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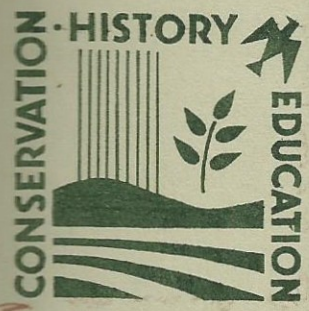

In a BUCKS CO. WATERSHED
... HONEY HOLLOW

Printed by the SOIL CONSERVATION SOCIETY OF AMERICA

Library of Congress Catalog Card Number: 72-190305

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HONEY HOLLOW WATERSHED
NATIONAL HISTORIC LANDMARK

CITATION by the
UNITED STATED DEPARTMENT of the INTERIOR

August 4, 1969 – HONEY HOLLOW WATERSHED CONSERVATION AREA, BUCKS COUNTY, PENNSYLVANIA. Established in 1939, the Honey Hollow Watershed Conservation Area was the first small upland watershed in agricultural use and multiple ownership to demonstrate that cooperative action, supported by Federal technical assistance, was a practicable method of achieving national goals in soil, water and wildlife conservation and flood prevention. As such, it served as a prototype for thousands of similar small watersheds throughout the Nation. Today, it remains a model of modern soil and water conservation. All the conservation measures introduced in the late 1930's - terraces, contour-plowed fields, diversion ditches, wildlife hedges, ponds and tree clumps - have been faithfully maintained in accordance with the original plans developed by the Soil Conservation Service. While the land use pattern has been modified somewhat, it remains substantially the same. All but one of the original buildings survive. The structures and grounds are maintained in excellent condition.

FOREWORD

If one surveys a map of the great Delaware River Basin, Honey Hollow Creek appears as a tiny element in the vast network of drainage streams feeding into the mighty Delaware River. But the meaning and value of Honey Hollow stretches far beyond its size.

The Honey Hollow Watershed is not an area of untouched, pristine wilderness. It shares with the surrounding reaches of the Delaware River Basin a long and rich cultural history. As one stands at the springs from which the waters of the stream emerge, one looks down on a gentle valley patterned with growing crops, pastures, woodlots, and ponds. This land has been used by modern man since the days of William Penn. On the whole, however, and especially in recent years, man has used the land well. He has learned to live with nature rather than to seek dominion over it. It is because man has sought to develop a lasting and mutually beneficial relationship with nature here by initiating in 1939 a complete watershed conservation program, the first farmer-undertaken watershed effort in the history of the United States, that this small area has been designated a National Historic Landmark by the United States Government.

The Honey Hollow Watershed Association plans to develop a Center for Outdoor Education on the Watershed. The lessons that have been learned by the people who live here are lessons from which we can all learn. As a first step in that direction, the Watershed Association has rightly asked itself, what are the components, the natural elements with which man has developed his harmonious relationship here? This is a preliminary report of the findings accumulated in striving to answer that question.

The findings reported here are the work of a number of highly qualified local naturalists. While they are preliminary in content, both singly and in totality they give us a fascinating picture of the Watershed. Each study begins with a brief descriptive narrative that sets it in context. That is then followed by a list of findings. These, in turn, attest to the richness of the setting of Honey Hollow.

The Association feels that this study, as an on-going effort, is giving it a depth of knowledge about the nature of the Watershed that is requisite in its efforts to establish a Center for Outdoor Education on the Watershed. We are proud to have the support of the highly qualified people who have given freely of their time and expertise to make this publication possible.

John C. Mertz

"Designation of any place or building in the United States as a National Historic Landmark is the greatest honor it can attain as a place of national historic value."

S. K. STEVENS, Chairman
Advisory Council on Historic Preservation

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"It is the distinct judgment of the National Audubon Society, Nature Planning Division, that the ... Honey Hollow Watershed has one of the most ideal concentrations of essential ingredients found anywhere in North America for a comprehensive outdoor education program."

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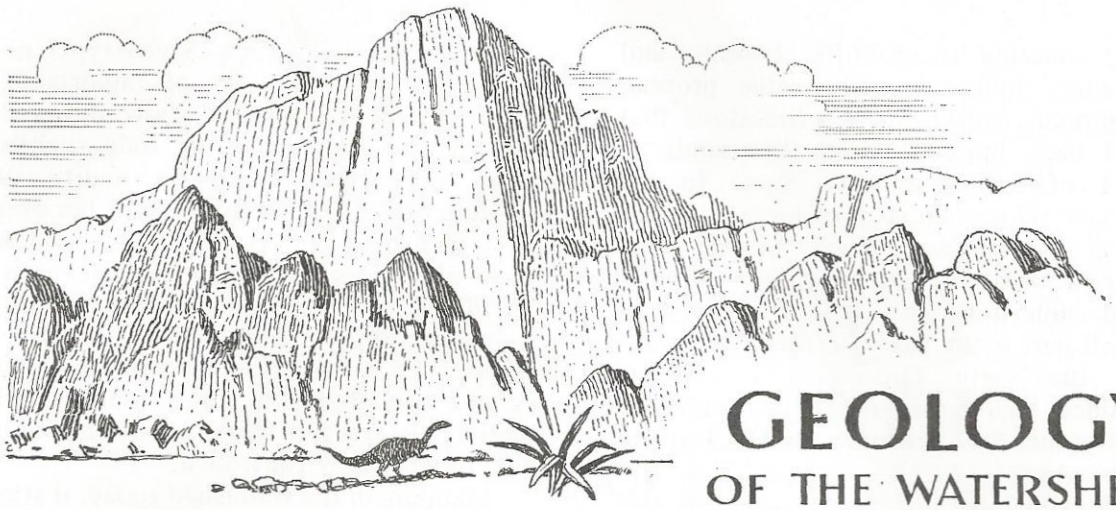
"In a day of environmental crisis, Honey Hollow provides more than a glimpse of the nation's past but, uniquely, a vision of its future."

From a report to the Advisory Council on
Historic Preservation by the National Park Service



GEOLOGY OF THE WATERSHED

CHARLOTTE GANTZ – Naturalist and Author

Bucks County lies within three major physiographic provinces. Its northwestern corner is part of the Reading Prong of the Blue Ridge that extends from Georgia to Massachusetts. The southern part is within the Coastal Plain. In between, stretches the Piedmont Upland, rolling countryside with basement rock that is partly crystalline, partly limestone of pre-Cambrian and early Paleozoic age—much of it formed when this area was covered by the sea. The Honey Hollow Watershed is in this middle section.

Long after the sea had retreated, crustal disturbances in the late Triassic (roughly 170 to 180 million years ago) resulted in the formation of a trough extending from the Hudson River in New York, through New Jersey and Pennsylvania to Maryland. This trough cut through what is now the Piedmont Upland in Bucks County and formed a depression thirty-two miles wide. At times some of this basin was marshland; at times (as the reddish shale and soil tell us) it was arid--possibly desert country. Sediment was carried into it from the Appalachians, which were then much higher, and the trough was gradually filled with Triassic shale and sandstone, covering completely the original Cambrian and pre-Cambrian formations. Part of the Honey Hollow Watershed is situated on Stockton sandstone, formed from this Triassic sediment.

Crustal unrest in the late Triassic also brought about a great deal of igneous activity. There were no volcanic explosions in our area, but molten lava welled up in cracks just below the surface, forming dikes and sills that cut through the sedimentary rock in many parts of the county. (When the flow is vertical it's called a dike; when horizontal, it's a sill, and while we speak of "cracks", these fissures can be hundreds of feet--even a mile or more in width.) Erosion over the years exposed much of this igneous rock, and because it was more resistant than sandstone or shale, it finally dominated the landscape in hills and ridges. Bowman's Hill, Jericho Mountain, Solebury Mountain, Haycock Mountain – all had such an origin.

The third event responsible for our present scenery was again part of this general disturbance. Massive faulting took place: large blocks of rock broke off from the parent rock and were pushed upward, the throw reaching in places 10,000 feet

and creating steep cliffs. Erosion and levelling followed, and in the process, Cambrian and Ordovician limestone that had been buried beneath thousands of feet of sandstone again came to the surface. One such strip of limestone runs from the Delaware River through Solebury township to Buckingham Mountain; and while most of it is late Cambrian, a small part is the Beekmantown formation of the early Ordovician—a massive-bedded, high-magnesium, non-fossiliferous limestone. Part of Honey Hollow rests on this rock.

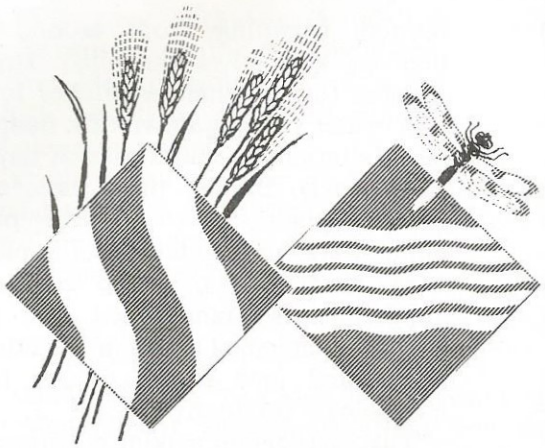
Buckingham Mountain, created by this faulting, was more resistant than other parts of the strip, being Cambrian quartzite rather than limestone, and it was able to maintain some elevation. When erosion did take place, large pebbles of quartz and quartzite were transported,probably by an acient stream, across Solebury township. Many were dropped en route and became consolidated into conglomerate forming a ridge which still exists. This, too, enters into the Honey Hollow Watershed.

As a result, we have three types of rock here: Stockton sandstone first, Ordovician limestone intruding into the Stockton, and finally quartzite from one end of the intrusion carried into the Stockton and forming Stockton conglomerate. Igneous rock can be found nearby, but not within the watershed.

The character of the soil is determined by the underlying rock. Seven types occur, but only two are of importance. Duffield silt loam, found above the limestone, is quite fertile and only slightly acid. (Limestone moderates acidity, of course.) Edgemont gravelly loam lies over the sandstone and conglomerate, and is acid as well as low in nutrient elements. Acid soil is widespread in the county and what one expects over Triassic sandstone. Limestone is often highly permeable and carries polluted flow into underground waters. Because of this, sewage disposal has to be strictly controlled.

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 in Greece or Paracutin in Mexico, and later it was the site of a racing torrent. It seems extraordinary that events 450 millions 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.



SOIL & WATER OF HONEY HOLLOW

MERVIN S. SKILES – District Conservationist, U.S. Soil Conservation Service
MALCOLM P. CROOKS – Program Advisor, National Assn. of Conservation Districts

Soil and water are basic natural resources. They are essential for life. Neither industrialization, nor technology nor sophisticated formulations of food and fiber compounds can remove us from dependence upon the productivity of our soils for our food, clothing and housing.

What is soil? Simply, it is the product of weathered rock, together with organics, micro-organisms, water and air. Soils vary widely in character and productivity. There are some 5,000 different soils which have been classified in the United States. In the 700 acre Honey Hollow Watershed alone, 22 different soils have been mapped. Soils are formed over a very long period during which temperature changes, freezing and thawing, wetting and drying, combined with the action of plant roots, lichens, micro-organisms and chemical reactions, break the original solid rock into smaller and smaller pieces. Some of the minerals are absorbed by water. The first few hardy plants die, leaving an organic residue which is the medium for succeeding generations of plants and increasing numbers of biological communities. Top soil is characterized by large amounts of organic materials and all the biological life that goes with it. Organic material gives the surface soil its characteristically dark color, its sponge-like quality and holds that all important element, nitrogen, in the soil.

The inorganic portion of the soil only amounts to about half the volume of normal soil. Organic material (humus), air and water make up the remainder. Soil particles are classified into three size categories (rocks and gravels are larger and usually not classified as soil particles). Sand is the largest soil particle, silt next and clays are the smallest. Almost all soils have a combination of all three size particles, but the percentage of each varies soil by soil, and in the sedimentary soils, almost foot by foot. Picture, if you will, a magnified cross-section of a soil with soil particles of various sizes. Sands (the largest) will allow water to trickle through faster than do clays because of the larger air spaces between the sand particles. On the other hand, clays have more total surface area by volume so we naturally find more chemical reactions taking place

in clay soils than in sands. Another reason for this is that clays contain a greater variety of minerals and chemical compounds than sands or silts. Soils are the medium for and a part of untold combinations of chemical and bio-chemical reactions. Using large amounts of organics in farming and gardening is sound, but let none be deceived that chemicals are foreign to the soil or to biological life - they are the substance of both.

The Honey Hollow lands were first farmed about 1700. They produced bountifully as evidenced by the fine, substantial stone houses and barns. But the methods of tilling which were successful in the gentle rainfall lands of England were not suitable to the climate and topography of eastern America. Erosion slowly took its toll. With the coming of machinery to the farm, more intensive cultivation was possible, hardpans were formed by the heavier equipment and erosion accelerated. This is why the Honey Hollow soil conservation project was initiated by the farmers of the Watershed. Hundreds of tons of valuable topsoil had been washed from a few hundred acres in the upper portion to the seven-acre marsh on the old Waring farm. Here it lay, up to three feet in depth, never again to produce corn or wheat or vegetables.

By the late 1930's, Alston Waring became concerned about the sediment and erosion damage he saw occurring on his farm (now the Phillips farm) and asked the U.S. Soil Conservation Service for advice. After surveying his farm and the lands upstream, they recommended that Mr. Waring's problems could only be solved if the other landowners in the Watershed cooperated to control rainfall runoff, hence the erosion and deterioration of all of their lands. Most of the landowners agreed and various water control practices were installed: Contour farming (planting crops around rather than up and down the hills); Diversion terraces (broad, shallow ditches to intercept water running downhill); Strip cropping (alternating plantations of hay, corn and wheat). Besides these basic erosion control practices, trees were planted, ponds were constructed, wildlife plantings were made. All of these conservation improvements transformed the Honey Hollow Watershed from a deteriorating agricultural area to one which became increasingly productive.

The first step in making a soil conservation plan is to inventory the kinds of soil, the topography and the amount of topsoil remaining. Each soil has its own characteristics of productivity, water holding capacity, drainage of water through it, erodibility and so forth. Topography is important because the steeper the slope, the more readily water will run off, instead of seep into, the soil. The depth of topsoil is an indication of erosion history and influences the water holding capacity of the soil. The soil survey and mapping of the Honey Hollow Watershed, done by the U.S. Soil Conservation Service serves as the foundation for their recommendations on how to conserve water and to minimize erosion here.

Before proceeding to their soil classifications, brief mention should be made about Honey Hollow streams. The principal springs lie in the upper reaches, in the sandstone formations. The two main branches join just south of Audubon Lake. While both branches flow year long, the streambed of a lower segment of the western stream usually dries up each summer. Flowing water above and below this portion of the stream indicates that it flows underground through this lower portion. Average annual rainfall is about 45 inches, plus or minus up to 15 inches in any particular year. Precipitation is fairly evenly distributed during each

month of the year, with August and July usually being the months of highest rainfall. There are no natural lakes in the Watershed, but there are three marshes and six man-made ponds.

The southern half of Honey Hollow is a valley and the soils are derived from the ancient Cambrian and Ordovician limestones, among the oldest of the earth's crustal materials. These tend to be alkaline and hold water more readily in times of drought. On the other hand, soils such as Lansdale and Steinsburg, which are formed from the sedimentary rocks from the Triassic period and are in the upper half of the Watershed, are more acid and better drained, but droughtier.

* * * * *

More specific qualities of the soils are listed in the Soil and Water Management Recommendations for the Honey Hollow Watershed and summarized below. This study categorizes the soils found in this watershed into five groups:

Steep soils with slopes greater than 15%
Deep, somewhat poorly to very poorly drained
Deep, moderately well drained soils
Deep, well drained soil, 0 to 15% slopes
Moderately deep, well drained soils.

The following is an explanation of these five groups:

1. STEEP SOILS WITH SLOPES GREATER THAN 15%

This grouping contains deep to moderately deep, (20" or more to bedrock) well drained soils (36" or more seasonal high water table) with slopes of 15 to 35%. The primary limiting factor on these soils is the slope.

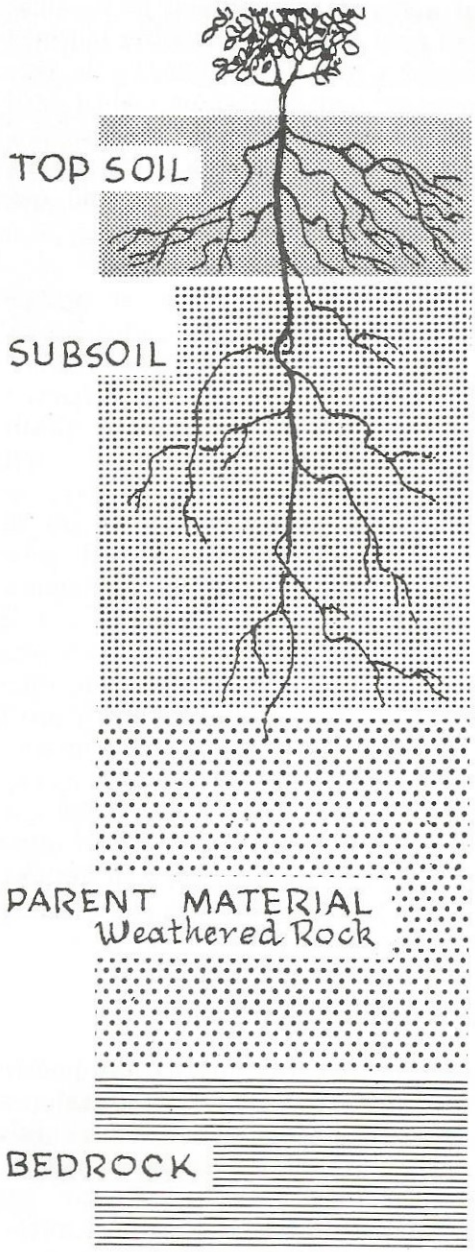
2. DEEP, SOMEWHAT POORLY TO VERY POORLY DRAINED

This grouping contains deep, (36" or more to bedrock) somewhat poorly to very poorly drained soils (20" or more seasonal high water table) on floodplains and upland with slopes of 0 to 15%. The primary limiting factor on these soils is the high water table (which ranges from 0 to 20" during the wet season of the year).

These soils are generally not suited for crops or pasture because of the problem of wetness. These soils are suited for selected woodland types and are generally well suited for wetland wildlife. On slopes of 0 to 8%, these soils are well suited for development of ponds and dams.

3. DEEP, MODERATELY WELL DRAINED SOILS

This grouping contains deep, (36" or more to bedrock) moderately well drained soils (18" or more seasonal high water table) with slopes of 0 to 15%. The primary limiting



factor which will affect use on these soils is the depth to high water table (18 to 24") during the wet seasons of the year.

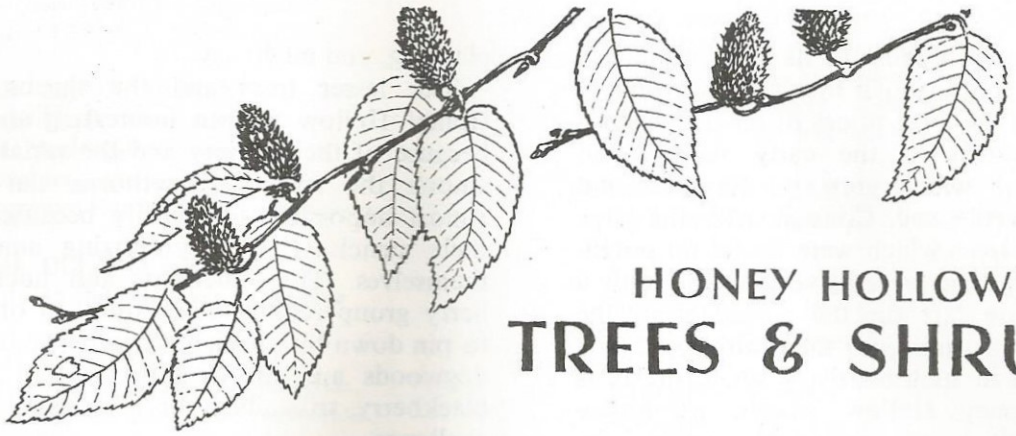
These soils are best suited for corn, wheat and hay. They are generally unsuited for such crops as alfalfa and potatoes. There will be some difficulties with timeliness of farming operations on these soils because of wetness in the early spring. Drainage may be needed in order to profitably crop these soils. These soils are well suited for permanent hayland or pasture, woodland and wildlife.

4. DEEP, WELL DRAINED SOILS, 0 TO 15% SLOPES

This grouping contains the deep, (36" or more to bedrock) well drained upland soils (36" or more seasonal high water table) on a 0 to 15% slope. These soils are generally very well suited for crops such as row crops, small grains, grass and legume hay. Slope and erosion are the primarily limiting factors for use as cropland. The grouping is also well suited for pasture, woodland, open and woodland wildlife.

5. MODERATELY DEEP, WELL DRAINED SOILS

This grouping contains moderately deep, (18 to 36" to bedrock) well drained upland soils (36" or more seasonal high water table) on slopes of 3 to 15%. The primarily limiting factors which will affect use on these soils are depth and slope. These soils are well suited to row crops, small grains and grass and legume hay. They are also well suited for pasture, woodland and open and woodland wildlife.



HONEY HOLLOW'S TREES & SHRUBS

LESTER S. THOMAS – Formerly Chief Naturalist, Bucks County Park Board

The original forest of southeastern Pennsylvania was largely hardwood, with some pine on the sandy uplands and hemlock on the north slopes. By hardwoods, we mean the deciduous trees as distinct from the evergreens. Foresters termed the old forest of the Piedmont, such as that in the Honey Hollow Watershed, as an oak-chestnut-hickory type. The term can still pertain after three hundred years and more of the white man's tenure here. The chestnut is gone as a tree, of course, and there are other species besides the type families. Now, as then, there are black birch, ash, beech, elm, maple and others, but the oaks and hickory are still the indicator species.

Every settler had his woodlot, of necessity. As the original forest was removed to make room for pasture and crops, there was always left a generous piece of woodland, usually on the least tillabel portion of the farmstead. The new homes and barns were built from the cleared timber. Later cutting for firewood, fencing, tools, and additional outbuilding construction was made from these reserved woodlots. Our first settlers lived in what has been called the "wooden age," at least on the back country farms. Every kind of tree and shrub seemed to have its specific use, and by trial and error the farmers found their respective virtues. But fuel was the top priority. To heat the early homes of our forebears, even with their low ceilings, required many cords of hickory, oak and maple (these were the best for heating and for cooking as well).

The early farmer, once his fields were clear of trees and brush, would sometimes leave a large elm or other tree in the pasture as shade for his horses and cattle. Occasionally the pasture fence would be run into the edge of the woods for the same reason. Even today we can find a number of isolated trees which offer welcome shade and protection, not only to pastured stock, but to the weary and perspiring human.

The former woodlots of the Watershed, which in most cases may be termed "forests" because of their present extent, an unique in that, in spite of generations of wood-cutters, the locations and numbers of species are the same. There have been a few introductions, but these are mainly at the edge of the woodlots. The native chestnut was once a principal forest tree here, but the blight which arrived in the first decade of this century has killed all the larger trees and still destroys the sprouts which continue to spring from the old stump roots. The black walnut is

sparse now because of its great value as a timber tree through the years; it probably brought the best prices of all. The walnut was known in the early days as an indicator which grew on the best and most fertile soil. Consequently the large walnut trees which were found on potential crop land were harvested early; only a few were left on the perimeter of the field, we surmise, for their nut crop.

Even in such relatively small forests as the Honey Hollow woods, we notice preferences of individual species for specific exposure, moisture, and other soil factors. Some like the north slope, others the south, and several do not seem to care. The chestnut or mountain oak, for instance, is found with few exceptions only in shallow, agriculturally poor soil of the ridge, while the red maple and sycamore, as examples, prefer the soils to be well-watered and deep. The tuliptree, known also as tulip-poplar, is found where the soil is rich, but not necessarily wet. The hemlock does best in a northern exposure. The sassafras might be found in a number of fertile spots, but one can almost be sure to find it plentiful along a fence row, with wild berries and a few red cedars as companions. Seed and fruit-eating birds perch and nest in fence rows, and the sassafras and others are of their planting, you might say.

The lesser trees and the shrubs of Honey Hollow are an interesting study because of their variety and the variation among the species. Hawthorns can be almost impossible to identify because of their penchant for hybridizing among themselves. The blueberry and huckleberry group require close study in order to pin down the species in hand. The bush dogwoods are not as difficult, but the blackberry tribe, high or low, can be a challenge.

Few small forests are as challenging for study as those found at Honey Hollow. One reason is because they have never been cut clean. From present indications, the cutting of timber and fire wood has been a selective operation through all the years of human occupation. And the fires that may have ravaged the woodlands -- there are some very old signs -- were apparently of short duration and small extent. Therefore, today's woods walker is fortunate to find the Honey Hollow woods basically the same as when the forest first heard the sound of an axe. The really big and so-called "virgin" trees are long gone, but their descendants still hold the soil on the ridges, offer sanctuary to wildlife and color the landscape as the seasons dictate.

The following is a preliminary list of trees, shrubs, and woody vines found in the Honey Hollow Watershed. More species will undoubtedly be added in future investigations, and specific identifications will be confirmed or corrected. Common names used are those of the United States Forest Service or in current usage among local botanists and naturalists. Technical names are those of the Forest Service or Gray's Manual of Botany (latest edition).

THE PINE FAMILY
Eastern White Pine - *Pinus strobus*
Scotch Pine - *Pinus sylvestris*
Eastern Hemlock - *Tsuga canadensis*
Red Cedar - *Juniperus virginiana*

THE WILLOW FAMILY
Eastern Cottonwood - *Populus deltoides*
Black Willow - *Salix nigra*
Weeping Willow - *Salix babylonica*
Pussy Willow - *Salix discolor*
Willow - *Salix spp.*

THE WALNUT FAMILY
Black Walnut - *Juglans nigra*
Bitternut Hickory - *Carya cordiformis*

Shagbark Hickory - *Carya ovata*
Pignut Hickory - *Carya glabra*

THE MAPLE FAMILY
Sugar Maple - *Acer saccharum*
Red Maple - *Acer rubrum*
Boxelder - *Acer negundo*
Sycamore Maple - *Acer pseudo-platanus*

THE OLEASTER FAMILY
Autumn Olive - *Elaeagnus Umbellata*

THE DOGWOOD FAMILY
Flowering Dogwood - *Cornus florida*
Pagoda Dogwood - *Cornus alternifolia*
Gray Dogwood - *Cornus Paniculta*
Tupelo - *Nyssa sylvatica*

THE HEATH FAMILY
Pink Azalea - *Rhododendron nudiflorum*
Rosebay Rhododendron - *Rhododendron maximum*
Mountain Laurel - *Kalmia Latifolia*
Dwarf Huckleberry - *Gaylussacia dumosa*
Deerberry - *Vaccinium stamineum*
Lowbush Blueberry - *Vaccinium pennsylvanicum*
Highbush Blueberry - *Vaccinium corymbosum*

THE OLIVE FAMILY
White Ash - *Fraxinus americana*
Regal Privet - *Ligustrum obtusifolium*

THE HONEYSUCKLE FAMILY
Tartarian Honeysuckle - *Lonicera tartarica*
Japanese Honeysuckle - *Lonicera japonica*
Arrow-wood - *Viburnum acerifolium*
Arrow-wood - *Viburnum recognitum*
Black-haw - *Viburnum prunifolium*
Elder (Elderberry) - *Sambucus canadensis*
American Cranberry-bush - *Viburnum trilobum*

THE WITCH–HAZEL FAMILY
Witch-hazel - *Hamamelis virginiana*

THE SYCAMORE FAMILY
American Sycamore - *Platanus occidentalis*

THE ROSE FAMILY
Apple - *Pyrus spp.*
Allegheny Serviceberry - *Amelanchier laevis*
Hawthorn - *Crataegus spp.*
Black Cherry - *Prunus serotina*
Purple-flowering Raspberry - *Rubus odoratus*
Black Raspberry - *Rubus occidentalis*
Dewberry - *Rubus procumbens*
Mountain Blackberry - *Rubus allegheniensis*
Multiflora Rose - *Rosa multiflora*

THE LEGUME FAMILY
Black Locust - *Robinia pseudoacacia*

THE CASHEW FAMILY
Staghorn Sumac - *Rhus typhina*
Poison-ivy - *Rhus radicans*

THE VINE FAMILY
Fox Grape - *Vitis labrusca*
Virginia Creeper - *Parthenocissus quinquefolia*
American Bittersweet - *Celastrus scandens*

THE HOLLY FAMILY
American Holly - *Ilex opaca*
Winterberry - *Ilex verticillata*

THE BIRCH FAMILY
Sweet Birch - *Betula lenta*
Common Alder - *Alnus serrulata*

THE BEECH FAMILY
American Beech - *Fagus grandifolia*
White Oak - *Quercus alba*
Chestnut Oak - *Quercus prinus*
Northern Red Oak - *Quercus rubra*
Pin Oak - *Quercus palustris*
Scarlet Oak - *Quercus coccinea*
Black Oak - *Quercus velutina*

THE ELM FAMILY
American Elm - *Ulmus americana*

THE MULBERRY FAMILY
Red Mulberry - *Morus rubra*

THE MAGNOLIA FAMILY
Yellow Poplar - *Liriodendron tulipefera*

THE BARBERRY FAMILY
Barberry - *Berberis spp.*

THE LAUREL FAMILY
Sassafras - *Sassafras albidum*
Spicebush - *Lindera benzoin*

FLOWERING HERBACEOUS PLANTS

GROWING IN THE WATERSHED

DAVID E. BENNER —Instructor, Ornamental Horticulture Dept., Delaware Valley College

Herbaceous plants are those whose leaves and stems die back to the ground each year, most of them being perennial. In this group of plants we find most of our native and introduced wild flowers. Some of our native wild flowers have not only exquisite beauty but fragrances that cultivated garden flowers cannot match. If you have never smelled the delicate perfume of the Mayflower or Trailing-arbutus in late March or early April, you have missed something wonderful.

But let us not be content with the beauty and fragrance of the flowers, for many of these plants have fragrant stems, leaves and roots. Wild Ginger roots have a pleasant ginger flavor and make delicious candied ginger when boiled in sugarwater. The leaves and stems of the wild Bergamots or Beebalms have a strong minty odor and produce a tasty tea. Mayapple fruits are ripe when soft in the fall. They smell like ripe grapes and make an amber-colored marmalade that is ambrosia. Pokeberry shoots in early spring are as good as or better than Asparagus with no unpleasant odor afterwards. Many other plants are edible, especially those not-native to Pennsylvania.

Aside from being edible, a great number of our plants have medicinal uses, some authentic and others mere superstition. A few are poisonous and should be avoided such as the False Hellebore and the root of the Mayapple. This root was used to commit suicide by the Lenni-Lenape Indians, the Indian name being koopoh. Braves and Warriors would use this rather than be taken prisoner by hostile tribes.

If we eliminate man from the picture for a moment, what value do wild flowers have in Nature? Here again, much could be said, but a few examples will suffice. The flowers produce nectar for insects and birds. Seeds provide food for small rodents and birds. The plants themselves often help control erosion. There are many woods in this general area of Bucks County that are thickly carpeted with Mayapples from spring until early fall. What could be better than having thousands of small umbrellas in a small woods to help prevent soil erosion from heavy

summer rains? When late fall arrives, the tough, long rhizomes (roots) of this plant also help prevent erosion because they often grow on top of or just beneath the soil surface.

In lowland areas where flooding often occurs, plants such as Cattails and Lizard-tail help present soil and banks from being washed away.

Here then, are a few reasons why wild flowers are important. It is hoped that this short introduction will spur the reader to further investigate the uses and importance of this group of plants and the native flora of Honey Hollow.

Some of the plants in the following list might be considered weeds by certain people. What is a weed, anyway? Emerson said, "A weed is a plant whose virtues we have not yet discovered." According to the dictionary, it is any undesired, uncultivated plant growing in profusion so as to crowd out a desired crop. Gray's Manual lists a weed as a troublesome or aggressive plant growing where not wanted.

It would seem that our most obnoxious plants are non-native. Two classic examples would be the Canada Thistle and Japanese Honeysuckle. Both of these were introduced by man into the United States.

All of the plants in the two preliminary lists that follow are typical for central Bucks Co. except for a few species which are now rare in this area.

Ageratum, Wild White, or Snow Snakeroot - *Eupatorium rugosum*
Anemonella or Rue Anemone - *Anemonella thalictroides*
Arrowhead - *Sagittaria latifolia*
Aster, Blue Wood - *Aster cordifolius*
Aster, New England - *Aster novae-angliae*
Aster, White Wood - *Aster divaricatus*
Avens, White - *Geum canadense*
Bindweed, Hedge, or Wild Morning Glory - *Convolvulus sepium*
Bloodroot - *Sanguinaria canadensis*
Blue-eyed-grass - *Sisyrinchium gramineum*
Blueflag Iris - *Iris versicolor*
Bluets or Quaker Ladies - *Houstonia caerulea*
Boneset - *Eupatorium perfoliatum*
Burdock, Common - *Arctium minus*
Buttercup, Bristly - *Ranunculus bispidus*
Buttercup, Kidney-leaf - *Ranunculus abortivus*
Butterflyweed - *Asclepias tuberosa*
Cardinalflower - *Lobelia cardinalis*
Cat-tail - *Typha latifolia*
Citronella Horsebalm - *Collinsonia canadensis*
Cohosh Bugbane or Fairy-candles - *Cimicifuga racemosa*
Columbine, Wild - *Aquilegia canadensis*
Cynthia - *Krigia amplexicaulis*
Duckweed, Lesser - *Lemna minor*
Dutchmans-breeches - *Dicentra cucullaria*
Enchanters Nightshade - *Circaea latifolia*
Evening-primrose - *Oenothera biennis*
Fairy-candles or Cohosh Bugbane - *Cimicifuga racemosa*
Field Pussytoes - *Antennaria neglecta*
Five-finger Cinquefoil - *Potentilla canadensis*
Fleabane, Common - *Erigeron philadelphicus*
Fleabane, Daisy - *Erigeron ramosus*
Goldenrod, Canada - *Solidago canadensis*
Goldenrod, Downy - *Solidago puberula*
Goldenrod, Early - *Solidago juncea*
Goldenrod, Flat-topped - *Solidago graminifolia*
Goldenrod, Giant - *Solidago gigantea*
Goldenrod, Gray-stemmed or Dwarf - *Solidago nemoralis*
Goldenrod, White - *Solidago bicolor*
Goldenrod, Wreath - *Solidago caesia*
Goldenrod, Wrinkled - *Solidago rugosa*
Goldeye Grass - *Hypoxis birsuta*
Hawkweed, Rough - *Hieracium scabrum*
Hawkweed, Veined - *Hieracium venosum*
Hellebore, White - *Veratrum viride*
Hemp Dogbane - *Apocynum cannabinum*
Indian-pipe - *Monotropa uniflora*
Indian-tobacco - *Lobelia inflata*
Iris, Blueflag - *Iris versicolor*
Ironweed - *Vernonia noveboracensis*
Jack-in-the-pulpit - *Arisaema triphyllum*
Jerusalem Artichoke - *Helianthus tuberosus*
Jewelweed or Touch-me-not - *Impatiens biflora*
Joe-pye-weed - *Eupatorium purpureum*

Jumpseed - *Tovara virginiana*
Ladyslipper, Pink - *Cypripedium acaule*
Lesser Duckweed - *Lemna minor*
Loosestrife, Whorled - *Lysimachia quadrifolia*
Marshmarigold - *Caltha palustris*
Mayapple - *Podophyllum peltatum*
Meadowrue, Tall - *Thalictrum polygamum*
Meadow Sneezeweed - *Helenium autumnale*
Milkweed, Common - *Asclepias syriaca*
Milkweed, Swamp - *Asclepias incarnata*
Monkeyflower - *Mimulus ringens*
Morning Glory, Wild, or Hedge Bindweed - *Convolvulus sepium*
Mountain Woodsorrel - *Oxalis montana*
Partridgeberry - *Mitchella repens*
Pasture Rose - *Rosa carolina*
Pepper-root or Toothwort - *Dentalia laciniata*
Pokeberry - *Phytolacca americana*
Poor-robins-plantain - *Erigeron pulchellus*
Quaker Ladies or Bluets - *Houstonia caerulea*
Rue Anemone or Anemonella - *Anemonella thalictroides*
Saxifrage, Early - *Saxifraga virginiensis*
Sensitive Plant - *Cassia nictitans*
Skunkcabbage - *Symplocarpus foetidus*
Sneezeweed, Meadow - *Helenium autumnale*
Snow Snakeroot or Wild White Ageratum - *Eupatorium rugosum*
Solomon-plume - *Smilacina racemosa*
Spikenard, American - *Aralia racemosa*
Spotted St. Johnswort - *Hypericum punctatum*
Springbeauty - *Claytonia virginica*
Strawberry, American - *Fragaria vesca v. americana*
Striped Pipsissewa - *Chimaphila maculata*
Tall Thistle - *Cirsium altissimum*
Toothwort or Pepper-root - *Dentaria laciniata*
Touch-me-not or Jewelweed - *Impatiens biflora*
Trailing-arbutus - *Epigaea repens*
Troutlily - *Erythronium americanum*
Turtlehead - *Chelone glabra*
Venus Looking-glass - *Specularia Perfoliata*
Violet, Common Purple - *Viola sororia*
Violet, Marsh - *Viola cucullata*
Violet, Smooth Yellow - *Viola Pensylvanica*
Violet, Southern Wood - *Viola Hirsutula*
Virginia Mountain-mint - *Pycnanthemum virginianum*
White Hellebore - *Veratrum viride*
Whorled Loosestrife - *Lysimachia quadrifolia*
Wild Geranium - *Geranium maculatum*

INTRODUCED AND NATURALIZED FLOWERING HERBACEOUS PLANTS

Arnica or Fall Dandelion - *Leontodon autumnalis*
Black-eyed-Susan - *Rudbeckia hirta*
Bladder Campion - *Silene cucubalus*
Bouncing-bet or Soapwort - *Saponaria offincinalis*
Butter-and-eggs - *Linaria vulgaris*
Buttercup, Creeping - *Ranunculus repens*
Canada Thistle - *Cirsium arvense*
Catnip - *Nepeta cataria*
Celandine - *Chelidonium majus*
Chamomile, Wild - *Matricaria maritima*
Chicory - *Cichorium intybus*
Corn-cockle - *Agrostemma githago*
Creeping Buttercup - *Ranunculus repens*
Creeping Thyme - *Thymus serpyllum*
Crowsfoot-trefoil - *Lotus corniculatus*
Daisy, Field - *Chrysanthemun leucanthemum*
Dandelion, Common - *Taraxacum officinale*
Dandelion, Fall, or Arnica - *Leontodon autumnalis*
Daylily, Common Orange - *Hemerocallis fulva*
Deptford Pink - *Dianthus armeria*
Garlic - *Allium sativum*
Garlic, Field - *Allium vineale*
Garlic Mustard - *Alliaria officinalis*
Grape-hyacinth - *Muscari botryoides*
Hemlock, Poison - *Conium maculatum*
Johnny Jump-up - *Viola tricolor*
Loosestrife, Willow - *Lythrum salicaria*
Mullein - *Verbascum thapsus*
Mullein, Moth - *Verbascum blattaria*
Mustard, Black or Wild - *Brassica nigra*
Penstemon, White - *Penstemon digitalis*
Periwinkle - *Vinca minor*
Poison Hemlock - *Conium maculatum*
Queen-Annes-lace or Wild Carrot - *Daucus carota*
Roving Bell-flower - *Campanula rapunculoides*
Self-heal - *Prunella vulgaris*
Soapwort or Bouncing-bet - *Saponaria officinalis*
Spearmint - *Mentha spicata*
Sweet-clover, White - *Melilotus alba*
Sweet-clover, Yellow - *Melilotus officinalis*
Teasel - *Dipsacus sylvestris*
Thyme, Creeping - *Thymus serpyllum*
Wild Carrot or Queen-Annes-lace - *Daucus carota*
Wild Rocket - *Hesperis matronalis*
Willow Loosestrife - *Lythrum salicaria*
Yarrow, Common - *Achillea millefolium*

FLOWERING HERBACEOUS PLANTS – 1977 ADDITIONS

NATIVE

Rough avens - *Geum virginianum*
Long-leaved chickweed - *Stellaria longifolia*
Star chickweed - *Stellaria pubera*
Cleavers - *Gallium aparine*
Yellow wood sorrel - *Oxalis europaea*
Violet wood sorrel - *Oxalis violacea*
Pinesap - *Monotropa hypopithys*
Moccasin-flower - *Cypripedium acaule*
Whorled pogonia - *Isotria verticillata*
Common cinquefoil - *Potentilla simplex*
Sweet goldenrod - *Solidago odora*
Naked-flowered tick-trefoil - *Desmodium nudiflorum*
Northern willow-herb - *Epilobium glandulosum*
Great lobelia - *Lobelia siphilitica*
Herb-Robert - *Geranium robertianum*
Carolina cranesbill - *Geranium carolinianum*
Horse-nettle - *Solanum carolinense*
Common ragweed - *Ambrosia artemisiifolia*
Great ragweed - *Ambrosia trifida*
Small white aster - *Aster vimineus*

INTRODUCED

Common buttercup - *Ranunculus acris*
Mouse-ear chickweed - *Cerastium vulgatum*
Lesser stitchwort - *Stellaria graminea*
White clover - *Trifolium repens*
Alsike clover - *Trifolium hybridum*
Red clover - *Trifolium pratense*
Hop clover - *Trifolium agrarium*
Cow-cress - *Lepidium campestre*
Gill-over-the-ground - *Glechoma hederacea*
King devil - *Hieracium pratense*
Mayweed - *Anthemis cotula*
Field mustard - *Brassica rapa*
Shepherd's purse - *Capsella bursa-pastoris*
Dead nettle - *Lamium alba*
Common plantain - *Plantago major*
English plantain - *Plantago lanceolata*
Sheep sorrel - *Rumex acetosa*
Bird's eye speedwell - *Veronica chamaedrys*
Corn speedwell - *Veronica arvensis*
Star of Bethlehem - *Ornithogallum umbellatum*
Wild madder - *Galium mollugo*
Scarlet pimpernel - *Anagallis arvensis*
Crown vetch - *Coronilla varia*
Hairy vetch - *Vicia villosa*

MAMMALS
OF THE WATERSHED

DONALD FITTING – Lifetime Observing Naturalist
GEORGE CARMICHAEL – Science Curriculum Chairman and
Biology Teacher, Pennbury School District

When the first Europeans settled this land, they found nearly unbroken forests which not only interfered with agriculture but appeared ominously threatening. The presence of wolves, bears, cougars, and bobcats seemed to verify their fears. From the first the settlers slaughtered these animals, plus buffalo, elk, deer and a host of smaller mammals senselessly, not just for fur or food but often in a frenzy to eliminate every trace of wilderness. Much of the Indian's anger at the white man was caused by this slaughter of game.

Of course, beaver, otter, mink, fox, raccoons and other mammals were valued for their pelts, so as the fear of the wilderness subsided, the trapping of the native mammals continued as the fur trade grew. Some mammals profited by the destruction of the shady forests. More sunlight reaching the ground stimulated the growth of grasses, herbs, and shrubs not to mention man's crops, providing more food for woodchucks, rabbits, and a host of small rodents. In addition to better habitat, the elimination of many of their natural enemies caused their population to increase to the point where they often became pests.

When game and fur mammals came to the brink of extinction, ideas of conservation began to grow. It was too late in the East for elk, buffalo, wolves, and cougars but deer, re-introduced, protected, and provided with the more favorable open habitat, thrived. Today with man the only important predator, they often become pests, damaging crops and their own environment – even starving in large numbers in snowy winters.

Other mammals are often very adaptable, taking advantage of our sloppiness and feeding on our garbage. Two natives, the raccoon and the opossum, and man's two "fellow-travelers", the brown rat and the house mouse, have more than held their own. The latter two species have increased and spread throughout the world whever Europeans have gone, to become the dominant wild mammals in our cities and farms.

Many mammals (mice, voles, and shrews, for example) by virtue of their small size and nocturnal habits seldom attract attention. Further, most mammals reproduce very rapidly. If it were not for the fact that these small mammals provide food for snakes, hawks, owls as well as other mammals, we should be overrun

with them (as indeed occasionally happens). Today as with most other forms of life the destruction of natural habitats poses the greatest threat to a continued variety of native wild mammals and at the same time favors a very few species not entirely welcomed by man.

Mammals are characterized by possession of hair (sometimes very sparse), milk glands (mammae), and usually constant body temperature control. This category includes ourselves.

* * * * *

The following preliminary list includes species of wild mammals which (based on known range) might occur in Honey Hollow Watershed. Those marked by a double asterisk have been verified. Those not verified but most likely present are indicated by a single asterisk. The status of the rest is uncertain, though they are species known to be present in Bucks County.

MARSUPIALS

**Opossum - *Didelphis marsupialis*

INSECT–EATING MAMMALS

*Masked Shrew - *Sorex cinereus*
Smoky Shrew - *Sorex famies*
*Least Shrew - *Cryptotis parva*
**Shorttail Shrew - *Blarina brevicauda*
**Starnose Mole - *Condylura cristata*
**Eastern Mole - *Scalopus aquaticus*
Hairytail Mole - *Parascalops breweri*

BATS

*Keen Myotis - *Myotis keeni*
**Little Brown Myotis - *Myotis lucifugus*
*Small-footed Myotis - *Myotis subulatus*
*Silver-haired Bat - *Lasionycteris noctivagans*
*Eastern Pipistrel - *Pipistrellus subflavus*
*Big Brown Bat - *Eptesicus fuscus*
*Red Bat - *Lasiurus borealis*
*Hoary Bat - *Lasiurus cinereus*

CARNIVOROUS MAMMALS

**Raccoon - *Procyon lotor*
*Shorttail Weasel - *Mustela erminea*
**Longtail Weasel - *Mustela frenata*
*Mink - *Mustela vison*
River Otter - *Lutra canadensis*
**Striped Skunk - *Mephitis mephitis*
**Red Fox - *Vulpes fulva (or Vulpes vulpes)*
**Gray Fox - *Urocyon cinereoargenteus*
Bobcat - *Lynx rufus - Recorded within lifetime of present resident (F. Crooks)*

RODENTS

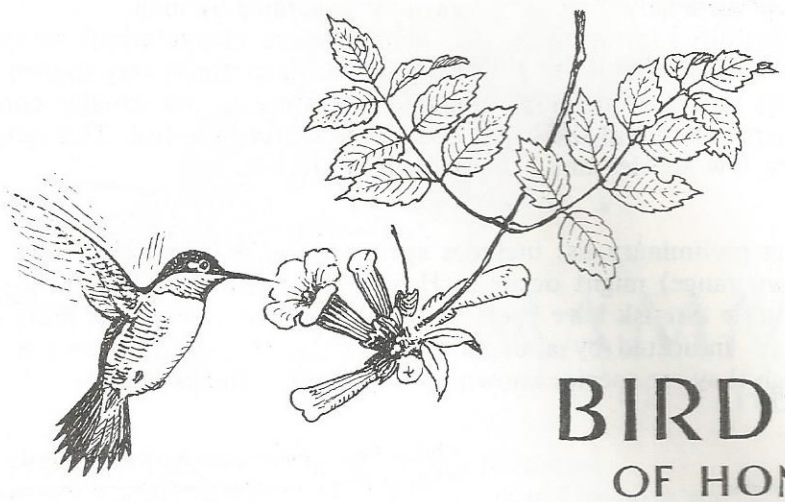
**Woodchuck - *Marmota manax*
Eastern Chipmunk - *Tamias striatus*
**Eastern Gray Squirrel - *Sciurus carolinensis*
**Red Squirrel - *Tamiasciurus hudsonicus*
**Southern Flying Squirrel - *Glaucomys volans*
Beaver - *Castor canadensis*
**White-footed Mouse - *Peromyscus leucopus*
Southern Bog Lemming - *Synaptomys cooperi*
Boreal Redback Vole - *Clethrionomys gapperi*
**Meadow Vole - *Microtus pennsylvanicus*
**Pine Vole - *Pitymys pinetorum*
**Muskrat - *Ondatra zibethicus*
**Norway Rat - *Rattus norvegicus (introduced)*
**House Mouse - *Mus musculus (introduced)*
*Meadow Jumping Mouse - *Zapus hudsonius*
Woodland Jumping Mouse - *Napaeozapus insignis*

RABBITS AND HARES

**Eastern Cottontail - *Sylvilagus floridanus*
European Hare - *Lepus europaeus (introduced)*

ODD–TOED HOOFED MAMMALS

**Whitetail Deer - *Odocoileus virginianus*



BIRDS
OF HONEY HOLLOW

JOSEPH E. PEARSON — Ornithologist

Since most birds are daytime creatures and share with us the world of color and sound. it is not surprising that our association with them has been a long and intimate one. Man has been fascinated with birds since the beginning of time. Early man carved designs of birds on the stone walls of his caves, indicating to us that his interest in the birdlife of his day was great. But unfortunately man has often disregarded the intricate laws of Nature, and so he robs her in many different ways, not realizing that he is destroying the balance of Nature. Nature can live in perfect harmony when left alone, and until man realizes that he is often the culprit, Nature will remain out of order. It is our sincere desire that here in Honey Hollow we can help her to restore the perfect balance which she needs if she is to survive.

The Honey Hollow Watershed area is unique in birdlife because of the diversified habitat. There is also plenty of food available from the many berry-bearing plants and shrubs that were planted here as far back as the late Thirties and early Forties of this century. Because of the foresight of the landowners and the suggestions of the Soil Conservation Service, these were planted to control washouts and to stop erosion, while at the same time supplying birds with food, shelter, and nesting sites. Specific birds found around these plantings are berry-eating birds such as Cedar Waxwings, Catbirds, Mocking Birds, Towhees, Robins, and Cardinals. The woodlands have large trees, some quite tall, which attract the tiny Wood Warblers. One should look for them in early May and late September during their migrations. After a more comprehensive study is made, we will undoubtedly find a few species of Warblers nesting here in the Watershed area.

We then move out into the large open fields where we find such birds as the Meadowlark, Pheasant, Bobwhite, Cowbird, Grackle, Robin and Starlings, Son and Field Sparrows, plus Juncos, Chickadees, and Tree Sparrows in the winter time. The beautiful Indigo Bunting can be heard occasionally as he sits on the top of some dead tree.

There is a beautiful marshland within the Watershed that is of great value to birdlife. Cattails provide nesting sites for several different species such as the Red-Winged Blackbird and the tiny Yellow-

throat. Here the Little Green Heron, sometimes the Great Blue Heron, and the Barn and Tree Swallows find excellent food. On occasion small shore birds such as the Solitary and Spotted Sandpipers, the Common Snipe, and Woodcock may be located here as well. A few ducks may use the marsh for food and resting during the migration. An interesting fact is that thistles grow at one end of the marsh, and the American Goldfinch likes to pluck down from it for building its nest. Elderberries grow here, too, which are a special food for the Goldfinch.

The big pond, which is centrally located in the Watershed, is by far the best place to look for water birds. These include Mallards, Blacks, and Canada Geese, and some of these nest here and raise their young. If one listens sharply, he may hear the rattling call of the Belted Kingfisher.

The large woods just west of the proposed site for the Center for Outdoor Education, with a fine small stream flowing through it, makes this an ideal place to find at least three species of Thrushes. In the taller trees one should be able to find the Scarlet Tanager, Baltimore Oriole, Yellow-Billed Cuckoo, and the Rose-Breasted Grosbeak; also, Hairy, Downy, and Red-bellied Woodpeckers, the Tufted Titmouse, Sapsucker and Flicker. In the winter time one should find Brown Creepers, Ruby-Crowned Kinglets, and good numbers of White Throated Sparrows. The Blue Jay who is here, despite his bad reputation, really is a very beautiful bird. He plants enough acorns to be responsible for the growth of fifteen percent of all the oaks that grow in Pennsylvania.

Besides these habitats in Honey Hollow, there is still another area, and that is the Big Sky above the Watershed. If one would find a good look-out and view this area in late September or early October, one would not only see the beauty of Honey Hollow, but catch a fine view of some hawks leisurely floating by, riding the thermal air currents. Broadwinged, Redtailed, and perhaps a Sharp-Shinned or a Cooper's Hawk could be seen, also Turkey Vultures during the summer months and late fall.

Birds have helped man for thousands of years, from the geese whose warning cries saved Rome to the canaries that were used to warn coal miners of methane gas leakage. They are a vital part of our environment, and it was well that we understood the place they hold in the world which we also share. With our growing population and expanding urbanism, how important it is to preserve the habitats and open spaces such as are found in Honey Hollow in order that the balance of nature may be maintained.

An asterisk denotes birds that have nested on the Watershed. (60 species)
Several birds reported in this list were taken from old records dating back to 1931.

Heron, Great Blue - *Ardea herodias*
Heron, Green - *Butorides virescens virescens*
Bittern, American - *Botaurus lentiginosus*
*Goose, Canada - *Branta Canadensis*
*Duck, Mallard - *Anas platyrhynchos platyrhynchos*
Duck, Black - *Anas rubripes*
Teal, Blue Winged - *Anas discors*
Duck, Wood - *Aix sponsa*
Duck, Ring-necked - *Aythya collaris*
Bufflehead - *Bucephala albeola*
Merganser, American - *Mergus merganser americanus*
Vulture, Turkey - *Cathartes aura*
Hawk, Sharp-shinned - *Accipiter striatus velox*
Hawk, Cooper's - *Accipiter cooperii*
Hawk, Red-tailed - *Buteo jamaicensis*
Hawk, Red-shouldered - *Buteo lineatus*
Hawk, Broad Winged - *Buteo platypterus platypterus*
Hawk, Marsh - *Circus cyaneus hudsonius*

Osprey - *Pandion haliaetus carolinensis*
*Hawk, Sparrow - *Falco sparverius*
*Bobwhite - *Colinus virginianus*
Grouse, Eastern Ruffed - *Bonasa umbellus umbellus*
*Pheasant, Ring-necked - *Phasianus colchicus torquatus*
*Killdeer - *Charadrius vociferus vociferus*
Woodcock, American - *Philohela minor*
Sandpiper, Spotted - *Actitus macularia*
Sandpiper, Solitary - *Tringa solitaria solitaria*
Gull, Herring - *Larus argentatus*
*Dove, Rock - *Columba livia*
*Dove, Mourning - *Zenaidura macroura*
*Cuckoo, Yellow-billed - *Coccyzus americanus americanus*
*Cuckoo, Black-billed - *Coccyzus erythrophthalmus*
*Owl, Barn - *Tyto alba pratincola*
*Owl, Screech - *Otus asio*
*Owl, Great Horned - *Bubo virginianus*
Owl, Long-Eared - *Asio otus wilsonianus*
Whip-Poor-Will - *Caprimulgus vociferus*
Nighthawk - *Chordeiles minor*
*Swift, Chimney - *Chaetura pelagica*
*Hummingbird, Ruby-throated - *Archilochus colubris*
Kingfisher, Belted - *Megaceryle alcyon alcyon*
*Flicker, Yellow-Shafted - *Colaptes auratus*
*Sapsucker, Yellow-bellied - *Sphyrapicus varius varius*
*Woodpecker, Red-bellied - *Centurus carolinus*
*Woodpecker, Hairy - *Dendrocopos villosus*
*Woodpecker, Downy - *Dendrocopos pubescens*
*Kingbird, Eastern - *Tyrannus tyrannus*
Flycatcher, Olive-sided - *Nuttallornis borealis*
*Flycatcher, Great-crested - *Myiarchus crinitus*
*Phoebe, Eastern - *Sayornis phoebe*
Flycatcher, Yellow-bellied - *Empidonax flaviventris*
Flycatcher, Least - *Empidonax minimus*
*Pewee, Eastern Wood - *Contopus virens*
Lark, Horned - *Eremophila alpestris*
Swallow, Tree - *Iridoprocne bicolor*
Swallow, Rough-winged -*Stelgidopteryx ruficollis seripennis*
*Swallow, Barn - *Hirundo rustica erythrogaster*
Swallow, Cliff - *Petrochelidon pyrrhonota albifrons*
Martin, Purple - *Progne subis subis*
*Jay, Blue - *Cyanocitta cristata*
*Crow, Common - *Corvus brachyrhynchos*
Crow, Fish - *Corvus ossifragus*
*Chickadee, Black Capped - *Parus atricapillus*
*Chickadee, Carolina - *Parus carolinensis*
*Titmouse, Tufted - *Parus bicolor*
*Nuthatch, White-breasted - *Sitta carolinensis*
Nuthatch, Red-breasted - *Sitta canadensis*
Creeper, Brown - *Certhia familiaris*
*Wren, House - *Trogladytes aedon*
Wren, Winter - *Troglodytes troglodytes*
*Wren, Carolina - *Thryothorus ludovicianus*
*Mockingbird - *Mimus ployglottos*
*Catbird - *Dumetella carolinensis*
*Thrasher, Brown - *Toxostoma rufum rufum*
*Robin - *Turdus migratorius*
*Thrush, Wood - *Hylocichla mustelina*
Thrush, Hermit - *Hylocichla guttata faxoni*
Thrush, Olive-backed - *Hylocichla ustulata*
Thrush, Gray-cheeked - *Hylocichla minima*
*Thrush, Veery - *Hylocichla fuscescens*
*Bluebird, Eastern - *Sialia sialis*
Gnatcatcher, Blue-Gray - *Polioptila caerulea caerulea*
Kinglet, Golden-Crowned - *Regulus satrapa satrapa*
Kinglet, Ruby-Crowned - *Regulus calendula calendula*
Waxwing, Cedar - *Bombycilla cedrorum*
*Starling - *Sturnus vulgaris vulgaris*
*Vireo, White-eyed - *Vireo griseus*
*Vireo, Red-eyed - *Vireo olivaceus*
Vireo, Blue-headed - *Vireo solitarius*
Warbler, Black and White - *Mniotilta varia*
Warbler, Worm-Eating - *Helmitheros vermivorus*
*Warbler, Blue-Winged - *Vermivora pinus*
Warbler, Parula - *Parula americana*
*Warbler, Yellow - *Dendroica petechia*
Warbler, Magnolia - *Dendroica magnolia*
Warbler, Cape May - *Dendroica tigrina*
Warbler, Black-throated-blue - *Dendroica caerulescens*
Warbler, Myrtle - *Dendroica coronata coronata*
Warbler, Black-throated-green - *Dendroica virens*
Warbler, Blackburnian - *Dendroica fusca*
Warbler, Yellow-throated - *Dendroica dominica*
*Warbler, Chestnut-sided - *Dendroica pennsylvanica*
Warbler, Bay-breasted - *Dendroica castanea*
Warbler, Black-Poll - *Dendroica striata*
Warbler, Prairie - *Dendroica discolor*
Warbler, Palm - *Dendroica palmarum*
*Oven-Bird - *Seiurus aurocapillus*
Thrush, Northern Water - *Seiurus noveboracensis*
Warbler, Kentucky - *Oporornis formosus*
*Yellow-Throat - *Geothlypis trichas*
*Chat, Yellow-Breasted - *Icteria virens virens*
Warbler, Wilson's - *Wilsonia pusilla pusilla*
Warbler, Canada - *Wilsonia canadensis*
Redstart, American - *Setophaga ruticilla*
*Sparrow, House - *Passer domesticus domesticus*
Bobolink - *Dolichonyx oryzivorus*
*Meadowlark, Eastern - *Sturnella magna*

*Blackbird, Red-Winged - *Agelaius phoeniceus*
*Oriole, Orchard - *Icterus spurius*
*Oriole, Baltimore - *Icterus galbula*
Blackbird, Rusty - *Euphagus carolinus*
*Grackle, Purple - *Quiscalus quiscula*
*Cowbird - *Molothrus ater*
*Tanager, Scarlet - *Piranga olivacea*
*Cardinal - *Richmondena cardinalis*
Grosbeak, Rose-Breasted - *Pheucticus ludovicianus*
*Bunting, Indigo - *Passerina cyanea*
Grosbeak, Evening - *Hesperiphona vespertina vespertina*
Finch, Purple - *Carpodacus purpureus purpureus*
Redpoll - *Acanthi flammea*
*Goldfinch, American - *Spinus tristis tristis*
*Towhee, Rufous-sided - *Pipilo erythrophthalmus*
*Sparrow, Grasshopper - *Ammodramus savannarum*
Sparrow, Vesper - *Pooecetes gramineus gramineus*
Junco, Slate-colored - *Junco hyemalis*
Sparrow, Tree - *Spizella arborea arborea*
*Sparrow, Chipping - *Spizella passerina passerina*
*Sparrow, Field - *Spizella pusilla pusilla*
Sparrow, White-crowned - *Zonotrichia leucophrys*
Sparrow, White-throated - *Zonotrichia albicollis*
Sparrow, Fox - *Passerella iliaca iliaca*
*Sparrow, Swamp - *Melospiza georgiana*
*Sparrow, Song - *Melospiza melodia*

NON-FLOWERING PLANTS OF HONEY HOLLOW WATERSHED

FERNS – ELIZABETH REX THOMAS – Biologist
OTHER NON–FLOWERING PLANTS – DAVID E. BENNER – Instructor,
Ornamental Horticulture Dept., Delaware Valley College

In point of time, reaching back to the primeval, ferns are older than flowers. In their heyday, ferns clothed the land in tall and lavish dimensions, a fitting habitat for the dinosaurs that roamed among them. Today in Honey Hollow the ferns are muted background plants - from very tiny ones to those often several feet tall. Some are prominent, others much be discovered by careful search.

All share the same growth processes unique to ferns. The fronds rise from a central rootstock or from crowns while others occur along a creeping, branching rootstock. The shapes of the fronds range from a simple leaf to elaborately divided ones. The simple divisions of a frond are called pinnae, and these may be divided further into pinnules.

Ferns reproduce from spores whose placement is clue to their identification. The spores are gathered in small cases called sporangia, which in most cases are grouped on the underside of the fronds. Some occur in rows, some at random, others in crescent shape, while some are placed under the curled edges of the fronds. In some species, however, the spores are borne on separate fertile fronds entirely unlike the non-fruiting or sterile fronds. Those of the Grapeferns are carried in grapelike arrangements on a stem rising above the single sterile frond which usually is on the same stem. Those of the Ostrich and Sensitive ferns look like stalks of small brown berries growing beside the green sterile fronds. Then there is the handsome, tawny spike of the Cinnamon fern rising in the center of its crown; its cousin, the Royal fern, whose sporangia are found at the tips of the fronds; and still another cousin, the Interrupted fern, whose fronds interrupt their greenery part way up the stem to produce pairs of

shaggy, brown, hanging clusters of spore cases.

In the wide range of habitat at Honey Hollow, the ferns are at home according to their preferences, and the diligent searcher or casual stroller will enjoy their discovery and their place in the total picture.

The following preliminary list includes ferns both known and likely to occur in the Watershed.

LARGE PATCHES IN OPEN FIELDS, WOODLAND
Hayscented Fern - *Dicksonia punctilobula*

PREFERS MOIST GROUND, SHADE OR FULL SUN
Sensitive Fern - *Onoclea sensibilis*
Ostrich Fern - *Matteucia struthiopteris*

FOUND IN OPEN WOODS
Virginia Grape Fern - *Botrychium virginianum*
New York Fern - *Aspidium noveboracensis*
Lady Fern - *Asplenium filix-femina*

DITCHES AND EDGE OF WATERS
Marsh Fern - *Aspidium thelypteris*

FOUND IN MOIST GROUND, PARTIAL SHADE
Royal Fern - *Osmunda regalis*
Interrupted Fern - *Osmunda claytoniana*
Cinnamon Fern - *Osmunda cinnamomea*

WET, SHADY ROCKS
Brittle Fern - *Cystopteris fragilis*

RICH WOODS AND SHADE
Christmas Fern - *Polystichum acrostichoides*
Long Beech Fern - *Phegopteris polypodioides*

SHADY WOODS; LIKES ROCKS NEARBY
Evergreen Wood Fern - *Aspidium marginale*

STONY GROUND; PREFERRING LIMEY SOIL
Ebony Spleenwort - *Asplenium platyneuron*

RICH, MOIST WOODS
Maidenhair - *Adiantum pedatum*

ATTACHED TO BOULDERS, LOGS
Common Polypody Rock Fern - *Polypodium virginianum*

ALMOST ANYWHERE EXCEPT IN PURE SAND
Bracken - *Pteris aquilina*

Let us remember that the above list of ferns represents only a small part of the fascinating world of non-flowering plants which number around 100,000 species. Such plants range from the microscopic bacteria to the largest trees known, the giant redwoods. And so in order of development are included the algae, fungi (and mushrooms), lichens, mosses, liverworts and hornworts, ferns (and the fern allies such as clubmosses and horsetails), cycads, gingkoes and conifers.

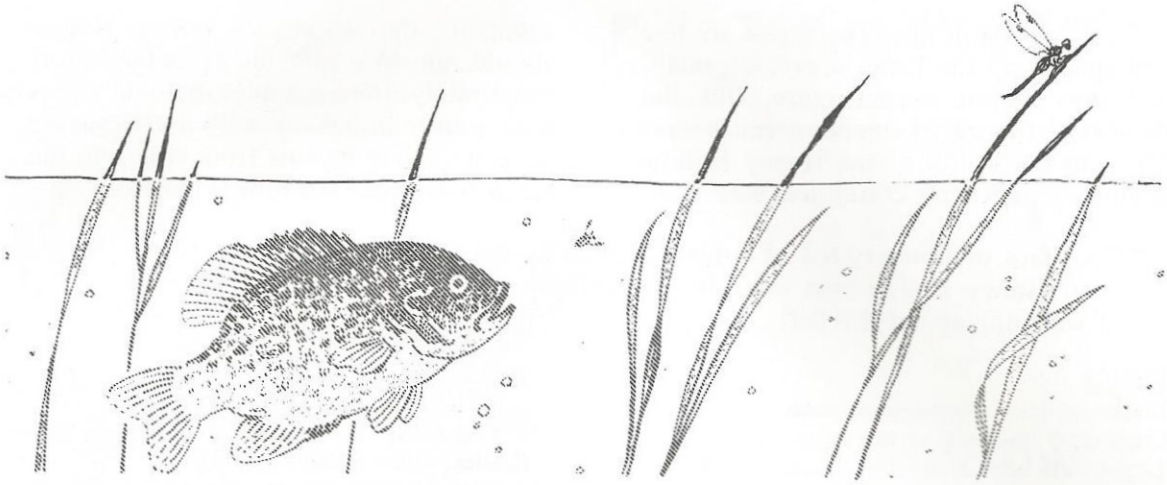
Many bacteria cause diseases in plants and animals and man, while others are very beneficial, helping to bring about the decay of plant and animal remains. Algae--particularly the smaller forms in plankton–are an important source of food for many aquatic animals. Algae also help maintain the oxygen content of the water. Some mushrooms are excellent food for man, while others may be poisonous. Lichens slowly break down rocks to form soil. Throughout the world, coniferous forests, including pines, spruces, firs, junipers, redwoods and others are very important economically to man.

A brief preliminary list of some of these plants found in the Watershed follows.

Algae, green - *Chlorella pyrenoidosa*
Algae, green - *Draparnaldia glomerata*
Algae, green (Pond silk) - *Spirogyra communis*
Algae, green - *Ulothrix zonata*
Cup fungus - *Peziza repanda*
Coral mushroom - *Sparassis crispa*
Sulphur polyporus - *Polyporus sulphureus*
Multi-zoned polystictus - *Polystictus versicolor*
Common shelf fungus - *Ganoderma applanatum*
Oak daedalea - *Daedalea quercina*
Destroying angel - *Amanita virosa*
Fly amanita - *Amanita muscaria*
Cup-shaped clitocybe - *Clitocybe cyathiformis*
Common schizophyllum - *Schizophyllum commune*
Meadow mushroon - *Agaricus campestris*
Morel, common - *Morchella esculenta*
Shaggy mane - *Coprinus comatus*
Common ink-cap - *Coprinus atramentarius*
Glistening ink-cap - *Coprinus micaceus*
Common Psathyrella - *Psathyrella disseminata*
Pear-shaped puffball - *Lycoperdon pyriforme*
British soldier lichen - *Cladonia cristatella*
Ladder lichen - *Cladonia verticillata*
Pyxie cup lichen - *Cladonia pyxidata*
Hieroglyphics lichen - *Graphis scripta*
Pink pearl button lichen - *Lecanora caesiorubella*
Lungwort lichen - *Sticta pulmonaria*
Spoon-leaved spagnum - *Sphagnum palustre*
Common hair-cap moss - *Polytrichum commune*
Star moss - *Mnium cuspidatum*
Ostrich plume moss - *Ptilium crista-castrensis*
Common hornwort - *Phaeoceris laevis*
Common liverwort - *Marchantia polymorpha*
Great scented liverwort - *Conocephalum conicum*
Common pellia (liverwort) - *Pellia epiphylla*
Field horsetail - *Equisetum arvense*
Shining clubmoss - *Lycopodium lucidulum*
Running pine clubmoss - *Lycopodium flabelliforme*
Flat-branched ground pine - *Lycopodium obscurum*
Rock spike moss - *Selaginella rupestris*

NON-FLOWERING PLANTS – 1977 ADDITIONS

Amanita - *Amanita citrina*
Parasol mushroom - *Lepiota procera*
Shield Lepiota - *Lepiota clypeolaria*
Hygrophorus - *Hygrophorus nitidus*
Sweetish Lactarius - *Lactarius subdulcis*
Fedid Russula - *Russula foetens*
Scaly Lentinus - *Lentinus lepideus*
Sweet Clitocybe - *Clitocybe odora*
Rooted Collybia - *Collybia radicata*
Capped Mycena - *Mycena galericulata*
Clean Mycena - *Mycena pura*
Abortive Clitopilus - *Clitopilus abortivus*
Violet Cortinarius - *Cortinarius violaceus*
Chantarelle - *Cantharellus cibarius*
Clavaria - *Clavaria viscosa*
Pestle-shape Clavaria - *Clavariadelphus pistillaris*
Pine cone mushroom - *Strobilomyces strobilaceus*
Polyporus - *Polyporus frondosus*
Dog stinkhorn - *Mutinus caninus*
Common earth ball - *Scleroderma aurantium*
Gem puffball - *Lycoperdon gemmatum*
Jelly fungi - *Tremella*
Pitted Boletinus - *Boletinus porosus*
Painted Boletinus - *Boletinus pictus*
Small Cantharelle - *Cantharellus minor*
Peziza - *Peziza (scutellinia) scutellata*
Dead man's finger - *Xlaria polymorpha*
Straight coral fungus - *Clavaria stricta*
Horn of plenty - *Craterellus cornucopioides*
Edible bolete - *Boletus edulis*
Two-colored bolete - *Boletus bicolor*
Blusher - *Amanita rubescens*
Sheathed amanitopsis - *Amanitopsis vaginata*
Honey armillaria - *Armillaria mellea*
Yellow clitocybe - *Clitocybe aurantiiaca*
Buttery collybia - *Collybia butyracea*
Little wheel marasmius - *Marasmius rotula*
Black-stemmed marasmius - *Marasmius androsaceus*
Emetic russula - *Russula emetica*
Vermilion chanterelle - *Cantharellus cinnabarinus*
Horse mushroom - *Agaricus arvensis*
Lichen - *Cladonia coniocraea*



AQUATIC LIFE
IN THE STREAMS AND PONDS OF HONEY HOLLOW

JOHN C. MERTZ — Assistant Professor of Biology, Delaware Valley College

A small, upland stream such as Honey Hollow Creek is more than simply a rivulet of water flowing from the highlands toward the sea. In a very real sense it is essentially an indicator of the character and quality of the land over and through which it flows. It is home to a wide array of plants, animals and microorganisms. And the diversity and stability of this stream community reflect on the character of the land through which the stream flows.

In this day of urbanization and pollution, biologists find that stream communities are, indeed, sensitive indicators of environmental health. A stream flowing through fertile soils tied down by lush vegetation flows clean and pure; in it lives a wide variety of organisms, forming the integrated structure of a self-regulating biological system. On the other hand, a stream ravaged by sewage effluent, excessive silt and flood water carried off of stripped lands, or industrial poisons, is scarred by its affliction; its community consists of fewer kinds of organisms (although some of them may occur in enormous numbers), and these few are unable to establish the kinds of checks and balances among themselves that will give the community as a whole long-term stability. All too often man's intrusion on the aquatic landscape has meant a reduction in the stream's capacity to maintain a balanced community of inhabitants. And all too often man pays little attention to the stream community until the fishes and waterfowl he values most have long since disappeared from it.

The Honey Hollow Watershed has built its reputation on its program of comprehensive soil and water management. If that management program has been wise, in terms of the long-term conservation of watershed resources, one would expect that the stream community will reflect that wisdom by exhibiting a diversity of members interacting in a fashion that will confer stability on the community itself. The accompanying list, a very preliminary list to be sure, is testimony that that has been the case.

The reader will note that there are few fish species on the list - the creek is small, and one cannot expect more. But the diversity of kinds of smaller animals does attest to the health of the Honey Hollow environment. Given continued wise management, the waters of Honey Hollow should remain a valuable living laboratory indefinitely. Here is a microcosm in miniature, nature in balance with itself - we can all learn many lessons from studying this small ecosystem and how it operates.

This preliminary list of Aquatic Fauna existing in the streams and ponds of Honey Hollow was made in late summer. Checks made at other seasons will supplement this list.

FISHES

Blacknose dace - *Rhinichthys atratulus*
Creek chub - *Semotilus atromaculatus*
Largemouth bass - *Micropterus salmoides*
Bluegill - *Lepomis machrochirus*
Catfish (not identified)

MACROSCOPIC INVERTEBRATE ANIMALS

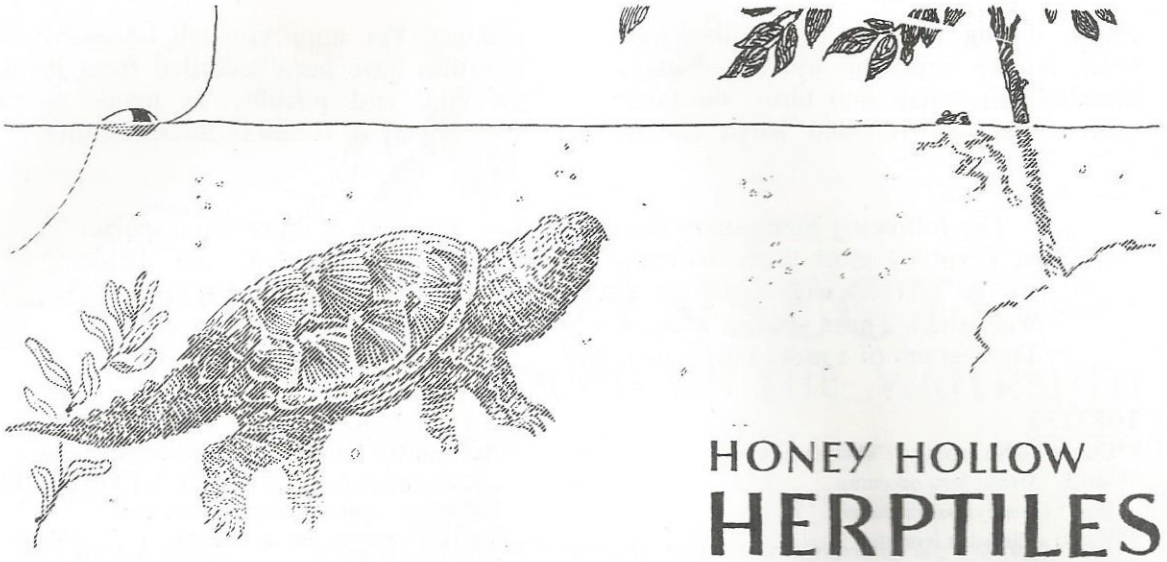
Roundworms - Phylum Aschelminthes, Class Nematoda
Flatworms - Phylum Platyhelminthes, Class Turbellaria, Family Planariidae
Bloodworms - Phylum Annelida, Class Oligochaeta, Family Tubificidae
Aquatic insects - Phylum Arthropoda, Class Insecta
- Mayflies - Order Ephemeroptera, Families Baetidae and Heptageniidae
- Stoneflies - Order Plecoptera, Families Perlodidae and Nemouridae
- Caddis flies - Order Trichoptera, Families Philopotamidae and Hydropsychidae
- True bugs - Order Hemiptera
  - Waterstriders - Family Gerridae
  - Broad-shouldered water striders - Family Veliidae
  - Giant water bug - Family Belostomatidae
  - Water scorpions - Family Nepidae
  - Water boatmen - Family Corixidae
  - Backswimmer - Family Notonectidae
- True flies - Order Diptera
  - Midge flies - Family Tendipedidae
  - Crane flies - Family Tipulidae
- Beetles - Order Coleoptera
  - Crawling water beetles - Family Haliplidae
  - Whirligig beetles - Family Gyrinidae
  - Elmid beetles - Family Elmidae
- Dragonflies and damselflies - Order Odonata
  - Dragonfly nymphs - Families Gomphidae and Libellulidae
  - Damselfly numphs - Family Coenagrionidae

Crustaceans - Phylum Arthropoda, Class Crustacea
- Fairy shrimps - OrderAnostraca, Families Chirocephalidae and Streptocephalidae
- Tadpole shrimps - Order Notostaca
- Clam shrimps - Order Conchostraca, Families Lynceidae, Limnadiidae, and Caenestheridae
- Water fleas - Order Cladocera
- Seed shrimps - Order Podocopa, Families Cypridídae and Cytheridae
- Cpoepods - Order Eucopepoda, Families Harpacticidae, Centropagidae, and Cyclopidae
- Aquatic sow bugs - Order Isopoda
- Scuds, sideswimmers, shrimps - Order Amphipoda
- Freshwater crayfish - Order Decapoda

Snails - Phylum Mollusca, Order Gastropoda
- Pouch snails - Family Physidae
- Orb snails - Family Planorbidae

Clams - Phylum Mollusca, Class Pelecypoda
- Fingernail clams - Family Sphaeriidae

For more on Dragon and Damselflies see page 35.



HONEY HOLLOW HERPTILES

GEORGE CARMICHAEL – Science Curriculum Chairman and
Biology Teacher, Pennsbury School District

The term "herptiles" is a convenient term to refer specifically to two groups of back-boned animals (studied by scientists called herpetologists): Amphibians (frogs, toads, and salamanders) lack claws (or toenails) and scales and generally must deposit their eggs in water or in very moist places. The young or larvae generally breathe by means of gills. Reptiles (lizards, snakes and turtles) produce their young alive or from eggs deposited on the land. They posses scales skins and (when limbs are present) clawed toes. There are no larval stages.

While usually considered to be of little significance to man, herptiles contribute importantly to the food webs in natural communities, both as food for larger predators such as raccoons and birds, and as important consumers of insects, other small invertebrates, and rodents. The role of frogs and salamanders in experimental biology and biochemistry has been and still is of considerable importance. Frogs legs and snapper soup are familiar food items to many persons. Because of the small size and secretiveness of most species, they have survived the impact of man upon their environment better than many "higher" forms. The advent of biocides such as DDT, however, has been particularly deadly to amphibians. The greatest danger to herptiles appears to be the blind destruction of marshes and other habitats through filling, draining, paving, and polluting. Ignorance and superstitions also play a part especially in the destruction of snakes. Even in areas known to be inhabited by poisonous snakes, the chance of a person being bitten is less than the chance of his being struck by lightening.

The "Hoop Snake" is alleged to take its tail in its mouth and roll after its enemies. The "milk snake" is blamed by the farmer for his dry cow. Actually this reptile is frequently found around farm buildings attracted by rats and mice, its principle food. It is incapable of retaining but tiny amounts of liquid. After 300 million years of natural selection, these humble but diversified creatures, having reached their

zenith during the age of reptiles, have been largely replaced by the "warm-blooded" mammals and birds, the latter better able to withstand harsh climate changes. Yet, approximately 68 species of herptiles have been recorded from Pennsylvania, and possibly as many as 53 species may be found in Bucks County.

The following preliminary list (based upon know ranges) are those species of herptiles most likely to occur in the Honey Hollow Watershed. Those species marked with a double asterisk have been verified as present in the Watershed. Those species marked with a single asterisk are probably present. The rest are of a more uncertain status.

TURTLES

**Common Snapping - *Chlydra serpentina*
*Musk - *Sternotheru odoratus*
Bog - *Clemmys muhlenbergi*
**Wood - *Clemmys insulpta*
**Spotted - *Clemmys guttata*
**Eastern Painted - *Chrysemys picta picta*
**Eastern Box - *Terrapene carolina carolina*

LIZARDS

Northern Fence - *Sceloporus undulatus hyacinthinus*
Five-lined Skink - *Eumeces fasciatus*

SNAKES

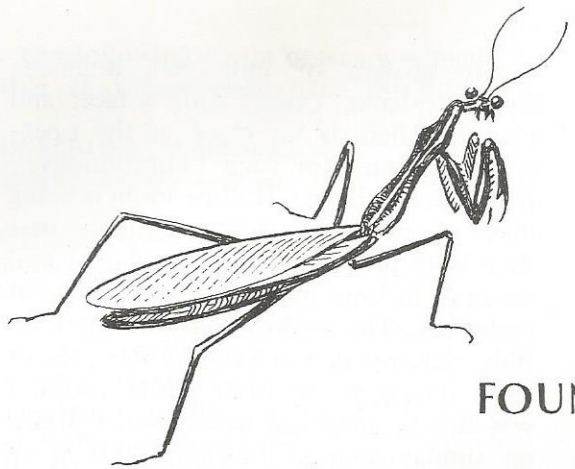
Eastern Smooth Earth - *Haldea valeriae valeriae*
*Northern Red-bellied - *Storeria occipitomaculata occipitomaculata*
*Northern Brown - *Storeria dekayi dekayi*
**Northern Water - *Natrix sipedon sipedon*
**Eastern Garter - *Thamnophis sirtalis sirtalis*
*Eastern Ribbon - *Thamnophis sauritus*
Eastern Hognose - *Heterodon platyrhinos*
*Northern Ringneck - *Diadophis punctatus edwardsi*
**Northern Black Racer - *Coluber constrictor constrictor*
Black Rat - *Elaphe obsoleta obsoleta*
*Eastern Milk - *Lampropeltis doliata triangulum*

SALAMANDERS

*Red-spotted Newt - *Notophthalmus viridescens viridescens*
Jefferson - *Ambystoma jeffersonianum*
Spotted - *Ambystoma maculatum*
Marbled - *Ambystoma opacum*
Eastern Tiger - *Ambystoma tigrinum tigrinum*
**Northern Dusky - *Desmognathus fuscus fuscus*
**Red-backed - *Plethodon cinereus cinereus*
Slimy - *Plethodon glutinosus glutinosus*
Four-toed - *Hemidactylium scutatum*
**Northern Red - *Pseudotriton ruber ruber*
**Long-tailed - *Eurycea longicauda longicauda*
**Northern Two-lined - *Eurycea bislineata bislineata*

FROGS AND TOADS

Eastern Spadefoot - *Scaphiopus holbrooki*
**American Toad - *Bufo americanus americanus*
Fowler's Toad - *Bufo woodhousei fowleri*
**Northern Spring Peeper - *Hyla crucifer crucifer*
*Eastern Gray Treefrog - *Hyla versicolor versicolor*
**Northern Cricket Frog - *Acris crepitans crepitans*
*Upland Chorus Frog - *Pseudacris triseriata feriarum*
**Pickerel Frog - *Rana palustris*
**Leopard Frog - *Rana pipiens pipiens*
**Green Frog - *Rana clamitans melanota*
*Wood Frog - *Rana sylvatica*
**Bull Frog - *Rana catesbeiana*



INSECTS
FOUND ON THE WATERSHED

CHARLOTTE GANTZ – Entomologist

The insect world is a vital part of our community but, bombarded as we are with "Bugs are our enemies–kill them all!", it's a fact we are likely to forget.

Without the bees, butterflies, moths and some of the flies, we would have no vegetables or fruits (cereal grains are wind-pollinated) and the landscape would soon be destitute of flowers. Most birds need insect food, for even the seed-eaters generally feed insects to their young. Today there are areas in northern New Jersey--undeveloped, rural land--where birds were once abundant. Now the insects are notably absent (air pollution? pesticides? probably both) and the birds have gone. Here there is indeed a "Silent Spring", that will never recover until the insects return--if indeed they ever do. In England naturalists are deeply concerned over the loss of their butterflies. (Destruction of habitat, certain chemical fertilizers, and radioactive dust have been blamed in Europe.) Butterflies have also become scarce in parts of Florida, and in much of New Jersey both butterflies and moths are disappearing at an alarming rate.

One of the gravest elements in the picture is the fact that few entomologists are paying any attention to our losses. Most of the men and women trained in this field find employment with producers of pesticides--for this is where the money is. Only a few universities have departments in entomology, and hardly any funds are being allotted today for general research on insects (research, that is, not specifically directed towards control). As a result we may well find that many species have reached a dangerously low point before ever a note of alarm is sounded.

In the face of this current trend, it is both important and heartening that the proposed Honey Hollow Center for Outdoor Education is taking stock of its insect life and reckoning the insects among its assets. Because of such interest, I undertook a check of the insect life of the area. At this point, however, comment is due upon the enormity of the task. Insect species can be numbered in the hundreds of thousands, and few professional entomologists today have the training needed for a complete census. The late Dr. Frank E. Lutz, when he was Curator of Insects at the American Museum of Natural History, attempted such a count in his 75 x 200 foot lot in a New Jersey suburb and arrived at a figure of 1,402. In an area such as that at the Honey Hollow

Watershed, he might well have doubled this total. But he was one of a dying breed. Today specialization is the word, and it would probably require a dozen of our ordinary professionals to duplicate his feat.

General knowledge in a field is now often the special domain of the amateur, and there is a crying need for amateurs in entomology. We can't hope to identify every aphid or leafhopper, every braconid wasp, every minute beetle--for one thing the necessary literature is often unavailable--but we can give names to the more conspicuous and easily identified insects. During some 22 years on a farm not far from Honey Hollow, I named close to 500 species, and had the advantage of being able to pursue my nature studies without ever leaving home.

By making counts at regular times each year and by keeping records, I was also able to determine relative abundance and shortages. (In the same way through the Audubon Society Christmas counts we keep track of bird populations.) In addition, my survey of one area provided a yardstick by which to gauge others. I realized that in many parts of Bucks County butterflies and grasshoppers were very low, and that while katydids were still in evidence during August, other nighttime insect calls were often missing. (England lacks this nocturnal chorus, and summer evenings there are curiously silent.)

Part of the problem here is pesticides, but this is only a part. More important is the increasing loss of pasture land with its weedy growth of milkweed, dogbane, daisy fleabane, Queen Anne's lace, and thistles. There is no place in the open-space program for such "unproductive" fields. But at Honey Hollow room is being made once again for pastures (in the past they were part of every typical farm), and we may in time find this a small oasis of insect life. The program has not yet been fully developed, but even at the present time, during a two-hour initial count, I was able to spot close to 50 species. Based on similar counts elsewhere, this is an encouraging figure. Grasshoppers, including the rather rare meadow grasshoppers, and several kinds of bees were abundant, and there were quite good figures for most of the other orders. (Incidentally I was also conscious of many warblers and fly-catchers while I made my count, for where insects abound, insect-eating birds are likely to be present, too.) By planting some of the old-fashioned shrubs (which also would be part of an old farm), including some herbs, the numbers of bees and butterflies could be greatly increased. It's a sign of our times--and a sad one--that most nurserymen now are looking for insect-free shrubs. If Honey Hollow breaks the pattern and offers a refuge to at least some insects, it will be making a real contribution. If in addition it gives to those who come to the Watershed Center a basic idea of the variety in the insect world, its importance in our life and the satisfaction to be derived from its study, it will be adding immeasurably to our understanding and acceptance of the whole world of nature.

The following insect census was made during several days in late summer of 1971. When other seasons are investigated, this list will be extended considerably.

THYSANURA – Bristletails
Silverfish - *Lepisma saccharina*

ODONATA – Dragonflies and Damselflies
Common forktail - *Ischnura verticalis*
Civil bluet - *Enallagma civile*
Black-winged damselfly - *Calopteryx maculata*
Skimmer - *Libellula luctuosa*
White-tail - *Plathemis lydia*
Green Jacket - *Erythemis simplicicollis*
Amberwing - *Perithemis tenera*
Skimmer - *Tramea lacerata*

Not seen, but almost certainly here are *Anax junius, Libellula pulchella and Sympetrum rubicundulum.*

ORTHOPTERA – Grasshoppers, Katydids, Crickets, Cockroaches, Mantids and Walking Sticks
Short-winged green grasshopper - *Dichromorpha viridis*
Northern green-striped locust - *Chortophaga viridifasciata*
Carolina locust - *Dissosteira carolina*
Lesser Migratory grasshopper - *Melanoplus bilituratus (formerly stlanis) (formerly atlanis)*
Red-legged locust - *Melanoplus femur-rubrum*
Little pasture locust - *Melanoplus confusus*
Graceful narrow-winged locust - *Melanoplus gracilis*
Green-legged locust - *Melanoplus viridipes*
Scudder's short-winged locust - *Melanoplus scudderi*
Northern true katydid - *Pterophylla camellifolia*
Common meadow grasshopper - *Orchelimum vulgare*
Slender meadow grasshopper - *Conocephalus fasciatus fasciatus*
Short-winged meadow grasshopper - *Conocephalus brevipennis*
Straight-lanced grasshopper - *Conocephalus strictus*
Striped ground cricket - *Nemobius fasciatus*
Larger spotted ground cricket - *Nemobius maculatus*
Pennsylvania field cricket - *Acheta assimilis pennsylvanicus*
Black-horned tree cricket - *Oecanthus nigricornis*

Not seen but almost certainly here are Melanoplus differentialis, Schistocerca obscura, Tettigidea armata, Scudderia furcata, Amblycorypha oblongifolia, Oecanthus niveus and other tree crickets–probably quite a number beyond those named.

ISOPTERA – Termites
Common Termite - *Reticulitermes flavipes*

HEMIPTERA – Bugs
Water skater - *Gerris marginatus*
Leaf bug - *Stenotus binotatus*
Tarnished plant bug - *Lygus oblineatus*
Ambush bug - *Phymata erosa*
Damsel bug - *Nabis ferus*
Boxelder bug - *Leptocoris trivittatus*
Green stink bug - *Acrosternum hilare*

This list is obviously incomplete. Many more bugs will be added.

HOMOPTERA – Cicadas, Hoppers, Whiteflies, Aphids and Scale insects
Cicada - *Tibicen chloromera*
Tree hopper - *Entylia sinuata*
Buffalo tree hopper - *Ceresa bubalis*
Frog hopper (Spittle bug) - *Philaenus leucophthalmus*
Leaf hopper - *Graphocephala coccinea*
Plant hopper - *Ormenis septentrionalis*
Plant hopper - *Ormenis pruinosa*
Boxwood psylla - *Psylla buxi*

NEUROPTERA – Nerve-winged Insects
Lacewing - *Chrysopa sp.*

COLEOPTERA – Beetles
Ground beetle - *Galerita janus (or possibly Galerita bicolor)*
Soldier beetle - *Chauliognathus pennsylvanicus*
Soldier beetle - *Chauliognathus marginatus*
Tumbling flower beetle - *Mordella strata and Mordella octomaculata*
Black blister beetle - *Epicauta pennsylvanica*
Red-necked cane borer - *Agrilus ruficollis*
Shining flower beetle - *Acylomus ergoti*
12-spotted lady beetle - *Coleomegilla fuscilabris*
Lady beetle - *Cycloneda sanguinea*
Convergent Lady beetle - *Hippodamia convergens*
Japanese beetle - *Popillia japonica*
Mexican bean beetle - *Epilachna varivestis*
Locust borer - *Megacyllene robiniae*
Milkweed beetle - *Tetraopes tetraophthalmus*

Dogbane beetle - *Chrysochus auratus*
Imported willow leaf beetle - *Plagiodera versicolor*
12-spotted cucumber beetle - *Diabrotica undecimpunctata*
Corn rootworm - *Diabrotica longicornis*
Engraver beetle - *Hylurgopinus rufipes*
White pine weevil - *Pissodes strobi*

LEPIDOPTERA – Butterflies and Moths
Little wood satyr - *Euptychia cymela*
Monarch - *Danaus plexippus*
Great spangled fritillary - *Speyeria cybele*
Meadow fritillary - *Boloria toddi*
Pearl Crescent - *Phyciodes tharos*
Painted lady - *Vanessa cardui*
Tiger swallowtail - *Papilio glaucus*
Spicebush swallowtail - *Papilio troilus*
Common sulphur - *Colias philodice*
European cabbage butterfly - *Pieris rapae*
Silver-spotted skipper - *Epargyreus clarus*
Common sooty wing - *Pholisora catullus*
Least skipper - *Ancyloxipha numitor*
Tawny-edged skipper - *Polites themistocles*
Peck's skipper - *Polites peckius*
Virginia ctenucha - *Ctenucha virginica*
Owlet moth - *Spragueia onagrus*
Owlet moth - *Drasteria crassiuscula*
Owlet moth - *Feltia subgothica*
Army worm - *Pseudaletia unipuncta*
Tent caterpillar - *Malacosoma americanum*
Crocus geometer - *Zanthotype sospeta*
Bagworm - *Thyridopteryx ephemerae-formis*
Hag moth - *Phobetron pithecum*
Corn earworm - *Heliothis zea*
Close-wing - *Crambus sp.*
Plume moth - *Platyptilia marginidactyla*
Blackberry miner - *Nepticula villosella*
Hummingbird Moth - *Hemaris thysbe*

DIPTERA – Flies
Crane fly - *Pachyrhina ferruginea*
Midge - *Chironomus plumosus*
Boxelder gall fly - *Cecidomyia negundis*
Goldenrod bunch gall - *Rhopalomyia solidaginis*
Nun midge gall - *Asphondylia monacha*
Snipe fly - *Chrysopila ornata*
Bee fly - *Spogostylum simson*
Syrphid fly - *Syrphus americana*
Syrphid fly - *Mesogramma polita*
Thick-headed fly - *Physocephala tibialis*
Picture-winged fly - *Tritoxa incurva*
Fruit fly - *Paracantha culta*
Holly leaf miner - *Phytomyza ilicis*
Common house fly - *Musca domestica*
Blow fly - *Lucilia caesar*

HYMENOPTERA – Ants, Wasps and Bees
European pine sawfly - *Neodiprion sertifer*
Carpenter ant - *Camponotus herculeaneus pennsylvanicus*
Cornfield ant - *Lasius niger*
Potter wasp - *Ancistrocerus capra*
Yellow jacket - *Vespula maculifrons*
Yellow jacket - *Vespula diabolica*
Paper wasp - *Polistes fuscatus*
Banded paper wasp - *Polistes annularis*
Hunter's paper wasp - *Polistes hunteri*
Astatine wasp - *Astata unicolor*
Mud-dauber - *Chalybion californicum*
Organ-pipe mud-dauber - *Trypoxylon albitarsus*
Sand wasp - *Bicyrtes quadrifasciatus*
Sweat bee - *Halictus ligatus*
Sweat bee - *Halictus rubicundus*
Mining bee - *Augochlora pura pura*
Leafcutter bee - *Megachile montivaga*
Bumble bee - *Bombus affinis*
Bumble bee - *Bombus impatiens*
Bumble bee - *Bombus pennsylvanicus*
Bumble bee - *Bombus perplexus*
Bumble bee - *Bombus vagans*
Carpenter bee - *Xylocopa virginica*
Honey bee - *Apis mellifera*

INSECTS – 1977 ADDITIONS

ODONATA – Dragonflies and Damselflies
Damselfly - *Enallagma durum*
Damselfly - *Enallagma signatum*
Damselfly - *Nehalennia posita*
Damselfly - *Argia putrida*
Violet dancer - *Argia violacea*
Green darner - *Anax junius*
Skimmer - *Celithemis elisa*
Tenspot skimmer - *Libellula pulchella*
The Widow - *Libellula luctuosa*
White-tail - *Plathemis lydia*
The Blue bell - *Nannothemis bella*
Red toper - *Sympetrum semicinctum*
Red toper - *Sympetrum internum*

ORTHOPTERA – Grasshoppers, Katydids, Crickets, Cockroaches, Mantids and Walking Sticks
Sprinkled locust - *Chloealtis conspersa*
Oblong-winged katydid - *Amblycorypha oblongifolia*
Fork-tailed katydid - *Scudderia furcata*
Carolina ground cricket - *Nemobius carolinus*
Four-spotted tree cricket - *Oecanthus quadripunctatus*
Snowy tree cricket - *Oecanthus niveus*
Mole cricket - *Gryllothlpa hexadactyla*
Handsome bush cricket - *Phyllopalpus pulchellus*
Uhler's camel cricket - *Ceuthophilus uhleri*
Straight-lanced meadow grasshopper - *Conocephalus strictus*
Short-winged meadow grasshopper - *Conocephalus brevipennis*
Lance-tailed meadow grasshopper - *Conocephalus attenuatus*
Woodland meadow grasshopper - *Conocephalus nemoralis*
Slightly musical conehead - *Neoconocephalus exiliscanorus*

PLECOPTERA
Stone fly - *Perlesta placida*

DERMOPTERA
Earwig - *Forficula auricularia*

HOMOPTERA – Cicadas, Hoppers, Whiteflies, Aphids and Scale Insects
Treehopper - *Ceresa diceros*
Two-spotted treehopper - *Enchinopa binotata*
Leafhopper - *Graphocephala coccinea*
Leafhopper - *Kolla bifida*
Leafhopper - *Draculacephala mollipes*
Lamb's quarters leafhopper - *Eutettix chenopodium*
Bean aphid - *Aphis rumicis*
Willow aphid - *Plocomaphis terricola*
Golden glow aphid - *Macrosiphum rudbeckiae*
Milkweed aphid - *Aphis asclepiadis*
Button bush aphid - *Aphis cephalanthi*
Ironweed aphid - *Aphis vernoniae*
Ragweed aphid - *Macrosiphum ambrosiae*
Fleabane aphid - *Macrosiphum erigeronensis*

HEMIPTERA – Bugs
Water skater - *Rhagovelia obesa*
Four-lined plant bug - *Poecilocapsus lineatus*
Meadow plant bug - *Miris dolobratus*
Lace bug - *Corythuca juglandis*
Small milkweed bug - *Lygaeus kalmi*
Negro bug - *Allocaris pulicarius*
Leaf-fotted bug - *Chariesterus antennator*
Squash bug - *Anasa tristis*
Stink bug - *Mormidea lugens*
Stink bug - *Euschistus variolarius*
Stink bug - *Cosmopepla bimaculata*

NEUROPTERA
Antilion - *Brachynemurus abdominalis*

COLEOPTERA – Beetles
Soldier beetle - *Podabrus rugulosus*
Firefly - *Photinus pyralis*
Sap beetle - *Glischrochilus quadrisignatus*
Two-spotted lady beetle - *Adalia bipunctata*
Nine-spotted lady beetle - *Coccinella novemnotata*
Red lady beetle - *Cycloneda munda*
Mexican bean beetle - *Epilachna varivestris*
Colorado potato beetle - *Leptinotarsa 10-lineata*
Leaf beetle - *Systena hudsonias*
Net-winged beetle - *Calopteron maculatus*
Locust borer - *Megacyllene robiniae*
Long-horned beetle - *Strangelina famelica*
Engraver beetle - *Hylurgopinus rufipes*
White pine weevil - *Pissodes strobi*

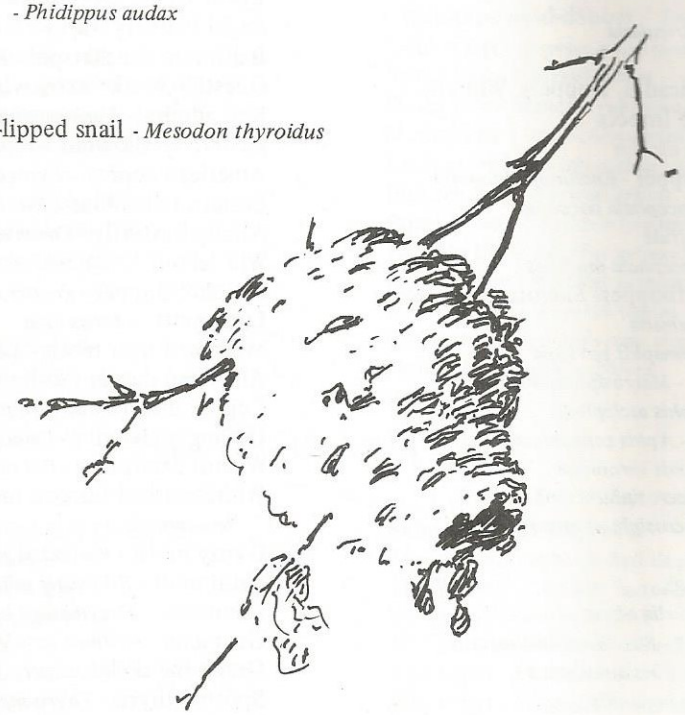
LEPIDOPTERA – Butterflies and Moths
Regal fritillary - *Speyeria idalia*
Baltimore checkerspot - *Euphydryas phaeton*
Question Mark - *Polygonia interrogationis*
Red admiral - *Vanessa atalanta*
Eastern swallowtail - *Papilio polyxenes*
American copper - *Lycaeana americana*
Eastern tailed blue - *Everes comyntas*
Alfalfa butterfly - *Colias eurytheme*
Whirlabout - *Polites vibex*
Zabulon skipper - *Poanes zabulon*
Luna moth - *Actias luna*
Milkweed tiger moth - *Euchaetias egle*
American dagger moth - *Acronycta americana*
Copper underwing - *Amphipyra pyramidoides*
Darling underwing - *Catacala cara*
Walnut caterpillar - *Datana integerrima*
White-marked tussock moth - *Hermerocampa leucostigma*
Gypsy moth - *Porthetria dispar*
Satin moth - *Stilpnotia salicis*
Geometer - *Eucymatoge intestinata*
Geometer - *Deilinea variolaria*
Grapevine skeletonizer - *Harrisina americana*
Spotted thyris - *Thyris maculata*
Beech miner - *Tischeria citripennella*

DIPTERA – Flies
Maple spangle gall - *Cecidomyia ocellaris*
Goldenrod bunch gall - *Rhopalomyia solidaginis*
Robber fly - *Erax aestuans*
Robber fly - *Promachus*
Syrphid fly - *Mesogramma marginata*
Syrphid fly - *Allograpta oblique*
Syrphid fly - *Syrphus laxa*
Syrphid fly - *Eristalis tenax*
Syrphid fly - *Pipiza femoralis*
Dolichopid fly - *Dolichopus longipennis*
Goldenrod ball gall - *Eurosta solidaginis*
Jewelweed miner - *Agromyza borealis*
Aster miner - *Agromyza curvipalpis*
Stable fly - *Stomoxys calcitrans*
Bot fly - *Cuterebra buccata*
Blow fly - *Calliphora vicina*

ARTHROPODIA
Class Arachnida - Spiders and Kin
Cobweb weaver - *Theridula emertoni*
Spined micrathena - *Micrathena gracilis*
Six-spotted fishing spider - *Dolomedes triton*
Flower spider - *Misumena vatia*
Crab spider - *Tibellus oblongus*
Jumping spider - *Phidippus audax*

MOLLUSCA
Class Gastropodia
Common white-lipped snail - *Mesodon thyroidus*

HYMENOPTERA – Ants, Wasps and Bees
Braconid wasp - *Aphidius polygonaphis*
Ichneumon wasp - *Tersilochus conotracheli*
Silky ant - *Formica fusca*
Ant - *Leptothorax* (nesting in acorn)
Tiphiid wasp - *Myzinum 5-cinctum*
Scoliid wasp - *Scolia dubia*
Scoliid wasp - *Scolia nobilitata*
Potter wasp - *Ancistrocerus capra*
Black and yellow mud dauber - *Sceliphron cementarium*
Aphid wasp - *Pemphredon*
Digger wasp - *Oxybelus quadrinotatum*
Sand wasp - *Bicyrtes quadrifasciatus*
Great golden digger - *Ammobia ichneumonea*
Mining bee - *Agapostemon radiatus*
Leafcutter bee - *Megachile latimanus*
Leafcutter bee - *Megachile texana*
Bumblebee - *Bombus bimaculatus*



THE ULTIMATE RESOURCE

CHARLES CHILD – Author and Artist

In the hurry and clash of today's world we tend to forget that man is a part of nature, not separate from her. But perhaps in response to the violence and degradation that surrounds us, there is growing a world-wide renewal of interest and appreciation of man's true relationship to the world he lives in. This relationship, we are beginning to realize, is not one in which man, the Master, makes nature the Slave, but more nearly that of a child to its mother.

The 700 acres of the Honey Hollow Watershed eloquently testify to the truth of this new realization. Here we can see the results of a long-sustained relationship between Man-as-child and Nature-as-mother, a creative symbiosis in which for nearly two centuries both nature and man have actively sustained and supported each other. Such a relationship can be compared to a chord of music in which each of a number of elements resonates to amplify the other elements, producing a magical, or what the scientists would call a synergistic whole--something which is greater than the sum of its parts. This harmony is real, actual, dynamic and can be felt here as it changes, shifts and renews itself with the change and renewal of the seasons.

This harmonious interweaving of elements is perhaps the ultimate resource of the Honey Hollow Watershed, in which if one were merely to come in order to count all the frogs, or all the trees, the marshlands or the hedgerows and the open fields, he would still miss the essential and final element: a mystery-of-the-whole, called beauty. And the reward--a renewal of the spirit--will not be given to anyone, young or old, who comes to Honey Hollow as an arrogant or merely curious tourist. Therefore we would venture to suggest to the visitor to this little world that he savor the experience quietly and humbly as he walks along the trails or stops for a moment to observe the fragile strength of a fern or the flash of a bird in flight.

It is the hope of those who have worked for so many years to create and sustain this small but perfect microcosm of one part of American nature that it will fulfill its ultimate purpose: to show for generations to come, that a sustained effort to work with nature rather than to dominate her, can produce everywhere, not just here at Honey Hollow, a more rewarding environment, a new strength, a lasting beauty.

A MINIATURE HISTORY OF HONEY HOLLOW

About 1705. A plow first entered the virgin soil of Honey Hollow.

1939. The soil showed signed of erosion, critical on the steeper slopes. Advised by the Soil Conservation Service, Honey Hollow farmers changed square fields to contoured strips, planted wildlife hedges and built ponds. Now man was working in harmony with nature.

1969. The United States Government recognized the pioneering efforts in establishing the first soil, water and wildlife conservation program on a watershed basis and, under the Historic Sites Act of 1935, the Secretary of the Interior declared Honey Hollow Watershed to be a National Historic Landmark.

* * * *

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.

HONEY HOLLOW WATERSHED ASSOCIATION

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Bucks County Historical Society
Philadelphia Conservationists

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Pennsylvania Forestry Association
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Watershed Associations
Soil Conservation Society of America,
William Penn Chapter

National
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Soil Conservation Society of America

Acknowledgment is gratefully extended to the following governmental agencies for their assistance:

United States Department of Agriculture
Forest Service, N.E. Region
Soil Conservation Service, Harrisburg, Pa.

United States Department of the Interior
National Bark Service, N.E. Region

Pennsylvania Department of Environmental Resources
Bureau of Forestry
State Conservation Commission

Bucks County Conservation District

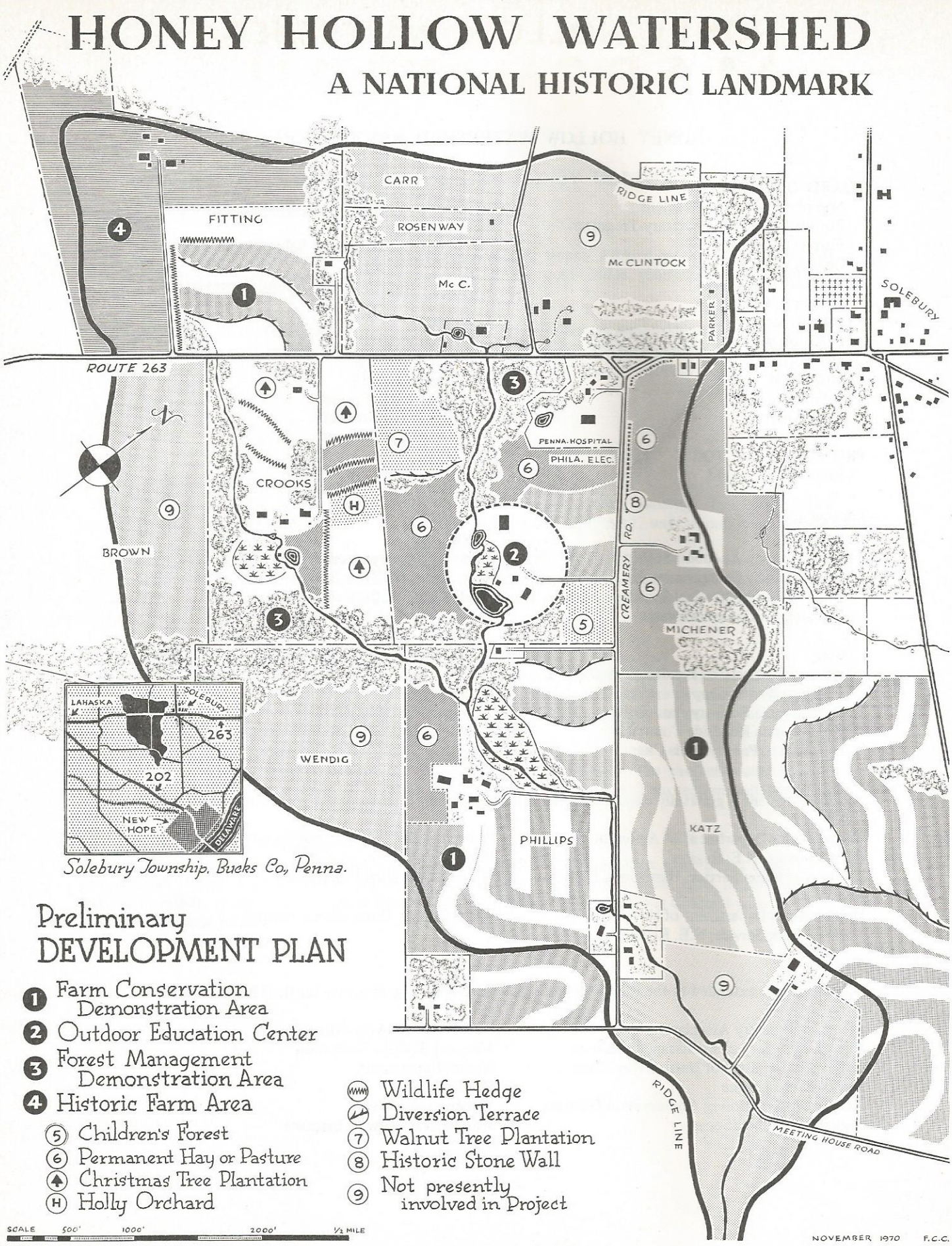
Appreciation is extended to the following national conservation organizations for their help and support:

American Forestry Association
American Society of Landscape Architects
Citizens' Committee of Natural Resources
Izaak Walton League
National Association of Conservation Districts
National Audubon Society

National Parks Association
National Wildlife Federation
Nature Conservancy
Sierra Club
Wilderness Society
Wildlife Management Institute

HONEY HOLLOW WATERSHED

A NATIONAL HISTORIC LANDMARK



Solebury Township, Bucks Co., Penna.

Preliminary DEVELOPMENT PLAN

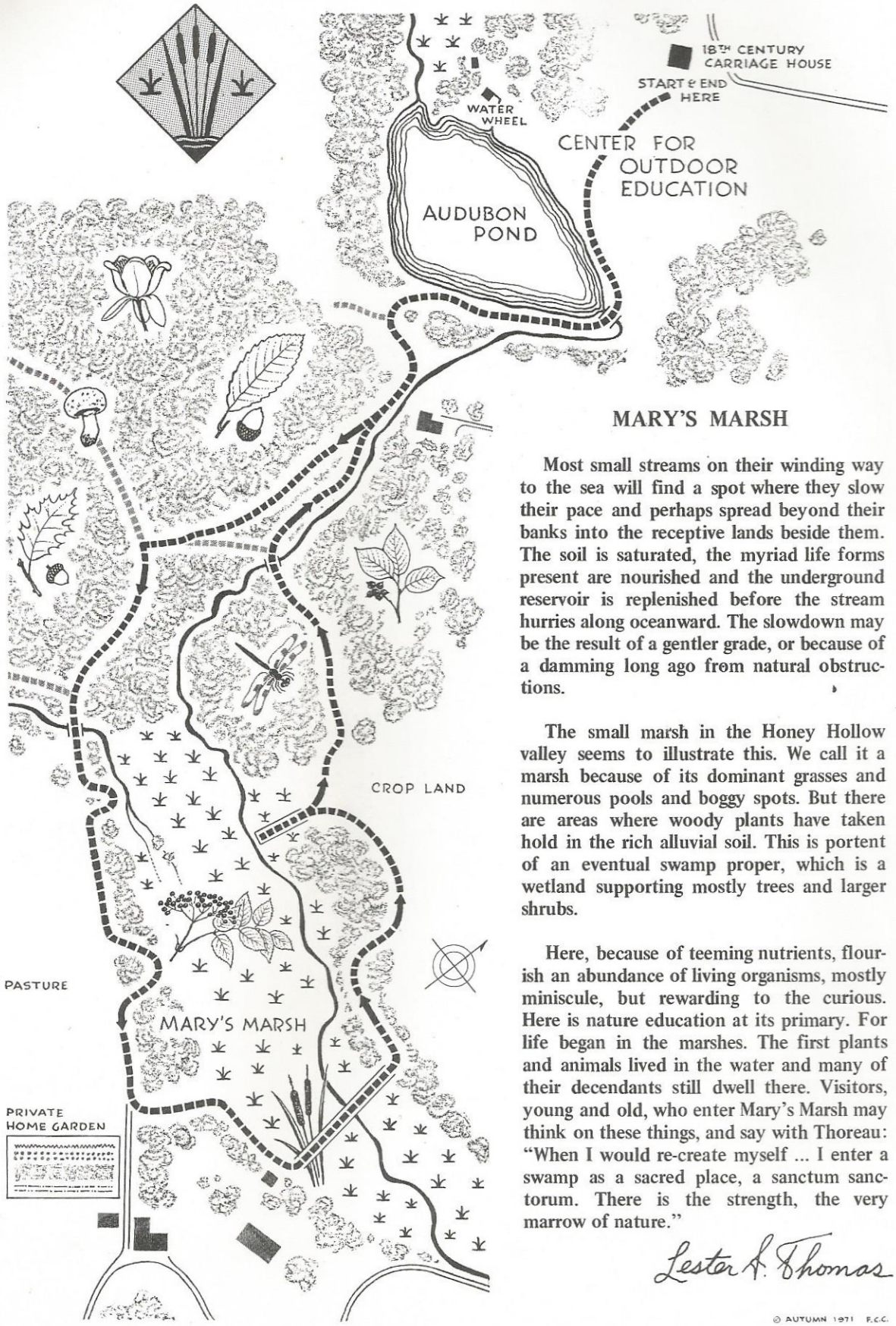
1. Farm Conservation Demonstration Area
2. Outdoor Education Center
3. Forest Management Demonstration Area
4. Historic Farm Area

- (5) Children's Forest
- (6) Permanent Hay or Pasture
- (▲) Christmas Tree Plantation
- (H) Holly Orchard
- (WWW) Wildlife Hedge
- Diversion Terrace
- (7) Walnut Tree Plantation
- (8) Historic Stone Wall
- (9) Not presently involved in Project

SCALE 500' 1000' 2000' ½ MILE

NOVEMBER 1970 F.C.C.

HONEY HOLLOW WATERSHED
MARSH TRAIL



MARY'S MARSH

Most small streams on their winding way to the sea will find a spot where they slow their pace and perhaps spread beyond their banks into the receptive lands beside them. The soil is saturated, the myriad life forms present are nourished and the underground reservoir is replenished before the stream hurries along oceanward. The slowdown may be the result of a gentler grade, or because of a damming long ago from natural obstructions.

The small marsh in the Honey Hollow valley seems to illustrate this. We call it a marsh because of its dominant grasses and numerous pools and boggy spots. But there are areas where woody plants have taken hold in the rich alluvial soil. This is portent of an eventual swamp proper, which is a wetland supporting mostly trees and larger shrubs.

Here, because of teeming nutrients, flourish an abundance of living organisms, mostly miniscule, but rewarding to the curious. Here is nature education at its primary. For life began in the marshes. The first plants and animals lived in the water and many of their decendants still dwell there. Visitors, young and old, who enter Mary's Marsh may think on these things, and say with Thoreau: "When I would re-create myself ... I enter a swamp as a sacred place, a sanctum sanctorum. There is the strength, the very marrow of nature."

Lester A. Thomas