Habitat Enhancement Recommendations

Managers of a natural area must consider not only the species they wish to protect and the habitats they wish to preserve, but also the ecosystem as a whole, the processes involved and the landscape context in which the site occurs. Therefore, the management recommendations for Asylum Lake are presented from several aspects: recommendations for individual species; recommendations for habitat types; and recommendations for the property as a whole.

For any natural area, several management approaches may be appropriate, and the choice among them depends on the specific goals of the managers. Besides the specific recommendations included in this chapter, this report offers two alternative scenarios for configuring habitats on the Asylum Lake property. In selecting among the options, it is important to note that any action that may benefit one species or habitat type may, simultaneously, alter or degrade another. These trade-offs must be identified and evaluated on a case-by-case basis.

The Asylum Lake property has undergone many changes since European settlement as a result of introduction and encroachment of exotic species, termination of natural disturbance mechanisms and the impact of human activities. The overriding management goal, expanded upon in the following sections, is to promote the return of native floral and faunal components to Asylum Lake and to encourage endemic species of plants and animals to perpetuate under conditions similar to pre-settlement. Another major management goal is to preserve existing favorable conditions, while fostering the development of other desired characteristics. These recommendations assume that Asylum Lake Preserve some day may be a true preserve representing the natural communities of plants and animals that now exist only as an exception in Kalamazoo County.

Each management strategy reflects the combined habitat needs of a diverse group of plants and animals and also takes into account soils, topography, precipitation and temporal changes. Financial feasibility and the diverse opinions of all parties involved have been considered. The impact on and influence of the surrounding landscape, especially human habitation and development, are also part of the picture. Connectivity is an essential aspect of land management all too often ignored.

Recommendations include increasing the amount of the preserve in forest, thereby decreasing the amount of forest fragmentation on the property; restoring an oak savanna ecosystem; protecting and enhancing the already outstanding avian use of the site; providing options for future ecological research and education; and directing human activities at the site to specific areas to protect wildlife use and to promote wildlife viewing opportunities. All recommendations are consistent with the goals stated in the Governance Charter for the Asylum Lake Preserve and other documents. These stated goals are promoting ecosystem integrity and natural aesthetics, ensuring the passive recreational opportunities afforded by the property and supporting research and education.
Ecosystem restoration is a long-term effort requiring careful advance planning, clear goals and a gradual approach. It is important to resist making uninformed decisions. Hasty actions to make it appear something is being done will serve only to create future problems and negatively impact the site’s potential. Educating the university and community about the need for patience will be a key to success. Prairie development and oak savanna and forest restoration management need to be carefully planned to promote overall ecosystem health. Use of Michigan genotypes for the restoration should be encouraged because there is some indication that this will lead to better ecosystem health. Some believe that there is little value in replacing exotic species with exotic genotypes, although others say that assembling the appropriate species is the major consideration.

Research efforts must be compatible, coordinated and cooperative. Current conditions need to be well documented and change carefully monitored. Restoration ecology is a relatively new science and baseline studies are needed. The Asylum Lake site has the potential to be a significant asset for a university of increasing research stature. Any restoration program should include thorough documentation of changes, successes and failures at all stages.

WMU should consider creating a “Wildlife Management Team” for the Asylum Lake property and perhaps for other natural areas under its auspices. This team would use the information in this report and work with the university’s biology and geology departments and others with relevant expertise to develop and implement on-going monitoring of the impact of activities and conservation efforts at the site. The Kalamazoo Nature Center’s Research and Community Wildlife programs also could provide experienced ongoing support for such a program and related conservation and education efforts.

Aquatic Systems

To maintain and improve the health of the aquatic ecosystems at Asylum Lake, sources of artificial nutrient input should be identified and controlled as much as possible. This will reduce aquatic plant productivity, lower decomposition rates, prevent depletion of oxygen and slow the lake’s eutrophication.

Stormwater runoff is a concern for the Asylum Lake property, particularly in view of the planned reconstructions of Drake Road and Parkview Avenue and the development at Lee Baker Farm. Care must be taken in the design of these projects to avoid pollution of surface water or groundwater. Ongoing monitoring of water quality is essential.

Oxygen levels, vegetative cover, prey abundance and even the levels of some pollutants may be deduced by monitoring fish species. Such surveys of the property should include a thorough examination of the fish species present, including onshore surveys, seining, dip-netting and angling. The species found during these inventories will provide insight to the health and productivity of the lakes themselves.
The wetlands (Map 4) at Asylum Lake separate the open water of the lakes from the slopes and upland areas, in many cases providing a final line of protection by filtering pollutants in stormwater run-off moving toward the lakes. Any construction in the vicinity has the potential to disrupt surface or sub-surface water flow, affect the wetlands and possibly the lakes. Such development is likely to increase runoff and erosion, altering the hydrology of the region. Monitoring wells, both at the developing sites and within the bounds of the preserve, should be used for continuing observation of these changes. Wetland plant and animal populations also should be monitored.

Asylum Lake Landcover and Habitat Management Recommendations

Habitat management recommendations for the Asylum Lake property must reflect a compromise among a number of conflicting natural and human land values. For example, the process of removing introduced and/or invading grasses or woody vegetation must be balanced against the needs of the wildlife species already utilizing the property, the natural trends of the system, the financial feasibility of such a task and time limitations. Current land cover is shown in Map 2.

All compartments of Asylum Lake have significant populations of both invasive (exotic) and native species, including species of high conservative value. Conservatism is a specific term describing the probability that a given plant species would occur in a landscape essentially similar to its pre-settlement condition. These species add to the biodiversity as components of a natural community, as well as offering clues to the area's history. Although there is not a strong community of conservatives represented anywhere on the property, small individual populations do exist. The Asylum Lake property has the potential to support four extensive types of plant communities: mesic prairie, oak savanna (bur oak plains, oak openings, oak barrens), oak forest (dry and dry-mesic southern forest), and a variety of open wetland habitats. In addition, other plant communities are present on a more restricted basis, including forested wetland, emergent wetland, shrub-scrub and oldfield.

It would be preferable to undertake restoration efforts in a 'piece-meal' fashion, but under a carefully considered plan. This would allow ongoing biological and ecological research into the effects of forest, savanna, prairie and wetland restoration. Data also could be gathered from each area (restored and non-restored) and valuable comparisons made. The science of ecological restoration is still young, and empirical data of this nature are valuable and under-represented. However, barriers would be important between restored and non-restored areas to prevent the reinvasion of such adventive species as buckthorn (Rhamnus sp.), honeysuckle (Lonicera sp.), Asiatic bittersweet (Celastrus orbiculatus), etc. Purple loosestrife (Lythrum salicaria), as it occurs in the wetlands, should be eradicated all at once and not in a piece-meal fashion, because it is a damaging pest and difficult to control.

Another precaution concerns retaining biodiversity and ecological integrity. In the process of restoring these communities, care should be taken to maintain proper habitat
for birds, mammals, insects, etc., as well as considering soil structure and disturbance and hydrological function. It is possible, with the best of intentions, to further degrade these ecosystems. One precautionary measure, mentioned above, is to plan for replacement of buckthorn and honeysuckle during eradication efforts, using appropriate native shrubs to maintain wildlife habitat. In any case, experienced restoration professionals should be consulted in determining appropriate restoration procedures.

“Combinations of soils, topography, existing plant community, management history, climatic conditions, timing of treatments, etc., produce unique results spatially and even temporally at the same site. There is no substitute for experienced managers and their creative experimentation with available tools” (Ryan, 1990).

Restoration projects at Asylum Lake offer a unique research opportunity. The presence of Kleinstuck Preserve in close proximity is fortuitous, since Kleinstuck, with a similar grouping of non-native species, can serve as a control site in evaluating the work at Asylum Lake.

Management Recommendations
--Increasing Forest, Decreasing Edge, Creating a Grassland and Oak Savanna Mosaic (Maps 8 and 10)
The forest segments located on the property, while compromised by non-natives, demonstrate enough biodiversity to justify restoration to a higher quality forest. Although pre-settlement records indicate this area was oak savanna rather than closed forest, recreating pre-settlement conditions should not always be the target in a restoration or management effort (Packard 1997). The pre-settlement surveys represent what existed at a particular moment, not necessarily long-established communities. If sufficient structure exists to support a forest dominated by white oak (Quercus alba), for example, that would be a logical target for forest restoration on this property. Non-native shrubs should be replaced with native fruit and nut producing understory shrubs and trees. Forest wildflower populations should be augmented and a greater diversity of wildflower species, including spring ephemerals such as bloodroot (Sanguinaria canadensis), added. Woodland sunflower (Helianthus divaricatus) and other suitable summer and early fall species also could be introduced. Black cherry (Prunus serotina) is characteristic of disturbance and will thin out as the forest matures. Forests A and B are in moderate condition with some older trees near the end of their lifespan, while Forest C may need some tree planting.

The existing woodlands on the preserve are narrow, less than 150 feet along the west edge of Little Asylum Lake and as narrow as 250 feet along the south edge of Asylum Lake. This provides a high ratio of linear edge, increasing “edge effects.” Numerous studies have shown that edges are generally areas of poor nesting success in such fragmented landscapes.
Planned prairie reconstruction and reforestation could both reduce the ratio of forest edge to forest area and expand relict grassland species. One proposal would allow Old Field A and the north half of Old Field B to lie fallow and grow to forest.

The northern peninsula of Old Field B contains thick sods of brome grasses that may require burning and perhaps plowing to make way for reforestation. The north half of Farm Field A could be managed as an oak savanna system, the trees gradually thinning southward to the border of the prairie reconstruction in the south half of the farm field. This site already has been planted with bur oak (*Quercus macrocarpa*). Care should be taken to re-plant or allow native grasses and forbs to return so that this preserve may represent a true Michigan prairie-savanna ecosystem.

Much of the area encompassing Old Fields D and E, the Old Orchard and Forest E could be allowed to grow into a forest serving as a buffer along US 131. This stand would provide wind and erosion protection for much of the site including the prairie and savanna in the central portion of the preserve. However, decisions about management of the land along the highway must consider effects on the visibility of the Lee Baker Farm developments. Forest, while providing increased protection from the wind, would block part of the view.

--Returning to a Pre-Settlement Oak Savanna System (Maps 9 and 10)
The Asylum Lake Preserve contains a unique ecosystem of remnant savanna and forests containing a canopy of oaks with an understory of dogwood (*Cornus*) species, black cherry, sassafras (*Sassafras albidum*) and many other shrubs and forbs (Oak Openings Conservation Plan 1997). Restoring the Asylum Lake Preserve to pre-settlement conditions of oak savanna would be an ambitious venture and, as with all restorations, there should be careful consideration of the source and genotypic composition of all plantings.

Some species, such as bur oak, are keystone species that define a certain plant community. The frequency of this tree, in addition to other conservative species in Old Orchard, and Old Fields D and E, justifies its restoration to an oak savanna community. This sector of the property could also demonstrate to travelers on US 131 that the university is undertaking significant research on ecosystem processes, in addition to business, technology, and manufacturing research going on directly south of this parcel. This area would combine with the already planned conversion of Old Field A to oak savanna, as a number of bur oak trees have already been planted there.

Restoration of Old Fields A, D, E, and F to Oak Savanna could be accomplished through planting and thinning techniques. In addition, the Old Orchard located west of Drake Road, immediately north of Forest E, would be managed as part of the preserve in a savanna-like landscape. Ultimately, these areas would be primarily composed of white oak, with small numbers of pignut and shagbark hickories (*Carya glabra* and *C. ovata*), black oak (*Quercus velutina*) and bur oak with a density of 1 to 15 trees per acre (Hodler et al. 1981).
Restoring Old Field B to oak savanna, while maintaining the vista of this area, will require more effort than the restoration of fallow cornfields such as Farm Field A and Old Field A. Mowing, burning or even plowing may be necessary to manage for native grasses and to remove non-native brome grasses now present on the site. The planting of fire-tolerant bur oak trees should be timed according to which treatments are needed.

Forests C and E, dominated by black locust (*Robinia pseudoacacia*) and Norway maple (*Acer platanoides*), could be subjected to more intensive management to remove these and other alien species. These forests could then be managed for oak. A second alternative would be to allow Forests C and E to continue through succession to a mixed hardwood forest.

The location of Forest C and Old Field C in the buffer area between the Business, Technology and Research Park (BTR) and Parkview Hills provides an opportunity for cooperation between those two entities to develop and maintain a wildlife corridor. Native plantings should be emphasized, as they have been in much of the area already planted along the eastern edge of the BTR.

**Management Techniques**

**Controlled Burns:**

Fire has historically been a controlling force in Michigan’s native grassland communities (*Daubenmire 1968*) and is likely to be useful in the management of native flora and fauna in these areas. Careful prescribed burning of native and introduced grasslands could (*Hanaburgh 1995*):

- Encourage native warm-season grasses and forbs if present in the seed bank.
- Increase the cover of native grasses and forbs, while maintaining structural variation.
- Set back succession, thereby maintaining a more meager habitat for those species that require it.
- Release nutrients back into the soil and enhance grass species composition by eliminating ground litter buildup.
- Control plant diseases and the spread of exotic plant species and woody vegetation.
- Increase seed production and insect populations in recently burned areas, benefiting several species of grassland birds, mammals and predatory insects.

**Controlled Burning Guidelines**

Most grassland birds seem to be adapted to moderate length (3-5 years) burning rotations. In general, grassland species benefit within 1 to 2 years following a burn (*Temple and Johnson 1997*). Burning in early spring is advised to avoid risk to nesting species. In grassland areas larger than 100 acres burning can be rotated on 20 to 40% of the land on 2-6 year cycles.

Drawbacks to burning are the proximity of the property to urban areas and the hazards of smoke. A previous controlled burn at Asylum Lake was successful and proceeded
without problems. Burning near US 131, Drake Road or Parkview Avenue should be
done only during periods of calm winds and where wind direction will not impact
drivers. Indeed, in areas adjacent to major roads, mowing may be the most feasible
primary management tool.

Care should be taken when burning fields with shrub accumulation and higher fuel
loads. These burns are generally hotter and may result in undesired effects.

Mowing:
Mowing mimics natural disturbances, controls woody vegetation, reduces litter layer (if
cuttings are removed) and alters species composition.
- Mow in mid-summer after the nesting season to protect nest success and
  suppress warm season grass growth that benefits a few native forbs, flowering
  species and cool season grasses.
- Mow in dormant season of early spring or late fall to benefit most native forbs.
- Ideally vegetation should be allowed to re-grow prior to dormancy.

Glyphosate Application:
Applying glyphosate to control woody vegetation in grassland is extremely time-
consuming. The process involves cutting back vegetation prior to application by hand
over approximately a nine-month period.

Invasive Species Management Recommendations

There are a number of vascular plant species of special interest at Asylum Lake. Some
aggressive, exotic species (Table R) representing a threat to the local biodiversity
demand control measures. As a whole, the Asylum Lake property represents an area
worthy of preservation, but it needs some restoration and subsequent conservation.

No matter what species is considered for control and/or eradication, two points need to
be considered. First, the appropriate treatment depends on the particular situation.
Surrounding vegetation, degradation of the surrounding ecosystem, and proximity to
water and human habitation all weigh into a management decision. Second, it is more
useful to manage an invasive species using a system approach rather than simply a
species approach. “Aggressive plants are typically not a problem in a healthy, well-
managed system. Many exotic plants can be controlled...by restoring natural processes
such as fire and the natural hydrologic regime. Attempts to control problem species without
restoring such natural processes may offer merely short-term relief (Solecki 1997).” (Italics
added.)

In any case where herbicides are mentioned as a control method, they should only be
considered when all other viable options (i.e., burning, cutting, girdling, biological
control) have been exhausted or deemed ineffective. If used inappropriately, any
herbicide has the chance of detrimentally affecting wanted vegetation and hydrology at
Asylum Lake or downstream at Parkview Hills and beyond.
Restoration of the Asylum Lake Preserve offers an excellent opportunity to the university to conduct a controlled ecological study measuring baseline abundance for a number of plant and animal species and then determining the impact of management of exotic species on them. Plans for such a study should be developed as part of the overall restoration and management plan.

As indicated earlier in this report, invasive species, such as the honeysuckles, provide important food resources for fledglings and fall migrants. They also leaf early, providing roosting and feeding sites for spring migrants. Buckthorn provides extensive food resources during late fall and winter. Replacing these species and their attributes will not be easy, but it is necessary.

Buckthorn (*Rhamnus cathartica* and *R. frangula*) and honeysuckle (*Lonicera*, mostly *L. tatarica* and *L. mackii*)
- Burning has had mixed results, and may encourage growth.
- Resprouting can also be combated by repeated cutting within a season to drain the plant’s carbohydrate supply (Hoffman and Kearns 1998).
- Cutting and hand application of Glyphosate, only in highly degraded areas as determined on a case-by-case basis to discourage the vigorous resprouting Wetland environments plagued by buckthorn (although most buckthorn at Asylum Lake is in mesic-dry forests) can be improved by restoring original water levels.

Eradication of buckthorn and honeysuckle must coincide with replacement by native shrubs to fill the vacated niches. Some examples of native shrub species are spicebush (*Lindera benzoin*), American highbush cranberry (*Viburnum opulus* var. *americanum*), arrow-wood (*Viburnum dentatum*) and smooth shadbush (*Amelanchier* sp.).

Purple loosestrife
The ideal prevention for purple loosestrife is early detection and quick eradication. Purple loosestrife can form a monoculture quickly, and attempts to control it should be implemented immediately.
- Control by pulling with care to avoid leaving sproutable stem parts in the soil.
- Research has been done on the use of native and non-native herbivorous beetles as natural predators (Salatas 2000; Malecki, et al. 1993).
- Removing inflorescences is not recommended, because the plant may sprout more flowering stems.
- Spot application of Rodeo or Triclopyr (herbicides) is not recommended, especially near water.

Garlic mustard (*Alliaria petiolata*)
Persistence is the key with this biennial pest. The mat of vegetation its populations form grow and shrink in deceptive magnitude from year to year, but presence of even a few garlic mustard plants signals the need for prompt application of control methods. *Alliaria* can choke out perennial and ephemeral species and increase the cover of disturbance-adapted annual species by 6-10%.
• Cut close to the ground at the onset of or during flowering (to deter resprouting) or pull and discard in black plastic bags. Do not put into compost heap.
• Insect predators have been sought to deter garlic mustard. One ongoing study already has defined 17 insect species that feed only on *Alliaria* (Hinz and Gerber 1998).

**Multiflora rose** (*Rosa multiflora*)
The removal of multiflora rose will allow reestablishment of many plant species, large and small. Multiflora provides suitable nesting substrate and late winter food for wintering birds, but is otherwise deleterious.
• Mow or pull 3-6 times a year for 2-4 years. Fill mower tires with foam to avoid deflation from the many thorns of the rose, if appropriate.
• Cut and herbicide in the dormant season to avoid harming desirable surrounding vegetation.
• There is current research with a native virus, a beetle and a wasp.

**Spotted knapweed** (*Centaurea maculosa*)
Spotted knapweed is most effectively controlled by early detection, but where it exists at Asylum Lake, it is well established.
• Reduce by intense burns; more intense fires give better results.
• Biological control and herbicides have met with varied success (Hoffman and Kearns 1998).
• Use gloves when hand-pulling plants.

**Oriental bittersweet, wintercreeper** (*Euonymus fortunei*) and **periwinkle** (*Vinca minor*)
Oriental bittersweet, wintercreeper and periwinkle are three invasive vine species found at Asylum Lake. There is little or no information on the control of these species. The removal of these species seems likely to include a high degree of disturbance of surrounding soil and vegetation.

**Norway maple and black locust**
Although non-native species, these trees also provide wildlife values and are used intensively by some species.
• Control by girdling (not as effective with black locust) or by pulling smaller plants.
• Uproot young trees (e.g., the Weedwrench [Dunmore 2000] or Root Talon).
• A Triclopyr/mineral oil solution is most applied as a basal bark treatment, or to girdled or cut stumps (Hoffman and Kearns 1998).

In extreme cases it may be necessary to use a bulldozer, but only in highly degraded environments. This is an unlikely scenario for Asylum Lake. These trees may be considered lesser pests and left where they are, unless they are spreading into more sensitive areas.
The following organizations may be able to provide further information about control of invasive plant species.

Little Traverse Conservancy  
3264 Powell Rd.  
Harbor Springs, MI 49740  
(616) 347-0991  
Tbail@sunny.ncmc.cc.mi.us

Michigan Department of Natural Resources  
Plainwell Operations Service Center  
621 N. 10th St.  
Plainwell, MI 49080  
616-685-6851

Michigan Natural Areas Council  
5066 Elmhurst  
Royal Oak, MI 48073  
(313) 435-2070

The Nature Conservancy, Michigan Chapter  
2840 E. Grand River Ave., Suite #5  
East Lansing, MI 48823  
(517) 332-1741

Society for Ecological Restoration  
1207 Seminole Highway  
Madison, WI 53711  
(608) 262-9547  
ser@vms2.macc.wisc.edu

Southwest Michigan Land Conservancy  
6851 Sprinkle Road  
Portage, MI 49002-9708  
(616) 324-1600

Insects

Lepidoptera  
Butterflies and skippers require a complex system of microhabitats in which to feed, lay eggs and roost. Some caterpillars have host-plant limitations and all need safe areas to rest and pupate. Recommendations are as follows:  
• Maintain open areas. Some butterflies do well in forest clearings and edges, but most need the full-sun exposure of a field.
• Replace exotic plants with native vegetation. Native species provide better habitat in all respects. However, it is important to replace vegetation in sections, so that there is always usable habitat available.
• Burn or mow old fields in mosaic patterns to mimic naturally occurring fires. This will control exotic species, prevent shrub invasion and produce microhabitats.
• Limit on-site use of pesticides and herbicides. These toxins, besides affecting butterflies themselves, may bioaccumulate and be passed up the food chain.

**Odonata**

Dragonflies and damselflies require both emergent vegetation and open water as adults, while juveniles are purely aquatic and hunt primarily in the littoral zone. Recommendations are as follows:
• Prevent shoreline degradation, including erosion; prevent invasion and domination by exotic vegetation.
• Limit on-site use of pesticides and herbicides. Both juvenile and adult Odonata are predators and may bioaccumulate toxins and then pass them up the food chain to fish, birds, etc.
• Prohibit shoreline construction, such as a kayak/canoe launch. The relatively large stretch of undeveloped shoreline, perhaps the property’s most valuable and most fragile resource, is essential dragonfly habitat.
• Monitor water quality in a systematic manner. Tolerance levels differ among the various species of Odonata.

**Amphibians and Reptiles**

Recommendations for supporting reptile and amphibian populations involve enhancing current conditions, improving habitat quality and providing additional habitat.
• Improve or maintain existing habitat. This can include replacing exotic vegetation with native varieties, limiting use of pesticides and herbicides, and preventing degradation of shoreline. Standing snags and rotting logs should be left in place.
• Monitor water quality at least monthly. With companies moving into the Business, Technology and Research Park, local air and run-off pollution may increase above prior residential-area-only levels. Nearly all of these species are tied to the lake and its wetlands; any changes, good or bad, will affect them.
• Minimize traffic fatalities. Turtles searching for nesting areas are often hit by vehicles, and frogs disperse during rains with no regard for roads. Death rates can be lowered through the use of “animal tunnels” — underpasses and/or overpasses. This will become even more important when Parkview and Drake become four-lane boulevards. No tunnels should lead to the BTR park, unless they provide access to a wildlife haven or corridor.
• Survey populations regularly at appropriate times. Much of this can be done in cooperation with WMU faculty and classes. Frog species should be censused
during their breeding seasons (early spring, late spring, and early summer). Turtle species should be censused while basking. All herpetofauna should be searched for by "chance encounter."

- Control/manage raccoon (*Procyon lotor*) populations. Raccoons thrive in suburban areas, but their large populations also affect natural communities. They dig up turtle and snake eggs and catch frogs, in addition to competing for food resources such as berries and crayfish. Turtles in particular are vulnerable to this excess predation pressure. An abundance of raccoons will undo any herpetofauna restoration efforts.

**Fish**

A fish’s habitat, unlike that of most other animals, is strictly limited by the edges of the water. This leaves fish most vulnerable to habitat degradation.

- Prevent accelerated eutrophication due to fertilizer runoff. The decay of excessive plant growth decreases available oxygen, increasing the chances of fish die-offs in unfavorable weather. Simultaneously, the excessive plant growth decreases the amount of shoreline habitat suitable for egg-laying and fry.
- Limit on-site use of pesticides and herbicides. Fish may be directly affected by these toxins and can also bioaccumulate them and pass them up the food chain.
- Maintain a natural shoreline. Loss of protected shallow-water areas with appropriate vegetation density reduces survival rates of young fish.

Systematically monitor water quality. While different fish species tolerate different levels of pollutants, a combination of these factors with unfavorable weather could be fatal.

**Birds**

Bird surveys at Asylum Lake reveal the rich variety of avifauna present throughout the year, in terms of both species and individuals. These same surveys indicate that permanent residents are common, and short-distance and neotropical migrants are common during spring and autumn. The populations of breeding birds, especially neotropical migrants, are somewhat diminished. Based on the biological inventory, recreational birding would be an excellent use for the site, and maintaining and enhancing avian diversity should be a primary goal of the management plan.

Management of this resource depends on protecting the features that attract birds now, reducing negative human influences, and finding ways to enhance birds’ use of the site. Among the negative human influences are habitat fragmentation, road mortality, inappropriate intrusion, unleashed pets and non-point source pollution.

The open wetlands are one of the most important features of the site (Map 4). They consistently draw ducks, geese and other waterfowl to Asylum Lake from late February through much of December. It is one of the most easily accessible waterfowl viewing sites in the Kalamazoo area. Because it is closed to hunting, waterfowl watching is
especially good in the autumn when many other sites are disrupted by human
activities.

Controlling human access is a critical factor in managing for viewable wildlife like
waterfowl. The north shore of Asylum Lake is a relatively safe haven, and access to that
side of the lake should be discouraged. The ban on boats in the lake should be retained.
These actions will prevent disturbance of feeding and resting waterfowl. Protecting the
water quality of Asylum and Little Asylum lakes from non-point source pollution, such
as runoff from Drake Road and Parkview Avenue, should be a priority.

Waterfowl can be affected by pollutant levels in the aquatic habitats they frequent.
Concentrations of various synthetic nutrients and chemicals adversely affect water
quality and may change the aquatic vegetation structure in the lakes. Additionally, the
composition of tree and shrub species immediately adjacent to the water systems can be
affected by invasive species that predominate in parts of the preserve. These changes,
among other factors, affect seasonal food availability and cover opportunities, thereby
altering the composition of the waterfowl utilizing Asylum Lake, Little Asylum Lake
and their tributaries.

Water and wetlands also attract songbirds. Studies on the northern shore of Lake
Huron indicate that birds concentrate near water bodies during spring migration
because of the prevalence of flying insects that require water to complete their life
cycles (Ewert and Hamas 1996). Birds seek out the wooded buffers near lakes and
ponds where they find plentiful food, enabling them to store up energy to continue
their migration. Thus it is important to protect the wooded lake edges back to at least
150 feet.

A third feature of the Asylum Lake Preserve that enhances its value to birds is the
phenology of its plant communities. Many insect species time their emergence to
coincide with leaf-out of shrubs and trees. Asylum Lake has a good mix of plant species
from the early-leaﬁng species like honeysuckle and black cherry to late-leaﬁng oaks and
sassafras. As a result, there is usually a continuous insect hatch providing food for the
many neotropical migrants which forage on their way north. As restoration efforts get
underway, it is essential that native plantings include species with diverse (especially
early) leaf-out patterns.

The extensive inventory of fruiting trees and shrubs contributes signiﬁcantly to avian
abundance on the property. Ripe fruit develops on fruit-bearing shrubs and trees
beginning in midsummer. From then to midwinter a variety of ripe fruit is available.
This becomes especially important during winter when other food is less available.
Again, restoration efforts should focus on native plantings that provide food
throughout the year. Late winter is an especially critical time period for avian survival.

The closure of the Asylum Lake Preserve to vehicles (including non-motorized vehicles)
 enhances its value for birds. Decreasing the stress on birds and other wildlife permits
use by the larger avian species which otherwise might be driven from the grounds.
Trail placement and development should take into account the impacts of human intrusion on wildlife. There should be safe havens within the preserve. The network of trails need not blanket it, but rather should provide access to representative portions of the site. Portions of the forest should be without trails to allow larger bird species such as hawks and owls to rest with minimal disturbance.

This report recommends landscape improvements to enhance the various wildlife habitats on the property. Many of these changes will affect the available food and cover for bird species utilizing the property.

Implementation of recommendations to decrease edge will add large tracts of buffered forest for woodland nesting species. It will also decrease edge effect and Brown-headed Cowbird (*Molothrus ater*) parasitism common in highly fragmented landscapes.

Additionally, propagating an oak savanna system within areas of the preserve will dramatically alter the open areas of the Asylum Lake property. Burning these open areas to set back succession, replacing non-native trees with fire-resistant bur oak and planting grassland plants, forbs, and grasses form an ambitious project. The composition of bird species using the property will change drastically under this management approach, and it is important to monitor these changes as they occur.

Research on the property, geared toward defining the relationships of these species with the land cover changes, would be a great benefit to the field of restoration ecology. Point count surveys, nest monitoring and vegetation monitoring, including productivity and phenology, are some of the suggested areas of study.

Standing dead wood (snags) is an important resource in any forest system. At present, the forest has a substantial amount of dead wood and supports an extensive population of cavity nesting birds, notably woodpeckers. Plentiful dead standing wood should be retained.

The bluebird (*Sialia sialis*) nest box trail presently established in Old Field B should be expanded into the oak savanna and prairie of Old Field A and Farm Field A. Nest boxes would work effectively in the old fields west of Drake Road and north of Parkview Avenue.

Wildlife mortality along Drake Road and Parkview Avenue is mentioned elsewhere. However, birds deserve special consideration. Avoid placement of low-lying shrubby vegetation along the roadways. Such placement would encourage birds to forage and fly at heights within the range of traffic.

**Deer Management at Asylum Lake**

Any recommendation for a balanced ecosystem at Asylum Lake must include discussion of deer (*Odocoileus virginianus*) management. Although it is a thrill to see
these majestic animals, because of their adaptive and persistent nature, backyard deer soon go from neighbors to pests to pests. There is potential for overpopulation of deer in the Asylum Lake area as a result of habitat reduction associated with adjacent development and the absence of population controls. Inevitably overpopulation would lead to unhealthy deer more prone to disease. Population pressure creates competition for food sources and contributes to over-browsing and encroachment onto human landscapes. Overbrowsing by deer destroys valuable landscaping and greater deer numbers lead to an increase in car/deer collisions.

Also, there is a direct correlation between deer density and the composition of bird populations (McShea and Rappole 2000). Bird species respond to vegetation volume rather than directly to deer density, with most species responding positively to increased vegetation when deer are excluded from selected areas. In the McShea and Rappole study, the majority of bird species numbers increased following reduced deer density. Birds apparently are responding to annual changes in site condition and are particularly influenced by reduced heterogeneity. Information on the impact of deer browsing on ground-nesters is mixed, but McShea and Rappole indicate that increasing ground cover benefits ground-nesting birds. When the understory of woody shrubs has been removed, suitable nesting sites are lost for some species. This interspecific relationship between deer and birds can also be applied to other fauna and flora and is something to consider as more research is done on the Asylum Lake property.

Since Asylum Lake is within the city limits of Kalamazoo where no hunting is allowed, control of wildlife populations is a real challenge. Increasing traffic flow on the adjacent roads, Parkview Avenue and Drake Road, and the reconstruction of both of these thoroughfares, as well as the proximity to major highways, US 131 and Interstate 94, pose hazards to both wildlife and human travelers. Deer population control is a highly emotional issue, with many active advocates, both pro and con.

Three general approaches can be taken, alone or in combination, to control or manage wildlife populations: (1) manage the wildlife, (2) manage the resource or (3) install a barrier between the wildlife and the resource. In many cases, the third approach is cost prohibitive, and other procedures are more attractive. Recommendations for Asylum Lake include:

- Continually monitor the deer population at Asylum Lake, mapping evidence and movements.
- Periodically survey deer numbers and impacts in adjacent areas such as Parkview Hills and the Lee Baker Farm.
- Map the movement patterns of deer in the southwest quadrant of the city.
- Use Michigan Department of Natural Resources information to determine the carrying capacity for Asylum Lake and adjacent properties.
- Explore methods to control population at desired carrying capacity.
- Choose the most appropriate method for an urban environment.
- Carry out chosen population control plan.
• Consider fencing and wildlife corridors, using underpasses or overpasses, to promote human and wildlife safety.

Managing this urban deer population will be a continuing challenge, but deer, other wildlife and human populations all will benefit from a proactive approach to deer management at Asylum Lake.

Potential Archaeological Sites

Dr. Michael Nassaney (personal communication 1999) of WMU’s Anthropology Department recommends that an archaeological survey of the area be done before any construction or other earth disturbance occurs. Potentials for this property, along with the Business, Technology and Research Park(BTR) site and Colony Farm Orchard, include native American activity an African-American homestead, the Lee Baker Farm complex and the Asylum itself.

Coordination with Parkview Hills

Part of the value of the Asylum Lake property lies in its proximity to the open lands remaining on WMU’s Lee Baker Farm and Colony Farm Orchard properties and the Parkview Hills complex. These areas can be considered together for many management decisions, especially since they share a watershed. The Asylum Lake property is immediately upstream of Parkview; therefore, any action that affects the hydrology of Asylum will go on to affect Parkview. The two properties are not contiguous. Parkview Avenue divides them, even where their borders overlap for a short distance. For that reason, the new engineering college and the BTR should be included in any landscape-level management discussions.

From a bird’s-eye view, the only real distinction between the Parkview and Asylum Lake properties is one of habitat. Parkview Hills has little or no grassland-type open areas left, but it has an abundance of relatively healthy forestlands. Asylum Lake has both grasslands and forests, although the exact nature and proportions could change, depending on which management recommendations are followed. The BTR is still under construction, presenting an excellent opportunity to build in ecologically sound landscaping and run-off control techniques. (For example, a plot of land planted with prairie grasses absorbs five times more rain than one with turf grass. Natural plantings need little maintenance or chemical assistance.) However, at the moment, there’s not much to attract any sort of animal to the site. Asylum and Parkview have flowing water and associated wetlands, but the BTR Park is dry. Open waters created as part of the BTR stormwater management plan will provide additional habitats.

Large or mobile animals will have little difficulty in going from one area to another, depending on the traffic on Parkview Avenue. If the avenue is reconstructed to carry more traffic to the engineering college, business park and residences to the west, animal “by-passes” should also be constructed. For example, the drainage system that passes under the road could be enlarged into a tunnel, allowing any animal following the
watercourse to avoid the dangers of traffic. Habitat corridors should connect the areas to allow for interchange between the populations, thus keeping them genetically viable. This is most important for animals such as frogs and turtles, but also applies to birds and larger mammals like foxes.

Following the axiom that a diverse habitat supports a diverse fauna, the managers of the Asylum Lake property should carefully consider the existing habitat at Parkview and the projected habitat in the engineering college and business park. Grassland species are in serious decline due to loss of habitat, so that might come into consideration as well. Once goals are set at the landscape level, managing individual properties becomes easier. Therefore it is important that the managers of the Asylum Lake property work with Parkview Hills in developing management approaches for the whole area. Removal of invasive exotics is also easier if adjacent areas coordinate their efforts. However, the wetlands should be maintained, protected, and improved regardless of what is done on nearby properties.