North Carolina Pollinator Identification Guide

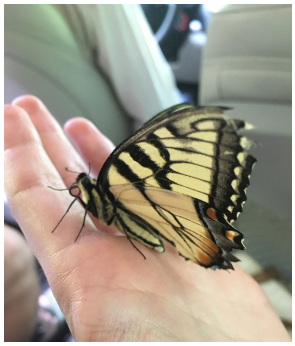
North Carolina Wildlife Federation

THE BUTTERFLY HIGHWAY
A PROGRAM OF THE NC WILDLIFE FEDERATION

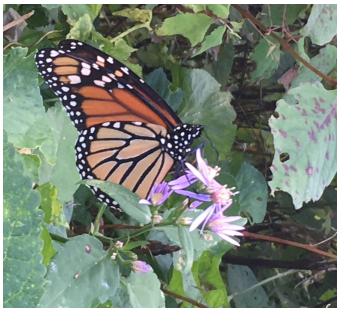
www.ncwf.org

Table of Contents: Pollinator ID Guide

Introduction:



The purpose of this pollinator identification guide is to educate wildlife stewards on common pollinators that are endemic to North Carolina. Pollinators are vastly important to the health of our ecosystems and to the production of our food. With growing concern over the loss of viable habitat for our pollinators, NCWF is committed to the education on the importance of pollinator gardens and gardening for wildlife. We hope that this pollinator identification guide will encourage viewers to learn more about the pollinators that can be found in their homes and neighborhoods as well as their important ecological services.



This guide also includes a few examples of endangered or threatened pollinator species to help emphasize the need to increase pollinator habitat. Endangered species often rely on specific conditions in an environment in order to survive, but climate change and urban sprawl have reduced viable habitat by shifting average temperatures of an ecosystem, reducing numbers of available host plants, and polluting natural areas. The ability to identify pollinators in our backyards strengthens human-wildlife connections in our communities and helps spread awareness for habitat conservation. Education and individual actions are key to the preservation of these disappearing species.

Bees, Ants, and Wasps: Hymenoptera Order

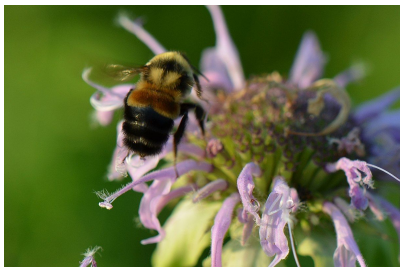
There are more than 500 species of native bees found in North Carolina. Bees are considered the most efficient pollinators due to their deliberate action of collecting pollen to feed their young. Most bees also have a furry body, making it easy for pollen to stick to them and be carried to other flowers. While it can be very challenging to identify a bee to the species level, NCWF has listed the major groups found in North Carolina, along with a few key characteristics. Other resources are provided for more education on our native bees under our resources page.

5 Bee Families in NC:

- Mining Bees- (Andrenidae) These bees can be smaller or larger and typically nest in large aggregations. They emerge in early spring. 130 species of Andrenidae species are native to NC.
- Polyester Bees- (Colletidae) These bees can range in size and also nest in large aggregations. Many line their nests with cellophane-like substance to waterproof their nests. 39 species are native to NC.
- Sweat Bees- (Halictidae) These bees are commonly known as sweat bees, due to their habit of drinking sweat for the salt content. This bee family exhibits a diverse sociality between species. They have a less precise way of pollen collection. 133 species are native to NC.
- Leafcutter, Mason, and Resin Bees- (Megachilidae) These bees collect pollen on hairs on the underside of their abdomen. There are 104 species native to NC.
- Honeybee, Carpenter Bees, Bumble Bees- (Apidae) Apidae is a catch-all for anything that doesn't fit into the other families making it a very diverse family of bees and preventing any generalization of the family. Pollen collecting hairs are located on the hind legs and are often referred to as "pollen baskets". There are 152 species native to NC.

Endangered or Threatened Bees:

- **Rusty-Patched Bumblebee**
  - **Scientific Name**: *Bombus affinis*
  - **Family**: Apidae
  - **Identification:** Identified by the rust-colored patch on the abdomen of worker bees. Black circular spot of hairs in the center of thorax that come to a v shape at the bottom
  - **Habitat and Ecology**: Their range extends mainly to the NC mountains, mainly taking up residence in prairies or grasslands. They nest in old rodent sites or in clumping native grasses and they also need undisturbed soil for overwintering.
  - **Conservation Status:** Critically Endangered



- **Reason for decline:** Habitat loss, pesticide use, and pathogens from managed bees have caused their decline.

- **Yellow-banded Bumble Bee**

  - **Scientific Name:** *Bombus terricola*
  - **Family:** Apidae
  - **Identification:** Yellow-banded bumble bees have black heads with a yellow band right before the wing pads and another yellow band on the abdominal segment. Queens are typically larger than the males.
  - **Habitat and Ecology:** Occupy a diversity of habitats from woodlands and prairies to urban areas and farmlands. Like many other bumble bees, these bees nest in the ground, on the ground or in pre-existing cavities. Queens typically overwinter under leaf litter and rotting logs. Overwintering queens emerge in the spring, create a nest and lay their eggs, and provide nectar and pollen for the new generation. In the fall, new queens mate and find a place to overwinter to begin the cycle again next year.
  - **Conservation Status:** Vulnerable
  - **Reason for decline:** North Carolina has not been assessed for the conservation status of this bumble bee but its range used to be over much of the eastern and western United States and into Canada. Decline is suspected to be caused by habitat loss, pesticide use, and pathogens spread from managed bees.

Common Bees:

- **Mining Bees**

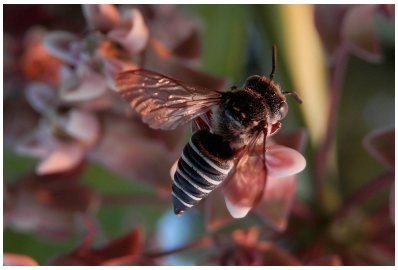
  - **Scientific Name:** *Andrena spp.*
  - **Family:** Andrenidae
  - **Identification:** Most species-rich genus in NC. Three submarginal cells on the wings. Males have yellow hair, extensive marking or both while the females have yellow hairs on the depression near their eyes. This feature distinguishes them from the Colletidae family.
  - **Habitat and Ecology**: Mining bees are solitary nesters and will build nests in bare, well-draining soil areas. Even though they are solitary nesters, they may still nest in large aggregation in early spring. They can be seen flying from February until October but the peak of their flight occurs from March to May.
- **Yellow-Faced Bees**

  - **Scientific Name:** *Hylaeus spp.*
  - **Family Name:** Colletidae
  - **Identification:** These are small bees with no hairs for pollen collection. Their face can be almost entirely yellow and can have a wasp-like appearance.

- **Habitat and Ecology:** These bees do not collect pollen on their bodies and instead have evolved to carry pollen and nectar in their stomachs to carry it back to their nests. This accounts for their hairless appearance. They typically begin flying in May and into November but their peak of flight can be observed in June and July.

- **Mason Bees**
  - **Scientific Name:** *Osmia spp.*
  - **Family:** Megachilidae
  - **Identification**: Metallic green/blue coloration
  - **Habitat and Ecology**: Mason bees nest in pre-existing cavities and use mud to partition their nests. They carry pollen on hairs on their back and abdomen. The majority of these bees emerge in April and by July they have laid their eggs and are done flying.

- **Leaf Cutter Bees**
  - **Scientific Name**: *Megachile spp.*
  - **Family**: Megachilidae
  - **Identification**: Most species have several bands of white hairs on their abdomens with their lower abdomen often having yellow or white hairs as well.
  - **Habitat and Ecology:** These bees use leaf material to line nests. They fly from April to October with a peak of activity happening in June and September.



- **Cuckoo Leafcutter Bees**
  - **Scientific Name:** Megachile spp.
  - **Family:** Megachilidae
  - **Identification:** Cuckoo leafcutter bees are a native bee that is distinguished by its pointed "tail", black and white striped abdomen and red-tinted or all black legs.
  - **Habitat and Ecology:** The female cuckoo leafcutter bees will lay their eggs in other leafcutter bees' nests using their pointed abdomens to break into the cells. There are about 14 species of cuckoo leafcutter bees in North Carolina with the majority of them having a peak flight period in the summer and in September.

- **Sweat bees**
  - **Family Name**: Halictidae
  - **Identification**: Sweat bees are often small with a variety of coloration between species. While some may have black bodies, most sweat bees have a metallic blue or green coloration.
  - **Habitat and Ecology:** They are called sweat bees because they will often drink sweat in order to obtain salts and minerals. Some may be independent while

others live in social colonies. They nest in underground tunnels, fallen logs or pre-existing cavities. While many species of sweat bees will fly from March until November, the peak for most NC sweat bees flying is in July.

- **Bumble Bees**
  - **Scientific Name**: *Bombus spp.*
  - **Family:** Apidae
  - **Identification:** A larger bee that typically has white or yellow hair on the upper part of their abdomen. Noticeable "pollen baskets" on their hind legs where they collect pollen.
  - **Habitat and Ecology:** Bumble bees typically nest in colonies that they build in old rodent holes, birdhouses, or grass tussocks. They often use a specific kind of pollination called "Buzz pollination" where they beat their wings at a certain frequency to dislodge pollen. They can be found flying from March until December with a peak of bumble bee flight happening from June to August.

- **Long-horned Bees**
  - **Family:** Apidae
  - **Identification:** These are large bodied bees that have pollen collecting hairs on their hind legs. The males sport a very long antennae which earned these bee's their common name.
  - **Habitat and Ecology:** These bees fly from June to October with their peak flight period occurring from July to August.

- **Carpenter Bees**
  - **Scientific Name**: *Xylocopa spp.*
  - **Family:** Apidae
  - **Identification:** These are larger bees with black, hairless abdomens. Females have an all black head while the males have a yellow spot on their face.
  - **Habitat and Ecology:** Carpenter bees build their nests by excavating into dead wood. These bees are larger than most, but unlike bumblebees, these bees do not have any hair on their abdomen. They fly from March to October with the peak of their flight typically occurring in May.

Wasps:

While wasps are largely feared for their stingers, these insects play a vital role in our ecosystems. Wasps are important in population control of insects, mainly by eating spiders, tobacco hornworms, or potato beetle grub. Many wasps are parasitoids, meaning that they will lay their eggs in other insect's bodies or eggs which then grow inside the host eventually killing it. While insect prey is a wasp's main diet, wasps often visit flowers for supplemental nutrients by sipping on nectar. When this is the case, wasps partake in pollination services.

- **Thread-Waisted Wasps**
  - **Family**: Sphecidae
  - **Identification:** Distinguishing thin abdomen giving these wasps their common name. Most have an all black coloration with some having green or blue metallic colors as well.

  - **Habitat and Ecology**: These wasps usually nest in the ground in conditions similar to ground nesting bees, exposed bare and well-draining soil. While these wasps often predate on spiders and grasshoppers, they are also found supplementing their diet with nectar and pollen. They lack hair on their bodies making them less efficient pollinators in comparison to bees but can still be found transferring pollen as they visit flowers.

Ants:

Ants can be seen sipping nectar from a flower, however, their smooth bodies and biology result in poor pollination services. Ants are not efficient pollinators, and only a select few have been researched enough to be considered as such. Most plants that are pollinated by ants are low-growing with inconspicuous flowers that grow at a uniform height.

- **Field Ant:**
  - **Scientific Name:** *Formica schaufussi*
  - **Identification:** A medium-sized ant with orange-red coloration and a dark colored abdomen.
  - **Habitat and Ecology:** This ant is very common and its range extends across the eastern United States. It has the ability to live in several different habitats, however, the plant that it is known to pollinate only grows on granite stonecrops. The plant it is known to pollinate in North Carolina is the "Small's stonecrop" (*Diamorpha smallii*) which is a winter annual that blooms in March.

Butterflies and Moths: Lepidoptera Order

Butterflies are commonly sighted in gardens and are very popular amongst gardeners and wildlife lovers. These intriguing insects fly from spring to early fall and are attracted to gardens that provide their main food source: nectar. Rather than collecting pollen, these butterflies land on flowers to sip the sugary nectar that is secreted from inside the flower. There are around 175 butterflies native to North Carolina, however, NCWF has listed a few that are most commonly seen in pollinator gardens.

Groups of Butterflies Followed by Scientific Family:

- Swallowtails- (Papilionidae) large butterflies with tails on their hind wings. Rest with wings open.
- Whites and Sulphurs- (Pieridae)Small to large butterflies with rapid fluttering flight. Most are white, yellow or orange. Whites rest with wings open while Sulphurs rest with wings folded.
- Hairstreaks- (Lycaenidae) Small butterflies with a fast and sporadic flight pattern. Most rest with their wings folded back.
- Blues- (Lycaenidae) Small to very small butterfly with a fluttering and sporadic flight pattern. Sit with wings folded or partly open.
- Longwings and Fritillaries- (Nymphalidae) longwings are larger and mostly tropical butterflies. Fritillaries are a medium size and mainly orange and black. They usually rest with wings spread.
- Crescents and Checkerspots- (Nymphalidae) Fairly small butterflies, flying fast and low to the ground. Rest with wings spread open.
- Typical Brushfoots- (Nymphalidae) Highly varied group that range from small to large sizes. Usually fly with alternating flaps and glides. Many have an irregular wing shape.
- Satyrs- (Nymphalidae) Medium size brown butterflies with a bouncy flight pattern. Typically found in woods or fields. Sit with wings folded.
- Spread-Wing Skippers- (Hesperiidae) Small and stout bodied butterfly. They have a fast flight pattern and dull coloration on wings. Most rest with wings open but a few rest with wings folded.
- Grass Skippers- (Hesperiidae) Mostly small butterflies with stout bodies and short wings. Have a fast flight pattern and usually have a “jet-plane” structure of wings when resting. The hindwings are open while the forewings are folded.

Endangered in North Carolina:

- **St. Francis Satyr**
  - **Scientific Name:** *Neonympha mitchellii francisci*
  - **Group:** Satyr
  - **Identification:** Small, brown butterfly with two orange bands on the wing margins. These butterflies have 3-4 eyespots on the inside of the orange bands below the forewing and 5-6 jewel eyespots below the hindwing. They rest on foliage with their wings closed. Males typically emerge before the females and will patrol areas in search for them.

  - **Habitat and Ecology**: These butterflies are only found in marshy wetlands on Fort Bragg. They prefer sunnier locations and rely on disturbance by fire and beaver dams for the creation of their habitat. They typically have two broods from May to September and exhibit a bouncy flight pattern that is low to the ground.
  - **Larval Host Plant**: Larvae feed on sedges.
  - **Conservation Status**: Endangered
  - **Reason for decline:** The St. Francis satyr lost habitat due to fire suppression on Fort Bragg and the extirpation of beavers from that area. A soldier who discovered the butterfly was also a butterfly collector and collected the only known population to extinction. More populations have now been found and a breeding program is in place to help the recovery of this butterfly.
- **Monarch**
  - **Scientific Name**: *Danaus plexippus*
  - **Group:** Brushfoots
  - **Identification**: Large orange wings with black stripes. White polka-dots line the wing margins and dot the body of the butterfly. The males have a black dot on the hind wings while the females do not.

  - **Habitat and Ecology:** The monarch butterfly is a migrating butterfly that can be found in both eastern and western parts of the US and up into Canada. They spend their winter months overwintering in central Mexico where they congregate in mass in treetops. Monarchs typically have 4-5 broods in the year with the last brood making the habitual migration back to their overwintering site.
  - **Larval Host Plant**: Larvae feed solely on milkweed plants.
  - **Conservation Status**: Least Concern
  - **Reason for decline**: Habitat loss both in the United States due to pesticide use and urban sprawl. Habitat loss in Mexico due to expanding avocado plantations and other encroaching industries.

Commonly Butterflies:

- **Tiger Swallowtail**

  - **Scientific Name:** *Papilio glaucus*
  - **Group:** Swallowtail
  - **Identification:** Large butterfly with yellow wings and black tiger stripes. Males are yellow but females can be yellow or black. The yellow bands on the forewing are broken up into spots that may appear blue and red.
  - **Habitat and Ecology**: Found in forests and along streams but are often found in gardens. Typically have 2-3 broods from spring until fall.
  - **Larval Host Plant**: Tiger Swallowtail larvae eat from a variety of trees and shrubs including cottonwood, tulip tree, sweetbay, cherry and more.
- **Zebra Swallowtail**

  - **Scientific Name**: *Protographium marcellus*
  - **Group:** Swallowtail
  - **Identification**: The Zebra swallowtail has long tails on the hind wings and a distinctive white and black zebra striped pattern. The underside of the hindwing shows a bright red stripe as well.
  - **Habitat and Ecology**: Typically found in moist woods and fields in the eastern states. They 2-3 broods from spring to summer in the south. They exhibit a swift flying pattern with a side-to-side wavering flight close to the ground.
  - **Larval Host Plant:** Zebra Swallowtail larvae feed on pawpaw trees.
- **Pipevine Swallowtail**

  - **Scientific Name**: *Battus philenor*
  - **Group:** Swallowtail
  - **Identification**: Pipevine swallowtails are black with subdued spots near the wing margins. The males exhibit a blue-green iridescence on their hind wings while the females are more black. The hindwings show a blue iridescence with orange spots near the wing margins.

  - **Habitat and Ecology:** Typically found in open habitats and gardens. Pipevine swallowtails will have 2-4 broods from spring until fall. They are characterized further by their low and rapid flight pattern and quick fluttering of wings.
  - **Larval Host Plant:** The pipevine swallowtail larvae eat pipevines which make them poisonous to eat. Predators typically avoid these butterflies and anything that has a similar pattern to them. Both the spicebush swallowtail, Red-spotted purple, female Tiger Swallowtail,

and female Diana butterflies mimic the Pipevine's coloration and are therefore often avoided by predators.

- **Spicebush Swallowtail**
  - **Scientific Name**: *Papilio troilus*
  - **Group:** Swallowtail
  - **Identification:** The Spicebush swallowtail is mostly black with light greenish colored spots on the margins of the wings. Males typically have a flush of greenish white on the hindwings while the females have a more bluish color. The hindwings have two orange spot bands whereas the Pipevine only has one.

  - **Habitat and Ecology**: Found in wooded areas and exhibits a slow flight pattern close to the ground. The coloration of this butterfly mimics the pipevine swallowtail, a poisonous butterfly, and warns off predators as a result. Typically flies from spring until fall and has 2-3 broods in the year.
  - **Larval Host Plant:** The Spicebush swallowtail larvae feed on spicebush, sassafras and other plants in the laurel family.
- **Palamedes Swallowtail**

  - **Scientific Name:** *Papilio palamedes*
  - **Group:** Swallowtail
  - **Identification:** The Palamedes Swallowtail is similar to the Tiger Swallowtail in size but the coloration slightly differs. The difference lies in the true brown color of the wings on the Palamedes swallowtail with a yellow postmedian band the crosses on both wings. Yellow spotted bands also color the wing margins. The hindwings exhibit lots of colors with yellow and orange bands with subdued blue colors between them.
  - **Habitat and Ecology**: Typically found on the coastal plain and eastern piedmont of North Carolina, this butterfly enjoys swampy woodlands. They typically fly from spring until summer with 2-3 broods.
  - **Larval Host Plant:** The Palamedes Swallowtail larvae feed on redbay and other laurels.
- **Falcate Orangetip**

  - **Scientific Name:** *Anthocharis midea*
  - **Group:** Whites and Sulphurs
  - **Identification:** Distinctive orange-tipped wings on the males while the females have a yellowish coloration on their wingtips. The forewings have a falcate shape on the tips which gives this butterfly its name. Hind wings and forewings are mostly white. The under wings exhibit a white and brown marble pattern.

- **Habitat and Ecology:** This early flier is one of the first butterflies to appear in the spring. They have a side-to-side flight pattern and stick relatively close to the ground.
- **Larval Host Plant:** Larvae feed on rock cress, bittercress, and other mustards.

- **Red-banded Hairstreak**
  - **Scientific Name:** *Calycopis cecrops*
  - **Group:** Hairstreak
  - **Identification:** A small gray-brown butterfly with a white postmedian lines that are edged inward by a thick red band. The blue spot on the hind wing has little to no red cap. Open wings are typically blackish brown with varying amounts of blue coloration.

  - **Habitat and Ecology:** Often found in shady areas and close to the ground with adults congregating in treetops in the late afternoon or evening. Typically have 2-3 broods in North Carolina.
  - **Larval Host Plant:** Red-banded hairstreak larvae feed on wax myrtle but may also eat rotting leaves.
- **Gray Hairstreak:**
  - **Scientific Name:** *Strymon melinus*
  - **Group:** Hairstreak
  - **Identification:** A small butterfly that is identified by the black and white post median line that is often edged with red-orange spots. The above wings are brownish-gray with a bright orange eyespot on the bottom of the hind wings.

  - **Habitat and Ecology:** They are typically found in fields, gardens, and parks. Males may sit on trees or shrubs and look for females who are ready to mate. Females will lay a single egg on top of host plant flowers. Younger caterpillars will eat the flowers and fruits while older ones may move on to eat the leaves. They may have between 2-4 broods during the year.
  - **Larval Host Plant:** Caterpillars eat the flowers of legumes, mallows, clovers and others.
- **Spring Azure**
  - **Scientific Name:** *Celastrina ladon*
  - **Group:** Blues
  - **Identification:** The topside of the males' wings have a pale blue coloration covering their entire wings while the females have a broader brown band along the wing margins with the rest of their wings pale blue or white in color. Blues tend to have an up and down flight pattern and fly rather slowly.

  -

- **Habitat and Ecology:** These small blue butterflies are a common sight and are very abundant. They begin flying in the spring and continue until fall having 1-3 broods during the year. They perch with their wings up and may gently rub them together while taking a rest.
- **Larval Host Plant:** Larvae eat a variety of plants including dogwood, viburnums and others.

- **Variegated Fritillary**

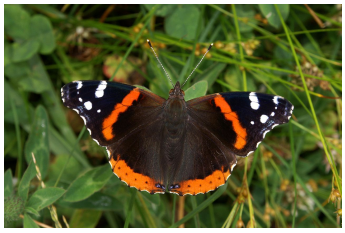
  - **Scientific Name:** *Euptoieta hegesia*
  - **Group:** Long-wings and Fritillaries
  - **Identification:** Orange and brown wings with black spots and submarginal lines that go across the wings. They have a low and direct flight pattern.
  - **Habitat and Ecology:** Commonly sighted visiting flowers in gardens but can also be found on farmlands, in meadows, and along roadsides. It flies spring until fall with 2-3 broods occurring over the course of the year.
  - **Larval Host Plant:** Larvae will eat passion flower vines, violets and other plants as well.
- **Pearl Crescent**

  - **Scientific Name:** *Phyciodes tharos*
  - **Group:** Crescents and Checkerspots
  - **Identification:** A small butterfly with orange and black markings above the wings and yellow and brown marking below the wings. They exhibit a low and direct flight consisting of a variation of flaps and glides.
  - **Habitat and Ecology:** One of the most common butterflies in the eastern United States, and is a frequent visitor of flowers. They can be found in gardens, fields, woodland edges and along streams. They fly from spring to fall having 1 or more broods during the year,with more occuring in the south.
  - **Larval Host Plant:** Larvae eat plants in the Aster Family
- **Common Buckeye**

  - **Scientific Name:** *Junonia coenia*
  - **Group:** Brushfoot
  - **Identification:** The common buckeye exhibits brownish-gray wings with multicolored eyespots with a pale-colored band on the forewings. Orange bands can also be seen on the forewings with orange coloration near the wing margins.

- **Habitat and Ecology:**Typically found in open habitats in fields, roadsides and gardens. They fly from spring to summer in North Carolina with 2-3 broods occuring.
- **Larval Host Plant:** The larvae of the Common Buckeye eat toadflax, snapdragons, monkeyflowers and more.

- **Red Admiral**
  - **Scientific Name:** *Vanessa atalanta*
  - **Group:** Brushfoot
  - **Identification:** The Red Admiral has black-brown wings with distinctive orange-red slashes going across the forewings. White spots can be found on the margins of the forewings and orange-red bands cover the margins of the hindwings.



  - **Habitat and Ecology:** The red admiral is a common butterfly across the United States and can be found in a variety of habitats from forest clearings and stream sides to fields and gardens. Their flight pattern is extremely fast and erratic, especially exhibited in males as they protect their territory from other organisms in their search for females. They typically have 2-3 broods and fly from spring to fall.
  - **Larval Host Plant:** The larvae of the Red Admiral feed on nettle, false nettle, pellitories and related plants.
- **American Lady**
  - **Scientific Name:** *Vanessa virginiensis*
  - **Group:** Brushfoot
  - **Identification:** The hindwings above have a row of spots connected by a line near the margins of the wings. The forewing above has a white dot on an orange background. Additionally on the forewing, a break between black marks on the inner part of the wing also characterizes this butterfly. The hindwings below have two large eyespots with an olive colored background.

  - **Habitat and Ecology:** The American Lady butterfly can be found in semi-open habitat and typically flies south to overwinter since it cannot survive cold temperatures. They begin flying in the spring and typically have 2-3 broods.
  - **Larval Host Plant:** The larvae of the American Lady feed on everlastings, pussytoes, and cudweeds.

- **Painted Lady**
  - **Scientific Name:** *Vanessa cardui*
  - **Group:** Brushfoot
  - **Identification:** The hindwing below has a submarginal row of 4 small eyespots. The forewing above has a heavy balck mark that is connected by a thin black line, unlike the American Lady. The hindwing above also has a row of submarginal spots that are distinct against the orange background.

  - **Habitat and Ecology:** Like the monarch, the Painted Lady cannot survive winter temperatures and therefore overwinters in Mexico. They migrate north in the spring and typically have 1-3 broods. They can be found in a variety of habitats but will often visit gardens.
  - **Larval Host Plant:** Larvae will feed on thistle, mallows, fiddleneck and others.
- **Red-spotted Purple**
  - **Scientific Name:** *Limenitis arthemis*
  - **Group:** Brushfoot
  - **Identification:** Black wings with a blue iridescence. Mimics the coloration of the pipevine swallowtail, a poisonous butterfly, which deters predators. No tails on the red-spotted purple which is a distinguishing feature between the two. Red-orange spots can be found near the margins of the hindwings.

  - **Habitat and Ecology:** Commonly found in mixed forest settings but is also frequently spotted in gardens. They typically have 2-3 broods from spring until fall.
  - **Larval Host Plant:** The larvae eat a variety of trees including willow, cottonwood, and tulip poplars.
- **Question Mark**
  - **Scientific Name:** *Polygonia interrogationis*
  - **Group:** Brushfoot
  - **Identification:** The underside of the wings may vary in overall coloration, but all question mark butterflies' main identifying feature is found in the silvery comma and adjacent dot which together form a question mark. The upperside of the wings are black and orange with a number of black dots with a single black bar near the wing margins.

  - **Habitat and Ecology:** It can be found flying in woodland openings, stream sides, and gardens. Adults will regularly fly away from their normal

breeding areas and some on the east coast even take on a short migration. They typically fly from spring to fall with two broods occurring during the summer. The second brood of adult butterflies will hibernate over the winter months and begin flying again in the spring to mate and repeat the cycle.
    - **Larval Host Plant:** The larvae eat hops, nettles, elms and hackberries
- **Carolina Satyr**

    - **Scientific Name:** *Hermeuptychia sosybius*
    - **Group:** Satyr
    - **Identification:** Small, brown butterfly with two black eye-spots below the hind wings surrounded by a yellow band. The wings above are a brown color with no distinctive shapes or bands.
    - **Habitat and Ecology:** Usually found in small grassy woodlands or wetlands. They have a bouncy flight pattern that is often just a few feet above the ground. They have 3 broods in North Carolina from spring until fall.
    - **Larval Host Plant:** The larvae will feed on a variety of grasses
- **Silver-spotted Skipper**

    - **Scientific Name:** *Epargyreus clarus*
    - **Group:** Spreadwing Skipper
    - **Identification:** A common skipper identified by its bold white patch below on the hind wing. The forewings have a pointed shape and are a dark brown in color and a golden band on the forewings above.
    - **Habitat and Ecology:** Although one of the most common skippers to visit in gardens, this skipper can also be found in forest edges and meadows. Adults typically perch with their wings closed, revealing the white colored patch on the underside of the wing. They fly from spring through summer with 1-2 broods occurring.
    - **Larval Host Plant:** Larvae feed on oaks, locusts, wisteria, and other plants in the legume family.
- **Swarthy skipper**

    - **Scientific Name:** *Nastra lherminier*
    - **Group:** Grass-skipper
    - **Identification:** Their wings above are brown with a light hint of forewing spots while their wings below are a yellow-brown color with pale yellow venation.
    - **Habitat and Ecology:** These fairly common butterflies can be found flying in meadows and roadsides where habitat is open and grassy.
    - **Larval Host Plant:** Larvae feed on little bluestem

- **Crystal Skipper**
  - **Scientific Name:** *Atrytonopsis quinteri*
  - **Group:** Grass Skipper
  - **Identification:** Small, brown butterfly classified as a grass skipper. The wings have several white spots which led to the name of the butterfly. It's head has distinctive white markings as well.
  - **Habitat and Ecology**: Only found on a 30 mile stretch on the barrier islands of North Carolina, this butterfly can be found living on grassy sand dunes. They typically have 2 broods throughout the summer. Like most skippers, the crystal skipper has a quick and darting flight pattern.
  - **Larval Host Plant**: Larvae feed only on Seaside Little Bluestem.
  - **Special Concern:** This species has been recently discovered and is considered one of the rarest species globally due to its local abundance on the outer banks of NC and nowhere else in the world. Climate change and rising sea-level threaten this species' survival.

Moths:

Moths belong to the insect order Lepidoptera, the same order as butterflies. Moths are considered important nocturnal pollinators, especially with plants that have co-evolved with moths and continue to depend on their pollination services. Moths can be difficult to identify with over 1,200 different species in NC alone. There are, however, a few specific moths that have been studied and whose pollination services are considered unique and important to specific plant species.

- **Yucca Moth**

  - **Scientific Name**: *Tegeticula yuccasella*
  - **Identification**: A small white or tan moth with its forewings being wide, blunt and white while the hindwings display a more tan or gray color.
  - **Habitat and ecology:** This moth can be found in sand dunes, pine forests or grasslands where yucca plant species are present. Adult female moths lay their eggs in the flowers of yuccas and deliberately deliver pollen from the anthers to the stigma of the flower resulting in pollination. This is to ensure seed development in which her young will depend for survival. If the yucca senses too many eggs were laid, it may choose to abort some flowers to prevent the moth larvae from eating all of its seeds.
  - **Larval Host:** Larvae feed on the developing seeds of yuccas.
- **Hummingbird Clearwing Moth**

  - **Scientific Name:** *Hemaris thysbe*
  - **Identification:** The hummingbird clearwing moth is a very unique moth as it does not fly like a typical moth and it flies during the day and at night. The flight pattern of this moth resembles that of a hummingbird as it is often seen hovering over flowers. It's wing margins and abdomen have a brownish-red color with the wings being clear towards the center.
  - **Habitat and Ecology:** Hummingbird clearwing moths are commonly found in gardens with abundant flowers present but can be found naturally in wooded areas, woodland edges and open meadows. They emerge from their overwintering cocoons in spring or early summer and visit flowers during the warmer months.
  - **Larval Host:** The larvae feed on viburnums, honeysuckle and other plants that are in the rose family.

Beetles: Coleoptera Order

While beetles are not as efficient in pollination as bees, many beetles munch on pollen which results in pollen sticking to their bodies. Many beetles such as lady beetles, checkered beetles and long-horned beetles have been seen carrying large amounts of pollen on their bodies which signifies some degree of pollination service.

- **Notched Flower Long-Horned Beetle**
  - **Scientific Name**: *Typocerus sinuatus*
  - **Identification**: These beetles have long antennae and are part of the long-horned beetle family. Their yellow and black spotted elytra (wing covers) is broad near the head and then narrows towards the abdomen. Their elytra also exhibit a dimpled texture and are notched at the ends.

  - **Habitat and Ecology**: These beetles can be found in gardens, woodlands or grasslands where they forage on flowers for pollen and nectar. Their larvae overwinter in dead and decaying logs and will stay there through the winter months.
  - **Larval Host/Food**: These beetles eat the pollen of flowering plants, including our native venus fly trap.

Flies: Diptera Order

Flies are an underrated pollinator that deserves more credit. While they are certainly less efficient at pollination than some of our native bees, they are often attracted to the same flowers that bees and butterflies visit. Flies particularly pollinate flowers that produce bad odors such as our native Skunk Cabbage, Jack-in-the-Pulpit, and Pawpaws.

- **Syrphid Flies**
  - **Family**: Syrphidae
  - **Identification**: These flies are bee mimics which have evolved over time to have similar coloration to bees but do not have any stingers. This helps the flies avoid predation by animals that avoid bees due to their sting. They are also known as Hover Flies due to their hovering flight pattern around flowers. They also differ from bees by having large, compound eyes and only one wing set instead of two.

  - **Habitat and Ecology**: Syrphid flies can often be found in pollinator gardens as they hover over flowers and eat pollen, nectar or both. These flies are beneficial to the garden, not only as pollinators, but also as pest controllers as they often lay their eggs near colonies of aphids for their predatory larvae to feed on.

Hummingbirds: Apodiformes Order

Most birds are not pollinators, but some hummingbirds are an exception. Hummingbirds are only found on the North and South America continents. It is believed that some flowers have co-evolved with hummingbirds as their main pollinator. These flowers often exhibit tubular, red or orange flowers which are found to be the most attractive to hummingbirds.

- **Ruby-throated Hummingbird**
  - **Scientific Name**: *Archilochus colubris*
  - **Identification**: The Ruby-throated Hummingbird is a small green and white hummingbird characterized by the red feathers on its throat.
  - **Habitat and Ecology**: This hummingbird is the only hummingbird to breed in North Carolina and is a common site in pollinator gardens. It is believed that many of our native flowers have co-evolved with hummingbirds as suggested by the many red and tubular flower forms. During the winter months, these hummingbirds will migrate to the tropics and return again in the spring.

Resources:

Citizen Science Project: Bumble Bee Watch
NCSU Extension Bee Identification Guide
North Carolina Butterfly Identification and Flight Charts
Moth Pollination
Syrphid Fly Pollination
Fly Pollination
Ruby-Throated Hummingbird
Wasp Pollination
Ant Pollination
IUNC Red List Conservation Status

Citations:

Bartlette, T. (2004) *Family Sphecidae - Thread-waisted Wasps.* Retrieved at https://bugguide.net/node/view/135

Frank, S. and Hicks, C. (2016) *Hoverflies – Bee mimics provide pollination and biocontrol services.* Retrieved at https://entomology.ces.ncsu.edu/2015/06/hoverflies-bee-mimics-provide-pollination-and-biocontrol-services/

IUCN 2020. The IUCN Red List of Threatened Species. Retrieved at https://www.iucnredlist.org

LeGrand, H. Butterflies of North Carolina: Their Distribution and Abundance. Retrieved at http://www.dpr.ncparks.gov/nbnc/a/accounts.php

Levenson, H. and Youngsteadt, E. (2019). *The Bees of North Carolina: An Identification Guide*. Retrieved at https://content.ces.ncsu.edu/the-bees-of-north-carolina-identification-guide

Mass Audubon (n.d.) *Hummingbird Moth (Clearwing Moth).* Retrieved at https://www.massaudubon.org/learn/nature-wildlife/insects-arachnids/hummingbird-moth-clearwing-moth

Pellmyr, Olle. 1996. *Tegeticula yuccasella* (Riley). Retrieved at http://tolweb.org/Tegeticula_yuccasella/12475

United States Department of Agriculture. *Ant Pollination*. Retrieved at https://www.fs.fed.us/wildflowers/pollinators/animals/ants.shtml

United States Department of Agriculture. *Fly Pollination*. Retrieved at https://www.fs.fed.us/wildflowers/pollinators/animals/flies.shtml

United States Department of Agriculture. *Wasp Pollination*. Retrieved at https://www.fs.fed.us/wildflowers/pollinators/animals/wasps.shtml

Winter, K. Coevolution Institute. *Ruby-Throated Hummingbird*. Retrieved at https://www.fs.fed.us/wildflowers/pollinators/pollinator-of-the-month/ruby-throated_hummingbird.shtml

Wyatt, R. (1981) *Ant-Pollination of the Granite Outcrop Endemic Diamorpha smallii (Crassulaceae).* Retrieved at https://bsapubs.onlinelibrary.wiley.com/doi/epdf/10.1002/j.1537-2197.1981.tb07827.