
CHAPTER 4. BIOLOGICAL RESOURCES

Wildlife

Terrestrial Wildlife

Severe habitat alterations from human activity have contributed to a decrease in terrestrial species diversity. Historic data for Pennsylvania reveals a decrease in bird and mammal diversity. This can be largely attributed to the degradation and loss of habitat (Gross 1998; Wright and Kirkland 1998). Continued loss of habitat will lead to declines in wildlife species.

Trends in other portions of the Commonwealth are not always reflected in rural communities as they are in the Lower Crooked Creek watershed. Hunters, anglers, and furtakers have long been attracted to Pennsylvania's rural areas to enjoy their abundant natural resources. Rural areas have also come to recognize the importance of these participants' activities to their economy.



Turtle located in the Lower Crooked Creek watershed.

A list of common wildlife species identified in the Lower Crooked Creek and Tub Mill Run watersheds is available in Appendix J. With over 50 percent of the watershed being forested, wildlife habitat within the watershed has not been as deeply impacted by sprawl as other areas of Pennsylvania. Conservation of wildlife habitat area in the watershed is encouraged to protect the diversity.

Deer Management

Deer management has become an issue in the watershed as well as the Commonwealth. Deer have enormous impacts on forests, agriculture, and many other aspects of life. By the 1890s, nearly 70 percent of Pennsylvania's woodlands were cut or converted to agricultural fields and deer were virtually nonexistent throughout the Commonwealth. In 1907, antlerless deer received total protection until 1923 when the first antlerless deer season was established. With forest regeneration the deer population increased rapidly. Deer populations are currently exceeding the capacity of the environments that support them. When deer become overly abundant, they destroy not only their habitat, but also the habitat for many other species such as small game and turkey (Alt 2002).

To control deer populations, two goals must be accomplished. The first is to balance the deer herd with its environment. The second to restore a more natural breeding ecology, which will lead to better buck-doe ratios, larger bucks, and greater hunter satisfaction. In order to achieve these goals, the Pennsylvania Game Commission (PGC) has implemented deer management plans. A variety of methods have been proposed to control the deer populations. It is an ongoing process and needs support from the PGC and the public (Alt 2002).

Atlas Project

The Pennsylvania Herpetological Atlas Project (i.e. Atlas Project) inventories species, provides distribution data, and creates a database of current reptile and amphibian species within Pennsylvania. The Wild Resource Conservation Fund and private donors sponsor the program. It is administered by Indiana University of Pennsylvania. The Atlas Project functions on a six-year time frame. The sixth field

season was completed in 2003. Volunteers are still encouraged to send information to Indiana University of Pennsylvania but funding for the project is not being sought. Funding to make the database publicly available may be sought in the future. Table 4-1 has a listing of species identified in the Lower Crooked Creek watershed by the Atlas Project.

**Table 4-1 Common Reptiles and Amphibians Within the Lower Crooked Creek Watershed
(Source: PA Herpetological Atlas 2002)**

| Common Name | Scientific Name | Common Name | Scientific Name |
|---------------------------|-------------------------------------|----------------------|--------------------------------|
| Mudpuppy | <i>Necturus maculosus</i> | Wood Frog | <i>Rana sylvatica</i> |
| Hellbender | <i>Cryptobranchus alleganiensis</i> | Bullfrog | <i>Rana catesbeiana</i> |
| Red-spotted Newt | <i>Notophthalmus viridescens</i> | Green Frog | <i>Rana clamitans</i> |
| Spotted Salamander | <i>Ambystoma maculatum</i> | Pickerel Frog | <i>Rana palustris</i> |
| Northern Dusky Salamander | <i>Desmognathus fuscus</i> | Snapping Turtle | <i>Chelydra serpentina</i> |
| Mountain Dusky Salamander | <i>Desmognathus ochrophaeus</i> | Painted Turtle | <i>Chrysemys picta</i> |
| Seal Salamander | <i>Desmognathus monticola</i> | Wood Turtle | <i>Clemmys insculpta</i> |
| Spring Salamander | <i>Gyrinophilus porphyriticus</i> | Box Turtle | <i>Terrapene carolina</i> |
| Two-lined Salamander | <i>Eurycea bislineata</i> | Black Racer | <i>Coluber constrictor</i> |
| Longtail Salamander | <i>Eurycea longicauda</i> | Ringneck Snake | <i>Diadophis punctatus</i> |
| Redback Salamander | <i>Plethodon cinereus</i> | Black Ratsnake | <i>Elaphe alleganiensis</i> |
| Slimy Salamander | <i>Plethodon glutinosus</i> | Milk Snake | <i>Lampropeltis tirangulum</i> |
| American Toad | <i>Bufo americanus</i> | Northern Water Snake | <i>Nerodia sipedon</i> |
| Fowler's Toad | <i>Bufo fowleri</i> | Queen Snake | <i>Regina septemvittata</i> |
| Gray Treefrog | <i>Hyla versicolor</i> | Smooth Green Snake | <i>Opheodrys vernalis</i> |
| Spring Peeper | <i>Pseudacris crucifer</i> | Eastern Garter Snake | <i>Thamnophis sirtalis</i> |

Aquatic Species

The diversity, number, and type of fish and macroinvertebrates (organisms associated with soil or stream substrates that lack backbones and can be seen without magnification), within a stream indicate the water's quality. Water quality degradation from human development, mining, and nutrient rich discharges has had a negative impact on native fish populations and habitat viability. Water quality improvement projects, such as mine drainage abatement, or polluted runoff control, have the potential to increase the diversity and numbers of fish.

As an integral element in assessing the health of waterways the tiny organisms living in the streams can be mistakenly underrated. To live and thrive in waterways, fish require small insects and other organisms. For this reason macroinvertebrates are used in determining the quality of water. Individual



A stonefly is one of the macroinvertebrates used in determining water quality (Source: New York State Department of Environmental Conservation)

species of macroinvertebrates tolerate different levels of pollution. The presence of sensitive macroinvertebrates indicates good water quality because these organisms cannot tolerate much pollution.

Maintaining a healthy balance of all life forms is imperative. Too many small organisms, such as a toxic bacterium, can often be harmful and upset the balance in the water. For example, when the bacteria *E. coli* is overabundant in a stream as a result of activities such as sewage discharges and/or cattle with full access to the stream and its tributaries, moderate to severe risks to human health can result. Although

nearly all municipal and on-lot water well systems provide filters to eliminate or greatly minimize the presence of organisms, the overabundance of these organisms can be too much for filters to handle, causing maintenance to become cost prohibitive.

Fish are the most visible and often most visually spectacular of the freshwater aquatic species. In the Ohio River Basin, 130 species of fish have been identified, 11 of which have been introduced. Within the Lower Crooked Creek watershed, 33 species have been identified by the PFBC (Table 4-2).

Table 4-2. Common Fish Species Identified in the Lower Crooked Creek Watershed by the Pennsylvania Fish and Boat Commission

| Common name | Scientific name | Common name | Scientific name |
|------------------|--------------------------------|---------------------|---------------------------------|
| Smallmouth Bass | <i>Micropterus dolomieu</i> | Northern Hog Sucker | <i>Hypentelium nigricans</i> |
| Black Crappie | <i>Pomoxis nigromaculatus</i> | Pumkinseed | <i>Lepomis gibbosus</i> |
| Bluegill | <i>Lepomis macrochirus</i> | Quillback | <i>Carpionodes cyprinus</i> |
| Bluntnose Minnow | <i>Pimephales notatus</i> | River Chub | <i>Nocomis micropogon</i> |
| Brook Trout | <i>Salvelinus fontinalis</i> | Rock Bass | <i>Ambloplites rupestris</i> |
| Brown Bullhead | <i>Ictalurus nebulosus</i> | Shorthead Redhorse | <i>Moxostoma macrolepidotum</i> |
| Channel Catfish | <i>Ictalurus punctatus</i> | Silver Shiner | <i>Notropis photogenus</i> |
| Common Carp | <i>Cyprinus carpio</i> | Spotfin Shiner | <i>Cyprinella spiloptera</i> |
| Emerald Shiner | <i>Notropis atherinoides</i> | Tiger Muskellunge | <i>Tiger muskellunge</i> |
| Fantail Darter | <i>Etheostoma flabellare</i> | Trout Perch | <i>Percopsis omiscomaycus</i> |
| Gizzard Shad | <i>Dorosoma cepedianum</i> | Variegated Darter | <i>Etheostoma variatum</i> |
| Golden Redhorse | <i>Moxostoma erythrurum</i> | Walleye | <i>S. Vitreum vitreum</i> |
| Golden Shinner | <i>Notemigonus crysoleucas</i> | White Crapie | <i>Pomoxis annularis</i> |
| Greenside Darter | <i>Etheostoma blennioides</i> | White Sucker | <i>Catostomus commersoni</i> |
| Largemouth Bass | <i>Micropterus salmoides</i> | Yellow Bullhead | <i>Ameiurus batakus</i> |
| Logperch | <i>Percina caprodes</i> | Yellow Perch | <i>Perca flavescens</i> |
| Mimic Shinner | <i>Notropis volucellus</i> | | |

The Pennsylvania Fish and Boat Commission (PFBC) stocks fish in two areas in the watershed: Cherry Run and Crooked Creek Lake. There are no Class A Wild Trout Streams, PFBC Special Regulation Areas, or Pennsylvania Wilderness Trout Waters existing in the Lower Crooked Creek or Tub Mill Run watersheds. The watersheds are designated as warm water fisheries, with the exception of Cherry Run, which is designated as a cold-water fishery and stocked with trout (25 Pa. Code § 93.9s 1997).

Vegetation

Tales of the northeastern United States prior to European settlement recall the vast, verdant forests inhabited by Native Americans. This portrait extends to the original setting of the Lower Crooked Creek watershed before logging, farming, mineral extraction, and community development occurred. In the past century, native vegetation has gone through periods of removal and regrowth as the result of uncontrolled land use practices.

The removal of native vegetation for various land use practices leaves a barren landscape, often stripped of nutrients and light that native plants need. Many foreign species are opportunistic and can flourish in extremely adverse conditions. Land cleared of native vegetation is prime ground for invasive

species colonization. Invasive plants are environmentally noxious weeds that grow aggressively, spread easily, and displace native plants.

The rise of non-native species is evolving into a severe threat to Pennsylvania's native flora and to those animals that depend on them for survival. The Lower Crooked Creek watershed mirrors this trend. Invasive/exotic plant species have commanded the habitat of native plant populations, causing a struggle for survival among native species and impairing native ecosystems. Land development and land use alterations, such as urban growth, suburban sprawl, deforestation, road building, and wetland draining, have been the greatest threat to native plant communities (Thompson 2002).

Second and third growth deciduous forests, mostly located on gently rolling hillsides and steep slopes, are the dominant forest types within the Lower Crooked Creek watershed. According to the USDA Forest Service Ecoregion Mapping (1994), the watershed is located within the Eastern Broadleaf Forest Province. The Lower Crooked Creek watershed is in the Southern Unglaciated Appalachian Plateau Section. It is characterized as second and third growth mixed mesophytic forest and Appalachian oak forest, including mixed oak forest, oak-hickory-chestnut forest, oak-pine forest, hemlock forest, floodplain forest, and swamp forest (USDA Forest Service 1994).

Native Species

Native plant species are those that occur naturally in the region. They grow and evolve and are the backbone of a healthy ecosystem. Just over 62 percent of current plant species in Pennsylvania are native to the commonwealth, and nearly 30 percent of these are listed as species of special concern, meaning they are in danger of becoming extinct (Thompson 2002). Crooked Creek and Tub Mill Run watersheds are expected to be comparable to the rest of the Commonwealth.

Invasive/Exotic Species

Invasive species are the second greatest danger to our nation's plants and animals. Only the loss of habitat poses a greater threat. Lower Crooked Creek and Tub Mill Run watersheds are not exempt from this threat. Invasive species are hard to control. If they escape from cultivation they can overtake large areas, degrading the habitat value for other plants, insects, birds, and animals. Most invasive plants are non-native. They were brought to the region from western regions of North America and other continents. Some are native species that became pests when human activities altered their landscape, giving them an edge over other plants. The species listed in Table 4-3 are some of the worst offenders in Pennsylvania.

Japanese knotweed blankets many riparian and streamside areas along Crooked Creek and its tributaries. This highly opportunistic plant quickly colonizes streamside land. It forms dense thickets overshadowing any native species and diminishes the opportunity for native plants to colonize the area (Remaley 2001). The root network that characterizes Japanese knotweed led to its use for erosion control and landscape screening. The persistence of Japanese knotweed and its ability to grow and thrive in a variety of adverse conditions makes it difficult to eradicate.



Japanese knotweed in flower

Multiflora rose is the most predominant invasive species located in the Lower Crooked Creek watershed (Beale, personal communication 2003). It is characterized as a thorny, perennial shrub with arching stems and leaves divided into five to eleven sharply toothed leaflets. Extremely prolific, multiflora rose can form impenetrable thickets that exclude native plant species. Multiflora rose has a

Table 4-3. Some Invasive Species in Pennsylvania
(Source: Department of Conservation and Natural Resources, Keynotes Summer 1999)

| Invasive Species | | | |
|----------------------|--------------------------|-----------------------------|-------------------------|
| Amur Honesuckle | Autumn Olive | Beefsteak Plant | Bell's Honeysuckle |
| Birdsfoot Trefoil | Black Alder | Border Privet | Bugleweed |
| Bull Thistle | Canada Thistle | Cheat Grass | Climbing Euonymus |
| Common Privet | Common St. Johnswort | Crown-Vetch | Dame's Rocket |
| Doublefile Viburnum | Empress Tree | European White Birch | Fiveleaf Akebia |
| Giant Hogweed | Glossy Buckthorn | Gout Weed | Guelder Rose |
| Japanese Barberry | Japanese Knotweed | Japanese Spiraea | Jimson Weed |
| Johnson Grass | Kudzu | Leatherleaf Clematis | Linden Viburnum |
| Maiden Grass | Mile-A-Minute Vine | Morrow's Honeysuckle | Mutlifora Rose |
| Norway Maple | Orange Daylily | Paper Mulberry | Purple Loostrife |
| Reed Canary Grass | Russian Olive | Shattercane | Siberian Elm |
| Standish Honeysuckle | Star of Bethlehem | Sweet Breath of Spring | Sweet Clover |
| Sycamore Maple | Tall Fescue | Tatarian Honeysuckle | Tree of Heaven |
| Water Chestnut | White Mulberry | White Poplar | Wild Parsnip |
| Yellow Flag | | | |

Species in bold have been identified in the Lower Crooked Creek and/or Tub Mill Run watersheds

tolerance for various soil, light, and moisture conditions. This exotic species rapidly invades open woodlands, forest edges, streambanks, roadsides, pastures, and open fields. Currently, a native viral pathogen, rose-rosette disease, is attacking multiflora rose in the watershed and has the potential to eliminate this invasive species. Multiflora rose was introduced to the east coast from Japan in 1886 as rootstock for ornamental roses. Before it was deemed invasive, it was used for erosion control, wildlife habitat, and as crash barriers on highway median strips.

The Bureau of State Parks has implemented an Invasive Species Control Program, including the use of biological agents, to help alleviate the problem of invasive species. The program is of great benefit, especially when a particular species of concern or delicate natural area is in danger of attack. A native plant species initiative is in effect for all state parks. This initiative states that all new plantings will be a species native to the park.

Although an invasive plant species survey is lacking within the Lower Crooked Creek and Tub Mill Run watersheds, multiflora rose and Japanese knotweed appear to be invading riparian areas. Completing an invasive plant survey in the watershed would identify, locate, and develop a strategy for eradication of invasive species in the watersheds.

Rare Threatened and Endangered Species

Within Pennsylvania, rare, threatened, and endangered species of plants and animals are tracked through the Pennsylvania Natural Diversity Inventory (PNDI). PNDI is a database listing of species located across the Commonwealth managed by the Pennsylvania Natural Heritage Program (PNHP). The PNHP partnership is comprised of the Department of Conservation and Natural Resources (DCNR), PGC, PFBC, U.S. Fish and Wildlife Service, Western Pennsylvania Conservancy (WPC), and the Pennsylvania Biological Survey. Inventories are conducted to collect data on the Commonwealth's most sensitive and

significant organisms and features. The purpose of the PNHP efforts is to provide recent, accurate data on ecological resources for planning, conservation, and natural resource management throughout Pennsylvania.

The PNDI search for the Lower Crooked Creek watershed identified one sensitive species, the Wabash pigtoe (*Fusconaia flava*). It is a freshwater mussel that was identified in South Bend Township, but has not been observed since 1919. Information was limited from PNDI because county inventories for Armstrong and Indiana counties have yet to be completed. Other sensitive or significant organisms may exist in the watershed.

Important Habitats

Natural Heritage Areas

County Natural Heritage Inventories (CNHIs) are Pennsylvania's method of assessing areas of important flora, fauna, and ecological communities within each county. After a complete assessment and analysis of floral and faunal communities, a CNHI report is developed describing each Natural Heritage Area, its local and ecological significance, threats and stresses to the communities, and recommendations for management. Inventories are conducted only within interested counties, with the county administering the study and WPC conducting the research in western Pennsylvania. The inventories are non-regulatory, meaning they are not enforceable and hold no power in land use planning. The inventories can serve as efficient and practical tools to use for biological diversity management and enhancement, ecological protection, land use planning, and educational purposes.

Currently Armstrong and Indiana counties do not have CNHIs; therefore no natural heritage areas have been identified. Completing CNHIs for the two counties is needed to identify areas having sensitive and significant species.

Important Bird Areas

Identifying and protecting outstanding habitat for avian and other wildlife species is the driving force behind the Important Bird Areas (IBAs) program, established in 1996 throughout the United States. The National Audubon Society, in partnership with the American Bird Conservancy, identifies these habitats. Over 400 IBAs have been identified in the United States, including 74 in Pennsylvania alone. IBAs may be identified as critical habitats, such as spruce-fir bogs, bottomland hardwood swamps, and open grasslands, or other areas including migratory staging areas, winter feeding and roosting sites, and prime breeding habitat for multiple avian species (National Audubon Society 2001).

IBAs are established to conserve bird habitat and educate the public. A stringent set of criteria is necessary to establish an area as an IBA (National Audubon Society 2001):

- Sites with a significant density and/or diversity of avian activity during breeding seasons, in winter, or during migration
- Sites that provide habitat to one or more species of Pennsylvania special concern
- Sites that provide habitat to one or more species on the Federal Threatened or Endangered species list
- Sites with rare, threatened, or unique habitats characteristic with bird habitats
- Sites where avian research is located.



Mallards are one species that make the Lower Crooked Creek watershed its home

Currently no IBAs exist in the watershed; however the completion of CNHIs could potentially lead to the future classification of IBAs.

Riparian Habitats

Riparian habitats, those areas adjacent to streams, are an integral part of the ecological health of watersheds. Riparian habitats have been recognized for several decades as distinct ecologically significant areas as well as physical systems capable of trapping and filtering sediment, stabilizing streambanks, detaining upland runoff, and subsequently recharging groundwater supplies. Riparian areas serve as a vital link between aquatic and upland habitats, and are located in varying widths along streams. Forested buffers offer greater benefits for streambank stabilization through dense root systems, sediment and nutrient filtration, and flood protection. Grass and shrub riparian zones also do well at filtering sediment, nutrients, pesticides, and microbes while providing economic viability and incentive for farmers who utilize streamside land for agricultural production.



Degraded riparian corridor located in the Lower Crooked Creek watershed

Riparian areas are ecological strongholds for food production, cover supply, and thermal protection for in-stream and riparian species. Woody and leafy debris from streamside trees of forested buffers provide food supply for aquatic fish, shellfish, aquatic insects, and amphibians, and can lower stream temperatures and provide shade during the summer months. Terrestrial wildlife also utilize the rich habitats within riparian zones.

Within the Lower Crooked Creek watershed, riparian habitats have been altered by development on the floodplains. The lack of vegetative buffers in the riparian areas leaves the stream vulnerable to increased runoff that carries nutrients, sediments, and contaminants from adjacent upland and upstream areas. When vegetative buffers are replanted, stream quality typically increases. The streambank vegetation filters sediments, nutrients, and toxins before they reach the stream. The stream can again utilize its floodplain to decrease water velocity and flood events, and increase wildlife habitat. Streambanks are more stable and erosion decreases.

Management Recommendations

Biological Diversity

- Provide educational programs for municipal officials on integrated land use planning, incorporating habitat conservation and biodiversity enhancement.
- Provide education and outreach programs to schools on the importance of protecting biological diversity.

Deer Management

- Promote and support deer management strategies.

Invasive, Native, and Sensitive Plants

- Conduct an assessment and develop an eradication strategy for invasive species in the watershed.
- Conduct an assessment and develop a management plan for native species in the watershed.
- Work with landowners to develop a monitoring plan for invasive species.

Protecting Important Habitats

- Conduct County Natural Heritage Inventories in Armstrong and Indiana Counties.
- Develop a demonstration site representing various types of best management practices.
- Educate municipal officials on the benefits of having County Natural Heritage Inventories completed.
- Encourage the USACE and public parks to allow some open fields the opportunity to re-establish with native plants, providing habitat for wildlife.
- Evaluate present stream conditions through aquatic surveys.
- Incorporate aquatic habitat enhancements into streambank stabilization and water quality improvement projects.
- Preserve native habitats by using smart land use planning strategies.
- Promote "backyard" wildlife habitat conservation program.
- Purchase conservation easements at select prime habitat areas.
- Implement abandoned mine drainage and sewage remediation projects to improve the viability of aquatic life in the watershed.

Rare, Threatened or Endangered Species

- Appoint a liaison to work with a member of the PA Biological Survey to submit recent identification of rare, threatened, and endangered species within the watershed and to report the condition of these species' habitats.