Sycamore Island Management Report

prepared by Applied Ecological Services for Allegheny Land Trust

Colcom Foundation

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1. OVERVIEW

In May 2009, Applied Ecological Services, Inc. (AES) was retained by Allegheny Land Trust (ALT) to conduct an ecological assessment and to prepare a management plan for Sycamore Island, a 14.3 acre forested island in the Allegheny River near Pittsburgh, Pennsylvania. Ecological field investigations and public outreach activities began in June 2009 and continued through the end of September 2010. This report includes the results of our work and provides recommendations and plans for managing the ecological and cultural resources of Sycamore Island.

The ecological and cultural significance of Sycamore Island is well known. Previous studies such as the 3 Rivers 2nd Nature Report conducted by Carnegie Mellon University that characterized riverbank vegetation in the Allegheny and Monongahela Rivers, have described the ecological resources and conservation value of Sycamore Island (3Rivers 2nd Nature, 2002). The Island's floodplain hardwood forest is recognized as among the rarest plant communities of its type, both regionally and globally. The Pennsylvania Natural Diversity Index (PNDI) classifies floodplain forest as imperiled in the state, and Sycamore Island has a ranking of "high significance" within the Allegheny River BDA Natural Heritage Area. Today, it is valued as one of the last remaining undeveloped islands within the Lower Allegheny Watershed.

Nonetheless, humans have impacted the island in the past with periodic interludes of recognition and appreciation as a natural refuge. In 1936, both Sycamore Island and Nine Mile Island were leased from the Pennsylvania Railroad by the Audubon Society of Western Pennsylvania, making these islands the first bird sanctuaries in the Pittsburgh region. Plans for the development of a marina on Sycamore Island were initiated during the late 1960's but were later abandoned, leaving behind several significant features including a barge that remains embedded in the sand at the island's southern tip, a partially installed swimming pool, docking platform and a series of offshore pilings in the back channel. During the last century, development and industrialization of the watershed contributed to changes in the island's configuration and topography, due in part to dredge spoiling and increased sedimentation from development. Because of these changes and the island's position in the river, its area has more than doubled from just over 6 acres in 1809 to over 14 acres today. More recent impacts to the Island's ecology include the affects of invasive species and climate change. All of these stressors must be considered and addressed in long-term management efforts.

In January 2008, with funding from the Colcom Foundation, ALT purchased Sycamore Island to protect and manage the island's dynamic riverine ecology and the critical wildlife habitat, educational, and recreational benefits it provides in an otherwise industrialized and urbanized landscape. In undertaking the current assessment and planning effort, ALT identified five principle goals it believes are key to successfully managing the resources of Sycamore Island:

> **Understanding** fully the natural processes, functions and values of the Island from the treetops to river bottom and its impact on the ecology and hydrology of the Allegheny River. As well as on a broader scale, understanding the historic and present day anthropogenic stressors impacting the natural processes, functions, and values and how these factors will influence long-term management and preservation of the island's natural resources.

Managing properly the natural processes, functions and values of the Island based upon the findings of the field assessment and inventory, and literature review of previous studies and articles.

Preserving the natural processes, functions and values of the Island to protect its habitat value, and its rare floodplain hardwood forest plant community within the Allegheny River BDA Natural Heritage Area.

Enhancing and restoring, where possible, the natural processes, functions and values of the Island to increase the habitat potential for aquatic, terrestrial and resident and migrating avian species.

Ensuring that public use and enjoyment will not compromise the health and integrity of the Island's natural processes, functions and values, nor interfere with ALT's commitment to protect these unique ecological attributes.

Sycamore Island approached from up river, June 2009

2. EXECUTIVE SUMMARY

Roughly nine miles upstream from the point in Pittsburgh, nestled in a westerly bend of the Allegheny River, sits a valuable natural resource known as Sycamore Island. From ancient days of fielding the natural forces of a faster, freely flowing, wild river to modern times sitting somewhat buffered off to the side of a continually deepened channel in a controlled, tamed, channelized, urban waterway, the Island has always been largely a reflection of its surrounding mainland. For essentially its entire existence, the Island's interactions were exclusively with various facets of nature: the river's hydrology, the flow of sediment, local plant life and wildlife, and climate. Then, some time around the start of the twentieth century, a new interaction confronted the Island: human interaction. Along with urbanization of the surrounding area came river damming, boating traffic, clear-cutting, dredge material dumping, and various levels of development. From 1967 to 1972, the Island was transformed to a recreational destination. The in 1972, Hurricane Agnes brought all development to a sudden halt. From 1972 to the present, the Island has sat largely untouched by humans and has consequently been experiencing an era of passive restoration.

In 2008, Allegheny Land Trust purchased Sycamore Island with the goal of preserving the Island's natural features, while simultaneously making it safe, accessible, and exciting to the public. In 2009, ALT engaged Applied Ecological Services, Inc. to study the Island, help lead a public process, and compile a comprehensive management report containing detailed scientific findings, compiled feedback from the public process, and a full set of recommendations and strategies.

In its present state, Sycamore Island hosts a significant level of biodiversity. Relatively rare floodplain forest plant communities cover most of the Island. Species richness of fish and pearly mussels inhabiting surrounding waters has been increasing in recent decades. Many species of birds reside on, visit, or migrate past the Island. Spiny soft shell turtles inhabit the Island. Insect activity is robust. Herpetofaunal diversity is low. Mammal diversity is moderate.

Impacts caused by disturbance are also clearly visible on the Island. Japanese knotweed and, to a lesser extent, other invasive plants cover parts of the Island. Invasive zebra mussels and Asian clams are common in the surrounding river. A massive barge pierces the entire lower portion of the Island. A graded roadbed and asphalt remains span an edge of the Island. Creosote-containing utility poles, transformers, and wires remain in varying states of disrepair. An old metal structure used as a pool, a rusting commercial oven, various containers, and piles of debris lie upon the Island. Much, if not most, of the land form is artificial, the result of years of dumping dredge materials.

The Island contains a great deal of human allure. Natural beauty abounds and changes with the seasons. Inspiring outdoor spaces are framed by the arching canopy of silver maples, American sycamores, and eastern cottonwoods. Trodden paths make penetrating the forest interior feasible. An intact picnic table and fire pit invite respite. Resilient, character-filled black willows anchor the southern tip of the Island. River-smoothed stones and cobbles comprise the eastern shore. The derelict barge has been overtaken by beautiful native vegetation. From its supposed bow sprouts, in fitting fashion, an American sycamore.

While the Island serves as a valuable host to a wide array of organisms, investigations have yet to uncover any threatened or endangered species. Although the Island apparently houses no endangered species of organisms, Sycamore Island as a whole should rightly be regarded as an endangered species of landform. The Island can be viewed as endangered in both a natural sense and in a human or sociological sense. In terms of nature, floodplain forests and forested urban islands are extreme rarities. Throughout the world, large rivers have generally become centers of population and civilization. As such, urban rivers are typically channelized and denuded of any riparian vegetation. Development extends right up to the banks. Urban rivers, with their fixed banks and regularly deepened navigational channels are more akin to canals than to interactive systems of ground water, surface water, and sediments housed in flexible beds that migrate over time. The lower Allegheny is a typical urban river. The riparian, floodplain forest of Sycamore Island, especially in such an urbanized setting, is a true rarity. Further, in cultural or sociological terms, Sycamore Island offers humans a unique experience. Not all rivers, urban or otherwise, contain relatively stable islands. Usually, when urban rivers do contain such islands, they are not legally accessible. The combination of attributes that greet the Sycamore Island visitor make for a trove of educational and recreational opportunities. From both natural and human perspectives, the Island is a unique resource.

As a rare, endangered resource, Sycamore Island is laden with both intrinsic natural value and intrinsic cultural value. Accordingly, a top goal of planning the future of the Island is to strike a proper balance between the sometimes conflicting needs of nature and desires of humans. Applying this goal within the context provided by the various findings and analyses contained in this report leads to a mission: making Sycamore Island safe, accessible, and exciting for humans and safe and inviting for a wide diversity of native plants and animals. Among the recommendations made, and elaborated upon with the body of this report, in support of this mission are the following:

Conservation

- Implement a budget-conscious, basic monitoring program that occurs each spring and fall. The program should be led by a capable ecologist. It should be comprised of a spring visit and fall visit, accompanied by a written report of findings and observations. Monitoring should cover the various elements covered in the Sycamore Island Management Report. A public spring meeting and fall meeting could easily be scheduled to coincide with each semi-annual visit to keep interested parties apprised of significant island observations, changes and happenings.
- Designate the northern portion of the island as sensitive/ off-limits. One prominent marker for this area could be the very large, multiple-trunked silver maple that juts out near the northeast edge of the island. This area is most subject to high and/or high-velocity river flow, along with any debris carried by the current. Plant, insect, and bird diversity is high here.
- Leave as much of the barge intact as possible, while addressing liability and safety concerns, and allow nature to reclaim the barge over time. (This site could be billed as an excellent, illustrative demonstration of urban ecology.) For safety, consider removing exposed spikes and loose debris (including the barge metal box structure) and installing a guardrail that spans the northern edge of the barge. Appropriate safety signage should be prominently posted.

- Highlight the natural areas that most resemble a floodplain forest that has not been significantly altered by humans.

Future Studies

- Conduct ecological studies of the dynamic ends of the island. Worthwhile areas of study are resident, transient, and migratory wildlife; changing plant assemblages; and accretion/ erosion of soil over time.
- Conduct a legal query as to whether the appropriate utility has any legal responsibility for removing poles (laden with creosote), wires, and other structures. Regardless of legal responsibility, contact the utility and request that it remove its various structures and objects. Even if the utility is no longer responsible and is unwilling to cooperate, all objects that pose safety risks and/or serve as contaminant sources should be removed.
- Have an appropriate attorney consider potential areas of liability and review all island elements and signage for liability issues.
- Initiate a tree inventory of all trees beyond a specified diameter at breast height (dbh). This inventory should be led by a certified arborist but could be aided significantly by volunteers. Once the inventory is completed, volunteers could carry out a simple regular monitoring plan.
- Monitor planned dredging activities in the Allegheny River. Monitor for any impact when dredging near the island occurs.
- Engage in further study of intact natural areas of the island, adjacent to knotweed patches, where knotweed is not invading.
- Locate the spots on the island where red oak seedlings are emerging and employ regular monitoring of these trees. If able to mature to fruiting age, these trees could provide a highly beneficial, brand new food source to the island. Acorns on Sycamore Island would lead to a positive increase in biodiversity.
- Monitor zebra mussel presence and quantity on the pilings and cobbles.
- Regularly monitor mass-wasting that occurs on the steep edges of the island fronting the main channel.
- Several new or continuing organism studies would be valuable and could be tied into island restoration planning. Potential areas of study could include:
    - Birds
    - Turtles
    - Insects and pollinators
    - Native and invasive plants
    - Potential fish habitat
    - Potential mussel habitat

  In carrying out such studies, relationships could be formed with such entities as universities, Audubon groups, local science and nature clubs, local experts, etc.

Restoration

- Consider using the test plot nearest the barge as an early restoration zone. Specify as part of the restoration plant mix a low, dense matrix of native thorny, dense-growing vegetation, such as a thicket of brambles, greenbrier, viburnums, shrub dogwoods, etc. This thicket could simultaneously provide desirable new ground-level cover for wildlife and dissuade humans from getting too close to the barge.

- Re-use the pool structure in a manner that creates habitat in a safe and aesthetically pleasing manner (to be covered in pool design project).
- Prepare a practical, sustainable, realistic restoration plan, which uses appropriate local natural areas and historical data for reference.
- Devise and implement a plan to replace knotweed with dogwood, buttonbush, and sycamore (among others) in selected areas.
- Implement knotweed studies and removal projects.
- Apply any relevant results of the seed-bank study to the Island.
- Encourage growth- through seedling protection and new tree plantings- of cottonwood and sycamore. These are two important tree species present on the Island, in addition to silver maples, that add significantly to plant diversity. When massive enough, they are also favored for nesting by bald eagles.
- Girdle all trees-of-heaven and remove all new growth that sprouts in response to girdling.
- Remove buckthorn from the southern tip of the Island.
- Manage the purple loosestrife that has been establishing itself along the northwest edge of the Island.
- Initiate selective re-vegetation along the bare, muddy banks of the back channel.
- Accept and plant donated native plants that are appropriate for the Island.

Island Access

- Limit boat landings to kayaks and canoes. Set up one landing at an appropriate spot on the main channel side that provides ample gravel/ cobble beach, along with relatively easy access to the accessible inner area of the island. While we have identified a few potential landing areas, we believe that a simple study aimed at determining the “best” landing location is advisable.
- Design and build a low impact trail that allows the island visitor to experience the internal spaces of the island, key natural attributes, important historical remnants, and interesting overlooks and viewing areas. This trail system should make maximal use of footpath and remnant roadways that are already in place.
- Discourage foot traffic along the banks of the back channel.
- Develop the area that presently contains a picnic table and fire pit as a designated gathering area of the island. This area can be used for various gatherings, picnics, outdoor classes, limited camping, etc.
- Develop a boat trail, with a corresponding map, that enables kayakers and canoers to learn about the island from the river.
- Implement a wayfinding and safety signage program that clearly shows trail users the “right way” and clearly point out hazards and off-limit areas. Easily seen blazes on trees would effectively guide hikers along the terrestrial island tour.
- Offer a series of ALT-sponsored island events, such as “S’mores on Sycamore” and various theme-based programs.
- Limit camping to special events that are extremely well planned, managed, and supervised by ALT in conjunction with a suitable partner.

Regulations

- Prominently post in strategic locations the “rules of Sycamore Island”, which spell out the dos and do-nots of the island. Rules should be listed on a sturdy sign. The purpose of such a posting is to protect the environment, limit injuries and address liability. Listed rules should be essential rather than exhaustive. Examples of areas/ topics to be covered on such a sign include barge danger, high areas, extremely muddy areas, conservation zones, no unauthorized camping or fires, no swimming, no littering, no removal of biotic or abiotic objects, permitted hours (dawn to dusk), etc.

Education and Public Outreach

- Design and build a demonstration native shade garden as part of the designated gathering area. The shade garden can be maintained by volunteers. It could serve to educate visitors about native plants and habitat and could also serve to demark or delineate the extent of on-foot accessibility, as the planted and tended area would be clearly designated as a no-access area.
- Design and build a kiosk to be located within the gathering area. This kiosk can have elements such as educational data and photos, event information, a place for visitors to note observations, trail maps, ALT information program, etc.
- Create an educational signage program that ties directly into the land and river tours of Sycamore Island, as well as associated trail maps. (There can also be a “grand tour” for those who desire to circle the island via boat and also explore it on foot.) Signage should be attractive, interesting and made of sturdy materials. Signs for the water trail should describe key island attributes (e.g., the barge, the willows, the high dredge pile, the pilings, the north tip, knotweed, etc.) and should be easily readable from a canoe or kayak.
- An audio tour accessed by cell phone could tie into the sign program, whereby each sign has a number that will prompt a recorded explanation of the area near the sign.
- Initiate a series of “citizen scientist” programs, such as bird walks, plant walks, tree flowering and leaf out observation, area cleanups, invasive removals, new plantings, etc.
- Create an “Interactive Sycamore Island” section of the ALT website. This could highlight noteworthy island observations and happenings and invite user interaction.
- In conjunction with the web feature, consider installing one or more permanent cameras that enable viewers to take in dynamic areas on a real time-basis. One potential camera location is the willow area, which experiences regular bird and turtle activity. Another potential area is the area where turkey vultures tend to gather. The vultures are intelligent, interesting, very large birds that make use of the island throughout much of the year. They would make for very interesting observation.
- Devise programs that seek to involve schools with the island. Programs should be open to students of all ages in public and private schools.
- Devise a program that invites scientific collaboration with local schools and universities. Various aspects the island could easily lend themselves to various studies, reports, theses, etc.
- Implement a volunteer-based citizen-island-watch program in coordination with local police and fire departments.

3. PROJECT PHILOSOPHY AND APPROACH

Project Philosophy

The guiding philosophy for the Sycamore Island Management Plan involves applying the *Ecosystems Approach*™ to island management. Because Sycamore Island functions as part of the larger ecosystem, it is important to first consider the systems in which it thrives as being fundamental to designing an effective, long-term management strategy. The ultimate goal then is to design program strategies for places such as Sycamore Island within the context of the larger, more comprehensive system (in this case the Allegheny River and the surrounding watershed). An underlying deeper understanding of an ecosystem and the existing or potential alterations to the physical, chemical, and community structure will enable the most effective and efficient management strategies to be designed and effectively managed using the *Ecosystems Approach*™.

Project Approach

Four key areas of exploration encompass the project approach for Sycamore Island. These include:

- ***Understanding the Dynamic Natural and Anthropogenic Processes of River Island Ecology***
- ***Understanding Invasive Species Impacts in an Urban Island Context***
- ***Heightening Public Awareness and Education through Hands-on, Interactive Community Involvement***
- ***Ensuring Long-Term Success through a Simplified, Easily Executed Management Plan***

4. SITE CONTEXT

4.1. Location

Sycamore Island is 14.3 acre river-formed landmass located in the Allegheny River approximately nine miles north of the River's confluence with the Monongahela and Ohio Rivers (See **Appendix A: Map 1.** Regional Context). The Island is included within the Borough of Blawnox in Allegheny County. The Island is positioned between Lock & Dam 2 and 3, and shares this reach of the River with adjacent Nine Mile Island (Figure 4.4)

4.2. Geology and the Shaping of the Allegheny River and Surrounding Watershed

Sycamore Island lies within the Lower Allegheny subwatershed, one of 13 subwatersheds of the larger Allegheny Watershed. The Allegheny Watershed covers 11,770 square miles and includes an 87 mile segment located in Warren, Forest and Venango Counties that has been designated as a heritage of invaluable ecological and cultural value by the Wild and Scenic Rivers Act of 1968 (US Forestry Service, www.fs.fed.us). Approximately two million people inhabit this watershed, which spans between New York and Pennsylvania, with the headwaters beginning just east of Coudersport, PA (Pennsylvania Environmental Council www.watershedatlas.org).

The Allegheny River lies within Pennsylvania's Pittsburgh Low Plateau physiographic province, which contains several narrow, yet somewhat shallow valleys, high, level terraces and dendritic waterways (Pennsylvania Environmental Council 33). The Pittsburgh Low Plateau is comprised of mostly Pennsylvanian bedrock from 286 to 320 million years ago, and is characterized by sandstone, shale, conglomerate clay, coal and limestone deposits (Pennsylvania Environmental Council 33).

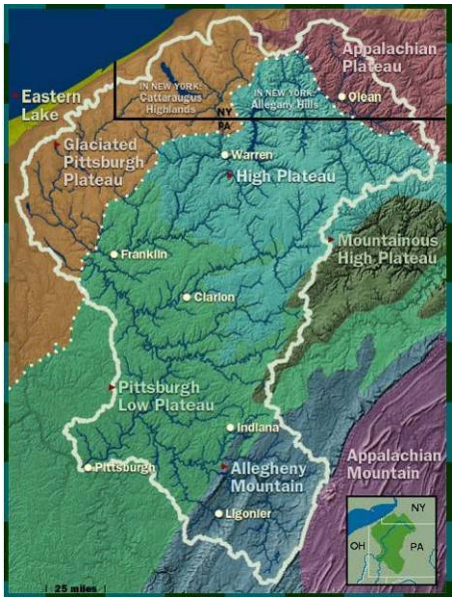


Figure 4.1. Map of the physiographic provinces of Western PA
(Map courtesy of Pennsylvania Environmental Council accessed at watershedatalas.org)

The modern system of rivers seen today in western Pennsylvania was caused by the Wisconsinan glaciation, which advanced into Pennsylvania 75,000 years ago. The silt, sand, and gravel added to the Allegheny and Ohio River valleys aided in the frequent development of river islands, while building up channel sediments in the Monongahela River and its associated tributaries. When the Ice Age ended 10,000 years ago, water volumes and sediment loads carried by the rivers also decreased. The rivers cut new channels in the sand and gravel beds. (Pennsylvania Environmental Council 35).

The Allegheny River developed as consolidation of three separate streams that existed prior to the Wisconsinan glaciations. Pre-Illinoian glaciers dammed these streams to form a large glacial lake. Subsequent breaching of the glacial lake formed a new channel, the nascent Allegheny River. In a successive period of glacial retreat, large quantities of deposited glacial till was carried into the Allegheny River by contributing streams. In time, within the Allegheny River system, the deposition of sand, silt and gravel on the non-flooded portions of the channel bed gave rise to riverine islands (Weigman, 2008).

4.3. Soils, Topography, and Drainage

The majority of the soils on Sycamore Island, formed from recent deposition of alluvium derived mainly from sandstone and shale, are silty and fine-textured. Taxonomically classed in the Philo series, the soils are rapidly well-drained to well-drained. The site's topography is relatively flat with elevations ranging from 724 feet to 750 feet above sea level. Dredge spoiling has created areas of higher elevation on the ridgeline on the back channel side as well as a hillock on the main channel side.
(Appendix A: Map 2. Sycamore Island Contours and **Appendix B** for Philo soil series description)

4.4. Ecology

Inventories and vegetation analysis conducted in 2000-2002 by the Three Rivers Watershed organization and Three Rivers Second Nature (3R2N) characterized the principle woody and herbaceous plant communities that occupy the banks of the Allegheny and Monongahela Rivers within Allegheny County (3R2N, 2002). The study also included most of the islands within the targeted reach of the Allegheny River, including Sycamore Island. In their examination of the islands, using a classification system developed for Pennsylvania (Fike 1999), they identified four of the eight riparian plant community types of Fike's River Bed-Bank-Floodplain Complex, defined as a mosaic of forest, shrub woodland, grassland, and partially vegetated gravel or sand bar communities associated with major river systems. Of the four community types—Sycamore-Boxelder Floodplain Forest, Silver Maple Floodplain Forest, Black Willow Scrub/Shrub Wetland, and Water Willow-Smartweed River Bed Community—the study found Silver Maple Floodplain Forest to be the dominant community type of Sycamore Island and of the greater Allegheny River study area. By comparison, the Sycamore-Boxelder association is dominant along the Monongahela. Only Herr's Island was found to support sycamore trees. Assuming that the Island's name was correctly applied over 100 years ago reflecting the dominance of sycamores on the island, this raises the issue of shifting community composition on Sycamore Island. Not addressed in the 3R2N study, but of great significance, is the offshore shoals that provide habitat for freshwater mussels. In the past, the diversity of mussels reached 40 or more species. These populations declined with development and the expansion of industry in the watershed and with dredging for navigation. In recent years, with water quality recovering in the river,

mussel populations have also begun to recover, yet dredging and sand spoiling continue to threaten aquatic habitat.

The 3R2N study also examined the extent of exotic species invasions of shorelines and riparian areas. Of particular interest was Japanese knotweed (*Polygonum cuspidatum*), which is expanding rapidly in the watershed and which has become the principle target of management efforts by conservationists. The study noted a rapid expansion of Japanese knotweed (JK) just during the three-year project alone. Of the 85 woody species recorded during the study, 29 (34%) are introduced from the southern US, Europe, and Asia. Of those, nine are considered invasive and a threat to ecosystem health and biodiversity. In addition to Japanese knotweed, these species include norway maple (*Acer platanoides*), tree of heaven (*Ailanthus altissima*), barberry (*Berberis thunbergii*), oriental bittersweet (*Celastrus orbiculatus*), honeysuckle [*Lonicera maackii*. *Lonicera* sp (shrub), *Lonicera* sp (vine)], buckthorn alder (*Rhamnus frangula*), and multiflora rose (*Rosa multiflora*). As we continue to learn about the links between biodiversity and ecosystem function in the Allegheny River system, it is imperative that these species be controlled and managed to mitigate their damaging affects in high quality areas that support or buffer our greatest remaining biodiversity.

In spite of the impacts of invasive species and a long history of industry and water regulation in the Allegheny River, the study notes the relatively intact condition, as well as the restoration and protection value of the hardwood floodplain forest community of Sycamore Island and other variations of this community type in the Allegheny/Monongahela River system. Of particular value is its function as wildlife habitat for local and migratory birds and other wildlife, and as space for outdoor recreation and environmental education. Other agencies and organizations have determined the hardwood floodplain forest ecosystem to be among the rarest plant community types in the world and have sought to provide some level of public awareness and protection through a classification and ranking system. Currently, the Pennsylvania Natural Diversity Index (PNDI) classifies hardwood floodplain forest as imperiled in the State (http://www.dcnr.state.pa.us/forestry/pndi/pndiweb.htm), and within the Allegheny River BDA Natural Heritage Area program, Sycamore Island's floodplain hardwood forest holds a ranking of "high significance".

4.5. Cultural History

The cultural history of Sycamore Island reveals few records, but some evidence suggests that as early as 2,000 years ago tribes of the Six Nations lived and hunted in the region and may have visited the islands as they plied the waters of the Allegheny (http://www.watershedatlas.org/). Following European settlement in the region, an early Treasury Office of Pennsylvania record dated October 24, 1809 shows the six-acre Sycamore Island was purchased for $1.60 by Nathanial Irish. By the early 1900's with industrial expansion underway, the region's rich resources made the Allegheny River Valley, particularly the area around Pittsburgh, an attraction for mining and manufacturing, with the river serving as a source of water and as a means of transporting goods by barge (Allegheny River Conservation Plan 25-26).

These and other changes precipitated by expansive development without a doubt dramatically impacted the ecology of the river environment and its islands. Over the last century, for example, Sycamore Island's configuration and topography changed significantly in part due to dredge spoiling and increased sediment deposition from the developing watershed. These

changes, coupled with the Island's position on the inside bend of the river, where silt and sediment deposition is greatest during high water, caused the Island's area to more than double from just over six acres in 1809 to over 14 acres today. With the decline of industry and manufacturing in the late 1900's (Allegheny River Conservation Plan 25-26), such impacts have more or less subsided, but have been replaced in a variety of ways by other anthropogenic stressors, among them the combined affects of introduced plant and animal species and climate change.

Throughout Sycamore Island's history, people have been attracted to its natural charm and beauty and have appreciated its value as a refuge for wildlife as well as a recreational retreat from the area's urban and industrial environment. In 1936, both Sycamore Island and Nine Mile Island were leased from the Pennsylvania Railroad by the Audubon Society of Western Pennsylvania, making these islands the first bird sanctuaries in the Pittsburgh Region. Later, plans for the development of a marina on Sycamore Island were initiated but were eventually abandoned. Evidence of this attempt at development is visible today, most notably the marooned barge embedded at the Island's south end that was to be used for drive-up boat fueling, a partially installed swimming pool, electric poles and a series of offshore pilings for constructing a dock facility.

Figure 4.2. Sycamore Island Cultural Relics. Across from top: 1) pilings, 2) pump well, 3) concrete footing, 4), pool structure, 5) barge, 6) oven, 7) tanks, 8) foundation, 9) dock.

Today, the Island and its surrounding waters are used for boating, picnicking, fishing, and outdoor educational programs. A makeshift camping area that exists in a clearing on the back channel side of the island serves as evidence of the Island's use as a recreational area. Similarly, walking paths created by occasional visitors are indications of continued interest and exploration. However, public use and enjoyment of the island must be carefully balanced with protection and management of the Island's valuable ecological resources.

4.6. Impacts of a Regulated River

Sycamore Island is situated on a working river with an active navigable channel open to recreational and commercial traffic using the Port of Pittsburgh waterway system. This system encompasses an eleven-county area in southwestern Pennsylvania containing 200 miles of commercially navigable waterways. Four public river terminals link the barge commerce with the regions rail and highway systems (Allegheny River Conservation Plan 29). The United States Army Corps of Engineers (ACoE) maintains and manages a minimum nine foot channel depth in the lower 72 miles of the Allegheny River via a series of locks and dams (Figure 4.3). Achieving and maintaining this depth requires periodic dredging of deposited sand and sediment from the river channel and spoiling this material on adjacent shores and islands. Intervening pools created by the locks and dams provide a source of water for municipal and industrial uses. The ACoE also monitors river stage and flow data and provides daily updates online, along with reservoir pool and release schedules, and project information. Real time information on Allegheny pools can be accessed at http://www.lrp.usace.army.mil/wm/index.htm.

Figure 4.3. Allegheny River Locks and Dams and their relative locations along the river.
(Map courtesy of Commonwealth of Pennsylvania Fish and Boat Commission accessed at http://www.fish.state.pa.us/anglerboater/1999/julaug99/walleyee.htm

Regulating the water depth of the river poses challenges for managing and protecting other important resources in the river environment. Dams were constructed simply as concrete walls or fixed-crest dams that extend across the river to maintain the desired water level in the pool above. Although the pool formed behind fix crest dams serves as reservoir for municipal and industrial water needs, without a means to control water release, fixed crest dams do not provide flood control during natural flooding events or when water is released from regional reservoirs (Allegheny Reservoir and Piney Reservoir on the Clarion River). This lack of flood control has caused property damage for Riverfront residents (Allegheny River Conservation Plan 29-30). Moreover, Sycamore Island is situated between Lock and Dam #2 and Lock and Dam #3 (C.W. Young), which were both finished in 1935. The Island's local hydrology has since been altered over the course of 75 years from one that is naturally free-flowing, to one where the natural flow of water is greatly inhibited.

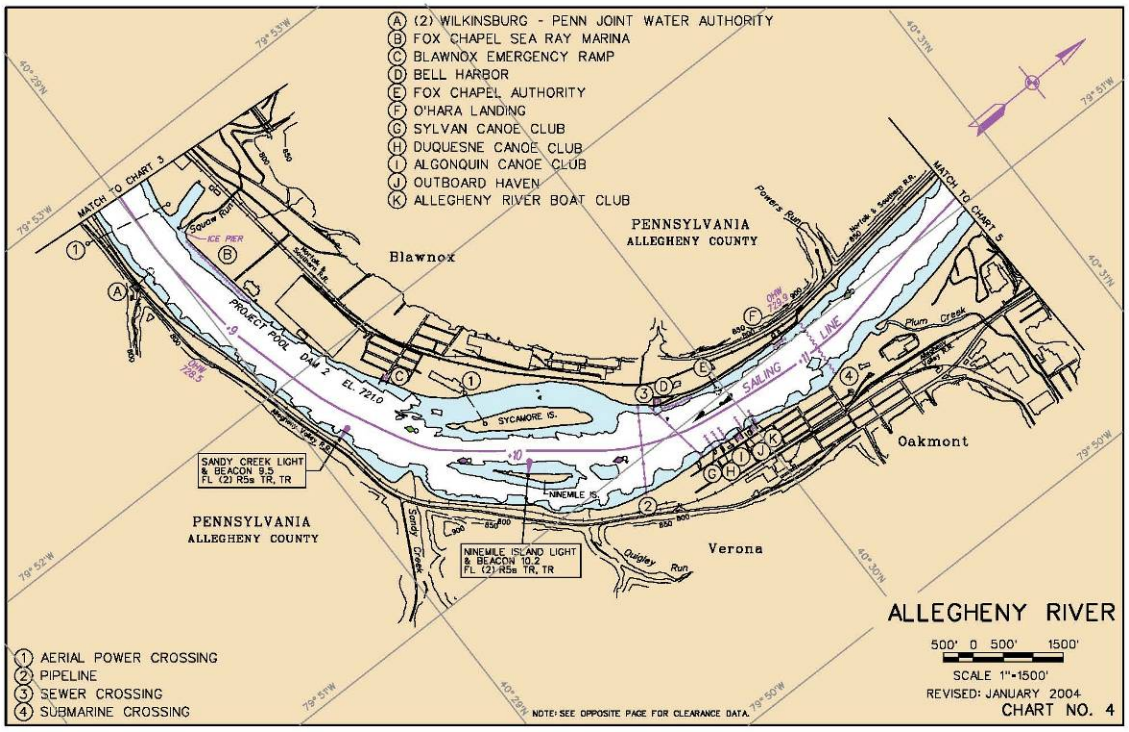


Figure 4.4. USACE navigational chart for Allegheny River Lock and dam 2: Blawnox, Sycamore Island, Nine Mile Island, Verona, Oakmont

(Map courtesy of USACE, Pittsburgh District, accessed at http://www.lrp.usace.army.mil/navchart/al/chart4.pdf)

5. NATURAL RESOURCES INVENTORY

5.1. Natural Community Mapping, Vegetation and Seedbank Studies

Overview

In June 2009, Applied Ecological Services, Inc. conducted field investigations to better understand the floristic quality and distribution of plant communities of Sycamore Island. In addition, we located and characterized unique natural and cultural features that represent either opportunities for enhancing biological diversity on the Island or critical resource issues that should be addressed in the management plan. Our principle objectives for this study were to:

- Map and characterize the natural communities and cultural features of the Island to identify the unique qualities of the Island.
- Establish and measure vegetation from permanent study transects to help characterize vegetation communities and to provide baseline data that will allow analysis of restoration potential and subsequent change in response to management practices.
- Determine the presence of rare, threatened or endangered plant species that require protection.
- Identify disturbance patterns that represent critical management challenges and risk to native biodiversity, including the distribution and importance of invasive exotic plant species, particularly Japanese knotweed (*Polygonum cuspidatum*).
- Establish a test plot at each study transect to test and demonstrate treatment strategies for cost-effectively controlling Japanese knotweed.
- Conduct a seedbank analysis in each test plot to determine the potential for a native seedbank response following treatment of Japanese knotweed.
- Examine site constraints, which may affect restoration of native species and/or recreational use of the island.

Methods

Preliminary Field Reconnaissance and Community Mapping

On the initial day of fieldwork, AES ecologists conducted a preliminary survey of Sycamore Island to identify, map, characterize, and photo document distinct plant communities, unique land cover features, disturbance patterns, and habitat types. Plant communities were mapped based on topography, soil moisture, plant community structure and composition, and disturbance characteristics. Following the survey we selected the most representative areas of the Island in which to establish study transects and test plots for demonstrating and measuring restoration treatment effects, particularly for controlling or eliminating Japanese knotweed (*Polygonum cuspidatum*).

Study Transects and Test Plots

During the preliminary site survey, we identified three island settings with relatively unique and representative site conditions and with sufficient area for study transects and associated test plots. Transects were positioned so that a portion of each transect contained cover by Japanese knotweed. Test plots were established over the portion of each study transect containing cover by Japanese knotweed to monitor treatment success and response of the native seedbank stimulated by the removal of Japanese knotweed. We installed transect end points and associated study plot corners with labeled, GPS-located metal T-posts in the following locations (**Appendix A: Map 6.** Test Plot Locations).

Test Plot 1 – Transect 1
The 50 m transect is located in the downstream end of the Island and primarily intercepts the Mesic Floodplain Forest community that has developed at mid to upper elevations on better drained historic sand spoils. The north end of the transect intercepts forested Steep Shoreline Slopes. The 25 m x 50 m (0.125 ha) test plot overlaps the southern half of the transect and contains >70% cover by Japanese knotweed.

Test Plot 2 – Transect 2
The 100 m transect is located in the mid section of the Island and parallels the south-eastern shoreline, intercepting both Wet Floodplain Forest and Disturbed Wet-Mesic Floodplain Forest cover at lower elevations of the Island in moderate to poorly drained sandy soils. The 50 m x 50 m (0.25 ha) test plot overlaps the north half of the transect in Disturbed Wet-Mesic Floodplain Forest and contains 100% cover by Japanese knotweed.

Test Plot 3 – Transect 3
The 50 m transect is located in the northern sector of the Island and intercepts Wet Floodplain Forest at lower elevations of the Island where these is evidence of flood scouring. The 25 m x 50 m (0.125 ha) test plot overlaps the E half of the transect and contains 100% cover by Japanese knotweed.

Vegetation and floristic data were collected from each transect/test plot location using the following sampling techniques:

- Ground story vegetation (herbaceous growth and woody growth ≤ 1 m in height) and selected ground cover elements [bare soil, fine litter (leaves and woody debris ≤ ¾ in thick), coarse litter (woody debris > ¾ in thick), and bryophytes] were measured as percent cover of each species or cover type intercepted by ten 1m2 circular quadrats placed on the ground at regular intervals along each transect: 5 m intervals along 50m transects and 10 m intervals along the 100m transect. Analysis of the data generated values for absolute frequency and cover, relative frequency and cover, and importance values for each species within each quadrat and summarized by transect.
- Tree and shrub canopy intercept was measured by projecting the canopy of woody growth >1 m onto the transect tape and tallying the total running distance of each species intercepted along the length of the tape. Analysis of the data generated a percent cover of each species along each transect.

- Tree and shrub stem density and tree basal area was measured in an eight-meter wide belt centered over each transect. All woody stems <2 inches in diameter at breast height (dbh) were classified as shrubs, identified to species, and tallied. All stems ≥2 inches dbh were classified as trees, identified to species, and diameters measured at breast height. Analysis of the data generated number of stems per hectare and average basal area per species per hectare.
- Species diversity was measured using the Timed Meander Search (TMS) method (Goff et al. 1982), whereby an investigator intensively searches for and identifies as many new species as possible inside one minute timed segments within an identified community type or designated area. The search is abandoned when no new species can be identified during 3-5 successive one-minute segments. The TMS method provides a semi-quantitative analysis that equates the number of species encountered with time or level of search effort and therefore can be used to compare sites and track trends following site restoration treatments. The TMS method also provides a more systematic approach for locating threatened or endangered species that may be present at a site.

Additional sampling and documentation was gathered during the inventory:

- Photo documentation was conducted as part of the field investigation. Photos were taken of representative field conditions and unique features, as well as at transect end points. Photo points were located with GPS.
- Soil samples were collected from each test plot for conducting a greenhouse seedbank study. Using a common garden bulb planter we extracted surface soil plugs to a depth of 10 cm from a randomly determined number of locations within each test plot to fill a one-gallon sealable plastic bag. In the greenhouse, soils were spread evenly in separate labeled germination trays and under typical greenhouse conditions were watered to stimulate germination and growth. Emerging seedlings were identified and tallied periodically until no new growth appeared (approximately five months). Unconfirmed seedlings were potted to advance growth for further examination and specimens photographed and pressed. Two principle questions were considered in conducting the seedbank study: 1) is there a viable native seedbank available to respond to restoration treatments, and 2) are exotic invasive species including Japanese knotweed important in the seedbank, and to what degree will they pose a long-term management risk?

Results

Preliminary Field Reconnaissance and Community Mapping

Plant Communities and Habitats

We identified ten distinct land cover types or zones on the Island that can be characterized based on topographic position and relationship to the river hydrology, soil moisture gradients, plant species composition and structure, and natural and cultural disturbance patterns. These zones provide a variety of habitats and microhabitats for wildlife and an opportunity to interpret the unique biodiversity of the Island. (**Appendix A: Map 3.** Sycamore Island Plant Communities) illustrates the distribution of the 11 plant communities or zones described below.

1. Active Shoreline (littoral zone)

This is a highly dynamic and variable community of sorted sands and gravels subject to water level changes, wave action, ice scour, and other erosive forces. This zone extends beyond the immediate shoreline at the Island's upstream and downstream terminus to form gravel shoals that support unique aquatic plants and wildlife, including a number of the Allegheny's remaining freshwater mussels. Exposed shoreline substrates are often absent of vegetation during low water conditions or support moderately diverse assemblages of species tolerant of wet conditions and periodic disturbance, such as those listed in Table 5.1. Shorelines are characterized by overhanging trees and shrubs such as willow (*Salix* spp) and buttonbush (*Cephalanthus occidentalis*), and emergent vegetation, such as water willow (*Justicia americana*), growing in mostly monotypic stands on shoals in protected, quiet waters (Figure 5.1).

Table 5.1. Common species of the active shoreline (littoral zone). Non-native species arecapitalized.

Scientific Name	Common Name
Apocynum cannabinum	Indian Hemp
Asclepias incarnata	Swamp Milkweed
Asclepias syriaca	Common Milkweed
Cephalanthus occidentalis	Buttonbush
CERASTIUM ARVENSE	Chickweed
CONIUM MACULATUM	Poison Hemlock
Convolvulus sepium	Hedge Bindweed
Eupatorium perfoliatum	Boneset
Eupatorium rugosum	White Snakeroot
Hypericum sp.	St. John's Wort
Justicia americana	Water-willow
LYTHRUM SALICARIA	Purple Loosestrife
Physalis virginiana	Ground Cherry
SOLANUM CAROLINESE	Horse Nettle
SOLANUM DULCAMARA	Deadly Nightshade
Urtica diocia var. procera	Stinging Nettle
Vitis sp.	Wild Grape

Figure 5.1. Typical shoreline plant assemblage located along N back channel

2. Steep Shoreline Slopes

Better-drained soils immediately above the active shoreline support a mesic forest canopy and understory on the more stable soils of the slopes on the lee side of the Island (back channel). On the main channel, the banks are subject to greater erosive forces and are therefore less likely to support vegetation.

Figure 5.2. Dying fall vegetation reveals the steep shoreline character

3. Mesic Floodplain Forest (Historic Spoils)

Better drained soils in the higher elevations of the Island, formed from historic dredge spoils, support a mature canopy of the characteristic floodplain species silver maple (*Acer saccharinum*) and sycamore (*Platanus occidentalis*). Understory associates are typical of more upland settings, such as tree-of-heaven (*Ailanthus altissima*), an invasive non-native tree, hackberry (*Celtis occidentalis*), white ash (*Fraxinus americana*), wild black cherry (*Prunus serotina*), gray dogwood (*Cornus racemosa*), and enchanter's nightshade (*Circaea lutetiana canadensis*). Japanese knotweed (*Polygonum cuspidatum*) has invaded this community and forms a single dense patch with few associates. Other native understory species in less disturbed areas include white snakeroot (*Eupatorium rugosum*), germander (*Teucrium canadense*), moonseed vine (*Menispermum canadense*), poison ivy (*Rhus radicans*), Virginia creeper (*Parthenocissus quinquefolia*), white avens (*Geum canadense*), and brambles (*Rubus* spp). Occasional red and black oak seedlings (*Quercus rubra*, *Q. velutina*) have established in the understory. Other non-native species of management concern include dames rocket (*Hesperis matronalis*), black locust (*Robinia pseudoacacia*), Tartarian honeysuckle (*Lonicera tatarica*), glossy buckthorn (*Rhamnus frangula*), and European highbush cranberry (*Viburnum opulus*). These and other common species of this setting are listed in Table 5.2. This area was selected as a representative area for establishing one of the three test plots (Figure 5.3).

Figure 5.3. Mesic Floodplain forest invaded by Japanese knotweed. Opening in the overstory further encourages the spread of Japanese knotweed.

Table 5.2. Common species of the mesic floodplain forest on historic spoils. Non-native species are capitalized.

Scientific Name	Common Name
Acer saccharinum	Silver Maple
Actinomeris alternifolia	Wingstem
AILANTHUS ALTISSIMA	Tree-of-Heaven
Boehmeria cylindrica	False Nettle
Celtis occidentalis	Hackberry
Circaea lutetiana canadensis	Enchanter's Nightshade
Cornus racemosa	Gray Dogwood
Eupatorium rugosum	White Snakeroot
Fraxinus americana	White Ash
Impatiens capensis	Orange Jewelweed
LONICERA TATARICA	Tartian Honeysuckle
MORUS ALBA	White Mulberry
Oenothera biennis	Evening Primrose
Parthenocissus quinquefolia	Virginia Creeper
Pilea pumila	Clearweed
Platanus occidentalis	Sycamore
POLYGONUM CUSPIDATUM	Japanese knotweed
Prunus serotina	Wild Black Cherry
Rhus radicans	Poison Ivy
ROBINIA PSEUDOACACIA	Black Locust
Rubus allegheniensis	Blackberry
Rubus occidentalis	Black Raspberry
Vitis riparia	Riverbank Grape

4. Wet-Mesic Floodplain Terrace (Higher Quality)

A low terrace along the main channel side of the Island supports higher quality vegetation free of knotweed invasion. Large, mature silver maples, some more than a meter and a half in diameter, form a majestic cathedral-like canopy above an open understory and a nearly continuous herb layer of native jewelweed (*Impatiens capensis*) and other characteristic floodplain herbaceous associates such as wingstem (*Actinomeris alternifolia*), green dragon (*Arisaema dracontium*), fringed loosestrife (*Lysimachia ciliata*), and false nettle (*Boehmeria cylindrica*). Invasive species to be managed in this setting include scattered stems of non-native invasive privet (*Ligustrum vulgare*) and white mulberry (*Morus alba*). This area of the Island is attractive to visitors for picnicking and bird watching. A well-used foot trail bisects this community. Other common species found in this community are listed in Table 5.3 along with those mentioned above in Table 5.2. This area was selected as one of the test plot locations to represent the higher quality conditions on the Island (Figure 5.4).

Figure 5.4. High quality wet-mesic forest

Table 5.3. Common species of the wet-mesic floodplain terrace. Non-native species are capitalized.

Scientific Name	Common Name
Acer saccharinum	Silver Maple
Actinomeris alternifolia	Wingstem
AILANTHUS ALTISSIMA	Tree-of-Heaven
Celtis occidentalis	Hackberry
Circaea lutetiana canadensis	Enchanter's Nightshade
Cornus racemosa	Grey Dogwood
Eupatorium rugosum	White Snakeroot
Fraxinus americana	White Ash
Ilex opaca	American Holly
Impatiens capensis	Orange Jewelweed
Lindera benzoin	Spicebush
Lysimachia ciliata	Fringed Loosestrife
MORUS ALBA	White Mulberry
Parthenocissus quinquefolia	Virginia Creeper
Phytolacca americana	Pokeweed
POLYGONUM CUSPIDATUM	Japanese knotweed
Quercus velutina	Black Oak
Rhus radicans	Poison Ivy
Rubus allegheniensis	Blackberry
Viburnum dentatum	Arrow-wood
Vitis riparia	Riverbank Grape

5. Backwater Cove (Artificial)

Scouring exacerbated by the barge has created a small backwater cove with sandy substrates and quiet, shallow water. This area supports a mix of emergent vegetation (Figure 5.5).

Figure 5.5. Backwater cove segregated from the rest of the island by barge structure.

6. Disturbed Wet-Mesic Floodplain Forest

Evidence of historic spoils deposition and other soil disturbance are apparent in this zone. A non-native ornamental known as sweet violet (*Viola odorata*) was observed here; and while it is reported by some as rarely escaping cultivation, it forms an extensive continuous mat in some locations in the understory and may have been introduced during attempts to develop the Island. Japanese knotweed forms a large, nearly continuous stand throughout this community. Also of note, a large metal container, once used as swimming pool, is located along the western edge of the area. Many of the common species of the higher quality wet-mesic floodplain forest are found here, but degraded conditions largely due to competition from knotweed, have reduced their cover and importance significantly (Figure 5.6).

Figure 5.6. Ridgeline along the Wet-Mesic Forest, *Viola odorata* is a common feature of groundcover vegetation.

7. Forested Spoils Mound (Historic Spoils)

A prominent unnatural mound feature comprised of spoils is situated just beyond the middle of the Island adjacent to the main channel shoreline. This hill is forested and partially colonized by Japanese knotweed (Figure 5.7).

Figure 5.7. Historic spoils mound created from dredge material is the highest point on the Island.

8. Wet Floodplain Forest

The upstream lower elevations of the Island are characterized by highly uneven ground featuring broad depressions that may be formed in part by the scouring of seasonal floods. The canopy is dominated by mature silver maple and occasional large cottonwood. During our site visit, these trees served as roosts for a number of vultures as they dried their wings in the morning sun. Characteristic understory species of shaded floodplains include silky dogwood (*Cornus amomum*), spice bush (*Lindera benzoin*), elderberry (*Sambucus canadensis*), riverbank grape, poison ivy, wild golden glow (*Rudbeckia laciniata*), wood nettle (*Laportea canadensis*), wingstem, jewelweed, and sensitive fern. Japanese knotweed has heavily colonized this community along with occasional oriental bittersweet (*Celastrus orbiculatus*), and multiflora rose (*Rosa multiflora*). Canopy openings support a more continuous herb layer dominated by wood nettle. An uncommonly observed tree species in this community was tulip tree (*Liriodendron tulipifera*), an upland tree species. This area was selected as a location for one of the three test plots to represent wetter conditions supporting an infestation of Japanese knotweed. Common species observed in this community are listed in Table 5.4.

Table 5.4. Common species of wet floodplain forest. Non-native species names are capitalized.

Scientific Name	Common Name
Acer saccharinum	Silver Maple
Actinomeris alternifolia	Wingstem
CELASTRUS ORBICULATUS	Oriental Bittersweet
Circaea lutetiana canadensis	Enchanter's Nightshade
Eupatorium rugosum	White Snakeroot
Ilex opaca	American Holly
Impatiens capensis	Orange Jewelweed
Laportea canadensis	Wood Nettle
Lysimachia ciliata	Fringed loosestrife
Onoclea sensibilis	Sensitive Fern
Parthenocissus quinquefolia	Virginia Creeper
Phytolacca americana	Pokeweed
Pilea pumila	Clearweed
POLYGONUM CUSPIDATUM	Japanese knotweed
Populus deltoides	Eastern Cottonwood
Quercus rubra	Red Oak
Rhus radicans	Poison Ivy
Rubus allegheniensis	Blackberry
VIBURNUM OPULUS	European Highbush Cranberry
Vitis riparia	Riverbank Grape

Figure 5.8. Wingstem colony occupying the Wet Floodplain Forest Patch.

9. Wet Meadow Scour Zone (Log Jams, Detritus)

The leading open promontory of the Island functions as a deposition point for floating natural detritus and human debris under flood conditions. It features an extensive log jam that makes access to this area of the Island challenging and somewhat hazardous. A large infestation of Japanese knotweed dominates this area, also making access difficult. Less disturbed areas contain scattered patches of native species characteristic of open wet meadows, such as swamp milkweed (*Asclepias incarnata*). The highly invasive non-native purple loosestrife (*Lythrum salicaria*) occurs in scattered patches in this zone (Figure 5.9).

Figure 5.9. Log jam pile at the base of a silver maple located in the wet meadow scour area.

10. Wet Floodplain Forest (Willow Dominated)

This is a semi-isolated extension at the downstream end of the Island dominated by a dense canopy of willow (*Salix* sp), in addition to a shrubby understory of silky dogwood (*Cornus amomum*) and buttonbush (*Cephalanthus occidentalis*). It is separated from the rest of the Island by the abandoned barge that may have contributed to its formation and now makes it difficult to access from the main island. Surprisingly, knotweed and other invasives have not established in this location. This is likely due to the competition from dense willow and shrub growths found here. The shrubby structure makes this area particularly attractive to birds as cover. (Figure 5.10)

Figure 5.10. The willows on the back channel are stabilizing at accreting shoreline substrate.

Cultural Features and Disturbance Patterns

The four principle disturbance patterns apparent on the Island, both human-induced and natural, are associated with past deposition of dredge spoils from the river channel, past development activities including abandoned structures and utilities, invasion of the native island plant communities by highly aggressive exotic plant species, and the affects of flooding, particularly excessive deposition of large scale organic debris (logs) and garbage.

Dredge Spoils—The affects of dredge spoiling on the Island is most apparent in the areas mapped as Mesic Floodplain Forest, Forested Spoils Mound, and Disturbed Wet-Mesic Floodplain Forest. In these locations, the natural elevation of the Island has increased substantially, which has created better-drained soil conditions that have allowed some undesirable non-native upland tree and shrub species to invade, including tree-of-heaven, white mulberry, black locust, glossy buckthorn, and tartarian honeysuckle. At the same time, these same soil conditions have allowed native oak species, both red and black, typically species encountered on more mesic-upland locations, to establish as small seedlings under the silver maple. As no mature oaks are present on the Island, it is likely that acorns have found their way to the Island via floodwaters or mammal or bird vectors. The presence of larger trees on the historic spoils suggests dredging has ceased much more than a decade or two ago. Although one of the affects of the dredge spoils has been an increase in the patch diversity of plant communities on the Island by altering topography and soil moisture gradients, the overall impact has been one of disturbance creating conditions favoring the establishment of Japanese knotweed and other invasive species. Tree of heaven (*Ailanthus altissima*), another invasive, is located in small stands along the margins of the Island on elevated sites. Since *Ailanthus* is a facultative upland species, its presence on the Island may indicate a plant community shift to a more mesic/upland forest canopy. In addition, native species that suggest this shift are the red and black oaks currently present as young seedlings, tulip tree, as well as brambles (*Rubus* spp, black raspberry and blackberry) typically important in other dry mesic settings. The Island has most likely always had areas of higher elevation and better drainage that would support such species, but this condition has likely been exacerbated and expanded upon with fill deposition and early attempts at development.

Development— Over the years the barge has become buried in sediment and has lost much of its structural integrity. Vegetation has established on the upper surface of the barge, but provides only minimal wildlife habitat. Here native plants such as *Penstemon* sp., *Carex* spp., and *Comandra* sp., not conspicuous elsewhere on the Island, grow in “planters” created in the sediment-filled channels of the I-beams. Nevertheless, the barge is a structural hazard and should be examined for potentially toxic materials. North of the barge a hundred meters or so, light poles, electrical wiring and asphalt debris from a roadway remain from the abandoned resort. A large container that served as a swimming pool remains further north near the center of the Island. The barge and swimming pool locations are mapped (**Appendix A: Map 4. Cultural Points**). A series of metal poles (or moorings) are buried several yards off the shoreline in the back channel. It is reported that boaters use the moorings while fishing and recreating on the river. Birds also use these as occasional perches.

Exotic Invasive Species—AES identified fifteen exotic invasive species of management concern on the Island. The ecological impacts of these species are becoming generally better-known, among them are competition with and reduction of native biodiversity and replacement of

native vegetation and habitats. Of the identified species, the most widespread and pernicious is the creeping perennial Japanese knotweed . The extent of this species on the Island is mapped in (**Appendix A: Map 5**.Knotweed Extent). Development of a cost effective treatment and control strategy for this species is the focus of the test plot program. Japanese knotweed can spread rapidly via vegetative growth from rhizomes that can spread as much as 60 feet or more and penetrate in excess of seven feet deep. Root and stem fragments distributed in floodwater can colonize freshly disturbed soils. Hybrid forms of Japanese knotweed are reported to produce abundant viable seed (McHugh 2006). The tall stature, growing upwards of 2.5m, and dense structure of Japanese knotweed colonies discourage access to riparian areas by humans and wildlife. Purple loosestrife (*Lythrum salicaria*), another prolific spreader, is currently present in only small scattered patches along the western shoreline. Nevertheless, this species should be addressed immediately with management to prevent its spread into other areas of the Island, while it is relatively easy and inexpensive to control. These and other invasive and exotic species recommended for control and removal in restoration and management planning are listed in Table 5.5.

Table 5.5. Sycamore Island exotic invasive species.

Scientific Name	Common Name
AILANTHUS ALTISSIMA	Tree-of-Heaven
CATALPA SPECIOSA	Hardy Catalpa
CELASTRUS ORBICULATUS	Oriental Bittersweet
CONIUM MACULATUM	Poison Hemlock
HESPERIS MATRONALIS	Dame's Rocket
HYPERICUM PERFORATUM	Common St. John's Wort
LIGUSTRUM VULGARE	Privet
LONICERA TATARICA	Tartarian Honeysuckle
LYTHRUM SALICARIA	Purple Loosestrife
MORUS ALBA	White Mulberry
POLYGONUM CUSPIDATUM	Japanese knotweed
RHAMNUS FRANGULA	Glossy Buckthorn
ROBINIA PSEUDOACACIA	Black Locust
ROSA MULTIFLORA	Multiflora Rose
VIBURNUM OPULUS	European Highbush Cranberry

Figure 5.11. The large palmate leaves of Japanese knotweed effectively block out sunlight for other species.

Flooding—While flooding is a natural disturbance process in floodplain settings and channel islands, the regulated nature of the present-day Allegheny and the rapid overland movement of runoff from the developed, industrialized watershed have exaggerated the severity of flood events. In addition, floods carry a large volume of floating material including logs, garbage, and miscellaneous debris. This material is readily deposited extensively over the leading, upstream end of the Island, creating extensively disturbed as well as hazardous conditions for Island visitors and wildlife. These disturbed areas are prime loci for establishment of Japanese knotweed propagules carried by the flood waters.

Study Transects & Test Plots

Data from the study transects are compiled and analyzed in a series of tables. This summary and analysis includes 1) quadrat data from the herbaceous layer (**Appendix C:** Tables 5.6 through 5.8), 2) floristic inventory data from within the test plots (**Appendix C:** Tables 5.9 through 5.11) and from the adjacent areas outside the test plots (**Appendix C:** Tables 5.12 through 5.14), 3) floristic inventory data compiled for the entire Island (**Appendix C:** Table 5.15), 4) further analysis comparing selected results for Test Plots/Transects 1, 2, and 3 (Tables 5.16 through 5.19), and 5) analysis of the woody data (Tables 5.20 through 5.23). Please refer to **Map 6.** Test Plot Location.

Quadrat Data

This summary analysis provides data for both vascular plant species and for physiognomic groups (trees, shrubs, perennial forbs, etc.) measured within $1m^2$ plots, including floristic quality and relative importance measures. This data is used to draw key comparisons between the test plots/transects (see below in *Summary Test Plot/Transect Quadrat and Floristics Analysis*), and will be useful in following trends resulting from future management treatments. A floristic quality index (FQI), an analytical tool based on applying a numerical score called the coefficient of conservatism (C) that measures the fidelity of a plant species to its natural habitat, is used to evaluate the vegetation on the Island. The floristic quality index applied to the data is not specific to the flora for this region, and therefore, should be used cautiously as a relative measure for analysis of the Sycamore Island vegetation. The FQI analysis should be updated when an index is created for the Pennsylvania regional flora. For purposes of interpreting the FQI used in the present analysis, a Mean C Value (coefficient of conservatism) from 0-10 is assigned to each native species. In an attempt to measure the species fidelity to the native plant community to which it is typically associated. For example, a C value of 0 is assigned to weedy natives such as common ragweed that are tolerant of disturbance and therefore are found in many plant community types that have been subjected to disturbance. A C value of 10 is assigned to uncommon or rare species that are typically associated with unique settings and which typically do not persist in highly disturbed communities. The FQI value assigned to the collective flora of a sampled community reflects the relative quality of the plant community (an FQI value of 30-35 or higher is typically associated with relatively intact natural communities).

The low species diversity and floristic quality measured in the transect/test plot quadrat data (**Appendix C**: Tables 5.6 through 5.8, and the transect summary in Table 5.16) is due to the intentional placement of the transects under a dense canopy of Japanese knotweed. Japanese knotweed has the highest relative importance value (RIV) of all the species measured in T1, T2, and T3 [RIV is calculated by adding relative frequency (RFRQ) and relative cover (RCOV) and dividing by 2]. Quadrats located beyond the Japanese knotweed canopy (see for example Quadrats 1-5 in T2) contain greater native species diversity and significantly greater cover by these species, particularly by the herbaceous forbs orange jewelweed and fringed loosestrife. Although Japanese knotweed, classified here as an adventive shrub, represents the most important physiognomic group in each transect, the balance of the vegetation is represented by native physiognomic groups and their associated species including the annual forbs of orange jewelweed (the most important ground cover in T2 and T3) and clearweed; woody vines of poison ivy, wild grape, and Virginia creeper (most important in T1 and T2); perennial forbs of

enchanter's nightshade, wingstem, white snakeroot, fringed loosestrife, and false nettle; and shrub and tree seedlings of gray dogwood and silver maple.

Floristic Inventory & TMS Data

Species lists compiled during TMS surveys within test plots and in areas surrounding each test plot were summarized by species and physiognomic groups (see **Appendix C**: Tables 5.9 through 5.14; see also summary in Tables 5.17-5.18). Additional species encountered during the survey of the Island were combined with quadrat and other survey data to compile a total species list for the Island. Of the three test plots and adjacent areas sampled, TP2, representing the higher quality Mesic Floodplain Terrace absent of spoils, generally had the highest species diversity, as did the adjacent areas outside of TP3 in the Wet Floodplain Forest. By increasing the area of search, species diversity, FQI values, and the diversity of physiognomic groups increased overall compared to the Test Plots. The degree to which species represent wet versus dry conditions is indicated by the Wetness Factor (W; values below 0 are wet and above zero are dry). The values support the classification of the mapped community types with TP1 flora above 0 (Mesic Floodplain Forest on historic spoils), and all other areas below 0. As with the quadrat data, the FQI applied to the inventory data is not specific to the flora for this region, and therefore should be used only as a relative measure for comparing data between sampled areas. No endangered, threatened, or rare plant species were observed or recorded during our investigation.

A separate TMS analysis graphically depicts the number of species encountered per minute over the duration of the search. This analysis compares the TMS data from Test Plots dominated by Japanese knotweed (Figure5.12) versus data from adjacent areas (Figure 5.13) without Japanese knotweed. In both cases, the general trend is a sharp reduction of new species encountered early in the search; however, beyond the Japanese knotweed canopy new species encounters continued for several minutes beyond the 10-minute search within the Test Plots.

Figure 5.12

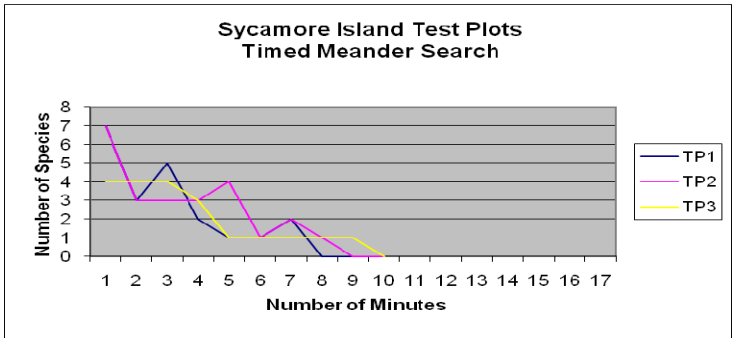
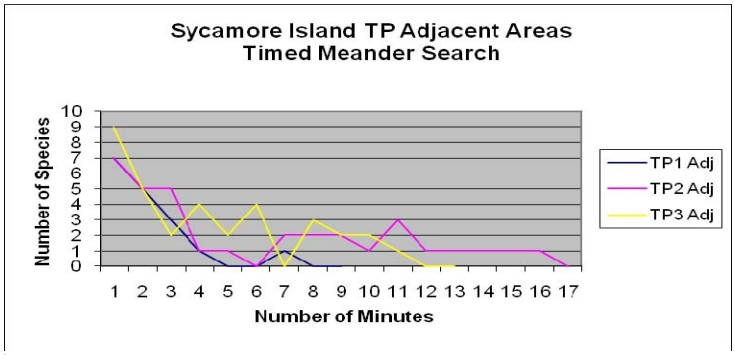


Figure 5.13



Summary Test Plot/Transect Quadrat and Floristics Analysis

Selected parameters are summarized for easy comparison to show variation at each transect/test plot location across the Island. The focus of this comparison is on species diversity of both native and non-native species and importance values of key species and physiognomic groups.

Table 5.16. Test Plot-Transect—Herbaceous Quadrat Data Analysis

Test Plot-Transect	No./% Natives 2009	No. /% Adventives 2009	No. Total Species 2009	Native Mean C 2009	Native FQI 2009	Species RIV % 2009	Physiognomic Group RIV % 2009
SIT1	6	1	7	1.33	3.27	POLYGONUM CUSPIDATUM (70.9) Parthenocissus quinquefolia (9.2) Circaea lutetiana canadensis (6.4) Rhus radicans (4.1) Boehmeria cylindrica (3.3) Cornus racemosa (3.2) Acer saccharinum (3.0)	Ad Shrub (70.9) Nt W-Vine (13.3) Nt P-Forb (9.7) Nt Shrub (3.2) Nt Tree (3.0)
SIT2	5	1	6	2.40	5.37	POLYGONUM CUSPIDATUM (39.4) Impatiens capensis (27.1) Rhus radicans (15.6) Circaea lutetiana canadensis (10.6) Lysimachia ciliata (4.3) Parthenocissus quinquefolia (3.0)	Ad Shrub (39.4) Nt A-Forb (27.1) Nt W-Vine (18.5) Nt P-Forb (14.9)
SIT3	7	1	8	3.14	8.32	POLYGONUM CUSPIDATUM (67.8) Impatiens capensis (9.2) Actinomeris alternifolia (6.3) Eupatorium rugosum (4.7) Pilea pumila (4.5) Parthenocissus quinquefolia (2.6) Circaea lutetiana canadensis (2.6) Rhus radicans (2.3)	Ad Shrub (67.8) Nt A-Forb (13.7) Nt P-Forb (13.6) Nt W-Vine (4.9)
mean	6	1	7	2.29	5.65		

Table 5.17. Test Plot Floristic Inventory Data Analysis

Test Plot	No./% Natives 2009	No./% Adventives 2009	No. Total Species 2009	Native Mean C 2009	Native FQI 2009	No./% Native Species/ Physiognomic Group 2009	No./% Adventive Species/Physiognomic Group 2009
1	16 (72.7%)	6 (27.3%)	22	2.94	11.75	Tree 5 (22.7%) W-Vine 3 (13.6%) P-Forb 3 (13.6%) Shrub 2 (9.1%) A-Forb 2 (9.1%) B-Forb 1 (4.5%) Total Phys Grps 6	Tree 3 (13.6%) Shrub 3 (13.6%) Total Phys Grps 2
2	24 (82.8%)	5 (17.2%)	29	3.04	14.9	P-Forb 11 (37.9%) Tree 4 (13.8%) Shrub 4 (13.8%) W-Vine 4 (13.8%) A-Forb 1 (3.4%) Total Phys Grps 5	Tree 3 (10.3%) Shrub 2 (6.9%) Total Phys Grps 2
3	17 (85.0%)	3 (15%)	20	3.59	14.79	P-Forb 6 (30.0%) Tree 3 (15.0%) W-Vine 3 (15.0%) Shrub 2 (10%) A-Forb 2 (10%) Cryptogam 1 (5%) Total Phys Grps 6	Shrub 2 (10%) W-Vine 1 (5%) Total Phys Grps 2
mean	19	4.7	23.7	3.19	13.81		

Table 5.18. Test Plot Adjacent Areas Floristic Inventory Data Analysis

Test Plot	No./% Natives 2009	No./% Adventives 2009	No. Total Species 2009	Native Mean C 2009	Native FQI 2009	No./% Native Species/ Physiognomic Group 2009	No./% Adventive Species/Physiognomic Group 2009
1	14 (82.4%)	3 (17.6%)	17	3.36	12.56	P-Forb 5 (29.4%) Tree 4 (23.5%) Shrub 3 (17.6%) W-Vine 2 (11.8%) Total Phys Grps 4	Tree 1 (5.9%) Shrub 1 (5.9%) P-Forb 1 (5.9%) Total Phys Grps 3
2	27 (84.4%)	5 (15.6%)	32	3.44	17.90	P-Forb 11 (34.4%) Tree 5 (15.6%) Shrub 5 (15.6%) W-Vine 4 (12.5%) A-Forb 1 (3.1%) Cryptogam 1 (3.1%) Total Phys Grps 6	Tree 3 (9.4%) Shrub 2 (6.3%) Total Phys Grps 2
3	24 (80.0%)	6 (20.0%)	30	3.33	16.33	Shrub 7 (23.3%) P-Forb 7 (23.3%) Tree 5 (16.7%) W-Vine 4 (13.3%) A-Forb 1 (3.3%) Total Phys Grps 5	Shrub 3 (10%) Tree 1 (3.3%) Shrub 1 (3.3%) P-Forb 1 (3.3%) Total Phys Grps 4
mean	21.7	4.7	26.3	3.38	15.60		

Table 5.19. Sycamore Island Total Species List Floristic Inventory Data Analysis

No./% Natives 2009	No./% Adventives 2009	No. Total Species 2009	Native Mean C 2009	Native FQI 2009	No./% Native Species/ Physiognomic Group 2009	No./% Adventive Species/Physiognomic Group 2009
55 (72.4%)	21 (27.6%)	76	3.75	27.78	P-Forb 24 (31.6%) Tree 11 (14.5%) Shrub 10 (13.2%) W-Vine 5 (6.6%) A-Forb 2 (2.6%) B-Forb 2 (2.6%) Cryptogam 1 (1.3%) Total Phys Grps 7	P-Forb 8 (10.5%) Shrub 6 (7.9%) Tree 4 (5.3%) W-Vine 2 (2.6%) B-Forb 1 (1.3%) Total Phys Grps 5

Woody Data

Woody data analysis provides a summary of tree and shrub densities (stems/ha), tree diameters (diameter at breast height used to calculate basal area), and woody canopy intercept (percent canopy cover per species). Silver maple is the only woody species that grows beyond the shrub layer in the sampled transects with a stem density of 367/ha and second highest of shrubs (83/ha), with stems in multiple size classes, the largest reaching 50 inches dbh in T2. Consequently silver maple reaches its highest basal area in T2 at 53.9 m2/ha, compared to 17 m2/ha in TP1 and 0.6 m2/ha in TP3. The highest tree mortality is measured in T2 with several dead silver maple in smaller size classes <12 inches dbh. In the shrub layer gray dogwood has the highest number of stems (133/ha) followed by silver maple, white mulberry (50/ha), and tree-of-heaven (33/ha). Occasional stems of hackberry, white ash, elderberry, spicebush, and common privet occur in the shrub layer. Of these woody species, tree-of-heaven, common privet, and white mulberry are exotic species that displace native species. Canopy intercept of silver maple exceeds 80-90% cover in T1 and T2, with just over 75% cover in T3. Wild grape has the next highest intercept mainly in the shrub layer with between 9% and 15% cover, followed by elderberry with 7.7%. The only sycamore canopy cover was measured in T1 with <1% cover.

Table 5.20. Transect - Tree and Shrub Stem Density and Canopy Intercept

Sycamore Island (AES 09-0015)- Tree & Shrub Stem Density & Size Classification
23-Jun-09
Shrub Plots: 400m2 Tree Plots: 400m2
Samplers: J. Hendrickson, S. Quitel, M. Ruziska, L. Smith

		Shrubs	Tree Size Classes (DBH)									Total Tree Stems	
Location	**Species**	**<2in**	**2-4in**	**4-6in**	**6-8in**	**8-10in**	**10-12in**	**12-14in**	**14-16in**	**16-18in**	**18-20in**	**>20in**	**Total**	**Stems/ha**
Transect 1	Acer saccharinum	4		1		1	2	1	1			3	9	225
	Ailanthus altissima	4											0	0
	Ailanthus altissima (dead)	1											0	0
	Fraxinus americana	2											0	0
	Celtis occidentalis	1											0	0
	Cornus racemosa	12											0	0
	Total	**23 (1)**	**0**	**1**	**0**	**1**	**2**	**1**	**1**	**0**	**0**	**3**	**9**	
	Total Stems/ ha	**575 (25)**	**0**	**25**	**0**	**25**	**50**	**25**	**25**	**0**	**0**	**75**		**225**
Transect 2	Acer saccharinum	6	2	1	1	2	1	6	6	4	1	4	34	850
	Acer saccharinum (dead)		1	1	2	1							5	125
	Fraxinus americana	1											0	0
	Lindera benzoin	1											0	0
	Morus alba	6											0	0
	Quercus rubra	3											0	0
	Viburnum opulus	3											0	0
	Total	**20**	**2 (1)**	**1 (1)**	**1 (2)**	**2 (1)**	**1**	**6**	**6**	**4**	**1**	**4**	**34 (5)**	
	Total Stems/ ha	**500**	**50 (25)**	**25 (25)**	**25 (50)**	**50 (25)**	**25**	**150**	**150**	**100**	**25**	**100**		**850 (125)**
Transect 3	Acer saccharinum											1	1	25
	Cornus racemosa	4											0	0
	Ligustrum vulgare	1											0	0
	Sambucus canadensis	3											0	0
	Total	**8**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	
	Total Stems/ ha	**200**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**25**		**25**

Note: ( ) = Dead

Table 5.21. Woody Stem Area/ha

Sycamore Island (AES 09-0015) - Total Stems/ha
23-Jun-09
Shrub Plots: 400m2 Tree Plots: 400m2
Samplers: J. Hendrickson, S. Quitel, M. Ruziska. L. Smith

	Trees		Shrubs	
Species	**Total**	**Stems/ha**	**Total**	**Stems/ha**
Acer saccharinum	44	367	10	83
Acer saccharinum (dead)	5	42	0	0
Ailanthus altissima	0	0	4	33
Ailanthus altissima (dead)	0	0	1	8
Celtis occidentalis	0	0	1	8
Cornus racemosa	0	0	16	133
Fraxinus americana	0	0	3	25
Ligustrum vulgare	0	0	1	8
Lindera benzoin	0	0	1	8
Morus alba	0	0	6	50
Quercus rubra	0	0	3	25
Sambucus canadensis	0	0	3	25
Viburnum opulus	0	0	3	25
Total	**44 (5)**		**51 (1)**	
Total Stems/ ha		**367 (42)**		**423 (8)**

Table 5.22. Tree Basal Area

Sycamore Island (AES 09-0015)--Tree Basal Area									
23-Jun-09									
Samplers: J.Hendrickson, S. Quitel, M. Ruziska, L. Smith									
				Transect Segment (m)					
Transect 1	**Species**	**DBH (cm)**	**Basal Area m2/ha**	**0-10**	**10-20**	**20-30**	**30-40**	**40-50**	**Total Basal Area m2/ha**
	ACESAI	30.48	0.9116	7.54	4.12	5.39	0.00	0.00	17.0
	ACESAI	71.12	4.9632						
	ACESAI	22.86	0.5128						
	ACESAI	34.29	1.1538						
	ACESAI	64.77	4.1165						
	ACESAI	39.37	1.5209						
	ACESAI	54.61	2.9263						
	ACESAI	27.31	0.7319						
	ACESAI	14.61	0.2094						
	Total Basal Area	**m2/ha**		**7.54**	**4.12**	**5.39**	**0.00**	**0.00**	**17.0**
				Transect Segment (m)					
Transect 2	**Species**	**DBH (cm)**	**Basal Area m2/ha**	**0-20**	**20-40**	**40-60**	**60-80**	**80-100**	**Total Basal Area m2/ha**
	ACESAI	38.1	1.4244	9.71	4.45	2.23	9.16	28.36	53.9
	ACESAI	41.91	1.7235						
	ACESAI	36.83	1.3310						
	ACESAI	9.53	0.0891						
	ACESAI	38.1	1.4244						
	ACESAI	36.83	1.3310						
	ACESAI	28.58	0.8015						
	ACESAI	20.96	0.4311						
	ACESAI	34.29	1.1538						
	ACESAI	45.72	2.0511						
	ACESAI	36.83	1.3310						
	ACESAI	33.02	1.0699						
	ACESAI	45.09	1.9950						
	ACESAI	13.97	0.1915						
	ACESAI	6.35	0.0396						
	ACESAI	40.64	1.6206						
	ACESAI	32.39	1.0294						
	ACESAI	24.13	0.5713						
	ACESAI	35.56	1.2408						
	ACESAI	57.79	3.2771						
	ACESAI	38.1	1.4244						
	ACESAI	18.42	0.3329						
	ACESAI	31.12	0.9503						
	ACESAI	31.75	0.9892						
	ACESAI	53.34	2.7918						
	ACESAI	42.55	1.7766						
	ACESAI	127	15.8266						
	ACESAI	76.2	5.6976						
	ACESAI (dead)	29.21	0.8372	1.38	0.51	0.04	0.00	0.00	1.9
	ACESAI (dead)	23.5	0.5419						
	ACESAI (dead)	16.51	0.2675						
	ACESAI (dead)	15.88	0.2474						
	ACESAI (dead)	6.35	0.0396						
	Total Basal Area	**m2/ha**		**9.7 (1.4)**	**4.5 (0.5)**	**2.2 (0.04)**	**9.2**	**28.4**	**53.9 (1.9)**
				Transect Segment (m)					
Transect 3	**Species**	**DBH (cm)**	**Basal Area m2/ha**	**0-10**	**10-20**	**20-30**	**30-40**	**40-50**	**Total Basal Area m2/ha**
	ACESAI	24	0.5652	0.00	0.00	0.00	0.57	0.00	**0.6**
	Total Basal Area	**m2/ha**		**0.0**	**0.0**	**0.0**	**0.6**	**0.0**	**0.6**

Table 5.23. Woody Canopy Intercept

Sycamore Island (AES 09-0015) - Woody Canopy Intercept
6/23/2010
Samplers: J. Hendrickson, S. Quitel, M. Ruziska, L. Smith

Location	Species	Intercept (m)	Relative % Intercept
Transect 1	Acer saccharinum	39.60	81.8
50m	Ailanthus altissima	0.30	0.6
	Celtis occidentalis	0.70	1.4
	Platanus occidentalis	0.20	0.4
	Populus deltoides (dead)	0.50	1.0
	Vitis riparia	7.10	14.7
	Total	**48.40**	**100.0**
Transect 2	Acer saccharinum	83.80	90.8
100m	Vitis riparia	8.50	9.2
	Total	**92.30**	**100.0**
Transect 3	Acer saccharinum	25.80	76.6
50m	Ligustrum vulgare	0.50	1.5
	Sambucus canadensis	2.60	7.7
	Vitis riparia	4.80	14.2
	Total	**33.70**	**100.0**

Seedbank Study

Seedlings were harvested from the germination trays during late summer/fall 2009 during four harvest events: 9/12, 10/18, 11/14, and 11/29. Seedbank results are tallied and summarized in Table 5.24. Conditions were photo documented within the germination trays at the time of set-up (Fig. 5.14), and prior to Harvest 1 following approximately one month of growth (Fig. 5.15 through 5.18), and prior to Harvest 2 following an additional 45 days of growth (Fig. 5.19 through 5.22).

Figure 5.14. Seedbank study set-up, July 2009 (L-R): Test Plot 1, Test Plot 2, Control, Test Plot 3.

Fig. 5.15. Test Plot 1

Fig. 5.16. Test Plot 2

Fig. 5.17. Control

Fig. 5.18. Test Plot 3

(Fig. 5.15 through 5.18). Growth by August 26, 2009, prior to Harvest 1 (9/12).

Fig. 5.19. Test Plot 1

Fig. 5.20. Test Plot 2

Fig. 5.21. Control

Fig. 5.22. Test Plot 3

(Fig. 5.19 through 5.22). Growth by October 10, 2009 between Harvest 1 (9/12) and 2 (10/18).

Table 5.24. Seedbank summary data.

Sycamore Island Seedbank Study
Investigators: Steve Apfelbaum, Susan Lehnhardt
Data Collected: 12-Sep-2009, 18-Oct-2009, 14-Nov-2009, 29-Nov-2009

Specimen Number	Species Name	Common Name	Test Plot 1	Test Plot 2	Test Plot 3	Control	Native/ Advent	Unknown Genus/ Species	Observed Growing on SI	Notes
1	Epilobium coloratum	Willow herb	1			2	N			assume contamination from greenhouse*
2	Lindernia dubia	False pimpernel	24	19	27		N			most com. seedling in all samples suggests consistent seedbank element on SI
3	Eragrostis hypnoides	Creeping lovegrass		3	1	9	N			assume contamination from greenhouse
4	Eragrostis spectabilis	Purple lovegrass		1	1		N			low no. suggests minor element in the seedbank
5	Boehmeria cylindrica	False nettle	4		13		N		✓	high no. in TP3; indicator of higher soil moisture conditions
6	Mollugo verticillata	Carpet weed		1	1	1	A			assume contamination from greenhouse
7	Vitis sp	Grape	1				N		✓	low no. is inconsistent with the importance of Vitis in the SI plant communities
8	Cynanchum nigrum	Black swallow-wort		1			A	□	✓	potential invasive sp. ; low no. is consistent with current minor presence on SI
9	Penthorum sedoides	Ditch stonecrop	4		1		N		□	species of moist to wet conditions
10	Juncus tenuis	Path rush	69	4	64		N			high no.s of this disturb tolerant sp. in T1 and T3 compared to T2
11	Eupatorium perfoliatum	Common boneset	1	1			N		✓	high quality species
12	Ludwegia palustris	Marsh purslane	5	1	6		N			species of moist to wet conditions
13	Monocot		1					✓	□	leaf characters like Pontedaria cordata, not observed on SI
14	Hypericum perforatum	Com St. John's-wort	1	1	9		A	□	✓	potential invasive, not currently observed in large numbers
15	Rubus sp			2			N		✓	several Rubus spp. present on SI
16	Physalis heterophyla	Clammy ground cherry		6	1		N		□	common weedy native
17	Aster simplex	Panicled aster		1			N		□	species of wet conditions
18	Cyperus sp	Nutsedge			13		N	□		native graminoid
19	Salix sp	Willow			1		N	□	✓	dense willow growth occurs on south end of island
20	Carex sp	Sedge			2		N	□	□	native graminoid
21	Cardamine sp	Bitter cress			3		N	□	✓	C. pensylvanica observed growing on SI
22	Mimulus sp	Monkey flower	4	1	7		N	□	□	native forb of moist to wet conditions
23	Dicot		55		1	3		✓		basal rosette, assume contamination from greenhouse
24	Dicot		1					✓		composite characteristics
25	Dicot		3					✓		opposite leaves
26	Eupatorium rugosum	White snakeroot	1				N		✓	common species of upland degraded woods
27	Typha augustifolia	Narrow-leaved cattail		1			A			aggressive hybrid cattail
28	Erigeron sp	Fleabane	2	5	3	3	N	□		assume contamination from greenhouse
29	Carex sp	Sedge	1				N	□		native graminoid
30	Polygonum cuspidatum	Japanese knotweed			1		A		✓	low number of POLCUS seedlings identified
31	Carex sp	Sedge			9		N	□		native graminoid
32	Dicot				1			✓		fragarant, opposite leaves
33	Dicot				2			✓		shallow serrate leaves, coarse pubescence
								□		
		Total Seedlings/Plot	178	48	167	18				T3 with higest productivity (no. of seedlings) assuming contamination of T1
		Total Genus/Species/Unk	17	15	21	5	33			T3 higest no. of species (genus/sp/unknown)
		Total Native Gen/Sp	12	11	15	3	22 (67%)			T3 higest no. of native species (genus/sp)
		Total Adventive Species	1	4	3	1	5 (15%)			T2 and T3 highest no. of adventive species
		Total Unknown Gen/Sp	4	0	3	1		6 (18%)		18% of the species that emerged from the seedbank were not identified
		Total Unknown Nat/Adv	4	0	3	1	6 (18%)			18% of the species were not confirmed as native versus adventive (non-native)
		Total Observed on SI							10 (30%)	30% of species (genus, sp, or unknown) were observed growing on SI

* Seedlings were grown in AES greenhouses located at AES's Prairie Nursery, Brodhead, WI.

Of the 33 vascular plant species recorded and listed in Table 5.24, 22 (67%) are identified as native, at minimum, to the genus taxa level. Of the remaining 11, five (15%) are identified as adventive (non-native or exotic) species. The remaining six (18%) could not be identified to the level of genus or species (nor classified as native versus adventive) and thus are identified only to the level of class: monocot [emerging from the soil as a single leaf (cotyledon) as in grasses and grass-like plants such as rushes, bulrushes, lilies, etc.] or dicot [emerging as two leaves (cotyledons) as with many flowering plants].

Of the 393 seedlings harvested, only 16 (4%) were of confirmed adventive species. Test Plot 3 produced the greatest number of seedlings [167, when TP1 with 178 is adjusted for assumed contamination from the greenhouse by an unknown dicot (Specimen 23) that appeared in the Control], the highest overall number of species (21), and the highest number of native species (15). By comparison, TP1 and TP2 do not have native species numbers that appear to be significantly lower than TP3, although TP2 appears to be much less productive of seedlings than either TP1 or TP3. The highest number of adventive species was harvested from TP2, although the actual number of harvested seedlings of these species was very low (a single seedling of each species).

Of the total species, ten (30%) were observed growing on Sycamore Island. Of these, seven are native species, all of which are relatively tolerant of disturbed conditions. Three are exotic species that are or have the potential to be invasive on the Island, most notably Japanese knotweed (Specimen 30). Interestingly, only one seedling of Japanese knotweed was harvested from TP3, in spite of the abundant opportunity for seed production from the nearly monotypic cover of Japanese knotweed in each test plot. Black swallow-wort (Specimen 8) is equally uncommon, with only one seedling harvested from TP2. Common St. John's-wort (Specimen 14) was present in each TP, but with only slightly higher numbers, the highest being in TP3. In contrast, species with the highest numbers of harvested seedlings, false pimpernel (Specimen 2) and path rush (Specimen 10), were not observed conspicuously growing on the Island at the time of our site visit.

Discussion and Recommendations

Preliminary Field Reconnaissance and Community Mapping

Sycamore Island plant communities are dominated by a canopy of mature silver maple trees of multiple size classes, the largest tree encountered measured 50 inches in diameter. Significant numbers of silver maple saplings and seedlings in the understory ensure its continued dominance in the canopy. Sycamore is a minor element in the tree canopy and does not appear to have potential for increasing in the canopy in the near future. The greatest plant community diversity is found in the understory, supported in up to ten plant communities or vegetation zones, grading from wet to mesic moisture conditions. The most dynamic communities are at the shoreline and adjacent shallows, and at both the leading and trailing ends of the Island, which are subjected to the greatest impacts from flooding, erosion and deposition, and ice scour. The leading tip of the Island has the largest infestation of Japanese knotweed as a result, as well as the most extensive accumulations of organic and human generated detritus. In this sense, it serves an important filtering function for the rest of the Island. The least dynamic communities of the Island are at the highest elevations, on historic dredge spoils; and therefore, the logical location for past development activities. Evidence of this development can be seen by remnant utilities and

abandoned structures. Introduction of some non-native plant materials may have occurred during this time. Mesic conditions in this setting have allowed invasion by upland tree and shrub species including exotic invasive shrubs. The exotic shrub layer produces dense shade that reduces native species diversity and cover, and the loss of fine-rooted vegetation is one of the greatest contributors to soil instability. The abandoned barge at the southern end of the Island is the most curious cultural feature, although it represents a risk to public safety. One of the unlikely benefits of the barge is the unique aquatic plant community that has developed on fine sand deposited in the protected quiet waters immediately downstream of this structure. The highest quality community (and most aesthetically pleasing) on the Island, due to the high tree canopy and open understory, is the low terrace adjacent to the main river channel. Dredge spoils are absent and invasive species are the least represented here. The open settings at the upstream end of the Island also support plant communities more typical of open floodplains. This area supports important native species diversity and provides favored roosting habitat for large birds such as vultures observed here drying their wings.

Recommendations

1) Develop management strategies that maximize protection and enhancement of the highest quality communities and sensitive areas: the shoals and shoreline, and the Wet-Mesic Floodplain Terrace and the Wet Floodplain Forest,
2) remove and control all invasive species to reduce competition and to stimulate native species diversity and vigor for stabilizing soils and improving habitat quality,
3) train and support volunteer stewards to assist with invasive species management and prevention advocacy,
4) seek and develop partnerships with upstream land owners and land managers to reduce invasive species and thereby mitigate risk of reinvasion,
5) provide public education to increase awareness of the threat to native biodiversity by invasive species and improper land use,
6) where practicable, remove remnant structures and materials from past development to protect the public and wildlife and to enhance native plant communities and wildlife habitat,
7) reduce further soil disturbance by leaving dredge spoils intact and encouraging native vegetation to continue to develop and provide stability,
8) continue to monitor the impacts of flooding and river hydrology on shallow water habitats and organisms, particularly freshwater mussels, and
9) monitor the changes to island configuration with periodic aerial photography to compare with historic aerial imagery.

Study Transects and Test Plots

The data collected in the Test Plots and associated transects provide a baseline measure of existing vegetative conditions in representative floodplain forest settings of Sycamore Island, including areas where Japanese knotweed has colonized. The flora of the Island is currently dominated by native species common to floodplain forest communities in the Allegheny River Valley. No threatened, endangered, or rare vascular plant species were encountered during our investigation. Species more common to upland settings including oak species and invasive exotic woody species are invading or have become established, particularly on better-drained spoils, indicating a shift toward more mesic conditions in these artificially elevated settings. Of the principle disturbance processes affecting the Island's biodiversity and ecosystem health—invasion

by exotic plant species, past development, dredge spoiling, and excessive flooding impacts of the developed watershed—establishment and spread of exotic invasive species represents the most widespread disturbance pattern and, by their removal and control, perhaps the easiest and most cost effective strategy for increasing native plant diversity and habitat quality. Test Plots and study transects provide an opportunity for testing and measuring responses to treatment and management strategies and for long-term monitoring of the Island's plant communities.

Recommendations

1) Continue to periodically monitor the permanent study transects to detect trends and responses to management and invasive species control strategies,
2) establish and manage a database including all baseline data and future monitoring data, and establish Sycamore Island as a long-term research site for industrial river island ecology and recovery, and
3) invite other researchers and students to contribute to the research effort.

Seedbank Study

An important consideration in determining restoration strategies for managing Japanese knotweed on Sycamore Island, as well as the potential for increasing overall biodiversity with restoration treatments, is the content of the seedbank. Two principle questions were considered in conducting the seedbank study: 1) is there a viable native seedbank available to respond to restoration treatments, in particular removal of dense Japanese knotweed stands, and 2) are exotic invasive species including Japanese knotweed important in the seedbank, and to what degree will these species pose a long-term management risk?

Based on the results of the study, native species are well represented in the seedbank directly beneath the Japanese knotweed canopy in all Test Plots, particularly in TP3 in lower elevations in the north half of the Island. Many of the native species observed in the seedbank study (70%) were not observed to be conspicuously growing on the Island at the time of our vegetation study, suggesting that stimulation from restoration and management activities, particularly removal of competitive shading from exotic shrubs and Japanese knotweed, will likely release additional native diversity from the seedbank. In contrast, non-native species are not abundant in the seedbank, most notably Japanese knotweed, with only one seedling identified. This absence of Japanese knotweed seedlings is encouraging and suggests that removal of Japanese knotweed cover will not likely be followed by a flush of seedlings along with potential re-sprouts from surviving rhizomes. Other important exotic species that emerged in the seedbank study that have the potential to be invasive on the Island, particularly black swallow-wort and St. John's-wort, appear to be present in relatively low numbers both in the seedbank of the Test Plots and elsewhere on the Island. Several other exotic species not represented in the seedbank study are found conspicuously growing on the Island. All of these species, listed previously in Table 5.5, should be given serious consideration for management.

Recommendations

1) Remove and control exotic invasive species to protect and enhance native biodiversity and to remove the risk of increasing their importance in the soil seedbank and to optimize the native seedbank.

5.2. Aquatic Species Survey

Fish

Overview

In order to gain a better understanding of the role that Sycamore Island plays in the ecological functions and values of the larger Allegheny River, the 3 Rivers Ecological Research Center (3RERC) was consulted to (1) conduct an inventory and assessment of riverine fish assemblages in the shoreline, back channel, and main river habitats surrounding Sycamore Island and (2) conduct an in stream habitat evaluation. Alluvial river islands provide important and sensitive wildlife habitats that extend beyond shorelines to underwater areas. The shallow habitats that river islands create can increase the heterogeneity of rivers and, in terms of sustaining a fishery, provide areas for spawning, resting, hiding, and foraging. The following paragraphs describe the methods used:

1. Inventory and assessment of riverine fish assemblages in shoreline, back channel, and main river habitats surrounding Sycamore Island.

   Methods

   3RERC collected data on fish species composition, relative abundance, catch-per-unit-effort, and length distribution of catches, using the methods described below:

   Backpack Electrofishing: Using pulsed DC backpack gear (ETS unit), 3RERC biologists conducted a standardized electrofishing survey along two 300-meter reach lengths contiguous with wadeable areas of Sycamore Island's shoreline. The backpack electrofishing survey targeted small nongame species and juvenile game species. Catch data of young-of-year smallmouth bass (*Micropterus dolomieu*) will be compared to Pennsylvania index values for evaluation purposes.

   Nighttime Boat Electrofishing: Using pulsed DC boat gear (ETS unit and a 6-kilowatt Baldor generator mounted on a 20-foot Clark aluminum plate boat), 3RERC biologists conducted a standardized electrofishing survey during the evening hours along nonwadeable areas of Sycamore Island's shoreline as well as throughout the island's back channel (area between the right descending bank and the island) and in the main channel of the river near the island. The nighttime boat electrofishing surveys targeted both nongame and game species.

   Beach Seining: A 10.7-meter long by 1.8-meter tall beach seine constructed of Ace-type nylon netting with 3-millimeter mesh was fished along wadeable areas of Sycamore Island's shoreline. The beach seine survey targeted small nongame species.

   Baited Hoop Nets: Following protocols developed by the U.S. Geological Survey for the Upper Mississippi River LTRMP (*Long Term Resource Monitoring Program Procedures: Fish Monitoring*, USGS 1995), four baited hoop net sets, each set comprised of paired deployment of both a large (1.2-meter diameter hoops, 3.7-centimeter mesh size) and small (0.6-meter diameter hoops, 1.8-centimeter mesh size) hoop net, were deployed along

nonwadeable areas of Sycamore Island's shoreline as well as within the island's back channel. The standard unit of hoop netting effort will be a net-day (24 hours). Hoop net surveys will be performed over two consecutive days in August and will target catostomids (suckers) and ictalurids (catfish).

2. Evaluation of instream habitat.

Methods

3RERC biologists conducted an inventory and evaluation of instream river habitats along Sycamore Island's shoreline and in the back channel and main channel areas surrounding the island using protocols developed by the U.S. Environmental Protection Agency (*Concepts and Approaches for the Bioassessment of Non-Wadeable Streams and Rivers*; USEPA 2006). These surveys included an assessment of substrate size, degree of embeddedness, quality and quantity of large woody debris, aquatic vegetative cover, and riparian cover.

Results

A total of 32 fish species were found in the waters surrounding Sycamore Island. Of these, many popular game fish are present, such as various perch, walleye, bluegill, bass, and catfish species. Many of the species observed are known hosts to the observed mussel species as well as others.

Due to lost of funding, the 3 Rivers Ecological Research Center has been closed. A summary of management recommendations is forth coming from PA Fish and Boat Commission, due October 29, 2010.

PLACE HOLDER

Table 5.25 Sycamore Island Fisheries Data

Pennsylvania Fish and Boat Commission
2009-2010 Sycamore Island Fisheries Data
Allegheny River Section 21
Pool 2

Family / Common name	Scientific Name: Genus	Species	Length Group (mm)	9/20/2009 Back Channel Boat EF	9/20/2009 Main Channel Boat EF	10/20/2009 Back Channel Boat EF	10/20/2009 Main Channel Boat EF	9/21/2009 Back Channel Beach Seine	9/21/2009 Main Channel Beach Seine	7/9/2010 Back Channel Large Hoop Net	7/9/2010 Back Channel Small Hoop Net	7/12/2010 Main Channel Large Hoop Net	7/12/2010 Main Channel Small Hoop Net	TOTAL COLLECTED
Lepisosteidae (Gars)														
Longnose gar	*Lepisosteus*	*osseus*		1										1
Hiodontidae (Mooneyes)														
Mooneye	*Hiodon*	*tergisus*		1		1								2
Clupeidae (Herrings & Shads)														
Gizzard shad	*Dorosoma*	*cepedianum*				2								2
Cyprinidae (Minnows)														
Spotfin shiner	*Cyprinella*	*spiloptera*		6				6	5					17
Common carp	*Cyprinus*	*carpio*		6	9	9	4					1		29
Streamline chub	*Erimystax*	*dissimilis*			2									2
Emerald shiner	*Notropis*	*atherinoides*		43	63	44	12	14	66					242
Mimic shiner	*Notropis*	*volucellus*				6	2		11					19
Channel shiner	*Notropis*	*wickliffi*		1	12	4	11	1	5					34
Bluntnose minnow	*Pimephales*	*notatus*				1			11					12
Shiners < 40 mm	*Notropis*	*volucellus OR wickliffi*							4					4
Catostomidae (Suckers)														
River carpsucker	*Carpiodes*	*carpio*				3								3
Quillback	*Carpiodes*	*cyprinus*		5		4	5					1		15
Highfin carpsucker	*Carpiodes*	*velifer*		1										1
Northern hog sucker	*Hypentelium*	*nigricans*		1			1							2
Smallmouth buffalo	*Ictiobus*	*bubalus*		10	11	8	1			8	1	7		46
Silver redhorse	*Moxostoma*	*anisurum*		32	17	2	3					7	1	62
Smallmouth redhorse	*Moxostoma*	*breviceps*		11	1		5							17
River redhorse	*Moxostoma*	*carinatum*				1								1
Black redhorse	*Moxostoma*	*duquesnei*			1	1								2
Golden redhorse	*Moxostoma*	*erythrurum*		24	12	7	9					1		53
Ictaluridae (Bullhead Catfishes)														
			350			1				1				2
			375				1			3		2		6
			400				1			1		9	3	14
			425		1		1			2		8	2	14
			450									2	1	3
			475			1	4			2		7	1	15
Channel catfish	*Ictalurus*	*punctatus*	500	1								1		2
			525							1				1
			550									1		1
			575			1						1		2
			625							1				1
			650									1		1
			450		1									1
Flathead catfish	*Pylodictis*	*olivaris*	675									1		1
			700							2				2
			850							1				1
Atherinopsidae (New World Silversides)														
Brook silverside	*Labidesthes*	*sicculus*						7						7
Moronidae (Temperate Basses)														
White Bass	*Morone*	*chrysops*	250									1		1
			275							1				1
Centrarchidae (Sunfishes)														
			100		1					1				2
			125	2			1							3
Rock bass	*Ambloplites*	*rupestris*	150			1	1				1		3	6
			175	1			1				1			3
			200								1			1
			50	1										1
			75		1									1
Bluegill	*Lepomis*	*macrochirus*	150	1						2				3
			175							1			1	2
			200								1			1
			75	1	1	1	4							7
			100	2										2
			150	2			1							3
			175	2		1	3							6
			200			1								1
Smallmouth bass	*Micropterus*	*dolomieu*	225		1		1							2
			250			1	1							2
			275				2							2
			300			1	2							3
			350		1	1								2
			450				1							1
			125		1									1
Spotted bass	*Micropterus*	*punctulatus*	175								1			1
			200			1								1
			300										1	1
Percidae (Perches)														
Yellow perch	*Perca*	*flavescens*	200			1								1
Logperch	*Percina*	*caprodes*		1	2		1							4
			250	1	1	2	1							5
			275	3	1	5	1							10
Sauger	*Sander*	*canadensis*	300	1	1	3	2							7
			325	1		3								4
			350			1								1
			150	1	2	1	1							5
			175		1	1								2
Walleye	*Sander*	*vitreus*	250		1	1								2
			275			1	1							2
			300	1										1
Sciaenidae (Drums)														
			250	1										1
			275	2										2
			300	2	2	2								6
Freshwater drum	*Aplodinotus*	*grunniens*	325	1										1
			350	1										1
			550		1									1

Mussels

Methods

AES biologist and ecologists focused on opportunistic collection efforts at numerous site visits, totaling 15 informal searches for Unionid mussels on Sycamore Island from August 17, 2009 to September 9, 2010. Terrestrial area searches targeted potential midden areas and water/rack lines for shell remains. No intensive sampling efforts were conducted as they would stand above-and-beyond the scope of the project.

Figure 5.23. Threehorn wartyback (Obliquaria reflexa)

The natural structure of the lower Allegheny River consisted of wide, shallow, fast moving waters over frequent assemblages of gravel, cobble, and sand substratum. Through damming and dredging, the river has been divided into a series of pools. The pool structure has altered critical elements to north american mussel habitat by slowing flow, increasing depth, and changing substratum type in many areas (Strayer, 1993). Lock and dam structures have also impeded river navigation by many native fish species, many of which serve as hosts for the parasitic glochidia phase present in the life cycle of most Pennsylvania unionids. By deepening channels and displacing sediment- shallow water habitats with naturalized substrata are less common and often associated with the margins of an island within the river ecosystem, such as Sycamore Island. Additional representation of remaining habitat is found at the bottom of the dams where the water is shallow and fast-flowing, especially when directly associated with cobbley substratum.

Figure 5.24. Pink heelsplitter (*Potamilus alatus*)

Results

Twelve (12) Pennsylvania-native pearly mussel species (of 10 different Genus) were identified via shell remains on or around Sycamore Island. Additionally, two non-native species are present.

Table 5.26. Unionid Species Observed at Sycamore Island

Common Name	Taxonomic binomial	Global Rank	State Rank	PA Native?	# of Shells found
wabash pigtoe	*Fusconaia flava*	G5	S2	Y	22
mapleleaf	*Quadrula quadrula*	G5	S1S2	Y	35
ike	*Elliptio dilatata*			Y	3
flutedshell	*Lasmigona costata*			Y	15
giant Floater	*Pyganodon grandis*			Y	4
plain pocketbook	*Lampsilis cardium*			Y	1
fatmucket	*Lampsilis siliquoidea*			Y	14
fragile papershell	*Leptodea fragilis*	G5	S2	Y	4
black sandshell	*Ligumia recta*			Y	3
pink heelsplitter	*Potamilus alatus*	G5	S2	Y	200+
threehorn wartyback	*Obliquaria reflexa*	G5	SH	Y	19
pink papershell	*Potamilus ohiensis*	G5		Y	?
Asian clam	*Corbicula fluminea*			N	1000+
zebra mussel	*Dreissena polymorpha*			N	500+

G5	Secure - Common, typically widespread and abundant. Typically with considerably more than 100 occurrences and more than 10,000 individuals.
SH	Historical - Element occurred historically in the state (with expectation that it may be rediscovered), perhaps having not been verified in the past 20 years, and suspected to be still extant. Naturally, an Element would become SH without such a 20-year delay if the only known occurrences in a state were destroyed or if it had been extensively and unsuccessfully looked for. Upon verification of an extant occurrence, SH-ranked Elements would typically receive an S1 rank. The SH rank should be reserved for Elements for which some effort has been made to relocate occurrences, rather than simply ranking all Elements not known from verified extant occurrences with this rank.
S1	Critically Imperiled - Critically imperiled in the state because of extreme rarity or because of some factor(s) making it especially vulnerable to extirpation from the state. Typically 5 or fewer occurrences or very few remaining individuals or acres.
S2	Imperiled - Imperiled in the state because of rarity or because of some factor(s) making it very vulnerable to extirpation from the state. Typically 6 to 20 occurrences or few remaining individuals or acres.

Figure 5.25. Mapleleaf (*Quadrula quadrula*)

Figure 5.26. Wabash pigtoe (*Fusconaia flava*)

Discussion

The results of this effort suggest similar to slightly less diversity compared to existing results within the same lock and dam section of the river and other studies conducted within the Lower Allegheny watershed and Pittsburgh area. Of particular note, one species, the threehorn wartyback (Figure 5.23), previously believed to have been historically present (PANHD state ranking- SH) but locally extirpated, was found on numerous occasions at Sycamore Island. Not only were relatively fresh shells (paired) found on the island, they were located on seven different occasions over a full year, totaling 19 shells, suggesting an existing nearby population. Despite recent mussel surveys within the area, such as the Allegheny Pools Mussel Project led by the Western Pennsylvania Conservancy, this species has not been observed nearby (Source: Thomas. Experts: Sycamore Island river ecosystem 'improving'. Article in Aspinwall Herald, September 8, 2010). Recent studies (six years ago) by the Ohio River Valley Ecosystem Team of the United States Fish and Wildlife Services have revealed threehorn waryback (along with other rare species) in pools 8 and 9 (ORVE Mollusk Subgroup Meeting Minutes, USFWS, 2005). More recent studies (last year) revealed threehorn wartyback just three miles north of Sycamore Island within the Allegheny River, suggesting the re-colonization/dispersal of this species from north to south within the river.

Three different species [wabash pigtoe (Figure 5.26), fragile papershell, and pink heelsplitter (Figure 5.24)] found on the island are considered state imperiled and one species (mapleleaf) (Figure 5.25) is considered critically imperiled and a candidate for state-threatened status.

The most abundantly observed native species was pink heelsplitter with well over two hundred shells identified. Only one paired plain pocketbook was found, making this the least observed species. The invasive zebra mussel was found attached to many native mussel shells.

Habitat- The submerged substrata surrounding Sycamore Island is varied (see geotechnical map). To the west is predominantly silty sediment within the relatively shallow (2-6 feet deep), slow-moving waters of the back channel. Sediment load is thick, creating largely unfavorable habitat conditions for most PA-native unionaceans. The northern tip is largely clayey with a transition to sand, with gravel and cobble substrates emerging farther south along the eastern bank. The water is faster flowing, more clear, and deeper (6-16 feet deep) than the back channel. Dredging has contributed to steep elevation changes in some areas and catalyzed

underwater erosion and subsequently steeper transitions, thereby degrading traditional mussel habitat. An area off the northeast tip has a relatively low grade (see bathymetric map). Approximately five feet from the shore in approximately 2.5 feet depth waters, AES observed a live mussel bed containing at least three different species through passive observations. Species within this grouping are believed to be pink heelsplitter, fluted shell, and mapleleaf. In addition to the above-mentioned species, other species' shells found in the immediate vicinity include threehorn wartyback, black sandshell, fragile papershell, fatmucket, Wabash pigtoe and plain pocketbook. It is likely that relatively low grade, sandy substrate, and relatively fast flowing water in this area are contributing to the presence of mussels at this location.

While more intensive survey methods, such as quantitative methods, will reveal detailed information regarding the actual locations and densities of mussels (Smith et. al., 2001) within the waters around the island, the crude, qualitative methods exercised were valuable in understanding the composition of species (Metcalfe-Smith et. al., 2000). Efforts were conducted while performing other duties on the island, significantly reducing cost.

Recommendations

Applied Ecological Services, Inc. does recommend that a more intensive mussel survey be conducted, especially near the concrete structures that extend into the water on the southern section of the back channel shoreline. Large rocks within the river system have a higher probability of supporting mudpuppy (*Necturus maculosus*), the host species for the federally endangered salamander mussel (*Simpsonaias ambigua*). Natural boulders and bedrock are present within the same braid of river along the main shore across from Nine Mile Island, suggesting the historic presence of large rock material within this area prior to anthropogenic alterations. The presence of habitat for mudpuppy, and the occasional capture of a few by fisherman every year in the Allegheny, point to the potential presence of both mudpuppy and the parasitic salamander mussel.

Macroinvertebrates

While a detailed aquatic insect study was beyond the scope of the project, general observations were made specific to macroinvertebrate habitat and presence on and around the island.

Methods

On various trips, AES biologist and ecologists would examine the coast surrounding Sycamore Island with a special focus on areas that differ in water depth, substrate type, and water velocity. Areas with rock and cobble were searched by flipping rocks, catching escaping individuals from the water and examining the rocks for insects. Areas with. sediment-laden sections were searched less intensively, but samples of sediment were sifted through in attempts to locate aquatic insects.

Figure 5.27. Odonate instar on main channel bank. Pebble substrate with coarse woody debris

Results

Species were observed from at least five different Orders (Trichoptera, Zygoptera (sub-Order), Anisoptera (sub-Order)(Figure _ top), Ephemeroptera, and Coleoptera,). No species observed are directly associated with waters of high-quality. All species observed are tolerant of pollution present within mid-low quality streams. Large numbers of damselfly and dragonfly adults were observed along the margins of the main channel bank where larval populations were most present for both groups. Caddisflies (Trichoptera) were most abundant in cobbly to rocky substratum along the main channel bank. In late-June an explosive population of mayflies (Ephemeroptera) inhabited all margins of the island. Exoskeletons from larval molting were evident en masse within all surrounding waters as well.

Figure 5.28. Pebbly/sandy habitat at NE shoreline. The present of coarse woody debris further enhances aquatic insect habitat in this area.

Discussion

Varying substrate, water depth, water flow velocity, and coarse woody debris presence all contribute to varying habitats for different macroinvertebrate groups in the shallows surrounding the island. AES observed an abundance of a select number of species, indicating low species-richness, but significant suitable habitat for aquatic insect development

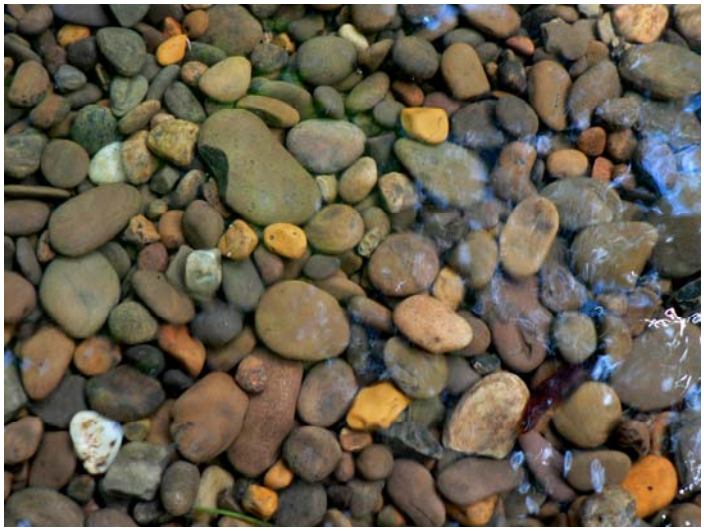


Figure 5.29. Pebble/stone over sand in shallow areas along main channel. Numerous Trichoptera found here.

Recommendations

1) Develop a children's educational program that involves searching for aquatic insects, catching them, and identifying them under a field magnifier before releasing them, and
2) conduct a more intensive aquatic insect survey with formal survey techniques including, kick net, dip net, and dredge analysis sampling methods. Attempt to engage a local educational facility (college grad student, undergrad curriculum field class) or hire a biological consultant.

5.3. Vertebrate Surveys

Herpetofauna

Introduction

Herpetofauna, or reptile and amphibian species, are ectothermic, relying on external heat sources to complete metabolic functions such as critical digestive, circulatory, and respiratory activity. Due to this intimate dependency upon external heat sources, such as the sun, these animals have a critical dependency upon particular components within their habitat to ensure survival through weather, climate, and seasonal variations. Applied Ecological Services, Inc. has exercised basic, yet effective survey methods to determine the presence or absence of herpetofaunal species on Sycamore Island.

Methods

Four different survey methods were used to characterize the herpetofauna presence on Sycamore Island. Reptiles and amphibians are often difficult to survey due to their highly secretive nature and ability to remain hidden for long periods of time. Many environmental parameters, such as ambient temperature, precipitation, soil moisture, relative humidity, light intensity, wind, and season greatly influence reptile and amphibian activity patterns (Vogt and Hine, 1982; Zappalorti, unpublished data).
Due to the cryptic nature of these animals, a variety of survey methods were executed to enhance the probability of accurately representing the herpetofaunal population on Sycamore Island. The following methods were used:

Random Opportunistic Sampling (ROS)
This method is a simple practice for a professional herpetologist. It involves gathering data via searches that do not have a time or area restriction and may be conducted while performing other duties onsite. A strong attribute of this technique is developing qualitative impressions of abundance and habitat use that may suggest the need for more specific survey efforts and revealing critical habitat areas. This method is best used as a supplement to other, more specific survey methods.

Time (and area) Constrained Surveys (TCS)
This method involves identifying a specific area (typically defined by existing borders, habitat type, or other) and systematically searching all potential hiding places within this area over a set amount of time. Open areas are searched for basking snakes and turtles while artificial cover, rocks, and fallen logs are carefully flipped and investigated for hidden fauna. Time constraints limit over-searching an area and causing too much disturbance. Dates chosen for this method often coincide with a critical behavior event of a target species (ex. open sandy hills near water searched during turtle nesting season). This method is highly effective.

Amphibian Calling Survey
Many frog and toad species rely upon vocalization by males to initiate breeding events. During the right time of the season and in suitable breeding habitats, males will sing their respective calls in an attempt to attract females to the breeding location, a body of water. This offers scientists a unique opportunity to sample both species diversity and abundance at a centralized

location. While estimating relative abundance of individuals is less reliable than other methods of determination, this unobtrusive method is extremely valuable when determining presence/absence and critical habitat evaluations.

Pitfall Trapping

Pitfall traps are an extremely valuable method of sampling many animal groups, including reptiles and amphibians. By estimating the most likely areas for species to travel through (considering seasonal and surrounding habitat factors), a surveyor can place arrays of buckets in the ground aimed to catch animals that encounter it by way of pitfall. Silt fencing is used to guide animals to the traps. Traps are checked every 24 hours when open to minimize stress on captured animals.

Results

Surveys were conducted in August and September, 2009, March through July 2, 2010, and a brief visit in September, 2010. A total of 11 field visits were made with a focus on herpetofauna. Combined efforts yielded six species. These are green frog (*Lithobates clamitans melanota*), bullfrog (*Lithobates catesbeiana*), American toad (*Bufo americana*), snapping turtle (*Chelydra serpentina*), red-eared slider (*Trachemys scripta elegans*), and spiny softshell (*Apalone spinifera*). Additionally, a potential map turtle (*Graptemys geographica*) was observed basking southwest of the island on a fallen tree along the mainland shore. It was very distant, but seemed to have the characteristic overlapping vertebral scutes and contour-like patterning on the skin of the neck and sides of face. Photographs taken are un-confirmable. This a species that was once common in these waters, but has not been sighted recently within the Lower Allegheny.

Random Opportunitistic Survey

Below is a table of all species observed during Random Opportunistic Survey efforts.

Table 5.27 Species Observed During ROS

Common Name	Taxonomic Binomial	# of Individuals	Date(s) Observed
northern green frog	*Lithobates clamitans melanota*	13	8/20/2009, 4/15,4/16/6/1, 7/1/2010
bullfrog	*Lithobates catesbeiana*	1	9/18/2009
American toad	*Bufo americana*	1	9/9/2010
common snapping turtle	*Chelydra serpentina*	2	4/15, 6/2/2010
red-eared slider	*Trachemys scripta elegans*	6	9/18/2009, 4/15, 6/1, 7/1/2010
spiny softshell turtle	*Apalone spinifera*	30+	8/20, 9/18/2009, 4/15, 4/16, 6/1, 6/2, 7/1, 7/2/2010

Time Constrained Surveys

On different occasions, surveys were conducted to intensively search specific sections of the Island. Survey areas included: the southern tip to the barge (from bank to bank), central western area (near pool) where coarse woody debris is present, pebble beach along the eastern

bank (a potential site for nesting turtles), and the northern tip and perimeter of the rack line where significant woody debris exists. Efforts resulted in sparse observations of green frog and, spiny softshell turtles.

Amphibian Calling Surveys

ACS surveys were conducted on April 16, June 1, and July 1, 2010. Due to no natural onsite ponds, pools, or wetlands, survey locations were at the remnant pool structure and the shoal in the south section along the back channel. Shorelines were walked quietly with frequent stops and three minute listening intervals to characterize the use of any semi-protected waters of the Allegheny River (other than the shoal) by breeding amphibians. Only one green frog was observed calling from the pond location on June 1, 2010. Northern gray treefrogs (*Hyla versicolor*) were heard calling from across the backchannel on June 1, 2010. Despite individual northern green frogs found in the shoal, no frogs were attempting to call from this location. No toads were observed attempting to breed on the island, despite a late-summer observation of a small adult American toad.

Pitfall Traps

Two trapping events were conducted. A total of six, five-gallon buckets were placed in locations on the island (See map). Due to the need for regular checking and the relative remoteness of the location, these traps were opened for 24 hour events each time. Locations were selected near significant course woody debris or water structures. No reptiles or amphibians were captured during these two survey events.

Discussion

Test digs by gravid female soft shell turtles and nests within the main channel bank in June have suggested critical nesting habitat for the spiny soft shell on the Island. There is sparse representation of amphibians onsite. This is likely due to the lack of breeding habitat. There is no area on the island where flood waters puddle and sustain an ample hydroperiod and seasonal alignment to support breeding activity. The lack of frogs and toads likely has a negative impact on snake and bird diversity as well.

Figure 5.30. Spiny soft shell turtle

No snake species were found on the island after ample survey effort. This suggests no overwintering, nesting, rookery, or preferred foraging habitat present on the island for potential snake species. It is our professional opinion that a variety of snake species may be opportunistically observed on the island, despite the lack of observed species during the surveys. The property is a forested island within a complex river system, allowing the possibility for seasonal movements of herpetofauna, even if only brief. With a tributary stream outflow nearby, species such as northern water snake (*Nerodia s. sipedon*), queen snake (*Regina septemvittata*), eastern garter snake (*Thamnophis s. sirtalis*), Lithobatid frogs, riverine salamanders (hellbenders and mudpuppies), and northern gray treefrog (*Hyla versicolor*) are all possible occurrences on or near the Island. An unconfirmed observation of a map turtle

(*Graptemys geographica*) basking on a river drifted dead tree suggests the potential for this regionally declined species of river turtle as well.

The most common reptile on the island is the spiny soft shell turtle. The rocky shore of the main channel bank provides open, sunny locations suitable for early afternoon basking by adults and nesting habitat. Test digs (Figure 5.34) in the banks and hatch-year spiny soft shell turtle (Figure 5.33) in the shallows strongly suggest this bank as critical breeding habitat. Muddy banks of the back channel provide ideal basking conditions in the late afternoon and can often be observed in numbers along this bank.

Figure 5.31. Test dig in rocky shore along main channel favored by spiny soft shell turtles.

Other islands within the Allegheny support hybrid populations of Fowler's x American toad. The lack of ponded/ephemeral pooling, significant presence of rock and river stone from dredge spoil dumping,
closed overstory canopy, and largely invaded/altered understory contribute to the absence of breeding populations of Bufonids on the Island. On September 9, 2010, a young adult American toad (*Bufo americana*) was located on the island. Its presence suggests that Sycamore Island is within the range of an existing breeding population and is subject to transient presence of these toads (and, likely, other herpetofauna). The creation of suitable breeding habitat on the island will likely be colonized and used within a relatively short period of time. Amphibians are well situated within the middle of the food web. Promoting amphibian abundance on the island will theoretically control insect populations (including mosquito) and provide food for numerous animals, such as small and medium-sized mammals, snakes, turtles, other amphibians, and birds.

Prolonged trapping events (greater than 24 consecutive hours) would significantly increase the probability of capturing onsite terrestrial fauna. The general paucity of herpetofauna on the island does not suggest the need for a more intensive pitfall trapping event.

Recommendations

1) Create suitable habitat for pool-breeding amphibians by incorporating pond creation into pool structure design or other construction element,

2) develop a citizen science effort to annually conduct amphibian calling surveys through the North American Amphibian Monitoring Program (NAAMP),

3) if ponded area is created, coordinate with Dr. Brady or other scientist/herpetologist to evaluate the use and rate of colonization by amphibian species. This can be an educational opportunity (signage) and have academic/publishable implications regarding habitat management for amphibians, and

4) encourage opportunistic encounters with snakes and other herpetofauna by ALT staff and the public to be documented via an observation log at a kiosk on the island. Encourage photography of observed animals.

Mammals

Onsite mammals were opportunistically observed while performing visual encounter surveys and other duties on the island. Efforts to search for herpetofauna often reveal the presence or evidence of small mammals. The onsite pitfall trapping effort contributed to this examination of small mammals onsite.

Table 5.28. Summary of Mammal Observations

Common Name	Taxonomic Binomial	Observational Notesa
raccoon	*Procyon lotor*	roosting in large silver maple in center of island
eastern gray squirrel	*Sciurus carolinensis*	Numerous. nesting on island
white-tailed deer	*Odocoileus virginianus*	transient
American mink (potential)	*Neovison vison*	Cavity in main channel shore has weasel-family tracks
muskrat	*Ondatra zibethicus*	foraging in back channel. Middens on island
North American beaver	*Castor canadensis*	evidence of relatively recent tree girdling

There is a raccoon family, gray squirrels, and transient deer. Potential and/or un-confirmed species include muskrat (tracks, no huts) and mink (small cavities along main channel slope with small, weasel-like prints). Beaver evidence exists on the island in the form of tree girdling and young tree removal. Pitfall trapping efforts and visual encounter surveys did not reveal any small mammals onsite. Although un-observed, it is likely that there is some presence of small mammals, such as white-footed mice, shrew species, and/or mole species.

Recommendations

If there arises a need or desire to further understand mammal activity onsite, the following efforts are recommended. Otherwise, no specific effort to sample mammals is necessary for existing goals.

1) Obtain collection permit and deploy baited Sherman traps to sample small mammal population,
2)conduct more intensive pitfall trapping exercise to supplement Sherman trap effort, and
3) install a motion camera along game trail to detect movement by medium-sized mammals.

5.4. Avian Species Survey

Introduction

A variety of avifaunal surveys were conducted on and around Sycamore Island in an attempt to characterize bird presence. Survey types used were breeding passerine, migratory passerine and migratory waterfowl surveys. Below you will find brief a description of each selected survey method. A table consisting of all the birds observed will contain data from the combined survey efforts.

A breeding passerine bird survey was conducted on June 3 and July 1, 2010. Migratory passerine surveys were conducted on August 20, 2009; September 19, 2009; April 14, 2010, and April 15, 2010. Migratory waterfowl surveys were conducted on November 4, 2009, and March 10, 2010.

Figure 5.32. A great blue heron (*Ardia herodias)* in fall resting by back island channel after feeding.

Methods

Breeding

Point Count Breeding Bird Survey- Methods for sampling the breeding bird population at Sycamore Island followed the USGS North American Breeding Bird Survey Protocol with specifications detailed by the Pennsylvania Game Commission. Activity codes are derived from the Pennsylvania Breeding Bird Atlas Breeding Codes. Survey points were selected along a bisecting transect (N-S) through the center of the island. The duration of each sample was divided into three periods, starting with the first three minutes, the subsequent two minutes, and the final five minutes. This data collection method is comparable to the Pennsylvania breeding bird atlas data and other formalized breeding bird data sets (Ralph et al. 1995, PAGC, 2010). Points are sampled within the first four hours of daylight when singing birds are most conspicuous. At each point, the observer documents all species detected as well as individual locations relative to the observer. Counts should not be conducted in periods of heavy rain or high wind speeds. While moving as quietly as possible, the observer travels from one point to the next. Any additional observations made while walking between sample points is documented.

Figure 5.33. Chestnut-sided warbler (*Dendoica pennsylvanica)* in fall/non-breeding plumage in willows at southern tip of island.

Migration

Passerine Migration – Surveys were conducted within the peak migration window for northbound (spring) and southbound (fall) migrants. Climate and weather conditions were considered as well to maximize the potential to sample on days when good representations of migrant birds were likely present. Surveys may be conducted within the first 8 hours of daylight. Approximately 5 hours of search effort was exerted during each migratory passerine survey day. Efforts consist of meandering about the island in a quiet fashion, using both

visual and audible cues to find and identify migrant birds. Many migrant birds do not sing or sing infrequently (especially during the fall migration when many wood warblers are already in fall/non-breeding plumage) while foraging. For this reason, it is critical that the observer(s) have a strong background in bird identification skills (including varying ages, dimorphism, and associated plumages) and field experience. Mixed migrant flocks often move quickly through the tree canopy and only offer brief opportunities for identification. That said, this method is a valuable tool in recognizing the value of a site as stop-over habitat for migrants, but the species richness is variable from day to day and, often, from observer to observer.

Waterfowl – Two site visits were conducted during peak migration times for waterfowl in western Pennsylvania. In addition to sampling from the island, searches were conducted by boat and from strategic locations along the river to the north and south of the island with a high-powered spotting telescope.

Materials

The principal observer, Michael J. McGraw, used Kowa 10.5X roof prism binoculars at all survey events. A 12.5 – 60X Kowa Prominar angle-lens spotting telescope was used for waterfowl surveys and opportunistically as needed (i.e. confirming a breeding songbird on a nest in the overstory tree canopy). The Sibley Guide to Birds was kept with the observer and referenced as needed. Data sheets used for the point count breeding bird survey mimicked the Pennsylvania Game Commission Breeding Bird Protocol data sheet labeled "**FORM** Wind-70008-BBPC-1".

Results

A total of 116 bird species (excluding three domesticated waterfowl) were observed between August 9, 2009 and July 1, 2010. Thirty-five species were confirmed breeding on the island. Thirteen additional species are considered probable breeders on the island and 12 others are possible (as per the PA Breeding Bird Atlas Breeding Codes). All other bird species were observed in migration or passing through the area without any observed significant connection to Sycamore Island (See Table 5.28. Bird Observations).

Discussion

Breeding Birds – The composition of birds observed breeding and potentially breeding is to be expected for the habitat available, surrounding landscape, and geographic location. Willow flycatcher (*Empidonax traillii*) is considered a Species of Maintenance Concern within Pennsylvania (PAGC Wildlife Action Plan 2007) and the Ohio Hills Region (Physiographic Area 22) (Rosenberg and Dettmers 2004). This means that the species is experiencing a declining trend in population throughout the continent and efforts must be made to reverse or stabilize this trend. The suitable breeding habitat on the island for willow flycatcher is located near the northern tip of the island. This area is significantly encroached upon by Japanese knotweed. Removal of this invasive species and native restoration efforts will increase suitable nesting habitat for willow flycatcher on the island. Scarlet tanager (*Piranga olivacea*) was observed on the island as well. This species shares a similar conservation status as the willow flycatcher. A more interior forest breeder, the scarlet tanager may nest within the hardwoods around the center of the island, but was not confirmed. Efforts to minimize fragmentation and promote canopy continuity will encourage this species to breed on the island.

Figure 5.34. Active Canada goose (*Branta canadensis*) nest on central-western part of island. Canada goose is nesting throughout the island.

Waterfowl - The backchannel and southwest shoal/southern tip play a valuable role for migrating waterfowl, providing shelter and food sources. In the three rivers area, the highlights of winter birding are largely centered around the rivers. The occasional songbird vagrant, early spring migrant, late fall migrant, or irruptive northern species attract local birders, but the waterfowl, gulls, and raptor of the rivers and riparian areas are reliably diverse every winter. Various waterfowl assemblages are sighted in small groups along the rivers throughout the

winter months (November – March). Some of the highlights observed by local bird watchers of species that were not captured in our winter waterfowl surveys include:
- canvasback (2), Allegheny River, near Nine Mile Island, Pat McShea 1/16
- red-throated loon (1), Ohio River, Dashields, Mark Vass 11/22

Despite most waterfowl moving in (relatively) small groups as they pass through the Pittsburgh area, the three rivers region is significant as a safe corridor for transit, shelter, and foraging in migration. All of the above mentioned waterfowl species and others can be potentially viewed from the island in the winter months.

Recommendations for Birds

There is significant potential to manage the island for increasing the breeding bird diversity. Bird types that may benefit from suggested management practices include; wading birds (nesting colony), raptors (bald eagle, osprey), and wood warblers and other passerine/songbirds.

Wading Birds- Islands situated in larger rivers often are colonized by wading birds, such as the great blue heron, green heron, black-crowned night heron, and great egret. These animals build shallow stick nests anywhere from 6 to 75 feet from the ground, typically in groupings, or colonies, however sometimes solitary. These colonies are very sensitive to human disturbance and an increased predation risk results from un-balanced ecosystems (dense populations of medium-sized mammals). In its current state, the island has potential to be colonized. Populations of breeding wading birds within western Pennsylvania are limited and not inclined to expand rapidly or require additional areas for colonization. Current conservation efforts are geared towards protecting and enhancing the existing colony habitats, but a proactive approach to enhancing potential nesting habitat is encouraged, due to the scarcity of forested island habitat and this bird group's preference of this habitat for critical breeding behavior. With limited suitable habitat considered a key reason for wading bird population declines (Parnell et. al., 1988), making Sycamore Island an inviting place for nesting wading birds is highly recommended.

Figure 5.35. Young female cooper's hawk (*Accipiter cooperii*) perched in silver a silver maple near stick nest on NW part of island.

Raptor – Bald eagles are expanding in range and population throughout many sections of the United States, including western Pennsylvania. Three juvenile bald eagles and one adult were observed within one mile of Sycamore Island during various survey efforts (See Table). With

new nesting territories being established every year, it makes sense to ensure the suitability of nesting bald eagles on Sycamore Island. By minimizing human presence during the nest building period (Dec-early March) and observing any activity, ALT can determine if bald eagles attempt to nest on Sycamore Island. If nest building and courtship occurs, other access restrictions should be heeded to ensure success of the nest. Promoting the existing growth of sycamore and cottonwood trees will further increase habitat suitability, as both species are commonly used for nest trees (Buehler, 2000). A bald eagle pair could potentially begin nesting on Sycamore Island as early as this winter 2010. The island also provides optimal perch-foraging habitat for many raptor, especially bald eagle and osprey, which spend much time perch-foraging, preening, resting, and protecting territory from tall riparian-zone trees.

Wood Warblers and other Passerine – Songbirds inhabit all vertical strata of the forest (groundstory, understory, overstory, open sky) and different species have adapted to co-exist with each other by dividing this strata into different structural foraging and nesting zones (i.e. trunk vs. limbs for foraging, different species of woody shrubs for nesting). This creates a complex mosaic of species within any given forest section. ALT has the unique opportunity to sculpt the existing habitat to encourage the healthiest and most representative compilation of birds on the Island. That said, some 'low-hanging fruit' exists for habitat enhancement and species-specific promotion. By removing Japanese knotweed from the island and restoring the understory to native woody shrubs and forbs, this will expand the potential nesting and foraging space available for numerous species currently nesting and foraging on the island. There are two species of wood warbler, the yellow-throated warbler (*Dendroica dominica*) and the cerulean warbler (*Dendroica caerulea*) that are locally present, but rare. These wonderfully colorful neotropical migrants are the source of attraction for many birders within the Pittsburgh area. Confirmed presence will be awarded with recognition by both public and scientific entities and serve to promote the island and ALT's mission. Both species breed within riparian-zone forests, which are found on Sycamore Island. Neither species were observed in migration or breeding surveys. Both species often nest in tall, broadleaf trees (specifically sycamore trees) near water in western Pennsylvania. By ensuring the health and continued growth of the sycamore trees on the island, specifically the cluster of similarly aged trees in the central/eastern section of the island (just southeast of the pool structure), the likelihood of having these species nest on the island will increase.

Table 5.28. Bird Observation

Alpha Code	Common Name	Taxonomic Binomial	Date(s) Observed	Survey Type Observed Within	Behavioral Observations	Observed in Migration	Breeding Behavior Observed	Breeding Status
COLO	common loon	*Gavia immer*	3/10/2010, 4/15/2010	MW, MP	In flight low over AR	Y		None
HOGR	horned grebe	*Podiceps grisegena*	3/10/2010	MW	Foraging at tip of 9 mi. Island	Y		None
PBGR	pied-billed grebe	*Podylimbus podiceps*	3/10/2010	MW	N tip of 9mi island	Y		None
DCCO	double-crested cormorant	*Phalacrocorax auritus*	8/09/2009, 9/18/2009, 3/10/ & 7/1/2010	ALL	Many foraging and basking on snags, riverbanks, and docks	Y		None
GBHE	great blue heron	*Ardea herodias*	8/09, 9/18, 11/4/ 2009 & 3/10, 4/15, 4/16, 6/2/ & 7/1/2010	All	Nesting colonies nearby, but not on island	Y		None
GREG	great egret	*Adrea alba*		MW, MP	Flyover and stalk-foraging along margin	Y		None
GRHE	green heron	*Butorides virescens*	9/18/2009, 4/16/2010	MP, BP	flushed from island, foraging on main shore	N	X	Possible
TUSW	tundra swan	*Cygnus columbianus*	3/10/2010	MW	Lift-off from AR/ Stop-over	Y		None
CAGO	Canada goose	*Branta canadensis*	8/09, 9/18, 11/4/ 2009 & 3/10, 4/15, 4/16, 6/2/ & 7/1/2010	ALL	Nesting on Island, foraging in shoal	Y	ON, NE, NY, FL	Confirmed
	Canada goose X barnyard goose hybrid	----------	4/15 & 4/16/2010	MP	In AR along 9 mi. Island shore	N		N/A
WODU	wood duck	*Aix sponsa*	6/2/2010	ALL	Many. Observed with young	N	FL	Confirmed
MALL	mallard	*Anas playrhincos*	6/2/2010	ALL	Many. Nesting on Island	N	FL	Confirmed
ABDU	American black duck	*Anas rubripes*		MW	Few in area	N	X	Possible
ABDH	American black duck X mallard hybrid	*Anas rubripes X platyrhincos*		MW		N	X	Possible
----------	domestic mallard	----------		MW		N		None
----------	domestic muscovy	----------		MW		N		None
AMWI	American wigeon	*Anas americana*	3/10/2010	MW		Y		None
NOSH	northern shoveler	*Anas clypeata*		MW		Y		None
BWTE	blue-winged teal	*Anas discors*		MW		Y		None
GWTE	green-winged teal	*Anas crecca*		MW		Y		None
RNDU	ring-necked duck	*Aythya collaris*	3/10/2010	MW		Y		None
LESC	lesser scaup	*Aythya affinis*	11/4/2009	MW		Y		None
BLSC	black scoter	*Melanitta nigra*	11/4/2010	MW		Y		None
COGO	comon goldeneye	*Bucephala clangula*	11/4/2010	MW		Y		None
BUFF	bufflehead	*Bucephala albeola*	11/4/2009 & 3/10/2010	MW		Y		None
HOME	hooded merganser	*Lophodytes cucullatus*	11/4/2009 & 3/10/2010	MW		Y		None
COME	common merganser	*Mergus merganser*	11/4/2009 & 3/10/2011	MW		Y		None
RBME	red-breasted merganser	*Mergus serrator*		MW		Y		None
RUDU	ruddy duck	*Oxyura jamaicensis*		MW		Y		None
TUVU	turkey vulture	*Cathartes aurus*	6/2/2010	ALL	Roosting in open, sugar maple area		X	Possible
SSHA	sharp-shinned hawk	*Accitpiter striatus*		MP	In migration in fall			None

Table 5.28. Bird Observation

Alpha Code	Common Name	Taxonomic Binomial	Date(s) Observed	Survey Type Observed Within	Behavioral Observations	Observed in Migration	Breeding Behavior Observed	Breeding Status
COHA	Cooper's hawk	*Accipiter cooperii*	6/2/2010	ALL	Potential nest in NW sect. of island		T	Probable
RSHA	red shouldered hawk	*Buteo lineatus*		MP	In migration in fall			None
BWHA	broad winged hawk	*Buteo platypterus*		MP	In migration in fall			None
RTHA	red-tailed hawk	*Buteo jamaicensis*	6/2/2010	ALL	Potentially nesting on 9 mi island			None
BAEA	bald eagle	*Haliaetuus leucocephalus*	11/04/2009 & 3/10/2010	MW	Wintering birds observed			None
OSPR	osprey	*Pandion haliaetus*	11/04/2009 & 3/10/2011	MW	In migration in fall and spring			None
MERL	merlin	*Falco columbarius*	11/4/2010	MW	Foraging in migration	Y		None
AM.KE	American kestrel	*Falco sparverius*	4/14/2010	General	Foraging			None
PEFA	peregrine falcon	*Falco peregrinus*	9/18/2009	General	Low flying over AR			None
AMCO	American coot	*Fulica americana*	3/10/2010	MW	Near NE bank in river near exposed roots of Acer saccharinum	Y		None
KILL	killdeer	*Charadrius vociferus*	4/15, 6/2/2010	MP, BP	SE part of island on ground/ Flyover		X	Possible
SOSA	solitary sandpiper	*Tringa solitaria*		MP		Y		None
SPSA	spotted sandpiper	*Actitis macularia*	4/15, 4/16/2010	MP	Foraging along sediment-laden west bank	?		None
RBGU	ring-billed gull	*Larus delawarensis*	8/09, 9/18, 11/4/ 2009 & 3/10, 4/15, 4/16, 6/2/ & 7/1/2010	ALL		Y		None
HEGU	herring gull	*Larus argentatus*	8/09, 9/18, 11/4/ 2009 & 3/10, 4/15, 4/16, 6/2/ & 7/1/2010	ALL	Likely of the breeding colony approximately 3 miles downriver	N		None
MODO	mourning dove	*Zenaida macroura*	6/2/2010	ALL	Nesting on island	N	CN, FL	Confirmed
ROPI	rock pigeon	*Columba livia*	6/2/2010	ALL	Flocking over river	N		None
CONI	common nighthawk	*Chordeiles minor*	6/2, 7/1/2010	BP	Likely breeding on rooftops in Balwnox river-front industrial section	Y	X	Probable on rooftops nearby
CHSW	chimney swift	*Chaetura pelagica*	8/09/2009, 4/15, 4/16, 6/2, & 7/1/2010	MP, BP	Foraging and flying over AR and SI	Y	X	Probable on buildings nearby
RTHU	ruby-throated hummingbird	*Archilochus colubris*	9/18/2009, 4/15, 4/16, 6/2, & 7/1/2010	MP, BP	Often perched at snag east of picnic table	Y	NB	Confirmed
BEKI	belted kingfisher	*Ceryle alcyon*	8/09, 9/18, 11/4/2009, 4/14, 6/1/2010	MP, BP	Nest cavities along the southeast bank near barge	N	NB (cavity maintenance)	Confirmed
RBWO	red-bellied woodpecker	*Melanerpes carolinus*	8/09, 9/18, 11/4/ 2009 & 3/10, 4/15, 4/16, 6/2/ & 7/1/2010	ALL	Nesting on island		T, FL	Confirmed
DOWO	downy woodpecker	*Picoides pubescens*	8/09, 9/18, 11/4/ 2009 & 3/10, 4/15, 4/16, 6/2/ & 7/1/2010	ALL	Nesting on island		C,P,CF, Copulation	Confirmed
HAWO	hairy woodpecker	*Picoides villosus*		All			C,P	Probable
NOFL	northern flicker	*Colaptes auratus*	8/09, 9/18, 11/4/ 2009 & 3/10, 4/15, 4/16, 6/2/ & 7/1/2010	ALL	Nesting on island		T	Confirmed

Table 5.28. Bird Observation

Alpha Code	Common Name	Taxonomic Binomial	Date(s) Observed	Survey Type Observed Within	Behavioral Observations	Observed in Migration	Breeding Behavior Observed	Breeding Status
PIWO	pileated woodpecker	*Dryocopus pileatus*		ALL	Seemingly foraging on island and nesting in hjigher elevation along eastern river bank		X	Possible
EAWP	eastern wood pewee	*Contopus virens*		MP, BP			T	Probable
WIFL	willow flycatcher	*Empidonax traillii*		BP	On territory in habitat (north tip)	N	T, CF	Confirmed
EAPH	eastern phoebe	*Sayornis phoebe*		MP, BP			X	Possible
GCFL	great-crested flycatcher	*Myiarchus crinitus*		MP, BP		Y	T	Probable
EAKI	eastern kingbird	*Tyrannus tyrannus*		MP, BP		Y	T	Probable
REVI	red-eyed vireo	*Vireo olivaceous*		MP, BP			T, A, ON	Confirmed
WAVI	warbling vireo	*Vireo gilvus*	6/2/2010	MP, BP			T, NB, FL	Confirmed
BHVI	blue-headed vireo	*Vireo solitarius*		MP	In migration			None
BLJA	blue jay	*Cyanocitta cristada*	6/2/2010	ALL			T, A, FL	Confirmed
AMCR	American crow	*Corvus brachyrhyncos*	8/09, 9/18, 11/4/ 2009 & 3/10, 4/15, 4/16, 6/2/ & 7/1/2010	ALL			ON	Confirmed
NRWS	northern rough-winged swallow	*Stelgidopteryx serripennis*	6/2/2010	MP, BP	Male bringing food to nest cavity and removing fecal sacs	Y	CF, NY	Confirmed
BKSW	bank swallow	*Riparia riparia*	8/9/2009	MP	Foraging over AR near 9 mi Island			
TRSW	tree swallow	*Tachycineta bicolor*	8/9/2009,	MP				
BNSW	barn swallow	*Hirundo rustica*	8/9/2009,	MP, BP				
BCCH	black-capped chickadee	*Poecile atricapillus*	8/09, 9/18, 11/4/ 2009 & 3/10, 4/15, 4/16, 6/2/ & 7/1/2010	ALL	Singing in center of island	N	P, A	Probable
CACH	Carolina chickadee	*Poecile carolinensis*	8/09, 9/18, 11/4/ 2009 & 3/10, 4/15, 4/16, 6/2/ & 7/1/2010	ALL	Adult male carrying food to nest with begging young in willow cavity	N	CF, NY	Confirmed
TUTI	tufted titmouse	*Baeolophus bicolor*	8/09, 9/18, 11/4/ 2009 & 3/10, 4/15, 4/16, 6/2/ & 7/1/2010	ALL		N	A, Copulation	Confirmed
WBNU	white-breasted nuthatch	*Sitta carolinensis*		ALL			ON (cavity)	Confirmed
BRCR	brown creeper	*Certhia americana*		MP			O	Observed
CAWR	Carolina wren	*Thyrothorus ludoviscianus*	6/2/2010	ALL			ON, A, T	Confirmed
HOWR	house wren	*Troglodytes aegon*		ALL			T	Probable
GCKI	golden-crowned kinglet	*Regulus satrapa*		MP				None
RCKI	ruby-crowned kinglet	*Regulus calendula*		MP				None
BGGN	blue-gray gnatcatcher	*Polioptila caerulea*		MP, BP			X	Possible
EABL	eastern bluebird	*Sialia sialis*		MP, BP				Observed
AMRO	American robin	*Turdus migratorius*	8/09, 9/18, 11/4/ 2009 & 3/10, 4/15, 4/16, 6/2/ & 7/1/2010	ALL			ON, FL	Confirmed
WOTH	wood thrush	*Hylocichla mustelina*		MP, BP			T	Possible
SWTH	Swainson's thrush	*Catharus ustulatus*		MP				None
HETH	hermit thrush	*Catharus guttatus*	4/15/2010	MP				None
GRCA	gray catbird	*Dumetella carolinensis*	6/2/2010	ALL			ON, CF, CN, FL	Confirmed

Table 5.28. Bird Observation

Alpha Code	Common Name	Taxonomic Binomial	Date(s) Observed	Survey Type Observed Within	Behavioral Observations	Observed in Migration	Breeding Behavior Observed	Breeding Status
NOMO	northern mockingbird	*Mimus polyglottus*		ALL			T, A	Confirmed
EUST	European starling	*Sturnus vulgaris*		ALL			X	Possible
CEDW	cedar waxwing	*Bombycilla cedrorum*	6/2/2010	ALL			X, FL	Confirmed
NOPA	northern parula	*Parula americana*		MP				None
TEWA	Tennessee warbler	*Vermivora peregrina*		MP				None
NAWA	Nashville warbler	*Vermivora ruficapilla*		MP				None
YEWA	yellow warbler	*Dendroica petechia*		MP, BP			T, ON, FL	Confirmed
CSWA	chestnut-sided warbler	*Dendroica pennsylvanica*		MP				None
MAWA	magnolia warbler	*Dendroica magnolia*		MP				None
BTEW	black-throated-blue warbler	*Dendroica caerulescens*		MP				None
YRWA	yellow-rumped warbler	*Dendroica coronata*		MP				None
BTNW	black-thoated green warbler	*Dendroica virens*		MP				None
PAWA	palm warbler	*Dendroica palmarum*		MP				None
PIWA	pine warbler	*Dendroica pinus*		MP				None
BLPW	blackpoll warbler	*Dendroica striata*		MP				None
BAWW	black-and-white warbler	*Mniotilta varia*		MP, BP				None
AMRE	American redstart	*Setophaga ruticilla*		MP, BP			T	Probable
COYE	common yellowthroat	*Geothlypis trichas*		MP, BP			T, A, DD, FL	Confirmed
SCTA	scatrlet tanager	*Piranga olivacea*		ROS	Observed		X	Possible
NOCA	northern cardinal	*Cardinalis cardinalis*	8/09, 9/18, 11/4/ 2009 & 3/10, 4/15, 4/16, 6/2/ & 7/1/2010	ALL			ON, FL	Confirmed
RBGR	rose-breasted grosbeak	*Pheuticus ludovicianus*		MP, BP			T, A	Probable
INBU	indigo bunting	*Passerina cyanea*	8/09/2009, 6/2 & 7/1/2010	MP, BP			T, A, ON, FL	Confirmed
EATO	eastern towhee	*Pipilo erythropthalmus*		MP, BP			T	Probable
CHSP	chipping sparrow	*Spizella pallida*		MP, BP			ON, FL	Confirmed
WTSP	white-thoated sparrow	*Zonotrichia albicolis*	11/4/2010	MW				None
SOSP	song sparrow	*Melospiza melodia*	8/09, 9/18, 11/4/ 2009 & 3/10, 4/15, 4/16, 6/2/ & 7/1/2010	ALL			T, A, DD, ON, FL	Confirmed
SWSP	swamp sparrow	*Melospiza georgiana*		MP			X	Possible
DEJU	dark-eyed junco	*Junco hyemalis*	11/4/2009	MW	Wintering flock	Y	N	None
BHCO	brown headed cowbird	*Molothrus ater*	6/2/2010	MP, BP		Y	X, Parasitize SOSP nest	Confirmed
RWBB	red-winged blackbird	*Agelaius phoenicus*	6/2 & 7/1/2010	MP, BP		Y	T, A, DD, FL	Confirmed
COGR	common grackle	*Quiscalus quiscula*	6/2/2010	MP, BP	On main shore	Y	ON, FL	Confirmed
BAOR	Baltimore oriole	*Icterus galbula*	7/1/2010	MP, BP	Nest in tall tree in CW island	Y	ON	Confirmed
HOFI	house finch	*Carpodacus mexicanus*		ALL		N	T	Probable
AMGO	American goldfinch	*Carduelis tristis*	8/09, 9/18, 11/4/ 2009 & 3/10, 4/15, 4/16, 6/2/ & 7/1/2010	ALL	Breeding throughout island	N	T, A, FL	Confirmed
HOSP	house sparrow	*Passerine domesticus*	6/2/2010	ALL			X, FL	Confirmed

5.5. Threatened and Endangered Species Review

Overview

A formal request for a project review by the Pennsylvania Natural Heritage Program (PANHP) was submitted on September 22, 2009. Results were described as 'No Known Impact' from Pennsylvania Game Commission (mammals, birds), Pennsylvania Department of Conservation and Natural Resources (plants), and Pennsylvania Fish and Boat Commission (invertebrates, fish, reptiles and amphibians)

In speaking with Nathan Dewar, GIS Specialist for the Pennsylvania Natural Heritage Program, on September 25, 2009, AES learned that the PANHP has no existing data for the island and therefore, no records of any sensitive (or common) species using the island during the course of their natural history. AES strongly encourages the sharing of all natural resource data with the PANHP to update their database and further enhance the Land Trust/ PANHP relationship. By conducting existing data research on the region, locality, and habitat type, we formulated lists of potential endangered, threatened, and species of concern.

Methods

AES used the available historical and current scientific data to analyze the potential presence of endangered, threatened or species of concern as classified in the state of Pennsylvania. The state of Pennsylvania's Game and Fish and Boat Commissions, partnered with the Pennsylvania Natural Heritage Program (previously Pennsylvania Natural Diversity Index (PNDI)), has compiled a database detailing occurrences of plant and animal species throughout the state. A formal review of the project area was requested from PANHP (See **Appendix D**).

To further ensure a sound understanding of Sycamore Island's potential to provide habitat for state listed endangered, threatened or species of concern, AES cross-referenced the PANHP lists of plants, vertebrates, and invertebrates of Allegheny County, Pennsylvania with available habitat on the island to generate a list of potential species to exist on the island. Furthermore, neighboring counties were analyzed in a similar fashion so as to not exclude rare species that have been observed in similar habitat within the same geographic region.

Results

The project review process with PANHP revealed "No Known Impact" on any documented floral or faunal species for "Habitat Conservation and Restoration, Control of Invasive or Exotic Plant Species" and "Recreation, Trails & Trailheads (parking, etc.)" activities conducted on Sycamore Island (See Appendix C). Three agencies (PAGC, PADCNR, and PAFBC) state "No Further Review Required", while the USFWS makes a recommendation for each proposed activity. The United States Fish and Wildlife Service resulted in 'Conservation Measure', with no further review required for "Habitat Conservation and Restoration, Control of Invasive or Exotic Plant Species". The conservation measure is defined as a voluntary implementation of a recommendation for contributing to the conservation and recovery of endangered and threatened species. Due to the conservative and restorative nature of this project as well as the size (narrow, 14 acres) and properties (island), this conservation measure will be satisfied without further review, planning, or design.

Due to the conservative and restorative nature of the Trust's goals and intentions for use of the island space, no proactive survey measures are required by any state or federal agency.

Plants

Cross referencing of observed plant species with the PA Natural Heritage database reveled no threatened or endangered species on the island.

Invertebrates

There is potential for presence of endangered or threatened invertebrates on and immediately surrounding the island. Below is a complete list of the endangered, threatened, species of concern, and candidate species for the state of Pennsylvania as of 2009.

Table 5.29. PA List of Threatened and Endangered Species

Common Name	Taxonomic Binomial	State Status	Global Status	Potential Habitat at Sycamore Island?	PNDI Hit?
bog copper	*Lycaena epixanthe*	S2	G4G5	No. Habitat and Distribution	NO
brook floater	*Alasmidonta varicose*	S2	G3	Yes. Large River riffles/ gravel or sand	NO
creek heelsplitter	*Lasmigona compressa*	S2S3	G5	No. Small Creeks and Headwaters	NO
cylindrical papershell	*Anodontoides ferussacianus*	S2S3	G5	Yes.	NO
dion skipper	*Euphyes dion*	SOC		No. Wetlands and Maple Swamps	NO
eastern floater	*Pyganodon cataracta*	S3S4	G5	No. Habitat requirements similar, but limited to Atlantic drainage	NO
eastern lampmussel	*Lampsilis radiata*	S2	G5	No. Atlantic drainage	NO
elfin skimmer	*Nannothermis bella*			No. Bogs, fens and meadows	NO
elktoe	*Alasmidonta marginata*	S4	G4	Unlikely. In smaller streams north of Lower Allegheny	NO
giant swallowtail	*Papilio cresphontes*	S2	G5	No. Needs prickly ash (Xanthoxylum americanum)	NO
green floater	*Lasmigona subviridis*	S2	G3	Unlikely. Habitat similar, but only known in Susquehana.	NO
juniper hairstreak	*Callophrys gryneus*	S2S4	G5	No. Cedars in SE PA	NO
mottled darner	*Aeshna clepsydra*	S2S3	G4	Unlikley. Open water areas, males patrol shorelines	NO
mustached clubtail	*Gomphus adelphus*			Unlikely. Near riffles in rivers and streams	NO
northern riffleshell	*Epioblasma torulosa rangiana*	Endangered		Yes. In Allegheny River	NO
rainbow mussel	*Villosa iris*	S1	G5	Yes. In Ohio River Drainage	NO
regal fritillary	*Speyeria idalia*	Endangered		No. Milkweeds and thistles	NO
Roger's clubtail	*Gomphus rogersi*			Unlikely. Along rocky streams	NO
sky-tailed emerald	*Stomatochlora elongate*			No.	NO
triangle floater	*Alasmidonta undulate*	S3S4	G4	No. Susquehana drainage	NO
yellow lampmussel	*Lampsilis cariosa*	S2	G5	No. Susquehana drainage	NO

There are a number of factors contributing to the potential presence of rare unionids in and around the shallows of the island. The major river systems of the Pittsburgh area (Ohio, Monongehela, and Allegheny) suffered severe biodiversity loss as a direct response to the industrial boom (mid to late 19th century) and subsequent pollution of the waters (Ortmann, 1909). Destruction of the riparian buffer zones for industrial, residential, and commercial

development further impacted water quality, as well as floral and faunal diversity. Manipulation of the substrate, primarily dredging to enhance navigation capabilities, directly impacted, killed and displaced native populations of freshwater mussels. Dredging is still practiced as a navigable waterway maintenance effort and continues to impact river dwelling invertebrates. In addition, the lock and dam system within the Allegheny River inhibits migration and other aspects of the natural history of host fish species for freshwater mussels (Allegheny County NHI 1993).

Qualitative sampling techniques used by AES yielded evidence of 12 native species in the waters surrounding the island. A recent study indicates that searching shell piles (shell middens) revealed 88% of the total species found in a scuba search effort (Smith et al 2001). This method is not suitable for determining actual abundance, but is a competent method of determining presence and/or absence (Smith et al 2001).

The rebound of these bivalves is directly related to improved water quality and the subsequent re-colonization of the river in this area by host fish species. The quality of the Pittsburgh-area river systems has and continues to improve. Due to the parasitic nature of larval (glochidium) freshwater mussels, the potential for a species being present here that recent studies did not reveal is actual. Neither intensive mussel survey methodologies scuba, abundance transects, etc. were required or conducted.

Vertebrates

Reptiles and Amphibians

The habitat composition and geographic location of Sycamore Island does not warrant intensive biological survey methods (i.e. drift fence trapping, pitfall trapping, radiotelemetry) to detect potential endangered, threatened, species of concern, or candidate species of reptile or amphibian. The table below lists the current reptile and amphibian species that are classified in the state of Pennsylvania as Endangered, Threatened, Species of Concern, or Candidate for listing.

Table 5.30. Pennsylvania List of Endangered, Threatened, Species of Concern or Candidate

Common Name	Taxonomic Binomial	State Status	Global Status	Potential Habitat at Sycamore Island?	PANHP Hit?
bog turtle	*Glyptemys muhlenbergii*	S2 E	G3 T	No. Out of range and habitat is unsuitable.	NO
coastal plain leopard frog	*Rana utricularia*	E		No. Limited to inner coastal plain in southeastern PA.	NO
eastern massasauga rattlesnake	*Sistrurus c. catenatus*	E		No. Relict Prairie/ Old Field Habitat.	NO
eastern mud salamander	*Pseudotriton m. montanus*	E		No. Seepages and bogs in southcentral PA. Considered to be extirpated from PA	NO
green salamander	*Aneides aeneus*	S1 T	G3G4	No. Rocky outcroppings in the Pottsville formation.	NO
Kirtland's snake	*Clonophis kirtlandii*	SH E	G2	Yes. Within known range. Historical records in Pittsburgh area. Potentially extirpated.	NO
New Jersey chorus frog	*Pseudacris feriarum kalmi*	E		No. Limited to inner coastal plain in southeastern PA.	NO
red-bellied turtle	*Pseudemys r. rubiventris*	S2	G5	No. Similar riverine habitat, but limited to eastern PA.	NO
rough green snake	*Opheodrys a. aestivus*	S1 E	G5	No. Out of known range.	NO
timber rattlesnake	*Crotalus horridus*	S3S4 C	G4	No. Rocky outcroppings and associated deciduous forest.	NO
Blanding's turtle	*Emys blandingi*	S1 C	G4	No. Limited to habitat near Lake Erie	NO
broadhead skink	*Eumeces laticeps*	 C		No. Range extends into three counties in southeastern PA.	NO
shorthead garter snake	*Thamnophis brachystoma*	S3S4		Yes. This species was confirmed within the past ten years in Allegheny County.	NO
queen snake	*Regina septimvittata*	SC		Yes. Found along the tributaries of the Allegheny and sometimes within the riparian buffer of the Allegheny River.	NO
hognose snake	*Heterodon platyrhincos*	S3	G5	Yes. Three records were found in the Allegheny River floodplain in Allegheny County.	NO

Upon reviewing current and historical records of herpetofaunal presence and/ or absence surveys of the region, two endangered species, the eastern massasauga rattlesnake and Kirtland's snake, have occurred or currently do occur within Allegheny County, Pennsylvania. Of these species, the Kirkland's snake, may still occur within the Pittsburgh area although, it is believed to be locally extirpated (Conant 1943).

Eastern Massasauga Rattlesnake (*Sistrurus c. catenatus*)

> This is Pennsylvania's smallest crotalid species. Its habitat preferences are open, wet meadows and relict prairies associated with western Pennsylvania and the prairie peninsula. There is a small, disjunct population within suitable habitat in northern Allegheny County.

Kirtland's Snake (*Clonophis kirtlandi*)

> This rare and secretive species is historically found in wet meadows and low-lying, open habitats. The Pennsylvania population of this species is disjunct and is suspected to have been locally extirpated (last confirmed siting in the Pittsburgh area was on 06/15/1941(Conant 1943)). Its relationship to open, un-forested areas (including urban landscapes) is believed to be linked to its preference for prairie habitat structure. It is likely this species had a prolific presence in the post-glacial period when prairie and open-space habitat was dominant in the region. The expansion of hardwood forests likely limited the species to relict populations that inhabit land exhibiting post-glacial openness. They have been found in forested areas and should be conservatively noted, although extremely unlikely to be present on Sycamore Island.

Twenty-two percent of the species of amphibians and reptiles native to Pennsylvania are of special concern or have been extirpated from the state. The eastern tiger salamander (*Ambystoma tigrinum* tigrinum), midland smooth softshell turtle (*Trionyx muticus*), and eastern mud turtle (*Kinosternon subrubrum* subrubrum) are considered extirpated. Species listed as State Endangered by the Pennsylvania Fish and Boat Commission are the eastern massasauga rattlesnake (*Sistrurus catenatus* catenatus), eastern mud salamander (*Pseudotriton montanus* montanus) , Kirtland's snake (*Natrix kirtlandii*), New Jersey chorus frog (*Pseudacris nigrita* kalmi), and the southern leopard frog (*Rana sphenocephala*). Three species are listed as State Threatened: the redbelly turtle (*Pseudemys rubriventris* rubriventris), green salamander (*Aneides aeneus*), and rough green snake (*Opheodrys aestivus* aestivus). Three additional species have candidate status: Blanding's turtle (*Emys blandingi*), broadhead skink (*Eumeces laticeps*), and timber rattlesnake (*Crotalus horridus* horridus). One species, the bog turtle (*Clemmys muhlenbergi*), is listed as Endangered under the Federal Endangered Species Act (excerpt from PA Natural Heritage Program). There is no expected presence of any threatened or endangered reptiles or amphibians on Sycamore Island.

Birds

Twenty one bird species are listed as Endangered, Threatened or Candidate Species in Pennsylvania. Of these, the bald eagle (*Haliaeetus leucocephalus*) and osprey (*Pandion haliaetus*) have potential to establish breeding on the island. Recent studies have shown an increase in populations of both species within the region and the island provides structural characteristics for suitable nesting habitat.

Through the Pennsylvaina Game Commission's Wildlife Action Plan there are a number of bird species classified as warranting protection. Species in the PAGCWAP that may nest on the island are the scarlet tanager and willow flycatcher.

The island is comprised of 11 sub-category habitat types. The dominant habitat type is riparian hardwood floodplain forest. This classification is then divided into six sub-categories (See Map 1). The structure of this type of forest is dense overstory canopy, minimal understory/woody shrub layer, and moderate ground cover.

5.6. Invasive Vegetation Species Management

We characterize fifteen non-native vascular plant species growing on Sycamore Island as invasive species due to their ability to displace native plants in their natural habitats and in some instances to form dense or nearly monotypic stands. Many exotic invasive species also have the ability to alter growing conditions to favor their persistence at the expense of other species and to alter habitat conditions for some organisms. Table 5.31 lists the invasive plant species currently posing a risk to native biodiversity on the Island. In Table 5.31 we rank each species according to their current distribution and abundance, level of risk, and recommend strategies for their control.

Table 5.31. Sycamore Island invasive species of management concern, distribution, risk, and control strategies.

Priority	Scientific Name	Common Name	Distribution/ Abundance	Risk	Control Strategy
1	POLYGONUM CUSPIDATUM	Japanese Knotweed	Localized, extensive	H	1, 4
2	LYTHRUM SALICARIA	Purple Loosestrife	Localized, occasional on shorelines	H	1
3	LONICERA TATARICA	Tartarian Honeysuckle	Scattered, widespread in uplands	H	2, 3
4	ROSA MULTIFLORA	Multiflora Rose	Scattered, common	H	2, 3
5	CELASTRUS ORBICULATUS	Oriental Bittersweet	Scattered, common	H	2, 3
6	CONIUM MACULATUM	Poison Hemlock	Localized, occasional	M	1
7	HESPERIS MATRONALIS	Dame's Rocket	Scattered, common	M	1
8	LIGUSTRUM VULGARE	Privet	Scattered, occasional in uplands	M	2, 3, 5
9	RHAMNUS FRANGULA	Glossy Buckthorn	Localized, occasional	M	2, 3
10	ROBINIA PSEUDOACACIA	Black Locust	Scattered, common	M	2, 3, 5
11	VIBURNUM OPULUS	European Guelder Rose	Scattered, common	M	2, 3
12	HYPERICUM PERFORATUM	Common St. John's Wort	Scattered, common in uplands	M	1
13	MORUS ALBA	White Mulberry	Scattered, occasional in uplands	L	2, 3
14	AILANTHUS ALTISSIMA	Tree-of-Heaven	Localized, occasional in uplands	L	2, 3, 5
15	CATALPA SPECIOSA	Hardy Catalpa	Localized, occasional in uplands	L	2, 3, 5

Prioritizing Invasive Species Based on Distribution and Abundance

Woody and herbaceous invasive plant species found on Sycamore Island exhibit five general distribution and abundance patterns:

- Localized, occasional: concentrated populations of one or a few plants, infrequently encountered (e.g. purple loosestrife)
- Localized, extensive: concentrated populations of varying distribution, but where found forming extensive clones (e.g. Japanese knotweed)
- Scattered, occasional: plants scattered and encountered infrequently
- Scattered, common: plants scattered and encountered more frequently

- Scattered, widespread: plants scattered and encountered frequently

When prioritizing control strategies, it is important to consider that invasive plants are able to shift in dominance over time by increasing in both distribution and abundance, from localized to scattered distribution, and from occasional to common and widespread abundance. Plants, either woody or herbaceous, that are currently localized, meaning they are present as one or a few plants in concentrated populations, are generally the easiest and least costly to treat and control. Once additional populations establish in a scattered to widespread distribution, some invasive species are poised to expand rapidly to become the predominant species in a given area.

The real ecological risk of the invasive species on Sycamore Island does not necessarily correlate with this simple classification of distribution and abundance, but it is a useful and simple framework to use to develop and test restoration strategies. For example, glossy buckthorn is currently classified as localized and occasional with a moderate ecological risk. In some settings however, a given population may be causing significant shade suppression and soil erosion from steep slopes above a sensitive shoreline area or biologically diverse refugium vulnerable to sediment burial. This localized population therefore might be better assessed as a high risk population. Thus, restoration strategies need to be adjusted by review of each invasive plant population to determine if there are secondary impacts that would necessitate a shift in the treatment priority for one population over another.

Prioritizing Invasive Species Based on Risk Assessment

Some invasive plants are more aggressive in their ability to spread and colonize, and these species should be given the highest priority for targeted investments of labor and restoration dollars. Species in Table 5.31 have been classified using the risk categories: **L**ow, **M**oderate, and **H**igh.

Low risk species are expected to remain isolated under the prevailing conditions on Sycamore Island, while moderate and high-risk species will have greater potential to become widespread in upland, lowland, or shoreline environments. Investments in controlling invasives should focus initially on highest risk species, followed by moderate risk species. Low risk species may be addressed as labor and available funding permit, and once higher priority species are satisfactorily under control.

It is important to consider adjustments to the prioritization assessment if conditions on the Island change. Events such as ice storms, severe flooding, high winds, and other disturbances can result in tree falls and blowdowns or scouring and sediment deposits that can create opportunities for rapid shifts in invasive species dominance. Such newly available habitat beneath canopy gaps and in disturbed soil settings can offer even low priority species an opportunity to spread quickly. Stewards of the Island must remain vigilant of changing conditions and be prepared at any time to reassess invasive species risk and prioritization as a part of an adaptive management process.

Treatment Prioritization—Where and When Should Treatment Occur

We recommend the following strategies for prioritizing invasives species control on Sycamore Island:

1. **Restoring high quality remnant natural areas and biodiversity refugia** is the most important early strategy in any restoration program. Where invasive species have colonized or are established adjacent to such sensitive areas, these individuals or populations should be given highest priority. These are also the areas that will require the most care and attention to detail so that the treatment of invasive plants does not jeopardize or stress the natural remnant or species refugium present.
2. **Reducing outlier isolated populations** which represent the expansion potential of exponentially growing populations. In an area with no high quality natural area remnants or refugia, the highest priority is to bring control immediately to the outlier individual or populations. Reducing the advancing front or leading population centers is an inexpensive strategy that works well to begin controlling the species.
3. **Pushing back the creeping margins of populations** is the third priority and this should be completed on a methodical and systematic basis with annual monitoring and mapping to closely follow the rate of expansion or reduction with successful treatment.
4. **Addressing the core of invasive populations** is a fourth priority. The purpose is to extinguish core areas that have the potential to produce viable propagules that can create new isolated populations via movement along drainage ways and migratory bird or other wildlife and human vectors.
5. **Addressing invasive plant mobility by people and wildlife** is a very important priority. Public trails and wildlife trails are often shared. Frequently, deer and many other wildlife species (e.g. birds, raccoon, skunk, opossum, small rodents, etc.) collect and shed plant seeds from their coats or consume and defecate fruit and seeds along or near trails. Humans also collect seeds in their clothing and on boots and distribute them in the same manner. Thus, many invasive species are found colonizing along trails. The existing trail should become a treatment priority zone and new public trails should be carefully considered to minimize the spread of invasive species.

Treatment Strategy—Method Selection and Timing

Treatment strategies for invasive plant species are based on the growth habit and population size of the plant species as well as the type of method required for effective control. Sycamore Island invasive plants fall into the following general categories:

- isolated individual herbaceous and woody (seedling, shrub, tree) plants,
- larger populations of rhizomatous herbaceous plants (clones), and
- larger populations of woody plants (creeping margins and population centers).

How one actually treats invasive plants to effectively reduce or control their populations is where the rubber meets the road. Not only is the technical treatment method important, but equally as important is the timing of treatments, giving consideration to the seasonality and phenological and metabolic condition of the individual plants targeted. Even more important is the follow-up treatment strategy. Invasive plants are most successfully managed using multiple, back-to-back treatments, not a single treatment event, and using an integrated strategy of multiple treatment methods (e.g. cutting, followed by herbicide treatment, followed by seasonal

burning). The following provides a synthesis of the strategies that are typically required for effective treatment of the invasive plants found on Sycamore Island.

Table 5.32 presents five general primary, secondary, and long-term treatment strategies that are assigned to each invasive plant species listed in Table 5.31. Additional species-specific treatment methods and strategies are included in species fact sheets in **Appendix E** or can be researched further online.

Monitoring Strategy

Ideally, an invasive species control strategy would begin by mapping actual (using GPS) or estimated boundaries of each of the targeted and classified species. From this, the actual or estimated acreages and materials and labor costs needed to treat each species could be calculated. For this project, the only invasive plant species for which population mapping has been completed is Japanese knotweed (**Appendix A: Map** 5 Japanese knotweed Extent). This map can be used to demonstrate the cost and monitoring process that could be developed for each of the other invasive species of management concern on Sycamore Island. This strategy may be useful in acquiring future funding for invasive species control.

Table 5.32. Invasive plant treatment strategies for types of invasive plants present on Sycamore Island. Please see Table 5.6-1 for the listing of invasive plants for which these strategies has been developed.

Treatment Strategy #	Type of Plant	Primary Treatment	Repeated Primary Treatment	Secondary Treatment	Repeated Secondary Treatment	Long term Treatment	Repeated Long term Treatment
1	Isolated individuals herbaceous plants	Pulling, prescribed burning, or direct wick application of appropriate herbicides	Repeat of most applicable strategy	Prescribed burning	Prescribed burning	Planting native plants to secure site	Ensuring native plant populations secure site
2	Isolated individual woody plants (seedlings, sapling, shrub size)	Pulling, prescribed burning, or direct wick application of appropriate herbicides, timed to lowest root reserves	Repeat of most applicable strategy. Wicking or spraying root and stump suckers twice annually	Wicking or spraying root and stump suckers twice annually	Prescribed burning	Planting native plants to secure site	Ensuring native plant populations secure site
3	Isolated individual larger woody plants	Girdling, direct basal bark or girdle application of appropriate herbicides	Repeat of most applicable strategy	Planting native plants to secure site, often secured with prescribed burning	Prescribed burning	Planting native plants to secure site	Ensuring native plant populations secure site
4	Larger populations of rhizomatous herbaceous plants	Spraying of appropriate herbicide at a time when associated native plants are least vulnerable. Alternative—wick application of invasives timed to lowest root reserves	Repeat of most applicable strategy	Prescribed burning	Prescribed burning	Planting native plants to secure site	Ensuring native plant populations secure site
5	Larger population creeping margins and centers for woody plants	Girdling, direct basal bark or girdle application of appropriate herbicides. Alternative—wick application of invasives timed to lowest root reserves	Wicking or spraying root and stump suckers twice annually	Prescribed burning Wicking or spraying root and stump suckers twice annually	Prescribed burning	Planting native plants to secure site	Ensuring native plant populations secure site

5.7. Geotechnical Investigation

Geotechnical, Soils and Island Morphology Overview

Overview

In general, the bulk of the terrestrial areas of Sycamore Island are heavily human-induced and relatively minimally river-induced. This situation is a direct result of many years of using the island as a dumping ground for dredge spoils. Factors such as topography, soil structure, soil texture, sediment particle size, and hydrology (as well as dominant plant communities) stem directly from the properties of the dredge materials. River hydrology does act as a regular structural and textural determinant with the island at its shoreline edges, as well as certain areas, mostly along the back channel, where the shoreline slopes gradually to higher ground. Excluding shoreline, the general form of the island is like an elevated plateau marked by a ridge/berm that runs parallel to the back channel and a sheer face that fronts the main river channel. The result of this human-shaped form is an island landform with a surface that, on floodplain maps, sits mostly high in the floodplain.

The Shoreline

The portion of Sycamore Island that does have a continuous relationship with the river is the entire shore that rings the island. The character of the main channel shore and that of the back channel shore are drastically different, due to the marked difference in river conditions that each shore faces on a continual basis. The shoreline that fronts the main river channel is comprised of well-sorted, fine quartz sand; fine, well-rounded gravel; and well-rounded cobbles; along with occasional boulders. Along the shore above the barge, silts and clays are essentially absent. Below the barge, sand is still present, cobbles and gravel are sparse, and a hard substrate of fine silts and clays is pronounced. The profound change in the southern shoreline character is due to the presence of the barge, which juts out into the river and acts as a breakwater or jetty, thereby encouraging sediment accretion upstream of the barge and causing sediment starvation downstream. In direct contrast to the main channel shore, the shore along the back channel is predominantly comprised of fine, flour-like silts, along with fine clays. Sand layers and small cobble piles occur in a few spots but are largely absent. The northern tip of the island is marked by a hardpan of fine silts and clays atop a sandy layer in spots. At the southern tip, a mostly silt and clay substrate gives way to fine sands in the shallows just beyond the willows.

The specific shoreline characteristics reflect the proximate river conditions. Water velocity is generally higher in the main channel than in the back channel. Thus, the main channel is able to transport heavier sediment particles, like sands, gravels, and cobble. The slower moving waters of the back channel are generally able to carry the much lighter suspended particles of silts and clays, many of which settle onto the shore. Boating traffic also impacts the shore facing the main channel. As vessels pass up and down the main shipping channel of the Allegheny, the resulting wake causes a series of waves to reach the shores of Sycamore Island. As the energy of the waves dissipate, larger solids (sands, gravels, cobbles, boulders) dropout along and near the shore. Many of the much lighter suspended silts and clays are washed back out into the river with the ebb and flow motions of the waves. Because of the shallow depths of the back channel, boats other than canoes and kayaks, tend to stay out of this area and thus have little to no impact upon the adjacent island shore. (**See Appendix A: Map 8** Geotechnical Observations)

Soil Profile

In contrast to many floodplain-forest islands in more natural, less human-influenced states, the substrate composition of the built-up area of Sycamore Island is a direct product of the particular dredge spoils that have been piled up over the years. On a less human-altered riverine island, the composition of terrestrial soils would be based upon the deposits dropped by the river during its periodic flood stages. When Sycamore Island began to be used as a depository for dredge spoils, most of its history of natural sedimentation effectively ended. Today, the soils that sit upon the island contain a conglomeration of particles that range from clay-sized all the way up to boulder-sized. Soil properties in specific areas of the island are a direct product of the composition of dredged materials dumped in each area. The predominant soil type in many areas seems to be a silty loam. Also, cobbles of various sizes and small boulders are strewn throughout the island interior. Soils of the island interior appear relatively well-drained, with no observation of any areas of saturated soils, hydric soils, or standing water. Certain areas of the island that appear to hold a material amount of soil moisture are characterized by monocultures of one of two jewelweed species, *Impatiens capensis* and *I. pallid*.

Because of the large amount of dredge material comprising much of the island, it is very difficult to describe a true typical soil profile. In areas where leaf accumulation is substantial, a thin organic layer has formed, and a very young A layer appears to be forming. Observations of several exposed, eroded edges of the island indicate that a layer of river-deposited fine sands exists in several areas at a level where the river formerly was in regular contact with the island. The stratigraphy of the dredge materials that cover the bulk of the island can best be observed along the sheer faces fronting the main channel during late fall, winter, and early spring.

Island Morphology

Regarding island morphology, most of the topography of Sycamore Island is due to dredge dumping and grading activities during times of heavier human usage. Once active dredge spoil dumping ceased, vegetation readily re-colonized the island. Today, the dredge materials topping the island are largely held together by a well-developed inter-twined network of plant roots. This built up mass of the island appears to be relatively intact, except along portions of the sheer edge on the main channel side of the island, where mass wasting is occurring at least occasionally.

The outer portions of the island footprint are in regular contact with the river and are being shaped, in various degrees, by the flows and mechanics of the river. In a natural, relatively heavily islanded river like the Allegheny, the flow regime of the river would generally lead to sediment erosion on the upstream point of the island and accretion on the downstream end. Because of a series of dams and locks, along with the continual maintenance of a shipping channel, the Allegheny is no longer a naturally flowing river. However, even while sitting within a highly managed river system, Sycamore Island is experiencing erosion and accretion along its banks.

One year of observation is not nearly enough time to determine whether, in net terms, the island is growing, shrinking, or moving over time. Comments and aerial photographs dating back to 1938 in the *Phase I Environmental Site Assessment* suggest that Sycamore Island may have been growing over the last 70 years. (Historically aerial photographs clearly show that

Nine Mile Island has been shrinking.) During our investigations, several persons indicated that Sycamore Island has increased in acreage over the past century. While we are not in a position to state with authority that the island is in a state of net accretion, our year of investigation has enabled us to point to specific areas of net sediment change. Our limited observations actually could be construed to be consistent with the position that the island is in a state of net growth.

One area of clear sediment loss is just to the west of the upstream-most tip of the island. Interestingly, the northern tip of the island does not appear to be undergoing significant sediment loss. When large vessels pass down the prescribed river channel, they send out a pattern of waves that strike the island at an angle almost parallel with the shape of the top of the back channel. The result is that waves strike the island most forcefully just to the west of the tip of the island. Repeated wave strikes have carved out several in-roads in the hardpan of this area. However, wave energy in this general area tends to deposit sands and gravel onto the shore from the tip downstream on the main channel side. While it is not clear whether net accretion is occurring on this part of the shore (the ebb flow of the waves carries sediment back out into the river), there does not seem to be net erosion. Further, as the wave energy dissipates in the back channel, the suspended particles of lighter silts and clays gradually settle, with many finding their ways to the back channel shore of the island. (See Figure 5.36)

Figure 5.36. Western edge of the north tip of the island where wave action has carved out a ridge from the clay hardpan.

At the southern end of the island, accretion seems to clearly be in progress. Simple downstream flow of the river, along with the wake of downstream passing vessels, move sediments in such a manner that some tend to aggregate at the end of the island. In addition, when large vessels pass up through the prescribed shipping lane, waves, slowed to an extent by the river current, flow toward the island at an angle and seem to lead to sediment deposition in the waters just beyond the willows. Aerial maps, as well as a May 2010 flyover in a commercial airplane, clearly

show a pattern of accretion at the end of the island. Sediment hand sample analysis performed from a kayak reveals thick pockets of fine sands, along with areas of fine silts, comprising much of this zone of accretion. (See Figure 5.37)

Figure 5.37. Aerial of Sycamore and Nine Mile Islands. Observe the zone of sediment accretion below the barge on the southwest tip of the Island. (Image courtesy of Google Earth)

In sum, our analysis indicates clear accretion at the downstream end of the island, some erosion in the northwest corner of the island, possible slow accretion along the shore of the back channel, and likely stable shores along the main channel. (Also, the portion of the barge jutting out into the river tends to cause added accretion above the structure while robbing the immediate area below of sediment. The likely overall impact of the barge is a redistribution of sediment without a noticeable net gain or loss.) Thus, the island may well be in a current state of land mass growth. Assuming that the island is in fact growing, one factor that may be enabling its growth is its position within the river. An aerial view of the island shows it to be somewhat "nestled" in a westward bend of the river. This positioning may serve to buffer the island from the highest velocities of river flow and vessel wake. Also, the deepest section of the river (the thalweg), the periodically dredged shipping channel, is a good distance away from the island. (The shipping channel is relatively near Nine Mile Island and, thus, may be a prime contributor to its continuing loss of land.) Further, this section of the Allegheny, like most urban rivers, is essentially channelized. While natural rivers tend to move laterally over time, when riparian areas are developed right up to the river banks, as is the case in Blawnox and Verona, river channels become fixed. Consequently, Sycamore Island is strategically situated in a wide portion of the river, nestled within a shallow, slow-moving bend, removed from the deep

shipping channel of the river. This relatively fixed position in a more protected section of the river may be contributing to net accretion of the island.

While mass wasting at the edge of the relatively high land mass on its main river channel side does occur at times, it is not necessarily the case that this erosion is detrimental to the island. During high river levels, the flow of the river, along with waves caused by passing vessels can undercut the dredge spoil-based "cliff". At a certain point of undercut, part of the face gives way and chunks of sediment tumble onto the shore. When the upper portions of the edge give way, plants rooted within the material also fall down. While this kind of erosion equates to sediment loss for the island, our one year of observation and our review of historical aerial photographs do not indicate that the island is losing shoreline acreage on its main channel side. It is possible that such erosion is enabling part of the island to return to a more natural, pre-dredge dumping elevation – one in which more river-island interaction occurs. Regular observation over time can definitively reveal whether this is in fact the case.

Recommendations

- Initiate a program of random soil hand samples to be sent to a soil lab for an analysis of basic chemical parameters. Among other things, this analysis would aid proper plant selection in restoration activities.
- Conduct a random soil pit project to obtain a better understanding of the character of the dredge materials and, if present, soil profiles that comprise the island substrate.
- Note instances of mass wasting along the eastern end of the Island during regular island monitoring.
- Mount cameras at the ends of the Island to monitor patterns of waves and incremental accretion and erosion.
- Install geo-referenced posts with flags as a means to measure any changes in shoreline footprint over time.
- Obtain from the Army Corp a schedule of any dredging activities planned in the channel near the Island. Note any changes or occurrences (e.g. siltation, new debris, increased quantity of mussel shells) that seem to coincide with recent dredging.
- Obtain a schedule of dam releases and note any detectable changes that occur shortly after dam release.

Bank Pin Study

Overview and Method

A visual assessment of general shoreline conditions and substrate was conducted on June 24, 2009. A map was created to annotate these observations. Bank pins were installed in three locations on Sycamore Island. Bank pins are valuable in measuring bank erosion trends over time in areas of concern. Standard pins are three foot steel rebar rods that are hammered perpendicularly into an eroding bank. At Sycamore Island, three bank pins were installed at each of three erosion-prone sites along the eastern edge of the island (facing the main channel). The pins were installed in steep banks at the head of the island, the midway point, and in a shallow bank at the downstream end of the island. Locations were chosen in areas of visually significant erosion at different areas along the length of the island. The bank pins are numbered based on their position in the vertical array. Influences on bank erosion were considered in the specific locations of bank pin installation: vegetative cover, proximity to overhanging trees, bank sediment substrate, etc. The length of exposed pin was measured, location documented, and tagged for easy relocation. The exposed pins will be continuously measured for at least a year to determine the relative trend of bank erosion at that location. (See Table 5.33 Bank Pin Exposure Study)

Summary of Bank Pin Study

Although no quantitative conclusions can be made because of the limited data within the study period, mass wasting can be observed in all three locations. Based on the observed general trend, Bank Pin Group 1 suggests that the bank is sloughing from top to bottom. Bank Pin Group #2 shows that erosion is principally occurring from bottom to top, caused by waves hitting and undercutting the bank. Because Bank Pin Group # 3 was inserted vertically on the beachhead near the cove, fluctuations in level of bank pin exposure demonstrate cycles of sediment deposition and loss typical of a riparian island.

Figure 5.38. Bank pin Group #2, on 06/24/2009.

Table 5.33 Bank Pin Study

Bank Pin Exposure Study
Applied Ecological Services, Inc.

Project: **Sycamore Island Ecological Assessment**

Project Number: **09-0015**

		Date:	Date:	Date:	Date:	Date:	Date:	Date:	Date:	Date:	Date:	Date:	Date:
		6/24/2009	**9/18/2009**	**9/9/2010**									
Cross Section/Group	Pin # (order highest to lowest)	Exposed Length (ft)	Exposed Length (ft)	Exposed Length (ft)	Exposed Length (ft)	Exposed Length (ft)	Exposed Length (ft)	Exposed Length (ft)	Exposed Length (ft)	Exposed Length (ft)	Exposed Length (ft)	Exposed Length (ft)	Exposed Length (ft)
Bank Pin Group 1	1	1	1.17	Could Not Locate									
	2	1	1.01	Could Not Locate									
	3	1	1.04	Could Not Locate									
Bank Pin Group 2	1	0.75	0.785	Could Not Locate									
	2	0.75	0.8	Could Not Locate									
	3	0.75	0.83	Could Not Locate									
Bank Pin Group 3	1	0.375	0.9	0.79									
	2	0.333	0.85	0.79									
	3	0.375	Could Not Locate	Could Not Locate									

GROUP DESCRIPTIONS	Bank Pin Group 1	Bank Pin Group 2	Bank Pin Group 3
	located on bank 8-10' tall, main-channel side	located on bank 6-10' tall, main-channel side	located in cove created by barge
	well vegetated bank	margionally well vegetated	set up horizontally along stream bank-pins point into sky
	large willow overhang into river 20' upstream		set up in water
	small willows overhanging into river 5' downstream		

5.8. Bathymetric Survey

Overview of Survey Methods

Aquatic Systems, Inc. was retained to provide a bathymetric survey of the reach of the Allegheny River that contains Sycamore Island. Aquatic Systems collected bathymetric data from "bank to bank" along the river reach RM 9.85 to 10.35. This encompassed both Sycamore and Nine Mile Islands. This survey required the use of a survey vessel, a global positioning system (GPS) unit, and an echo sounder. The echo sounder recorded the depth and associated coordinates (latitude/longitude) from the GPS along transects surveyed "bank to bank". Each transect was spaced at approximately 60 feet intervals to yield approximately 120 transects. The collected bathymetric data was processed into contour maps for the river reach. This was accomplished by downloading the raw bathymetric data files to a desktop computer, converting this data to a Microsoft Excel spreadsheet format, and adjusting the data to X (latitude), Y (longitude), and Z (depth) point files. The bathymetric maps were created by downloading the point files into a contour mapping computer program. Aquatic Systems, Inc. provided AES electronic copies of the contour map in a GIS compatible format (**Appendix A: Map** 9 Bathymetric Map).

Findings

The bathymetric map of the Allegheny River around Sycamore Island indicates that the river bottom elevation ranges from 702 feet at it lowest to 720 feet at its highest. Referencing the elevation data for the island, the surface level of the water is between 722 feet to 724 feet. As confirmed by the navigational experiences of boater, the water level in the back channel is shallower than the front channel, having a consistent 4 foot depth. On the main channel, the channel depth averages about 8 feet. Further, the riverbed on the main channel is pockmarked with holes and depressions, which may serve as habitat for bottom-dwelling fish species. A noteworthy feature of on the main channel side is a pool located two thirds of the way down the island, which may serve as fish habitat.

Recommendations

Use the current bathymetric data to establish a benchmark for monitoring changes in channel morphology especially as it pertains to dredging activities. The bathymetric data can also be used to delineate the trail path for canoers and kayakers to keep from grounding on the dynamic, accreting land along the front and back channel.

5.9. Human Use and Impact Study

Background

AES retained local subconsultant, Studio for Spatial Practice (SfSP), to complete an analysis and mapping of the surrounding built environment and existing patterns of human use on the island, river and riverbanks. This analysis considered how Sycamore Island relates to other major planning efforts along the Allegheny River, including proposed trail extensions, 3 Rivers Park, and the upcoming Allegheny Riverfront Vision. The result of SfSP's analysis included four annotated maps concerning human use and activity. These maps are listed as follows:
(Please **see Appendix A: Maps 10-13**)

Map 10: Allegheny Riverfront Recreation System
SfSP outlined the area currently being studied as part of the Urban Redevelopment Authority of Pittsburgh's Allegheny Riverfront Vision project. The ARV Plan will be a comprehensive and unified vision for the redevelopment of the south shore of Pittsburgh's Allegheny River, including the consideration of riverfront trails, public access, open space and ecological enhancement.

Map 11: Existing Trails and Boat Access
This analysis noted typical river navigation routes in the vicinity of Sycamore Island. The varied shades of blue indicate the areas most frequented by the three main types of watercraft. The darkest blue, shown between Sycamore and Nine Mile Islands, represents the deepest portion of the channel, accommodating river barges and tug boat traffic. The wider, medium shade of blue indicates the area used by motorized craft. This zone extends around the western tip of Sycamore Island. The lightest blue represents the most common path taken by kayak and canoe users. Only non-motorized craft can navigate the shallower island back channels, providing refuge from faster-moving river traffic. The Nine Mile Island back channel is also home to an active Jet Ski Club. The red dotted line indicates an informal walking trail running from the eastern end of Sycamore Island, past the ruins of an above-ground pool, along a central ridge toward the western tip of the island.

Map 12: River Activity and Surrounding Communities
This analysis focused on Sycamore Island, Nine Mile Island and the surrounding riverfront context, including the adjacent communities of Oakmont, Verona, Blawnox, Penn Hills and Fox Chapel. Highlighted areas include river-oriented operations such as boat launches, yacht clubs, marinas and restaurants. This view also shows major roads and industrial areas, and identifies local schools that could take advantage of their proximity to the river and the islands for educational purposes. The various shades of green represent natural features such as woodlands, parks and other green spaces.

Map 13: Public River Access and Parking
This analysis identified the boat access points within the closest vicinity of Sycamore Island. The following locations are called out on the map.

- **Harmarville Public Boat Launch** - Public parking lot and informational signage. Managed by the Fish and Boat Commission.

- **Oakmont Boat Launch -** Informal boat launch ramp at the end of California Street. No parking or informational signage. Several large parking lots related to the Greek Orthodox Social Hall are immediately adjacent to the public boat launch.
- **Verona Public Boat Launch** - A green boathouse with water trail parking is currently being built at the site of the Verona public boat launch.
- **Blawnox Municipal Boat Launch** - This boat launch area is for emergency use only. No public parking area is provided.

6. TEST AND DEMONSTRATION PLOT TREATMENT AND MONITORING PLAN

Three permanent test plots are located on Sycamore Island (see **Map 6** Test Plot Locations) to test treatment effectiveness for removing and controlling the exotic invasive species Japanese knotweed (*Polygonum cuspidatum*). The test plots are intended to:

1) monitor short term and long term treatment effectiveness,
2) assess response from the native seedbank, and
3) observe success in increasing native biodiversity by controlling an aggressive exotic invasive plant that is displacing native biodiversity and cover on Sycamore Island.

Impacts and Growth Characteristics of Japanese Knotweed

The ecological impacts of Japanese Knotweed and other invasive knotweeds (*P. sachalinense*, *P. polystachyum*, and hybrids) are still under investigation; however, negative impacts to native flora, to riparian habitat, and to water quality are well documented and have led to large scale efforts to control Japanese Knotweed in many regions of the US and Britain (McHugh 2006). Japanese Knotweed is reported to inhibit the growth of other plants (Gover et al. 2005).Moving water is a primary dispersal vector of knotweed propagules (Soll 2004). As a result, riparian habitats subjected to flooding like Sycamore Island are especially vulnerable to Japanese Knotweed invasion, particularly in areas where the most scouring and the most deposition have occurred. Dense stands can form on river banks and shorelines making access difficult for people and wildlife. On Sycamore Island, Japanese Knotweed clones are in fact concentrated on historic dredge spoils and in the scour and deposition zone at the upstream end of the Island subjected to the full force of flood waters and floating debris.

Japanese knotweed is a rhizomatous, herbaceous perennial plant that grows up to 10-15 feet tall with large, broadly triangular flat-based leaves (heart-shaped leaves are characteristic of other species or hybrids). The smooth, stout, hollow bamboo-like stems (the plant is also known as Mexican bamboo, although the species is native to NE Asia) often remain standing after the plant dies back each year. Numerous, highly branched panicles of attractive, creamy white flowers grow from the plants upper leaf axils and bloom in late summer. Japanese Knotweed was introduced in the late 1800's as an ornamental plant, and its ability to spread rapidly and form dense shrub-like clones made it a popular plant for privacy screens and for stabilizing slopes, although since its introduction, experience has demonstrated poor erosion control (King County 2008). These growth characteristics also made Japanese Knotweed able to escape the garden and become a successful invader of disturbed natural settings. Japanese Knotweed tolerates shade, high temperatures, high salinity, and drought (Panke and Renz 2010), allowing it to establish in highly disturbed settings. The principle reproductive and dispersal strategies of Japanese Knotweed are via vegetative growth, and root and stem fragments distributed by floodwaters and fill dirt. Fragments as small as half an inch can form new, fast-growing colonies in freshly disturbed sediments in floodplains and cobble bars (Soll 2004). Japanese Knotweed re-sprouts vigorously following cutting. Stout rhizomes can grow 65 feet or more from parent plants to form extensive stands (Panke and Renz 2010). Seed dispersal is less likely to result in new populations, although there is some evidence for successful germination (McHugh 2006). A single plant can produce as many as 127,000 seeds (McHugh2006). Interestingly, only one

Japanese Knotweed seedling emerged during the soil seedbank study conducted with soils collected from Japanese Knotweed infested test plots on Sycamore Island.

Guidelines for Developing Treatment Strategies for Japanese Knotweed on Sycamore Island

Treatment strategies have been developed by land managers for both small and well-established populations of Japanese Knotweed in sensitive and less sensitive areas. Strategies use a number of methods including; 1) mechanical or manual control, 2) chemical control, 3) cultural control, and 4) combinations of all three in an integrated program. Mechanical or manual control methods typically employ hand cutting, mowing, grazing (by goats), digging and pulling, tilling, and covering or mulching. Chemical control employs use of approved herbicides applied with a variety of techniques including spraying, wicking, injecting, and pouring. Cultural control involves preventing further spread of rhizome pieces in soil and on equipment and encouraging or establishing alternative groundcover vegetation. There are currently no biological control agents tested and available for Japanese Knotweed, although research is underway (King County 2008).

Because mechanical removal strategies by themselves can suppress but rarely eradicate populations of Japanese Knotweed (Ranke and Renz 2010), most land managers prefer and have greater success using an integrated approach by applying a number of available methods, including chemical herbicides. Often referred to as Integrated Pest Management (IPM), it involves selecting from a range of possible control methods to match the management requirements of each specific site (King County Noxious Weed Control Program 2008) and the growth habits of target plants (Gover et al. 2005). Because of the challenges of treating well-established populations of Japanese and its ability to persist or re-invade, a carefully integrated and long-term program is recommended for managing Japanese Knotweed populations on Sycamore Island. In addition, the program must consider the following constraints and opportunities to optimize program success:

1. **Treatment strategies must be safe for volunteers to employ.** Selection of cutting tools must consider age and skill level of volunteers. Hand-held cutting tools such as loppers or pruning shears are most appropriate for younger volunteers. More experienced volunteers may use machetes, sickles, or shoulder-harnessed motorized trimmers with metal blades (brush saws). **Chemical applications must be applied by licensed herbicide applicators only, using only approved formulations for site conditions and following all label directions.** A special permit for aquatic pesticide application may be required in Pennsylvania and should be applied for and secured well in advance of the treatment activity.
2. Cutting methods to remove growing stems for subsequent chemical treatments must optimize a clean cut and must **avoid creating fragments** that can be washed down stream to form new colonies. For this reason mowing implements that shred plant material are not appropriate. Prevent spread by washing vehicles and equipment that have been used in infested areas.
3. **Gather and properly dispose of all cut material to prevent spread** of Japanese Knotweed onsite and to downstream locations. Do not dispose of Japanese Knotweed stems and rhizomes in the river channel. Japanese Knotweed rhizomes cannot be effectively destroyed by composting. Stems, however, can be composted, but because

they will root on moist soil they need to be completely dried out before composting (King County 2008).

4. **Treatment strategies must minimize further disturbance to soils**, particularly in areas subjected to greatest flood scouring and areas where other invasive species will benefit from disturbed soil conditions. Therefore, digging, pulling, and tilling strategies are not appropriate on Sycamore Island. These techniques are appropriate only where extensive soil disturbance can be followed by large-scale and costly reseeding and planting efforts.
5. **Chemical treatments must avoid damage to non-target native plants.** Treatment methods should be chosen to minimize drift damage to adjacent native vegetation within and outside the test plots. Chemical formulations should be chosen that do not have a residence time in the soil.
6. Due to the level of effort required to access the Island on a regular basis, **treatment strategies must avoid highly labor intensive treatment strategies** requiring multiple, repeated cuttings on a regular time schedule for three years or more. For this reason, repeated mowing and cutting strategies without follow-up chemical treatment are not recommended for Sycamore Island populations. Such treatments that span multiple years discourage even the most dedicated volunteers, and lack of ease in accessing the populations on the Island by boat makes this approach undesirable and less likely to be successful.
7. **Early detection and prevention.** Once initiated, the treatment program should regularly monitor Japanese Knotweed populations and non-infested areas to detect re-growth and new small populations that can be eradicated more easily and effectively.
8. **Both control successes and failures are worth sharing with other land management groups.** This information is critical for improving the cost-effectiveness of treatment techniques and for identifying the Best Management Practices (BMPs).
9. **Successful control of Japanese Knotweed is best considered as a long-term, well-planned program that includes a Control Phase and a Maintenance Phase, followed by long-term monitoring.** It is likely to take two years and require multiple treatments to significantly suppress Japanese Knotweed populations, followed by a carefully executed long-term monitoring phase to maintain control and prevent future reinvasion.
10. **Use the test plots to determine best methods** for Sycamore Island and then apply those methods to the larger populations systematically.
11. **Maximize re-vegetation by native understory species for long-term maintenance following Japanese Knotweed removal.**
12. Control of Japanese Knotweed on Sycamore Island is possible; however, a successful landscape level program to decrease the risk of reinvasion and spread is worth considering and will require **outreach to public and private landowners in the watershed**. Mapping populations of Japanese Knotweed, as was done on Sycamore Island, is a key factor in watershed planning for landscape scale knotweed control (McHugh 2006). Utilizing the **demonstration test plots for public outreach and education** is an excellent way to engage volunteers and land managers at the watershed scale.
13. **Working with volunteers and other community organizations** will ensure an adequate labor force to undertake the work. It will also inspire citizens to see the rewards of restoring and protecting native biodiversity and to see Sycamore Island as the place where they established their role as environmental stewards.
14. **Grants are available for invasive vegetation removal, especially for work done through non-profit or government organizations.**

Treatment and Monitoring Program for Sycamore Island Test Plots

The test plot treatment program will apply treatment scenarios to facilitate implementation scheduling and to optimize treatment success based on current knowledge. The program will be conducted in two phases: a Control Phase and a Maintenance Phase. Treatments will follow a management calendar (Tables 6.1 and 6.2) based on Japanese Knotweed's seasonal growth behavior and reported best response to treatment (Gover et al. 2005; McHugh 2006). Treatment will vary within test plots to compare treatment intensity and effectiveness (one versus two herbicide treatments/season) and in the method of herbicide application (e.g. wicking versus foliar spray) in order to test and demonstrate the method most effective and least damaging to growing native vegetation. Before implementation, the test plot treatment program should be reviewed and approved by ALT staff and stakeholders experienced in invasive species control.

Control Phase: Year 1

Table 6-1. Control Phase treatment schedule

Treatment/Activity	MAR		APR		MAY		JUN		JUL		AUG		SEP		OCT	
JK Phenology																
Monitoring Site Visit																
Cut / Cut-treat App.																
Monitoring Site Visit																
Foliar Herbicide App.																
Monitoring Site Visit																
Optional treat/monitor																

Japanese Knotweed Phenology*:* Japanese Knotweed emerges and begins rapid growth late-March to mid-April, depending on soil temperatures. Plants can reach full height by the end of May. Flowering usually occurs in July and seeds mature in August and September.

Monitoring Site Visit—(Spring)*:* Visit the site with volunteers to relocate test plots and to assess growth of Japanese Knotweed. All monitoring site visits should include photo documentation of conditions in the test plots and a written record of observations. Following the site visit, coordinate crews and volunteers for the cutting treatment in late spring.

Cut and Cut/Treat Application*:* Two strategies will be employed in *half of each test plot*: 1) cutting and allowing re-growth to occur for several weeks followed by late season foliar treatment (at least 6 weeks or minimum 3' height), and 2) cutting and immediate treatment of cut stump with herbicide, with follow-up foliar treatment to re-growth (coinciding with other foliar treatments). Specific methods for each cutting strategy:

- **Cut-only**: Cut stems approximately 2 "above the ground surface. Remove and carefully dispose of all cut material (see below for proper disposal method).
- **Cut and treat**: Cut stems at the second joint from the ground and apply herbicide using a sponge applicator or hand-held mister sprayer to cut surface. Take care to ensure joint surface remains; however, if hollow portion of the stem is exposed by cutting between

rather that at the joint, apply 2-5mL of herbicide into the hollow stem. Remove and carefully dispose of all cut material (see below for discussion of proper disposal method).

- **Herbicide formulation for cut stump treatment**: 30-50% glyphosate mixture with water. Use the common product name Roundup® for terrestrial settings and aquatic-approved Rodeo® when working in or near standing water or saturated ground.
- **Disposal Method**: Managing and disposing of the cut stems can end up being a significant part of the control effort (McHugh 2006), particularly during the initial treatments of the Control Phase. This effort is nevertheless critical to avoid creating a larger problem by generating additional rooting propagules. A clear plan should be devised prior to cutting. Typical disposal methods include bundling the stems or packing the stems into plastic garbage bags (not practical for large populations) and transporting offsite to be dried and burned. For Sycamore Island this would require boating stems from the Island to the main shore, which would be very labor-intensive and costly. It may be possible, however, during the early restoration and management activities on the Island to identify a disturbed location where stems could be safely stockpiled for drying and burning with little or no damage to native vegetation, e.g. at higher elevations on historic spoils near previous development sites. Later efforts at controlling Japanese Knotweed populations beyond the test plots may need to consider other options, including transporting to the mainland.

The purpose of cutting is to stimulate shoot growth, which depletes root reserves and makes the plant more susceptible to succumbing to subsequent herbicide treatments. Cutting also reduces plant canopy height to facilitate follow-up herbicide application and to reduce the amount of herbicide used and the risk of overspray (where foliar application is used). Experience in Pennsylvania (Gover et al. 2005) suggests June 1 is the optimal time to cut Japanese Knotweed so that re-growth is sufficient for follow-up herbicide treatments later in the growing season (at least six weeks or minimum 3' height). Cutting too early can result in re-growth that reaches full height. Cutting later than June reduces the window for affective treatment due to insufficient re-growth and plant surface for uptake of the herbicide. Herbicide applications later in the growing season (mid to late summer) are most effective because the plant is actively sending carbohydrates from the leaves back to the rhizomes for storage and thus will deliver herbicide more effectively to the rhizomes.

***Monitoring Site Visit—Mid-Summer**:* Return to the test plots at the end of June or early July to begin monitoring treatment impacts and re-growth height of Japanese Knotweed stems. As with the spring monitoring visit, record and photo document conditions in the test plots. Note evidence of any spread of Japanese Knotweed beyond the test plots. Also, note any emergence and growth of native plants and other potential invasive species responding to removal of the Japanese Knotweed canopy and thus requiring treatment along with Japanese Knotweed re-growth. Following the site visit, coordinate crews and appropriate/experienced volunteers for the foliar treatment in late summer.

***Foliar Herbicide Application**:* Two foliar treatment techniques will be used: 1) wick application, and 2) back-pack foliar spray. Wick applications will be applied to the cut-treat half of each test plot, and back-pack foliar spray will be applied to the cut-only half of each test plot.

- **Wick application (to cut-treat half of each test plot)**: Using a wick or wipe-on applicator (sponge or wick on a long handle) apply a 7-8% glyphosate solution directly to foliage and stems. To significantly increase herbicide effectiveness, use an appropriate 0.5% non-ionic surfactant to allow the herbicide to penetrate the leaf cuticle. Although slow compared to spray application, use of a wick avoids the risk of spray drift. However, caution must be taken to prevent any dripping or dribbling from the wick from falling on the ground or onto non-target plants. This technique may require multiple follow-up applications to be successful, as it is more difficult to achieve complete coverage compared to spraying.
- **Back-pack foliar spray (to cut-only half of each test plot)**: apply a 2-5% solution of glyphosate with complete, uniform coverage. As with wick application, use a non-ionic surfactant.

***Monitoring Site Visit—Late Summer**:* Return to the test plots 30 days or so, following the foliar treatment (end of August through September) to monitor foliar treatment impacts and any re-growth of JK stems. As with previous monitoring visits, record and photo document conditions in the test plots. Again, note evidence of any spread of JK, native seedbank response, and other invasive species requiring treatment. If significant re-growth has occurred, consider an additional treatment before frost occurs. If additional treatment occurs, a final monitoring visit could be conducted in late October.

***Additional late-season treatment and monitoring**:* If significant re-growth occurs following the foliar treatment and should the budget allow, conduct an additional cut-treat application before the first frost to maximize treatment success. If temperature conditions allow, follow-up treatment may include wick or foliar application to new seedlings and sprouts.

Maintenance Phase: Year 2 (with annual monitoring and treatment thereafter)

Continuation of treatments and monitoring visits in Year 2, immediately following initial eradication treatments, is critical for long-term control success. This constitutes the Maintenance Phase. The timing of treatment applications and monitoring follows the same calendar as Year 1.

Table 6-2. Maintenance Phase treatment schedule

Treatment/Activity	MAR		APR		MAY		JUN		JUL		AUG		SEP		OCT	
JK Phenology																
Monitoring Site Visit																
Cut / Cut-treat App.																
Monitoring Site Visit																
Foliar Herbicide App.																
Monitoring Site Visit																
Optional treat/monitor																

Evaluating and Documenting Treatment Response: Treatment response within the test plots should be evaluated and documented in the spring at the time of the first monitoring visit of Year 2. If the budget allows, random quadrat samples could be used to quantitatively measure treatment response and potential increases in native species diversity and cover. It may be

possible at that time to draw conclusions about which treatment method(s) or strategy(s) are most successful and desirable for applying to other Japanese Knotweed populations on the Island. A clear plan should be developed by expanding and adjusting the test plot plan to serve as a Japanese Knotweed management plan for the Island. If treatment response is not clear by spring of Year 2, continue with a repeat of the treatment plan for Year 1, before drawing conclusions.

Long-term Maintenance

Once treatments are determined to be successful, and re-vegetation is occurring spontaneously from the native seedbank, follow-up herbicide treatments can be conducted using a spot-treatment technique. If a response from the native seedbank does not occur during the Year 2 growing season, it will be important to conduct native enhancement seeding within the test plots to colonize and compete with potential Japanese Knotweed or other exotic species re-invasion. As native vegetation becomes established, treated areas should be regularly monitored (annually) for Japanese Knotweed re-invasion and re-growth, as well as for other invasive species, and treated according to recommended control methods. A wicking technique called the “glove of death” developed by The Nature Conservancy land stewards is often used to treat scattered stems in sensitive areas with little or no impact to surrounding vegetation (McHugh 2006).

- **Glove of Death**: Herbicide (33% glyphosate mixture) is sprayed directly onto a heavy cotton glove worn over a thick rubber/latex (or nitrile) glove and then applied directly the entire plant (tall stature plants can be initially cut to 3’ to reduce herbicide use).

7. RECOMMENDATIONS FROM PUBLIC OUTREACH EFFORTS AND INTERVIEWS

Overview

Applied Ecological Services, Inc. realizes that a key component to the success of a restoration project is how scientific findings, observations, and proposed plans are presented to the public so as to ensure a continued and lasting impact. Just as important as providing raw educational elements for the public, such as public meetings, signage, and kiosks are the community involvement programs and events that are executed. In many of our restoration projects, AES strives to bring the science of ecology to the public by directly involving them in scientific and restoration activities in the field. Some examples of these activities are: creating self-guided walking tours in and around the island, setting up test/demonstration plots to be managed and monitored with the help of community volunteers, enlisting community members for large-scale plantings, trail maintenance and clean-ups, as well as training volunteers in invasive species removal. Each of these components will be useful in building common understandings and consensus and will ultimately help to transmit the ecological importance of Sycamore Island to the public. (See **Appendix F** for summaries of public outreach activities and materials) Throughout the year and a half that we have conducted work on Sycamore Island, these are the findings we have gathered:

Partnerships

- ALT should make a commitment to partner with other organizations for the management, stewardship and public outreach/education associated with the Island. These organizations include groups such as: Venture Outdoors, RiverQuest, Urban Ecology Collaborative, Friends of the Riverfront, Blawnox Police and Fire Department, Sylvan Canoe Club, Scouts Troops, Fox Chapel School District, Riverview School District, Adjacent Marinas, Duquesne University, Carnegie Museum of Natural History, Carnegie Studio for Creative Inquiry, and Citizen Scientists.

Interpretive Program

- Recommended interpretive signage: floodplain forest, freshwater mussel beds/mussel exhibit, freshwater ecology, flora/fauna, mayflies, island ecology/formation in the Allegheny River
- Downloadable trail map and podcasts associated with interpretive strategy
- Explore feasibility/costs associated with installation of a webcam to observe nesting bird species on the Island throughout the seasons
- Partner with DCNR and Fish and Boat for use of part time environmental educators to assist with special tours, education, or events of Sycamore Island.

Access and Tourism

- A minimal access area for man-powered (canoes/kayaks) or non-obtrusive motor powered boats, such as pontoon boats for groups should be provided; it would be too costly and intrusive to the local environment of the island to build a complete docking facility to accommodate large vessels, such as RiverQuest's Explorer.

- ALT should provide access information and maps for Sycamore Island on a website, which would include: recommended places to park, access points for canoe/kayak launch, how to navigate locks and dams via canoe/kayak, etc.
- ALT should encourage local communities (Blawnox, Verona, Oakmont) to promote eco-tourism efforts associated with tourists for river activities and Sycamore Island such as a designated parking area next to a restaurant or coffee shop, local stores/restaurants that could provide bathroom access, canoe rentals, etc.

Feasibility

- Permitting requirements for boat access/minimal docking and landing facilities will involve ACOE Section 404 and Section10 permits; additional studies are needed to explore feasibility of the recommended areas.

Larger Regional Management Implications

- ALT should keep abreast of bridge construction at lower 14 Mile Island and how this may impact Sycamore Island; there is potential partnership with PA Fish and Boat Commission for fish habitat restoration in the Sycamore Island vicinity with local rock obtained from the bridge demolition (p.o.c. Bob Ventorini).
- The back channel of Sycamore Island has interesting, fine textured shallow water habitat; additional studies to improve fish habitat in this area are recommended.
- Sycamore Island should be managed as a larger unit:
    - Sycamore Island and Nine Mile Island are part of the same system
    - ALT should initiate conversations with US Fish and Wildlife Service to explore options for including Sycamore Island as part of the larger system of islands in the Ohio River National Wildlife Refuge
    - The surrounding tributaries to Sycamore Island (Plum Creek, Quigley Run, and Sandy Creek) should be considered in long-term management and monitoring efforts of the Island ecology and associated species. ALT should be aware of past and future studies associated with these.

Regional Trail Linkages

- Sycamore Island should be advertised as a stop/feature in the following regional trail system maps/websites:
    - Water Trail, 3 Rivers Heritage Trail, Pittsburgh-Erie, Harrisburg-Pittsburgh
- The historic Allegheny River Boulevard scenic overlook should be advertised as a bird watching and vantage point for observing Sycamore Island and the Allegheny River from land; ALT should become apprised of partnerships and efforts to restore this overlook and advertise this on a website where public access and safety concerns are addressed with usage of the overlook.

Ongoing Informal Documentation and Observation

- ALT should seek out local citizens to document Sycamore Island at different times of the year through photographs to observe and document changes over time

Safety and Emergency Plan

- ALT should collaborate with Blawnox Fire Department and Police Department for river rescue emergency service and should provide a seasonal schedule of events, as well as advance notification prior to events held on the Island.
- ALT should post rules and regulations signs prominently throughout the Island and at all four corners with a number to call to report suspicious activity or concerns

Community Volunteering/Stewardship

- ALT should designate two to three eco-steward captains for Sycamore Island. These individuals should receive invasive species removal training in partnership with the urban eco-steward training program and should act as the liaison between ALT stewardship coordinator and the planning/execution of large group plantings, clean ups, and invasive species removal.
- Enlist community members for some of the following efforts:
    - photo documentation of the Island
    - clean ups / camping
    - giving tours of the Island
    - making signs
    - clearing and maintaining trails
    - education and scientific monitoring (local community members – 'Citizen Scientists' - high school service learning groups)

Rules and Regulations of the Island

- Stay on trail at all times
- No public camping or campfires unless with the expressed permission of ALT
- Use only the designated landing area to access the island
- No use of drugs or alcohol
- No trespassing on historic barge or pool
- For emergencies or to report suspicious activity, please call ALT at (412) 741-2750
- To hear more about the special tours and events of Sycamore Island see ALTs website
- Island is open to the public from dusk until dawn
- Do not remove, take, or disturb anything on the Island
- Do not feed or disturb wildlife
- No hunting at any time
- No lighting of fires except during ALT sponsored events

Table 7.1 Public Education and Outreach Activity Matrix

Sycamore Island Ecological Assessment and Management Plan
Prepared by: Applied Ecological Services, Inc.

Activity	Partner (s)	Description	Resources Provided by Partner	Target Group	ALT's Commitment	Cost	Time	Fundraising Potential?
Educational Program	PA Fish and Boat Commission	**Boating Education and Safety Course**	canoes, kayaks, paddles, lifevests, course instructor - can outfit up to 70 people	Local youth; community members	Co-sponsorship and coordination with PA Fish and boat	Free	August - September - October	yes
Educational Program	PA Fish and Boat Commission	**KARE Program** (Keystone Aquatic Resource Education)	canoes, kayaks, paddles, lifevests, course instructor - can outfit up to 70 people	Teachers - Act 48 hours	Co-sponsorship and coordination with PA Fish and boat	Free	August - September - October	yes
Canoe Trips	Venture Outdoors	**Canoe Trips and Tours of Island and Surrounding Environs**	canoes, kayaks, paddles, lifevests, course instructor, programming, promotional capabilities; risk management plan	Youth and community members	Co-sponsorship and coordination with Venture Outdoors staff	Cost per trip paid by each participant	July - August - September - October	yes
Hands-on Field Trips	RiverQuest (RQ)	**Field trips and hands-on lessons in aquatic ecology**	Coordination with local schools to obtain grants/funding to provide hands-on field trips to the Island for youth	School students	Coordination with RiverQuest	Grants and funding coordinated between RQ and school districts	September - October	no
Special Events - Ecotour	DCNR/Allegheny Islands State Park	**Canoe / kayak tour that could start at Allegheny Islands State Park, float to Sycamore Island, and down to Pittsburgh**	Coordination and co-sponsorship of event with ALT	Community members	Coordination with DCNR; Co-sponsorship of event; advertising; PR; location of partner to outfit canoes and kayaks	Varies	July - August	yes

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Sycamore Island Ecological Assessment and Management Plan
Prepared by: Applied Ecological Services, Inc.

Activity	Partner (s)	Description	Resources Provided by Partner	Target Group	ALT's Commitment	Cost	Time	Fundraising Potential?
Special Events - 'Smores on Sycamore'	Local professionals with knowledge of various aspects of the River or surrounding region	**Hold special storytelling evenings around the fire with smores**	Undetermined	Community members - scouts troops	Advertising, sponsorship and coordination of event	Varies	July - August - September	yes
Special Events - RiverQuest Explorer Tour	RiverQuest (RQ)	**Allegheny River and Sycamore Island tour from vantage point of RiverQuest Explorer**	Use of Exploror Vessel (cost - undetermined)	Community members	Advertising, sponsorship and coordination of event	Varies	August - September	yes
Special Group Campouts (by ALT permission only)	Venture Outdoors	**Overnight campout for local community members and youth**	outfitting, professional staff, insurance/risk management plan, training on 'leave no trace' principles	Community members - local youth	Coordination with Venture Outdoors; staffing if necessary	Cost per trip paid by each participant	July - August - September	yes
Combined Camping and Service Learning Weekends (by ALT permission only)	Scouts Troops - Local Scout Troop Leader	**Overnight campout paired with a working weekend to maintain trails, remove knotweed, clean debris, etc.**	Crew for clean-up	Scouts Troops	Coordination with Scouts leader	Free	Spring or Fall	no
Possible Island Tours by Environmental / Interpretive Educator	DCNR / Allegheny Islands State Park educational facilitators	**Island tours by environmental educator**	Potential sharing of educational staff and curriculum material	Youth and community members	Coordination and outreach to DCNR	Unknown	July, August, September, October	no

Table 7.1 Public Education and Outreach Activity Matrix

Sycamore Island Ecological Assessment and Management Plan
Prepared by: Applied Ecological Services, Inc.

Activity	Partner (s)	Description	Resources Provided by Partner	Target Group	ALT's Commitment	Cost	Time	Fundraising Potential?
Japanese Knotweed Removal and Management / Island Plantings / Clean-ups	Friends of the Riverfront 'Riverfronts Naturally' program	**The 'Riverfronts Naturally' program is a community group of volunteers who participate in riparian restoration and planting efforts in Pittsburgh**	Large volunteer base (1000+) to assist with invasives removal, management, restoration, riparian plantings, and island clean-ups	Volunteers in the 'Riverfronts Naturally' program	Coordination and outreach with Friends of the Riverfront	Free	Early Spring - Late Fall	no
Japanese Knotweed Removal and Management / Island Plantings / Clean-ups	Urban Ecology Collaborative	**Urban eco-stewards training for volunteers for invasive plant removal**	Training program for the designated eco-steward captains of Sycamore Island (2-3 people); volunteer coordination and management strategies to prevent burnout and improve success	Planting - invasive plant removal volunteers	Stewardship coordination with AES and urban eco-stewards	Free	Early Spring	no
Methods for Removing Japanese Knotweed in Riverine Environments	DCNR - Allegheny Islands State Park - Ohio River Islands National Wildlife Refuge - US Fish and Wildlife Service	**We encourage a dialogue between ALT, DCNR, and US Fish and Wildlife Service to share successful strategies for knotweed removal in riverine environments as different strategies are tested**	knowledge	N.A.	Coordination and outreach with AES, DCNR - Allegheny Islands State Park, and US Fish and Wildlife Service - Ohio Islands National Wildlife Refuge	Free	N.A.	no

Table 7.1 Public Education and Outreach Activity Matrix

Sycamore Island Ecological Assessment and Management Plan
Prepared by: Applied Ecological Services, Inc.

Activity	Partner (s)	Description	Resources Provided by Partner	Target Group	ALT's Commitment	Cost	Time	Fundraising Potential?
Island Patrolling - Monitoring	PA Fish and Boat Commission	**Could potentially partner with Fish and Boat Commission to have their rangers periodically patrol the island - timed in accordance with their visits to DCNR's Allegheny Islands State Park**	Patrolling and enforcement	Island and river users	Outreach to PA Fish and Boat	Free	Varies - summer	no
Island Patrolling - Monitoring	Local community members	**Observation and reporting of Island activity**	Patrolling and enforcement	Island and river users	Coordination with local community members	Free	Year round	no
Emergency Response	Blawnox Fire and Police Departments	**Emergency response on island**	River rescue division provided by Blawnox Fire Department - Enforcement of rules and regulations of island - Blawnox Police Department	Island and river users	Provide seasonal schedule of events to police and fire department - notify police and fire departments when island events are being held	Free	Year round	no
Regional Trail Linkages Interpretive Signage Program	Friends of the Riverfront	**Integration of Sycamore Island as destination point along Water Trail, 3 Rivers Heritage Trail, Pittsburgh-Erie Trail, and Harrisburg - Pittsburgh Trail**	Advertising, logistical information and advice on bases, materials and local contractors for the making of interpretive signs; potential lending of design and interpretive material for signs	Tourists	Promotional materials, co-sponsorship and coordination	Varies	N.A.	no

8. TRAIL AND INTERPRETIVE SIGNAGE PLANS

8.1. Signage Plan

While ALT has generated considerable public interest for Sycamore Island as one of its highly valued holdings through public outreach efforts, implementation of a comprehensive signage system would cement an identity for the Island. A comprehensive signage suite is a way to define physically how ALT perceives the role of Sycamore Island in ensuring ecological diversity. For Sycamore Island, which has a limited carrying capacity because of its small size, an effective signage system that communicates proper rules of engagement will enable the island's sensitive habitats to persist and flourish.

As it stands, the low level of vandalism on Sycamore Island is a good indicator that it is being used in a fairly respectful way. However, every facet of the Island that is attractive for exploration carries its own risks, not only to the Island's habitat health, but also to the users as well. For one, unregulated use of the Island as a camp site, as evidenced by the presence of makeshift tents and firepits, is a real cause for concern. The Island is full of detritus that can serve as a fuel load should an ember from a campfire go astray. Off-trail use can fragment habitat and compact sensitive soils. Walking on the barge structure is a real hazard because of rotting timbers and protruding nails. Landing of power crafts on the sensitive back channel also exacerbates erosion.

Thus, the basic rationale for the Island's signage plan is to strategically structure the visitor's experience while protecting sensitive or off-limit areas. The signage system should be minimally intrusive, complimenting rather than distracting from the wilderness experience of place since the natural elements of Sycamore Island, such as the silver maple grove, are the real highlights of the visitor's experience. Functionally, the signage system should be consistent and legible, employing clear and minimal numbers of fonts, it should be attractive, and made of durable materials that can withstand the elements. Further, it should also be accessible, meeting the needs of a wide range of island users, transmitting information in either graphic or written form. Although appropriate signage forms should be designated to meet regulatory/informational, interpretative and general naming needs, the signs themselves do not need to be mutually exclusive; an interpretative sign may also have wayfaring information.

The signage suite should consist of the following elements:

Wayfaring signs- These signs should guide the visitor's movement throughout the island. The signs should be located at key locations, such as an arrival point or decision nodes. They should be small, but conspicuous and have different symbol or color codes for different circulation systems. In addition, the wayfaring signage system should be structurally hierarchical, whereby node points are privileged, having directional, distance and level of difficulty information. The layout of wayfaring signs can serve as a mechanism that reinforces the rules and regulations set forth by regulatory signs. While wayfaring signs can be as basic as blaze markers on trees, a novel approach would be to incorporate indigenous materials like cobbles or found materials repurposed as markers.

Naming sign(s) - Key information such as the Island's name (and Island's logo, if applicable), as well as ALT's name and logo, should be featured prominently in the naming sign(s). The display

should be large enough to serve an iconic purpose and should be posted at location(s) where it can be viewed by a large number of individuals or at a landing point.

Interpretative signs - The interplay of the Island's ecology and manmade features afford a prime opportunity for urban island ecology education; therefore, ALT should prioritize a thematic strategy for the interpretative materials. Prior to establishing an interpretative strategy, ALT should identify a targeted audience since this will determine the content of the signs and how they will appear. The thematic strategy should follow from the salient points presented in the Sycamore Island Management Report. For example, an urban ecology narrative could incorporate information about riparian island ecology, including its rarity, significance, and the challenges that it faces in an urban context. On-going monitoring and studies, targeting Japanese knotweed and other invasive species can be folded into the narrative structure since they represent the efforts needed to protect a sensitive ecosystem like that of Sycamore Island. As with the naming sign(s), the interpretative signage should be prominently displayed at a location that is easily accessible to the majority of island users.

Regulatory/ warning signs- These signs should convey operational information about the proper and prohibited uses of the Island. The intent of the regulatory signs is to protect the Island from rogue use, as well as to warn to the visitor of the hazards present on the Island. Physical and biological hazards, such as the moored barge, deep water, slippery substrates, log jam/detritus pile, and extensive poison ivy cover should be noted in the hazard signs. When formulating language for regulatory signs, it is important to keep in mind that the visitor is an ally in the protection of Sycamore Island, and therefore the 'don'ts' should have complimentary 'dos' .The following figure demonstrates a conceptual layout of the signage program (See **Appendix A: Map 14** Signage).

Recommendations for Action

In the immediate future:

1) ALT should post the rules and regulations of the Island in the clearing that serves as a makeshift campground since it is a highly frequented locus. It is imperative to list the prohibition of the lighting of fires or the shooting of firearms, since both of these activities can spark a flame. ALT, police and fire department phone numbers should be posted even in spite of this general regulation.

2) Warning signs should be posted at key hazard locations such as the barge, the derelict pool structure, the log jam field.

3) A general warning sign should numerate additional hazards such as wet and sipper rocks, exposed cables, deep waters, poison ivy and sharp grade drops.

4) The existing footpath should be marked with simple blazes on trees to establish a well-delineated travel path, localizing manmade disturbance.

In the near future:

ALT should consider and identify what it believes is the overall narrative for the Island since it will help to drive home the take away message for the visitors.

8.2. Trail

Overview

Consistent with the overall management goals, the driver for conceptual trail design of Sycamore Island seeks to strike a balance between the developments of an ecologically and physically sustainable trail network that serves the needs of the Island's users, while preserving the sense of place and protecting sensitive habitats. Striking a balance between ecology and use will require a limitation on the number of visits and users. Physical sustainability ensures that the trail network will remain stable over time, requiring minimal upkeep, and able to be enjoyed well into the future. Ecological sustainability ensures that the trail minimizes impact to sensitive areas, whereby the layout serves as a means to manage access. Engineered stewardship, which fosters a sense of responsibility in the user, is a complimentary mechanism that contributes to the development of a successful trail design. A clearly marked trail loop, rules and regulations, and interpretive signage that engage the trail user are some key elements of engineered stewardship.

The specific goals of the Sycamore Island trail are to provide safe island access points, educate the public about riparian island ecology (including cultural factors and invasive species management), prevent trespassing and off-trail use to hazardous or ecologically sensitive areas, and set up ideal locations to observe island wildlife.

Currently, an informal trail exists that preserves the footprint of prior island development. The path passes through a rogue picnic area, follows along the ridgeline on the back channel side and terminates near the derelict pool structure. The path picks up on an asphalt path at certain places.

Method

By virtue of the fact that Sycamore Island is a land mass, situated amidst the Allegheny River corridor, the trail system for the Island can be developed from multiple, telescoping perspectives. On one hand, the Island can be experienced as a whole from the vantage point of someone on the river. Its size, shape, siting-- the general sense of place-- can be comprehended all at once. In the larger expanse of the river, spatial relationships can be established between Sycamore Island to Nine Mile Island, the surrounding mainland, and to the other islands in the Allegheny River. Travel on the river, where islands, including Sycamore Island, make up landmarks, is in itself a worthy attraction befitting its own trail experience. Thus, Sycamore Island can be incorporated into the *narrative structure* of the larger water trail system like that of the Three Rivers Water Trail. Tours of the Allegheny by boat, such as those conducted by the River Quest Explorer, are but one facet of the larger river trail experience in which Sycamore Island contributes. The caveat of such a tour would be that it is passive, experienced entirely from the deck of a boat.

A smaller water trail limited to the site scale of the Sycamore Island's periphery can also be an effective way to enjoy the Island. Suitable for leisurely travel on the water by kayak or canoe, this water trail lets the visitor experience the Island at more watchful pace. The experience of this trail is one of slowly unfolding vistas, revealing the shoreline and the interplay of land and water. Augmented reality, in the form of downloadable podcasts or dial-in services, can be incorporated into the water trail, adding a layer of information to the physical experience. The

kayaker or canoer can circumnavigate the Island guided by a podcast tour, which can literally be animated to demonstrate principals to correlate with observed phenomenon. Information about Sycamore Island's internal settings can be accessed without ever having to come ashore. On the back channel side, the pilings are a great destination opportunity where interpretative material or wayfinding games can be posted. The benefits of a water trail are twofold; the visitor can have a virtual experience of the Island that captures all the salient points without physically disturbing any habitat, and the podcast's contents can be constantly updated, keeping a digital record of the Island.

The main internal trail system will consists of a loop that treads through the different natural as well as cultural features of the island. The trail will keep clear of much of the island's structurally intact or sensitive areas and instead be localized to the middle section, which has experienced the most human disturbance. Educational or interpretive material will be strategically posted along the path to inform the visitors about highlighted subjects such as restoration of native habitat through revegetation; control of invasive species, most notably Japanese Knotweed; repurposing of the pool structure to create wetland habitat; riparian forest ecology and formation; and urban ecology such as the barge, which is being re-colonized by vegetation. The primary landing on the main channel, located close to the clearing that is currently being used as an informal campground, will serve as the trailhead for the trail. Heading northeast, the trail will traverse the edge of jewelweed glade, curve through a demonstration restoration area in test plot 2, and approach a gathering area near the pool structure, follow along the ridgeline on the back channel side before looping back south east to the initial starting point. (Please see **Appendix A: Map. 15**. Trail Plan)

Implementation

ALT should engage in preparation of a comprehensive trail plan carried out to construction document stage. Additional studies and site surveys may be required for implementation.

In addition to private sponsors, ALT can apply for grants through programs such as PA DCNR's Pennsylvania Recreation Trail Program (grant procedures can be accessed at (http://www.dcnr.state.pa.us/brc/grants/), Partnerships with Allegheny Trail Alliance, Allegheny Valley Trail Association, and the PA Fish and Boat Commission, and is encouraged. Trail development should be planned to coincide with invasive species control programs or funding to limit site disturbance.

In the near future, ALT can begin a program of engineered stewardship. ALT with the guidance of its consultant should identify and designate a safe landing area in close proximity to the makeshift picnic area. Rules and regulations of the Island should be posted near the landing location as well as contact information to report unregulated activities. Rogue paths can be closed by placing logs or fallen tree limbs in the way. Basic trail cleanup can be conducted by small volunteer groups led by ALT staff or designated stewards chosen from advisory group.

Resource links:
www.fish.state.pa.us/watertrails/trailindex.htm

www.atatrail.org/

www.avta-trails.org/

9. A MANAGEMENT AND PRIORITIZING STRATEGY FOR CARRYING OUT RECOMMENDATIONS

This section considers the many findings, observations, and recommendations contained throughout this report and lays out a format geared toward guiding ALT toward accomplishing its most important goals regarding preserving, developing, and restoring its unique land asset known as Sycamore Island. First, we identify the essential parameters that should be regularly monitored over time. Next, we outline a comprehensive set of related actions that, if implemented, would relatively rapidly put the Island in a state of safe accessibility. Then, we list a variety of activities that can feasibly be undertaken by volunteers and/or ALT staff. Finally, we discuss two related areas, along with associated recommendations, that are long-term in nature: island restoration and scientific study of important biotic and abiotic aspects of the Island.

9.1. Immediate and Ongoing: Establish a Routine to Monitor Essential Parameters and Keep the Momentum Going

The efforts expended on preparation of this report and various other activities on behalf of ALT have resulted in a very large volume of baseline data on scientific, historic, cultural, physical, and many other aspects of Sycamore Island. Also, over the past year, a remarkable amount of interest, awareness, and excitement has been generated around ALT's acquisition and future use of the Island through several public meetings, kayak tours, a Riverquest tour, an upcoming (December 6, 2010) WQED feature, and positive press coverage. For data to be meaningful over the long-term, much of the data should be regularly monitored and compared regularly over time. For excitement to continue over the long-term, steps must be taken to ensure continued involvement by interested individuals and groups over time. For these reasons, we believe that it is essential to immediately set up a routine that encompasses monitoring key aspects of the Island, keeping the most proactive island supporters actively engaged, and keeping the public regularly informed about important island-related happenings.

Key aspects of the Island could be monitored effectively through two single-day island visits a year, one in May and one in October. These visits should be led by an ecologist familiar with the Island, accompanied by a field assistant and an ALT representative. During each visit, among the aspects observed would be: the entire island shoreline, the dynamic island ends, signs of erosion and accretion, plant communities, wildlife signs, noted presence or absence of plant and animal species, changes in forest canopy, Japanese knotweed coverage, purple loosestrife coverage, general occurrence of zebra mussels, recent evidence of flooding, the state of the barge, the state of the planned or laid trails and adjacent areas, the state of the large dredge spoils pile, other noteworthy observations, and other aspects as specified. Immediately after each monitoring visit, a brief standardized report that includes findings and observations, notable changes on or near the island, and recommended action items would be prepared for ALT.

By their very nature, riverine islands are landforms that undergo frequent change. Regular baseline monitoring visits to Sycamore Island in the spring and autumn will provide an accurate, innovative and useful real-time picture of the Island's evolution over time. It is worth noting that during the most recent visit to the Island, in September 2010, among the changes from prior site visits observed were: three newly seen plant species, one newly seen amphibian, an apparent absence of spiny softshell turtles, an apparent decrease in purple loosestrife density in its main

area of invasion, an increase in submerged aquatic vegetation in the back channel, several fallen trees in the forest, new debris patterns, and drier conditions in previously wet sections at the base of the barge.

Seasonal Public Meetings and Creating a Core Volunteer Task Force

Public interest in Sycamore Island is high. Turnout at the last two public meetings was high, and audience participation and feedback were enthusiastic. The media have taken a clear interest in the Island. We feel that momentum has been established and that it should be continued. One relatively simple way to continue the momentum is to have public meetings that coincide with the recommended spring and fall monitoring activities. An evening open meeting that occurs right after each monitoring investigation would provide attendees with new, fresh, timely information about the Island. It would also give attendees the opportunity to share any new information that they may have. ALT could share any island-related progress. After reviewing the various public interactions regarding the Island, we feel that a significant level of trust, familiarity, and rapport has been established among members of the interested public, ALT staff, and the project team. We also feel that this high level of cooperative spirit should be further built upon.

Our year of helping to lead and organize the public process has brought clearly to life another meaningful observation: while there are certainly many citizens who are interested in the present and future well-being of Sycamore Island, there is a subset of interested citizens who appear willing to perhaps play roles somewhat more proactive than attending open meetings in helping to shape the future of the Island. We feel that several individuals, with differing areas of interest and expertise would, if approached, agree to be part of a volunteer task force or advisory group on behalf of the Island. Early in our project, an advisory group was assembled. Some of these individuals exhibited more interest in the Island than others. Much of their early insight was very helpful, especially when delivered during one-on-one interviews. Now, considering the combination of meeting minutes, attendee lists, and individual contributions, we believe that the stage is set to attract a small group of individuals who meet regularly and actually help with carrying out many of the recommendations contained within this report.

9.2. First Comprehensive Action Item: Accomplish the Mission – Make Sycamore Island Safe, Accessible, and Exciting for Humans and Safe and Inviting for a Wide Diversity of Native Plants and Animals

ALT purchased Sycamore Island with a major goal of making the Island open to the public and a simultaneous major goal of protecting the natural integrity of the Island. Accomplishing each of these goals requires striking a proper balance between the needs of humans and the needs of nature. Accordingly, ALT requires an action plan comprised of a set of integrated steps that will relatively quickly render the island safe, accessible, and exciting for humans and safe and inviting for a wide diversity of native plants and animals.

This report contains many recommendations pertaining to a trail, boat landing, amenities, the pool (also the subject of a related design project), the barge, ecologically sensitive areas, and the trees of the Island. We feel that a logical next step is to quickly (if possible) turn these recommendations and concepts into an accelerated master accessibility plan that provides the blueprints for opening up the Island to safe human use, while protecting the interests of wildlife, plants, and structural integrity of the Island. This comprehensive plan would take the various

recommended elements, which are essentially in conceptual stages, and advance them into development stages, with construction drawings where appropriate.

Island Accessibility

The essence of the plan for human accessibility to the terrestrial portions of the Island is to largely follow the historic footprint of human use prior to Hurricane Agnes (1972). Prior to 1972, most island development was centered between the barge and pool areas. In fact, a graded, paved road along the western portion of the Island connected these two areas. The graded base of this road, along with asphalt remains, persist today. Our plan calls for constructing a looped trail network largely within the formerly developed portion of the Island. The bulk of the area around (and also within) this internal zone should be preserved and maintained as natural land. This trail network will give hikers a first-hand experience of being fully immersed within the confines of an islanded floodplain forest. The trail will also expose hikers to the cathedral-like atmosphere provided by the canopy of the forest. At the same time, restricting island visitors to prescribed areas within the forested interior will allow the dynamic ends of the Island, other interior areas, and most of the shoreline to remain relatively undisturbed.

In keeping with the goal of restricting foot traffic to designated trails and gathering areas on the Island, authorized boat landing spots should be kept to a minimum. Our investigations led us to propose one designated kayak/canoe landing area on the gravelly beach of the main channel, at a point between the barge and the midline of the main channel shore. Locating a landing for non-motorized craft on a gravelly/cobbley stretch of shore would result in minimal island disturbance. We do, however, note that issues associated with a landing in the proposed area include wake or waves from passing vessels and island access that fronts the occasional to frequent traffic of the main channel, which some boaters may find discomforting.

During public meetings, some individuals expressed a desire for island access for boats larger than kayaks and canoes. One reason for this desire is to better enable children unable to safely maneuver kayaks or canoes to access the island. While we identify with such a desire, we strongly feel that an authorized landing connected to the Island for boats larger than canoes or kayaks would seriously threaten the Island in numerous ways, including plant and wildlife disturbance, soil structure disturbance, and overuse of the Island by humans. We recommend that this subject be taken up at a later point by the proposed advisory group. Providing access to Sycamore Island to a wide variety of interested citizens is a notable goal. However, the Island sits within a busy, urban navigational channel. This fact presents a certain real level of danger even to the ablest of boaters and swimmers. Accordingly, all of our human use-related recommendations are geared towards humans with clear boating and swimming abilities. Also, Sycamore Island is a relatively small piece of land that is perpetually exposed to a wide variety of natural and human-induced forces. Providing easier access to larger vessels will undoubtedly threaten the integrity of the Island. The long-term well-being of the Island will be best served by human access that limits the number of pedestrian visitors able to visit the Island at any one time.

Tree Inventory

Among the most valuable natural assets of Sycamore Island are the trees of the floodplain forest. These long-lived organisms provide essential habitat, display natural beauty that changes with the seasons, and literally hold together much of the island through an intricately

interwoven, subterranean network of root mass. An initial tree inventory would prove beneficial over time for several reasons. Baseline data on the trees of the Island would set the stage for various important biological studies or analyses, many of which could be carried out by volunteers under proper guidance. An inventory of trees kept regularly updated would reveal real-time changes occurring on the Island. The inventory would easily point out noteworthy specimens, as well as species of note. The inventory would provide a framework from which to document the development of emerging sycamores and cottonwoods among the largely predominant silver maples. It would also yield worthwhile data regarding restoration planning, such as indicating the likely long-term viability of red oak seedlings and suggesting the potential benefits or detriments of providing additional canopy space for the young oaks. If set up and overseen by a certified arborist, the tree inventory could be carried out, to a large extent, by interested volunteers. A tree inventory would ideally take place in the late fall or winter, in conjunction with the design development phase of the trail and landing plans.

Creation of Landing and Gathering Areas

Accessible from the proposed trail and landing area, a variety of amenities would serve to enrich the experience of visitors touring the Island on foot. Reuse of the pool structure, currently the subject of a focused study, will provide a compelling item of curiosity close to the geographic center of the Island. Besides the pool area, a planned gathering area at the present site of the picnic table would make an excellent place to take in the large-outdoor-room feel afforded by the over-arching tree canopy. A kiosk placed in this gathering area could provide relevant information about the Island and ALT. A section of the kiosk could be designated for visitors to post their own findings made or feelings experienced while touring the Island. In addition to the viewing experiences made available at the one or two landings, a trail spur leading to a unique view of the barge jutting out over the river and topped by a sycamore, is very feasible. Another potential viewing area could be a trail spur terminating atop the large pile of dredge spoils, the highest point in elevation on the Island. Interestingly, five different tree species are growing on or around this man-made mound.

Signage

Central to ensuring safety, direction and excitement to island visitors is a comprehensive signage program that covers education, way finding, and island rules. Effective and clearly posted information will significantly shape the island visitor's experience. Educational signs will keep trekkers on the trails, within prescribed areas, and out of proscribed areas. Conspicuously posted rules will help protect the Island, keep visitors out of dangerous situations, and minimize liability exposure for ALT.

A potentially rich educational experience awaits future island visitors. Various research and investigation activities have uncovered a wealth of information about the ecology, history, and culture of Sycamore Island. Greeting trail users, graphically exciting and content-rich signs could cover the following topics: the silver maples of the island, the sycamores of Sycamore Island, native shrubs, native groundcover, the impacts of Japanese knotweed, nesting Canada geese, roosting turkey vultures, visiting migratory birds, dredge materials, human imprints, the history of the barge, the geology of river stones, the river floodplain, Hurricane Agnes, and other topics.

In addition to a terrestrial trail, we recommend a water-based kayak/canoe trail. Educational signage visible to paddlers would provide a unique, exclusive island perspective. Among the

topics to be described on signs aimed at boaters are: the dynamic island ends, island migration, sediment deposit and erosion, river locks and dams, the dredged navigational channel, the barge as a lesson in urban ecology, the black willow community, emergent water willow, resilient buttonbush, submerged aquatic vegetation, purple loosestrife, resident fish, resident mussels, the invasive zebra mussel, Asian clams, spiny softshell turtles, river debris, and other features.

The wealth of information compiled about Sycamore Island is vast – much, much more than could ever be conveyed on appealing educational signs. An effective way to make more of this information available to visitors who desire it is to tie a supplemental cell-phone tour to the land and water-based trails and their corresponding educational signs. Many of the interesting features of the Island could be orally described in greater detail and recorded. A phone number and topic code would then be indicated on a guided trail map and/or each posted educational sign. A hiker desiring more detail on a particular subject could simply dial a phone number and particular code and then be treated to additional interesting information. For instance, a kayaker paddling past the barge, who takes in the information and images on a posted sign referring briefly to urban ecology, could have the option of calling a number to learn more about the way nature has been reclaiming the slowly decaying man-made structure.

Part of the overall signage program should be a clear wayfinding system. Visitors should unequivocally be shown where to proceed and what is on or off limits as soon as their crafts approach the Island. Along the trails, trees should be clearly blazed with an island motif – perhaps a stenciled sycamore leaf. Signs should instruct walkers to stay on the trails. Restoration and conservation zones should be identified, ideally along with educational facts. Areas of potential danger should be very clearly identified and labeled. Such danger areas include the barge, deep water, deep mud, slippery rocks, river current, vessel wake, steep areas, poison ivy, potentially sharp or rusty objects left on the Island, and any other areas considered potentially dangerous. In essence, wayfinding signs should serve to keep visitors on the trails, landing areas, and gathering areas only. All other areas should be off limits. Where meaningful, wayfinding signs should be posted for paddlers. Among these signs, posted instructions for paddlers to keep off the land at the island ends should be very prominent.

A sign that depicts the essential rules of Sycamore Island should be created after thorough consideration and legal review. The goal of the sign is to alert visitors to important regulations that they may not instinctively have thought would be in effect. At the same time, the list of rules should not be viewed as over-bearing. Legally providing access to the Island to all citizens entails placing a great deal of trust in the public. We believe that it is worth noting how little the Island has been defaced by individuals as it has sat unattended. Compared to other forested areas within urban regions that we have examined, Sycamore Island is strikingly clean and devoid of serious damage purposely caused by humans. Almost no graffiti or carving upon the trees exists throughout the Island. Relics such as the barge, pool, and oven have been largely left alone. The picnic table continues to remain in usable condition and appears to be used for picnics. Signs of attempted fires, outside of a seemingly properly used fire pit, are not visible. Outside of some discarded garbage and some occasional tents and lean-tos, the Island has essentially been left intact.

We are admittedly not certain as to what to conclude from our observation that on an essentially unpatrolled island, hidden by a thick screen of trees, visitors have largely refrained from even petty vandalism. One might surmise that most individuals who have chosen to visit or

to explore the Island have also chosen to exercise respect for the surrounding natural and built attributes. While we do not want to at all predict or suggest that no past vandalism means no future vandalism, we do feel that a posted set of rules should appear exhaustive. Among the rules worthy of listing are:

- Island is open to visitors from dawn to dusk.
- Leave no garbage (unless ALT decides to make for regular trash pickup, we recommend that no trash container by placed on the Island).
- Fires are prohibited, except during ALT-managed events.
- Camping is prohibited, except during ALT-managed events.
- Remain on the trails and gathering areas, and stay out of all other areas.
- Respect all island plant life and wildlife.
- Do not remove natural objects from the Island.
- Smoking is prohibited.

Actions to Consider Prior to Opening Sycamore Island to the Public

Prior to officially opening the Island to the public, any debris or structural items that could be considered imminently dangerous should be removed or rendered adequately safe in the eyes of a knowledgeable tort law attorney. The Phase I report contains a seemingly complete list of man-made objects. Of these, any remaining 55-gallon (or similar) containers should be removed, as should any piles of debris. We urge removal of all utility-owned items. We further recommend that, in keeping with the goal of keeping the Island in as natural a state as reasonably possible, electricity not be restored to the Island. We feel that the rusting commercial oven and the submersible pump structure can be safely left as relics, subject to removal of any sharp or loose attachments on either item. We have already recommended re-use of the pool structure and nearby empty storage containers, and an analysis of items is currently in progress. We feel that remains of the former docks or marina can be left in place. The pilings in the back channel should be periodically monitored for stability to make sure that they do not become boating hazards.

We regard the barge as an important historic structure, which is slowly being colonized by nature. We recommend that loose debris and sharp objects be removed from this structure and that a guardrail be installed along its upstream length. Also, adequate, lawyer-reviewed warning signs should be posted to keep persons off of and out of the structure. Ensuring safety around the barge is essential; for we regard this historic relic – with its quality wood and iron frame overtopped by a sycamore in the front, a cottonwood in the rear, and staghorn sumac throughout, and draped over by Virginia creeper (blazing burgundy in the fall), grape, various forbs – as a major feature bound to attract many island visitors.

Legal Review

Prior to officially opening Sycamore Island to the public, we recommend that ALT secure the services of an attorney well-versed in issues of liability to review the wayfinding and access/no

access signage planned for the Island, especially where it relates to the barge and pool structures. While we believe that persons choosing to visit Sycamore Island do so at their own risk, we likewise believe that it is prudent for ALT to take reasonable steps to minimize its legal exposure in the event of a mishap.

Recommendations That Can be Carried Out at Low or Nominal Cost

Over the past year, many efforts made by ALT and other groups and individuals have served to generate a great deal of interest and enthusiasm regarding Sycamore Island. Given the momentum that currently exists, now is a fitting time to begin planning activities that benefit the Island and are relatively simple to carry out. The following is a list of recommendations that could be implemented at little or no cost to ALT:

- Continue the established pattern of public meetings by planning for spring and fall public meetings, ideally in conjunction with spring and fall island monitoring, at venues similar to the ones used over the past year.

- Invite potentially interested persons to serve as members of a volunteer advisory group that meets regularly (perhaps seasonally or quarterly) to proactively discuss and advise on matters related to the well-being of the Island. Potential members could be from among the following groups: nearby residents, the boating community, local wildlife or botanical groups, nearby schools, retirees with relevant knowledge and interest, AES, and other groups.

- In conjunction with local police and fire departments and interested citizens, form an 'Island Watch" group, similar to neighborhood watch groups, to come up with a basic set of procedures to follow in the event of an observed island-related problem, such as a boating accident, fire, threat to wildlife or plants, vandalism, or human activity after dusk.

- A vast array of photos of the Island and its attributes has been accumulated. These photos are very diverse, capturing the animals, plants, structures, and majesty of the Island throughout the seasons. Many of the photos are of high quality and/or artistic in nature. From these images, an attractive coffee-table-sized photo journal, entitled something like "Images of Sycamore," could be assembled. Such a book could possibly be sold to raise money for ALT or could be used as an incentive for large donors. The same could be said of note card or a calendar of Sycamore Island images.

- Carry out periodic volunteer island clean-ups.

- Have Knotweed awareness and removal days.

- Have volunteers girdle the trunks of invasive tree-of-heaven and periodically remove the sprouts that emerge in response to girdling.

- Accept and plant native plants appropriate for the Island that are donated to ALT.

- Continue to offer events with partner entities, such as Venture Outdoors and Riverquest.

- Allow citizens to legally enjoy the Island under moonlight with an ALT-managed event, entitled “S’mores on Sycamore,” during which attendees learn a bit about nocturnal island creatures and gather for island-history stories around an authorized campfire.

- Offer periodic island bird walks, plant walks, and other guided hikes.

- Enlighten department heads of college programs in ecology, urban studies, landscape architecture, wildlife biology, botany, community planning, sociology, and other relevant areas of study about Sycamore Island and invite input and involvement on the part of the departments. A variety of research and study topics are available for college students focusing on various science and liberal arts studies.

- We believe that the barge on its own could make for a fascinating study or thesis in urban ecology. The barge is intimately related to the plant, animals, sediments, structure, hydrology, and history of the Island. A time-based study of the barge and its past, present, and future impacts upon the Island could prove very fulfilling to the right student and highly informative to many.

- Continue to make Sycamore Island an important piece of the ALT website. Consider an interactive feature in which users can post their recent findings or feeling about the Island.

- The Army Corps of Engineers has expressed potential interest in providing funding for restoration pertaining to aquatic habitat. On September 9, 2010, an AES ecologist guided two Corps representatives through much of the Island. Many sections along the muddy back channel shore would make for excellent restoration of submerged aquatic vegetation, emergent vegetation, and shoreline vegetation. Subject to further study, the opportunity to create pockets of vernal pool hydrology, possibly in the area just north of the pool structure, many also exist. We firmly support continued discussions between ALT and the Corps regarding identifying specific restoration projects eligible for funding.

- Inconspicuously mounted cameras in certain parts of the Island would offer ongoing interest and opportunities for discovery. Cameras at either dynamic end of the Island would provide continuous wildlife data, as well as ongoing recording of river flow wave pattern and their incremental impacts upon the Island. A camera in the vicinity of the main gathering area of turkey vultures would provide fascinating footage. Access to real-time footage of these areas could be provided over the web. Also, the data contained in such footage could be used for valuable long-term study of plants, wildlife, river hydrology, and island morphology.

Some Notes About Restoration and Future Study Recommendations

Throughout the sections of this report detailing the scientific aspects of Sycamore Island, we offer many recommendations for restoration and future study activities. We make out recommendations with full awareness that funding for many of these activities is likely to be quite limited. We are also aware that often, when some funding becomes available, decisions must be made as to whether to direct limited funds toward natural improvements or human-

centered amenities. We directly address this duality of interests (human and nature) through our own entire project approach, which is based open striking an effective balance between human desires and nature's requirements. Accordingly, some practical points about restoration are in order.

To a large extent, Sycamore Island has been restoring itself throughout its history. By its own nature, a natural island in a natural river channel experiences periodic destruction and re-growth throughout its history. Major floods can strip away vegetation and soil and can even obliterate entire island landmasses. Before the Allegheny River was tamed with dams, it is likely that natural forces at time denuded Sycamore Island of large amounts of its vegetation. It is likely that the Island was able to heal itself over time with new vegetative growth. At a relatively recent time, the area around Sycamore Island became settled and, later, highly urbanized. It stands to reason that at some point soon after urbanization, the Island was cleared of most or all of its forest. Perhaps, at that time, the Island had a lower elevation and was dominated by trees other than silver maples, possibly American sycamores. After the Island was cleared, a period of dredge dumping likely ensued. When dumping ceased, the Island yet again restored itself. This time, silver maples rapidly settled upon the new island topography. Even later, sections of the Island were cleared, roads and structures were constructed, a barge was permanently beached, and electricity was brought to the island. The 1972, Hurricane Agnes struck. The Island was flooded, structures dislodged, and major stands of vegetation were destroyed or disturbed. Since 1972, the Island has been undergoing yet another self-healing process.

A major point to realize about the dynamic history of the Island is that, on its own, the Island is able to restore itself rather effectively. Less than four decades after heavy development and a major hurricane, the island is largely cover by a canopy of native trees, many of massive proportions. Much of the forest floor is covered by native groundcover. The tops of the Island support a true diversity of plant species. The barge is covered by a diverse mixture of almost wholly native trees, shrubs, vines, and forbs. In the most disturbed areas of the Island, Japanese knotweed has taken over. Although it is a very aggressive alien plant, knotweed does support a host of pollinators, and its rapidly spreading root mass does hold together the upper soil later. While the aggressive nature of knotweed essentially shuts out growth opportunities for many native plants of much greater overall natural value, the rapid settling of knotweed, compared to a patch of land bereft of any vegetation, represents an automatic response by the Island to restore some degree of stability triggered by one or more disturbance events. Less than forty years after major natural and human-induced turmoil, Sycamore Island is nearly fully covered by one or more layers of vegetation, considerable root mass holds together dredge-based soils, and wildlife is generally abundant on and around the Island. And all of this has occurred without any apparent restoration efforts by humans.

The Island shows clear signs of beneficial evolution. Young sycamores have reached the canopy in several areas. New native flowering plants have appeared in various spots along the shorelines. Several oak seedlings, which potentially found their ways onto the Island through the acorn-storing efforts of blue jays or squirrels, appear healthy. Purple loosestrife density seems to have decreased over the past year. A second amphibian species was recently found. All of these occurrences can be regarded as examples of restorative processes taking place on their own.

The Island would certainly benefit significantly from proactive restoration efforts. Plant diversity could be enhanced. Habitat for fish, mussels, insects, amphibians, reptiles, birds, and small mammals could be improved. Execution of the minimalistic trail plan that we recommended will enable beneficial native plants and animals to flourish in undisturbed conservation areas. Knotweed could be replaced with appropriate native plants. Erosive forces could be reduced through vegetation.

We advocate ecologically restoring parts of the Island and taking steps to increase biodiversity. However, considering the costs of restoration, limited funding, and competing interests, we urge restoration efforts that are highly selective and well thought out. Invasive Japanese knotweed is clearly one of the major problems on the island. But, as indicated earlier, it is an extremely labor-intensive plant to control or eradicate. In the open area of the northern portion of the Island, knotweed proliferates. Gaining long-term control in this area is extremely difficult because just across the back channel, lining the west bank of the Allegheny, is a continuous stand of knotweed, which sends a constant supply of rhizomes and seeds toward the Island. With limited funds, selective restoration planning would not view this area as a top priority restoration zone. Rather, an area that should be regarded as a high priority zone is the patch of knotweed adjacent to the barge on its north side. This patch is shaded and confined by surrounding native vegetation. Once under control and replaced by suitable plants, maintenance of a restored native plant community in this area would be feasible. Further, replacing this knotweed patch with a thicket of native shade tolerant plants that are thorny and dense would serve as a natural barrier to approaching the barge. Taking an approach such as this is an illustration of what we mean by urging selective restoration.

Throughout our report, we have attempted to be thorough in laying out recommended restoration activities and areas of further study. We have also attempted to be thorough in providing recommended strategies for making the Island safe and appealing to visitors. The careful balance of interests underlies all of our recommendations. We believe that this same careful balance of interests should be applied by ALT in formulating island management strategies regarding optimal use of limited funds.

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Chapter 5

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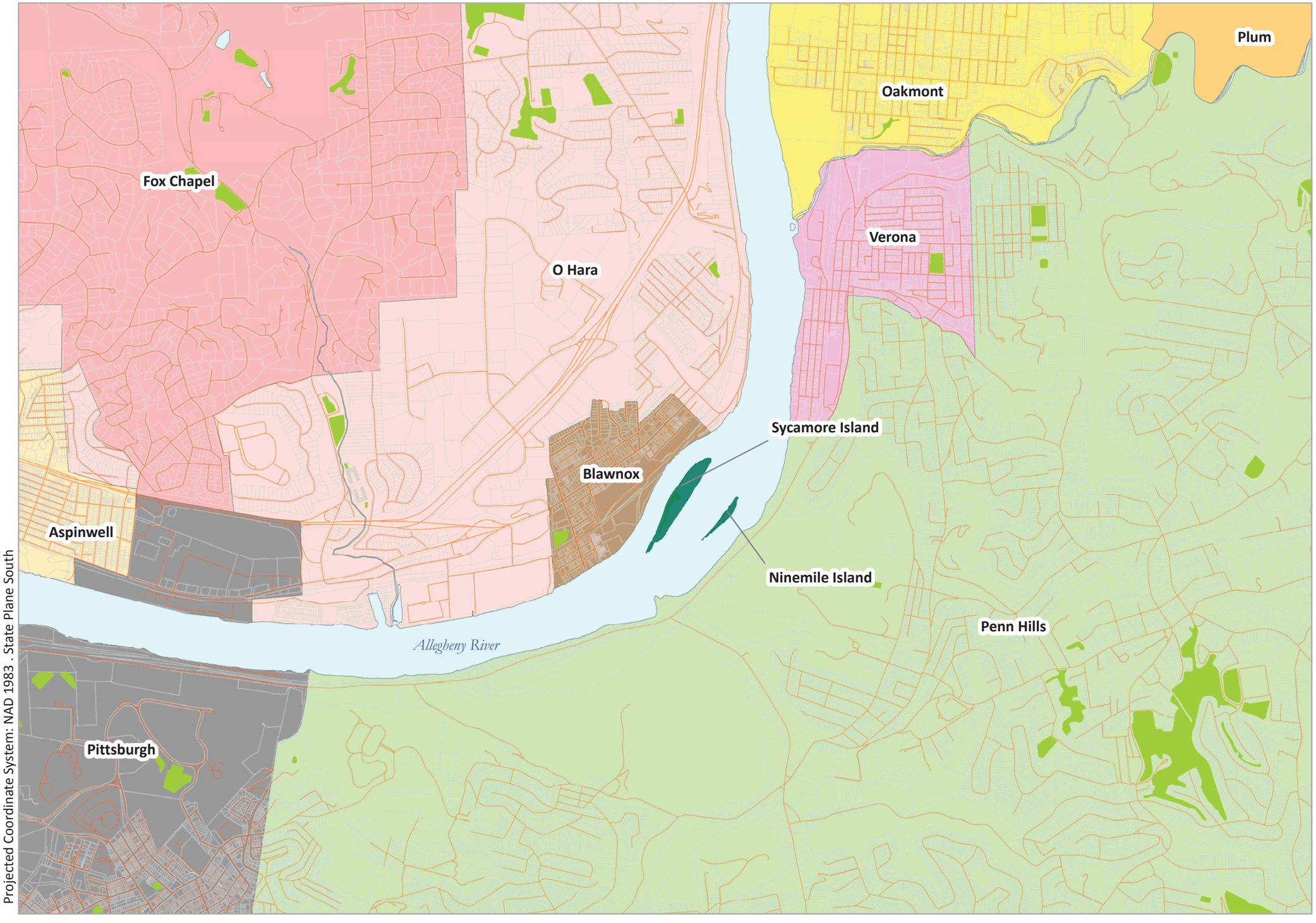
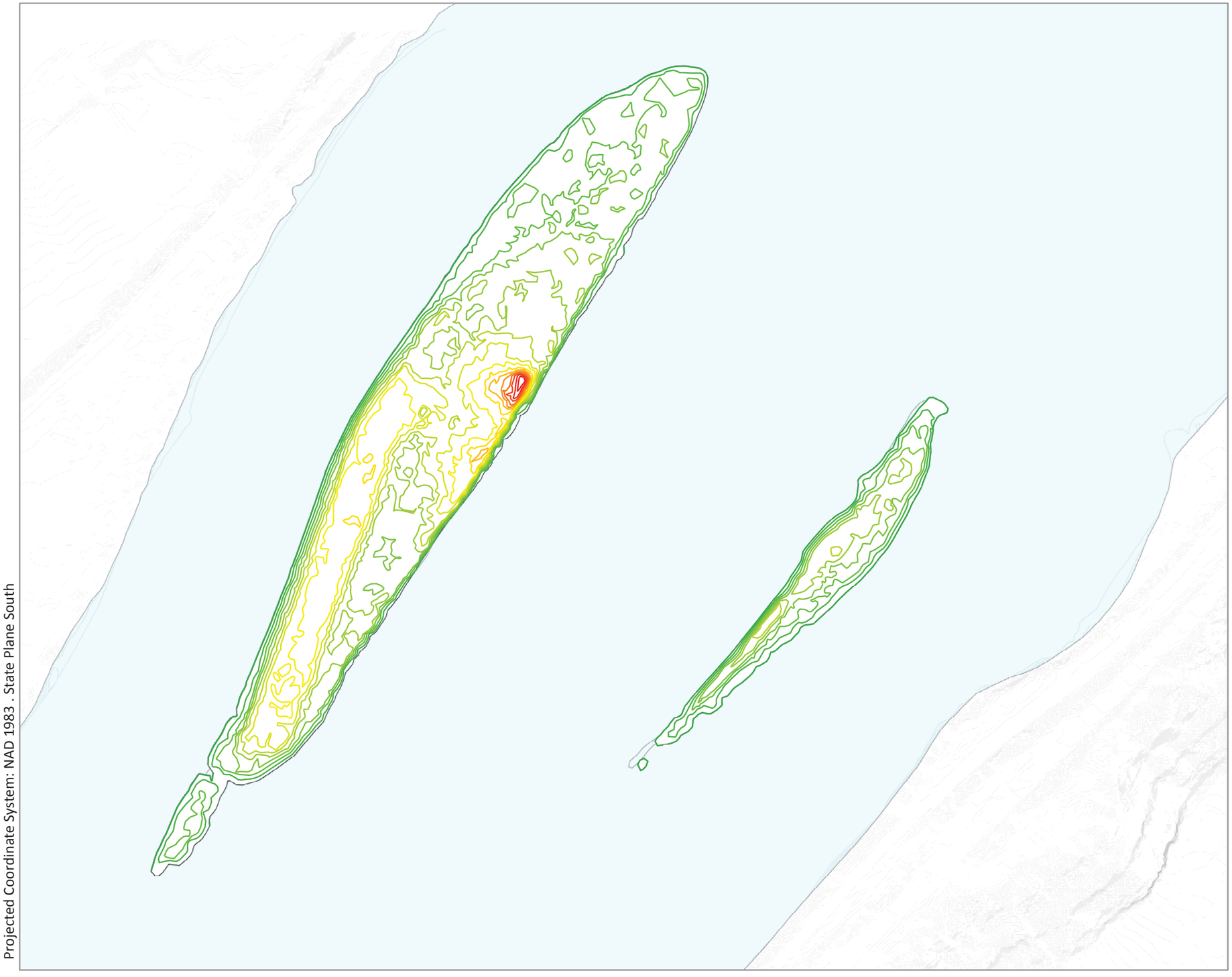
APPENDIX A: MAPS

MAP 1



Sycamore Island Regional Context

MAP 2



Sycamore Island Contours

ELEVATION

- 724
- 726
- 728
- 730
- 732
- 734
- 736
- 738
- 740
- 742
- 744
- 746
- 748
- 750
- 752

Projected Coordinate System: NAD 1983 . State Plane South

Allegheny River Islands

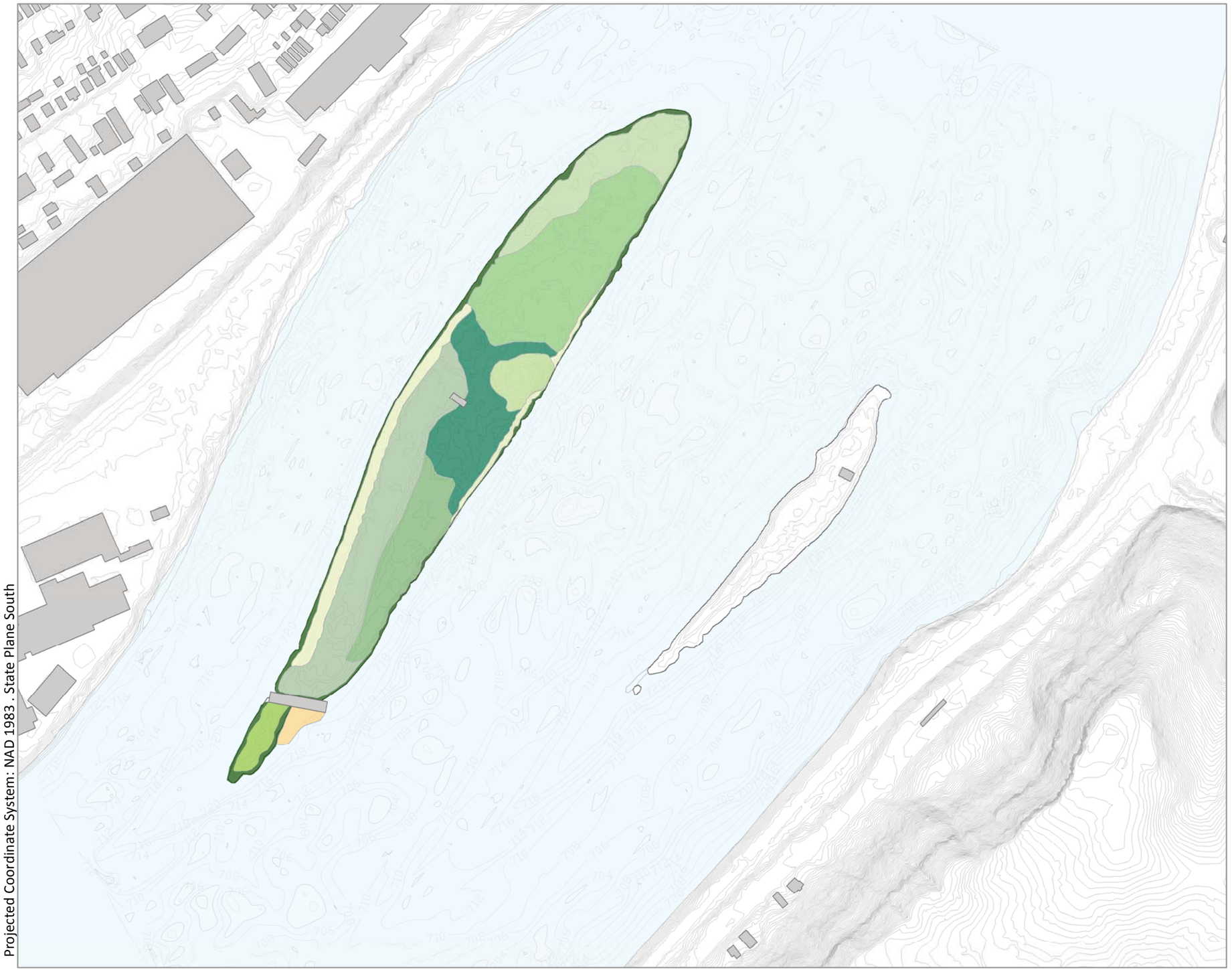
Sycamore Island

Applied Ecological Services, Inc.

N

0 0.025 0.05 0.1 Miles

MAP 3



Projected Coordinate System: NAD 1983 . State Plane South

Plant Communities

- Active Shoreline
- Backwater Cove (Artificial)
- Disturbed Wet-Mesic Floodplain Forest
- Forested Spoils Mound (Historic Spoils)
- Mesic Floodplain Forest (Historic Spoils)
- Steep Shoreline Slopes
- Wet Floodplain Forest
- Wet Floodplain Forest (Willow Dominated)
- Wet Meadow Scour Zone (Log Jams - Detritus)
- Wet-Mesic Floodplain Terrace

Structures

Allegheny River

Sycamore Island

Applied Ecological Services, Inc.

0 150 300 600 Feet

N

MAP 4

Projected Coordinate System: NAD 1983 . State Plane South

Cultural Points

- Pilings
- Asphalt
- Dock Remnants
- Fallen Transformer
- Fence Post
- Foundation with Submersible Pump
- Historic Barge
- Historic Pool
- Old Incinerator
- Picnic Table
- Pole
- Steel Drums
- Transformer Tower Pole


Historic Pool


Foundation with Submersible Pump


Dock Remnants


Historic Barge


Old Incinerator

0 170 340 680 Feet

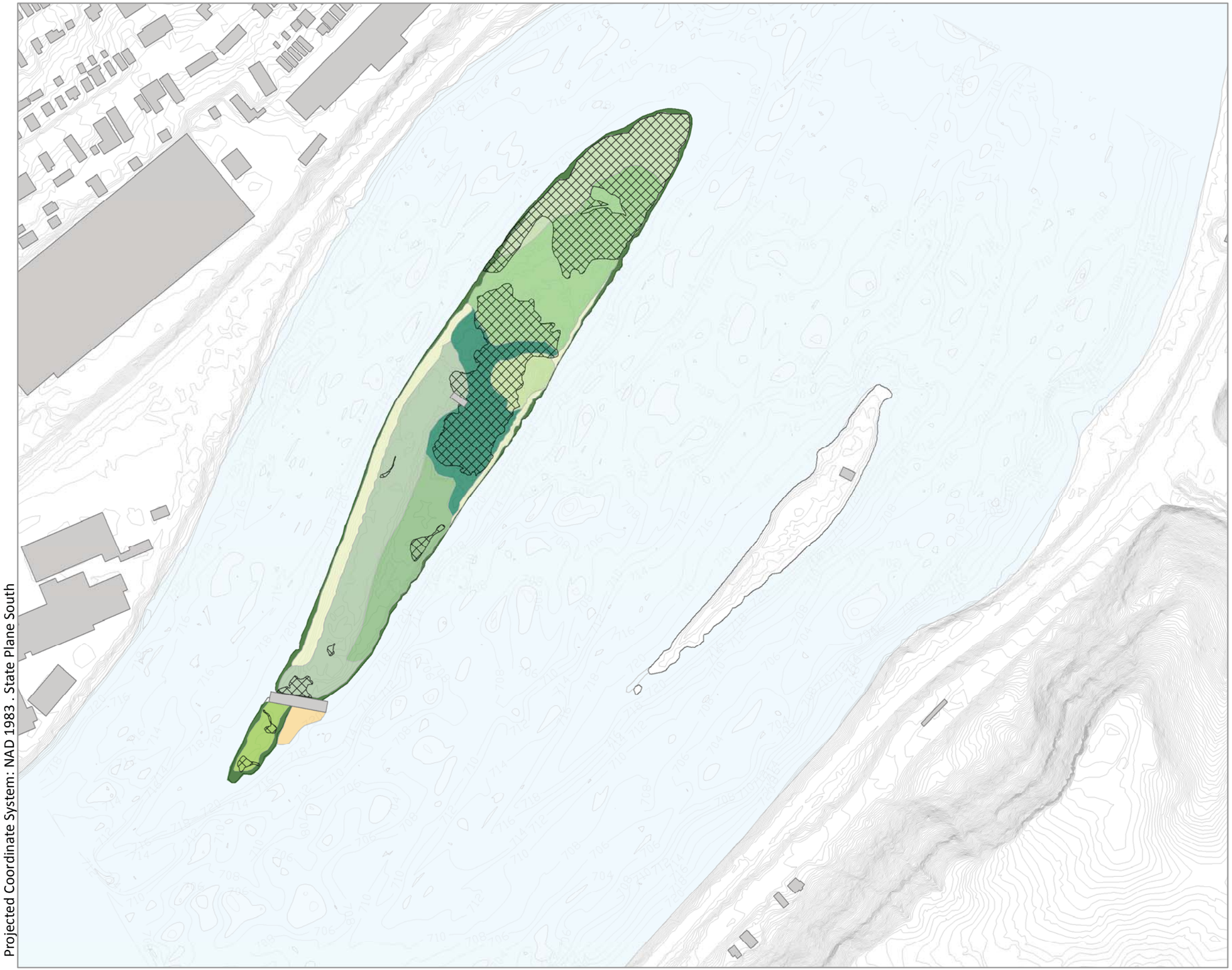
Structures | 2' Contour Interval | Allegheny River | Islands

Sycamore Island

Applied Ecological Services, Inc.

N

MAP 5



Japanese Knotweed Extent

Japanese Knotweed Invasion

- Active Shoreline
- Backwater Cove (Artificial)
- Disturbed Wet-Mesic Floodplain Forest
- Forested Spoils Mound (Historic Spoils)
- Mesic Floodplain Forest (Historic Spoils)
- Steep Shoreline Slopes
- Wet Floodplain Forest
- Wet Floodplain Forest (Willow Dominated)
- Wet Meadow Scour Zone (Log Jams - Detritus)
- Wet-Mesic Floodplain Terrace

Projected Coordinate System: NAD 1983 . State Plane South

Structures

Allegheny River

Sycamore Island

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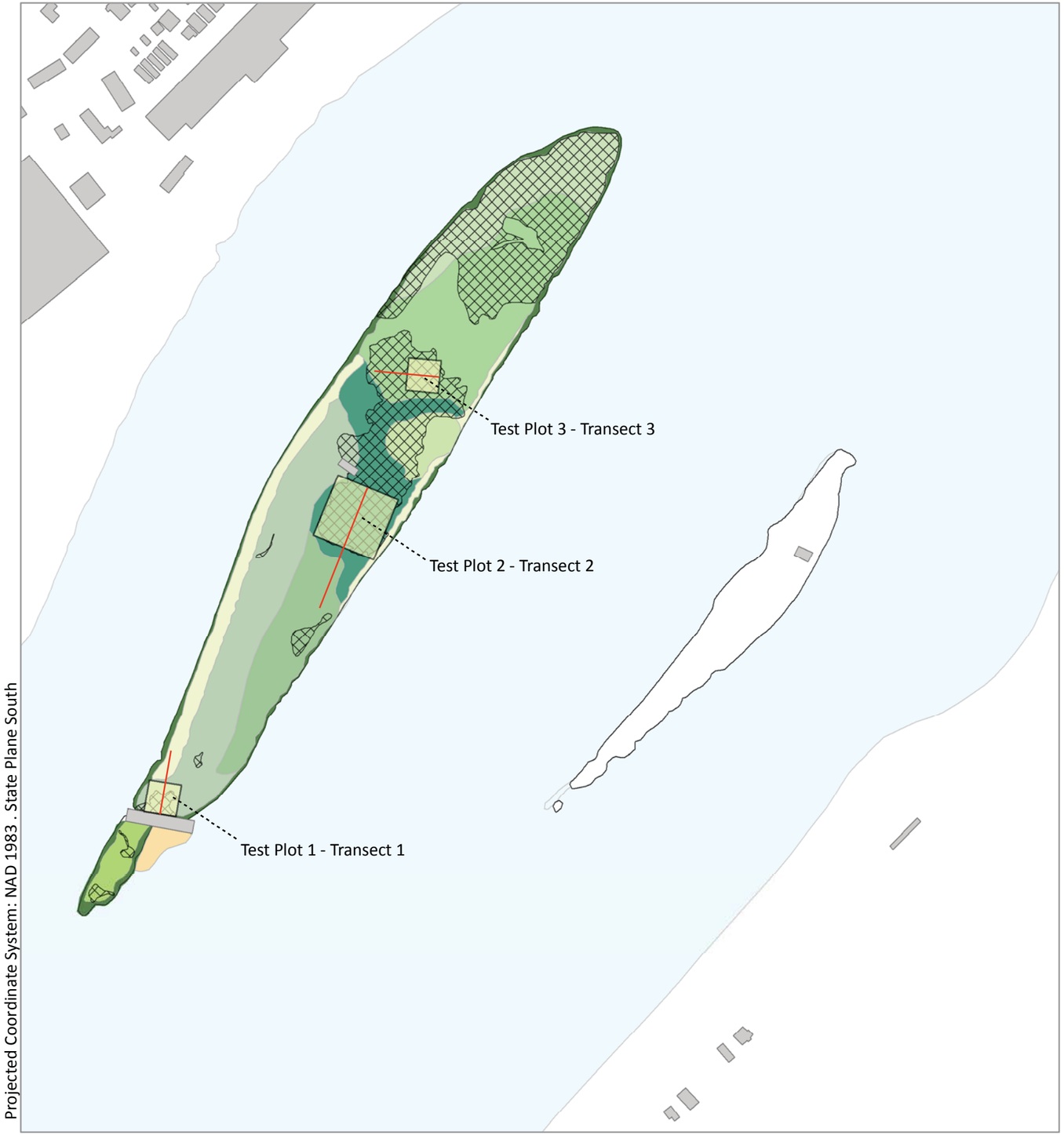
0 150 300 600 Feet

N

MAP 6



Test Plot Locations

Japanese Knotweed Invasion

Test Plot Location

Transect Line Location

Test Plot 1 - Transect 1 - Japanese Knotweed Invaded Area

Test Plot 1 - Transect 1 - Silver Maple Canopy - Native Forbs

Test Plot 2 - Transect 2 - Jewel Weed Glade - Silver Maple Canopy

Test Plot 2-Transect 2 - Japanese Knotweed - Silver Maple Canopy

Test Plot 3 - Transect 3 - Dense Japanese Knotweed Area

Test Plot 3 - Transect 3 - Silver Maple Seedlings and Knotweed

Structures

Allegheny River

Sycamore Island

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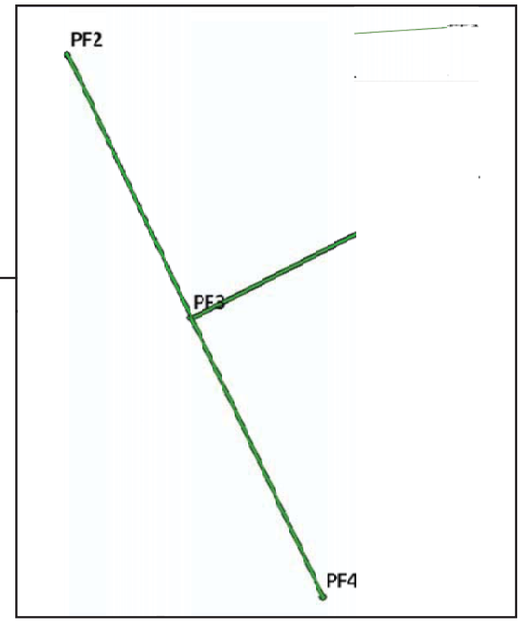
0 150 300 600 Feet

N

MAP 7

Faunal Survey Locations

- Breeding Bird Survey Points
- 100m Buffer
- 250m Buffer
- Pitfall Trap Locations
- Pitfall Driftfence Line



PCL9
PCL8
PCL7
PF3
PF1
PF4
PF2
PCL6
PCL5
PF5
PCL4
PF6
PCL3
PCL2
PCL1

Projected Coordinate System: NAD 1983 . State Plane South

0 62.5 125 250 Meters

N

2' Contour Interval Allegheny River Islands

Sycamore Island

Applied Ecological Services, Inc.™

MAP 8

Geotechnical Observations

Shoreline Substrate

Name

- Boulders
- Clay
- Cobble
- Gravel
- Mud
- Sand
- Silty Sand

Bank Pin Locations

Bank Pin Location Descriptions

Bank Pin Group 1
Located on bank 8-10' high, main-channel side
Well vegetated bank
Large willow overhang into river 20' upstream
Small willows overhanging into river 5' downstream

Bank Pin Group 2
Located on bank 6-10' high, main-channel side
Margionally well vegetated

Bank Pin Group 3
Located in cove created by barge, main-channel side

Structures — 2' Contour Interval — Allegheny River — Islands

Sycamore Island

Applied Ecological Services, Inc.

0 150 300 600 Feet

N

MAP 9

Bathymetric Mapping

Projected Coordinate System: NAD 1983 . State Plane South

Structures 2' Contour Interval Allegheny River

Sycamore Island

Applied Ecological Services, Inc.

0 200 400 800 Feet

N

MAP 10

Sycamore Island - Allegheny Riverfront Recreation System

* The pink-highlighted area is currently being studied as part of the Urban Redevelopment Authority of Pittsburgh's Allegheny Riverfront Vision project. The ARV Plan will be a comprehensive and unified vision for the redevelopment of the south shore of Pittsburgh's Allegheny River, including the consideration of riverfront trails, public access, open space and ecological enhancement.

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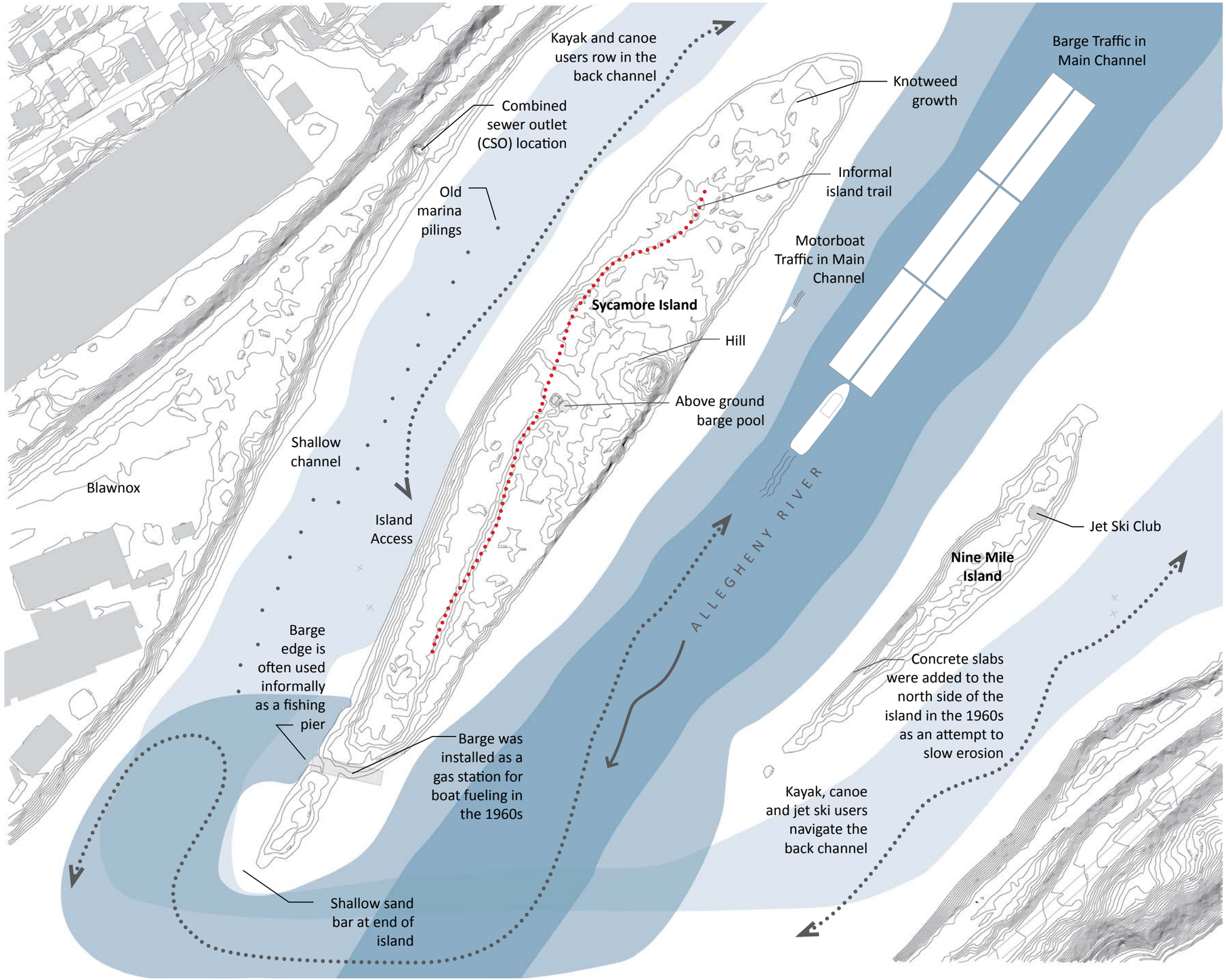
MAP 11



Sycamore Island - trails and boat access

Sycamore and Nine Mile Islands

Sycamore and Nine Mile Islands

The map at left depicts typical river navigation routes in the vicinity of Sycamore Island. The varied shades of blue indicate areas most frequented by three main types of watercraft. The darkest blue, shown between Sycamore and Nine Mile Islands, represents the deepest portion of the channel, accommodating river barges and tug boat traffic. The wider, medium shade of blue indicates the area used by motorized craft. This zone extends around the western tip of Sycamore Island. The lightest blue represents the most common path taken by kayak and canoe users. Only non-motorized craft can navigate the shallower island back channels, providing refuge from faster-moving river traffic. The Nine Mile Island back channel is also home to an active Jet Ski Club. The red dotted line indicates an informal walking trail running from the eastern end of Sycamore Island, past the ruins of an above-ground pool, along a central ridge toward the western tip of the island.

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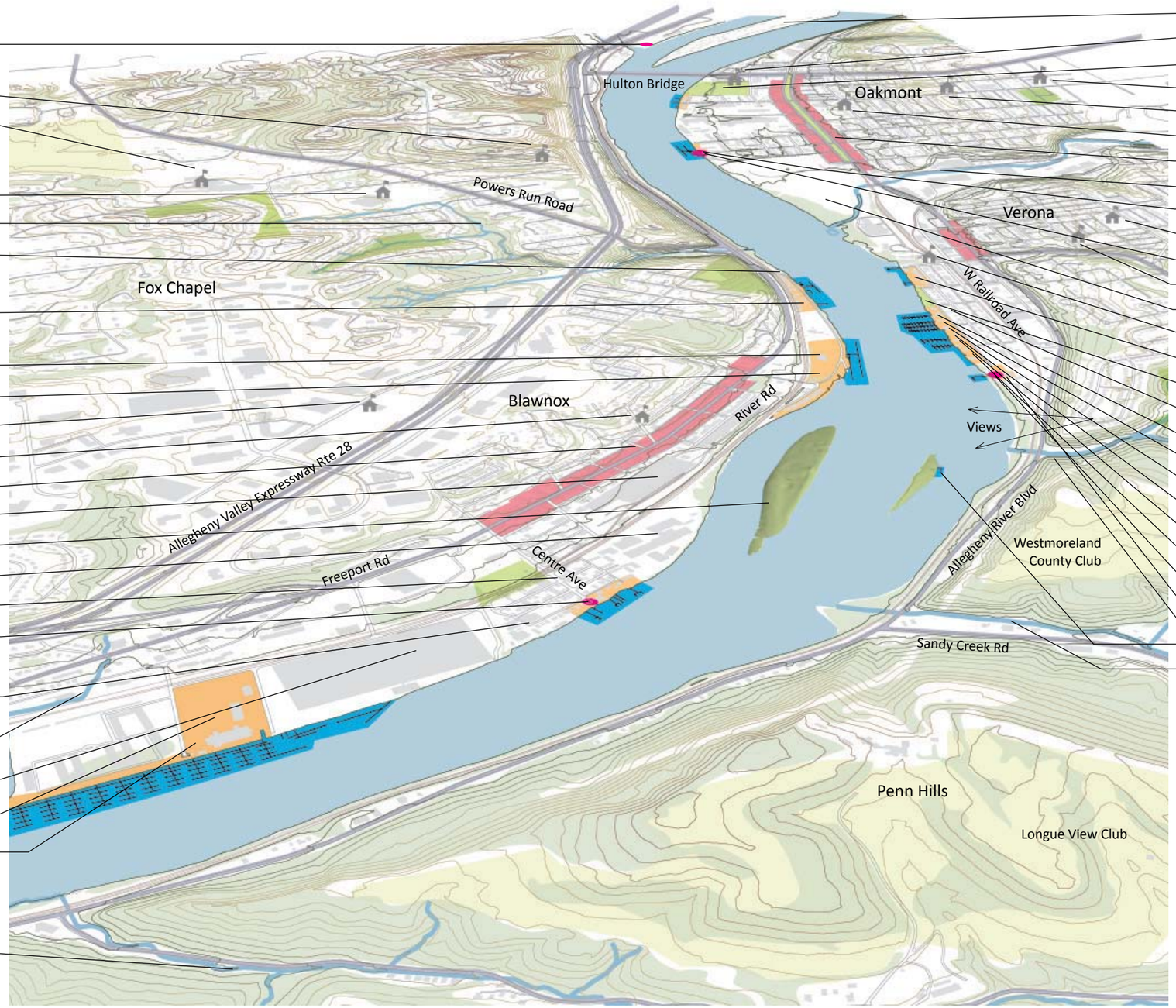
MAP !2



Harmarville Public Boat Launch
Trinity Christian School
Fox Chapel Area Senior High School
O'Hara Elementary
Powers Run
Silky's Crow's Nest (Restaurant)
Ohara Landing Boat Club and Marina
Bell Harbor Yacht Club
Residential
University of Pittsburgh
St. Edward's School
Blawnox Business District
Warehouses
Sycamore Island
Warehouses
Sproul's Superette
Blawnox Municipal Boat Launch
The "Bottoms"
Squaw Run
GENCO Warehouse
Residential
Fox Chapel Yacht Club
Shades Run

Twelve Mile Island
Riverview High School
Oakmont Riverside Park
Redeemer Lutheran School
Tenth Street School
Saint Irenaeus School
Oakmont Business District
Plum Creek
Oakmont Yacht Club
St. Joseph's School
Oakmont Boat Launch
Verner School
Future Residential Development
Riverview Childrens' Center
Verona Business District
Verona Riverside Park
Residential
Marina Pub
Outboard Haven Marina
Allegheny River Boat Club
Verona Boathouse Row
Duquesne Canoe Club
Sylvan Canoe Club
Verona Public Boat Launch
Steel City Rowing
Quigley Creek
Nine Mile Island - Jet Ski Club
Sandy Creek

river and creeks
woodlands / greenspace
river oriented residences
business district
building
public marina
public boat launch
school

This image focuses on Sycamore Island, Nine Mile Island and the surrounding riverfront context, including the adjacent communities of Oakmont, Verona, Blawnox, Penn Hills and Fox Chapel. Highlighted areas include river-oriented operations such as boat launches, yacht clubs, marinas and restaurants. This view also shows major roads and industrial areas, and identifies local schools that could take advantage of their proximity to the river and the islands for educational purposes. The various shades of green represent natural features such as woodlands, parks and other green spaces.

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Sycamore Island - river activity and surrounding communities

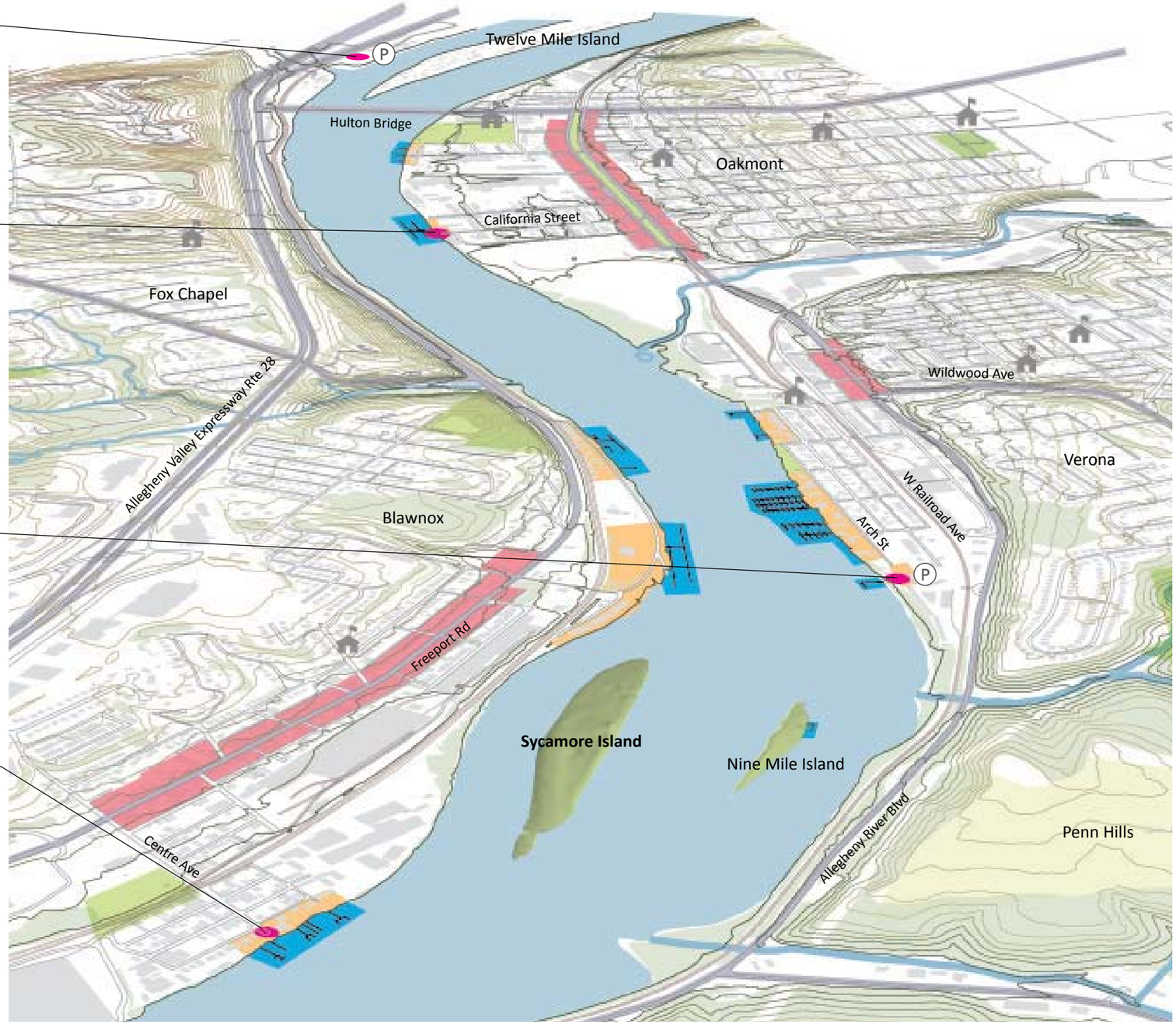
MAP 13

Harmarville Public Boat Launch
Public parking lot and informational signage. Managed by the Fish and Boat Commission.

Oakmont Boat Launch
Informal boat launch ramp at the end of California Street. No parking or informational signage. Several large parking lots related to the Greek Orthodox Social Hall are immediately adjacent to the public boat launch.

Verona Public Boat Launch
A green boathouse with water trail parking is currently being built at the site of the Verona public boat launch.

Blawnox Municipal Boat Launch
This boat launch area is for use by Blawnox residents only. No public parking area is provided.




Harmarville Public Boat Launch


Oakmont Boat Launch

Verona Public Boat Launch


Blawnox Municipal Boat Launch

river and creeks
woodlands / greenspace
river oriented residences
business district
building
public marina
public boat launch
school
public parking lot at boat launch

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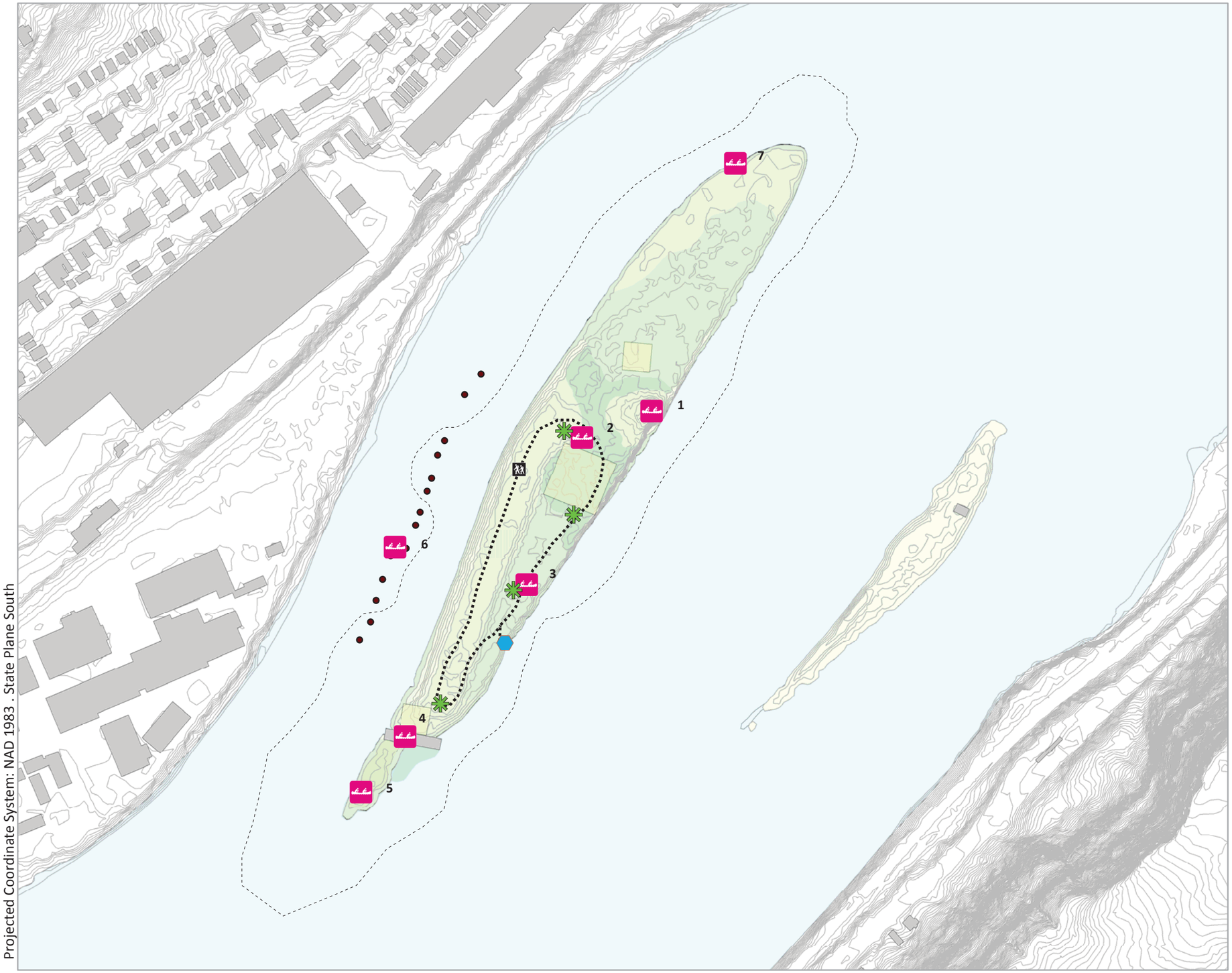
Sycamore Island - public river access and parking

Map 14



Projected Coordinate System: NAD 1983 . State Plane South

Signage Layout

- Piling
- Naming Sign/ Land Trail Interperative Point (tbd)
- Water Trail Interperative Point
  1) Effects of Regulated Rivers
  2) Urban Ecology: Habitat Creation for Amphibians
  3) Riparian Island Ecology
  4) Urban Ecology: The Barge as Nature Reclaimed
  5) Riparian Island Formation
  6) Urban Ecology: Bird Nesting Habitat
  7) Effects of Invasives
- Regulatory Signage Point
- Test Plot
- Land Trail
- Water Trail

Structures | 2' Contour Interval | Allegheny River | Islands

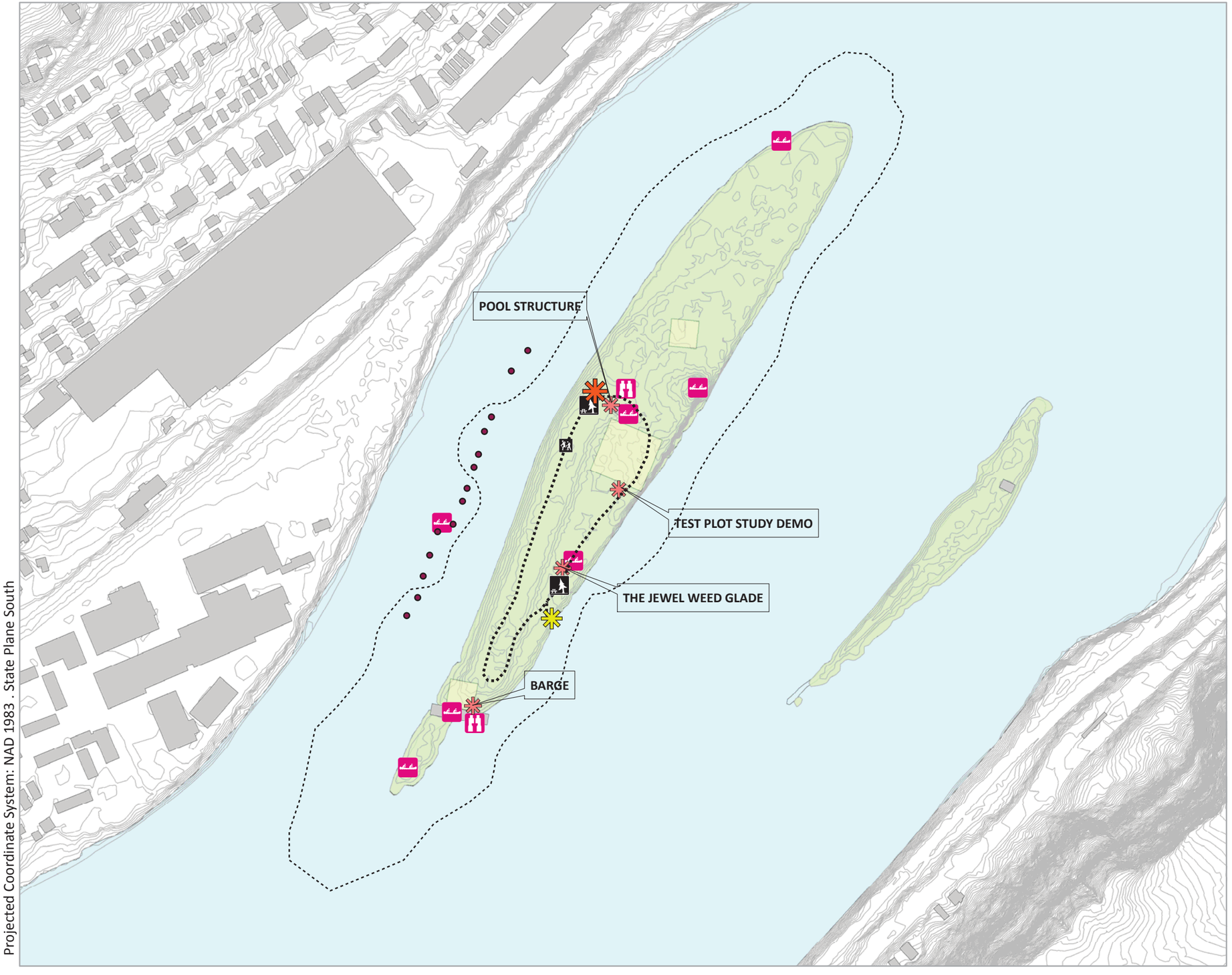
Sycamore Island

Applied Ecological Services, Inc.

0 150 300 600 Feet

N

Map 15



Projected Coordinate System: NAD 1983 . State Plane South

Structures 2' Contour Interval Allegheny River Islands

Sycamore Island

Trail Map

- Pilings
- Gathering Area
- ViewingPlatform
- Main Channel Island Access Point
- Point of Interest
- Water Trail
- Wildlife Viewing Area
- Water trail
- Interpretive Trail
- TestPlot

Applied Ecological Services, Inc.

0 150 300 600 Feet

N

APPENDIX B: SOIL SERIES

Established Series
Rev. ART-WWB-WFH
07/2002

PHILO SERIES

The Philo series consists of very deep, moderately well drained soils on flood plains. They formed in recent alluvium derived mainly from sandstone and shale. Permeability is moderate to moderately rapid. Slope ranges from 0 to 6 percent. The mean annual precipitation is about 43 inches and the mean annual temperature is about 52 degrees F.

TAXONOMIC CLASS: Coarse-loamy, mixed, active, mesic Fluvaquentic Dystrudepts

TYPICAL PEDON: Philo silt loam - cultivated. (Colors are for moist soils unless otherwise stated.)

Ap--0 to 6 inches, brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate fine granular structure; friable; strongly acid; abrupt smooth boundary. (5 to 10 inches thick.)

Bw1--6 to 16 inches, dark yellowish brown (10YR 4/4) silt loam; moderate fine granular structure; friable; strongly acid; gradual smooth boundary.

Bw2--16 to 22 inches, brown (10YR 5/3) silt loam weak very fine subangular blocky structure; friable to firm; few fine distinct dark brown to brown (7.5YR 4/4) iron concentrations and gray (10YR 5/1) iron depletions; strongly acid; clear smooth boundary. (Combined thickness of the Bw is 9 to 40 inches.)

C1--22 to 32 inches, gray (10YR 5/1) silt loam, massive; friable; common distinct strong brown (7.5YR 5/8) iron concentrations; common black concretions; strongly acid; clear smooth boundary. (0 to 12 inches thick.)

C2--32 to 42 inches, variegated gray (10YR 5/1) and strong brown (7.5YR 5/8) loam; massive; firm; strongly acid; clear smooth boundary. (0 to 12 inches thick.)

2C3--42 to 60 inches, stratified sand and gravel.

TYPE LOCATION: Barbour County, West Virginia; north of Big Run on the south side of U. S. Highway 119 near the intersection with State Route 36.

RANGE IN CHARACTERISTICS: Solum thickness ranges from 20 to 48 inches. Some pedons have stratified sand and gravel at depth as shallow as 30 inches, however, the transition zone is 5 inches or more thick. In other pedons, medium-textured materials extends to depths of 5 feet or more. Depth to hard rock ranges from 60 inches to 12 feet or more. In most pedons, rock fragments range from 0 to 20 percent in the A, Bw, and C horizons, 0 to 40 percent in the 2C horizon, and average less than 20 percent in the particle size control section. Some pedons, have rock fragments in C horizons that range from 0 to 40 percent, and 2C horizons below 40 inches that range from 0 to 75 percent. Reaction when unlimed ranges from very strongly acid to moderately acid.

The A horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2 or 3. If moist value is 3, either the dry value is more than 5.5 or the A horizon is less than 1/3 the thickness from the soil surface to the base of the Cambic horizon. Texture of the fine-earth fraction is silt loam, loam, sandy loam, and fine sandy loam.

The Bw horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 3 to 6, and chroma of 3 to 6. Low chroma redoximorphic features range from dark grayish brown (10YR 4/2) to light gray (10YR 6/1). High chroma redoximorphic features range from dark brown (7.5YR 4/4) to strong brown (7.5YR 5/8). Texture of the fine-earth fraction is silt loam, loam, fine sandy loam, and sandy loam. Some pedons have thin horizons where the fine-earth fraction is very fine sandy loam.

Some pedons have BC horizons with colors and textures similar to the Bw horizon.

The C horizon has hue of 7.5YR, 10YR, 2.5Y, 5Y, or neutral, value of 4 to 6, and chroma of 0 to 6, and has redox features. Redoximorphic features are strong brown (7.5YR 5/6 or 7.5YR 5/8), yellowish red (5YR 4/6) or redder. If matrix chroma is greater than 2, redoximorphic features have chroma of 2 or less. Texture of the fine-earth fraction is silt loam, loam, fine sandy loam, and sandy loam.

Texture of the fine-earth fraction in the 2C horizon ranges from sand to silt loam.

COMPETING SERIES: The Basher, Iotla and Pootatuck series are in the same family. The Iotla series is somewhat poorly drained with redox features just below the A horizon. Basher soils have hue of 5YR or redder in the Bw horizon. Pootatuck soils have a sand fraction dominated by feldspars.

GEOGRAPHIC SETTING: Philo soils are on nearly level flood plains. Slopes range from 0 to 6 percent. The soils developed in recent alluvium washed mainly from sandstone and shale derived soils. Climate is humid temperate. Average annual precipitation ranges from 40 to 55 inches and mean annual air temperature ranges from 47 degrees to 59 degrees F. The number of days without killing frost ranges from 130 to 200.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the well drained Pope or Wenonah, somewhat poorly drained Stendal, poorly drained Atkins and poorly and very poorly drained Elkins soils on flood plains. The Buchanan, Cotaco and Ernest soils are moderately well drained soils on foot slopes and colluvial fans. The Dekalb, Gilpin and Muskingum soils are well drained upland soils. Chenango and Alton soils are skeletal soils on adjacent terraces. The Holly and Papakating soils are more poorly drained alluvial soils.

DRAINAGE AND PERMEABILITY: Moderately well drained. Subject to stream overflow. The potential for surface runoff is low or very low and permeability is moderate to moderately rapid. A seasonally fluctuating water table rises to within 1-1/2 to 3 feet below the soil surface.

USE AND VEGETATION: Most areas are cleared and cultivated or pastured. Original vegetation was mixed water tolerant hardwoods.

DISTRIBUTION AND EXTENT: Georgia, Southern Indiana, Kentucky, Maryland, New York, Southern Ohio, Pennsylvania, Tennessee, Virginia, and West Virginia. MLRA Extent is large.

MLRA OFFICE RESPONSIBLE: Morgantown, West Virginia

SERIES ESTABLISHED: Muskingum County, Ohio, 1925.

REMARKS: Diagnostic horizons and features recognized in this pedon are:

1. Ochric epipedon - The zone from 0 to 9 inches (Ap horizon).
2. Cambic horizon - The zone from 9 to 22 inches (Bw1 and Bw2 horizons).
3. Fluvaquentic feature - Irregular decrease in organic carbon and low chroma redoximorphic features are within a depth of 24 inches of the surface.
4. Udic soil moisture regime.

Additional Data: Soil Interpretation Records - WV0020, WV0129.

APPENDIX C: QUADRAT DATA

Table 5.6. Test Plot 1 – Transect 1 quadrat data summary.

SITE Sycamore Island
LOCALE (SIT1) Test Plot 1 – Transect 1 (quadrat data)
DATE 6/23/09
BY S. Lehnhardt, S. Batunkyi

QUAD	MC	w/Ad	FQI	w/Ad	MW	w/Ad	NS	TS	MW SEQ	w/Ad
1	0.0	0.0	0.0	0.0	0.0	3.0	0	1	0.5	2.5
2	2.0	1.0	2.0	1.4	1.0	2.0	1	2	0.3	2.7
3	0.0	0.0	0.0	0.0	0.0	3.0	0	1	0.3	2.7
4	0.0	0.0	0.0	0.0	0.0	3.0	0	1	-1.0	2.0
5	0.0	0.0	0.0	0.0	-3.0	0.0	1	2	-0.9	1.1
6	1.5	1.5	3.0	3.0	0.3	0.3	4	4	-0.6	0.8
7	2.0	1.0	2.0	1.4	1.0	2.0	1	2	-1.3	0.4
8	2.0	1.0	2.0	1.4	-5.0	-1.0	1	2	-1.3	1.3
9	0.0	0.0	0.0	0.0	0.0	3.0	0	1	-1.7	1.7
10	0.0	0.0	0.0	0.0	0.0	3.0	0	1	0.0	3.0
AVG	0.8	0.5	0.9	0.7	-0.6	1.8	1	2		
STD	0.9	0.6	1.1	1.0	1.8	1.4	1	1		

TRANSECT DATA, AGGREGATE

C	Number			
0	1		7	Total Species
1	2		1.33	Native Mean C
2	3	0 to 3	1.14	w/Adventives
3	0	100.0%	3.27	Native FQI
4	0		3.02	w/Adventives
5	0		-1.17	Native Mean W
6	0	4 to 7	-0.57	w/Adventives
7	0	0.0%		
8	0			
9	0	8 to 10		
10	0	0.0%		
			6	Native Specie

PHYSIOGNOMY

Native	6	85.7%
Tree	1	14.3%
Shrub	1	14.3%
W-Vine	2	28.6%
H-Vine	0	0.0%
P-Forb	2	28.6%
B-Forb	0	0.0%
A-Forb	0	0.0%
P-Grass	0	0.0%
A-Grass	0	0.0%
P-Sedge	0	0.0%
A-Sedge	0	0.0%
Cryptogam	0	0.0%
Adventive	1	14.3%
Tree	0	0.0%
Shrub	1	14.3%
W-Vine	0	0.0%
H-Vine	0	0.0%
P-Forb	0	0.0%
B-Forb	0	0.0%
A-Forb	0	0.0%
P-Grass	0	0.0%
A-Grass	0	0.0%
P-Sedge	0	0.0%
A-Sedge	0	0.0%

PHYSIOGNOMIC RELATIVE IMPORTANCE VALUES

Physiog.	FRQ	COV	RFRQ	RCOV	RIV
Ad Shrub	9	775	52.9%	88.8%	70.9%
Nt W-Vine	4	26	23.5%	3.0%	13.3%
Nt P-Forb	2	66	11.8%	7.6%	9.7%
Nt Shrub	1	5	5.9%	0.6%	3.2%
Nt Tree	1	1	5.9%	0.1%	3.0%

SPECIES RELATIVE IMPORTANCE VALUES

Scientific Name	C	Wetness	FRQ	COV	RFRQ	RCOV	RIV
POLYGONUM CUSPIDATUM	*	FACU	9	775	52.9%	88.8%	70.9%
Parthenocissus quinquefolia	2	FAC-	3	6	17.6%	0.7%	9.2%
Circaea lutetiana canadensis	1	FACU	1	60	5.9%	6.9%	6.4%
Rhus radicans	2	FAC+	1	20	5.9%	2.3%	4.1%
Boehmeria cylindrica	2	OBL	1	6	5.9%	0.7%	3.3%
Cornus racemosa	1	FACW-	1	5	5.9%	0.6%	3.2%
Acer saccharinum	0	FACW	1	1	5.9%	0.1%	3.0%
			17	873			

TRANSECT INVENTORY

Acronym	Scientific Name	Common Name
ACESAI	Acer saccharinum	SILVER MAPLE
BOECYC	Boehmeria cylindrica	FALSE NETTLE
CIRLUC	Circaea lutetiana canadensis	ENCHANTER'S NIGHTSHADE
CORRAC	Cornus racemosa	GRAY DOGWOOD
PARQUI	Parthenocissus quinquefolia	VIRGINIA CREEPER
POLCUS	POLYGONUM CUSPIDATUM	JAPANESE KNOTWEED
RHURAD	Rhus radicans	POISON IVY

TRANSECT STRING

QUAD	1	QUAD	4	QUAD	7
POLCUS	100	POLCUS	90	POLCUS	100
				PARQUI	1

QUAD	2
POLCUS	80
PARQUI	3

QUAD	3
POLCUS	90

QUAD	5
POLCUS	80
ACESAI	1

QUAD	6
PARQUI	2
CIRLUC	60
CORRAC	5
RHURAD	20

QUAD	8
POLCUS	75
BOECYC	6

QUAD	9
POLCUS	100

QUAD	10
POLCUS	60

Table 5.7. Test Plot 2 – Transect 2 quadrat data summary.

SITE Sycamore Island
LOCALE (SIT2) Test Plot 2 – Transect 2 (quadrat data)
DATE 6/23/09
BY S. Lehnhardt, S. Batunkyi

QUAD	MC	w/Ad	FQI	w/Ad	MW	w/Ad	NS	TS	MW SEQ	w/Ad
1.0	2.8	2.8	5.5	5.5	-1.5	-1.5	4	4	-0.9	-0.9
2.0	2.0	2.0	3.5	3.5	-0.3	-0.3	3	3	-0.7	-0.7
3.0	2.0	2.0	3.5	3.5	-0.3	-0.3	3	3	-1.2	-1.2
4.0	3.0	3.0	3.0	3.0	-3.0	-3.0	1	1	-1.2	-1.2
5.0	2.0	2.0	3.5	3.5	-0.3	-0.3	3	3	-1.1	-0.1
6.0	0.0	0.0	0.0	0.0	0.0	3.0	0	1	-0.1	1.9
7.0	0.0	0.0	0.0	0.0	0.0	3.0	0	1	0.0	3.0
8.0	0.0	0.0	0.0	0.0	0.0	3.0	0	1	0.0	3.0
9.0	0.0	0.0	0.0	0.0	0.0	3.0	0	1	0.0	3.0
10.0	0.0	0.0	0.0	0.0	0.0	3.0	0	1	0.0	3.0
AVG	1.2	1.2	1.9	1.9	-0.6	1.0	1	2		
STD	1.2	1.2	2.0	2.0	0.9	2.2	2	1		

TRANSECT DATA, AGGREGATE

C	Number			
0	0		5	Native Species
1	1		6	Total Species
2	2	0 to 3	2.40	Native Mean C
3	1	80.0%	2.00	w/Adventives
4	1		5.37	Native FQI
5	0		4.90	w/Adventives
6	0	4 to 7	-0.60	Native Mean W
7	0	20.0%	0.00	w/Adventives
8	0			
9	0	8 to 10		
10	0	0.0%		

PHYSIOGNOMY

Native	5	83.3%
Tree	0	0.0%
Shrub	0	0.0%
W-Vine	2	33.3%
H-Vine	0	0.0%
P-Forb	2	33.3%
B-Forb	0	0.0%
A-Forb	1	16.7%
P-Grass	0	0.0%
A-Grass	0	0.0%
P-Sedge	0	0.0%
A-Sedge	0	0.0%
Cryptogam	0	0.0%
Adventive	1	16.7%
Tree	0	0.0%
Shrub	1	16.7%
W-Vine	0	0.0%
H-Vine	0	0.0%
P-Forb	0	0.0%
B-Forb	0	0.0%
A-Forb	0	0.0%
P-Grass	0	0.0%
A-Grass	0	0.0%
P-Sedge	0	0.0%
A-Sedge	0	0.0%

PHYSIOGNOMIC RELATIVE IMPORTANCE VALUES

Physiog.	FRQ	COV	RFRQ	RCOV	RIV
Ad Shrub	5	480	26.3%	52.6%	39.4%
Nt A-Forb	5	255	26.3%	27.9%	27.1%
Nt W-Vine	5	98	26.3%	10.7%	18.5%
Nt P-Forb	4	80	21.1%	8.8%	14.9%

SPECIES RELATIVE IMPORTANCE VALUES

Scientific Name	C	Wetness	FRQ	COV	RFRQ	RCOV	RIV
POLYGONUM CUSPIDATUM	*	FACU	5	480	26.3%	52.6%	39.4%
Impatiens capensis	3	FACW	5	255	26.3%	27.9%	27.1%
Rhus radicans	2	FAC+	4	92	21.1%	10.1%	15.6%
Circaea lutetiana canadensis	1	FACU	3	50	15.8%	5.5%	10.6%
Lysimachia ciliata	4	FACW	1	30	5.3%	3.3%	4.3%
Parthenocissus quinquefolia	2	FAC-	1	6	5.3%	0.7%	3.0%
			19	913			

TRANSECT INVENTORY

Acronym	Scientific Name	Common Name
CIRLUC	Circaea lutetiana canadensis	ENCHANTER'S NIGHTSHADE
IMPCAP	Impatiens capensis	ORANGE JEWELWEED
LYSCIL	Lysimachia ciliata	FRINGED LOOSESTRIFE
PARQUI	Parthenocissus quinquefolia	VIRGINIA CREEPER
POLCUS	POLYGONUM CUSPIDATUM	JAPANESE KNOTWEED
RHURAD	Rhus radicans	POISON IVY

TRANSACT STRING

QUAD	1	QUAD	4	QUAD	8
LYSCIL	30	IMPCAP	45	POLCUS	100
IMPCAP	50				

RHURAD	4
PARQUI	6
QUAD	2
IMPCAP	50
RHURAD	25
CIRLUC	10
QUAD	3
IMPCAP	30
RHURAD	3
CIRLUC	30

QUAD	5
IMPCAP	80
RHURAD	60
CIRLUC	10
QUAD	6
POLCUS	80
QUAD	7
POLCUS	100

QUAD	9
POLCUS	100
QUAD	10
POLCUS	100

Table 5.8. Test Plot 3 – Transect 3 quadrat data summary.

SITE Sycamore Island
LOCALE (SIT3) Test Plot 3 – Transect 3 (quadrat data)
DATE 6/23/09
BY S. Lehnhardt, S. Batunkyi

QUAD	MC	w/Ad	FQI	w/Ad	MW	w/Ad	NS	TS	MW SEQ	w/Ad
1	0.0	0.0	0.0	0.0	0.0	3.0	0	1	-0.3	1.6
2	4.0	3.2	8.0	7.2	-0.5	0.2	4	5	1.5	2.4
3	4.0	2.0	4.0	2.8	5.0	4.0	1	2	0.5	1.4
4	3.0	1.5	3.0	2.1	-3.0	0.0	1	2	-0.3	1.3
5	3.0	1.5	3.0	2.1	-3.0	0.0	1	2	-2.0	1.0
6	0.0	0.0	0.0	0.0	0.0	3.0	0	1	-1.0	2.0
7	0.0	0.0	0.0	0.0	0.0	3.0	0	1	-1.0	2.0
8	3.0	1.5	3.0	2.1	-3.0	0.0	1	2	-1.0	2.0
9	0.0	0.0	0.0	0.0	0.0	3.0	0	1	-1.3	0.9
10	3.2	2.7	7.2	6.5	-1.0	-0.3	5	6	-0.5	1.3
AVG	2.0	1.2	2.8	2.3	-0.6	1.6	1	2		
STD	1.7	1.1	2.8	2.5	2.2	1.6	2	2		

TRANSECT DATA, AGGREGATE

C	Number				
0	0			7	Native Species
1	1			8	Total Species
2	2	0 to 3		3.14	Native Mean C
3	1		57.1%	2.75	w/Adventives
4	1			8.32	Native FQI
5	2			7.78	w/Adventives
6	0	4 to 7		-0.14	Native Mean W
7	0		42.9%	0.25	w/Adventives
8	0				
9	0	8 to 10			
10	0		0.0%		

PHYSIOGNOMY

Native	7	87.5%
Tree	0	0.0%
Shrub	0	0.0%
W-Vine	2	25.0%
H-Vine	0	0.0%
P-Forb	3	37.5%
B-Forb	0	0.0%
A-Forb	2	25.0%
P-Grass	0	0.0%
A-Grass	0	0.0%
P-Sedge	0	0.0%
A-Sedge	0	0.0%
Cryptogam	0	0.0%
Adventive	1	12.5%
Tree	0	0.0%
Shrub	1	12.5%
W-Vine	0	0.0%
H-Vine	0	0.0%
P-Forb	0	0.0%
B-Forb	0	0.0%
A-Forb	0	0.0%
P-Grass	0	0.0%
A-Grass	0	0.0%
P-Sedge	0	0.0%
A-Sedge	0	0.0%

PHYSIOGNOMIC RELATIVE IMPORTANCE VALUES

Physiog.	FRQ	COV	RFRQ	RCOV	RI
Ad Shrub	10	821	43.5%	92.1%	67.8%
Nt A-Forb	6	11	26.1%	1.2%	13.7%
Nt P-Forb	5	49	21.7%	5.5%	13.6%
Nt W-Vine	2	10	8.7%	1.1%	4.9%

SPECIES RELATIVE IMPORTANCE VALUES

Scientific Name	C	Wetness	FRQ	COV	RFRQ	RCOV	RIV
POLYGONUM CUSPIDATUM	*	FACU	10	821	43.5%	92.1%	67.8%
Impatiens capensis	3	FACW	4	9	17.4%	1.0%	9.2%
Actinomeris alternifolia	5	FACW	2	35	8.7%	3.9%	6.3%
Eupatorium rugosum	4	UPL	2	6	8.7%	0.7%	4.7%
Pilea pumila	5	FACW	2	2	8.7%	0.2%	4.5%
Parthenocissus quinquefolia	2	FAC-	1	8	4.3%	0.9%	2.6%
Circaea lutetiana canadensis	1	FACU	1	8	4.3%	0.9%	2.6%
Rhus radicans	2	FAC+	1	2	4.3%	0.2%	2.3%
			23	891			

TRANSECT INVENTORY

Acronym	Scientific Name	Common Name
ACTALT	Actinomeris alternifolia	WINGSTEM
CIRLUC	Circaea lutetiana canadensis	ENCHANTER'S NIGHTSHADE
EUPRUG	Eupatorium rugosum	WHITE SNAKEROOT
IMPCAP	Impatiens capensis	ORANGE JEWELWEED
PARQUI	Parthenocissus quinquefolia	VIRGINIA CREEPER
PILPUM	Pilea pumila	CLEARWEED
POLCUS	POLYGONUM CUSPIDATUM	JAPANESE KNOTWEED
RHURAD	Rhus radicans	POISON IVY

TRANSACT STRING

QUAD	1
POLCUS	80

QUAD	2
POLCUS	100
RHURAD	2
ACTALT	20
EUPRUG	4
PILPUM	1

QUAD	3
POLCUS	95
EUPRUG	2

QUAD	4
POLCUS	95
IMPCAP	4

QUAD	5
POLCUS	100
IMPCAP	1

QUAD	6
POLCUS	100

QUAD	7
POLCUS	100

QUAD	8
POLCUS	90
IMPCAP	1

QUAD	9
POLCUS	60

QUAD	10
POLCUS	1
PARQUI	8
IMPCAP	3
ACTALT	15
CIRLUC	8
PILPUM	1

Table5.9. Test Plot 1, Floristic Inventory data summary.

SITE Sycamore Island
LOCALE Test Plot 1 – Floristic Inventory
DATE 6/23/09
BY S. Lehnhardt, S. Batunkyi

FLORISTIC QUALITY DATA				NATIVE			ADVENTIVE	
16	Native Species	5	Tree	22.7%	3	Tree	13.6%
22	Total Species	2	Shrub	9.1%	3	Shrub	13.6%
2.94	Native Mean C	3	W-Vine	13.6%	0	W-Vine	0.0%
2.14	w/Adventives	0	H-Vine	0.0%	0	H-Vine	0.0%
11.75	Native FQI	3	P-Forb	13.6%	0	P-Forb	0.0%
10.02	w/Adventives	1	B-Forb	4.5%	0	B-Forb	0.0%
0.50	Native W	2	A-Forb	9.1%	0	A-Forb	0.0%
1.27	w/Adventives	0	P-Grass	0.0%	0	P-Grass	0.0%
		0	A-Grass	0.0%	0	A-Grass	0.0%
		0	P-Sedge	0.0%	0	P-Sedge	0.0%
		0	A-Sedge	0.0%	0	A-Sedge	0.0%
		0	Cryptogam	0.0%			

ACRONYM	C	SCIENTIFIC NAME	W	WETNESS	PHYSIOG.	COMMON NAME
ACESAI	0	Acer saccharinum	-3	FACW	Nt TREE	SILVER MAPLE
ACTALT	5	Actinomeris alternifolia	-3	FACW	Nt P-FORB	WINGSTEM
AILALT	*	AILANTHUS ALTISSIMA	5	UPL	Ad TREE	TREE OF HEAVEN
CELOCC	3	Celtis occidentalis	1	FAC-	Nt TREE	HACKBERRY
CIRLUC	1	Circaea lutetiana canadensis	3	FACU	Nt P-FORB	ENCHANTER'S NIGHTSHADE
EUPRUG	4	Eupatorium rugosum	5	UPL	Nt P-FORB	WHITE SNAKEROOT
FRAAMA	5	Fraxinus americana	3	FACU	Nt TREE	WHITE ASH
IMPCAP	3	Impatiens capensis	-3	FACW	Nt A-FORB	ORANGE JEWELWEED
LONTAT	*	LONICERA TATARICA	5	[UPL]	Ad SHRUB	TARTARIAN HONEYSUCKLE
MORALB	*	MORUS ALBA	0	FAC	Ad TREE	WHITE MULBERRY
OENBIE	0	Oenothera biennis	3	FACU	Nt B-FORB	COMMON EVENING PRIMROSE
PARQUI	2	Parthenocissus quinquefolia	1	FAC-	Nt W-VINE	VIRGINIA CREEPER
PILPUM	5	Pilea pumila	-3	FACW	Nt A-FORB	CLEARWEED
PLAOCC	9	Platanus occidentalis	-3	FACW	Nt TREE	SYCAMORE
POLCUS	*	POLYGONUM CUSPIDATUM	3	FACU	Ad SHRUB	JAPANESE KNOTWEED
PRUSER	1	Prunus serotina	3	FACU	Nt TREE	WILD BLACK CHERRY
RHURAD	2	Rhus radicans	-1	FAC+	Nt W-VINE	POISON IVY
ROBPSE	*	ROBINIA PSEUDOACACIA	4	FACU-	Ad TREE	BLACK LOCUST
RUBALL	3	Rubus allegheniensis	2	FACU+	Nt SHRUB	COMMON BLACKBERRY
RUBOCC	2	Rubus occidentalis	5	UPL	Nt SHRUB	BLACK RASPBERRY
VIBOPU	*	VIBURNUM OPULUS	3	[FACU]	Ad SHRUB	EUROPEAN HIGHBUSH CRANBERRY
VITRIP	2	Vitis riparia	-2	FACW-	Nt W-VINE	RIVERBANK GRAPE

Table 5.10. Test Plot 2, Floristic Inventory data summary.

SITE Sycamore Island
LOCALE Test Plot 2 – Floristic Inventory
DATE 6/23/2009
BY S. Lehnhardt, S. Batunkyi

FLORISTIC QUALITY DATA			NATIVE			ADVENTIVE	
24	Native Species	4	Tree	13.8%	3	Tree	10.3%
29	Total Species	4	Shrub	13.8%	2	Shrub	6.9%
3.04	Native Mean C	4	W-Vine	13.8%	0	W-Vine	0.0%
2.52	w/Adventives	0	H-Vine	0.0%	0	H-Vine	0.0%
14.90	Native FQI	11	P-Forb	37.9%	0	P-Forb	0.0%
13.56	w/Adventives	0	B-Forb	0.0%	0	B-Forb	0.0%
-0.17	Native W	1	A-Forb	3.4%	0	A-Forb	0.0%
0.28	w/Adventives	0	P-Grass	0.0%	0	P-Grass	0.0%
		0	A-Grass	0.0%	0	A-Grass	0.0%
		0	P-Sedge	0.0%	0	P-Sedge	0.0%
		0	A-Sedge	0.0%	0	A-Sedge	0.0%
		0	Cryptogam	0.0%			

ACRONYM	C	SCIENTIFIC NAME	W	WETNESS	PHYSIOG.	COMMON NAME
ACESAI	0	Acer saccharinum	-3	FACW	Nt TREE	SILVER MAPLE
ACTALT	5	Actinomeris alternifolia	-3	FACW	Nt P-FORB	WINGSTEM
AILALT	*	AILANTHUS ALTISSIMA	5	UPL	Ad TREE	TREE OF HEAVEN
ARIDRA	7	Arisaema dracontium	-3	FACW	Nt P-FORB	GREEN DRAGON
BOECYC	2	Boehmeria cylindrica	-5	OBL	Nt P-FORB	FALSE NETTLE
CATSPE	*	CATALPA SPECIOSA	3	FACU	Ad TREE	HARDY CATALPA
CELOCC	3	Celtis occidentalis	1	FAC-	Nt TREE	HACKBERRY
CIRLUC	1	Circaea lutetiana canadensis	3	FACU	Nt P-FORB	ENCHANTER'S NIGHTSHADE
CORRAC	1	Cornus racemosa	-2	FACW-	Nt SHRUB	GRAY DOGWOOD
EUPRUG	4	Eupatorium rugosum	5	UPL	Nt P-FORB	WHITE SNAKEROOT
GEUCAN	1	Geum canadense	0	FAC	Nt P-FORB	WOOD AVENS
ILEOPA	9	Ilex opaca	3	FACU	Nt SHRUB	AMERICAN HOLLY
IMPCAP	3	Impatiens capensis	-3	FACW	Nt A-FORB	ORANGE JEWELWEED
LAPCAN	3	Laportea canadensis	-3	FACW	Nt P-FORB	WOOD NETTLE
LIGVUL	*	LIGUSTRUM VULGARE	1	FAC-	Ad SHRUB	COMMON PRIVET
MENCAN	6	Menispermum canadense	-1	FAC+	Nt W-VINE	MOONSEED
MORALB	*	MORUS ALBA	0	FAC	Ad TREE	WHITE MULBERRY
OXAEUR	0	Oxalis europaea	3	FACU	Nt P-FORB	TALL WOOD SORREL
PARQUI	2	Parthenocissus quinquefolia	1	FAC-	Nt W-VINE	VIRGINIA CREEPER
PHYAME	1	Phytolacca americana	1	FAC-	Nt P-FORB	POKEWEED
POLCUS	*	POLYGONUM CUSPIDATUM	3	FACU	Ad SHRUB	JAPANESE KNOTWEED
POPDEL	2	Populus deltoides	-1	FAC+	Nt TREE	EASTERN COTTONWOOD
QUERUB	7	Quercus rubra	3	FACU	Nt TREE	RED OAK
RHURAD	2	Rhus radicans	-1	FAC+	Nt W-VINE	POISON IVY
RUBIDS	3	Rubus idaeus strigosus	4	FACU-	Nt SHRUB	RED RASPBERRY
RUBOCC	2	Rubus occidentalis	5	UPL	Nt SHRUB	BLACK RASPBERRY
SCRMAR	4	Scrophularia marilandica	4	FACU-	Nt P-FORB	LATE FIGWORT
TEUCAN	3	Teucrium canadense	-3	FACW	Nt P-FORB	GERMANDER
VITRIP	2	Vitis riparia	-2	FACW-	Nt W-VINE	RIVERBANK GRAPE

Table 5.11. Test Plot 3, Floristic Inventory data summary.

SITE	Sycamore Island
LOCALE	Test Plot 3 – Floristic Inventory
DATE	6232009
BY	S. Lehnhardt, S. Batunkyi

FLORISTIC QUALITY DATA				NATIVE			ADVENTIVE	
17	Native Species	3	Tree	15.0%	0	Tree	0.0%	
20	Total Species	2	Shrub	10.0%	2	Shrub	10.0%	
3.59	Native Mean C	3	W-Vine	15.0%	1	W-Vine	5.0%	
3.05	w/Adventives	0	H-Vine	0.0%	0	H-Vine	0.0%	
14.79	Native FQI	6	P-Forb	30.0%	0	P-Forb	0.0%	
13.64	w/Adventives	0	B-Forb	0.0%	0	B-Forb	0.0%	
-0.82	Native W	2	A-Forb	10.0%	0	A-Forb	0.0%	
-0.15	w/Adventives	0	P-Grass	0.0%	0	P-Grass	0.0%	
		0	A-Grass	0.0%	0	A-Grass	0.0%	
		0	P-Sedge	0.0%	0	P-Sedge	0.0%	
		0	A-Sedge	0.0%	0	A-Sedge	0.0%	
		1	Cryptogam	5.0%				

ACRONYM	C	SCIENTIFIC NAME	W	WETNESS	PHYSIOG.	COMMON NAME
ACESAI	0	Acer saccharinum	-3	FACW	Nt TREE	SILVER MAPLE
ACTALT	5	Actinomeris alternifolia	-3	FACW	Nt P-FORB	WINGSTEM
CELORB	*	CELASTRUS ORBICULATUS	5	UPL	Ad W-VINE	ORIENTAL BITTERSWEET
CIRLUC	1	Circaea lutetiana canadensis	3	FACU	Nt P-FORB	ENCHANTER'S NIGHTSHADE
EUPRUG	4	Eupatorium rugosum	5	UPL	Nt P-FORB	WHITE SNAKEROOT
ILEOPA	9	Ilex opaca	3	FACU	Nt TREE	AMERICAN HOLLY
IMPCAP	3	Impatiens capensis	-3	FACW	Nt A-FORB	ORANGE JEWELWEED
LAPCAN	3	Laportea canadensis	-3	FACW	Nt P-FORB	WOOD NETTLE
LYSCIL	4	Lysimachia ciliata	-3	FACW	Nt P-FORB	FRINGED LOOSESTRIFE
ONOSEN	8	Onoclea sensibilis	-3	FACW	CRYPTOGAM	SENSITIVE FERN
PARQUI	2	Parthenocissus quinquefolia	1	FAC-	Nt W-VINE	VIRGINIA CREEPER
PHYAME	1	Phytolacca americana	1	FAC-	Nt P-FORB	POKEWEED
PILPUM	5	Pilea pumila	-3	FACW	Nt A-FORB	CLEARWEED
POLCUS	*	POLYGONUM CUSPIDATUM	3	FACU	Ad SHRUB	JAPANESE KNOTWEED
POPDEL	2	Populus deltoides	-1	FAC+	Nt TREE	EASTERN COTTONWOOD
QUERUB	7	Quercus rubra	3	FACU	Nt TREE	RED OAK
RHURAD	2	Rhus radicans	-1	FAC+	Nt W-VINE	POISON IVY
RUBALL	3	Rubus allegheniensis	2	FACU+	Nt SHRUB	COMMON BLACKBERRY
VIBOPU	*	VIBURNUM OPULUS	3	[FACU]	Ad SHRUB	EUROPEAN HIGHBUSH CRANBERRY
VITRIP	2	Vitis riparia	-2	FACW-	Nt W-VINE	RIVERBANK GRAPE

Table 5.12. Test Plot 1 (Adjacent Areas), Floristic Inventory data summary.

SITE	Sycamore Island
LOCALE	Test Plot 1 (Adjacent Area) – Floristic Inventory
DATE	6/23/2009
BY	S. Lehnhardt, S. Batunkyi

FLORISTIC QUALITY DATA			NATIVE	82.4%		ADVENTIVE	17.6%
14	Native Species	4	Tree	23.5%	1	Tree	5.9%
17	Total Species	3	Shrub	17.6%	1	Shrub	5.9%
3.36	Native Mean C	2	W-Vine	11.8%	0	W-Vine	0.0%
2.76	w/Adventives	0	H-Vine	0.0%	0	H-Vine	0.0%
12.56	Native FQI	5	P-Forb	29.4%	1	P-Forb	5.9%
11.40	w/Adventives	0	B-Forb	0.0%	0	B-Forb	0.0%
-0.36	Native W	0	A-Forb	0.0%	0	A-Forb	0.0%
0.41	w/Adventives	0	P-Grass	0.0%	0	P-Grass	0.0%
		0	A-Grass	0.0%	0	A-Grass	0.0%
		0	P-Sedge	0.0%	0	P-Sedge	0.0%
		0	A-Sedge	0.0%	0	A-Sedge	0.0%
		0	Cryptogam	0.0%			

ACRONYM	C	SCIENTIFIC NAME	W	WETNESS	PHYSIOG.	COMMON NAME
ACESAI	0	Acer saccharinum	-3	FACW	Nt TREE	SILVER MAPLE
ACTALT	5	Actinomeris alternifolia	-3	FACW	Nt P-FORB	WINGSTEM
CELOCC	3	Celtis occidentalis	1	FAC-	Nt TREE	HACKBERRY
CIRLUC	1	Circaea lutetiana canadensis	3	FACU	Nt P-FORB	ENCHANTER'S NIGHTSHADE
CORRAC	1	Cornus racemosa	-2	FACW-	Nt SHRUB	GRAY DOGWOOD
EUPRUG	4	Eupatorium rugosum	5	UPL	Nt P-FORB	WHITE SNAKEROOT
FRAAMA	5	Fraxinus americana	3	FACU	Nt TREE	WHITE ASH
HESMAT	*	HESPERIS MATRONALIS	5	UPL	Ad P-FORB	DAME'S ROCKET
LYSCIL	4	Lysimachia ciliata	-3	FACW	Nt P-FORB	FRINGED LOOSESTRIFE
PHYAME	1	Phytolacca americana	1	FAC-	Nt P-FORB	POKEWEED
PLAOCC	9	Platanus occidentalis	-3	FACW	Nt TREE	SYCAMORE
RHURAD	2	Rhus radicans	-1	FAC+	Nt W-VINE	POISON IVY
RIBAME	7	Ribes americanum	-3	FACW	Nt SHRUB	WILD BLACK CURRANT
ROBPSE	*	ROBINIA PSEUDOACACIA	4	FACU-	Ad TREE	BLACK LOCUST
RUBALL	3	Rubus allegheniensis	2	FACU+	Nt SHRUB	COMMON BLACKBERRY
VIBOPU	*	VIBURNUM OPULUS	3	[FACU]	Ad SHRUB	EUROPEAN HIGHBUSH CRANBERRY
VITRIP	2	Vitis riparia	-2	FACW-	Nt W-VINE	RIVERBANK GRAPE

Table 5.13. Test Plot 2 (Adjacent Areas), Floristic Inventory data summary.

SITE Sycamore Island
LOCALE Test Plot 2 (Adjacent Area) – Floristic Inventory
DATE 6/23/2009
BY S. Lehnhardt, S. Batunkyi

FLORISTIC QUALITY DATA			NATIVE		ADVENTIVE	
27	Native Species	5	Tree	15.6%	3 Tree	9.4%
32	Total Species	5	Shrub	15.6%	2 Shrub	6.3%
3.44	Native Mean C	4	W-Vine	12.5%	0 W-Vine	0.0%
2.91	w/Adventives	0	H-Vine	0.0%	0 H-Vine	0.0%
17.90	Native FQI	11	P-Forb	34.4%	0 P-Forb	0.0%
16.44	w/Adventives	0	B-Forb	0.0%	0 B-Forb	0.0%
-0.22	Native W	1	A-Forb	3.1%	0 A-Forb	0.0%
0.19	w/Adventives	0	P-Grass	0.0%	0 P-Grass	0.0%
		0	A-Grass	0.0%	0 A-Grass	0.0%
		0	P-Sedge	0.0%	0 P-Sedge	0.0%
		0	A-Sedge	0.0%	0 A-Sedge	0.0%
		1	Cryptogam	3.1%		

ACRONYM	C	SCIENTIFIC NAME	W	WETNESS	PHYSIOG.	COMMON NAME
ACESAI	0	Acer saccharinum	-3	FACW	Nt TREE	SILVER MAPLE
ACTALT	5	Actinomeris alternifolia	-3	FACW	Nt P-FORB	WINGSTEM
AILALT	*	AILANTHUS ALTISSIMA	5	UPL	Ad TREE	TREE OF HEAVEN
ARIDRA	7	Arisaema dracontium	-3	FACW	Nt P-FORB	GREEN DRAGON
BOECYC	2	Boehmeria cylindrica	-5	OBL	Nt P-FORB	FALSE NETTLE
CATSPE	*	CATALPA SPECIOSA	3	FACU	Ad TREE	HARDY CATALPA
CELOCC	3	Celtis occidentalis	1	FAC-	Nt TREE	HACKBERRY
CIRLUC	1	Circaea lutetiana canadensis	3	FACU	Nt P-FORB	ENCHANTER'S NIGHTSHADE
CORAMO	6	Cornus amomum	-3	FACW	Nt SHRUB	SILKY DOGWOOD
CORRAC	1	Cornus racemosa	-2	FACW-	Nt SHRUB	GRAY DOGWOOD
EUPRUG	4	Eupatorium rugosum	5	UPL	Nt P-FORB	WHITE SNAKEROOT
GEUCAN	1	Geum canadense	0	FAC	Nt P-FORB	WOOD AVENS
ILEOPA	9	Ilex opaca	3	FACU	Nt TREE	AMERICAN HOLLY
IMPCAP	3	Impatiens capensis	-3	FACW	Nt A-FORB	ORANGE JEWELWEED
LAPCAN	3	Laportea canadensis	-3	FACW	Nt P-FORB	WOOD NETTLE
LIGVUL	*	LIGUSTRUM VULGARE	1	FAC-	Ad SHRUB	COMMON PRIVET
MENCAN	6	Menispermum canadense	-1	FAC+	Nt W-VINE	MOONSEED
MORALB	*	MORUS ALBA	0	FAC	Ad TREE	WHITE MULBERRY
ONOSEN	8	Onoclea sensibilis	-3	FACW	CRYPTOGAM	SENSITIVE FERN
OXAEUR	0	Oxalis europaea	3	FACU	Nt P-FORB	TALL WOOD SORREL
PARQUI	2	Parthenocissus quinquefolia	1	FAC-	Nt W-VINE	VIRGINIA CREEPER
PHYAME	1	Phytolacca americana	1	FAC+	Nt W-VINE	POISON IVY
POLCUS	*	POLYGONUM CUSPIDATUM	3	FAC-	Nt P-FORB	POKEWEED
POPDEL	2	Populus deltoides	-1	FACU	Ad SHRUB	JAPANESE KNOTWEED
QUERUB	7	Quercus rubra	3	FAC+	Nt TREE	EASTERN COTTONWOOD
QUEVEL	6	Quercus velutina	5	FACU	Nt TREE	RED OAK
RHURAD	2	Rhus radicans	-1	UPL	Nt TREE	BLACK OAK
RUBIDS	3	Rubus idaeus strigosus	4	FACU-	Nt SHRUB	RED RASPBERRY
RUBOCC	2	Rubus occidentalis	5	UPL	Nt SHRUB	BLACK RASPBERRY
SCRMAR	4	Scrophularia marilandica	4	FACU-	Nt P-FORB	LATE FIGWORT
TEUCAN	3	Teucrium canadense	-3	FACW	Nt P-FORB	GERMANDER
VITRIP	2	Vitis riparia	-2	FACW-	Nt W-VINE	RIVERBANK GRAPE

Table 5.14. Test Plot 3 (Adjacent Areas), Floristic Inventory data summary.

SITE Sycamore Island
LOCALE Test Plot 3 (Adjacent Area) – Floristic Inventory
DATE 6/23/2009
BY S. Lehnhardt, S. Batunkyi

FLORISTIC QUALITY DATA			NATIVE	80.0%		ADVENTIVE	20.0%
24	Native Species	5	Tree	16.7%	1	Tree	3.3%
30	Total Species	7	Shrub	23.3%	3	Shrub	10.0%
3.33	Native Mean C	4	W-Vine	13.3%	1	W-Vine	3.3%
2.67	w/Adventives	0	H-Vine	0.0%	0	H-Vine	0.0%
16.33	Native FQI	7	P-Forb	23.3%	1	P-Forb	3.3%
14.61	w/Adventives	0	B-Forb	0.0%	0	B-Forb	0.0%
-0.71	Native W	1	A-Forb	3.3%	0	A-Forb	0.0%
0.23	w/Adventives	0	P-Grass	0.0%	0	P-Grass	0.0%
		0	A-Grass	0.0%	0	A-Grass	0.0%
		0	P-Sedge	0.0%	0	P-Sedge	0.0%
		0	A-Sedge	0.0%	0	A-Sedge	0.0%
		0	Cryptogam	0.0%			

ACRONYM	C	SCIENTIFIC NAME	W	WETNESS	PHYSIOG.	COMMON NAME
ACESAI	0	Acer saccharinum	-3	FACW	Nt TREE	SILVER MAPLE
ACTALT	5	Actinomeris alternifolia	-3	FACW	Nt P-FORB	WINGSTEM
AILALT	*	AILANTHUS ALTISSIMA	5	UPL	Ad TREE	TREE OF HEAVEN
BOECYC	2	Boehmeria cylindrica	-5	OBL	Nt P-FORB	FALSE NETTLE
CELOCC	3	Celtis occidentalis	1	FAC-	Nt TREE	HACKBERRY
CELORB	*	CELASTRUS ORBICULATUS	5	UPL	Ad W-VINE	ORIENTAL BITTERSWEET
CIRLUC	1	Circaea lutetiana canadensis	3	FACU	Nt P-FORB	ENCHANTER'S NIGHTSHADE
CORAMO	6	Cornus amomum	-3	FACW	Nt SHRUB	SILKY DOGWOOD
CORRAC	1	Cornus racemosa	-2	FACW-	Nt SHRUB	GRAY DOGWOOD
EUPRUG	4	Eupatorium rugosum	5	UPL	Nt P-FORB	WHITE SNAKEROOT
FRAAMA	5	Fraxinus americana	3	FACU	Nt TREE	WHITE ASH
ILEOPA	9	Ilex opaca	3	FACU	Nt TREE	AMERICAN HOLLY
IMPCAP	3	Impatiens capensis	-3	FACW	Nt A-FORB	ORANGE JEWELWEED
LAPCAN	3	Laportea canadensis	-3	FACW	Nt P-FORB	WOOD NETTLE
LINBEN	7	Lindera benzoin	-2	FACW-	Nt SHRUB	SPICEBUSH
LIRTUL	5	Liriodendron tulipifera	2	FACU+	Nt TREE	TULIP TREE
MENCAN	6	Menispermum canadense	-1	FAC+	Nt W-VINE	MOONSEED
PARQUI	2	Parthenocissus quinquefolia	1	FAC-	Nt W-VINE	VIRGINIA CREEPER
PHYAME	1	Phytolacca americana	1	FAC-	Nt P-FORB	POKEWEED
POLCUS	*	POLYGONUM CUSPIDATUM	3	FACU	Ad SHRUB	JAPANESE KNOTWEED
POPDEL	2	Populus deltoides	-1	FAC+	Nt TREE	EASTERN COTTONWOOD
RHURAD	2	Rhus radicans	-1	FAC+	Nt W-VINE	POISON IVY
ROSMUL	*	ROSA MULTIFLORA	3	FACU	Ad SHRUB	MULTIFLORA ROSE
RUBALL	3	Rubus allegheniensis	2	FACU+	Nt SHRUB	COMMON BLACKBERRY
RUBOCC	2	Rubus occidentalis	5	UPL	Nt SHRUB	BLACK RASPBERRY
RUDLAC	5	Rudbeckia laciniata	-4	FACW+	Nt P-FORB	WILD GOLDEN GLOW
SAMCAN	1	Sambucus canadensis	-2	FACW-	Nt SHRUB	ELDERBERRY
VIBOPU	*	VIBURNUM OPULUS	3	[FACU]	Ad SHRUB	EUROPEAN HIGHBUSH CRANBERRY
VIOODO	*	VIOLA ODORATA	5	UPL	Ad P-FORB	SWEET VIOLET
VITRIP	2	Vitis riparia	-2	FACW-	Nt W-VINE	RIVERBANK GRAPE

Table 5.15. Sycamore Island Total Species List

SITE Sycamore Island
LOCALE Total Species List
DATE June 23, 2009
BY SML/SB

FLORISTIC QUALITY DATA			NATIVE		ADVENTIVE	
55	Native Species	11	Tree	14.5%	4	Tree	27.6%
76	Total Species	10	Shrub	13.2%	6	Shrub	7.9%
3.75	Native Mean C	5	W-Vine	6.6%	2	W-Vine	2.6%
2.71	w/Adventives	0	H-Vine	0.0%	0	H-Vine	0.0%
27.78	Native FQI	24	P-Forb	31.6%	8	P-Forb	10.5%
23.63	w/Adventives	2	B-Forb	2.6%	1	B-Forb	1.3%
-0.56	Native W	2	A-Forb	2.6%	0	A-Forb	0.0%
0.26	w/Adventives	0	P-Grass	0.0%	0	P-Grass	0.0%
		0	A-Grass	0.0%	0	A-Grass	0.0%
		0	P-Sedge	0.0%	0	P-Sedge	0.0%
		0	A-Sedge	0.0%	0	A-Sedge	0.0%
		1	Cryptogam	1.3%			

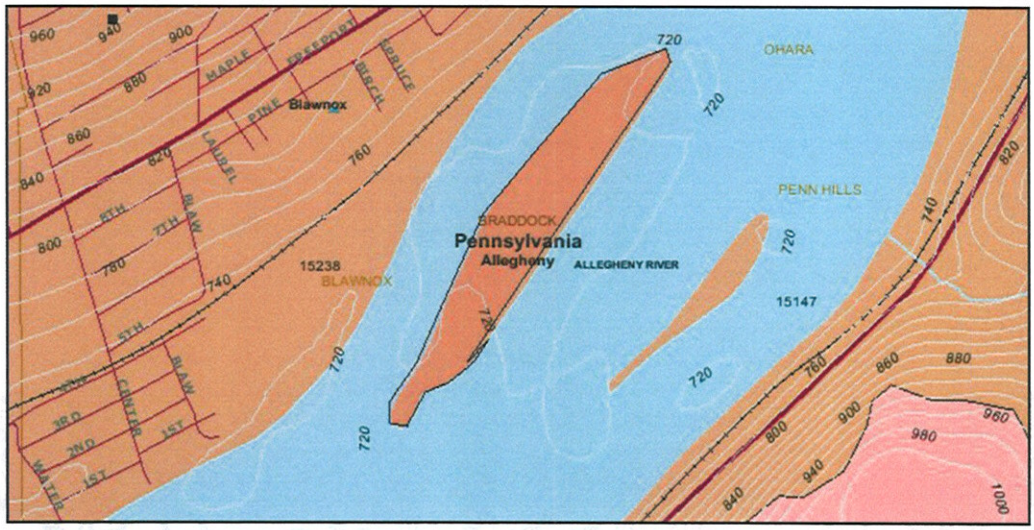
ACRONYM	C	SCIENTIFIC NAME	W	WETNESS	PHYSIOG.	COMMON NAME
ACESAI	0	Acer saccharinum	-3	FACW	Nt TREE	SILVER MAPLE
ACTALT	5	Actinomeris alternifolia	-3	FACW	Nt P-FORB	WINGSTEM
AILALT	*	AILANTHUS ALTISSIMA	5	UPL	Ad TREE	TREE OF HEAVEN
APOCAN	4	Apocynum cannabinum	0	FAC	Nt P-FORB	INDIAN HEMP
ARIDRA	7	Arisaema dracontium	-3	FACW	Nt P-FORB	GREEN DRAGON
ARITRI	4	Arisaema triphyllum	-2	FACW-	Nt P-FORB	JACK-IN-THE-PULPIT
ASCINC	4	Asclepias incarnata	-5	OBL	Nt P-FORB	SWAMP MILKWEED
ASCSYR	0	Asclepias syriaca	5	UPL	Nt P-FORB	COMMON MILKWEED
BOECYC	2	Boehmeria cylindrica	-5	OBL	Nt P-FORB	FALSE NETTLE
CARPEN	4	Cardamine pensylvanica	-4	FACW+	Nt B-FORB	PENNSYLVANIA BITTER CRESS
CATSPE	*	CATALPA SPECIOSA	3	FACU	Ad TREE	HARDY CATALPA
CELOCC	3	Celtis occidentalis	1	FAC-	Nt TREE	HACKBERRY
CELORB	*	CELASTRUS ORBICULATUS	5	UPL	Ad W-VINE	ORIENTAL BITTERSWEET
CEPOCC	5	Cephalanthus occidentalis	-5	OBL	Nt SHRUB	BUTTONBUSH
CERARV	6	Cerastium arvense villosum	5	[UPL]	Nt P-FORB	FIELD CHICKWEED
CIRARV	*	CIRSIUM ARVENSE	5	UPL	Ad P-FORB	FIELD THISTLE
CIRLUC	1	Circaea lutetiana canadensis	3	FACU	Nt P-FORB	ENCHANTER'S NIGHTSHADE
CONMAC	*	CONIUM MACULATUM	-3	FACW	Ad B-FORB	POISON HEMLOCK
CONSEP	1	Convolvulus sepium	0	FAC	Nt P-FORB	HEDGE BINDWEED
COROBL	6	Cornus obliqua	-4	FACW+	Nt SHRUB	BLUE-FRUITED DOGWOOD
CORRAC	1	Cornus racemosa	-2	FACW-	Nt SHRUB	GRAY DOGWOOD
CYNNIG	*	CYNANCHUM NIGRUM	5	UPL	Ad P-FORB	BLACK SWALLOWWORT
EUPPER	4	Eupatorium perfoliatum	-4	FACW+	Nt P-FORB	COMMON BONESET
EUPRUG	4	Eupatorium rugosum	5	UPL	Nt P-FORB	WHITE SNAKEROOT
FRAAMA	5	Fraxinus americana	3	FACU	Nt TREE	WHITE ASH
GEUCAN	1	Geum canadense	0	FAC	Nt P-FORB	WOOD AVENS
HESMAT	*	HESPERIS MATRONALIS	5	UPL	Ad P-FORB	DAME'S ROCKET
HYPPER	*	HYPERICUM PERFORATUM	5	UPL	Ad P-FORB	COMMON ST. JOHN'S WORT
ILEOPA	9	Ilex opaca	3	FACU	Nt TREE	AMERICAN HOLLY
IMPCAP	3	Impatiens capensis	-3	FACW	Nt A-FORB	ORANGE JEWELWEED
JUSAME	6	Justicia americana	-5	OBL	Nt P-FORB	WATER WILLOW
LAPCAN	3	Laportea canadensis	-3	FACW	Nt P-FORB	WOOD NETTLE
LIGVUL	*	LIGUSTRUM VULGARE	1	FAC-	Ad SHRUB	COMMON PRIVET
LINBEN	7	Lindera benzoin	-2	FACW-	Nt SHRUB	SPICEBUSH
LIRTUL	5	Liriodendron tulipifera	2	FACU+	Nt TREE	TULIP TREE
LONTAT	*	LONICERA TATARICA	5	[UPL]	Ad SHRUB	TARTARIAN HONEYSUCKLE
LYSCIL	4	Lysimachia ciliata	-3	FACW	Nt P-FORB	FRINGED LOOSESTRIFE
LYTSAL	*	LYTHRUM SALICARIA	-5	OBL	Ad P-FORB	PURPLE LOOSESTRIFE
MENCAN	6	Menispermum canadense	-1	FAC+	Nt W-VINE	MOONSEED
MORALB	*	MORUS ALBA	0	FAC	Ad TREE	WHITE MULBERRY
OENBIE	0	Oenothera biennis	3	FACU	Nt B-FORB	COMMON EVENING PRIMROSE
ONOSEN	8	Onoclea sensibilis	-3	FACW	CRYPTOGAM	SENSITIVE FERN
OXAEUR	0	Oxalis europaea	3	FACU	Nt P-FORB	TALL WOOD SORREL
PARQUI	2	Parthenocissus quinquefolia	1	FAC-	Nt W-VINE	VIRGINIA CREEPER
PHYAME	1	Phytolacca americana	1	FAC-	Nt P-FORB	POKEWEED
PHYSUB	0	Physalis subglabrata	5	UPL	Nt P-FORB	TALL GROUND CHERRY
PHYVIV	6	Physostegia virginiana	-5	[OBL]	Nt P-FORB	OBEDIENT PLANT
PILPUM	5	Pilea pumila	-3	FACW	Nt A-FORB	CLEARWEED
PLAOCC	9	Platanus occidentalis	-3	FACW	Nt TREE	SYCAMORE
POLCUS	*	POLYGONUM CUSPIDATUM	3	FACU	Ad SHRUB	JAPANESE KNOTWEED
POPDEL	2	Populus deltoides	-1	FAC+	Nt TREE	EASTERN COTTONWOOD
PRUSER	1	Prunus serotina	3	FACU	Nt TREE	WILD BLACK CHERRY
QUERUB	7	Quercus rubra	3	FACU	Nt TREE	RED OAK
QUEVEL	6	Quercus velutina	5	UPL	Nt TREE	BLACK OAK
RHAFRA	*	RHAMNUS FRANGULA	-1	FAC+	Ad SHRUB	GLOSSY BUCKTHORN
RHURAD	2	Rhus radicans	-1	FAC+	Nt W-VINE	POISON IVY
RIBAME	7	Ribes americanum	-3	FACW	Nt SHRUB	WILD BLACK CURRANT
ROBPSE	*	ROBINIA PSEUDOACACIA	4	FACU-	Ad TREE	BLACK LOCUST
ROSMUL	*	ROSA MULTIFLORA	3	FACU	Ad SHRUB	MULTIFLORA ROSE
RUBALL	3	Rubus allegheniensis	2	FACU+	Nt SHRUB	COMMON BLACKBERRY
RUBIDS	3	Rubus idaeus strigosus	4	FACU-	Nt SHRUB	RED RASPBERRY
RUBOCC	2	Rubus occidentalis	5	UPL	Nt SHRUB	BLACK RASPBERRY
RUDLAC	5	Rudbeckia laciniata	-4	FACW+	Nt P-FORB	WILD GOLDEN GLOW
SALNIG	4	Salix nigra	-5	OBL	Nt TREE	BLACK WILLOW
SAMCAN	1	Sambucus canadensis	-2	FACW-	Nt SHRUB	ELDERBERRY

SCRMAR	4	Scrophularia marilandica	4	FACU-	Nt P-FORB	LATE FIGWORT
SOLCAR	*	SOLANUM CAROLINENSE	4	FACU-	Ad P-FORB	HORSE NETTLE
SOLDUL	*	SOLANUM DULCAMARA	0	FAC	Ad W-VINE	BITTERSWEET NIGHTSHADE
TEUCAN	3	Teucrium canadense	-3	FACW	Nt P-FORB	GERMANDER
ULMRUB	4	Ulmus rubra	0	FAC	Nt TREE	SLIPPERY ELM
URTDIO	*	URTICA DIOICA	-1	FAC+	Ad P-FORB	STINGING NETTLE
URTPRO	2	Urtica procera	-1	FAC+	Nt P-FORB	TALL NETTLE
VIBOPU	*	VIBURNUM OPULUS	3	[FACU]	Ad SHRUB	EUROPEAN HIGHBUSH CRANBERRY
VIOODO	*	VIOLA ODORATA	5	UPL	Ad P-FORB	SWEET VIOLET
VITNOV	**7**	Vitis novae-angliae	3	FACU	Nt W-VINE	NEW ENGLAND GRAPE
VITRIP	**2**	Vitis riparia	-2	FACW-	Nt W-VINE	RIVERBANK GRAPE

APPENDIX D: T&E SEARCH

1. PROJECT INFORMATION

Project Name: **Sycamore Island**
Date of review: **9/25/2009 4:48:22 PM**
Project Category: **Recreation,Trails & Trailheads (parking, etc.)**
Project Area: **14.8** acres
County: **Allegheny** Township/Municipality: **Blawnox**
Quadrangle Name: **BRADDOCK**
ZIP Code: **15238**
Decimal Degrees: **40.49014 N, --79.85692 W**
Degrees Minutes Seconds: **40° 29' 24.5" N, -79° 51' 24.9" W**



2. SEARCH RESULTS

Agency	Results	Response
PA Game Commission	No Known Impact	No Further Review Required
PA Department of Conservation and Natural Resources	No Known Impact	No Further Review Required
PA Fish and Boat Commission	No Known Impact	No Further Review Required
U.S. Fish and Wildlife Service	**Avoidance Measure**	**See Agency Response**

As summarized above, Pennsylvania Natural Diversity Inventory (PNDI) records indicate there may be potential impacts to threatened and endangered and/or special concern species and resources within the project area. If the response above indicates "No Further Review Required" no additional communication with the respective agency is required. If the response is "Further Review Required" or "See Agency Response," refer to the appropriate agency comments below. Please see the DEP Information Section of this receipt if a PA Department of Environmental Protection Permit is required.

RESPONSE TO QUESTION(S) ASKED

Q1: Describe how wastewater (effluent) will be handled (select one). For the purpose of this question, wastewater/effluent does not include stormwater runoff. If the project involves solely the renewal or modification of an existing discharge permit (e.g., NPDES permit), select from options 3, 4, 5, or 6 below.
Your answer is: **1. This project/activity (including construction, maintenance, and operation of the completed project) will not generate any wastewater/effluent; therefore, none will be discharged.**

Q2: Select the statement below that accurately describes where the proposed project and project-associated activities will occur. "Project" includes all features of the project (including buildings, roads, utility lines, outfall and intake structures, wells, stormwater retention/detention basins, parking lots, driveways, lawns, etc.), as well as all associated impacts (e.g., temporary staging areas, work areas, temporary road crossings, areas subject to grading or clearing, etc.).
Your answer is: **4. This project and all project activities will occur at least 100 feet from all waterways and waterbodies (rivers, creeks, streams, tributaries, lakes, ponds). In addition, implementation of the entire project will result in less than 2 acres of earth disturbance.**

3. AGENCY COMMENTS

Regardless of whether a DEP permit is necessary for this proposed project, any potential impacts to threatened and endangered species and/or special concern species and resources must be resolved with the appropriate jurisdictional agency. In some cases, a permit or authorization from the jurisdictional agency may be needed if adverse impacts to these species and habitats cannot be avoided.

These agency determinations and responses are **valid for one year** (from the date of the review), and are based on the project information that was provided, including the exact project location; the project type, description, and features; and any responses to questions that were generated during this search. If any of the following change: 1) project location, 2) project size or configuration, 3) project type, or 4) responses to the questions that were asked during the online review, the results of this review are not valid, and the review must be searched again via the PNDI Environmental Review Tool and resubmitted to the jurisdictional agencies. The PNDI tool is a primary screening tool, and a desktop review may reveal more or fewer impacts than what is listed on this PNDI receipt.

PA Game Commission

RESPONSE: No Impact is anticipated to threatened and endangered species and/or special concern species and resources.

PA Department of Conservation and Natural Resources

RESPONSE: No Impact is anticipated to threatened and endangered species and/or special concern species and resources.

PA Fish and Boat Commission

RESPONSE: No Impact is anticipated to threatened and endangered species and/or special concern species and resources.

U.S. Fish and Wildlife Service

RESPONSE: Avoidance Measure: Use stringent erosion and sedimentation controls before, during, and after project implementation to ensure that sediment and contaminants do not enter any waterway(s) (rivers, creeks, streams, tributaries) or waterbodies (lakes, ponds).

As the project proponent or applicant, I certify that I will implement the above Avoidance Measure:

_____(Signature)

SPECIAL NOTE: **If you agree to implement the above Avoidance Measure, no further coordination with this agency regarding threatened and endangered species and/or special concern species and resources is required.** If you are not able to comply with the Avoidance Measures, you are required to coordinate with this agency - please send project information to this agency for review (see "What to Send" section).

4. DEP INFORMATION

The Pa Department of Environmental Protection (DEP) requires that a signed copy of this receipt, along with any required documentation from jurisdictional agencies concerning resolution of potential impacts, be submitted with applications for permits requiring PNDI review. For cases where a "Potential Impact" to threatened and endangered species has been identified before the application has been submitted to DEP, the application should not be submitted until the impact has been resolved. For cases where "Potential Impact" to special concern species and resources has been identified before the application has been submitted, the application should be submitted to DEP along with the PNDI receipt, a completed PNDI form and a USGS 7.5 minute quadrangle map with the project boundaries delineated on the map. The PNDI Receipt should also be submitted to the appropriate agency according to directions on the PNDI Receipt. DEP and the jurisdictional agency will work together to resolve the potential impact(s). See the DEP PNDI policy at http://www.naturalheritage.state.pa.us.

5. ADDITIONAL INFORMATION

The PNDI environmental review website is a **preliminary** screening tool. There are often delays in updating species status classifications. Because the proposed status represents the best available information regarding the conservation status of the species, state jurisdictional agency staff give the proposed statuses at least the same consideration as the current legal status. If surveys or further information reveal that a threatened and endangered and/or special concern species and resources exist in your project area, contact the appropriate jurisdictional agency/agencies immediately to identify and resolve any impacts.

For a list of species known to occur in the county where your project is located, please see the species lists by county found on the PA Natural Heritage Program (PNHP) home page (www.naturalheritage.state.pa.us). Also note that the PNDI Environmental Review Tool only contains information about species occurrences that have actually been reported to the PNHP.

6. AGENCY CONTACT INFORMATION

PA Department of Conservation and Natural Resources

Bureau of Forestry, Ecological Services Section
400 Market Street, PO Box 8552, Harrisburg, PA. 17105-8552
Fax:(717) 772-0271

U.S. Fish and Wildlife Service

Endangered Species Section
315 South Allen Street, Suite 322, State College, PA. 16801-4851
NO Faxes Please.

PA Fish and Boat Commission

Division of Environmental Services
450 Robinson Lane, Bellefonte, PA. 16823-7437
NO Faxes Please

PA Game Commission

Bureau of Wildlife Habitat Management
Division of Environmental Planning and Habitat Protection
2001 Elmerton Avenue, Harrisburg, PA. 17110-9797
Fax:(717) 787-6957

7. PROJECT CONTACT INFORMATION

Name:_____
Company/Business Name:_____
Address:_____
City, State, Zip:_____
Phone:(_____)_____Fax:(_____)_____
Email:_____

8. CERTIFICATION

I certify that ALL of the project information contained in this receipt (including project location, project size/configuration, project type, answers to questions) is true, accurate and complete. In addition, if the project type, location, size or configuration changes, or if the answers to any questions that were asked during this online review change, I agree to re-do the online environmental review.

_____ _____
applicant/project proponent signature date

APPENDIX E: INVASIVE VEGETATIVE SPECIES

Tree of Heaven

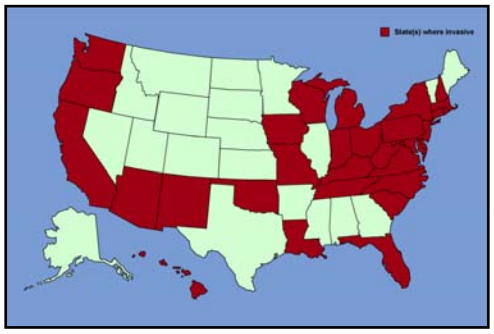
Ailanthus altissima (Mill.) Swingle
Quassia family (Simaroubaceae)

NATIVE RANGE
Central China

DESCRIPTION
Tree-of-heaven, also known ailanthus, Chinese sumac, and stinking shumac, is a deciduous tree in the mostly tropical quassia family. Mature trees can reach 80 feet in height. Ailanthus has smooth stems with pale gray bark and twigs which are light chestnut brown, especially in the dormant season. Its large compound leaves are 1-4 feet in length, alternate, and composed of 10-41 smaller leaflets. Each leaflet has one or more glandular teeth along the lower margin. The leaf margins are otherwise entire or lacking teeth. Ailanthus is a dioecious ("two houses") plant meaning that male and female flowers occur on separate plants. Flowers occur in large terminal clusters and are small and pale yellow to greenish. Flat, twisted, winged fruits each containing a single central seed are produced on female trees in late summer to early fall and may remain on the trees for long periods of time. The wood of ailanthus is soft, weak, coarse-grained, and creamy white to light brown in color. All parts of the tree, especially the leaves and flowers, have a nutty or burned nut odor.

Look-alikes: It is important not to confuse native shrubs and trees with ailanthus. Native sumacs (*Rhus*) and trees like ash (*Fraxinus*), hickory (*Carya*), black walnut, butternut and pecan (*Juglans*) can be distinguished from tree-of-heaven by having completely serrated (toothed) leaf margins.

ECOLOGICAL THREAT
Tree-of-heaven is a fast-growing tree and a prolific seeder, that can take over sites, replacing native plants and forming dense thickets. Ailanthus also produces chemicals that prevent the establishment of other plant species nearby. Its root system may be extensive and has been known to cause damage to sewers and foundations.



DISTRIBUTION IN THE UNITED STATES
Tree-of-heaven is occurs in many states across the continental U.S. and Hawaii and to date has been reported to be invasive in natural areas in 30 states (see map).

HABITAT IN THE UNITED STATES
Tree-of-heaven is a common tree in disturbed urban areas, where it sprouts up just about anywhere, including alleys, sidewalks, parking lots, and streets. For example, the book "A Tree Grows in Brooklyn," by Betty Smith, is based on the tree-of-heaven. Away from cities, ailanthus is commonly seen in fields, and along roadsides, fencerows, woodland edges and forest openings. It occurs as seedlings that pop up by the hundreds in recently planted fields and as persistent thickets in rocky, untillable areas. Nationally, ailanthus is recognized to be a serious agricultural pest.

BACKGROUND
Tree-of-heaven was first introduced to America by a gardener in Philadelphia, PA, in 1784, and by 1840 was commonly available from nurseries. The species was also brought into California mainly by the Chinese who came to California

during the goldrush in the mid-1800s. Today it is frequently found in abandoned mining sites there. The history of ailanthus in China is as old as the written language of the country.

BIOLOGY & SPREAD

Tree-of-heaven reproduces both sexually (by seeds) and asexually through vegetative sprouting. Flowering occurs late in the spring. Ailanthus is dioecious, with male and female flowers on separate plants. The fruits, or samaras, occur in terminal clusters on female plants during the summer, and may persist on the tree through the winter. One study reports that an individual tree can produce as many as 325,000 seeds per year. Established trees also produce numerous suckers from the roots and resprout vigorously from cut stumps and root fragments.

MANAGEMENT OPTIONS

Elimination of Ailanthus requires diligence, due to its abundant seed production, high seed germination rate, and vegetative reproduction. Followup monitoring and treatment when needed should be an integral part of any serious ailanthus management program. Regardless of method selected, treated areas should be rechecked one or more times a year and any new suckers or seedlings treated (cut, sprayed or pulled) as soon as possible, especially before they are able to rebuild root reserves. Establishing a thick cover of trees (non-invasive and preferably native) or grass sod will help shade out and discourage establishment of ailanthus seedlings. Targeting large female trees for control will help reduce spread of ailanthus by seed.

Biological

Several fungal pathogens are being investigated as potential biological controls for ailanthus. Two of these, *Verticillium dahliae* and *Fusarium oxysporum*, have been isolated from dead and dying ailanthus trees in New York and in southern and western Virginia. A disease affecting ailanthus in PA was studied using inoculations in the lab and on canopy field trees; the agent was identified to be *Verticillium albo-atrum* and is being suggested as a potential biocontrol agent pending further studies including risk analysis. None are available for use at this time however.

Manual

Young seedlings may be pulled or dug up, preferably when soil is moist. Care must be taken to remove the entire plant including all roots and fragments, as these will almost certainly regrow. Root suckers appear similar to seedlings, but would be connected to a pre-existing lateral root, and would be nearly impossible to remove effectively.

Mechanical

Cutting alone is usually counter-productive because ailanthus responds by producing large numbers of stump sprouts and root suckers. However, for small infestations, repeated cutting of sprouts over time can exhaust the plants reserves and may be successful if continued for many years or where heavy shade exists. If possible, the initial cutting should be in early summer in order to impact the tree when its root reserves are lowest. Cutting large seed producing female trees would at least temporarily reduce spread by this method.

Chemical

The most effective method of ailanthus control seems to be through the use of herbicides, which may be applied as a foliar (to the leaves), basal bark, cut stump, or hack and squirt treatment. Keep in mind that it is relatively easy to kill the above ground portion of ailanthus trees, you need to kill or seriously damage the root system to prevent or limit stump sprouting and root suckering. Always be extremely careful with herbicide applications in the vicinity of valuable ornamental shrubs and trees.

Foliar sprays applied when trees are in full leaf are very effective, and should be the method of choice where ailanthus size and distribution allow effective spray coverage of all foliage without unacceptable contact with nearby desirable vegetation or applicator. Where ailanthus is in association with other exotic weed species, as is often the case, foliar spray allows treatment of the entire area at one time. Limitations of the method are the seasonal time frame, the need to transport a larger, more diluted volume of spray material, and the fact that rapid growing ailanthus are often out of

effective reach. The non-selective herbicide glyphosate (e.g., Roundup®, Rodeo®, Accord®), will kill or injure almost any plant, herbaceous or woody, contacted by the spray. Triclopyr (e.g., Garlon® 3A, Garlon® 4) is selective for broadleaf and woody plants and will not kill grasses contacted by the spray. Both glyphosate and triclopyr are systemic herbicides, meaning that they are absorbed by plants and are carried to the root systems. These herbicides have low soil activity, so do not pose a threat to groundwater if applied properly and at recommended label rates. Both glyphosate and triclopyr should be mixed with water and a small amount (0.5%, or as per label) of a non-ionic surfactant (except for Roundup®, which contains a surfactant) to help the spray spread over and penetrate the leaves. The mixture should be applied to leaves and green stems, including sprouts and suckers, until thoroughly wet but not to the point of runoff. With backpack sprayers, concentrations of 2% of a typical glyphosate product such as Roundup® or Accord® applied June 15 - September 15, or 1.5% of a 4 lb./gallon triclopyr product such as Garlon® 4, or 2% of a 3 lb./gallon triclopyr product such as Garlon® 3A applied June 1-September 1 have worked well in the Mid-Atlantic area, with slightly greater effectiveness for the triclopyr products. For higher volume applications such as would be applied by a truck mounted sprayer, the concentration for these products could be reduced by 0.5% to 1-1.5%. Other herbicides which have shown to be effective for foliar application of ailanthus are imazapyr (e.g., Arsenal®, Chopper®), and metsulfuron methyl (e.g., Escort®).

Basal bark application is one of the easiest methods and does not require any cutting. It works best during late winter/early spring and in summer. The base of the tree stem must be free of snow, ice, or water on the bark from recent rainfall, though precipitation following application is inconsequential. Late winter/early spring (February 15 -April 15, Mid-Atlantic) is generally the most productive time, since vegetation near the base of the trees is usually absent or leafless. Late spring and early summer applications (April 15-June 1, Mid-Atlantic), when plant fluids are moving upwards to support new growth, are questionable. Application during the summer (June 1-September 15, Mid-Atlantic) works very well as long as vegetation is not a hindrance, and allows lower concentrations of herbicide to be used. Fall to mid-winter applications (October-January) have given poor results. Mix up a solution of 20% (as low as 10% in summer depending on objectives) concentration of oil-soluble triclopyr product (e.g., Garlon® 4) in 80% oil (fuel oil, diesel, kerosene, mineral oil, or special vegetable oils). With these diluents some applicators add a pine oil based additive (e.g., Cide-Kick® II) at the rate of 10%, which helps penetrate the bark and eliminate any unpleasant odor. Some companies market diluents based on mineral or vegetable oils specifically designed for basal bark application, which should be considered for use in sensitive areas. Another option is to use a pre-mixed, ready-to-use triclopyr product designed for basal bark (and cut stump) application (e.g., Pathfinder® II). Using a handheld or backpack type sprayer, apply the mixture in a 12 inch wide band around the entire circumference of the tree base with no “skips”. The basal bark method is generally used for trees that are less than 6 inches in diameter, though slightly larger stems may also be treated effectively by thoroughly treating bark up to 24 inches in height. Follow-up foliar herbicide application (see above) to basal sprouts and root suckers may be necessary. Another herbicide which has been shown to be effective for basal bark control of ailanthus is imazapyr (e.g., Chopper®, Stalker®). This is sometimes used in a combination with triclopyr at a concentration of 15% Garlon® 4 and 5% Stalker® in 80% oil dilutant.

The *hack-and-squirt or injection* method is very effective and minimizes sprouting and suckering when applied during the summer. Root suckering will be an increasing problem in the fall, winter and spring. This method requires first making downward-angled cuts into the sapwood around the tree trunk at a comfortable height, using a hand ax. With spray bottle or wand in the other hand, squirt a straight (100%) concentration of a water-soluble triclopyr product (e.g., Garlon® 3A) into the cuts within a minute or two, applying 1-2 milliliters into each cut (typically 1-2 squirts of a trigger squirt bottle) so that the bottom of the cut is covered, but liquid doesn't run out of it. Generally, you would make about 1 hack cut for each inch of diameter plus one (i.e., for a 10 inch diameter tree, make about 11 cuts). Space the cuts so that about 1-2 inches of uncut living tissue remains between them. A continuous line of cuts around the trunk would likely cause the tree to go into emergency response mode and react by producing basal sprouts and root suckers. For this reason, girdling or frilling (girdling followed by herbicide) is not highly recommended unless long term follow-up treatment is possible. While spaced injection works well for ailanthus, it is not as effective on some other species. This method can be used with trees of any size, though it is most productive with stems over 2 inches in diameter. This method is relatively easy for one person to do, with hatchet in one hand and spray bottle in the other, but should be done with a buddy nearby in case of an accident. Monitor the treatment area and be prepared to follow-up with a foliar application the next year to control any basal sprouts or root suckers that might emerge. Glyphosate products have sometimes been recommended for control of ailanthus using this method, but several field trials have shown consistently poor long-term control of basal sprouts and root suckers at any time of year. Other herbicides which have shown to be effective for hack-and-squirt control of ailanthus during the growing season are dicamba (e.g., Banvel®, Vanquish®), imazapyr (e.g., Arsenal® A.C., Chopper®), and 2,4-D + picloram (e.g., Pathway®). Dicamba is particularly effective in October.

The *cut stump* method is useful in areas where the trees need to be removed from the site and will be cut as part of the process. While situations exist that dictate this method over the others given above, felling trees is usually less effective in killing the root system, slower, more labor intensive, and more hazardous to personnel than other methods. This method is likely to be most successful during the growing season, with diminishing success through the early fall. Dormant season applications may prevent resprouting from the stump itself, but will do little to inhibit root suckering. However, at any time of year, if the tree must be cut it is better to treat the stump than not. Application of herbicide to the cut stumps must be conducted immediately after cutting, within 5-15 minutes of the cut with water soluble formulations, longer with oil mixtures, to ensure uptake of the chemical before the plant seals the cut area off. The mixture may be painted on with a paint brush or sprayed on using a spray bottle or backpack sprayer. A mixture of 20% Garlon® 4 plus 80% oil dilutant, as for basal bark spraying (above), may be used. In this case the whole stump surface and sides to the ground line would be sprayed. Another option is to use Garlon® 3A at 100%, treating only the outer 1/3 of the stump surface. Be prepared to follow-up with a foliar application the next year to control any stump sprouts or root suckers which emerge. Other herbicides which have shown to be effective in stump treatment of ailanthus are the same as those listed above for hack and squirt or injection.

USE PESTICIDES WISELY: Always read the entire pesticide label carefully, follow all mixing and application instructions and wear all recommended personal protective gear and clothing. Contact your state department of agriculture for any additional pesticide use requirements, restrictions or recommendations.

NOTICE: mention of pesticide products on this page does not constitute endorsement of any material.

CONTACTS

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SUGGESTED ALTERNATIVE PLANTS

Many lovely native trees and shrubs make excellent substitutes for Ailanthus and are readily available. Some examples for the eastern United States include deciduous shrubs such as staghorn sumac (*Rhus typhina*), smooth sumac (*Rhus glabra*), fringe-tree (*Chionanthus virginicus*), black walnut (*Juglans nigra*), butternut (*Juglans cinerea*) and hickories (*Carya*). Whenever possible, use plant species that are native and adapted to the ecological region where you live. They will be more valuable to the wildlife species that have evolved with them and depend upon them for food and shelter. Check with your local native plant society for recommendations and sources of native plants.

OTHER LINKS

- http://www.invasive.org/search/action.cfm?q=Ailanthus%20altissima
- http://nbii-nin.ciesin.columbia.edu/ipane/icat/browse.do?specieId=30

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USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service

Plant Fact Sheet

NORTHERN CATALPA

Catalpa speciosa (Warder) Warder ex Englm.

Plant Symbol = CASP8

Contributed by: USDA NRCS Manhattan Plant Materials Center and Kansas State University Forestry Research

J.S. Peterson @ plants.usda.gov

Alternate Names

Hardy catalpa, western catalpa, Catawba, cigar tree, Indian bean tree, Indian cigar

Uses

Northern catalpa is primarily used today as a large ornamental shade tree. It is widely planted in urban areas as a street and lawn tree. Conservation uses include plantings in mined-land reclamation projects and shelterbelts.

Status

Please consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status (e.g. threatened or endangered species, state noxious status, and wetland indicator values).

Weediness

This plant may become weedy or invasive in some regions or habitats and may displace desirable vegetation if not properly managed. Please consult with your local NRCS Field Office, Cooperative Extension Service office, or state natural resource or agriculture department regarding its status and use. Weed information is also available from the PLANTS Web site at plants.usda.gov.

Description and Adaptation

A member of the Trumpet-creeper Family (Bignoniaceae), northern catalpa is a perennial deciduous tree which readily grows in USDA Hardiness Zones 4 to 8. The height at 20 years is about 20 feet. Catalpas prefer moist, deep, well drained soil, but adapts to dry or wet soils. The soil pH may range from 5.5 to 7.0. It prefers an open sunny space to partial shade. It is tall with an irregular, open-rounded to narrow-oval crown. This tree comes into leaf very late in the spring and it is one of the first to lose its leaves in the fall. Its longevity is about 60 years.

The tree bark ranges from scaly to ridged, to blocky plates. On young tree seedlings the bark is thin and easily damaged by impact, or rodents.

Twigs in winter have a unique identifying characteristic. They have sunken leaf scars which resemble suction cups. Their whorled arrangement of 3 scars per node is another trait easily identified.

Leaves are simple, large ovate to ovate-oblong, from 8 to 12 inches long, heart-shaped tropical looking without any lobes and are yellowish green in color. Leaves are generally opposite on large branches and often whorled in 3 on young stems. They turn an undistinguished yellow in the fall before dropping.

The flowers of catalpa are perfect. Flowering takes place in late spring to early summer. They occur as large clusters of showy, white, bell-shaped corollas of 5 lobes with ruffled edges and yellow, orange or purple interior spotting or streaking. Individual flowers are showy, tubular up to ½ inch broad. They

are branched in about 10 inch clusters at the stem tips.
Seedpods are slender and green in the summer growing from 10 to 24 inches long, looking similar to an exaggerated green bean. They mature in the fall, turn dark brown, split open lengthwise to let seeds fall in the spring. The shape and color of the mature seedpod gives rise to the common name of cigar tree. It has been extensively propagated for over 200 years. It can now be found in most states east of the Rocky Mountains and in Utah.

Establishment
When placed as an ornamental in a yard setting, care must be taken to ensure it is not too close to a building, fence, property line or septic system. Ample space should be provided to let it reach a mature height.

Management
The biggest management problem with a catalpa tree used as an ornamental is litter. It will drop a heavy load of flowers in the spring, then a plentiful supply of leaves in the fall and finally a lot of large seedpods in the winter.

Pests and Potential Problems
Larva of the catalpa sphinx caterpillar (*Ceratomia catalpae*) eats leaves. Almost complete defoliation may occur in some years.

Immature seeds in the pods are often destroyed by a small yellow grub, the larva of a gnat.

Brown leaf spots on leaves are often created by the fungi *Macrosporium catalpae*. Catalpa is also susceptible to the decay fungus *Polystictus versicolor*. Powdery mildew causes a white powdery coating on the leaves. When severe the leaves turn yellow and drop. Verticillum wilt will make the branches die, and can eventually kill trees. Catalpa midge (*Cecidomyia catalpae* Comstock) causes leaf spots, injures terminal buds and branch tips, as well as seeds in the pods.

Environmental Concerns
It is an invasive, weedy tree which escapes cultivation easily. The flowers, long seedpods and seeds fall down from spring through winter, and create a mess on the ground anywhere near the tree.

Cultivars, Improved, and Selected Materials (and area of origin)
There are two species of catalpa native to North America, northern catalpa (*Catalpa speciosa*) and southern catalpa (*Catalpa bignonioides*). They appear very similar but are two distinct species. One variety of *C. speciosa* has been documented: 'Pulverulenta' from Paul & Son.

Control
Please contact your local agricultural extension specialist or county weed specialist to learn what works best in your area and how to use it safely. Always read label and safety instructions for each control method. Trade names and control measures appear in this document only to provide specific information. USDA, NRCS does not guarantee or warranty the products and control methods named, and other products may be equally effective.

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For more information about this and other plants, please contact your local NRCS field office or Conservation District, and visit the PLANTS Web site<http://plants.usda.gov> or the Plant Materials Program Web site <http://Plant-Materials.nrcs.usda.gov>

Fact Sheet: Oriental Bittersweet

Oriental Bittersweet

Celastrus orbiculatus Thunb.
Staff-tree family (Celastraceae)

NATIVE RANGE

Eastern Asia, Korea, China and Japan

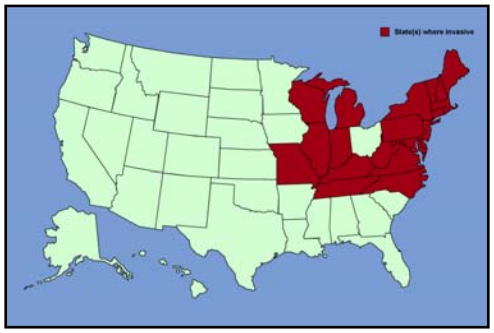
DESCRIPTION

Oriental bittersweet is a deciduous woody perennial plant which grows as a climbing vine and a trailing shrub. Stems of older plants 4 inches in diameter have been reported. The leaves are alternate, glossy, nearly as wide as they are long (round), with finely toothed margins. There are separate female (fruiting) and male (non-fruiting) plants. Female plants produce clusters of small greenish flowers in axillary clusters (from most leaf axils), and each plant can produce large numbers of fruits and seeds. The fruits are three-valved, yellow, globular capsules that at maturity split open to reveal three red-orange, fleshy arils each containing one or two seeds. The abundance of showy fruits have made Oriental bittersweet extremely popular for use in floral arrangements.

NOTE: Because Oriental bittersweet can be confused with our native American bittersweet (*Celastrus scandens*) which is becoming less and less common, it is imperative that correct identification be made before any control is begun. American bittersweet produces flowers (and fruits) in single terminal panicles at the tips of the stems; flower panicles and fruit clusters are about as long as the leaves; the leaves are nearly twice as long as wide and are tapered at each end. Oriental bittersweet produces flowers in small axillary clusters that are shorter than the subtending leaves and the leaves are very rounded. Comparing the two, American bittersweet has fewer, larger clusters of fruits whereas Oriental bittersweet is a prolific fruiter with lots and lots of fruit clusters emerging at many points along the stem. Unfortunately, hybrids of the two occur which may make identification more difficult.

ECOLOGICAL THREAT

Oriental bittersweet is a vigorously growing vine that climbs over and smothers vegetation which may die from excessive shading or breakage. When bittersweet climbs high up on trees the increased weight can lead to uprooting and blow-over during high winds and heavy snowfalls. In addition, Oriental bittersweet is displacing our native American bittersweet (*Celastrus scandens*) through competition and hybridization.



DISTRIBUTION IN THE UNITED STATES

Oriental bittersweet currently occurs in a number of states from New York to North Carolina, and westward to Illinois. It has been reported to be invasive in natural areas in 21 states (CT, DE, IL, IN, KY, MA, MD, ME, MI, MO, NC, NH, NJ, NY, PA, RI, TN, VA, VT, WI, and WV) and at least 14 national parks in the eastern U.S.

HABITAT IN THE UNITED STATES

Oriental bittersweet infests forest edges, woodlands, fields, hedgerows, coastal areas and salt marsh edges, particularly those suffering some form of land disturbance. While often found in more open, sunny sites, its tolerance for shade allows oriental bittersweet to invade forested areas.

BACKGROUND

Introduced into the U.S. in the 1860s as an ornamental plant, oriental bittersweet is often associated with old homesites, from which it has escaped into surrounding natural areas. Oriental bittersweet is still widely planted and maintained as an ornamental vine, further promoting its spread.

BIOLOGY & SPREAD
Oriental bittersweet reproduces prolifically by seed, which is readily dispersed to new areas by many species of birds including mockingbirds, blue jays and European starlings. The seeds germinate in late spring. It also expands vegetatively through root suckering.

MANAGEMENT OPTIONS
Manual, mechanical and chemical control methods are all effective in removing and killing Oriental bittersweet. Employing a combination of methods often yields the best results and may reduce potential impacts to native plants, animals and people. The method you select depends on the extent and type of infestation, the amount of native vegetation on the site, and the time, labor and other resources available to you. Whenever possible and especially for vines climbing up trees or buildings, a combination of cutting followed by application of concentrated systemic herbicide to rooted, living cut surfaces is likely to be the most effective approach. For large infestations spanning extensive areas of ground, a foliar herbicide may be the best choice rather than manual or mechanical means which could result in soil disturbance.

Biological
No biological controls are currently available for this plant.

Chemical
Systemic herbicides like triclopyr (e.g., Garlon® 3A and Garlon® 4) and glyphosate (e.g., Accord®, Glypro®, Rodeo®) are absorbed into plant tissues and carried to the roots, killing the entire plant within about a week. This method is most effective if the stems are first cut by hand or mowed and herbicide is applied immediately to cut stem tissue. Herbicide applications can be made any time of year as long as temperatures are above 55 or 60 degrees Fahrenheit for several days and rain is not expected for at least 24 hours. Fall and winter applications will avoid or minimize impacts to native plants and animals. Repeated treatments are likely to be needed. In areas where spring wildflowers or other native plants occur, application of herbicides should be conducted prior to their emergence, delayed until late summer or autumn, after the last killing frost occurs, or carefully targeted. Herbicidal contact with desirable plants should always be avoided. If native grasses are intermingled with the bittersweet, triclopyr should be used because it is selective for broad-leaved plants and will not harm grasses. Follow-up monitoring should be conducted to ensure effective control.

Glyphosate products referred to in this fact sheet are sold under a variety of brand names (Accord®, Rodeo®, Roundup Pro® Concentrate) and in three concentrations (41.0, 50.2 and 53.8% active ingredient). Other glyphosate products sold at home improvement stores may be too dilute to obtain effective control. Triclopyr comes in two forms – triclopyr amine (e.g., Garlon® 3A, Brush-B-Gone®, Brush Killer®) and triclopyr ester (e.g., Garlon® 4, Pathfinder®, and Vinex®). Because Garlon® 3A is a water-soluble salt that can cause severe eye damage, it is imperative that you wear protective goggles to protect yourself from splashes. Garlon® 4 is soluble in oil or water, is highly volatile and can be extremely toxic to fish and aquatic invertebrates. It should not be used in or near water sources or wetlands and should only be applied under cool, calm conditions.

Basal bark application
Use a string trimmer or hand saw to remove some of the foliage in a band a few feet from the ground at comfortable height. To the exposed stems, apply a 20% solution of triclopyr ester (Garlon® 4) (2.5 quarts per 3-gallon mix) in commercially available basal oil with a penetrant (check with herbicide distributor) to vine stems. As much as possible, avoid application of herbicide to the bark of the host tree. This can be done year-round although efficacy may vary seasonally; temperatures should be above 50 degrees F for several days.

Cut stem application
Use this method in areas where vines are established within or around non-target plants or where vines have grown into the canopy. Cut each vine stem close to the ground (about 2 in. above ground) and immediately apply a 25% solution of glyphosate (e.g., Accord®) or triclopyr (e.g., Garlon® 3A) mixed with water to the cut surface of the stem. The glyphosate application is effective at temperatures as low as 40°F and a subsequent foliar application may be necessary. The triclopyr application remains effective at low temperatures (<60°F) as long as the ground is not frozen. A subsequent foliar application may be necessary to control new seedlings. Homeowners can apply products like Brush-B-Gone®, Brush Killer® and Roundup Pro® Concentrate undiluted to cut stems. Using a paint brush or a plastic spray bottle, apply herbicide to the cut surface.

Foliar application
Use this method to control extensive patches of solid bittersweet. It may be necessary to precede foliar applications with stump treatments to reduce the risk of damaging non-target species. During foliar applications some of the herbicide is also absorbed through the stem for additional (basal bark) effect. Apply a 2% solution (8 oz per 3 gal. mix) triclopyr ester (Garlon® 4) or triclopyr amine (Garlon® 3A) mixed in water with a non-ionic surfactant to the leaves. In Rhode Island, concentrations as low as 1% in mid-summer and 0.05% in September have been very effective. Thoroughly wet the foliage but not to the point of runoff. The ideal time to spray is after much of the native vegetation has become dormant (October-November) to avoid affecting non-target species. A 0.5% concentration of a non-ionic surfactant is recommended in order to penetrate leaf cuticle. If the 2% rate is not effective try an increased rate of 3-5%. Ambient air temperature should be above 65°F.

For dense, low patches of bittersweet another alternative is to cut the entire patch to the ground early in the growing season. About one month later, apply 1-2% solution of triclopyr ester (Garlon® 4) or triclopyr salt (Garlon® 3A) in water to the previously cut patch using a backpack sprayer. This method has resulted in complete rootkill of the bittersweet and no off-target damage or root uptake by adjacent plants.

Manual and Mechanical
Small infestations can be hand-pulled but the entire plant should be removed including all the root portions. If fruits are present, the vines should be bagged in plastic trash bags and disposed of in a landfill. Always wear gloves and long sleeves to protect your skin from poison ivy and barbed or spined plants. For climbing vines, first cut the vines near the ground at a comfortable height to kill upper portions and relieve the tree canopy. Vines can be cut using pruning snips or pruning saw for smaller stems or a hand axe or chain saw for larger vines. Try to minimize damage to the bark of the host tree. Rooted portions will remain alive and should be pulled, repeatedly cut to the ground or treated with herbicide. Cutting without herbicide treatment will require vigilance and repeated cutting because plants will resprout from the base.

USE PESTICIDES WISELY: Always read the entire pesticide label carefully, follow all mixing and application instructions and wear all recommended personal protective gear and clothing. Contact your state department of agriculture for any additional pesticide use requirements, restrictions or recommendations.

NOTICE: mention of pesticide products on this page does not constitute endorsement of any material.

CONTACTS
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SUGGESTED ALTERNATIVE PLANTS
Several attractive native vines are available that provide nectar, seed and host plant material for butterflies, hummingbirds, and other wildlife. These include American bittersweet (*Celastrus scandens*) which is native to the eastern U.S. and should only be planted in areas where Oriental bittersweet is not well established or has been successfully controlled, to prevent hybridization with the native species. Other good alternatives include trumpet honeysuckle (*Lonicera sempervirens*), trumpet creeper (*Campsis radicans*), passionflower vine (*Passiflora lutea*), Dutchman's pipe (*Aristolochia macrophylla*) and native wisteria (*Wisteria frutescens*)*.

*If you wish to plant wisteria, make certain that it is the native species. Two commonly planted ornamental wisterias, Chinese wisteria (*Wisteria sinensis*) and Japanese wisteria (*Wisteria floribunda*), are exotic and aggressive invaders.

OTHER LINKS
- http://www.invasive.org/search/action.cfm?q=Celastrus%20orbiculatus
- http://nbii-nin.ciesin.columbia.edu/ipane/icat/browse.do?specieId=27

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Poison Hemlock

Conium maculatum L.

Common Names: poison hemlock, cigue maculae, deadly hemlock, poison parsley, cigue tachetee, poison fool's parsley

Native Origin: Europe; introduced to North America in the 1800's as a garden or ornamental plant

Description: A biennial herb in the carrot family (Apiaceae) that grows 3 to 8 feet tall. Stems are stout, hollow, ridged, and purple-spotted. Leaves are shiny green, 3 to 4 times pinnately compound, and clasp the stem at the obvious nodes. Crushed foliage and roots have a disagreeable, parsnip-like odor. Flowers are small, white, and borne in umbrella-shaped clusters about 3 inches across (appearing in early summer). It reproduces from seeds that are ridged and flattened, with 2 seeds borne together. It has a thick, white taproot that may easily be mistaken for wild parsnips.

Habitat: The plant grows on dry to moist soils and is often found near roadsides, field borders, hiking trails, railroad tracks, stream banks, irrigation ditches, waste areas, riparian woodlands and open floodplains of rivers and streams.

Distribution: This widespread species is reported from states shaded on Plants Database map.

Ecological Impacts: All plant parts are poisonous; however, the seeds contain the highest concentration of poison. (It was probably used to poison Socrates.) It contains highly poisonous alkaloids toxic to all classes of livestock and humans. Human deaths have occurred from harvesting and consuming the roots as wild carrots or parsnips. It may act as a pioneer species quickly colonizing disturbed sites and displacing natives during early successional areas.

Infestation

Control and Management: This plant requires active control measures to prevent dominance on a site.

- **Manual**- Hand-pulling, grubbing and/or multiple mowing close to the ground may eventually kill poison hemlock.
- **Chemical**- It can be effectively controlled using any of several readily available general use herbicides such as glyphosate, and 2,4-D. Treat plants before they begin to bud with 2,4-D plus dicamba. Repeat applications may be necessary to reduce densities. Follow label directions and state requirements.
- **Biological Control**-The European palearctic moth or commonly called hemlock moth (*Agonopterix alstroemeriana* C.) may offer possibilities for biological control. The larvae of the hemlock moth can cause severe defoliation by consuming leaves, young stem tissue, flowers and seeds.

References: www.ars.usda.gov/Services/docs.htm?docid=9975, plants.usda.gov, www.invasive.org, www.oneplan.org/Crop/noxWeeds/nxWeed21.htm, www.vet.purdue.edu/depts/addl/toxic/plant28.htm, www.ansci.cornell.edu/plants/conium.html, www.cbif.gc.ca/pls/pp/poison?p_x=px, www.montana.edu/wwwpb/pubs/mt200013.html, tncweeds.ucdavis.edu/esadocs/documnts/conimac.html

Produced by the USDA Forest Service, Forest Health Staff, Newtown Square, PA. WOW 02-13-06
Invasive Plants website: http://www.na.fs.fed.us/fhp/invasive_plants

Dames' Rocket *(Hesperis matronalis)*

aka Dames Violet, Sweet Rocket

Provincial Designation: Noxious

Overview:

Dame's rocket is a biennial or short-lived perennial native to Europe & SW Asia. A member of the Mustard family, it is a prolific seed producer. The flowers are very fragrant - especially in the evening – and are insect pollinated. Introduced as an ornamental, it has spread throughout North America, except for the driest areas.

Dame's rocket produces a rosette in the first year of growth and then a flowering bolt in the second year. It blooms early summer, and stems wither and die by late summer.

It is very similar to Garden phlox, which has 5 petals and opposite leaves, but Dame's rocket has 4 petals & alternate leaves.

Habitat:

Requires moderately moist soils and does best in the moist, humus rich soils of wooded areas. It is tolerant of partial shade, such as forest edges.


Photo by D. Townsend

Identification:

Stems: Stems are erect, several per plant, and grow 0.5 to 1m tall, occasionally taller. The upper stems are often branched.

Leaves: Leaves are alternate, lance shaped, and 1-4 cm wide and 4-15 cm long. They are dark green, hairy on both sides, and have serrated edges. Lower leaves have short petioles (stems). Basal leaves wither by flowering.

Flowers: Flowers can be white, lavender-pink or purple and are 8-12 mm wide with four petals. Flowers are borne in loose clusters at tops of stems.

Seeds: Seed pods are long 0.5 to 1.5 cm long, constricted between seeds[1] and become papery as they mature. Seeds are black and 1-1.5 cm long.


Photo by Richard Old, XID Services Inc.


Photo by M. Frey

Prevention:

Dame's rocket is often a contaminant of wildflower seed mixes – do not purchase seed mixes which do not list the Latin names of the contents. It requires disturbance to become established, but then can out compete native vegetation. Plants will re-bloom if deadheaded.

Control:

Grazing: Not known. *Invasive plants should never be considered as forage.*

Cultivation: Not a suitable control method.

Mechanical: Hand pulling is considered the most effective as the roots come out easily from moist soils, or can easily be dug out with a knife. Plant density may increase the year following control work due to disturbance, but repeated removal will exhaust the seed bank. Burning can also be effective.

Chemical:[2] While there are no herbicides registered for use on Dame's rocket, glyphosate has proven effective and should be applied to rosettes. Consult your local Agricultural Fieldman or Certified Pesticide Dispenser for more information.

Biological: None researched to date.

1 Flora of China. *Hesperis matronalis* www.eFloras.org

2 Always follow the product labels. The use of pesticides in any manner not published on the label or registered under the *Minor Use of Pesticides* regulation constitutes an offence under both the *Federal Pest Control Products Act and Alberta's Environmental Protection and Enhancement Act.*

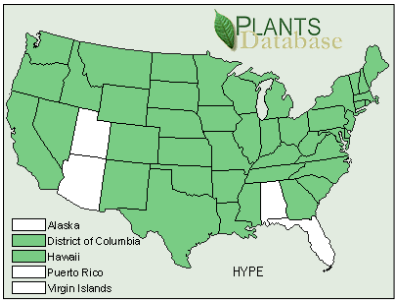
Alberta Invasive Plants Council
www.invasiveplants.ab.ca
Phone: (403) 982-7923
Alberta

Common St. John's Wort *Hypericum perforatum* L.

Common Name: St. Johnswort, St. John's wort, common St. Johnswort, Klamath weed, common goatweed, tipton weed

Native Origin: Europe, North Africa, and Asia except for the Arctic regions

Description: An erect perennial herb in the Mangosteen family (*Clusiaceae*) typically growing 1 – 2.5 feet in height. Reddish stems are single or multiple, smooth, somewhat two-edged, woody at the base, and branching out toward the top of the plant. The narrow, lance shaped leaves are 1 - 2 inches long, stalkless with pointed tips. Each leaf is spotted with tiny translucent dots. Yellow star-like flowers have 5 petals with tiny black dots on the margins. Flowers occur in clusters at the ends of stems with 25 – 100 flowers per cluster. The fruit is a 3-sectioned pod with numerous dark brown seeds. One plant can produce up to 100,000 seeds per year that are viable for ten years. The root system consists of a long taproot with shallow rhizomes extending several inches from the crown. It spreads both by underground rhizomes, above-ground creeping stems, and by seeds that are dispersed by wind and animals.



Habitat: It prefers poor, sandy, dry soils and full sun, and can be found primarily in waste areas, railroad right-of-ways, sidewalk cracks, roadsides, meadows, dry pastures, rangelands, fields, open woods, dunes, and disturbed ground. However, it has the capability to invade healthy rangelands.

Distribution: This species is reported from states shaded on Plants Database map. It is considered invasive in ID, MI, MO, MT, NY, OR, WA, WI, and WY.

Ecological Impacts: This ecologically invasive plant crowds out native species and is toxic to livestock.

Toxicity: It contains hypericin, a phototoxin that travels to the skin after ingestion. It is activated by ultraviolet rays responsible for dermatitis, inflammation of the mucus membranes causing itching, swelling, blisters, and open sores in animals.

Control and Management: Wear gloves and avoid touching the eyes when collecting. Photosensitivity such second degree blisters could occur to the skin.

- **Manual**- Pull new or small infestation sites. Repeated pulls to remove the whole plant and lateral roots. Do not leave plants at the site, since vegetative growth will occur, and the seed source will remain. Regular tilling is effective where feasible.
- **Chemical**- It can be effectively controlled using any of several readily available general use herbicides such as 2,4-D right after germination on new seedlings and before blossoms open. Repeated applications will be necessary. Follow label and state requirements.
- **Biocontrol**- Two foliage beetles, *Chrysolina hyperici* and *C. quadrigemina* were released in California from 1945 to 1946, and established within two years. A root-boring beetle *Agrilus hyperici* and a leaf bud gall-forming midge *Zeuxidiplosis giardi* were released in 1950 to help the *Chrysolina* spp. These established California colonies became the source for collections and distribution to *Hypericum perforatum* infestations throughout the western United States. Recently released and established is the moth *Aplocera plagiata.*

References: http://plants.usda.gov, www.nps.gov/plants/alien/map/eucy1.htm, www.forestimages.org, Czarapeta, Elizabeth J., Invasive Plants of the Upper Midwest: An Illustrated Guide to their Identification and Control, 2005. p. 110, www.invasivespeciesinfo.gov/plants/stjohnswort.shtml, http://www.nwcb.wa.gov/weed_info/Written_findings/Hypericum_perforatum.html

Produced by the USDA Forest Service, Forest Health Staff, Newtown Square, PA. WOW 1-08-07
Invasive Plants website: http://www.na.fs.fed.us/fhp/invasive_plants

INVASIVE EXOTICS

Common Privet
Ligustrum vulgare
Olive Family (Oleaceae)

What does it look like? Common privet, native to Europe, is a stout, many branched, deciduous shrub that can grow up to 15 ft. in height. The leaves have short stalks, are smooth on the underside and grow opposite each other on the stem. The white flowers are produced in clusters from May through June.

What habitats are threatened by this plant? An extremely aggressive plant, common privet invades river bottoms, open woods, fencerows, and roadsides. Common privet can form dense, impenetrable thickets due to its suckering nature. The thickets are so thick that they crowd out more desirable plants.

How does this plant spread? Common privet was introduced from Europe in the middle of the 20th century as a garden plant. It is a prolific producer of seed that is sought after by birds, who in turn spread the seeds far from the original planting. Privet also spreads by root suckers. Since its escape from cultivation, common privet has spread throughout the eastern half of the United States.

How can it be controlled? First, do not plant privet in the landscape. In cultivated areas, such as gardens, small plants can be dug out. This method however is nearly impossible with larger plants. For these, chemical control with a glyphosate herbicide, such as Roundup, is most effective. Spraying herbicide on the foliage is best for actively growing plants. For freshly cut stumps, painting on herbicide is most effective. Great native plants to substitute for the privet are inkberry (*Ilex glabra*) and plum-leaved viburnum (*Viburnum prunifolium*).

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Exotic Bush Honeysuckles

Lonicera fragrantissima (fragrant honeysuckle), *L. maackii* (Amur honeysuckle), *L. morrowii* (Morrow's honeysuckle), *L. standishii* (Standish's honeysuckle), *L. tatarica* (Tartarian honeysuckle), *L. xylosteum* (European fly honeysuckle), *L.* X *bella* (hybrid, pretty honeysuckle) and possibly others
Honeysuckle family (Caprifoliaceae)

NATIVE RANGE

Eurasia (Japan, China, Korea, Manchuria, Turkey and southern Russia)

DESCRIPTION

Exotic bush honeysuckles are upright, generally deciduous shrubs that range from 6 to 15 feet in height. The 1-2 ½ inch, egg-shaped leaves are opposite along the stem and short-stalked. Older stems are often hollow. Pairs of fragrant, tubular flowers less than an inch long are borne along the stem in the leaf axils. Flower color varies from creamy white to pink or crimson in some varieties of Tartarian honeysuckle. Flowering generally occurs from early to late spring, but varies for each species and cultivar. The fruits are red to orange, many-seeded berries. Native bush honeysuckles may be confused with these exotic species and cultivars, so proper identification is necessary. Unlike the exotics, most of our native bush honeysuckles have solid stems.

ECOLOGICAL THREAT

Exotic bush honeysuckles can rapidly invade and overtake a site, forming a dense shrub layer that crowds and shades out native plant species. They alter habitats by decreasing light availability, by depleting soil moisture and nutrients, and possibly by releasing toxic chemicals that prevent other plant species from growing in the vicinity. Exotic bush honeysuckles may compete with native bush honeysuckles for pollinators, resulting in reduced seed set for native species. In addition, the fruits of exotic bush honeysuckles, while abundant and rich in carbohydrates, do not offer migrating birds the high-fat, nutrient-rich food sources needed for long flights, that are supplied by native plant species.

DISTRIBUTION IN THE UNITED STATES

Amur, Tartarian, Morrow's, and pretty honeysuckle generally range from the central Great Plains to southern New England and south to Tennessee and North Carolina. The remaining species are sporadically distributed. The maps below from left to right are: *Lonicera fragrantissima*, *L. maackii*, *L. morrowii*, *L. standishii*, *L. tatarica*, *L. xylosteum*, *L.* X *bella*

HABITAT IN THE UNITED STATES

Exotic bush honeysuckles are relatively shade-intolerant and most often occur in forest edge, abandoned field, pasture, roadsides and other open, upland habitats. Woodlands, especially those that have been grazed or otherwise disturbed, may also be invaded by exotic bush honeysuckles. Morrow's honeysuckle and pretty honeysuckle have the greatest habitat breadth and are capable of invading bogs, fens, lakeshores, sandplains and other uncommon habitat types.

BACKGROUND

Exotic bush honeysuckles have been introduced for use as ornamentals, for wildlife cover and for soil erosion control.

BIOLOGY & SPREAD

Open-grown exotic bush honeysuckles fruit prolifically and are highly attractive to birds. In the eastern United States, over twenty species of birds feed on the persistent fruits and widely disseminate seeds across the landscape. In established populations, vegetative sprouting also aids in the persistence of these exotic shrubs.

MANAGEMENT OPTIONS

Mechanical and chemical methods are the primary means of control of exotic bush honeysuckles. No biological control agents are currently available for these plants and any potential agents that might be considered would have to be specific to the exotic species, for obvious reasons. Hand removal of seedlings or small plants may be useful for light infestations, but care should be taken not to disturb the soil any more than necessary. In shaded forest habitats, where exotic bush honeysuckles tend to be less resilient, repeated clippings to ground level, during the growing season, may result in high mortality. Clipping must be repeated at least once yearly because bush honeysuckles that are cut once and left to grow will often form stands that are more dense and productive than they were prior to cutting.

Seedlings of exotic bush honeysuckles can also be controlled by application of a systemic herbicide, like glyphosate (e.g., Roundup®), at a 1 percent solution, sprayed onto the foliage or applied by sponge. Well established stands of exotic bush honeysuckles are probably best managed by cutting the stems to ground level and painting or spraying the stumps with a slightly higher rate of glyphosate (2-3%).

Prescribed burning has shown some promise for exotic bush honeysuckles growing in open habitats. In all instances, control should be initiated prior to the seed dispersal period (late summer to early autumn) to minimize reinvasion of treated habitats.

USE PESTICIDES WISELY: Always read the entire pesticide label carefully, follow all mixing and application instructions and wear all recommended personal protective gear and clothing. Contact your state department of agriculture for any additional pesticide use requirements, restrictions or recommendations.

NOTICE: mention of pesticide products on this page does not constitute endorsement of any material.

CONTACTS

For more information on the management of exotic bush honeysuckles, please contact:

- Tennessee Exotic Pest Plant Council, http://www.tneppc.org/
- The Nature Conservancy - Pest Plant Abstracts, http://www.imapinvasives.org/GIST/ESA/
- Virginia Natural Heritage Program - Bush honeysuckles, http://www.dcr.virginia.gov/natural_heritage/documents/fslobe.pdf

SUGGESTED ALTERNATIVE PLANTS

Many native plants make excellent substitutes for exotic bush honeysuckles for home landscaping and wildlife planting. In the eastern U.S., examples include spicebush (*Lindera benzoin*), ink-berry (*Ilex glabra*), gray dogwood (*Cornus racemosa*), northern bayberry (*Myrica pensylvanica*), red chokecherry (*Aronia arbutifolia*), and arrowwood (*Viburnum dentatum*). These species are readily available through commercial nurseries.

OTHER LINKS

- http://www.invasive.org/search/action.cfm?q=Lonicera%20fragrantissima
- http://www.invasive.org/search/action.cfm?q=Lonicera%20maackii
- http://nbii-nin.ciesin.columbia.edu/ipane/icat/browse.do?specieId=66
- http://www.invasive.org/search/action.cfm?q=Lonicera%20morrowii
- http://nbii-nin.ciesin.columbia.edu/ipane/icat/browse.do?specieId=67
- http://www.invasive.org/search/action.cfm?q=Lonicera%20tatarica
- http://nbii-nin.ciesin.columbia.edu/ipane/icat/browse.do?specieId=68
- http://nbii-nin.ciesin.columbia.edu/ipane/icat/browse.do?specieId=70
- http://nbii-nin.ciesin.columbia.edu/ipane/icat/browse.do?specieId=69

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PHOTOGRAPH

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Purple Loosestrife

Lythrum salicaria L.

Loosestrife Family (Lythraceae)

DESCRIPTION

Purple loosestrife is a stout, erect, perennial herb with a strongly developed taproot that grows in swamps, marshes, along riverbanks, and other wet, open areas. It is conspicuous from late June through September when the tall spikes of magenta-purple flowers are present. The plant ranges in height from 2 to 6 feet and from a distance, purple loosestrife may be confused with several other tall, native herbs with long red or purple spike-like inflorescences. Up close, however, it is easily distinguished from native plants.

Stem - The four-angled stem can be glabrous to pubescent and rises from a semi-woody base. The perennial roots of purple loosestrife form a dense mass that can produce as many as 30-50 stems annually.

Leaves - The simple, narrow to narrowly oblong leaves occur either in pairs (opposite) or a whorled configuration along the stems. Each 1-4" long leaf has a smooth edge and heart-shaped base that clasps the stem. The closest similar species is winged loosestrife (*Lythrum alatum*), a rare native plant that can be distinguished by its alternate leaf arrangement, except for those lowest on the plant.

Flowers- The magenta-purple flowers have 5-7 petals and are borne on narrow, upright spikes, 4–20 inches tall. Occasionally flowers will be white or light pink. The flowers open in July and continue to bloom through September or October.

Fruit - The fruit is a capsule generally containing 100 or more, tiny, dark colored seeds. Seed capsules remain on the plants through the winter, disseminating seed on a continual basis.

DISTRIBUTION AND HABITAT

Purple loosestrife is native to a wide geographic area across Eurasia and was first reported on the coast of northeastern North America in 1814. By 1830 purple loosestrife was well established along the New England seaboard. Although purple loosestrife occurs in every continental US state except Florida, the heaviest concentrations are in the glaciated wetlands of the northeast. Purple loosestrife is found in wetlands such as cat-tail marshes, sedge meadows, and open bogs. It also occurs along streams, riverbanks, and lakeshores. It is opportunistic in areas that have received recent soil disturbance and it is not uncommon to find it growing in manmade storm water retention ponds and in ditches adjacent to parking lots and roads.

Purple loosestrife grows best in high organic soils, but tolerates a wide range of conditions including clay, sand, muck, and silt. Generally, the plant is found in full sun, but it can survive in partial shade. Infestations of purple loosestrife appear to follow a pattern of establishment, maintenance at low

numbers, and then dramatic population increases when conditions are optimal. It flourishes in wetland habitats that have been disturbed or degraded by draining, natural draw down in dry years, bulldozing, siltation, shore manipulation, livestock trampling, or dredging. Mudflats exposed at low water levels will quickly be colonized if a loosestrife seed source is present.

REPRODUCTION AND METHODS OF DISPERSAL

Its prolific seed production, up to 2.7 million per plant per year, enables purple loosestrife to establish dense stands within a few years. Purple loosestrife spreads by seeds that may be distributed by water, by wind over ice in the winter, or by clinging to the feet of waterfowl. These seeds can remain viable 10-15 years and once germinated can reach sexual maturity in 8-10 weeks, thus flowering in their growing season. High seed viability (up to 99% in the first year) and prolific seed production can build up a seed bank of massive proportions. It can also spread vegetatively by formation of adventitious shoots and roots from clipped, trampled, or buried stems. These rhizomes can grow as much as one foot per year.

EFFECTS OF INVASION

An invasion of purple loosestrife leads to a loss of plant and wildlife diversity by affecting biogeochemical and hydrological processes in wetlands. Seeds are usually present in large numbers and germinate in such high densities that growth of native seedlings is prevented by what quickly develops into a monoculture of purple loosestrife and dominating the wetland environment. The build up of other debris around the roots enables loosestrife to invade deeper water and to form dense stands that shade out and push out floating vegetation by closing open water spaces. The impact of purple loosestrife is seen in the loss of native flora and fauna in affected wetlands, degradation of wetland pastures and wild hay meadows, clogging of irrigation systems, and the loss of natural habitat for recreational enjoyment.

CONTROL

Several control methods have been attempted with varying degrees of success, but current methods for eradicating large, dense populations of loosestrife are not totally effective. Natural area managers must determine their objectives first. Smaller populations can be generally be eradicated. Populations up to three acres can be cleared with herbicides or hand-pulled, depending upon the size of the work crew and time available. Large populations, exceeding the 3 acre size will be difficult, if not impossible, to completely eradicate using presently known methods. The boundaries of large populations should be contained at their present position through perimeter treatments. Preventing any further expansion can be accomplished by hand-pulling new plants along the periphery or spraying herbicide on plants extending beyond the main body of the population. As well, the use of biological control agents has proven to be successful in significantly reducing the volume of plant material allowing other species to regenerate in the wetland matrix.

Mechanical - Hand-removal is recommended for small populations and isolated stems. Ideally, the plants should be pulled out before they set seed in early fall. The entire rootstock must be removed since regeneration from root fragments is possible. Care must be taken to minimize disturbances to the soil and native plant cover. Uprooted plants and broken stems must be removed from the area since the broken stems can re-sprout.

Chemical - Glyphosate is most commonly used for purple loosestrife control. However, its non-selective action can cause native vegetation to die back leading to even greater explosions of loosestrife invading from the seed bank. Where possible, spot applications targeting loosestrife plants should ensure that no large holes appear in adjacent vegetation. The safest method of applying glyphosate herbicide is to cut off all stems at about 6 inches and then paint or drip a 20–30% solution onto the cut surfaces. Spraying should be done after the period of peak bloom, usually late August. It is critical that any control effort be followed up the same growing season and for several years afterwards since some plants will be missed, new seedlings may sprout from the extensive seed bank, and some plants might survive the treatment. For larger infestations where spot application of glyphosate is not practical, a 2,4-D broadleaf herbicide can be used. They have the advantage of not harming grasses and other grass-like species, which are the dominant plants in many wetland types.

Biological - Three host-specific insect species approved by USDA-APHIS have been released in the United States. These species are *Hylobius transversovittatus*, a root-mining weevil, *Galerucella calmariensis*, and *Galerucella pusilla*, two leaf-eating beetles, and *Nanophyes marmoratus*, a flower-feeding weevil. All four species have been successfully established in North America and are ccurrently available from various breeding operations. When these insects are present in high densities they cause defoliation of mature plants, death of seedlings, and the destruction of flowering spikes or prevention of their formation. Indications of successful introduction and control of purple loosestrife have been recorded at a number of release sites. On-going experiments have successfully demonstrated that certain loosestrife-eating insects can cause a reduction of as much as 95% of the biomass of purple loosestrife over a 3-5 year period. Although these beneficial insects do not completely eliminate purple loosestrife from a site, they can reduce and continue to suppress populations to more manageable and less harmful densities.

NATIVE ALTERNATIVES FOR LANDSCAPE USE

Purple loosestrife has long been used as a garden ornamental because of its attractive, long-lasting spikes of purple flowers. The claim is frequently made that horticultural cultivars do not produce viable seed and thus are not a threat to natural areas. However, it has been shown experimentally that garden forms of purple loosestrife do cross-pollinate with stands of the rare native species, winged loosestrife (*Lythrum alatum),* resulting in viable seed production.

Native alternatives to purple loosestrife for garden use include: Joe-pye-weed (*Eupatorium fistulosum, E. maculatum*), New England aster (*Aster novae-angliae*), purple-stemmed aster (*Aster puniceus*), New York ironweed (*Vernonia noveboracensis*), obedience-plant (*Physostegia virginiana*), bee-balm (*Monarda didyma*), hardhack (*Spiraea tomentosa*), swamp milkweed (*Asclepias incarnata*), blazing-star (*Liatris spicata*), great blue lobelia (*Lobelia siphilitica*), and cardinal flower (*Lobelia cardinalis*).

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February 2005

White Mulberry *Morus alba*

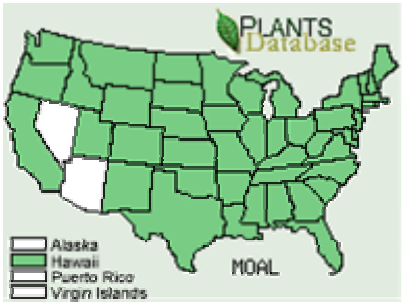
Common Names: Common mulberry, white mulberry

Native Origin: *Morus alba* was introduced during colonial times in an effort to establish a silkworm industry in the United States. It comes from Asia. It was widely cultivated in Europe during the 18th and 19th centuries for silkworms. It is still cultivated in China, India, Bangladesh and Pakistan.

Description: A deciduous shrub or tree, 30 to 50 feet in height and approximately 1.5 feet in diameter. It has low branches and a wide spreading crown. Bark is orange-brown with lenticels when young, becoming gray with long narrow irregular ridges. Glossy green leaves that turn yellow in autumn are 3 to 6 inches long, alternate, stipulate, and variable in shape. Unisex flowers are small, greenish-yellow, with dense spikes. The blackberry-like aggregate fruits, 1 to 1 1/4 inch long, turn from green to white to red to black as they ripen, May to August.

Habitat: White mulberry occurs naturally in sparse forests on hillsides at a wide range of elevations. It grows in part shade to full sun. It can grow in clay, loam, sand, acidic, alkaline, and well-drained soils. It tolerates extended flooding or droughty conditions.

Distribution: The seeds are spread by wildlife that feed on the fruits. It expands locally by producing new plants from its roots. It occurs throughout the US with exception of Alaska, Arizona and Nevada.



Ecological Impacts: Impacts include hybridization with and replacement of native mulberry. It transmits a harmful root disease to red mulberry and invades natural areas including fields, forest edges and roadsides.

Control and Management:

- **Manual**- Hand pull seedlings, cut trees, grind stumps, girdle large trees
- **Chemical**- Paint stumps with glyphosate

Diseases: Leaf spot, bacterial blight, powdery mildew, and cankers may infect this tree.

Natural Enemies: Fifty four species of fungi infect white mulberry; approximately 263 arthropods occur on this species

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http://www.duke.edu/~cwcook/trees/moal.html,
Plant Invaders of Mid-Atlantic Natural Areas, p. 59,
Invasive Plants of Asian Origin Established in the United States and their Natural Enemies p. 110

Japanese knotweed

***Polygonum cuspidatum* Siebold & Zucc.**

(synonyms: *Polygonum zuccarini* Small, *Fallopia japonica* Ronse Decraene, or *Reynoutria japonica* Houtt.)

and

Giant knotweed

***Polygonum sachalinense* F.W. Schmidt ex Maxim.**

[synonyms: *Fallopia sachalinensis* or *Reynoutria sachalinensis* (F. Schmidt ex Maxim) Nakai]

Buckwheat Family (Polygonaceae)

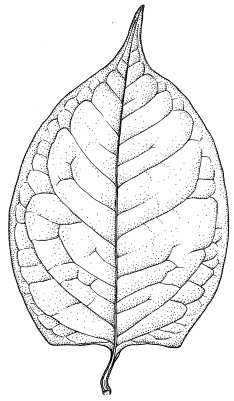
DESCRIPTION

Japanese knotweed and giant knotweed are herbaceous perennials that form large colonies of erect stems that can reach 9 feet in height. They spread by vigorous rhizomes (horizontal stems that grow just below the soil surface).

Japanese knotweed and giant knotweed are very similar in appearance and are known to hybridize. The best character for separating them is the shape of the leaf base, those of Japanese knotweed are truncate (squared-off) at the bottom, while those of giant knotweed are heart-shaped.

Height - Individual stems are 3–9 feet tall depending on the vigor of the colony.

Japanese knotweed with flower buds



P. cuspidatum

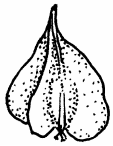
Stem - The hollow, bamboo-like stems are erect and unbranched or with a few branches toward the tip. Despite their size, knotweed stems are annual; they die back to the rhizome at the end of the growing season. New shoots emerge in April and grow rapidly; early in the season they can grow 3–4 inches per day.

Leaves - Leaves are alternate on the stem, simple, 4–6 inches long and almost as wide, and dark green. Japanese knotweed leaves are abruptly squared-off (truncate) at the base; those of giant knotweed have a heart-shaped base. Both narrow to a pointed tip.

Flowers - Both Japanese knotweed and giant knotweed have numerous small, greenish-white lowers that are produced in late summer. Japanese knotweed bears only male or female flowers on a given plant.

Giant knotweed blooms have both male and female parts in the same flower. However, appearances can be difficult to interpret as both the male and female flowers of Japanese knotweed have vestigial organs of the other sex present.

Fruit and seed - The seed (technically a fruit called an achene) of both knotweeds is shiny black, 3-angled, and about 1/6 inch long. It is enclosed in a winged calyx that contributes to its buoyancy. The seeds have no dormancy requirement and germinate readily.



winged calyx which encloses the fruit (achene) of *P. cuspidatum*

Roots - Roots are present along the rhizome and can extend quite deeply into the soil making knotweed effective in preventing erosion.

DISTRIBUTION AND HABITAT

Japanese knotweed is native to Japan; giant knotweed comes from Sakhalin Island in northern Japan. They were introduced into North America for ornamental use in the late 1800s. Japanese knotweed is now widely naturalized in Europe and North America. In the east it extends from Newfoundland to North Carolina. It is also widespread in the Midwest and in coastal areas of the Pacific Northwest. It is most commonly found lining the banks of creeks and rivers where it often forms an impenetrable wall of stems; it also occurs in wetlands, waste ground, and along roads and railroads. In Pennsylvania knotweed has also been extensively planted at strip mine reclamation sites.

EFFECTS OF INVASION

Dense stands of knotweed exclude other plant species leading to very limited biological diversity in infested sites.

REPRODUCTION AND METHODS OF DISPERSAL

Japanese knotweed and giant knotweed both spread vegetatively by the growth and fragmentation of rhizomes. Even a 1–2 inch-long piece of rhizome dislodged by flooding can initiate a new colony when it is deposited downstream. Knotweed also grows from seeds, which are produced in large numbers and dispersed by wind and water. Seed viability is high, and seed bank densities have been measured at 220–1758 seeds per square meter. Highest germination rates occur on exposed mineral soil.

CONTROL

Mechanical - Repeated cutting of the stems reduces vigor and with persistence might be sufficient to control small, isolated populations. Attempts to dig out the plants are doomed to fail because of the ability of even small segments of rhizome to resprout.

Chemical - Research conducted at Penn State for the National Park service resulted in a recommendation of a foliar spray of glyphosate plus sticker-spreader applied in early June and

again in late August of the same year at the rate of 4 lbs active ingredient per acre. A third application may be needed the following spring if significant regrowth occurs. Rapid establishment of alternative plant cover is an important aspect of control as knotweed seedlings do not compete well with other vegetation.

The British Nature Conservancy Council recommends cutting in late spring or summer followed by an application of glyphosate in the fall. At least two additional applications will be needed to control the regrowth.

Biological - No biological control options are currently available.

NATIVE ALTERNATIVES FOR REVEGETATION OF STREAM BANKS

The following species are suggested for establishing native plant cover after knotweed has been removed: ***shrubs*** - winterberry holly (*Ilex verticillata*), spicebush (*Lindera benzoin*), buttonbush (*Cephalanthus occidentalis*), silky willow (*Salix sericea*), pussy willow (*Salix discolor)*, American elderberry (*Sambucus canadensis*), alder (*Alnus serrulata* and *A. incana* ssp. *rugosa);* ***herbaceous species***- riverbank rye (*Elymus riparius*), wild-rye (*Elymus villosus*), big bluestem (*Andropogon gerardii*), switch grass (*Panicum virgatum*), wingstem (*Verbesina alternifolia*), joe-pye-weed (*Eupatorium fistulosum* and *E. maculatum*), boneset (*Eupatorium perfoliatum*).

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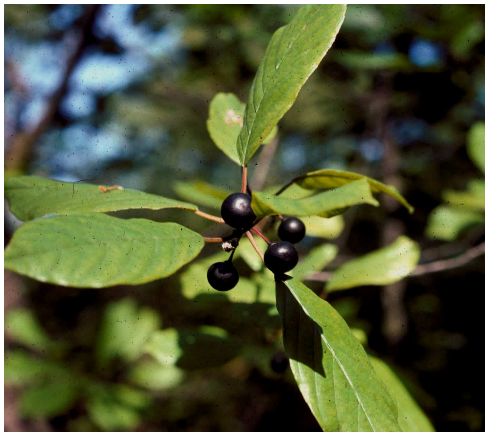
April 2002

Glossy Buckthorn

Rhamnus frangula DC.

Buckthorn Family (Rhamnaceae)



glossy buckthorn

DESCRIPTION

If you find a large shrub with leaf veins that curve to follow the leaf margin and small black berries on short stalks along the branches, its probably one of the non-native buckthorns.

Glossy buckthorn is a deciduous shrub or small tree of wet or dry sites. In full sun plants may bear fruit in as little as 3 years from seed. It is less prolific in shaded sites. Two other non-native species, common buckthorn (*R. cathartica*) and Dahurian buckthorn (*R. davurica*), also occur in Pennsylvania and can be quite invasive in open woods, old fields, and roadsides; both have opposite leaves and spine-tipped twigs.

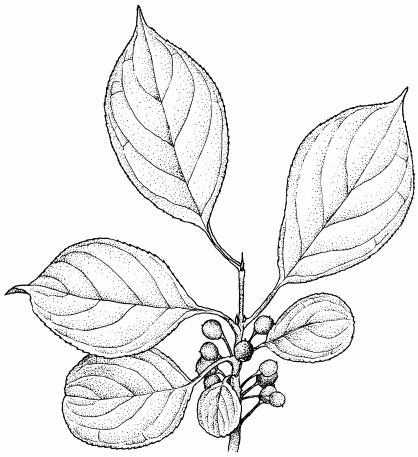
The two native buckthorn species that occur in Pennsylvania (*R. alnifolia* and *R. lanceolata*) are rare and limited to calcareous woods and wetlands; both have alternate leaves and lack spiny twigs.

Height - Glossy buckthorn can reach 18 feet in height, but is usually 10–12 feet tall and 8–12 feet wide. The other two species are larger, growing to as much as 25 feet tall.

Stem - Branches are slender; the bark is gray with prominent vertical lenticels. Short lateral branches that end in thorns are often present.

Leaves - Leaves are alternate on the stem, oblong in shape, and 1–3 inches long, with a leaf stalk about ⅓ the length of the blade. The leaf margin is wavy, but not toothed. Leaves of all the buckthorns have lateral veins that curve to follow the leaf margin as they approach the edge; dogwoods are the only other woody plant in our area that has that characteristic. Glossy buckthorn leaves begin to expand very early in the spring, before most native species. The leaves often don't fall until November.

Flowers - Small, greenish-white flowers with 5 petals appear in May or early June.



common buckthorn in fruit

Fruit and seed - All three species of non-native buckthorns have small black berries that ripen in late July through September. The fruits, which are eaten by songbirds, ducks, and small mammals, each contain 2–4 grooved seeds. In addition to animal dispersal, the fruits are known to float in water. Seeds require both stratification and scarification to germinate.

Roots - Roots that remain in the ground after stems are cut or pulled will resprout vigorously.

DISTRIBUTION AND HABITAT

All three species of non-native buckthorns are native to Europe and Asia. The natural habitat of glossy buckthorn includes alder thickets, calcareous wetlands, and the understory of oak, pine, and spruce forests. It was introduced in North America before 1800 and is now naturalized from Nova Scotia to Tennessee and west to Illinois.

In Pennsylvania glossy buckthorn has invaded bogs, fens, wet meadows, riparian areas, and upland habitats throughout the state. It is less vigorous in dense shade, but does especially well along south-facing and west-facing forest edges. Although widely recognized as an invasive species, glossy buckthorn is still cultivated; an upright form is promoted for hedges under the name 'Tallhedge'. Common and Dahurian buckthorn are more limited, occurring mostly in the southern half of the state.

EFFECTS OF INVASION

Glossy buckthorn often forms thick, even-aged thickets that exclude other shrubs and herbaceous species because of the dense shade created. Research carried out in northwestern Pennsylvania revealed that the diversity of native herbaceous plants was lower in riparian habitats when glossy buckthorn was present.

REPRODUCTION AND METHODS OF DISPERSAL

All the non-native buckthorns propagate mainly by seed; however, cut stumps or roots remaining after pulling will resprout.

CONTROL

Mechanical - Hand pulling is effective in small infestations; however, resprouting may occur if portions of the roots remain. Repeated cutting can weaken plants, but resprouting will continue for some time.

Chemical - Cutting followed by treatment of the stumps with glyphosate or triclopyr has proven effective either during the growing season or on mild days in the winter. Cutting alone results in vigorous sprouting from the stumps. Foliar applications of glyphosate can be made in the fall when many native species have become dormant but buckthorn is still actively growing.

Biological - No biological control options are currently available for any of the non-native buckthorns.

NATIVE ALTERNATIVES FOR LANDSCAPE USE

The following native shrubs are suggested as alternatives to buckthorn for landscape use: red chokeberry (*Aronia arbutifolia*), black chokeberry (*Aronia melanocarpa*), American elderberry (*Sambucus canadensis*), (*Cornus amomum*), silky dogwood (*Cornus racemosa)*, arrow-wood (*Viburnum recognitum* or *V. dentatum*), witch-hazel (*Hamamelis virginiana*), bladdernut (*Staphylea trifoliata*), nannyberry (*Viburnum lentago*), ninebark (*Physocarpus opulifolius*).

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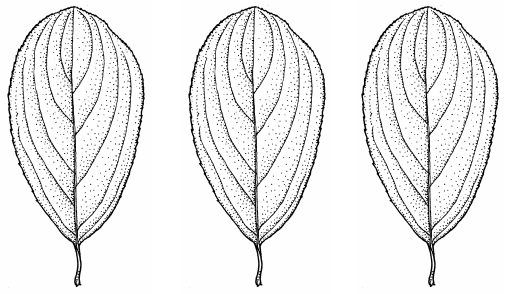

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updated March 2004

Fact Sheet: Black Locust

Black Locust

Robinia pseudoacacia L.
Pea family (Fabaceae)

NATIVE RANGE

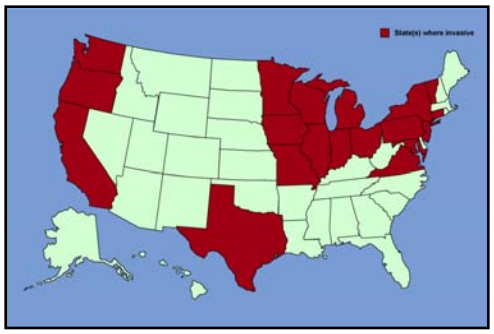
Southeastern United States; on the lower slopes of the Appalachian Mountains, with separate outliers north along the slopes and forest edges of southern Illinois, Indiana, and Missouri

DESCRIPTION

Black locust is a fast growing tree that can reach 40 to 100 feet in height at maturity. While the bark of young saplings is smooth and green, mature trees can be distinguished by bark that is dark brown and deeply furrowed, with flat-topped ridges. Seedlings and sprouts grow rapidly and are easily identified by long paired thorns. Leaves of black locust alternate along stems and are composed of seven to twenty one smaller leaf segments called leaflets. Leaflets are oval to rounded in outline, dark green above and pale beneath. Fragrant white flowers appear in drooping clusters in May and June and have a yellow blotch on the uppermost petal. Fruit pods are smooth, 2 to 4 inches long, and contain 4 to 8 seeds. Two other locusts native to the Appalachians, Robinia viscosa (with pink flowers), and Robinia hispida (with rose-purple flowers), are used in cultivation and may share black locust's invasive tendencies.

ECOLOGICAL THREAT

Black locust poses a serious threat to native vegetation in dry and sand prairies, oak savannas and upland forest edges, outside of its historic North American range. Native North American prairie and savanna ecosystems have been greatly reduced in size and are now represented by endangered ecosystem fragments. Once introduced to an area, black locust expands readily into areas where their shade reduces competition from other (sun-loving) plants. Dense clones of locust create shaded islands with little ground vegetation. Lack of ground fuel limits the use of fire in natural disturbance regimes. The large, fragrant blossoms of black locust compete with native plants for pollinating bees.



DISTRIBUTION IN THE UNITED STATES

Black locust has been planted in many temperate climates and is naturalized throughout the United States, within and outside of its historical range, and in some parts of Europe.

HABITAT IN THE UNITED STATES

Black locust is an early successional plant, preferring full sun, well drained soils and little competition. It is commonly found in disturbed areas such as old fields, degraded woods, and roadsides. Due to its rapid growth, black locust has been promoted by state and federal agencies and nurseries, and is sometimes planted in or near prairies, oak savannas and native woodland edges.

BACKGROUND

Black locust has been planted extensively for its nitrogen fixing abilities, as a source of nectar for honeybees, and for fenceposts and hardwood lumber. The clonal pattern of growth and connected roots are promoted for erosion control. It is also used for mine soil reclamation. Black locust is susceptible to some damage from two native insects, the locust borer (*Megacyllene robiniae*) and the locust leafminer (*Odontota dorsalis*).

Plant Conservation Alliance's Alien Plant Working Group
Weeds Gone Wild: Alien Plant Invaders of Natural Areas
http://www.nps.gov/plants/alien/

BIOLOGY & SPREAD

Black locust reproduces vigorously by root suckering and stump sprouting to form groves (or clones) of trees interconnected by a common fibrous root system. Physical damage to roots and stems increases suckering and sprouting, making control difficult. Black locust clones easily spread in quality and restorable natural areas. Although black locust produces abundant seeds, they seldom germinate.

MANAGEMENT OPTIONS

Mowing and burning are only effective in reducing the further spread of young shoots from a clone or parent tree. To kill a clone, cutting alone is ineffective. Herbicides applied to the stems or cut stumps spread into the root system and provide better control. From mid-June to August hand sprayer application of 6.25% glyphosate solution (15:1 water:glyphosate) to stumps cut near the ground has been used by the Minnesota Department of Natural Resources, Region V State Parks Resource Management Office. Resprouting and suckering from dense clones may require follow up treatment after a few years*.

*Because plants that appear to have been killed can resprout even several years after treatment with herbicide, annual monitoring should be conducted and follow-up treatments made as needed.

Throughout the year a 25% triclopyr solution in basal oil (3:1 oil:triclopyr) applied immediately to cut stumps using backpack sprayers has been used with success by the Scientific and Natural Areas Program in Minnesota. Thoroughly wet the cut stump and bark below the cut, down to the root collar, but avoid runoff. Any runoff will kill surrounding vegetation, especially if treated in the winter before snow melt.

USE PESTICIDES WISELY: Always read the entire pesticide label carefully, follow all mixing and application instructions and wear all recommended personal protective gear and clothing. Contact your state department of agriculture for any additional pesticide use requirements, restrictions or recommendations.

NOTICE: mention of pesticide products on this page does not constitute endorsement of any material.

SUGGESTED ALTERNATIVE PLANTS

For erosion control, soil enrichment, and nectar sources, plant native grasses and other native herbs, shrubs and trees that are appropriate for your soil and moisture conditions. If tree plantings will affect nearby natural communities, plant oak tree species native to your area for timber or shade. Contact the native plant society in your state or a state forester or resource manager for recommendations on appropriate, non-invasive native tree and shrub species for your site.

OTHER LINKS

- http://www.invasive.org/search/action.cfm?q=Robinia%20pseudoacacia
- http://nbii-nin.ciesin.columbia.edu/ipane/icat/browse.do?specieId=102

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Fact Sheet: Multiflora Rose

Multiflora Rose

Rosa multiflora Thunb.
Rose family (Rosaceae)

NATIVE RANGE

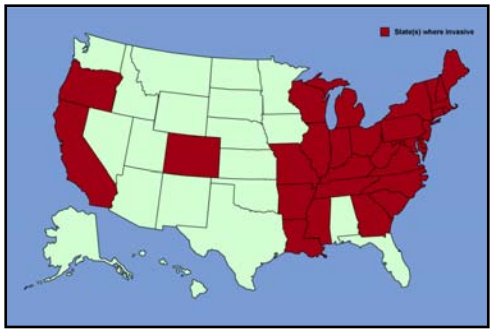
Japan, Korea, and eastern China

DESCRIPTION

Multiflora rose is a thorny, perennial shrub with arching stems (canes), and leaves divided into five to eleven sharply toothed leaflets. The base of each leaf stalk bears a pair of fringed bracts. Beginning in May or June, clusters of showy, fragrant, white to pink flowers appear, each about an inch across. Small bright red fruits, or rose hips, develop during the summer, becoming leathery, and remain on the plant through the winter.

ECOLOGICAL THREAT

Multiflora rose is extremely prolific and can form impenetrable thickets that exclude native plant species. This exotic rose readily invades open woodlands, forest edges, successional fields, savannas and prairies that have been subjected to land disturbance.



DISTRIBUTION IN THE UNITED STATES

Multiflora rose occurs throughout the U.S., with the exception of the Rocky Mountains, the southeastern Coastal Plain and the deserts of California and Nevada.

HABITAT IN THE UNITED STATES

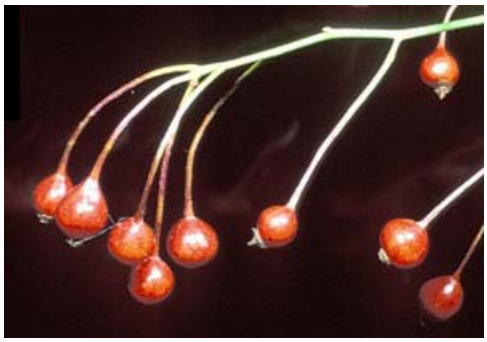
Multiflora rose has a wide tolerance for various soil, moisture, and light conditions. It occurs in dense woods, prairies, along stream banks and roadsides and in open fields and pastures.

BACKGROUND

Multiflora rose was introduced to the East Coast from Japan in 1866 as rootstock for ornamental roses. Beginning in the 1930s, the U.S. Soil Conservation Service promoted it for use in erosion control and as "living fences" to confine livestock. State conservation departments soon discovered value in multiflora rose as wildlife cover for pheasant, bobwhite quail, and cottontail rabbit and as food for songbirds and encouraged its use by distributing rooted cuttings to landowners free of charge. More recently, multiflora rose has been planted in highway median strips to serve as crash barriers and to reduce automobile headlight glare. Its tenacious and unstoppable growth habit was eventually recognized as a problem on pastures and unplowed lands, where it disrupted cattle grazing. For these reasons, multiflora rose is classified as a noxious weed in several states, including Iowa, Ohio, West Virginia, and New Jersey.

BIOLOGY & SPREAD

Multiflora rose reproduces by seed and by forming new plants that root from the tips of arching canes that contact the ground. Fruits are readily sought after by birds which are the primary dispersers of its seed. It has been estimated that an average multiflora rose plant may produce a million seeds per year, which may remain viable in the soil for up to twenty years. Germination of multiflora rose seeds is enhanced by passing through the digestive tract of birds.



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http://www.nps.gov/plants/alien/

MANAGEMENT OPTIONS

Mechanical and chemical methods are currently the most widely used methods for managing multiflora rose. Frequent, repeated cutting or mowing at the rate of three to six times per growing season, for two to four years, has been shown to be effective in achieving high mortality of multiflora rose. In high quality natural communities, cutting of individual plants is preferred to site mowing to minimize habitat disturbance. Various herbicides have been used successfully in controlling multiflora rose but, because of the long-lived stores of seed in the soil, follow-up treatments are likely to be necessary. Application of systemic herbicides (e.g., glyphosate) to freshly cut stumps or to regrowth may be the most effective methods, especially if conducted late in the growing season. Plant growth regulators have been used to control the spread of multiflora rose by preventing fruit set.

Biological

Biological control is not yet available for management of multiflora rose. However, researchers are investigating several options, including a native viral pathogen (rose-rosette disease), which is spread by a tiny native mite, and a seed-infesting wasp, the European rose chalcid. Rose-rosette disease, native to the western U.S., has been spreading easterwardly at a slow pace and is thought to hold the potential for eliminating multiflora rose in areas where it grows in dense patches. An important drawback to both the rose rosette fungus and the European rose chalcid is their potential impact to other rose species and cultivars.

USE PESTICIDES WISELY: Always read the entire pesticide label carefully, follow all mixing and application instructions and wear all recommended personal protective gear and clothing. Contact your state department of agriculture for any additional pesticide use requirements, restrictions or recommendations.

NOTICE: mention of pesticide products on this page does not constitute endorsement of any material.

CONTACTS

For more information on multiflora rose management, please contact:

- Robert J. Richardson, Aquatic and Noncropland Weed Management, Crop Science Department, Box 7620, North Carolina State University, Raleigh, NC 27695-7620, (919) 515-5653, Rob_Richardson at ncsu.edu

SUGGESTED ALTERNATIVE PLANTS

Using native shrubs and trees for land restoration and landscaping purposes is one way to prevent invasions by multiflora rose.

OTHER LINKS

- http://www.invasive.org/search/action.cfm?q=Rosa%20multiflora
- http://nbii-nin.ciesin.columbia.edu/ipane/icat/browse.do?specieId=29

AUTHORS

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PHOTOGRAPHS

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USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service

Plant Fact Sheet

AMERICAN CRANBERRYBUSH

Viburnum opulus L. var. *americanum* Ait.

Plant Symbol = VIOPA2

Contributed by: USDA NRCS Plant Materials Program

Herman, D.E. et al. 1996
North Dakota Tree Handbook
@ PLANTS

Alternate Names
Viburnum opulus L.ssp. *trilobum* (Marsh.) Clausen, *Viburnum trilobum* Marsh.,highbush cranberry

Uses
Wildlife: American cranberrybush is a good wildlife food and cover plant for small mammals and birds. Twigs are eaten by deer, moose and beaver. Fruits are a staple winter food for ruffed grouse and are eaten sparingly by pheasants and at least five species of songbirds. Humans find the fruit tart but edible and excellent as a preserve or sauce.

Erosion Control: The shrub is useful as a medium tall hedge or border for screening or a windbreak.

Landscaping: It is an attractive flowering landscape plant for use in odd areas or in group plantings around homes and farm ponds. The fruit is a bright red which increases its ornamental value. Combined, its characteristics make it useful as a dual purpose food plant and ornamental.

Status
Please consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status (e.g. threatened or endangered species, state noxious status, and wetland indicator values).

Description
Viburnum trilobum Marsh., American cranberrybush is an erect native shrub, averaging in height from 6 to 10 feet, occasionally taller on good sites. The plants are multi-stemmed but do not form thickets by spreading. They are dense shrubs because of close branching. The leaves are opposite, 3-lobed maple-like leaves and from 2 to 5 inches long. In the fall the leaves become scarlet. The creamy-white flowers, which appear in late May and early June, measure 3 to 4 inches across. Each bloom is composed of an outer ring of large sterile flowers and an inner ring of tiny fertile ones. The fruit, which ripens in September and October, resembles the true cranberry in size and color but is more translucent when ripe. Fruit hangs on the branches all winter.

Adaptation and Distribution
American cranberrybush is adapted throughout the Northeast, although distribution is widely scattered throughout much of its range. It is found growing in well-drained, imperfectly drained, and poorly drained, but not droughty soils. Soil pH is not critical, but for best results soil should be reasonably fertile.

American cranberrybush is distributed throughout the northern states. For a current distribution map, please consult the Plant Profile page for this species on the PLANTS Website.

Establishment
Establish hedges or block plantings by using bare root or container grown stock. Plant 2 year old nursery seedlings. If planting your own seed, it takes 2 years for them to germinate.

When establishing a planting, prepare a good bed by plowing a few furrows, or by removing at least 4 square feet of sod for each plant. For the first 2 years, either cultivate, weed, or mulch with straw, hay, or sawdust to control competition. During the early years of establishment remove all competing vegetation.

As a wildlife border along the edge of woods, plant the American cranberrybush one or two rows between the open fields and the trees. Space each plant 5 or 6 feet apart. As a hedge where a medium-tall screen is desired, plant 2 rows 2 feet apart with staggered spacing or 1 row with 1 foot spacing**.** In an odd area or group planting around a pond, plant in the center or behind low growing shrubs. Full growth of the shrub requires 5 to 10 years.

Pests and Potential Problems
This plant has no serious pests.

Cultivars, Improved, and Selected Materials (and area of origin)
'Compactum', 'Andrews', 'Hahs', and 'Wentworth.' Plants are available at commercial hardwood nurseries.

Prepared By & Species Coordinator:
USDA NRCS Plant Materials Program

Edited: 05Feb2002 JLK; 060818 jsp

For more information about this and other plants, please contact your local NRCS field office or Conservation District, and visit the PLANTS Web site<http://plants.usda.gov> or the Plant Materials Program Web site <http://Plant-Materials.nrcs.usda.gov>

You're INVITED to join Allegheny Land Trust and Applied Ecological Services for a guided boat tour and presentation about Sycamore Island aboard RiverQuest's state of the art educational vessel, the EXPLORER.

Allegheny Land Trust

Helping local people save local land.

WHERE: Fox Chapel Marina

WHEN: Wednesday, August 19, 2009

TIME: 6:00-8:00 pm *(Boat leaves dock promptly at 6:00)*

While aboard the RiverQuest Explorer, Allegheny Land Trust and scientists from Applied Ecological Services will give a presentation about the work they are conducting for the Sycamore Island Ecological Assessment and Management Plan. The scenic boat tour down the Allegheny River and around Sycamore Island will provide a unique vantage point for you to learn about the island. Don't miss your chance to attend this special event, compliments of Allegheny Land Trust.

Space is limited!

Please RSVP by
Friday, August 14, 2009
Light Refreshments

412.741.2750 - admin@alleghenylandtrust.org

www.alleghenylandtrust.org

www.appliedeco.com

RiverQuest
www.riverquest.org

Allegheny Land Trust
409 Broad Street
Suite 206A
Sewickley, PA 15143

APPENDIX F: PUBLIC OUTREACH ACTIVITIES

Appendix F. Public Outreach Efforts

The public outreach events for educational and volunteer stewardship conducted by AES and ALT over the past year have greatly informed management recommendations with respect to public use, enjoyment, recreation, volunteer activities, and education. The public outreach events organized and facilitated from June 2009 – August 2010 by AES and ALT include:

RiverQuest Boat Tour

Monday, August 17, 2009 (held in partnership with the organization RiverQuest http://www.riverquest.org/). This involved a tour up river on RiverQuest's state of the art 'green' educational vessel the Explorer that began at the Carnegie Science Center and headed up the Allegheny River to Sycamore Island. While onboard, passengers were given a PowerPoint overview of the Sycamore Island Management Plan goals and ecological highlights from ALT executive director, Roy Kraynyk and AES ecologist, Scott Quitel, with AES wildlife biologist, Mike McGraw on board to identify the different birds on the river for the guests. After arriving at Sycamore Island, AES ecologist, Scott Quitel, pointed out the key ecological highlights of the Island from the vantage point of the observation deck. Video footage was taken and archived for ALTs records.

1. Public Meeting #1

Tuesday, September 22, 2009 (held at the Oakmont Yacht Club, Oakmont, PA) The first public meeting involved a PowerPoint slideshow with an introduction of ALTs mission and properties by Roy Kraynyk and an overview of the Sycamore Island Management Plan goals by AES ecologist, Scott Quitel with a group discussion among the audience following the slide show. This public meeting was very important in identifying key community stakeholders, gathering local historical uses of the island, river and surrounding land, and gathering general public comments towards the management plan. Team members present at the first public meeting include the following: Roy Kraynyk (ALT), Rhonda Madden (ALT), Doug France (ALT), Leanne Bloor (ALT), Scott Quitel (AES), Julie Hendrickson (AES), Jonathan Kline (SfSP), and Lisa Smith (Consulting Ecologist).

2. Venture Outdoors Canoe Outing

Sunday, September 20, 2010 – (held in partnership with Venture Outdoors - http://www.ventureoutdoors.org/). This trip involved an educational canoe and kayak paddling tour around Sycamore Island for interested community members and was led by a Venture Outdoors crew leader. The trip departed from Blawnox and the crew leader was accompanied by AES ecologist, Scott Quitel and former ALT stewardship director, Doug France.

3. Public Meeting #2

Thursday, April 15, 2010 (held at Hoboken Presbyterian Church, Blawnox, PA) Extensive advertising and preparation for the second public meeting was focused on attracting a large turn-out of community members in order to gather and record feedback on the management plan preliminary recommendations to date and consider this when writing the final management plan recommendations. Preparation efforts for this meeting were also focused on using the meeting to reach out to local community members who were interested in volunteering in the ongoing management efforts for the Island. The meeting began with Roy Kraynyk (ALT) giving an introduction to ALT and Sycamore Island. This was followed by a virtual tour slideshow of Sycamore Island and a PowerPoint presentation by Scott Quitel (AES) that outlined preliminary management recommendations for Sycamore Island. The PowerPoint presentation was followed by a summary of 'Getting Involved' tables and breakout sessions for the second half of the meeting by Julie Hendrickson (AES). The breakout sessions were organized into the following subtopics and facilitated by a project teammember:

Community Watch and Island Monitoring – facilitated by Emilie Cooper (ALT)

Programming and Activities (Planting and Clean-Ups) – facilitated by Lisa Smith (local consulting ecologist)

Education – facilitated by Julie Hendrickson

Ecology and Habitats (Plants & Critters) – facilitated Mike McGraw

History and Culture – facilitated by Christine Brill and Jonathan Kline.

In addition to gathering public input and feedback at the individual breakout sessions, a questionnaire was handed out to each attendee of the meeting for additional feedback. Complete summaries of the meeting and each of the break-out sessions are archived within the meeting minutes currently in ALTs possession. Team members present at the second public meeting include the following: Roy Kraynyk (ALT), Emilie Cooper (ALT), Jessica Stewart (ALT), Scott Quitel (AES), Michael McGraw (AES), Julie Hendrickson (AES), Christine Brill (SfSP), Jonathan Kline (SfSP), and Lisa Smith (consulting ecologist).

4. Public Meeting #3

Thursday, September 9, 2010 – (held at Sylvan Canoe Club, Oakmont, PA) This last public meeting presented key findings about Sycamore Island to ALT's staff, its members and other interested parties. Prior to this meeting, ALT staff was successful in generation media AES interest and AES staff biologist, Mike McGraw gave a press interview. A PowerPoint presentation was prepared by AES summarizing the fieldwork and research conducted during throughout.

Roy Kraynyk of ALT made an introductory statement about the Sycamore Island study made possible through the support of Qaulcom Corporation. Scott Quitel (AES), presented an informal narrative of the island and reported on the preliminary findings including summaries of vertebrate and invertebrate species observed on the island during the study period. General trends and observations were also noted, especially the absence of the spiny softshell turtle. Discussion and follow up questions but attendees addressed the role of Sycamore Island in overall waterfront plan of the area.

Design concepts for the reuse of the pool structure were also introduced. Breakout sessions following the presentation were led by Scott Quitel (AES), Lisa Smith (ecological consultant) and Sandy Batunkyi (AES). Mr. Quitel and Ms. Smith worked in tandem to give additional information about the island's ecology and access. Ms. Batunkyi explained the ideas behind the various pool concepts to the attendees.

5. Public Television Interview

Friday, May 7, 2010 (Sycamore Island) Scott Quitel and Roy Kraynyk were interviewed on Sycamore Island by WQEDs, Pierina Morelli, producer of On Q.

Applied Ecological Services, Inc.
AES East
1100 E Hector Street, Suite 398, Conshohocken PA 19428
Phone: 610-238-9088 Fax: 610-238-9931
www.appliedeco.com

TO: Roy Kraynyk

FROM: Scott Quitel

CC: Doug France, Steven Apfelbaum, Julie Hendrickson, Lisa Smith, Jonathan Kline

DATE: 31 March 2009

SUBJECT: Meeting Highlights from Wednesday March 25, 2009

ATTENDEES: Roy K., Doug F., Steve A. (via phone), Scott Q., Julie H., Lisa S., Jonathan K.

Items worth considering from the onset of the project:

Long-term implementation goals

- Consider the implementation goals and long term visions for the Sycamore Island project upfront - the restoration, conservation/conservation planning, educational and cultural/meaningful opportunities - to better gear scope, process and work products to meet these ultimate end objectives. (Steve)

Involvement of funders from beginning of project

- Consider opportunities to keep funders in the loop from the onset of the project - for example, it is important to know how our abbreviated executive summary work products will be used by ALT for funders. (Steve)
    - Consider the potential for inviting funders to the island at some point (Roy)
    - Demonstration test plots can be instrumental in bringing funding to the table (Steve)

Sensitivity in reaching out to surrounding communities

Use the Sycamore Island project as a means to garner support for conservation and ALT's mission and organization as a whole

- A really good opportunity to gain support for conservation at all levels – however, must balance resources with use - ALT has had to hold back organizations dying to use the island. There is an extreme sense of ownership for the island by various interest groups. (Roy)
- RiverQuest - encourage communication with Karl; explore dock feasibility (especially with regard to mussel beds) for their vessel - the existing pilings on the back channel. (Roy)
- Interpretive Signage - gear this towards multiple, intended uses (cultural, historical, ecological, educational) in order to gain public support for organization and mission statement. (Roy)

Explore creative ways to engage/spark public interest and involvement in the project on multiple levels

Cultural, industrial, human use history / heritage connections in addition to ecological

- Finding something unique to the industrial heritage may spark some curiosity - for example, if we find an interesting artifact, this could make for an interesting draw that could target a different user group for the island (Roy, Jonathan)
- Our mapping overlay process will take into account any ecological, historical, or cultural features (Scott)

Branding - Marketing opportunities for project - Publicity surrounding Sycamore Island project

- How to create 'buzz' around the project within the community - make project 'sizzle' - through press releases, radio announcements, etc.? (Scott)
- ALT is very interested in PR (Roy)
- Allegheny Front - local Wednesday evening radio program (Lisa); former radio piece done with ALT and Allegheny Front
- Target local paper - involve volunteers, resources, friends in community so that Sycamore Island project becomes a headline in local paper - this is what gets read (Roy)
- Wilderness and Wild & Scenic River Designations - legislation surrounding this - there may be a lot of attention turned to rivers this year (Lisa) - phone call to Seattle American Rivers to find out (Steve)
- Don Hopi - story from him perhaps? (Lisa)
- Have news people accompany us to island during field work, etc…? (Roy)
- Gateway Clipper fleet - could possibly give ecotour of Island? (Roy)
- Project website - iterative - first as clearinghouse for team/project information and logistics and then turned into marketing piece?
- Bob Johnson - artist; cube of debris from island/river

5 one-on-one key stakeholder interviews

RiverQuest - Karl Thomas

- Can we include Sycamore Island promotional material within their education packets?

Friends of the Riverfront - Tom Baxter

Motorboat Community

- O'Hara and Oakmont

Paddleboat Community

- Sylvan and Steel City
- How to involve/engage Verona paddling groups? (Jonathan)

Army Corps - Colonel Crall (district contact)

- Barge/Boat traffic on River
  - Need to consider barge movement from the onset (Steve)
  - There is barge movement and dredging for centerline in this portion of River (Doug)
  - Are there stacking barges? (Jonathan)
  - Dredge disposal? CDF? Is there a dredging plan? We need to understand what permits they have in place and where they are disposing of dredge (Steve)
  - Potential to coordinate with Corps contractor to shoot points of island shoreline and back channel in June during their annual survey work - consider datum and coordinates as they relate to LIDAR topo survey of island (Julie)

Other groups - resources – organizations/agencies to consider

- PEC's initiative on the river "Allegheny Riverfronts"
- Port of Pittsburgh
- Fish and Boat Commission – Sue Thompson's program
- Audubon Society of Western Pennsylvania
- Local birding clubs (records, data and inventories of birds)

- US Fish and Wildlife Service - Ohio River Island National Wildlife Refuge
- Deborah Weisberg - Radio - Allegheny Front
- Western Pennsylvania Conservancy
- Carnegie Museum of Natural History

- Venture outdoors (piggyback on their expeditions to help with logistics of getting people to the island?)
- Any other local naturalists? Nature writers or artists?
- Human history - local knowledge of place- archaeological, cultural, mythology, industrial past
- Local Native American groups

WPC - a good resource for biology, geology - how to engage them? (Lisa)

- Want best mix of talent - do what is best for Island (Scott)
- Would encourage a phone call to them at an appropriate point - are members of their team available on an as-needed basis? We could come to them as we refine roles/staffing (Steve)

Stewardship Perspective

- Would like to keep the Blawnox shoreline along back channel forested - how to access? – how to address safety issues? (Doug)
- Doug interested in partnering more with Fish and Boat Commission
- Rachel Carson event in Blawnox - late May (Doug)- pass out surveys - ask for people's experiences of the island - tie these into an interpretive strategy?
- International Coastal Clean up - count each item of pollution - goes into an international database
- Carnegie history link (obtain this from Doug)

Public Outreach

Venues? - What types of organizations? (Roy)

How did 3Rivers 2nd Nature do this? (Roy)

- Held at Oakmont Yacht Club for water trail planning - group would present data and findings for ecology of pool, emphasize safety of river use, hold breakout sessions/groups to find out how people are using the river currently and ways they would like to use it; much about educating people on river and related issues (Jonathan)

How to advertise for these events? (Roy)

- Tim Collins partnered with Friends of the Riverfront (Jonathan)
- May need to have a planning meeting around strategy for public meetings (Lisa)

When to hold public outreach meetings? (Roy)

- Key junction points of project - can AES team establish dates within 2 week windows? (Roy)
- Maybe gear public meetings (e.g. inventory and assessment phase) toward related interest groups – creative approach to meetings

How to hold these meetings?

- Maybe tag along on key events in community? (Lisa)
  - Oakmont Regatta - hand out a survey, ask about people's experiences with the island (Roy); tie these into a cultural interpretive strategy?
  - Sylvan Regatta
  - Venture Outdoors (could handle boating logistics of getting people to island - could include our promotional brochures/items in with their materials; piggyback on their advertising mechanisms to get people out for our use?)
  - Rachel Carson Homestead Street Fair - 'Sustainable Feast" - Blawnox community day May 24 (Doug)

Development of technical advisory committee

Perhaps establish an advisory team for input and review - select key individuals from other teams, neighborhoods, organizations to participate (Steve).

- Yes, will work together to develop this - group of ALT board members will participate - Roy, Doug, Pat McShea (sp), MaryBeth Steislinger, Ron Schipani, Mike (Corak?) from Army Corps, someone from Gateway Clipper fleet (Roy)
- Any local specialists – WPC, F& BC, PAGC - knowledge of place (e.g. mussels - Allegheny River (Lisa)
- US Fish and Wildlife Service - Ohio River Island National Wildlife Refuge. Minimally, these folks could provide technical guidance and share experiences/knowledge. (Lisa)
- Human history - local knowledge of place- archaeological, mythology, cultural (Steve)

Project schedule – staffing

- There is existing data for the island and we'll need to determine how to acquire that information, make sure it is used correctly and involve those practitioners who provide the data in how we use the data or any recommendations that are based on that data.
- Is there flexibility in shifting funds around within allotted budget to better accommodate science and public outreach goals? (Scott)
    - yes (Roy)

LIDAR

2' contour intervals and vegetation cover - we will be able to download from website - Michael Kotyk - GIS guy

Please help us in our efforts to share the history, mystery and importance of Allegheny County's last remaining undeveloped island,

Sycamore Island
Blawnox, PA

On the back side of this postcard, we invite you to share with us your personal stories, favorite memories, and experiences from Sycamore Island and the neighborhoods, industry and land that surround it. Why is this place special to you? What interesting things can you tell us about the island or surrounding areas?

We would like to collect your stories and those you remember from your family members to help capture and reveal a living history of Sycamore Island and the surrounding neighborhoods. These stories will help bring to life the rich cultural, ecological and industrial heritage of this area from the perspective of the people who know it best...you!

If you have any questions, please contact:
Doug France: 412.741.2750 | dfrance@alleghenylandtrust.org
Julie Hendrickson: 610.238.9088 | julie.hendrickson@appliedeco.com

From: _____

To: Applied Ecological Services, Inc.
1100 East Hector Street, Suite # 398
Conshohocken, PA 19428
attn: Julie Hendrickson

The mission of the Allegheny Land Trust (ALT) is to serve as the lead land trust conserving and stewarding lands that support the scenic, recreational, educational and environmental well-being of communities in Allegheny County and its environs. Please visit ALT's website for more information pertaining to the Sycamore Island Ecological Assessment and Management Plan Project or for more information about other ALT properties at: www.alleghenylandtrust.org

Allegheny Land Trust and Applied Ecological Services

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Allegheny Land Trust and Applied Ecological Services

We invite you to share with us your personal stories, favorite memories and experiences from Sycamore Island and the surrounding neighborhoods, industry and environs in the space provided below:

Your name:
Resident of:
Is there a phone or email address we can reach you at?
Alternatively, please feel free to email this information to julie.hendrickson@appliedeco.com

We invite you to share with us your personal stories, favorite memories and experiences from Sycamore Island and the surrounding neighborhoods, industry and environs in the space provided below:

Your name:
Resident of:
Is there a phone or email address we can reach you at?
Alternatively, please feel free to email this information to julie.hendrickson@appliedeco.com

North tip of Sycamore Island, Allegheny River. Photo taken by: Jane Ockershausen, December 20th

Sycamore Island Progress Report

3 March 2010

Prepared By: Applied Ecological Services
Michael McGraw, Julie Hendrickson, and Scott Quitel

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www.appliedeco.com

Preparation for a Vibrant Spring;

An Update of Ongoing Ecological Analyses at Sycamore Island

Below are updates and projections for faunal studies at Sycamore Island. Seasons dictate the nature and timing of these events and we are in preparation for our spring field efforts, a season that is optimal for a variety of survey methods within our study plan.

BIRDS

The Island is ripe with potential for wonderful wildlife observations this coming spring. Many bird species are known to migrate along riparian corridors, regardless of their breeding habitat requirements, using islands and river banks for food and shelter along their journey. On any given morning after good migration conditions, it is possible to view over 30 different warbler species, 3 vireo species, 10 tyrant flycatcher species, 2 tanager species and many other wonderful songsters on the Island! Starting in April and continuing into the breeding season, AES will schedule a series of visits to observe birds at different stages of the spring migration period.

From the second half of May thru June, we will commence a breeding bird survey (following USGS North American Breeding Bird Survey and Pennsylvania Breeding Bird Atlas protocols), visiting the site in replication to observe early-, mid- and late-season breeders. The breeding season surveys will reveal what bird species consider the island home, relying upon its natural conditions for critical life-history components, such as foraging, mating, nesting, and raising young. Rare but potential breeders may include cerulean (*Dendroica cerulea*) and yellow-throated (*Dendroica dominica*) warblers. Busy and boisterous belted kingfishers (*Ceryle alcyon*) will be updating their nest tunnels and vehemently protecting their home ranges. All strata of the tree and shrub canopy layers will be divided up into three-dimensional territorial lines, guarded by colorful songsters eager to procreate and provide. The island may prove to play an important role in the continued expanding range of bald eagles (*Haliaeetus leucocephalus*) and ospreys (*Pandion haliaetus*), for purposes of nesting, roosting, and/or perch foraging. Other raptors, such as red-tailed hawk (*Buteo jamaicensis*), red-shouldered hawk (*Buteo lineatus*), and Cooper's hawk (*Accipiter cooperii*) may nest here. Owls such as eastern screech (*Otus asio*) and great horned owls (*Bubo virginianus*) are potential breeders here and there is also potential for nesting wading birds. AES will perform a site visit in the first half of March to assess the island for late winter/early spring breeding raptors and owls and early migrants.

It is important to note that these marvelously wild spring and summer on-goings by nesting birds are sensitive to disturbance and presence of people on the island. We cannot stress enough the importance of minimizing the amount of human disturbance on the Island in the spring and summer months, most crucially from May 15 – July 1.

Despite observations of bald eagles in the winter along the Allegheny River in numerous areas, including the immediate vicinity of Sycamore Island, no observations of bald eagle nest building or courtship behavior have been made on the Island to date. AES is supplementing the bird data for the winter months with local birding organizations (www.3rbc.org) and daily bird observation information (PABIRDS@LIST.AUDUBON.ORG). These observations will serve to justify the list of bird species that may be observed from the island in the winter months, specifically the birds that do not reside on the island, but utilize the river ecosystem. Winter island resident birds have been characterized by a November 2009 site visit, identifying all bird species observed (heard and/or seen) on the island. This strategy preserves funds to put forth a concerted effort during the spring/fall neotropical songbird migration and breeding bird seasons, as these surveys will provide the most critical data sets relative to the Island and its natural resources.

REPTILES AND AMPHIBIANS

A host of potential frog, toad, salamander, snake and turtle species may inhabit Sycamore Island. Surveys for determining presence/absence will commence this spring in March and continue through June of 2010. Local educational facilities (Duquesne University/Murphy's Bottom, Dr. Brady Porter) and state agencies (PADCNR, Allegheny Islands State Parks) have compiled comparative data of the herpetofauna inhabiting other islands in the Allegheny River. Coupled with the data that we will obtain this season and regional natural heritage database information, ALT and AES can identify critical structural components that may be absent from Sycamore Island, inhibiting residency by otherwise expected species and then develop strategies to include these features, such as vernal pools or suitable nesting habitat. We have already begun the process of approaching the pool ruins re-design with this theme, exploring the possibility of creating a vernal or permanent pool structurally suitable for breeding amphibians at the microhabitat level.

We have received our scientific collection permits and are extremely excited to perform the spring faunal analyses that we have scheduled for the Island and look forward to sharing the data with the ALT. This data will fuel ecologically sensitive trail design and identify educational, conservation, and stewardship opportunities for the Trust and surrounding communities moving forward. If there are any questions regarding the survey methods, time frames, rationale, or questions regarding specific animal species, please feel free to contact Michael McGraw, Wildlife Biologist, at (610)238-9088.

PUBLIC OUTREACH

VOLUNTEER INVOLVEMENT

Central to the ecological management plan of Sycamore Island is ensuring stewardship of the island by local citizens and ALT in the years to come. As we continue preparing the different sections of the management report in the coming months, we are going to be working closely with ALT and other local organizations closely to map out an executable volunteer program. To date, several people, as well as local organizations have expressed enthusiasm and interest in becoming active volunteers and forming partnerships with ALT to

assist in the management and long term stewardship of Sycamore Island. The challenge at hand then, is how to meaningfully involve volunteers within a well-thought out and organized framework to maintain enthusiasm and participation, while also planning with enough foresight to eliminate potential problems, maximize limited resources, and achieve the desired results. We are currently exploring ways to involve the public in the management of the Japanese Knotweed on the island via the 3 different test plots we have established thus far. Management of the knotweed within a riverine environment is a particularly sensitive issue, and this, coupled with the potential for significant breeding birds on the Island during the spring and early summer must be considered carefully before bringing volunteers to the Island. Our spring and summer faunal surveys will provide a better idea of the species that are using the island for critical habitat, as well as a stopover point during migration.

2ND PUBLIC MEETING

We have a date set for the 2nd public meeting. This will be held on Thursday, April 15th from 6:30 – 8:00 pm at the Hoboken Presbyterian church basement in Blawnox, PA.

SYCAMORE ISLAND

located between Blawnox and Verona on the Allegheny River

PUBLIC MEETING

Thursday, September 9, 2010 at 6:30 P.M.

Sylvan Canoe Club, 132 Arch Street, Verona PA , 15147

For more info. please call 412.741.2750 or contact Emilie Cooper at ecooper@alleghenylandtrust.org

Please join Allegheny Land Trust as we present our visions for Sycamore Island. INTERPRETIVE WALKING TRAIL for island exploration, field test plots for VEGETATIVE RESTORATION, and conversion of a relic pool for WILDLIFE HABITAT are some of the exciting topics to be discussed. Experts will be on hand to answer questions. See you then!

ALLEGHENY LAND TRUST