*Tallgrass Research and Management*

# FY98 WILDLIFE PRESERVATION FUND REPORT:

# BASELINE LEPIDOPTERA SURVEYS FOR TWO ILLINOIS NATURE PRESERVES

Prepared for:

Illinois Department of Natural Resources

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**Acknowledgements**

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## Introduction

Transeau's Prairie Peninsula contains one of the most fragmented habitats in North America. The eastern portion of the tallgrass prairie region is especially fragmented, with the states of Indiana, Illinois and Iowa ranking 48th -50th respectively for intact natural habitat remaining (Klopatek et al., 1979). Despite, or perhaps because of this, Illinois has many extremely rare species. This makes it imperative that remnant populations on protected natural areas are maintained, while, at the same time, performing management practices deemed important for each ecosystems overall health.

Management priorities for Illinois nature preserves are clearly stated in the Illinois Department of Natural Resources (IDNR) publication 'The Changing Illinois Environments: Critical Trends' (1995) "Interest in maintaining global biodiversity, as well as state and federal legislation, requires us to apply a species-level management strategy at sites where rare and endangered species currently reside." Often rare and endangered species are overlooked until survey work is conducted. This is especially true of insects, which are small, mobile and often not recognized to species by amateurs and professionals alike.

Baseline insect surveys provide valuable information for site managers. Baseline surveys alert site managers to the presence of rare and endangered species on the site, before potentially detrimental management activities are undertaken. This allows managers to monitor rare species and determine if their populations are increasing or declining. By comparing changes in insect populations within and across preserves and factoring in variables, such as management practices and site size, insights into causes of population changes may be gained (New, 1991; Pollard and Yates, 1993)

In April, 1997, John Wilker (IDNR) submitted a proposal prepared by me to the Illinois Department of Natural Resources and the Wildlife Preservation Fund Advisory Committee entitled 'Baseline Lepidoptera Surveys for Two Illinois Nature Preserves'. The proposal was approved, and this report is the result of the funded research. The purpose of this study was to establish baseline data on the presence of nocturnal lepidoptera (primarily Noctuidae) and the presence and abundance of diurnal (Papilionoidea and Hesperioidea) lepidopteran species at Long Branch Sand Prairie and Barton-Sommer's Woods.

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# Chapter 1

## Long Branch Sand Prairie Nature Preserve

## Site Description

Long Branch Sand Prairie nature preserve is a 93-acre site with a mix of sand prairie, scrub oak and old fields on it. It is part of a larger, (183-acre) area containing a mosaic of these communities (Fig. 1), which is located in Sections 25 and 36 of T 20 N, R 9 W, and Sections 30 and 31 of T 20 N, R 8 W of the Third Principal Meridian. No prescribed burning has occurred on this site since the state of Illinois acquired it in December 1987. The site has most likely received very infrequent burning since the 1930's. Local landowners expressed negative attitudes towards fire, and talked of spreading prairie hay in blowouts to attempt to stabilize dunes during the 1930's. In the early 1990's, and again in early spring of 1997, a bulldozer came on site to doze non-native pine trees into piles, which were burned. Other than these activities, which created the 'disturbed' habitat category, little or no management has occurred on this site since IDNR acquired it in 1987.

The topography varies from relatively flat to rugged dunes, with elevations from 485 to 515 feet above sea level. Soils on the preserve are primarily of the Sparta-Plainfield-Ada soil association, with a transition to the Marshan-Udolpho soil association (NCSS 1995) occurring on the east edge of the preserve where the ground slopes down to the terraces of White Oak Creek (see Table 1).

**Habitat categories:** Categories ranged from the Disturbed category, to prairie and woodland categories. A brief description of these categories follows:

**Disturbed**: bulldozed in the spring of 1997, and dominated by bare sand, annuals and scattered remnants of the former vegetative cover.

**Old Fields**: Clearly plowed in the late 20th century and dominated by *Panicum perlongum, Panicum capillare,* and weedy or annual forbs. *Eragrostis trichodes, Polygonum pensylvanicum, Asclepias syriacus,* and *Heterotheca villosa* are locally dominant within this area.

**Sand Lovegrass** (*Eragrostis trichodes*) **Prairie**: On smooth gentle dunes, without blowouts and with interspersed plowed fields and scattered woody invasion. The sand lovegrass prairie lacks conservative forbs and may have been plowed or heavily grazed in the distant past.

**Little Bluestem** (*Schizachyrium scoparium*) **Prairie**: On rugged sand dunes, interspersed with blowouts and copses and containing conservative prairie forbs, such as *Liatris aspera, Baptisia lactea, Tephrosia virginiana* and occasionally *Amorpha canescens.*

**Prairie Sandreed** (*Calamovilfa longifolia*) **Prairie**: On gently sloping low prairie, with some conservative forbs, including *Amorpha canescens*, but low forb density overall.

**Black Jack Oak** (*Quercus marilandica*) **Savanna**: Open-canopied copses, interspersed with openings and narrow coves, occasionally closed-canopied in spots. There are some grasses in the understory, and shrubs (*Salix humilis, Rhus aromatica*) in many of the openings.

**Oak woods**: Closed-canopied woods with some woodland forbs (*Parthenocissus quinquefolia)* in understory and dominated by oaks (*Quercus marilandica, Quercus velutina*). This probably represents very old, once open-canopied copses.

## Methodology

Diurnal and nocturnal lepidopteran species were monitored using different methodologies. Nocturnal species were sampled using two black lights placed at varying locations from June 23 until October 3, 1997. Diurnal species were monitored using modified Pollard (Pollard and Yates 1993) transects at each site from June17 until July 31, 1997. A representative sample of the nocturnal species were taken, spread, pinned, identified to species, and deposited at the Illinois State Museum insect collection.

**Diurnal sampling:** A standard Pollard transect was used, with only minor modifications. A fixed route was established with flagging used to mark the route. The route was designed to sample a variety of habitats, and the length of the route was determined for each habitat. All diurnal lepidoptera seen within 5 meters of the observor in any direction (except behind) were recorded by habitat, as the observor traveled at a steady pace along the route. At the beginning of each route, and numerous times during the route, the observor paced off 5-meter distances to determine if butterflies were within the 5-meter limit. If the observor paused for any reason, the recording of species stopped until the observor renewed their pace through the site. Date, time of day, temperature, windspeed, amount of sunshine, and miscellaneous commentary on the ecosystem (eg drought stress of plants, or sex ratios of lepidoptera) were recorded at each visit. No specimens of diurnal lepidoptera were taken, as butterflies seen within the route were identified while alive in the field. Exceptions to this were several hairstreak butterflies, which flew high into oak trees before they could be identified. These were simply noted as hairstreaks, and were not further identified.

**Nocturnal sampling**: Two bucket-style black light traps, equipped with 12 volt marine batteries, 15 watt U-shaped black light tubes and photocell switches, were set out at each site for at least one night, twice each month. Traps were examined early the next morning, representative specimens taken, and the rest of the insects released.

Pinned specimens were identified to species to the best of my ability using available texts (Covell 1984, Hardwick 1996, Rings et al. 1992, Rockburne and Lafontaine 1976, Sargent 1976). Specimens were then taken to the Ohio State University collection center, where I compared my specimens with those in the collection, and gained the assistance of Eric Metzler in confirming or correcting identifications of many moths. I then perused available texts for information on the abundance of the species that I had vouchered. Next, I checked the collections of the Field Museum, the Illinois Natural History Survey and Ron Panzer's database. I also made a partial survey of the Illinois State museum's and Jim Wiker's (Oakford, IL) collection. I used this information to determine the rarity of these moths at the state level. Species determined to be rare are discussed in the results.

## Data Analysis

**Diurnal sampling:** The length of each route occurring in each community was measured, and the acreage sampled in each community was determined. For each species, I then determined the density of butterflies per acre of plant community by dividing the number of butterflies seen by the acreage sampled in each community. Using aerial photographs (1983-1986) from the soil survey maps of Mason County (Calsyn 1995) and a planimeter, I determined the area of each community

within Long Branch Nature Preserve. I then estimated the numbers of butterflies of each species per site by multiplying the density/community type by the acres of each community type and summing the totals.

## Results

**Diurnal Sampling:** The monitoring route sampled 6.2 acres, or 6.7% of the site each time the route was walked. The percent of the different plant communities sampled varied from a low of 2.7% of the Oak Woods sampled to a high of 11.2% of the Oak Barrens sampled (Table 2). The Little Bluestem and Sand Lovegrass Prairies had intermediate sampling percentages of 6.2% and 9.2% respectively.

Two butterfly species occurred in large numbers on the site. These were the Regal Fritillary (*Speyeria idalia*) and Wood Nymphs (*Cercyonis pegala*). An estimated 2179 Regal Fritillaries were flying on the 93-acres of the nature preserve on June 17, 1997 (Figure 1). Regal Fritillaries occurred at densities of 38.8/acre in Little Bluestem Prairie, 33.1/acre in Sand Lovegrass Prairie, 24.3/acre in Old Fields and a surprising 16.5/acre in the Oak Barren/Edge habitat (Figure 2). Wood Nymphs peaked at an estimated 984 individuals (Figure 3) on the 93 acre site on the last sampling day (July 31). At that time, they showed a strong preference for the Oak Barren/Edge habitat. Wood Nymphs also showed a strong avoidance of the Old Field habitat throughout their flight time, suggesting that Wood Nymphs may be restricted to native habitats.

**Nocturnal Sampling:** One hundred twenty seven (127) species of moths from Long Branch Nature Preserve were identified (Table 3) and vouchered at the Illinois State Museum, Springfield, Illinois. Of these, 15 (11.8%) were considered rare in Illinois, based upon a search of literature and collections. The Flower Moths (Heliothinae) had more rare species (four) than any other subfamily of moth. Almost without exception, museum specimens of these moths were collected in the 19th and early 20th century. While this may reflect collection effort, it most likely also reflects the presence of more remnant insect populations persisting on the more abundant habitat fragments occurring at that time. Unless specimens have been collected in the latter half of the 20th century, as is the case for all specimens in the Panzer collection, records presented here should be considered to represent historical distributions, not present occurrences.

Each of the vouchered moth species thought to be rare are listed below, along with pertinent data. These data include the name, subfamily, known or suspected food plants, distribution in North America and distribution in Illinois. Counties of occurrences are followed by collections in which specimens were observed. Abbreviations for collections are as follows:

ISM = Illinois State Museum
INHS = Illinois Natural History Survey
FMNH = Field Museum of Natural History
Panzer = Collection and notes of Ron Panzer, Markham, Illinois.

**Flower Moths (subfamily Heliothinae):** Nine species of flower moths were vouchered at LBSP during this study, with four of these considered rare in Illinois. Many species of flower moths, especially those in the genus Schinia, are habitat restricted due to the prevalence of monophagous and oligophagous dietary habits (Hardwick 1996). Flower moths typically lay eggs in the flower heads of their host plants. Several days later the eggs hatch, and the larvae feed upon the flower head and seeds, until maturing. Pupation and overwintering typically occurs in the soil. Some desert flower moths have the ability to stay in the pupal stage for several years, until appropriate (usually rainfall) events stimulate eclosion (Hardwick 1996). The adult lifespan of flower moths is typically a week or less. Most Schinia species are univoltine, although some produce successive summer generations if their host plants have a prolonged bloom time. Dormant season fires will most likely have little effect on most flower moths.

*Heliothis paradoxus* is a flower moth known to oviposit on *Andropogon barbinodes*, a western bluestem grass (Hardwick pp 61, 1996). Its distribution in Illinois suggests that it may be feeding upon little bluestem (*Schizachyrium scoparium)* here. *H. paradoxus* occurs from central Mexico to Oregon and east to Florida and Minnesota, with a population in southwest Ontario. Illinois county records are Cook (FMNH), Adams, Champaign, Mason, Marshall, Peoria and Putnam (INHS) counties.

*Rhodoecia aurantiago* is a flower moth known to feed on Gerardia. *R. aurantiago* occurs from Massachusetts westward to southern Ontario and Illinois, and southward to Florida and central Texas (Hardwick pp42, 1996). Illinois county records are Cook (FMNH, INHS, Panzer), Lake, (FMNH, INHS), Putnam (INHS), Iroquois and Grundy (Panzer) counties.

*Schinia diffusa* (Illinois state record) is a flower moth whose only known larval food plant is *Haplopappus annua*, a member of the Asteraceae. Prior to this study, *S. diffusa* was known to occur from central Florida and the gulf coastal states westward to southern Texas and the high plains of Colorado (Hardwick pp. 131, 1996). *H. annua* occurs on sand prairies in the western great plains from western Nebraska to central Oklahoma, south and west to Texas and New Mexico (McGregor, R.L., and T.M. Barkley 1986). Composites, such as golden aster (*Chrysopsis camporum*), should be observed to determine if they are the host plant of S. diffusa in Illinois. There are no records of *S. diffusa* from Illinois.

*Schinia sanguinea*, sometimes called *S. gloriosa*, is a flower moth whose only known larval food plants are Liatris species. *Liatris aspera* occurs at this site. *S. sanguinea* range is from the southeastern states west to Texas, and north to Illinois and Minnesota, with an isolated population in Ontario (Hardwick pp. 160, 1996). Illinois county records are Cook, Winnebago, Peoria (INHS), McHenry (INHS, Panzer) Carrol, and Lake Counties (Panzer) counties.

**Miscellaneous Subfamilies:**
*Itame Subcessaria* (Ennominae) is an uncommon geometer, known to feed on gooseberries and currants (Covell pp. 347, 1984). Its range is from Newfoundland to eastern Kentucky, west to Manitoba, Iowa and South Dakota. Illinois county records are Cook (FMNH, INHS), Menard (ISM), Putnam, LaSalle (INHS), Jo Davies and Will (Panzer) counties.

*Grammia phyllira* (Arctiinae) is a Tiger Moth, thought to feed on corn, tobacco and lupines. Despite this list of host plants, *G. phyllira* is uncommon along the Atlantic coast and rarer inland (Covell pp. 71, 1984). Illinois county records are Cook (FMNH), Adams, Marshall, Putnam (INHS) and Whiteside (Panzer) counties.

*Spilosoma latipennis* (Arctiinae) is an uncommon Tiger Moth, which feeds on a variety of plants. It occurs from Maine to southern Ontario, west to Nebraska and Arkansas (Covell, pp. 66, 1984). Illinois county records are Cook and McHenry (INHS) counties.

*Apamea burgessii* (Amphipyrinae) is an uncommon noctuid moth, which was identified by E. Metzler. I can find little information on this species. Illinois county records are Cook (FMNH), Champaign, Marshall and Putnam (INHS) counties.

*Cucullia speyeri* (Noctuinae) is an uncommon moth which feeds on Erigeron species (Rings et al. pp. 114, 1992). It occurs from southern Maine and Ontario to North Carolina, west to Manitoba and South Dakota (Covell pp. 120, 1986). Illinois county records are Cook County, Farma, IL (FMNH), McHenry and Putnam (INHS) counties.

*Leucania extincta* (Noctuinae) is a rare moth known to occur from the East Coast and Illinois (Metzler, personal communication). In Illinois it is known to occur in 'northern Illinois' (INHS).

*Xylena vetusta* (Noctuinae) is a Dart Moth that feeds on many plants. Despite this, it is uncommon to rare throughout its range (Covell pp. 89, 1986). It occurs from Nova Scotia to Georgia, west to Manitoba and Texas. Illinois county records are Cook, Marshall, Mason, Putnam (INHS), Jo Davies, Whiteside, and Carrol (Panzer) counties.

*Eucoptocnemis fimbriaris* (Noctuinae) is a Dart Moth with no known food plants. It occurs from New Hampshire to Florida west to Illinois and Texas, and is uncommon to rare northward (Covell pp. 91, 1984). It does not occur in Ohio (Rings et al. 1996). In Illinois it is known from Putnam (INHS) county.

*Euxoa niveilinea* (Noctuinae) is a Dart Moth. Illinois county records are Cook (FMNH, INHS), Crawford, Putnam and Union (INHS) counties.

*Sphinx eremitus* (Sphinginae) is a sphinx moth, which feeds on Bee balm, bugleweeds, mints and sage. It occurs from Nova Scotia to North Carolina, west to Manitoba and Arkansas, and is uncommon to rare southward (Covell pp 34, 1986). Illinois county records are Cook (INHS, Panzer), Marshall and McHenry (INHS) counties.

## Discussion

**Diurnal Sampling:** By strictly adhering to a 10-meter wide sampling swath, I was able to make estimates of butterfly population size. This may prove valuable in determining if habitat restricted

populations are large enough to maintains their existence in the face of deterministic and stochastic events. Deterministic events, such as habitat loss, are beyond the control of the site manager. Stochastic events, such as fire, unusual climatic events, fluctuations in availability of host plants, or unusually heavy predator pressure, may have catastrophic effects on small, reproductively isolated populations.

Faced with the current uncertainty regarding what minimum viable population sizes are for many species (especially insects), a quick review of insect population dynamics may be in order. Insects are mostly annual species, which produce large numbers of eggs (often > 100) per individual. Unlike annual plants, insects seldom produce a seed bank to tide them through difficult years. High mortality rates keep insect populations in check. This cycle of high reproductive rates and high mortality rates in annual species naturally leads to highly fluctuating population numbers.

The following scenario of roughly resembles population fluctuations observed by Panzer (In Press) in fire-sensitive prairie insects. In a stable population of 100 reproductive females (200 individuals), if each individual female lays 50 female eggs (5,000 total), then 2% of those eggs will survive to be a reproductive female. If 20% of the eggs die before hatching in an average year, then 97.5% of the hatched eggs must die later if we are to leave only one reproductive female (population stability). If a fire, or severe winter, kills 90% of the eggs before hatching, then the 97.5% mortality operates on only five eggs/female. This would leave us with a population of 12.5 reproductive females after this stochastic event. Put two bad years back-to-back, and a population of 100 reproductive females (200 individuals) would be extirpated or down to a few individuals and facing a genetic bottleneck. Many populations of rare, habitat-restricted insect species are thought to occur in populations smaller than 200 individuals.

**Regal Fritillaries:** Regal Fritillaries occur from the midwestern United States to the east coast and New England, occurring in meadows and prairies (Scott 1986). Their numbers are declining throughout their range. In West-Central Illinois, regal fritillaries occur in small, scattered populations, with the exceptions of the sand dune and floodplain areas of Mason and Cass counties (Sedman and Hess 1985). Regal fritillaries are strong fliers, and can readily disperse across large areas. While at Kansas State University, I saw a regal fritillary on the quad. This is at least a mile from the closest prairie. Lou Nelms, living east of Mason City, has seen regal fritillaries on his homestead, which is over ten miles from the nearest known source population. Jim Wiker once collected a regal fritillary along the railroad tracks in Athens, Illinois. It is likely that this butterfly followed the tracks from a site in Mason County, perhaps 20 miles away. Long-range dispersal is a likely explanation for regal fritillaries appearing infrequently and in low numbers at well-monitored sites, such as Revis Prairie, Goose Lake Prairie and the Kibbe Science Station. Unfortunately, many regal fritillary populations in Illinois are too isolated for even these strong fliers to form metapopulations.

The proximate cause of the rapid decline of the regal fritillary in eastern North America is unknown. Many isolated populations have less than a dozen individuals observed in them each year. It is likely that these populations have less than 200 reproductive females in many years. Going by the best scientific knowledge of today, these populations are not viable, and will disappear in the near

future. This has already occurred in most eastern states, where, just a few decades ago, the regal fritillary was common in marshes, grasslands and coastal prairies. In fact, after discussing the status of Illinois regal fritillary populations with Ron Panzer and Doug Taron, I have come to believe that the only regal fritillary populations in Illinois with consistently more than 200 individuals in them are the Sand Ridge State Forest and the Long Branch Sand Prairie metapopulations.

There were over 2,000 regal fritillaries estimated on the Long Branch nature preserve. If the adjacent, unprotected prairie is as productive as the nature preserve, then the greater Long Branch area (183-acres) had over 4,000 regal fritillaries on-site in 1997. In addition, Frita Meyer's nearby (approximately ¾ mi.) and currently unprotected property has over 40 acres of high-quality sand prairie. Jim Wiker tells me that he has seen large numbers of regal fritillaries on this site as well. Regrettably, the nearby Matanzas Wet Sand Prairie and Sand Prairie-Scrub Oak nature preserves seem to be regal fritillary population sinks. This may be due to the paucity of larval food plants (violets) on these sites. There are large numbers of *Viola rafinesquii* at Long Branch. Nonetheless, this metapopulation is far larger than any regal fritillary population in Illinois, with the possible exception of the poorly studied Sand Ridge State Forest metapopulation. The Sand Ridge metapopulation is certainly declining in numbers, as Sand Ridge State Forest is rapidly transitioning from a 7,500 acre sand prairie/scrub oak community to a closed-canopied white pine forest.

**Wood Nymphs:** Wood nymphs occur throughout temperate North America, occurring in moist grassy places (Scott 1986). In West-Central Illinois, wood nymphs are locally common in dry prairie, old fields and prairie savanna (Sedman and Hess 1985). There were nearly 1,000 wood nymphs estimated in the Long Branch Sand Prairie nature preserve. As part of a 183-acre site, the total numbers in the greater Long Branch population were probably closer to 2,000 individuals. This suggests that this population may be viable long-term. Wood Nymphs presently occur in a wide range of open woods and prairie habitats, frequently occurring in degraded natural areas. However, the avoidance of the disturbed and old field habitats in this study suggest that wood nymphs may become uncommon if we lose these degraded natural areas.

**Nocturnal Sampling:** Three moth species vouchered during this project were previously known from one location (or less) in Illinois. *Schinia diffusa* is a state record, and represents a disjunct population of this moth from its western and southern populations. *Eucoptocnemis fimbriaris* was only known from one county (Putnam) before this survey. This eastern moth has now been rediscovered in central Illinois, after many years without known records. *Leucania extincta* represents an entomological boon for Illinois. Formerly known only from the East Coast and a few specimens collected by Forbes in northern Illinois in the early 20th century, we now have an opportunity to reexamine this highly disjunct population. Eric Metzler has expressed an interest in examining a series of specimens to determine if *L. extincta* in Illinois truly represents a widely disjunct population, or if it is an undescribed endemic species.

## Conclusion

We are currently experiencing a conservation crisis in Illinois entomology. We have documented (Panzer 1993, Catchpole personal observation: 1987-1998) the loss of insect species from even the highest quality Illinois nature preserves (Illinois Beach State Park: Frosted Elfin, Ottoe Skipper; Revis Hill Prairie: Arogos Skipper). Furthermore, biogeographical population distributions suggest that many more species have been locally extirpated (Panzer 1993) without voucher specimens to verify their disappearance. Fortunately, only a few species have been extirpated from all of Illinois (e.g. Dakota Skipper, Arogos Skipper).

If Illinois is going to support remnant dependant animal species that normally occur at low population densities, then we must design preserves around the most viable remaining populations. Long Branch Sand Prairie certainly qualifies as a critical, core-area for the regal fritillary. If, as is expected, there will be no populations of regal fritillaries in northern Illinois in the near future, then Long Branch will be the only population large enough to restore regal fritillaries to the rest of Illinois. Long Branch also provides habitat for rare moth species. Even if further research reveals the presence of these rare moths on other sites, we now know that Long Branch provides habitat for them.

Critical steps to preserve and enhance the insect populations at Long Branch involve both management practices and land acquisitions. The acquisition of adjacent high-quality dry prairie and mesic plowed fields is of critical importance. Restoration of mesic sand prairie, with its dense floral components, will provide nectar sources during dry summers. In addition, mesic prairie restorations should be planted with large numbers of sand and mesic prairie violets. These native violets no longer occur on many Mason County sand prairie sites. However, they occur commonly on dry-mesic to mesic sand prairies throughout the rest of the Midwest. The plowing of nearly all Mason County sand prairies, except extremely arid and unstable dunes, has resulted in a system of nature preserves that has few native violets within it.

Management practices should involve burning the site on a three to four year rotation and burning no more than half of the site at one time. When dividing the site into burn units, the plant communities should be divided so that no plant community occurs only in one burn unit. By following these guidelines, the manager is assured that there will often be unburned refugia for fire sensitive insects. Even if a species occurs only within one burn unit, by allowing at least three years for the population to recover, the population will most likely be fully recovered before the next burn (Panzer, in press).

There is an urgent need for further research to catalog animals on our Illinois nature preserves. If combined with strategic land acquisitions and sound management practices, we may be able to avoid a catastrophic episode of extinctions in Illinois. Now is the time to purchase the remaining unprotected natural areas and provide them with strategically placed buffers and restorations. Through this process we can protect and enlarge our remnant plant and animal populations, assuring future generations a chance to see the beauty and diversity of wild Illinois.

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Figure 1. 1978 aerial photo of Long Branch Nature Preserve, Mason County, Illinois. Dashed line encompasses the dedicated nature preserve.

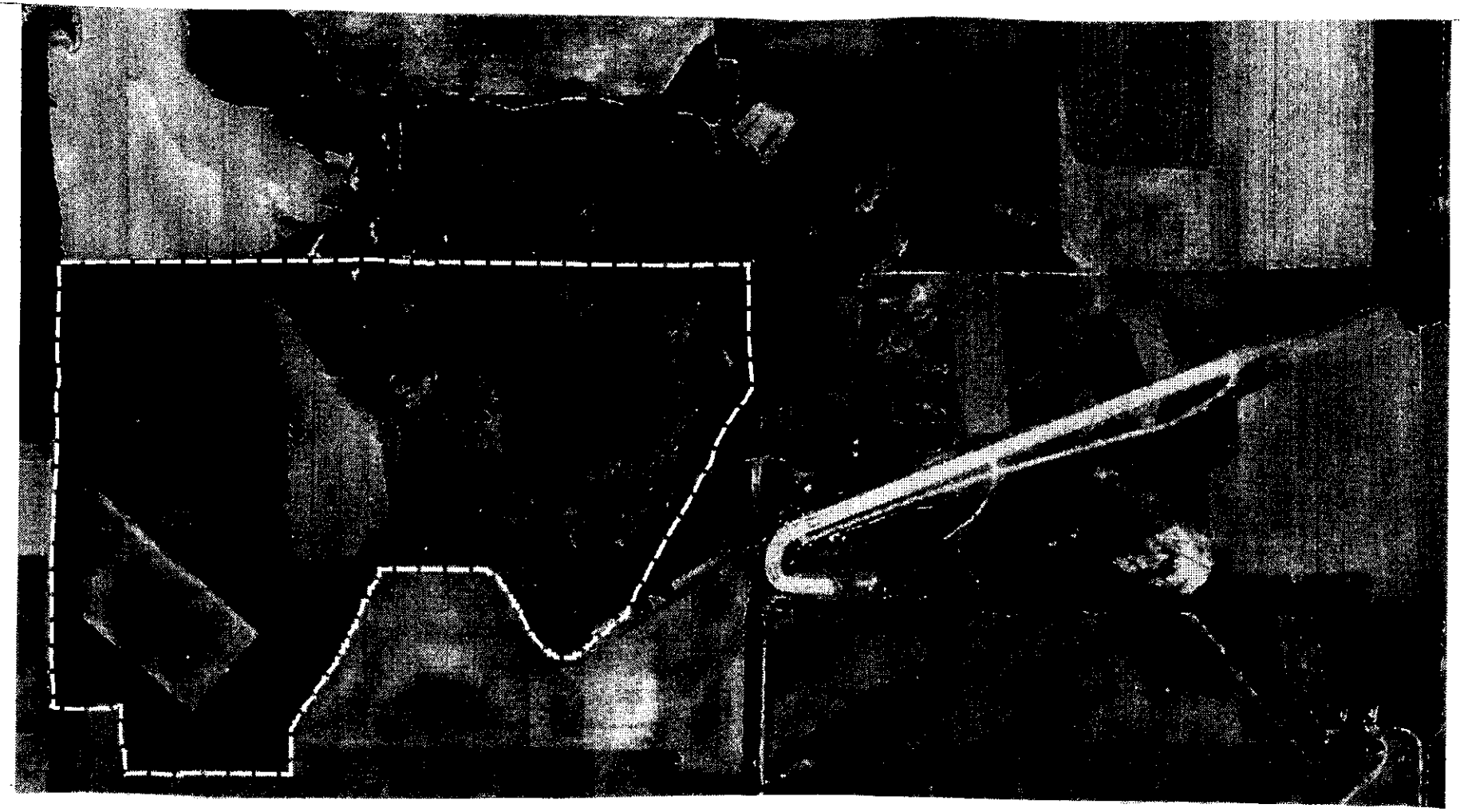

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Figure 2. Estimated abundance of Regal Fritillary (*Speyeria idalia*) butterflies at Long Branch Sand Prairie Nature Preserve, Mason County, Illinois in 1997. Estimated numbers of Regal Fritillaries on the Y axis, sampling dates on the X axis. Numbers were determined by dividing the numbers of Regal Fritillaries observed in each habitat by the number of acres sampled in that habitat and then multiplying by the acres of that habitat on-site. This process was repeated for each habitat and the resultant numbers were then summed.

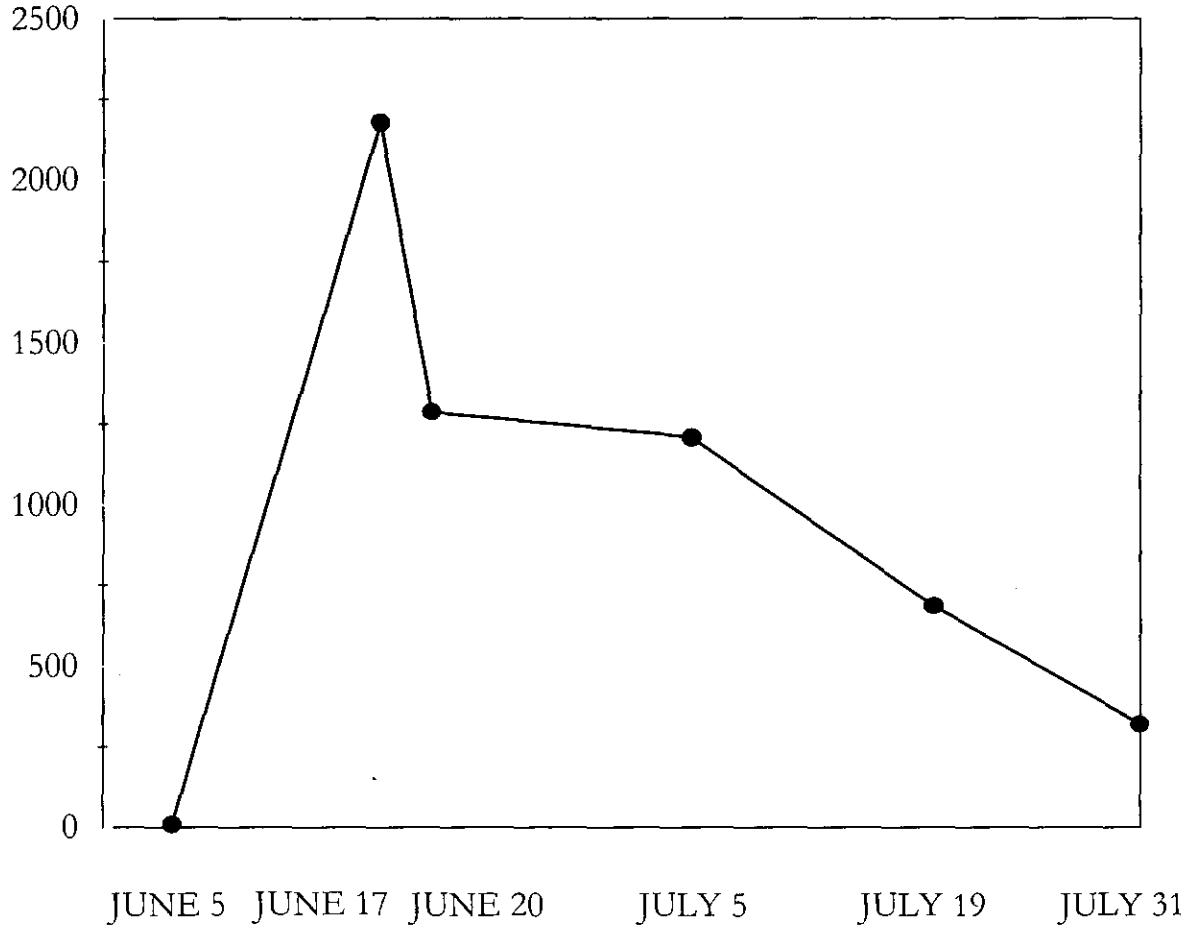

Figure 3. Density (Numbers/acre) of Regal Fritillary (*Speyeria idalia*) per habitat at Long Branch Sand Prairie Nature Preserve, Mason County, Illinois in 1997. Numbers were determined by dividing the numbers of Regal Fritillaries observed in each habitat by the number of acres sampled in that habitat and then multiplying by the acres of that habitat on-site. Dist = disturbed habitat, Oak B = Black Jack Oak Barrens, Oak W = Oak Woods, Field = Old Field, SLP = Sand Lovegrass Prairie, LBP = Little Bluestem Prairie.

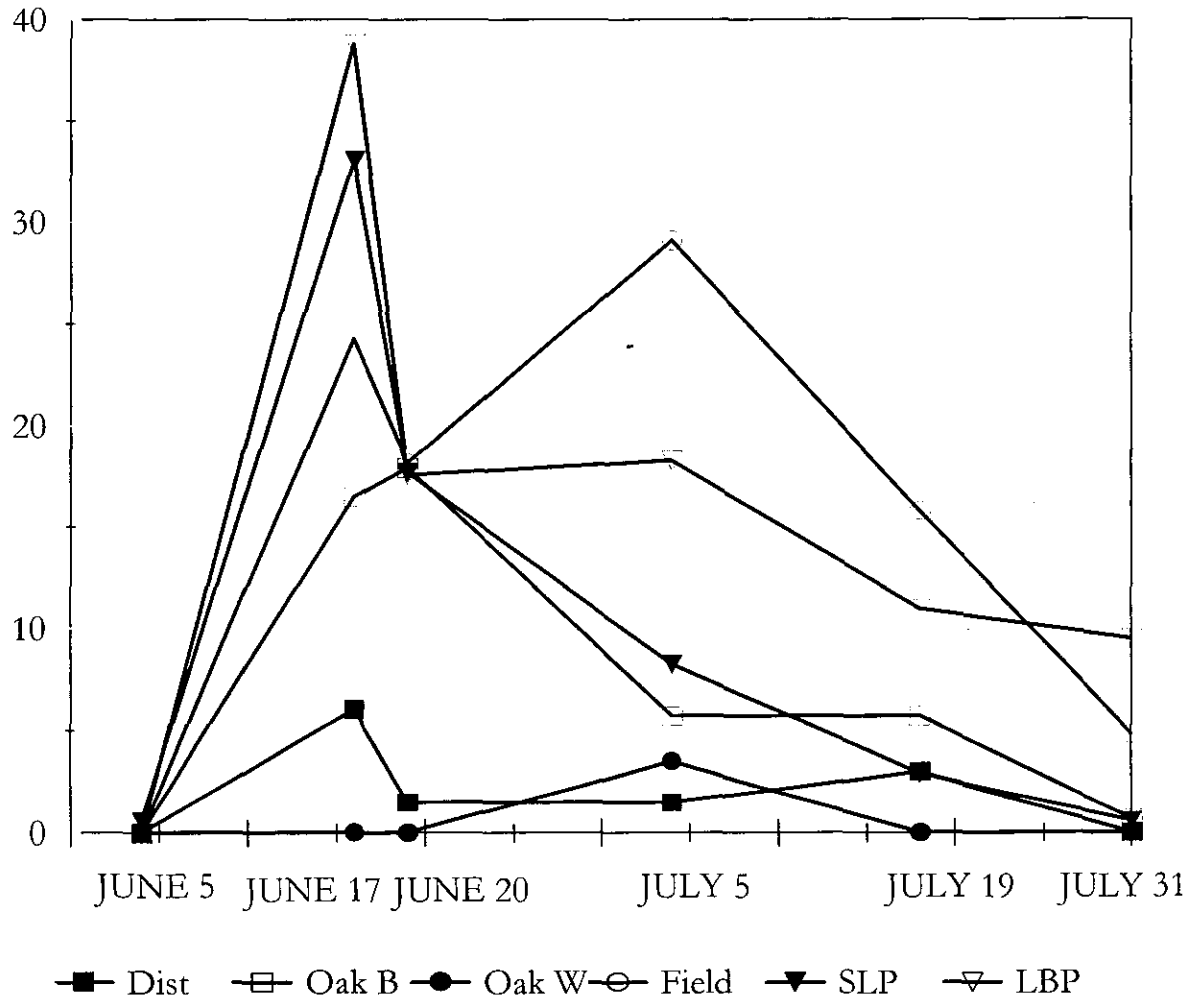

Figure 4. Density (Numbers/acre) of Wood Nymphs (*Cercyonis pegala*) per habitat at Long Branch Sand Prairie Nature Preserve, Mason County, Illinois in 1997. Numbers were determined by dividing the numbers of Wood Nymphs observed in each habitat by the number of acres sampled in that habitat and then multiplying by the acres of that habitat on-site. Dist = disturbed habitat, Oak B = Black Jack Oak Barrens, Oak W = Oak Woods, Field = Old Field, SLP = Sand Lovegrass Prairie, LBP = Little Bluestem Prairie.

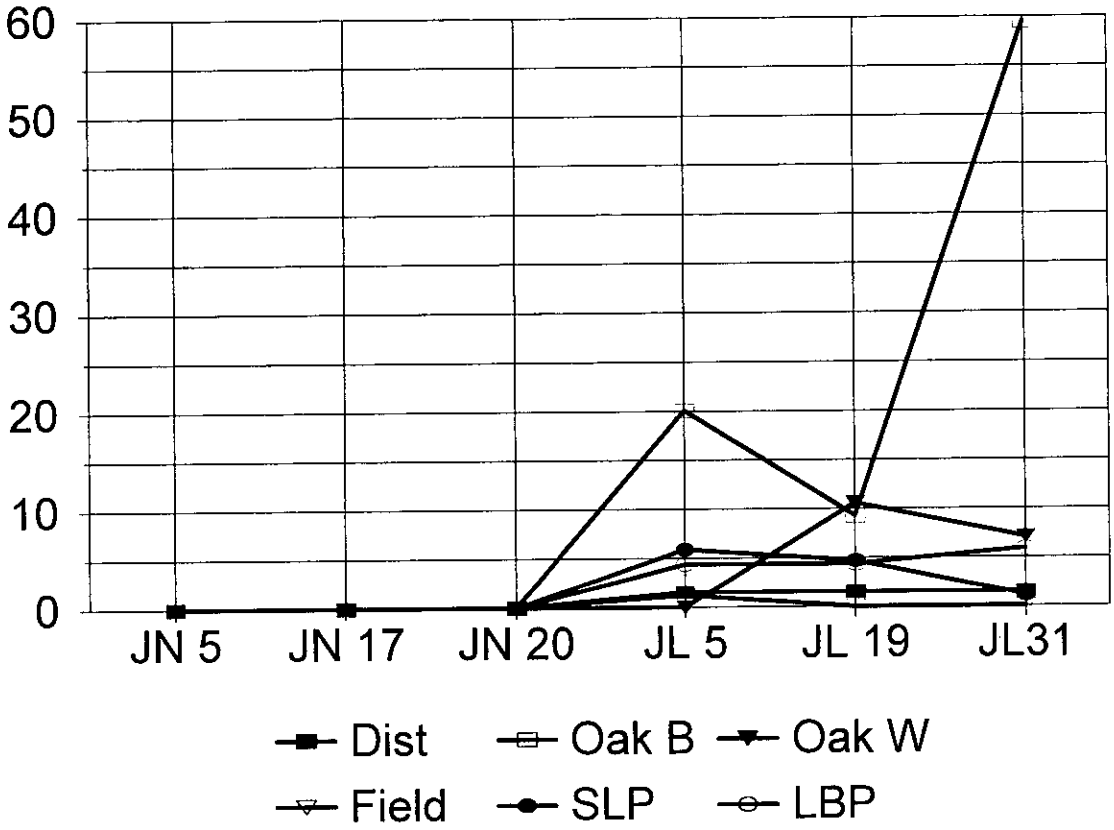

Table 1. Soils and associated vegetation of Long Branch Sand Prairie Nature Preserve, Mason County, Illinois. Determinations made by combining field observations of vegetation with soils as identified on the Soil Survey of Mason County, Illinois (1995).

| **Soil Numbers** | **Soil Name** | **Drainage** | **Presettlement Community** | **Current Communities** | **Dominant Plant** | **Acreage** |
|---|---|---|---|---|---|---|
| 54B<br>54D<br>54E | Plainfield Sand | Excessively Drained | Dry Prairie w/ widely scattered trees | Dunic Prairie<br>Level Prairie<br>Low Prairie<br>Copses | *S. scoparium*<br>*E. trichodes*<br>*C. longifolia*<br>*Q. marilandica* | 19.2<br>18.0<br>1.2<br>22.9 |
| 88B | Sparta Loamy Sand | Excessively Drained | Dry Prairie | Old Field<br>Disturbed<br>Low Prairie<br>Level Prairie | *ND*<br>*ND*<br>*?*<br>*E. trichodes?* | |
| 151 | Ridgeville Sandy Loam | Poorly Drained | Mesic Prairie? No natural examples remaining | Old Field | *ND* | |
| 201 | Gilford Sandy Loam | Poorly Drained | Mesic Prairie | Low Prairie w/ woody invasion | *C. longifolia* | 0.3 |
| 770 | Udolpho fine sandy loam | Poorly Drained | Mesic to Wet-Mesic Prairie | Low Prairie w/ woody invasion | *C. Longifolia* | 0.1<br>+ adj. offsite |

Table 2: Percent of communities sampled by Pollard Route at Long Branch Sand Prairie Nature Preserve, Mason County, Illinois. Percentages determined by measuring area of each route sampled in each community, and dividing by the area of each community as determined from aerial photograph.

| Community Type | Acres of Community Sampled | Acres of Community On-Site | Percent of Community Sampled |
|---|---|---|---|
| **Disturbed** | 0.66 | 10 | 6.6% |
| **Oak Barrens** | 1.39 | 12.5 | 11.2% |
| **Oak Woods** | 0.28 | 10.4 | 2.7% |
| **Old Field** | 0.82 | 18.1 | 4.6% |
| **Sand Lovegrass Prairie** | 1.69 | 18.5 | 9.2% |
| **Little Bluestem Prairie** | 1.37 | 22.2 | 6.2% |
| **Totals** | 6.22 | 93 | 6.7% |

Table 3: Moths identified to species and vouchered from Long Branch Sand Prairie Nature Preserve, Mason County, Illinois in 1997. Dates represent earliest and latest dates of collection on voucher specimens only, and may not reflect total flight time.

| Superfamily | Family | Subfamily | Genus | Species | Dates Early | Dates Late | Noteworthy |
|---|---|---|---|---|---|---|---|
| Bombycoidea | Apatelodidae | | Apatelodes | torrefacta | 02-Jul-97 | 02-Jul-97 | |
| Bombycoidea | Lasiocampidae | | Tolype | velleda | 02-Oct-97 | 02-Oct-97 | |
| Cossoidea | Cossidae | | Zeuzera | pyrina | 02-Jul-97 | 02-Jul-97 | nn |
| Geometroidea | Geometridae | Ennominae | Antepione | thisoaria | 31-Jul-97 | 31-Jul-97 | |
| Geometroidea | Geometridae | Ennominae | Euchlaena | amoenaria | 01-Aug-97 | 01-Aug-97 | |
| Geometroidea | Geometridae | Ennominae | Itame | subcessaria | 23-Jun-97 | 23-Jun-97 | * |
| Geometroidea | Geometridae | Ennominae | Melanophia | canadaria | 19-Jul-97 | 19-Jul-97 | |
| Geometroidea | Geometridae | Ennominae | Procherodes | transversata | 02-Jul-97 | 03-Oct-97 | |
| Geometroidea | Geometridae | Ennominae | Tornos | scolapacinarius | 23-Jun-97 | 23-Jun-97 | |
| Geometroidea | Geometridae | Larentiinae | Orthonama | centrostrigaria | 01-Oct-97 | 01-Oct-97 | |
| Geometroidea | Geometridae | Sterrhinae | Calythosanis | amaturaria | 19-Jul-97 | 19-Jul-97 | |
| Geometroidea | Geometridae | Sterrhinae | Haematopsis | grataria | 23-Jun-97 | 02-Oct-97 | |
| Geometroidea | Geometridae | Sterrhinae | Scopula | inducta | 19-Jul-97 | 19-Jul-97 | |
| Noctuoidea | Arctiidae | Arctiinae | Apantesis | nais | 01-Sep-97 | 01-Sep-97 | |
| Noctuoidea | Arctiidae | Arctiinae | Cycnia | tenera | 23-Jun-97 | 23-Jun-97 | |
| Noctuoidea | Arctiidae | Arctiinae | Grammia | anna | 23-Jun-97 | 01-Sep-97 | |
| Noctuoidea | Arctiidae | Arctiinae | Grammia | arge | 02-Jul-97 | 01-Aug-97 | |
| Noctuoidea | Arctiidae | Arctiinae | Grammia | oithona | 24-Jun-97 | 01-Sep-97 | |
| Noctuoidea | Arctiidae | Arctiinae | Grammia | phyllira | 19-Jul-97 | 01-Sep-97 | * |
| Noctuoidea | Arctiidae | Arctiinae | Halysidota | tessellaris | 23-Jun-97 | 23-Jun-97 | |
| Noctuoidea | Arctiidae | Arctiinae | Haploa | reversa | 02-Jul-97 | 02-Jul-97 | |
| Noctuoidea | Arctiidae | Arctiinae | Holomelina | aurantiaca | 23-Jun-97 | 23-Jun-97 | |
| Noctuoidea | Arctiidae | Arctiinae | Holomelina | rubicundaria | 23-Jun-97 | 23-Jun-97 | |
| Noctuoidea | Arctiidae | Arctiinae | Pyrrharctia | isabella | 01-Sep-97 | 01-Sep-97 | |

Table 3: Moths identified to species and vouchered from Long Branch Sand Prairie Nature Preserve, Mason County, Illinois in 1997. Dates represent earliest and latest dates of collection on voucher specimens only, and may not reflect total flight time.

| Superfamily | Family | Subfamily | Genus | Species | Dates Early | Dates Late | Noteworthy |
|---|---|---|---|---|---|---|---|
| Noctuoidea | Arctiidae | Arctiinae | Spilosoma | latipennis | 02-Jul-97 | 02-Jul-97 | * |
| Noctuoidea | Arctiidae | Arctiinae | Spilosoma | virginica | 24-Jun-97 | 01-Aug-97 | |
| Noctuoidea | Arctiidae | Lithosiinae | Hypoprepia | fucosa | 23-Jun-97 | 29-Jun-97 | |
| Noctuoidea | Arctiidae | Lithosiinae | Hypoprepia | miniata | 24-Jun-97 | 31-Jul-97 | |
| Noctuoidea | Noctuidae | Acontiinae | Acontia | aprica | 23-Jun-97 | 23-Jun-97 | |
| Noctuoidea | Noctuidae | Acontiinae | Agroperina | helva | 01-Sep-97 | 01-Sep-97 | |
| Noctuoidea | Noctuidae | Acontiinae | Cerma | cerintha | 23-Jun-97 | 23-Jun-97 | |
| Noctuoidea | Noctuidae | Acontiinae | Homophoberia | apicosa | 01-Aug-97 | 01-Aug-97 | |
| Noctuoidea | Noctuidae | Acontiinae | Spragueia | leo | 01-Aug-97 | 01-Sep-97 | |
| Noctuoidea | Noctuidae | Acontiinae | Tarachidia | candefacta | 19-Jul-97 | 01-Sep-97 | |
| Noctuoidea | Noctuidae | Acontiinae | Thioptera | nigrofimbria | 01-Sep-97 | 01-Sep-97 | |
| Noctuoidea | Noctuidae | Acontinae | Amyna | octo | 03-Oct-97 | 03-Oct-97 | |
| Noctuoidea | Noctuidae | Acronictinae | Acronicta | interrupta | 01-Sep-97 | 01-Sep-97 | |
| Noctuoidea | Noctuidae | Acronictinae | Acronicta | lithospila | 15-Sep-97 | 02-Oct-97 | |
| Noctuoidea | Noctuidae | Acronictinae | Simyra | henrici | 02-Jul-97 | 01-Sep-97 | |
| Noctuoidea | Noctuidae | Amphipyrinae | Amphipyra | pyramidoides | 02-Oct-97 | 02-Oct-97 | |
| Noctuoidea | Noctuidae | Amphipyrinae | Apamea | burgessii | 01-Sep-97 | 15-Sep-97 | * |
| Noctuoidea | Noctuidae | Amphipyrinae | Cirrhophanus | triangulifer | 01-Sep-97 | 01-Sep-97 | |
| Noctuoidea | Noctuidae | Amphipyrinae | Crambodes | talidiformis | 19-Jul-97 | 19-Jul-97 | |
| Noctuoidea | Noctuidae | Amphipyrinae | Elaphria | festivoides | 01-Aug-97 | 01-Aug-97 | |
| Noctuoidea | Noctuidae | Amphipyrinae | Elaphria | grata | 01-Sep-97 | 01-Sep-97 | |
| Noctuoidea | Noctuidae | Amphipyrinae | Papaipema | baptisiae | 01-Sep-97 | 02-Oct-97 | |
| Noctuoidea | Noctuidae | Amphipyrinae | Proxenus | miranda | 19-Jul-97 | 01-Sep-97 | |

nn = non-native; * = rarely found in Illinois collections; and SR = Illinois State Record.

Table 3: Moths identified to species and vouchered from Long Branch Sand Prairie Nature Preserve, Mason County, Illinois in 1997. Dates represent earliest and latest dates of collection on voucher specimens only, and may not reflect total flight time.

| Superfamily | Family | Subfamily | Genus | Species | Dates Early | Dates Late | Noteworthy |
|---|---|---|---|---|---|---|---|
| Noctuoidea | Noctuidae | Amphipyrinae | Spodoptera | ornithogalli | 23-Jun-97 | 03-Oct-97 | |
| Noctuoidea | Noctuidae | Catocalinae | Caenurgia | chloropha | 01-Aug-97 | 01-Aug-97 | |
| Noctuoidea | Noctuidae | Catocalinae | Catocala | amatrix | 01-Sep-97 | 01-Sep-97 | |
| Noctuoidea | Noctuidae | Catocalinae | Catocala | neogama | 01-Sep-97 | 01-Sep-97 | |
| Noctuoidea | Noctuidae | Catocalinae | Catocala | paleogama | 31-Jul-97 | 01-Aug-97 | |
| Noctuoidea | Noctuidae | Catocalinae | Catocala | piatrix | 31-Jul-97 | 03-Oct-97 | |
| Noctuoidea | Noctuidae | Catocalinae | Catocala | ultronia | 02-Jul-97 | 02-Jul-97 | |
| Noctuoidea | Noctuidae | Catocalinae | Lesmone | detrahens | 02-Jul-97 | 01-Sep-97 | * |
| Noctuoidea | Noctuidae | Catocalinae | Panopoda | carneicosta | 13-Jul-97 | 13-Jul-97 | |
| Noctuoidea | Noctuidae | Catocolinae | Caenurgina | crassiuscula | 23-Jun-97 | 01-Aug-97 | |
| Noctuoidea | Noctuidae | Catocolinae | Caenurgina | erechtea | 23-Jun-97 | 03-Oct-97 | |
| Noctuoidea | Noctuidae | Catocolinae | Mocis | texana | 01-Aug-97 | 01-Sep-97 | |
| Noctuoidea | Noctuidae | Cuculliinae | Cucullia | speyeri | 24-Jun-97 | 24-Jun-97 | * |
| Noctuoidea | Noctuidae | Hadeninae | Faronta | diffusa | 01-Sep-97 | 01-Sep-97 | |
| Noctuoidea | Noctuidae | Hadeninae | Lacinipolia | implicata | 01-Sep-97 | 01-Sep-97 | |
| Noctuoidea | Noctuidae | Hadeninae | Lacinopolia | renigera | 23-Jun-97 | 03-Oct-97 | |
| Noctuoidea | Noctuidae | Hadeninae | Leucania | extincta | 15-Jul-97 | 01-Oct-97 | * |
| Noctuoidea | Noctuidae | Hadeninae | Leucania | lapidaria | 24-Jun-97 | 24-Jun-97 | |
| Noctuoidea | Noctuidae | Hadeninae | Leucania | linda | 23-Jun-97 | 03-Oct-97 | |
| Noctuoidea | Noctuidae | Hadeninae | Leucania | phragmitidicola | 13-Jul-97 | 01-Oct-97 | |
| Noctuoidea | Noctuidae | Hadeninae | Nephelodes | minians | 15-Sep-97 | 15-Sep-97 | |
| Noctuoidea | Noctuidae | Hadeninae | Orthodes | crenulata | 01-Sep-97 | 02-Oct-97 | |
| Noctuoidea | Noctuidae | Hadeninae | Pseudaletia | unipunctata | 23-Jun-97 | 02-Oct-97 | |

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Table 3: Moths identified to species and vouchered from Long Branch Sand Prairie Nature Preserve, Mason County, Illinois in 1997. Dates represent earliest and latest dates of collection on voucher specimens only, and may not reflect total flight time.

| Superfamily | Family | Subfamily | Genus | Species | Dates Early | Dates Late | Noteworthy |
|---|---|---|---|---|---|---|---|
| Noctuoidea | Noctuidae | Heliothinae | Heliocheilus | paradoxus | 23-Jun-97 | 01-Sep-97 | * |
| Noctuoidea | Noctuidae | Heliothinae | Heliothis | zea | 01-Sep-97 | 15-Sep-97 | |
| Noctuoidea | Noctuidae | Heliothinae | Heliothus | subflexus | 23-Jun-97 | 23-Jun-97 | |
| Noctuoidea | Noctuidae | Heliothinae | Heliothus | phloxiphaga | 01-Aug-97 | 01-Sep-97 | |
| Noctuoidea | Noctuidae | Heliothinae | Rhodoecia | aurantiago | 02-Oct-97 | 02-Oct-97 | * |
| Noctuoidea | Noctuidae | Heliothinae | Schinia | diffusa | 01-Sep-97 | 01-Sep-97 | SR |
| Noctuoidea | Noctuidae | Heliothinae | Schinia | lynx | 01-Sep-97 | 01-Sep-97 | |
| Noctuoidea | Noctuidae | Heliothinae | Schinia | rivulosa | 01-Aug-97 | 01-Aug-97 | |
| Noctuoidea | Noctuidae | Heliothinae | Schinia | sanguinea | 01-Sep-97 | 01-Sep-97 | * |
| Noctuoidea | Noctuidae | Hypeninae | Plathypena | scabra | 01-Aug-97 | 01-Oct-97 | |
| Noctuoidea | Noctuidae | Noctuinae | Abagrotis | alternata | 01-Sep-97 | 01-Sep-97 | |
| Noctuoidea | Noctuidae | Noctuinae | Abagrotis | cupida | 24-Jun-97 | 02-Oct-97 | |
| Noctuoidea | Noctuidae | Noctuinae | Agrotis | gladiaria | 01-Oct-97 | 01-Oct-97 | |
| Noctuoidea | Noctuidae | Noctuinae | Agrotis | ipsilon | 01-Aug-97 | 01-Oct-97 | |
| Noctuoidea | Noctuidae | Noctuinae | Agrotis | venerabilis | 01-Oct-97 | 02-Oct-97 | |
| Noctuoidea | Noctuidae | Noctuinae | Agrotis | vetusta | 15-Sep-97 | 03-Oct-97 | * |
| Noctuoidea | Noctuidae | Noctuinae | Choephora | fungorum | 03-Oct-97 | 03-Oct-97 | |
| Noctuoidea | Noctuidae | Noctuinae | Euagrotis | illapsa | 19-Jul-97 | 01-Sep-97 | |
| Noctuoidea | Noctuidae | Noctuinae | Eucoptocnemis | fimbriaris | 01-Oct-97 | 03-Oct-97 | * |
| Noctuoidea | Noctuidae | Noctuinae | Euxoa | detersa | 15-Sep-97 | 03-Oct-97 | |
| Noctuoidea | Noctuidae | Noctuinae | Euxoa | fumalis | 23-Jun-97 | 23-Jun-97 | |
| Noctuoidea | Noctuidae | Noctuinae | Euxoa | immixta | 23-Jun-97 | 23-Jun-97 | |
| Noctuoidea | Noctuidae | Noctuinae | Euxoa | nivilinea | 15-Sep-97 | 02-Oct-97 | * |

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| Superfamily | Family | Subfamily | Genus | Species | Dates Early | Dates Late | Noteworthy |
|---|---|---|---|---|---|---|---|
| Noctuoidea | Noctuidae | Noctuinae | Euxoa | tessellata | 23-Jun-97 | 02-Jul-97 | |
| Noctuoidea | Noctuidae | Noctuinae | Euxoa | velleripennis | 01-Sep-97 | 02-Oct-97 | |
| Noctuoidea | Noctuidae | Noctuinae | Feitia | jaculifera | 01-Sep-97 | 15-Sep-97 | |
| Noctuoidea | Noctuidae | Noctuinae | Feltia | geniculata | 15-Sep-97 | 15-Sep-97 | |
| Noctuoidea | Noctuidae | Noctuinae | Protolampra | brunneicollis | 23-Jun-97 | 15-Sep-97 | |
| Noctuoidea | Noctuidae | Noctuinae | Spaelotis | clandestina | 23-Jun-97 | 23-Jun-97 | |
| Noctuoidea | Noctuidae | Noctuinae | Xestia | adela | 03-Oct-97 | 03-Oct-97 | |
| Noctuoidea | Noctuidae | Noctuinae | Xestia | badinodis | 01-Oct-97 | 03-Oct-97 | |
| Noctuoidea | Noctuidae | Noctuinae | Xestia | bicarnea | 01-Sep-97 | 15-Sep-97 | |
| Noctuoidea | Noctuidae | Noctuinae | Xestia | dolosa | 01-Sep-97 | 01-Sep-97 | |
| Noctuoidea | Noctuidae | Plusiinae | Allagrapha | aeria | 01-Sep-97 | 01-Sep-97 | |
| Noctuoidea | Noctuidae | Plusiinae | Anagrapha | falcifera | 02-Jul-97 | 03-Oct-97 | |
| Noctuoidea | Noctuidae | Plusiinae | Autographa | precationis | 23-Jun-97 | 02-Jul-97 | |
| Noctuoidea | Noctuidae | Plusiinae | Rachiplusia | ou | 15-Sep-97 | 15-Sep-97 | |
| Noctuoidea | Notodontidae | | Dasychira | dorsipennata | 01-Oct-97 | 01-Oct-97 | |
| Noctuoidea | Notodontidae | | Datana | perspicua | 19-Jul-97 | 19-Jul-97 | |
| Noctuoidea | Notodontidae | | Furcula | cinerea | 01-Aug-97 | 01-Aug-97 | |
| Noctuoidea | Notodontidae | | Nadata | gibbosa | 24-Jun-97 | 01-Aug-97 | |
| Pyraloidea | Pyralidae | Crambinae | Urola | nivalis | 19-Jul-97 | 01-Aug-97 | |
| Pyraloidea | Pyralidae | Odontiinae | Eustixia | pupula | 01-Aug-97 | 01-Aug-97 | |
| Pyraloidea | Pyralidae | Pyralinae | Herculia | infimbrialis | 13-Jul-97 | 13-Jul-97 | |
| Pyraloidea | Pyralidae | Pyralinae | Herculia | olinalis | 13-Jul-97 | 13-Jul-97 | |
| Pyraloidea | Pyralidae | Pyraustinae | Ostrinia | nubialis | 23-Jun-97 | 01-Aug-97 | |

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Table 3: Moths identified to species and vouchered from Long Branch Sand Prairie Nature Preserve, Mason County, Illinois in 1997. Dates represent earliest and latest dates of collection on voucher specimens only, and may not reflect total flight time.

| Superfamily | Family | Subfamily | Genus | Species | Dates Early | Dates Late | Noteworthy |
|---|---|---|---|---|---|---|---|
| Pyraloidea | Pyralidae | Pyraustinae | Pyrausta | signatalis | 02-Jul-97 | 01-Aug-97 | |
| Sphingoidea | Sphingidae | Macroglossinae | Eumorpha | achemon | 15-Sep-97 | 15-Sep-97 | |
| Sphingoidea | Sphingidae | Macroglossinae | Eumorpha | pandorus | 31-Jul-97 | 01-Sep-97 | |
| Sphingoidea | Sphingidae | Macroglossinae | Hyles | lineata | 23-Jun-97 | 01-Sep-97 | |
| Sphingoidea | Sphingidae | Sphinginae | Ceratomia | catalpae | 13-Jul-97 | 01-Aug-97 | |
| Sphingoidea | Sphingidae | Sphinginae | Ceratomia | hageni | 23-Jun-97 | 23-Jun-97 | |
| Sphingoidea | Sphingidae | Sphinginae | Laothoe | juglandis | 02-Jul-97 | 01-Aug-97 | |
| Sphingoidea | Sphingidae | Sphinginae | Manduca | quinquemaculata | 31-Jul-97 | 03-Oct-97 | |
| Sphingoidea | Sphingidae | Sphinginae | Sphinx | eremitus | 02-Jul-97 | 02-Jul-97 | * |
| Yponomeutoidea | Yponomeutidae | | Atteva | punctella | 01-Aug-97 | 01-Aug-97 | |

nn = non-native; * = rarely found in Illinois collections; and SR = Illinois State Record.

# Chapter 2

## Barton-Sommer's Woods Nature Preserve

## Site Description

Barton-Sommer's Woods Nature Preserve contains 30-acres of floodplain woodland, riparian edge and old field along Salt Creek in Mason County, Illinois. It is located in the SE ¼ of section 1, T.19N, R.5W. No prescribed burning or other management has occurred on this site since it was acquired by the Illinois Department of Natural Resource (IDNR) in the mid-1990's. Soils are of the Elburn-Plano-Thorp association and of the Beaucoup-Dockery association representing terrace and floodplain soils respectively (NCSS 1995). The mostly closed-canopy mature second-growth woods supports a dense herbaceous layer of Virginia Wild Rye (*Elymus virginicus*) and Stinging Nettles (*Urtica dioicous*). Most sun-loving forbs are located along the banks of Salt Creek on the south end of the preserve, and along the edge of the plowed field on the west edge of the preserve. There are several open areas within the preserve, primarily in old river channels. There is also a recently abandoned field in the southwest portion of the preserve, which has naturally revegetated.

## Methodology

Diurnal and nocturnal lepidopteran species were monitored using different methodologies. Nocturnal species were sampled using two black lights placed at varying locations from June 29 until October 12, 1997. Diurnal species were monitored using modified Pollard (Pollard and Yates 1993) transects at each site from June17 until July 31, 1997. A representative sample of the nocturnal species were taken, spread, pinned, identified to species, and deposited at the Illinois State Museum insect collection.

**Diurnal sampling:** A standard Pollard transect was used, with only minor modifications. A fixed route was established with flagging used to mark the route. The route was designed to sample a variety of habitats. All diurnal lepidoptera seen within 5 meters of the observor in any direction (except behind) were recorded as the observor traveled at a steady pace along the route. At the beginning of each route, and numerous times during the route, the observor paced off 5-meter distances to determine if butterflies were within the 5-meter limit. If the observor paused for any reason, the recording of species stopped until the observor renewed their pace through the site. Date, time of day, temperature, windspeed, amount of sunshine, and miscellaneous commentary on the ecosystem (eg drought stress of plants, or sex ratios of lepidoptera) were recorded at each visit. No specimens of diurnal lepidoptera were taken, as butterflies seen within the route were identified while alive in the field

**Nocturnal sampling**: Two bucket-style black light traps, equipped with 12 volt marine batteries, 15 watt U-shaped black light tubes and photocell switches, were set out at each site for at least one night, twice each month. Traps were examined early the next morning, representative specimens taken, and the rest of the insects released.

Pinned specimens were identified to species to the best of my ability using available texts (Covell 1984, Hardwick 1996, Rings et al. 1992, Rockburne and Lafontaine 1976, Sargent 1976). Specimens

were then taken to the Ohio State University collection center, where I compared my specimens with those in the collection, and gained the assistance of Eric Metzler in confirming or correcting identifications of many moths. Next, I perused available texts for information on the abundance of the species that I had vouchered. I then made a list of insects that might be rare in Illinois, based upon the abundance data in the texts. I proceeded to check the collections of the Field Museum, the Illinois Natural History Survey and Ron Panzer's database to see where in Illinois these species had been found. I also made a partial survey of the Illinois State museum's and Jim Wiker's (Oakford, IL) collection. Information on the moths that were uncommonly found in Illinois collections are presented in the results.

## Results

**Diurnal Sampling:** One hundred-eighty two butterflies in twenty-two species were seen within 5 meters of the monitor while on route (Table 4). Silver-spotted Skippers (*Epargyreus clarus*) and Hackberry (*Asterocampa celtis*) butterflies were the two most common species (53 and 25 individuals, respectively). Silver-spotted Skippers occur throughout most of North America and are found in open-woods, canyons and prairie valleys (Scott 1986). Hackberry butterflies are found in sunny woods from central America to New England, with the larvae feeding on Hackberries (Celtis spp.) Both butterflies are common in West-Central Illinois (Sedman and Hess 1985).

**Nocturnal Sampling:** One hundred four (104) moth species from Barton-Sommer's Nature Preserve (Table 5) were identified and vouchered at the Illinois State Museum. Of these, nine (8.7%) were considered rare in Illinois, based upon a search of literature and collections. The borer moths (Amphipyrinae) had the most rare species (four), with inchworms of the subfamily Ennominae the second most common (three). Almost without exception, museum specimens of these moths were collected in the 19th and early 20th century. While this may reflect collection effort, it most likely also reflects the presence of more remnant insect populations persisting on the more abundant habitat fragments occurring at that time. Unless specimens have been collected in the latter half of the 20th century, as is the case for all specimens in the Panzer collection, records presented here should be considered to represent historical distributions, not present occurrences.

Each of the vouchered moth species thought to be rare are listed below, along with pertinent data. These data include the name, subfamily, known or suspected food plants, distribution in North America and distribution in Illinois. Counties of occurrences are followed by collections in which specimens were observed. Abbreviations for collections are as follows:

ISM = Illinois State Museum
INHS = Illinois Natural History Survey
FMNH = Field Museum of Natural History
Panzer = Collection and notes of Ron Panzer, Markham, Illinois.

**Borer Moths (Subfamily Amphipyrinae):** Many of the Amphipyrinae are stem borers as larvae. This lifestyle has led to many species becoming monophagous or oligophagous. Amphipyrinae that

are well known for being habitat restricted include many Papiapema and Spartinophaga moths, as well as many species scattered through other amphipyrine genera. Amphipyrinae are often fire sensitive (Panzer, personal communication) because the eggs often overwinter above ground.

*Archanara subflava* (Amphipyrinae) feeds on bulrushes and rushes (Covell pp. 124, 1984) or cattails (Rockburne and Lafontaine pp. 73, 1976). Rings et al. (1992) presents several credible references suggesting that it feeds on giant or great bulrush. It occurs from Nova Scotia to New Jersey, west to Manitoba, Minnesota and Illinois, and is a species of special concern in Ohio, where it is known from only one location. Illinois county records are Cook (FMNH, INHS), McHenry and Putnam (INHS) counties.

*Bellura gortynoides* (Amphipyrinae) feeds on yellow water lilies (Rings et al. pp. 93, 1992) and perhaps cattails and pickerelweed (Covell pp. 128, 1984). It occurs from Nova Scotia to Florida, west to Michigan, Illinois and Kentucky, and is locally common. The Illinois county record is Cook County (FMNH, INHS).

*Papiapema nelita* (Amphipyrinae) feeds on tall coneflower or burdock (Rings et al. pp. 92, 1992). It is uncommon in Ohio. Illinois county records are Cook (FMNH, INHS, Panzer), Will, Lake (Panzer), Putnam (INHS) and Peoria (FMNH) counties.

**Inchworms (Subfamily Ennominae):** Inchworms are largely woodland moths, which develop a twiglike appearance to escape the notice of predators. They typically pupate in loose coccons in leaf litter or in soil (Covell, 1984) and due to this will probably experience different short-term responses to fire.

*Cabera quadrifasciaria* (Ennominae) has no known food plants. It occurs from Ohio to Kentucky, west to Nebraska, Kansas and Arkansas, and is uncommon to rare (Covell pp. 360, 1984). The Illinois county records is Putnam (FMNH) County

*Econista dislocaria* (Ennominae) has no known food plant. It occurs from Ontario and western Pennsylvania to eastern South Carolina and Mississippi, west to South Dakota and Texas, and is uncommon (Covell pp. 351, 1984). Illinois county records are Cook and Champaign (FMNH) counties.

*Eugonobapta nivosaria* (Ennominae) has no known food plant. It occurs from Maine and Quebec to western North Carolina, west to Manitoba and Missouri, and is locally common. (Covell pp. 372, 1984). The Illinois county record is Cook County and Beverly H's, IL (FMNH).

**Other Subfamilies:**

*Heterophelps refusaria* (Larentiinae) has no known food plant. It occurs from Quebec and Maine to North Carolina Mountains, west to Manitoba and northern Missouri, and is uncommon (Covell pp. 389, 1984). Illinois county records are Cook (FMNH, INHS) and Putnam (INHS) counties.

*Protorthodes eureka* (Noctuinae), is sometimes also referred to as Miodera eureka. This moth was identified by comparison with several specimens in the Illinois State Museum collection, where it was collected in Menard County. I have found little information in texts regarding this moth.

*Compacta capitalis,* (Pyraustinae) a large, showy pyralid moth was vouchered in late June. Covell (pp. 402, 1984) lists this moth as rare, with a range from Virginia to Florida, west to Illinois and Texas. The larval food plant is unknown. The INHS has vouchers from Lacon, IL (June 27, 1933; June 9, 1936) and Putnam County, IL (July 15, 1947; July 25, 1948).

## Discussion

**Diurnal Sampling:** Butterflies occurred in low densities at Barton-Sommer's Woods. Nearly all butterflies were concentrated along Salt Creek and at the west edge of the preserve, where high densities of nectar plants are concentrated. Although the site possesses a dense understory of Virginia Wild Rye and Stinging Nettles, the density of nectar producing flowers inside the woods is low. It is anticipated that burning and thinning activities planned for the site will encourage the spread of nectar producing flowers from their refugia along the woods edges into the interior of the woods as light levels are increased and fire reintroduced.

**Nocturnal Sampling**: Three moth species vouchered during this study were known from only one Illinois county before this study. In addition, four more species were only known from two counties in Illinois. *Bellura gortynoides*, *Econista dislocaria* and *Protorthodes eureka* all were previously known from only one county. The first two species are known from the Midwest. I have not been able to determine the range of *P. eureka.* Of the four species known from two counties, one stands out. This is *Compacta capitalis*, which is listed as rare throughout its range (Covell 1984). This large, showy pyralid moth is the type of moth collectors love to take. In addition, this moth readily came to black lights, as was evidenced by many (1/2 dozen or so at each light) specimens being seen during their flight period. This leads to a greater degree of certainty that it is truly rare.

Floodplain woodlands with grassy understories have become rare in Illinois. This suggests that natural remnants of this community, like Barton-Sommers Woods Nature Preserve may provide habitat for many now-rare insects. However, the lack of collecting in this habitat makes the determination of rarity problematic. Further research in floodplains and other relict grassy woodlands remaining in Illinois should be strongly encouraged. For now, the high number (seven) of moths found by this research which were formerly known from two counties or less in Illinois, strongly suggests that this preserve plays an important role in preserving the natural heritage of Illinois.

Table 4. Results of Pollard Transects at Barton-Sommer's Woods Nature Preserve in 1997. The common names (Scott 1986) of the butterflies are listed with the number of each species observed on the sampling dates.

| Common Name | June 17 | June 29 | July 5 | July 17 | July 31 | Totals |
|---|---|---|---|---|---|---|
| Silver Spotted Skipper | 6 | 3 | 8 | 0 | 34 | 51 |
| Cabbage White | 1 | 0 | 0 | 0 | 0 | 1 |
| Great Spangled Fritillary | 2 | 0 | 4 | 0 | 0 | 6 |
| Buckeye | 2 | 0 | 0 | 0 | 0 | 2 |
| Question Mark | 1 | 0 | 0 | 1 | 5 | 7 |
| Eastern Tailed Blue | 1 | 0 | 1 | 0 | 1 | 3 |
| Comma | 0 | 5 | 1 | 0 | 3 | 9 |
| Delaware Skipper | 0 | 2 | 0 | 0 | 0 | 2 |
| Hackberry | 0 | 17 | 3 | 3 | 0 | 23 |
| Dun Skipper | 0 | 1 | 0 | 0 | 0 | 1 |
| Little Wood Satyr | 0 | 2 | 0 | 0 | 0 | 2 |
| Red Admiral | 0 | 1 | 1 | 3 | 4 | 9 |
| Monarch | 0 | 1 | 3 | 1 | 4 | 9 |
| Pearl Crescent | 0 | 1 | 9 | 3 | 0 | 13 |
| Checkered White | 0 | 0 | 2 | 6 | 0 | 8 |
| Common Sooty Wing | 0 | 0 | 1 | 0 | 0 | 1 |
| Cabbage White | 0 | 0 | 0 | 5 | 7 | 12 |
| Spring Azure | 0 | 0 | 0 | 0 | 16 | 16 |
| Pearly Eye | 0 | 0 | 0 | 0 | 1 | 1 |
| Tawny Emperor | 0 | 0 | 0 | 0 | 2 | 2 |
| Common Sulphur | 0 | 0 | 0 | 0 | 3 | 3 |
| Erynnis spp. | 0 | 0 | 0 | 0 | 1 | 1 |
| **Total** | | | | | | **182** |

Table 5: Moths identified to species and vouchered from Barton-Sommer's Woods Nature Preserve, Mason County, Illinois in 1997. Dates represent earliest and latest dates of collection on voucher specimens only, and may not reflect total flight time.

| Superfamily | Family | Subfamily | Genus | Species | Dates Early | Dates Late | Noteworthy |
|---|---|---|---|---|---|---|---|
| Bombycoidea | Apatelodidae | | Apatelodes | torrefacta | 29-Jun-97 | 29-Jun-97 | |
| Bombycoidea | Lasiocampidae | | Heteropacha | rileyana | 18-Aug-97 | 18-Aug-97 | |
| Bombycoidea | Saturniidae | Citheroniinae | Dryocampa | rubicunda | 29-Jun-97 | 29-Jun-97 | |
| Bombycoidea | Saturniidae | Citheroniinae | Eacles | imperialis | 25-Jul-97 | 01-Aug-97 | |
| Bombycoidea | Saturniidae | Citheroniinae | Sphingicampa | bicolor | 25-Jul-97 | 18-Aug-97 | |
| Bombycoidea | Saturniidae | Citheroniinae | Sphingicampa | bisecta | 25-Jul-97 | 25-Jul-97 | |
| Gelechiodea | Oecophoridae | Drepressariinae | Machimia | tentoriferella | 08-Sep-97 | 08-Sep-97 | |
| Geometroidea | Geometridae | Ennominae | Anavitrinella | pampinaria | 29-Jun-97 | 18-Aug-97 | |
| Geometroidea | Geometridae | Ennominae | Antepione | thisoaria | 29-Jun-97 | 29-Jun-97 | |
| Geometroidea | Geometridae | Ennominae | Cabera | quadrifasciaria | 30-Jun-97 | 30-Jun-97 | * |
| Geometroidea | Geometridae | Ennominae | Econista | dislocaria | 29-Jun-97 | 30-Jun-97 | * |
| Geometroidea | Geometridae | Ennominae | Ennomis | magnaria | 12-Oct-97 | 12-Oct-97 | |
| Geometroidea | Geometridae | Ennominae | Eugonobapta | nivosaria | 30-Jun-97 | 30-Jun-97 | * |
| Geometroidea | Geometridae | Ennominae | Eusarca | confusaria | 29-Jun-97 | 25-Jul-97 | |
| Geometroidea | Geometridae | Ennominae | Eutrapela | clemataria | 30-Jun-97 | 25-Jul-97 | |
| Geometroidea | Geometridae | Ennominae | Lytrosis | unitaria | 29-Jun-97 | 29-Jun-97 | |
| Geometroidea | Geometridae | Ennominae | Melanophia | canadaria | 30-Jun-97 | 30-Jun-97 | |
| Geometroidea | Geometridae | Ennominae | Mellilla | xanthometata | 18-Aug-97 | 18-Aug-97 | |
| Geometroidea | Geometridae | Ennominae | Pero | honestaria | 18-Aug-97 | 18-Aug-97 | |
| Geometroidea | Geometridae | Ennominae | Procherodes | transversata | 30-Jun-97 | 08-Sep-97 | |
| Geometroidea | Geometridae | Ennominae | Semiothisa | promiscuata | 18-Aug-97 | 18-Aug-97 | |
| Geometroidea | Geometridae | Ennominae | Xanthotype | urticaria | 29-Jun-97 | 18-Aug-97 | |
| Geometroidea | Geometridae | Larentiinae | Eubaphe | mendica | 29-Jun-97 | 08-Sep-97 | |
| Geometroidea | Geometridae | Larentiinae | Eulithis | diversilineata | 08-Sep-97 | 12-Oct-97 | |
| Geometroidea | Geometridae | Larentiinae | Eulithis | gracilineata | 29-Jun-97 | 30-Jun-97 | |

Table 5: Moths identified to species and vouchered from Barton-Sommer's Woods Nature Preserve, Mason County, Illinois in 1997. Dates represent earliest and latest dates of collection on voucher specimens only, and may not reflect total flight time.

| Superfamily | Family | Subfamily | Genus | Species | Dates Early | Dates Late | Noteworthy |
|---|---|---|---|---|---|---|---|
| Geometroidea | Geometridae | Larentiinae | Heterophelps | refusaria | 30-Jun-97 | 30-Jun-97 | * |
| Geometroidea | Geometridae | Sterrhinae | Scopula | limboundata | 18-Aug-97 | 18-Aug-97 | |
| Noctuoidea | Arctiidae | Arctiinae | Cycnia | tenera | 25-Jul-97 | 25-Jul-97 | |
| Noctuoidea | Arctiidae | Arctiinae | Grammia | virgo | 25-Jul-97 | 25-Jul-97 | |
| Noctuoidea | Arctiidae | Arctiinae | Halysidota | tessellaris | 29-Jun-97 | 30-Jun-97 | |
| Noctuoidea | Arctiidae | Arctiinae | Haploa | lecontei | 29-Jun-97 | 29-Jun-97 | |
| Noctuoidea | Arctiidae | Arctiinae | Haploa | reversa | 29-Jun-97 | 29-Jun-97 | |
| Noctuoidea | Arctiidae | Arctiinae | Pyrrharctia | isabella | 08-Sep-97 | 08-Sep-97 | |
| Noctuoidea | Arctiidae | Arctiinae | Spilosoma | latipennis | 29-Jun-97 | 30-Jun-97 | |
| Noctuoidea | Arctiidae | Arctiinae | Spilosoma | virginica | 25-Jul-97 | 25-Jul-97 | |
| Noctuoidea | Noctuidae | Acontiinae | Acontia | aprica | 25-Jul-97 | 25-Jul-97 | |
| Noctuoidea | Noctuidae | Acontiinae | Agroperina | helva | 08-Sep-97 | 08-Sep-97 | |
| Noctuoidea | Noctuidae | Acontiinae | Lithacodia | carneola | 08-Sep-97 | 08-Sep-97 | |
| Noctuoidea | Noctuidae | Acronictinae | Acronicta | interrupta | 30-Jun-97 | 30-Jun-97 | |
| Noctuoidea | Noctuidae | Agaristinae | Eudryas | grata | 25-Jul-97 | 25-Jul-97 | |
| Noctuoidea | Noctuidae | Amphipyrinae | Amphipoea | velata | 29-Jun-97 | 29-Jun-97 | |
| Noctuoidea | Noctuidae | Amphipyrinae | Amphipyra | pyramidoides | 08-Sep-97 | 08-Sep-97 | |
| Noctuoidea | Noctuidae | Amphipyrinae | Archanara | subflava | 30-Jun-97 | 30-Jun-97 | * |
| Noctuoidea | Noctuidae | Amphipyrinae | Bellura | gortynoides | 30-Jun-97 | 30-Jun-97 | * |
| Noctuoidea | Noctuidae | Amphipyrinae | Chytonix | palliatricula | 29-Jun-97 | 29-Jun-97 | |
| Noctuoidea | Noctuidae | Amphipyrinae | Dipterygia | rozmani | 30-Jun-97 | 08-Sep-97 | |
| Noctuoidea | Noctuidae | Amphipyrinae | Luperina | passer | 12-Oct-97 | 12-Oct-97 | |
| Noctuoidea | Noctuidae | Amphipyrinae | Ogdoconta | cinereola | 29-Jun-97 | 29-Jun-97 | |
| Noctuoidea | Noctuidae | Amphipyrinae | Papaipema | cataphracta | 12-Oct-97 | 12-Oct-97 | |
| Noctuoidea | Noctuidae | Amphipyrinae | Papaipema | maritima | 12-Oct-97 | 12-Oct-97 | * |

Table 5: Moths identified to species and vouchered from Barton-Sommer's Woods Nature Preserve, Mason County, Illinois in 1997. Dates represent earliest and latest dates of collection on voucher specimens only, and may not reflect total flight time.

| Superfamily | Family | Subfamily | Genus | Species | Dates Early | Dates Late | Noteworthy |
|---|---|---|---|---|---|---|---|
| Noctuoidea | Noctuidae | Amphipyrinae | Papaipema | nebris | 08-Sep-97 | 08-Sep-97 | |
| Noctuoidea | Noctuidae | Amphipyrinae | Papaipema | nelita | 18-Aug-97 | 08-Sep-97 | * |
| Noctuoidea | Noctuidae | Amphipyrinae | Phosphila | miselioides | 18-Aug-97 | 18-Aug-97 | |
| Noctuoidea | Noctuidae | Amphipyrinae | Plagiomimicus | pityochromus | 18-Aug-97 | 18-Aug-97 | |
| Noctuoidea | Noctuidae | Amphipyrinae | Stiriodes | obtusa | 29-Jun-97 | 25-Jul-97 | |
| Noctuoidea | Noctuidae | Catocalinae | Catocala | ultronia | 02-Jul-97 | 25-Jul-97 | |
| Noctuoidea | Noctuidae | Catocolinae | Caenurgina | crassiuscula | 29-Jun-97 | 29-Jun-97 | |
| Noctuoidea | Noctuidae | Catocolinae | Mocis | texana | 18-Aug-97 | 18-Aug-97 | |
| Noctuoidea | Noctuidae | Catocolinae | Parallelia | bistriaris | 08-Sep-97 | 08-Sep-97 | |
| Noctuoidea | Noctuidae | Catocolinae | Plusiodonta | compressipalpis | 18-Aug-97 | 18-Aug-97 | |
| Noctuoidea | Noctuidae | Catocolinae | Spiloloma | lunalinea | 30-Jun-97 | 25-Jul-97 | |
| Noctuoidea | Noctuidae | Catocolinae | Zale | lunata | 30-Jun-97 | 12-Oct-97 | |
| Noctuoidea | Noctuidae | Cuculliinae | Sunira | bicolorago | 12-Oct-97 | 12-Oct-97 | |
| Noctuoidea | Noctuidae | Hadeninae | Pseudaletia | unipunctata | 29-Jun-97 | 12-Oct-97 | |
| Noctuoidea | Noctuidae | Hadeninae | Tricholita | signata | 08-Sep-97 | 08-Sep-97 | |
| Noctuoidea | Noctuidae | Heliothinae | Heliothis | zea | 08-Sep-97 | 08-Sep-97 | |
| Noctuoidea | Noctuidae | Heliothinae | Heliothus | subflexus | 08-Sep-97 | 08-Sep-97 | |
| Noctuoidea | Noctuidae | Heliothinae | Schinia | arcigera | 08-Sep-97 | 08-Sep-97 | |
| Noctuoidea | Noctuidae | Heliothinae | Schinia | rivulosa | 25-Jul-97 | 25-Jul-97 | |
| Noctuoidea | Noctuidae | Hypeninae | Bomolocha | baltimoralis | 18-Aug-97 | 18-Aug-97 | |
| Noctuoidea | Noctuidae | Hypeninae | Bomolocha | manalis | 30-Jun-97 | 08-Sep-97 | |
| Noctuoidea | Noctuidae | Hypeninae | Plathypena | scabra | 30-Jun-97 | 08-Sep-97 | |
| Noctuoidea | Noctuidae | Noctuinae | Abagrotis | alternata | 08-Sep-97 | 08-Sep-97 | |
| Noctuoidea | Noctuidae | Noctuinae | Agrotis | ipsilon | 30-Jun-97 | 25-Jul-97 | |
| Noctuoidea | Noctuidae | Noctuinae | Choephora | fungorum | 12-Oct-97 | 12-Oct-97 | |

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| Superfamily | Family | Subfamily | Genus | Species | Dates Early | Dates Late | Noteworthy |
|---|---|---|---|---|---|---|---|
| Noctuoidea | Noctuidae | Noctuinae | Miodera | eureka | 18-Aug-97 | 18-Aug-97 | * |
| Noctuoidea | Noctuidae | Noctuinae | Peridroma | saucia | 29-Jun-97 | 29-Jun-97 | |
| Noctuoidea | Noctuidae | Noctuinae | Protolampra | brunneicollis | 25-Jul-97 | 25-Jul-97 | |
| Noctuoidea | Noctuidae | Noctuinae | Xestia | bicarnea | 18-Aug-97 | 08-Sep-97 | |
| Noctuoidea | Noctuidae | Noctuinae | Xestia | dolosa | 25-Jul-97 | 25-Jul-97 | |
| Noctuoidea | Noctuidae | Plusiinae | Agrapha | oxygramma | 12-Oct-97 | 12-Oct-97 | |
| Noctuoidea | Noctuidae | Plusiinae | Allagrapha | aeria | 08-Sep-97 | 08-Sep-97 | |
| Noctuoidea | Noctuidae | Plusiinae | Anagrapha | falcifera | 08-Sep-97 | 08-Sep-97 | |
| Noctuoidea | Noctuidae | Plusiinae | Autographa | precationis | 08-Sep-97 | 08-Sep-97 | |
| Noctuoidea | Noctuidae | Plusiinae | Diachrysia | balluca | 29-Jun-97 | 08-Sep-97 | |
| Noctuoidea | Noctuidae | Plusiinae | Pseudoplusia | includens | 12-Oct-97 | 12-Oct-97 | |
| Noctuoidea | Noctuidae | Sarrothripinae | Baileya | australis | 18-Aug-97 | 18-Aug-97 | |
| Noctuoidea | Noctuidae | Sarrothripinae | Baileya | dormitans | 25-Jul-97 | 25-Jul-97 | |
| Noctuoidea | Notodontidae | | Datana | angusii | 29-Jun-97 | 25-Jul-97 | |
| Noctuoidea | Notodontidae | | Datana | contracta | 30-Jun-97 | 30-Jun-97 | |
| Noctuoidea | Notodontidae | | Datana | integerrima | 29-Jun-97 | 29-Jun-97 | |
| Noctuoidea | Notodontidae | | Datana | ministra | 30-Jun-97 | 30-Jun-97 | |
| Noctuoidea | Notodontidae | | Heterocampa | obliqua | 30-Jun-97 | 30-Jun-97 | |
| Noctuoidea | Notodontidae | | Lochmaeus | bilineata | 30-Jun-97 | 08-Sep-97 | |
| Noctuoidea | Notodontidae | | Nadata | gibbosa | 29-Jun-97 | 18-Aug-97 | |
| Noctuoidea | Notodontidae | | Nerice | bidentada | 08-Sep-97 | 08-Sep-97 | |
| Noctuoidea | Notodontidae | | Schizura | unicornis | 25-Jul-97 | 25-Jul-97 | |
| Pyraloidea | Pyralidae | Pyraustinae | Herculia | olinalis | 29-Jun-97 | 29-Jun-97 | |
| Pyraloidea | Pyralidae | Pyraustinae | Compacta | capitalis | 29-Jun-97 | 30-Jun-97 | * |
| Pyraloidea | Pyralidae | Pyraustinae | Desmia | funeralis | 31-Jul-97 | 08-Sep-97 | |

Table 5: Moths identified to species and vouchered from Barton-Sommer's Woods Nature Preserve, Mason County, Illinois in 1997. Dates represent earliest and latest dates of collection on voucher specimens only, and may not reflect total flight time.

| Superfamily | Family | Subfamily | Genus | Species | Dates Early | Dates Late | Noteworthy |
|---|---|---|---|---|---|---|---|
| Pyraloidea | Pyralidae | Pyraustinae | Ostrinia | nubialis | 25-Jul-97 | 18-Aug-97 | |
| Sphingoidea | Sphingidae | Sphinginae | Ceratomia | hageni | 29-Jun-97 | 08-Sep-97 | |
| Sphingoidea | Sphingidae | Sphinginae | Laothoe | juglandis | 29-Jun-97 | 29-Jun-97 | |
| Sphingoidea | Sphingidae | Sphinginae | Paonias | excaecatus | 29-Jun-97 | 25-Jul-97 | |
| Sphingoidea | Sphingidae | Sphinginae | Smerinthus | jamaicensis | 18-Aug-97 | 18-Aug-97 | |
| Yponomeutoidea | Yponomeutidae | | Atteva | punctella | 25-Jul-97 | 25-Jul-97 | |

# Chapter 3

## Effectiveness of Various Immobilizing Agents in Light Traps

## Introduction

Black lights have proven effective in sampling lepidoptera, although their effective range in attracting moths is about 50 feet (Robinson and Robinson, 1950). Despite the limited range of attraction and often-infrequent number of sampling dates within a year, there remains a desire to minimize impact upon moth populations being sampled. In this chapter, I present observations regarding the effectiveness and lethality of several different techniques used in sampling moths.

During the course of this study, various methods were tried to determine the most effective and least harmful method of sampling moth populations using bucket-style black light traps. Two different immobilizing agents and no immobilizing agent were tried in traps. No vigorous methodology was used in this aspect of the project, rather the immobilizing techniques, or lack thereof were applied at my convenience and whimsy. An ongoing problem when sampling moths, especially in sand areas, is the presence of large numbers of beetles in the traps. Beetles are often very active and can kill or damage moths to the extent that they can not be identified to species.

## Methodology

Nineteen nights between June 23 and October 15 1997, two bucket-style black light traps were set out at Long Branch or Barton-Sommer's Nature Preserves in Mason County, Illinois. Ethyl acetate, dry ice and no immobilizing agent were variously tried in the buckets to determine their effectiveness and lethality to moths. In each instance, the two bucket-style traps were set out in one of the preserves and the moths collected were observed early the next morning (typically between 7:00 – 9:00 AM). Specimens not needed as voucher specimens were returned to their habitat by emptying the buckets.

**Ethyl acetate:** One-cup Tupperware containers were filled with ethyl acetate. The lids of the containers were slit in an X fashion and a common household sponge were cut and inserted through the lid so that it touched the bottom of the container, while at least one inch of sponge protruded out the top of the container. One container was placed in each bucket-style light trap.

**Dry ice**: A cooler was used to transport ethyl acetate to the sites. Bucket traps were modified by placing a one inch sheet of Styrofoam snugly into the bottom of the buckets. Either loose Styrofoam peanuts, or loosely wadded paper towel were placed over the dry ice to prevent the moths from coming into direct contact with the dry ice.

**No immobilizing agent:** On some nights no immobilizing agent was used. Bucket traps were set out and observed early the next morning.

## Results and Discussion

**Ethyl acetate**: This was the most consistently effective immobilizing agent. Moths and other

insects collected were usually immobilized. Occasionally the ethyl acetate failed to immobilize the insects, usually on windy nights, when the levels of ethyl acetate remaining in the container may have been low. On some nights, the ethyl acetate seemed quite effective, with nearly all specimens appearing still and lifeless. However, seemingly dead moths sometimes revived later in the day, indicating that some moths are capable of reviving after appearing lifeless. In some instances, moths were truly killed by ethyl acetate. In between these two extremes, were nights on which the moths were immobilized, but quite obviously alive, as they soon began to stir when exposed to fresh air.

**Dry ice**: This was disappointing as an immobilizing agent. Difficult to find and store, I also had difficulties determining an appropriate amount to place in the buckets. Evaporation rates seemed to vary greatly with changes temperature and windspeed between nights. Styrofoam peanuts were not a good idea. Moisture tended to condense inside the buckets, and moths crawling down into damp peanuts became sodden and hard to sort and identify. Paper towels worked better because the paper towels absorbed excess moisture and allowed moths to be removed more easily. However, between condensation problems and frequent failure to have enough dry ice in the buckets, this method was scarcely better than no immobilizing agent.

**No immobilizing agent:** This was never successful during the course of this study. Large numbers of beetles caused severe damage to the moths, killing or rendering unidentifiable many individuals. However, I sampled moths in late April 1998 in Long Branch Nature Preserve under Ron Panzer's FY99 contract, and found that no immobilizing agent was needed at this time of year. At that time, only a few, smaller beetles were found in the traps and the moths were surprisingly passive and easily handled.

## Conclusion

A means of inexpensively sampling large numbers of sites for moths has led to a reliance on bucket traps, rather than a single sheet with observors collecting off it. Concerns have been raised about bucket-style light traps causing mortality to more moths than are needed for voucher specimens, despite the small (50 foot) sampling range typically produced by black lights. This has led to a search for a non-lethal immobilizing agent. Except in spring sampling, moth fluttering and beetle predation and scrabbling caused high levels of mortality and unidentifiable moths. Further experimentation will be needed to overcome the problems of condensation and variable evaporation rates that dry ice buckets experienced. At present, ethyl acetate is the most humane and least lethal means of immobilizing moths in bucket-style black light traps. Although less than perfect, many moths may be released from traps using ethyl acetate as an immobilizing agent with no apparent harm having been done to them.

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