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Service

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Environmental Assessment

Prairie-wide Habitat Maintenance

Midewin National Tallgrass Prairie
Will County, Illinois

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INTRODUCTION

This prairie-wide habitat maintenance Environmental Assessment (EA) documents the potential environmental effects of proposed habitat maintenance activities at Midewin. This EA was prepared in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and state laws and regulations. This EA discloses the direct, indirect, and cumulative environmental impacts and any irreversible or irretrievable commitment of resources that would result from the proposed action and implementation of alternatives.

An Interdisciplinary Team of resource specialists used a systematic approach for analyzing the proposed project and alternatives to it, estimating the environmental effects, and preparing this EA. The planning process complies with NEPA and the Council on Environmental Quality (CEQ) regulations for implementing NEPA (40 CFR 1500-1508). An EA is “a concise public document...that serves to briefly provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of ‘no significant impact’ ” (40 CFR 1508.9).

BACKGROUND

Midewin National Tallgrass Prairie (Midewin) is in Will County, Illinois, approximately 45 miles southwest of Chicago, 15 miles south of Joliet, and 3 miles north of Wilmington (Figure 1, Appendix 4). Midewin was established through the Illinois Land Conservation Act (ILCA) of 1995. Through this legislation, the USDA Forest Service (Forest Service) was to take over management responsibilities of land formerly managed by the Department of Defense (DoD), as an ammunition plant. On March 10, 1997 the first transfer from the DoD to the Forest Service took place.

From the initial transfer of 15,080 acres, additional lands were transferred and acquired to comprise the current total of 18,225 acres. Additionally 1,445 acres will be transferred from the DoD to the management of the Forest Service over the next several years. This prairie-wide habitat maintenance EA also covers these imminent transfers (Figure 1, Appendix 4), for a total of 19,670 acres.

One mission of Midewin is to restore prairie ecosystems across the former ammunition plant. Of special value are the few remaining undisturbed remnants of prairie vegetation and sensitive grassland bird habitat. Prairie restoration provides habitat for many sensitive plant and animal species and improves the landscape for recreational activities. This proposal provides an integrated invasive plant management system of prairie-wide habitat maintenance, which implements the Midewin Land and Resource Management Plan (Prairie Plan).

Invasive plants are defined as having been introduced into an environment in which they did not evolve and thus have no natural enemies to limit their reproduction and spread (Westbrooks 1998). Through competition for light, water, and nutrients, they displace diverse native plant communities with low diversity ecosystems that are less efficient and effective at nutrient recycling, reducing erosion, and providing habitat for a diversity of wildlife species (Hartmann and McCarthy 2007). Once established, invasive plants may grow and spread rapidly, and may be difficult to control and/or eliminate. (See the Invasive Plants section of this document for more specific information on invasive species and infestations on Midewin.)

Habitat maintenance activities proposed with this environmental assessment would control invasive species using several management tools and apply prescribed burning to stimulate native plant competition, preventing further deterioration of diverse prairie ecosystems. This project would allow Midewin to fully participate in collaborative weed management partnerships between state and Federal agencies, neighboring landowners and non-governmental agencies. It addresses the Forest Service sustainable ecosystem management goals in the areas of ecosystem health and community partnerships.

PROJECT AREA

Prior to Army ownership Available information indicates that prior to agriculture and arsenal development, most of Midewin's natural landscape was dominated by prairie, wetlands, savanna and woodlands which were maintained by wild fires which regularly killed shrubs and trees. Sometime during the onset of agricultural uses and before 1940, much of the Midewin area was drained and converted to pasture grasses and crops. Only portions along streams, woodland groves, some scattered wetlands and areas with bedrock near the surface and/or glacial erratics were left in a somewhat natural state. Although these areas were not converted to crop agriculture or pasture, most were historically grazed by livestock.

During Army ownership At the time of the initial transfer in 1997, the lands consisted of highly developed areas with Army infrastructure, pasture lands, crop lands, abandoned former crop fields, scattered shrublands, young woodlands and remnants of native vegetation. The army infrastructure consisted of roads, railbeds, buildings, and munitions storage igloos. Over 300 miles of roads and railbeds with associated ditches are located within the boundaries of Midewin. The buildings consist of scattered individual buildings or groups of buildings. Some areas consist of parallel-spaced warehouses, magazines and munitions storage igloos. At the time of transfer, 3,376 acres were in pasture and were being grazed. Three hundred seventy-seven acres was in hay production and 5,638 acres were in small grain production.

During Army management, regular mowing and regular tree and shrub removal prevented tree and shrub encroachment on non-crop lands. The crop lands helped control invasive plant species. Prescribed fires were prohibited because of the explosive material on site. Mowing and tree and shrub removal controlled some of the invasive species. The Army hunting club planted two non-native invasive species, Autumn olive and bush honeysuckle, for wildlife purposes that have since expanded and threaten large areas of the Prairie.

With the closure of the plant in 1996, Army maintenance activities ceased. Areas not initially transferred were no longer managed and have deteriorated over the past 10 years. Roadsides are covered in Autumn olive, which continues to colonize and move rapidly into new areas. Areas where pastures were separated by a road and were effectively one large pasture for habitat purposes are now isolated smaller pastures because of the Autumn olive infestation along the roadsides and fences, see Photos 1 and 2.

The Army had no need to control invasive plants such as Canada thistle, nodding thistle, Johnson grass, reed canary grass, multiflora rose, poison hemlock, wild parsnip, common reed, garlic mustard, purple loosestrife, and teasel which have spread throughout Midewin and threaten native wildlife and plant communities.



Photo 1. Autumn olive invasion along chain-link fence surrounding a pasture.

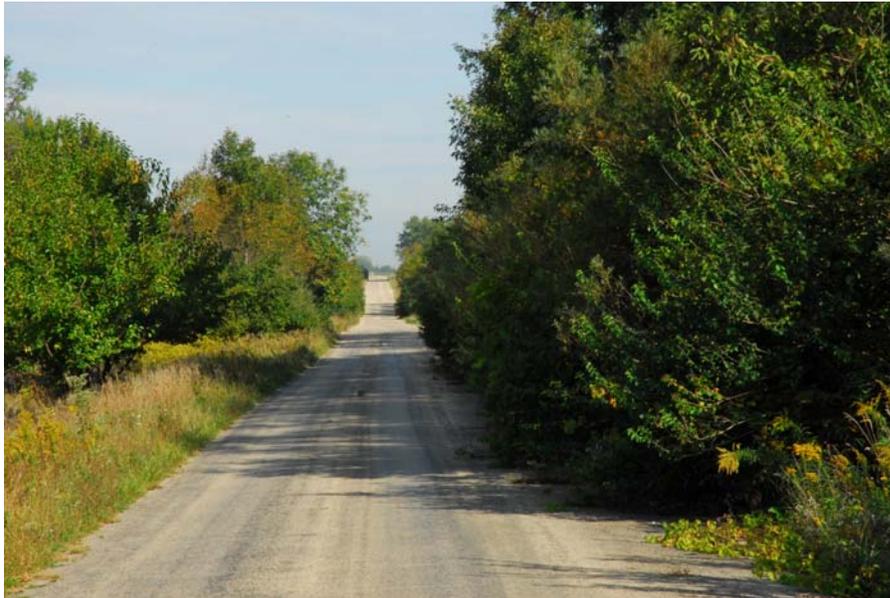


Photo 2. Bush honeysuckle and Autumn olive invading roadside.

Many areas which were dominated by grasses and broad-leaved herbaceous plants are now dominated by shrubs, see photo 3.



Photo 3. Herbaceous pasture being invaded by Autumn olive and Osage orange.

Midewin National Tallgrass Prairie Approximately 833 acres of Midewin are currently dominated by native vegetation (see Figures 2 and 3, Appendix 4) and considered high quality native plant community remnants. Portions of these native plant communities have been receiving some active management, authorized by existing NEPA decisions. Approximately 1,758 acres (Figure 4, Appendix 4) have been converted from former crop lands, pastures and old abandoned fields to native vegetation or is in the process of being converted. This restoration process has been done in partnership with other governmental agencies and non-governmental agencies. Partnership funding of these projects totals more than \$5,000,000. These restored areas include the South Patrol Road, Route 66 Prairie, Blodgett Road, and Middle Grant Creek restorations. Work will begin soon on the Drummond Floodplain restoration, again mostly funded by partners. Restoration work in these areas was authorized by prairie-wide and site specific decision notices: *Managing Vegetation with Prescribed Fire, Grant Creek/Hoff Road and Mola Restoration, Herbicide Use For Invasive Plant Species and Noxious Weeds Control, Blodgett Road and South Patrol Road Restorations, and Drummond Floodplain and Middle Grant Creek Restorations.*

Approximately 4,525 acres are currently being managed by grazing or hay rotation (Figure 5, Appendix 4) to provide the necessary habitat structure for grassland wildlife. Additionally, approximately 3,724 acres (Figure 5) is currently in row crop production. These activities were authorized by the March 2007 Decision Memo on *Continued Agricultural Use.*

Large portions of Midewin are a mosaic of weedy native and non-native invasive plants. In some cases native and non-native invasive species threaten to completely take over areas at Midewin excluding desirable vegetation. With the exception of areas being actively managed under other NEPA decisions, invasive species are on the increase at Midewin. New problem invasive species are starting to turn up, entering Midewin along transportation corridors. Former small infestations are actively growing in size. For example, roadsides that 10 years ago were

dominated by grasses and other herbaceous vegetation are now dominated by bush honeysuckle and Autumn olive (see Photo 2). Honeysuckle and Autumn olive have colonized and grown so rapidly that some roads are getting closed in from branches hanging out over the road. Invasive species have been increasing at a rapid rate at Midewin. These invasive plant species and new invaders are expected to increase over the future and become even more of a problem. Active management can control the spread of invasive plant species.

PURPOSE AND NEED FOR THE PROPOSED ACTION

Establishment of an integrated invasive plant management system of prairie-wide habitat maintenance will help meet the goals outlined in the Prairie Plan by authorizing activities that protect both natural and restored habitats at Midewin. Implementing the prairie-wide habitat maintenance program will prevent degradation of existing habitats and improve the efficiency of our restoration program. This approach would also allow the Forest Service to respond to unforeseen changing conditions in a timely fashion before new invasive plant species become a significant problem. The end result will be more efficient conservation and enhancement of native populations of fish, wildlife, and plants in accordance with Midewin's establishing legislation, the Illinois Land Conservation Act of 1995 (ILCA, PL 104-106).

Midewin is increasingly surrounded by industrial development, roads, and urbanization which will result in ever increasing invasive threats. There is almost no area completely free of invasive plants and some areas are already severely degraded by invasive species. If this trend is allowed to continue, many existing prairie remnants will disappear and the costs of restoring the Prairie will increase significantly. It is difficult to determine where and when the next outbreak of invasive plant species will occur so it is impossible to foresee and plan for all future sites needing treatment. In some cases invasives are coming in from the outside where Midewin has little control. A flexible integrated control method is necessary to react quickly to a new outbreak.

Ongoing restoration efforts have required aggressive control of invasive species prior to, and after, planting and seeding. Our earliest restoration project, South Patrol Road Restoration, has required multiple herbicide applications and prescribed burns to allow the native plants to out-compete invasive species and become well-established. This experience, and other projects, has demonstrated that controlling invasives prior to restoration is cost-effective and that established populations of invasives increase the cost of restoration. It is in the public interest to prevent the establishment of invasive populations as quickly as, and to the maximum extent, possible.

The proposed habitat maintenance activities allow maximum response to invasive species outbreaks and reduce the risk to remnant prairie sites. Investments have been, and are today being, made by the Forest Service and its many partners to restore the prairie and grassland habitat at Midewin as directed by the ILCA. Although control of invasives within these restored areas continues, if invasive plant species in adjacent areas are not controlled now, time and effort to control invasives in already restored areas will only increase in the future. Without the ability to control invasive plants prairie-wide, these major investments may be at risk in the near future.

Project Goals and Objectives Habitat maintenance goals are based on the Prairie Plan goals and objectives. Specific goals for this proposal include:

- 1) Keeping the identified natural community remnants from deteriorating.
- 2) Improving or maintaining the quality of cool-season grass areas currently being managed for grassland wildlife.
- 3) Reducing the risk of invasive plant species (native and non-native) from spreading throughout Midewin and threatening ongoing and future restoration.
- 4) Reducing hazardous fuels that threaten Forest Service and adjacent private infrastructure and Midewin native plant communities.

Prairie Plan Goals and Objectives The Midewin Land and Resource Management Plan (Prairie Plan) outlines the desired condition of a more natural appearing landscape through sound ecosystem management. Goals and objectives (Prairie Plan 2-5, 2-6) to reach the desired condition include:

Goal 1: Sustain habitats and processes necessary to maintain the biological diversity of the tallgrass prairie and provide for multiple-use outputs.

Objective 2.4.7.c: Implement prescribed fire to restore fire as natural disturbance process.

Objective 2.4.7.d: Implement a grazing management program for grassland bird habitat.

Goal 2: Provide ecological conditions to sustain populations of native and non-native species of plants and animals and achieve objectives for Management Indicator Species.

Objective 2.4.9.b: Protect, manage, monitor and enhance all existing native vegetation remnants.

Objective 2.4.9.c: Reduce agriculture crops by approximately 150 acres/year and either restore to grassland or native habitat.

Goal 3: Reduce noxious weeds and exotic, invasive plant and animal species infestations and prevent new invader species from becoming established.

Objective 2.4.10.b: Reduce or limit expansion of noxious and invasive species, with emphasis on areas with high potential to spread.

Objective 2.4.10.c: Manage noxious weeds and invasive species in coordination with adjacent landowners, users, affected resources, and funding sources. (Prairie Plan pp. 2-5, 2-6).

The Proposed Action provides for a variety of habitat maintenance activities to control invasive species across the prairie. Lands approved for these activities include existing native vegetation remnants (see Figures 2 and 3, Appendix 4), future restoration areas, and in restored areas where these specific activities are not already covered by a decision document. Habitat maintenance activities are necessary to stimulate native vegetation and control both native and non-native invasive species. These maintenance activities include mowing, invasive tree removal (in identified native vegetation remnants only), mechanical and hand removal, herbicide use, and prescribed fire. Where required following invasive species control, native and non-native vegetation would be seeded to prevent erosion and subsequent invasion by invasive species. Grazing and row crop production will also help control invasive species.

PROPOSED ACTION

The Forest Service is proposing to implement an integrated invasive plant management system of prairie-wide habitat maintenance activities on native vegetation remnants, future, and current restoration areas. Specific actions proposed to preserve existing native vegetation remnants and maintain unfragmented and restored habitats include mowing, prescribed burning, treating invasive species and noxious weeds with authorized herbicides, and mechanical removal. Mechanical removal involves removing invasive small trees and shrubs that are less than 6 inches diameter at breast height (dbh). Tree and shrub dbh is measured at 4.5 feet from the ground. Invasive trees larger than 6" dbh would only be removed from the 833 acres of existing native vegetation remnants (Figures 2 and 3, Appendix 4).

The actions described above would be applied to National Forest System lands across the prairie (with the exception of trees >6" dbh only being removed from native remnants) and would also be applied to lands when they are transferred from the Army or other entities in the future (Figure 1, Appendix 4). Areas proposed for habitat maintenance activities include both altered and unaltered locations on Midewin; specifically identified native vegetation remnants, roadsides, non-wooded areas, old farmsteads and fields, restored wetland and upland prairies, areas with existing or future grazing and agricultural permits, and former Army infrastructure sites. Some of these activities are currently being implemented in several locations at Midewin under previous decisions notices.

This proposed action would permit these habitat maintenance activities on all of Midewin National Tallgrass Prairie and would allow agricultural uses of row crops and cattle grazing on newly acquired lands. This is our best effort to anticipate the spread of invasive species and fuel buildup based on historical conditions and changes on the landscape in the past 10 years. Changes that have taken place since the first land transfer have shown the necessity of a prairie-wide habitat management program. As the Army transfers additional lands, the treatments identified will also be applied to those lands without further analysis.

PUBLIC INVOLVEMENT SUMMARY

The public was invited to participate in this analysis in September 2006. The Forest Service contacted approximately 150 interested parties in late September 2006, requesting comments. A scoping package was distributed that included a project description, site map, and a request that interested parties consider the following specific questions:

- Is there any information about the project area (Midewin) that you believe is important in the context of the proposed activities and which the Forest Service might have overlooked?
- For you or the group you represent, what are the potential effects of this proposal about which you are particularly concerned?
- Are there reasonable alternative ways to meet the Purpose and Need (the rationale for conducting activities) for which you would like the Forest Service to develop and analyze the environmental effects?

- Are there issues and concerns, in addition to the ones listed above, which you believe are important and would like to have addressed in the EA? If so, please include your rationale for why they should be analyzed.

ISSUES RELATED TO THE PROPOSED ACTION

The Interdisciplinary Team (IDT) carefully reviewed comments received from the public, other agencies, and Forest Service resource specialists. Four responses were received from this proposed action, all supportive. However, an earlier tree and shrub removal project was proposed in 2002. Several issues were raised during the scoping period for that project. The tree and shrub removal project was much more extensive and elicited many comments. The issues derived from this earlier project included impacts on wildlife with the removal of woody vegetation, and impacts to hunting. These issues helped frame the scope of this project and removal of trees over 6" in dbh—with the exception of native vegetation remnants—has to be part of a site-specific restoration project EA. Resolution of the issues is measured by indicators, and each alternative has been analyzed in consideration of these indicators.

Issue 1: *Negative impacts on wildlife will result with the removal of woody vegetation. Although most comments were based on white-tailed deer, other game animals were also mentioned by some individuals.*

Indicator: Potential effects of the proposed prairie-wide habitat maintenance project on wildlife would be determined by the expected extent of habitat change on different groups of wildlife species and extent to how common each wildlife group is.

Issue 2: *Negative impacts of prairie management effects on archery deer hunting.*

Indicator: The effects of the proposed action on white-tailed deer hunting will be examined by looking at 1) the amount of white-tailed deer habitat, 2) effects of the proposed action on deer populations and 3) the amount of white-tailed deer hunting opportunities, and 4) the type of white-tailed deer hunting opportunities.

Besides these specific issues identified through public input, the ID Team also analyzed the following: vegetation, wildlife, invasive species, TES species (threatened, endangered and sensitive species), water quality, soils, cultural resources, recreation and scenery management and Management Indicator Species.

ISSUES ELIMINATED FROM FURTHER STUDY

Several comments received for the initial tree and shrub removal proposal in 2002 were dropped from further study. One individual suggested leaving hardwoods and not turning forest into savannah. Several other individuals commented on trails and the need for hunting amenities. These issues are beyond the scope of the current proposal and will not be addressed in this report.

DECISION FRAMEWORK

Midewin's Prairie Supervisor must decide whether to implement the prairie-wide habitat maintenance program to restore the tallgrass prairie ecosystem as outlined in the Prairie Plan.

If the Prairie Supervisor decides to perform these restoration activities, then she must also decide on the following specific management activities:

- What mitigation measures to implement in order to minimize adverse effects and protect habitat.
- What standard measure of success to use in determining the effectiveness of the prairie-wide habitat maintenance.

The Prairie Supervisor must also determine if the selected alternative would or would not be a major Federal action significantly affecting the quality of the human environment. If the Prairie Supervisor determines that it would not significantly affect the quality of the human environment, then she can prepare and sign a Finding of No Significant Impact (FONSI) and the project can proceed.

If the Prairie Supervisor determines that the selected alternative would significantly affect the quality of the human environment, then an Environmental Impact Statement (EIS) and a Record of Decision (ROD) must be prepared and signed before the project can proceed.

APPLICABLE REGULATORY REQUIREMENTS, REQUIRED COORDINATION, LICENSES, PERMITS

This Prairie-wide Habitat Maintenance would comply with the following regulations:

1. National Forest Management Act (NFMA, 36 CFR 219.27)
 - ✓ Consistent with NFMA guidelines.
 - ✓ Prevent or reduce serious long-lasting damage and hazards from pests.
 - ✓ Provide and maintain for diversity of plant communities.
 - ✓ Prevent the destruction or adverse modification of critical habitat for Threatened and Endangered species.
 - ✓ Protect soil and water conservation resources.
2. Section 7 (c) of the Endangered Species Act (16 U.S.C. 1531 et seq.)
 - ✓ Require concurrence with the U.S. Fish and Wildlife Service.
 - ✓ Protect Federal Threatened and Endangered species.
3. Sections 401 and 404 of the Clean Water Act (33 U.S.C. 1251 et seq.), as amended. Executive Order 11990, Protection of Wetlands (42 F.R. 26961). Sections 401 and 403 of the Rivers and Harbors Act of 1899.

- ✓ Protect all navigable waters; including all tributaries and wetlands connected to navigable waters.
4. Section 106 of the National Historic Preservation Act of 1966 (U.S.C. sec 470), as amended.
- ✓ Protect important heritage resources.
 - ✓ Requires consultation with the State Historic Preservation Office.

The various planned prairie-wide habitat maintenance activities may require coordination or concurrence with the following agencies for licenses, permits and approvals:

- U.S. Fish and Wildlife Service for Federal Threatened and Endangered species.
- U.S. Army Corps of Engineers for work in waters of the U.S. (WUS), and in wetlands adjacent to WUS.
- Illinois Environmental Protection Agency for Section 401 water quality certification.
- Title 1 of the Clean Air Act, as amended (1990).
- Illinois Department of Natural Resources for State Threatened and Endangered species and work within a floodplain.
- Illinois State Historic Preservation Office for heritage resource protection.

ALTERNATIVES

This section describes the alternatives considered for the prairie-wide habitat maintenance project, including no action. A detailed description and the environmental consequences of each alternative are presented. The ID Team formulated one action alternative (the proposed action).

The ID Team considered subsets of the proposed management actions, but no one subset would meet the goals of controlling invasive plant species at Midewin. Only the implementation with all the management actions would meet the goals. For this reason, only the proposed action was brought forward.

ALTERNATIVE 1 – PROPOSED ACTION

The Forest Service is proposing to use an integrated invasive plant management system prairie-wide to control invasive plant species. Integrated invasive plant management uses two or more techniques of invasive species control. The FS will control most invasive plant species through a combination of the management tools described below. For example, the control of common teasel may consist of spot foliar herbicide treatments on rosettes in late fall and/or early spring, followed by the hand removal of flowering heads on rosettes that were missed with the previous treatments. A final hand removal of flowering heads may be necessary several weeks later.

Table 1 lists specific invasive plant species and invasive species groups with potential management control techniques.

Table 1. Invasive plant species and management control techniques.

Invasive species	Entire tract mowing	Spot Mowing	Brush Mowing	Individual Tree Removal	Mechanical and Hand Removal	Prescribed Fire	Grazing	Row Crop Production	Herbicide Treatment
Teasel		X			X	X	X	X	X
Reed Canary Grass		X			X	X	X	X	X
Common Reed Grass		X			X	X	X	X	X
Bush Honeysuckle	X	X	X		X	X		X	X
Autumn Olive	X	X	X		X	X		X	X
Non-native Thistles		X			X	X		X	X
Cottonwood		X	X	X	X	X	X	X	X
Native Invasive Shrubs	X	X	X		X	X	X	X	X
Black Locust				X		X		X	X
Purple Loosestrife					X				X

The actual areas treated each year will change based on their response to treatment and the observed need for invasive species control and fuel reductions. The same piece of ground may receive two or more treatments in any one year. For example, the newly restored upland prairie may be spot mowed to treat thistle, then spot treated with herbicide, and later treated by a prescribed fire all in the same year. Likewise, areas that are grazed may be spot mowed and may also get a spot treatment of herbicides. All treatments will be driven by species aggressiveness and threat.

These complementary habitat management treatments are all necessary to reach the ecosystem goals of the Prairie Plan. No one habitat management treatment alone will provide the means to prevent further spread of invasive species. The staff at Midewin needs to be flexible in the use of these management tools to respond quickly to new or increasing infestations of native and non-native invasive species. The following prairie-wide actions would be implemented under Alternative 1:

Entire tract mowing is used primarily for habitat structure management. Entire tracts are mowed to manage structure, remove duff and grass litter and cut down woody sprouts and seedlings. This tool is usually used when entire tracts are infested with small trees and shrubs or it is

necessary to treat entire tracts to keep invading trees and shrubs out. Invasive herbaceous vegetation may become so prevalent in a tract the entire tract may also have to be mowed. The vegetation is mowed and left on site or removed as hay. Entire tract mowing is typically done between August 15th and April 15th to avoid harming ground-nesting wildlife. By keeping the mower set low to the ground and mowing over the entire tract, small invasive trees and shrubs, some late season herbaceous invasive plant species, and hazardous fuels can be controlled or reduced temporarily. Mowing would typically take place only under dry soil conditions or on frozen ground. Usually, this kind of mowing is necessary once every two or three years; although when infestations are more severe, annual mowing may be necessary. Up to 6000 acres would be “entirely mowed” on an annual basis. Entire tract mowing is most often done by a farm tractor pulling a large rotary mover.

Spot-mowing to control invasive plant species is defined as mowing small, isolated areas, usually no more than a few acres at the extreme. “Spot-mowing” may need to be conducted during the nesting period of ground-nesting wildlife to cut the flowering heads of weeds such as Canada thistle before they set seed. Spot mowing may also be used to reduce the height of tall plants for later treatment with herbicides, thus reducing the amount of herbicide needed and the potential for drift onto non-target species. Impacts to wildlife are minimized by mowing only small areas and keeping the mowing blades high off the ground. Spot mowing would typically take place only under dry soil conditions or on frozen ground. This kind of mowing is done yearly or whenever a problem with invasive species is discovered. No more than 500 acres would be spot-mowed yearly at Midewin. Spot-mowing may be done with tractor mounted implements, walk-behind rotary brush-mowers or hand-held power weed cutters; the tractor-mounted mowers do the greatest amount of mowing.

Brush-mowing consists of controlling invasive woody vegetation (trees and shrubs) that are less than six inches diameter at breast height (dbh). Brush-mowing is usually conducted on large areas of grassland and some prairie remnants that are now severely invaded by non-native shrubs. Brush-mowing also prevents some seed and fruit production on non-native shrubs, thus reducing the spread of these invaders.

Brush-mowing is typically done between August 15th and April 15th to avoid harming nesting wildlife. Brush-mowing would typically take place only under dry soil conditions or on frozen ground. Approximately 2000 acres per year with scattered invasive trees and shrubs less than six inches dbh will require this specialized treatment. Areas in need of brush-mowing are scattered throughout the Prairie. Small trees and shrubs may be scattered throughout an area, but more likely grouped in thickets. Roadsides and old railroad right-of-ways are typically infested with small trees and shrubs. After the initial “mowing of the invasive woody trees and shrubs,” subsequent mowing would be with a regular tractor and mower. Occasionally, follow up mowing with more specialized equipment may be necessary following the initial treatment. Brush-mowing usually requires the use of a more specialized piece of equipment with a front-mounted rotary mower or drum mower.

Individual Tree removal is the removal of larger invasive trees (greater than six inches dbh). Individual tree removal would only take place within the 833 acres of native vegetation remnants (see Figures 2 and 3, Appendix 4). This activity would depend on the sensitivity of the remnant and the time of year. Tree removal is typically done between August 15th and April 15th to avoid harming nesting wildlife. Tree removal would also typically take place only under dry soil conditions or on frozen ground. Several hundred trees would be individually identified for removal. In areas with less sensitive soils and plant species, the trees may be removed by a feller/buncher machine and the woody material chipped. The stumps will be ground down to six inches below the soil surface, depending on the sensitivity of the area. In more sensitive areas where equipment access is difficult, trees may be girdled and the cut surface treated with an herbicide to kill the tree. The trees would be left standing to slowly decay over time. The preferred method of tree control would be removal and use of girdling minimized. In woodlands and savanna native vegetation areas, only selected invasive trees would be removed to allow for the regeneration of more desirable tree species. Tree removal activities on the 833 acres would happen gradually over several years.

Mechanical and hand removal of invasive plant species consists of pulling or cutting stems and flower heads to control invasive plant species. This may be done by hand or with the aid of a tool or machine. The cut material is then removed to a compost pile for disposal or left in the field. Garlic mustard and small cottonwood seedlings are easily pulled from the ground during moist soil conditions. Teasel flowering heads can be removed by cutting prior to seed set. Small trees and shrubs can be removed by a skidsteer type machine with a jaw-type device. Mechanical removal is typically used in conjunction with other treatment methods and by large groups of volunteers. Approximately 200 acres each year would be treated in this fashion. Small trees and shrubs may also be removed by hand using a chainsaw, handheld brush cutter or handsaw on vegetation less than six inches dbh. 75% of the targeted invasive tree and shrub species are less than three inches dbh.

Prescribed fire consists of a controlled burn to mimic natural fire regimes that can no longer occur because of fragmentation of landscapes. Prescribed fire is used to control invasive trees, shrubs, and herbaceous plants; reduce hazardous fuels; and stimulate native herbaceous vegetation. Stimulating native vegetation increases the competitive edge of native vegetation over invasive non-native vegetation. Typically “prescribed fire” is used during the dormant plant season (October through April) to avoid harm to wildlife and plants during the growing season. Occasionally areas may need to be burned during the growing season to control some invasives and stimulate some native vegetation.

Dormant season burns vary in size from only a few acres to hundreds of acres, future burns may be in the thousands of acres. Growing-season prescribed burns would typically be less than 200 acres. Approximately 1500 acres are currently burned by “prescribed fire” each year at Midewin, and this acreage is expected to increase when additional areas are restored and as “prescribed fire” replaces other restoration tools such as mowing. Up to 4000 acres would be treated with prescribed fire on an annual basis.

Grazing is used at Midewin as a management tool to control the grass heights for grassland wildlife. Because different species of grassland wildlife prefer different grass heights, managed grazing can provide the preferred grass heights. Grazing is also an effective means of controlling some invasive plant species. Cattle will browse on some trees and shrubs, thereby limiting plant growth. Herbaceous plant species are also sometimes grazed or trampled in such a fashion that their growth becomes limited. Managed cattle grazing can provide necessary habitat and also control invasive plant species. Currently, approximately 4,525 acres are under authorized grazing permits, and an additional 200 acres of pasture may be ready for grazing within the next two-three years. Additional areas acquired from the DoD may also go into a grazing rotation. The locations of grazing pastures will slowly shift over the next decade toward the areas identified in the Prairie Plan for grassland bird habitat, primarily towards the east side of Midewin.

Prairie vegetation developed with large grazers, like bison and elk. Grazing provided a disturbance regime that was necessary to maintain the biodiversity of prairies. Due to lack of grazing in prairies, today some plant species may be uncommon or conversely too common. Short term or intermittent grazing may be necessary on some restored prairie areas to control invasive species and to increase biodiversity on the prairie. Prescribed burning and cattle grazing can be used in conjunction to mimic the wildfires and grazing from which prairie vegetation adapted. It is anticipated that a maximum of 6000 acres would be grazed yearly.

Row crop production is another tool used to control the spread of invasive species. The ILCA, Midewin's enabling legislation, directs that row crops are to be phased out and the land restored to native vegetation or agricultural uses must serve resource management purposes to continue over time. Continued row crop production keeps invasive plant species out of the crop fields until the fields can be planted with native prairie species. It will take many years before the Forest Service has the capacity to restore all the fields now under row crops. If row crop production ceased, the crop fields would soon grow up into invasive species that would rapidly spread across Midewin and onto neighboring private lands. Additionally, row crops can facilitate preparation of seed beds for planting native species. Prior to restoration, some old fields may need 1 or 2 years of treatment with row crops to control invasive plants.

Crops at Midewin are usually limited to a wheat and soybean rotation, but oats may be substituted for wheat. Glyphosate-resistant soybeans would be planted with one or two applications of glyphosate herbicide during the growing season to control weeds. The number of acres in row crop production will gradually decrease. Row crop production is currently at 3724 acres and is not expected to increase except only temporarily if needed for developing a reduced invasive species load for subsequent restoration planting. The overall amount of acres in row crops will continue to decrease as 100-200 acres of crop land are converted each year. Row crop production on lands to be acquired from the DoD may be necessary to help control the spread of invasive species. It is not anticipated that row crop production would increase beyond 4,000 acres and over time will continue to decrease.

Herbicide application is a management tool that can be effective in control of some invasive plant species. For most invasive plant species, herbicide application is used in conjunction with other management tools. Eight different herbicides were approved for use at Midewin under the *Herbicide Use for Invasive Plant Species and Noxious Weeds Control* decision notice in 2002.

These herbicides were chosen and analyzed for effectiveness and sensitivity to the environment. Herbicides that were thought to be harmful to the environment were excluded from the analysis. The following herbicides, authorized under the 2002 herbicide use decision, are currently applied to control invasive plants at Midewin. This proposal would continue their use throughout all of Midewin.

- 2,4-D
- Glyphosate
- Pelargonic acid
- Sethoxydim
- Tricolopyr
- Chlopyralid
- Fosamine
- Ammonium salt of imazapic

Foliar or cut surface treatment would be used, depending on the species being treated and herbicide used. Most areas needing herbicide application would receive a spot treatment. Spot treatment is defined as applying herbicide to individual plants or small groups of plants. Spot treatment areas would generally be less than one acre in size.

Occasionally an entire field may need to be treated with a boom sprayer on a vehicle or with a larger farm herbicide spreader. An application over a large area would only occur on rare occasions to prepare sites for planting of native prairie and would not exceed 300 acres in size at any one time.

Potentially, all areas of Midewin (not including the fields under row crops) would need some form of herbicide treatment. In the past few years approximately 1500 total acres per year have been spot treated with herbicide. Areas totaling up to 4000 acres may need spot herbicide application on an annual basis in the future to keep invasive plant species under control. The actual acreage receiving herbicide is a small fraction of the total acres indicated, since most areas only have localized infestations at this time. Frequently a treatment area will receive more than one treatment in a year. Follow-up treatments may be necessary to get plants missed during the initial or subsequent treatments.

Table 2. Estimated Maximum Proposed Annual Treatments under the Proposed Action.

Treatment	Estimated Maximum Acres Per Year	Scale of Treatment
Entire Tract Mowing	6000	Entire tracts
Spot Mowing	500	Localized areas
Brush Mowing	2000	Localized areas, rarely small entire tracts
Individual Tree Removal	833*	Only within the 833 identified acres
Mechanical and Hand Removal	200	Localized areas
Prescribed Fire	4000	Entire or combined large tracts
Grazing	6000	Entire tracts
Row Crop	4000	Entire tracts
Herbicides	4000	Localized area, rarely small entire tracts

*The invasive trees on the native vegetation remnants would be removed gradually over several years.

ALTERNATIVE 2 – NO-ACTION

Under the no-action alternative many of the proposed actions would continue only on lands covered under existing decisions. Some proposed actions would not occur at all.

Entire tract mowing would only take place on lands acquired prior to the land transfer of 2005 and other lands under existing decision notices. Lands acquired after 2005 would not be treated using entire tract mowing and invasive plant species would be allowed to grow. Approximately 15,080 acres would be covered under the no-action alternative.

Spot mowing would only take place on lands acquired prior to the land transfer of 2005 and other lands under existing decision notices. Lands acquired after 2005 would not be treated using spot mowing and invasive plant species would be allowed to grow. Approximately 15,080 acres would be covered under the no-action alternative.

Brush mowing would only take place on lands with existing site specific decision notices, approximately 1,500 acres.

Individual Tree removal techniques would only take place on areas under existing decision notices (approximately 1,500 acres). For the most part, these areas have already had invasive trees removed. Tree removal would not take place in the 833 acres of native vegetation remnants. Invasive trees and shrubs in these remnant areas would continue to grow, ultimately excluding native grassland and wetland vegetation.

Mechanical and hand removal would only take place on lands acquired prior to the land transfer of 2005 and other lands under existing decision notices. Lands acquired after 2005 would not be treated with mechanical and hand removal of invasive plant species and those invasive species would continue to grow. Approximately 15,080 acres would be covered under the no-action alternative.

Prescribed fire would only be used on areas covered under the existing prescribed fire decision notice and existing project specific restoration decision notices. Approximately 3,355 acres would be available for treatment. The remaining acres would not be treated with prescribed fire; invasive plant species would continue to spread and hazardous fuels would continue to accumulate.

Row crop production and grazing would only be used on lands with existing NEPA decision notices. Land acquired in the future from the DoD and not under an existing decision notice would be left fallow and the growth and spread of invasive plant species would continue.

Herbicide application would only take place on lands acquired prior to the land transfer of 2005 and lands under existing decision notices. Lands acquired after 2005 would not be treated using these management techniques and invasive plant species would be allowed to grow and spread. Approximately 15,080 acres would be covered under the no-action alternative.

Table 3. Maximum allowable area for each proposed management activity.

Proposed Management Techniques	Action Alternative (Area Available for treatment)	No Action Alternative (Area Available for treatment)
Entire Tract Mowing	Prairie-wide	5,200 acres
Spot Mowing	Prairie-wide	15,080 acres
Brush Mowing	Prairie-wide	1,500 acres
Individual Tree Removal (native vegetation remnants only)	833 acres	0 acres
Mechanical & Hand Removal	Prairie-wide	15,080 acres
Prescribed Fire	Prairie-wide	3,355 acres
Grazing	Prairie-wide	15,080 acres
Agriculture	4,000 acres estimated	4,000 acres estimated
Herbicide Application	Prairie-wide	15,080 acres

MITIGATION MEASURES

Mitigation measures were developed in response to public comments on the proposal and internal review. Besides the mitigation measures listed below, numerous standards and guidelines identified in the Prairie Plan also protect sensitive resources.

- 1) Survey sites for nesting birds or RFSS before spot-mowing from April 15th to August 15th, or mow at a high enough height to avoid ground nesting wildlife.
- 2) Survey sites for nesting short-eared owls or northern harriers before entire tract mowing or prescribed burning in grasslands from April 15th to August 15th. If nesting is found, then management activities should be reconsidered to avoid disturbing the nests of these species.
- 3) Conduct individual tree removal between October 15th and April 1st in riparian areas and August 15th and April 1st in other areas to avoid impacts to nesting birds, bats, other wildlife, and sensitive plants.
- 4) Minimize equipment and vehicles in stream channels and wetlands. Use Best Management Practices (BMPs) where access is needed.
- 5) No row crop agriculture in native vegetation remnants or other TES plant and insect habitats.
- 6) In areas sensitive to rutting, conduct management activities requiring heavy equipment and vehicles only when the ground is frozen or dry.
- 7) Halt vegetation management activities if whooping cranes appear in the area. Do not resume activities in the area until the cranes continue on migration.

- 8) Limit use of fire plows for creating firebreaks to areas outside of native vegetation remnants, restored native vegetation, and areas that have never been plowed or surveyed for heritage resources.
- 9) Establish appropriate buffer zones to protect native vegetation remnants from herbicide drift associated with row crop production.
- 10) Repair significant soil disturbance caused by tree or shrub removal, and if needed, seed or plant with appropriate plant species.
- 11) Leave certain non-native plant species (cool-season grasses, Osage-orange, etc.) on appropriate sites where they are necessary to provide habitat for grassland and shrubland birds.
- 12) Remove hay and straw bales and farm implements in areas visible to the public within timeframe specified in permit.
- 13) Locate livestock watering areas away from high visibility areas, where practical.
- 14) Provide natural or man-made screening to livestock watering tanks in high visibility areas where practical.
- 15) Make efforts to diminish the visual effects of woody vegetation waste in high visibility areas.
- 16) Educate permittees and recreation users of other uses on Midewin and reasons for management activities.
- 17) Require permittees and contractors to use the most direct route to access work areas, where practical.
- 18) Notify recreational visitors appropriately of management activities and potential hazards.
- 19) Temporarily close areas to public where management activities may create safety hazards.
- 20) Perform management activities during periods of lowest potential visitor use where practical.
- 21) Adjacent to trails, use a mower configuration that is less likely to spread/throw debris on trail and mow parallel to trail instead of across the trail if possible.
- 22) Consider other types of cattle operations different from cow/calf operations where cattle/visitor interactions may occur.
- 23) Minimize girdling of trees that may create a safety hazard to visitors. Provide adequate information on hazards to visitors.
- 24) Ground disturbing activities may not penetrate below the plow zone in areas that have never been surveyed for heritage resources, but have been plowed in the past.
- 25) Ground disturbing activities will only be conducted during winter months when the ground is completely frozen in areas that have never been surveyed for heritage resources, have never been plowed, or are NRHP-eligible.
- 26) Clean all equipment used in mowing in the area mowed, prior to moving to a new mowing area. Clean all mowers with compressed air upon return to the Supervisor's office.

Environmental Management System Midewin National Tallgrass Prairie has an approved Environmental Management System (EMS) in place. An EMS is a system to continually improve management and implementation of projects at Midewin. Within the EMS are implementation requirements that will take place during work at Midewin. These implementation requirements are similar to mitigation measures and will be implemented and will negate or minimize some possible impacts from the action alternative. Listed below are the relevant implementation requirements.

- 1) Rutting and compaction of soils is to be avoided. Unless otherwise designated, soil ruts deeper than 2 inches or covering more than 10% of the designated work area must be avoided in sensitive areas identified by Midewin specialists.

- 2) All chip piles and green waste must be removed from the Prairie by April 15th to minimize disturbance to habitat unless otherwise approved by the Contracting Officer's Representative (COR) or Project Manager (PM).

- 3) All contract heavy equipment and off-road equipment will be washed down by the contractor prior to entering Midewin National Tallgrass Prairie to ensure that all possible invasive plant species are removed from the equipment. With the approval of the COR, cleaning with compressed air may be an adequate cleaning method.

- 4) The COR or PM will consult with the Midewin Archaeologist during project design and prior to the start of work concerning exact locations of on-the-ground work, and potential access routes, to determine the potential for impacting heritage resources. The Midewin Archaeologist will determine what mitigation actions as identified in the Project NEPA are necessary for protection of heritage resources. The Archaeologist will determine whether construction or snow fencing will be required for potentially eligible heritage sites. Some brush and woody vegetation removal can be conducted at certain times of the year through consultation with the Midewin Archaeologist. If heritage resources are uncovered during project implementation, all work will temporarily cease in the immediate area pending an assessment by the Midewin Archaeologist.

- 5) The COR or PM will consult with the Midewin Horticulturalist or Ecologist during project design and prior to the start of work concerning exact locations of on-the-ground work, and potential access routes, to determine the potential for impacting native vegetation resources. The Horticulturalist or Ecologist will determine what mitigation actions as identified in the Project NEPA are necessary for protection of native vegetation resources. The Horticulturalist or Ecologist will determine whether construction or snow fencing will be required for identified (Threatened and Endangered) T&E and Regional Forester Sensitive Species (RFSS) areas. Some brush and woody vegetation removal can be conducted at certain times of the year through consultation with the Horticulturalist or Ecologist. If native vegetation areas are discovered during project implementation, all work will temporarily cease in the immediate area pending an assessment by the Midewin Horticulturalist or Ecologist.

6) The COR or PM will consult with the Midewin Hydrologist during project design and prior to the start of work concerning exact locations of on-the-ground work, and potential access routes, to determine the potential for impacting hydrological resources. The Midewin Hydrologist will determine what mitigation actions as identified in the Project NEPA are necessary for protection of hydrological resources. The Hydrologist will determine whether construction or snow fencing will be required for potentially eligible wetlands. Some brush and woody vegetation removal can be conducted at certain times of the year through consultation with the Midewin Hydrologist. If wetlands are uncovered during project implementation, all work will temporarily cease in the immediate area pending an assessment by the Midewin Hydrologist.

7) Midewin personnel will mark all herbicide areas with pin flags, or flagging as needed on the ground or supply a map of application area as needed. *Woody Control*: The contractor will ensure that at least 95% all target woody plants in designated herbicide application areas are killed through herbicide applications. Applicator will use appropriate timing and application methods for maximum effectiveness and will retreat as necessary within growing season. Visual inspection will be used to confirm kill rate. To settle disputes about kill rate; inspection will consist of one-one hundredth (1/100) hectare plots unless there are 10 or less shrubs or small trees in the 1/100 hectare area, then the inspection area would be based on a 1/10 hectare area. Inspection plots within the designated area will be representative of the density of the woody vegetation within the whole of the designated area. *Herbaceous Control*: Through Midewin inspections, herbicide applications will ensure that survival rate of targeted herbaceous species is less than 10% (measured as having live shoots) within same growing season. General: Under no conditions will contractor allow over-spray of herbicides to drift into more than 10% of the area within 1 yard of the target plant, and no herbicide damage can occur beyond 3 feet of the target infestation. There must be no damage to TE species and no damage greater than 2% to RFSS as a result of application of herbicides. Contractors will be required to use a dye with herbicide application.

8) Where appropriate, interpretive material may be developed to educate the visiting public about the association of project impacts and long term goals.

9) In the event of a spill of hazardous substances or petroleum, the user of the material shall immediately report the spill to the Midewin Safety Officer, COR or PM who will assure the proper notification reporting is performed by the user. The 24-hour phone numbers for the Illinois Emergency Management Agency are 1-800-782-7860 or 1-217-782-7860. CERCLA Reportable Quantities (RQs) are found in 40 CFR 302.4, petroleum spill reporting requirements are found in Section 311 of the Clean Water Act. The Midewin Safety Officer, COR or PM will consult with Midewin Engineering concerning each reported spill incident. Midewin Engineering will investigate each incident as requested and will determine appropriate action.

10) The COR or PM will ensure spill cleanup materials will be available on each project at all times on the Prairie. Any spill greater than one (1) pint must be immediately reported to the COR

or PM. Contractor personnel must have training to ensure they are qualified to identify such releases and are competent to provide proper cleanup and reporting. All spilled materials and impacted soils will be removed and properly disposed as necessary.

11) All contract equipment will be washed down by contractor prior to entering Midewin National Tallgrass Prairie to ensure that all possible invasive plant species are removed from the equipment. With the approval of the COR, cleaning with compressed air may be an adequate equipment cleaning method. The COR or designated Inspectors will randomly inspect contractor vehicles to ensure invasive plant control measures are being fully implemented.

12) No mowing is permitted between April 15th and August 15th, unless otherwise authorized by the CO or COR. All areas to be mowed will be marked by Midewin personnel using blue paint or blue flags.

13) No tree and shrub removal will be accomplished between April 15th and August 15th unless otherwise authorized by the CO or COR. Midewin personnel will mark all TE species and RFSS with orange construction fencing where necessary. Midewin personnel will mark all desirable trees and shrubs with blue paint to indicate they are not to be removed. Contractor will only use hand tools within 25 feet of designated TE species and RFSS areas designated with orange construction fencing. Contractor to replace all desirable trees and shrubs damaged or destroyed by contractor's work with the same species.

MONITORING

The following monitoring questions would be addressed on a regular basis to determine the impacts of the management techniques identified in the Prairie-wide Habitat Maintenance EA.

1) Are continued agriculture permits used for resource management purposes?

Annual reporting

2) How many acres are under grazing or special use permits?

Annual reporting

3) Is Midewin causing significant deterioration of air quality?

Annual reporting

4) Has a fire/smoke management plan for Midewin been developed and followed?

Annual reporting

5) Have fire burn plans been developed and followed?

Annual reporting

6) What cumulative effects are management actions having on cultural resources and/or traditional cultural properties?

Ten year reporting.

7) To what extent are noxious weeds and invasive species expanding or being reduced?

Annual

8) Is scenery on National Forest System land improving?

Five year reporting

9) To what extent are National Forest System lands and their management contributing to the recovery, conservation, and viability of threatened, endangered or proposed species and to what extent are actions prescribed in recovery plans being implemented?

Annual

10) To what extent are National Forest System lands and their management contributing to the viability of Regional Forester Sensitive Species and other species of concern?

Five year reporting

11) To what extent are management activities affecting riparian areas?

Five year reporting

12) To what extent are management activities affecting wetland areas?

Five year reporting

13) What effects are management activities having on Management Indicators?

Five year reporting

COMPARISON OF ALTERNATIVES

The following table compares the alternatives by Prairie Plan objectives, issues and environmental effects. Information on the goals and issues is detailed previously in this document, and environmental effects section follows this table.

Table 4. Summary matrix of alternatives.

Prairie Plan OBJECTIVES	Alternative 1 (Proposed Action)	Alternative 2 (No action)
Objective: Implement prescribed fire to restore fire as natural disturbance process.	Yes	Only partially meets objective
Objective: Implement a grazing management program for grassland bird habitat	Yes	Only partially meets objective
Objective: Protect, manage, monitor and enhance all existing native vegetation remnants.	Yes	Only partially meets objective
Objective: Reduce agricultural crops by approximately 150 acres/year and either restore to grassland or native habitat.	Not guaranteed, Only partially meets objective	Only partially meets objective
Objective: Reduce or limit expansion of noxious and invasive species, with emphasis on areas with high potential to spread.	Yes	Only partially meets objective. Failure to control invasives on portions of Midewin would make management of other areas difficult.
Objective: Manage noxious weeds and invasive species in coordination with adjacent landowners, users, affected resources, and funding sources.	Yes	Only partially meets objective. Failure to control invasives on portions of Midewin would make management of other areas difficult.
ISSUES		
Issue: Negative impacts on wildlife with the removal of woody vegetation.	Some possible short-term negative impacts on common wildlife. Probable positive impact on uncommon wildlife species. Control of invasive plants will benefit all species.	Some positive impacts on common wildlife, but negative impact on uncommon wildlife.
Issues: Prairie management effects on archery deer hunting.	Alternative 1 shouldn't change deer population or deer habitat to a significant degree. Alternative 1 doesn't change the amount of archery deer hunting opportunities, although the type of hunting (more ground based) may change with time.	Alternative 2 shouldn't change deer population or deer habitat to a significant degree. Alternative 1 doesn't change the amount of archery deer hunting opportunities, although the type of hunting (more ground based) may change with time.
ENVIRONMENTAL EFFECTS*		
Vegetation	All native vegetation remnants in better condition, and successional changes to open land halted or held in check.	Some native vegetation remnants managed and improved, but some experience decline. Much open land not covered by previous decision documents continues transformation into

		dense stands of shrubs and young trees.
Invasive Species	More effective, integrated control of invasive plants throughout Prairie. Gradual control or elimination of invasive plants from most source areas on FS land.	Control continues in areas already covered by decision documents, but longer time needed before effective control outside these areas. Significant source areas remain on FS land for longer period.
Wildlife	Strong positive impact on the rarer specialist species. Both positive and negative impacts on individual common generalist species (raccoon, fox squirrel, American robin).	Strong negative impact on rarer specialist species. Both positive and negative impacts on common generalist species (raccoon, fox squirrel, American robin).
TES Plant and Animal Species	Long-term positive outcomes for all species, with slight increases of habitat; all existing habitat improved. Some short-term, non-significant effects on a few species.	Immediate positive outcomes restricted to areas already covered by decision documents. Habitat degradation from successional changes continues elsewhere on FS land.
Soils	Short-term (1-2 yrs): Potential for erosion during row cropping and prescribed burning. Long-term (10-20 yrs): Potential for soil compaction from row cropping, increased soil moisture.	Short-term (1-2 yrs): Potential for erosion during row cropping and prescribed burning - less than proposed action. Long-term: (10-20 yrs): Potential for soil compaction from row cropping – less than proposed action, increased soil moisture – less than proposed action, potential for soil heating from wildfire
Water Quality	Short-term (1-2 yrs): Chance for 2,4-D contamination, sediment following rain even after burning Long-term (10-20 yrs): Decrease in aquatic invasive species, increase in water quantity	Short-term (1-2 yrs): Chance for 2,4-D contamination, sediment following rain even after burning – less than proposed action Long-term (10-20 yrs): Increase in aquatic invasive species
Air Quality	Short-term (1-2 yrs): Vehicle emissions, contaminants from prescribed burning Long-term (10-20 yrs): Increased contaminants as prescribed fire use increases	Short-term (1-2 yrs): Vehicle emissions, contaminants from prescribed burning – less than proposed action Long-term (10-20 yrs): Increased contaminants as prescribed fire use increases
Management Indicator Species	Slight to strong positive outcomes, depending on indicator, furthering directions set in Prairie Plan. No permanent, significant impacts on one indicator (white-tailed deer).	Some positive outcomes in areas already covered by previous decision documents. Mostly negative outcomes outside these areas. No permanent, significant impacts on one indicator (white-tailed deer).
Recreation & Scenery Management	Short-term: negative Long-term: positive	Short-term: neutral Long-term: negative
Cultural Resources	Neutral	Negative

* with the implementation of the mitigation measures, EMS implementation requirements and standards and guidelines from the Prairie Plan. To fully understand overall positive, negative or neutral impacts the individual effects analysis sections need to be examined.

ENVIRONMENTAL CONSEQUENCES

This section summarizes the physical, biological, social and economic environments of the project area and the potential changes to those environments due to implementation of the alternatives. It also presents the scientific and analytical basis of alternatives presented in the chart above. The key issues generated through the scoping process and the requirements of the National Environmental Policy Act (NEPA) define the general scope of environmental concern for this project. Cumulative effects are discussed for each key issue identified below. Cumulative effects result from incremental impacts of proposed activities when added to other past, present, and reasonably foreseeable actions regardless of what agency or person undertakes such actions. A description of the past, present, and reasonably foreseeable actions at Midewin, as a basis for the cumulative effects analysis, is presented below.

Past activities since the early 1800s on private and government lands that have affected Midewin include the conversion of native vegetation to agricultural uses, conversion of pastures and hayfields to row crops, drainage of wetlands, fragmentation of extensive natural habitats, suppression of the natural fire regime, introduction of non-native plant and animal species, hunting large ungulates (bison and elk) to extinction, and infrastructure development of roads, railroads, energy transportation, and communications.

Present and potential future activities at Midewin include prescribed burning, invasive species control, hydrologic restoration, native plant community restoration, grassland bird management (including grazing by livestock), continued row crop production, stream rehabilitation, building demolition, hazardous materials cleanup, scientific research, environmental education, and trails and recreation facilities construction. Present and future activities on the former Joliet Arsenal that may impact restoration activities at Midewin include development and operation of the Deer Run Industrial Park, Will County Landfill, Island City Industrial Park and management of the Lincoln National Cemetery. Development of the areas adjacent to Midewin are increasing and in the not too distant future industrial, commercial and housing developments will surround portions of Midewin and will have an effect on Midewin.

Adjoining lands The adjoining lands to Midewin are a mix of government owned lands, corporate lands and private lands. Figure 6 (Appendix 4) shows the lands surrounding Midewin on the west and south sides which is primarily large landowners. Adjoining land use is currently quite different on the east side versus the west side of Illinois Route 53, much of this land is privately owned and in smaller parcels. Many of the adjoining lands on the east side are private farms.

On the west side of Route 53, the adjoining land is primarily owned in large blocks with few landowners. The Illinois Department of Natural Resource's Des Plaines Conservation Area abuts Midewin in the southwest corner. This area of approximately 4,000 acres is managed for wildlife, native vegetation and recreational uses and is likely to remain the same into the future. The habitats are very similar to those on Midewin. Portions of this property, primarily the high quality natural areas and heavily used recreational areas, are actively managed for invasive species. However, other portions of their lands are not managed and infestations of invasive plants are extensive.

The DoD manages the Joliet Training Area, an area of approximately 3,700 acres. This area is adjacent to the northwestern portion of Midewin. Although this is a National Guard and Army Reserve training area, the land is mostly undeveloped and similar to habitats on Midewin. Portions are managed with some invasive species control, while other portions receive no or little management. The northeastern portion of Midewin west of Route 53 is bounded by the Deer Run Industrial Park (2000+ acres) and the Abraham Lincoln Veterans Cemetery (982 acres). Deer Run Industrial Park consists of a railroad intermodal yard with storage for new cars, containers and trailers, and large warehouses. Most of the landscape is developed with the exceptions of floodwater retention basins, protected wetlands and small patches of native vegetation. Invasive species are becoming a problem in the natural communities and wetlands. Abraham Lincoln Veterans Cemetery includes an extensive natural woodland, Hoff Woods. This approximate 400 acre natural area includes both degraded woodland and high quality woodlands, but it is not managed to control invasive species.

On the east side of Route 53, the adjoining land is a mix of private ownership and some industrial ownership. On the north, east and southeast borders family farms currently make up most of the land use. Invasive species aren't much of a problem on these lands since they are primarily in row crops. The Forest Preserve District of Will County has a rails-to-trails conversion, Wauponsee Trail, along the eastern boundary of Midewin. This area is being actively managed by the Forest Preserve District. Along most of the southern portion of Midewin east of Route 53, a 1,100 acre industrial park is being developed along with the 455 acre Will County landfill.

VEGETATION

Affected Environment The current vegetation on Midewin includes a diversity of native (both remnant and restored), early successional, and agricultural habitats. The native vegetation remnants and restored habitats include: upland prairie, wet prairie, dolomite prairie, sedge meadow, marsh, seep, savanna, and woodland/forest. The remnants often exist as discrete patches among successional vegetation and agricultural habitats. Restored habitats are largely former crop fields that are being restored to native vegetation. Early successional habitats are sites that have revegetated with little or no human interference after intensive disturbance, such as row crop agriculture, construction, soil removal, or prolonged grazing. These areas tend to be dominated by dense stands of non-native plants or aggressive native plants. The agricultural habitats consist of cropland of either winter wheat, soybeans or spring oats and agricultural grasslands consist of pastures and hay fields with introduced forage plants.

Effects Analysis

Alternative 1: Proposed Action

Brush mowing, entire tract mowing, spot mowing, and hay-mowing would be used in agricultural grasslands and early successional habitats. These activities should help maintain the habitats in their current condition and prevent further succession, which would result in the development of dense shrubby vegetation. These actions would also minimize flowering and seed set among both shrubby and herbaceous invasive plants, thus preventing the expansion of existing infestations by reducing onsite sources of invasive plants. Conducting mowing

activities when the ground is frozen or dry avoids potential adverse impacts to vegetation from crushing, rutting or soil compaction.

Brush mowing, entire tract mowing and spot mowing may be used in native vegetation remnants and restored habitats and should have beneficial effects. The different mowing treatments to some extent mimic the effects of natural fires and native grazing animals; they kill aboveground growth of encroaching shrubs and trees, temporarily reduce the height of herbaceous vegetation, reduce or remove duff and litter, and expose the soil surface to light. When properly timed, these actions can promote growth and recruitment among native herbaceous plants, and reduce cover and seed set among certain invasive plants, such as sweet-clover and Canada thistle. Mowing when the ground is frozen or dry avoids potential adverse impacts to native vegetation from rutting, crushing or soil compaction.

Individual Tree Removal: Individual tree removal would have a beneficial impact on native vegetation remnants. Removal of large invasive trees helps to return these tracts to a more natural state. Besides shading out desirable native vegetation some trees can lower the water table drying out the habitat making it less desirable for native wetland species. Tree removal would release native vegetation from suppression from shading and allow for a restoration of hydrology.

Mechanical and Hand Removal: Hand control methods would result in minimal trampling or other disturbance on all types of vegetation. However, these methods can be very effective in controlling small infestations of invasive plants or removing infestations from sensitive habitats. Hand pulling and hand cutting have both proven effective on Midewin in reducing or even eliminating infestations of garlic mustard and teasel from sensitive native vegetation remnants. Hand removal (with chainsaws) of understory shrubs in savanna and woodland remnants has also proven effective, especially when combined with an appropriate herbicide application. In less sensitive areas, pulling up of invasive vegetation could take place. This combination of techniques reduced the amount of herbicide used and applied, thus reducing the potential for adverse impacts on non-target plants.

Prescribed Fire: Prescribed burning is a substitute for wildfires that were once a frequent occurrence in Illinois before the middle 1800s. These fires were set by Native Americans or lightning. The natural vegetation of northeastern Illinois has developed in the presence of fire. Prescribed burning is widely recognized as an important tool for maintaining diversity and structure in remnant and restored native vegetation in many regions, including Illinois. Most native plants have adaptations that allow them to survive or thrive in habitats with periodic fire. Outside of native habitats, prescribed burning would also be used as a management tool in agricultural grasslands and early successional habitats. Non-native grasses in these habitats would benefit from prescribed fire provided it is not conducted in late spring. Removal of duff and encroaching woody vegetation would increase vigor and density of the grasses after the fire. In early successional habitats, use of prescribed burning would prevent further succession and encroachment of shrubs and young trees, maintaining open habitats.

Grazing: Livestock grazing on Midewin is now restricted to agricultural grasslands, where it is used as a tool to management habitat for grassland birds. Livestock were formerly grazed on several native vegetation remnants on former arsenal, but cattle are now excluded from most remnants. Currently there are no livestock grazing on native habitat restorations, but grazing

may be used as a management tool on restored habitat in the future. Effects from grazing by large ungulates are usually associated with duration (length of time), intensity (number of animals/area), and timing (time of year). Grazing in restored habitats would primarily be used to manage vegetation height and structure, mostly to favor low stature native grasses and sedges over tall grasses. Livestock grazing is expected to be used as management tool on up to 6000 acres, and should not have any adverse impacts on vegetation structure and species diversity.

Row Crop Production: There is no row crop agriculture within native vegetation remnants, and this activity would never be used as a management tool within native vegetation remnants. Where row crop agriculture occurs near native vegetation remnants, then buffer strips would be used to prevent herbicide drift. Thus, there should be no adverse effects on native vegetation remnants from this activity. Row crop agriculture is also an inappropriate management tool in established habitat restorations. However, it could be used when a restoration planting fails. This temporary use (1-3 years) would help control invasive plants and prepare the site for another restoration planting. This action might eliminate a few established native plants in a restoration, but overall would contribute to the success of the habitat restoration. Row crop agriculture would be used in a similar way in the renewal of agricultural grasslands and seed production fields. Failed plantings and weed infestations would be eliminated, with reestablishment after 1-3 years of row crops.

Herbicide Application: Herbicides used on Midewin have been selected for a combination of non-persistence, selectively of action, and effectiveness if applied at the proper time season. Proper use of equipment, following directions for application, and recognition of target and non-target plant species is essential to avoid adverse effects from herbicide drift or misapplication. Since 2002, Midewin staff, partners, and contractors have been applying herbicide on site for control of invasive plants. Damage to non-target species is restricted to within 1.5 feet of target species, so the adverse effects are extremely localized. The eradication of invasive species, however, has opened up areas for colonization by desirable native forbs and grasses. The actions proposed will have similar effects; some very localized damage to non-target species, but overall effects beneficial. Because herbicide use reduces the need for other types of recurring mechanical treatments (mowing) it can also reduce impacts on soils and vegetation in sensitive habitats. Herbicide application from a boom-sprayer could have the potential for adverse effects, but limiting acreage and use to areas with dense stands of invasive plants reduces adverse effects on non-target vegetation and will open up areas for colonization by native plants.

Alternative 2: No Action

The proposed actions would continue to occur in areas where their use has already been analyzed for environmental effects. Native vegetation remnants in these areas would continue to be managed and would improve in quality. Native remnants outside of these areas would not be managed and would be susceptible to encroachment by non-native invasive and aggressive native trees. On areas previously analyzed for agricultural activities (livestock, grazing, hay-mowing, and row crops), these uses would continue. Under the no action alternative, row crops could not be used for temporary invasive plant control prior to restoration in newly acquired lands. Early successional vegetation would continue to exist and would expand into unmanaged areas. Eventually all early successional habitats would become thickets or stands dominated by non-native invasive or aggressive native vegetation with very little vegetative diversity.

Cumulative Effects on Vegetation The area analyzed for cumulative effects on vegetation is Midewin National Tallgrass Prairie and the adjacent Prairie Parklands, which covers approximately 1,477 square miles in Will, Kankakee, Grundy, LaSalle, Kendall, and extreme southern Cook counties. Historically, the vegetation of this area consisted of a mosaic dominated by prairie, but interspersed with a diversity of wetlands, savannas, and woodlands.

Initiating and continuing active management of remnant and restored native vegetation on Midewin through the implementation of the action alternative, Midewin will make a significant contribution to the persistence of native vegetation in the Prairie Parklands region, especially the globally rare dolomite prairie. The proposed action would also result in Midewin being the only place in the Prairie Parklands with a considerable amount of agricultural grasslands. Although this action would prevent expansion of early successional habitats on Midewin, considerable areas would continue to exist.

Under the no-action alternative, Midewin would still make a significant contribution to the persistence of remnant native vegetation and the expansion of restored native habitats. However, the management of those areas outside of ongoing projects would be delayed until incorporation into specific habitat restoration projects. These projects would then require more intensive actions to remove successional shrubs, trees, and weed infestations. This would divert resources from other projects, perhaps delaying their implementation.

Midewin would continue to support agricultural grasslands and row crop fields. Early successional habitat on Midewin would increase, but would progressively become dominated by trees and shrubs instead of grasses and forbs. These early successional habitats would remain an important part of the landscape throughout the Prairie Parklands, largely in areas that are not cost-effective for development.

INVASIVE PLANTS

Affected Environment Non-native plant species are a large component (approximately 35% of vascular plant species) of the local vegetation in northeastern Illinois and adjacent areas (Swink and Wilhelm 1994). Most of these non-native plants are relatively benign and occur only in early successional habitats. A significant minority of non-native plants do cause deleterious economic, ecologic, and human health effects, including reducing crop yields, requiring increased maintenance of rights-of-way, increasing allergies, clogging waterways, changing structure in wildlife habitat, and displacing biologically diverse natural communities, such as prairies. Invasive plants and noxious weeds on the Midewin National Tallgrass Prairie include over one hundred plant species, encompassing a broad variety of origins and life histories. Some invasive plants pose significant threats to biological diversity and restoration; a few plants are notable as health and safety hazards; others cause economic losses to agriculture.

Non-native Invasive Plants: All the plants in this category originate from outside northeastern Illinois. Most of these plants originate from Europe or Asia, but a few are from elsewhere in North America. Black locust (*Robinia pseudoacacia*) is native in the Appalachians and the Ohio River Valley, but was introduced in northern Illinois. Osage-orange (*Maclura pomifera*) is native to the southern Great Plains, but was introduced throughout the Midwest during the 1800s

for use as a living fence. Common reed (*Phragmites australis*) has populations that are native to North America, including northeastern Illinois, but a strain from Europe has been introduced and is by far the predominant aggressive form that is considered invasive.

One characteristic that all the plants in this category share is their ability to invade and change natural ecosystems. Through competition for light, water, and nutrients, they displace diverse native plant communities with low diversity ecosystems that are less efficient and effective at nutrient recycling, reducing erosion, and providing habitat for a diversity of wildlife species (Hartmann and McCarthy 2007). Because these invasive plants were often imported from another region, these species have left behind pests and pathogens that kept their populations in check within their native range. Fire suppression, hydrologic changes, and nutrient pollution often provide invasive plants with a further competitive edge.

Well-known invasive plants include garlic mustard (*Alliaria petiolata*), a herbaceous plant that invades woodlands and displaces native wildflowers; teasels (*Dipsacus laciniatus* and *D. sylvestris*) can have similar effects in prairies. Purple loosestrife (*Lythrum salicaria*), reed canary-grass (*Phalaris arundinacea*), and common reed have similar effects in wetlands. European buckthorn (*Rhamnus cathartica*) and Amur honeysuckle (*Lonicera maackii*) form dense shrubby undergrowth in native woods; here they shade out native wildflowers, exclude native shrubs, and prevent regeneration of native trees, especially oaks. Studies on woodland birds have demonstrated that birds using non-native shrubs as nesting sites are more vulnerable to predators than those using native shrubs (Schmidt and Whelan 1999). Autumn-olive (*Elaeagnus umbellata*), osage-orange, and multiflora rose (*Rosa multiflora*) invade prairies and other grasslands; eventually their infestations become so dense that grasses and other herbaceous vegetation are displaced, and all grassland wildlife disappears from infested sites. Some plants, like crownvetch (*Coronilla varia*) and Canada bluegrass (*Poa compressa*), threaten habitats that contain threatened, endangered, or sensitive plant species. Appendix 2 summarizes all invasive species known to be present on Midewin; two species have been added since the Prairie Plan (USDA Forest Service 2002a, 2002b, 2002c).

Many of the species in Appendix 2 are widespread on Midewin and adjacent lands. Some of these plants are very common. On Midewin, it is difficult to find any acres without at least a few individuals of one of these species. The lowest incidences of these invasive plants are currently in row crop fields, some managed native habitat remnants, and portions of ongoing restoration projects. Of the 69 species listed in Appendix 2, approximately 25 species are the focus of 99% of invasive control efforts by Midewin staff. The remaining plants are less common, either because they are more recent arrivals or they are not as competitive as other invasive plants under Midewin conditions, thus their control is less urgent.

Many other invasive plants that are not yet found at Midewin are likely to appear on site within the next 1-10 years (Appendix 2). Many of these plants are already common elsewhere in the Midwest, and have recently appeared in northeastern Illinois; one of these plants is giant hogweed (*Heracleum mantegazzianum*), an invasive plant that also causes severe blisters and rashes from dermal contact. Some of the most likely invaders include Oriental bittersweet (*Celastrus orbiculatus*), purpleleaf wintercreeper (*Euonymus fortunei*), and Nepalese stilt-grass (*Microstegium vimineum*). Some of these plants occur within a few miles of Midewin.

Non-native, invasive plants can be spread in many ways. Their seeds (and sometimes rhizomes) can be spread in construction, landscaping, and restoration materials, as contaminants of seed,

soil, gravel, and mulch. Some invasive plants were purposefully introduced as landscape plants, for erosion control or to benefit wildlife; eventually their seeds were spread from the original plantings by wind, water, animals, and people. Some invasive plants have been spread unintentionally by people, on shoes, clothing, tires, in mud on vehicles/equipment (mowers, off-road vehicles), on hooves or hair of domestic animals, in droppings/manure, and in transported bedding & feed. Human disturbance or resource damage (erosion, fire suppression, equipment trespass, user-made trails) often creates conditions that are conducive for new infestations.

Noxious Weeds: Noxious weeds have a specific legal standing in Illinois. This list consists mostly of plants that are weeds under agricultural conditions, but also includes some plants that cause health problems (ragweeds). The state also maintains a list of exotic weeds; these plants are prohibited for sale in Illinois because of their known invasive behavior in natural areas and other non-agricultural habitats (Illinois Compiled Statutes 505 ILCS100/ and 525 ILCS10/).

Aggressive Native Plants: These are plants that are native to northeastern Illinois and Midewin. They were originally restricted to floodplains or other sites that were periodically disturbed by natural events (floods, tornadoes, wildlife trails). Fire suppression, farming, livestock grazing, heavy equipment, and other human activities have allowed these plants to become very common outside their limited habitats. Fire suppression allows certain native trees and shrubs to aggressively invade prairie remnants; these aggressive plants include green ash (*Fraxinus pennsylvanicus*), gray dogwood (*Cornus racemosus*), sandbar willow (*Salix interior*), and sumac (*Rhus* spp.). Intensive grazing encourages some native shrubs and trees to invade grasslands and woodlands, especially coralberry (*Symphoricarpos orbiculatus*), prickly-ash (*Zanthoxylum americanum*), red cedar (*Juniperus virginiana*) and hawthorns (*Crataegus* spp.). New prairie and wetland restorations are subject to dense infestations of cottonwood (*Populus deltoides*) seedlings, cattails (*Typha latifolia*), and tall goldenrod (*Solidago canadensis*). Control efforts directed against these plants often become less intensive as hydrologic restoration, prescribed fire, and restoration of native vegetation proceeds. Aggressive native plants at Midewin are listed in Appendix 2.

Effects Analysis

Regardless of the alternative, some invasive species control and prevention will still occur on Midewin. The primary differences between the two alternatives are the acreage to be treated and the types of treatments allowed and the area these treatments cover.

Alternative 1: Proposed Action

Under this alternative, invasive plant species would be controlled over the entire extent of Midewin, including all lands received through transfer from the Army and recent donations.

Many extensive shrub infestations that are currently dealt with by periodic brush mowing, will be gradually eliminated through a combination of cutting and removing the tops, herbicide treatments (to stumps, foliage, and resprouts), and uprooting. There will be more systematic control of all infestations, reducing sources of invasive plants from within Midewin. This will

reduce efforts needed to control and remove invasive plants from both ongoing and future restoration projects. The wider use of herbicides will allow treatment of newly discovered infestations, thus preventing new invasive species from gaining footholds on Midewin. Better shrub control, tree removal in native vegetation remnants, wider use of prescribed fire, and wider options for herbicide applications will result in more vigorous native vegetation in remnants and restorations. These habitats will then be able to resist invasion more effectively, requiring less intensive management in the future.

Under this alternative, there would still continue to be influx of seeds of invasive plants from beyond Midewin's boundaries. These off-site sources would be dealt with by a diversity of methods, including prevention, public education, inspections, and early detection-rapid response. However, Midewin's contribution to infestations off site would be gradually reduced.

Alternative 2: No Action

Under the no-action alternative, invasive plant species would be controlled only on that portion of Midewin already covered under site-specific affects analyses and decision documents, approximately 15,440 acres. Not all treatments would be available in these areas, and some treatments (individual tree removal, brush-mowing, shrub removal, boom applications of herbicides) would not be available.

Infestations outside these areas would not be treated until site-specific affects analyses and decision documents were completed, delaying early treatment of small infestation. Infestations on these lands will continue to become more severe and increasingly dominated by invasive shrubs and trees. Some native vegetation remnants will become overgrown by invading brush before actions could be taken. Once they can be treated, these infestations will require a greater effort for control and removal. Until treated, these infestations will be a major source of infestations to other portions of Midewin, requiring greater prevention and control efforts at sites where treatments are possible. However, because the treatment options available are more restricted, treatments will not be as effective as under the action alternative.

Untreated portions of Midewin will continue to act as sources of invasive species that infest surrounding lands.

Cumulative Effects on Invasive Plants The area analyzed for cumulative effects on invasive plants is Midewin National Tallgrass Prairie and the adjacent Prairie Parklands, which covers approximately 1,477 square miles in Will, Kankakee, Grundy, LaSalle, Kendall, and extreme southern Cook counties. Historically, the vegetation of this area consisted of a mosaic dominated by prairie, but interspersed with a diversity of wetlands, savannas, and woodlands.

Alternative 1: Proposed Action

Invasive plants will always be a threat to ecosystem restoration and management on Midewin. However, as the surrounding landscape changes, the actual plant species involved may also change, reflecting the change from a predominantly agricultural landscape to a more developed landscape. Other factors, such as climate change, release of specific biological controls, and arrival of new invasive plants, will also change the number and species makeup of that group of plants considered "non-native invasives" and "aggressive natives". On Midewin, as restoration

proceeds and native habitats increase, many invasive plants will decline overall and/or become increasingly restricted to the edges of Midewin. Monitoring for new infestations and a rapid response to treat these infestations will contribute to this expected decline. Midewin will not be a significant source of invasive infestations on surrounding public and undeveloped lands.

Alternative 2: No Action

The long-term cumulative effects of the no-action alternative will not differ significantly from those of the action alternative. However, progress towards the same ends will be slower and require greater effort and expense to control and remove infestations. There will also be a longer period during which Midewin continues to be a source of invasive plants onto surrounding lands.

WILDLIFE

Affected Environment Most wildlife (including insects and other invertebrates) found on Midewin can be placed into two ecological types: generalists and habitat specialists. The white-tail deer is a generalist species that will be considered separately in the Management Indicators section, because of its importance as a game animal and public interest.

The generalist species are mostly widespread common wildlife that are somewhat tolerant of habitat disturbance and can utilize a wide diversity of habitat types. Many of these species are tolerant of human presence and urban development and can be frequently found in close proximity to humans. These generalist wildlife species are widespread within and outside Midewin. Among these types of wildlife are coyote, raccoon, opossum, white-tailed deer, striped skunk, fox squirrel, short-tailed shrew, red-tailed hawk, mallard, great-horned owl, northern cardinal, American robin, red-winged blackbird, indigo bunting, song sparrow, common garter snake, bullfrog, and tiger swallowtail butterfly. These generalist species tend to be common because the habitats they can occupy are common and/or they can occupy a variety of habitats. Some of these species are considered edge species, species that occur primarily in the edge between open areas and closed woody areas. Under some circumstances these species have become so ubiquitous that they are considered pests.

The habitat-specific wildlife species often require a specific type of habitat type, and often are only present if the habitat meets certain criteria, such as area, structure, or plant species composition. These habitat specific species tend to be uncommon because their requisite habitat types tend to be rare. For example, some are only associated with certain plants that are rare because the plant only survives in rare high quality native plant communities. These species tend to be less common both within and outside Midewin. Some examples of these species include dickcissel, grasshopper sparrow, Bell's vireo, sora rail, deer mouse, smooth green snake, northern leopard frog, prairie-dock stem-borer moth, and many types of aquatic invertebrates. Many of these species are thought to be declining in numbers due to habitat loss.

Effects Analysis

Alternative 1: Proposed Action

The proposed action will have both positive and negative impacts on the generalist species. There will be fewer disturbed acres and less edge areas with the proposed management actions which will have a negative impact on wildlife using these areas. Continued agriculture and grazing may have positive impacts on species utilizing these areas. Prescribed burning can have both negative impacts (changing habitat structure) and provide temporary foraging areas (for example robins and other birds feeding in burned over areas). Most generalist species would benefit if non-native species are controlled and replaced by native species. Those generalist species that may be negatively impacted; such as raccoon, fox squirrel, and American robin; tend to be quite common at Midewin and in Will County and surrounding areas. Nearby corporate lands, Army land at the Joliet Training Area and state land at nearby state parks and conservation areas provide extensive habitat for these species. Even developed areas such as the Deer Run Industrial Park provide habitat for these species. Continued conversion of cropland to urban and industrial development in the area outside of Midewin will provide additional habitat for some of these species. Some of the proposed management actions could have positive effects on some of the generalist species. For example, removal of invasive brush with an increase of herbaceous plants will provide additional habitat for garter snakes. There will be winners and losers among the generalist species, but because of the ubiquitous nature of these species and large amount of diverse habitats at Midewin and the surrounding landscape there should be no significant declines in generalist species. See the Management Indicator Species section for specific information on white-tailed deer.

The proposed action should have mostly positive impacts on the habitat-specific wildlife species over the long term, although some species may suffer short-term negative impacts. Habitat for these species should increase in size and improve in quality with the proposed management practices and invasive species control. Prescribed fire can have a mixed impact, both positive and negative, even within a particular species. For example, sedge wrens may be less common in areas following a prescribed burn, but will come back within a year and will ultimately be positively impacted in the long-term by habitat improvements due to prescribed fire. Many of these wildlife species are partially dependant upon Midewin to provide adequate habitat. For some habitat-specific species there is very little adequate habitat outside of Midewin.

Alternative 2: No-action Alternative

Under the no-action alternative, there would be positive and negative impacts for the generalist wildlife species. Non-native invasive species would be allowed to increase on lands not covered under existing environmental assessments and decision notices. Replacement of natives by non-natives will have a negative impact for many generalist species, although some may be able to cope with the non-native plants. With no management on additional lands these areas would slowly get overgrown with both native and non-native invasive species. Some species would benefit and others would not.

Under the no-action alternative, there would probably be primarily negative impacts to the habitat-specific species. In areas not covered by existing environmental assessments, habitat for

these species would deteriorate and be ultimately lost. For the most part these species would experience a negative impact with the no-action alternative.

Cumulative Effects on Wildlife The area analyzed for cumulative effects on wildlife is Midewin National Tallgrass Prairie and the adjacent Prairie Parklands, which covers approximately 1,477 square miles in Will, Kankakee, Grundy, LaSalle, Kendall, and extreme southern Cook counties. Historically, the vegetation of this area consisted of a mosaic dominated by prairie, but interspersed with a diversity of wetlands, savannas, and woodlands.

Under both the proposed action and no-action alternatives there would be wildlife species that would be positively impacted and those that would be negatively impacted. Wildlife species (habitat specialists) that are rare or localized within the cumulative effects area would be positively impacted in the long term. There may be isolated short-term negative impacts, but this are offset by the overall long-term positive impact. Many of these species are dependant upon their long-term survival for Midewin. If habitat is lost at Midewin and population sizes decrease, these species will decline throughout the cumulative effects area and the region. The proposed actions will have a major contribution to the continued survival of these species in the area.

The generalist wildlife species tend to be very common in the cumulative effects area and local region. There will be positive impacts and negative impacts on generalist species with both the proposed action and the no-action alternative, depending upon the specific animal. Some species may gain from the replacement of non-native plant species by native species. Some edge species may lose some habitat with removal of invasive plant species. Within the cumulative effects area there would be only minimal population changes with the proposed management activities, since these species are so common.

THREATENED, ENDANGERED, AND SENSITIVE PLANT AND ANIMAL SPECIES

Affected Environment Midewin National Tallgrass Prairie currently supports populations of, or provides habitat for forty-nine (49) species of threatened, endangered sensitive, and rare (TES) species of plants and animals. As the proposed action encompasses the whole of Midewin, there is the potential to affect all forty-nine species. Appendix 1 lists the species of concern.

Effects Analysis

Alternative 1: Proposed Action

With application of the mitigation measures and Prairie Plan standards and guidelines there should be no negative effects from any of the proposed actions. The proposed actions should have positive impacts on TES species by helping to control invasive plant species which threaten TES plant and animal habitats. Appendix 1 lists the expected effects on TES species by alternative.

Mowing (including all types), individual tree removal, and mechanical and hand removal: These techniques proposed could have negative impacts if performed during sensitive time periods,

when TES animals are breeding or TES plants are actively growing, flowering or producing seed. When properly timed, these activities should have no negative impact, and will ultimately have a positive impact since invasive plants are a major threat to all of these TES species. Removal of invasive plant species can promote the spread of native vegetation into new areas providing for additional and improved habitat for TES species.

Prescribed fire: Prescribed fire is a substitute for wildfires that were once a common occurrence in the Midwest. Many native plants and animals are adapted to periodic fire. Others species that are not adapted to fire require refugia to allow for recolonization following fire. Improper timing of prescribed fire or lack of refugia can have a negative impact on some TES species. Proper timing and refugia, as spelled out in the mitigation measures and Prairie Plan standards and guidelines, will negate the possible negative impacts. Prescribed fire overall will have a positive impact on TES species with helping to control invasive species that are a threat to TES species. Prescribed fire may also provide increased seed germination and recruitment of new plants with some TES plant species. Prescribed fire can also stimulate prairie vegetation to expand beyond current boundaries providing for additional habitat for TES plant and animal species.

Grazing: Grazing is currently restricted to agricultural grasslands that do not have TES plant populations. Sullivant's coneflower is one exception, where several populations can be found in grazing areas. Grazing on Sullivant's coneflower may have a slight negative impact, but the other populations will benefit from the other proposed actions. Grazing does occur where some TES animal species occur. Grazing is used to manage habitat for some TES animal species; for this reason grazing is beneficial to these animals. Grazing currently is not used on native habitat restoration, but it may be used in the future to mimic native grazers that are extirpated from Midewin. Improper timing and duration of grazing could have a negative impact on some plant and animal TES species. The mitigation measures and Prairie Plan standards and guidelines will mitigate any negative impacts from grazing. Overall grazing will have a positive impact for TES species.

Row crop production: Row crop production does not take place in native vegetation remnants or other habitats that may contain TES species. Possible herbicide drift from row crop production is the only likely negative impact from row crop production on TES species. Mitigation measures will avoid or minimize any potential negative impacts. Row crop production will have no impact or a slight positive impact by helping to control the spread of invasive species into TES species habitat.

Herbicide Application: Herbicide application if not carefully administered could have a negative impact on some TES species. Following label directions, the mitigation measures and Prairie Plan standards and guidelines will protect TES species from negative impacts. Overall herbicide application will have a positive impact by controlling invasive species which are a major threat to most TES species.

Alternative 2: No Action

For some TES plant and animal species, not all the occupied habitat is currently covered for the management tools by existing environmental analysis or decision documents. It is likely that this habitat will decline in quantity and quality over time, primarily due to invasive species encroachment. Some unmanaged populations may decline to a level where other factors (loss of

minimum habitat size, herbivory, competition and encroachment from invasives, loss of pollinators, genetic erosion, predation, loss of food plants, and wildfires) may cause extirpation.

Cumulative Effects on TES plants and animals The area analyzed for cumulative effects on TES species is Midewin National Tallgrass Prairie and the adjacent Prairie Parklands, which covers approximately 1,477 square miles in Will, Kankakee, Grundy, LaSalle, Kendall, and extreme southern Cook counties. Historically, the vegetation of this area consisted of a mosaic dominated by prairie, but interspersed with a diversity of wetlands, savannas, and woodlands.

Alternative 1: Proposed Action

The TES plants and insects which are dependant upon native host plants are for the most part restricted to native vegetation remnants. Habitat management and restoration on Midewin will make a significant contribution to their continued presence in the region. By allowing more widespread, timely, and effective habitat management, the action alternative should contribute to this goal. There would also be a reduced risk that any populations of these species might be lost.

The grassland bird and wetland vertebrate TES species are widespread breeding species in North America, but now have their distribution and numbers greatly reduced by habitat loss, especially in the Midwest. Habitat management and restoration on Midewin will make a significant contribution to their continued presence in the region. By allowing more widespread, timely, and effective habitat management, the action alternative should contribute to this goal. There would also be a reduced risk that any populations of these species might be lost.

The Franklin's ground squirrel is widespread in the upper Midwest, but its population has declined, presumably because of habitat loss. The status of this secretive mammal in the Prairie Parklands is uncertain, there are many sites capable of supporting this species, but it has not been found at many locations. Habitat management and restoration on Midewin may contribute to the continued presence of this species in the Prairie Parklands. By allowing more widespread, timely, and effective habitat management, the action alternative should contribute to this goal.

Two TES aquatic invertebrates (ellipse and the mayfly) have declined as stream habitats were degraded throughout the region; the mayfly (*Danella lita*) was considered extirpated from Illinois before its recent rediscovery. Although Midewin will contribute to the recovery of stream ecosystems on site, general trends upstream in the watersheds and elsewhere in the Prairie Parklands will probably have an adverse impact. In comparison, the cumulative effects of the action alternative will probably be insignificant on these two stream invertebrates.

The cerulean warbler and red-headed woodpecker that are TES bird species are widespread in eastern North America, but have been undergoing range-wide declines. All forested and wooded areas in northeastern Illinois are too fragmented, and most woodlots are too small in area to prevent edge effects (such as brood parasitism by cowbirds or increased nest predation), from impacting the cerulean warbler. Regardless of management at Midewin, this region will continue to act as a sink for this species. However, lack of savanna management, habitat loss, and increased road density are trends affecting red-headed woodpecker populations in the Prairie Parklands and the Midwest. The red-headed woodpecker, like many other savanna birds, is not sensitive to habitat fragmentation and benefits from woodland restoration (Brawn 2006). Management and restoration at Midewin and elsewhere will contribute to this species' continued presence in the Prairie Parklands.

The establishment of a Wisconsin-Florida migratory population of whooping cranes is considered important to ensuring the long-term survival of this endangered bird. Midewin is one of many potential stops for whooping cranes migrating through northeastern Illinois. The proposed actions should not have any, adverse impacts on whooping crane.

The further recovery of bald eagles and their return as a breeding species to northeastern Illinois is largely dependent upon protection of the birds from shooting, harassment, and disturbance. Protection of potential nesting and foraging habitat is also essential. Given that Midewin does not provide extensive foraging, roosting, or nesting habitat, the proposed actions should not have any, adverse impacts on bald eagles.

The Indiana bat is a widespread species declining throughout its range. Previous studies have failed to confirm Indiana bats using riparian habitat in northeastern Illinois, although they are known to occur in urbanized riparian corridors elsewhere in the Midwest. Surveys in and around Midewin have failed to turn up Indiana bats (Glass 1994, Hofmann 2005, Whitaker and Everson 2005a, 2005b, and Widowski et al. 2007). The proposed alternative will not have any impacts on Indiana bats, because the local bat population, if present, is very small.

Alternative 2: No Action

Under the no-action alternative, Midewin will still make a major contribution to the continued presence of the TES plants (with the exception of the glade mallow) and insect species in the Prairie Parklands. These species are sufficiently rare that their continued presence is somewhat dependent on Midewin's contributions. A greater effort will be needed to initiate habitat management after a longer period of no action, increasing the risk that one or more populations of these species might be lost. Then an intensive population restoration project would be required. The glade mallow occurs at a sufficient number of sites that its continued presence is not dependant only upon Midewin habitat.

Under the no-action alternative, Midewin will still make a contribution to the continued presence of six grassland birds and wetland wildlife TES species in the Prairie Parklands. Two grassland bird species (upland sandpiper and loggerhead shrike) are sufficiently rare that their continued presence is dependent on Midewin's contributions. For two wetland species that require large wetlands (American bittern and Blanding's turtle), Midewin makes a proportionately greater contribution because it is a large, mostly contiguous area. There would also be an increased risk that one or more populations of these species might be lost. Then an intensive population restoration project would be required.

Under the no-action alternative, Midewin will still make a contribution to the continued presence of Franklin's ground-squirrel in the Prairie Parklands. Given the lack of knowledge about this species' current distribution and status in the Prairie Parklands, it is difficult to determine the degree to which actions on Midewin will affect this mammal.

Under the no-action alternative, Midewin will still make a contribution to the continued presence of these two stream TES invertebrates in the Prairie Parklands, by providing undeveloped riparian habitats. However, other external factors, such as runoff and pollution from private lands, may degrade conditions if entire watersheds are not protected. The no-action alternative will have little effect in comparison to the impacts from region-wide development.

The no-action alternative will probably have no effect on the continued presence of the cerulean warbler in the Prairie Parklands; other, external factors such as habitat fragmentation and brood parasitism are more important. Red-headed woodpeckers are more likely to continue to be regionally present under the no-action alternative; their numbers will decline as a consequence of habitat loss on private lands.

The no-action alternative should not have any adverse effects on the restored population of whooping cranes, bald eagles or Indiana bats.

SOILS

Affected Environment Midewin mainly consists of fine-grained soils that hold water well and have gentle slopes. Small portions of the land have steeper slopes and/or more sandy soils with less water-holding capacity. Midewin soils have been subjected to excavation, manipulation and chemical treatments by the Army and farmers for decades prior to Forest Service management.

Effects Analysis

Alternative 1: Proposed Action

Mowing (all forms) and Individual Tree Removal: Soil rutting is the main potential for damage from these treatments. Rutting occurs when heavy machinery is used on fine-grained soils that are wet. Rutting destroys the structure of the soil and reduces the size of soil pores, which reduces the rate water can infiltrate into the ground, causing more ponding of water at the soil surface. There are a few areas in the southwest of Midewin that are not as susceptible to soil rutting due to different soil textures. Soil rutting can be mitigated by restricting mechanical treatments to dry soils conditions or frozen ground. Mechanical treatments can cause compaction if heavy equipment is used on the same ground repeatedly, but treatments are generally not repeated more than once a year.

Mechanical and Hand Removal: Removing vegetation by hand may cause minor disturbance to the soil when roots are pulled out. Hand removal leaves many other desired plants in the ground so large areas of bare soil do not occur and erosion of the soil is unlikely. Hand removal of vegetation does not have a significant effect on Midewin soils. Mechanical removal would have similar impacts as mowing and individual tree removal.

Prescribed Fire: Fire has a potential to sterilize soil and destroy structure if it burns too hot for a long period. Hot fires of long duration are more likely to occur during wildfires in heavy fuels such as trees. In contrast, prescribed fire on Midewin would be planned for specific weather conditions in a high temperature, short duration fuel type (prairie grasses). Past prescribed fires on Midewin rarely completely burn off the soil organic matter (Peter To, personal comm.). There is more potential for soil erosion on steeper slopes on Midewin, but most of the land is below 6 percent slopes.

Grazing: Grazing may contribute to soil compaction within grazing areas due to hoof pressure. Soil compaction is greater where cattle traffic is concentrated along travel routes and around watering areas. Travel routes and watering areas are a small amount of the total area, so soil compaction is not significant across Midewin. Cattle can benefit soil by providing nutrients and organic matter from their waste as they graze throughout the area.

Row Crop Production: Midewin currently uses no-till farming techniques for soybeans, wheat and oats. Farming of row crops has the potential to increase erosion of the soil. A relative measure of erosion can be obtained using the crop management factor (C) from the Universal Soil Loss Equation. No-till farming of soybeans, wheat and oats result in a range of 0.05 to 0.3 for C, compared to 1.0 for continuously tilled ground with no planting and less than 0.003 for prairie land (Novotny and Chesters 1981). While converting existing land to prairie is the best option to reduce erosion, existing row crop production will help reduce soil erosion and control invasive species at the same time. Heavy equipment traveling on the same area over an extended period of time may cause compaction of the soil. No-till farming reduces the number of times machinery is used which reduce compaction from equipment.

Herbicide Application: In 2002, analysis was conducted (*USDA Forest Service 200db*) and a decision made (*USDA Forest Service 2002e*) concerning herbicide use for vegetation on Midewin. The current project is generally proposing herbicide application on small acreages similar to the previous analysis, but is also proposing occasional broadcast treatments using mechanized equipment over larger areas up to 300 acres at a time. Half-life, which is a measure of persistence, and mobility of an herbicide are the two primary factors that may affect the soil environment. The longer an herbicide is active within the soil, the longer the potential for migration or affecting vegetative growth. The half-life for herbicides ranges from a few days to several weeks, and up to several months for imazapic. The long half-life for imazapic is considered a benefit to controlling vegetation and it does not appear to affect native prairie plants. Most of the herbicides are considered non-mobile within the soil, except for 2,4-D and clopyralid which can be highly mobile. However, these two herbicides also have very short half-lives, so the chances of mobility are greatly reduced. When used according to label specifications, no long-term impacts to soils are expected.

Alternative 2: No Action

Under the no action alternative grazing, herbicides and prescribed fire will continue to be used in designated areas but would not be used in other areas where they may be needed. Vegetation will not be controlled, with an end result of vegetative cover of both invasive and native plant species that provide plant cover and reduced erosion potential. Fuels will continue to build up in the form of dead vegetation which increases the chance of a wildfire occurring and damaging the soil.

Cumulative Effects on Soils Within Midewin, actions in the past and future include prairie and wetland restoration activities. These activities have a goal of returning Midewin to a more natural state, both vegetatively and hydrologically. Old infrastructure will continue to be removed or disabled within Midewin including the removal of buildings, roads, rail beds and destruction of drain tiles. Farming will continue to be phased out and the land restored to native prairie. Grazing will continue for the foreseeable future to benefit wildlife species. Prescribed fire will continue to be used to maintain prairie vegetation and control invasive species.

The proposed action would have some cumulative effect on the soils on Midewin. As areas are restored to wetlands, the ground in these areas will become increasingly wet and thus be more susceptible to rutting. This will have the effect of increasing limitations on the use of heavy

equipment in areas to reduce rutting of the soil. Mechanical removal of invasive species would have a short term impact of soil mixing, but over time the soil will undergo natural soil forming processes and reform soil horizons. Herbicides used on Midewin will not cause significant cumulative effects because label directions will be followed concerning the amount and timing of herbicide used during a given time period. As farming is reduced, the areas will be restored to native vegetation and thus be less susceptible to erosion. Prescribed burns will both reduce the build up of fuel and encourage new growth, resulting in a cumulative positive effect over time.

Table 5. Summary of Resource Effects with Mitigations on Soils

Resource	Alternative 1 (proposed)	Alternative 2 (no action)
Soil Quality		
- Short Term (1-2 Years)	Potential for erosion during row cropping and prescribed burning	Potential for erosion during row cropping and prescribed burning - less than proposed action.
- Long Term (10-20 Years)	Potential for soil compaction from row cropping, increased soil moisture	Potential for soil compaction from row cropping – less than proposed action, increased soil moisture – less than proposed action, potential for soil heating from wildfire

WATER QUALITY

Affected Environment Surface water on MNTP drains through four main streams that generally flow in a west-southwesterly direction: Jackson, Prairie, Grant, and Jordan Creeks. Water quantity through these streams varies considerably throughout the season and they may exhibit dry bed conditions during the year. Grant Creek is the only stream listed for Illinois 303(d) impairment of aquatic life due to unknown cause(s) (*Illinois Environmental Protection Agency, 2006*). A total maximum daily load (TMDL) for Grant Creek has not been completed by the state of Illinois. The major rivers into which Midewin streams flow, the Des Plaines and Kankakee River, are both listed as impaired waters for a variety of reasons. Stream water quality has been monitored with macroinvertebrate and fish surveys that show the aquatic communities are fairly diverse and stable. Long-term records and data are incomplete, although Prairie Creek has been monitored on a five-year schedule by the Illinois Department of Natural Resources and IEPA.

Effects Analysis

Alternative 1: Proposed Action

Mowing (including all types) and Individual Tree Removal: Water quality may be negatively affected by these actions if equipment is fueled or serviced within riparian areas or wetlands. If oil, fuel, or other fluids are spilled in these areas the fluids have short transit times to surface

water. The more fluid spilled the greater the impact to water quality. This can be mitigated by not allowing fluid filling in riparian areas or wetlands. If rutting occurs within a wetland or riparian area, water infiltration is reduced and ruts may act as channels for erosion. Rutting can be mitigated by allowing heavy machinery only when the ground is dry or frozen.

Mechanical and Hand Removal: Removing vegetation by hand is not expected to affect water quality because of the limited amount of area where this would occur and the surrounding vegetation would limit the opportunity for erosion to reach water bodies. Mechanical removal has the same potential of impacts as mowing and individual tree removal.

Prescribed Fire: Fire can result in erosion and sediment transport to surface water if the fire is followed by a heavy rainstorm before vegetation becomes reestablished. Erosion is less of a concern for prescribed fires because the fires burn in a mosaic pattern and generally do not remove all organic matter, thus creating longer paths of surface erosion and decreasing the chance of sediment to reach surface waters. Burn plans for prescribed fires can be written to mitigate fire impacts to water resources.

Grazing: Grazing may impact water quality by reducing vegetation in riparian areas that can result in increased stream bank erosion. Grazing allotments on Midewin have fences along riparian areas of the major streams and tributaries to reduce the chance of cattle entering these sensitive areas. Prompt recovery of livestock outside designated grazing areas and keeping cattle gates closed will help to reduce the potential for cattle negatively impacting stream areas.

Row Crop Production: The main potential impact to water quality from farming is soil erosion and transport of sediment into surface waters. However, current farming methods use no-till farming which greatly reduces the amount of exposed soil. Grasses water-ways have been established within crop fields where soil erosion could become a problem. In addition, farmed areas are located on gently sloped areas reducing erosion. Row crop farming is not expected to have a significant effect on water quality.

Herbicide Application: There is a potential negative effect to water quality when herbicides enter streams, lakes, wetlands, or groundwater on Midewin. Contamination could occur through incidental direct application or runoff into surface waters or leaching through soils into groundwater. Direct application is a minor problem because herbicide label directions will be followed which determines where an herbicide can be used and the weather conditions under which it can be applied. This will reduce the likelihood of drifting herbicide settling on surface waters, and the any amount that does reach the surface waters will not have enough concentration to significantly affect aquatic life. The ester formulation of 2, 4-D is the most toxic to aquatic life of the proposed herbicides, while some salt formulations are approved for aquatic use (*USDA Forest Service 2002d*). Potential negative effects to water uses can be mitigated by only using 2, 4-D when none of the other herbicides will accomplish the objectives, following label directions, and restricting mixing and filling of herbicides to designated areas. Appendix 4 reviews herbicide behavior in water and soil to provide guidance for herbicide treatment near aquatic systems.

Alternative 2: No Action

If this alternative is chosen grazing, herbicides and prescribed fire will continue to be used in designated areas but would not be used in other areas where they may be needed. Invasive

aquatic species such as purple loosestrife, eurasian watermilfoil, reed canary grass and common reed would not be controlled.

Cumulative Effects on Water Quality Within Midewin, actions in the past and future include prairie and wetland restoration activities. These activities have a goal of returning Midewin to a more natural state, both vegetatively and hydrologically. Old infrastructure will continue to be removed or disabled within Midewin including the removal of buildings, roads, rail beds and destruction of drain tiles. Farming will continue to be phased out and the land restored to native prairie. Grazing will continue for the foreseeable future to benefit wildlife species. Prescribed fire will continue to be used to maintain prairie vegetation and control invasive species. Outside of Midewin within the watersheds, urban development continues at a rapid pace with the associated increase in impervious land surfaces which will affect the hydrology of the surrounding land including Midewin. Some potential effects of urbanization include increasing quantities of streamflow, alterations of the timing of waterflow through the hydrologic system, and decreasing water quality.

The cumulative effects of the proposed action on aquatic resources are minor compared to activities occurring outside Midewin. Restricting changes of equipment fluids to outside of riparian areas and wetlands will reduce the potential for spills to affect water quality. Allowing heavy equipment operation only during dry or frozen ground conditions will reduce the potential for sediment transport to surface waters. Maintaining fences along riparian areas and recovering stray cattle as quickly as possible will reduce potential impacts of cattle grazing on water resources. Following herbicide labels will reduce the potential for water contamination. There may be a small increase in water quantity due to removal of trees that transpire more water than prairie vegetation.

Table 6. Summary of Resource Effects with Mitigations on Water Quality

Resource	Alternative 1 (proposed)	Alternative 2 (no action)
Water Quality		
- Short Term (1-2 Years)	Chance for 2,4-D contamination, sediment following rain even after burning	Chance for 2,4-D contamination, sediment following rain even after burning – less than proposed action
- Long Term (10-20 Years)	Decrease in aquatic invasive species, increase in water quantity	Increase in aquatic invasive species

AIR QUALITY

Affected Environment National Ambient Air Quality Standards (NAAQS) exist for certain criteria pollutants in the Clean Air Act as amended November 15, 1990, including ozone, volatile organic compounds (VOCs), particulate matter, and nitrogen oxides (NOx). Will County is

within a Class II airshed and in a non-attainment zone for 1-hour Ozone. Ground-level ozone pollution results from a combination of plentiful sunshine and various pollutants, principally those from automobile exhaust. Ozone concentrations that exceed air quality standards for one-hour concentrations occur during hot summer afternoons. Under the general conformity provisions of the Clean Air Act, federal agencies are prohibited from taking any action within a non-attainment area that causes or contributes to a new violation of the standards, or increases severity of a standard. Federal agencies are required to ensure their actions conform to applicable State Implementation Plans. Grassland burns produce volatile organic compounds (VOCs), particulate matter, and nitrogen oxides (NO_x), which can contribute to the formation of ground-level ozone.

Effects Analysis

Alternative 1: Proposed Action

Mechanical Mowing, Tree Removal, Mechanical Removal and Row Crop Production:

Mechanical equipment used to mow, remove vegetation or farm will contribute exhaust to the overall airshed. However, these mechanical operations will occur sporadically when needed and will not be a continuous source of pollution, thus reducing their effects on air quality. Of these mechanical treatments, farming probably has the most potential for air pollution, but its contribution of emissions is greatly reduced under no-till management.

Grazing and Hand Removal: Grazing and hand removal of vegetation will have no effect on air quality.

Prescribed Fire: Regional weather patterns include winds from the southwest, west, or northwest when the most favorable burning conditions occur. Prescribed burns under these conditions may result in smoke being dispersed over Midewin National Tallgrass Prairie, Highway 53, the Lincoln National Memorial Cemetery, local private properties, homes, and industries, including Deer Run Industrial Park, ExxonMobil, and the villages of Elwood, Symerton, Wilmington and/or Manhattan. It is unlikely that Interstate 55, to the west of Midewin, would be affected, as easterly winds are usually accompanied with unfavorable burning conditions.

Burning late in the spring season when vegetation is green will produce more smoke. Burning in areas with poison ivy, can cause a rash on sensitive people because smoke particles carry the irritating oil from dead leaves and stems of poison ivy, and if inhaled may cause serious complications.

Assuming an emission factor of 15 pounds per ton for grass fine particulate matter (PM_{2.5}) and an average fuel loading of 4 tons per acre on Midewin, estimated emission production for prescribed burns at Midewin is 60 pounds/acre (0.045 tons/acre) for fine particulate matter (*National Interagency Fire Center 2003*). If 500 acres are burned at the same time (a high rate of burning), this would yield 22.5 tons of fine particulate matter to the air which is about 1.5 times the daily particulate matter emitted by point sources in Will County. These emissions can contribute to ozone formation. However, the prescribed burns will occur during spring and fall months, when ozone levels generally do not exceed air quality standards. As part of the planning process for the prescribed burns, Midewin will coordinate with the Illinois EPA to track ozone and air pollutant conditions so that the burns do not occur during periods when ozone concentrations may exceed air quality standards.

Herbicide Application: Herbicide application will not have a significant effect on air quality because of application methods and the herbicide directions for use. Aerial application will not be used, which removes the sources of greatest source of potential contamination from herbicides. Labels specify weather conditions for use, which reduces possibility of drift.

Alternative 2: No-action

Emissions would also result under the no-action alternative, but to a lesser degree. Fewer acres would be available for prescribed fire, herbicide treatment and mechanical treatment.

Cumulative Effects on Air Quality It is estimated that during a day of high fire activity (over 500 acres) at Midewin, emissions from prescribed burning would only be a minor source of pollutants in the ozone non-attainment area in Illinois. When the mitigation measures are implemented (no burning on hot summer afternoons) there would not be any increase in emissions of the pollutants that are the ingredients for ozone pollution during the summer months (USDA Forest Service 2001).

Table 7. Summary of Resource Effects with Mitigations on Air Quality

Resource	Alternative 1 (proposed)	Alternative 2 (no action)
Air Quality		
- Short Term (During activity)	Vehicle emissions, contaminants from prescribed burning	Vehicle emissions, contaminants from prescribed burning – less than proposed action
- Long Term (10-20 Years)	Increased contaminants as prescribed fire use increases	Increased contaminants as prescribed fire use increases

MANAGEMENT INDICATORS

Affected Environment By definition, Management Indicators are “plant and animal species, communities, or special habitats...believed to be vulnerable to population decline” and are “most likely to provide an indication of management actions through population change” (USDA Forest Service 2002b). At Midewin, Management Indicators are best represented by habitats. Direction for Management Indicators is found in 36 CFR 219.19, which establishes management and maintenance requirements for viable populations of native and desired non-native vertebrate species. Viable populations have numbers and distributions of reproductive individuals sufficient to insure their well distributed and continued existence within the planning area. Monitoring of population trends, in cooperation with state fish and wildlife agencies, is required to the extent possible. Cumulative effects may be indicated by long-term trends found as the result of monitoring, including monitoring done outside of Midewin.

The Forest Service Manual (FSM 1900 and 2600) addresses Management Indicator direction in Planning, Wildlife, Fish, and Rare Plant Habitat Management, where effects to Management Indicator populations must be assessed as those that “best represent the issues, concerns, opportunities to support the recovery of Federally-listed species, provide continued viability of sensitive species, and enhance management of wildlife and fish. . .” (FSM 2621.1).

Native Habitat Management Indicators There are eight native habitat management indicators on Midewin; dolomite prairie, upland typic prairie, wet typic prairie, sedge meadow, marsh, seep, savanna, and forest/woodland. They correspond to native habitats prior to 1830. Soils, general land office surveys, location of existing remnants, on Midewin, and nearby native habitat remnants were used as sources to determine the distribution and species composition of these management indicators on Midewin.

Grassland Habitat Indicators Grassland habitat indicators are used for monitoring grassland habitat, both acreage and management treatments. Many species of grassland habitat are highly sensitive to habitat structure (grass height, litter density), management (prescribed burning, haying, mowing) or area effects (fragmentation). The grassland habitat indicators for Midewin are broken into three categories, short-stature grasslands (grass height less than 12 inches), medium-stature grasslands (grass height greater than 12 inches but less than 24 inches) and tall-stature grasslands (grass height greater than 24 inches).

Benthic Macro-invertebrates Aquatic insects (especially insect larvae), crustaceans, snails, worms, leeches, and other invertebrates are present in and on the substrate of permanent streams. (“benthic” means “bottom”). Species diversity and abundance is directly dependent upon several factors, most importantly, on water quality. Pollution, sedimentation, and substrate disturbances can all cause changes in the composition and abundance of the macro-invertebrate community.

Leafy Prairie-clover This plant (*Dalea foliosa*) is a Federal endangered species; its habitat is dolomite prairie. Like many other prairie species, a series of factors affect populations, including annual precipitation, herbivory, fire management, and invasive plant control. One population of leafy prairie-clover is found at Midewin. Since monitoring began in 1997, this population has fluctuated in size from 96 to 240 plants. Five additional populations are known in northeastern Illinois (four occurring in protected sites). The remaining populations are found in central Tennessee and north-central Alabama.

Henslow’s Sparrow This grassland bird is a Regional Forester Sensitive Species (RFSS); it is also listed as endangered by the Illinois Endangered Species Protection Board. Henslow’s sparrow is an area-sensitive grassland species that requires unfragmented habitat. This bird is also sensitive to management, preferring a cover of tall grasses (greater than 25 inches) with a layer of ground litter. Henslow’s sparrow will not breed in otherwise suitable habitat for one to two years immediately following a fire; grazing and mowing also preclude use of grasslands by this bird. Midewin has a small but growing population of Henslow’s sparrows, probably offspring from the larger population nesting at nearby Goose Lake Prairie State Natural Area or other suitable habitat in the region.

White-tailed Deer White-tailed is included as a management indicator because it is a demand species sought by hunters and it can have serious impacts on plants and plant communities. Because of its location in northeastern Illinois, Midewin offers hunting of this species in a region where deer hunting is usually restricted due to conflicts between high human population density and public safety. Visitors to Midewin may also appreciate the presence of white-tail deer for

observation. High deer population size and density can adversely impact human health and safety, either as traffic hazards or as vectors for disease-carrying ticks. High deer populations can have adverse effects on forest regeneration (Horsley et al. 2003), certain native plants (Anderson et al. 2001), other wildlife (McShea and Rappole 2000), and can facilitate invasive plant species movement into areas of natural vegetation (Smith et al. 2000; Vellend 2002). White-tail deer can also cause economic problems by feeding on agricultural crops and landscape plants.

White-tailed deer occur throughout Midewin and use a wide variety of habitats, including native prairie, forests, old fields, thickets, fencerows, and agricultural grasslands (Hoffmeister 1989). Under some conditions, it may be desirable to reduce deer populations when they threaten ecological sustainability or public health. Heavy deer depredations at the Midewin seed beds required the installation of deer-proof fences.

Although absolute numbers are hard to come by, deer population numbers are thought to be increasing in Illinois and throughout the Midwest. Data from the Illinois Department of Transportation (IDOT) has shown a steady increase in deer-vehicle accidents from 1983 to 2005 (12,152 and 23,694 respectively) which would indicate an increase of the deer population. Based on IDOT data Will County where Midewin is located ranked 7th of the top ten counties with the most deer-vehicle accidents in 2005.

Effects Analysis

Alternative 1: Proposed Action

The proposed action management tools are expected to result in a positive effect, no effect or slight temporary negative effect on the management indicators.

Native Habitat Indicators Native habitat indicators should benefit under the actions proposed. There will be a slight increase in acreage, as management activities allow the reestablishment of native vegetation and removal of encroaching shrubs and trees from existing native habitats. However, the greatest benefits will be increases in overall native plant cover, species diversity, and increased flowering, seed production, and recruitment. Existing remnants and restored habitats will improve in both quality and function.

Grassland Habitat Indicators The proposed action will result in improvement of all three grassland types, because of expanded and improved management choices.

Benthic Macroinvertebrates There should be no real change to this indicator under the proposed action. There may be some temporary effects, due to increased runoff after mowing or shrub removal.

Leafy Prairie-clover The improved habitat as a result of the proposed action may result in some population expansion and increase. See further discussion of this species in Appendix 1, under dolomite prairie species.

Henslow's Sparrow Improved management should benefit this grassland species. See further discussion of this species in Appendix 1, under grassland bird species.

White-tailed Deer There should be no overall change in the population on Midewin of this adaptable, widespread, and abundant wildlife species, although there may be temporary impacts. Continued row crop and grazing activities should have no effect on white-tailed deer. Deer will continue to utilize these areas. Mowing (other than brush mowing), hand removal and prescribed fire will have little impact on deer populations. Prescribed fire could result in positive impacts to white-tail deer. New resprouts after a fire may be more palatable and more accessible. The proposed management activities may cause areas to be temporarily abandoned by deer, but within a short period of time they'll return. Brush mowing, tree removal and herbicide use (herbicide use on shrubs and small trees only) could have a slight negative impact on white-tail deer. Each of these proposed management actions will result in a more permanent habitat change with the possibility of a slight decline in deer population numbers. The main factors contributing to this decline in use by deer would be the removal of cover and winter browse. More likely, there would be no effect, as white-tailed deer are numerous, adaptable, and mobile animals. The proposed action may result in some deer use pattern changes, some areas being used less and others more. The removal of trees and shrubs from the nearby Goose Lake Prairie State Park resulted in very little decline in deer population numbers overall. Very little change in overall population numbers are expected from the management activities proposed.

Alternative 2: No-action alternative

The no-action alternative would result in reduced management. Areas not under management would degrade, resulting in degradation of dependant management indicators.

Native Habitat Indicators Existing restored habitats should remain the same. Remnants managed under previous decisions should improve or stay the same. These remnants not managed would continue to degrade.

Grassland Habitat Indicators Grassland habitat already covered by previous decision documents would continue to improve. Some management tools, such as prescribed burning, would remain unavailable for use in many grassland areas. Some management activities such as mowing might become more intensive, to keep invasive shrubs under control.

Benthic Macroinvertebrates The no-action alternative would probably have no effects on benthic macroinvertebrates; current conditions would continue.

Leafy Prairie-clover Most of the existing population would remain unmanaged until a future effects analysis is completed. This could result in a decline of the population over time with the threat of extirpation.

Henslow's Sparrow Henslow's sparrow habitat already managed under previous decision documents would continue to be managed. Some more effective management tools, such as brush mowing, would remain unavailable for use in many grassland areas.

White-tailed Deer There may be a slight positive benefit from the no-action alternative with an increase in cover and winter browse. This could result in an increase in deer population numbers, which is not desirable.

Cumulative Effects on Management Indicators The area analyzed for cumulative effects on management indicators is Midewin National Tallgrass Prairie and the adjacent Prairie Parklands, which covers approximately 1,477 square miles in Will, Kankakee, Grundy, LaSalle, Kendall, and extreme southern Cook counties. Historically, the vegetation of this area consisted of a mosaic dominated by prairie, but interspersed with a diversity of wetlands, savannas, and woodlands.

Because the outcomes of both alternatives are very similar, both the action and no-action alternatives are discussed together in the following paragraphs.

Native Habitat Indicators Under both action and no-action alternatives, native habitat indicators will increase on Midewin, as they would on other managed public and private lands. What little native habitat remains outside of protection and management in the Prairie Parklands will be lost to development, land use conversion, or infestations of invasive plants. Under the action alternative, some of Midewin's long-term contributions will proceed at a faster and more effective pace.

Grassland Habitat Indicators Midewin would become the largest concentration of short-stature in the Prairie Parklands, with significant contributions to both mid-stature and tall stature grasslands. Outside of other public lands that are protected and managed, most large areas of grassland (greater than 40 acres) will disappear. The end result of both the action and no-action alternatives will be very similar; under the action alternative, Midewin's long term contributions will occur somewhat sooner.

Benthic Macroinvertebrates The differences between these two alternatives would be very minor, as the major impacts on the aquatic fauna will be changes in the streams caused by landscape conversion in the watersheds upstream from Midewin. These changes will effect water quality, water chemistry, seasonal water levels, and sediment deposition in the stream beds. These upstream changes will have a much more significant impact on the benthic macroinvertebrates than either alternative considered here.

Leafy Prairie-clover Existing leafy prairie-clover populations in the Prairie Parklands will be protected and managed, and some additional populations may be established in suitable habitat. Some existing, but unprotected habitat will be lost to development. The two alternatives do not effect this outcome.

Henslow's Sparrow Goose Lake Prairie State Natural Area, Midewin, and other existing habitat will continue to be managed for this species under both alternatives. Midewin's contribution to this species' population in the Prairie Parklands may be enhanced at an earlier date by the action alternative.

White-tailed Deer Deer will likely remain widespread and abundant in the Prairie Parkland regardless of the alternative implemented. Deer are able to thrive in developed landscapes where utility corridors, riparian vegetation, parks, forest preserves, and industrial buffer exist. State government decisions to raise or lower the number of available deer permits, or the spread of chronic wasting disease, are the most likely factors to affect deer populations in the long term. There should be no change in the Midewin population of this adaptable, widespread, and abundant wildlife species.

RECREATION AND SCENERY MANAGEMENT

Affected Environment Approximately 1/3 of Midewin is open to public use; 6400 acres. Public access east of Illinois 53 includes a parking lot at the intersection of Hoff and Old Chicago Roads. Approximately 15 miles of multiple use trail (hiking, biking and equestrian) and 2 miles of hiking-only trails are available from this location. A new bridge across Prairie Creek links an interim trail system to the Wauponsee Glacial trail.

Typical recreation activities at Midewin include hiking, biking, horseback riding, bird watching and deer and turkey hunting.

Approximately 2,900 acres are open to the public on the west side of Illinois 53. This area can be accessed from one parking lot on Explosives Road off Illinois 53 where there are three miles of interim hiking-only trails. Three additional parking lots access the west side of Midewin along River Road. No trails are available from these access points at this time. The remaining approximately 12,000 acres of Midewin is closed to visitors due to army clean-up of arsenal remnants and public safety concerns associated with those activities.

Archery deer hunting begins October 1 and typically runs through the middle part of January. There are three 3-4 day firearm seasons in late November and early December for hunters using shotguns and/or muzzleloaders. Annually there is approximately 1100 hunter at Midewin. Hunters are allowed to hunt in areas of Midewin that are open to general public use. Midewin also participates in spring turkey season. Midewin is a special hunt area with 40 licenses for turkey hunting.

A new parking lot is opened on the east side of Illinois 53 accessing a new multiple use trail that crosses Illinois 53 and runs to the south and west. The parking lot also accesses the interim trail system on the east side of Midewin. The new parking lot provides parking for 12 vehicles with trailers and 20 single vehicles.

Effects Analysis – Scenery

1. Action Alternative:

Because it will take several years for the Forest Service to restore the Midewin landscape to that identified in the plan, this type of management is a reasonable temporary visual substitute for the desired future condition.

Entire tract mowing, spot mowing and row crop production should only have a temporary visual impact to Midewin visitors. Mowing of scattered small trees and shrubs will move the landscape towards the natural appearing landscape as directed by the plan. In some locations this type of

mowing may open views to the abandoned army infrastructure. The infrastructure includes buildings of various sizes, parking lots, pipelines, and bunkers. The positive or negative perception of the infrastructure by the public will depend upon the type of infrastructure and the perspective of the viewer.

Hand removal and herbicide application is expected to be small enough in scale as to not have a visual impact to Midewin users. Any impacts would also be very temporary.

Prescribed fire results in only temporary negative impacts, and over time results in a positive visual impact. The visual significance depends upon the vegetation type, the relative success of the burn and the position of the viewer. Regardless of the visual impact of the prescribed burn, it quickly diminishes during the next growing. The burned area usually has more of the desired landscape characteristics such as species diversity following the prescribed fire.

The effect cattle grazing has on scenery is from the support facilities needed for cattle operations, rather than the cattle themselves. Watering areas typically become trampled to the extent that the area is denuded of vegetation. Fences across the landscape typically depict long, straight, differences in management regimes across the landscape. Implementation of measures will diminish the scenery impacts to an acceptable level.

2. No-action Alternative

The no-action alternative would ultimately have a negative scenery impact on portions of Midewin. Under the no-action alternative many of the proposed actions would continue on land covered by existing environmental analysis and decision documents. There would be no difference between the proposed action and the “no-action” alternative on those lands. Primary differences would only occur on lands transferred from the Army to the Forest Service after 2005 and on lands not currently covered under completed decision documents. Uncontrolled growth of invasive species would occur on areas transferred after 2005 and not covered under other decisions.

Effects Analysis – Recreation

1. Action Alternative

Equipment impacts on the activities proposed are temporary and/or seasonal and therefore do not affect recreation year-round. Many of the proposed treatment methods will require use of large equipment/implements. Large tractors are utilized in entire tract mowing, spot mowing, and row crop production. Combines are an essential part of row crop production. Row crops and hay are removed from Midewin with trucks and/or tractors. All of these activities present a potential for conflict with recreation users when the activities are taking place in, or moving through any portion of Midewin that is open to the public. The activities themselves (the presence of equipment and equipment noise) may degrade some people’s recreation experience. Also, some activities such as row crop production will be phased out as restoration of the prairie continues.

Recreation users will be impacted by any closures if needed to carry out the proposed activities. Short term closures are needed in areas for prescribed fire and herbicide use. Closures are not typical with the other proposed activities, although they may be possible in the future due to currently unforeseen circumstances.

The negative impacts may be greatest for off-trail users such as hunters, bird watchers, and nature enthusiasts. These types of users are much more likely to come in close contact with management activities. Since these management activities take place over short periods of time and in specified areas, the overall effects will be limited. The mitigation measures will help alleviate the potential conflicts.

Prescribed fire requires short term closures in the area of the burn. Smoke may affect visitors down wind of the fire. Additional safety hazards may be caused by people stopping on roads or other nearby areas to watch.

Trails may cross pastures with active cattle grazing. Mixing livestock and people may cause conflict. Mother cows are often protective of their calves. Bulls are often sporadic in their behavior. Some visitors may not be aware of danger posed by the livestock. Additionally, people may feel the presence of cattle, including the site and smell of cow manure, the sounds of a cattle herd, and the cattle themselves are degrading to their natural experience. On the other hand many people like cows and feel they are a part of nature.

Some deer hunters feel that removal of scattered trees and shrubs will limit hunting opportunities at Midewin. Deer hunting opportunities won't change with the proposed management tools. The same amount of land will still be available. Hunting techniques may have to change in areas which have had tree and shrub removal. Temporary ground blinds or the tops of munitions igloos may need to be used in place of more traditional tree stands. The removal of trees and shrubs will take place over many years and during that time additional lands will open at Midewin and there will be additional areas open for deer hunting. The amount of land available to hunting will increase greatly as additional areas are open to the public, and as additional lands are transferred from the Army. Implementing mitigation measures reduces safety hazards of tree girdling.

All management and administrative activities could have a short term negative impact on visitors to Midewin. These impacts are unavoidable, but can be mitigated by following the Prairie Plan standard and guidelines, mitigation measures, and by educating the public.

2. No-action Alternative

Management activities approved under other decision notices will continue. Some proposed activities wouldn't be allowed and no management would occur on newly acquired and lands from Army transferred. Vast areas will grow up in invasive species and won't resemble native habitats. Many visitors to have expressed the desire to have a restored grassland ecosystem and are looking forward to hiking in restored areas. A frequent question visitors ask is, "where is the 'tallgrass prairie' and how can I get out into it?" The no-action alternative would limit the amount of grassland ecosystem restored and limit the enjoyment that visitors will have.

Cumulative Effects on Recreation and Scenery Habitat maintenance within the existing native vegetation and restoration areas are a direct effort to accomplish the goals in the Prairie Plan to "provide opportunities to easily view and experience the prairie landscape" and to "Continue to improve and maintain naturally appearing landscapes especially when viewed from trails, roadways, and visitor or administrative facilities." (Prairie Plan 2.5.3)

Maintenance of pasture lands and miscellaneous areas where scattered trees and shrubs and old fence rows are removed moves in the direction of the desired future condition. Expansive vistas

that have closed in over the past twenty years would be reopened for visitors to enjoy. Bird habitat would be restored, providing additional opportunities for bird watchers. Deer hunters who like this type of habitat as deer cover would have to find alternative hunting sites. Additional lands at Midewin will open in coming years, providing new hunting area for hunters.

HERITAGE RESOURCES

Affected Environment After the arrival of Europeans in the 1830's, the majority of the area has been continuously managed and modified by agricultural cultivation, cattle grazing, and vegetation removal via mowing.

Effects Analysis

1. Action Alternative

Entire Tract Mowing and Spot Mowing: This type of mowing is usually conducted in areas that have previously been under cultivation. The Ap soil Horizon (plowzone) is generally to a depth of 12 to 15 inches. This action only would have an effect on archaeological sites if the disturbance reached a depth below the Ap horizon. This would not be possible, as mowing would not occur during wet conditions that allowed for such disturbance.

Brush Mowing of Invasive Wood Vegetation (trees and shrubs): In areas without a plowzone, such as in the woodland environments, the potential for damage to the archaeological integrity of sites is high. Soil rutting can be mitigated by restricting mechanical treatments to the winter months when soils are completely frozen and there is a layer of snow. Cut vegetation may be left for habitat, cut with a chipper, or hauled off site. Stumps are left in place. This type of vegetation removal has successfully been performed at Midewin in other project areas during the frozen months without any surface disturbance. For areas with a plowzone, this action only would have an effect on archaeological sites if the disturbance reached a depth below the Ap horizon, which not be allowed.

Mechanical Removal of Large Trees: In areas that have not previously been plowed, unsurveyed areas or on known archaeological sites, any mechanical removal would be conducted during the winter months when the ground is completely frozen and there is a layer of snow. If there is any potential for the vehicle to disturb the surface of the soil, work would be discontinued. This type of vegetation removal has successfully been performed at Midewin in the past during the frozen months without any surface disturbance. Where there are plowzones, stumps would be ground down to six inches below the ground. On unevaluated archaeological sites and in areas that never have been plowed, stumps would be left in place. Mechanical removal will not be allowed near surface features on archaeological sites (unevaluated farmsteads).

Girdling of trees.: Girdling involves cutting a groove around the trunk through the inner bark and cambium. This interrupts the flow of sap between the crown and roots, and the tree eventually will die over a year or more of time. Depending on the species, herbicide may be applied to the open cut. Rather than the whole tree uprooting, the tree typically falls in large sections, piece by piece as the top and branches deteriorate. The trunk usually snaps at the base or where the girdle cut was made. The whole process takes place over a period of time, and generally, the branches and pieces fall during heavy winds. This is more advantageous than allowing a tree to die naturally and uproot, as tree throws are undesirable on archaeological sites. The dead trees will open the canopy for desired species of trees, forbs, and grasses in the restoration areas. Girdling

would be done in areas that were sensitive vegetation areas or in areas sensitive for cultural resources. Girdling would also be conducted on unevaluated archaeological sites.

Mechanical and Hand Removal of invasive plants: Hand removal has the potential for removal of artifacts from archaeological sites by large groups of people on work days. This can be mitigated by educating the group about archaeological sites and by adequate supervision from Midewin staff during projects. Mechanical removal would only take place on areas evaluated for heritage resources and known to be free of heritage resources.

Prescribed burning: Burning will have no effect on subsurface deposits on archaeological sites. Prehistoric sites would have been burned in the past, as the natural burn cycle of the tallgrass prairie is approximately every 5 years. Effects on surface artifacts are minimal. In areas that have never been plowed, any heavy equipment such as fire engines will remain on road surfaces. Areas with recorded or a high potential for archaeological sites would be designated as resource protection areas and would receive special attention and protection during prescribed burning.

Grazing: Grazing is not permitted in areas that are typically more sensitive for cultural resources, for example native woodlands, along riparian areas, or in areas that have not been plowed in the past. The location of water tanks has the potential to disturb archaeological sites. Cattle traffic can trample historic sites, and the location of the tanks triggers muddy conditions and the concentration of cattle in localized areas. This can be mitigated by locating the tanks away from historic farmsteads. Cattle would also be fenced out from unevaluated farmsteads or sites that are eligible for listing in the National Register of Historic Places.

Row Crop Production: This action will have no effect on archaeological sites as long as the soil disturbance does not penetrate below the Ap horizon.

Herbicide Application: Herbicide application will have no effect on archaeological sites.

Most invasive species will be controlled with a combination of the management tools described above. Approximately 5% of Forest Service lands at Midewin have never been plowed. These areas and native woodlands are in the greatest need for conservation and enhancement. They would receive special attention during habitat maintenance. Any of these activities that have the potential to disturb the ground would be scheduled when the ground is completely dry or frozen in these areas. Monitoring would be done by the Prairie Archaeologist and other Forest Service specialists to ensure that these conditions are being met.

2. No-action alternative:

Without, routine ecological management actions, the result will be dense shrubland and non-native plants. On historic and prehistoric archaeological sites, the amount of roots from trees and shrubs has the potential to laterally and vertically displace artifacts and deposits. The possibility of tree throws or blowdowns has the potential to pull large chunks of soil and artifacts from a cultural context, thereby affecting the archaeological integrity of the sites. Areas that are not infested with woody vegetation or invasive trees will have no effect on archaeological sites.

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Appendix 1: Effects on TES Species by Alternative

Threatened, Endangered, and Sensitive Species

Species (grouped by habitat) and Status ¹	Alternative 1 (Proposed)	Alternative 2 (No Action)
Dolomite Prairie Plant Species		
Leafy Prairie-clover (<i>Dalea foliosa</i>) – FE, SE Pitcher’s Stitchwort (<i>Minuartia patula</i>) – ST, RFSS Limestone Quillwort (<i>Isoëtes butleri</i>) – SE, RFSS False Mallow (<i>Malvastrum hispidum</i>) – SE, RFSS Dolomite Hedge-Hyssop (<i>Gratiola</i> sp.) – NS	All species benefit from increased quality of habitat and reduced infestation of invasive plants. Slight increase in habitat.	Populations already covered by previous effects analysis and decisions are managed and increase; populations not covered (some for all species) decline until effects analysis initiated by future projects. Additional areas of potential habitat not improved, and increased management needed to combat new infestations arising from untreated areas.
Outwash Plain Prairie Plant Species		
Sullivant’s Coneflower (<i>Rudbeckia fulgida sullivantii</i>) – RFSS Crawe’s Sedge (<i>Carex crawei</i>) – RFSS	All species benefit from increased quality of habitat and reduced infestation of invasive plants. Slight increase in habitat	Populations already covered by previous effects analysis and decisions are managed and increase; populations not covered (some for both species) decline until effects analysis initiated by future projects. Additional areas of potential habitat not improved, and increased management needed to combat new infestations arising from untreated areas.
Typic Prairie Plant Species		
Eastern Prairie Fringed Orchid (<i>Platanthera leucophaea</i>) – FT, SE Mead’s Milkweed (<i>Asclepias meadii</i>) – FT, SE Earleaf False-foxglove (<i>Agalinis auriculata</i>) – ST, RFSS Small white lady’s slipper (<i>Cypripedium candidum</i>) – ST, RFSS Hill’s Thistle (<i>Cirsium hillii</i>) – RFSS Hairy Valerian (<i>Valeriana edulis ciliata</i>) – RFSS Cluster Fescue (<i>Festuca paradoxa</i>) – RFSS	All species benefit from increased quality of habitat and reduced infestation of invasive plants. Slight increase in habitat increases success of seed magnification projects for Mead’s milkweed and hairy valerian. Increases likelihood for expansion of adjacent populations of Hill’s thistle and eastern	All known populations already covered by previous effects analysis and decisions; all are managed and increase. Additional areas of potential habitat not improved, and increased management needed to combat new infestations arising from untreated areas.

¹ FE = Federal Endangered, FT = Federal Threatened, RFSS = Regional Forester’s Sensitive Species, SE = State Endangered, ST = State Threatened, NS = No status currently; rare species awaiting description

Species (grouped by habitat) and Status ¹	Alternative 1 (Proposed)	Alternative 2 (No Action)
	prairie fringed orchid onto FS land.	
Riparian Plant Species		
Glade Mallow (<i>Napaea dioica</i>) – RFSS	Better management in occupied and restored habitats would benefit glade mallow, while increased openness in riparian habitats would provide potential habitat for population expansion.	The only population is covered by previous effects analysis and decisions. Additional areas of potential habitat not improved, and increased management needed to combat new infestations arising from untreated areas.
Woodland/Forest Plant Species		
American Ginseng (<i>Panax quinquefolius</i>) -- RFSS Goldenseal (<i>Hydrastis canadensis</i>) – RFSS	Both species benefit from improved habitat, especially reduced invasive shrub understory and garlic mustard.	Only spot control of invasives currently allowed in portions of occupied and suitable habitat, so some adverse effects will continue until covered by future decisions.
Grassland Bird and Mammal Species		
Henslow’s Sparrow (<i>Ammodramus henslowii</i>) – ST, RFSS Short-eared Owl (<i>Asio flammeus</i>) – SE, RFSS Upland Sandpiper (<i>Bartramia longicauda</i>) – SE, RFSS Northern Harrier (<i>Circus cyaneus</i>) – SE, RFSS Bobolink (<i>Dolichonyx oryzivorus</i>) – RFSS Migrant Loggerhead Shrike (<i>Lanius ludocivianus migrans</i>) – ST, RFSS Franklin’s Ground-squirrel (<i>Spermophilus franklinii</i>) – ST, RFSS	All grassland birds will benefit from reduced shrub invasion in all grasslands, and expansion of agricultural grassland habitats. Keeping management activities from disturbing nesting birds insures no adverse effects. Proper fire rotation periodicity prevents adverse effects on Henslow’s sparrow. Allowing shrub development at margins of unfragmented grassland maintains nest sites and cover for shrike and ground-squirrel.	Existing habitat would continue to be managed, but no expansion, so populations remain roughly the same. Because of increasing infestations outside of areas with effects analysis and decisions, management within existing habitat would become more intensive.
Wetland Birds and Herps		
American Bittern (<i>Botaurus lentiginosus</i>) – SE, RFSS Common Moorhen (<i>Gallinula chloropus</i>) – ST Least Bittern (<i>Ixobrychus exilis</i>) – SE, RFSS King Rail (<i>Rallus elegans</i>) – ST, RFSS Plains Leopard Frog (<i>Rana blairi</i>) – RFSS Blanding’s Turtle (<i>Emys blandingi</i>) – ST, RFSS	Wetland habitats will be managed to exclude or eradicate invasive plants (both herbaceous and woody), maintaining good plant diversity and structure for these species. Both herp species benefit	Habitat within areas covered by previous effects analysis and decisions would continue to be managed. Areas not covered would become increasingly invaded by shrubs and saplings, eventually becoming

Species (grouped by habitat) and Status ¹	Alternative 1 (Proposed)	Alternative 2 (No Action)
	from keeping adjacent uplands as open habitat.	unsuitable until future effects analysis and decisions are complete.
Savanna/Woodland Birds		
Cerulean Warbler (<i>Dendroica cerulea</i>) – RFSS Red-headed Woodpecker (<i>Melanerpes erythrocephalus</i>) – RFSS	Habitat would improve because dense invasive shrub understory would be removed in all habitats. There would be a temporary decline in nesting habitat for cerulean warbler until native shrubs are restored. In native savanna, woodland, and forest remnants, the red-headed woodpecker would also have immediate short-term benefits as girdled and dying invasive trees provide increasing nesting and foraging sites.	Much of existing habitat would remain unsuitable because of dense understory dominated by invasive shrubs.
Stream Invertebrates		
Ellipse (<i>Venustaconcha ellispiformis</i> , a mussel) – RFSS Crawling Mayfly (<i>Danella lita</i>) – RFSS	Any adverse effects are likely to be short-lived resulting from runoff in areas where there has been soil disturbance. Long term benefits may include more stable stream flow because of reduced ground water draughts caused by dense stands of invasive shrubs.	No short-term adverse effects from soil disturbance, but long-term adverse effects may result from increased water fluctuations during draughts caused by dense woody growth in riparian areas.
Prairie Insects		
Eryngium Stem-borer Moth (<i>Papaipema eryngii</i>) – SE, RFSS Liatris Stem-borer Moth (<i>Papaipema berriana</i>) – RFSS #10 Stem-borer Moth (<i>Papaipema</i> sp. 10) -- NS Redtail Prairie Leafhopper (<i>Aflexia rubranura</i>) – ST, RFSS Noctuid Moth (<i>Dichagyris reliqua</i>) – RFSS Leafhopper (<i>Macrosteles pоторia</i>) – RFSS Noctuid Moth (<i>Oncocnemis sandersiana</i>) – RFSS Noctuid Moth (<i>Plusia venusta</i>) – RFSS Jaguar Moth (<i>Schinia jaguariana</i>) – RFSS	Although many individual insects of these species may be killed during prescribed burns, rotational burning that leaves unburned refugia will ensure no long-term, adverse effects that will result in loss of populations of these species. These species are expected to benefit from management that will result in increased numbers and vigor of their food plants and nectar	Populations would survive in areas where habitat is already being managed and restored, but there would be no increases in habitat beyond these areas until further effects analysis and decisions were completed.

Species (grouped by habitat) and Status ¹	Alternative 1 (Proposed)	Alternative 2 (No Action)
Sedge Moth (<i>Spartiniphaga includens</i>) – RFSS Hermit Sphinx Moth (<i>Sphinx eremita</i>) -- RFSS Clemens' Spinx Moth (<i>Sphinx lucitiosa</i>) – RFSS	sources.	
Other		
Bald Eagle (<i>Haliaeetus leucocephalus</i>) – SE	No adverse effect on bald eagles, as mitigation measures and design criteria will ensure no disturbance of migrating or roosting birds.	No adverse effects on bald eagles.
Whooping Crane (<i>Grus americana</i>) – FE	No adverse effect on whooping cranes, as wetland sites for migrant birds will be improved by better invasive shrub control.	No adverse effects on whooping cranes, as wetland habitats in restored areas will continue to exist and be managed.
Indiana Bat (<i>Myotis sodalis</i>) – FE, SE	Time restraints on tree cutting or girdling should prevent any direct adverse effects on Indiana bat. Temporary increases in dead and dying invasive trees in savanna, woodland, and forest remnants could provide more summer roost sites for Indiana bats.	No adverse effects on Indiana bats.

Appendix 2. Plants Designated as Noxious Weeds and Exotic Weeds of Illinois

<i>Scientific Name</i>		
Common Name	Legal Status in Illinois	Status on Midewin
<i>Ambrosia artemisiifolia</i> Common Ragweed	Noxious (only within the corporate limits of cities, villages, and incorporated towns)	Widespread.
<i>Ambrosia trifida</i> Giant Ragweed	Noxious (only within the corporate limits of cities, villages, and incorporated towns)	Widespread.
<i>Cannabis sativa</i> Marihuana, Hemp	Noxious	Very rare as a wild plant; illegal plantings have been found and destroyed in the past.
<i>Carduus nutans</i> Musk Thistle, Nodding Thistle	Noxious	Scattered.
<i>Cirsium arvense</i> Canada Thistle, Field Thistle	Noxious	Widespread.
<i>Lythrum salicaria</i> Purple Loosestrife	Noxious	Very rare; new infestations are eradicated within 1-2 years after discovery.
<i>Pueraria lobata</i> Kudzu	Noxious, Exotic	Not present
<i>Rhamnus arguta</i> Saw-toothed Buckthorn	Exotic	Not present.
<i>Rhamnus cathartica</i> Common Buckthorn	Exotic	Localized.
<i>Rhamnus davurica</i> Dahurian Buckthorn	Exotic	Not present.

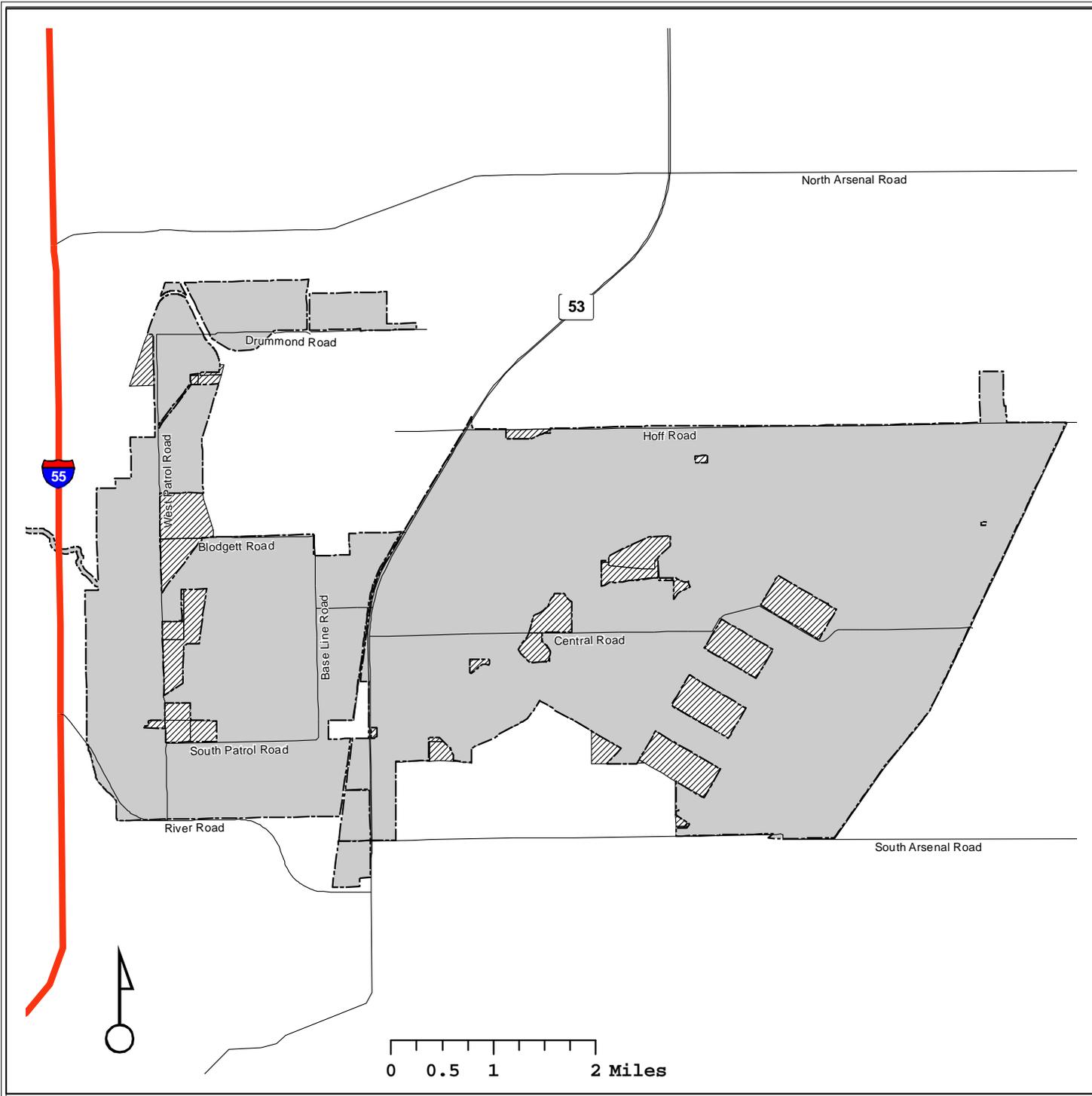
<i>Scientific Name</i>		
Common Name	Legal Status in Illinois	Status on Midewin
<i>Rhamnus frangula</i> Glossy Buckthorn	Exotic	Very rare, first discovered in 2006.
<i>Rhamnus japonica</i> Japanese Buckthorn	Exotic	Not present.
<i>Rhamnus utilis</i> Chinese Buckthorn	Exotic	Not present.
<i>Rosa multiflora</i> Multiflora Rose	Exotic	Widespread.
<i>Sonchus arvensis</i> Perennial Sowthistle	Noxious	Widespread.
<i>Sorghum almum</i> Perennial Sorghum	Noxious	Not present.
<i>Sorghum halapense</i> Johnsongrass	Noxious	Localized.
<i>Sorghum</i> spp. Sorghum hybrids with rhizomes	Noxious	Not present.

Appendix 3. Summary of herbicide behavior in water and soil to provide guidance for herbicide treatment near aquatic systems

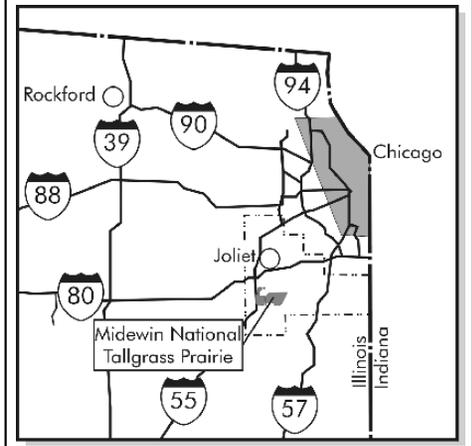
Herbicides	Registered for aquatic use	Toxicity to fish and aquatic organisms	Bioaccumulation	Half-life in water	Half-life in soil	Mobility in soil	Guidance for application near aquatic systems
2,4-D acetic acid	Yes, some salt formulations	Ester formulations are toxic; salt formulations nontoxic.	Conflicting reports on bioaccumulation. According to some studies, 2,4-D is rapidly excreted in urine and does not bioaccumulate. Field studies indicated that high applications of 2,4-D amine or ester to a lake, at high application rates, did not result in bioconcentration. Other studies state that 2,4-D can accumulate in fish and aquatic invertebrates.	1 week to several weeks.	7 to 10 days.	Leaching potential high because most formulations do not bind tightly with soils. However, in many instances, extensive leaching does not occur, most likely because of the rapid degradation of the herbicide.	Some salt formulations can be safely applied to aquatic resources. Strong preference will be given to other herbicides over the 2,4-D ester formulation, for application within 100 feet of aquatic resources.
Glyphosate	Yes	Moderately toxic; formulation registered for aquatic use is practically non-toxic.	Does not bioaccumulate in fish.	12 days to 10 weeks.	Average of 47 days.	Leaching potential very low.	Formulation registered for aquatic use can be safely applied to aquatic resources. Preference will be given to the aquatic use formulation for application within 100 feet of aquatic resources.
Pelargonic acid	No	Little to no toxicity.	Rapid decomposition on land and in water, so it does not bioaccumulate.	Half-life of minutes.	No residual activity.	Rapid degradation; leaching potential low.	Should not be applied to open water; however may be safely applied to dry aquatic resources and around aquatic resources.
Sethoxydim	No	Moderately to slightly toxic.	Tendency to dissipate quickly precludes any bioaccumulation in the food chain.	Rapidly degraded by light in less than 1 hour.	4 to 5 days.	Degrades rapidly; leaching potential low.	Do not apply directly to open water; however, minimal impacts if applied around aquatic resources due to rapid degradation and low leaching potential.

Herbicides	Registered for aquatic use	Toxicity to fish and aquatic organisms	Bioaccumulation	Half-life in water	Half-life in soil	Mobility in soil	Guidance for application near aquatic systems
Triclopyr	Aquatic formulation being developed.	Ester formulation is toxic. Acid and salt formulation is lightly toxic.	The hydrophobic nature of the ester formulation allows it to be readily absorbed through fish tissues where it is converted to triclopyr acid which can be accumulated to a toxic level. However, if applied properly, triclopyr would not be found in concentrations adequate to harm aquatic organisms.	Salt formulation has half-life of several hours; ester formulation takes longer to degrade.	30 days	Ester formulation has low mobility; salt formulation has higher mobility. Yet, both are rapidly degraded to triclopyr acid, which has an intermediate adsorption capacity, thus limiting mobility.	Do not apply acid and salt formulations directly to open water, however they may be safely applied around aquatic resources. Once it is registered for aquatic use, the aquatic formulation will be safe to apply to aquatic resources. Strong preference will be given to other herbicides over the triclopyr ester formulation for application within 100 feet of aquatic resources.
Clopyralid	No	Low toxicity to aquatic animals.	Does not bioaccumulate in fish tissues.	8 to 40 days.	40 days	Does not bind strongly to soils. During the first few weeks, there is a strong potential for leaching and possible contamination of ground-water, but adsorption may increase over time.	Preference will be given to other herbicides over clopyralid for application within 100 feet of aquatic resources.
Imazapic	No	According to some studies moderate toxicity. But, in an aqueous solution it is relatively safe for aquatic animals due to its rapid degradation. Other studies indicate low toxicity.	Is rapidly excreted and does not bioaccumulate in animals.	Half-life of 1- 2 days in sunlight.	Average of 120 days (can range from 31 - 233 days).	Limited horizontal mobility, but may leach vertically depending on soil type.	Do not apply directly to open water; however, minimal impacts to aquatic resources if applied around aquatic sites due to rapid degradation in water. However, preference will be given to other herbicides over imazapic for application within 100 feet of aquatic resources.
FAS	No, but can be safely applied to floodplains and low-lying areas if water is not present.	Low toxicity.	No evidence that FAS bioaccumulates in fish.	Highly water soluble, but is stable & persistent once it enters aquatic systems; degraded rapidly in aquatic sediments.	Average of 8 days (can range from 1 – 2 weeks).	Rapid degradation and high binding potential with some soils; low mobility.	Do not apply directly to open water but can safely be applied around aquatic resources.

Appendix 4. FIGURES/MAPS



-  Midwin
-  Potential Land Transfers





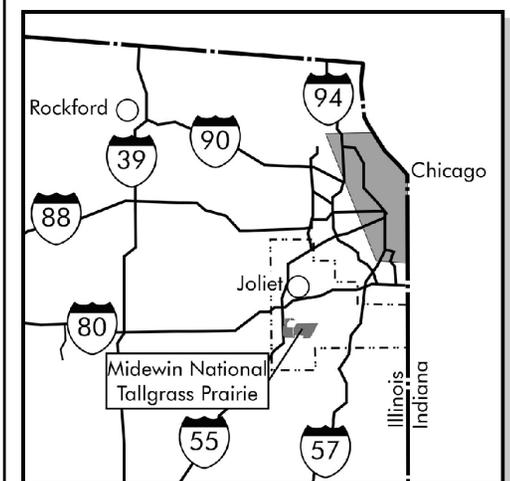
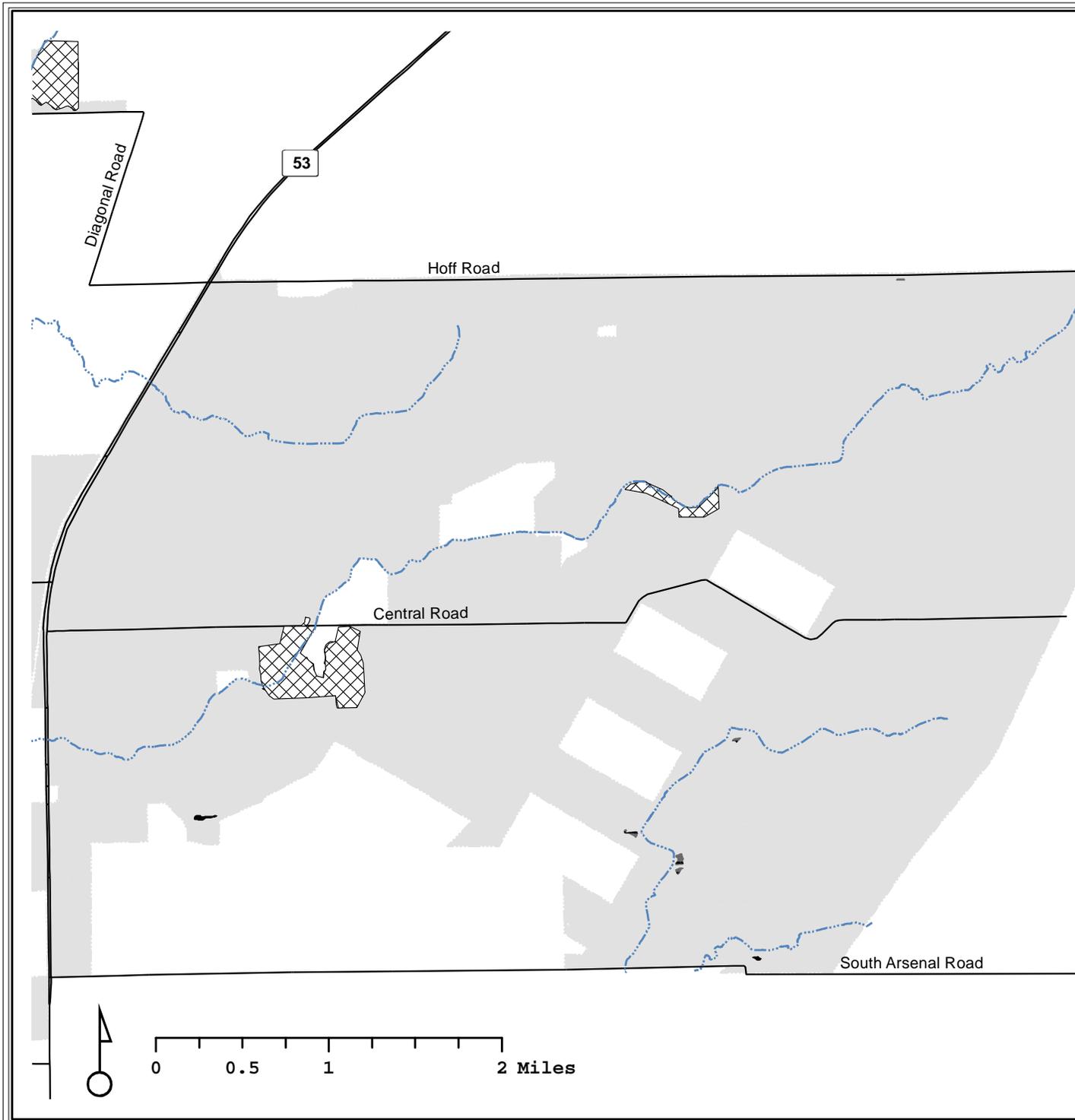
USDA Forest Service

Prairie Habitat Maintenance EA

Figure 2
East Side

Natural Community Remnants

-  Prairie
-  Wetland
-  Woodland
-  Streams





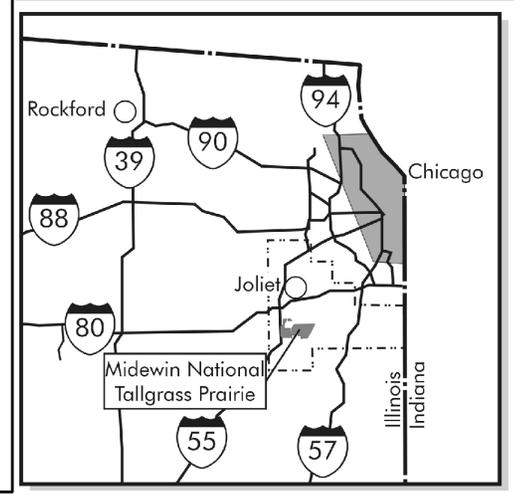
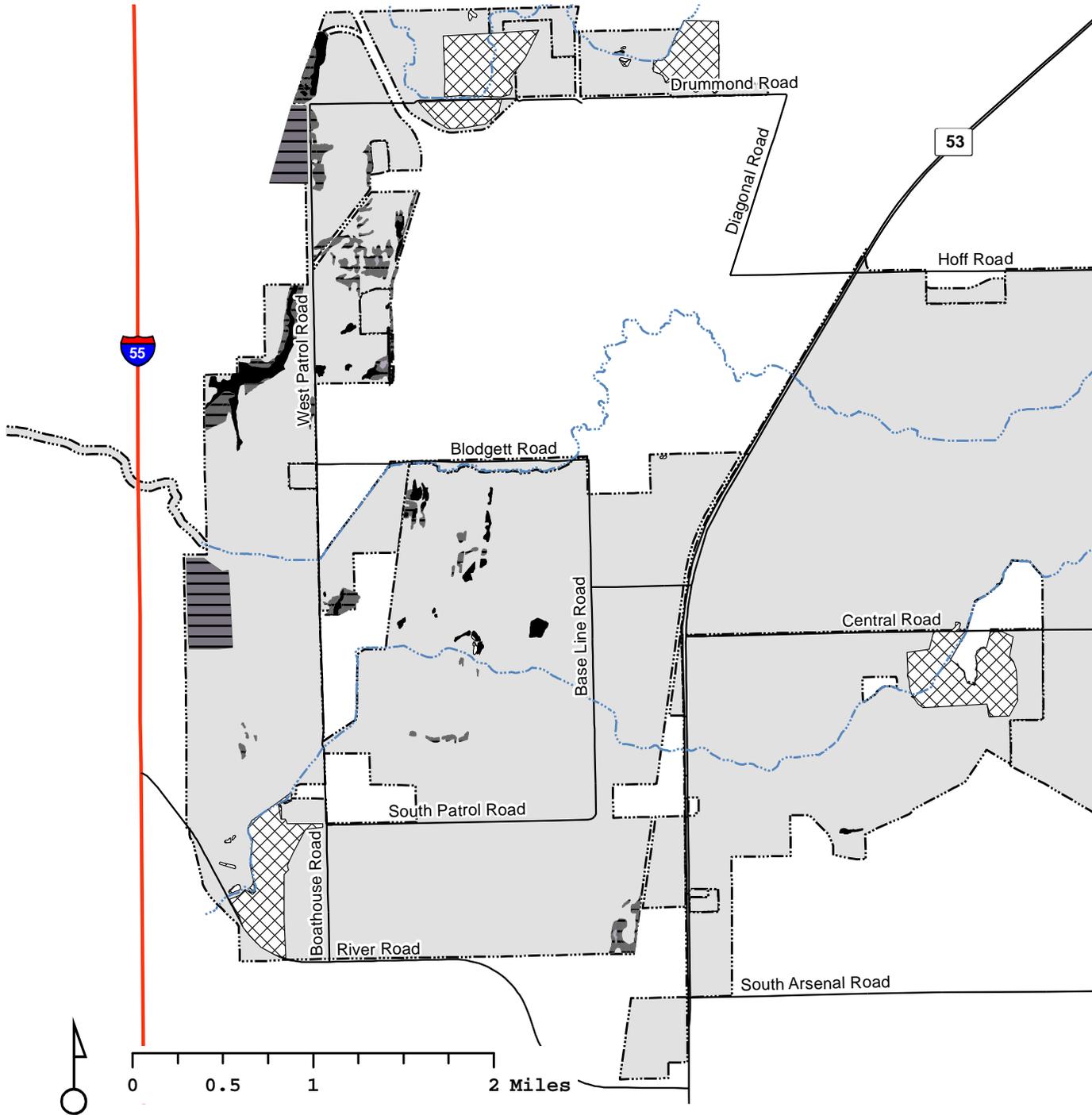
USDA Forest Service

Prairie Habitat Maintenance EA

Figure 3
West Side

Natural Community Remnants

- Prairie
- Wetland
- Woodland
- Streams





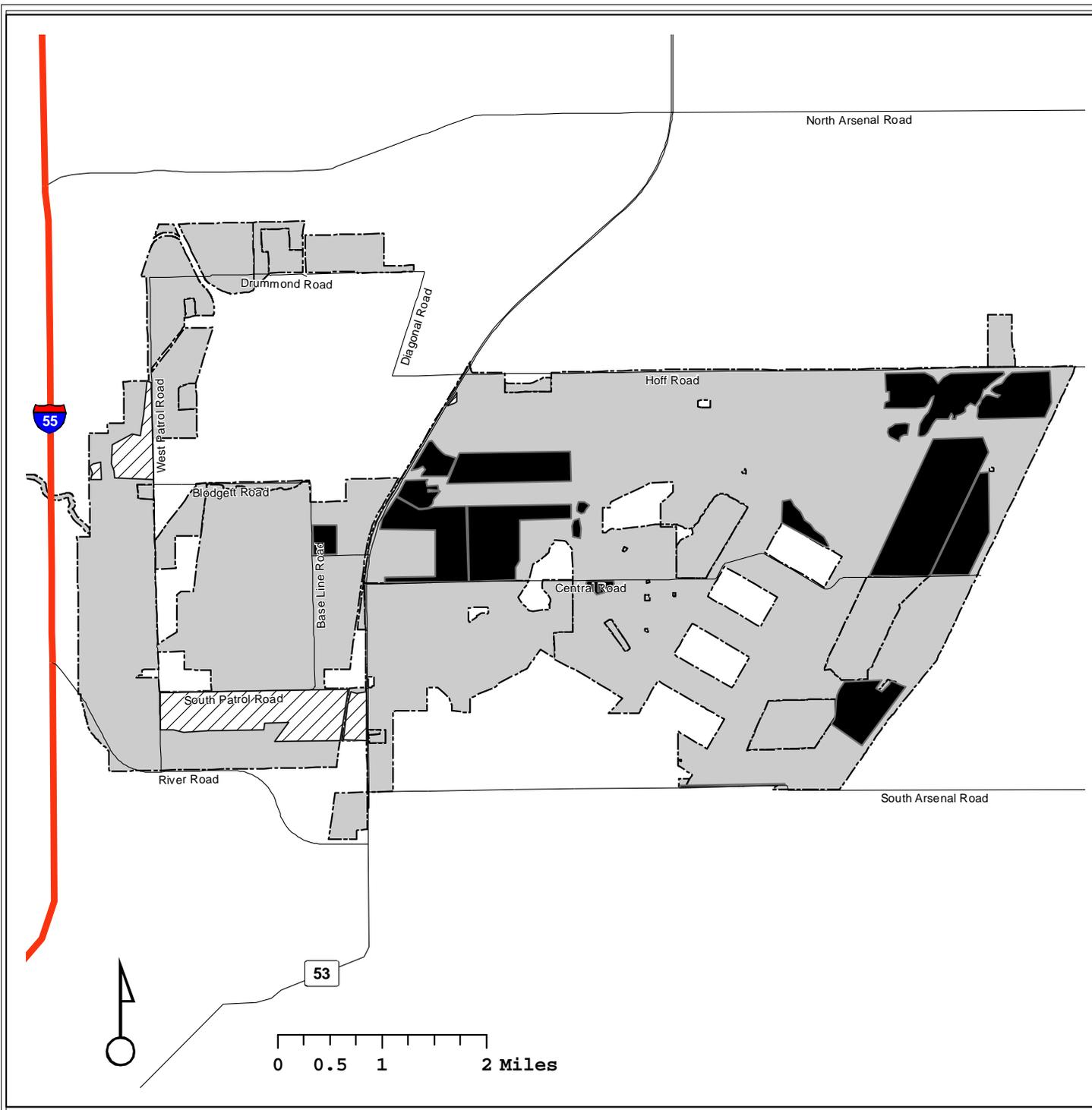
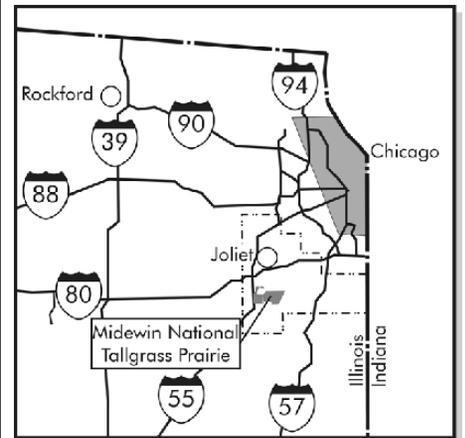
USDA Forest Service

Prairie Habitat Maintenance

Figure 4

CONVERSION AREAS

-  Grassland
-  Prairie





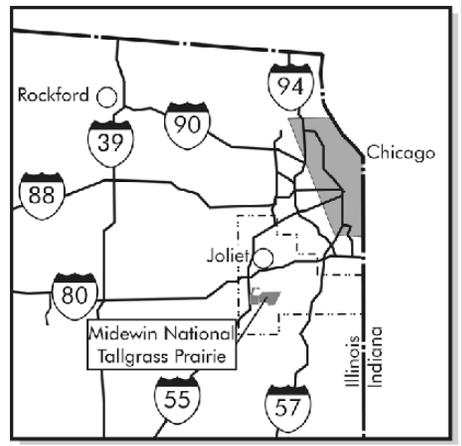
USDA Forest Service

Prairie Habitat Maintenance

Figure 5

2007 Existing Leases

-  Crop
-  Grazing
-  Hay





USDA Forest Service

Prairie Habitat Maintenance

Figure 6

Legend

Adjacent Ownership

-  CenterPoint
-  Dept of Defense
-  Dept of Veterans Affairs
-  JADA
-  Will County
-  IL Dept of Natural Resources

