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## NATURAL RESOURCES ASSESSMENT

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### Overview

The fertile lands and abundant geological resources, important to local economies in southwestern Pennsylvania, have also greatly altered the natural landscape. Nowhere is this more evident than in Washington County, which is the second leading producer of coal and is only 52 percent forested compared to approximately 60 percent for the state as a whole (Dominion study 2004). Though it also has been impacted by past disturbance, the Buffalo Creek valley is considered by residents and visiting naturalists to contain example habitats of what once abounded in Washington County. A number of natural areas in the Buffalo Creek watershed have recovered or are beginning to recover from disturbance, and the lack of mining impacts make this watershed unique in the county.

Prior to this study, little information existed about the communities and species of the valley and surrounding area. This plan is different from usual watershed assessments in that a goal of the plan is to describe some of these attributes. This is considered necessary in order to identify possible threats to natural resources and to have a record of the area's natural heritage for future generations.

This chapter presents results of Western Pennsylvania Conservancy's (WPC) efforts to describe plants and animals in the Buffalo Creek watershed.

- The first section discusses "Plants and Plant Communities," including a list of plants identified through survey work by WPC's Botanist and descriptions of natural communities compiled by WPC's Community Ecologist.
- The second section discusses the "Wildlife" of the watershed, including diversity of birds, butterflies, mammals, amphibians and reptiles, mollusks, snails, and dragonflies, along with discussing requirements for these species.
- The third section discusses "Species of Concern," including those found in the West Virginia and Pennsylvania portions of the watershed.
- The fourth section describes "Areas Important For Conservation," including Natural Heritage Areas, Watershed Conservation Areas, High Quality Forest Areas, and the Buffalo Valley Important Bird Area.
- Finally, the chapter ends with a summary of findings and accompanying recommendations for protecting the natural resources of the Buffalo Creek watershed.

### Plants and Plant Communities

#### Vascular Flora

##### Scope of Work

The term "vascular flora" refers to what most people typically consider to be "plants," those containing specialized tissues for transporting water and nutrients. A Checklist of Vascular Flora of the Buffalo Creek Watershed (Appendix A) was developed primarily from survey work performed for the Buffalo Creek Watershed Assessment and Protection Plan. It is supplemented by species reported by members of the Botanical Society of Western Pennsylvania. The list does not represent a comprehensive list of the species present in the watershed. The habitats most covered are floodplains and rock outcrops

located in areas such as Buffalo Creek, Buck Run, and Dutch Fork Creek and tributaries such as Polecat Hollow.

The majority of the records on the plant list are based on sightings by experienced botanists, without supporting specimens. In some cases, especially when needed for confident determination to species, specimens were collected. These specimens are housed at the herbarium at the Carnegie Museum of Natural History.



*A rock outcrop along Buffalo Creek*

Appendix A also provides name and habitat information for each species in the hope that it will be useful to students of the flora of the area. If a habitat is checked, it does not necessarily mean that the species was observed in that habitat, but only that based on experience, the species could be expected in that habitat in this region. Typically, species do not necessarily restrict themselves to the habitats accorded to them on the list.

The habitat designation “Stream Banks and Sand Bars” was used for species that are characteristic of the edges of streams, i.e. a species that seem to be favored at the edge of a stream or on a sand bar, and is thus found in this habitat more frequently than elsewhere. However, almost any plant on the checklist could be found on a

streambank, as streams border all of the other habitats listed.

The rock outcrops that were surveyed were mostly composed of sandstone or, in a few cases, shale. There are limestone-containing formations in the surface geology of the watershed, but no outcrops were encountered that appeared to be composed of limestone. In some cases, the presence of calciphiles (calcium-requiring plants) suggested that the sandstone is calcareous, and such calcareous sandstones are sometimes referred to as limestone. In the right-hand column of the checklist the letter “c” is included to indicate calciphiles. This designation was not used for species like basswood (*Tilia americana*), sugar maple (*Acer saccharum*), sharp-lobed hepatica (*Hepatica nobilis* var. *acuta*), and others that appear to have a preference, rather than a requirement, for such alkaline conditions.

### **Species of Special Concern**

No plant species of conservation concern were encountered during this study, which was done only in the Pennsylvania portion of the watershed, and no populations of such are known in the Pennsylvania portion. Slender wheatgrass (*Elymus trachycaulus*) is known from the West Virginia portion of the watershed from a 1958 specimen (Pers. Comm., B. Sargent)). This grass is listed in West Virginia as rare, and there is a proposal in Pennsylvania to add the species as Tentatively Undetermined, with the suggestion that it most likely fits the criteria for a designation of Pennsylvania Rare. Close by, the watersheds of Enlow Fork to the south and Raccoon Creek to the north each harbor numerous populations of state-rare plant species. Additional floristic work is warranted in this watershed, where much of the area currently occupied by early-successional forest has potential for recovery from past land-use impacts (mostly logging and agriculture). Several plant species that are not rare are worthy of some discussion as representative of the unique biota of the watershed.

Crepis rattlesnake-root (*Prenanthes crepidinea*) was thought to be quite rare until a few years ago (Isaac 2000). However, the species was significantly under-documented, probably due largely to the fact that individual plants live for several to many years, but flower only once in their last season of life (monocarpic) and individuals that are not yet of flowering age senesce (die off) well before flowering time in the fall. Since plants with only leaves present are ignored by many botanists, and are even less likely to be collected, the species often went unnoticed in the spring and early summer, the only period during which all individuals are apparent. *Prenanthes crepidinea* was not reported within the Buffalo

Creek watershed until collected by Bonnie Isaac et al. in April of 2000 (Isaac 12118; Isaac CM; Isaac YUO). During this study, crepis rattlesnake-root was found not only in floodplains, to which it is usually restricted in Pennsylvania, but also on a steep slope containing many groundwater seeps. Isaac (pers. comm.) concurs that the species is found above the floodplains more frequently in the southwest corner of Pennsylvania than in other parts of the state. From the sparse habitat data available from specimens collected further south and west (compiled in Isaac, 2000), this might reflect greater ecological amplitude of the species closer to the center of its distribution.



*Trillium sessile*, found in a seep at Polecat Hollow

A number of species found within the Buffalo Creek watershed are near the northern (and sometimes eastern) limit of their range, and are absent or rare further north or east in Pennsylvania. The most conspicuous of these species are the buckeyes (*Aesculus flava* and *A. glabra*). Other species in this category include dwarf larkspur (*Delphinium tricorne*), appendaged waterleaf (*Hydrophyllum appendiculatum*), toadshade (*Trillium sessile*), valerian (*Valeriana pauciflora*), Canada leafcup (*Polymnia canadensis*), one of the small-flowered crowfoots (*Ranunculus micranthus*), Short's aster (*Symphyotrichum shortii*), and goose-foot corn-salad (*Valerianella chenopodiifolia*). Canada waterleaf (*Hydrophyllum canadense*) is sporadically distributed around Pennsylvania, but only in the three most southwestern counties does it so dominate some floodplains that at first one might think it forms a monoculture in the herbaceous layer, until a closer examination reveals the high diversity of herbaceous species intermingled.

#### Non-native exotic plant species

Of the 337 species found in the watershed (Appendix A), 61 (or 18 percent) are not native to the region. This figure is considerably lower than the 37 percent reported for Pennsylvania as a whole by Rhoads and Klein (1993). This is partly due to the high number of introduced species in the Philadelphia area, which, in addition to being the most urbanized area in the state, hosts major international port facilities. Mostly, though, the low proportion of non-native species on the list is due to the fact that recording all species in highly disturbed areas, such as roadsides or residential areas, was not attempted. Furthermore, non-native conifer species found in plantations were not included.

Some of the most common invasive species in the watershed include bush honeysuckle (*Lonicera morrowii*), multiflora rose (*Rosa multiflora*), autumn olive (*Elaeagnus umbellata*), and Japanese barberry (*Berberis thunbergii*). They are most prevalent in old fields, somewhat open forests (forests dominated by oak species), and along roadsides. These species are of greatest concern in red oak-mixed hardwood forest and dry oak-mixed hardwood forest communities and any forest following logging (clear-cutting or otherwise). The native understory, which is adapted to the higher light conditions characteristic of oak-dominated forests may suffer from increased shade following invasion of non-native shrub species.

Additional invasive species in the watershed include garlic mustard, tree of heaven, Japanese knotweed, and mile-a-minute weed. Garlic mustard (*Alliaria petiolata*) is a common invader of partly shaded forest understories and forest and stream edges. In the watershed, it appears to concentrate along dirt roads next to forests, where it eventually enters the understory and may alter habitat for species of butterflies, birds, and other animals. Tree of heaven (*Ailanthus altissima*) is a fast-growing and dispersing tree that spreads in disturbed areas, altering natural habitats. It is common in the watershed in early-successional forests that have been recently logged and is often accidentally introduced by way of contaminated logging equipment. Japanese knotweed (*Polygonum cuspidatum*) is one of the most serious threats to natural habitats in Pennsylvania. It spreads quickly in disturbed areas along streams to form dense thickets that exclude native vegetation. Though it is not yet prevalent in the watershed, populations of Japanese knotweed have been found mainly in the Indian Camp subwatershed and in the Upper Dutch

Fork Creek subwatershed. Finally, mile-a-minute weed (*Polygonum perfoliatum*) is another dominant invasive species in the immediate Buffalo Creek valley area. It has become the most abundant species in the area surrounding the Green Cove Wetland Area where its seeds are likely dispersed by both birds and water.

Many of the non-native species in the watershed represent significant ecological problems. Others, while non-native, do not greatly threaten native plant and animal species and communities. Control programs for these non-native plant species vary depending on the size of the population, the habitat (i.e. wetland or upland), etc. While this report does not identify specific management techniques, general management recommendations for all non-native invasive plant species should include identification and mapping of all non-native plant epicenters when found, and possible removal through means such as physical removal, burning, and use of herbicides. Though the spread of most invasive species in general is difficult to prevent, concentrated efforts could protect important ecological areas. Examples include mechanical removal of garlic mustard at Polecat Hollow and use of herbicides on alianthus in the Narigan Run valley. Efforts aimed at preventing the spread of Japanese knotweed would be one of the most important steps towards protecting native species in the Buffalo Creek valley. This species is not yet common within the watershed, although its spread could greatly alter native communities.

### **Plant Communities**

One of the goals set in developing this plan was to identify characteristic plant communities within the Buffalo Creek watershed. A plant community is an assemblage of plant populations sharing a common environment and interacting with each other, with animal populations, and with the physical environment (Fike 1999). The objective of this section is to classify and describe the terrestrial and palustrine (wetland) plant communities within the Buffalo Creek watershed. This section attempts to describe all of the human-created and managed communities, excluding agricultural lands, residential property, and pine plantations.

### **Scope of Work**

Plant communities in the three main sections of the Buffalo Creek watershed were visited from August to October 2003 and again in May and September 2004. Plant species inventories were conducted and vegetation communities were determined according to Fike (1999). The three main areas visited during this time were State Game Lands 232 (newly acquired Allegheny Power lands), and an area in the vicinity of Dutch Fork Reservoir. Limited surveys were conducted on private land throughout the watershed. GPS locations were taken at each of the sites and the structure, composition, and quality of the vegetative communities was assessed. At each GPS point, the dominant species in the overstory, sub-canopy, shrub, and herbaceous layers were identified and recorded. Physical site characteristics recorded included the following: slope aspect and percent, topographic position, estimated soil drainage, estimated soil texture, and percent of un-vegetated surface (estimated by percent coverage of bedrock, litter, rocks, sand, bare soil, and water). Invasive species were documented, as well as successional state. The quality of the community was estimated by numbers of exotic species present and number of early-successional species versus late-successional species (i.e. black cherry and black walnut versus sugar maple). Points were downloaded and mapped in ArcView. Non-GPS monitoring points were noted on a paper map and then digitized in ArcView.

### **Community Descriptions**

The descriptions of the community types within the Buffalo Creek watershed are organized within the following broader categories: creeks and associated floodplain forests, open wetlands, mesic forests, dry hardwood forests, and early-successional plant communities. Within each broad community category, communities are described based on the dominant plant species and physiognomic state (i.e. woodland versus forest). There may be additional species found in the communities that are not listed. There is no dichotomous key to the community types presented. However, readers of this report should be able to use this to classify most plant communities found in the watershed.

### Dry Hardwood Forest Types

•**Red oak-mixed hardwood forest:** This forest type is common on low to mid slopes on well-drained soil throughout the watershed. Much of the remaining oak forests exist only because the percent slope was too high for logging activity. One important characteristic of these forests is that while the red oak and other oak species dominate the canopy layer, the subcanopy is often dominated by maples and beech, suggesting a successional shift towards hardwoods other than red oak.

Quality examples of this forest type are found in the Dog Run watershed along Dog Run Road and mid to lower slopes of tributaries to Dutch Fork Lake. Small patches of older growth red oak-mixed hardwood forests are found on steep slopes of small creeks and narrow ridge tops.

Canopy (overstory): red oak (*Quercus rubra*), white oak (*Q. alba*), sugar maple (*Acer saccharum*), red maple (*A. rubrum*), shagbark hickory (*Carya ovata*), American beech (*Fagus grandifolia*), and black walnut (*Juglans nigra*)

Subcanopy: often composed of tree species other than oaks, including, but not limited to, sugar maple, American beech, American elm (*Ulmus americana*), sassafras (*Sassafras albidum*), flowering dogwood (*Cornus florida*), shadbush (*Amerlanchier arborea*), and red maple

Shrubs: spice bush (*Lindera benzoin*) and blackhaw (*Viburnum prunifolium*)

Herbaceous species: halberd leaved violet (*Viola hastate*), bloodroot (*Sanicula Canadensis*), rattlesnake fern (*Botrychium virginianum*), woodland stone crop (*Sedum ternatum*), Jack in the pulpit (*Arisaema triphyllum*), bigleaf aster (*Aster macrophyllus*), longstyle sweetroot (*Osmorhiza longistylis*), Clayton's sweetroot (*O. claytonia*), Canadian clearweed (*Pilea pumila*), Christmas fern (*Polystichum acrostichoides*), flattened oat grass (*Danthonia compressa*), and roundleaf greenbrier (*Smilax rotundifolia*)

•**Dry mixed oak forest:** This type is found on mid to upper slopes on somewhat excessively drained soils. The presence of blueberries indicates that the soil is dry and acidic and their presence is an important distinction between this type and the red oak-mixed hardwood forest type. Soils are generally more acidic than those supporting either the red oak-mixed hardwood, sugar maple, or mesic sugar maple-basswood forest types.

Key examples of this forest type can be found on the upper slopes and ridge tops in the Buck Run watershed. Because of the value of oak lumber, only small patches of older growth dry oak forest remain.

Canopy: white oak (*Quercus alba*), red oak (*Q. rubra*), chestnut oak (*Q. montana*), and pignut hickory (*Carya glabra*)

Shrubs: witch hazel (*Hamamelis virginiana*), flowering dogwood (*Cornus florida*), alternate-leaved dogwood (*C. alternifolia*), and blueberries (*Vaccinium sp.*)

### Mesic Hardwoods Forest Types

•**Tulip tree-elm-maple forest:** This type is found at lower slopes along creek bottoms in the upper reaches of tributaries to Buffalo Creek where no developed floodplain exists. Soils are rich in organic matter and are often saturated due to the prevalence of seeps. There is often evidence of relatively recent logging (decaying stumps, logging roads, etc.). Good examples of this forest type can be found on the lower slopes in the Narigan Run ravine valley.

Canopy: American elm (*Ulmus americana*), slippery elm (*U. rubra*), sugar maple (*Acer saccharum*), tulip tree (*Liriodendron tulipifera*), red ash (*Fraxinus pennsylvanica*), and red maple (*A. rubrum*)

Shrubs: spice bush (*Lindera benzoin*) and elderberry (*Sambucus nigra ssp. Canadensis*)

Herbaceous species: common violet (*Viola sororia*), Virginia springbeauty (*Claytonia virginiana*), dogtooth violet (*Erythronium americanum*), woodland stone crop (*Sedum ternatum*), chickweed (*Stellaria sp.*), common cinquefoil (*Potentilla simplex*), white wood aster (*Aster divaricatus*), Pennsylvania sedge (*Carex pennsylvanica*), hoary vervain (*Verbana Stricta*), skunk cabbage (*Symplocarpus foetidus*), and bristly greenbrier (*Smilax tamnoides*)

●**Sugar maple-beech forest:** Sugar maple and American beech dominate the canopy of this type found on mid to upper slopes with mesic (wetter) conditions. There are often seeps and saturated soils associated with this forest type, but it is not restricted to lower slopes along small tributaries.

Canopy: primarily sugar maple (*Acer saccharum*), American beech (*Fagus grandifolia*), also including tulip tree (*Liriodendron tulipifera*), red oak (*Quercus rubra*), American elm (*Ulmus americana*), slippery elm (*U. rubra*), and red ash (*Fraxinus pennsylvanica*)

Shrubs: alternate-leaved dogwood (*Cornus alternifolia*), spice bush (*Lindera benzoin*), multiflora rose (*Rosa multiflora*), and elderberry (*Sambucus nigra ssp. Canadensis*)



**Jumpseed, *Polygonum virginianum*, is a common plant species in the watershed**

Herbaceous species: spinulose wood fern (*Dryopteris carthusiana*), smooth and hairy sweet cicely (*Osmorhiza longistylis, O. claytonii*), hairy Solomon's seal (*Polygonatum pubescens*), littleleaf buttercup (*Ranunculus abortivus*), white avens (*Geum canadense*), waterleaf (*Hydrophyllum sp.*), king of the meadow (*Thalictrum pubescens*), garlic mustard (*Alliaria petiolata*), purple phlox (*Phlox divaricata*), jewelweed (*Impatiens sp.*), white wood aster (*V. stricta*), common blue violet (*V. sororia*), dwarf larkspur (*Delphinium tricorne*), large-flowered trillium (*Trillium grandiflorum*), ground-ivy (*Glechoma hederacea*), eastern woodland sedge (*Carex blanda*), and mayapple (*Podophyllum peltatum*)

●**Mixed mesophytic:** This type is specific to the southwestern part of Pennsylvania and includes several species at their northern and eastern limits (Fike 1999). This forest has a high diversity of canopy trees including Ohio buckeye and yellow buckeye. It is very challenging to distinguish this type from beech and sugar maple types that happen to be close to the river floodplain. More work needs to be done to find specific examples of this forest type within the watershed and to distinguish it from other types with uncharacteristically high species diversity.

Canopy: Ohio buckeye (*Aesculus glabra*), yellow buckeye (*A. flava*), black walnut (*Juglans nigra*), cucumber tree (*Magnolia acuminata*), white ash (*Fraxinus americana*) shagbark hickory (*Carya ovata*), and all of those mentioned in the sugar maple-beech forest type

Shrub and herbaceous species: Pawpaw (*Asimina triloba*), red bud (*Cercis canadensis*), bladdernut (*Staphylea trifolia*), witch hazel (*Hamamelis virginiana*), spicebush (*Lindera benzoin*). There is great diversity in the herbaceous species.

### Disturbed Habitats

There are several former agricultural fields within the Buffalo Creek watershed that have been out of active agriculture production for many years. Commonly located on ridge tops, plant communities vary greatly with respect to dominant species, but, generally, these types consist of an open canopy of small (<20 cm diameter at breast height) trees and shrubs that are able to colonize former crop and pastureland. Many non-native plant species dominate the shrub and herbaceous layers.

●**Old field:** This type can be described as a meadow dominated by forbs and grasses that occurs on a site that has been cleared and plowed for farming or development, and then abandoned. Shrubs may be present but comprise less than 50 percent cover in the community, and exotic shrubs sometimes dominate. Within the Buffalo Creek watershed, these occur primarily on low to moderate slopes and ridge tops where forests were cleared for crop and pastureland. Following abandonment, former agricultural land has succeeded from old field to woodland and may, in time, develop once again into forest. The old field type is distinguished from the post-agricultural black walnut-early-successional woodland type by the absence of a canopy.

Shrubs: patches of hawthorns (*Crataegus sp.*), gray dogwood (*Cornus foemina*), arrowwood (*Viburnum dentatum*), raspberries and blackberries (*Rubus spp.*), sumac (*Rhus typhina*, *R. glabra*), eastern red cedar (*Juniperus virginiana*), and exotic shrubs such as honeysuckle (*Lonicera spp.*), multiflora rose (*Rosa multiflora*), Japanese barberry (*Berberis thunbergii*), bush honeysuckle (*Lonicera sp.*), and autumn olive (*Elaeagnus umbellatus*)



*Wild grapes are found in some early-successional areas*

Herbaceous species: goldenrods (*Solidago altissima*, *S. nemoralis*, *S. rugosa*, *S. canadensis*, *S. juncea*, *S. canadensis*, and *Euthamia graminifolia*), bluegrass (*Poa pratensis*), timothy (*Phleum pratense*), sweet vernal grass (*Anthoxanthum ododatum*), orchard grass (*Dactylus glomerata*), calico aster (*Aster lateriflorus*), wild strawberry (*Fragaria virginiana*), Queen Anne's lace (*Daucus carota*), ragweeds (*Ambrosia spp.*), hawkweeds (*Hieracium spp.*), and dandelion (*Taraxicum officinale*)

●**Post-agricultural-successional shrubland:** This habitat type occurs on sites that have been cleared and plowed for farming or development, and then abandoned, or otherwise disturbed. Shrubs comprise over 50 percent cover. This community usually contains species from the old field forest type and is the result of succession from this type over time. These areas are often heavily impacted by exotic species, such as honeysuckle, multiflora rose, Japanese barberry, and others. A similar community type defined by Fike is the Black Locust Community (1999). However, few places surveyed in State Game Lands 232 were dominated by black locust.

Common species: hawthorns (*Crataegus spp.*), serviceberries (*Amelanchier spp.*), raspberries and blackberries (*Rubus spp.*), sumac (*Rhus typhina*, *R. glabra*), eastern red cedar (*Juniperus virginiana*), honeysuckle (*Lonicera spp.*), multiflora rose (*Rosa multiflora*), and Japanese barberry (*Berberis thunbergii*)

●**Post-agricultural black walnut-early-successional woodland:** This type is found primarily on low to moderate slopes and ridge tops where forests were cleared for crop and pastureland. Following abandonment, former agricultural land succeeded from old field to woodland and may, in time, develop

once again into forest. This type is most often characterized by the dominance of small (<10 cm), early-successional species in the overstory.

There are many good examples of this type throughout the Buffalo Creek watershed. The best examples are found on ridge tops and slopes surrounding Dutch Fork Lake and other areas on State Game Lands 232. There is often evidence of agricultural activities associated with these communities.

Canopy: black walnut (*Juglans nigra*), black locust (*Robinia pseudoacacia*), black cherry (*Prunus serotina*), and elms (*Ulmus americana* and *U. rubra*)

Subcanopy: black raspberry (*Rubus occidentalis*), blackberry (*R. allegheniensis*), multiflora rose (*Rosa multiflora*), poison ivy (*Toxicodendron radicans*), and riverbank and summer grapes (*Vitis riparia* and *V. aestivalis*)

Herbaceous species: striped cream violet (*Viola striata*), tall hairy agrimony (*Agrimonia gryposepala*), jumpseed (*Polygonum virginianum*), spotted lady's thumb (*Polygonum persicaria*), avens (*Geum canadensis*), black snakeroot (*Sanicula canadensis*), calico aster (*Aster lateriflorus*), garlic mustard (*Alliaria petiolata*), white snakeroot (*Eupatorium rugosum*), Christmas fern (*Polystichum acrostichoides*), and spotted water hemlock (*Cicuta maculate*)

### **Floodplains**

●**Sycamore–box elder floodplain forest:** Floodplains of the larger creeks of the Buffalo Creek watershed (Buffalo Creek, Buck Run) are broad with little or no slope. Several micro sites occur within the floodplain and may affect water relations, and thus species composition. Sycamore and eastern cottonwood dominate this forest type found within the floodplains of Buffalo Creek, Buck Run, and other larger creek systems.

Good examples of this type are found along Buck Run Creek.

Canopy: sycamore (*Platanus occidentalis*) and eastern cottonwood (*Populus deltoids*)

Subcanopy: black willow (*Salix nigra*), box elder (*Acer negundo*), yellow buckeye (*Aesculus octandra*), and Ohio buckeye (*A. glabra*)

Shrub: spice bush (*Lindera benzoin*), black raspberry (*Rubus occidentalis*), willows (*Salix* sp.), and multiflora rose (*Rosa multiflora*)

Herbaceous species: clearweed (*Pilea pumilla*), jewelweed (*impatiens* sp.), lady's thumb (*Polygonum persicaria*), deer tongue grass (*Panicum clandestinum*), calico aster (*Aster lateriflorus*), crooked-stem aster (*Aster prenanthoides*), woodreed (*Cinna arundinacea*), wingstem (*Verbesina alternifolia*), bottlebush grass (*Elymus hystrix*), beggarticks (*Bidens* sp.), purpleleaf willowherb (*Epilobium coloratum*), bitter dock (*Rumex obtusifolius*), nettle (*Urtica dioica*), whitegrass (*Leersia virginiana*), and white snakeroot (*Eupatorium rugosum*)

●**Herbaceous/Shrub-dominated floodplain wetlands:** This type is characterized by saturated soils and a lack of canopy; it is dominated by shrubs and herbaceous species.

Shrubs: willows (*Salix* spp.), silky dogwood (*Cornus amomum*), and black raspberry (*Rubus occidentalis*), as well as non-native multiflora rose (*Rosa multiflora*) and bush honeysuckle (*Lonicera* sp.)

Herbaceous species: wingstem (*Verbensia alternifolia*), stinging nettles (*Urtica dioica*), Canada nettle (*Laportea canadensis*), false nettle (*Boehmeria cylindrica*), jewelweed (*Impatiens sp.*), lady's thumb (*Polygonum persicaria*), deer tongue grass (*Panicum clandestinum*), calico aster (*Aster lateriflorus*), crooked-stemmed aster (*Aster prenanthoides*), sweet woodreed (*Cinna arundinacea*), bottlebush grass (*Elymus hirtus*), beggarticks (*Bidens sp.*), purpleleaf willow herb (*Epilobium coloratum*), poke weed (*Phytolacca americana*), clearweed (*Pilea pumilla*), bitter dock (*Rumex obtusifolius*), white grass (*Leersia virginiana*), sedges (*Carex spp.*), and white snakeroot (*Eupatorium rugosa*)

Good examples of this type are found along Buck Run creek.

●**Black maple-elm creek floodplain:** This type is found along the floodplain and lower slopes of smaller creeks and streams of the Buffalo Creek watershed. Streams are usually on top of bedrock and the floodplains are characteristically narrow with very steep slopes. Species in this type are often a combination of the forested and herbaceous floodplain types and upland sugar maple and red oak types. Species composition varies considerably and includes species from both types. Soils are often somewhat high in pH (~6.5) and there are usually seeps flowing from the slopes. Furthermore, there is the chance that in these sites, water comes in contact with limestone.

There are many good examples of this type throughout the Buffalo Creek watershed. The best examples are found along small tributaries of Dutch Fork Lake.

Overstory: black maple (*Acer nigrum*), sugar maple (*A. saccharum*), tulip tree (*Liriodendron tulipifera*), American elm (*Ulmus Americana*), and slippery elm (*Ulmus rubra*)

Understory: sugar maple and black maple saplings dominate

Herbaceous species: Virginia creeper (*Parthenocissus quinquefolia*), large-flowered trillium (*Trillium grandiflorum*), smooth and hairy sweet cicely (*Osmorhiza longistylis*, *O. claytonii*), cut-leaved grape fern (*Botrychium dissectum*), Christmas fern (*Polystichum acrostichoides*), trout lily (*Erythronium americanum*), false Solomon's seal (*Smilacina racemosa*), stinging nettle (*Urtica dioica*), and smooth rock cress (*Arabis laevigata*)

### **Streambanks and sandbars**

There are numerous species that depend on the changing environment of streambanks and sandbars. Some of these are the same species that are found in the floodplain communities. Further surveys for these species are needed.

## **Wildlife**

### **Birds**

#### **Birds of Buffalo Creek Watershed**

The diversity of habitats in the Buffalo Creek watershed support a wide range of bird life, including an abundance of migratory birds, wintering birds, wading birds, hawks, and owls, according to recent surveys by PA Audubon and the Three Rivers Birding Club. It was because of this diversity that the Buffalo Creek valley was recently named the 80<sup>th</sup> IBA in Pennsylvania. The Three Rivers Birding Club has adopted the watershed and conducts bird outings there on a regular basis. Additionally, the first annual winter bird count was held in January 2004, and a second event was held in December 2004.



***Barn Swallows utilize the new bluebird boxes at Green Cove Wetlands***

The Buffalo Creek watershed is part of the Ohio Hills Bird Conservation Region, which is designated by Partners in Flight, an agency dedicated to bird conservation in North America. It is considered one of the highest priority regions for conservation in the northeastern United States due to its concentration of high priority and declining bird species. Within Pennsylvania, much of the landscape surrounding the watershed has been altered due to development. Portions of the Buffalo Creek valley contain important remaining habitats appropriate for forest-interior bird species.

Forest-interior species require a certain number of relatively intact, forested acres for viable, breeding populations. Among the species of highest concern in the Buffalo Creek watershed is the Cerulean Warbler, of which 54 pairs were found during a June 2003 survey. The Ohio Hills remains the most critical physiographic province for

Cerulean Warblers in the United States, containing at least 50 percent of the breeding habitat (Ohio Hills Conservation Plan). Forest management planning, including the protection of forest corridors, is badly needed to protect this and other forest species, which also include the Worm-eating Warbler, Acadian Flycatcher, Louisiana Waterthrush, and Eastern Wood Pe-wee. Forestry management in the watershed must allow for contiguous acres of mature forest to support these species into the future. Much of the forested land in the watershed is under ownership of the Pennsylvania Game Commission (PGC). However, there are currently no management plans in place by the PGC to protect these species. Future action should include detailed management plans by the PGC to protect forest-interior birds on State Game Lands 232.

In addition to these migratory forest birds, the watershed has a large population of year-long residents, including many scrub/shrub species. In January 2004, volunteers from the Three Rivers Birding Club, BCWA, and other conservation groups joined together for the first annual winter bird count focused on the watershed. Unfortunately, severe flood conditions prevented a thorough count. Despite this, 2,570 birds were counted, with 51 winter species documented, including large populations of song sparrow and white-crowned sparrow. On December 26, 2004 the second winter count, under cold but drier conditions, tallied 4,367 birds of 59 species. Notable in both counts are the sparrow populations, averaging the following during both counts: White-Crowned Sparrows (150), Tree Sparrows (70), Song Sparrows (110). December 2004 yielded much higher numbers of Northern Mockingbirds (92), American Bluebirds (65), Redtailed Hawks (46), American Kestrels (16), and four species of owls. A few other species of interest during the second count were Rough-legged hawk, Rusty Blackbird, Chipping Sparrow, and American Phoebe.

Buffalo Creek also contains possibly the largest population of wading birds that can be found in Washington County. Heron rookeries (nesting areas) have been found along undisturbed areas around Dutch Fork Creek and Buffalo Creek, where the birds feed primarily on small fish. Volunteers have identified over 50 nests. The presence of these birds is somewhat controversial, as they compete with humans for fish within rivers and ponds.

The PGC has improved the habitat for herons and other wading birds by restoring wetlands in the watershed, attracting species like Green Herons and Spotted Sandpipers, also



***The Northern Parula, pictured along Buck Run, rarely nest in forests that do not contain moss and lichens***

migrating birds such as bitterns and egrets and shorebirds such as Greater and Lesser Yellowlegs. The seasonal lowering of the pools also creates habitat for many species.

In total, at least 180 species of birds have been recorded in the Buffalo Creek watershed, with close to 100 breeding species. See Appendix B for a complete list of birds that have been identified.

### **Important Habitats**

#### **Forests**

Although approximately 50 percent of the land in the watershed is forest, much of this is early-successional growth, containing habitat undesirable for birds requiring more mature and intact forests. Important areas for these forest birds include State Game Lands 232 along Buck Run Road, the Camp Buffalo Road area, Narigan Run, Dog Run (lower, near waterfall), Welch Run, and Polecat Hollow. These tend to be mid-successional, healthy sugar maple and oak mixed hardwood forests with a layered forest structure. These species also need corridors between large forest fragments to migrate. When many of the other forests in the watershed were surveyed, they were found to contain early-successional species such as locusts, young hickories, and multiflora rose. Few interior forest specialist bird species were found. However, these more successional areas may provide a buffer that contributes to the high diversity of the more mature forest areas. Much of this forested acreage is part of a tract recently acquired by the PGC from West Penn Power and have remained relatively untouched in the last 30 years. Portions of some of the important forest habitat for birds, such as Narigan Run and Polecat Hollow, are privately owned.

#### **Wetlands**

Most of the current wetland habitat is a result of restoration projects undertaken by the PGC. Though each one of the restored wetlands creates a unique habitat, the Green Cove Wetland has been the most successful and abounds in bird life. Waterfowl species include breeding Wood Ducks; waders include Great Blue Herons, Green Herons, raptors, Nighthawks, swifts, and Belted Kingfishers. Passerines include Tree Swallows, Kingbirds, vireos, warblers, blackbirds, and others, which forage for food in and around the wetlands. Additionally, a pair of American Bitterns and a Great Egret were identified during spring migration in 2004. Two other wetland areas present near the intersections of Buffalo Creek and Buck Run have been gradually becoming more popular among waterfowl, but have yet to be as preferred by birds as Green Cove.

#### **Grasslands**

Succession is the most serious threat to grassland habitat in the watershed, as lack of removal of woody vegetation results in the conversion of abandoned fields to scrub/shrub habitat. Pastures and hayfields can serve as habitat for grassland birds, if hay is harvested later in the season and pastures are not heavily grazed. The PGC periodically mows some of its fields, such as the Camp Buffalo area, during non-breeding seasons to maintain them as grasslands. The Camp Buffalo grassland/wet meadow supports a variety of sparrows, blackbirds, and ground-nesting species. Many of the grassland birds are likely inhabiting non-intensively managed private fields. For instance, a Bobolink pair is routinely spotted in such a field along Post Road in Blaine Township. Intensively managed areas, such as yards and most pastures and cropland, do not provide appropriate habitat for grassland birds.



*A pasture providing appropriate habitat for this Bobolink, found along Post Road*

#### **Scrub/shrub**

There is currently no shortage of scrub/shrub areas for birds. Clear-cuts and old fields eventually become scrub/shrub, if not

managed otherwise. Management for game species usually supports scrub/shrub habitats. These habitats can be found almost anywhere in the watershed, such as along agricultural streams and Buck Run Road, where a previous clear-cut has encouraged species such as multiflora rose to invade. Notable bird species found in these types of habitats include the Blue-winged Warbler, Yellow-breasted Chat, Indigo Bunting, Blackbird, Song Sparrow, White-crowned Sparrow, and Wood Thrush. These species often nest low to the ground. During the winter bird survey, a birder observed that the watershed may have one of the highest concentrations of wintering scrub/shrub species, including the Song Sparrow and White-crowned Sparrow, in Pennsylvania. These high populations were observed in PGC land near the Green Cove Wetlands and the new wetlands on State Game Lands 232.

### **Bird Species of Conservation Concern**

In Pennsylvania, wetland and grassland habitats are considered the most threatened. Forest species are considered to face a much smaller threat because most of the state is forested. However, because many species have ranges that comprise only a section of the state, regional trends are often more indicative. This is true for migratory forest-interior species found in the Ohio Hills Bird Conservation Region. Although species such as the Acadian Flycatcher, Worm-eating Warbler, Louisiana Waterthrush, and Cerulean Warbler can be found within a larger range, a core of their population is found in the Ohio Hills, which in Pennsylvania includes the southwestern portion. These forest-interior species are the most significant birds of concern in the watershed and require more forested acreage to survive as the fragmentation of forested land increases. For example, research shows that in a 40 percent forested landscape, 476 acres are needed to maintain a large Scarlet Tanager population, while only 62 acres are needed if the area is 60 percent forested. This species is considered an umbrella species, or good indicator of bird diversity: a recent study showed that 12 other species of high conservation priority were commonly found in plots containing Scarlet Tanagers (Rosenberg 1999).

The quality of habitat available can be just as important as the acres of forest. For instance, the Cerulean Warbler requires more mature forests of an uneven structure, with distinct canopy layers (Rosenberg 2000). The Louisiana Waterthrush is found along smaller streams with intact riparian zones and good water quality, where it feeds on aquatic macroinvertebrates. Grassland birds, which are considered to be declining in Pennsylvania, are not as common in the watershed. Most of the abandoned fields have reverted to scrub/shrub habitats, pastures receive intense grazing pressure, and few strip mine grasslands exist. Uncommon species such as Bobolink, Henslow's Sparrow, and Field Sparrow are present, but in small numbers.

The Red-headed Woodpecker, which was positively identified in the watershed in 2004, is a species of conservation concern. Its decline has been attributed to road mortality and loss of habitat, including clear-cuts, agricultural development, channelization, and the loss of orchards. Red-headed Woodpeckers inhabit multiple habitats containing large forest fragments with dead trees for nesting, often located near agricultural fields where they forage for food.

Table 2-1 lists birds of conservation concern found in the Pennsylvania portion of the watershed, according to their PA Audubon and Partners in Flight status and the Audubon Society, an organization dedicated to bird conservation in the United States. Birds of Conservation Concern are considered to be those that are thought to be declining in all or part of their range or to have significant threats within their migratory or breeding ranges. In addition to these species, which are also likely inhabitants of the West Virginia portion, the barn owl was positively identified in the West Virginia portion in 2004. This species is considered rare in West Virginia. There is no current confirmation of barn owls in the Pennsylvania portion.

Table 2-1. Birds of Conservation Concern		
*Cerulean Warbler	Field Sparrow	Bobolink
*Worm-eating Warbler	Henslow's Sparrow	Scarlet Tanager
*Wood Thrush	Blue-gray Gnatcatcher	Chimney Swift
*Blue-winged Warbler	Yellow-breasted Chat	Black-billed Cuckoo
*Willow Fly-catcher	Indigo Bunting	Yellow-throated Warbler
*Acadian Flycatcher	Eastern Phoebe	Red-headed Woodpecker
Louisiana Waterthrush	Great-crested Flycatcher	American Bittern (non-breeding)
Yellow-throated Warbler	Eastern Towhee	Great Egret (non-breeding)
Great Blue Heron		

\* these birds are on the Audubon Watch List

**Butterflies**

***Butterflies of the Buffalo Creek Watershed***

Indicator species are those that either signal the presence or abundance of other species or changes in the physical environment through their presence. Butterflies are becoming more widely accepted as ecological indicators because of their habitat, light, and temperature requirements. Many butterflies feed and lay their eggs on specific plant species. They are also at a low trophic level, which allows them to respond quickly to environmental stress. Changes in the presence or abundance of certain species of butterflies may indicate shifts in key habitat necessary for their survival.



*Milbert's tortoiseshell butterfly, photographed at Green Cove Wetland Area*

Two butterfly walks were held (in conjunction with dragonfly/damselfly walks) in order to obtain baseline information on butterfly species found in the Buffalo Creek watershed. Data was qualitative, and numbers of individuals from each species were not recorded in most cases. Organizations partnering with WPC included BCWA, the Buffalo Valley Alliance, the Three Rivers Birding Club, and Westmoreland Bird and Nature Club. Dramatic shifts in the presence of some of the species identified in the future could indicate changes in habitat availability. Continued monitoring of the butterflies in the watershed will provide important insight into the health of these areas.

Table 2-2. Distribution of Butterfly Species By Family		
Family	Description	#
nyphalidae	brush-legged butterflies	13
hesperiidae	skippers	11
lycaenidae	gossamer-winged butterflies	8
papilionidae	swallowtails	4
pieridae	whites and sulfurs	3

A total of 39 species of butterflies were identified in the Buffalo Creek watershed according to Table 2-2. A complete list can be found in Appendix C. Brush-legged butterflies make up the majority of species that can be found in Pennsylvania and in the watershed. These include fritillaries, satyrs, monarchs, and tortoiseshells. Probably the most unique find was Milbert's tortoiseshell, which meets

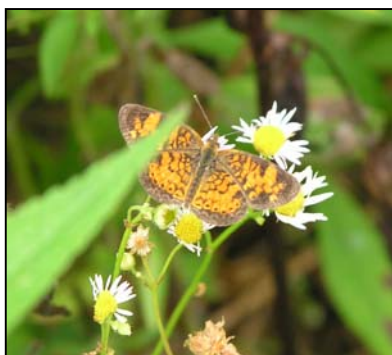
the southernmost point of its range in the watershed and has never before been recorded for Washington County. Skippers were also abundant, and there are likely many more species of skippers in the watershed yet to be identified. The majority of these small, fast butterflies identified were in the

subfamily Hesperinae, called grass skippers because they feed on grasses as larvae. The firey skipper, identified during the second butterfly walk, is a grass skipper that breeds in the southern United States and South America. This species is likely a “stray,” just passing through the watershed. Among the gossamer butterflies, a butterfly of special concern, the bronze copper, was identified. The bronze copper, a species of water edges that feeds primarily on curly dock as a caterpillar, is a species of concern in Pennsylvania.

The butterfly assemblage is often directly related to the types of habitat available. The butterfly walks surveyed only a small number of areas in the watershed, including primarily the areas surrounding Green Cove, Buck Run, and Route 232 wetlands, as well as forest and meadow habitat along Buck Run Road. Butterflies such as the monarch and American snout are migratory species that may breed in the watershed but depend on a variety of habitats over a large geographic area. Species such as eastern tiger swallowtail, black swallowtail, pearl crescent, and great spangled fritillary have a wide variety of weedy larval hosts and are found in numerous areas, such as gardens and roadsides.

**Table 2-3. Example Requirements of Some Butterflies Identified within the Buffalo Creek Watershed**

	<b>Hosts</b>	<b>Adult Food</b>	<b>Habitat</b>
Milbert's tortoiseshell	nettles	thistles, goldenrods, wet areas, rotting fruit	wet areas near woodlands, moist pastures
bronze copper	herbs of the buckwheat family	blackberries, red clover	low, wet areas
American snout	hackberry	nectar from asters, dogbane, dogwood, goldenrods	forest clearings and edges
Aphrodite fritillary	violets	nectar from milkweeds and other flowers	prairies, high mountains, dry fields
eastern tiger swallowtail	leaves of basswoods, tulip, birch, ash, cottonwood, and willow trees	a variety of flowers, including wild cherry	deciduous woods, forests, parks, suburbs
northern pearly eye	grasses such as white grass, bearded shorthusk, and bottlebrush	dung, fungi, carrion, sap	damp woods near marshes or waterways
monarch	milkweeds	milkweed nectar, a variety of flowers	open habitats like fields and meadows



*Pearl crescent is another common butterfly in Buffalo Creek, usually found in weedy woodland edges as was this individual seen along Colby-Young Road*

Among the butterflies sampled, two of the most dependent on local habitats include the meadow fritillary (open meadows) and common wood nymph (forests). The bronze copper is considered to be specific to pond edges containing its host plant, curly dock. Though Milbert's tortoiseshell inhabits a variety of habitats, it tends to be found in areas near nettles, which serve as host plants for the caterpillars of the species. Most of the species sampled, with the exception of the skippers (many of which were grass skippers), require an area near some type of woodlot or forest. These include question marks, red admirals, red-spotted purples, and eastern commas. Table 2-3 gives example requirements for some butterflies found in the watershed.

### **Butterflies of Conservation Concern**

Bronze copper (*Lycaena hyllus*) is an “S2” species in Pennsylvania, meaning that there are only six to 20 occurrences, or locations where the species has been documented in Pennsylvania. The species has been found in various standing water edges throughout the watershed. It is considered by some butterfly researchers to be “remnant dependent,” which means it depends on and seeks out specific remaining habitats for its survival, likely water edges containing its host plant. Its caterpillar host plants are plants of the buckwheat family. In Pennsylvania, this primarily is curly dock (*Rumex crispus*), which is actually an exotic species that is rather abundant. It may be the mowing of host plants, on which the butterfly overwinters, that has contributed to its low numbers.

## **Mammals**

### **Mammals of the Buffalo Creek Watershed**

#### *Pennsylvania Mammal Records*

Many mammals are nocturnal and/or secretive in their habits, making them difficult to study without sophisticated or costly equipment and methods. As a result, the distribution of mammal species in Pennsylvania has not been thoroughly researched in most cases. The distribution depends largely on the presence of available habitats, current and historic. Many mammals, once extirpated (eliminated), may not easily re-colonize an area unless suitable habitat remains nearby. For instance, grassland-specialist mammals, such as the least shrew, are declining throughout the northeast as grasslands disappear due to succession and development.

#### *Important Mammal Area Project*

The Important Mammal Area Project recognizes areas with diverse populations of mammals and mammals of special concern. It is being carried out through an alliance of conservation organizations, sportsmen, wildlife professionals, and scientists. Important Mammal Areas are nominated by members of a community and determined by a board of experts called the Mammal Technical Committee. The decisions are based on five criteria, including the presence of diverse or unique mammal populations, high-density populations, the existence of threatened or endangered species, the existence of declining species, and the importance for public education (IMAP). The Buffalo Valley Alliance recommended the Buffalo valley for Important Mammal Area Status in 2003. The nomination reached level I, meaning that suitable habitat was found. The Buffalo valley ultimately did not move to level II of the process to reach Important Mammal Area status because of a lack of data available on the mammals in the watershed.

Though there is virtually no documentation on the mammals species in the watershed, a probable list of resident mammals can be extrapolated based on habitat availability and mammal specimens at the Carnegie Museum of Natural History’s Mammals Section. The Buffalo Creek watershed has the potential to harbor a high diversity of mammals because of its varied habitats, including woodlands, wetlands, grasslands and meadows, scrub/shrub areas, and rock overhangs.

Based on specimens housed at the Carnegie Museum of Natural History Mammals Section, the Buffalo Creek watershed potentially houses 45 of the 70 species currently or historically found in Pennsylvania. Of the 70 Pennsylvania mammals, four (wolf, mountain lion, lynx) have either been extirpated or rarely occurred in the state, and their original distribution is not well known (Carnegie Museum of Natural History).

In general, the Buffalo Creek watershed potentially houses the common species of mammals found across Pennsylvania, as well those confined to either the western or southern portion of the state. The evening bat potentially reaches its northern limit in the watershed, while the fox squirrel is generally confined to the western portion of Pennsylvania, which includes the Buffalo Creek watershed. A number of species found throughout the rest of Pennsylvania, such as the star-nosed mole and short-tailed weasel,

are conspicuously absent from Washington County, or southwestern Pennsylvania in general, because of climate or topography.

### **Mammal Species of Special Concern**

No mammal species of special concern have currently been identified in the Pennsylvania portion of the Buffalo Creek watershed. In West Virginia, the meadow jumping mouse is considered a species of special concern and records show a 1987 occurrence from the Castleman Run Wildlife Management Area (Pers. Comm., B. Sargent). This species is likely found in the Pennsylvania portion, but is not considered a species of concern in Pennsylvania. Distribution records indicate endangered Indiana bat, least shrew, and Allegheny woodrat could potentially be in the watershed, though none of these species has yet been identified there.

### **Important Habitats**

Forest edge refers to the portion of a forest that is adjacent to shrubland, residential land, or other non-forest habitats. Core forest, generally considered to be forested areas greater than 300 feet (100 meters) from a forest edge, is minimal in the watershed. Therefore, mammal species with large home ranges that require large forest areas--including the fisher, black bear, and bobcat, are unlikely residents (though the black bear has been seen using the area as a corridor) (Debinski, D. M. and R. D. Holt 2000). The forest tracts are large enough to easily support a variety of other forest-dwelling mammal species, especially small mammals with smaller ranges including woodland jumping mouse, fox squirrel, and smoky shrew (Grzimek 1975).

Interconnected forest fragments provide refuge for species requiring multiple habitats such as the red fox and the big brown bat. Conservation efforts to protect a mammal should take into consideration both home range (generally related to body size) and habitat constraints. Most of the larger tracts of forest in the watershed are located in the western portion of the watershed in State Game Lands 232. Mammals requiring larger forest tracts would likely be found mostly in this area (Trapp 1975). However, many of the smaller mammals additionally inhabit smaller forest tracts throughout the watershed, including near areas of human habitation. Mammals such as raccoons, opossums, minks, and shrews show an affinity for woodlands close to water with macroinvertebrates.

A large proportion of mammals require environments such as forest edges, grasslands, wet meadows, riparian zones, and scrub/shrub areas, or have multiple habitat requirements. Historically, southwestern Pennsylvania has been important for small mammals, which once depended on grasslands confined to that portion of the state (Pers. Comm., J. Hart). Now that grassland areas are disappearing in western Pennsylvania, strip mines (which are not regularly cultivated, interfering with breeding habits) constitute the majority of grasslands.

The primary habitats for grassland species in the watershed are recently abandoned and lightly used fields. Generally, cultivated fields do not provide good habitat for small mammals because tilling destroys small mammal breeding areas. An exception is the marmot or woodchuck (*Marmota monax*), which can be found occupying many such areas. No-till agriculture, or carefully timed tilling practices, may reduce the negative impact on small mammals. The PGC mows areas such as the former Boy Scout camp along Camp Buffalo Road to maintain them as grasslands. It is important to mow these areas in non-breeding seasons, such as late summer or early winter, to avoid destroying breeding habitat for birds and small mammals. Grasslands in the watershed potentially contain mammals such as herbivorous



***Wet meadow located in the old Boy Scout camp, likely important for various small mammal species***

meadow voles and deer mice. The evening bat, which is likely a resident of the watershed, does not utilize caves but trees with loose bark near such areas for its hibernacles.

Though mammals are considered foremost as terrestrial animals, many of them actually are semi-aquatic, depending on wetland plants and animals for food (Carnegie Museum of Natural History). Some of these, like the muskrat, southern bog lemming, and meadow jumping mouse, which can be found in the watershed, are good swimmers. Additionally, most shrews (with the exception of the least shrew) rely on damp, wooded areas characteristic of the floodplain forest along Buffalo Creek. This potentially includes the northern short-tailed shrew, the pygmy shrew, and the smoky shrew. Dozens of small mammals were observed escaping their streamside burrows along the Buffalo Creek floodplain during a 2004 flood. Wet meadows, which retain wet soils and could in some cases be considered wetlands, are important for the wetland mammal species, which eat bulbs and tubers of wetland plants to supplement their aquatic diets.

The most abundant mammal habitats in the watershed are edge habitat and reverting grassland habitat, commonly referred to as “scrub/shrub.” These habitats often provide a variety of cover for game species, such as whitetail deer, and also provide cover for mammals such as the red fox, white-footed mouse, and eastern cottontail rabbit. The extensive scrub/shrub habitat has likely created high densities of mammal species requiring edge and multiple habitats. This can be postulated based on the extensive edge species of birds that have been documented, which point to possible trends in mammal and other groups. Though often thought of as undesirable, partly because it contributes to invasive species, scrub/shrub is a habitat type that can contribute to biodiversity if a proper balance is maintained between it and other habitats such as intact forest. Examples of mammals that would utilize this type of habitat include opossums, masked shrews, eastern cottontail rabbits, white-footed mice, gray fox, and whitetail deer. Though edge species thrive in this environment, specialist forest and grassland species do not. The succession of old pastures will ultimately result in scrub/shrub habitat if management options are not implemented.

Rock overhangs, which include acidic cliff communities, are present along Camp Buffalo Road, Buck Road, and various small tributaries in the watershed. There is also evidence that caves, which provide similar habitat and are usually formed through the dissolution of rock material, are present in the watershed along Dog Run and other tributaries. However, these are likely limited and difficult to find, due to the sporadic nature of calcareous rock deposits in the watershed. Sandstone rock, which is much more present, does not dissolve as easily.

Bats such as the Indiana bat (Endangered) and eastern pipistrelle rely exclusively on caves for a part of the year, while other bats, such as the northern long-eared bat, prefer these hibernacles, but often end up using hollow trees and manmade structures (Humphrey 1978). The Indiana bat, specifically, almost exclusively utilizes caves in proximity to intact riparian areas. Though there have been no Indiana bats positively identified in the watershed, the habitat exists for this endangered species. The state-endangered Allegheny woodrat, which has been identified in nearby Greene and Westmoreland counties, is also a possible inhabitant of the watershed’s caves and overhang areas.

Given the large home ranges of many mammals and the expansion of humans, humans and mammals are bound to come into conflict. For instance, a gray fox’s home range is about 1,300 acres, which means that it will eventually encounter private lands. The big brown bat, which was once a forest dweller, has now become accustomed to living near people in places like church belfries and loose shelters (Banfield 1974). Raccoons, whose home range can be from 10 to 20 square miles, are often found in human buildings, instead of its usual rock crevices, abandoned dens, and old stumps (Lotze 1979). Woodchucks, deer mice, squirrels (gray, fox, and red), whitetail deer, and white-footed



*Northern spring salamander found by W & J students at Narigan Run*

mice are common in our back yards, especially in rural areas. There is even the possibility of mammals such as weasels, beavers, and flying squirrels living near houses, depending on the kinds of habitat that surrounds residential areas. In many cases, humans can live in conjunction with mammals (as with other organisms) in private lands by providing wooded corridors next to streams and along old fields. Bat boxes, which are constructed roosting structures, can provide alternative bat roosting sites for many bat species.

## **Amphibians and Reptiles**

### **Amphibians and Reptiles of the Buffalo Creek Watershed**

Amphibian and reptile distributions tend to be dependent on climate, habitat availability, and historical dispersal routes among major river basins (Hulse et al.). The Pennsylvania Gap Analysis Project estimates that amphibian and reptile populations in southwest Pennsylvania are comparatively lower than in much of the state (PA GAP). This is attributed partly to the effects of development and fragmentation.

Limited emphasis was put on investigating the amphibians and reptiles of the watershed for the protection plan. Efforts included several days of investigation of headwater streams and major tributaries by WPC staff, and student salamander field days at Narigan Run conducted by Washington and Jefferson University students. Results are shown in Appendix D. Vernal pools encountered during other field activities were searched briefly for individuals. The Amphibians and Reptiles of Pennsylvania study was consulted, and its author, Dr. Arthur Hulse, was contacted personally for additional accounts of species in the watershed.

Dr. Hulse, or volunteers, identified a total of eight species of amphibians and reptiles during the course of the Amphibian Atlas Project. Seventeen additional species were documented within the watershed by WPC staff and volunteers during the course of this study (Table 2-4). Twenty additional species are considered to potentially occur in the watershed based on published distributions (Hulse et al.).



***A smooth green snake found along  
Camp Buffalo Road***

There are a number of species found in southwest Pennsylvania that are not commonly found elsewhere in the state. These include the mudpuppy, ravine salamander, seal salamander, mountain chorus frog, eastern spiny soft-shelled turtle, and shorthead garter snake. Of these species, the soft-shelled turtle was identified during the course of the study. The ravine salamander is a likely resident of the watershed because of its preference for areas under large, flat sheets of limestone. However, it is an extremely difficult salamander to find because these rock layers cannot be lifted manually (Pers. Comm. , A. Hulse.).

Neither the spotted salamander nor the related Jefferson salamander was identified during the course of the study, but both are likely residents of the watershed. A larva of the ambystomid family was found in a vernal pool and was thought to be either a Jefferson or spotted salamander. However, this individual could not be positively identified to species.

Though actively searched for, the slimy salamander was conspicuously absent during sampling efforts. Slimy salamanders were identified in the watershed during the Amphibian Atlas Project but, after further study, they do not appear to be particularly abundant.

A Fowler's toad was identified during this study, which is a new record in Washington County. This individual was identified in a wetland near Polecat Hollow. However, no specimen was collected and further sampling is needed to verify that this individual was accurately identified.

### **Important Habitats**

One of the most significant findings was that salamanders, and not fish, seem to be the dominant top predator in most of the forested, headwater streams. It is expected that fish populations are limited in many of these ecosystems because of the high gradients of these streams and natural barriers to fish movement. Salamanders were commonly found under rocks, along riverbanks, and between rocks in outcrops adjacent to streams where fish numbers were low or absent. The most common species identified in these habitats was the northern dusky, followed by the two-lined salamander. Mountain duskies were identified occasionally, while northern spring salamanders and long-tail salamanders were rare, but present. Redbacks were common under leaves and logs of forested hillsides. Forested seep areas were other important salamander habitats in the watershed, containing primarily northern duskies.

<b>Table 2-4. Amphibian and Reptile Records</b>		
<b>Scientific Name</b>	<b>Common Name</b>	<b>Observer</b>
<i>Apalone spinifera spinifera</i>	eastern spiny softshell*	WPC, PGC
<i>Bufo americanus americanus</i>	eastern American toad	WPC
<i>Bufo woodhousii fowleri</i>	Fowler's toad	WPC
<i>Chelydra serpentina serpentina</i>	common snapping turtle	WPC
<i>Cryptobranchus alleganiensis alleganiensis</i>	eastern hellbender	A. Hulse, Amphibian Atlas Project
<i>Desmognathus fuscus fuscus</i>	northern dusky salamander	WPC
<i>Desmognathus ochrophaeus</i>	mountain dusky salamander	WPC
<i>Diadophis punctatus edwardsii</i>	ringneck snake	Amphibian Atlas Project
<i>Eurycea bislineata</i>	two-lined salamander	WPC
<i>Eurycea longicauda longicauda</i>	longtail salamander	WPC, Amphibian Atlas Project
<i>Gyrinophilus porphyriticus porhyriticus</i>	northern spring salamander	WPC
<i>Nerodia sipedon sipedon</i>	northern water snake	Amphibian Atlas Project
<i>Notophthalmus viridescens viridescens</i>	red-spotted newt	WPC
<i>Opheodrys vernalis</i>	smooth green snake	WPC
<i>Plethodon cinereus</i>	redback salamander	WPC, Amphibian Atlas Project
<i>Plethodon glutinosus</i>	northern slimy salamander	Amphibian Atlas Project
<i>Pseudacris crucifer crucifer</i>	northern spring peeper	WPC
<i>Rana catesbeiana</i>	bullfrog	WPC, Amphibian Atlas Project
<i>Rana clamitans melanota</i>	green frog	WPC
<i>Rana palustris</i>	pickerel frog	Three Rivers Birding volunteers
<i>Rana pipiens</i>	northern leopard frog	WPC
<i>Rana sylvatica</i>	wood frog	WPC
<i>Regina septemvittata</i>	queen snake**	Amphibian Atlas Project
<i>Terrapene carolina carolina</i>	eastern box turtle	WPC

\* of conservation concern according to Pennsylvania Gap Analysis Project

\*\* potential indicator of good water quality

Species most encountered in vernal pools and the newly constructed wetlands included wood frogs, pickerel frogs, and spotted newts. Wet meadows within the former Boy Scout camp along Camp Buffalo Road and along Lower Dutch Fork Creek are popular breeding sites for wood frogs in the spring.

The spiny-softshell turtle was identified both in Buffalo Creek and Lower Dutch Fork Creek. This may be the first documentation of this species in Washington County (Hulse et al.). This is typical habitat, since they generally prefer slow-moving rivers and ponds. They can be found basking in the sun, especially in late summer. There is some anecdotal evidence that they were also present in Dutch Fork Lake Reservoir before it was drained.

Amphibians are often considered particularly vulnerable to pollution and sedimentation. Of those found in the watershed, northern dusky salamanders are considered to be especially sensitive to sedimentation. Fortunately, many headwater streams in the watershed have yet to be affected by development, logging, and other pressures that could affect this and other species.

### **Species of Concern**

The hellbender, which was identified in the West Virginia portion of the watershed, is considered a rare species in West Virginia. This species has also been identified in the Pennsylvania portion but is not considered to be rare in Pennsylvania.

## **Aquatic Mollusks of Buffalo Creek**

### **Overview**

Information was obtained for two groups of aquatic mollusks in the Buffalo Creek system – freshwater snails and mussels. Freshwater mollusks are important indicators of habitat and water quality in streams. Factors such as excessive siltation derived from agricultural runoff and riparian silticulture can clog gill-breathing species such as mussels and operculate snails. Other factors that can be problematic for freshwater mollusks include agricultural chemical runoff, road runoff, altered hydrological cycles due to dams, loss of woody riparian areas, and stream channelization.

### **Freshwater Mussels**

There are historical records for 12 species of freshwater mussels in the Buffalo Creek watershed (Table 2-5). Mussels should be regarded as an important component of riverine ecosystems where they have historically occurred. Besides being an important filter-feeding part of nutrient cycling, they are long-lived and relatively immobile, which makes them wholly dependent on a clean riverine environment and susceptible to degradation of water and habitat quality.

Virtually all species of freshwater mussels in North America are obligate parasites, meaning they must have a host animal with which to reproduce. The host animal is typically a fish. Mussels typically disperse their larvae onto the gills of the fish. The larvae will mature and metamorphose into juvenile adults, drop off the gills, and settle into the substrate. Some rare mussels are specific to certain species of fish, which also may be rare, while other mussels tend to use a wide array of hosts. The current mussel communities in Buffalo Creek are mostly more sediment-tolerant and tolerant of poorer habitat and water quality (Table 2-6). Historically, several of the species present required high-quality water and habitat. Even if there are remnant populations of historical species, unless the host fish has survived, they cannot maintain viable, reproducing populations.

The fatmucket is mostly found in slackwater areas in streams and lakes. It typically burrows in softer substrates, such as sand, fine gravel, or mud, but can also be found in firmer gravel/sand characteristic of flowing areas. Recent research on freshwater mussel communities in Pennsylvania shows this species to be more of a generalist species with regard to flow and habitat (Nightingale et al. 2003). The fatmucket frequently occurs alone and is considered its own mussel community (termed *Fatmucket Mussel Community*).

The white heelsplitter and the giant floater occur together frequently enough in Buffalo Creek that they are considered their own unique community (called a *Slackwater Ohio Basin Mussel Community*).

This community is typically found in sluggish areas of streams and also in lakes and reservoirs. They prefer to burrow in mud and sand in areas of slow flow; their fish hosts are fairly pollution-tolerant.

The creeper (*Strophitus undulatus*) is another mussel species that occurs often enough by itself that it is considered its own mussel community in portions of Pennsylvania (*Creeper Mussel Community*), although it is somewhat rare in Buffalo Creek and does not form a true community within the watershed. This species can be located in small creeks and streams and is often associated with increasing forest cover in Pennsylvania (Nightingale et al. 2003).

#### *Species of Concern*

Of note in Buffalo Creek is the presence of the paper pondshell (*Utterbackia imbecillus*). This species is somewhat rare in Pennsylvania, though it is not considered threatened or endangered. It is commonly encountered in ponds, reservoirs, and sluggish areas of streams.

**Table 2-5. Mussels Species Historically Found in the Watershed**

Scientific and Common Name	Fish Hosts
<i>Lampsilis cardium</i> (plain pocketbook)*	green sunfish, smallmouth bass, largemouth bass, yellow perch, white crappie, walleye, sauger
<i>Lampsilis fasciola</i> (wavyrayed lampmussel)*	smallmouth bass
<i>Lampsilis siliquoidea</i> (fatmucket)	bluegill, longear sunfish, smallmouth bass, largemouth bass, sand shiner, bluntnose minnow, rockbass, white sucker, pumpkinseed, striped shiner, common shiner
<i>Lasmigona complanata</i> (white heelsplitter)	common carp, banded killifish, green sunfish, orangespotted sunfish, white crappie, largemouth bass
<i>Lasmigona costata</i> (flutedshell)	northern hogsucker, longnose dace, common carp
<i>Pleurobema clava</i> (clubshell)*†	central stoneroller, striped shiner, logperch, blackside darter
<i>Pleurobema sintoxia</i> (round pigtoe)*	spotfin shiner, southern redbelly dace, northern redbelly dace, bluntnose minnow, spotfin shiner, bluegill
<i>Ptychobranchus fasciolaris</i> (kidneyshell)*	unknown
<i>Pyganodon grandis</i> (giant floater)	> 30 species, including many listed above
<i>Strophitus undulatus</i> (creeper)	> 25 species, including many listed above
<i>Utterbackia imbecillus</i> (paper pondshell)	> 30 species, including many listed above
<i>Villosa iris</i> (rainbow)*	streamline chub, greenside darter, rainbow darter, bluebreast darter, green sunfish, striped shiner, smallmouth bass, largemouth bass, yellow perch, rock bass, mosquitofish, striped bass

\* = no longer found in the watershed

† = federally endangered species as per the United States Endangered Species Act

Table 2-6. Mussel Communities	
Community Name	Dominant Species
Creeper Community	creeper
Fatmucket Community	fatmucket
Ohio Basin Slackwater Community	giant floater; white heelsplitter

### Freshwater Snails

Many of the species of freshwater snails in Buffalo Creek are fairly ubiquitous throughout Pennsylvania. Recent limited studies within the watershed by Pennsylvania Natural Heritage Program (PNHP) biologists have located five species of snails. Table 2-7 shows freshwater snails that have been recently located in Buffalo Creek watershed (Evans 2003). More work is needed to get a better picture of the freshwater snail fauna of this watershed. All species found in the watershed to date are pulmonates. This group of snails is ancestrally derived from land snails and occupies freshwater habitats secondarily. Due to the adaptations for living on land, freshwater pulmonates are able to breath atmospheric air. This is different from operculate, or gill-breathing snails, which are entirely dependent on adequate supplies of dissolved oxygen in the water to respire. Several pulmonates are also less affected by sedimentation than the gill-breathers, many of which are relatively inefficient feeders.

The following freshwater snails have been recently located in Buffalo Creek (Evans 2003):

Table 2-7. Freshwater Snails	
Scientific Name	Common Name
<i>Ferrissia rivularis</i>	creeping ancyloid
<i>Ferrissia walkeri</i>	cloche ancyloid
<i>Fossaria modicella</i>	rock fossaria
<i>Physella acuta</i>	European physa
<i>Physella gyrina</i>	tadpole physa

*Ferrissia rivularis* and *Ferrissia walkeri* are within the family Ancyliidae, the freshwater limpets. These are small (< 6 mm in length) oval-shaped snails that have a pointed apex, or top. They are found in running water or on the edge of flow. Typical substrate for these species is woody debris (submerged tree limbs, sticks), flat rocks, and trash. These species can be found throughout the watershed in areas ranging from small creeks to the mainstem of Buffalo Creek. These species are able to tolerate some elevated levels of sedimentation.

*Physella gyrina* and *Physella walkeri* are in the family Physidae, and are among the most abundant aquatic snails in Pennsylvania (Evans 2003). They can be found in lakes, reservoirs, and streams. These species typically are found feeding along muddy or sandy edges of streams. While *Physella gyrina* is a native species, *Physella acuta* is European in origin and has apparently spread across the North American continent. It was formerly thought to be two separate species. These species are common throughout the watershed, and are among the hardiest freshwater snail species found in North America.

*Fossaria modicella* was located in one section of Buffalo Creek. This species was located on a sand/mud flat along the edge of the stream. *Fossaria* in general are typically found in floodplains or on the edge of streams in mud or softer substrate, but can also be found on vegetation (Clarke 1973).

### Dragonflies and Damselflies

#### Odonates of Buffalo Creek Watershed

Dragonflies and damselflies (odonates) are two of the more charismatic insects. Due to misconceptions about their anatomy, they have received names such as “devil’s darning needle” and “horse stingers” (Needham et al. 2000). Several species are superb fliers and can often be observed putting on fantastic aerial displays. All odonates, however, begin their life in aquatic environments. There are two major groups of odonates: dragonflies and damselflies. Dragonflies (Odonata: Anisoptera) spend anywhere from a month up to eight years in the water (Dunkle 2000). The larvae of damselflies (Odonata: Zygoptera) can also spend a great deal of their life in water. An easy way to distinguish between dragonfly and damselfly larvae is by looking at the gills. Damselfly larvae have external gills that protrude from the abdomen (resembling small handheld fans), while dragonfly larvae have internal gills.



*A slender spreadwing, identified at Green Cove wetland area*

In general, the greatest impacts to odonates in headwater streams and upland streams are soil stability and vegetative cover (Corbett 1999). For the most part, reducing siltation, providing woody perches in wet areas (such as planting trees or shrubs), and not rapidly drawing down artificial impoundments are management actions that can establish and promote odonates.

During dragonfly and butterfly outings held in the watershed in summer 2004, 21 species of odonates were identified (Table 2-8).

### **Important Habitats**

Odonates can be found in nearly every type of aquatic habitat in the watershed. Damselflies can be observed flitting among vegetation on the edges of lakes and streams. Along Buffalo Creek and several tributaries, the ebony jewelwing (*Calopteryx maculata*) is a common sight. Even temporary wetlands that only hold water for part of the year can be important habitats for odonates, particularly species such as the ruby meadowhawk (*Sympetrum rubicundulum*) and the slender spreadwing (*Lestes rectangularis*).

In the spring, one can locate the bluet damselflies in meadows near wet areas, while in the autumn these same areas are dominated by meadowhawks. Many species in the Buffalo Creek watershed, particularly the twelve-spotted and the common whitetail skimmers, are excellent colonizers of new habitats. This can be observed in newly created wetland areas, ponds, and other aquatic environments. This rapid colonization potential of new habitats has been documented numerous times in dragonflies. Damselflies are slightly less agile fliers and not as prolific as some of the dragonflies in colonizing new habitats.

### **Interesting Odonates**

There are no threatened or endangered odonates in the Buffalo Creek watershed. However, the citrine forktail damselfly (*Ischnura hastate*) is one of the rarer findings. While it is found throughout western Pennsylvania, its northeastern U.S. range extends only up into New York. This is the smallest damselfly in Pennsylvania and can easily be overlooked. It tends to be found in dense vegetation in ponds or backwater areas in streams (Westfall and May 1996). They can be distinguished by their very small size and bright yellow-orange abdomen.

Carolina saddlebags (*Tramea Carolina*) is rarer statewide than many other dragonflies. It is ranked S4S5? by the PNHP, which means its conservation ranking is estimated to be between S4 (apparently stable) and S5 (common and widespread). More research on the distribution of this species may be instructive in assisting scientists to evaluate its true status.

<b>Table 2-8. Odonates of the Buffalo Creek Watershed</b>			
<b>Scientific Name</b>	<b>Common Name</b>	<b>WPC Staff</b>	<b>Volunteer Naturalists</b>
<i>Anax junius</i>	green darner	x	x
<i>Calopteryx maculata</i>	ebony jewelwing	x	x
<i>Celithemis elisa</i>	calico pennant		x
<i>Enallagma civile</i>	familiar bluet	x	x
<i>Enallagma signatum</i>	orange bluet	x	x
<i>Epiptera cynosura</i>	common baskettail		x
<i>Epiptera spiniceps</i>	prince baskettail	x	x
<i>Erythemis simplicicollis</i>	eastern pondhawk		x
<i>Ichmura verticalis</i>	eastern forktail	x	x
<i>Ischnura hastata</i>	citrine forktail	x	x
<i>Lestes rectangularis</i>	slender spreadwing	x	x
<i>Libellula cyanea</i>	spangled skimmer	x	x
<i>Libellula luctuosa</i>	widow skimmer	x	x
<i>Libellula lydia</i>	common whitetail	x	x
<i>Libellula pulchella</i>	twelve-spotted skimmer	x	x
<i>Pachydiplax longipennis</i>	blue dasher	x	x
<i>Pantala flavescens</i>	wandering glider		x
<i>Perithemis tenera</i>	eastern amberwing	x	x
<i>Sympetrum rubicundulum</i>	ruby meadowhawk	x	x
<i>Tramea carolina</i>	Carolina saddlebags	x	x
<i>Tramea lacerata</i>	black saddlebags	x	x

One of the more dramatic species in the watershed is the green darner (*Anax junius*). This is one of the more easily distinguished species. It is a very large dragonfly, about three inches long. Males have a turquoise blue abdomen with a green thorax; females look similar but have some striping on the abdomen. This species is an excellent flier and can be seen defending territories and feeding on insects in ponds, lakes, wetlands, and reservoirs.

The skimmers are common residents of standing water areas in the watershed. The twelve-spot skimmer (*Libellula pulchella*) is easily identified by the alternating white and black spots on the wings. Other skimmers found in the same habitats include the common whitetail (*Libellula lydia*), characterized by the frosted white abdomen, and the widow skimmer (*Libellula luctuosa*), with males having dark basal bands bordered by a broad white stripe and females simply having the dark bands at the base of the wings. Male spangled skimmers (*Libellula cyanea*), are blue with white marks near the wingtips; females have black wingtips and yellowish markings on the sides of the thorax.

## **Fish**

### **Fish of the Buffalo Creek Watershed**

A list of fish species was constructed based on WPC surveys of three previously unsampled stream reaches in the watershed and studies by Pennsylvania Fish and Boat Commission and California

University of Pennsylvania. Though fish can be used to estimate stream health using biological indices, the different methodologies used and the lack of a proven system for evaluating Pennsylvania streams did not allow for this. DEP is currently working to develop an index of stream health based on fish populations, but this index is not yet available for general use.

The fish assemblage of the Buffalo Creek watershed includes many fish species common to warm-water streams in the Ohio River drainage. A total of 48 species were identified based on sampling of Buffalo Creek, Brush Run, Buck Run, and Dutch Fork Creek. These species are listed in Appendix E. Of these species, approximately 18 percent of those found are considered to be non-native, introduced species. Approximately 28 percent are considered tolerant to pollution and 14 percent are considered intolerant. The remaining species are considered of intermediate tolerance. The number of species identified generally increased with increasing stream size, as expected (Figure 2-1). Brush Run had a lower number of species and total number of fish than any other stream sampled, despite being similar in size to Buck Run and Dutch Fork Creek. This might be explained by the lower habitat quality of the Brush Run segment, which had fewer sequences of pools and riffles.

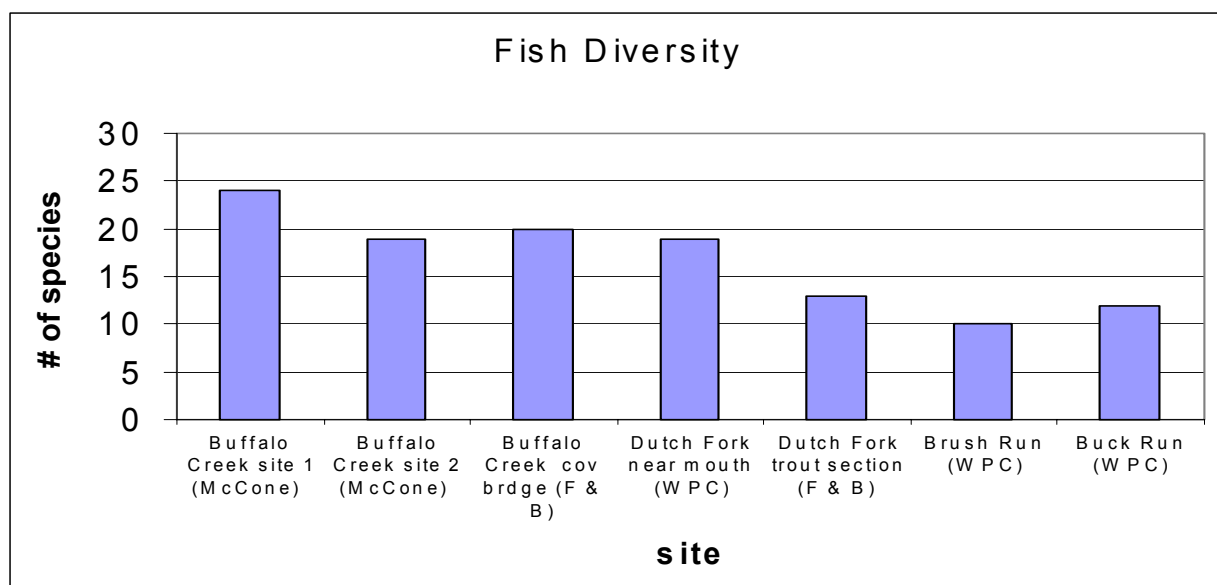


Figure 2-1. Fish Diversity at sampled sites.

The most common species identified was the creek chub, which usually comprised at least 50 percent of samples. Many of the identified species were more characteristic of lake or reservoir systems, likely reflecting the number of introduced species and movement of species from Dutch Fork Lake Reservoir. These included the black crappie, bluegill, gizzard shad, muskellunge, northern pike, saugeye, tiger muskie, walleye, and white crappie. A total of seven darter species were identified, including the banded, blackside, fantail, greenside, johnny, rainbow, and variegated darter species. In Pennsylvania, the blackside, rainbow, and variegated darters are only native to the Lake Erie and Ohio River drainages. The redbreast dace, though fairly common in Pennsylvania, is characteristic of cooler, headwater streams (Michigan DNR). This species is distributed discontinuously throughout the landscape and is susceptible to changes in temperature, oxygen, and shade resulting from land cover changes (MNFI 2000).

A number of popular sport fish are common in the Buffalo Creek watershed and were identified during surveys, including largemouth bass, smallmouth bass, brown trout, and rainbow trout.

### Species of Concern

No fish species of concern have been identified in the Buffalo Creek watershed.

## Species of Concern

Species are ranked at the state and global levels based on the number of occurrences that have been documented in that geographic area. Most plant and animal species have a rank assigned to them that indicates their level of occurrence in the state or globally, even if they are not considered threatened or endangered. Table 2-9 describes the ranking systems used at the state and local levels. A species is commonly considered to be of “special concern” in Pennsylvania if it has a ranking of “vulnerable” or lower (Table 2-10). The Pennsylvania Natural Heritage Program (PNHP) is responsible for collecting and managing data related to species in the commonwealth and establishing these rankings. PNHP is a partnership among WPC, Department of Conservation and Natural Resources, and The Nature Conservancy. The West Virginia Natural Heritage Program is responsible for tracking species in West Virginia. Global ranks are assigned based on data collected at similar state offices nationwide as part of a network called NatureServe.

State Rank Codes		Global Rank Codes	
SX	Extirpated	GX	Presumed Extinct
SH	Historical	GH	Possibly Extinct
S1	Critically Imperiled	G1	Critically Imperiled
S2	Imperiled	G2	Imperiled
S3	Vulnerable	G3	Vulnerable
S4	Apparently Secure	G4	Apparently Secure
S5	Secure	G5	Secure
SU	Unrankable	GU	Unrankable
S?	Unranked	G?	Unranked
HYB	Hybrid	HYB	Hybrid
SE	Exotic		
SA	Accidental		
SZ	Zero Occurrence		
SP	Potential		
SR	Reported		
SRF	Reported Falsely		

Five species are listed as species of special concern in the Buffalo Creek watershed by either Pennsylvania or West Virginia (Table 2-10). Information about these species is further described in this chapter. The hellbender and meadow jumping mouse are found in the Pennsylvania portion but are not considered of special concern there. If identified in Pennsylvania, slender wheatgrass and barn owl would also be a species of special concern in Pennsylvania. If identified in West Virginia, bronze copper would be a species of special concern in West Virginia.

State and global rankings are used to establish endangered, threatened, and rare statuses.

Endangered species are those species

that are in danger of extinction within either a state (state endangered) or its entire range (globally endangered). Threatened species are species that may soon become endangered if critical habitat is not maintained. The classification “rare” is used by states to indicate species that are uncommon in the state or restricted to only certain habitats. Pennsylvania uses the “rare” designation only for plant species, while West Virginia uses the designation for both plant and animal species.

**Table 2-10. Buffalo Creek Watershed Species of Concern**

Scientific Name	Common Name	Where Seen	State Status	Global Status
<i>Cryptobranchus alleganiensis</i>	hellbender	WV, near border	S2	G4
<i>Elymus trachycaulus trachycaulus</i>	slender wheatgrass	WV	S2, rare	G5
<i>Lycaena hyllus</i>	bronze copper	PA, wetland areas	S2	G5
<i>Tyto alba</i>	barn owl	WV, near Bethany College	S1BS1N	G5
<i>Zapus hudsonius</i>	meadow jumping mouse	WV, Castleman WMA	S3	G5

## Important Areas for Conservation

### Core Forest Areas

Forests comprise about 52 percent of the landscape in the Buffalo Creek watershed. However, most of this is low-quality early-successional forest or is heavily fragmented. The watershed is highly agricultural, with over 47 percent of land devoted to crop or pastureland. Wetlands comprise less than one percent of land cover. Because of the importance of large, intact forest blocks as corridors for migratory birds and other wildlife in an otherwise agricultural and fragmented landscape, a general assessment was done of the health and location of larger forest blocks in the watershed. These blocks are given the designation “core forest areas.”

### Forestry Analysis Scope of Work

Large contiguous blocks of core forest habitat were identified from the SEC National Land Cover Database using Geographical Information Systems (GIS). To select and analyze the core forests, the land cover data was reclassified to forest (deciduous, coniferous, mixed, transitional, and forested wetland) and non-forest in GIS. Fragmenting features, including roads, large rivers, and obvious right of ways, were removed, resulting in a map depicting contiguous forest in the Buffalo Creek watershed. Buffers of 100 meters (representing edge) were removed from each forest block to generate a map of core forest area within the Buffalo Creek watershed. The largest forest blocks and those separated only by small roads or streams were visited to assess the quality and contiguousness.

Assessments for quality and contiguousness took place in conjunction with surveys for plant species and communities in the area. In addition to PNHP site survey protocols for rare species, forest quality and contiguity were assessed qualitatively at several points throughout each polygon (forest block) or group of polygons. GPS locations were recorded to document location for later analysis in GIS. Forest quality was determined by size and type of trees, and type of shrub and groundcover species. Presence or absence of non-native species was noted at each point and used to determine habitat quality.

### Findings

GIS analysis identified several areas containing over 100 acres of contiguous interior forest habitat. Other areas were identified that have many small blocks of core forest fragmented only by small dirt roads (Narigan Run, Buck Run). Forest blocks identified as containing large contiguous tracts of interior forest varied greatly in quality and type. When field checked, areas identified as forest interior were not always high quality. Forest quality ranged from patches of relatively undisturbed forests, composed of large trees with few non-native species, to areas of low-quality, early-successional woodlands and shrublands with high concentrations of non-native vegetation. Evidence of logging activity, in the form of stumps, roads, and early-successional species such as black cherry and tulip tree, was present in even the highest quality sites. In many cases, logging activity over the past 10 years has markedly reduced the amount of core forest, and ecologists often found early-successional community types (old fields and woodland types) where high-quality forest interior was expected from the data.

Two areas identified by WPC botanists and stream ecologists, and members of the Audubon Society, as high-quality habitats (Buck Run and Narigan Run) were not identified in the GIS analysis as containing or being a part of large, contiguous forest habitats. This further demonstrates that the landscape analysis techniques used are not sufficient to determine habitat quality without sufficient fieldwork to assess the quality and character of the blocks.

Despite inaccuracies in the land cover data, the forest blocks identified in the GIS analysis did include some of the highest quality forest habitat in the watershed (Table 2-11; Figure 2-2). Dog Run, Polecat Hollow, Chapel Hill Road, and Dutch Fork Lake are all large blocks of contiguous forestland, and also contain some of the highest quality forest in the watershed. Therefore, it can be assumed that even though GIS analysis was unable to distinguish between varying types of forest or measure forest quality, the largest remaining blocks of contiguous forest determined from the analysis do indeed contain patches of the highest quality habitat. The large blocks of forestland identified by GIS as containing interior forest habitat are presented in Table 2-11, along with factors identified in the field.

A number of species require large sections of contiguous forest as part of their home range requirements or for migration corridors. These include migratory birds such as the Cerulean Warbler, Scarlet Tanager, and Worm-eating Warbler.

<b>Table 2-11. Core Forest Areas</b>			
<b>Forest Block</b>	<b>Acres Core Forest</b>	<b>Ownership</b>	<b>Quality Characters</b>
Sugarcamp	410 acres	Private	Large contiguous river floodplain and associated slopes; parts developed; large populations of invasive plant species
Dog Run	355 acres	Public/private	High quality streamside forest and associated slopes; headwaters developed/cleared; headwater area contains large tree of heaven and Japanese knotweed clones; much of the forest composed of early successional forest
Polecat/Buffalo	408 acres	Public/private	High quality streamside forest and associated slopes; ridge tops developed/cleared for agriculture
Dutch Fork Lake	473 acres	Public/private	High quality streamside forest and associated slopes; steep slopes with more or less old growth oak forest; post-ag ridge tops*
Chapel Hill Road	303 acres	Private	Undisturbed red oak mixed hardwoods forest; two areas divided by Chapel Hill Road *

\*non-contiguous areas

**Natural Heritage Areas**

Natural Heritage Inventories (NHIs) are surveys conducted by WPC to identify important natural communities and species of special concern in a county. The 1994 Washington County NHI was a joint effort of the Pennsylvania Department of Community Affairs, the Washington County Planning Commission, and WPC. NHIs are a best effort to evaluate important natural areas based on aerial images and on-the-ground investigations, but important areas may exist that are not included in the inventories. WPC continues to collect additional data to update its databases and NHIs. In the 1994 Washington County NHI, WPC identified natural heritage areas, termed BDAs, LCAs, and DAs.



*WPC employees investigate Buffalo Creek BDA*



A **BDA** (or **biological diversity area**) is an area of land recognized as supporting populations of state, nationally, or globally significant species or natural communities, high-quality examples of natural communities or ecosystems, or natural exceptional native diversity. These areas are typically small and contain a buffer that takes into account the natural community or habitat that is the focus of the site.

A **LCA** (or **landscape conservation area**) is a larger area of land that contains minimal human disturbance and allows ecosystems to function on a landscape level. These areas often contain multiple BDAs.

A **DA** (or **dedicated area**) is an area of land recognized because of an owner's specific intention to protect it, which could result in the site improving to become either a BDA in the future or an even better high-quality area within an already designated BDA. Numerous areas in the watershed could be DAs in the future through landowner agreements, special programs, or other methods.

A total of 27 BDAs and five LCAs were identified in Washington County (Wagner 1994). No DAs were identified. Two BDAs and one LCA are located within the Buffalo Creek watershed (Figure 2-3). BDAs and LCAs are given a ranking based on their importance to biological diversity and ecological integrity in the county according to definitions in Table 2-12. All of the Natural Heritage Areas in the Buffalo Creek watershed were given an "exceptional" ranking. It is recommended that appropriate buffers be established around BDAs to protect wildlife, maintain hydrology, and prevent invasive species from entering the sites.

<b>Table 2-12. Significance Rankings for BDAs</b>	
<b>Significance Rank</b>	<b>Explanation</b>
Exceptional	Sites are of exceptional importance for the biological diversity and ecological integrity of the county or region, containing one or more occurrences of state or national species of special concern or a rare natural community of good size, condition, and extent. These areas deserve complete and strong protection.
High	Sites are highly important for biological diversity of county or region and, just like exceptional sites, contain species of special concern or natural communities that are highly ranked; these sites are also of relatively large extent and are primarily undisturbed, but are of slightly less importance in terms of rare species or condition than exceptional sites. These sites deserve strong protection.
Notable	Sites in this category contain occurrences of species of special concern or natural communities that are either more common or of smaller size and extent than exceptional or high-ranking areas, or have activity and disturbance. These sites deserve special protection within the context of their characteristics, degree of disturbance, and place in the community.
County	These sites have great potential for protecting biodiversity but have not yet been found to contain species of special concern or state-significant natural communities. Because of their size, undisturbed character, or proximity to other significant areas, these sites deserve further study and investigation as possible future high or exceptional sites.

### **Buffalo Creek BDA**

Located along Buffalo Creek in a portion of State Game Lands 232, this exceptional BDA contains three high-quality natural communities including a floodplain forest community, acidic cliff community, and mesic central forest community (Wagner 1994).

Sycamore (*Platanus occidentalis*), smooth buckeye (*Aesculus glabra*), and sugar maple (*Acer saccharum*) dominate the floodplain forest community, which is beginning to regain some of the diversity lost from past logging practices with species such as black walnut (*Juglans nigra*) and bitternut hickory (*Carya cordiformis*) growing back in significant numbers. Herbaceous species such as false mermaid (*Floerkea proserpinacoides*), trout lily (*Erythronium Americana*), and spring beauty (*Claytonia virginica*), as well as a thick blanket of Virginia waterleaf (*Hydrophyllum virginicum*), can be found at the site.

On the steep north-facing slopes of the valley are sandstone and shale outcrops that support acidic cliff communities comprised of species such as Christmas fern (*Polystichum acrostichiodes*), marginal wood fern (*Dryopteris marginalis*), bloodroot (*Sanguinaria canadensis*), and walking fern (*Asplenium rhizophyllum*). Sections of the forest on the north-facing slopes are dominated by sugar maple and contain shrubs such as black cohosh (*Caulophyllum thalictriodes*), goldenseal (*Hydrastis canadensis*), and black snake root (*Cimicifuga racemosa*). At the top of the slopes are red and white oak (*Quercus rubrum* and *Q. alba*) communities. The forested tributaries to the north are drier with larger amounts of down junberry. Although these northern tributary watersheds are more disturbed than the other slopes, they are an important aspect of the site.

An opportunity exists to preserve and enhance the natural resources of this site. Surrounded by and even including some agricultural fields, a large portion of this BDA was logged within the last 15 to 25 years. It is recommended that no further logging should take place in the floodplain including this BDA, and other key pieces of the surrounding area should be allowed to revert to forest. Other parts of the upland areas and adjacent areas could still be managed for game species or continue as agriculture (Wagner 1994).

### **Dutch Fork Valley BDA**

Beginning at Dutch Fork Lake reservoir, a large portion of the Dutch Fork Creek valley is designated as part of the Dutch Fork Valley BDA. Including a portion of State Game Lands 232, this BDA contains significant natural communities, is a significant nesting site for great blue herons, and is a historic area for a mussel species of special concern (Wagner 1994).

The floodplain forest community along the mainstem portion of Dutch Fork Creek supports tree species such as cottonwood (*Populus deltoids*), sycamore (*Platanus occidentalis*), black willow (*Salix nigra*), black walnut, and smooth buckeye (*Aesculus glabra*). To the west, two small, high-gradient streams flow across the floodplain to the creek. Sugar maple (*Acer saccharum*), red oak (*Quercus rubra*), tulip tree (*Liriodendron tulipifera*), and slippery elm (*Ulmus rubra*) form the canopy of the valleys of these small streams and are a medium age example of a mesic central forest community. Lush growth of glade fern (*Athyrium pycnocarpon*) and pale touch-me-not (*Impatiens pallida*) covers the ground, and a series of short waterfalls make this area unique.

Access to the northern part of this area is well developed, with a road running along the eastern upland and a telephone line cutting across the northern section. A recommendation for the Pennsylvania Game Commission is that, as part of the establishment of a core area within State Game Lands 232, activities within this area should be limited to passive recreation. Agricultural areas, if abandoned or located on steep slopes, should be allowed to undergo natural succession. Routing of utility lines through the BDA should be discouraged when possible. Timbering, creation of food plots, and general wildlife

management activities could take place outside the BDA, allowing an appropriate buffer for this special area.

### **Buffalo Creek LCA**

This Natural Heritage Area includes most of the Dutch Fork watershed and a large portion of the Buffalo Creek watershed, contains both the Buffalo Creek and Dutch Fork BDAs, and encompasses much of State Game Lands 232. The predominately agricultural landscape and open fields and woodlots of this BDA allow for the potential to utilize this LCA for protection of biodiversity in the county. Buffering and expanding the significant BDAs within the LCA, as well as limiting fragmentation by roads and utilities, will allow for a viable ecological system. There is an opportunity for townships, local organizations, and the PGC to work together in protecting the assets of this LCA (Wagner 1994).

### **Watershed Conservation Areas**

Important natural areas containing unique species assemblages and ecological features in the watershed were identified as Watershed Conservation Areas during stream visual assessment surveys and forest analysis surveys. While these sites do not meet the requirements for a BDA designation according to the Washington County NHI (Wagner 1994), they represent areas of higher-quality natural communities with little non-native plant species presence, and have a high probability of supporting plants and animals of special concern. For example, several conservation areas were selected because they include relatively good quality forest habitat or include areas designated as part of the Important Bird Area that supports migratory forest-interior birds requiring large contiguous tracts of mature forest. Whereas core forest areas were selected based on strict scientific criteria, these conservation areas were selected based on qualitative information and the judgement of WPC staff, and therefore may not contain all of the important areas for conservation in the watershed. In some cases, important core forest areas and Watershed Conservation Areas contain portions of the same areas, though not all of the conservation areas selected were large enough to be considered important core forest.

Much of the remaining high-quality forest areas are owned by PGC, which has the goal of managing land for the best diversity of habitats for both game and non-game species (Pers. Comm., M. Kammerdiener). All forestlands, except for those on steep slopes or riparian zones, are kept on a 100-year or less rotation and even-aged management is employed. Forest areas to be logged are considered on a case-by-case basis, with little consideration for the role of that parcel as part of the landscape as a whole. This strategy, which protects many species having more generalist requirements, provides no special protections from logging and fragmentation for forest-interior species. These species, including many of those important to the valley's Important Bird Area designation, require older forests of multiple age structure that are contiguous and unfragmented.

It is recommended that the PGC develop a management plan including provisions for protection of forest-interior birds in State Game Lands 232. This may include establishment of a core area of contiguous forest. Logging in this area should be limited and only occur if adjacent areas have reverted back to appropriate interior-forest habitat. Logging practices should include those that allow for uneven-aged forests, which these species prefer. Because forest-interior birds are considered to have some of the most stringent habitat requirements, these practices would protect additional species of other taxonomic groups, such as mammals and butterflies that prefer similar habitats. The adoption of such a management strategy would likely benefit game species as well, as areas surrounding the core area could continue to be managed using current management strategies.

In situations where conservation areas are wholly or partly under private ownership, it is recommended that landowners be educated about the ecological values of their properties and the opportunities for forest easements. Management plans, easements, or other efforts towards conservation are recommended for all of these areas.

### **Dog Run, exceptional forest area**

Located within State Game Lands 232, this forest contains one of the higher quality sites within the watershed. The upper slopes generally support red oak-mixed hardwood species, while the lower slopes tend to be dominated by sugar maple and may contain species of the black maple creek and sycamore-box elder forest communities. While the headwaters are of poor quality, the central portion of Dog Run Creek, which includes a waterfall, is of higher quality. Although this area cannot be considered “old growth,” steeper slopes support large maples and oaks and, in addition to the surrounding forest, provide significant habitat for species requiring core forest areas. Sugar maple appears to be dominant here in the understory in both red oak-mixed hardwoods and sugar maple-mixed hardwoods forests.

#### **Threats**

Of the total 355-acre contiguous forest block along Dog Run Creek, the area of high-quality sugar maple forest and mixed oak forest is rather small. It is surrounded by poorer quality, early-successional forest predominated by black locust (*Robinia pseudoacacia*) and other species common to a post-agricultural black walnut-early-successional woodland community. While the high-quality forest is relatively free of exotic invasive plants, with the exception of garlic mustard, the number of invasive non-native plants is considerably higher in the early-successional woodland area and may threaten the quality of the central portion of the Dog Run forest.

#### **Management Recommendations**

Further investigation into the condition of the site and extent of the high-quality forest communities is needed. Further investigation of the geology is also needed. Protection of this area would require a special management plan that includes measures to control invasive species in adjacent forest types in order to create a buffer for this conservation area. Logging activity should be limited in this area to curtail non-native species expansion.

### **Narigan Run**

Located within a deep valley along Narigan Run Road, this rich, mesic site supports a number of plant community types, beginning with a black maple-elm creek floodplain forest community on either side of the creek and sugar maple-mixed hardwoods further up the slope. The tree canopy of the mid to upper slopes of Narigan Run is dominated by sugar maple. There are several seeps in the mid to upper slopes along Narigan Run that contribute a significant portion of the water flow to Narigan Run during wet months. While total core forest area is upwards of 200 acres along the stream, the area is fragmented by several small former logging roads and patches of early-successional and old field communities.

Salamander surveys of the PGC property found a dense population of northern dusky (*Desmognathus fuscus fuscus*) salamanders in the hillside seeps. This species is sensitive to sedimentation and alteration of its habitat (Hulse et al.). Other species of salamanders within the site include the red-back (*Plethodon cinereus*), northern two-lined salamander (*Eurycea bislineata*), and northern-spring salamander (*Gyrinophilus porphyriticus porphyriticus*). Bird species identified at the site include many common species, as well as Cerulean Warblers (*Dendroica cerulea*), Scarlet Tanagers (*Piranga olivacea*), Louisiana Waterthrush (*Seiurus motacilla*), and Acadian Flycatchers (*Epidonax virescens*). The Narigan valley is considered an important component of Important Bird Area 80.

#### **Threats**

Garlic mustard is prevalent along the roadsides through Narigan Run and poses the most serious threat to native species at this site. Future management should consider the impact of this non-native species. This area is one of the best representations of an intact forest valley that can be found within the watershed. However, this area also contains some of the last remaining high-value timber. The upper portion of the watershed, which is privately owned, is currently being logged. This recent logging may decrease the value for wildlife habitat, including that for interior-forest birds, and will be an obstacle in

protecting the area. The biggest water-quality problems are sediment from the nearby road and upstream logging practices.

### Management Recommendations

Efforts should be made to convey the importance of this natural area to the PGC and private landowner. A more detailed forestry management plan, to maintain the diversity and extent of the forest, is recommended for this site.

### Polecat Hollow

This popular hiking and wildflower viewing area contains a variety of forest habitats. The valley supports a sugar maple-mixed hardwood forest with species such as slippery elm and hackberry.



*A seep along Polecat Hollow in winter*

The eastern-facing slope contains a middle-aged-mixed sugar maple stand. The hilltop appears to have been recently logged and is an early-successional forest containing invasive species such as multiflora rose. The western-facing slope can be best described as a later-successional white oak-mixed hardwood forest. Portions of the upper valley contain active pastureland. Seep areas contain important micro-communities with species including trillium sessile and a number of ferns.

Polecat Hollow is one of the most productive areas for salamanders in the watershed, which serve as the most significant predators in the small stream's food chain and are abundant in the seep areas.

### Threats

Logging activity may alter the hydrology of the natural seeps found along the hillside and result in sedimentation to Polecat Hollow Creek. The seeps are also vulnerable to any increases in farming or intensive land use on the ridge tops, which may drain into the valley. These activities could affect the sensitive salamander populations in the creek.

Invasive plant species are present along the roadsides and any increase in light through the canopy will facilitate further invasion.

Polecat Hollow is a popular wildlife viewing and horseback riding area. In addition, there is evidence that the area is also utilized by All Terrain Vehicles (ATVs), which traverse the stream. Portions of Polecat Hollow have been used as garbage dumps in the past, which could increase when Camp Buffalo Road is re-opened. Development of a comprehensive management strategy for the Polecat Hollow valley is complicated by the fact that the valley is owned by both private and public entities.

### Management Recommendations

Because of the high quality of the site, easy access, and public interest as a conservation area, Polecat Hollow should be a priority candidate for the Buffalo Creek Watershed Association (BCWA), or other group, for invasive species control, restoration, and trash removal efforts. BCWA has discussed the development of a more established trail leading to this site, and some kind of adoption of this site would be appropriate, as it is in need of restoration and protection. Efforts at the site could include physical removal of invasive garlic mustard plants by volunteers in early spring (before they go to seed). All ATVs should be banned from the site and barriers put in place to close the trails that already exist. Future logging at this site should consider the sensitive seep areas and the importance for migratory birds, such as Louisiana Waterthrush and Cerulean Warblers, which require blocks of mature forest. Forestland

easements, which would restrict some activities that could negatively impact the site, would be a recommended action.

### **Welch Hollow**

This area, close to the West Virginia border, connects to the higher quality forest area along Sugarcamp Run, one of the largest blocks of contiguous high-quality forestland found on private lands within the watershed. The landscape and forests are similar to those of Buck Run and its tributaries, and the Welch Run floodplain contains a moderately well-developed sycamore-box elder floodplain forest. Like Buck Run and Narigan Run, the associated slopes contain sugar maple-mixed hardwoods and red oak-mixed hardwoods forest communities. The only population of bur oak (*Quercus macrocarpa*) was found along the lower slopes of this floodplain.

### **Threats**

Because much of Welch Hollow is privately owned by multiple landowners, the floodplain and associated slopes are considerably more developed. Large clones of tree of heaven (*Ailanthus altissima*) are present on the floodplain and slopes.

### **Management Recommendations**

Because of its close proximity to the West Virginia border, this area should be surveyed further for slender wheatgrass (*Elymus trachycaulus*), a species of concern known from the West Virginia portion of the watershed. Future monitoring should be conducted in this area to determine the extent of the tree of heaven population and its effects on the floodplain. Area landowners should be informed about the threat posed by tree of heaven. This, and other exotic species, should be removed and managed. Portions of the Buck Run watershed should be surveyed further to determine its potential to serve as a reference community/ecosystem for this and other degraded creek floodplains.

### **Dutch Fork Lake**

The forest communities surrounding Dutch Fork Lake are very similar to those in the Dog Run area. This includes a pattern of flat ridge tops supporting old fields and early-successional black walnut woodland communities, and also steep slopes supporting mixed oak forest types and ravines, as well as lower slopes supporting sugar maple-mixed hardwood forests. On either side of the lake are primarily sugar maple forests. However, small patches of red oak forests and early-successional forests are found in the vicinity and contain many species common to river floodplains, including sycamore and black maple.

A main tributary of Dutch Fork Reservoir appears to support the highest-quality forest communities surveyed in the Dutch Fork Lake area. This sugar maple forest contains many species of the sycamore-box elder floodplain forest. As with the previous sites, slopes are generally steep (>25%) and are dominated by red and white oaks. Ridge tops were most likely open pasture or agricultural land over 30 years ago and now support species of the post-agricultural black walnut early-successional woodland. Similar to State Game Lands 232, several former agricultural fields situated on high, gently sloping ridge tops within the Dutch Fork Lake area are now dominated by small (<20 cm diameter at breast height) black walnut, black locust, black cherry, and elms.

Although the dominant cover type of the high, level ridge tops is the early-successional forest type, one area along a small tributary east of Dutch Fork Lake consists of a very high-quality red oak-mixed hardwoods and red maple forest. This area contains trees roughly 40 centimeters in diameter, and although it is not considered old growth, it is generally undisturbed as it is relatively inaccessible by vehicle and foot traffic.

Threats

The more mature forests in this area are vulnerable to logging pressures, which has the potential to introduce light and invasive species. Deer could reduce the ability of early-successional forests to regenerate.

Management Recommendations

Management recommendations for this conservation area include monitoring and control of invasive species, particularly multiflora rose and other invasives. These may enter high-quality forest from adjacent old fields and early-successional forest, especially after logging. Controlling the deer population, which could prevent the regeneration of healthy early-successional forest, also should be a priority. Any logging that takes place should consider the importance of mature forest in this area for wildlife, and tracts of mature forest corridor should be maintained. Such management also has the potential of keeping the timber value of the site high by reducing invasives and increasing the value of standing timber.

**Buck Run Floodplain Forest and Associated Slopes**

The Watershed Conservation Area consists of a stretch of the Buck Run creek floodplain, a major tributary of Buffalo Creek, along Buck Run Road. The floodplain supports one of Buffalo Creek watershed's most intact and highest-quality sycamore-box elder floodplain forests. Red oak-mixed hardwood forests and sugar maple-basswood forests occur on the slopes adjacent to the floodplain on either side. These forest patches are also of good quality as they most likely escaped logging due to the steep slopes. Slopes range from 15 to 30 percent on either side. Several smaller tributaries of Buck Run were identified and inventoried. There are several rock outcroppings throughout this area and several along small tributaries of Buck Run. Within the red oak-mixed hardwood forest or sugar maple-mixed hardwood forests on the associated slopes of the floodplain, many small micro-sites exist due to stream drainages or differences in topographic position and substrate. Rock outcrops in the area are mostly composed of sandstone or, in a few cases, shale. There are limestone-containing formations in the surface geology of the watershed, but there were no encounters with any outcrops that appeared to be composed entirely of limestone.

Threats

Threats to this area include invasive species. Although currently less common in this floodplain than others, monitoring and preventing invasive species from entering this Watershed Conservation Area should be a priority. Also, any decrease in the quality of forest in this area could affect its importance as an Important Bird Area, since Buck Run and its associated floodplains are considered to support the highest density of forest-interior birds found within the watershed (Pers. Comm., L. Helgerman).

Management Recommendations

Any future logging in this area should be part of an overall management strategy that considers the importance of mature forest habitats for migratory birds. Conservation organizations should take the lead in working with the PGC to develop such a strategy, which might include setting aside core areas for these species.

Portions of the Buck Run watershed should be surveyed further to determine its potential to serve as a reference community/ecosystem for this and other degraded creek floodplains.



*Green Cove Wetland Area contains important bird habitat*

### **Green Cove Wetland Area**

Green Cove Wetland, created in 2003, is one of four wetland restoration projects planned by the PGC to create habitat for game species and other wildlife (Pers. Comm., D. Dunkerley). To date, this area has been the most successful of the wetland projects and has resulted in breeding and feeding habitat for many species of birds, amphibians, bats, dragonflies, and other wildlife. Several species of concern utilize the wetland during migration, including the Great Egret and American Bittern. A feature of the site includes a handicap-accessible observation area.

#### **Threats**

Invasive species at the site are an issue, especially mile-a-minute weed, which has crowded out other native species that surround the wetland. Restoration was not successful at removing enough topsoil to access the native seed bank, and many plants at the site planted by the PGC are not necessarily native to the area. Frequent mowing, which is needed to maintain the site for visitors, has the potential to eliminate certain plant species required for the life cycles of butterflies and dragonflies.

#### **Management Recommendations**

A future project could involve removing some of this topsoil to revive the natural seed bank. While still allowing a path for visitors, future mowing should consider the benefits of important plant species.

### **Important Bird Area**

In October 2003, the Buffalo Creek valley was designated the 80<sup>th</sup> Important Bird Area (IBA) by the Pennsylvania Audubon Society (PA Audubon). The goal of PA Audubon is to recognize and protect at-risk bird species and habitats before they reach threatened or endangered status. During the October 2003 IBA ceremony, the Three Rivers Birding Club announced that it adopted the IBA, which will ensure continued monitoring of the area. The Buffalo Creek valley meets three of the PA Audubon IBA criteria, including PA-1c (having at least 50 pairs of wading birds during the breeding season), PA1-e (having an exceptional concentration and/or diversity of birdlife), and PA 4-4b (having an exceptional representative natural habitat within its physiographic province) (Pers. Comm., S. Hoffman). The presence of significant concentrations of migratory interior-forest species was an important component to the designation.

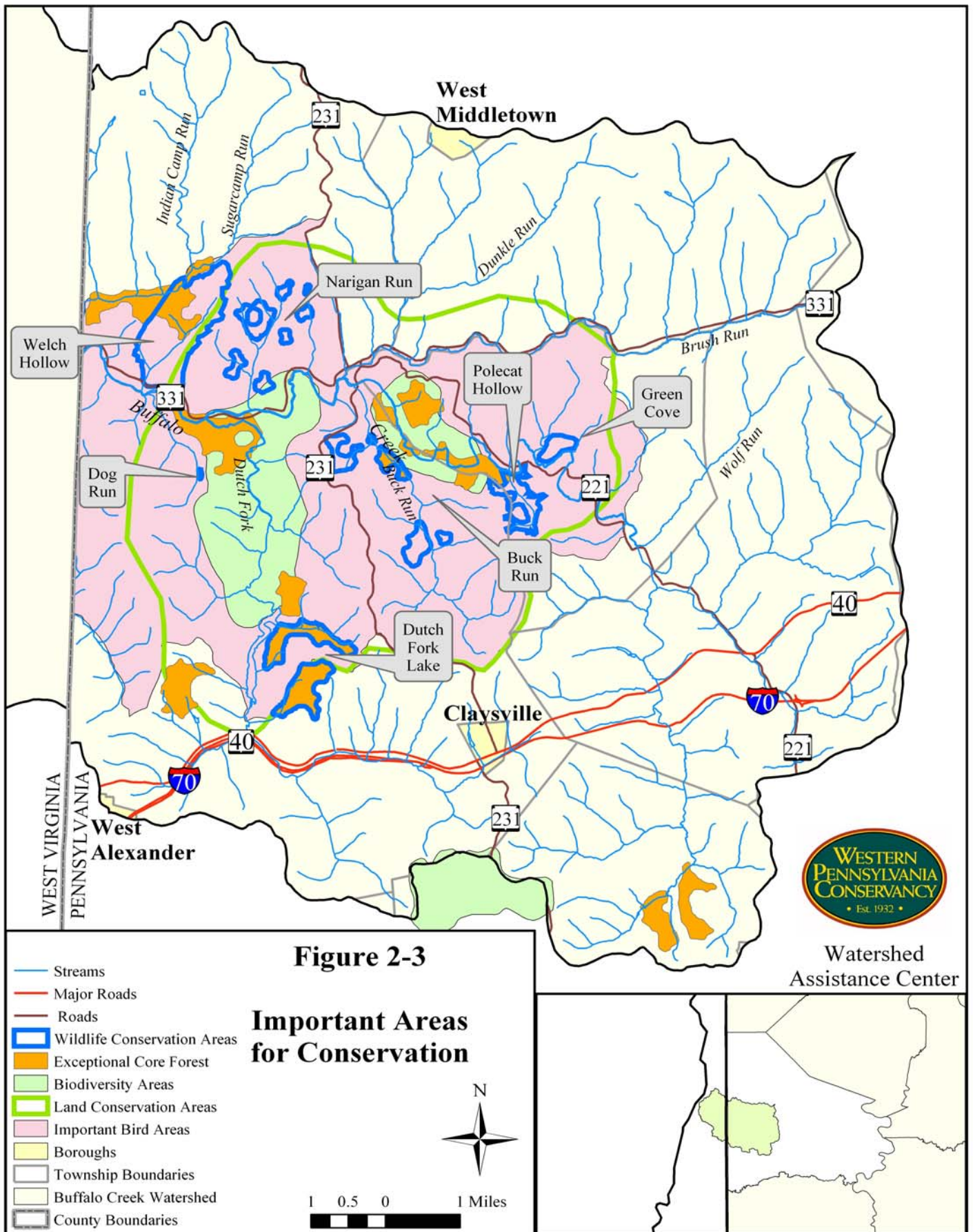


***Members of the Three Rivers Birding Club at an outing in Buffalo Creek***

The new IBA primarily contains State Game Lands 232 and some surrounding private lands. PA Audubon surveys, conducted primarily throughout the newly acquired State Game Lands area and Dutch Fork Lake, identified over 80 species of birds in June 2003. Six of these species are on the Audubon Watch List and many more are listed as having high priority for conservation according to a Partners in Flight species assessment. Only private lands in which the owner grants access for birdwatching can be considered for inclusion in the IBA.

IBAs provide a scientifically determined method for prioritizing areas for conservation. Bird species are unique to specific habitats and their presence or absence reflects the health and extent of that habitat. An IBA designation also promotes local stewardship and advocacy. The designation does not limit development or specific land-use practices within the IBA, though it is the hope of PA Audubon that these areas are considered when developing management objectives.

Results of continued monitoring of the IBA through the Three Rivers Birding Club may reflect the success of conservation efforts in the watershed and also areas in which protection activities should be focused.



## Recommendations

- Continue to monitor and document species occurrences, particularly species of special concern.
- Increase participation in streambank fencing and/or other best management practices on agricultural lands to encourage the growth of riparian zones (which often serve as corridors for wildlife) through involvement in the Conservation Reserve Enhancement Program and other programs.
- Allow areas between existing forest tracts to become reforested in order to increase habitat for wildlife requiring large forest tracts, which is limited in the watershed.
- Encourage the Pennsylvania Game Commission and private landowners to use management practices such as periodic mowing or burning on old fields that are no longer cropland or pasture (during appropriate times of the year, during non-breeding seasons), and use of warm-season grasses, to maintain habitat for grassland mammals.
- Develop a better understanding of mammal and other wildlife diversity and habitat requirements in the watershed through more intense study.
- Avoid large-scale clear-cutting activities in areas where older forest habitat is appropriate for wildlife, such as migratory birds.
- In areas where logging is occurring, forest health should be maintained by the Pennsylvania Game Commission and private landowners. Management options should take into consideration habitat for forest-interior species, including maintaining contiguous forest and mixed-age stands.
- In areas of development or logging, corridors should be maintained, especially along streams.
- Develop detailed management plans for Biological Diversity Areas and Watershed Conservation Areas.
- Educate owners of large forest blocks about the importance of their properties and possible management options. Inform forest landowners about management assistance through the DCNR Bureau of Forestry.