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3.1 Objective: Maintain and Improve Ecological Function of Natural Areas in the Park, building out from “Best” and “Good Ecological Integrity Areas to Expand their Size and Connectivity.

In approaching ecological management of Hartwood Acres Park’s natural lands, the focal point for conservation planning should be the areas with the highest ecological integrity, as the cornerstones to build outwards from and improve the overall ecological health of the park. The first priority should be to maintain the existing high quality areas, and the second priority is to connect these small patches into larger areas of high integrity through restoration in the landscapes in between.

A high proportion of Hartwood Acres Park is forested, but the quality of these forest ecosystems is very patchy, with many areas experiencing diminished ecological integrity from deer overbrowse, invasive species, and forest canopy gaps. These intertwined problems tend to expand, as invasive species colonize the high-light environment in the canopy gap, deer browse out natives that try to establish, and then dense vine growth pulls down more tree canopy surrounding the gap. They can also prevent native forest regeneration, setting the forests on a course to transform over time from native-dominated to invasive dominated, as the existing native tree canopy dies out. The invasive species Japanese stiltgrass is a particular threat in this respect because it can colonize shaded areas, it prevents regeneration of native tree species, and it is rapidly expanding within the park.

The existing high-quality ecological areas in Hartwood Acres are mapped and described in section 2.6 “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 ecological integrity, with a mature native tree canopy and some presence of native herb and shrub species, and they are difficult to restore if lost. Furthermore, because higher ecological integrity areas have more resilience against stressors, efforts to steward the overall ecological health of the park will be most successful if they build on the areas that are most stable. Protecting and even improving the ecological integrity of the park’s forests provides benefit to park users, as these areas are some of the most aesthetically beautiful forests, and intact forests are much easier to traverse for recreational use than tangles of invasive vine and shrub. Hartwood Acres Park also has ecological value as an intact natural area in a landscape that is highly fragmented with suburban development. Efforts to maintain the remaining areas with good ecological integrity will continue to provide myriad of benefits to the natural landscape and humans alike.

Issues:

- Invasive plants
 - The most severe and widespread ecological issue facing the native plant communities of Hartwood Acres Park is infestation by invasive weeds. In general, the “best” ecological integrity areas have pioneer populations only, the “good” areas have pioneer to moderate populations, and all other areas have moderate to severe infestations of invasive plant species. In Hartwood Acres, there is a strong correlation between aspect, plant community, and invasive presence. The west-facing slopes and high knobs are much more intact than the east-facing slopes and mesic valleys. Furthermore, younger forest areas almost all have a very high presence of invasive species, as they regenerated in the last few decades, when non-native invasive seed source had become pervasive.
- 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. Furthermore, aggressive vines can cause canopy gaps to expand by pulling down adjacent trees. Canopy gaps are a major problem at Hartwood Acres Park, degrading the condition of a fairly substantial acreage of mature forest that would otherwise be high quality.



Invasive Japanese Barberry

- Deer Over-Browse
 - This is a severe problem at Hartwood Acres Park that appears to have gone on for many years and has significantly reduced the overall plant diversity in the park. It may have also compromised native forest regeneration. WPC recommends that existing deer control programs should continue, and any additional herd reduction measures would be beneficial. All restoration plantings should be fenced to prevent deer access.
- Balancing Recreational use with Conservation
 - More intense recreational uses like mountain biking and horseback riding can severely damage sensitive ecological 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. Japanese stiltgrass appears to be spreading along trails and roads. Hartwood Acres is an intensively used park with many trails to maintain and regulate.



Utility ROW running through Hartwood Acres Park

- Forest Pests and Pathogens
 - The ecological assessment noted several forest pest and pathogen issues in Hartwood Acres 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.
- Public Appreciation and Support
 - Hartwood Acres is a popular and well-used park. Public support for conservation management efforts in forested areas will be important for the ongoing success of these efforts.

Opportunities: Invasive Species Management Guidelines

- 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. Japanese stiltgrass is currently spreading rapidly through the park and expanding into high-quality areas, where it often



Forest Pest - Hickory Gall phylloxera

first appears along trail edges. Eradicating these populations while they are small should be a top priority. Even though new introductions will continue to appear and require ongoing management, it may be possible to prevent the understory from becoming a carpet of stiltgrass throughout the park.

- 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.
- Pioneer populations of new invasive species within the park (even if they are present elsewhere in the region) should also be prioritized for treatment. Jetbead (*Rhodotypos scandens*) is one such species that still has a fairly small population within the park.
- 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.
- 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 Restoration 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 for more information.

Continue existing deer management program in the park and partnering with surrounding landowners and communities on deer management, and expand efforts for deer reduction if possible.

- The populations of some conservative plant species (see list on page 34) have been reduced to dangerously low levels within the park. These may need restoration efforts to regain viability. All restoration efforts should use locally sourced plant materials, ideally propagated from existing plants within the park or nearby areas.
- Installing deer fencing around especially sensitive areas may be a good way to stop further loss of plant diversity in combination with existing deer management program.



Protected Meadow Area in Schenley Park, Pittsburgh.

Tree Management in High Quality Ecological Areas

- In general, less trail development is better in areas of high ecological integrity.
- If possible, limiting trail use to foot traffic is a best practice for high integrity areas. Mountain bikes, horses, and ATVs all spread invasive species propagules at a faster rate than foot traffic alone.
- Close problematic and/or redundant trails in mature forest patches.
- Prioritizing 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 Hartwood Acres Park.



Interpretive Signage at the Boyce Park Meadow

3.2 Objective: Ecological Management of Utility Rights-of-Way

Utility rights-of-way 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 and 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. Hartwood Acres Park's ROWs



Utility ROW through Hartwood Acres Park

are currently dominated by native species, but Canada thistle (*Cirsium arvense*), Oriental bittersweet (*Celastrus orbiculatus*), Japanese stiltgrass (*Microstegium vimineum*), and Japanese honeysuckle (*Lonicera japonica*) were noted at specific locations.

- Rights-of-way are often planted with non-native species that provide little habitat value for native wildlife.
- Equipment used to prune trees in rights-of-way is often moved between many jobs 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:
 - Clean equipment between sites to avoid transport of invasive species seed/materials.
 - Prevent soil exposure and erosion with management to minimize vegetation removal, and ensure and maintain vegetation establishment, especially on steep slopes.
 - 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 warm-season 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 which should be considered.

- 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-ofWay >15% Slope
 - PA Bureau of Forestry Planting and Seeding Guidelines: http://www.docs.dcnr.pa.gov/cs/groups/public/documents/document/dcnr_20031083.pdf
 - Guidelines for Administering Oil and Gas Activity on State Forest Lands: http://www.docs.dcnr.pa.gov/cs/groups/public/documents/document/dcnr_20031083.pdf



Utility ROW in Hartwood Acres

3.3 Objective: Enhance User Experience in Undeveloped Areas of the Park such as Forests and Meadows

Hartwood Acres Park currently has a large network of well-used trails. There are some informal trails that have developed as cut-throughs between formal trails. There are some areas where erosion and trail expansion has developed, although problems are not pervasive. The network could benefit from a comprehensive assessment to determine which trails may be redundant or poorly sited for long-term maintenance. 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.
- Existence of some informal trails causing confusion with formal trails.
- Design, redundancy and maintenance issues with formal trails.

Opportunities:

- Conduct a comprehensive evaluation and assessment of the trail system to identify needed improvements for the entire trail system and for individual trails.
- 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, and/or redundant trails.
- Install interpretive signage to help raise awareness about the park’s natural features and efforts to maintain/improve them, such as forest communities, the existing restoration forest planting, invasive species, oak wilt, and any new meadows 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, 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.



The completed Boyce Park Meadow at Indian Hill

Perennial meadows 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 serve as topic for 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 and Challenges:

- Public perception of meadow areas:
 - o The public reception to the Indian Hill Meadow at Boyce Park (planted in 2017) 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.
 - o Conversely, 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.
- Mowing ingrained in park workflow
 - o Hartwood Acres Park contains acres of lawn that receives 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 Hartwood Acres Park.

Issues:

- High-energy 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, right-size 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 culvert erosion issues. Incorporate green infrastructure components to slow, store, and filter stormwater if feasible.



Erosion in Field into Middle Road - MGMT Zone 1



WPC staff and Barrett Elementary students plant new trees in new tree pits meant to capture and retain stormwater in front of the school in Homestead.