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WISCONSIN'S PROGRAM FOR PRESERVATION OF NATURAL AREAS AND OTHER MINIMUM-MANAGEMENT LANDS

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ABSTRACT

Management of lands for timber and wildlife requires alterations of natural ecosystems to enhance productivity. Since ecological processes are best expressed in unimpaired natural systems, natural areas are reference points against which the success or failure of land manipulations can be evaluated.

Wisconsin in 1951 pioneered a systematic program of preserving choice natural areas in a state scientific area system. The Scientific Areas Preservation Council with a small staff, but with considerable assistance from public land managers and private preservation groups, has succeeded in preserving 110 natural areas encompassing 15,000 acres.

Increasing public recreation demands, as well as continuing urbanization and more intensive land use, seriously affects both potential and established scientific areas. Excessive deer populations also threaten the plant diversity of some areas. While the usual management is protect and "leave alone", a number of forest and prairie types are fire dependent and require periodic managed burns to simulate the effects of wild fire.

Scientific areas furnish vital habitat for endangered species; however, as small, select areas they represent only part of the need for natural areas. Wisconsin recently adopted a comprehensive wild resources policy recognizing that the five million acres of public forest, wildlife and park land contains the raw material to fashion a complex of natural lands ranging from small natural areas to larger wild areas and wilderness.

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INTRODUCTION

The need to preserve complex and little understood natural communities has been advocated by many ecologists, especially in recent years. Aldo Leopold (1941), although not the first advocate, most eloquently stated that, "A science of land health needs, first of all, a base-datum of normality, a picture of how healthy land maintains itself as an organism."

Natural area preservation is now accepted as an integral, if small, part of the land management policy of many conservation agencies. Threatened species are considered worth saving, not only for the cultural enrichment of future generations, but also in recognition of their biotic value and right to exist. In a most utilitarian sense, natural areas a[redacted]reference areas or controls, against which we can measure the success or failure of our ever-increasing manipulation of the land.

However, few forestry and wildlife research projects show use of natural areas. Managers, in their day-to-day decisions, cause major changes in ecosystems, apparently without need of natural areas as controls. It appears that acceptance of natural area preservation policy has yet to become translated into management practices.

With some training in ecological principles -- and liberal application of the trial and error method -- managers have had some success in restoring or enhancing productivity of public lands. Millions of acres of aspen in Wisconsin, considered worthless in the 1940's, are now successfully managed to supply a growing pulpwood demand. By good fortune, intensive aspen management also enhances deer and ruffed grouse productivity.

Failures are not unknown due to a lack of respect for ecological principles. The craze to fill every forest opening with neat rows of monotype pine in the 1940's and 50's caused not only a significant loss of plant diversity, but also a corresponding lack of wildlife diversity. Furthermore, the increased susceptibility of the monotype to damage by insects, disease and wild fire frequently destroyed the potential timber crop. Lack of biotic diversity leads to community instability.

The Canada Goose program is regarded as a wildlife management success story. Visitors to the Horicon National Wildlife Refuge may now see 150,000 geese in one location where there were none in 1945. But the Horicon Goose "Motel" has trained the "wild" goose to make daily flights from refuge to outside cornfields, regardless of thousands of visitors -- whether they are equipped with gun or camera. The refuge-trained goose illustrates another Leopold maxim, "very intensive management of fish or game lowers the unit value by artificializing it."

The problem does not rest solely with forest and wildlife managers. The public demands quick success programs. Furthermore, much habitat under the managers' control has been degraded by a prior history of poor land use. Exotics and native "pest" species pose immediate problems. For example, the larger rivers and some lakes in southern Wisconsin are polluted and dominated by the exotic carp. Removal of carp with fish toxicants is now economically feasible. The immediate beneficial effect of carp removal is a dramatic improvement of water clarity. With less turbidity, habitat for many fish species is improved. However, since the fish toxicants used are nonselective, treatment in some instances may result in an overall decrease in biotic diversity. Assessing the environmental impact of fish toxicant programs is complex. Identification of all the species in a river ecosystem that may be affected is difficult; understanding the interactions of the species is even more difficult, but nonetheless an obligation incurred by program sponsors.

Our way of life has committed us to intensive management of most of the land. To be successful, we must gain a better understanding of ecological processes. Since these processes are best expressed in natural systems, we should preserve all of the various types of natural communities to guide our management efforts. A 300-year old hemlock forest growing on the stumps of past generations of hemlock illustrates long-term success in coping with the environment. We could use some of this stability in our management programs.

THE SCIENTIFIC AREA PROGRAM

Aldo Leopold was an early force in the natural area movement. As an employee of the Forest Service in the 1920's, he successfuly promoted the first official wilderness preservation program in the West. Later as a conservation commissioner in Wisconsin, he was instrumental in the formation of a natural area committee to advise the Wisconsin Conservation Commission on the purchase and preservation of natural areas. In 1951, our Legislature formalized this committee and Wisconsin became the first state to establish a natural area preservation program. Designated natural areas were called scientific areas and were defined as tracts of land or water in an essentially natural state, which are set aside and dedicated for scientific research, the teaching of conservation and natural history, and especially preservation for future generations. Later the definition was broadened to include unique geological and archeological features.

The Wisconsin Scientific Areas Preservation Council is an advisory group attached to the Department of Natural Resources (DNR). Its six members represent the universities and other educational interests in the state. The Department provides a budget for administration and a staff of two specialists. Two years ago an additional, though small, budget was established for the acquisition of areas.

The Council identifies the best remaining natural areas and arranges for their preservation, either through dedication of tracts already in public ownership or encouraging acquisition by both public and private agencies. The program's success has hinged on this cooperative approach. From the beginning the DNR has assumed a leadership role and more than half of the designated scientific areas are on state parks, forests and wildlife areas. Scientific areas are also being designated on county forest and park land and on lands under federal control.

Private preservation groups deserve special recognition. The Wisconsin Chapter of the Nature Conservancy has through fund raising and by providing the vehicle for gifts of land acquired and dedicated 20 scientific areas worth at least a half million dollars. Usually these acquisitions of private land are immediately transferred to universities for management and use.

Illinois followed Wisconsin and initiated a very good nature preserves system in 1963. Now at least 20 states have established or are working towards establishing natural area systems.

John Humke (1970), in comparing the natural area programs of several Midwest states, indicated that the Illinois program is a model for legal protection of areas. Illinois nature preserves cannot be encroached upon without approval of the Nature Preserves Commission, the Department of Natural Resources and the Governor's office.

Humke further indicated that Wisconsin's program excelled in its methodical approach to establishing a complete scientific area system. The basis for this methodical approach to preservation of 32 terrestrial plant communities is John Curtis's Vegetation of Wisconsin (1959). Aquatic area preservation received less attention in the beginning but is being accelerated, utilizing a combination of chemical and physical characteristics to classify about 30 aquatic community types. The vegetation of Wisconsin existing at the time of the original land survey has been mapped based on the plant communities developed by Curtis. (Fig. 1) The estimated acreage of the native plant communities and the approximate acreage preserved is given in Table 1.

Our general goal is the preservation of sufficient scientific areas and other natural areas in each region of the state to insure adequate representation of all biotic communities and unique natural features native to the region: first, to insure their preservation, but also their availability for research and educational use at all levels of instruction.

SCIENTIFIC AREA PROGRAM STATUS

The scientific areas systems now contains 110 scientific areas encompassing some 15,000 acres. All terrestrial communities are represented in at least one location in the state, but many aquatic types are still unrepresented.

The answer to the question of how much is needed could be -- since only remnants remain, all should be preserved. Realistically, ever-present economic restraints require some dilution of this ideal objective.

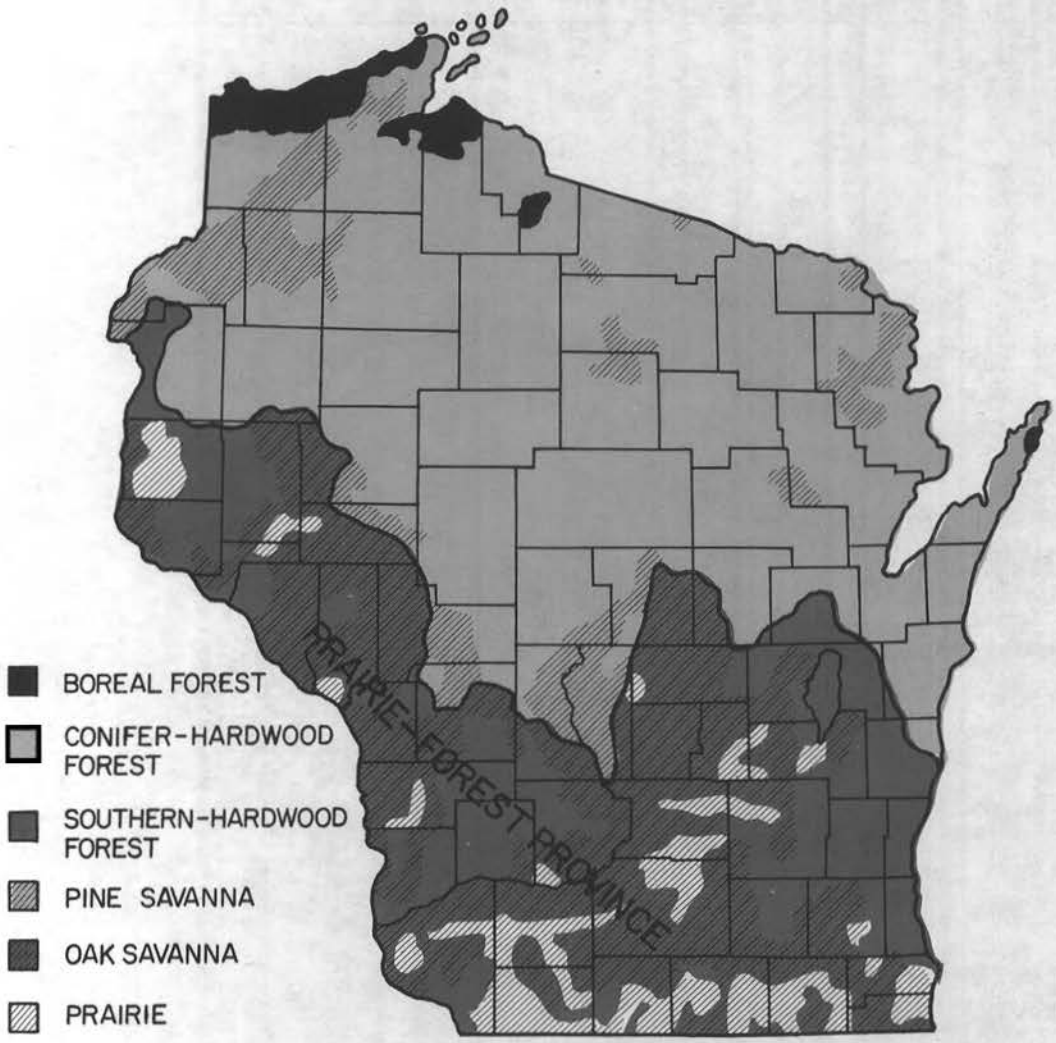
Our specific goal is at least 200 scientific areas containing a total of 400 native biotic communities by 1980. Since this goal represents only 0.1 percent of the acreage of the state and less than 1 percent of the 5 million acres of public land, it is an extremely small commitment of resources considering the large potential benefits.

The number of areas dedicated and total acreage means little unless a standard of excellence is pursued. Scientific areas should be the best and most representative example obtainable to maintain high quality in the system.

TABLE 1. Wisconsin Presettlement Plant Communities and Scientific Area Representation

Presettlement Plant Communities*		Representative Areas in the Scientific Area System	
Community Type	Estimated Acres	No. of Examples	Acres Protected
MAJOR COMMUNITIES			
Northern Mesic Forest	11,750,000	14	1,100
Oak Opening	5,500,000	3	40
Southern Mesic Forest	3,432,500	9	320
Pine Barrens	2,340,000	5	1,000
Northern Dry-Mesic Forest	1,930,000	9	500
Oak Barrens	1,800,000	2	220
Northern Wet Forest	1,680,000	14	900
Southern Sedge Meadow	1,000,000	5	700
Southern Dry Forest	971,000	6	200
Mesic Prairie	840,500	1	3
Boreal Forest	672,500	3	200
Dry Mesic Prairie	630,000	4	200
Northern Wet-Mesic Forest	560,000	14	800
Wet-Mesic Prairie	420,000	7	330
Southern Dry-Mesic Forest	416,000	9	450
Northern Dry Forest	340,000	5	500
Southern Wet-Mesic Forest	336,000	5	2,040
Northern Sedge Meadow	115,000	2	120
Open Bog	110,000	10	350
Dry Prairie	105,000	5	175
Wet Prairie	105,000	1	40
Southern Wet Forest	84,000	3	340
Total	35,137,500		
LESSER COMMUNITIES**			
Shaded Cliff		7	
Exposed Cliff		5	
Lake Dunes		3	
Cattail Marshes (Emergent aquatics)		7	
Fen - probably a few hundred acres		5	
Alder Thicket - unknown size		6	
Shrub carr - unknown size		12	
Cedar glades - perhaps several thousand acres		3	
Sand barrens - probably a disturbance community		1	
Bracken grassland - perhaps an artificial community		2	

*Curtis, J. T. (1959).
**Acreage not designated.


BOREAL FOREST
CONIFER-HARDWOOD FOREST
SOUTHERN-HARDWOOD FOREST
PINE SAVANNA
OAK SAVANNA
PRAIRIE
PRAIRIE-FOREST PROVINCE

Frequently several similar areas are recommended for inclusion in the scientific area system. Some means of ranking areas to determine a priority for designation is required to minimize personal bias of staff, and at times support our rejection of a cooperator's "pet" proposal.

Parameters of size, biotic diversity, degree of rarity, level of human disturbance, and presence or absence of exotics are used in the ranking process. Availability is also important, and areas on public land are usually favored.

MANAGEMENT OF SCIENTIFIC AREAS

Scientific areas are dedicated through agency resolutions and memorandums of understanding. Management plans developed jointly by the Council and the land managing agency are incorporated in the dedication agreements. A general set of management objectives applies to most areas, including restrictions on plant and animal collecting and prohibition of species introductions. The general objectives also provide guidelines for vegetation management techniques and control of public use. More specific management recommendations are added to meet individual area needs; considering the areas' size, buffer area, accessibility, durability rating, and in some cases, protection from animal damage.

Public Use

Although public use is not encouraged, any recreational and educational use which does not impair the natural condition is permitted. Attention drawing signs are discouraged, in fact most scientific areas are intentionally left unmarked.

In several instances, scientific areas require special protection at critical times. Fourmile Island Heron and Egret Rookery on the Horicon Marsh Wildlife Area, for example, is closed to all travel during the nesting season.

Human Interference

Management problems are often caused by either direct or indirect human interference with natural processes. Direct interference occurs when incompatible adjoining land use produces spill-over effects. Highway interests should understand that new roads must not only avoid scientific areas, but also avoid a buffer area. Air, water and noise pollution respect no boundaries.

Scientific areas near urban centers have always been threatened by being too accessible to outdoor enthusiasts of all sorts, and now this intrusion has been compounded by the rapidly increasing use of off-the-road vehicles such as snowmobiles, mini-bikes, and dune buggies.

Chiwaukee Prairie, one of our finest low prairies, is located near a large urban center with subdivisions reaching its boundaries. After ten years of attempting to control misuse, the property manager is now fencing the perimeter and locking the gate -- a distasteful but necessary protective measure.

Parfrey's Glen Scientific Area is within a highly scenic state park. In the past ten years, visitor counts increased from 20,000 to 50,000 annually and studies confirmed that vegetation damage had accelerated. The choice is clear, either close the area or provide funds to control use. A boardwalk and restricted trail will be constructed to channel use away from sensitive vegetation on the steep slopes.

Indirect human interference is less discernible, and damage may occur before the problem is recognized. For the past 40 years, the forest communities of northern Wisconsin have been subjected to abnormally high populations of deer at one time or another. Choice browse species such as ground hemlock, mountain ash and white cedar are becoming threatened species. Large predators such as timber wolves no longer exert a check on deer populations and hunting has not taken up the slack.

Several years ago we determined that if our best hemlock-hardwood type scientific area was to be a truly representative example of natural vegetation, steps must be taken to reduce browsing pressure. One-half of the 320-acre scientific area has been surrounded with a deer-proof fence to eliminate deer for a sufficient time to restore natural reproduction. This scientific area now provides an excellent opportunity for long-term research on a large natural forest community, both with and without deer.

Vegetation Management (Fire)

The usual policy for forest communities is minimum interference with natural processes, allowing succession to proceed. However, the open natural communities require management, since we have curtailed a natural force -- wildfire. Wild fires and Indian-set fires maintained a third of Wisconsin's presettlement vegetation in savanna or prairie. Pine barrens, mostly grassland with an abundance of shrubs, once provided blueberries for pioneer families as well as excellent habitat for sharp-tailed grouse and deer. With cessation of wild fires following settlement, much of the original 3 1/2 million acres of barrens has become forests, either through natural succession or aided by tree planting. Sharp-tailed grouse have declined drastically and most remnant flocks are now found on the few barrens managed by the Department with controlled fire.

Curtis (1959) provided a good description of the original pine barrens and argued for a quantitative evaluation of fire rather than its complete condemnation. He said, "Fire is a normal environmental influence in the life of the forest -- the forests of northern Wisconsin are adapted to this situation and the normal complements of species as we know them can exist only if fire is continued. Controlled fire, burning when and where desired can be used as a valuable tool in both silvicultural and game management operations."

The first use of controlled fire to restore pine barrens in Wisconsin occurred on the Douglas County Grouse Area in 1947. With a continued burning program, the DNR has restored a classic barrens on 3,000 acres. By the mid-1960's the Department was managing 100,000 acres for sharp-tailed grouse. Though recent records show a decrease in the use of fire for grouse management, fire is now more frequently utilized by game managers for waterfowl and deer habitat management, and by foresters to reduce slash and to promote the natural regeneration of jackpine and aspen.

Three scientific areas have been established on northern Wisconsin pine barrens being managed with fire by the Department of Natural Resources. A fourth area , Moquah Barrens, a Federal research natural area, has not burned in 40 years. Though slowly becoming a forest, it is a valuable control. No less than 13 of the 32 Wisconsin plant communities require fire for maintenance. Prairies, fens, sedge meadows and savannas, totalling 1,500 acres on 20 scientific areas, are burned at varying intervals of two to ten years to maintain these natural communities.

Both frequency of burning and seasonal timing are critical variables, but managers emphasize that burning schedules are not always practical -- weather conditions may dictate the burning date. More study is needed if fire is to gain its deserved prominence as a management tool. Answers to the questions of when to burn, how frequently, and how much for various management objectives, can be answered by examining more closely the results of fire use on the scientific areas.

SCIENTIFIC AND EDUCATIONAL USE

Sampling of use in 1971 indicated that at least 260,000 people had some contact with scientific areas, though mostly for casual nature observation. Formal educational use was reported by 23 midwest universities, involving 1,700 students. In addition, 65 research projects were reported in progress.

Scientific area use must be limited to maintain quality, thus, as use increases, the educational needs of high schools and the general public should be met on other natural areas. We have recently increased our efforts to identify additional natural areas for this purpose in the populous regions of the state where demand is high and opportunities are shrinking.

Though the search for natural areas and scientific areas has become increasingly systematic, the ideal goal is a comprehensive inventory of each county. The inventories provide a complete listing of natural areas from which we can select the best examples for future scientific areas. Many natural areas, not quite of scientific area quality, are at least identified in the register and become potentially available for local school use. Furthermore, the inventories are much in demand by public agencies for land use and recreational planning. Only 8 of Wisconsin's 72 counties have now been inventoried, but with anticipated financial assistance from planning agencies, we should be able to inventory most of the remaining counties within the next decade.

A TOTAL PRESERVATION PROGRAM

Scientific areas are the small gems of our natural resource wealth, and represent only a part of the total preservation need. Alone, they would become mere museums of the past with no ability to respond to change. However, Wisconsin's 5 million acres of publicly owned forests, parks and wildlife areas still contain the raw material to fashion a complete complex of minimum-management lands -- including select scientific areas, natural areas of local significance, and larger wild areas and wilderness areas.

The Council and other preservation interests in Wisconsin have advocated an inventory and classification of the public lands and waters to identify these wild resources. Recognizing the opportunity, the DNR recently adopted a comprehensive wild resources policy, bringing together previous piece-meal preservation efforts. An advisory council will be appointed with both agency and citizen representation to guide the program. Criteria have been established for nine types of wild resources which will be identified, first on state lands, and eventually on county forest lands (Table 2).

TABLE 2. Components of Wisconsin Wild Resources System

Wild Resource	General Criteria
A. Wilderness areas	With the exception of islands, more than 3,000 acres in size, where natural forces predominate or can be restored. Motors, roads, mineral exploration and manipulation of vegetation is prohibited.
B. Wild areas	Preferably 3,000 acres in size, but less may qualify. No use of motorized vehicles, except for restricted type logging and restricted passage of snowmobiles. No new utility easements.
C. Natural areas	Good examples of native biotic communities and natural features, development limited to protection of values. Public educational use encouraged and collections permitted.
D. Scientific areas	The best example of the various biotic communities or natural feature available for preservation. Public use not encouraged and collections by permit only.
E. Wild rivers	Sectors of rivers free of dams, without road access. Quality of water and shoreline in a nearly pristine condition or restorable.
F. Scenic rivers	Similar to wild rivers, but may be accessible by roads.
G. Recreation rivers	In addition to the above, they may have been impounded in the past and have some development.
H. Wilderness lakes	A minimum of five acres in size, with undeveloped and publicly-owned shores. No roads within one-quarter mile and motors prohibited.
I. Wild lakes	Similar to wilderness lakes, except that road access is allowed. Motors and primitive camping are permitted.

Identification and classification of the wild resources on public lands should divert some public recreational and educational use away from the fragile scientific areas. Most importantly, the classification will guide the intelligent development of public land and prevent the inadvertent loss of choice areas. The first step in preservation is identification.

FUTURE CHALLENGES

The preservation framework is now established; the problem remains of speeding up the preservation process, both on public and private lands. By and large, public agencies have willingly set aside natural areas. Some reticence is expected, since we ask managers not only to withdraw lands from productive use but also to assume a continuing management responsibility. The few instances of resistance encountered indicate a need for better documentation of the necessity of preservation programs. The educational institutions utilize natural areas on public land and vocally support preservation, but they have contributed few dollars. Universities should also purchase and maintain scientific areas since they are easily as essential to teaching as expensive class rooms.

Even the most optimistic land acquisition program will not be enough to preserve natural areas now privately owned. Many areas of scientific area quality will be to development soon -- unless alternative means of preservation are developed. ome cases, owners speculating on future values refuse to negotiate and the pular alternative of condemnation is seldom exercised. Land use legislation ld be enacted, both on the federal and state level, which recognizes that unique ral areas are critical resources of national and state concern. They should be ected with state zoning where local zoning fails to prevent immediate loss, and ay development until acquisition can be accomplished.

CONCLUSION

Scientific areas provide the guidelines for intelligent management of land resources. But their vitality should be assured by buffering and reinforcing with larger areas of wild land and multiple-use land where possible. Isolated scientific areas, surrounded by predominately agricultural land, need connecting links for the vital exchange of genes. These links can be provided by farm fencerows and roadsides if they are maintained in native vegetation.

The goal of land health depends on a total preservation program requiring that each land use contributes its share of biological diversity.

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