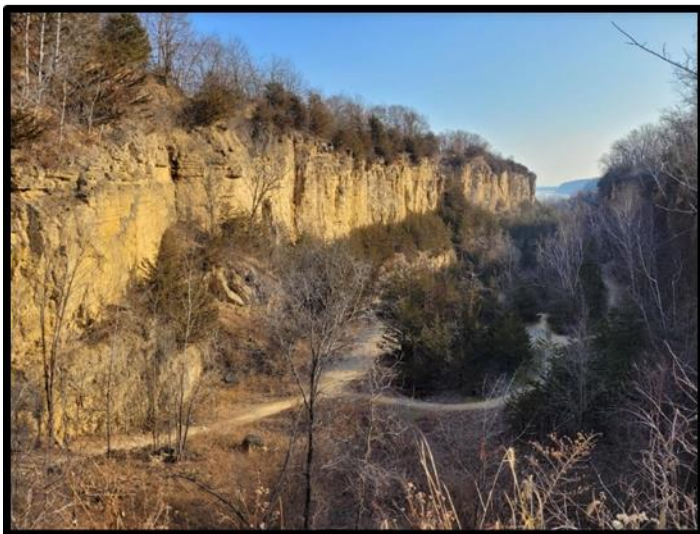


# WOODLAND STEWARDSHIP PLAN

FOR

## MINES OF SPAIN STATE RECREATION AREA

A plan that will increase the diversity of forest types & wildlife habitat, improve tree health, preserve aesthetics, and foster recreational opportunities.



**Developed by:**

Alex Hoffman, District Forester  
Elli Lineburg, Park Manager  
Jason Gilmore, Park Ranger

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# **Woodland Stewardship Plan for Mines of Spain State recreation area**

**MANAGER:** Park Manager  
Mines of Spain State Recreation Area  
8991 Bellevue Heights  
Dubuque, IA 52003  
563-556-0620

**LOCATION:** Section 1, Table Mound Township  
Sections 4,5,6,8,9,10 Mosalem Township, Dubuque County

**TOTAL ACRES:** 1469.8 (includes City of Dubuque property in total)

## **INTRODUCTION**

The Iowa Department of Natural Resources (DNR) is the state government agency whose vision is to lead Iowans in caring for their natural resources. Conservation and enhancement of natural resources to ensure a legacy for future generations is part of the DNR's mission. Within the DNR, the State Parks Bureau works to manage state operated parks, preserves, and forests.

The state park system manages resources for a variety of public users. Beyond recreation, parks contain critical wildlife habitat in the form of forests, prairies, and wetlands. Mines of Spain is primarily forested and if properly managed, provides a unique opportunity for the DNR to carry out its mission by publicly demonstrating sustainable forest management and the enhancement of these valuable resources for wildlife.

The DNR is also the agency responsible for the stewardship of indigenous and migratory wildlife species found in the state. The DNR recognizes the need for forest wildlife stewardship plans (FWSPs) to properly manage the forest resources. Forests are not static systems, even though changes occur relatively slowly over a long period of time. A hands-off or "preservation" philosophy will ensure that the forest of 100 years from now will be much different and likely less diverse than the forest of today. These changes will negatively impact wildlife species. Some forest stands may take more than 120 years to mature, a time span that may extend through the careers of several managers. This slow but constant change requires managers to plan over the long term and leave a written record of these plans and management activities in the form of FWSPs. This process will help ensure the wise management of our forests and will aid future managers with decision making.

There is no single type of forest stand that can provide all of the requirements for all forest wildlife species. Different species require different (and sometimes quite specific) forest types and age classes. Some generalist wildlife species use all of the forest age classes, while some specialist species have such specific requirements that only one or two particular forest types are needed to survive.

Oak forests are indisputably important in Iowa. The pre-settlement forests across the state were dominated by a mixture of oak species. Wildlife species adapted to the oak forests and thrived amidst their diversity. Today, the forests of Iowa are changing at alarming rates. It is estimated that Iowa loses approximately 5,800 acres of oak dominant forest each year. These losses are due to several factors, including both natural and human controlled. This pronounced loss of oak leads to a reduction in the quality of habitat and food sources available to wildlife, as well as the economic value and quality of the forest. The importance of managing forests for oak cannot be overstated, and the Iowa DNR has made this a priority across much of the state.

## DESCRIPTION OF AREA

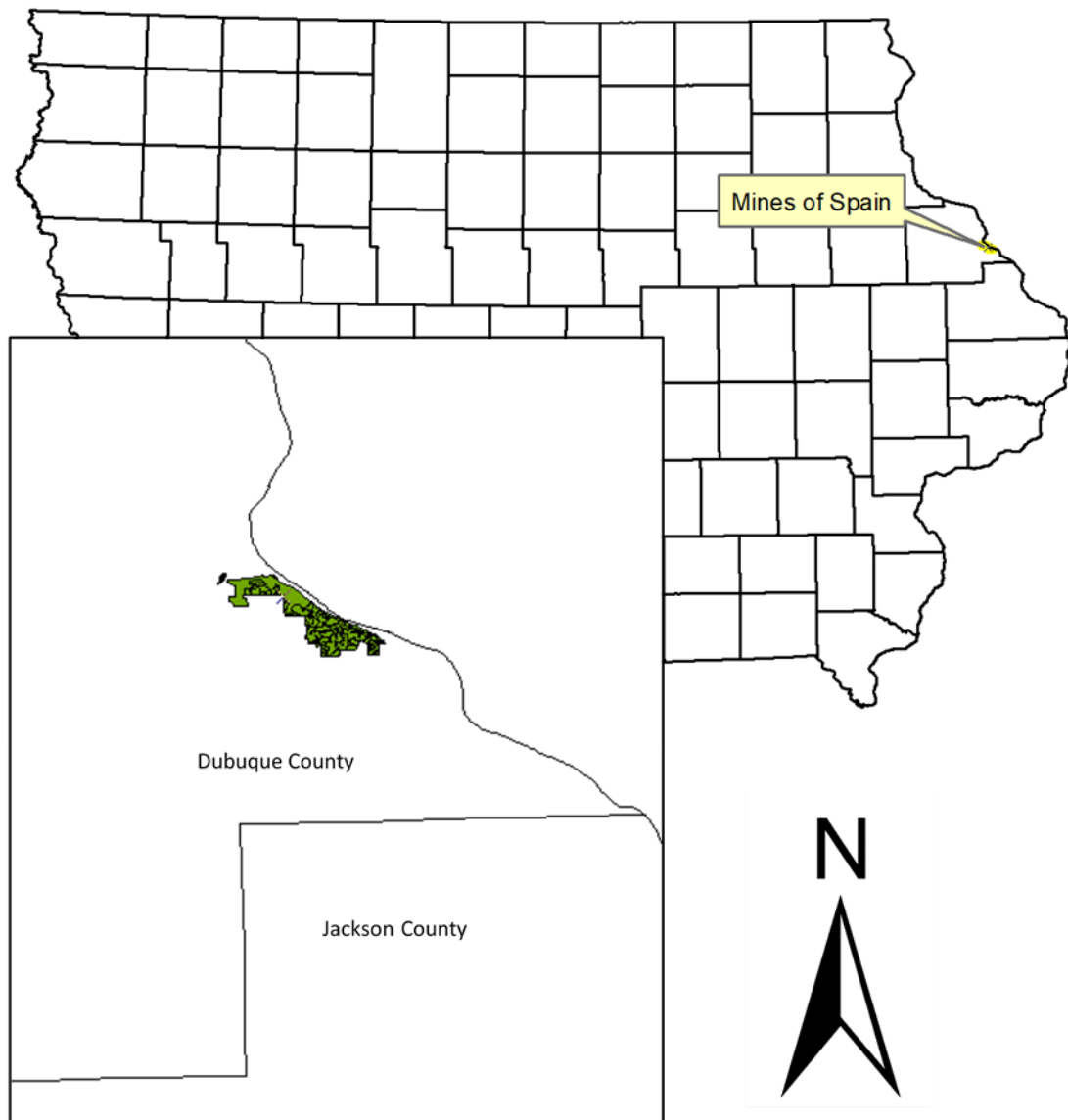
Mines of Spain State Recreation Area is located within the geographic region known as the *Driftless Area*, which is characterized by karst topography that features steep bluffs and ravines, rocky outcrops, numerous large sinkholes, springs and cold-water streams. Much of the park features this steep, rocky terrain.

Rich in history and natural resources, the Mines of Spain State Recreation Area in Dubuque is a National Historic Landmark waiting to be explored. Village sites, rock shelters and trading post sites dot the landscape, and the area was once the location for lead mining until after the Civil War. The Julien Dubuque Monument, honoring the area's first European settler, sits high above the Mississippi River and serves as a landmark for the Mines of Spain area. This state recreation area provides ample opportunity for visitors to explore a variety of trails and learn more about the history of the state.

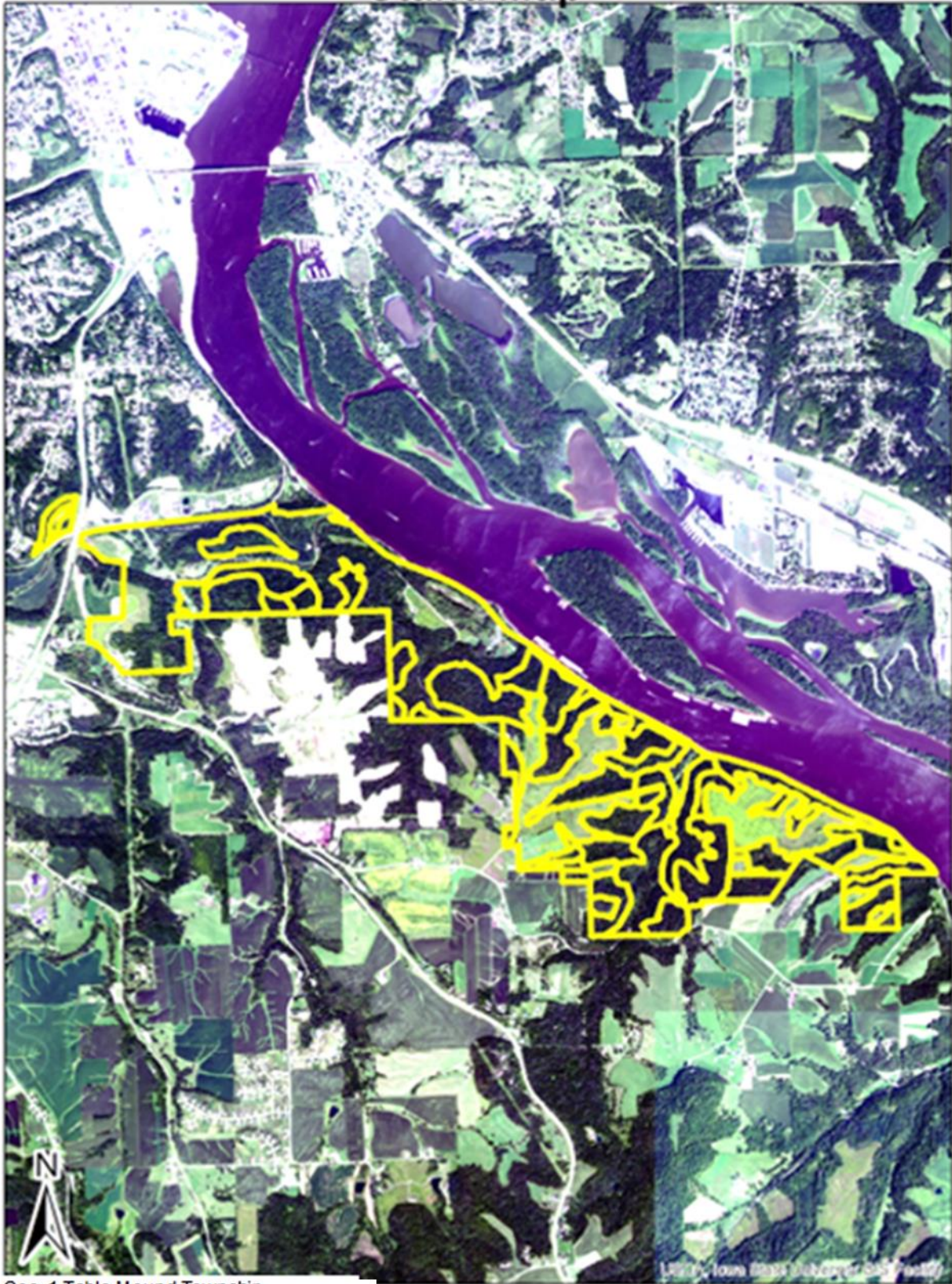
### Mounds and Mines

Care has been taken to consider Native American mound sites and historic mines. Mounds or mines that fall within the boundaries of stands slated for active (even-aged, uneven-aged, or early successional management) will be adequately buffered to ensure they are preserved and not disturbed. The Iowa Office of the State Archaeologist Department has been consulted and will be relied on for appropriate measures regarding these sensitive and significant sites.

### Landscape Position



# Mines of Spain Recreation Area Stand Map



Sec. 1 Table Mound Township  
Sec. 4, 5, 6, 7, 8, 9, 10 Mosalem Township  
T-88N R-3E  
Dubuque County

0 1 2 Miles

## HOW THE FOREST WILDLIFE STEWARDSHIP PLAN WAS DEVELOPED

Objectives address the habitat needs of a diverse array of wildlife species and the woodland condition of each area. Forest management is essential to the long-term conservation of the native plant communities occurring on these areas. Actively managing the forest is also critical to improving these areas for wildlife and wildlife-related recreation.

Management of state parks is a cooperative effort by both the Parks Bureau and Wildlife Bureau to enhance state owned areas for a diversity of wildlife species and recreation opportunities. Stands are identified by tree species, tree size, topography, and management system. Stands are walked and identified by the forester. The park ranger, park manager and forester discuss the options for each stand and how management of that stand will fit into the overall management for the area. Forester recommendations are designed to manage the stand to reach the goals and objectives, while utilizing strategic and sound forest management practices.

The FWSP will be the guiding document that prioritizes management activities to meet the needs of forest wildlife species. The DNR's comprehensive Iowa Wildlife Action Plan identifies wildlife "species of greatest conservation need" (SGCN). Habitat needs of these wildlife species will be considered when determining forest management decisions. One of the primary goals will be to maintain quality habitat that will support abundant and diverse wildlife populations.

## FOREST MANAGEMENT OBJECTIVES

The primary objectives for the area are as follows:

- Maintaining diverse, high quality forest habitats for the benefit of diverse wildlife populations
  - Emphasis on oak management
  - Emphasis on diversity of age classes
  - Emphasis on promoting SGCN habitats
- Promote high quality wildlife-dependent recreational opportunities

The DNR recognizes that it is difficult, if not impossible, to manage for all species at the same time on any given tract or area. However, this plan operates under the assumption that creating and maintaining diverse forest habitats will benefit the most wildlife species possible, regardless of their protective status. In other words, game and nongame species alike will benefit from good habitat management practices.

### Oak Management

Oaks are a critical component to Iowa's forests. Iowa's wildlife species adapted, coexisted, and eventually became dependent on the benefits that oaks provided. The acorns of the oak provide a high level of fat and protein to wildlife at a time of year that food resources are low and high-quality nutrients are critical. While the mast that oaks provide are a staple food source for many wildlife species, other characteristics of the oak are extremely beneficial as well. Some of those characteristics include deeply furrowed bark that host insects and invertebrates creating foraging opportunities for insect eating birds, reptiles, and mammals. The rigor and architecture of the branches provide structure for nesting, roosting, and perching. The leaves provide an important food source for many moths and butterflies, with oaks supporting higher diversity and richness of caterpillars than any other native tree family (Narango et al. 2020). Pollinators also benefit from the over-wintering habitat provided by the oak. Because of the critical role that oak trees play in the ecosystem, they are emphasized heavily in this forest wildlife stewardship plan.

Iowa's oak forests are faced with many threats. There are a variety of factors that contribute to the decline of oak forests. Native and non-native pests, pathogens, and diseases contribute to the mortality of oak. The succession of shade-tolerant species creates a shaded forest floor that is not conducive to the regeneration of shade intolerant oak seedlings. Fragmentation of the landscape and invasive species also play a role in the degradation of our oak forest. In order to combat these circumstances, active forest management is essential.

The even-aged management of oak described in this plan is used to promote the ecological niche in which oaks thrive. Oak trees use a specific strategy to regenerate that requires full sunlight. This is why harvest techniques that provide high levels of sunlight to the forest floor such as shelterwoods or clearcuts are used to promote the successful

regeneration of oak. These harvest techniques simulate natural disturbances that occurred on the landscape historically such as forest fires and windstorms.

## **Harvests**

Harvesting is conducted primarily to regenerate stands of desirable species, thin stands to a more desirable stocking, or to achieve a diversity of tree size classes. Harvests are an essential tool for simulating natural disturbances and creating suitable growing conditions for desirable shade intolerant tree species. Harvests are scheduled based on an individual stand's rotation age. The rotation age is determined based on a variety of factors.

The forest type that is present influences the rotation age of the stand. There are a variety of forest types on any given area, with each forest type reaching biological maturity at different times. Biological maturity is the point at which a stand's volume reaches a plateau or starts to decline based on natural factors such as mortality, breakage or rotting. A species such as quaking aspen will reach biological maturity many years before a species such as white oak.

Along with forest type, site productivity influences the point of biological maturity. High site productivity will increase the growth rate, vigor, and health of the stand. This will likely extend the biological maturity of the stand.

Forest health can influence the point at which a stand is harvested. Insects, disease, and pathogens can infect a stand unexpectedly. An event like this can alter the rotation age of the stand.

Landscape level considerations also influence rotation age. Wildlife objectives may require certain age structures in targeted locations across the area due to how the stand fits in among the broader landscape. This may either increase or decrease the rotation age of the stand.

A variety of regeneration techniques will be used in this forest stewardship plan. Each of them has been selected to achieve a targeted outcome. The timing of and results of these techniques will influence the point at which a stand is harvested.

Economics and logistics can alter the timing, scope, and size of a harvest. A harvest is implemented based on a silvicultural prescription designed to reach a wildlife management or forest health objective. Any financial return is purely a byproduct of proper management and not a driving factor. Income from harvests will be reinvested into the area to complete the recommended projects within the plan. Those projects include: tree planting, thinning young stands, removing undesirable and invasive species, converting areas to more desirable species, and completing early successional cuts.

Sustainable forestry aims to manage a forest for maximum distribution of age and size classes and gives an indication of the amount of acreage or volume that can be harvested from a given geographical area periodically, without ever running out of volume or growing stock. Generally speaking, with even-aged management the sustainable harvest is the total acreage of the forest divided by the rotation age. Rotation ages for stands vary by the dominant species in each stand, but are generally set at the point of biological maturity. The majority of actively managed even-aged stands use a 120-year rotation, on average. The rotation age calculations reflect only the annual allowable harvest. In actual practice, these figures will fluctuate over and under the allowable harvest periodically.

Stands managed under an uneven-aged system have no rotation age because regeneration in these systems is ever-present and different age classes occur within the same stand. Sustainable harvest volume is estimated by calculating the growth in volume over a period of time, generally 20 years.

## **Invasive Species**

Several exotic, invasive species are found throughout the park. Some of the most common invasive species include round leaf bittersweet, bush honeysuckle, and buckthorn, among others. Control efforts must be taken prior to or alongside any management scheduled for a particular stand.

This is particularly important in areas containing aggressive and destructive round leaf bittersweet. Deemed one of the most significant threats to forests in Iowa, round leaf bittersweet grows quickly and aggressively, edging out or killing native species. The vines can quickly become large, breaking tree limbs or leaders with its weight. Once large enough, the vines can even “strangle” trees to death by wrapping tightly around trunks. The dense vegetation smothers leaves, tree regeneration, and woodland forbs. It is spread both by seed and vegetative root sprouts making control very difficult. Because of this, persistence will be key in setting it back or eliminating it where it is found.

Control methods will vary by species and new methods may be tested for effectiveness.

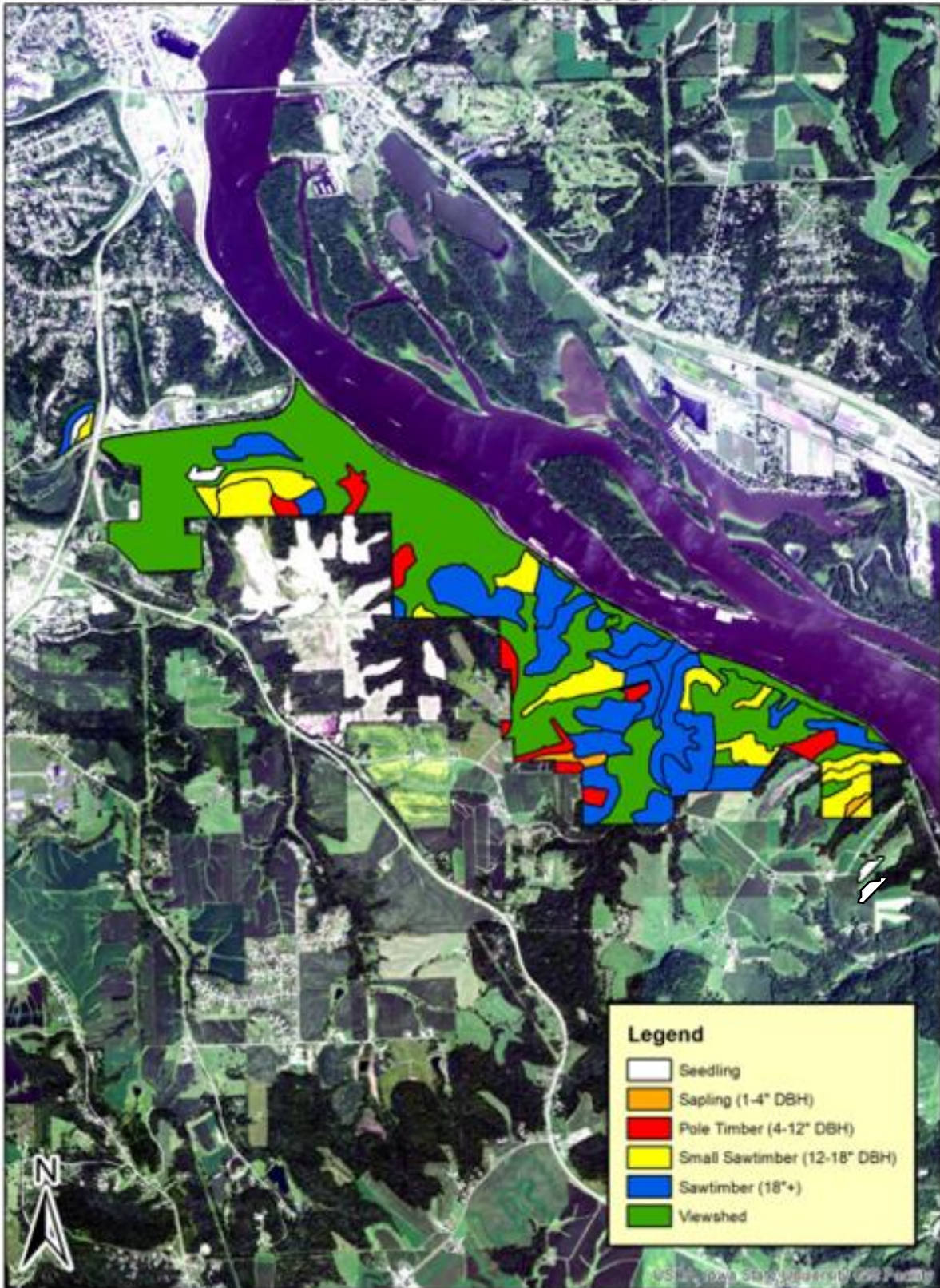
**Current Distribution of Tree Size on the Area**

**\*DBH = Diameter at Breast Height**

<b>Tree Size</b>	<b>Active Forested Acres</b>	<b>% of Total Area</b>
Seedling	9.6	1.4 %
Sapling (1-4" DBH)	12.2	1.8 %
Pole Timber (4-12" DBH)	74.1	10.8 %
Small Sawlog (12-18" DBH)	184.4	26.9 %
Sawtimber (>18+ " DBH)	404.5	59.1 %
Totals	684.8 (excludes Viewshed/Other areas)	100%



# Mines of Spain Recreation Area Diameter Distribution



Sec. 1 Table Mound Township  
Sec. 4,5,6,8,9,10 Mosalem Township  
Dubuque County

0 1 2 Miles

## PROPOSED MANAGEMENT SYSTEMS FOR THE AREA

Recommendations for each stand were based on whether the area will be managed to create early successional growth, an even-aged system, an uneven-aged system, or viewshed. The decision on which management system would be used was based on the objectives for the area to create a certain structural cover, maintain an oak component where feasible, develop a diverse woodland landscape, protect fragile sites, and increase the acres of early successional growth.

Based on forester recommendations for Mines of Spain, the acres under each management system are as follows:

Management System	Acres	% Total
Early successional	29.7	4.3 %
Even-aged	555.0	81.1 %
Uneven-aged	100.1	14.6 %
Actively managed acres	684.8	100 %
+ Viewshed / Other areas (no intensive management, parking lots, roads, sensitive sites, prairies, mowed areas, etc.)	785.0	

### Landscape Considerations

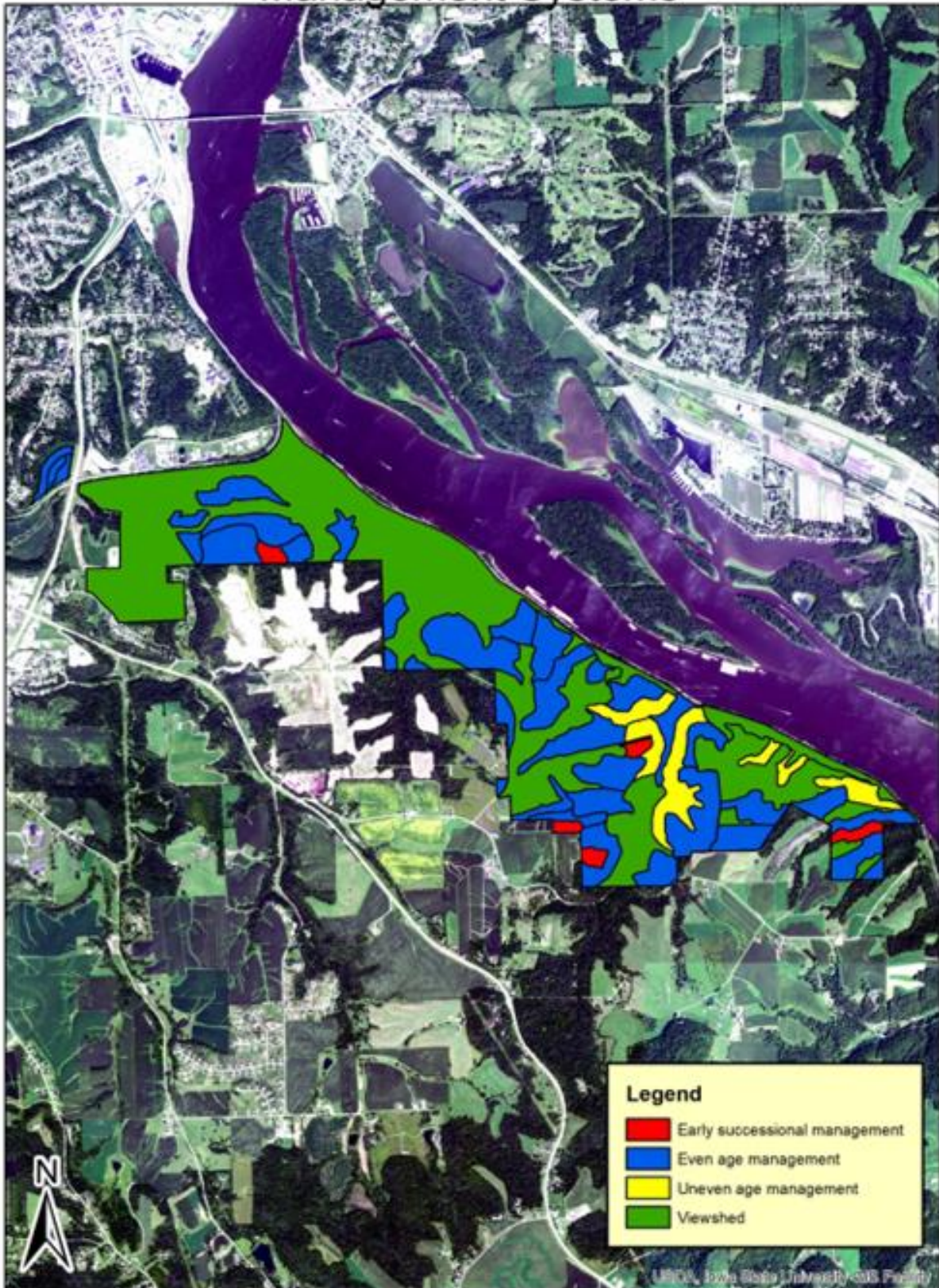
Forest wildlife management plans should take into consideration factors beyond the target property. Wildlife do not recognize property lines, and move freely to satisfy their life cycle needs. Land managers need to think on a broader scale to maximize benefits to local wildlife populations. Current and future conditions on surrounding properties may directly affect the planning and effective results of management actions carried out on the park.

The cumulative effect of early successional management and the regeneration management (clearcuts) in stands managed as even-aged will create and maintain an ever-shifting patchwork of young forest that varies spatially and temporally. This mosaic will provide critically important habitat to vast array of wildlife that depend on or prefer early successional forest types. Young forest is a habitat type that is often considered a limiting factor in forested landscapes in Iowa.

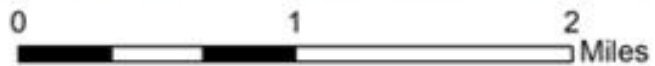
The cumulative effect of uneven-aged management and viewshed management will be to ensure a significant portion of the park remains in relatively undisturbed, mature forest. This is of particular significance when the larger landscape around the park is taken into consideration. Surrounding the park is a uniquely large expanse of predominantly mature forest habitat bordering the Mississippi River. This forest complex spans several square miles, which is unique in Iowa, and is an important corridor for wildlife movement including bird and bat migration. Landscape level forests provide critically important habitat to wildlife that depend on or prefer forest interior or large expanses of mature forest habitat.

Throughout the park, there are remnant hill prairies scattered throughout that have been colonized by eastern red cedar or invasive woody shrubs such as honeysuckle, autumn olive, buckthorn, and/or barberry. Where these areas exist within active management stands or viewshed designated areas, efforts should be made to clear the woody encroachment and subsequently followed up with prescribed fire in an attempt to restore and maintain the hill prairie plant community.

# Mines of Spain Recreation Area Management Systems



Sec. 1 Table Mound Township  
Sec. 4,5,6,8,9,10 Mosalem Township  
Dubuque County



## **Early Successional Management**

Many species of birds such as American woodcock, blue-winged warbler, black-billed cuckoo, yellow-billed cuckoo, and eastern towhee are dependent on the early stages of woody growth for breeding. Many mature-forest birds also use early successional forests during the post-fledging and migratory periods. The high stem density of both trees and shrubs provides suitable foraging and/or nesting habitat, and protection from predators. One way that this habitat can be created is by cutting a stand and allowing all of the desirable species to re-sprout. Many tree and shrub species stump sprout vigorously after being cut, especially when cut at a younger stand age.

The majority of early successional management is recommended for the woodland edges adjacent to open habitats. Keeping the woody species growth “low and dense” in these areas will create more attractive habitat for shrubland and “edge” wildlife species. This will “feather” the edges and make a gradual transition from the grassland/agricultural field edges to the larger trees. Feathering or softening the woodland edges creates attractive cover for many species and often results in less nest parasitism of interior forest bird species by brown-headed cowbirds.

The early successional management areas will be managed on a 10-15-year rotation. In other words, every 10-15 years the area will be cut to rejuvenate the desirable species and create areas with high stem density.

Mines of Spain has 29.7 acres (4.3% of all actively managed woodland acres) scheduled for early successional management. Applying sustainable forestry guidelines, around 6 acres could be cut every 5 years.

## **Even-Aged Management**

Even-aged management is essential for wildlife species depending on oak/hickory forests. Even though large blocks of forest are needed for some wildlife species, each stage of an even-aged stand provides habitat for wildlife. For example, regenerating stands (1-10 years old) benefit the same species of birds as does early successional stands, such as the blue-winged warbler, black-billed cuckoo, yellow-billed cuckoo, eastern towhee and American woodcock.

Sapling to small pole-sized stands between 10 and 20 years old, may be used by species such as the Kentucky warbler. From age 20-60 years, pole to medium-sized trees tend to be used by canopy nesters such as the scarlet tanager, and ground nesters such as the ovenbird. Mature stands of 60 to 125 years of age are used by birds such as the wood thrush, Acadian flycatcher, ovenbird and scarlet tanagers. All size classes are important for many game species such as bobcat, deer, squirrel, and wild turkey.

As forest stands age, they constantly lose trees to shading, insects, disease and other factors. The dead and dying trees provide habitat for cavity nesters such as wood ducks, woodpeckers, nuthatches and titmice. Over 30 species of Iowa nesting birds nest in the cavities of trees. Iowa’s seven species of woodpeckers (including two SGCN) are the primary cavity builders and nesters, and these woodpeckers are the keystone species that provide the cavities for so many other secondary nesting birds, as well as providing homes for flying squirrels, gray and fox squirrels, bats, and a host of other species. In northeast Iowa, federally endangered northern long-eared bats and the tricolored bat (proposed endangered) use loose-barked, live trees such as shagbark hickory as well as the sloughing bark from dying trees for their maternity colonies.

Even-aged management involves growing a stand of trees which are close to the same age. At some point in the stand’s life, the area is clearcut which creates the even-aged structure. Even-aged management creates excellent habitat for deer and turkey, and is essential to the regeneration of oak which require full sunlight. The only way that oak can be maintained as a component of the forest is by practicing some form of even-aged management.

Common forms of even-aged management in Iowa include clearcutting and planting, clearcutting with regeneration already established, or a shelterwood system to develop desirable seedlings on the ground.

Shelterwood is a form of even-aged management. The final cut is a clearcut, but several thinnings are done prior to the final cut. The large, healthy trees are left to provide seed for naturally reseeding the stand, and to create partial shade to inhibit the growth of weeds and brush until the desirable seedlings are well established. The final cut, or clearcut, is normally done when there are a sufficient number of desirable trees that are 3-5 ft. tall. The shelterwood system can

take many years to develop a good stocking of desirable young trees. You may have to kill the undesirable species several times to favor the species you want. The final clearcut should not be made until you are satisfied with the stocking of desirable young trees. Snags and large wolf trees nearing the end of their lifespan should be left standing to provide cavity opportunities in the new stand, which would otherwise take decades to create through regeneration.

Clearcutting to create full sunlight is essential at some point in the stand's life to successfully regenerate oak. If stands are not clearcut, the oak component of the forest will be lost to shade tolerant species such as sugar maple and basswood. Clearcuts also provide additional early successional habitat in the early stages. The area is in the brushy stage for a very short period, normally 10-15 years. After that time, the trees will totally shade the ground, and the area becomes a pole-sized (4-12" DBH) stand of trees.

Prescribed fire can be an important tool in managing oak stands. Frequent burning of the leaf layer in the woodland will kill thin barked species such as hard maple, cherry, elm, bitternut hickory, and ironwood. Fire will expose mineral soil and open up the ground to sunlight. These conditions favor the natural regeneration of oak. Oak seedlings will tolerate light fires. The top will be killed by the fire, but the deep root systems survive and sprout. Fire will be utilized on a limited scale to encourage oak regeneration in oak stands. Once an adequate number of oak seedlings are present, the over story will need to be removed or the young oak will die from lack of sunlight.

Fire is also an important tool in promoting a more diverse herbaceous plant community on the forest floor. The conditions that favor oak regeneration also favor many native plants that thrive on periodic disturbance. Fire can combat invasive species such as garlic mustard and multiflora rose that crowd out desirable native plants. Periodic fire, coupled with the practices to provide more sunlight through the canopy, will set the stage for more diversity across even-aged stands. It has become apparent that fire is not used frequently enough in many upland forests. It seems to be a novelty practice that is used more as a singular event or for promotional status than as a routine part of forest management. Fire can be used, if feasible, and where fire-intolerant invasive species occur in significant numbers in even-aged stands where regeneration or promotion of fire tolerant species is desired.

Mines of Spain has 555 acres (81.1%) of all actively managed woodland acres that will be managed as even-aged. Applying sustainable forestry guidelines, approximately 23 acres could be clearcut every 5 years or 4.6 acres every year assuming a 120-year rotation age.

### **Uneven-Aged Management**

Uneven-aged management develops a stand of trees with multiple tree ages and sizes represented. The stand structure is developed by selectively harvesting mature and defective trees, and removing unwanted small trees that are damaged or defective as single trees or in small groups. Because uneven-aged stands always have large trees present, this system favors species that will grow in shade such as sugar maple and basswood.

Uneven-aged management will maintain blocks of forest that will always have larger trees. Uneven-aged management is desirable where the understory is mainly sugar maple, on steep slopes, and on areas where always having large trees is important.

Uneven-aged management areas will provide continuous tracts of forest with minimal disturbance. Large tracts of uneven-aged management will provide necessary habitat for nesting Neotropical migratory bird species such as eastern wood-pewee, Acadian flycatcher, wood thrush, cerulean warbler, worm-eating warbler, Kentucky warbler, and for migrant Neotropical migratory species such as golden-winged warbler, bay-breasted warbler, and Canada warbler.

Selective harvesting will create small openings in the canopy, which will increase ground cover, and enhance stand structure. Bats will use canopy gaps for foraging and area-sensitive species like the red-shouldered Hawk and pileated woodpecker will also benefit from the contiguous canopy this harvest strategy maintains. Den trees will be left to provide cavities for wildlife such as woodpeckers, bats, raccoons and squirrels. Retaining live loose bark tree species (e.g., shagbark hickory) whenever possible and 6-10 snags per acre benefits bats and other wildlife. Timber stand improvement and selective harvesting, along with allowing some natural tree mortality, will create woody debris on the forest floor that will serve as important habitat for reptiles, amphibians and small mammals.

Mines of Spain has 100.1 acres (14.6% of all forest acres) that will be managed as uneven-aged forest. Applying sustainable forestry guidelines, approximately 25 acres can be selectively harvested (single tree or group selection) every 5 years or 5 acres each year assuming a 20-year re-entry harvest cycle for those acres. Selective harvests may be used on this area (in conjunction with other management practices) as an important step in the process of creating more species diversity in the forest stand.

### **Viewshed Management**

Viewshed areas are typically steep slopes, areas along streams which are fragile and are best left to naturally progress through succession, or other particularly sensitive sites (ecologically, culturally, or socially). Areas where endangered plant or animal species exist may also be under the viewshed system of management. Management can take place on these areas where desirable, but the primary objective is to have very minor disturbance if any. Such management typically includes lower impact practices such as prescribed fire and invasive species control. Managers will monitor these stands and may choose to implement these practices when they integrate with management of surrounding stands or when degradation threatens the entire stand or surrounding areas.

Viewshed management is an important component of the overall forest management in many localized areas in Iowa. Some landform regions, such as the Paleozoic Plateau, experience a greater need for this system of management than do other regions. Like uneven-aged forest management, viewshed areas provide an important core area of relatively stable natural habitat. Many birds, bats, and insects benefit greatly from the areas designated as viewshed. Algific slopes and moderate slopes under viewshed management protect several of Iowa's rarest species and SGCN.

\*For the purpose of this work plan, areas designated viewshed will also include areas not being actively managed as forest land including prairies, food plots, roads, parking lots, scenic areas, trails, bluffs, visitor centers, interpretive areas, water features, culturally significant sites, etc.)

Mines of Spain has 785 acres that will be designated as viewshed.

## **SOILS**

All forested acres of this plan are located within the Paleozoic Plateau landform. This landform is dominated by rock outcroppings, deep narrow valleys, and coldwater streams. The native vegetation of this landform is mostly forested.

Soil is the medium for plant growth and can dictate current and future forest composition. Soil type is a variable that is considered for all forest management decisions. The common soil types found in this forest management plan are Fayette and Nordness series. Seaton and Chaseburg soils are also present to a lesser extent.

The Fayette series consists of very deep, well drained soils formed in loess. These soils are on convex crests, interfluvies and side slopes on uplands and on treads and risers on high stream terraces. Slope ranges from 0 to 60 percent.

The Nordness series consists of shallow, well drained soils formed in loamy or silty material and a paleosol over limestone bedrock. These soils are on high structural benches, crests, and convex side slopes on uplands. Much of the park also includes Nordness-Rock Outcrop complex, which is very shallow and dominated by rock.

The Seaton series consists of very deep, well drained soils formed in coarse loess. These soils are on ridge tops and side slopes on uplands near the bluffs along the major valleys and on treads and risers on high stream terraces. Slopes range from 0 to 60 percent.

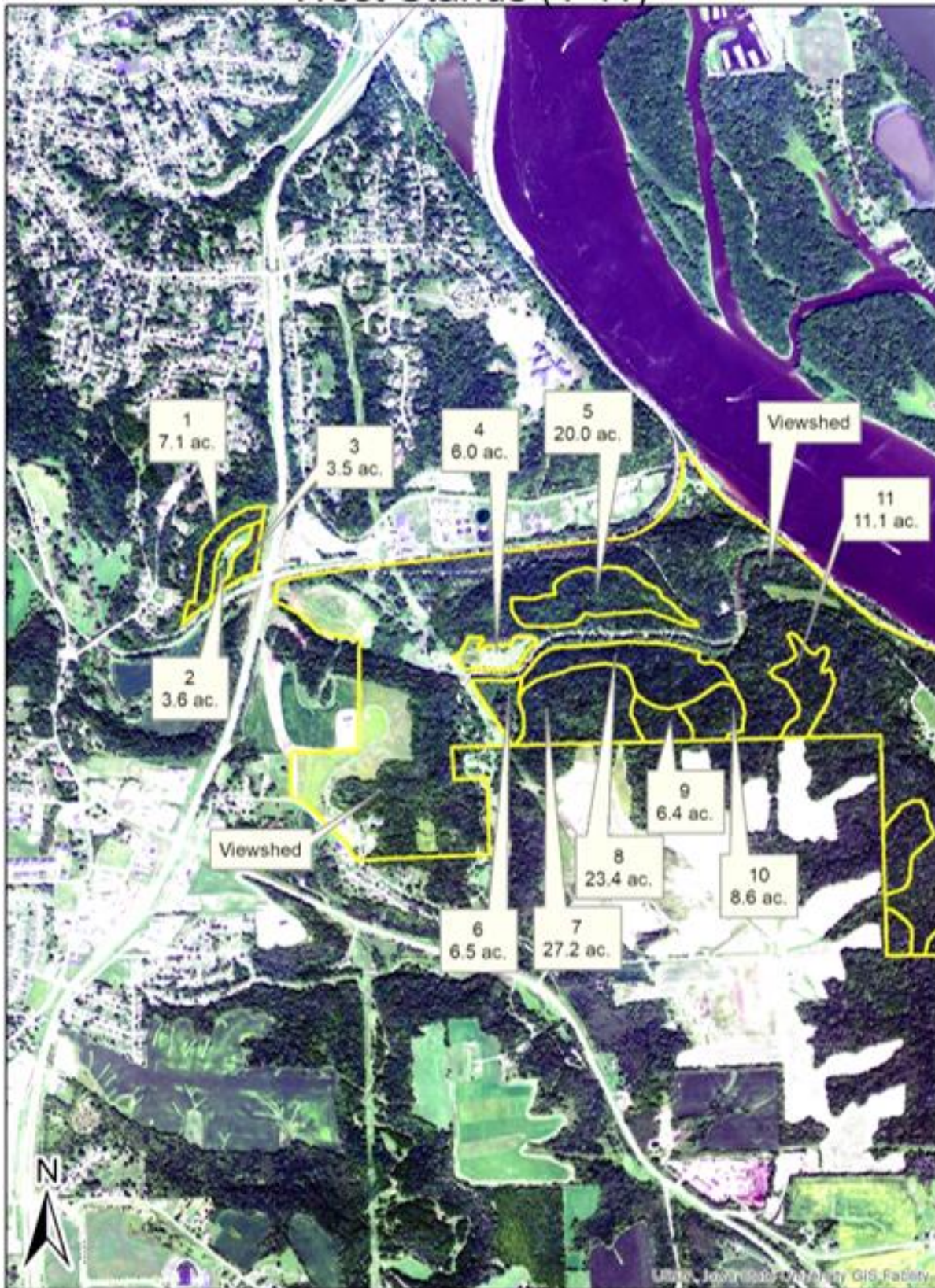
The Chaseburg series consists of very deep, well drained soils formed in silty and loamy slope alluvium. These soils are on narrow flood plains, drainageways, foot slopes and toe slopes of hills, and alluvial fans. Permeability is moderate. Slopes range from 0 to 15 percent.

## **WORK PLAN FOR MINES OF SPAIN RECREATION AREA**

This is the “working plan” designed to aid foresters, biologists, and park managers in the implementation of forest management practices. It is written with the understanding that these professionals have a basic understanding of forest management principles and techniques. Every detail has not been outlined in the plan because the plan would become too long to be of practical use. This plan is intended to get work accomplished on the ground.

Before implementation of any prescribed harvests, the project plan will be reviewed internally to determine potential impacts to both state and federal threatened or endangered species. Harvests will not be initiated until this review has been completed and all T/E comments/concerns have been addressed.

# Mines of Spain Recreation Area West Stands (1-11)



Sec. 1 Table Mound Township  
Sec. 5,6 Mosalem Township  
Dubuque County

0 0.5 1 Miles



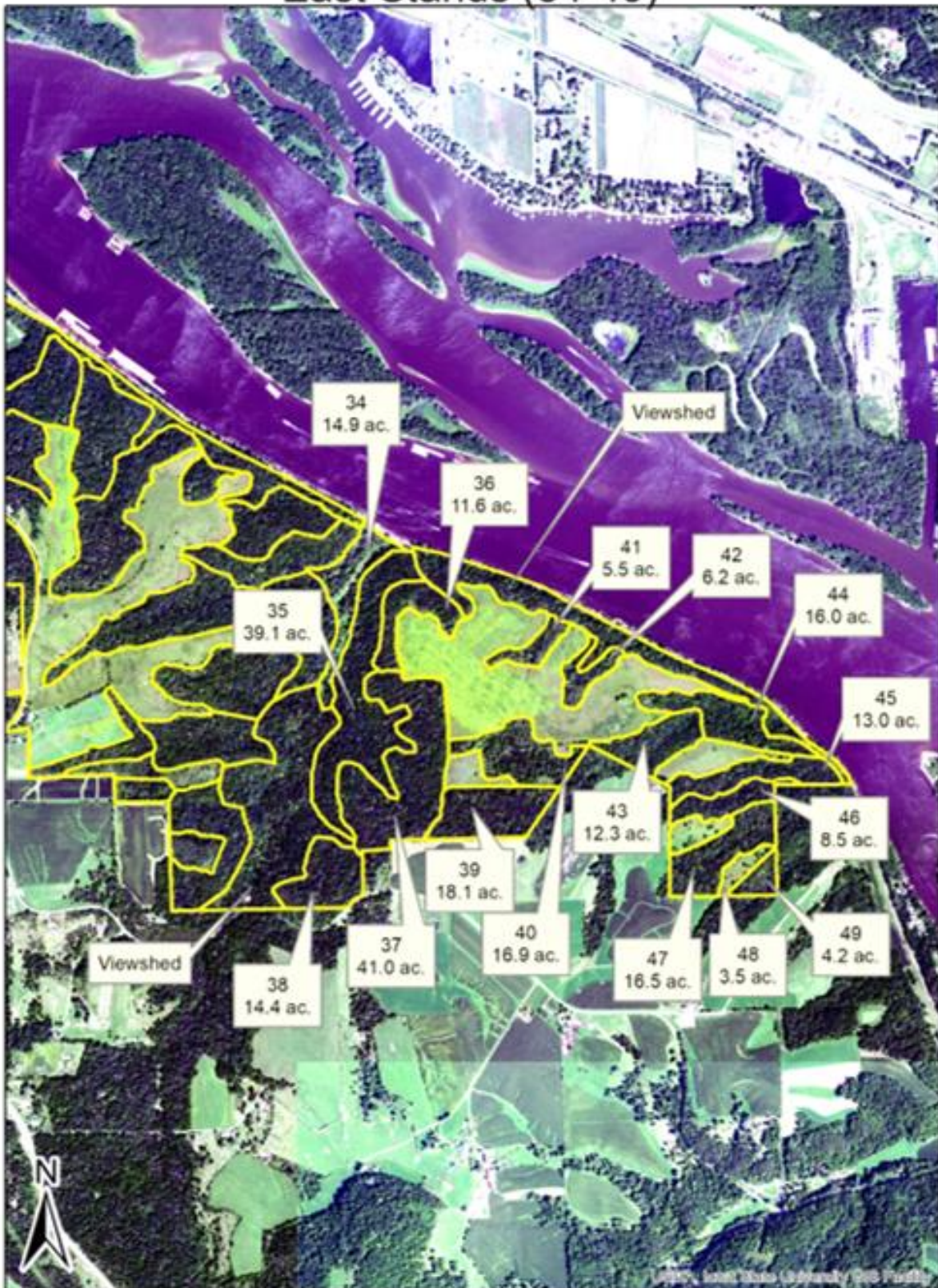
# Mines of Spain Recreation Area Central Stands (12-33)



Sec. 4,5,8,9  
Mosalem Township  
Dubuque County



# Mines of Spain Recreation Area East Stands (34-49)



Sec. 9,10  
Mosalem Township  
Dubuque County

0 0.5 1 Miles

## STAND SUMMARIES & RECOMMENDATIONS

Stand	Acres	Overstory	Intermediate/ Understory	Size Class	Management System	Prescription	Priority	Year	Stand Comments
1	7.1	White oak, bur oak, red oak, basswood, walnut	Hackberry, elm, basswood, ironwood, bitternut hickory, buckthorn, barberry	Sawtimber	Even-aged	Weed tree removal + invasive removal	Low	2034	
2	3.6		Reed canary grass	Seedling	Even-aged	Tree planting	Low	Any	
3	3.5	Silver maple, cottonwood, walnut	Elm, boxelder, hackberry, silver maple, ash	Small sawtimber	Even-aged	Weed tree removal	Low	2044	
4	6.0		Reed canary grass	Seedling	Even-aged	Tree planting	Low	Any	
5	20.0	Bur oak, white oak, red oak, walnut	Hackberry, elm, ironwood, cherry, red oak, dogwood, hazelnut, honeysuckle, buckthorn	Sawtimber	Even-aged	Weed tree removal + prescribed burn	Medium	2030	Moderate invasive presence
6	6.5	Cottonwood, silver maple, walnut	Boxelder, willow	Small sawtimber	Even-aged	Crop tree release	Low	2034	
7	27.2	Walnut, black oak, red oak, bur oak, shagbark hickory, cherry, elm, paper birch, hackberry	Hackberry, elm, ironwood, eastern red cedar, buckthorn, honeysuckle, barberry, burning bush, round leaf bittersweet	Small sawtimber	Even-aged	Invasive removal + weed tree removal + potential prescribed burn	High	2026	Very heavy invasive presence
8	23.4	Black oak, cherry, walnut, paper birch, white oak, red oak, elm, hackberry	Hackberry, elm, cherry, black oak, shagbark hickory, ironwood, barberry, honeysuckle, buckthorn, burning bush, round leaf bittersweet	Small sawtimber	Even-aged	Invasive removal + thinning + potential prescribed burn	High	2025	Heavy invasive presence
9	6.4	Bigtooth aspen, red oak, bitternut hickory, shagbark hickory, cherry, elm, hackberry, walnut, paper birch	Shagbark hickory, bitternut hickory, ironwood, hackberry, cherry, barberry, honeysuckle, buckthorn, round leaf bittersweet	Pole timber	Early successional	Invasive removal + Prescribed burn + ESM cut	Medium	2028	Very heavy invasive presence Could involve harvest once ready to cut.
10	8.6	Walnut, bur oak, red oak, cherry, hackberry, basswood	Hackberry, elm, ironwood, cherry, walnut, bitternut hickory, barberry, honeysuckle, round leaf bittersweet	Sawtimber	Even-aged	Invasive removal + Weed tree removal	High	2025	Some oak dying. Heavy invasive presence.
11	11.1	Cherry, elm, bitternut, black oak, walnut, hackberry		Pole timber	Even-aged	Round leaf bittersweet removal + Crop tree release	Low	2034	Heavy round leaf bittersweet presence

Stand	Acres	Overstory	Intermediate/ Understory	Size Class	Management System	Prescription	Priority	Year	Stand Comments
12	9.7	Black oak, white oak, red oak, honey locust, basswood	Black oak, white oak, red oak, shagbark hickory, cherry, walnut, hackberry, elm, ironwood	Pole timber	Even-aged	Crop tree release	High	2025	Mainly pole sized oak with scattered large trees
13	3.3	Bur oak, walnut, white oak, red oak, shagbark hickory, hackberry, elm	Hackberry, elm, walnut, ironwood, sugar maple basswood, honeysuckle	Sawtimber	Even-aged	Weed tree removal	Low	2034	
14	3.1	Bur oak, walnut, white oak, red oak, shagbark hickory, hackberry, elm	Hackberry, elm, walnut, ironwood, sugar maple, eastern red cedar, prickly ash basswood, honeysuckle	Small sawtimber	Even-aged	Weed tree removal	Low	2035	
15	47.9	White oak, shagbark hickory, walnut	Elm, hackberry, bitternut hickory, shagbark hickory	Sawtimber	Even-aged	Prescribed fire + weed tree removal	High	2025	Excellent stand of white oak
16	15.6	Mainly bitternut hickory with some walnut, red oak, basswood	Bitternut hickory, hackberry, basswood	Small sawtimber	Even-aged	Clearcut + Plant	Low	2040	Mostly bitternut hickory
17	22.1	Walnut, white oak, red oak, bitternut hickory	Hackberry, bitternut, sugar maple	Sawtimber	Even-aged	Prescribed fire + Clearcut w/ Reserves	High	2027	Some oak mortality. Sugar maple regeneration will become more prevalent without intervention
18	9.0	Red oak, walnut, ash, aspen, hackberry, bitternut hickory, shagbark hickory, elm, ironwood, white oak, cherry	Round leaf bittersweet, barberry	Pole timber	Even-aged	Invasive removal + Crop tree release	Medium	2029	
19	29.8	White oak, red oak, black oak, walnut, shagbark hickory, hackberry, bitternut hickory, elm, honey locust, cherry, cottonwood	Hackberry, bitternut hickory, elm, ironwood, cherry, honeysuckle, gooseberry	Sawtimber	Even-aged	Invasive removal + Shelterwood harvest + Weed tree removal	Low	2034	Hackberry is >75% of midstory and understory in places
20	5.3	White oak, red oak, cherry, basswood, bitternut hickory	Hackberry, bitternut hickory, sugar maple, shagbark hickory, cherry, basswood, elm	Sawtimber	Even-aged	Shelterwood Harvest + weed tree removal + Fire	Medium	2030	
21	16.1	Walnut, red oak, honey locust, basswood, elm, bitternut hickory, hackberry, aspen	Walnut, hackberry, bitternut hickory, elm, shagbark hickory, red oak	Sawtimber	Even-aged	Improvement harvest + thinning	Low	2035	Coppice aspen pockets

Stand	Acres	Overstory	Intermediate/ Understory	Size Class	Management System	Prescription	Priority	Year	Stand Comments
22	16.9	White oak, walnut, sugar maple, honey locust, shagbark hickory, eastern red cedar, hackberry	Sugar maple, basswood, hackberry, walnut, mulberry, bitternut hickory, honey locust	Sawtimber	Uneven-aged	Weed tree removal + selection Harvest	Low	2035	Rock outcroppings
23	28.9	Walnut, white oak, hackberry, bitternut hickory, honey locust, red oak, shagbark hickory	Bitternut hickory, elm, honey locust, hackberry, cherry, shagbark hickory, ironwood, sugar maple, honeysuckle	Small sawtimber	Even-aged	Crop tree removal + invasive removal	Low	2034	Two-aged stand. Overstory trees are very low quality
24	16.4	Sugar maple, white oak, Shagbark hickory, red oak	Sugar maple, hackberry, basswood, ironwood	Sawtimber	Uneven-aged	Selection Harvest + weed tree removal	Low	2040	Red oak mostly dead/dying of oak wilt. Extremely dense hackberry understory in upper portion of stand
25	4.8	Aspen, cherry, black oak, walnut, bitternut hickory	Wild plum, sumac, ninebark, dogwood	Pole timber	Early successional	ESM cut	Medium	2030	Stemmy as is for now
26	1.8	Bur oak, ash, boxelder	Dogwood, wild plum, honeysuckle, buckthorn	Pole timber	Even-aged	Invasive removal + crop tree release	Low	2032	
27	9.0	Hackberry, walnut, elm, boxelder, basswood, shagbark hickory, red oak, bur oak, cottonwood	Hackberry, elm, boxelder, walnut, honey locust, honeysuckle	Pole timber	Even-aged	Crop tree release	Low	2035	Not a high number of crop trees per acre
28	22.6	Walnut, black oak, red oak, white oak, shagbark hickory, honey locust, hackberry, bur oak	Hackberry, bitternut hickory, elm, shagbark hickory, walnut, ironwood, sugar maple, bur oak	Sawtimber	Even-aged	Weed tree removal + prescribed fire	Medium	2028	Stand improves towards the east
29	18.2	White oak, bur oak, black oak, red oak, walnut, shagbark hickory, hackberry, honey locust	Hackberry, elm, bitternut hickory, basswood, ironwood, sugar maple	Sawtimber	Even-aged	Prescribed fire + weed tree removal	High	2025	Excellent leaf litter for fire
30	8.7	Eastern red cedar, walnut, cherry, red oak, autumn olive	Autumn olive, honeysuckle, walnut, cherry	Sapling	Even-aged	Invasive removal + tree planting	Medium	2029	Filling in with autumn olive and honeysuckle.
31	4.4	Aspen, boxelder, mulberry, walnut, cherry, red oak, bur oak, eastern red cedar	Autumn olive, elderberry	Pole timber	Early successional	ESM cut + invasive removal	Medium	2030	
32	20.5	White oak, shagbark hickory, bur oak, walnut, red oak, basswood, hackberry, honey locust	Hackberry, ironwood, elm, cherry, bitternut hickory, sugar maple, honeysuckle	Sawtimber	Even-aged	Weed tree removal + invasive removal + Prescribed fire	High	2025	Excellent oak overstory

Stand	Acres	Overstory	Intermediate/ Understory	Size Class	Management System	Prescription	Priority	Year	Stand Comments
33	5.6	Aspen	White oak, red oak, walnut, cherry, eastern red cedar, honeysuckle	Pole timber	Early successional	ESM cut	High	2026	Excellent stand of aspen
34	14.9	Silver maple, cottonwood, elm, walnut	Boxelder, silver maple, elm	Sawtimber	Even-aged	Vine control (wild cucumber) + tree planting	Medium	2036	Wild cucumber completely blanketing trees in bottom.
35	39.1	White oak, basswood, sugar maple, red oak, hackberry, shagbark hickory	Sugar maple, ironwood, elm, basswood, bitternut hickory	Sawtimber	Uneven-aged	Selection harvest + weed tree removal	Low	2040	Steep and rocky. More oak dominance in south half.
36	11.6	Honey locust, basswood, walnut, hackberry, elm, cherry, bur oak, aspen	Elm, boxelder, cherry, honey locust, mulberry, honeysuckle, barberry, round leaf bittersweet	Small sawtimber	Even-aged	Invasive removal + Stand conversion	Low	2040	Heavy invasive presence
37	41.0	White oak, red oak, black oak, walnut, shagbark hickory, cherry, basswood, honey locust, bur oak, sugar maple	Shagbark hickory, white oak, walnut cherry, hackberry, elm, bitternut hickory, ironwood	Sawtimber	Even-aged	Improvement harvest / Commercial thin + weed tree removal	High	2026	
38	14.4	Bur oak, white oak, red oak, shagbark hickory	Elm, bitternut hickory, ironwood, hackberry, burning bush, barberry	Sawtimber	Even-aged	Prescribed burn + weed tree removal	Medium	2028	
39	18.1	Cherry, hackberry, elm, shagbark hickory, red oak, white oak, honey locust, basswood	Hackberry, elm, bitternut hickory, boxelder, round leaf bittersweet, honeysuckle	Sawtimber	Even-aged	Invasive removal + Prescribed fire + Clearcut	High	2025	Lots of overmature cherry, canopy gaps, windthrow
40	16.9	Elm, hackberry, boxelder, mulberry, honey locust	Elm, hackberry, boxelder, mulberry, honeysuckle, prickly ash, gooseberry, multiflora rose, round leaf bittersweet	Small sawtimber	Even-aged	Stand conversion	Low	2040	Heavy invasive presence. Old farmstead.
41	5.5	Cherry, basswood, walnut, sugar maple, cottonwood	Sugar maple, hackberry, bitternut hickory, elm, round leaf bittersweet	Small sawtimber	Uneven-aged	Invasive removal + Weed tree removal	Low	2040	
42	6.2	Red oak, basswood, sugar maple, aspen	Sugar maple, basswood, hackberry	Sawtimber	Uneven-aged	Selection harvest	Low	2045	Steep ditches in interior would need worked around

Stand	Acres	Overstory	Intermediate/ Understory	Size Class	Management System	Prescription	Priority	Year	Stand Comments
43	12.3	Red oak, white oak, walnut, cherry, basswood, bitternut hickory, elm, hackberry, paper birch		Pole timber	Even-aged	Crop tree release	High	2027	
44	16.0	Hackberry, cherry, elm, bitternut hickory, sugar maple, walnut, red oak	Hackberry, bitternut hickory, sugar maple, ironwood, elm, cherry, honeysuckle, round leaf bittersweet	Sawtimber	Uneven-aged	Invasive removal + Weed tree removal	Low	2045	High round leaf bittersweet presence. Most overstory trees severely defective
45	13.0	Cherry, black oak, elm, hackberry, shagbark hickory, basswood	Elm, hackberry, cherry, black oak, shagbark hickory, round leaf bittersweet	Small sawtimber	Even-aged	Invasive removal + oak release	Medium	2028	Oak pick up towards east portion
46	8.5	Aspen, red oak, shagbark hickory	Elm, hackberry, cherry, round leaf bittersweet	Small sawtimber	Early successional	Invasive removal + ESM cut	Medium	2032	Could involve harvest
47	16.5	Walnut, cherry, black oak, elm, hackberry, cottonwood	Cherry, walnut, elm, hackberry, bitternut hickory, boxelder	Small sawtimber	Even-aged	Weed tree removal	Low	2035	
48	3.5	Red oak, bur oak	Red oak, bur oak, white oak, eastern red cedar	Sapling	Even-aged	Tree planting	High	2025	Existing regeneration
49	4.2	Black oak, bur oak, walnut, hackberry, Kentucky coffee tree, shagbark hickory, basswood	Shagbark hickory, elm, hackberry, ironwood, walnut, aspen	Small sawtimber	Even-aged	Weed tree removal	Medium	2028	Coppice aspen pockets
VS	785.0			Varies	Viewshed				

## THREATENED AND ENDANGERED SPECIES KNOWN TO OCCUR AT MINES OF SPAIN

The following list is taken from the Iowa DNR Natural Areas Inventory and Multiple Species Inventory and Monitoring (MSIM) Database

Common Name	Scientific Name	Class	State Status*	Federal Status*
Pearly Everlasting	<i>Anaphalis margaritacea</i>	Plant	S	
Narrowleaf Pinweed	<i>Lechea intermedia</i>	Plant	T	
Jeweled Shooting Star	<i>Dodecatheon amethystinum</i>	Plant	T	
Wild Indigo Dusky Wing	<i>Erynnis baptisiae</i>	Animal	S	
Great Plains Ladies'-tresses	<i>Spiranthes magnicamporum</i>	Plant	S	
Southern Flying Squirrel	<i>Glaucomys Volans</i>	Animal	S	
Glandular Wood Fern	<i>Dryopteris intermedia</i>	Plant	T	
Summer Grape	<i>Vitis aestivalis</i>	Plant	S	
Indiana Bat	<i>Myotis sodalis</i>	Animal	E	E
Northern Harrier	<i>Circus cyaneus</i>	Animal	E	
Short-eared Owl	<i>Asio flammeus</i>	Animal	E	
Henslow's Sparrow	<i>Ammodramus henslowii</i>	Animal	T	
Peregrine Falcon	<i>Falco peregrinus</i>	Animal	S	
Bald Eagle	<i>Haliaeetus leucocephalus</i>	Animal	S	
Red-shouldered Hawk	<i>Buteo lineatus</i>	Animal	E	
Barn Owl	<i>Tyto alba</i>	Animal	E	
Least Shrew	<i>Cryptotis parva</i>	Animal	T	
Pipevine Swallowtail	<i>Battus philenor</i>	Animal	S	

\*E= Endangered / T= Threatened / S= Special Concern

In addition, Mines of Spain falls within the high potential zone for the federally endangered rusty patched bumble bee (RPBB). High quality forests within the HPZ may provide overwintering habitat for RPBB queens and early woodland wildflowers and flowering shrubs provide an important source of food for queens that emerge in early spring. Even though management is intended to improve habitat quality and forest health, activities may impact overwintering queens depending on timing so it may be necessary to implement conservation measures to minimize adverse impacts.

### LITERATURE CITED

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