

# Michigan Butterfly Network Handbook

Kalamazoo Nature Center  
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## Introduction

Habitat loss and fragmentation have widespread effects on their respective plant and animal communities. Land managers and stewards must decide how to best approach site restoration, management, and conservation in this new and changing world. Specifically, population decline and species loss are critical components when developing a conservation plan. In Michigan, agricultural land usage has reduced the size of native prairie lands and drained wetlands, both of which are important habitats of plant and animal species, such as native butterflies. Butterflies are charismatic biological indicators that we can use to assess the effects of habitat augmentation and the general health of an ecosystem.

Butterflies have unique life histories and specific habitat requirements. Long-term monitoring can be used to assess butterfly status and trends. Abundances can fluctuate from year to year due to sensitivities to climate and habitat structure and a multiple-year approach is necessary to assess how different species of native butterflies are responding to changes occurring in their natural environment over time. We can then use relative population densities of species in the field to assess land management programs and develop butterfly conservation programs. These methods will allow us to uncover population declines before it is too late.

How can we monitor and assess butterfly population sizes and trends at a large, statewide scale? We can do this with the help of citizen scientists! We can collect data on butterfly species and populations in a region to gather information on long-term, large-scale trends with our standard monitoring protocol (methodology). Volunteer citizen scientists across the state can gather butterfly population data in their respective communities by establishing and monitoring permanent sections over multi-year periods. Our permanent survey routes use the Pollard Walk (see Pollard 1977 on page 12 or diagram on page 7), a tried and true method for surveying butterflies.

Implementing a butterfly monitoring program throughout the state will build a picture of Michigan species and their population status and trends over time while connecting people to the outdoors. The knowledge we gain from citizen science participants in the field will contribute to regional and state-wide management programs and conservation efforts. We hope that this program will foster public interest and awareness, facilitate institutional partnerships and community engagement, and enhance knowledge and research at the regional and national scale.

This booklet is meant to be used as a reference guide as you learn to be a Michigan Butterfly Network monitor, we appreciate your time and energy – we could not do this without you!

Sincerely,

Jennifer Meilinger  
Community Science Director  
Kalamazoo Nature Center  
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## Methodology: Survey Routes

What is a **survey route**?

A survey route is a path that you establish and survey 6 or more times throughout the summer field season, either by yourself or with a scribe. This route will be established once at the beginning of your project and will not change. A **survey route** is a fixed path (though not necessarily linear) that an observer walks to record all observed butterflies within a specific distance. This is essentially a corridor that you walk through at a constant pace (approx. 5-7 minutes per 100 meters, or 110 yards) and record all butterflies within 5 meters (16 feet) on either side, in front of, and above you. The best way to think of this is imagining yourself in a box that extends 5 meters to your left, your right, as well as above and in front of you. Note that you do not survey butterflies behind you. Survey routes can pass through one habitat type or many. A new **section** will begin each time the habitat changes and be recorded with a new letter of the alphabet (ex: section A). For example, if your survey route starts out in a woody wetland and then crosses into a prairie (herbaceous upland), then the survey route will consist of two sections, **Section A** in the woody wetland and **Section B** in the prairie. If the survey route crosses back into the forested wetland, then it would be **Section A** again. Your survey route can be made up of continuous sections of varying lengths but the start and end points of each section should be clearly marked and the habitat type that they occur in should be recorded. This information is recorded only once and is recorded on the **Site Information Form**.

Your survey route will be one **continuous** line with no breaks in surveying. If your survey route passes through a large parking lot or mowed area, it will be listed as a different habitat type (and thus, a new section). Habitat designations are also found on the Site Information Form. Quantify the difference between a low intensity developed area (a suburban yard) and a high intensity developed area (a large parking lot or development with less than 20% vegetation).

Sometimes a survey route will consist of a path that you follow out and return on the way back, like many paths that go to an overlook. In this case, one must only record butterflies on the way to the end point, or returning, **but not both**.

Where to **locate survey routes**?

It is most important to locate routes in places that can be continually monitored year after year so that we can track changes in the abundance and diversity of butterflies that use the site. In general, survey routes are best located in parks, nature preserves, wildlife refuges, or other natural areas that occur in your local area. In fact, surveys can be located in any sort of habitat, but these places should be easily accessible for surveys, and owned by some sort of government or institution, as privately owned land may change hands and access may change. A survey route should:

- Have **sections** that designate different habitats.
- Take advantage of **existing trails** where possible.
- Be **easy to locate** (by you and others) and be **repeatable** in subsequent years (by you or others).
- Require anywhere from 30 minutes to 4 hours to complete at a constant (slow) pace.
- Be .1 – 4 miles in length (if walking at the constant rate recommended above, it will take about 80 minutes to walk one mile – this does not include time to identify butterflies).

Using the above criteria, and the help of a local land manager or Butterfly Network partner organization, you should decide on a site and route where you would like to monitor butterflies. However, you should keep in mind that routes that work well on paper are not always easily accessible once in the field. Therefore it is important to walk your potential route and contact the Butterfly Network ([butterflynetwork@naturecenter.org](mailto:butterflynetwork@naturecenter.org)) to verify that it falls within the scope of this project before you begin to monitor. In many cases a partner institution will have monitoring sites that have already been mapped from which you can choose based on your location.

How do we determine the **habitat types** in a survey route?

Different butterflies are found in different habitats and therefore it is important that we monitor butterflies in an array of habitat types to get accurate information on Michigan's butterflies. **It is important that we all use the same criteria to determine the habitat types of each section within the survey route so that we can compare data from sections across Michigan.** These designations are described below and are also found on the Site Information Form, which is available at the end of this packet. You should pick one of the following designations for each section on your survey route and then add further description as you find necessary. If you have any questions about designating habitats, remember to think 'big picture' if a habitat seems to change for only 10 meters, then **do not** designate a new habitat type, it is likely just a variable habitat, and that is fine. You can always snap some photos of confusing areas and send them to the Butterfly Network Coordinator ([butterflynetwork@naturecenter.org](mailto:butterflynetwork@naturecenter.org)) and we can help you decide. This portion of the monitoring occurs only once (before your first survey route run) so take your time and do it carefully.

Listed below, are the designations of natural areas commonly found in Michigan. These designations are used to describe the habitats that are found within the survey routes in the *Site Information Form*. New sections will begin with each new habitat. **The choices to be used in the data sheets are listed in bold.** These are not all of the habitats in Michigan, so use your own judgement to describe additional habitats.

#### **Habitat Types:**

1. Developed - Areas characterized by a high amount (30% or greater) of constructed materials (i.e. asphalt, concrete, buildings, etc.).

- **Developed, Open Space** - Includes areas with a mixture of some constructed materials, but mostly vegetation in the form of lawn grasses. Impervious surfaces account for less than 20 % of total cover. These areas most commonly include large-lot single-family housing units, parks, golf courses, and vegetation planted in developed settings for recreation, erosion control, or aesthetic purposes.
- **Developed, Low Intensity** - Includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 20-49% of total cover. These areas most commonly include single-family housing units.
- **Developed, Medium Intensity** - Includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 50-79% of the total cover. These areas most commonly include single-family housing units.
- **Developed, High Intensity** - Includes highly developed areas where people reside or

work in high numbers. Examples include apartment complexes, row houses and commercial/industrial buildings. Impervious surfaces account for 80 to 100% of the total cover.

2. Barren - Areas characterized by bare rock, gravel, sand, silt, clay, or other earthen material, with little or no "green" vegetation present regardless of its inherent ability to support life. Vegetation, if present, is more widely spaced and scrubby than that in the "green" vegetated categories (for example lichen cover may be extensive).

- **Bare Rock/Sand/Clay** - Perennially barren areas of bedrock, desert pavement, scarps, talus, slides, volcanic material, glacial debris, beaches, and other accumulations of earthen material.
- **Quarries/Strip Mines/Gravel Pits** - Areas of extractive mining activities with significant surface expression.

3. Forested Upland - Areas characterized by tree cover (natural or semi-natural woody vegetation, generally greater than 6 meters tall); tree canopy accounts for 25-100% of the cover.

- **Deciduous Forest** - Areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. More than 75% of the tree species shed foliage simultaneously in response to seasonal change.
- **Evergreen Forest** - Areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. More than 75% of the tree species maintain their leaves all year. Canopy is never without green foliage.
- **Mixed Forest** - Areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. Neither deciduous nor evergreen species are greater than 75% of total tree cover.

4. Herbaceous Upland - Upland areas characterized by natural or semi-natural herbaceous vegetation; herbaceous vegetation accounts for 75-100 % of the cover.

- **Grasslands** - Areas dominated by upland grasses and forbs. In rare cases, herbaceous cover is less than 25 %, but exceeds the combined cover of the woody species present. These areas are not subject to intensive management, but they are often utilized for grazing.

5. Shrubland Upland - Areas characterized by natural or semi-natural woody vegetation with aerial stems, generally less than 5 meters tall. Also included are both evergreen and deciduous species of shrubs and young trees that are small or stunted because of environmental conditions.

- **Shrubland** - Areas dominated by shrubs; shrub canopy accounts for 25-100% of the cover. Shrub cover is generally greater than 25 % when tree cover is less than 25%. Shrub cover may be less than 25% in cases when the cover of other life forms (i.e. herbaceous or tree) is less than 25% and shrubs cover exceeds the cover of the other

life forms

6. Wetlands - Areas where the soil or substrate is periodically saturated with or covered with water.

- **Woody Wetlands** - Areas where tree cover greater than 1.5 meters tall account for 25-100% of the cover and the soil or substrate is periodically saturated with or covered with water.
- **Shrub Wetland**- Includes wetlands dominated by woody vegetation less than 5 meters in height. Total vegetation coverage is greater than 20%.
- **Herbaceous Wetlands** - Areas where perennial herbaceous vegetation accounts for 75-100 % of the cover and the soil or substrate is periodically saturated with or covered with water.
- **Other** – If you have verified that the wetland is another habitat type (hanging bog, calcareous fen, etc. please use this)

7. Planted/Cultivated - Areas characterized by herbaceous vegetation that has been planted or is intensively managed for the production of food, feed, or fiber; or is maintained in developed settings for specific purposes. Herbaceous vegetation accounts for 75-100% of the cover.

- **Pasture/Hay** - Areas of grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops, typically on a perennial cycle. Pasture/hay vegetation accounts for greater than 20% of total vegetation.
- **Cultivated Crops** - Areas used for the production of annual crops, such as corn, soybeans, vegetables, tobacco, and cotton, and also perennial woody crops such as orchards and vineyards. Crop vegetation accounts for greater than 20% of total vegetation. This class also includes all land being actively tilled.

8. Oldfield (Abandoned Agricultural Field, etc.) - An area characterized by abandoned farmland or other previously landscaped land that is no longer maintained and has not been purposefully planted.

9. Savanna (Oak Openings, Burr Oak Plain, Oak-Pine Barrens, Wooded or Shrub Grassland, etc) - Any area where scattered trees and/or shrubs occur within a habitat dominated by grasses or non-woody vegetation. Oak trees in savannas typically have wide branching arms, because they grew up in full sunlight. These can range from 20-80% tree cover.

## Mapping the Survey Route

**Mapping your survey route is an important part of pre-butterfly monitoring.** The map you create allows us to visualize where you walk when completing your survey route, to track changes over time, and record its location for future monitors. This information will allow us to keep track of all of the survey routes throughout the state of Michigan and help us determine

where new ones should be located in the future.

**This portion of your monitoring duties is only done once.** This is very important and please do not hesitate to contact us with any questions, if you are frustrated by this experience, please stick with it. It is the last step to finish before you get to start your butterfly survey walks!

## Creating a Map

Google Maps Engine is a tool found within the Maps Application of Google. In order to create a Google Map with the Engine tool, you will have to create a Google email account, if you do not already have one. Here is the webpage: <https://www.google.com/maps/d/u/0/>

## Survey Procedure

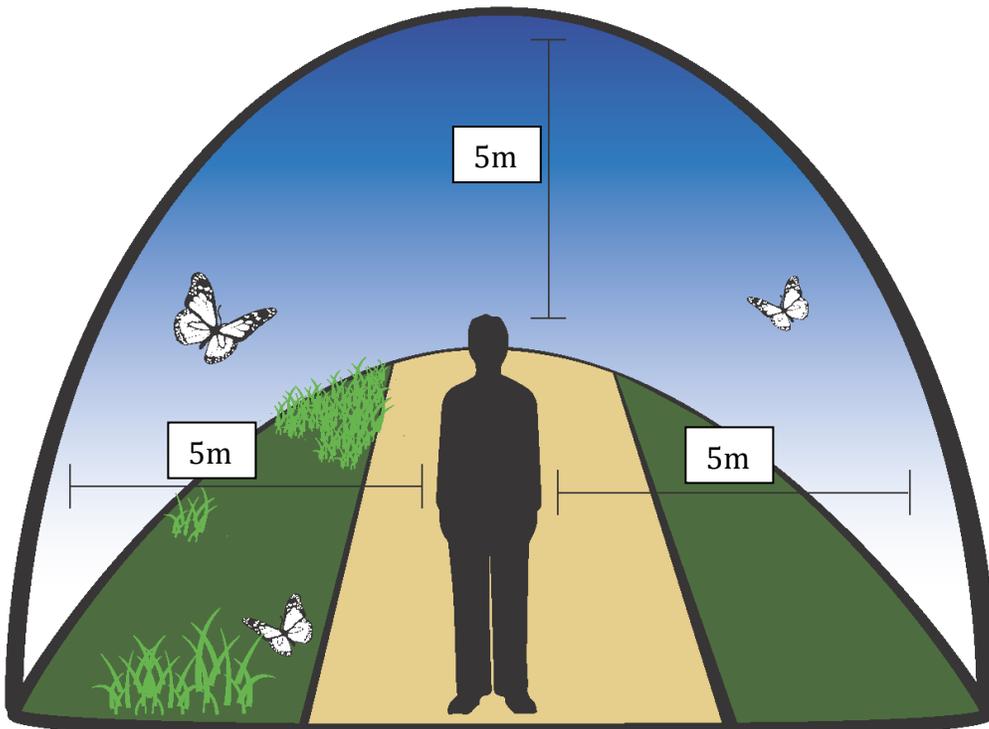
In order to have valuable scientific data, all surveys need to have a universal or standard procedure. A protocol is an official procedure and our protocol needs to follow specific criteria at each site:

- For each survey route run a single observer (monitor) is responsible for all butterfly identification.
- A monitor may be accompanied by another person as a recorder (scribe) which can improve the focus of monitors. Although a scribe can help monitors identify a noticed butterfly, they are not allowed to point out butterflies. Only the monitor can spot a butterfly in the field.
- For each survey route run the monitor must:
  - a **Walk** at a constant pace: Approximately (and no faster than) 5-7 min per 100 meters. Practice walking survey routes within this time period to get a feel for the rate at which to walk.
    - On a practice run, take a measuring tape to become familiar with the 5 meter band on each side within which you will be monitoring.
    - Keep in mind, this timing may be different depending on terrain. For example, walking through a bog or walking up steep hills may take longer. This is OK.
  - b **Pause** only to identify and record all butterflies within your survey corridor. You can also pause to chase and capture fast moving individuals to better identify them, but make sure to return to the departure point to resume. Short pauses do not need to be recorded, but longer pauses should be timed and noted.
  - c **Identify** species to the greatest degree of certainty in the field. If species is unknown, record as 'unknown' and (if possible) identify post-run using photographs or field guides. Record the finest level of identification that you can, be it family, genus, or species.
  - d **Record** all species sighted within 5 meters on either side of the survey route in the timed period using the **Monitoring Data Collection Form**.

- e **Review** the data form upon completion, double checking the accuracy and legibility of survey data.
- A survey run should:
  - a Occur **six** or more times per season: June 1 to September 1. **Four** of the **six** runs should take place before July 20. No more than one run per week. Monitors may complete more than six surveys per season, and may run more surveys before and after the season.
  - b Take place between the hours of **10 AM** and **4:30 PM** when butterflies are assumed to be most active. Runs may last 1 – 4 hours depending on the length of the route and the number of butterflies sighted.
  - c Take place only on **clear** and **calm** days with a temperature of at least 70 degrees. Please fill in this climate info on your Monitoring Data Collection Form accurately. You can survey on a cool and cloudy day, but you will likely not encounter as many butterflies.

**Important Note:** You should not be doing any other activities while you are monitoring, such as walking your dog, photographing, taking someone on a tour of the site or taking time to make detailed observations of other animals or plants. These activities can distract you from monitoring and may cause you to miss seeing some butterflies.

Below is a visual of the Pollard Walk. Butterfly monitors will record butterflies 5 meters to their right, left, as well as head and above them. Never record butterflies behind you.



## Data Recording

Data recording is a very important part of the process and should be taken just as seriously as identifying butterflies! We recommend that you familiarize yourself with the data forms and ask any questions you might have **before** you conduct your first survey. For this project there are two types of data forms.

The **Site Information Data Form** is used to record specific information about your survey route and the habitat designations of your survey route and sections. This data form should be filled out once you have determined where your survey route will be before you begin to monitor. **It only needs to be completed once.** You will notice that the habitat designations are located at the bottom of the site information form and these should be referenced when you are designating the habitat in each of your sections. There is ample room on this form for you to make notes about your sections including what type of vegetation or species of plants occur. Examples of information you will want to record include i.e. this section is along a power line, or e.g. this section is a forested upland consisting mostly of maple and beech trees. *Refer to the Habitat Designations Section on [pages 3-5](#) for further detail.*

The second data form is the **Monitoring Data Collection Form** and this is used to record your butterfly observations every time you survey (a minimum of **six** times per season). You will need to fill out a new Monitoring Data Collection Form for every survey. As a general rule, you should fill out all the general information including weather, date, monitor, and site before you begin walking your survey route so that you are not distracted from observing butterflies. Monitors may have a silent scribe that is responsible for filling in the data form while the monitor concentrates on identification. This scribe will **not** assist in spotting butterflies. After you have finished each survey, it is important to double check your data and verify that you have completed all fields on the data form. In addition to recording your butterfly observations, you will also use this data form to record critical information about the survey including start/end time, breaks in survey time, if there was a scribe or not, and weather (temperature, wind speed, and wind direction) during each survey route run. This information is very useful when interpreting the data and will allow us to answer such questions like how butterflies cope with hot or cooler weather during the season. On the back of the Monitoring Data Collection Form you will notice that there is extra room to record observations before/after a survey occurs. Additionally, there is room to record any specific changes that occur at each section (ex: Section A was recently mowed).

On the **Monitoring Data Collection Form**, you will notice that the butterfly species are grouped by the family to which they belong. Furthermore, both the scientific and common names are present. It is important to remember that you should only identify a butterfly to the level that you are comfortable, for instance it is ok to identify a butterfly as a skipper in the *Hesperiidae* family. In this situation, you would simply mark the butterfly in the field marked skipper under the correct section. If you happen to identify a butterfly species that does not occur on the data form, you can simply write in the species name in the available space at the bottom of the data form under the appropriate section for the survey.

**Important Note for Data Accuracy:** An intense transition zone dividing distribution for plants and butterflies transects Michigan from Muskegon to Midland. It is not definitive but is helpful when considering whether you are likely observing some species like Pearl or Northern Crescents and Eastern Tiger or Canadian Tiger Swallowtails as well as some other butterfly species that live north or south of that line. You might find both

species of crescents or swallowtails north or south of the line but Pearl Crescents rapidly diminish northward and Northern Crescents southward. The same is true for Eastern and Canadian Tiger Swallowtail. Learning minor differences on appearance of the butterflies is required to separate them. To be most accurate it might be best to list Pearl/Northern Crescent or Eastern/Canadian Tiger Swallowtail. The farther you are from the intense transition zone will make it easier to decide on the species. Kalamazoo supports Eastern Tiger Swallowtails.

## After the Run

We encourage all monitors to record your data and hours online each time after you complete the route. We use the PollardBase database to collect all butterfly monitoring data. This site requires each observer to create an account and password. *We suggest making your login simple and easy to remember, for example first initial and your last name.* If your home institution records your monitoring hours please remember to record them after each run.

### Entering your data into Pollardbase

- Go to [www.PollardBase.org](http://www.PollardBase.org) and create a username and password
- You must then wait for moderators to approve you (we try to check the site daily during the spring!)
- Email [butterflynetwork@naturecenter.org](mailto:butterflynetwork@naturecenter.org) with your name, contact information, and the site you will be monitoring (we need to keep track of assigned and unassigned survey routes!)
- If you created a new site and shared the Google Map, a moderator will contact you to let you know when your site is uploaded into the database
- Double check all data and information. Be careful when entering start/stop times and dates!
- Enter survey route data online after each run at [www.PollardBase.org](http://www.PollardBase.org)

### Creating a Google Map in Gmail

- The website to create a **new** butterfly survey route map is as follows:
  - Go to [www.google.com/maps/d/u/0/](http://www.google.com/maps/d/u/0/) and login in with your Gmail account
  - Click on the three black horizontal bars on the top left hand side of the page
  - Choose "Create a New Map"
- If you created a "New Map" and shared the Google Map, a moderator will contact you to let you know when your new site/map is uploaded into the database.
- Double check all data and information and please be very careful when entering start times, start times and dates!
- Enter survey route data online after each run at [www.PollardBase.org](http://www.PollardBase.org).

## Safety

- **Consider using the "buddy system" when monitoring, especially if you are on a wetter site where you are wading in water.** Any time you are in a natural area, you must consider safety. This second person can function well as a scribe. You would call out each butterfly as you identified it, and the scribe would then record it on the field form for you.

- **If you do go out alone, set up a check-in system with someone. (The Butterfly Network Director will help you with this if needed.)** You would call this person before you went into the field, run your route, and then check in with them once you were done. If they didn't hear from you within a specified length of time, they would come to find you, or notify the authorities, or both. You would need to establish this ahead of time.
- **EXTREMELY IMPORTANT: If you are allergic to bee stings, carry a bee sting kit.** Never make an exception to this rule. Make sure to also go directly to the hospital after using your kit. It is not a cure; it merely gives you time to get help.
- **Use caution using trees as support in wetland habitat.** Poison sumac oils cause skin irritation and rashes, which is found in the bark and leaves of the tree. If contact is made avoid touching eyes, wash hands and clothes with cool soapy water.
- **Carry drinking water.** It can get quite hot in the field. Take precautions against heat exhaustion.
- **Carry a cell phone if you have one.** It's a good idea whenever you are in the field or away from the car.

## Butterfly Identification

Identifying butterflies in the field can be challenging, but with proper training and a bit of practice recognizing species and the key features will become increasingly straightforward. Participants may come from diverse backgrounds in education or experience. It is important to recognize this experiential gradient in the training and learning process. New monitors should concentrate on learning common butterfly species in the region and on developing an eye for common features.

In the field, many true butterflies can be observed while foraging on flowers and can be easily netted and studied up close. An essential component to the learning and identification process is a good field guide that has clear illustrations and noteworthy features of butterfly species (see Appendix for field guide suggestions). Monitors should be comfortable using their chosen field guide and always carry it in the field when in need of information or identification verification.

Butterfly anatomy is the primary feature to use when keying out identifying characteristics. Monitors should be comfortable with parts of the body and how to use them for species identification. The basic size and shape of the wings (small, medium, large) is a great starting point and important to make comparisons. Color and pattern of the wings and their markings is the next general step in species identification and differentiation. We recommend introducing anatomy and wing terminology in monitor training sessions.

Butterfly behavior is also an important feature that you can use to distinguish species. Butterflies often have distinctive flight patterns or feeding behaviors. Does an individual soar high, flutter slowly, or bob low in flight? For example, one can easily distinguish Monarchs from Viceroy's using differences in flight behavior, Monarchs glide in flight while Viceroy's do not. Swallowtails continuously flutter their wings while feeding, a behavior distinctive from afar. Location and timing of an observation can also be a helpful hint, as many species have habitat preferences or are active at certain times of the season.

Skippers are small, fast moving and thus hard to catch. Monitors should concentrate on learning the common 10-20 species at their sites with the help of a field guide. Many skippers look the same so knowing wing patterning and coloration along with having a lot of practice will help in pegging a tricky skipper.

Thus using a “GISSSS” approach, or “General Impression, Size, Shape, Sweep, and Seasonality”, is helpful for identification purposes. It can also be helpful to know butterfly families and their familial characteristics for identification. Taken together, monitors should get used to using several tools in their identification “toolbox” to key out individuals in the field at a sightings notice. Accuracy is very important, however, we recognize that in the field it can be tough to accurately identify fast-moving individuals or those that you are unfamiliar with. Thus monitors should record observations based on level of certainty (i.e. to family, etc.) and not guess on identification.

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## Appendix A: Equipment

### Books

*Field Guide to Butterflies of North America* by Brock and Kaufman

*Peterson Field Guide to Butterflies* by Opler- superb text information, but lacks good pictures

### Popular books more specific to Michigan:

*Butterflies and Skipper's of Michigan* by Mo Nielsen

*Butterflies of Michigan* by Jaret Daniels

### Nets

BioQuip Products

Website: <https://bioquipinc.com/product-category/equipment/nets-accessories/>

Acorn Naturalists, [www.acornnaturalists.com/store/](http://www.acornnaturalists.com/store/), search for Field Insect Net.

Forestry Suppliers, Inc., [www.forestry-suppliers.com](http://www.forestry-suppliers.com), PO Box 8397, Jackson, MS 39284-8397.  
(800) 647-5368. Economy Insect Nets, 15" hoop, 3' wooden handle, polyester net.

### Binoculars

Any reliable brand is acceptable. Several factors make a lot of difference; others are personal preference. The main factors to consider are listed below.

Close Focusing: maximum is the 6 to 8 foot range. Jeffrey Glassberg warns that the close focus can vary greatly from pair to pair, even in the same model, so try out your individual pair before buying.

Power: between 7 and 10. This number is the first number in the binocular description (e.g. 7 in 7x42) and means that the object will appear to be that many times closer to you than it actually is (e.g. 7 times closer). Try out various powers. In this range, personal preference is the main factor.

Brightness: This is not all that important, unless you are looking for savanna butterflies. The second number in the binocular description (e.g. 42 in 7x42) is the diameter of the lens in millimeters (mm). The larger the diameter, the more light will be admitted. Other factors can also impact how much light is transmitted, but this is a good starting guide.

## Appendix B: Southwest Michigan Beginner's Checklist

### General Characteristic and Marking Facts:

- Moth vs. Butterfly: antennae are the sure way to tell moths from butterflies. Moths have no club; butterflies do have clubs at end
- For the most part, butterflies fly during the day and moths fly at night
- When butterflies land it's with precision, when moths land it's like an airplane crashing
- Four surfaces to learn: forewing, hindwing, upper side (dorsal), underside (ventral)
- Male and female can be somewhat different in coloration or markings
- Color shade is variable; shades vary between individuals so do not count on color for identification characteristic
- Size can be misleading! Be careful not to misidentify "runts" based solely on size

### Monitors should learn these 25 species in preparation for their first monitoring season:

- 1 American Copper
- 2 American Lady
- 3 Black Swallowtail
- 4 Cabbage White
- 5 Clouded Sulphur
- 6 Common Wood Nymph
- 7 Eastern Comma
- 8 Eastern Tailed Blue
- 9 Eyed Brown
- 10 Great Spangled Fritillary
- 11 Little Wood Satyr
- 12 Monarch
- 13 Mourning Cloak
- 14 Northern Pearly Eye
- 15 Orange Sulphur
- 16 Painted Lady
- 17 Pearl Crescent
- 18 Question Mark
- 19 Red Admiral
- 20 Red-spotted Purple
- 21 Spicebush Swallowtail
- 22 Spring Azure
- 23 Summer Azure
- 24 Tiger Swallowtail
- 25 Viceroy

## Appendix C: Butterfly Species of Michigan

### Swallowtails

- \*Black Swallowtail (*Papilio polyxenes*)
- Giant Swallowtail (*Papilio cressphontes*)
- Pipevine Swallowtail (*Battus philenor*)
- \*Spicebush Swallowtail (*Papilio troilus*)
- \*Eastern Tiger Swallowtail (*Papilio glaucus*)
- Zebra Swallowtail (*Eurytides marcellus*)
- Canadian Tiger Swallowtail (*Papilio canadensis*)

### Whites and Sulphurs

- \*Orange Sulphur (*Colias eurytheme*)
- \*Cabbage White (*Pieris rapae*)
- Checkered White (*Pontia protodice*)
- Cloudless Sulphur (*Phoebis sennae*)
- \*Clouded Sulphur (*Colias philodice*)
- Dainty Sulphur (*Nathalis iole*)
- Southern Dogface (*Colias cesonia*)
- Falcate Orangetip *Anthocharis midea*
- Little Yellow (*Eurema lisa*)
- Olympia Marble (*Euchloe olympia*)
- Mustard white (*Pieris napi*)
- West Virginia White (*Pieris virginianensis*)
- Pink-edged Sulphur (*Colias interior*)

### Coppers & Harvester

- \*American Copper (*Lycaena phlaeas*)
- Bog Copper (*Lycaena epixanthe*)
- Bronze Copper (*Lycaena hylus*)
- Gray Copper (*Lycaena dione*)
- Dorcas Copper (*Lycaena dorcas*)
- Purplish Copper (*Lycaena helloides*)
- Harvester (*Feniseca tarquinius*)

### Hairstreaks

- Acadian Hairstreak (*Satyrium acadica*)
- \*Banded Hairstreak (*Satyrium calanus*)
- \*Coral Hairstreak (*Satyrium titus*)
- Early Hairstreak (*Erora laeta*)
- Edwards' Hairstreak (*Satyrium edwardsii*)
- \*Gray Hairstreak (*Strymon melinus*)
- Hickory Hairstreak (*Satyrium caryaevorum*)

- Northern Oak Hairstreak (*Satyrium favonius ontario*)
- Juniper Hairstreak (*Callophrys gryneus*)
- Striped Hairstreak (*Satyrium liparops*)
- White M Hairstreak (*Parrhasius m-album*)

### Elfins

- Brown Elfin (*Callophrys augustinus*)
- Eastern Pine Elfin (*Callophrys niphon*)
- Frosted Elfin (*Callophrys irus*)
- Henry's Elfin (*Callophrys henrici*)
- Hoary Elfin (*Callophrys polios*)

### Blues

- \*Eastern Tailed Blue (*Everes comyntas*)
- Greenish Blue (*Plebejus saepiolus*)
- Karner Blue (*Lycaeides melissa samuelis*)
- Rearkirt's Blue (*Hemiargus isola*)
- Silvery Blue (*Glaucopsyche lygdamus*)
- \*Spring/Summer Azure (*Celastrina ladon/neglecta*)

### Metalmarks

- Swamp Metalmark (*Calephelis muticum*)

### Satyrs & Wood Nymphs

- \*Appalachian Brown (*Satyrodes appalachia*)
- \*Eyed Brown (*Satyrodes eurydice*)
- \*Little Wood-Satyr (*Megisto cymela*)
- Mitchell's Satyr (*Neonympha mitchellii*)
- \*Northern Pearly-eye (*Enodia anhedon*)
- \*Common Wood-Nymph (*Cercyonis pegala*)
- Common Ringlet (*Coenonympha tullia*)
- Jutta Arctic (*Oenesis jutta*)
- Chryxus Arctic (*Oeneis chryxus*)

### Nymphalids

- \*American Painted Lady (*Vanessa virginiensis*)
- \*Aphrodite Fritillary (*Speyeria aphrodite*)
- Atlantis Fritillary (*Speyeria atlantis*)
- Baltimore Checkerspot (*Euphydryas*)

phaeton)  
 Bog Fritillary (*Boloria eunomia*)  
 \*Common Buckeye (*Junonia coenia*)  
 \*Eastern Comma (*Polygonia comma*)  
 Goatweed Leafwing (*Anaea andria*)  
 Gorgone Checkerspot (*Chlosyne gorgone*)  
 Gray Comma (*Polygonia progne*)  
 \*Great Spangled Fritillary (*Speyeria cybele*)  
 Hackberry Emperor (*Asterocampa celtis*)  
 \*Meadow Fritillary (*Boloria bellona*)  
 \*Milbert's Tortoiseshell (*Nymphalis milberti*)  
 \*Mourning Cloak (*Nymphalis antiopa*)  
 \*Painted Lady (*Vanessa cardui*)  
 \*Pearl Crescent (*Phyciodes tharos*)  
 \*Question Mark (*Polygonia interrogationis*)  
 \*Red Admiral (*Vanessa atalanta*)  
 \*Red-spotted Purple (*Limenitis arthemis astyanax*)  
 Regal Fritillary (*Speyeria idalia*)  
 \*Silver-bordered Fritillary (*Boloria selene*)  
 Silvery Checkerspot (*Chlosyne nycteis*)  
 American Snout (*Libytheana carinenta*)  
 Tawny Emperor (*Asterocampa clyton*)  
 Variegated Fritillary (*Euptoieta claudia*)  
 \*Viceroy (*Limenitis archippus*)  
 Tawny Crescent (*Phyciodes batesii*)  
 Harris' Checkerspot (*Chlosyne harrisii*)  
 Compton Tortoiseshell (*Nymphalids vaualbum*)  
 White Admiral (*Limenitis arthemis arthemis*)  
 \*Monarch (*Danaus plexippus*)

### **Spread-winged Skippers**

Arctic Skipper (*Carterocephalus palaemon*)  
 Common Checkered-Skipper (*Pyrgus communis*)  
 Columbine Duskywing (*Erynnis lucilius*)  
 Common Sootywing (*Pholisora catullus*)  
 Dreamy Duskywing (*Erynnis icelus*)  
 Grizzled Skipper (*Pyrgus centaureae*)  
 Hoary Edge (*Achalarus lyciades*)  
 Horace's Duskywing (*Erynnis horatius*)

Juvenal's Duskywing (*Erynnis juvenalis*)  
 Mottled Duskywing (*Erynnis martialis*)  
 Northern Cloudywing (*Thorybes pylades*)  
 Common Roadside-Skipper (*Amblyscirtes vialis*)  
 \*Silver-spotted Skipper (*Epargyreus clarus*)  
 Sleepy Duskywing (*Erynnis brizo*)  
 Southern Cloudywing (*Thorybes bathyllus*)  
 Wild Indigo Duskywing (*Erynnis baptisiae*)

### **Folded-winged Skippers**

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

**Not sure what the exact species is? No problem. Remember, only ID an individual to the level that you are certain. If there is a shadow of doubt, opt for the higher level (family or genus).**

|                  |                                     |
|------------------|-------------------------------------|
| Polygonia sp.    | Unidentified Anglewing              |
| Polyommata sp.   | Unidentified Blue                   |
| Satyrodes sp.    | Unidentified Appalachian/Eyed Brown |
| Butterfly        | Unidentified Butterfly              |
| Chlosyne sp.     | Unidentified Checkerspot            |
| Lycaeninae sp.   | Unidentified Copper                 |
| Thorybes sp.     | Unidentified Coudywing              |
| Erynnis sp.      | Unidentified Duskywing              |
| Asterocampa sp.  | Unidentified Emperor                |
| Hesperiinae sp.  | Unidentified Grass skipper          |
| Speyeria sp.     | Unidentified Greater fritillary     |
| Theclinae sp.    | Unidentified Hairstreak/Elfin       |
| Vanessa sp.      | Unidentified Lady                   |
| Boloria sp.      | Unidentified Lesser fritillary      |
| Enodia sp.       | Unidentified Pearly-eye             |
| Amblyscirtes sp. | Unidentified Roadside Skipper       |
| Satyrinae sp.    | Unidentified Satyr                  |
| Pyrginae sp.     | Unidentified Spread-wing skipper    |
| Coliadinae sp.   | Unidentified Sulphur                |
| Papilioninae sp. | Unidentified Swallowtail            |
| Pierinae sp.     | Unidentified White                  |

## Appendix D: Michigan Butterfly Network Cheat Sheet

### Setting up a new survey route

- Only done once and *only if a new site is being created*
- Choose a site that has public access, will be available for the long-term
- Use existing trails and paths when possible
- Get landowner agreement
- Use google maps engine, step-by-step instructions in the protocol

### Walking the survey route

- Pollard Walk method – a moving box that is 5 meters to your left, right, front, and above
- 5-7 minutes/100 meters or 110 feet (Here Comes the Bride walk)
- Know what 5 meters looks like
- Do not multi-task (only butterflies when monitoring!)
- Walk at a rate that you can observe all butterflies (here comes the bride walk)
- If you break (to eat, converse, ID a butterfly) for 3 minutes or more, record it as a break
- Never record a species unless you are certain
- Record every individual butterfly you see, even if it's only unknown butterfly/skipper

### Entering your data & PollardBase

- Register on Pollardbase.org
  - All links are found on naturecenter.org/michiganbutterfly
  - Click the link under Butterfly Monitoring labeled “Learn More & Register”, scroll to Current Monitors and click “PollardBase”
  - Create new account & **\*make sure you designate your program as Michigan\***
  - Wait for moderators to approve the site. It will not be viewable to them until a moderator goes on and approves them as a new user
- If you created a site and shared the Google Map, a moderator will contact you to let you know when your site is uploaded into the database
- Enter your data as soon as possible after monitoring
  - Instructions can be found on both the PollardBase site and in the Butterfly Network protocol
- Be careful when entering start and stop times and dates (am/pm)!