United States Department of Agriculture | **Forest Service** | **Midewin National Tallgrass Prairie** | **3007 South State Route 53 Wilmington, IL 60481 (815) 423-6370**

File Code: 1950-1
Date: March 27, 2002

Dear Friends of Midewin:

The Environmental Assessment for restoration activities on the Grant/Creek Hoff Road site and the Mola tract at Midewin National Tallgrass Prairie is now available for public review and comment over the next 30 days. This project proposes to restore approximately 114 acres by removing drain tiles, removing woody vegetation, planting native vegetation, controlling native invasive species and noxious weeds with mechanical methods, and maintaining the vegetation with prescribed fire and mowing following the Prairie Plan objectives and standards and guidelines.

On April 19, 2000 Midewin initiated a public comment period to scope for issues regarding these projects at Midewin. The scoping period ended on May 19, 2000. Public comments received were used to identify significant issues, mitigation measures, and to craft the alternatives.

To request a copy of the Environmental Assessment for Grant Creek/Hoff Road and Mola Restoration, please contact Enid Erickson at (815) 423-6370 or email at eerickson@fs.fed.us

The 30-day public comment period for this environmental assessment closes on Monday, April 29, 2002. All public comments on the EA will be addressed in my final decision. A Decision Notice will be published after considering all public comments. As the Prairie Supervisor, I am the Forest Service deciding official for this project.

Comments may be sent via the email to eerickson@fs.fed.us or mailed to Enid Erickson at the address above. Please be sure to include the following information when providing written comments:

- Your name, address, organization represented, and title;
- Title of the document you are commenting on;
- Specific facts and supporting reasons regarding your comments.

Copies of the Decision Notice will be mailed to those submitting comments and those requesting copies. For further information concerning this project, please contact Enid Erickson at (815) 423-6370.

Sincerely,

FRANK KOENIG
Prairie Supervisor, Midewin National Tallgrass Prairie

ENVIRONMENTAL ASSESSMENT

for the

GRANT CREEK / HOFF ROAD AND MOLA TRACT RESTORATION PROJECTS

MIDEWIN NATIONAL TALLGRASS PRAIRIE
Will County, Illinois

March 28, 2002

Responsible Agency: USDA Forest Service
Midewin National Tallgrass Prairie

Responsible Official: Frank Koenig, Prairie Supervisor
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1. PROJECT SCOPE

1.1 Introduction

Midewin National Tallgrass Prairie (Midewin) proposes to conduct restoration activities on the prairie. This Environmental Assessment (EA) documents the potential environmental effects of restoration projects at the Grant Creek/Hoff Road and Mola sites on 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 either of the action alternatives or the no action alternative. Based on this EA, the Prairie Supervisor will decide whether or not to allow restoration projects to proceed within the Grant Creek/Hoff Road and Mola project areas.

An Interdisciplinary Team of resource specialists (identified in Chapter 7), used a systematic approach to analyze the proposed project and alternatives to it, estimate the environmental effects, and prepare this EA. The site specific 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).

This section defines and explains the scope (boundaries/limits) of the environmental analysis for the proposed restoration projects. It briefly describes the proposed action, the purpose and need for the action, objectives, decision to be made, public involvement, relevant planning documents, applicable regulatory requirements, and identifies the resource issues studied in detail in this EA.

1.2 Project Areas

The project areas consist of two tracts proposed for restoration located on approximately 114 acres of the Midewin National Tallgrass Prairie, located 15 miles south of Joliet and 4 miles north of Wilmington, Illinois. The 49-acre Grant Creek/Hoff Road project area is located within the eastern portion of Midewin in Section 31, T34N, R10E, Will County, Illinois, and lies within the Grant Creek watershed. The 65-acre Mola project area is located directly across from the

Midewin administrative site in Section 13, T33N, R9E, Will County, Illinois. Appendix A contains a site-specific map of both project areas.

Adjacent to Midewin are the Joliet Army Training Area, Abraham Lincoln National Cemetery, Des Plaines State Fish and Wildlife Area, and the yet to be completed Deer Run Industrial Park, Island City Industrial Park, and Will County landfill. There are also private lands adjacent to Midewin, primarily along the north and east boundaries.

1.3 Proposed Action

The April 19, 2000 scoping letter proposed restoration activities at the Grant Creek/Hoff Road and Mola sites, including removal of drain tiles and woody vegetation, restoration of native vegetation, control of native invasive species and noxious weeds (non-native or exotic vegetation) with mechanical methods, prescribed fire, competition from restored native vegetation, and selective application of approved herbicides. Both sites would be restored with appropriate types of native vegetation, including wetland, prairie (both upland and wet prairie types), and savanna vegetation. Long-term management would include supplemental seeding and planting, prescribed burning, and mowing. Mitigation and monitoring would continue in the future to ensure the effectiveness of the mitigation and monitoring activities. Specific details on the Action and No Action Alternatives are contained in the Description of Alternatives (Chapter 2).

Herbicide use at Midewin is currently under analysis as a separate Environmental Assessment. Application of herbicides at the Grant Creek/Hoff Road and Mola sites will not be undertaken until that analysis has been completed and a decision made by the Prairie Supervisor concerning the use of herbicides at Midewin National Tallgrass Prairie.

1.4 Purpose and Need for Action

The establishing legislation for Midewin National Tallgrass Prairie is the Illinois Land Conservation Act (ILCA) of 1995, which directs the Forest Service (FS) to restore the tallgrass prairie at Midewin. The primary purposes of Midewin, as outlined in the ILCA are:

1) To manage the land and water resources to conserve and enhance the native populations of fish, wildlife, and plants;
2) To provide scientific, environmental, and land use education and research;
3) To allow continuation of agriculture uses over the next 20 years; and

4) To provide a variety of recreation opportunities that are not inconsistent with the preceding purposes.

In order for this to be accomplished, there must be landscape-scale restoration of hydrology and appropriate native vegetation. Consistent with the first primary purpose stated above, the purpose and need for this proposed restoration project is to:

- Restore hydrology to a more natural condition at the two sites;
- Establish appropriate native vegetation;
- Restore habitat for appropriate prairie and wetland native wildlife and plant species; and
- Control invasive plant species, including noxious weeds.

Previous landowners converted the original native vegetation to agricultural land using cultivation and drainage to maintain crop production. Information from early land survey records, county soil maps, and nearby native vegetation remnants support restoration of the project areas as prairie (both upland and wet prairie types), sedge meadow, and oak savanna.

Few native vegetation remnants exist in the vicinity of the project areas (or near Midewin), largely because of long-term agricultural land use, coupled with the current trend of converting private agricultural lands into commercial and residential developments. In fact, less than 0.2% of Will County consists of high-quality remnants of natural communities. Most of Will County's non-agricultural and non-developed land is dominated by invasive native and non-native plant species. Although many (perhaps most) native vegetation remnants are either already protected or likely to become protected in the foreseeable future, some will probably be destroyed by agricultural activities, urban sprawl, or other development.

Of the lands transferred from the Army to the USDA Forest Service, less than 3%, or approximately 330 acres, contain native vegetation remnants. Currently 610 acres at two sites on the west side of Midewin are also being restored (Blodgett Road and South Patrol Road Wetlands Restoration EA, 2000b). These are the first wetland restoration projects to be implemented at Midewin.

Restoring native prairie habitat will be a long-term project at a site as large as Midewin. Active management will be needed to maintain and enhance all restored habitats. This EA analyzes the environmental effects of restoring the

hydrology and appropriate native vegetation at the Grant Creek/Hoff Road and Mola sites.

1.5 Project Objectives and Desired Conditions

In accordance with goals presented in the Prairie Plan for Midewin, the goal of this project is to restore approximately 114 acres to native prairie vegetation. Implementation of this project would move Midewin toward the desired future condition outlined in the Plan. To achieve this goal, the Interdisciplinary Team identified the following objectives for the Grant Creek/Hoff Road and Mola restoration projects:

1. Restore the soil condition and hydrology to support sedge meadow habitat.

2. Plant with an appropriate mix of native plants.

3. Enhance the scenic quality along State Highway 53 toward a more natural appearing prairie landscape.

4. Manage the newly restored sites over the long term following management prescriptions for periodic mowing, weeding, cutting, and prescribed burning.

5. Monitor changes to plant and animal communities.

6. Implement prairie restoration in a cost effective manner.

1.6 Decision to be Made

The Prairie Supervisor of Midewin National Tallgrass Prairie must decide whether to conduct restoration projects at the Grant Creek/Hoff Road and Mola sites at this time or whether to defer the activities until a later time. These activities are described in detail in Chapter 2.

If the restoration alternative is approved, project implementation is expected to begin during the summer of 2002 and continue as needed (indicated by periodic monitoring of site conditions) or until there is a major change in conditions that would require further analysis.

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 he determines that it would not significantly affect the quality of the human environment, then he can prepare and sign a Finding of No Significant Impact (FONSI), and the project may 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 this project may proceed.

1.7 Public Involvement Summary

The public was invited to participate in this analysis in April 2000. The Interdisciplinary Team contacted approximately 400 interested individuals and organizations on April 19, 2000, requesting written comments on the proposed restoration projects at the Grant Creek/Hoff Road and Mola sites by May 19, 2000. Seven written comments were received and have been considered in this Environmental Assessment. Issues raised during the public scoping process are discussed below (see Key Issues).

1.8 Relevant Planning Documents

Planning documents that directly influenced the scope of this environmental analysis (EA) are:

- Midewin National Tallgrass Prairie Land and Resource Management Plan (Prairie Plan)
- Midewin National Tallgrass Prairie Plan Final Environmental Impact Statement (FEIS)

The Prairie Plan and Plan FEIS contain direction for management of Midewin. The proposed restoration projects at the Grant Creek/Hoff Road and Mola tracts are consistent with these two documents, meeting all direction and standards for the Restoration Management Area. We have tiered this project EA to both the Prairie Plan and the Plan FEIS.

The proposed restoration activities do not represent ***irreversible*** (activities that cause the loss of future options, such as extinction of a species) or ***irretrievable*** (activities that can be undone with relative ease and minimal finances unless

necessary for safety or resource protection purposes) commitments of resources. While we cannot retrieve the financial resources used following completion of a restoration activity, the activities covered under this EA are necessary for resource protection purposes, i.e., to control the encroachment of woody vegetation and slow the spread of invasive and exotic plant species.

1.9 Applicable Regulatory Requirements, Licenses, and Permits

National Forest Management Act (NFMA) (36 CFR part 219.27)-
This project is consistent with NFMA guidelines and would restore, to the extent possible, native plant communities and associated prairie, wetland, and savanna habitat. Restoration of the Grant Creek/Hoff Road and Mola tracts would protect soil and water conservation resources and would provide and maintain for diversity of plant communities.

Illinois Land Conservation Act of 1995-
The goal of this project, to restore the hydrology to a more natural condition and to re-establish native vegetation, is aligned with the first purpose of Midewin's establishing legislation: "To manage the land and water resources…in a manner that will conserve and enhance the native populations and habitats of fish, wildlife, and plants." This restoration project also meets the intent of Midewin's enabling legislation.

National Historic Preservation Act of 1966, Archaeological Resources Protection Act of 1979, Executive Order (E.O.) 11593 of 1971, and E.O. 1307 of 1997-
Federal agencies are mandated to take heritage resources into consideration when planning land management activities. Specific direction is provided to address heritage resource issues and values during the early planning stages of projects (see Heritage Resources, Chapter 5).

Clean Air Act, as amended November 15, 1990 –
A burning permit will be obtained from the Illinois Environmental Protection Agency prior to prescribed burning activities.

1.10 Key Issues

Public scoping is an early and open process used to determine the range of issues as well as significant issues related to the effects of the proposed action. Many potential issues raised by the public can be resolved by implementing mitigation measures, altering design criteria, adhering to applicable laws and regulations, or may be dismissed if the issues are outside the scope of the analysis.

Key issues and other concerns related to the proposed action were identified by a review of appropriate source materials used to develop the Midewin Land and Resource Management Plan (Prairie Plan) and by meetings of Midewin staff to identify site-specific issues and concerns. Public comments received in response to the initial scoping letter were reviewed to help determine significant issues related to the proposed action (in compliance with 40 CFR 1501.7). The Interdisciplinary (ID) Team carefully considered comments received from the public, other agencies, and Forest Service resource specialists. The issues were then used to formulate alternatives, prescribe mitigation measures, and serve as a basis for analyzing effects.

Described below are issues identified during the public scoping period and through internal scoping of Midewin staff. The proposed resolution to each issue follows.

1. ISSUE: Assure that the projects do not impact either the active rail Right-of-Way [ROW] or the State Highway 53 ROW.

Issue Resolution: The ID Team will consider a variety of potential impacts, including hydrological and air quality impacts from prescribed burning. The mitigation measures will prescribe means to avoid impacts (if any) to adjacent lands, including the active rail ROW and State Highway 53. Specific measures are detailed under alternative mitigation measures for hydrology in Chapter 4.

Prescribed fire has a potential to impact the highway and railway. Burn plans for prescribed fires will determine appropriate weather conditions and burn methods in order to prevent impacts.

The watershed alterations of the proposed action are limited to removal of drain tiles and replacement of crops and other non-native vegetation with prairie communities. Removal of drain tiles is intended to increase ponding and retention of soil moisture for supporting wetland species. These actions are

considered in the watershed context of this EA (Environmental Consequences) and assessed for potential effects on the transportation routes (Analysis of Effects). The proposed action does not include any alteration of storm water drainage structures that serve the transportation routes; if any mitigation measures are found to be warranted, they could include construction or improvement of drainage structures for the transportation facilities.

2. ISSUE: Assure that necessary open burning permits are obtained from the Illinois Environmental Protection Agency prior to conducting prescribed burning actions.

Issue Resolution: The USDA Forest Service will ensure that all necessary permits related to prescribed burning are obtained and that compliance is met for all applicable federal laws, regulations, and Forest Service direction. Prescribed fire effects on air quality will be considered prior to any prescribed burning actions.

3. ISSUE: Consider the use, reuse, or recycling of ballast from an old railroad berm through the north end of the Grant Creek/Hoff Road tract, thereby ensuring that the ballast is not a solid waste or hazardous waste for purposes of regulation under the Resource Conservation and Recovery Act.

Issue Resolution: Ballast at Midewin has been evaluated and determined not to be a hazardous waste. The USDA Forest Service has approved ballast for reuse as below grade fill material. Recycling of useable ballast would be encouraged of contractors for those materials that have commercial value, depending on market conditions and economics.

4. ISSUE: Ensure that restoration will not preclude future trail development.

Issue Resolution: Trail development would be planned with guidance from the Prairie Plan which does not show future trail corridors through these project sites. However, development and implementation of trails for future use by the public would not be precluded by restoration projects in either the Grant Creek/Hoff Road or Mola tracts.

5. ISSUE: Consider creating an observation area at each site with interpretive signage to promote increased public access at Midewin.

Issue Resolution: With increased native vegetation (including wildflowers), increased wildlife use, and reduced invasive plant species, such sites may be attractive to prairie visitors in a few years time. Preparation of interpretive information and protective measures for vegetation and wildlife would be needed to interpret the sites. The scope of this proposal was limited to restoration activities, and this EA will not analyze the effects of interpretation at this early stage in restoration. Development of observation areas for future use by the public would not be precluded by restoration projects in either the Grant Creek/Hoff Road or Mola tracts.

6. ISSUE: Begin restoration now before invasive species have an opportunity to become more widely established.

Issue Resolution: We propose to begin the restoration work immediately following completion of Forest Service compliance with the National Environmental Policy Act (NEPA) and as soon as it is legally and practically feasible to begin restoration efforts. Chapter 5 discusses resources that could be affected by restoration activities, including streams and wetlands, soils, Federal endangered and threatened plant and animal species, other special status species, and vegetation. Methods of controlling and eradication invasive species are discussed, for instance, burning, hand pulling, and mowing. The use of herbicides to control invasive plant species and noxious weeds at Midewin is being analyzed in a separate Environmental Assessment and is not addressed in this EA.

2. DESCRIPTION OF ALTERNATIVES

Alternative Development

Based upon written comments received in response to the April 2000 scoping notice and on key issues, the Interdisciplinary Team formulated two project alternatives, which are discussed in detail below.

2.1 ALTERNATIVE 1 –RESTORATION OF GRANT CREEK/ HOFF ROAD AND MOLA TRACTS

Approximately 114 acres of agricultural land and adjacent successional land would be restored to native prairie (both upland and wet prairie types), wetland, and savanna vegetation. Invasive species and noxious weeds would be controlled by means of various Integrated Pest Management (IPM) techniques. Surviving populations of native plants would be protected and enhanced. Noxious weeds are defined under the Illinois Exotic Weed Act as "…plants not native to North America which, when planted, either spread vegetatively or naturalize and degrade natural communities, reduce the value of fish and wildlife habitat, or threaten an Illinois endangered or threatened species."

The following activities are proposed for the Action Alternative. Restoration activities would be implemented in phases over several years as funds permit. Land-disturbing activities such as drain tile removal, excavating or filling, and fencerow obliteration work would occur prior to planting.

Planting Prescription and Strategy - An appropriate mix of native species would be used for restoration planting. Only seeds and plants (plugs or rootstock) grown from seed that originated from appropriate local sources would be used. (See Appendix B for a list of desired plant species.) Planting techniques would include broadcast seeding, seed drilling, and hand or mechanical planting of plugs. Depending on seed and plant material availability and the establishment rate within the first several years, there would be supplemental planting and over-seeding as deemed necessary to improve species composition and diversity.

Continued Maintenance – Once established, restored native vegetation would be managed by mowing, prescribed burning, and controlling invasive species, including noxious weeds. Under the Action Alternative, invasive plant control would include mowing, hand-pulling, seed-head removal, competition from native vegetation, prescribed burning, and limited cultivation. For all prescribed burns, appropriate documentation and burn plans would be prepared and implemented

by qualified fire personnel. Supplemental plant species enhancement (through seeding and planting) would occur as needed. The use of herbicides to control invasive plant species and noxious weeds is being analyzed in a separate EA.

Adaptive Management - The initial restoration process would take several years, with supplemental seeding and planting requiring periodic input over the next few decades. Long-term management of these sites would require monitoring, prescribed burning, and control of invasive species. Changes to the restoration strategy and maintenance may be made if new and appropriate techniques become available, or if monitoring indicates a need for some changes.

2.1.1 Proposed Actions at Both Sites

Under the Action Alternative (Alternative 1), restoration activities proposed at both the Grant Creek/Hoff Road and Mola sites include:

- Cutting and disposing of woody vegetation through such means as chipping, piling and burning, or removing off-site.

- Initiating an integrated pest management approach to control invasive plant species such as certain grasses, forbs, shrubs, and tree seedlings. Methods used could include mechanical control (i.e. mowing or disking), prescribed fire, competition from restored native vegetation, and hand cutting and pulling.

- Utilizing prescribed burning and mowing to manage the restored native vegetation after its initial establishment. There would also be control of invasive plant species with hand pulling, seed-head removal, and other mechanical methods, as deemed necessary by monitoring.

- Disabling drain tiles and filling ditches. Tile lines would be disabled by excavating and plugging sections of the tile lines and then backfilling the trenches. Ditches may be filled completely or blocked at appropriate places, depending upon the availability of suitable fill materials. Drainage in tile lines entering the project areas from adjoining lands would be accommodated, if necessary or desirable, to maintain functional drainage of the adjoining lands.

- Planting native prairie and wetland vegetation (seed and plants) during the first year, including plugs and rootstocks. Enhancement by over-seeding and supplemental planting of plugs would continue for the

following 3 to 5 years or longer, depending on the success of restoration efforts and the need to enrich the vegetation.

- Planting of plugs and rootstock may be concentrated in highly visible areas, such as near roadsides, to provide early enhancement of scenic quality.

2.1.2 Proposed Actions at the Grant Creek/Hoff Road Site

Proposed actions specific to the Grant Creek/Hoff Road restoration site involve converting thirty acres of agricultural land and nineteen acres of grassland thickets and disturbed land to wetland, prairie, and savanna habitat. The primary objectives are to restore the hydrology, soils, and native vegetation to the area. Forty-six acres of prairie and wetland and three acres of savanna would be restored. Restoration activities planned for this site include:

- Removing approximately eight acres of early successional woody growth.

- Removing the ballast (gravel fill material) of an old railroad berm from the north end of the tract and reconditioning the soil surface, as needed, to reduce compaction. As the status of ballast at Midewin has been evaluated and determined not to be a hazardous waste, its reuse as below grade fill has been approved by the USDA Forest Service and would be encouraged of contractors.

- Removing two culverts from the upper branch of Grant Creek, one under an access road and the second under the old railroad berm. After removal, actions would be taken to reconstruct and stabilize stream banks, and prevent channel scour.

- Stabilizing stream banks with appropriate native grasses and forbs. Some portions of the stream banks may require the use of erosion-control fabrics or other materials until vegetation is sufficiently established to stabilize the reconfigured stream banks.

- Planting understory species in potential savanna habitat, emphasizing species that become established and thrive until canopy trees develop (thirty-fifty years). After trees mature, savannas would be supplemented with shade-tolerant shrubs and herbaceous plants.

- Beginning establishment of savanna trees during the second year of the project (2003) and continuing as needed to provide suitable number and age range of savanna trees.

- Leaving selected trees to screen undesirable views or begin restoration of savanna structure on appropriate sites. Only non-invasive native trees would be selected for this purpose, primarily black walnut, eastern hackberry, black maple, willows, and staminate trees of eastern cottonwood.

2.1.3 Proposed Actions at the Mola Site

Proposed actions specific to the Mola tract restoration include converting 54 acres of agricultural land and eleven acres of abandoned orchard and disturbed land to wetland and prairie. The primary objectives are to restore the hydrology and native vegetation in the tract. Sixty-five acres of prairie and wetland would be restored. Restoration activities planned for this site include:

- Removing approximately four acres of early successional woody growth. Some selected trees would be left to screen undesirable views (such as adjacent commercial property). Only non-invasive native trees would remain, primarily eastern hackberry, wild plum, willows, and staminate trees of eastern cottonwood.

- Enhancing native plant populations in an abandoned apple orchard at the northwest corner of the tract through planting prairie vegetation (both seeds and plants), removing woody plants, mowing (to reduce seed-set in giant ragweed), and prescribed burning.

2.2 ALTERNATIVE 2 – NO ACTION

This alternative would defer any management or wetland restoration activities at this time by the Forest Service, including drain tile removal, mowing, prescribed burning, and hand pulling and cutting of noxious weeds and invasive plant species. The No Action Alternative is required by the Council on Environmental Quality regulations and also responds to certain concerns. It forms the baseline for comparison of the other alternatives.

At present, both project areas are under agricultural use (winter wheat, oats, or soybeans). Agricultural activities at Midewin were analyzed in an Environmental Assessment (USDA Forest Service 2001a) and have been authorized to continue

until 2006 or until the Forest Service makes a decision to remove the land from agricultural production. After 2006, further analysis and evaluation will be required before agricultural use can continue. If agricultural uses are discontinued without restoration, then the land is likely to be colonized by woody and herbaceous invasive plant species. Alternative 2 would therefore result in either 1) continuing agricultural practices and maintaining croplands until 2006, or 2) allowing the Grant Creek/Hoff Road and Mola tracts to remain untreated by restoration actions, with eventual colonization by invasive species of undesired vegetation.

Additionally, restoration of the hydrologic regimes in the project areas would not be facilitated because existing drain tiles would not be disabled or removed.

2.3 COMPARISON OF ALTERNATIVES

Table 1. Comparison of Alternatives and Project Objectives

Objectives	Alternative 1 - Action	Alternative 2 – No Action
Restore soil condition & hydrology to support sedge meadow habitat.	YES	Partially effective
Plant appropriate mix of native plants.	YES	NO
Enhance scenic quality along St. Hwy. 53.	YES	NO
Manage restored sites following management prescriptions for mowing, weeding, cutting, & prescribed burning.	YES	NO
Monitor changes to plant and animal communities.	YES	Partially effective
Implement prairie restoration in a cost effective manner.	YES	NO

All objectives listed in Table 1 for restoration of the Grant Creek/Hoff Road and Mola tracts would be achieved under the Action Alternative. Under the No Action Alternative, the proposed restoration of these tracts would not be implemented, and restoration objectives would not be met or would be only partially met for two of the objectives. Under no action, agricultural use could either be continued or halted in the proposed project areas. If continued, agricultural practices would

not have positive effects on soils or hydrologic conditions. If agriculture uses were to be discontinued, gradual soil and hydrology improvements could be expected, although erosion rates would be higher with the increase in invasive plant species and resulting decreased soil cover. Wetland habitat would also become dominated by invasive plant species and woody vegetation if restoration objectives are not met.

With continued agricultural uses, monitoring under the No Action Alternative would likely indicate similar numbers of edge species, such as raccoons and white-tailed deer, that are currently found in the Grant Creek/Hoff Road and Mola tracts. If agriculture is not continued, then monitoring should indicate that abandoned fields became suitable for some grassland species until the establishment and domination of invasive species to the exclusion of other species. Partially effective, short-term changes to plant and animal communities would eventually become long-term encroachments of invasive vegetation.

Table 2. Comparison of Alternatives and Project Issues Resolution

Issues	Alternative 1 - Action	Alternative 2 – No Action
Assure projects do not impact railroad or State Hwy. 53 right-of-way.	YES	Not applicable (N/A)
Assure that burning permits are obtained from IL. EPA.	YES	N/A
Consider ballast recycling from railroad berm in Grant Ck./Hoff Road tract.	YES	No
Ensure that restoration will not preclude future trail development.	YES	N/A
Consider observation areas for public viewing.	YES	No

All issues raised during the scoping process for this proposed restoration project (listed in Table 2) would be addressed and resolved under the Action Alternative.

2.4. ALTERNATIVES CONSIDERED BUT DROPPED FROM FURTHER ANALYSIS:

Control of invasive vegetation with herbicides

Herbicide application at Midewin National Tallgrass Prairie will be analyzed under a separate Environmental Assessment currently under preparation. That EA will include both the Grant Creek/Hoff Road and Mola tracts in analyzing herbicide application as a separate component of Midewin's Integrated Pest Management approach. Herbicide treatment is therefore not analyzed as part of this EA.

Reducing the acreage restored by dropping one unit or the other

The Interdisciplinary Team considered dropping either the Mola site or the Grant Creek/Hoff Road site from the project, but reducing the acreage would not fulfill project objectives of restoring the soil conditions and prairie vegetation or enhancing the scenery along State Route 53 and was not considered further.

3. MITIGATION MEASURES

To minimize impacts to resources under the Action Alternative, the following mitigation measures would be implemented in accordance with the Prairie Plan:

- **3.1 Sensitive, Threatened and Endangered Species -** Removal of woody vegetation would be conducted manually during the dormant season (1 November-30 March). Woody plant stands (thickets or fencerows) would not be removed during the bird-breeding season (30 March-15 August). Prescribed burning and mowing would be conducted at suitable times to avoid adverse impacts on nesting birds. If prescribed burns were to be conducted later than 15 March, then surveys would be completed beforehand to locate nests of northern harriers or other ground-nesting birds to avoid adverse impacts. Special status species would not be introduced into the project areas until it has been determined that any naturally occurring population would not be adversely impacted by the introduction. Restored habitats would be evaluated for their potential to support additional special status species before any species-specific restoration projects are conducted.

- **3.2 Heritage Resources** – Surveys have been conducted and effects determined for heritage resources located within the project areas in compliance with Section 106 of the National Historic Preservation Act of

1966 and other relevant mandates concerning heritage values. Two heritage sites were recorded during the surveys. One heritage site was determined to be potentially eligible for listing in the National Register of Historic Places and would be avoided during project activities. Should previously undiscovered heritage resources be located during the course of project work, the Forest Service archaeologist would be contacted. Work in the vicinity of the find would be temporarily halted pending an assessment by the archaeologist.

- **3.3 Soils** – Vehicular traffic would not occur on wet soils. Fill material for ditches would be material of native origin and local source. Soils would not be disturbed or compacted when wet. Where heavy machinery is used on hydric soils (when wet), the equipment would ride on pads or wide-area (low-pressure) tires to minimize surface compaction. Heavy equipment would be confined to designated work areas and travel routes located primarily in areas to be disturbed by restoration work (e.g. fence rows, along ditches). Areas of excavation or heavy machinery traffic would be plowed following work to eliminate deep compaction. To further prevent compaction in the fields, any old roads, rail beds, and past building sites would be deep-plowed. Topsoil would be removed and replaced over any drain tile excavations.

- **3.4 Hydrology** – Tiles would be disabled by removing sections of tile at intervals along the length of the tile, depending on slope, tile diameter, and length. Tile sections designated for removal would be either dug up and removed or crushed in place and the trench backfilled with native material. Appropriate vegetation would be planted on barren surfaces to control erosion.

- **3.5 Air Quality** – Woody debris may be burned as an alternative to chipping or cutting and removing. Burning should be conducted at the Mola site when the wind is blowing easterly and at the Grant Creek/Hoff Road site when the wind is blowing westerly and northwesterly to keep smoke directed away from State Highway 53 and Hoff Road. Burning would be conducted when weather systems are stable (generally clear skies, light winds, and no temperature inversions). Project specific burn plans and applicable state and county burning permits must be approved prior to executing prescribed burns. Prescribed burning would only be conducted on days when there is no eminent risk that regional ozone concentrations would exceed air quality standards and when conditions do not cause smoke problems for State Highway 53, Hoff Road, or the railway corridor. Both project areas are over three miles from Interstate

55 and of sufficient distance not to pose an air quality problem if the burns are conducted under optimal conditions. Local area residents would be warned about smoke from any prescribed fires at Midewin. Notices would be posted on area highways to inform motorists of prescribed burning activities.

- **3.6 Scenic Quality** - Areas to be regraded would blend with and mimic the natural topography. Restoration planting would occur in a random, natural form that resembles that of nature. Edges of woody plant removal where the entire stand is not removed would be feathered to mimic nature. Tree stumps would be removed to within four inches of the ground. Within 100 yards of primary transportation routes (State Highway 53 and Hoff Road), stumps would be sloped away from the primary line of sight.

4. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES OF THE ALTERNATIVES

4.1 Introduction

This chapter briefly describes the present condition of the environment and changes that may be expected by implementing the action alternative or by taking no action at this time. The significant 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. This chapter also forms the scientific and analytic basis for the comparison of alternatives. The affected environment of the physical, biological, and socio-economic resources are described first, followed by the environmental consequences (direct and indirect effects) of the alternatives.

Cumulative effects are discussed for each major issue or concern. Cumulative effects result from incremental impacts of proposed activities when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions. The area of consideration for cumulative effects covers the Prairie Parklands in Will County, Illinois. Midewin is part of the Prairie Parklands, an area of approximately 40,000 acres of habitat that includes the Illinois Department of Conservation's Des Plaines Conservation Area, Goose Lake Prairie State Park, Heidecke Lake Fish and Wildlife Area, and portions of corporate lands owned by Commonwealth Edison, General Electric, Exxon Mobil Corporation, BP Corporation, Stepan, Dow Chemical, and other

entities. In all there are 22 proximal areas in the Prairie Parklands owned by State, county, and local governments, corporations, and interested private landowners located within twelve miles of Midewin.

Will County consists of 543,043 acres of land. It is estimated that this region is about 46 percent cropland, 9.9 percent urban, 30.4 percent pasture and other grasslands, 2.7 percent open water, 3.1 percent wetland, and 7.7 percent forest. The county includes the watersheds of the Kankakee, Des Plaines, and Calumet Rivers; the Kankakee and the Des Plaines Rivers are the only two major rivers in the county. The landscape of Will County is primarily open farmland, with a large concentration of urban land along the northern borders, and smaller urban concentrations along the Des Plaines River corridor and major transportation routes. Will County has one of the largest concentrations of open grassland in the state of Illinois. However, many of the crop fields and grasslands in the northern portion of the county are rapidly being converted to urban land uses (residential subdivisions and commercial complexes).

At present, the USDA Forest Service administers approximately 15,189 acres within the Midewin National Tallgrass Prairie and is expected to receive up to 4,000 additional acres through transfer from the Army. Slightly more than 4,000 acres of Midewin are currently in row crop or hay production. The remaining land is pasture, abandoned fields, fencerows, abandoned home sites, structures built for the Joliet Army Ammunition Plant (JAAP), and remnants of native vegetation (woodland, prairie, and wetlands).

Past activities that occurred on all JAAP land prior to 1940 include timber cutting, wetland drainage, and conversion of natural vegetation to row crop fields, pasture, and hayfields. Most of these activities continued under the Army, but industrial areas were also constructed on several tracts. The Army improved existing roads and added infrastructure such as, railroads, power lines, security fences, buildings, drainage ditches, reservoirs, wells, water towers, water lines, and new roads to support the ordnance plant.

Present and potential future activities at Midewin include prescribed burning, invasive species control, hydrologic restoration, natural community restoration, grassland bird habitat management (including grazing by livestock), continued row crop production, stream rehabilitation, building demolition, hazardous substances cleanup, scientific research, environmental education, trails and recreation facilities construction, and road removal. Present and future activities on other portions of the former Joliet Arsenal that may impact restoration activities at Midewin include development two industrial parks (Deer Run and Island City), management of lands at the Abraham Lincoln National Cemetery,

the Joliet Army Training Area, and construction and operation of the Will County landfill, all of which lie adjacent to Midewin National Tallgrass Prairie.

4.2 Soils

4.2.1 Affected Environment

Grant Creek/Hoff Road - The Grant Creek/Hoff Road site lies on the margin of the glacial till plain/Wheaton glacial moraine. The terrain has a low, rolling character with approximately twenty feet of relief. Side slopes of hills generally do not exceed five percent, and slopes in defined drainages generally do not exceed two percent. The soil series consist of the Ashkum, Elliot, and Varna (mollisols) and the Morley (an alfisol) series. The Ashkum, a poorly- drained, hydric, silty clay loam, lies in narrow riparian bands along Grant Creek and lesser drainages; slopes are less than two percent. The Elliot, a somewhat poorly drained silt loam, adjoins the Ashkum along drainages and generally occupies low rises between drainages. The Varna, a well-drained silt loam mollisol, adjoins the drainages and, similar to the Elliot, overlaps areas between drainages. The Morley, a well-drained silt loam, occupies two small hilltop and side-slope patches in the project area, outliers of a large band of Morley series that lies west of the project area along the edge of the moraine. The site has a low erosion potential on the low slopes of drainage routes and moderate erosion potential on side slopes. Soil moisture levels tend to be fairly high along drainages, owing to the poor internal drainage of the soils and high local water table (NRCS 1996).

Nearly all soils have been modified to some degree by past uses and soil disturbances, principally till agriculture and tile drainage. It may be presumed that past crop production resulted in compaction and losses of topsoil, organic matter, and soil structure, along with alterations of the microbial processes and nutrient cycling. Limited areas of excavation, fill, and severe compaction are also present. Fire, grazing, and poor soil drainage were components of the natural landscape and soil formation processes (NRCS 1996).

Mola Tract - The Mola tract lies entirely on the level Kankakee/Des Plaines outwash plain. All soils on the Mola tract are poorly drained hydric (wetland) mollisols (prairie soils), with slopes less than two percent. Soil series include the Harpster, a calcareous fine sandy loam, and the Drummer (possibly Selma) silty clay loam. The Mola tract includes a small area (approximately ½-acre) of fine-grained fill material on a former building site. The site has a very low erosion

potential because of the poor internal drainage of the soils and high zonal water table.

4.2.2 Environmental Consequences

Alternative 1

The proposed restoration actions would promote long-term recovery and protection of soils. Under permanent, perennial native vegetation, soils would undergo a number of changes through time to restore the native soil properties. Without further tilling or other soil disturbances, soils would begin to develop or redefine their structure and horizons under the action of precipitation and drainage, rooting vegetation, burrowing animals, and biodegradation of stored organic matter. Where drain tiles are removed, the hydrologic regimes of the soils (e.g. the extent and duration of soil saturation and seasonal soil moisture levels) would be restored to conditions that more closely approximate those that existed prior to 1830. The restoration of hydrological conditions would promote restoration of the chemical conditions of the soils. Microbial communities in the soils, which determine nutrient cycling and development of soil structure, would probably adjust toward conditions that more closely resemble those of native prairie soils. It is likely that organic content in the upper soil horizon would increase, in turn increasing the water storage capacity of the soils and trapping carbon and nutrients. Potential erosion rates would be reduced and within the natural range of variability. Stabilization of exposed grounds and control of invasive species would facilitate restoration of soils, topography in accordance with the Prairie Plan. The project would be designed to avoid altering the hydrology in a manner that could adversely impact adjacent private lands.

Prescribed burning activities at the two sites would produce periods immediately after the burns when the potential for soil erosion is slightly higher than at other times. However, the potential for erosion would be lower than under crop cover. Soil disturbances would occur during restoration. Compaction would occur where equipment is used to remove or pile woody vegetation, excavate drain tiles, or cultivate vegetation. Soil profiles that were previously disturbed under roads and rail beds and above drain tiles would be disrupted again. The extent and intensity of compaction and disturbance would be minimized or avoided through application of mitigation measures. Soil compaction would be alleviated over time by burrowing animals, frost action, and shrink-swell processes as the restored ecosystem stabilizes.

Alternative 2

Under the No Action Alternative, agricultural use with cultivation of small grains and beans could continue until 2006, when the Forest Service will consider renewal of grazing permits at Midewin. Annual application of pesticides and fertilizers on croplands would not be eliminated, and improved soil characteristics would not occur as a result. The positive effects of controlling or eliminating invasive species and restoring native vegetation and hydrologic regimes would not take place.

If agricultural use is not permitted to continue, the effects of no action under Alternative 2 would be similar to those of the Action Alternative, principally, soil improvements that result from discontinuation of crop production. Perennial ground cover would become established on the site and the drain tiles would eventually become dysfunctional. The positive effects of restoring native vegetation and hydrologic regimes would occur more slowly and to a lesser degree. Higher rates of soil erosion might occur in some areas where exotic vegetation provides less soil cover.

4.2.3 Cumulative Effects

Relevant past, present, and reasonably foreseeable future actions in the Grant Creek and Prairie Creek watersheds that encompass the two proposed project areas include continued crop production and expanding urbanization, both of which tend to result in erosion and loss of soil functions. The proposed action, when combined with large numbers of similar actions in both watersheds, would have a significant beneficial cumulative effect on soils by preventing erosion or loss of quality and promoting the recovery of their native properties.

4.3 WETLANDS

As defined by Executive Order 11990, wetlands are "…areas inundated by surface or ground water with a frequency under normal circumstances to support a prevalence of vegetation or aquatic life that requires saturation or seasonal saturation for growth or reproduction." Wetlands at Midewin provide habitat for native wildlife and plants, including species of concern (Federal threatened and endangered, Regional Forester sensitive species, and those listed by the State of Illinois). Wetland functions also include filtering of pollutants, recharging of groundwater, retention of floodwaters, buffer for open water habitats, and nutrient and mineral recycling.

4.3.1 Affected Environment

Grant Creek/Hoff Road- The Grant Creek/Hoff Road project area includes portions of two upper branches of Grant Creek that are riverine wetlands. The two branches of Grant Creek have been partially channelized and scoured as a result of watershed alterations. The channels have areas of chronic bank erosion, particularly they are crossed by roads and rail grades. The floodplain areas of the two Grant Creek branches and three lesser tributaries (without defined channels) generally qualify as “prior converted wetlands” because although the soils and hydrological conditions indicate that sedge meadows and wet prairies were present under native conditions, the wetland vegetation was replaced with agricultural plantings decades ago. Some wetland vegetation occupies the riparian corridors, but the wetland communities have been altered by tile drainage, crop production, fire suppression, and encroachment of woody vegetation.

Mola Tract- Nearly the entire Mola tract consists of prior converted wetlands that were probably wet prairies and sedge meadows under native conditions. The perimeter of the tract consists of forested palustrine wetlands where successional woodlands have become established in soils and hydrological conditions that are equivalent to the cropland areas. Restored wet prairie and sedge meadow communities occupy the adjacent area to the south (the Vulcan tract), and a drainage ditch along the western margin of the Mola tract bordering the railway qualifies as an emergent palustrine wetland.

4.3.2 Environmental Consequences

Alternative 1

The proposed actions under Alternative 1 would result in protection and maintenance of the physical integrity of the existing and native wetland areas at both sites, as described in the previous section on Soils. The proposed actions do not include filling, physical alteration, or other loss of any existing wetlands. The proposed actions include the restoration, to the extent possible, of prior converted wetlands.

Grant Creek/Hoff Road- The proposed actions under Alternative 1 include efforts to stabilize eroding stream banks through revegetation. The northern branch of Grant Creek would be impacted by the removal of two culverts and the associated road or rail grade fill in the adjacent floodplain. At both sites, the culvert removal would require mechanical reconstruction and stabilization of the stream banks. Some areas of prior converted wetlands would be physically

disturbed by removal of drain tiles; however, the disturbance would be minimal and the disturbed sites would be stabilized with appropriate vegetative cover.

Mola Tract- The prior converted wetlands would be minimally disturbed by drain tile removal or disablement, and their hydrological regimes would be improved to support wetland vegetation. Mechanical entry into the perimeter wetlands may be necessary for removal of woody vegetation or restoration of native prairie vegetation; the potential for compaction of wetland soils would be minimized by restriction of mechanical entry to dry soil conditions (see Chapter 4, Mitigation Measures). The drainage ditch that runs between the Mola tract and the Union Pacific Railway would not be physically altered under the proposed action. Restored wet prairie and sedge meadow communities in the adjacent Vulcan tract would not be physically altered by the proposed action.

Alternative 2

The No Action Alternative would protect and maintain the physical integrity of the existing and prior converted wetlands. The No Action Alternative includes no filling or physical modification of existing or prior converted wetlands. Wetland vegetation would become established by invasion and succession under this alternative, and hydrological conditions of wetland areas would gradually revert to native conditions as drain tiles become dysfunctional. However, the wetland communities that persist under this alternative would be of low quality, with domination by a few species of invasive native species, noxious weeds, and woody vegetation.

If agricultural uses were eliminated under the No Action Alternative, then wetland vegetation would become established by invasion and succession. The positive effects of controlling or eradicating invasive species and restoring native vegetation and hydrologic regimes would not occur. If farming practices were allowed to continue until 2006 under the No Action Alternative, then the project areas would be maintained in their current conditions as croplands.

4.3.3 Cumulative Effects

It is likely that the extent and quality of wetlands in the Grant Creek and Prairie Creek watersheds will decline in the future as urban development of watershed lands continues. The declines will be counter-balanced, to some extent, by wetland restoration on Midewin. The cumulative effects of restoration of all potential wetlands in the Grant Creek and Prairie Creek watersheds on Midewin would have a beneficial cumulative effect on the conditions of wetland areas in the two watersheds.

4.4 Hydrology and Water Quality

4.4.1 Affected Environment

Grant Creek/Hoff Road- The Grant Creek/Hoff Road tract occupies a middle watershed position. Surface water enters the site from ditches along State Highway 53 and Hoff Road, which join at the upstream end of the site to form the northern branch of Grant Creek. Another upper branch of Grant Creek enters the project site a short distance downstream through culverts under State Highway 53. The northern branch of Grant Creek is joined by the eastern branch of Grant Creek at the downstream end of the project site. Grant Creek exits the site through culverts under State Highway 53 immediately downstream from the confluence of the northern and eastern branches.

The upper watershed channels carry storm water runoff from State Highway 53, the community of Elwood, and cropland; the eastern branch of Grant Creek drains grasslands and cropland within Midewin. The two branches of Grant Creek and adjacent corridors are within the hundred-year floodplain mapped by the Emergency Management Agency (FEMA), which abuts State Highway 53 but does not extend onto the elevated road grade. Three low swales (without defined channels) drain into the branches of Grant Creek from the east (Midewin), and surface runoff from State Highway 53 passes directly onto the project site. Drain tiles enter the project area from agricultural lands of Midewin that lie to the east; the drain tiles underlie the swales and floodplain area of Grant Creek, discharging into Grant Creek.

Mola Tract- The Mola tract occupies an upper watershed position due to a natural watershed divide that runs east-west across the northern portion of the site. State Highway 53 on the east and the Union Pacific railway on the west function as drainage barriers. Most of the Mola tract drains, by sheet flow, to the south and west into a drainage ditch along the railway, which continues southward toward the Kankakee River. Total relief in the tract is approximately two feet.

The surfaces of State Highway 53 and the railway lie approximately two feet and three feet, respectively, above the neighboring surfaces of the Mola tract. The western portion of State Highway 53 drains directly onto the Mola tract by sheet flow, and the southern margin of the Mola tract receives runoff from a portion of the median strip of State Highway 53 through a culvert under the road. The hundred-year, ten-day rainfall for the areas is approximately 11.5 inches, which is less than the surface storage capacity of the site below the grades of State

Highway 53 and the railway. The Mola tract and adjoining transportation routes are not included in the hundred-year floodplain as mapped by FEMA.

A small portion of the northern part of the Mola tract drains northward through a drainage ditch, across an adjoining property, and into Prairie Creek. Drain tiles do not enter Mola from adjoining lands. Drain tiles from Mola discharge into the ditch along the railway. Others run into the property adjoining Mola to the south, but are not functional beyond the property line.

4.4.2 Environmental Consequences

Alternative 1

Grant Creek/Hoff Road- The elimination of tiles in the project area would result in greater durations of high soil moisture levels and in more persistent ponding, particularly in the riparian areas (swales and floodplains). The perennial grass cover would reduce the potential for surface runoff and erosion, particularly in comparison with the inability of croplands to accommodate surface runoff or prevent erosion during spring months. Improvements in soil conditions would increase soil moisture storage capacities in and on the soil, and soil moisture would tend to be higher throughout the year. The greater retention of precipitation on the land surface would result in slightly smaller rates of runoff into the upper swales and channels of Grant Creek, particularly in response to storms of relatively small intensity or duration. The water table would tend to fluctuate at slightly higher levels, depending on the local effects of drain tiles and ditches. Evapotranspiration may be higher during spring months where perennial grasses have replaced row crops.

No adverse hydrological effects would occur to adjacent lands under the Action Alternative. As described above, the actions could reduce the rates of runoff into the tributaries of Grant Creek that occur in response to common storm events. The more persistent ponding and higher moisture levels that occur on a regular basis in response to common storm events would not reach elevations that threaten State Highway 53 or Hoff Road. The removal of drain tiles and establishment of perennial vegetation would have no foreseeable effect on the hydrological response of the Grant Creek tract to extreme rainfall events such as a hundred-year event. This site constitutes a relatively small part of its watershed, and direct effects would be minor. Alteration of the tile systems would not cause any detrimental reduction in drainage from the lands of Midewin that lie to the east.

In general, the water quality of runoff would improve slightly over the conditions created by cropland due to slightly lower levels of sediment, pesticides, and nutrients. Establishing perennial ground cover and stream bank vegetation would reduce sediment loads. Short-term adverse effects on water quality could occur from prescribed fires if heavy rainstorms follow prescribed burns in areas before new vegetation cover the ground, resulting in flushes of sediments into surface waters. However, prescribed fires generally leave an abundant amount of vegetation to protect soil surfaces from erosion.

Mola Tract- The elimination of drain tiles in the project area would result in more persistent ponding, particularly in the southwest corner of the site, along with greater duration of high soil moisture levels. The perennial grass cover would reduce the potential for surface runoff and erosion in comparison to cropland, particularly during spring months. Improvements in soil conditions would increase the soil moisture storage capacity in and on the soil, and soil moisture would tend to be higher throughout the year. The greater retention of precipitation on the land surface would result in slightly smaller rates of runoff into the ditch along the railway, especially in response to storms of relatively small intensity or duration. The water table would tend to fluctuate at slightly higher levels, depending on the local effects of drain tiles and ditches. Evapotranspiration may be higher during spring months where perennial grasses have replaced row crops.

No adverse hydrological effects would occur to adjacent lands under the Action Alternative. As described above, the actions may reduce the rates of runoff into the ditch along the railway that occur in response to common storm events. The more persistent ponding and higher moisture levels that occur on a regular basis in response to common storm events would not reach elevations that threaten the railway or State Highway 53. The removal of drain tiles and establishment of perennial vegetation would have no foreseeable effect on the hydrological response of the Mola tract to extreme rainfall events such as a hundred-year event. This site constitutes a relatively small part of its watershed, and direct effects would be minor. Alteration of the tile systems would not adversely impact upstream areas, as the drain tile systems drain only lands of Midewin.

The water quality of runoff would improve slightly over the conditions created by cropland due to slightly lower levels of sediment, pesticides, and nutrients. Short term adverse effects on water quality could occur from prescribed burning if heavy rainstorms were to follow prescribed fires before new vegetation could cover the ground, resulting in flushes of sediments into surface waters. However, the Mola site has low erosion potential because of extremely low

slopes, and prescribed fires generally leave an abundant amount of vegetation to protect the soil surface.

Alternative 2

The No Action Alternative would have effects on hydrology and water quality similar to the Action Alternative. However, although drain tiles would remain intact, they would eventually become dysfunctional. Invasive species would become established on the site and soil conditions would stabilize in the absence of tillage, resulting in effects similar to those of the Action Alternative. With continued agricultural practices under the No Action Alternative, croplands would be maintained in the foreseeable future in their current conditions.

4.4.3 Cumulative Effects

Future management of Midewin will include projects comparable to the proposed actions in the Grant Creek and Prairie Creek watersheds. Taken together, such projects may have significant beneficial cumulative impacts on the receiving waters. The proposed action would have no significant cumulative effect on the Des Plaines or Kankakee Rivers. The project areas and the activities within them are negligible when compared to the larger Grant Creek and Prairie Creek watershed areas and river basin impacts related to those watersheds.

4.5 Air Quality

4.5.1 Affected Environment

National Ambient Air Quality Standards (NAAQS) exist for certain criteria pollutants, including ozone, volatile organic compounds (VOCs), particulate matter, and nitrogen oxides (NOx), all of which are produced by grassland burns. 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 the severity of a standard. Federal agencies are required to ensure that their actions conform to applicable State Implementation Plans. Will County lies within a Class II airshed and a non-attainment zone for “1-hour ozone” (ozone concentrations averaged over one-hour period exceed air quality standards during some summer afternoons). Ground-level ozone pollution results from a combination of plentiful sunshine and various pollutants, principally those from automobile exhaust, including VOCs, particulate matter, and NOx.

The use of prescribed burning as a restoration tool at the Grant Creek/Hoff Road and Mola project areas may produce temporary air quality problems from smoke dispersal in the vicinity of the burns. Smoke from prescribed fires can reduce visibility or cause distractions on roads and highways. Smoke can cause unpleasant odors, carry ash, or cause respiratory distress in some individuals, particularly the very young, the elderly, or others with respiratory ailments. The two sites lie adjacent to State Highway 53 and near Interstate 55, local roads, neighboring industries, rural homes, the Abraham Lincoln National Cemetery, and the villages of Wilmington, Elwood, Symerton, and Manhattan.

5.5.2 Environmental Consequences

Alternative 1

The Action Alternative proposes to include prescribed burning as a restoration and management tool for the Grant Creek/Hoff Road and Mola sites. Estimated emission rates for prescribed burns at Midewin are .0301 tons/acre for VOC Methane and Non-Methane, .00675 tons/acre of NOx, and .0301 tons/acre for particulate matter (National Interagency Fire Center 1994). These emissions can contribute to ozone formation. However, any prescribed burns at these sites would be limited to spring and fall months when ozone levels generally do not exceed air quality standards. Prior to any burns, Midewin would coordinate with the Illinois Environmental Protection Agency to track ozone and air pollutant conditions so that burning does not occur during periods when ozone concentrations may exceed air quality standards. The mechanized agriculture that presently occurs on Midewin and within the proposed project areas produces dust and vehicle emissions that would be reduced under restoration management.

Looking at regional weather patterns, the most favorable burning conditions occur when the winds are from the southwest, west, or northwest. Under these wind conditions, smoke may be dispersed over Midewin, State Highway 53, Abraham Lincoln National Cemetery, local agricultural lands, rural homes, industries, 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 by unfavorable burning conditions.

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

Alternative 2

Under the No Action Alternative, a continuation of agricultural use may be authorized until 2006, thereby maintaining the current levels of pollutants that result from agricultural practices. The mechanized agriculture that presently occurs on the sites produces dust and vehicle emissions that would be reduced under Alternative 2 if agricultural use were to be discontinued. There is also a low possibility, under both alternatives, that lightning ignitions could occur and produce negative air quality effects at uncontrolled times.

4.5.3 Cumulative Effects

Actions in the past, present, and that will continue in the future which affect air quality in Will County include emissions from a variety of industries, automobile traffic, and agricultural burning. Over the next five years, Midewin is proposing to conduct periodic prescribed burns on approximately 500 acres per year in order to facilitate resource management objectives. Burning of woody debris piles implemented in compliance with air quality mitigation measures would not produce significant effects on air quality in Will County. Alternative 1 would have no effect on cumulative air quality in Will County.

Emissions from fire activity on the proposed restoration sites would be an extremely minor source of pollutants in the ozone non-attainment area in Illinois. When the mitigation measures for prescribed burns 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 2001b).

4.6 Hazardous Substances / Contaminants

5.6.1 Affected Environment

The Mola site was not part of the former Joliet Army Ammunition Plant, and no hazardous substances or materials are known or suspected to exist as contaminants on the site. The Grant Creek/Hoff Road site is located outside of, and bordered by, the security fence of the former arsenal and was managed for agricultural uses only under Army administration. A portion of a rail bed that served the arsenal crosses the north end of the site.

At other sites within the former arsenal, an arsenic-based herbicide was used by the Army to control vegetation along the security fences and on rail beds in the 1950s and 1960s. Recent sampling has found arsenic to be erratically present on the rail beds and in the top layer of soil adjacent to the fence lines at levels that are higher than normal for the soils of Midewin. The elevated concentrations of arsenic are found in an irregular pattern at areas along the fences, in the upper inches of soil, and generally within five feet of the fences. Sampling indicated that residual arsenic did not migrate in the soil, nor was arsenic present in detectable amounts in vegetation now growing at or near the fence lines (TN & Associates, Inc. 2000).

Past pesticide use for agricultural purposes in the project areas is not believed to have left residual contaminants in, or otherwise affected soil, water, or vegetation, and is not addressed further in this EA.

4.6.2 Environmental Consequences

Both alternatives (Action and No Action) would have no direct, indirect, short-term, or adverse effects on existing contaminated or hazardous substance conditions. The security fence bordering the Grant Creek/Hoff Road site would not be disturbed during this project. The amount of arsenic in the soil at localized areas of elevated concentrations along the fences is insignificant compared to the amount of arsenic that occurs across Midewin as a natural element in the soils (TN & Associates, Inc. 2000). Based on sampling at Midewin for arsenic contamination, prescribed burning along the fence line does not raise a risk of exposure to arsenic poisoning because the arsenic is not taken up by vegetation, it is not volatile, and the restoration work would not cause the arsenic to become more mobile. Ballast removed from rail beds in this project site will be sampled and appropriate actions taken based on the results. For example, reuse as below grade fill has been approved by the USDA Forest Service, and ballast may therefore be reused as covered fill.

4.6.3 Cumulative Effects

The cumulative effects of all past, present, and reasonably foreseeable future actions within the former Joliet Arsenal will not significantly affect hazardous substance stability, immobility, or migration.

The United States Army will be decontaminating buildings, equipment, and soil from the former Joliet Army Ammunition Plant over the next decade. This restoration project would not affect the Army's cleanup operations and would be unlikely to affect the condition of any contaminated sites at Midewin.

4.7 Vegetation and Natural Communities

4.7.1 Affected Environment

The Grant Creek/Hoff Road and Mola tracts are proposed for restoration activities. The existing vegetation of these tracts is described below. Nomenclature follows Swink and Wilhelm (1994) with a few exceptions; non-native plant species are indicated with an asterisk (*).

Grant Creek/Hoff Road tract, 49 acres - The predominant vegetation along Grant Creek and the lower portions of adjacent side channels consists of reed canary-grass* (*Phalaris arundinacea*). Other herbaceous plants include smooth brome* (*Bromus inermis*), saw-toothed sunflower (*Helianthus grosseserratus*), pale dock (*Rumex altissimus*), water smartweed (*Polygonum amphibium*), and wild parsnip* (*Pastinaca sativa*). Occasional woody plants, include small thickets (<0.1 ha) of trees and shrubs. Common woody plants in these thickets include eastern cottonwood (*Populus deltoides*), box elder (*Acer negundo*), silver maple (*Acer saccharinum*), black willow (*Salix nigra*), peachleaf willow (*Salix amygdaloides*), common elderberry (*Sambucus canadensis*), wild grape (*Vitis riparia*), and Amur honeysuckle* (*Lonicera maackii*).

Three fields within the Grant Creek/Hoff Road tract are in agricultural use; all three fields are under 14 acres in size (totaling 29 acres). These fields have been planted in hay (alfalfa* and orchard grass*), soybeans, winter wheat, or left fallow during the past six years.

Present on the Grant Creek/Hoff Road tract are a few small successional woodlands (<1 ha), two of which are associated with former homestead localities. Common trees at the Grant Creek/Hoff Road site include several non-native species, notably Siberian elm* (*Ulmus pumila*), Norway maple* (*Acer platanoides*), and Norway spruce* (*Picea abies*). Other woody species include silver maple, black maple (*Acer nigrum*), eastern hackberry (*Celtis occidentalis*), and black walnut (*Juglans nigra*). All were probably planted at this site, but many of the trees now present are offspring of the original shade trees. The understory vegetation consists of Asiatic shrub honeysuckles* (*Lonicera* spp.), wild black raspberry (*Rubus occidentalis*), white snakeroot (*Eupatorium rugosum*), common burdock* (*Arctium minus*), and Virginia stickseed (*Hackelia virginiana*). There is no evidence of any surviving native woodland vegetation. Other thickets present on this site are typically associated with the abandoned railroad berms at the north end of the tract. These thickets are dominated by green ash (*Fraxinus pensylvanicus*), white mulberry* (*Morus alba*), willows, and Amur honeysuckle*.

Linear strips of grassland occur between the agricultural fields, along upland drainages, and bordering State Highway 53. These grasslands are dominated by smooth brome grass*. Other common herbs include reed canary-grass*, orchard grass* (*Dactylis glomerata*), Kentucky bluegrass* (*Poa pratensis*), white sweet clover* (*Melilotus alba*), perennial sow thistle* (*Sonchus arvensis*), Canada thistle* (*Cirsium arvense*), wild carrot* (*Daucus carota*), tall boneset (*Eupatorium altissimum*), old-field thistle (*Cirsium discolor*), and tall goldenrod (*Solidago canadensis*). Along State Highway 53, a few prairie species are present: compass plant (*Silphium laciniatum*), tall coreopsis (*Coreopsis tripteris*), porcupine grass (*Stipa spartea*), pale purple coneflower (*Echinacea pallida*), smooth blue aster (*Aster laevis*), and big bluestem (*Andropogon gerardii*). These species probably colonized the roadside from a prairie remnant to the west of State Highway 53 in the Union Pacific Railroad right-of-way.

Mola Tract, 65 acres - Most of this tract (approximately 80%) was a row crop field, planted annually with field corn, oats, winter wheat, or soybeans. When fallow, common plants included typical agricultural weeds such as horseweed (*Conyza canadensis*), giant foxtail * (*Setaria faberi*), annual fleabane (*Erigeron annuus*), common ragweed (*Ambrosia artemisiifolia*), prickly lettuce* (*Lactuca serriola*), cocklebur * (*Xanthium strumarium*), bull thistle * (*Cirsium vulgare*), old-field thistle, and wild mustards (*Barbarea vulgaris* and *Brassica* spp.). A few species with more invasive potential are now present, including white sweet clover* (*Melilotus alba*), wild carrot*, and cut-leaved teasel* (*Dipsacus laciniatus*). The wettest portions of the site are dominated by early successional wetlands herbs, including cattails (*Typha latifolia* and *T. angustifolia*), barnyard grass (*Echinochloa crusgallii*), fall panicum (*Panicum dichotomoflorum*), spikerush (*Eleocharis* spp.), yellow nutsedge (*Cyperus esculentus*), smartweeds (*Polygonum pensylvanicum*), late boneset (*Eupatorium serotinum*), rushes (*Juncus torreyii*), water plantain (*Alisma trivale*), and beggar's-ticks (*Bidens* spp.). Less frequent species include river bulrush (*Scirpus fluviatilis*), common reed* (*Phragmites australis*), reed canary-grass*, rice-cut grass (*Leersia oryzoides*), blue vervain (*Verbena hastata*), swamp milkweed (*Asclepias incarnata*), winged loosestrife (*Lythrum alatum*), and fog-fruit (*Phyla lanceolata*). There are also many young trees (>3 years old) of eastern cottonwood, black willow, and green ash.

Margins of the field consist of fencerows now dominated by spontaneous trees of eastern cottonwood, with occasional silver maple, green ash, American elm (*Ulmus americana*), box elder (*Acer negundo*), and white mulberry. Under and between these trees are dense stands of the exotic reed canary-grass. A few native species are present in these tree rows, primarily wild plum (*Prunus americana*) and prairie cordgrass (*Spartina pectinata*).

The northern end of the Mola tract consists of uncultivated land dominated by successional stands of trees, primarily eastern cottonwood and silver maple, but also white mulberry, green ash, and American elm. The understory is often bare, except for leaf litter, and there are some stands of reed canary-grass along the margins of the site. Toward the west, these stands of trees become more open and appear to be abandoned pastures or orchards. A few decadent apple trees (*Malus domesticus*) grow beneath the cottonwoods, but the dominant shrubs are wild blackberry (*Rubus* spp.), wild black raspberry (*Rubus occidentalis*), and multiflora rose* (*Rosa multiflora*). The most common herbaceous species are Kentucky bluegrass, tall goldenrod, giant ragweed (*Ambrosia trifida*), and wild carrot. A few prairie species persist in these openings, including saw-toothed sunflower (*Helianthus grosseserratus*), prairie dock (*Silpium terebenthinaceum*), yellow coneflower (*Ratibida pinnata*), switchgrass (*Panicum virgatum*), wild strawberry (*Fragaria virginiana*), big bluestem, bluejoint grass (*Calamagrostis canadensis*), Canada wild rye (*Elymus canadensis*), wild blue iris (*Iris shrevei*), marsh phlox (*Phlox glaberrima*), and woolly sedge (*Carex pellita*).

The nearest native vegetation remnants lie west of the Union Pacific Railroad; one is immediately opposite the Mola tract and consists of a fairly diverse wet prairie remnant. Farther south (approximately 0.2 miles) is a complex remnant consisting of degraded sedge meadow, wet prairie, and upland prairie vegetation. South of the Mola tract on private land is a large wetland and prairie restoration on former agricultural land (Vulcan tract).

(Observations based on field visits by Eric Ulaszek in June 1997, June 1999, December 1999, and July 2001.)

4.7.2 Environmental Consequences

Alternative 1

Under the Action Alternative, there would be an overall increase in cover by native plants and restored native vegetation, especially typic prairie, sedge meadow, and savanna communities. There would also be an increase in plant species diversity, especially of non-invasive species characteristic of native habitats. At the same time, there would be decreases in invasive species as their habitats (crop fields, non-native grassland, and fencerows) are restored to native vegetation. This change would result primarily from using appropriate techniques based on Integrated Pest Management (IPM) strategies, primarily the planting and establishment of appropriate native plants. Other management activities would be included, such as hydrological restoration (e.g., disabling

drain tiles), prescribed burning, cutting of undesirable woody plants, and spot mowing of noxious weeds. Over time, native species diversity would be expected to increase as conditions improve to allow enhancement of both project areas with late-successional species.

Prescribed burning would reduce the height and total cover of shrubs and other small woody vegetation. The smaller woody plants would be burned back to the ground; some re-sprouting would occur, but the reduced shade would allow greater competition from grasses and other herbaceous plants. Tallgrass prairie vegetation (both existing and restored) responds positively to prescribed burning, which reduces mulch cover and increases the number of reproductive grass shoots. Prescribed burning also results in a more rapid development of young plants and an increase in flower production (Anderson 1990, 1997; Collins and Gibson 1990; Glenn-Lewin et al 1990; Northern Prairie Wildlife Research Center 2000a, 2000b).

Some changes could take decades or perhaps longer. Planted oaks would take time to reach maturity and create the mosaic of sun and shade characteristic of savannas. Shade-tolerant savanna species would not be restored to the Grant Creek/Hoff Road site until suitable microhabitat (e.g., shade from oak trees) is present.

Similarly, restoration of wetlands on the Mola tract would also take time. Several seasons after tile disabling or other work would be required for the subsurface ground water to accumulate to levels needed to support sedge meadow vegetation. Although many early successional wetland plants would colonize the site, either from seed banks or broadcast seed, the characteristic “hummocky” appearance, a result of dominance by the tussock sedges *Carex stricta* and *C. haydenii*, may take years to develop.

Restoration of prairie communities would take time. Heavy planting and seeding of forbs and bunch-forming grasses (little bluestem and prairie dropseed) would be needed to prevent the establishment of low-diversity stands of one or more species of tall grasses. Some forb species would not become established in young restorations (e.g., prairie gentian, *Gentiana puberulenta*) and would require over-seeding at a later time. Many pollinating insects would require years or decades to re-colonize these sites, and might require active restoration (translocation and release). Underground changes would also take time, as root biomass increases in concert with mycorrhizal and microbial diversity.

Both tracts would eventually consist of a mosaic of habitats, their distribution and composition controlled by the interaction of topography, hydrology, soils, and fire

behavior. Within these habitats, a mosaic of plant associations would exist, more dependent upon plant-plant interactions, plant-animal interactions, yearly weather conditions, and fire frequency. Most non-native plant species would be eliminated, and the few colonizers would either be suppressed by competition from natives or controlled by land managers. Native invasive species would be restricted to appropriate habitats along ecotones or in riparian zones.

The few native plant species surviving on both tracts would increase and spread into the restorations, enriching the species diversity and genetic diversity of restored populations. The vulnerability of these native plants would also be reduced because they would no longer exist as small populations in habitats dominated by invasive species.

Grant Creek/Hoff Road Tract- Restored native vegetation of the Grant Creek/Hoff Road tract would consist largely of upland typic prairie. Along stream channels and in swales, the vegetation would be restored to wet prairie and riparian sedge meadows. Also restored would be a small tract of upland oak savanna. Plant species that would be seeded or planted in these habitats are listed in Appendix B.

Some woody vegetation may survive as isolated thickets along the stream channels and at former house sites; any native invasive species would be gradually replaced by more appropriate savanna or riparian woody species.

Mola Tract- Restored native vegetation of the Mola tract would consist largely of wet typic prairie. There would also be extensive sedge meadows, and some wetter localities would likely support emergent marsh vegetation. Better-drained sites that are present along the eastern and northern margins of the Mola tract should be restorable to upland typic prairie. Plant species that would be seeded or planted in these habitats are listed in Appendix B.

Most of the woody plants growing around the margins of the Mola tract would be removed. Some staminate cottonwoods (non-seed producing trees) would be allowed to survive at the north end of the tract, primarily to screen views of adjacent private land (a grain elevator complex).

Alternative 2

Under the No Action Alternative, agricultural use may continue, and there would be no positive effects on native vegetation or natural communities within the project areas as the result of restoration. If the sites are not farmed under this alternative, then former crop fields would gradually be colonized by a mixture of

non-native and native invasive plant species. Early colonists would likely be ragweeds (*Ambrosia* spp.), tall goldenrod, quackgrass (*Agropyron repens*), hairy aster (*Aster pilosus*), wild carrot, teasels, sweet clover (*Melilotus* spp.), Canada thistle (*Cirsium arvense*), and other herbaceous species. Eventually, woody species would spread out from the fencerows, former house sites, riparian thickets, and other stands of trees and shrubs. Likely invaders include autumn-olive (*Elaegnus umbellate*), Amur honeysuckle, wild blackberry, black cherry, green ash, hackberry, eastern cottonwood, and red haw.

4.7.3 Cumulative Effects

Past activities in Will County which have probably affected vegetation and natural communities include: conversion of natural vegetation to cropland and pasture, grazing, mowing of grassland for hay, fire suppression, erosion and sedimentation from agricultural activities, timber cutting, drainage of wetlands, extirpation of large ungulates (elk, bison), introduction of non-native animal and plant species, and development of an urban area and rural communities with transportation and energy transmission infrastructure.

Most of the remaining native vegetation in Will County has been identified by the Illinois Natural Areas Inventory and subsequent surveys. Less than 0.2% of Will County consists of high-quality remnants of natural communities. Most of Will County's non-agricultural and non-developed land is dominated by invasive native and non-native plant species. Although many (perhaps most) native vegetation remnants are either already protected or likely to become protected in the foreseeable future, some will probably be destroyed by agricultural activities, urban sprawl, or other development.

Present or reasonably foreseeable future activities at Midewin that may affect native vegetation and natural communities include: restoration and management of native vegetation, restoration of natural hydrology, removal of invasive plant species, grazing of livestock, and construction and use of trails. The extent of land dominated by native vegetation on Midewin is expected to increase from 330 acres to approximately 9,670 acres in the foreseeable future. Most of this increase will be the result of restoration on agricultural fields and successional vegetation on former agricultural lands. The quality of existing natural communities is expected to increase as these areas are managed with prescribed burning and removal of invasive species.

Under Alternative 1, both the Grant Creek/Hoff Road and Mola restoration sites would contribute to the overall restoration of Midewin and the Prairie Parklands. As surrounding land is restored, both sites would exist in a matrix of restored and

rehabilitated native vegetation, supporting larger, continuous populations of native plants and other organisms.

Restoration would also reduce invasive species on the two tracts. Beneficial impacts on native vegetation would occur by reducing internal sources of invasive plant species and eliminating remaining sources of infestation as a threat to adjacent areas, including nearby native vegetation remnants and restoration projects.

Restoration of the Grant Creek/Hoff Road and Mola sites would have additional positive effects on nearby native vegetation remnants and restoration projects. To the west of the Mola tract (west of the Union Pacific Railroad) are two native vegetation remnants (each <10 acres) and a large restoration project (South Patrol Road, >300 acres). To the south of the Mola tract, on private land, is another wetland/prairie restoration project (approximately 80 acres). Restoration on the Mola tract would facilitate restoration of native vegetation on these sites by providing greater connectedness of habitat and hydrological function. There would also be potential habitat for expansion of both flora and fauna in the existing remnants.

The native vegetation remnant nearest to the Grant Creek/Hoff Road tract lies across State Highway 53 in the right-of way (ROW) of the Union Pacific Railroad. The prairie remnant in this ROW has provided seeds for Midewin projects, but has been degraded by lack of management, non-selective herbicide application, and installation of pipelines and optic-fiber cables. Restoration may provide a place for expansion of native plant populations, preserving some of their genetic diversity after this remnant no longer exists.

4.8 General Wildlife

4.8.1 Affected Environment

Presently, both proposed project areas primarily provide habitat for common and abundant edge species such as raccoons, opossum, white-tailed deer, fox squirrel, cardinal, indigo bunting, American robin, and gray catbird. There is little habitat for native grassland species such as eastern meadowlark, savannah sparrow, grasshopper sparrow, dickcissel, prairie vole, and smooth green snake in either tract. Wetland habitat for rails, waterfowl, muskrats, frogs, toads, and turtles is also very limited in both the Grant Creek/Hoff Road and Mola tracts. Grassland and wetland wildlife species are limited because of past modifications to each area through agricultural activities such as installing drainage structures,

planting row crops, and allowing woody vegetation to grow up along fencerows and field margins.

Edge wildlife species are much more common in Will County and the general area than wetland and grassland species. These edge species are fairly common at Midewin and in the surrounding area. Wetland species are not widespread at Midewin and surrounding areas due to the extensive wetland loss from development and agriculture. Although grassland wildlife species are not common in the surrounding area owing to conversion of prairie to agricultural land, some grassland species are still somewhat common at Midewin because of extensive agricultural grasslands. Midewin provides some of the only remaining habitat for these grassland species and some of the only land that can be converted to grassland in Will County and the surrounding area.

4.8.2 Environmental Consequences

Alternative 1

Under the Action Alternative, some wildlife would be impacted positively, others negatively. Control and eradication of invasive vegetation species through prescribed burning, mowing, cutting, and planting can benefit many wildlife species by increasing habitat diversity, quality and yield of nutritious browse, seeds, and forage. The primary effect of mechanical control and burning of undesired vegetation is habitat alteration rather than mortality of wildlife species. Prescribed burns would be conducted after August 15 and before early April to avoid adverse effects on birds' nests and their young. Alternative 1 would provide a dynamic mosaic of herbaceous cover, litter depths, plant associations, and unburned refugia necessary to support a diversity of animal species (Ortmann et al. 1998).

Wildlife that would be negatively impacted includes primarily edge species. However, wildlife using wetland and grassland habitat would benefit. Edge species are much more common in Will County and the general area than wetland and grassland species. Edge species such as raccoons, opossums, cardinals, and American robins would be negatively impacted by the Action Alternative. However, these species are fairly common at Midewin and in Will County and the surrounding areas. Nearby corporate lands, Army land at the Army Training Area, and state land at nearby state parks and conservation areas provide extensive habitat for edge species. These species tend to be ubiquitous, even occurring in residential areas, and species declines at Midewin should not drastically impact their populations.

Wetland species such as rails, muskrats, and amphibians are not widespread at Midewin and the surrounding area due to the extensive wetland loss from development and agriculture. Wetland restoration under the Action Alternative would provide increases in habitat for these species. There are relatively few opportunities for wetland restorations greater than 10 acres to occur on areas outside Midewin within Will County. Wetland restoration that occurs is frequently undertaken for mitigation purposes or for fishing, and these types of wetlands are seldom suitable for most wetland wildlife. Wetland restoration under the Action Alternative would have a positive impact on wetland wildlife species.

Grassland wildlife species such as the savannah sparrow, grasshopper sparrow, and smooth green snake are not common in the surrounding area due to the conversion of prairie to agricultural land. What grasslands do exist are rarely suitable for these species because of their small size and management regimes. The limited prairie and grassland restoration that is achieved is seldom designed or managed to meet the needs of grassland wildlife. Prairie restoration under the Action Alternative would provide high quality habitat for grassland wildlife. Some of these species are still common at Midewin owing to the presence of large (>75 acres) permanent pastures. Midewin provides some of the only remaining habitat for these species and some of the only large tracts that can be converted to grassland in Will County and the surrounding area. There is little chance that sizeable prairie or grassland restoration will occur other than at Midewin National Tallgrass Prairie.

Alternative 1 would impact grassland and wetland wildlife in a positive manner, although to varying degrees. There would be increases in restored native vegetation in addition to increases in grassland and wetland wildlife species.

Alternative 2

Under the No Action Alternative, continued agricultural use would preempt habitat for sensitive wildlife, although both the Grant Creek/Hoff Road and Mola sites would remain suitable for edge species. If agricultural uses are not renewed, then the abandoned fields would become suitable for some grassland species for a short period of time. As shrubs and young trees invade, there would be habitat for edge species. A few wetland species might benefit as old drainage improvements fail, but these would be limited to species able to survive in wetlands dominated by thickets of young woody growth, for instance, woodcocks, some amphibian species, and mosquitoes. Grassland species would not be able to survive in these habitats. Extensive low diversity thickets also provide poor habitat for most edge species.

4.8.3 Cumulative Effects

Past activities in Will County that have affected wildlife are similar to those discussed for special status species below. Not all of these activities have adversely affected all wildlife species; for example, elimination of large predators has allowed for population increases of smaller predators such as raccoons and coyote. Some, perhaps most, of the wildlife species present on private land in Will County are likely to decrease, largely because of habitat destruction. However, it is likely that some habitat for these species will become state, county, and municipal conservation lands in Will County. Near Midewin, large segments of land are owned by corporations and used as buffer for industrial parks. This land is essentially left alone and provides early successional and edge species habitat.

Present or reasonably foreseeable future activities at Midewin that may impact wildlife include: restoration of native vegetation, restoration of natural hydrology, removal of invasive and non-native plant species, grazing of livestock, and construction of trails. Nearby corporate lands, Army land at the Joliet Army Training Area, and state land at nearby state parks and conservation areas provide extensive habitat for edge species. These species tend to be ubiquitous, and declines at Midewin would not drastically impact their populations.

However, there is little chance that sizable prairie, grassland, or wetland restorations will occur on a large scale in Will County other than at Midewin National Tallgrass Prairie. Alternative 1, when combined with similar projects at Midewin, would provide significant habitat for wildlife and contribute to the diversity of wildlife surviving in the Prairie Parklands. The Mola tract, for example, is located adjacent to two large restoration projects and would contribute toward creating a habitat mosaic (upland prairie and wetlands) attractive to area-sensitive wildlife species.

Under the No Action Alternative, habitat for most wildlife species would not change over the short term. A lack of restoration would increase woody encroachment and habitat for edge species over time, but decrease the habitat for grassland and wetland species. Some adjacent projects within Midewin might become less suitable for area-sensitive species if a large tract of woody vegetation is allowed to grow unimpeded, such as the habitat that would be expected over time given no action in the proposed project areas.

4.9 Management Indicator Species (MIS)

4.9.1 Introduction

The Forest Service is required to address Management Indicator Species (MIS) under the current planning regulations 36 CFR §219 to gauge the effects of management activities implemented under land management plans. MIS are plant and animal species, communities, or special habitats selected for emphasis in planning (FSM 2620.5). Species selected will be those that "best represent the issues, concerns, and 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). Midewin National Tallgrass Prairie integrates MIS into the planning process consistent with Forest Service Manual direction. A set of Management Indicator Species has been identified in the recently-completed Prairie Plan. See Table 1. below. MIS at Midewin include several species and ecological conditions or selected vegetation communities that will be monitored to determine population trends and evaluate effects of management activities on selected species.

Table 3. Management Indicators and associated species of interest for Midewin

Management Indicators	Species of interest or other conditions associated with the management indicators.
Dolomite Prairie	tufted hair grass, flattened spikerush, low calamint, prairie dropseed, nodding wild onion, Butler's quillwort[1,4], false mallow[1,4], Pitcher's stitchwort[1,5], leafy prairie clover[2,4], red-veined prairie leafhopper[1,4]
Upland Typic Prairie	prairie dropseed, shooting-star, rattlesnake master, *Eryngium* stem-borer moth[1,4], compass plant, prairie gentian, pale purple coneflower, Henslow's sparrow[1], red-veined prairie leafhopper[1,4]
Wet Typic Prairie	prairie cordgrass, eastern prairie fringed orchid[3,4], chimney crayfish, common snipe, marsh phlox, prairie sundrops
Sedge Meadow	tussock sedges, bluejoint grass, sora, common snipe
Marsh	common bur-reed, river bulrush, great bulrush, marsh wren, least bittern[1,3], pied-billed grebe[4], sora
Seep	skunk cabbage, spotted Joe-pye weed
Savanna	bur oak, red headed woodpecker, wild hyacinth
Woodland/Forest	white oak, red oak, American hazel, wild ginger, eastern wood peewee, red eyed vireo
Short-stature Grassland Habitat	upland sandpiper[1,4], loggerhead shrike[1,5], grasshopper sparrow, thirteen-lined ground squirrel
Medium-stature Grassland Habitat	bobolink[1], eastern meadowlark, savannah sparrow, smooth green snake
Tall-stature Grassland Habitat	Henslow's sparrow[1,4], northern harrier[1,4], sedge wren

Management Indicators	Species of interest or other conditions associated with the management indicators.
Benthic Macroinvertebrates	stream quality, orange-throated darter, slender madtom, northern hogsucker, ellipse[1], creek heelsplitter, smallmouth bass
Leafy prairie clover[2,4]	mesic dolomite prairie
Henslow's sparrow[1,4]	prairie management indicator
White-tailed Deer	demand species, may have adverse impacts on certain native plants

[1]Regional Forester's Sensitive Species
[2]Federal Endangered Species
[3]Federal Threatened Species
[4]Illinois Endangered Species
[5]Illinois Threatened Species

4.9.2 Analysis

This section is an analysis of the effects of restoring former agricultural fields to wet prairie communities on Midewin National Tallgrass Prairie. Effects are also discussed for a No Action Alternative. Analysis of project level effects is used to determine the contribution of a planned activity toward meeting the Prairie Plan objectives for providing well-distributed, viable populations of wildlife and plant species (Prairie Plan pages 2-3). Effects of management activities are examined in light of the existing habitat conditions, both within and outside of the Midewin boundaries, and documented conditions or trends of populations.

A. Dolomite Prairie -- Approximately 120 acres of dolomite prairie on Midewin; restoration of approximately 230 acres has been initiated. However, this plant community does not appear on the soil types found on either the Mola site or the Grant Creek/Hoff Road site and would not be affected by proposed restoration activities or by the No Action Alternative.

B. Upland Typic Prairie -- Approximately 4 acres of upland typic prairie occur on Midewin; restoration of approximately 80 acres has been initiated. The Action Alternative would increase the habitat conditions for Upland Typic Prairie and eventually result in a positive trend in the populations of associated animal and plant species of interest. Population sizes of species of interest and all characteristic species should increase.

Encroachment by non-native plants would continue under the No Action Alternative. These habitats are expected to degrade over time, because management will be restricted to few types of actions, such as mowing. Conditions that measure native species diversity, seasonal flowering diversity, and habitat structure should show declines.

C. Wet Typic Prairie -- Approximately 26 acres of wet typic prairie occur on Midewin; restoration of approximately 465 acres has been initiated. The action alternatives would increase the habitat conditions for Wet Typic Prairie and eventually result in a positive trend in the populations of associated animal and plant species of interest. Population sizes of species of interest and all characteristic species should increase. As full forb diversity is restored, there should be sufficient amounts of forbs flowering throughout the growing season to support adequate populations of insect pollinators.

Encroachment by non-native plants will continue in the no action alternative. These habitats are expected to degrade over time, because management will be restricted to few types of actions, such as mowing. Conditions that measure native species diversity, seasonal flowering diversity, and habitat structure should show declines.

D.Sedge Meadow -- Approximately 20 acres of sedge meadow occur on Midewin; restoration of approximately 55 acres has been initiated. The action alternatives would increase the habitat conditions for Sedge Meadow and eventually result in a positive trend in the populations of associated animal and plant species of interest. Encroachment by non-native plants will continue in the no action alternative.

E. Marsh -- Approximately 58 acres of marsh are found on Midewin; restoration of approximately 32 acres has been initiated. The action alternatives proposed here would not change conditions in the Marsh community. The No Action alternative likewise would have no effect on the Marsh community.

F. Seep -- Approximately 0.6 acres of seep at Midewin; no restoration has been initiated. The action alternatives proposed here are expected to change conditions in the Seep community. The No Action alternative likewise would have no effect on the Seep community.

G. Savanna -- Approximately 25 acres of savanna at Midewin; no restoration has been initiated. The action alternatives proposed would offer a small amount of additional savanna habitat once restored at the Grant Creek/Hoff Road site, but not the Mola site. Where savanna restoration will begin from cropland or agricultural grassland, development of canopy structure may require 40-80 years of tree growth. Native plant species diversity of savannas will increase over time, but prairie forbs and grasses are likely to predominate until canopy trees mature. The No Action alternative would have no change to the savanna community.

H. Woodland and Forest -- Approximately 150 acres of woodland and forest found on Midewin; no restoration has been initiated. The action alternatives proposed here would not change conditions in the Woodland and Forest community. The No Action alternative likewise would have no effect on the Woodland and Forest community.

I. Short-stature Grassland Habitat -- Approximately 2800 acres of agricultural grasslands available as grassland bird habitat. Approximately 50% is maintained as short-stature grassland habitat through livestock grazing and brush mowing. The action alternatives proposed here would not change conditions in the Short-stature Grassland Habitat community. The No Action alternative likewise would have no effect on the Short-stature Grassland Habitat community.

J. Medium-stature Grassland Habitat -- Approximately 2800 acres of agricultural grasslands available as grassland bird habitat. Approximately 20% is maintained as medium-stature grassland habitat through low-intensity livestock grazing, hay-cutting, and brush mowing. For the Medium-stature Grassland Habitat, the action alternatives may have some positive benefit over the long-term, once native prairie plant communities become established. The No Action Alternative would not change habitat conditions for the Medium-stature Grassland Habitat.

K. Tall-stature Grassland Habitat -- Approximately 2800 acres of agricultural grasslands available as grassland bird habitat. Approximately 30% is maintained as tall-stature grassland habitat through periodic mowing. An additional 150 acres of native prairie vegetation are also available as grassland bird habitat; many of these exist as inclusions within ungrazed agricultural grasslands. For the Tall-stature Grassland Habitat, the action alternatives would have a positive benefit over the long-term, once native prairie plant communities become established. The No Action Alternative would not change habitat conditions for the Tall-stature Grassland Habitat.

L. Benthic Macroinvertebrates -- This is a group of invertebrate species that live on the bottom of streams; included are the aquatic larvae of certain insects (mayflies, stoneflies, caddisflies, dobsonflies, damselflies, midges, etc.), snails, worms, freshwater mussels, crayfish, leeches, and other invertebrates. Unlike fishes, they are relatively immobile within this habitat, and thus are good indicators of local stream conditions (Illinois River Watch 1997). Each species within this group has different tolerances to pollution. Thus the composition of macroinvertebrate samples can indicate the ecological health of a stream. The action alternatives proposed would offer minimal additional habitat for Benthic Macroinvertebrates once a small section of Grant Creek is restored at the Grant

Creek/Hoff Road site. As water quality increases, it may be possible to see an increase in the species of interest and an increase in the total native species diversity in the stream. However, stream restoration will also be affected by off-site impacts higher in the watersheds. The No Action alternative would have no change to the Benthic Macroinverterbrate community.

O. Leafy Prairie Clover – This plant does not appear on the soil types found on either the Mola site or the Grant Creek/Hoff Road site and would not be affected by restoration activities proposed or by the No Action Alternative.

P. Henslow's Sparrow -- Under the action alternatives, the Henslow's sparrow population will likely increase. The No Action Alternative is not expected to change or improve habitat conditions for Henslow's sparrow.

Q. White-tailed Deer -- White-tailed deer are included because of their status as a game species in Illinois. Because of its location (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 appreciate the presence of white-tailed deer for observation.

White-tailed deer negatively impact native vegetation, by selectively browsing certain shrubs (American hazel) or inflorescences and seedheads of certain forbs (leadplant, culver's-root, Michigan lily, downy sunflower) (Nelson, 2000). Deer population size and density can also adversely impact human health and safety, either as traffic hazards or as vectors for disease-carrying ticks.

White-tailed deer use most of the vegetation types at Midewin, including croplands, agricultural grasslands, native vegetation remnants, and successional vegetation. Deer are fairly widespread and often conspicuous on Midewin; deer hunting is allowed, in accordance with state regulations, on a limited portion of Midewin west of Illinois Route 53 and south of Prairie Creek.

Conversion of croplands and successional woody vegetation to prairies and wetlands in the action alternatives will have minimal effect on white-tailed deer. The reduction and elimination of row crops will remove one potential food source (young crop plants and waste grain), while concurrent restoration activities will provide increased browse for deer in existing and restored native vegetation. Because white-tailed deer can have a negative impact on prairie vegetation, specific native plant species, and the seed production beds, it is desirable to reduce deer populations when they threaten ecological sustainability.

Monitoring deer populations, hunter success, user conflicts, and adverse impacts (threats) to other resources should allow balanced management.

The No Action Alternative considered here is not likely to affect White-tailed Deer.

4.9.3 Summary of Effects

All action alternatives provide for improvement over the current condition for many species and conditions associated with the Management Indicators. The only possible exception may be white-tailed deer, which may decline slightly under the action alternatives (based on habitat changes). However, declines in the deer population may have positive effects on other Indicators and their associated species groups. More likely, there will no effect, because deer are relatively common around Midewin.

There will be similar positive effects under the action alternatives for species associated with savannas and intolerant benthic macro-invertebrates. Some of these positive effects, however, will not be realized for decades.

4.9.4 Cumulative Effects

In general, the action alternatives provide for improved conditions for many of species and conditions associated with these Management Indicators in the Central Till Plain Section (CTPS) over the current condition. The only possible exception may be white-tailed deer, for which Midewin may not have any major impact, since this species is common throughout the CTPS.

These benefits for the CTPS would not occur under the No Action Alternative.

4.9.5 Monitoring

The trends and amounts of management indicators provide the basis to evaluate the results of plan implementation (Committee of Scientists report, USDA 1999). Table 2 shows the Management Indicators and selected elements/conditions to be monitored. In addition, trends for sensitive species, native vegetation remnants, and invasive species will be monitored using a variety of techniques including: population sampling/counting, spatial parameters, using trend indicators, and studies to develop better population-habitat inferences.

Table 4 Management Indicators/Ecological Conditions and Selected Elements to be Monitored on Mola and Grant Creek/Hoff Road project sites

Management Indicators of Concern/Interest	Condition Indicator/Feature to be monitored											
	Native Plant Species Diversity	Seasonal Flowering Diversity	Relative cover of Native Herbs	Total Area of Habitat on Midewin	Size of Unfrag-mented Tract	Number of Shrubs >1.5m tall / ha	Tree Canopy Closure (%)in June	Graminoid height (cm) taken in June	Litter depth (cm) taken in Apr-May	RiverWatch Stream Quality Protocol	Demo-graphic Monitoring	Threats
Dolomite Prairie	n/a	n/a	n/a	n/a		n/a						n/a
Upland Typic Prairie	+	+	+	+		+						+
Wet Typic Prairie	+	+	+	+		+						+
Sedge Meadow	+		+	+		+						+
Marsh	n/a		n/a	n/a								+
Seep	n/a		n/a	n/a		n/a						n/a
Savanna	+	+	+	+		+	+					+
Woodland/Forest	n/a	n/a	n/a	n/a	+	n/a	+					n/a
Short-stature Grassland Habitat				n/a	n/a	n/a		n/a	n/a			n/a
Medium-stature Grassland Habitat				+	+	+		+	+			+
Tall-stature Grassland Habitat				+	+	+		+	+			+
Benthic Macro-Invertebrates										+		+
Leafy prairie-clover				n/a							n/a	n/a
Henslow's sparrow				+							+	+
White-tailed Deer											+	

4.10 Federal Listed Species

Currently, no Federal listed species are known to occur within or adjacent to the Grant Creek/Hoff Road or Mola proposed restoration areas (Appendices C and D). Long–term restoration of these tracts may create opportunities for establishing new populations of at least one Federally threatened plant, the eastern prairie white-fringed orchid (*Platanthera leucophaea*). This species occurs in moist prairies; suitable prairie habitat would be restored on both tracts. However, it may take years of management and enhancement before the restorations develop into suitable habitat for the orchid. Active establishment of this orchid in these project areas would require further analysis and will not be considered further as part of this assessment.

In summary, the cumulative effects of all past, present, and reasonably foreseeable actions, including management practices described in the Prairie Plan for Midewin, will not cause significant adverse impacts to Federally listed threatened, endangered, or proposed species within the project areas or areas near or adjacent to Midewin. The U.S. Fish and Wildlife Service has concurred with these findings for Federally listed species at Midewin National Tallgrass Prairie (October 17, 2001, project file letter).

4.11 Regional Forester Sensitive Species

Pre-existing surveys and records, and recent surveys specifically conducted for this project, have determined that five sensitive plant and animal species (RFSS) are present or likely to be present within the Grant Creek/Hoff Road and Mola project areas (Appendices C and D). Aspects of these species' conservation status and biology that are relevant to the proposal are summarized below. Additional information on these species and the effects of controlling invasive vegetation are contained in the Biological Evaluation prepared for this project (Ulaszek 2002) and the draft conservation assessments prepared for Midewin National Tallgrass Prairie (USDA-FS 2000).

The Affected Environment for each species is described below, followed by the Environmental Consequences.

4.11.1 Upland Sandpiper (*Bartramia longicauda*) RFSS; State Endangered

Affected Environment

This species is an area-sensitive grassland bird that breeds in the northern USA and Canada. Upland sandpipers migrate south in winter to southern South

America. Preferred habitat is open grassland with relatively short grasses (a heterogenous cover between 4 to 12 inches in grass height is best for breeding), with little accumulated duff. In the Midwest, grazing is an appropriate management tool to create this habitat structure. The upland sandpiper is known to nest sporadically at some locations in the Prairie Parklands, but only regularly at Midewin, which has the most stable and largest breeding population of upland sandpipers in Illinois. The decline of this species in Illinois (and the Midwest) is almost entirely the result of habitat loss and changing land management practices that have resulted in the loss of extensive natural (upland prairie) and agricultural (pastures) grasslands. Upland sandpipers may be found loafing (uninterferred resting, displaying, mating) at the Grant Creek/Hoff Road and Mola sites, although nesting and foraging habitat do not currently exist at either site. Some adjacent grasslands are used by this species as nesting habitat, especially east of the Mola tract (east of State Highway 53).

Environmental Consequences

Alternative 1 – The Action Alternative would create some marginal habitat for upland sandpipers through reconstruction of native prairie habitat. Restoration and management activities such as prescribed burning and mowing would improve habitat structure for upland sandpipers, and they would continue to use these tracts for loafing and possibly as foraging or even nesting habitat. Mowing and prescribed burns, if conducted from late April to late July, could cause nest or chick mortality if nesting were to occur in either project area. Mitigation measures that would be implemented include conducting prescribed burns and mowing only outside the breeding period (see Mitigation Measures).

Alternative 2 - The No Action Alternative would also provide some temporary habitat for this species, primarily for foraging or loafing. There would be no risk to breeding upland sandpipers from prescribed burning or mowing. However, the project areas would eventually become unsuitable for upland sandpipers because of duff accumulation, invasive plant species, and shrub encroachment.

4.11.2 Northern Harrier (*Circus cyaneus*) RFSS, State Endangered

Affected Environment

This raptor is widepread in the northern hemisphere, nesting in tundra, grasslands, marshes, prairies, and other open habitats. Wintering habitat is similar, but the harrier also forages over crop stubble and pastures. This species usually occurs on Midewin as a winter visitor; it is usually seen foraging over grasslands, pasture, and crop stubble. There is one confirmed nesting record in the past five years. However, this raptor may have nested at other times undetected, as northern harriers are observed occasionally on Midewin during

the breeding season. Northern harriers have nested recently on nearby state land and other tracts in northern and central Illinois. Midewin contains suitable foraging habitat (and potential breeding habitat) for northern harriers. The Grant Creek/Hoff Road and Mola tracts currently provide marginal foraging habitat, with most observations on these tracts occurring outside of the breeding season.

Environmental Consequences

Alternative 1 – Restoration activities under Alternative 1 would provide enhanced foraging habitat for harriers, primarily as typic prairie and sedge meadow. Management activities such as prescribed burning and mowing could temporarily reduce habitat quality (for one season), but would improve habitat structure for northern harriers over time. Mowing and prescribed burns, if conducted from April to late July, could cause nest or chick mortality if nesting were to occur in these areas; however, these areas are likely to be used only for foraging. Prescribed burning and mowing would only be undertaken after the nesting period (see Mitigation Measures).

Alternative 2 – If agricultural use continues, the No Action Alternative would provide sub-optimal foraging habitat for northern harriers. There would be no risk of nest mortality from mowing or prescribed burns. However, these areas would eventually become unsuitable for northern harriers because of invasive plant species and shrub encroachment.

4.11.3 Bobolink (*Dolichonyx oryzivora*) RFSS; State Watch List

Affected Environment

The bobolink is an area-sensitive grassland bird that breeds in the northern USA and southern Canada. After the breeding season, they migrate south to spend the northern hemisphere winter in South America. Preferred habitat is open grassland with grasses of medium height (cover between 12 and 24 inches in grass height is best for breeding), with little accumulated duff and few or no shrubs. The bobolink is known to nest at a few other locations in the Prairie Parklands, although the only population consisting of more than a few pairs is at Midewin, containing the largest breeding concentration of bobolinks in Illinois. The decline of this species in Illinois (and the Midwest) is almost entirely the result of habitat loss and changing land management practices that have resulted in the loss of extensive natural (upland prairie) and agricultural (pastures and hayfields) grasslands. Bobolinks nest in pastures and hayfields immediately adjacent to the Grant Creek/Hoff Road and Mola sites, but do not use either area as breeding habitat. Instead, they occasionally visit the sites to forage or loaf (uninterferred resting, displaying, or mating behavior).

Environmental Consequences

Alternative 1 – The Action Alternative would create some breeding habitat for bobolinks through reconstruction of native prairie and sedge meadow habitat. These restored habitats are more likely to be suitable for bobolinks if emphasis is placed upon establishing mid-height graminoids (e.g., prairie dropseed, little bluestem, and sedges) and high forb diversity rather than only the tallest grasses (big bluestem, Indian grass, and switch grass). Restoration and management activities such as prescribed burning and mowing would improve habitat structure for bobolinks. These activities, if conducted from late April to late July, could cause nest or chick mortality if nesting were to occur in these areas. Mitigation measures that would be implemented include conducting prescribed burns and mowing only outside the breeding period (see Mitigation Measures).

Alternative 2 – If agricultural use is discontinued, the No Action Alternative could provide some temporary habitat for bobolinks. There would be no risk to nesting bobolinks from prescribed burning or mowing. However, the project areas would eventually become unsuitable for bobolinks because of duff accumulation, invasive plant species, and shrub encroachment.

4.11.4 Migrant Loggerhead Shrike (*Lanius ludovicianus migrans*) RFSS; State Threatened

Affected Environment

This subspecies is the breeding form found in the Midwest USA, Northeast USA, and southern Ontario; the entire range of this species includes most of the USA, southernmost Canada, and northern Mexico. Northern populations (including those at Midewin) winter in the southern USA. The shrike prefers grasslands with grass heights less than 4 to 12 inches for foraging; the presence of dense, thorny shrubs is required for nesting and prey impalement. The largest concentration of nesting loggerhead shrikes in northern Illinois is at Midewin. This species may currently use the Grant Creek/Hoff Road and Mola tracts for foraging on a sporadic basis. Neither site contains optimal nesting sites or foraging habitat. Occupied and potential breeding and foraging habitat for loggerhead shrikes is found elsewhere at Midewin.

Environmental Consequences

Alternative 1 – Restoration activities would improve habitat structure for loggerhead shrikes. Management activities such as prescribed burning and mowing may have both negative and positive impacts. Mowing and prescribed burning would provide the short grass habitat that loggerhead shrikes prefer for foraging. However, a prescribed burn may also top-kill some shrubs used as nesting sites. Shrubs suitable for nesting would most likely resprout within 2 to 5

years of a prescribed burn. Resprouting after fire could be advantageous, since loggerhead shrikes seem to prefer multi-stem shrubs. Prescribed burning would avoid those areas with loggerhead shrikes during the breeding season (see Mitigation Measures).

Alternative 2 - The No Action Alternative would still provide marginal foraging habitat for a short period of time. However, without management, suitable nesting shrubs and young trees would continue to grow and eventually become unsuitable as potential nest sites. Invasive woody growth would make the habitat unsuitable even for foraging.

4.11.5 Plains Leopard Frog (*Rona Blaire*) RFSS

Affected Environment

This amphibian has a relatively restricted range in the Great Plains and Midwest regions of the USA, extending south into Northeast Mexico. The breeding habitats for this frog are usually open marshes and natural ponds that lack predatory fish. Outside the breeding season, the plains leopard frog often forages in grasslands, prairies, and pastures. This species is widely distributed in central and southern Illinois; Midewin is at the northern margin of the species' range. Despite intensive surveys, this frog has only been found at one locality on Midewin along Prairie Creek. Although this locality is not within either of the proposed project areas, it is only 0.75 miles northwest of the Mola tract. It is conceivable that foraging Plains leopard frogs could occasionally disperse to this site. However, at present the Mola tract is not highly suitable for this amphibian and lacks any breeding habitat. Additional wetland restoration on Midewin could provide more habitat for the Plains leopard frog.

Environmental Consequences

Alternative 1 – Restoration activities could provide additional habitat for the plains leopard frog, especially within the Mola tract. As vegetation and hydrology are restored, some wetlands may become suitable as breeding habitat. Restoration of prairie, sedge meadow, and savanna would create suitable foraging habitat. Given the Mola tract's proximity to the known frog location, it is even possible that plains leopard frogs may colonize the Mola tract after restoration. Management activities such as prescribed burning and mowing may result in some direct mortality on plains leopard frogs if they are present in upland areas during the management actions. However, since most prescribed burns are conducted while this species is either in hibernation or breeding in wetlands, little direct mortality is expected.

Alternative 2 – Under the No Action Alternative, there should be no effects on this frog at Midewin, as it has not been found within either of the project sites. If agricultural uses were discontinued, there would probably be a short period when both tracts would be suitable as foraging habitat, but this suitability would decline as the fields become dominated by dense stands of invasive woody plants.

4.11.6 Additional Regional Forester Sensitive Species

Other Regional Forester sensitive species known from or occurring adjacent to Midewin could also benefit from these proposed restoration projects. These species currently are not found in or use either the Grant Creek/Hoff Road or Mola tracts, but could eventually colonize onto these sites or be actively established through translocation or planting programs. Sensitive plant species for which suitable habitat would be restored include Crawe's sedge (*Carex crawei*), Hill's thistle (*Cirsium hillii*), glade mallow (*Napaea dioica*), Sullivant's coneflower (*Rudbeckia fulgida sullivantii*), earleaf false-foxglove (*Tomanthera auriculata*), and hairy valerian (*Valeriana edulis ciliata*). Sensitive animal species for which suitable habitat would be restored include the red-veined prairie leafhopper (*Aflexia rubranura*), Henslow's sparrow (*Ammodramus henslowii*), short-eared owl (*Asio falmmeus*), blazing-star stem-borer (*Papaipema beeriana*), rattlesnake-master stem-borer (*Papaipema eryngii*), and king rail (*Rallus elegans*). If established, there would be benefits for these species from implementation of Alternative 1 because of increased habitat and populations. Those species with nearby (<1 mile) populations (Crawe's sedge, Sullivant's coneflower, and earleaf false-foxgove) could benefit because of invasive species control measures that would reduce infestation rates by invasive species.

Continued agricultural use under the No Action Alternative would not result in adverse effects on any of these species. However, no additional habitat would be available for population expansion. If agricultural uses were discontinued, however, then the Grant Creek/Hoff Road and Mola tracts could become major seed sources for exotic species, resulting in impacts on nearby populations of Crawe's sedge, Sullivant's coneflower, and earleaf false-foxgove.

4.11.7 State-Listed Species

Three Regional Forester sensitive species are listed by the State of Illinois as endangered or threatened: upland sandpiper (state endangered), northern harrier (state endangered), and loggerhead shrike (state threatened; Illinois Endangered

Species Protection Board 1998). The bobolink is on the State Watch List, which does not provide special status (1995). These state-listed species are discussed above.

Three other state-listed species that are not included as RFSS occur on Midewin (Appendices C and D). Neither the Grant Creek/Hoff Road nor Mola sites tracts are suitable for these species: common moorhen (*Gallinula chloropus*), pied-billed grebe (*Podilymbus podiceps*), or the small white lady's slipper orchid (*Cypripedium candidum*). Under the Action Alternative, it is not likely that habitat will be present for either bird species, which require deep marshes with both semi-permanent open water and dense emergent vegetation. However, restored typic prairie and sedge meadows may eventually become suitable for the lady's slipper orchid. After suitable habitat has become established, it may be possible to establish this plant in one or both restorations. The No Action Alternative would not have adverse impacts on these three species, as they do not occur at either site.

4.11.8 Cumulative Effects

Past activities in Will County which have probably affected Regional Forester sensitive species and state-listed species include: conversion of natural vegetation to cropland and pasture, grazing, mowing of grassland for hay, fire suppression, erosion and sedimentation from agricultural activities, timber cutting, drainage of wetlands, extirpation of large ungulates (elk and bison) and large predators (gray wolf, puma, black bear), introduction of non-native animal and plant species, and development of an urban area and rural communities with transportation and energy transmission infrastructure. Not all of the activities have adversely affected these species. For example, upland sandpiper habitat on pastures is maintained by livestock grazing. Nevertheless some, perhaps most, of the special status species present on private land in Will County are likely to decrease, largely because of habitat destruction. It is likely that some habitat for these species will become state, county, and municipal conservation lands in Will County. In addition, habitat for some species has been or is being restored on nearby state and county lands, most notably at Goose Lake Prairie State Park in Grundy County.

Present or reasonably foreseeable future activities at Midewin which may affect Regional Forester sensitive species and state-listed species include: restoration and management of native vegetation (including grazing livestock and use of prescribed fire), restoration of natural hydrology, control of invasive plant species,

expansion of grassland bird habitat, gradual phasing out of row crops, tallgrass prairie ecosystem research, and construction and use of trails.

Alternative 1

Under Alternative 1, there would be positive impacts on all Regional Forester sensitive species occurring in or adjacent to the areas proposed for restoration. There may be some temporary adverse effects from such management practices as prescribed burning or mowing, but there should not be long-term adverse consequences for these populations with implementation of mitigation measures. For the upland sandpiper and migrant loggerhead shrike, the benefits would probably be limited, as the restored native habitats are unlikely to provide optimal foraging and breeding habitat. However, they would contribute to the overall restoration of unfragmented grasslands and concurrent reduction of invasive woody species, and perhaps make small improvements to the viability of both species on Midewin and the Prairie Parklands. For the bobolink, northern harrier, and plains leopard frog, there would likely be greater benefits, primarily in improved foraging habitat (northern harrier, Plains leopard frog) and potential breeding habitat (primarily bobolink). These benefits could contribute to increased nesting by northern harriers, an expanded population of plains leopard frogs, and further increases in the number of nesting bobolinks at Midewin and the Prairie Parklands. Additionally, ecological restoration of the Grant Creek/Hoff Road and Mola tracts could enhance the viability of some species within the region by improving and expanding existing habitat, especially for those that may colonize or be established on the project areas in the future.

Alternative 2

Under the No Action Alternative, these benefits would not occur. Although there would still be occasional use of these tracts by upland sandpipers, northern harriers, bobolinks, and loggerhead shrikes, there would be no contribution to their viability at Midewin or the Prairie Parklands. Following removal of these lands from agricultural use, there might be some brief benefits if the abandoned fields are used as foraging habitat by the birds. However, the habitat would become unsuitable as shrubs and trees invade the sites. A net negative effect could be expected as both tracts become increasingly infested with invasive species and a source for further infestations.

4.12 Recreation and Scenery Management

4.12.1 Affected Environment

Recreation.
Public recreational access to Midewin is restricted because of remaining structures and features related to Army arsenal operations that are safety hazards. Cleanup actions and removal of unsafe structures is ongoing at this time. However, two interim hiking trails are now available to hikers in the western portion of Midewin. Neither trail is located near the proposed project areas. Other recreational pursuits at Midewin include seasonal deer hunting, guided tours for members of the public and school groups, and numerous volunteer opportunities.

Although both the Grant Creek/Hoff Road and Mola sites are located outside the security fence for the former Joliet Arsenal, currently there is no recreation access to either site. Both sites are readily visible to motorists driving along State Highway 53. The Mola tract is situated directly across State Highway 53 from the Midewin administration site and the Grant Creek/Hoff Road tract is located immediately east of State Highway 53 and just south of Hoff Road.

Recreation Opportunity Spectrum (ROS) classifications are designated in the Prairie Plan, and ROS for the Grant Creek/Hoff Road site is "*Rural*" (areas with high levels of development and a noticeably modified environment interspersed with a natural-appearing landscape). The Mola site is "*Roaded Natural*" (areas with moderate levels of development and a noticeably modified environment within a natural-appearing landscape). Restoration activities proposed under the Action Alternative are considered by the Forest Service to be common natural resource management actions when conducted at sites with these classifications.

Scenery Management.
The Prairie Plan designates Existing Scenic Integrity for Midewin. The Grant Creek/Hoff Road site has Existing Scenic Integrity of very low and moderate. The Mola tract has Existing Scenic Integrity of moderate. Both sites have a proposed scenic integrity level of high due to their prominent locations within the State Highway 53 corridor. Objectives of the Prairie Plan are to enhance the scenic integrity in the areas through ecosystem management. Restoration activities in these areas would meet the Prairie Plan objectives for Scenic Integrity.

4.12.2 Environmental Consequences

Alternative 1

Recreation.
The Action Alternative would have no direct, indirect, short-term, or adverse effects on existing or future recreation opportunities at the Grant Creek/Hoff Road or Mola sites. No recreation opportunities currently exist, and the actions proposed would not preclude future recreation opportunities in these areas. The restoration of these sites would provide long-term and beneficial effects by providing a unique interpretive opportunity.

Interim hiking trail opportunities are available outside of the perimeter fence on the west side of Midewin. Use of these trails is unlikely to be affected by the action alternatives. The activities proposed would not have any effect on or preclude future recreation opportunities or opportunities related to interpretation, environmental education, or research.

Scenery Management.
Historically, Midewin's scenery consisted of a gently rolling prairie landscape with scattered woodlands. Agricultural practices starting in the 1830s changed the landscape dramatically, as a road grid system (of one mile intervals), farmsteads, and planted exotic vegetation (for windbreaks, shade, and fruit). A second transportation system consisting of additional roads and over 100 miles of railroad was laid over the original grid system to serve the post-1940 Army infrastructure of bunker fields, warehouse clusters, and other structural features either removed or planned for removal to make way for Midewin's restoration efforts.

State Highway 53 runs parallel to both project areas. Short-term effects of the proposed restoration actions would include adverse impacts on the scenic quality of the project areas and highway corridor as a result of burning, mowing, and cutting. Efforts would be made to increase populations of aesthetically appealing plants adjacent to State Highway 53. Restoration techniques would be used that ensure rapid establishment rates of plants with high aesthetic qualities.

Long-term effects of the proposed actions would improve scenic quality by reducing the amount of non-native species, restoring native plant communities, and restoring the natural hydrologic system. Long-term effects of restoration would comply with Midewin's scenic integrity objectives through enhancement of the scenic quality and restoration of the landscape to a more natural appearance.

Alternative 2

Under the No Action Alternative, there would not be any impact on recreation opportunities, as these do not currently exist within the project areas. Future recreation opportunities would not be precluded or enhanced, and the scenic quality would not be improved to a more natural appearing landscape.

4.12.3 Cumulative Effects

The cumulative effects of all past, present and reasonably foreseeable future actions related to restoration have not and are not expected to significantly affect the provision of future recreation opportunities or scenic quality in these areas.

4.13 Heritage Resources

4.13.1 Affected Environment

Expected heritage sites at Midewin, including both project areas, are Euro-American farmsteads dating from the mid-nineteenth to the mid-twentieth centuries and prehistoric Native American sites dating from as early as 12,000 to 1000 BC to the 1830s. There is also the possibility of currently unknown sites or features associated with the WW II-era Kankakee Ordnance Works, or the later Joliet Arsenal being discovered.

The approximate 114-acre combined Grant Creek/Hoff Road and Mola Tract project areas have been used for agricultural purposes since the mid-nineteenth century. Land in these areas was drained to benefit agricultural production during the late nineteenth and early twentieth centuries. Specifically, most of the farmland drainage in Will County appears to have occurred between 1880 and 1914. As a result of this drainage activity and the concomitant cultivation, the soils of these areas have been repeatedly disturbed for over 150 years. Excavating drainage ditches and laying drainage tiles impacted only the areas in the immediate vicinity of the tile placement; the remainder of the area remains undisturbed, with the exception of impacts from plowing, disking, and planting. Plowing generally impacts all soils under cultivation to a depth of approximately 20-25 cm. (8-10 inches) below the present ground surface.

Two archaeological sites were recorded during the inventory of the two project areas, and these consist of the remains of mid-nineteenth to mid-twentieth

century Euro-American farmsteads. The heritage site located in the Grant Creek/Hoff Road project area is considered to be potentially eligible for listing in the National Register of Historic Places (NRHP). The second site, located within the Mola tract, has been largely destroyed as the result of past human actions related to widening State Highway 53 to four lands, and is considered ineligible for listing in the NRHP. The site lacks contextual integrity and cannot provide information that would add to what is known of the area's history (McCorvie, Rizo 2002).

4.13.2 Environmental Consequences

Alternative 1

Under Alternative 1, the NRHP potentially eligible heritage resource located during inventories of the project areas would be avoided during restoration activities. Monitoring and protection of this site would ensure that effects would not occur. This alternative would therefore have no effect on heritage resources.

Alternative 2

Alternative 2 (No Action) would have no effect on heritage resources in either the Grant Creek/Hoff Road or Mola tract, as no ground disturbance would occur.

4.13.3 Cumulative Effects

Effects of past actions within both project areas include impacts from agricultural pursuits and later Joliet Army Ammunition Plant actions. Combined with present and reasonably foreseeable future actions related to restoration activities within the Grant Creek/Hoff Road and Mola tracts, impacts to heritage resources are not expected. A potentially significant farmstead has been identified. Negative impacts to this heritage resource that may result from project activities would be mitigated through site avoidance and protection during restoration work.

Only those heritage resources that have been inadvertently missed during project area surveys could be impacted by planned restoration activities. However, as indicated by the results of past monitoring, the likelihood of missing heritage resources during inventories is possible, but does not occur with any frequency. The types of sites most likely to be missed are small and ephemeral (isolated finds), and are not likely to contain information that would add significantly to our understanding of the history or prehistory of northeastern Illinois. Impacts to this type of site would result in minimal effects on heritage resources.

4.14 Socio-Economics and Environmental Justice

4.14.1 Affected Environment

Executive Order 12898 (February 11, 1994) directs Federal agencies to focus attention, identify, and address as appropriate, disproportionately high and adverse human health along with adverse environmental conditions in minority and low-income communities. The principle behind environmental justice is simple: people should not suffer disproportionately because of their ethnicity or income level.

The proposed action affects Forest Service lands on Midewin National Tallgrass Prairie in Will County, Illinois. The area is fairly affluent. Will County ranks tenth in Illinois in per capita income, with a poverty rate of 6%, where statewide, the rate is 12%. Approximately 11% of the total population in Will County is minority, compared to 17.8% statewide. Since the early 1970s, the economy of the area has steadily changed from a manufacturing base to a more service-oriented economy. There is no evidence that this proposal would disproportionately affect any minority or low-income communities. This proposal deals with converting former agricultural land to native wetland or prairie based on resource conditions and capabilities.

It is estimated that it will cost approximately $763,425 over three years to successfully restore the 114 acres at these two sites. If the action alternative is selected, partial funding will come from Forest Service appropriated funds. Additional funds totaling $220,400 will come from Corlands. Ducks Unlimited and the Illinois Department of Natural Resources are partners with the Forest Service on the Mola restoration project. To complete the project, the remaining funds will either come from additional Forest Service appropriations or grants from non-profit organizations.

After the land was transferred to the Forest Service from the Army, existing leases for agriculture production were continued as special use permits. As described in the Illinois Land Conservation Act, agriculture special use permits will not be authorized beyond the year 2016, unless needed for wildlife habitat or resource management. Currently, less than half of Midewin is in row crop or hay production. Any rental fees collected from such special uses are placed in a special fund to be used for prairie improvement work at Midewin, with 25% of funds collected paid to Will County for local county roads and public schools.

4.14.2 Environmental Consequences

Alternative 1

Under the Action Alternative, up to $763,425 would be needed to complete the Grant Creek/Hoff Road and Mola tract restoration work. Funding would come from a mix of federal appropriations, funds collected from previous agriculture special uses, and from a group of partners and donors.

Alternative 2

Under the No Action Alternative no restoration work would be completed and no funds spent. Some revenues could be collected if the sites were leased for agriculture again. Under this alternative the purposes for which Midewin was established under the Illinois Land Conservation Act, would not be fulfilled, i.e, these lands would not be enhanced for the benefit of native plants and wildlife.

4.14.3 Cumulative Effects

The area of consideration for cumulative effects includes Will County, Illinois, covering 543,043 acres of land. It is estimated that this region is about 46% cropland, 9.9% urban, 30.4% pasture and other grasslands, 2.7% open water, 3.1% wetland, and 7.7% forest. The county includes the watersheds of the Kankakee, Des Plaines, and Calumet Rivers; the Kankakee and the Des Plaines Rivers are the only two major rivers in the county. The landscape of Will County is primarily open farmland, with one of the largest concentrations of open grassland in Illinois.

Past activities that occurred on Joliet Army Ammunition Plant land prior to 1940 include timber cutting, wetland drainage, and conversion of natural vegetation to agricultural fields and pasture. The Army later improved existing roads and added infrastructure to support the ordnance plant (new roads, railroads, power lines, security fences, buildings, drainage ditches, reservoirs, wells, water towers, water lines, and other structures).

Present and potential future activities at Midewin include projects related to prairie restoration, continued row crop production, building demolition, hazardous materials cleanup, scientific research, environmental education, trails and recreation facilities construction, and road removal. Present and future activities on other portions of the former Joliet Arsenal that also may affect restoration activities at Midewin include development of two industrial parks, management of

lands at the Abraham Lincoln National Cemetery, and construction and operation of the Will County landfill.

The proposed restoration projects, when combined with the cumulative effects of all past, present, and reasonably foreseeable future actions, are not expected to impact socio-economic conditions or environmental justice in Will County.

5. Monitoring

Monitoring will be conducted to evaluate the effectiveness of the restoration projects, primarily by using permanent photo points updated annually, and random sampling inventories of the vegetation (broad-scale observation of different plots and disturbed grounds such as fencerows and ditches). Hydrological and soil monitoring will be conducted periodically during the first three years following project implementation and less frequently thereafter. Monitoring is to include the following:

1. Inspecting sites where drain tiles were removed or disabled to detect concentrated surface or subsurface flow, erosion, or other aberrations.
2. Monitoring soil moisture levels at vegetation monitoring points to record the extent, depth, or duration of ponding or saturation in comparison with previous observations.
3. Installing monitoring wells at specific locations (e.g. vegetation monitoring points) or use of existing wells to detect changes in depth to water table.
4. Inspecting altered drainage ditches for signs of runoff (water depth or velocity) and erosion or sediment deposition.
5. Inspecting planted surfaces for signs of overland flow or erosion.
6. Collecting soil core samples at vegetation monitoring points to record changes in soil characteristics.
7. Monitoring vegetation change, focusing on changes in cover of native plant species and species diversity.
8. Monitoring appropriate fauna, including but not restricted to grassland and wetland birds, amphibians, and butterflies.
9. Monitoring any populations of RFSS that colonize or are established in the project areas.
10. Monitoring infestations of noxious weeds and invasive plant species to determine efficacy of management practices.

6. Conclusion

This Environmental Assessment (EA) analyzes the effects of proposed restoration actions on the Grant Creek/Hoff Road and Mola tracts. Through external public scoping and internal scoping of Midewin resource specialists, issues were raised that helped define the alternatives for this project. Two alternatives were developed as a result of the scoping process. The Action Alternative would restore native plant communities and associated habitat for prairie, wetlands, and savanna on approximately 114 acres within Midewin National Tallgrass Prairie. The No Action Alternative would defer any management or wetland restoration activities at this time on these sites.

This EA was completed in compliance with the National Environmental Policy Act and other relevant Federal and state laws and regulations. This analysis is consistent with and tiered to the Prairie Plan and the Prairie Plan Final Impact Statement, which contain direction for the long-term management of Midewin. It discloses the direct, indirect, and cumulative environmental impacts that would result from either the Action or No Action Alternative. Comprising the affected environment, Midewin's natural resources have each been addressed, and the environmental consequences of the alternatives on these resources have been analyzed. Based on this EA, the Prairie Supervisor will decide whether or not to authorize the restoration projects at the Grant Creek/Hoff Road and Mola sites.

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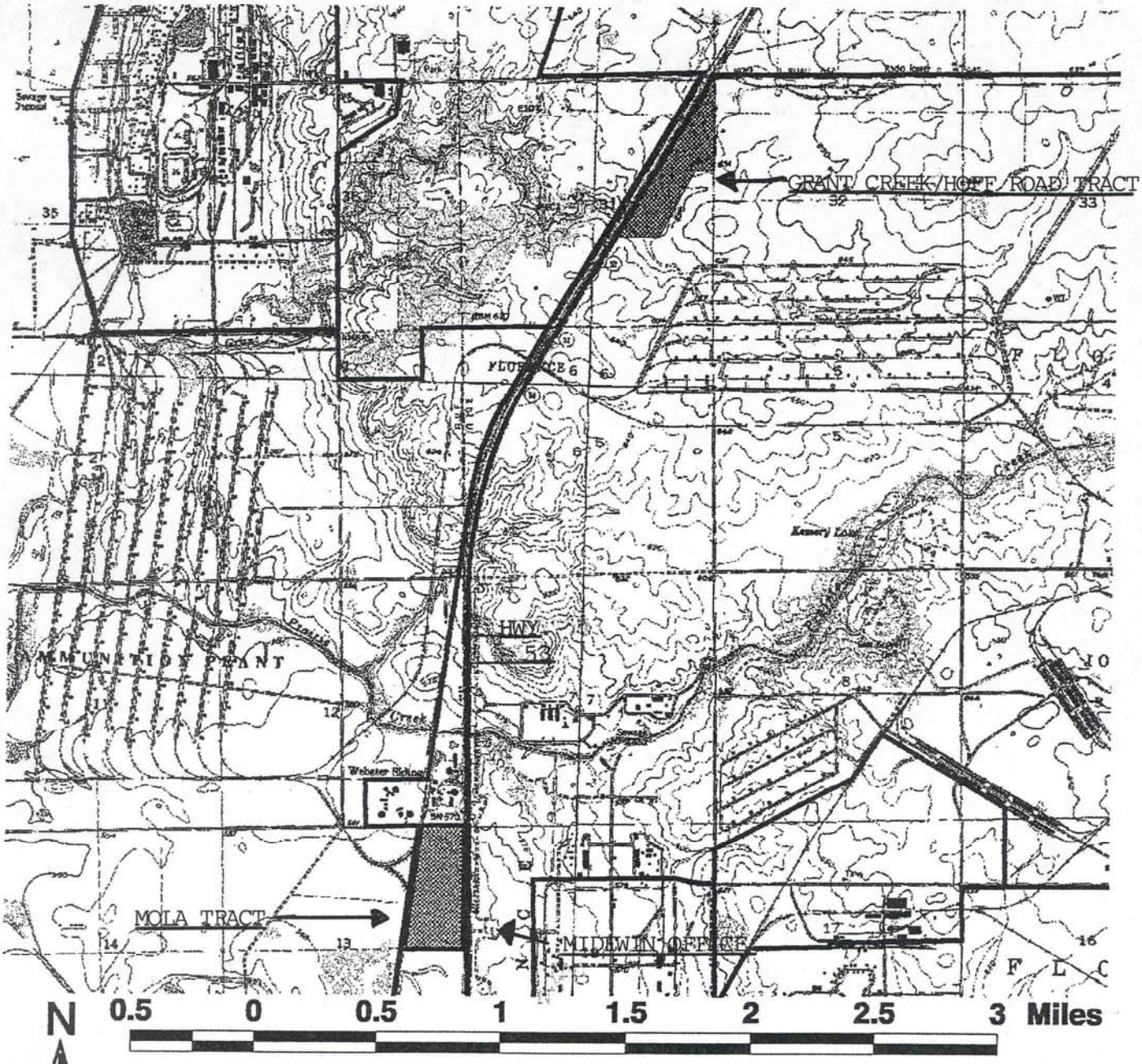
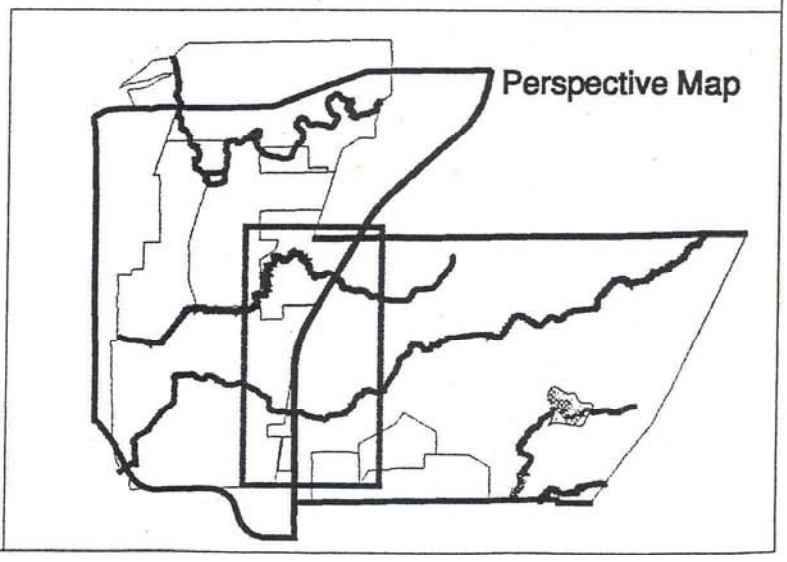
APPENDIX A

Midewin National Tallgrass Prairie
Wilmington, IL 60481

Mola Tract and Grant Creek/Hoff Road Restoration Projects





Restoration Area
Midewin Boundary

Map created 04/12/00, jbm

Appendix B: Desired Plant Species for Restored Native Vegetation, Grant Creek/Hoff Road and Mola Tracts, Midewin National Tallgrass Prairie

The following table includes most native plant species that we propose to have present in restored native vegetation in the Grant Creek/Hoff Road and Mola tracts on Midewin National Tallgrass Prairie; relative desired abundance of these species is incorporated into the table. Because of difficulties in species establishment, including sufficient seed and site conditions, we expect that it would take time to restore vegetation to these levels of diversity. Not all species in the table would be available for planted seed mixes, and some additional natives are expected to colonize from adjacent areas. Many late-successional species may be introduced at later stages of restoration, as appropriate for these species' ecology.

This table does not include every possible native species that could be established in both restoration projects; such a list could exceed 600 vascular plant species. Instead, we selected species most likely to be present based on pre-1830 vegetation (from soils and General Land Office surveys), species' historic occurrence and habitat in Will and adjacent counties, and species' presence on Midewin and in adjacent regions. Additions and deletions may occur as further information becomes available.

The Mola tract has potential for restoration to wet typic prairie, sedge meadow, and upland typic prairie. One small area may be suitable for marsh vegetation, but this would consist entirely of emergent herbs such as cattails, bulrushes, and bur-reed. The hydrology appears to be insufficient for the development of interspersed patches of open water.

The Grant Creek/Hoff Road tract has potential for restoration to upland typic prairie, with smaller amounts of wet typic prairie and sedge meadow in swales. The north tributary of Grant Creek also has potential for restoration of riparian/stream channel vegetation. Woodland or savanna soils are present, and given the isolation (from other native woodlands) and topography of the site, restoration of upland oak savanna is considered appropriate. As the hydrology is restored, small seeps may appear on the side slopes of the deeper swales. If they do appear, supplemental planting with appropriate species would be appropriate.

This table does not include the many species of widespread, weedy natives that are not associated with specific native vegetation. These species were probably opportunists, adapted to colonizing sites disturbed by erosion, animals, humans, or other processes. These 'native weeds' include common ragweed (*Ambrosia artemisiifolia*), wood sedge (*Carex blanda*), horseweed (*Conyza canadensis*), tall goldenrod (*Solidago canadensis*), tall boneset (*Eupatorium altissimium*), common evening primrose (*Oenothera biennis*), annual fleabane (*Erigeron annuus*), cleavers (*Galium aparine*), heal-all (*Prunella vulgaris*), path rush (*Juncus tenuis*), smartweed (*Polygonum pennsylvanicum*), pokeweed (*Phytolacca americana*), and other species. A few individuals or clumps of certain woody species, such as eastern cottonwood (*Populus deltoides*), black walnut (*Juglas nigra*), box elder (*Acer negundo*), American elm (*Ulmus americana*), hackberry (*Celtis occidentalis*), hawthorns (*Crataegus* spp.), wild plum (*Prunus americana*), elderberry (*Sambucus canadensis*), and willows (*Salix* spp.) may be allowed to survive along the edges of the projects, where they can serve to screen views without fragmenting grassland habitat.

Plant species are listed alphabetically by scientific name. A few species would only be restored to one of the two projects. These are indicated by a "(G)" (Grant Creek/Hoff Road) or an "(M)" (Mola tract) following the common name.

Scientific Name **Common Name**	**Upland Typic Prairie**	**Wet Typic Prairie**	**Sedge Meadow**	**Marsh**	**Savanna**	**Perennial Stream/ Riparian**
Acer nigrum Black Maple (G)	-	-	-	-	+	-
Agalinis tenuifolia Slender False-foxglove	-	+++	++	-	-	-
Agastache nepetoides Yellow Giant Hyssop (G)	-	-	-	-	+	+
Agastache scrophulariaefolia Purple Giant Hyssop (G)	-	-	-	-	++	-
Agrimonia gryposepala Agrimony	+	+	-	-	++	-
Agrimonia parviflora Marsh Agrimony	-	+	+	++	-	+
Alisma subcordatum Common Water-plantain	-	-	+	+++	-	-
Allium canadense Canada Wild Onion, Wild Garlic	+++	+++	+	-	++	+
Allium cernuum Nodding Wild Onion	+++	++	-	-	++	-
Amorpha canescens Leadplant	+++	-	-	-	++	-
Andropogon gerardii Big Bluestem	+++	++	+	-	++	+
Andropogon scoparius Little Bluestem	+++	+	-	-	+++	-
Anemone canadensis Meadow Anemone	+	+++	+	+		+
Anemone cylindrica Prairie Thimbleweed	+++	-	-	-	+	-
Anemone virginiana Woodland Thimbleweed (G)	+	-	-	-	++	+
Angelica atropurpurea Great Angelica	-	-	+	-	-	-
Antennaria neglecta Small Pussy-toes (G)	+	-	-	-	++	-
Antennaria plantaginifolia Plantain-leaved Pussy-toes	++	-	-	-	++	-
Apios americana Groundnut	+	++	+	+	+	++
Apocynum androsaemifolium Spreading Dogbane (G)	-	-	-	-	++	-
Apocynum cannabinum Indian Hemp	++	+	-	-	+	-
Apocynum sibiricum Prairie Dogbane	+	++	+	-	-	+
Aquilegia canadensis Wild Columbine (G)	-	-	-	-	++	-
Asclepias hirtella Tall Green Milkweed (M)	++	-	-	-	-	-
Asclepias incarnata Marsh Milkweed, Swamp M.	-	++	++	++	-	+
Asclepias purpurescens Purple Milkweed (G)	+	-	-	-	++	-

Asclepias sullivantii Prairie Milkweed, Sullivant's M.	+++	+	-	-	+	-
Scientific Name **Common Name**	**Upland Typic Prairie**	**Wet Typic Prairie**	**Sedge Meadow**	**Marsh**	**Savanna**	**Perennial Stream/ Riparian**
Asclepias tuberosa Butterfly Milkweed (G)	++	+	-	-	++	-
Asclepias verticillata Whorled Milkweed	++	-	-	-	+	-
Asclepias viridiflora Short Green Milkweed	++	-	-	-	+	-
Aster drummondii Drummond's Aster (G)	-	-	-	-	++	-
Aster ericoides Heath Aster	+++	-	-	-	+	-
Aster laevis Smooth Blue Aster	+++	-	-	-	++	-
Aster lateriflorus Calico Aster	-	+	-	-	+	++
Aster novae-angliae New England Aster	+	+++	++	-	++	-
Aster ontarionis Ontario Aster (G)	-	-	-	-	+	-
Aster azureus Sky Blue Aster	++	-	-	-	+	-
Aster praealtus Willow Aster	-	-	+	++	-	-
Aster ptarmicoides (= *Solidago p.*) Stiff White Aster	+	-	-	-	-	-
Aster puniceus Red-stemmed Aster (G)	-	+	+	-	-	-
Aster simplex Panicled Aster	-	++	++	+	-	++
Astragalus canadensis Canada Milkvetch	++	-	-	-	+	-
Baptisia leucantha (= *B. lactea*) Tall Wild Indigo, White W.I.	++	-	-	-	++	-
Baptisia leucophaea Cream Wild Indigo	+++	-	-	-	++	-
Bidens aristosa/B. polylepis Swamp Marigold	-	++	++	+++	-	+
Bidens cernuua Nodding Bur Marigold	-	+	+	++	-	++
Bidens comosa Swamp Tickseed	-	-	-	+	-	+
Bidens connata Purple-stemmed Tickseed	-	+	++	+++	-	+
Bidens coronata Slender Swamp Marigold	-	++	++	++	-	-
Blephilia ciliata Ohio Horse Mint (G)	-	-	-	-	+	-
Boehmeria cylindrica False Nettle	-	+	++	++	-	+
Bouteloua curtipendula Side-oats Grama Grass (G)	++	-	-	-	+	-

Brickellia eupatorioides False Boneset (G)	+++	-	-	-	++	-
Scientific Name **Common Name**	**Upland Typic Prairie**	**Wet Typic Prairie**	**Sedge Meadow**	**Marsh**	**Savanna**	**Perennial Stream/ Riparian**
Cacalia atriplicifolia Pale Indian-plantain (G)	+	-	-	-	++	-
Cacalia plantaginea Prairie Indian-plantain	+	+++	++	-	-	-
Calamagrostis canadensis Blue-joint Grass	-	+++	+++	+	-	+
Calystegia spithamaea Low Bindweed (G)	++	-	-	-	-	-
Camassia scilloides Wild Hyacinth	++	++	-	-	++	-
Campanula americana Tall Bellflower (G)	-	-	-	-	+	+
Cardamine bulbosa Bulbous Spring Cress	-	++	++	-	-	+
Carex annectans Fox Sedge	-	+	++	+	-	-
Carex bicknellii Prairie Sedge	++	-	-	-	+	-
Carex brevior Sedge	+	-	-	-	-	-
Carex buxbaumii Sedge	-	++	++	+	-	-
Carex cephalophora Sedge (G)	-	-	-	-	+	-
Carex comosa Sedge	-	-	+	++	-	-
Carex crawei Crawe's Sedge (M)	+	-	-	-	-	-
Carex cristatella Sedge	-	+	++	+	-	+
Carex emoryi Riverbank Sedge (G)	-	-	++	-	-	++
Carex festucacea Sedge	+	+	-	-	+	-
Carex frankii Sedge	-	+	+	++	-	+
Carex granularis Sedge	-	++	+	-	-	-
Carex gravida Sedge	++	-	-	-	++	-
Carex grisea Sedge (G)	-	-	-	-	+	+
Carex haydenii Tussock Sedge (M)	-	+	+++	-	-	+
Carex hystericina Bottlebrush Sedge	-	-	++	+	-	-
Carex jamesii Sedge (G)	-	-	-	-	+	-
Carex lacustris Lake Sedge	-	+	+++	++	-	+

Carex meadii Mead's Sedge	+++	-	-	-	++	-
Carex normalis Sedge	+	+	-	-	-	+
Scientific Name **Common Name**	**Upland Typic Prairie**	**Wet Typic Prairie**	**Sedge Meadow**	**Marsh**	**Savanna**	**Perennial Stream/ Riparian**
Carex pellita Sedge	+	+++	+++	+	-	++
Carex pensylvanica Penn Sedge (G)	-	-	-	-	++	-
Carex sartwellii Sedge	-	+	++	+	-	-
Carex scoparia Sedge	-	++	++	+	+	-
Carex squarrosa Sedge	-	-	+	++	-	-
Carex stipata Sedge	-	+	+++	++	-	-
Carex stricta Tussock Sedge	-	+	+++	++	-	-
Carex suberecta Sedge (M)	+	+++	+	-	-	-
Carex tenera Sedge (G)	-	-	-	-	++	-
Carex tetanica Sedge (M)	+	++	+	-	-	-
Carex tribuloides Sedge	-	-	++	+	-	+
Carex trichocarpa Sedge	-	++	+++	++	-	++
Carex utriculata Sedge (M)	-	-	+	+	-	-
Carex vulpinoidea Fox Sedge	-	+	++	+	-	-
Carya ovata Shagbark Hickory (G)	-	-	-	-	+	-
Ceanothus americanus New Jersey Tea (G)	+++	-	-	-	+++	-
Celastrus scandens American Bittersweet (G)	-	-	-	-	+	-
Chamaecrista fasciculata Partridge-pea	+++	-	-	-	-	-
Cicuta maculata Water Hemlock	-	++	++	++	-	-
Cirsium discolor Old Field Thistle	++	+	-	-	+	+
Claytonia virginica Spring Beauty	+	-	-	-	+++	-
Comandra umbellata False-toadflax, Bastard-toadflax	+++	-	-	-	++	-
Coreopsis palmata Prairie Coreopsis, Stiff Tickseed	+++	-	-	-	++	-
Coreopsis tripteris Tall Coreopsis	+++	+	-	-	+++	-

Cornus obliqua Silky Dogwood, Blue Dogwood	-	+	+	-		++
Cornus racemosa Gray Dogwood (G)	-	-	-	-	+	-
Corylus americana American Hazel (G)	-	-	-	-	++	-
Scientific Name **Common Name**	**Upland Typic Prairie**	**Wet Typic Prairie**	**Sedge Meadow**	**Marsh**	**Savanna**	**Perennial Stream/ Riparian**
Cuscuta spp. Native Dodders	+	+	+	+	+	+
Cyperus erythrorhizos Redroot Nutsedge (M)	-	-	-	++	-	-
Cyperus ferruginescens Rusty Nutsedge (M)	-	-	-	++	-	-
Cyperus strigosus Marsh Nutsedge	-	-	+	++	-	+
Dalea candida White Prairie-clover	+++	-	-	-	++	-
Dalea purpurea Purple Prairie-clover	+++	-	-	-	++	-
Danthonia spicata Poverty Oat Grass (G)	+	-	-	-	+	-
Dasistoma macrophylla Mullein Foxglove (G)	-	-	-	-	++	-
Dentaria laciniata Common Toothwort (G)	-	-	-	-	+	-
Desmodium canadense Showy Tick-trefoil	+++	-	-	-	++	-
Desmodium cuspidatum Bracted Tick-trefoil (G)	-	-	-	-	+	-
Desmodium illinoense Illinois Tick-trefoil	+++	-	-	-	++	-
Dodecatheon meadia Shooting-star	+++	-	-	-	+++	-
Echinacea pallida Pale Purple Coneflower (G)	+++	-	-	-	++	-
Eleocharis acicularis Needle Spikerush	-	-	+	++	-	-
Eleocharis compressa Flattened Spikerush (M)	-	++	-	-	-	-
Eleocharis erythropoda Redroot Spikerush	-	-	++	+++	-	-
Eleocharis obtusa Blunt Spikerush	-	-	+	++	-	+
Elymus canadensis Canada Wild-rye	+++	+	-	-	+++	++
Elymus hystrix (= *Hystrix patula*) Bottlebrush Grass (G)	-	-	-	-	++	-
Elymus riparius Riverbank Wild-rye	-	+	+	-	+	+
Elymus virginicus Virginia wild-rye	-	+	+	-	++	++
Epilobium coloratum Cinnamon Willow-herb	-	+	++	+	-	-

Equisetum arvense Field Horsetail	+	++	++	-	-	++
Equisetum hyemale Winter Scouring-rush (G)	-	-	-	-	-	+
Equisetum laevigatum Prairie Scouring-rush	++	++	+	-	-	-
Eragrostis spectabilis Purple Love Grass	+	-	-	-	+	-
Scientific Name **Common Name**	**Upland Typic Prairie**	**Wet Typic Prairie**	**Sedge Meadow**	**Marsh**	**Savanna**	**Perennial Stream/ Riparian**
Erigeron philadelphicus Marsh Fleabane	-	++	++	-	-	+
Erigeron strigosus Daisy Fleabane	++	-	-	-	++	-
Eryngium yuccifolium Rattlesnake-master	+++	+	-	-	+	-
Erythronium albidum White Dogtooth-lily (G)	-	-	-	-	+	-
Eupatorium maculatum Spotted Joe-Pye Weed	-	++	+	+	+	-
Eupatorium perfoliatum Marsh Boneset	-	+	+++	++	-	+
Eupatorium purpureum Purple Joe-Pye Weed (G)	-	-	-	-	+	-
Eupatorium rugosum White Snakeroot (G)	-	-	-	-	+	-
Euphorbia corollata Flowering Spurge	+++	-	-	-	++	-
Euthamia graminifolia Grass-leaved Goldenrod	++	+++	+	-	-	-
Festuca obtusa Nodding Fescue (G)	-	-	-	-	+	-
Fragaria virginiana Wild Strawberry	++	++	-	-	++	+
Galium boreale Northern Bedstraw	-	++	+	-	-	-
Galium obtusum Wild Madder	-	++	++	+	-	-
Gaura biennis Butterfly Gaura	++	-	-	-	++	-
Gentiana andrewsii Bottle Gentian	+	+++	+	-	-	-
Gentiana puberulenta Prairie Gentian	++	-	-	-	-	-
Gentianella quinquefolia occidentalis Stiff Gentian	++	-	-	-	+	-
Geranium maculatum Wild Geranium (G)	-	-	-	-	++	-
Geum canadense White Avens (G)	-	-	-	-	+	-
Geum laciniatum Rough Avens	-	++	++	+	-	+

Glyceria striata Fowl Manna Grass	-	+	++	+	-	+
Gratiola neglecta Clammy Mud-hyssop (M)	-	+	+	+	-	+
Hedeoma pulegioides American Pennyroyal (G)	-	-	-	-	+	-
Helenium autumnale Marsh Sneezeweed	-	+	++	+	-	-
Helianthus divaricatus Woodland Sunflower (G)	-	-	-	-	+	-
Scientific Name **Common Name**	**Upland Typic Prairie**	**Wet Typic Prairie**	**Sedge Meadow**	**Marsh**	**Savanna**	**Perennial Stream/ Riparian**
Helianthus grosseserratus Saw-toothed Sunflower	++	++	+	-	-	++
Helianthus mollis Ashy Sunflower (M)	++	-	-	-		-
Helianthus occidentalis Western Sunflower (G)	++	-	-	-	-	-
Helianthus pauciflorus (= *H. rigidus*) Prairie Sunflower	+++	-	-	-	++	-
Helianthus tuberosus Jerusalem Artichoke (G)	-	-	-	-	-	++
Heliopsis helianthoides False Sunflower	++	-	-	-	++	+
Heracleum maximum Cow Parsnip (G)	-	-	-	-	++	+
Heuchera richardsonii Prairie Alumroot	+++	-	-	-	++	-
Hierachloë odorata Vanilla Grass	+	++	++	-	-	+
Hydrophyllum virginianum Virginia Waterleaf (G)	+	-	-	-	++	+
Hypericum pyramidatum Great St. John's-wort	-	-	-	-	+	-
Hypericum sphaerocarpum Round-fruited St. John's-wort (M)	-	+	-	-	-	-
Hypoxis hirsuta Yellow Stargrass	++	++	-	-	-	-
Impatiens capensis Orange Jewelweed, Touch-me-not	-	++	++	++	-	++
Iris virginicus shrevei Blue Flag, Wild Blue Iris	-	+	+++	++	-	+
Juglans nigra Black Walnut (G)	-	-	-	-	+	-
Juncus acuminatus Rush	-	+	++	++	-	-
Juncus dudleyi Dudley's Rush	-	++	+++	+	-	-
Juncus interior Inland Rush (M)	-	+	+	-	-	-
Juncus torreyi Torrey's Rush	-	++	++	++	-	-

Koeleria macrantha June Grass (G)	++	-	-	-	++	-
Krigia biflora Two-flowered Cynthia	++	+	-	-	++	-
Lactuca candensis Canada Wild Lettuce	++	+	-	-	++	-
Lactuca floridana Blue Wild Lettuce (G)	-	-	-	-	+	-
Lathyrus palustris Marsh Vetchling	-	++	++	+	-	-
Lathyrus venosus Veiny Pea (G)	-	-	-	-	+	-
Scientific Name **Common Name**	**Upland Typic Prairie**	**Wet Typic Prairie**	**Sedge Meadow**	**Marsh**	**Savanna**	**Perennial Stream/ Riparian**
Leersia oryzoides Rice Cut Grass	-	-	+	+++	-	+
Lespedeza captitata Round-headed Bush-clover	+++	-	-	-	++	-
Liatris aspera Rough Blazing-star	+++	-	-	-	++	-
Liatris pycnostachya Prairie Blazing-star (G)	+++	+	-	-	++	-
Liatris scariosa nieuwlandii Savanna Blazing-star (G)	-	-	-	-	++	-
Liatris spicata Marsh Blazing-star (M)	++	+++	+	-	+	-
Lilium michiganense Michigan Lily, Turk's-cap Lily	+	++	+	-	++	-
Lilium philadelphicum andinum Prairie Lily	++	-	-	-	+	-
Lindernia dubia False Pimpernel (M)	-	-	++	++	-	+
Lithospermum canescens Hoary Puccoon	++	-	-	-	++	-
Lobelia siphilitica Great Blue Lobelia	-	+	++	++	-	++
Lobelia spicata Spiked Lobelia	++	+	-	-	++	-
Ludwigia palustris Marsh Purslane (M)	-	-	+	++	-	-
Lycopus americanus Common Water Horehound	-	+++	++	+	-	-
Lycopus uniflorus Northern Bugleweed (M)	-	+	++	-	-	-
Lysimachia lanceolata Lance-leaved Loosestrife	++	-	-	-	+	-
Lysimachia quadriflora Prairie Loosestrife	-	++	++	-	-	-
Lythrum alatum Winged Loosestrife	-	++	+++	+	-	-
Malus ioensis Prairie Crabapple (G)	-	-	-	-	+	-
Melica nitens Tall Melic Grass (G)	-	-	-	-	+	-

Mentha arvensis villosa Wild Mint	-	++	+++	+	-	-
Mimulus ringens Monkey-flower	-	+	++	++	-	++
Moehringia lateriflora Wood Sandwort (G)	-	-	-	-	+	-
Monarda fistulosa Wild Bergamot	+++	-	-	-	++	+
Muhlenbergia frondosa Common Satin Grass	-	+	-	-	++	+
Muhlenbergia glomerata Marsh Wild Timothy (M)	-	+	++	+	-	-
Muhlenbergia mexicana Leafy Satin Grass	-	++	+	-	++	++
Scientific Name **Common Name**	**Upland Typic Prairie**	**Wet Typic Prairie**	**Sedge Meadow**	**Marsh**	**Savanna**	**Perennial Stream/ Riparian**
Napaea dioica Glade Mallow	-	+	+	-	-	++
Oenothera pilosella Prairie Sundrops	+	++	+	-	-	-
Osmorhiza claytonii Hairy Sweet Cicely (G)	-	-	-	-	++	-
Osmorhiza longistylis Smooth Sweet Cicely (G)	-	-	-	-	+	+
Oxalis violacea Violet Wood Sorrel	++	++	-	-	++	-
Oxypolis rigidior Cowbane	-	++	++	+	-	-
Panicum implicatum Old-field Panic Grass	++	-	-	-	++	-
Panicum leibergii Prairie Panic Grass (G)	+++	-	-	-	-	-
Panicum oligosanthes scribnerianum Scribner's Panic Grass	++	+	-	-	++	-
Panicum virgatum Switch Grass	++	++	+	-	++	++
Paronychia canandensis Forked Chickweed (G)	-	-	-	-	+	-
Parthenium integrifolium Wild Quinine	+++	+	-	-	++	-
Pedicularis canadensis Common Lousewort	++	-	-	-	++	-
Pedicularis lanceolata Swamp Lousewort, Fen Betony	-	++	++	-	-	-
Penstemon calycosus Smooth Beard-tongue (M)	+	+	-	-	-	-
Penstemon digitalis Foxglove Beard-tongue	+++	++	-	-	+++	-
Penthorum sedoides Ditch Stonecrop	-	+	+	++	-	+
Perideridia americana Thicket Parsley	+	-	-	-	++	-

Phlox divaricata Wild Blue Phlox (G)	-	-	-	-	+	-
Phlox glaberrima interior Marsh Phlox	-	+++	++	-	++	-
Phlox pilosa fulgida Prairie Phlox	+++	-	-	-	+++	-
Phyla lanceolata (= *Lippia l.*) Fog Fruit	-	++	+	+	-	-
Physalis virginiana Lance-leaved Ground Cherry (G)	+	-	-	-	+	-
Physostegia virginiana arenaria Prairie Obedient Plant	+++	+	-	-	++	-
Podophyllum peltatum Mayapple (G)	-	-	-	-	++	-
Polemonium reptans Jacob's Ladder (G)	-	-	-	-	+	-
Scientific Name **Common Name**	**Upland Typic Prairie**	**Wet Typic Prairie**	**Sedge Meadow**	**Marsh**	**Savanna**	**Perennial Stream/ Riparian**
Polygala senega Seneca Snakeroot (G)	++	-	-	-	++	-
Polygonatum caniculatum Common Solomon's Seal	-	-	-	-	++	+
Polygonum amphibium Water Smartweed, Heartease (M)	-	++	++	+++	-	-
Polygonum coccineum Scarlet Smartweed	-	++	++	+	-	-
Polygonum hydropiperoides Mild Water Pepper (M)	-	+	++	++	-	-
Polygonum punctatum Dotted Smartweed	-	-	-	-	-	++
Polytaenia nuttallii Prairie Parsley	+	-	-	-	-	-
Potentilla arguta Prairie Cinquefoil	+++	-	-	-	-	-
Potentilla simplex Field Cinquefoil	++	+	-	-	++	-
Prenanthes aspera Rough White Lettuce	++	-	-	-	+	-
Prenanthes racemosa Glaucous White Lettuce	+	++	-	-	-	-
Prunus americana Wild Plum	-	-	-	-	+	-
Psoralea onobrychis French Grass (M)	+	-	-	-	-	-
Psoralea tenuiflora Scurfy Pea (G)	+	-	-	-	-	-
Pycnanthemum tenuifolium Slender Mountain-mint	++	-	-	-	+	-
Pycnanthemum virginianum Common Mountain-mint	++	+++	+	-	++	-
Quercus alba White Oak (G)	-	-	-	-	+	-
Quercus macrocarpa Bur Oak (G)	-	-	-	-	++	+

Quercus velutina Black Oak (G)	-	-	-	-	+	-
Ranunculus fascicularis Early Buttercup (G)		-	-	-	++	-
Ranunculus pensylvanicus Bristly Buttercup (M)	-	-	++	+	-	-
Ratibida pinnata Yellow Coneflower	+++	+	-	-	++	-
Rorippa palustris fernaldiana Marsh Yellow Cress	-	+	++	++	-	+
Rosa blanda Smooth Rose	-	+	+	-	++	+
Rosa carolina Carolina Rose, Pasture Rose	++	+	-	-	++	-
Rosa setigera Prairie Rose, Illinois Rose	-	-	-	-	+	++
Rubus allegheniensis Wild Blackberry	+	-	-	-	+	-
Scientific Name **Common Name**	**Upland Typic Prairie**	**Wet Typic Prairie**	**Sedge Meadow**	**Marsh**	**Savanna**	**Perennial Stream/ Riparian**
Rubus occidentalis Wild Black Raspberry	-	-	-	-	+	+
Rudbeckia hirta Black-eyed Susan	+++	++	-	-	+++	+
Rudbeckia laciniata Tall Coneflower, Golden-glow	-	-	-	-	-	+
Rudbeckia fulgida sullivantii Sullivant's Coneflower (M)	++	+	-	-	-	-
Rudbeckia subtomentosa Sweet Coneflower (M)	+	++	-	-	-	-
Ruellia humilis Hairy Wild Petunia	++	-	-	-	-	-
Rumex altissimus Pale Dock	-	++	+	+	-	+
Sagittaria latifolia Common Arrowhead, Arrowleaf	-	-	++	+++	-	++
Salix eriocephala (= *S. rigida*) Heart-leaved Willow	-	-	-	-	-	+
Salix humilis Prairie Willow	++	-	-	-	+	-
Salix interior Sandbar Willow (G)	-	-	-	-	-	+
Sambucus canadensis Common Elderberry	-	-	-	-	-	+
Sanicula odorata (= *S. gregaria*) Clustered Black Snakeroot (G)	-	-	-	-	+	-
Satureja arkansana Low Calamint (M)	-	+	-	-	-	-
Saxifraga pensylvanica Marsh Saxifrage	-	++	++	-	-	-
Scirpus acutus Hardstem Bulrush	-	-	+	++	-	-
Scirpus atrovirens Green Bulrush	-	++	++	+	-	++

Scirpus fluviatilis River Bulrush	-	-	+	+++	-	++
Scirpus pendulus Red Bulrush	+	+++	++	+	+	-
Scirpus pungens (= *S. americanus*) Chairmaker's Rush	-	+	++	+	-	++
Scirpus validus Softstem Bulrush, Great Bulrush	-	-	+	+++	-	-
Scrophularia marilandica Late Figwort (G)	-	-	-	-	+	++
Scutellaria epilobiifolia Marsh Skullcap (M)	-	-	-	++	-	-
Scutellaria lateriflora Mad-dog Skullcap	-	-	++	++	-	-
Scutellaria parvula Small Skullcap	++	-	-	-	+	-
Senecio pauperculus Balsam Ragwort	++	+++	+	-	++	-
Scientific Name **Common Name**	**Upland Typic Prairie**	**Wet Typic Prairie**	**Sedge Meadow**	**Marsh**	**Savanna**	**Perennial Stream/ Riparian**
Silene stellata Starry Campion (G)	-	-	-	-	+	-
Silphium integrifolium Rosinweed	+++	+	-	-	++	-
Silphium laciniatum Compass Plant	+++	+	-	-	+	-
Silphium perfoliatum Cup Plant	-	++	+	-	-	++
Silphium terebenthinaceum Prairie Dock	+++	++	-	-	+	-
Sisyrinchium albidum White Blue-eyed Grass	++	+	-	-	++	-
Sium sauve Water Parsnip (M)	-	-	+	++	-	-
Smilacina racemosa False Solomon's Seal (G)	-	-	-	-	+	-
Smilacina stellata Starry Solomon' Seal	+	++	-	-	++	-
Smilax lasioneura Tall Carrion Flower	-	-	-	-	+	-
Solidago gigantea Giant Goldenrod	-	++	+	-	-	++
Solidago juncea Early Goldenrod	++	++	-	-	++	-
Solidago nemoralis Gray Goldenrod (G)	++	-	-	-	++	-
Solidago riddellii Riddell's Goldenrod	-	++	-	-	-	-
Solidago rigida Stiff Goldenrod	+++	-	-	-	++	-
Solidago speciosa Showy Goldenrod (G)	-	-	-	-	+	-
Solidago ulmifolia Elm-leaved Goldenrod (G)	-	-	-	-	++	-

Sorghastrum nutans Indian Grass	+++	+	-	-	++	-
Sparganium eurycarpum Common Bur-reed (M)	-	-	+	+++	-	-
Spartina pectinata Prairie Cordgrass	+	+++	++	-	-	++
Specularis perfoliata Venus' Looking-glass (G)	-	-	-	-	+	-
Sphenophlois intermedia Slender Wedge Grass	-	++	+	-	-	-
Sphenopholis obtusata Prairie Wedge Grass	+	-	-	-	+	-
Sporobolus asper Rough Dropseed	++	-	-	-	-	-
Sporobolus heterolepis Prairie Dropseed	+++	++	-	-	++	-
Stachys palustris homotricha Woundwort	-	++	++	-	-	-
Stachys tenuifolia hispida Marsh Hedge Nettle	+	++	+	-	-	+
Scientific Name **Common Name**	**Upland Typic Prairie**	**Wet Typic Prairie**	**Sedge Meadow**	**Marsh**	**Savanna**	**Perennial Stream/ Riparian**
Stipa spartea Porcupine Grass	+++	-	-	-	++	-
Symphoricarpos orbiculatus Coralberry (G)	-	-	-	-	+	-
Teucrium canadense American Germander	+	++	++	-	+	++
Thalictrum dasycarpum Purple Meadow-rue, Smooth M.	-	++	++	+	-	+
Thalictrum revolutum Waxy Meadow-rue, Skunk M.	-	++	++	-	-	-
Tradescantia ohiensis Ohio Spiderwort	+++	++	-	-	++	++
Trillium recurvatum Red Trillium, Wakerobin (G)	-	-	-	-	+	-
Trisoteum aurantiacum Early Horse-gentian (G)	-	-	-	-	+	-
Triosteum perfoliatum Late Horse-gentian (G)	-	-	-	-	+	-
Typha latifolia Common Cattail, Broad-leaved C.	-	-	+	+++	-	+
Urtica dioica (= *U. procera*) Tall Nettle	-	-	-	-	-	+
Valeriana edulis ciliata Hairy Valerian	-	++	++	-	-	-
Verbena hastata Blue Vervain	-	+	++	++	++	+
Verbesina alternifolia Yellow Crownbeard	-	-	-	-	-	++
Vernonia fasciculata Prairie Ironweed	++	++	+	-	+	-
Veronicastrum virginicum Culver's-root	+++	++	-	-	++	-

Vicia americana American Vetch	++	++	-	-	+	-
Viola pedatifida Prairie Violet	++	-	-	-	++	-
Viola sororia Common Blue Violet	-	+	+	-	++	++
Zizia aptera Heart-leaved Alexanders (G)	+	-	-	-	-	-
Zizia aurea Golden Alexanders	++	+++	+	-	+	++

Appendix C. Grant Creek/Hoff Road and Mola Tract Restoration Projects Summary Table for Special Status Plant Species

Scientific Name	Common Name	Status[1]	Species Present?	Habitat Present?[2]
Carex crawei	Crawe's Sedge	RFSS	No	No*
Cirsium hillii	Hill's Thistle	RFSS, ST	No	No*
Cypripedium candidum	Small White Lady's-slipper	SE	No	No*
Dalea foliosa	Leafy Prairie-Clover	FE, SE	No	No
Hydrastis canadensis	Goldenseal	RFSS	No	No
Isoëtes butlerii	Glade Quillwort	RFSS, SE	No	No
Malvastrum hispidum (= *Sphaeralcea angusta*)	False Mallow	RFSS, SE	No	No
Minuartia patula (= *Arenaria patula*)	Pitcher's Sandwort	RFSS, ST	No	No
Napaea dioica	Glade Mallow	RFSS	No	No*
Panax quinquefolius	American Ginseng	RFSS	No	No
Platanthera leucophaea	Eastern Prairie White-fringed Orchid	FT, SE	No	No*
Rudbeckia fulgida var. *sullivantii*	Sullivant's Coneflower	RFSS	No	No*
Tomanthera auriculata (= *Agalinis auriculata*)	Earleaf False-Foxglove	RFSS, ST	No	No*
Valeriana edulis var. *ciliata*	Hairy Valerian	RFSS	No	No*

[1] FE = Federal Endangered species
FT = Federal Threatened species
RFSS = Regional Forester's Sensitive species
SE = Endangered by Illinois Endangered Species Protection Board (1998)
ST = Threatened by Illinois Endangered Species Protection Board (1998)
SW = Watch List by Illinois Endangered Species Protection Board (1995)

[2] Restoration activities will result in some potential habitat for species marked with an asterisk (*).

Appendix D. Grant Creek/Hoff Road and Mola Tract Restoration Projects
Summary Table for Special Status Animal Species

Scientific Name	Common Name	Status[1]	Species Present?	Habitat Present?[2]
Birds:				
Ammodramus henslowii	Henslow's Sparrow	RFSS, SE	No	No*
Asio flammeus	Short-eared Owl	RFSS, SE	No	No*
Batramia longicauda	Upland Sandpiper	RFSS, SE	Yes	Yes
Circus cyaneus	Northern Harrier	RFSS, SE	Yes	Yes
Dendroica cerulea	Cerulean Warbler	RFSS, SW	No	No
Dolichonyx oryzivora	Bobolink	RFSS, SW	Yes	Yes
Gallinula chloropus	Common Moorhen	ST	No	No
Haliaeetus leucocephalus	Bald Eagle	FT, SE	No	No
Ixobrychus exilis	Least Bittern	RFSS, ST	No	No
Lanius ludovicianus migrans	Migrant Loggerhead Shrike	RFSS, ST	Yes	Yes
Podiceps podilymbus	Pied-billed Grebe	ST	No	No
Rallus elegans	King Rail	RFSS, ST	No	No*
Reptiles and Amphibians:				
Emydoidea blandingii	Blanding's Turtle	RFSS, ST	No	No
Rana blairi	Plains Leopard Frog	RFSS	No	Yes
Mussels:				
Venustaconcha ellipsiformis	Ellipse (mussel)	RFSS, SW	No	No
Insects:				
Aflexia rubranura	Red-veined Prairie Leafhopper	RFSS, ST	No	No*
Papaipema beeriana	Blazing-star Stem-borer (moth)	RFSS	No	No*
Papaipema eryngii	Rattlesnake-master Stem-borer (moth)	RFSS, SE	No	No*

[1] FE = Federal Endangered species
FT = Federal Threatened species
RFSS = Regional Forester's Sensitive species
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[2] Restoration activities will result in some potential habitat for species marked with an asterisk (*).