NATIONAL SCIENTIFIC RESERVE / WISCONSIN

ICE AGE
This planning publication has neither been approved nor disapproved. Its purpose is to provide planning information and alternatives for further consideration and discussion, and it may undergo considerable revision.
a master plan

ICE AGE NATIONAL SCIENTIFIC RESERVE - Wisconsin -

U.S. DEPARTMENT OF THE INTERIOR  STATE OF WISCONSIN
NATIONAL PARK SERVICE  DEPARTMENT OF NATURAL RESOURCES

JULY 1973
MASTER PLAN SUMMARY

A comprehensive plan for Ice Age was prepared in 1968 recommending a nine unit National Scientific Reserve of 32,500 acres containing representative features of continental glaciation in Wisconsin. That plan was accepted by the Secretary of the Interior and the Governor of Wisconsin and published in the Federal Register in May 1971. This Master Plan represents a revision of the 1968 comprehensive plan.

This Master Plan describes and evaluates the glacial features and related resources of the Scientific Reserve and offers development and management recommendations which will preserve and protect them, and provide for their interpretation.

Several of the Ice Age units encompass state or county parks and forests having existing recreation facilities and services and

Parnell Esker, Kettle Moraine Ice Age Unit
established visitor use patterns. At the Devils Lake, Mill Bluff and Interstate Units, the Master Plan encourages alterations in the established State Park development and management concepts.

With the exception of those Ice Age units already supporting established overnight use, the Scientific Reserve would be day use. Trailside camping provisions of a primitive nature are recommended for the Bloomer unit. Recommended Ice Age Trail Systems for each of the units would be interpretive in nature as well as provide opportunities for active outdoor recreation.

Proposed Ice Age interpretive facilities would be integrated with present and proposed state and county recreational developments. Recommended interpretive services would augment present programs.

Interpretive methods would vary between the units according to the Ice Age story to be related. At five of the units, interpretive centers would be provided as points of initial area interpretation. Trail and roadside exhibits would encourage self-guiding interpretation. A series of interpretive publications and a movie about the Scientific Reserve would augment these provisions. The placement of Ice Age orientation and interpretive exhibits at selected State tourist centers and waysides on Interstates 90 and 94 approaching the Mill Bluff Unit would serve as an important facet of the interpretive program.

The Ice Age impact region possesses an excellent system of state, county, and township highways. This transportation network will be the primary means of bringing visitors to the Reserve and circulating them through each unit with interpretive auto tour routes and waysides serving as a basic means of relating the Ice Age story.

Expansion of the Devils Lake, Kettle Moraine, and Bloomer Ice Age Units is proposed to incorporate additional significant features of continental glaciation into the Scientific Reserve. Among them is the internationally known moulin kame, Dundee Mountain. Increased opportunities for interpretation of the Ice Age story and a greater degree of protection for the Reserve's features will also be provided by the proposed unit expansions. Acreage contained in the Reserve would be increased from 32,500 acres to 37,200 by these additions.

Development and management of the Ice Age National Scientific Reserve will require close coordination with many state and local agencies and private groups. The designation of auto tour routes and placement of wayside exhibits will necessitate joint planning with state,
county and township highway departments. Of equal importance will be a close liaison between the Department of Natural Resources and the Ice Age Park and Trail Foundation in the Foundation's effort to develop a hiking-riding trail linking the nine Ice Age units.
Background

On May 29, 1971, an order was published in the Federal Register formally establishing the Ice Age National Scientific Reserve, Wisconsin. The publication of this "Notice of Establishment and Boundaries" culminated almost 14 years of public and private efforts to designate an area or areas to be included in the National Park System which would relate the story of continental glaciation.

It was largely through the efforts of the late Raymond T. Zillmer, a Milwaukee, Wisconsin attorney, that the first formal proposal for such an area was formulated in 1958. The proposal urged establishment of a Moraine National Park, with the objective of incorporating examples of Wisconsin Ice Age glaciation into a Nationally designated park. Congressman Henry S. Reuss, Wisconsin, indicated his support of such a proposal by introducing a Bill to establish the Moraine National Park.

Congressman Reuss' legislation and the proposal on which it was based led to the initiation of a field reconnaissance of areas of Wisconsin Ice Age glaciation in September 1958. The findings of the initial study team led to a recommendation by the Advisory Board on National Parks, Historic Sites, Buildings, and Monuments at its October 1958 meeting "... that studies be undertaken by the National Park Service to locate and determine the extent of appropriate, typical examples of continental glaciation and related natural phenomena that might be considered for inclusion in the National Park System". Based on that recommendation the National Park Service, Department of the Interior, and the State of Wisconsin undertook a joint study to consider the feasibility of the Moraine National Park proposal.

The report of the State-Federal study team disclosed an exceptional variety of widely scattered Ice Age glacial features of national significance throughout Wisconsin. It was proposed that the most significant of these features be designated as units of an Ice Age National Scientific Reserve to be authorized by Act of Congress. It was further recommended that the Reserve be administered by the State of Wisconsin in cooperation with the Secretary of the Interior.

The Advisory Board on National Parks, Historic Sites, Buildings, and Monuments added its support to the study recommendation when it urged establishment of the Reserve in September 1961. Congressional support for the proposal grew with the introduction of several new Bills to
authorize establishment of the Ice Age National Scientific Reserve and in March 1962, President Kennedy in his Message on Conservation urged favorable action on the Ice Age legislation.

On October 13, 1964, the Congress enacted the basic legislation authorizing establishment of the Ice Age National Scientific Reserve for the purpose of assuring the "... protection, preservation, and interpretation of the nationally significant values of Wisconsin continental glaciation, including moraines, eskers, kames, kettleholes, drumlins, swamps, lakes and other reminders of the Ice Age".

The implementation of the provisions of the Ice Age Act and the planning, operation, and management of the Scientific Reserve was to be a cooperative venture of Federal, State, and local governments. The Secretary of the Interior was directed to cooperate with State and local agencies in devising a comprehensive plan for the Scientific Reserve and to provide the State with financial assistance for land acquisition.

When Congress authorized the Ice Age National Scientific Reserve, it was envisioned that the project would consist of several units across the State totaling approximately 32,500 acres. The Act specified that these units would comprise portions of the Northern Unit of Kettle Moraine State Forest and the Campbellsport Drumlins, portions of Devils Lake State Park, portions of Chippewa County, and related areas agreed upon by the Secretary of the Interior and the Governor of Wisconsin.

A geological study was undertaken by Professor Black of the University of Wisconsin to recommend the areas of continental glaciation which were worthy of preservation and qualified for inclusion in the Reserve. From this study the comprehensive plan was completed in 1968 by the National Park Service and the Wisconsin Department of Natural Resources with assistance from the Geology Department, University of Wisconsin. The comprehensive plan identified portions of the four areas stipulated and five additional units for inclusion in the Reserve.

In addition to identifying the units to be included in the Scientific Reserve, the comprehensive plan recommended a cost sharing formula for development and operation. This led to enactment of Public Law 91-483 in 1970 which amended the financial assistance provision of the authorization Act to allow for greater financial assistance to the State. Under this amending legislation a financing program for the Reserve was established which provided that: (1) land acquisition would be accomplished using 50% State funds and 50% Federal Land and
Water Conservation funds; (2) development would be by 25% State funds, 50% Land and Water Conservation funds, and 25% National Park Service funds; and (3) the cost for operation and maintenance of facilities and staffing would be shared equally by the State and by the National Park Service using appropriated funds.

The nine Ice Age units recommended in the comprehensive plan were accepted by the Secretary of the Interior and the Governor of Wisconsin and published in the Federal Register on May 29, 1971. This formally established the Ice Age National Scientific Reserve. In accordance with the Ice Age Act as amended, an agreement was developed between the Secretary of the Interior and the State of Wisconsin in 1972 covering the specific areas of responsibility in the planning, development, and operation of the Reserve.
Purpose

The purpose of the Ice Age National Scientific Reserve is to assure the protection, preservation, and interpretation of various nationally significant land forms that were shaped by the last stage of continental glaciation as it occurred in Wisconsin.

Objectives

To achieve this purpose the National Park Service and the Wisconsin Department of Natural Resources will cooperate in the planning, acquisition, development, management, and protection of the Ice Age National Scientific Reserve following the objectives stated below. These objectives are in keeping with the purpose of the Scientific Reserve and the authorizing Act of October 13, 1964, as amended by the legislation of October 21, 1970.

* Management

The Reserve will comprise nine detached units managed by the Wisconsin Department of Natural Resources through its District offices.

Protection, maintenance and interpretation of the Reserve will be on a unit by unit basis in accordance with an overall management plan.

* Visitor Use

Operation of the Reserve will be on a year-round basis with extended hours during the period Memorial Day to Labor Day. Visitation will be primarily day use with overnight accommodations to be located outside the boundaries of the Reserve. Camping accommodations will be provided at those units where already established, i.e., Kettle Moraine, Devils Lake, Mill Bluff and Interstate. The Two Creeks Buried Forest, Sheboygan Marsh, Campbellsport Drumlins, and Cross Plains
Units will have no overnight accommodations within their boundaries. Backcountry trailside camping will be permitted within the Bloomer Unit.

* Facilities

Visitor facilities will be developed to provide for or support the interpretive objectives of the Reserve and afford the best protection possible to the resources of each unit. New facilities will be designed to harmonize with their surroundings and where appropriate with existing developments. The quantity and types of facilities and services provided at each unit of Ice Age will provide for a level of visitation which the resources can support with minimal environmental damage.

* Recreational Activities

Only those activities which will insure preservation and protection of the Ice Age features will be permitted. Intensive use zones affording opportunities for motorized sightseeing, picnicking, hiking, camping, and related activities will only be in areas where such activities are compatible with the protection and preservation of the Scientific Reserve. Activities which promote a greater understanding of the Ice Age story will be encouraged.

* Interpretive Theme

Interpretation of the Reserve will focus on helping the visitor understand and appreciate the forces and processes of Ice Age glaciation and how it shaped the land. The interpretive program will have as its theme Wisconsin Ice Age Glaciation and its effects on man and his environment. Man's effect on the glacial features and in turn how glacial actions have affected human history will also be stressed.
The Resource

* Resource Description

The Ice Age National Scientific Reserve is distinguished for its outstanding hallmarks of continental glaciation. These hallmarks extend across the northern half of America from the headlands of Cape Cod on the Atlantic to the slopes of the Rocky Mountains in western Montana. Nowhere are these evidences better defined and more impressive than in Wisconsin. Indeed, the name of the State has been applied to the most recent advance of the continental ice sheet, the Wisconsin Stage, that ended about 10,000 years ago.

Established primarily to preserve and protect remnants of continental glaciation in Wisconsin, the Scientific Reserve contains other valuable natural resources. These include objects of wonders associated with earth history and a wide variety of plant and animal species. Evidences of past human habitation and visitation can also be found throughout the Reserve and represent another category of significant area resources to be preserved and interpreted.

Glaciation - The story of continental glaciation is a provocative subject and is recognized among earth scientists as one of the great natural history sagas of North America. Four times during the Ice Age of the Pleistocene Epoch, spanning a period beginning a million years or more ago, enormous sheets of ice pushed southward from a massive central ice cap which formed in the region of Labrador and Hudson Bay. Between each advance of the frozen ice blanket, intervals of warmer climate comparable in duration prevailed. During each of the intervals the ice sheets were forced by melting to retreat back toward their source.

Each of the ten-thousand year stages of ice advances and retreats are named. The advances are the Nebraskan, Kansan, Illinoisan, and Wisconsin Stages, named from the States in which evidences of the respective stages are best represented.

Several theories as to the cause of the Ice Age have been advanced over the years and speculation continues today. The theory currently held in highest favor is that a fluctuation in solar energy produced
a chilling effect on the earth resulting in the creation of large ice masses and the consequent periods of continental glaciation.

As the Arctic in effect moved south, its cold breath turned temperate America boreal, the warm south cool, and flourishing with northern trees and other plants. Drenching rains made deserts green and blooming, and lake basins were filled. Yet so much water was locked within the ice sheet that the seas' levels fell. Alaska was joined with Asia, and the land of America stretched beyond present coasts. Huge mastodons, mammoths and giant bison roamed this changed geography of climate. Though now long extinct, they were feared yet hunted realities of life to the men and women, ancestors of the Indians, who knew the Ice Age world; who, generation after generation, lived through difficult times that must yet have had compelling beauty.

The continental ice sheet scoured, scratched, grooved and eroded the land over which it moved. Soil and rock fragments of all types and sizes were collected, mixed and ground smooth within the flow of the glacial ice, and transported south. This rock material, termed glacial drift, or till, was deposited by the glaciers, active and melting ice in depths ranging from a few inches to hundreds of feet on lands once covered by the ice. This drift was deposited under the advancing glacial ice, and it accumulated at the glaciers' leading edges when the ice advance was in equilibrium with its retreat. The long, marginal drift ridges are called moraines. When the glacier melted back, or retreated, more drift material was deposited across the land as a gently undulating ground moraine or till plain.

Sometimes debris collected along the course of water channels that developed under the ice sheet. When the ice melted, these stream deposits were left upon the ground as long narrow ridges, called eskers. These sinuous hogbacks are striking features of a glaciated landscape. The gravels they contain, sorted out by the running water long ago, are prized sources now for building materials.
Where water flowed through holes and cracks in the ice or cascaded over the edges of the glaciers, the debris carried by the water was piled into conical masses known as kames, resembling volcanic cinder cones wherever they stand out on the landscape.

Scientists still puzzle over the origin of drumlins, oval hills trending in the direction of ice movement. Although formed in some manner from the till contained in the moving ice, or dredged up by it, the reasons for the peculiar form and orientation of drumlins are not yet clearly understood.

Streams flowing outward from the margins of the glaciers sorted and spread glacial debris into outwash plains. These gravelly, sandy deposits often lie on unglaciated terrain just beyond terminal moraines and have in some cases been deposited upon a previously formed ground moraine. In other situations they occur banked high between morainal ridges.

Large depressions called kettleholes dimple many moraine areas. Many of them water-filled, mark sites where huge chunks of ice detached from the ice sheet, once lay buried under an insulating blanket of glacial debris. When the buried ice eventually melted, the loose earth and rock material above it caved in to form a crater-like cavity. A portion of the moraine in southeastern Wisconsin has so many such depressions that it is named the Kettle Moraine.

These and other striking features form important evidence for us today to study and ponder on the enormity of the past glacial phenomena of our earth. A scoring of bedrock, a boulder different from surrounding rock and brought there by the ice (geologists call them erratics) are clues to a vast remodeling of our land.

This continental glaciation profoundly affected the environment of the entire region. Glacial excavation accounts in part for the enormous basins occupied by the Great Lakes, the largest bodies of fresh water in the world. Moreover, Wisconsin, like the other States over which the ice sheets moved, owes much of its agricultural and other riches to sculpturing, erosion, and deposition by the glaciers.
Vegetation - The widespread geographical location of the Ice Age units results in a diversity of plant species found within and adjacent to the Scientific Reserve. These range from marsh and swamp plants and aquatic plants to those characteristic of a dry, sandy prairie.

Northern red oak, basswood, sugar and red maples, and shagbark hickory and white oak are the most common tree species found in the eastern Ice Age units. Abandoned farm fields and conifer plantations provide for a diverse mix of tree species as well as numerous shrubs, wildflowers and ferns. In the more northern and western areas of the Scientific Reserve, the pines, hemlock, firs, spruce and cedars predominate with a mix of maple, oak, birch, and aspen.

At some locations, such as Devils Lake, differences in elevation, slope and exposure provide a marked contrast in vegetative types between those adapted to a cool, shady, moist climate and those adapted to warm, sunny and dry conditions. This diversity of micro-climates makes it possible for approximately 700 species of ferns and flowering plants to flourish at this Ice Age Unit alone.

Animal Life - The diverse vegetative communities within and adjacent to the Ice Age National Scientific Reserve support a large and varied animal population. Thousands of species are represented ranging from the smallest insects to the white-tailed deer. At the Devils Lake Unit of the Scientific Reserve, 175 species of birds alone have been observed. Ten species of snakes and at least ten species of amphibians can also be found here.

Within the Kettle Moraine Unit of Ice Age, nearly 40 mammals are known to exist. The most abundant are the mice, voles and shrews. Deer, rabbits, squirrels and ground squirrels are common. Not so frequently seen are foxes, woodchucks, badger and coyote.

During migration periods, the Sheboygan Marsh area teams with waterfowl and dense warbler and hawk concentrations are common in the Kettle Moraine area. The uncommon Pileated Woodpecker is a resident in the Bloomer Unit and Bald Eagles are often seen at Interstate Park, the westernmost unit of the Scientific Reserve.

The waters of the St. Croix River flowing through the Interstate Unit as well as those of Devils Lake, Sheboygan Lake, and the many lakes of the Kettle Moraine and Bloomer Units support a variable population of fish species. Northern, walleyes, large and small-mouth bass, perch and panfish are common. In some areas, such as at Devils Lake, rainbow and brown trout have been introduced.
The presence of this rich array of animal life and the vegetative species that support them is in part a product of Ice Age glaciation. It was the workings of the glaciers that produced the many lakes and wetlands, the high dry drift bluffs, and certain forests and prairie lands that support the varied ecological niches in which they are found.

Human History - Man's habitation of the region fluctuated with the advance and retreat of the glacial ice sheets as he gathered available foods and followed the game which migrated north and south at the edge of the glacial fields.

A few men soon became many and formed tribes that roamed the land. Early European explorers misnamed them Indians and as they moved westward in search of furs found a land full of lakes, rivers and wetlands left by the glaciers and rich in the prized beaver they sought. Systems of waterways, likewise a glacial product, served as easy routes of travel.

As other settlers arrived they found the glaciers had left large areas of fertile soil ideal for cropland and which supported vast forestlands.

The prairies were tilled for crops and the forests were cut for lumber and to provide more land for farming. The richest lands were settled first and when they became infertile were abandoned and new lands settled. Today large areas of Wisconsin are still agricultural. Resorts and vacation homes have been developed around many glacial lakes and the plentiful glacial sands and gravels are quarried across the State.

* Resource Evaluation

The continental ice sheet was a stupendous thing, which few of us can really visualize. Its geographical scope alone stagers the
imagination, and at best the effect it had upon America can be seen only as relatively small, key fragments that remain scattered over half our continent. The maximum advances of the Wisconsin Stage of continental glaciation has, however, left a belt of conspicuous glacial features across the State of Wisconsin which can help us to comprehend the Ice Age story. Four units of particular importance, each offering a distinctive wealth of glacial evidence are the Kettle Moraine of southeastern Wisconsin, the nearby drumlins of Campbellsport, the Devils Lake area in the Baraboo range, and the end moraine of the glacial lobe that once advanced across Chippewa County near Bloomer. A detailed resource evaluation for each of the Ice Age units appears in The Plan section.
Regional Analysis

The Ice Age National Scientific Reserve, with its wide geographical distribution, is situated within a region of impact encompassing the State of Wisconsin, eastern Minnesota, most of Michigan, northeastern Iowa, northern Illinois, and northwestern Indiana.

* Access

Excellent highways insure easy access to all units of the Scientific Reserve. Interstates 90 and 94 provide a network of highspeed routes of travel between Chicago, Illinois, Madison and Milwaukee, Wisconsin, and Minneapolis-St. Paul, Minnesota, and four of the Ice Age units: Cross Plains, Devils Lake, Bloomer, and Mill Bluff. Interstates 90 and 94 in fact bisect the Mill Bluff unit.

The four easternmost Ice Age areas, Campbellsport Drumlins, Kettle Moraine, Sheboygan Marsh, and Two Creeks, are accessible from Milwaukee, Fond du Lac and Green Bay, Wisconsin, by U.S. Routes 41 and 141 and State Routes 57 and 42. Interstate, the westernmost unit of the Scientific Reserve, lies only 60 miles from Minneapolis-St. Paul via Interstate Highway 35 and U.S. Route 8.

* Circulation

Immediate access to most of the Scientific Reserve is provided by state, county, and township roads which also serve as a means of circulation within the units. The Kettle Moraine is laced with roads with the bulk of users entering and circulating through the unit along State Route 67 and County Trunks G, SS, F, A, and S. A portion of the designated Kettle Moraine Scenic Drive is routed through the area.

Located just five miles north of the Kettle Moraine via County Trunk P is the Sheboygan Marsh Ice Age unit. Immediate access is provided by a single township road which joins County Trunk P two miles to the east of the unit. The site is easily accessible from Sheboygan 15 miles to the east and Fond du Lac 20 miles to the west.

County Trunk M, running east and west and County Trunk AA, running north and south through the Bloomer unit provide access at four points and together with interconnecting township roads circulate the visitor and serve as the route for a motorized interpretive trail of
The Impact Region

ICE AGE NATIONAL SCIENTIFIC RESERVE

* Two Creeks Buried Forest
* Sheboygan Marsh
* Kettle Moraine
* Campbellsport Drumlins
* Cross Plains
* Devils Lake
* Mill Bluff
* Bloomer
* Interstate
the areas glacial features.

The road system within and adjacent to the Campbellsport Drumlin unit likewise serves as a means of interpreting the area to the visitor. Main routes of access and circulation are County Trunks BB and K off State Route 67 from the south, County Trunk Y off U.S. Route 41 from the west, and from the east via County Trunk V.

Situated three miles south of Baraboo, the Devils Lake unit is served by State Routes 159 and 123 from the north, 113 from the north and east, and South Shore Drive from the west. Major access is from U.S. Route 12 one mile west of the unit. Portions of these routes in conjunction with County Trunk DL and Newman Road provide a scenic drive throughout the unit.

Cross Plains, with its close proximity to Madison and U.S. Route 14, serves as a focal point for a scenic drive along the edge of Wisconsin's driftless area. Utilizing numerous county and township roads, visitors may engage in a motorized interpretive journey leading them directly to the unit. Foot trails serve as the means of circulation within the unit.

County Trunk W bisects the Mill Bluff Ice Age unit north and south insuring access from either direction and circulation throughout the area. Access is also possible from Interstates 90-94 passing through Mill Bluff by way of exits from U.S. Routes 12 and 16 at Oakdale, three miles west, and Camp Douglas two miles east.

Existing park roads joining U.S. Route 8 on the north and County Trunk S on the south provide circulation through Interstate, the westernmost Ice Age unit.

Likewise, the Two Creeks unit located on the shore of Lake Michigan, is served by two highways: State Route 42 forming its west boundary and County Trunk BB from the west. Highways thus provide excellent access to all units of the Scientific Reserve and insure easy motorized visitor circulation throughout.
* Population

Population patterns of the Ice Age region are variable ranging from such highly urbanized centers as Chicago-Milwaukee and Minneapolis-St. Paul, to the more rural areas of northwestern Wisconsin and the Upper Peninsula of Michigan. Projections through 1980 indicate that virtually all areas of the region will experience population growth.

The regions large Standard Metropolitan Statistical Areas such as Chicago, Milwaukee, and Minneapolis-St. Paul are especially likely to see an increase in population. All witnessed population increases during the period 1960-1970 with Minneapolis-St. Paul displaying a 22.4% growth rate.

**POPULATION TRENDS IN THE ICE AGE IMPACT REGION**

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Continued population growth, the concentration of people in the regions larger metropolitan areas, and expansion of the Interstate highway system can be expected to increase use of the Ice Age units during this decade.
* Park and Recreation Facilities

The Ice Age region is rich in the number, variety, and quality of park and recreation facilities and attractions. Two units of the Scientific Reserve because of the State Parks which comprise them are already well-known attractions and among the most heavily visited areas in the State of Wisconsin; Devils Lake State Park and the Kettle Moraine State Forest. Apostle Islands National Lakeshore, Voyageurs National Park, the St. Croix National Scenic Riverway, the Wolf National Scenic Riverway, Sleeping Bear Dunes National Lakeshore and Pictured Rocks National Lakeshore are all recently authorized additions to the National Park System located in the impact region. Other National Park Service units include Isle Royale National Park, Michigan; Grand Portage National Monument, Minnesota; Indiana Dunes National Lakeshore, Indiana; and Effigy Mounds, Iowa.

National Forests and state and county parks, forests, and recreation sites are also numerous. Wisconsin alone has 58 state parks and eight state forests. The regions Metropolitan parks are among the finest in the Nation and include the well-known Minneapolis Park System, Milwaukee Recreation Department, and the Cook County (Illinois) Forest Preserve District. These many park and recreation facilities and the natural resources on which they are based are an attraction to visitors from throughout the United States and Canada. Most are residents of the regions major population centers.

The presence of this rich array of natural and recreational attractions and the many services and facilities that support their use, such as hotels, motels, resorts and private homes and cottages, will contribute to use of the Scientific Reserve. While visitation to Ice Age will generally coincide with the summer use season, the trend towards year around outdoor activities can be expected to affect visitation to the Scientific Reserve by increasing its period of use.
A Popular Hiking Trail and Recreation Site in the Kettle Moraine State Forest
Surrounding and Existing Use

Most of the land and water comprising the Reserve is in public ownership as state and county parks or forests. The remainder is in private ownership and is utilized primarily for agricultural purposes.

Because of the wide geographical distribution of the nine Ice Age units, surrounding land use trends vary. However, several general trends are apparent: an increase in the amount of land being converted from agricultural to residential use, and an increase in recreational second home construction.

The conversion of agricultural and forestry lands to residential use is occurring primarily in and near the Cross Plains, Kettle Moraine, Bloomer and Mill Bluff units. On private forested lands within and adjacent to the Bloomer unit, new homes for year around residential or summer recreational use are being constructed at an increased rate especially along the shorelines of the areas many small lakes.

The Two Creeks Ice Age unit consists of cropland and is in a primarily agricultural area. Point Beach State Forest, six miles to the south, is the closest major recreational area. Two Rivers-Manitowoc serves as its economic service center.

Sheboygan Marsh remains an area of wetlands with open agricultural lands encompassing its fringes. Along with the Kettle Moraine unit, an area of mixed forest and open upland supporting primarily recreational use and agriculture, its major economic service centers are: Fond du Lac, Sheboygan, West Bend, and Milwaukee, Wisconsin. The Campbellsport Drumlins, situated 10 miles west of the Kettle Moraine unit, shares these same service centers and consists mainly of open agricultural lands, with scattered hardwood woodlots.

The Cross Plains unit located 10 miles west of Madison is about 80% wooded with the remainder in open pasture. The surrounding lands are principally agricultural with increasing residential development. A few sand and gravel quarries are situated immediately to the south.

Devils Lake, characterized by abrupt rocky bluffs and high rolling hills, is predominantly forested within the boundaries of the state park. Surrounding lands are generally more open and support mixed agricultural uses. A substantial United States government facility, the Badger Ordinance Works, is situated to the south and the City of Baraboo, which is the major service center, is three miles north. The Wisconsin River to the south, east and north is a major water recreation use area with the Wisconsin Dells, a major visitor attraction, located on its banks 15 miles north of Devils Lake.
A Line of Kames Near Bloomer Forms a Backdrop to the Predominant Land Use of the Region
Lands surrounding the Mill Bluff unit are in predominantly agricultural use. A rather unique area because of its towering rock chimneys, most of the land included within its boundaries is wooded. Some residential development is beginning to occur westward toward Mill Bluff from Camp Douglas and immediately northwest of the unit. Camp Douglas and Tomah are the closest service centers.

The Bloomer unit is 90% forested with almost one-third comprised of the Chippewa County Forest. Agricultural land is predominant to the west with timber production and forest-oriented recreation the major land uses to the north and east. Bloomer, eight miles to the south, serves as the major service center.

The Interstate Park unit is situated in an area of mixed forest and agricultural use. Within the unit the land is characterized by bluffs and steep tree-covered rocky terrain. St. Croix Falls, Wisconsin, and Taylor Falls, Minnesota, bordering the area on the north, are the two nearest service centers of importance.

* Evaluation

The variety of land uses within and adjacent to the Scientific Reserve: agricultural, residential, recreational and forest utilization provide a diverse landscape. Whereas in many National Park System areas, most of these uses would be out of place, at Ice Age they can serve as a land management tool and as an important element of the interpretive story. Many existing agricultural practices will be encouraged to help maintain open vistas which aid the user in viewing various glacial features. Certain forestry practices which maintain more open stands permitting better viewing of features and improved visitor access and circulation will also be allowed.

Ice Age comprises almost 30% of the existing State-owned park lands in Wisconsin. As such, it will provide an added attraction for visitors—especially out-of-state—who utilize State-owned park and recreation lands and the region as a whole. In combination with the other newly authorized National Park System areas in the region, it can be expected to have a noticeable impact on the regional economy and land use patterns.

Land uses within the boundaries of the Scientific Reserve will remain basically unchanged. An increase in recreational use will, of course, be seen at such areas as Bloomer, Mill Bluff and to a lesser degree at Two Creeks, Campbellsport Drumhills, Cross Plains, and Sheboygan Marsh. In some areas adjacent to the Reserve, it can be
expected that an increase in residential land use will occur as land owners "cash in" on the presence of Ice Age.

The emphasis on automotive, hiking, and bicycling use of Ice Age will complement established recreational uses at the various units and in the region as a whole. It can also be expected that there will be some new services and facilities provided on adjoining lands to complement the visitor use provisions of the Scientific Reserve. The Ice Age National Scientific Reserve is expected to expand and enrich the recreation and environmental appreciation opportunities of the region.
THE PLAN

* Planning Considerations

The Ice Age National Scientific Reserve is composed of nine separate units spread across the State of Wisconsin from Lake Michigan to Minnesota. This poses problems for planners and managers that are not normally encountered in planning National Park areas. Three of the Ice Age units are within existing state parks, one within a state forest, and one within a county park. Recreation development has occurred in these units and definite recreation use patterns already exist.

The development and use of these areas has been primarily for their recreation values and the Ice Age aspect has been incidental to such recreation pursuits as hiking, camping, and swimming. The Ice Age aspect should be integrated with ongoing programs in such a way as to insure that the Federal and State responsibility under the Ice Age legislation is not compromised.

Although the existing recreation use is compatible with the purposes of the Scientific Reserve, future development should provide facilities and services which are needed to preserve and interpret the Ice Age resources. New developments for high intensity recreation use should be added only after a thorough evaluation indicates they will create no significant adverse impact on the Ice Age features.

Because existing facilities will continue to be used, there will be no single architectural theme throughout the Reserve. New developments should blend with existing architectural styles insofar as possible. In the new units of the Reserve, facilities should be designed using natural materials of the area wherever possible. A standard sign system will be used to provide a degree of continuity throughout the Reserve. There will also be a standard design for trail markers and wayside exhibits and an Ice Age symbol for easy
recognition of Ice Age information and interpretation locations.

Currently most visitors to the existing units are from local or, in some cases, regional areas. Since few visitors are expected to go to all nine Ice Age units, it will be important to provide a means to convey the overall Ice Age story throughout the Reserve while focusing on the particular features that are of outstanding significance in each unit. The interpretive program will aim to instill in the visitor an understanding and appreciation of continental glaciation and its effects on man.

Much of the land is currently in agricultural use and in many cases that is compatible with the preservation and interpretation needs of the specific unit and should be continued. In areas where it is determined that the Ice Age story can be told effectively in heavily farmed areas only enough land will be acquired to provide for interpretive and minimum visitor service facilities.

The Ice Age Park and Trail Foundation is promoting a hiking-riding trail which would connect the nine units of the Reserve. Some of this trail has been developed in the Kettle Moraine unit and other segments are being planned. This is a long term project and will require close coordination between the Wisconsin DNR and the Foundation to assure proper trail connections and locations in the Ice Age units.

* Resource Management

Lands and waters comprising the Ice Age National Scientific Reserve will be managed by the Wisconsin Department of Natural Resources on a unit by unit basis through the Departments District Offices.

At those units, comprised of established state parks and forests such as the Devils Lake and Kettle Moraine units, a good knowledge of the ecosystems of each already exists. At others, such as the Bloomer unit, research will be required to obtain basic data about the areas flora, fauna and physiographic history and condition.

For each unit, a basic resource management plan should be prepared which provides an ecosystem analysis and identifies research needs. Research carried out by cooperating scientific institutions and especially that related towards increasing our knowledge of Ice Age glaciation should be stressed and encouraged. Findings of these research projects should serve as the basis for the unit resource management plans.
Carrying Capacity - The ability of a natural resource to support human use without being irreparably damaged is an important consideration in resource management planning. Attempts should be made to determine this natural resource carrying capacity for each of the Ice Age units. Facilities and developments should not be provided which will encourage use above this capacity level. If such conditions are found to already exist, management steps should be taken to reduce human impact to an acceptable level. Indications of overuse include polluted waters, damaged vegetative cover, compacted soils, drastically altered ecosystems, and visitor behavioral problems caused by crowding and conflicts in area use.

Flora and Fauna - The wide geographical distribution and variety of physiographic conditions of the Ice Age units makes possible a diverse plant and animal population. Resource planning should encourage retention of the natural habitat which supports these species.

Consistent with Department of Natural Resource policy and state fish and game programs, habitat should be managed to perpetuate these populations. Where hunting is permitted, it should be regulated to insure visitor safety. Recreational vehicle use such as snowmobiling and trailcycling should be carefully controlled to avoid adverse impacts on the resource.

The forest resources at such units as Bloomer and the Kettle Moraine should be managed to insure retention of the physiographic conditions important to the Ice Age story. While timber harvesting would be permitted, it should be based on an overall resource management plan that insures adequate protection of the natural habitat and geologic features. Vegetative screens should be retained along access and circulation corridors, lakeshores and stream courses.

History and Archeology - Known historical and archeological resources within the Scientific Reserve are limited. Several effigy mounds have been located at Devils Lake and at the Interstate unit a 10-inch copper spike or awl was found in peat together with flint weapon points. The Old Wade House, an 1850's stagecoach inn, is located adjacent to the Kettle Moraine unit.

Archeological and historic sites surveys should be undertaken at Interstate, Devils Lake, Kettle Moraine and elsewhere in the Reserve where artifacts and remains are likely to be found. Based on the findings of these inventories, appropriate indepth studies should then be undertaken. Appropriate finds should be interpreted as part of the Ice Age story. Archeological testings should be undertaken prior to any new or expanded development within the units.
* Administration

The designation of a single individual given the responsibility for overseeing management of all the Ice Age units is recommended. In addition, managers responsible for the day to day operation of each of the units should be designated. An appropriate staff should be provided to operate and maintain each of the Ice Age units. In some Districts, this will require the hiring of additional personnel, most on a seasonal basis. All individuals so assigned should understand the resource management objectives and plans for the Scientific Reserve.

* Regional Planning and Zoning

The wide distribution of the Scientific Reserve across Wisconsin and the heavy emphasis on county and township highways as a means of visitor access and circulation necessitates coordinated planning with many local and regional agencies and organizations. At Sheboygan Marsh and Bloomer where heavy county land ownerships are situated within and adjacent to the units, cooperative development and land use for trails and other recreational developments should be undertaken.

Ice Age Trail - Under terms of the Ice Age legislation, assistance will be provided to the Ice Age Park and Trail Foundation in studying the location of a proposed Ice Age Trail in Wisconsin. This trail emphasizing the Ice Age story could serve as an extension of the interpretive story of the Scientific Reserve. Coordination with the Trail Foundation should be insured by active participation in the trail study and subsequent interpretive planning.

Counties - Almost one-third of the lands comprising the Bloomer Ice Age unit consist of a portion of the Chippewa County Forest which is currently under a management program permitting logging. Because some methods of timber harvesting would adversely affect physiographic conditions important to the Ice Age story, a cooperative management agreement for the Bloomer unit should be prepared which insures retention of the areas most important landscape qualities.

At Sheboygan Marsh the surrounding county park serves as the focal point for the interpretive story. As such, there is need for coordinated development and planning of trails, interpretive devices and related facilities. County maintenance and perhaps operation should be explored as a possibility for this unit.
As site planning for each of the Ice Age units progresses, close liaison will be necessary with state and county highway departments pertaining to wayside and overlook facilities along roadways. Contact should be made at an early stage regarding placement of Ice Age interpretive displays at Interstate highway waysides approaching the Mill Bluff unit.

* Ice Age Interpretation

The task of interpreting the Ice Age is divided between the National Park Service and the State of Wisconsin.

The expertise and resources of the National Park Service will be used to plan and develop the interpretive program. The program will strive to keep Ice Age an identifiable and specialized part of the State's overall interpretive program. The construction of exhibits and audio-visual aids and the preparation of information and interpretive brochures will be the responsibility of the National Park Service.

The State's responsibilities will center on the operation of the information-interpretation programs of the Scientific Reserve. Additional interpretive personnel will be required at some units.

Interpretive devices will vary between the individual units of Ice Age and are outlined in greater detail under discussions of each unit. The extent of interpretation, the media used and the physical developments will be dictated by the glacial story and resources of each.

In addition to the individual unit provisions, an interpretive folder for Ice Age is needed. The folder, to be available at all units, will provide the visitor a general introduction to the Reserve and to each unit. It will give a brief description of each unit's resources and available facilities allowing the visitor to plan his visit between units. Included will be a map of Wisconsin showing major access routes and individual maps indicating the features and facilities of each unit.
The most important interpretive device, however, will be a motion picture explaining the glacial story and how each Reserve unit is related to it. This film will be designed for use at all areas having visitor contact facilities. In addition, the film will be available to schools as an introduction to glacial history and the Ice Age National Scientific Reserve.

The film, using both animated and actual photography, will depict the Ice Age from its beginning. Animation will be used to show the size and power of this massive ice sheet. The formation of glacial features will be depicted and then compared with actual features found in the Reserve. The glaciers effects on man from the change in climate and vegetation in preglacial times to the landforms of today and their effect on the settlement and development of Wisconsin will likewise be shown.

A geologic publication available for people who wish to delve deeper into the geologic history of the area will augment the movie.

Ice Age orientation and interpretive exhibits and materials will be available at the State Tourist Information Centers located on Interstate Highways I-90 and I-94 at Beloit and Hudson for visitors entering the State. Additional displays will be situated at the wayside rest facilities of these interstate highways passing through the Mill Bluff unit. These waysides, located on the northbound lane of I-90 - 94 near Mauston, the east bound lane of I-90 near Rockland and southbound lane of I-94 near Millston, will orient travelers to the Scientific Reserve and direct visitors to the Mill Bluff unit.
General Acquisition and Development

The master plan for the Ice Age National Scientific Reserve reflects a heavy emphasis on interpretation of the evidences of continental glaciation in Wisconsin. It recognizes that at many of the Reserve units, development and visitation patterns have been largely fixed by public use provisions of the existing state and county parks and forests that comprise them.

There is a heavy reliance on existing facilities to support visitor use at most units. Proposed developments are minimal and consist of interpretive centers at several units and the provision of interpretive exhibits and trails.

Existing state and county roads will serve as the means of access and circulation for Ice Age users necessitating close cooperative resource planning and development between state and county agencies in the management of lands and waters within and immediately adjacent to the Reserve.

Land Acquisition Priorities - Land acquisition within the boundaries of some units of the Scientific Reserve as designated and published in the Federal Register in May 1971 has not yet begun; specifically, Cross Plains, Bloomer, and Sheboygan Marsh. At Campbellsport Drumlins, 10 of the originally recommended 20 acres of land to be acquired in fee simple have been purchased. While with the exception of Interstate, purchases are not complete in the five other units, acquisition programs are underway.

The master plan calls for boundary changes at three of the Ice Age units; Kettle Moraine, Devils Lake, and Bloomer. Additional fee simple acquisition of property will be required at each. While no change in boundaries is proposed for Campbellsport Drumlins, an additional fee simple purchase is recommended within that unit also.

The escalation of property values coupled with the rapid conversion of many open space lands to uses incompatible with Ice Age purposes makes the acquisition of controlling interests in all lands in private ownership within the Reserve boundaries a matter of high priority. Some units, however, have more pressing needs than others because of rapidly increasing land costs, encroaching or existing incompatible land uses, or the immediate need for development of Ice Age interpretive facilities.
<table>
<thead>
<tr>
<th>UNIT PRIORITY</th>
<th>Urgency of Acquisition</th>
</tr>
</thead>
<tbody>
<tr>
<td>CROSS PLAINS</td>
<td>Rapidly increasing land values in area. Unit's significant feature not yet in state ownership. Land for sale with threat of conversion to residential use.</td>
</tr>
<tr>
<td>KETTLE MORaine</td>
<td>Purchase of lands necessary to provide continuity of management unit and interpretive trail corridor, and to protect significant Ice Age resources.</td>
</tr>
<tr>
<td>BLOOMER</td>
<td>No acquisitions to date. Early purchase necessary to insure preservation of key features. Encroaching residential and summer home development.</td>
</tr>
<tr>
<td>CAMPBELLSPORT DRUMLINS</td>
<td>Complete purchases of two remaining overlook sites to permit establishment of interpretive route.</td>
</tr>
<tr>
<td>DEVILS LAKE</td>
<td>Early purchases desirable to insure adequate buffer protection for the resource features.</td>
</tr>
<tr>
<td>TWO CREEKS</td>
<td>Current land use not adverse. Completion of acquisition required to permit new dig and exhibit shelter placement.</td>
</tr>
<tr>
<td>SHEBOYGAN MARSH</td>
<td>Current land use not adverse. Explore possible purchase and transfer to County for operation.</td>
</tr>
<tr>
<td>MILL BLUFF</td>
<td>All key features in state ownership. Complete current acquisition program for state park to provide resource buffer.</td>
</tr>
<tr>
<td>INTERSTATE</td>
<td>All lands acquired.</td>
</tr>
</tbody>
</table>
Development Priorities - The wide geographical distribution of the nine Reserve units necessitates a unit by unit planning and management approach which integrates each into an overall program for the Ice Age National Scientific Reserve.

A priority schedule for development has been prepared based on these unit plans and the management objectives for the Reserve. While a concurrent and rapid provision of Ice Age interpretive facilities and programs at all units is desirable, several units because of public use pressures and the presence or absence of interpretive facilities are in greater need of earlier development than others.

DEVELOPMENT PRIORITIES

Kettle Moraine Unit
Heavy existing use. Interpretive Center needed. All necessary lands acquired.

Devils Lake Unit
Highest use area. Existing nature center inadequate. Shuttle system needed to relieve visitor use pressures and provide interpretive services.

Mill Bluff Unit
All necessary lands acquired. Major Ice Age interpretive point due to proximity of Interstate Highway.

CROSS PLAINS UNIT

2nd Priority
TWO CREEKS UNIT
CAMPBELLSPORT DRumlINS UNIT

BLOOMER UNIT

3rd Priority
SHEBOYGAN MARSH UNIT
INTERSTATE UNIT
As part of the unit development program the preparation and placement of Ice Age interpretive exhibits at Interstate Highway Waysides approaching the Mill Bluff unit is a "development" which should likewise be given a high priority.

* Signing

The early development of a sign system for all units of the Scientific Reserve is of primary importance. In the case of those areas which are existing State parks and forests, entrance signs would serve the dual purpose of identifying the area as both an Ice Age unit and as a unit of the State park and forest system.

A standard style and format for entrance, orientation, and interpretive signs would be established for the Reserve to insure continuity between the units and easy public recognition of the fact that each area is part of the Scientific Reserve. Creation of an Ice Age logo to aid in public recognition of the Reserve and its facilities would be encouraged.

Close liaison would be necessary with appropriate highway departments regarding the development and placement of Ice Age unit directional signs, auto tour route markers, and interpretive signs to insure compliance with State and Federal highway standards. The National Park Service would assist the Department of Natural Resources in the development of a sign program for the Reserve.
General Development Plan
Ice Age National Scientific Reserve
Wisconsin

1. Two Creeks Buried Forest Unit
   Interpretive Shelter
   Entrance and Parking (10 cars, 2 buses)
   Trail; Exhibits and Signs

2. Sheboygan Marsh Unit
   Sheltered Overlook
   Entrance and Parking (20 cars, 2 buses)
   Interpretive Trail; Exhibits and Signs

3. Kettle Moraine Unit
   Interpretive Center
   Entrance Road
   Parking (50 cars, 5 buses)
   Interpretive Trails; Exhibits and Signs
   Interpretive Tour Route; Exhibits and Signs

4. Campbellsport Drumlin Unit
   Interpretive Tour Route
   Wayside Interpretive Overlooks
   Exhibits
   Parking (5 vehicles each)
   Interpretive Trail

5. Cross Plains Unit
   Interpretive Shelter
   Comfort Station
   Parking (25 cars, 2 buses)
   Interpretive Tour Route
   Interpretive Trail; Exhibits and Signs

6. Devils Lake State Park Unit
   Interpretive Center
   Parking (50 cars, 5 buses)
   Information Station
   Shuttle Parking
   Backcountry Trailhead
   Interpretive Shuttle
   Interpretive Overlooks
   Interpretive Trails; Exhibits and Signs

7. Mill Bluff State Park Unit
   Interpretive Center
   Parking (30 cars, 4 buses)
   Interpretive Trail; Exhibits and Signs
   Interpretation/Orientation Waysides
   (Three on Interstates 90 and 94)

8. Bloomer Unit
   Interpretive Center
   Parking (25 cars, 2 buses)
   Trails
   Interpretive Tour Route
   Interpretive Overlooks
   Parking (10 vehicles each)

9. Interstate Park Unit
   Interpretive Center
   Parking (50 cars, 5 buses)
   Interpretive Trails
Resource evaluation

Located near Manitowoc, the Two Creeks Buried Forest has become world famous among earth scientists for the field evidence of multiple glacial advances and retreats within the Wisconsin Stage of glaciation and for the precise determination of the age of a localized interglacial stage. Logs, forest floor litter of spruce and hemlock and faunal remains are found here in lacustrine sediments of the interglacial period. Based on radiocarbon dating of the organic deposits, it appears that the forest producing the logs and accompanying litter was thriving about 11,850 years ago. This age obtained from radiocarbon dating supplants earlier approximations of 19,000 years. Studies of the organic material and the lacustrine sediments in which it is buried, also shed light on ecological conditions and the changing levels of Lake Michigan during that period in earth history.
* SIGNIFICANT RESOURCES

- Spruce and hemlock logs and accompanying organic litter occurring in the lacustrine deposits and exact radiocarbon dating of wood at this site.

- Lacustrine sediments and glacially deposited material in which they are interbedded

- Evidence of drowned trees being cut off and pushed over by advancing glacial ice

- Lake Michigan which was formed in part by glacial action.
Interpretation

The erosion of clay banks along the Lake Michigan shoreline revealed the logs and litter of a forest growing during the interglacial period. Scientists throughout the world use this material at Two Creeks as a standard for glacial dating. This provides the subject matter for an unusual interpretive story. The site's location on the shore of Lake Michigan also affords an opportunity to interpret the glaciers effect on the formation and utilization of the Great Lakes.

*INTERPRETIVE SHELTER

A simple enclosed shelter will cover the site of a dig exposing the buried interglacial forest.

*EXHIBITS

Exhibits within the interpretive shelter will relate the story of the excavation of a glacial forest.

- Vegetation changes during glacial periods
- Identification of forest matter
- Carbon 14 method of aging

An overlook of Lake Michigan will house displays explaining:

- Formation of the Great Lakes
- Glacial movements in the area
- The course and effect of changing lake water levels.
Development

Development at the Two Creeks unit would be minimal, consisting of an enclosed interpretive shelter housing exhibits and covering the site of an interpretive dig. A short entrance spur off adjacent highway 42 and parking for 10 cars and 2 buses could complete the interpretive shelter development. A short trail leading to a Lake Michigan overlook with interpretive exhibit would also be provided. Landscaping including highway screening would round out the site development.

Land Acquisition

The Two Creeks unit will consist of 24.67 acres to be purchased in fee. The State has already acquired 12.61 acres for Ice Age purposes. No changes in the established boundaries are proposed.
KEWAUNEE COUNTY
MANITOWOC COUNTY

Ice Age Development
sheltered-interpretive exhibit-geologic digs
parking - 10 cars - 2 buses
trail

Two Creeks

from Manitowoc 16 miles

Two Creeks Buried Forest Unit
Ice Age National Scientific Reserve
Wisconsin
SHEBOYGAN MARSH

An Interpretive Overlook of Sheboygan Marsh

Resource evaluation

Moving southeastward across Wisconsin from the area of present-day Green Bay, the Green Bay lobe of the glacier created a large lake known as Glacial Lake Sheboygan. In the thousands of years since its creation it has gradually filled with sediments and organic debris creating a marsh-covered area of thousands of acres 15 miles west of Sheboygan. Today it serves as a rich resource of plant and animal life indigenous to a marsh-swamp environment. It also serves as a living history of man's attempt to use and control a rich marshland.

Combined with the existing Sheboygan Marsh County Park, this Ice Age unit comprises almost one half of the total area of former Glacial Lake Sheboygan.
* SIGNIFICANT RESOURCES

- Sheboygan Marsh, including its 100 feet or more of Glacial Lake sediments

- A deep, buried pre-glacial valley

- The nearby enclosing hills consisting of bedrock and fluted, drumlinoid forms

- Several small kames together with a portion of the famed Kettle Interlobate Moraine nearby to the east

- A varied biota including the indigenous vegetative cover and abundant bird life

- Evidences of the attempts as early as 1868 to drain the shallow lake and more recent installations to control the flow of the river
Interpretation

The Sheboygan Marsh provides an excellent opportunity to explore the changes occurring in the life of a glacial lake. The retreating glacier caused changes to the lakes environment varying the communities of the lake. By exploring the infilling process, these changes can be seen and why man's efforts to utilize this land failed can be understood.

*TRAILS

Construction of a boardwalked trail in cooperation with the County Park is encouraged to utilize the resources of the marsh for interpretive purposes.

*EXHIBITS

*Marsh Overlook - Glacial movement and the formation of this glacial lake will be interpreted;
   changes from the retreating ice,
   formation of Sheboygan Marsh,
   community changes through bottom sediment examination, and
   man's attempt to drain the marsh.

*Marsh Trail - Inhabitants of the Marsh; its plants,
   animals,
   community changes within the marsh, and the
   infilling process is the topic of interpretation.
Development

Sheboygan Marsh development is modest. An existing access road at the north end of the unit would be upgraded and parking for 20 cars and 2 buses provided adjacent to an inplace interpretive exhibit overlooking the marsh. A self-guiding boardwalked interpretive trail developed in cooperation with the adjacent county park would be constructed from the overlook point into the marsh.

Surrounded on three sides by the Sheboygan Marsh County Park, consideration should be given to the eventual incorporation of this Ice Age unit into the Park. This could be either by title transfer of the unit to the county as part of the Park or by a cooperative management agreement whereby the county would operate and maintain the Ice Age unit with ownership retained by the State.

Land Acquisition

No changes in the established Ice Age boundaries are proposed. It is recommended that the 80 acres of private land comprising the unit be acquired in fee.
Sheboygan Marsh Unit
Ice Age National Scientific Reserve
Wisconsin
KETTLE MORAIINE

Resource evaluation

Along Lake Michigan a ridge runs northward mile on mile. Kames and eskers fringe it; Kettleholes dimple it. This is the Kettle Moraine, a 200 foot high windrow deposited between two lobes of the ice sheet that moved down what is now the Lake Michigan basin and the depression marked by Green Bay and Lake Winnebago.

Embracing this outstanding landscape is the northern unit of the Kettle Moraine State Forest superlative among the Ice Age units from the standpoint of the variety, abundance and magnitude of its glacial features. These features provide evidence of the dynamics of ice movement and stagnation and contribute to the outstanding scenic quality and recreational potential of the unit.
The area is famed for the Northern Kettle Interlobate Moraine formed in the zone where ice of the Lake Michigan and Green Bay Lobes came in contact with each other. The unit also lies within an area which played an important role in the era of discovery, exploration and early settlement of the Great Lakes Region.

* SIGNIFICANT RESOURCES

- The famed Northern Kettle Interlobate Moraine

- Portions of the end moraines of the Lake Michigan and Green Bay lobes

- Kettles in a remarkable variety of sizes, shapes and depths of which Greenbush Kettle is an outstanding example

- Drift ridges, rounded domes, conical peaks, sharp spurs, mounds, knolls, hummocks and other features characteristic of kettle moraine

- Eskers including the well known Parnell Esker

- Kames such as Dundee Mountain, one of the best known moulin kames, because of its ease of accessibility and size

- Crevasse fills which bear a resemblance to eskers or kames

- Drumlins of moderate size

- Historical features such as the Old Wade House and stage coach travel routes
Interpretation

The rugged kettle topography and associated features of an interlobate moraine provide the focal point for the main interpretive story. An exploration of their formation and how these landforms affected the settlement and development of this portion of Wisconsin will allow the visitor a greater appreciation of the shaping force of the glaciers.

*INTERPRETIVE CENTER

An interpretive center located at the junction of highways 67 and "G" will offer:

*Ice Age Orientation - The Ice Age film, publications, maps and informational personnel will provide an orientation to the units and features of the Ice Age National Scientific Reserve.

*Ice Age Interpretation - Exhibits, displays, maps, interpretive programs and personnel will interpret the unique features of the kettle topography, the natural and historical resources of the Kettle Moraine unit.

*HIKING TRAILS

Short nature trails and longer hiking trails will be utilized for Ice Age interpretation.

*Kettle Moraine Trail - A long hiking trail connecting many features of the Kettle Moraine, man's use will be interpreted at old farm sites, quarries and recreational sites.

*Parnell Esker Trail - The formation, features, and use of an esker.

*Dundee Mountain Trail - A trail to the top of this feature will offer interpretation of the surrounding features; and the formation of this large kame.

*Kettle Lake Trail - Why some kettles are dry, others wet, their inhabitants and the life history of a kettle lake will be the topic of this trail.
*AUTO TRAIL*

An auto tour route connecting many of the glacial, historical and scenic features of the Kettle Moraine unit is required. Additional routes to the features of the Campbellsport Drumlins unit and the Sheboygan Marsh unit should be included in a printed guide explaining features along the route.

*EXHIBITS*

Exhibits appropriate to the interpretive story of the trails and interpretive center will be provided. Interpretive Center displays will be concerned with the formation of the Kettle Moraine.

- Formation of features of kettle topography
- Inwash plain
- Farmers and settlers use of the land
- Drainage by the Milwaukee River
- Glacial movement

Auto trail and hiking trail displays will be provided at:

- Dundee Kame - Kame formation and use
- Parnell Esker - Esker formation and use
- Kettle Lake - "Life history" of a kettle lake (in filling)
- Parnell Tower - Identity of glacial landmarks
- Quarry sites - Aggregates of glacial deposits

Many of these exhibits can be so placed as to be utilized by the motorist and hiker alike.
Development

An interpretive center with adjoining parking for 50 cars and 5 buses would be the major Ice Age facility in the Kettle Moraine unit. Designed as an interpretive facility only, the structure could be sited at the junction of two of the unit's main routes of travel, highways 67 and "G".

A designated and marked Ice Age auto tour route and system of interpretive trails all with appropriate exhibits and signing would serve the visitor. A hiking trail would be developed from the area of Dundee Mountain northeastwardly across the unit linking and interpreting many of the most significant Ice Age features.

Land Acquisition

Revisions in the Ice Age boundaries of the Kettle Moraine would be necessary due to substantial unit expansion to incorporate additional significant Ice Age features not included in the Reserve as established in 1971. Totaling 3,390 acres, most of which is within the boundaries of the Kettle Moraine State Forest, the recommended addition would include such features as Dundee Mountain to the east and the Jersey Esker to the southwest of Dundee, Wisconsin.

Included in this expansion would be 320 acres northeast of Long Lake, the acquisition of which would allow development of the cross unit Ice Age interpretive trail and additional protection to such important glacial features as Garrity and McMullen Hills. Total size of the unit would be 18,390 acres.
Kettle Moraine Unit
Ice Age National Scientific Reserve
Wisconsin

- **Ice Age Development**
  - Interpretive center
  - Parking: 50 cars, 5 buses
  - Interpretive trails
  - Interpretive tour route

**Suggested tour route**
- From Campbellsport Drumline Unit
- From Fond du Lac 18 miles
- From southern unit
- From interpretive center of Kettle Moraine State Forest
- Parking: 50 cars, 5 buses
- Interpretive trails
- Interpretive tour route

- **Kettle Moraine State Forest**

- **Proposed Ice Age Addition**

- **DuDInDII**
- **MaAuede Lake**

- **Dundee**
- **McMullen Hill**
- **Conner Hill**
- **Johnson Hill**
- **Parnell Tower**

- **Greenbush**

- **Glenbuela**

- **Sheboygan**

- **Sheboygan Marsh Unit**

- **Sheboygan 20 miles**

- **Sheboygan Marsh Unit**

- **From Plymouth 6 miles**

- **From Sheboygan 20 miles**

- **From Fond du Lac 18 miles**
Resource evaluation

Six miles west of the Kettle Moraine unit near the town of Campbellsport the farmlands swell into long, rounded hills. Pastures carpet their slopes and woods often crown the tops of the formations. This "School" of hills is a fine display of large, somewhat atypical drumlins.

The drumlins found in this unit are closer together and less elongate than most of the typical drumlins elsewhere in Wisconsin.

* SIGNIFICANT RESOURCES

- The nearly 20 large and closely spaced drumlins
- Drumlin slope, outline, and summit scenic views
Interpretation

Although not typical drumlins, the density, scenic appeal, and land use patterns of the Campbellsport Drumlins provide an interesting interpretive story.

*AUTO TOUR ROUTE

An auto tour route with interpretive overlooks will circulate the visitor around the perimeter of the unit to experience the size, scale, shape and uses of the drumlins.

*EXHIBITS

Exhibits interpreting the drumlins will be provided at each of the auto tour overlooks.

*Southeast Overlook - A discussion of drumlin formation and agricultural uses and patterns will be provided.

*Northwest Overlook - A comparison of more typical drumlins with those at Campbellsport will be made and characteristics and uses of the lands between them discussed.

*Southwest Overlook - The drumlins and the story of glacial movement they portray will be interpreted.
Development

Facilities to be provided at the Campbellsport Drumlins unit are modest. An auto tour route with three wayside interpretive overlooks consisting of an in-place interpretive exhibit and parking for 5 cars would comprise the development. If feasible, a self-guiding interpretive trail would be developed into the unit's swamp area beginning at the northernmost wayside.

Land Acquisition

While no change in the established Reserve boundaries is recommended for this unit, additional fee simple acquisition of approximately 20 acres in the southwest portion of the unit is proposed to provide an additional interpretive overlook.

Of the 3,600 acres within the boundaries, 40 would be acquired in fee. The remainder of the unit could remain in private ownership unless uses incompatible with the preservation of the present appearance threaten the area. Purchase in fee or scenic easements would then be recommended to preserve the most significant natural features.
Resource evaluation

The Cross Plains unit contains a segment of the terminal moraine along the boundary between glaciated terrain on one side and the unglaciated "driftless area" on the other. The world famous driftless area, comprising the southwestern quarter of Wisconsin is essentially an "island" which almost entirely, escaped glaciation during the four glacial stages.

Within this unit the relationships between moraine, bedrock, and glaciated landscapes on one side of the moraine, and unglaciated landscapes on the other are strikingly exhibited. Rugged ridges of moraine belonging to the Wisconsin Stage of glaciation meet eroded driftless area to the south and west. Contrasts in topography between the glaciated and unglaciated terrains can be observed from vantage points atop the moraine.
* SIGNIFICANT RESOURCES

- Wisconsin Stage terminal moraine of rugged relief enhanced in scenic quality by the relatively high elevation of the bedrock upon which it rests

- Heavily glaciated terrain on one side of the moraine and unglaciated driftless area on the other

- Layers of bedrock on the glaciated side which are remnants of the preglacial landscape

- Bedrock exposures in road cuts and gorges on both sides of the terminal moraine

- Lacustrine deposits of temporary proglacial lakes contemporary with the maximum and waning stages of the ice sheet

- Proglacial drainageways

- Topsoils of loess serving as vivid reminders of the importance of wind as a geologic agent

- Ice-damming and changed drainageways

- Contrasts in drainage patterns between the glaciated and the unglaciated sides of the moraine

- Deep gorge, partially cut by subglacial stream flow

- Recessional moraines occurring as moraine ridges within the glaciated area
Interpretation

An inwash of poor drainage marks the area between the low hills of the terminal moraine and the well drained topography of the unglaciated driftless area near the Cross Plains unit. Within the unit the ice mass ground to a halt before receding. Melt water from the glacier's front ran back under the ice and down the limestone gorge. Lacustrine deposits and wind-blown loess deposits provide a contrast to the exposed bedrock. An understanding of glaciated and unglaciated landforms will allow the visitor to understand man's varied uses of the land.

*INTERPRETIVE SHELTER

The exhibit shelter providing interpretive displays should also have office space for a part-time naturalist from Devils Lake or an environmental education specialist for the Madison area. In summer the interpreter would provide on-site interpretation at the gorge site or along the tour route.

*TRAIL

A trail at the Gorge site will illustrate the end of the glacial advance, and show the bedrock with morainal deposits, drainage and vegetation of the gorge.

*AUTO TOUR ROUTE

An auto tour route will enable the visitor to better understand the differences between the glaciated and unglaciated landscapes: Associated landforms, drainage patterns, agricultural patterns and land use. Although the tour will concentrate on features near the unit, the printed guide should interpret features found between Madison and Cross Plains.

*EXHIBITS

At the Gorge site interpretation will focus on drainage from the glacier front under the ice and down the gorge.

- The formation of pro-glacial lakes
- An ice front on bedrock
- Theories of the "driftless area"
Along the auto tour route,
- glacial drainage and pro-glacial lakes,
- agricultural uses and patterns,
- bedrock quarrying vs. aggregate quarrying and
- vegetation differences will be interpreted.
**Development**

The close proximity of the Cross Plains unit to Madison and the Ice Age story to be told here will undoubtedly generate heavy school and weekend use. An interpretive shelter housing exhibits and providing modest office space for a seasonal interpreter will be the major facility provided. Adjacent parking to accommodate 25 cars and 2 buses and a comfort station would also be required.

Development of a self-guiding interpretive trail featuring the gorge as the focal point would provide an additional medium for telling the Ice Age story.

An auto tour route between Madison, the Cross Plains unit, and Highway 14 utilizing existing roads would be developed in cooperation with appropriate highway departments. This could involve the development of several small pullouts with simple in-place exhibits interpreting the glaciated and unglaciated landscapes in the Cross Plains vicinity.

**Land Acquisition**

A total of 160 acres, all in private ownership, would be acquired in fee.
Cross Plains Unit
Ice Age National Scientific Reserve
Wisconsin
Resource evaluation

Nowhere in Wisconsin is the forceful drama of continental glaciation more apparent than at Devils Lake. There the juggernaut of ice crushed around and partly over the ancient quartzite ramparts of the Baraboo Range. Diverting the Wisconsin River from the gorge it had previously cut through the range, the ice dammed both ends of the old river gap with debris. Devils Lake now fills the basin remaining between the two moraine dams. Above it stand the purple quartzite blocks and sheer rock walls of the range. White pines command the slopes and ledges, and oak, hickory, maple and basswood forests mantle the moraines.

Most of the Devils Lake area is now within a state park of more than 4,000 acres, a small part of which has been developed intensively for swimming, camping, picnicking, boating, and hiking. More than 1.5 million visits are made to the park annually.
The Devils Lake Ice Age unit contains features which illustrate outstanding chapters of the geologic history of the region other than glaciation. The Baraboo Range has a hard central core of Precambrian quartzite and is flanked by sedimentary rocks of Cambrian and Ordovician age. These relationships indicate that an ancient landscape of high quartzite mountains was buried one or more times by sediments of ancient seas. The Baraboo Range of today represents the higher portions of the ancient landscape which is but partly exhumed by erosion including the action of Ice Age glaciers.

This area also includes unique segments of end moraine, proglacial lakes, knobs, and swales, erratics, talus, and potholes worn into hard bedrock by the action of churning or cascading waters. Flora and fauna of the area are varied and the unit reflects considerable history. Prehistory cultural material such as Indian campsites, effigy mounds, and artifacts have been found.

* SIGNIFICANT RESOURCES

- Devils Lake and the moraines at either end which impound it
- End moraine marking the front of the Green Bay lobe of the continental glacier
- Drained proglacial lakes which developed in front of the moraine
- Knob and swale topography, the knobs being the glacial deposits and the swales the kettles adjacent
- Erratics consisting of glacially deposited cobbles and boulders
- Potholes in hard rock produced by the churning action of streams. Some of these are doubtless of glacial stream origin but it is possible others are very old dating back to early Paleozoic or late Precambrian times
- Varied and abundant flora and fauna
- Evidence of the human history of discovery, exploration and early settlement of the area
- Baraboo Range and the Paleozoic sedimentary rocks flanking it, which provide one of the finest areas in the country for the study of the geomorphology of the upper Great Lakes region
Interpretation

The major interpretive story is the formation of Devils Lake by glacial action. The geologic story goes back to the formation of the Baraboo Range and its subsequent dissection by the Wisconsin River. The advancing ice formed Devils Lake by blocking the river channel with morainal debris. Additional interpretation will deal with the glacial topography and features, the varieties of flora and fauna within the unit, and man's long association with Devils Lake.

*INTERPRETIVE CENTER

In addition to the existing State Park Nature Center at the north end of the lake, an Ice Age Interpretive Center will be provided at the southwest end.

*Ice Age Orientation - The Ice Age film, publications, maps, displays and informational personnel will provide an orientation to the Ice Age National Scientific Reserve.

*Ice Age Interpretation - Exhibits, maps, displays, interpretive programs and personnel will interpret the glacial, geological, natural and historical resources of the Devils Lake Unit.

*TRAILS

A wide variety of trails within the unit will be used for Ice Age Interpretation.

*West Bluff Trail - This trail will utilize an interpretive display and spectacular view from the West Bluff to show the formation of Devils Lake.

*Potholes Trail - The pothole features will be utilized to interpret the forces of glacial water.

*Moraine Trail (new) - Following the moraine along and across the Baraboo Hills east of Devils Lake, exhibits will interpret the glacial advance, morainal switch back, proglacial drainage systems and glacial topography.
*AUTO TRAIL*

An auto tour route with exhibits will interpret many of the features within the Devils Lake Unit. This route may be used by an interpretive shuttle bus at a future date.

*EXHIBITS*

- Geology; the formation of the Baraboo Hills, Wisconsin River Channel, and Devils Lake

- Man at Devils Lake; the mound builders, luxury resorts, railroad, and state park

- Carbon 14 dating of vegetation; the glacial changes in climate, flora, and fauna.

- West Bluff Trail - The formation of Devils Lake

- Potholes Trail - Water action causing potholes

- Morainal Trail - The Old Wisconsin River Channel, the glacial advance, and proglacial lakes and drainage systems
Development

Ice Age developments at the Devils Lake unit would augment and alter present recreational and interpretive provisions of the State Park. Based on an overall unit concept of visitor circulation by trail and shuttle system during the peak use periods and the separation of day and overnight use development sites, Ice Age facilities would center on the provision of an interpretive center with a 50 car, 5 bus parking area at the southwest end of the Lake and a system of interpretive hiking trails. Ski Hi Road would become the main entrance to Devils Lake with parking provided to accommodate private vehicles during the peak use seasons when the unit's circulation-transportation and interpretive shuttle bus systems would be operative. Overnight camping would be limited to the northern end of Devils Lake and the southern end would become the unit's day use area with provisions for swimming, picnicking, boating and related activities.

Several interpretive overlooks accessible by vehicle and trail would be developed in various sections of the unit as well as a self-guiding auto tour route and trails complete with exhibits and signing.

Land Acquisition

A total of 9,610 acres of land would be acquired in fee and easement for the Devils Lake unit. This represents a 770 acre addition to the established Ice Age unit, and a need for changes in the designated boundaries of the Scientific Reserve. Acquisition of this acreage would insure adequate protection to the unit's Ice Age features by eliminating the threat of encroachment by residential or similar incompatible land use developments. The State presently owns 4,800 acres of the unit.
from Baraboo 2 miles
from Sauk City 10 miles
immediate zone of influence

Park Entrance
administration-information station
shuttle staging area
parking — cars — buses

Ice Age Development
interpretive center
parking — 50 cars — 5 buses

Back Country Trail Head
(interpretive center
overflow parking)

existing
nature
center

ski hi road

proposed
campground

relocated DL

interpretive overlook

Day Use Area
swimming, picnicking
boating, day camp

proposed
ice age addition

Devis Lake State Park Unit
Ice Age National Scientific Reserve
Wisconsin

ON MICROFILM
July 73 DSC
Resource evaluation

The Mill Bluff unit encompasses an interesting portion of the flat bed of extinct glacial Lake Wisconsin - a lake that covered about 1825 square miles, and had a depth of 60 to 80 feet. Pinnacles and mesas on the old lake bottom are in situ remnants of bedrock outliers over and around which the glacial lake waters lay. Because of its mesas and pinnacles, the area is unlike anything else encountered east of the Mississippi River. Historically, early explorers and travelers made mention of its features in their diaries and journals making the area significant to the study of exploration and settlement of the upper midwest.

* SIGNIFICANT RESOURCES

- A portion of the flat bed of glacial Lake Wisconsin
- Remnant bedrock pinnacles and mesas which once existed as islands in the ancient glacial lake
- Changes from the lake (deposits)
- The driftless area and its rocky outliers
- Man's use of the area; ease of travel on flat ground, landmarks for travelers, the drainage of the marsh, and farming practices.

Two trails will be provided

*Mill Bluff Trail - An interpretation of the formation of the lake and its features visible including plant changes on the butte.

*Wetland Trail - Indian uses of the wetland plants and animals and community differences between the lake bottom and hills to the west.
Once small rocky islands in a huge glacial lake, the striking buttes of the Mill Bluff Unit are landmarks to travelers of Wisconsin's Interstate System just as they were to early settlers following the flat lands of the lake bottom. The remnant glacial lake and hardened sandstone that resisted glacial ice and water combine to provide an interesting interpretive story.

**INTERPRETIVE CENTER**

An interpretive center will be located within the existing state park north of the Interstate highway along County Highway W.

*Ice Age Orientation - The Ice Age film, publications, maps, displays and informational personnel will provide the Interstate traveler an orientation to the Ice Age National Scientific Reserve.

*Ice Age Interpretation - Displays, exhibits, maps, interpretive programs and personnel will provide interpretation to the features of the Mills Bluff Unit.

**TRAILS**

*Mills Bluff Trail - This trail will utilize the bluff-top view to interpret the glacial lake bed, buttes and unglaciated lands to the west.

*Wetland Trail - Features of a wet lake bottom, soil types, plant and animal communities will be interpreted.

*Ice Age Trail - Interpretation of other ice age features; glacial grooves and striations, ice rafted rocks and deposits, wave action will be stressed.

**EXHIBITS**

Interpretive Center displays will delve into:

- The formation of glacial Lake Wisconsin
- Glacial movement
Development

Ice Age interpretive facilities at Mill Bluff would consist of an interpretive center with adjacent parking and a system of interpretive trails with overlooks, exhibits and signing. These provisions would augment existing and proposed recreational developments for the State Park.

The interpretive center is envisioned as the initial orientation-interpretation point for the Mill Bluff visitor and as such should be sited for ease of accessibility. To reduce the cost and number of structural developments within the unit, the interpretive center could be housed in the same building as the park's administrative functions, but in a separate, easily identifiable interpretive wing.

Interstate Waysides - In cooperation with the State Highway Department, Ice Age orientation-interpretation exhibits would be placed at existing State-owned waysides on Interstates 90 and 94 to the east and west of the Mill Bluff unit. These would introduce interstate travelers to the Scientific Reserve and specifically to the presence of the Mill Bluff unit along their route of travel.

Land Acquisition

There are no changes proposed in the established Ice Age boundaries of this unit. All of the 930 acres contained in the Mill Bluff unit lie within the State Park boundaries and will be acquired in fee.
Near the town of Bloomer the Chippewa lobe of the Wisconsin glacial advance piled up a miniature mountain landscape. It stands today above the cultivated outwash plain as a woodland of jumbled hills set with more than 300 kettlehole lakes, ponds and pools. In kettleholes which do not hold bodies of water there are open bogs and swamps whose undisturbed plant communities offer excellent possibilities for biological study. Here, in addition to the scientific features, is secluded countryside to be walked and explored, hunted and fished. On the basis of the origin of its features, glaciologists refer to it as a "dead-ice" or "ice-stagnation" area.

Within the unit are many lakes, some of which are fringed by sandy shores, swamp and marsh. The unit has kames, crevasse ridges, kettles, outwash deposits and inwash features formed in completely ice-enclosed areas open to the sky. Some eskers are found nearby. These inwash features stand today as circular to subcircular plains elevated above
adjacent dead ice drift after the disappearance of the surrounding ice. Until recent years, the area was almost completely primitive but the natural integrity and beauty of the scene are now being impaired by uncontrolled private developments.

The Bloomer Area contains fine examples of dead-ice moraine.

* SIGNIFICANT RESOURCES

- Elevated inwash plains, some with stream channels and wave-cut terraces
- Crevasse fills, kames, and outwash plains
- An excellent variety and abundance of flora and fauna
- Lakes, swamps, and marshes of interest in eutrophication and micro-environment studies
Interpretation

The rugged woodland topography of the Bloomer Unit allows an excellent opportunity for the visitor to study the varied features of the stagnant ice moraine.

*INTERPRETIVE CENTER

Exhibits, displays, maps, interpretive programs and seasonal personnel will provide an orientation and interpretation of the features of the Bloomer Unit.

*HIKING TRAILS

Short nature trails and longer hiking trails will both be utilized for Ice Age interpretation.

*Moraine Trail - Following the terminal moraine, exhibits and a trail guide will interpret features of stagnant ice moraine; outwash plain, ice ramps, the glacial advance and direction, crevasse fills, kettles, kames, eskers and inwash lake plains.

*Kettle Trail - A short nature trail utilizing kettles in different stages of infilling to interpret community differences and entrapification.

*Ice-walled Lake Trail - A trail to the top of an ice-walled lake plain for view and interpretation of the surrounding area.

*AUTO TRAIL

An auto tour route is required to allow short-term visitors an opportunity to view the features of the Bloomer Unit. A guide and exhibits would be provided.

*EXHIBITS

Interpretive Center exhibits will stress:

- The glacial advance and direction

- Frontal stagnation, its causes and length
Features of stagnant-ice moraine; ice ramps and outwash plains, ice walled lake plains, and crevass fills.

The careful placement of auto and hiking trail exhibits will allow some to be utilized for both uses.

- Kettle lakes and their communities
- Stagnant-ice formations and their origins
- Ice walled lake plain (near Plummer Lake) interpreting glacial drainage across the plain
- The interlobate moraine, river channel blockage and the rerouting around Flambeau Ridge
- Agricultural uses of the outwash plain and moraine features
- The formation of glacial erratics
Development

Built around the provision of a self-guiding auto tour route and a system of trails as the means of relating the Ice Age story, development of the Bloomer unit would be modest. Largely undeveloped with the exception of minimal residential development near Shattuck Lake, the unit has sometimes been referred to as the "Bloomer Wilderness Area".

An interpretive center situated at the southern end of the unit would serve as an initial orientation and interpretation point. Parking for 25 cars and 2 buses and a major trail head would be provided at the center. Trails into the most inaccessible portions of the unit would offer trailside camping opportunities of the Adirondack shelter type.

A minimum of five major interpretive overlooks with parking for 10 cars each would be provided along the designated auto tour route. One of these, located near Shattuck Lake, would offer day use opportunities such as picnicking and serve as the major embarkation point for those engaged in overnight hiking activities utilizing trailside camping provisions.

All trails would be interpretive and self-guiding in nature utilizing either trail guides or exhibits and signing. While the area has a number of existing trails to be incorporated in the unit system, several new ones would be developed to more adequately interpret the Ice Age story.

Land Acquisition

Land to be acquired as part of the Bloomer unit would be increased by 560 acres necessitating an alteration in the established unit boundaries.

With the exception of 1,000 acres in County ownership as part of the Chippewa County Forest, virtually all of the unit's 3,500 acres consist of private land holdings. Approximately 2,300 acres would be purchased in fee with the remaining acreage acquired as scenic easement.
A combination of fee and easement purchases would be utilized to acquire these private lands. No County forest lands would be acquired. A cooperative management agreement with Chippewa County would insure that land uses within the Forest portion of the unit would be compatible with the purposes of the Scientific Reserve.
Bloomer Unit
Ice Age National Scientific Reserve
Wisconsin
Resource evaluation

Located along the St. Croix River, a principal drainageway during and after the Ice Age, the Interstate Ice Age Unit contains large circular and subcircular potholes exposed in adjacent abandoned channels of the river a little higher in elevation than the present stream bed. These potholes are a testimony to the power of the torrents of water derived from drainage of the glacial lakes.

Equally significant are the seven great Precambrian lava flows into which the St. Croix River has carved its channel. In places these Precambrian lavas are overlain by Cambrian sandstone.

Lake O' the Dalles located within the unit is considered by geologists to have been the location of a gigantic whirlpool in the turbulent river. It was formerly much larger than it is today. The sediments deposited in the whirlpool area contain organic remains from which a knowledge of past ecology and environmental conditions can be derived.
The Unit also possesses archeological significance. A copper spike or awl more than 10 inches long was found in an area peat bed along with flint weapon points and the horns and bones of an extinct form of bison.

* SIGNIFICANT RESOURCES

- A portion of the St. Croix River which served as a major drainageway of glacial Great Lakes during and after the Ice Age
- Giant potholes six by 10 feet across and 15 feet deep
- Seven great Precambrian lava flows overlain in places by Cambrian sandstone
- Abandoned glacial drainageways
- Lake O' the Dalles, a giant river whirlpool in the St. Croix
- Significant artifacts and bones indicating the area to be a potentially important archaeological and Paleontological site
Interpretation

The Interstate Gorge was carved through sandstone and Precambrian lava by glacial drain water. The interpretive story will focus on these waters, their origin and the results of their action. The water also deposited debris and materials which allow us to follow the change in vegetative and animal inhabitants, as well as man's presence in the area.

*INTERPRETIVE CENTER

Construction of an interpretive center in the potholes area will provide a point for initial area interpretation.

*Ice Age Orientation - The Ice Age film, publications, maps, displays and informational personnel will provide an orientation to the Ice Age National Scientific Reserve for visitors entering from the west.

*Ice Age Interpretation - Exhibits, maps, displays, interpretive programs and personnel will interpret the unique glacial, natural and historic features of the Interstate Unit.

*TRAILS

A great number of existing trails can be utilized for Ice Age interpretation.

*Potholes Trail - The action of glacial melt water can be seen in numerous potholes carved into Precambrian lava and the river gorge.

*Summit Rock Trail - Leading up through a rock gorge to a spectacular view of the St. Croix River and the gorge, plant changes along the trail can be interpreted.

*Lake of the Dalles Trail - Winding around the lake which was once a huge whirlpool, lake bottom peat and sediments can be examined.

*Copper Mine Trail - This trail to the sandstone capping the area and the copper mine excavations, interprets the geology and man's use of the area.
*EXHIBITS*

Interpretive Center exhibits will stress the story of:

- Water Flow – where it came from, the drainage of the glaciers, their depth and width, and the volume of flow
- Glacial movement in area
- Plant and animals found in the whirlpool peat
- Geology of area;
  - Lava flows,
  - sandstone capping and
  - cutting of the gorge
- Man's use of area; logging, agricultural and mining

Trail exhibits will be located along the:

- Potholes Trail – Water action forming potholes
- Lake of the Dalles Trail – Whirlpool action specimens uncovered in peat
- Copper Mine Trail – Copper formation, why found here, when quarried, value
- Summit Rock Trail – Plant and animal inhabitants (a great number are found in the park) and the influence of the river on bird migrations and the birds on the plants of the area.
Development

Ice Age development at Interstate would consist of the provision of an interpretive center and interpretive trail complete with appropriate signing and exhibits. Parking for 50 cars and 5 buses would be provided adjacent to the interpretive center.

Interstate suffers from heavy vehicle congestion during periods of peak use. To help alleviate this situation, vehicle camping would be limited to the north end of the unit with tent camping only allowed at the southernmost facilities. The initiation of these management steps and provision of a new entrance from the east off highway 35 should do much to relieve this congestion and improve the quality of the visitors experience at this Ice Age unit. If these steps prove inadequate to cope with the situation, the development of a shuttle bus system to move unit visitors should be explored.

Land Acquisition

All of the 920 acres comprising this unit of the Scientific Reserve have been acquired.
VILLAGE OF ST. CROIX FALLS

VILLAGE OF TAYLORS FALLS

vehicle camping only

potholes
rock formations

Immediate zone
of influence

Ice Age Development
interpretive center
parking - 50 cars - 5 buses
trails

Summit Rock

River Bluffs Trail

Folsom Island

tent camping only

Ice Age National Scientific Reserve

Wisconsin

wilderness

old copper mine

From Minneapolis
St. Paul, Minnesota
45 miles

Lake O' the Dalles

St. Croix River

Eagle Peak

PROPOSED STATE
PARK ADDITION

Park Entrance
maintenance area
contact station

1200 0 1200 2400

feet

Interstate Park Unit

Ice Age National Scientific Reserve
Wisconsin

ON MICROFILM

005 20009-A
July 73 DSC
Priority Needs

The acquisition of lands, site development, and the preparation of interpretive exhibits and publications are all important Ice Age National Scientific Reserve management needs. A schedule of overall priorities for the purpose of guiding the timely accomplishment of these important needs follows.

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<td>B. Complete acquisition program</td>
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<td>B. Facility development of 1st priority units</td>
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<td>C. Facility development of 2nd priority units</td>
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<td>D. Facility development of 3rd priority units</td>
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<td>E. Signing of all units</td>
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<td>F. Placement of Interstate Highway and state tourist information center exhibits</td>
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<tr>
<td>A. Preparation of Ice Age film</td>
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<td>B. Preparation of Ice Age and individual unit interpretive folders</td>
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<td>C. Interpretive exhibit preparation</td>
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<td>D. Interpretive trail development and signing</td>
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<td>E. Preparation of Ice Age geology publication</td>
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<td>A. Prepare resource management plans for all units</td>
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<td>B. Continue and expand needed Ice Age research of units</td>
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<td>A. Establish corridor for trail and assist in development</td>
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<td>Term</td>
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<tr>
<td>Crevasse Filling</td>
<td>An elongate kame believed deposited in a glacial crevasse.</td>
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<tr>
<td>Crevasse Ridge</td>
<td>Water-deposited material in a glacial crevasse now occurring as a more or less straight ridge rising above the general land surface and extending parallel to the direction of ice movement.</td>
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<tr>
<td>Driftless Area</td>
<td>An unglaciated area. In Wisconsin the driftless area of about 45,00 square miles escaped glaciation but lies far within glaciated terrain.</td>
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GLACIER---------------- A stream or sheet of ice, formed by the compacting and recrystallization of great thicknesses of snow. If sufficiently large, glaciers flow down mountain valleys or outward across country in all directions from a center of accumulation, as in Greenland.

GROUND MORAINES------- The irregular sheet of till deposited beneath the advancing ice and directly from the ice when it melts away.

ICE AGE---------------- Glacial epoch corresponding to the Pleistocene Epoch on the geologic time scale. In upper middle America, the Ice Age began some one million years ago and ended about 10,000 years ago.

INTERLOBATE MORAINES--- A moraine situated between lobes; applied to deposits lying between adjacent ice lobes.

INWASH PLAINS----------- Formed by water deposited sediments in ice-enclosed areas open to the sky in dead-ice glaciers. The inwash plains are higher than the surrounding area and are rimmed around their perimeters. The elevation results with the melting away of the surrounding ice.

KAME------------------- A conical hill formed by glacial debris deposited by meltwater flowing into funnel-shaped holes in the ice. When of considerable size, kames resemble volcanic cinder cones.

KETTLE------------------ A depression in the ground surface formed by the melting of a block of ice buried or partially buried by glacial drift, either outwash or till.

KETTLE HOLE------------- A steep-sided hollow without surface drainage, especially in a deposit of glacial drift and often containing a lake or swamp.

KETTLE MORAINES--------- A moraine the surface of which is marked by many kettle holes. Usually an end moraine.
LACUSTRINE---------- Produced by or belonging to lakes. Deposits which have been accumulated in freshwater lakes or marshes.

LATERAL MORAINE-------- A ridge of superficial debris, collected from higher cliffs, along a lateral margin of a glacier.

MORAINE---------------- An accumulation of earth and stones carried and finally deposited by a glacier.

MOULIN KAME------------ A nearly cylindrical vertical shaft in a glacier scoured out by meltwater and rock debris pouring into it.

OUTWASH PLAIN--------- Stratified drift deposited by streams beyond the glacier itself.

PLEISTOCENE EPOCH------ In the geologic time classification, the Quaternary Period consists of the Pleistocene and Recent Epochs. The Recent Epoch covers approximately the last 10,000 years. The Quaternary Period began a million years or more ago.

POTHOLE----------------- A kettlelike or circular hole generally deeper than wide, worn into the solid rock at falls and strong rapids by sand, gravel, and stones being spun around by the force of the current.

PROGLACIAL LAKE-------- A lake occupying a basin in front of a glacier generally in direct contact with the ice.

RECESSIONAL MORAINE----- Successive moraines built during temporary halts or slight advances of an ice front during a period of general recession of a glacier.

TALUS-------------------- Coarse rock waste at the foot of a cliff, or a sheet of waste covering a slope below a cliff.
TERMINAL MORAINES--- The transported debris left by a glacier at or near its lower terminus.

TILL-------------- That part of glacial drift consisting of material deposited by and underneath the ice, with little or no transportation and sorting by water; it is generally an unstratified, unconsolidated, heterogeneous mixture of clay, sand, gravel and boulders.
APPENDIXES

A. Legislative Acts
B. Management Agreement
C. References & Credits
D. Planning Team
Public Law 88-655
88th Congress, H. R. 1096
October 13, 1964

An Act

To authorize the Secretary of the Interior to cooperate with the State of Wisconsin in the designation and administration of the Ice Age National Scientific Reserve in the State of Wisconsin, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That it is the purpose of this Act to assure protection, preservation, and interpretation of the nationally significant values of Wisconsin continental glaciation, including moraines, eskers, kames, kettleholes, drumlins, swamps, lakes, and other reminders of the ice age.

Sec. 2. (a) To implement the purpose of this Act, the Secretary of the Interior (hereinafter called the “Secretary”), in cooperation with State and local governmental authorities of Wisconsin, may formulate within two years after this Act takes effect a comprehensive plan for the protection, preservation, and interpretation of outstanding examples of continental glaciation in Wisconsin; but he shall not spend more than $50,000 of Federal funds thereon.

(b) When the comprehensive plan is completed and the Secretary is satisfied that State legislation exists for the preservation of the nationally significant features of the reserve, open to the people of the entire Nation, he shall transmit copies thereof to the President of the Senate and the Speaker of the House of Representatives and may, ninety days thereafter and after consulting with the Governor of the State of Wisconsin, publish notice in the Federal Register of the establishment of the Ice Age National Scientific Reserve and of the boundaries thereof, which boundaries shall comprise lands owned or to be acquired by the State and local governments of Wisconsin in the following areas:

1. Eastern area (portions of the northern unit of the Kettle Moraine State Forest and Campbellsport drumlin area);
2. Central area (portions of Devil’s Lake State Park);
3. Northwestern area (portions of Chippewa County);
4. Related areas (other areas in the State of Wisconsin which the Secretary and the Governor of Wisconsin agree upon as significant examples of continental glaciation).

(c) Any area outside of the national forests that the Secretary and the Governor of Wisconsin agree has significant examples of continental glaciation but is not described in the original notice may be included in the reserve by the Secretary after notice to the President of the Senate and the Speaker of the House of Representatives and publication in the Federal Register, as herebefore provided, and any area that they consider to be no longer desirable as a part of the reserve may be excluded from it by the Secretary in the same manner.

Sec. 3. The Secretary may grant financial assistance to the State of Wisconsin for its acquisition of lands and interests in lands lying within the area designated as the reserve. Any grant made under this section shall be only for lands or interests in land acquired by the State after establishment of the reserve, as provided in section 2, subsection (b), of this Act, and the total of all grants under this section shall not exceed $750,000 or 50 per centum of the fair market value of the lands or interests in land so acquired, including incidental acquisition costs, whichever is less, and shall be subject to terms and conditions prescribed by the Secretary.

Sec. 4. The comprehensive plan presented by the Secretary to the President of the Senate and the Speaker of the House of Representatives may include such recommendations, if any, as he and the Governor of the State of Wisconsin may wish to make with respect to...
Federal and State participation in the financing of appropriate interpretive and other public facilities and services within the reserve, including facilities and services to be furnished by such private organizations as the Ice Age Park and Trail Foundation, a nonprofit corporation, but no commitment with respect thereto shall be made by the Secretary and no Federal appropriations shall be available for this purpose.

Sec. 5. (a) Whenever the Secretary determines that appropriate management and protection set down in the comprehensive plan are not being afforded the nationally significant values within the reserve or that funds are not being provided on the prescribed matching basis by the State of Wisconsin or other non-Federal sources, he may terminate contributions under this Act.

(b) Any payment made by the Secretary under the provisions of subsection (2) of section 3 of this Act shall be made subject to the understanding and agreement by the State of Wisconsin that the conversion, use, or disposal, for purposes contrary to the purposes of this Act, as determined by the Secretary, of any land acquired by said State with funds supplied in part by the United States pursuant to said subsection, shall result in a right of the United States to compensation therefor from said State in the amount of one-half of the fair market value of the land, exclusive of any improvements thereon, as determined at the time of such conversion, use, or disposal.

Sec. 6. There are hereby authorized to be appropriated not to exceed $800,000 to carry out the provisions of this Act.

To authorize the Secretary of the Interior to provide financial assistance for development and operation costs of the Ice Age National Scientific Reserve in the State of Wisconsin, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Act of October 13, 1961 (78 Stat. 897) is amended as follows:

(1) Section 3 is repealed.
(2) Section 4 is amended by deleting everything after the word "nonprofit" and inserting the word "corporation."
(3) Section 5 is amended to read as follows:

"Sec. 5. (a) The Secretary is authorized to provide technical assistance to the State of Wisconsin for planning and development of the reserve in accordance with the comprehensive plan.

(b) In addition to grants made pursuant to the Land and Water Conservation Fund Act of 1965 (78 Stat. 897; 16 U.S.C. 4601-8), the Secretary is authorized to make grants of not to exceed 50 per centum of the actual cost of each development project within the reserve in accordance with the comprehensive plan: Provided, That the maximum amount of such grants for all projects shall not exceed $125,000.

(c) The Secretary, pursuant to an agreement with the State of Wisconsin, may pay up to 50 per centum of the annual costs of management, protection, maintenance, and rehabilitation of the reserve.

(d) Whenever the Secretary determines that appropriate management and protection set down in the comprehensive plan are not being afforded the nationally significant values within the reserve or that funds are not being provided on the prescribed matching basis by the State of Wisconsin or other non-federal sources, he may terminate contributions under this Act."

(4) Section 6 is repealed.

Approved October 21, 1970.

LEGISLATIVE HISTORY:

HOUSE REPORT No. 91-903 (Comm. on Interior and Insular Affairs).
SENATE REPORT No. 91-1266 (Comm. on Interior and Insular Affairs).
Apr. 20, considered and passed House.
Oct. 7, considered and passed Senate.
B. Management Agreement

AGREEMENT BETWEEN THE SECRETARY OF THE INTERIOR AND THE STATE OF WISCONSIN FOR THE DEVELOPMENT, MANAGEMENT, PROTECTION, MAINTENANCE AND REHABILITATION OF ICE AGE NATIONAL SCIENTIFIC RESERVE

This Agreement, made and entered into this 25th day of September, 1972, by and between the Secretary of the Interior, hereinafter referred to as Secretary, and the State of Wisconsin, hereinafter referred to as State.

WITNESSETH

WHEREAS, Public Law 88-655 (78 Stat. 1087) authorizes the Secretary of the Interior to cooperate with the State of Wisconsin in the designation and administration of the Ice Age National Scientific Reserve in the State of Wisconsin; and

WHEREAS, Public Law 91-483 (84 Stat. 1083) authorizes the Secretary of the Interior to provide financial assistance for development of the Ice Age National Scientific Reserve; and

WHEREAS, the above legislation provides that the Secretary of the Interior, pursuant to an agreement with the State of Wisconsin, may pay up to 50 per centum of the annual cost of management, protection, maintenance and rehabilitation of the Reserve; and

WHEREAS, the Secretary of the Interior and the State of Wisconsin are desirous of cooperating to assure the protection, preservation and interpretation of the nationally significant values of Wisconsin continental glaciation, including moraines, eskers, kames, kettleholes, drumlins, swamps, lakes, and other natural phenomena of the ice age; and

WHEREAS, the Secretary and the State through the National Park Service (NPS) and the Wisconsin Department of Natural Resources (DNR), their respective representatives, have formulated a Comprehensive Plan for the Ice Age National Scientific Reserve and further desire to cooperate in the management, protection and development of the Ice Age National Scientific Reserve;

NOW, THEREFORE, the Secretary and the State mutually agree as follows:
1. **Objects of Agreement:** This agreement is intended to provide for the acquisition, development, operation and financing of the Ice Age National Scientific Reserve, and for orderly and harmonious cooperation between the National Park Service of the United States Department of the Interior, and the Wisconsin Department of Natural Resources, in implementing the provisions of Public Laws 88-655 and 91-483 and the Comprehensive Plan for the Ice Age National Scientific Reserve.

2. **General Planning Procedure:** Although planning in general is the joint responsibility of the NPS and the DNR, specific responsibility for certain phases of planning shall be the prime responsibility of one or the other agency as set forth herein. Each agency shall finance its own planning work and shall consult with and secure review and approval of the plans for each other.

3. **Master Plan:** A detailed Master Plan and an Interpretive Prospectus shall be prepared by NPS for the Reserve. The Master Plan and Interpretive Prospectus shall be programmed for completion during Fiscal Year 1973.

4. **Detailed Site Plans:** Detailed site planning to implement the schematic development plans of the Master Plan shall be prepared by DNR as shall all construction drawings.

5. **Land Acquisition:** The DNR shall have sole responsibility for all land acquisition, including appraisals, negotiations, obtaining of options, recordation of deeds, and initiation of applications for Federal grants-in-aid under the Land and Water Conservation Fund. Title to all real property acquired shall be taken in the name of the State of Wisconsin.

6. **Land Acquisition Financing:** All acquisitions of real property by DNR for inclusion in the Reserve shall be financed through applications for acquisition project grants-in-aid under the Land and Water Conservation Fund. Such grants-in-aid shall be based upon the regular Land and Water Conservation Fund procedure under which 50% of the acquisition cost is borne by the applicant and the remaining 50% is derived from the state's apportionment of the Land and Water Conservation Fund.

7. **Development Financing:** The cost of outdoor recreation development projects within the Reserve shall be financed in the following manner: 25% of the project cost shall be borne by the State, 25% of the project cost shall be borne by the NPS out of appropriated construction funds, and the remaining 50% of the
project cost shall be derived from the state's apportioned share of the Federal Land and Water Conservation Fund. Provided, that the maximum amount of such development project costs to be paid directly by NPS for all such projects shall not exceed $425,000. As each development project is programmed, the DNR will advise the NPS by September 1 of each year of the engineering estimates for allocation of funds by the Service in the following fiscal year. The transfer of funds for expenditures incurred by DNR shall be by quarterly billing to the NPS Finance Office of the Northeast Region, National Park Service.

8. Costs of Operation and Maintenance: The annual cost of management, protection, maintenance and rehabilitation of the Reserve shall be shared equally by DNR and NPS with the NPS 50% share being derived from funds appropriated specifically for this purpose. The DNR will advise NPS by August 15 of each year of budgeted funds required for the following federal fiscal year. The following chart specifies the procedure.

<table>
<thead>
<tr>
<th>Funding required for Federal FY</th>
<th>Cost Figures to be Provided by:</th>
<th>To assure that funds will be available on:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1974</td>
<td>August 15, 1972</td>
<td>July 1, 1973</td>
</tr>
<tr>
<td>1975</td>
<td>August 15, 1973</td>
<td>July 1, 1974</td>
</tr>
<tr>
<td>1976</td>
<td>August 15, 1974</td>
<td>July 1, 1975</td>
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</table>

etc., etc., etc.

The DNR request for funding assistance shall be transmitted to the Director, Northeast Region, via memorandum in the following format:

Requirements by the State of Wisconsin for the National Park Service share of management, protection, maintenance and rehabilitation for the ___ Federal Fiscal Year (July 1, ___ thru June 30, ___) are as follows:

- Management & Protection
  - Personal Services $________
  - Other related expenses $________

- Buildings & Utilities Maintenance
  - Personal Services $________
  - Other related expenses $________
Roads & Trail Maintenance
Personal Services $__________________

Other related expenses $__________________

Grand Total $__________________

The above figures are based on 50% of the direct costs incurred by the State of Wisconsin in conducting the Management and Operation of the Ice Age National Scientific Reserve in accordance with the legislation contained in Public Law 88-655, October 13, 1964, as amended by Public Law 91-483, October 21, 1970.

The DNR will bill NPS quarterly for its share of the annual costs as prescribed above by a method to be agreed upon between the finance offices of DNR and NPS (Northeast Region).

9. Ice Age Trail: The NPS and DNR shall jointly assist the Ice Age Park and Trail Foundation in a study of the proposed Ice Age Trail in Wisconsin.

10. NPS Review of Land and Water Conservation Fund Projects: The DNR shall submit all Land and Water Conservation Fund project proposals for acquisition within the Reserve to the NPS for review and concurrence at the time the project proposals are sent to the Bureau of Outdoor Recreation, Department of the Interior.

11. Development of Facilities: The DNR shall have overall responsibility for development of facilities in the Reserve. It shall determine development priority based upon land control and needs, and shall be responsible for preparation and administration of construction contracts in accordance with Land and Water Conservation Fund grant requirements. Construction drawings and development proposals shall be prepared by the DNR and submitted to the NPS for review and approval prior to submission to the Bureau of Outdoor Recreation for Land and Water Conservation Fund Grants. The DNR shall notify the NPS when BOR grant approval is received. The NPS shall budget for and construct interpretive exhibits and audio visual aids with construction to be financed from appropriated funds. The NPS shall notify the DNR of annual expenditures for this purpose.
12. **Interpretive Programs:** Interpretive programs are a key element in the Comprehensive Plan for the Reserve and shall play a major role in the operation of the Reserve. The NPS will provide the expertise and information necessary to carry on interpretive programs. The DNR shall place particular stress and emphasis upon Ice Age interpretation, correlating such interpretation to the Ice Age where possible. Informational and interpretive brochures shall be prepared by the NPS in order to insure that the entire program for the Reserve is based upon the most up-to-date scientific knowledge and current research.

13. **Operation and Maintenance:** Overall administration and management of the Reserve shall be the responsibility of the DNR and the actual operation and maintenance shall be carried out by employees of DNR. The NPS shall conduct biennial reviews of the administration and management of the Reserve.

14. **Recreational Activities:** Outdoor recreational activities shall be permitted throughout the Reserve: Provided, however, that such activities shall be compatible with preservation of the Ice Age resources.

15. **Jurisdiction Over the Reserve:** The individual units of the Ice Age National Scientific Reserve are state areas subject to the normal requirements of Wisconsin law with respect to such matters as use fees, state or local taxes, licensing and wildlife management, provided, however, that such areas shall remain subject to applicable Federal regulations regarding migratory birds.

16. **Golden Eagle Passport:** In recognition of the substantial Federal investment in the financing of the acquisition, development and operation of the Reserve, and the national significance of the Reserve, the Golden Eagle Passport or equivalent annual passport or sticker shall be honored throughout the Reserve so as to permit entrance into the Reserve without the necessity of paying any entrance fee that might be otherwise required by the State. Holders of a Golden Eagle Passport will be required, however, to pay any other fees imposed by the DNR for use of facilities within the Reserve, it being intended that the Golden Eagle Passport shall be accepted in lieu of an entrance fee only.

17. **Exchange of Personnel or Equipment:** To the extent permissible, NPS and DNR may cooperate in the assignment of personnel or equipment in order to carry out the responsibilities of the respective parties under the terms of this agreement.
18. Exchange of Information: The DNR and the NPS shall make available to each other any additional information relating to the Reserve that is not otherwise specifically provided for in this agreement.

19. Nondiscrimination: The State of Wisconsin shall not discriminate against any person on the basis of race, color, or national origin in the use of any property or facility acquired, developed or operated pursuant to this agreement, and the State further agrees to comply with the terms and intent of Title VI of the Civil Rights Act of 1964, (78 Stat. 241), and with the regulations promulgated pursuant to such Act by the Secretary of the Interior and contained in 43 CFR 17.

20. Equal Opportunity: In all construction contracts entered into by the State relating to the Reserve which are either directly or indirectly Federally assisted, there shall be incorporated therein the Equal Opportunity clause provided for in 41 CFR 1-12.803.

21. Officials Not be Benefit: No member of or delegate to Congress, or resident commissioner, shall be admitted to any share or part of this contract, or to any benefit that may arise therefrom; but this provision shall not be construed to extend to this agreement if made with a corporation for its general benefit.

22. Periodic Review: This agreement shall become effective when signed by the parties hereto and shall continue in force until terminated by mutual agreement or at the option of either party upon one year's notice given in writing upon any anniversary date hereof. The agreement shall be reviewed by the NPS and the DNR biennially and at such other times as may be requested by either party on 60 days' written notice.

23. Liaison and Coordination Responsibility: To provide for a primary point of contact between DNR and the NPS, the Director of the Bureau of Parks and Recreation of DNR and the Assistant to the Director in charge of the Chicago Field Office of the NPS are assigned.

24. Availability of Funds: Nothing herein contained shall be construed as binding the Secretary of the Interior to expend in any one fiscal year any sum in excess of appropriations made by Congress for that fiscal year, or to involve the United States in any contract or other obligation for the future expenditure of money in excess of such appropriations. Funds for cost sharing shall be requested by the parties hereto.
IN WITNESS WHEREOF, the parties hereto cause this agreement to be executed on the date hereinabove first set forth.

/s/ Rogers C. B. Morton    /s/ Patrick J. Lucey
SECRETARY OF THE INTERIOR    GOVERNOR, STATE OF WISCONSIN
**C. References & Credits**

BLACK, ROBERT F.


NATIONAL PARK SERVICE


STATE OF WISCONSIN, DEPARTMENT OF NATURAL RESOURCES


PHOTOGRAPH CREDITS:

Pages 1, 6, 22, 35, 39, 51, 61 and 65 R. F. Black, University of Connecticut, "Geology of Ice Age National Scientific Reserve". 1966


Pages 11, 20, 43, 56 and 71 Wisconsin Department of Natural Resources
D. The Planning Team

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Schematic preparation by the Graphics Section, Denver Service Center, National Park Service