

Fermilab Annual Ecological Land Management Plan For Calendar Year 2000

**Developed by
The Fermilab Ecological Land Management Committee
1/13/00**

I. Introduction

The [Ecological Land Management Committee](#) prepares the Fermilab Annual Ecological Land Management Plan for approval by the Fermilab Director. The first part of the Plan lists the most significant accomplishments during CY 1999. The second part of the plan contains the Committee's recommendations for a coherent, prioritized set of activities for Calendar Year 2000, which incrementally advances the goals in the Long Range Ecological Land Management Plan. The Committee makes these recommendations with the suggestion that resources, which the Lab can make available for ecological land management, be applied to these activities. It is understood that the judgment of those doing the work will prevail on the details of implementation and that changes in scope and detail will occur.

The Fermilab Land Management Plan Map (See CY 2000 Fermilab Land Management Map) has been updated to show the NuMI and MiniBooNE projects areas in ELM 24.

II. Ecological Land Management Accomplishments in Calendar Year 1999

A summary of activities throughout the site is listed below. The attached ELM Tract Annual Management Plan Sheets detail accomplishments in each ELM tract.

A. Harvests

1. The attendance at the volunteer harvests in 1999 exceeded 400 people (See Hand Harvest 1 and Hand Harvest 2). Some of the more important forbs collected include bush clover, obedient plant, nodding wild onion, wild quinine, and prairie coreopsis.
2. One trip was made to Markam Prairie. Seed from lead plant, white and purple prairie clover, blazing star, prairie drop seed, and Sullivan's milkweed was collected. Seed from wood lily, Culver's root, prairie sunflower, spiderwort, and bottle gentian was hand collected in the remnant prairie at the Burlington Railroad.
3. Bob Betz collected the following species for Fermilab at the Hinsdale Prairie: Culver's root, purple and white prairie clovers, New Jersey tea, prairie gentian, alum root, heath aster, and smooth blue aster. In the past few years, Fermilab has donated prairie grass seed to the Hinsdale Prairie. (See Seed Cleaning.)
4. Prairie seed was machine harvested (See Machine Harvest) in ELM tracts 8, 24, 25, and 28. More than 18,000 pounds of prairie matrix seed was collected. About 6,000 pounds will be traded for forbs for enrichment.
5. Fermilab traded, with a commercial vendor, approximately 3000 pounds of big bluestem and yellow coneflower seed for various native species needed for enrichment of the existing tracts. These were the types of plants commonly found in fully developed, mature prairies, yet still rare in the

Fermilab prairie tracts. We also acquired little bluestem seed to develop a small nursery for future projects.

B. Tracts Enriched

1. Parts of ELM tracts 1 and 25 were drilled (See Machine Planting) with an enrichment mix. An enrichment mix was broadcast in parts of ELM tracts 1 and 4.
2. About 100 people planted about 125 new trees and bushes in the northern part of ELM 24 during the 1999 Arbor Day activities (See Arbor Day). Species planted included bur oak, black walnut, American plum, white oak, and hawthorns. About half these trees were taken from ELM 4, where they were growing too close together.
3. About 15 trees and bushes, including hawthorn and swamp white oaks, were moved prior to the start of the NuMI construction, from a wet area in ELM 25 to a similar wet area in ELM 24.

C. New Prairie Planted

1. About 18 acres of new prairie were planted in ELM 23.
2. About 2 acres of little bluestem were planted in ELM 12. This is a test to determine if we can grow little bluestem in ELM 14.

D. Ongoing Improvement Programs

1. As part of the noxious weed control program, teasel was sprayed in ELM tracts 19, 20, 24, 25, and 26. Loosestrife control was conducted in ELM tracts 1, 9, 11, 14, and 15; buckthorn and honeysuckle in ELM tracts 24 and 25; and cottonwood in ELM 1. Roads and Grounds, who conducts the control program, reports that the resources available do not keep up with the spread of these exotic species. The number of areas where they are found continues to grow annually.

2. Parts of ELM tracts 1, 2, 3, 4, 23 24, 25 and 28 were burned (See Burning).
The east half of ELM 14 was burned. A prairie burn history and plan was developed (See Burn Plan).

E. Status of Flora and Fauna

1. Status of Flora at Fermilab

Robert F. Betz (See Botanical Report-Fermilab 1999) prepared the annual status report of flora on-site.

Additional information about ecological land management activities and facts is available in the [Natural Areas Restoration](#) site.

A database of some of the plants identified at Fermilab has been established in the [Find Plants in the Fermilab Prairie](#) site.

2. Status of the On-Site Bird Populations

Peter Kasper prepared the annual report on the on-site bird population, [1999 Fermilab Bird Report](#).

Peter Kasper also maintains the on-going compilation of bird observations since 1987, [The Birds of Fermilab](#).

3. Wildlife Management

White-tailed deer continue to be the major focus of wildlife management at Fermilab. The U.S. Department of Agriculture Wildlife Services group conducted deer removals from November 1998 until March 1999, bringing the herd closer to the target density of approximately 10 animals per square mile. During the growing season of 1999, various subtle signs of these efforts were

noted. The following species were noticeably more abundant throughout the forests located in the west half of the site:

Phlox divaricata

Blephilia hirsuta

Arisaema triphyllum

Impatiens capensis

Impatiens pallida

Campanula americana

In addition to these observations in the forest, two species that have been demonstrated to be favorite forage for deer in the prairie, *Baptisia leucantha* and *Desmodium canadense* were observed to be more abundant in the center of the Main Ring and in the relatively young restoration along Kirk Road.

Comparison of browse lines around the site gave the impression that although there is still a noticeable browse line, it tends to be less defined than in years past.

Other wildlife species, including beaver, groundhogs, raccoons, and pigeons are controlled by the Roads and Grounds Department. Canada geese continue to constitute a nuisance species, however no controls have been implemented for them.

4. Status of Butterflies at Fermilab

Tom Peterson prepared the first annual report on a survey of butterflies on-site, [Butterfly Report– Fermilab– 1999](#).

F. NERP Research Projects

The "Measurement of Infiltration Rates on Midwestern Prairie Restorations in the Chicago Region" study was completed in 1999. Five projects are underway, including the following:

1. James D. Bever, "Biodiversity of Arbuscular Mycorrhizal Fungi and the Success of the Prairie Restoration"
2. Brenda Molano, "Differences in Reproductive Success of Prairie Plant Species between Restored and Remnant Prairies"
3. Wayne Lampa, "Tracking Natural Community Fragmentation and Changes in Land Use and Land Cover: A case study of Chicago Wilderness"
4. Diana Lane, "Species-specific Controls of Nutrient Cycling During Succession in Tallgrass Prairie"
5. Julie Jastrow, "Carbon Sequestration in Terrestrial Ecosystems"

In addition, the following two projects have been approved, but have not yet begun work in the field:

Roger Anderson, "Effect of species richness on the establishment and success of garlic mustard (*Alliaria petiolata*)"

V. Nuzzo and B. Blossey, "Interactions between Garlic Mustard and White-tailed deer foraging"

G. Other Accomplishments/Special Projects

1. About 25 pounds of little bluestem seed was planted in ELM 12.
2. Friends of Fermilab donated money for 5 bird feeders and the winter supply of birdseed for the Lederman Science and Education Center bird feeding area.
3. At least several dozen trees came up from the seeds planted last year in ELM 8. Another acre was planted next to that plot with seeds from black walnut, shagbark and bitternut hickory, red and white oak, hawthorn, and eastern wahoo.

4. The Committee gained an expert on butterflies, Tom Peterson. Tom has begun a survey to monitor the butterfly population on-site. He walks a fixed route, with the same weather conditions (warm and sunny), around mid-day to record the number of species he sees. This is tabulated for the whole season. For each species, there will also be a peak total day. The monitoring is mostly done in June and July. The results will also be included in the Northern Illinois Monitor Network. The results of his 1999 work are included in this report– see Section E.
5. Fermilab continues to be an active member of Chicago Wilderness (CW). We were represented by a display of the Fermilab Prairie Restoration at the 3rd Annual "It's Wild in Chicago" event sponsored by CW at the Field Museum in Chicago in May. Also in May, we participated in the annual CW Congress meeting, to discuss the Regional Biodiversity Recovery Plan. During the first of two seed-collecting days at the Lab, we participated in the National Public Lands Day regional event, which was sponsored by CW.
6. A program of burning was begun in ELM 14. The maintenance program for ELM 14 calls for maintaining an intermediate successional state. The past program of removing 10% of the largest trees was not addressing the intrusion of various aggressive brush species and is resource intensive. This year the west half of the tract was burned. The Bell's Vireos nested in the unburned portion of the site. Plans are to alternate sections burned, to control brush and to leave areas for the nesting birds.
7. The water was pumped out of the Village Oxidation Pond (See Oxidation Pond) and the piping and spray apparatus removed. The Pond, maintained in that state through the summer, dried out. The elevation at the bottom of the Oxidation Pond is 716.5 feet, and the boards in the A.E. Sea discharge structure are set at 717.0 feet. Thus, there is the potential to maintain a few inches of water in the Oxidation Pond. After the area dried out, some relief features were constructed to provide small islands within the area of water. Seeds of various sedges were planted this fall.

8. A portable seed dryer (See Seed Dryer) was designed and built to dry the mechanically harvested prairie seed. This solved the problem of spoilage due to moisture encountered last year. Another innovative feature introduced in the mechanical harvest is the use of burlap bags to hold prairie seed that we intend to trade to an off-site vendor.
9. The Core of Engineers approved the Main Injector Wetland Mitigation Area Project. The Management Plan for that area is to burn it as resources allow; control cottonwoods by cutting or chemicals; enrich the area; and install very shallow piezometers to monitor the water table.

H. Community Participation

1. The Lab participated in National Public Lands Day, sponsored by Chicago Wilderness, by including special tours at the first fall volunteer harvest. The Kane County Citizens for the Environment helped with the tours. The Kane County Mounted Patrol sent some volunteers to help. The Batavia Women's Club helped out by serving food. It is believed few people turned out only for the National Public Lands Day.
2. Children from Granger Middle School cleaned up trash in ELM 25.
3. About 200 students from Wheaton-Warrenville High School helped by hand harvesting in ELM 1 and ELM 25.
4. Fermilab exchanged prairie seeds with the DuPage, DeKalb, Kane, Will, and Kendall Forest Preserve Districts. The exchange program included Elmhurst Prairie, Indian Boundaries Prairie, and West Chicago Prairie Steward Group.
5. Seed was donated to 12 schools and other organizations for educational purposes.

III. Recommendations for Calendar Year 2000

The Committee believes that the first priority must be the ongoing maintenance and improvement activities (e.g. mowing, burning, enrichment, redistribution of small trees, and spraying of herbicides) conducted by the Roads and Grounds personnel. These activities are critical to maintaining and building on ecological improvements already achieved. The recommendations below are activities, in addition to maintenance activities, which will further the long range goals already established.

A. Special Projects

The Committee recommends the following special projects, some of which are already planned.

1. The thistles in RA 2 are becoming a maintenance problem. Only about half of the field is needed each year for hay for the buffalo. The Committee concurs with a recommendation that the tract be maintained by rotating each half, alternately, through a three-year "land management AG Lease" program.
2. The Committee recommends continuation of the project to develop the Village Oxidation Pond as a wetland.
3. The Committee was presented a proposal to develop the eastern portion, east of the remnant fence, of ELM 17 into a long-term "AG lease for prairie plant seed." The Committee supports that proposal.
4. The Committee also recommends the Lab continue with the implementation of a plan to improve maintenance of ELM 14. Peter Kasper has noted that the Bell's Vireos nested in the unburned areas in 1999. The committee suggests that in CY 2000 no burning be done. If the vireos move back into the west side (burned in CY 1999) then the burning program should be restarted.
5. The Committee continues to support a modest program of planting little bluestem as a method of finding if the conditions at Fermilab will support

establishing it where short grasses are wanted to encourage the nesting of grassland birds.

6. The Committee supports planting prairie seed in the Main Injector adjacent to the spoil pile area of ELM 4.
7. The Committee supports a proposal to plant prairie matrix in ELM 15. ELM 15 is used for parking for large public events. It is very rough and needs to be “worked down”. Each year the area is mowed to maintain it as a grassland and to ensure it is not over-run by invasive brush and trees. The Committee agrees that prairie grasses would be effective and suggests that the area continue to be maintained as a grassland.
8. The Committee recommends the Lab consider whether establishing “Experimental Sites” for some threatened plants would introduce a special burden if the operational needs of the Lab dictated construction at that site.
9. A group from upper Wisconsin is raising whooping cranes that they will train to migrate to Florida. They would like permission to use Fermilab for an overnight roosting spot in case of emergency. The Main Ring Lake/Logo Lake area was suggested. The Committee supports this proposal.
10. Many places on site have an increasing population of “undesirable” trees—e.g. cottonwood and willow. In the southern part of ELM 1 and parts of ELM 6 the number and size of these trees is negatively impacting the higher quality prairie development. The MI wetland mitigation area has many small cottonwood trees. In some places these trees are growing on berms or other places where they have to be removed because of potential impact on the program. Roads and Grounds removes trees as time permits and after obtaining permission from Lab management. The time necessary to get management clearance often precludes using tree removal as “fill-in” work and thus decreases the effectiveness of this part of the land management work. The Committee suggests that the Lab develop a Tree Removal Program. The program could specify the pre-approved conditions for removal of trees. For example, perhaps pre-approval can be granted for the

removal of cottonwoods and willows that are less than 6 inches in diameter, located in non-public areas. The Committee suggests that Roads and Grounds, working through their management structure, develop such a program for consideration by the Director.

11. The Committee encourages the on-going attempt to develop working relationships with commercial prairie seed vendors. This relationship may take the form of seed trade or “special AG land leases”.
12. The Committee continues to encourage the Lab to seek and participate in ecological related research that is compatible with the Lab Ecological Land Management Program. The Committee also encourages the Lab to continue to seek interested individuals to conduct ecological surveys. For example, the Butterfly Survey Program by Tom Peterson is a significant addition to the annual surveys being done on-site.
13. The committee supports the ongoing efforts to control the white-tailed deer population on the Fermilab site.

B. Recommendations for each ELM Tract

Specific recommendations for each ELM tract are indicated on the ELM Tract Annual Management Plan Sheets which follow. The second column is copied from the Long Range Management Plan. The third column is a copy of the CY 1999 Plan. The fourth column indicates what was done in that tract during CY 1999. The fifth column is the Committee recommendations for CY 2000. The recommendations are based on what the Committee believes is the next logical step in moving towards the long range goal, tempered with the Committee’s estimation of what resources may be available during the year.

IV. ELM Tract Annual Management Plan Sheets

ELM Tract Annual Management Plan Sheets Accomplishments Calendar Year 1999 and Recommendations for Calendar Year 2000 1/13/00

Tract Number/ Type	Long Range Management Plan	Annual Plan FY 1999	Activities CY 1999	Annual Plan CY 2000
1 Prairie	Continue current enrichment practice of overseeding needed species. Prairie areas should be burned every 2 to 3 years. The cottonwood grove in the far south needs to be removed. The deer enclosure areas will be utilized to conduct experiments.	<u>1999 Plan.</u> Burn both the north half and the south half. Control the cottonwood spread in the southern part by a combination of fire, herbicides, and cutting small trees with shears.	<u>1999 Accomplishments.</u> <ul style="list-style-type: none"> • Enriched with forbs. • South half burned spring and fall. • Cottonwood control. • Volunteer hand harvest. • Loosestrife control. 	<u>2000 Plan.</u> Continue to maintain and enrich.
2 Woods	The weedy brush should be eliminated. It is recommended that the tract be overseeded with savanna understory species. An annual burn is recommended for the next few years, until underbrush is under control. After that, burning every three years is also recommended.	<u>1999 Plan.</u> Burn and oversee as resources permit.	<u>1999 Accomplishments.</u> <ul style="list-style-type: none"> • Burned in spring. • Overseeded with a savanna mix. 	<u>2000 Plan.</u> Implement a more aggressive development program. Open up the understory by thinning the weedy species of trees and shrubs. Enrich with savanna mix.

3 Woods	This should be developed as a wet wood. The priority for this area is to study the composition of the forest and develop an intensive management plan.	<u>1999 Plan.</u> As an interim measure to developing an intensive management plan, the tract will be burned as part of ELM 1.	<u>1999 Accomplishments.</u> <ul style="list-style-type: none"> • Burned in the fall. • Enriched with forbs. 	<u>2000 Plan.</u> Implement a more aggressive development program. Thin the weedy species of trees and shrubs.
4 Prairie	Continued current enrichment practices of overseeding needed species in the prairie areas are recommended. The prairie should be burned every other year. The wooded areas can be burned every 2-3 years, overseeded with woodland understory species and enriched with appropriate trees. The two woods should have different management techniques. The northern section of the prairie area will be developed after the Main Injector construction is finished. Activities in this tract should be coordinated with the NERP researcher (Sluis).	<u>1999 Plan.</u> Poplars should be removed. Overseed the southern part with a wet mesic mix. Check the water table. Burn for cottonwood control. Examine the northern part for development. Overseed the mitigation area.	<u>1999 Accomplishments.</u> <ul style="list-style-type: none"> • Southern part and the wetland mitigation area were burned in the spring. • The southern part was enriched with forbs. 	<u>2000 Plan.</u> Seed the area adjacent to the MI spoil pile.

5 Brush	This area should be burned in thirds, one third each year. The objective is to maintain the underbrush at a minimum in order to keep this area in an intermediate successional stage. This will preserve a relatively isolated and very diverse scrubby habitat for wildlife. This management technique will sustain one of the few breeding areas for Bell's Vireo and yellow-breasted chats.	<u>1999 Plan.</u> Burn one third as time permits. Develop a pattern and schedule for burning.	<u>1999 Accomplishments.</u> <ul style="list-style-type: none"> • No maintenance activity during this period. 	<u>2000 Plan.</u> No activity planned.
6 Prairie	The primary focus for development should be the wetlands. However, there is opportunity for some prairie development in the southern part.	<u>1999 Plan.</u> Mow and maintain as needed until resources are available for development.	<u>1999 Accomplishments.</u> Mowed.	<u>2000 Plan.</u> Mow.
7 NERP	To maximize the usefulness for potential future research, it is suggested that the prairie areas be burned and enriched as resources permit. The pasture grasses should be mowed or burned to discourage intrusion of brush, exotics, and trees.	<u>1999 Plan.</u> Burn as time permits.	<u>1999 Accomplishments.</u> <ul style="list-style-type: none"> • Fallow areas were mowed. • Firebreaks were mowed around prairie areas. 	<u>2000 Plan.</u> Burn prairie areas. Mow non-prairie areas.

8 NERP	To maximize the usefulness for potential future research, it is suggested that the prairie areas be burned and enriched as resources permit. The pasture grasses should be mowed or burned to discourage intrusion of brush, exotics, and trees.	<u>1999 Plan.</u> Burn as time permits.	<u>1999 Accomplishments.</u> <ul style="list-style-type: none"> • Fallow areas were mowed. • Firebreaks were mowed around prairie areas. • Tree seeds (e.g. oak, hickory, and hawthorn) were planted for nursery stock. • Machine harvest. 	<u>2000 Plan.</u> Burn prairie areas. Mow non-prairie areas. Maintain the tree nursery.
9 Prairie	The priority for this tract is wetland development. Shorelines in this area are degraded, and should be given attention. (Any shoreline work must be coordinated with FESS.) New Prairie reconstruction in the southern portion is a lesser priority. The pasture grass fields should be mowed during the dormant season.	<u>1999 Plan.</u> Mow and maintain.	<u>1999 Accomplishments.</u> <ul style="list-style-type: none"> • Mowed. • Loosestrife control. 	<u>2000 Plan.</u> Mow and maintain.
10 Prairie	It is recommended that management of this area focus strongly on wetland development. There is also opportunity for some new prairie reconstruction.	<u>1999 Plan.</u> Enrich new prairie as resources permit.	<u>1999 Accomplishments.</u> <ul style="list-style-type: none"> • Mowed. 	<u>2000 Plan.</u> Develop the wetland area. Maintain the mesic area.

11 Grass- land	Maintain the grassland cover by mowing every other year or burning. The shrub should be cut. The wetland should be enhanced through burning, control the water levels with Agri-drain on drain tile, and possible plant community enrichment. Selective herbicide application may be used for problem species.	<u>1999 Plan.</u> Mow. Burn as time permits. Develop wetland only if outside interest and resources are found.	<u>1999 Accomplishments.</u> <ul style="list-style-type: none"> • Mowed. • Loosestrife control. 	<u>2000 Plan.</u> No change.
12 NERP	To maximize the usefulness for potential future research, it is suggested that the prairie areas be burned and enriched as resources permit. The pasture grasses should be mowed or burned to discourage intrusion of brush, exotics, and trees.	<u>1999 Plan.</u> Burn as time permits. Plant little bluestem as a test.	<u>1999 Accomplishments.</u> <ul style="list-style-type: none"> • Fallow areas were mowed. • Firebreaks were mowed around prairie areas. • Two acres of little bluestem planted. 	<u>2000 Plan.</u> Burn prairie areas. Mow non-prairie areas. Manage the little bluestem field.
13 NERP	To maximize the usefulness for potential future research, it is suggested that the prairie areas be burned and enriched as resources permit. The pasture grasses should be mowed or burned to discourage intrusion of brush, exotics, and trees.	<u>1999 Plan.</u> Burn as time permits.	<u>1999 Accomplishments.</u> <ul style="list-style-type: none"> • Fallow areas were mowed. • Firebreaks were mowed around prairie areas. 	<u>2000 Plan.</u> Burn prairie areas. Mow non-prairie areas.

14 Brush	Each year roughly 10% of the largest non-native trees in this area should be selected for removal in order to keep this area in an intermediate successional stage. The goal is to preserve a relatively isolated and very diverse scrubby habitat for wildlife. Owl's Nest Woods should be buffered with a brushy edge, grading into a more open scrubby habitat. Shoreline erosion should be managed to protect valuable trees.	<u>1999 Plan.</u> Remove the largest 10% of the non-native trees. Plant more natural species-e.g. nannyberry, hazelnut and hawthorn.	<u>1999 Accomplishments.</u> <ul style="list-style-type: none"> • Removed about 10% of the largest non-native trees. • The west half was burned in the spring. • Loosestrife control. 	<u>2000 Plan.</u> Remove the largest 10% of the non-native trees.
15 Grass-land	To keep stable grassland, it may be necessary to mow annually late in the growing season. Maintenance activities should be scheduled to minimize the impact on nesting of grassland birds when practical.	<u>1999 Plan.</u> Mow as needed.	<u>1999 Accomplishments.</u> <ul style="list-style-type: none"> • Mowed. • Loosestrife control. 	<u>2000 Plan.</u> Mow. A portion may be seeded with native grasses.
16 Grass-land	The tract needs to be burned or mowed to control goldenrod, at a time and in a manner to minimize the impact on the nesting of grassland birds. A search is underway for an optimum technique that both protects the grassland birds and controls the goldenrod.	<u>1999 Plan.</u> Mow east of Eola.	<u>1999 Accomplishments.</u> <ul style="list-style-type: none"> • Mowed both sides of Eola. 	<u>2000 Plan.</u> Mow.

17 Grass- land	The tract needs to be burned or mowed to control goldenrod, at a time and in a manner to minimize the impact on the nesting of grassland birds. The optimum technique that both protects the grassland birds and controls the goldenrod is under study.	Mow. <u>1999 Plan.</u>	<u>1999 Accomplishments.</u> <ul style="list-style-type: none"> • Mowed. 	<u>2000 Plan.</u> Mow. Consider a part of this tract for long term lease for growing prairie seed.
18 Woods	For aesthetic reasons mow the areas adjacent to Batavia Road and near the Village buildings. No other maintenance is needed. Allow the wooded area to fill in naturally.	Mow if needed. <u>1999 Plan.</u>	<u>1999 Accomplishments.</u> <ul style="list-style-type: none"> • No maintenance activity during this period. 	<u>2000 Plan.</u> No maintenance planned.
19 Grass- land	The Oxidation Pond should be drained and developed as a wetland. The brush along the northeastern shorelines of DUSAF Pond should remain undisturbed. The pasture grass areas should be mowed during the dormant season.	Mow. Drain the oxidation pond and begin developing it as a wetland. <u>1999 Plan.</u>	<u>1999 Accomplishments.</u> <ul style="list-style-type: none"> • Grass areas mowed. • The oxidation pond was drained. • Some wetland plant seeds were broadcast. • Teasel was sprayed. 	<u>2000 Plan.</u> Mow. Continue development of the Oxidation Pond as a wetland.
20 Prairie	It is recommended that some new prairie be developed. The remnant should be enriched and the emergent wetland developed.	Mow. <u>1999 Plan.</u>	<u>1999 Accomplishments.</u> <ul style="list-style-type: none"> • Mowed. • Teasel was sprayed. 	<u>2000 Plan.</u> No maintenance planned. A maintenance program is needed to control the brush.

21 NERP	Whenever the current or future NERP projects allow, this tract should be fire managed. Until then, annual mowing where possible would be desirable for brush control.	<u>1999 Plan.</u> Mow fire breaks.	<u>1999 Accomplishments.</u> <ul style="list-style-type: none"> • Fire breaks mowed under the power lines and around the perimeter. • Unused research equipment removed. 	<u>2000 Plan.</u> High priority for burning.
22 Grass-land	The tract should be mowed and overseeded with prairie matrix.	<u>1999 Plan.</u> Mow every other year.	<u>1999 Accomplishments.</u> <ul style="list-style-type: none"> • No maintenance activity during this period. 	<u>2000 Plan.</u> No maintenance planned.
23 Prairie	The prairie remnant and the proposed 10 additional acres in the southern portion should be enriched and restored. It is of interest to see how the prairie remnant abutting the new area will spread into the new area. The remnant should be managed by fire. The area near Casey's Pond should be overseeded with prairie matrix.	<u>1999 Plan.</u> Plant the new area with prairie mix.	<u>1999 Accomplishments.</u> <ul style="list-style-type: none"> • The new area was planted with a prairie mix. • Part was burned. • Volunteer hand harvest. 	<u>2000 Plan.</u> Enrich.

24 Woods	The goal in this tract is to develop a large area of woods, maximizing the area to edge ratio. First priority is to connect existing wooded areas with future tree plantings to eliminate fragmentation. The woodland understory species should be enriched. Burns should be conducted every 2 or 3 years, the frequency should be determined in part by the prevalence of garlic mustard, or other invasive species. Restore the spoil area along Giese Road.	<u>1999 Plan.</u> Determine the need for spoil piles for NuMI in ELM 24. If the existing spoil pile areas along Giese Road cannot be used, then continue the restoration of the existing spoil pile areas. Plant trees on Arbor Day. Rescue trees as needed from NuMI area. Burn big woods.	<u>1999 Accomplishments.</u> <ul style="list-style-type: none"> • About 125 trees were planted during Arbor Day activities. • The Big Woods was burned in the fall. • Understory mix was planted to enrich the woods. • Seed was harvested from the prairie area. • Machine harvest. • Teasel was sprayed. • Buckthorn and honeysuckle control. 	<u>2000 Plan.</u> Plant trees on Arbor Day. Continue vegetation studies related to the deer management program. Enrich the understory. Evaluate the need for burning.
25 Prairie	Continue the current enrichment practices of overseeding needed species in the reconstructed prairies. Continue the practice of moving plants (<u>hepaticas</u> etc.) in Morgan's Woods that are threatened by Kirk Road construction. Newer prairie areas should be burned every year. Older areas every other year.	<u>1999 Plan.</u> Machine harvest will be conducted in this prairie area. Burn the prairie. Enrich the prairie--drill where the prairie is burned, broadcast other areas.	<u>1999 Accomplishments.</u> <ul style="list-style-type: none"> • The prairie was burned in the spring of 1998. • Machine harvesting was done. • Parts were enriched. • Machine harvest. • Teasel was sprayed. • Buckthorn and honeysuckle control. 	<u>2000 Plan.</u> Enrich. Continue management.

26 Prairie	New prairie reconstruction is recommended for pasture grass fields. Continue enrichment of the existing prairies, burning every 2 to 3 years.	<u>1999 Plan.</u> Continue to develop the prairie.	<u>1999 Accomplishments.</u> <ul style="list-style-type: none"> • Firebreaks were mowed. • Volunteer hand harvest. • Teasel was sprayed. 	<u>2000 Plan.</u> Continue management.
27 Woods	Connect fragmented wooded areas with future tree plantings. The understory should be enriched. The adjacent wetlands should be maintained and enhanced.	<u>1999 Plan.</u> Nothing.	<u>1999 Accomplishments.</u> <ul style="list-style-type: none"> • No maintenance activity during this period. 	<u>2000 Plan.</u> No maintenance planned.
28 Prairie	The recommended management is annual burning with intensive enrichment as available resources permit.	<u>1999 Plan.</u> Burn if time is available. Enrich the prairie.	<u>1999 Accomplishments.</u> <ul style="list-style-type: none"> • The prairie was enriched and burned. • Machine harvest. 	<u>2000 Plan.</u> Enrich and burn.

Fermilab Prairie Burn History

Year/Burn Group (by plot #)	1, 2, 3, 5, 8	4, 7, 9	6, 10, 11, 13	12, 22	14, 18	15, 17, 20, 21	16	19	A	BN-N	BN-S	CA2	BW	MW	MI
Fall 1991															
Spring 1992	x				x	x15,17					x				
Fall 1992		x	x								x				
Spring 1993	x			x12	x	x15,17	x	New							
Fall 1993		x		x-12			x				x		x	x	
Spring 1994	x		x		x	x15,17						x			
Fall 1994		x				x15,17							x		
Spring 1995	x				x		x								
Fall 1995	x	x			x	x15,17				x	x				
Spring 1996			x	x12			x-	x				x			New
Fall 1996															
Spring 1997			x	x-12				x		x	x				
Fall 1997		x													
Spring 1998	x		x	x12	x	x15,17, 20		x			x				x
Fall 1998							x	x							
Spring 1999			x			x					x	x			x

x=75-100% coverage x- = 50-75% coverage

Burn Projections:

Fall '99/Spring '00	x	x	x	x	x	20,21 only	x			x		x	x		x
Fall '00/Spring '01			x			x	x	x			x	x		x	
Fall '01/Spring '02	x	x	x	x	x	x				x			x		x
Fall '02/Spring '03			x			x	x	x			x	x		x	
Fall '03/Spring '04	x	x	x	x	x	x				x			x		x

BOTANICAL REPORT—FERMILAB 1999

Robert F. Betz

10/15/99

New Species

During the 1999 growing season three new native species were found at Fermilab. The first was a prairie plant, the partridge pea (Cassia fasciculata), found in ELM-25 (Plot #15). As indicated by its English name, it is a member of the pea family.

The second was a wet-woodland plant, Pennsylvania bitter cress (Cardamine pennsylvanica), a member of the mustard family, in ELM-27 and the wooded area east of Kautz Road.

The third species is the somewhat weedy marsh plant nodding bur marigold (Bidens cernua), a member of the sunflower family. During September it produced a colorful ring of yellow flowers around the shoreline of Swan Lake to the west of Wilson Hall. Its prickly four-pronged burrs were undoubtedly transported to Fermilab by geese and other water birds on their feathers from surrounding aquatic areas.

With these three additional species, there are now 256 native prairie and prairie marsh species and 193 native tree and shrub species at Fermilab. In addition, there are 118 species of non-native (exotic) herbaceous weeds and 30 species of non-native trees and shrubs. In total, there are approximately 600 species. Most, but not all, of the non-native species are confined to roadsides, ditches, berms, and other disturbed areas.

Changes in Prairie Plant Populations

The increase in the populations of second stage prairie plants noted during the 1998 season has continued unabated during the 1999 season. Worthy of note is the increase in the number of gentians, especially the closed gentian (Gentiana andrewsii) and yellow gentian (G. flavida) in a number of tracts, especially in ELM-1, ELM-25, and ELM-26. Small increases in stiff (G. quinquefolia) and fringed gentians (G. crinita) also occurred in these same tracts.

The appearance of the prairie gentian (G. puberulenta), a comparatively rare late successional (fourth stage) plant of virgin prairies, in ELM-1 (Plot #1) was unexpected. (Only two plants, growing in the remnant prairie along the Burlington-Northern Railroad right-of-way, have ever been found at Fermilab). It was growing in a foci of second successional stage plants. It is quite possible that it had grown from a seed that had accidentally drifted down-wind from a few seeds sown near an enclosure about 1000 yards away several years ago. It lends credence to the pioneer ecological successional method of prairie restoration that is being attempted at Fermilab.

The increase in the numbers of blooming white wild indigos (Baptisia leucantha) and showy tick-trefoil (Desmodium canadense) in many of the prairie ELM tracts during the 1999 season is probably due to the reduction of the deer population. Deer are especially fond of the flowers of these species.

Another surprise was the appearance of more than 100 stems of marsh blazing star (Liatris spicata) in ELM-25 (Plot #17). In addition, a rough blazing star (L. aspera) was also found in this tract for the first time.

In ELM-4 (wetland mitigation area), which was commercially seeded, scattered specimens of 25 species of prairie plants were found among a variety of weedy annual vegetation. Twenty-two were plants of the first or early prairie stage. The remaining three species, purple coneflower (Echinacea pallida), prairie blazing star (Liatris pycnostachya) and rough-blazing star (L. aspera) were of the second prairie stage. Efforts will be made to enrich this developing prairie.

Continuing fire management of the Burlington-Northern Railroad right-of-way prairie has stimulated the flower production of a number of uncommon prairie and savanna plants, such as, prairie lily (Lilium philadelphicum andinum), prairie violets (Viola pedatifida), and one-flowered broom rape (Orobanche uniflora). Seed from these plants are important to the enrichment of the Fermilab prairie.

Changes in the Marshes

The prairie marshes continue to show increased populations of bulrushes, spike rushes, sedges, monkey flower, fog fruit, horehounds and various mints. Colonies of cardinal flower (Lobelia cardinalis), great blue lobelia (Lobelia siphilitica), common boneset (Eupatorium perfoliatum), and marsh betony (Pedicularis lanceolata) are continuing to expand not only in a number of marshes in ELM-1 and ELM-25, but in some of the ditches along roadways.

Changes in the Woods

With the culling of the deer herd, the woodland flowers are slowly beginning to reappear. Among those that were in evidence this spring were woodland phlox (Phlox divaricata), wood mint (Blephilia hirsuta), Jack-in-the-pulpit (Arisaema triphyllum), spotted touch-me-not (Impatiens capensis), pale touch-me-not (I. pallida), and tall bellflower (Campanula americana).

Weed Problems

Many of the problems involving weeds are due to the disturbed conditions found in modern landscapes—cultivation of soils, compaction of soil by heavy machinery, movement of soils from one place to another, chemical and bacterial pollution, salting along highways, etc. As the natural communities at Fermilab move toward higher ecological stages, it is less likely that weeds can penetrate into them. However, there are

still many areas at Fermilab that are continually being disturbed, which invite a rich variety of weed species from all parts of the globe.

At present, two weed species, both from Eurasia, cut-leaved teasel (Dipsacus laciniatus) and purple loosestrife (Lythrum salicaria) are occasionally found in scattered patches throughout Fermilab. The Department of Roads and Grounds is actively controlling them.

It is still not clear whether the developing prairie will be able to oust Eurasian crown vetch (Coronilla varia) from localized patches, as in ELM-1 (Plot #9). Preliminary observations are that it will.

The oriental bittersweet (Celastrus orbiculatus) is a woody vine that was introduced from East Asia that clammers over the vegetation along roadsides, fence rows, and woodland edges choking out shrubs and small trees. It has been eliminated from the half-dozen spots where it has been found.

Another potential weed threat to Fermilab is the common reed (Phragmites australis), a tall grass found in many parts of the world. It is probably not a native plant. Populations of this marsh grass have recently soared in marshes and roadside ditches eliminating many native marsh plants. It may need to be controlled.