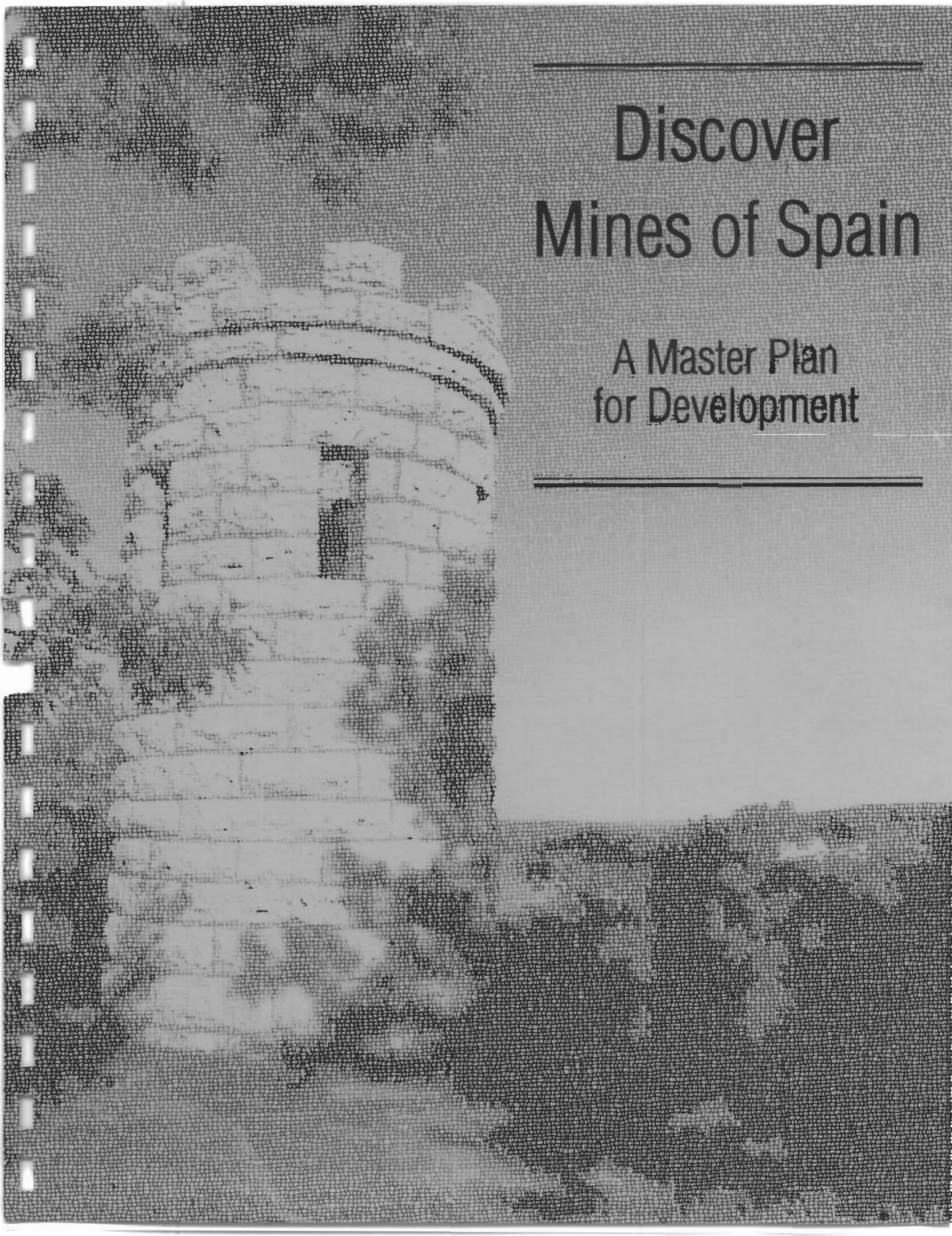

Discover Mines of Spain

A Master Plan
for Development



Mines of Spain State Recreation Area Master Plan

Prepared by:

**Angela Corio
Outdoor Recreation Planner**

Division of Parks, Recreation and Preserves

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**The recommendations in this report were adopted by the Natural Resource Commission
on March 1989.**

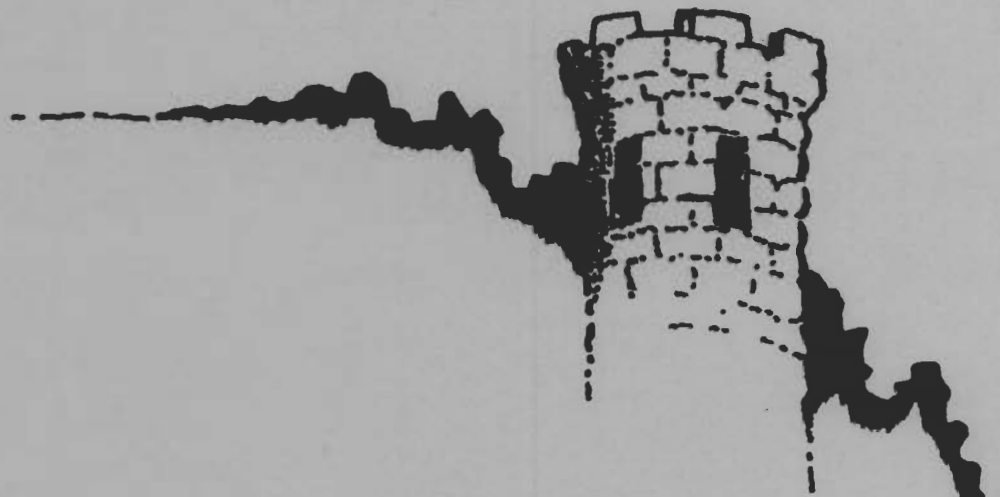
**Sam Kennedy, Chairperson, Clear Lake; Douglas R. Smalley, Vice-Chairperson, Des Moines;
(Mrs.) Marion J. Patterson, Secretary, Cedar Rapids; Thomas E. Spahn, Dubuque; John D. Field,
Hamburg; William B. Ridout, Estherville; Richard C. Young, Waterloo.**

**Iowa Department of Natural Resources
Larry J. Wilson, Director**

Table of Contents

Page

Project Background	2
- Introduction	
- Master Plan Goals	
- Project History	
Recreation Demand and Development Priorities	3
- Local Conditions	
- Existing Recreation Facilities	
- Analysis Priority Needs	
- Existing Condition and Facilities of the MOS	
Master Plan	10
- Interpretive Facilities and Programs	
- Special Events and Programs	
- Recreation Facilities	
- Future Land Acquisition and Development	
Architectural Theme, Signage & Site Accessories	20
Resource Management	25
- Vegetation	
- Wildlife	
- Aquatic Resources	
- Geology	
- Archaeology	
Staff Requirements	40
Implementation Phasing Schedule and Cost Estimates	41
Appendix	46
- Site Analysis	
- Management Prescriptions for Native Timber Types	
- Interpretive Signs	



PROJECT BACKGROUND

Introduction

Perched on a high bluff overlooking the Mississippi River is the Julien Dubuque Monument, the landmark of the Mines of Spain. Steeped in history with plentiful flora and fauna, this area is an attraction of statewide, regional and even national significance. It was the rich and diverse natural resources that attracted both native Americans and European traders & settlers. Lead was mined above and below ground; timber was cut for steamship building, construction, and for fuel; wildlife was hunted with stone, bow and gun; limestone was quarried; fields were plowed; and many peoples lived here, some for a season, others year round. Yet, the Mines of Spain has remained basically undeveloped to tell the story of human interaction with nature.

This 1,300-acre area located just south of the city limits of Dubuque, was acquired by the state of Iowa in 1980. Evidence of past occupation by prehistoric Indians dates back 8,000 years and includes conical and lineal mounds, numerous rock shelters, and campsites. The area was important to the French-Canadian fur trading cultures when Julien Dubuque arrived in the 1780s. At that time, he found a Fox Indian village at the confluence of Catfish Creek and the Mississippi River. In 1788, the Fox Indians granted Dubuque permission to mine lead in their area. Dubuque's settlement on the Mines of Spain was the first Euro-American settlement in what later became the state of Iowa.

In addition to its historical significance, a variety of landforms provide habitat for numerous plants and animals, including some on the Iowa list of threatened and endangered species. A diversity of geologic features includes the Mississippi Valley blufflands, abandoned entrenched valleys, once significant lead deposits and exposed sequences of Galena Group dolomites.

Master Plan Components

The master plan effort initiated in 1985 was based on a number of scientific and historic resource studies. The plan's three components are: 1) interpretation of the area's rich history, 2) traditional recreation facilities compatible with the resources, and 3) comprehensive resource management. Through a program of careful development and management, the Mines of Spain will become a "special place" for its visitors, enabling them to enjoy recreational pursuits and to explore an interesting chapter of Iowa's past.

Master Plan Goals

1. To protect and enhance the site's unique, rare and significant cultural and natural resources. These include geological, archaeological, historic, scenic, wildlife and vegetative resources.
2. To develop and promote facilities and programs that interpret the significance of the site's resources and to increase visitor understanding and appreciation of the natural and cultural heritage represented there.
3. To maximize multiple-use recreation facilities and opportunities compatible with the area's resources.
4. To manage the site for examples of pre- and post-settlement vegetation and for the enhancement of both nongame and game wildlife populations.

Project History

Federal, state and local groups had long been interested in the Mines of Spain, but for various reasons were unable to acquire the area. In 1980, a purchase agreement was negotiated largely through the efforts of the Iowa Natural Heritage Foundation, a private nonprofit conservation group. The nearly three-million dollar acquisition was made possible through the Iowa Conservation Commission's (now Department of Natural Resources) "Open Spaces Program," a special cost share grant from the U.S. Department of Interior, and a donation by the land sellers, Herman and Marcella Lott. The support and efforts of many concerned citizens were also instrumental in making this public purchase possible.

Local Conditions

Major cities within a four-hour drive are Chicago, Illinois, Madison and Milwaukee (Wisconsin), Minneapolis (Minnesota), and Des Moines with a population of 10,285,660. Approximately 289,150 people live within a 50-mile radius of Dubuque County. The population of Dubuque County is 93,745, of which 61,321 live in the city of Dubuque.

The current main access to the Mines of Spain is off U.S. Highways 151/61/52 on Grandview avenue to Julien Dubuque Drive. Highway 52 is the Great River Road which carries recreational traffic of approximately 20,000-30,000 vehicles per year. Regional access to Dubuque includes U.S. Highways 20, 151, 61 and 52, connecting to either Illinois, Wisconsin, Minnesota or Iowa.

Regional Recreation Facilities

Within 50 miles of Dubuque County, there are 65 conservation/recreation areas consisting of 29,615 acres owned by federal, state (Illinois, Wisconsin and Iowa), county and municipal governments. Twenty-eight of these are located in Dubuque County and include one federal area, four state areas, eight county areas, and 19 community areas (2+ acres) comprising 4,683 acres. Major recreational opportunities include picnicking, camping, hiking nature study, downhill and cross-country skiing, bicycling, fishing, hunting, boating, and canoeing. The Mines of Spain is the largest state area in the county, accounting for 28 percent of the total acreage available for public recreation.

The other 37 recreational facilities within an hour of Dubuque represent 24,930 acres. Major recreation and wildlife areas in Iowa include Bellevue State Park, Maquoketa Caves State Park, Green Island Wildlife Area and Sny Magill Wildlife Area. Major Wisconsin recreation areas include Governor Dodge Park, Yellowstone Park and Wyalusing Park, consisting of 10,730 acres. The major Illinois park is Mississippi Palisades which comprises 2,500 acres.

According to the 1986 Statewide Comprehensive Outdoor Recreation Plan, the most popular recreation activities in Iowa are represented in Figure 1, along with the recreation supply within 50 miles of Dubuque County (within Iowa).

Recreation Activities	% of Iowans Participating	Supply of Recreation Within 50 miles of Dubuque County (in Iowa)	% of Statewide Recreation Supply*
Picnicking	70	4,707 picnic tables	8
Driving for Pleasure	68	Data Not Available	
Fishing	48		
Swimming (Pool)	37	23 pools	5
Hiking	36	93.4 miles	10
Swimming (Beach)	33	6,300' beach frontage	7
Biking	33	63 miles	10
Boating/Water Skiing	27	57 boat ramps	7
Golfing	26	7 18-hole courses	4.4
		14 9-hole courses	5
Camping (RV)	21	1,145 modern camp sites	6
Softball	20	60 softball diamonds	6
Camping (Tent)	18	1,469 nonmodern sites	9
Small Game Hunting	14	24,580 acres public hunting area	7
Canoeing/Kayaking	11	60 miles warm river frontage	10
Ice Fishing	10	Data Not Available	
Tennis	10	70 tennis courts	5.3
ATV Driving	9	24 miles trail	21
Horseback Riding	7	43.3 miles trail	7
Deer Hunting	7	24,580 acres public hunting area	7
Snowmobiling	5	83.7 miles trail	7
Cross-Country Skiing	3	Data Not Available	
Sailing	2	Data Not Available	

Figure 1

*Population within a 50-mile radius of Dubuque County accounts for 6% of the state population.

In addition to recreation areas in Iowa, the 13,230 acres in Wisconsin and Illinois offer recreation opportunities such as: picnic/day use, swimming, canoeing, boating and fishing. Trail systems include: hiking-40 miles, equestrian-27 miles, cross-country skiing-26 miles, snowmobiling-28 miles. Overnight accommodations include 300 RV campsites, 560 nonelectric sites, 70 equestrian campsites, and family cabins are available at the three Wisconsin parks.

Analysis - Priority Needs

The determination of the appropriate type of recreational opportunities for the Mines of Spain included an analysis of information from the 1986 State Comprehensive Outdoor Recreation Plan, goals of the Department of Natural Resources, and the expressed desires of local officials and residents.

State Comprehensive Outdoor Recreation Plans

The 1986 Iowa SCORP projects an increasing demand statewide for trail-oriented activities (biking, hiking, all-terrain vehicle driving, horseback riding, canoeing, and cross-country skiing), traditional outdoor recreation activities (swimming, camping and fishing) and sport-oriented activities (golf and softball). Popular activities such as pleasure driving, picnicking, boating, water skiing and hunting are not seen increasing in demand as those mentioned above, but holding steady with significant participation rates.

The Illinois and Wisconsin SCORPs identify regional demand (nearest Dubuque) for multi-use trails, backpack camping, RV camping, sport fishing, golfing, organized sports, and tennis.

Public Meetings

At the public meetings held during the master plan process, a broad spectrum of comments were received ranging from support for no development to maximum resort development. Several Dubuque officials supported a high level of recreation development to complement the area tourist activity. There was great interest in seeing development of the historic aspects to emphasize the Mines of Spain's role in local, regional and national history. Concern was expressed for the preservation of the archaeological sites, rare plants and animals, and scenic quality of the area. There was both support and opposition for hunting and horseback riding. Before plan implementation an additional public information meeting/hearing was held to address local concern for the new entrance road alignment.

Iowa Department of Natural Resources Goals

The principal recreation goal of the Department of Natural Resources for the Mines of Spain is to maximize public use opportunities and facilities compatible with the natural and cultural resources of the area. A balance of recreation activity opportunities will be provided such as picnicking, camping, hiking, nature exploration, history interpretation and nature study will be promoted and expanded.

Principal recreation development needs identified for the Mines of Spain

-- Interpretation and Nature Study

Recent years have seen an increase in public interest in natural systems and cultural history. The rich diversity and abundance of natural, historic, and prehistoric resources on the Mines of Spain provide a wealth of interpretive opportunities. Visitors want to know the history of the areas they visit.

Programs will be developed to further the public's awareness of the prehistoric/historic significance. This could be accomplished through construction of replicas of historic features, and living history or seasonal re-enactments. The historic interpretive focus will complement the museum and historic emphasis in the Dubuque area.

-- Trails

All forms of trail recreation are becoming more popular. A variety of trails will be developed from highly structured interpretive trails to rugged long distance hiking. The steep topography and distribution of cultural features throughout the site may limit some forms of trail use. Restrictive steep topography will require extensive step construction to provide a safe walking surface while controlling erosion and protecting the adjacent resources.

If possible the Heritage Trail (a 26 mile rock surfaced trail connecting Dyersville with the northereast city limits of Dubuque) should be connected with the Mines of Spain. This would allow the site to be a staging area for this multi-use trail.

-- Sightseeing and Picnicking

Picnicking and driving for pleasure are two popular activities among Iowans. That fact coupled with the proximity of the Mines of Spain to the Great River Road indicates a need for traditional picnic facilities as well as the development of scenic overlooks. The Julien Dubuque Monument has long been a popular overlook point and area landmark. Safe viewing structures are needed at the monument and will be developed there as well as elsewhere on the MOS.

-- Camping

Demand for camping facilities is projected to increase according to the 1986 Iowa Statewide Comprehensive Outdoor Recreation Plan. Development of overnight accommodations was identified as desirable, considering the demand for facilities, the large number of tourists in Dubuque, and the proximity of the area to the Great River Road.

-- Hunting and Fishing

The Upper Mississippi has long been an attractive area for hunting and fishing. Hunting is restricted to bow hunting through 1990 as stipulated by the previous landowners.

-- Water Access

The Mississippi River provides for a variety of water-based recreation.

Existing Conditions and Facilities

The Mines of Spain's northern border is an industrial area. Bordering on the east is three and a half miles of the Mississippi River separated from the site by the Soo Line Railroad. The south and west boundaries are adjacent to private property.

Primary access is from the Grandview Avenue exit off Highway 61, to Julien Dubuque Drive which connects to a gravel entrance road leading to the Julien Dubuque Monument. Access to E.B. Lyons Interpretive Center is from Bellevue Heights of Highway 52 (the Great River Road). A staging area/parking lot is located in the southern portion at Cattese Hollow. Roads within the area include a gravel road to the monument and to Horseshoe Bluff Quarry.

E.B. Lyons Interpretive Center and Prairie Woodland Preserve is a 40-acre area under lease from the city of Dubuque. It provides a focus for visitors to the Mines of Spain. Visitors can acquaint themselves with the special features of the area, such as human history, vegetation, wildlife, and geology, through the displays and "hands-on" stations located inside. Approximately 10,500 people visited E.B. Lyons in 1986.

On the E.B. Lyons preserve is the remains of the Otto Junkermann farm. Built in 1860 was a stone summer cottage with three rooms and an attached summer kitchen. A stone barn, root cellar, wine cellar, caretaker's house and greenhouse were also constructed. Steps and terraces of native stone were built on the side of a knoll where a stone chapel was erected in 1861. Apple trees and a large number of conifers were planted. Already presented on the property were a pit mine and a shaft mine. Later the foundations for a permanent family home were begun, but Otto died in 1883 before it was completed. Today trails lead to the stone chapel, the only building still intact on the area, the root and wine cellars, the foundations of the stone cottage, barn and greenhouse, the terraces where grapes were grown and the entrances to the shaft and pit mines. Near the nature center entrance, the foundation of the uncompleted house contains a wild flower garden. Some apple trees remain, tall pines still grow near the chapel, and a large tamarack tree stands near a huge bur oak that may have been there when the early French fur traders first came to this area.

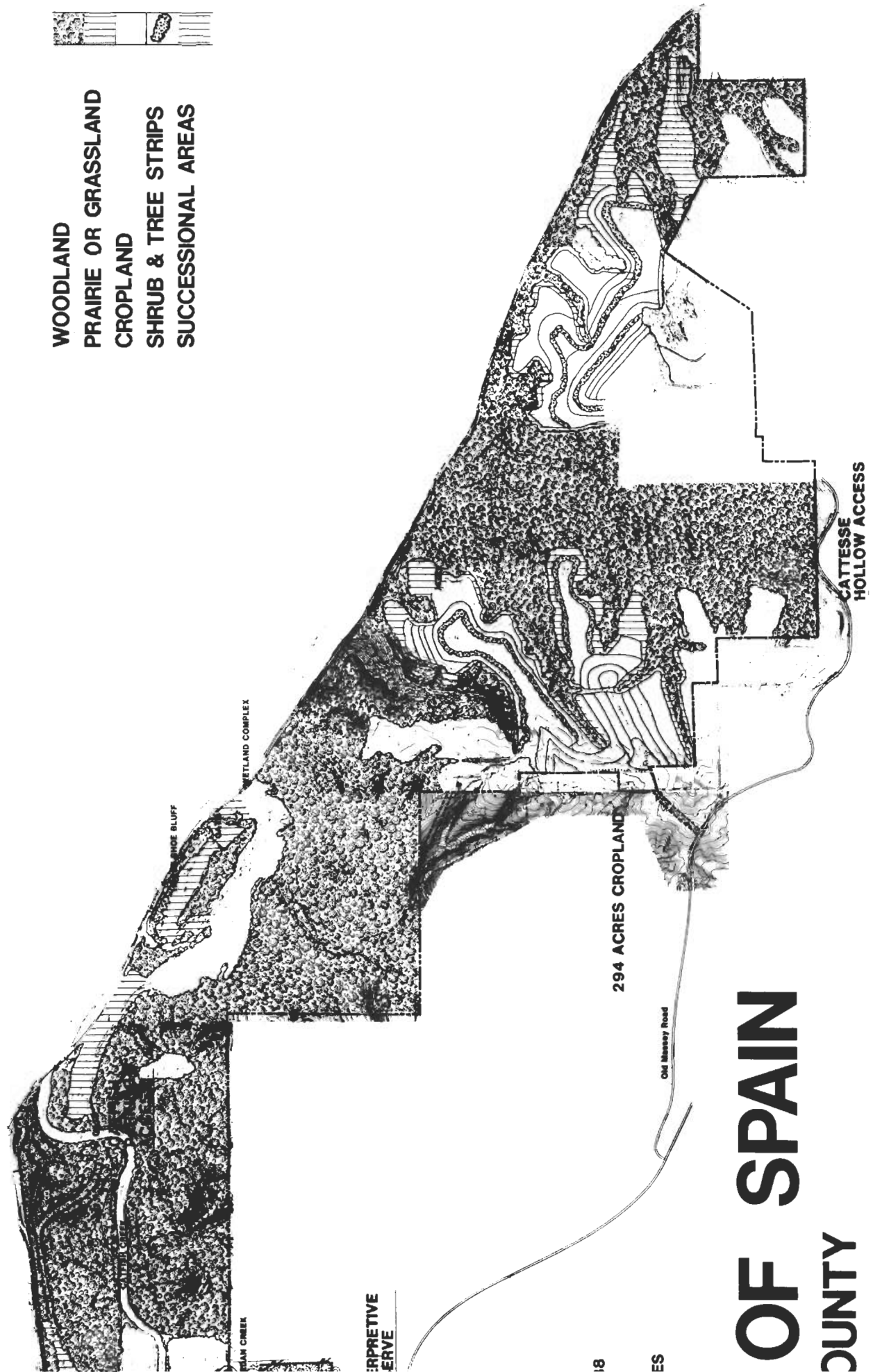
Programs and workshops are held throughout the year and can include topics such as spring wildflowers, geology and fossils, trees, aquatic life, animals, archaeology, birds, insects, edible wild foods, land stewardship, cross-country skiing, tracks, prairies, lead mining, and native crafts and history. Ninety-four events were held in 1986 with 2,681 people participating. Major events include spring and fall programs, Arbor Day Celebration, Youth Trailside Explorers, autumn seminars, fall craft festival, and the Old Fashioned Christmas Party. Slide shows and programs are given offsite to service clubs, schools, scout groups, libraries, and nursing homes. Seasonal walks are an important part of the area's interpretive programs. Both naturalist-led and self-guided hikes use the trails' built-in learning stations and outdoor lecture and demonstration areas.

EXISTING FEATURES

- WOODLAND
- PRAIRIE OR GRASSLAND
- CROPLAND
- SHRUB & TREE STRIPS
- SUCCESSIONAL AREAS



JULIEN DUBUQUE
MONUMENT



OF SPAIN

COUNTY



Junkermann Chapel

The current interpretive building design was intended to be the first phase, but additional phases were never completed. The existing large open room must accommodate permanent displays, seasonal exhibits and seating space for large and small groups. Consequently, there is limited space for permanent exhibits; seasonal exhibits must be continually moved; and the large open room with glass walls does not lend itself well for slide shows or a classroom setting. The presence of a large seated group inhibits other visitors from looking at the displays and exhibits. A classroom/auditorium annex is badly needed.

Other than the E.B. Lyons area and trails, the Julien Dubuque Monument and previously described roads, there are no other facilities on the area. There are, however, signs of previous occupation throughout the area such as Indian mounds, pit mines, mines/caves, stone foundations, abandoned limestone quarry, logging/mining roads and farm buildings.

Needed Facilities

Recreation facilities need to be developed to accommodate visitors' needs while controlling user impact on the area's resources. In addition to recreation activity and user needs, a number of management requirements should be satisfied in the development of this area. These include:

-- Vehicular Access, Roads and Parking Facilities

The existing access from Grandview Avenue requires visitors to travel through residential streets, passed an industrial area and the city sewage treatment facility to the Mines of Spain via Julian Dubuque Drive. This circuitous route is undesirable from convenience, safety, and scenic viewpoints. The Grandview overpass on Hwy 61 is a difficult and confusing route. With anticipated increased levels of use resulting from the proposed facility development, continued use of this entrance will only compound the problem with impacts upon traffic patterns and densities. Also the existing entrance does not allow visitors to experience the rich scenic qualities.

Roads and parking areas need to be designed to accommodate projected use levels and overflow areas designated for peak periods or special events. Parking lots should have a well defined structure for efficient use, circulation and maintenance. Pedestrian circulation in and around parking areas needs to be given attention.

-- Pedestrian Bridge to Connect E.B. Lyons and MOS. Currently the 40 acre E.B. Lyons Nature Center area does not have a pedestrian connection with the Mines of Spain area. A pedestrian bridge needs to be built over Granger Creek to allow pedestrian access between the two areas.

-- Administrative and Maintenance Facilities and Visitor Orientation

On-site administrative offices and a maintenance facility are needed for visitor orientation, area security and maintenance functions.

On-site administrative offices and a maintenance facility are needed for visitor orientation, area security and maintenance functions.

-- Resource Management

Resource management programs and procedures need to protect the integrity of the site's resources and to ensure that examples of pre- and post-settlement vegetation are maintained.

-- On-Site Staff Residence

On-site staff housing is desirable as a deterrent to vandalism and misuse of the area after hours as well as to have a manager close by to handle emergencies.

-- Utilities

Sanitary facilities and drinking water are needed to accommodate area visitors. Modern flush restrooms should be utilized when possible.

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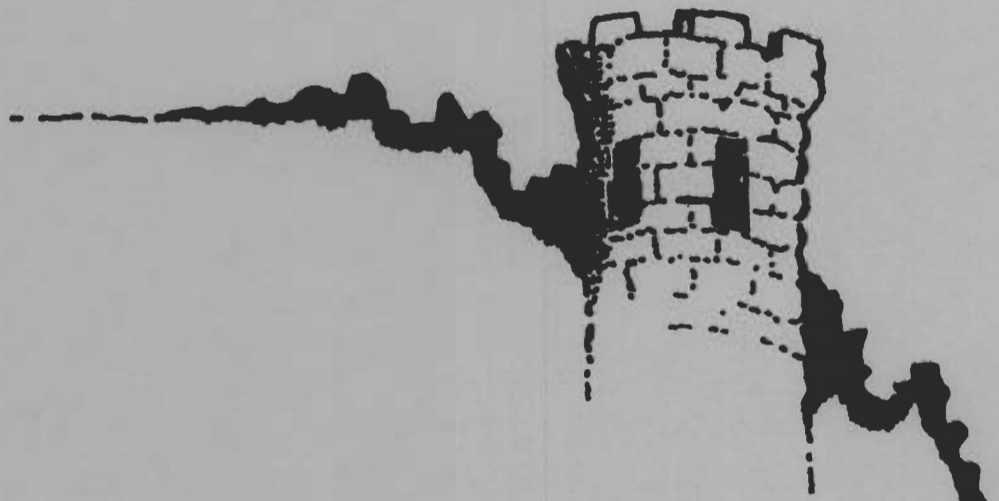
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**MASTER PLAN FACILITY &
PROGRAM DEVELOPMENT**

Master Plan and Design Criteria

Development and Design Philosophy

Mines of Spain, Interaction Between People and Nature, Past and Present is the theme for development of the 1,300-acre area. Some signs of past activities such as mining, lumbering, grazing and quarry activity are evident while evidence of habitation by prehistoric and historic peoples is less obvious. Revitalizing this link with the past by interpreting the significant historic events which occurred on the Mines of Spain is a key element of future developments. Another component of the interpretive program will emphasize the significance and interrelationships of the geologic features, ecologic habitat, archaeological sites and recorded history. Interaction between people and nature in the present will include the development of recreation facilities that are compatible with the site's resources. Activities will include: sightseeing, hiking, picnicking, backpack camping, cross-country skiing, spelunking, hunting, fishing, and canoeing. The master plan is an exciting blend of constructed historic replicas, conventional recreation opportunities and undeveloped natural areas.

A summary of the site analysis (see appendices) outlines the ecological parameters and identifies opportunities and constraints for both human and resource management. It also establishes a rational framework for planning concerns and concepts to guide the development process. The following sections are devoted to translating these concerns and concepts into facilities and programs.

Interpretive Facilities and Programs

Cultural activity on the area over the past 300 years has greatly affected MOS in such ways as the shape of the land (pit mines and the quarry) and the mosaic of vegetative communities resulting from lumbering, grazing and mining. Interpretive goals are to tell the story of past activities and interactions such as those of the French-Canadian fur traders, Julien Dubuque and the Fox Indians. Interpretation will also emphasize the area's geology, vegetation and wildlife. This component will be developed in two phases, with the first phase being pictorial interpretive signage along a structured trail and replica construction being the second phase.

First Phase - Primary Interpretive Trail

A primary interpretive trail will provide a safe recognizable walking surface and connect the interpretive features and recreation facilities. Pictorial interpretive signs along the trail will tell the story of life in other times on the Mines of Spain. Signage will interpret the following features.

- Prehistoric Era. The lifeways of these people will be explained through dioramas, displays, and artifacts at E.B. Lyons and also with pictorial signage at the mounds and rock shelters.
- Mining. Different mining technologies and methods span the times of Indian pit mining, Julien Dubuque's mining operation and on into the early 1900's.



Pictorial Interpretive Signage at Indian Mounds



**Example of Pictorial Signage
to be used
along the Interpretive Trail**

- Miner's Cabin. Signs will depict a miner's cabin and how they lived.
- Fox Indian Village. In 1820 this village was described "as consisting of 19 lodges, built in two rows and quite compact, and having populations of 250 souls." Interpretive signage will provide a picture of these peoples' shelters, and the text will describe how they lived, their food, tools, etc.
- Trapper/Trader's Cabin.
- Julien Dubuque. He spent 22 years at the Mines of Spain. The story of those years will be told through dioramas and displays at E.B. Lyons and through interpretive signage at his gravesite, the Julien Dubuque Monument.

Geological Interpretive Points of Interest

- Julien Dubuque Monument; Overview of Mississippi River Blufflands; abandoned valley of Catfish Creek to the north.
- Abandoned Valley at Horseshoe Bluff
- Quarry
- Upland Overview of Paleozoic Plateau Landform Region
- Lead Mines
- Cattese Hollow rock outcroppings

Vegetation & Wildlife

- Pre-settlement vegetation--interpret various plant communities that existed before settler's arrival.
- Post-settlement vegetation--describe the different plant communities that are a result of human disturbance or occupation.
- Rare, threatened, and endangered vegetative & wildlife species.

Wildlife

- Interpret the changing wildlife populations through time.
- Provide increased opportunities for visitors to view wildlife through food plots near use areas, wildlife plantings, marsh walk, and wildlife observation blind.

Second Phase - Constructed Historic Replicas

Constructed historic replicas will enable visitors to visualize the kind of people who previously occupied the area, how they lived, and how they associated with the land. These features will include:



Artist's Rendition of an Historic Replica of an Indian Campsite



On-site Interpretive Program

- Fox Indian Campsite. A large Fox Indian village was located near Catfish Creek at the time of Julien Dubuque's arrival. According to the archaeological survey, a number of campsites existed as well. A reconstructed campsite would consist of several shelters made of traditional materials.
- Fessler Mine and a Miner's Cabin. Mining of lead took place at various locations throughout the area utilizing a number of mining technologies. Fessler Mine #1 will be opened for restricted public use. Lead veins and some of the original tracks are still visible. When closed, the mine entrance would be grated to prevent human admittance but would allow for free circulation of bats which inhabit the caves.

Over the years, a number of miners lived near their mines on the area including a mining town called Mosalem. A one-room miner's cabin will be constructed and furnished accordingly.
- Trapper/Trader's Cabin. The Indian-white trading culture relied on mutual benefits and dependence. It flourished for nearly 150 years because of the accepted mutual benefits, easy travel afforded by the waterways of the Upper Mississippi and abundant wildlife. A trapper/trader's cabin will be constructed and furnished to provide a glimpse of this past lifestyle.

Exact locations will be determined by future research for construction of these features. Siting will be as historically accurate as possible, minimize resource disturbance, with the additional consideration of vehicle and pedestrian circulation.

Special Events and Programs

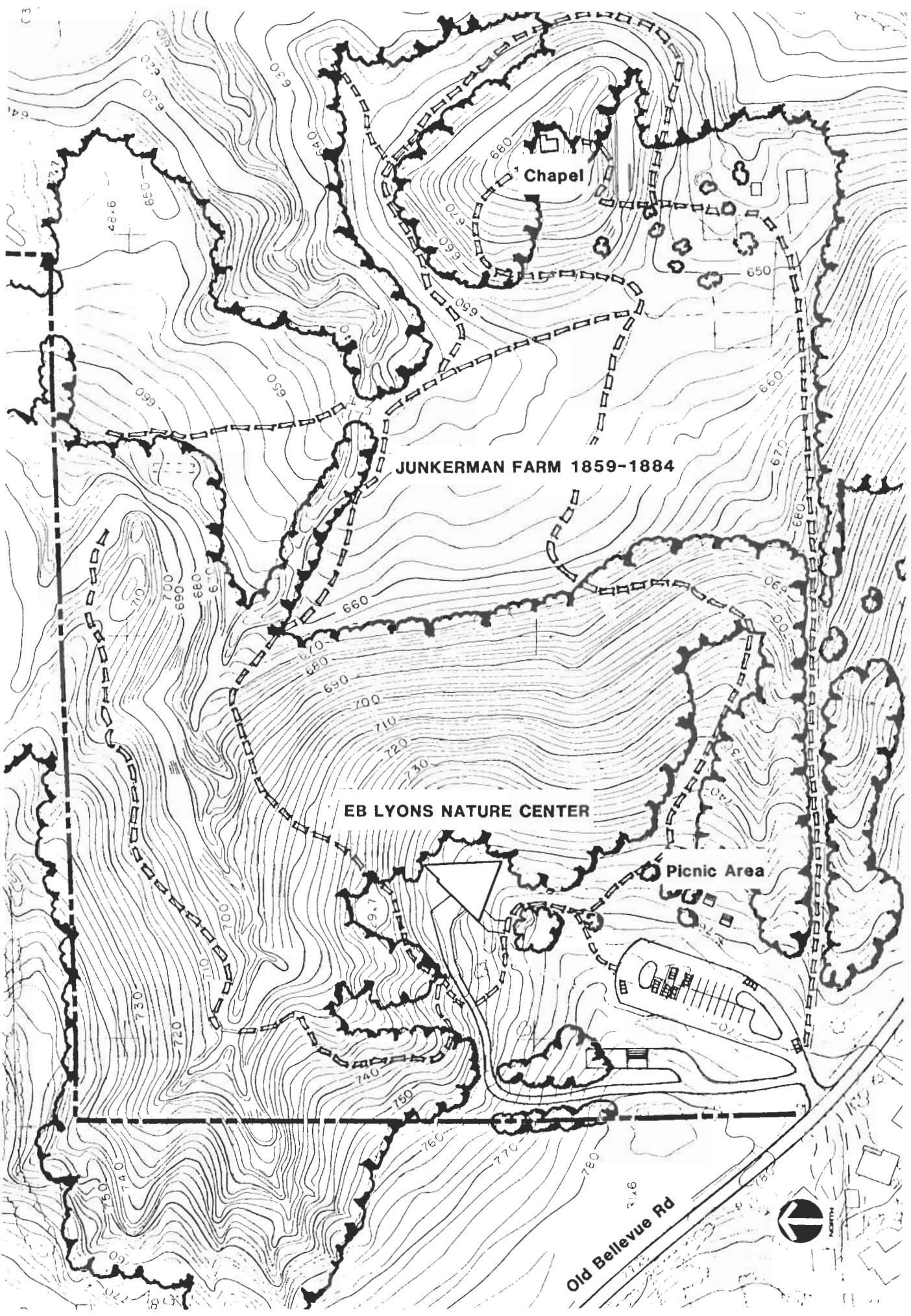
The constructed historic replicas will provide the setting for a variety of special events and programs. Summer theatre groups or school drama classes could provide living history by re-enacting any number of historic events or simply recreating everyday frontier life.

Rendezvous and black powder shoots are also potential events. Ongoing interpretive demonstrations, seasonal exhibits, lectures and films offering a wide range of topics such as Upper Mississippi history, geology, mining, Indian history, early Dubuque settlement, and wildlife will be coordinated by interpretive staff.

E.B. Lyons Interpretive Center Addition

A 2,000 square foot addition to E.B. Lyons is planned for classroom space/ auditorium and additional display area. This center will continue to provide the focus for visitor orientation to the Mines of Spain natural and cultural resources coordination of the interpretive program.

The 1,000-square foot auditorium space will provide an area for lectures, film series, school group orientation, demonstrations, etc. and will also double as a classroom. This addition will also include public restrooms on the main floor. Current facilities are not accessible to the physically impaired.



Chapel

JUNKERMAN FARM 1859-1884

EB LYONS NATURE CENTER

Picnic Area

Old Bellevue Rd

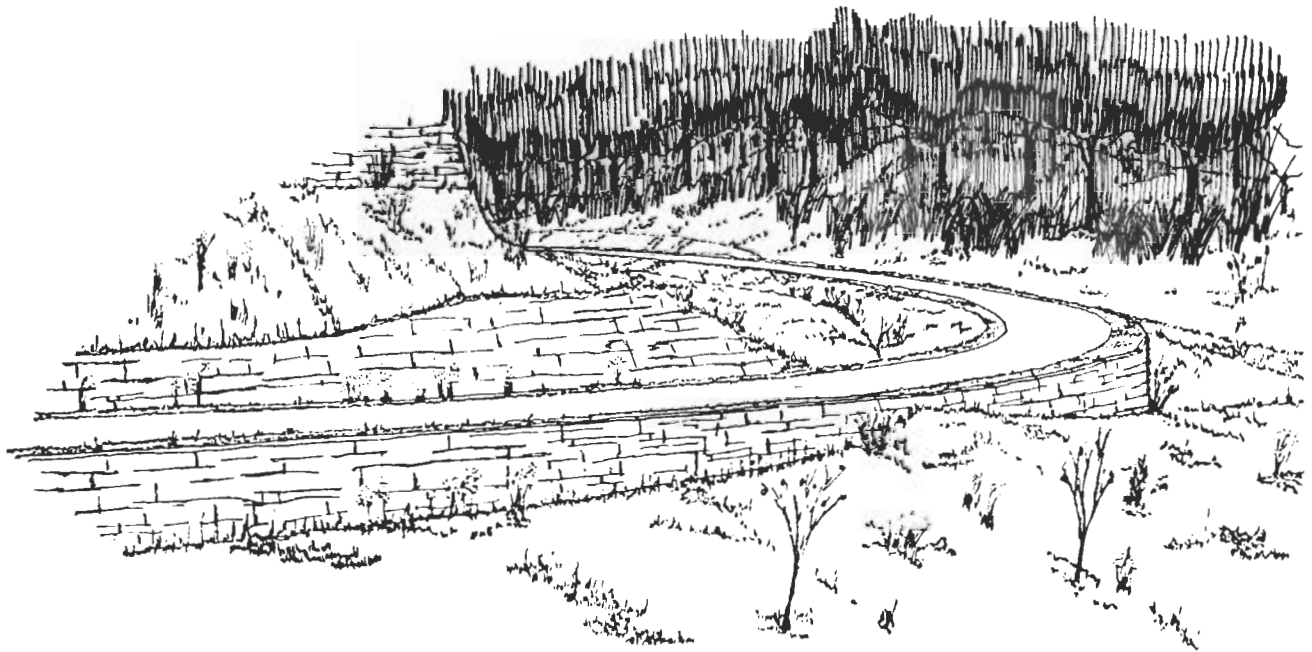


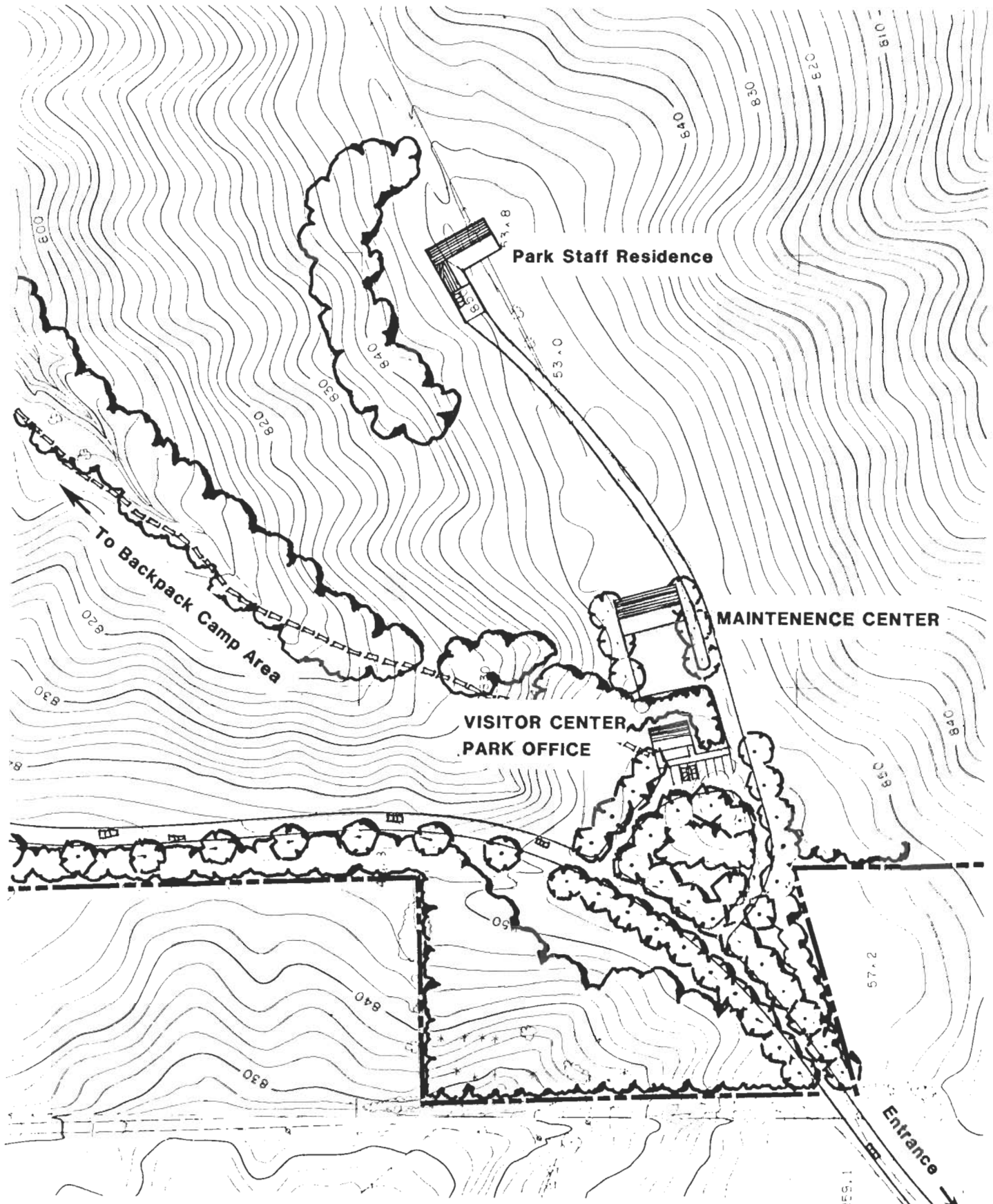
Recreation Facilities

Area Entrance

A more scenic and accessible entrance road off Highway 52 (Great River Road) is planned for the area. From Highway 52 visitors may turn off to E.B. Lyons Nature Center or proceed to Old Massey Road to the Mines of Spain. This new entrance road will allow all visitors to experience the scenic beauty of the area as well as provide a safer and more secure access.

Every effort is being made to minimize the visual intrusion of the roadway and blend it into its setting. Efforts include using a minimum road width and corridor; facing all retaining walls, bridge abutments and wing walls with limestone; using a colored seal coat on the asphalt surface so that it will blend with the rock outcroppings; leaving jagged rock cuts and blending fills. See appendix for "Road Design Criteria".





Park Office/Visitor Orientation Building

A park office building will be located near the entrance to provide staff assistance and visitor orientation. The building will be designed so that visitors can acquire brochures, maps and booklets and have access to modern restrooms whether the office is open or closed. An equipment maintenance area will be located behind the office building and screened from view of the entrance road and visitor parking lot.



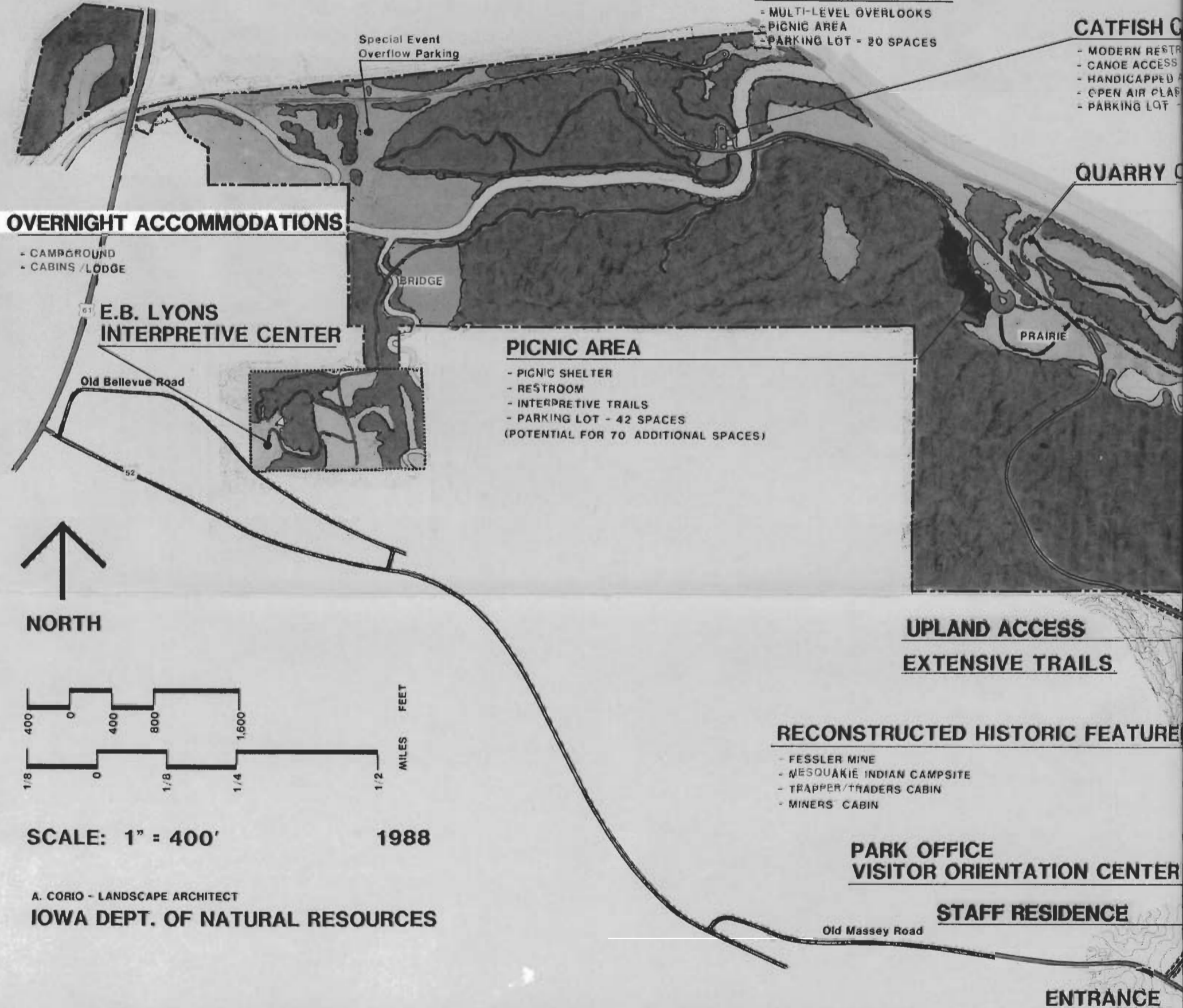
JULIEN DUBUQUE MONUMENT

- MULTI-LEVEL OVERLOOKS
- PICNIC AREA
- PARKING LOT - 20 SPACES

CATFISH C

- MODERN RESTROOM
- CANOE ACCESS
- HANDICAPPED ACCESS
- OPEN AIR PLATFORM
- PARKING LOT

QUARRY C



PICNIC AREA

- PICNIC SHELTER
- RESTROOM
- INTERPRETIVE TRAILS
- PARKING LOT - 42 SPACES
- (POTENTIAL FOR 70 ADDITIONAL SPACES)

**UPLAND ACCESS
EXTENSIVE TRAILS**

RECONSTRUCTED HISTORIC FEATURES

- FESSLER MINE
- MESQUAKIE INDIAN CAMPSITE
- TRAPPER/TRADERS CABIN
- MINERS CABIN

**PARK OFFICE
VISITOR ORIENTATION CENTER**

STAFF RESIDENCE

ENTRANCE

SCALE: 1" = 400' 1988

A. CORIO - LANDSCAPE ARCHITECT
IOWA DEPT. OF NATURAL RESOURCES

MINES OF SPAIN

DUBUQUE COUNTY

MASTER PLAN

REEK CANOE ACCESS

DOM
ACCESSIBLE FISHING DOCK
ROOM / PICNIC SHELTER
20 SPACES

OVERLOOK

HORSE SHOE BLUFF

- GEOLOGIC INTERPRETIVE TRAIL
- WETLAND COMPLEX
- WILDLIFE OBSERVATION BLIND
- MARSH WALK
- HANDICAPPED ACCESSIBLE
- PARKING LOT

WOODLAND

PRAIRIE

GRASSLAND

CROPLAND

SHRUB & TREE STRIPS

LANDSCAPE PLANTINGS

OPEN AREAS



BACKPACK CAMPING AREA

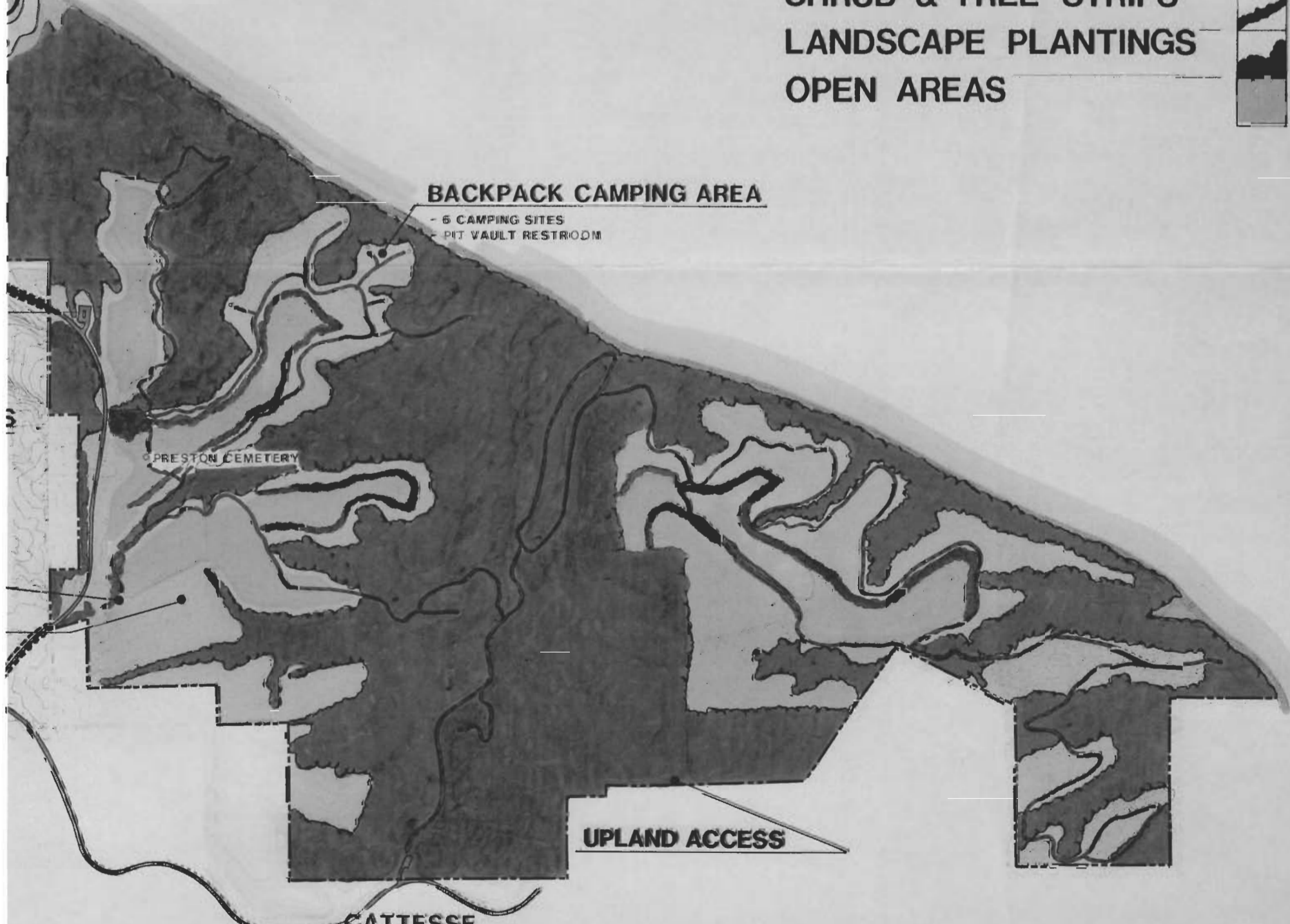
- 6 CAMPING SITES
- PIT VAULT RESTROOM

PRESTON CEMETERY

UPLAND ACCESS

CATTESSE HOLLOW ACCESS

- PARKING LOT - 24 SPACES



Julien Dubuque Monument

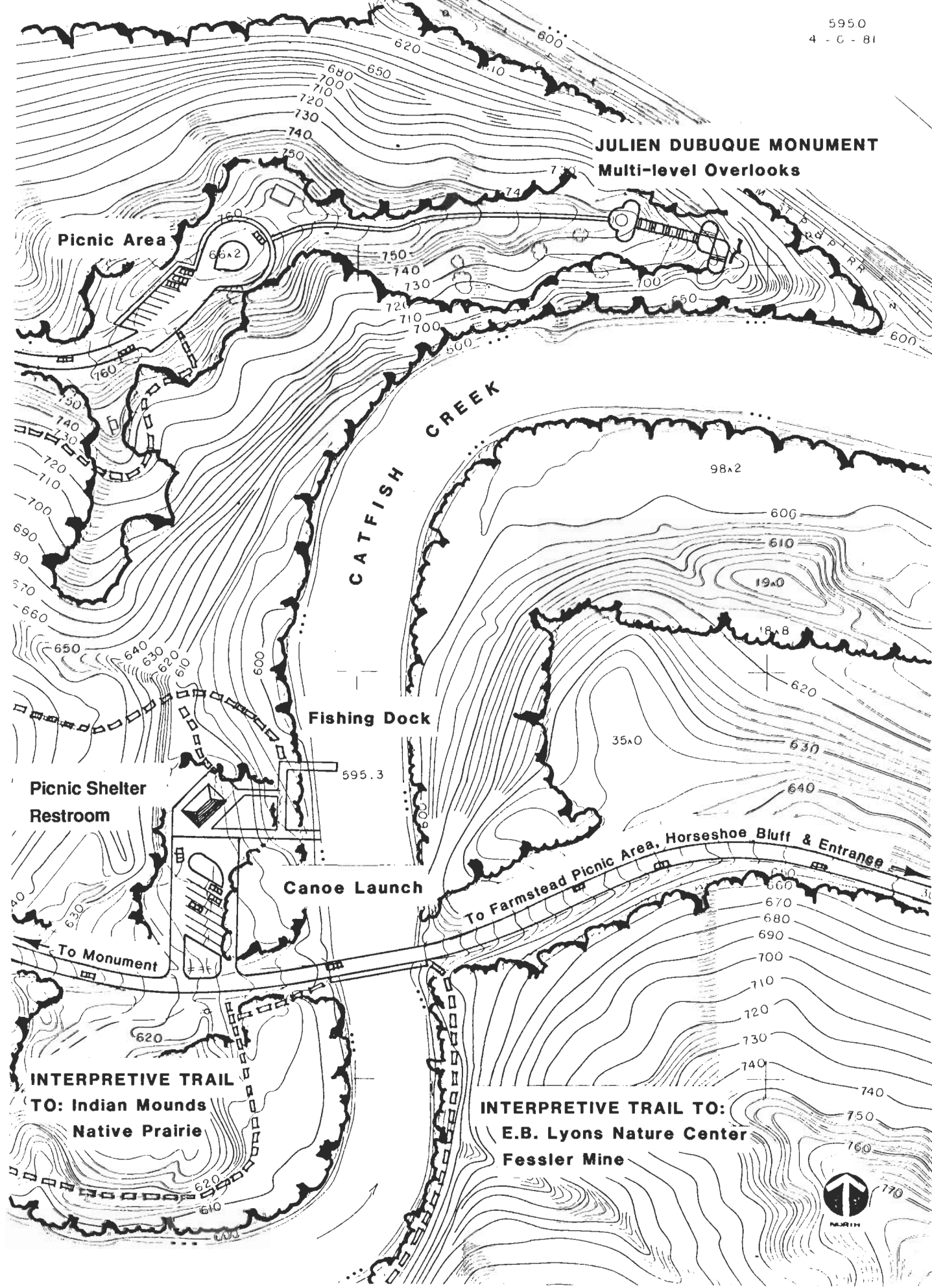
The Julien Dubuque Monument, a landmark within the Mines of Spain area is a popular sightseeing attraction from the river and from within the area. Dedicated in 1897, the monument is an example of 19th century community boosterism, a movement that produced such monuments both to celebrate a city's past, and also to attract newcomers. Overlooks will be designed to safely accommodate visitors and complement the limestone monument. A small picnic area will be developed on this spectacular bluff overlooking the Mississippi River. An improved structured parking lot will accommodate 20 vehicles with bus turn-around. A trail head from the monument area leads down to Catfish Creek.

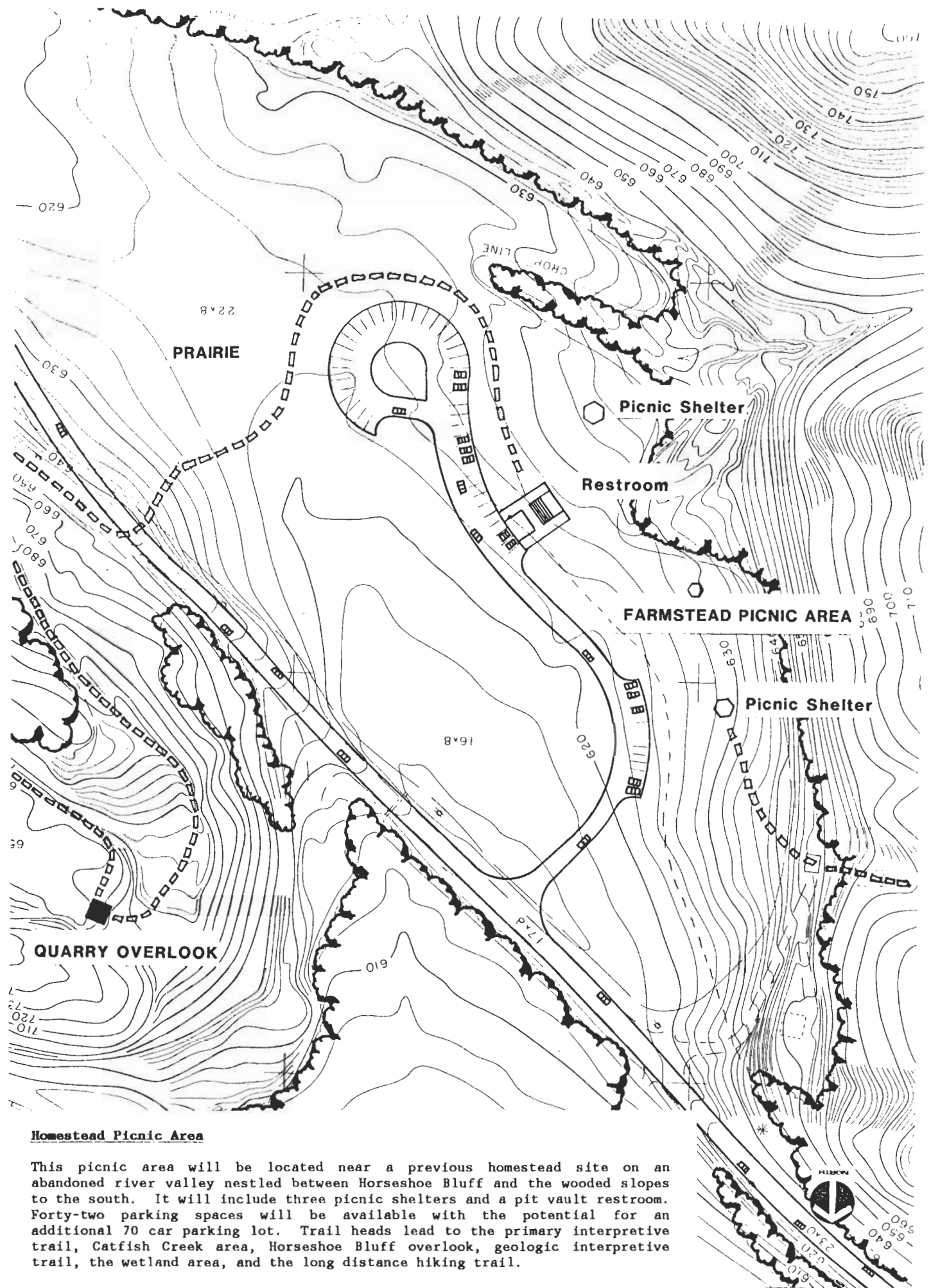
Catfish Creek Area

Catfish Creek will be developed with a fishing pier accessible to the physically impaired and a canoe access. A picnic shelter will also be used as an outdoor classroom for school groups. The shelter will also contain a modern restroom and drinking fountain. From this area trails lead to the Julien Dubuque Monument, the Homestead Picnic Area and to the primary interpretive trail. The parking lot will accommodate 12 vehicles or six vehicle/trailers.



JULIEN DUBUQUE MONUMENT
Multi-level Overlooks





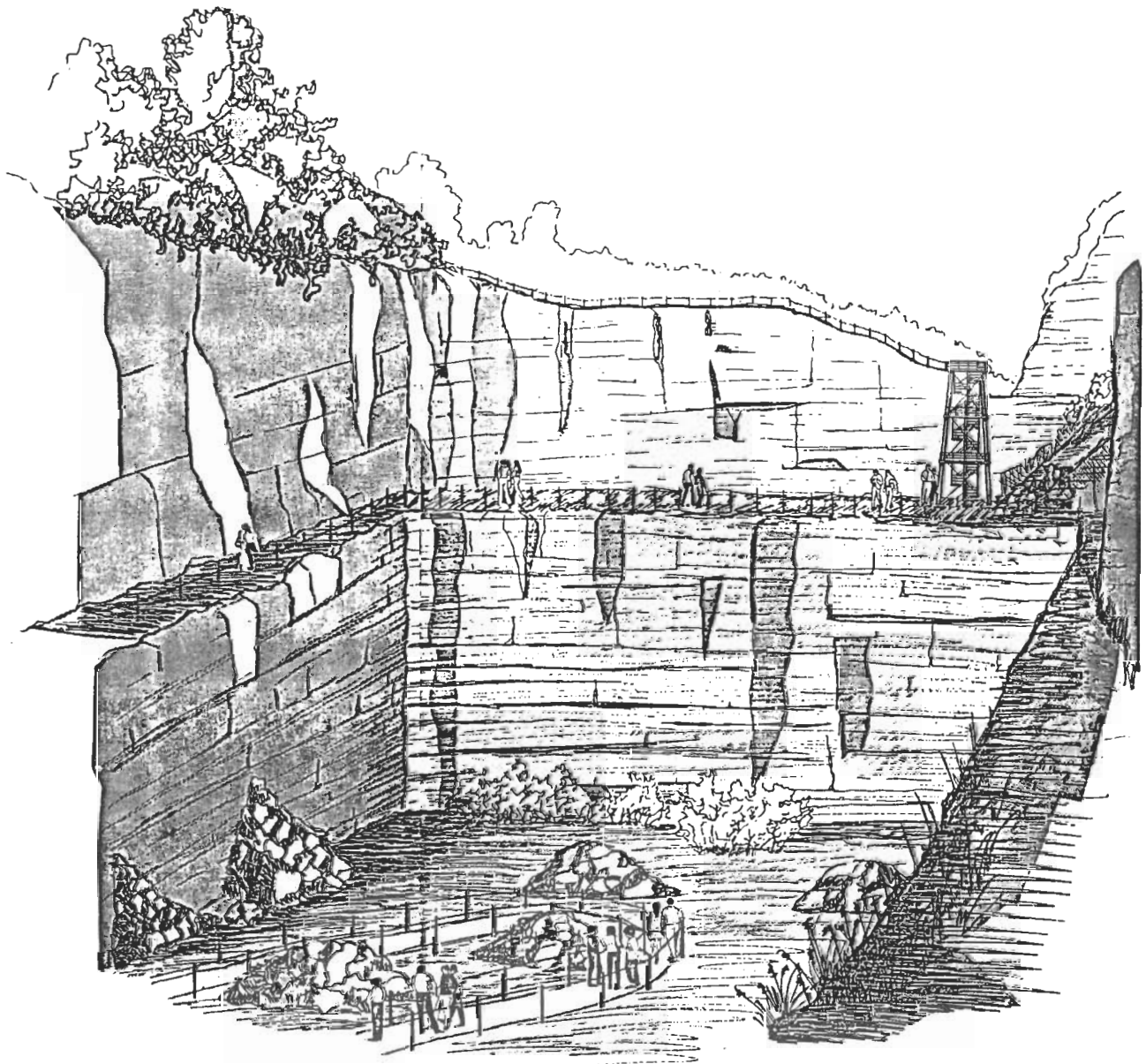
Homestead Picnic Area

This picnic area will be located near a previous homestead site on an abandoned river valley nestled between Horseshoe Bluff and the wooded slopes to the south. It will include three picnic shelters and a pit vault restroom. Forty-two parking spaces will be available with the potential for an additional 70 car parking lot. Trail heads lead to the primary interpretive trail, Catfish Creek area, Horseshoe Bluff overlook, geologic interpretive trail, the wetland area, and the long distance hiking trail.

Horseshoe Bluff & the Geologic Interpretive Trail

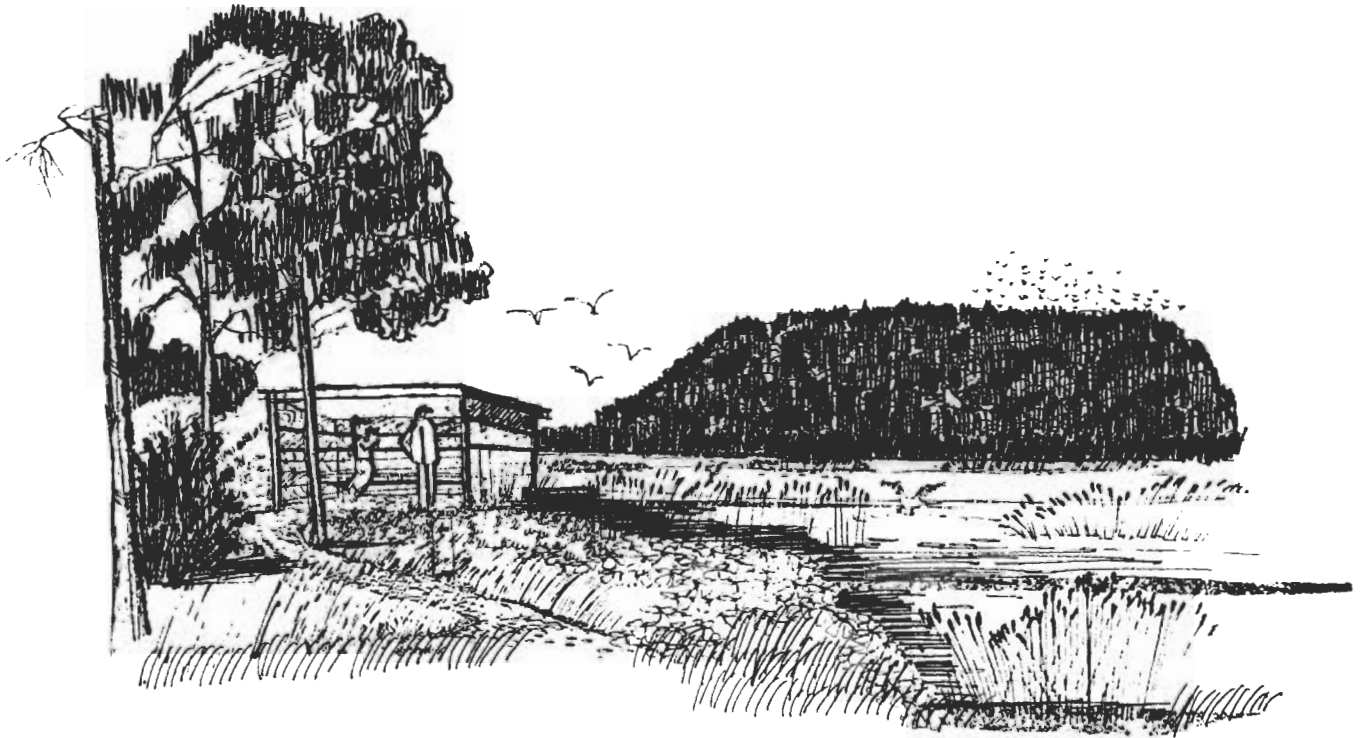
This site represents an interesting chapter of the Mines of Spain geologic history. A thick sequence of Ordovician-age dolomite is exposed in the quarry walls of Horseshoe Bluff. Recognizing the attractiveness to visitors, interpretation and safe use are the goals for this special feature. A trail through the quarry is planned with geologic interpretive signs identifying the interesting features. An overlook step tower will be located on the north end of the bluff to provide safe access from the top of the quarry wall to the first level of the quarry floor. A spectacular view of the Julien Dubuque Monument with the city of Dubuque in the background can be seen from this north end.

Rock climbing and rapelling are prohibited at MOS by administrative rule. The quarry will be closed to public access during late winter and spring when freeze/thaw processes may cause rock movement.



Quarry Wetland

Near the southeast end of the quarry, on an area used for stockpiling during quarry stone production operations, is a reconstructed wetland. The 3-acre wetland's water source is the nearby Mississippi River, and from rain water runoff and infiltration within the watershed. The wetland will be enlarged during the entrance road construction. If sufficient water levels of 6-8' are maintained, a sport fishery may be possible.



Wildlife Blind

MISSISSIPPI RIVER

Observation Blind

Marsh Walk

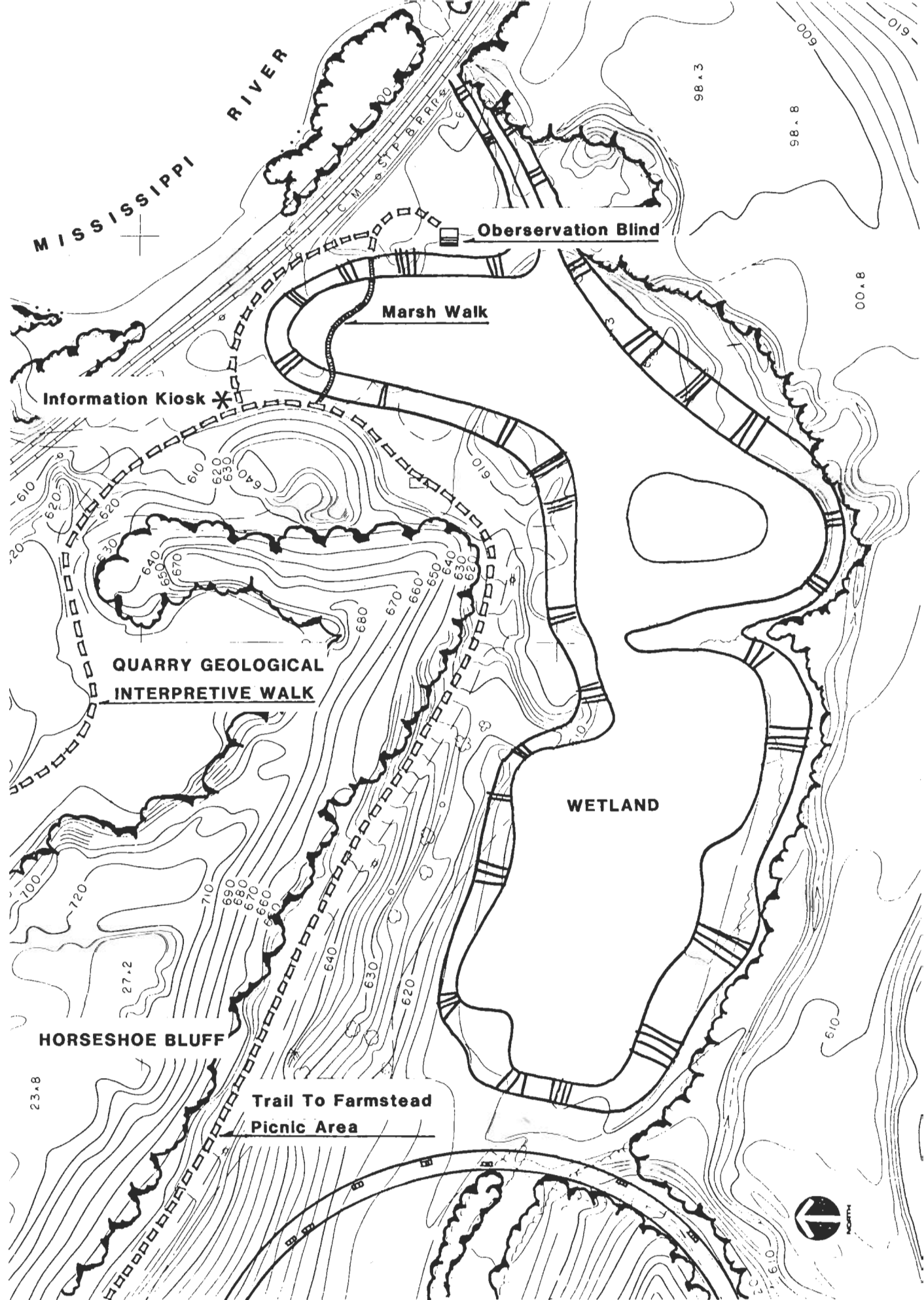
Information Kiosk

QUARRY GEOLOGICAL INTERPRETIVE WALK

WETLAND

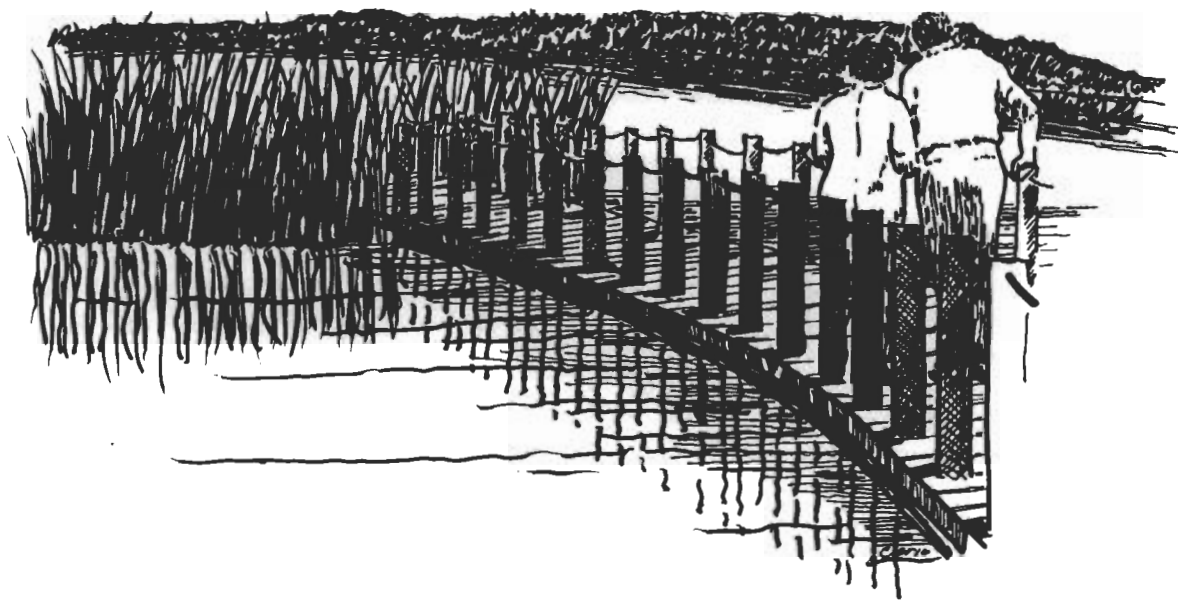
HORSESHOE BLUFF

Trail To Farmstead Picnic Area



Marsh Walk

An elevated marsh walk and a wildlife observation blind are planned if sufficient water for marsh-like habitat can be maintained. These facilities will increase area visitors chances to observe wildlife.



-Marsh Walk

Backpack Camping Area

A six-site backpack camp area will be developed on a southern upland west of Cattese Hollow. Hike-in camping is a popular alternative form of camping. Access to this area will be by hiking trail only from the Cattese Hollow parking lot (1.2 miles) or the park office/visitor orientation center near the entrance (.6-.8 miles).

Cattese Hollow Access

A 24-vehicle parking lot will provide access to the rugged hiking trails in the southern portion. This access will be used by backpack campers, hikers, hunters and cross-country skiers.

Trails

The primary access throughout the area will be by pedestrian trail because of restrictive topography for roads, lack of public access, and a desire for a portion of the area to be relatively undeveloped. Hiking trails will be divided into two categories according to their level of use and proximity to the hub of activity. The level of recommended construction improvement is dependent upon this classification.

Primary Interpretive Trails. These will be the popular highly used trails which will connect the recreation facilities and interpretive features within the area. They will be the most heavily structured with step surfacing, edging and trail structures to protect the adjacent resources from user impacts as well as provide an easy walking surface. There will be 7 miles of trails in this category.

Long-Distance Trails. These trails will receive less use than the interpretive trails and will generally traverse the southern portion of the area. Nine miles of trails will be provided for long-distance hiking, hunting, cross-country skiing and snowshoeing.

Multi-use trails to include equestrian and snowmobile use were originally considered. The primary reasons for extending the prohibition of snowmobiles and equestrians were: the long narrow shape of the area and its dissection by extremely steep ravines covered by soil with severe use limitations; and the presence of cultural resources, and sensitive or endangered plant species throughout the site.

Bicycle Trail. While the topography is equally restrictive for bicycle trails, the Mines of Spain may someday be a staging area for the Heritage Trail if a connection can be made through the city of Dubuque.

Future Land Acquisition and Developments

Future land acquisition to the Mines of Spain State Recreation Area is desirable where the acquisition promotes the goals and objectives identified for the area. Acquisition is seen as important in the following three areas:

1. Additional land near E.B. Lyons should be acquired to provide overnight facilities, i.e. campground and/or an area to locate rental cabins and tipi.
2. Additional land in the southern end is needed to provide better public access.
3. Additional land should be considered for a buffer or protection zone to prevent commercial or large scale residential developments adjacent to the property. This would include land between the existing property and the surrounding roadways.

Vehicular Campground and Cabins

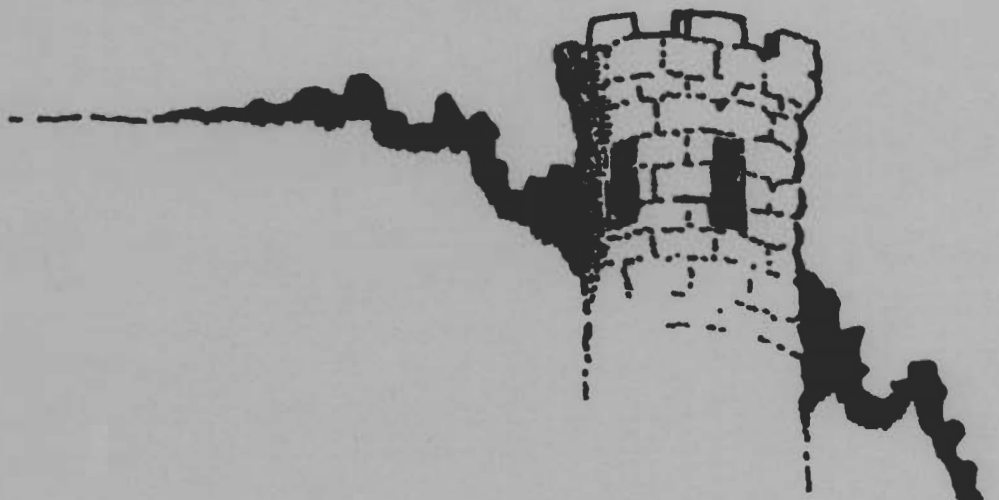
A need for traditional overnight facilities was identified early in the planning process. An appropriate location however, could not be found after an analysis of the site for a relatively flat area of a desirable size, configuration and location to other planned recreation facility developments. A traditional vehicular campground, rental cabins and tipi will be developed if additional suitable land in an appropriate location can be acquired and if the need for such facilities still exists.



Traditional Campground Development Dependent on Additional Land Acquisition



Proposed Rental Tipi



**ARCHITECTURAL THEME,
SIGNAGE AND SITE ACCESSORIES**

Architectural Theme, Signage and Site Accessories

Architectural features will harmonize with the landscape utilizing a rustic theme with energy conscious features and siting. "Rustic" is defined here as constructed of native materials, wood and stone with a proper scale to achieve a harmony with the natural surroundings. Architectural features will be straightforward with a post and beam construction and a low profile roofline. Durable low-maintenance materials and selective use of glass, texture and color will reflect the qualities of the site.

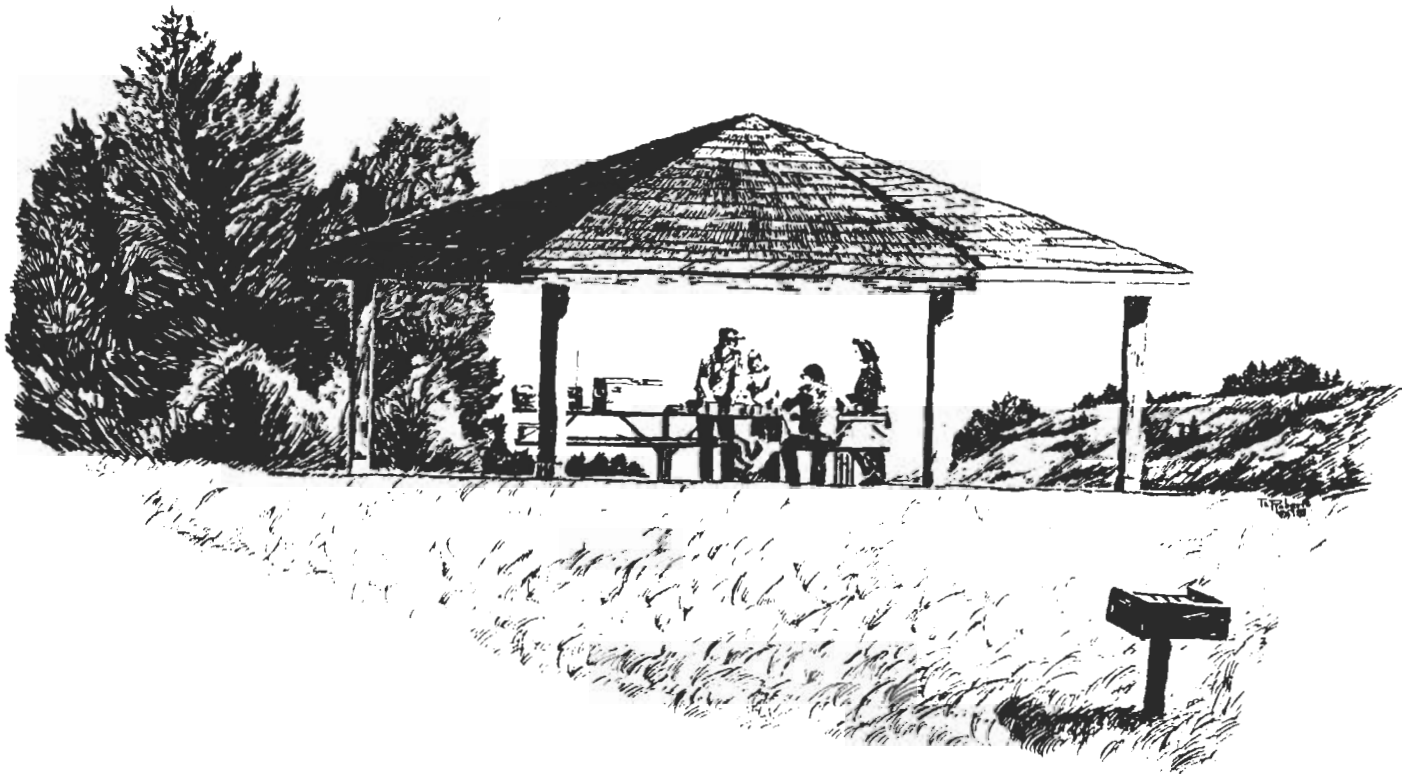
The two dominating architectural features currently on the area are E.B. Lyons Interpretive Center with its massive beams and use of glass and the Julien Dubuque Monument constructed of native limestone. The proposed rustic-style buildings will complement these existing features and provide a unified recognizable theme for the area.

The following graphics illustrate the general theme and design intent. Further refinement will be required in final design stages.

The various structures are described and shown on the following pages.

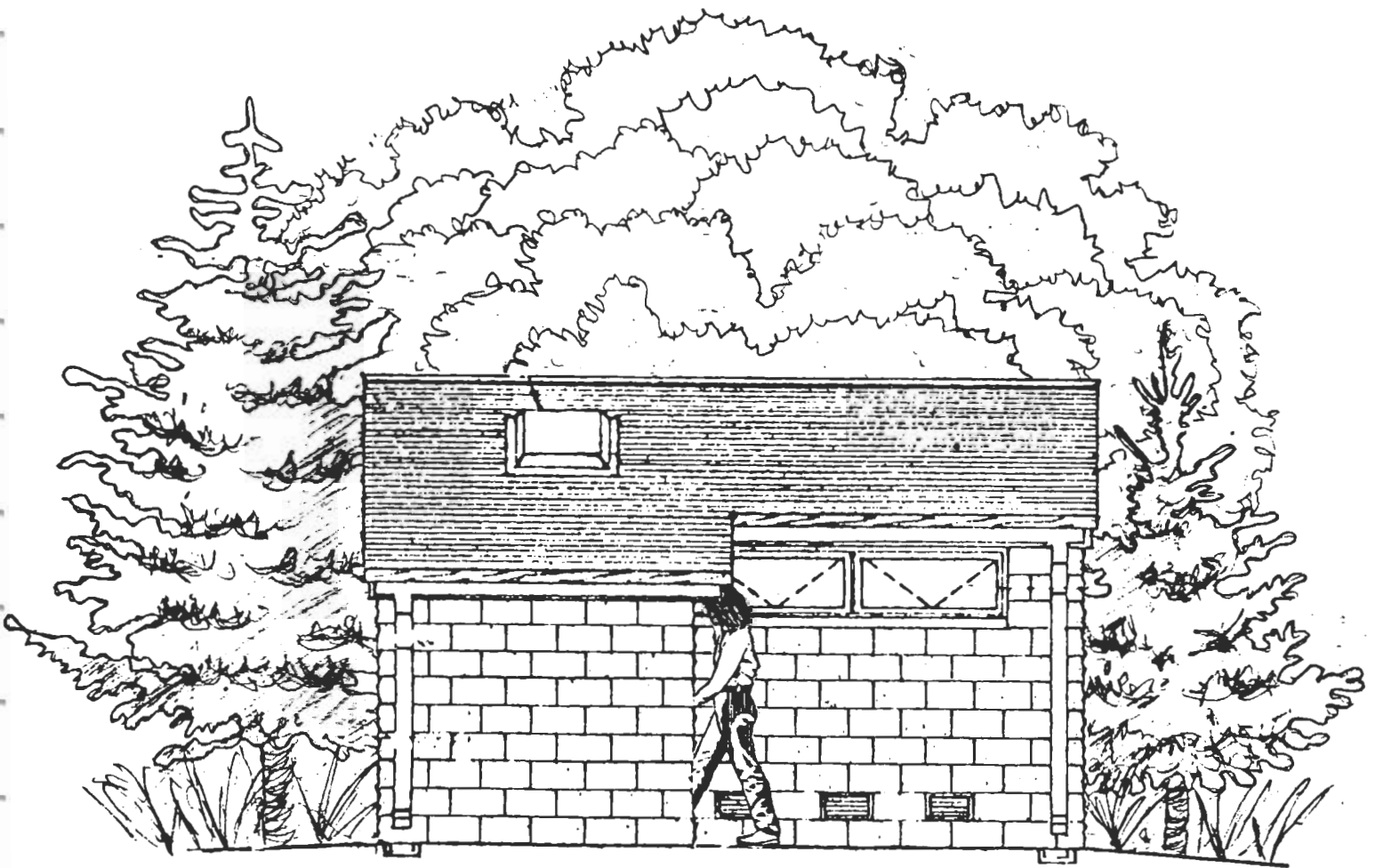
-- Open Shelters

These structures will employ a octagon shape. This shape of picnic shelters will reflect both the pod concept of E.B. Lyons Interpretive Center and the cylindrical shape of Julien Dubuque's Monument. The octagon was also commonly used during the CCC era, when many of Iowa's parks were constructed.



-- Restrooms

Both the modern flush toilet and the pit vault toilet will employ the DNR standard design constructed of rustic stone face block. These standards will be modified to incorporate a simple hip roof line.



Restroom

-- Park Office/Visitor Orientation Building

This building will be a solid wood structure. Passive solar features and other energy-conserving techniques such as generous roof overhangs, sun screening devices, natural lighting and ventilation systems will be incorporated into this building.



-- Maintenance Building

This building will be the standard design. It will be carefully located behind the park office/visitor orientation building to be as visually unobtrusive as possible. A vegetative screen will be included around the security fence to block the view from the road.

-- Staff Residence

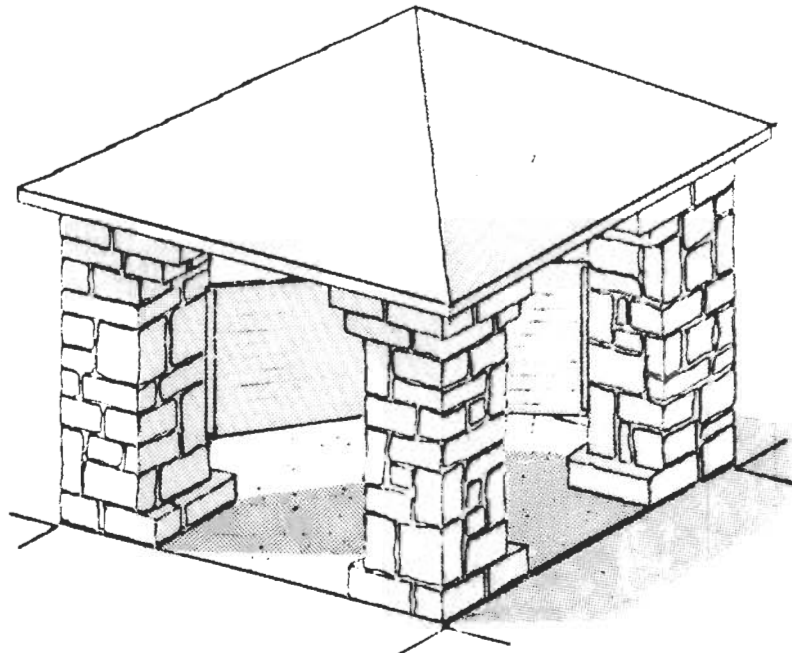
A residence will be constructed on the most suitable location near the entrance to provide area security and staff presence.

Signage

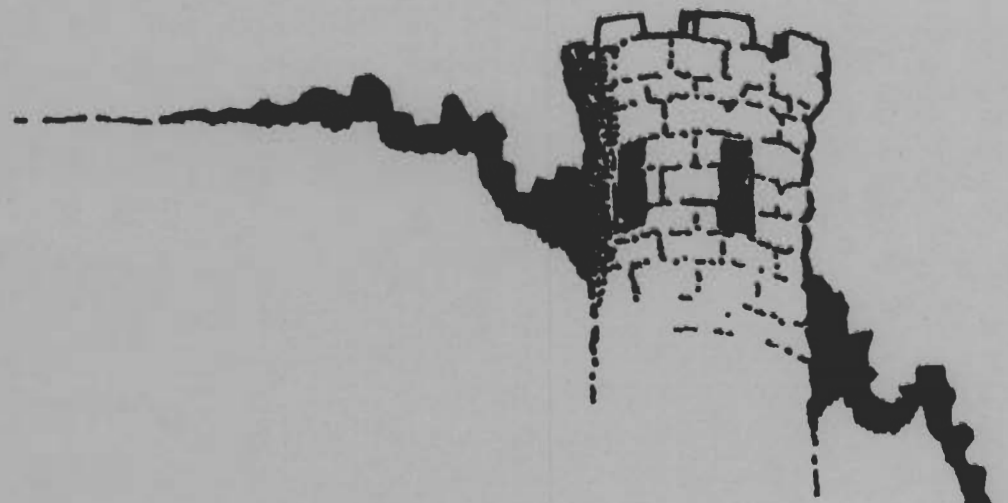
The sign system will be consistent with the DNR Parks Bureau Sign Policy. Purpose of signs is to convey effective and concise information (rules and regulations) and to inform the public of the facilities/features available and direct them to these in a direct and unobtrusive manner. The entrance sign will be constructed of limestone and wood.

Site Accessories

Site accessories should be carefully chosen and selectively located to complement and harmonize with the site's major facilities. Functional design, strong construction and durable materials will ensure long life and efficient use. A minimal number of designs, materials and finishes will be used for aesthetic unity.



Informational Kiosk



RESOURCE MANAGEMENT

Resource Management

The third major component of this master plan is the resource management program. Protection, conservation, and enhancement of the resource base, especially the area's significant cultural and natural resources, is an overall goal of resource management plan. Prescribed management methods will be targeted to the area's ecological health, visual qualities as well as its recreation and interpretive potential.

The following resource management procedures have been prescribed after analysis and synthesis of resource studies by members of the DNR staff task force and the Mines of Spain Scientific and Historic Advisory Committee.

Vegetation Management Plan

The vegetation management plan is based on the overall goal of resource protection, conservation and enhancement by actively managing the area to ensure that examples of pre- and post-settlement vegetation are maintained and for the enhancement of wildlife populations. The plan classifies the Mines of Spain property into five vegetation zones, each with one or more subdivisions which specifically identify an area or a project. A map depicting the location of these zones, and subdivisions included, follows. Each item is briefly described in the text below.

Non-Intensively Managed Native Vegetation

Features in this category will be protected from major disturbances in order to promote the development of old-growth forest. Low-intensity management such as selective control of exotic plants, limited clearing of shrubs and small trees around certain historical sites, and occasional harvest of individual, highly valuable walnut trees may be conducted.

Four features are targeted to receive this special protected status, namely (1) reference vegetation, (2) certain threatened and endangered plant species, (3) certain historical relics, and (4) scenic buffers. Specific areas variously contained from only one to all four features, but these features were often clustered and were therefore pooled for brevity in mapping (Table 1). Lands in this zone include all of the riverfront bluffs, some large and small coves associated with the riverfront, and some small isolated inland sites (Figure 1).

Threatened and endangered plant species whose habitat is protected by this status are the jeweled shooting star (Dodecatheon amythestinum) and the glandular wood fern (Dryopteris intermedia). The shooting star occurs throughout the Mines of Spain area on rimrock habitats, but the largest populations are apparently concentrated on the river bluffs (Blewett et al., 1983; Lehmann, personal communication). Two other endangered plant species, Great Plains ladies tresses (Spiranthes magnicamporum) and pinweed (Lechea intermedia) are associated with hill prairies to be actively managed and will

be discussed in that section. Summer grape (*Vitis aestivalis*) is known to occur in the northwestern part of the property, and will be discussed under areas for further study.

Old-growth forest to be protected from disturbance under this plan includes (1) maple-basswood forests occupying steep riverfront bluffs and the lower parts of associated coves and (2) oak-hickory forests in the upper ends of riverfront coves (Figure 1). Hill prairies, aspen forests, and silver maple forests occur entirely in the actively managed native vegetation zone as do some occurrences of juniper, maple-basswood, and oak-hickory forests. Certain other juniper groves and oak-hickory forest locations are placed in the further study category. All of these classifications will be discussed in the following sections.

The development of old-growth forests will provide two benefits: (1) it creates a unique component of the total landscape diversity to be utilized by wildlife and observed by visitors (complementing younger, periodically disturbed forests elsewhere on the property) and (2) it provides a unique opportunity to monitor long-term changes in forest composition and structure. With regard to this second point, ecologists often disagree on the successional relationship between oak-hickory and maple-basswood communities (some claiming that oak-hickory is a stable type, others claiming that maple-basswood is the ultimate climax). The establishment of a forest reserve containing both types to be observed over a long period of time is the only way in which this problem can be clearly resolved. Research of this nature could determine whether the oak-hickory type will decline in the absence of man-induced disturbances such as timber harvests. In this connection, the transects studied by Blewett et al. (1983) should be relocated and permanently marked for later reference.

In general, timber harvest will not occur within the nonintensive management areas with the exception of possible salvage of individual walnut trees.

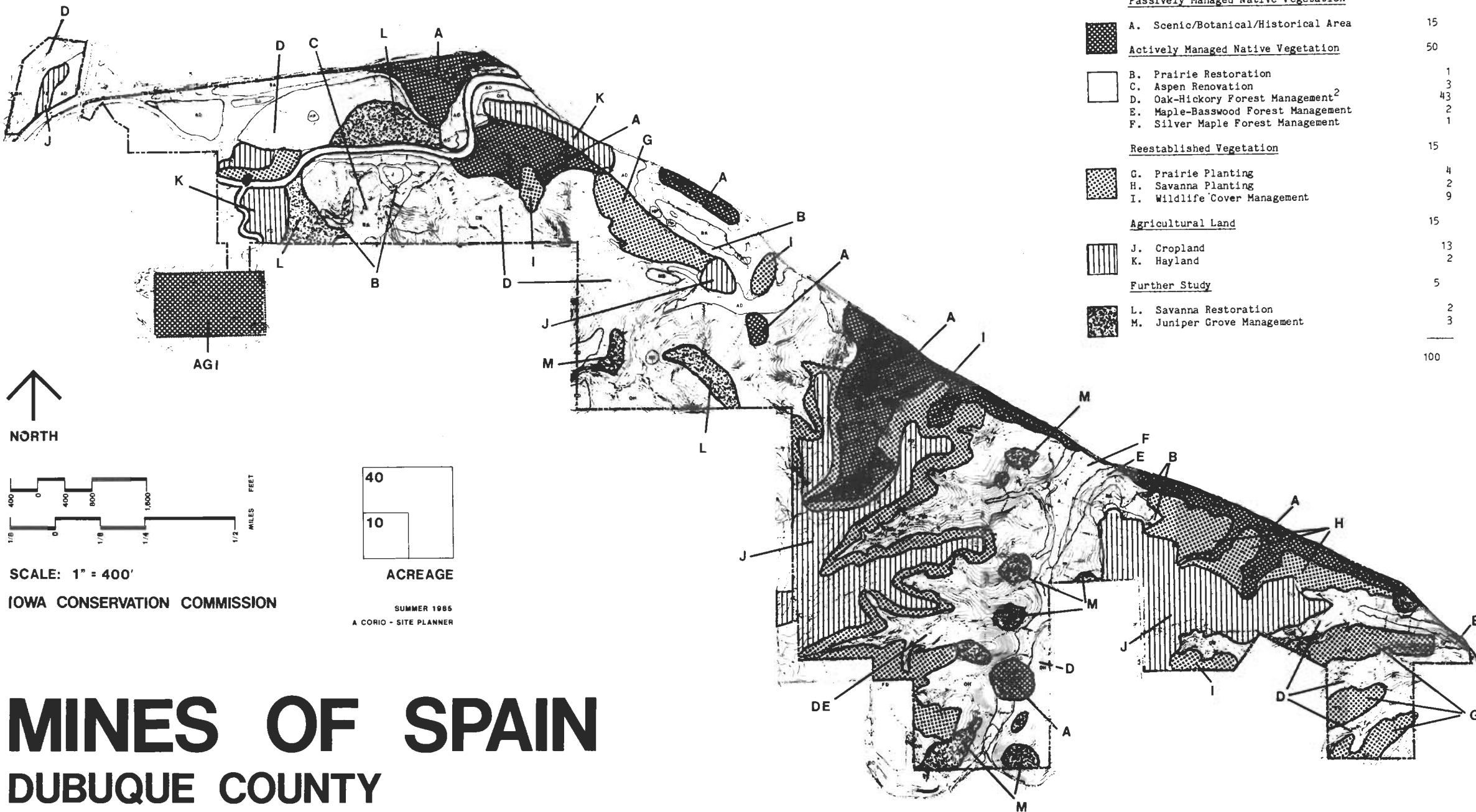
A large concentration of mining pits in the large riverfront cove containing reference vegetation is contained within the passively managed zone.

A small area (about 1/2 acres) of mining pits within this concentration will be selected as an historical interpretive site and managed to maintain and enhance visibility of the pit-and-mound topography by limited clearing of shrubs and small trees. The vegetation of the remainder of the mining pits area will not be manipulated (except for walnut salvage as described above) so as to permit observation of the all-aged forest structure described by Blewett et al. (1983).

Intensively Managed Native Vegetation

Consistent with the management goal to provide examples of pre- and post-settlement vegetation, five vegetation types occurring naturally on the Mines of Spain property are targeted to receive more intensive management to enhance their value as wildlife habitat and/or to prevent their loss through natural succession. Accordingly, specific projects to be implemented under this proposal are: (1) hill prairie restoration, (2) aspen renovation, (3) oak-hickory forest management, (4) maple-basswood forest management, and (5) silver maple forest management (Table 1). A two-tiered priority ranking will be used to identify the above projects as high-priority (requiring immediate

Table 1. Proposed vegetation management zones and projects for Mines of Spain with associated acreage.



	% of MOS ¹	Acres ¹
Passively Managed Native Vegetation		
A. Scenic/Botanical/Historical Area	15	195
Actively Managed Native Vegetation		
B. Prairie Restoration	1	15
C. Aspen Renovation	3	40
D. Oak-Hickory Forest Management ²	43	565
E. Maple-Basswood Forest Management	2	20
F. Silver Maple Forest Management	1	10
Reestablished Vegetation		
G. Prairie Planting	4	50
H. Savanna Planting	2	30
I. Wildlife Cover Management	9	115
Agricultural Land		
J. Cropland	13	170
K. Hayland	2	25
Further Study		
L. Savanna Restoration	2	30
M. Juniper Grove Management	3	35
	100	1,300

SCALE: 1" = 400'
IOWA CONSERVATION COMMISSION

SUMMER 1985
A CORIO - SITE PLANNER

MINES OF SPAIN

DUBUQUE COUNTY

attention) and moderate-priority (as time permits). High priority projects include hill prairie restoration and aspen renovation while moderate priority projects are the management of oak-hickory, maple-basswood, and silver maple forests. The rationale for this distinction is that the prairie and aspen communities are more prone to rapid natural succession while succession in the other three communities occurs at a slower rate.

Hill prairies to be restored through a program of prescribed burning and brush control are basically those recommended by Blewett et al. (1983), namely those in the Catfish Creek area (including the Julien Dubuque Monument), the Horseshoe Bluff quarry slope, and the southern part of the Mines of Spain property. Ideally, all prairie remnants should be restored, but limited staffing requires that restoration of inaccessible or less diverse sites be deferred until sites with greater potential have been adequately treated. Accordingly, the hill prairie atop the steep riverfront side of Horseshoe Bluff and a small, eroded prairie at the extreme north end of the property are placed in this low-priority category. The populations of two endangered plant species associated with the hill prairies, Spiranthes magnicamporum and Lechea intermedia, will be monitored as part of the restoration effort. These species should benefit from the proposed restoration.

Aspen communities are located in three general locations in the Mines of Spain. The largest area with the best potential for renovation occurs on the slopes immediately south of Catfish Creek (Figure 1). This stand is associated with hill prairies and juniper groves also within the actively managed zone. Aspen renovation will be based upon a 50-year rotation involving the periodic creation of several small clearcuts. Specifically, the 40 acres of aspen forest in the Mines of Spain will be divided into ten 4-acre units, one of which will be cut every five years. Once a given stand is cut, it will remain undisturbed for 50 years. Aspen is a light-demanding species which will not regenerate except where the forest canopy has been removed. Forest fires formerly provided this disturbance, but the widespread suppression of wildfire in modern times requires that artificial disturbances (i.e., timber harvesting) be employed to maintain this community. Young aspen stands provide readily accessible forage preferred by deer. The renovation of aspen forest would, therefore, increase the attractiveness of the Mines of Spain for this species. As with all of the forest areas to be intensively managed, harvest areas would be irregularly shaped and designed to resemble a natural mosaic.

Management of oak-hickory forests is designed to perpetuate the dominance of oak species and prevent their succession to maple-basswood forests. This type is considered to be either climax or subclimax, depending on dryness of the site (Eyre 1980; Cahayla-Wynne and Glenn-Lewin 1978). Blewett et al. (1983) found that the maple-basswood type was apparently expanding into some, but not all, areas presently occupied by other species on the Mines of Spain. To ensure that all options are exercised for maintenance of the oak-hickory type at the Mines of Spain, intensive management is recommended to complement nonintensive management elsewhere (see above). The areas selected for intensive management of oak-hickory forests include those west of Horseshoe Bluff and in Cattese Hollow. Shelterwood or clearcut harvesting is the treatment recommended to perpetuate oak species (Sander et al. 1981; Burns 1983). A 100-year rotational system involving periodic harvests of small areas can be developed to meet this need. In particular, the 200 acres of well-stocked oak-hickory forest on the Mines of Spain will be maintained by

the creation of twenty 10-acre patches, one of which will be clear cut every five years. After a given patch is cut, it will not be disturbed for another 100 years. Harvesting alone may not necessarily result in oak dominance because of competition from mesophytic species, suggesting the need for additional treatment in the form of prescribing burning or application of herbicides (Lorimer 1985). A detailed management plan for the oak-hickory forests on the Mines of Spain will be developed with these considerations in mind. This management is designed to result in an oak-hickory forest consisting of a variety of size classes instead of a more monotonous, unmanaged cover. This habitat diversity is desirable from a wildlife management perspective; in particular, ruffed grouse (Bonasa umbellus) populations are expected to increase (Little and Sheets 1982).

Maple-basswood forests on the Mines of Spain occur on nearly all of the riverfront bluffs and associated coves as well as on some inland slopes (Figure 1). Those on the bluffs and in the large cove selected as a vegetation reference will be managed nonintensively, but those in Cattese Hollow and in the vicinity of Horseshoe Bluff will be intensively managed. The primary purpose of this management is to diversify the available wildlife habitat. Uneven-aged management can be applied to this forest type (Nyland et al. 1981; Burns 1983). There are approximately 200 acres of maple-basswood forest in the intensively managed vegetation zone. One-third of these will be selectively cut every five years. A given area will be cut only once every fifteen years. A higher diversity of plant species will be maintained in comparison to an undisturbed forest because light-demanding species will persist as a component of the community. In turn, this diversity will enhance wildlife habitat. Careful planning of harvests and inventory of maple-basswood forests will be carried out to avoid disturbing sensitive botanical and archaeological sites, especially in Cattese Hollow where rock shelters are known to be concentrated.

The largest stand of silver maple forest on the Mines of Spain occurs at the mouth of Cattese Hollow; a smaller stand exists as a narrow strip along Catfish Creek. Both areas are zoned for intensive management (Figure 1). As with the other intensive managed forest types, a major goal of management is to increase size class diversity for wildlife. Even-aged management, particularly clearcutting, is the practice recommended for regeneration (Burns 1983).

Reestablished Vegetation

The objectives of reestablishing vegetation on cropland are (1) to reduce erosion from steep, unvegetated slopes, (2) create wildlife habitat, and (3) reconstruct examples of the original native vegetation. In almost all cases, these projects will involve planting of native trees, shrubs, or herbs on land currently or recently cropped; in addition, a few small ponds will be developed in the heads of forested ravines. Three specific projects are proposed: (1) prairie reconstruction, (2) savanna reconstruction, and (3) wildlife habitat development. High-priority status will be assigned to prairie reconstruction and wildlife habitat development while savanna reconstruction will receive a moderate-priority status.

Prairie reconstruction will occur in three general locations on the Mines of Spain: (1) on three fields in the extreme southern end of the property, and (2) along the new entrance road on previous upland fields, (3) in the valley

immediately west of Horseshoe Bluff (Figure 1). Indian grass has already been planted in the first two locations with early indications of success. The addition of other native grasses and forbs (broad-leafed herbs) to these prairies should be a long-term goal. Periodic burning and/or haying will be necessary to maintain these prairies in good condition.

Savanna reconstruction will be similar to prairie reconstruction with the addition of widely spaced plantings of bur oak, black oak, and white oak seedlings. In this regard, Curtis (1959) reported that pre-settlement savannas in Wisconsin contained about 13 trees per acre. The areas selected for savanna reconstruction are three fields on adjacent ridges above the riverfront in the southern part of the Mines of Spain (Figure 1). As with the reconstructed prairie, this savanna will need to be burned or hayed while protecting the tree seedlings until they become well-established.

Wildlife habitat development will involve several activities scattered over the Mines of Spain property (Figure 1). These include: (1) planting of groves of eastern red cedar or mixed groves of cedar and walnut, (2) planting of strips of native trees and shrubs along the boundary between cropland and other vegetation, (3) abandonment of cropland with subsequent vegetative management, and (4) development of artificial ponds and wetlands. A fifth activity, development and maintenance of food plots, cropland, and hayland will also benefit wildlife but will be discussed under the agricultural land section. With regard to the development of ponds and wetlands, it should be noted that the three-acre wetland immediately south of Horseshoe Bluff has already been completed and maybe enlarged during the entrance road. Five ponds will be developed in the heads of upland ravines.

Agricultural Land

Cropland and hayland will be maintained on the Mines of Spain to provide habitat for wildlife, protect certain archaeological sites, and generate income. Two main areas of cropland are located on flat uplands in the southern part of the Mines of Spain; both of these areas will be reduced in size as steep slopes are put into permanent vegetation. Cultivated food plots will be located in the valley west of Horseshoe Bluff and in the extreme northern part of the property. Hayland composed of exotic grasses will be maintained in their present locations north of Horseshoe Bluff and at the confluence of Catfish and Granger Creeks (Figure 1). It is important that these sites be maintained in their present condition to avoid disturbing buried Indian relics.

Further Study

Two intensive management projects will be studied further to determine the feasibility of their implementation: (1) oak savanna restoration and (2) juniper grove management. Restoration of oak savanna by thinning and burning existing woodland is considered for three areas on the Mines of Spain: (1) a south-facing slope above Catfish Creek, (2) a west-facing slope above Granger Creek, and (3) a ridgetop west of Horseshoe Bluff. The first two sites were classified as oak-hickory forest while the latter was classified as a bur oak woodland by Blewett et al. (1983). All three sites contain one or more indications of being former savannas, namely (1) association with prairie remnants, (2) presence of open-grown oaks in the overstory, (3) presence on former savanna soil series, or (4) presence on xeric habitats. However, while

restoration of these site to their supposed pre-settlement vegetation is a desirable goal, exact procedures for achieving this goal are not clearly identified. This problem requires further study (including visits to oak savanna restoration projects in other states) and development of a detailed management plan at a later date. The endangered grapevine species (Vitis aestivalis) has been collected in the vicinity of the northwestern area proposed for savanna restoration; this species will be relocated and monitored to determine its response to restoration of the site. Because other species of the grapevine are known to increase in abundance with disturbance, it is expected that restoration will benefit this species as well.

Several juniper groves were mapped by Blewett et al. (1983) on the Mines of Spain. These communities may have been hill prairies prior to encroachment by eastern red cedar. The juniper groves associated with hill prairies in the Catfish Creek area will be managed as part of the prairie restoration effort, but the potential of the remaining groves for prairie restoration is presently not known. Furthermore, preservation of some groves as wildlife habitat is desirable. A survey should be conducted to determine which groves would be suitable for prairie restoration and for maintenance in their present condition.

See Appendix for "Management Prescriptions for Timber Types."

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Wildlife

Wildlife has been greatly affected by changes in the area habitat over the years. A goal of wildlife management is the enhancement of nongame and game wildlife populations through habitat manipulation. In addition, active wildlife management programs and practices can be tailored to complement other recreational facilities and increase visitor's observation of wildlife. Following is a description of habitats and recommendations for wildlife enhancement as they related to the vegetation management plan.

I. Mississippi River

The river is important to the diversity of area wildlife. Careful observation for nesting eagles is recommended along the river bluffs. Peregrine falcons and osprey migrate over the area as well. Transplant experiments involving nestling falcons have been tried along river bluffs upstream from the Mines of Spain, into Minnesota. If successful transplants occur and new nest sites are established, the same effort could be attempted in the rock ledges of Horseshoe Bluff. The tall isolated character of this bluff offers the best known site on the area for establishment of nesting peregrine falcon.

II. Nonintensively Managed Native Vegetation

Wildlife using these zones will include selected songbirds, plus several cavity-dwelling species including raccoon, opossum, fox and gray squirrel, flying squirrel, screech owl, barred owl, great horned owl, woodpeckers, flycatchers and belted kingfisher. Maintenance of carrying capacity for these and other forest species will be met through protection of selected areas. Artificial nest box programs are not recommended for the area in general. Nest boxes may prove useful along interpretive trails.

III. Intensively Managed Native Vegetation Zones

This category has been suggested for 45 percent of the area as part of the vegetation management study. It will certainly enhance wildlife diversity and associated plant communities. Basic timber types to be maintained are aspen, oak-hickory, maple-basswood, and silver maple.

A. Aspen (40 acres)

The recommended cut of four acres every five years will result in 10-acre stands over a 50-year period. Clearcutting stems two inches or larger in each cut will provide optimum sunlight penetration and result in dense shrub and aspen regeneration. Heavy stem densities will provide maximum carrying capacity for ruffed grouse and deer. An occasional red cedar should be allowed to grow on these aspen slopes. Sixty-three wildlife

species are known to use this species for a portion of their life requirements. Expected shrub growth in the clearcuts includes raspberry, blackberry, sumac, dogwood, hazelbrush, prickly ash, wild plum elderberry and gooseberry. All offer good feeding and loafing cover for a wide range of wildlife.

B. Oak-Hickory (200 acres)

Like aspen, these types thrive on open sunlight conditions. The 100-year rotational cutting pattern offers ideal wildlife benefit. It will result in 10 acres being cut every five years. The resulting "edge effect" around the clearcuts will improve carrying capacity for many wildlife species. The exception will be occasional den trees that can be marked during the timber cruise to be left. Tree tops and slash should be left to lay throughout the cut area.

C. Maple Basswood (200 acres)

Selective cutting and thinning has been recommended for this timber type. The majority of this type is found along Cattese Hollow. The lower reaches are comprised of numerous meanders in the small stream and occasional ground seeps. These areas act as important wintering areas for wild turkey. The protected nature of the canyon and associated canopy timber provides aquatic plant life that is available to the birds during periods of rough winter weather. It also acts as production, feeding and loafing area for cavity dwellers such as the pileated woodpecker, wood duck, raccoon and owls. A coordinated effort will be made to save denning trees and to designate future den trees during selective logging operations.

D. Silver Maple (10 acres)

Management of this stand type will have an effect on cavity dwelling species also. Acreage is limited to the lower floodplain of Cattese Hollow. The above management considerations apply to this area as well.

IV. Cropland

The "edge" between different cover types on the cropland base have increased since state ownership as prescribed in the 1981 interim management plan. A combination of tree and shrub planting on selected contour strips and rotational row cropping have greatly increase the linear distance of interface between two or more cover types. This practice increases the number and distribution of given species and the range of species on these lands.

V. Wetlands

A. The constructed wetlands at the south edge of the Horseshoe Bluff quarry represents the largest open wetland site on the area. The stop log structure installed in the outlet channel offers excellent water level control potential. If emergent

plant communities establish in typical band formation around the edge of the marsh, the typical marsh wildlife species can be expected to occur (examples include blue heron, green heron, least and American bittern, marsh wren, blue wing teal, mallard, mink, muskrat, beaver, occasional river otter, coot, clapper rail, Wilson snipe, raccoon, skunk). If the emergent band does not establish, a partial drawdown may be in order by removing enough logs from the control structure to expose the desired mudflat acreage around the edge of the marsh. As plants begin to grow, logs will be replaced so that water levels do not flood the new growth. Cattail tubers can be transplanted into these mudflats if they do not begin to occur naturally. If marsh vegetation becomes excessive, the water level will be raised to drown out portions of the plant community. A 60 percent vegetation-40 percent open water ratio should maintain optimum plant and wildlife species diversity.

- B. Upland Watering Areas. Small one-quarter to one-half acre watering sites are recommended at a number of upland areas. These areas can be selected by the area manager after observing local wildlife movements. A minimum of five sites distributed over the area are recommended. Shallow depressions holding 12 to 24 inches of water would be adequate. Ravine heads seem to be logical construction points. Lowhead berming with drop pipe structures to relieve high water levels will be designed into the small berm and should prove adequate in small watersheds. The Maquoketa State Wildlife Unit personnel and equipment can be utilized for construction of these structures when locations have been determined by the area manager and management biologist. These small impoundments will act as favored watering areas for selected songbirds, white-tailed deer, wild turkey and other wildlife.

Aquatic Resource Management

The goal is to enhance and protect the aquatic resources within the area. The following describes management recommendations of these resources.

Mississippi River

Access to the river from the MOS and to the MOS from the river was considered, but would require crossing an active railroad right-of-way and be both very difficult and dangerous. Therefore, no development is recommended at this time along the Mississippi River adjacent to the MOS.

Catfish Creek

Lower Catfish Creek could provide a limited small boat/canoe access to the Mississippi River. Therefore, an improvement of the Catfish Creek parking lot with an access trail/canoe launching facility is recommended. Also, a fishery investigation of Catfish Creek should be conducted to better define fish

utilization of the stream. Recommendations should then be made in an effort to improve existing fish habitat on the lower section of the creek. This could include occasional creek jetties and bank stabilization.

Granger Creek

Because Granger Creek borders the MOS property for only 900 feet, no recommendations are provided concerning the development or management of Granger Creek.

Quarry Wetland

The water control structure connecting the Mississippi River with the wetland should remain closed during periods of high turbidity (early spring) in order to reduce sedimentation of the complex. Hopefully, water gained through ground water percolation and surface runoff and infiltration will be sufficient to fill the complex. Then water level management should include holding the "reduced silt" water for as long as possible. With sufficient water levels of six to eight feet, a sport fishery could be maintained.

Construction of an elevated walkway and observation blind would be a valuable addition for future interpretation of the area. However, if it becomes difficult or impossible to hold sufficient water to maintain marsh-like habitat, the elevated walkways and an observation blind will not be constructed.

New Lake/Pond Construction

The Dubuque County SCS office has identified nine possible locations where pond/wetland complexes could be built. Construction of pond/wetland complexes could add valuable fish and wildlife habitat to the MOS upland areas. Ponds in excess of one-half acre and eight-foot minimum depth could support a limited sport fishery. Therefore, it is recommended that a minimum of two deep-water ponds and three shallow-water ponds be considered for construction as funds can be made available. The selected locations and priority for construction of the ponds are indicated.

Geology

A description of geologic resources and recommended management follows.

Regional Physiographic Features: Silurian Escarpment, Sinsinewa Mound, and Mississippi Valley and Blufflands

These features are scenic and significant to the interpretation of the regional geology and landscape evolution. These features are best seen from the Julien Dubuque Monument, the Horseshoe Bluff Overlook, and the ridgetops in the southern portion of the property where elevations approach 850 feet above sea level. These sites will be managed to maintain open vistas to the distant features, and sites will be accessible by foot trail.

POTENTIAL POND SITES

RECOMMENDED :

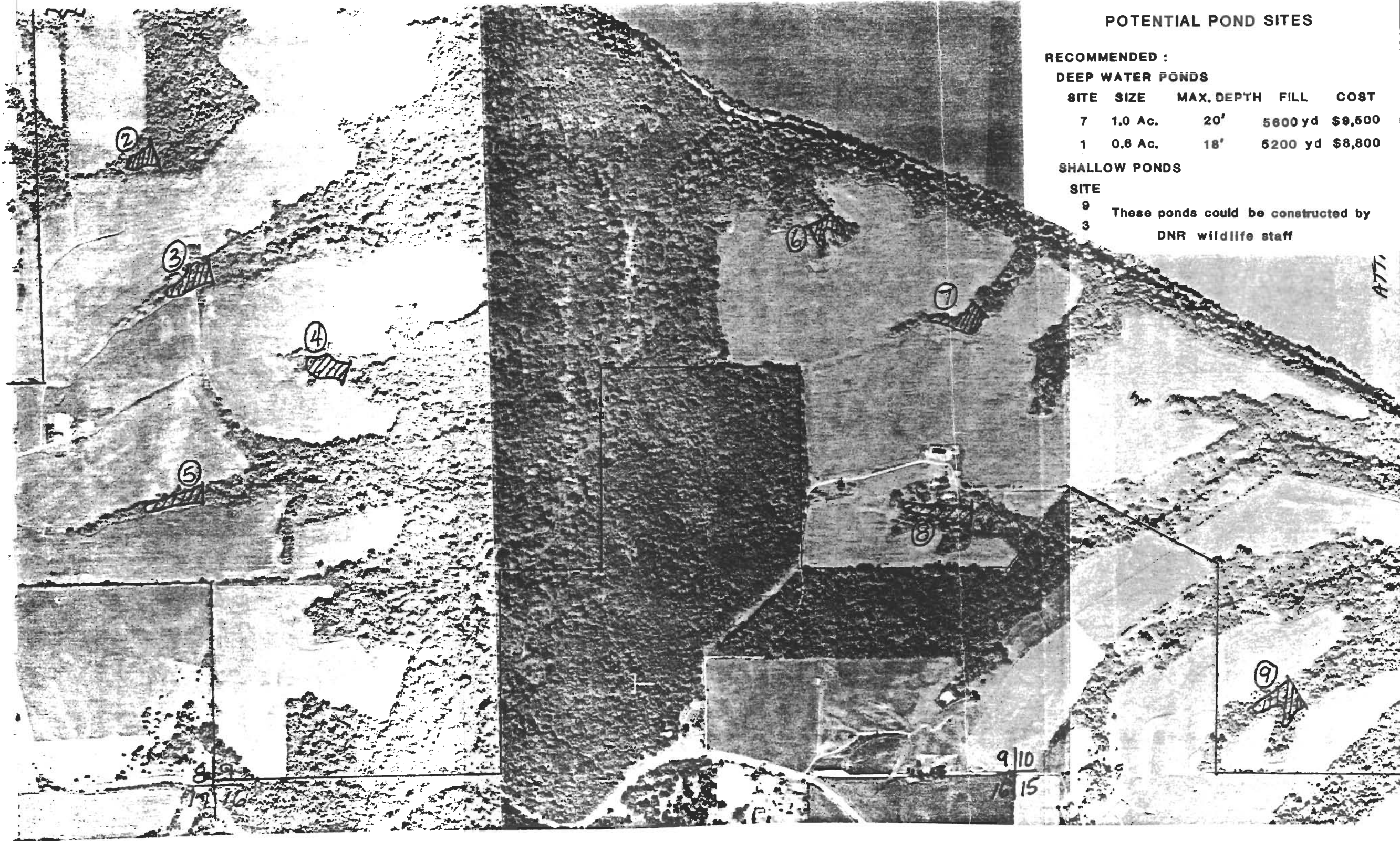
DEEP WATER PONDS

SITE	SIZE	MAX. DEPTH	FILL	COST
7	1.0 Ac.	20'	5600 yd	\$9,500
1	0.6 Ac.	18'	5200 yd	\$8,800

SHALLOW PONDS

SITE

9
3 These ponds could be constructed by
DNR wildlife staff



ATT.

Upper Mississippi Valley Lead/Zinc District

The Mines of Spain is an excellent site for examination of the geologic occurrence of lead/zinc ores known as "Mississippi Valley Type" deposits. The shallow depths of these ores in vertical crevice and cave systems developed along the regional fracture patterns in the Galena Group rocks have contributed to a long history of mining activity and geological investigations in the Dubuque area.

Access will be restricted to all mine openings in order to protect remaining veins of galena from collectors, protect remaining relics of the mining history and technology, and protect visitors from the hazards associated with unstable underground and surface conditions. A gate may be necessary at the Fessler #2 Mine. Access should be limited to research activity to recover the maximum amount of archaeological, historical, geological and biological information, and on the geologic occurrence of the ore within the rock strata. Interpretation should focus on early mining history and technology. Fessler #1 will be refurbished for visitor entry. Trails will be available to selected mine sites (pit, shaft, and adit types).

In addition, the location of all mine and cave features should be recorded. The clusters of pit mines throughout the property should be mapped in individual detail. These relatively shallow features may become obscured by vegetation or erosion. It is also possible that the toppling and uprooting of large trees may cause depressions in the surface that will mimic a pit mine. A carefully plotted inventory and selective vegetation management will help to maintain the physical and historical integrity of these features.

Ordovician Stratigraphy and Associated Features (Minerals, Fossils, Sedimentary Structures, Karst, Structural Fracture Trends, Weathered Slump Blocks)

The Galena Group dolomites (Wise Lake and Dunleith Formations) which outcrop on the Mines of Spain contain a record of marine environments that were present in the midcontinent 400 million years ago. The abandoned quarry at Horseshoe Bluff provides an excellent opportunity to observe numerous geological features and characteristics within these rock units. A trail through the central axis of the quarry, away from the highwalls, will be developed and the quarry floor, as well as large blocks of rocks remaining within the quarry, will be used to observe fossils, minerals and rock characteristics at close range. Climbing on or rappelling from the quarry walls will be prohibited as the rock is weathered, fractured and unstable.

Areas of differentially eroded rock outcrops, associated concentrations of slump blocks, and caves should be protected from development or disturbance except for foot trails. Cattese Hollow is especially rich in these features as are the rimrock blufflands which border the Mississippi Valley.

Features Associated with Quaternary History and Drainage Evolution

Floodplain and terrace deposits, alluvial fans, entrenched valleys, incised meanders, rock-cored meanders, abandoned channels, a hanging valley, and examples of stream capture characterize the valleys and drainageways of the Mines of Spain. These features are also tied to significant topographic evidence of past drainage evolution in the city of Dubuque and at the Little

Maquoketa Mounds Preserve north of Dubuque. These features relate to the history of the Upper Mississippi Valley, and the influence of glacial activity on its development. Their shapes and underlying materials should be protected from obscuring or destructive development. Sediments within these features have significant geological and archaeological research potential. Trails will be routed to enable observation of these landscape features. The floor of the abandoned valley around Horseshoe Bluff, one of the site's prominent features, will be enhanced for observation by the planting of prairie species with minimal tree planting.

It is probable that additional features and sites of geologic significance will be identified in the future. Planning efforts will be flexible enough to recognize and protect, to the degree necessary, those discoveries that come with further exploration or research.

Archaeology

The archaeological resources of the Mines of Spain represent a nonrenewable resource and will be accorded proper management and protection.

Following are the archaeological management recommendations:

A Phase I Archaeologic Survey has been conducted on all existing property and will be conducted on any future acquisitions.

Prior to any construction, the Department of Natural Resources will consult with the State Historic Preservation Officer to determine what effect such activities may have on previously identified sites. Should the activity affect an archaeological site, it will be evaluated for its integrity and significance. Such evaluation will consist of an intensive site survey or testing program.

The Department of Natural Resources will contact the Office of the State Archaeologist concerning activity that will affect any site involving ancient human remains as specified under the provisions of the Iowa Code 305A.7-9.

Management of mounds will be carried out as in the prescribed management practices of Effigy Mounds National Monument and are excepted below.

The purposes of mound maintenance, in priority order are:

1. Preventing deterioration of, or damage to, mounds.
2. Retaining the natural appearance of prehistoric times on and around the mounds; and
3. Having mounds visible and accessible to visitors.

The major problem in mound maintenance is striking a balance between preservation and the natural forest environment. The prehistoric forest consisted of large, mature trees which were widely spaced; probably averaging 30 to 40 feet from each other. Mounds were built in cleared spots between trees. As a general rule, the area should appear as it did just after a mound or mound group was constructed.

MOUND PRESERVATION:

1. A grass cover is maintained to prevent erosion. Leaves, shade, and other factors which retard grass growth should be removed as much as possible.
2. While mowing, the lightest equipment available should be used to prevent wheel scars. The ground should be dry and firm. Hacking or gouging with mower blades is to be avoided. While mowing mounds, depending on grass growth and other considerations, blade height should be between 4 to 6 inches.
3. Trees growing on mounds are to be removed. Stumps should be removed down to about 6 inches below ground level. The resulting cavity is then filled with clean dirt; not with wood chips or other perishable material. Grubbing of roots causes extensive damage and should not be done. As the root system decomposes, additional dirt is placed in the cavity to prevent depression.

It is important to keep records. After a number of years it is difficult to distinguish a tree hole from a "pothunters" pit.

Whenever possible the bottom of a stump cavity or pit should be marked with some modern artifact. Some archeologists use poker chips. A flattened beer can works well to mark the limit of modern mound disturbance.

4. Trees and brush should not grow within about 8 feet of a mound. When brush is not kept back it tends to produce trees which "crowd" mounds and will, eventually, have to be removed.
5. At no time should vehicles of any sort be driven onto or across mounds. Unnecessary walking on mounds should be avoided. Whenever possible trails, paths, and roads should be situated and plainly visible to avoid inadvertent mound traffic.
6. All mowed mounds should be raked thoroughly in early spring and late fall. Special attention should be paid to mound borders where compacted leaves are found. If this is not done grass will not grow and soil erosion occurs.

Areas Adjacent To Mounds

- 1) With power mowers, it is often easy to create artificially straight forest-grass borders. One way to avoid this is to follow the natural lines created by large trees at the edge of mowed areas. Where this is not possible the mower operator should steer a jagged course for a more natural look.

- 2) Sawn logs should be taken into woods away from view. Piling of chain saw debris around borders of cleared areas should be avoided.

Visibility

Mounds along the interpretive trail should be visible from the trail so that visitors will not be encouraged to leave designated paths or to walk on the mounds. In some cases tree growth areas will partially obscure a mound. The general rule should be that all or most of a mound should be visible from the point on the trail closest to it.

Isolated Mounds

Despite the fact that visitors will probably not see them, the following management prescriptions will apply:

1. Trees should be removed from the mounds.
2. Trees close to mounds with roots growing into mounds should be removed.
3. Heavy brush should be cleared from isolated mounds at least once a year; preferable in July when thickest.
4. Mounds should be inspected periodically for signs of erosion, illegal tampering, or other damage.
5. "Suckers" from sawn stumps should be removed whenever seen.

It is important that each mound be maintained according to its specific needs. Variables such as shade, rainfall, visitor load, grass growth, etc. should be evaluated at each site at least annually. It is important that all workers thoroughly understand decisions and standards and the reason for establishing them.

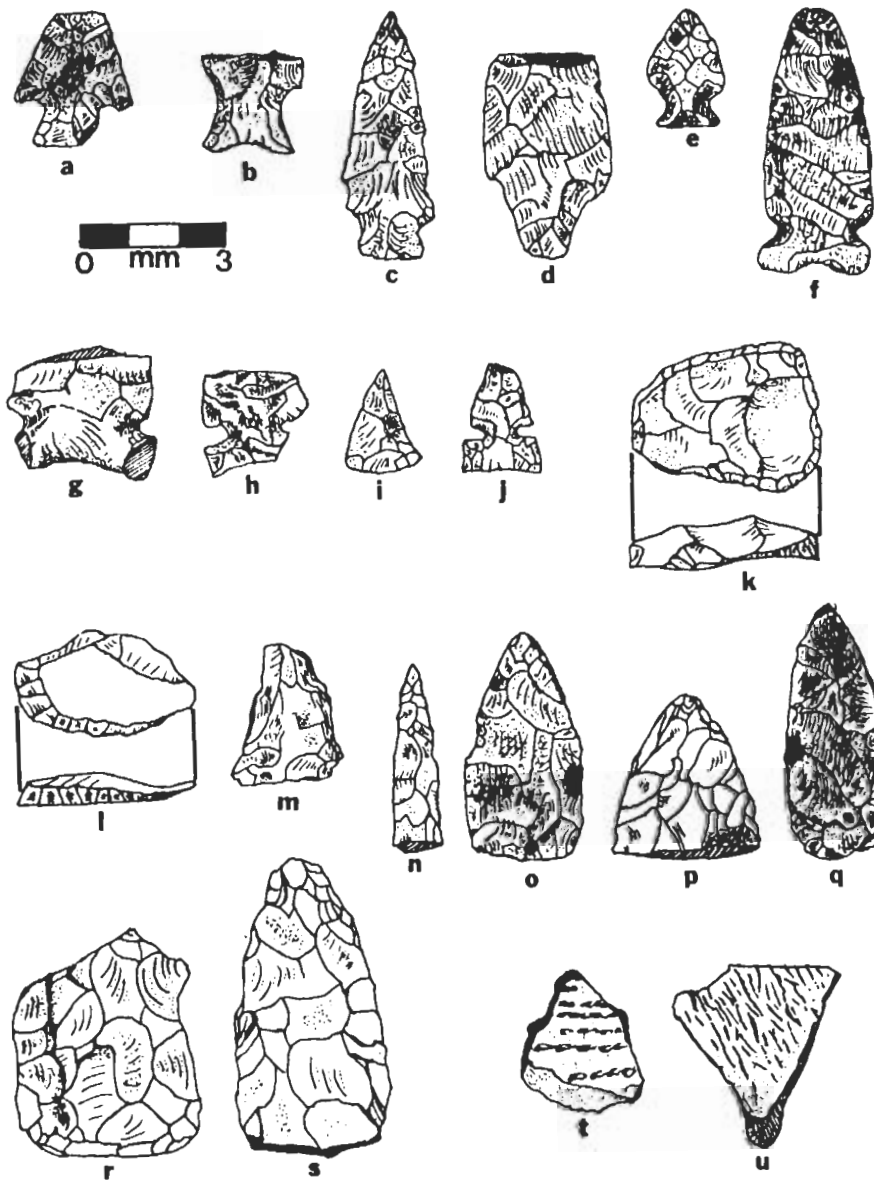
SOURCES

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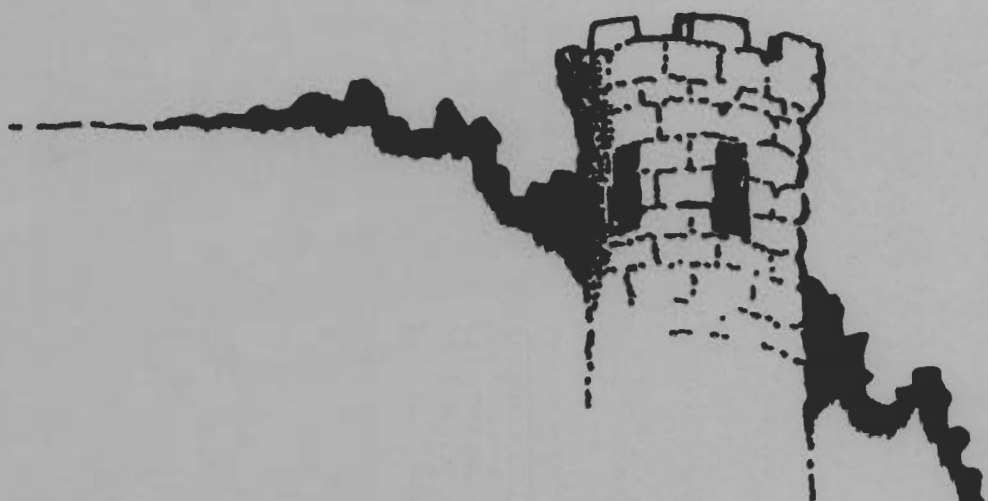
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Artifacts from the Mines of Spain area. a-j, projectile points; k-l, end scrapers; m-n, drill fragments; o-s, bifaces; t-u, ceramics.



**PHASING SCHEDULE
AND COST ESTIMATES**

Staff Requirements

In determining staff requirements and management implications of the Master Plan, consideration must be given to seasonal fluctuations of visitation, public demand for facilities, required staff service to maintain the resources, the quality of facilities and the desired quality of visitor experience. Visitor impressions are formed by the quality of facilities and the quality of management. Staff requirements also depend upon the number and location of facilities, their dispersion on site and the level of maintenance necessary and desired.

The potential exists at MOS to provide multi-faceted services to the public, especially in the areas of conservation education and resource appreciation. These high public contact programs require a special organization of staff for efficient management and effective public service. The recommended staffing organization is represented below.

Fully Staffed Area Would Consist Of:

- 1 Ranger III
- 1 Maintenance Repair Person
- 2 Naturalists
- 1 Park Attendant
- 1 Secretary
- 4 Natural Resource Aides

Current

- 1 Ranger II
- 2 Park Attendants (1 serves as part-time naturalist)
- 1 Natural Resource Aide

Staffing Changes:

Phase I Staffing Level

- 1 Ranger III (upgraded)
- 1 Park Attendant
- 2 Naturalist
- 3 Natural Resource Aides

Phase II

Add:

- 1 Natural Resource Aid

Phase III

Add:

1 Maintenance/Repair Person
1 Secretary

Phase IV

2 Natural Resource Aides Added to Phase III staff

Staffing phases correspond to Master Plan implementation phases.

Phasing Schedule

PHASE I

Primary Interpretive Trail Development
- Construction and signage

Road Development and Paving

- Entrance road
- Picnic area
- Restructured monument parking lot
- Restructured E.B. Lyons parking lot
- Wetland/quarry parking lot

Pedestrian Bridge Over Granger Creek to Connect E.B. Lyons & MOS

Monument Overlook

Park Office/Visitor Orientation/Maintenance Center

Staff Residence

Sewer and Waterlines

Archaeology Survey

Vegetation Survey

Picnic Area Development

- Pit restroom
- Three (3) shelters

PHASE II

Upland Parking Lot

Fessler Mine Development

- Opening of Fessler Mine

Quarry Overlook

- Step tower
- Walkway security rail
- Geologic interpretive trail

Wetland Development

- Wildlife observation blind
- Marsh walk

Catfish Parking Lot Development

- Modern restroom

Electric, Sewer and Water

Trail Development - Southern Portion

Backpack Campground

Upland Ponds

PHASE III

E.B. Lyons Interpretive Center Addition

Reconstructed Historic Structures

- Miner's cabin
- Mesquakie Indian campsite
- Trapper/trader's house

PHASE IV

Campground Development

Cabins Development

- This phase of development is contingent upon acquisition of suitable area for these facilities and a demonstrated demand.

Preliminary Cost Estimates

PHASE I

Primary Interpretive Trail Development - 9 miles

23,100' trail step construction @ \$15.00/LF	\$ 346,500
29,040' trail requiring cleaning, waterbars or drainage modification @ \$2.50/LF	72,600
Pictorial Interpretive Signs	8,000
Text Interpretive Signs	3,000

Road Development

Entrance Road and Picnic Road Grading, Paving with Retaining Walls	660,000
Road to Monument Grading and Paving	170,000
Catfish Creek Bridge Replacement	150,000
Monument Parking Lot	40,000
E.B. Lyons Parking Lot	40,000
Picnic Area Parking	10,000
<u>Pedestrian Bridge Over Granger Creek</u>	60,000
<u>Monument Overlook</u>	80,000
<u>Park Office/Visitor Orientation and Maintenance Buildings</u>	215,000
<u>Picnic Area Development</u>	
Nonmodern Restroom	35,000
Three Shelters	30,000
<u>Upland Parking Lot</u>	20,000
Sewer and Water	70,000
<u>Staff Residence</u>	75,000
<u>Archaeology and Vegetation Studies</u>	<u>12,000</u>

SUBTOTAL, PHASE I

\$2,077,100

PHASE II

<u>Fessler Mine Development</u>	50,000
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Quarry Overlook

Step Tower
Walkway Security Rail
Geologic Interpretive Trail \$ 90,000

Catfish Parking Lot Development

Modern Restroom 50,000
Sewer and Waterlines (5,280') 70,000

Canoe Access and Fishing Enhancement*

Wetland Development

Wildlife Observation Blind 6,500

Marsh Walk (250') 25,500

Trail Development

Southern Portion (9 miles @ \$1.00/LF) 47,520

Backpack Campground

Six Sites 1,200
Pit Restroom 25,000
Engineering & Design 75,000

SUBTOTAL - PHASE II \$ 460,720

PHASE III

E.B. Lyons Interpretive Center Addition
@ \$75/sq. ft. 2,000 SF \$ 150,000

Reconstructed Historic Features

Miners Cabin
Mesquakie Indian Campsite
Trapper/Trader's House

Study and Construction \$ 120,000

SUBTOTAL - PHASE III \$ 270,000

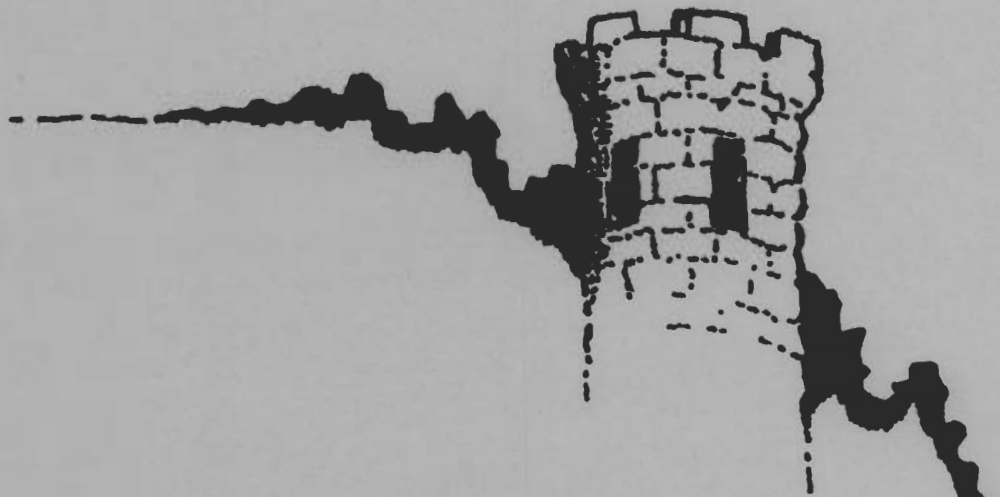
PHASE IV

Campground and Cabin Area Development

Land Acquisition 120 acres (approximately @ \$1,200/acre	\$ 144,000
Campground Loop Road 2,500'	71,025
50 Camping Pads (gravel)	10,000
50 Electrical Units	7,500
Shower/Restroom Building	125,000
Utilities	50,000
Cabin Area	
6 Cabins	80,000
4 Rental Tipi	10,000
Road 2,000'	56,000
Utilities	50,000
SUBTOTAL, PHASE IV	\$ 603,525
TOTAL	\$3,411,345

Preliminary cost estimates made without detailed engineering or architectural study.

*Catfish Creek canoe access and fishery enhancement will be implemented with other funds.



APPENDICES

Site Analysis

The resource analysis was important to identify the significant resources, determine their suitabilities and limitations, and gain an understanding of the interrelationships. The site analysis was primarily based on professional scientific and historic studies which include: geology, vegetation, archaeology, speleology, mammals and historic. A brief summary follows. For more detailed information, refer to the original reports listed in the bibliography.

GEOLOGY

The geologic setting of the Mines of Spain is dominated by the geomorphic impact of the Mississippi River Valley, the surrounding scenic, bedrock-controlled landscapes of the "Driftless Area," and the mineral deposits of the Upper Mississippi Valley Lead-Zinc District.

The Mississippi River Valley is one of the most distinctive physiographic features of the central United States. Its sweeping contours of water, islands, bluffs, rock exposures, and scenic vistas are a geological oasis in the midst of landscapes otherwise committed to the geometric cultural patterns imposed by agriculture. At the Mines of Spain, this island-laced channel is entrenched 200 feet below the surrounding uplands, and is bounded by abrupt blufflands of Ordovician-age dolomite. Another significant regional geomorphic feature, the Silurian Escarpment, forms a visual boundary to the southwest. This prominent, wooded bluffline marks the leading edge of the outcrop belt of Silurian-age rocks in Iowa, and its elevation above the floor of the Mississippi Valley boosts the local relieve in this vicinity to well over 500 feet. To the east, on the Illinois horizon, stands Sinsinewa Mound, an isolated erosional remnant of these same Silurian rocks which were once continuous across the entire region. From the higher elevation on the Mines of Spain, these distinctive features can be observed, as well as overviews of the sharply dissected, bedrock dominated terrain which characterize the Paleozoic Plateau, one of Iowa's principal landform provinces.

The glacial history which affected the North American continent, particularly during the latest (Wisconsinan) glacial episode, had an important influence on the present appearance of the Mississippi Valley, as well as that of Catfish Creek, Granger Creek, and Horseshoe Bluff. Evidence for the landscape evolution and drainage alterations triggered by large floods of glacial meltwater are recorded in the floodplain and terrace deposits, alluvial fans, entrenched valleys, incised meanders, rock-cored meanders, abandoned channels, a hanging valley, and examples of stream capture which characterize the valleys and drainage ways of the Mines of Spain. The prominent abandoned valley at Horseshoe Bluff was once occupied by either Granger or Catfish Creek, both of which took different routes through different valleys to the Mississippi than they do today. These drainage diversions, and the "pirating" of waters from one stream valley to another, are related in time to similar features just north of Dubuque in the Little Maquoketa River Valley, and to the large abandoned channel through downtown Dubuque known as Couler Valley.

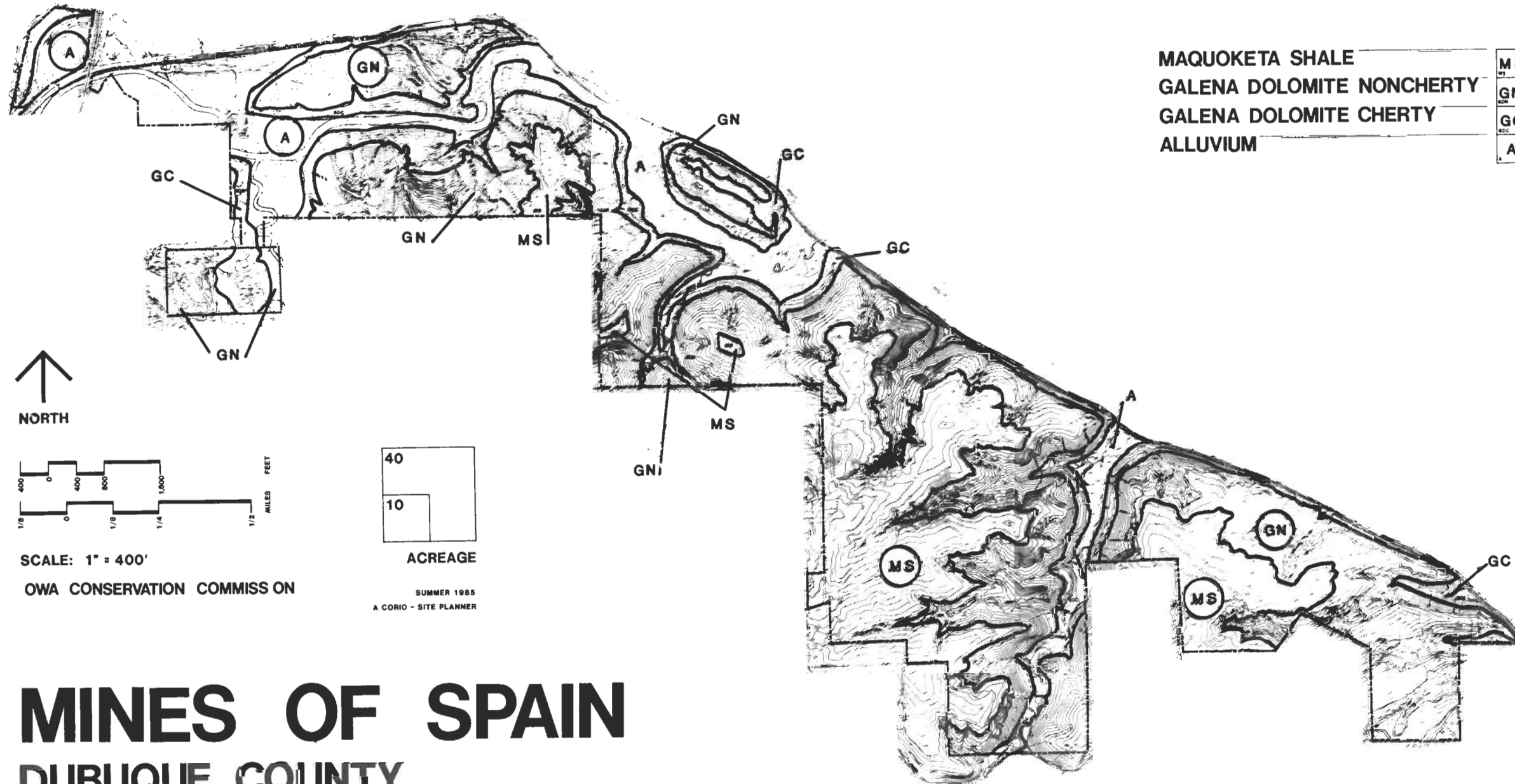
The Galena Group dolomites (Wise Lake and Dunleith Formations) which outcrop the Mines of Spain contain a record of marine environments that were present

in the midcontinent 400 million years ago. The Horseshoe Bluff quarry provides an excellent opportunity to observe the characteristics of these rocks, including calcite crystals, fossils, evidence of karst processes, and vertical crevice systems. Naturally occurring exposures of these rocks elsewhere on the property are important to the site's scenic qualities and to the distribution of biological species and communities. Cattese Hollow is especially rich in picturesque, differentially eroded rock outcrops and concentrations of slump blocks tilted at unusual angles on the ravine sideslopes. The dolomite here, and along the rimrock bluffs which border the Mississippi Valley, display pitted, rough textured surfaces characteristic of carbonate rocks long-exposed to the forces of weathering.

The Mines of Spain is an excellent site for examination of the geologic occurrence of the ore deposits associated with the Upper Mississippi Valley Lead-Zinc District. It was the availability of this resource here, at shallow depths in crevice and cave systems, that supported the Indian-French trading culture exemplified by Julien Dubuque as a unique type of American frontier and put this site on late 17th Century European maps of North America. The mineral galena, the principal ore of lead, was found in linear veins and crevices associated with broad, regional north-south and east-west fracture systems which extend vertically through the bedrock. Movement of mineral-rich, hydrothermal solutions through these fracture openings precipitated the lead ores found here. The Mines of Spain is an exceptional area because of the diversity of geologic conditions which exist, because of its significant combination of natural and cultural resources, and because of its clear demonstration of the role of geology in shaping part of our national history.

GEOLOGY

MAQUOKETA SHALE	MS
GALENA DOLOMITE NONCHERTY	GN
GALENA DOLOMITE CHERTY	GC
ALLUVIUM	A

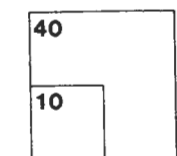


MINES OF SPAIN

DUBUQUE COUNTY

SCALE: 1" = 400'

OWA CONSERVATION COMMISSION



ACREAGE

SUMMER 1985
A CORIO - SITE PLANNER

VEGETATION

The Mines of Spain area has had a complex history of land use which has resulted in vegetation changes over the past 300 years. Early accounts of the lead mining region describes Julien township, now Dubuque city as "heavily timbered land before the time of white settlers." Various land uses altered the appearance and in some cases the shape of the landscape.

Vast amounts of timber were consumed in the Catfish Creek area for lead smelting, the steamship industry and lumber milling. The lumber trade at Dubuque was one of the area's major sources of income. Two miles south of Dubuque at the mouth of Catfish, a steam sawmill was operated having a capacity for logs equal to 8,000,000 board feet of lumber.

Farming in the 1840's resulted in clearing of land for settlements and crop planting. Oak and walnut were so abundant they were indiscriminately cut down to make rails for fences (Calvin and Bain, 1899, WPA 1942). The building of homes, furniture, carriages, and farm implements also used a considerable amount of lumber.

Woodland areas have not been grazed for many years; and no logging has taken place since the turn of the century except for the removal of some walnuts in the 1950's.

In addition to previous land uses, the rugged topography, variation of slope steepness, slope aspect, and differing soil conditions also contribute to the mosaic of vegetation communities. Nine communities were identified on the Mines of Spain with a total of 478 vascular plant species representing 55 percent of Dubuque County flora. A brief summary of each community follows.

Oak-hickory is the predominant community which occurs on upland flats and on south and west-facing slopes. Overstory consists of white, black, and northern red oaks; shagbark and butternut hickories; slippery and American elms; white ash and black cherry. Most of the understory is ironwood and common chokecherry. Dense thickets of shrubs are common and may include arrowwood, viburnum, gray dogwood, prickly ash, hazelnut and gooseberry, blackberry and raspberry. Herbaceous vegetation is sparse.

Maple-basswood thrives on the moist cool sites in the ravines and on steep north and east-facing slopes, mostly on the Mississippi River bluffs, which were inaccessible to disturbances from mining, logging and farming. Canopy trees are sugar maple, basswood, black walnut, northern red oak, white ash, Kentucky coffeetree and elm species. Sparse understory trees include pagoda dogwood and American hornbeam. There are few shrubs but an abundance of herbaceous plants such as ferns and wildflowers.

Alluvial forest occurs in the floodplain and consists of silver maple, willow species, cottonwood and green ash. Herbaceous growth includes nettle, sedge species, jewelweed and horsetail. This community can be found along Catfish, Granger and Cattese Creeks, and along the Mississippi River.

The birch-aspen communities can be linked back to the time when Dubuque was a manufacturing center with a large steamboat builder and a steam powered lumber mill at Catfish Creek. Present aspen-birch probably dates back to the end of the steamboat period.

Some prairie remnants persist on loess caps and southerly exposures in the Catfish Creek area, on the southwest quarry slope, and on a bluff spur at the south end of the property. All have been disturbed in the past, but all have characteristic hill prairie species and common prairie grasses. Less disturbed, small prairie pockets have been found on the northwest facing slope above Cattese Hollow.

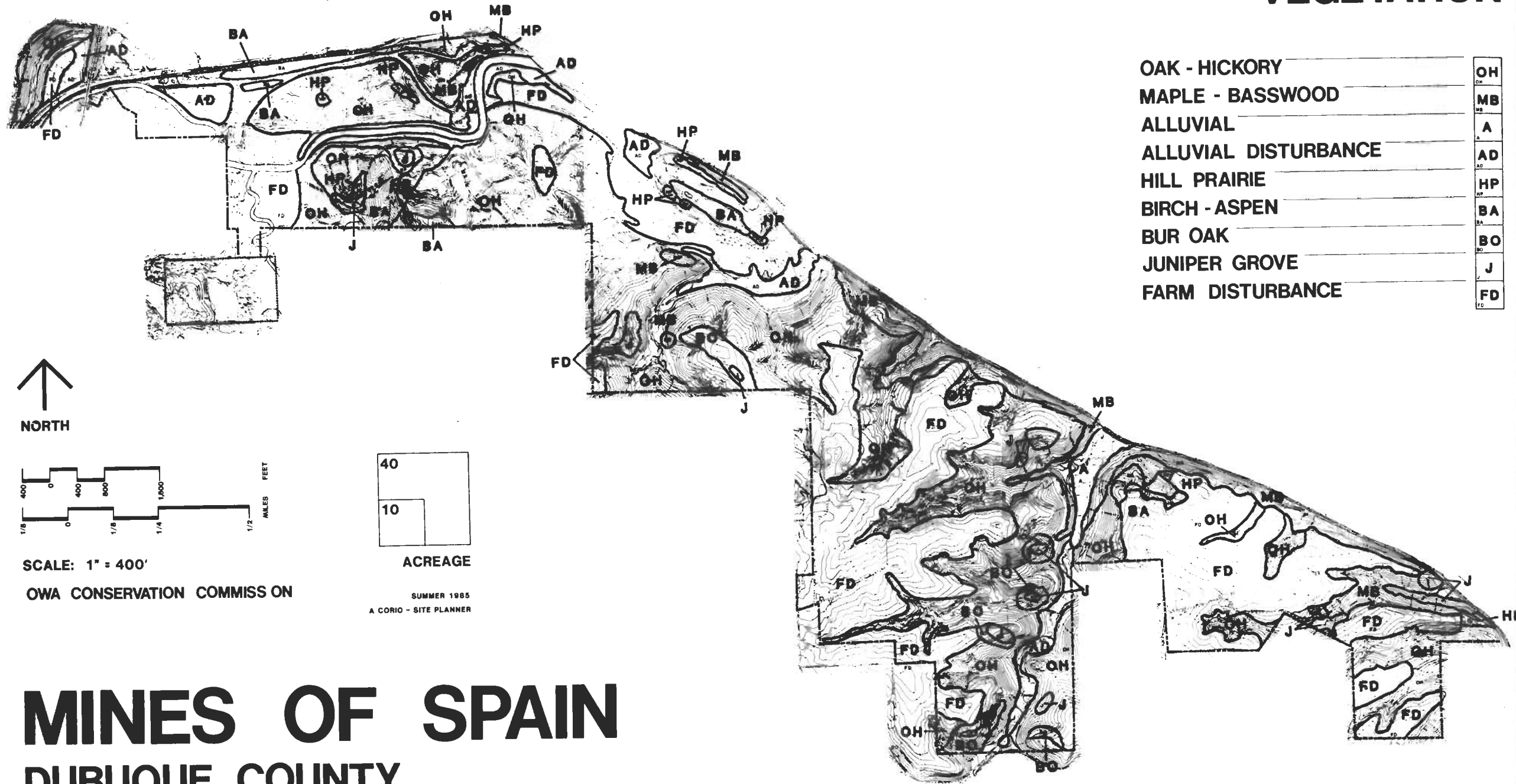
The distribution of juniper groves on ridges and southerly exposures suggest that prairies were once more widespread. A plausible explanation for their recent origin in the role of birds, particularly migrating flocks of cedar waxwings that could have dispersed the seed.

The bur oak community is also found on ridges and southerly exposures. Their presence is clear evidence that hilltops and ridges were historically more open. Large broad crowned bur oaks suggest that there was once a savanna landscape of scattered trees and prairie grasses. Fire, natural and people-started, kept woody species from invading the prairie while the thick bark of the bur oak prevented severe fire injury.

Four rare, threatened or endangered species are known from the property: Glandular Wood Fern (*Dryopteris intermedia*), Pinweed (*Lechea intermedia*), Jeweled Shooting Star (*Dodecatheon amethystinum*) and Summer Grape (*Vitis aestivalis*). The presence of sensitive species with low tolerance to disturbance attest to the undisturbed character of some of the woodlands.

Farm disturbance has occurred on one-third of the Mines of Spain area. Much of that area has been taken out of agricultural crops since the land came under state ownership in 1980.

VEGETATION



MINES OF SPAIN

DUBUQUE COUNTY

SCALE: 1" = 400'
 OWA CONSERVATION COMMISSION

40
 10
 ACREAGE
 SUMMER 1985
 A CORIO - SITE PLANNER

WILDLIFE

Wildlife communities are generally influenced by plant communities, weather and geographic features. The great diversity between gently rolling uplands, steep bluffs and protected stream valleys on the Mines of Spain has created a similar wide range in plant and animal communities found on the area. Over the years, there have been changes in the composition of wildlife and their populations, mostly due to changes in habitat. Fur was the resource that first brought the Europeans to this region. Fur trading companies obtained beaver, mink and other pelts from the Indians and white trappers and shipped them yearly to the east coast and Europe. Farming and lumbering brought the greatest change to habitat. Timber cutting made temporary changes in the natural system of plant succession, farming made permanent changes in the vegetation.

Market hunting was a business created by demand for wild meat for consumption in restaurants, hotels and homes. Buffalo were gone from the Dubuque area by 1838, and elk in 1855. Deer, beaver and otter were virtually gone by 1900. In that same year, the sale of wild game was outlawed; hunting bag limits and game seasons were established in 1916; the Upper Mississippi Wildlife and Fish Refuge was created by act of Congress in 1924. Many species of wildlife have recovered remarkably, a few have exceeded their historic populations, and others like the wolf and buffalo are gone forever.

Today, the Mississippi River with its network of islands, backwaters and channels provides territory for approximately 270 bird species. Fifty different mammal species and 45 separate reptile and amphibian species occupy this stretch of river as well. The floodplain borders the entire east boundary of the Mines of Spain area. Resident and migrant wildlife populations using the river help fill voids caused by the loss of a member of a given wildlife community. The net result is a certain built-in resistance to the elimination of wildlife populations on the area. The river acts as an arterial highway, alternate feeding site and escape route for several species using the Mines of Spain.

Stable numbers of bald eagle roost between November and March in the heavy limbed canopy of mature hardwood trees along the Mississippi River. An active nesting site has been located 17 river miles downstream from the Mines of Spain as well as increased observations of eagles during the summer months in that area. Peregrine falcons and osprey migrate over the area as well.

According to the mammal study, 43 wildlife species can be associated with the Mines of Spain (table follows). Other threatened or endangered species include the river otter, which is known to occur along Catfish Creek, and Keene's myotis (bat). Other suspected species include bobcat, Indian bat, evening bat, woodland vole, ermine, long-tailed weasel, spotted skunk and least shrew.

WILDLIFE SPECIES LIST

* Species Observed

- * Wild Turkey
- * Ring-Necked Pheasant
- * Bobwhite Quail
- * Mallard
- * Wood Duck
 - Canada Goose
 - Hooded Merganser
 - Ruddy Duck
 - Pied Billed Grebe
 - American Egret
- * Green Heron
- * Great Blue Heron
 - Black Crowned Night Heron
 - American Bittern
- * Killdeer
- * Bluejay
 - Cliff Swallow
- * Bank Swallow
- * Barn Swallow
- * Tree Swallow
 - Purple Martin
- * Crow
- * Black Capped Chickadee
 - Evening Grosbeak
- * House Wren
- * Catbird
- * Brown Thrasher
- * Robin
- * Eastern Bluebird
- * Starling
- * Sparrow Hawk
 - Screech Owl
- * Great Horned Owl
- * Barred Owl
- * Mourning Dove
- * Yellow Billed Cuckoo
- * Belted Kingfisher
- * Yellow Shafted Flicker
- * Red Bellied Woodpecker
- * Red Headed Woodpecker
- * Pileated Woodpecker
- * White Breasted Nuthatch
- Rose Breasted Nuthatch
- * Cedar Waxwing
- * Indigo Bunting
- * Wood Thrush
 - Rails
- * American Woodcock
- * Turkey Vulture
 - Whippoorwill
 - Night Hawk
- * Red Tail Hawk
 - Sharp Shinned Hawk
 - Marsh Hawk
- * Bald Eagle
- * Osprey
- * Ruffed Grouse
- * Brown Creeper
- * Chimney Swift
 - Yellow Bellied Sapsucker
- * Chipping Sparrow
- * House Sparrow
- * Slate Colored Junco
- * Cowbird
- * Scarlet Tanager
- * Goldfinch
- * Downy Woodpecker
- * Hairy Woodpecker
- * Eastern Kingbird
- * Vireos
- * Warblers
- * Bobolink
- * Meadowlark
- * Redwing Blackbird
 - Yellow Headed Blackbird
- * Cardinal
- * Baltimore Oriole
 - Bronze Grackle
- * Rufous Sided Towhee
 - Horned Lark
- * Flycatchers
- Phoebe

MAMMALS

- * White Tailed Deer
- Bobcat
- * Fox and Gray Squirrel
- * Raccoon
- * Opossum
- * Cottontail Rabbit
- * Long Tail Weasel
- * Mink
- * Muskrat
- * Striped Skunk
- Spotted Skunk
- * Badger
- * Flying Squirrel
- * Beaver
- * River Otter
- * Red and Gray Fox
- * Coyote
- * Woodchuck
- * Pocket Gopher
- * 13 Lined Gopher
- * Eastern Chipmunk
- * Little Brown Bat
- * Red Bat
- * Eastern Pipistrelle
- * Keene's Myotis
- * Big Brown Bat
- Norway Rat
- * White Footed Mouse
- Deer Mouse
- * House Mouse
- * Meadow Jumping Mouse
- * Eastern Mole
- * Short Tail Shrew
- * Masked Shrew
- * Meadow Vole

REPTILES/AMPHIBIANS

- * Eastern Garter Snake
- * Northern Water Snake
- * Bullsnake
- * Black Rat Snake
- Timber Rattlesnake
- Massasauga Rattlesnake
- * Fox Snake
- Prairie Ringneck Snake
- * Eastern Gray Tree Frog
- Green Frog
- * Leopard Frog
- * American Toad
- * Eastern Tiger Salamander
- * 5 Lined Skunk
- * Bullfrog
- * Western Painted Turtle
- * Snapping Turtle



AQUATIC RESOURCES

The aquatic resources of the Mines of Spain include segments of the Mississippi River, Catfish Creek, Granger Creek, and a newly developed wetland.

Mississippi River

The Mississippi River adjoins the eastern boundary of the Mines of Spain property. This river system is the largest in the U.S. and is one of the most ecologically productive and diverse big rivers in the world. The Upper Mississippi River is home for approximately 139 freshwater fish species with a large variety of waterfowl, birds, mammals, reptiles and amphibians. The Mississippi is responsible for many of the exposed geological features and landscape characteristics on, and historical development of the Mines of Spain property. The river also provides a multitude of water oriented commercial and recreational opportunities.

Catfish Creek

Catfish Creek is a 14-mile long Mississippi River tributary which transects the northern edge of the MOS property. The stream has four major tributaries which include the north, middle, and south forks of Catfish Creek and Granger Creek. The watershed includes approximately 72 square miles of Dubuque County which is composed of approximately 70 percent rural, 24 percent woodlands and 6 percent urban lands. An investigation of Catfish Creek was conducted by John Beals in 1981 (B.S. thesis Loras College, Dubuque), Seining produced a variety of fish species which included largemouth bass, smallmouth bass, sauger, carp, redhorse, white sucker and numerous shiners. Beals reported that Catfish Creek had no observed serious water quality problems. However, he stated that due to high bacterial levels, Catfish Creek was not recommended for any primary contact recreation such as swimming. Beals further stated that the stream had medium to high turbidity levels and that upland work was needed to reduce sediment loads.

Presently, data is not available on the sportfish harvest of Catfish Creek. However, due to the close proximity of the Mississippi River, lower Catfish Creek probably provides a seasonal sport fishery.

Granger Creek

Granger Creek is a major tributary to Catfish Creek. The watershed consists of 87 percent rural and 13 percent woodland. The upper section of the stream is categorized by narrow, shallow rock riffles surrounded by mostly open pasture farmland. It was recently identified as a marginal stream for a put-and-take trout fishery and stocking trout was not recommended.

Quarry Wetland

A small wetland was developed as part of a cleanup agreement of a rock storage area adjacent to the MOS limestone quarry. The wetland was provided with a concrete/stop log water control structure that will help maintain and regulate optimum water levels. The source of water for the wetland will be high water back-up and percolation from the nearby and connected Mississippi River and

rain water runoff and infiltration within the watershed. The wetland was constructed without knowing the water holding capabilities of the area.

CULTURAL RESOURCES

The natural resources have profoundly affected the cultural history of the area. For the prehistoric people, the Mississippi River was a source of food, water and a transportation route; the rock formations provided surveillance points, landmarks and shelter; abundant wildlife provided food and clothing for the prehistoric people and also attracted the French-Canadian trapper/traders; and it was the lead deposits which drew international attention to the area as early as 1682.

Prehistoric evidence such as earth mounds, rock shelters, village and campsites and other artifacts indicate previous occupation on the Mines of Spain dating back 8,000 years ago to the Archaic culture. These people were skilled hunters who probably traveled in small groups of families moving as the seasons changed and different food sources become available.

The Woodland Indian culture which dates back 3,000 years ago is known for its use of pottery, cultivated plants and burial mounds. A few mound groups are scattered throughout the site. These mounds are believed to have been used primarily for religious, ceremonial and burial purposes.

By 1000 A.D., these hunting gathering groups had been replaced by cultures based primarily on agriculture. Early trappers and traders found the Sauk and Fox tribes. The Indian-French trading culture flourished for nearly 150 years from the 17th to the early 19th century. It had started with the Marquette and Joliet exploration of the Upper Mississippi in 1673. The abundance of animals and the available waterways made possible this fur trade which was naturally advantageous to the Indians and the French.

The lead mines of the Upper Mississippi became an integral part of the frontier economy. As early as 1697, the mines of this area appeared on maps in France and Britain. One battle of the American Revolutionary War was fought at the Mines of Spain. It was one of small consequence to the war but of interest to the state.

In 1788, Julien Dubuque was given permission by the Mesquakie (Fox) Indians to mine the lead. He spent 22 years living and working with the Indians on the Mines of Spain. His business establishment included a wharf, a blacksmith shop and forge, mining equipment, livestock and accoutrements of the fur trade. The Mines of Spain also contained housing for himself (possible two dwellings), for his French associates as well as several hundred Indians.

It has been estimated that Dubuque annually shipped hundreds of thousands of pounds of lead to St. Louis. With the going price of lead at five cents a pound, his yearly income from mining was well over \$5,000 which was a large sum at that time. Despite this income, Dubuque was chronically in debt at the time of his death.

In 1796, Dubuque submitted a petition to Baron de Carondelet, the Spanish governor of Louisiana, seeking confirmation of his rights to what he chose to

call the "Mines of Spain" (in order to flatter the governor). His petition was granted for an area approximately 21 miles long and 9 miles wide, an area much larger than the Mesquakie grant.

Dubuque died at age 48 in 1810 and a dispute ensued over the well-known lead mines. The Mesquakie fought off attempts for 23 years by Dubuque's creditors and anyone who tried to lay claim to their land. The Indians continued to mine the lead after Dubuque's death. A traveler, Henry Schoolcraft, described in 1820 the Mesquakie Indian village at the mouth of Catfish Creek as consisting of 19 lodges built in two rows, pretty compact, with a population of 250 souls.

The Mesquakie apparently left the Mines of Spain shortly after the signing of the Black Hawk War and Treaty. Lead provided the basis of Dubuque area economy but soon farming, manufacturing and transportation became significant. Lead and zinc were mined into the 1900's but not on the previous scale. It is reported that the Fessler mines on the present day Mines of Spain were the last to be mined in 1914.

THE PALIMPSEST

EDITED BY WILLIAM J. PETERSEN

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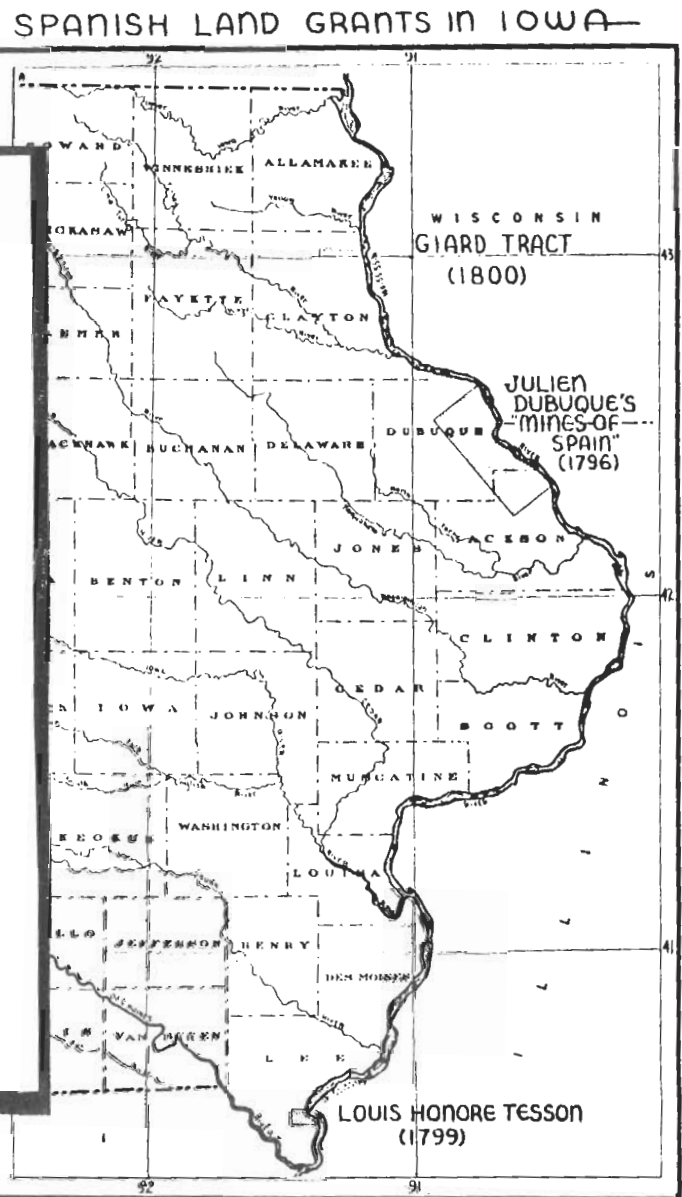
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Iowa under Spain

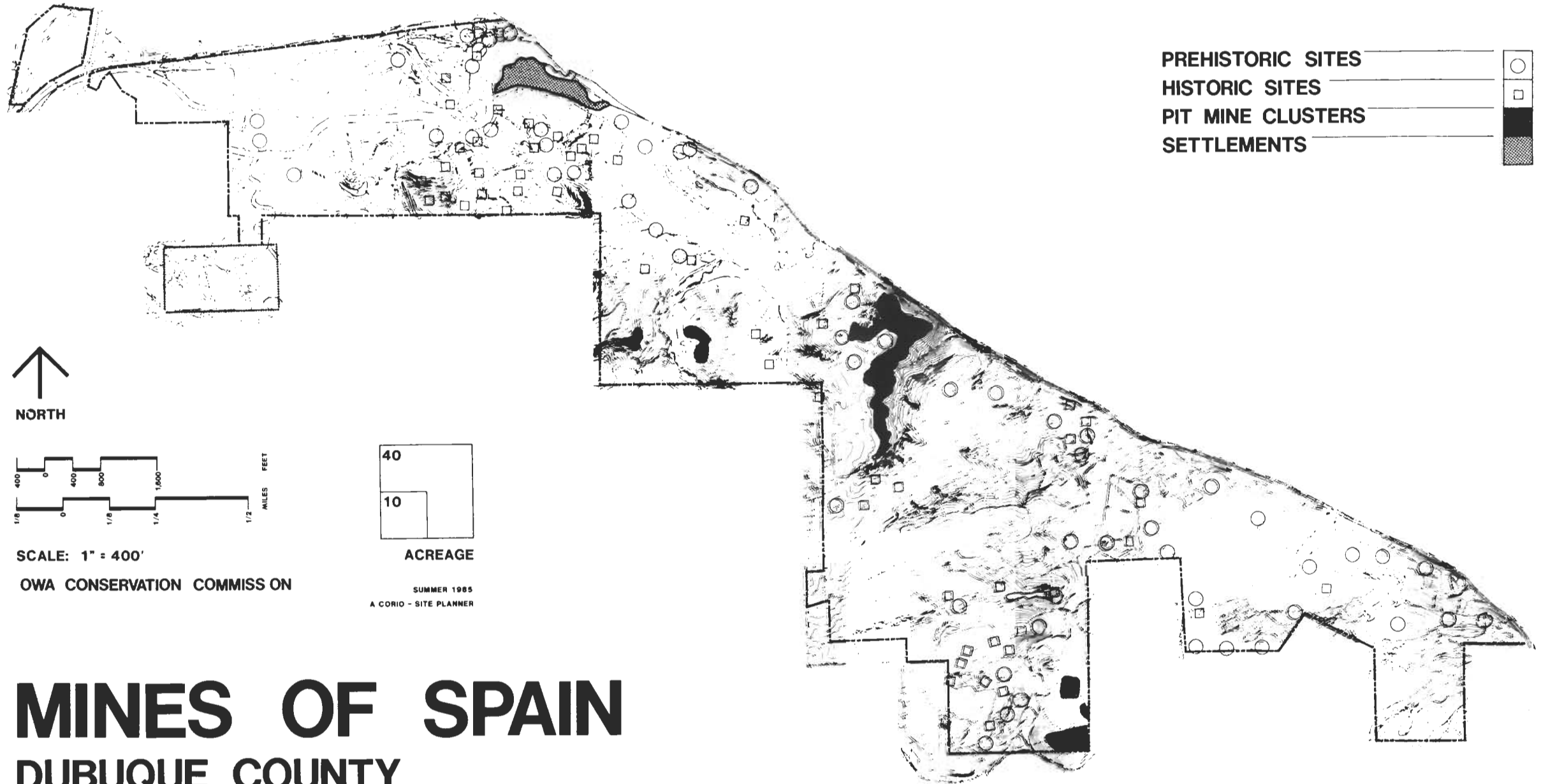
At the close of the French and Indian Wars, in 1763, the victorious British were forced to choose between Canada and the tiny sugar island of Guadaloupe. Canada was chosen. France also gave up all claim to the Ohio Valley and the land east of the Mississippi with the exception of the island on which New Orleans had been located in 1718. New Orleans and all the country west of the Mississippi, including the Iowa country, had been secretly ceded to Spain in 1762. Thus England and Spain stood face to face on opposite banks of the Mississippi.

Spain remained in technical possession of Iowa from 1762 to 1804 when Upper Louisiana was transferred to the United States following the Louisiana Purchase. From the start Spanish governors had difficulty in gaining the upper hand in New Orleans and the sparsely populated territory along the Lower Mississippi that had been settled solely by the French, who naturally despised their new rulers. North of the Missouri River, a hand-

157



CULTURAL RESOURCES



MINES OF SPAIN

DUBUQUE COUNTY

PHYSIOGRAPHY

The beauty of this rugged landscape is controlled by the underlying bedrock. It is characteristic of the Paleozoic Plateau landform region, with resistant rock outcrops, high bluffs, narrow ridges, deeply dissected streams and ravines, seeps, caves and crevices. The landscape reflects the interrelationships that have evolved between the underlying geological formations and the surface drainage patterns.

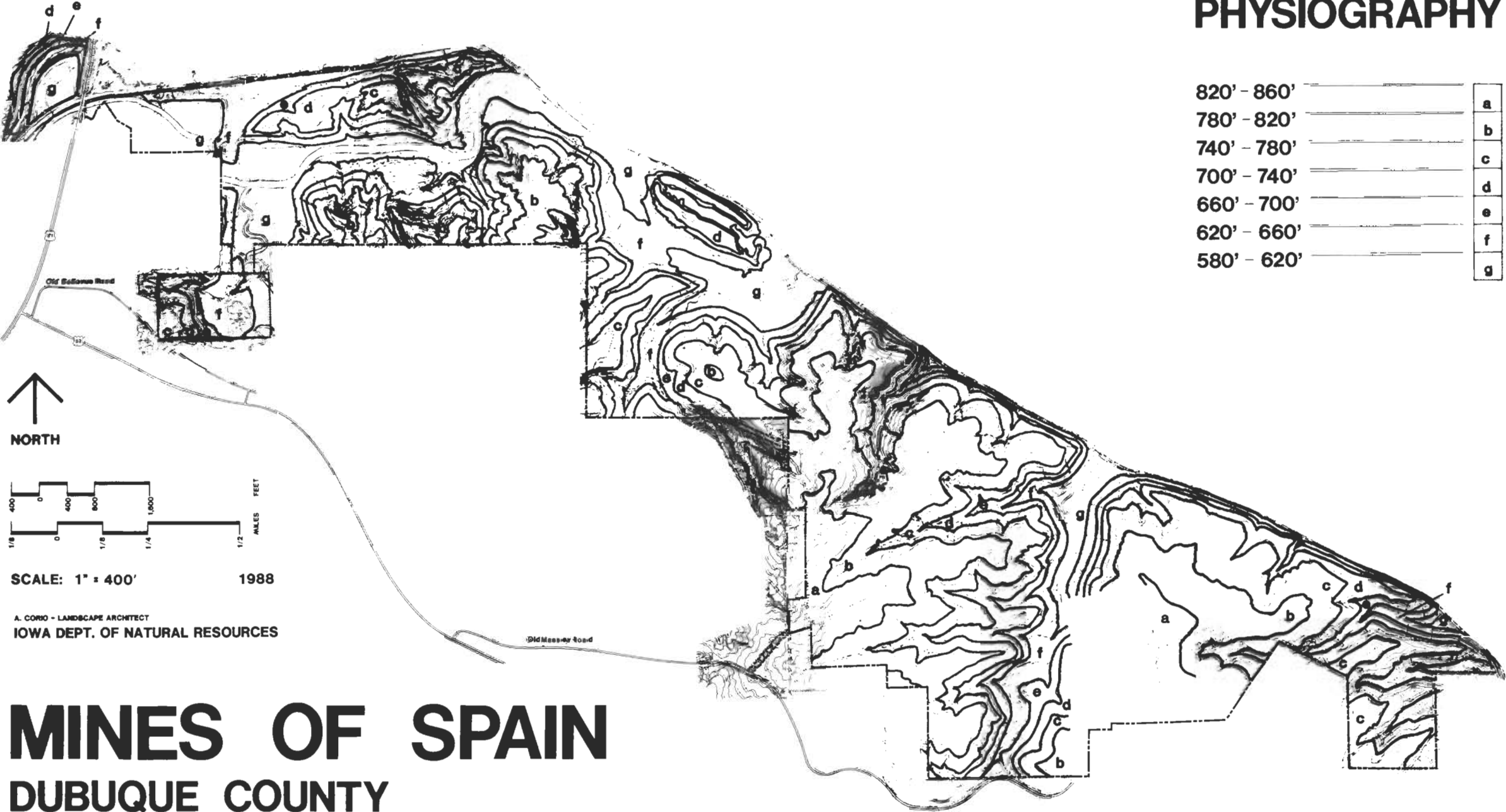
Drainage patterns on the area are controlled by three main creeks, Catfish Creek, Granger Creek, and Cattese Hollow. The watershed characteristics are described in the previous Aquatic Resource section.

Granger and Catfish Creeks are on the northern portion of the site. Cattese Hollow completely bisects the southern portion of the area.

There is 268 feet elevational difference on the area. The high point located on one of the southern uplands is at 860 feet and the low point of 592 feet is at river level. Flood stage lies between elevations 600 feet and 625 feet. Cattese, unlike Catfish and Granger, is an intermittent stream with springs and seasonal seeps.

PHYSIOGRAPHY

820' - 860'	a
780' - 820'	b
740' - 780'	c
700' - 740'	d
660' - 700'	e
620' - 660'	f
580' - 620'	g



SCALE: 1" = 400' 1988

A. CORIO - LANDSCAPE ARCHITECT
IOWA DEPT. OF NATURAL RESOURCES

MINES OF SPAIN

DUBUQUE COUNTY

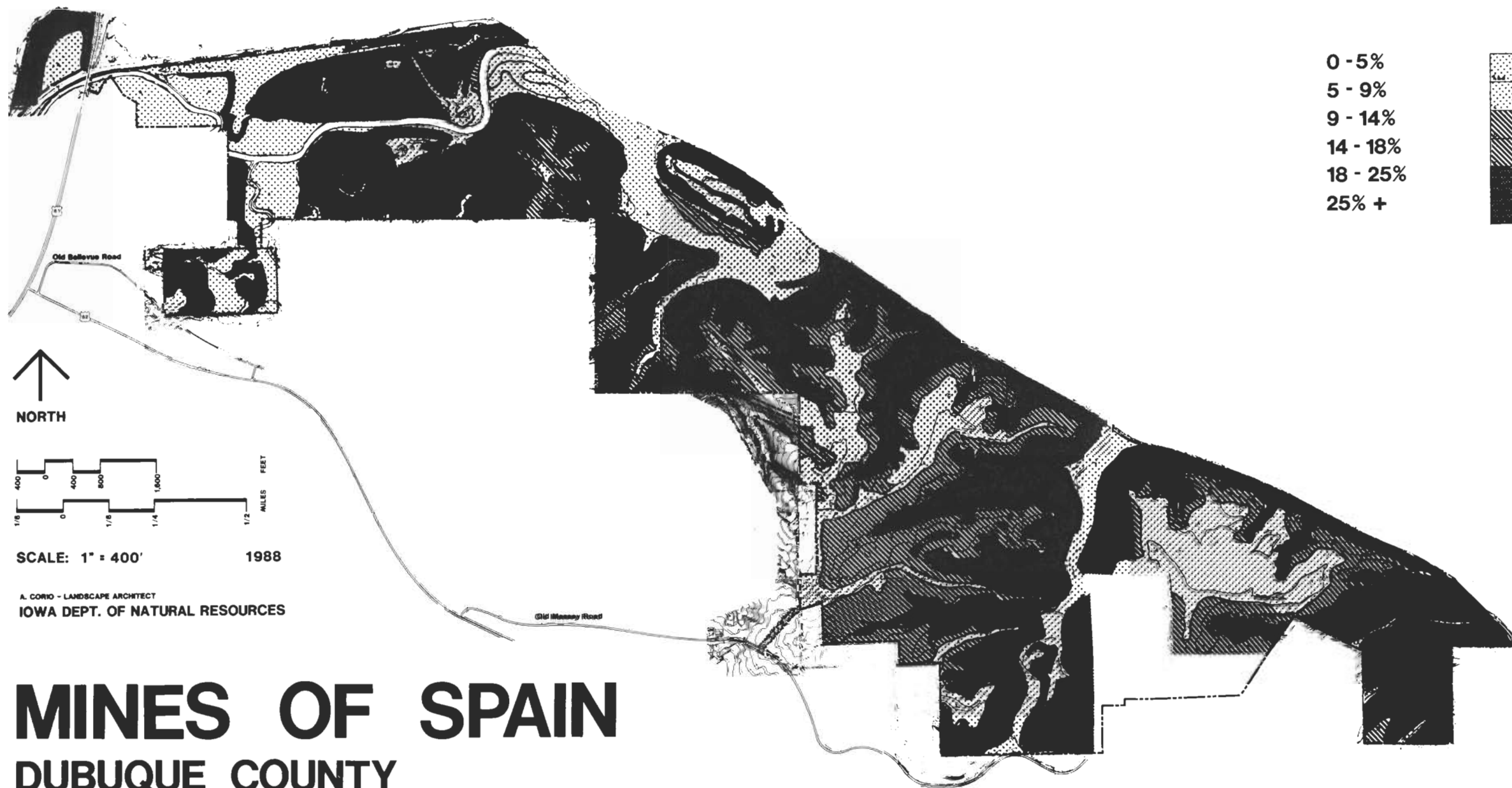
SLOPE STEEPNESS

The rugged and complex topography of Mines of Spain adds to the highly scenic qualities of the site, but directly controls and limits uses and the placement of facilities and utilities. Slope steepness was interpreted from aerial stereoplotted topographic mapping of the park (1980). Six increments ranging from 0 percent to 25+ percent were delineated.

The valley floors of Cattese Hollow, Catfish and Granger Creeks, the abandoned stream valley behind Horseshoe Bluff, and some minor ridge lines are the only areas of 0-5 percent. The southern uplands and other narrow ridges have slopes that range from 5-18 percent. Vertical bedrock outcrops, steep and very steep slopes 18-60 percent dominate the rest of the area.

SLOPES

- 0 - 5%
- 5 - 9%
- 9 - 14%
- 14 - 18%
- 18 - 25%
- 25% +



SCALE: 1" = 400' 1988

A. CORIO - LANDSCAPE ARCHITECT
IOWA DEPT. OF NATURAL RESOURCES

MINES OF SPAIN

DUBUQUE COUNTY

SOILS

The site's physiography, drainage patterns and slope steepness are characteristics of a complex pattern of soil distribution on the site. According to soils information mapped by the USDA Soil Conservation Service, major soil types are found on the site. For purposes of master planning, soils were divided into four categories which reflect overall limitation for facility development and recreational usage. The principal limiting soil factors are soil depth, slope steepness and soil stability.

Summary Groupings

- Soils with severe restrictions - Preservation and Nature Hazard
 - Nordness 14-18% and 18-25% Steep Rock 25%+
 - Seaton 14-18% and 18-25% Zwingle 5-9%
 - Fayette 18-25%, and 25%+

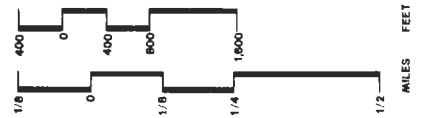
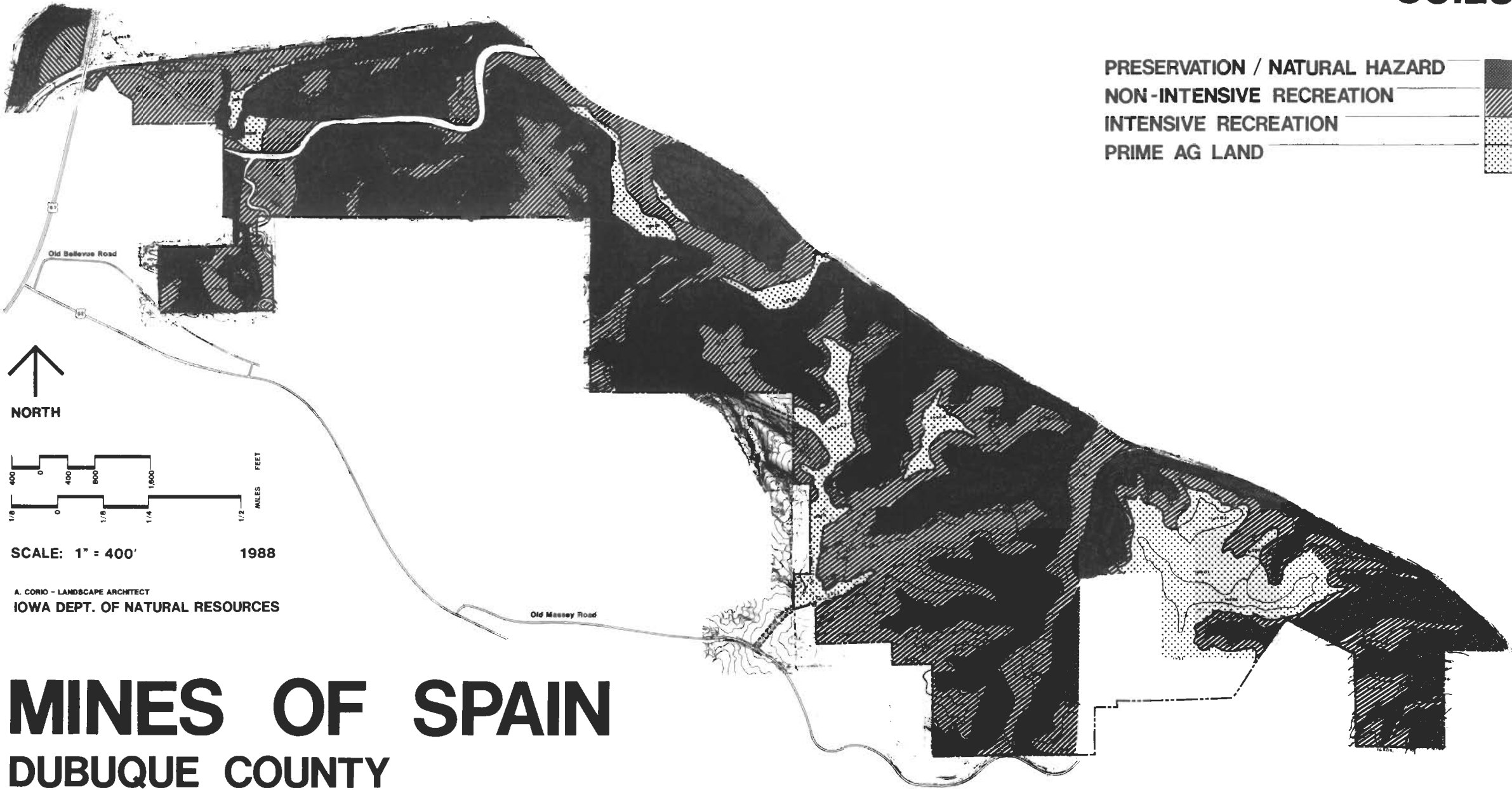
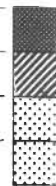
- Soils with moderate restrictions - Suitable for Nonintensive Recreation
 - Chaseburg 0-5%
 - Nordness 9-14% Dorchester 0-1%
 - Seaton 9-14% Arenzville 0-2%
 - Fayette 9-14% and 14-18% Dorchester/Volney 0-2%
 - Dubuque 9-14% Worthen 2-5%

- Soils with few restrictions - Suitable for Intensive Recreation
 - Lamont 2-5% Worthen 2-5%
 - Fayette 2-5%, 5-9%

- Soils with high Corn Suitability Rating - Prime Ag Land
 - Fayette 2-5%, 5-9% Arenzville 0-2%
 - Chaseburg 0-5% Worthen 2-5%
 - Dorchester 0-1%

SOILS

- PRESERVATION / NATURAL HAZARD
- NON-INTENSIVE RECREATION
- INTENSIVE RECREATION
- PRIME AG LAND



SCALE: 1" = 400' 1988

A. CORIO - LANDSCAPE ARCHITECT
IOWA DEPT. OF NATURAL RESOURCES

MINES OF SPAIN

DUBUQUE COUNTY

VISUAL RESOURCES

Scenic quality is a valuable natural asset. While often overlooked as a planning, design and management consideration, visual resources are the source of attraction and the essence of satisfaction for many park and recreation area users. Distinctiveness, variety and integrity of natural features contribute most directly to the area's high level of visual quality.

For planning purposes, three visual factors need to be considered: often-seen areas, vantage points and major views, and visually significant areas and features. These factors help to establish a hierarchy of visual assets in the park. In many cases, these factors overlap to create areas of above average visual importance.

Most Often-Seen Area

These are visual zones which are most commonly seen by area visitors. Often-seen areas include visual resources within range of roads, Mississippi River, picnic areas and hiking trails. These visual resources often constitute the first and lasting impression area users have of the area. These areas need to be managed to maintain and enhance visual images in keeping with the character of the area.

Vantage Points and Major Views

Vantage points are places which offer park visitors advantageous positions for enjoying major views of the surrounding landscape or excellent views within the area. These visual resources often provide valuable recreational experience and are often photographed, becoming visual souvenirs of the area. Julien Dubuque Monument offers grand views of the Mississippi River, city of Dubuque, Julien Dubuque bridge, and the Mines of Spain. Also seen from there is Sinsinewa Mound which is an isolated erosional remnant of Silurian rocks which were once continuous across the entire region. From the north end of the quarry a dominant view to the north is the Julien Dubuque Monument with a backdrop of the city of Dubuque. To the south there is a view of the quarry walls of Horseshoe Bluff with the Mississippi River in the background. The Silurian escarpment is a prominent feature seen to the southwest. Grand views of the Mississippi River are accessible on many of the ridgetops along the river. Pinnacle Rock provides great views of Cattese Hollow and the vegetation patterns of the valley.

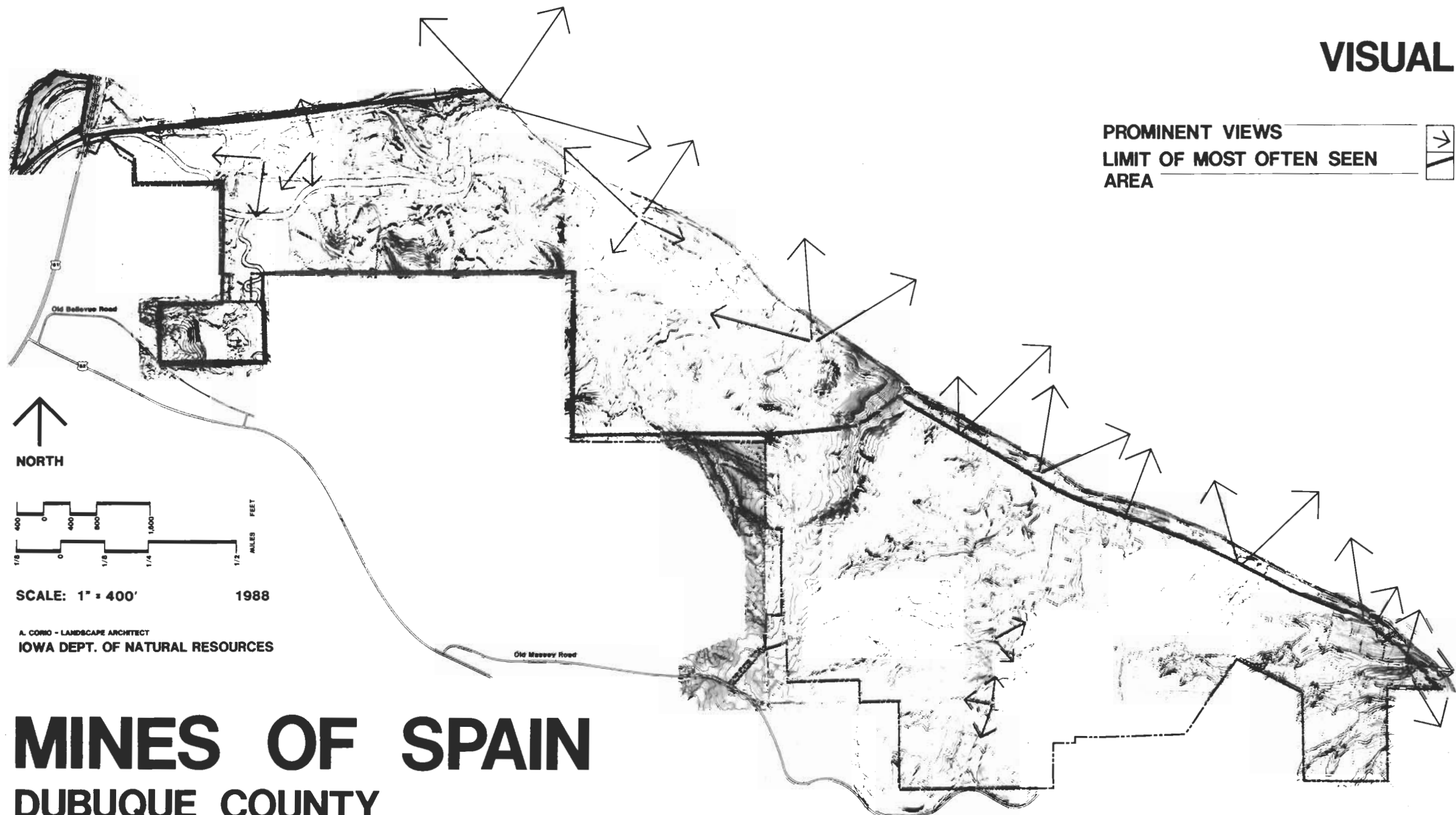
Visually Significant Areas and Features

These are areas or features which are visually exciting or interesting. These areas often contain distinctive elements such as a unique archaeological or historic feature; a geologic feature or combination, vegetation types, and water in some form; and visual integrity, often with a backdrop or enclosure. Visual features or areas include the Julien Dubuque Monument, pit mines, Cattese Hollow and its picturesque rock outcropping, Horseshoe Bluff quarry, the wetland, Indian mounds and rock shelters, Junkerman farm and the Preston cemetery.

Maintaining and enhancing visual quality needs to be a conscious consideration in determining facility locations, recreational uses, and resource management techniques. In developing the area, careful attention is needed in designing and constructing recreation facilities which are in harmony with the character of the area.

VISUAL

PROMINENT VIEWS 
LIMIT OF MOST OFTEN SEEN AREA 



MINES OF SPAIN

DUBUQUE COUNTY

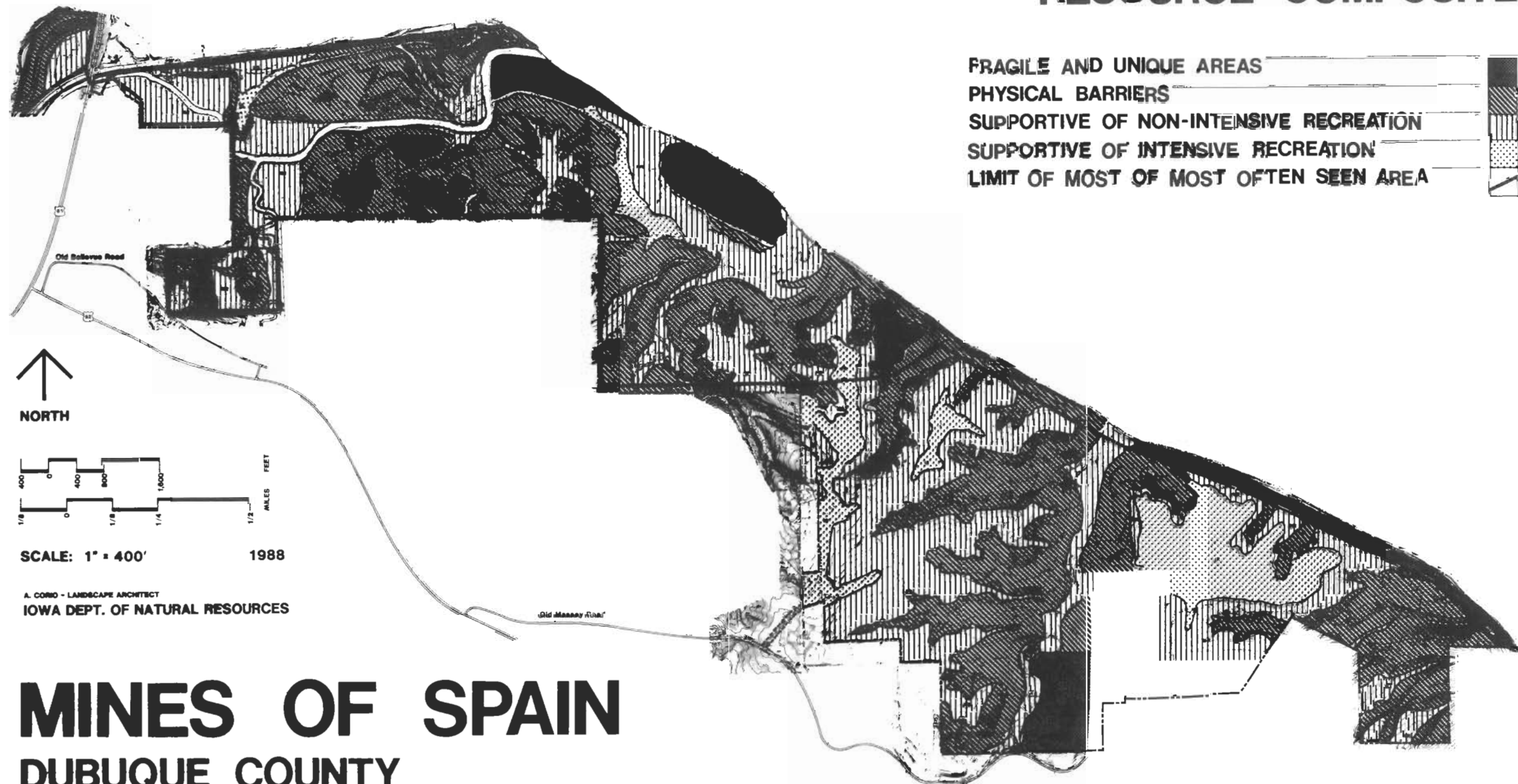
ENVIRONMENTAL CAPACITY ZONES

The previously discussed studies present the site as a series of "single topic" viewpoints. In order to generally understand the interrelationships among these "single topic" studies and to determine overriding implications which will influence facility development and use patterns, this information has been synthesized into a single composite map. Synthesis has produced four distinct environmental capacity zones that generally identify the range of conditions found on the site; reflects inherent site suitabilities and limitations for recreation activity; and describes the need for general levels of resource conservation/management. The environmental capacity zones and their descriptions are outlined below.

1. Fragile and Unique Areas--These are the most sensitive sites and are least adaptable to development. Protection is necessary to maintain the integrity of the resources in these areas.
 - This zone contains resources unique to the site and/or region; resources of prime interest for study and observation; species which are "threatened" or "endangered"; and resources susceptible to negative impact due to most types of recreational activity.
 - Resources included in this zone are Horseshoe Bluff, the concentrated pit mine area, some of the hill prairies, areas containing rare and plant species, Catfish settlement area, Indian mounds and Fessler Mines, other mines and/or cave features and steep bluffs along the Mississippi River.
 - This zone includes rock outcrops and steep slopes greater than 18 percent grade.
 - Primitive hiking trails are possible in certain areas of this zone.
2. Areas Supportive of Nonintensive Recreational Uses--This zone contains marginal areas not suited for intensive usage or development. Resource management programs need to reinforce natural characteristics and environmental qualities in this zone.
 - This zone is characterized by moderately steep slopes, periodic flooding, soils with severe limitations for septic systems and are capable of supporting only nonintensive human use. Facility development would likely be secondary to the natural resources because of environmental qualities.
3. Areas Supportive of Intensive Recreational Uses--This zone is the least sensitive area of the site and is most adaptable to development and intensive use. Resource modification and development needs to reflect and integrate with the character of the area.
 - This zone includes areas that were heavily disturbed, are relatively flat with well drained soils that are able to support recreation facilities such as buildings, restrooms and septic systems.

4. Limits of Most Often-Seen Areas--This zone is an area of significant scenic quality. Facility development and site management should be carefully designed to harmonize with the dominant characteristics of this zone.

RESOURCE COMPOSITE



MINES OF SPAIN

DUBUQUE COUNTY

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MANAGEMENT PRESCRIPTIONS FOR NATIVE TIMBER TYPES

The Mines of Spain Master Plan (1987) specifies intensive management on approximately 46 percent of the area to enhance wildlife habitat and maintain a variety of successional plant communities. The timber types to be maintained are aspen, oak-hickory, maple-basswood and silver maple as mapped by Blewett et al. (1983). The primary approach to management will be area regulation with balanced regeneration of these types (see attached map). Specific management prescriptions are given for each timber type.

It is anticipated that additional locations within the intensively managed zone will be identified as unique archaeological, geological or botanical sites. Such sites may be excluded from intensive management. Therefore, the acreages used in management calculations for these timber types are reduced from 640 by approximately 100 acres. This will begin management on a conservative basis and build in flexibility for reclassification of specific sites.

Aspen Timber Type (40 acres)

Objective:

Maintain the aspen timber type with stand composition being at least 70 percent trembling and/or bigtooth aspen and a range of stand age classes from recently regenerated to mature.

Management System:

Even aged.

Rotation:

50 years.

Stand Size:

Approximately four acres.

Harvest Schedule:

Clearcut four acres every five years resulting in ten four-acre stands.

Harvest Requirements:

The preferred method of harvest is a commercial clearcut. Prior to the first growing season following the commercial harvest, all residual stems with stump diameters of 2.0 inches and larger are to be cut with the exception of dead or girdled and den trees. If the timber cannot be sold, the trees are to be felled and left on site to decay.

Discussion:

Aspen species are intolerant to shade and require conditions created by a clearcut to regenerate well. Fire could be used as a natural alternative but may not be practical. The fire would have to be sufficiently intense to kill most stems, but it would also have to be contained within a specific area. Unless field trials with burning prove practical, clearcutting should be used to ensure regeneration of the aspen timber type.

Oak-Hickory Timber Type (200 Acres)

Objective:

Maintain an oak-hickory component on approximately one-half of the intensively managed non-aspen upland timber area.

Management System:

Even-aged.

Rototation:

100 years.

Stand Size:

Five to 10 acres.

Harvest Schedule:

Regenerate approximately 10 acres every five years.

Harvest Requirements:

Clearcut is the preferred method of harvest to regenerate this area. Following a commercial clearcut but prior to the first subsequent growing season, all residual live trees with stump diameters two inches and larger are to be cut or girdled with the possible exception of den trees.

An alternative to clearcutting is the two or three cut shelterwood to establish regeneration, if not present, prior to the final overstory harvest. This method, however, tends to favor the more shade tolerant species including hard maples, basswood, and ash and should generally not be used within additional understory vegetation control and possible planting.

Intermediate Management:

Between 10 and 20 years after harvest, the resulting pole size stands are to be thinned. Stump sprout clumps are to be cut leaving only the best stem per clump with the exception of basswood where the best three stems are left. There should also be a crop tree thinning to

create five to eight feet of open space around the crowns of oak, shagbark hickory, and walnut of intermediate, codominant, and dominant crown classes. No additional thinning or harvest is recommended until end of rotation.

Discussion:

Throughout most of the upland timber area, natural succession is resulting in a gradual conversion from the oak-hickory to maple-basswood timber types. Conditions created by clearcutting will help maintain a component of the early successional oaks, shagbark hickory and walnut. Harvest should be scheduled to follow years of average or better acorn drops. Nonharvest or selection harvests would favor the shade tolerant maple-basswood timber type.

It is possible that fire could be used to control understory vegetation to favor oak regeneration. Field trials could be conducted but until proven feasible, the above management program should be followed.

Maple-Basswood Timber Type (200 acres)

Objective:

Development and maintain an uneven-aged maple basswood timber type on approximately one-half of the actively managed, non-aspen upland timber area.

Management System:

Uneven-aged.

Cutting Cycle:

15 years.

Harvest Schedule:

Approximately one-third (67 acres) will be selectively harvested each five years.

Harvest Requirements:

The post-harvest stand objective will be 85 square feet of basal area in trees five inches d.b.h. (diameter breast height) and over, maximum tree size 24 inches d.b.h. and "q" factor = 1.3.

This description will gradually result in stands with a desirable stocking for good continuous growth. Table 1.

Table 1. Desirable stocking per acre for continuous growth.

D. B. H.	Desirable stand after cutting	
	Trees	Basal Area
(Inches)	(Number)	(Square Feet)
24	2.5	7.8
22	3.3	8.7
20	4.1	8.9
18	5.3	9.4
16	6.9	9.7
14	9.0	9.6
12	11.7	9.2
10	15.2	8.4
8	19.8	6.9
6	25.7	5.1
Total	103.5	83.7

Discussion:

Species of the oak hickory association should be maintained as long as feasible within the above restrictions. Several harvests will be needed to reach the desired diameter class distribution. Noncommercial thinning may be needed in the lower diameter classes if the stands deviate significantly from Table 1. With control of slash and damaged trees, use of this system will have minimal visual impact on the area. The selection system is not suitable for steep slopes because entry onto the site, with its attendant damage to trees and to the site, is at relatively close intervals of time.

It may be desirable to take positive measures, where practical, to assure an oak-hickory-walnut component within these stands. This might require planting, and would most surely require weeding. It would be practical if resources were available to do the work. The reason for this would be better wildlife habitat, mostly in the form of an additional food source.

Silver Maple Timber Type (10 acres)

Objective:

Maintain a bottomland silver maple timber type.

Management System:

Even-aged.

Rotation:

80 years.

Stand Size.

Five acres.

Harvest Schedule:

Regenerate approximately one-half of the area (five acres) every 40 years.

Harvest Requirements:

Due to the shade intolerance of silver maple seedlings, commercial clearcut followed by cutting or girdling all live residual trees with stump diameters two inches and larger will be the general method used to regenerate this area.

Discussion:

Specific recommendations and actual management of this area should be delayed pending the results of current silver maple management along the Mississippi River by the Army Corps of Engineers.

Additional Harvest Considerations

The following items should be considered when any timber management activities are planned.

1. The location scheduled for an activity should be checked by the area manager, district forester and other specialists as needed to protect unique features.
2. The visual impact of management operations are to be minimized through layout of cutting areas, selection of management systems and control of slash and damaged trees.
3. Logging and hauling will be permitted only when the ground is firm.
4. Major skid trail and haul road locations are to be approved by the area manager and district forester.
5. If suitable native grass species are available, skid trails, haul roads, and yarding areas should be seeded.

6. Two to five den trees per acre should be maintained fro wildlife. Preference should be given to mast producing species.
7. Dead trees should be left for wildlife except where visual or safety are of greater concern.
8. Management operations should be adequately documented such that the results of management and experimental trails can be used to improve future management.
9. Harvest of walnut trees will generally be independent of the general harvest schedule for the timber types. Walnut can usually be sold for a higher price if not mixed with other species.

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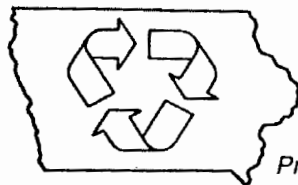
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