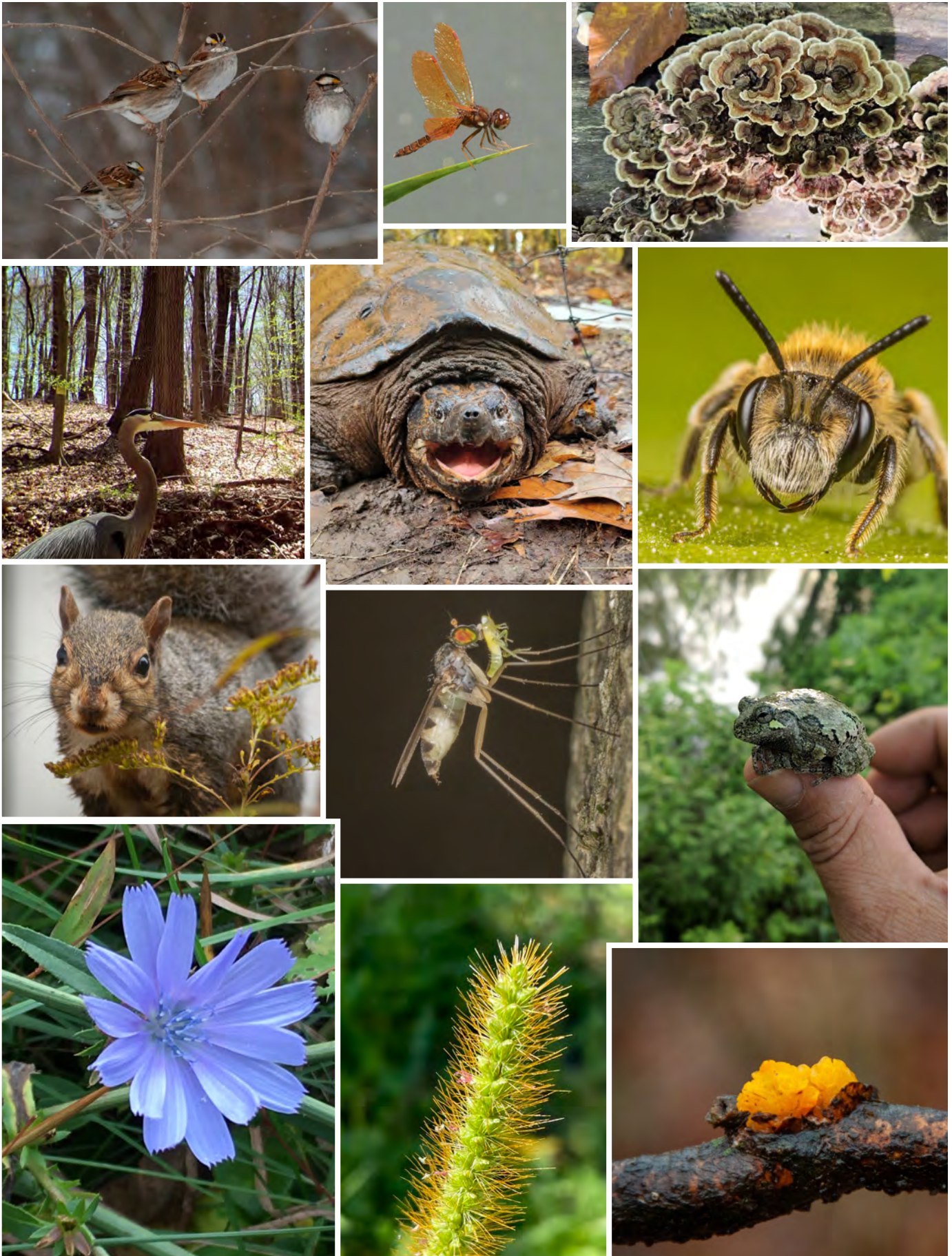


# **Honey Hollow Watershed Revisited 2022**



**An Inventory of Natural Resources**



White-throated Sparrow, MJ; Eastern Amberwing , PG; Turkey-Tail Trametes, MJ; Great Blue Heron, MC; Common Snapping, Turtle, KL; Mining Bee, DW; Eastern Gray Squirrel, MJ; *Neurigona* (long-legged fly genus with leafhopper nymph), DW; Gray Treefrog , LC; Chicory, LT; Foxtail, RR; Witch's Butter, MJ

# Honey Hollow Watershed Revisited 2022

An Inventory of Natural Resources

Solebury Township, Bucks County, Pennsylvania



JM



**Bucks County Audubon Society**  
At Honey Hollow

2877 Creamery Road, New Hope, PA 18938



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2023 Bucks County Audubon Society

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Cover photos by Deborah Glessner  
Front, Woods Edge Trail  
Back, Audubon Pond  
Facing page, south from Audubon Pond

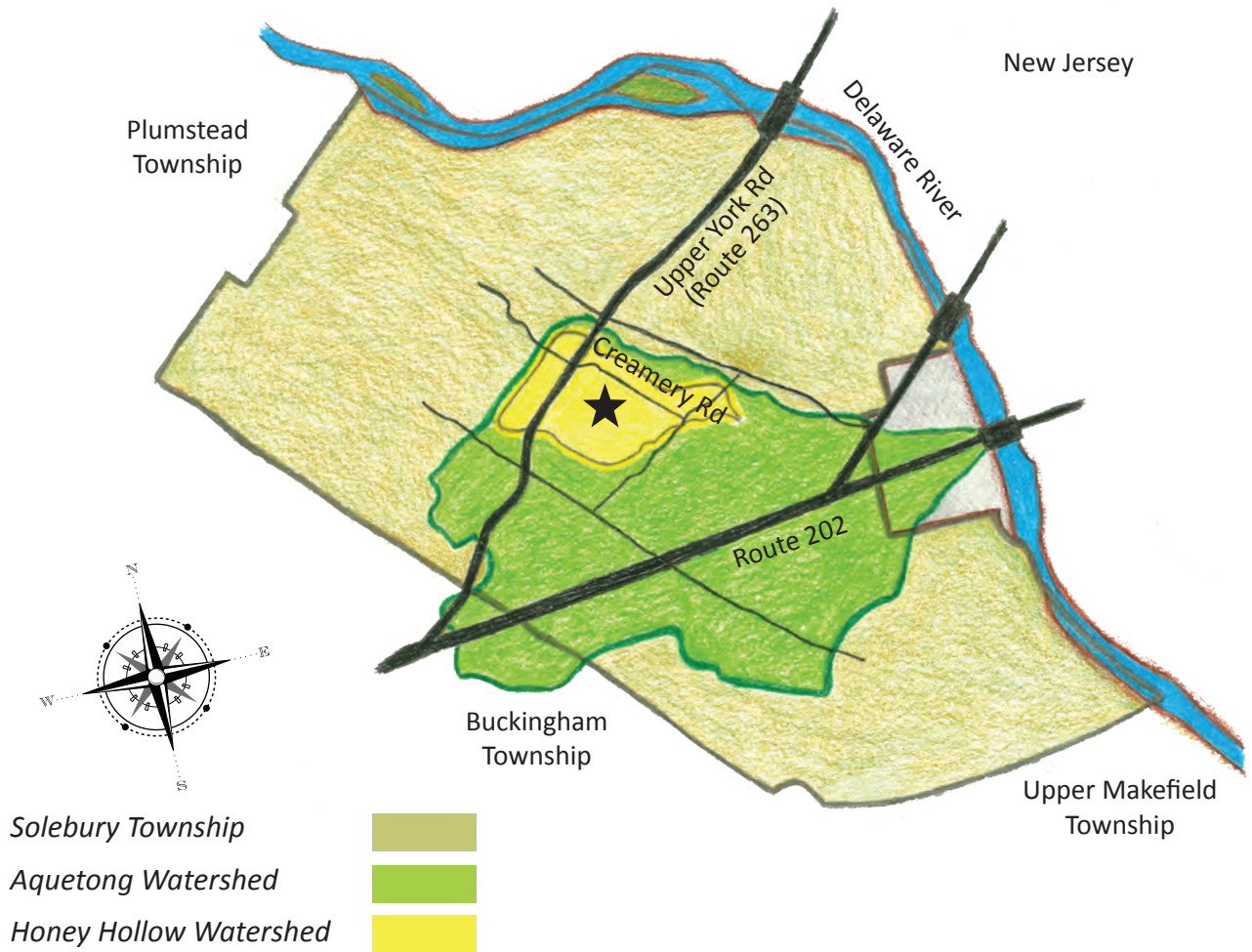




We dedicate this book to Nancy Wottrich and Bruce McNaught  
who devoted many years of skill and love to the  
Honey Hollow Watershed and the  
Bucks County Audubon Environmental Center.

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**The Burpee Foundation**

**Marshall-Reynolds Foundation**

**The McLean Contributionship**

**Bucks County Tourism Grant Program**

We are thankful to all for their vision and good faith.



Honey Hollow Creek Enters Audubon Pond, DG

## **Thanks to the Crooks Family**

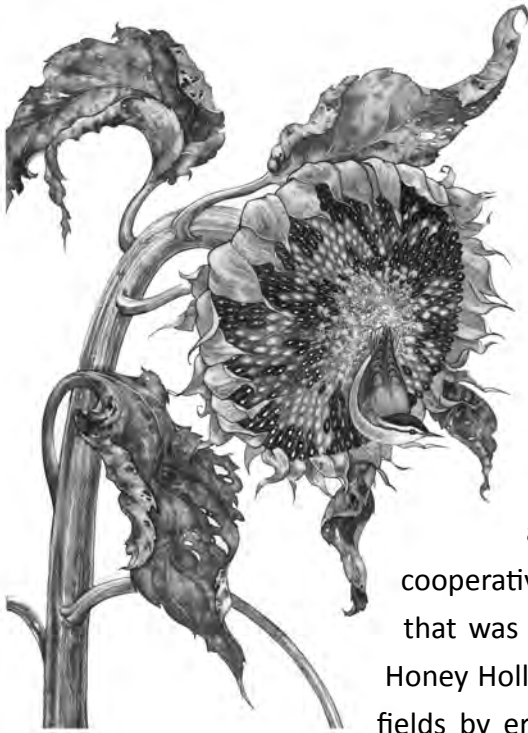
Nothing that has been accomplished at Honey Hollow would have been possible without the efforts of the Crooks Family at Tuckamony Farm. They were part of the original effort to rescue and protect the watershed and, then, to develop the Environmental Education Center. Family members' deep understanding of and love for the site has made them superb stewards of the land. Read more about Malcolm and Lars Crooks' efforts to promote sustainable agriculture and protect the resident wildlife and habitat on pages 121 and 125.

## **Remembering the Original Residents of This Land**

We respectfully acknowledge the Lenni-Lenape people, who lived in harmony with this land for thousands of years before the arrival of European settlers. In particular, we remember Peg Tuckamony, one of the last Lenni-Lenape in this area, who lived as a basket maker on this property where she died in 1928. Tuckamony Farm was named in her honor by Forrest C. Crooks.



# Foreword



Sunflower with Red-breasted Nuthatch, JG

The Honey Hollow Watershed was designated a National Historic Landmark in 1969. It was the first watershed in the country to demonstrate that wildlife conservation, flood prevention and enhanced agricultural techniques could be achieved through cooperative local action. This effort was in reaction to a crisis that was only worsening in the late 1930s. The landowners of Honey Hollow were helplessly witnessing the destruction of their fields by erosion and flooding, so they enlisted the help of the

Soil Conservation Service. Together, they implemented a cooperative plan to solve this widespread agricultural and

environmental problem, and soon attracted national attention. Even the Vice President of the United States at the time, Henry Wallace himself, visited the 700-acre watershed in 1944 to see the success. The model he witnessed was subsequently replicated many times across the state and country. Its significance was not lost on the National Park Service and eventually led to the 1969 designation as a Historical Landmark.

In 1972, Bucks County Audubon Society (BCAS) and the Honey Hollow Watershed Association had the foresight to conduct inventories of the physical and biological components of the Solebury, Bucks County site. They envisioned its future as an environmental model and education center. In that year, the Honey Hollow Watershed Association published the *Inventory of Natural Resources in a Bucks County Watershed ...Honey Hollow*. The Association used the inventory to identify various components of the watershed with which humans had, up to that point, developed a harmonious relationship. In the completed document, they presented the ingredients that made up the ecology of Honey Hollow in 1972, including a geological review, a study of soils and water, and summaries of the site's biological diversity. When appropriate, each section included a brief narrative that contextualized the data and then a list of the findings. Those conducting the inventory felt that this was a prerequisite in their efforts to establish

a center for outdoor education at the site, now our nature center. A second edition with updates and additions was completed in 1977 and published in 1978. This document is available online at the Bucks Audubon website (<https://www.bcas.org/honey-hollow-watershed-revisited/>).

In an effort to explore how the Honey Hollow Watershed has fared during the 50 years since the original inventory, Bucks Audubon has conducted a similar assessment of the location's natural history: *Honey Hollow Watershed – Revisited*. During 2022, a group of talented naturalists and biologists explored the forests, fields and waterways of the two properties central to the watershed – the Bucks County Audubon Environmental Center and the Crooks Family's Tuckamony Farm – a total of 180 acres that include a variety of habitats representative of the entire 700-acre watershed. This report contains the results of the recent inventory and, when possible, presents them alongside the findings from the 1972/77 efforts.

We hope that these results will educate local residents and communities and provide insights into backyards and open space throughout the region. As Bucks Audubon uses these findings to plan a sustainable course forward, perhaps other individuals and groups will be inspired to complete inventories of their backyards and open spaces exploring the composition and health of these important resources. Only when we have baseline data can we properly assess and address change in today's rapidly changing natural world.

## **Some Project Notes**

While both the 1972 inventory and the 2022 effort relied on the skills and leadership of numerous amateur and professional biologists and general naturalists, the recent effort had the added advantage of a small army of volunteer citizen scientists who posted their observations on iNaturalist or eBird. Many of their species identifications were later confirmed by experts. These observations can be explored online at iNaturalist under the heading of "Community Projects" and the title "Honey Hollow Watershed Natural Resource Inventory."

Because of limited space in the print version, some information occurs only in the digital version of this report: specifics of taxonomic changes, habitat characteristics, details of

occurrence at Honey Hollow, and notes about what to look for when searching in the watershed. And please .... keep searching! As John Mertz noted 50 years ago, with wise management, the waters of Honey Hollow should remain a valuable living laboratory indefinitely (Mertz 1972).

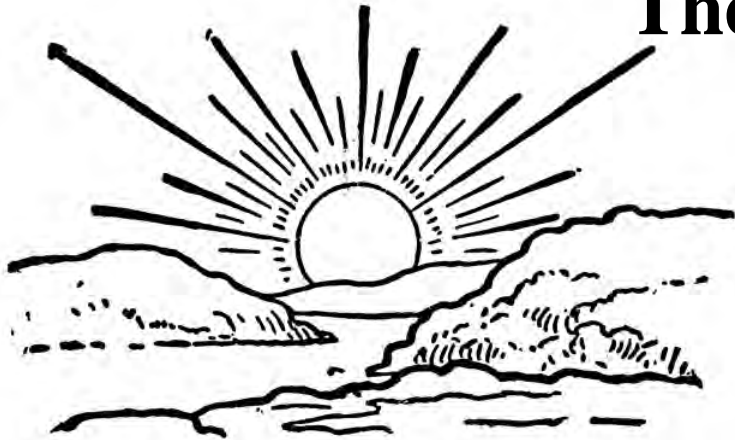
## **Some List Notes**

The lists of species provided herein do not so much reflect comparisons across 50 years (what was here then/what's here now) as they do a set of snapshots taken during the long life of the watershed; snapshots made at different times by different groups of people with different skill sets, technologies, and approaches. Absences on the lists, therefore, do not necessarily mean that the species were not present, possibly just that they were not caught in period-specific snapshots. Neither do these lists reflect abundance or well-being as that would require effort far beyond the scope of this study. Continued monitoring and the regular collection of data is warranted.

Lists indicate two categories of occurrence: confirmed (C) and probable (P). Probable status was assigned to species that met at least two of the following criteria: geographic range overlaps Honey Hollow and appropriate habitat exists, reliable observations place individuals in the general area, and/or the species occurred in the area historically. Species known to be non-native are marked as "nn."

Most lists are organized alphabetically by order or family, and genus and species; two exceptions include fungi (organized first by type) and birds (orders organized phylogenetically). Asterisks indicate taxonomic changes since 1972 or 1977; species assigned a new genus follow other members of that genus. The abbreviation "sp." refers to a single, unspecified species of a genus, while "spp." is plural and indicates that multiple, unspecified species of the genus were present. If a common name has changed, the current one precedes that from previous years and is separated from the latter with a slash. In cases where an organism had more than one common name during the same time period, a comma is used to separate them. Some organisms did/do not have common names. In other cases, especially in 1972 and 1978, more than one species has or was identified by the same common name.

# The Beginnings



Some personal notes and thoughts by John Mertz, one of the original inventory authors, about the beginnings of Bucks County Audubon Society and its relationship with the Honey Hollow Watershed...

In late summer 1968, I was looking forward to my second year as a faculty member at my alma mater, Delaware Valley College (now Delaware Valley University). As I got ready for my ecology course, I received a visitor: it was Ray Hendrick, who had graduated from DelVal two years ahead of me. He explained that he was becoming increasingly concerned about what was happening in our environment – trash along roadsides, landfills filling up, instances of bad water, human waste disposal, loss of natural habitats for wildlife, etc. – but, as a major in Dairy Science, he had had no formal academic exposure to the subject of environmental concern. I welcomed him to sit in on my course and so began a lifelong friendship. Our extended discussions led us to explore the possibility of establishing a local organization that would assume the responsibility of educating the general public about environmental issues. We explored becoming a local affiliate of one of the national environmental organizations, ultimately settling on National Audubon Society because it seemed to be the most focused on public education.



# Audubon

Prior to an open public meeting at the college's one auditorium, Florence Schaffhausen, who wrote environmental columns in both the *Doylestown Intelligencer* and the *Bucks County Courier Times*, offered to give us some publicity. The response was overwhelming from all areas of the county. We described our intention to organize a chapter of the National Audubon Society, which was greeted with great enthusiasm. So, Ray and I promised to move the project forward and keep everybody informed of our progress,

including a group of mostly elderly gentlemen who indicated they were there to represent a place called Honey Hollow in Solebury: Forrest and Malcolm Crooks, Francis Fitting, Forrest Coburn and Alston Waring, who invited me to visit him at his home on Creamery Road to discuss Honey Hollow's interest in the Audubon proposal.

When I visited shortly thereafter, it was an eye-opener. Alston explained how in the 1930s the farmers within the Honey Hollow Watershed had become concerned about the erosion of their soils into Honey Hollow Creek and thence into the Delaware River. So, they had contacted the U.S. Department of Agriculture for help which came in the person of the Secretary of Agriculture, who quickly grasped the problem and recommended a set of then-new soil conservation practices, among them were contour plowing, water diversion terraces, strip cropping and sodded drainways. Putting these techniques into practice involved a great deal of labor over years, but the farmers in the watershed had already committed to facing the problem in cooperation with each other, and their efforts soon paid dividends.

Now in 1968, the Watershed Association had applied to the federal government for recognition as the first place in America where all of the land owners within a single stream drainage area (a watershed) had banded together to adopt the latest erosion management strategies to conserve the productive soils in the whole watershed. The nomination of Honey Hollow as a National Historic Landmark brought a number of important visitors. Our interest in establishing a local chapter of National Audubon and our close alliance with Honey Hollow brought the Vice President of the National Audubon Society to Honey



Hollow as well, with the promise that their education division would conduct a study of the feasibility of establishing a nature education center at the site, a promise soon fulfilled. So, we were well on our way to an enduring relationship with the Honey Hollow Watershed, with National Audubon, and with a substantial fraction of the Bucks County public toward establishing what soon became known, and incorporated, as Bucks County Audubon Society.

For the first years, BCAS relied on a dedicated cadre of volunteers to operate the organization. Once we had established ourselves, our membership grew very rapidly and soon was well over 1000, opening a number of political doors to us. We met monthly

in the same auditorium at DelVal where we had held our preliminary meeting in 1968, establishing a program of speakers to address those meetings and a program of volunteers to run nature field trips, mostly for the birders in our membership. We were all volunteers, but we accomplished some mighty tasks, including helping to defeat efforts to build a nuclear power plant along the Delaware River and establishing recycling across Bucks County.

Finally, the folks at Honey Hollow were especially anxious that we establish an environmental education program for adults at the watershed. We succeeded in assembling a team of experienced educators to produce programs, and ran a series of Saturday workshops on various natural history topics over several weeks. The response was marvelous and resulted in the decision to develop a center for outdoor education at Honey Hollow. The first step in the process was to answer the question, “What are the components of this site?” The original, 1972 *Inventory of Natural Resources in a Bucks County Watershed .... Honey Hollow* was conducted to answer that question.



Back of the nature center, 2023, CC

These were the principle objectives of the Honey Hollow Watershed Association and Bucks County Audubon Society as they set out to conduct the original inventory.

#### 1. TO PRESERVE THE HISTORIC VALUES OF THE WATERSHED

Our rich heritage can be seen in land with its well preserved 18th century buildings. This open history book should be treasured so future generations may read it with enjoyment, understanding and profit.

#### 2. TO DEMONSTRATE SOIL AND WATER CONSERVATION PRACTICES

Certain portions of the Watershed should be kept in cultivation. As time advances, the newest farming and conservation practices should be adopted and demonstrated under the direction of the United States Soil Conservation Service.

#### 3. TO CONDUCT AN OUTDOOR EDUCATION CENTER

It is important that both children and adults have the opportunity to experience unspoiled nature under the guidance of trained ecologists and learn to appreciate our resources which are so essential to all life. They should also learn why, if we are to survive, we must live in harmony with our natural environment.

#### 4. TO CONDUCT A WOODLAND MANAGEMENT PROGRAM

Forests play a key role in keeping our total environment in balance. The project would include demonstrations for multiple uses of woodlands: timber, recreation, watershed protection, wildlife, fuel, Christmas trees and holly.

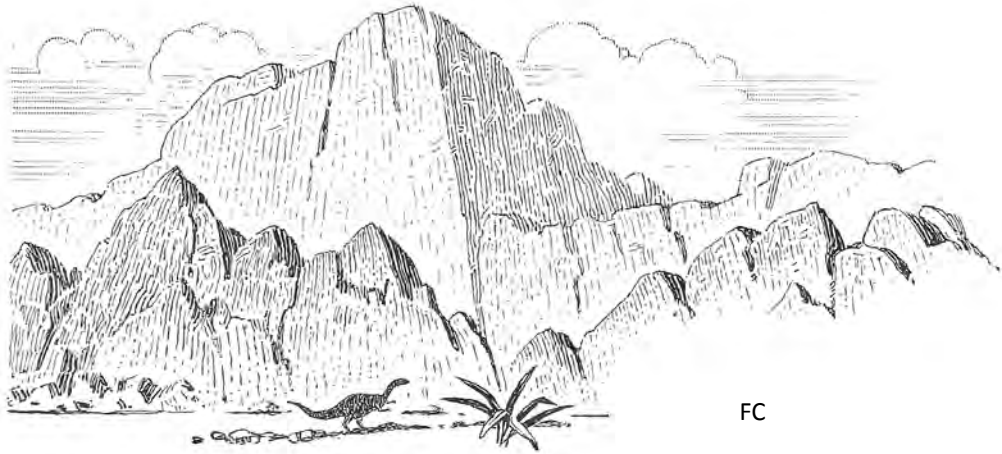
#### 5. TO PRESERVE OPEN SPACE

As urbanism continues its unrelenting march, it is imperative that some open space be set aside, some natural areas. Honey Hollow offers its gentle hills and valleys, its fields and wooded paths, its little streams and placid ponds. It offers peace, quiet beauty, and an intimate glimpse of our Colonial past. It is our heritage to preserve forever.



New farming techniques employed, Waring, 1942

# Hydrogeology



The Honey Hollow Watershed is a relatively small drainage basin which flows into and is thus part of the Aquetong Creek Watershed. The Aquetong Creek Watershed drains a large portion of central Solebury Township and feeds into the Delaware River.

The Honey Hollow Watershed lies within the Gettysburg-Newark Lowland section of the Piedmont Physiographic Province. The Lowland Section extends through southeastern Pennsylvania from Gettysburg to Newark, New Jersey and consists of rolling lowlands, shallow valleys and isolated hills.

Honey Hollow is a classic funnel-shaped watershed. The topography, and thus the configuration of the watershed, was created through differential weathering of a variety of underlying rocks. The upper headwaters, located north of Old York Road (Route 263), contain bedrock, which is relatively slower to decompose than rocks found in the lower portion of the watershed to the south near Meetinghouse Road. The watershed has a total relief of 280 feet, ranging from 430 feet of elevation on the north edge divide to 150 feet elevation at the southern mouth. Slopes are steepest in the central portion of the watershed, south of Upper York Road/Route 263, where they average 10 percent.

The geology of the Honey Hollow Watershed varies from north to south. The oldest rocks in the watershed are in the south region and were formed during the Cambrian Period about 510 million years ago. Those rocks are classified as the Allentown Formation and consist of dolostone, a calcium-magnesium carbonate rock similar to limestone. The rocks formed from sediments originally deposited as limy mud and sand in warm, shallow seas that once covered the eastern United States. Very little life existed when these rocks



were deposited and, generally, only the fossils of “stromatolites” can be found in them. Stromatolites are fossil structures of layered formations created by mats of cyanobacteria (also known as blue-green bacteria and less correctly as blue-green algae) and trapped sediments after being deposited over time. In cross section, they look somewhat like a cabbage sliced in half. The Allentown Formation carbonate rocks are readily dissolved by the acidic precipitation which seeps into the ground. This formation generally weathers to create broad lowlands with thick clay soils which are remnants of the clay after the carbonate portion of the rock dissolves. Small cavernous conduits can dissolve as water passes through the rock. These voids provide good groundwater storage and flow but can also allow sinkholes to form in the thick clay soils.

Immediately north of the Allentown Formation are found the Beekmantown Group rocks. These rocks were formed during the lower to middle Ordovician Period (485 to 460 million years ago) and are of similar composition as the Allentown Formation, also “dolostone.” They, too, weather to form broad lowlands with thick clay soils and voids in bedrock which conduct groundwater flow.

The central and northern upland portion of the Honey Hollow Watershed contain an entirely different form of rock from the southern carbonate region. The upland rocks are of the Stockton Formation and were deposited in the late Triassic Period about 237 to 207 million years ago. These rocks formed when the continent of Africa separated from North America to create a rift valley or crack which extended from North Carolina to Newfoundland and filled with sediments. The Stockton Formation was carved by the transport of sands and quartz pebbles deposited by streams that flowed north from former mountains in the Philadelphia area. The rocks are described as arkose or sandstone with some feldspar found in former stream channels. Siltstones and mudstones also exist in the Stockton Formation rocks and were likely formed from silt and mud that accumulated on the floodplains of the ancient streams. During the Triassic Period when the rocks were formed, plants existed and dinosaurs were just starting to evolve, but neither of their fossils are generally found here. This is because anything which died in or near the streams would have been degraded by the actions of the waters and decayed by oxygen, since the sediments were not well submerged beneath water. The Stockton Formation sandstone rocks weather physically as the sand grains separate from the poorly cemented rock matrix to release the original sand, silt and clay particles. This weathered stone results in a variety of sandy to silty soils. Because the rocks break down relatively more

slowly than the carbonate rocks to the south, the Stockton Formation sandstones create the steeper sloped upland area in the watershed.

Within the Stockton Formation is a rock member referred to as a “quartz conglomerate.” This is found as two layers traversing the north portion of the Honey Hollow Watershed. The rock is seen as boulders in the stream channel north of the Bucks County Audubon Society Visitor Center. This conglomerate consists of quartz pebbles in a poorly sorted arkosic sandstone. The rock was formed from the accumulation of pebbles and sands in stream channels that carried quartz rocks which had eroded from former mountains in the Philadelphia area. The conglomerate is the most resistant rock in the watershed and forms the subtle ridgetop along which Old York Road follows. The quartz conglomerate forms a type of dam which holds water in the headwaters before allowing it to spill out as numerous springs and seeps into the more steeply sloped hillsides immediately to the south.

In summary, the geology of the Honey Hollow Watershed is composed of three general hydrogeologic regions: 1) an upland headwater area north of Old York Road which is relatively flat and contains well drained sandy soils that readily absorb precipitation, allowing waters to soak into the underlying sandstone aquifer, providing good groundwater storage; 2) a steeply sloped area in the central portion of the watershed where groundwater from the uplands discharges through springs and seeps from the sandstone aquifer to provide a consistent supply of streamflow, even during dry periods. This is also the region where runoff from the uplands area flows down the steep slopes to erode the sandy to silty soils; and 3) a relatively flat lowland area in the south portion of the watershed where runoff and precipitation are able to soak into the underlying very permeable carbonate aquifer system, which slowly releases groundwater at the mouth of the watershed. The ability of these carbonate rocks to store and release waters gradually as stream baseflow provides a consistent and high-quality supply of water to feed the downstream Aquetong Creek system.

Fifty years ago, Charlotte Gantz pondered the impact of the ancient geological forces as she concluded her essay in the first inventory asserting, “Standing in the watershed today, it stirs the imagination to realize that what is now rolling countryside was once an ancient sea, later widespread marshes, then desert. Once it was marked by a rocky escarpment as high as Mt. Olympus or Paricutin in Mexico, and later it was the site of a racing torrent. It

seems extraordinary that events 450 million years ago can today eliminate the possibility of a housing development in parts of Honey Hollow, unless sewers are extended from New Hope, and can determine that some of the land shall be exceptionally good for agriculture. Some - where flint pebbles occur in quantity – will find better use as pasture. This ancient history still governs the life of today; no study of the watershed could be begun without a knowledge of what went before.”

The people who settled near the idyllic headwaters of the Honey Hollow Creek benefited from the springs emerging from the hillsides, but then watched in concern and despair as their soil washed from the fields down the slopes of the landscape. Gradually, however, they learned to live and work with the enduring nature of their environment, all based on hundreds of millions of years of geologic activity.



Problems in the 1930s: Erosion, Flooding and Silt Deposits. Waring, 1942



# Soil and Water

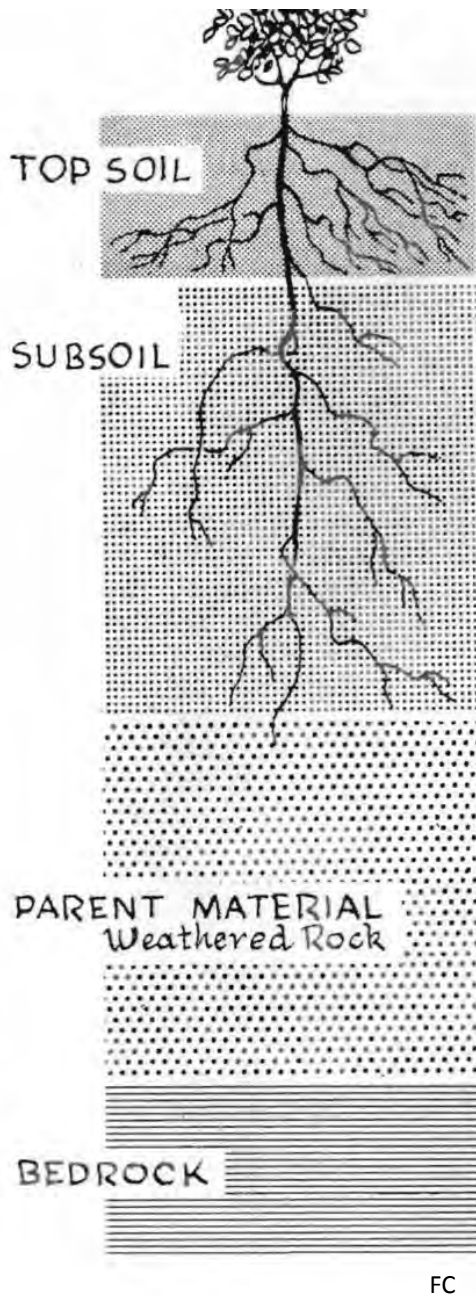


Precious, Waring 1942

On top of Honey Hollow’s ancient geology is its brown gold – its soil, part of which is actually born of that geological layer or bedrock immediately beneath it. When, over millions of years, that rock is worn and weathered, particles are formed that then mix with water, air and a variety of microorganisms and other organics, resulting in the basic element we call “soil.” The rock particles are classified according to their sizes from sand (the coarsest) to silt to clay (the finest). This sizing, plus the percentage of each of the other elements, is the basis for the classification of a soil as one of thousands of named types. Each of these soil types has its own characteristics – productivity, drainage or water retention, erodibility, etc. In the Honey Hollow Watershed alone, 22 types have been mapped.

In one sense, the farmers of Honey Hollow were too successful as a result of their rich soil. The farmers’ productivity gave them the financial ability to adopt modern, heavy machinery in the first decades of the 20<sup>th</sup> century. When they expanded their cultivation into areas not previously used, they accelerated erosion and the general depletion of the soil. They saw many tons of valuable topsoil from the higher reaches of the watershed deposited as waterlogged soil up to three feet deep in the seven acre marsh in the lower area of the watershed just west of Creamery Road. This was the motivation for their request for help and advice from the U.S. Soil Conservation Service in the late 1930s.

The first step in making a soil conservation plan was and is to determine the types of soil at a site. The second is to consider the topography of the land and, therefore, the conditions in which the soils lie. Finally, the third step is to determine the amount of soil, in a useful state, that remains at spots around the site.



The Conservation Service classified the soils found in the Honey Hollow Watershed into five groups, each with its own strengths and challenges:

- 1) Soils on steep slopes greater than 15%, moderately deep (20+ inches to bedrock), well drained. Slope limits any use.
- 2) Soils on slopes less than 15%, deep (36+ inches to bedrock), poorly to very poorly drained floodplain. Wetness limits use to wetland habitat and wildlife, ponds.
- 3) Soils on slopes less than 15%, deep (36+ inches to bedrock), moderately well drained with some water retention issues during wettest months. Best suited to summer crops, hayfields and pasture.
- 4) Soils on slopes less than 15%, deep (36+ inches to bedrock), well drained. Well suited for crops, pasture and woodland.
- 5) Soils on slopes between 3% and 15%, moderately deep (18 to 36 inches to bedrock), well drained. Well suited to crops, pasture and woodland with consideration given to slope and soil depth.

Mitigation measures addressing the erosion and other problems that occurred in each of these groups were designed and implemented. They included contour farming, diversion terraces and

ditches, strip cropping and crop rotation, tree and bush planting, pond building and dam construction. The farmers soon saw, literally, the fruits and other products of their labor. For the next 30 or more years, the site was used to educate others about these novel approaches, most of which are now standard practices. The farming in the watershed today continues to employ these basic conservation strategies while the current stewards of the land have added some new approaches in recognition of recent discoveries.

Scientists have begun to recognize the vital importance of a vibrant community of microscopic organisms in the soil that works in symbiotic relationships with the roots of plants. The organisms help transmit nutrients into plants and can even transport nutrients between plants. We are only just beginning to understand the complexity and importance of this “root microbiome.” These discoveries have elevated the importance of avoiding the use of pesticides. Cover crop planting and rotational crop and pasture management also improve soil health. “No till” farming and other methods of allowing precipitation to be filtered by soils and become clean groundwater are now regularly used to further decrease erosion and improve our water supply -- the lifeblood of everything that lives and grows in a watershed.

In addition to runoff from precipitation, the Honey Hollow Watershed water supply depends on the springs from the creek’s headwaters that contribute water from the underground aquifer. These two sources of water create a perennial stream flow into the Aquetong Creek, classified as a high-quality, cold-water fishery by Pennsylvania per Chapter 93 of Title 25 of the Pennsylvania Code, and on into the Delaware River in New Hope. Starting in July of 2021, data on water quality, macro-invertebrates, and physical conditions were collected at Site 2 (40°22’23”, 75°00’45”) on the Honey Hollow Branch in the preserve. Site 2 is located on the stream at the closest point to the bird observation blind at the trail crossing.

The data summarized below were collected at least monthly during 20 visits from January 2022 through January 2023. No stream monitoring was done during storm runoff conditions. A LaMotte Green Standards water monitoring kit was used to measure water temperature, pH, transparency (clarity), dissolved oxygen, chloride, phosphate and nitrate concentrations. Water temperature ranged from 41° F in January to 64.4° F from July through early September. The highest temperature measured remained below the maximum standard of 66° F for cold water fisheries. The average was 54.5° F. The dissolved oxygen data ranged from 2 to 4 mg/l, averaging 3.8 mg/l. The water quality standard for cold and warm water fisheries is 5 mg/l or higher. The percent of oxygen saturation ranged from 18 to 42%. Transparency ranged from 0 cm (crystal clear) in the winter months to 60 cm twice, once in summer and once in fall. The average was 23 cm. The pH was steady at 7, except once when it was closer to 8. Chloride concentrations ranged from 0.5 to 1.0 mg/l from January through April 2022. The concentration was 0 mg/l for the rest of the year. Phosphate concentrations ranged from 1.0 to 4.0 mg/l.

Nitrate concentrations were 5 mg/l for all, except one reading of 4 mg/l. The United States Environmental Protection Agency (USEPA) maximum contaminant level for nitrate is 10 mg/l. The macroinvertebrates sampled are discussed in the section of this inventory entitled “In the Waters and Nearby.”

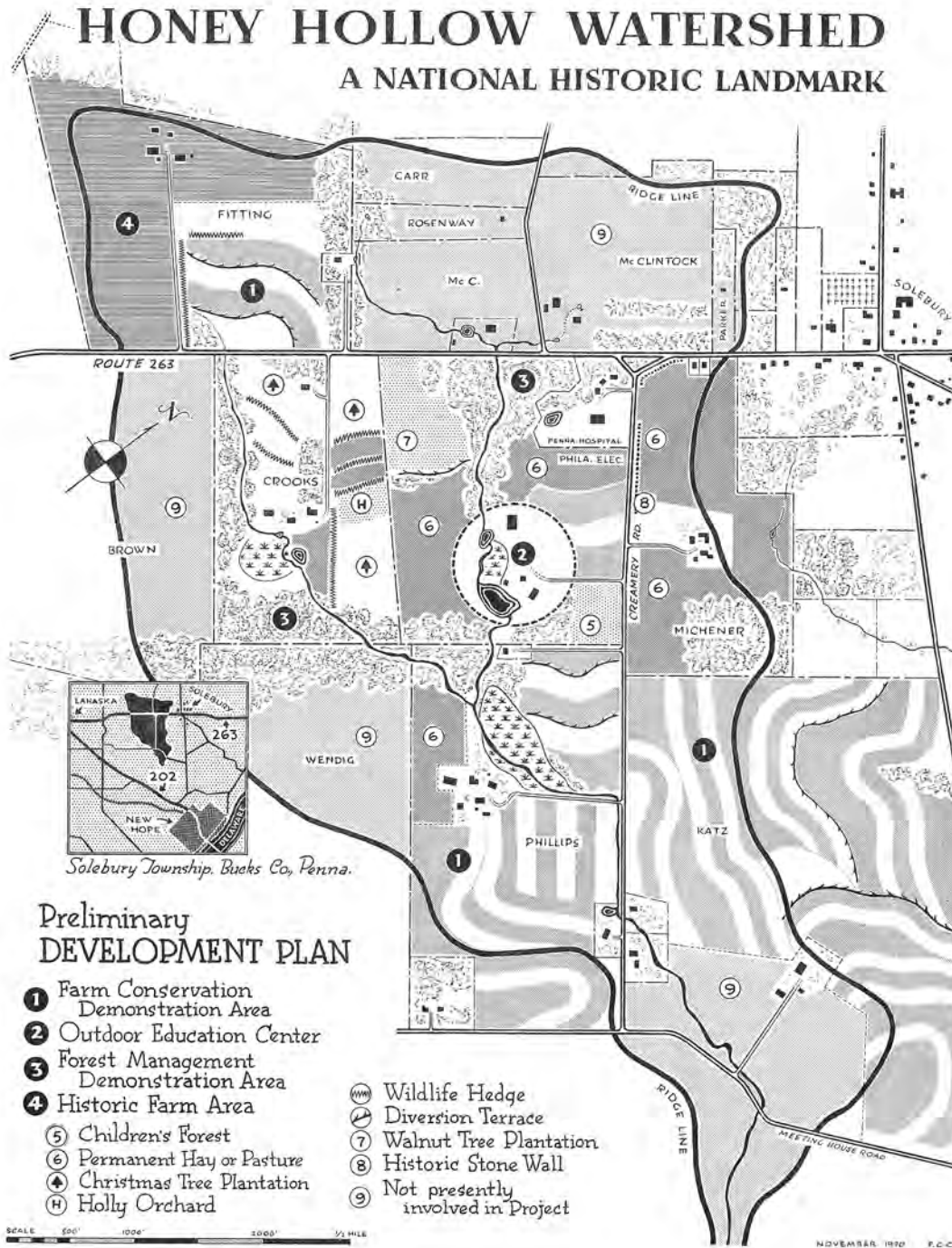
Altogether, these data indicate that the Honey Hollow Creek is a high-quality stream above the pond. It is particularly good to see the low chloride levels, given the proximity to Upper York Road/Route 263 and high clarity indicating a lack of silt and erosion. The one area of slight concern is the oxygen saturation level, which is lower than ideal. However, these results are from the analysis of just one year of data. The importance of continuing and expanding monitoring of this source of life for the entire watershed cannot be overemphasized.

A growing understanding of the inter-relationships -- the interplay-- among geology, soil and water allowed the farmers of the 1940s and onward to develop approaches to farming that worked with the environment rather than battling it. They learned that there is a link between the science of successful farming and the ethic of environmental conservation. The stewardship that emerged and became the guiding force remains evident in the care and use of the site today.



Plans for wildlife preservation included ponds. Waring, 1942

The map below illustrates the agricultural measures initiated in the 1940s and in the years that followed. It shows the land use and ownership just prior to the 1972 inventory.





# Climate Change



My mother, Bertha Conyne, loved every moment and detail of preparing for my sister's wedding in Bucks County in 1972. It was outdoors in our garden and, just as planned, had the peak of lilac bloom as a backdrop – May 16<sup>th</sup>. This year, 50 years later, the scent and sight of lilacs on May 16<sup>th</sup> were a memory because their bloom peaked between April 26<sup>th</sup> and 30<sup>th</sup>, depending where you live in and around Bucks County. The signs of climate change are often

subtle and easy to overlook without markers and record keeping. More and more, however, the impacts are being noticed and highlighted. Birds, bats and insects are migrating earlier in the spring and later in the fall. The birds are laying eggs earlier and insect hatches are happening earlier and, in some cases, more frequently. Gardening dates are shifting. . . and the list continues.

The average overall temperature in Bucks County between 1967 and 1972 was 50.72 degrees Fahrenheit. Between 2016 and 2021, it was 54.4 degrees – an increase of 3.68 degrees. This is a remarkable increase over a relatively short period of time, and it's statistically highly significant. This means that the average temperatures we are now experiencing are similar to those in Baltimore 50 years ago. Our averages from a half century ago are now the norm in more northern Cleveland and Hartford. Our average high and low temperatures – 61.15 degrees and 40.26 degrees in 1967-1972, 64.43 degrees and 44.35 degrees in 2016-2021 – reflect a similar trend.

While our average annual precipitation has increased over these same time periods from 45.85 inches to 50.47 inches, this increase is not statistically significant because snow and rain events have always been highly variable from year to year. However, what has changed significantly is the frequency of severe weather events. The amount of our yearly precipitation that comes in intense single-day events has risen steadily during the last

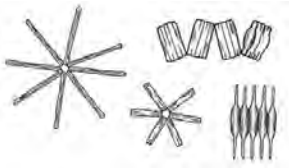
several decades. These events have a major impact on our daily lives, our communities and the natural world. For more information about our local climate, see [dvrpc.org/energyclimate/ccmit/](http://dvrpc.org/energyclimate/ccmit/)

Considering this information, it's important to place the concept of "50 years" in perspective. While it seems like a long amount of time, a lifetime, since my sister was married, those 50 years are a tiny blip by Earth history standards, so that's a lot of change for such a miniscule jot of time. Virtually every element of the world we live in is impacted in some way by these changes. People react and take appropriate steps to cope in the best ways possible. The natural world does the same thing – earlier migration, altering food sources, evolving a lighter coat and better heat tolerance, etc. Those who succeed will survive, and those who don't will languish or disappear.

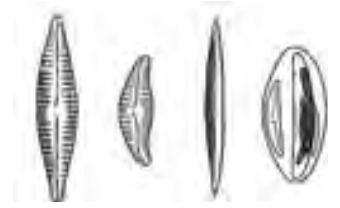
#### Bucks County Climate Data

	1967 – 1972	2016 – 2021	Change
Average Temperature	50.72 F	54.4 F	<b>+3.68 *</b>
Average High Temperature	61.15 F	64.43 F	<b>+3.28*</b>
Average Low Temperature	40.26 F	44.35 F	<b>+4.09*</b>
Precipitation	45.85 in	50.47 in	<b>+4.62</b>

\*The standard deviations for the data sets above were compared; differences between average and high and low temperatures were highly significant.



# In the Waters and Nearby



As John Mertz expressed in 1972, upland streams such as Honey Hollow Creek are more than simply rivulets of water flowing from highlands to the sea. They are indicators of the quality of the land over and through which they flow. Healthy streams and associated ponds support many forms of life through the nurturing conditions they create. The riffles, runs and pools of streams provide habitat and nutrients for aquatic organisms throughout their life cycles and, periodically, sustenance for local floodplain and riparian systems. In healthy streams, water becomes well oxygenated as it flows and bubbles over rocks, fallen logs and other obstacles, providing another necessary resource for life. Overhanging riparian vegetation provides shade, keeping the water cool. Healthy streams support healthy populations of algae, microorganisms, and all kinds of larger, visible animals.

Honey Hollow also includes several lentic or *still water* environments: the ponds, pools, and marshes. These areas provide a variety of additional habitat types, used by many different types of organisms.

## Microscopic Life

In addition to the organisms visible to us in Honey Hollow's waters is another whole world of microscopic creatures, living their lives and providing food for higher trophic levels in myriad food chains. In this aquatic microscopic world, phytoplankton (including algae, some bacteria, and some protists) make their own food via photosynthesis, wherein they use carbon dioxide to produce high-energy sugars using energy from sunlight, releasing oxygen as a byproduct. By making usable food from inorganic materials, these organisms serve as the "primary producers" in aquatic systems and are the first step in the complex web of energy-based, who-eats-what interactions among Honey Hollow watershed community members.



A bit higher in the trophic hierarchy (but typically still too small to be seen by unaided eyes) are zooplankton, microscopic herbivores and carnivores that feed on phytoplankton and bridge the gap between the primary producers and the much larger aquatic macroinvertebrates.

Below are the microorganisms and other tiny things documented within Honey Hollow waters. Sampling for these organisms in 1972 occurred only in late summer. Four species of algae were given the name “Algae, Green” in 1972. Although the viewing and identification of microorganisms has become much more accessible and possible over fifty years, algae were not among the organisms for which the current group of people searched.



Epistylis, JL

**Viruses, Bacteria, and Microorganisms.** Asterisk indicates taxonomic change since 1972. Common name: current one/that from previous years. Occurrence: confirmed (C), probable (P); see Foreword for details. 72/77 refers to the original 1972 inventory and the 1978 2nd edition, while 18-22 refers to the five years during which data were collected for the current inventory.

Genus	Species	Common Name	72/77	18-22
<b>Viruses</b>				
<b>Order Bunyvirales</b>				
<i>Emaravirus</i>	spp.	Rose Rosette Emaravirus		C
<b>Order Patatavirales</b>				
<i>Potyvirus</i>	spp.	Pokeweed Mosaic Virus		C
<b>Bacteria (Kingdom Bacteria)</b>				
<b>Order Oscillatoriales</b>				
<i>Oscillatoria</i>	spp.			P
<b>Kelp, Diatoms, &amp; Allies (Kingdom Chromista)</b>				
<b>Order Naviculales</b>				
<i>Navicula</i>	spp.			C
<b>Order Surirellales</b>				
<i>Surirella</i>	spp.			C
<b>Order Sessilida</b>				
<i>Epistylis</i>	spp.			C
<b>Order Vaucheriales</b>				
<i>Vaucheria</i>	spp.			P

Genus	Species	Common Name	72/77 18-22
<b>Green Algae (Kingdom Protista)</b>			
<b>Order Chaetophorales</b>			
<i>Draparnaldia</i>	<i>glomerata</i>	Chlorophycean Green Algae/Algae Green	C
<b>Order Sphaeropleales</b>			
<i>Hydrodictyon</i>	<i>reticulatum</i>	Water Net	C
<b>Order Zygnematales</b>			
<i>Closterium</i>	spp.		C
<i>Spirogyra</i>	<i>communis</i>	Desmid/Algae Green	C
<b>Order Chlorellales</b>			
<i>Auxenochlorella*</i>	<i>pyrenoidosa</i>	Algae Green	C
<b>Order Ulotrichales</b>			
<i>Ulothrix</i>	<i>zonata</i>	Algae Green	C
<b>Rotifers (Phylum Rotifera)</b>			
<b>Order Flosculariaceae</b>			
<i>Testudinella</i>	spp.		C

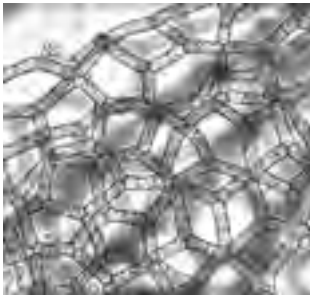


A few of the organisms above were also found in two water samples viewed under a microscope by author John Lisowski, a Pennsylvania Master Naturalist, who noted his findings were typical of streams and ponds in Pennsylvania (but he was excited about the *Surirella* diatom and rotifer *Testudinella*, both lifetime discoveries for him!):

From the East Branch of Honey Hollow Creek

- Genus *Navicula*, Phylum Gyrista, Class Bacillariophyceae (a diatom)
- Genus *Oscillatoria*, a member of Blue-green Algae, Class Cyanophyceae
- Family Philodinidae, Phylum Rotifera, Subclass Bdelloidea
- Nematodes, Phylum Nematoda
- Genus *Closterium*, Order Desmidiales, Class Zygnematophyceae (a green alga)
- Genus *Surirella*, Class Bacillariophyceae, Order Surirellales (a diatom)

From Audubon Pond



Water Net, JL

- Genus *Epistylis*, Phylum Ciliophora, Class Oligohymenophorea
- Genus *Testudinella*, Phylum Rotifera, Class Monogononta, Subclass Monogononta
- Family Culicidae, Mosquito larvae (“wrigglers”)
- *Hydrodictyon reticulatum* (“Water Net”), a taxon of green algae of the family Hydrodictyaceae
- Family Cyclopidae, Phylum Arthropoda, Class Copepoda, Order Cyclopoida

The iNaturalist data and this small survey illustrate that Honey Hollow’s clean waterways support healthy populations of the microscopic primary producers and zooplankton that, ultimately, support the diverse aquatic and associated terrestrial communities native to the watershed. Future investigation of Honey Hollow’s microscopic aquatic community will certainly add to the list of organisms in this crucial component of a functioning ecosystem.



Copepod nauplius and adult, JL

**Macroinvertebrate** is the term for animals without internal skeletons that are large enough for us to see with unaided eyes. Aquatic macroinvertebrates spend all or part of their lives in water, and occur in both lotic (systems of moving water, e.g., rivers, streams and springs) and lentic systems. They include such aquatic animals as snails and crayfish and worms, as well as many insects that spend only their immature stages in water. Some feed on decaying, fallen plant material, some scrape algae off of rocks and other surfaces, and others are predators. As part of the complex energy-based Honey Hollow web, they, too, in turn, provide food for higher trophic levels. Many of these organisms are especially sensitive to shifts in environmental conditions, and therefore

can be used by ecologists as indicators of water-system health. For example, the presence of pollution-intolerant macroinvertebrates in an area would indicate the water is free of particular pollutants.

Macroinvertebrates were sampled in the stream (at the closest point to the bird observation blind at the trail crossing) on 20 visits (including at least once per month from January 2022 through February 2023). Twelve different types of animals were found, including the immature stages of several insects, two crustaceans (crayfish and scuds) and aquatic worms. Five of the 12 are classified as sensitive to pollution, six are classified as less sensitive and one is classified as tolerant to pollution. These macroinvertebrates were used to compute a water-quality rating based on the Izaak Walton League method: the rating was “good” for 4 samples, “fair” for 15 samples, and “poor” for one sample.

The total number of macroinvertebrates collected in the 20 samples was 1,478: 954 from sensitive, 530 from less sensitive and 14 from tolerant categories. That the animals found in greatest abundance were those classified as “sensitive” (Mayflies, Caddisflies, and Stoneflies) and “less sensitive” (Scuds) suggests that long-term efforts to protect the health of this watershed have been – and continue to be – successful.

### **Honey Hollow Macroinvertebrates**

<b>Sensitivity</b>	<b>Common Name</b>	<b>Taxonomic info</b>	<b># Collected</b>
Sensitive	Mayflies	Ephemeroptera	934
	Caddisflies	Trichoptera	142
	Stoneflies	Plecoptera	115
	Riffle beetles	Coleopera, Family Elmidae	11
	Water-penny Beetles	Coleopera, Family Psephenidae	2
Less Sensitive	Scuds	Amphipoda	544
	Crane Flies	Diptera, Family Tipulidae	12
	Damselflies	Odonata, Family Calopterygidae	5
	Dragonflies	Odonata, Suborder Anisoptera	3
	Net-spinning Caddisflies	Trichoptera, Family Hydropsychidae	5
Tolerant	Crayfish	Decapoda, Family Cambaridae	5
	Aquatic worms	Opisthoptera	14

Many other types of macroinvertebrates, and several types of slime molds and fish, have been identified in and around the waters as well as into terrestrial areas of the watershed. The high biodiversity at Honey Hollow attests to the successful efforts to protect and

manage this piece of Pennsylvania, to ensure the perpetuation of this microcosm of “nature in balance with itself,” as envisioned by Mertz in 1972.

As the pressures humans put on natural systems increase, so does the challenge before us: How best to conserve the players and mechanisms of functioning systems in the face of introduced species, toxins and other pollutants, and now, rapidly changing environmental conditions? Answers lie within continued protection and monitoring (of this site and its neighboring watersheds), communication of findings and education of the public, and thoughtful responses regarding the short- and long-term consequences of human actions. The waters of Honey Hollow make the entire ecosystem possible, and the continued good care of them is an essential piece of the conservation puzzle.

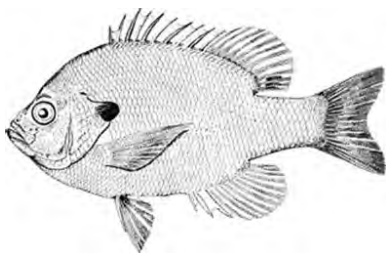
**Slime Molds, Macroinvertebrates, and Fish.** Asterisk indicates taxonomic change since 1972. Common name: current one/that from previous years. Occurrence: confirmed (C), probable (P); see Foreward for details. 72/77 refers to the original 1972 inventory and the 1978 2nd edition, while 18-22 refers to the five years during which data were collected for the current inventory. Please note - Insects are included in “Arthropods” section.

Genus	Species	Common Name	72/77	18-22
<b>Slime Molds (Phylum Mycetoza)</b>				
<b>Order Liceales</b>				
<i>Lycogala</i>	<i>epidendrum</i>	Wolf's Milk		C
<b>Order Physarales</b>				
<i>Fuligo</i>	<i>septica</i>	Dog Vomit Slime Mold		P
<b>Order Stemonitales</b>				
<i>Stemonitis</i>	<i>splendens</i>	Chocolate Tube Slime		C
<b>Order Trichiales</b>				
<i>Arcyria</i>	<i>cinerea</i>	White Carnival Candy Slime Mold		C
A.	<i>denudata</i>	Carnival Candy Slime Mold		C
<i>Trichia</i>	<i>varia</i>			C
<b>Crustaceans (Phylum Arthropoda)</b>				
<b>Order Anostraca</b>				
		fairy shrimps		C
<b>Order Cladocera</b>				
		water fleas		C
<b>Order Cyclestherida*</b>				
		clam shrimps		C
<b>Order Amphipoda</b>				
		scuds, sideswimmers, shrimps		C
<i>Gammarus</i>	sp.	amphipods, scuds		P
<b>Order Decapoda</b>				
		freshwater crayfish		C
<i>Cambarus</i>	<i>bartonii</i>	Eastern Crayfish		P



Genus	Species	Common Name	72/77	18-22
<b>Order Eucepoda</b>				
		copepods		C
<b>Order Isopoda</b>				
		aquatic sow bug		C
<i>Armadillidium</i>	<i>vulgare</i>	Common Pill Woodlouse		C
<i>Caecidotea</i>	sp.	American waterslators		P
<i>Haplophthalmus</i>	<i>danicus</i>	Terrestrial Cave Isopod		C
<i>Oniscus</i>	<i>asellus</i>	Common Shiny Woodlouse		C
<i>Philoscia</i>	<i>muscorum</i>	Common Striped Woodlouse		C
<i>Trachelipus</i>	<i>rathkii</i>	Rathke's Woodlouse		C
<b>Order Podocopida</b>				
		seed shrimps		C
<b>Order Notostaca</b>				
		tadpole shrimps		C
<b>Molluscs (Phylum Mollusca)</b>				
<b>Class Bivalvia</b>				
		finger nail clams		C
<i>Musculium</i>	sp.			P
<b>Class Gastropoda</b>				
<i>Campeloma</i>	<i>decisum</i>	Pointed Campeloma		P
<i>Cipangopaludina</i>	<i>chinensis</i>	Chinese Mystery Snail		P
<i>Arion</i>	<i>fuscus</i>	Northern Dusky Slug		P
<i>Bradybaena</i>	sp.			P
<i>Deroceras</i>	<i>reticulatum</i>	Milky Slug		C
<i>Discus</i>	<i>rotundatus</i>	Rounded Snail		P
<i>Limax</i>	<i>maximus</i>	Leopard Slug		C
<i>Megapallifera</i>	<i>mutabilis</i>	Changeable Mantleslug		P
<i>Mesodon</i>	<i>thyroidus</i>	White-lip Globe Snail/Common White-lipped Snail		C
<i>Philomycus</i>	<i>togatus</i>	Toga Mantleslug		P
<i>Physa</i>	sp.	pouch snails		C P
<i>P.</i>		orb snails		C
<i>Succinea</i>	sp.			P
<i>Ventridens</i>	<i>ligera</i>	Globose Dome Snail		P
<b>Flatworms (Phylum Platyhelminthes)</b>				
<b>Order Tricladida</b>				
		flatworms		C
<i>Bipalium</i>	<i>adventitium</i>	Wandering Broadhead Planarian		C
<i>B.</i>	<i>pennsylvanicum</i>	Three-lined Land Planarian		C
<i>Phagocata</i>	<i>morgani</i>			P
<b>Segmented Worms (Phylum Annelida)</b>				
<b>Order Crassicitellata</b>				
<i>Lumbricus</i>	<i>terrestris</i>	Common Earthworm		C
<b>Order Rhynchobdellida</b>				
<i>Placobdella</i>	<i>parasitica</i>	Smooth Turtle Leech		C
<b>Order Phyllodocida</b>				
		bloodworm		C

Genus	Species	Common Name	72/77 18-22	
<b>Millipedes, Centipedes, &amp; Allies (Phylum Arthropoda)</b>				
<b>Class Chilopoda</b>				
<i>Geophilus</i>	sp.	compost centipedes		P
<i>Strigamia</i>	sp.			P
<i>Lithobius</i>	<i>forficatus</i>	Brown Centipede		C
<i>Scolopocryptops</i>	<i>sexspinosus</i>	Eastern Red Centipede		P
<i>Scutigera</i>	<i>coleoptrata</i>	House Centipede		P
<b>Class Diplopoda</b>				
<i>Abacion</i>	sp.			P
<i>Cylindroiulus</i>	<i>caeruleocinctus</i>			P
<i>Ophiulus</i>	<i>pilosus</i>			P
<i>Ptyoiulus</i>	sp.			P
<i>Oxidus</i>	<i>gracilis</i>	Greenhouse Millipede		C
<i>Pseudopolydesmus</i>	<i>serratus</i>	Common Pink Flat-back Millipede		P
<b>Class Symphyla</b>				
<i>Hanseniella</i>	sp.			P
<b>Fish (Subphylum Vertebrata)</b>				
<b>Order Centrarchiformes</b>				
<i>Lepomis</i>	sp.	common sunfish		C
<i>L.</i>	<i>macrochirus</i>	Bluegill	C	C
<i>Micropterus</i>	<i>salmoides</i>	Largemouth Bass	C	C
<b>Order Cypriniformes</b>				
<i>Rhinichthys</i>	<i>atratulus</i>	Eastern Blacknose/Blacknose Dace	C	C
<i>R.</i>	<i>cataractae</i>	Longnose Dace		C
<i>Semotilus</i>	<i>atromaculatus</i>	Creek Chub	C	C
<b>Order Cyprinodontiformes</b>				
<i>Gambusia</i>	<i>holbrooki</i>	Eastern Mosquitofish		P
<b>Order Siluriformes</b>				
		catfish		C



# Fungi and Lichens



The Kingdom Fungi is a huge, diverse, secretive group about which much remains to be discovered. Fungi occur in every habitat on Earth, but many are inconspicuous because of the small size of their structures and the cryptic nature of their lives in soil, inside and outside other creatures, as well as on dead material. This makes them tough to observe and to study.

Most fungi are multicellular (made of more than one cell) and are termed, in general, “molds,” whereas single-celled fungi are termed, in general, “yeasts.” Molds are mostly made up of thread-like structures called “hyphae” that are often microscopic and typically grow underground and underneath things like rotting logs. “Mycellium” is the term used to describe the whole collective mass of hyphae of a particular fungus, a mass that can be as small as the inside of a single ant or as large as extending across 2,385 acres in Oregon (about 3.7 square miles - a “humungous fungus”).



puffball

The only structures we ever see of most fungi are the sexual-reproduction parts (mushrooms, puffballs and truffles). Within these fruiting bodies and where substrate meets air are produced the spores that allow fungi to combine their genetic information with that of others to produce genetically unique descendant individuals. Regarding secrecy and the fact that we see so little of their lives, if a fungus produces microscopic fruiting bodies, we might not even know it is nearby!

Fungi are heterotrophic (they obtain energy by “eating” parts of other organisms), not autotrophic (they don’t photosynthesize). But because their cells are enveloped by walls and they have no mouths, even small pieces of food cannot be taken into their bodies. Fungi solve the problem in two basic ways: the first involves digesting food items outside of hyphae and then absorbing only the molecules they need. They secrete digestive

enzymes to their outsides that then break down mostly dead or dying organic matter into molecular building blocks. As such, these fungi are extremely important players in the decomposition pathways of ecosystem biogeochemical cycles: they make molecular building blocks available to other organisms.

The second approach involves one of the most important symbiotic relationships on Earth; relationships in which two or more types of organisms are intimately involved in each others' lives, for example, parasites and their hosts, or flowering plants and their pollinators. Some symbiotic relationships are mutualistic: they provide benefits to all of the interacting parties e.g., flowering plants and their pollinator or humans and many of the microorganisms in our guts. Many fungi form symbiotic mutualistic relationships with plants, with their roots, specifically. The fungi wrap around the roots or penetrate into them, and nutrient-exchange structures develop that allow the exchange of energy-rich sugars (from the plants, made via photosynthesis) for water and nutrients (from the fungi, obtained via far-reaching hyphae). These fungi are collectively termed Mycorrhizae, and they are present in and on the roots of approximately 95% of families of plants with roots and are largely responsible for the great success of plants.



shelf fungus

Tough as they can be to detect, 17 fungi species were found in 1972, and 42 more were added to the first inventory in 1977. During the years 2018-22, 157 species identifications were posted on iNaturalist of which 101 were confirmed. The scientific names of some will likely change in the future, because of recent intensified work on this group. It's an exciting time in our understanding of the North American world of fungi. The year 2022 was relatively dry and therefore not a good year for mushroom searches; inventory surveys of the future will certainly find even more of these secretive creatures.

Below are the fungi confirmed to be present at Honey Hollow in 1972 and 1977, and during 2018-22, and those likely to be present currently.

**Fungi.** Asterisk indicates taxonomic change since 1972 or 1977. Common name: current one/that from previous years. Occurrence: confirmed (C), probable (P); see Foreward for details. 72/77 refers to the original 1972 inventory and the 1978 2nd edition, while 18-22 refers to the five years during which data were collected for the current inventory.

Genus	Species	Common Name	72/77	18-22
<b>Mushrooms (Class Agaricomycetes)</b>				
<b>Order Agaricales</b>				
<i>Agaricus</i>	sp.	field and button mushrooms		P
A.	<i>arvensis</i>	Horse Mushroom	C	
A.	<i>campestris</i>	Meadow Mushroom	C	
<i>Amanita</i>	sp.	Amanita sect. <i>Vaginatae</i>		P
A.	<i>brunnescens</i>	Brown American Star-footed Amanita		C
A.	<i>citrina</i>	False Death-Cap	C	
A.	<i>crenulata</i>	Poison Champagne Amanita		C
A.	<i>daucipes</i>	Carrot-footed Lepidella		C
A.	<i>flavoconia</i>	Yellow Patches		C
A.	<i>muscaria</i>	Fly Agaric/Fly Amanita	C	
A.	<i>rubescens</i>	Blusher		C
A.	<i>virosa</i>	European Destroying Angel/Destroying Angel		C
<i>Amanita*</i>	<i>vaginata</i>	Grisette/Sheathed Amanitopsis		C
<i>Apioperdon*</i>	<i>pyriforme</i>	Pear-shaped Puffball	C	C
<i>Armillaria</i>	<i>mellea</i>	Honey Mushroom/Armillaria	C	P
<i>Callistosporium</i>	<i>purpureomarginatum</i>	Purple-edged Lute		C
<i>Clitocybe</i>	<i>odora</i>	Aniseed Funnel/Sweet Clitocybe		C
<i>Collybiopsis</i>	<i>luxurians</i>	Luxury Caps		C
C.	<i>villosipes</i>			P
<i>Conocybe</i>	<i>apala</i>	Milky Conecap		C
<i>Coprinellus</i>	sp.	<i>Coprinellus</i> sect. <i>Micacei</i>		P
<i>Coprinellus*</i>	<i>disseminatus*</i>	Trooping Crumble Cap/Common <i>Psathyrella</i>	C	
<i>Coprinellus*</i>	<i>micaceus</i>	Mica/ Glistening Ink Cap		C
<i>Coprinopsis*</i>	<i>atramentaria*</i>	Common Ink Cap		C
<i>Coprinus</i>	<i>comatus</i>	Shaggy Mane		C
<i>Cortinarius</i>	sp.	webcaps		P
C.	<i>violaceus</i>	Violet Webcap/Violet <i>Cortinarius</i>		C
<i>Dendrothele</i>	<i>nivosa</i>			C
<i>Entoloma*</i>	<i>abortivum*</i>	Aborted <i>Entoloma</i> /Abortive <i>Clitopilus</i>	C	C
<i>Gloioxanthomyces*</i>	<i>nitidus</i>	Gilled Mushroom		C
<i>Gymnopus</i>	<i>dryophilus</i>	Oak-loving <i>Gymnopus</i>		C
<i>Gymnopus*</i>	<i>androsaceus</i>	Horsehair Fungus/Black-stemmed <i>Marasmius</i>		C
<i>Henningsomyces</i>	<i>candidus</i>	White Tubelet		C
<i>Hypholoma</i>	<i>fasciculare</i>	Sulphur Tuft		C
H.	<i>subviride</i>			C
<i>Inocybe</i>	sp.	fiber caps		P
<i>Laccaria</i>	sp.	deceivers		P
<i>Lentinula</i>	sp.			P
<i>Lepiota</i>	<i>clypeolaria</i>	Shield Dapperling		C
<i>Lepista</i>	<i>nuda</i>	Blewit		C
<i>Lycoperdon</i>	<i>perlatum*</i>	Common Puffball/Gem Puffball	C	C
L.	<i>pratense</i>	Meadow Puffball		P
<i>Macrolepiota</i>	sp.			P
<i>Macrolepiota*</i>	<i>procera</i>	Parasol Mushroom	C	P
<i>Marasmius</i>	<i>capillaris</i>			C
M.	<i>rotula</i>	Collared Parachute/Little Wheel <i>Marasmius</i>		C
M.	<i>strictipes</i>			C
<i>Megacollybia</i>	<i>rodmanii</i>	Eastern American Platterful Mushroom		P

Genus	Species	Common Name	72/77	18-22
<i>Mycena</i>	<i>crocea</i>	Walnut Mycena		P
<i>M.</i>	<i>galericulata</i>	Common Bonnet/Capped Mycena	C	P
<i>M.</i>	<i>haematopus</i>	Bleeding Fairy Helmet		C
<i>M.</i>	<i>inclinata</i>	Clustered Bonnet		C
<i>M.</i>	<i>leaiana</i>	Orange Mycena		P
<i>M.</i>	<i>meliigena</i>	Mauve Bonnet		C
<i>M.</i>	<i>pura</i>	Lilac Bonnet/Clean Mycena	C	
<i>Oudemansiella</i>	sp.			P
<i>Oudemansiella*</i>	<i>radicata</i>	Rooting Shank/Rooted Collybia	C	
<i>Panellus</i>	<i>stipticus</i>	Luminescent Panellus		C
<i>Pholiota</i>	<i>aurivella</i>	Golden Pholiota		C
<i>Pleurotus</i>	<i>ostreatus</i>	Oyster Mushroom		C
<i>P.</i>	<i>pulmonarius</i>	Summer Oyster Mushroom		C
<i>Pluteus</i>	sp.	shields		P
<i>P.</i>	<i>cervinus</i>	Deer Mushroom		C
<i>Psathyrella</i>	<i>piluliformis</i>	Common Stump Brittlestem		P
<i>Pseudoclitocybe*</i>	<i>cyathiformis</i>	The Goblet/Cup-shaped Clitocybe	C	
<i>Radulomyces</i>	<i>copelandii</i>	Asian Beauty		C
<i>Resupinatus</i>	<i>applicatus</i>	Smoked Oysterling		P
<i>Rhizomarasmusius</i>	<i>pyrrhocephalus</i>	Hairy Long Stem Marasmius		C
<i>Rhodocollybia*</i>	<i>butyracea</i>	Buttery Collybia	C	
<i>Sarcomyxa</i>	<i>serotina</i>	Late Oyster		C
<i>Schizophyllum</i>	<i>commune</i>	Splitgill Mushroom/Common Schizophyllum	C	C
<i>Simocybe</i>	sp.			P
<i>Typhrasa</i>	<i>gossypina</i>	Wrinkled Psathyrella		C
<b>Order Auriculariales</b>				
<i>Auricularia</i>	<i>polytricha</i>	Wood Ear Mushroom		P
<i>Ductifera</i>	<i>pululahuana</i>	White Jelly Fungus		C
<i>Exidia</i>	<i>crenata</i>	American Amber Jelly Fungus		C
<i>E.</i>	<i>glandulosa</i>	Black Witches' Butter		C
<i>E.</i>	<i>nigricans</i>	Warlocks's Butter		P
<b>Order Boletales</b>				
<i>Baorangia*</i>	<i>bicolor</i>	Two-colored Bolete	C	
<i>Boletus</i>	<i>edulis</i>	King/Edible Bolete	C	
<i>B.</i>	<i>separans</i>	Lilac Bolete		C
<i>Gyroporus</i>	sp.			P
<i>Hygrophoropsis*</i>	<i>aurantiaca</i>	False Chanterelle/Yellow Clitocybe	C	
<i>Imleria</i>	<i>pallida</i>	Pallid Bolete		P
<i>Leccinum</i>	sp.			P
<i>Scleroderma</i>	<i>aurantium</i>	Common Earth Ball	C	
<i>S.</i>	<i>citrinum</i>	Common Earthball		C
<i>Strobilomyces</i>	<i>strobilaceus</i>	Old-Man-of-the-Woods/Pine Cone Mushroom	C	P
<i>Suillus*</i>	<i>cavipes*</i>	Hollow Bolete/Pitted Boletinus	C	
<i>Suillus*</i>	<i>spraguei*</i>	Painted Suillus/Painted Boletinus	C	
<i>Tylophilus</i>	<i>plumbeoviolaceus</i>	Violet Gray Bolete		C
<b>Order Cantharellales</b>				
<i>Cantharellus</i>	<i>cibarius</i>	Golden Chantarelle/Chantarelle	C	
<i>C.</i>	<i>cinnabarinus</i>	Red/Vermilion Chantarelle	C	
<i>C.</i>	<i>lateritius</i>	Smooth Chanterelle		C
<i>C.</i>	<i>minor</i>	Small Chanterelle		C

Genus	Species	Common Name	72/77	18-22
<i>Craterellus</i>	<i>cornucopioides</i>	Horn-of-Plenty	C	
<b>Order Gloeophyllales</b>				
<i>Gloeophyllum</i>	<i>sepiarium</i>	Conifer Mazegill		C
<i>Neolentinus*</i>	<i>lepideus</i>	Trainwrecker/Scaly Lentinus	C	
<b>Order Gomphales</b>				
<i>Clavariadelphus</i>	<i>pistillaris</i>	Common Club Coral Fungus/Pestle-shape Clavaria	C	
<b>Order Gomphales</b>				
<i>Ramaria*</i>	<i>stricta</i>	Upright/Straight Coral Fungus	C	
<b>Order Hymenochaetales</b>				
<i>Fulvifomes</i>	<i>robiniae</i>	Cracked Cap Polypore		P
<i>Fuscoporia</i>	<i>gilva</i>	Mustard Yellow Polypore		P
<i>Hydnoporia</i>	<i>olivacea</i>	Brown-toothed Crust Fungus	C	
<i>Trichaptum</i>	<i>abietinum</i>	Purplepore Bracket		P
<i>T.</i>	<i>biforme</i>	Violet-toothed Polypore		P
<b>Order Phallales</b>				
<i>Mutinus</i>	<i>caninus</i>	Dog Stinkhorn	C	
<i>M.</i>	<i>elegans</i>	Devil's Dipstick	C	
<i>Pseudocolus</i>	<i>fusiformis</i>	Stinky Squid	C	
<b>Order Polyporales</b>				
<i>Bjerkandera</i>	<i>fumosa</i>	Big Smoky Bracket	C	
<i>Cerioporus</i>	<i>leptocephalus</i>	Blackfoot Polypore	C	
<i>C.</i>	<i>squamosus</i>	Dryad's Saddle	C	
<i>Cerrena</i>	<i>unicolor</i>	Mossy Maze Polypore		P
<i>Daedalea</i>	<i>quercina</i>	Oak Mazegill/Oak Daedalea	C	
<i>Daedaleopsis</i>	<i>confragosa</i>	Thin-walled Maze Polypore	C	
<i>Ganoderma</i>	<i>applanatum</i>	Artist's Bracket/Common Shelf Fungus	C	
<i>G.</i>	<i>curtisii</i>	Golden Reishi	C	
<i>G.</i>	<i>lobatum</i>		C	
<i>Grifola*</i>	<i>frondosa</i>	Hen of the Woods/Polyporus	C	C
<i>Irpex</i>	<i>lacteus</i>	Milk-white Toothed Polypore		P
<i>Irpiciporus</i>	<i>pachyodon</i>	Marshmallow Polypore		P
<i>Ischnoderma</i>	<i>resinosum</i>	Resinous Polypore	C	
<i>Laetiporus*</i>	<i>sulphureus</i>	Chicken of the Woods/Sulphur Polyporus	C	C
<i>Lentinus</i>	<i>brumalis</i>	Winter Polypore	C	
<i>Meripilus</i>	<i>sumstinei</i>	Black-staining Polypore	C	
<i>M.</i>	<i>tremellosus</i>	Trembling Crust	C	
<i>Neoantrodia</i>	<i>serialiformis</i>		C	
<i>Neofavolus</i>	<i>alveolaris</i>	Hexagonal-pored Polypore	C	
<i>Nigroporus</i>	<i>vinosus</i>		C	
<i>Niveoporofomes</i>	<i>spraguei</i>	Green Cheese Polypore	C	
<i>Perenniporia</i>	<i>tenuis</i>		P	
<i>Phanerochaete</i>	sp.		P	
<i>Phlebia</i>	<i>coccineofulva</i>	Scarlet Waxcrust	P	
<i>P.</i>	<i>radiata</i>	Wrinkled Crust	C	
<i>Phlebiopsis</i>	<i>crassa</i>		P	
<i>Physisporinus</i>	<i>crocatus</i>		P	
<i>Sparassis</i>	<i>crispa</i>	Cauliflower/Coral Fungus	C	
<i>Steccherinum</i>	<i>ochraceum</i>	Ochre Spreading Tooth	C	
<i>Trametes</i>	<i>betulina</i>	Gilled Polypore	C	
<i>T.</i>	<i>cinnabarina</i>	Northern Cinnabar Polypore	C	

Genus	Species	Common Name	72/77	18-22
<i>T.</i>	<i>conchifer</i>	Little Nest Polypore		P
<i>T.</i>	<i>gibbosa</i>	Lumpy Bracket		C
<i>T.</i>	<i>hirsuta</i>	Hairy Bracket		P
<i>T.</i>	<i>lactinea</i>			C
<i>Trametes*</i>	<i>versicolor</i>	Turkey Tail/Multi-zoned Polystictus	C	C
<i>Tyromyces</i>	<i>chioneus</i>	White Cheese Polypore		C
<b>Order Russulales</b>				
<i>Aleurodiscus</i>	<i>oakesii</i>	Smooth Patch Disease		P
<i>Artomyces</i>	<i>pyxidatus</i>	Crown-tipped Coral Fungus		C
<i>Hericium</i>	<i>erinaceus</i>	Lion's-mane Mushroom		P
<i>Lactarius</i>	sp.	common milkcaps		P
<i>L.</i>	<i>subdulcis</i>	Mild Milkcap/Sweetish Lactarius	C	
<i>Lactifluus</i>	<i>piperatus</i>	Peppery Milkcap		C
<i>L.</i>	<i>volemus</i>	Weeping Milk Cap		C
<i>Peniophora</i>	<i>albobadia</i>	Giraffe Spots		C
<i>Russula</i>	<i>compacta</i>	Fishbiscuit Russula		C
<i>R.</i>	<i>emetica</i>	The Sickener/Emetic Russula	C	
<i>R.</i>	<i>foetens</i>	Stinking Brittlegill/Fetid Russula	C	
<i>R.</i>	<i>mariae</i>	Purple-bloom Russula		C
<i>R.</i>	<i>ochroleuroides</i>			C
<i>Stereum</i>	<i>complicatum</i>	Crowded Parchment		C
<i>S.</i>	<i>gausapatum</i>	Bleeding Oak Crust		C
<i>S.</i>	<i>lobatum</i>			C
<i>S.</i>	<i>ostrea</i>	False Turkey-tail		C
<i>S.</i>	<i>striatum</i>	Silky Parchment		C
<i>S.</i>	<i>subtomentosum</i>	Yellowing Curtain Crust		C
<i>Xylobolus</i>	<i>frustulatus</i>	Ceramic Parchment		C

#### Cup Fungi and Allies (Classes Leotiomycetes & Pezizomycetes)

<b>Order Helotiales</b>				
<i>Calycina</i>	<i>citrina</i>	Yellow Fairy Cups		C
<i>Chlorociboria</i>	sp.			P
<b>Order Pezizales</b>				
<i>Galiella</i>	<i>rufa</i>	Hairy Rubber Cup		P
<i>Morchella</i>	<i>esculenta</i>	Yellow Morel/Morel Common	C	
<i>Otidea</i>	sp.			P
<i>Peziza</i>	<i>varia</i>	Palomino or Recurved Cup	C	
<i>Phylloscypha</i>	<i>phyllogena</i>	Common Brown Cup		C
<i>Scutellinia</i>	sp.	eyelash cups		C
<i>Scutellinia*</i>	<i>scutellata</i>	Common Eyelash/Peziza		C

#### Rust Fungi (Class Pucciniomycetes)

<b>Order Platyglloeales</b>				
<i>Insolibasidium</i>	<i>deformans</i>	Honeysuckle Leaf Blight		P
<b>Order Pucciniales</b>				
<i>Allodus</i>	<i>podophylli</i>	Mayapple Rust		C
<i>Gymnoconia</i>	<i>nitens</i>			C
<i>Gymnosporangium</i>	<i>clavipes</i>	Quince Rust		P
<i>G.</i>	<i>juniperi-virginianae</i>	Juniper-apple Rust		C
<i>G.</i>	<i>sabinae</i>	Pear Rust		C



Genus	Species	Common Name	72/77 18-22
<i>Phragmidium</i>	sp.		P
<i>Puccinia</i>	<i>andropogonis</i>		C
<i>P.</i>	<i>sparganioidis</i>	Ash Rust	P

#### Jelly Fungi (Classes Dacrymycetes & Tremellomycetes)

Order Dacrymycetales			
<i>Calocera*</i>	<i>viscosa</i>	Jelly-Antler/Clavaria	C
<i>Dacrymyces</i>	<i>chrysospermus</i>	Orange Jelly Spot	C
<i>D.</i>	<i>stillatus</i>	Jelly Spot Fungus	P
Order Tremellales			
<i>Phaeotremella</i>	<i>foliacea</i>	Leafy Brain	C
<i>Tremella</i>	sp.	jelly fungi	C
<i>T.</i>	<i>mesenterica</i>	Witch's Butter	C

#### Ball Molds (Class Atractiellomycetes)

Order Atractiellales			
<i>Helicogloea</i>	<i>compressa</i>		C
<i>Phleogena</i>	<i>faginea</i>	Fenugreek Stalkball	C

#### Gall Fungi (Class Taphrinomycetes)

Order Taphrinales			
<i>Taphrina</i>	<i>caerulescens</i>	Oak Leaf Blister	C

#### Stone Fungi (Class Sordariomycetes)

Order Diaporthales			
<i>Amphilogia</i>	<i>gyrosa</i>	Orange Hobnail Canker	C
<i>Tubakia</i>	<i>suttoniana</i>		P
Order Hypocreales			
<i>Gibellula</i>	sp.		P
<i>Trichoderma</i>	<i>viride</i>		C
Order Xylariales			
<i>Annulohyphoxylon</i>	<i>thouarsianum</i>	Cramp Balls	P
<i>Biscogniauxia</i>	<i>atropunctata</i>	Hypoxylon Canker	C
<i>Hypoxylon</i>	<i>fragiforme</i>	Beech Woodward	C
<i>Xylaria</i>	<i>polymorpha</i>	Dead Man's Fingers	C P

#### Insect-Hanger Fungi (Class Laboulbeniomyces)

Order Laboulbeniales			
<i>Hesperomyces</i>	<i>harmoniae</i>		C

#### Insect-Killer Fungi (Class Entomophthoromycetes)

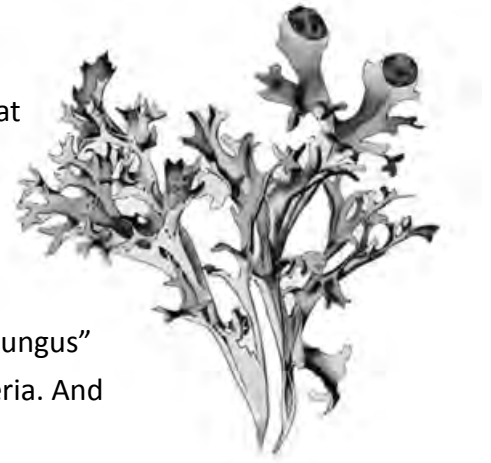
Order Entomophthorales			
<i>Entomophthora</i>	sp.	fly death fungi	P

#### Plant-Pathogen Fungi & Allies (Class Dothideomycetes)

Order Botryosphaerales			
<i>Botryosphaeria</i>	<i>dothidea</i>	Asteromyia Gall Midge Fungus	C
Order Venturiales			
<i>Apiosporina</i>	<i>morbosa</i>	Black Knot	C

## Lichens

Have you ever wondered about the splotchy, somewhat gnarled, greenish, brownish or grayish things growing on rocks and tombstones and the bark of trees? What are they? Some kind of weird plant or fungus?



Answer: “Weird” (in a good way) = Yes, “Plant” = No, and “Fungus” = Yes. Plus also algae or bacteria, or maybe algae *and* bacteria. And maybe more than one type of fungus!

Lichens (pronounced “likens”) are mutualistic symbiotic mixes of fungi and something that photosynthesizes, usually algae. This is different from the mutualism between fungi and plant roots, or flowering plants and their pollinators because, in a lichen, all of the interacting parties merge and function as a single organism. The fungi provide structural support and protection - and compartmentalization - as well as access to water and minerals. The algae (or photosynthetic bacteria) provide energy in the form of sugars made via photosynthesis. As such, a lichen is a composite organism: a single organism made of two or more independent organisms.

Lichens occur in terrestrial habitats throughout the world, from sea level to high elevations, on almost any surface that is stable and reasonably well lit. They occur commonly on natural substrates such as rocks, soil, and the bark of trees, and also on structures created by humans, e.g., walls, roofs, bridges, and tombstones.

Lichens possess a few characteristics that enable them to colonize bare habitats, and therefore function as ecological pioneers; they’re fairly energy self-sufficient and tend to have low mineral requirements, and they can digest their way into rocks and other hard surfaces. Their fungi are the type that secrete digestive enzymes to the outside; they break down just enough surface to anchor themselves. As such, they are often the first living organisms to colonize bare rocky areas or areas made bare because of landslides or volcanic eruptions. As lichens in these situations slowly break down rocks, they help to create soil, making the areas habitable by others. Lichens are eaten by snails and slugs, spiders, crustaceans and lots of insects, and by all kinds of mammals – from mice to bats and deer. Some insects use them as egg-laying sites and many birds or small mammals use them for nest insulation or camouflage.



Lichens are grouped based on growth form: crustose (appearing sprayed on), foliose (leafy like) or fruticose (ornate, sometimes miniature-tree like). Because a lichen's structure — and therefore its appearance — is dictated by the genes of the major type of fungus present, lichens are considered “lichenized” fungi, and the different composite organisms are given fungal

genus and species names. The photosynthetic symbionts (photobionts) have their own species names, but there are far fewer of them: at the moment, there are about 20,000 named mycobiont species (the predominant fungi in lichens) but only about 200 named photobionts.

Lichens don't have roots; they absorb water and minerals from the air. This makes them highly sensitive to pollutants, particularly the two common types: sulfur dioxide and nitrogen oxides, and therefore their health in any particular area serves as an indicator of air quality.

Sixty different lichens were identified at Honey Hollow during the years 2018-2022, and 53 of those were confirmed to be present growing on trees in the forested areas and on rocks along the stream corridor. In the 21st century, more than 125 species of lichens have been recorded from Bucks County, including these species from Honey Hollow. Of the Honey Hollow species, six were found nowhere else in Bucks County. One species (*Lecania erysibe*) is rarely seen in the eastern United States and appears to be a new record for the Commonwealth of Pennsylvania!

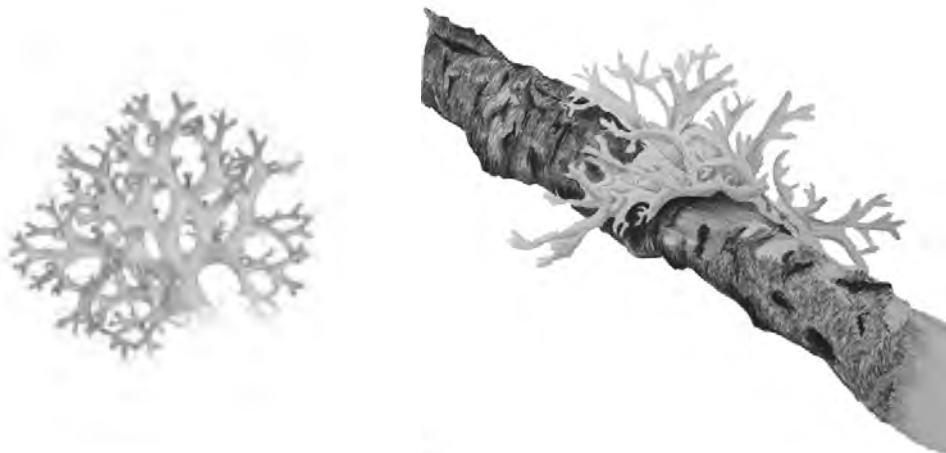
Most lichens do not have common names as do birds and flowers, and many are too small and inconspicuous for most people to identify when walking in the woods, especially the ones that grow on rocks. In the online version of this report, we include brief descriptions of the lichens you're likely to recognize if hiking trails at Honey Hollow.

Below are the lichens confirmed to be present at Honey Hollow in 1972 and 1977, and during 2018-22, and one not seen but likely to be currently present. Many of the iNaturalist identifications of lichens were confirmed by Dennis Waters, one of the inventory authors.

**Lichens.** Asterisk indicates taxonomic change since 1972. Common name: current one/that from previous years. Occurrence: confirmed (C), probable (P); see Foreward for details. 72/77 refers to the original 1972 inventory and the 1978 2nd edition, while 18-22 refers to the five years during which data were collected for the current inventory.

Genus	Species	Common Name	72/77	18-22
<b>Order Acarosporales</b>				
<i>Sarcogyne</i>	<i>privigna</i>			C
<i>Trimmatothelopsis</i>	<i>americana</i>			C
<b>Order Arthoniales</b>				
<i>Chrysothrix</i>	<i>caesia</i>			C
<b>Order Caliciales</b>				
<i>Amandinea</i>	<i>polyspora</i>			C
<i>Buellia</i>	<i>curtisii</i>	Button Lichen		C
<i>B.</i>	<i>spuria</i>	Button Lichen		C
<i>Phaeophyscia</i>	<i>adiastola</i>	Shadow Lichen		C
<i>P.</i>	<i>pusilloides</i>	Shadow Lichen		C
<i>P.</i>	<i>rubropulchra</i>	Shadow Lichen		C
<i>Physcia</i>	<i>millegrana</i>	Rosette Lichen		C
<i>P.</i>	<i>pumilior</i>	Rosette Lichen		C
<i>P.</i>	<i>stellaris</i>	Star Rosette Lichen		C
<i>Rinodina</i>	<i>moziana</i>			C
<b>Order Candelariales</b>				
<i>Candelaria</i>	<i>concolor</i>	Candleflame Lichen		C
<i>Candelariella</i>	<i>efflorescens</i>			C
<b>Order Lecanorales</b>				
<i>Biatora</i>	<i>printzenii</i>			C
<i>Cladonia</i>	<i>caespiticia</i>			C
<i>C.</i>	<i>coniocraea</i>	Common Powderhorn	C	
<i>C.</i>	<i>cratatella</i>	British Soldier Lichen	C	C
<i>C.</i>	<i>ignatii</i>			C
<i>C.</i>	<i>ochrochlora</i>			C
<i>C.</i>	<i>parasitica</i>			C
<i>C.</i>	<i>petrophila</i>			C
<i>C.</i>	<i>peziziformis</i>	Turban Cup Lichen		C
<i>C.</i>	<i>pyxidata</i>	Pebbled Pyxie Cup/Pyxie Cup	C	
<i>C.</i>	<i>verticillata</i>	Ladder Lichen	C	
<i>Fellhanera</i>	<i>silicis</i>			C
<i>Flavoparmelia</i>	<i>caperata</i>	Common Greenshield Lichen		C
<i>Lecania</i>	<i>croatica</i>			C
<i>L.</i>	<i>erysibe</i>			C
<i>Lecanora</i>	<i>caesiorubella</i>	Frosted Rim-/Pink Pearl Button Lichen	C	
<i>L.</i>	<i>hybocarpa</i>			C
<i>L.</i>	<i>strobilina</i>	Mealy Rim-lichen		C
<i>Lepraria</i>	<i>finkii</i>	Dust Lichen		C
<i>L.</i>	<i>normandinoides</i>	Dust Lichen		C

Genus	Species	Common Name	72/77	18-22
<i>Myelochroa</i>	<i>aurulenta</i>			C
<i>Parmelia</i>	<i>sulcata</i>	Shield Lichen		C
<i>Parmotrema</i>	<i>hypotropum</i>	Powdered Ruffle Lichen		C
<i>P.</i>	<i>reticulatum</i>	Black Sheet Lichen		C
<i>Punctelia</i>	<i>caseana</i>	Moondust Speckled Lichen		C
<i>P.</i>	<i>rudecta</i>	Rough Speckled Shield Lichen		C
<i>Pyrrhospora</i>	<i>varians</i>			C
<b>Order Lecideales</b>				
<i>Porpidia</i>	<i>albocaerulescens</i>	Smokey-eyed Boulder Lichen		C
<b>Order Leprocaulales</b>				
<i>Leprocaulon</i>	<i>adhaerens</i>	Dust Lichen		C
<b>Order Lichenotheliales</b>				
<i>Lichenothelia</i>	sp.			C
<b>Order Mycocaliciales</b>				
<i>Phaeocalicium</i>	<i>polyporaem</i>			C
<b>Order Ostropales</b>				
<i>Graphis</i>	<i>scripta</i>	Common Script/Hieroglyphics Lichen	C	C
<i>Pseudosagedia</i>	<i>cestrensis</i>			C
<i>P.</i>	<i>guentheri</i>			C
<b>Order Peltigerales</b>				
<i>Lobaria</i> *	<i>pulmonaria</i>	Tree Lungwort/Lungwort Lichen		C
<b>Order Pertusariales</b>				
<i>Aspicilia</i>	<i>laevata</i>			C
<i>Circinaria</i>	<i>caesiocinerea</i>			C
<i>Pertusaria</i>	<i>pustulata</i>			C
<b>Order Teloschistales</b>				
<i>Caloplaca</i>	<i>flavocitrina</i>	Firedot Lichen		C
<i>C.</i>	<i>flavovirescens</i>	Firedot Lichen		C
<b>Order Trapeliales</b>				
<i>Trapelia</i>	<i>placodioides</i>			C
<b>Order Trypetheliales</b>				
<i>Viridothelium</i>	<i>virens</i>	Speckled Blister Lichen		P
<b>Order Umbilicariales</b>				
<i>Ropalospora</i>	<i>viridis</i>			C
<b>Order Verrucariales</b>				
<i>Endocarpon</i>	<i>pallidulum</i>			C
<i>Verrucaria</i>	sp.			C





Monarch on Milkweed, MJ

# Plants



Moss and Fern, RS

Plants evolved from an aquatic algal ancestor and adapted to terrestrial conditions over hundreds of millions of years, as they acquired characteristics that enabled them to – ultimately – counteract gravity, access water and keep from drying out, as well as reproduce sexually without needing water for swimming sperm.

**Bryophytes** (mosses, liverwort and hornworts) are descendants of the earliest plants to move onto land and are not very terrestrial. Without the waterproof coverings and water-finding roots of more recent groups of plants (below), they are vulnerable to desiccation. As such, most of them are restricted to moist or aquatic environments.

**Pteridophytes** (ferns, horsetails and clubmosses) have root-like structures and waterproof “cuticles” (outer coverings), and special tissues that transport water and sugars around their bodies which helps them stand up straight. As such, these plants can – and do – get big. As in bryophytes, fern sperm must swim to eggs, a stage in their lives requiring environmental moistness.

In an ancestor of the next two groups, seeds evolved. As do the eggs of animals, seeds contain embryos with enough energy, in the form of fats/oils, to get development underway before young plants are able to germinate (giving them a bit of a “head start”).

**Gymnosperms** (conifers, cycads, and ginkgos) are completely terrestrial. They have roots, thick cuticles and bundle their sperm in little packages – pollen grains – that, typically, the wind carries to eggs in cones, sometimes great distances away.

**Angiosperms** are the dominant land plants in most of Earth’s terrestrial ecosystems: about

90% of all plant species are angiosperms. This group includes willows to wheat, bamboo to bananas, roses to radishes, maples to marigolds, and crabgrass to cacti. The success of angiosperms is related to the increased efficiency in getting eggs and sperm together via flowers and pollinators and the increased success in spreading offspring around via fruits.



Bee on Virginia Bluebell, MJ

The flowers of some angiosperms are wind pollinated, while others engage in mutualistic relationships with animals that unwittingly carry out pollination: flowers provide high-energy nectar to draw in visitors that, then, come in contact with sticky pollen as they feed. When they visit the next flower, sperm is transferred to egg. To ensure that pollinators visit flowers of the same species, many angiosperms have coevolved with their pollinators, such that their flowers possess the characteristics particular pollinators seek. For example, many white and odorous flowers that open at night attract bats and moths, and many yellow and blue flowers with ultraviolet patterns and landing platforms attract bees. Hummingbirds are attracted to red and pink flowers with tubular shapes, and flies are often attracted to brownish flowers that smell of decay.

Angiosperms produce fruits that aid in dispersal. Fixed in place, plant parents need to disperse their offspring in the form of seeds, and fruits are the way they do it. Fruits develop from flowers to enclose seeds and disperse them in a variety of ways. For example, some fruits fall into water and float to new locations (e.g., coconuts), and some are dispersed via wind (e.g., maple “helicopters”). Other fruits get stuck in the feathers or fur of passing birds or mammals, and still others are eaten by animals that then drop seeds through sloppy eating or pass them – undigested - through digestive tracts.

## Honey Hollow Watershed

### Bryophytes

Of the species reported on iNaturalist, only a few were confirmed, but there is no question that many species of bryophytes are present and thriving at Honey Hollow, as a hike through the area will attest. We are certain to fill in more details on this group of plants in the future.



Haircap Moss, RS

**Bryophytes.** Common name: current one/that from previous years. Occurrence: confirmed (C), probable (P); see Foreward for details. 72/77 refers to the original 1972 inventory and the 1978 2nd edition, while 18-22 refers to the five years during which data were collected for the current inventory.

Genus	Species	Common Name	72/77	18-22
<b>Hornworts</b>				
<b>Order Notothyladales</b>				
<i>Phaeoceros</i>	<i>laevis</i>	Smooth/Common Hornwort	C	
<b>Liverworts</b>				
<b>Order Pelliales</b>				
<i>Pellia</i>	<i>epiphylla</i>	Common Pellia	C	C
<b>Order Marchantiales</b>				
<i>Conocephalum</i>	<i>conicum</i>	Great Scented Liverwort	C	
<i>Marchantia</i>	<i>polymorpha</i>	Common Liverwort	C	C
<b>Order Porellales</b>				
<i>Frullania</i>	<i>eboracensis</i>	New York Scalewort		P
<b>Mosses</b>				
<b>Order Bryales</b>				
<i>Plagiomnium</i>	<i>cuspidatum</i>	Woodsy Thyme-moss		P
<b>Order Dicranales</b>				
<i>Dicranum</i>	<i>scoparium</i>	Broom Forkmoss		P
<i>Fissidens</i>	sp.	pocket mosses		P
<i>Leucobryum</i>	<i>albidum</i>	White Moss		P
L.	<i>glaucum</i>	Pincushion Moss		P
<b>Order Hypnales</b>				
<i>Brachythecium</i>	<i>rivulare</i>	Waterside Feather Moss		P
<i>Hypnum</i>	<i>cupressiforme</i>	Cypress-leaved Plait-moss		P
<i>Pseudanomodon</i>	<i>attenuatus</i>	Tree-skirt Moss		P
<i>Ptilium</i>	<i>crista-castrensis</i>	Ostrich-plume Moss	C	



Genus	Species	Common Name	72/77 18-22	
<i>Thuidium</i>	<i>delicatulum</i>	Delicate Fern Moss		P
<b>Order Orthotrichales</b>				
<i>Uloa</i>	<i>crispa</i>	Crisped Pincushion		P
<b>Order Polytrichales</b>				
<i>Atrichum</i>	<i>undulatum</i>	Catherine's Moss		P
<i>Pogonatum</i>	sp.			P
<i>Polytrichum</i>	<i>commune</i>	Common Haircap Moss	C	C
<i>P.</i>	<i>juniperinum</i>	Juniper Haircap Moss		P
<b>Order Pottiales</b>				
<i>Syntrichia</i>	<i>ruralis</i>	Star Moss	C	P
<b>Order Sphagnales</b>				
<i>Sphagnum</i>	sp.	sphagnum mosses		C
<i>S.</i>	<i>palustre</i>	Prairie Peatmoss/Spoon-leaved Sphagnum	C	

## Pteridophytes

Ferns come in many different sizes, color, and shapes. The leaves (also known as fronds) of some species are completely undivided while others are deeply lobed or divided into smaller leaflets called pinnae. The pinnae of some species are divided even further into smaller leaflets, giving the fronds a lacy appearance when viewed from above.



Sensitive Fern, RS

Spores are the dispersal stage of fern life cycles. They are incredibly small (some smaller than 1/200<sup>th</sup> of a centimeter across) and are housed in structures that are grouped into “sori” (singular sorus). The sori are located in different areas of different types of ferns and are large enough to be seen with unaided eyes. In some ferns, such as Cinnamon Fern and Sensitive Fern at Honey Hollow, sori are found on distinct “fertile fronds” that often look like a tall spike near the plant. The sori of many other ferns, such as Lady Fern and the many Wood Ferns on site, are located on the undersides of regular fronds.

Thirteen species of ferns, from seven taxonomic families, were confirmed to occur in the watershed. Common species, ubiquitous throughout the Mid-Atlantic region of the United States, include Christmas Fern, Sensitive Fern and Hay-scented Fern. No clubmosses were found during recent surveys.

The middle-stream section of the watershed supports the highest diversity of ferns, including two species not very common in the area but growing in a rocky streambed at Honey Hollow: Goldie’s Wood Fern and Silvery Glade Fern. Members of the most diverse

genus of ferns observed in the watershed — the Wood Ferns (*Dryopteris*) — were prolific in this middle stream area, with four species and one hybrid (*Dryopteris* × *triploidea*) identified. The high species diversity, combined with the surprising absence of a few species associated with disturbed habitats and “found” in the watershed in 1972 (and otherwise common throughout the region, e.g., Ebony Spleenwort, Bracken Fern, and a few clubmosses), strongly suggests that Honey Hollow’s middle stream area has not been as heavily impacted by humans as have been other areas of the watershed. The absence of bracken in particular, characterized as occurring “almost anywhere except in pure sand” in 1972, hopefully suggests that years of protection are righting some of the wrongs of the past, making possible at least partial restoration of native systems.



Dryopteris pinnule, RS

Below are the ferns, and their allies, documented to occur at Honey Hollow in 1972 and during the years 2018-2022.

**Pteridophytes.** Asterisk indicates taxonomic change since 1972. Common name: current one/that from previous years. Occurrence: confirmed (C). 72/77 refers to the original 1972 inventory and the 1978 2nd edition, while 18-22 refers to the five years during which data were collected for the current inventory.

Genus	Species	Common Name	72/77	18-22
<b>Ferns and Horsetails</b>				
<b>Family Aspleniaceae</b>				
<i>Asplenium</i>	<i>platyneuron</i>	Ebony Spleenwort	C	
<b>Family Athyriaceae</b>				
<i>Athyrium</i> *	<i>filix-femina</i>	Lady Fern	C	C
<i>Deparia</i>	<i>acrostichoides</i>	Silvery Glade Fern		C
<b>Family Cystopteridaceae</b>				
<i>Cystopteris</i>	<i>fragilis</i>	Brittle Bladder/Brittle Fern	C	
<b>Family Dennstaedtiaceae</b>				
<i>Dennstaedtia</i> *	<i>punctilobula</i>	Hay-scented Fern	C	C
<i>Pteridium</i> *	<i>aquilinum</i> *	Bracken	C	
<b>Family Dryopteridaceae</b>				
<i>Dryopteris</i>	× <i>triploidea</i>	Triploid Wood Fern		C
<i>D.</i>	<i>carthusiana</i>	Spinulose Wood Fern		C
<i>D.</i>	<i>crinata</i>	Crested Wood Fern		C
<i>D.</i>	<i>goldiana</i>	Goldie's Wood Fern		C
<i>D.</i>	<i>intermedia</i>	Intermediate Wood Fern		C
<i>Dryopteris</i> *	<i>marginalis</i> *	Evergreen Wood Fern	C	C
<i>Polystichum</i>	<i>acrostichoides</i>	Christmas Fern	C	C

Genus	Species	Common Name	72/77	18-22
<b>Family Equisetaceae</b>				
<i>Equisetum</i>	<i>arvense</i>	Field Horsetail	C	
<b>Family Onocleaceae</b>				
<i>Matteuccia</i>	<i>struthiopteris</i>	Ostrich Fern	C	
<i>Onoclea</i>	<i>sensibilis</i>	Sensitive Fern	C	C
<b>Family Ophioglossaceae</b>				
<i>Botrychium</i>	<i>virginianum</i>	Rattlesnake/Virginia Grape Fern	C	
<b>Family Osmundaceae</b>				
<i>Claytosmunda*</i>	<i>clytoniana</i>	Interrupted Fern	C	C
<i>Osmunda</i>	<i>spectabilis*</i>	American Royal/Royal Fern	C	
<i>Osmundastrum*</i>	<i>cinnamomeum*</i>	Cinnamon Fern	C	C
<b>Family Polypodiaceae</b>				
<i>Polypodium</i>	<i>virginianum</i>	Common Polypody Rock Fern	C	
<b>Family Pteridaceae</b>				
<i>Adiantum</i>	<i>pedatum</i>	Maidenhair Fern	C	
<b>Family Thelypteridaceae</b>				
<i>Parathelypteris*</i>	<i>noveboracensis</i>	New York Fern	C	C
<i>Phegopteris</i>	<i>polypodiodes</i>	Long Beech Fern	C	
<i>Thelypteris*</i>	<i>palustris*</i>	Marsh Fern	C	
<b>Clubmosses</b>				
<b>Family Lycopodiaceae</b>				
<i>Dendrolycopodium*</i>	<i>obscurum</i>	Flat-branched Tree-clubmoss/F-b Ground Pine	C	
<i>Diphasiastrum*</i>	<i>digitatum*</i>	Fan Clubmoss/Running Pine Clubmoss	C	
<i>Huperzia*</i>	<i>lucidula*</i>	Shining Firmoss/Shining Clubmoss	C	
<b>Family Selaginellaceae</b>				
<i>Selaginella</i>	<i>rupestris</i>	Rock Spikemoss	C	

## Gymnosperms and Angiosperms

### Temperate Deciduous Forests

Honey Hollow watershed is located within habitat classified as temperate deciduous forest (or temperate broadleaf forest), a biome type that occurs mostly in the Northern Hemisphere and mostly in midlatitudes, in areas with enough rainfall to support tall

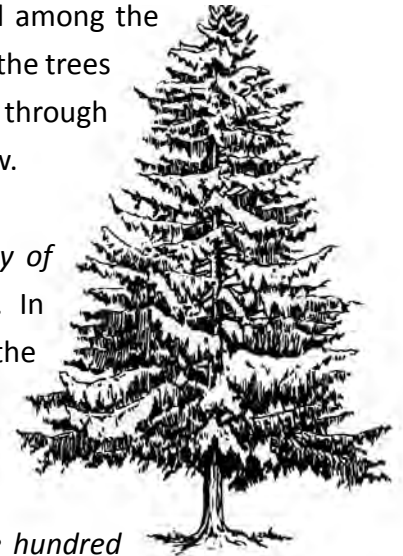


trees and with soils fertile enough to support the regrowth each spring of the leaves lost the previous fall. Because of their locations on Earth, these forests experience considerable temperature changes throughout the year, and deciduous trees respond to the frozen conditions of winter by dropping their leaves and going dormant until more suitable conditions return. The thick layer of leaf litter created in fall contributes to the nutrient richness of the soil.

The Oak, Hickory, Maple and Beech trees of the watershed are angiosperms (flowering plants) and are common components of deciduous forests across Pennsylvania and Earth. Pines and hemlock (gymnosperms) are also commonly found among the hardwoods (angiosperms) in these forests. The vertical orientation of the trees sets up a stratified structure, from the covering of canopy trees down through smaller trees and shrubs to the non-woody “herbaceous” layer below.

More than 50 years have passed since the publication of *Inventory of Natural Resources in a Bucks County Watershed* (Waring et al. 1972). In “Honey Hollow Trees & Shrubs,” Thomas (1972) briefly describes the composition of the hardwood forest at the time:

*Foresters termed the old forest of the Piedmont...as an oak-chestnut-hickory type. The term can still pertain after three hundred years and more...the chestnut is gone as a tree of course,.. and now as then there are black birch, elm, maple, and others, but the oaks and hickory are still the indicator species.*



Fifty years hence, the basic composition has not changed much, as the forest is still characterized by oaks and hickories. Other species include large Tulip Poplars, Red and Sugar Maples, sycamores, scattered ashes, a few elms, and the stump sprouts, saplings and small trees of American Chestnut. American Chestnut had been a dominant member of this community in the past, but suffered drastic declines because of an invasive pathogen: a fungus introduced to New York City from Asia in 1904 wiped out most chestnut populations by the mid-1900s. The incipient chestnuts at Honey Hollow may be resistant to the fungus, or more likely, have not yet have been infected. The loss of chestnut trees, because of an introduced pathogen, was one of the first of the human-initiated traumas to be inflicted upon the forests of the Honey Hollow watershed.

Another was the infestation, and thereafter decline, of Eastern Hemlocks because of the invasive Hemlock Woolly Adelgid (an insect, *Adelges tsugae*), native to eastern Asia and identified in the eastern U.S. in the 1950s. Eastern Hemlock is still present as small trees and saplings at Honey Hollow, and many of the individuals examined appeared healthy and not seriously affected by Woolly Adelgid.

A third infestation involves the Emerald Ash Borer (*Agrilus planipennis*, a beetle from northeast Asia) that has caused extensive mortality in several species of ash trees in the eastern U.S. since the late 1990s. All of the White and Green Ashes seen during surveys in 2022 were either dead or dying, with the exception of the uncommonly large White Ash near the environmental center which has been treated to prohibit infestation. The numbers of forested upland, wetland, and stream-corridor spring woodland ephemerals (e.g., violets, Spring Beauty, Trout Lily, native mustards such as toothwort and cresses, Wild Geranium, Windflower, some sedges and Dwarf Ginseng) appear to be drastically reduced because of dense spring growth of Lesser Celandine (an invasive plant from Europe and Asia), as well as the unrelenting pressure from White-tailed Deer. Several species seen in 1972 and 1977 appear to be absent recently, or their occurrence consists of only a few, scattered individuals managing to squeeze up from within the dense celandine (the latter a spring ephemeral itself, is almost entirely gone by early summer). Squeezers include Spring Beauty, Marsh Blue Violet and other violets, Windflower, Trout Lily, Dwarf Ginseng and Cutleaf Toothwort.

### **Outside the Forest**

The most intact habitats in the watershed, with the highest percentages of native species, are the wetlands associated with the stream, ponds and marsh in the eastern and southeastern areas of the property. Holding their own despite increasing pressure from Lesser Celandine, many native species are present, including American Bur-reed, Sweet Flag, iris, Reed Canary Grass, Rice Cutgrass, cattails, Pickerelweed, duckweed, pondweed, Joe Pye Weed, Skunk Cabbage, New York Ironweed and a host of different sedges.

Autumn Olive, Tartarian Honeysuckle, Multiflora Rose, Round-leaved Bittersweet, Japanese Honeysuckle and other nonnative shrubs and vines occur as dense thickets in certain areas in the fields and along forested edges at Honey Hollow. Native plants compete poorly in these thickets, but some of the nonnatives appeared to be used extensively by migrant and resident birds during the 2022 survey. The fields, lawns and forest edges contain many species of nonnative plants, including the common medley of Queen Anne's Lace, plantains, clovers, hawkweed and mustards, some of which are invasive (such as Devil's Tail [Mile-a-Minute Weed], Crown and Tufted Vetch, Timothy, Japanese Knotweed and Stiltgrass). These habitats also support diverse native communities of numerous goldenrod, aster, and milkweed species.

From iNaturalist data and field surveys conducted in 2022, more than 70 new species were added to the 1972/77 lists for plants in and outside of the forest at Honey Hollow. These new additions include mostly sedges and grasses, but also several notable species such as Toadshade, Goldthread, and the orchids Late Coralroot, Spotted Coralroot and Showy Orchis. Toadshade is expanding its range which is mostly western PA, and there are recent records in adjacent counties, but it's a new record for Bucks County. Goldthread, too, may be new for Bucks County. And the orchids, in decline mainly because of deer browsing, are uncommon and have become increasingly difficult to find.

Below are the gymnosperms and angiosperms found to occur in the Honey Hollow watershed in 1972 and 1977, and during the years 2018-2022.

**Gymnosperms and Angiosperms.** Asterisk indicates taxonomic change since 1972 or 1977. Common name: current one/that from previous years; nn=nonnative. Occurrence: confirmed (C), probable (P); see Forward for details. 72/77 refers to the original 1972 inventory and the 1978 2nd edition, while 18-22 refers to the five years during which data were collected for the current inventory.

Genus	Species	Common Name	72/77	18-22
<b>Gymnosperms</b>				
<b>Family Cupressaceae</b>				
<i>Juniperus</i>	<i>virginiana</i>	Eastern Redcedar	C	C
<i>Metasequoia</i>	<i>glyptostrobooides</i>	Dawn Redwood		C
<i>Taxodium</i>	<i>distichum</i>	Bald Cypress, nn		C
<b>Family Pinaceae</b>				
<i>Picea</i>	sp.	spruce species		C
<i>Pinus</i>	<i>nigra</i>	Austrian Pine, nn		C
<i>P.</i>	<i>strobus</i>	Eastern White Pine	C	C
<i>P.</i>	<i>sylvestrus</i>	Scots/Scotch Pine, nn	C	C
<i>Tsuga</i>	<i>canadensis</i>	Eastern Hemlock	C	C
<b>Angiosperms: Monocots</b>				
<b>Family Alismataceae</b>				
<i>Sagittaria</i>	<i>latifolia</i>	Broadleaf Arrowhead/Arrowhead	C	C
<b>Family Amaryllidaceae</b>				
<i>Allium</i>	<i>sativum</i>	Garlic, nn	C	
<i>A.</i>	<i>vineale</i>	Wild Garlic/Field Garlic, nn	C	C
<i>Galanthus</i>	<i>nivalis</i>	Common Snowdrop, nn		C
<i>Narcissus</i>	<i>pseudonarcissus</i>	Wild Daffodil, nn		P



Genus	Species	Common Name	72/77 18-22	
<b>Family Araceae</b>				
<i>Arisaema</i>	<i>triphyllum</i>	Jack-in-the-pulpit	C	C
<i>Lemna</i>	<i>minor</i>	Common Duckweed/Lesser Duckweed	C	C
<i>Symplocarpus</i>	<i>foetidus</i>	Eastern Skunk Cabbage/Skunk Cabbage	C	C
<b>Family Asparagaceae</b>				
<i>Liriope</i>	sp.	liliturfs		P
<i>Maianthemum*</i>	<i>racemosum*</i>	Solomon's Plume/Solomon-plume	C	P
<i>Muscari</i>	<i>botryoides</i>	Common Grape Hyacinth/Grape-hyacinth, nn	C	
<i>Ornithogalum</i>	<i>umbellatum</i>	Common Star-of-Bethlehem/Star of Bethlehem, nn	C	C
<i>Polygonatum</i>	<i>biflorum</i>	Smooth Solomon's Seal		C
<i>P.</i>	<i>pubescens</i>	Hairy Solomon's-seal		C
<b>Family Asphodelaceae</b>				
<i>Kniphofia</i>	<i>uvaria</i>	Red Hot Poker, nn		P
<i>Hemerocallis</i>	<i>fulva</i>	Orange Day-lily/Daylily Common Orange, nn	C	C
<b>Family Commelinaceae</b>				
<i>Commelina</i>	<i>communis</i>	Asiatic dayflower, nn		P
<b>Family Cyperaceae</b>				
<i>Carex</i>	<i>blanda</i>	Eastern Woodland Sedge, Eastern Woodsedge		P
<i>C.</i>	<i>gracillima</i>	Graceful Sedge		P
<i>C.</i>	<i>lurida</i>	Sallow Sedge		P
<i>C.</i>	<i>molesta</i>	Troublesome Sedge		P
<i>C.</i>	<i>projecta</i>	Necklace Sedge		P
<i>C.</i>	<i>rosea</i>	Rosy Sedge		P
<i>C.</i>	<i>stricta</i>	Tussock Sedge		C
<i>C.</i>	<i>sylvatica</i>	European Woodland Sedge, nn		P
<i>C.</i>	<i>vulpinoidea</i>	Fox Sedge		P
<i>C.</i>	<i>glaucoidea</i>	Blue sedge		C
<i>C.</i>	<i>laxiculmis</i>	Creeping Sedge		C
<i>C.</i>	<i>molesta</i>	Troublesome Sedge		C
<i>C.</i>	<i>pennsylvanica</i>	Pennsylvania Sedge		C
<i>C.</i>	<i>scoparia</i>	Pointed Broom Sedge		C
<i>C.</i>	<i>hystericina</i>	Bottlebrush Sedge		C
<i>Scirpus</i>	<i>cyperinus</i>	Woolgrass, Wool Sedge		P
<i>S.</i>	<i>microcarpus</i>	Panicled Bulrush, Bulrush		P
<i>S.</i>	<i>polyphyllus</i>	Leafy Bulrush		P
<i>S.</i>	<i>atrovirens</i>	Black Bulrush		C
<b>Family Dioscoreaceae</b>				
<i>Dioscorea</i>	<i>villosa</i>	Wild Yam		C
<b>Family Hypoxidaceae</b>				
<i>Hypoxis</i>	<i>hirsuta</i>	Yellow Star Grass/Goldeneye Grass	C	
<b>Family Iridaceae</b>				
<i>Iris</i>	<i>pseudacorus</i>	Yellow Iris, nn		C
<i>I.</i>	<i>versicolor</i>	Northern Blue Flag/Blueflag Iris	C	P
<i>Sisyrinchium</i>	sp.	blue-eyed grasses	C	C
<i>S.</i>	<i>atlanticum</i>	Eastern Blue-eyed Grass		C
<i>S.</i>	<i>mucronatum</i>	Needle-leaved blue-eyed Grass		C
<b>Family Junaceae</b>				
<i>Juncus</i>	<i>acuminatus</i>	Sharp-fruited Rush		C
<i>J.</i>	<i>effusus</i>	Soft Rush		P
<i>J.</i>	<i>tenuis</i>	Slender Path Rush, Path Rush		P

Genus	Species	Common Name	72/77 18-22	
<i>Luzula</i>	sp.	woodrushes		P
L.	<i>echinata</i>	Common Woodrush		C
<b>Family Liliaceae</b>				
<i>Erythronium</i>	<i>americanum</i>	Yellow Trout Lily/Troutlily	C	C
<b>Family Melanthiaceae</b>				
<i>Trillium</i>	sp.	sessile-flowered trilliums		P
<i>Veratrum</i>	<i>viride</i>	Green False Hellebore/Hellbore White	C	C
<b>Family Orchidaceae</b>				
<i>Corallorhiza</i>	<i>odontorhiza</i>	Late Coralroot		C
<i>Cypripedium</i>	<i>acaule</i>	Pink Lady's Slipper, Moccasin Flower/Ladyslipper Pink	C	C
<i>Epipactis</i>	<i>helleborine</i>	Broad-leaved Helleborine, nn		C
<i>Galearis</i>	<i>spectabilis</i>	Showy Orchis		C
<i>Goodyera</i>	<i>pubescens</i>	Downy Rattlesnake Plantain		C
<i>Isotria</i>	<i>verticillata</i>	Large Whorled Pogonia/Whorled Pogonia	C	C
<b>Family Poaceae</b>				
<i>Agrostis</i>	<i>gigantea</i>	Redtop, nn		P
<i>Andropogon</i>	<i>gerardi</i>	Big Bluestem		P
<i>Anthoxanthum</i>	<i>odoratum</i>	Sweet Vernal Grass, nn		C
<i>Bromus</i>	<i>inermis</i>	Smooth Brome, nn		P
B.	<i>japonicus</i>	Japanese Brome, nn		P
<i>Chasmanthium</i>	<i>latifolium</i>	Inland Wood Oats		C
<i>Cinna</i>	<i>latifolia</i>	Drooping Woodreed		C
C.	<i>arundinacea</i>	Wood Reedgrass		C
<i>Coleataenia</i>	<i>anceps</i>	Beaked Panicum		C
<i>Cyperus</i>	sp.	flatsedges		P
<i>Dactylis</i>	<i>glomerata</i>	Orchard Grass, nn		C
<i>Dichanthelium</i>	<i>clandestinum</i>	Deertongue		C
D.	<i>latifolium</i>	Broad-leaved Panic Grass		P
<i>Digitaria</i>	<i>ischaemum</i>	Smooth Crabgrass, nn		P
<i>Eleusine</i>	<i>indica</i>	Goose Grass, nn		P
<i>Elymus</i>	<i>hystrix</i>	Bottlebrush Grass		C
E.	<i>repens</i>	Quack Grass, nn		P
E.	<i>virginicus</i>	Virginia wildrye		P
<i>Glyceria</i>	<i>striata</i>	Fowl Mannagrass		P
<i>Hordeum</i>	<i>jubatum</i>	Foxtail Barley, nn		C
<i>Leersia</i>	<i>oryzoides</i>	Rice Cutgrass		C
L.	<i>virginica</i>	White Grass		P
<i>Microstegium</i>	<i>vimineum</i>	Japanese Stiltgrass, nn		C
M.	<i>vimineum</i>	Stiltgrass, nn		C
<i>Muhlenbergia</i>	<i>frondosa</i>	Wirestem Muhly		C
<i>Panicum</i>	<i>virgatum</i>	Switchgrass		P
<i>Phalaris</i>	<i>arundinacea</i>	Reed Canary Grass		P
<i>Phleum</i>	<i>pratense</i>	Timothy Grass, nn		C
<i>Phragmites</i>	<i>australis</i>	Giant Reed, nn		C
<i>Poa</i>	<i>alsodes</i>	Woodland Bluegrass		C
P.	<i>nemoralis</i>	Wood Bluegrass		C
P.	<i>pratensis</i>	Kentucky Bluegrass		P
<i>Schizachyrium</i>	<i>scoparium</i>	Little Bluestem		P
<i>Setaria</i>	<i>faberi</i>	Giant Foxtail, nn		C
S.	<i>pumila</i>	Yellow Foxtail, nn		P



Genus	Species	Common Name	72/77	18-22
<i>Sorghastrum</i>	<i>nutans</i>	Indiangrass		C
<i>Tridens</i>	<i>flavus</i>	Purpletop Tridens		C
<b>Family Smilacaceae</b>				
<i>Smilax</i>	<i>herbacea</i>	Smooth Carrionflower		C
<i>S.</i>	<i>rotundifolia</i>	Roundleaf Greenbrier		C
<b>Family Typhaceae</b>				
<i>Sparganium</i>	<i>americanum</i>	American Bur-reed		P
<i>Typha</i>	<i>latifolia</i>	Broad-leaved Cattail/Cat-tail	C	
<b>Angiosperms: Dicots</b>				
<b>Family Acanthaceae</b>				
<i>Ruellia</i>	<i>humilis</i>	Hairy Ruellia		C
<b>Family Adoxaceae</b>				
<i>Viburnum</i>	<i>plicatum</i>	Japanese Snowball, nn		C
<b>Family Altingiaceae</b>				
<i>Liquidambar</i>	<i>styraciflua</i>	American Sweetgum		C
<b>Family Amaranthaceae</b>				
<i>Amaranthus</i>	<i>hybridus</i>	Smooth Pigweed		P
<i>Chenopodium</i>	<i>album</i>	Common Lambsquarters, nn		P
<b>Family Anacardiaceae</b>				
<i>Rhus</i>	<i>aromatica</i>	Fragrant Sumac		C
<i>R.</i>	<i>typhina</i>	Staghorn Sumac	C	C
<i>Toxicodendron*</i>	<i>radicans</i>	Eastern Poison Ivy/Poison Ivy	C	C
<b>Family Apiaceae</b>				
<i>Aegopodium</i>	<i>podagraria</i>	Goutweed, nn		P
<i>Anthriscus</i>	<i>sylvestris</i>	Cow Parsley, nn		P
<i>Conium</i>	<i>maculatum</i>	Poison Hemlock/Hemlock Poison, nn	C	
<i>Coriandrum</i>	<i>sativum</i>	Coriander, nn		C
<i>Cryptotaenia</i>	<i>canadensis</i>	Honewort		C
<i>Daucus</i>	<i>carota</i>	Queen Anne's Lace/Queen-Annes-lace, Wild Carrot, nn	C	C
<i>Zizia</i>	<i>aurea</i>	Golden Alexander		C
<b>Family Apocynaceae</b>				
<i>Apocynum</i>	<i>cannabinum</i>	Hemp Dogbane	C	C
<i>Asclepias</i>	<i>incarnata</i>	Swamp Milkweed/Milkweed Swamp	C	
<i>A.</i>	<i>syriaca</i>	Common Milkweed/Milkweed Common	C	C
<i>A.</i>	<i>tuberosa</i>	Butterfly Milkweed/Butterflyweed	C	C
<i>Vinca</i>	<i>minor</i>	Lesser Periwinkle/Periwinkle, nn	C	
<b>Family Aquafoliaceae</b>				
<i>Ilex</i>	<i>opaca</i>	American Holly	C	C
<i>I.</i>	<i>verticillata</i>	Winterberry	C	
<b>Family Araliaceae</b>				
<i>Aralia</i>	<i>elata</i>	Japanese Angelica Tree		P
<i>A.</i>	<i>racemosa</i>	American Spikenard/Spikenard American	C	
<i>Hedera</i>	<i>helix</i>	Common Ivy, nn		C
<i>Panax</i>	<i>trifolius</i>	Dwarf Ginseng		C
<b>Family Asteraceae</b>				
<i>Achillea</i>	<i>millefolium</i>	Common Yarrow/Yarrow Common, nn	C	C
<i>Ageratina*</i>	<i>altissima*</i>	White Snakeroot/Ageratum, Wild White, Snow Snakeroot	C	C
<i>Ambrosia</i>	<i>artemisiifolia</i>	Common Ragweed	C	C
<i>A.</i>	<i>trifida</i>	Giant/Great Ragweed	C	C
<i>Antennaria</i>	<i>neglecta</i>	Field Pussytoes	C	

Genus	Species	Common Name	72/77	18-22
A.	<i>plantaginifolia</i>	Plantain-leaved Pussytoes		C
<i>Anthemis</i>	<i>cotula</i>	Stinking Chamomile/Mayweed, nn	C	
<i>Arctium</i>	<i>lappa</i>	Greater Burdock, nn		P
A.	<i>minus</i>	Lesser Burdock/Burdock, Common	C	P
<i>Artemisia</i>	<i>annua</i>	Sweet Annie, nn		C
A.	<i>indica</i>	Mugwort, nn		P
A.	<i>verlotiorum</i>	Chinese Mugwort, nn		P
A.	<i>vulgaris</i>	Common Mugwort, nn		P
<i>Bidens</i>	<i>cernua</i>	Nodding Beggarticks		C
B.	<i>trichosperma</i>	Marsh Tickseed		P
<i>Chrysanthemum</i>	<i>vulgare*</i>	Oxeye Daisy/Daisy Field, nn	C	
<i>Cichorium</i>	<i>intybus</i>	Chicory, nn	C	C
<i>Cirsium</i>	<i>altissimum</i>	Tall Thistle	C	
C.	<i>arvense</i>	Creeping Thistle/Canada Thistle, nn	C	P
C.	<i>discolor</i>	Field Thistle		C
C.	<i>vulgare</i>	Bull Thistle		C
<i>Conoclinium</i>	<i>coelestinum</i>	Blue Mistflower, nn		C
<i>Coreopsis</i>	<i>lanceolata</i>	Lance-leaved Coreopsis		C
C.	<i>tripteris</i>	Tall Coreopsis		C
<i>Doellingeria</i>	<i>umbellata</i>	Flat-topped Aster		C
<i>Elephantopus</i>	<i>carolinianus</i>	Leafy Elephant's-foot		C
<i>Erechtites</i>	<i>hieraciifolius</i>	American Burnweed		C
<i>Erigeron</i>	<i>annuus</i>	Annual Fleabane		P
E.	<i>canadensis</i>	Horseweed		P
E.	<i>philadelphicus</i>	Philadelphia Fleabane/Fleabane Common	C	C
E.	<i>pulchellus</i>	Robin's-plantain/Poor-robins-plantain		C
E.	<i>ramosus</i>	Spreading Fleabane/Fleabane Daisy		C
E.	<i>strigosus</i>	Daisy Fleabane		C
<i>Eupatorium</i>	<i>perfoliatum</i>	Common Boneset/Boneset		C
E.	<i>purpureum</i>	Sweet Joe-pye-weed/Joe-pye-weed		C
E.	<i>serotinum</i>	Late Boneset		C
<i>Eurybia*</i>	<i>divaricata*</i>	White Wood Aster/Aster White Wood	C	C
<i>Euthamia*</i>	<i>graminifolia</i>	Flat-topped Goldenrod/Goldenrod Flat-topped	C	P
<i>Eutrochium</i>	<i>fistulosum</i>	Hollow Joe-Pye Weed		C
<i>Helenium</i>	<i>autumnale</i>	Common/Meadow Sneezeweed		C
H.	<i>flexuosum</i>	Southern Sneezeweed		C
<i>Helianthus</i>	<i>microcephalus</i>	Small Woodland Sunflower		P
H.	<i>tuberosus</i>	Jerusalem Artichoke		C
<i>Hieracium</i>	<i>scabrum</i>	Rough Hawkweed/Hawkweed Rough		C
H.	<i>venosum</i>	Rattlesnake Weed/Hawkweed Veined		C
<i>Hypochaeris</i>	<i>radicata</i>	Common Cat's-ear, nn		P
<i>Krigia</i>	<i>biflora*</i>	Two-flower Dwarf Dandelion/Cynthia		C
<i>Lactuca</i>	<i>biennis</i>	Tall Blue Lettuce		C
L.	<i>serriola</i>	Prickly Lettuce, nn		C
<i>Lapsana</i>	<i>communis</i>	Nipplewort, nn		C
<i>Leucanthemum</i>	<i>vulgare</i>	Oxeye Daisy, nn		C
<i>Matricaria</i>	<i>discoidea</i>	Pineapple-weed, nn		C
<i>Nabalus</i>	<i>altissimus</i>	Tall Rattlesnake Root		C
N.	<i>trifoliolatus</i>	Three-leaved Rattlesnake Root		P
<i>Packera</i>	<i>aurea</i>	Golden Ragwort		C

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<i>Pilosella</i>	<i>officinarum</i>	Mouse-eared Hawkweed, nn		C
<i>P.</i>	<i>piloselloides</i>	Smooth Hawkweed		P
<i>Pilosella*</i>	<i>caespitosa*</i>	Meadow Hawkweed/King Devil, nn	C	
<i>Pseudognaphalium</i>	<i>obtusifolium</i>	Sweet Everlasting		C
<i>Ratibida</i>	<i>columnifera</i>	Upright Prairie Coneflower		C
<i>Rudbeckia</i>	<i>hirta</i>	Black-eyed Susan	C	C
<i>R.</i>	<i>triloba</i>	Brown-eyed Susan		C
<i>Scorzonerooides*</i>	<i>autumnalis</i>	Autumn Hawkbit/Arnica, Fall Dandelion, nn	C	
<i>Solidago</i>	<i>altissima</i>	Tall Goldenrod		C
<i>S.</i>	<i>bicolor</i>	Silverrod/Goldenrod White	C	
<i>S.</i>	<i>caesia</i>	Bluestem Goldenrod/Goldenrod Wreath	C	C
<i>S.</i>	<i>canadensis</i>	Canada Goldenrod/Goldenrod Canada	C	P
<i>S.</i>	<i>gigantea</i>	Giant Goldenrod/Goldenrod Giant	C	
<i>S.</i>	<i>juncea</i>	Early Goldenrod/Goldenrod Early	C	
<i>S.</i>	<i>nemoralis</i>	Field Goldenrod/Goldenrod Gray-stemmed or Dwarf	C	C
<i>S.</i>	<i>odora</i>	Sweet Goldenrod	C	
<i>S.</i>	<i>puberula</i>	Downy Goldenrod/Goldenrod Downy	C	
<i>S.</i>	<i>rugosa</i>	Common Wrinkle-leaved Goldenrod/Goldenrod Wrinkled	C	C
<i>Symphyotrichum</i>	<i>lanceolatum</i>	Panicled Aster		P
<i>S.</i>	<i>lateriflorum</i>	Calico Aster		C
<i>S.</i>	<i>novi-belgii</i>	New York Aster		C
<i>S.</i>	<i>pilosum</i>	Frost Aster		P
<i>Symphyotrichum*</i>	<i>cordifolium*</i>	Common Blue Wood Aster/Aster Blue Wood	C	C
<i>Symphyotrichum*</i>	<i>novae-angliae</i>	New England Aster/Aster New England	C	C
<i>Symphyotrichum*</i>	<i>racemosum*</i>	Small White Aster	C	
<i>Taraxacum</i>	<i>officinale</i>	Common Dandelion/Dandelion Common, nn	C	C
<i>Tripleurospermum*</i>	<i>inodorum*</i>	Scentless Mayweed/Chamomile Wild, nn	C	
<i>Verbesina</i>	<i>alternifolia</i>	Wingstem		C
<i>Vernonia</i>	<i>noveboracensis</i>	New York Ironweed/Ironweed	C	C
<b>Family Balsaminaceae</b>				
<i>Impatiens</i>	<i>capensis*</i>	Common, Orange Jewelweed/Jewelweed, Touch-me-not	C	C
<i>I.</i>	<i>pallida</i>	Pale Jewelweed		C
<b>Family Berberidaceae</b>				
<i>Berberis</i>	sp.	Barberry, nn	C	P
<i>B.</i>	<i>thunbergii</i>	Japanese Barberry, nn		C
<i>Podophyllum</i>	<i>peltatum</i>	Mayapple	C	C
<b>Family Betulaceae</b>				
<i>Alnus</i>	<i>incana</i>	Gray Alder		P
<i>A.</i>	<i>serrulata</i>	Smooth/Common Alder	C	C
<i>Betula</i>	<i>lenta</i>	Sweet Birch	C	C
<i>B.</i>	<i>nigra</i>	River Birch		C
<i>B.</i>	<i>allegeniensis</i>	Yellow Birch		C
<i>B.</i>	<i>populifolia</i>	Gray Birch		C
<i>Carpinus</i>	<i>caroliniana</i>	American Hornbeam		C
<b>Family Bignoioaceae</b>				
<i>Campsis</i>	<i>radicans</i>	American Trumpet Vine		C
<b>Family Boraginaceae</b>				
<i>Hackelia</i>	<i>virginiana</i>	Stickseed		C
<i>Hydrophyllum</i>	sp.	waterleaves		P
<i>Mertensia</i>	<i>virginica</i>	Virginia bluebells		C

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<i>Myosotis</i>	<i>discolor</i>	Changing Forget-me-not, nn		P
<i>Phacelia</i>	<i>bipinnatifida</i>	Purple Phacelia		P
<b>Family Brassicaceae</b>				
<i>Alliaria</i>	<i>petiolata*</i>	Garlic Mustard, nn	C	C
<i>Arabidopsis</i>	<i>thaliana</i>	Mouse-ear Cress, nn		P
<i>Barbarea</i>	<i>vulgaris</i>	Garden Yellowrocket, nn		C
<i>Brassica</i>	<i>nigra</i>	Black Mustard/Mustard Black, Mustard Wild, nn	C	
<i>B.</i>	<i>rapa</i>	Field Mustard, nn	C	P
<i>Capsella</i>	<i>bursa-pastoris</i>	Shepherd's Purse, nn	C	C
<i>Cardamine</i>	<i>bulbosa</i>	Bulbous Cress		C
<i>C.</i>	<i>hirsuta</i>	Hairy Bittercress		C
<i>C.</i>	<i>impatiens</i>	Narrow-leaved Bittercress		C
<i>Cardamine*</i>	<i>concatenata*</i>	Cut-leaved Toothwort/Pepper-root, Toothwort	C	
<i>Hesperis</i>	<i>matronalis</i>	Dame's Rocket/Wild Rocket, nn	C	C
<i>Lepidium</i>	sp.	pepperweeds, nn		P
<i>L.</i>	<i>campestre</i>	Field Peppergrass/Cow-cress, nn	C	
<i>Mummenhoffia</i>	<i>alliacea</i>	Garlic Penny-cress, nn		C
<i>Nasturtium</i>	<i>officinale</i>	Watercress, nn		C
<i>Rorippa</i>	sp.	yellowcresses, nn		P
<b>Family Buxaceae</b>				
<i>Pachysandra</i>	<i>procumbens</i>	Allegheny Spurge, nn		C
<i>P.</i>	<i>terminalis</i>	Japanese pachysandra, nn		C
<b>Family Campanulaceae</b>				
<i>Campanula</i>	<i>rapunculoides</i>	Creeping Bellflower/Roving Bell-flower, nn	C	
<i>Lobelia</i>	<i>cardinalis</i>	Cardinal Flower/Cardinalflower	C	C
<i>L.</i>	<i>inflata</i>	Indian Tobacco	C	C
<i>L.</i>	<i>siphilitica</i>	Great Blue Lobelia/Great Lobelia	C	C
<i>Triodans*</i>	<i>perfoliata</i>	Clasping Venus's Looking Glass/Venus Looking-glass	C	
<b>Family Cannabaceae</b>				
<i>Celtis</i>	<i>occidentalis</i>	Common Hackberry		P
<b>Family Caprifoliaceae</b>				
<i>Dipsacus</i>	<i>fullonum</i>	Wild Teasel, nn		C
<i>D.</i>	<i>sylvestris</i>	Wild Teasel/Teasel, nn	C	
<i>Lonicera</i>	<i>japonica</i>	Japanese Honeysuckle, nn	C	C
<i>L.</i>	<i>maackii</i>	Amur Honeysuckle, nn		C
<i>L.</i>	<i>morrowii</i>	Morrow's Honeysuckle, nn		P
<i>L.</i>	<i>periclymenum</i>	European Honeysuckle, nn		P
<i>L.</i>	<i>tartarica</i>	Tatarian Honeysuckle, nn	C	C
<b>Family Caryophyllaceae</b>				
<i>Agrostemma</i>	<i>githago</i>	Corn Cockle, nn	C	
<i>Arenaria</i>	<i>serpyllifolia</i>	Thyme-leaved Sandwort, nn	C	C
<i>Cerastium</i>	<i>fontanum</i>	Mouse-ear Chickweed, nn	C	P
<i>Dianthus</i>	<i>armeria</i>	Deptford Pink, nn	C	C
<i>Saponaria</i>	<i>officinalis</i>	Common Soapwort/Bouncing-bet, Soapwort, nn	C	
<i>Silene</i>	<i>latifolia</i>	White Champion, nn		C
<i>S.</i>	<i>vulgaris*</i>	Bladder Champion, nn	C	
<i>Stellaria</i>	<i>graminea</i>	Lesser Stitchwort, nn	C	
<i>S.</i>	<i>longifolia</i>	Long-leaved Starwort/Long-leaved Chickweed	C	
<i>S.</i>	<i>media</i>	Common Chickweed, nn		P
<i>S.</i>	<i>pubera</i>	Star Chickweed		C

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<b>Family Celastraceae</b>				
<i>Celastrus</i>	<i>orbiculatus</i>	Oriental Bittersweet, Asiatic Bittersweet, nn		C
<i>C.</i>	<i>scandens</i>	American Bittersweet	C	
<i>Euonymus</i>	<i>alatus</i>	Winged Euonymus, nn		C
<i>E.</i>	<i>fortunei</i>	Wintercreeper, nn?		C
<b>Family Convulvaceae</b>				
<i>Calystegia</i>	<i>silvatica</i>	Large Bindweed, nn		P
<i>Calystegia*</i>	<i>sepium</i>	Hedge Bindweed/Bindweed, Hedge, Wild Morning Glory	C	P
<b>Family Cornaceae</b>				
<i>Cornus</i>	<i>alternifolia</i>	Alternate-leaved/Pagoda Dogwood	C	
<i>C.</i>	<i>florida</i>	Flowering Dogwood	C	P
<i>C.</i>	<i>racemosa*</i>	Gray Dogwood	C	C
<b>Family Cucurbitaceae</b>				
<i>Sicyos</i>	<i>angulatus</i>	Bur-cucumber		C
<b>Family Cupressaceae</b>				
<i>Juniperus</i>	<i>virginiana</i>	Eastern Redcedar		C
<b>Family Cuscutaceae</b>				
<i>Cuscuta</i>	<i>gronovii</i>	Common Dodder		C
<b>Family Cyperaceae</b>				
<i>Carex</i>	<i>platyphylla</i>	Broad-leaved Sedge		C
<b>Family Elaeagnaceae</b>				
<i>Elaeagnus</i>	<i>umbellata</i>	Autumn Olive, nn	C	C
<b>Family Ericaceae</b>				
<i>Chimaphila</i>	<i>maculata</i>	Striped Wintergreen/Striped Pipsissewa	C	C
<i>Epigaea</i>	<i>repens</i>	Trailing Arbutus	C	
<i>Gaylussacia</i>	<i>dumosa</i>	Dwarf Huckleberry	C	
<i>Kalmia</i>	<i>latifolia</i>	Mountain Laurel	C	
<i>Monotropa</i>	<i>hypopitys</i>	Pinesap	C	
<i>M.</i>	<i>uniflora</i>	Ghost Pipe/Indian-pipe	C	C
<i>Rhododendron</i>	<i>maximum</i>	Great Rhododendron/Rosebay	C	P
<i>R.</i>	<i>periclymenoides*</i>	Pinxter Flower/Pink Azalea	C	C
<i>R.</i>	<i>prinophyllum</i>	Early Azalea		P
<i>Tilia</i>	<i>americana</i>	Basswood		C
<i>Vaccinium</i>	<i>angustifolium*</i>	Lowbush Blueberry	C	
<i>V.</i>	<i>corymbosum</i>	Northern Highbush/Highbush Blueberry	C	
<i>V.</i>	<i>pallidum</i>	Blue Ridge blueberry		P
<i>V.</i>	<i>stamineum</i>	Deerberry	C	P
<b>Family Euphorbiaceae</b>				
<i>Acalypha</i>	<i>rhomboidea</i>	Common Copperleaf, nn		C
<i>Euphorbia</i>	<i>maculata</i>	Spotted Spurge, nn		C
<b>Family Fabaceae</b>				
<i>Amphicarpaea</i>	<i>bracteata</i>	American hog-peanut		C
<i>Baptisia</i>	<i>australis</i>	Tall Blue Wild Indigo		C
<i>Cassia</i>	<i>nictitans</i>	Sensitive Pea/Sensitive Plant	C	
<i>Cercis</i>	<i>canadensis</i>	Eastern Redbud		C
<i>Chamaecrista</i>	<i>fasciculata</i>	Partridge Pea		C
<i>Desmodium</i>	<i>canadense</i>	Showy Tick-trefoil		C
<i>D.</i>	<i>incanum</i>	Creeping Beggarweed		C
<i>D.</i>	<i>paniculatum</i>	Panicled Ticktrefoil		C
<i>Gleditsia</i>	<i>triacanthos</i>	Honey Locust		C

Genus	Species	Common Name	72/77	18-22
<i>Hylodesmum</i> *	<i>nudiflorum</i>	Naked-flowered Tick-Trefoil	C	
<i>Kummerowia</i>	<i>striata</i>	Japanese Clover, nn		C
<i>Lespedeza</i>	<i>capitata</i>	Round-headed Bush Clover		C
<i>L.</i>	<i>cuneata</i>	Chinese Bushclover, nn		C
<i>L.</i>	<i>hirta</i>	Hairy Lespedeza		C
<i>Lotus</i>	<i>corniculatus</i>	Bird's-foot Trefoil/Crowsfoot-trefoil, nn	C	C
<i>Medicago</i>	<i>lupulina</i>	Black Medick, nn		C
<i>Melilotus</i>	<i>alba</i>	Sweet-clover White, nn	C	
<i>M.</i>	<i>officinalis</i>	Sweet-clover Yellow, nn	C	
<i>Robinia</i>	<i>pseudoacacia</i>	Black Locust	C	C
<i>Securigera</i> *	<i>varia</i>	Purple Crownvetch/Crown Vetch, nn	C	C
<i>Senna</i>	<i>hebecarpa</i>	American Senna		C
<i>Trifolium</i>	<i>campestre</i> *	Hop Trefoil/Hop Clover, nn	C	C
<i>T.</i>	<i>hybridum</i>	Alsike Clover, nn	C	
<i>T.</i>	<i>pratense</i>	Red Clover, nn	C	C
<i>T.</i>	<i>repens</i>	White Clover, nn	C	C
<i>Vicia</i>	<i>cracca</i>	Tufted Vetch, nn		C
<i>V.</i>	<i>sativa</i>	Common Vetch, nn		C
<i>V.</i>	<i>tetrasperma</i>	Smooth Tare, nn		C
<i>V.</i>	<i>villosa</i>	Hairy Vetch, nn	C	C
<i>Wisteria</i>	<i>sinensis</i>	Chinese Wisteria, nn		P
<b>Family Fagaceae</b>				
<i>Castanea</i>	<i>dentata</i>	American Chestnut		C
<i>Fagus</i>	<i>grandifolia</i>	American Beech	C	C
<i>Quercus</i>	<i>alba</i>	White Oak	C	C
<i>Q.</i>	<i>bicolor</i>	Swamp White Oak		C
<i>Q.</i>	<i>coccinea</i>	Scarlet Oak	C	C
<i>Q.</i>	<i>montana</i> *	Chestnut Oak	C	C
<i>Q.</i>	<i>muehlenbergii</i>	Chinkapin Oak		P
<i>Q.</i>	<i>palustris</i>	Pin Oak	C	P
<i>Q.</i>	<i>rubra</i>	Northern Red Oak	C	C
<i>Q.</i>	<i>velutina</i>	Black Oak	C	C
<b>Family Geraniaceae</b>				
<i>Geranium</i>	<i>carolinianum</i>	Carolina Crane's Bill/Carolina Cranesbill	C	
<i>G.</i>	<i>dissectum</i>	Cut-leaved Crane's-bill, nn		P
<i>G.</i>	<i>maculatum</i>	Wild Geranium	C	C
<i>G.</i>	<i>robertianum</i>	Herb Robert	C	
<b>Family Hamamelidaceae</b>				
<i>Hamamelis</i>	<i>virginiana</i>	Common Witch-hazel/Witch-hazel	C	P
<b>Family Hippocastanaceae</b>				
<i>Aesculus</i>	<i>glabra</i>	Ohio Buckeye, nn?		P
<i>A.</i>	<i>hippocastanum</i>	Horse-chestnut, nn		P
<b>Family Hypericaceae</b>				
<i>Hypericum</i>	<i>perforatum</i>	Common St. John's-wort		C
<i>H.</i>	<i>punctatum</i>	Spotted St John's Wort/Spotted St Jonswort	C	P



Genus	Species	Common Name	72/77 18-22	
<b>Family Iteaceae</b>				
<i>Itea</i>	<i>virginica</i>	Virginia Sweetspire		C
<b>Family Juglandaceae</b>				
<i>Carya</i>	<i>cordiformis</i>	Bitternut Hickory	C	C
<i>C.</i>	<i>glabra</i>	Pignut Hickory	C	P
<i>C.</i>	<i>ovata</i>	Shagbark Hickory	C	C
<i>C.</i>	<i>tomentosa</i>	Mockernut		C
<i>Juglans</i>	<i>cinerea</i>	Butternut		C
<i>J.</i>	<i>nigra</i>	Eastern Black/Black Walnut	C	C
<b>Family Lamiaceae</b>				
<i>Ajuga</i>	<i>reptans</i>	Carpet Bugle		C
<i>Clinopodium</i>	<i>vulgare</i>	Wild Basil, nn?		C
<i>Collinsonia</i>	<i>canadensis</i>	Citronella Horse Balm/Citronella Horsebalm	C	C
<i>Glechoma</i>	<i>hederacea</i>	Ground-ivy/Gill-over-the-ground, nn	C	C
<i>Lamium</i>	<i>album</i>	White Deadnettle/Dead Nettle, nn	C	
<i>L.</i>	<i>purpureum</i>	Red Deadnettle, nn		C
<i>Mentha</i>	<i>spicata</i>	Spearmint, nn	C	
<i>Monarda</i>	<i>didyma</i>	Scarlet Beebalm, nn		C
<i>M.</i>	<i>fistulosa</i>	Wild Bergamot		C
<i>Nepeta</i>	<i>cataria</i>	Catnip, nn	C	
<i>Prunella</i>	<i>vulgaris</i>	Common Selfheal/Self-heal, nn	C	C
<i>Pycnanthemum</i>	<i>virginianum</i>	Virginia Mountain Mint	C	C
<i>Salvia</i>	<i>lyrata</i>	Lyreleaf Sage		C
<i>Teucrium</i>	<i>canadense</i>	American Germander		C
<i>Thymus</i>	<i>serpyllum</i>	Wild Thyme/Creeping Thyme, nn	C	
<b>Family Lauraceae</b>				
<i>Lindera</i>	<i>benzoin</i>	Northern Spicebush/Spicebush	C	C
<i>Sassafras</i>	<i>albidum</i>	Sassafras	C	C
<b>Family Lythraceae</b>				
<i>Lythrum</i>	<i>salicaria</i>	Purple Loosestrife/Loosestrife Willow, nn	C	C
<b>Family Magnoliaceae</b>				
<i>Liriodendron</i>	<i>tulipifera</i>	Tulip Tree/Yellow Poplar	C	C
<b>Family Melanthiaceae</b>				
<i>Trillium</i>	<i>sessile</i>	Toadshade		C
<b>Family Montiaceae</b>				
<i>Claytonia</i>	<i>virginica</i>	Virginia Spring Beauty/Springbeauty	C	C
<b>Family Moraceae</b>				
<i>Broussonetia</i>	<i>papyrifera</i>	Paper Mulberry, nn		C
<i>Morus</i>	<i>alba</i>	White Mulberry		P
<i>M.</i>	<i>rubra</i>	Red Mulberry	C	
<b>Family Nyssaceae</b>				
<i>Nyssa</i>	<i>sylvatica</i>	Black Tupelo/Tupelo	C	P
<b>Family Oleaceae</b>				
<i>Fraxinus</i>	<i>americana</i>	White Ash	C	P
<i>F.</i>	<i>pennsylvanica</i>	Green Ash		P
<i>Ligustrum</i>	<i>obtusifolium</i>	Border/Regal Privet	C	C
<b>Family Onagraceae</b>				
<i>Circaea</i>	<i>alpina</i>	Small Enchanter's Nightshade		C
<i>C.</i>	<i>canadensis*</i>	Broadleaf Enchanter's Nightshade/Enchanters Nightshade	C	C
<i>Epilobium</i>	sp.	willowherbs		P

Genus	Species	Common Name	72/77	18-22
<i>E.</i>	<i>ciliatum*</i>	Fringed Willowherb/Northern Willow-herb	C	
<i>Oenothera</i>	<i>biennis</i>	Common Evening-primrose/Evening-primrose	C	C
<b>Family Orobanchaceae</b>				
<i>Epifagus</i>	<i>virginiana</i>	Beechdrops		C
<b>Family Oxalidaceae</b>				
<i>Oxalis</i>	<i>acetosella</i>	Common Woodsorrel, nn		C
<i>O.</i>	<i>dillenii</i>	Slender Yellow Woodsorrel		P
<i>O.</i>	<i>montana</i>	Mountain Woodsorrel, nn	C	
<i>O.</i>	<i>stricta*</i>	Upright Yellow Woodsorrel/Yellow Wood Sorrel	C	C
<i>O.</i>	<i>violacea</i>	Violet Woodsorrel	C	
<b>Family Papaveraceae</b>				
<i>Chelidonium</i>	<i>majus</i>	Greater Celandine/Celandine, nn	C	C
<i>Dicentra</i>	<i>cucullaria</i>	Dutchman's Breeches/Dutchmans-breeches	C	
<i>Sanguinaria</i>	<i>canadensis</i>	Bloodroot	C	C
<i>Stylophorum</i>	<i>diphyllum</i>	Celandine Poppy, nn		C
<b>Family Phrymaceae</b>				
<i>Mimulus</i>	<i>ringens</i>	Allegheny Monkeyflower/Monkeyflower	C	C
<b>Family Phytolaccaceae</b>				
<i>Phytolacca</i>	<i>americana</i>	American Pokeweed/Pokeberry	C	C
<b>Family Plantaginaceae</b>				
<i>Callitriche</i>	<i>stagnalis</i>	Pond water-starwort		P
<i>Chelone</i>	<i>glabra</i>	White Turtlehead/Turtlehead	C	C
<i>Linaria</i>	<i>vulgaris</i>	Common Toadflax/Butter-and-eggs, nn	C	C
<i>Penstemon</i>	<i>digitalis</i>	Foxglove Beardtongue/Pentstemon White, nn	C	
<i>Plantago</i>	<i>lanceolata</i>	Ribwort Plantain/Common Plantain, nn	C	C
<i>P.</i>	<i>major</i>	Greater/Common Plantain, nn	C	
<i>P.</i>	<i>rugelii</i>	American Plantain		P
<i>P.</i>	<i>virginica</i>	Dwarf Plantain		P
<i>Veronica</i>	<i>arvensis</i>	Corn Speedwell, nn	C	C
<i>V.</i>	<i>chamaedrys</i>	Germander Speedwell/Bird's Eye Speedwell, nn	C	
<i>V.</i>	<i>officinalis</i>	Heath Speedwell, nn		C
<i>V.</i>	<i>persica</i>	Bird's-eye Speedwell, nn		C
<i>V.</i>	<i>serpyllifolia</i>	Thyme-leaved Speedwell, nn		C
<b>Family Platanaceae</b>				
<i>Platanus</i>	<i>occidentalis</i>	American Sycamore	C	C
<b>Family Polygonaceae</b>				
<i>Fallopia</i>	<i>convolvulus</i>	Black-bindweed, nn		P
<i>F.</i>	<i>scandens</i>	Climbing False Buckwheat		P
<i>Persicaria</i>	<i>arifolia</i>	Halberd-leaved Tearthumb		C
<i>P.</i>	<i>longiseta</i>	Low Smartweed, nn		C
<i>P.</i>	<i>pennsylvanica</i>	Pinkweed		P
<i>P.</i>	<i>perfoliata</i>	Mile-a-minute Weed, nn		C
<i>P.</i>	<i>sagittata</i>	Arrow-leaved Tearthumb		C
<i>Persicaria*</i>	<i>virginiana</i>	American Jumpseed/Jumpseed	C	C
<i>Polygonum</i>	<i>aviculare</i>	Prostrate Knotweed, nn		P
<i>Rumex</i>	<i>acetosa</i>	Common/Sheep Sorrel, nn	C	
<i>R.</i>	<i>acetosella</i>	Sheep's Sorrel, nn		C
<i>R.</i>	<i>obtusifolius</i>	Broad-leaved Dock, nn		C
<b>Family Primulaceae</b>				
<i>Lysimachia</i>	<i>quadrifolia</i>	Whorled Loosestrife/Loosestrife Whorled	C	



Genus	Species	Common Name	72/77	18-22
<i>Lysimachia*</i>	<i>arvensis</i>	Scarlet Pimpernel, nn	C	C
<b>Family Ranunculaceae</b>				
<i>Actaea*</i>	<i>racemosa</i>	Black Cohosh/Cohosh Bugbane, Fairy-candles	C	
<i>Aquilegia</i>	<i>canadensis</i>	Red Columbine/Columbine, Wild	C	
<i>Caltha</i>	<i>palustris</i>	Marsh Marigold	C	P
<i>Coptis</i>	<i>trifolia</i>	Threeleaf Goldthread		C
<i>Ficaria</i>	<i>verna</i>	Lesser Celandine, nn		C
<i>Ranunculus</i>	<i>abortivus</i>	Small-flowered Buttercup/Buttercup, Kidney-leaf	C	C
<i>R.</i>	<i>acris</i>	Meadow Buttercup/Common Buttercup, nn	C	P
<i>R.</i>	<i>bulbosus</i>	Bulbous Buttercup, nn		P
<i>R.</i>	<i>hispidus</i>	Bristly Buttercup/Buttercup, Bristly	C	
<i>R.</i>	<i>polyanthemos</i>	Multi-flowered Buttercup, nn		P
<i>R.</i>	<i>recurvatus</i>	Hooked Buttercup		C
<i>R.</i>	<i>repens</i>	Creeping Buttercup/Buttercup Creeping, nn	C	P
<i>R.</i>	<i>sardous</i>	Hairy Buttercup, nn		P
<i>Thalictrum</i>	sp.	meadow-rues		P
<i>T.</i>	<i>pubescens*</i>	Tall Meadow-Rue/Meadowrue Tall	C	
<i>Thalictrum*</i>	<i>thalictroides</i>	Rue Anemone/Anemonella	C	
<b>Family Rosaceae</b>				
<i>Amelanchier</i>	<i>canadensis</i>	Shadbush		C
<i>A.</i>	<i>laevis</i>	Smooth Shadbush/Allegheny Serviceberry	C	
<i>Aronia</i>	sp.	chokeberries		C
<i>A.</i>	<i>melanocarpa</i>	Black Chokeberry		P
<i>Chaenomeles</i>	<i>speciosa</i>	Chinese Quince, nn		C
<i>Crataegus</i>	sp.	hawthorns, n/nn	C	P
<i>C.</i>	<i>monogyna</i>	Common Hawthorn, nn		P
<i>Fragaria</i>	<i>vesca v americana</i>	Woodland Strawberry/Stawberry American	C	
<i>F.</i>	<i>virginiana</i>	Virginia Strawberry		P
<i>Geum</i>	<i>canadense</i>	White Avens/Avens White	C	P
<i>G.</i>	<i>virginianum</i>	Cream-colored Avens/Rough Avens	C	
<i>Malus</i>	<i>coronaria</i>	Sweet Crabapple		C
<i>M.</i>	<i>sylvestris</i>	European Wild Apple		P
<i>M.</i>	<i>toringo</i>	Toringo Crabapple, nn		P
<i>Malus*</i>	sp.	apples	C	P
<i>Potentilla</i>	<i>canadensis</i>	Dwarf/Five-finger Cinquefoil	C	P
<i>P.</i>	<i>indica</i>	Mock Strawberry, nn		C
<i>P.</i>	<i>recta</i>	Sulphur Cinquefoil, nn		C
<i>P.</i>	<i>simplex</i>	Common Cinquefoil	C	P
<i>Prunus</i>	<i>× subhirtella</i>	Rosebud Cherry, nn		P
<i>P.</i>	<i>cerasifera</i>	Cherry-plum, nn		P
<i>P.</i>	<i>pendula</i>	Weeping Cherry, nn		P
<i>P.</i>	<i>pennsylvanica</i>	Fire Cherry		C
<i>P.</i>	<i>serotina</i>	Black Cherry	C	P
<i>P.</i>	<i>virginiana</i>	Chokecherry		P
<i>Pyrus</i>	<i>calleryana</i>	Callery Pear		C
<i>Rhodotypos</i>	<i>scandens</i>	Jetbead, nn		C
<i>Rosa</i>	<i>carolina</i>	Carolina/Pasture Rose	C	C
<i>R.</i>	<i>multiflora</i>	Multiflora Rose, nn	C	C
<i>Rubus</i>	<i>alleggheniensis</i>	Allegheny/Mountain Blackberry	C	P
<i>R.</i>	<i>flagellaris*</i>	Common Dewberry/Dewberry	C	C

Genus	Species	Common Name	72/77 18-22	
<i>R.</i>	<i>occidentalis</i>	Black Raspberry	C	C
<i>R.</i>	<i>odoratus</i>	Purple-flowering Raspberry	C	
<i>R.</i>	<i>pensilvanicus</i>	Pennsylvania Blackberry		P
<i>R.</i>	<i>phoenicolasius</i>	Wineberry		C
<b>Family Rubiaceae</b>				
<i>Cephalanthus</i>	<i>occidentalis</i>	Buttonbush		C
<i>Galium</i>	<i>album</i>	White Bedstraw, nn		P
<i>G.</i>	<i>aparine</i>	Catchweed Bedstraw/Cleavers	C	P
<i>G.</i>	<i>mollugo</i>	Hedge Bedstraw/Wild Madder, nn	C	C
<i>Houstonia</i>	<i>caerulea</i>	Azure Bluet/Bluets, Quaker Ladies	C	
<i>Mitchella</i>	<i>repens</i>	Partridgeberry	C	
<b>Family Salicaceae</b>				
<i>Populus</i>	<i>deltoides</i>	Eastern Cottonwood	C	P
<i>P.</i>	<i>tremuloides</i>	Trembling Aspen, nn?		C
<i>Salix</i>	sp.	willow, nn		C
<i>S.</i>	<i>babylonica</i>	Weeping Willow, nn	C	
<i>S.</i>	<i>discolor</i>	Pussy Willow	C	
<i>S.</i>	<i>nigra</i>	Black Willow	C	P
<b>Family Sapindaceae</b>				
<i>Acer</i>	<i>negundo</i>	Boxelder	C	C
<i>A.</i>	<i>platanooides</i>	Norway maple, nn		C
<i>A.</i>	<i>pseudoplatanus*</i>	Sycamore Maple, nn	C	C
<i>A.</i>	<i>rubrum</i>	Red Maple	C	P
<i>A.</i>	<i>saccharum</i>	Sugar Maple	C	C
<b>Family Saxifragaceae</b>				
<i>Saxifraga</i>	<i>virginensis</i>	Virginia Saxifrage/Saxifrage Early	C	
<b>Family Scrophulariaceae</b>				
<i>Verbascum</i>	<i>blattaria</i>	Moth Mullein/Mullein Moth, nn	C	C
<i>V.</i>	<i>thapsus</i>	Great Mullein/Mullein, nn	C	C
<b>Family Simaroubaceae</b>				
<i>Ailanthus</i>	<i>altissima</i>	Tree-of-heaven, nn		C
<b>Family Solanaceae</b>				
<i>Physalis</i>	<i>longifolia</i>	Long-leaved Groundcherry		P
<i>Solanum</i>	<i>carolinense</i>	Carolina Horsenettle/Horse-nettle	C	C
<i>S.</i>	<i>dulcamara</i>	Bittersweet Nightshade, nn		C
<b>Family Ulmaceae</b>				
<i>Ulmus</i>	<i>americana</i>	American Elm	C	
<i>U.</i>	<i>parvifolia</i>	Chinese Elm, nn		P
<i>Zelkova</i>	<i>serrata</i>	Japanese Zelkova, nn		P
<b>Family Urticaceae</b>				
<i>Boehmeria</i>	<i>cylindrica</i>	False Nettle		C
<i>Laportea</i>	<i>canadensis</i>	Wood Nettle		C
<i>Pilea</i>	<i>pumila</i>	Canada clearweed		C
<b>Family Verbenaceae</b>				
<i>Verbena</i>	<i>urticifolia</i>	White Vervain		C
<b>Family Viburnaceae</b>				
<i>Sambucus</i>	<i>canadensis</i>	Black Elderberry/Elder	C	C
<i>Viburnum</i>	<i>acerifolium</i>	Mapleleaf Viburnum/Arrow-wood	C	C
<i>V.</i>	<i>dentatum</i>	Southern Arrowwood		C
<i>V.</i>	<i>dilatatum</i>	Linden Viburnum, nn		C

Genus	Species	Common Name	72/77	18-22
V.	<i>opulus*</i>	Cranberry Viburnum/American Cranberry-bush, nn?	C	
V.	<i>prunifolium</i>	Blackhaw/Black-haw	C	C
V.	<i>recognitum</i>	Southern Arrowwood/Arrow-wood	C	
<b>Family Violaceae</b>				
<i>Viola</i>	<i>arvensis</i>	European Field Pansy, nn		C
V.	<i>cucullata</i>	Marsh Blue Violet/Violet Marsh	C	P
V.	<i>eriocarpa*</i>	Smooth Yellow Violet/Violet Smooth Yellow		P
V.	<i>hirsutula</i>	Southern Wood Violet/Violet Southern Wood	C	
V.	<i>odorata</i>	Eurasian Sweet Violet, nn		P
V.	<i>pubescens</i>	Downy Yellow Violet	C	
V.	<i>riviniana</i>	European Dog Violet, nn		C
V.	<i>sororia</i>	Common Blue Violet/Violet Common Purple	C	P
V.	<i>striata</i>	Cream Violet		P
V.	<i>tricolor</i>	Wild Pansy/Johnny Jump-up, nn	C	
<b>Family Vitaceae</b>				
<i>Ampelopsis</i>	<i>glandulosa</i>	Porcelain Berry		P
<i>Parthenocissus</i>	<i>quinquefolia</i>	Virginia Creeper	C	C
<i>Vitis</i>	<i>aestivalis</i>	Summer Grape		P
V.	<i>cinerea</i>	Graybark Grape		P
V.	<i>labrusca</i>	Fox Grape	C	C
V.	<i>riparia</i>	Riverbank Grape		P
V.	<i>vulpina</i>	Frost Grape		P



St. John's Wort, MJ

# Arthropods



Luna Moth on Luffa Vine, JG

Arthropods – the giant group of invertebrates that includes insects, crustaceans, centipedes, spiders and ticks – is the most successful group of animals by any measure. They occur worldwide and in all habitats. Currently, approximately 80% of all named species of animals are arthropods (there are approximately one million that have been named so far, with an estimated total number of actual arthropod species equaling seven to eight million), and many new ones are

described every year. Most arthropod species are insects (possibly six million of them), and an estimated 40% of all insect species are beetles. Beetles, therefore, make up about one quarter of all animal species. That’s a lot of beetles!

Despite the huge diversity in their ecologies, body shapes and colors, all arthropods share some fundamental aspects of their body plans that are associated with the success of the group as a whole: an exoskeleton, metamorphosis and molting, and flexible appendages. The outer covering of arthropods– their “cuticle” – is different from our skin because it also serves as their skeleton. Exoskeletons can be thin and flexible (as in caterpillars) or as thick as a lobster’s claw. They provide not only physical support and protection from predators, but also protection from parasites, support for internal organs, something for muscles to pull on and areas for gas exchange (respiration). Exoskeletons present a problem, though: once completely formed, they can’t get any bigger, so neither can the arthropod within. Therefore, most arthropods periodically shed their current exoskeletons, while secreting new ones below as they increase in size.

Arthropods lay eggs that hatch into either nymphs or larvae. Nymphs are smaller, reproductively immature versions of adults that go through sequential developmental stages in which they grow larger and, ultimately, become reproductively mature and capable of flight, in airborne species. Larvae are typically worm-like and don’t look at

all like adults. They eat voraciously to become bigger before undergoing metamorphosis inside protective cases, from which they emerge as reproductively mature adults. The lives of adults are often totally different from the lives of those same individuals as larvae as evident in caterpillars and butterflies or wasps.

The jointed legs of arthropods are so crucial to their success that this is the characteristic for which the group is named. Exoskeletons are thin at the joints, enabling bending of these form-fitting suits of armor. Early arthropods were made of many segments, and each segment had a pair of legs as in centipedes and millipedes. Over evolutionary time, different types of arthropods underwent different patterns of segment fusion, and the legs previously associated with segments disappeared or were modified in many ways. Not only do arthropod appendages allow individuals to walk, crawl and creep; but they now also allow individuals to run, jump, dig, swim, fly, fight opponents, attract mates, transfer sperm, take care of offspring, sting, bite and eat; the mouthparts of many arthropods are actually modified appendages. No wonder these animals look so strange when they eat; they're chewing with legs!

Some of the arthropod groups surveyed and receiving expert attention are introduced below.

### **Arachnids (spiders, ticks, mites, scorpions)**

Most arachnids are terrestrial, and most adults have eight legs, no antennae and no wings. Most arachnids are spiders, but there are numerous species of ticks and mites, too. A few smaller groups of arachnids include scorpions, harvestmen (daddy long-legs) and pseudoscorpions.

Arachnids have a reputation for being scary creatures that are dangerous to humans, which – with the exception of some ticks – couldn't be farther from the truth. Honey Hollow is home to many beneficial spiders, mites, harvesters and at least one species of nearly microscopic pseudoscorpion, that all play important ecological roles: pollinator, scavenger and predator (including of many pest insects).

Though they have not been recorded at Honey Hollow, there are three medically significant spiders present in southeastern Pennsylvania: Northern Black Widow (*Latrodectus variolus*), Southern Black Widow (*Latrodectus mactans*) and False Black Widow (*Steatoda*

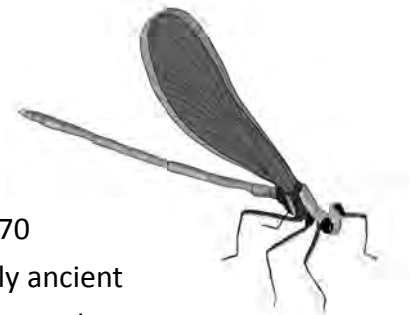
*grossa*). These spiders live in dark, dry, secluded spaces and are very timid. Bites only occur when the spider is unable to run away (for example, if the spider is handled or crushed). The bites are quite painful, but an antivenom is widely available. Contrary to popular belief, there are no known populations of Recluse Spiders in Pennsylvania at this time.

## **Insects**

Most adult insects have six legs, a single pair of antennae and (often) one or two pairs of wings. They exist in all habitat types and are critically important members of functioning ecosystems. At Honey Hollow, they pollinate plants, decompose organic matter and serve as food for all kinds of other organisms.

### **Odonata**

Odonata is the order of insects that includes dragonflies and damselflies. More than 5,000 species worldwide occur on every continent except Antarctica. North America is home to more than 470 species, of which 180 are known to occur in Pennsylvania. It is a fairly ancient order, with the earliest fossils dating back to over 300 million years ago. The largest dragonfly known to have existed lived during the Permian (about 275 million years ago); with a wingspan of almost 30 inches, it was also the largest insect ever recorded on Earth.



Ebony Jewelwing, MJ

Odonates spend most of their lives living in water as nymphs. Over the course of one to three years (depending upon the species), they molt multiple times until they are ready to “emerge” from their final molt into adulthood, a process that occurs out of water. Pre-emergence nymphs crawl from the water onto a vegetation perch and push and redistribute fluids throughout different parts of their bodies so as to split out of their old outer coverings (their “shells”). At emergence, they push their wings and bodies out, taking time to let parts dry and stiffen, as they assume adult forms. They will not molt again during their one to ten weeks (depending upon the species) of adult life. The shells they leave behind can be used for species identification and occurrence information.

Odonates take advantage of the habitats provided by Honey Hollow and the adjacent private farm. The two small still ponds with critically important well vegetated edges, the East and West Branch of Honey Hollow Creek (permanently wet areas) and Crooks

Marsh provide feeding and breeding habitats for many species. Upland fields and sunlit trails provide additional feeding areas. Mating and egg laying are almost exclusively associated with water, so it is common to see many male odonates gathering near water with appropriate egg-laying sites in anticipation of visiting females. Some of them will be successful in attempts to fertilize eggs; others continue to wait as females depart to feed and prepare to return to mate and lay eggs again.

Emergence times are variable, with the adults of some early-season species all but disappearing before adults of other species appear. The Common Baskettail is one of our earlier species, peaking in May and early June, while some darner species (*Aeshna*) don't make their appearance until July and peak in August and September. Other species are found beginning in spring and may still be active right up until winter, such as the Common Green Darner, one of our earliest – and latest – occurring odonate species, partly because local populations include both resident and migrant individuals.

The search for, and identification of, odonates is becoming increasingly popular, in part for the simple reason that most people can identify an insect as a dragonfly or damselfly, though species identification is more challenging. But it's also because, unlike most orders of insects, a standardized set of common English names was created for all North American odonates and adopted by the Dragonfly Society of the Americas in 1996. This then facilitated the creation of popular field guides for both novice and experienced enthusiasts. These enthusiasts, in turn, have provided the scientific community an enormous amount of data on identification, range and seasonality.

In the 1972 survey, eight species of odonates were reported: three species of dragonflies and five of damselflies. The additions from 1977 included 10 species of dragonflies and three of damselflies. Coverage in 2022 took place over five separate days between May 30 to July 30, during which 27 species of odonates were found, including 17 species of dragonflies and 10 of damselflies.

In 2022, the most widespread and possibly most abundant species found was Ebony Jewelwing. Few were found near ponds; but they were common along the streams, in clearings in the wooded areas and along the wooded edges of open fields. This stunning little damselfly has a metallic green body and dark wings, making it easy for beginners to identify.

The most exciting find was a healthy colony of Sweetflag Spreadwing in Crooks Marsh. According to the Odonata Central and iNaturalist databases, this is the only verified record for this species in the five-county Philadelphia area and only the third verified record in Pennsylvania east of the Susquehanna River. Other sightings of particular interest included a Unicorn Clubtail, an Eastern Least Clubtail and Azure Bluets that were present in several areas.

There were six species reported on prior surveys that were not found in 2022. Several of the previous reports may have been mis-identifications based upon the incomplete knowledge of fifty years ago; for example, Elfin Skimmer was reported in 1977, but no appropriate habitat exists at Honey Hollow for this species. Big Bluet was included in the census of 1971, but there are no modern records for this species in Pennsylvania that are not directly associated with the tidal portion of the Delaware River. Familiar Bluet was reported from 1971; however, we now know that several species in this genus are extremely difficult to identify in the field. We were only able to identify the similar bluet seen in 2022 to genus (*Enallagma*).

There is reason to keep looking for additional odonates at Honey Hollow, including species reasonably common in this general area but not found in our recent survey. For example, a larva of one of the spiketail species (*Cordulegaster*) was found but – despite hours of searching over multiple days in the muddy habitat they prefer – no adults were located. Additional visits through spring and summer, and over multiple years, should turn up new findings.

### **Hymenoptera**

Honey Hollow is abuzz with the diligent work of bees, ants, wasps and sawflies of the order Hymenoptera. These insects are all united by a few quirks of their anatomy: two pairs of wings,\* one pair of mandibles (jaw-like mouthparts), little claws on their feet, and a row of microscopic hooks along their hindwings that connects to their forewings in flight to create a single flexible aerodynamic surface. This is what makes them such agile flyers. Many bees and wasps can sting, but the vast majority are completely harmless to humans. There are about 114,000 species of Hymenoptera known to science, with just as many that are still waiting to be studied. At the time of this writing, about 115 species have been recorded from Honey Hollow, though there are



Bald-faced Hornet queen, CK





Eastern Yellowjacket  
worker, CK

certainly hundreds more here just waiting to be found. Perhaps you'll be the first to spot them!

Native bees are the most important pollinators for many of our native plants. Ants and wasps are some of our most important predators, not just in Pennsylvania, but in all terrestrial environments. They are responsible for keeping hundreds of thousands of different pest species in check worldwide. It is encouraging to see such thriving populations of bees, ants and wasps at Honey Hollow.

\*Some specialized ants and wasps have since lost the ability to fly, but we know their evolutionary ancestors had wings, so they are all grouped together.

### **Diptera**

Flies, as members of the order Diptera are commonly known, comprise one of the largest divisions of the insect world. Like butterflies, beetles and bees, they go through four life stages: egg, larva, pupa, adult. Flies come in an unimaginable diversity of forms; they may be compact like house flies or skinny like mosquitoes. Crane flies have long, dangling legs twice the length of their skinny elongate bodies. Horse flies sport bulging eyes that take up most of their head. Many hover flies closely mimic bees or wasps, affording them protection from predators. With the right mindset, flies are beautiful to behold. They come in a dazzling variety of colors.

In almost every process in nature, flies play a role. They clean up waste. They kill pestiferous insects. They are themselves pestiferous insects. Many are important pollinators (Honey Hollow crops included) and larval stages (maggots) are important members of ecosystem decomposition and recycling teams. They shred plant material as they feed, adding organic matter to soils that decomposers then break down to molecular building blocks to be used by other organisms.

Flies are everywhere at Honey Hollow. They occur in the fields and at every level of the forest, from the ground to the canopy. Great mating swarms hover near wetlands. Maggots occur in the soil as well as on, and in, the bodies of other organisms. Adults and larvae invade human kitchens, bathrooms, barns, and stables, to take advantage of the resources we provide: our drains and waste products, our food, our animals and their

food and waste products, even our own bodies. We detected 153 species of flies in 2022, but have only just begun. Many flies are difficult to identify, and others are tiny or elusive. With deserved increased interest in this group, many more species are likely to be discovered in the watershed in the future.

## Lepidoptera

Butterflies and moths are closely related and share many characteristics, including the tiny scales that cover their wings, bodies and legs, that flake off if the animals are touched. Both butterflies and moths undergo complete metamorphosis, in which individuals hatch from eggs into caterpillars that do little more than eat for their first few weeks, to build up enough energy for the next stages of their lives: converting caterpillar bodies into flying, reproductively-mature adult bodies during pupation and the realization of adulthood. Adults usually live only a couple of days, during which their sole mission is to mate and reproduce.



Tiger Swallowtail, MJ

Because of their bright colors, bold patterns, daytime activity and association with flowers, butterflies may be the most commonly recognized of all insects. Their antennae are long, skinny and club-like, with bulbs at their ends (different from the “feathery” antennae of moths), and they tend to rest with their wings closed vertically over their backs (different from the flat and open wings of most resting moths). Of species seen at Honey Hollow, Monarchs might be the most famous for their migratory behavior, but at least a couple of others are also known to be migratory: Common Buckeye and Painted Lady.

Moths are diverse. Across North America, there are about 12,000 species of moths (compared to the approximate 830 species of butterflies), which vary in size, patterning and behavior. Caterpillars and adults can be colored to blend into the background or to mimic the appearance of other organisms such as snakes or wasps or even the eyes of a predator as a survival strategy. A few have evolved to resemble undesirable items in the environment such as bird droppings. The adults of many species are nocturnal, but some are diurnal, and (as above) some don’t feed as adults, but many do. Some of the species that feed as adults are generalists and may visit the flowers of different species, while others specialize on a single plant type.

Butterflies, and especially the more numerous moths, are among the unsung heroes of

functioning terrestrial ecosystems. Adults and caterpillars are an important food resource for all kinds of wildlife, including other insects, spiders, frogs, toads, lizards, many birds, shrews, skunks and bats (moths are a major part of the diet of many bats). Species that feed as adults are extremely important pollinators, especially nocturnal moths, which visit more species than do bees during the day. And caterpillars, by shredding plant material as they feed, play important roles in ecosystem nutrient recycling.



Snowberry Clearwing, MJ

Butterflies and moths also play important roles for humans as bioindicator species. Because their physiology is sensitive to small changes in environmental conditions, changes in their presence, abundance or behavior can provide evidence of some of the effects of human activities on the world around us. At Honey Hollow, monitoring these delicate bioindicators will provide valuable information regarding encroaching threats, particularly those in the contexts of pollution, pesticides, habitat alteration and destruction, and the climate crisis.

Below are the arachnids and insects found in the Honey Hollow watershed in 1972 and 1977, and confirmed and likely to be present during 2018-2022.

**Arthropods.** Asterisk indicates taxonomic change since 1972 or 1977. Common name: current one/that from previous years. Occurrence: confirmed (C), probable (P); see Foreward for details. 72/77 refers to the original 1972 inventory and the 1978 2nd edition, while 18-22 refers to the five years during which data were collected for the current inventory.

Genus	Species	Common Name	72/77	18-22
<b>Arachnids (Class Arachnida)</b>				
<b>Order Araneae</b>				
<i>Acacesia</i>	<i>hamata</i>	Difoliate Orbweaver		C
<i>Acanthepeira</i>	<i>cherokee</i>	Cherokee Orbweaver		C
A.	<i>stellata</i>	Starbellied Orbweaver		C
<i>Araneus</i>	<i>alboventris</i>			C
A.	<i>marmoreus</i>	Marbled Orbweaver		C
<i>Argiope</i>	<i>aurantia</i>	Yellow Garden Spider		C
<i>Castianeira</i>	sp.	ant-mimic sac spiders		C
<i>Colonus</i>	<i>sylvanus</i>	Sylvan Jumping Spider		P
<i>Coras</i>	sp.	funnel weavers		C
<i>Dolomedes</i>	<i>albineus</i>	White-banded Fishing Spider		C
D.	<i>tenebrosus</i>	Dark Fishing Spider		C
D.	<i>triton</i>	Six-spotted Fishing Spider	C	P
D.	<i>vittatus</i>	Banded Fishing Spider		C
<i>Dysdera</i>	<i>crocata</i>	Woodlouse Spider		C
<i>Eris</i>	<i>militaris</i>	Bronze Jumping Spider		C

Genus	Species	Common Name	72/77	18-22
<i>Euryopis</i>	<i>funebria</i>	Eastern Triangular Cobweaver		P
<i>Frontinella</i>	<i>pyramitela</i>	Bowl-and-doily Spider		C
<i>Gea</i>	<i>heptagon</i>	Heptagonal Orbweaver		C
<i>Hentzia</i>	sp.	long-jawed jumping spiders		P
<i>Larinia</i>	sp.	grass orb-web spiders		P
<i>Leucauge</i>	<i>venusta</i>	Orchard Orbweaver		C
<i>Maevia</i>	<i>inclemens</i>	Dimorphic Jumping Spider		P
<i>Mangora</i>	<i>gibberosa</i>	Lined Orbweaver		C
<i>M.</i>	<i>maculata</i>	Green-legged Orbweaver		C
<i>M.</i>	<i>placida</i>	Tuft-legged Orbweaver		P
<i>Mecaphesa</i>	<i>asperata</i>	Northern Crab Spider		P
<i>M.</i>	<i>lemniscata</i>	Basilica Orbweaver		C
<i>Micrathena</i>	<i>gracilis</i>	Spined Micrathena	C	C
<i>Mimetus</i>	sp.	cannibal spiders		P
<i>Misumena</i>	<i>vatia</i>	Goldenrod Crab/Flower Spider	C	
<i>Misumenoides</i>	<i>formosipes</i>	White-banded Crab Spider		C
<i>Misumessus</i>	<i>oblongus</i>	American Green Crab Spider		C
<i>Neoscona</i>	<i>arabesca</i>	Arabesque Orbweaver		P
<i>N.</i>	<i>crucifera</i>	Spotted Orbweaver		C
<i>Oxyopes</i>	<i>salticus</i>	Striped Lynx Spider		C
<i>O.</i>	<i>scalaris</i>	Western Lynx Spider		P
<i>Paraphidippus</i>	<i>aurantius</i>	Golden Jumping Spider		C
<i>Pardosa</i>	sp.	thin-legged wolf spiders		P
<i>Pelegrina</i>	<i>galathea</i>	Peppered Jumping Spider		C
<i>Phidippus</i>	<i>audax</i>	Bold Jumping/Jumping Spider	C	C
<i>P.</i>	<i>princeps</i>	Grayish Jumping Spider		C
<i>Philodromus</i>	sp.			P
<i>Pisaurina</i>	<i>mira</i>	American Nursery Web Spider		C
<i>Platycryptus</i>	<i>undatus</i>	Tan Jumping Spider		C
<i>Rabidosa</i>	<i>rabida</i>	Rabid Wolf Spider		C
<i>Sarinda</i>	<i>hentzi</i>			C
<i>Synemosyna</i>	<i>formica</i>	Slender Ant-mimic Jumping Spider		C
<i>Tetragnatha</i>	sp.	long-jawed orb weavers		P
<i>Theridion</i>	sp.	typical cobweb spiders		P
<i>Theridula</i>	<i>emertoni</i>	Cobweb Spider	C	
<i>Tibellus</i>	<i>oblongus</i>	Oblong Running/Crab Spider	C	
<i>Trochosa</i>	sp.	wolf spiders		P
<i>Wulfila</i>	<i>albena</i>			P
<i>Xysticus</i>	sp.	ground crab spiders		P
<i>Zygoballus</i>	<i>rufipes</i>	Hammer-jawed Jumping Spider		P
<b>Order Endeostigmata</b>				
<i>Acalitus</i>	<i>ferrugineum</i>	Beech Erineum Mite		P
<i>Aceria</i>	<i>brachytarsa</i>	California Black Walnut Pouch Gall Mite		P
<i>A.</i>	<i>caulis</i>	Black Walnut Petiole Gall Mite		C
<i>A.</i>	<i>cephalanthi</i>	Buttonbush Mite		P
<i>A.</i>	<i>fraxiniflora</i>	Ash Flower Gall Mite		P
<i>A.</i>	<i>nyssae</i>			C
<i>Aculops</i>	<i>aenigma</i>			P
<i>Aculus</i>	<i>tetanothrix</i>	Willow Bead Gall Mite		P
<i>Eriophyes</i>	<i>cerasicrumena</i>	Black Cherry Leaf Gall Mite		C

Genus	Species	Common Name	72/77	18-22
<i>E.</i>	<i>laevis</i>	Alder Leaf Gall Mite		P
<b>Order Ixodida</b>				
<i>Dermacentor</i>	<i>variabilis</i>	Dog, Wood, Brown Tick		C
<i>Ixodes</i>	<i>scapularis</i>	Deer, Black-legged Tick		C
<b>Order Opiliones</b>				
<i>Leiobunum</i>	<i>nigropalpi</i>			P
<i>L.</i>	<i>vittatum</i>	Eastern Harvestman		P
<b>Order Pseudoscorpiones</b>				
		pseudoscorpion		P
<b>Order Trombidiformes</b>				
		water mite		P
<i>Leptus</i>	sp.			P
<i>Trombidium</i>	sp.			P
<b>Insects (Class Insecta)</b>				
<b>Order Coleoptera</b>				
		whiligig beetles		C
<i>Acalymma</i>	<i>vittatum</i>	Striped Cucumber Beetle		C
<i>Acylopus</i>	<i>ergoti</i>	Shining Flower Beetle		C
<i>Adalia</i>	<i>bipunctata</i>	Two-spotted Lady Beetle		C
<i>Agrilus</i>	<i>bilineatus</i>	Two-lined Chestnut Borer		C
<i>A.</i>	<i>planipennis</i>	Emerald Ash Borer		P
<i>A.</i>	<i>ruficollis</i>	Red-necked Cane Borer Beetle		C
<i>Alobates</i>	<i>pensylvanicus</i>	False Mealworm Beetle		C
<i>Altica</i>	<i>chalybea</i>	Grape Flea Beetle		P
<i>Anisodactylus</i>	sp.			P
<i>Arrhenodes</i>	<i>minutus</i>	Oak Timberworm Weevil		C
<i>Astyliidius</i>	<i>parvus</i>			C
<i>Axion</i>	<i>tripustulatum</i>	Thrice-struck Lady Beetle		C
<i>Baliosus</i>	<i>nervosus</i>	Basswood Leaf Miner		P
<i>Barypeithes</i>	<i>pellucidus</i>	Hairy Spider Weevil		P
<i>Bisnius</i>	<i>blandus</i>			P
<i>Calligrapha</i>	<i>bidenticola</i>			C
<i>C.</i>	<i>californica</i>	Coreopsis Beetle		P
<i>Calopteron</i>	<i>reticulatum</i>	Reticulated Net-winged Beetle		P
<i>C.</i>	<i>terminale*</i>	End Band Net-wing/Net-winged Beetle	C	C
<i>Calosoma</i>	<i>scrutator</i>	Fiery Searcher Beetle		C
<i>Capnochroa</i>	<i>fuliginosa</i>			P
<i>Capraita</i>	<i>subvittata</i>			P
<i>Cassida</i>	<i>rubiginosa</i>	Thistle Tortoise Beetle		C
<i>Cathartophilanus</i>	<i>imbellis</i>			P
<i>Ceruchus</i>	<i>piceus</i>	Red-rot Decay Stag Beetle		C
<i>Charidotella</i>	<i>sexpunctata</i>	Golden Tortoise Beetle		C
<i>Chauliognathus</i>	<i>marginatus</i>	Margined Leatherwing/Soldier Beetle	C	C
<i>C.</i>	<i>pensylvanicus</i>	Goldenrod Soldier/Soldier Beetle	C	
<i>Chilocorus</i>	<i>stigma</i>	Twice-stabbed Lady Beetle		C
<i>Chlaenius</i>	<i>aestivus</i>			P
<i>Chrysochus</i>	<i>auratus</i>	Dogbane Leaf/Dogbane Beetle	C	C
<i>Coccinella</i>	<i>novemnotata</i>	Nine-spotted Lady Beetle	C	
<i>C.</i>	<i>septempunctata</i>	Seven-spotted Lady Beetle		C

Genus	Species	Common Name	72/77	18-22
<i>Colaspis</i>	sp.			P
<i>Coleomegilla</i>	<i>maculata</i> *	Spotted Pink Ladybeetle/12-spotted Lady Beetle	C	C
<i>Conotrachelus</i>	sp.			P
<i>Copris</i>	sp.			P
<i>Cotinis</i>	<i>nitida</i>	Common Green June Beetle		C
<i>Cryptarcha</i>	<i>ampla</i>			P
<i>Cycloneda</i>	<i>munda</i>	Polished/Red Lady Beetle	C	
<i>C.</i>	<i>sanguinea</i>	Spotless Lady/Lady Beetle	C	
<i>Cymbiodyta</i>	sp.			C
<i>Cyrtepidomus</i>	<i>castaneus</i>	Asian Oak Weevil		C
<i>Deloyala</i>	<i>guttata</i>	Mottled Tortoise Beetle		C
<i>Dendroides</i>	sp.			P
<i>Diabrotica</i>	<i>barberi</i> *	Northern Corn/Corn Rootworm	C	
<i>D.</i>	<i>undecimpunctata</i>	Spotted Cucumber/12-spotted Cucumber Beetle	C	C
<i>Diaperis</i>	<i>maculata</i>	Spotted Diaperis		C
<i>Dibolia</i>	<i>borealis</i>	Northern Plantain Flea Beetle		C
<i>Diplotaxis</i>	sp.			P
<i>Disonycha</i>	<i>pennsylvanica</i>	Pennsylvania Flea Beetle		P
<i>Eburia</i>	<i>quadrigeminata</i>	Ivory-marked Borer		C
<i>Ectopria</i>	<i>nervosa</i>	Water Penny Beetle		P
<i>Ellychnia</i>	<i>corrusca</i>	Winter Firefly		P
<i>Epicauta</i>	<i>pennsylvanica</i>	Black Blister Beetle	C	
<i>Epilachna</i>	<i>varivestis</i>	Mexican Bean Beetle	C	C
<i>Euparius</i>	<i>paganus</i>			P
<i>Exema</i>	sp.			P
<i>Exomala</i>	<i>orientalis</i>	Oriental Beetle		C
<i>Galerita</i>	sp.	ground beetles	C	P
<i>G.</i>	<i>bicolor</i>	False Bombardier Beetle		P
<i>Gambrinus</i>	<i>griseus</i>			P
<i>Glischrochilus</i>	<i>fasciatus</i>	Picnic Beetle		C
<i>G.</i>	<i>quadrisignatus</i>	Four-spotted Sap/Sap beetle	C	
<i>Glischrochilus</i>	<i>sanguinolentus</i>			C
<i>Haliphus</i>	sp.			P
<i>Harmonia</i>	<i>axyridis</i>	Asian Lady Beetle		C
<i>Helichus</i>	sp.			P
<i>Hesperus</i>	<i>baltimorensis</i>			P
<i>Hippodamia</i>	<i>convergens</i>	Convergent Lady Beetle	C	
<i>Homaeotarsus</i>	<i>badius</i>			P
<i>Hoshihananomia</i> *	<i>octopunctata</i>	Eight-spotted Tumbling/Tumbling Flower Beetle	C	C
<i>Hydroporus</i>	sp.			P
<i>Hylurgopinus</i>	<i>rufipes</i>	Native Elm Bark/Engraver Beetle	C	
<i>Kuschelina</i>	<i>gibbitarsa</i>			P
<i>Larinus</i>	<i>carlinae</i>	Canada Thistle Bud Weevil		C
<i>L.</i>	<i>turbinatus</i>			C
<i>Lebia</i>	<i>viridipennis</i>			C
<i>Lema</i>	<i>daturaphila</i>	Three-lined Potato Beetle		P
<i>Leptinotarsa</i>	<i>decemlineata</i> *	Colorado Potato Beetle	C	
<i>L.</i>	<i>juncta</i>	False Potato Beetle		C
<i>Limnohydrobius</i>	sp.			C
<i>Lixus</i>	<i>concausus</i>	Rhubarb Weevil		P

Genus	Species	Common Name	72/77	18-22
<i>Lucidota</i>	<i>atra</i>	Black Firefly		C
<i>Lytta</i>	<i>aenea</i>			P
<i>Maladera</i>	sp.			P
<i>Megacyllene</i>	<i>robiniae</i>	Locust Borer	C	C
<i>Megarthus</i>	sp.			P
<i>Melanotus</i>	sp.			P
<i>Microrhopala</i>	<i>vittata</i>	Goldenrod Leaf Miner Beetle		C
<i>Mordella</i>	<i>strata</i>	Tumbling Mourner/Tumbling Flower Beetle	C	
<i>M.</i>	<i>marginata</i>	Tumbling Ragdoll		P
<i>Mycetochara</i>	sp.			P
<i>Nebria</i>	<i>lacustris</i>	Lacustrine Gazelle Beetle		P
<i>N.</i>	<i>pallipes</i>			C
<i>Necrophila</i>	<i>americana</i>	American Carrion Beetle		C
<i>Neomida</i>	<i>bicornis</i>	Two-horned Darkling Beetle		C
<i>Nicrophorus</i>	<i>orbicollis</i>	Roundneck Sexton Beetle		C
<i>Nipponoserica</i>	<i>peregrina</i>			P
<i>Odontocorynus</i>	sp.			P
<i>Odontotaenius</i>	<i>disjunctus</i>	Horned Passalus Beetle		C
<i>Olibrus</i>	sp.			P
<i>Onthophagus</i>	<i>hecate</i>	Scooped Scarab		P
<i>Osphya</i>	<i>varians</i>			P
<i>Oulema</i>	<i>melanopus</i>	Cereal Leaf Beetle		P
<i>Paederus</i>	sp.	Whiplash Beetles		P
<i>Paria</i>	<i>frosti</i>			P
<i>P.</i>	<i>quadrinotata</i>			P
<i>Pedilus</i>	sp.			P
<i>Pelidnota</i>	<i>punctata</i>	Grapevine Beetle		C
<i>Peltodytes</i>	<i>edentulus</i>			P
<i>Penthe</i>	<i>obliquata</i>			C
<i>Phanaeus</i>	<i>vindex</i>	Rainbow Scarab		C
<i>Philonthus</i>	sp.			P
<i>Photinus</i>	<i>pyralis</i>	Common Eastern Firefly/Firefly	C	
<i>Photuris</i>	sp.			P
<i>Pissodes</i>	<i>strobi</i>	White Pine Weevil	C	
<i>Placonotus</i>	sp.			P
<i>Placopterus</i>	<i>thoracicus</i>			C
<i>Plagiodera</i>	<i>versicolora</i>	Imported Willow Leaf Beetle	C	
<i>Platydracus</i>	<i>maculosus</i>	Brown Rove Beetle		C
<i>Platynus</i>	sp.			P
<i>Platysoma</i>	<i>leconti</i>	Hister Beetle		P
<i>Podabrus</i>	<i>rugosulus</i>	Wrinkled Soldier/Soldier Beetle	C	
<i>Poecilus</i>	<i>chalcites</i>			P
<i>Popillia</i>	<i>japonica</i>	Japanese Beetle	C	C
<i>Prometopia</i>	<i>sexmaculata</i>	Six-spotted Sap-feeding Beetle		P
<i>Propylea</i>	<i>quatuordecimpunctata</i>	Fourteen-spotted Lady Beetle		C
<i>Psephenus</i>	<i>herricki</i>			C
<i>Pseudocneorhinus</i>	<i>bifasciatus</i>	Two-banded Japanese Weevil		C
<i>Pyrrhalta</i>	<i>viburni</i>	Viburnum Leaf Beetle		P
<i>Rhagium</i>	<i>inquisitor</i>	Ribbed Pine Borer		C
<i>Rhaxonycha</i>	<i>carolina</i>	Carolina Cantharid		P

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<i>Rhinocomimus</i>	sp.			P
<i>Rhinusa</i>	<i>antirrhini</i>			P
<i>Rhodobaenus</i>	<i>tredecimpunctatus</i>	Ironweed Curculio		C
<i>Rhyssomatus</i>	<i>lineaticollis</i>	Milkweed Stem Weevil		P
<i>Rhipiphorus</i>	<i>walshii</i>			P
<i>Scarites</i>	<i>subterraneus</i>	Big-headed Ground Beetle		P
<i>Sphaeroderus</i>	sp.	small snail-eating beetles		P
<i>Stenelmis</i>	<i>crenata</i>			P
<i>Stenocorus</i>	<i>cinnamopterus</i>			P
<i>Stenolophus</i>	<i>ochropezus</i>			P
<i>Strangalia</i>	<i>famelica</i>	Slender Flower Longhorn/Long-horned Beetle	C	
<i>Synolabus</i>	<i>bipustulatus</i>	Oak Leafrolling Weevil		C
<i>Systema</i>	<i>hudsonias</i>	Flea/Leaf Beetle	C	
<i>S.</i>	<i>marginalis</i>			P
<i>Tarpela</i>	<i>micans</i>	Rainbow Beetle		P
<i>Telephanus</i>	<i>atricapillus</i>	Black-headed Silvan Flat Bark Beetle		C
<i>Tenebroides</i>	sp.	Cadelles		P
<i>Tetraopes</i>	<i>tetrophthalmus</i>	Red Milkweed/Milkweed Beetle	C	C
<i>Tropisternus</i>	sp.			P
<i>Tryptherus</i>	sp.			P
<i>Typocerus</i>	<i>velutinus</i>	Banded Longhorn Beetle		C
<i>Uleiota</i>	<i>dubia</i>			P
<i>Urgleptes</i>	<i>querci</i>			C
<b>Order Diptera</b>				
<i>Acericecis*</i>	<i>ocellaris</i>	Ocellate Gall Midge/Maple Spangle Gall	C	
<i>Aedes</i>	<i>albopictus</i>	Asian Tiger Mosquito		C
<i>A.</i>	<i>triseriatus</i>	Eastern Treehole Mosquito		P
<i>Agromyza</i>	<i>masculina</i>			C
<i>A.</i>	<i>vockerothi</i>			C
<i>Allognosta</i>	sp.			P
<i>Allograpta</i>	<i>obliqua</i>	Oblique Streaktail/Syrphid Fly	C	
<i>Anopheles</i>	<i>punctipennis</i>	Woodland Malaria Mosquito		C
<i>Anthomyia</i>	<i>oculifera</i>			C
<i>Asphondylia</i>	<i>monacha</i>	Nun Midge/Nun Midge Gall	C	
<i>A.</i>	<i>solidaginis</i>			C
<i>Asteromyia</i>	<i>carbonifera</i>	Goldenrod Gall Midge		C
<i>A.</i>	<i>euthamiae</i>	Leaf Gall Midge		C
<i>Atomosia</i>	<i>puella</i>			C
<i>Aulagromyza</i>	sp.			P
<i>Bibio</i>	<i>femoratus</i>			C
<i>Bittacomorpha</i>	<i>clavipes</i>	Eastern Phantom Crane Fly		C
<i>Calliphora</i>	<i>vicina</i>	Bluebottle/Blow Fly	C	
<i>Calycomyza</i>	sp.			P
<i>Cerodontha</i>	<i>angulata</i>			P
<i>Chaetopsis</i>	<i>fulvifrons</i>			P
<i>Chasmatonotus</i>	<i>unimaculatus</i>			C
<i>Chironomus</i>	<i>plumosus</i>	Winnebago Lake Fly/Midge	C	
<i>Cholomyia</i>	<i>inaequipes</i>			P
<i>Chrysogaster</i>	sp.	Low-horned Wrinkleheads		P
<i>Chrysopilus</i>	<i>pilosus</i>			C



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C.	<i>proximus</i>			P
C.	<i>quadratus</i>	Quadrate Snipe Fly		C
C.	<i>thoracicus</i>	Golden-backed Snipe Fly		C
<i>Chrysopilus*</i>	<i>ornatus*</i>	Ornate Snipe/Snipe Fly	C	C
<i>Chrysops</i>	<i>macquarti</i>			C
C.	<i>univittatus</i>			C
<i>Chrysotoxum</i>	<i>plumeum</i>	Broad-banded Meadow Fly		C
<i>Cladura</i>	<i>flavoferruginea</i>			P
<i>Clusia</i>	<i>lateralis</i>			P
<i>Coenosia</i>	sp.	Tiger Flies		P
<i>Condylostylus</i>	<i>caudatus complex</i>			P
C.	<i>comatus complex</i>			P
C.	<i>sipho complex</i>			P
<i>Contarinia*</i>	<i>negundinis*</i>	Box Elder Gall Midge/Boxelder Gall Fly	C	
<i>Cordyligaster</i>	<i>septentrionalis</i>			C
<i>Cricotopus</i>	sp.			P
<i>Cuterebra</i>	<i>buccata</i>	Glire Bot/Bot Fly	C	
<i>Dasineura</i>	<i>pellex</i>	Ash Bullet Gall Midge		C
<i>Dialysis</i>	<i>rufithorax</i>			C
<i>Dictya</i>	sp.			P
<i>Dilophus</i>	<i>spinipes</i>			P
<i>Diogmites</i>	sp.	hanging-thieves		P
<i>Dolichopus</i>	<i>longipennis</i>	Dolichopid Fly	C	
D.	sp.			P
<i>Drosophila</i>	sp.	small fruit flies		P
<i>Efferia*</i>	<i>aestuans</i>	Robber Fly	C	
<i>Epiphragma</i>	<i>fasciapenne</i>	Band-winged Crane Fly		C
E.	<i>solatrix</i>	Spectacled Crane Fly		C
<i>Epistrophe</i>	<i>xanthostoma</i>	Emarginate Smoothtail		C
<i>Erioptera</i>	<i>chlorophylla complex</i>			P
E.	<i>venusta</i>			C
<i>Eristalis</i>	<i>tenax</i>	Common Drone Fly/Syrphid Fly	C	
<i>Eudasyphora</i>	<i>cyanicolor</i>			P
<i>Euhybus</i>	sp.			P
<i>Eupeodes*</i>	<i>americanus</i>	Long-tailed Aphideater/Syrphid Fly	C	P
<i>Eurosta</i>	<i>comma</i>			C
E.	<i>solidaginis</i>	Goldenrod Gall Fly/Goldenrod Ball Gall	C	C
<i>Gnophomyia</i>	<i>tristissima</i>			C
<i>Gonia</i>	sp.	cutworm flies		P
<i>Gymnoclytia</i>	sp.			P
<i>Gymnopternus</i>	sp.			P
<i>Helina</i>	sp.	plumose house flies		P
<i>Holcocephala</i>	<i>fusca</i>			P
<i>Homoneura</i>	sp.			P
<i>Japanagromyza</i>	<i>viridula</i>	Oak Shothole Leafminer		C
<i>Juriniopsis</i>	<i>adusta</i>			P
<i>Laphria</i>	<i>flavicollis</i>			C
L.	<i>sericea complex</i>			P
<i>Limonia</i>	sp.			P
<i>Liriomyza</i>	<i>eupatorii</i>			C

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<i>L.</i>	<i>fricki</i>			C
<i>L.</i>	<i>limopsis</i>			P
<i>Lispe</i>	sp.	barred mudflies		P
<i>Lonchaea</i>	sp.			P
<i>Lucilia</i>	<i>caesar</i>	Caesar Greenbottle/Blow Fly	C	
<i>L.</i>	<i>coeruleiviridis</i>	Blue-green Bottle Fly		C
<i>Megasyrphus*</i>	<i>laxus</i>	Black-legged Gossamer/Syrphid Fly	C	
<i>Metalimnobia</i>	<i>cinctipes</i>			C
<i>Meunieriella</i>	sp.			P
<i>Milesia</i>	<i>virginiensis</i>	Virginia Giant Hover Fly		C
<i>Minettia</i>	<i>magna</i>			P
<i>M.</i>	<i>obscura complex</i>			P
<i>Musca</i>	<i>autumnalis</i>	Face fly		P
<i>M.</i>	<i>domestica</i>	House/Common House Fly	C	C
<i>Mycodrosophila</i>	<i>stalker</i>			C
<i>Nemorimyza</i>	<i>posticata</i>			C
<i>Neolasioptera</i>	<i>farinosa</i>			C
<i>Nephrotoma</i>	<i>ferruginea</i>	Ferruginous Tiger Crane Fly		P
<i>Ochthera</i>	sp.	mantid shoreflies		P
<i>Ophiomyia</i>	<i>kwansonis</i>	Daylily Leafminer		C
<i>O.</i>	<i>maura</i>			P
<i>Ophiomyia*</i>	<i>curvipalpis</i>	Aster Miner	C	
<i>Opomyza</i>	<i>petrei</i>			P
<i>Pachyrhina</i>	<i>ferruginea</i>	Crane Fly	C	
<i>Paracantha</i>	<i>culta</i>	Fruit Fly		C
<i>Paralimna</i>	<i>punctipennis</i>			C
<i>Parydra</i>	<i>aquila</i>			P
<i>Phortica</i>	<i>variegata</i>			C
<i>Physocephala</i>	<i>tibialis</i>	Common Eastern Physocephala/Thick-headed Fly	C	C
<i>Phytoliriomyza</i>	<i>melampyga</i>	Jewelweed Leaf-miner Fly/Jewelweed Miner	C	C
<i>Phytomyza</i>	<i>albiceps complex</i>			P
<i>P.</i>	<i>ilicicola</i>	Native Holly Leafminer		C
<i>P.</i>	<i>ilicis</i>	Holly Leaf Miner		C
<i>P.</i>	<i>opacae</i>			C
<i>P.</i>	<i>plantaginis</i>			C
<i>Pipiza</i>	<i>femoralis</i>	White-haired Pithead/Syrphid Fly	C	
<i>Platycheirus</i>	sp.	sedgesitters		P
<i>Pollenia</i>	sp.	cluster flies		P
<i>Polystepha</i>	<i>pilulae</i>	Oak Leaf Gall Midge		C
<i>Procecidochares</i>	<i>atra</i>	Goldenrod Brussels Sprout Gall Fly		P
<i>Prolimnophila</i>	<i>areolata</i>			C
<i>Promachus</i>	sp.	robber flies		C
<i>Rainieria</i>	<i>antennaepe</i>			C



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<i>Resseliella</i>	<i>liriodendri</i>	Tulip Tree Leaf Spot Gall Midge		P
<i>Rhagio</i>	<i>mystaceus</i>	Common Snipe Fly		C
<i>R.</i>	<i>punctipennis</i>	Lesser Variegated Snipe Fly		C
<i>Rhagoletis</i>	<i>suavis</i>	Walnut Husk Maggot Fly		C
<i>Rhopalomyia</i>	<i>pedicellata</i>	Goldentop Pedicellate Gall Midge		C
<i>R.</i>	<i>solidaginis</i>	Goldenrod Bunch Gall Midge	C	C
<i>Rivellia</i>	sp.			P
<i>Sarcophaga</i>	sp.	common flesh flies		P
<i>Sargus</i>	<i>fasciatus</i>			C
<i>Scaptomyza</i>	sp.			P
<i>Schizomyia</i>	<i>racemicola</i>			C
<i>Sepedon</i>	sp.	snail-killing flies		P
<i>Sepsis</i>	sp.			P
<i>Simulium</i>	sp.	common blackflies		P
<i>Siphona</i>	sp.			P
<i>Sphaerophoria</i>	sp.	globetails		P
<i>Sphecomyia</i>	<i>vittata</i>	Long-horned Yellowjacket Fly		C
<i>Sphegina</i>	sp.			P
<i>Stomoxys</i>	<i>calcitrans</i>	Stable Fly	C	C
<i>Symplecta</i>	<i>cana</i>			C
<i>Tabanus</i>	<i>atratus</i>	Black Horse Fly		C
<i>T.</i>	<i>calens</i>			P
<i>Tachypeza</i>	sp.			P
<i>Temnostoma</i>	<i>trifasciatum</i>	Three-lined Falsehorn		P
<i>Tetanocera</i>	<i>plebeja</i>			P
<i>Thecophora</i>	sp.			P
<i>Tipula</i>	<i>abdominalis</i>	Giant Crane Fly		C
<i>T.</i>	<i>borealis</i>			P
<i>T.</i>	<i>furca</i>			C
<i>Toxomerus</i>	<i>geminatus</i>	Eastern Calligrapher		C
<i>Toxomerus*</i>	<i>marginatus</i>	Margined Calligrapher/Syrphid Fly	C	C
<i>Toxomerus*</i>	<i>politus</i>	Maize Calligrapher/Syrphid Fly	C	C
<i>Toxonevra</i>	<i>superba</i>	Antlered Flutter Fly		C
<i>Trichocera</i>	sp.			P
<i>Trichopoda</i>	<i>pennipes</i>	Swift Feather-legged Fly		C
<i>Tritoxa</i>	<i>flexa</i>	Black Onion Fly		C
<i>T.</i>	<i>incurva</i>	Picture-winged Fly	C	C
<i>Xenox*</i>	<i>habrosus*</i>	Bee Fly	C	
<i>Xylophagus</i>	<i>lugens</i>			C
<i>Xylota</i>	sp.	leafwalkers and forest flies		P
<b>Order Hemiptera</b>				
		backswimmer		C
		broad-shouldered water striders		C
		giant water bug		C
		water boatmen		C
		water scorpions		C
		waterstriders		C
<i>Acanalonia</i>	<i>bivittata</i>	Two-striped Planthopper		C
<i>A.</i>	<i>conica</i>	Green Cone-headed Planthopper		P
<i>Acanthocephala</i>	<i>terminalis</i>			P

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<i>Adelphocoris</i>	<i>lineolatus</i>	Alfalfa Plant Bug		C
<i>Agallia</i>	<i>constricta</i>	Constricted Leafhopper		P
<i>Alydus</i>	<i>eurinus</i>			P
<i>Anasa</i>	<i>tristis</i>	Squash Bug	C	C
<i>Anoscopus</i>	<i>serratulae</i>			P
<i>Anotia</i>	<i>burnetii</i>			P
<i>Aplos</i>	<i>simplex</i>			P
<i>Aquarius</i>	<i>remigis</i>	Common Water Strider		C
A.	sp.			C
<i>Arilus</i>	<i>cristatus</i>	North American Wheel Bug		C
<i>Athysanus</i>	<i>argentarius</i>	Silver Leafhopper		P
<i>Banasa</i>	sp.			P
<i>Belostoma</i>	sp.			C
<i>Boisea*</i>	<i>trivittata*</i>	Eastern Boxelder/Boxelder Bug	C	
<i>Catonia</i>	<i>nava</i>			C
<i>Chaitophorus</i>	sp.			P
<i>Chariesterus</i>	<i>antennator</i>	Euphorbia/Leaf-fotted Bug	C	
<i>Chinavia*</i>	<i>hilaris*</i>	Green Stink Bug	C	C
<i>Clastoptera</i>	<i>xanthocephala</i>	Sunflower Spittlebug		P
<i>Colladonus</i>	<i>clitellarius</i>	Saddled Leafhopper		C
<i>Collaria</i>	sp.			P
<i>Corimelaena</i>	sp.			P
<i>Corimelaena*</i>	<i>pulicaria*</i>	Ebony/Negro Bug	C	
<i>Corythucha</i>	<i>juglandis</i>	Walnut Lace/Lace Bug	C	
C.	<i>ciliata</i>	Eastern Sycamore Lace Bug		P
C.	<i>marmorata</i>	Chrysanthemum Lace Bug		P
<i>Cosmopepla</i>	<i>lintneriana*</i>	Twice-stabbed Stink/Stink Bug	C	
<i>Cylapus</i>	<i>tenuicornis</i>			C
<i>Daktulosphaira</i>	<i>vitifoliae</i>	Grape Phylloxera		C
<i>Draeculacephala</i>	<i>robinsoni</i>			P
<i>Drymus</i>	<i>crassus</i>			C
<i>Eratoneura</i>	sp.			P
<i>Euschistus</i>	<i>tristigmus</i>	Dusky Stink Bug		C
E.	<i>variolarius</i>	One-spotted Stink/Stink Bug	C	
<i>Euthochtha</i>	<i>galeator</i>	Helmeted Squash Bug		C
<i>Gerris</i>	sp.			C
G.	<i>marginatus</i>	Water Strider/Water Skater	C	
<i>Graphocephala</i>	<i>versuta</i>	Versute Sharpshooter		C
<i>Grylloprociphilus</i>	<i>imbricator</i>	Beech Blight Aphid		C
<i>Gyponana</i>	sp.			P
<i>Halyomorpha</i>	<i>halys</i>	Brown Marmorated Stink Bug		C
<i>Harmostes</i>	<i>fraterculus</i>			C
H.	<i>reflexulus</i>			C
<i>Helochara</i>	<i>communis</i>	Bog Leafhopper		P
<i>Hormaphis</i>	<i>hamamelidis</i>	Witch-hazel Cone Gall Aphid		C
<i>Jalysus</i>	sp.			P
<i>Jikradia</i>	<i>olitoria</i>	Coppery Leafhopper		P
<i>Lasiomerus</i>	sp.			P
<i>Latalus</i>	<i>sayii</i>			P
<i>Leptoglossus</i>	<i>oppositus</i>			P

Genus	Species	Common Name	72/77 18-22	
<i>Leptopterna*</i>	<i>dolabrata*</i>	Meadow Plant Bug	C	P
<i>Lepyronia</i>	<i>quadrangularis</i>	Diamondback Spittlebug		C
<i>Liburniella</i>	<i>ornata</i>	Ornate Planthopper		C
<i>Limnopus</i>	<i>canaliculatus</i>			C
<i>Lopidea</i>	sp.	scarlet plant bugs		P
<i>Lycorma</i>	<i>delicatula</i>	Spotted Lanternfly		C
<i>Lygaeus</i>	<i>kalmii</i>	Small Milkweed Bug	C	C
<i>Lygaeus</i>	<i>kalmii angustomarginatus</i>	Eastern Small Milkweed Bug		C
<i>Lygus</i>	<i>lineolaris*</i>	N American Tarnished Plant/Tarnished Plant Bug	C	P
<i>Magicicada</i>	sp.	periodical cicadas		C
<i>Megalonotus</i>	<i>sabulicola</i>	Introduced Dirt-colored Seed Bug		P
<i>Melanolestes</i>	<i>picipes</i>			P
<i>Menosoma</i>	<i>cinctum</i>			P
<i>Mezira</i>	spp			P
<i>Microvelia</i>	sp.			P
<i>Mormidea</i>	<i>lugens</i>	Stink Bug	C	C
<i>Murgantia</i>	<i>histrionica</i>	Harlequin Bug		C
<i>Myodocha</i>	<i>serripes</i>	Long-necked Seed Bug		P
<i>Myzocallis</i>	<i>asclepiadis</i>			C
<i>Nabis</i>	<i>ferus</i>	Damsel Bug	C	
<i>N.</i>	sp.			P
<i>Neolygus</i>	sp.			P
<i>Neoplea</i>	<i>striola</i>			C
<i>Neotibicen*</i>	<i>tibicen tibicen*</i>	Common Swamp Cicada/Cicada	C	C
<i>Nepa</i>	<i>apiculata</i>			C
<i>Neurocolpus</i>	<i>nubilus</i>	Clouded Plant Bug		P
<i>Oncometopia</i>	<i>orbona</i>	Broad-headed Sharpshooter		C
<i>Oncopeltus</i>	<i>fasciatus</i>	Large Milkweed Bug		C
<i>Orientus</i>	<i>ishidae</i>	Japanese Leafhopper		P
<i>Ormenoides</i>	<i>venusta</i>			C
<i>Pachypsylla</i>	<i>celtisdismamma</i>	Hackberry Nipplegall Psyllid		C
<i>Paraulacizes</i>	<i>irrorata</i>	Speckled Sharpshooter		C
<i>Philaenus</i>	<i>leucophthalmus</i>	Frog Hopper (Spittle Bug)	C	
<i>P.</i>	<i>spumarius</i>	Meadow spittlebug		P
<i>Phlegyas</i>	<i>abbreviatus</i>			C
<i>Phylloplecta</i>	sp.			P
<i>Phylloxera</i>	<i>caryaemagna</i>			C
<i>Phymata</i>	<i>americana</i>	Jagged Ambush Bug		P
<i>P.</i>	<i>erosa</i>	Jagged Ambush Bug	C	
<i>P.</i>	<i>fasciata</i>			P
<i>Phytocoris</i>	<i>eximius</i>			P
<i>Plagiognathus</i>	<i>politus</i>			P
<i>Planicephalus</i>	sp.			P
<i>Poecilocapsus</i>	<i>lineatus</i>	Four-lined Plant Bug	C	
<i>Prepops</i>	sp.			P
<i>Prociphilus</i>	<i>tessellatus</i>	Woolly Alder Aphid		C
<i>Prosapia</i>	<i>bicincta</i>	Two-lined Spittlebug		P
<i>Pselliopus</i>	<i>cinctus</i>	Ringed Assassin Bug		C
<i>Pseudopachybrachius</i>	<i>basalis</i>			C
<i>Ptochiomera</i>	<i>nodosa</i>			C

Genus	Species	Common Name	72/77	18-22
<i>Ranatra</i>	sp.			C
<i>Reuteroscopus</i>	<i>ornatus</i>	Ornate Plant Bug		C
<i>Rhagovelia</i>	<i>obesa</i>	Ripple Bug/Water Skater	C	C
<i>Rhynchomitra</i>	<i>microrhina</i>			C
<i>Rocconota</i>	<i>annulicornis</i>	Ringed Horn Assassin Bug		C
<i>Scaphytopius</i>	<i>acutus</i>	Sharp-nosed Leafhopper		C
<i>S.</i>	<i>frontalis</i>	Yellow-faced Leafhopper		P
<i>S.</i>	<i>magdalensis</i>	Blueberry Leafhopper		P
<i>Scolops</i>	<i>sulcipes</i>	Partridge Planthopper		C
<i>Sigara</i>	sp.			C
<i>Sinea</i>	<i>spinipes</i>	Spiny Assassin Bug		P
<i>Stenotus</i>	<i>binotatus</i>	Two-spotted Grass/Leaf Bug	C	
<i>Stictocephala</i>	<i>brevitylus</i>			P
<i>Stiretrus</i>	<i>anchorago</i>	Anchor Stink Bug		P
<i>Telamona</i>	<i>excelsa</i>			P
<i>Thelia</i>	<i>bimaculata</i>	Locust Treehopper		C
<i>Thionia</i>	sp.			P
<i>Trepobates</i>	<i>subnitidus</i>			C
<i>Trigonotylus</i>	<i>caelestialium</i>	Rice Leaf Bug		C
<i>Tylozygus</i>	<i>geometricus</i>			C
<i>Uroleucon</i>	sp.			P
<i>Uroleucon*</i>	<i>rudbeckiae</i>	Goldenglow Aphid	C	
<i>Xestocephalus</i>	<i>similis</i>			P
<i>Zelus</i>	<i>luridus</i>	Pale Green Assassin Bug		P
<b>Order Homoptera</b>				
<i>Aphis</i>	<i>asclepiadis</i>	Milkweed Aphid		C
<i>A.</i>	<i>cephalanthi</i>	Button Bush Aphid		C
<i>A.</i>	<i>nerii</i>	Oleander Aphid		C
<i>A.</i>	<i>rumicis</i>	Dock/Bean Aphid		C
<i>A.</i>	<i>vernoniae</i>	Ironweed Aphid		C
<i>Draeculacephala</i>	<i>mollipes</i>	Tenderfoot Leafhopper		C
<i>Enchenopa</i>	<i>binotata complex</i>	Two-marked/Two-spotted Treehopper		C
<i>E.</i>	<i>latipes</i>	Widefooted Treehopper		C
<i>Entylia</i>	<i>carinata*</i>	Keeled Treehopper/Tree Hopper	C	C
<i>Flatormenis*</i>	<i>proxima*</i>	Northern Flatid Planthopper/Plant Hopper	C	C
<i>Fullawaya*</i>	<i>terricola</i>	Willow Aphid		C
<i>Graphocephala</i>	<i>coccinea</i>	Red-banded Leafhopper/Leafhopper	C	C
<i>Hadrophallus*</i>	<i>bubalus</i>	Buffalo Treehopper		C
<i>Metcalfa*</i>	<i>pruinosa</i>	Citrus Flatid Planthopper/Plant Hopper		C
<i>Paraphlepsius*</i>	<i>strobi*</i>	Lamb's Quarters Leafhopper		C
<i>Psylla</i>	<i>buxi</i>	Box Sucker/Boxwood Psylla		C
<i>Stictocephala*</i>	<i>diceros</i>	Two-horned Treehopper/Treehopper	C	C
<i>Tylozygus*</i>	<i>bifidus*</i>	Leafhopper	C	C
<i>Uroleucon*</i>	<i>ambrosiae</i>	Brown Ambrosia/Ragweed Aphid		C
<i>Uroleucon*</i>	<i>erigeronensis</i>	Large Fleabane Daisy/Fleabane Aphid		C
<b>Order Hymenoptera</b>				
<i>Acordulecera</i>	sp.			P
<i>Agapostemon</i>	<i>sericeus*</i>	Silky Striped Sweat/Mining Bee	C	
<i>A.</i>	<i>virescens</i>	Bicolored Striped Sweat Bee		C
<i>Aglaostigma</i>	<i>semiluteum</i>			P

Genus	Species	Common Name	72/77	18-22
<i>Aleiodes</i>	sp.	common mummy wasps		P
<i>Amphibolips</i>	<i>confluenta</i>	Spongy Oak Apple Gall Wasp		C
A.	<i>quercusinanis</i>	Larger Empty Oak Apple Wasp		C
<i>Ancistrocerus</i>	<i>adiabatus</i>	Bramble Mason Wasp		P
A.	<i>antilope*</i>	Lobed Mason/Potter Wasp	C	
<i>Andrena</i>	spp	mining bees		P
<i>Anomalon</i>	sp.			P
<i>Aphaenogaster</i>	<i>fulva</i>	Tawny Collared Ant		P
<i>Aphidius</i>	<i>polygonaphis</i>	Braconid wasp	C	
<i>Apis</i>	<i>mellifera</i>	Western Honey/Honey Bee	C	C
<i>Astata</i>	<i>unicolor</i>	Astatine Wasp	C	
<i>Augochlora</i>	<i>pura</i>	Pure Green Sweat bee	C	C
<i>Augochlorella</i>	<i>aurata</i>	Golden Sweat Bee		C
<i>Bicyrtes</i>	<i>quadrifasciatus</i>	Four-banded Stink Bug/Sand Wasp	C	
<i>Bombus</i>	<i>affinis</i>	Rusty-patched Bumble Bee/Bumble Bee	C	
B.	<i>bimaculatus</i>	Two-spotted Bumble Bee/Bumble Bee	C	
B.	<i>griseocollis</i>	Brown-belted Bumble Bee		C
B.	<i>impatiens</i>	Common Eastern Bumble Bee/Bumble Bee	C	C
B.	<i>pensylvanicus</i>	American Bumble Bee/Bumble Bee	C	
B.	<i>perplexus</i>	Perplexing Bumble Bee/Bumble Bee	C	C
B.	<i>vagans</i>	Half-black Bumble Bee/Bumble Bee	C	
<i>Camponotus</i>	<i>chromaiodes</i>	Ferruginous Carpenter Ant		C
C.	<i>pennsylvanicus*</i>	Eastern Black Carpenter Ant/Carpenter Ant	C	C
C.	<i>subbarbatus</i>	Bearded Carpenter Ant		C
<i>Ceratina</i>	sp.			P
<i>Cerceris</i>	<i>insolita</i>			C
<i>Chalybion</i>	<i>californicum</i>	Common Blue Mud-dauber Wasp/Mud-dauber	C	
<i>Crematogaster</i>	<i>cerasi</i>	Cherry Ant		P
<i>Cryptanura</i>	<i>spinaria</i>			P
<i>Dasymutilla</i>	<i>scaevola</i>			C
<i>Dolichovespula*</i>	<i>arenaria*</i>	Common Aerial Yellowjacket/Yellow Jacket	C	
<i>Dolichovespula</i>	<i>maculata</i>	Bald-faced Hornet		C
<i>Ectemnius</i>	<i>continuus</i>	Common Ectemnius		P
<i>Enicospilus</i>	sp.			P
<i>Eumenes</i>	<i>fraternus</i>	Fraternal Potter Wasp		C
<i>Formica</i>	<i>fusca complex</i>	Fusca-group Field Ant		P
F.	<i>incerta</i>	Uncertain Field Ant		P
F.	<i>pallidefulva</i>	Pale Field Ant		C
F.	<i>pallidefulva complex</i>	Pallidefulva-group Field Ant		P
F.	<i>subaenescens*</i>	Silky Ant	C	
<i>Halictus</i>	<i>ligatus</i>	Ligated Furrow Bee/Sweat Bee	C	
H.	<i>rubicundus</i>	Orange-legged Furrow Bee/Sweat Bee	C	
H.	sp.	furrow bees		P
<i>Hylaeus</i>	sp.	masked bees		P
<i>Ichneumon</i>	<i>centrator</i>			C
<i>Lasioglossum</i>	sp.			P
<i>Lasius</i>	<i>americanus</i>	Woodland Fuzzy Ant		P
L.	<i>aphidicola</i>	Shaded Fuzzy Ant		P
L.	<i>niger</i>	Black Garden Ant/Cornfield Ant	C	
<i>Leptothorax</i>	sp.	ant		C

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<i>Macrocentrus</i>	sp.			P
<i>Macroteleia</i>	spp			P
<i>Megachile</i>	<i>latimanus</i>	Broad-handed Leafcutter/Leafcutter Bee	C	
<i>M.</i>	<i>montivaga</i>	Silver-tailed Petalcutter/Leafcutter Bee	C	
<i>M.</i>	sp.			P
<i>M.</i>	<i>texana</i>	Texas Leafcutter/Leafcutter Bee	C	
<i>Megarhyssa</i>	<i>macrurus</i>	Long-tailed Giant Ichneumonid Wasp		C
<i>Metallus</i>	<i>lanceolatus</i>			C
<i>M.</i>	<i>rohweri</i>			C
<i>Myzinum</i>	<i>quinquecinctum</i> *	Five-banded Thynnid/Tiphiid Wasp	C	
<i>Nefusa</i>	<i>ambigua</i>	Violet Leafmining Sawfly		C
<i>Neodiprion</i>	<i>sertifer</i>	European Pine Sawfly	C	
<i>Nomada</i>	sp.	nomad bees		P
<i>Nylanderia</i>	<i>flavipes</i>	Yellow-footed Ant		C
<i>Ophion</i>	sp.			P
<i>Oxybelus</i>	<i>uniglumis</i> *	Square-headed/Digger Wasp	C	
<i>Pemphredon</i>	sp.	aphid wasps	C	P
<i>Philonix</i>	<i>fulvicollis</i>			P
<i>Phylloteras</i>	<i>poculum</i>			C
<i>Pimpla</i>	sp.			P
<i>Polistes</i>	<i>annularis</i>	Ringed/Banded Paper Wasp	C	
<i>P.</i>	<i>dorsalis</i> *	Least/Hunter's Paper Wasp	C	
<i>P.</i>	<i>fuscatus</i>	Imposter Paper/Paper Wasp	C	C
<i>P.</i>	<i>metricus</i>	Metric Paper Wasp		C
<i>Ponera</i>	<i>pennsylvanica</i>			P
<i>Prenolepis</i>	<i>imparis</i>	American Winter Ant		C
<i>Sceliphron</i>	<i>caementarium</i>	Yellow-legged/Black and Yellow Mud-dauber Wasp	C	
<i>Scolia</i>	<i>bicincta</i>	Double-banded Scoliid Wasp		C
<i>S.</i>	<i>dubia</i>	Blue-winged Scoliid/Scoliid Wasp	C	C
<i>S.</i>	<i>dubia dubia</i>	Two-spotted Scoliid Wasp		C
<i>S.</i>	<i>nobilitata</i>	Noble Scoliid/Scoliid Wasp	C	
<i>Sphecius</i>	<i>speciosus</i>	Eastern Cicada-killer Wasp		C
<i>Sphex</i> *	<i>ichneumoneus</i>	Great Golden Digger	C	
<i>Stigmatomma</i>	<i>pallipes</i>	Vampire Ant		C
<i>Tapinoma</i>	<i>sessile</i>	Odorous House Ant		C
<i>Taxonus</i>	<i>pallipes</i>			P
<i>Temnothorax</i>	<i>curvispinosus</i>	Bent-spined Acorn Ant		C
<i>Tersilochus</i>	<i>conotracheli</i>	Ichneumon Wasp	C	
<i>Tethida</i>	<i>barda</i>			C
<i>Tiphia</i>	sp.			P
<i>Tremex</i>	<i>columba</i>	Pigeon Horntail	C	
<i>Trichogramma</i>	sp.			P





Genus	Species	Common Name	72/77	18-22
<i>Trypoxylon</i>	<i>albitarse*</i>	Organ-pipe Mud-dauber	C	
<i>T.</i>	<i>politum</i>	Organ-pipe Mud-dauber Wasp		C
<i>Vespa</i>	<i>crabro</i>	European Hornet, nn		C
<i>Vespula</i>	<i>maculifrons</i>	Eastern Yellowjacket/Yellow Jacket	C	C
<i>V.</i>	<i>squamosa</i>	Southern Yellowjacket		C
<i>Xylocopa</i>	<i>virginica</i>	Eastern Carpenter/Carpenter Bee	C	C
<b>Order Lepidoptera</b>				
<i>Abrenthia</i>	<i>cuprea</i>			P
<i>Acharia</i>	<i>stimulea</i>	Saddleback Caterpillar Moth		C
<i>Acleris</i>	<i>flavivittana</i>	Multiform Leafroller Moth		C
<i>Acrolophus</i>	sp.	grass tubeworm moths		P
<i>Acronicta</i>	<i>hasta</i>	Cherry Dagger		C
<i>A.</i>	<i>lobeliae</i>	Greater Oak Dagger		C
<i>Acronicta*</i>	<i>americana</i>	American Dagger Moth	C	C
<i>Actias</i>	<i>luna</i>	Luna Moth	C	
<i>Agriphila</i>	<i>uricolellus</i>	Lesser Vagabond Sod Webworm Moth		C
<i>A.</i>	<i>vulgivagellus</i>	Vagabond Sod Webworm Moth		C
<i>Agrotis</i>	sp.			P
<i>Alsophila</i>	<i>pometaria</i>	Fall Cankerworm Moth		P
<i>Alypia</i>	<i>octomaculata</i>	Eight-spotted Forester Moth		C
<i>Amphipyra</i>	<i>pyramidoides</i>	Copper Underwing	C	
<i>Anavitrinella</i>	<i>pampinaria</i>	Common Gray		P
<i>Ancyloxypha*</i>	<i>numitor</i>	Least Skipper	C	C
<i>Antaeotricha</i>	<i>schlaegeri</i>	Schlaeger's Fruitworm Moth		P
<i>Apantesis</i>	<i>arge</i>	Arge Moth		C
<i>Apatelodes</i>	<i>torrefacta</i>	Spotted Apatelodes Moth		C
<i>Aphomia</i>	<i>sociella</i>	Bee Moth		P
<i>Apoda</i>	<i>biguttata</i>	Shagreened Slug Moth		C
<i>Archips</i>	sp.			P
<i>Argyrotaenia</i>	<i>velutinana</i>	Red-banded Leafroller Moth		C
<i>Artace</i>	<i>cribrarius</i>	Dot-lined White		C
<i>Atalopedes</i>	<i>campestris</i>	Sachem		C
<i>Automeris</i>	<i>io</i>	Io Moth		C
<i>Blastobasis</i>	<i>glandulella</i>	Acorn Moth		P
<i>Boloria</i>	<i>bellona</i>	Meadow Fritillary		C
<i>B.</i>	<i>bellona toddi*</i>	Todd's Meadow/Meadow Fritillary	C	
<i>Cabera*</i>	<i>variolaria</i>	Vestal Moth/Geometer	C	
<i>Caenurgina*</i>	<i>crassiuscula</i>	Clover Looper/Owlet Moth	C	P
<i>Calledapteryx</i>	<i>dryopterata</i>	Brown Scoopwing		P
<i>Callosamia</i>	<i>angulifera</i>	Tulip-tree Silkmoth		C
<i>Calycopis</i>	<i>cecrops</i>	Red-banded Hairstreak		C
<i>Cameraria</i>	<i>caryaefoliella</i>	Pecan Leafminer Moth		C
<i>C.</i>	<i>guttifinitella</i>	Poison Ivy Leaf-miner Moth		C
<i>Campaea</i>	<i>perlata</i>	Pale Beauty		P
<i>Catocala</i>	<i>cara</i>	Darling Underwing	C	
<i>C.</i>	<i>grynea</i>	Woody Underwing		P
<i>C.</i>	<i>ilia</i>	Ilia Underwing		C
<i>C.</i>	<i>maestosa</i>	Sad Underwing		C
<i>C.</i>	<i>piatrix</i>	Penitent Underwing		C
<i>C.</i>	<i>residua</i>	Residua Underwing		P

Genus	Species	Common Name	72/77	18-22
<i>C.</i>	<i>ultronia</i>	Ultronia Underwing		C
<i>Cecrita</i>	<i>guttivitta</i>	Saddled Prominent		C
<i>Celastrina</i>	<i>neglecta</i>	Summer Azure		C
<i>Cenopsis</i>	sp.			P
<i>Ceratonia</i>	<i>amyntor</i>	Elm Sphinx		C
<i>Chloridea</i>	<i>virescens</i>	Tobacco Budworm Moth		P
<i>Chlorochlamys</i>	<i>chloroleucaria</i>	Blackberry Looper Moth		P
<i>Choristoneura</i>	<i>parallela</i>	Parallel-banded Leafroller Moth		P
<i>Chrysaster</i>	<i>ostensackenella</i>			P
<i>Chytolita</i>	sp.			P
<i>Cisseps</i>	<i>fulvicollis</i>	Yellow-collared Scape Moth		C
<i>Citheronia</i>	<i>regalis</i>	Regal Moth		C
<i>Clemensia</i>	<i>albata</i>	Little White Lichen Moth		P
<i>Clepsis</i>	sp.			P
<i>Cochylichroa</i>	<i>hoffmanana</i>	Hoffman's Cochyliid Moth		P
<i>Coleophora</i>	sp.	Casebearers		P
<i>Colias</i>	<i>eurytheme</i>	Orange Sulphur/Alfalfa Butterfly	C	
<i>C.</i>	<i>philodice</i>	Clouded/Common Sulphur	C	C
<i>Condica</i>	<i>vecors</i>	Dusky Groundling		P
<i>C.</i>	<i>videns</i>	White-dotted Groundling		P
<i>Condylolomia</i>	<i>participialis</i>	Drab Condylolomia Moth		P
<i>Coryphista</i>	<i>meadii</i>	Barberry Geometer Moth		P
<i>Costaconvexa</i>	<i>centrostrigaria</i>	Bent-lined Carpet		C
<i>Crambus</i>	sp.	grass veneers/close-wings	C	
<i>C.</i>	<i>agitatellus</i>	Double-banded Grass-veneer		C
<i>Cremastobombycia</i>	sp.			P
<i>Crocidophora</i>	<i>serratissimalis</i>	Saw-toothed Crocidophora Moth		P
<i>Ctenucha</i>	<i>virginica</i>	Virginia Ctenucha Moth	C	
<i>Cupido*</i>	<i>comyntas</i>	Eastern Tailed Blue	C	C
<i>Cycnia</i>	<i>tenera</i>	Delicate Cycnia Moth		C
<i>Danaus</i>	<i>plexippus</i>	Monarch	C	C
<i>Darapsa</i>	<i>myron</i>	Virginia Creeper Sphinx		C
<i>Datana</i>	<i>integerrima</i>	Walnut Caterpillar Moth	C	C
<i>D.</i>	<i>ministra</i>	Yellow-necked Caterpillar Moth		C
<i>D.</i>	<i>perspicua</i>	Spotted Datana Moth		P
<i>Desmia</i>	<i>funeralis</i>	Grape Leafroller Moth		P
<i>Dichrorampha</i>	<i>leopardana</i>			P
<i>Drepana</i>	<i>arcuata</i>	Arched Hooktip Moth		C
<i>Dyspteris</i>	<i>abortivaria</i>	Bad-wing Moth		C
<i>Elachista</i>	<i>illectella</i>			P
<i>E.</i>	<i>madarella</i>			P
<i>Elophila</i>	sp.			P
<i>Endothenia</i>	sp.			P
<i>Epargyreus</i>	<i>clarus</i>	Silver-spotted Skipper	C	C
<i>Epicallima</i>	<i>argenticinctella</i>	Orange-headed Epicallima Moth		C
<i>Epimecis</i>	<i>hortaria</i>	Tulip-tree Beauty		C
<i>Epirrhoe</i>	<i>alternata</i>	White-banded Toothed Carpet		P
<i>Erynnis</i>	<i>baptisiae</i>	Wild Indigo Duskywing		P
<i>E.</i>	<i>horatius</i>	Horace's Duskywing		C
<i>Eubaphe</i>	<i>mendica</i>	Beggar Moth		C

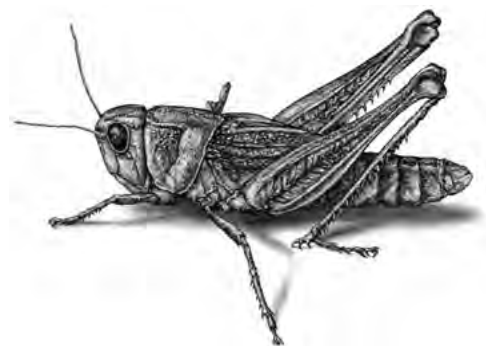
Genus	Species	Common Name	72/77 18-22	
<i>Euchaetes</i>	<i>egle</i>	Milkweed Tussock/Milkweed Tiger Moth	C	C
<i>Eucopina</i>	<i>tocullionana</i>	White Pine Coneborer Moth		P
<i>Eucosma</i>	sp.			P
<i>Eudonia</i>	sp.			P
<i>Eulithis</i>	<i>diversilineata complex</i>	Grapevine Looper Moth		P
<i>Eulogia</i>	<i>ochrifrontella</i>	Broad-banded Eulogia Moth		C
<i>Euphydryas</i>	<i>phaeton</i>	Baltimore Checkerspot	C	
<i>Eupithecia</i>	<i>miserulata</i>	Common Eupithecia Moth		P
<i>Eupsilia</i>	sp.			P
<i>Eusarca</i>	<i>confusaria</i>	Confused Eusarca Moth		C
<i>Euzophera</i>	<i>ostricolorella</i>	Root Collar Borer Moth		C
<i>Fascista</i>	sp.			P
<i>Feltia</i>	<i>jaculifera</i>	Dingy Cutworm Moth		P
<i>F.</i>	<i>subgothica</i>	Subgothic Dart/Owlet Moth	C	
<i>Fulgoraecia</i>	<i>exigua</i>	Planthopper Parasite Moth		P
<i>Galgula</i>	<i>partita</i>	Wedgling Moth		C
<i>Geina</i>	<i>periscelidactylus</i>	Grape Plume Moth		P
<i>Gillmeria*</i>	<i>pallidactyla*</i>	Yarrow Plume/Plume Moth	C	
<i>Glaucolepis</i>	<i>saccharella</i>			P
<i>Gluphisia</i>	<i>septentrionis</i>	Common Gluphisia Moth		P
<i>Gnorimoschema</i>	<i>gallaesolidaginis</i>	Goldenrod Elliptical-Gall Moth		C
<i>Gracillaria</i>	<i>syringella</i>	Lilac Leafminer Moth		C
<i>Haematopis</i>	<i>grataria</i>	Chickweed Geometer Moth		C
<i>Halysidota</i>	<i>tessellaris</i>	Banded Tussock Moth		C
<i>Haploa</i>	sp.			P
<i>Harrisina</i>	<i>americana</i>	Grapeleaf/Grapevine Skeletonizer Moth	C	C
<i>Helcystogramma</i>	<i>hystricella</i>	Lanceolate Moth		C
<i>Helicoverpa*</i>	<i>zea</i>	Corn Earworm Moth	C	
<i>Hellinsia</i>	sp.			P
<i>Hemaris</i>	<i>diffinis</i>	Snowberry Clearwing		C
<i>H.</i>	<i>thysbe</i>	Hummingbird Clearwing/Hummingbird Moth	C	C
<i>Herpetogramma</i>	<i>aeglealis</i>	Serpentine Webworm Moth		P
<i>Heterophleps</i>	<i>triguttaria</i>	Three-spotted Fillip		P
<i>Homosetia</i>	<i>costisignella</i>			P
<i>H.</i>	<i>fasciella</i>			P
<i>Horisme*</i>	<i>intestinata</i>	Brown Bark Carpet Moth/Geometer	C	
<i>Hyalophora</i>	<i>cecropia</i>	Cecropia Moth		C
<i>Hypagyrtis</i>	sp.			P
<i>Hypena</i>	<i>deceptalis</i>	Deceptive Snout		P
<i>H.</i>	<i>madefactalis</i>	Gray-edged Snout		P
<i>H.</i>	<i>manalis</i>	Flowing-line Snout		C
<i>H.</i>	<i>scabra</i>	Green Cloverworm Moth		C
<i>Hypercompe</i>	<i>scribonia</i>	Giant Leopard Moth		C
<i>Hyperstrotia</i>	sp.	graylet moths		P
<i>Hyphantria</i>	<i>cunea</i>	Fall Webworm Moth		P
<i>Idia</i>	<i>aemula</i>	Common Idia Moth		C
<i>I.</i>	<i>lubricalis</i>	Glossy Black Idia Moth		C
<i>I.</i>	<i>scobialis</i>	Smoky Idia Moth		C
<i>Illexia</i>	<i>intractata</i>	Black-dotted Ruddy Moth		C
<i>Iridopsis</i>	<i>larvaria</i>	Bent-line Gray		P

Genus	Species	Common Name	72/77	18-22
<i>Isa</i>	<i>textula</i>	Crowned Slug Moth		C
<i>Junonia</i>	<i>coenia</i>	Common Buckeye		C
<i>Lacinipolia</i>	<i>explicata</i>	Explicit Arches		C
<i>L.</i>	<i>implicata</i>	Implicit Arches		C
<i>L.</i>	<i>renigera</i>	Bristly Cutworm Moth		C
<i>Lascoria</i>	<i>ambigualis</i>	Ambiguous Moth		P
<i>Lethe</i>	<i>appalachia</i>	Appalachian Brown		C
<i>Leucania</i>	sp.			P
<i>Leucoma*</i>	<i>salicis</i>	White Satin/Satin Moth	C	
<i>Leuconycta</i>	<i>diptheroides</i>	Green Leuconycta Moth		P
<i>Limenitis</i>	<i>a arthemis × F astyanax</i>	White Admiral × Red-spotted Purple		P
<i>L.</i>	<i>arthemis astyanax</i>	Red-spotted Purple		C
<i>Lithacodia</i>	<i>musta</i>	Small Mossy Glyph		C
<i>Lomographa</i>	<i>vestaliata</i>	White Spring Moth		P
<i>Lon*</i>	<i>zabulon</i>	Zabulon Skipper	C	C
<i>Lophocampa</i>	<i>caryae</i>	Hickory Tussock Moth		C
<i>Lycaena</i>	<i>phlaeas hypophlaeas*</i>	American Copper	C	
<i>Lymantria*</i>	<i>dispar</i>	Spongy Moth/Gypsy Moth, nn	C	
<i>Macaria</i>	<i>fissinotata</i>	Hemlock Angle		P
<i>M.</i>	<i>pustularia</i>	Lesser Maple Spanworm Moth		C
<i>Macrosaccus</i>	<i>robiniella</i>	Black Locust Leafminer		C
<i>Malacosoma</i>	<i>americana</i>	Eastern Tent/Tent Caterpillar Moth	C	C
<i>Manduca</i>	<i>sexta</i>	Carolina Sphinx		C
<i>Marimatha</i>	<i>nigrofimbria</i>	Black-bordered Lemon Moth		P
<i>Megisto*</i>	<i>cymela</i>	Little Wood Satyr	C	
<i>Melanolophia</i>	<i>canadaria</i>	Canadian Melanolophia Moth		P
<i>Metalectra</i>	<i>discalis</i>	Common Fungus Moth		C
<i>Metarranthis</i>	sp.	geometer moths		C
<i>Microcrambus</i>	<i>elegans</i>	Elegant Grass-veneer		C
<i>Mocis</i>	<i>texana</i>	Texas Mocis Moth		P
<i>Mompha</i>	<i>argentimaculella</i>			C
<i>Monopis</i>	sp.			P
<i>Mythimna*</i>	<i>unipuncta</i>	Army Worm moth	C	
<i>Nadata</i>	<i>gibbosa</i>	White-dotted Prominent		C
<i>Neurobathra</i>	sp.			P
<i>Noctua</i>	sp.	yellow underwings		P
<i>Nomophila</i>	<i>nearctica</i>	Lucerne Moth		P
<i>Oneida</i>	sp.			P
<i>Orgyia*</i>	<i>leucostigma</i>	White-marked Tussock Moth	C	
<i>Orthonama</i>	<i>obstipata</i>	Gem Moth		C
<i>Palpita</i>	sp.			P
<i>Palthis</i>	<i>angulalis</i>	Dark-spotted Palthis Moth		C
<i>P.</i>	<i>asopialis</i>	Faint-spotted Palthis Moth		C
<i>Pandemis</i>	<i>lamprosana</i>	Woodgrain Leafroller Moth		P
<i>P.</i>	<i>limitata</i>	Three-lined Leafroller Moth		C
<i>Panopoda</i>	<i>carneicosta</i>	Brown Panopoda Moth		C
<i>P.</i>	<i>rufimargo</i>	Red-lined Panopoda Moth		C
<i>Paonias</i>	<i>myops</i>	Small-eyed Sphinx		C
<i>Papaipema</i>	sp.			P
<i>Papilio</i>	<i>glaucus</i>	Eastern Tiger/Tiger Swallowtail	C	C

Genus	Species	Common Name	72/77	18-22
<i>P.</i>	<i>polyxenes</i>	Black/Eastern Swallowtail	C	C
<i>P.</i>	<i>troilus</i>	Spicebush Swallowtail	C	C
<i>Parallelia</i>	<i>bistriaris</i>	Maple Looper Moth		C
<i>Parasa</i>	<i>chloris</i>	Smaller Parasa Moth		C
<i>Parectopa</i>	<i>plantaginisella</i>			C
<i>P.</i>	<i>robiniella</i>	Locust Digitate Leafminer Moth		C
<i>Pasiphila</i>	<i>rectangulata</i>	Green Pug		P
<i>Patalene</i>	<i>olyzonaria</i>	Juniper Geometer Moth		C
<i>Perispasta</i>	<i>caeculalis</i>	Titian Peale's Moth		C
<i>Petrophila</i>	<i>fulicalis</i>	Feather-edged Petrophila		P
<i>Phaenasiophora</i>	<i>confixana</i>	Macrame Moth		C
<i>P.</i>	<i>pyramusalis</i>	Dark-banded Owlet		C
<i>Phobetron</i>	<i>pithecium</i>	Hag Moth	C	
<i>Pholisora</i>	<i>catullus</i>	Common Sooty Wing	C	
<i>Phyciodes</i>	<i>tharos</i>	Pearl Crescent	C	C
<i>Phyllocnistis</i>	<i>liriodendronella</i>	Tulip Tree Leaf Miner		C
<i>P.</i>	<i>vitegenella</i>			P
<i>P.</i>	<i>vitifoliella</i>			C
<i>Pieris</i>	<i>rapae</i>	Cabbage White/European Cabbage Butterfly	C	C
<i>Pigritia</i>	sp.			P
<i>Plagodis</i>	<i>alcoolaria</i>	Hollow-spotted Plagodis Moth		C
<i>Platynota</i>	<i>idaeusalis</i>	Tufted Apple Bud Moth		P
<i>Pleuroprucha</i>	<i>insulsaria</i>	Common Tan Wave		P
<i>Pococera</i>	sp.			P
<i>Polites</i>	<i>peckius</i>	Peck's Skipper	C	C
<i>P.</i>	<i>themistocles</i>	Tawny-edged Skipper	C	
<i>P.</i>	<i>vibex</i>	Whirlabout	C	
<i>Polygonia</i>	<i>interrogationis</i>	Question Mark Butterfly	C	
<i>Pristerognatha</i>	<i>agilana</i>			P
<i>Prochoerodes</i>	<i>lineola</i>	Large Maple Spanworm Moth		C
<i>P.</i>	<i>badia</i>	Skiff Moth		C
<i>Protodeltote</i>	<i>muscosula</i>	Large Mossy Glyph		C
<i>Pseudeustrotia</i>	<i>carneola</i>	Pink-barred Pseudeustrotia Moth		C
<i>Psilocorsis</i>	sp.			P
<i>Pyrrharctia</i>	<i>isabella</i>	Isabella Tiger Moth		C
<i>Redectis</i>	<i>vitrea</i>	White-spotted Redectis Moth		P
<i>Renia</i>	<i>adspergillus</i>	Speckled Renia Moth		P
<i>R.</i>	<i>salusalis</i>	Dotted Renia Moth		P
<i>Rheumaptera</i>	<i>meadii</i>	Barberry Geometer Moth		P
<i>Rivula</i>	<i>propinqualis</i>	Spotted Grass Moth		C
<i>Scolecocampa</i>	<i>liburna</i>	Deadwood Borer Moth		C
<i>Scoparia</i>	sp.			P
<i>Scopula</i>	<i>limboundata</i>	Large Lace-border Moth		C
<i>Sitochroa</i>	<i>palealis</i>	Carrot Seed Moth		P
<i>Speyeria</i>	<i>cybele</i>	Great Spangled Fritillary	C	
<i>Speyeria</i>	<i>idalia</i>	Regal Fritillary	C	
<i>Spodoptera</i>	<i>ornithogalli</i>	Yellow-striped Armyworm Moth		C
<i>Spragueia</i>	<i>onagrus</i>	Black-dotted Spragueia/Owlet Moth	C	
<i>Stigmella</i>	<i>rhoifoliella</i>			C
<i>S.</i>	<i>rosaefoliella</i>			C

Genus	Species	Common Name	72/77	18-22
<i>Stigmella*</i>	<i>villosella</i>	Blackberry Miner	C	
<i>Strymon</i>	<i>melinus</i>	Gray Hairstreak		C
<i>Synchlora</i>	<i>aerata</i>	Wavy-lined Emerald		P
<i>Thyridopteryx</i>	<i>ephemeraeformis</i>	Evergreen Bagworm/Bagworm Moth	C	
<i>Thyris</i>	<i>maculata</i>	Spotted Thyris Moth	C	
<i>Timandra</i>	<i>amaturaria</i>	Cross-lined Wave		C
<i>Tischeria</i>	<i>citrinipennella</i>	Beech Miner	C	
<i>Tosale</i>	<i>oviplagalis</i>	Dimorphic Tosale Moth		P
<i>Trichoplusia</i>	<i>ni</i>	Cabbage Looper Moth		P
<i>Udea</i>	<i>rubigalis</i>	Celery Leaf-tier Moth		C
<i>Vanessa</i>	<i>atalanta</i>	Red Admiral	C	
V.	<i>cardui</i>	Painted Lady	C	C
<i>Vernia</i>	<i>verna</i>	Little Glassywing		C
<i>Xanthorhoe</i>	<i>lacustrata</i>	Toothed Brown Carpet		P
<i>Xanthotype*</i>	<i>sospeta</i>	Crocus Geometer	C	
<i>Xestia</i>	<i>c-nigrum complex</i>	Black-letter Dart		P
X.	<i>dolosa</i>	Greater Black-letter Dart		P
<i>Zale</i>	<i>galbanata</i>	Maple Zale Moth		P
Z.	<i>horrida</i>	Horrid Zale Moth		C
Z.	<i>lunata</i>	Lunate Zale Moth		P
<i>Zanclognatha</i>	<i>cruralis</i>	Early Fan-foot		P
Z.	<i>pedipilalis</i>	Grayish Fan-foot		C
<b>Order Odonata</b>				
<i>Anax</i>	<i>junius</i>	Common Green Darner/Green Darner	C	C
<i>Argia</i>	<i>fumipennis</i>	Variable Dancer		C
A.	<i>fumipennis violacea*</i>	Violet Dancer	C	
A.	<i>moesta*</i>	Powdered Dancer/Damselfly	C	
<i>Arigomphus</i>	<i>villosipes</i>	Unicorn Clubtail		C
<i>Calopteryx</i>	<i>maculata</i>	Ebony Jewelwing/Black-winged Damselfly	C	C
<i>Celithemis</i>	<i>elisa</i>	Calico Pennant/Skimmer	C	
<i>Enallagma</i>	<i>aspersum</i>	Azure Bluet		C
E.	<i>civile</i>	Familiar/Civil Bluet	C	
E.	<i>durum</i>	Big Bluet/Damselfly	C	
E.	<i>geminatum</i>	Skimming Bluet		C
E.	<i>signatum</i>	Orange Bluet/Damselfly	C	C
E.	<i>traviatum</i>	Slender Bluet		C
<i>Epiaeschna</i>	<i>heros</i>	Swamp Darner		P
<i>Epithea</i>	<i>cynosura</i>	Common Baskettail		P
E.	<i>princeps</i>	Prince Baskettail		C
<i>Erythemis</i>	<i>simplicicollis</i>	Eastern Pondhawk/Green Jacket	C	C
<i>Ischnura</i>	<i>verticalis</i>	Eastern/Common Forktail	C	C
<i>Ischnura*</i>	<i>posita</i>	Fragile Forktail/Damselfly	C	C
<i>Lestes</i>	<i>rectangularis</i>	Slender Spreadwing		C
<i>Libellula</i>	<i>incesta</i>	Slaty Skimmer		C
L.	<i>luctuosa</i>	Widow Skimmer/The Widow	C	C
L.	<i>pulchella</i>	Twelve-spotted/Tenspot Skimmer	C	C
L.	<i>semifasciata</i>	Painted Skimmer		C
L.	<i>vibrans</i>	Great Blue Skimmer		C
<i>Nannothemis</i>	<i>bella</i>	Elfin Skimmer/The Blue bell	C	
<i>Pachydiplax</i>	<i>longipennis</i>	Blue Dasher		C

Genus	Species	Common Name	72/77 18-22	
<i>Perithemis</i>	<i>tenera</i>	Eastern Amberwing/Amberwing	C	C
<i>Plathemis</i>	<i>lydia</i>	Common Whitetail/White-tail	C	C
<i>Stylogomphus</i>	<i>albistylus</i>	Eastern Least Clubtail		C
<i>Sympetrum</i>	sp.	meadowhawks		P
S.	<i>internum</i>	Cherry-faced Meadowhawk/Red Topper	C	
S.	<i>semicinctorum</i>	Band-winged Meadowhawk/Red Topper	C	
<i>Tramea</i>	<i>lacerata</i>	Black Saddlebags/Skimmer	C	C
<b>Order Orthoptera</b>				
<i>Allonemobius*</i>	<i>fasciatus</i>	Striped Ground Cricket	C	P
<i>Allonemobius*</i>	<i>maculatus</i>	Larger Spotted Ground Cricket	C	
<i>Amblycorypha</i>	sp.	round-headed katydids		P
A.	<i>oblongifolia</i>	Oblong-winged Katydid	C	
<i>Anaxipha</i>	<i>exigua</i>	Say's Trig		C
<i>Camptonotus</i>	<i>carolinensis</i>	Carolina Leafroller Cricket	C	
<i>Ceuthophilus</i>	sp.			P
C.	<i>uhleri</i>	Uhler's Camel Cricket	C	
<i>Chloealtis</i>	<i>conspersa</i>	Sprinkled Locust	C	
<i>Chortophaga</i>	<i>viridifasciata</i>	Green-striped Grasshopper/N Green-striped Locust	C	
<i>Conocephalus</i>	<i>attenuatus</i>	Long-tailed Meadow Katydid/Lance-t M Grasshopper	C	
C.	<i>brevipennis</i>	Short-winged Meadow Katydid/S-w M Grasshopper	C	C
C.	<i>fasciatus fasciatus</i>	Slender Meadow Katydid/S M Grasshopper	C	
C.	<i>nemoralis</i>	Woodland Meadow Katydid/W M Grasshopper	C	
C.	<i>strictus</i>	Straight-lanced Meadow Katydid/S-l M Grasshopper	C	
<i>Dichromorpha</i>	<i>viridis</i>	Short-winged Green Grasshopper	C	
<i>Diestrammena</i>	<i>japanica</i>	Japanese Camel Cricket		C
<i>Dissosteira</i>	<i>carolina</i>	Carolina Grasshopper/Carolina Grasshopper	C	C
<i>Eunemobius*</i>	<i>carolinus</i>	Carolina Ground Cricket	C	
<i>Gryllus</i>	sp.			P
<i>Gryllus*</i>	<i>pennsylvanicus*</i>	Fall/Pennsylvania Field Cricket	C	
<i>Hapithus</i>	<i>agitator</i>	Restless Bush Cricket		P
H.	<i>saltator</i>	Jumping Bush Cricket		C
<i>Meconema</i>	<i>thalassinum</i>	Drumming Katydid		C
<i>Melanoplus</i>	<i>bivittatus</i>	Two-striped Grasshopper		P
M.	<i>confusus</i>	Pasture Spur-throat Grasshopper/Little Pasture Locust	C	
M.	<i>differentialis</i>	Differential Grasshopper		C
M.	<i>femurrubrum*</i>	Red-legged Grasshopper/Red-legged Locust	C	
M.	<i>gracilis</i>	Graceful Grasshopper/Graceful Narrow-winged Locust	C	
M.	<i>sanguinipes*</i>	Lesser Migratory Grasshopper	C	
M.	<i>scudderi</i>	Scudder's Short-winged Grasshopper/S S-w Locust	C	
M.	<i>viridipes</i>	Green-legged Spur-throat Grasshopper/G-l Locust	C	



Genus	Species	Common Name	72/77	18-22
<i>Microcentrum</i>	sp.	angle-winged katydids		P
<i>Montezumina</i>	<i>modesta</i>	Modest Katydid		P
<i>Myrmecophilus</i>	<i>pergandei</i>	Eastern Ant Cricket		P
<i>Neoconocephalus</i>	<i>bivocatus</i>	False Robust Conehead		C
<i>N.</i>	<i>exiliscanorus</i>	Slightly Musical Conehead	C	
<i>Neocurtilla*</i>	<i>hexadactyla</i>	Northern Mole Cricket/Mole Cricket	C	P
<i>Neoxabea</i>	<i>bipunctata</i>	Two-spotted Tree Cricket		C
<i>Oecanthus</i>	<i>latipennis</i>	Broad-winged Tree Cricket		P
<i>O.</i>	<i>nigricornis</i>	Black-horned Tree Cricket	C	
<i>O.</i>	<i>niveus</i>	Narrow-winged/Snowy Tree Cricket	C	C
<i>O.</i>	<i>quadripunctatus</i>	Four-spotted Tree Cricket	C	
<i>Orchelimum</i>	<i>vulgare</i>	Common Meadow Katydid/C M Grasshopper	C	
<i>Paratettix</i>	<i>cucullatus</i>	Hooded Grouse Locust		P
<i>Phyllopalpus</i>	<i>pulchellus</i>	Red-headed/Handsome Bush Cricket	C	C
<i>Pterophylla</i>	<i>camellifolia</i>	Common/Northern True Katydid	C	
<i>Scudderia</i>	<i>furcata</i>	Fork-tailed Bush Katydid/Fork-tailed katydid	C	
<i>Velarifictorus</i>	<i>micado</i>	Japanese Burrowing Cricket		P
<b>Other Insects</b>				
<b>Order Archaeognatha</b>				
<i>Trigoniophthalmus</i>	<i>alternatus</i>	Cave Bristletail		C
<b>Order Zygentoma*</b>				
<i>Lepisma</i>	<i>saccharina</i>	Common Silverfish		C
<b>Order Ephemeroptera</b>				
<i>Ameletus</i>	<i>lineatus</i>			P
<i>Baetis</i>	sp.	blue-winged olives		P
<i>Epeorus</i>	sp.			P
<i>Eurylophella</i>	sp.	chocolate duns		P
<i>Hexagenia</i>	sp.	giant mayflies		P
<i>Labiobaetis</i>	sp.			P
<i>Maccaffertium</i>	<i>modestum</i>			P
	<i>vicarium</i>			P
<i>Siphonurus</i>	sp.			P
<i>Stenonema</i>	<i>femoratum</i>	Dark Cahill		P
<b>Order Dermaptera</b>				
<i>Forficula</i>	<i>auricularia</i>	European Earwig/Earwig	C	C
<b>Order Plecoptera</b>				
<i>Acroneuria</i>	sp.			P
<i>Allocapnia</i>	sp.			P
<i>Amphinemura</i>	sp.			P
<i>Eccoptura</i>	<i>xanthenes</i>			C
<i>Haploperla</i>	sp.			P
<i>Perlesta</i>	<i>placida</i>	Golden Stones/Stone fly	C	
<i>Podmosta</i>	sp.			P
<i>Soyedina</i>	sp.			P
<b>Order Blattodea</b>				
<i>Parcoblatta</i>	<i>pennsylvanica</i>	Pennsylvania Wood Cockroach		P
<i>Reticulitermes</i>	<i>flavipes</i>	Eastern Subterranean/Common Termite	C	P
<b>Order Mantodea</b>				
<i>Mantis</i>	<i>religiosa</i>	European Mantis		C
<i>Tenodera</i>	<i>sinensis</i>	Chinese Mantis		C



Genus	Species	Common Name	72/77 18-22
<b>Order Psocodea</b>			
<i>Lichenomima</i>	sp.		P
<i>Polypsocus</i>	<i>corruptus</i>	Corrupt Barklouse	P
<b>Order Megaloptera</b>			
<i>Chauliodes</i>	<i>pectinicornis</i>	Summer Fishfly	C
<b>Order Neuroptera</b>			
<i>Brachynemurus</i>	<i>abdominalis</i>	Long-tailed Antlion/Antlion	C
<i>Chrysopa</i>	sp.	lacewings	C
<i>Dicromantispa</i>	<i>sayi</i>	Say's Mantidfly	C
<i>Leucochrysa</i>	<i>pavida</i>	Lichen-carrying Green Lacewing	P
<i>Micromus</i>	sp.		P
<i>Zeugomantispa</i>	<i>minuta</i>	Green Mantidfly	C
<b>Order Thysanoptera</b>			
<i>Aeolothrips</i>	sp.		P
<i>Thrips</i>	sp.		P
<b>Order Trichoptera</b>			
<i>Chimarra</i>	sp.	little black caddisflies	P
<i>Diplectrona</i>	sp.	diplectronan caddisflies	P
<i>Dolophilodes</i>	<i>distinctus</i>		P
<i>Hydropsyche</i>	sp.		P
<i>Limnephilus</i>	sp.		P
<i>Neophylax</i>	sp.	autumn mottled sedges	P
<i>Psilotreta</i>	sp.		P
<i>Pycnopsyche</i>	sp.		P
<i>Rhyacophila</i>	sp.		P
<i>Triaenodes</i>	sp.		P



# Herptiles



Spotted Salamander, JG

Collectively termed “herps” and taught together in Herpetology classes, amphibians and reptiles mostly live very different lives, primarily because of the different types of eggs they lay.

Amphibian eggs need to be laid in water or damp places, and young amphibians (e.g., tadpoles) start their lives in wet or watery environments. Adults of many species occur on land, but because their skin is not waterproof (and, for many, it must remain moist in order for them to be able to breathe across it), they are usually found not far from moisture. All adult amphibians are carnivorous, but there’s not much specialization in their morphology or behavior; they basically eat anything they can see, catch, kill and swallow. Reptile skin is waterproof, and their eggs can be laid on land and so the lives of most of them are not dependent on standing water (as are amphibian lives; this was a huge step in vertebrate evolutionary history!). Most young reptiles hatch out of eggs looking like miniature adults. Most adult reptiles are carnivorous, too; but they tend to specialize regarding prey type (e.g., insects, small mammals, bird eggs) and the adaptations that enable detection, capture and processing thereof.

Amphibians and reptiles are ectothermic (“cold blooded” is an outdated term): they need to absorb heat from sources outside of their bodies (“ecto”) in order to warm up enough to be active. That’s why you’ll see, for example, frogs half-immersed along pond edges and turtles basking in the sun (Their blood can become as warm as ours!). We take advantage of this; some of our best views of them are of individuals seeking to absorb heat energy from their surroundings.



Common Watersnake, MJ

Thermal environmental conditions are also important regarding the sex of offspring for many reptiles (all studied crocodylians, most turtles and some lizards) because the sex of hatchlings is

determined by the temperatures to which eggs are exposed. In general, for most turtles and some lizards, higher temperatures result in greater numbers of female hatchlings; the opposite is true for crocodylians. Sex is determined chromosomally – as in us – in snakes and most lizards.

Both amphibians and reptiles are suffering population declines and species extinctions globally and within the United States because of the combined direct and indirect effects of habitat destruction and loss, introduced species and pathogens, emerging diseases, chemical and plastic pollution, the climate crisis, and the harvest



Red-eared Slider, Painted Turtle, MJ

of individuals from the wild. Many members of the herp community of 1972 still occur at Honey Hollow but four species have likely disappeared for anthropogenic reasons: Northern/Eastern Cricket Frogs were listed as endangered in PA in 2010 after being extirpated from the majority of known locations; Atlantic Coast Leopard Frogs (probably incorrectly identified as Northern Leopard Frogs in 1972) are now endangered in PA; New Jersey Chorus Frogs (separated from Upland Chorus Frog subsequent to 1972) are endangered in PA; and this area is now probably too dry in the summer for Spotted Turtles (a “species of special concern” in PA and listed as endangered by the International Union for Conservation of Nature).

Of 30 species of herps confirmed to be, or identified as “probably” present in 1972, one or more were likely incorrectly identified (the Northern Leopard Frog, as mentioned, and possibly Wood Turtle). Seventeen species were recently confirmed to continue to occur on site via observation of live individuals and one more through discovery of an Eastern Box Turtle carcass. One turtle and four species of snakes were not seen in recent years but could occur on site, and are even likely to be present, because of the existence of appropriate habitat and nearby observations of occurrence: Eastern Musk Turtle, Northern Black Racer, Dekay’s Brownsnake and Northern Ringneck Snake.

The most commonly occurring of the different types of herps at Honey Hollow are probably Eastern Painted Turtles, Eastern Garter Snakes, Eastern Red-backed and Northern Two-lined Salamanders (the latter especially in waterways), and American Toads. But these species are difficult to find! Among the most commonly seen herps during 2018-2022 at Honey Hollow were American Toads, Pickerel Frogs, Eastern Red-backed Salamanders,

## Northern Two-lined Salamanders and Green Frogs.



Pickerel Frog, MJ

The following list includes species confirmed and likely to be present in 1972 and during the years 2018-2022.

**Amphibians and Reptiles.** Asterisk indicates taxonomic change since 1972. Common name: current one/ that from previous years. Occurrence: confirmed (C), probable (P); see Foreward for details. 72/77 refers to the original 1972 inventory and the 1978 2nd edition, while 18-22 refers to the five years during which data were collected for the current inventory.

Genus	Species	Common Name	72/77	18-22
<b>Amphibians (Class Amphibia)</b>				
<b>Frogs and Toads, Order Anura</b>				
<i>Acris</i>	<i>crepitans</i>	Eastern/Northern Cricket Frog	C	
<i>Anaxyrus</i>	<i>americanus</i>	American Toad	C	C
<i>Hyla</i>	<i>versicolor</i>	Gray/Eastern Gray Treefrog	P	C
<i>Lithobates</i>	<i>catesbeianus</i>	American Bullfrog	C	C
<i>L.</i>	<i>clamitans</i>	Green Frog	C	C
<i>L.</i>	<i>palustris</i>	Pickerel Frog	C	C
<i>L.</i>	<i>pipiens</i>	Leopard Frog	C	
<i>L.</i>	<i>sylvaticus*</i>	Wood Frog	P	C
<i>Pseudacris</i>	<i>crucifer</i>	Spring Peeper/Northern Spring Peeper	C	C
<i>P.</i>	<i>feriarum</i>	Upland Chorus Frog	P	
<b>Salamanders, Order Caudata</b>				
<i>Desmognathus</i>	<i>fuscus</i>	Northern Dusky Salamander	C	C
<i>Eurycea</i>	<i>bilineata</i>	Northern Two-lined Salamander	C	C
<i>E.</i>	<i>longicauda</i>	Long-tailed Salamander	C	C
<i>Notophthalmus</i>	<i>viridescens</i>	Red-spotted Newt	P	
<i>Plethodon</i>	<i>cinereus</i>	Eastern Red-backed/Red-backed Salamander	C	C
<i>Pseudotriton</i>	<i>ruber</i>	Northern Red Salamander	C	C
<i>Ambystoma</i>	<i>maculatum</i>	Spotted Salamander		P
<b>Reptiles (Class Reptilia)</b>				
<b>Turtles, Order Testudines</b>				
<i>Chelydra</i>	<i>serpentina</i>	Common Snapping Turtle	C	C
<i>Chrysemys</i>	<i>picta picta</i>	Eastern Painted Turtle	C	C
<i>Clemmys</i>	<i>guttata</i>	Spotted Turtle	C	
<i>Glyptemys</i>	<i>insculpta</i>	Wood Turtle	C	
<i>Sternotherus</i>	<i>odoratus</i>	Eastern Musk Turtle/Musk Turtle	P	P
<i>Terrapene</i>	<i>carolina</i>	Eastern Box Turtle	C	C
<b>Snakes, Order Squamata</b>				
<i>Coluber</i>	<i>constrictor</i>	Northern Black Racer	C	P
<i>Diadophis</i>	<i>punctatus edwardsii</i>	Northern Ringneck Snake	P	P
<i>Lampropeltus</i>	<i>triangulum</i>	Eastern Milksnake	P	C
<i>Nerodia*</i>	<i>sipedon sipedon</i>	Northern Watersnake	C	C
<i>Storeria</i>	<i>dekayi</i>	Dekay's Brownsnake/Northern Brown Snake	P	P
<i>S.</i>	<i>occipitamaculata</i>	Northern Redbelly Snake/N Red-bellied Snake	P	
<i>Thamnophis</i>	<i>saurita</i>	Ribbon/Eastern Ribbon Snake	P	
<i>T.</i>	<i>sirtalis</i>	Eastern Garter Snake	C	C

# Birds



Ruby-throated Hummingbird  
and pea plant, JG

Of all of the life forms that inhabit Honey Hollow, the most watched, studied and loved are probably birds. History, art and religion show us that this enduring relationship spans across all continents and reaches back to early humans. For at least the last half century, people around the globe have been increasingly feeding and cherishing their backyard birds and traveling worldwide to see different species. Bird enthusiasts now number in the millions. Much of this interest and admiration has to do with the essential characteristics that make a bird, a bird.

Birds are warm-blooded vertebrates that lay hard-shelled eggs. Described as nature's most perfect invention, these eggs are often of subtle hues and patterns and laid in intricately constructed nests. Unique to birds, feathers keep them warm and play an important role in the culture of each bird species. Often colorful and specialized, they are a good indication of a bird's health and they are used to attract a mate. But the attribute of birds that has most elicited human awe and envy is flight. This singular characteristic which separates them from most other vertebrates is a biological and technical marvel that provides birds with the ability to escape predators and the freedom to seek out new habitats. Light, strong bones and other structural characteristics make birds the masters of the sky -- a human dream.

In the 1972 inventory of natural resources, Joe Pearson wrote about the abundance of local birdlife in Honey Hollow. He attributed this to the healthy and diverse habitats of the watershed in keeping with the conservation and agricultural planning and practices that had been applied to the site since the 1940s. Pearson noted that the fields, regrowth and hedgerows were healthy and properly maintained for wildlife and agriculture alike. He expressed his deep hope that humans would learn about the importance and fragility

of the balance of nature and recognize the roles they play in damaging it. . . or protecting it. It has become clear that, while precious sites such as Honey Hollow are important to our local quality of life, we must foster conservation efforts beyond our backyards and community.

In the 50 years since Joe Pearson expressed those sentiments, Honey Hollow has been protected and maintained. Its fields, marshlands, ponds and woods currently provide food and water as well as places to feed, rest, hide, attend to feathers, socialize and raise offspring for more than 175 species of birds. Superficially, its habitats remain much the same – diverse and healthy. However, there have been more subtle changes that are certainly affecting the resident and migrant birdlife at the site. Those caretakers who have protected much of the acreage that makes up the watershed have not been able to shut out the creeping impact of climate change and invasive species. They have not been able to protect the site from species declines and other changes happening hundreds or thousands of miles away. In fact, an international group of scientists concluded in 2019 that the number of breeding birds in the United States and Canada had decreased by 2.9 billion individuals since 1970 as described in “Vanishing: More Than One in Four Birds Has Disappeared in the Last Fifty Years” (2019).

These declining species are both our “common” and our rarer species. For example, Red-winged Blackbirds are still numerous, but their numbers have fallen from 260 million to 170 million in North America. Habitats, which have been altered by humans in many ways, including climate change, are no longer able to support birdlife as they once did. National Audubon Society published “Survival by Degrees” (2019), a study indicating that 389 of 604 species of breeding birds in North America will be forced to relocate by climate change and the resulting habitat loss. Alternate appropriate habitat may not exist. Some species will go extinct. Twelve of the species considered “highly vulnerable” by the Audubon report call or have called Honey Hollow home for at least part of the year: Eastern Whip-poor-will, Red-headed Woodpecker, Fish Crow, Wood Thrush, Brown Thrasher, Field Sparrow, Eastern Towhee, Worm-eating Warbler, Cerulean Warbler, Pine Warbler, Yellow-throated Warbler and Scarlet Tanager. An additional 28 species on the Honey Hollow bird list are considered “moderately vulnerable”.

The lists of the birds currently seen or no longer observed at Honey Hollow reflect many stories of change. Fifty years ago, we had Sparrow Hawks and Olive-backed Thrushes,

rather than the American Kestrels and Swainson’s Thrushes of today. The Cackling Goose wasn’t even a named species in 1972. We didn’t fully understand the flycatchers in the genus *Empidonax*. “Gamebirds” like Ruffed Grouse and Ring-necked Pheasant were still nesting in Bucks County, but Wild Turkeys were unheard of in the watershed area. Eastern Meadowlarks and Bobolinks were found regularly at Honey Hollow. Although many of the declines in bird populations are the results human activities, so too are a few additions to the Honey Hollow list: Black Vulture, Pileated Woodpecker, woodpeckers in general, Fish Crow and Common Raven appear to be thriving. Some of these declines, increases and other changes can be attributed to habitat loss and climate change, but there are additional forces at play, including increased scientific understanding and conservation efforts.



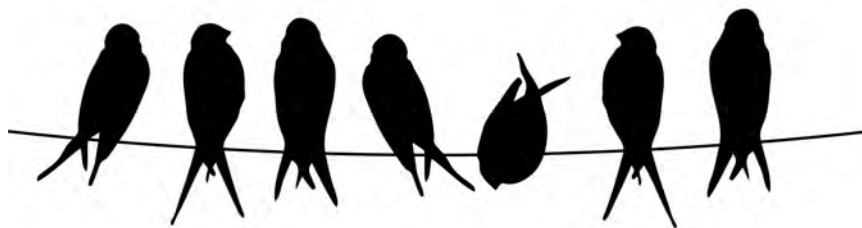
Cooper’s Hawk, MJ

The story of birds at Honey Hollow is long, complicated and ever-changing. Birds species’ presence and absence tells us of the health of ecosystems. The birdlife that visits the watershed produces food for many other species and is rewarded with diverse habitat that remains quite healthy despite a changing climate and invasive species. However, The watershed and its avian inhabitants face many current threats from across the hemisphere and beyond – pressures that must be addressed with thoughtful cooperation and sacrifice if we are to stop or slow population declines and give these beloved species a chance to evolve and adapt to the changes they’re confronting.

**Birds.** Asterisk indicates taxonomic change since 1972. Common name: current one/that from previous years; nn=nonnative. Occurrence: confirmed (C), probable (P); see Foreward for details. 72/77 refers to the original 1972 inventory and the 1978 2nd edition, while 18-22 refers to the five years during which data were collected for the current inventory.

Genus	Species	Common Name	72/77 18-22	
<b>Order Anseriformes (Waterfowl)</b>				
<i>Branta</i>	<i>canadensis</i>	Canada Goose	C	C
<i>Anser</i>	<i>caerulescens</i>	Snow Goose		C
<i>Anas</i>	<i>platyrhynchos</i>	Mallard	C	C
A.	<i>rubripes</i>	American Black Duck/Black Duck	C	

Genus	Species	Common Name	72/77	18-22
<i>Spatula*</i>	<i>discors</i>	Blue-winged Teal	C	
<i>Mareca</i>	<i>americana</i>	American Wigeon		C
<i>Aix</i>	<i>sponsa</i>	Wood Duck	C	C
<i>Aythya</i>	<i>collaris</i>	Ring-necked Duck	C	C
<i>Bucephala</i>	<i>albeola</i>	Bufflehead	C	
<i>Mergus</i>	<i>merganser</i>	Common Merganser/American Merganser	C	
<b>Order Galliformes (Pheasants)</b>				
<i>Colinus</i>	<i>virginianus</i>	Northern Bobwhite/Bobwhite	C	
<i>Bonasa</i>	<i>umbellus</i>	Ruffed Grouse/Eastern Ruffed Grouse	C	
<i>Phasianus</i>	<i>colchicus</i>	Ring-necked Pheasant, nn	C	C
<i>Meleagris</i>	<i>gallopavo</i>	Wild Turkey		C
<b>Order Columbiformes (Pigeons and Doves)</b>				
<i>Columba</i>	<i>livia var. domestica</i>	Feral Pigeon, nn	C	C
<i>Zenaida *</i>	<i>macroura</i>	Mourning Dove	C	C
<b>Order Cuculiformes (Cuckoos)</b>				
<i>Coccyzus</i>	<i>americanus</i>	Yellow-billed Cuckoo	C	C
<i>C.</i>	<i>erythrophthalmus</i>	Black-billed Cuckoo	C	C
<b>Order Caprimulgiformes (Nightjars)</b>				
<i>Antrastomus</i>	<i>vociferus</i>	Eastern Whip-poor-will/Whip-Poor-Will	C	
<i>Chordeiles</i>	<i>minor</i>	Common Nighthawk/Nighthawk	C	C
<b>Order Apodiformes (Swifts and Hummingbirds)</b>				
<i>Chaetura</i>	<i>pelagica</i>	Chimney Swift	C	C
<i>Archilochus</i>	<i>colubris</i>	Ruby-throated Hummingbird	C	C
<b>Order Gruiformes (Marshbirds)</b>				
<i>Fulica</i>	<i>americana</i>	American Coot		C
<b>Order Charadriiformes (Shorebirds)</b>				
<i>Charadrius</i>	<i>vociferus</i>	Killdeer	C	C
<i>Calidris</i>	<i>minutilla</i>	Least Sandpiper		C
<i>Scolopax *</i>	<i>minor</i>	American Woodcock	C	C





Genus	Species	Common Name	72/77	18-22
<i>Gallinago</i>	<i>delicata</i>	Wilson's Snipe		C
<i>Actitis</i>	<i>macularius</i>	Spotted Sandpiper	C	C
<i>Tringa</i>	<i>solitaria</i>	Solitary Sandpiper	C	C
<i>Larus</i>	<i>delawarensis</i>	Ring-billed Gull		C
L.	<i>argentatus</i>	Herring Gull	C	P
<b>Order Suliformes (Cormorants, etc.)</b>				
<i>Phalacrocorax</i>	<i>auritus</i>	Double-crested Cormorant		C
<b>Order Pelecaniformes (Herons and Egrets)</b>				
<i>Ardea</i>	<i>herodias</i>	Great Blue Heron	C	C
A.	<i>alba</i>	Great Egret		C
<i>Butorides</i>	<i>virescens</i>	Green Heron	C	C
<i>Botaurus</i>	<i>lentiginosus</i>	American Bittern	C	
<b>Order Accipitriformes (Vultures and Raptors)</b>				
<i>Coragyps</i>	<i>atratus</i>	Black Vulture		C
<i>Cathartes</i>	<i>aura</i>	Turkey Vulture	C	C
<i>Accipiter</i>	<i>striatus</i>	Sharp-shinned Hawk	C	C
A.	<i>cooperii</i>	Cooper's Hawk	C	C
<i>Haliaeetus</i>	<i>leucocephalus</i>	Bald Eagle		C
<i>Ictinia</i>	<i>mississippiensis</i>	Mississippi Kite		C
<i>Buteo</i>	<i>jamaicensis</i>	Red-tailed Hawk	C	C
B.	<i>lineatus</i>	Red-shouldered Hawk	C	C
B.	<i>platypterus</i>	Broad-winged Hawk	C	C
<i>Circus</i>	<i>hudsonius*</i>	Northern Harrier/Marsh Hawk	C	P
<i>Pandion</i>	<i>haliaetus</i>	Osprey	C	C
<b>Order Strigiformes (Owls)</b>				
<i>Tyto</i>	<i>alba</i>	Barn Owl		C
<i>Megascops</i> *	<i>asio</i>	Eastern Screech-Owl/Screech Owl	C	C
<i>Bubo</i>	<i>virginianus</i>	Great Horned Owl	C	C
<i>Asio</i>	<i>otus</i>	Long-eared Owl	C	
<i>Aegolius</i>	<i>acadicus</i>	Northern Saw-whet Owl		C
<b>Order Coraciiformes (Kingfishers)</b>				
<i>Megaceryle</i>	<i>alcyon</i>	Belted Kingfisher	C	C
<b>Order Piciformes (Woodpeckers)</b>				
<i>Colaptes</i>	<i>auratus</i>	Northern Flicker/Yellow-shafted Flicker	C	C
<i>Sphyrapicus</i>	<i>varius</i>	Yellow-bellied Sapsucker	C	C
<i>Melanerpes</i> *	<i>carolinus</i>	Red-bellied Woodpecker	C	C
<i>Dryobates</i> *	<i>villosus</i>	Hairy Woodpecker	C	C
<i>Dryobates</i> *	<i>pubescens</i>	Downy Woodpecker	C	C
<i>Dryocopus</i>	<i>pileatus</i>	Pileated Woodpecker		C

Genus	Species	Common Name	72/77 18-22	
<b>Order Falconiformes (Falcons)</b>				
<i>Falco</i>	<i>peregrinus</i>	Peregrine Falcon		P
<i>F.</i>	<i>sparverius</i>	American Kestrel/Sparrow Hawk	C	C
<i>F.</i>	<i>columbarius</i>	Merlin		C
<b>Order Passeriformes (Passerines/Songbirds/Perching Birds)</b>				
<i>Tyrannus</i>	<i>tyrannus</i>	Eastern Kingbird	C	C
<i>Contopus</i>	<i>virens</i>	Eastern Wood-Pewee	C	C
<i>Contopus *</i>	<i>cooperi*</i>	Olive-sided Flycatcher	C	
<i>Myiarchus</i>	<i>crinitus</i>	Great Crested Flycatcher	C	C
<i>Sayornis</i>	<i>phoebe</i>	Eastern Phoebe	C	C
<i>Empidonax</i>	<i>flaviventris</i>	Yellow-bellied Flycatcher	C	
<i>E.</i>	<i>minimus</i>	Least Flycatcher	C	
<i>E.</i>	<i>traillii</i>	Willow Flycatcher		C
<i>Vireo</i>	<i>griseus</i>	White-eyed Vireo	C	
<i>V.</i>	<i>olivaceus</i>	Red-eyed Vireo	C	C
<i>V.</i>	<i>gilvus</i>	Warbling Vireo		C
<i>V.</i>	<i>solitarius</i>	Blue-headed Vireo	C	C
<i>Cyanocitta</i>	<i>cristata</i>	Blue Jay	C	C
<i>Corvus</i>	<i>brachyrhynchos</i>	American Crow	C	C
<i>C.</i>	<i>ossifragus</i>	Fish Crow	C	C
<i>C.</i>	<i>corax</i>	Common Raven		C
<i>Poecile *</i>	<i>atricapillus</i>	Black-capped Chickadee	C	C
<i>Poecile *</i>	<i>carolinensis</i>	Carolina Chickadee	C	C
<i>Baeolophus*</i>	<i>bicolor</i>	Tufted Titmouse	C	C
<i>Eremophila</i>	<i>alpestris</i>	Horned Lark	C	
<i>Tachycineta</i>	<i>bicolor</i>	Tree Swallow	C	C
<i>Stelgidopteryx</i>	<i>serripennis</i>	Northern Rough-winged Swallow/R-w Swallow	C	C
<i>Hirundo</i>	<i>rustica</i>	Barn Swallow	C	C
<i>Petrochelidon</i>	<i>pyrrhonota</i>	Cliff Swallow	C	P
<i>Progne</i>	<i>subis</i>	Purple Martin	C	P
<i>Regulus</i>	<i>satrapa</i>	Golden-crowned Kinglet	C	C
<i>R.</i>	<i>calendula</i>	Ruby-crowned Kinglet	C	C
<i>Sitta</i>	<i>carolinensis</i>	White-breasted Nuthatch	C	C
<i>S.</i>	<i>canadensis</i>	Red-breasted Nuthatch	C	C
<i>Certhia</i>	<i>americana*</i>	Brown Creeper	C	C
<i>Poliophtila</i>	<i>caerulea</i>	Blue-gray Gnatcatcher	C	C
<i>Troglodytes</i>	<i>aedon</i>	House Wren	C	C
<i>T.</i>	<i>hiemalis*</i>	Winter Wren	C	C
<i>Thryothorus</i>	<i>ludovicianus</i>	Carolina Wren	C	C
<i>Sturnus</i>	<i>vulgaris</i>	European Starling/Starling, nn	C	C

Genus	Species	Common Name	72/77	18-22
<i>Dumetella</i>	<i>carolinensis</i>	Gray Catbird/Catbird	C	C
<i>Toxostoma</i>	<i>rufum</i>	Brown Thrasher	C	C
<i>Mimus</i>	<i>polyglottos</i>	Northern Mockingbird/Mockingbird	C	C
<i>Turdus</i>	<i>migratorius</i>	American Robin/Robin	C	C
<i>Hylocichla</i>	<i>mustelina</i>	Wood Thrush	C	C
<i>Catharus</i>	<i>guttatus</i>	Hermit Thrush	C	C
C.	<i>ustulatus</i>	Swainson's Thrush/Olive-backed Thrush	C	C
C.	<i>minimus</i>	Gray-cheeked Thrush	C	P
C.	<i>fuscescens</i>	Veery/Veery Thrush	C	C
<i>Sialia</i>	<i>sialis</i>	Eastern Bluebird	C	C
<i>Bombycilla</i>	<i>cedrorum</i>	Cedar Waxwing	C	C
<i>Passer</i>	<i>domesticus</i>	House Sparrow, nn	C	C
<i>Coccothraustes</i> *	<i>vespertinus</i>	Evening Grosbeak	C	
<i>Haemorhous</i>	<i>mexicanus</i>	House Finch, nn		C
<i>Haemorhous</i> *	<i>purpureus</i>	Purple Finch	C	C
<i>Acanthis</i>	<i>flammea</i>	Common Redpoll/Redpoll	C	
<i>Spinus</i>	<i>pinus</i>	Pine Siskin		C
S.	<i>tristis</i>	American Goldfinch	C	C
<i>Pipilo</i>	<i>erythrophthalmus</i>	Eastern Towhee/Rufous-sided Towhee	C	C
<i>Ammodramus</i>	<i>savannarum</i>	Grasshopper Sparrow	C	C
<i>Pooecetes</i>	<i>gramineus</i>	Vesper Sparrow	C	
<i>Junco</i>	<i>hyemalis</i>	Dark-eyed Junco/Slate-colored Junco	C	C
<i>Spizelloides</i> *	<i>arborea</i>	American Tree Sparrow/Tree Sparrow	C	C
<i>Spizella</i>	<i>passerina</i>	Chipping Sparrow	C	C
S.	<i>pusilla</i>	Field Sparrow	C	C
<i>Zonotrichia</i>	<i>leucophrys</i>	White-crowned Sparrow	C	C
Z.	<i>albicollis</i>	White-throated Sparrow	C	C
<i>Passerella</i>	<i>iliaca</i>	Fox Sparrow	C	C
<i>Melospiza</i>	<i>georgiana</i>	Swamp Sparrow	C	C
M.	<i>melodia</i>	Song Sparrow	C	C
<i>Icteria</i>	<i>virens</i>	Yellow-breasted Chat	C	
<i>Dolichonyx</i>	<i>oryzivorus</i>	Bobolink	C	C
<i>Sturnella</i>	<i>magna</i>	Eastern Meadowlark	C	C
<i>Agelaius</i>	<i>phoeniceus</i>	Red-winged Blackbird	C	C
<i>Icterus</i>	<i>spurius</i>	Orchard Oriole	C	C
I.	<i>galbula</i>	Northern Oriole/Baltimore Oriole	C	C
<i>Euphagus</i>	<i>carolinus</i>	Rusty Blackbird	C	
<i>Quiscalus</i>	<i>quiscula</i>	Common Grackle/Purple Grackle	C	C
<i>Molothrus</i>	<i>ater</i>	Brown-headed Cowbird/Cowbird	C	C
<i>Mniotilta</i>	<i>varia</i>	Black-and-white Warbler	C	C

Genus	Species	Common Name	72/77 18-22	
<i>Helmitheros</i>	<i>vermivorus</i>	Worm-eating Warbler	C	C
<i>Setophaga</i>	<i>pinus</i>	Pine Warbler	C	C
<i>Vermivora</i>	<i>cyanoptera</i>	Blue-winged Warbler	C	C
<i>Setophaga</i> *	<i>americana</i>	Northern Parula/Parula Warbler	C	C
<i>Setophaga</i> *	<i>petechia</i>	Yellow Warbler	C	C
<i>Setophaga</i> *	<i>magnolia</i>	Magnolia Warbler	C	C
<i>Setophaga</i> *	<i>tigrina</i>	Cape May Warbler	C	P
<i>Setophaga</i> *	<i>caerulescens</i>	Black-throated Blue Warbler	C	C
<i>Setophaga</i> *	<i>coronata</i>	Yellow-rumped Warbler/Myrtle Warbler	C	C
<i>Setophaga</i> *	<i>virens</i>	Black-throated Green Warbler	C	C
<i>Setophaga</i> *	<i>fusca</i>	Blackburnian Warbler	C	C
<i>Setophaga</i> *	<i>dominica</i>	Yellow-throated Warbler	C	
<i>Setophaga</i> *	<i>pennsylvanica</i>	Chestnut-sided Warbler	C	C
<i>Setophaga</i> *	<i>castanea</i>	Bay-breasted Warbler	C	P
<i>Setophaga</i> *	<i>striata</i>	Blackpoll Warbler/Black-Poll Warbler	C	C
<i>Setophaga</i> *	<i>discolor</i>	Prairie Warbler	C	C
<i>Setophaga</i> *	<i>palmarum</i>	Palm Warbler	C	C
<i>Seiurus</i>	<i>aurocapilla</i>	Ovenbird/Oven-Bird	C	C
<i>Parkesia</i>	<i>motacilla</i>	Louisiana Waterthrush		C
<i>Parkesia</i> *	<i>noveboracensis</i>	Northern Waterthrush	C	C
<i>Leiothlypis</i>	<i>ruficapilla</i>	Nashville Warbler		P
<i>Geothlypis</i>	<i>trichus</i>	Common Yellowthroat/Yellow-Throat	C	C
<i>Geothlypis</i> *	<i>formosa</i>	Kentucky Warbler	C	P
<i>Cardellina</i> *	<i>pusilla</i>	Wilson's Warbler	C	C
<i>Cardellina</i> *	<i>canadensis</i>	Canada Warbler	C	C
<i>Setophaga</i>	<i>ruticilla</i>	American Redstart	C	C
<i>Piranga</i>	<i>olivacea</i>	Scarlet Tanager	C	C
<i>Cardinalis</i> *	<i>cardinalis</i>	Northern Cardinal/Cardinal	C	C
<i>Pheucticus</i>	<i>ludovicianus</i>	Rose-breasted Grosbeak	C	C



Bobolink

# Mammals



Virginia Opossum, MJ

The ancestors of mammals evolved about 200 million years ago in a world reigned by dinosaurs. Early mammals minimized competition with – and predation by – these ecosystem rulers by basically staying out of their way. Early mammals were active at night rather than during daytime, and being “nocturnal” remains a characteristic of many extant species (a characteristic that makes them difficult to observe and study). Associated with their nocturnal lives are excellent senses of hearing and smell, and endothermy: most mammals are warm most of the time because they get their body heat from the inside (“endo”), from the metabolic breakdown of the tons of food they eat (compared to ectotherms). Most mammals have hair or fur as insulation to conserve food-based body heat, and all of them nourish young with the secretions of specialized mammary glands. Human beings are, of course, a part of this group.

Early mammals living among dinosaurs ranged in size from a couple of inches long to raccoon-sized and were already diverse in their ways of life: in addition to scampering about in the tops of vegetation, some were gliding, climbing, swimming or digging. Mammals became even more diverse as they adapted to changing ecosystems without dinosaurs. Today – despite the relatively small total number of mammal species (about 6500, worldwide) – they range in size from tiny shrews to giant whales, in diet from leaves to seals, and in ways of life from beavers to giraffes to bats and to humans. The nonhuman mammals observed in the Honey Hollow watershed in recent years range in size from tiny shrews to hefty Black Bears, in diet from seeds (mice) to other mammals (coyotes) and in ways of life from moles to skunks and deer.

A few of the species identified on site in 1972 but not observed in recent years are probably still here (e.g., Gray Fox and Star-nosed Mole), but four such species are in steep decline across Pennsylvania, of which two (the bats) may have disappeared from the watershed altogether: Long-tailed Weasel, Muskrat,



Striped Skunk, MJ

Little Brown Bat, and Tricolor Bat. Long-tailed Weasel and Muskrat numbers have been declining for the last 50-60 years across North America, for reasons that likely include the shift from small farms to industrialized agriculture, disturbance to or destruction of habitat, increased use of herbicides and pesticides, exposure to pollutants including lead and other heavy metals, and health issues including parasites and fungal infections. Yet healthy populations of Muskrat are known to occur along the Delaware River, and both Long-tailed Weasel and Muskrat have been identified on iNaturalist in nearby areas. Thus, we identify these two species as probably/likely to occur at Honey Hollow.

Most North American bat populations have also been in decline for decades, but recent assaults are accelerating the pace of mortality and jeopardizing the long-term survival of many species: habitat loss, wind-energy development, climate change and a cold-loving fungus that causes White-nose Syndrome (WNS) are all exacting their tolls. WNS was first discovered in North America in 2006 in upstate New York, and quickly thereafter caused the devastation of North American populations of many bat species, including at least a couple at Honey Hollow. Arriving in Bucks County in 2009-10, the fungus resulted in a death count as high as nine of every 10 individuals in populations of all six bat species that hibernate in Pennsylvania, including the Little Brown Bat that used to be a common presence in our watershed. Some of these species are candidates for threatened and endangered species status at the state and federal level.



Three species in the “likely present” category of 1972 were confirmed on site in recent years: Big Brown Bat, Eastern Red Bat and American Mink. There were also a couple of pleasant surprises: a Black Bear was seen twice and coyotes numerous times, in trail camera pictures. The Black Bear population in PA was about 4,000 in the 1970s but has increased significantly, to more than 18,000 by 2022. Coyotes have been expanding their range in PA since the late 1960s, into all parts of the state by 1990s. While the coyote is a confirmed resident of the immediate area, the bear was certainly just passing through in search of more forest and fewer people and roads. An unfortunate but not surprising discovery (again via trail camera pictures) was that several feral cats include Honey Hollow Watershed in their home ranges. These non-native, invasive mammals are a menace to our native wildlife.



American Black Bear

Fitting and Carmichael (1972) speak to the fact that for some large mammals (including elk, wolves, buffalo and cougars), conservation efforts came too late to prevent extirpation from our region, but that White-tailed Deer, having been reintroduced (circa 1906) – and then without predators – were thriving. Fifty predator-free years later, the species has learned to exploit suburban life and its numbers have exploded. The earlier authors’ admonition that a thriving deer population could damage the environment has come true across the broad region surrounding and including Honey Hollow: overgrazing by deer has denuded much of the understory in unprotected wooded areas of the watershed. The deer enclosure in the southern corner of the Honey Hollow property envelops a remarkably diverse and lush understory compared to the rest of the woodland.

Looking forward, there is reason to monitor the local occurrence and activity of four mid-sized mammal species: River Otter, Beaver, Bobcat, and Fisher. The River Otter and Beaver are well-established in and along the Delaware River, and both have been confirmed nearby, but neither have been detected at Honey Hollow. There are unconfirmed reports (on iNaturalist) of both Bobcat and Fisher in Bucks County, and both species have stable – and probably increasing – populations immediately to our north, making dispersal in this direction likely. Thus, possibly all four of these species could be confirmed in the watershed in the decades to come.



White-tailed Deer

Many of the mammal species identified in recent years were detected via trail cameras, and some of the pictures were delightful: a camera-shy mink, an elusive coyote, and a fox that slipped on the ice were a few favorites. See the BCAS website to view these and other charming photographs.

Below are mammals confirmed and likely to be present at Honey Hollow in 1972 and during the years 2018-2022.

**Mammals.** Asterisk indicates taxonomic change since 1972. Common name: current one/that from previous years. Occurrence: Confirmed, Probable; see Foreward for details. 72/77 refers to the original 1972 inventory and the 1978 2nd edition, while 18-22 refers to the five years during which data were collected for the current inventory.

Genus	Species	Common Name	72/77	18-22
<b>Order Artiodactyla</b>				
<i>Odocoileus</i>	<i>virginianus</i>	White-tailed Deer	C	C
<b>Order Carnivora</b>				
<i>Canis</i>	<i>latrans</i>	Coyote		C
<i>Felis</i>	<i>catus</i>	Feral Cat		C

Genus	Species	Common Name	72/77 18-22	
<i>Lutra</i>	<i>canadensis</i>	River Otter		P
<i>Lynx</i>	<i>rufus</i>	Bobcat	P	P
<i>Mephitis</i>	<i>mephitis</i>	Striped Skunk	C	C
<i>Mustela</i>	<i>richardsonii</i>	Stoat/Short-tailed Weasel	P	
<i>Neogale*</i>	<i>frenata</i>	Long-tailed Weasel	C	P
<i>Neogale*</i>	<i>vison</i>	American Mink	P	C
<i>Pekania</i>	<i>pennanti</i>	Fisher		P
<i>Procyon</i>	<i>lotor</i>	Common Raccoon	C	C
<i>Urocyon</i>	<i>cinereoargenteus</i>	Gray Fox	C	P
<i>Ursus</i>	<i>americanus</i>	American Black Bear		C
<i>Vulpes</i>	<i>vulpes</i>	Red Fox	C	C
<b>Order Chiroptera</b>				
<i>Eptesicus</i>	<i>fuscus</i>	Big Brown Bat	P	C
<i>Lasionycteris</i>	<i>noctivagans</i>	Silver-haired Bat	P	
<i>Lasiurus</i>	<i>borealis</i>	Eastern Red Bat	P	C
<i>L.</i>	<i>cinereus</i>	Hoary Bat	P	
<i>Myotis</i>	<i>leibii*</i>	Eastern Small-footed Myotis	P	
<i>M.</i>	<i>lucifugus</i>	Little Brown Bat	C	
<i>M.</i>	<i>keeni</i>	Keen Myotis	P	
<i>Perimyotis*</i>	<i>subflavus</i>	Tricolored Bat/Eastern Pipistrel	P	
<b>Order Didelphimorphia</b>				
<i>Didelphis</i>	<i>virginiana</i>	Virginia Opossum	C	C
<b>Order Eulipotyphla</b>				
<i>Blarina</i>	<i>brevicauda</i>	Northern Short-tailed Shrew	C	C
<i>Condylura</i>	<i>crystata</i>	Star-nosed Mole	C	P
<i>Cryptotis</i>	<i>parva</i>	North American Least Shrew	P	
<i>Scalopus</i>	<i>aquaticus</i>	Eastern Mole	C	C
<i>Sorex</i>	<i>cinereus</i>	Masked Shrew	P	
<b>Order Lagomorpha</b>				
<i>Sylvilagus</i>	<i>floridanus</i>	Eastern Cottontail	C	C
<b>Order Rodentia</b>				
<i>Castor</i>	<i>canadensis</i>	Beaver		P
<i>Glaucomys</i>	<i>volans</i>	Southern Flying Squirrel	C	C
<i>Marmota</i>	<i>monax</i>	Groundhog/Woodchuck	C	C
<i>Microtus</i>	<i>pennsylvanicus</i>	Meadow Vole	C	C
<i>Mus</i>	<i>musculus</i>	House Mouse	C	P
<i>Ondatra</i>	<i>zibethicus</i>	Muskrat	C	P
<i>Peromyscus</i>	<i>leucopus</i>	White-footed Mouse	C	C
<i>Pitymys</i>	<i>pinetorum</i>	Woodland/Pine Vole	C	
<i>Rattus</i>	<i>norvegicus</i>	Brown/Norway Rat	C	C
<i>Sciurus</i>	<i>carolinensis</i>	Eastern Gray Squirrel	C	C
<i>Tamiasciurus</i>	<i>hudsonicus</i>	North American Red Squirrel	C	P
<i>Zapus</i>	<i>hudsonius</i>	Meadow Jumping Mouse		P





# Planning for the Future in 2023

Fifty years ago, a group of people with remarkable foresight gathered biological information about a place they treasured and hoped would allow them to achieve the goals listed in their objectives. The 1972/77 inventory they created is an unusual document; very few environmental centers have broad, baseline biological data about a significant site from 50 years earlier. Only because we have this snapshot of Honey Hollow in the 1970s can we look at the watershed today and find stability or change, sometimes for the better but occasionally troubling.



Ruby-throated Hummingbird,  
Alana Valente, age 7

Throughout the chapters of this book, we've noted that the Honey Hollow Watershed remains a healthy, vibrant site with diverse habitat and clean, clear water. Many of the same species live here as did fifty years ago. Some species are flourishing and new species are being observed. Some species have become hard to find and others have disappeared altogether. These changes, for better or worse, reflect subtle pressures on the watershed coming, for the most part, from the outside and most at a global level. Globalization and climate change provide most of the challenges to the ecosystems of Honey Hollow that have emerged over the last fifty years. Invasive plants and animals are challenging our native flora, fauna and fungi for resources. Pathogens coming from other parts of the world are introducing our native taxa to diseases to which they have no resistance. Climate changes are redefining the traditional calendar for plants and animals whether that be when they are reproducing, what they're eating, or by whom they're being eaten. Now, what do we do with this information?



Turtle, artist unknown

This project was well underway when I started as Executive Director of Bucks County Audubon Society in early 2023. As I learned more about the organization and the Honey Hollow Watershed, themes began to emerge. The property at Honey Hollow has been described well as a "living history book." Children and students of all ages come here every week to

learn lessons that are possible only at an unusually rich and diverse piece of land like Honey Hollow. Sometimes young people are brought to summer camp by parents that attended camp here themselves. Few sights are as gratifying as the transfer of happy educational experiences down through generations. Conveying the information and lessons learned from this recent study to these families and young explorers will be a crucial task in passing the message of stewardship along.

In a time when words including *acorn, ash, beech, blackberry, bloom, bramble, buttercup, clover, fern, ferret, fungus, mint, monarch, minnow, otter, pasture, raven, thrush, violet, willow, weasel* and *wren* have been removed from the *Junior Oxford Dictionary* to make space for words like *attachment, blog, broadband, bullet-point, cut-and-paste,* and *voice-mail,\** we need to give kids and their families a chance to re-discover another world and vocabulary.\* We need to show them how they can tell that the Honey Hollow Creek is clean because a kingfisher is feeding and nesting there. They should learn that some species of ferns flourish in certain undisturbed habitats especially because overpopulated deer don't like to eat them . . . and so much more that the watershed can teach them.



Bee, Connor Smith, age 10

Meanwhile, Earth's temperature has risen, invasive plants have made inroads and certain populations surge while others decline, creating tricky work for planning and managing our land. The results of this study will aid Bucks County Audubon Society in continuing several of our projects that are already underway - projects such as self-guided trails, pond restoration, native plantings and preservation efforts. For the future, this inventory will serve as a guide and basic reference as we address new challenges and needs.

The stewards of Honey Hollow that preceded us were gifted storytellers, who left us stimulating written records of the land and life they preserved. The contributors to this volume should be proud to take their place in this tradition. We hope that the example we provide with this publication will spread and be taken up elsewhere. One of our first tasks, now that this document has been published, is to promote and provide "how to" guidance for similar efforts through National Audubon, throughout Pennsylvania and

beyond. We hope that we will inspire similar efforts elsewhere, recognizing that people love and protect what they know and understand.

I look forward to seeing you at Honey Hollow.

A handwritten signature in black ink, appearing to read "M. Celec". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

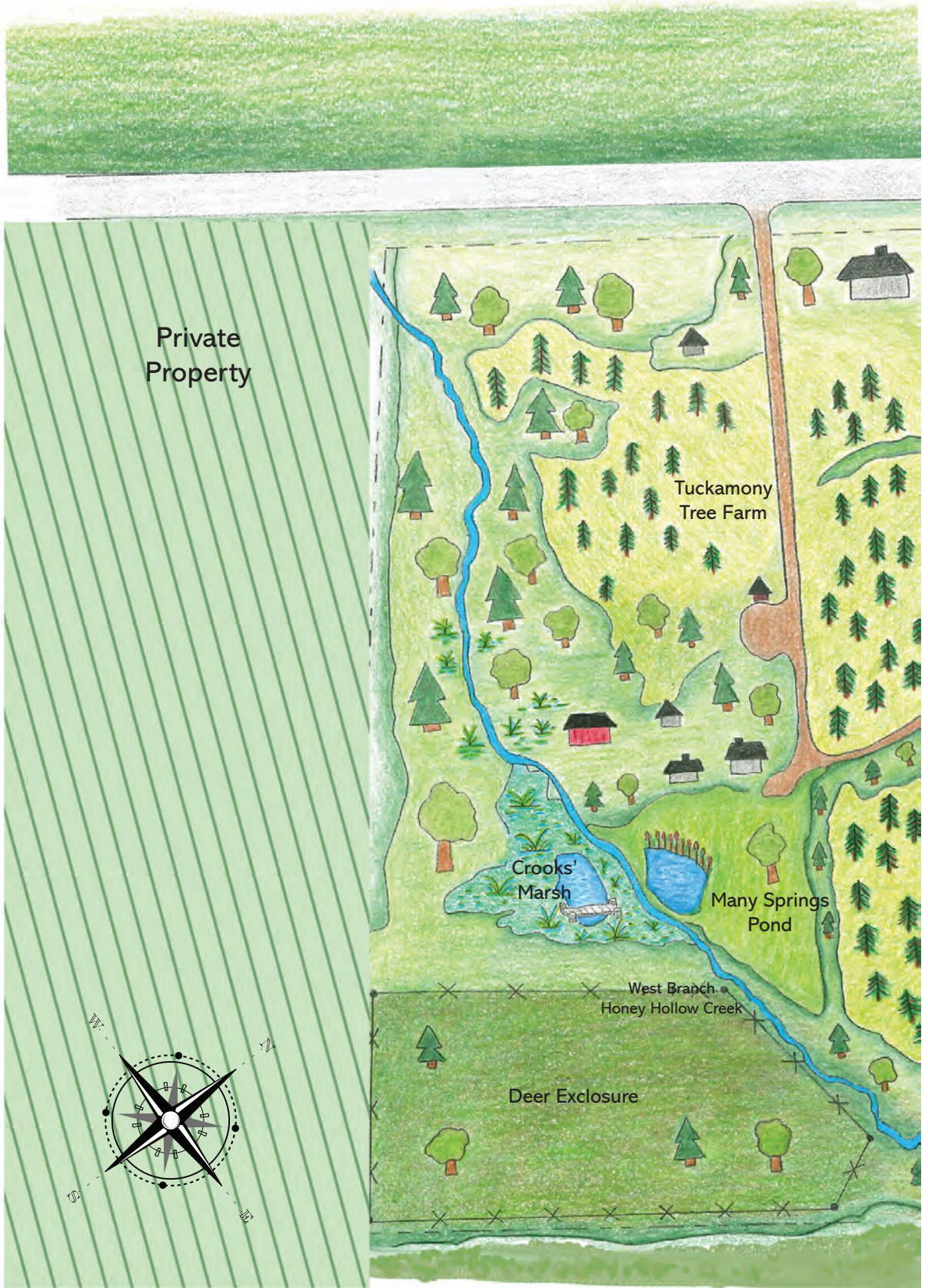
Michael Celec

Executive Director of the Bucks County Audubon Society

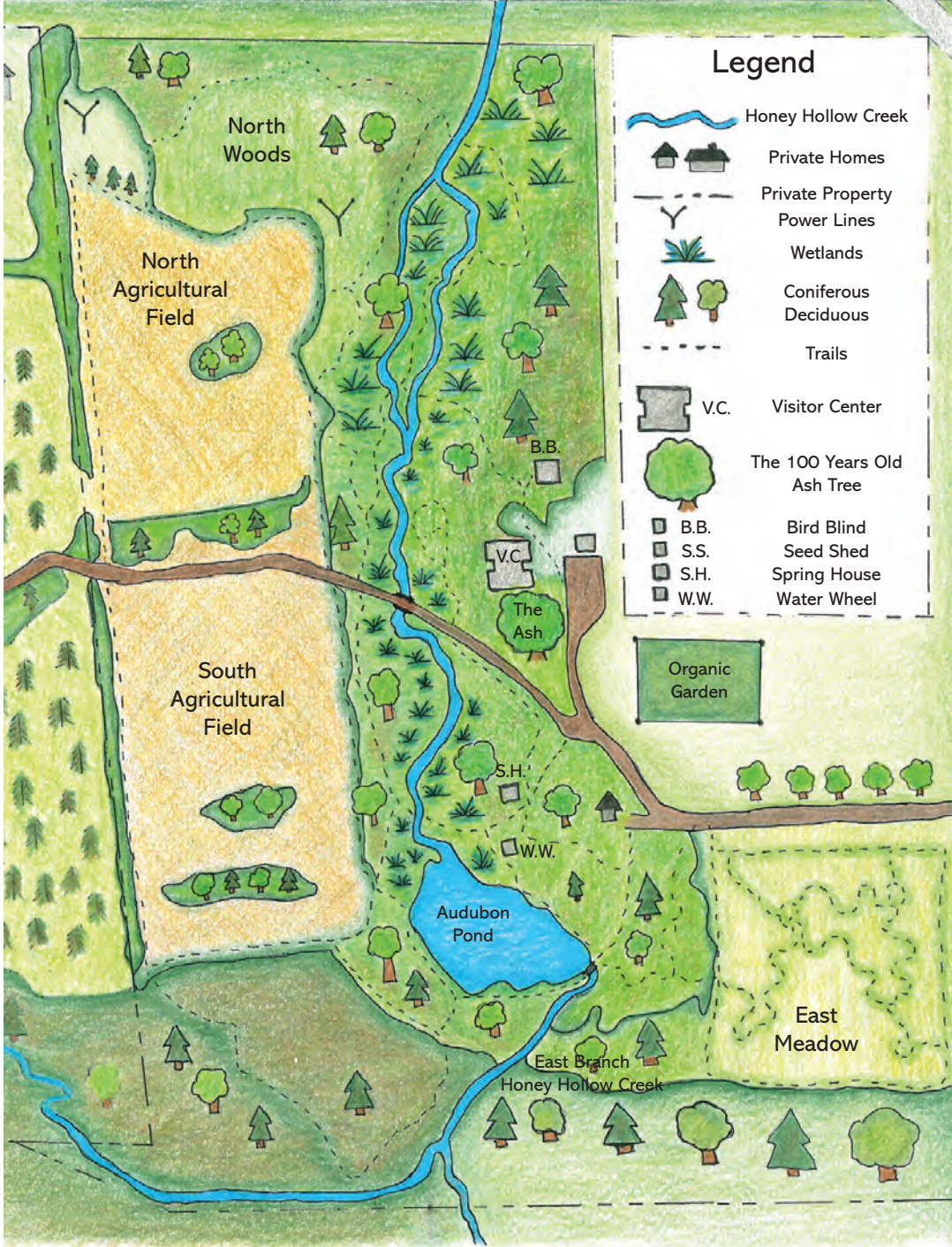


Bluebird, Alana Valente, age 7

\*MacFarlane, R., & Morris, J. (2017). *The Lost Words -- A Spell Book*. Hamish Hamilton, an imprint of Penguin Books.



Upper York Road / Route 263



### Legend

- Honey Hollow Creek
- Private Homes
- Private Property
- Power Lines
- Wetlands
- Coniferous  
Deciduous
- Trails
- V.C. Visitor Center
- The 100 Years Old Ash Tree
- B.B. Bird Blind
- S.S. Seed Shed
- S.H. Spring House
- W.W. Water Wheel

Creamery Road

B.C.A.S.

# On-going Projects

## What Was, What Is and What Could Be



American Chestnut

Our inventory project was made possible by the visionaries who saw the need and opportunity for an environmental education center at the Honey Hollow site. They understood that collecting baseline data about the organisms that made up the tapestry of the watershed was a crucial starting point for long-term efforts to conserve and improve the local natural world for current and future generations. As they foresaw, Bucks County Audubon Society (BCAS) has been using that information for guidance in past and current efforts to achieve conservation and education goals today.

A huge, old White Ash tree greets you as you approach Bucks County Audubon's Honey Hollow Environmental Center. This sprawling shade tree has surely seen well over a hundred years of change in the surrounding acreage. What it couldn't see was the arrival from Asia of the Emerald Ash Borer, first in Michigan in 2002. In only about ten years since its arrival in Bucks County in 2012, the insect has wiped out the ash populations. Had BCAS not decided to have its welcoming giant chemically treated to repel the borers, it, too, would have died along with every other ash on the property. There is hope that when all of the untreated ash trees are gone and the borer has run out of food, it will disappear. Gradually, in the future, the ash trees will come back with more resistance to the borer. We can hope that beloved, treated trees like ours will still be here to greet them.

Slightly to the southwest of the ash tree are four young chestnut trees. Prior to the early 20<sup>th</sup> century, American Chestnuts made up 25% of North American deciduous, upland

forest trees. Introduced to North America in the early 1900s, a fungal blight from Asia devastated American Chestnut populations across the continent. This devastating loss contributed to the extinction of the Passenger Pigeon and was felt across the continent in many other ways. Today, decades of research and careful breeding have resulted in the young chestnuts in the care of the nature center. Their DNA is 15/16 American Chestnut and 1/16 Chinese Chestnut, providing the trees with resistance to the deadly blight. Honey Hollow is contributing to the hope that majestic American Chestnuts can someday reclaim their place in upland forests across North America.

Last year, I sat in a meeting in the environmental center and watched a Big Brown Bat snuggle into a large crack between the stonework and the window frame. Twenty years ago, that would have been a common observation on the buildings and trees at the site, but not anymore. More than half of the bat species across North America are in sharp decline. Over 90% of the Little Brown Bats and Northern Long-eared Bats, both common across Pennsylvania not long ago, have succumbed to the fungal disease “white-nose syndrome” since it was identified on the continent in 2006. This disease interrupts their

hibernation and results in starvation. In addition, droughts and violent storms related to climate change, forest fragmentation and wind turbines are making life difficult for bats. Our hope is that as Little Brown Bats and others of the nine bat species that live in Pennsylvania begin to develop resistance to the fungus, Honey Hollow will be there to offer shelter, healthy habitat and plentiful food in the form of mosquitoes and other insects to aid in their recovery.

From 1920 until the 1970s, there was a decline of almost 90% in the Eastern Bluebird population. This beloved songbird fell victim to the loss of its essential cavity nest-sites, to removal by humans and competition from introduced House Sparrows and European Starlings.

Pesticides and feral cats also took a toll on the bluebird. There was fear that this species was headed for extinction; however, a massive effort by citizen scientists across the eastern United States, informed and encouraged by the North American Bluebird Society, brought the bluebird back from the brink. BCAS at Honey Hollow has played a large, local role in this effort. While birdhouses have been maintained at the site for more than 50 years, participation in Project Nestwatch, run by the Cornell Lab of Ornithology, has given us insight



Bluebird House, CC

into just how much we can contribute to the recovery of a species. There are currently 48 nest boxes being maintained and monitored on the property. Over the last three years, there have been 95 nesting attempts in those boxes by a variety of bird species. From those attempts, 5 Carolina Chickadees, 15 Tree Swallows, 64 House Wrens and 68 Eastern Bluebirds have fledged. Imagine what the total was for the entire 50-year period! Today the Eastern Bluebird is a common sight sitting on fence posts or nest boxes around the property.





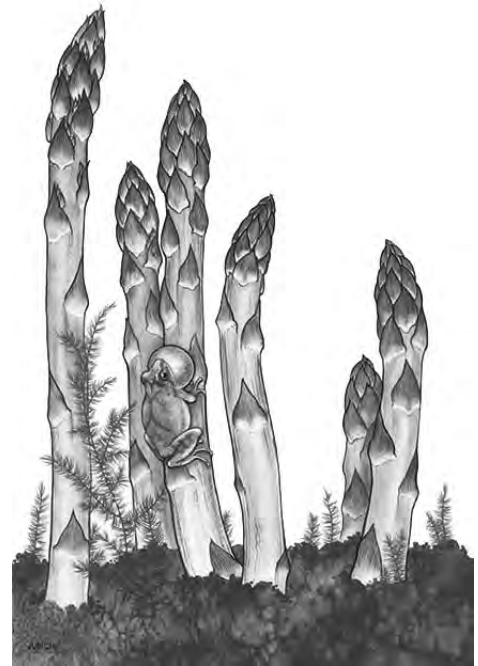
BCAS will use 50 years of data and experience to continue these efforts and address new issues as needs arise. We hope that this new inventory will be used by generations to come to preserve the natural world as we connect people to nature.



illustration by Susan Gordon

# With Thanks to the Authors of the 1972/77 Inventory

Bucks County Audubon Society and the Honey Hollow Watershed Association were fortunate when they decided to publish a Natural Resource Inventory. The very people who helped found the organizations were also some of the best writers, naturalists, biologists and scientists in the region. A committee was formed and individual experts were selected to write an introduction for each study group. Data had been collected from individuals, students, and biologists for several years. The inventory was published in 1972 and sold in bookstores and nature centers. Because there was nothing like it in Bucks County, and back then there were no specific field guides to the region, the first printing sold out. In 1978, Bruce McNaught and Forrest Crooks coordinated a second printing with corrections and additions. Forrest produced all the artwork, layout and maps for the inventory.



Spring Peeper and Asparagus, JG

The entire 1972/77 inventory is available on the Bucks County Audubon Society (BCAS) website: [bcas.org](http://bcas.org). The authors of the 1972 inventory were a “Who’s Who” of Bucks County naturalists. They were all important environmental leaders in the county and most were involved in the formation of the Environmental Education Center at Honey Hollow. What follows is a little background on each of these people.

## **John Mertz - Foreword and Aquatic Life in Streams and Ponds**

John was one of the original founders of BCAS, which was founded as a chapter of the National Audubon Society in 1969. He served as the first president of the organization. The initial meetings and programs were held at Delaware Valley College (now Delaware Valley University) where John was a biology professor. His career at the college spanned 47 years and included 11 years as Academic Dean. John holds a PhD in Ichthyology from the University of Illinois and has always had a keen interest in aquatic life, often sharing

that interest with students and teachers over the years. John played an important role in the organization's formation of the Honey Hollow Environmental Education Center in 1980. He is still active with BCAS.

**Charlotte Gantz - *Geology and Insects Found on the Watershed***

Charlotte was a graduate of the Columbia Law School and became Assistant Corporation Counsel for the New York City Law Department. Her true love from the time she was a child, however, was natural history. After moving with her family to a farm in Bucks County in the 1950s, she became a natural history writer and published books and articles including a number for *Audubon Magazine*. Her "backyard museum" in her barn became legendary to local science students and teachers. She often shared specimens collected from around the world with local schools. Her collection was given to the Carnegie Museum of Natural History shortly before her passing. Charlotte had a tremendous interest in entomology, which she enjoyed sharing with people of all ages. She served on the Honey Hollow Board of Directors for ten years.

**Malcolm Crooks - *Soil and Water*.**

Malcolm grew up on Tuckamony Farm, which is part of the Honey Hollow Environmental Education Center. His parents, Forrest and Irene Crooks, participated with other farmers in implementing new farming techniques to protect soil on a watershed-wide basis. This was the first time such an approach had been done in the United States and led to the addition of the Honey Hollow Watershed to the National Historic Landmark Registry. Malcolm's entire life was devoted to a love for the environment and natural resource protection. He started his career as the first executive director of the Stoney-Brook Millstone Watershed Association in New Jersey, served as secretary of the New Jersey State Conservation Committee and eventually became Regional Director of the National Association of Conservation Districts. In 1980, the Crooks family donated their farm to the Heritage Conservancy to preserve the property and to provide a permanent home for the education programs of the Honey Hollow Watershed Association and Bucks County Audubon Society. Malcolm served as president of both Honey Hollow and Bucks County Audubon and was a board member for many years. From the organization's formation until his recent passing, Malcolm was an intimate part of the Education Center at Honey Hollow.

### **Mervin Skiles - *Soil and Water***

Merv was the District Manager for the Bucks County Soil Conservation Service (now the Natural Resource Conservation Service) that worked with the farmers in the 1930s in the Honey Hollow Watershed to implement contour plowing, diversion terraces, strip cropping and other soil protection measures. These watershed-wide farming methods brought government officials and many prominent soil scientists and agricultural students to Honey Hollow throughout the 1940s-1960s. This led the Soil Conservation Service to use the watershed as a national model of land stewardship.

### **Lester Thomas - *Honey Hollow's Trees and Shrubs***

Les was Bucks County's first Chief Naturalist. He was instrumental in starting the Churchville Outdoor Education Center in Northampton Township in 1964 and in the development of the Bucks County Nature Center System. The library at Churchville is named in his honor. Les became well known in his retirement as a natural history writer. He had articles and a regular column in Bucks County newspapers and published several books. Les was a member of the Delaware Valley Ornithological Club. In 1953 he published in their journal *Cassinia* "Birds of Bucks County," one of the first annotated lists of the county's birds.

### **David Benner - *Flowering Herbaceous Plants and Non-Flowering Plants***

Dave was well known for moss gardening. His tours of his personal moss gardens around his home were a spring treat for eager visitors. His famous maintenance-free gardens and moss yards were featured in magazines and books. Dave was a professor in the Ornamental Horticulture Department of Delaware Valley College, an incredible botanist and an expert on trees. For many years he managed Bucks County's Historic Tree Registry and ran field trips for Bucks County Audubon to see some of the county's giant trees.

### **Donald Fitting - *Mammals of the Watershed***

Don's family owned a farm across Route 263 from the entrance to Tuckamony Farm. In the 1930s they also implemented soil conservation measures on their farm to help protect the Honey Hollow Watershed. Don continued to farm the family land as well as several neighboring properties into the 1990s. The large spring that is the headwaters to the Honey Hollow Creek is on the family farm, where Don raised trout for years. He was an avid hunter and fisherman, and in later years, became a talented wildlife photographer. Don served on BCAS's Property Committee during the construction of the Honey Hollow Environmental Center.

### **George Carmichael – *Honey Hollow Herptiles***

George was a talented science/ biology teacher in the Pennsbury School District for most of his working career. He also served as chairman of the district's Science Department. For many years he was known as Mr. Bucks County Audubon because he maintained all of the organization's files until there was a permanent home for them at Honey Hollow. He was also a great naturalist, with a special interest in insects, reptiles and amphibians. Before technical field guides were available, he developed keys to dragonfly identification. During his summers off, he served as Silver Lake Nature Center's first naturalist. He also started some of Honey Hollow's teacher workshops and summer camp programs. He served on both organizations' Board of Directors for many years. George was an important advocate in the formation of the Environmental Education Center at Honey Hollow.

### **Joseph Pearson - *Birds of Honey Hollow***

Joe's lifelong love of birds led him to become one of BCAS's founding members. His birding skills and love of people made him a great teacher, and birding with him was contagious. Joe started the Upper Bucks Christmas Bird Count, one of the oldest counts in the region, and led many early Bucks County Audubon field trips.

### **Charles Child - *The Ultimate Resource***

Charles was a founding board member of Honey Hollow and a well-known Bucks County artist and writer. He wrote the closing piece for the original inventory. His brother Paul was married to the world-renowned chef Julia Child. Charles' most famous book *Roots in the Rock*, written in 1964, told the story of his family building a summer house on Mt. Desert Island in Maine. This book is still available today. His beautiful Lumberville home was a revolving door for Bucks County artists and writers.



Yellow Garden Spider, JG

# 2022 Inventory Participants

Many people with incredible stores of knowledge participated in this project. Almost all of them generously contributed many hours of volunteer time. These citizen scientists were united by their love of the natural world and their commitment to conserving it for future generations. Here's just a little about most of them.

**Deray Burton** (Water) got involved with the inventory project by way of a stream monitoring effort started at Honey Hollow in 2021. Since that project involved sampling for macroinvertebrates, it was a natural fit. Deray's interest in biology goes back to attending field trips led by a local naturalist with his dad. He is one the volunteers that makes it possible for Bucks Audubon to accomplish its mission.

**Carolee Caffrey** (Manager, Writer, Editor) is a behavioral ecologist with a PhD from UCLA and a lot of experience at the interface of science, education, and conservation. She is the first person to undertake a long-term field study of marked American Crows, first in Los Angeles CA and then in Stillwater OK (much of her crow work is at <https://www.caroleecaffrey.com>). She has worked on behalf of birds at and for Audubon, the CA Department of Fish and Game, and the U.S. Navy, and has taught a bunch of different biology courses at several universities and colleges over many years. She is currently updating the American Crow account for Birds of the World.

**Margie Rauscher-Charney** (Map Artist, Trail Cameras) was in charge of the trail cameras used during this project. She learned how to use, position and monitor them, resulting in some entertaining and interesting pictures of some of our most elusive local creatures. Margie put in hundreds of hours and many dozens of hiking miles as a project volunteer.



Carolina Chickadee  
and rose hips, JG

She attributes her ability to photograph the most difficult-to-find animals, to her inner child coming to life. Though she did not follow a career in any subject related to nature, the opportunity to participate in the project ignited her heart with the desire to search out the wildlife by crawling under and through heavily vegetated areas, climbing up & over trees and walking along creek beds searching for secluded spots that provided safety for the resident animals. She loved simply pretending to be one of them.

**Sally Conyne** (Manager, Writer, Editor) grew up in a bird-watching, nature-loving, farm family in Bucks County, Pennsylvania. She taught secondary school in the Council Rock Schools before deciding to combine her love of teaching and the sciences at the Academy of Natural Sciences in Philadelphia. There she created “Young Ornithologists,” a summer program for inner city kids, and did field work in Latin America – especially Guyana – during the winters. In 1999, she moved to the National Audubon Society as Director of Citizen Science to develop projects including eBird/Birdsource in collaboration with the Cornell Lab of Ornithology. She and her ornithologist husband, Frank Gill, are now involved in numerous conservation projects and world birding. Sally became interested in conducting this project when she realized that 50 years had passed since she and her family enjoyed and learned so much about local natural history from the first Inventory.

**Lars Crooks** (Consultant, Tuckamony Steward/Owner) grew up on the property and has been involved with Honey Hollow his entire life. One of his earliest memories is of posing outside the Malcolm Crooks’ barn and office in a “Hooray for Honey Hollow” t-shirt. Many of his formative memories are tied to the Honey Hollow frog walks, astronomy nights and explorations of the woods and creeks of the watershed. Lars took over the Christmas tree operation from Malcolm 20 years ago and thereafter has explored sustainably regenerative and organic-minded practices: the cessation of fungicide application, the reduction of routine herbicide and pesticide use, the inoculation of transplanted trees with mycorrhizae, and the selection of species that are better suited to our changing climate. Currently, he is experimenting with silvopasturing sheep in the tree fields to reduce weeds and the need for mechanical mowing. Lars feels blessed to live somewhere with a rich history based in reverence for nature, conservation of resources and mindful cooperation. He is thankful for all of the kind and knowledgeable people with whom he’s had the opportunity to talk, walk and collaborate here on the farm and looks forward to the new people and ideas coming from this continuing project.

**Avery English** (Manager, Organizer) is the Assistant Manager of the Honey Hollow Watershed Revisited project. She has a Bachelor of Arts degree with honors from The New School in N.Y. where she was awarded a rare scholarship in the Creative Writing MFA program. While working for the National Audubon Science Office, she assisted the director of the Christmas Bird Count and assisted with many other citizen science projects. She is an advocate for animals, and manages a support group *The 188* for neglected dogs rescued from a hoarder/breeder.

**Phil Getty** (Hydrogeology) consulted as an environmental hydrogeologist in the Bucks County area for 40 years. He holds B.S. and M.S. degrees in geology from Pennsylvania State and West Virginia Universities. He has served on the boards of the Peace Valley Nature Center and Bucks County Audubon Society, as well as taught at Delaware Valley University. He has advised land conservation associations, such as the Heritage Conservancy, on natural resources. In addition, Phil has given talks and presentations for numerous geology classes and led field trips for naturalists, nature centers and the general public, with the goal of increasing our awareness of the land beneath our feet.

**Deborah (Debbie) Glessner** (Photographer) is a retired public school educator who has loved photography since she was a teenager shooting with her Brownie camera. She ventured into the world of SLR photography in the early 1970s and eventually transitioned into digital photography. For Debbie, photography has always been about “who I am, what I see, and what I feel.” She loves photographing wildlife and landscapes and is an extremely visual person which she uses to avoid cliché images, striving to look at the ordinary in new and unusual ways.

**Susan Gordon** (Artist) of Lambertville created the mural illustrating on-going projects at Honey Hollow. Susan specializes in portraits of pets and people as well as seascapes, snowscapes and landscapes. Her paintings and drawings hang in private collections both here and abroad.

**Judy Griffith** (Artist) Judy’s life has been dedicated to protecting and restoring the Earth. As an artist/illustrator, she has used her skills to achieve these goals by educating and inspiring others. In addition, she and her husband have established permanent stewardship and protection of Ninestone Land Trust, 412 acres of diverse Ozark ecosystems in northwest Arkansas which include forests, streams, bluffs, and waterfalls. The roots of



Judy's commitment lie, in part, at Honey Hollow with her "Aunt Jane" Jackson, an early and leading member of Bucks Audubon. A beloved and trusted friend for many years whom Judy came to know when she was just 5 years old, Jane was the only person she knew who, through the Audubon Society, worked to understand and preserve nature at Honey Hollow and elsewhere.

**Paul and Anita Guris** (Insects, especially Dragon- & Damselflies) have been studying dragonflies and damselflies and logging their findings in the Odonata Central database for about 12 years. After years of traveling to see and study birds, they finally found a new taxa in odonates that fed their enthusiasm. They also have a working knowledge of reptiles, amphibians, fish, and marine mammals and ran their own pelagic birding tour company for 18 years.

**Juanita Hummel** (iNaturalist) retired from a career as a lab scientist and headed outdoors to the natural world to learn more about birds, plants, butterflies, and amphibians and their habitats. She is currently serving as president of the Washington Crossing Audubon Society. She is a Pennsylvania Master Naturalist as well as a volunteer naturalist and board member at Bowman's Hill Wildflower Preserve.

**Marissa Jacobs** (Artist) created many of the sketches included in the inventory book. She is an ecologist and environmental educator, who blends environmental concepts with art & creativity. Not only does she teach program participants how to engage in eco art to better understand the ecosystems around them, but she also actively creates original works of art that she uses in her lessons, for commissions & interpretive signage, and to create pieces that will spark conversations about conservation, wildlife ecology, and sustainability. Her favorite nature-related artistic mediums are scientific & botanical illustration, nature photography, and working with foraged botanical textile dyes. You can view more of her work at [www.TheArtofEcology.com](http://www.TheArtofEcology.com), or on Instagram @TheArtofEcology.

**Chris Alice Kratzer** (Insects, especially Wasps) is an engineer, scientist, entrepreneur, and author. Her biological interest is primarily in entomology with a focus on Vespid wasps and Cicadid cicadas. She founded Owlfly LLC in 2020 with the intent to use her knowledge of mechanical engineering and wasp nest architecture to design the next generation of structural insulation, which has the potential to significantly reduce carbon emissions associated with heating and cooling buildings. She is the author and illustrator of *The*

*Social Wasps of North America*, the first complete guide to these species.

**John Lisowski** (Water) retired after spending 37 years working in Information Systems and Technology in the world of healthcare. His original training was, however, in aquatic biology. What better way to enjoy a productive retirement than to revisit his interests in biology, microscopy, and natural history and combine these with his IT skills? He completed the Pennsylvania Master Naturalist (PMN) program in 2019 and enjoys sharing his interest in natural history through various volunteer activities. He's taught PMN classes in Citizen Science and iNaturalist and has presented several sessions on "Exploring the Microscopic Life of Pennsylvania Waters."

**Kyle Loucks** (Herptiles) is the Southeast regional coordinator for the Pennsylvania Amphibian and Reptile Survey. A lifelong resident of Bucks County, he has been finding reptiles and amphibians in Pennsylvania for over 45 years and submitted over 20,000 records to various databases. In addition to the herpetological atlas, he is on the state's Bog Turtle monitoring team with the Mid-Atlantic Center for Amphibian and Reptile Conservation and also conducts studies of Box and Wood Turtles, and Eastern Smooth Green Snakes.

**Nick Macelko** (Water, iNaturalist) is currently a Civil Engineer at PennDOT and spends his days managing projects in southeastern Pennsylvania. However, in his spare time, Nick is a passionate citizen scientist eager to learn and teach about the species and habitats that occur locally and across the state.

**Bruce McNaught** (BCAS History) has given this inventory historical focus. He was Executive Director of Bucks County Audubon at Honey Hollow for nearly 25 years from 1977 to 2001. He coordinated the publication of the second edition of the original Natural Resource Inventory in 1978. Since leaving BCAS he has worked as a consulting biologist for a number of organizations and agencies. His familiarity with local birds, butterflies, dragonflies and general natural history, as well as data collection tools such as iNaturalist and eBird, makes him a treasured resource.

**John Mertz** (The Beginnings) was one of the original founders of BCAS, which was founded as a chapter of the National Audubon Society in 1969. He served as the first president of the organization. The initial meetings and programs were held at Delaware Valley College

(now Delaware Valley University) where John was a biology professor. His career at the college spanned 47 years and included 11 years as Academic Dean. John holds a PhD in Ichthyology from the University of Illinois and has always had a keen interest in aquatic life, often sharing that interest with students and teachers over the years. John played an important role in the organization's formation of the Honey Hollow Environmental Education Center in 1980. He is still active with BCAS.

**Michael Pirrello** (Insects, especially Moths) is a curator for iNaturalist where he keeps taxonomy and related issues up to dates. His primary focus is on identifying North American Pentatomomorpha (stinkbugs and allies). He is also an avid moth-er during the summer months. He has been invaluable to the project by showing us how to use iNaturalist and its data as we've learned something about local moths.

**Richard P. Radis** (Plants) is a writer, editor, naturalist, environmental consultant and consulting botanist. Since the 1970s, he has worked on land and water preservation issues, wetland and vernal pond surveys, land management, preserve design, and as an endangered species specialist. He has conducted numerous plant and animal inventories. His writing and photography have appeared in the *New York Times*, *The Star Ledger*, and many other national and regional publications.

**Bob Reiser** (Water) has had an interest in observing and identifying plants and birds in the wild since he was a child. His interest in water resources developed when he was in college and continued through a 36-year career in that field. Retirement in 2021 gave him time to volunteer with the Audubon Society.

**Steve Saffier** (Early Management, iNaturalist) splits his time between birds and cars. He helped to get the 2022 Inventory project started. Currently, he does backyard consultations and bird walks for Wild Birds Unlimited in Buckingham. He is also deeply involved with the Bird Town program ([birdtownpa.org](http://birdtownpa.org)). On the flip side of this coin, his company CarSmarts Media ([carsmartsradio.com](http://carsmartsradio.com)) provides exclusive marketing services to Classic Auto Mall, an 8-acre facility in Morgantown, which consigns classic and specialty automobiles.

**Ryan Schmidt** (Plants, especially Ferns & Mosses) is a botanist generally interested in understanding the intersection between plants and people, specifically the human impacts on botanical biodiversity throughout time. He has always been fascinated by

the vast diversity and charismatic forms of ferns and clubmosses and the ability of these ancient lineages to tell a story about the evolution of biodiversity throughout Earth's history. While at Rutgers University, he studied Ecology, Evolution, and Natural Resources, working with herbarium specimens of ferns and weeds at the Chrysler Herbarium. Ryan is currently completing his PhD studying the introduction and spread of historical non-native plants in North America.

**Bonnie Semmling** (Plants, especially Ferns & Mosses) is a botanist and naturalist based in central New Jersey. She recently graduated from Rutgers University with a B.S. in Environmental Policy, Institutions, and Behavior and a minor in Ecology, Evolution, & Natural Resources. She attributes her deep love of nature and curiosity to being able to explore the outdoors freely as a child. When she is not outside searching for plants, you may find her in an herbarium, conducting research there.

**Luke Smithson's** (Fungi) main area of interest and focus is in macrofungi, aka mushrooms. He is particularly interested in fungal taxonomy and identification, focusing primarily on the woodlands of the Mid-Atlantic and Coastal Plain regions. He is a member a network of fellow fungi-philosophers who use chemical reagents, microscopy, and DNA to explore the under-studied fungal world.

**Alana Valente** (artist) is 7 years old. She loves to watch and learn about birds and all sorts of other animals and plants. She hopes she can continue to enjoy them and share her knowledge when she is older.

**Dennis P. Waters** (Lichens) is a lichenologist and visiting scientist in the Department of Ecology, Evolution, and Natural Resources at Rutgers University. He specializes in the lichens of the mid-Atlantic region. His recent publications include lichen biodiversity surveys of Bowman's Hill Wildflower Preserve and Five Mile Woods in Bucks County and the Abbott Marshlands in Mercer and Burlington Counties in NJ. He is co-author, with James C. Lendemer of the NY Botanical Garden, of "A revised checklist of the lichenized, lichenicolous and allied fungi of New Jersey," published in 2019.

**Doug Wechsler** (Insects) is a naturalist, photographer and author. He is a lifelong birder, herper, and insect enthusiast, but his latest passion has been photographing flies. Doug worked at the Academy of Natural Sciences of Drexel University in Philadelphia where

he ran VIREO, the worldwide collection of bird photographs. When not involved in conservation and photography in Latin America, Doug is writing children's books about natural history.

**Leroy Tabb and Bill Keim** contributed photographs to iNaturalist that were used on the inside covers of this document.

**Diana Morris-Bauer** donated many hours to the challenging task of copy-editing this manuscript

Generic artwork without captions is from the public domain or was purchased from iStock clip art.



Please see the following publications for more information about the history of Honey Hollow and its stature as a National Historic Landmark:

Waring, P. Alston. *The Story of Honey Hollow and the Origins of the Conservation Movement in Pennsylvania*. The Honey Hollow Watershed Association, Charles Ingerman, Quixott Press, Doylestown, PA 1973.

Waring, P.A. - Farmer, New Hope, Bucks County, PA. *Teamwork to Save the Soil and Increase Production*. United States Department of Agriculture. Soil Conservation Service. Miscellaneous Publication # 486. 1942.

# Bucks County Audubon Society

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(215) 297-5880

Bucks County Audubon Society's mission is to educate and engage children and adults of the greater Bucks County region about our natural world, with an emphasis on conservation and stewardship, including the protection of birds, wildlife and habitats.

## Staff

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Diane Smith, Director of Education, dianesmith@bcas.org

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## Board of Directors, 2022-2023

President	Kalle Weeks
Vice President	Barb Caldwell
Vice President	James Mansfield
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Bucks County Audubon Society is a chapter of the National Audubon Society, 225 Varick Street, New York, NY 10014 and the regional Audubon Mid-Atlantic, 3401 Reservoir Drive, Philadelphia, PA 19121.

With thanks and appreciation for to a multitude of volunteers/citizen scientists  
Solebury Township Commissioners  
Aquetong Watershed Association  
Bucks County Commissioners



Black Vulture, juv., MJ; White-footed Mice, MJ; White-banded Crab Spider, MJ; Eastern Black Walnut, LC; Slender Bluet, PG; Common Garter Snake with American Toad, MJ; Black- and-White Warbler, PG; *Odontocorynus*, (weevil genus), BK; Bold Jumping Spider, DW

