



Florida Butterfly Monitoring Network

Butterfly Biodiversity Census Guidelines

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Introduction

It is increasingly important for biologists and land stewards to regularly monitor organisms that inhabit the isolated and widely scattered natural areas of Florida. As more and more wild lands are lost to development or subjected to fragmentation, it is imperative to assess current species' distribution and population trends so that appropriate conservation and management strategies can be developed. Populations of short-lived organisms such as butterflies are excellent indicators of biodiversity and ecosystem health. They react to problems in the environment such as habitat loss or degradation, pollution, invasive species, and climate change much more rapidly than longer-lived organisms, and therefore provide a sort of early warning system.

There are more than 725 species of butterflies found in North America north of Mexico. While the majority of these are regular breeding residents, still others show up from time to time as tropical vagrants. In Florida, over 180 different butterflies have been recorded – the most for any state east of the Mississippi River! Within that mix, some 40 are considered either unique to the state or occur mostly within its boundaries. Although such numbers pale in comparison to many tropical countries, the sunshine state truly boasts a rich and diverse butterfly fauna.

Much of Florida's abundant butterfly life is directly related to climate and geography. Totalling 58,560 square miles, this primarily long, narrow state represents the southernmost portion of the Southeast Coastal Plain. It has some 1350 miles of coast and is literally surrounded on all but one side by warm marine waters. This helps to temper the severity of the seasons and provides for a prolonged growing period. Additionally, Florida extends through a broad latitudinal gradient. The result is a significant variation in climate from warm temperate to nearly tropical as one moves southward through the state. This transition lends itself to high biodiversity and provides ample opportunities for year-round butterfly viewing (Daniels, 2003).

Butterflies undergo four different life stages: egg, larva, pupa, and adult. Each life stages may require specific habitat needs, such as a particular host plant for the larva to eat or a flower nectar source for the adult to gain nutrients. Except for some migratory species, the presence of adult butterflies typically indicates that a breeding population occurs in the surrounding area. Moreover, adult butterflies are relatively large (compared to the other life stages), easy to identify and occur in a wide variety of different habitats.

The Florida Butterfly Monitoring Network (FBMN) utilizes permanent census routes to survey butterflies. These routes, known as Pollard walks, allow us to measure relative butterfly densities as well as generate detailed lists of butterfly species and the habitats in which they occur (Pollard, 1977). The data generated from Pollard walks are practical and statistically manageable for long-term projects. The resulting up to date information on the distribution and population trends of both common and imperiled species will facilitate the development of appropriate conservation and management strategies thereby helping to protect Florida's precious biodiversity.

Census Route Design

All census routes are predetermined by Florida Butterfly Monitoring Network personnel in cooperation with existing park biologists or land stewards. For consistency, census route design and field methodology follow that used by our partner organization - the Illinois Butterfly Monitoring Network.

Established census routes should ideally:

- transect a variety of different habitats and/or management units
- make use of existing trails whenever possible
- be well-marked or otherwise easy to locate and repeat in subsequent years
- require less than 2 hours to complete.

It is important that census routes incorporate both open and closed habitats as well as degraded and pristine environments. Analysis of this data can provide the first indications that management practices of degraded areas are paying off.

Census routes will additionally encompass several plant communities, or management units. The plant communities traversed by the census route should be delineated and prominent features marked. This will tell observers when they have moved from one habitat to the next and to tally butterflies in the appropriate column on their data sheets.

Census Procedure

Our census data will be of real scientific value if the following criteria are met:

1) Each census, called a “route” should be taken by a single observer. Other people may accompany this observer to help in record keeping or identifying only. Only the observer should be spotting butterflies. If the observer fails to notice a butterfly, the recorder should not point it out.

2) The observer should:

- always proceed at a uniform pace.
- ideally conduct census routes between 10AM-noon or 2-4PM. conduct routes only on days with less than 50% cloud cover.
- conduct routes only on days with moderate to light or no wind.
- record all species sighted within a directional radius of roughly 6 meters (20 feet) to each side of the route. Butterflies are presumed to be absent from overgrown sections (within 20 feet) where the monitor’s vision does not penetrate. Census routes should be conceptualized as corridors, 12 meters (40 feet) in width. Each butterfly will be tallied on the data sheet.
- record the plant community of each section of the census route. Each census route will cover major habitats and management units, known as transects. Observers will need to record the plant community on their data sheets under the corresponding letter.

- pause briefly to chase, capture, and identify fast-moving or elusive individuals, returning to departure point to resume route. Brief pauses will not be recorded. Longer pauses should be timed and noted on the census field form. This is especially important as butterfly densities are calculated as the number of butterflies recorded within an interval of space and/or time.
- never do any other activities while monitoring. Other activities, like taking someone on a tour of the site or collecting other data, will distract from your monitoring, causing you to miss seeing some butterflies.
- maintain accurate and detailed data sheets, making sure to include the start and stop time of each census run as well as all other data.
- never remove any butterfly from the site, for photography or identification.
- make the best identification possible. Never mark a species if you are not certain. Feel free to consult field guides for verification, or mark species as “unidentified” if there is some question.

Filling out the Butterfly Biodiversity Census Data Sheet

1. **Locality:** Write down both the name of the larger area and the transect name that is surveyed within that area, eg. C-4 Area, Transect 1. On your data sheet, mark the habitat type, eg. A=scrub pine, B= mowed roadside, etc. at the top of each column.
2. **Date:** Always include the day, month, and year the survey is conducted. This is useful to determine seasonal variation and abundance trends for the butterflies.
3. **Observer:** List the names of all the people that go on the survey walk, but note which is the ONE person that is the butterfly recorder.
4. **% sunshine:** Note the percent of time the sun was shining during the survey using the following code:
 - 1= 0-25%
 - 2= 26-50%
 - 3= 51-75%
 - 4= 76-100%
5. **Temperature:** Take a °F reading from an outside thermometer, or make your best estimate of the temperature, e.g. “low 80s.”
6. **Wind:** Use the following code to estimate wind speed in miles per hour:
 - 1= <1 mph; smoke rises vertically
 - 2= 1-3 mph; wind direction shown by smoke drift
 - 3= 4-7 mph; wind felt on face, leaves rustle
 - 4= 8-12 mph; leaves and small twigs in constant motion
 - 5= 13-20 mph; raises dust and loose paper, small branches are moved

7. % cloud cover: Note the percent of the sky that is covered by clouds when recording commences.
8. Comments: Note any general comments you have about the weather or conditions that day, e.g. “prescribed burn in progress, light smoke in the air.” There is a space at the end of the survey for you to make additional notes, eg. whether you needed to stop for more than 5 minutes to rest or identify a butterfly.
9. Start and stop time: It is VERY important that you note the time you begin and end your survey.
10. Totals: When you are finished with your surveying, add up the total number of each species in each row in the right-most column. Then total the number of each family seen.
11. Butterfly counts: Make a hatch mark for each individual of a species in the column that represents the plant habitat transect in which the individual was seen. Make sure that you mark the correct transect as you move from A to B, etc. Take care not to score the same individual butterfly more than once and don’t make a positive ID if you are not certain. Identify it to family and mark it “unknown.”

Safety Precautions for Observers

1. Carry drinking water in the field.
2. Wear appropriate field clothing and footwear.
3. Wear sunscreen and a hat.
4. If you have one, carry a cell phone in case of emergency.
5. If you go out alone, set up a check-in time with someone.
6. If you are allergic to bee stings, carry a bee sting kit.
7. Watch your feet! Be aware that there are snakes in the area and take care when you are running after butterflies.

Family Nymphalidae (Continued)	A	B	C	D	Total
<i>Phyciodes phaon</i> , Phaon Crescent					
<i>Vanessa atalanta</i> , Red Admiral					
<i>Junonia coenia</i> , Common Buckeye					
<i>Siproeta stelenes</i> , Malachite					
<i>Limenitis archippus</i> , Viceroy					
<i>Anartia jatrophae</i> , White Peacock					
<i>Hermeuptychia sosybius</i> , Carolina Satyr					
<i>Danaus plexippus</i> , Monarch					
<i>Danaus gilippus</i> , Queen					
Unknown Nymphalidae					
Additional Nymphalidae:					
Family Lycaenidae: Gossamer-winged B'flies					
<i>Strymon melinus</i> , Gray Hairstreak					
<i>Calycopis cecrops</i> , Red-banded Hairstreak					
<i>Eumaeus atala</i> , Atala					
<i>Hemiargus ceraunus</i> , Ceraunus Blue					
<i>Leptotes cassius</i> , Cassius Blue					
Unknown Lycaenidae					
Additional Lycaenidae:					
Family HesperIIDae: Skippers					
<i>Urbanus proteus</i> , Long-tailed Skipper					
<i>Pyrgus oileus</i> , Tropical Checkered Skipper					
<i>Polites vibex</i> , Whirlabout					
<i>Hylephila phyleus</i> , Fiery Skipper					
Unknown HesperIIDae					
Additional HesperIIDae:					
Notes:					

Training Outline

Indoors

1. "Butterfly 101"
 - what is a butterfly?
 - descriptions of life stages and behavior
 - why are they good indicators of diversity?
 - when and where do I find butterflies?
 - discussion of nectar sources
2. Butterfly net usage
 - basic techniques for catching butterflies
 - techniques for removing butterflies from the net
 - both procedures will be practiced in the field
3. Identification
 - importance of a proper ID
 - identification on the wing and in your hand
 - discussion of important characteristics including size, color, shape, and flight patterns
 - slide presentation of all butterfly families
 - discussion of distinguishing characteristics for difficult IDs
 - using the field guides
 - what do I do if I still don't know what species it is?
4. Safety precautions

Outdoors

1. Practice proper net usage.
2. Practice catching butterflies and removing them from the net.
3. Introduction to identification in the field.
4. Become familiar with the beginner's checklist.
5. Walk the course and identify various plant community transects.
6. Realize the extent of your "corridor" as you are sampling, i.e., how far is 20 feet?

Butterfly Identification

It can be helpful for identification to be able to know in which family a butterfly belongs. Learning the species in terms of familial characteristics can quickly narrow the possibilities when looking up a butterfly in a field guide. Initial observations like size, general wing color, wing markings like bands and eyespots, and flight pattern are often characteristic of certain families. Although there are many more families and sub-groupings, we will be identifying butterflies into 6 different families.

Butterfly Families

Papilionidae	Swallowtails
Pieridae	Whites and Sulphurs
Lycaenidae	Gossamer-winged Butterflies
Riodinidae	Metalmarks
Nymphalidae	Brush-footed Butterflies
Hesperiidae	Skippers

Butterfly Family Characteristics and Tips on Differentiation Between Similar-Looking Species

Papilionidae – Swallowtails

- Large-sized butterflies
- Long-hindwing tails (exception: *Polydamus* Swallowtail lacks tails)
- Swift and powerful flight, often several meters off the ground
- Often seen visiting flowers; flutter wings while feeding

<i>Battus polydamus</i> - Polydamus Swallowtail	*lacks tails*
<i>Battus philenor</i> - Pipevine Swallowtail	* iridescent blue hindwings*
<i>Papilio polyxenes</i> - Eastern Black Swallowtail	* red hindwing eyespot w/black dot*
<i>Papilio troilus</i> - Spicebush Swallowtail	*pale green-blue marginal spots *
<i>Papilio palamedes</i> - Palamedes Swallowtail	*black w/ broad yellow dorsal band*
<i>Papilio cresphontes</i> - Giant Swallowtail	*brown, crossing bands of yellow spots*
<i>Papilio glaucus</i> - Eastern Tiger Swallowtail	* yellow, black forewing stripes
<i>Eurytides marcellus</i> - Zebra Swallowtail	*long, slender tails*

Pieridae – Whites and Sulphurs

- Small- to medium-sized butterflies
- Typically shades of white or yellow; but sexually dimorphic; seasonally variable
- Flight is rather quick and erratic, often low to the ground
- Often visit flowers; wings together over the back while feeding

<i>Ascia monuste</i> - Great Southern White	*white wings, blue-tipped antennae*
<i>Pontia protodice</i> -Checkered White	*black and white checkered wings*
<i>Phoebis sennae</i> - Cloudless Sulphur	*large and yellow*
<i>Zerene cesonia</i> -Southern Dogface	*Pointed forewings*
<i>Eurema nicippe</i> –Sleepy Orange	*orange above with black borders*
<i>Eurema daira</i> - Barred Sulphur	*dorsal black forewing bar*
<i>Eurema lisa</i> - Little Sulphur	*lacks dorsal forewing bar*
<i>Nathalis iole</i> - Dainty Sulphur	*smaller than <i>E. daira</i> *

Nymphalidae – Brush-footed Butterflies

- Only 4 walking legs, + 2 “brush feet”
- Greatest variability in size, color, and wing shape
- Often have eyespots, bands, or other wing markings

<i>Agraulis vanillae</i> - Gulf Fritillary	*elong. orange wings, black spots*
<i>Heliconius charitonius</i> - Zebra Longwing	*elong. black wings, yellow stripes*
<i>Phyciodes phaon</i> - Phaon Crescent	*small, orange w/dark spots/bands*
<i>Vanessa atalanta</i> - Red Admiral	*white spots, red band on forewing*
<i>Anartia jatrophae</i> - White Peacock	*white with orange margin*
<i>Junonia coenia</i> - Common Buckeye	*eyespots and orange bands*
<i>Limenitis plexippus</i> – Viceroy	*black post-median hindwing line*
<i>Limenitis arthemis</i> - Red-Spotted Purple	* iridescent blue hindwings*
<i>Danaus plexippus</i> – Monarch	*larger than mimics, bright orange*
<i>Danaus gilippus</i> – Queen	*dorsal veins not outlined in black*
<i>Hermeuptychia sosybius</i> - Carolina Satyr	*dark lines, many small eyespots*
<i>Megisto cymela</i> - Little Wood Satyr	*large and yellow-rimmed eyespots*

Lycaenidae – Gossamer-winged Butterflies

- Small butterflies
- Often have bright blue wings ventrally; sexually dimorphic; may be gray or brown; dorsally wings may have bands or small spots; wings may have small tails
- Quick and erratic flight; often low to the ground
- Often visit flowers; wings held together over their back at rest; may rub hindwings together
- Frequent open, disturbed sites with weedy vegetation to dense woodlands

<i>Strymon melinus</i> - Gray Hairstreak	*slate gray*
<i>Calycopis cecrops</i> - Red-banded Hairstreak	*broad red band 1-side edged white*
<i>Parhassius m-album</i> - White-M Hairstreak	*hindwing w/white M and red spot*
<i>Satyrrium [Fixsenia] favonius</i> - Southern Hairstreak	*long tails; wide red marginal patch*
<i>Leptotes cassius</i> - Cassius Blue	*hindwing w/2 eyespots*
<i>Hemiargus ceraunus</i> - Ceraunus Blue	*hindwing w/1 black spot w/orange*

Hesperiidae – Skippers

- Small- to medium-sized butterflies
- Robust, hairy bodies and relatively compact wings
- Generally brown, may be orange
- Antennae have distinct hooks at the tip
- Quick, erratic flight, usually low to the ground
- Often visit flowers

<i>Epargyreus clarus</i> - Silver-Spotted Skipper	*Large; white ventral patch*
<i>Urbanus proteus</i> - Long-tailed Skipper	*blue-green body*
<i>Pyrgus oileus</i> - Tropical Checkered Skipper	*hairy; white and black
<i>Hylephila phyleus</i> - Fiery Skipper	*orange w/small spots*
<i>Polites vibex</i> - Whirlabout	*orange w/large spots

Beginner's Checklist of Common Florida Butterflies

Family Papilionidae: Swallowtails

<i>Battus polydamus</i>	Polydamus Swallowtail
<i>Battus philenor</i>	Pipevine Swallowtail
<i>Papilio polyxenes</i>	Eastern Black Swallowtail
<i>Papilio troilus</i>	Spicebush Swallowtail
<i>Papilio palamedes</i>	Palamedes Swallowtail
<i>Papilio cresphontes</i>	Giant Swallowtail
<i>Papilio glaucus</i>	Eastern Tiger Swallowtail
<i>Eurytides marcellus</i>	Zebra Swallowtail

Family Pieridae: Whites and Sulphurs

<i>Ascia monuste</i>	Great Southern White
<i>Pontia protodice</i>	Checkered White
<i>Phoebis sennae</i>	Cloudless Sulphur
<i>Phoebis philea</i>	Orange-Barred Sulphur
<i>Eurema daira</i>	Barred Sulphur
<i>Eurema nicippe</i>	Sleepy Orange
<i>Eurema lisa</i>	Little Sulphur
<i>Nathalis iole</i>	Dainty Sulphur

Family Riodinidae: Metalmarks

<i>Calephelis virginensis</i>	Little Metalmark
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Family Lycaenidae: Gossamer-winged Butterflies

<i>Strymon melinus</i>	Gray Hairstreak
<i>Calycopis cecrops</i>	Red-banded Hairstreak
<i>Leptotes cassius</i>	Cassius Blue
<i>Hemiargus ceraunus</i>	Ceraunus Blue

Family Nymphalidae: Brush-footed Butterflies

<i>Agraulis vanillae</i>	Gulf Fritillary
<i>Heliconius charitonius</i>	Zebra Longwing
<i>Dryas iulia</i>	Julia
<i>Phyciodes phaon</i>	Phaon Crescent
<i>Vanessa atalanta</i>	Red Admiral
<i>Junonia coenia</i>	Common Buckeye
<i>Anartia jatrophae</i>	White Peacock
<i>Limenitis arthemis</i>	Red-Spotted Purple
<i>Limenitis plexippus</i>	Viceroy
<i>Hermeuptychia sosybius</i>	Carolina Satyr
<i>Danaus plexippus</i>	Monarch
<i>Danaus gilippus</i>	Queen

Family Hesperidae: Skippers

<i>Urbanus proteus</i>	Long-tailed Skipper
<i>Pyrgus oileus</i>	Tropical Checkered Skipper
<i>Hylephila phyleus</i>	Fiery Skipper
<i>Polites vibex</i>	Whirlabout