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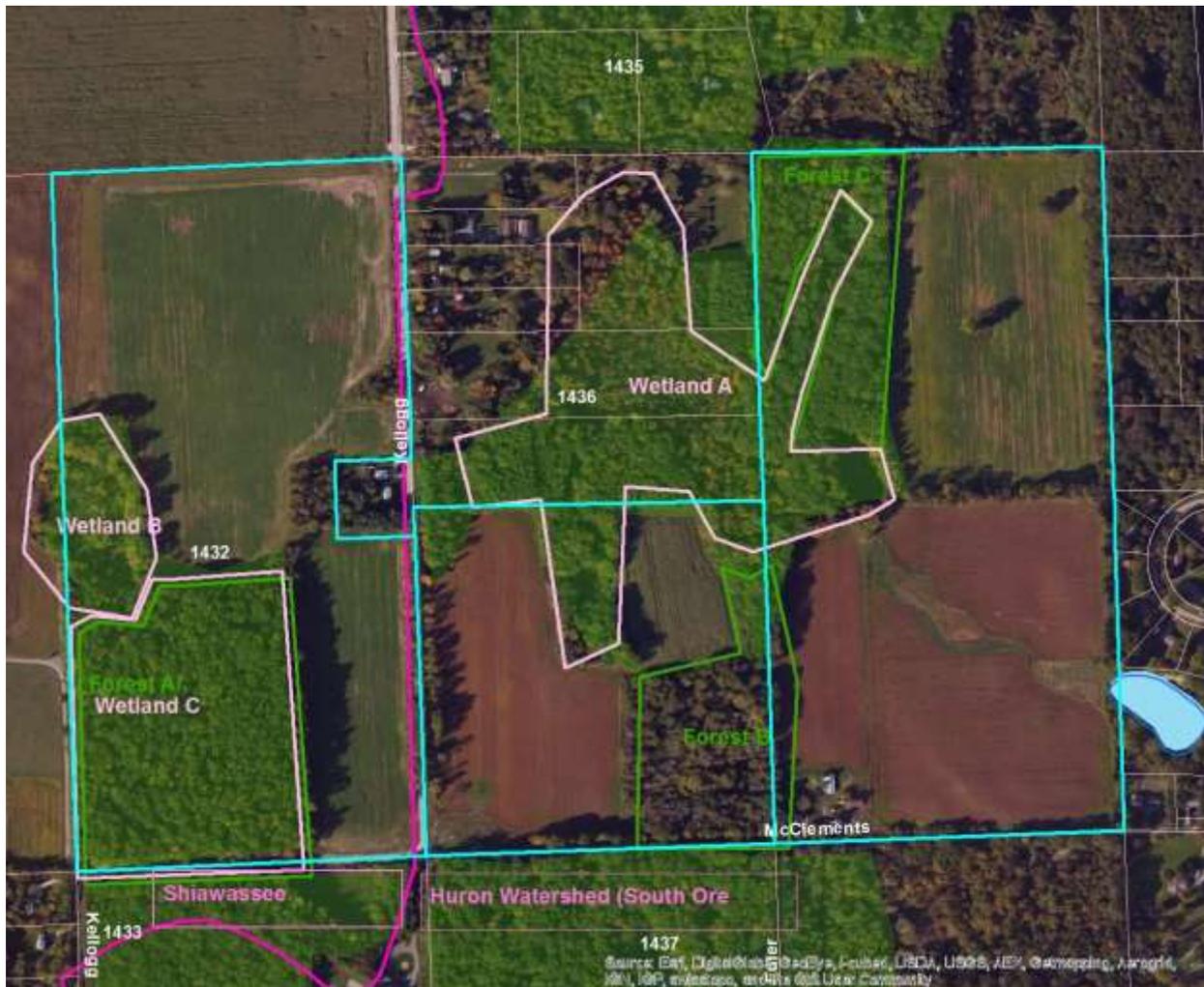
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HRWC Bioreserve Site Assessment

Site: Parcels 11-01-300-006, 11-01-300-005, and 11-02-400-004, Bioreserve sites 1436 and 1432 (about 70 acres).

I. Site Location and Natural Areas Assessed:



II. Bioreserve Map and Field Assessment Score:

The site receives scores based on the GIS model underlying the Bioreserve Map and based on the field assessment.

The top section of the table on page three lists how the Bioreserve Map ranks the site for 15 ecological criteria. Rankings for each criterion range from 0 to 100.

The total score for site # 1436 is 300, and for 1432 is 350, which places both sites in the **lower-range** [lower range: 25-366; mid-range: 366-591; highest range: 591 – 1224] of all the Bioreserve Sites in the watershed ranging from 25 – 1244. For more details on how the sites were scored on the Bioreserve Map, see <http://www.hrwc.org/our-work/bioreserve/bioreserve-map/>.

The bottom section give scores for each type of natural area visited by the field assessment team. For each answer a team could enter on the worksheet, the site receives a certain number of points. For instance, for each plant a team checks off on the plant list, the site receives 5 points. If invasive species are listed as dominant, the site receives fewer points than if native species are checked as dominant. Each ecosystem within the natural area receives two scores, one for ecological integrity and one for level of disturbance.

Potential maximum points each type of natural area could receive:

Ecosystem Type	Ecological Integrity (higher score indicates higher quality site)	Level of Disturbance (higher score indicates higher level of disturbance on site)
Wetlands		
Bog or fen	255	100
Other wetlands	171	110
Forests	144	154
Grasslands	126	239
Waterways	51	n/a

III. Scores for the Natural Area:

	Site 1432 GIS score	Site 1436 GIS score
Ranking Criteria		
Rank for Size	0	0
Rank for Core Size	0	0
Rank for Water	0	0
Rank for Wetlands	100	100
Rank for Groundwater	0	0
Rank for Remnant Ecosystems	25	25
Rank for Glacial Diversity	0	0
Rank for Topography	0	0
Rank for Connectedness Count	0	0
Rank for Connectedness%	50	75
Rank for Potentially Unchanged %	75	0
Rank for Potentially Unchanged Area	0	0
Rank for Restorability	100	100
Rank for MNFI Communities	0	0
Rank for Biorarity	0	0
Final Rank	350	300
This parcel's natural area sites:	Ecological integrity scores	Level of disturbance score
Wetland A:	74	9
Wetland B:	53	4
Wetland C:	83	4
Forest A:	88	9
Forest B:	41	39
Forest C:	70	9

IV. Site Landscape Context:

Landscape of the 1800s: the wetlands on the site were historically inland wet prairie, while the forests were black/white oak and oak/hickory ecosystems. Inland wet prairie ecosystems have undergone drastic reductions as the area has been settled and are considered endangered ecosystems (see map below).

Glacial landscape: Medium textured glacial till: flat to gently rolling landscape created as the glacier advanced, grinding up the earth, and then retreated.



V. Field Assessment:

The volunteer team visited the site on 5/13/2014, and spent about three hours assessing the site.

For the purposes of the assessment, the team delineated six different ecosystems on aerial photos of the site: three wetlands and three forests.

VI. Site Overview:

The landscape is flat. Signs of wildlife observed by the team included bird nests, frogs, ground birds, small mammals, and song birds.

Overall disturbance is mild, and consists of rock piles and trash piles. Invasive species are present in isolated pockets within a single community.

Assessment highlights: The wetlands and forests on this site received a significantly higher than average score for the field assessment. The wetlands and forests lie in what was historically inland wet prairie, an ecosystem type that has undergone drastic reductions as the area has been settled and is considered endangered. Volunteers found little or no invasive plants in forest A, forest C, wetland A, wetland B, and wetland C.

Livingston County recently acquired the property and is looking into plans for developing for both passive and active recreation. Forests A and C are high quality forest swamp complexes, with upland and lowland areas, and with many large trees, a diverse understory, and only a few invasive plants. Forest B is a weedy, disturbed shrubby forest with a dump in the middle of it. Historical photos show Forests A and C (and Wetlands A and B) have probably never been cleared for agriculture, while Forest B was a farm field in the 50's.

A. Wetland A:

Ecological Integrity Score: 74 out of 171 possible

Disturbance Score: 9 out of 100 possible

Wetland A is 31 acres in size and makes up the middle third of the site. The wetland is in a ravine or depression, has standing water, appears to occasionally flood, and has a water source that is not apparent. Where soils were exposed by animal burrows and fallen trees, the team found smooth mucky soils. The wetland vegetation has distinct zones, and includes an open water area, a shrub area, and a forest swamp area.

Shrubs and trees are dominant, including blueberry, Michigan holly, willow, ash, red maple, and swamp white oak. Grasses and forbs that together include various sedges and ferns are also common, along with a few emergent and floating-leaf plants and invasives that together include buttonbush and buckthorn (glossy).

Invasives occur only in isolated pockets.

B. Wetland B:

Ecological Integrity Score: 53 out of 171 possible

Disturbance Score: 4 out of 100 possible

Wetland B is 7 acres in size and is a buttonbush pond on the west edge of the property. The wetland is in a ravine or depression, has standing water, and has a water source that is not apparent. Where soils were exposed by animal burrows and fallen trees, the team found smooth mucky soils. The wetland vegetation has distinct zones, and includes an open water area, a shrub area, and a forest swamp area.

Shrubs and trees are dominant, including buttonbush, Michigan holly, willow, ash, red maple, and swamp white oak. Forbs are also common, along with a few emergent and floating-leaf plants, grasses, and invasives that together include buttonbush and various sedges.

Invasives occur only in isolated pockets.

C. Wetland C:

Ecological Integrity Score: 83 out of 171 possible

Disturbance Score: 4 out of 100 possible

Wetland C is 11 acres in size and is part of a wetland/upland wooded area on the southwest corner of the property. The wetland is in a ravine or depression, is at the margin of a waterway, has standing water, appears to occasionally flood characteristically of a vernal pond, and has a water source that is not apparent. Where soils were exposed by animal burrows and fallen trees, the team found smooth mucky soils. The wetland vegetation has no distinct zones, and includes an open water area, a forb/wildflower area, a shrub area, and a forest swamp area.

Shrubs and trees are dominant, including blueberry, Michigan holly, ash, red maple, and swamp white, red, black, white oak. Forbs such as ferns and skunk cabbage are also common, along with a few emergent and floating-leaf plants, grasses, and invasives that together include buttonbush and various sedges.

Invasives occur only in isolated pockets.

Functional Values of Wetlands

Smaller wetlands isolated from lakes and streams can serve as many ecological functions as larger wetlands.

Water quality protection

Acting as living filters, wetlands filter pollutants from rain water and snow melt that flows off of developed areas and farm fields. Wetland plants remove phosphorus and nitrogen from the water. Wetlands also adsorb bacteria, toxic metals, pesticides, and grease.

Protection from shoreline/streambank erosion

Wetland plant roots stabilize soil and help prevent soil erosion. Vegetation dampens wave action along lakes and moderates the current of rivers.

Wildlife and plant habitat

Over half of Michigan's wildlife depends upon wetlands for food, shelter, or nesting habitat, including endangered and threatened species like the bald eagle, osprey, loon and sandhill crane. Wetlands support some of the most diverse plant communities of all ecosystems. Nearly all fish species and amphibians require wetlands for food and shelter, and they are the preferred habitat of muskrat, otter, beaver, mink and raccoon.

Aesthetics and recreation

Wetlands provide recreation such as hiking, birdwatching, nature photography, canoeing, hunting, fishing, and trapping, and generate revenues to the local community through these activities. Wetlands greatly enhance the value of neighboring properties.

Flood and stormwater control

Wetlands hold rainwater and snow melt during wet times, decreasing flooding. They release the water gradually in dry times, thus helping streams maintain steady flows.

Groundwater recharge

Just as wetlands can hold water in wet times, they become sources of water during dry periods. They can serve as recharge areas to local aquifers, keeping our groundwater supply constant.

Source: Huron River Watershed Council, Ann Arbor, MI, 2002

Vernal Pond Overview:

Vernal ponds are seasonal depressional wetlands. They are covered by shallow water for variable periods from winter to spring, but may be completely dry for most of the summer and fall. These small ephemeral wetlands are generally isolated, but sometimes are connected to each other by small drainages known as vernal swales.

Climatic changes associated with each season cause dramatic changes in the appearance of vernal pools. The pools collect water during winter and spring rains, changing in volume in response to varying weather patterns. During a single season, pools may fill and dry several times. In years of drought, some pools may not fill at all.

Functions & Values:

The unique environment of vernal ponds provides habitat for numerous rare plants and animals that are able to survive and thrive in these harsh conditions. Many of these plants and animals spend the dry season as seeds, eggs, or cysts, and then grow and reproduce when the ponds are again filled with water. In addition, birds such as egrets, ducks, and hawks use vernal ponds as a seasonal source of food and water. Vernal ponds are critical spawning areas for the Marbled Salamander (*Ambystoma opacum*) and other amphibians.

Status:

Vernal ponds are a valuable and increasingly threatened ecosystem, often smaller than the bulldozer that threatens to destroy them. Great efforts are being made to protect the remaining vernal ponds, as their disappearance marks the loss of rare and important habitat and some of the associated plant and animal species as well.

Source: U.S. Environmental Protection Agency

Forest Swamp Overview:

A swamp is any wetland dominated by woody plants. Swamps are characterized by saturated soils during the growing season, and standing water during certain times of the year. The highly organic soils of swamps form a thick, black, nutrient-rich environment for the growth of water-tolerant trees. Some swamps are dominated by shrubs, such as Buttonbush or Smooth Alder. Many plants, birds, fish, and invertebrates require the habitats provided by swamps. Many rare species depend on these ecosystems as well.

Functions & Values of forested swamps:

Swamps serve vital roles in flood protection and nutrient removal. Floodplain forests are especially high in productivity and species diversity because of the rich deposits of alluvial soil from floods. Many upland creatures depend on the abundance of food found in the lowland swamps, and valuable timber can be sustainably harvested to provide building materials for people.

Status of forested swamps:

Due to the nutrient-rich soils present in swamps, many of these fertile woodlands have been drained and cleared for agriculture and other development. Over 70% of the Nation's floodplain forested swamps have been lost. Historically, swamps have been portrayed as frightening no-man's-lands. This perception led to the vast devastation of immense tracts of swampland over the past 200 years.

Source: U. S. Environmental Protection Agency

D. Forest A:

Ecological Integrity Score: 88 out of 144 possible

Disturbance Score: 9 out of 154 possible

Forest A is 11 acres in size and is part of an upland/lowland complex on the southwest corner of the property. It has a mixture of tree sizes, standing dead trees, large rotting logs, and fallen trees and branches, and contains wetland characteristics such as bare muddy areas.

Though no one single size of tree really dominates this forest, very large trees (>18 inches diameter), large trees (>10 inches diameter), and medium-sized trees (6-10 inches diameter) are most abundant. Also present are a few small trees (2-6 inches diameter) and saplings. Where soils were exposed by animal burrows and fallen trees, the team found dark brown soils.

The largest tree species are maple (red) and oak (white, red, black, swamp white); moderately-sized trees include black cherry, maple (red), and oak (white, red, black, swamp white); small trees are represented by ash, basswood, black cherry, maple (red), and oak (white, red, black, swamp white); saplings include ash, black cherry, maple (red), and oak (white, red, black, swamp white). Native trees, native shrubs, and native ground cover species dominate the forest. The team reported native shrubs and vines such as witch-hazel, and native herbaceous ground cover such as sedges and trillium.

The team found invasive species occurring only in isolated pockets. Invasive species observed include garlic mustard. Human disturbance is absent.

Forest A and Wetland C together are an upland/wetland complex with no clear boundaries between the two.

E. Forest B:

Ecological Integrity Score: 41 out of 144 possible

Disturbance Score: 39 out of 154 possible

Forest B is 11 acres in size and is a former old field and dump on the south side of the property. It has a mixture of tree sizes and standing dead trees.

Though no one single size of tree really dominates this forest, medium-sized trees (6-10 inches diameter), small trees (2-6 inches diameter), and saplings are most abundant. Where soils were exposed by animal burrows and fallen trees, the team found dark brown soils.

The largest tree species are black cherry and box-elder; moderately-sized trees include black cherry, box-elder, maple (red), oak (red), and sycamore; small trees are represented by black cherry, box-elder, and oak (red); saplings include black cherry and box-elder. Though no one single type of vegetation dominates, native trees, native shrubs, and invasive species are abundant.

The team found invasive species primarily within the forest interior. Invasive species observed include garlic mustard. Human disturbance is extensive, as the team noted the presence of rutted, furrowed, or hard, compacted soil, rock piles, and trash pit.

F. Forest C:

Ecological Integrity Score: 70 out of 144 possible

Disturbance Score: 9 out of 154 possible

Forest C is 10 acres in size and is on the north side of the site. It has a mixture of tree sizes, standing dead trees, large rotting logs, and fallen trees and branches.

Very large trees (>18 inches diameter) and large trees (>10 inches diameter) dominate the forest, with medium-sized trees (6-10 inches diameter) also abundant. Small trees (2-6 inches diameter) are also present, along with a few saplings. Where soils were exposed by animal burrows and fallen trees, the team found dark brown soils.

The largest tree species are black cherry, maple (red), and red, white, black, swamp white; moderately-sized trees include black cherry, maple (red), and red, white, black, swamp white; small trees are represented by black cherry and maple (red); saplings include ash, black cherry, and maple (red). Native trees dominate the forest, with native shrubs and native ground cover also abundant. The team reported native shrubs and vines such as blueberry/huckleberry and Michigan holly, and native herbaceous ground cover such as sedges and trillium.

The team found invasive species occurring only in isolated pockets. Invasive species observed include garlic mustard. Human disturbance is mild, as the team noted the presence of deer blinds.

Forest Overview:

A healthy forest is a complex, interdependent community of plants, animals and soil. Each layer of the forest provides diverse habitats and helps to protect clean water. The canopy is the forest's top layer. It shades and protects animals and plants below, while also intercepting and slowing rainfall. Beneath the canopy is the understory, a second layer made up of smaller trees and shrubs. As older trees die and leave gaps in the canopy, younger trees grow to replace them. The

next layer, the forest floor, is populated by vines, grasses, mosses, worms, insects, fungi, bacteria and other small plants and animals. They continually decompose leaves, wood and other organic material that falls to the forest floor so that it may be reused by larger plants. This layer is also a storehouse of nutrients. The litter on the forest floor protects the soil, the bottom layer of the forest. Healthy forests often contain more living biomass in the soil below ground than on the surface.

Values & Functions:

Forests protect clean water:

Similar to wetlands, forests act as giant sponges that absorb and slowly release pollutants like nutrients and sediment from stormwater runoff. Forests store, clean and slowly release about two-thirds of the water that maintains stream flow and replenishes groundwater. Riparian forests that buffer streams significantly reduce the amount of excess nitrogen and phosphorus that enters a water body, sometimes by as much as 30 to 90 percent. Forests protect and filter drinking water for people. Mature trees provide deep root systems that hold soil in place, helping to stabilize stream banks and reduce erosion.

Forests provide habitat for wildlife:

Healthy forests provide food, shelter, nesting sites and safe migration paths for critters in the water and on the land. Riparian forests shade the water beneath their canopies, maintaining cooler water temperatures in summer, an important factor for spawning fish. Decaying leaves and wood on the forest floor are also essential links in the food web.

Forests clean the air:

Forests absorb and trap nitrogen, particulates and other pollutants released into the atmosphere by cars, industries, agriculture and construction. Forests retain more than 85 percent of the nitrogen deposited on them from the air. Trees also produce the oxygen that we breathe.

Source: Chesapeake Bay Program

VII. Species List:

Wetland A

Grasses/Sedges

Panic Grass

Sedges (Various)

Forbs

Horsetail

Fern, Bracken

Fern, Cinnamon

Fern, Sensitive

Fern, Wood

Geranium

Impatiens

Jack-in-the-Pulpit

Jumpseed

Mayapple

Mayflower, Canada

Nightshade, Enchanter's

Rattlesnake Root

Solomon's Seal, False

Trillium

Violet

Water Hemlock

Shrubs/Vines

Blueberry

Buttonbush

Dogwood, Gray

Gooseberry, Prickly

Michigan Holly

Hophornbeam

Rubus spp.
Serviceberry
Virginia Creeper
Willow, Shrubby

Trees

Ash
Cherry, Black
Cherry, Sweet
Elm, American
Hickory, Pignut
Hickory, Shagbark

Wetland B

Grasses/Sedges

Sedge, Lake

Forbs

Clearweed
Fern, Sensitive
Skunk Cabbage
Smartweed

Shrubs/Vines

Wetland C

Grasses/Sedges

Sedges (Various)

Forbs

Agrimony
Bloodroot
Fern, Wood
Geranium
Jack-in-the-Pulpit
Jumpseed
Mayapple
Nightshade, Enchanter's
Rattlesnake Root
Trillium
Violet

Shrubs/Vines

Musclewood
Gooseberry, Prickly
Nannyberry
Hophornbeam

Maple, Red
Oak, Black
Oak, Red
Oak, Swamp White
Oak, White
Prickly-Ash

Invasives

Garlic Mustard
Rose, Multiflora

Buttonbush

Trees

Ash
Elm, American
Maple, Red

Invasives

Rose, Multiflora

Poison Ivy
Sumac, Staghorn
Virginia Creeper
Witch-Hazel

Trees

Ash
Beech, American
Cherry, Black
Chokecherry
Elm, American
Hickory, Pignut
Hickory, Shagbark
Maple, Red
Oak, Black
Oak, Red
Oak, Swamp White
Oak, White
Prickly-Ash

Forest A

Grasses/Sedges

Sedges (Various)

Forbs

Agrimony
Bloodroot
Fern, Wood
Geranium
Jack-in-the-Pulpit
Jumpseed
Mayapple
Nightshade, Enchanter's
Rattlesnake Root
Trillium
Violet

Shrubs/Vines

Musclewood
Gooseberry, Prickly
Nannyberry
Hophornbeam

Forest B

Forbs

Agrimony
Jumpseed
Nightshade, Enchanter's

Shrubs/Vines

Dogwood, Gray
Elderberry
Grape
Rubus spp.
Virginia Creeper

Forest C

Grasses/Sedges

Panic Grass
Sedges (Various)

Forbs

Horsetail
Fern, Bracken
Fern, Cinnamon
Fern, Sensitive
Fern, Wood

Poison Ivy
Sumac, Staghorn
Virginia Creeper
Witch-Hazel

Trees

Ash
Beech, American
Cherry, Black
Chokecherry
Elm, American
Hickory, Pignut
Hickory, Shagbark
Maple, Red
Oak, Black
Oak, Red
Oak, Swamp White
Oak, White
Prickly-Ash

Trees

Ash
Box-Elder
Cherry, Black
Cottonwood
Elm, American
Oak, Red
Prickly-Ash

Invasives

Garlic Mustard

Geranium
Impatiens
Jack-in-the-Pulpit
Jumpseed
Mayapple
Mayflower, Canada
Nightshade, Enchanter's
Rattlesnake Root
Solomon's Seal, False
Trillium

Violet

Water Hemlock

Shrubs/Vines

Blueberry

Buttonbush

Dogwood, Gray

Gooseberry, Prickly

Michigan Holly

Hophornbeam

Rubus spp.

Serviceberry

Virginia Creeper

Willow, Shrubby

Trees

Ash

Cherry, Black

Cherry, Sweet

Elm, American

Hickory, Pignut

Hickory, Shagbark

Maple, Red

Oak, Black

Oak, Red

Oak, Swamp White

Oak, White

Prickly-Ash

Invasives

Garlic Mustard

Rose, Multiflora

A note about invasive species and their management:

Most properties in southeast Michigan have at least some invasive plant species growing on them. Invasive plants are plants which grow quickly and aggressively, spreading and displacing other plants. Invasives are usually introduced by people either accidentally or intentionally, into a region far from their native habitat. Whether your property is found to be minimally or pervasively covered with invasive species now is the time to understand which species grow there and what management options you have to control and, if possible, eradicate them. The following practical steps for managing invasive plants are from the Pennsylvania Department of Conservation and Natural Resources.

What Can I Do about Invasive Plants?

The best insurance against future problems is to avoid the use of known invasive plants and educate others about the problems of invasives. This web site lists many of the plants that are invasive in Pennsylvania. Plants on this list should be avoided because they can escape cultivation and aggressively move into surrounding ecosystems. One way to avoid invasives is to choose plants that are native to your area. Natives often are adapted to a specific environmental niche, and have natural controls that keep them in balance.

Minimize landscape disturbance. Invasive plants thrive on bare soil and disturbed ground where the native plant community has been displaced. The key to controlling invasives is to protect healthy native plant communities.

Use fertilizers wisely. Proper site preparation begins with a soil test before applying fertilizer. High nitrogen levels sometimes give an advantage to invasive species that are better adapted to using plentiful nutrients for explosive growth. For soil fertility, try using organic, slow-decomposing compost and mulches

Have a land management plan for maintenance over time. It makes sense when designing a property to plan for future maintenance. Lawns are maintained by weekly mowing, while gardens are often hand-weeded. Meadows in Pennsylvania may need to be mowed every year. Woodlands are probably the lowest-maintenance landscape, but they too will need to be monitored and invasive plants removed.

Scout your property annually for invasives or other problems. The best way to control invasives is prevention, and prevention can only happen through vigilance. Listed on this web site are resources to help property owners.

Remove invasives before they are a problem. Effective scouting or monitoring means that problems are found while they are still small and easily controllable. For instance, do not let invasive plants go to seed. Mechanical removal through digging or cutting is preferred. Large populations of invasives may need to be stopped chemically with spot applications of herbicide by trained individuals or by homeowners carefully following label instructions.

Replace invasive plants with native or noninvasive species. Invasives are good at exploiting bare soil and empty niches. When you remove an invasive plant, unless there is another plant substituted, the invasive will tend to come right back. What grows in the future depends largely on what is there now; so it is important to fill that niche with a desirable plant that will provide seed for the future.

Remove invasives first when their densities are low. This gives the most immediate success because invasive plant control works best where there is a functioning native plant community still in place which can move right into the empty niche.

- Avoid using known invasive plants
- Minimize landscape disturbance
- Protect healthy native plant communities
- Use fertilizers wisely
- Have a land management plan for maintenance over time
- Scout regularly
- Remove invasive plants when they are present in low numbers or when they are confined to a small area before they become a problem
- Dispose of removed invasive plants wisely
- Replace invasive plants with native or noninvasive species
- Clean equipment that has been used in an area having invasive plants

Disclaimer: The Rapid Ecological Assessment (Assessment) provides on-the-ground field assessment of a natural area. The Assessment provides detailed information about the ecological quality of a site for the purposes of the HRWC Bioreserve Project and is conducted by a team of trained volunteers. The Assessment is not a professional ecological inventory and should not be interpreted as a scientifically complete ecological inventory or plant list.