SAGINAW FOREST MANAGEMENT PLAN

For the School of Natural Resources and Environment

University of Michigan

Summer 2009

By Lawrence Arbor Care
and
The Johnson Hill Land Ethics Studio

INTRODUCTION

Saginaw Forest is an 80-acre tract of land including approximately 55 acres of plantation, an 11 acre lake, 6 acres of wetlands and roughly 8 acres of secondary forest and open areas. It is located 3 miles from the University of Michigan on West Liberty Road, west of Ann Arbor. The forest is significant to the School of Natural Resources and Environment (SNRE) because the donation of the land is tied to the origins of the School over 100 years ago, and has been a significant part of students' academic experiences ever since.

In 2008, the SNRE began a process for developing a management plan for the property. Following a vision session by the Saginaw Forest Management Advisory Committee, requests were put forth to consulting foresters for input on developing a management plan for the future use of the woods and property. The Advisory Committee sought a long term vision for Saginaw Forest, a vision that encompassed the diverse uses that the forest has historically provided and also one that placed strong emphasis on the framework that the school has well established: stewardship and sustainability. The desire to make the site available to a greater number of users (K-12 school groups, recreational users, and outside groups or organizations who are looking for outdoor space to gather and learn), while continuing to provide educational and research opportunities to University students and faculty, required an in depth analysis of site opportunities and constraints. Although the primary focus of the project was initially forest management, the large number of site issues proved to be better suited for a team of consultants who could address the site issues as well. Therefore, in December 2008, the Johnson Hill Land Ethics Studio/Lawrence Arbor Care team was hired to create a forest management plan.

BRIEF HISTORY OF SAGINAW FOREST

Early field day at the Saginaw Forestry Farm

The Department of Forestry (at that time located in the College of Literature, Science, and Arts) was established in 1903. One of the early needs of the Department was an area for research and teaching. University Regent Arthur Hill, from Saginaw, deeded 80 acres of property to the Department with the stipulation that it be used as a demonstration and experimental area for forestry and named it the "Saginaw Forestry Farm." Hill's deed specifically carries the phrase "… to determine what species of trees can be used to replant the worn out farmlands of Michigan." The name was changed to "Saginaw Forest" in 1919. As of the mid 1950s, many older residents of Ann Arbor still referred to it as the "Forestry Farm" (Dana, 1953).

At the time of deeding, almost all the land had been cleared of trees and used for agriculture. However, some small areas of secondary growth oak and hickory existed on steeper slopes, and the wetlands around the lake contained a good growth of elm, aspen, willow, and red and silver maples. The land had been rented for farming before it was deeded to the University, and Young (1928) notes that the soil had deteriorated under these practices and was in poor condition.

Steeper slopes were badly washed and numerous eroding gullies had been formed (Young, 1928).

Third Sister Lake

Campfire area

Caretakers cabin

Third Sister Lake was originally designated as a potential source for potable drinking water for Ann Arbor (Weld, 1904).

Planting started in 1904 on the poorer soils and continued until 1915 when most of the area was covered. Forty species, of which 28 were not native to southeastern Michigan and 10 were not even native to the U.S., were planted on 55 acres (Dana, 1953, Young, 1928). It is worth noting that some of the land on better soils was still under lease for farming purposes until 1915 (Young, 1928). Those not planted have also reverted to forested cover over time.

SNRE's annual campfire occurred in the fall and a weekend long "field day" took place in the spring for many years. The fall campfire continues to be an annual event for current students and an opportunity for alumni to join with current students and faculty as part of homecoming weekend.

When the land was deeded, an old barn stood on the southeastern corner of the property. In 1914, the frame of this structure was sold to a neighboring farmer. In 1915, it was decided that some sort of shelter was needed for tools, work crews, and classes, so the stone cabin (existing on the site today) was built. Unfortunately, the need of a caretaker's residence was not foreseen. Initial plans for the building were drawn by Professor Beverly Robinson of the Department of Architecture. A separate storage building was built in 1947 and this building still exists today. Today the original stone cabin is the caretaker residence, occupied by an SNRE graduate student.

By the late 20th century, the agricultural land that has surrounded Saginaw Forest has gradually given way to a variety of more urban development and construction, especially on the land bordering Saginaw Forest to the east (Hammer, 1995).

1,4 Dioxane was found in Third Sister Lake and the small intermittent creek that feeds it starting in 1984-1985. It is likely that 1,4 dioxane had been present there for several years, perhaps since 1966 when the Gelman Corporation started generating waste that included this byproduct (an industrial solvent used to make medical filters). Samples taken in 1986 from the caretaker's well and Third Sister Lake found 1,4 dioxane levels to be nearly 20 times the legal limit for drinking water and nearly at the legal limit for bodily contact (Englebert et al., 1988).

Today, the caretaker's well is no longer used for drinking water. Although water no longer enters Third Sister Lake from the Pall Life Sciences facility, and therefore the 1,4 dioxane levels should be greatly decreased from when it was sampled in 1988, further research is needed to determine the impact of this contaminant on the lake ecosystem.

Pall Life Sciences

In 1996, the Gelman Corporation merged with Pall Life Sciences and it is Pall Life Sciences that now owns much of the property located on the north and east side of the Saginaw Forest.

More recently, salt input from increasing urban development may have affected the stability of Third Sister Lake (Bridgeman et al., 2000, Hammer and Stoemer, 1997, Judd et al., 2005. In the late 1980s, a zooplankton predator, *Leptodora kindtii* was accidentally introduced into Third Sister Lake (McNaught et al., 2004).

SITE LOCATION AND CONTEXT

BASE INFORMATION AND BACKGROUND RESEARCH

Meetings and Interviews

Background research began with interviews of two key individuals: Lori Kumler, a caretaker who lived at Saginaw Forest for a number of years and Michael Wagman, a graduate student and member of the Saginaw Forest Management Advisory Committee. Ms. Kumler provided information on observed usage of the Forest: types of users, types of use, rates of use, and historical insights based upon her observations. Mr. Wagman shared his work analyzing aerial photography to document vegetation changes over time (approximately 5 decades), or since the last observations with regards to plantings. He also made available a number of documents that recorded planting history and maintenance.

Interviews were also conducted with a short list of faculty members affiliated with terrestrial and aquatic teaching and research at the SNRE to record their insights pertaining to teaching and research opportunities at the site. These faculty members provided very valuable information regarding current and anticipated levels of use in the Forest for purposes of teaching and research.

In addition, the project team met with a public school representative, adjacent business representatives, emeritus faculty members, and representatives from the City of Ann Arbor Parks and Recreation Department.

Hazardous Tree Survey

First Priority hazardous trees

Numerous dead or over-mature trees are located throughout Saginaw Forest. For the purposes of this report however, only the dead or over-mature trees that pose a potential risk to the public if they were to fall were evaluated. A hazard exists if the structural integrity of a tree is compromised in some fashion and if there is potential for a person to be struck if this tree, or any part of this tree, were to fail. A significant number of hazardous trees were identified that are located within falling distance of the maintained pathway system.

The hazardous trees were ranked relative to their degree of hazard. The criteria used to prioritize the hazardous trees were as follows:

- First Priority: large (> 12” DBH) dead trees leaning toward the path within falling distance.
- Second Priority: large (> 12” DBH) dead trees within falling distance of path or large trees with large deadwood (> 5 inch diam.) within falling distance of path.
- Third Priority: large trees with significant large deadwood (>3” diam. but < 5” diam.) within falling distance of path and smaller dead trees (< 12” DBH) within falling distance of path.

Each of the maintained paths on the property was surveyed relative to the proximity of hazardous trees. A total of 445 trees were identified as being hazardous to some degree. Fifty nine were listed as First Priority while 194 and 193 were listed as Second and Third Priority, respectively.

Pine trees comprise 28.3% of the hazardous trees recorded, the largest percentage of any one genus. This is a reflection of the large number of pines that were planted on the property and their generally shorter life span compared to the hardwood species.

Nearly 21% of the hazardous trees recorded are ash trees. It is unlikely that there are any healthy ash trees on the property due to Emerald Ash Borer infestation.

Oaks make up 17.2% of the hazard tree record while Black Cherry comprised 12.1% of the total. The number of hazardous Black Cherry trees is somewhat perplexing because, according to historical records, no Black Cherries were ever planted on the property. This reflects the ability of Black Cherry to infiltrate into an area that is developing botanically. The fact that many of them are hazardous implies a lack of ability to compete with many of the other species in the long term.

Plantation Blocks

There are a total of 5 Blocks and 37 Lots located within Saginaw Forest. To study the various Lot plantings, 25 sample plots were established. The sample plots were concentrated primarily in the Lots that still had trees remaining from those that were originally planted. The goal was to use the sample plots to help determine the general condition of the trees in the individual Blocks so that a determination could be made as to whether to enhance and/or maintain the Block, or to consider removal or replanting of the trees.

The main method of enhancing the health and condition of the plantations will be to perform thinning of the stand in some form or fashion. Thinning can be done by row thinning, plot thinning, or selective thinning. The type of thinning will be determined by the present condition of the stand, stem density or basal area, and species involved.

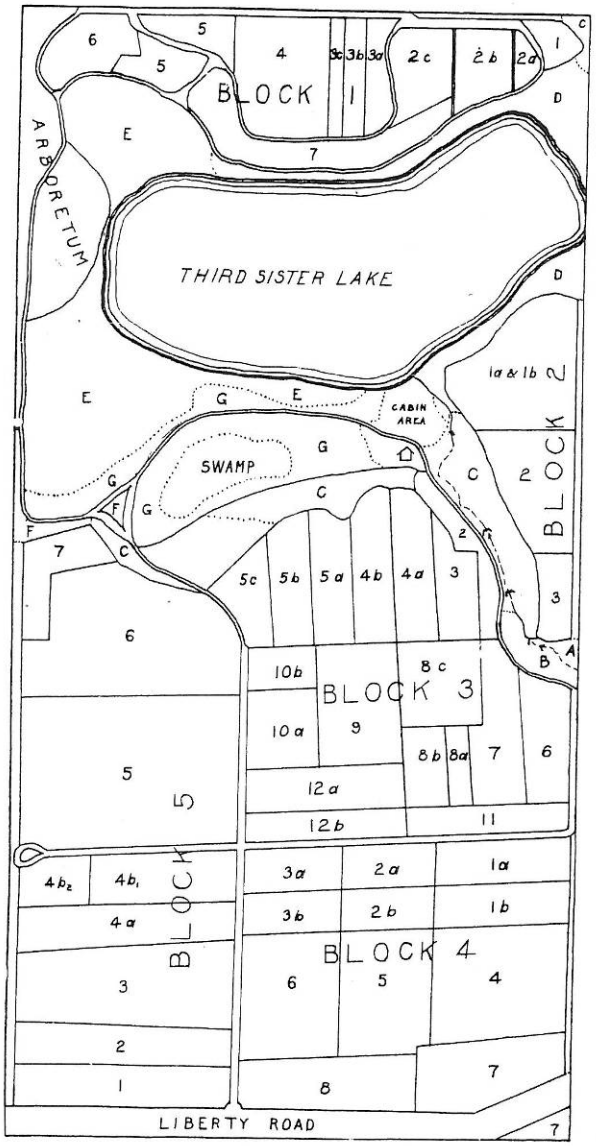
It is anticipated that some of the material to be thinned may have enough commercial value to offset the cost of the work prescribed. Depending on the volume of material to be removed there may even be a net revenue gain that could be made available for other suggested improvements. Another option would be to harvest more trees than are recommended in the thinning program to provide additional funds for improvements.

Due to the vulnerability of some of the Lots to ‘wind throw’, the trees may need to be thinned with a carefully designed process that saves strategically isolated groups of trees to act as wind buffers for the residual trees in the block. The need for this process will be dependent upon the species of the trees, extent of the thinning recommended, and the exposure to prevailing winds. The need and/or the means for selecting trees to be saved for this purpose will require the services of an experienced forester.

The thinning process itself could be an educational opportunity for SNRE students and perhaps the local K-12 students. The thinning can be accomplished in a conventional fashion with modern equipment or by utilizing historical/antique methods with a team of experienced horse

skidders. The historical form of timber harvesting has more recently gained prominence because of its inherent low impact on the site. This “green” form of harvesting would also be a unique educational experience for students of all levels.

The present condition of each of the Lots in each Block helped to determine whether any segment of the forest should be 1) thinned or 2) cleared for new plantings or some other use.



SAGINAW FOREST

SCHOOL OF NATURAL RESOURCES
UNIVERSITY OF MICHIGAN

Scale: 0 100 200 ft.

Block	Lot	Species	Stock	Date	Acres
1	1	Scotch Pine	2-0	Sp. '04	.24
	2a	Austrian Pine	2-0	"	.12
	2b	White Pine	2-0	"	.54
	2c	" "	2-0	"	.57
	3a	Douglas Fir	2-0	"	.37
		Western Y. Pine	2-0	Sp. '08	
	3b	Tulip Poplar	2-0	Sp. '04	.28
		White Pine		Sp. '08	
	3c	Douglas Fir	2-2	Sp. '21	.23
	4	White Pine	2-0	Sp. '04	1.63
	5	Western Y. Pine	2-0	Sp. '08	.75
	6	Scotch, Austrian + W. Y. Pine	2-0	Sp. '06	.61
	7	Scotch Pine	2-0	Sp. '08	.91
		Catalpa	1-0	Sp. '04	
2	1a+1b	Norway Spruce	3-0	Sp. '04	1.68
	2	Norway Pine	3-1	Sp. '23	1.04
	3	Scotch Pine	2-2	Sp. '22	.34
3	1	Black Locust	1-0	Sp. '04	.53
	2	Hickory	1-0	Sp. '07	
		Black Locust			
		Elm			
	3	Scotch Pine	2-2		
		Japanese Red Pine	2-2	Sp. '27	.53
	4a	Scotch Pine	2-2	Sp. '26	.77
	4b	" "	2-2	Sp. '24	.64
		Japanese Red Pine	2-2	Sp. '25	
	5a-5b-5c	Black Locust	1-0	" '06	1.86
		Norway Spruce	2-2	" '15	
	6	Basswood	1-0	" '06	.75
	7	W. Yellow Pine	2-1	" '38	.85
	8a	Sugar Maple	1-0	" '06	.24
	8b	" "	1-0	" '06	.45
	8c	Norway Pine	2-2	" '21	.90
	9	Corsican Pine	2-0	" '30	1.30
	10a	Red Oak	1-0	" '06	.76
	10b	White Oak	1-0	"	.35
	11	Wh. + Burr Oak	Seed	"	.62
	12a	Bl. Walnut	1-0	"	.46
	12b	" "	Seed	Fall '06	.61
4	1a	Wh. Oak	Seed	Fall '06	.74
		Wh. Pine			
	1b	Chestnut	Seed	Fall '06	.74
		Wh. Pine.			
	2a+2b	Red Oak	1-0	Sp. '08	1.02
		Scotch + Wh. Pine			
	3a+3b	Red Oak	Seed	Fall '06	
				Sp. '07	1.08
	4	Bl. Walnut	"	" '09	
		Pine-Oak	2-2		1.87
		Larch-Spruce	2-2		
	5	Red Oak	1-0	Sp. '07	1.45
	6	" "	Seed	"	1.54
	7	Nor. Spruce	2-2	" '14	1.03
	8	Red Oak	1-0	" '08	1.17
5	1	W. Y. Pine	2-0	Sp. '09	1.07
	2	" "	2-0	" '37	.97
	3	Nor. Spruce	3-0	Fall '11	2.21
	4a	Cottonwood	Cuttings	Sp. '12	1.05
	4b1	W. Y. Pine	2-1	" '15	1.00
	4b2	Nor. Pine	2-2	" '21	.37
	5	W. Y. Pine	2-0	" '09	4.04
	6	" " "	2-0	" '12	2.76
		Filled Douglas Fir		" '18	
	7	Nor. Spruce	2-0	" '37	.64

A = Box Elder B = Douglas Fir C = Oak-Hickory
D = Soft Maple, Willow, Aspen E = Elm, Soft Maple Swamp
F = Nor. + Wh. Spruce G = Wh. Cedar

REVISED AUG. '53

Plantation blocks, lots, species, and dates planted

Site Analysis

Observations of use patterns and conditions along with observations from the caretakers, students, and faculty revealed a number of site issues that should be addressed.

- Trails and Circulation – Some trails need repair and/or resurfacing. A single trail leads in and out of the portion of the site located north of Third Sister Lake. This has resulted in congestion and increased wear on the trail at numerous locations.
- Signage – Orientation and identification signs are old and/or lacking altogether.
- Access and Parking – The main gate on Liberty Road is poorly located from a safety standpoint. No parking is available, visual sightlines to the east and west for drivers exiting the sight are poor, and room for automobile stacking is limited. The gate itself is imposing and uninviting. Due to these problems, many visitors park on private property at the east side of the property.
- Learning Facilities – An outdoor lecture space(s) would be useful so that classes could congregate for talks/demonstrations and the like.
- Site Boundaries – The lack of a definitive edge to the site results in confusion as to where visitors can and cannot 1) access the site and 2) venture for learning purposes. Most of the original fences are deteriorating, have fallen down or been trampled at user defined points of entry. Fencing along the south of property, along Liberty Rd. has been damaged by road clearing crews and should be re-established.
- Invasive Plants – Many non-native invasive plants have infiltrated the site in areas, particularly in the southern half of the forest. Despite attempts by caretakers, invasive plants have spread along roads and paths and will require a larger effort to reduce invasive plant presence on the site. Species include Norway maple, honeysuckle, buckthorn, Japanese barberry, and the like.
- Lake – Eroded edges need reinforcement in areas of high use. The lake access location at the caretaker's cabin and a second location on the north side of the lake where the trail dips down to the lake are the areas in most need. Currently there are three large trees in the water near the cabin making access difficult.
- Stream Bank – Stormwater runoff during peak rainfall events has caused severe erosion in a number of locations and contributed to sediment movement into the lake. Previous efforts to stabilize the stream banks have failed resulting in highly eroded edges that need stabilization and vegetation. The adjacent business parks also contribute rainwater to the stream once retention basins reach capacity. As adjacent properties develop and the amount impervious surface increases, the potential for more severe erosion potential persists.

GOALS

As a result of the interviews, conversations, site investigations, and fieldwork, a number of goals have been identified (in order of priority):

1. Remove hazardous trees from areas adjacent to trails to ensure safe passage for the high number of active recreation users that visit the site.
2. Provide safe access to and promote opportunities for students and faculty members in SNRE and the greater University community to utilize Third Sister Lake for (1st) teaching and (2nd) research. A great deal of information on previous Third Sister Lake research documents have recently been assembled by SNRE.
3. Create trails to allow for additional access to the site, in particular, the addition of a boardwalk trail east of Third Sister Lake that would provide a loop route around the lake. A boardwalk platform in this area may also provide access for sampling techniques of water/wetland and offer opportunities for restoration of degraded wetland at the east end of lake. Some of this work could be done by volunteers during work days at Saginaw Forest.
4. Create forest and ecosystem conditions through active management that will provide the most opportunities for students and faculty members to utilize the site for (1st) teaching and (2nd) research for SNRE and the greater University community. Provide a contact name and phone number where members of the University and community can schedule their use and provide facilities where teaching equipment can be stored.
5. Restore degraded areas of the site to improve ecosystem function. This involves the removal of noxious invasive plants and improvements of degraded steam corridors and areas subject to erosion. Some of this work could be done by volunteers during work days at Saginaw Forest.
6. Provide parking and group facility accommodations for users interested in using the site, including, but not limited to, SNRE students, K-12 students, and/or adult education classes. Support facilities (vault toilets or other sanitary accommodations) should be considered.
7. Provide improved signage for orientation and movement through the Forest and interpretation of historical uses and activities.
8. Define the site perimeter with signage and limited fencing. Confine fencing to fragile areas and areas where foot traffic is degrading the site and/or research areas.

RECOMMENDATIONS

Hazardous Trees

The first step that needs to be taken in Saginaw Forest is to address the hazardous tree issue.

- First Priority Trees: These trees should be removed as soon as possible or at the latest, within the next six months.
- Second Priority Trees: These trees should be removed or trimmed within the next twelve to eighteen months.
- Third Priority Trees: These trees should be trimmed or removed within the following year.

Plantation Blocks

At the very least, most Lots should be thinned to promote health and to invigorate the stand. Many of the Lots, if not most of them, include invasive species that are either influencing the integrity of the stand or completely dominating the local ecosystem. These species should be removed and/or controlled so as to limit their continued influence on the original species composition.

- **Block 1**
  Most of Block 1 is in good condition and should be thinned to retain its species character and enhance the residual stock. However, much of the Scots Pine and Austrian Pine in Block 1 is in poor condition and will not have much, if any, timber value. The trees will need to be removed to clean out the dead and dying material. The White Pine, Douglas Fir and Western Yellow Pine should be thinned by 30 to 40 % to "release" the residual stems. The value or the material from those trees should provide some revenue neutral or revenue positive return. Much of the catalpa along the lake side of the block will need to be removed and will have no value.

- **Block 2**
  Most of Block 2 is in fair to good condition and should be thinned to retain its species character and enhance the residual stock. Block 2 can be cleaned up by simply removing dead and dying stems. It is located close to the caretaker's house, is a gathering place for students and the public, and serves as a beautiful background for the area.

- **Block 3**
  Block 3 contains the most species and size diversity and as such is the most in question as to how much timber value may be associated with the stand. The original 19 Lots contained 15 different species, and many of the Lots are full of invasive plants. The spruce near the main entrance is in the best condition of the softwoods. There are some nice stands of Black Walnut, Tulip Poplar, and Sugar Maple that should be thinned to enhance the residual stock but the Scots Pines, Norway Pine, and Corsican Pine have been crowded into poor condition and should be removed and salvaged if a market is available. Even though the original plantings in this Block did not include Tulip Poplars

there are quite a few mixed in at this point. The only area that originally had Tulip Poplars planted was in Block 1 on the other side of the lake.

We will have to have buyers look at the stand and solicit offers on what we would want removed. Most of the Plots in the block will need to have 30% to 40% of the subordinate trees removed to release the residual. Block 3 may provide the best opportunity to make wholesale changes.

- **Block 4**
  Block 4 is mostly hardwood species and should be selectively thinned to release the remaining stems. The thinning should provide some revenue and should cover most or all of the cost of the thinning. The thinning should involve 25% to 30% of the stems.

  The eastern half of Lot 8 in Block 4 is in poor condition and therefore could easily serve an alternative use. It is in poor condition due mainly to the stormwater runoff that has saturated the soil to such an extent that it is too wet for the species growing there. It is also located where a storm drain spills into the property from points south. This area, as well as additional portions of Lot 8 and/or portions of Lot 7, could be used for parking. This use would also provide an opportunity to better control the runoff onto the site.

- **Block 5**
  Block 5 is mostly softwood species of fairly good quality. Based upon the information obtained from our sample plots, the portions of the forest in the poorest condition and health are Lots 1 and 2. These Lots were originally planted in Western Yellow Pine. Over 50% of the stand is either dead or in poor condition. The location of these Lots along Liberty Road suggests that uses other than planting to re-establish a single species plantation or multi-species stand be considered. This area could be very valuable as space for public parking since it is located just inside the entrance. Safety implications would require that this potential use be evaluated by the Washtenaw County Road Commission, the County Sheriff's Office, and University staff.

  The remainder of the southern half of Block 5 is in good condition and should be thinned to enhance the residual stock of (primarily) Norway Spruce.

  The northern half of Block 5, which includes Lots 5-7, is also in a rather poor condition but not to such an extent that it shouldn't be thinned to promote and enhance the residual stock of primarily softwood species. Overall, a thinning of 30%-50% of the block will benefit the remaining stems and should provide a enough revenue to complete the thinning if not with a small profit.

Note that at the present time, the timber market in Michigan is somewhat depressed and therefore the marketability of any of the trees recommended for removal is not a guarantee that there will be a market for the timber.

All trees to be removed from any of the blocks will need to be marked in advance and a contract for removal will need to be prepared. A forester will need to coordinate the harvest procedure to insure a quality process. To be able to estimate, with a reasonable amount of accuracy, any

timber values for the material removed by thinning, specific trees will have to be marked and scaled. This should be part of the next phase of the management plan for Saginaw Forest. A list of possible timber buyers in southern Michigan can be found in the appendix. There is also the possibility of utilizing harvested wood for on-site building of proposed infrastructure but will require further investigation of details for drying and storing the wood on site, etc.

It will be important to undertake a proactive public relations campaign prior to the start of the thinning/removal operations. Given the fact that many people in the community have known and loved Saginaw Forest for years, there will likely be some public outcry regarding the removal of any trees and/or the construction of new improvements. A good process should at least include a meeting with the immediate neighbors and a general public meeting for other community members. Newspaper and newsletter articles are also good.

Schematic Plan

Although the SNRE does not wish to simply provide additional parkland for the community, Saginaw Forest will inevitably continue to be used by the general public for park purposes. The challenge will be to plan for this use while at the same time providing quality for teaching and research opportunities for SNRE (and other schools). All of the suggested design improvements have been made with this in mind.

Recurrent themes that were identified during the informational gathering sessions included parking, research equipment vandalism, opportunities for research, and the need for a small research building/station.

- **Parking**
  Convenient parking would be helpful on the site for all users; single day users, researchers and organized groups such as classes and field trips. It is especially important to provide safe parking and unloading zones for vans and busses that drop of large numbers of people at the site as that type of usage increases.

  The lack of parking is an issue that was repeatedly mentioned. There is currently no parking allowed on the site. Although there is no formal agreement between the SNRE and the homeowners living south of Saginaw Forest, visitors are directed to street parking on Westview Way, which is located in the subdivision south of West Liberty Road. Parking at this location requires visitors to cross West Liberty Road at a point where there are no sidewalks and where the speed limit (45 mph) makes it dangerous to cross safely.

  In addition, the limited maneuvering space in front of the gate and the limited sight distance on West Liberty Road (in both directions: hill to the west, curve to the east) make it difficult for those who are authorized to use the main entrance. Parking was previously allowed in this area, and visitors who drive to the site with the expectation of being able to park at the gate area find it difficult to turn around or back out, and continue on to the recommended street parking on Westview Way. As a consequence, those familiar with the situation often park east of Saginaw Forest in the commercial and light

industrial parking lots located in this area. This has resulted in new footpaths being blazed in unplanned locations, which increased wear and erosion on the site.

Two options are available for parking on or near the site.

1. Two possible on-site locations can be found near West Liberty Road on both sides of the existing entrance drive, in areas where the health of the trees has declined significantly. A small parking lot in either of these locations could take advantage of the exiting driveway and still provide for unencumbered access to the site by authorized vehicles. Although the removal of many trees would be required, a parking lot in either of these locations could be well screened from West Liberty Road. The entrance gate would need to be moved further into the property to allow room for access to a new parking area a safe distance from the road. A parking lot at this location, with a safe turn-around area, would also allow for easier merging into the flow of traffic. If a new parking lot is constructed in this area, it is highly recommended that the type of surface and the techniques used for stormwater management be an example of best management practices (an identified goal of the visioning committee).

2. A second option for parking includes developing a relationship with adjacent property owners to the east. Pall Life Sciences has expressed an interest in partnering with the SNRE to develop opportunities for property management and carbon sequestration. They have also indicated possibilities for providing use of existing surface parking and creating a pathway to the property in exchange for management input. Other possibilities include the outright purchase or lease of said properties, or portions thereof, or other adjacent properties.

- **Circulation**

  A small number of well defined trails exist on the site. Additionally, a larger number of user defined footpaths and shortcuts have developed over time. The addition of a few trails would help coordinate existing highly used paths with the most interesting features of the site. In particular, access to the forested portions of the site north of Third Sister Lake (historically an old White Pine stand) is accessible by only one trail on the property. Opportunities for circulation are increased tremendously if that portion of the site could be made to be a part of a looped trail system. This could be accomplished by constructing a boardwalk extending from the forest stands north of the cabin area, across the wetlands east of the lake, to the uplands north of the lake. Care would need to be taken in the construction of such boardwalk so as not to disturb ongoing research activities.

  By focusing user activities onto a series of planned trails, there will be fewer tendencies for visitors to create their own trails, which may help protect areas of research from unwanted disturbances.

  Remedial repairs are needed for many of the trails to control width and to correct for heavy wear and erosion. Woodchips would be appropriate for lesser used trails, but the heavily used routes will need something more permanent. Consideration should be given

to surfacing these heavily used trails with stone dust or other natural material that will hold up over time.

Barrier free access is a concern that has not been well addressed at Saginaw Forest. Where feasible, pathway gradients and surfacing materials should be established to allow access for all levels of mobility.

- **Property Borders**
  Fencing is old, damaged, or non-existent on the property and as a result, access points have been created at a number of locations by individual users. Signage and new fencing in a few areas is necessary to direct access to locations that can be better maintained.

- **Signage**
  There is an increased need for orientation on site. The topographic changes, mature trees, and winding trails make it difficult at times for visitors to orient themselves on the site. The addition of simple "you are here" graphics would help visitors find their way around the site and increase knowledge of the site.

  Identification/interpretation signs at select locations would be useful for helping casual visitors and younger students to better understand the dynamics of the site.

- **Buildings**
  The existing caretaker cabin was originally built for equipment storage for the forestry farm. The structure is approaching 100 years in age and is not adequate for housing, despite its long history as a caretaker's cabin. With no indoor toilet facilities, poor energy efficiency, and deteriorating conditions, it would be appropriate for this building to once again revert to a secure storage shed for field and/or teaching equipment.

  If the caretaker cabin reverts to a storage facility, the existing storage barn should be removed. It is aging (constructed in 1947), and due to the nature of its construction and its current structural condition, it cannot be secured for the teaching, research, and maintenance equipment that needs to be stored there.

  If it is still desirable and feasible to maintain a caretaker cabin on-site, a new facility could be constructed using the harvested timber from stand thinning. This process would provide an excellent opportunity for SNRE to incorporate hands-on learning opportunities for training in the field incorporating sustainable design and building techniques and environmentally sensitive site planning principles. In keeping with the SNRE mission, the building would want to be built and positioned to be as energy efficient as possible. Interpretive signs could be added to explain both the history of the existing caretaker cabin as well as to explain the energy efficiency techniques used in the new buildings.

- **Pavilion/Restroom**
  A simple open-air, group facility in the vicinity of the existing buildings and in view of the lake would be very beneficial as a place to begin programming and interpretation on site. Such a structure would provide opportunities for introductions to site geography and

explanations of site history from a scenic perspective. In addition, it could provide shelter during inclement weather and a composting toilet for visitors. As with the potential new caretaker cabin, this structure could be constructed from harvested timber on the site. Opportunities exist for student design, site planning, and construction.

If deemed to be necessary, this building could be scaled up to be a very modest classroom facility.

- **Boathouse and Dock**
  Much research is carried out on the Third Sister Lake but facilities to access the lake are limited. A boathouse located at the water's edge would provide a convenient place to house rowboats, canoes, and/or kayaks as well as providing a secure location to store oars, life jackets, and research tools.

  In addition to providing more convenient boat access for researchers, a dock will help to decrease the amount of foot traffic and erosion at the water's edge.