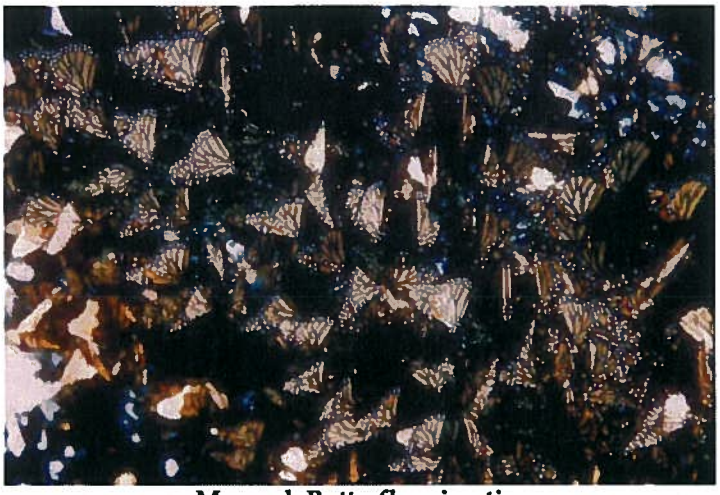
Terrestrial Insects

Lepidoptera – Butterflies
Michigan's butterflies fall into three of the broad Life Zone categories described by C.H. Merriam (Opler & Malikul 1992): the Upper Austral Life Zone, the Transition Life Zone and, in the northern Lower Peninsula and Upper Peninsula, the Canadian Life Zone. These areas are differentiated by annual mean temperature differences. Kalamazoo County falls within the Upper Austral Life Zone, characterized by warmer summer temperatures and on-average shorter winters. The regal fritillary (*Speyeria idalia),* northern metalmark (*Calephelis borealis)* and the dusky azure (*Celastrina ebenina)* are found primarily in this zone.

Michigan's endangered species list under Part 365 of PA 451 of 1994 listed 11 species of butterflies and skippers as "endangered and threatened" in Michigan, along with 14 "species of special concern." This law authorizes the Michigan Department of Natural Resources (MDNR) to engage in activities to promote their numbers and habitat. Indications of their presence on the property would necessitate preserving aspects of their preferred habitat.



Monarch Butterfly migration

Methods
Dr. Richard Fleming, biology professor and former head of the biology department at Olivet College, surveyed butterfly and dragonfly populations of the Asylum Lake area. During the period between May 31 and September 16, 2000, he visited the preserve eight times with a focus on insects found in the various habitats on the property.

In addition, the Nature Center relied on the sightings of a number of competent volunteers and staff throughout the survey period. Most of the identifications were made from live specimens observed in the field and all observations were recorded on field data forms.

Results and Discussion

Butterfly species observed are listed in Table D. Distribution of butterfly species depends largely on the presence of larval food plants. Therefore, it is somewhat surprising that certain relatively common butterfly species were not found, since most of their food plants were present. The following were expected, but not seen during Richard Fleming's May-September surveys:

Common Name	Scientific Name	Larval Food Plants
Viceroy	*Limenitis archippus*	Willows
Red Admiral	*Vanessa atalanta*	Nettles
American Painted Lady	*Vanessa virginiensis*	Burdock
Comma	*Polygonia comma*	Elm, nettle, hops
Question Mark	*Polygonia interrogationis*	Elm, nettle, hackberry, hops
Spring Azure	*Celastrina ladon*	Flowering dogwood, viburnum
Summer Azure	*Celastrina neglecta*	Legumes, mints
Black Swallowtail	*Papilio polyxenes*	Umbelliferae (Queen Anne's Lace)

Some butterfly species are subject to considerable population fluctuations from year to year. In the summer of 2000, populations of viceroys, red admirals, American painted ladies, commas and question marks were down in many parts of southwest and south-central Michigan. The absence of several expected butterfly species during the survey season suggests that either Asylum Lake butterfly populations were experiencing the region-wide downslide that occurred that summer, or basic habitat needs are not being met. Further study may be required to make a determination.

Several habitats on Asylum Lake offer relatively poor foraging and cover opportunities for butterfly species. Fallow fields such as Farm Field A, only recently idled, provide almost no benefit to feeding or roosting butterflies. However, older fields, with concentrations of native flowers, roosting structures, and protection from wind could possibly host nectar-eating butterflies such as the viceroy, red admiral, American painted lady, summer azure, and black swallowtail. Opportunities may also exist for the fruit-eating butterflies in the Old Orchard.

Preserving as much natural habitat as possible on this site and conducting controlled burns to set back succession on field and savanna sites will almost certainly provide the important plants and microhabitats needed for foraging, egg deposition, chrysalides and roosting opportunities. This is crucial for the continued diversity of butterflies and skippers on the preserve. Further studies to identify current roosting, breeding and foraging zones may aid future management efforts at the preserve.

General butterfly habitat requirements

Most of the expected butterfly species of the preserve visit a variety of plants and flowers to obtain nectar. Important flowering plants include New Jersey tea (*Ceanothus americanus*), butterfly-weed (*Asclepias tuberosa*), common milkweed (*Asclepias syriaca*), wild lupine (*Lupinus perennis*), bush-clovers (*Lespedeza* spp.), dogbanes (*Apocynum* spp.), rough blazing star (*Liatris* spp.), Missouri ironweed (*Vernonia missurica*), wild-bergamot (*Monarda fistulosa*), black-eyed Susan (*Rudbeckia hirta),* blackberries (*Rubus* spp.), asters (*Aster* spp.), goldenrods (*Solidago* spp.), spiraea (*Spiraea* spp.) and sumacs (*Rhus* spp.). However some butterflies feed primarily on rotting fruit, tree sap flows, dung, bird droppings, or carrion, these include; spring azure, question mark, and the comma.

In almost all of these species, the male butterflies, primarily those seeking mates, visit moist sand or mud, probably to consume fluids rich in salt and other nutrients. Further study is needed to determine the causes behind this intriguing behavior.

Egg deposition and chrysalis development areas are also important to promoting healthy populations of butterflies. Caterpillars have more specific food requirements than adults do, and the absence of these food sources may be a limiting factor for many species. The viceroy caterpillar feeds solely on willows (*Salix* spp.), monarch caterpillars feed solely on milkweeds, American coppers prefer sheep sorrel (*Rumex acetosella*), great-spangled fritillary favors violets (*Viola* spp.), spicebush swallowtail caterpillars feed on sassafras (*Sassafras albidum*) or spicebush (*Lindera benzoin*). Other common caterpillar host plants in the Midwest include: alfalfa (*Medicago sativa*), hollyhock (*Alcea rosea*), tulip-tree (*Liriodendron tulipifera*), wisteria (*Wisteria* spp.), mallows (*Malva* spp.), asters, lamb's quarters (*Chenopodium album*) and thistles (*Cirsium* spp.).

Wild lupine thrives in the openings following management burns and is the sole host plant for caterpillars of the endangered Karner blue butterfly (*Lycaeides melissa samuelis*) that occurs in southwestern Michigan. Frosted elfin *(Incisalia irus),* the Karner blue, and the persius dusky wing *(Erynnis persius)* feed nearly exclusively on lupine in these areas. Where and when appropriate, planting and conservation of wild lupine on the property would be of primary importance.

The powesheik skipperling (*Oarisma powesheik),* listed as threatened in Michigan, is limited to unplowed tall-grass prairies, mainly on grassland preserves in Michigan. Populations of these species should be preserved if discovered on the property. The regal fritillary (*Speyeria idalia)* demonstrates its highest concentrations in the tall-grass prairie and mid-grass prairie regions, but also occurs in wet meadows in other areas.

Species dependent on freshwater, marshes and wet meadows, such as the bronze copper (*Lycaena hyllus),* Harris checkerspot *(Chlosyne harrisii),* Mitchell's satyr *(Neonympha mitchellii)* and the black dash *(Ehyes conspicuus)* have experienced recent

declines in several areas. Many conservationists are particularly concerned about the condition of the habitats of Mitchell's satyr in its southwest Michigan strongholds. Most of these species are found in neighboring counties, although not currently identified in Kalamazoo County.

The following are the habitat requirements for several *expected* butterflies of the county:

Black Swallowtail
Adults feed on cultivated flowers such as lilac (*Syringia* spp.), common milkweed, thistle and zinnia (*Zinnia elegans*). Males utilize moisture and nutrients from damp soils. Eggs are deposited on a variety of plants in the carrot family, often Queen Anne's lace (*Daucus carota*). Habitat includes old fields, vacant rural and urban lots, farmland and city gardens.

Spring Azure
Adults seldom feed on nectar but utilize moisture and nutrients from puddles. Eggs are laid among the flower buds of maple-leaved viburnum (*Viburnum acerifolium*) and flowering dogwood (*Cornus florida*). Habitat includes forest openings and edges and along trails in forests.

Summer Azure
Adults nectar on dogbane, common milkweed, staghorn sumac (*Rhus typhina*), spiraea, New Jersey tea and a variety of other flowers. Eggs are laid on flower heads of plants including composites, dogwood, legumes, mints (*Mentha* spp.), spiraea and sumac. Habitat is forest openings, edges, brushy fields, along roads and streamsides.

Question Mark
Adults rarely feed on nectar from flowers, but have been observed on aster, common milkweed and bog-rosemary (*Andromeda glaucophylla*). Most utilize tree sap and rotted fruit and take moisture and nutrients from damp soils. Eggs are laid on elm (*Ulmus* spp.), nettle (*Urtica* spp.), hackberry (*Celtis occidentalis*) and hops (*Humulus lupulus*). Habitat includes forest openings, edges and trails, roadsides and streamsides.

Comma
Adults rarely feed on nectar although they have been observed on common milkweed. They feed primarily on tree sap, rotted fruit and decaying organic matter and take moisture and nutrients from damp soils. Eggs are laid on elm, nettle and hops. Habitat includes forest openings, edges and trails, swamps and streamsides.

American Painted Lady
Adults take nectar from aster, red clover (*Trifolium pratense*), chokecherry (*Prunus virginiana*), dogbane, orange hawkweed (*Hieracium aurantiacum*), lilac, common milkweed, bog-rosemary and Labrador tea (*Ledum groenlandicum*). Eggs are laid on

pearly everlasting (*Anaphalis margaritacea*) and pussy-toes (*Antennaria* spp.). Burdock (*Arctium* spp.) and cudweed (*Gnaphalium* spp.) are also utilized. Habitat includes old fields, prairies, meadows, disturbed areas and roadsides.

Red Admiral
Adults take nectar on red clover, bog laurel (*Kalmia polifolia*), lilac, common milkweed, blazing-star, bog-rosemary, staghorn sumac, teasel (*Dipsacus* spp.) and joe-pye-weed (*Eupatorium maculatum*), and also feed on tree sap and rotted fruit. Eggs are laid on nettles. Habitat includes swamp openings and edges, marshes, meadows, disturbed areas, and rural and urban gardens and parks.

Viceroy
Adults feed on nectar from a variety of flowers, including aster, blackberry, bouncing Bet (*Saponaria officinalis*), goldenrod, thistle, and joe-pye-weed. They also take moisture and nutrients from damp soils, carrion and dung. Eggs are laid only on willows, frequently on sandbar willow in wetlands. Habitat includes marshes, meadows, stream and lake margins, and roadside ditches.

Odonata – Dragonflies and Damselflies
Methods
Sixteen species of dragonflies were identified on the property throughout the survey period, predominantly in the Libellulidae or skimmer family. Conditions did not allow a close enough approach for positive identification of a number of the individuals that almost certainly represented additional species. Surveys were conducted primarily by volunteers and staff members and observed species were recorded on field data forms.

Results and Discussion
Odonata identified appear in Table E. The varied habitats on the property offer good "hunting grounds" for dragonfly adults. Notably, Old Field B supported two and a probably a third species found nowhere else on the property. Several other species were generally evenly distributed.

Members of Michigan's Odonata include those that oviposit in both lentic (still water) and lotic (flowing water) systems. Most adults and juveniles are found near water, which is required for larval development. Eggs are laid in aquatic vegetation or simply dropped in shallow waters. Aquatic nymphs should be abundant in Asylum Lake and Little Asylum Lake, although a study of nymphs was not conducted for this inventory.

Predators of adult Odonata include many species of birds: falcons, kingbirds, kingfishers, herons, terns, gulls, sandpipers, blackbirds, swallows, swifts, martins and grackles. Other predators are amphibians, bats, spiders, wasps, and other dragonflies and insects. Weather is also responsible for mortality; cloudy rainy days may shorten feeding hours and windstorms may force populations into waters where they drown.

Information on habitat requirements in the literature is far from complete and typically relates only to specific family groups. However, some basic requirements in water quality, available aquatic and terrestrial substrates and vegetation are documented.

Active measures to conserve and, in some cases, rehabilitate Odonata habitats are urgently needed. Because many Odonata have stringent habitat requirements, habitat destruction and degradation due to human activity are an enormous and growing problem (Moore 1982, 1991a). Research to increase understanding of the distribution and habitat requirements of dragonflies and damselflies on the Asylum Lake Preserve would greatly benefit Asylum Lake insect diversity and would add to the general knowledge of Odonata habitat requirements.

Odonata habitat has been degraded and lost due to various causes including development for human use in agriculture, industry and housing. Other land use changes that have altered Odonata habitats are building and highway construction, drainage and reclamation of wetlands, changes in farming practice that reduce pond maintenance, and pollution by agricultural and industrial chemicals, especially pesticides (Moore 1976).

Preservation of aquatic plant species and lotic and lentic water systems is of primary importance to dragonflies and damselflies. The presence of aquatic and terrestrial vegetation structures at rendezvous sites strongly affects distribution of adults; studies have found differences in vegetation structure may affect mating success.

Larva Development

Most of the work on Odonata concerns the habitat of their larval stages. Current literature does not provide much information on the habitat elements that may be essential to a particular species. The work on larval habitats is crucial, however, because a majority of the lifecycle takes place in aquatic environments.

Larvae are generally scarce in dense mats of algae and plants because the mats may interfere with feeding techniques. They inhabit water sources containing a variety of substrates, including sediment, detritus, mud, coarse and light sands or light silt. Most damselflies (Zygoptera) and many of the Darners (Aeshnidae) utilize aquatic plants to stalk prey. The narrow wing damselflies (Coenagrionidae), some of the Aeshnidae and the emerald dragonflies (Coruliidae) hold onto submerged rocks, sticks and roots. Predators of Odonata larvae include aquatic birds, fish and large predaceous insects.

Tiger Swallowtail Larva

Dragonflies:
Suborder Anisoptera
Members of the Libellulidae family, including meadowhawks, various skimmers, the Halloween pennant, pond hawks and amberwings, found on the site breed primarily in the stagnant waters of ponds and swamps. A large majority of the dragonflies found on the Asylum Lake Preserve were in the Libellulidae family.

Members of the Gompidae family, also known as clubtails, are often found active over water and utilizing water edge structures. Hunting takes place from the ground, rocks, or logs. Females lay eggs in oxygen-rich flowing waters of stream and rivers. Only one clubtail species was reported on the preserve.

Some members of the Corduliidae, or emerald family, including the Prince Basketail found on site, lay their eggs in muddy substrates. They typically occur around swamps and ponds.

Members of the Aeshnidae, or darner family, generally occur around ponds and swamps. One species, the Common Green Darner, was found during the survey period.

The family Macromiidae, or cruisers, are found along large streams and lakes. The belted and river skimmers occur along boggy pond shores. No Macromiidae were reported on the preserve.

Damselflies:
Suborder Zygoptera
Calopterygidae are the broad-winged damselflies.
Lestidae, the spread wing damselflies, are found in swamps and ponds.
Coenagrionidae, the narrow-winged damselflies, also live around ponds and swamps, with a few found along streams.