

EXISTING CONDITIONS FOR 'STAND 1. MIXED HARDWOOD-CONIFER'

Land area: 4.97 Acres

Land use history: The size and density of trees indicates that this has been a forest for approximately the last 100 years. The stand has been part of the greenbelt or buffer around the lake since the buffer was designated in the mid-1950's.

Forest Type:

- Existing: Southern Dry-Mesic Oak (Oak-Mixed Hardwood)
- Potential: Same

Successional trend: This is at present a very cosmopolitan forest stand. Of the trees sampled at 3 plot locations in this stand, pole-size, small, medium and large sawlog size^ Norway spruce*, Norway maple* and Scots pine* made up an estimated 65 percent of the basal area of the stand. Medium sawlog size Douglas fir accounted for another 3 percent of basal area. So native trees, including pole and sawlog size white ash, and sawlog size black cherry, white and red pines, red oak, and black walnut comprised just 32 percent of the basal area. Most of the understory saplings noted were Norway maple and black cherry. Young white oak, Norway maple, white ash, redbud and glossy buckthorn* were noted near Plot 2. The forest understory included white oak, Norway maple, black cherry, white ash, Douglas fir*, glossy buckthorn*, forsythia*, non-native honeysuckle* and wild grape. Ground vegetation included blackberry, black and red raspberries, Virginia creeper, English ivy*, dame's rocket*, enchanter's nightshade, yellow wood-sorrel, fragrant bedstraw, common burdock*, motherwort*, Pennsylvania sedge and pokeweed.

^(US Forest Service tree diameter at breast height - DBH - used are: saplings 1-4.9 inches dbh; poles 5-11.4 inches dbh; small sawlogs 11.5-17.4 inches dbh; medium sawlogs 17.5-23.9 inches dbh; large sawlogs 24 inches dbh and larger).

Forest health: Most trees in this stand appear to be in good health, with no significant insect or disease problems found during forest inventory fieldwork, except the gradual onset of demise of ash trees from emerald ash borer.

Site quality: Site index was 67 for red pine, which is above average. This forest appears to be a good site for growing red pines, Norway maples, Norway spruce, and black cherry.

Approximate age:	108	Size Class:	Medium to Large Sawlogs (17.5" +)
Trees per acre:	100	Mean Stand Diameter:	17.2 in.
Basal Area (BA):	97	Acceptable BA:	60-80
Growth Rate:	%	Timber Quality:	medium

Stocking: Estimated basal area of 97 square feet per acre with an estimate of one 100 trees per acre indicates a stocking level of just under 80 percent. This stand would be considered fully stocked at between 60 and 100 percent stocking, or between 75 and 128 square feet of basal area per acre. This is the range of density or stocking where trees can fully utilize the site¹. Basal area is a convenient method by which foresters estimate both size and density of trees.

It represents the sum of the cross-sectional area of each of the tree trunks in the acre being sampled, measured at breast height (4 1/2 feet above the ground), and expressed in square feet per acre. Both root competition and crown size are related to the cross-sectional area of a tree, so it gives a ready check on competition for light, moisture and mineral nutrients. Basal area is easier to measure and use than the number of trees per acre. For example, 70 square feet of basal area per acre could contain 350 to 470 trees per acre, depending on tree diameter². Relative stand density is estimated at 46 percent of the average maximum stocking expected in undisturbed stands of similar size and species composition, below optimum for best individual tree growth. This stand is considered in the low range of being fully stocked with trees, most of which have not reached the recommended rotation (harvest) size (24-28 inch dbh)¹ and age (e.g. 90-120 years for oaks, 70-90 years for black cherry)⁵.

Stand volume: 11044 net board feet (International 4 inch log rule) per acre
(7180 net board feet per acre by Doyle log rule)

Habitat and wildlife use: Acorns are a major source of hard mast for deer, turkeys, blue jays and many other animals, and the seeds in pine, spruce and fir cones are vital to squirrel and mouse populations³. Cherries, wild grapes, raspberries and Virginia creeper provide soft mast, seeds or foliage for small birds, deer, rabbits, turkeys, ruffed grouse (partridge) and other animals from late summer through winter⁴.

Mature upland deciduous and especially mixed deciduous/coniferous forests also provide multiple vertical layers of varied habitats for a wide array of wildlife species populating every layer, from salamanders, centipedes, squirrels and fox sparrows at the ground layer to warblers, squirrels and broad-winged hawks in the high canopy. Old standing dead trees (snags) or live cavity trees provide food, cover and nesting opportunities for many woodpeckers, owls, wood ducks, flying squirrels, raccoons, nuthatches and other tree dwellers⁸.

Establish a mind-set and practice of protecting the following nesting shelters within the greenbelt, the Tipsico Lake Road wetland, and your own properties, at Dunham Lake or elsewhere:⁶

- any living trees with cavities or dens for wildlife
- dead snags, important for perching, food, and cavities
- fallen logs and large branches, important habitats for salamanders, centipedes, beetles and other species
- Dens dug in the ground, with a buffer of natural vegetation around them

Obviously as managers of parks used by many people, especially in this narrow, linear park that is the greenbelt, you must remove or bring to a horizontal position at least the most obvious hazard trees within reach of the trails and the beach parks. Trail maintenance on national, state and many municipal lands has changed to the point that large down trees and logs need only have a wide enough section cut out to allow unobstructed passage along the trail, the width determined by the intended uses of the trail. It is no longer necessary to completely remove entire large trees from the trail corridor. Once the trail is made passable again, the remainder of the tree is left for salamanders and their friends (and food).

The following habitat features help provide the basic necessities of food, water, shelter and space, and should be protected whenever possible:

- any surface-water features, such as streams, ponds and wetlands, including ephemeral (vernal) wetlands that are present in the spring but dried up by fall, all critical frog habitats
- any natural corridors of vegetation, such as fencerows or buffers along streams or lakes - the wider the better
- stands of coniferous trees that provide shelter for mammals, such as deer, and large and small birds such as wild turkeys, grouse, saw-whet owls and pine siskins, during severe weather and the winter months

Lower areas along the lake shore are important habitats for frogs, turtles, some snake species, salamanders, crayfish and others. The shore is certainly visited many times per day and night by deer, raccoons, fox, rabbits and other wildlife coming to drink, and by mink, weasels, skunks and maybe otters to hunt. One very important function of the greenbelt along this lake is that of a travel corridor for wildlife, who move undisturbed from forest, field and wetland patches to other patches, mostly at night. The greenbelt trails seem to be well used by humans, many with dogs, during all daylight hours, so wild animals that travel on the ground mostly avoid the area during the days.

Important autumn foods for deer, wild turkeys, waterfowl, raccoons, possums, squirrels, mice, woodpeckers, crows and some smaller birds include acorns, beech nuts, crabapples, and agricultural crops such as corn and soybeans. Of these, your community can provide crabapples and apples within the beach access parks and on private residential lots, and acorns, hickories and other nuts in most of the forest stands. Because of beech bark disease, it may not be feasible to try to develop beech as a new component in your forest. You could gradually increase the numbers of oak, hickory, black walnut and butternut trees in this forested buffer by planting seedlings, and protecting them from browsing by deer. To maintain acorn production at approximately 100 pounds per acre, you need to maintain about 50 square feet of oak basal area per acre⁹. This would mean keeping about 28 trees of 18 inch dbh size per acre, or 64 trees of 12 inch dbh, or 113 trees of 9 inch dbh per acre. Most likely it would mean keeping a combination of sizes to equal the needed 50 square feet basal area per acre. This condition already exists in Stand 2, and Stands 11 and 12 are close to having that density of acorn-producing oaks.

Normally in a larger forest stand it could be beneficial to create a couple of 1/2 acre openings, or perhaps 3 or 4 - 1/4 to 1/3 acre openings for each ten acres of forest. Creating herbaceous openings or clearings is probably not needed in this situation, due to the narrow width of this greenbelt.

Recreational opportunities: The current system of trails through this stand and the entire greenbelt allows the residents of Dunham Lake to make use of this linear forest park for hiking or fitness walks, bicycling, wildlife viewing, skiing/snowshoeing and above all, walking dogs. They may be enough to provide access for any future timber and smaller vegetation management activities such as invasive species control, removal of dead or down trees as firewood, or controlled burns.

With such an extensive system of trails it is best to number or letter each trail intersection and use trail logs to evaluate the condition of each segment of trail, including stairs and boardwalks. This is quite helpful when planning for annual trail maintenance. There are trail logs and some trail evaluation and maintenance information in the Trails appendix.

Potential for timber production: This stand is considered a southern dry-mesic deciduous (oak-mixed hardwood) forest, typical of well-drained, moderately fertile glacial end moraines, kames, eskers, and till plains with hilly or rolling topography³. The large numbers of non-native trees that were planted, or grew on their own, in this stand have certainly modified the stand from a typical oak-mixed hardwoods stand. The importance of this forest type for timber and wildlife habitat can hardly be overstated. Oaks - particularly red and white oaks - black cherry and black walnut are among our finest and most valuable hardwoods. Timber harvest is stated as one of your association's goals only for the purposes of wildlife habitat improvement and recreational development. The only timber harvest recommended at this time for this stand is the gradual or focused removal of Norway maples, and possibly the thinning in small patches of Norway spruce, to allow more room for oaks, hickories, walnuts, and white and red pines to develop. Oak-hickory management will be more suited to Stands 2, 11 and 12, which already have significant oak components.

There has been great reluctance among some residents to remove most or all of the larger, older Norway maple trees because they are a major component of the overall forest canopy, which taken as a whole is very attractive. Some may even appreciate the deep burgundy colors of Norway maple leaves in the fall, which is one of their attractive qualities which convinced people to plant them on this continent years ago. Like many non-native species, however, Norway maples often out-compete the native trees and displace them in the landscape. Together as a genus maple buds, flowers, seeds, twigs and bark have been found to be used as a food source by 33 wildlife species⁴. By comparison various parts of oaks were found in the diets of 96 wildlife species, while hickories, willows, birches, hazelnuts, aspens and walnuts were used by 25, 25, 24, 23, 28 and 7 wildlife species, respectively. Replacing the invasive Norway maples over time with oaks and other native trees will not detract from available wildlife food sources. Delaying removal of Norway maples will only make the task more and more difficult, because like buckthorns, autumn olive and non-native honeysuckles, they are very prolific and successful at colonizing many habitats.

Numbers of trees per acre in this stand indicate a relatively uneven-aged distribution, with many young trees and fewer of each size class until there are only a few of the largest trees⁶. This first graph below gives the estimated trees per acre from sample plots in the stand. Compare this graph with that shown for even-aged and uneven-aged stands from *The Woodlot Management Handbook*⁶, by Hiltz and Mitchell, reproduced below. This graph of Stand 1 most closely resembles the authors' graph for an uneven-aged forest. Note also that presenting tree numbers per acre by size in this format allows one to quickly see how the different species compare in size categories and proportions of those categories. For good long-term management of a hardwood forest, the authors recommend working toward uneven-aged management. Most landowners I work with want periodic timber harvest income as well as wildlife habitat improvements, water and soil protection, and wetland and stream protection as goals for their forested lands. I usually provide them with a copy of chapter 6 from this book on Timber and Firewood Harvest. Some of those recommendations about firewood harvest may help your community in dealing with Norway maple removal, but chapter 5 in this book, Environmental Sustainability and Habitat Conservation, has much more information appropriate to your goals. I recommend you purchase a few copies of the book and as a group make use of much of the information in it in for managing the greenbelt.

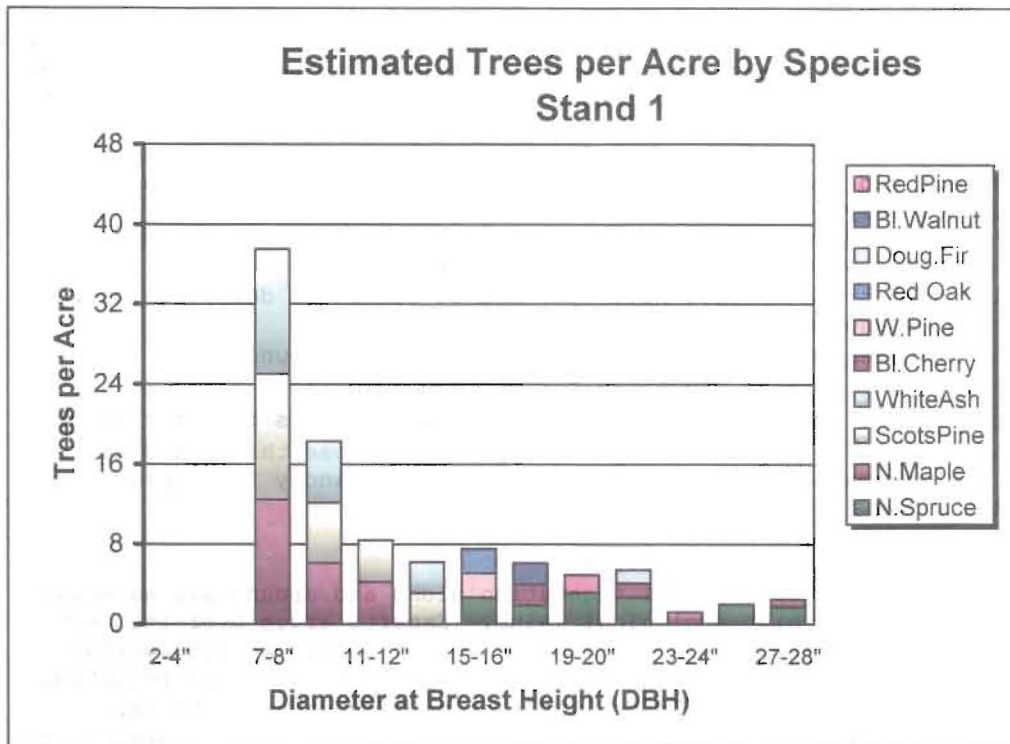
Hilts and Mitchell list indicators of old-growth forest⁶ (page 66). Those that apply to your greenbelt forest are: numerous large trees, greater than 20 inch dbh; and plentiful spring flowering plants. An important characteristic that does not apply is a large size, a minimum of 185 acres needed for forest-interior birds and much larger acreage for large mammals. In chapter 5 they state: to protect and restore old-growth features representing undisturbed forests, you need only leave your woodland alone for a century or two. Given that we are not around for that length of time, some specific management options you should consider include the following:

- allowing dead trees to fall naturally and to remain as decaying logs, forming pits and mounds where they fall
- leaving branches and fallen debris to decay on the ground
- protecting cavity trees and snags for nesting wildlife
- protecting mast trees such as oak, beech, and cherry as food for wildlife
- leaving very large trees and supercanopy trees (those that stand well above the general canopy) in your woodland; supercanopy trees provide roosting sites for hawks and other birds of prey

Further recommendations in this chapter:

- Buffers of undisturbed natural vegetation along and around all waterways or wetlands are of high ecological value. Experts argue over the best width of such buffers, but a minimum of 50 feet should be considered. On steep or unstable slopes, a buffer to the top of the slope is required.
- In these buffers there should be little or no harvesting of trees, no skidding trails, or road construction. No heavy equipment should be used that would lead to erosion of soil, resulting in sediments entering a stream.
- Some drainage features, such as springs, seepage zones, and some wetlands, dry out later in the summer season. This does not mean they should not be protected. In determining areas to protect, walk your woodland in early spring to make note of all wet areas. These are the areas you should protect from disturbance.
- Any site with bare, eroding soil should be protected from further disturbance, and if necessary, rehabilitated with natural vegetation. This is particularly true for areas along watercourses, where eroding sediment can enter the stream, destroying aquatic life, including fish habitats.
- Steep slopes tend to erode most easily, especially if they are composed of erodable soil types. Such slopes should be left in forest cover, with no access by heavy equipment and no attempts to build roads across them.



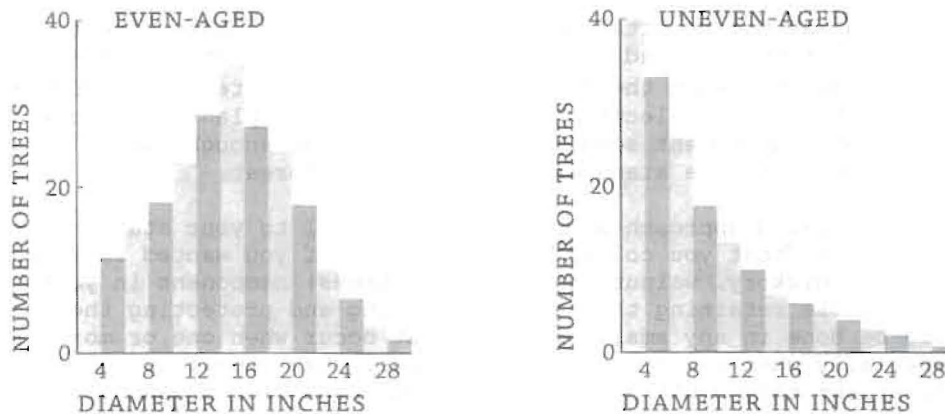


Choosing a silvicultural system to regenerate oak-hickory stands depends on the amount and sources of advance oak reproduction already present in the stand. In my inventory of Stand 1 there were white oak seedlings in 1 of the 3 sample plots, and no red oak or hickory seedlings or saplings noted. Black cherry was found in 1 plot, and Norway maple seedlings and saplings were found in all 3 sample plots. So there was very little advance reproduction of oaks. Besides saplings already present, oak reproduction can come from stump sprouts after harvest, from acorns of the current year or those buried in caches by squirrels and forgotten, or from seedlings planted by the landowner before or after harvest of the overstory.



Views from the north end of the upper trail in Stand 1.

THE WOODLOT MANAGEMENT HANDBOOK



Even-aged and uneven-aged forest stands: Uneven-aged stands tend to have a large number of smaller trees, and fewer numbers of larger trees, as shown in the right graph; even-aged stands tend to have a predominance of trees clustered around a few middle-aged size classes, as shown on the left. (Numbers conceptual only.)

Source: adapted from P. Williams and S. Pease. *An introduction to Farm Forestry*. Guelph, ON: Dept. of Environmental Biology, University of Guelph, 1993.

The most common silvicultural system recommended to regenerate oak-hickory stands with too little advance regeneration to adequately replace the stand is called the shelterwood method. In this several-step system first the unwanted understory trees and shrubs that will compete with small oaks are cut or killed up to 2 inches dbh; the overstory is thinned to about 70 percent stocking (in this case about 90 square feet per acre basal area), leaving the best dominant and codominant trees as uniformly spaced as possible, while killing all unmerchantable trees larger than 2 inches dbh; oak and hickory seedling establishment and growth are monitored, and additional light overstory cuts are made if needed, controlling the understory again if unwanted trees are again restricting growth of oak regeneration; and when a survey shows the regeneration potential of the oak regeneration (saplings plus potential stump sprouts) is adequate to replace the stand, the remaining overstory trees are removed in one cut⁷. The time required to get oaks established and let them grow to adequate size will probably be 20 years or more. The shelterwood system is the best known method for assuring oak regeneration in a forest while providing for income from two or more harvests. One major drawback is that the aesthetically pleasing and wildlife food- and shelter-producing forest canopy is suddenly removed in the final overstory harvest, leaving landowner and wildlife with a young stand of uniform age.

Group selection, removing small groups of overstory trees, can be used to reproduce oaks satisfactorily. Groups must be kept small, with the diameter of a circular opening not exceeding 1-2 times the height of the dominant trees.

Evaluate the potential of the oak advance reproduction to fill each opening created by group cutting. If the oak advance reproduction is adequate, harvest all merchantable trees in the group, and cut or kill all remaining culls (unmerchantable trees) and trees larger than 2 inches dbh in the group space. If oak advance reproduction is not adequate to fill the opening, follow the procedure for the shelterwood method where the openings will be located. The 70 percent stocking may not be attainable in small groups so take care to leave seed-producing oaks in the planned openings. Removing lower-story competition may allow enough light to reach the forest floor to regenerate oaks⁷. Either the shelterwood or the group selection methods may require planting of oak and hickory seedlings and subsequent seedling care to provide enough oak regeneration to perpetuate the stand as an oak-hickory forest.

Obviously the shelterwood approach would be antithetical to your stated goals for this linear forest that you collectively manage. If you wanted to increase the hard mast (oak, hickory, walnut and other nut trees) component in your greenbelt stands while retaining the canopy, planting and protecting these seedlings could be done in any small openings that occur when one or more trees come down, especially when you remove Norway maples. Oak seedlings need sunlight to flourish; they don't grow well in shade of a closed canopy.

Potential for other uses: Starting this current school year your group of stewards could make arrangements with science or ecology/biology teachers and administrators of local middle schools and high schools, or Scout troops, to bring groups of students or Scouts to the greenbelt for field trips periodically. Those students most interested in biology and ecology could then come back at scheduled times to assist with some of the tasks you want to accomplish, including some monitoring for invasive plants and for frogs, salamanders and other smaller animals. Scouts could also work on some of their nature-oriented merit badges there. You all may already be doing these kinds of connective, inclusive activities.

Water quality issues: With nearly all of the greenbelt adjacent and mostly uphill from the lake, it is very important to limit or eliminate the use of pesticides and fertilizers on the lawns uphill from the lake. Perhaps this could be accomplished by a vote on a proposal, but it will be more likely to succeed with most adjacent neighbors of the greenbelt through educating people of the need and benefits of keeping such pollutants from washing into the lake with rain or snowmelt. I believe your greenbelt group has been active in this education effort for some time.

Important natural features: Besides the lake, the rolling hilly topography with moist, rich loamy soils is the most important natural feature of this stand. The uneven terrain probably kept the stand from being cleared for farming, and the rich soil is the reason the site can grow such high quality trees.

MANAGEMENT PLANS FOR 'STAND 1. MIXED HARDWOOD-CONIFER'

Landowners' objectives for this stand: Manage the hardwood forest sustainably for forest health, recreation, and wildlife habitat. Maintain trail system within the forest for recreation and very limited timber management. Control non-native invasive plant species.

Silvicultural Prescription:

Recommended silvicultural system: Uneven-aged management, favoring oaks, hickories, walnuts, white and red pines and black cherry, working toward a modified old-growth management approach that includes reproduction of mast trees.

Details of the silvicultural prescription: Small group selection of Norway maples over time with even smaller openings than recommended can be used to increase the component of oaks and other mast trees while preserving a relatively intact forest canopy. Recommend girdling about 1/4 of the larger maples and removing 1/4 of the smaller trees, with herbicide treatment of stumps, every two to three years. Allow them to die in place, and market them over the following year to a firewood provider. This approach might ease the residents into the gradual removal of these highly invasive trees, without drastically altering the canopy all at once. This will require planting of oak, hickory and walnut seedlings in small open spots, and removal of competing trees, especially unmerchantable trees and/or unwanted species, while leaving most snags and den trees standing, and logs on the forest floor.

PLANNED ACTIVITIES:

2013: Prepare for removal of Norway maples. Evaluate oak regeneration, current and potential. Remove any potential hazard trees along the trail system.
Priority: 1

2014: Carry out Norway maple removal, by allowing a firewood provider to take them. Be sure to have a comprehensive timber sale contract, preferably with the help of a consulting forester.
Construct brush piles for wildlife with branches from harvest.
Evaluate presence of non-native invasive plants in this stand. Divide stand into 6-8 zones, plan to remove invasive plants in two zones per year.
Priority: 2

2015: Evaluate oak regeneration. If regeneration is not adequate, plan and prepare for planting either this year or next. Consider thinning the Norway spruce in very small patches. Use the poles for construction projects within the greenbelt, or for dock or boardwalk materials, employing a portable sawmill operator.
Begin removal of invasive plants.
Priority: 4

2016: Plant oak and hickory seedlings in relatively open canopy areas of this stand, especially where spruce were thinned. Build and install nest boxes and platforms for flickers, owls, squirrels, even raccoons if interested. Make a record book showing each numbered structure, with location, description and maintenance and repair activities over time.
Continue invasive plant removal.
Priority: 3

2017: Evaluate soil erosion on slopes. Map any erosion problem locations, make plans to repair eroded areas and prevent further erosion with placement of structures and dense ground cover plantings.
Continue invasive plant control.
Priority: 3

2018: Evaluate condition of trails through this stand and the remainder of the Livingston portion of the greenbelt. Plan for repairs and improvements over the next two years. Monitor condition and nesting success of any nest boxes, roosting boxes or platforms. Make necessary repairs, record activities and results.

Continue invasive plant control.

Priority: 4

2019: Evaluate oak regeneration, plan for and carry out any needed planting or seeding. Continue invasive plant control.

Priority: 3

2020: Carry out trail improvements or repairs.

Finish invasive plant control.

Priority: 2

2021: Evaluate and make any repairs to nest boxes and platforms.

Evaluate oak-hickory regeneration from plantings.

Resurvey zones for invasive plant return.

Priority 3

2022: Evaluate erosion along areas of the slope as well as the shoreline. Plan to repair any damage found over the next two years.

Priority: 4

(Note: when considering the continual vigilance and effort to remove unwanted non-native plants, especially those that are highly effective in colonizing land and displacing more desirable native plants, remember that there are invasives and then there are INVASIVES!! That is, not all non-native plants are an equal threat (how many of you lie awake at night worrying about mullein or Queen Anne's lace?). Several stands in this greenbelt have the non-native ground covers known as myrtle or periwinkle, and/or English ivy, covering areas of the hillsides. With slopes, the first priority is that they have some fairly dense groundcover to hold the soil in place and deflect raindrops during heavy rain events. Where periwinkle and/or English ivy have colonized a hillside, that is something to be grateful for because there probably were some areas of exposed soil that needed vegetation to protect them. These foreigners can be allowed to hold that soil in place for now, functioning somewhat like nursemaids for the present, while your group can focus your limited resources and time on the more serious invasive threats that continually present themselves in the greenbelt. In several years, when your efforts have succeeded in getting the really serious invasives under control, and you can relax a little, then you can collectively decide how to replace those herbaceous groundcovers with native groundcover plants that you would prefer. As you formulate your plan and begin to implement it, be sure to thank the myrtles and English ivy for holding the hillside soils in place while you tended to more serious invasives. Also be sure you each know exactly what poison ivy (a native plant) looks like so you avoid grabbing hold of it while intending to pull out the others. By the way, poison ivy is commonly considered in Native American philosophy to be the chief of the warrior plants, whose function is to keep humans out of really disturbed areas of land until those areas can heal.