## Western Pennsylvania Conservancy





# ALLEGHENY COUNTY PARKS ECOLOGICAL ASSESSMENT AND ACTION PLAN SETTLERS CABIN PARK

Prepared for the Allegheny County Parks Foundation July, 2019



#### FOREWORD

With nine parks encompassing over 12,000 acres, Allegheny County boasts one of the largest regional park systems in the country. While a wide variety of recreational activities make each park a unique destination, nature is the common thread that connects our parks and is our most treasured – and jeopardized – asset. The abundant resources found in our parks' forests, meadows and streams provide vital habitat for flora and fauna that clean our air and water, pollinate our plants and connect the web of life. We are stewards of these natural sanctuaries and are working to protect them for future generations.

In 2017, the Allegheny County Parks Foundation, together with Allegheny County Parks, partnered with the Western Pennsylvania Conservancy (WPC) to conduct an Ecological Assessment and Action Plan in Settlers Cabin Park. This study evaluates the park's natural resources and ecological assets and recommends an implementation plan for protecting, preserving and improving the environmental health of the park.

Settlers Cabin Park's ecosystem is highly influenced by the presence of high-pH soils that originated from calcareous bedrock. The northern end of Pinkertons Run stream has intact, mature forest and a floodplain community characterized by an abundance of exceptional wildflowers, making this area the ecological jewel of the park. However, there are impacts to Pinkertons Run from acid mine drainage (AMD), and plans are already underway to address this problem. AMD is the residue from years of active mining before the land was acquired by Allegheny County in 1971 for a public park.

Settlers Cabin Park contains several populations of plant species that are rare in Pennsylvania and Allegheny County, and conservation should be a management goal. This report cites a wide variety of species that are thriving in the park's highly favorable soil, including natives such as James' sedge and ramps and recommends preserving them.

WPC suggests converting several mowed areas to native meadows and new forests, a measure that will provide for a richer wildlife and pollinator habitat. It also noted the value in restoring forests degraded by pests such as the emerald ash borer and the disease oak wilt, and also cited the presence of invasive species needing removal. Strategies to reduce stormwater runoff were also suggested.

WPC recommended adding interpretive signage to help educate the public about protecting the park's features and developing a sustainable trail plan.

We are deeply grateful to the Benedum Foundation for providing the funding to make this report possible. We also thank the outstanding staff at the Western Pennsylvania Conservancy and the Allegheny County Parks Department for their expertise and insightful contributions to this report. We look forward to working with the County Parks staff and other partners to prioritize and implement these recommendations and to continue this important work in all of the Allegheny County Parks.

Caren Glotfelty Executive Director July 2019

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# INTRODUCTION

# 1.1 BACKGROUND

## History of Settlers Cabin Park—Allegheny County Parks System

Settlers Cabin Park's name comes from the origins of an original log cabin from the first known European settlers to the area. The region was deep mined in the 1920s and then surface-mined in the 1940s until Allegheny County purchased the land in 1971. Large portions of the park have gone undeveloped since the mining. It is known for its hilly, wooded geography as well as impressive swimming pools for summertime fun. In 1998, 432 acres of Settlers Cabin Park were designated for the creation of the Pittsburgh Botanic Garden.

Settlers Cabin is one of the nine parks that comprise the Allegheny County Parks, a regional system that is managed by the Allegheny County Parks Department with legislative oversight by Allegheny County Council. Rich in recreational, natural, and historic resources and located within a 15 to 20 mile radius from downtown Pittsburgh, the nine parks - Boyce Park, Deer Lakes Park, Harrison Hills Park, Hartwood Acres Park, North Park, Round Hill Park, Settlers Cabin Park, South Park and White Oak Park - are meant to serve all of the communities and citizens of Allegheny County.

## The Allegheny County Parks Foundation

The Allegheny County Parks Foundation (ACPF) supports the improvement, preservation and restoration of nine county parks consisting of 12,000 acres strategically located throughout Allegheny County. The Parks Foundation assists in the transformation of these parks by assembling resources, improving assets, and mobilizing public and private stakeholders to advance strategies and aspirations to make the parks signature assets in Southwestern Pennsylvania.

ACPF's overall mission is to help improve, conserve, maintain, protect, preserve and restore park facilities and open spaces, and also to support educational, recreational, natural and cultural activities. These efforts all work to enhance the quality of life for county residents, promote healthy lifestyles, improve the environment, and stimulate economic growth and vibrancy for the region. In partnership with Allegheny County, ACPF strives to enhance the park experience for all users.

The Allegheny County Parks Foundation has commissioned this report to provide scientific and technical guidance for future enhancements to Settlers Cabin Park.

## Western Pennsylvania Conservancy

The Western Pennsylvania Conservancy (WPC) is one of the oldest and largest environmental organizations in the state. It has helped establish many state parks through its land protection programs, it shepherds the state's database of rare and endangered species, it provides assistance to landowners and communities wishing to protect their watersheds, and is the caretaker of Fallingwater. Its community greening program provides technical assistance and programming to communities desiring to enhance their local quality of life through green strategies including community gardens, tree plantings, and green infrastructure projects. This project has combined expertise from the WPC's Community Gardens and Greenspace Program and the Natural Heritage Program.

## Purpose of the Project

The purpose of this project is to provide information on the current ecological conditions and maintenance activities of Settlers Cabin and present prioritized recommendations for actions that will enhance the quality and function of



A Box Turtle along a Hiking Trail at Settlers Cabin Park

the park and improve the park experience for all visitors. The last assessment of the environmental conditions of the county parks was conducted for the Allegheny County Parks Comprehensive Master Plan and was released in 2002. A tremendous amount of change has taken place in the region since that time. Allegheny County has been undergoing a transformation of its economy and local environment. Significant changes in the landscape are occurring due to pests and diseases that affect trees and plants, including oak wilt and the emerald ash borer which has killed almost all ash trees in the region. Climate change is affecting storm and weather patterns, growth and introduction of invasive plants and animals as well as air and water quality. In addition, scientific knowledge about how to manage ecological systems and stresses has changed and a new era has begun with the application of green infrastructure to solve issues related to stormwater, erosion, energy consumption and alternative transportation. All of this change brings the Allegheny County Parks to an opportune moment to reassess conditions, identify needs and opportunities, and craft recommendations for improving the parks both as living ecological systems and as beloved spaces for the many citizens who use them each year. This is the fourth ecological assessment and recommendation document that the Western Pennsylvania Conservancy has provided for Allegheny County Parks Foundation. Boyce Park concluded in January 2016, South Park concluded in January 2017, and Hartwood Acres will be completed concurrent with this project.

# **1.2 PROFILE OF SETTLERS CABIN PARK**

Settlers Cabin Park is located 15 miles west of Pittsburgh's downtown and nine miles southeast of the Pittsburgh International Airport in Robinson, North Fayette and Collier Townships. Named for the original cabin discovered in 1971,

Settlers Cabin and the surrounding area was rich in shallow coal and widely mined until it was secured by Allegheny County.

Early European settlers moved into the area west of Pittsburgh in the 18th century that is now the park, which was largely controlled at the time by the Six Nations of Iroquois. When treaties were negotiated with the



The Walker-Ewing-Glass House, located on Pinkertons Run Road (Source Photo: http://pittsburghbotanicgarden.org)

Iroquois and the United States government after the French and Indian War, settlers began farming this rolling land.

In the early twentieth century, mining rights were sold off by farming land owners and heavily mined until Allegheny County purchased the land in 1971. At that point the land was "a maze of open and back-filled mines." According to



WPC has led multiple reforestation tree plantings on old mining sites within Settlers Cabin Park at the Pittsburgh Botanic Garden (Spring 2017).

one of the last remaining family members who lived on a family farm where the Park is now located, they had to go to the nearby town to get water as the ground water was undrinkable, tainted with acid mine drainage. Since then, the land has been restored and reforested, and active wells and exposed oil and gas lines closed.

At 1,610 acres, it is the third largest park in the Allegheny County parks system. In addition to the historic log cabins, it has a popular wave pool, the only dive pool in the Allegheny County Park system, tennis courts, playgrounds and a Dek hockey rink. Settlers Cabin also has about 22 miles of trails for walking and biking.



One of the many hiking trails through Settlers Cabin Park

In 2015, ACPF, with support from Allegheny County and the PA Department of Conservation and Natural Resources, completed a connector trail within the park that will eventually connect Settlers Cabin Park to the Panhandle Trail, a 29-mile trail that stretches from Carnegie to Weirton, WV. The Panhandle Trail also connects to the nearby Montour Trail, a 60-plus mile trail around Pittsburgh making it the longest suburban rail trail in the United States. In 1998 the Horticultural Society of Western Pennsylvania signed a 99-year renewable lease with the Allegheny County Board of Commissioners for 432 acres (later becoming 452 acres) of the southwestern corner of Settlers Cabin Park. After massive planning and infrastructure restoration, the Pittsburgh Botanic Garden opened year-round to the public in spring 2015. The Botanic Garden, separated by Pinkerton Run Road, operates separately from Settlers Cabin Park, and is not included in this report.

## **Literature Cited**

Gangewere, R. Jay. July/August 1986. "Allegheny County Parks." Carnegie Magazine, Pittsburgh, PA Pittsburgh Botanic Garden. 2017. Website: http:// pittsburghbotanicgarden.org/about-us-2/history-of-the-land/

## **1.3 ECOLOGICAL ASSESSMENT OF SETTLERS CABIN PARK** METHODS

### Team

The WPC team consisted of its community forestry staff including the community forester, director of community forestry, and outreach coordinator, as well as WPC's land protection specialist from the Land Conservation Program, two staff ecologists, and WPC's Natural Heritage Program science director.

## Approach

The team used aerial photographs to identify likely areas with forest cover; these photos were compared to older photos to identify locations that might have longer-term growth signifying potentially more ecologically significant locations. From these preliminary indications, the park was segmented into areas for further exploration. The field team included the WPC ecologist, community forester, community forestry arborist and additional field staff. They visited the entire park and delineated sections and documented types of forest, types of understory vegetation and other features and conditions. WPC performed an Ecological Integrity Analysis by ranking each section of the park into four categories (Best, Good, Ok and Poor) based on their key environmental featues. These features were noted such as seeps, rock outcrops, slopes and open areas. Additionally, the team used a customized Geographical Information System (GIS) data collection application to map four distinct management zones that were broken into 72 ecological units (EU). Existing conditions of each unit were documented, analyzed and inventoried.

Problems were noted including erosion, soil compaction, dangerous trees or overgrowth, and conflicts between users and ecosystem. A green infrastructure survey was also completed to identify the most strategic locations to apply green infrastructure to manage stormwater runoff and improve the park's ecological function, aesthetics and sustainability.

### Intended Users

This report and accompanying set of maps, charts and resources is intended for use by the Allegheny Parks Foundation and the Allegheny Parks Department staff to protect and restore Settlers Cabin Park's natural assets.



WPC Staff and Allegheny County Parks Rangers take photos of a plant found during a hike at Settlers Cabin Park.

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# 2.1 ECOLOGICAL OVERVIEW

This section provides an overview of the ecology of Settlers Cabin Park. The state of ecosystems today in the park is due to the interaction of the basic environmental conditions in the park; the plants, animals and other living organisms that inhabit our region; and the land management activities of people. **Allegheny County's Ecological Heritage** provides a background for understanding Settlers Cabin Park's natural communities in a regional context, while **Land Use and Ecological History of Settlers Cabin Park** describes the ways in which human activities have affected the development of natural communities in the park. The state of the natural communities is the result of historic land use, most notably surface mining and agriculture. Soils and geology are the foundations of the web of life, providing nutrients and shaping growing conditions for plants, which are the base of the food chain. The **Geology** and **Soils** sections below describe these features of the park in more detail.

Pittsburgh Botanical Garden accounts for 30% of acreage at Settlers Cabin Park. Of the remaining acreage under the management of Allegheny County (or about 1,134 acres), about 90% of acreage is in a natural condition (nondeveloped, not actively managed). About 75% of the park was previously cleared for agriculture or mining, and has reverted to forest in the last several decades since the park's establishment: about 50% of natural communities in the park are considered young (mid-successional) forests, and about 25% of communities are early successional (grass, forb, or shrub dominated). In these successional landscapes, the legacy of agriculture on the soils and the presence of invasive species pose significant challenges to the redevelopment

of mature native forest communities. Mining scars and mine drainage also affect soil and water quality in the park. The park also contains populations of several uncommon plant species, which should receive special management consideration for their conservation. They are all specialists of high-pH soils, which are a unique environmental feature of the park.



WPC Staff Assessing Vegetation in Settlers Cabin Park

# 2.2 GEOLOGY

Surface geology refers to the bedrock layers closest to the surface of the earth. Bedrock is the foundation material for soil, and also greatly influences the chemistry of water bodies such as streams, rivers, and lakes. Surface geology can be a determining factor in the diversity of plant life on land, and animal life in streams and lakes.

Pennsylvania is divided into physiographic regions based on landforms and geological history. Settlers Cabin Park is located in the Pittsburgh Low Plateau section of the Appalachian Plateau province, characterized by low rolling hills that formed by the gradual erosion of stream valleys, rather than the tectonic upheavals that formed the Allegheny and Appalachian ranges. In this region, the surface geology layers were formed through sedimentary processes, and they have not been extensively folded by subsequent tectonic activity; today they lie horizontally or gently undulate over large distances. The Pittsburgh Low Plateau province



Settlers Cabin Waterfall

Geologists classify rock layers into groups and formations based on the time period in which they formed. Formations are also described according to their mineral composition, which greatly influences soil materials and plant life. The surface geology of Settlers Cabin Park is from the Monongahela and Casselman formations. The Monongahela Group underlies most of the park's hilltop and upper slope areas, while the Casselman Formation underlies the stream valleys, except in the southeastern corner of the park, where it is ubiquitous.

The Monogahela Group consists of many layers of limestone, shale, sandstone, and coal. It has a fairly high proportion of calcareous materials, because some of the limestone layers are relatively thick, and some of the sandstone and shale layers are also calcareous. These calcareous materials in turn influence the calcium content and pH of the soil. Many plants grow best in soils with

pH between 5.0 and 6.5, because in this range, most nutrients are readily available, while toxic metals are chemically bound. However, Pennsylvania's natural diversity of plant species also includes specialists who thrive on acidic or calcareous soils. In many areas of Settlers Cabin Park, soil pH is fairly high, 6.0-7.0, creating the potential to host very diverse plant communities, as well as some calcareous specialists. This type of environment is somewhat uncommon today in Allegheny County, because calcareous geology is a minority component in the county; the Monongahela group has the highest fraction of calcareous materials of the four geological groups mapped in Allegheny County.

Because calcium dissolves readily in water, and leaches out of soils quickly, the influence of calcareous bedrock materials is strongest on slopes, where erosion removes



Soil Testing within Settlers Cabin Park

surface materials and exposes new bedrock relatively quickly (Ciolkosz et al. 1995; Bennie et al. 2006). Floodplains also sometimes have a strong calcareous influence, because of the accumulation of materials eroded from the slopes



above. Calcareous soils and bedrock affect aquatic ecosystems as well, because they tend to raise the pH of stream waters, and provide buffering capacity that counteracts acidic inputs such as acid rain or acid mine drainage.

The Monongahela Group also includes the Pittsburgh coal seam, a very thick and economically important coal layer. This is the layer that has been mined in various parts of the park; the mine scars occur at the base of the Monongahela Group, visible on the soils map (page 16).

The Casselman Formation consists of layers of shale, siltstone, sandstone, red beds, thin impure limestone, and thin nonpersistent coal. It contains only a minimal amount of calcareous materials. Because the Casselman underlies lower slopes and stream valleys, soils over this formation likely reflect both Casselman-derived materials that have weathered in place, and the addition of Monongahela-derived bedrock materials that have eroded from upper slopes.

# 2.3 SOILS

Soil types vary according to topographic position (USGS 1981). Generally, Dormont, Library, Culleoka, and Guernsey soils are found in high slope and ridgetop locations in Settlers Cabin Park. The Gilpin, Weikert, and Culleoka complex, Gilpin-Upshur, Gilpin, and Wharton soils are typically found in mid to lower slopes, with Gilpen representing much of the valley bottoms in the park. Drainage in these soils ranges from moderately well drained to well drained. Cavode is the exception, having somewhat poor drainage: this type is restricted to one, low slope location in the park. Soils data for the park also provide a guide to areas of past mining activity; the areas mapped as strip mine soils correspond to successional communities at Settlers Cabin Park. Because soil types correspond to topography, they also correspond to categories of natural communities documented at Settlers Cabin Park.

Mature forests, found mostly in mid to low slopes surrounding streams, and are associated with Gilpin, Weikert, and Culleoka complex, Gilpin-Upshur, Gilpin, and Wharton soils. Successional communities are often associated with Dormont, Library, Culleoka, and Guernsey soils, as well as soils associated with strip mining. Interpreting the association between soils and natural communities, with the exception of successional communities in strip mined areas, should be approached with caution. Natural communities are more likely associated with disturbance history, aspect, and slope, rather than soil types.



# 2.4 ALLEGHENY COUNTY'S ECOLOGICAL HERITAGE

This region's natural ecosystems have developed over tens of thousands of years. Further south, the Southern Appalachian Mountains are one of the world's biodiversity hot spots, in part because of a hospitable climate and in part because ecological development was never reset by glaciation. Southwestern Pennsylvania is at the northern edge of this bioregion; the character and diversity of its plant and animal life show both an Appalachian and Midwestern influence, and it is markedly different than previously glaciated ecosystems just a short distance to the north. Southern influences extend into Allegheny County in particular because of the moderate climates along the major river corridors: the Ohio, Allegheny, Monongahela, and Youghiogheny.

There are no detailed descriptions of the region's ecosystems preserved before about 1900. Historical ecological assessment techniques such as pollen analysis conducted in other areas of the northeast show that significant ecosystem changes were set in motion in the 1600 and 1700s by the arrival of Europeans and the decimation of Native American societies, who had influenced and managed natural landscapes for several thousand years previous to the arrival of European colonists. Furthermore, by the early 1900s, clearcutting for agricultural development and timber sale was already well advanced in the region, and early documentarians could only assess the remaining forest areas. However, despite these limitations, their work remains the best reference we have available for the original character of our region's forest ecosystems.



A juvenile tulip tree (*Liriodendron tulipifera*) growing in Settlers Cabin Park

In the early 1900s, E. Lucy Braun catalogued the natural forest ecosystems of eastern North America, in a definitive work that can never be replicated because these systems have been so extensively altered in the years since. She placed southwestern Pennsylvania within the Cumberland and Alleghenv Plateaus section of the original Mixed Mesophytic forest region (Braun, 1950). This region extends from northern Alabama to glaciated northeastern Pennsylvania; Allegheny County is at the far northern end. The Mixed Mesophytic Forest is characterized by an exceptionally diverse tree canopy, and by a rich Appalachian-influenced herbaceous layer. Dominant species of the climax forest in this region are the American beech (Fagus grandifolia), tulip tree (Liriodendron tulipifera), basswood (Tilia sp.), sugar maple (Acer saccharum), American chestnut (Castanea dentata), sweet buckeye (Aesculus octandra), red oak (Quercus rubra), white oak (Q. alba), and hemlock (Tsuga canadensis). According to Braun's work, Allegheny County lies within a subdivision of this region called the Low Hills Belt, characterized by a larger proportion of oak than is typical for Mixed Mesophytic Forest.

Otto Jennings of the Carnegie Museum of Natural History also wrote pioneering baseline ecological descriptions for the region in the early 1900s. He described two forest types for the region, a "White Oak Association" and a "Sugar Maple – Beech Association". The White Oak Association is found on

rolling uplands and rounded hills, and it is dominated by white oak, shagbark hickory, red maple. and other oak species. The "Sugar Maple -Beech Association" is found on richer, moister soils such as floodplains, valleys, and lower slopes, and the canopy dominants are sugar maple, American beech, hickories (Carya spp.), red oak, white oak, white ash (Fraxinus americana), and American basswood.



A juvenile white oak tree (*Quercus alba*) growing in Settlers Cabin Park

In the last few centuries, since European colonization, this ecological baseline has undergone unprecedented changes; today's landscape reflects both the rich ecological heritage of the region, and the impact of many modern challenges such as forest pests, fragmentation, invasive species, and postagricultural forest recovery. Tree species that were once a ubiquitous part of our region's forests, such as the American chestnut, American elm, white ash, and green ash, have been eliminated or greatly reduced in our forests by the introduction of exotic forest pests and diseases. More species may still be lost; oak species, hemlock, and American beech are threatened by the gypsy moth, hemlock wooly adelgid, and beech bark disease complex, respectively. Invasive plant species have been introduced that are displacing native species on a large scale. Excessive deer browse is also a modern problem that threatens forest regeneration and diversity, as deer were previously held in check by keystone predators such as wolves. The challenge in landscapes such as the Allegheny County Parks is to safeguard and improve the health of the remaining natural diversity and to restore ecological health where it has been impaired.

# 2.5 LAND USE AND ECOLOGICAL HISTORY OF SETTLERS CABIN PARK

WPC examined historic aerial photos (Penn Pilot 2017) of Settlers Cabin Park. Historic aerial photos from 1938, 1951, and 1967 were georeferenced in ArcMap. Modern aerial photos (PA Map, 2003-2006) were used to make inferences about current land use practices and natural community composition. In some instances, topographic and soil maps were used to identify areas of Settlers Cabin Park that were strip mined.

By 1938, most upland areas of the park were cleared for agriculture. Some stream valleys remained at least partially forested (either mature forest or successional forest), including those valleys surrounding Pinkertons Run and Baldwin Run. Many of these forested stream valleys continued to mature into the 1950s. Photos from 1951 indicated that many upland habitats, previously cleared for agriculture, were transitioning to early successional shrublands. However, some agriculture remained on the landscape, and strip mining in select locations in the park had occurred (sometime between 1938 and 1951). The western side of the park appears to have seen increased agricultural disturbance, as well as surface mining disturbance, between 1938 and 1951.

Many areas that had previously been mined were in an early successional state by 1967. Most forested valleys continued to mature, as did younger, successional forests on ridgetops, and slopes above and below mining scars. The large utility right-of-way, which cuts diagonally from northwest to southeast across the park, was established after 1967. Many parkscape features, including picnic and pavilion areas, play areas, tennis courts, the park wave pool, and parking areas, are located in areas that were strip mined or that were disturbed by agriculture.









0 0.125 0.25 0.5 Miles

# 2.6 BOTANICAL CONSERVATION TARGETS AT SETTLERS CABIN PARK

The park contains several populations of plant species that are rare in the state or region. Conservation of these species should be a particular management goal. All of these species are found only in calcareous soils.

## James' Sedge

James' sedge is listed on the Pennsylvania Natural Heritage Program (PNHP) watch list because it is uncommon and may become rare without conservation action. It is a grass-like plant that forms graceful green tufts and small, balloon-like seed stalks. This species is a specialist of mesic to drymesic calcareous soils, and most known populations are in central Pennsylvania. Settlers Cabin Park is one



James' Sedge

of only a few locations known from southwestern Pennsylvania. James' sedge occurs in the forested floodplain community along the northern segment of Pinkertons Run. The plant was observed to occupy only a relatively limited area, although more intensive survey work may reveal more plants.

## Management Recommendations:

- The area of the park where James' sedge was observed has fairly high cover of invasive species. Control to reduce shading and competitive pressure from these species is recommended, using techniques that do not harm other native vegetation. James' sedge is particularly vulnerable to out-competition because of its small stature, only 4-12" tall.
- Adapt trail maintenance to avoid damage to the James' sedge plant, where they occur by trails. Trail rerouting or other significant alterations in current management are not needed, but care should be taken during maintenance activities to avoid damage to the actual James' sedge plants, especially before seeds have fallen.

# Goldenseal (Hydrastis canadensis)

Goldenseal (*Hydrastis canadensis*) has a legal status of Pennsylvania Vulnerable, due to the potential impact on this species of collection for medicinal use and for sale in the medicinal plant trade. It was identified in only one area of the park.

### **Management Recommendations:**

 Monitor and manage invasive species in the area occupied by goldenseal, using control techniques that do not harm native species. Invasive species are currently moderately prevalent in the forested area occupied by goldenseal, with some dense populations nearby; this is the highest priority management need for the species at this time.



Goldenseal (Hydrastis canadensis)

• Currently there are no trails or public use facilities near the goldenseal population; because this species is vulnerable to collection, as well as to forest degradation from edge effects, it is best to continue to avoid placement of any trails or facilities resulting in public traffic or forest disturbance near the population.

## Ramps (Allium tricoccum)

Ramps are a conservative species of rich mesic forest habitats; they are also an edible plant with great cultural significance in Appalachia. In recent years, culinary use of ramps has become more widespread, and harvesting for sale at farmers markets and to restaurants has increased. However, the plant grows fairly slowly, taking 7 years to reach flowering maturity from seed. Although this species can sometime be found growing very abundantly in large patches, research (Rock et al 2004) has shown that only very modest harvesting is sustainable: 10% of the population every ten years (i.e., with 9 years in between for recovery). This species is listed on



Ramps (Allium tricoccum)

the PNHP Watch List because of concern about overharvesting. The population in Settlers Cabin is not a particularly large one. Because it is visible from trails, it could be especially vulnerable to harvesting.

### Management Recommendations:

- Monitor the population to detect any signs of harvesting, such as earth disturbance or reduced plant cover. It is only visible a few months a year, between May and July, after which time the leaves die back.
- Post generic signs in the park to encourage users to take only photographs and leave only footprints and to convey the message that harvesting any plant materials is not sustainable in a park with a large number of public users.

# 2.7 ECOLOGICAL INTEGRITY MAPPING

In Settlers Cabin Park, the most ecologically intact communities are found in the stream valleys and adjacent slopes, while the uplands and ridgetops are typically either developed or have early-successional forest of lower quality. Aspect and bedrock geology also correlate with strong differences in plant community composition. East- and north- facing slopes have mesic forest communities typically dominated by sugar maple and black maple, while westand south- facing slopes have drier forest communities that are typically oak dominated. The most diverse communities are found where the soils have higher pH due to the influence of limestone bedrock.

Compared to Boyce, South and Hartwood Acres Parks where WPC has conducted ecological assessments, a much greater extent of Settlers Cabin Park has relatively intact ecological communities. We have highlighted the areas with the greatest ecological integrity and diversity by mapping areas as "**best**", "**good**", "**ok**", and "**poor**" quality natural communities.

- "Best quality" these areas have mature plant communities with species diversity as good as or better than is typical for an intact example of the community type in our region, including more "conservative" species that require intact forest habitat and do not re-establish quickly after disturbance. These species have special conservation value, because they are difficult to re-establish once lost. They can also provide seed and propagule stock for restoration efforts elsewhere in the park, if they are managed to develop healthy populations and sustainably harvested. These areas also currently have low presence of invasive species, and should be monitored and managed to prevent the establishment and spread of invasives.
- "Good quality" these are areas that have medium-aged to mature plant communities, with species diversity that is somewhat lower than expected for a reference example of the community type. "Conservative" species are less common or absent in these areas. Exotic species may be present but native species are dominant. Restoration of greater species diversity should be considered through movement of seed propagules

from "best quality" examples of similar community types in the park. Invasive species management may also be needed in these areas.

• "Poor quality" - these are areas that have early successional plant communities with low diversity of native plants; species tend to be nonconservative, i.e., those that can colonize disturbed habitats easily, and exotic invasive plants are common. These areas will require intensive management to restore ecological quality and allow them to proceed on a natural successional path to develop a mature native plant community. The primary difficulty is the need to manage invasive species so that natives can establish and mature; propagule introduction may also eventually be needed to restore more conservative species



An example of a good quality ecological integrity area in Settlers Cabin Park.



# 2.7.1 BEST QUALITY AREAS - PINKERTONS RUN NORTH

The northern end of Pinkertons Run has intact, mature forest that is very diverse due to high-pH soils from the influence of calcareous bedrock. This area is truly the ecological jewel of the park. The main stem has a broad floodplain with a diverse sugar maple – mixed hardwood forest community. This floodplain community is characterized by a dense herbaceous layer with a rich mixture of mesic upland species and facultative (capable of living in multiple environments) wetland species. Sugar maple (*Acer saccharum*) is dominant in the canopy with green ash (*Fraxinus pensylvanica*), black cherry (*Prunus serotina*), black maple (*Acer nigrum*), red maple (*Acer rubrum*), basswood (*Tilia americana*), and American elm (*Ulmus americana*) also



Pinkertons Run North

present. The shrub layer is somewhat sparse but dominated by spicebush (*Lindera benzoin*), with black raspberry (*Rubus occidentalis*) also scattered. The herbaceous layer has an abundance of conservative spring wildflowers, including: wild geranium (*Geranium maculatum -* 5), wild blue phlox (*Phlox divaricata -* 8), cream violet (*Viola striata -* 4), two-leaved toothwort (*Cardamine diphylla -* 7), Virginia bluebell (*Mertensia virginica -* 8), wild stonecrop (*Sedum ternatum -* 6), nodding fescue (*Festuca subverticillata -* 6), wild licorice (*Galium circaezans -* 6), Jack-in-the-pulpit (*Arisaema triphyllum -* 5), false-mermaid (*Floerkea proserpinacoides -* 5), ramps (*Allium tricoccum -* 7), Solomon's-seal (Polygonatum pubescens - 6), false Solomon's-seal (*Maianthemum racemosum -* 5), James' sedge (*Carex jamesii -* 8), spicebush

(*Lindera benzoin* - 5), a snakeroot species (*Sanicula sp.*), cutleaf toothwort (*Cardamine concatenata* - 5), and mayapple (*Podophyllum peltatum* - 5). Less conservative species that are typical of floodplains, including jumpseed (*Polygonum virginianum* - 4), wingstem (*Verbesina alternifolia* - 2), cleavers (*Galium aparine* - 2), and jewelweed (*Impatiens sp.*) are also present.

The invasive exotic species garlic-mustard (*Alliaria petiolata*) and narrowleaved bittercress (*Cardamine impatiens*) are present here, and should be managed while populations are small. The exotic shrub multiflora rose (*Rosa multiflora*) is also present, but may not need management because this species is currently affected by a blight disease.

The dry slope to the east of Pinkertons Run is also very diverse and intact, with a different set of species than the floodplain due to the lower moisture levels. It is unique from other dry slopes in the park because it shows the influence of calcareous bedrock and has significant sugar maple in the canopy along with oak species. The community is classified as dry oak – mixed hardwood forest, while most other dry western-facing slopes have acidic soil and host Allegheny Plateau oak forest communities with a very different set of species. The herbaceous layer includes many conservative species such as ragwort (*Packera obovata* - 6), a muhly grass species (*Muhlenbergia sp.*) violet wood-sorrel (*Oxalis violacea* - 6), sweet cicily (*Osmorhiza* - *sp.*), early saxifrage (*Saxifraga virginiensis* - 6), bluestem goldenrod (*Solidago caesia* - 6), smooth rockcress (*Arabis laevigata* - 7), sharp-lobed hepatica (*Hepatica nobilis var. acuta* - 9), bluets (*Houstonia caerulea* - 3), sedge (*Carex albursina* - 8), black maple (*Acer nigrum* - 7), rue-anemone (*Thalictrum thalictroides* - 6), and Christmas fern (*Polystichum acrostichoides* - 5).

The eastern tributary to Pinkertons Run, near the northern boundary of the park, has a diverse sugar maple - basswood forest along the drainage, a good example of this community type. The canopy dominant is basswood (*Tilia americana*), with sugar maple (*Acer saccharum*), red oak (*Quercus rubra*), and slippery elm (*Ulmus rubra*) also common, and American hop-hornbeam (*Ostrya virginiana*) in the subcanopy. The herbaceous layer is diverse, and invasive species are minimal as of yet. The Pennsylvania Watch List species bladdernut (*Staphylea trifolia*), a calcareous soil indicator, is present here. Where this tributary joins Pinkertons Run, there is an extensive wetland in the broad, flat floodplain; it is obvious that AMD sediments have been accumulating in this wetland, and it was therefore rated "poor" ecological integrity. Remarkably, however, it appears to still be dominated by native species, primarily skunk cabbage (*Symplocarpus foetidus*), cattail (*Typha latifolia*), and soft rush (*Juncus effusus*).

# 2.7.2 CENTRAL TRIBUTARY

This area has a steep ravine with a mesic red oak mixed hardwood forest community. The canopy dominant is red oak (*Quercus rubra*), with white oak (*Quercus alba*), sugar maple (*Acer saccharum*), and some basswood (*Tilia americana*) and Canada hemlock (*Tsuga canadensis* - 8); the subcanopy includes choke cherry (*Prunus virginiana* - 5) and hop-hornbeam (*Ostrya virginiana* - 7). The herbaceous layer is diverse and mostly composed of native species, primarily conservative spring ephemeral wildflowers and ferns. Species include: bloodroot (*Sanguinaria canadensis* - 5), mayapple (*Podophyllum peltatum* - 5), Solomon's-seal (*Polygonatum pubescens* - 6), sugar maple (*Acer saccharum* - 6), false Solomon's-seal (*Maianthemum racemosum* - 5), wild-ginger (*Asarum canadense* - 7), giant blue cohosh (*Caulophyllum giganteum* - 7), wild stonecrop (*Sedum ternatum* - 6), Christmas fern (*Polystichum acrostichoides* - 5), smooth rockcress (*Arabis laevigata* - 7), ragwort (*Packera obovata* - 6), violet wood-sorrel (*Oxalis violacea* - 6), and appendaged waterleaf (*Hydrophyllum appendiculatum* - 8).

# 2.7.3 EASTERN TRIBUTARY

The stream valley along Baldwin Road also has a high quality, diverse, mature forest community, starting at the southeastern corner of the park and extending upstream to the "waterfall" area. It is set on a mesic, east-facing slope, with a steep ravine near the southern end. Although it is classified as a

sugar maple – basswood forest community, and the canopy is dominated by black maple, the hardwood diversity is greater than other sugar maple - basswood forests in the park (which are mainly dominated by sugar and/ or black maple) and resembles an Appalachian cove community. The area around the small, steep ravine between the southeastern corner of the park and the rightof-way (ROW) to the north is particularly diverse and intact, and has some calcareous bedrock

influence. Black maple (Acer



Eastern Tributary

nigrum) is the dominant canopy species, with basswood (*Tilia americana*), black walnut (*Juglans nigra*), shagbark hickory (*Carya ovata*), American beech (*Fagus grandifolia*), northern red oak (*Quercus rubra -* 6), American elm (*Ulmus americana -* 5), cucumber-tree (*Magnolia acuminata -* 8), and red maple (*Acer rubrum -* 1) also present. The herbaceous layer includes a diverse mix of conservative wildflowers: mayapple (*Podophyllum peltatum* - 5), Solomon's-seal (*Polygonatum pubescens* - 6), wild blue phlox (*Phlox divaricata* - 8), sweet-scented bedstraw (*Galium triflorum* - 5), wild stonecrop (*Sedum ternatum* - 6), false Solomon's-seal (*Maianthemum racemosum* - 5), honewort (*Cryptotaenia canadensis* - 4), doll's-eyes (*Actaea pachypoda* - 7), Virginia waterleaf (*Hydrophyllum virginianum* - 6), Christmas fern (*Polystichum acrostichoides* - 5), cleavers (*Galium aparine* - 2), downy yellow violet (*Viola pubescens* - 7), zigzag goldenrod (*Solidago flexicaulis* - 7), wild hydrangea (*Hydrangea arborescens* - 6), rattlesnake fern (*Botrychium virginianum* - 5), bristly greenbrier (*Smilax tamnoides* - 5), wakerobin (*Trillium erectum* - 7), wild geranium (*Geranium maculatum* - 5), wild-ginger (*Asarum canadense* - 7), and ramps (*Allium tricoccum* - 7), skunk-cabbage (*Symplocarpus foetidus* - 5), sedge (*Carex prasina* - 8).

Invasive species are uncommon here, although garlic-mustard (*Alliaria petiolata*) is present, and Japanese stiltgrass (*Microstegium vimineum*) has established on the slope extending down from Baldwin Road. This should be a priority area for controlling this species before it spreads pervasively.

# 2.7.4 GOOD QUALITY AREAS - PINKERTONS RUN SOUTH

The southern end of the Pinkertons Run stream valley within the park is classified as "good" ecological integrity because the canopy is mature and native; however, diversity is low in the herbaceous layer, and some areas are dominated by the invasive exotic species Japanese stiltgrass (*Microstegium vimineum*). It is classified as a sugar maple – basswood forest, but the herbaceous diversity is much lower than reference examples of this type. The

lack of diversity may in part correlate with more acidic soils in this part of the stream valley.

## 2.7.5 EASTERN TRIBUTARY-NORTHERN FORKS

The stream valley in the eastern half of the park has two headwater forks that join near the waterfall area. These stream tributaries have forests that are somewhat younger and more disturbed than the high-quality valley forest downstream of the waterfall. The western fork has some interesting



Eastern Tributary - Northern Forks

sloped seepage wetlands that formed due to mining scars but are inhabited
primarily by native species typical of acidic wetlands. The eastern slope of this drainage has slightly more mature forests that were classified as "good" ecological integrity, while the western slope of the drainage has forests that are successional, have frequent canopy gaps, and invasive species are common.

The eastern fork is more intact, with mid-successional-mature forests. The western slope (east-facing) has a sugar maple – basswood community with relatively low diversity, while the eastern slope (west-facing and drier) has a red oak – mixed hardwood forest community with primarily red oak, hickory, black cherry, red maple. The stream valley bottom has some canopy gaps, some wet, others probably resulting from dead ash. There is a broad floodplain area in the center of this drainage that has some extensive canopy gaps and is more heavily invaded than surrounding areas (rated as "poor" ecological integrity). North of this open area, the stream valley has a mid-successional-mature red oak – mixed hardwood community with fairly low diversity but mainly native species.

# MANAGEMENT RECOMMENDATIONS FOR AREAS OF "BEST" AND "GOOD" ECOLOGICAL INTEGRITY

- Manage deer populations in the park to reduce browsing pressure. Immediate deer fencing around especially sensitive areas may be a good way to stop further loss of plant diversity, as long-term deer management plans are developed.
- Trail development should be limited in the mature forest areas. If mountain biking cannot be contained to trails, trails should be restricted to foot traffic.
- Interpretive signage regarding the biodiversity value of the mature forest areas, including requests not to pick flowers or other native vegetation, and to refrain from damaging recreational activities, may help with public cooperation in conservation-oriented management of these areas.
- Mature forest areas should be a special focus for invasive species management, to preserve these ecosystems while they are still in reasonably good condition.

## 2.8 CONSERVATIVE PLANT SPECIES OF SETTLERS CABIN PARK

The following table lists plant species found in Settlers Cabin Park that require intact natural habitats with little disturbance. The "Coefficient of Conservatism" is a rating developed to estimate how strongly a plant requires such a habitat; a species rated "10" will almost never be found outside of a very intact natural habitat, while a species rated "1" can easily colonize disturbed areas . The presence of species rated "5" or above can serve as a guide to indicate good quality natural habitats (Swink and Wilhelm 1994). They are also important conservation targets because many of the species rated "6" or above generally re-establish extremely slowly once lost (this is especially true for herbaceous species, less so for woody species).

Some natural habitats depend on natural disturbances, such as floodplains or fire. Although species that inhabit these ecosystems generally have low coefficients of conservatism, this does not diminish their ecological importance.

Settlers Cabin Park is especially rich in conservative plant species compared to other parks, and many species are present in multiple areas of the park and have reasonably healthy populations.

Scientific Name	Common Name	C-Value
Carex leptalea	Sedge	9
Hepatica nobilis var. acuta	Sharp-Lobed Hepatica	9
Carex albursina	Sedge	8
Carex jamesii	Sedge	8
Carex prasina	Sedge	8
Carex woodii	Sedge	8
Galium concinnum	Shining Bedstraw	8
Galium lanceolatum	Wild Licorice	8
Hydrastis canadensis	Goldenseal	8
Hydrophyllum appendiculatum	Appendaged Waterleaf	8
Magnolia acuminata	Cucumber-Tree	8
Mertensia virginica	Virginia Bluebell	8
Phlox divaricata	Wild Blue Phlox	8
Rubus pubescens	Dwarf Raspberry	8
Tsuga canadensis	Canada Hemlock	8
Acer nigrum	Black Maple	7
Actaea pachypoda	Doll's-Eyes	7

Scientific Name	Common Name	C-Value
Adiantum pedatum	Maidenhair Fern	7
Allium tricoccum	Ramp	7
Arabis laevigata	Smooth Rockcress	7
Arabis laevigata	Smooth Rockcress	7
Asarum canadense	Wild-Ginger	7
Cardamine diphylla	Two-Leaved Toothwort	7
Cardamine douglassii	Purplecress	7
Carex amphibola	Sedge	7
Carex communis	Red Sedge	7
Caulophyllum giganteum	Giant Blue Cohosh	7
Hieracium venosum	Rattlesnake-Weed	7
Ostrya virginiana	hop-hornbeam	7
Polygonatum biflorum	Solomon's-seal	7
Quercus coccinea	scarlet oak	7
Solidago flexicaulis	zigzag goldenrod	7
Staphylea trifolia	Bladdernut	7
Tilia americana	Basswood	7
Trillium erectum	Wakerobin	7
Viola pubescens	downy yellow violet	7
Acer saccharum	sugar maple	6
Actaea racemosa	black cohosh	6
Athyrium filix-femina	lady fern	6
Carex digitalis	Sedge	6
Carex gracilescens	Sedge	6
Carex gracillima	Sedge	6
Carpinus caroliniana	Hornbeam	6
Carya ovata	Shagbark Hickory	6
Erythronium americanum	Yellow Trout-Lily	6
Fagus grandifolia	American Beech	6
Festuca subverticillata	Nodding Fescue	6
Galium circaezans	Wild Licorice	6
Hydrangea arborescens	Wild Hydrangea	6
Hydrophyllum virginianum	Virginia Waterleaf	6
Oxalis violacea	Violet Wood-Sorrel	6
Packera obovata	Ragwort	6

Scientific Name	Common Name	C-Value
Paronychia canadensis	Forked Chickweed	6
Pinus strobus	Eastern White Pine	6
Polygonatum pubescens	Solomon's-Seal	6
Quercus alba	White Oak	6
Quercus rubra	Northern Red Oak	6
Quercus velutina	Black Oak	6
Quercus velutina	Black Oak	6
Quercus velutina	Black Oak	6
Saxifraga virginiensis	Early Saxifrage	6
Sedum ternatum	Wild Stonecrop	6
Silene stellata	Starry Campion	6
Solidago caesia	Bluestem Goldenrod	6
Thalictrum thalictroides	Rue-Anemone	6
Vaccinium pallidum	Lowbush Blueberry	6
Zizia aurea	Golden Alexanders	6
Arisaema triphyllum	Jack-in-the-pulpit	5
Botrychium virginianum	Rattlesnake Fern	5
Cardamine concatenata	Cutleaf Toothwort	5
Carex rosea	Sedge	5
Claytonia virginica	Virginia Spring-Beauty	5
Dryopteris intermedia	Intermediate Wood Fern	5
Elymus hystrix	Bottlebrush-Grass	5
Eupatorium purpureum	Sweet-Scented Joe-Pye- Weed	5
Floerkea proserpinacoides	False-Mermaid	5
Galium triflorum	Sweet-Scented Bedstraw	5
Geranium maculatum	Wild Geranium	5
Geranium maculatum	Wild Geranium	5
Heracleum maximum	Cow-Parsnip	5
Lindera benzoin	Spicebush	5
Luzula multiflora	Field Woodrush	5
Maianthemum racemosum	False Solomon's-Seal	5
Maianthemum racemosum	False Solomon's-Seal	5
Osmorhiza claytonii	Sweet-Cicely	5
Podophyllum peltatum	Mayapple	5

Scientific Name	Common Name	C-Value
Polystichum acrostichoides	Christmas Fern	5
Prunus virginiana	Choke Cherry	5
Ranunculus hispidus	Buttercup	5
Rudbeckia laciniata	Cutleaf Coneflower	5
Sanguinaria canadensis	Bloodroot	5
Smilax tamnoides	Bristly Greenbrier	5
Symplocarpus foetidus	Skunk-Cabbage	5
Ulmus americana	American Elm	5
Viburnum prunifolium	Black-Haw	5
Viola cucullata	Blue Marsh Violet	5

### 2.9 PLANT COMMUNITY TYPES AT SETTLERS CABIN PARK

Community types are assigned using the Pennsylvania Natural Heritage Program's (PNHP) plant community classification system and the U.S. National Vegetation Classification. When possible, community types were assigned using the PNHP plant community classification system (PNHP 2018). In certain situations, we utilized the National Vegetation Classification (USNVC 2018) if a similar, but more accurate community type was available for natural or successional communities at Settlers Cabin Park. There were many successional types that were not easily classified by the Pennsylvania or Natureserve classifications, and are closely associated with disturbance history. The conditions and composition of these successional communities are summarized in their own section below. There were also park-specific types (both natural communities and successional communities), not part of the Pennsylvania classification and with no clear Natureserve analog. These parkspecific types may be part of a mosaic of natural or successional communities, or may represent a variant of a natural community that results from disturbance history or regional botanical composition (see previous table).

## **2.9.1 NATURAL COMMUNITIES**

#### **Terrestrial Communities - Dry Oak Heath Forest**

In Pennsylvania, Dry oak – heath forests are often documented on dry, acidic ridgetops or high slope forests. In western Pennsylvania, and specifically at Settlers Cabin Park, we have observed this community type on south facing slopes: the presence of Dry oak – heath forests in western Pennsylvania may be associated with aspect and soils. The Dry oak – heath forest (Fike 1999) is often characterized by white oak (*Quercus alba*), chestnut oak (*Q. montana*), hickory (*Carya sp.*), red maple (*Acer rubrum*), black cherry (*Prunus*)

serotina), and black-gum (*Nyssa sylvatica*), with mountain laurel (*Kalmia latifolia*), lowbush blueberry (*Vaccinium angustifolium*), hillside blueberry (*V. pallidum*), or huckleberry (*Gaylussacia baccata*) in the shrub layer. The herb layer is typically sparse, but would include teaberry (*Gaultheria procumbens*), sarsaparilla (*Aralia nudicaulis*). We also observed a subtype of the Dry oak – heath community at Settlers Cabin Park which is probably more accurately described in the **Allegheny Plateau oak forest** of the National Vegetation Classification system (CEGL006018). At Settlers Cabin Park, this community type is also dominated by white oak, hickory, red maple, and black cherry, however the shrub layer is less developed, and mountain laurel is absent. Instead, this community supports a low density shrub layer where hillside blueberry was most common. The herb layer contained Pennsylvania sedge (*Carex pennsylvania*), teaberry, and rattlesnakeweed (*Hieracium venosum*). We also observed higher than average (for terrestrial forests at the park) bryophyte cover (Dicranum and Leucobryum).

#### Dry Oak - Mixed Hardwood Forest



Dry Oak Heath Forest - Settlers Cabin Park

This forest community was documented on mid to upper slopes at Settlers Cabin Park. Dominant species included white oak, pignut hickory (*C. glabra*), black oak (*Q. velutina*), red oak, sugar maple, and red maple. Although the understory of this community type is often quite rich in other parts of Pennsylvania, species richness was variable at Settlers Cabin Park. Herbaceous cover and overall canopy cover were usually high, owing much to cover from fern and maple (*respectively*). Dominant species in the herb layer included Christmas fern (*Polystichum acrostichoides*), and woodferns (*Dryopteris intermedia*, *D. carthusiana*). The herb layer also included wild-oats (*Uvularia sessilifolia*), and Solomon's seal (*Polygonatum biflorum*). We also observed a subtype of the Dry oak – mixed hardwood forest at Settlers Cabin Park which is probably more accurately described in the Oak hickory hop-hornbean sedge forest of the National Vegetation Classification system (CEGL006301). This subtype included more black oak, but white oak was still dominant.

#### **Red Oak - Mixed Hardwood Forest**

We documented this community type on mid to low slope forests at Settlers Cabin Park. Often, this community type transitions to sugar maple or silver maple dominated forests in low slope positions. These transitions were difficult to document in the field, as the transition from Dry oak – mixed hardwood forests (upslope) and mesic low slope forests (sugar maple – black maple mesic forest, sugar maple – basswood forest, sugar maple – mixed hardwood



A Mixed Hardwood Forest in Settlers Cabin Park

floodplain forest) were often gradual, and red oak was often a component of all of the aforementioned communities that surround red oak - mixed hardwood forests. Red oak is a canopy dominant; the community is further characterized by the presence of a sometimes guite diverse canopy that includes both mesic and dry-mesic species, such as: black oak (*Quercus velutina*), white oak, shaqbark hickory (*C. ovata*), red maple, black maple (*A. nigrum*), mockernut hickory (C. tomentosa), black cherry, tuliptree (Liriodendron tulipifera), Sassafras (Sassifras albidum), and beech (Fagus americana). The shrub layer includes spicebush (Lindera benzoin), witch hazel (Hamamelis virginiana), and alternative-leaved dogwood (Cornus alternifolia). Typical herbaceous species include black snakeroot (Actaea racemosa), hog peanut (Amphicarpea bracteata), mayapple (Podophyllum peltatum), Christmas fern (Polystichum) acrostichoides), and sweet-scented bedstraw (Galium triflorum). The herbaceous layer contains rich indicators such as stonecrop (Sedum ternatum). false Soloman's seal (Maianthemum canadense), downy yellow violet (Viola pubescens), and wood geranium (Geranium maculatum).

#### Sugar Maple - Basswood Forest

This type was documented mainly on east-facing slopes above Pinkerton

Run and Baldwin Run. The canopy of the sugar maple basswood forest were typically dominated by sugar maple, with a mix of basswood (Tilia americana), black maple, and sometimes red oak. Hemlock was occasionally present in the subcanopy, especially in lower slope forests. White or green ash (Fraxinus americana, F. *pennsylvanica*) were recently a component of these forests, but nearly all ash in Settlers Cabin Park have been lost to Emerald Ash Borer. Dead ash have resulted in canopy gaps,



Sugar Maple Basswood Forest in Settlers Cabin Park

which have released many understory species (native and non-native). Canopy gaps appear to be more abundant in lower slope examples of sugar maple – basswood forests. The herbaceous layer of sugar maple – basswood forests in Settlers Cabin Park varies from extremely diverse where the community is mature and underlain by calcareous bedrock (Pinkertons Run North, Eastern Tributary ravine), to lower than expected diversity with more conservative species lacking in some mid-successional stands. Common herbs include Christmas fern, wood geranium, violet species, mayapple, wild ginger (Asarum canadense), and ramps (Allium tricoccum). See listing under "Pinkerton Run North" for more information. The sugar maple - basswood forest is similar in many ways to the sugar maple - mixed hardwood floodplain forest, both in their canopy composition and diversity. However, sugar maple - basswood forests were limited to low to mid slope habitat at Settlers Cabin, whereas the sugar maple - mixed hardwood floodplain forests were located more often in narrow and broad stream valleys along Pinkertons Run and Baldwin Run. Additionally, senstive fern (Onoclea sensibilis) and skunk cabbage (Symplocarpus foetidus) are nearly always absent from the herbaceous layer in sugar maple - basswood forest at Settlers Cabin. Occasionally, we noted co-dominance of sugar maple and black maple in the canopy of sugar maple - basswood forests. Although black maple is not uncharacteristic of this community type (especially in western Pennsylvania), co-dominance of black maple could occur in wetter habitats, and/or transition zones between sugar maple - basswood forests and sugar maple - mixed hardwood floodplain forests.

## 2.9.2 WETLAND COMMUNITIES

#### Sugar Maple - Mixed Hardwood Floodplain Forest

This type typically occurs on small to medium size tributaries of the Ohio River Basin, At Settlers Cabin Park, sugar maple – mixed hardwood floodplain forests were documented in valley bottoms along Pinkertons Run and Baldwin Run. This community had a canopy of sugar maple, black maple, basswood, and bitternut hickory (C. cordiformis). It was similar to the sugar maple - basswood forests that were mapped at Settlers Cabin Park,



both in its canopy composition <sup>Mixed</sup> Hardwood Floodplain Forest in Settlers Cabin Park

and diversity in the herbaceous layer. In fact, both occurrences of the sugar maple – mixed hardwood floodplain forest are associated with stands of sugar maple – basswood forest around Pinkertons Run. They shared many of the same species in the canopy and understory, with slightly more mesic soils, inclusions of stream bank or riparian vegetation in the sugar maple – mixed hardwood floodplain forest. This type was documented on broad, sprawling stream valleys, whereas sugar maple – basswood was more associated with low to mid slope forests. Many dead ash and dead/dying black walnut (Juglans nigra) were documented in these floodplain communities, resulting in greater densities of herbaceous vegetation, rich spring flora, and unfortunately, a greater diversity and density of invasive species (Asiatic bittersweet, garlic mustard, narrowleaf bittercress). The herbaceous layer was extremely diverse: see the Pinkertons Run North list under "Ecological Integrity Mapping" for more detail. This community also supports sensitive fern and skunk cabbage, two species which help to distinguish this community from sugar maple – basswood forests

#### **Cattail Marsh**

This palustrine type was documented in only one location in Settlers Cabin park. This small wetland (1.91 acres) was documented in the headwaters to a first order tributary to Baldwin Run, and appears to be fed by seepages that are located upslope (see Sphagnum-woolgrass sloped seep). This wetland is not diverse, and is dominated by common cattail (Typha latifolia). Standing water was present.

#### Skunk-Cabbage - Golden Saxifrage Seep

This small wetland was documented in a single location at Settlers Cabin Park, nested within a sugar maple – mixed hardwood floodplain forest along a tributary to Pinkertons Run. Common cattail was also documented in this wetland, but Skunk-cabbage was the dominant species. Acid mine drainage was documented upstream of this wetland: this Skunk-cabbage seep community may provide a valuable service in improving water quality of this tributary before it enters Pinkertons Run. Although we only documented one occurrence of this community type at Settlers Cabin Park, it may occur as a small wetland or seepage feature throughout the park, nested within low-slope forests.

#### Spahagnum-Woolgrass Sloped Seep

This park-specific type appears to be associated with woodland (or completely open) habitat that is on mining scars, or down slope of mining scars. Sphagnum is abundant, and is sometimes deep (peat was documented in this community type). Tree cover in the canopy was highly variable, but was most often red oak, pin oak (*Quercus palustris*), and red maple. Honeysuckle (*Lonicera*) was present, which is evidence of past disturbance. We noted old fence-posts in some of these communities; along with historic aerial photography, this is a second piece of evidence that these sites were pastured prior to 1939. Wool-grass appears to be the dominant herb,

## **2.9.3 SUCCESSIONAL COMMUNITIES**

## Black Walnut Wingstem Ruderal Woodland (CEGL007879; Natureserve 2017)

This forest type is found on sites that have been previously cleared for agriculture or homesteads, usually on high-pH soils. It is found on floodplains and slopes. Black walnut (*Juglans nigra*) is the canopy dominant, and sometimes the canopy is almost exclusively composed of this species. Other species may include American elm (Ulmus americana), hackberry (*Celtis occidentalis*), and bitternut hickory (*Carya cordiformis*). Wingstem (*Verbesina alternifolia*) is generally dominant in the herbaceous layer, with white snakeroot (*Ageratina altisimma*), jumpseed (*Persicaria virginiana*), and the exotic species Japanese stiltgrass (*Microstegium vimineum*) also common. In floodplain situations, the wetland-indicator species Skunk cabbage (*Symplocarpus foetidus*), golden ragwort (*Packera aurea*), and sensitive fern (*Onoclea sensibilis*) are often present. According to Natureserve, this community type occurs in a variety of habitats, all of which are associated with disturbance where soils are rich or circumneutral soils.

#### Northeastern Ruderal Hardwood Forest (CEGL006599; Natureserve 2017)

Successional forests and woodlands make up a large portion of forested habitat at Settlers Cabin Park. These forests are highly variable in their composition, and do not appear to occur predictably throughout the park. Most often, these successional forest communities are similar to Dry oak mixed hardwood forests, or Red oak - mixed hardwood forest, but cherry and red maple can also be dominant/co-dominant in this community at Settlers Cabin Park. Natureserve (2017) suggests this type can occur on sites ranging in soil moisture from dry to mesic, and in some cases, dry forests with small seepages: the presence of seepages would explain the presence of elm and herbaceous species that prefer mesic conditions (*jewelweed*, *Impatiens spp.*) in some locations in the park. Canopy cover can be dense or reduced, depending on successional stage. We often observed invasive species in stands of the Northeastern ruderal hardwood forest. Stands of tree-of-heaven have also been noted in Northeastern ruderal hardwood forests at Settlers Cabin Park. In addition to exotic plant species, these forests may have disturbed canopies, with large canopy gaps that have resulted from 1) poor regeneration, or 2) treefalls that have occurred as a result of invasive vines (Asiatic bittersweet). These forests align with formerly disturbed habitat, most notably in areas of the park that have been strip-mined. Strip-mined areas are identifiable by historic aerial photos (1951, in particular), but soil maps and topographic maps also make it easy to identify strip-mined areas as well. Strip-mined examples of these forests occur in high slope habitats, where sloped topography is interrupted by broad benches that have been cut into the hillside, and are often more invaded

than other successional habitats at Settlers Cabin Park. However, there are many examples of non-mined successional forests that are equally (or more) invaded than previously mined successional forests.

#### White Pine Plantation

Often associated with formerly mined areas, these white pine dominated forests were planted following disturbance. Occasionally, Norway spruce was also found in these conifer stands. Although there are some hardwoods in the understory (serviceberry, *Amelanchier spp.*; dogwood, *Cornus spp.*), these communities are not very diverse. This was especially true in the understory, which were often invaded by exotic shrub species, or had very little herbaceous cover.

#### Successional (Early)

This broad successional type includes grass and forb dominated communities, including managed rights-of-way, and formerly disturbed sites that are highly invaded by exotic species. Common invasives include autumn olive and honeysuckle in shrubland successional habitats.

#### References

- Bennie, Jonathan, Mark O. Hill, Robert Baxter, and Brian Huntley. 2006. "Influence of Slope and Aspect on Long-Term Vegetation Change in British Chalk Grasslands." Journal of Ecology 94 (2): 355–368. doi:10.1111/ j.1365-2745.2006.01104.x.
- Braun, Emma Lucy. 1950. Deciduous Forests of Eastern North America. Philadephia; Toronto: Blakiston Co.
- Chamberlain, S.J., and H.M. Ingram. 2012. "Developing Coefficients of Conservatism to Advance Floristic Quality Assessment in the Mid-Atlantic Region." Journal of the Torrey Botanical Society 139 (4): 416–27.
- Ciolkosz, Edward J., Richard C. Cronce, William D. Sevon, and William J. Waltman. 1995. "Genesis of Pennsylvania's Limestone Soils." 135. Agronomy Series. Penn State College of Agricultural Sciences. http://agris.fao.org/agris-search/search/display.do?f=1997/US/US97022. xml;US9715741.
- Swink, F., and G. Wilhelm. 1994. Plants of the Chicago Region. 4th ed. Indianapolis, IN: Indiana Academy of Science.

- Pennsylvania Natural Heritage Program. "Terrestrial and Palustrine Plant Communities of Pennsylvania." 2018. http://www.naturalheritage.state. pa.us/communities.aspx.
- Rock, Janet H, Brian Beckage, and Louis J Gross. 2004. "Population Recovery Following Differential Harvesting of Allium Tricoccum Ait. in the Southern Appalachians." Biological Conservation 116 (2): 227–34. https:// doi.org/10.1016/S0006-3207(03)00193-9.
- "USNVC [United States National Vegetation Classification]. United States National Vegetation Classification Database, V2.0." 2018. Federal Geographic Data Committee, Vegetation Subcommittee. usnvc.org.m







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# 2.10 SETTLERS CABIN PARK MANAGEMENT ZONE SUMMARIES & POTENTIAL PRIORTY PROJECTS

Based on community usage and community practice, some of the small segments have been clustered to provide clear management zones toward which recommendations can be focused. Four distinct management zones broken into 72 ecological units (EU) are depicted on the map on page 45.

## 2.10.1 MANGEMENT ZONE 1

Management Zone 1 includes the uplands to the west of Pinkertons Run, centered on a hilltop and including its upper slopes as well as two small drainages to the next tributary west. It is mostly early successional forest except for two maintained fields (EU 2 and 5) on the hilltops. Past land use history appears to have been somewhat diverse across parcels, leading to small-scale variation in present-day forest condition. The northern end is fairly young and generic early successional forest dominated by black cherry, black oak, and sassafras (EU 1 and 3); the invasive exotic vine oriental bittersweet is pervasive here. EU 6 is delineated around an area of more mature forest, including a steep ravine with moderately diverse and mature mesic oak-hickory forest which has regrown over terrain significantly disturbed from mining. The EU extends east to include a patch of moderately mature oak hickory forest. The ravine has minimal presence of invasive species, but the oak hickory forest upslope has some canopy gaps colonized by oriental bittersweet.

This management zone is bisected by a ROW. The ROW crosses the ravine described above at the base of the drainage and there is a wetland present here which has been colonized by the invasive exotic species common reed, (*Phragmites australis*). The wetland is located at the far western end of EU 7 near the borders with EU 1 and 6. This species should be removed.

To the south of the ROW, EU 8 has a mid-successional forest composition tending towards an oak-hickory community. This area has recovered comparably well with moderate diversity of native species (including several species of oak and hickory, along with beech, blackgum, flowering dogwood, sugar maple, spicebush, viburnum, hawthorn, blue-stemmed goldenrod, white snakeroot, and native bedstraw). Invasive species are uncommon or established in sporadic clumps.

Early successional forests and woodlands return for the remainder of this zone between the ROW and Pinkerton Run Road (EU 10, 11, 12). A small population of Japanese knotweed is present at the edge of EU 10 near the parking area at the park boundary.

#### Management Zone 1 Priority Projects

- 1. Remove the invasive Phragmites australis in the small ROW wetland.
- 2. Remove the stand of Japanese knotweed at the parking area along Pinkerton Run Road. Monitor the nearby forest for additional clumps and remove any that are found.
- 3. Monitor and manage invasive plant species in EU 8 and within the drainage of EU 6. These locations currently have minimal invasive cover and border earlier successional forests and the ROW which are more heavily concentrated with exotic plant populations.



Succesional Forest in Management Zone 1





## 2.10.2 MANAGEMENT ZONE 2

Management Zone 2 is centered around Pinkertons Run and contains one of the most intact and diverse forest communities within Settlers Cabin Park. The northern portion of the unit has calcareous bedrock influence and hosts some very diverse plant communities. The James' sedge, a Pennsylvania Watch List species, is present in this area, along with a number of other conservative forest species. Consult the Botanical Conservation Targets section of the Ecological Background for more information on these species as they will benefit from management to control invasive species and to maintain the integrity of the forest community.

Zone 2 is bisected by the same ROW that divides Zone 1, as well as a small pond (EU 20). To the north of the ROW, a sugar maple – mixed hardwood floodplain forest community is found within the valley along Pinkertons Run (EU 23). The canopy is consistently intact and only small patches of invasive barberry and garlic mustard were observed. As the forest progresses north along the stream, the tree diversity decreases and scattered gaps with more invasive cover are located near the juncture of two smaller streams.

The east-facing slopes to the west of Pinkertons Run contain a mesic sugar maple-basswood forest that has limited invasive plant cover (EU 24). In the far northwest of this unit, a large flow of acid mine drainage exits the mining scar in EU 4 and flows downward through EU 24 and into a wetland in EU 25. AMD is likely accumulating in this unit, dominated by skunk cabbage,

before continuing into Pinkertons Run in the northern part of EU 23. The west-facing slopes to the east of Pinkertons Run (EU 26 and 22) are much drier due to their aspect; a diverse and intact dry oak - mixed hardwood forest community is present here. Calcareous bedrock supports a diverse herbaceous layer and the presence of sugar maple along with drier oak species.



Pinkertons Run Floodplain Forest in Management Zone 2

South of the ROW, the sugar maple floodplain forest populates the forested valley along Pinkertons Run (EU 15). A mesic sugar maple-basswood forest community dominated by black maple is to the west on the east-facing slope (EU 14). The herbaceous layer here is not particularly rich, especially compared with the potential of this community type, but it is mostly native; patches of Japanese stiltgrass were observed and grapevine has colonized multiple canopy gaps. Further upslope in EU 13 is a Norway spruce plantation. Plans are in development to install an acid mine drainage treatment system in the floodplain here , as well as streambank modifications geared towards improving habitat value for trout. Funders for these projects include Trout Unlimited (technical support), Pennsylvania Department of Environmental Project, the Foundation for Pennsylvania Watersheds and Allegheny County. Both projects are scheduled for construction in 2020.

The west-facing slopes to the east of the stream valley (EU 19 and 16) are drier with red and white oak and a classic oak heath herbaceous layer that includes lowbush blueberry, rattlesnake weed, and Dircanum and Leucobryum mosses. As the slope begins to flatten off in EU 18, the forest composition becomes more mesic than the dry oak communities further west. Black cherry and multiple species of hickory dominate the upper canopy while several species of sedge were observed on the forest floor. Just to the south in EU 17, the plant community becomes much more mesic along a very steep ravine. Several seeps were observed and some contained a white discharge that may be aluminum from mining disturbances.

#### **Management Zone 2 Priority Projects**

- 1. Routinely monitor and remove invasive plants throughout the majority of this management zone, especially in the more ecologically sensitive floodplain along Pinkertons Run.
- 2. Minimize new trail development and off-trail traffic of people and bikes.
- 3. If it is desired to add tree or shrub cover, use species consistent with the existing forest community and soil properties. The stream valley does not appear to be ideally suited to conifer species, as evidenced by the regrowth of hardwood canopy. Conifer species may have a mixed impact on trout habitat. While they provide shade, they also acidify soils and they do not provide the same leaf litter benefits as food and habitat sources to the insects that trout feed on.
- 4. Use clean equipment to prevent further introduction of invasive species.



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## 2.10.3 MANAGEMENT ZONE 3

Management Zone 3 contains the majority of the eastern portion of Settlers Cabin Park. The main features of this zone are the more mature and intact forest communities along an unnamed tributary to Pinkertons Run at Greer Road (EU 67 and western EU 71) and an unnamed tributary to Robinson Run that begins in the northeastern part of the park and flows south along Baldwin Road (EU 57-64).

The Greer Road tributary to Pinkertons Run flows within a steep ravine and is surrounded by a red oak-mixed hardwood forest dominated by red oak, white oak, and sugar maple and that has a very depauperate (lacking in species diversity) understory. The southern section of the ravine transitions into a drier Allegheny Plateau oak forest, especially on the south facing slopes. The stream then flows into Pinkerton Run just outside of the park boundary near the intersection of Pinkerton Run Road and Baldwin Road.

Bordering the Greer Road tributary to the west, north, and east are several

swaths of early successional forests and woodlands that have been disturbed by past mining activity (EU 65-69). These disturbed forests are found in the higher, flatter terrain that was more conducive to resource extraction than the steep ravines. The ROW bisects this zone and borders the early successional forested area before intersecting the Baldwin Road tributary on the eastern park boundary.



Wetland-Sloped Sphagnum Moss & Woolgrass Seep Management Zone 3

The unnamed tributary to Robinson Run begins just south of the park wave pool in Management Unit 4 and then quickly enters the northernmost section of this management unit (EU 57-58). The forested units north of the ROW are in close proximity to previously mined areas and are therefore only midsuccessional in composition. Swaths of red oak-mixed hardwood forest surround the majority of the northern half of this tributary (EU 57, 59, 61, 62) with drier communities found on the west-facing slopes. Canopy gaps with invasive plants are scattered throughout and are partially caused by ash mortality. One exception is the successional semi-open woodland of EU 60 located where two small tertiary ravines enter the tributary from the east and west forming slightly wider bottomland.

An especially unique feature of this zone is a series of steep ravines, containing several small wetlands, that enter the tributary from the west, just north of the ROW (EU 73-75). Units 73 and 75 contain densely sloped seeps dominated by sphagnum moss and woolgrass, along with asters, viburnums, rushes, and goldenrod. These features are likely the result of AMD-related seepage, but only scattered iron pollution was visible during the assessment. The upper slopes are more acidic and have a few rhododendrons present while the lower slopes have a higher pH and are more mesic in character. Significant quantities of cattail were found in additional wetlands in EU 74. Plans are in development to improve the trail design to minimize erosion and vegetation damage at this scenic feature, which includes a waterfall popular with park visitors.

South of the ROW, the stream flows through a mature sugar maple-basswood forest that has minimal exotic plants present. The canopy is dominated by many species of mesic hardwoods and contains some more conservative herbaceous species like goldenseal and Solomon's seal. Japanese stiltgrass was located closer to Baldwin Road and there was evidence of illegal ATV use.

#### **Management Zone 3 Priority Projects**

In the highest quality portions of this management unit, management should be geared to preserve ecological integrity.

- 1. Control the spread of invasive species.
- 2. Limit trail development & use sustainable trail BMPs.
- 3. Control off-trail foot & bike traffic.
- 4. Interpretative signage may be useful in some places to dissuade people from climbing out on rocks or steep wet slopes and damaging vegetation.



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## 2.10.4 MANAGEMENT ZONE 4

Management Zone 4 is located in the central and northern section of the park. It is fully comprised of highly disturbed forests on former mined land and it houses the most developed regions of the park.

Early successional forests that contain significant populations of many common invasive plant species are the dominate composition type found in this zone. Examples of this forest type are EU 30, 32, 43, 51, 54, and 55. Unit 51 contains large swaths of ash mortality covered in oriental bittersweet. Norway maple was observed locally in the central portion of EU 51 and tree-of-heaven locally in EU 53 near the border with EU 47 and 54. Unit 47 was previously mined and has since been reclaimed with conifers.

The highly disturbed units within this management zone border some much more mature and intact areas in other management zones. The Pinkertons Run floodplain is directly to the west and the tributary to Robinson Run is directly to the east. Furthermore, the unique wetlands at the popular waterfall are to the southeast and are surrounded on three sides by successional mined land.



Dead & Hazerdous Ash Trees near the Playground on Teepee Drive - Management Zone 4

#### **Management Zone 4 Priority Projects**

- Invasive species are very extensive in some of the early successional areas of this unit. It is not feasible to treat all the infested areas. Borders with mature and intact natural communities, newly establishing invasives (species that are not present in other parts of the park), and large seed producing populations should be prioritized.
- 2. Conduct meadow and forest restoration projects in early successional units that are not significantly invaded by exotic plant species.
- 3. Plant landscape trees in parkscape lawn settings near roads, pavilions, and other park infrastructure.
- 4. Install green infrastructure projects to mitigate stormwater runoff in developed sections of the park.



Allegheny County Parks and Western Pennsylvania Conservancy staff prep for a restoration tree planting at Boyce Park in the fall of 2018

## **SECTION III - OBJECTIVES, ISSUES AND OPPORTUNITIES:**

3.1 Maintain and Improve Ecological Function and quality of "Best" & "Good" Ecological Integrity Areas in the Park
3.2 Ecological Management of Utility Rights-of-Way
3.3 Enhance User Experience in Underdeveloped Areas of the Park such as Forests and Meadows
3.4 Enhancing the Ecological Value and Visual Appeal of currently Mowed Areas.
3.5 Reducing Erosion, Flooding and other downstream Environmental Impacts resulting from Stormwater Runoff

within Settlers Cabin Park **71** 

### 3.1 OBJECTIVE: MAINTAIN AND IMPROVE ECOLOGICAL FUNCTION AND QUALITY OF "BEST" AND "GOOD" ECOLOGIAL INTEGRITY AREAS IN THE PARK.

While ecological stewardship of all park lands is an ideal goal, the focal point for conservation planning should be the areas with the highest ecological integrity. These remnants of mature natural areas are a fraction of the total area in natural cover and contain the most irreplaceable ecological resources. Management and restoration efforts should focus first on maintaining ecological health within these areas, and then on expanding outward into surrounding areas that have lower existing biodiversity, and greater ecological challenges. Projects beyond the high integrity areas should be sited and designed with the goal of enhancing the size and connectivity of high integrity areas

The existing high-quality ecological areas in Settlers Cabin Park are mapped and described in section 2.7, "Ecological Integrity Mapping." Most of these areas are forests, although some wetland areas are included too. Many of them were never tilled or fully cleared, although they may have been logged. These areas are reservoirs of biodiversity, and they are difficult to restore if lost. They are worth protecting and even improving for the ecological and natural value they provide to the rest of the park as well as surrounding communities. Like many of the large parks in Allegheny County, Settlers Cabin Park is surrounded by a highly fragmented and developed suburban landscape with a history of significant resource extraction. Efforts to maintain the remaining areas with good ecological integrity will continue to provide a myriad of benefits to the natural landscape and to humans alike.



Solomon's Seal (*Polygonatum biflorum*), one of many plants found in Settlers Cabin Park High Integrity Areas.

#### **Issues:**

- Invasive plants
  - The most severe and widespread ecological issue facing the native 0 plant communities of Settlers Cabin Park is infestation by invasive weeds. In general, the "best" ecological integrity areas have minimal infestation, the "good" areas have pioneer populations, and all other areas have moderate to severe infestations of invasive plant species. This reflects the recent land use history of these areas. The "best" and "good" integrity areas have long-standing natural communities that recovered from 19th century impacts before the introduction of many non-native species, and current conditions with shaded canopy cover and mature native communities provide some deterrence to establishment of many non-natives. Areas that have been more recently and intensively disturbed now host young forest communities that regenerated in the last few decades, when non-native invasive seed source had become pervasive, and invasive species such as oriental bittersweet and bush honeysuckles established alongside pioneer natives in open, hospitable conditions.
- Canopy Gaps in Mature Forests
  - When forest canopy gaps form in mature forests with good ecological integrity, they can serve as entry points for invasive species that can then spread into the surrounding intact areas. Furthermore, aggressive vines can cause canopy gaps to expand by pulling down adjacent trees. Settlers Cabin Park does not have a large problem with forest canopy gaps in its mature forests, but there are a few areas that could benefit from restoration



Dense honeysuckle and autumn olive, two highly invasive species in EU 5 of Management Zone 1

- Deer Over-Browse
  - Settlers Cabin Park is less severely impacted by deer overbrowsing than some other county parks. At this time, we recommend that existing deer control programs should continue, and native vegetation should be periodically assessed to determine whether browsing has increased to a level that requires more vigorous protection. The list of Conservative Plant Species in Settlers Cabin Park in Section 2.8 is a good reference for species to consider, as these species are difficult to restore if they are lost.



An example of a deer enclosure to prevent deer overbrowse

- Balancing recreational use with conservation
  - o More intense recreational uses like mountain biking and horseback riding can severely damage sensitive botanical areas, especially when trails through such areas are not adequately designed and regulated. More intensive use also brings greater problems with the transportation of invasive species. Trails at Settlers Cabin Park currently see relatively light use compared to many other county parks, but upcoming new residential developments may bring more users to the park.
- Forest pests and pathogens
  - o The ecological assessment noted several forest pest and pathogen issues in Settlers Cabin Park . The most visually and ecologically significant impact is the park-wide loss of ash trees as a component of the forest and recreational areas resulting from emerald ash borer infestation. In some cases, the loss of these trees has created canopy gaps that facilitate the establishment of invasive species

within areas with otherwise good ecological integrity. While no serious pest or pathogen issues are currently causing tree mortality in the mature forests, it is important to be prepared for rapid response to any new forest pest or pathogen.

- Right-of-Way Maintenance
  - o Power line rights-of-way, highlighted in the following map, cut swaths through mature forests in Settlers Cabin Park and invite invasive species as well as an in-road for ATV activity from outside the park.
- Public appreciation and support
  - o Settlers Cabin Park has a less active and organized community of park users than some other county parks. While there are fewer competing uses to coordinate during conservation planning, there is also a lower potential volunteer base.

#### **Opportunities:**

#### **Invasvie Species Management Guidlines**

- The top priority is to maintain the quality of existing areas with high ecological integrity through early detection and removal of invasive species before they become problematic. Restoration is much more difficult, time-consuming, and expensive if invasive species become pervasive in an area.
- Develop capacity among park Rangers, maintenance staff, or other personnel who traverse park trails regularly to recognize invasive species, and take simple efforts to remove pioneer infestations. Focus efforts on high-quality areas, and on pioneer populations of invasive species that are new to the park or region. Trail edges and forest edges are particularly likely to experience seed introductions and may need special focus within high-quality areas.
- Volunteer groups interested in conservation may also be a source of capacity for invasive species management, with appropriate training.
- In areas of lower ecological integrity where invasive species have already become well established, management efforts should be prioritized when invasive species interfere with local uses (such as tangles of oriental bittersweet closing trail access), and when proximity to areas of high ecological integrity threatens those areas.
- Do not allow mountain biking, horseback riding, or ATV use in the most sensitive ecological areas, as these activities increase the rate of

introduction of invasive plant seeds.

- Use best management practices for cleaning equipment used in the park to prevent introduction of invasive plant seeds or materials through tire treads, front end loaders, etc.
- Be cautious in sourcing any fill, leaf compost, or topsoil used in the park, to prevent introduction of invasive propagules.
- Installing interpretive signage about the natural history of the mature forest areas such as requests not to pick flowers or other native vegetation and to refrain from damaging recreational activities may help with public cooperation in conservation-oriented management.
- Because invasive plants will continue to be a reality, this will be an ongoing management concern that will require regular attention indefinitely.

## Canopy Gap Forest Resoration in "Good" and "Best" Ecological Integrity Areas

• Forest restoration efforts in small-scale canopy gaps within mature forests of otherwise good quality can help to steer regeneration back towards native species, rather than allowing the gap to destabilize and degrade the surrounding natural community. See recommendations in section 4.1.1 for more information.



#### Trail Management Recommendations

An example of a canopy gap at Settlers Cabin Park

- In general, less trail development is better in areas of high ecological integrity. Close problematic and/or redundant trails in these areas.
- If possible, limiting trail use to foot traffic is a best practice for high integrity areas. Mountain bikes, horses, and ATVs all spread propagules of invasive plants at a greater rate than foot traffic alone.
- Prioritize implementation of best management practices on existing trails through areas of high ecological integrity.
- Monitor and treat forest pests and pathogens when possible, particularly those that could create wide-scale impacts if not treated early (oak wilt, Asian long-horned beetle, etc.), and those that impact any rare or sensitive tree species.

#### **Public Outreach Recommendations**

- Install interpretive signage about the natural history of the high ecological integrity areas such as requests not to pick flowers or other native vegetation and to refrain from damaging recreational activities may help with public cooperation in conservation-oriented management.
- Increase outreach and education programming to the local community and to educational institutions about the history, ecology, and biodiversity of Settlers Cabin Park.



An example of interprative signage at the Indian Hill meadow in Boyce Park

## 3.2 OBJECTIVE: ECOLOGICAL MANAGEMENT OF UTILITY RIGHTS-OF-WAY

Utility rights-of-way (ROW) exist in most Allegheny County Parks. Optimal ecological management aims to keep these corridors as compatible as possible with the native ecological character of the surrounding landscapes, and to minimize the potential for these corridors to cause ecological problems such as the introduction of invasive plant species and forest pathogens, soil erosion, and loss of native habitat.

#### **Issues & Challenges**

- Utility rights-of-way typically require the clearance of woody vegetation, creating a linear fragmenting feature within forested landscapes.
- Rights-of-way can be corridors for invasive species, both because they are high-light, disturbed habitats that many of these species thrive in, and because maintenance equipment can introduce invasive plant propagules. Sometimes non-native seed mixes are used that even include

aggressive or invasive species.

- Rights-of-way can be planted with nonnative species that provide little habitat value for native wildlife.
- Equipment used to prune trees in rightsof-way is often moved between many jobs



Utility Right-of-Way in Management Zone 1, West of the Pond

over a large geographic area without sterilization between sites, and can introduce forest pathogens.

• Soil exposure and erosion can occur on steep slopes if vegetation is not properly managed.

#### **Opportunities: Utility Right-Of-Way Best Management Practices**

- Engage proactively with utility companies, regulators, and others planning for new and existing utility corridors, to minimize ecological impacts on park lands.
- If new ROW corridors are considered, prioritize avoidance of "best" and "good" ecological integrity areas.
- For existing ROW corridors, best management practices should be employed in the following areas:
  - o Clean Equipment between sites to avoid transport of invasive species seed/materials.
  - o Prevent soil exposure and erosion with management to minimize vegetation removal, and ensure and maintain vegetation establishment, especially on steep slopes.
  - o Prune trees during dormant season (November through mid-April) rather than growing season to reduce transport of fungal diseases such as oak wilt (PSU extension).
  - In cases where vegetation will be planted, species should be native to Allegheny County or adjacent counties. The Pennsylvania Bureau of Forestry (BOF) has found that while native warmseason grasses are excellent at erosion prevention due to their dense root systems, it is difficult to get utility companies to use practices that can ensure their establishment on steep slopes. The BOF has developed an alternative species mix including native and non-aggressive non-native species for these sites.
  - o Monitor ROWs for the establishment of pioneer populations of invasive species; detect and treat early to prevent general infestation of the park.
  - o If herbicides are used, ensure that they are not environmentally persistent or detrimental to surrounding native vegetation.
  - o More information can be found in the following resource documents:
    - PA Bureau of Forestry Native Seed Mix for Rights-of-Way
    - PA Bureau of Forestry Seed Mix for Rights-of-Way >15% Slope
    - PA Bureau of Forestry Planting and Seeding Guidelines: http:// www.docs.dcnr.pa.gov/cs/groups/public/documents/

## 3.3 OBJECTIVE: ENCHANCE USER EXPERIENCE IN UNDERDEVLOPED AREAS OF THE PARK SUCH AS FORESTS AND MEADOWS

The trail network at Settlers Cabin Park experiences less heavy use than some other parks in the county, and does not have problems with excessive trail proliferation or overdevelopment. However, as new housing developments are completed in the near future, park use may expand. Now is an ideal time to assess the trail system capacity for heavier use, and address any potential conflicts with natural features or ill-sited trails. There is currently little in the way of interpretive materials for the natural landscape, and many opportunities exist for such outreach to enhance the user experience and communicate conservation values to the community.

#### **Issues:**

- Lack of a central "trail head" where visitors can arrive and get information on trail use.
- Some trails through heavily invaded, early successional areas have become impassible due to overgrowth of shrubs, vines, and thorny species.
- The mined strip of the park creates a terrain feature that is difficult to route trails throughout the park.

#### **Opportunities:**

- Conduct a comprehensive evaluation and assessment of the trail system to identify needed improvements for the entire trail system and for individual trails, especially in light of potential future increase in trail use.
- Establish one or more "trail head" areas that provide convenient access to the entire trail system and where visitors can obtain trail information, rules, maps, etc.
- Retire and close problematic trails.
- Install interpretive signage to help raise awareness about the park's natural features and efforts to maintain/improve them, such as forest communities, spring wildflower diversity and ecology, invasive species, and any new meadows or forest restoration projects that are established.
- Collaboration between park staff and active community volunteers and user groups to improve and maintain the trails in a comprehensive manner.
# 3.4 OBJECTIVE: ENHANCING THE ECOLOGICAL VALUE AND VISUAL APPEAL OF CURRENTLY MOWED AREAS

Reducing or eliminating mowing and establishing meadows or reforestation is a relatively simple and highly effective way to enhance the park landscape's ability to provide ecosystem services, and can have high visual appeal if done properly. Meadows provide year-long food resources and shelter for small mammals, and birds. Wildflowers also attract hummingbirds, butterflies, and other beneficial insects.

Meadows can serve a highly important ecosystem service by providing sources of food and breeding habitat for native pollinating insects, especially in a suburban setting where mowed lawns and ornamental landscaping can lack

this function. Scientists across the globe are raising alarms about collapsing populations of native pollinator insects. While this is a global issue that will require global solutions, much can be done on the local level by restoring manicured, highly simplified suburban landscapes into more diverse native plant communities. Perennial meadows



Finished Meadow at Indian Hill in Boyce Park (Completed 2017)

are a useful and beautiful alternative to the mowed lawn. A landscape of perennial grasses and wildflowers provides a myriad of ecological benefits with very little maintenance required once established. After the plants are established, watering is virtually unnecessary, and mowing requirements are reduced to once per year at most.

Besides benefits to wildlife, the root system within a meadow slows down and infiltrates stormwater much more effectively than mowed lawn, allowing it to seep into the ground rather than gush into storm drains as a pulse of runoff. And since they require no fertilizers or insecticides, meadows cut down on the amount of excess nutrients that pollute the ecosystem.

Perennial meadows can also be more visually rewarding. In stark contrast to a static lawn, meadows constantly change throughout the seasons. Blades of tall warm-season grasses catch the sunlight as they rhythmically dance in the breeze, while colorful wildflowers produce eye-pleasing colors and textures. This landscape amenity can reduce stress and offer community environmental learning.

In addition to the ecological, visual and education benefits to establishing meadows, significant cost savings and environmental benefits can be realized through reducing or eliminating mowing. Reducing mowing will lead to savings on mower maintenance and replacement costs, fuel costs, staff costs spent on mowing, fertilizer and chemical costs and more. Reducing mowing could also significantly reduce emissions and the overall carbon footprint of park management activities.

#### **Issues & Challenges:**

- Public perception of meadow areas
  - In the past, many citizens, park users, and even park staff may have negative perceptions of discontinuing regular mowing of areas that are traditionally mowed lawn. While some efforts have been well received, there have been several small controversies over some of the "field restoration" efforts across the county park system where mowing was discontinued in particular.
  - The public perception of the Indian Hill Meadow (planted in 2017 in response to a recommendation made in the *Boyce Ecological Assessment and Action Plan*) was a resounding success.
    Thousands of people enthusiastically enjoyed it by visiting in person or through social media. ACPF and Allegheny County Parks are planning to plant meadows in all nine parks buoyed by this reaction.
- Mowing Ingrained in Park Workflow
  - Settlers Cabin Park contains acres of lawn that receive regular mowing during the growing season. Because of the volume of work involved in regular mowing of these areas, mowing is an ingrained and primary component of the seasonal flow of work within the park. Establishing meadows over time will gradually reduce the amount of staff time needed for mowing that could then be re-allocated to other maintenance activities.

### **Opportunities:**

- Reducing frequency of mowing and re-seeding mowed areas with native meadow mix, especially emphasizing pollinator-friendly species and visual appeal.
- Expanding and amplifying educational and interpretive efforts by park rangers and naturalists regarding meadow habitat, especially as it relates

to pollinators and other wildlife.

- Measure cost and carbon emissions savings realized from reduced mowing, share results widely.
- Maintain seasonal mowing and train park staff on herbicide treatment and other control strategies to prevent invasive plant infestations.

### 3.5 OBJECTIVE: REDUCING EROSION, FLOODING AND OTHER DOWNSTREAM ENVIRONMENTAL IMPACTS RESULTING FROM STORMWATER RUNOFF WITHIN SETTLERS CABIN PARK.

#### Issues:

- High-velocity runoff during rain events from impervious surfaces such as parking lots, sidewalks, roads, rooftops, ball fields, mowed areas (to a degree).
- Un-maintained or inadequately designed stormwater infrastructure (Roads, ditches, culverts, storm drains, trails, etc.)

#### **Opportunities:**

- Convert paved areas to more permeable surfaces, appropriately-sized parking lots, add stormwater.
- Capture components to all buildings to capture rooftop runoff (green roofs, rain gardens, soakage trenches, etc.).
- Conduct a broad-scale tree planting program across the park to increase canopy cover and enhance stormwater mitigation potential.
- Upgrade drainage infrastructure to reduce culvert erosion issues. Incorporate green infrastructure components to slow, store, and filter stormwater.



Bioswale and its signage along Hawthorne Road in Millvale, PA.



WPC Staff, Allegheny County Parks Staff and Volunteers help plant landscape trees in Boyce Park in the Fall of 2016.

## **SECTION IV - RECOMMENDATIONS:**

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## **4.1 RESTORE FORESTS**

WPC recommends several sites for reforestation, as indicated in the map on the following page.

### Methodology

Several opportunities for forest restoration projects in Settlers Cabin Park were identified during this assessment. One location is a formerly developed, now recovering floodplain along Pinkertons Run, while other locations are canopy gaps within existing high quality forests.

### **4.1.1 CANOPY GAP RESTORATION**

The goal of the canopy gap restoration tree plantings is to reforest relatively small areas where gaps have formed in native forest communities, to create a trajectory for re-establishment of native forest and improved forest integrity. If left unmanaged, canopy gaps can become establishment sites for invasive exotic species that then expand outwards into adjacent forests, often causing further canopy loss and ecosystem destabilization.

The strategy is to first eradicate any existing invasive plant populations, then plant a suite of native trees, shrubs, and herbs that match the existing natural forest community, and will over time out-compete invasive plant species, to restore a contiguous forest community. See page 28 for a map and descriptions of the ecological integrity found in Settlers Cabin Park.

Ongoing management will be needed at such sites to water new plantings, protect them from deer and small mammal herbivory, and to spot-treat any invasive plants that appear. Plantings may be designed in multiple phases. At first, establishing density and shade are most important; species that grow fast in gaps but do not persist long-term in shade may be used in this phase, possibly interspersed with slower-growing species. A second planting may be designed for a few years later once shade has been established, to introduce native forest species that are shade-tolerant, slower growing, and typical of the target forest community but unlikely to re-establish on their own.

The New York City Park System's "Guidelines for Urban Forest Restoration" includes more detail about many aspects of restoration plantings, including how to control invasive plants, sizing and density of tree plantings, and examples of planting plans.



### Project Timeline Estimates

Project Phase	Cost Item	Timeframe
Site Preperation	Invasive Species Treatment	Year 1-2
First-Stage Planting	Faster-Growing Trees & Shrubs	Year 2-3 (If site requires invasvie removal prior to planting)
	Herbivory Protection (Fencing & Tubes)	Planting Years
Maintenance Costs	Watering	Years 1-? Following Plantings
	Invasive Monitoring	Years 2+
	Replanting any Failures	Year following any plantings
Second-Stage Planting	Shade Tolerant Trees, Herbs & Shrubs	Years 7-10 depending on first stage growth
	(Potential Cost offset if local site Materials are propgated in- house in time interval between stage 1-2)	
	Herbivorv Protection	Planting Years

\*Project Costs will ultimately depend on contracted services provided through competitive bids and components that can be completed in-house or via inkind services.

### 4.1.2 PINKERTONS RUN STREAM AND FOREST RESTORATION

The goal of the Pinkerton Run restoration project is two-fold: 1) to establish canopy cover that shades the stream, lowering water temperatures to improve fish habitat, and 2) to steer a large early successional area within a matrix of fairly good integrity forest towards native forest community regeneration.

Efforts are already underway to remediate abandoned mine discharge and improve water quality in the southern portion of Pinkertons Run within the park, and interest has been expressed in further improving fish habitat through lowering water temperatures by establishing greater shade over the stream. This can be done most effectively by restoring forest cover on a large, open floodplain area in the central portion of the park just south of the pond.



There is a large beaver pond adjacent to this area which should be taken into consideration with respect to the long-term viability of newly planted trees. This is the largest stretch of Pinkertons Run with little to no shading on it, while upstream and downstream, native forest is already established. This restoration work would have the further benefit of protecting the integrity of the good quality forest to the north and south of the floodplain opening; without intervention, this area will likely become host to many invasive species that could spread outwards into healthier forests. Small stands of Japanese knotweed have already established.

Many of the same principles as described above for canopy gap restoration apply to this site as well, although it will be more challenging because it is a larger opening. Site preparation will include removal of existing patches of Japanese knotweed and scattered invasive shrubs, as well as removal of old foundation blocks and other debris.

Due to variation of habitat characteristics across the floodplain, there is a greater range of appropriate natural community types that can be included as restoration targets in this larger site than for a small canopy gap that should essentially mimic the surrounding forest. There is a gradation between low-lying, very hydric areas near the stream that could host wetland trees and shrubs, and more upland areas where mesic hardwood forest species will be appropriate. The soil pH is fairly high, so the mature floodplain forest community that occurs upstream on Pinkertons Run can be used as a reference for a long-term restoration goal.

However, because the site is rather large and open right now, the planting plan can include both a short-term stage with earlier successional species designed to establish competitive cover and shade quickly, and a longer-term plan for a mature forest. The short term plan can include a greater reliance on native tall shrub species such as willows (Salix spp.) and dogwoods (Cornus spp.) that have already naturally established in scattered locations, while in the long term mature forest plan, the cover of these species will likely reduce under full canopy shade. Current vegetation on the floodplain ranges from small patches of low wetland grasses, sedges and herbs; large open areas of goldenrods and other early successional herb species; patchy shrub cover of both native and non-native species; and scattered larger trees. The native species that have already established can be used as a guide for the species mix in the first planting stage. Tall shrubs and even some trees could potentially be propagated from cuttings of existing materials on site, reducing materials expenses.

South of this open floodplain area, the portion of Pinkertons Run where the water quality remediation work is being conducted is fairly well forested with a native forest community already. A few small gaps exist where canopy

restoration work similar to that described in the first part of the "Restore Forests" section could be done. Invasive species have established in some of these, which would be particularly beneficial targets for restoration. The forest along this part of the stream does contain some patches of native wildflowers that should not be disturbed, so restoration efforts must be sited and conducted carefully to blend with and enhance the existing species composition. A different species list is recommended in this portion of the stream, both to blend with existing forest communities, and because the site characteristics are less hydric and lower pH.

Project Phase	Cost Item	Timeframe
Site Preperation	Invasive Species Treatment	Year 1-2
	Removal of Old Foundation Rubble / Debris	Year 1-2
First-Stage Planting	Trees & Shrubs	Year 2 or 3,
	(Potential Cost Offset by propegating onsite Plant Material)	
	Herbivory Protection (Fencing & Tubes)	Planting years
Maintenance Costs	Watering	Years 1-?
	Invasive Monitoring	Years 2+
	Replanting any Failures	Year following any plantings
Second-Stage Planting	Shade Tolerant Trees, Shrubs, Herbs	Years 10-15
	(Potential Cost Offset by propegating onsite Plant Material)	
	Herbivory Protection	

Project Timeline Estimate (Pinkertons Run Large Floodplain)

\*Project Costs will be ultimately depend on contracted services provided through competitive bids and components that can be completed in-house or via in-kind services.

### Pinkertons Run Open Floodplain Suggested Species List

Common	Scientific	Growth Form	Wetland Tolerance	Growth Rate	Shade Tolerance
Pennsylvania blackberry	Rubus pensilvanicus*	shrub	FAC	fast	moderate
Hackberry	Celtis occidentalis*	tree	flood- tolerant	fast	moderate
Black maple	Acer nigrum*	tree	mesic upland	medium	high
Black cherry	Prunus serotina*	tree	mesic upland	medium	low
Black walnut	Juglans nigra*	tree	flood- tolerant	fast	low
American elm	Ulmus americana*	tree	flood- tolerant	fast	moderate
Black willow	Salix nigra*	tree	very flood- tolerant	fast	low
Black raspberry	Rubus occidentalis*	shrub	some flood tolerance	fast	moderate
Diamond willow	Salix eriocephala*	shrub	very flood- tolerant	medium	low
Ninebark	Physocarpus opulifolius*	shrub	flood- tolerant	medium	low
Tuliptree	Liriodendron tulipifera*	tree	mesic upland	fast	moderate
Staghorn sumac	Rhus typhina*	small tree	mesic upland	fast	low
American sycamore	Plantanus occidentalis	tree	flood- tolerant	fast	low
American hornbeam	Carpinus caroliniana	small tree	some flood tolerance	slow	high
American hop- hornbeam	Ostrya virginiana	small tree	some flood tolerance	slow	high
Shadbush	Amelanchier arborea	small tree	mesic upland	slow	high
Sandbar willow	Salix exigua*	shrub	very flood- tolerant	fast	low
Silky dogwood	Cornus amomum	shrub	very flood- tolerant	fast	moderate

Common	Scientific	Growth Form	Wetland Tolerance	Growth Rate	Shade Tolerance
Sugar maple	Acer saccharum	tree	mesic upland	moderate	high
Basswood	Tilia americana	tree	mesic upland	moderate	high

\* Species already present on site.

### Pinkertons Rub Southern Forest Section Suggested Species List

Common	Scientific	Growth	Wetland Tolerance	Growth Rate	Shade Tolerance
Red maple	Acer rubrum*	tree	flood- tolerant	moderate	high
Red oak	Quercus rubra*	tree	mesic upland	moderate	low
White oak	Quercus alba*	tree	mesic upland	moderate	low
Tuliptree	Liriodendron tulipifera*	tree	mesic upland	fast	moderate
Shagbark hickory	Carya ovata*	tree	mesic upland	moderate	moderate
Bitternut hickory	Carya cordiformis	tree	mesic upland	moderate	moderate
Shadbush	Amelanchier arborea*	small tree	mesic upland	slow	high
Spicebush	Lindera benzoin*	shrub	mesic upland	slow	high
Witch hazel	Hamemalis virginiana	shrub	mesic upland	moderate	high
Black raspberry	Rubus occidentalis	shrub	mesic upland	fast	moderate
American hornbeam	Carpinus caroliniana	small tree	mesic upland	slow	high
Paw paw	Asimina triloba	small tree	mesic upland	fast	high

\* Species already present on site.

## **4.2 LANDSCAPE TREE PLANTINGS**

WPC uses the term "landscape trees" as trees that are planted within managed areas of parks and open spaces and are associated with facilities and buildings as part of the landscape. By WPC's community forestry standards, these trees are a minimum of two inch caliper (diameter of the trunk at four feet) and typically stand 8 to 10 feet tall at the time of planting. The trees are balled and burlap (B&B) which means they are excavated at the nursery in such a way that they have a root ball that is secured with natural burlap and a wire cage. These trees are typically used by WPC as park, trail, and street trees through their community forestry programs because they can better withstand contact with people that could damage smaller trees. Landscape trees have significant and measurable environmental, economic, and aesthetic benefits for the built environment including energy savings, stormwater control, wildlife habitat improvement, and increases in property values. The WPC community forester has recommended that up to 77 new landscape trees be planted in Settlers Cabin Park.

### Cost Estimates

Project Administration	\$100
Forestry Consultation	\$50/hr
Volunteer Tree Planting Event Coordination	\$50/hr
2" Caliper Landscape Trees	\$200 each
Mulch, Stakes, Tie, Protection:	\$25 per tree
<b>Open Site Preparation (Excavation, Backfill):</b>	\$250 per tree

#### Methodology

Project staff begins the tree planting process by conducting planting site assessments. The project forester identifies optimal planting locations using community forestry specifications which include considerations for proximity to buildings, roads, and utilities, species diversity, and other site conditions such as light exposure and soil conditions. Tree plantings occur in the spring and in the fall while the tree is dormant but the ground is not frozen. Once the planting sites are assessed and the species have been selected, the project forester hand selects each specimen from a local nursery. All of WPC trees must come from within a 150-mile radius of the City of Pittsburgh.

Staff can then begin planning for the planting event by recruiting and training volunteers to help with the tree plantings. Experience has shown that this helps ensure the long-term health of the trees since volunteer-planted trees under staff supervision are planted in a superior fashion to contracted plantings



using landscaping firms. Volunteer engagement also helps ensure that the community is invested in the project and better understands the value of the trees and how they should be maintained.

With all volunteer tree plantings in Allegheny County Parks, site preparation completed for each tree is normally conducted by park staff to achieve substantial cost savings. Because of varying soil and sub-surface conditions in urban and even park environments, it is essential to have the planting sites prepared in advance of the volunteer planting event. Relying on volunteers to hand dig the tree planting sites leaves too much to chance. Planting site preparation in "open sites" (open green spaces in parks usually) includes excavating a hole 36" in diameter and 24" deep and backfilling to surface level with a specific grade of top soil.

Maintenance is essential for the successful establishment of these trees. The Conservancy will provide Allegheny County Parks' staff with a maintenance plan for the trees which will include guidelines on watering, weeding, mulching, and protecting the trees over the first three years. WPC will also provide guidance on training pruning that should occur between years 3 and 5. Tree care can also provide a good opportunity for volunteer engagement.



Tree Planting at Harrison Hills Park, Spring 2015.



### Timeline

WPC recommends planting up to 77 landscape trees in Settlers Cabin Park. If selected to assist with the plantings, WPC would suggest splitting the work between the spring and fall planting seasons. Staff would work with Allegheny County Parks, including Park Rangers, and ACPF staff to plan and execute the plantings and would lead all technical forestry work and plan all logistics for volunteer tree plantings.

One specific site where landscaping trees can provide immediate benefits is at Tee Pee Drive from the intersection with Papoose Drive to the intersection with Greer Rd in the center of Management Zone 4. Suggested planting map is found on the previous page; cost estimates are below based on 47 trees.

Landscape Tree Planting (47)		
Project Administration	\$100	
Forestry Consultation	\$250, (\$50/hr at 5 hours)	
Volunteer Tree Planting Event Coordination	\$250, (\$50/hr at 5 hours)	
2" Caliper trees	\$9,400, (\$200 per tree for 47 trees)	
Mulch, Stakes, Tie, Protection	\$1,175, (\$25 per tree for 47 trees)	
Open site Preparation	\$11,750, (\$250 per tree for 47 trees)	
Total Cost	\$22,925	

A second site where landscaping trees can provide immediate benefits is further south on Tee Pee Drive at the Seneca and Apache shelters in Management Zone 4. Suggested planting map is found on the next page; cost estimates are below based on 30 trees.

Landscape Tree Planting (30)		
Project Administration	\$100	
Forestry Consultation	\$250, (\$50/hr at 5 hours)	
Volunteer Tree Planting Event Coordination	\$250, (\$50/hr at 5 hours)	
2" Caliper trees	\$6,000, (\$200 per tree for 30 trees)	
Mulch, Stakes, Tie, Protection	\$750, (\$25 per tree for 30 trees)	
Open Site Preparation	\$7,500, (\$250 per tree for 30 trees)	
Total Cost	\$14,850	



## 4.3 ESTABLISH MEADOWS

This assessment located two areas of regularly mowed lawn in Settlers Cabin Park which are suitable for establishing meadows of native grasses and wildflowers. These areas will have high ecological value, will be visually appealing and will require minimal maintenance relative to maintaining a mowed lawn.

It is recommended that a demonstration project area be selected and converted from lawn to meadow as soon as possible. If successful, it will provide an ideal outreach and education opportunity that will be important for building support for more wide-scale establishment of meadows on mowed areas.

Once a site is selected, several site preparation steps should be taken to ensure the area can be enjoyed by the public and that vigorous establishment of native meadow plants occurs and is sustained.

Following the protocol that the County is using at the demonstration meadow at Boyce Park, site preparation and seeding will be conducted by Allegheny County Park staff using a Truax no-till native seed drill.



Completed Demonstration Meadow in Boyce Park





The two mowed areas recommended for meadow installation are in the northern part of management zone 4 near the Cayuga and Gilbert Love shelters. The primary location is a 1.68 acre elongated field that parallels Papoose Drive between both shelters. WPC staff assessed this area on a summer day when there was a large volume of park visitors. The roadway was shared by several pedestrians walking between the shelters and a popular playground along with frequent vehicular traffic.



Meadow Opportunity at the 1.68 Acre Mowed Field between Gilbert Love and Cayuga Shelters.

If the 1.68 acre field were to be converted into a meadow, a short trail could be maintained through the meadow and provide a direct off-road pedestrian connection between the recreation facilities. The trail could contain interpretive signage to educate park users on the importance of meadow and identify flora and wildlife species they may observe.



Meadow Opportunity at the 1.16 Acre mowed field behind the Cayuga Shelter

A secondary meadow opportunity exists as a 1.16 acre mowed field directly behind the Cayuga shelter. The field is tucked away from the busy road and playground and is surrounded by forest on three sides. The forest edges are heavily invaded by several invasive plant species and any conversion to a meadow would need to include long term monitoring and local removal of exotic plants. Equipment needed for meadow establishment projects include the following:



Tractor or ATV mounted herbicide sprayer



Disc tiller on trailer



Cultipacker



Grain drill

The steps in establishing a meadow on the selected site could include the following steps:

- 1. Mark off areas where mowed lawn will be retained (i.e. trails, picnic groves, etc.)
- 2. Spray grass area to be re-seeded with a systemic herbicide. Repeat again in early spring if total kill not achieved
- 3. No-till drill meadow with seed mix

If work is not conducted by park staff, the estimated total cost for hiring custom equipment operators to establish meadows is approximately \$1,000 per acre broken down as follows:

Herbicide Treatment:	\$20-35 per acre	
Grain Drill:	\$27-\$35 per acre	
Meadow Seed Mixes:	\$20-\$45 per pound	
Seeding Rate:	10-20 pounds per acre	

## **4.4 GREEN INFRASTRUCTURE**

Green infrastructure is increasingly recognized in our region as an affordable and effective strategy for managing stormwater runoff while improving water quality. Green infrastructure such as bioswales capture stormwater runoff from parking lots and roads and facilitates the infiltration and filtration of runoff through engineered structures that usually include hardscaping and plants.

### Methodology

WPC has identified several potential locations for bioswales in Settlers Cabin Park, with a focus on the Wave Pool parking lot and the Dek Hockey Rink. The Wave Pool parking lot is over four acres of mostly asphalt pavement and presents a significant opportunity for a highly visible and impactful green infrastructure project. A combination of perimeter bioswales, strategically installed pervious paving, and tree plantings would provide measurable stormwater management benefits for the park and watershed (see map on page 94) and would substantially improve the asthetics and function of the lot.



Settlers Cabin Wave Pool Parking Lot



L



Proposed Green Infrastructure Facility behind the Dek Hockey Rink (EU 42).

The Dek Hockey Rink located off of Ridge Road offeres another opportunity. A large portion of the park drains in to this low lying area behind the Dek Hockey Rink (EU 42). Initial investigation by WPC staff shows this particular site suffers from frequent runoff during rain events. The site already has a small bioswale that is designed to hold water but the capacity could be greatly increased with the addition of engineered soil and proper plantings.

In addition, a hybrid ditch could be installed where water currently ponds on the road and erodes the down-grade portion of the hillside. This is especially frequent along Greer Road between Bayer Road and Te Pee Drive (EU 33 and 35). This would greatly help with erosion seen in the forest in these management units and make the road safer for vehicular traffic, in addition to providing capacity for significant stormwater capture (see page 96 photos).



Proposed Hybrid Green Infrastructure Facility along Greer Road between Bayer Road and Te Pee Drive (EU 33 and 35)



The process to install bioswales would begin with engineering analyses of the sites to calculate the drainage areas and stormwater capture goals. Implementation can be credited toward Municipal Separate Storm Sewer (MS4) program requirements. (Refer to the Department of Environmental Protection MS4 manual for more information http://www.dep.pa.gov/Business/Water/ CleanWater/StormwaterMgmt/Stormwater/Pages). Collier, North Fayette, and Robinson Townships could possibly receive credit for green infrastructure installations in the park.

Another necessary measure would include conducting infiltration tests that indicate the infiltration potential of the soils and substrate. Once these technical components are complete, design of the facility can begin. Design features can vary based on site conditions, desired stormwater capture goals, and aesthetics. The design will indicate where the runoff will enter the bioswale and what materials will be used in construction. Materials typically include a combination of rock, soil, and plants and usually feature constructed components such as concrete weirs.

The success and sustainability of any green infrastructure comes in large part from the community engagement component, wherein residents, staff, and officials understand the value of this work and develop the capacity to plan, implement, and maintain these types of projects themselves over the long term.

<b>Project Management</b> Financial Management Bidding & Contracts Coordination among Partners and Contractors Contractor Oversight	\$3,750
<b>Survey, Design &amp; Engineering</b> Landscape Design Hydraulic and Hydrologic Analyses	\$4,500
<b>Construction &amp; Materials</b> Native Plants, Trees Bioswale (1600 sq. ft.), Soil	\$30,880
Total to Control 1" of Stormwater Runoff	\$39,130

#### Cost Estimates

## 4.5 MANAGEMENT/PLANNING

## 4.5.1 PARK STAFF TRAINING

### Invasive Species Management

In the spring of 2019, the Allegheny County Park Rangers are expected to launch the Allegheny County Park Steward Program with a pilot program in North Park. Park Stewards will adopt a plot of land in the Allegheny County Parks, remove invasive species and monitor the plots' progress.

### Tree Planting and Care (Tree Tender Training)

WPC has been working with the non-profit Tree Pittsburgh since 2008 through the TreeVitalize Pittsburgh project. An important component of the success of that project has been the training of volunteers through Tree Pittsburgh's "Tree Tender" program. Tree Pittsburgh has trained over 1,400 Tree Tenders in Allegheny County through an eight hour workshop that covers everything from the benefits of trees to communities to the planting and care of trees over the long term. In the Boyce Ecological Assessment and Action Plan (2016), WPC recommended that the Allegheny County Parks Maintenance staff undergo Tree Tender Training. The County Parks Director agreed that this was a high priority, and the PNC Foundation provided a grant to ACPF to cover the cost of two training



Volunteers and staff plant and protect restoration trees during a planting along a river trail in Pittsburgh's South Side.

sessions. The first was held in April 2016, and a second training session to complete the "Tree Tender" certification will be held in early 2017. Trained Parks staff will help to care for and enhance the longevity of newly planted trees.

### 4.5.2 REDUCE MOWING, PRIORITIZE ECOLOGICAL MANAGEMENT AND MAINTENANCE OF CAPITAL PROJECTS

As discussed in the previous section, making reductions to the acreage and frequency of mowing in Settlers Cabin Park will result in significant ecological, visual, education and cost savings benefits.

As staff time availability increases with reduced mowing obligations, staff capacity should be re-allocated more heavily toward ongoing maintenance and management of the capital projects mentioned above.

- Invasive Weed Management
  - As described in previous sections of this report, managing invasive weed infestations impacting mature forest areas of South Park is a priority management concern, and will continue to be into the future. Investments in tools and staff training are priority recommendations also mentioned in this section.
- Trail System Maintenance
- Green Infrastructure Maintenance
- Meadows and Reforested Areas Maintenance

### 4.5.3 PROCURE TOOLS AND EQUIPMENT

For invasive weed management, trail maintenance, meadow management, tree planting, fence building and maintenance. Procuring an adequate supply of the tools listed below will cost approximately \$20,000 total, although the tools could be acquired as needed over the course of several months/years.

#### Hand Tools:

Hedge shears:	\$20-\$75 each (depending on size)
Hand pruners:	\$15-\$45 each
Loppers:	\$20-\$80 each (depending on size)
Bow saws:	\$15-\$30 each
Long reach pruners:	\$75-\$150 each
Picks mattock:	\$15-\$40 each

### Specialty Tools:

Tree and root puller (Pullerbear):	\$200
Root Talon:	\$70
Root Buster:	\$45
Tree planting dibble bar:	\$35-\$45 each

#### **Power Tools:**

Professional-grade chain saws:	\$350-\$600 each (depending on size and brand)
Professional-grade Pole saws:	\$400-\$700 each (depending on size)
Walk-behind brush cutter:	\$1,500 - \$3,000
Brush hog tractor attachment:	\$2,000 - \$4,000
Tree hole auger:	
Attachment for tractor with 3-point hitch:	\$450-\$1,000
Hand-held:	\$200-\$400

Goat herd:

- Use of goat herds to graze on invasive weeds has emerged locally as a potentially high impact, low cost strategy to be used in combination with other treatment methods, either chemical or mechanical. For example, spraying a systemic herbicide (i.e. tryclopyr or glyphosate) immediately following grazing by goats can create good conditions for herbicide absorb into the plants' vascular system, increasing the chances of a total kill of the unwanted vegetation.
- There is one location non-profit organization that uses goats as a way to manage invasive and unwanted plant species - Alegheny GoatScape - that used to to business as Steel City Grazers. WPC engaged Steel City Grazers on one project to control a small patch of Japanese knotweed and other invasives in the City of Pittsburgh that proved to be highly effective. The fee for that project was based on a \$500 base fee plus \$100 per day for a 10-goat herd with an expectation that it could take two to three weeks per acre to be cleared. Those fees included transportation of the goats, temporary electric fencing to contain the goats to the area being managed, a donkey whose role was to protect the goats from predators such as coyotes and feral dogs and daily care of the animals.
- Interest was also raised by County Park staff and others during the

meetings conducted in conjunction with this project about the possibility of acquiring a permanent goat herd (or herds) to manage invasive weeds across the County Parks system. Because of recent notoriety, demand is quite high for privately owned goat herds. Acquiring a goat herd would help to ensure goats are always available for weed management.

• Goats themselves are relatively inexpensive



Steel City Grazers goat herd eats invasive plants along Bates Street in the Oakland neighborhood of Pittsburgh, Sept. 2015.

to buy (sometimes even free). However, they do require good fencing, food and shelter during winter and inclement weather, transportation to and from weed management projects, protection from predators, and a knowledgeable caretaker.



Steel City Grazers Western Pennsylvania Conservancy, Oakland, Pittsburgh, PA, September 2015 Japanese Knotweed, Porcelainberry, Pilewort, Other

## 4.5.4 DEVELOP A SUSTAINABLE TRAIL MANAGEMENT PLAN

In conjunction with training Parks staff on trail management and maintenance, developing a sustainable trail management plan that provides a comprehensive vision and management framework for all trails in Settlers Cabin Park is a top priority. Such a plan should include broad stakeholder and public input, as well as engagement of trail design, construction and maintenance professionals.

The scope of the plan should include the following:

- Survey and evaluation of current and future trail usage.
- A comprehensive assessment and evaluation of the existing trail system by trail consultants.
- Identifying most appropriate trails for each permitted use.
- Identifying locations for development of new trailheads.
- A plan for interpretive signage and other outreach and educational assets.
- Prioritizing trails/trail sections will be the focus of future maintenance efforts and developing detailed work logs.
- Garner broad stakeholder and public input.
- Training and project oversight for County Parks staff on trail construction and maintenance BMPs.
- Identifying trails to close/eliminate due to redundancy, illegal vehicle use or other problems.
- Plan for accessibility in compliance with the ADA.

A more detailed budget estimate should be developed based on soliciting proposals from outside consultants, but the total cost to develop the plan is likely to cost fanywhere from \$25,000 to \$120,000 depending on the contractor. The planning process would likely take at least two years to complete. For fundraising purposes, developing the Sustainable Trail Management Plan could be packaged with other recommended initiatives to develop an interpretive plan for Settlers Cabin Park and to train County Parks' staff on trail management and maintenance.

Based on discussions held in conjunction with this project, it was also mentioned that the plan could be done in conjunction with a broader County Parks system wide trail planning effort that leverages the skill and expertise of the Allegheny County Park Rangers and Trail Pittsburgh, an organization that conducts extensive volunteer activities to protect and enhance trails for all park user groups.

## **4.6 THE POWER OF GREEN**

Settlers Cabin Park is in a great position to use the power of green to enhance its immediate present and support its future. With the engagement and leadership of the Allegheny County Parks Foundation and the Allegheny County Parks, it has many of the elements that are necessary for successful greening projects. Strategic greening has the potential to be a rallying point for community improvement that can involve citizens from school children to seniors, from business owners to cultural institutions, from novices to skilled members of the community. The power of green is found in the multifaceted benefits and the profoundly satisfying experience of improving the living landscape of the community. Settlers Cabin Park has the elements in place to harness this power for all its constituents, employees and its landscape.

