

Madison Metropolitan School District

School Forest Education Plan



December 2010

Approved by the Board of Education on 31 January 2011

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Rationale

The Madison School Forest, also known as the Jackson School Forest, is located about 12 miles southwest of Madison in the Towns of Verona and Montrose in Wisconsin's Driftless Area. The district has had this school forest since 1959, and has used this to benefit student learning in a variety of ways since that time.

Value Statement

The Madison School Forest is an exceptional education facility that provides the opportunity to expand and enhance student and teacher learning as well as community involvement. It serves as a multiple-use natural school and community resource, providing opportunities for people to develop awareness of and appreciation for the natural world to become informed, responsible decision-makers regarding the environment. Integrating environmental education into the curriculum is an effective method to increase student achievement and create environmentally literate students. It can also decrease behavioral issues and increase attendance. (Lieberman and Hoody, 1998) Ultimately, hands-on, authentic experiences will enhance students' environmental knowledge and help them meet future challenges as members of our global society. A study completed by Cullen and Volk (2000) determined that teaching environmental awareness and knowledge is not enough to produce the goals of environmentally responsible behavior. They provided concrete data that teaching action skills helps bring out environmentally responsible behavior, but also strengthens the awareness and knowledge of environmental issues. Additionally, Sivek (2002) completed a study analyzing environmental sensitivity among Wisconsin high school students. Sivek states that environmental sensitivity is a pre-cursor to environmental literacy. The majority of high school students cited that time spent outdoors was the most important influence among those that develop environmental sensitivity.

Target Messages

The following are broad themes that are covered by student experiences at the Madison School Forest. It is through these "target messages" that the essence of our connection to the environment is made:

1. Humans are part of the natural world.
2. We rely on our environment for resources, recreation, and inspiration. Our lives are greatly influenced monetarily, recreationally, emotionally and spiritually by the natural resources in the Madison School Forest.
3. The natural world has inherent value.
4. We have an obligation to be good environmental stewards for the current and future health of the land and of humans. Environmental stewardship, sustainability and conservation are essential for insuring a high quality of life for future generations on a local, regional, national and global scale.
5. Knowledge and skills will allow students to make informed choices and develop lifestyles that contribute to a healthy society and environment.
6. Taking an active role in responsible resource use will help to sustain and improve our environment and community.
7. Responsible citizens will act wisely regarding the overall health of the environment.

Needs Assessment Findings

A School Forest Needs Assessment Survey was distributed to certified staff in the spring of 2010. This was provided in the form of an electronic survey over the course of two weeks. A total of 107 teachers responded to the survey, representing less than 10% of the entire district's teaching staff. The survey questions and responses are found in Appendix A in this document.

A separate analysis of attendance data was also used to help determine patterns of attendance as well as looking for potential barriers to use of the School Forest. This data is available upon request; only the results and analysis are used for this plan.

From the survey results and analysis, the following key points were uncovered:

- Nearly 16,000 MMSD students have some type of outdoor experience on an annual basis. This includes experiences at the School Forest as well as nearby Nature Net sites. These 16,000 students represent approximately 67% of all students in the district. In the 2009-2010 school year, 6,000 MMSD students visited the School Forest. This represents approximately 25% of all students in the district.
- Approximately less than 2,000 students in grades K-8 were not able to participate in an outdoor experience during the 2009-2010 school year.
- There is an inconsistent understanding of district resources and how to access them.
- Transportation to the School Forest is key to continued or improved usage. District funding for transportation and naturalists remains of critical importance.
- Developing an improved, coordinated approach to “booking” parts of the School Forest experience (hikes, studies, stress challenge, etc.) is needed.
- Expansion of programming is desired (after school, adventure-based experiences, teaching outdoor safety, etc.).
- There is a desire for increased “community building” materials be made available to staff and students visiting the school forest.
- Professional development that is offered for credit using the resources of the School Forest is desired.
- The need for an interactive nature center that can accommodate increased use and changes in learning objectives over time is needed.

Results of the survey indicated the School Forest was not being utilized to its potential. Barriers were identified that were preventing teachers from using the resources there with their students. These barriers include (as highlighted above): a lack of understanding among the MMSD teachers and staff regarding what educational benefits are provided by using the Madison School Forest, district provided transportation to and from the School Forest, types of programming available to students and staff, as well as how to access/schedule and coordinate School Forest experiences.

Staff and students who have visited the School Forest and participated in programs are extremely interested in continued and expanded programming. Staff are seeing opportunities to use the School Forest for more than just traditional Environmental Education programming.

During the 2009-2010 school year, only 2 of the 32 elementary schools in MMSD did not utilize the School Forest at any time, at any grade level. During that same year, 3 of the district's 11 middle schools did not have any students use the School Forest, although one of these schools has an urban forest on its grounds. It was also determined that specific grades tend not to use the School Forest resources. The grades that are least likely to be at the School Forest are 4th, 5th, 7th, and 8th grades.

As School Forest naturalist educators visit schools that are underrepresented at the School Forest to present information at staff meetings, they have found that many teachers are not aware of the School Forest and the programs that are available or the fact that the school district pays for transportation and naturalists' fees for one trip to the School Forest per class as long as funds are available. The Friends of the School Forest also offers scholarships to fund a second trip to the School Forest for classes that made a trip in the fall, however, many teachers didn't even know they were able to schedule a first trip.

Madison's School Forest has the advantage of well-educated naturalist educators to conduct or help teachers conduct field studies at the School Forest. Many naturalists have worked at the School Forest for 20 or more years. Working to break down the communication and transportation barriers that are preventing the utilization of the resources the School Forest provides to our students, teachers, and community members is critical to improving the overall effectiveness of the School Forest program.

Site Description and Opportunities

Site Description and Location Overview

The Madison Metropolitan School District obtained the first 160 acres of the Madison School Forest in 1958 through the efforts of educator Paul Olson and civic leaders, Joseph Jackson and William B. Roys. Several additional parcels were obtained later to bring the total to 287 acres. The large block of southern dry forest was designated as the Olson Oak Woods State Natural Area in 1980 and was given the stronger status of dedication in 1997.

Scattered open grown oaks with spreading limbs dating to the 1750's and several multiple-stemmed trees from the 1840's remain as evidence of former savanna conditions and the occurrence of fire. (WDNR PUB-ER-115-2003). A conifer plantation was planted in the 1960's by Madison school children. The Madison School Forest also includes limestone sink holes, a long ridge of sandstone cliffs, open fields and many sandstone rock outcrops.

More than 40 species of birds have been found to breed here, including Cooper's Hawk, Acadian Flycatcher, and Kentucky, Cerulean, and Hooded Warblers. (WDNR PUB-ER-115-2003). There has been a Great Blue Heron rookery on the site for the last 5 years. The 3 acre campground is located on a high flat plateau. The campground is handicapped accessible and is reserved by school groups in the fall and spring. Campground buildings were constructed with wood from the forest milled on site in the 1960's.

The naturalist educator program, begun by Dr. Jim Zimmerman and Dr. Virginia Kline, was developed in the early 1960's to help teachers and students learn about the School Forest ecosystem. Today naturalist educators help provide environmental education to more than 5,000 students and teachers yearly at the School Forest.

Legal Description: 166 acre Olson Oak Woods State Natural Area

Dane County – Township 5 North, Range 8 East

Section 5: All that part of the Northwest Quarter (NW $\frac{1}{4}$) described as follows: Beginning at the Northwest corner of Section 5, the point of beginning, then east along the north line of said section 1320 feet; then south along the quarter-quarter line 250 feet; then west for 1320 feet; then north along the west line of said section 250 feet to the point of beginning.

Section 6: All that part of the Northeast Quarter (NE $\frac{1}{4}$) described as follows: Beginning at the northeast corner of Section 6, the point of beginning, then south along the east line of said section 250 feet; then west 1320 feet; then north along the quarter-quarter line 250 feet; then east along the north line of said section 1320 feet to the point of beginning.

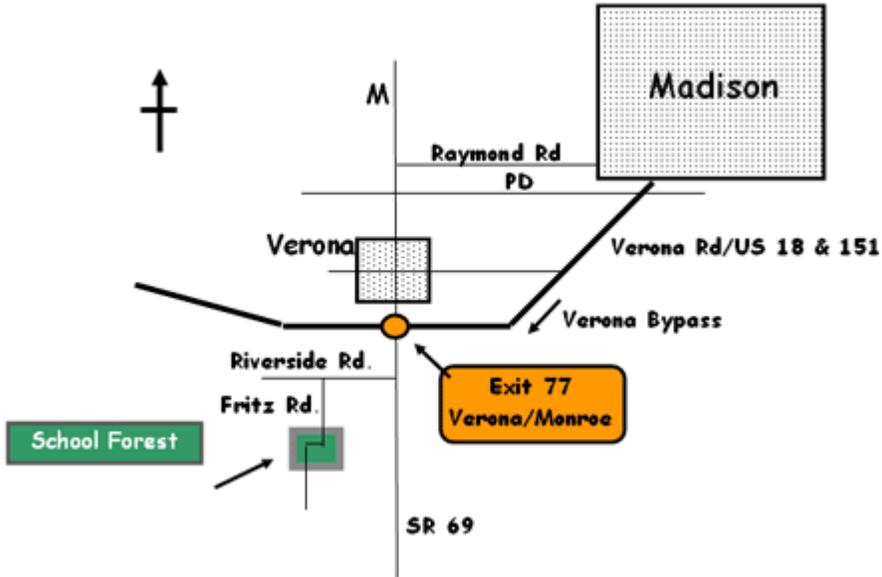
Dane County – Township 6 North, Range 8 East

Section 31: The eastern half of the Southeast Quarter (E $\frac{1}{2}$ SE $\frac{1}{4}$)

Section 32: The western half of the Southwest Quarter (W $\frac{1}{2}$ SW $\frac{1}{4}$) except for the following described lands: Beginning at the northwest corner of the Southwest Quarter (SW $\frac{1}{4}$), the point of beginning, then east along the quarter section line 1320 feet; then south along the quarter line 300 feet; then west 1320 feet; then north along the west line of said section 300 feet to the point of beginning. Subject to all rights, restrictions, and easements of record. Total conveyance containing 166.15 acres, M/L.

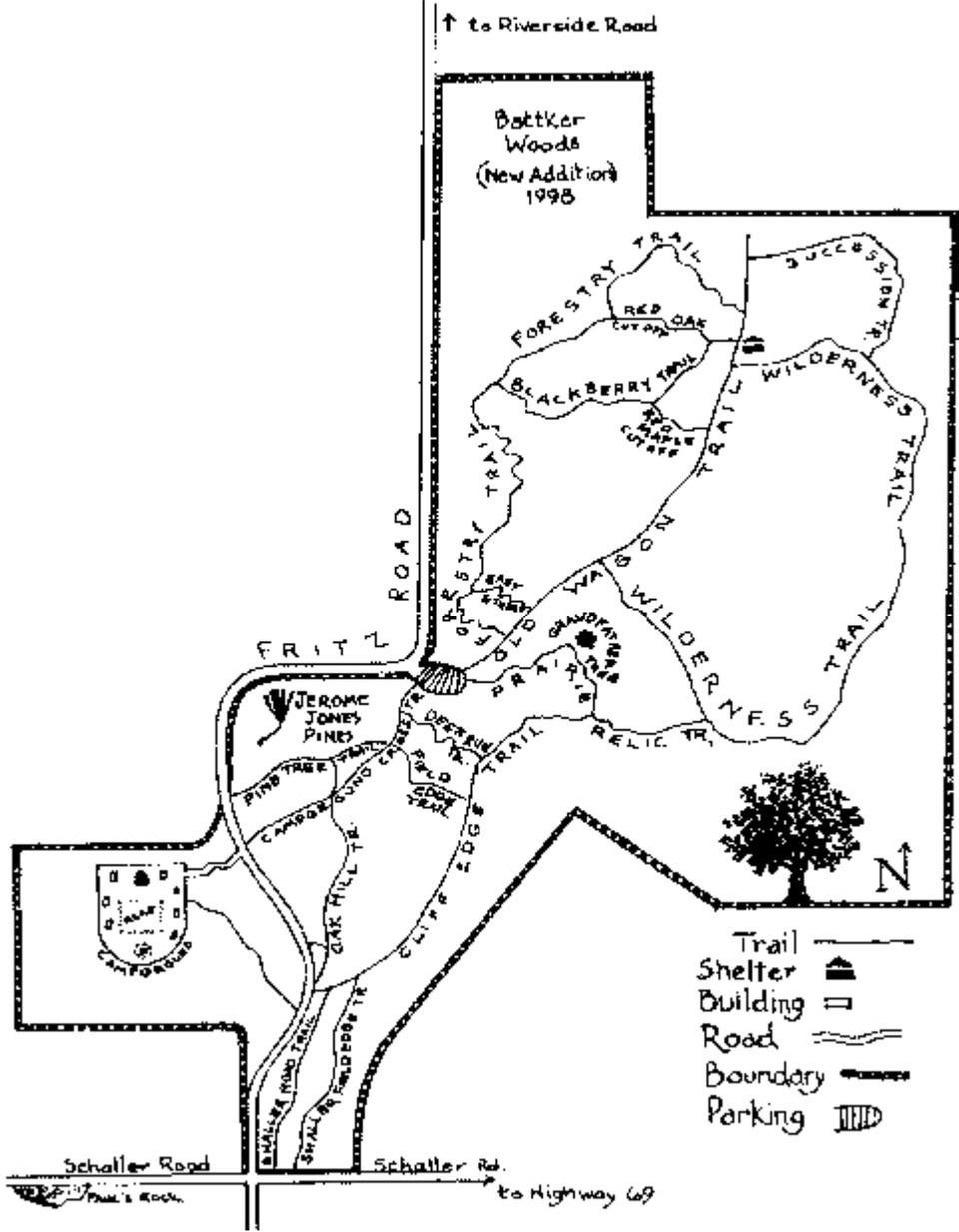
(Madison School Forest Management Plan: Section 1: Recommendations for the Madison School Forest 1997, DNR Articles of Dedication, page 27)

Directions: Road Map to School Forest



- Verona Road West onto Verona by-pass
- Exit by-pass at Verona/Monroe
- SR 69 (Paoli St.) south to Riverside Road
- Riverside Road west to Fritz Road
- Fritz Road south to School Forest
- NOTE: The day-use parking lot is on the **left**; the campground is after the two big curves on the **right**.

School Forest Trail Map



Site History

Cultural History of the Madison School Forest

Before European settlement, the Native Americans managed the vegetation with fires frequently enough to maintain a savanna and prevent the growth of forest. Herds of bison probably also helped keep the land open. Tree density was 10-20 per acre; these were open-grown bur and white oaks with low-spreading branches, growing in a matrix of grasses and wildflowers. Settlement put an end to the fires and the roaming of bison herds. Areas such as the forest core that were not put into cultivation, rapidly converted to even-aged forests of white, bur, black, and red oak. Many of the rapidly growing forest trees, including the red and black oaks, had actually been present in the savanna but only as large roots ("grubs") that produced new shoots after each fire to replace those burned back. The large roots favored rapid growth of the new shoots. When the Stewarts bought the 160 acres from the government in 1845, the land was probably still fairly open and the trees of the future forest just getting a start. Their management decision not to plow this land with its steep slopes allowed the forest to grow. The Stewarts next management decision – to fence the forest and keep the cows out (an unusual action at the time) – made a major contribution to the uniquely good quality of the forest today.

In 1946, over a century after the land was bought from the government, Grant Cottam did an intensive study of the woods for his PhD dissertation. By then there were over 140 trees per acre; almost all were oaks, and more than half were white oaks. The average diameter of the trees was about twelve inches. There was an abundance of shrubs – more than 20 species including gray dogwood, hazelnut, and blackberry. The 140 species of herbs found on the forest floor included typical oak forest ground layer species such as wild geranium and false Solomon's seal, along with a small component of prairie species and a few species, such as Canada mayflower, that are more typical of northern forests.

There had been no major harvest of trees by that time, although a few large trees had been removed, and it is likely that the forest had been a source of fuel for the owners. Between 1950 and 1959 there was a substantial harvest, estimated in 1959 as having been approximately 650,000 board feet. (According to Wisconsin Conservation Department foresters Rausch and Robert, the rate of growth for the 160 acres at that time was approximately 21,000 board feet per year.) Red and black oak were harvested more heavily than white oak, in part because they were infested with oak wilt. The trees were taken from throughout the forest, but the heaviest cut was in the northeast and northwest quarters of the forest where the red oak was common. In a 1959 report, Cottam observed that in part of the northeast quarter virtually every tree harvestable had been cut, including a large number (about 10 per acre) of old, open-growth white oaks. This was apparently the ten-acre piece described by Rausch and Robert as having almost the entire stocking removed. Both reports expressed concerns that known management techniques could restore that part of the forest. Cottam noted a 10 acre strip along the northern boundary immediately north of the severely cut area that was of good quality with large white oaks "as good as anything left in the forest." (This area is now the site of the Stress Challenge/Ropes Course.) It was at this point that the Stewarts decided to sell the forest. Their decision to turn down an offer from someone who wanted to use the wood for charcoal production, and instead to sell the forest to the Madison School District with deed restrictions specifying that the property was to be used as a school forest, again protected the forest.

As soon as the 160 acre block was acquired by the Madison School District in 1959, Paul Olson, a school administrator and early proponent of outdoor learning, recommended that the area be divided into two complementary compartments; a "Forestry Area" where harvesting would be done by students participating in the Summer Conservation Work-Learn Program, and a "Natural Area" where management would consist only of maintenance of trails for the new interpretive program he envisioned. The Rausch and Robert plan recommended that the southeast quarter of the forest be the natural area, while the west half of the forest and the uncut part of the northeast quarter would be the forestry area. The newly formed School Forest Advisory Committee, however, unanimously decided that the area for forestry practice should be the north half of the forest. Nevertheless, within a few years, the boundary was changed to follow the old road that entered the forest near the southwest corner and curved from west to north, exiting the forest just east of the center of the north boundary. The 76 acres west of the road became the forestry area. This area included the northwest quarter, a substantial part of the southwest quarter, and a narrow strip of the northeast quarter.

During the summer of 1959, the first harvest (3,200 board feet) by participants in the Summer Conservation Work-Learn Program took place. Many of the trees selected for harvest were red and black oaks infected with, or already dead from, oak wilt. For a year or so, infected trees were concentrated in the Forestry Area.

A portable sawmill was set up, and most of the trees harvested became the lumber used for buildings for the School Forest programs. By the time of the last harvest in 1980, 120,000 board feet had been harvested. By then there was some concern that the early summer harvesting may have been contributing to the spread of oak wilt. Salvage of dead oaks for firewood has continued to the present.

In 1963-65, the Work-Learn students also planted tree seedlings, mainly in the northwest quarter. At least 250 each of sugar maple, white oak, and red oak were planted. Survival of the oaks is unknown, but the sugar maples have done well. In addition, small numbers of species not native to Wisconsin were unwisely planted, including Norway maple and tulip poplar. Most of these have been removed.

At first there were no restrictions on hunting in the forest. Paul Olson felt that allowing hunting was important to control populations of plant eaters such as deer and rabbits, and also was good for neighbor relations. As the use of the forest increased, however, the potential conflict between hunters and other users led him in the late sixties, reluctantly, to seek Wisconsin Wildlife Refuge status for the forest.

In 1980 a plan for further harvesting proposed by the DNR area forester provoked a major controversy. A committee was appointed to consider the problem, and after two meetings the decision was made not to conduct a harvest operation, and to seek designation of the Natural Area as an Official State Natural Area. Ninety acres were officially designated as the Olson Oak Woods State Natural Area that same year. The 90 acres did not include the heavily cut portion of the northeast quarter. This, along with the high quality white oak stand along the north boundary, was given "buffer" status. However, it did include approximately 12 acres south of the southwest quarter which had been acquired after the original 160 acre piece.

The School Forest Advisory Committee had become inactive when, in 1989, the assignment of a ropes course to the high quality strip at the north edge of the northeast quarter triggered a public outcry from those who felt that this activity was incompatible with maintaining the quality of the forest. The protest did not succeed in preventing installation of the ropes course, but in the hope of avoiding further controversies in the future, a new advisory Management Committee was appointed "to provide technical expertise and advice on a variety of issues... in the management of the School Forest in the years ahead." A proposal was made by some members of the committee that both the Natural Area and the Forestry Area be given "dedicated" Wisconsin Natural Area status, which would give the forest the highest level of protection afforded by the state. Others on the committee opposed dedication because it would restrict tree harvesting. This controversy remained unresolved for four years.

In 1995 a consensus was reached on a compromise plan which included concessions on the part of all factions. The key elements were:

- The development of a management plan for the Forestry Demonstration and Research Area that will allow selective harvesting designed to favor oak reproduction and develop old growth forest characteristics.
- The modification of policy for oak forest management within the Natural Areas system to allow inclusion of an area that will be selectively harvested to favor oak reproduction and the development of old growth forest characteristics.

With acceptance of the management plan:

- Those opposed to further harvesting agreed to allow harvesting in the Forestry Area according to the plan.
- Those opposed to dedication of the 166 acres of forest agreed to dedication, with the Forestry Area management plan to be part of the agreement with the DNR Bureau of Endangered Resources Natural Areas Section.
- The Natural Areas Section and its advisory Natural Areas Preservation Council agreed that the Forestry Area management plan is compatible with dedication of the area.

Natural History of the Madison School Forest

Topography and Soil

St. Peter sandstone, in places covered by a thin layer of shale, underlies the forest. The forest is located in the Driftless Area and the terrain is deeply dissected. A prominent ridge extends from north to south, roughly through the center of the forest. It is intersected near the center of the forest by a ridge extending to the southeast. Valleys with steep slopes drain toward the south, west, and east. Sinkholes are a feature of two of the valleys. Most of the soils of the forest are silt loams derived in part from deposits of windblown loess; but some areas, especially on the steep west-facing slopes, have shallow, sandier soil.

Vegetation

The forest canopy is heavily dominated by oaks, although other trees have increased in importance since the 1946 study. In the Natural Area there are 112 trees per acre; 77 are oaks and the average diameter of the oaks is about 17 inches. As is true of most oak forests, reproduction of the oaks, which are shade intolerant, is limited. Oak sapling (dbh-1-4") average density is only about 50 per acre, fewer than were present in 1946, and most of these occur on the drier, sandier soils. Shagbark hickory saplings are now almost as frequent as oak saplings – a dramatic increase. In the Forestry Area, saplings of red and sugar maple are now as frequent as hickory saplings. The maples are much more tolerant of shade than the oaks and create very shady conditions which can change the character of the forest.

There is a well-developed shrub layer, especially in the gaps. Along with the native shrubs there are two non-native invaders: buckthorn and honeysuckle, which pose a threat to the forest. Garlic mustard is controlled by annual herbicide application. The ground layer is diverse. It is likely that all or most of the 140 species found in 1946 are still present. A spreading population of celandine, a non-native herbaceous species, is cause for concern.

Because of the variations in soil, slope steepness, and slope aspect, there have always been differences in composition and structure between different parts of the forest. This kind of biodiversity is important for the ecological integrity of the forest and adds interest to interpretive tours. Protection of this biodiversity should be taken into account when planning management.

Site Management

Full details in the Madison School Forest Management Plans, Section 1:1997 and Section 2: 2005 can be found at these links:

http://envedweb.madison.k12.wi.us/files/enved/forest/docs/sf_mgmt_plan_section1.pdf

http://envedweb.madison.k12.wi.us/files/enved/forest/docs/sf_mgmt_plan_section2.pdf

Key Goals

The key goals of these plans include:

1. Provide a diverse and accessible site for educational use
2. Provide a diverse and accessible site for habitat restoration
3. Manage the land to maintain intact ecosystems (State Natural Area, pine plantation, oak savanna, oak woodland, cliff edge communities, grasslands)
4. Manage land to maximize learning opportunities

Objectives

The ecosystem management objectives are found in the two Madison School Forest management plans, Management Plan Section 1, 1997 and Management Plan 2, 2005

The management objectives are to:

1. Maintain intact southern dry forest canopy for the protection and preservation of interior forest bird species and to provide for educational opportunities (1997)
2. Maintain and restore native plant communities and associated wildlife (2005)
3. Use selective harvesting when recommended to maintain and restore native plant communities (2005)

The objectives for site management in relation to the educational plan are to:

1. Involve diverse students of all ages in the management of the site
2. Continue to develop in students a sense of stewardship and accomplishment through involvement in restoration management activities
3. Provide educational opportunities for students to participate in long term research, restoration, citizen science, management and harvesting activities (2005)

Educational Opportunities Provided by the Site

- Air quality monitoring
- Art, photography, drawing, painting
- Bird watching and identification
- Carbon sequestration measurement
- Citizen science data collection
- Climate change monitoring
- Descriptive writing
- Diversity calculations and comparisons
- Geology
- Ecological restoration of prairie, woodland and savanna
- Ecological succession
- Ecosystem services
- Food web analysis
- Forest management and history
- Forest measurement and surveys
- Forest products
- Invasive species impact and control
- Habitat surveys and classification
- Land use history
- Life-cycle investigations
- Mapping
- Matter and energy cycling
- Navigation skills
- No child left inside
- Nutrient cycling
- Observations using senses
- Phenology
- Plant identification and classification
- Service learning
- Soil analysis
- Olson Oak Woods State Natural Area management and research
- Overnight camping experiences
- Team building
- Tree identification
- Trail hiking
- Water cycle
- Water quality analysis
- Weather and climate measurements
- Wildlife identification and classification

Campground Facilities Management and Use

The School Forest campground is available only for MMSD school groups using the MMSD environmental education program during the academic school year. The School Forest campground is used during the fall and spring by MMSD classes for overnight camping or day use only. Teachers schedule an environmental education field study through the naturalist coordinator in the morning or afternoon. Teachers plan activities for the rest of the campout or the day. Some groups schedule a ropes course session to alternate with the environmental education field study.

Campground Description

The 3 acre Campground Area features a 1 acre grass field in the center with buildings around the periphery. From the field the land drops steeply on three sides and features scenic rock outcrops. The slopes are wooded. Paul's Rock is to the south. The buildings on the campground area were built with oak from the School Forest in the 1960's. The buildings include: four bunk houses, rustic kitchen, nature center with a wood burning stove, wash station, open air pavilion with fireplace, outdoor fire ring, storage shed, one wheelchair accessible restroom, and an observatory. The observatory was completed in the 1990's. District funding was discontinued for the observatory in 2001. The observatory is currently unused and in need of repair. The center of the campground area includes an acre of open grass.

Campground Management

1. The campground is an educational facility designed to support the environmental educational mission of the District and its focus is not to be used as a recreational facility.
2. The campground is to be used exclusively by MMSD students and staff for environmental education during the academic year.

3. MMSD students and staff always have priority to schedule environmental education events at the campgrounds during the academic year. Groups with an environmental education focus such as Girl Scouts and Boy Scouts may be allowed to rent the facilities on available weekends during the academic year if no MMSD function is scheduled prior.
4. All non-MMSD groups wishing to rent the camping area and/or facilities shall sign a contract with MMSD. Renters requesting use for less than 3 consecutive days shall sign a short term contract. Renters requesting use for more than 3 consecutive days shall sign a long term contract.
5. Camping fees apply to all users.
6. Non-MMSD long term campground users will pay fees within 30 days of invoice unless otherwise agreed upon between parties and obey all rules and guidelines. Non-MMSD short term campground users will pay fees 2 weeks prior to the beginning of the rental period.
7. Fee schedule will be determined on an annual basis.
8. Entities wishing to hold a summer day camp program may apply by November 1st for the following summer for permission to rent the facilities, provided the day camp begins after the last day of the academic year in June and ends prior to the beginning of the new academic year in August/September and serves school age children who reside in the Madison Metropolitan School District. Permission to rent shall be granted pursuant to criteria including, but not limited to, the amount the entity proposes to pay for use, the fiscal security of the entity wishing to rent, and whether there is an environmental education component to the day camp.
9. The one acre center grass field is to remain open with mowing only and is to be used by teachers and campers for games and tent camping.
10. Construction or development of any kind other than repair and maintenance on the campground area requires approval through a process established by the Assistant Superintendent of Business Services and the Superintendent's designee for Environmental Education.
11. A maximum of 100 campers are allowed on the premises at any one event.
12. The campground buildings need to be repaired and maintained on a regular basis.
13. Refer to the 1997 Management Plan for needed improvements to the campground buildings.

Educational Connections

The educational connections for the Madison Metropolitan School District (MMSD) will provide the foundation for development of our school forest curriculum. The Madison School Forest will be developed as an extension of our classrooms and schoolyards. We will use the school forest to teach what can be best taught outdoors through experiential activities. We will provide safe, relevant, differentiated experiences to meet the needs of all students in the district.

The educational goals from which our learning objectives will be developed are Wisconsin's Model Academic Standards for Environmental Education. These standards serve as rigorous goals for teaching and learning for all students including students with disabilities, English Language Learners, and accelerated learning needs consistent with all other students.

Although content and performance standards outline the core ingredients for quality environmental education, they do not prescribe how environmental education will be taught at the local level. Educators, community members, and parents will continue to develop appropriate curricula using the standards as guidelines against which they can monitor the quality of their children's environmental education experiences.

Key Concepts/Educational Goals

- A. **Questioning and Analysis** – Students in Madison will use credible research methods to investigate environmental questions, revise their personal understanding to accommodate new knowledge and perspectives, and be able to communicate this understanding to others.
- B. **Knowledge of Environmental Processes and Systems** – Students in Madison will demonstrate an understanding of the natural environment and the interrelationships among natural systems.
- C. **Environmental Issue Investigations Skills** – Students in Madison will be able to identify, investigate, and evaluate environmental problems and issues.
- D. **Decision and Action Skills** – Students in Madison will use findings from environmental issue investigations to develop decision-making skills, and to gain experience in citizen action skills.
- E. **Personal and Civic Responsibility** – Students in Madison will develop an understanding and commitment to environmental stewardship.

Site Connections, Classroom Curriculum Connections, and Alignment with State Standards

The Wisconsin Environmental Education Board (WEEB) defines environmental education as “a lifelong learning process that leads to an informed and involved citizenry having the creative problem-solving skills, scientific, and social literacy, ethical awareness and sensitivity for the relationship between humans and the environment, and commitment to engage in responsible individual and cooperative actions. By these actions, environmentally literate citizens will help ensure an ecologically and environmentally sustainable environment.”

Madison, like many other Wisconsin school districts, integrates environmental examples into some of their course work, thereby fostering enthusiasm for science and other disciplines. Infusing environmental education throughout the K-12 curriculum increases classroom learning. Environmental education provides a vehicle for engendering responsible citizenship, utilizing a variety of instructional models and guidelines that have been long accepted in the field of education.

The lessons below are examples of, and serve as a model for the development of more, carefully designed curricula to accomplish several goals. The **first goal** is to bring new renewed enthusiasm and perspective to Environmental Education in MMSD. We want to be sure that Environmental Education is not lost or diminished amidst the concerns over decreased budgets, No Child Left Behind legislation, or pressures to limit curricula to only a few content areas. Rather, our planet needs environmentally literate citizens more than ever before in history.

The **second goal** is to provide a model of Environmental Education that is standards-based, reflects best teaching practices, and is integral to the curriculum in MMSD. The Wisconsin Model Academic Standards in Science and in Environmental Education define major concepts and skills required for scientifically and environmentally literate citizens. These lessons demonstrate how closely these two sets of standards are linked, both in content and in spirit. Therefore, the field study and inquiry lessons support an integration of Science and Environmental Education. We are convinced that in order for environmental education to be able to take its rightful place in the core curricula, the content must be standards-based and the instruction must be best practice. We believe the curricular models in these lessons accomplish both.

The **third goal** is to provide curricula that are engaging and meaningful for students to learn and realistic for teachers to instruct. The curricula is best called “field studies” because a portion of the instruction must be conducted outside in the “field” and students learn or study while they are outside. Environmental education is so much more than a walk or tour! Some of the very best MMSD teachers worked diligently to infuse their grade-level expertise into these field studies. The experienced MMSD teachers who wrote these model curricula know the demands of classroom teachers! Students must be continually kept in mind when planning lessons such as these: what interests them; what skills they have or have not yet mastered; and what kind of questions they have about the world around them.

The following field studies are viewed as just a beginning, not an end. Our hope is that teachers will find ways to incorporate even more environmental education into their students’ science, social studies, math, literacy, physical education, technology, and fine arts curriculum. Since these were written, there have been continuing efforts to do just this: expand upon the field study concept.

This model reflects key ideas we feel are essential for integration of environmental education that will stand the test of time. The concepts are sound and grade level appropriate. The instruction has clear learning goals that are standards-based. Student learning is assessed in each lesson to provide teachers with indicators of how well the learning goals have been met. Meaningful integration is critical to both finding time to focus on environmental education and insuring students learn essential concepts in the content areas integrated together.

Examples/Models of Integration of Environmental Education and Science

These activities were developed with the generous support of a WEEB grant in 2004.

Kindergarten

Observing Animals in their Homes

Students enjoy walking outside around their schoolyards and at the School Forest, observing trees, animals, and clues that animals are present. This curricular extension provides an opportunity for students to connect science concepts to their outdoor explorations. All living things have basic needs for survival, including food, water, and shelter. Through discussion, drawing, and building keen observation skills, students will develop an understanding of the needs of living organisms, and how they these needs can be both similar and different to the needs of humans.

MMSD Science Scope and Sequence Connection

FOSS Trees and/or FOSS Animals Two by Two

Wisconsin Model Academic Standards – Science

A. Science Connections

- A.4.1. When conducting science investigations, ask and answer questions that will help decide the general areas of science being addressed
- A.4.3. When investigating a science related problem, decide what data can be collected to determine the most useful explanations
- A.4.5. When studying a science-related problem, decide what changes over time are occurring or have occurred

C. Science Inquiry

- C.4.2. Use the science content being learned to ask questions, plan investigations, make observations, make predictions, and offer explanations

- C.4.6. Communicate the results of their investigations in ways their audiences will understand by using charts, graphs, drawings, written descriptions, and various other means

F. Life and Environmental Science

- F.4.1. Discover how each organism meets its basic needs for water, nutrients, protection, and energy in order to survive
- F.4.2. Investigate how organisms, especially plants, respond to both internal cues (the need for water) and external cues (changes in the environment)

Wisconsin Model Academic Standards – Environmental Education

A. Questioning and Analysis

- A.4.1. Make observations, ask questions, and plan environmental investigations
- A.4.2. Collect information, make predictions, and offer explanations about questions asked
- A.4.3. Develop answers, draw conclusions, and revise their personal understanding as needed based on their investigations
- A.4.4. Communicate their understanding to others in simple terms

Grade 1

Changes in Plants and the Seasons

In first grade, students study that plants have basic needs and go through life cycles; plants have structures that support their needs during the life cycles; and seasonal changes affect that growth, behavior and life cycles. Students can extend their science knowledge and skills through a yearlong study of a local nature area and visit the School Forest. The question students study is “What plant growth, behavior and life cycle changes occur during seasonal changes?” The class will observe, record and discuss plant needs, growth, behavior and life cycle and these items are affected by the weather and/or seasonal changes. Environmental curricular activities include measuring the weather; participating in a nature walk; and drawing and writing observations in a student notebook. Classroom science curriculum connections are to the FOSS module, New Plants.

MMSD Science Scope & Sequence Connection

FOSS New Plants

Wisconsin Model Academic Standards – Science

A. Science Connections

- A.4.2. When faced with a science-related problem, decide what evidence, models or explanations previously studied can be used to better understand what is happening now
- A.4.3. When investigating a science related problem, decide what data can be collected to determine the most useful explanations
- A.4.5. When studying a science related problem, decide what changes over time are occurring or have occurred

C. Science Inquiry

- C.4.2. Use the science content being learned to ask questions, plan investigations, make observations, make predictions, and offer explanations
- C.4.5. Use data they have collected to develop explanations and answer questions generated by investigations
- C.4.6. Communicate results of their investigations in ways their audience will understand by using charts, graphs, drawings, written descriptions, and various other means

F. Life and Environmental Science

- F.4.1. Discover how each organism meets its basic needs for water, nutrients, and protection in order to survive
- F.4.2. Investigate how organisms, especially plants, respond to both internal cues (the need for water) and external cues (changes in the environment)
- F.4.3. Illustrate the different ways that organisms grow through life stages and survive to produce new members of their type

Wisconsin Model Academic Standards – Environmental Education

A. Questioning and Analysis

- A.4.1. Make observations ask questions and plan environmental investigations
- A.4.2. Collect information makes predictions, and offer explanations about questions asked
- A.4.3. Develop answers, draw conclusions, and revise their personal understanding as needed based on their investigations
- A.4.4. Communicate their understanding to others in simple terms

B. Knowledge of Environmental Processes and Systems

- B.4.1. Describe the flow of energy in natural systems, citing the sun as the source of energy on earth; e.g. a food chain
- B.4.6. Cite examples of how different organisms adapt to their habitat

Grade 2

The Weather Around Us

In second grade, students study the properties of air; measure the weather; observe and record changes in the seasons and the moon's appearance. Students can extend their science knowledge and skills through a yearlong study of a local nature area and visit the MMSD School Forest. The two questions students study are "What is the weather like throughout the year?" and "How does the weather and the change in seasons affect plants and/or animals?" The class will observe, record and discuss the weather, seasonal changes and affects of those changes on plants and animals. Environmental circular activities include measuring the weather and recording information year round at nature sites, participating in a weather walk with naturalists, and drawing and writing observations in a student nature notebook. Classroom science curriculum connections are to the FOSS module, Air & Weather.

MMSD Science Scope and Sequence Connection ***FOSS Air and Weather***

Wisconsin Model Academic Standards – Science

E. Earth and Space Science

- E.4.5. Describe the weather commonly found in Wisconsin in terms of clouds, temperature, humidity, and forms of precipitation, and the changes that occur over time, including seasonal changes.
- E.4.6. Using the science themes, find patterns and cycles in the earth's daily, yearly, and long-term changes.

Wisconsin Model Academic Standards – Environmental Education

A. Questioning and Analysis

- A.4.1. Make observations ask questions and plan environmental investigations
- A.4.2. Collect information makes predictions, and offer explanations about questions asked
- A.4.3. Develop answers, draw conclusions, and revise their personal understanding as needed based on their investigations
- A.4.4. Communicate their understanding to others in simple terms

Grade 3

Designed to Do the Job

In third grade, students study plant and animal growth, behavior and life cycles. They observe and record how certain structures assist the organism in survival. The students identify the organism's basic needs and how an organism uses its structures to respond to internal and external cues. Students can extend their science knowledge and skills through a yearlong study of a local nature area and visit the MMSD School Forest. Students investigate the question, "How are an organism's structures related to their function?" The class will observe, record, compare and discuss organism structures and their functions during seasonal changes. Environmental curricular activities include observing the weather, taking a nature walk, and recording observations.

MMSD Science Scope & Sequence Connection ***FOSS Structures of Life (focus on plants)***

Wisconsin Model Academic Standards – Science

A. Science Connections

- A.4.2. Investigate how organisms, especially plants, respond to both internal cues (the need for water) and external cues (changes in the environment)

Wisconsin Model Academic Standards – Environmental Education

A. Questioning and Analysis

- A.4.1. Make observations ask questions and plan environmental investigations
- A.4.2. Collect information makes predictions, and offer explanations about questions asked
- A.4.3. Develop answers, draw conclusions, and revise their personal understanding as needed based on their investigations
- A.4.4. Communicate their understanding to others in simple terms

B. Knowledge of Environmental Processes and Systems

- B.4.1. Describe the flow of energy in natural systems, citing the sun as the source of energy on earth; e.g. a food chain.

Grade 4

Turning Back to the Soil

Studying the world we cannot see is an exciting part of the nature of science. In fourth grade students learn about the “microworld” and study various forms of organisms that can sometimes only be seen with a microscope. In this field study, students extend their learning at the Madison School Forest by closely observing fungi and other decomposers that turn organic matter into soil. The inquiry students will investigate at the Madison School Forest is “What and where are the decomposers?” and “What role does decomposition play in the ecosystem?” Students will observe and decomposers and analyze how they break down leaf litter back into soil. Student activities include taking “The Rotten Hike”, using a soil bore, sketching soil strata, and conducting a quadrant study.

Discovery Hike (“The Rotten Hike” or “Observing the Details”)

MMSD Science Scope & Sequence Connection, *STC Microworlds*

Wisconsin Model Academic Standards – Science

A. Science Connections

- A.4.5. When studying a science-related problem, decide what changes over time are occurring or have occurred

C. Science Inquiry

- C.4.4. Use simple science equipment to collect data relevant to questions and investigations
- C.4.6. Communicate the results of their investigations in ways their audiences will understand by using charts, graphs, drawings, written descriptions, and various other means

E. Earth and Space Science

- E.4.1. Investigate that earth materials are composed of rocks and soils and correctly use the vocabulary
- E.4.6. Using the science themes, find patterns and cycles in the earth’s daily, yearly and long-term changes

F. Life and Environmental Science

- F.4.4. Using the science themes, develop explanations for the connections among living and nonliving things in various environments

Wisconsin Model Academic Standards – Environmental Education

- A.4.1. Make observations, ask questions and plan environmental investigations
- B.4.1. Describe the flow of energy in natural systems, citing the sun as the source of energy on the earth
- B.4.4. List the components of an ecosystem, including the qualities of a healthy habitat

Grade 5

Living and Non-living: Two Parts of an Ecosystem

Although the Madison School Forest is a relatively small area, there are many distinctly different locations to study within the boundaries. In fifth grade, students begin to investigate the living (biotic) and non-living (abiotic) components of an ecosystem, and the important relationships between organisms and their environment. Students can extend their science knowledge and skills at the Madison School Forest by comparing and contrasting the biotic and abiotic components within two different locations asking the questions “What are the non-living differences between locations that have different amounts of sunlight?” and “How are the living organisms adapted to those differences?” Activities that students will engage in include gathering weather and soil data, using a quadrant study protocol to identify plants and animals within different locations, and comparing their data between the two different locations.

MMSD Science Scope & Sequence Connection

FOSS Environments

Wisconsin Model Academic Standards – Science

E. Earth and Space Science

- E.8.4. Using the science themes, analyze the influence living organisms have had on the earth's systems, including their impact on the composition of the atmosphere and the weathering of rocks

F. Life and Environmental Science

- F.8.2. Show how organisms have adapted structures to match their functions, providing means of encouraging individual and group survival within specific environments
- F.8.6. Understand that an organism is regulated both internally and externally
- F.8.8. Show through investigations how organisms both depend on and contribute to the balance or imbalance of populations and/or ecosystems, which in turn contribute to the total system of life on the planet
- F.8.9. Explain how some of the changes on the earth are contributing to changes in the balance of life and affecting the survival or population growth of certain species

Wisconsin Model Academic Standards – Environmental Education

A. Questioning and Analysis

- A.8.4. Use critical thinking strategies to interpret and analyze gathered information

B. Knowledge of Environmental Processes and Systems

- B.4.1. Describe the flow of energy in natural systems, citing the sun as the source of energy on the earth; e.g. a food chain
- B.4.4. List the components of an ecosystem, including the qualities of a healthy habitat
- B.4.6. Cite examples of how different organisms adapt to their habitat
- B.8.5. Give examples of human impact on various ecosystems
- B.8.8. Explain interactions among organisms or populations of organisms

Grade 6

Insect Diversity at the School Forest

The FOSS Diversity of Life course introduces students to the incredible variety of life on Earth. Investigation 9 specifically focuses on insects along with some of the specific structural and behavioral adaptations that they possess. Student interest in insects and the idea that they are the most diverse group of organisms on Earth ensures that this activity matches the main theme of the FOSS Diversity of Life course. Students will go on a nature walk covering several different environments within the Madison School Forest. Along the walk they will look for insects and use a chart to attempt to place each insect in its appropriate group. They will also specifically look for Asian ladybird beetles in several environments in the Madison School Forest. From these two activities they will build a picture, over time, of the types of insects found in specific environments in the school forest and gather data on any changes in population density of Asian ladybird beetles in several environments. If the timing of the fieldtrip meshes with an appropriate time to remove invasive plant species such as garlic mustard, students could work with the naturalists to do so.

MMSD Science Scope & Sequence Connection

FOSS Diversity of Life

Wisconsin Model Academic Standards – Science

A. Science Connections

- A.8.8. Use the themes of evolution, equilibrium and energy to predict future events or changes in the natural world

C. Science Inquiry

- C.8.2. Identify data and locate sources of information including their own records to answer the questions being investigated
- C.8.4. Use inferences to help decide possible results of their investigations, use observations to check those inferences
- C.8.6 State what they have learned from investigations, relating their inferences to scientific knowledge and to data they have collected
- C 8.9 Discuss the importance of their results and implications of their work with their peers, teachers, and other adults

F. Life and Environmental Science

- F.8.1. Understand the structure and function of cells, organs, tissues, organ systems and whole organisms
- F.8.2. Show how organisms have adapted structures to match their functions, providing means of encouraging individual and group survival within specific environments
- F.8.7. Understand that an organism's behavior evolves through adaptation to its environment
- F.8.8. Show through investigations how organisms both depend on and contribute to the balance or imbalance of populations and /or ecosystems, which, in turn, contribute to the total system of life on the planet

Wisconsin Model Academic Standards – Environmental Education

A. Questioning and Analysis

- A.8.4. Use critical-thinking strategies to interpret and analyze information gathered in their investigations
- A.8.5. Use the results of their investigations to develop answers, draw conclusions and revise their personal understanding
- A.8.6. Communicate the results of investigations by using a variety of media and logically defend their answers

B. Knowledge of Environmental Processes and Systems

- B.8.2. Explain how change is a natural process, citing examples of succession, evolution and extinction
- B.8.7. Give examples of human impact on various ecosystems
- B.8.8. Explain interactions among organisms or populations of organisms

C. Environmental Issue Investigation Skills

- C.8.2. Use environmental monitoring techniques such as, observations, chemical analysis, and computer mapping software to collect data about environmental problems

D. Decision and Action Skills

- D.8.6. Develop a plan for improving or maintaining some part of the local environment and identify their role in accomplishing this plan

Grade 7

Connections to Populations & Ecosystems

The Madison School Forest is a treasure in southern Wisconsin. Within its boundaries are pieces of an ecosystem known as a Southern Dry Oak, or Oak Savanna. This ecosystem was once common in southern Wisconsin, but is now almost gone. Students in seventh grade science investigate the fragile balance within ecosystems and among populations. This field study can extend their science knowledge and skills at the Madison School Forest. Students will use scientific protocol to identify and collect data on one or more invasive species, species that do not exist in the original ecosystem, but are now becoming over-populated and displacing native species. Using a transect method, students will locate, identify, record, and remove non-native

species. The combined efforts of the student service work will ultimately contribute to the restoration of native species at the Madison School Forest.

MMSD Science Scope and Sequence Connection
FOSS Populations and Ecosystems

Wisconsin Model Academic Standards – Science

C. Science Inquiry

- C.8.8. Use computer software and other technologies to organize, process and present their data

F. Life and Environmental Science

- F.8.10. Project how current trends in human resource use and population growth will influence the natural environment and show how current policies affect those trends

G. Science in Social and Personal Perspectives

- G.8.5. Investigate a specific local problem to which there has been a scientific or technological solution, including proposal for alternative courses of action, the choices that were made, reasons for the choices, any new problems created, and subsequent community satisfaction

Wisconsin Model Academic Standards – Environmental Education

B. Knowledge of Environmental Processes and Systems

- B.8.5. Give examples of impact on various ecosystems

C. Environmental Issue Investigation Skills

- C.8.2. Use environmental monitoring techniques, such as observations, chemical analysis, and computer mapping software to collect data about environmental problems
- C.8.3. Use questioning and analysis skills to determine beliefs, attitudes, and values held by people involved in an environmental issue

D. Decision and Action Skills

- D.8.5. Explain how personal actions can impact an environmental issue; e.g., doing volunteer work in conservation
- D.8.6. Develop a plan for improving or maintaining some part of the local environment and identify their role in accomplishing this plan

Additional field studies have been, and will continue to be designed and formatted to align with MMSD Scope and Sequence and WMAS for each grade level to offer teachers more choices in field studies.

Staff Development

A continual series of professional development opportunities, preferably to be held at the School Forest, will be provided for district staff and naturalist educators to become more familiar and comfortable with the School Forest site and the curriculum for use at the site. Opportunities could be mandatory or require voluntary participation. Topics covered during the workshops could include, but not be limited to:

- Oak savanna and woodland ecology and management
- Integration of the use of the School Forest with WMAS-EE standards and other content area standards
- School Forest curriculum updates
- School Forest curriculum development
- Integration of engineering and technology standards
- Integration of engineering practices
- Integration of science practices including inquiry
- Differentiation of School Forest curriculum to meet diverse student needs
- Accommodations and modifications at the School Forest to meet diverse student needs
- Preparation for and follow up to field studies at the School Forest for teachers and students
- Environmental education connections of schoolyards to the School Forest
- Environmental education curriculum training including LEAF, UW-Arboretum and others
- Community events

- Presentations by resource specialists from UW-Madison, WDNR, UW-Arboretum and others
- Olson Oak Woods State Natural Area management and research
- Forestry tools with optional field experiences
- Lifetime outdoor recreation/wellness experiences
- Assessment analysis for EE
- School Forest plants field experiences
- School Forest wildlife with optional animal tracking field experiences
- Water and water chemistry experiences
- Relationship, team-building experiences
- Use of technology tools
- Natural, cultural, and land use history of the School Forest
- Soil analysis experiences
- Phenology
- Art – photography, drawing, painting
- Data collection and analysis
- Descriptive writing
- Diversity calculations and comparisons
- Mapping
- Navigation skills
- Observation with a variety of senses
- Geology
- Forest measurements
- Management plan development and implementation
- Service learning/civic engagement/citizen science
- Trail hiking
- Weather and climate measurements
- Air quality monitoring
- Life-cycle investigations
- Invasive species impact and control
- Food web analysis
- Ecological disturbance, restoration, and succession
- Habitat surveys and classification
- Nutrient cycles
- Wildlife identification and classification
- Planning an overnight camping experience
- Helping students develop research questions and conduct research projects

Given the extensive list of staff development topics, a rotational schedule will be developed. While many of the staff development opportunities will be short (1-2 hour) workshops, several could be combined into day-long opportunities. These would be generally conducted at the School Forest by appropriate staff from partnering organizations: UW-Madison Arboretum, MMSD District Instructional Resource Teachers, Wisconsin Dept. of Natural Resources staff, etc. These and others are listed in the Resource section below.

Teachers and naturalist educators will also be encouraged to take advantage of environmental education curricular offerings provided by other organizations. Staff involvement in state and national professional organizations will be encouraged as well.

A staff development goal could be the creation of an EE contact person in each school who would help distribute EE related information and staff development opportunities, as well as serve as a liaison between the School Forest coordinator/head naturalist and each school building.

Resources Available

People:

- MMSD Environmental Education Coordinator
- MMSD Classroom Teachers
- MMSD Instructional Resource Teachers

- Madison School Forest Advisory Board Members
- Madison School Forest Naturalist Educators
- Friends of the Madison School Forest
- WDNR Forestry Staff
- WDNR Science and Research Staff
- WDNR State Natural Area Managers
- UW-Madison Wildlife Ecology Department Staff
- UW-Madison Arboretum EPS Staff
- LEAF Program Staff

Materials:

General

- Maps of School Forest

Safety

- Safety glasses
- Gloves

Basic Exploring

- Magnifying lenses

Facilities

- Parking lot
- State Natural Area picnic shelter

Forestry Measurement

- Diameter tapes
- Tree keys
- Rulers

Invasive species removal

- Flagging tape
- Hand saws
- Bow saws
- Pruners
- Loppers
- Tug a suckle ropes

Plant Studies

- Plant presses
- Herbarium specimens
- Flower keys

Weather and Soil

- Air Thermometers
- Soil thermometers
- Wind gages
- Soil probes
- Trowels

Campground Facilities:

- Kitchen
- Nature center
- Covered picnic shelter with fireplace
- 4 sleeping cabins
- Observatory
- Toilet building
- Water station
- Wood shed

Equipment

- Rain ponchos
- GPS Units (20)
- Compasses
- Topographic maps

Curriculum guides

- LEAF lesson guides (1 of each unit)
- PLT activity guide (1)
- UW Arboretum Earth Partnership for Schools K-12 guide

Wildlife Observation

- Microscopes
- Binoculars (12)
- Skulls
- Study skins
- Mounted specimens
- Animal tracks and molds
- Nests and hives
- Artificial nest boxes

Resources Needed

People:

- Parent and community volunteers
- K-12 teachers
- Community partners

Materials:

Recording and Technology

- Video camera
- Digital Camera
- Data Projector
- Computers for data collection/storage
- DSL Internet connection

Safety

- First aid kits
- Disposable examining gloves
- Weather radio
- Flashlights and extra batteries
- Candles and matches
- Blankets
- Cell phone

Basic Exploring

- Bug boxes
- Insect nets
- Stereomicroscopes
- Pails and other containers
- Funnels
- Ice cube trays for sorting specimens
- Garden tools (trowels, forks)

General

- School Forest user's guide/teacher's guide
- Paper bags
- Ziploc bags
- Plastic containers
- 100' measuring tapes
- Stopwatches
- ID books and field guides (flowers, trees, birds, mammals, etc.)

Facilities

- Winterized educational facility
- Improved toilet facilities in SNA
- Trail benches
- Trail sitting circles
- Education stations
- Trail signs
- Trail kiosk

Forestry Measurement

- Tree cookies
- Wood samples
- Board foot samples
- Biltmore sticks
- Prisms
- Increment borer
- Ingle gauges
- Clinometers

Invasive species removal

- Mechanical weed wench

Fire Management

- Fire rakes
- Shovels
- Backpack water cans

Wildlife Observation

- Echo locator
- Radio telemetry equipment
- Spotting scope

Geology/Soils

- Soil samples
- Soil test kits
- Soil sieves
- Soil color charts
- Reference specimens

Weather Studies

- Weather station
- Heat index charts
- Sling psychrometers
- Rain gauge
- Cloud charts
- Wind scale charts
- Wind chill charts

Curriculum Guides

- Project Wild
- LEAF

- Barometers
- Anemometers
- Light meters
- Air quality kits (CO2, SO2, NOx, ozone, radon)

Assessment

The on-going success of the MMSD School Forest program will be assessed in a variety of ways including:

- Surveys of teachers and/or administrators to determine student usage, facility needs/improvements, educational resource needs, and perceived value of the School Forest educational experience.
- Evaluation of staff development by participants to determine educational success and future staff development needs.
- Student surveys of environmental knowledge.
- Identification of assessment items which include environmental education topics or themes, and analysis of MMSD student scores on those questions to determine potential needs.
- Increased usage of the School Forest site by students, including those from schools not currently using the School Forest.
- A post-trip satisfaction survey for teachers.

These methods of feedback and assessment will be added to as opportunities present themselves.

Sustaining the School Forest Program

School Forest Committees and Responsibilities

Listed below are several groups playing key roles in support of the Madison School Forest and Environmental Education in the district. This includes the Board of Education created Madison School Forest Advisory Board, the School Forest Naturalist Educators who contract with the district to provide support, and the independent group Friends of the Madison School Forest. A proposed Advisory Board sub-committee in support of the Education Plan is also listed.

Current Madison School Forest Advisory Board:

Tim Peterson, MMSD Environmental Education and Science Coordinator
 Betty Downs, MMSD Naturalist Program Coordinator
 Chris Sessions, School Forest Naturalist
 Matt Zine, WDNR State Natural Areas Manager
 Rich Henderson, WDNR Science and Research
 Steve Holaday, WDNR Forester
 Allen Prey, Retired WDNR Forest Biologist
 Carla Hacker, Stress Challenge program leader
 Scott Craven, Professor, UW-Madison Wildlife Ecology

School Forest Advisory Board Responsibilities:

To provide direction and advice on:

- Implementation of School Forest management plans 1997 and 2005, as well as future plans.
- Site development and maintenance, e.g., facilities, trails.
- Annually review the management plan to ensure it's being followed and is relevant.
- Building and facilities maintenance and improvement plans.
- All special projects at the School Forest that alter site or alter the ecosystem.
- Funding and grant writing to implement management plans.

Proposed School Forest Education Sub-committee

This 10 person committee will include the MMSD environmental education coordinator, MMSD teachers and naturalist educators.

School Forest Education Plan Committee Responsibilities:

- Implement the School Forest education plan.
- Oversee development of educational materials for teachers, students and naturalist educators.
- Review education plan every 2 years.
- Support grant development to address identified needs.
- Plan in-service trainings/workshops for teachers and naturalists.

Madison School Forest Naturalist Educators (2010-2011):

Ernie Cooney
Betty Downs, retired MMSD teacher
Nancy Fonzen, MMSD parent
Beverly Fowler
Pat Giesfeldt, retired MMSD teacher
Jim Griffin, retired MMSD principal
Dale Grimm, MMSD grandparent
Emily Harris, retired MMSD teacher
Estelle Katz
Lois Komai
Mary Maxwell, retired MMSD social worker
Jennifer Mitchell, MMSD parent
Samantha Nagy, wildlife biologist
Jack Naughton, retired MMSD counselor
Dorothy Nelson
Ami Rupnow, MMSD parent
Chris Sessions
Walt Shaw
Nancy Sheehan, MMSD parent

Friends of the Madison School Forest Board members:

This independent group was formed to support environmental education in the Madison School District by assisting in the conserving, researching, and protecting of the plant and animal communities of the school forest, and in purchasing adjacent land to protect the unique natural environment.

Dale Grimm, President
Dorothy Nelson, Vice President
Dave Ropa, Treasurer
Eileen Potts Dawson, Secretary
Rich Bolton, Legal Counsel
Betty Downs
Amy Kishter
Allen Prey
Jobelle Shands, Emeritus
Dave Spitzer

Field Study Scheduling

Teachers work with the MMSD program assistant and naturalist coordinator to set up field studies and/or camping dates and times using the MMSD online environmental education calendar. The teacher fills out a registration form and sends or faxes it to the program assistant for approval of the environmental education coordinator. Registration forms are then sent to the naturalist coordinator who contacts the teacher to plan the field studies and schedules naturalists and bus transportation.

Teachers are able to schedule for the following school year beginning in the spring of 2011. Information on field studies and registration procedures are emailed by the program assistant to all MMSD teachers in the spring for the following school year and again in the fall for the current school year.

School Forest Naturalist Educators

School Forest naturalist educators are the key to the 50-year success of the School Forest environmental education programs. School Forest naturalist educators, some with over 20 years of experience lead the field studies at the School Forest. Naturalist educators are retired teachers and principals, parents, scout and youth leaders, ecologists and other people with expertise in environmental education. Many field studies are developed through collaboration between teachers and naturalist educators. Naturalist educators work with teachers to develop field studies to meet curriculum goals requested by teachers. The naturalist educators are paid as consultants per field study. The compensation for naturalist educators needs to be reviewed as specified in Recommendation #2 and Addendum D of the Madison School Forest Management Plan: Section 1, 1997.

School Forest Naturalist Coordinator

The naturalist coordinator schedules naturalist educators for field studies, arranges bus transportation, contacts teachers to plan School Forest curriculum, conducts meetings and in-services for naturalist educators, oversees and communicates campground and trails needs, maintains and updates materials and information binders for naturalist educators, and maintains communications with all School Forest users and managers. Many other additional duties are performed as need occurs.

This position and its responsibilities are being reviewed to determine how best to provide the support needed based on the amount of time required and resources available. See Recommendation #2 and Addendum D of Madison School Forest Management Plan: Section 1, 1997.

Communication Plan

- New ways of connecting with staff across the district will be developed, including but not limited to, fliers, brochures, video clips, email, etc.
- The Madison School Forest information located at the MMSD Environmental Education website, http://envedweb.madison.k12.wi.us/school_forest , will be maintained by the district.
- An independent group, The Friends of the Madison School Forest, will maintain its own website, <http://www.friendsofthemadisonschoolforest.org/> , in support of the School Forest and Environmental Education in MMSD.
- Both websites will provide updates on the School Forest, community activities, and photos of events that have taken place at the School Forest.
- MMSD, with help from The Friends of the School Forest Advisory Committee and School Forest naturalist educators, will host an annual School Forest Day for community members and MMSD families to learn about and participate in activities at the School Forest.
- Informational updates about activities at the School Forest will be made annually to the Board of Education.
- Information will be shared with the media about “milestones” at the School Forest including community involvement, teacher training, restoration projects and other special projects

Long-Range Plan

The following Long-range goals provide a direction for the School Forest and its programs as we work to increase student access and depth of program opportunities for the Madison Metropolitan School District.

Development of a **Center for Research at the Madison School Forest** to support Research Studies, Service Projects, Long-term Monitoring, and Citizen Science

The Madison School Forest has been a research site since 1946 when Grant Cottam did his PhD dissertation research, *The Phytosociology of an Oak Woods in Southwestern Wisconsin* at Stewart's Woods (later,

Madison's Jackson School Forest), in what is now the Olson Oak Woods State Natural Area. Since then the site has been used as a research site for UW-Madison, the Wisconsin DNR Natural Areas Scientists, MMSD students, teachers and naturalist educators. There is a wealth of historic and current data collected at the Madison School Forest. MMSD teachers, students, naturalist educators and others will be encouraged and supported to continue this valuable research tradition at the Madison School Forest.

Key elements to accomplishing the above:

- Establish a Center for Research at the Madison School Forest overseen by a MMSD Advisory Board. The Center for Research will be housed at the Madison School Forest Nature Center until the winterized educational facility is constructed. All research data will be kept in a secure location.
- Partnerships with the community will be enhanced and developed. Current partnerships include: Friends of the Madison School Forest, UW - Center for Biology Education, UW - Madison Discovery Center, Madison Audubon Society, Foundation for Madison Public Schools, UW - Madison Arboretum, WEEB, LEAF, UW - Madison Departments of Forestry and Wildlife Ecology, WDNR Bureaus of Forestry and Endangered Resources. Additional partnerships will be sought.
- An annual Madison School Forest Science Symposium will be held for sharing research at the School Forest. This will include adults and students presenting and sharing research at the School Forest. This Science Symposium will be held at the School Forest Nature Center until the winterized educational facility is constructed. Researchers from UW-Madison and WDNR Science Services will be invited to present their research. Any citizens doing research at the School Forest will be invited to share research at the Madison School Forest Science Symposium.
- Research will meet rigorous scientific standards and will be peer reviewed. All MMSD projects will be approved by the Center for Research at the Madison School Forest Advisory Board. Protocols will be established for project approval. Teachers, naturalist educators, students and others will receive education and training in selecting and conducting high quality research projects. Education and training will be age-appropriate and will encourage projects for K-12 students.
- All student research will contain provisions for continuation. Data will be stored and made available to students, staff, the scientific community and the public. We have all seen wonderful grants that are "one and done". Wonderful student research is done and data is collected. Then the project is discontinued once the grant funding is over. There is often no provision for continuation. To prevent this from occurring, all research projects done through the Center for Research at the Madison School Forest will require a protocol for continuation, if appropriate, and data that has been collected will be stored for future use.
- Past Research at the School Forest will be collected and made available for analysis and review. Some examples of past research and data collections are as follows:
 - Cottam, G. 1948. The phytosociology of an oak forest in southwestern Wisconsin. Ecology 30:271-87. Trees, saplings, seedlings, shrubs, herbs. An ecological study.
 - Kline, V.K., G. Cottam and others 1992. Unpublished. A repeat of the Cottam 1948 study, shrubs and herbs omitted.
 - Robert, K. and T. Rausch. 1959. Forest management plan for the School Forest. Trees (board feet).
 - Seybold, W. 1994. Forest cruise. Trees (board feet).
 - DNR Bureau of Endangered Resources. Bird census for years 1983 and 1986-92, inclusive.
 - Henderson, R. 1996/97, WDNR Science Services Research Project. Quadrant data collected on trees, shrubs and herbaceous plants to monitor Olson Oak Woods State Natural Area Management strategies.
- Established Current Research Project Examples:
 - **Invasive Plant Removal:**

Service projects are often requested by middle and high school groups, as well as scout groups. Naturalist educators conduct invasive plant removal work parties along with education about invasive plants and why they are a problem in natural areas. These areas will be GPS located and data on plants removed will be stored in a permanent data base. Invasive plants are a concern to ecologists as a threat to biodiversity locally and world wide. This information will be

useful to the community at large. Partnerships include: Friends of the Madison School Forest, WDNR Endangered Resources and Natural Areas Managers. Additional partnerships and grant funding will be sought to help continue this project.

– **Heron Study:**

School Forest naturalist educator, Nancy Sheehan, and Jefferson Middle School teacher, Jill Olson, began a long-term monitoring project for the heron rookery at the School Forest in 2010. School Forest naturalists and volunteers helped with the project. The Madison Audubon Society supported this effort with equipment and volunteers. Students mapped and located nests using GPS and measuring tools in the winter of 2010. They will continue this project in winter 2011. Partnerships include: Madison Audubon Society, Friends of the Madison School Forest (future grant writing assistance) and Madison School Forest naturalist educators. Additional partnerships and grant funding will be sought to help continue this project.

– **Sink Hole Mapping:**

School forest naturalist educator, Nancy Sheehan, other naturalist educators and Jefferson Middle School teacher, Jill Olson, helped seventh graders map School Forest sink holes using GPS and measuring tools in fall of 2009 and 2010. We would like to get other middle school students involved in this project. Partnerships include: Wisconsin Geological Survey and Madison School Forest naturalist educators. Partnerships and grants will be sought to continue this project.

– **Phenology and Quadrant Tree Studies:**

Lincoln Elementary School did a project called “I went in March.” All classes at Lincoln Elementary School went to the School Forest in March 2010 with the same teacher while other classroom teachers had planning time back at school. The students collected three weeks of weather and phenological data with naturalist educators in the morning. In the afternoon, they did quadrant studies collecting data on the diameters of trees in different parts of the forest. Quadrant locations were marked with GPS units. These can be redone in the future to monitor changes in tree diameters over time. This data needs to be maintained in the Center for Research at the Madison School Forest so that these data collecting projects can be repeated by other classes and comparisons of data can be made. Partnerships and grants will be sought for continuation of this project.

– **Citizen Science:**

Teachers, students and naturalist educators can take advantage of many opportunities available to become involved in citizen science environmental monitoring and phenological data collecting. Partnerships and grants will be sought for additional citizen science projects.

School Forest field studies

Add 2 or 3 additional field studies to the MMSD website for teachers and students. These can be per individual grade level or grade band level: K-2, 3-5, 6-8, 9-12. Field studies will be aligned to WMAS Science and Environmental Education standards and MMSD Scope and Sequence. Connections to other content areas will also be included in all future field study development, as well as the appropriate use of technology.

FOSS School Forest field studies

Work will continue to make MMSD developed field studies that have been aligned with MMSD Scope and Sequence more “user friendly” for easier use by teachers and naturalist educators.

Observatory and astronomy curriculum

Astronomy curriculum for middle and high school students will be developed for the observatory located at the School Forest campground. The observatory will be remodeled to make it usable on site by naturalist educators, teachers and students. Additional portable telescopes will be obtained to supplement the observatory.

Ropes course coordination

Naturalist educators, teachers and ropes course instructors will meet annually to align coordination of the ropes course use and MMSD environmental education programs. A model that works well is that of alternating ropes course use and environmental education programs before and after lunch. Schedules need to be aligned for maximum benefit for students, teachers, and programs.

Citizen science/Student research special projects

Work will continue to develop special projects for school groups wanting to engage in in-depth field studies. Protocol, requirements and methods for naturalists, teachers and students to set up and carry out effective citizen science and student research projects need to be established. This will include sharing information with other students, staff and the public through presentation seminars held annually or other appropriate methods. Funding will be secured to support these efforts.

Winterized educational facility

The School Forest is currently useable in the summer, fall and spring. The facilities are not heated and the water is turned off in winter to prevent freezing of pipes. The use of environmental education programs would greatly increase with a winterized educational facility and winterized sleeping quarters. A winterized educational facility is part of the 1997 Management Plan. This would be possible with the 75 acre land acquisition parcel # 1 in the 1997 Management plan. The current rustic campground facilities would continue to be used by students in the fall and spring. The winterized educational facility will house the Center for Research at the Madison School Forest. Funding for this new facility and land can be secured by applying for grants, foundation donations, and private donors.

Upgrades of current facilities

Signs are needed for both the School Forest day lot and the campground. Buses often go to the wrong location. The nature center needs additional educational displays. Hands-on activities for students will be provided for use by campers. The nature center will be equipped with internet connections, computers, data projectors, screens, etc. These items will aid in student presentations and data collection and storage for long-term monitoring projects.

Connections to the Friends of the School Forest Site

Trail connections will be made so students, teachers, naturalist educators and others can walk from the school forest to the adjacent 75 acre Friends of the School Forest prairie and savanna restoration site. Curriculum providing connections between the school forest, savanna and prairie will be developed and made available to naturalist educators, teachers, students and others.

Permanent deer exclosures

A temporary deer exclosure, currently west of the school forest campground, shows the effects of deer browse on vegetation. Additional deer exclosures, curriculum and data collection methods will be developed.

Promotional and educational materials for the school forest

Promotional and educational materials will be developed including: videos, CDs, Power points, brochures, Web connections to information, etc. Materials will be developed for students, teachers and the public to include but are not limited to: school forest management, ecology, history and use. Materials will help teachers prepare students for their field studies and follow up to the visit to the school forest.

Field studies for middle school and high school students

Additional field studies will be developed for middle school and high school students who are using the school forest campground and may be alternating activities with the ropes course. Field studies that have been done include: GPS use, geocaching, map and compass use, invasive species service projects, sink hole measurement, trail clearing service projects and tree identification. Field study development may include; forest management, carbon sequestration data collection, quadrant studies, bat surveys, astronomy, and trail mapping with GPS.

Campground driveway

The driveway to the campground is a narrow winding gravel/dirt path. It is difficult for buses to get in and out. There is room for travel only one way at a time. Purchase of the adjacent property would allow a U-shaped driveway leading both in and out of the campground. This would improve safety and efficiency getting in and out of the campground. The parking lot could be expanded to allow for more parking spaces. This would allow, in turn, the increased usage of the School Forest facilities for student groups. This purchase of 15 acres next to the nature center and kitchen is part of the 1997 Management Plan. The purchase could be funded by applying for grants, foundation donations, and private donors.

Future Vision:

- In every grade level, students will have the opportunity to visit the school forest one or more times per year for environmental education.
- Teachers, students and naturalist educators will have more opportunities to collaborate on special projects that include long term research projects, environmental service projects, citizen science and environmental monitoring.
- Community events for families and staff will be held at the school forest annually.
- With winterized educational and camping facilities the school forest environmental education programs will be used year round
- Foundation for Madison Public Schools: The current School Forest Endowment Fund is now over \$100,000. With active recruitment of donations, the School Forest Endowment Fund will grow by \$100,000 annually to eventually reach over \$1,000,000 to help support the Madison School Forest Environmental Education programming that is not included in the regular budget. The money would be used to support additional programming falling outside of the regular budget.
- The Center for Research at the Madison School Forest will become a valuable community research center to be expanded in the future to include other local natural areas including but not limited to the Cherokee Marsh and the Friends of the School Forest prairie restoration adjacent to the Madison School Forest.

Implementation plan

The School Forest Advisory Board and the School Forest Education Plan Committee will begin implementation when the plan is approved by WEEB and the MMSD Board of Education. Securing of funding and grant writing will be needed for implementation of parts of the plan. Plans will begin to move forward in the spring of 2011. The School Forest Advisory Board will determine the priorities for implementation upon recommendation of the MMSD Environmental Education coordinator. Staff development and communication portions of the plan will be developed and implemented within short-term timelines.

District commitment

This plan will be approved by the Madison Metropolitan School District Board of Education in January, 2011.

An example of the deep commitment of the district to the School Forest and continued student and staff use can be seen in the following:

In May 2010, during the midst of huge budget cuts throughout the district, the MMSD Board of Education voted unanimously to reinstate the School Forest funding at the same level as last year for the 2010-2011 school year. This district funding supports bus transportation, naturalist educator fees, and maintenance for the School Forest.

Informational Resources

1. Madison School Forest Management Plan, Section 1: Recommendations for the Madison School Forest, 1997
2. Madison School Forest Management Plan, Section 2: Areas Outside of the State Natural Area, 2005
3. Phytosociology of an Oak Woods in Southwestern Wisconsin, Grant Cottam, PhD Thesis, 1948
4. Madison School Forest, Paul J. Olson and James H. Zimmerman, 1974 – 3rd Edition
5. <http://www.uwex.edu/wgnhs/sample.htm>, maps
6. <http://envedweb.madison.k12.wi.us/forest/sfmaps.html>, School Forest maps and directions
7. <http://dnr.wi.gov/org/land/er/sna/index.asp?SNA=157>, WDNR site for Olson Oak Woods State Natural Area
8. <http://accessdane.co.dane.wi.us> and Google maps: Arial photo, road, contour maps
9. The School Forest Guidebook, 1998: by Dave Spitzer's 4th grade class at Lincoln Elementary School
10. Historical files: Histories written by Virginia Kline and Elnora Wilson, old brochures, Discovery Trail booklet, news articles, School Board speeches by Virginia Kline and Grant Cottam, tree surveys done by Cottam and Kline, old School Forest maps, photographs, etc.
11. Culen, G. R., & Volk, T. L. (2000). Effects of an extended case study on environmental behavior and associated variables in seventh- and eight-grade students. *The Journal of Environmental Education*. 31(2): 9–15.

Appendix A: Needs Assessment

The following is the survey instrument used as well as the results obtained from the 2010 School Forest Survey.

Madison School Forest Needs Assessment Survey Results

1. Did you know the school district has a school forest? . . . 102 yes – 5 no
2. Have you ever used the School Forest? . . . 82 yes – 25 no
3. Do you currently use the School Forest for camping? . . . 18 yes – 64 no
4. Do you currently use the School Forest for classroom curriculum connections? . . . 57 yes – 25 no
5. Do you currently use the School Forest for community building/stress challenge? . . . 40 yes – 40 no
6. Do you currently use the School Forest for civic engagement/service learning? . . . 12 yes – 67 no
7. Do you currently use the School Forest for other activities/purposes? . . . 19 yes – 61 no
8. Suggestions for improving transportation to and from the School Forest:
 - Making more trips available to classrooms would be very helpful.
 - Help with paying for transportation – at least for our children of need.
 - I love that the district provides one bus trip to the School Forest. If they didn't do that, the trips would be beyond our reach. Please don't stop doing that!
 - The free transportation is great! Keep it up if at all possible.
 - Good unless we could get a discount on bus cost
 - Transportation costs could be sought using grant money especially aimed at low-income kids who would normally not get an opportunity to experience the outdoors.
 - The cost of transportation is the main issue against using it. As bus costs go up, it becomes difficult to afford every year.
 - Make transportation free.
 - Make the busses more affordable.
 - We have had a few times the bus has been late, but it was the bus company's fault.
 - When negotiating bus service for the school year, perhaps we could use this as leverage to ask for reduced rates i.e. "MMSD will give the bus company a guaranteed amount of service to be used for School Forest transport if they give us a 30% discount on the cost of those trips.
 - Make sure the bus knows which location to go to for presentations.
 - Pay for more than one trip. Friends of the School Forest scholarships for second trips should be open to middle schools.
 - Make it free.
 - More funds to support transportation.
 - The school buses work well for transportation, but providing for the cost of transportation is always a challenge.
 - Use something more flexible than First Student.
 - Keep the free buses. This is a huge incentive for us to go there.
9. Suggestions for improving the scheduling of classes at the School Forest?
 - We need the School Forest instruction staff to work with us for planning these trips.
 - I would suggest that it be used for staff development/team building exercises.
 - After school programs, adventure programs
 - We have tried for the last few years to get to the stress challenge and have never been able to get in due to it always being full.
 - Maybe having a representative come to one of our staff meetings to speak briefly about the school forest and scheduling procedures.
 - It would be easiest to have an online calendar with a link to open slots where you could fill out one online form to make a reservation, with a quick email confirmation.

- Streamlining the registration processes between C & A, Stress Challenge and School Forest
- Being able to sign up for spring dates at the beginning of the school year
- I suppose you could block out days of the week for certain grade levels and use a lottery-type process.
- The last few times I tried to schedule, it was booked when we wanted to go. Need to know pretty far in advance if one wants to go there.
- Limit certain activities for each grade level. Too many kids have done activities while others haven't.
- More staffing if needed to get more done while at the course
- We use the School Forest for community building in the fall and spring; our groups have gotten a date. Rain outs mean no trip for the kids and that is disappointing.
- Better communication about what guided tours are available, provide lesson ideas for academic connections
- Allow staff to sign up on an online calendar. If we see that colleagues are bringing a group from another school, we can share best practices/ideas. Offer specific times and get volunteers from community or MMSD retired forces to be "naturalists" for seasonal activities (winter bird watching & tracking, spring sap scavenging, invasive species ID and culling, etc.).
- More guides would be helpful so that we can have smaller groups when we tour the forest.
- Set up a brochure to know what is offered and what has to be provided by the school team/teacher who is trying to set up the experience.
- Hard thing with scheduling classes is also trying to get the guides to make field trip complete
- Be nice if you schedule a class and it automatically has someone that can guide you

10. Suggestions for improving safety at the School Forest:

- Teaching students about safety in the forest, survival, teamwork, what is OK to eat – what is not, how to use a compass, tell about what time it is according to the sun and how to build a shelter out of leaves and sticks
- Require a minimum of adult supervision per group.
- The paths to the ropes course could have more wood chips on it, so it isn't so slippery when wet.
- Just being sure there are enough adults . . . maybe there would be a group of parents that would be interested in being volunteers
- Perhaps provide each teacher with a band-aid, disinfectant kit if teacher has forgotten one

11. Suggestions for additional materials and equipment that would enhance your activities at the School Forest:

- Perhaps a general website description of what can be done there (in general), how to schedule your group, who to call for consultation, website description of activities in more detail
- A bon-fire pit if there is not one
- Class sets of compasses, hand lenses
- Community building equipment kept on-site at the camping site (i.e., cones, balls, blindfolds, etc.)
- I would love to be able to take my kindergarten students out to the School Forest, but we would have to work on organizing activities that would be appropriate at their level. I feel they could really gain a lot from being out at the School Forest!
- Community building resources (parachute, balls, hula hoops, jump ropes, etc.) that could be used at School Forest
- Some picnic tables for kids to sit and eat at for lunch and or other activities
- It would be great to have a more interactive nature center and a garden.
- Magnifiers, microscopes
- A better map of all the trails; Maybe a broom to clean up the shelter near the ropes course when we are finished eating lunch there; Wagons or cars available to help haul gear out to the shelter near the ropes course and trash back to the bus
- Be nice if there were classes that School Forest offered for credit . . . I met on a Sunday last fall to learn GPS . . . on a weekend.
- Perhaps more direct connections for the FOSS science curriculum would be helpful.
- A well-stocked nature center . . . clipboards, pencils, colors, markers, scissors, etc.

12. Suggestions for improving logistics at the School Forest:

- Make reservation online with an online calendar so staff could check availability
- Advertise the different ways of using the School Forest more to staff.
- The key!! It is such a pain to go downtown to get it. Make more keys. Send them out through the school mail. It really is quite a hassle and when the policy changed there was little communication about it.
- Calendar and scheduling is crazy when combining activities like I do.
- An ease in seeing open reservations and making reservations directly online would be helpful.
- Improved communication between C & A, Stress Challenge, and School Forest personnel
- Logistically, it takes a lot of work on the part of the staff member but that will not change.
- Ask for additional funding through school fees?
- The driveway's a little tricky! Also, when the weather doesn't cooperate, it would be nice if there was a place where the kids could seek shelter from the wind and/or precipitation.
- Please recycle! Our recycling efforts at our school are way ahead of what is being done at the forest. Our school contractor recycles all numbered plastics, all aluminum, all milk cartons, and all paper. We also compost for our school garden.
- The first time I went to the School Forest, it was difficult to locate which driveway to take (where the cabins are). I would recommend putting a sign up where you turn!
- Not so much logistics . . . but there are some areas that could use the forest but haven't thought about it for team building such as music groups (band, choir, and orchestra), HS theater groups, etc.

13. Which professional development opportunities would be most valuable to you? Please check all that apply.

- Content (background information on forests, wildlife, water, soils, etc. . . . 43 (63%)
- Environmental education (background information on EE, how can it be used, state EE Standards 42 (62%)
- Environmental education curriculum (e.g., LEAF, Project Learning Tree, Project Wet, Project Wild) 39 (57%)
- Forest management 12 (18%)
- School Forest development and administration 9 (13%)
- Other, please specify: 13 (19%)
 - Stress challenge
 - Set up links to current science programs in elementary (study how FOSS is set up, use that as basis to expand from)
 - More coordination within our school about who is using the forest, who is communicating about dates, etc.
 - Continued offering in stress challenge/community building
 - Stress challenge/ropes course
 - Community building efforts
 - History of School Forest
 - How to be a naturalist
 - Specifics about our School Forest that makes it different from other forests in the area and/or state
 - GPS as a tool for gathering data
 - Guided tour and content background workshop on flora and fauna specific to our school forest
 - Resources available for planning a trip to the School Forest (\$ and people)

