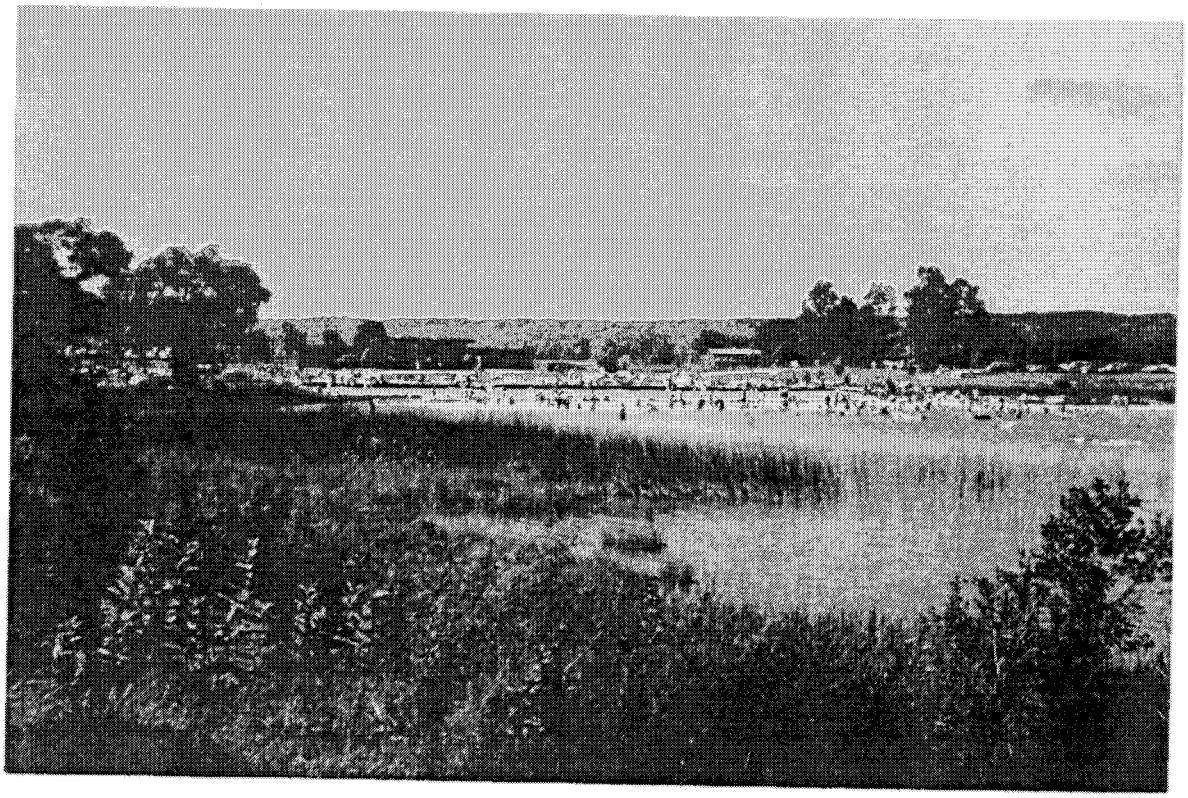
KETTLE MORAINE STATE FOREST

SOUTHERN UNIT



MASTER PLAN

Department of Natural Resources

September, 1991

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

Date: November 5, 1991 **File Ref:** 2100

To: Gloria McCutcheon - SED
Dave Weizenicker - PR/4

From: C. D. Besadny

Subject: Kettle Moraine Master Plans

At its September 26, 1991 meeting, the Natural Resources Board adopted the master plans for the Northern and Southern Units of the Kettle Moraine State Forest with the exception that mountain bikes be allowed only on the Emma Carlin Trail in the Southern Unit and the New Fane Trail in the Northern Unit.

The Resource Management/Business Committee directed the staff to evaluate the use of mountain bikes in the forest during the next three years, and to report back to the Board sooner if it becomes evident that considerable irreparable damage from mountain bike use is taking place.

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ACKNOWLEDGEMENTS

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INTRODUCTION AND EXECUTIVE SUMMARY

The Kettle Moraine State Forest is a unique remnant of glacial topography in southeastern Wisconsin (Map 1). Comprised of four units--Northern, Southern, Loew's Lake, and Lapham Peak--the forest provides a variety of outdoor recreational opportunities. Activities frequently pursued include camping, hiking, fishing, hunting, picnicking, cross-country skiing, horseback riding, wildlife observation, and snowmobiling.

The topography of the Kettle Moraine was formed during the last Ice Age 10,000 to 15,000 years ago. Massive lobes of ice--up to one mile thick--collided, causing tremendous pressure, friction, and buckling of the land surface. As the glacier melted, moraines, drumlins, kames, and eskers were formed. Many lakes, bogs, wetlands, and potholes are also a direct result of glacial activity.

Purchase of the Kettle Moraine State Forest - Southern Unit

In recognition of the unique, intact glacial formations in the Kettle Moraine area, in 1939 the State of Wisconsin purchased the first parcel of land for what was to become the Southern Unit. Today the Southern Unit project boundary encompasses 22,480 acres, of which 18,390 is in public ownership. The project boundary proposed in this plan has an acreage goal of 29,085 acres. This figure includes 1,036 acres of state-owned land, the 1,076-acre Scuppernong Wildlife Area and the 118-acre Bluff Creek Fisheries Area, all of which are being incorporated into the Southern Unit. The National Park Service also recognized the significance of the Southern Unit's glacial features and designated 33 miles of the Ice Age Trail as part of the National Scenic Trail system.

Management of the Forest

Outdoor recreation is the primary use and management focus of the Southern Unit with approximately one million visitors annually. The integration of other program activities such as fisheries, wildlife, and forestry, and the proper management of endangered and cultural resources is also important to achieving the goals and objectives of the forest.

Development of the Plan

The master plan is the result of the work of several groups including a Department task force, a vegetation management committee, a citizen's advisory committee, various resource management specialists, citizens, and organized groups.

The master plan serves as a guide to the management of the Southern Unit. Modifications to the master plan may be necessary due to changes in environmental or resource conditions, changes in legislation, or additional information and other unforeseen circumstances.

Goal Statement and Management Proposals

The goal for the forest is: "To preserve a unique geological formation of state and national significance; to provide a variety of outdoor educational and recreational opportunities that

are in harmony with each other and the environment; to be a place to escape the sights and sounds of urban life; to protect the natural landscape; and to protect rare species, communities, and ecosystems, while retaining and enhancing the high quality experience of current forest users and demonstrating sound resource management practices."

Major proposals in the plan include:

Land Acquisition

* Expand the project boundary by 6,605 acres to a total of 29,085 acres.

  - Add 4,375 acres of privately owned lands to the expanded boundary.

  - Incorporate the 1,076-acre Scuppernong Wildlife Area and the 118-acre Bluff Creek Fisheries Area into the expanded boundary.

  - Incorporate 1,036 acres of other state-owned lands into the expanded boundary.

Timber and Vegetation Management

* Base vegetation management decisions on integrated resource management principles with priority on wildlife habitat, recreation, restoration of native plant communities, and education and interpretation.

* Encourage and supplement natural regeneration of the forest using artificial regeneration techniques that imitate a natural appearing forest.

* Recognize outdoor recreation, wildlife habitat and aesthetics as key objectives in making timber harvesting and other vegetative management decisions.

* Reinstate a tree planting program which matches the species to the site characteristics and incorporates savanna reestablishment where appropriate.

Parks and Recreation

* Concentrate recreational development in areas of existing intensive development.

* Prohibit the use of motorized all terrain vehicles (ATVs) on the forest except possibly for disabled persons by permit only. A disabled access policy has not been approved and is subject to the Department developing a manual code. If ATVs are permitted on county snowmobile trails in the future, the Department may review the policy banning them from the forest. ATVs would only be allowed on designated snowmobile trails during periods of adequate snow cover.

* Construct a variety of recreational facilities including picnic shelters, scenic overlooks, and wildlife observation structures.

* Upgrade and improve the energy efficiency of existing facilities.

* Designate specific trails for mountain bike use.

* Establish an archery hunting- and trapping-only zone around the Scuppernong Trail. Deer and spring turkey hunting with firearms will be allowed in this zone during established hunting seasons.

Interpretation and Education

* Provide interpretation and education of the Southern Unit's natural history, flora, fauna, environment, geology, archeology, and history.

* Expand the naturalist program to include the concept of integrated resource management.

Wildlife

* Restore 10 small (1-10 acre) wildlife impoundments/wetlands.

* Establish an annual spring turkey hunting season.

* Establish a 200-foot strip along all water bodies on state property where agricultural practices such as cultivation, fertilization, or pesticide application will be restricted.

* Continue the sharecropping program.

* Incorporate information on wildlife observation areas into forest literature.

Endangered Resources

* Designate the Kettle Moraine Oak Opening as a State Natural Area and add 492 acres to the Young Prairie State Natural Area.

* Designate the 3,245-acre Scuppernong River area as a Habitat Preservation Area.

* Implement management programs to inventory forest habitats for rare plant and animal species.

* Implement management programs to protect and restore state endangered, threatened, and special concern species.

Fisheries

* Remove the dike at Scuppernong Springs to allow reversion back to a natural spring and stream system.

* Construct a self-guided aquatic habitat interpretive trail at Ottawa Lake.

* Dredge the Paradise Springs pond to provide for a 10% increase in trout populations.

Cultural Resource Management

* Develop long-term management plans for sites listed on or eligible for the State or National Register of Historic Places.

* Consider cultural resource protection and preservation in any land use changes or development projects.

DEFINITIONS OF USEFUL TERMS

Access: The opportunity for the public to launch watercraft such as boats and canoes, enter the water to swim or wade, fish from the bank or while wading, or engage in recreational activities on the banks of a river or lake.

Aesthetic Management: Aesthetic management emphasizes the management of timber harvests toward the creation of more visually diverse landscapes.

Biodiversity: Biodiversity is a variety and variability among living organisms and the ecological systems in which they occur on the local and regional landscape.

Cultural Resources: Buildings or other structures, or other cultural remains that have architectural, archeological, or other historic or cultural significance. Cultural resource sites have educational, recreational, scientific research, and historic value.

Drumlins: Oval-shaped hills formed under glacial ice in the back of the marginal moraine.

Endangered Species: A species on the Wisconsin Endangered Species list is any whose continued existence as a viable component of the state's wild animals or wild plants is determined by the Department to be in jeopardy on the basis of scientific evidence.

Esker: A long, narrow ridge of coarse gravel deposited by a stream flowing in an ice-walled valley or tunnel in a melting glacier.

Extirpation: The elimination of a species.

Fragmentation: The result of dividing large and continuous tracts of natural habitat into smaller habitats surrounded by altered or disturbed areas.

Habitat Preservation Area: Habitat Preservation Areas are those lands and waters containing excellent natural habitat and characteristics that are conducive to the perpetuation and production of fish and wildlife.

Integrated Resource Management: A process to increase the effectiveness and efficiency of protecting and managing natural resources. It applies the concept of cooperative decision making among resource management and environmental protection personnel, the public, and other local, state and federal government representatives.

Interlobate Moraine: A geological feature formed by the opposing movements of two lobes of a glacier at their junction.

Kame: A conical-shaped hill formed at the bottom of a vertical shaft by glacial debris deposited by meltwater.

Kettle: A depression formed by buried glacial ice. Some kettle holes hold water.

Natural Areas: Tracts of land or water which exhibit pre-settlement conditions and contain significant native plant and animal communities or unique geologic features. Natural Areas have been identified statewide by the Wisconsin Scientific Areas Preservation Council and the Department's Bureau of Endangered Resources.

Neo-tropical Migrants: Bird species that summer in North America and migrate to and winter in Central and South America.

Prescribed Burn: The use of regulated fire to reduce or eliminate undesirable vegetation.

Preservation: Maintaining the integrity of a site, such as a woodland, in its natural or existing state.

Protection: Guarding against the disruption of a functioning ecological system.

Restoration: Bringing a site to its former or original condition, which includes encouraging the biological diversity of a site.

Silviculture: The theory and practice of controlling forest establishment, composition, and growth as a biological unit.

Special Concern Species: Some species about which a problem of abundance or distribution is suspected but not yet proven scientifically. The classification is to focus attention on species before they become threatened or endangered.

Stewardship Program: A 10-year $250 million fund (bonding program) that will make the 1990s a landmark decade for conservation. Stewardship is rooted in recommendations for protecting environmentally sensitive areas, acquiring recreational lands, and maintaining state recreational opportunities.

Threatened Species: A species on the Wisconsin Threatened Species list is one which appears likely, within the foreseeable future, on the basis of scientific evidence, to become endangered.

SECTION I - GOAL STATEMENT AND OBJECTIVES

Goal Statement

To preserve a unique geological formation of state and national significance; to provide a variety of outdoor educational and recreational opportunities that are in harmony with each other and the environment; to be a place to escape the sights and sounds of urban life; to protect the natural landscape; and to protect rare species, communities, and ecosystems while retaining and enhancing the high quality experiences of current forest users and demonstrating sound resource management practices.

Objectives

1. Provide multiple natural resource benefits with resource-based outdoor recreation opportunities (including hunting and fishing) recognized as the major use, while protecting the diverse native species and ecosystems of the Kettle Moraine region.

2. Provide a balance of outdoor recreational opportunities that will still protect sensitive resources, both natural and cultural, on the forest.

3. Provide opportunities for changes to the present level of recreational participation (Table 1).

4. Provide opportunities for high quality user experiences using regulatory techniques including zoning, spatial and time separation, permits, reservations, and density limits.

5. Concentrate any needed additional facilities for providing general recreational activities in areas of existing intensive development. The quality of existing facilities will be maintained or improved and comply with environmental regulations.

6. Provide recreational opportunities and facilities for individuals with physical or sensory disabilities.

7. Develop forest-specific interpretive, educational, and demonstration programs which provide the public with an appreciation of the natural and historical environment of the forest, and associated resource management activities, while enhancing the public's understanding of broader environmental and resource management concerns.

8. Prescribe resource management activities which enhance the setting for outdoor recreation, maintain aesthetics, and protect the natural communities and ecosystem functions and processes.

9. Implement integrated silvicultural and other vegetation management practices to promote a balance between recreational goals, aesthetic values, wildlife habitat, and educational activities, and the continued production of forest products.

10. Preserve and maintain State Natural and Habitat Preservation areas, and designate additional sites where appropriate.

11. Demonstrate proper methods of dealing with environmental concerns (recycling, wastewater treatment, pesticide usage, water quality, and erosion control) by using acceptable management practices.

Table 1 reflects the change in the level of recreational opportunities available in the Southern Unit.

Table 1

Change in Recreational Opportunities*

Activity	Change
Deer hunting	Slight increase
Turkey hunting	Significant increase
Pheasant hunting	Slight increase
Waterfowl hunting	Moderate increase
Rabbit hunting	Slight increase
Squirrel hunting	Slight increase
Grouse hunting	Slight increase
Other game hunting	Slight increase
Trapping	Slight increase
Warmwater fishing	Slight increase
Coldwater fishing	Slight increase
Boating & canoeing	Slight increase
General camping	Slight increase
Group camping - outdoor	Slight increase
Trailside camping	No change
Equestrian camping	No change
Picnicking	Slight increase
Outdoor education/skills	Moderate increase
Swimming	No change
Hiking	Slight increase
Equestrian riding trails	Slight increase
Cross country skiing	Slight increase
Snowmobiling	No change
Mountain Biking	Slight decrease
Biking	No change
Target shooting	Slight increase
Dog trials and training	Slight increase
Sightseeing	Slight increase
Wildlife observation	Slight increase
Gathering	Slight increase
Viewing from observation towers	Significant increase

* All new recreational uses and opportunities will be measured against their impact upon uses existing at the time, with greater value placed on non-mechanized activities.

SECTION II - PROPOSED MANAGEMENT AND DEVELOPMENT PLANS

A. Land Acquisition and Ownership Goals

The existing Kettle Moraine State Forest-Southern Unit project boundary encompasses 22,480 acres, of which 18,390 (82%) is in state ownership, as of December 1990 (Maps 2 and 3). The proposed project boundary would add 6,605 acres including 4,375 in private ownership, the 1,076-acre Scuppernong Wildlife Area and 118-acre Bluff Creek Fisheries Area, and 1,036 acres of other state-owned lands. The proposed project boundary encompasses a total of 29,085 acres. It is the policy of the Natural Resources Board to acquire land from willing sellers or through donations. In addition, easements which include scenic and land use restrictions can be used to protect critical habitat and aesthetics, or to discourage unwanted development.

This property is a major Department land holding in heavily urbanized southeastern Wisconsin. There are no other public or private lands in this area that can offer the amount of outdoor recreation provided by the Southern Unit. The forest offers large public hunting areas and an extensive trail corridor system including 33 miles of the Ice Age National Scenic Trail.

When the land acquisition program was developed for the forest, environmental protection, resource management, and visitor management were considered. For example, some lands were added to the project boundary so that the property would be wide enough in the future to separate the trail treads for the two forest-long trails. Other lands were added to protect geological features and to protect or restore wildlife habitat, restore wetlands, and to protect streambanks from erosion. The Department will focus its real estate acquisition activities on land within the proposed project boundary that has a high probability of a change in use, land now used or suitable for intensive outdoor recreation, land needed for habitat management or public facility development, and scenic land with a high potential for incompatible land use.

There is no specific timetable for land acquisition; however, the goal is to acquire land or easements over the next ten years. Funding will be secured through the Stewardship Program (1989 Wisconsin Act 31) and the Natural Resource Foundation whenever possible. Cooperative relationships with local units of government, and conservation organizations such as The Nature Conservancy, the Ice Age Park and Trail Foundation, and the Trust for Public Lands will continue to be developed as a means to acquire lands. Scenic and conservation easements, and short-term arrangements such as hunting leases and land use agreements will also be used.

B. Timber and Vegetation Management

Vegetation management provides many forest benefits. It enhances outdoor recreational opportunities, improves habitat for wildlife species, protects natural areas, perpetuates native forest cover types, and produces a sustained yield of forest products. The objectives for the forest guide the specific vegetation management activities. They are further modified by specific timber type, habitat, or other local management needs. Specific vegetation management recommendations are further discussed on page 17.

Vegetation Description and Management Prescription

The Southern Unit has a variety of plant communities including mixed hardwood forest, conifer plantations, wetlands, restored native prairies, oak savanna, and agricultural lands. A vegetation management committee established management recommendations for the forest vegetation cover types. The committee used the existing vegetation base from which to establish recommendations. The planned vegetation cover types, for all lands within the proposed project boundary are shown on Map 4. A comparison of the existing and planned cover type acreage, by compartment, is in Table 2. The total acreage in the planned cover type categories is greater than the total existing acreage to account for the expanded project boundary.

Long-range (100+ years) cover type goals have been established for all the acreage in the forest, except those in the oak/central hardwoods category. The Department will address this category after a vegetative reconnaissance (survey) is completed.

The long-range cover type goals established for the forest are based on two principles--biodiversity and aesthetic management. Biodiversity is the variety and variability among living organisms and the ecological systems in which they occur on the on the local and regional landscape. To protect and restore the natural diversity originally found in the presettlement Kettle Moraine area, the location of various cover types was changed and consolidated. Aesthetic management emphasizes the management of timber harvests toward the creation of more visually diverse landscapes. Cover type goals for acreage along roadways and in high use areas were established to be consistent with aesthetic management goals. A brief discussion of the general management prescriptions for various vegetation types in the forest is presented below.

Cover Type Descriptions and Management Recommendations

Weedy Field. A weedy field is an area recently under cultivation that is now reverting to a grassland, but still supports an abundance of weedy plants. Common species include foxtail, yarrow, and goldenrod. The management recommendation is to burn once every five years.

Old Field. An old field is a disturbed grassland, usually an old pasture, that has been in this state for a number of years. Usually the sod is very dense and thick. Common species include brome grass and kentucky bluegrass. The management recommendation is to burn once every five years.

Switch Grass Field. A switch grass field is a grassland dominated by switch grass. These fields will be burned once every seven years.

Prairie Old Field. A grassland that is being invaded by prairie species is classified as a prairie old field. At least one-fourth of the species should be prairie plants. Common species include blazing star and compass plant. The management recommendation is to girdle problem woody species and allow them to dry, and to burn once every three years.

Xeric Prairie. A xeric prairie is a grassland area of native plants located on a very dry site. Common species include little bluestem and silky aster. The management recommendation is to girdle problem woody species and allow them to dry, and to burn once every five to seven years.

Mesic Prairie. A mesic prairie is a grassland area of native plants, which is located in a moderately moist site. Common species include big bluestem and needle grass. The management recommendation is to girdle problem woody species and allow them to dry, and to burn once every three to five years.

Wet-mesic Prairie. A wet-mesic prairie is a grassland area of native plants located in a flat area that is very wet in the spring and fall. Common species include bluejoint and big bluestem. The management recommendation is to girdle problem woody species and allow them to dry, and to burn once every three to five years.

Lowland Prairie. Lowland prairies are dominated by native grasses, sedges, and forbs that are associated with prairies. Common species include prairie cordgrass and culvers root. The management recommendation is to girdle problem woody species and allow them to dry, and to burn once every three to five years.

Wet Meadow. A shallow wetland densely covered by low-growing sedges and forbs is classified as a wet meadow. The management recommendation is to burn once every five years.

Agricultural Lands. Agricultural lands are open areas that were recently or are still being cultivated.

Brush Field. A brush field is an area where the brush is co-dominant with the grasses, and at least fifty percent of the field is in brush. The management recommendation is to cut or girdle problem woody species and allow them to dry, and to burn once every five years.

Oak Savanna. The oak savanna is a semi-open area with less than fifty percent tree (crown) cover per acre. The management recommendation is to cut brush, girdle problem woody species, and burn once every three to seven years.

Oak/Central Hardwoods. This community consists of red, black, white, and bur oak associated with other hardwoods or dominated by cherry, elm, and walnut and associated with oak and hickory. The oak is favored on many sites to produce habitat and food resources for deer, wild turkeys, squirrels, rodents, birds, and many other species of wildlife. The primary management recommendation is to perpetuate the oak type. Much of the oak timber in the forest is mature or over-mature and needs to be regenerated. Because oak does not reproduce well in heavy shade, clearcutting, shelterwood harvesting, and prescribed burning are accepted silvicultural methods for regeneration. Control of understory competition and supplemental planting of oak seedlings may be required to ensure successful regeneration. The final harvest in the shelterwood area is not completed until adequate regeneration is established. Timber sales in this cover type will be designed to retain three to four den trees per acre. Oak wilt exists in the forest and control measures will be implemented as necessary. On some sites, succession from the oak forest to a central hardwood forest will be allowed to occur.

Conifer Plantations. A conifer plantation consists of red pine, white pine, norway spruce, and white spruce. The management activities prescribed for this timber type include thinning to maintain vigor, and pruning to improve stand quality, reduce fire hazard and prevent insect or disease infestations. Openings and small patches of vegetation within the plantation will be maintained. Plantations will be harvested at rotation age (from 90-120 years) and the site evaluated for continued pine plantation or conversion. Some new pine plantations will be considered in old field situations and be used as accents to hardwood associations. Small plantings of spruce will be considered for winter wildlife cover and for screening road sights and sounds from natural settings.

Red Cedar Glade. A red cedar glade is dominated by red cedar. The management recommendation is to cut brush, girdle problem woody species and allow them to dry, and to burn once every three years.

Compartment Descriptions

Compartment vegetation surveys, obtained through the systematic collection of basic cover type data, is used as the data base for forest management plans and activities. Basic cover type information for each of the 16 compartments in the Southern Unit is outlined below. The compartments are shown on Map 5.

Compartment 1. This compartment encompasses a major recreational area of the forest, containing the Ottawa Lake Recreation Area and a major field trial area. The recreation area contains a somewhat pure stand of black locust, but most of this compartment is marshland with small stands of swamp hardwoods, aspen and soft maple.

Compartment 2. This compartment is mostly timbered. Approximately 431 acres of conifer plantation were planted between 1941 and 1965. Most of the compartment is composed of native oak, ranging in age from 100 to 120 years. Where oak reproduction is absent, mixtures of buckthorn, box elder, cherry, and hickory form much of the stand.

Compartment 3. Oak covers most of the acreage in this compartment. The understory is mostly dogwood, cherry, buckthorn and raspberry. There is some pine plantations, fields, and upland brush.

Compartment 4. The upland brush in this compartment is primarily grasses with scattered oak and red cedar. A variety of conifer plantations including red and white pine, and spruce were established before 1960. The compartment also contains oak stands with an understory of buckthorn, sumac, and cherry.

Compartment 5. Most of this compartment is lowland marsh with pockets of aspen. The aspen understory is mostly buckthorn and box elder. The oak stands in this compartment are associated with hickory, cherry and buckthorn.

Compartment 6. The majority of this compartment is in private ownership and information on vegetation cover is unavailable.

Marshland and grassland dominate the publicly owned lands. Timbered tracts are small and scattered, with black oak dominating. Hickory, cherry and ash are also present.

Compartment 8. A significant portion of this compartment has been planted to red pine with the remaining area reverting to natural vegetation.

Compartment 9. Oak is the predominant cover type, with an understory of honeysuckle, viburnum, prickly ash and buckthorn. Significant red pine plantations are also present. There is a large area surrounding the forest headquarters buildings that will remain in a native vegetation cover.

Compartment 10. This compartment encompasses the Carlin Timber Harvest Forest. Red pine plantations and several blocks of white pine are scattered throughout the compartment. Box elder, elm and ash can frequently be found growing along the hiking and horseback trails. This compartment also supports several stands of white oak and black oak, with prickly ash and honeysuckle present in the understory. Grassland areas reverting to prairie are fairly common, as are upland brush areas dominated by prickly ash and sumac.

Compartment 11. Three main cover types--red pine plantations, native oak stands with mixed hardwoods, and upland grass/brush areas encompass this compartment.

Compartment 12. Over 400 acres of red pine and white pine plantations are present. In addition, stands of central hardwoods (oak, hickory, and, cherry) are common. There are pockets of ash, hackberry, and prickly ash. Most of this compartment's grasslands are abandoned farm fields, with natural grasses predominating. The upland brush areas are diverse with dogwood, wild plum, hawthorne and aspen.

Compartment 13. Almost 50% of this compartment is comprised of hardwood stands. The predominant cover type is oak/hickory, with bur, black, red, and white oak present. Significant portions of the compartment consist of red pine and white pine plantations. Over 200 acres of the compartment are categorized as grassland, upland brush, or marsh land.

Compartment 14. Oak, hickory, and cherry are the most common cover types in this compartment. In some sections, the understory contains undesirable brush species such as prickly ash and honeysuckle. A small portion of this compartment is comprised of a red pine plantation. The grassland and upland brush acreage supports patches of aspen, cherry, hawthorne, and other shrubs.

Compartment 15. This compartment encompasses red and white pine plantations and oak hardwood stands. Upland brush is a major problem in some areas, with prickly ash being the predominant species. There is a significant amount of young basswood growth in several areas. Open grassland and upland brush areas lend variety and diversity. Five acres of this compartment are used as a scientific tract by the U.S. Forest Service through a cooperative agreement with the Department.

Compartment 16. The Whitewater Lake Recreation Area is in this compartment. White and red pine, and spruce plantations are present. Nearly 200 acres of hardwood, with grassland and marshland, are contained in this compartment.

Table 2

Vegetation Cover Types

Existing Vegetation Cover Types

	Compartment Number*																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total
Grass	199	320	97	87	166	40	293	111	321	254	71	177	172	59	133	36	2536
Upland, Lowland Brush	89	63	31	52	581	52	12		104		92	13	90	254	139	151	1723
Lowland	166			1	510		247		92	104			31		11	28	1190
Agricultural Lands	55	82	65	12	219	30	153		262		91	20	27	92	53	7	1168
Central Hardwoods	81	931	318	189	189	71	63	183	748	109	392	435	604	651	396	243	5603
Conifer Plantation		431	255	212	104			169	411	233	222	368	405	52	109	87	2968
Water Bodies	29	10			13	7		45	36			16	26	36		14	232
Total Acres Existing	619	1837	766	553	1692	200	768	508	1974	700	868	1029	1355	1144	841	566	15,420

Planned Vegetation Cover Types

	Compartment Number																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total
Weedy Field - Foxtail, etc.	157	201			139	742	877		454	483	227		182	181	150		3793
Old Field - Brome Grass, etc.					401	25		60									486
Switch Grass Field	30																30
Prairie Old Field							507										507
Xeric Prairie			110						60						87		257
Mesic Prairie			183	29	290												502
Wet-Mesic Prairie					1464					69			41			141	1715
Lowland Prairie					279									188			467
Wet Meadow	213			1	746		1273		38	321	15	1836	220		494	651	5808
Agricultural Lands		94							5	9	14			13			135
Brushy Field	89																89
Oak Savanna				588	323	267	6			515	1117			316	103		3235
Oak/Central Hardwood	87	1606	527	407		95	324	120	934	698	410	61	848	1007	840	343	8307
Conifer Plantation		618	265	210			55	348	402	23	324	73	625		53	62	3058
Red Cedar Glade				9													9
Water Bodies	43	10			319	9	13	45	81		8	16	31	98		14	687
Total Acres Planned	619	2529	1085	1244	3961	1138	3055	573	1974	2118	2115	1986	1947	1803	1727	1211	29,085

* See Map 5 for compartment location.

C. Proposed Development and Operations

Coordination and integration of various program activities is essential to management of the forest. The result of this management will be a balance between the use and protection of the natural resources, and forest development and operations. During the development of each biennial budget, the Bureaus of Parks and Recreation, Fisheries Management, Wildlife Management, Forestry, and Endangered Resources will review proposed projects that are specific to the forest. Projects written by other programs that are related to the forest will receive a similar review.

Development and operations recommendations, by program, are presented below in priority order.

Parks and Recreation

Providing opportunities for a high-quality recreational experience is a primary objective in the future management and development of the forest. Recreational development will generally be concentrated in existing intensive development areas.

Development

1. Provide two disabled-accessible flush toilet/shower buildings in Whitewater Lake Campground.

Cost $280,000 each Biennium 1991-93 and 1993-95

The existing toilet buildings at Whitewater Lake campground are vault-type structures that are inaccessible to people with mobility impairments.

2. Replace the existing toilet, changing stall, and beach access facilities at the Whitewater Lake beach.

Cost $127,000 Biennium 1993-95

The restrooms at Whitewater Lake Beach are twenty-five years old and have structural problems. The restrooms also are not accessible to people with mobility impairments. Similarly, the only access to the swimming beach and picnic area is down a steep gravel path that frequently erodes. The changing stalls were removed in 1988. New changing stalls will be incorporated into the new disabled-accessible restroom facility or built adjacent to the picnic/beach area.

3. Construct a permanent entrance station at the Pinewoods Campground.

Cost $30,000 Biennium 1993-95

Currently, a small (4' x 8') temporary building is used to collect admission fees, disperse information, and register campers at the entrance to the 64-unit campground. The building

has no interior public space area, no restrooms or water service, and is not accessible to people with mobility impairments. Recent construction at Pinewoods has increased the number of traditional campsites to 100 and added a 160-person group campground. Because all of the group campsites and many of the traditional campsites will be reservable, a small indoor area is needed where campers can complete forms and review the choice of available sites.

4. Develop a forest-long snowmobile/equestrian trail with parking lot access at three points.

Cost $8,000 Biennium 1993-95

The trail is proposed to run from just north of the Pinewoods Campground, south along the eastern forest border, west past the headquarters building, and continue southwest to the Whitewater Lake Campground. A forest-long snowmobile and equestrian trail is in high demand by forest users. Equestrians would benefit from a forest-long trail by gaining shorter and safer access to the existing trail systems. An average of three long-distance trail events occur in the forest annually indicating the need for long-distance horse trails.

Snowmobiling will be the other principle use of the forest-long trail. The forest currently has three separate snowmobile trail systems. For snowmobilers to get from one system to the other, they must drive their machines on county or private club trails.

5. Construct a hiking and nature-interpretive trail around Ottawa Lake that will be accessible to people with mobility impairments.

Cost $5,000 Biennium 1993-95

A hiking and nature-interpretative trail around Ottawa Lake that is accessible to people with mobility impairments will:

* Reduce crowding on the Scuppernong Nature Trail (currently the closest trail to the campground).

* Provide a trail to users of the Ottawa Lake recreational facilities.

* Eliminate the need for hikers to cross a busy road to access the trails.

* Offer numerous interpretive possibilities.

* Provide campers with mobility impairments a trail near the campground.

6. Expand the east loop of the 35-site Whitewater Lake campground to a 100-unit campground with one entrance developed at the existing contact station.

Cost $250,000 Biennium 1993-95

One entrance will improve management and control of the campground with all traffic passing

the contact station. A portion of the new sites will offer electricity and will be accessible by persons who are disabled.

7. Develop a Special Events Area in the present location of the Ottawa Dog Trial Area and Puckner's Pond picnic grounds off of State Highway 67.

Cost $240,000 Biennium 1995-97

This area will provide a designated site for many activities currently taking place throughout the forest.

8. Construct a reservable group picnic shelter, and upgrade the parking and restroom facilities at the former site of the LaGrange campground off of CTH "H."

Cost $75,000 Biennium 1995-97

The new shelter will be enclosed, and the parking and restroom facilities will be upgraded. The use of the shelter will be similar to that of the Mackie shelter on the north end of the forest. The Mackie shelter is reserved year around for weddings, meetings, club outings, hiking and skiing parties, and other occasions. There will be direct access to the Nordic hiking and skiing trail system.

Forest shelters are reservable up to one year in advance. The group gets exclusive use of the shelter and associated facilities for that day. Volleyball and horseshoe courts will also be developed.

9. Replace the existing entrance station at the Ottawa Lake campground day use area.

Cost $32,000 Biennium 1995-97

The existing building is too small to meet the needs of staff and the public for registering campers, making reservations, loaning sports equipment, and processing the daily campsite waiting list. The 25-year old building has a flat roof that leaks, inadequate space for storage, and no plumbing.

10. Purchase and install play equipment at the Ottawa Lake day use area that is accessible to children with disabilities.

Cost $15,000 Biennium 1995-97

The equipment will replace the existing steel pipe swings with play equipment that is accessible by everyone.

11. Construct five walk-in camp sites at the Ottawa Lake campground.

Cost $2,000 Biennium 1997-99

Walk-in campsites are popular because they offer a more secluded setting. The area is suitable for walk-in campsites with a minimum of development work and environmental impact. Current fee and registration procedures will apply.

12. Convert the west loop of Whitewater Lake campground into a group campground.

Cost $5,000 Biennium 1997-99

Surveys show that the demand for group camp facilities remains high. This new campground will be within easy walking distance of the Rice Lake day use area which offers picnicking, boat access, fishing, and a self-guided nature trail, and will have direct access to the Ice Age Trail. This conversion will maintain a separation between the group and traditional campgrounds; however, they will be close enough to make maintenance and visitor service more effective. The entrance will be separate for each campground to avoid any unnecessary congestion.

13. Convert the Whitewater/Rice Lake Recreation Area into a one-entrance configuration.
Cost $300,000 Biennium 1999-01

One entrance will improve service to visitors ensuring they get their questions answered, receive maps, pay admission fees, and get help in case of an emergency.

14. Construct an 80-foot tall wooden observation tower on the moraine ridge to the west of the Scuppernong hiking/skiing trail parking lot.

Cost $150,000 Biennium 1999-01

Observation towers are popular, year around attractions. The view from the proposed site includes the Scuppernong Marsh, Ottawa Lake, and the rolling, glacial hills of the forest.

The Scuppernong hiking/skiing trail parking lot will be used. The existing toilets at that location need to be upgraded to meet current and proposed use levels, and a well is needed. Steps are needed from the parking lot to the top of the hill. The existing service road at the other side of the hill will be used during construction and maintenance.

15. Construct a bike and snowmobile trail on the railroad grade, when it is abandoned, connecting the villages of Palmyra and Eagle with the forest headquarters and various points of interest in the forest.

Cost $50,000 Biennium 1999-01

The trail may connect to Bald Bluff, Lone Tree, Stone Elephant, and the Paradise Springs Nature Area. The trail will provide off-road access to the forest headquarters and the natural history museum, the self-guided nature trail, and naturalist programs. The trail will also provide off-road access to the Paradise Springs Nature Area for trout fishing, hiking, and picnicking.

16. Finish construction of a 300-yard target range at the McMiller Sports Center.

Cost $60,000 Biennium 1999-01

The demand is significant for completion of the 300-yard target range. The range will be managed with existing staff and administrative facilities.

17. Upgrade two existing blinds and create one additional wildlife observation/photography blind at the Ottawa and Rice lake recreation areas.

Cost $5,000 Biennium 1999-01

The existing wildlife observation platforms, one on the northeast side of Ottawa Lake and one on the Rice Lake nature trail, need significant upgrading. A third wildlife observation blind proposed for the forest headquarters area will be accessible to people with mobility impairments.

18. Relocate Stark Road, an old gravel road, from its present location to one-half-mile south along State Highway 67.

Cost $35,000 Biennium 1999-01

The current gravel road is approximately one-half-mile long and ends in a 25-car parking lot. The road demands a lot of maintenance because of the poor soils on which it was built. Motorists, who are primarily hunters, interfere with hunting because the road passes through a high-quality small-game hunting area.

The proposed site has better soils for development of the road and parking lot. The existing trees will screen the lot.

19. Create an area for people with disabilities to pheasant hunt on the west side of County Highway N at Paradise Springs.

Cost $5,000 Biennium 1999-01

Across the road from the Paradise Springs Nature Area parking lot is a fair-quality pheasant hunting area. Pheasants are stocked there throughout the hunting season. A "removable" trail is planned to provide an independent, accessible hunting experience.

Operations

1. Manage the Ice Age Trail as a lightly used hiking trail.

Segments of the Ice Age Trail will continue to support several uses until, through the acquisition of land, it can be established as a single-use trail.

2. Prohibit the use of motorized all terrain vehicles (ATVs) on the forest, except possibly for disabled persons by permit only.

A disabled access policy has not been approved and is subject to the Department developing a manual code. If ATVs are permitted on county snowmobile trails in the future, the Department may review the policy banning them from the forest. ATVs would only be permitted on designated snowmobile trails during periods of adequate snow cover.

3. Designate the John Muir and Emma Carlin trails for mountain biking. Construct a connection between the Carlin and Muir trail systems. Mountain biking will be prohibited from other trails in the forest.

Approximately two miles of trail will be added to the 7.8-mile John Muir Trail. Hikers will be discouraged, but not prohibited, from using the trail. The 1.5-mile section of the Ice Age Trail that runs concurrent with the Emma Carlin Trail will be relocated to separate the two trails. In addition, the John Muir and Emma Carlin trail systems will be connected with a new approximately seven-mile trail that will be open to mountain bike use. Until that time, mountain bikers will be allowed to use the Ice Age Trail as a connection between the two trail systems. A monitoring program will be developed to document user conflicts and environmental concerns.

4. Schedule special events and management activities to minimize conflicts between user groups and disturbance to nesting wildlife species.

To the greatest extent possible, special events involving large numbers of people will be coordinated to minimize conflicts with other user groups during peak use periods. Special events that use extensive portions of the forest will not be allowed during the critical nesting period for rare and sensitive raptor species and ground nesting birds. Generally this period is from March through July.

5. Encourage citizens to form a friends group with Department assistance.

6. Encourage volunteer help in the forest for activities such as campground host, nature programs, ski and mountain bike patrol, and trail maintenance and development projects.

7. Acquire the town roads in the Blackhawk area, north of State Highway 12 in the town of LaGrange.

8. Take additional action in managing the vehicle parking and fee collection systems. No parking zones will be sought along two highways where congestion occurs. The roads are County Highway ZZ from State Highway 67 west to County Highway ZC and from State Highway 67 east to County Highway G, and County Highway N from State Highway 59 north one-half mile.

9. Establish a recycling program for waste generated by forest users in cooperation with local service clubs. Composting of lawn or other organic materials will not be a part of this program.

10. Establish an archery hunting- and trapping-only zone around the Scuppernong Trail.

The zone encompasses 800 acres north of town road ZZ and east of State Highway 67. Deer and spring turkey hunting with firearms during the established hunting seasons will be allowed in this zone.

11. Remove underground storage tanks on the forest, where feasible, and replace them with above-ground tanks or alternative energy-powered facilities.

All underground fuel storage tanks may have to be removed and alternative energy solutions, such as solar-, electric- or natural gas-powered facilities investigated.

12. Provide limited-impact concessions at the Ottawa and Whitewater lakes recreation areas, Pinewoods Campground, McMiller's Sports Center, and a few selected trailhead parking lots.

A service club or private concessionaire and the Department could develop an agreement for the sale of concessions on the forest. The concessions could range from canoe and cross-country ski rentals to the sale of food and camping supplies. A small concession building could be built at the Ottawa Lake picnic area for the sale of ice cream, ice, soda, and camping supplies.

No alcoholic beverages will be sold. Some limited-impact concessions now operate at the Southern Unit including campfire wood and newspaper sales.

13. Survey forest visitors and local residents periodically to better understand their needs and concerns.

Some surveys will be conducted informally as a search for indicators, while funding for some professional surveys will be requested. The collection of ideas and user data through the use of suggestion boxes and trail registration stations will continue.

14. Develop and implement a prescribed burn policy across the forest. Burning for specific management objectives will be practiced by the Bureaus of Parks and Recreation, Wildlife Management, Endangered Resources, and Forestry.

15. Designate the Pinewoods Campground traditional and group sites as pet-free. Pets assisting the disabled will be allowed.

Pets will still be allowed at the Ottawa Lake, Whitewater Lake, and Equestrian campgrounds.

16. Upgrade existing facilities to provide adequate service to the public and to meet current standards and codes. This includes structural, electrical, and plumbing work, as well as roads and trails.

17. Explore the possibility of a private concessionaire operating the McMiller Sports Center.

A long-term rental or lease agreement with a private establishment for operation of the McMiller shooting range will be explored. A private business may be able to put more resources into the operation, and offer a longer shooting season and league shoots.

18. Landscape old building sites and abandon wells and septic tanks when properties are acquired.

Landscaping and abandonment will help to create a more natural setting. The sites will be restored to grassland and natural succession will be encouraged. The sites will not be returned to presettlement conditions.

19. Upgrade the energy efficiency of buildings through insulation, water conservation, electrical modification, and other methods.

Water, electrical and heating fixtures will be replaced as they wear out or as their life-cycle cost becomes more than that of new fixtures. The use of more efficient water heaters and furnaces, fluorescent lighting, solar-powered/heated applications and added insulation will save energy and money.

Interpretation and Education

Development

Provide interpretation and education of the natural history of the Southern Unit's flora, fauna, ecology, geology, archeology, and history. Focus interpretation and education on ecosystem processes, plant communities, and rare species.

1. Establish an interpretive nature trail through a wet-mesic prairie west of the Paradise Springs Nature Trail.

Cost $1,000 Biennium 1993-95

2. Establish a historic exhibit at the old limestone kiln located in the LaGrange area of the forest.

Cost $2,000 Biennium 1995-97

3. Develop a teacher's guide to the forest identifying sites to visit and providing lesson plans that can be used in conjunction with the visit.

Cost $2,000 Biennium 1995-97

4. Develop an outdoor exhibit at Heart Prairie following the acquisition of this last remaining prairie remnant in the Kettle Moraine area.

Cost $2,000 Biennium 1993-95

5. Develop a self-guided auto brochure identifying glacial features of the Southern Unit. Features to be highlighted include the interlobate moraine, kettles, glacial spillways, a post-glacial lake bed, an outwash plain, drumlins, and eskers.

Cost $2,000 Biennium 1993-95

6. Develop outdoor exhibits near the County Highway C location of the Lake Koshkonong to Milwaukee Indian Trail, and at the Whitewater River/Millis Road Indian camp.

Cost $1,500 Biennium 1995-97

7. Encourage the maintenance and restoration of native plant communities through prescribed burns. Continue the current management of the North Prairie Cedar Glade and LaGrange Pasque flower area.

Cost $1,000 Biennium 1993-95

8. Develop an interpretive trail at the limestone outcropping. The trail will connect to the Ice Age Trail.

Cost $1,000 Biennium 1995-97

Forestry

Vegetation management on the forest has a direct impact on outdoor recreation areas, wildlife habitat, natural areas, watershed protection, water quality, and the production of a sustained yield of forest products. Management proposals for the forest resource has considerable impact on the unique scenic qualities on the forest.

Management

1. Site preparation

Prescribed burning, mechanical means, and herbicide application will be used to remove competing vegetation to prepare a site for regeneration. These methods may also be used to maintain wildlife openings and to restore prairie-type conditions. The use of herbicides will be minimal.

2. Reforestation

Natural regeneration is encouraged, but where this is not possible or practical, tree planting will be used. Native species best suited to the site will be planted. Limited herbicide use may be required. Tree shelters, such as protective tubes, may be used to enhance reforestation efforts by minimizing damage to seedlings from mice, rabbits, and deer. Planting will serve one or more of the following purposes:

* To supplement natural regeneration where it is inadequate.

* To improve the specific composition of existing stands.

* To establish forest on desirable open areas.

* To improve or maintain the aesthetics of an area and to provide wildlife habitat.

3. Timber Stand Improvement

Timber stand improvement includes a variety of management practices, including thinning, release, salvage, and pruning, designed to improve the growth and species composition of immature forest stands. Aesthetics and wildlife habitat needs will be considered in timber stand improvement projects.

4. Big Tree Silviculture

Big tree silviculture is a special management technique that is used to encourage the development of large diameter trees in long-lived species on specific habitats. This management technique produces den trees and nuts for wildlife, and adds to the aesthetics of the forest. Some timber harvesting is allowed under this management technique.

5. Timber Harvest

Timber harvest decisions will consider the affect on outdoor recreation, wildlife habitat, and forest aesthetics. Approximately fifty acres of hardwood and one hundred acres of softwood will be harvested annually. The majority of the softwood harvesting will be plantation thinnings. Upon completion of the forest central-hardwood vegetation survey, harvesting guidelines will be written.

Timber sale procedures are established by law and detailed in the Department's timber sale handbook. Timber sales also will be in accordance with the forest objectives and management guidelines established for the stand in which a timber sale takes place. Timber harvesting will occur during the period in which the affected area of the forest is least used by the public. Harvesting also will be restricted during the months of March through July to protect wildlife species from disturbance during the nesting season. Silvicultural guidelines used in determining the time, method, and details of harvest in intermediate cuts and salvage cuts have been developed by the U.S. Forest Service and the Department, and are tempered to meet local conditions.

6. Aesthetics

Aesthetic management techniques are defined in the Department's silviculture and forest aesthetic handbook and are modifications of standard timber management techniques. They are designed to minimize the negative affects on aesthetics and recreational values. In addition, timber harvesting techniques such as reduction of slash visibility, winter logging, and precautionary skidding are practices to minimize logging impact.

Operations

1. Update forest vegetation surveys by 1994, including revised stand prescriptions to implement the integrated management recommended in this plan.

2. Manage hardwood and conifer stands according to accepted silvicultural guidelines as scheduled in the 1994 survey update.

3. Use integrated pest management methods to minimize or prevent the development of pest problems.

4. Reinstate a tree planting program based on two principles--biodiversity and aesthetic management. Roadside buffer strips will be used at many locations, and 115 acres will be planted on an annual basis over the next ten years. The department previously conducted a tree planting program, but suspended it because of the recognized need for a more comprehensive approach.

5. Implement site preparation, planting, and timber stand improvement as scheduled in the 1994 compartment vegetation survey.

6. Continue management activities in the Carlin Demonstration Forest as outlined in the Carlin Demonstration Forest Plan.

Wildlife

The Southern Unit supports a variety of wildlife species that are important to the ecological balance of the forest and for the recreational opportunities they provide. Because this is the only large contiguous forested area remaining in southeastern Wisconsin, the preservation of the forest environment is critical to the continued existence of several game and non-game species in this region of the state.

Development

1. Incorporate information on wildlife observation areas into forest literature.

Cost $500 Biennium 1993-95 and beyond

2. Establish a spring turkey hunting season in the Southern Unit.

Cost $200/yr. Biennium 1991-93 and beyond

3. Provide dense nest cover for a variety of ground nesting wildlife species including grassland birds. Retain snags, snag replacements, woody ground debris, cavity trees, and other selected trees valuable to wildlife.

Cost $8,000 Biennium 1992 and every second year of each biennium

4. Restore drained wetlands and manage selected wetlands for waterfowl, furbearers, and other game and non-game wildlife. Ten small, 1- to 10-acre, wetland sites have been identified.

Cost $2500.00 Biennium 1991-93 and 1995-97

Wisconsin has lost over 60% of its wetlands, of which over 80% were in the southeastern part of the state. Wetlands provide many environmental amenities and are the most productive wildlife habitats, both in terms of species diversity and total wildlife abundance.

Operations

1. Manage Lake LaGrange and surrounding uplands for waterfowl production.

2. Maintain and improve species composition and distribution of specific upland brush areas.

3. Continue to use sharecropping as a cost-effective technique for providing wildlife with winter food plots and brood cover.

4. Construct and maintain artificial nesting and resting structures for wood ducks, bluebirds, swallows, and other cavity-nesting species. The nesting structures are very effective in improving production of these wildlife species.

5. Stock approximately 2,000 ring-necked pheasants annually.

Maintain pheasant hunting opportunities, but restrict the release areas to improve hunter success rates and to better control hunting pressure.

6. Investigate the potential of reintroducing prairie chickens on suitable grassland areas of the forest.

Endangered Resources

The mission of the Endangered Resources Program is to identify, protect, and manage native plant and animal species, natural communities, and other natural features; enhance and restore populations and habitats of rare and endangered species; and promote knowledge, appreciation, and stewardship of Wisconsin's native species and ecosystems for present and future generations.

Protection of the Southern Unit is imperative to the protection of the natural heritage of Wisconsin because the forest contains one of the only opportunities for protection of an Oak Opening, one of the rarest plant communities in the state. The forest is also one of the last undeveloped landscapes in rapidly developing southeastern Wisconsin. If we do not protect these areas now, we risk losing the native flora and fauna and their interrelationships with the land that characterize this special property and the region as a whole. Protection of endangered resources will be accomplished by continuing to protect and manage existing State Natural Areas and by implementing the following new designations, management guidelines, and development projects.

Designations

Designate the following sites as State Natural Areas or Habitat Preservation Areas.

A. Kettle Moraine Oak Opening State Natural Area.

Two existing State Natural Areas--Blue Springs Oak Opening and three parts of Clifford F. Messinger Dry Prairie and Savanna Preserve (Bald Bluff, Kestol Prairie, and Highway H Oak

Opening)--form the core of this proposed 659-acre State Natural Area. The designation will protect the rare oak opening, prairie ecosystem, and the rare species contained within.

Blue Springs Oak Opening features large bur and black oaks, most of them open-grown and in the 12- to 16-inch diameter size class, embedded in a ground cover dominated by grasses such as big and little bluestem, side-oats grama, Indian grass and prairie dropseed. Forbs and shrubs include purple prairie clover, white camass, leadplant, whorled milkweed, sky-blue aster, and Illinois tick-trefoil. A large population of the state-threatened kittentails (Besseya bullii) also occurs here.

Bald Bluff is a small dry prairie situated on a steep west-facing slope. The little bluestem, side-oats grama, and prairie dropseed grasses dominate, accompanied by pasque flower, silky aster, purple prairie clover, small skullcap, showy goldenrod, yellow cornflower, grooved yellow flax, wild bergamot, rough blazing star, and the uncommon short green milkweed and white camass are found here. This prairie is thought to be the best remaining example of a dry prairie in the forest. Kestol Prairie contains many of these same dry prairie species and the rare kittentails. The County Highway H Oak Opening is dominated by large open-grown bur and black oaks and an understory degraded by grazing and a lack of fire.

The intervening land is covered by a mix of more than thirty small remnant dry prairies on morainal knobs, an oak opening, a group of sand blows, a degraded grazed oak woodland with scattered prairie plants amid prickly ash and black locust, and former agricultural fields on sandy soil where prairie species are invading.

Through proper management, this area can be restored to a dynamic dry prairie-oak opening ecosystem. This ecosystem was once common in southeastern Wisconsin, especially on the interlobate moraines found in the forest. Only about 500 acres remain, due to a lack of fire--an integral component of a functioning prairie-oak opening ecosystem. Since viable, intact examples cannot be found, this community must be preserved by protecting degraded examples and using management techniques such as burning, girdling, brushing, and perhaps firewood sales to upgrade them to communities that more closely resemble the oak opening of presettlement times.

B. Addition to Young Prairie State Natural Area

The addition of 492 acres to the Young Prairie State Natural Area will increase this wet-mesic prairie site to 545 acres. The proposed addition is a series of six smaller remnants separated and surrounded by shrubs. Michigan lily, swamp thistle, Ohio horse mint, alum root, Ohio spiderwort, yellow coneflower, bergamot, prairie blazing star, compass plant, prairie dock, golden alexanders, and valerian flourish among the dominant grasses--big bluestem and cordgrass. A fen, dominated by shrubby cinquefoil, is located on a gently sloping peat mound just west of the prairie and separated from it by a narrow band of hardwoods. Fen thistle, grass of parnassus, Ohio goldenrod, and valerian also grow here. Of particular interest is the presence of a pitcher plant that grows on the sides of sedge tussocks. Small hardwater springs emanate from the western edge of the peat mound, forming a small creek that flows north through the site.

C. Scuppernong River Habitat Preservation Area

Two existing state natural areas--Kettle Moraine Fen and Low Prairie, and Scuppernong Prairie with the Melendy's Prairie addition--anchor this predominantly wetland ecosystem. These areas form the core of the proposed 3,245-acre Habitat Preservation Area. There are six state-listed rare plant species, two plant species of special concern, three state-endangered animals, and eight animal species of special concern located in the oak opening and prairie.

The 250-acre Kettle Moraine Fen and Low Prairie State Natural Area consists of a wet to dry-mesic prairie, a southern sedge meadow, and a degraded oak opening. In the prairie and oak opening, Indian grass, big and little bluestem, vanilla grass, rattlesnake master, marsh blazingstar, and prairie dock are found. In the sedge meadow, bluejoint grass, shrubby cinquefoil, valerian, grass of parnassus, Ohio goldenrod, and golden alexanders predominate.

The Scuppernong Prairie State Natural Area with the Melendy's Prairie addition protects a mostly undisturbed wet-mesic prairie and southern sedge meadow consisting of big bluestem, Indian grass, porcupine grass, blue joint grass, northern dropseed, cream wild indigo, shooting star, leadplant, compass plant, prairie dock, blue-eyed grass, Virginia mountain mint, prairie smoke, and prairie blazing star. John Curtis, author of The Vegetation of Wisconsin, used the original 25-acre Scuppernong Prairie during the 1940s and 1950s for research. A portion of the Melendy's Prairie is in private ownership and will become part of the State Natural Area upon acquisition.

The proposed Habitat Preservation Area supports a mix of fen, fairly intact sedge meadow, degraded but improving dry to dry-mesic prairie, and grasslands dominated by exotic species. These plant communities have been deprived of periodic burning, which was part of the natural ecosystem before European settlement. Mowing, grazing, water level changes, or plowing has manipulated the landscape; however many of the basic component species and structure of the native community remain. Even the exotic grasslands, which are the most disturbed sites, may retain some native species within their seed banks. The potential for native community restoration through burning and brushing is much greater on these lands than anywhere else in southeastern Wisconsin.

Management

The primary management activity for State Natural Areas and Habitat Preservation Areas will be the design and implementation of a prescribed burn plan. The plan will include fire control, safety, and logistical considerations; maintenance of air quality standards; burn objectives; and fire behavior considerations. Additional actions will include brushing, selective tree removal, and exotic species removal.

Management of the Habitat Preservation Area will include removal of encroaching woody vegetation by cutting, girdling, and selective herbicide use. Exotic species control will include the eradication of honeysuckles, buckthorn, multiflora rose, purple loosestrife, and garlic mustard. The initiation and continuation of a prescribed burn plan for the Habitat Preservation Area is essential to the restoration and protection of the plant communities. To reestablish a functioning ecosystem, activities such as the reestablishment of stream meanders, closure of ditches, and reintroduction of species formerly a part of this local ecosystem may be considered.

Guidelines for the Protection of Forest Interior and Grassland Birds

Protection of forest interior birds, grassland birds, and other bird species endangered, threatened, or of special concern is addressed under natural resources law. The preservation of plant communities containing endangered or threatened species is also addressed under natural resources law. The law states that the Department shall implement programs directed at conserving, protecting, restoring, and propagating selected state endangered and threatened species to the maximum extent practicable. Specific management actions will be taken where endangered and threatened species are found. The action will depend on the species or group of species, and specific management decisions will be made with input from and direct involvement of the necessary Department bureaus.

Several groups of birds including forest interior birds, grassland birds, and several species of concern are found within the forest. Due to continued habitat losses and fragmentation, several of these species are experiencing population declines. Unless appropriate management action is taken, these species may be candidates for extirpation. The two major bird groups of concern within the Southern Unit are forest interior and grassland species.

A. Forest Interior Species

Forest interior species are those whose long-term existence depends on large forested tracts. The results of international research show that bird species are affected either positively or negatively by the effects of forest fragmentation and isolation. The research clearly shows that some species need the interior of the forest in which to reproduce with enough success to maintain their numbers. These species are generally neotropical migrants having open nests, small clutches, and only one brood. Local populations without recruits from large intact forested tracts will be extirpated over time.

Three different phenomena negatively affect forest interior species--sensitivity to edges, sensitivity to area, and sensitivity to isolation. Edge sensitivity is imposed by at least three forces including increased competition of those species that do best in edges; increased nest predation inflicted by raccoons, skunks, opossums, snakes, blue jays, and crows; and increased nest parasitism by the brown-headed cowbird.

Birds affected by the area sensitivity phenomena require enough area of appropriate habitat to fulfill all life functions. Some species need adequate continuous habitat to maintain a viable population. For example, the sharp-tailed grouse will not sustain itself on anything less than approximately 10,000 acres. Bird species may experience isolation sensitivity when they are distanced from similar habitats. In this case, there is a greater chance of extirpation of isolated populations.

Forest interior bird species found in the Southern Unit are listed in Table 3. Only those species with a special status are annotated.

Table 3

Forest Interior Bird Species

Bird Species	Status*
Whip-poor-will	
Hairy woodpecker	
Pileated woodpecker	
Acadian flycatcher	T
Wood thrush	
Yellow-throated vireo	SC
Red-eyed vireo	
Cerulean warbler	T
Black and white warbler	SC
American redstart	
Ovenbird	
Kentucky warbler	T
Hooded warbler	E
Scarlet tanager	

* E = State-endangered, T = State-threatened, and SC = Special Concern

Management

1. Maintain appropriate forest interior conditions where sensitive forest interior birds are present.

2. Minimize forest fragmentation.

3. Minimize isolation by connecting forest patches with corridors, if feasible.

4. Use selective cutting on a long-term biological rotation in diverse or riparian forests.

5. Convert pine plantations to hardwoods following the gradual thinning and eventual harvesting.

6. Cut areas suitable for oak regeneration in larger blocks using clearcutting or shelterwood techniques, on a longer-term biological rotation that will approach old-growth state. Advanced regeneration work may include the removal of shrubs and exotics, prescribed burns, or planting.

7. Retain a 70-percent crown closure of the forest canopy, except for oak and aspen regeneration cuts, using selective cutting or timber stand improvement practices.

8. Increase the rotation length of even-aged stands to 100 years or more, except for aspen.

9. Minimize edge by clearcutting in circles or squares.

10. Limit aspen management to the peripheries of any large forested block.

11. Retain several uncut trees, or groups of trees and snags per acre, during clearcutting operations.

12. Preserve vegetative buffers along streams, lake shores, and sensitive plant sites.

13. Minimize right-of-way corridors and roads through large forested areas to prevent the creation of more edge.

14. Plan future intensive development away from large forested areas.

15. Discourage the daylighting of logging roads.

16. Restrict landings to forest exteriors.

17. Give high priority to reforesting openings within or between larger wooded tracts.

18. Minimize logging during the breeding season.

B. Grassland Birds

The U.S. Fish and Wildlife Service has identified grassland birds as having suffered the largest decline of any bird group over the last 25 years. The three species with the most serious declines are dickcissel, grasshopper sparrow, and western meadowlark--all grassland obligate birds. Grassland birds exhibit the same types of problems from fragmentation as forest interior birds, but grasslands are fragmented by trees and shrubs rather than through the removal of vegetation. Changes in land use practices, especially an increase in row-crop agriculture and an earlier cutting of hay, are also contributing to the decline in grassland bird species.

Grassland bird species found in the Southern Unit are listed in Table 4. Only those species with a special status are annotated.

Table 4

Grassland Bird Species

Bird Species	Status*
Northern harrier	SC
Short-eared owl	SC
Sedge wren	
Bobolink	SC
Eastern meadowlark	
Vesper sparrow	SC
Savannah sparrow	
Grasshopper sparrow	SC
Henslow's sparrow	SC
Field sparrow	SC
Dickcissel	SC

* SC = Special Concern

Management

1. Manage grassland conditions for sensitive and declining grassland birds, where they are present.

2. Minimize grassland fragmentation and isolation.

3. Remove encroaching woody vegetation, primarily along corridors, fencerows, roads, and ditches.

4. Restore natural hydrological conditions by filling ditches and reestablishing natural stream meanders.

5. Incorporate an appropriate prescribed burn plan to meet the needs of species of concern. For example, Henslow's sparrow requires dense duff for nesting and does best with a four- or five-year rotation.

6. Burn only a portion of a grassland in any one year to ensure different grassland conditions for the variety of grassland species.

7. Incorporate mowing with burning to control problem shrubs.

8. Reconstruct prairies on units larger than 40 acres. Smaller units are of limited benefit to grassland birds.

9. Establish a mix of forbs and grasses in prairie reconstruction. Plant grasses and forbs in a patchwork pattern. A mosaic of plants causes a wider diversity of birds to use the site.

Development

1. Manage the Kettle Moraine Oak Opening through the removal of brush, exotic species, and selective trees.

Cost $20,000 Biennium 1991-93 and beyond

Management is crucial for the restoration of this large oak opening. It is necessary to remove encroaching woody species from the areas with the best diversity and potential for rapid restoration. The site also will be prepared for future prescribed burns.

2. Inventory the forest for locations of rare plant species.

Cost $5000 Biennium 1991-93

The inventory is needed to assist in making management decisions about protecting rare species and their habitats. The inventory will be done in cooperation with the Southeastern Wisconsin Regional Planning Commission.

3. Inventory the forest for locations of rare aquatic animal species, reptiles, and amphibians.

Cost $6000 Biennium 1991-93

The inventory is needed to assist in making management decisions about protecting rare species and their habitats. The inventory will be done in cooperation with the Southeastern Wisconsin Regional Planning Commission.

4. Survey forestry compartments 2, 3, 10, 13, and 14 for endangered and threatened bird species to determine densities and to map their locations. The same compartments will be surveyed for locations of kittentails, prairie remnants, and oak openings.

Cost $1000 Biennium 1991-93

These compartments have known populations of kittentails and several bird species of concern including the hooded warbler, Kentucky warbler, cerulean warbler, Acadian flycatcher, Cooper's hawk, and Henslow's sparrow. The inventory is needed to assist in making management decisions about protecting rare species and their habitats. Upon completion of the inventory, the compartments will be classified according to their importance in protecting rare species.

5. Design and implement a prescribed burn plan for the Kettle Moraine Oak Opening and develop firebreaks.

Cost $5000 Biennium 1993-95

The development of a burn plan and the installation of adequate firebreaks will permit faster, more efficient, and safer burns.

6. Manage Scuppernong River Habitat Preservation Area by brushing, girdling, and removing woody and exotic species.

Cost $15,000 Biennium 1993-95

7. Design and implement a prescribed burn plan for Scuppernong River Habitat Preservation Area and develop firebreaks.

Cost $2,000 Biennium 1995-97

Operations

1. Continue natural area management on the following State Natural Areas--Scuppernong Prairie (including Melendy's Prairie), Eagle Oak Opening, Kettle Moraine Fen and Low Prairie, Ottawa Lake Fen, Young Prairie, Blue Spring Oak Opening, Clifford Messinger Dry Prairie and Savanna Preserve, and Bluff Creek Springs, Fens, and Oak Woods.

2. Conduct annual inspections on State Natural Areas to assess the facility and land management needs, threats to plant or community integrity, and use encroachment factors.

3. Continue surveys of breeding birds on the State Natural Areas.

4. Continue gathering locations of and population information on endangered, threatened, and special concern species.

Fisheries

The lakes and streams of the forest support a diverse fish population and provide anglers with a variety of fishing opportunities.

Development

1. Dredge the Paradise Springs Pond to provide for a 10% increase in trout populations.

Cost $8,000 Biennium 1991-93

2. Construct a self-guided aquatic habitat education trail at Paradise Springs and Ottawa Lake.

Cost $2,000 Biennium 1991-93

These trails will provide forest users with a greater understanding of habitat restoration, small stream ecology, and lake ecology.

3. Construct disabled-accessible fishing piers at Ottawa, Rice, and Whitewater Lakes.
Cost $90,000 Biennium 1995-97

These lakes have campgrounds nearby and a high demand for shore-based fishing facilities, especially among young anglers.

4. Remove the dike at Scuppernong Springs to allow reversion back to a natural spring and stream system.

Cost $1,000 Biennium 1997-99

With dike removal, a native cold- or cool-water fish community will be established and maintained under natural conditions through little human intervention. Primarily passive management techniques will be used to restore and protect native flora and fauna. Fishing that is consistent with the goal of a natural and self-sustaining fish population will be allowed.

Operations

1. Restore a balanced, productive fishery for warmwater game and panfish at Ottawa Lake.

An experimental management technique, introducing a non-game predator fish (Long Nose Gar) to lower panfish numbers and increase panfish growth rates, will be used. This will retain the diversity of native fish species and provide anglers with improved fishing opportunities.

2. Restore a quality brook trout fishery to McKlintok Springs to provide angling opportunities for youth. Alter existing laws to permit fishing only by youth.

3. Improve at least one-quarter-mile of trout stream habitat, on an annual basis, at either Bluff Creek, South Branch Scuppernong River, Paradise Springs Creek, Scuppernong River, or Whitewater Creek. Trout stream habitat improvement will restore aesthetic beauty and biological productivity to these damaged forest trout streams.

4. Establish a 200-foot strip along all water bodies on state property where agricultural practices such as cultivation, fertilization, or spraying of pesticides will be restricted.

Cultural Resource Management

Wisconsin has been inhabited by humans since the end of the last glacial period approximately 10,000 years ago. The chronicle of their lives, adaptation to changing environments, and use of the resources available in southeastern Wisconsin is recorded in archeological and historic sites. Intensive land use development and urbanization obliterated much of this record, leaving only a small percentage of sites intact. Over the past three decades, growing public concern over the loss of human history prompted the enactment of federal and state historic preservation laws. In Wisconsin, recently enacted statutes place responsibility on the Department to manage the cultural resources on its holdings, including those within the forest.

Management

1. Develop long-term management plans for properties listed on or eligible for the National or State Register of Historic Places.

2. Consider cultural resource protection and preservation in any land use changes or development projects.

3. Plant sensitive site areas in grasslands to protect them from future disturbance and looting.

4. Negotiate with the State Historical Society to mitigate adverse affects on cultural resources before any land disturbance activities, in accordance with of the Federal Historic Preservation Act of 1966, as amended, and Wisconsin Statutes.

5. Consider alternate uses, intact sale, or donation of historic structures before demolition. If this is not possible, fully document these structures before removal.

6. Provide interpretive and educational programs on cultural resources.

7. Develop educational literature on the preservation and protection of archeological and historic sites.

8. Prohibit the collection of artifacts on cropped land and other exposed areas controlled by the Department.

9. Develop a friends group to aid in the preservation of known sites and the discovery of new ones.

10. Work with special interest groups to protect burial mounds, cemeteries, and other culturally sensitive areas on state holdings within the forest.

11. Prohibit disturbance of burial mounds or cemeteries, marked or unmarked, on state holdings within the forest.

D. Disabled Access and Use

The Department recognizes its obligation to provide facilities and programs that are accessible to and usable by all segments of the visitor population. Facilities for people with disabilities will be provided on the forest in conformance with applicable laws and regulations. Sensitive design will facilitate this goal. Consultation and coordination regarding accessibility considerations will be developed with local clubs and organizations whose members are disabled.

Existing Facilities

The Ottawa Lake Campground has sites designated for people with mobility impairments. Pond and stream trout fishing is provided at Paradise Springs Nature Area for people with sight and mobility impairments. Ottawa Lake Picnic Area has accessible picnic tables and open-sided shelter buildings connected to parking lots by blacktopped walkways. The flush toilets at the Ottawa Lake day use area, McMiller Sports Center, and the forest headquarters are all accessible.

Certain other vault-type toilets throughout the forest have disabled-accessible fixtures but getting to and into the building can be problematic. Facilities at the Hickory Woods Group Camp, Rice Lake Picnic Area, and Pinewoods Campground are examples of this.

The Paradise Springs Nature Area is the forest's most suitable outdoor recreational area for people with mobility and sight impairments. Asphalt paths wind their way through the woods along a fast-flowing trout stream to a pond where trout can be viewed and fished for from a disabled-accessible pier. The springhouse, restrooms, and picnic facilities with an open-sided shelter with electricity are accessible. Guide cables provide access to all the facilities for those with sight impairments. Tape recorders and guide tapes describing the interpretive signs along the trail are available for visitors.

Planned Facilities

The Department is committed to making existing facilities, where possible, and all new facilities, accessible to people with disabilities. Between 1991 and 1993 the Department will concentrate on updating facilities in primary use areas. These facilities include parking areas, drinking fountains, toilet buildings, contact areas or offices, public telephones, and at least one campsite in each campground.

Between 1993 and 1995, the Department will concentrate on updating the forest's ancillary facilities. These include picnic shelters and amphitheaters.

Between 1995 and 1997, fishing piers, nature trails, and other forest recreational enhancements will be updated to be accessible to people with disabilities.

1. Construct disabled-accessible fishing piers at Rice and Whitewater lakes.

2. Place a "removable" trail in the pheasant hunting grounds across from Paradise Springs to provide an independent hunting experience for people with disabilities.

3. Build a wildlife observation blind, that is accessible to people with mobility impairments, near the forest headquarters.

4. Build two disabled-accessible flush toilet/shower buildings at the Whitewater Lake Campground. The buildings will complement the expansion of the campground because a portion of the new sites will be accessible.

5. Construct a hiking/nature interpretative trail, accessible to people with mobility impairments around Ottawa Lake. In addition, play equipment that is accessible to mobility impaired children will be installed at the Ottawa Lake day use area.

6. Construct a paved walkway connecting the Ottawa Lake bathhouse to the sand beach. A matting will be installed in the sand on the east end of the beach to provide wheelchair access to the water's edge.

E. Proposed Land Use Classifications

The forest is divided into five land use classifications--Resource Protection, Resource Management, Intensive Recreation, Extensive Recreation, and Administrative areas--each with a set of management guidelines. The guidelines apply only to state-owned land within the forest boundary. Proposed land use classifications for the forest are shown on Map 7.

Resource Protection Area

Resource Protection Areas are those tracts of land or water where human influences are minimal, and significant cultural and natural resources are prevalent. Department-owned lands designated as Natural or Habitat Preservation areas are included in this classification. Management activities in these areas emphasize the maintenance of natural conditions with a minimum of human intervention and stabilization of natural forces, and limited development. Unique and outstanding geological features of the forest will also be given consideration under this category.

There are 4,396 acres proposed for inclusion in this category.

Natural Areas. Natural Areas are tracts of land or water containing the best remaining examples of native biotic communities or other native features including significant geological or archeological features. There are 1,151 acres proposed for inclusion under this category.

Habitat Preservation Areas. Habitat Preservation Areas are defined as those lands and waters containing excellent natural habitat and characteristics that are conducive to perpetuation and production of fish and wildlife. There are 3,245 acres proposed for habitat preservation.

Resource Management Area

Resource Management Areas are those areas whose primary use is for research and the testing of new resource management methods and techniques.

No additional acreage is proposed for inclusion under this designation.

Intensive Recreation Area

Lands under this classification are adaptable to heavy recreational use and are located where active and intensive recreation developments are needed. This category includes campgrounds, picnic areas, boat landings, and beaches.

No additional acreage is proposed for inclusion under this designation.

Extensive Recreation Area

Lands under this classification contain good examples of native flora and fauna where aesthetics perpetuation or conversion of forest stand management can be carried out,

educational programs can be implemented, vegetation management to control insects and disease can be implemented, and public safety is provided.

There are 5,933 acres proposed for inclusion under this classification.

Administrative Area

Administrative areas include headquarters sites, vehicle service and storage buildings, storage yards and associated driveways, and parking areas.

No additional acreage is proposed for inclusion under this designation.

SECTION III - BACKGROUND INFORMATION

A. Regional Context, History of the Kettle Moraine, and Cooperative Projects

Regional Context

The Kettle Moraine State Forest-Southern Unit is in southeastern Wisconsin and encompasses portions of Waukesha, Jefferson and Walworth counties. The forest is approximately 35 miles west of Milwaukee. There are more than five million people living within 100 miles of the Southern Unit.

The Southern Unit is accessible from Interstate Highway 94 (Milwaukee and Madison), Interstate Highway 43 (Beloit and Janesville), and U.S. Highways 12 and 18 (Whitewater, Fort Atkinson and Jefferson).

Major population centers and mileage to the forest are shown in Table 5.

Table 5

Distance Between Major Population Centers and the Southern Unit

Municipality	Population[1]	Miles to Southern Unit[2]
Beaver Dam	14,240	56
Beloit (Metro Area)	35,149	43
Chicago (Metro Area)	3,367,000	91
Fond Du Lac	37,269	73
Janesville	52,381	33
Kenosha (Metro Area)	77,095	49
Madison (Metro Area)	214,000	60
Milwaukee (Metro Area)	1,207,000	38
Oshkosh (Metro Area)	52,758	91
Racine (Metro Area)	81,542	43
Rockford	140,000	55
Sheboygan (Metro Area)	47,836	82
Watertown	19,000	27
West Bend	22,000	48
Whitewater	12,000	10

[1] 1989-90 State of Wisconsin Blue Book
[2] 1988 Wisconsin Road Map

History of the Area

Sixty-two archeological and historical sites are recorded in the State Historical Society inventories for the Southern Unit of the Kettle Moraine State Forest.

These sites include sub-surface components of prehistoric and historic Native American occupations as well as historic European structures and cemeteries. Very little systematic archeological survey work has been done within the forest boundary and additional sites may also be present.

The abundant water resources provided an ideal area for human occupation. The lakes, streams, and marshy kettles provided food such as waterfowl, fish, turtles, and wild plants as well as a supply of water for large and small mammals. The upland areas provided nuts and berries for food and habitat for a stable mammal population. The rugged upland terrain and the marshy lowlands did not attract permanent human settlement. Brief trips to the morainal area for food and other resources are suggested by the archeological remains found to date. The remains show a high potential for small, short-term campsites within the forest boundary, used to gather food and raw material for tool-making. Archeological sites, found in and around the forest boundaries, range in age from Paleo-Indian (ca. 11,000 years ago) to historic Native American. European settlers, primarily immigrants from Scandinavia, Ireland, and Germany, also found the morainal area attractive for its supply of food and timber.

Paleo-Indians

Wisconsin has been inhabited since the end of the last glacial period approximately 10,000 years ago. The first inhabitants, known as Paleo-Indians, were primarily hunters and were organized in small mobile bands consisting of several related families. They followed large mammals such as mammoth, mastodon, bison and ground caribou. Their tool kits included large well-crafted lanceolate spearpoints and butchering tools, made primarily from exotic raw materials.

Most Paleo-Indian sites in Wisconsin consist of isolated artifacts found on upland plowed fields. Few campsites have been found. Private collections include several Paleo-Indian spearpoints found in the Southern Unit. There is a high potential for additional Paleo-Indian remains to be found on the upland glacial features in the forest.

Archaic Period

Between 8000 and 6500 BC, the glaciers had completely receded from the state and the large mammals dependent on the glacial environment had become extinct. The plant communities changed with the warmer climate from tundra and spruce forests to a deciduous canopy, alternating with grasslands in drier periods. These environments attracted smaller mammals to the area and people could now take advantage of the wider range of food sources available in the region. This change is reflected in the technology and lifestyle of the people in the Archaic period. The change in lifestyle, however, is not necessarily indicative of a replacement of populations from Paleo-Indian to Archaic times.

Archaic people were organized in small bands, as were Paleo-Indians, but roamed smaller territories than their predecessors. They adapted to the environment in each territory. For example, groups living along the larger lakes appeared to rely on fish and mussel resources while interior groups hunted and collected wild game and available plant species. The tool kits and food remains at these sites reflect food preferences. A variety of tools such as spearpoints for hunting, knives for butchering and plant processing, and axes for wood chopping have been found.

One Archaic culture type is the "Old Copper Culture". These people are believed to have first occurred in Wisconsin around 2000 BC. They used copper from the Lake Superior region for ornaments and tools such as fish hooks, axes, awls, spearpoints and knives. Other artifacts not made of materials found in the region, such as elk antler axe handles and projectile points, swan bone whistles, and marine shell beads, indicate trade with surrounding people.

A second Archaic culture type, known as "Red Ocher Culture" is known to have first occurred in Wisconsin around 1500 BC. This culture is known primarily from mortuary sites, where the human remains were sprinkled with ground hematite. Grave goods are more numerous than in the Old Copper Culture burials and include tools made from stone imported from Indiana and Illinois, copper tools and beads, and necklaces of traded marine shell. The cultural remains of the Red Ocher Culture are primarily found in the southeastern portion of the state, especially in areas bordering the Kettle Moraine.

Although remains from the Archaic period have been found throughout Wisconsin, the greatest concentration has been found in eastern Wisconsin bordering the Kettle Moraine area. Archaic campsites have been found in the Southern Unit. Copper tools are present in private collections from the Southern Unit, which may indicate either Red Ocher or Old Copper people in the area. In addition, the morainal area and the adjacent marshy regions hold high potential for finding food processing sites.

Woodland Period

About 1000 BC, overlapping with the Archaic period, significant technological and social changes began to appear. Sometime between 1000 BC and 500 BC, pottery manufacturing in Wisconsin was introduced. The transition from the Archaic period to the Woodland period is characterized by pottery making, human burials placed in mounds and the practice of cultivating native and imported plant species. Since social and economic strategies changed several times during the Woodland period, archaeologists divide the period into Early, Middle, and Late Woodland.

Few Early Woodland sites have been found in Wisconsin. Archeological evidence suggests that these people are almost indistinguishable from those in the Archaic period except that pottery is found on Early Woodland sites. The first pottery is crude, with thick walls and grit (crushed stone) temper. Pots were shaped with cord-wrapped paddles. Fingernail impressions, placed on the soft vessels before they are fired, are the first known decorations.

About AD 100, influences from the Hopewell Culture of the Middle Woodland period appear in the southern half of the state. This culture radiated to the region from centers in Illinois

and Ohio. Remains of the Hopewell culture contain the first evidence of a structured society with highly placed individuals and religious centers. During this period, round or conical mounds were built to house the dead. Grave goods include copper axes (some as much as three feet long), earspools, breast plates, headdresses, and platform pipes. Pottery is finer and decorations vary in form and complexity. By 600 AD, many isolated populations had developed, marking the beginning of the Late Woodland.

The Late Woodland in southern Wisconsin contains the first evidence of semi-permanent settlements related to plant cultivation. Although there is evidence of plant cultivation in other portions of the Midwest before 600 AD, no known sites in Wisconsin have produced this data before the Late Woodland period. With the introduction of corn agriculture into the region, the single economic strategy of procuring wild food through hunting, gathering and fishing changed to a dual economy of wild food collection in conjunction with plant cultivation. Local raw materials were used for tools, indicating less contact with outside groups. The most striking feature of Late Woodland in southern Wisconsin is the presence of large mounds representing birds, deer, bears, panthers, turtles and other shapes. Burials have been found in some mounds, but the mounds may have served as territory markers, clan representations, or astronomical alignments. Small triangular projectile points are the sole point type in this period. They persist from the Late Woodland period to historic contact, suggesting that bow and arrow technology was seen as the most efficient hunting method until the introduction of firearms by the Europeans.

Evidence of Woodland activity has been found in the Kettle Moraine region. Early, Middle, and Late Woodland period projectile points have been reported in private collections from the Southern Unit. There is a high probability for additional Woodland sites to be found in the morainal area.

Mississippian Period

The Mississippian period is characterized by a more permanent settlement system due to the increased cultivation of corn, beans and squash, introduction of shell tempering to pottery manufacturing, and the practice of placing the dead in cemetery areas instead of mounds. In southern Wisconsin, it is represented by two different manifestations--Middle Mississippian and Oneota.

No concrete evidence of Middle Mississippian use of the morainal region has yet been found. The Oneota culture had an economic strategy similar to Middle Mississippian, including the cultivation of corn, beans and squash, augmented by wild game, fish, nuts and berries.

Triangular points found in private collections from the Southern Unit may show Oneota presence, but also may indicate use by people from Late Woodland to historic contact.

Historic Occupation

It is suggested that prior to contact with Europeans, indigenous people in Wisconsin had contact with eastern groups that were pushed westward by European expansion. These groups brought European made goods to trade with Wisconsin people. The mass migration

caused settled groups to move from region to region in response to the threat of disease and the fear of warfare.

Before 1640, two indigenous groups--the Winnebago and Menominee--are believed to have located in southeastern Wisconsin. From 1640 to 1800, the Miami, Sauk, Fox, Potowatomi, Winnebago, Kickapoo, Mascouten and Ottawa were recorded to have settled in or passed through the region. From 1800 to 1833 (the latter date marks the government removal of eastern Indians), the Potowatomi and Winnebago were the primary inhabitants of the region, with the Menominee making hunting forays into the southeastern portion of the state. During the Black Hawk War, Black Hawk and his group of Sauk and Fox travelled as far east as the southern end of the Kettle Moraine to evade the government troops.

European immigration to southeastern Wisconsin increased in intensity after 1833. Pockets of primarily Irish, Norwegian, and German settlers appeared by the mid-1800s. Log cabins and a schoolhouse built by immigrants are still present within the forest. Two of the cabins are being restored.

History of the Kettle Moraine State Forest

Planning and Acquisition

During the late 1920s and early 1930s conservation leaders in Wisconsin recognized the importance of and need for establishing a state recreational area in proximity to the growing Milwaukee metropolitan area. The conservationists envisioned a forested area following the line of the hilly and rocky glacial drift from northeastern Walworth County into southern Sheboygan County. The Northern and Southern, Loew's Lake, and Lapham Peak units of the Kettle Moraine State Forest are the result of their foresight.

The Kettle Moraine State Forest was established in 1937 by the State Legislature. In 1939, the state made its first acquisition of land in the southern unit, paying $6,150 for 205 acres. This acreage was purchased expressly to provide outdoor recreation, conservation education and watershed protection, and to demonstrate the multiple-use principles of forestry. In 1947, lands were acquired for the development of the Whitewater Lake Recreation Area, and in 1967 the Ottawa Lake Recreation Area was established.

The naturalist program, in cooperation with wildlife management, has developed a variety of activities in the Southern Unit since the program's inception in 1971. The primary objective of the program is to acquaint visitors with the forest and convince them of their dependence, direct or indirect, upon the environment.

With the completion of the new headquarters/nature center in 1978, the facilities expanded to include a 99-seat lecture room and an extensive display-interpretation room. Forest use has grown steadily over the years with an increase from 368,000 visitors in 1969 to 1,306,000 visitors in 1988.

Cooperative Projects

There are seven cooperative projects on the Southern Unit including the Ice Age National Scenic Trail, the Palmyra Day Camp, the Oak Ridge Demonstration Farm, Old World Wisconsin, the Operation Hard Hat Day Camp, the Carlin Timber Harvest Forest, and a five-acre tract for forest research.

Ice Age National Scenic Trail. The trail is a cooperative project formed between the state of Wisconsin and the National Park Service on October 3, 1980. A 33-mile section of the trail runs through the Southern Unit. The purpose of the Ice Age National Scenic Trail is to link together the units of the Ice Age National Scientific Reserve. The trail system is an additional way to expose people to both the beauty and geologic remains of the Ice Age.

Palmyra Day Camp. The Milwaukee Public School System operates the camp as a nature education facility. The camp presents and educates school children on environmental and natural resource issues. Typical topics covered are ecology, biology, wildlife management, entomology, forestry, and other natural science subjects.

Oak Ridge Demonstration Farm. This facility is also operated by the Milwaukee Public School System. It is designed to present typical farming methods, crops and animals to school children in the setting of an operating farm. The land and buildings are under Department of Natural Resources jurisdiction.

Old World Wisconsin. The State Historical Society operates this outdoor living history museum on 560 acres of land that is under Department jurisdiction. The facility has authentic and replica historic buildings that depict the variety of ethnic heritages of Wisconsin's early settlers.

Operation Hard Hat (Urban Youth Work). This is an eight-week day camp operated by the Department as part of the Youth Conservation Camp program. The Department employees youths between the ages of 15 and 18 from the city of Milwaukee to work on conservation-related projects. The projects the group undertakes include stream habitat improvement, trail development and maintenance, prairie restoration, wildlife habitat restoration, and dike maintenance.

Carlin Timber Harvest Forest. In March of 1951, a memorandum of understanding was signed creating the Carlin Timber Harvest Forest--an 80-acre forest located in compartment 10. This memorandum of understanding is between the Department, the Lake States Forest Experiment Station of the U.S. Forest Service, and the University of Wisconsin Extension Service. The forest was established on state-owned lands to demonstrate timber volumes obtained from periodic harvesting, the maintenance of adequate forest growing stock, and financial returns from periodic harvests. In February of 1968, the first four-acre tract of the Carlin Forest was harvested using the clearcut regeneration method. Eight acres were harvested in 1970 and 1975, and a 28-acre shelterwood harvest was completed in 1983.

Forest Research Area. In the early 1970s the Department set aside a five-acre tract on which the U.S. Forest Service could conduct research. The site is in Compartment 15 and is planted with a variety of tree species.

B. Current Management Programs

Recreation is the primary use of the Southern Unit. The forest is managed for a variety of recreational activities including camping, picnicking, hunting, fishing, hiking, snowmobiling, horseback riding, nature study, cross-country skiing, automobile touring, bicycling, swimming, and dog trialing and training. Approximately 1,306,000 people used the forest in 1988.

Recreational Facilities. They include three traditional campgrounds, two group camps, nine picnic areas, two beaches, and trails for a variety of uses during all seasons. Unique facilities include the Ottawa dog trial area, a horseback riders campground, and McMiller Sports Center. Locations of the facilities are on Map 6.

Endangered Resources. Pursuits related to endangered resources include natural area interpretation, individual nature study, educational uses, research, rare species observation, and rare community observation. The protection of endangered resources is ensured in the forest. Major management activities include burning, brush removal, exotic species removal, restoring natural stream flows, rare bird research, rare plant monitoring, and ecosystem management.

Forestry. Forestry is a major land use and management activity in the Southern Unit. In mixed oak stands, management has consisted primarily of harvesting mature timber, and conducting salvage and sanitation harvests, and post harvest treatment. The conifer plantations are managed primarily with pruning and thinning.

Wildlife. Wildlife-related activities include hunting, trapping, bird watching, photography, and education. The Scuppernong Wildlife Area provides hunters with opportunities for deer, woodcock, duck, pheasant, rabbit, and squirrel hunting. The resources are managed with consideration for the area's capacity to provide various uses. Management techniques used on the forest include wildlife surveys, harvest regulations, controlled burning, cooperative farming agreements, nesting cover creation, vegetation succession management, general forest management, and other habitat creation and management.

Water Bodies. The lakes and streams in the Southern Unit provide year around fishing opportunities for bass, northern pike, trout, and panfish. Management includes stocking desirable species, catch and release regulations, and habitat improvement.

A. Soils, Geology, and Hydrology

Soils

The soils of the Southern Unit are generally wind-blown glacial deposits and limey glacial till of a loamy texture. Moderately deep to shallow loams and associated stony soils are also present. Wet soils occupy the many wetlands in the area.

The predominant upland soils in the forest are known as the Casco-Rodman association, characteristic of glacial activity. These soils are mainly droughty, shallow and subject to severe erosion. Both oak and central hardwoods, and red and white pine plantations grow on these soils. The lowland soils are primarily of the Houghton-Palms-Adrian association. They are very poorly drained organic soils found along drainageways, and in depressions and old lake beds.

The topography of the Southern Unit is unique, consisting of outwash plain, crevasse fills, post-glacial lake beds, eskers, and kettle holes or potholes. The slopes average 15 to 40 percent. Erodibility and steepness of the topography may limit some types of land uses.

Geology

Three bedrock formations--Galena Dolomite, Maquoketa Shale and Niagara Dolomite--are present beneath the forest. All three formations were created during the Paleozoic Era that covered a time span of 375 million years and ended 225 million years ago.

Galena Dolomite consists of shallow sea deposits, and varies in thickness from 125 to 250 feet. The Maquoketa formation also consists of shallow sea deposits and varies in thickness from 165 to 240 feet. Niagara dolomite, like the previous two formations, consists of shallow sea deposits from shells and corals that contained lime, and from lime precipitated by certain plants. This formation ranges from 450 to 800 feet in thickness and is very erosion resistant. An outcropping of Niagara dolomite occurs in the forest.

The most dominant and unique feature left by the Wisconsin glacier is the interlobate moraine. It was formed 15,000 years ago when two lobes of the Wisconsin glacier came together along an irregular line stretching from Richmond in Walworth County, through the Oconomowoc Lake country to the southern part of Kewaunee County. The resulting pressure, friction and buckling as the two massive ice lobes collided, caused the melting ice to deposit tremendous loads of rocks, gravel and sand between the lobes, forming the interlobate moraine.

The interlobate moraine differs from other types of moraines by its sharpness of topography. This moraine varies in width from a mile to ten miles, and in some places rises 100 to 300 feet above the surrounding lands. The surface of the interlobate moraine is generally marked

by broad swales, bulky hills, knobs and kettles. Most of the kettles are somewhat shallow, yet a few reach depths of 60 to 80 feet.

A survey by William C. Allen in 1918, reported that the moraine contains about 11.7% foreign materials, consisting mostly of igneous and metamorphic crystalline rocks from Canada. Quartzite is also numerous in the moraine along with limestone, sandstone, and chert.

Hydrology

Regional groundwater supplies to the Kettle Moraine area are abundant. The aquifers yielding groundwater in the Southern Unit include sand and gravel at 0-400 feet, Silurian Dolomite up to 300 feet, and Deep Sandstone up to 2000 feet. The chemical quality of the water in the underlying aquifers is similar and is generally very hard.

The source of groundwater in the forest is precipitation, which infiltrates the soil and recharges the aquifers. The amount and rate of infiltration is dependent on the materials overlying the aquifer. The major groundwater uses in the area are shallow wells for residences or other low-capacity activities.

B. Aquatic Resources

Rivers

There are four major streams in the Southern Unit, totalling approximately 24 miles in length.

Scuppernong River. About 16.6 miles of the river flow through portions of the forest in Jefferson and Waukesha counties. The stream is spring fed, and is a major tributary of the Bark River. The water is clear, and has a sand and gravel bottom. Over 3,465 acres of wetland adjoin the river, and over seven miles of public stream frontage exists.

The portion of the river in Jefferson County supports northern pike, largemouth bass, grass pickerel, channel catfish, panfish, and forage fish. The river supports a native trout population at its headwaters in Waukesha County. Paradise Springs, Scuppernong Springs, McClintok Springs and the southern branch of the Scuppernong River are all small tributaries with trout populations.

Bluff Creek. The creek originates from springs at the base of the terminal moraine and flows westward where it joins Whitewater Creek. The many springs at the headwaters area help to maintain excellent water quality in the stream, even though much of the main channel has been straightened through dredging. Current management activities include restoring the natural environment by eliminating the effects of this straightening. Most of the frontage on Bluff Creek is in public ownership.

The two-mile stream is a Class I and II brown trout stream. Bottom materials in the stream are suitable as spawning substrate. Trout redds have been observed, and some natural reproduction has been documented in the creek.

Steel Brook Creek. Approximately two miles of the creek flows through the Southern Unit, of which none is publicly owned. About 500 acres of marsh are associated with the stream.

Whitewater Creek. The creek originates in the impounded areas of Whitewater and Rice lakes. The stream flows 4.3 miles before it drains into Trapp Lake. Approximately 700 acres of marsh adjoin the stream, providing extensive publicly owned frontage.

Whitewater Creek supports northern pike, largemouth bass, panfish, brown trout and forage fish. Trout are found from the junction of Bluff Creek downstream to Trapp Lake. Trout numbers decrease downstream due to poor habitat, caused by ditching, and possibly warmwater temperatures.

Lakes

There are five major lakes within or bordering the Southern Unit. The lakes encompass 950 acres, and range in size from 28 to 640 acres. In addition, there are many warmwater kettles found throughout the forest characterized by shallow, fluctuating water levels. Many kettles hold little or no water in times of drought.

Spring Lake. This lake was created by a dam on the Scuppernong River near the town of Palmyra. The 90-acre lake has a maximum depth of 14 feet. Approximately two-thirds of the lake's marshy shoreline remains undeveloped. A ramp is available for launching small boats. Abundant aquatic vegetation causes use problems in shallow areas. The fishery at Spring Lake includes northern pike, largemouth bass, and bluegills.

Upper Spring Lake. The 32.4-acre lake, with a maximum depth of 10 feet, is an impoundment of the Scuppernong River. One hundred and fifty one acres of wetland adjoin the lake. Abundant aquatic vegetation and a muck bottom create use problems. State land borders the lake's ordinary high water mark, but access is not possible since the privately controlled flowage is maintained at low pool, resulting in a band of private land around the water. The fishery includes northern pike, largemouth bass, bluegills, and black crappie.

Rice Lake. This lake was created in 1954 by impounding Whitewater Creek. The lake is 137 acres with a maximum depth of 20 feet. Much of the lake basin is marshy and the excessive aquatic vegetation in shallow areas causes use problems. The lake's shoreline is largely undeveloped and public access is available. The major fish populations present in Rice Lake include northern pike, largemouth bass, black crappies, perch, and bluegills. Winterkill has been a problem in this lake approximately every 10 years.

Whitewater Lake. This is the largest lake in the Southern Unit with an area of 640 acres and a maximum depth of 38 feet. The lake lies in a depression between lateral moraines deposited by the glacier, and was created by the impoundment of Whitewater Creek. This is a eutrophic lake with abundant aquatic vegetation and occasional algal blooms. The fishery in Whitewater Lake includes largemouth bass, northern pike, and slow growing panfish.

Ottawa Lake. The 28-acre kettle lake with a maximum depth of 20 feet, is located in an old glacial basin. The entire shoreline is in public ownership. The lake supports a variety of fish

species such as largemouth bass, an occasional northern pike, and panfish. Recent introductions of walleye fingerling have been successful in fostering a small population in the lake. Bluegills are very slow growing and overabundant in the lake. Of the panfish present in Ottawa Lake, black crappie are the most desirable.

It is not known whether endangered or threatened fish species are present in the Southern Unit. As funds permit, a complete biological inventory will be conducted. Habitat protection, as appropriate, will be conducted when endangered or threatened species are found.

C. Vegetation and Wildlife, and Endangered Resources

Vegetation and Wildlife

The Southern Unit is comprised of two major forest types--mixed oak stands and conifer plantations. The area also supports a variety of upland shrubs including prickly ash, honeysuckle, dogwood, and sumac. Prairie, grassland, and emergent marsh vegetation make up the remainder of the vegetation cover.

Vegetation manipulation is a widely used management tool. Vegetative brushing, sharecropping, and controlled burning are used to maintain forest openings and provide extra food for deer and other species. Vegetation management is directed at earlier successional stages of the forest and maintaining small openings in the forest for most game species.

A variety of wildlife species, game and non-game, make the forest their home. The species and their habitats by vegetation cover type are described below. A general description of the forest deer herd and other species is also outlined.

Weedy Field. The diversity and abundance of wildlife species present depends on the density and species of plants that are present. Typical animal species could include the ring-necked pheasant, woodchuck, fox sparrows, deer, skunks, red fox, short-eared owls, and kestrels. These fields have low to moderate nesting value for most species.

Old Field. This cover type serves as a moderate to high quality nesting area for ground nesting birds and mammals. It also functions as a good feeding area for many seed and insect eating animals. Bobolinks, mallards, bluewing teal, dickcissels, wild turkeys, goldfinches, and badgers are some of the animals that favor this vegetation.

Switch Grass Field. This habitat provides a secure nesting area and cover for many ground nesting wildlife. This cover type is favored by the endangered sedge wren and hog-nosed snakes. The wild turkey uses this field type for nesting.

Prairie Old Field. This cover type is one of the most wildlife productive grasslands. It offers many nesting and feeding opportunities, but does not provide the secure nesting cover found in a xeric prairie.

Xeric Prairie. A high diversity of grassland wildlife species favor this cover type. The eastern horned lark is very abundant.

Mesic Prairie and Wet-Mesic Prairies. Few of the mesic prairie sites in the Southern Unit, presently available, are large enough to harbor "area critical" birds or mammals. This cover type is favored by the bobolink, dickcissel, and wild turkeys. The wet-mesic prairies are favored in addition by waterfowl, shorebirds, sandhill cranes, and herons during flooded periods.

Lowland Prairie-Wet Meadow. Wildlife species present in this cover type are similar to those in grasslands, except that bobolink, goldfinch, badger, and ground squirrel use is considerably diminished. Aquatic species such as sandhill crane, sedge and marsh wrens, waterfowl, and shorebirds inhabit this area during flooded periods.

Agricultural and Brush Fields. These areas have good wildlife value, primarily for nesting cover and food. Ruffed grouse, woodcock, cottontail rabbits, wild turkeys, squirrels, raccoons, and pheasant use the edge areas. Meadowlarks, killdeer, bluebirds, bobolinks, and vesper sparrows favor the interior. Birds of prey such as kestrels, harriers, and short-eared owls spend much of their time hunting for meadow voles and prairie deer mice in this cover type.

Oak Savanna. Both grassland and woodland wildlife species use this area for nesting and foraging. Ruffed grouse, wild turkey, white-tailed deer, woodchuck, white-footed mice, red fox, song sparrow, catbird, fox sparrow, and brown thrasher are only a few of the species that inhabit the oak savanna.

Oak/Central Hardwoods. This cover type is one of the most productive for wildlife. It provides browse and mast for white-tailed deer, wild turkeys, wood ducks, ruffed grouse, squirrels, rodents, and songbirds. The open stands with a lot of underbrush support the towhee, brown thrasher, blue-jay, and phoebe. As the tree species mature, they provide nesting cavities for woodpeckers, raccoon, squirrels, and screech owls.

Upland and Lowland Conifer Plantations. The red cedar glades attract wildlife species similar to the oak savannas, except the relative abundance of individual species is less. Cedar waxwings are more abundant than in savannas. Upland plantations of red and white pine lose their value with age as they are thinned and pruned, eliminating many of the branches used by small mammals. Mourning doves, sharp-shinned and Cooper's hawks, red squirrels, and cottontail rabbits inhabit these areas. White-tailed deer use dense conifer plantations as escape cover during cold weather. White pine plantations near open water are preferred winter roost sites for turkeys.

Deer Herd. The current population estimate for the Southern Unit shows an overwinter deer herd of about 18 deer per square mile. The forest is open for a fall gun and bow hunting season and deer numbers have been regulated by bow and gun harvests since 1955. The hunting seasons have varied from bucks only to either sex, and from antlered to quota deer. The herd has an extremely high annual reproductive rate, and could quickly exceed the carrying capacity of the forest. The objective of deer management is to maintain a healthy, stable population.

Wild Turkey. The eastern wild turkey is native to southeastern Wisconsin. Turkeys disappeared approximately 135 years ago due to complete timber removal, unrestricted

hunting, intense agriculture, and an introduction of domestic waterfowl as well as their diseases. The eastern wild turkey was reintroduced into the Southern Unit in 1986, after field investigations by several leading turkey biologists. Birds from southwest Wisconsin were live-trapped and released at several locations in the forest. The birds have reproduced and expanded throughout the forest. The old field and savanna cover types are favored by the wild turkey.

Game Birds. Although they were once common throughout the forest area, the ring-necked pheasant population is now largely augmented through stocking. The number of pheasants stocked each year has varied, but in general has averaged around 2,000 birds. Additionally, some local sports clubs annually stock pheasants in the forest. Pheasant hunting attracts more participants than any other hunting season with over 15,000 people hunting pheasants on the forest annually. The weedy field cover type is favored by pheasants.

The Southern Unit supports populations of other game birds including ruffed grouse, woodcock, and bobwhite quail. Adequate data on the actual populations of grouse and woodcock do not exist, yet the presence of these birds has been documented. The Southern Unit lies on the southern fringe of the ruffed grouse range in Wisconsin. Grouse were reintroduced to the forest in the early 1970s, and that population was supplemented through a release of additional grouse in 1976. Wildlife surveys indicate that a few grouse remain.

An attempt to reestablish bobwhite quail in the Southern Unit was made in the mid-1970s. Many limiting factors for quail survival are present in the forest making that reestablishment unsuccessful. Woodcock are also present in the forest, but they are primarily migrants. Some woodcock breeders are present.

Endangered Resources

The Southern Unit contains unique natural and cultural resources, which creates a variety of recreational, educational, and preservation opportunities. If the resources are not protected, the opportunity to learn from our natural and cultural resources is severely compromised.

The Southern Unit contains the last remnants of oak savanna in southeastern Wisconsin. This ecosystem, once composed of distinct plant communities such as springs and ephemeral kettle hole ponds, has the potential to be restored to its presettlement condition. In fact, the Southern Unit offers the best opportunity, and the only one on an interlobate moraine, for establishing a large, fairly complete functioning oak savanna ecosystem in the entire state.

Savannas once covered approximately 5.5 million acres of the Wisconsin landscape, of which the majority were in the southern one-third of the state. These dynamic ecosystems were home to numerous plant and animal species. Since European settlement, however, savanna communities have been reduced to a few hundred acres. With this loss, occurred the loss of wide-ranging and specialized species. Lost from the Southern Unit's fauna are several wide-ranging species such as the timber wolf, American bison, cougar, lynx, black bear and swallow-tailed kite, and specialized species such as the prairie chicken, sharp-tailed grouse, long-billed curlew and the now extinct passenger pigeon.

Wide-ranging and specialized species require large intact ecosystems in which they can remain a viable component. The Southern Unit contains only scattered fragments of the former system. These fragments, in turn, contain nearly all of the Southern Unit's special concern species.

The plant and animal species listed in Table 6 will be lost unless their respective communities are managed as part of a larger ecosystem. This still may not be enough, however, to ensure the continued existence of these species. There will be significant biodiversity losses without restoring the intervening dynamic ecosystems.

The species listed represent known occurrences, and require special interim management to ensure their existence until the landscape can be managed as an ecosystem. Many species and their habitats are sensitive to disturbance. A complete inventory of the forest will be conducted as soon as funds are available. Appropriate protection and management of state endangered and threatened species and communities found in the future will be taken.

Table 6

Endangered (E), Threatened (T), and Special Concern (SC) Species in the Southern Unit

Scientific Name	Common Name	Status	Number of Occurrences
Plants			
Asclepias lanuginosa	wooly milkweed	T	4
A. sullivantii	prairie milkweed	T	2
Besseya bullii	kittentails	T	3+
Cacalia tuberosa	prairie Indian plantain	T	4
Carex sychnocephala	many-headed sedge	SC	1
Cypripedium calceous var. parvifruom	small yellow lady's slipper	SC	3
Cypripedium candidum	white lady's-slipper	T	5
Eleocharis pauciflora	few-flowered spikerush	SC	1
Eleocharis rostellata	beaked spikerush	T	5
Gentiana alba	yellowish gentian	T	1
Gentianopsis procera	small fringed gentian	SC	3
Liatris spicata	marsh blazing star	SC	1
Panax quinquefolius	ginseng	SC	2+
Platanthera leucophaea	prairie white-fringed orchid	E	1
Scirpus cespitosus	tussock bulrush	E	1
Solidago ohioensis	Ohio goldenrod	SC	2
Tofieldia glutinosa	false asphodel	T	2
Triglochin maritimum	common bog arrow-grass	SC	3
Triglochin palustre	slender bog arrow-grass	SC	3

Table 6 (Cont.)

Scientific Name	Common Name	Status	Number of Occurrences
Animals			
Calephelis muticum	swamp metalmark	T	1
Euphysbimacula	two-spotted skipper	SC	1
Euphes conspicua	black dash	SC	1
Harkenclenus titus	Coral hairstreak	SC	3
Oarisma poweshiek	Poweshiek skipper	E	2
Papaipema silphii	Silphium borer moth	E	1
Papaipema berriana	Liatris borer moth	SC	1
Acris crepitans blanchardi	Blandchard's cricket frog	E	1
Emydoidea blandingii	Blanding's turtle	T	3
Rana palustris	pickerel frog	SC	1
Regina septemvittata	queen snake	E	3
Thamnophis proximus	western ribbon snake	E	1
Argia plana	Highland dancer	SC	1
Enallagma anna	River bluet	SC	3
Nannothemis bella	Elfin skimmer	SC	1
Erimyzon sucetta	lake chubsucker	SC	1
Etheostoma microperca	least darter	SC	1
Accipiter cooperii	Cooper's hawk	SC	20+
Ammodramus henslowii	Henslow's sparrow	SC	1
A. savannarum	grasshopper sparrow	SC	3
Bartramia longicauda	upland sandpiper	SC	1
Circus cyaneus	Northern harrier	SC	1
Dendroica cerulea	cerulean warbler	T	3
Dolinchonyx oryzivorus	Bobolink	SC	3+
Empidonax virescens	Acadian flycatcher	T	10
Oporonis formosus	Kentucky warbler	T	2
Wilsonia citrina	hooded warbler	T	5
Spermophilius franklinii	Franklin's ground squirrel	SC	1
Taxidea taxus	Badger	SC	1

D. Historical and Archeological Features

Currently, 62 archeological and historical sites are inventoried with the State Historical Society of Wisconsin (SHSW). One of those sites, the Ward District #3 Schoolhouse in Old World Wisconsin, has been placed on the National Register of Historic Places. Other historic sites, some not yet inventoried with SHSW, include Paradise Springs, the Scuppernong Hotel and Trout Ponds, Marl Pit, Eagle Diamond, the Badger Light Railroad, Elephant Rock, Bald Bluff, Old Limestone Melendy's Prairie, Whitewater Creek and the Limestone Outcropping. Two settler's cabins, dating from the mid-nineteenth century, are being restored for waysides and interpretive area use. Prehistoric archeological sites, ranging from 10,000 years ago to the time of European contact, also exist in the forest. See Section III - Background Information for additional discussion of cultural resources.

The 62 known sites are a fraction of the cultural resources present on the property. No systematic survey of the property has been conducted because funds are not available. The Department will continue to consider its statutory responsibilities toward cultural resources during any land disturbing activities.

Archeological and historic sites reported to the State Historical Society of Wisconsin (SHSW) are included in four inventories housed there--the Wisconsin Archeological Sites Inventory, the Burial Sites Inventory, the Wisconsin Inventory of Historic Places, and the State and National Register of Historic Places. Specific locations are covered by a legal confidentiality clause and are available at the discretion of SHSW. Cultural affiliation for the sites are described in this section. Additional information on these sites is available at SHSW.

E. Present Land Use Classifications

The following land use classifications presently delineate the primary use of a particular part of the Southern Unit and help establish management and development priorities. Additional discussion of these categories and sites is in Sections II and III. The locations of the land use classification areas are shown on Map 7.

Resource Protection Area

The nine State Natural Areas under this category, totalling 1,150 acres, are outlined below. Management activities in these areas emphasize the maintenance of natural conditions with a minimum of human intervention and stabilization of natural forces, and limited development. Tree and brush removal and prescribed burns will be conducted.

Eagle Oak Opening. This 90-acre site has three outstanding features--the abrupt morainal kettle hole topography typical of the forest, the large numbers of open-grown white and bur oaks, and a prolific display of pasque flowers in the spring. Most of the former oak opening has reverted to dry-mesic forest but there are areas where some of the following prairie species can still be found: big and little bluestems, Indian grass, side-oats grama, northern dropseed, blue-eyed grass, prairie buttercup, alum root, prairie smoke, New Jersey tea, birds-foot and prairie violets, shooting star, pale-spiked lobelia, white camas, goldenrods, and asters. The area has many glacial formations including kettle holes with ephemeral ponds.

Scuppernong Prairie. This 25-acre site was designated in 1952, and contains an undisturbed wet-mesic prairie and southern sedge meadow. The flora includes several rare species and such characteristic low prairie plants as big bluestem, Indian grass, porcupine grass, blue joint grass, northern dropseed, cream wild indigo, shooting star, leadplant, compass plant, prairie dock, blue-eyed grass, Virginia mountain mint, prairie smoke, and prairie blazing star. On a low rise in the center of the area and along the eastern boundary there are scattered open-grown bur oaks, typical of this region in presettlement times. The Melendy's Prairie unit, on the west side of County Highway N, is a complex of sedge meadow, wet-mesic prairie, and degraded oak woods. One state-endangered and three state-threatened plant species have been found on the site. The 160-acre Melendy's Prairie provides excellent habitat for uncommon birds such as bobolink and upland sandpiper, and uncommon animals such as the Franklin's ground squirrel, badger, and eastern hognose snake.

Kettle Moraine Fen and Low Prairie. Several different communities encompass this 250-acre natural area. To the north of the access lane is a low area with gently undulating topography that is dominated by wet prairie and fen species such as bluejoint grass, shrubby cinquefoil, valerian, grass of parnassus, Ohio goldenrod, and golden alexanders. The area south of the access land slopes gently toward the Scuppernong River. A rich wet-mesic prairie covers the slope. Common plant species include Indian grass, big and little bluestems, vanilla grass, rattlesnake master, marsh blazingstar, and prairie dock. Directly north of this prairie is a degraded oak opening, invaded by brushy species. Two mounds, one to the north and one to the south, are recovering from past disturbances and now contain dry-mesic prairie species.

Ottawa Lake Fen. The 50-acre Ottawa Lake Fen has two depressions connected by a deep marsh and shallow marl flats. The water flows south into Ottawa Lake. An unusually large number of wetland and aquatic plant communities occur within the natural area. More extensive than any other in the state, the fen-marl flats contain uncommon plants such as the pitcher plant, small bladderwort, marsh club-moss, and small fringed gentian. It is unusual to find the pitcher plant in such a highly alkaline situation. Freshwater mussels, snails, water snakes, pickerel frogs, painted turtle, green-backed heron, blue-winged warbler, common yellow throat, yellow warbler, swamp sparrow, and willow flycatcher are also found on the site.

Maintenance of the existing interpretive features, the canoe access boardwalk on the western shore, the bird observation tower, and the gravel access path are required.

Young Prairie. Young Prairie encompasses a 33-acre wet-mesic prairie and approximately 20 acres of old field that is reverting to prairie. It is among the best and largest prairie remnants of its type known in the region. A small stream and associated wetland vegetation are located in the northeast section of the tract. Surrounded by agricultural lands on the east, south, and west, and by old field on the north, this low prairie is somewhat flat except for seasonally flooded, shallow depressions scattered throughout. More than 80 species of native plants have been found including compass plant, prairie dock, blazing star, purple prairie clover, lead plant, shooting star, turks cap lily, coneflower, sunflowers, goldenrods, and asters. Nesting birds include bobolink, eastern meadowlark, common yellowthroat, sedge wren, and swamp sparrow. Occasional visitors are the upland sandpiper, sandhill crane, and short-eared owl.

Clover Valley Fen. This 66-acre fen features a series of peat mounds that rise eight to ten feet above the surrounding lowland. These mounds were formed by accumulations of partially decayed vegetation around slowly flowing springs. Radiocarbon dating of these and similar mounds in the area reveals that mound formation began approximately 11,500 years ago. An L-shaped mound with four distinctive points is centered on the site. Many characteristic fen plants including grass-of-parnassus, lousewort, Kalm's lobelia, common bog arrow-grass, valerian, Riddell's goldenrod, and several rare and restricted species are growing on the mound. In the southeast corner of the site are three small mounds, each with a distinct flora. Surrounding the mounds is sedge meadow, which has been grazed but maintains good integrity and diversity. Bisecting the tract is a small, sand-bottomed stream.

Clifford F. Messinger Dry Prairie and Savanna Preserve. This 246-acre site stretches across more than 20 miles of kettle moraine topography of kettle holes, interlobate moraine, and outwash plains. This preserve has sixteen separate sites grouped into five units containing prairie and oak opening communities. Each site has unique flora that together characterizes the presettlement flora of the region. The prairies are dominated by big and little bluestems, Indian grass, prairie dropseed, and side oats grama. Flowering plants include pasque flower, bird's-foot violet, purple prairie clover, hoary puccoon, old-field goldenrod, and blazing star. Although each of the 16 sites has its distinctive character, two deserve discussion here.

Bald Bluff Dry Prairie is the largest dry prairie of the group and the most diverse in terms of plant species. It also has historical significance, since it was visited by Abraham Lincoln when he was in the U.S. Army and it is thought to have been a Native American signal hill.

Whitewater Oak Opening, covering 120 acres of rugged morainal topography, is dominated by bur oak on the ridge tops and south-and southwest-facing slopes, by red oak on the north-facing slopes, and by white oak in other places. Like the few other remnant oak openings in the state, it has been invaded by shrubs and other woody growth over the years, especially honeysuckle and prickly ash. Yet, a wildfire in the 1950s opened up the site to a certain extent, and this natural fire is being imitated by prescribed burning, reinstating this crucial process of the oak opening ecosystem.

Bluff Springs, Fens, and Oak Woods. This 211-acre area includes the headwaters of Bluff Creek, a portion of Bluff Creek itself, fens and springs in six separate portions of the site, diverse and undisturbed wetlands, and southern dry-mesic forest. Common species include grass of Parnassus, loosewort, and potentilla. The forest is dominated by large red oak. Other species present in much smaller amounts and sizes are bur and white oaks, black cherry, and shagbark hickory. Herbaceous woodland plants include hepatica, pointed tick trefoil, annual bedstraw, lopseed, enchanters nightshade, sweet cicely, wild geranium, may apple, blue cohosh, and jack-in-the-pulpit.

Blue Spring Oak Opening. This 19-acre site features an oak opening with scattered open-grown bur and black oaks in the 12- to 16-inch diameter range on a west-facing slope overlooking Blue Spring Lake. A fairly rich savanna flora exists under the oaks, dominated by big and little bluestems, side oats grama, prairie dropseed, and Indian grass. More than 30 other prairie species have been found including whorled milkweed, sky blue aster, New jersey tea, shooting star, alumroot, bergamot, purple prairie clover, white camass, leadplant, pasque flower, Illinois tick trefoil, and old-field goldenrod.

Resource Management Area

Carlin Demonstration Forest. The 80-acre forest will continue to be managed as an experimental management area within this category. Management activities in the research forest will be intensified to promote the forest's value as an educational tool.

Oak Ridge Demonstration Farm. The 102-acre farm, operated by the Milwaukee Public School system, will continue to be managed as a demonstration area under this category.

Intensive Recreation Area

There are 1,388 acres of campgrounds, picnic areas, boat landings, and beaches within this category. Old World Wisconsin is also included under this designation.

Extensive Recreation Area

There are 15,642 acres under this category in the Southern Unit.

Administrative Area

There are three acres of the forest under this category.

F. Local and Regional Land Use Analysis

Generally, the management prescriptions presented in the plan for the forest will result in little direct effect on populations in the area.

State land acquisition for example, will not cause a significant shift in populations. This is supported by the policy of the Natural Resources Board to acquire land only from willing sellers or through donations.

The forest will continue to provide a solid core for long-range growth in the region's recreation and tourism business. The forest has and will continue to improve substantially the probability that scenic, natural, and outdoor recreational values will be maintained over the long term. The quality of these values is important in attracting tourists.

The proposed project will not have a significant negative economic impact on general agricultural or individual farm operations. Some agricultural lands will potentially be acquired, but much of this is marginal cropland located in scattered parcels.

Specific timber production estimates are not available. A slight increase in annual production in the forest is anticipated but this will not result in significant changes in local forest industry business activity or employment. Over the long-term the proposed forest management activities will improve the quality of the timber resource and help ensure a continuing source of timber for the regional forest products industry.

SECTION V - ENVIRONMENTAL IMPACTS OF THE PROPOSED PLAN

Environmental Analysis and Decision on the Need
for an Environmental Impact Statement (EIS)

Southeast District, Bureau of Parks and Recreation
Type List Designation - NR 150.03(6)(a)6.a.

This document is a Department environmental analysis that evaluates probable environmental effects and decides on the need for an EIS. The attached analysis includes a description of the proposal and the affected environment. The Department has reviewed the attachments and upon certification, accepts responsibility for their scope and content to fulfill requirements in s. NR 150.22, Wisconsin Administration Code.

A. Project Summary

The master plan for the 29,085-acre Kettle Moraine State Forest-Southern Unit will direct the management and development of the property for the next 10 years. The plan was developed by:

* a Department Task Force comprised of resource managers from the Bureaus of Parks and Recreation, Forestry, Wildlife Management, Fisheries Management, and Law Enforcement;

* a vegetation management committee comprised of most Task Force members, a biologist, a naturalist, and a specialist in endangered resources;

* a Citizens Advisory Committee comprised of users of the forest; and

* individual members of the public and organized groups.

Some major proposals in the plan include:

* Add an additional 6,605 acres to the present boundary for a total of 29,085 acres.

* Add the 1,076-acre Scuppernong Wildlife Area and the 118-acre Bluff Creek Fisheries Area to the forest.

* Use easements as alternatives and additions to fee acquisition.

* Base vegetation management decisions on integrated resource management principles with priority on wildlife habitat, recreation, restoration of native plant communities, and education and interpretation.

* Reinstate a tree planting program that matches the species to the site characteristics and incorporates savanna reestablishment where appropriate.

* Construct a variety of recreational facilities including picnic shelters, scenic overlooks, and wildlife observation structures. These will generally be in areas of existing development.

* Prohibit ATV use on the forest.

* Designate specific trails for mountain bike use.

* Establish an approximately 800-acre archery hunting- and trapping-only zone around the Scuppernong Trail.

* Establish a spring turkey hunting season.

* Develop two wildlife impoundments of approximately 50 acres each.

* Remove the dike at the Scuppernong Springs trout ponds and dredge the Paradise Spring trout ponds.

* Designate the 700-acre Kettle Moraine Oak Opening, and the 492 additional acres of the Young Prairie as State Natural Areas.

* Designate a 3,500-acre area around the Scuppernong River as a Habitat Preservation Area.

For further detail regarding proposals in the plan, the existing environment, and alternatives to the proposals, please see the respective section of the plan.

B. Evaluation of Project Significance

Environmental Effects and Their Significance

Changes in Land Ownership and Land Use

It is the policy of the Natural Resource Board to acquire land from willing sellers or through donations. As a result, not all lands authorized for acquisition will be purchased. The use of scenic and conservation easements with short-term arrangements, such as hunting leases and land use agreements, i.e. managed forest law and farmland preservation, are important additions to fee acquisition. There will be very little change from the present land use in the forest as a result of proposed land acquisition. Under the Resource Protection category, 1,257 acres of Natural Areas and 3,245 acres of Habitat Preservation Areas will be added. In addition, 6,193 acres will be added to the Extensive Recreation Area classification.

Natural Areas are tracts of land or water containing the best remaining examples of native biotic communities or other native features including significant geological or archeological features. Habitat Preservation Areas are defined as those lands and waters containing excellent natural habitat and characteristics that are conducive to perpetuation and production of fish and wildlife. Management activities in these areas emphasize the maintenance of

natural conditions with a minimum of human intervention and stabilization of natural forces, and limited development.

Extensive Recreation Areas are lightly developed or undeveloped areas that are used for recreation purposes. In addition, the plan will not change existing private land use.

Vegetation Management

A comprehensive vegetation management plan covering the entire forest will guide activities to protect or restore the forest's significant and rare resources. The management activities proposed include reforestation, minimizing grassland fragmentation, and increasingly using fire to maintain and expand native prairies and savannas. These activities are aimed, in part, at achieving biodiversity, or a more biologically diverse forest.

Biodiversity is a variety and variability among living organisms and the ecological systems in which they occur on the local and regional landscape. A strong emphasis is also placed on restoring native plant and animal communities to the forest.

Reforestation accomplishes several goals, including the:

* enhancement of habitat and food production for a variety of wildlife species.

* consideration of scenic values and wildlife production in timber harvesting; the cultivation of native species or presettlement species; improved water quality through the planting of vegetation on steep erodible slopes; and enhanced scenic values through the use of buffer strips or the planting of desired species to attract wildlife or for the species inherent value.

* reintroduction of hardwood species to the forest.

The minimization of grassland and forest fragmentation increases the productivity of selected species of wildlife. Both species and communities are enhanced because variability is increased. In addition, the requirements of individual species have a greater chance of being met, while isolation, predation, and parasitism are reduced.

The use of fire as a vegetation management tool allows the upgrading, restoration, and maintenance of prairie and savanna communities and increases their potential to resemble presettlement conditions. In addition, rare and endangered species in those communities can be protected and enhanced.

Recreation

Existing facilities will be upgraded or replaced to ensure that they meet existing building, plumbing, and environmental codes. New development will be constructed in a manner that respects and is sensitive to the natural resources it showcases.

ATVs will be prohibited because of the noise, safety, and erosion concerns associated with

their use. Specific trails will be designated for mountain bike use because of concerns over conflicts with hikers and horseback riders, and damage to erodible soils and other resources.

Wildlife

The recommendations in the plan increase the scope and intensity of management for game, non-game, and endangered species on the forest. There will not be a major shift in the existing management program.

The creation and restoration of small wetland areas will provide many environmental benefits including productive wildlife habitat. There are concerns over the success of restoration projects and the effects on existing resources, particularly rare communities. This concern centers on two factors--the success of environmental restoration cannot be guaranteed and human intervention is necessary to change existing natural conditions.

Fisheries

The proposed fisheries management activities focus on enhancing fish habitat, populations, and water quality while increasing angling and education opportunities. Dredging Paradise Springs pond will improve water quality and habitat for trout. Removing the dike at Scuppernong Springs will allow reversion back to a natural spring and stream system.

Endangered Resources

Designation of two State Natural Areas and a Habitat Preservation Area will have a significant, positive impact on the long-term survival of many endangered or threatened species. The sites proposed are large, somewhat undisturbed sites--a rarity in rapidly developing southeastern Wisconsin. The goal is to restore natural ecological systems and their functions to presettlement conditions.

Significance of Cumulative Effects

The cumulative effects of proposals in the plan will be positive. The objective of most actions is the increased diversity of functioning plant and animal communities. Each discipline will have input into projects, undertaken by other disciplines, to ensure an integrated approach to resource management. In addition, the plan recognizes that whenever a resource management decision is made, the natural environment will have the benefit of higher priority.

The effects of the plan on other Department-managed properties in the area of the Southern Unit will also be positive. Master plans for the Kettle Moraine State Forest-Northern Unit and other Department properties include similar objectives for the restoration of wetlands and grasslands, the reintroduction of native species of animals, the protection of endangered or threatened plants and animals, and the management of the landscape to simulate pre-settlement vegetation conditions.

These cumulative effects will assist in the survival of uncommon or rare plant communities. In addition, high quality habitat will be provided for a variety of animal species. At a minimum

this will help balance losses of habitat and other lands occurring in southeastern Wisconsin. Even with all Department lands in combination, land ownership and management by the Department totals a small amount of the total acreage in southeastern Wisconsin. The net result will be islands of biodiversity amid on ocean of urban and rural land uses.

Significance of Risk

The success of environmental restoration projects and species reintroduction is not guaranteed. There are several proposals within the plan to restore ecosystems to their presettlement condition. In addition, there are proposals for wetland restoration and creation. These ecosystems are valuable for future scientific research and education, and often contain rare species. The potential for restoration and preservation of these communities exists on the forest. The benefits of restoration outweigh the risks of possible failure.

Regeneration of oak, in particular red oak, in southeastern Wisconsin has proven to be uncertain. A variety of techniques have been used with varying degrees of success. Remnants of oak openings in the Southern Unit, therefore, merit protection and proper management. Continued attempts at regeneration, with the careful study of existing oak communities, will work toward finding successful regeneration techniques.

The removal of exotic species is a high priority management goal. The success of removal techniques cannot be guaranteed. Failure to attempt removal will result in further degradation of the affected communities with uncertain long-term effects on their component parts.

Although many significant resources have been identified in the plan, i.e. glacial features, cultural resources, and flora and fauna, the complexity and size of the Kettle Moraine may have resulted in other significant resources being overlooked. As funds and staffing allow, continued and additional inventories of resources of the forest will be conducted. Before any large development projects are undertaken, biologists, historians, archaeologists, and endangered resource experts will be consulted to ensure protection of known and unknown significant resources.

Animal reintroduction and habitat expansion also involves potential risks. It is possible for these projects to be too successful. An increase in the population of deer, turkey, and other animals can lead to crop depredation or increased highway accidents. The master plan contains enough flexibility to consider the varied success of habitat improvements.

The Bureau of Endangered Resources and the Bureau of Wildlife have proposed burning additional acres within the forest to enhance rare plant communities including oak savannas and prairies. With the increased use of prescribed burns and the burning of large areas, the potential for these fires to get out of control increases. The Department maintains a well-trained staff and a full complement of fire fighting equipment at the forest. The Department also has agreements with area towns for supplementary fire suppression, if necessary.

For the Department to not burn would risk the loss of rare plant communities, the loss in wildlife production, and the severe invasion of exotic plant species. The impact of prescribed burns on air quality will be negligible since the fires will be temporary and occur only in the spring and fall.

Significance of Precedent

It is proposed in the plan to establish an archery hunting- and trapping-only zone around the Scuppernong Trail. This designation will allow continued, but limited, hunting in the area and continued hiking and other non-consumptive, or passive uses. This proposal addresses safety concerns while maximizing the number of users.

Specific trails within the forest are designated for mountain biking. The trails were chosen to minimize adverse effects of this use on the resource, and to minimize user conflicts.

The plan is in accordance with local, county, and state policies.

Significance of Controversy Over Environmental Effects

Citizen Participation

There has been considerable emphasis on gathering citizen input during the master planning process. The Department held 17 open forums between 1988 and June of 1991 throughout southeastern Wisconsin. The initial open forums were held to determine issues the public wanted addressed and to provide information on the plan. Forums were held later in the process to gather feedback on completed portions of the plan.

The Kettle Moraine toll-free hotline was available throughout the planning process to provide the public a convenient way to comment on the plan. Department staff developed an informational program for public access television and appeared on several radio interviews and talk shows. In addition, staff made several presentations to special interest groups.

The Department formed a Citizen's Advisory Committee early in the planning process to evaluate public input and provide feedback on the plan. The committee formally met 15 times.

Several proposals in the plan that created some controversy are outlined below.

* Prohibit all-terrain vehicle (ATV) use on the forest.

ATV enthusiasts feel that the money from the ATV registration fees they pay should be used to provide them with trails in the forest. Horseback riders, hikers, and environmentalists feel that ATV use should be prohibited because of noise, safety, and environmental concerns.

* Restrict mountain bike use on the forest.

Mountain bikers feel they should be allowed to use most of the trails in the forest. Hikers and horseback riders want mountain bikers restricted because of concerns for safety and the degradation to the trails.

* Create an archery hunting zone around the Scuppernong Trail.

Hikers feel threatened and unsafe during the gun hunting seasons. Hunters feel that public lands for hunting are increasingly being restricted.

* Introduce a spring turkey hunting season.

Hikers feel that spring hunting, in addition to the various fall hunting seasons, further threatens their safety in the forest. Hunters favor this proposal because it provides them with additional opportunities to hunt on public lands.

* Acquire land within the project boundary.

Acquisition of land or easements by the Department is often perceived by landowners or Townships as threatening, detrimental, or resulting in a loss in tax base. Some changes in the forest boundary are proposed, yet state land acquisition will occur only through voluntary sales or donations. Studies suggest that state-owned land is not an economic burden to local governmental units due to state payments in lieu of taxes and increased school aids. In addition, the Department will change from payments in lieu of taxes to property tax payments on all lands purchased after January, 1992.

SECTION VI - ALTERNATIVES TO THE PROPOSED PLAN AND THEIR IMPACTS

Major concept alternatives which could be applied to the management, operation, and development of the Southern Unit are presented below. The fact that the forest is a well-established recreation area and affords a good measure of resource protection has been incorporated into the alternatives.

No Change - Status Quo

Under this alternative the property would continue to operate as is. No organized attempt would be made to overcome management problems and there would be little change in the degree of resource protection. Major development would occur as established in the Department's six-year capital improvement plan. Minor development and maintenance would occur as it becomes necessary or desirable, and if funds become available. Facilities operation under this option would usually result in adequate performance; however, there is greater potential for problems, that may be difficult and costly to solve later, to develop. This alternative would permit only limited adjustment in management to address changing trends in outdoor recreation or resource protection.

Modification to the Present Management and Use

This alternative recognizes the resource management practices that have been developed over the past several years. It also seeks to address management problems and concerns, recreation and education needs, and public concerns and interests that have been raised during the planning process. No new major developments would occur under this alternative, but improvements to or replacement of existing development would take place.

The current major emphasis on recreation with a secondary, but significant emphasis on resource protection and education would be continued without interruption.

Intense Development

With the implementation of this alternative major development would occur. The development could include additional campgrounds, a resort development, specialized trails for mountain bikes and ATVs, an additional interpretive center, a swimming pool at Pinewoods, and an increase in put-and-take fishing and hunting opportunities.

These additions to the Southern Unit probably would be met favorably by some user groups. The popularity of the forest would increase significantly for some and decrease for others. The monetary costs and the impact on the resource would be high, and environmental standards and awareness would be compromised.

Recommended Alternative

The modified approach to the existing use and management of the forest, or alternative two, is recommended. The Southern Unit does not have the capacity to support all types of outdoor recreation without resource degradation. Whenever a choice has to be made between the natural environment and outdoor recreation, the natural environment will have the benefit of being given a higher priority.

SECTION VII - COMPLIANCE WITH THE WISCONSIN ENVIRONMENTAL PROTECTION ACT

Decision

In accordance with s. 1.11, Stats., and Ch. NR 150, Adm. Code, the Department is authorized and required to determine whether it has complied with s. 1.11, Stats., and Ch. NR 150, Wis. Adm. Code.

EIS Process Not Required [X]

The attached analysis of the expected impacts of this proposal is of sufficient scope and detail to conclude that this is not a major action which would significantly affect the quality of the human environment. In my opinion, therefore, an environmental impact statement is not required prior to final action by the Department on this project.

Major Action Requiring the Full EIS Process [ ]

The proposal is of such magnitude and complexity with such considerable and important impacts on the quality of the human environment that it constitutes a major action significantly affecting the quality of the human environment.

Signature of Evaluator — Date Signed: 7/24/91

James L. Treichel for D. Weigenicher — Noted: Bureau Director — Date Signed: 8/22/91

Number of responses to news release or other notice: 545

Certified to be in Compliance with WEPA

Gary A. Birch — District Director or Director of BEAR (or designee) — Date Signed: 8/23/91

Notice of Appeal Rights

This notice is provided pursuant to section 227.48(2), Stats. If you believe that you have a right to challenge this decision, you should know that Wisconsin statutes and administrative rules establish time periods within which requests to review Department decisions must be filed.

For judicial review of a decision pursuant to sections 227.52 and 227.53, Stats., you have 30 days after the decision is mailed, or otherwise served by the Department, to file your petition with the appropriate circuit court and serve the petition on the Department. Such a petition for judicial review shall name the Department of Natural Resources as the respondent.

To request a contested case hearing pursuant to section 227.42, Stats., you have 30 days after the decision is mailed, or otherwise served by the Department, to serve a petition for hearing on the Secretary of the Department of Natural Resources. The filing of a request for a contested case hearing is not a prerequisite for judicial review and does not extend the 30-day period for filing a petition for judicial review.

Note: Not all Department decisions respecting environmental impact, such as those involving solid waste or hazardous waste facilities under sections 144.43 to 144.47 and 144.60 to 144.74, Stats., are subject to the contested case hearing provisions of section 227.42, Stats.

SECTION VIII - BOUNDARY CHANGES

Purpose

The plan includes a boundary expansion of 6,605 acres, of which 4,375 is in private ownership. The private lands included in the expansion are located in seven different areas, each of which has a specific purpose for being included in the project boundary. Acquisition will provide additional wildlife habitat, protect glacial features, improve water quality, protect wetlands, and provide a buffer to trail systems, campgrounds, and State Natural and Habitat Preservation areas. The goal statement for the forest states that unique geological formations will be preserved, the natural landscape protected and rare species and communities protected, and the experience for the forest user enhanced. The objectives further support these efforts--to maintain aesthetics, to protect ecosystems and Natural and Habitat Preservation areas, and to provide a balance between forest uses.

Description and Justification

A description and justification for each area proposed for inclusion in the project boundary is outlined below. The letters correspond with those shown on Map 8.

A. The area is generally flat, consisting of a mixture of farm fields (75%), wetlands (15%), and rolling uplands (10%). There are eight residences in this area most of which are located along Highway ZZ. The area is used by sandhill cranes, turkeys, pheasants, deer, and other small game and non-game species. It will be restored to provide outstanding wildlife habitat and could be critical to restoring a native prairie chicken flock and expanding the woodcock population.

B. Area "B" is part of the glacial moraine, with steep to rolling topography. It encompasses farmland (25%), pastures (25%), woodland (40%), and grassland/shrubs (10%). The area provides habitat for turkey, deer, squirrel, and other small game and non-game species. Acquisition of this area will protect glacial features on the east edge of the moraine. This area will serve as a buffer to encroaching subdivisions and guard against gravel mining and water table fluctuations.

C. The parcels in this area consist of grasslands (20%), farmland (60%), and wetlands (20%). Much of the farmland is former wetlands and potholes that were once drained and tiled. Wetland restoration will enhance waterfowl and sandhill crane production. Other wildlife will also benefit from this patchwork of wetland, grassland, and forest edge environments. Public ownership of the upland areas will improve water quality in streams and ponds, since use of these areas will be regulated.

D. Farmland (80%) and upland grassland (20%) encompass area "D". This area will serve as a buffer for the Nordic ski and hiking trail system from incompatible development. It will also provide dense nesting cover for waterfowl and pheasants.

E. Area "E" encompasses an esker--a unique glacial feature. Acquisition will protect the esker from the threat of gravel extraction and mining.

F. The parcels in area "F" consist of a lowland vegetation community. Acquisition will protect Bluff Creek and an adjacent wetland. Water table levels and surface water quality are critical to this fragile, quality trout stream and springs complex. Wetland habitat protection will also serve a wide variety of game and non-game species.

G. Area "G" encompasses farmland (40%), pastureland (20%), and wetlands (20%). It will provide a buffer to the Whitewater Lake campground, and the Clover Valley State Natural Area.

Cost

A. Number of landowners - There are 84 landowners in the proposed boundary expansion, totalling 4,375 acres.

B. Number of tracts with improvements - There are 64 tracts with improvements on them.

C. Total improvement value - The estimated total improvement value is $3.8 million.

D. Total land value - The estimated total land value is $6.2 million.

E. Relocation assistance (number and value) - Approximately 75 relocations have an estimated value of $600,000.

F. Total associated costs - The estimated cost for engineering, appraisals, surveys, archaeological studies, site reclamation, etc. is $300,000.

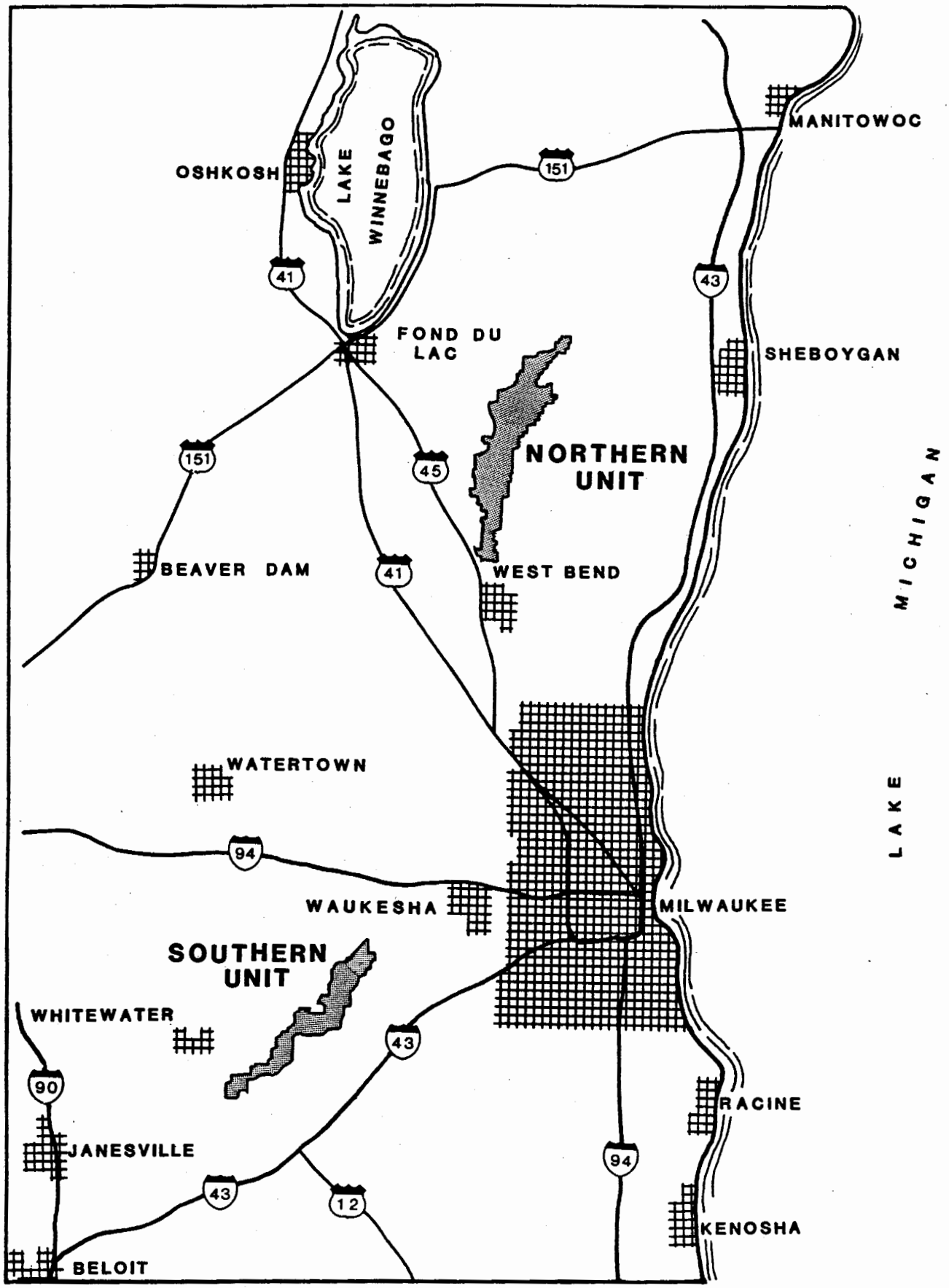
The total estimated cost of the land acquisition program is $10.9 million.

Impacts If Proposal is Rejected

The acquisition of these lands benefit every program on the forest. The additional wildlife habitat and buffers, and the protection of glacial features are the primary reasons for this land acquisition program. The growing population in southeastern Wisconsin will be ensured the continuation of nearby recreational opportunities. Residential development in the Kettle Moraine area, however, continues to put a strain on the resource. For instance, some bird species such as the sharp-tailed grouse, will not sustain itself on less than approximately 10,000 acres. As the amount of undeveloped acreage surrounding the forest diminishes, so may some of the species who now call the forest their home.

The Southern Unit is an example of glacial topography not found in other parts of Wisconsin. The National Park Service recognized the significance of the Southern Unit's glacial features and designated 33 miles of the Ice Age Trail as part of the National Scenic Trail System. Remnants of the glacier are limited in number. It is critical that we protect these features from mining and other development.

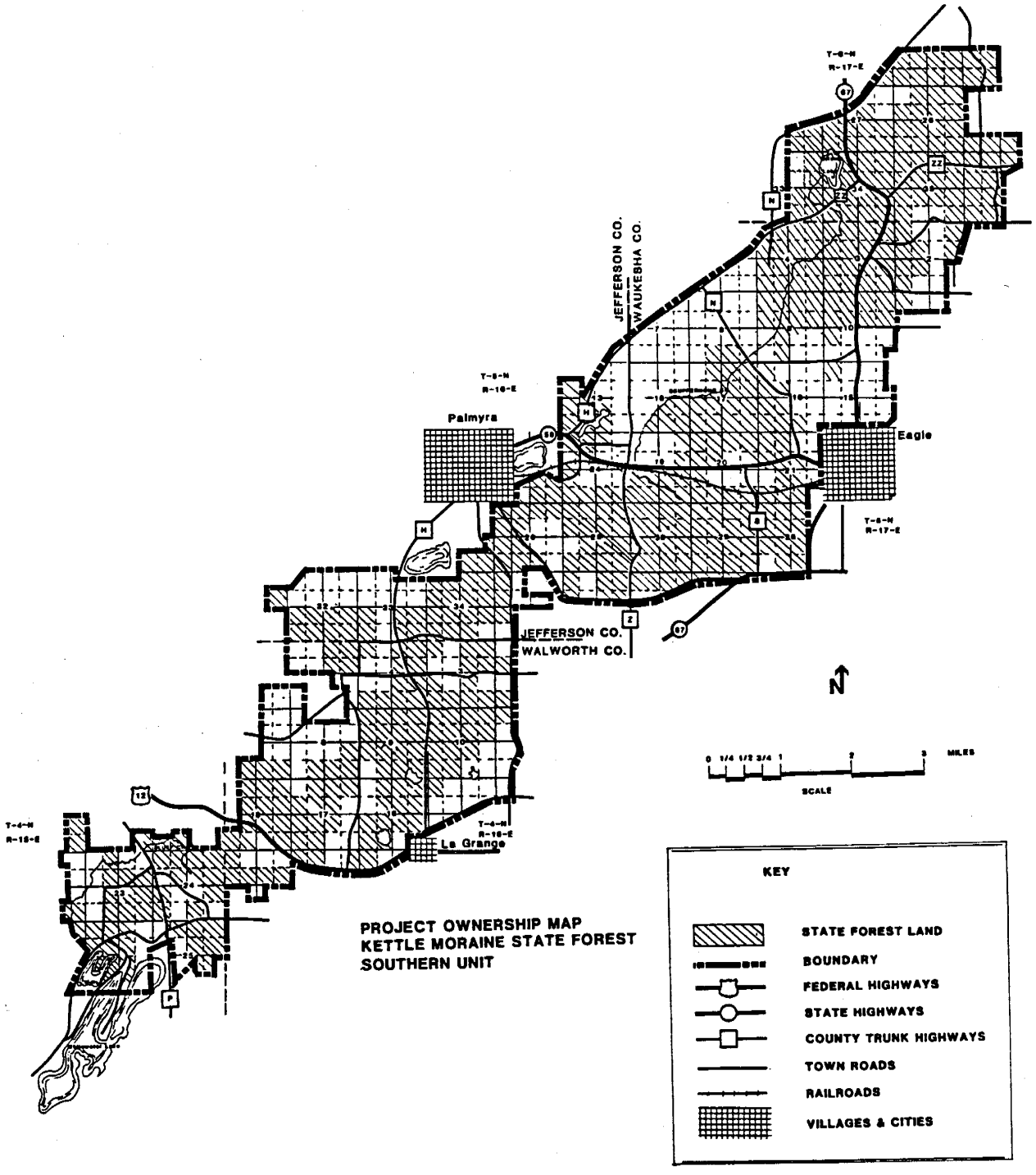
MAP 1 - FOREST LOCATOR



FOREST LOCATOR

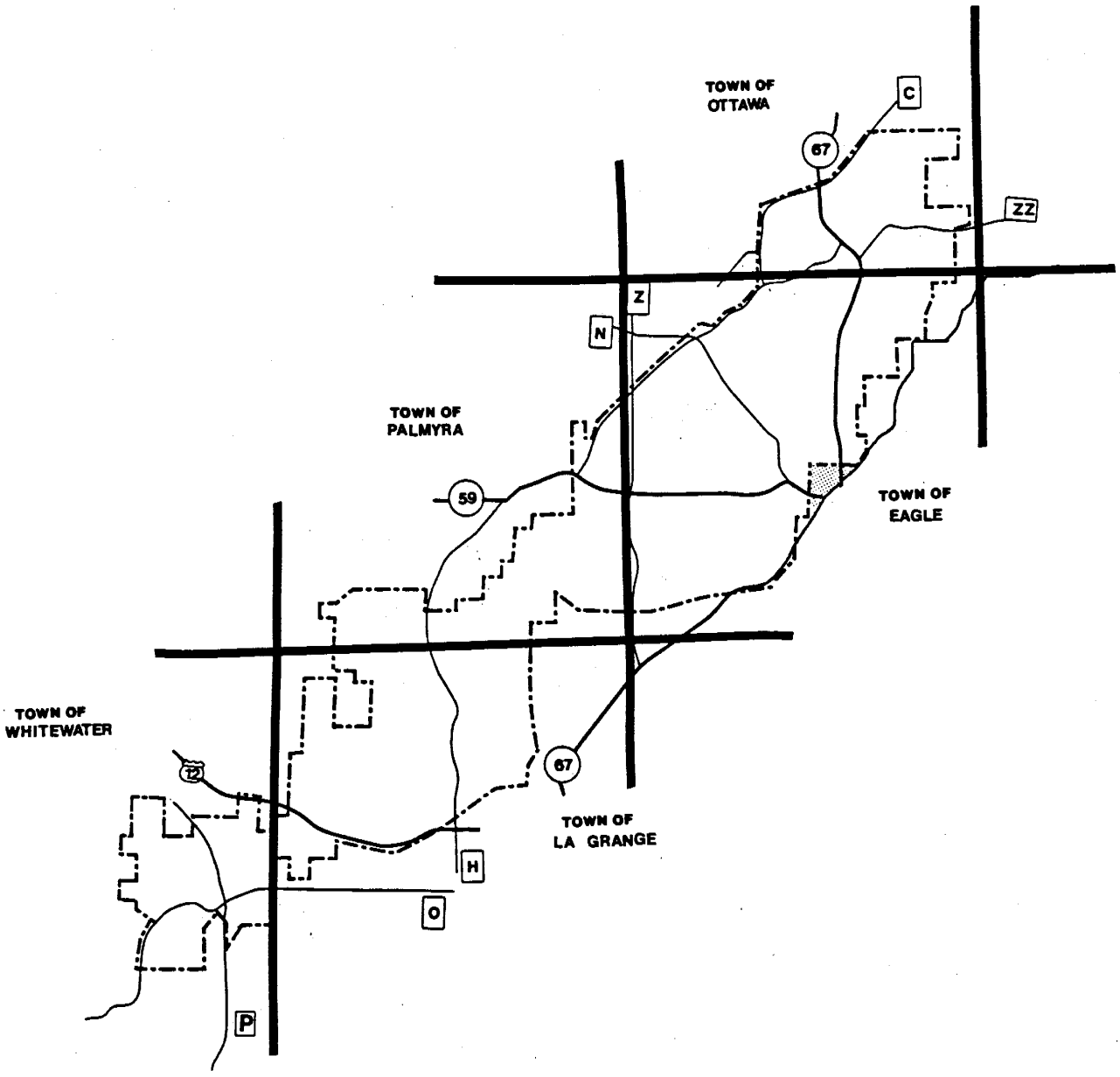
KETTLE MORAINE STATE FOREST

MAP 2 - PROJECT OWNERSHIP



PROJECT OWNERSHIP MAP
KETTLE MORAINE STATE FOREST
SOUTHERN UNIT

MAP 3 - TOWNSHIP LOCATOR

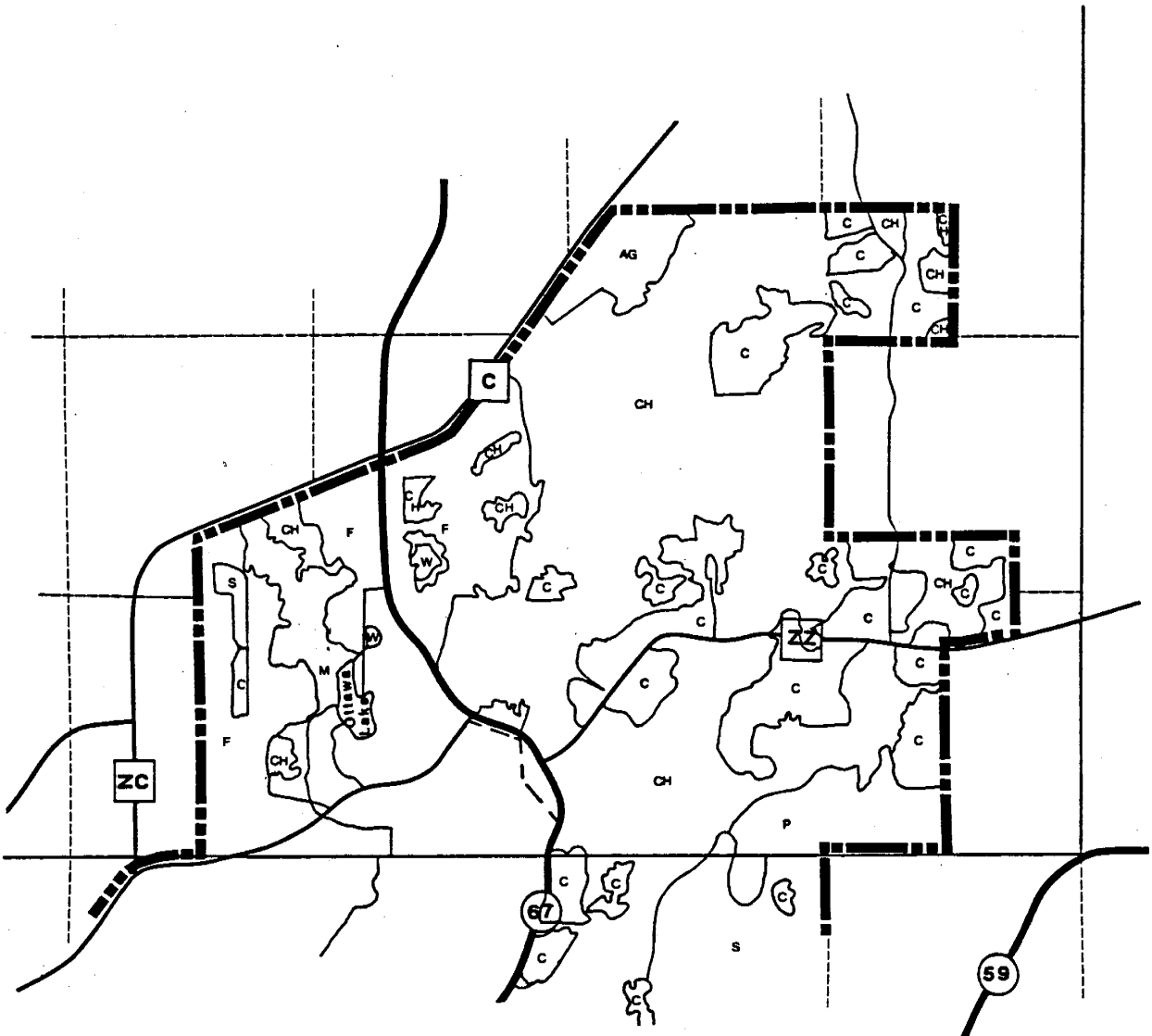


TOWNSHIP LOCATOR
KETTLE MORAINE STATE FOREST

SOUTHERN UNIT

N

MAP 4 - VEGETATION COVER TYPES



VEGETATION KEY

- CH – Central Hardwood
- NH – Northern Hardwood
- A – Aspen
- W – Wetland
- M – Meadow
- P – Prairie
- F – Field
- C – Conifer
- T – Tamarack
- US – Upland Shrub
- AG – Agricultural Land
- NA – Natural Area
- HPA – Habitat Preservation Area
- S – Savana

VEGETATION COVER TYPE MAP
TOWN OF OTTAWA
KETTLE MORAINE STATE FOREST

SOUTHERN UNIT

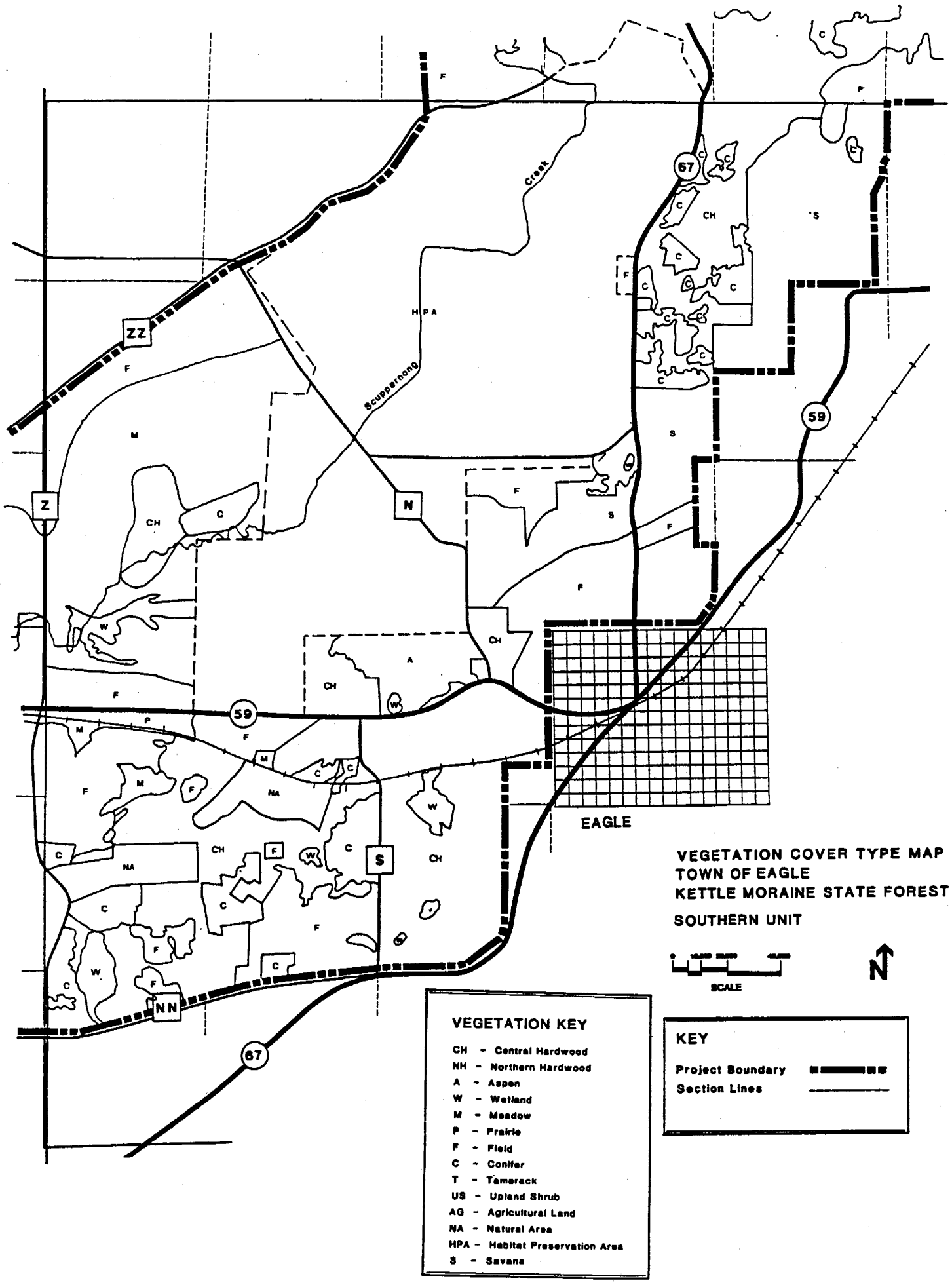
SCALE

N

KEY

Project Boundary

Section Lines



VEGETATION COVER TYPE MAP
TOWN OF EAGLE
KETTLE MORAINE STATE FOREST
SOUTHERN UNIT

SCALE

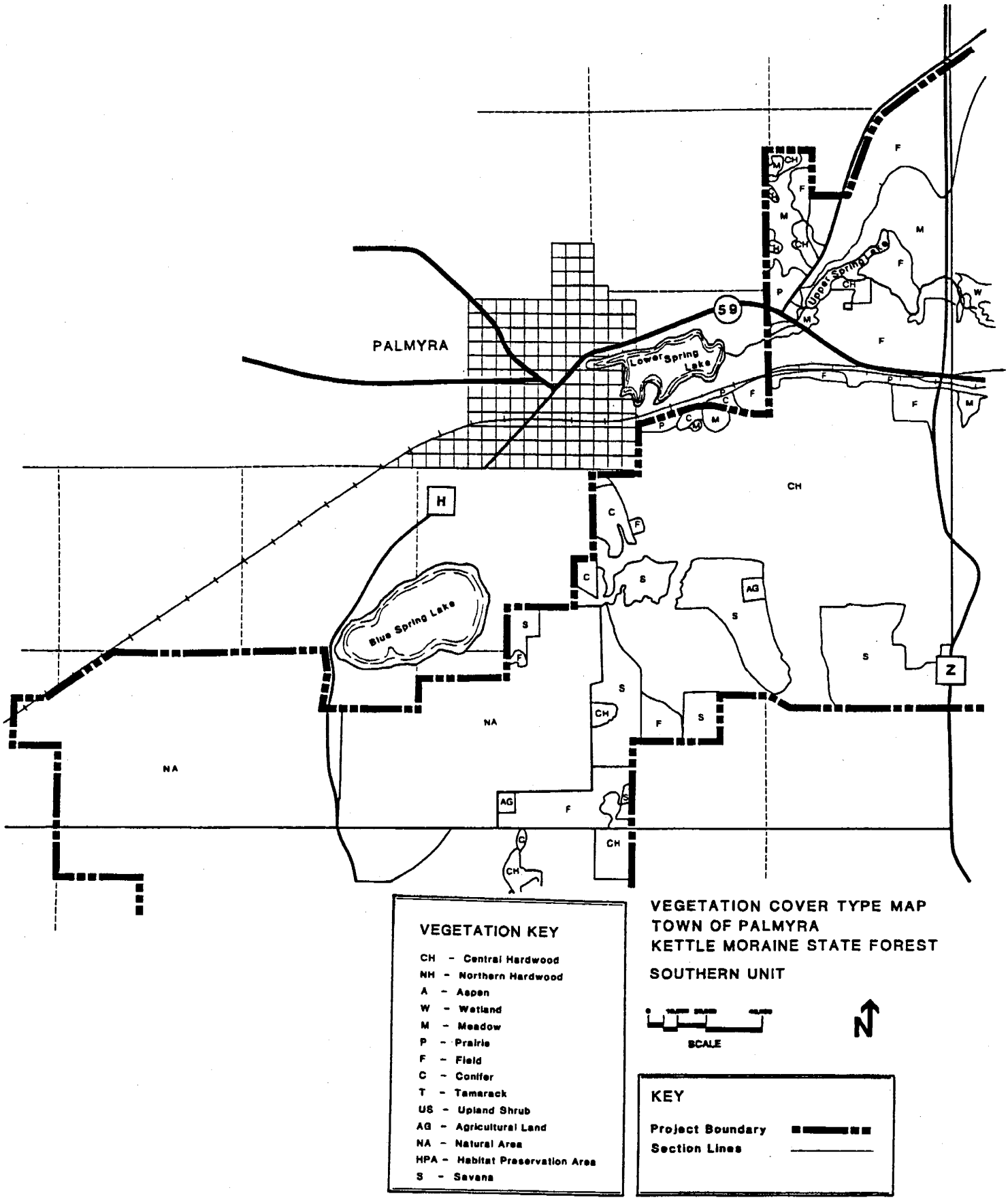
N

VEGETATION KEY

- CH - Central Hardwood
- NH - Northern Hardwood
- A - Aspen
- W - Wetland
- M - Meadow
- P - Prairie
- F - Field
- C - Conifer
- T - Tamarack
- US - Upland Shrub
- AG - Agricultural Land
- NA - Natural Area
- HPA - Habitat Preservation Area
- S - Savana

KEY

- Project Boundary
- Section Lines



VEGETATION KEY

- CH - Central Hardwood
- NH - Northern Hardwood
- A - Aspen
- W - Wetland
- M - Meadow
- P - Prairie
- F - Field
- C - Conifer
- T - Tamarack
- US - Upland Shrub
- AG - Agricultural Land
- NA - Natural Area
- HPA - Habitat Preservation Area
- S - Savana

VEGETATION COVER TYPE MAP
TOWN OF PALMYRA
KETTLE MORAINE STATE FOREST
SOUTHERN UNIT

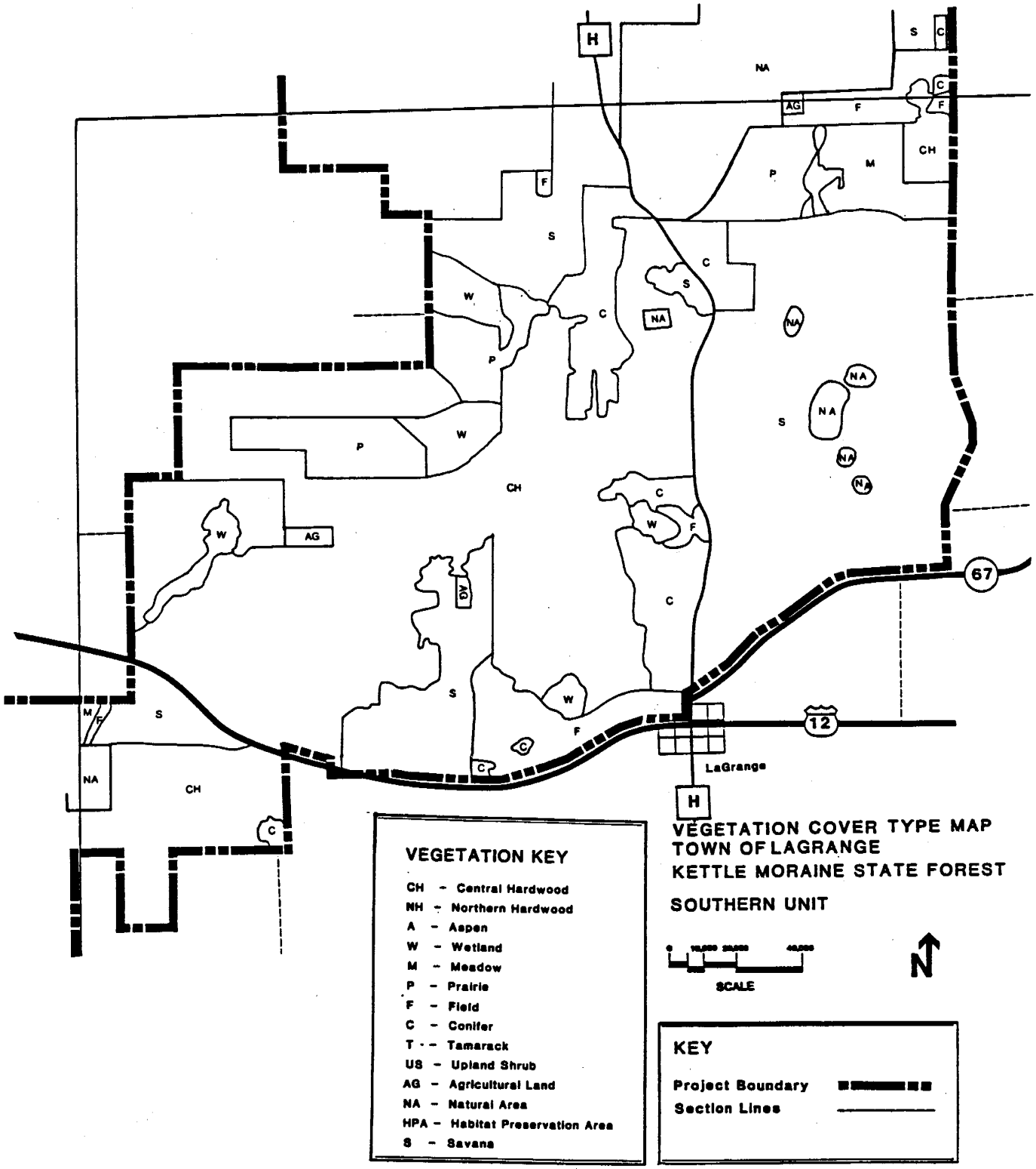
SCALE

N

KEY

Project Boundary

Section Lines



VEGETATION KEY

- CH – Central Hardwood
- NH – Northern Hardwood
- A – Aspen
- W – Wetland
- M – Meadow
- P – Prairie
- F – Field
- C – Conifer
- T – Tamarack
- US – Upland Shrub
- AG – Agricultural Land
- NA – Natural Area
- HPA – Habitat Preservation Area
- S – Savana

VEGETATION COVER TYPE MAP
TOWN OF LAGRANGE
KETTLE MORAINE STATE FOREST
SOUTHERN UNIT

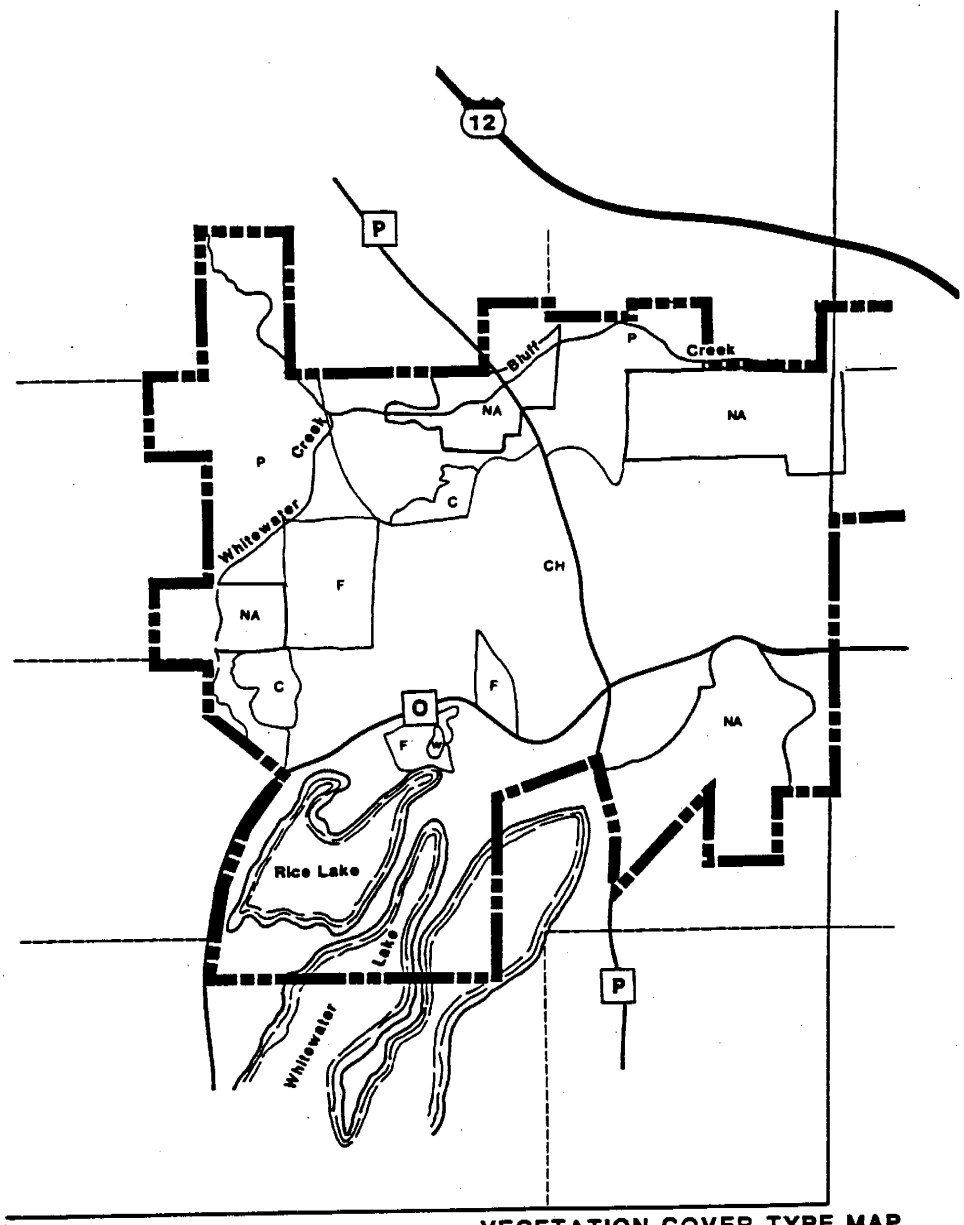
SCALE

N

KEY

Project Boundary

Section Lines



VEGETATION COVER TYPE MAP
TOWN OF WHITEWATER
KETTLE MORAINE STATE FOREST
SOUTHERN UNIT

VEGETATION KEY

- CH – Central Hardwood
- NH – Northern Hardwood
- A – Aspen
- W – Wetland
- M – Meadow
- P – Prairie
- F – Field
- C – Conifer
- T – Tamarack
- US – Upland Shrub
- AG – Agricultural Land
- NA – Natural Area
- HPA – Habitat Preservation Area
- S – Savana

SCALE

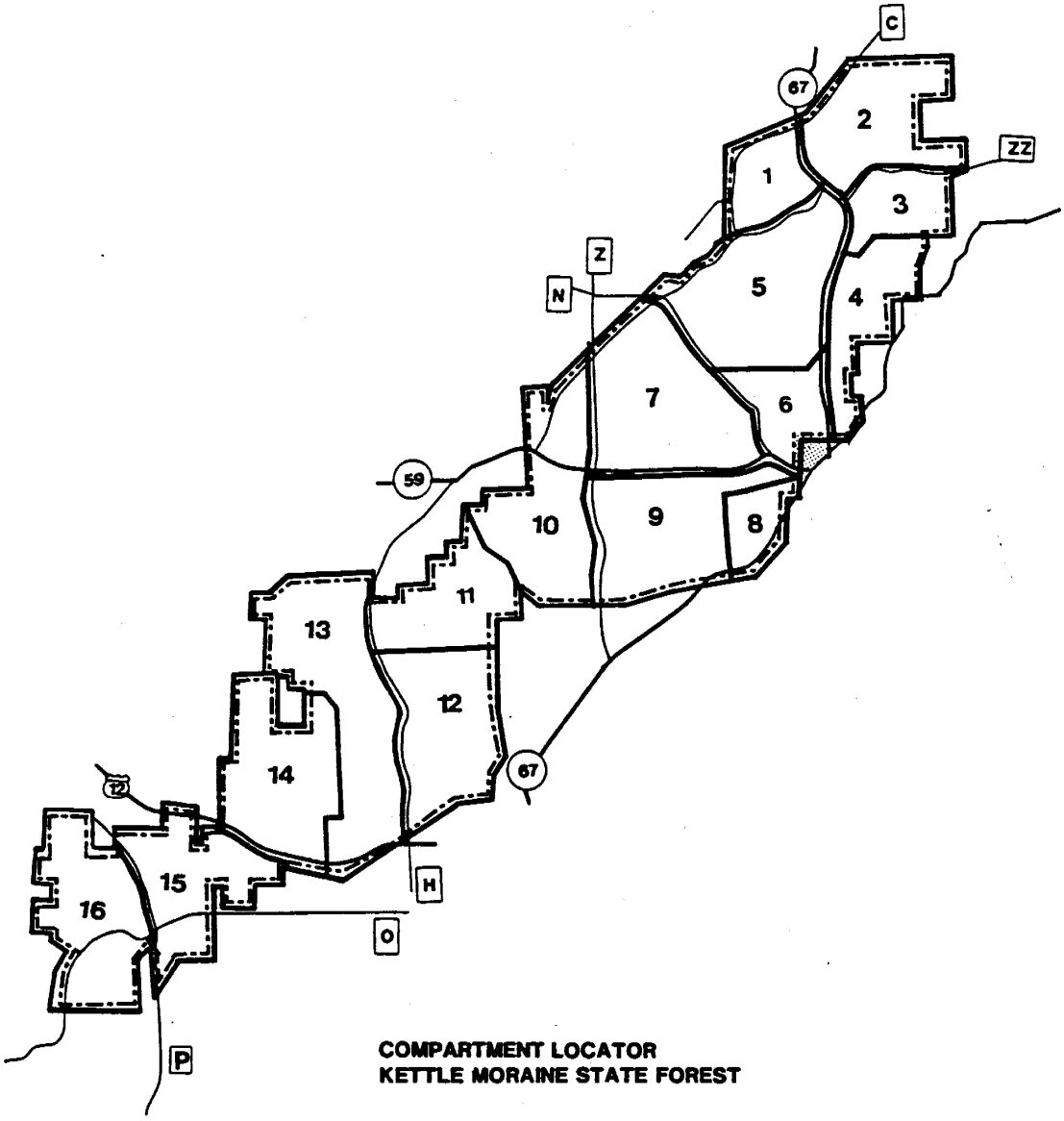
N

KEY

Project Boundary

Section Lines

MAP 5 - COMPARTMENT LOCATOR

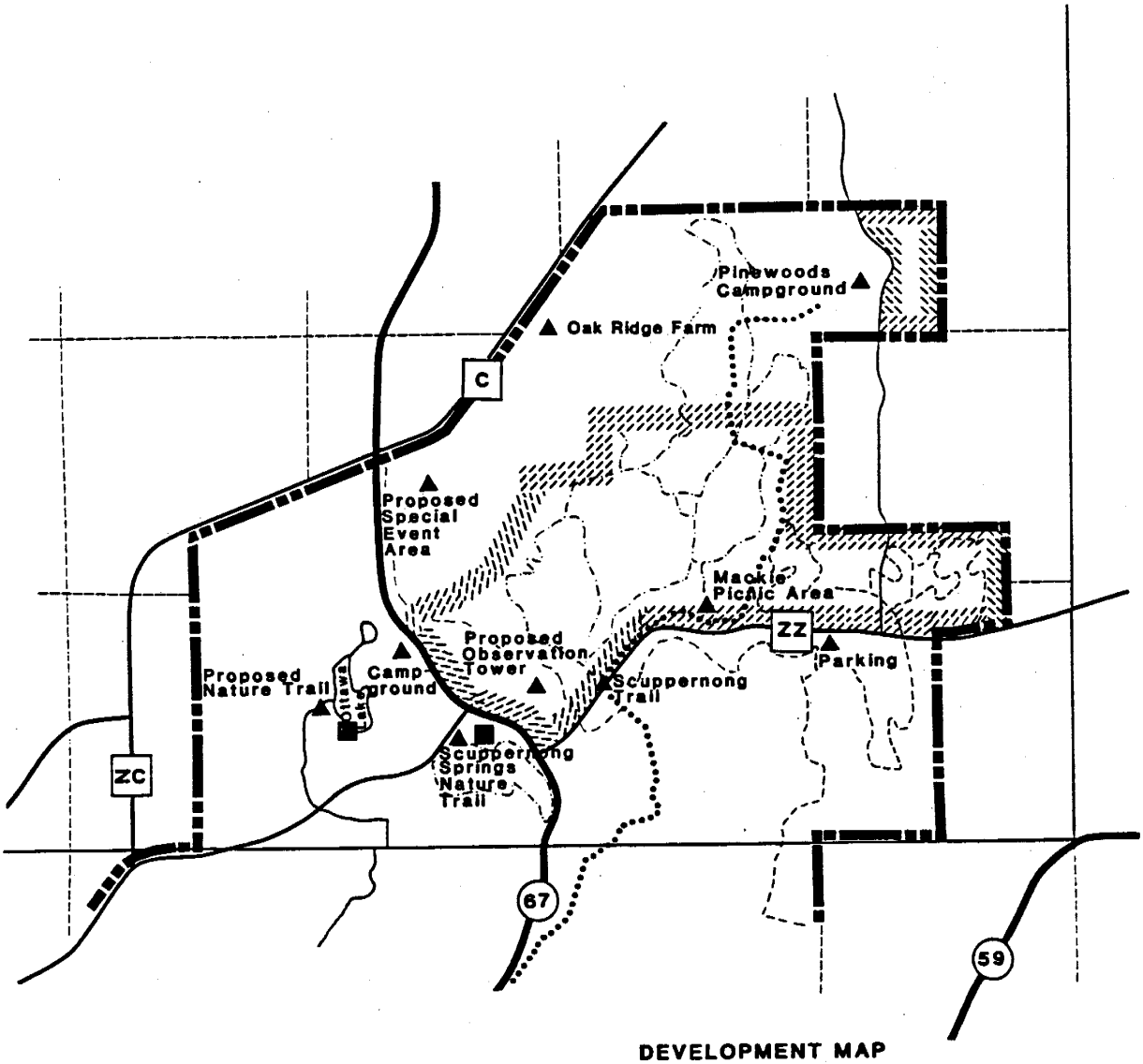


COMPARTMENT LOCATOR
KETTLE MORAINE STATE FOREST

SOUTHERN UNIT

N

MAP 6 - DEVELOPMENT



DEVELOPMENT MAP
TOWN OF OTTAWA
KETTLE MORAINE STATE FOREST
SOUTHERN UNIT

SCALE

N

TRAIL KEY

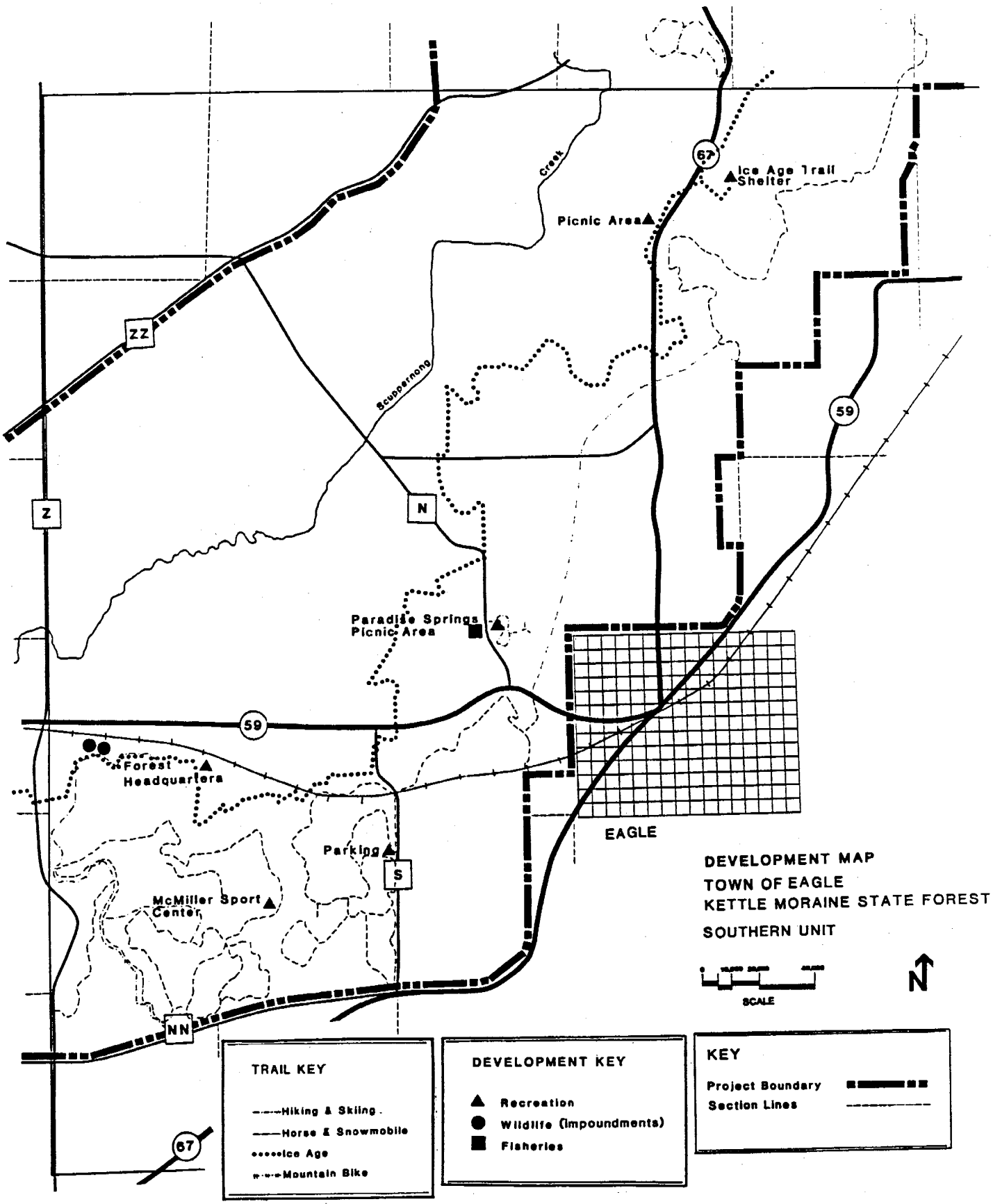
- Hiking & Skiing
- Horse & Snowmobile
- Ice Age
- Mountain Bike

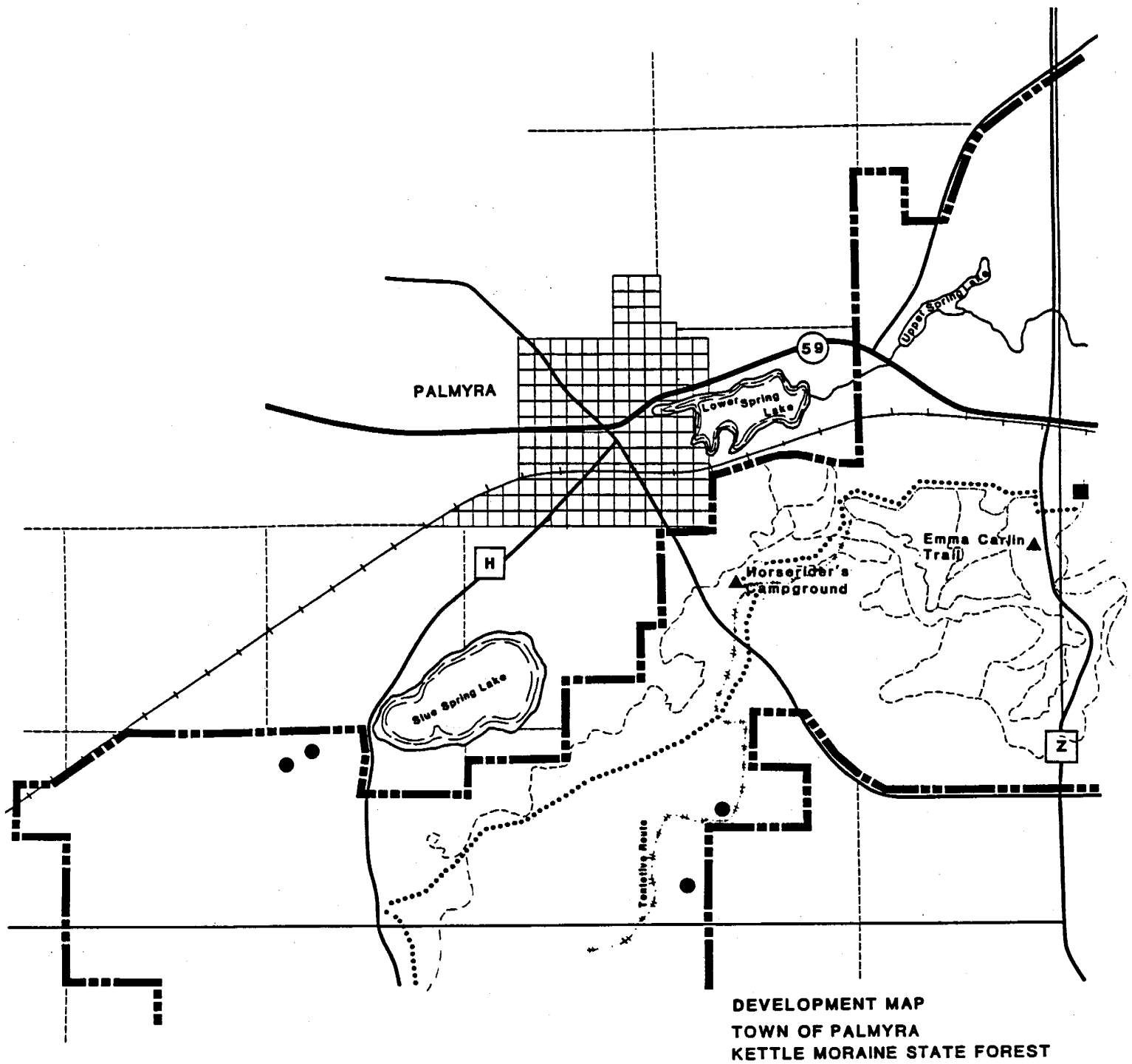
DEVELOPMENT KEY

- Recreation
- Wildlife (Impoundments)
- Fisheries

KEY

- Project Boundary
- Section Lines
- Restricted Hunting Zone


Ice Age Trail Shelter
Picnic Area
Creek
Scuppernong
ZZ
Z
N
67
59
Paradise Springs Picnic Area
Forest Headquarters
Parking
S
McMiller Sport Center
NN
EAGLE
DEVELOPMENT MAP
TOWN OF EAGLE
KETTLE MORAINE STATE FOREST
SOUTHERN UNIT
SCALE
N
TRAIL KEY
Hiking & Skiing
Horse & Snowmobile
Ice Age
Mountain Bike
DEVELOPMENT KEY
Recreation
Wildlife (Impoundments)
Fisheries
KEY
Project Boundary
Section Lines



DEVELOPMENT MAP
TOWN OF PALMYRA
KETTLE MORAINE STATE FOREST
SOUTHERN UNIT

SCALE

N

TRAIL KEY

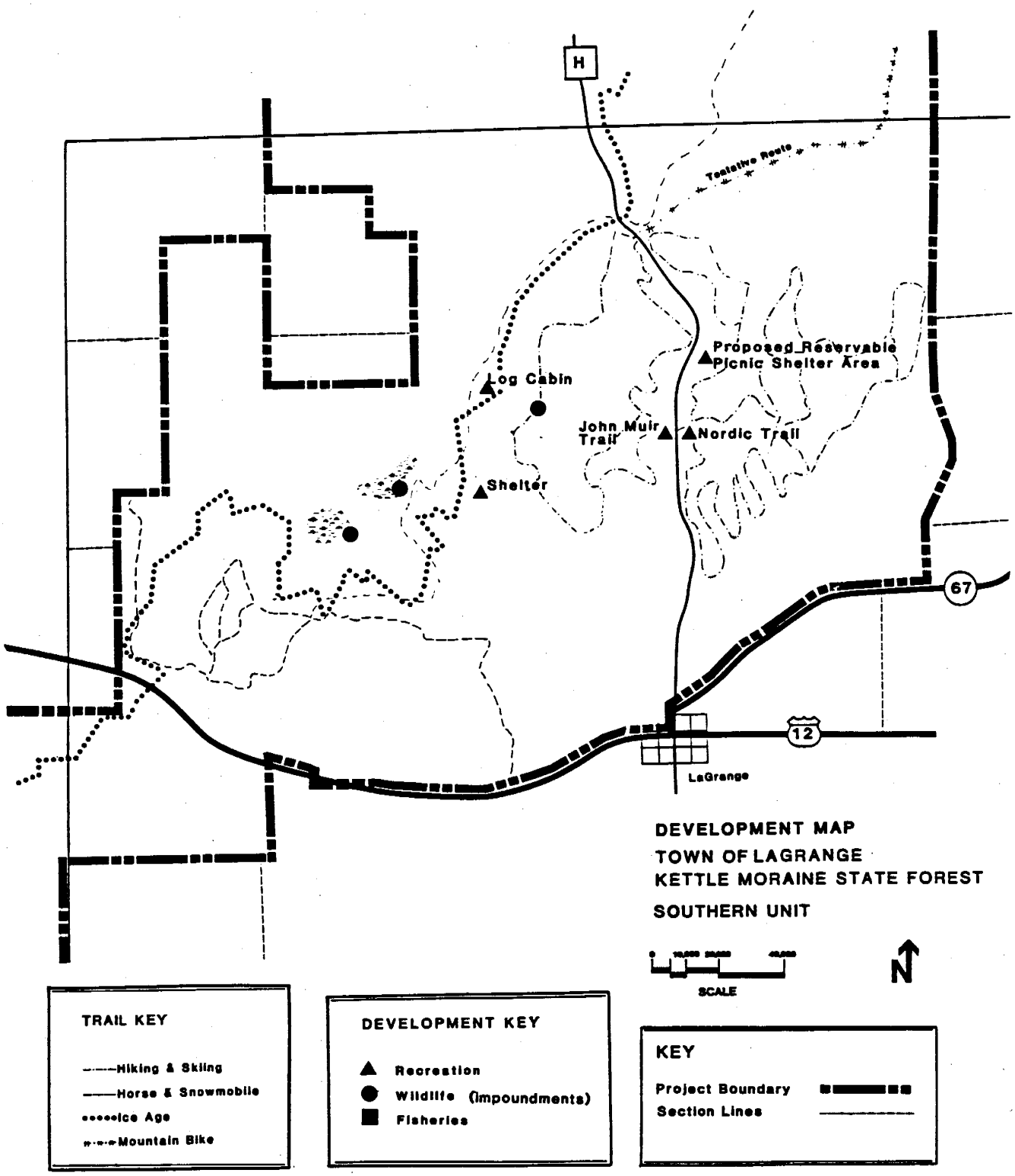
- Hiking & Skiing
- Horse & Snowmobile
- Ice Age
- Mountain Bike

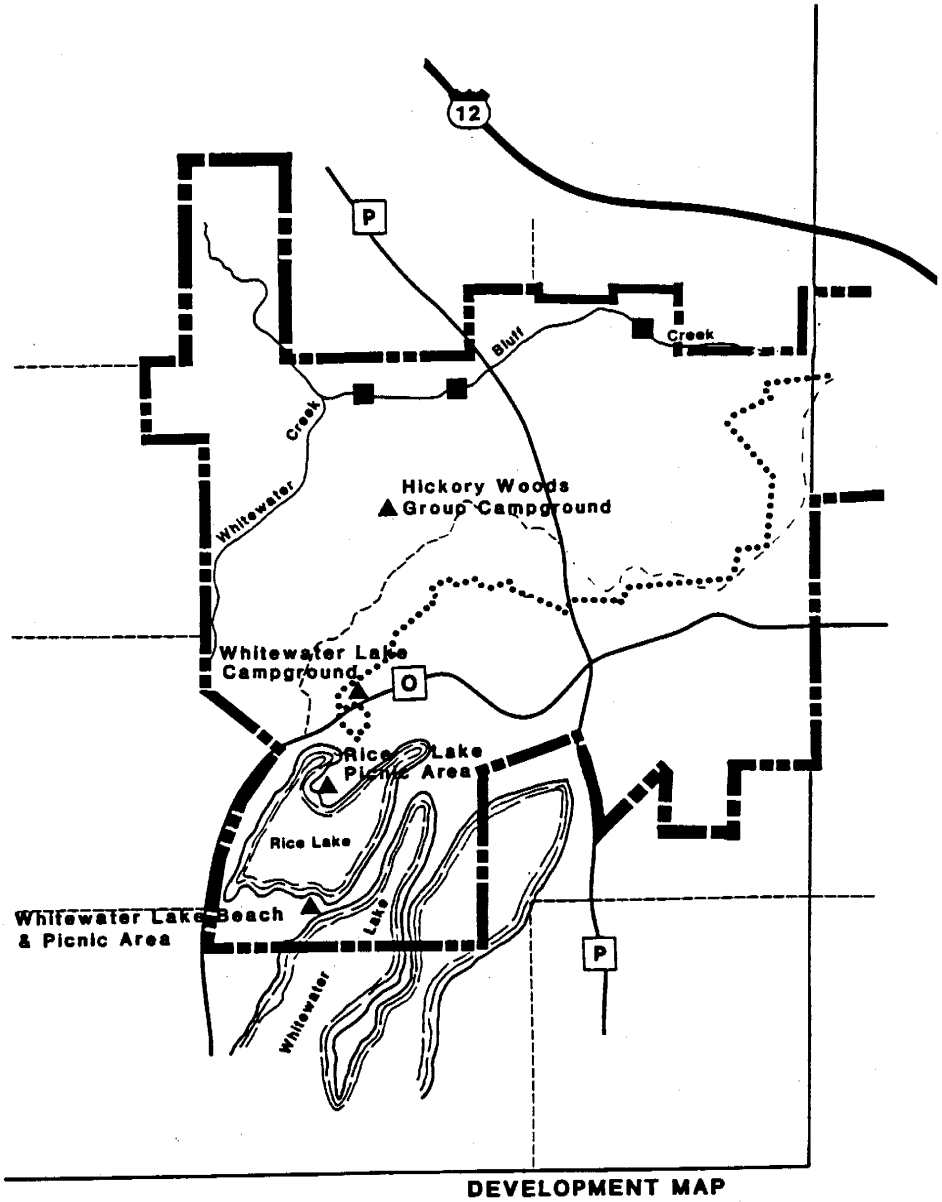
DEVELOPMENT KEY

- Recreation
- Wildlife (Impoundments)
- Fisheries

KEY

- Project Boundary
- Section Lines


H
Tentative Route
Proposed Reservable Picnic Shelter Area
Log Cabin
John Muir Trail
Nordic Trail
Shelter
67
12
LaGrange
DEVELOPMENT MAP
TOWN OF LAGRANGE
KETTLE MORAINE STATE FOREST
SOUTHERN UNIT
SCALE
N
TRAIL KEY
Hiking & Skiing
Horse & Snowmobile
Ice Age
Mountain Bike
DEVELOPMENT KEY
Recreation
Wildlife (Impoundments)
Fisheries
KEY
Project Boundary
Section Lines



DEVELOPMENT MAP
TOWN OF WHITEWATER
KETTLE MORAINE STATE FOREST
SOUTHERN UNIT

SCALE

N

TRAIL KEY

- Hiking & Skiing
- Horse & Snowmobile
- Ice Age
- Mountain Bike

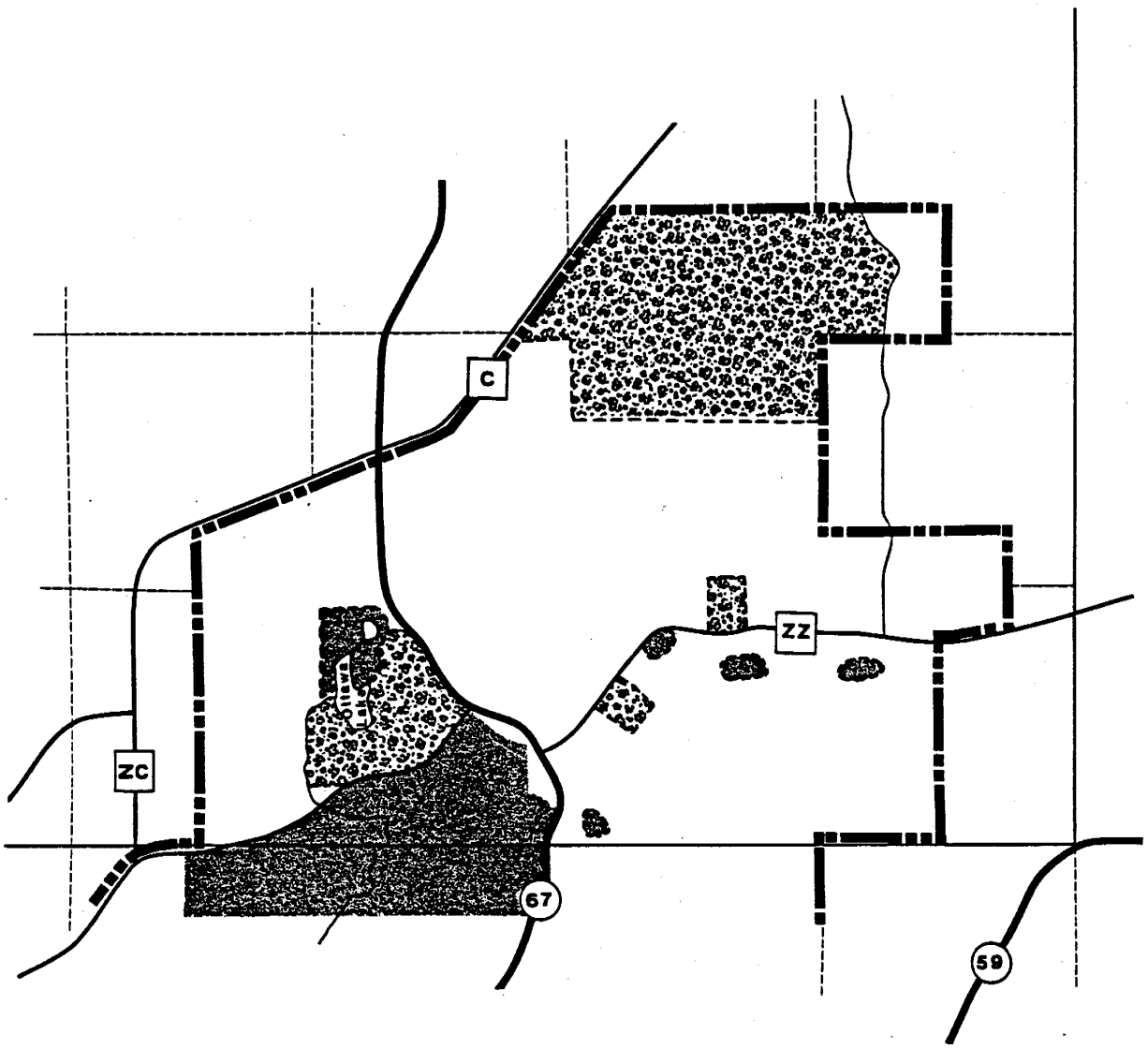
DEVELOPMENT KEY

- Recreation
- Wildlife (Impoundments)
- Fisheries

KEY

- Project Boundary
- Section Lines

MAP 7 - LAND USE CLASSIFICATIONS



TOWN OF OTTAWA
KETTLE MORAINE STATE FOREST
SOUTHERN UNIT

SCALE

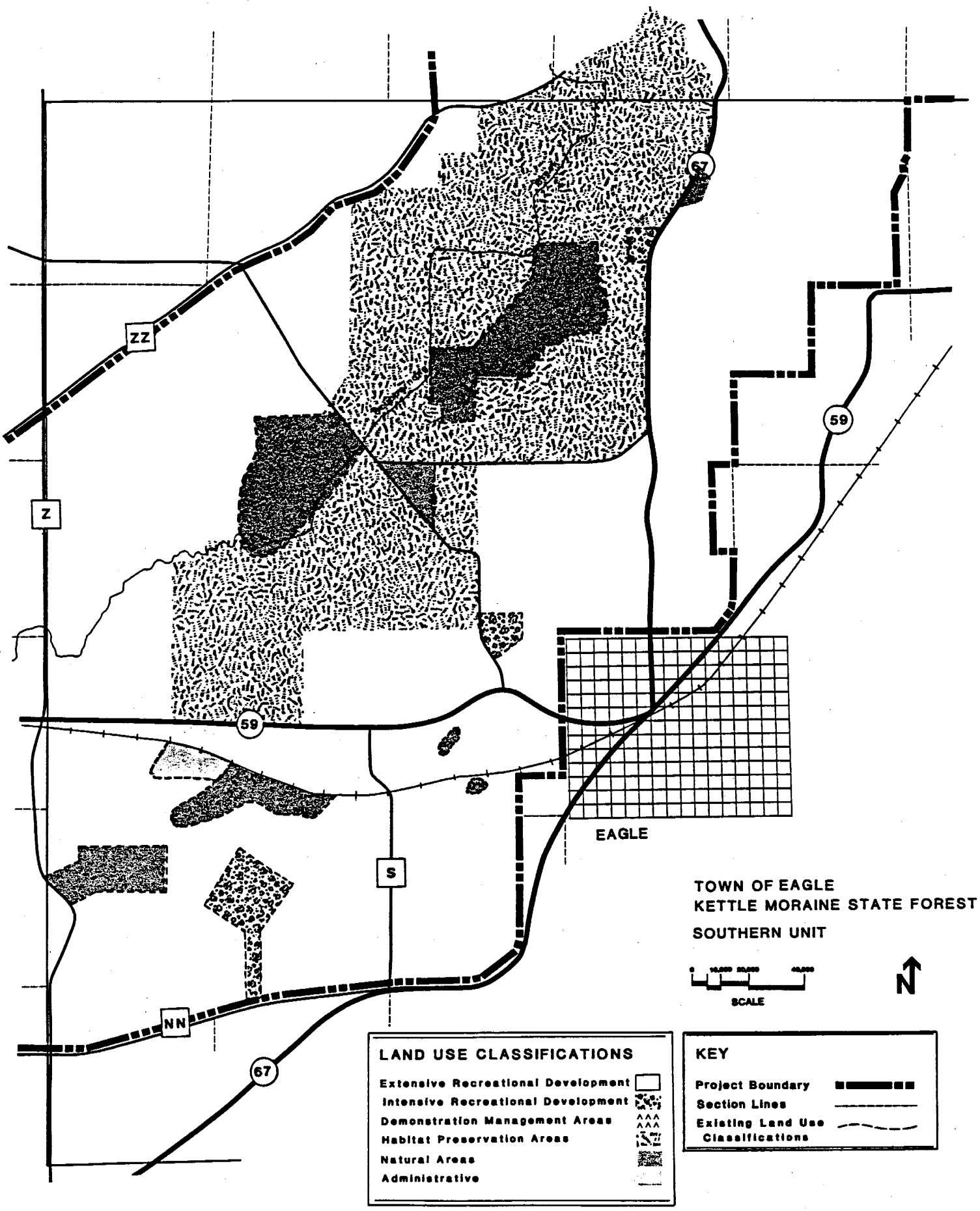
N

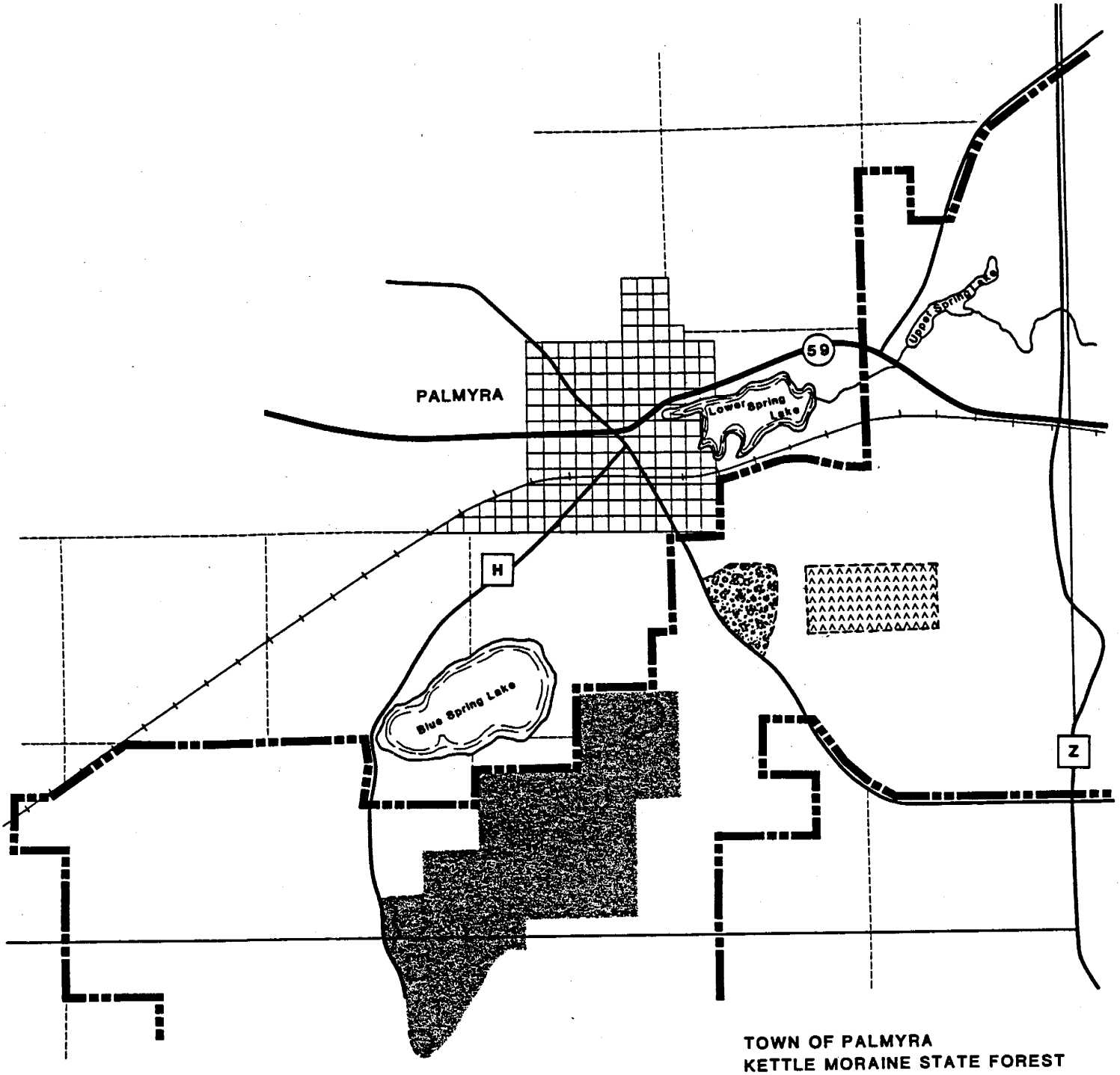
LAND USE CLASSIFICATIONS

- Extensive Recreational Development
- Intensive Recreational Development
- Demonstration Management Areas
- Habitat Preservation Areas
- Natural Areas
- Administrative

KEY

- Project Boundary
- Section Lines
- Existing Land Use Classifications


67
ZZ
59
Z
59
EAGLE
S
NN
67
TOWN OF EAGLE
KETTLE MORAINE STATE FOREST
SOUTHERN UNIT
SCALE
N
LAND USE CLASSIFICATIONS
Extensive Recreational Development
Intensive Recreational Development
Demonstration Management Areas
Habitat Preservation Areas
Natural Areas
Administrative
KEY
Project Boundary
Section Lines
Existing Land Use Classifications



TOWN OF PALMYRA
KETTLE MORAINE STATE FOREST
SOUTHERN UNIT

SCALE

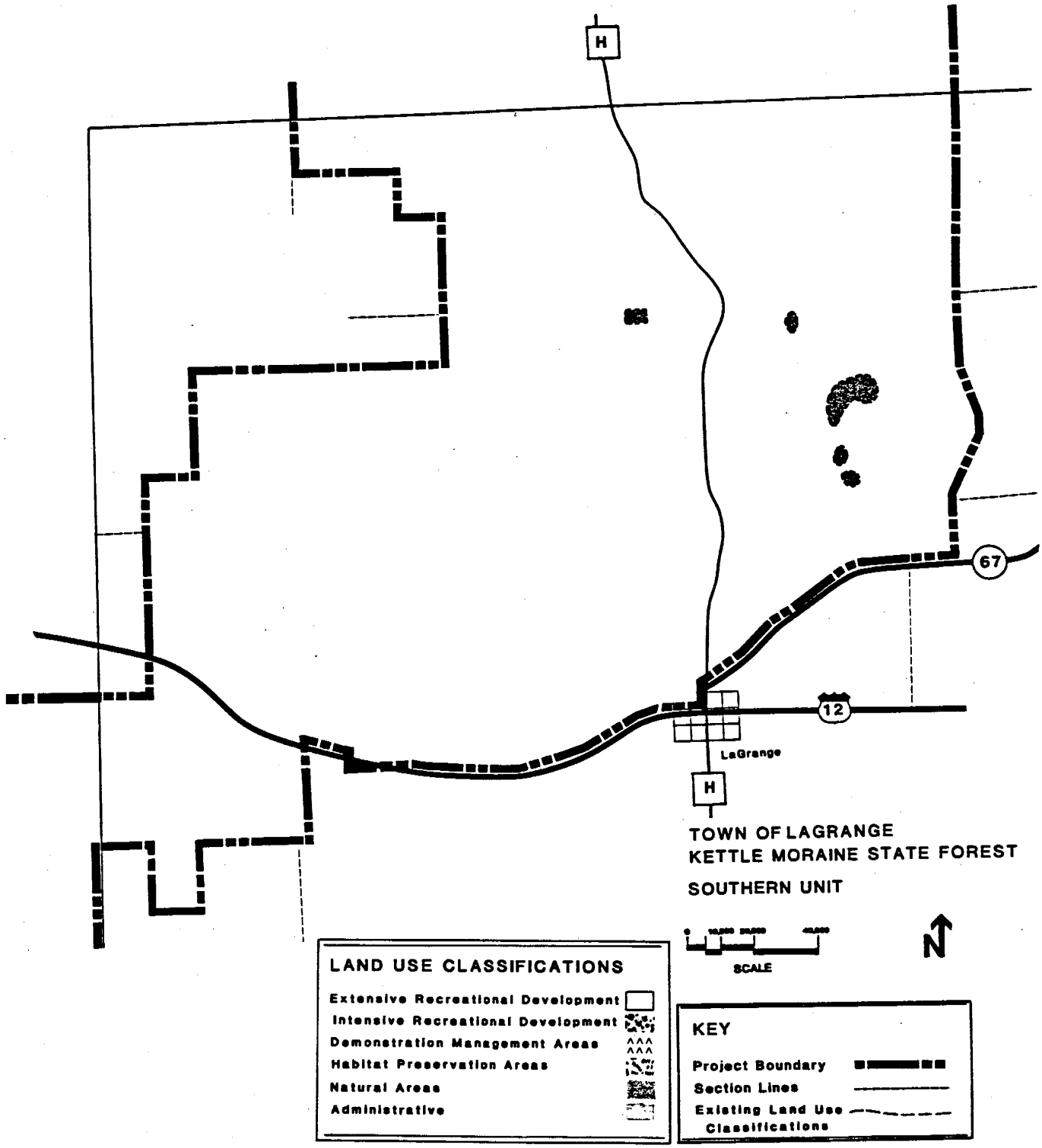
N

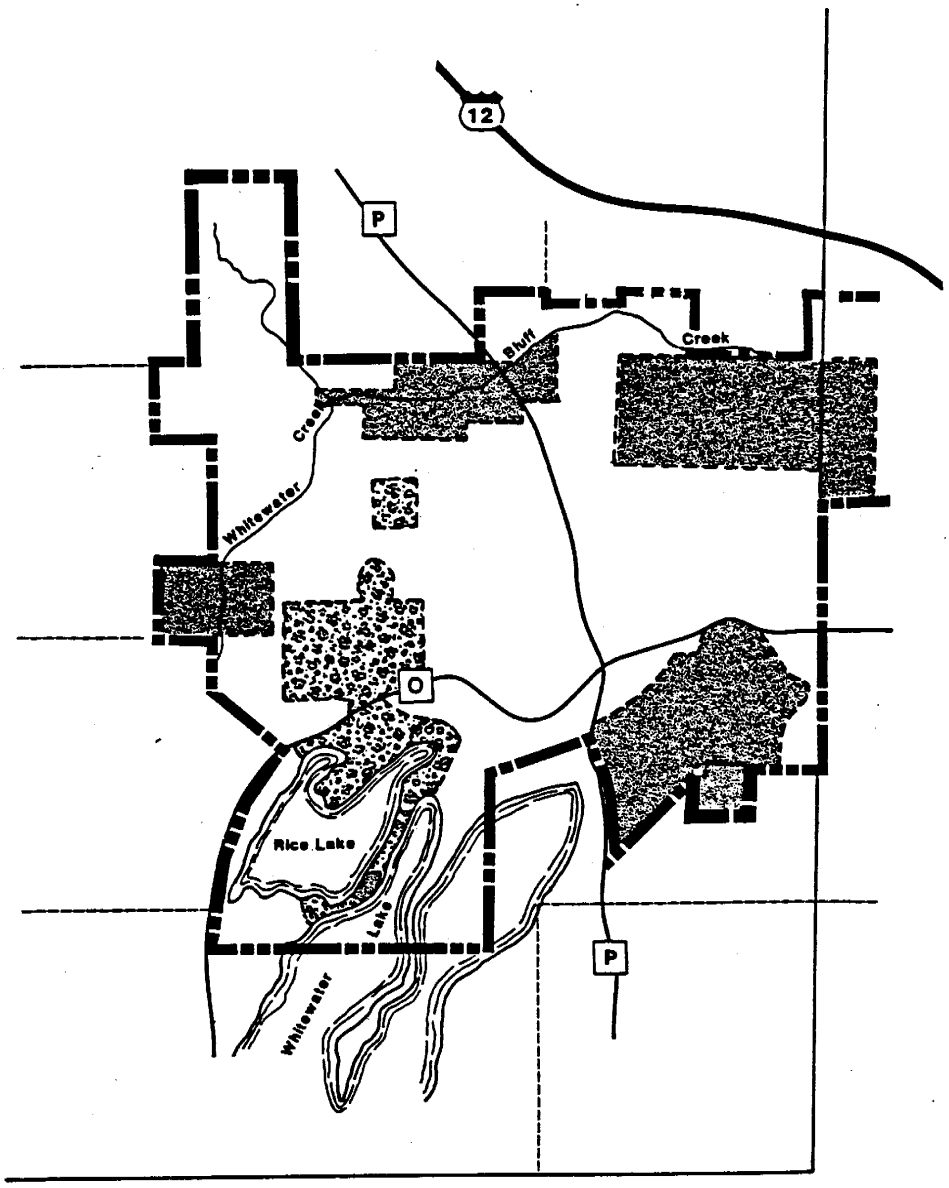
LAND USE CLASSIFICATIONS

- Extensive Recreational Development
- Intensive Recreational Development
- Demonstration Management Areas
- Habitat Preservation Areas
- Natural Areas
- Administrative

KEY

- Project Boundary
- Section Lines
- Existing Land Use Classifications


H
67
12
LaGrange
H
TOWN OF LAGRANGE
KETTLE MORAINE STATE FOREST
SOUTHERN UNIT
SCALE
N
LAND USE CLASSIFICATIONS
Extensive Recreational Development
Intensive Recreational Development
Demonstration Management Areas
Habitat Preservation Areas
Natural Areas
Administrative
KEY
Project Boundary
Section Lines
Existing Land Use Classifications



TOWN OF WHITEWATER
KETTLE MORAINE STATE FOREST
SOUTHERN UNIT

SCALE

N

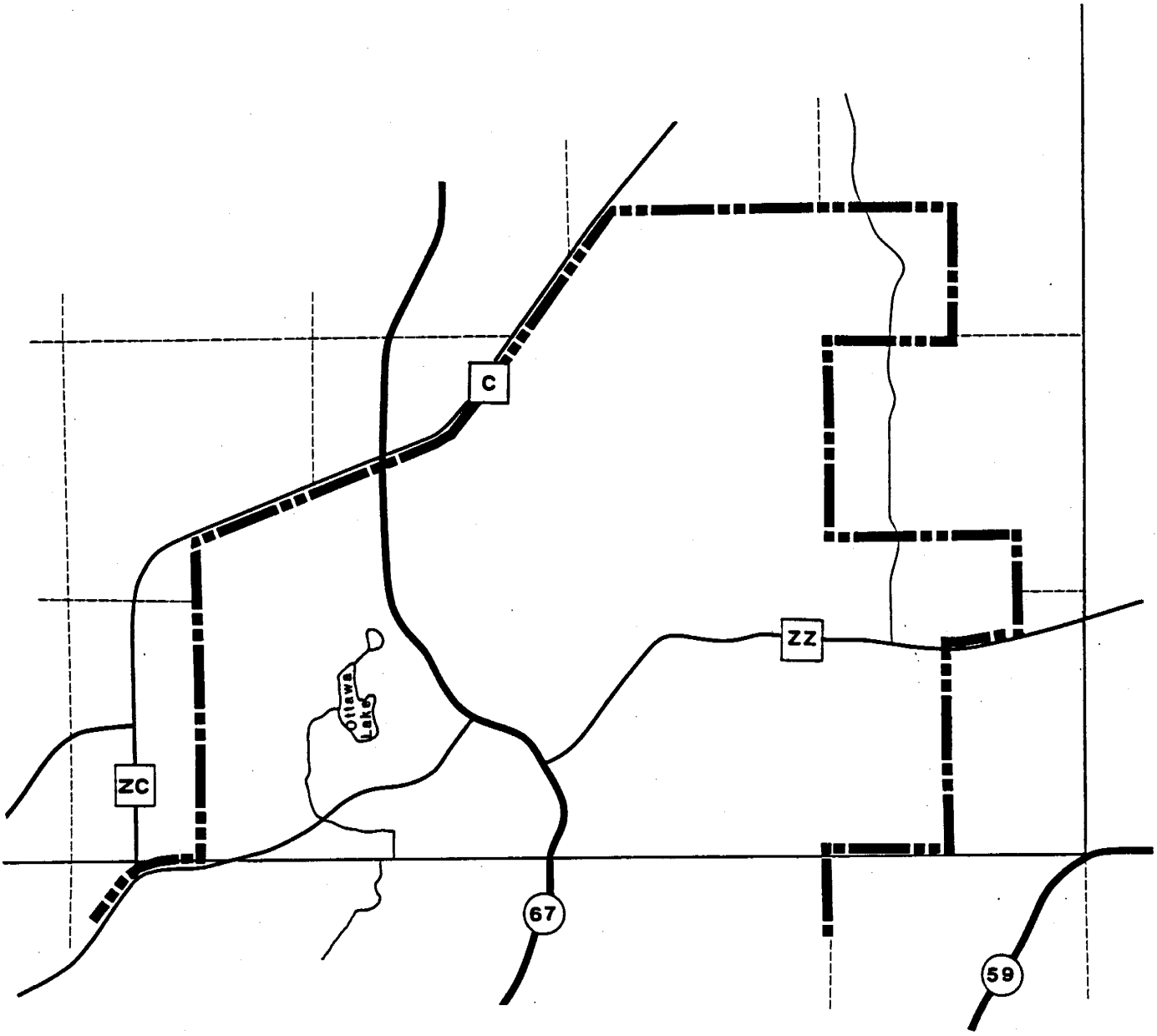
LAND USE CLASSIFICATIONS

- Extensive Recreational Development
- Intensive Recreational Development
- Demonstration Management Areas
- Habitat Preservation Areas
- Natural Areas
- Administrative

KEY

- Project Boundary
- Section Lines
- Existing Land Use Classifications

MAP 8 - PROJECT BOUNDARY



PROJECT BOUNDARY MAP
TOWN OF OTTAWA
KETTLE MORAINE STATE FOREST

SOUTHERN UNIT

SCALE

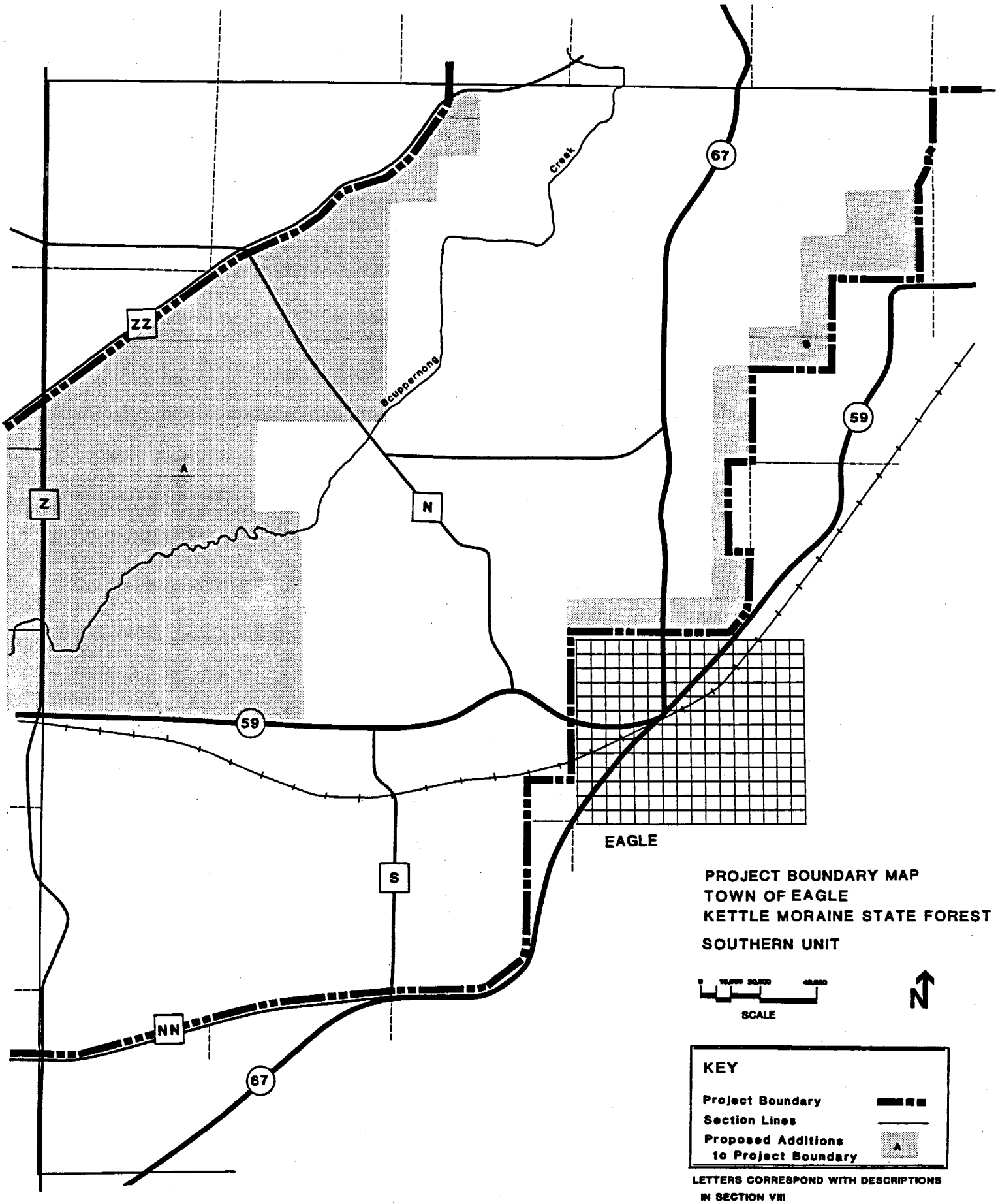
N

KEY

Project Boundary

Section Lines

Proposed Additions to Project Boundary



PROJECT BOUNDARY MAP
TOWN OF EAGLE
KETTLE MORAINE STATE FOREST
SOUTHERN UNIT

SCALE

N

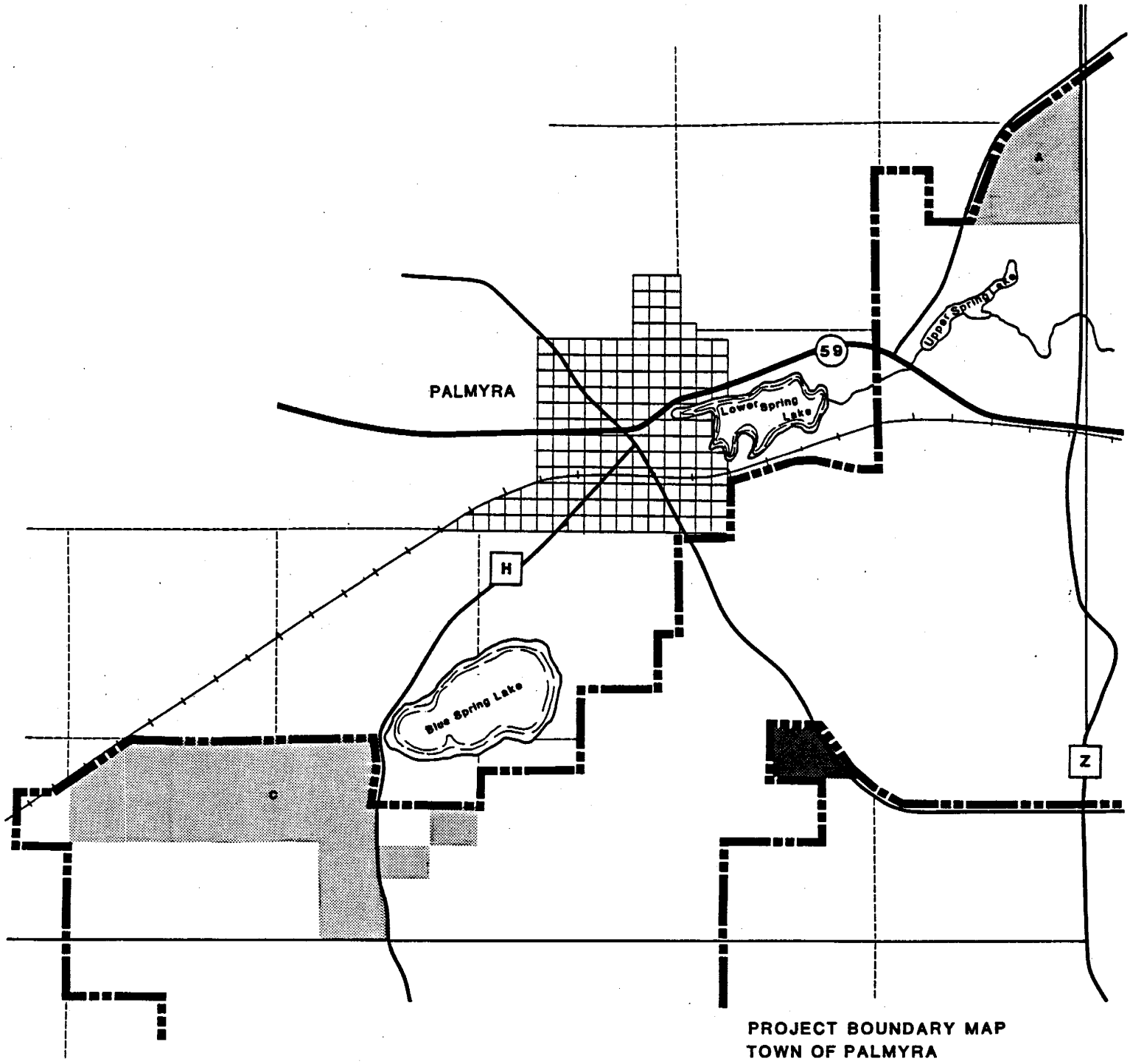
KEY

Project Boundary

Section Lines

Proposed Additions to Project Boundary — A

LETTERS CORRESPOND WITH DESCRIPTIONS IN SECTION VIII



PROJECT BOUNDARY MAP
TOWN OF PALMYRA
KETTLE MORAINE STATE FOREST
SOUTHERN UNIT

SCALE

N

KEY

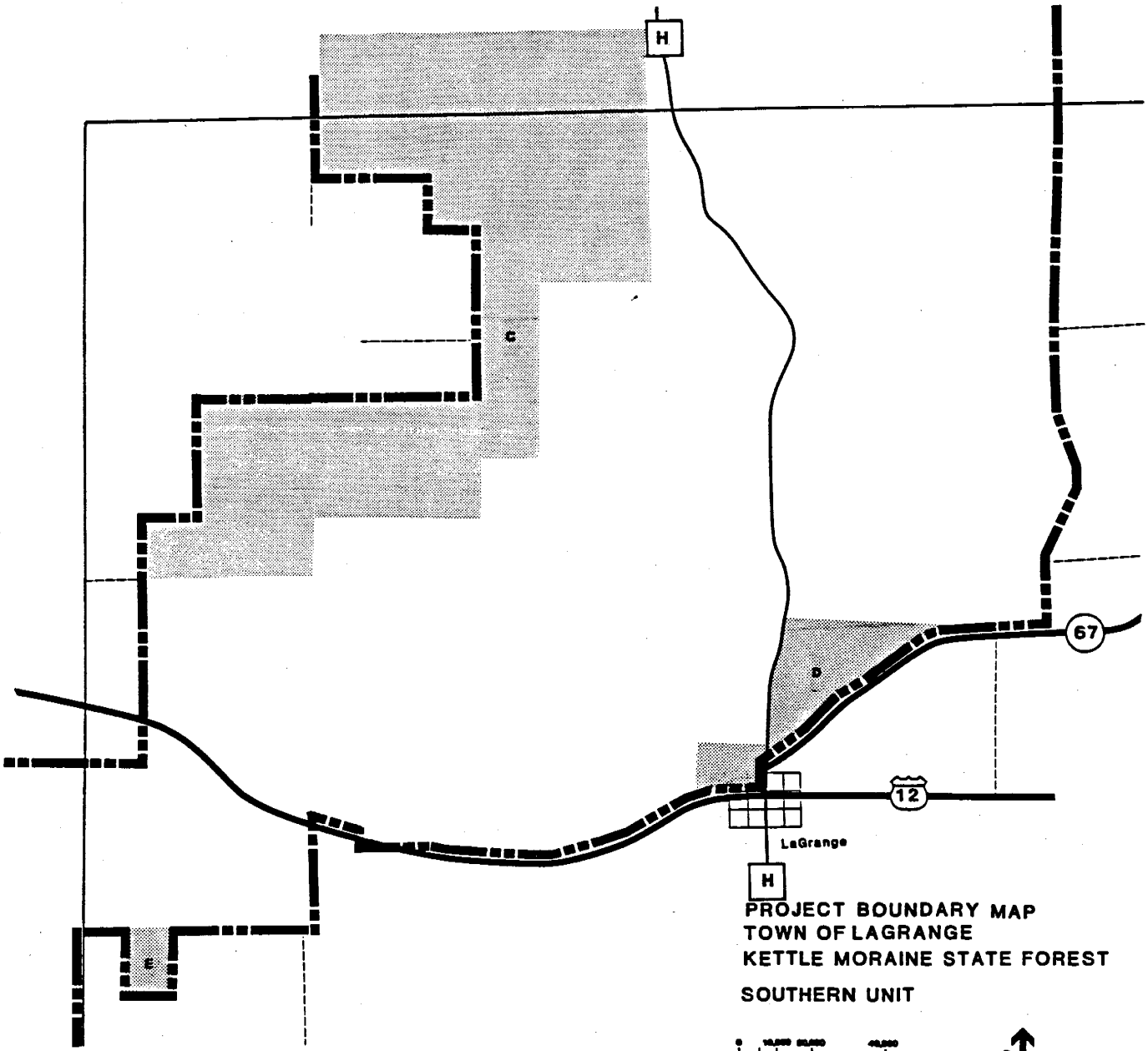
Project Boundary

Section Lines

Proposed Additions to Project Boundary — A

Deletion to Project Boundary

LETTERS CORRESPOND WITH DESCRIPTIONS IN SECTION VIII



PROJECT BOUNDARY MAP
TOWN OF LAGRANGE
KETTLE MORAINE STATE FOREST
SOUTHERN UNIT

SCALE

N

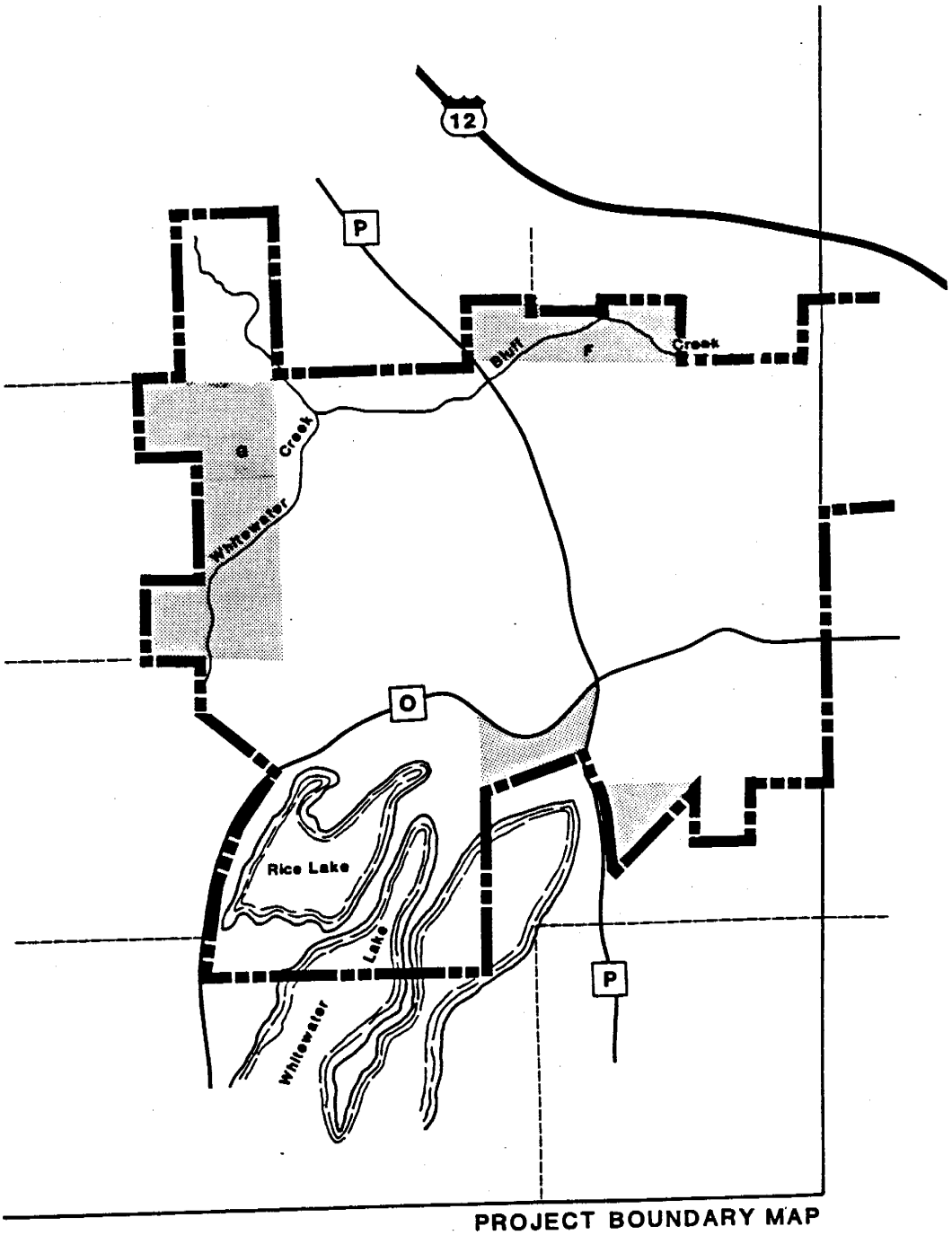
KEY

Project Boundary

Section Lines

Proposed Additions to Project Boundary — A

LETTERS CORRESPOND WITH DESCRIPTIONS IN SECTION VIII



PROJECT BOUNDARY MAP
TOWN OF WHITEWATER
KETTLE MORAINE STATE FOREST

SOUTHERN UNIT

SCALE

N

KEY

Project Boundary

Section Lines

Proposed Additions to Project Boundary — A

LETTERS CORRESPOND WITH DESCRIPTIONS IN SECTION VIII