoptera*: *Hesperioidea* and *Papilionoidea*), Wadena County, Minnesota, species accounts

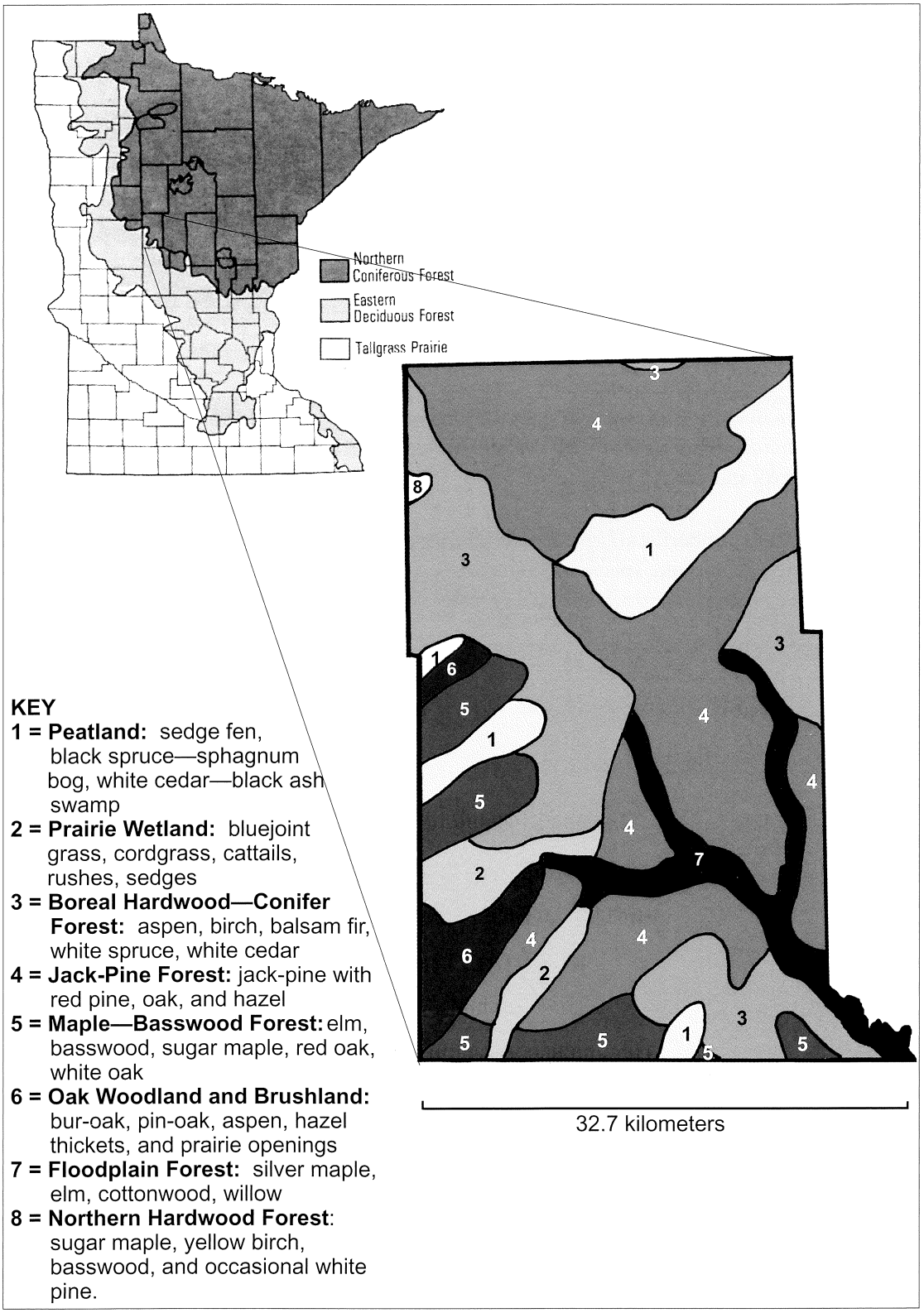


Figure 1. Location and vegetation maps for Wadena County, Minnesota. Map based on Wendt and Coffin, 1988.

The Flora and Fauna of Wadena County, Minnesota
Part I: The Butterflies (*Lepidoptera*: *Hesperioidea* and *Papilionoidea*) of Wadena County, Minnesota

By Richard J. Oehlenschlager
and
Ronald L. Huber

Does he who searches Nature s secrets scruple to stick a pin into an insect?
A.G. Oehlenschlager, *Aladdin s Lamp* (in Holland 1903:19)

Introduction

The butterflies (*Lepidoptera*: *Hesperioidea* and *Papilionoidea*) of Minnesota are generally well known and documented. However, no published accounts that specifically analyze any one of its 87 counties have been produced to date. This report represents the first account of this nature, offered in part to hopefully inspire systematic entomological investigations of other counties.

Counties are, as well as certain other organized land management units, stable and precisely defined areas that have documented histories of past land use activities. They are, furthermore, key entities influencing present and future forms of local land use and manipulation, including the management, preservation, or restoration of selected areas. These actions can determine the presence or absence of butterflies or their habitats at a given area; understanding the potential impacts of those activities from a county perspective seems a logical prelude to better understand those for Minnesota as well. Wadena County offers an exceptionally intriguing case for analysis by virtue of its transitional location in the coniferous forest, eastern deciduous forest, and tallgrass prairie regions in the state.

This survey results from over 20 years of variably intense field collections and observations made by the senior author and occasionally the junior author and others. Attempts are made here to summarize the known status, abundance, flight dates, habitats, and important larval food and adult nectaring plants for each of the 89 species thus far documented as occurring in Wadena County. Permanent voucher specimens of all but one species (Bog Copper *Epidemia epixanthe michiganensis*) are housed in the entomological collections at the Science Museum of Minnesota and the University of Minnesota.

Discussion

Butterflies are, as phytophagous insects, intricately linked to plant communities and individual species of plants within those communities. To facilitate future analysis of the distributional and ecological aspects of the local butterfly communities, basic features of the underlying geomorphology, climate, and vegetation of the county are here briefly described.

Geology and Geomorphology: Glacial advances prior to and during the early to mid-Wisconsin phases of glaciation, ca. 35,000–40,000 B.P., completely buried the Precambrian bedrock of the Canadian Shield in Wadena County under drift materials ranging from depths of 7.4 to several hundred meters (Bray, 1977; Ojakangas and Matsch, 1982; Wright, 1962). These were deposited on the surface as till plains, outwash plains, and drumlin fields. Irregular depressions in the till plains and ice block basins in the outwash plains formed the existing lakes, drainage patterns, and wetlands in the County. The Wadena drumlin field, perhaps the largest, most classic example of its geomorphic landscape type in North America, has been fully investigated and described by Wright (1962).

Climate and Vegetation: Climatic conditions of the glacial period supported tundra over the region until about 20,000–11,000 B.P., when coniferous forests subsequently developed. Warmer climates reached their maxima about 7,000 B.P., allowing prairies to extend completely over the region (Sims and Morey, 1972; Waddington, 1969; Wright and Watts, 1969). Later cooling permitted the establishment of hardwood forests and the development of the current climate, which now has a mean annual precipitation of 27.42", a mean annual temperature of 41.0°F, and a maximum range of -51°F to 112°F (Minnesota Soil Atlas, Brainerd Sheet, 1969). This regime supports two major biomes, coniferous and (transitional) hardwood forests that include vestiges of a third, the tall grass prairie. Boundaries between the hardwood and coniferous biomes are sharply defined in some locations within the county, as at T137N R34S Sec. 32 SW and SE on County State Aid Highway 227.

The presettlement vegetation of Minnesota as mapped by Marschner (1974), interpreted by Heinselman (1974), and later simplified by Wendt and Coffin (1988) includes eight plant community types in Wadena County (Fig. 1). Several of these (floodplain forest, oak woodland and brushland, and northern hardwood-conifer forest) occupy very restricted total areas in the county. In addition, some specialized natural communities such as open floating muskeg bog and tallgrass prairie tracts exist (or existed) that are (or were) too small to represent as mappable units.

The dominant plant communities conform quite closely to the glacial landform and various resultant soil types in the county with jack-pine (conifer) forest (Fig. 2) covering the higher outwash plains and drumlins in the northeastern half of the county and conifer bogs (Fig. 3), swamps, and peatlands occupying the lower elevations and interdrumlin lowlands in that same region. Deciduous hardwood forests, oak-woodland (Fig. 4), and wet prairies (Fig. 5) are prevalent on the till plains in west central and east central portions of the county and southwestern outwash plains.

Current vegetational landscapes generated by human manipulation such as logging, agricultural, and other land uses have completely transformed most of the original natural plant communities. Croplands, pasturelands, urban areas, gardens, fencerows, gravel pits, and golf courses all represent non-natural floristic communities, as do roads and railroads. Roads, whatever the type, pass through or contact all of the original and extant plant communities producing simultaneously their own distinct bordering flora. The single remaining railroad, which traverses the southern part of Wadena County, likewise supports a highly localized, restricted plant community relatively rich in species of tallgrass prairie affinity (Fig. 6).

Seven hundred and fifty species of vascular plants have been documented with specimens in Wadena County. Several hundred of these have been collected by the senior author and Welby Smith (pers. comm.) of the MNDNR. Others have been reported in Ownbey and Morley (1991) and McGregor (1986). Based upon an analysis of the known geographical distributions of vascular plants of Minnesota extrapolated from Ownbey and Morley (1991), a potential total

Photo by R. Oehlenschlager, 29 September, 2001

Figure 2. Coniferous forest: jack-pine (T136N R33W S30 SE NE).

Photo by R. Oehlenschlager, 29 September, 2001

Figure 3. Conifer bog and swamp (T136N R33W S7 SE SW).

Photo by R. Oehlenschlager, 29 September, 2001

Figure 4. Oak woodland and brushland: hardwood forest (T138N R34W S35 SW NW).

Photo by R. Oehlenschlager, 29 September, 2001

Figure 5. Wet prairie (T135N R35W S27 SW SW) cleared from tamarack bog.

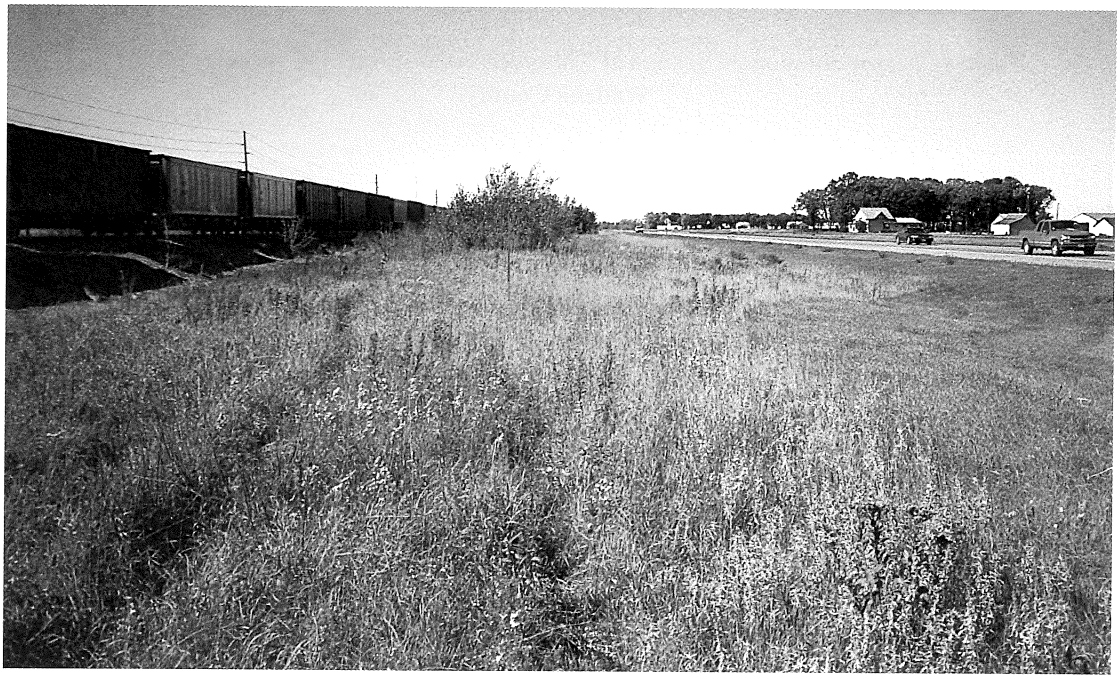


Photo by R. Oehlenschlager, 29 September, 2001

Figure 6. Railroad right of way with vestiges of tallgrass prairie (T134N R35W S14 SE SE).

Photo by R. Oehlenschlager, 29 September, 2001

Figure 7. Sedge-forb lowland (T136N R33W S11 SE SE) cleared from conifer bog and swamp.

Table 1. Major component groups of 750 species of documented vascular plants in Wadena County.

	No. of species	% of total known Wadena County species
Introduced (alien) species that are naturalized and invasive	88	11.7%
Species of boreal/coniferous forest affinity	142	18.9%
Species of prairie and hardwood forest affinity	75	10.0%
Species of statewide distribution or shared between hardwood and conifer forests or not classified	445	59.3%
Sedges (*Carex*) spp.	42	5.5%
Grasses	62	8.2%

Note: These numbers are not additive within each column because sedges and grasses are included in more than one category.

Table 2. Introduced alien plants classified by family.

Family	No. spp.	% of total aliens	% total of Wadena County vascular plants
Compositae	18	20.5%	2.4%
Cruciferae	9	10.2%	1.2%
Gramineae	13	14.8%	1.7%
Leguminosae	12	13.6%	1.6%
Other families	36	40.9%	4.8%

of between 1,000 and 1,342 species might occur or have occurred in the county. Some compositional features of the 750 species thus far documented are identified in Tables 1 and 2.

Species Accounts

Traditional field capturing techniques and occasional salvaging of vehicle or other killed specimens have thus far yielded 89 species of butterflies from Wadena County. In the following accounts, the abundance for each of these species is defined as

Uncertain—fewer than five records

Uncommon—five to 10 records

Common to very common—more than 10 to 100 individuals can be encountered daily during suitable flight conditions and the proper season

Abundant—large numbers, in hundreds, perhaps thousands, can be encountered daily

Extreme flight dates are given, which include the first spring or summer date of appearance and the last date of summer or autumn record. For unmistakable species, dates of field observations as well as specimen dates are cited. Those for species easily confused in the field are based upon specimens only.

Precise locations and dates of occurrence are listed for those species currently listed as rare. Observations of adult food/nectaring plants, common plant species in habitat associations, notes on behaviors, and unusual features of certain specimens are given for some species.

The butterfly nomenclature, both Latin and English names, and species sequences presented here follow Huber (1981 and revision in progress). Plant names follow Ownbey and Morley (1991) except for a single species of lichen taken from Hale (1969). In both cases, the pendulum continues to swing between the "lumpers" and the "splitters."

Epargyreus clarus clarus (Cramer [1775]) Silver-spotted Skipper

A male specimen taken 23 May 1980 as it visited a spiraea *Spiraea alba* [Du Roi] shrub in a farmyard in T136N R33W S11 NW represents the only county record.

Thorybes pylades (Scudder, 1870) Northern Cloudy Wing

Uncommon, five specimens recorded between 6-14 June all from T136N R33W S10, 11, and 14, basking on sandy roads through mixed forests of jack-pine *Pinus banksiana* [Lamb.], bur-oak *Quercus macrocarpa* [Michx.], northern pin-oak *Q. ellipsoidalis* [E.J. Hill], paper birch *Betula papyrifera* [Marsh.], American hazel *Corylus americana* [Walt.], and beaked hazel *C. cornutus* [Marsh.].

Erynnis icelus (Scudder and Burgess, 1870) Dreamy Dusky Wing

Common at edges of, and openings within, mixed hardwood-conifer forests, especially near trembling aspen *Populus tremuloides* [Michx.]; frequently perches on or near ground or on fallen branches and sticks and near ladies' tobacco *Antennaria neglecta* [Greene], gooseberry

Ribes hirtellum [Michx.], and lowbush blueberry *Vaccinium angustifolium* [Ait.]. Flight period is from 20 May to 25 June with peak numbers appearing about 27 May.

***E. brizo* (Boisduval and LeConte, 1837) Sleepy Dusky Wing**

Status is essentially the same as *E. icelus* but more common; also perches on twigs, sticks, logs, and moss-covered rocks. Flight period is 21 May to 3 June. The species appears here to be at the northwestern limits of its range in Minnesota.

***E. juvenalis* (Fabricius, 1793) Juvenal's Dusky Wing**

Very common in woodland edges, especially near bur-oak, American hazel, trembling aspen, and clones of smooth sumac *Rhus glabra* [L]. It visits hoary puccoon *Lithospermum canescens* (Michx.) [Lehm], *Antennaria neglecta*, and violet *Viola adunca* [Smith]. Widespread throughout the county; flying between 20 May and June 14, peaking in numbers between 28 May and 3 June, with fresh specimens appearing until 10 June. Males characteristically bask on sand road surfaces or perch on dead branches, often pugnaciously pursuing other males before returning to their original perches.

***E. lucilius* (Scudder and Burgess, 1870) Columbine Dusky Wing**

A single specimen collected by Huber 7 June 1969 at T136N R33W S11 in the vicinity of the larval food plant columbine *Aquilegia canadensis* [L.] is the sole record of this species. This species appears to be at or near its northwestern limits of its Minnesota range.

***Pyrgus communis* (Grote, 1872) Checkered Skipper**

Four specimens collected 20 June 1979, 30 June 1979 (2), and 28 August 1979 at T136N R33W S11 and 12. All were basking on sand road or bare ground, showing no association with plants. This species is an occasional immigrant from further south.

***Carterocephalus palaemon mandan* (W.H. Edwards, 1863) Arctic Skipper**

Very common and widespread in sedge-grass lowlands, ranging less frequently to dense ground cover of upland hayfields; appears between 27 May and 15 July.

***Ancyloxypha numitor* (Fabricius, 1793) Least Skipper**

Very common throughout mesic and wet sites: wet prairie, marshes, drainage ditches with sedges, among emergent plants, rushes, and broad-leafed cattail *Typha angustifolia* [L.], where it courses low and weakly near the water line. Flies continuously from 19 June to 2 September.

***Thymelicus lineola* (Ochsenheimer, 1808) European Skipper**

A recently introduced arrival that was first recorded 20 June 2001 at T135N R35W S17 SE SE and was found subsequently at widely scattered sites elsewhere in the county. It appears to be common in fields of timothy *Phleum pratense* [L.], the widespread larval food plant of the species. A total of four specimens taken at the initial site on 20 and 30 June and 1 July 2001 plus two others taken 7 July (T136N R33W S3 SE SE) and 8 July (T136N R34W S32 SW SW) comprise the complete documentation of the species in Wadena County.

***Hesperia leonardus* Harris, 1862 Leonard's Skipper**

Uncommon, local; found at two locations: 18 August 1991, T138N R33W S5 SW SW, five females feeding on blazing star *Liatris aspera* [Michx.] and 19 August 2000 a copulating pair T138N R34W S20 or 21 near *Liatris aspera* and Hill's thistle *Cirsium hillii* (Canby) [Fern.]. Both sites were between jack-pine forests and roadside. Phenotype is intermediate between *H. leonardus* and *H. pawnee* Dodge.

***Hesperia sassacus manitoboides* (Fletcher "1888" (1889)) Indian Skipper**

Common to very common in mesic grass-sedge-forb-lowlands to uplands in grasses, clover, northern ragwort *Senecio pauperculus* [Michx.], strawberry *Fragaria virginiana* [Duchesne], and daisy-fleabane *Erigeron strigosus* [Muhl.]; males perch with their hind wings flared outward, darting after other intruding males, only to soon return to the original grass perch. In flight from 7 June to 21 July, peaking between mid and late June. This subspecies is seldom recognized, but the phenotype in northern Minnesota differs from that found in southeastern Minnesota.

***Polites peckius* (W. Kirby, 1837) Peck's Skipper**

Very common and widespread in dense ground cover and undergrowth of forest edges, especially low brushy areas, apparently nectaring at selfheal *Prunella vulgaris* [L.]; bush honeysuckle *Diervilla lonicera* [Mill.]; clovers *Trifolium hybridum* [L.], *pratense* [L.], and *repens* [L.]; sweet clovers *Melilotus alba* [Medic] and *officinalis* (L.) [Pallas]; grasses; and thistles. Observed from 14 June to 28 August.

***Polites themistocles* Latreille, [1824] Tawny-edged Skipper**

Very common throughout lowland sedge-grass-forb complexes to upland old fields and croplands with timothy grass, alsike, and alfalfa *Medicago sativa* [L.]. Flight period is probably longer than the 11 June to 21 July specimen dates indicate.

***P. origenes* (Fabricius, 1793) Crossline Skipper**

Uncertain; four records, all from lowland grass-sedge-forb complexes. Collected 20 June 1965 (Verndale), 23 June 1991 (T136N R33W S33 NW NE), 30 June 1979 (T136N R33W S11 NE NW), and 7 July 1982 (T136N R33W S11 NE NW). The close resemblance of this species to *P. themistocles* perhaps obscures the true abundance of *P. origenes*. This species appears here to be near its northern limit of distribution in Minnesota.

***P. mystic* (W.H. Edwards, 1863) Long Dash**

Common and widespread. Habitat preference of this species seems to mirror that of *Hesperia sassacus*, with which it usually occurs. Flight dates: 13 June to 14 July peaking in late June and early July.

***Wallengrenia egeremet* (Scudder, 1864) Northern Broken Dash**

A male collected 8 July 2000 from a disturbance site grown over with dense tall grasses, cruciferae spp., clovers, and hoary alyssum *Berteroa incana* (L,) [DC] is the only record. This

species could easily have been overlooked because of its close resemblance to the abundant *Euphyes vestris*.

***Atalopedes campestris* (Boisduval, 1852) Sachem**

Apparently briefly common but sporadic. One record of five males captured 31 August 1991 on or near ground in a cutover roadside alfalfa field at T135N R35W S21 SW. This species is an occasional immigrant from further south.

***Anatrytone logan* (W.H. Edwards, 1863) Delaware Skipper**

Rather common and widespread throughout dry open roadsides, old fields, and woodland edges; strawberries, and cinquefoils *Potentilla arguta* [Pursch] and *simplex* [Michx.] are common plants associated at all collections sites. Nectaring individuals were strongly attracted to Hill's thistle. In flight from 4 July to 10 August.

***Poanes hobomok* (Harris, 1862) Hobomok Skipper**

Very common and widespread in forest opening or edges in dense shrubbery, commonly perching on American hazel, dogwoods, American red raspberry *Rubus strigosus* [Michx.], blackberry *Rubus* spp., dogbane *Apocynum androsaemifolium* [L.], agrimony *Agrimonia striata* [Michx.], yellow avens *Geum aleppicum* [Jacq.], bush honeysuckle, swamp-milkweed *Asclepias incarnata* [L.], and alsike clover. Flight dates span 23 May to 21 July.

***Poanes viator* (W.H. Edwards, 1865) Broad-winged Skipper**

A single female specimen collected 3 August 1997 as it fed on swamp-milkweed in wet prairie T135N R35W S34 NW NW is the only record. The site contains considerable amounts of stagnant surface water amid sedges, rushes, cattails, arrowheads *Sagittaria* spp., bur-reed *Sparganium eurycarpum* [Engelm.], and other emergents.

***Euphyes dion* (W.H. Edwards, 1879) Dion Skipper**

Only seven specimens known thus far. Four males taken 6 July 1991 and two males, one female on 14 July 1991 at T136N R33W S11 NE NW at edge of sedge-willow forb lowland with swamp-milkweed, thoroughwort *Eupatorium perfoliatum* [L.], skullcap *Scutellaria galericulata* [L.], field-mint *Mentha arvensis* [L.], *Geum* sp., and agrimony among sedge hummocks with small amounts of standing water. Probable sightings of this species in wet, widely scattered sedge marshes elsewhere in the county on 17 July 1999 suggest that it is more widespread. The rapid, sometimes rather high flight suggests that of a hairstreak in its erratic nature. Males were seen resting on fallen willows and sedges in patches of sunlight.

***Euphyes vestris metacomet* (Harris, 1862) Dun Skipper**

Common to abundant in moist areas, especially at mud flats and drainage ditches with sedge-grass-forb edges. It also ranges to upland fields and pastures where it frequently visits sweet clover and cow manure. Flight dates: 4 July to 10 August, peaking in mid-July.

***Amblyscirtes hegon* (Scudder, 1864) Pepper and Salt Skipper**

Two specimens taken 22 May 1980 at T136N R33W S12 NE NW were in patchy sun-

light on alsike clover and hoary puccoon at the edge of oak forest with a beaked hazel shrub layer. A third was collected by Huber 7 June 1969 at T136N R33W S11. Status uncertain.

***A. vialis* (W.H. Edwards, 1862) Roadside Skipper**

Only two records from 7 June 1969 (T136N R33W S11) and 25 June 1972 (T136N R33W S14) on roads, by R. Huber. Status uncertain.

***Papilio polyxenes asterius* (Stoll IN Cramer, 1782) Black Swallowtail**

Fairly common throughout roadsides, fencerows, hay fields, barnyards, and low shrubbery along forest margins and gardens. Females oviposit upon carrot *Daucus carota* [L.], dill *Anethum graveolens* [L.], wild parsnip *Pastinaca sativa* [L.], and Alexanders *Zizia aptera* (Gray) [Fern.] and *aurea* (L.) [Koch], and both sexes nectar on some of them as well as thistles. Flight dates extend from 28 May to 28 August.

***Pterourus canadensis* (Rothschild and Jordan, 1906) Canadian Tiger Swallowtail**

Very common, widely distributed throughout many habitats, including the overstory of hardwood forests. It commonly nectars at lilac *Syringa vulgaris* [L.], pea-tree *Caragana arborescens* [Lam.], and various garden plants. Apparent females probably of the species have been observed possibly ovipositing in the crowns of mature bur-oak trees. Flight dates (specimens): 28 May to 7 July. Examination of 27 specimens taken from the coniferous forest region of Wadena County reveals all to be *P. canadensis* with no evidence of hybridization or intergradation with Eastern Tiger Swallowtail *P. glaucus* (Linnaeus, 1758). Peak abundance is from late May to mid-June. Occasional black females (probably *P. glaucus*) have been seen. Some workers would return both Tiger Swallowtails to the genus *Papilio*.

***Pontia protodice* (Boisduval and LeConte, 1829) Checkered White**

Variably abundant, ranging locally from uncommon to very common, especially in disturbance sites where the growth of numerous cruciferae species is stimulated. Flies continuously from 23 June to 2 September. This species is a regular immigrant from further south.

***Pieris oleracea* Harris, 1829 Mustard White**

Common in pine forests and woodlands; collections show two broods, the spring form in flight from 15 May to 2 June and the summer morph from 23 June to 27 August. Ovipositing has been observed upon sand-cress *Arabis lyrata* [L.].

***P. rapae* (Linnaeus, 1758) Cabbage Butterfly**

Abundant and widespread throughout all open areas of the county, flying continuously from 28 May to 29 September, it visits common dandelion *Taraxacum officinale* [Wiggers] early in the spring as well as a considerable number of cruciferae species, including hoary alyssum.

***Euchloe olympia* (W.H. Edwards, 1871) Olympia Marble**

Common in open jack-red pine, bur-oak forest woodland where it flies low over mosses, reindeer moss *Cladonia rangiferina* (L.) [Wigg.], blueberry, bearberry *Arctostaphylos uva-ursi*

[L. Spreng.], and *Arabis lyrata*. Observed 9 May to 6 June with greatest abundance evident about May 24.

***Colias philodice* Godart, 1819 Clouded Sulphur**

Abundant and widespread throughout all open habitats, with noticeable year to year fluctuations. Flight dates: 27 May to 14 Oct. Early spring individuals are strongly attracted to dandelions, later to a wide variety of plants, especially cruciferae and leguminosae spp. Large concentrations of puddling males are encountered in June and July. Cold weather forms are found into early July. Probable hybrids with the following species have been examined.

***C. eurytheme* Boisduval, 1852 Alfalfa Butterfly**

Abundant and widespread, especially in open agricultural areas, and as its name suggests, in alfalfa. It commonly intermingles and displays aggressive interactions with *C. philodice*. Ovipositing on alfalfa and birdsfoot-trefoil *Lotus corniculatus* [L.] is frequent. Flight period is probably the longest of all nonhibernating species ranging from 28 May to 5 November. A sighting on 15 Nov 2001 in nearby Morrison County is probably the latest date for the state. This species is a regular immigrant from further south.

***C. interior* Scudder, 1862 Pink-edged Sulphur**

Briefly and locally common, specimen dates being 23-30 June; it is an inhabitant of jack-pine forest where it concentrates in openings dominated by blueberries. The occasional concentrations of puddling males on sandy forest roads seem not to associate with *C. philodice*.

***Nathalis iole* Boisduval, 1836 Dainty Sulphur**

Two records, both males, collected 11 August 2001 at T134N R33W S15 SE NE and 29 September 2001 at T135N R35W S27 SW SW. Both were fluttering low and weakly over scantily vegetated dry roadsides. The species appears as a vagrant from the south and is apparently sporadic in its occurrence here.

***Feniseca tarquinius* (Fabricius, 1793) Harvester**

Three records: 28 May 1993, 10 June 1982, and 8 July 2001 from T136N R33W S11 NW NW, T136N R33W S27 SE SE, and T136N R33W S3 SW SW respectively. One taken was perched on a high-bush cranberry *Viburnum trilobum* [Marsh.] leaf at an alder-fringed streamside; the others were found flying low and weakly over sandy roads through jack-pine forests, one hovering near upland willow *Salix humilis* [Marsh.].

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

Common in mesic to dry open areas: old fields, pastures, roadsides, hayfields, and waste areas. It flies continuously from 20 May to 2 September and visits cinquefoil *Potentilla recta* [L.], hoary alyssum, purple prairie-clover *Petalostemon purpureum* (Vent.) [Rydb.], and gray goldenrod *Solidago nemoralis* [Ait.] that are scattered among grasses. It has been observed ovipositing on sheep-sorrel *Rumex acetosella* [L.]. The form *fasciata* has been collected twice.

***Gaeides dione* (Scudder, 1869) Dione Copper**

Common, but local in mesic to upland old fields, hayfields, and roadsides. Grass and forb communities with low willow, thistles, and clover are favored. Males perch on sweet clover, low willows, goldenrods, thistles, and common mullein *Verbascum thapsus* [L.]. The flight period is undoubtedly longer than the specimen dates 5-21 July indicate. Some workers would return this and the following three coppers to the genus *Lycaena*.

***Hyllolycaena hyllus* (Cramer, [1775]) Bronze Copper**

Common and widespread in moist to wet lowlands in sedge, grass, and forb clumps, often near the edge of water; *Polygonum* spp. are characteristically present. Flies from 13 June to 4 September.

***Epidemia epixanthe michiganensis* (Rawson, 1948) Bog Copper**

One record, a worn female taken 28 July 1979 in a small old field at the edge of a black spruce *Picea mariana* (Mill.) [B.S.P.], tamarack *Larix laricina* (Du Roi) [Koch] bog (Fig. 5) where Labrador-tea *Ledum groenlandicum* [Oeder], sphagnum spp., and cranberry *Vaccinium macrocarpon* [Ait.], its larval food plant, are present. This species must be very restricted in its distribution here because only two other small sites are known in the county where its larval food plant grows. It may also be at the southwestern limits of its state range.

***E. helloides* (Boisduval, 1852) Purplish Copper**

Common in mesic to dry open grass-sedge-forb complexes, including upland hayfields of alsike and red clovers; in flight from 13 June to 29 September.

***Harkenclenus titus* (Fabricius, 1793) Coral Hairstreak**

Uncommon and little known in mesic low willow-grass-forb lowlands. Males perch rather conspicuously on low willows. Specimens date from 22 to 29 July. Some workers would include this species in the genus *Satyrium*.

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

Fairly common; frequently occurs in the same habitat as *Harkenclenus titus* but ranges more widely and to more diverse sites. Nectaring individuals have been collected upon swamp-milkweed, Joe-Pye weed *Eupatorium maculatum* [L.], clovers, and spotted jewelweed *Impatiens capensis* [Meerb.]. Flight period of specimens is 4 July to 1 August.

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

One specimen collected 14 June 1967 at T137N R34W S36 SW SW from the edge of low bur-oak woodland with pin-cherry *Prunus pensylvanica* [L.f.] and serviceberry *Amelanchier* sp. as it perched on American hazel. Sighting of unidentified hairstreaks into late July may pertain in part to this species. Status uncertain.

***S. calanus falacer* (Godart, 1824) Banded Hairstreak**

Uncommon; consistently occurs at edge of oak forest with American hazel and often smooth sumac. Specimens have been taken on sweet clover and hoary alyssum. Flight dates of

specimens 14 June to 14 July, but as in the case of *S. edwardsii*, sightings later in July may apply in part to this species.

***Incisalia augustinus* (Westwood IN Doubleday et. al, 1852) Brown Elfin**

Uncommon. Shrubby openings in jack-pine woodlands seem preferred. Individuals showed attraction to gooseberry *Ribes hirtellum*. Flight dates: 20 May to 3 June. Some workers would return this and the following two elfins to the megagenus *Callophrys*.

***I. polia* Cook and Watson, 1907 Hoary Elfin**

Abundant in openings in jack-pine-red-pine forests. Attracted to bearberry, blueberry ladies' tobacco, puccoon, lichens, and mosses. Perches low, or sometimes on the ground. Flight dates: 19 May to 12 June, being most abundant about 27 May.

***I. niphon clarki* T.N. Freeman, 1938 Eastern Pine Elfin**

Flies with and shows similar behavior to *I. polia* except that it perches higher, often on twigs of jack- and red pines. Flight dates of specimens are 18 May to 20 June. This species occupies strictly the coniferous forest of northeastern Wadena County where it is at or near the apparent southwestern limits of its Minnesota range.

***Everes comyntas* (Godart, [1824]) Eastern Tailed Blue**

Common throughout open uplands, especially in alsike, red and sweet clovers, and gray goldenrod *Solidago nemoralis*. It flies continuously between 3 June and 2 October. Some individuals assemble at mud puddles in June and July.

***E. amyntula albrighti* (Clench, 1944) Western Tailed Blue**

Briefly common but very local, being confined to opening or edge of jack-pine-red-pine forest with blueberry *Vaccinium angustifolium*, bearberry, violet *Viola adunca*, hoary puccoon, pale pea *Lathyrus ochroleucus* [Hook], and sand-cherry *Prunus pumila* [L.]. All records are from T136N R33W S10 and 11 between 21 May and 3 June. It consistently flies near the ground.

***Celastrina ladon* (Cramer, [1780]) Spring Azure**

Very common in mixed hardwood conifer woodlands with openings and edges dominated by American and beaked hazel, serviceberry, chokecherry, pin cherry, black cherry *Prunus serotina* [Ehrh], hawthorns *Crataegus chrysocarpa* [Ashe] and *macracantha* [Lodd], wild rose *Rosa woodsii* [Lindl.] and violet *Viola sororia* [Willd.]. The species is quite active before leafy foliage is fully expanded. Collections span the dates from 7 May to 3 June with peak abundance appearing about 17 May. Sightings of azures between late April and 7 May are of uncertain assignment because this species flies simultaneously with *C. lucia* in the same area (T136N R33W S11 NW NW 21 May 1979). Taxonomy of these azures is a work-in-progress.

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

Common and widespread throughout. It appears to concentrate in woodland clearings, paths, and forest edges but ranges far into open hayfields, fencerows, and roadsides. It feeds

upon clover (white, red, alsike, yellow, and white sweet) and alfalfa. It puddles commonly in groups with Northern Crescents, checkerspots, sulphurs, and White Admirals and visits mammal scats and dead carcasses. Specimen dates range from 30 June to 21 July, and possible sightings of this species occur early to mid-June. There may either be a brief hiatus about 23 June when no azures are seen or a period of nonoverlap with *C. ladon* and *C. lucia* somewhat earlier.

***C. lucia* (W. Kirby IN Richardson, 1837) Northern Azure**

Common; specimens thus far taken appear to frequent lower forests and swamps having substantial amounts of willow *Salix* spp., speckled alder *Alnus incana* (L.) [Moench], dogwoods *Cornus foemina* [Mill.] and *stolonifera* [Michx.], and black ash *Fraxinus nigra* [Marsh.]. It has been found nectaring at willows *Salix* spp. Flight dates of specimens range from 19 May to 3 June. Early sightings of azures from late April to 18 May may apply in part or equally to *C. ladon*.

***Glaucopsyche lygdamus couperi* Grote, 1873 Silvery Blue**

Very common throughout open woodlands and open areas of the county, much the same as *C. neglecta*. Flight dates from 9 May to 10 June. Possible ovipositing on *Viola adunca* has been observed, perhaps also on *Antennaria neglecta*, although legumes are the only reported larval hosts. Nectaring at Canada plum *Prunus nigra* [Ait.] and serviceberry is frequent.

***Lycaeides melissa melissa* (W.H. Edwards, 1873) Melissa Blue**

Briefly common but restricted to extreme southern Wadena County at three known locations: T134N R35W S15 SE NE in railroad rights of way (Fig. 6); T134N R35W S13; and T134N R33W S33 SE NW. Flight dates range from 2 to 31 August, peaking about 24 -27 August. Plant species common to tallgrass prairie represented at the first site were blazing star *Liatris aspera*, purple avens *Geum triflorum* [Pursh.], stiff goldenrod *Solidago rigida* [L.], showy goldenrod *S. speciosa* [Nutt.], prairie rose *Rosa arkansana* [Porter], prairie-phlox *Phlox pilosa* [L.], puccoon *Lithospermum canescens*, sand cherry, prairie June-grass *Koeleria macrantha* (Ledeb.) [Schultes], violet wood-sorrel *Oxalis violacea* [L.], and Canadian milk vetch *Astragalus canadensis* [L.]. Showy goldenrod was a persistently chosen nectaring plant and *S. rigida* was regularly used as a perching site. At the other locations, alfalfa was used as a nectar plant. There is almost certainly an earlier, overlooked brood of this butterfly.

***Plebejus saepiolus* (Boisduval, 1852) Greenish Blue**

A single specimen taken 8 June 1934 near Central (T134N R34W near S7) by D.G. Denning constitutes the only known record of the species in the county.

***Euptoieta claudia* (Cramer, [1775]) Variegated Fritillary**

Rather uncommon, encountered as widely scattered individuals in open areas such as old fields, disturbance sites, drained wetlands, roadsides, grasslands, and lawns; flying from 6 to 30 June (specimen dates). No association with any nectaring plant has been observed. This species is a regular immigrant from further south.

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

Very common throughout open areas of the county both uplands and lowlands. Specimen dates are 5 July to 10 August, but June and September field sightings may include the following species. It visits a wide number of common plants but strongly favors thistles of several species.

***S. aphrodite* (Fabricius, 1787) Aphrodite Fritillary**

Status similar to the preceding species; common nectaring plants noted include thistle spp., *Liatris aspera*, milkweeds *Asclepias syriaca* [L.] and *incarnata*, blue vervain *Verbena hastata* [L.], cinquefoil *Potentilla recta* and *norvegica* [L.], and Russian knapweed *Centaurea repens* [L.]. Specimen dates are 5 July to 28 August, earlier June and later September field observations not reliable.

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

Status nearly identical to the preceding two species, and it nectars on many of the same plants, but especially vervain and hoary alyssum. It also tends to penetrate more wooded habitats where it has been seen nectaring on ragwort *Senecio pauperculus* and dwarf dandelion *Krigia biflora* (Walt.) [Blake]. Specimen dates are 22 June to 27 August.

***Clossiana selene* (Denis and Schiffermueller, 1775) Silver-bordered Fritillary**

Very common throughout grasslands, especially mesic, but is present in wetter marshes, drier uplands where grasses and forbs are of medium height, and in forest openings. Flight period is from 28 May to 2 September. Visits many clovers, mustards, and especially hoary alyssum. Some workers would return this and the Meadow Fritillary to the genus *Boloria*.

***C. bellona* (Fabricius, 1775) Meadow Fritillary**

Very common, distributed similarly to *C. selene* but more consistently in lowlands. It is not uncommon in open jack-pine woodlands during May and June. Appears in flight between 19 May and 8 September. Swamp-milkweed is a most-favored nectaring plant. It puddles in moderate numbers and visits scats and road-killed carcasses.

***Charidryas gorgone carlota* (Reakirt, 1866) Gorgone Checkerspot**

A rather uncommon species that appears to be a new arrival in the county. It has been collected at three locations in 2001 where it had not been previously detected despite rather frequent searches. It may be increasing and spreading and seems here to be at or near its northeasternmost limits of distribution in Minnesota. Five specimens taken 2 June, 24 June, and 1 and 2 September were collected at T136N R33W S11 and 12 and T134N R34W S35 NE SW. Habitats represented are dry old fields with grasses and sedge *Carex foenea* [Willd.], some forbs including sunflower spp.; edges of hayfield-fencerow simultaneously with Harris' and Silvery Checkerspots; exposed ridges in short grass, mustards, clovers, and on clods of bare earth; and upland roadside borders of a dry drainage ditch. Eastern Tailed Blues, Pearl Crescent, Silver-bordered and Meadow Fritillaries and American Coppers were attendant species at the latter site. Fresh specimens on 2 June and 1-2 September indicate two broods. Some workers would return this and the following two checkerspots to the genus *Chlosyne*.

***C. nycteis* (Doubleday IN Hewitson, [1847]) Silvery Checkerspot**

Common throughout the county in mesic to wet open areas with mixed graminoid/forb cover including clovers. It often congregates on moist dirt roadsides and mud puddles as well as along the shorelines of ponds, streams, and lakes with Northern Crescents, Summer Azures, Clouded Sulphurs, and Harris' Checkerspots. Flight season extends from 10 June to 2 September with numbers diminishing after late July. Hoary alyssum is heavily visited.

***C. harrisii* (Scudder, 1864) Harris' Checkerspot**

Common locally in shrubby grassland-sedge-forb lowlands where flat-top aster *Aster umbellatus* [Mill], the larval food plant of the species, is widely present. Adults range to upland hay fields and visit clovers very frequently. The species also joins congregations of other species at mud puddles or wet sand roads. Flight period extends from 14 June to 31 July.

***Phyciodes tharos* (Drury, [1773]) Pearl Crescent**

The status of this species is poorly known. Of 215 specimens of the genus examined from the county, eight males have been identified as this species. The widely separated points of collection (T134N R34W S35 NE SW; T135N R35W S17 SE SE; T136N R33W S11 NE NW, S3 SW NW; and T137N R35W S20 NW NE) seem to indicate this species is best represented outside of the coniferous forest region of the county in drier more upland sites than *P. selenis*. The specimen dates represented are 10 June 2001, three quite fresh; 30 June 2001, 4-5 July 1990; 7 July 1982 (figured specimen in frontispiece); and 2 September 2001, a fresh specimen. These dates do not clearly indicate a flight period separate from that of *P. selenis*. The appearance of fresh specimens in early June, early July, and September implies that at least two broods and perhaps a partial third are produced. Vegetational features of the sites are typical grass-sedge-forb communities including clovers, thistles, and *Aster* spp. Antennal clubs in this population are orange and black.

***Phyciodes selenis* (W. Kirby, 1837) Northern Pearl Crescent**

(Reported as *P. morpheus*, *P. cocyta*, and *P. pascoensis* by other authors [Scott, 1986; Howe, 1975], Orange Crescent, Pasco Crescent, and Northern Crescent being alternative common names.) Obviously the taxonomy is far from settled.

Unexpectedly found to be the abundant member of the genus throughout the area, with 180 of 215 specimens examined representing this species! It is encountered in large numbers particularly near lowlands showing a wide range of wetness. Flight dates span 10 June to 2 September, with abundance peaking about 4-14 July. Copulating pairs have been collected 7 and 14 July. Specimens collected from June 10 to 4 July tend to be more deeply colored than later series and smaller in size, resembling very closely *P. tharos* and suggesting a possible second brood. However, this species at least in males appears to rather consistently show the extensive orange areas on its dorsal wing patterns. The habitats occupied by the species characteristically are moist communities with sedge-grass-forb and shrub components. *Aster* spp., swamp-milkweed, *Eupatorium* spp., Indian-paintbrush *Castilleja coccinea* [L. Spreng.], willows, goldenrods, thistles, catfoot *Gnaphalium obtusifolium* [L.], wild strawberries, clovers, and *Polygonum* spp. Some move to higher areas where they have been found flying simultaneously with *P. tharos*. Large concentrations appear around shorelines of lakes, marshes, ponds,

streams, mud puddles, and wet sands roads where they cluster on dead fish, snails, road-killed carcasses, canid scats, and cow and horse manure.

***Phyciodes batesii* (Reakirt, 1865) Tawny Crescent**

Rather uncommon to perhaps briefly common, occurring in local loose colonies. Twenty-six specimens have been collected from T136N R33W S33, 10, 11, and 14, spanning 23 June to 7 July. All were confined to jack-pine woodland, especially at disturbance sites and openings. Individuals have been encountered nectaring on blueberries, puccoon, bearberry, and dwarf dandelion. Opler (1992) reports wavy-leafed aster *Aster undulatus* [L.]to be the larval food plant but this species does not occur in Minnesota.

***Euphydryas phaeton* (Drury, [1773]) Baltimore**

Known only from a very recently emerged specimen collected 3 July 1983 at T136N R33W S11 SE SE (Fig. 7). It was nectaring on swamp-milkweed along a drainage ditch in sedge-forb-willow assemblage and in the immediate vicinity of its known larval food plant, turtlehead *Chelone glabra* [L.]. This turtlehead population, which includes plants in adjoining sections 12 SW SW and 14 NE NE and a single plant discovered 1.5 km westward in S10 SE, represents the only known locations of this foodplant in the county, indicating an extremely site-restricted distribution of the Baltimore in the region.

***Polygonia interrogationis* (Fabricius, 1798) Question Mark**

Rather uncommon, specimen dates ranging from 23 June to 28 August. Usually encountered basking on rocks, bases of trees, or building foundations. Females are occasionally seen in dense growths of stinging nettle *Urtica dioica* [L.] in low areas near forest edges. The light morph appears from July to September, the dark in June.

***P. comma* (Harris, 1842) Hop Merchant**

Common, but some years and seasons less so, especially during drier periods. Flies nearly continuously from 19 Apr to 14 Oct, with the light morph evident in April to May (emerged hibernators) and 6 July to 19 Oct. The dark morph is awing from 3 July to 27 August. Great variation is displayed on the underwing of females. The species is distributed widely throughout the county, with the largest numbers most concentrated near forests and woodlands around dead trees and rotting logs. In spring, sap-flows from wounds on paper birch *Betula papyrifera* are frequently visited. Wet sand of forest roads, animal scats, and road-killed carcasses attract substantial numbers. Hop Merchants tend to be wary of approach and often alight high up on tree trunks.

***P. progne* (Cramer, [1776]) Gray Comma**

Similar to the preceding species, perhaps slightly less common. It is more forest or woodland inhabiting, especially in mixed hardwood-conifer swamps around American elms *Ulmus americana* [L.]. The remains of this species and the preceding can often be found in hollow logs where the butterflies were hibernating and were most likely consumed by shrews during their hibernation. Flight dates extend from 5 April to 14 October with the light morph present late July through October and April, the dark morph late May into July. Like *P. comma*,

this species visits the sap-flows on birch; it also visits mammal scats, rotting fungi, and garbage.

***Roddia vaualbum j-album* (Boisduval and LeConte, 1833) Compton's Tortoise Shell**

Common and widespread throughout forests, lightly wooded, and open areas generally. Flies from 5 April to 14 October, the posthibernatory individuals attracted to spring sap-flows on birch and trembling aspen. Hibernators have been found in hollow oak trees, fallen logs, brush piles, and in farm outbuildings. Peak numbers seem to be reached about 14 July, but abundance varies considerably from year to year. Some workers would return this species to the genus *Nymphalis*.

***Nymphalis antiopa* (Linnaeus, 1758) Mourning Cloak**

Status is similar to the preceding with flight dates ranging from 21 April to 3 November. Largest numbers appear as fresh broods 3-14 July. It displays a strong affinity to trembling aspen forests and mixed hardwoods but commonly ranges into open areas.

***Aglais milberti* (Godart, 1819) Milbert's Tortoise Shell**

The distributional pattern is widespread throughout most habitats but perhaps most concentrated near forest edges and woodlands. Flight occurs continuously from 5 April to 14 October with fresh broods appearing in June and July. It basks commonly on rocks, buildings, and stumps. Nectars very frequently at hoary alyssum. Some workers would return this species to the genus *Nymphalis*.

***Vanessa atalanta* (Linnaeus, 1758) Red Admiral**

Common to extremely abundant as in early summer of 2001 when dense swarms were encountered on highways. Widespread in virtually all habitats throughout, with major hatches in late June and early July. A chrysalis found suspended in nettles 6 July eclosed 9 July 2001. It flies nearly continuously between 21 April and 7 November. This butterfly is a regular immigrant from further south.

***V. cardui* (Linnaeus, 1758) Painted Lady**

Common to very common in diverse habitats ranging from entirely open agricultural lands to open woodlands and forest clearings. It is intensely drawn to thistles, sweet clover, hoary alyssum, and in early spring the flowers of red maple *Acer rubrum* [L.]. Flight dates of specimens range from 9 May to 28 September. This butterfly is a regular immigrant from further south.

***V. virginiensis* (Drury, 1773) American Painted Lady**

Common to abundant with occasional massive outbreaks. Distribution, habitat preferences, and behavior quite similar to *V. cardui*. It has been observed ovipositing on *Antennaria neglecta* in open jack-pine forest. Thistles are the predominant nectaring plant. It visits mammal scats and muddy sites. Specimen dates span 17 May to 27 August.

***Junonia coenia* Huebner, [1822] Buckeye**

A single specimen found freshly dead under the window of Ted and Gen's Restaurant in Aldrich (T134N R34W S35) on 2 September 2001 is the sole county record. The specimen could not have been vehicle transported and may have been windblown into a window. This butterfly is an immigrant from further south.

***Basilarchia arthemis* (Drury, [1773]) White Admiral**

Abundant, distributed throughout the county in a great variety of habitats especially more open areas and open woodland. It concentrates in large clusters on mammal scats, cow and horse manure, muddy sites, garbage, road-kills, and rotting fruits and plant materials. Recorded in flight from 14 June to 10 August. The species often basks spread-winged on rocks, building steps and walls, and foliage of trees and shrubs. About 11% of the individuals lack completely the median submarginal row of orange spots on the upper surface of the wings. These spots vary considerably in size among individuals. No evidence indicating direct hybridization with *B. a. astyanax*, the Red-spotted Purple, is apparent on Wadena County specimens thus far examined. Some workers would return these and the Viceroy to the genus *Limenitis*.

***B. archippus* (Cramer, [1776]) Viceroy**

Common throughout lowlands dominated by willow, sedges, grasses, rushes, and cattails. It has been recorded in flight from 22 June to 28 August with greatest numbers appearing in mid-July. Nectaring on swamp-milkweed and boneset is frequent. Females have been observed ovipositing on *Salix* spp..

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

Abundant throughout shaded low-lying forests with rather dense shrub layers of American and beaked hazel. Flies from 10 June to 10 August. It often clusters in groups on tree trunks and on mammal scats.

***Satyrodes eurydice* (Linnaeus IN Johansson, 1763) Eyed Brown**

Following the suggestion by Carde et al. 1970, we treat *S. eurydice* as specifically distinct from what formerly has been considered its subspecies *S. e. fumosus*. Under this admittedly controversial arrangement, only two specimens of *eurydice*, *sensu strictu*, are currently available from the county, one taken 1 July 2001 at T135N R35W S27 SW and the other 27 August 1983 at T136N R33W S12. The first was taken flying simultaneously with *S. fumosus* in the same habitat (wet prairie, Fig. 5). Only further intensive and extensive collecting can clarify its true status and range within Wadena County and Minnesota. The range of dates for which the three *Satyrodes* congeners (see frontispiece) fly ranges from 25 June to 9 September.

***S. fumosus* Leussler, 1916 Smoky Eyed Brown**

Although existing collections of this genus from Wadena County are small owing to previously wrongful assumptions about the identification of members within it, the evidence at hand reveals rather surprisingly that *S. fumosus* is apparently the abundant widespread *Satyrodes* species within the county. Twenty-seven specimens examined span the dates 2-28 July and represent collection localities scattered throughout the county. Mesic to usually wet lowlands

dominated by tall sedge, forb grass, and willow are the typical habitats occupied by the species. The series of specimens generally appear uniformly dark, with the exception of faded individuals, which are all females. The markings, however, appear consistently different from those exhibited by *eurydice*. We deliberately treat this as a full species to encourage long-overdue study of the complex.

***S. appalachia leeuwi* (Gatrelle and Arbogast, 1974) Appalachian Eyed Brown**

Uncertain; based upon four specimens taken 5-21 July, all from T136N R33W S10-11 boundary. All were found in dense, shady, streamside thickets of speckled alder, willow spp., red osier dogwood, high-bush cranberry, sedges, and tall grasses among shallow pools of stagnant and flowing water. The species appears here to be at or near its northwesternmost distributional limits in North America. Further field efforts are needed to accurately determine the ecological interactions, habitat partitioning, flight periods, and abundance of this species relative to *S. eurydice* and *S. fumosus*.

***Megisto cymela* (Cramer, [1777]) Little Wood Satyr**

Abundant throughout the forests of the region, especially those with dense shrub and ground cover. It and *Enodia anthedon* are the most forest-restricted of our butterflies, rarely moving beyond forest edges. It flies from 5 June to 3 August. Because of its abundance, little attention has been given to it, and therefore little can yet be said regarding the possibility of more than one brood (or species?) being represented (Opler, 1992). It is somewhat crepuscular and is rather active on cloudy days and before rain. It is a common visitor on mammal scats.

***Coenonympha inornata* W.H. Edwards, 1861 Inornate Ringlet**

Common to very common throughout upland grasslands mixed with some forbs and sedges, but especially clover and grasses. Specimen dates range from 6 June to 11 August. Considerable individual variation in color exists. It commonly flies low in the ground cover.

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

Very common throughout the county, primarily in forests with *Enodia anthedon* and *Megisto cyemela*, but ranges into areas of tall sedge-grass lowlands with dense willow growth. Flight dates from 18 June to 27 August, with a suspect date of 30 May labeled from a 4-H collection specimen. Peak numbers occur about 4-14 July.

***Danaus plexippus* (Linnaeus, 1758) Monarch**

A common to abundant immigrant with occasional periods or years of relative scarcity. It can be found throughout all open areas, croplands, open woodlands, and the tops of trees in forests. Flight dates range from 15 May to 15 October, continuous until mid-September. Premigratory assemblages have been occasionally reported in August and early September as covering trees at certain sites. Fresh individuals appear in June through August and one emerging individual was found 18 September 1999. Larval food plants–common and swamp milkweeds–are abundant throughout the area. Adults nectar at a great variety of plants, including lilacs, caragana, asters, garden flowers, and in late summer especially *Liatris aspera*, upon which swarms of Monarchs concentrate.

Table 3. The distribution of 87 butterfly species in selected habitats.

	Open habitats				Forest					
Family	Wet	Mesic	Dry	Bog	Bog	Alder, Swamp	Hardwood	Mixed Hardwood-Conifer	Conifer	Forest edge
Hesperidae										
(15) generalists	2	5	2			1		4		1
(10) specialists	3		4							3
Papilionidae										
(2) generalists		1								1
Pieridae										
(4) generalists		4								
(4) specialists			1						3	
*Lycaenidae**										
(11) generalists		5	2			1		3		
(9) specialists			1	1		1			4	2
*Nymphalidae***										
(24) generalists	3	7	1				2	6		5
(8) specialists	3		3			1			1	

* Greenish Blue *Plebejus saepiolus* and **Buckeye *Junonia coenia* not assigned

Conclusions

Wadena County offers a complex mosaic of natural and human-generated floristic communities. The butterfly communities also reflect this complexity, there being both widespread habitat generalist and very locally restricted specialist butterflies, all of which have their counterpart plant species. The generalist butterfly components tend to be broadly distributed across different habitats and represent two rather well-defined species groups, the 32 species inhabiting open habitats and the 24 species occupying forests. Most open-country species occupy a wide variety of open habitats ranging from wet to dry areas and into shrub zones, forest edges, and forest openings. Forest inhabiting generalists occupy shrub-conifer bogs, swamps, upland hardwood forests, mixed hardwood-conifer and conifer forests but move relatively little beyond forest edges or adjoining shrub cover. Five of these species tend to concentrate at the forest edge and two in alders or swamps.

The 31 specialist species are restricted to open wetlands (six species), dry prairielike sites (one), open muskeg bog (one), oak forest edge (five), and conifer forests (eight). Two species, the Buckeye *Junonia coenia* and the Greenish Blue *Plebejus saepiolus,* are not classified as to a habitat affiliation. Table 3 identifies the number of butterfly species within each family that show their greatest abundance in one of the described habitats.

Open areas include a great species diversity in plant assemblages, among which are found the most alien or invasive plants including many that are cultivated agricultural crops. The importance of some families of these introduced species is indicated in Table 2 for the clovers, mustards, and legumes. Eighty of the 89 butterfly species documented in the county have been collected along roadsides dominated by these plant groups. Roads also pass through or along all natural and human-generated habitats in the county and serve as sites for puddling, basking, patrolling (demonstrated by Canadian Tiger Swallowtails, White Admirals, Monarchs) and as corridors of, or barriers to, dispersal among fragmented habitats. Some introduced plants are associated only with roadsides.

The disjunct distributions of those species here considered of uncertain status likely indicate that the larval food plants for those species are also sparsely distributed. Among these, the skippers appear to specialize upon sedge, *Carex* spp., for obligatory larval foods. Forty-two species of *Carex* of a potential 100 that probably occur in the county have been documented. Many of them are represented only as isolated specimens, not being found elsewhere. The disjunct pattern of certain plants also reveals the influence of the unique position of Wadena County in straddling the transitional tension zone of Minnesota flora where many plants attain their northern, eastern, southern, or western limits of distribution.

The 89 butterfly species thus far recorded represent 54.2% of the total reported for Minnesota. There are, however, at least 17 species that have not yet been found but that are expected on geographical grounds to occur and another 21 that could occur as casual vagrants. Some of these may have both short flight periods and very restricted habitats, requiring their detection to be accomplished by the proper timing and location of field efforts. Continuing investigations will further widen the extreme flight date records for the currently known species and clarify the confusing ecological relationships of many species, especially those shown in the frontispiece. It is hoped that the information presented here will provide a useful base for monitoring various kinds of future changes in the local butterfly fauna.

Acknowledgments

We graciously extend our gratitude to Ellen Holt-Werle for her painstaking preparation of the initial manuscript, to Bruce Erickson for his support and encouragement in the production of this paper, to Tim Ready for his expertise in photography, and to Deborah Schoenholz for her technical finesse in publication coordination. We also recognize with full appreciation the efforts of Welby Smith of the Minnesota Department of Natural Resources for his extensive assistance in identifying botanical specimens from Wadena County and Robert Dana, also of the Minnesota DNR, for his review of this manuscript. Many thanks are also due to George Balogh and Les Ferge for their excellent review comments.

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