

Environmental Assessment
Of
Drummond Floodplain and Middle Grant Creek Restoration

MIDEWIN NATIONAL TALLGRASS PRAIRIE
Will County, Illinois

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1.0 PROJECT SCOPE

1.1 INTRODUCTION

A mission of the Midewin National Tallgrass Prairie is to restore a vast prairie ecosystem over the landscape of the former Joliet Army Ammunition Plant, with special management emphasis on the few remnants of prairie vegetation and sensitive grassland birds in order to provide a sustainable ecosystem for future generations. Prairie restoration provides habitat for many sensitive plant and animal species and also improves the landscape for recreational activities. This proposal implements the Midewin Land and Resource Management Plan (Prairie Plan). It addresses the USDA Forest Service sustainable ecosystem management goals in the areas of ecosystem health and community partnerships. Specifically, this project would help sustain the biodiversity of diverse prairie ecosystems by providing habitat for dolomite prairie-specific species and other wet prairie communities. It would do so in an area noted for its high quality remnants of native vegetation that are at risk of degradation. This project would promote and strengthen collaborative partnerships between state and Federal agencies and neighboring landowners.

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

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

1.2 PROJECT AREA

Midewin is located in Will County, Illinois, approximately 45 miles southwest of Chicago, 15 miles south of Joliet, and 3 miles north of Wilmington (Figure 1). Midewin is part of the Prairie Parklands, a total area of approximately 40,000 acres of scattered lands important for habitat

conservation. These areas include public, private, and corporate lands in Will and Grundy counties, including the Illinois Department of Natural Resources' Des Plaines Conservation Area, Goose Lake Prairie State Park, Heidecke Lake Fish and Wildlife Area, several county Forest Preserves, and portions of corporate lands owned by Commonwealth Edison, General Electric, Exxon-Mobil, BP Amoco, Stepan, and Dow Chemical. Midewin is currently comprised of 15,189 acres of land that was part of the Joliet Army Ammunition Plant (Joliet Arsenal).

DRUMMOND FLOODPLAIN PROJECT AREA

The proposed Drummond Floodplain project area is approximately 470 acres and is located within the western portion of Midewin in portions of Sections 22, 23, 25, 26, and 27, T. 33 N., R. 9 E., Will County, Illinois. The area includes a portion of lower Jackson Creek, its floodplain, and the associated Drummond Dolomite Prairie in the lower part of the Jackson Creek watershed (Figure 2). The Drummond Floodplain project area also includes a portion of the Grant Creek watershed that is connected to the Jackson Creek floodplain on the south. Traversed by Drummond Road, the site is west of State Highway 53 and lies just west and north of the Deer Run Industrial Park, once a TNT manufacturing area within the former Joliet Arsenal.

Available information indicates that prior to agriculture and arsenal development, most of the site's natural landscape was dominated by wet prairie, sedge meadows, and marshes. Sometime during the onset of agricultural uses before 1940, this area was drained and converted to pasture grasses and crops. In more recent years, invasive plant species have infested some of the area, reducing the extent of open grassland habitat.

MIDDLE GRANT CREEK PROJECT AREA

The proposed Middle Grant Creek project area is approximately 385 acres and is located within the western portion of Midewin in Section 2, T. 33 N., R. 9 E., Will County, Illinois. This tract, showing little relief, includes one mile of Grant Creek, portions of three terrace surfaces of outwash plain (Figure 2), and a secondary drainage with an excavated channel that winds through the middle of the project area. Nine lines of obsolete roads, rail beds, and bunkers that were all once part of the former Joliet Arsenal are within the proposed project area. The tract under consideration lies just south of the Deer Run Industrial Park and is located west of State Highway 53.

According to available information, prior to agriculture and arsenal development, most of the site's natural landscape was dominated by mesic and wet prairie, sedge meadow, and scattered oak savanna to the east. Sometime during the onset of agricultural activities before 1940, the area was drained and converted to farmland, primarily pasture. In more recent years, invasive woody plants have spread through some of the area, reducing the extent of open grassland habitat.

1.3 PURPOSE OF THE PROPOSED ACTION

The purpose of the Drummond Floodplain and Middle Grant Creek restoration projects is to restore ecological conditions and processes across the landscape so that hydrological functions, topography, soils, vegetation, and habitat more closely approximate the pre-development conditions to the extent possible. Restoration of the tallgrass prairie habitat and ecosystems will conserve and enhance native populations of fish, wildlife, and plants in accordance with Midewin's establishing legislation, the Illinois Land Conservation Act of 1996 (ILCA, PL 104-106).

A desired condition outlined in the Midewin Land and Resource Management Plan (Prairie Plan) is a more natural appearing landscape, where Midewin's watersheds "sustain healthy ecosystems and provide conditions for the viability of native riparian and aquatic species. Soil properties, hydrological patterns, vegetation, and watershed disturbances mimic the natural range of variability" (Prairie Plan, p. 2-3). Restoration of the Drummond Floodplain and Middle Grant Creek tracts support the Prairie Plan goal to "improve and protect watershed conditions to provide the water quality and quantity and soil conditions necessary to support ecological functions and intended beneficial uses" (Prairie Plan, p. 2-7).

The Forest Service proposes to restore, to the extent possible, the Drummond Floodplain and Middle Grant Creek areas to pre-development conditions in order to comply with the responsibilities and obligations outlined in ILCA and the Prairie Plan. The goals within each project area are to:

- Implement integrated watershed restoration to restore and optimize hydrological, aquatic, and soil conditions for ecological values.
- Restore habitat and ecosystems.
- Improve scenic integrity.

Restoration of the Drummond Floodplain and Middle Grant Creek project areas will improve the interaction between Jackson Creek and Grant Creek and their associated floodplains. It will reduce erosion of the stream banks and improve storm water retention so that more water is available for groundwater recharge and restoration of wetland habitat and native prairie ecosystems.

1.4 NEED FOR THE PROPOSED ACTION

DRUMMOND FLOODPLAIN RESTORATION

The need to restore the Drummond Floodplain project area is the result, in part, of the USDA Forest Service adapting to changes in the area's hydrology from the newly developed Deer Run Industrial Park. Existing conditions are expected to change as the recently constructed storm water system of the adjacent industrial park discharges into the project area at several points, constituting a significant portion of the water supply to the outwash plain and partially defining the quality and extent of potential wetlands in the area. Additionally, construction of a connecting rail line across the floodplain has altered the routes of water movement over the years and reduced the storage capacity of the floodplain. Midewin proposes to adjust to these changes by manipulating and controlling the discharged industrial park stormwater to maximize opportunities for ecosystem restoration.

The project area includes a stretch of Jackson Creek that was channelized in the past, eliminating a long meander. Persistent, severe erosion has occurred since that time as the result of the stream's confinement in the constructed channel. The erosion along the creek needs to be eliminated in favor of a process of natural, balanced channel adjustment. The over-bank stream flow should be able to recharge surrounding wetlands, while floodplain storage would help reduce downstream flooding and improve the water quality. Stormwater from Deer Run Industrial Park should supply existing and restored wetlands with an appropriate quantity of water and be adequately dispersed across the outwash plain in order to recharge the area and support future wetland restoration.

Existing roads and rail beds on the floodplain limit the storage and movement of surface waters, and their removal is expected to improve floodplain and habitat conditions. To improve and protect watershed conditions, a primary objective of the Prairie Plan is the restoration of the "topography, soil profiles, and hardened surfaces in areas disturbed by fill or excavation, including road and rail beds, floodplain spoil piles, and building sites" (Prairie Plan, p. 2-7).

The Drummond Floodplain project area includes many shallow soil areas over dolomite that once supported extensive dolomite prairie communities. Improvements within the Drummond Floodplain project area would provide an opportunity for Midewin to work toward the desired condition of restoring and enhancing dolomite prairie. Native vegetation is absent or suppressed in much of the Drummond Floodplain project area. If left unattended, the existing dolomite prairie and wetland communities may continue to decline, largely because of encroachment by woody species, invasive grasses, and non-native forbs. Likewise, valuable grassland bird habitat needs to be maintained and kept free of invasive vegetation.

MIDDLE GRANT CREEK RESTORATION

Within the project area, Grant Creek was channelized in the past, creating an entrenched channel that is disconnected from the surrounding floodplain. Historically, the floodplain had supported associated wetlands. Because the floodwaters are confined to the channel, the severity of streambank erosion is aggravated and water availability on the floodplain is reduced. Abandoned and obsolete roads, rail beds, several bunkers, and other Army infrastructure on the floodplain limit the storage and movement of floodwaters, and removal of obsolete infrastructure is expected to improve floodplain and habitat conditions. Like the Drummond Floodplain, native vegetation is absent or reduced in much of the Middle Grant Creek project area.

1.5 PROPOSED ACTION

The Forest Service proposes to restore, to the extent possible, the Drummond Floodplain and Middle Grant Creek project areas to pre-development conditions. In both project areas, Army infrastructure would be removed to facilitate planting and enhancement of native vegetation. Additional actions proposed for the Drummond Floodplain project area would include the enhancement and restoration of rare dolomite prairie habitat. A desired condition cited in the Prairie Plan for ecological sustainability includes restoring and maintaining approximately 1,380 acres of dolomite prairie (Prairie Plan, p.3-1).

Specific actions to be carried out in order to successfully restore the Drummond Floodplain and Middle Grant Creek sites are described in Section 2.

Restoration of the Drummond Floodplain and Middle Grant Creek project areas would improve the interaction between Jackson Creek and Grant Creek and associated floodplains. Restoration would reduce erosion of the stream banks and improve stormwater drainage so that more water is available for groundwater recharge and for Midewin's restoration of wetland habitat and native prairie ecosystems.

1.6 PUBLIC INVOLVEMENT SUMMARY

The public was invited to participate in this analysis in December 2001. The Forest Service contacted approximately 500 interested parties on December 7, 2001, requesting comments by January 7, 2002. A scoping package was distributed that included a project description, site map, and a request that interested parties consider the following specific questions:

- Is there any information about the project area (Midewin) that you believe is important in the context of the proposed activities and which the Forest Service might have overlooked?

- For you or the group you represent, what are the potential effects of this proposal about which you are particularly concerned?
- Are there reasonable alternative ways to meet the Purpose and Need (the rationale for conducting activities) for which you would like the Forest Service to develop and analyze the environmental effects?
- Are there issues and concerns, in addition to the ones listed above, which you believe are important and would like to have addressed in the EA? If so, please include your rationale for why they should be analyzed.

1.7 ISSUES RELATED TO THE PROPOSED ACTION

The Interdisciplinary (ID) Team carefully reviewed comments received from the public, other agencies, and Forest Service resource specialists. The ID Team determined that the following issues are relevant to the decisions that must be made for this project, and these issues directly influenced the development of alternatives. Resolution of the issues is measured by indicators, and each alternative has been analyzed in consideration of these indicators.

Issue 1: *Avoid adverse impacts to adjacent private lands.*

Indicator: Potential effects of the proposed project on adjacent private land would be determined by the expected extent of water movement and by engineering design and control structures. Proper planning and design would ensure that private property owners do not experience adverse effects from flooding.

Issue 2: *Avoid adverse impacts to any existing hazardous materials conditions on adjacent Army-owned lands.*

Indicator: 1) Potential effects of the proposed project on hazardous materials would be determined by the existence and location of any contaminants, by the expected extent of water movement, and by the potential for the project to displace or affect any identified contaminants.

Issue 3: *Restore high quality stream and riparian areas along Jackson Creek and Grant Creek.*

Indicator: 1) Restored portions of Jackson Creek, Middle Grant Creek, and associated floodplains would be in compliance with all applicable laws and regulations protecting water quality and would be in compliance with the restoration directives of the Prairie Plan and ICLA, Midewin's enabling legislation. 2) To protect and

improve the restored communities at Midewin, a long-term monitoring program would measure the success of actions.

Issue 4: *Protect aquatic resources in Jackson Creek and Grant Creek.*

- With implementation of mitigation measures, restoration activities are expected to have minimal short-term adverse effects and positive long-term effects on the aquatic resources at Jackson Creek and Grant Creek.
- Restoration of the Drummond Floodplain and Middle Grant Creek areas should increase and enhance the in-stream, riparian, and wetland habitat associated with Jackson and Grant creeks and their floodplains, and benefit aquatic fauna, including breeding populations of amphibians.

Indicator: 1) Potential effects of the alternatives on existing aquatic resources would be determined by potential risks and/or benefits to the aquatic biota within the project area. 2) Potential effects would also be determined by compliance with the Clean Water Act, the Prairie Plan, and all applicable regulations. 3) Proper mitigation, including an erosion control plan, would ensure that construction activities do not have adverse effects on the aquatic communities.

Issue 5: *Protect existing wetlands and remnants of native vegetation.*

- If the Drummond Floodplain and Middle Grant Creek project areas are not improved, the existing dolomite prairie and wetland communities may continue to decline, largely because of encroachment by invasive plants.
- With implementation of sound management activities, demolition and construction should have minimal or no adverse effects on existing wetlands and native prairie remnants, including sensitive dolomite prairie habitat.
- Once restoration of the floodplain is complete, certain areas will receive more surface and ground water. Changes in the floodplain could result in changes to existing plant and wildlife communities. However, project objectives are to create high quality habitat for native species and promote the growth of native species. The adverse impacts from flooding should be quickly compensated by increased growth and development of highly valued native habitat.

Indicator: 1) Potential effects to existing wetlands and native prairie remnants would be determined by the potential for flooding and the mechanisms in place to control water movement. 2) Potential effects would also be determined by compliance with the Clean Water Act, the Prairie Plan, and ICLA. 3) Proper management practices and

monitoring would ensure that demolition and construction activities related to restoration will not have adverse impacts on existing native prairie remnants.

Issue 6: *Protect Federal Endangered and Threatened species, State Endangered and Threatened species, and Regional Forester Sensitive Species.*

- If the Drummond Floodplain and Middle Grant Creek project areas are not improved, encroachment by invasive plant species and noxious weeds will continue to threaten the status of Threatened, Endangered, and Sensitive plant species. Noxious weeds and invasive plant species pose a serious threat to rare dolomite prairie habitat and the Threatened, Endangered, and Regional Forester Sensitive Species associated with this habitat.
- Increased saturation and inundation within the project areas could result in adverse impacts to Threatened, Endangered, and Sensitive species. In particular, increased saturation and inundation could result in adverse impacts to sensitive dolomite prairie habitat and plant and animal species associated with this habitat, including the Federal Endangered leafy prairie-clover.
- With implementation of sound management activities, demolition and construction activities should have minimal or no adverse effects on Threatened, Endangered, and Sensitive species.

Indicator: 1) Improvements to the Drummond Floodplain and Middle Grant Creek would be in compliance with the Threatened and Endangered Species Act and the Prairie Plan. 2) Appropriate mitigation and monitoring would ensure that there is minimal or no adverse impacts on Threatened, Endangered, and Sensitive species from demolition and construction activities.

Issue 7: *Locate and protect heritage resources.*

Indicator: 1) Avoidance or mitigation of adverse effects to heritage resources determined to be potentially eligible or eligible for listing in the National Register of Historic Places that are within or immediately adjacent to the project areas.

Indicator: 2) Compliance with Section 106 of the National Historic Preservation Act and other applicable Federal mandates.

Issue 8: *Future recreational opportunities and scenic quality may be affected by the restoration activities.*

Indicator: 1) Potential impacts to recreational opportunities and scenic quality would be determined by proximity of restoration actions to future trails and other public

amenities. 2) Potential impacts to scenic quality would be determined by the potential for the action to detract from or enhance the scenic value of the area.

1.8 ISSUES ELIMINATED FROM FURTHER STUDY

One comment received during the public scoping period expressed concern over the cost, both financially and environmentally, of bunker removal in the Middle Grant Creek project area. The respondent asked whether the restoration could be successful if the bunkers were left in place. This issue was eliminated from further study because the project is not believed to have strong potential for success with the bunkers remaining in place, as they severely limit the storage and movement of floodwaters. Because of the cost of removing them, only select bunkers located in sites where they could interfere with or prevent wetland and hydrologic restoration would be demolished. Thus demolition would be limited to those bunkers whose removal would improve floodplain and habitat conditions. Achieving project goals in the most cost-effective manner remains an important factor in restoring prairie ecosystems at Midewin.

1.9 DECISIONS THAT MUST BE MADE

Midewin's Prairie Supervisor must decide whether to restore the tallgrass prairie ecosystem and habitat in the Drummond Floodplain and Middle Grant Creek project areas. The restoration activities are introduced in Section 1.5 and detailed in Section 2.0. If the Prairie Supervisor decides to perform restoration activities, then she must also decide on the following specific management activities:

- What mitigation measures to implement in order to minimize adverse effects and protect habitat from changes in hydrology following restoration.
- What mitigation measures to implement to minimize resource damage during construction activities.
- What standard measure of success to use in determining the effectiveness of restoration.
- What non-natural solutions to utilize to simulate and restore more natural conditions in a cost effective manner (e.g., use of control structures; construction of swales or berms to control water).

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

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

1.10 APPLICABLE REGULATORY REQUIREMENTS, REQUIRED COORDINATION, LICENSES, PERMITS

The Drummond Floodplain and Middle Grant Creek restoration projects would comply with the following regulations:

1. National Forest Management Act (NFMA, 36 CFR 219.27)
 - ✓ Consistent with NFMA guidelines.
 - ✓ Prevent or reduce serious long-lasting damage and hazards from pests.
 - ✓ Provide and maintain for diversity of plant communities.
 - ✓ Prevent the destruction or adverse modification of critical habitat for Threatened and Endangered species.
 - ✓ Protect soil and water conservation resources.
2. Section 7 (c) of the Endangered Species Act (16 U.S.C. 1531 et seq.)
 - ✓ Require concurrence with the U.S. Fish and Wildlife Service.
 - ✓ Protect Federal Threatened and Endangered species.
3. Sections 401 and 404 of the Clean Water Act (33 U.S.C. 1251 et seq.), as amended. Executive Order 11990, Protection of Wetlands (42 F.R. 26961). Sections 401 and 403 of the Rivers and Harbors Act of 1899.
 - ✓ Protect all navigable waters; including all tributaries and wetlands connected to navigable waters.
4. Section 106 of the National Historic Preservation Act of 1966 (U.S.C. sec 470), as amended.
 - ✓ Protect important heritage resources.
 - ✓ Requires consultation with the State Historic Preservation Office.

The various planned restoration activities would require coordination or concurrence with the following agencies for licenses, permits and approvals:

- U.S. Fish and Wildlife Service for Federal Threatened and Endangered species.

- U.S. Army Corps of Engineers for work in waters of the U.S. (WUS), and in wetlands adjacent to WUS.
- Illinois Environmental Protection Agency for Section 401 water quality certification.
- Illinois Department of Natural Resources for State Threatened and Endangered species and work within a floodplain.
- Illinois State Historic Preservation Office for heritage resource protection.

Coordination would be initiated through submittal of the Joint Application Packet entitled “Protecting Illinois Waters”.¹

1.11 PRAIRIE PLAN BACKGROUND

The Midewin Land and Resource Management Plan (Prairie Plan) was prepared to meet the requirements of the National Forest Management Act (NFMA), as amended. Effects of restoration at Midewin were thoroughly analyzed in the Final Environmental Impact Statement for the Prairie Plan (USDA Forest Service 2001, 2002a, 2002b), which provides direction and guidance for activities at the project level. The restoration actions proposed in this EA are consistent with, and tiered to, the Prairie Plan, where it is estimated that initial restoration activities at Midewin will cover 250 to 500 acres yearly. The proposed project would restore up to 855 acres. Activities proposed to restore the Drummond Floodplain and Middle Grant Creek project areas and analyzed in this EA would occur in Management Area 1 – the Prairie Ecosystem Restoration Area.

1.12 OTHER RELATED PROJECTS IN THE AREA

Other Forest Service projects likely to occur in or near the project areas and considered in this EA include herbicide use to control noxious weeds and invasive plants, along with prescribed burning. The affects of these actions were analyzed in two separate Environmental Assessments. Decision Notices were published in 2001 for herbicide use (including those areas under consideration in this EA), and in 2002 for prescribed fire in portions of Midewin, including a large section of the Drummond Floodplain project area. The Integrated Pest Management (IPM)-proposed actions considered in this EA, the environmental effects from the use of specified herbicides to control noxious weeds and invasive plant species, and the use of prescribed burning

¹ This permit application packet contains the necessary application forms and information for applying for U.S. Army Corps of Engineers and State of Illinois permits to perform work in waters within Illinois.

are tiered to those Environmental Assessments and Decision Notices, where in-depth analyses of these actions have been completed for very similar environments and habitats.

2.0 ALTERNATIVES

This section describes the alternatives considered for each restoration project, including no action. Information is provided on how the alternatives were developed, a detailed description of each alternative, alternatives considered but eliminated from detailed study, and a summary of environmental consequences for each alternative.

The intent of this EA is to determine the effects of restoration activities on the human and natural environment at Midewin. Based upon written comments received in response to the December 7, 2001 public scoping notice, the ID Team formulated three project alternatives for the Drummond Floodplain project area and two for the Middle Grant Creek project area.

2.1 ALTERNATIVES

2.1.1 ALTERNATIVE 1 – PROPOSED ACTION

DRUMMOND FLOODPLAIN PROJECT AREA

Alternative 1 for the Drummond Floodplain tract is the action described in the public scoping letter of December 2001. The site is approximately 240 acres and is bounded on the south by an abandoned rail bed, on the west by private property and the Burlington Northern/Santa Fe Railroad (BNSF RR), on the north by the property line of the Forest Service and BNSF RR, and on the east by the riparian area and old channel (oxbow wetland) of Jackson Creek and the railroad spur linking the Deer Run Industrial Park to the BNSF RR (Figure 2).

The following actions would be implemented under Alternative 1:

- Restoration of the Drummond Floodplain project area involves the detention and routing of surface waters and stormwaters from the Deer Run Industrial Park onto the outwash plain of the project area. Actions that enhance the movement of water onto the project area include removal or grading of roads and rail beds and their adjacent ditches, filling or blocking of ditches, construction of swales and culverts to connect floodplain areas, and use of constructed controls to manage water levels in wetlands.
- Improve the stream channel and increase the connection between the channel and the floodplain, in part, by the following: excavating a floodplain bench along the channelized reach and the south bank of Jackson Creek, which includes removal of the Drummond Road bypass; stabilizing eroding banks using erosion netting, root wads, willow cuttings, native vegetation, and other techniques that emulate natural channel structures; restoring the floodplain to a more natural condition by removing drain tiles (some tile lines would be broken); and removing abandoned telephone and

electrical poles and lines, fences, spoil piles, and other debris, including the pads along West Patrol Road.

- Implement an Integrated Pest Management (IPM) approach to control and remove woody, invasive, and non-native species. IPM methods would include mechanical treatments, prescribed fire, mowing, competition from native plants, and herbicide applications. Herbicide treatment would consist of spot foliar spraying with hand-held or backpack sprayers. The following EPA approved herbicides would be used for weed control: 2,4-D, glyphosate, triclopyr, clopyralid, pelargonic acid, sethoxydim, fosamine ammonium salt, and imazapic. IPM techniques of prescribed burning and mowing would be continued after the initial invasive species control actions to manage the restored prairie, wetland, and savanna.
- Monitor restored areas to determine results of management efforts (herbicide use², prescribed burning³, mowing, etc.) prior to enhancing native vegetation remnants. Appropriate native species would be planted to restore wetland, prairie, and savanna vegetation. Appendix A lists the desired plant species for restored native vegetation in the Drummond Floodplain project area. The timing, types, and amounts of plant materials (seeds, plugs, transplants) would be determined by the soil type and level of saturation in an area, as well as the availability of plant materials. Further over-seeding and planting would be used to enhance restorations during the ensuing three to five years.
- Protect and enhance existing native vegetation remnants by burning, noxious weed and invasive species control, brush removal, and enhancement seeding. Mitigation measures, including surveys of targeted areas, flagging, and the exclusion of earth disturbing and other potentially harmful activities, would also protect native remnants (Section 4.1).
- Restore rare dolomite prairie habitat; protect and enhance existing dolomite prairie remnants using the management techniques outlined above.
- West Patrol Road would remain in place to provide a hydrological buffer between the Drummond Floodplain project area and a section of dolomite prairie west of the road containing several sensitive plant species, including the Federal Endangered leafy prairie-clover (*Dalea foliosa*). Adjacent private property would also be protected from possible flooding by retaining the road.

^{2,3} Monitoring is also discussed in the Environmental Assessments, *Herbicide Use for Invasive Plant Species and Noxious Weeds Control* and *Prescribed Fire* (USDA Forest Service, Midewin National Tallgrass Prairie).

- Debris generated from the removal of unused remnants of Army infrastructure such as abandoned rail beds, roads, telephone and electrical poles and lines, fences, spoil piles, ballast, and fill material would be recycled or disposed of appropriately. Recycling and reuse would be strongly encouraged, but would depend on market conditions and economics. A wood chipping operation could be established on-site to facilitate the disposal of woody debris (and minimize the cost of disposal). All demolition and removal activities would be in compliance with OSHA (Occupational Safety and Health Administration) regulations.
- Rubble piles (both concrete and dolomite) would be removed from the Jackson Creek floodplain. Concrete rubble would be disposed of in an appropriate manner. The dolomite material would be stockpiled elsewhere and be available for restoration of dolomite prairie substrate.

MIDDLE GRANT CREEK PROJECT AREA

Alternative 1 for the 385-acre Middle Grant Creek project area (Figure 2) is the action described in the public scoping letter of December 2001. The following actions would be implemented under this alternative:

- Improve and stabilize the channel by excavating along its entrenched reaches to expand the floodplain and alleviate severe erosion. Excavate a swale to increase the flood-stage hydrological connections between Grant Creek and the wetlands within the project area to the south.
- Stabilize the streambank using appropriate native species and root wads; manage riparian vegetation to benefit aquatic and terrestrial communities.
- Improve hydrological connections by filling, blocking, or regrading drainage ditches to the natural contour to reduce drainage losses. Remove or disable drain tiles by breaking them.
- Include the following actions to improve landscape reconstruction and soil rehabilitation: obliterating and regrading or rehabilitating roads, rail beds, and culverts within the bunker field; removing spoil piles, debris and ballast from abandoned rail beds; and removing bunkers within floodplain or wetland areas.
- Implement an Integrated Pest Management (IPM) approach for this area to control woody, invasive, and non-native species similar to the IPM approach described for the Drummond Floodplain project area. IPM techniques could include mechanical treatments, prescribed fire, mowing, grazing, competition from native plants, and herbicide applications.

- Continue IPM techniques of mowing and possibly grazing after the initial invasive species control actions to manage the restored prairie, wetland, and savanna. Spot control of invasive plant species with herbicides would help prevent future infestations.
- Monitor areas as described for the Drummond Floodplain project area. Appendix A lists the desired plant species for restored native vegetation for the Middle Grant Creek project area.
- Protect and enhance existing vegetation remnants and aquatic resources as described for the Drummond Floodplain project area.
- Follow the same actions described for the Drummond Floodplain tract for the disposal of debris. Within the Middle Grant Creek project area, bunkers that directly impede restoration efforts would be removed. Other bunkers would be removed and road cuts filled to improve floodplain and habitat conditions. Bunkers within the southeast corner of the Middle Grant Creek project area were among others considered in the Environmental Assessment, *Demolition and Removal of Unneeded and Unsafe Facilities and Structures* (USDA Forest Service, Midewin NTP 2001b).

2.1.2 ALTERNATIVE 2 – ADDITIONAL ACRES RESTORED ON DRUMMOND FLOODPLAIN PROJECT AREA (PREFERRED ACTION)

DRUMMOND FLOODPLAIN PROJECT AREA

This alternative addresses the issue of protecting remnants of native vegetation. Under Alternative 2, the Drummond Floodplain project area would be increased to approximately 470 acres by the extension of the southern boundary from the abandoned rail bed to a drainage ditch located on Midewin property (Figure 2). The extension of the southern boundary would allow Midewin to more fully adjust to, and take advantage of, changes in the area's hydrology that are occurring from development of Deer Run Industrial Park. Alternative 2 would still retain West Patrol Road to protect the Federal Endangered leafy prairie-clover (*Dalea foliosa*) and adjacent private property from possible flooding. By expanding the project boundaries, Alternative 2 would restore approximately 230 more acres than Alternative 1, and would protect and rehabilitate approximately 50 more acres of native vegetation remnants (3.6 Vegetation and Natural Communities). Although these areas would eventually be restored and rehabilitated as directed in the Prairie Plan, this alternative would begin the process sooner. The ditch along TNT Road would be graded to route stormwater. A major ditch (Federal waters of the U.S. and within a 100-year floodplain) between TNT and West Patrol Road (the southern boundary of the project area) would be filled in along with those ditches discussed under Alternative 1.

MIDDLE GRANT CREEK PROJECT AREA

No additional acres are proposed for the Middle Grant Creek portion of this restoration project. Alternatives 1 and 2 for the Middle Grant Creek project area are identical.

2.1.3 ALTERNATIVE 3 – NO-ACTION

DRUMMOND FLOODPLAIN PROJECT AREA

Under Alternative 3, there would be no improvements made to the Drummond Floodplain project area or to that portion of Jackson Creek within the Drummond Floodplain tract. Erosion of streambanks would remain unchanged. Excavation along the creek would not take place, and there would be no improvement in the routing and storage of water. Roads and rail beds would remain in place and continue to limit wetlands. Wetland habitat would not be restored within the project area.

MIDDLE GRANT CREEK PROJECT AREA

Under Alternative 3, there would be no improvements made to Middle Grant Creek and the surrounding land, including the upper portion of the outwash plains. Watershed and wetland restoration would not occur within the project area. Floodwaters would continue to be confined to the stream channel, aggravating the severity of stream bank erosion and reducing water availability on the floodplain. Hydrologic connections that once existed would not be reestablished. Nine lines of obsolete roads, rail beds, and bunkers would remain and continue to inhibit movement and storage of floodwaters.

2.2 ALTERNATIVES DROPPED FROM FURTHER ANALYSIS

DRUMMOND FLOODPLAIN PROJECT AREA

One alternative considered and dismissed from further analysis was the reconfiguration of Jackson Creek to its original meander, located south of the existing channel. This alternative was discarded because the existing channel is down-cut over three feet, and reconfiguring Jackson Creek from its current route would not be feasible without considerable cost and disruption, including destruction of existing wetlands and associated plant and animal species.

Another alternative considered and dismissed from further analysis was the removal of West Patrol Road to restore a more natural landscape along the western boundary of the Drummond Floodplain project area. This alternative was discarded because the road provides a hydrological barrier between the Drummond Floodplain project area and a dolomite prairie remnant containing the Federal Endangered leafy prairie-clover (*Dalea foliosa*). The road also provides protection from flooding onto adjacent private property. To some extent, even without the road, these areas would be protected from changes in hydrology by the distance from the water source. However, the road does provide additional protection, and it was determined that it should

remain in place for the present. Options for removing it may be considered at a future date following restoration of the area's hydrology.

MIDDLE GRANT CREEK PROJECT AREA

An alternative considered and dismissed for the Middle Grant Creek area was to divert the stream channel south through the low-lying topography within the bunker field. This alternative proposed to restore a channel with a broad open floodplain and allow it to disperse onto the broader, more gradual floodplain of Middle Grant Creek. Creation of a substantial reach outside the property boundaries of Midewin would necessitate access to, and extension of, the project downstream to Army lands currently under remediation, in order to reconnect with the existing channel. Although this alternative could be accomplished, it could not be implemented in an expeditious manner. The cost, time, coordination, and contamination issues preclude the feasibility of such an action at this time. In addition, moving the creek channel would adversely impact the aquatic community currently existing in Middle Grant Creek and would require extensive and costly mitigation.

2.3 SUMMARY MATRIX OF ENVIRONMENTAL IMPACTS

The following matrix compares the alternatives by objectives and issues. Detailed information on the issues is provided in Section 1.7.

Summary Matrix of Environmental Impacts

Consequences	Drummond Floodplain Restoration			Middle Grant Creek Restoration	
	Alternative 1	Alternative 2	Alternative 3 (No action)	Alternative 1	Alternative 3 (No action)
<p><i>Objective:</i> To restore, to the extent possible, the Drummond Floodplain and Middle Grant Creek project areas to pre-development conditions.</p>	Yes, but to a lesser extent than Alternative 2.	Yes	Does not meet the objective.	Yes	Does not meet the objective.
<p><i>Objective:</i> To adapt to changes in hydrology that are occurring with the development of the Industrial Park.</p>	Yes, but to a lesser extent than Alternative 2.	Yes, provides the greatest opportunity to adapt to and take advantage of changes in the area's hydrology.	Does not meet the objective.	Yes	Does not meet the objective.
<p><i>Issue 1:</i> Avoid adverse impacts to adjacent private lands</p> <p><u>Indicator:</u> Expected extent of water movement and by engineering design and control structures.</p>	Retention of West Patrol Road eliminates the possibility of flooding on adjacent private land, and adjacent prairie supporting the Federal Endangered leafy prairie-clover.	Retention of West Patrol Road eliminates the possibility of flooding on adjacent private land, and adjacent prairie supporting the Federal Endangered leafy prairie-clover.	No effect	No effect when proper planning and design is implemented.	No effect
<p><i>Issue 2:</i> Avoid adverse impacts to any existing hazardous materials conditions on adjacent Army-owned lands</p> <p><u>Indicator:</u> Existence and location of any contaminants, expected extent of water movement, and the potential for the project to displace or affect any identified contaminants.</p>	No effect	No effect	No effect	No effect	No effect

Consequences	Drummond Floodplain Restoration			Middle Grant Creek Restoration	
	Alternative 1	Alternative 2	Alternative 3 (No action)	Alternative 1	Alternative 3 (No action)
<p><i>Issue 3:</i> Restore high quality stream and riparian areas along Jackson Creek and Grant Creek.</p> <p><u>Indicator:</u> Compliance with all Federal, state, and local regulations protecting water quality, and with the restoration directives of the Prairie Plan and the ILCA of 1996.</p> <p><u>Indicator:</u> A long-term monitoring program will measure the success of actions to protect and improve the restored communities at Midewin.</p>	<p>Compliant</p> <p>Yes</p>	<p>Compliant</p> <p>Yes</p>	<p>Stabilization would take much longer under this alternative. Even if conditions remain the same, improvements from natural processes could take decades. Conditions continue to change from upstream development.</p>	<p>Compliant</p> <p>Yes</p>	<p>Stabilization would take much longer under this alternative. Even if conditions remain the same, improvements from natural processes could take decades. Conditions continue to change from upstream development.</p>
<p><i>Issue 4:</i> Protect aquatic resources in Jackson Creek and Grant Creek.</p> <p><u>Indicator:</u> Potential risks and/or benefits to the aquatic biota within the project area.</p> <p><u>Indicator:</u> Compliance with the Clean Water Act, the Prairie Plan, and all applicable state and local regulations.</p> <p><u>Indicator:</u> Proper mitigation, including an erosion control plan, will ensure that construction activities will not have adverse effects on the aquatic communities.</p>	<p>Alternative 1 would protect and improve aquatic resources. No adverse impact when proper management and mitigation techniques are implemented.</p> <p>Compliant with the Prairie Plan to a lesser extent than Alternative 2 because of the smaller area (240 acres) proposed for restoration.</p>	<p>Alternative 2 would protect and improve aquatic resources. No adverse impact when proper management and mitigation techniques are implemented.</p> <p>Compliant (470 acres)</p>	<p>No impact on in-stream fauna (fish macroinvertebrates). However, this alternative would not restore wetland habitat for amphibians and wetland species.</p>	<p>Alternative 1 would protect and improve aquatic resources. No adverse impact when proper management and mitigation techniques are implemented.</p> <p>Compliant</p>	<p>No impact on in-stream fauna (fish macroinvertebrates). However, this alternative would not restore wetland habitat for amphibians and other wetland species.</p>

Consequences	Drummond Floodplain Restoration			Middle Grant Creek Restoration	
	Alternative 1	Alternative 2	Alternative 3 (No action)	Alternative 1	Alternative 3 (No action)
<p><i>Issue 5:</i> Protect existing wetlands and remnants of native vegetation.</p> <p><u>Indicator:</u> Potential for excessive flooding and the mechanisms in place to control water movement.</p> <p><u>Indicator:</u> Compliance with the Clean Water Act (wetlands), the Prairie Plan, and the ILCA of 1996.</p> <p><u>Indicator:</u> Proper management practices and monitoring will ensure that demolition and construction activities do not have adverse impacts on existing native prairie remnants.</p>	<p>Hydrological designs would regulate extent and frequency of flooding to avoid adverse impacts. Water dispersed over a smaller area (240 acres) resulting in a less stable hydrological regime. Could inundate existing wetlands. Retention of West Patrol Road to protect sensitive species.</p> <p>Compliant</p> <p>No impact when proper management and mitigation techniques are implemented.</p>	<p>Hydrological designs would regulate extent and frequency of flooding to avoid adverse impacts. Water dispersed over a greater area (470 acres) resulting in a more stable hydrological regime; existing wetlands less affected. Retention of West Patrol Road to protect sensitive species.</p> <p>Compliant</p> <p>No impact when proper management and mitigation techniques are implemented.</p>	<p>Adverse impacts to sensitive areas from continued encroachment of noxious weeds and invasive species.</p> <p>Noncompliant with the Prairie Plan and the ILCA.</p>	<p>No impact to sensitive areas or to species within these areas when proper management and mitigation techniques are implemented.</p> <p>Compliant</p>	<p>Adverse impacts to sensitive areas from continued encroachment of noxious weeds and invasive species.</p> <p>Noncompliant with the Prairie Plan and the ILCA.</p>

Consequences	Drummond Floodplain Restoration			Middle Grant Creek Restoration	
	Alternative 1	Alternative 2	Alternative 3 (No action)	Alternative 1	Alternative 3 (No action)
<p><i>Issue 6:</i> Protect Federal Endangered and Threatened species, State Endangered and Threatened species, and RFSS.</p> <p><u>Indicator:</u> Compliance with the Threatened and Endangered Species Act and the Prairie Plan.</p> <p><u>Indicator:</u> Proper mitigation and monitoring will ensure that there will be minimal or no adverse impacts on Threatened, Endangered, and sensitive species from demolition and construction activities.</p>	<p>Compliant. Retention of West Patrol Road provides protection for sensitive species.</p> <p>No impacts when proper management and mitigation techniques are implemented.</p>	<p>Compliant. Retention of West Patrol Road provides protection for sensitive species.</p> <p>No impacts when proper management and mitigation techniques are implemented.</p>	<p>Noncompliant with the Prairie Plan.</p> <p>Adverse impacts from continued encroachment of noxious weeds and invasive species.</p>	<p>Compliant</p> <p>No impacts when proper management and mitigation techniques are implemented.</p>	<p>Noncompliant with the Prairie Plan.</p> <p>Adverse impacts from continued encroachment of noxious weeds and invasive species.</p>
<p><i>Issue 7:</i> Locate and Protect heritage resources</p> <p><u>Indicator:</u> Compliance with Section 106 of the National Historic Preservation Act and other Federal requirements mandating protection of significant heritage resources.</p>	Compliant	Compliant	No effect	Compliant	No effect
<p><i>Issue 8:</i> Future recreational opportunities and scenic quality may be impacted by restoration.</p> <p><u>Indicator:</u> Proximity of the actions to future trails, campgrounds and other amenities.</p> <p><u>Indicator:</u> Potential for the actions to detract from or enhance the scenic value of the area.</p>	<p>No adverse impacts to future recreational opportunities.</p> <p>Beneficial impacts to recreationists by increasing ecological values and aesthetics of the project area. Benefits less than under Alternative 2 because of smaller restoration project area.</p>	<p>No adverse impacts to future recreational opportunities.</p> <p>Proposes the greatest benefits by increasing ecological values and aesthetics within a larger project area.</p>	<p>Adverse impacts to the scenic value of the area from existing debris piles and abandoned infrastructure.</p> <p>Adverse visual impacts from infestations of noxious weeds and invasive species.</p>	<p>No adverse impacts to future recreational opportunities.</p> <p>Beneficial impacts to recreationists by increasing ecological values and aesthetics of the project area.</p>	<p>Adverse impacts to the area's scenic value from existing debris piles, bunkers, and abandoned roads, rail beds, and culverts within the bunker field.</p> <p>Adverse visual impacts from infestations of noxious weeds and invasive species.</p>

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This section describes the present condition of the environment and changes that may be expected by implementing the action alternatives or by taking no action at this time. The key issues generated through the scoping process and the requirements of the National Environmental Policy Act (NEPA) define the general scope of environmental concern for this project. This section forms the scientific and analytic basis for the comparison of alternatives. Cumulative effects are discussed for each key issue identified below. Cumulative effects result from incremental impacts of proposed activities when added to other past, present, and reasonably foreseeable actions regardless of what agency or person undertakes such actions. A description of the past, present, and reasonably foreseeable actions at Midewin, as a basis for the cumulative effects analysis, is presented below.

3.1 CUMULATIVE EFFECTS INTRODUCTION – PAST, PRESENT, FUTURE ACTIONS

The USDA Forest Service administers approximately 15,080 acres within the Midewin National Tallgrass Prairie and is expected to receive up to 3,000 additional acres through transfer from the Army. Approximately 3,000 acres of Midewin are currently in row crop or hay production, with another 800 acres in the initial restoration phases. The remaining land is pasture, abandoned fields, fencerows, abandoned home sites, structures built for the Joliet Army Ammunition Plant (Joliet Arsenal), seedbeds, and remnants of native vegetation (forests, prairie, and wetlands).

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

Present and potential future activities at Midewin include prescribed burning, exotic species control, hydrologic restoration, natural community restoration, grassland bird management (including grazing by livestock), continued row crop production, stream rehabilitation, building demolition, hazardous materials cleanup, scientific research, environmental education, and trails and recreation facilities construction. Present and future activities on the former Joliet Arsenal that may impact restoration activities at Midewin include development of the Deer Run Industrial Park, construction and operation of the Will County Landfill, management of the Lincoln National Cemetery, development of a second industrial park, and Army remediation operations.

3.2 ADJOINING LANDS

AFFECTED ENVIRONMENT - DRUMMOND FLOODPLAIN PROJECT AREA – ADJOINING LANDS

In addition to lands under Forest Service management, the following lands adjoin the Drummond Floodplain project area and could be affected by the proposed restoration: the Deer Run Industrial Park and land under Army ownership (including a former toluene tank farm and the former sellite manufacturing area with a drainage ditch) on the east; the Exxon-Mobil refinery and private property on the west; Army-owned land containing the M9 northern ash pile southeast of the Jackson Creek cutoff; and the BNSF Railroad.

ENVIRONMENTAL CONSEQUENCES – DRUMMOND FLOODPLAIN PROJECT AREA - ADJOINING LANDS

Alternative 1 – Drummond Floodplain Project Area

There would be no adverse impacts to the Deer Run Industrial Park from restoration of the upstream Drummond Floodplain.

There would not be adverse impacts to the Exxon-Mobil refinery located west of the project limits. The refinery is located at a higher elevation than the project area, and therefore Alternative 1 would have no hydrological impacts.

There would not be adverse impacts to the adjacent Army-owned property west of West TNT Road containing a former toluene tank farm and a former sellite manufacturing area. Like the refinery, this area is elevated above the project area and therefore would not be affected by an increase in water (also see Section 3.3 Hazardous Substances). The water supply through the army-owned drainage ditch connected to the sellite area would not change, as stormwaters would not be routed through the ditch. Therefore, water flows and downstream erosion in the ditch would not increase from implementation of this alternative. The M9 northern ash pile lies southeast of the Jackson Creek wetland just outside the project limits on Army-owned land. The ash pile is located up-gradient, and therefore restoration of the wetland would have no hydrological impacts. There would be no impacts to the private property on the west. West Patrol Road would remain in place to provide a hydrological barrier and prevent flooding impacts.

Herbicide use to control noxious weeds and invasive plant species, as well as prescribed burning, are two Forest Service actions that could affect adjoining properties. The use of herbicides would provide benefits by minimizing the spread of invasive species onto adjacent lands. In particular, herbicide use could benefit an area of rare dolomite prairie located on the adjacent Mobil-Exxon property. In contrast, smoke generated during prescribed fires could adversely affect adjacent properties. The effects of herbicide use and prescribed fire for the Drummond Floodplain were analyzed in two separate Environmental Assessments. Decision Notices were published in 2001

to implement herbicide use at Midewin, including those areas considered in this proposal, and in 2002 to implement prescribed fire in portions of Midewin, including a large section of the Drummond Floodplain project area (See Section 1.12, Other Related Projects in the Area). The Environmental Assessments found that herbicide use and prescribed fire would have minimal environmental effects on Midewin and surrounding lands.

Alternative 2 – Drummond Floodplain Project Area

Under Alternative 2 the impacts to the Deer Run Industrial Park, Exxon-Mobil refinery, Army-owned land, and the private property would be the same as those discussed under Alternative 1.

Alternative 3 – No Action - Drummond Floodplain Project Area

There would be no impact to any adjoining lands under Alternative 3.

AFFECTED ENVIRONMENT - MIDDLE GRANT CREEK PROJECT AREA – ADJOINING LANDS

In addition to lands under Forest Service management, the following lands adjoin the Middle Grant Creek restoration area: the Deer Run Industrial Park, a narrow swath of Army-owned land to the north, and Army-owned land containing a landfill on the southwest.

ENVIRONMENTAL CONSEQUENCES - MIDDLE GRANT CREEK PROJECT AREA – ADJOINING LANDS

Alternatives 1 and 2 – Middle Grant Creek Project Area

There would be no impacts to the Deer Run Industrial Park or to the narrow swath of Army-owned land from restoration of the Middle Grant Creek area. Both properties are located north of Grant Creek and would not be affected by improvements to the floodplain occurring south of the creek. There would be no impacts to the adjacent Army-owned landfill demolition area to the west. The landfill is located approximately ¼-mile from the project area and would not be affected by changes in hydrology within the project site that would occur with restoration.

Alternative 3 – No Action - Middle Grant Creek Project Area

There would be no impacts to adjoining lands under Alternative 3.

Cumulative Effects

There would be no cumulative impacts to the lands adjoining the Drummond Floodplain and Middle Grant Creek restoration areas under the action alternatives. There would be no cumulative impacts under Alternative 3.

3.3 HAZARDOUS SUBSTANCES

AFFECTED ENVIRONMENT

According to the results of an Environmental Risk Assessment performed by the U.S. Army, hazardous substances were not found to substantially impact the aquatic components of the Grant Creek and Jackson Creek ecological systems, nor were they found to impact the terrestrial components of the ecological systems of either project area (U.S. Army, October 1998). Results of the aquatic investigation were based on water quality, habitat, and the health of fish, crayfish, invertebrates, and other aquatic organisms in each of Midewin's streams. For the terrestrial investigation, habitat, historical biological surveys, soil toxicity, and the health of small mammals and deer were examined (USDA Forest Service 2001a).

A Human Health Risk Assessment performed in 1994 at the former arsenal identified two locations adjacent to the Drummond Floodplain project area where calculated risks or hazards exceeded the acceptable levels for future recreational users and industrial workers (U.S. Army, October 1998). The locations include a former toluene tank farm (M10) west of West TNT Road and a sellite manufacturing area (M12) immediately south of the toluene tank farm. Both areas remain under Army ownership.

Historically, accidental releases from the toluene tank farm (M10 west) have occurred, necessitating the establishment of a groundwater management zone (GMZ) to monitor any remnant contamination from these releases. At this time, there are no longer any unresolved hazardous waste issues associated with the site. The toluene tank farm has been remediated, the tanks have been removed, and a final groundwater sampling event has been completed during the spring of 2002 that failed to yield any toluene constituents from several down-gradient monitoring wells. Other groundwater monitoring wells located near the site were determined to be 'clean' during several rounds of testing. A Request for Closure for the site, dated January 22, 2002, was submitted to the Environmental Protection Agency (EPA).⁴ EPA approval is expected once the findings of the most recent groundwater sampling event are incorporated. This site will eventually be transferred to the Forest Service.

The former sellite manufacturing area consists of the work site and a narrow drainage ditch traversing the southwest corner of the Drummond Floodplain project area. The site itself is elevated above the project area and therefore would not be affected by the project. Most of the contamination is concentrated in the drainage ditch that contains lead-contaminated soil to an approximate one-foot depth and a surficial (surface) layer of raw, elemental sulfur. There are no known groundwater issues associated with this site, and there are no data indicating a concern.

⁴ Both the Illinois EPA and the U.S. EPA review the remediation work occurring on the former Joliet Army Ammunition Plant.

This site and drainage ditch will eventually be remediated by the Army and transferred to the Forest Service.

A second groundwater management zone is located around a former acid manufacturing area (M6) and a TNT ditch complex (M8) east of the Drummond Floodplain project limits on the Deer Run Industrial Park. The GMZ does not extend onto the project area, and the contamination does not exceed the GMZ; therefore this project would not affect the contamination in this area.

The Human Health Risk Assessment did not identify any locations within the Middle Grant Creek project area where calculated risks or hazards exceeded the acceptable levels for future recreational users and industrial workers.

At various sites within Midewin, including the Drummond Floodplain and Middle Grant Creek project areas, an arsenic-based herbicide was used by the U.S. Army in the 1950s and 1960s to control vegetation along security fences and on rail beds. Other than the irregular (low potential) presence of arsenic along fences and rail beds, hazardous materials within the Drummond Floodplain and Middle Grant Creek project limits are not considered to be in concentrations of concern.

ENVIRONMENTAL CONSEQUENCES - DRUMMOND FLOODPLAIN RESTORATION – HAZARDOUS SUBSTANCES

Alternative 1 – Drummond Floodplain Project Area

Alternative 1 would have no adverse effects on existing hazardous materials conditions. There are no longer contamination issues associated with the former toluene tank farm, and the former sellite manufacturing site is elevated above the project area and would not be affected by an increase in water. Existing contaminants in the sellite drainage ditch would not be affected by this alternative. Stormwater from the industrial park will not be routed through the ditch. Water flows and downstream erosion in the ditch would not increase from implementation of this alternative. The Forest Service would coordinate with the Army and other agencies to ensure that potential hazardous waste issues associated with adjacent Army land are resolved prior to restoration.

The elevated levels of arsenic found in irregular, localized areas along fences and rail beds are not expected to become mobile as a result of the restoration. Arsenic is fairly immobile in soil and sediment and is not taken up by plants.

Alternative 2 – Drummond Floodplain Project Area

Alternative 2 would have no effects on existing hazardous materials conditions other than those discussed above.

Alternative 3 – No action - Drummond Floodplain Project Area

Alternative 3 would have no adverse effects on existing hazardous materials conditions.

ENVIRONMENTAL CONSEQUENCES - MIDDLE GRANT CREEK RESTORATION - HAZARDOUS MATERIALS

Alternatives 1 and 2 – Middle Grant Creek Project Area

There would be no effect on existing hazardous materials conditions. As mentioned above under Alternative 1 for the Drummond Floodplain tract, elevated levels of any arsenic found along fences and rail beds are not expected to become mobile as a result of the restoration.

Alternative 3 – No action - Middle Grant Creek Project Area

Alternative 3 would not result in adverse effects on existing hazardous materials conditions.

Cumulative Effects

The cumulative effects of all past, present, or reasonably foreseeable future actions within the former Joliet Arsenal would not affect hazardous material stability, immobility, or migration. The Forest Service will coordinate with the Army, as appropriate, for present and future projects to ensure that restoration activities at Midewin do not adversely affect hazardous materials conditions in the area.

3.4 WATER RESOURCES AND HYDROLOGY

AFFECTED ENVIRONMENT

The Jackson Creek and Grant Creek watersheds are characterized by low to rolling slopes and deep to shallow, fine-grained soils that are generally poorly drained, so saturation and shallow inundation occur frequently and extensively. Both watersheds receive runoff from upstream sources that include croplands and other agricultural areas, roads and transportation facilities, and areas of industrial and urban development. Jackson Creek and Grant Creek drain into the Des Plaines River, which supplies municipal drinking water and supports industrial processes,

water-contact recreation, and fishing. The original soils, hydrological functions, and vegetation of the watersheds have been modified or replaced, particularly in wetlands and riparian areas. Alterations include the use of extensive drain tile systems and ditches to drain large areas for conversion to cropland, stream channelization, and urban and industrial development.

Three aquifers underlie Midewin. A shallow dolomite aquifer (Kankakee Formation) is connected to the overlying aquifer of glacial deposits (Henry Formation), and both are separated from a deep Cambrian-Ordovician sandstone aquifer by a thick shale formation (Manquoketa Formation). The water table is generally shallow across Midewin, commonly less than five feet deep. The high water table is particularly observable in the Middle Grant Creek project area where groundwater seeps sustain existing wetlands. Past arsenal activities contaminated localized areas of the shallow aquifers; the contaminated areas remain under the control of the U.S. Army for long-term remediation. Two groundwater management zones are adjacent to the Drummond area. Possible project-related effects to groundwater are discussed in Section 3.3 Hazardous Substances.

AFFECTED ENVIRONMENT – DRUMMOND FLOODPLAIN RESTORATION – WATER RESOURCES

The Drummond Floodplain project area includes approximately ¾-mile of lower Jackson Creek, its floodplain (covering approximately 85% of the project area), and the associated Drummond Dolomite Prairie in the lower part of the Jackson Creek watershed. Currently, Jackson Creek receives runoff from a mix of agricultural, industrial, and urban areas. However, intensive urbanization is projected upstream from Midewin in the Jackson Creek watershed. Table 3-1 indicates the potentially affected area of Jackson Creek.

Table 3-1. Jackson Creek Watershed (Des Plaines River Sub-Basin)

Perennial Stream Miles	Drainage Area square miles (acres)	Drainage Area on Midewin square miles (acres)	Percentage of Watershed in Midewin	Watershed Land Uses	Stream Uses
25	37 (23,680)	1.1 (700)	2.9% (length 1.8 miles)	Agricultural Rural residential Suburban residential Army training area Prairie Parkland Transportation Commercial	Habitat for aquatic organisms Incidental recreational contact Livestock watering

The Drummond Floodplain restoration proposal is the result, in part, of Midewin’s need to adapt to changes in the area’s hydrology from the construction of the Deer Run Industrial Park. The

Forest Service does not have any legal right or responsibility to design or manage stormwater in the industrial park. However, the Deer Run Industrial Park has nevertheless adjusted stormwater design and management conditions to accommodate requests from the Forest Service.

Midewin staff and other interested parties expressed concern about the effects of stormwater from the industrial park on Midewin. It has been the opinion of Midewin staff that it would be preferable for the stormwaters to be discharged into palustrine wetlands on the outwash plain rather than to be discharged directly into Jackson Creek for the following reasons: 1) Discharge of storm runoff into Jackson Creek could increase peak flows and associated streambank erosion; 2) Discharges into Jackson Creek of low quality water could hurt the aquatic community; 3) Discharges onto the outwash plain could increase the water supply to former wetland areas in support of wetland restoration; 4) Palustrine wetlands could help to improve the water quality of the stormwaters; 5) Detention on the outwash plain could help recharge groundwater and thereby help sustain stream flow in Jackson Creek during dry conditions; 6) Discharges from the industrial park onto the outwash plain in part emulates the natural water budget, wherein groundwater was recharged in the gravel deposits that underlie the industrial park and discharged onto the outwash plain at the base of the gravel terrace.

The industrial park designed stormwater facilities (designated as Pond K and Ditch E) to discharge stormwaters at the historic drainage location, i.e. the site of the former Goose Creek drainage. Under that design, the stormwaters would pass through the Jackson Creek cut-off and into Jackson Creek. In collaboration with Midewin, the industrial park has redesigned the stormwater facilities so that some or all of the waters from Pond K and Ditch E can discharge onto the outwash plain west of the industrial park rather than through the historic Goose Creek outlet. This modification of the stormwater system will allow Midewin to use the stormwaters to restore and support wetlands on the outwash plain.

The Drummond Floodplain restoration proposal includes actions that would allow Midewin to route stormwaters from the industrial park to the north, south, and west of the stormwater outlets and perform restoration in the receiving areas.

Jackson Creek is a low-gradient stream with well-developed riffles and pools, and its substrate is primarily bedrock, cobbles, and gravel. Within the project area, Jackson Creek suffers from severe erosion due to deeply entrenched channelization. However, some reaches of Jackson Creek outside of the project area are still in good condition, earning the creek the designation of a “highly valued aquatic resource” by the Illinois Environmental Protection Agency (IEPA). Past inventories of Jackson Creek have given the creek a high rating for biological integrity (a Biological Stream Characterization⁵ index of “B”, IEPA), and the creek has been described by

⁵ BSC is generally based on the diversity of fish populations and the presence of pollution-intolerant species. In the absence of adequate fish survey data, macroinvertebrate data or physical habitat descriptors are used (USEPA, unknown date).

Glass (1994) as one of the “least disturbed streams in Northeast Illinois”. According to the IEPA’s 2000 *Water Quality Report*, Jackson Creek is in full support of its designated uses (Table 3-2). Jackson Creek has diverse fauna, including 34 fish species and 7 mussel species.

Table 3-2. Regulatory Status of Jackson Creek

Data Source	Use Support*	Designated Use**	Cause of Impairment
Intensive basin survey	Full	Overall Use; Aquatic Life	Not impaired

* Illinois streams are assigned the following use support rankings according to how well each stream meets its designated use: Full, Threatened, Partial Support, or Non-support

** Illinois streams are assigned one or more of the following designated uses: Overall Use, Aquatic Life, Fish Consumption, Swimming, Secondary Contact, Drinking Water Supply

In addition to Jackson Creek, there are two substantial drainage ditches (jurisdictional wetlands). One of these ditches flows out of the project area to the north, while the other flows to the west along the southern boundary of the project area (under Alternative 2).

The floodplains within the Drummond Floodplain project area are mainly located in the eastern portion of the tract (Figure 3). Past construction of the connecting rail line across the floodplain has altered routes of water movement and storage. Existing roads and rail beds on the floodplain also limit the storage and movement of floodwater. Because floodwaters are confined to the channelized reaches of Jackson Creek, the severity and persistence of stream bank erosion is aggravated and water availability on the floodplain is reduced.

ENVIRONMENTAL CONSEQUENCES – DRUMMOND FLOODPLAIN RESTORATION – WATER RESOURCES

Alternative 1 – Drummond Floodplain Project Area

Alternative 1 would benefit the area’s water resources and would protect and improve the integrity and functions of the Jackson Creek floodplain. The interaction between Jackson Creek and the floodplain would be improved and flood velocities and the severe erosion along the creek would be reduced. Floodplain storage would decrease downstream flooding and improve the water quality of Jackson Creek. The removal and regrading of Drummond Road and the abandoned rail bed into swales would permit a greater range of floodwater flows and would allow the regulatory floodplain (100-year) to expand southward. The removal of tiles and the impoundment of drainage ditches would create standing water, resulting in increases in the extent, depth, and persistence of soil saturation and ponding. Stormwater from the industrial park would be dispersed over large areas, increasing the soil moisture and raising the water table.

West Patrol Road would remain in place under Alternative 1 to provide adjacent private property with protection from flooding. Furthermore, there are several sensitive plant species, including the Federal listed leafy prairie-clover, that would be buffered by the road and constructed berm from additional water flowing from the east.

The natural hydrological regime in the project area would not be reestablished with restoration. Rather, the hydrology would be manipulated to increase the water supply over areas of hydric soils that were wetter historically. Increasing the amount of water in the area would begin to approximate natural historical conditions. Midewin would manipulate the hydrology with industrial park stormwater in order to emulate the historic system.

Alternative 2 – Drummond Floodplain Project Area

The effects on water resources under Alternative 2 would be similar to those benefits described under Alternative 1 for the Drummond Floodplain, but on a larger scale. Alternative 2 would allow the dissipation of some of the water load on the northern portion of the project site and increase the amount of ground recharge by saturating a greater area.

The drainage ditch along the southern boundary of the site would be impounded, blocked, or filled, thus reducing the rate of surface runoff that leaves the site. Because the ditch is within the 100-year floodplain and is a jurisdictional wetland, the Forest Service would obtain a permit from the Illinois Department of Natural Resources for construction within a regulatory floodplain. A Section 404 permit from the U.S. Army Corps of Engineers (COE) would also be required prior to the placement of fill material in this ditch in compliance with the Federal Clean Water Act. Filling the ditch would result in additional percolation and ponding of water in low-lying areas, expand the floodplain, and increase the wetland acreage in this area. As in Alternative 1, retention of West Patrol Road would eliminate the possibility of flooding on adjacent private land and on adjacent prairie supporting the Federally Endangered leafy prairie-clover.

Alternative 3 – No action - Drummond Floodplain Project Area

Alternative 3 would not manage stormwater from the industrial park for the beneficial effects of habitat restoration. Recharge of the ground water would be left to rainfall percolation. Drain tiles and ditches would remain intact and would continue to drain water away from the hydric soils that cover the area. The water table would not be raised, and Midewin's goal of wetland and prairie restoration (Prairie Plan, p. 2-5) would not be met. Under Alternative 3, the actions outlined for Alternatives 1 and 2 would not be implemented, and restoration of floodplains within the project areas would not occur. The Jackson Creek floodplain would remain unchanged from its current condition.

The severe erosion and scour along the stream would continue short-term, resulting in sediment loads/siltation and degradation of in-stream habitat. Many fish and macroinvertebrate species would be eliminated as riffle and pool habitats are scoured or covered with sediment and disappear (Rankin, 1995). Long-term, however, the stream would eventually stabilize under Alternative 3, although improvements from natural processes could take decades if watershed conditions were to remain the same. Conditions would continue to change from development upstream, preventing the stream from moving toward a more stabilized system.

AFFECTED ENVIRONMENT - MIDDLE GRANT CREEK RESTORATION – WATER RESOURCES

The Middle Grant Creek Restoration project area includes over one mile of Grant Creek and immediately surrounding lands in the middle portion of the Grant Creek watershed and the upper portion of the outwash plains. Two stream channels are included within the Middle Grant Creek project area: the existing channel of Grant Creek and a secondary drainage with an excavated channel that winds through the middle of the project area. Table 3-3 describes the area of Grant Creek potentially affected by restoration activities.

Table 3-3. Grant Creek Watershed

Perennial Stream Miles	Drainage Area sq. miles (acres)	Drainage Area on Midewin sq. miles (acres)	Percentage of Watershed in Midewin	Watershed Land Uses	Stream Uses
4.5	11 (10,273)	6.33 (4052)	40% (length 1.6 miles)	Agricultural Industrial Prairie Parkland Transportation Urban	Habitat for aquatic organisms Incidental recreational contact Livestock watering

The floodplains within the project area are mainly confined to the western boundary and the northern boundary along Grant Creek (Figure 3). The channel of Grant Creek is deeply entrenched in the project area, which limits flooding of the historic floodplain and drains historic wetland areas. Severe bank erosion occurs along Grant Creek, in part because the floodwaters are confined to the channel. The presence of roads, bunkers, and other abandoned infrastructure within the 100-year floodplain further restricts floodplain capacity.

Grant Creek is a low gradient stream with substrate dominated by gravel and sand. Grant Creek is considered a “moderate aquatic resource” by the IEPA, showing low water quality and low potential value due to the limited size of its drainage basin and poor aquatic communities from

insufficient flow and poor water quality. Past inventories on Grant Creek have given it an average rating for biological integrity (Biological Stream Characterization index of “C”, Illinois EPA). According to the IEPA’s *2000 Water Quality Report*, Grant Creek is only partially supporting its designated use; however, the causes of impairment were not identified in the report (Table 3-4). Grant Creek harbors 24 species of fish and 2 species of mussels.

Table 3-4. Regulatory Status of Grant Creek

Data Source	Use Support*	Designated Use**	Cause of Impairment
Monitoring data > 5 years old	Partial	Overall Use; Aquatic Life	Unknown

* Illinois streams are assigned the following use support rankings according to how well each stream meets its designated use: Full, Threatened, Partial Support, or Non-support

** Illinois streams are assigned one or more of the following designated uses: Overall Use, Aquatic Life, Fish Consumption, Swimming, Secondary Contact, Drinking Water Supply

ENVIRONMENTAL CONSEQUENCES – MIDDLE GRANT CREEK – WATER RESOURCES

Alternatives 1 and 2 – Middle Grant Creek Project Area

Streambank stabilization would reduce the erosion/scour/sediment loads that occur under high flow conditions, thereby improving water quality. The natural hydrology of the area would be further restored by the impoundment of ditches (principally the major drainage running through the middle of the project area), the removal or breakage of drain tiles, and the removal of bunkers and roads that inhibit the movement of water across the floodplain. The increase in floodplain area would facilitate the spread of floodwaters over the project site, alleviating some of the downstream floodwater impacts and decreasing bank erosion. The functions and values of the Middle Grant Creek floodplain would be protected.

The major drainage running through the project area is within the regulatory floodplain and is considered Waters of the U.S. (WUS). It therefore would require an Illinois Department of Natural Resources permit for construction within the regulatory floodplain, and a Section 404 permit from the U.S. Army COE prior to the placement of fill material. Filling the drainage would result in increased ponding, and would expand the floodplain and the wetland acreage in the area. Mitigation measures (Section 4.1) would minimize potential adverse effects to Grant Creek, the associated floodplain, and existing wetlands from construction and demolition activities.

Alternative 3 – No action - Middle Grant Creek Project Area

Alternative 3 would not result in improvements to the stream channel or floodplain. Under this alternative, high water flows would not be released to the floodplain, thereby exacerbating the erosion/scour and sedimentation problems currently found within Grant Creek. Roads and bunkers would remain in place and continue to restrict floodplain capacity. Drainage ditches and drain tiles would remain intact and continue to drain water away from hydric soils.

The severe erosion and scour along Grant Creek would continue short-term, resulting in sediment loads/siltation and degradation of in-stream habitat. Long-term, the stream would eventually stabilize, although improvements from natural processes could take decades if watershed conditions remain the same. Conditions would continue to change from development upstream, preventing the stream from moving toward a more stabilized system.

Cumulative Effects

It is unlikely that there would be major cumulative effects on the Jackson and Grant Creek watersheds because the project areas represent such a small portion of each watershed. However, restoration would result in minor cumulative benefits to the two watersheds in water quality improvements through the reduction of flood velocities, a decrease in sediment loads, and improved baseflows immediately downstream from Jackson and Grant Creeks. Alternative 2, which includes approximately 230 more acres in the Drummond Floodplain than Alternative 1, would provide greater benefits to the Jackson Creek watershed.

Future restoration goals for Midewin will include many projects comparable to the actions described in this EA. Together, all future restoration actions could have positive effects on the Jackson and Grant Creek watersheds. Incremental improvements on the floodplains of Midewin would result in changes in flood patterns that have major beneficial ecological and economic consequences for Midewin and downstream areas within the two watersheds. However, improvements to the two watersheds could be offset by other present and potential future upstream activities, for instance, urban expansion and agricultural land use.

Because these projects represent an extremely small portion of the Des Plaines River watershed, there would not be substantial cumulative effects to the watershed, river basin, or floodplain functions of this river.

3.5 WETLANDS

AFFECTED ENVIRONMENT

Midewin uses a wetland classification system from the Illinois Natural Areas Inventory (White, 1978) that recognizes wet prairies, sedge meadows, deep and shallow marshes, seeps, and

streams. Wetlands provide habitat for native plants and wildlife, and they serve to filter pollutants, recharge groundwater, retain floodwaters, buffer open water habitats, and recycle nutrients and minerals.

The fine-grained glacial soils of Midewin generally have low saturated conductivity. As a result, surface ponding occurs frequently in depressional areas and areas of low slope or enclosed drainage. The level topography and poor soil drainage produce extensive areas with persistent saturation at shallow depths. In addition, the water table is generally shallow (less than five feet deep), supporting wetland and wet prairie habitat. Extensive areas of level landscapes exist and are seasonally inundated or saturated; these areas often support wet prairies. Seeps and fens are present along valley sides, at the edges of terraces, and below end moraines.

In the mid-1800s, 41% of Midewin was covered by wetlands, including wet prairies, sedge meadows, pothole marshes, wet typical prairies, seeps, and fens inundated periodically or seasonally. However, by 1900 widespread drainage tiling of wetlands was underway. This human manipulation of the land created many ditches, potholes, and excavated depressions. These areas collect water and, due to lack of maintenance, eventually developed into wetland habitat.

Some pre-existing wetlands that could not be tilled and converted to agricultural uses were left intact; these areas received runoff from uplands and drained areas, and were often used for pasturing or watering livestock. Certain fragile wetlands such as seeps and fens were altered severely by prior livestock use. Other prairie wetlands, no longer protected by periodic fires, were invaded by woody species and began to develop into successional woodlands. Today, stream alterations and the disruption of natural hydrology from past uses continue to prevent recovery of some wetlands.

AFFECTED ENVIRONMENT - DRUMMOND FLOODPLAIN – WETLANDS

Historically, most of the Drummond Floodplain project area was dominated by wet prairie, sedge meadows, and marshes. However, before the onset of arsenal activities in 1940, this area was drained and converted to pasture grasses and crops. Currently, wetlands cover only one-third of the project area, although hydric (wetland) soils comprise a vast majority of the project area, indicating that this area formerly supported wet prairie and other natural wetlands. Figure 4 and Appendix B provide the soil types, acres of each soil type, and the restoration goals for each soil type within the project area. Today, most of the wetlands are found near the western boundary and are part of the palustrine⁶ system with emergent communities (Figure 5). Small areas of riverine wetlands and palustrine wetlands with forested, broad-leafed, deciduous communities

⁶ Palustrine wetlands include marshes, bogs, fens, wet meadows, swamps, and seasonally wet woods. The hydrology of these wetlands is affected by precipitation, surface water runoff, and groundwater discharge in varying combinations (Tiner, 1999)

are present along Jackson Creek. These wetlands range from being temporarily or seasonally flooded to being semi-permanently or permanently flooded. Seeps are also located along Jackson Creek. In addition, low quality palustrine wetlands dominated by reed canary-grass are located in the old Jackson Creek stream channel.

ENVIRONMENTAL CONSEQUENCES – DRUMMOND RESTORATION – WETLANDS

Alternative 1 – Drummond Floodplain Project Area

Under Alternative 1 there would be potential for approximately 100 to 120 acres of wet prairie, sedge meadow, and marsh to be restored across the Drummond Floodplain project area.⁷ Approximately 60-70 acres are hydric soils over bedrock that would be restored to wet, wet-mesic, or mesic dolomite prairie where hydrological conditions are appropriate. The new hydrologic regime (created by routing industrial park stormwater, improvements to Jackson Creek, road and rail bed removal, impoundment of ditches, and the removal of drain tiles) would increase the supply of water in the project area and create wetland habitat in areas that were historically wetter. However, the location and quantity of wetlands developed would be influenced by a variety of factors, including the extent of flooding, direction of water movement, water quality, topography, soil type, and other habitat conditions.

Some existing wetland areas may experience wetter hydrology than the hydrology experienced currently. While control structures would enable the Forest Service to adjust stormwater volumes and direct flows to avoid negative impacts and maximize benefits, stormwaters would be dispersed over a much smaller area for Alternative 1; therefore, greater potential would exist for inundating existing wetlands. This alternative would promote a less stable hydrological regime than Alternative 2.

Vegetation management under Alternative 1 would minimize the threat of non-native and invasive species. This action would promote the restoration of native and highly valued vegetation in areas that otherwise would be susceptible to degradation. The interaction of the water regime, soil, and vegetation would lead to habitat ideal for many of the sensitive plant and animal species desired at Midewin.

Alternative 2 – Drummond Floodplain Project Area

The impacts under Alternative 2 would be similar to those impacts discussed above for Alternative 1, but on a larger scale. Under Alternative 2 there would be potential for approximately 260 to 300 acres of wet prairie, sedge meadow and marsh to be restored across the

⁷ The acreage of currently existing wetlands does not include disturbed emergent wetlands (Table 3-7) since these are degraded communities requiring extensive restoration. Currently, the Drummond Floodplain project area contains 64 acres of disturbed emergent wetlands under Alternative 1, and 99 acres under Alternative 2.

Drummond Floodplain project area. Approximately 65 to 70 acres could be restored to wet, wet-mesic, or mesic dolomite prairie, depending on hydrological conditions. Alternative 2 would allow for additional control of surface water flow by the impoundment of additional ditches and the routing of industrial park stormwater south. Under this alternative, the hydrological regime would be more stable, since more surface water flow would be dissipated across a larger area. This would improve existing wetlands by allowing a less variable water supply and would also enlarge areas that could potentially develop wetland habitat.

As discussed under Section 3.4 (Water Resources and Hydrology), the drainage ditch along the southern boundary of the site would be impounded, blocked, or filled, thus reducing the rate of surface runoff that leaves the site. This ditch (and others that are determined to be jurisdictional) would require a Section 404 permit from the U.S. Army COE prior to the placement of fill material. The Forest Service at Midewin would fulfill all Section 404 permit requirements in compliance with the Federal Clean Water Act.

Alternative 3 – No action - Drummond Floodplain Project Area

Under Alternative 3, existing wetlands would continue to be infested and degraded by non-native and invasive plant species. Hydrology would not be improved, and wetland quality would eventually decline. Alternative 3 does not meet Midewin's desired condition of restoring wet prairie/sedge meadow habitat (Prairie Plan, p. 2-3).

AFFECTED ENVIRONMENT - MIDDLE GRANT CREEK RESTORATION – WETLANDS

Historically, most of the Middle Grant Creek project area was dominated by mesic wet prairie, sedge meadows, and limited oak savanna. However, sometime during the onset of agricultural activities before 1940, the area was drained and converted to agricultural uses. Currently, wetlands cover approximately 69 acres of the project area, although hydric soils comprise 170 acres, or 45% of the project area. Figure 6 and Appendix B provide the soil types, acres of each soil type, and the restoration goals for each soil type within the project area.

Most of the existing wetlands are located at the base of one or two terraced slopes and are part of the palustrine system with emergent communities (Figure 7). Although these wetlands are naturally forming, they were modified by the construction of such features as drainages and roads. Small areas of riverine wetlands along Grant Creek and palustrine wetlands with forested, broad-leaved deciduous vegetation are also present within the project area. These wetlands range from being temporarily or seasonally flooded to being semi-permanently or permanently flooded.

In addition to the naturally formed wetlands, other wetlands have formed within ditches and borrow pits. These wetlands are generally of lower value, but contribute substantially to the current total wetland acreage.

ENVIRONMENTAL CONSEQUENCES - MIDDLE GRANT CREEK RESTORATION – WETLANDS

Alternatives 1 and 2– Middle Grant Creek Project Area

Wetland effects would be similar to those identified under Alternative 1 for the Drummond Floodplain. There would be potential for approximately 90 to 110 acres of wetlands to be restored across the Middle Grant Creek project area.⁸ The hydrologic regime would be improved by increasing the interaction between Grant Creek and the floodplain and by the impoundment of ditches, removal of bunkers, and removal of drain tiles. The improved hydrology would increase the conditions for wetland formation within this area. As discussed previously, all drainage ditches that are determined to be jurisdictional wetlands (Waters of the U.S.) by the U.S. Army COE would require a Section 404 permit prior to the placement of fill material.

It is possible that construction activities (bunker demolition in particular) could have adverse effects on the existing wetlands in the project area, for example, in places where wetlands have formed between bunkers, making it difficult to avoid impacts (Figure 7). However, these impacts would be offset, since the improved hydrology created from restoration activities, including bunker demolition, would increase the size of existing wetlands. Proper planning and mitigation (Section 4.1) would minimize adverse impacts to existing wetlands that need to be preserved.

Alternative 3- No action - Middle Grant Creek Project Area

Under Alternative 3, the area's hydrology would not be improved and the benefits of wetland restoration would not be achieved. Existing wetlands within the Middle Grant Creek project area would continue to be infested and degraded by invasive and non-native species. Over time, successional woody vegetation would encroach on and eventually eliminate existing wetlands.

Cumulative Effects

There would be cumulative benefits to the wetlands on Midewin from implementation of this restoration project. One of the long-term goals for Midewin includes restoring and maintaining approximately 4,640 acres of wet prairie/sedge meadow habitat (Prairie Plan, p. 3-1). Restoration of the Drummond Floodplain and Middle Grant Creek project areas involves improvements that would incrementally contribute restored wetland acres to Midewin and help

meet the Prairie Plan objective for wetland restoration and protection. Of the two action alternatives analyzed for the Drummond Floodplain project area, Alternative 2 offers the greatest area for wetland restoration and includes approximately 230 more acres than Alternative 1, thereby providing greater cumulative benefits to Midewin's wetlands. Combined, the Middle Grant Creek and Drummond Floodplain restoration projects could potentially restore (depending on soil types and vegetation) over 800 acres of wetland and native prairie habitat.

The restoration alternatives would provide valuable wetland habitat in Will County. The No-action Alternative would not. Historically, the county's wetlands have been converted to agricultural uses or eliminated for urban development. It is likely that future urban development will continue to adversely affect wetlands in Will County. Restoration actions on Midewin would offset some of these adverse effects. The No-action Alternative would also have adverse effects on the existing wetlands of Midewin. Existing wetlands would decline as successional woody and invasive plant species invade these areas, out-competing native species and altering local hydrology.

3.6 VEGETATION AND NATURAL COMMUNITIES

AFFECTED ENVIRONMENT

Slightly more than 97.5% of Midewin's vegetation presently consists of successional and cultural communities dominated by a mix of non-native and disturbance-tolerant native plants. Approximately 25% of the plant species at Midewin are non-native. Only 2.5% (approximately 400 acres) of the total vegetation cover is comprised of small remnants of the original native vegetation. These remnants are typically less than one acre in size and highly isolated in a landscape dominated by cultural and successional vegetation. Furthermore, nearly all of the native vegetation remnants have been disturbed or degraded to varying degrees. Most notable of these surviving remnant communities is the dolomite prairie, covering approximately 120 acres on Midewin, partly within the Drummond Floodplain project area.

Past actions such as drainage of wetlands and increased runoff have had adverse impacts on the riparian vegetation of Jackson and Grant creeks. Down-cutting of both streams has lowered the water table in adjacent riparian areas, allowing colonization by woody plants and creating extensive successional woodlands along stream banks and other low areas. Suppression of the natural fire regime has also contributed to the expansion of successional woodlands within the Drummond Floodplain and Middle Grant Creek project areas.

⁸ Like the Drummond Floodplain, the acreage of currently existing wetlands does not include disturbed emergent wetlands (Table 3-9), since these are degraded communities requiring extensive restoration. Currently, the Middle Grant Creek project area contains 49 acres of disturbed emergent wetlands.

AFFECTED ENVIRONMENT - DRUMMOND FLOODPLAIN RESTORATION – VEGETATION AND NATURAL COMMUNITIES

The proposed 470-acre Drummond Floodplain restoration area includes a portion of lower Jackson Creek and adjacent floodplain and outwash plain areas. Most of the soils in the project area are hydric soils that formerly supported wet prairie, sedge meadows, and marshes, with many shallow soil areas overlying dolomite that once supported extensive dolomite prairie communities. Some wooded areas were present along Jackson Creek. Sometime during the onset of agricultural activities before 1940, attempts were made to drain the area and convert the land to agricultural uses. Some of the outwash plain may have been used intermittently as hay or crop fields until 1940, when the land came under jurisdiction of the U.S. Army and the Joliet Arsenal was developed. Livestock were grazed on the western portions until 1997.

With Army management of the land, existing vegetation was disturbed by the construction of roads, security fences, building pads, and other Army infrastructure. Additionally, a new channel was excavated in order to straighten Jackson Creek. Since that time, non-native trees, shrubs, forbs, and grasses have invaded much of the areas, changing the structure and composition of the vegetation. A rail spur and raised berm on private land divides the project area, and have been under construction since 2000 to connect the Burlington Northern-Santa Fe Railroad (BNSF RR) main tracks with the Deer Run Industrial Park.

The western portion of the Drummond Floodplain is mostly grasslands on the outwash plain, interspersed with wetlands and stands of shrubs and trees. For the most part, the grasslands are dominated by non-native, cool-season grasses, especially smooth brome, redtop, and meadow bluegrass. Typical forbs include common teasel, tall goldenrod, hairy aster, tall boneset, and sweet-clovers. Scattered within these grasslands are remnants of dolomite prairie communities concentrated at the western and southern margins of the project areas.

The largest area of dolomite prairie within the project area lies adjacent to the BNSF RR and north of the intersection of the Drummond roadbed and the railroad. Although degraded, these remnants are rich in native plant species that characterize dolomite prairie, including tufted hair grass, wiry panic grass, prairie dropseed, nodding wild onion, Riddell's goldenrod, low calamint, flattened spikerush, and hairy beardtongue. These dolomite prairie remnants comprise approximately 50 acres of the Drummond Floodplain project area. Considerable numbers of native graminoids and forbs persist in swales and depressions in these grasslands. Common native plants include prairie cordgrass, bull sedge, prairie ironweed, water horehound, woundwort, Canada wild onion, blue vervain, and spikerushes. There are also extensive stands of the invasive, non-native reed canary-grass, a species that appears to be actively invading the wet prairie remnants and moist grasslands. Large infestations of reed canary-grass occur both north and south of Drummond Road, and additional infestations are present along Jackson Creek. The dolomite prairie remnants have also been invaded by other non-native species, including Canada

bluegrass, meadow bluegrass, smooth brome, Canada thistle, common teasel, European St. John's wort, winter annual brome grasses, wild parsnip, and sweet clovers. Woody plants invading the grasslands include a mix of non-native and native species, including Osage-orange, eastern hackberry, hawthorns, and autumn olive.

The eastern section of the Drummond Floodplain project area consists mostly of the floodplain along Jackson Creek and adjacent uplands. The uplands consist of degraded native forest, woodland, and savanna, dominated by red oak, bur oak, shagbark hickory, and American basswood. Understory species include hop-hornbeam, toothwort, wild blue phlox, and jack-in-the-pulpit. These upland wooded habitats have also been invaded by non-native and disturbance-tolerant native plants, including garlic mustard, multiflora rose, white mulberry, Osage-orange, and Amur honeysuckle. The floodplain and riparian forests and woodlands are highly disturbed, but many native plants remain, including bur oak, sycamore, morning-star sedge, wood reed, Virginia bluebells, wingstem, green-headed coneflower, and cup-plant. Large areas, however, are now dominated by dense stands of disturbance-tolerant native trees, especially green ash. Non-native herbs dominate the understory, especially garlic mustard and reed canary-grass.

An emergent wetland has developed in the former channel of Jackson Creek; although it supports many native wetland herbs, there is an increasing presence of reed canary-grass and common reed. A degraded bur oak savanna occurs in the floodplain immediately north of the former creek channel and is severely infested with non-native Osage-orange, white mulberry, Amur honeysuckle, and garlic mustard.

The eastern section of the project area contains several hillside seeps. Although degraded by fire suppression and past grazing, native plants remain locally predominant. Native species present within these seeps include scouring-rush, spotted Joe-Pye weed, swamp goldenrod, orange jewelweed, and skunk cabbage. Table 3-5 provides the acreage of each vegetation type within the Drummond Floodplain project area.

**Table 3-5. Current Vegetation of the Drummond Floodplain Project Area.
(Note: native remnants may be prairie, woodland, marsh, etc.)**

Vegetation Type	Native Vegetation Remnant?	Existing Acres	
		Alternative 1*	Alternative 2**
Disturbed Emergent Wetlands	No	64	99
Forbland***	No	40	40
Successional Woodlands	No	40	40
Non-native Grasslands***	No	55	195
Wet-mesic Savanna	Yes, but highly degraded	2	2
Seeps	Yes	.16	.16
Mesic Upland Forests	Yes	2	2
Marshes	Yes	10	11
Sedge Meadow	Yes	0	2
Wet Dolomite Prairie	Yes	7	17
Mesic Dolomite Prairie	Yes	5	37
Wet Typic Prairie	Yes	0	1
Wet-mesic Typic Prairie	Yes	0	1.5

* Project site also includes approximately 4 acres of developed/disturbed land, .05 acres of rail bed, 4 acres of road, 2.5 acres of stream, and 3 acres of tree row/fencerow.

** Project site also includes approximately 10 acres of developed/disturbed land, 1.5 acres of rail bed, 4 acres of road, 2.5 acres of stream, and 6 acres of tree row/fencerow.

***Some occurrences within the project area contain “notable” populations of native plant species.

The remnants of native vegetation within the project area are mainly located along the western boundary, with some remnants scattered throughout the rest of the project area (Figure 8). Of these remnants, the rarest natural community is the dolomite prairie. The extreme moisture fluctuations, shallow soils, and calcareous nature of the soils exclude numerous common prairie plants and allow for the presence of many regionally uncommon or rare plants. Because dolomite prairies are now very rare, so are many species restricted to this habitat. Specialized plants such as the leafy prairie-clover (Federal Endangered) are dependent on these calcareous habitats.

ENVIRONMENTAL CONSEQUENCES - DRUMMOND RESTORATION – VEGETATION AND NATURAL COMMUNITIES

Alternative 1 – Drummond Floodplain Project Area

The intent of Alternative 1 for the Drummond Floodplain project area is to manipulate the area’s hydrology to restore the landscape (240 acres) to a mosaic of wetland and upland communities (dolomite and typic prairie, sedge meadows, marsh, and seeps) similar to those that once dominated the area prior to its conversion to agricultural use. Nearly all (84%) of the soils are hydric and once supported wetland vegetation. A few small, scattered areas of dry mollisol and alfisol soils once supported upland prairie and forest/savannah, particularly in the woodland areas associated with Jackson Creek. Based on the characteristics of existing soils and the extent

of water to be added to the area, Alternative 1 could restore 60–70 acres of dolomite prairie of varying moisture classes; 100-120 acres of wetland habitat consisting of wet and wet-mesic typic prairie, seeps, sedge meadows, and marsh; 10-15 acres of dry upland prairie; and 21 acres of floodplain forest and savannah (Table 3-6). Appendix A lists the desired native plant species for each of these restored habitats.

Table 3-6. Potential Restoration Goals for the Drummond Floodplain

Native Vegetation Communities	Acres historically (based on existing soils)		Existing acres of native community ⁹		Acres expected to be restored	
	Alt. 1	Alt. 2	Alt. 1	Alt. 2	Alt. 1	Alt. 2
Dolomite prairie	76	122	12	54	60-70	66-70
Wetland habitat (seeps, marsh, sedge meadow, wet and wet-mesic typic prairie)	126	297	10	16	100-120	260-300
Upland typic prairie	13	25	-	-	0-15	25-30
Woodland/forest/savannah	25	25	4	4	21	21

Restoration of the Drummond Floodplain site would benefit existing native vegetation and natural communities on Midewin through management and active restoration of adjacent land now dominated by non-native plants. Under Alternative 1, approximately 26 acres of existing native vegetation remnants would be protected, managed, and enhanced as part of the restoration, including over 12 acres of rare dolomite prairie habitat. Prescribed burning would play an important, positive role in the rehabilitation of these remnants (USDA Forest Service 2000c). As these remnants become surrounded by restored native habitats, there should be a decrease in their isolation and susceptibility to invasion of non-native plants and woody encroachment. The ability of these remnants and their biota to persist and interact in the restored environment should be improved.

One goal outlined in the Prairie Plan is to reduce noxious weed and invasive plant infestations and prevent new invader species from becoming established (Prairie Plan, p. 2-6). Two recent decisions on Environmental Assessments allow the Forest Service to use prescribed fire and herbicides to treat invasive species on Midewin. However, control of invasive species in the Drummond Floodplain tract would likely be unsuccessful unless accompanied by restoration and management of appropriate native vegetation. As restoration proceeds, enhancement planting, prescribed burning, and removal of encroaching woody species should increase competitiveness and reproduction of native graminoids and forbs (USDA Forest Service 2001c), leading to a decrease in non-native, invasive plants. More intensive techniques such as herbicide application

⁹ Acres of existing wetland habitat do not include disturbed emergent wetlands (Table 3-9) since this habitat type is of low quality and would require restoration.

will be needed to control infestations of certain aggressive or persistent species, for instance, reed canary-grass or teasel. Alternative 1 offers an effective way to control the growth and spread of noxious weeds and invasive plant species in the Drummond Floodplain project area.

Alternative 2 – Drummond Floodplain Project Area

Alternative 2 would manipulate the project area's hydrology and restore an approximate 470-acre area of former agricultural grasslands and successional fields to a mosaic of wetland communities consisting of wet dolomite and typic prairie, sedge meadows, marsh, and seeps (Jackson Creek area). Over 85% of the soil acreage is hydric and was once dominated by a variety of wetland communities. Alternative 2 could potentially restore 66-70 acres of dolomite prairie of varying moisture classes; 260-300 acres of wetland habitat consisting of wet and wet-mesic typic prairie, seeps, sedge meadows, and marsh; 25-30 acres of dry upland prairie; and 21 acres of floodplain forest and savannah (Table 3-6).

Restoration under Alternative 2 would have similar benefits as those discussed under Alternative 1, but on a larger scale. A much larger area (470 vs. 240 acres) would be rehabilitated and restored to appropriate native vegetation. More remnant native vegetation (74 vs. 26 acres) would be included in this project, and their rehabilitation would proceed earlier than might otherwise occur. This would include over 50 acres of remnant dolomite prairie habitat. Invasive plants would be controlled and removed over a larger area, thus reducing sources for re-infestation within the project area. This alternative meets the Prairie Plan guideline of protecting and managing native vegetation remnants to ensure long-term persistence (p. 4-23) to a greater extent than Alternative 1. By restoring considerably more area, this alternative better meets the Prairie Plan desired future condition of a more natural landscape than exists today (p. 2-3). A much larger area would also be cleared of invasive species and replanted with native plants. As directed in the Prairie Plan, these additional acreages would eventually be restored as native vegetation; however, this alternative would initiate their restoration earlier than might otherwise occur.

Alternative 3 – No action - Drummond Floodplain Project Area

Alternative 3 would not restore the Drummond Floodplain project area to native vegetation. Under this alternative, attempts to control noxious weeds and invasive plant species in the Drummond Floodplain could still be undertaken. However, the control of invasive species in the project area would likely be unsuccessful unless accompanied by active management (prescribed burning and herbicide application), and with restoration of desirable native species. If no action were taken to restore the project area, the existing native vegetation remnants would decline in size, quality, and species richness due to the pervasive encroachment of native and non-native invasive plant species. This is contrary to the Prairie Plan guidelines stating that all native vegetation remnants will be protected and managed to ensure long-term maintenance, and that all remnants will be restored to their original condition to the best extent possible (Prairie Plan, p. 4-

25, 4-26). The prairie remnants in this area are isolated and small in size, and therefore particularly sensitive to a lack of management. It is likely that under Alternative 3, the dolomite prairie and other native vegetation remnants would be extirpated as invasive plants continue to invade the area. Alternative 3 would be contrary to the purpose defined in the ILCA (1996 legislation establishing Midewin) “to manage the land and water resources of Midewin in a manner that will conserve and enhance the native populations and habitats of fish, wildlife, and plants.”

AFFECTED ENVIRONMENT – MIDDLE GRANT CREEK – VEGETATION AND NATURAL COMMUNITIES

The proposed 385-acre project area includes over one mile of Grant Creek and immediately surrounding lands in the middle portion of the Grant Creek watershed and the upper portion of the outwash plains. Two stream channels are included: the existing channel of Grant Creek running parallel to Blodgett Road near the northern project area boundary, and a secondary drainage with an excavated channel that winds to the west through the middle of the project area. Nine lines of obsolete roads, rail beds, and bunkers that were all once part of the former Joliet Arsenal are within the proposed project areas. The tract under consideration lies just south of the Deer Run Industrial Park and is located west of State Highway 53.

Prior to agriculture and arsenal development, most of the Middle Grant Creek project area was dominated by mesic to wet prairie and sedge meadows, with perhaps a limited area of oak savanna along the southeastern and eastern margins of the project area. Sometime during the onset of agricultural activities between 1830 and 1940, the wetlands were drained and attempts were made to convert the land to agricultural uses. Much of the native vegetation was destroyed or degraded during this period. While under Army administration, the landscape was further altered by construction of bunkers, rail lines, roads, and drainage ditches. The land within the project areas was also leased for livestock grazing. Grazing ceased in most of the project area in 1999. Despite these past uses, the Middle Grant Creek project area provides habitat for a diversity of grassland, shrubland, and wetland wildlife, including many bird species dependent upon grassland and wetland habitats.

At present, the vegetation in the project areas is predominantly grassland. These grasslands are dominated by non-native, cool-season grasses, especially smooth brome, tall fescue, meadow bluegrass, redtop, and timothy. The grasslands contain many non-native and weedy native forbs, including tall goldenrod, sweet clover, common teasel, bull thistle, whorled milkweed, and hound’s-tongue. Within the grasslands are small patches of prairie plants and degraded remnants of native prairie. Characteristic native species associated with these remnants include prairie cordgrass, big bluestem, yellow coneflower, wild bergamot, Sullivant’s coneflower, short-green milkweed, heath aster, sand dropseed, and Riddell’s goldenrod. Although no dolomite prairie is present, some areas support tufted hair grass and other native plants characteristic of calcareous, poorly-drained substrates. There are small areas where topsoil was removed and subsoil was exposed by Army construction activities. These disturbed areas have been colonized by some

native plant species, including stiff goldenrod, gray goldenrod, whorled milkweed, tall rush-grass, and sedges. Many of these grasslands are also being invaded by woody species, especially Osage-orange, autumn-olive, green ash, multiflora rose, and red hawthorn. In several places, there are dense, extensive thickets of woody growth, often forming shrublands or successional woodlands. In addition to the previously listed woody plants, other species present in these thickets include eastern cottonwood, white mulberry, Amur honeysuckle, garlic mustard, common burdock, and Virginia stickseed.

Wetland vegetation in the Middle Grant Creek project area includes 22 acres of small, degraded remnants of sedge meadows, wet prairie, seeps, and marshes. For the most part, these have also been degraded by both agricultural and ammunition plant activities, and have often been invaded by stands of reed canary-grass, common reed, and various weedy plants. Native species surviving in these wetlands include bull sedge, tussock sedge, fox sedge, cattails, blue vervain, prairie cordgrass, great bulrush, green bulrush, and spikerushes. There are also many drainage ditches present in this project area; many of the ditches now support a diversity of native wetland plants. The wooded areas associated with Grant Creek include a great deal of successional vegetation, with eastern cottonwood, green ash, red hawthorn, Amur honeysuckle, garlic mustard, and reed canary-grass being prominent species. Appendix C describes the vegetation communities present within the Middle Grant Creek project area; Table 3-7 provides the acreage of each community.

Table 3-7. Current Vegetation of the Middle Grant Creek Project Area

Vegetation Type	Native Vegetation Remnant?	Acres Within Project Area *
Shrubby Grasslands**	No	218
Disturbed Emergent Wetlands**	No	47
Successional Woodlands	No	26
Non-native Grasslands**	No	41
Marshes	Yes	6.5
Wet-mesic Typic Prairie	Yes	3.5
Wet-typic Prairie	Yes	6
Sedge Meadow***	Yes	6

*Project Site also includes approximately 5 acres of stream, 16 acres of rail bed, and 10 acres of road.

**Includes many populations of native forbs and graminoids.

***Includes a degraded seep/fen complex.

The remnants of native vegetation within the Middle Grant Creek project area are concentrated near the northeastern and northwestern boundaries. Additionally, there are a few isolated remnants scattered throughout the project area (Figure 9). That portion covered by native vegetation remnants in the Middle Grant Creek tract is approximately 22 acres.

ENVIRONMENTAL CONSEQUENCES – MIDDLE GRANT CREEK – VEGETATION AND NATURAL COMMUNITIES

Alternatives 1 and 2 – Middle Grant Creek Project Area

Unlike the Drummond Floodplain project area, which is dominated by hydric (wetland) soils, the Middle Grant Creek tract is an even mosaic of well-drained upland soils and poorly-drained wetland soils with the potential to support a very diverse mix of native habitat types. Three hundred and eighty five acres would be restored from agricultural grasslands and successional vegetation to upland typic prairie, mesic to wet typic prairie, marsh, sedge meadow, and seeps. Where transitional soils are present, open oak savannas would be restored. Based on the characteristics of existing soils, 80-120 acres of wetland habitat, 160-190 acres of upland typic prairie, and 30-50 acres of floodplain forest and oak savannah would be restored (Table 3-8). Appendix A lists the desired native plant species for each of these restored habitats.

Table 3-8. Potential Restoration Goals for Middle Grant Creek

Native Vegetative Communities	Acres historically (based on existing soils)	Existing acres of native community	Acres expected to be restored
Dolomite prairie (wet and mesic)	-	-	-
Wetland habitat (seeps, marsh, sedge meadow, wet prairie)	171	22	80-120
Upland typic prairie	174	-	160-190
Woodland/forest/savannah	40	?? ⁻¹⁰	30-50

Restoration of the Middle Grant Creek project area would benefit existing native vegetation and natural communities on Midewin and on adjacent land now dominated by non-native plants. Under the action alternatives, approximately 22 acres of existing native vegetation remnants would be protected and enhanced as part of the restoration. Prescribed burning will play an important, positive role in the rehabilitation of these remnants (USDA Forest Service 2000c). As the remnants become surrounded by restored native habitats, there should be a decrease in their isolation and susceptibility to invasion by non-native plants and woody encroachment. The ability of these remnants and their biota to persist and interact in the restored environment should be improved. Some isolated native plant populations (outside of native vegetation remnants) might be destroyed as ditches and scraped areas are restored to their original grade. Seed collection, transplants, and sod translocations would mitigate for this loss and provide local sources of plant material for use in restoration of the Middle Grant Creek project area.

¹⁰ There are no remnants of native forest/woodland; however, approximately 26 acres of successional woodlands are located within the Middle Grant Creek project area (Table 3-9).

Essential to the success of this project is the reduction of noxious weeds and non-native, invasive plants. Control of existing infestations and prevention of new infestations will be possible with the use of prescribed fire and herbicides (USDA Forest Service 2001c, 2002c). However, the control of invasive species would likely be unsuccessful unless accompanied by restoration and management of appropriate native vegetation. As restoration proceeds, enhancement planting, prescribed burning, and removal of encroaching woody species should increase the competitiveness and reproduction of native graminoids and forbs (USDA Forest Service 2001c), leading to a decrease in non-native, invasive plants. More intensive techniques such as herbicide application will be needed to control infestations of certain aggressive or persistent species such as reed canary-grass or teasel. Alternatives 1 and 2 offer an effective way to control the growth and spread of noxious weeds and invasive plant species in the Middle Grant Creek project area.

Alternative 3 – No action - Middle Grant Creek Project Area

The effects of Alternative 3 on the Middle Grant Creek project area would be similar to those effects discussed above for Alternative 3 on the Drummond Floodplain tract. Alternative 3 would not restore the 385-acre area to native vegetation. While dolomite prairie habitat is not present in the Middle Grant Creek area as it is in the Drummond Floodplain area, the Middle Grant Creek tract nevertheless supports several small native wetland remnants of marsh, sedge meadow, wet typic prairie, and wet-mesic typic prairie. Without proper management, these remnants will continue to degrade and eventually be extirpated by the encroachment of invasive species.

Cumulative Effects for the Drummond Floodplain and Middle Grant Creek Restoration Areas

Because of human activities, nearly all native vegetation in Will County has been destroyed or degraded and, as a result, lands not converted to agricultural, residential, commercial, or industrial uses are now dominated by non-native and disturbance-tolerant native plant species. Instead of native prairie, wetland, savanna, and woodland vegetation, the open land in Will County is covered by a variety of seral communities, such as old fields, shrubby grasslands, and thickets of disturbance-tolerant shrubs and trees. Native vegetation survives only as small remnants, or less than 0.01% of the original coverage. Many of these remnants are threatened by development or lack of management. Throughout most of Will and adjacent counties, the only reminders of the original native vegetation are small populations of prairie plants that survive in roadsides or in railroad rights-of-way. Some remnants, however, are now protected and actively managed to ensure their long-term survival as healthy examples of the ecosystems they represent. Many of these remnants are protected and managed by the Forest Preserve District of Will County. Also present are several important areas owned and managed by the State of Illinois, including Goose Lake Prairie State Natural Area in adjacent Grundy County, currently the largest continuous remaining tract of tallgrass prairie in Illinois. Here, management has focused on restoring degraded habitats and removing artificial features that fragment this large preserve.

A desired condition for Midewin is the movement of degraded lands toward a functioning mosaic of vegetation types (Prairie Plan, p. 2-5). One primary objective identified in the Prairie Plan is to restore over 10,000 acres of native communities, including dolomite prairie, upland typic prairie, wet prairie/sedge meadow, forest/woodland, and savanna. Restoration of the Drummond Floodplain and Middle Grant Creek project areas would contribute to this desired condition. Of the two action alternatives analyzed for the Drummond Floodplain tract, Alternative 2 offers the largest area for restoration and protection for the highest acreage of native vegetation remnants, including the greatest acreage of dolomite prairie. Combined, the Drummond Floodplain and Middle Grant Creek restoration projects (under Alternative 2) would restore over 800 acres of natural vegetation, or 8% of the Prairie Plan goal.

Restoration of these 800 acres would provide habitat for many grassland and prairie wildlife species either rare or decreasing in Will and adjacent counties. These two large tracts would also allow for the restoration of certain biodiversity functions now absent from small remnants, such as pollination, population expansion, gene flow, and predator-prey relationships. The existing remnants would no longer be isolated, but instead be interconnected in a matrix of restored native vegetation. Both project areas would eventually function more like pre-1830 ecosystems. The action alternatives would also contribute to the success of restoration elsewhere on Midewin and in adjacent areas of Will County by becoming a source of native biota for other restorations.

Of particular importance are the benefits provided by the restoration of dolomite prairie habitat. Midewin has a significant portion of dolomite prairie habitat and, with the additional acreage from the Drummond Floodplain restoration, could become the most important area for preservation of dolomite prairie and associated dolomite prairie plants within Will County, as well as within the larger region of the Prairie Parklands. Alternative 2 better serves the direction provided in the Prairie Plan because more dolomite prairie restoration would be initiated at an earlier stage than would be undertaken in Alternative 1.

Both action alternatives would have cumulative benefits on the control of invasive species in Will County and the Prairie Parklands. Alternative 2 would have greater benefits because more restoration would be initiated. For more than 800 acres, noxious weeds, encroaching woody plants, and non-native invasive plants would be controlled; the project areas would cease being sources areas for problem species. Adjacent properties owned by the Illinois Department of Natural Resources (IDNR), Forest Preserve District of Will County, and private landowners would benefit from reduced invasive plant populations on Midewin.

Alternative 3 would have adverse cumulative effects on the native vegetation and natural communities of Midewin. Failure to restore the Middle Grant Creek and Drummond Floodplain areas would not contribute to the restoration of 10,000 acres of native prairie habitat, the desired condition for Midewin. There would be no benefits to existing native vegetation remnants, including the dolomite prairie habitats. Instead, these remnants would continue to degrade,

vulnerable to loss of ecosystem functions, species loss through stochastic events, and further encroachment by invasive plants. Non-native plants not yet present on Midewin would likely colonize both project areas and spread elsewhere. Both project areas would remain a source of invasive plants, both for other areas within Midewin and for surrounding public and private lands in Will County and the Prairie Parklands

3.7 THREATENED, ENDANGERED, AND SENSITIVE SPECIES

AFFECTED ENVIRONMENT

All state or Federal Endangered (SE, FE) or Threatened (ST, FT) plant or animal species occurring in the project areas, as well as the Regional Forester Sensitive Species (RFSS), have been considered in terms of their known or potential presence in areas expected to be directly or indirectly affected by restoration activities. There are eighteen Threatened or Endangered, and Sensitive plant and animal species known or suspected to be present at Midewin within the two proposed restoration areas. (See Table 3-9.) Seven of the listed species occur in both the Drummond Floodplain and Middle Grant Creek project areas, ten occur only in the Drummond Floodplain project area, and one species occurs only in the Middle Grant Creek project area. A discussion of the status of these species and their habitat requirements is provided in Appendix D.

The leafy prairie-clover (Federal Endangered) is the only Federal listed species present within either proposed project area. It is located in the Drummond Floodplain tract and discussed below. However, after restoration, both project areas could provide suitable habitat for another listed plant, the eastern prairie white-fringed orchid (Federal Threatened) (Zambrana Engineering Inc. 1998). The nearest location of this orchid is 1.25 miles west of the Middle Grant Creek project area and two miles SSW of the Drummond Floodplain project area. This species occurs in wet and mesic tallgrass prairie, sedge meadows, fens, bogs, wet hay meadows, and moist abandoned fields. If suitable habitat becomes established, it may be possible to establish this species in the Drummond project area. The bald eagle (Federal Threatened) is an occasional visitor to Midewin during its spring and fall migration. Neither project area contains suitable foraging or roosting habitat for the eagle.

Table 3-9. Threatened, Endangered, and Sensitive Species

Species:	<u>Middle Grant Creek</u>		<u>Drummond Floodplain</u>	
	Species Present?	Potential Habitat?	Species Present?	Potential Habitat?
Leafy Prairie Clover (FE, SE) ¹¹	No	No	Yes	Yes
Glade mallow (RFSS)	No	Future	Yes	Yes
False mallow (RFSS, SE)	No	No	Yes	Yes
Butler’s quillwort (RFSS, SE)	No	No	Yes	Yes
Pitcher’s stitchwort (RFSS, ST)	No	No	Yes	Yes
Crawe’s sedge (RFSS)	No	Yes	Yes	Yes
Sullivant’s coneflower (RFSS)	Yes	Yes	Yes	Yes
Ellipse (RFSS)	No	Unlikely	Yes	Yes
Blanding’s turtle (RFSS, ST)	No	Future	Yes	Yes
Plains leopard frog (RFSS)	Likely	Future foraging	No	No
King rail (RFSS, ST)	No	Future	Yes	Yes
Upland sandpiper (RFSS, SE)	Yes	Yes	Yes	Yes
Migrant loggerhead shrike (RFSS, ST)	Yes	Yes	Yes	Yes
Bobolink (RFSS)	Yes	Yes	Yes	Yes
Northern harrier (RFSS, SE)	Yes	Yes	Yes	Yes
Short-eared owl (RFSS, SE)	Yes	Yes	Yes	Yes
Henslow’s sparrow (RFSS, SE)	Yes	Yes	Yes	Yes
Red-veined prairie leafhopper (RFSS, ST)	No	Future	Yes	Yes

Both project areas are adjacent to, or contain populations or known habitat for, seventeen Regional Forester Sensitive Species (RFSS), including Pitcher’s stitchwort, false mallow, glade quillwort, Crawe’s sedge, glade mallow, Sullivant’s coneflower, king rail, bobolink, Henslow’s sparrow, northern harrier, short-eared owl, Blanding’s turtle, red-veined prairie leafhopper, migrant loggerhead shrike, upland sandpiper, plains leopard frog, and ellipse. Possible effects of the proposed actions on these species are discussed below; the specific effects of herbicide use and prescribed burning have been analyzed in greater detail in the EAs and decisions for those actions at Midewin (USDA Forest Service 2001c and 2002c).

¹¹ FE = Federal Endangered species
 FT = Federal Threatened species
 RFSS = Regional Forester Sensitive Species
 SE = Endangered by Illinois Endangered Species Protection Board (1988)
 ST = Threatened by Illinois Endangered Species Protection Board (1988)

In addition to these sensitive species, it is likely that the proposed restoration projects would have positive effects on six other sensitive species (three plants, two insects, one bird) not currently known to be present in either project area (hairy valerian; earleaf false foxglove; Hill's thistle; rattlesnake-master stem-borer; blazing-star stem-borer; least bittern). These benefits would occur largely through restoration or establishment of additional habitat in areas now unsuitable for these species.

ENVIRONMENTAL CONSEQUENCES - DRUMMOND RESTORATION – SENSITIVE PLANT AND ANIMAL SPECIES

Federally Threatened and Endangered Species

Alternative 1 – Drummond Floodplain Project Area

Alternative 1 would restore 240 acres of riparian, wetland, and prairie habitat and include the enhancement and restoration of dolomite prairie, a rare prairie community that is restricted to a limited area of the upper Midwest. Restoration of dolomite prairie could improve and expand the habitat of the leafy prairie-clover, a plant species restricted to Midewin's dolomite prairie. An objective of the Prairie Plan is to restore or introduce leafy prairie-clover into dolomite prairie habitat that has been deemed suitable (Prairie Plan, p. 4-19). Habitat conditions throughout most of the Drummond Floodplain project area are currently too wet or would become too wet following restoration to support populations of leafy prairie-clover. However, potential mesic and wet-mesic dolomite prairie habitat for this rare prairie species would be created at the southwestern and western margins of the project area.

West Patrol Road would provide a hydrological barrier between most (>99%) of Midewin's population of leafy prairie-clover and potential flooding. The existing leafy prairie-clover populations would be protected from changes in hydrology by the distance from the water source and by several water control structures that would allow Midewin to control water volumes and direct water to appropriate areas.

Restoration activities would be planned to avoid and minimize adverse impacts to the leafy prairie-clover, particularly during the growing season from April 30th to October 30th (Prairie Plan, p. 4-19). It is possible, however, that restoration activities, including prescribed burning and herbicide use, could impact individual plants. The specific adverse effects that might result from the use of prescribed burning and herbicides have been analyzed in the Environmental Assessments for these actions (USDA Forest Service 2001c, p. 28; USDA Forest Service 2002c, pp. 54-57) and in the FEIS for the Prairie Plan (p. 3-126). Mitigation actions (Section 4.1) would minimize these effects on the leafy prairie-clover, to a great extent. Prescribed burning, invasive plant control, and dolomite prairie restoration benefits are expected to exceed any adverse effects on Midewin's population of leafy prairie-clover.

Alternative 2 – Drummond Floodplain Project Area

The effects on the leafy prairie clover under Alternative 2 would be similar to those effects described under Alternative 1 for the Drummond Floodplain, but on a much larger scale. Under this alternative, a considerably larger area would be restored (470 acres). This action would also include the protection and improvement of over 50 acres of existing dolomite prairie, the habitat of the leafy prairie-clover. A much larger area would be cleared of noxious weeds and invasive species and replanted with desirable native species. This action offers the most effective way of controlling and eradicating the noxious weeds and invasive species that are threatening sensitive dolomite prairie.

Alternative 3 – No action – Drummond Floodplain Project Area

Alternative 3 would adversely affect the leafy prairie-clover. Under Alternative 3, noxious weeds and invasive species would continue to infest the area, degrading the few remaining acres of native vegetation and eventually displacing sensitive plant species, including the leafy prairie-clover.

Regional Forester Sensitive Species

Alternative 1 – Drummond Floodplain Project Area

Alternative 1 would restore and enhance riparian, wetland, prairie, and rare dolomite prairie, a rare community that is restricted to a small area within the upper Midwest. This alternative would allow for the restoration of 60-70 acres of dolomite prairie habitat and would also include the protection, management, and enhancement of over 12 acres of existing dolomite prairie. Restoration and enhancement of dolomite prairie could improve and expand the habitat of four sensitive plant species (Pitcher's stitchwort, false mallow, glade quillwort, and Crawe's sedge) and one sensitive insect species (red-veined prairie leafhopper). Habitat conditions throughout most of the Drummond Floodplain project area are currently too wet or would become too wet following restoration to support many populations of these sensitive plant species. However, most existing populations occur in areas unlikely to benefit from hydrological changes. The existing populations of these five sensitive species would be protected from changes in hydrology by the distance from the water source and by several water control structures that would allow the Forest Service to control water volumes and direct water to appropriate areas. Also, the West Patrol Road berm would provide a hydrological barrier between most of these populations and potential flooding. Potential mesic and wet-mesic dolomite prairie habitat for these dolomite prairie species would be created at the southwestern and western margins of the project area, allowing for expansion of existing populations of all five species. These restorations must include prairie dropseed in appropriate microhabitats, as this grass species must be present to provide food and cover for the red-veined prairie leafhopper.

Restoration activities would be planned to avoid and minimize adverse impacts on all five species, particularly during the growing season from April 30th to October 30th (Prairie Plan, p. 4-19). It is possible, however, that restoration activities, including prescribed burning and herbicide use, could impact individual plants and insects. The specific adverse effects that might result from the use of prescribed burning and herbicides have been analyzed in the Environmental Assessments for these actions (USDA Forest Service 2001c, p. 28; USDA Forest Service 2002c, pp. 54-75) and in the FEIS for the Prairie Plan (pp. 3-126, 3-132, 3-172). All four plant species are vulnerable to herbicides, and the leafhopper is vulnerable because it is dependent upon a vulnerable plant, the prairie dropseed. Mitigation actions (Section 4.1) would prevent or minimize effects on these species.

Sullivant's coneflower and glade mallow would benefit from proposed changes throughout the Drummond Floodplain project area. Both are fairly widespread but not particularly abundant in the project area, perhaps because of woody encroachment and invasive plant species. Although individual plants might be susceptible to prescribed burning and herbicide use (USDA Forest Service 2001c and 2002c), these actions, in addition to hydrologic restoration, should create better conditions for both species. Some disturbed sites now occupied by Sullivant's coneflower (just north of Drummond Road) may become too wet to support this species. Overall, however, restoration of bottomland savannas, riparian woodlands, and seeps in the eastern portion of the Drummond Floodplain tract should result in increased habitat for both plant species. Active seeding and planting may be required to re-establish the plants in these historically degraded riparian habitats. As both plants are also vulnerable to herbicides, mitigation measures must be implemented to prevent or reduce adverse impacts.

Wetland animals found within the project area (Blanding's turtle and king rail) would benefit from the increased habitat that would result from restoration. Prescribed burning and mowing may have some adverse effects on these species, especially if conducted during the nesting season for the rail and the active season for the turtle. Analyses of these management tools on both species were completed for the prescribed fire EA (USDA Forest Service 2001c, pp. 36-37) and the FEIS for the Prairie Plan (USDA Forest Service 2002b, p. 3-151). Conclusions in both documents concur that the benefits exceed the potential adverse impacts provided certain mitigation measures are followed (see Section 4.1 in this document; USDA Forest Service 2002b p. 3-151). Hydrological restoration should increase the total wetland acreage; other restoration actions (such as prescribed burning and control of invasive species) should improve the quality of existing habitat for both species.

In addition to stormwater management, floodplain improvements at Jackson Creek would benefit the ellipse by improving habitat conditions. Higher baseflow and improved water quality would also benefit the ellipse. However, the project could result in temporary adverse impacts from increased sediment loads caused by construction activities along the streambank (USDA Forest Service 2002b). The ellipse is a filter-feeder and is sensitive to habitat alterations, particularly increased sediment loads in the water (Virginia Department of Game and Inland Fisheries,

unknown date). Mitigation measures, including signs, construction limit fences, and erosion control techniques, would minimize or prevent many of these temporary adverse effects on the ellipse.

Bird species preferring medium-stature or tall-stature grasses would also be expected to benefit from restoration. Removal of livestock from the Drummond Floodplain area in 1997 led to successful breeding by Henslow's sparrows in succeeding years, probably because of taller grasses and greater depths of accumulated litter. Although Henslow's sparrows may be adversely affected by prescribed burning (they rarely nest in grasslands that have been burned during the previous one or two years), the effect is temporary. Prescribed burning is a good management tool for maintaining grasslands as breeding habitat, provided burning does not occur on an annual or biennial schedule in any given tract (Herkert and Glass 1999). Prescribed burning and judicious use of herbicides are also essential for controlling the encroachment of woody vegetation (USDA Forest Service 2001c, 2002c).

The bobolink would also benefit from the proposed action, as removal and control of encroaching woody vegetation would improve habitat for this area-sensitive grassland bird. Periodic prescribed burning would maintain the light to moderate accumulation of litter and duff preferred by bobolinks. Control of invasive grasses such as reed canary-grass and common reed would ensure that wetlands are dominated by shorter graminoids, including sedges and the smaller prairie grasses.

Both the northern harrier and short-eared owl would benefit from restoration of the Drummond Floodplain tract. Removal of woody species would create open expanses of grassland favored by both species (USDA 2002b). Nesting of either species in the Drummond Floodplain area is possible, but is more likely dependent upon population cycles of their major prey, voles. Prescribed burning is a useful tool for managing breeding habitat for both raptors, but portions of grassland tracts must be left unburned to provide nesting cover (USDA Forest Service 2002b). Both the northern harrier and the short-eared owl begin nesting on the ground in early spring and would be vulnerable to late spring prescribed burns (USDA Forest Service 2001c and 2002b). Mitigation measures, including searching potential habitat for nests before spring burns (USDA Forest Service 2002a), should prevent adverse impacts to these species.

The short-stature grassland birds present within the Drummond Floodplain project area (upland sandpiper and migrant loggerhead shrike) would benefit only slightly from restoration of the Drummond Floodplain tract. In general, grass heights in restored wetlands and prairie would be too tall to provide optimal breeding and foraging habitat for either species. However, removal of encroaching woody vegetation might benefit the sandpiper, especially in areas where shallow soil restricts grass heights, as seen along the western and southwestern margins of the project area. One or more pairs of shrikes would probably continue nesting in the Drummond Floodplain project area as long as thorny shrubs remain. Mitigation measures would include

leaving scattered thorny shrubs around the edges of the project area (USDA Forest Service 2002a).

Alternative 2 – Drummond Floodplain Project Area

The effects on the state listed and Regional Forester Sensitive Species under Alternative 2 would be similar to those effects described under Alternative 1 for the Drummond Floodplain area, but on a larger scale. Under this alternative, approximately 230 additional acres would be restored to native prairie habitat. There are approximately 122 acres of dolomite prairie soils in the Drummond Floodplain project area under Alternative 2. Of the 122 acres, 54 consist of existing dolomite prairie remnants that would be protected and enhanced; 66-80 acres could be restored, expanding the habitat for dolomite plant species. Under Alternative 2, a larger area would be cleared of noxious weeds and invasive species and replanted with desirable native species, providing increased habitat for sensitive plant and animal species.

Alternative 3 – No action – Drummond Floodplain Project Area

Alternative 3 would adversely affect all Threatened, Endangered and Sensitive species present within the Drummond Floodplain project area. Under Alternative 3, noxious weeds and invasive species would continue to infest the area and eventually displace sensitive plant species. Fragmenting woody vegetation would encroach, making the habitat unsuitable for sensitive bird species. Alternative 3 would not improve existing habitat and would not create additional foraging and breeding habitat for any of the listed species currently found within the project area.

ENVIRONMENTAL CONSEQUENCES – MIDDLE GRANT CREEK – SENSITIVE PLANT AND ANIMAL SPECIES

Federally Threatened and Endangered Species

There is no habitat for leafy prairie-clover within the Middle Grant Creek project area, and the area does not have the potential for restoration of suitable dolomite prairie habitat.

Regional Forester Sensitive Species

Alternatives 1 and 2 – Middle Grant Creek Project Area

The proposed action would restore riparian, wetland, prairie, and savanna habitat within the Middle Grant Creek project area. For many of the plant and animals species of concern within this area, the effects would be similar to those described above for the Drummond Floodplain. This area does not have potential for restoration of dolomite prairie, but there is potential for restoration of certain dry upland prairie communities on the gravelly and sandy soils.

The existing populations of Sullivant's coneflower within this area would benefit from restoration. Many of the populations are being encroached upon by woody vegetation, and both prescribed burning and judicious use of herbicides would help reverse this process. As hydrological restoration proceeds, additional areas may become suitable for this perennial forb. Higher water tables would probably result in more seeps and calcareous wet-mesic prairie habitats, potential habitats for this species. However, as topography is restored to a more natural configuration, there may be some impacts on populations that have spread into adjacent ditches, scrapes, or other disturbed sites.

Livestock grazing may be used as a management tool in this area. The effects of livestock grazing on Sullivant's coneflower are uncertain; while livestock grazing may reduce flowering and seed production, it also reduces competition from taller prairie grasses and forbs (USDA Forest Service 2002b). Individual plants of Sullivant's coneflower are vulnerable to herbicides, but mitigation measures should prevent or reduce adverse effects on this species. Mitigation measures should also prevent long-term adverse effects on these populations as the site is restored.

Although not currently found in the Middle Grant Creek project area, two plant species found in the Drummond Floodplain area could benefit from restoration activities. Restoration of riparian habitat along Grant Creek would create habitat for the glade mallow. Restoration of wet prairies and seeps in this area may also result in habitat for Crawe's sedge, which prefers calcareous prairie habitats (Bowles 1991). Wetland restoration in the Middle Grant Creek area would result in habitat suitable for Blanding's turtle and king rail, species not currently found in the project area but which may eventually colonize after restoration. If prairie dropseed is successfully established in upland prairie restorations within the Middle Grant Creek project area, then there would be the potential for establishment of the red-veined leafhopper on these restored prairies.

Restoration of the Middle Grant Creek project area would benefit Henslow's sparrow, bobolink, northern harrier, and the short-eared owl by increasing the amount of suitable breeding and foraging habitat. Removal and control of encroaching woody vegetation south of Grant Creek would create habitat of sufficient size (at least 300 acres) for all four area-sensitive grassland birds. Management for herbaceous species of prairies and wetlands would create suitable nesting and foraging habitat. Prescribed burns in a given area must be periodic, not annual, so that management actions provide habitat for bird species that are sensitive to fire effects. Mitigation measures that reduce destruction of nesting harriers and owls from spring burns must also be followed (USDA Forest Service 2001c, 2002a, and 2002b).

The upland sandpiper and migrant loggerhead shrike may benefit more from habitat restoration of the Middle Grant Creek project area than the Drummond Floodplain area because of the increased possibility of establishing and maintaining a shorter grass prairie. The remnants of the terrace margins and ridges have sandy and gravelly soils which are likely to support a prairie community dominated by relatively short native grasses (e.g., little bluestem, prairie dropseed,

side-oats gram, porcupine grass, and June grass). Grazing could be used as a management tool in this area to increase the suitability of restored prairie for both the upland sandpiper and the loggerhead shrike. Currently, much of the land within the project area is too woody for either bird species. The removal of fragmenting woody vegetation during restoration would benefit both species. Mitigation measures would ensure that some thorny shrubs remain around the margins of the area as nesting sites for shrikes (USDA Forest Service 2002a).

Even with the associated benefits of prairie restoration, for instance, bunker demolition, removal of roads, and filling of ditches, actions taken to restore this area could adversely impact some sensitive plant and animal species. Mitigation and monitoring techniques would minimize potential impacts.

Wetland restoration would increase foraging and breeding habitat for the plains leopard frog. This wetland species has not been documented from the Middle Grant Creek project area, although it likely forages nearby. This species has been found in Prairie Creek, just south of the project area. It is likely that the plains leopard frog would spread to the Middle Grant Creek tract once it is restored and suitable breeding and foraging habitat is created. There is the potential for some adverse effects from prescribed burning and herbicide use; however, appropriate mitigation measures would minimize impacts when this amphibian is active (USDA Forest Service 2001c and 2002c).

State Threatened and Endangered Species

Twelve of the species discussed above are also listed as Endangered or Threatened by the State of Illinois (see Table 3-9). Also present on Midewin are three additional species not listed by the US Fish and Wildlife Service as Threatened, Endangered, or Proposed, or as Regional Forester Sensitive Species by Region 9, USDA Forest Service. The State Endangered small white lady's-slipper is an orchid of calcareous prairies and fens. Two State Threatened birds, the pied-billed grebe and the common moorhen require marshes with emergent vegetation interspersed with semi-permanent open water, a situation that is unlikely to develop in either project area. None of these three species is known to occur within either the Drummond Floodplain or the Middle Grant Creek project areas; at present, neither area contains suitable habitat. With restoration, however, both project areas may become suitable for the small white lady's-slipper.

After restoration, both project areas may become suitable for many state-listed bird species that are not currently present on Midewin or occur as occasional migrants. Some of the birds may colonize the restorations without assistance, for instance, the American bittern. Certain plant species may require active intervention to become established, such as the forked aster,; savanna blazing-star,; American burnet; and royal catchfly.

Alternative 3 – No action – Middle Grant Creek Project Area

Alternative 3 would adversely affect all Threatened, Endangered, and Sensitive species present within the Middle Grant Creek project area. Under this alternative, noxious weeds and invasive species would continue to infest the area, eventually displacing sensitive plant species. Fragmenting woody vegetation would encroach, making the habitat unsuitable for sensitive bird species. Alternative 3 would not improve existing habitat and would not create additional foraging and breeding habitat for sensitive species currently found within the project area.

Cumulative Effects

The cumulative effects area for Threatened, Endangered, and Regional Forester's Sensitive Species (RFSS) is the Prairie Parklands, a 239 square-mile, "resource-rich area" (RRA) in Grundy and Will counties in northeastern Illinois (Illinois Natural History Survey, unknown date). Past activities within the Prairie Parklands have caused drastic declines in populations of most Federal Endangered, RFSS, and state-listed species. Included are conversion of natural vegetation to cropland and pasture, grazing, mowing, fire suppression, introduction of non-native animal and plant species, and development of urban areas and rural communities with transportation and energy infrastructure. Nearly all of the tallgrass prairie ecosystem has been destroyed, leaving only a few small remnants of prairie, or less than 0.01 percent of the original coverage. Other natural vegetation types have been reduced, although not as severely as prairie vegetation. Dolomite prairies were concentrated in the lower Des Plaines River valley, where most were destroyed by rock quarrying and industrial development. The remaining dolomite prairies were degraded by intensive grazing, fire suppression, invasion by non-native plants, and lack of management.

The southward expansion of the Chicago metropolitan region is foremost among present or reasonably foreseeable future activities in the Prairie Parklands that could affect the Federal Endangered, RFSS, and state-listed species. This expansion, with residential, commercial, and industrial development, along with associated transportation, energy delivery, and communication infrastructure, is likely to cause further loss and degradation of the remaining natural habitat in the region. These development trends are evidenced by construction of the Deer Run Industrial Park adjacent to Midewin. Increasing demand for open land for outdoor recreation will likely result in recreation-use effects, but may also lead to more open land being protected. For instance, the Forest Preserve District of Will County has received support (in the form of referendums) to purchase more land. Goose Lake Prairie State Natural Area, the largest contiguous tract of natural prairie in Illinois, is being managed and restored to protect the prairie ecosystem. Populations of rare species and their habitats are likely to be increasingly limited to public lands.

Present or reasonably foreseeable future activities on Midewin that could affect the Federal Endangered, RFSS, and state-listed species include: restoration of native vegetation, prescribed

burning, restoration of natural hydrology, grazing of livestock, construction and use of trails, and removal of woody, invasive, and non-native plant species.

Federally Threatened and Endangered species

Dolomite prairie habitat restoration in the Drummond Floodplain project area would enhance and expand habitat for the leafy prairie-clover. However, much of the project area would remain unsuitable because the restored native vegetation would consist of wet dolomite prairie, wet prairie, and sedge meadow. Because there are only five populations of this Endangered plant remaining in Illinois, any improvement of existing habitat or expansion of potential habitat could contribute to the survival of this legume in northeastern Illinois. Thus the Drummond Floodplain restoration could have long-term beneficial effects on the leafy prairie-clover populations at Midewin and elsewhere in northeastern Illinois. As Midewin supports the only population of the dolomite-restricted leafy prairie-clover in the Prairie Parklands, this species' survival in the region depends on restoration efforts at Midewin. Prescribed burning and herbicide use could have adverse effects on individual plants; however, these management tools are essential to improve and expand habitat for leafy prairie-clover.

Restoration at both the Drummond Floodplain and Middle Grant Creek project areas could benefit another Federally listed plant, the eastern prairie white-fringed orchid. This orchid is not currently found on Midewin, but there are two populations elsewhere in the Prairie Parklands. Although Midewin does not support a population, an adjacent population and similar habitat provide opportunities for this species to spread onto or be actively established at Midewin. Both project areas could provide potential habitat for this orchid along with opportunities to establish new populations. However, even after restoration, these areas might not become suitable for the orchid for several decades.

Regional Forester Sensitive Species

Midewin has significant dolomite prairie habitat and, with the additional acreage from the Drummond Floodplain restoration, could become the most important area for preservation of dolomite prairie and the associated dolomite prairie plants within the Prairie Parklands. Restoration of dolomite prairie habitat in the Drummond Floodplain project area would benefit five sensitive species that are restricted to this habitat on Midewin (Pitcher's stitchwort, false mallow, glade quillwort, Crawe's sedge, and red-veined prairie leafhopper). All of these species have restricted ranges in Illinois, and improvement and expansion of their dolomite prairie habitat would have benefits; populations of all five species are found elsewhere within the Prairie Parklands. Glade quillwort is the least numerous of the five (only six populations in Illinois) and the most sensitive to disturbance. Improvement and expansion of habitat at Midewin would decrease the vulnerability of all five species to local extinction. There is potential for establishing both Crawe's sedge and the red-veined leafhopper in the Middle Grant Creek project area after successful habitat restoration.

Restoration at both the Drummond Floodplain and Middle Grant Creek project areas would create habitats suitable for glade mallow and Sullivant's coneflower. Although neither species is listed as Endangered or Threatened by the State of Illinois, both are rather local in distribution. The Prairie Parklands and adjacent areas support a relatively large number of populations of both species (Robertson and Phillippe 1992; USDA Forest Service 2002b). Habitat destruction in unprotected areas is likely to cause further declines in these species, so improving and expanding habitat for the glade mallow and Sullivant's coneflower should reduce their vulnerability in the Prairie Parklands.

The ellipse has declined throughout its range as a consequence of sediment runoff, pollution, and other stream alterations. The survival of this species in northeastern Illinois is dependent upon a few relatively high-quality streams, including Jackson Creek. Improving current conditions in Jackson Creek may be difficult, given that most of the watershed lies on private lands. However, these restoration projects may improve local stream conditions through bank stabilization, restoration with native vegetation, and sediment control.

Over ninety percent of Illinois' natural wetlands have been lost since the middle 1800s; wildlife species dependent on wetlands have also declined. By restoring wetlands in both the Drummond Floodplain and Middle Grant Creek project areas, there will be increased habitat for Blanding's turtle, king rail, and plains leopard frog. Although all these species occur in wetlands (some protected) elsewhere in the Prairie Parklands, improvement and expansion of habitat on Midewin should reduce their vulnerability to habitat loss as unprotected wetlands are degraded or destroyed.

Many grassland birds have undergone regional or range-wide population declines over the past five decades, with some species exceeding ninety percent loss in different regions. Midewin provides the largest concentration of habitat in Illinois for certain grassland birds and has the potential to support large, stable populations of many declining species, including Henslow's sparrow, upland sandpiper, bobolink, and migrant loggerhead shrike. Goose Lake Prairie State Natural Area is the only other area in the Prairie Parklands able to support large populations of grassland birds, although it is unsuitable for upland sandpipers and shrikes and marginal for bobolinks. The Drummond Floodplain and Middle Grant Creek restorations would provide habitat and contribute to maintaining stable populations of some grassland birds. Both projects would contribute to the stability of local bobolink and Henslow's sparrow populations. There may be increased nesting of northern harriers and short-eared owls in the Prairie Parklands because of expanded habitat, at least during years of high vole populations. Although neither project would result in prime habitat for upland sandpipers or loggerhead shrikes, a few pairs of each species would likely continue to use these areas. Management elsewhere on Midewin will provide short-stature grasslands required to maintain populations of upland sandpipers and loggerhead shrikes.

Restoration may also benefit other sensitive species found on Midewin (but not in the project areas) through habitat improvement and expansion. Sensitive species may colonize these areas from occupied sites or be disseminated into the restored tracts with human assistance.

State Endangered and Threatened Species

Restoration of the Drummond Floodplain and Middle Grant Creek project areas may benefit other State of Illinois Endangered and Threatened species found on Midewin and elsewhere in the Prairie Parklands through habitat improvement and expansion. Many bird species found elsewhere in the Prairie Parkland may colonize these sites after restoration is complete. Less mobile organisms, however, may require human intervention to reach these areas.

3.8 MANAGEMENT INDICATORS

AFFECTED ENVIRONMENT

Management indicators are defined as plant and animal species, communities, or special habitats selected for their emphasis in planning, and which are monitored to assess the effects of the management activities on their populations and the populations of species with similar habitats (Forest Service Manual [FSM] 2620.5). Species selected as management indicators on Midewin will be those that best represent the issues, concerns, and opportunities to support recovery of Federal listed species, provide continued viability of sensitive species, and enhance management of wildlife and fish for commercial, scientific, subsistence, or aesthetic values or uses (FSM 2621.1).

Midewin integrates Management Indicator Species (MIS) into the planning process consistent with Forest Service Manual direction. A set of management indicators was developed in the Prairie Plan, which focuses on using ecological conditions or selected vegetation communities. Midewin's MIS is shown in Table 3.10. These conditions and communities will be monitored to determine population trends and evaluate effects of management activities on selected species. The effects of restoration activities within the Drummond Floodplain and Middle Grant Creek project areas will be analyzed using the management indicators in Table 3.10.

Table 3-10. Management Indicators and Associated Species

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, <i>Eryngium</i> 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 white-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
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

¹Regional Forester’s Sensitive Species

²Federal Endangered Species

³Federal Threatened Species

⁴Illinois Endangered Species

⁵Illinois Threatened Species

This section provides an analysis of the effects of restoring former agricultural grasslands and successional fields to appropriate native vegetation on Midewin. 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, p. 2-3). Effects of management activities are examined in light of the existing habitat conditions, both within and outside Midewin’s boundaries, and documented conditions or trends of populations are addressed.

Dolomite Prairie is a subtype of tallgrass prairie that develops on relatively thin soils (<0.5m deep) over dolomitic bedrock. Dolomite prairie is characterized by these shallow soils, extreme fluctuations in soil moisture, and high magnesium concentrations in the soils; these conditions

prevent the growth of many typical prairie plants. Instead, many uncommon and rare prairie plants are predominant, including many species unable to compete on deeper soils, such as annual herbs. Within the Drummond Floodplain project area for Alternative 1 there are approximately 12 acres of existing dolomite prairie. There are approximately 54 acres under Alternative 2. There is potential to restore 64 acres of dolomite prairie for Alternative 1; Alternative 2 would restore 68 acres. Additionally, the existing dolomite prairie would be managed to enhance existing conditions and reduce invasive plants. One objective of this project is to optimize any opportunities to create or restore dolomite prairie and to avoid adverse impacts on the existing dolomite prairie. It is expected that the Threatened, Endangered, and Sensitive species found at Drummond Dolomite Prairie (Butler's quillwort, false mallow, pitcher's stitchwort, leafy prairie-clover, Crawe's sedge, Sullivant's coneflower, and red-veined prairie leafhopper) would benefit from this project. There is no dolomite prairie, nor are conditions appropriate for restoration of this habitat, within the Middle Grant Creek project area.

Under Alternative 3, there would be no management and enhancement of the existing 54 acres of dolomite prairie within the project area, nor would there be an effort to restore additional dolomite prairie habitat.

Upland Typic Prairie is the typical "blacksoil" prairie that once dominated well-drained soils throughout Midewin, Illinois, and the Midwest. Where it survives, upland typic prairie is dominated by deep-rooted, perennial grass and forbs. Approximately 4 acres of upland typic prairie survive on Midewin, but not in either project areas. Soils and surviving native plant populations, however, indicate that upland typic prairie was present in both project areas but was destroyed by agricultural practices. Both action alternatives would restore approximately 160-190 acres of upland typic prairie in the Middle Grant Creek project area. Only a small amount of upland typic prairie would be restored in the Drummond Floodplain project area: approximately 0-15 acres under Alternative 1 and 25-30 acres under Alternative 2. Under the No-action Alternative, no restoration of upland typic prairie would occur in either project area.

Wet Typic Prairie occurs on sites that are moister than upland typic prairie; soils are often seasonally inundated or saturated. Plant species diversity is often slower to occur than in upland typic prairie, and the dominant plants are usually wetland grasses (prairie cordgrass and bluejoint) and sedges. This habitat does not occur in the area proposed for restoration within the Drummond Floodplain under Alternative 1; however, Alternative 2 does include 2-1/2 acres of wet typic prairie surviving in small remnants. Approximately 9-1/2 acres of wet typic prairie survive within the Middle Grant Creek project area. Both action alternatives would greatly increase the amount of wet typic prairie in the Drummond Floodplain project area, with approximately 80-95 acres restored under Alternative 1, and approximately 210-250 acres restored under Alternative 2. Approximately 65-95 acres of wet typic prairie would be restored in the Middle Grant Creek project area under both action alternatives. Additionally, the restored wet prairie would serve as a major component (around 80%) in a matrix of restored wetland communities, increasing their ecosystem functions. Under the No-action Alternative, no

restoration of wet typic prairie would occur in either project area. Existing remnants would continue to degrade and eventually cease to exist.

Sedge Meadows have soils that are usually saturated for most of the growing season and are often temporarily inundated during early spring. Sedge meadows are usually dominated by sedges, although wetland grasses, bulrushes, and spikerushes are also present. No sedge meadow habitat currently exists under Alternative 1 for the Drummond Floodplain project area; however, approximately two acres are included within the Alternative 2 project limits. Six acres exist in the Middle Grant Creek project area. There is potential to restore this habitat in both project areas. Under Alternative 1, at least 15-18 acres of sedge meadow could exist in the Drummond Floodplain project area, but under Alternative 2, at least 40-45 acres would be restored. Approximately 12-18 acres would exist in the Middle Grant Creek project area after restoration. These sedge meadows would occur as smaller entities within a matrix of restored wetlands. However, they would also contribute to the heterogeneity and species diversity of these wetlands. Under Alternative 3, the existing sedge meadows will continue to degrade and suffer from invasion by non-native plants, especially reed canary-grass. The benefits associated with the sedge meadows in a matrix of restored wetlands would fail to occur.

Marshes are even wetter than sedge meadows, and may have small tracts of open water present, especially early in the growing season. Marshes are usually dominated by coarse graminoids such as cattails, bur-reeds, and bulrushes. Currently, approximately ten acres exist in the Drummond Floodplain project area under Alternative 1; eleven acres occur under Alternative 2. Approximately 6-1/2 acres occur in the Middle Grant Creek project area. These marshes occur in the lowest portions of the landscape and where most resistant to alterations of wetlands. It is doubtful that restoration would significantly increase the amount of marsh habitat. However, control of invasive species, prescribed fire management, and restoration of the surrounding landscape would improve the hydrology and vegetation, and lead to more stable and biologically diverse marsh habitats. Encroachment by non-native plants would continue in both project sites under Alternative 3.

Seeps are wetlands that develop where groundwater percolates to the surface, often on a slope. The water then flows into adjacent wetlands. Seep vegetation is variable and often reflects surrounding conditions. Seeps occurring in grasslands are dominated by sedges, rushes, and wetland grasses, while seeps found in wooded areas are often dominated by shrubs and broad-leaved herbaceous plants. For both action alternatives, approximately 0.2 acres of seep habitat exist in the Drummond Floodplain project area near Jackson Creek. A degraded seep/sedge meadow complex occurs in the Middle Grant Creek project area. Under Alternatives 1 and 2, there is potential to rehabilitate existing seeps and restore additional seep habitat in both project areas. The potential acreage of seeps following restoration is uncertain, but would probably not exceed two acres. Some of the additional acreage would occur through enlargement of existing seeps as woody vegetation is removed. A few new seeps would likely develop as hydrology is restored. The greatest potential lies at the bases of the terraces in the Middle Grant Creek tract.

While the acres rehabilitated and restored would be small, restoration of seep habitat would add to landscape and biological diversity within both project areas. Under Alternative 3, the existing seeps would continue to degrade and likely shrink in size as a consequence of further invasions of woody plants.

Savannas are grasslands with scattered trees. The savanna understory is dominated by native grasses, sedges, and forbs, with some shrubs. Canopy tree species vary, but usually include some species of oak, especially bur oaks. Canopy closure in savannas does not exceed 50% cover. Currently, under both action alternatives, the only savanna habitat present in either project area consists of approximately 2-1/2 acres of degraded wet mesic savanna in the Drummond Floodplain tract. Savanna habitat does not currently exist in the Middle Grant Creek project area. There is potential for at least forty acres of savanna habitat to be restored in both project areas under Alternatives 1 and 2. Under Alternative 3, existing savanna remnants would not be rehabilitated, and potential habitat would not be restored.

Woodlands and Forests are more shaded than savannas, with canopy closure exceeding 50% cover. The understory more often includes shrubs and saplings, and the ground layer includes many shade-tolerant herbaceous plants. Approximately two acres of mesic upland forest exists in the Drummond Floodplain tract under both action alternatives. Native woodland and forest habitats do not exist in the Middle Grant Creek project area, although degraded successional woodlands are found. Alternatives 1 and 2 would probably lead to some positive changes in the existing forest remnants, as understory management should control invasive species and improve native tree regeneration. At least thirty acres of successional woodlands are likely to be restored as native woodlands or forests. The few native and desirable species present would be retained and enhanced through plantings of seed, plugs, and seedlings. Prescribed burning, selective cutting, and herbicide treatments would control invasive shrubs and trees. Under Alternative 3, these benefits would not occur, and it is likely that the native forest remnants would gradually lose their characteristic native trees and herbs as invasive plants increase.

Short-stature Grasslands usually have grass heights shorter than 10-30 cm, with approximately half of the grass cover below 10-20 cm. Litter accumulation is low, and shrub cover less than one meter tall does not exceed 5%. Management is usually accomplished by grazing, but can be supplemented with mowing and prescribed burning. At present, neither project area is managed specifically as short-stature grassland habitat. However, small amounts of this habitat are present, primarily on dry ridges and in dolomite prairie. The action alternatives in the Drummond Floodplain tract would not greatly change conditions for short-stature grassland. Some soils that contain sand and gravel in the Middle Grant Creek project area would be cleared of shrubs and restored to a relatively upland typical prairie. If grazed, these areas would better meet the conditions for short-stature grassland habitat. Alternative 3 would probably lead to a loss in the limited amount of short-stature grassland with the continued encroachment of shrubs and other woody plants. Invasion by reed canary-grass and other species unsuitable to provide grassland habitat is also likely to continue under Alternative 3.

Medium-stature Grasslands usually have grass heights between 25-35 cm during late spring and early summer. Litter depth (1-2 cm) is an important feature. Grass composition is not important, with either low-stature native grasses or non-native pasture grasses occurring. Management is usually accomplished by grazing (although less intensively than for short-stature grasslands), by mowing, or by prescribed burning. Medium-stature grasslands are present in both project areas, but are being encroached upon by woody plants. Both action alternatives would enhance and expand this habitat, primarily in the form of restored prairies dominated by little bluestem, prairie dropseed, sedges, and other lower-stature native graminoids. Alternative 2 would likely restore more medium-stature grassland than Alternative 1 in the Drummond Floodplain project area. Alternative 3 would probably lead to a loss in medium-stature grassland, as encroachment by shrubs and other woody plants would continue.

Tall-stature Grasslands are characterized by grass heights over 35-40 cm in late spring and early summer, and can be the previous year's standing dead stems or new growth. Litter depth should be over 2 cm. These grasslands may be composed of tall pasture grasses or prairie grasses and sedges. Tall-stature grassland habitat is present in both project areas, but its quality is low because of woody encroachment. Both action alternatives would greatly enhance and expand the acreage of tall-stature grassland in both project areas. Most of the tall-stature grassland would consist of restored upland and wet typic prairie dominated by tall grasses, including prairie cordgrass, big bluestem, and Canada wild-rye. Because of the additional acreage in Alternative 2, it is likely that more tall-stature grassland would be restored than under Alternative 1. Alternative 3 would probably lead to a loss in tall-stature grassland, as encroachment by shrubs and other woody plants would continue. Invasion by reed canary-grass and other species unsuitable for providing grassland bird habitat would also continue under the No-action Alternative

Benthic Macroinvertebrates 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 and thus are more sensitive to pollutants and disturbances in their habitat (Berkman et al., 1986). Each species within this group has different tolerances to pollution (EPA Office of Water, 1997). Thus the composition of macroinvertebrate samples can indicate the ecological health of a stream.

Alternatives 1 and 2 would offer improved benthic macroinvertebrate habitat conditions by reducing the sediment deposition on the creek-bed. Furthermore, as water quality increases, it may be possible to see an increase in certain species and an increase in the total native species diversity in the streams. However, stream restoration would also be affected by off-site impacts higher in the watersheds. The benefits from the action alternatives could partially compensate for adverse effects originating off-site. Alternative 3 would have no direct effect on the benthic

macroinvertebrate community. This alternative would fail, however, to provide any beneficial effects to partially offset the negative impacts from upstream events.

Leafy Prairie-Clover impacts from the proposed restoration projects have been analyzed in depth under Threatened, Endangered, and Sensitive Species (Section 3-7). Individual plants of this Federal Endangered species could be lost or damaged from the use of prescribed burning or herbicides, although both of these management tools, in addition to restoration, are expected to greatly benefit Midewin's populations of leafy prairie-clover. These benefits would primarily work to improve existing habitat, but also provide additional habitat through restoration.

Under Alternative 3, certain adverse trends affecting the leafy prairie-clover would likely continue. Without surrounding restoration and management, it is unlikely that the population would be able to expand. Invasive plant species would continue to infest the area, degrading the few remaining acres of native vegetation, and eventually displacing additional native plants, including the leafy prairie-clover.

Henslow's Sparrow is a Regional Forester Sensitive Species that is discussed in greater depth under Threatened, Endangered, and Sensitive Species (Section 3-7), where effects of the proposed restoration projects have been analyzed. Both action alternatives would cause some existing habitat to become temporarily unsuitable for nesting Henslow's sparrows because of prescribed burning. However, this temporary loss would be mitigated by the total increase in suitable nesting habitat and the improved condition of that habitat through such actions as removal of woody plants through prescribed burning and herbicide treatments. Alternative 2 would result in a greater amount of potential nesting habitat.

Alternative 3 would not cause temporary losses of Henslow's sparrow nesting habitat from prescribed burning. Because there would be no management, however, the habitat would eventually be lost to encroaching woody vegetation, and Henslow's sparrows would likely cease to nest in both project areas.

White-tailed Deer is an important game animal in Illinois. Because of its location in northeastern Illinois, Midewin offers hunting of this species in a region where deer hunting is usually restricted due to conflicts between high human population density and public safety. Visitors to Midewin may also appreciate the presence of white-tailed deer for observation. Deer population size and density can adversely impact human health and safety, either as traffic hazards or as vectors for disease-carrying ticks. Although the white-tailed deer is a native mammal, it can negatively affect native vegetation through selective browsing of certain native forbs and shrubs. Under some conditions, it may be 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 facilitate balanced management.

Use of the project areas by white-tailed deer would probably decline under Alternatives 1 and 2. The main factors contributing to this decline in use by deer would be the removal of cover and winter browse. More likely, there would be no effect, as white-tailed deer are numerous, adaptable, and mobile animals. Alternative 3 is not likely to affect white-tailed deer populations.

Cumulative Effects: Drummond Floodplain and Middle Grant Creek Project Areas

Many of the Management Indicators have drastically declined throughout Will County from the conversion of native vegetation to agricultural lands, drainage of wetlands, and urbanization. Human actions have eradicated native plant communities on Midewin, causing declines in many of the plant and animal species associated with these communities. In general, Alternatives 1 and 2 provide for improved conditions for many species and conditions associated with the Management Indicators. Alternative 2 would provide greater cumulative benefits to the species and conditions of concern than Alternative 1 because of the more extensive area to be restored (230 additional acres). Alternative 2 better complies with direction in the Prairie Plan by initiating restoration of more acres for these Management Indicators. These benefits would not occur under Alternative 3. White-tailed deer is the only species for which the project may not have a cumulative impact, since this species is common throughout Will County.

All of Illinois' native habitats have been drastically reduced since 1830, and considerable losses and degradation are still underway. Dolomite prairie is the rarest of the prairie communities, with only 120 acres of dolomite prairie surviving on Midewin. Alternatives 1 and 2 make substantial contributions to dolomite prairie on Midewin by rehabilitating and restoring at least 60 acres. Alternative 2 would likely restore more acres. Only four acres of upland typic prairie (mesic typic prairie) and 26 acres of wet typic prairie (wet-mesic and typic wet prairie) exist on Midewin, having been reduced from at least 8,600 acres and 4,800 acres, respectively, in 1830 (USDA Forest Service 2002b). There have been greater losses elsewhere in Illinois. The action alternatives would manage, enhance, and restore at least 500 acres, and possibly more than 550 acres of upland and wet typic prairie communities. This would exceed the amount of all existing prairie remnants in Will County and make important contributions to habitat for populations of prairie plants and prairie-dependent wildlife.

Approximately 20 acres of sedge meadow, 58 acres of marsh, and 0.6 acres of seep persist on Midewin, reduced from at least 860 acres of wetland communities (aside from wet prairie) that existed in 1830 (USDA Forest Service 2002b). Alternatives 1 and 2 would make substantial contributions to non-prairie wetlands on Midewin by rehabilitating and restoring at least 50 acres, with Alternative 2 restoring more acres than Alternative 1. Restoring these wetlands would provide greater landscape and species diversity within the matrix of restored and rehabilitated prairie. This would help provide more breeding habitat for many wetland wildlife species in Will County, and also provide greater potential for larger, expanding populations while decreasing their vulnerability to local extirpation.

Woodlands and savannas have also declined, and intact savannas are now considered to be among the rarest natural communities in Illinois and elsewhere in the Midwest (Bowles and McBride 1995; Leach and Ross 1995). There are only 25 acres of savanna on Midewin, and this is highly degraded. Forest and woodland communities are better represented with approximately 150 acres. Under the action alternatives, there could be additions of 17 to 45 acres of restored savanna, woodland, and forest communities; the acreage would be equal under both Alternatives 1 and 2. Few extant savannas and woodlands survive in a matrix of prairie and wetlands. By restoring these landscapes as proposed, there would be progress toward restoring a functional mosaic of prairie, wetlands, savanna, and woodlands on Midewin.

Grassland habitat was greatly reduced as the prairie was converted to agricultural land. However, many species of grassland wildlife escaped local extinction because they were able to adapt to agricultural grasslands. These grasslands, managed as pastures or hayfields, gradually declined through the 1900s, and the new management regimes were not conducive to the survival of grassland wildlife. Many of these species survived at Midewin and elsewhere in the Prairie Parklands because of prairie preserves, such as the Goose Lake Prairie State Natural Area, and the Joliet Arsenal, which provided pastures and hayfields as habitat. Approximately 2,800 acres of agricultural grasslands are currently available on Midewin as grassland bird habitat. By continuing to provide the three grassland structure types (short, medium, and tall), Midewin contributes to the survival of these grassland species in the Prairie Parklands and in Illinois. Although the proposed restoration projects provide mostly for medium and tall-stature grassland habitat, small amounts of short-stature grassland bird habitat would likely result as well.

Under Alternative 3, there would be no management or restoration within the Drummond Floodplain or Middle Grant Creek project areas. Without hydrological restoration, woody plant removal, prescribed burning, and selective herbicide application, the acreage and quality of the habitat Management Indicators would continue to decline. Encroachment by invasive plants would proceed until nearly all traces of the native vegetation were gone. Without restoration of the surrounding land, native remnants would exist as islands, even more vulnerable to species loss and invasion. Populations of many native plants and wildlife would disappear. Many of the persisting populations would be less vigorous; for example, many plant species would cease or reduce flowering. As a consequence, other species, such as specialized pollinators, could disappear. Because of the decline and disappearance of these populations, there would be fewer sources to recolonize other prairie sites, fewer populations for genetic interchange, and perhaps less genetic diversity for all local populations. This could lead to increased local extinction risk for many fragmented populations of prairie-dependent species, both plants and wildlife. Instead of making a contribution to restoration of these habitats on Midewin and in the Prairie Parklands, these project areas would become a source of invasive plant species.

Throughout Illinois, there have been changes in benthic macroinvertebrate populations from human actions. Some of these impacts include: sediment deposition from agricultural runoff and erosion; pollution from fertilizer, manure, industrial sources, and human waste; changes in

stream dynamics through damming, channelization, and down-cutting; lowering of water tables; and diversion of surface waters. Many benthic macroinvertebrates have declined and are now restricted to the least disturbed watersheds and stream systems. A minority of aquatic invertebrate species can exploit degraded habitats, and have probably increased in numbers over the past 150 years. Jackson Creek is considered to be one of the higher quality streams in northern Illinois, but is likely to be adversely impacted as the watershed becomes urbanized. Similar impacts are expected for Grant Creek, although a greater proportion of the watershed is protected.

The restoration and management within those portions of Jackson and Grant creeks under the action alternatives may partially mitigate the impacts these streams receive from upstream. This could help maintain fairly diverse invertebrate fauna, with species relatively intolerant of degraded conditions. Under Alternative 3, these benefits would not occur, and the overall diversity of benthic macroinvertebrates in both the Jackson and Grant Creek watersheds would be expected to decline.

Cumulative effects of both action alternatives on the leafy prairie-clover and the Henslow's sparrow have been analyzed in greater detail above. Alternatives 1 and 2 would provide improved and expanded habitat for both the leafy prairie-clover and Henslow's sparrow, which are each restricted to a relatively few preserves in the Prairie Parklands. Benefits of the action alternatives would not occur under Alternative 3.

White-tailed deer occur throughout Midewin and the Prairie Parklands. None of the three alternatives are expected to effect deer populations at Midewin or in surrounding areas.

3.9 HERITAGE RESOURCES

AFFECTED ENVIRONMENT – DRUMMOND FLOODPLAIN AND MIDDLE GRANT CREEK PROJECT AREAS

Both the Drummond Floodplain and the Middle Grant Creek project areas have undergone extensive alteration, having been utilized for agricultural purposes starting in the mid-nineteenth century and for arsenal development after 1940.

The soils in these areas have been disturbed repeatedly for over 150 years as the result of draining the mesic and wet prairie, sedge meadows, and marshes to facilitate conversion to pasture grasses and crops for agricultural production. Most of the drainage for farming took place between 1880 and 1914. In fact, by 1880, 98 percent of the land in Will County was included in farms. Farms under cultivation as the result of drainage totaled 972 of the 2,719 farms listed in Will County in 1920, and some 70 percent of all farmland in Will County was designated as drained or in need of drainage at that time. Agricultural impacts to the project

areas have consisted of plowing, disking, and planting, generally affecting cultivated soils to a depth of 20-25 cm. (8-10 inches) below today's ground surface. Additional impacts from stream channelization, excavating drainage ditches, and laying drainage tile affected areas in the immediate vicinity of those activities.

Later impacts within portions of the project areas occurred as the result of arsenal development after 1940. The most extensive impact from arsenal development is found in the Middle Grant Creek project area, where a large section of a bunker field and its obsolete roads, rail beds, and bunkers remain.

As no farm-related structures remain standing, expected heritage site types in these disturbed areas would be archaeological in nature. Archaeological resources could be prehistoric Native American sites dating from as early as 12,000 to 1000 BC and into the 1830s, or Euro-American farmsteads dating from the mid-nineteenth to mid-twentieth centuries, including related features such as roads, discard areas, and fence lines. There is also the possibility that unknown sites or features associated with the World War II-era Kankakee Ordnance Works or the later Joliet Arsenal could be discovered.

Heritage resource inventories were conducted in the Drummond Floodplain and Middle Grant Creek project areas pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended, and its implementing regulations in 36 CFR Part 800. Section 106 requires that federal agencies, including the U.S. Forest Service, take into account the effects of their land management activities and undertakings on heritage resources eligible for, potentially eligible for, or listed in the National Register of Historic places (NRHP) in consultation with the State Historic Preservation Office (SHPO). Historic properties include any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the NRHP.

During the archaeological survey of the two project areas, eleven heritage resources were recorded, including four historical sites, six prehistoric sites, and one prehistoric and historical site. Of these, two sites were found in the Middle Grant Creek project area and nine in the Drummond Floodplain project area. All of the sites recorded during the archaeological inventory are considered to be potentially eligible for listing in the NRHP and would be protected during restoration activities. Protection of the sites would be achieved through monitoring of restoration activities and avoidance, as these resources may contain contextual integrity and potential data that could contribute future information on both the history and prehistory of Midewin and the surrounding region.

An historical cemetery lies just north of Jackson Creek and outside the Drummond Floodplain project area. The cemetery would not be adversely impacted by restoration of the creek and associated floodplain. The proposed work would stabilize the creek banks and help to prevent persistent undercutting near the cemetery property.

ENVIRONMENTAL CONSEQUENCES – DRUMMOND FLOODPLAIN AND MIDDLE GRANT PROJECT AREAS

Alternative 1 - Drummond Floodplain and Middle Grant Creek Project Areas

Eleven archaeological sites (four historical, seven prehistoric, and one prehistoric and historical) were recorded within the project areas during inventories for planned future restoration activities. All eleven sites have been determined to be potentially eligible for listing in the NRHP and would be avoided during project-related restoration actions. As all sites would be protected from effects of project actions, there would be no effects on these heritage resources. Alternative 1 would result in increased flooding south of channel, but the north side of the channel would not be affected. Therefore, it is expected that the cemetery would not be adversely impacted by restoration activities

Alternative 2 - Drummond Floodplain and Middle Grant Creek Project Areas

Alternative 2 is similar to Alternative 1, with the exception that 230 additional acres would be added for an increased total to 470 acres in the Drummond Floodplain project area. No archaeological sites were located during the survey of these added acres. Thus there would be no change in environmental consequences from Alternative 1, and no effects on heritage resources in either project area. The cemetery would not be adversely impacted by restoration activities under Alternative 2.

Alternative 3 - Drummond Floodplain and Middle Grant Creek Project Areas

Under the No-action Alternative, there would be no project effects on heritage resources because restoration activities would not be implemented in either project area.

Cumulative Effects

A heritage resource inventory has been completed for each project area in compliance with Section 106 of the National Historic Preservation Act. Heritage resources present within the project areas have been determined to be potentially eligible for listing in the NRHP. Accordingly, these resources would be protected and avoided during restoration activities, and effects to heritage sites would not occur.

However, cumulative effects analysis considers all known past actions, present actions, and reasonably foreseeable future actions that could have an impact on resources. Prior to 1978, heritage inventories were not systematically completed, resulting in previous impacts to some sites as the result of farming and arsenal development activities. Since then, surveys have been conducted for planned earth-disturbing activities, and heritage resources have been protected

from impacts related to those activities. Planned restoration actions for the Drummond Floodplain and Middle Grant Creek project areas are not expected to result in cumulative effects on heritage resources, since any effects would be mitigated through means of avoiding the resources.

Only those heritage resources that have been inadvertently missed during project area surveys could be impacted by restoration activities. However, as indicated by the results of past monitoring, the likelihood of missing sites 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 unlikely to contain information that would add substantially to our understanding of the history or prehistory of northeastern Illinois. Effects on this type of heritage resource would be minimal.

3.10 RECREATION

AFFECTED ENVIRONMENT

Nationally, the Forest Service uses a system called the Recreation Opportunity Spectrum (ROS) to inventory and classify National Forest System lands. The range of recreational experiences, opportunities, and settings available on a given area of land is classified using the ROS system, based on access, remoteness, visitor management, on-site recreation development, social encounters, and visitor impacts. Based on these six elements, the Forest Service assigns one of six ROS settings to all land that it manages, ranging from “primitive” to “urban”.

The Drummond Floodplain and Middle Grant Creek project areas are within the Roded Natural ROS setting. The Roded Natural ROS setting represents a moderate level of development and moderate to high social interaction within a modified physical setting that is not dominated by evidence of humans. New facilities are minimal, subtle, and in harmony with the natural environment. The environment may be modified but would appear natural.

AFFECTED ENVIRONMENT - *DRUMMOND FLOODPLAIN RESTORATION – RECREATION*

There are currently no hiking trails located within the Drummond Floodplain project area, and no trails are currently proposed or planned within the project area. Although deer hunting is allowed on portions of Midewin, none presently occurs within the project boundaries. At this time, there are no recreational facilities planned within the project area.

ENVIRONMENTAL CONSEQUENCES – DRUMMOND FLOODPLAIN RESTORATION – RECREATION

Alternative 1 – Drummond Floodplain Project Area

The area to be restored under Alternative 1 lies entirely within the Roded Natural ROS setting. This setting represents a moderate level of development and moderate to high social interaction within a modified physical setting that is not dominated by evidence of humans. Alternative 1 would meet the requirements of the Roded Natural ROS setting.

Because the area contains rare dolomite prairie and several Threatened, Endangered, and Sensitive plant species, no recreational amenities and little recreational use currently exist within that portion of the Drummond Floodplain to be restored under Alternative 1. As a result, there would be no direct or indirect effects on recreation. This project would not, however, preclude any future recreation opportunities that are consistent with the Prairie Plan.

Alternative 2 – Drummond Floodplain Project Area

The area to be restored under Alternative 2, which is approximately 230 acres larger than Alternative 1, lies entirely within the Roded Natural ROS setting. As described above, this setting represents a moderate level of development and moderate to high social interaction within a modified physical setting that is not dominated by evidence of humans. Alternative 2 would meet the requirements of the Roded Natural ROS setting. There would be no change in the in the ROS designation under Alternative 2.

Like Alternative 1, no recreational amenities and little use currently exist within that portion of the Drummond Floodplain to be restored under Alternative 2. As a result, there would be no direct or indirect effects on recreation. Like Alternative 1, Alternative 2 would not preclude any future recreation opportunities consistent with the Prairie Plan.

Alternative 3 – No action - Drummond Floodplain Project Area

Alternative 3 would not meet the requirements of the Roded Natural ROS setting. No vegetation, roads, rail beds, or other infrastructure would be removed from the Drummond Floodplain area. No regrading would stabilize the Jackson Creek banks and restore more natural hydrology. As a result, the physical setting would continue to be dominated by human alterations.

Alternative 3 would have no direct or indirect effects on existing recreation, since no recreational amenities or uses currently exist within the Drummond Floodplain project area, and no restoration activities would be planned or implemented. Alternative 3 would not preclude future

recreation opportunities consistent with the Prairie Plan. However, recreation opportunities would not provide the quality of experience that either of the action alternatives could provide.

AFFECTED ENVIRONMENT - MIDDLE GRANT CREEK RESTORATION – RECREATION

No hiking trails are located within the Middle Grant Creek project area. However, two “interim” hiking trails now open for use by the general public are located approximately one-half mile east and southeast of the project area within visible range. One trail, Henslow Trail, looks out onto the project area. Deer hunting is allowed in the southwest portion of Midewin, and in 1999 the boundaries of the deer hunting area were expanded. At its closest point, the Middle Grant Creek project area is approximately one mile north of the hunting area. A shuttle route (envisioned as a rubber-tired, quiet vehicle that can transport small and large groups of people) may eventually pass through the northeast portion of the project area. Currently, tour groups view the project area as they drive along Prairie Creek. The visitor center, a picnic area, a group campground, and other recreational facilities will not be located within this project area.

ENVIRONMENTAL CONSEQUENCES - MIDDLE GRANT CREEK RESTORATION – RECREATION

Alternatives 1 and 2– Middle Grant Creek Project Area

The Middle Grant Creek proposed restoration area lies in a Roaded Natural ROS setting. This setting represents a moderate level of development and moderate to high social interaction within a modified physical setting that is not dominated by evidence of humans, and would maintain the requirements of the Roaded Natural ROS setting.

No recreational amenities and little use currently exist within the Middle Grant Creek area. As a result, there would be no direct effects on recreation. However, indirect effects could occur. Users of the two interim hiking trails located approximately one-half mile east/southeast of the Middle Grant Creek restoration area could be adversely affected by construction noise and traffic. These adverse effects would be relatively short-term in duration and would occur while the Middle Grant Creek area is cleared, graded, seeded/planted, and maintained.

Deer hunters, who use an area about one-mile south of the Middle Grant Creek project area, could be affected by the proposed project in the short-term. Depending on the timing of the restoration work and the noise level of the equipment used, construction activities may disturb hunters or deer that frequent the area, thereby decreasing or increasing (deer may move south to avoid construction activities) hunter success. In the long term, removal of woody vegetation near Grant Creek could lead to changes in deer use patterns in the hunting areas to the south, which could affect hunter success.

Over time, restoration efforts in the Middle Grant Creek area would create habitats that attract numerous species of vegetation and wildlife. The presence of these species, in turn, would encourage bird watchers, amateur botanists, Midewin volunteers, school groups, and tour program participants to visit the area. As interim trails already occur in the vicinity of the Middle Grant Creek restoration area, recreational demand in the vicinity may increase. This increased demand would result in increased use if more recreational opportunities are offered in the future.

Alternative 3 – No action - Middle Grant Creek Project Area

Alternative 3 would not meet the requirements of the Roded Natural ROS setting. No vegetation, roads, rail beds, bunkers, or other infrastructure would be removed from the Middle Grant Creek area. No regrading would stabilize the Grant Creek banks and restore more natural hydrology. As a result, the physical setting would continue to be dominated by evidence of human alterations of the landscape. No recreation amenities or uses currently exist within the Middle Grant Creek area. As a result, Alternative 3 would have no direct effects on recreation.

Users of the interim trails that are located approximately one-half mile south of the Middle Grant Creek site would not experience short-term, adverse, construction-related effects (e.g., noise and traffic) if Alternative 3 were implemented. However, the potential long-term benefits of a restored landscape and the associated interpretive opportunities adjacent to the interim trails would be lost.

Deer hunters who use the area about one-mile south of the Middle Grant Creek project area would not be impacted by construction activities, noise, or traffic under Alternative 3. There would be no affect on deer numbers or hunter success in the short term.

As Alternative 3 includes no restoration activities, no natural habitats would be created and no recreational demand would be generated in the vicinity of Middle Grant Creek.

Cumulative Effects

Few recreational opportunities in northeastern Illinois have the potential to offer a setting and experience comparable to Midewin. As the largest public open space in the region, Midewin will be able to offer experiences of vastness and solitude, long-distance trails, distance from automobile traffic, and opportunities to see unique prairie plants and wildlife. These experiences are generally not available elsewhere near Midewin. The Drummond Floodplain and Middle Grant Creek projects would advance the environmental restoration of Midewin and help to create recreation opportunities that are unique to the region.

Rapid population growth is expected in areas surrounding Midewin. Recreational use would increase as recreational amenities are developed throughout Midewin and become well known

regionally and nationwide. The restored landscapes would enhance these recreational experiences, generate increased demand, and facilitate the future expansion of recreational amenities (e.g., picnic areas and trails), as deemed appropriate by the Forest Service.

Implementation of Alternative 2 for the Drummond Floodplain would advance the environmental restoration of Midewin and help to create recreation opportunities that are unique to the region. As Alternative 2 would restore approximately 230 more acres than Alternative 1, more of these beneficial cumulative effects could be expected.

Alternative 3 would not advance the environmental restoration of Midewin and, therefore, would not take full advantage of opportunities to promote visitors' experiences observing unique prairie plants and wildlife. More limited opportunities of experiencing vastness and solitude, long-distance trails, and distance from automobile traffic would be available under Alternative 3.

3.11 SCENIC QUALITY

AFFECTED ENVIRONMENT

The historic scenery of Midewin was a gently rolling, subtle, and expansive mix of prairie, open-grown woodland mixed with prairie, and dense woodland. Meandering streams drained the area. A mix of medium to tall grasses and forbs dominated the land. Patches of woodland provided the primary vertical elements, while flowering forbs provided color throughout much of the summer and fall.

Little of the historic scenery remains today. The scenery of the Drummond Floodplain and Middle Grant Creek project areas is now an irregular patchwork quilt of cultural influences that have been laid on the land over the past 200 years. Lower Jackson Creek and Middle Grant Creek have been straightened, channelized, and deepened. In addition, the Deer Run Industrial Park currently under construction adjoins the Drummond Floodplain and Middle Grant Creek project areas.

Scenic Integrity Objectives (SIO) are the result of the compilation of analyses and surveys to classify the desired scenic quality of the land. The objectives are used to guide management practices to ensure that the scenic and ecological integrity of the land is maintained or improved.

Areas of High Scenic Integrity – should appear unaltered from the natural landscape; valued landscape character appears intact.

Areas of Moderate Scenic Integrity – appear slightly altered.

Areas of Low Scenic Integrity – may appear altered.

AFFECTED ENVIRONMENT - DRUMMOND RESTORATION – SCENIC QUALITY

Visually, the Drummond Floodplain project area is highly impeded by surrounding land uses. The Exxon-Mobil refinery is the prominent visual feature immediately adjacent to the Drummond Floodplain project area. The refinery is a complex of tanks, pipes, and other steel structures that extend several stories high. In addition, Drummond Road and a rail line traverse the project area. Deer Run Industrial Park is, and will remain, a prominent feature to the south and east. When completed, trains, storage containers, and other facilities will be visible in the middle and foreground of the project area.

The portion of the Drummond Floodplain project area that lines Jackson Creek (east of Drummond Road) has a Moderate SIO, while the remainder of this area has a Low SIO. The southwest and northwest portions of the site are listed as moderate on the long-term map because they are visible from proposed trails or roads. The remainder of the site is considered “unseen” and therefore listed as low. Because the project site is outside of the State Highway 53 corridor and the visitor center viewsheds, the SIO for the entire site is low for the short term. In some areas within the project area the scenic integrity will never be high because of development on adjacent lands visible from the project area (i.e., Exxon-Mobil petroleum refinery, railroads, industrial park, and U.S. Army remediation plant).

ENVIRONMENTAL CONSEQUENCES - DRUMMOND FLOODPLAIN RESTORATION – SCENIC QUALITY

Alternative 1 – Drummond Floodplain Project Area

Alternative 1 would remove roads, rail beds, and other infrastructure from within the Drummond Floodplain project area. Woody vegetation would also be removed and the area would be replanted with native prairie vegetation. Regrading would stabilize the Jackson Creek banks and restore more natural hydrology. Steambank stabilization, removal of invasive plant species, and replanting of native species would improve the look of the degraded stream channel.

Over the long-term, Alternative 1 would help to restore the historic Drummond Floodplain scenery and meet the desired scenic condition (i.e., a more natural appearing landscape than exists today). Over time, these actions would meet or exceed the prescribed SIOs.

Alternative 2 – Drummond Floodplain Project Area

Effects of Alternative 2 on scenic quality would be similar to those of Alternative 1. However, approximately 230 more acres would be restored to native prairie than under Alternative 1, thereby improving and restoring the historic scenery of a much larger area.

Alternative 3 – No action – Drummond Floodplain

Alternative 3 would not restore the historic Drummond Floodplain area scenery, nor would it meet the desired visual condition (i.e., a more natural appearing landscape than exists today). This alternative would not meet the prescribed SIOs.

AFFECTED ENVIRONMENT - MIDDLE GRANT CREEK RESTORATION – SCENIC QUALITY

A tram route is proposed to run through the Middle Grant Creek project area. Areas in the foreground of this tram corridor are in the “high” scenic integrity objective level. Areas in the middle ground of this corridor are in the “moderate” SIO category. None of this project area lies within the State Highway 53 corridor or the proposed visitor center viewshed. However, much of the Middle Grant Creek restoration area is within the viewshed of existing interim trails, and so effort should be made to maintain or raise the scenic integrity levels as much as possible.

Evidence of the former arsenal remains an important landscape feature within the Middle Grant Creek project area. A portion of a large bunker field, which contains approximately 50 bunkers and associated roads and rail lines, occupies most of the project area south of Grant Creek. The Abraham Lincoln National Cemetery is just northeast of the project area, where the adjacent portion of the cemetery is primarily wooded and natural appearing. The Deer Run Industrial Park, currently under development, is located north of Grant Creek.

ENVIRONMENTAL CONSEQUENCES - MIDDLE GRANT CREEK RESTORATION – SCENIC QUALITY

Alternatives 1 and 2 – Middle Grant Creek Project Area

The effects on scenic quality would be similar to those effects described above for the Drummond Floodplain area. In the long-term, the historic Middle Grant Creek scenery would be restored and meet the desired visual condition. Over time, these actions would meet or exceed the prescribed SIOs.

Alternative 3 - No action – Middle Grant Creek Project Area

Alternative 3 would not restore the pre-development Middle Grant Creek scenery, nor would it meet the desired visual condition, which is a more natural appearing landscape than exists today. This alternative would not meet the prescribed SIOs.

Cumulative Effects

Restoration would help to restore the historic scenery of Midewin and meet the desired visual condition (i.e., a more natural appearing landscape than exists today). Alternative 2 would restore the historic scenery over a considerably larger area than Alternative 1; therefore, greater cumulative benefits would be expected. The restored landscapes would be seen by more visitors due to increasing populations in surrounding areas, expanded recreational amenities, and a growing awareness of Midewin.

Following restoration of the Drummond Floodplain site, the visual quality of this area would continue to be adversely affected by borrowed views of the adjacent Exxon-Mobil refinery, Army parcel, and possibly the industrial park. Following restoration of Middle Grant Creek, the visual quality of this area would continue to be adversely affected by the adjacent industrial park, Army parcel, bunker field and, possibly, by the national cemetery.

Alternative 3 would not improve scenic integrity at Midewin. Unrestored landscapes would still be seen by greater numbers of visitors as the result of increasing populations, recreational amenities, awareness of Midewin, development of the industrial park, and expansion of the national cemetery. However, fewer visitors would likely visit these areas, as fewer recreational and scenic amenities would exist.

3.12 SOILS

A brief narrative on soils is provided below. Thorough discussions of soils have been included under the resource topics Wetlands (Section 3.5) and Vegetation and Natural Communities (Section 3.6) because they are integral to those analyses. Therefore, a lengthy analysis is not repeated here. Complete soils data are also included in the EA Planning Record for this project.

Alternative 1 would increase the supply of water and decrease drainage on hydric and other soils in the project areas, and the soils and hydrological regimes of the Drummond Floodplain and Middle Grant Creek project area would begin to more closely resemble pre-development conditions. Alternative 2 would restore habitat and improve soils on 230 additional acres within the Drummond Floodplain. All action alternatives would establish appropriate wetland and prairie habitat on the appropriate soils (Appendix B). The soils within the project areas may be disturbed during restoration (i.e, compaction from heavy equipment); however, mitigation measures (Section 4.1) would minimize impacts. In the Drummond Floodplain project area, approximately 10 acres of soils could be disturbed where earth-disturbing activities occur. In the Middle Grant Creek project area, approximately 25 acres could be disturbed, predominantly from road and rail bed removal. However, within both project sites, soil conditions would improve in the long term.

Under Alternative 3, the soils would not undergo the changes expected under the hydrological regime described for the action alternatives. This would limit the amount of new hydric soil formation and eliminate the associated benefits of restored wetland and prairie habitat.

3.13 GENERAL WILDLIFE

A short discussion of general wildlife is provided below. More inclusive wildlife and associated habitat discussions have been included under the resource topics Sensitive Plant and Animal Populations (Section 3.7), Management Indicator Species (Section 3.8), and Vegetation and Natural Communities (Section 3.6) as integral to those analyses. A lengthy discussion is not repeated here. Wildlife data are also included in the EA Planning Record for this project.

In general, wetland and grassland wildlife would benefit from restoration of the Drummond Floodplain and Middle Grant Creek project areas. Habitat would be improved by a more consistent water supply, by improvements to the hydrology of Jackson and Grant Creeks and associated floodplains, and by control of noxious weeds and invasive species and the removal of fragmenting woody species. On Midewin, those species that utilize successional and edge habitat would be adversely impacted by the removal of successional vegetation and the subsequent decrease in edge habitat and an increase in unfragmented conditions. However, edge species should not experience a population decline since these habitat types are currently common throughout Will County. Alternative 2, by restoring an additional 230 acres, would provide the greatest increase in grassland and wetland wildlife habitat and the greatest decline of edge species habitat.

3.14 LAND USE

An abbreviated synopsis of land use is given below. Additional discussions on land use have been incorporated throughout the EA, in particular under the resource analyses of Recreation (Section 3.10), Scenic Quality (Section 3.11), and Adjoining Lands (Section 3.2). Land use is also included in discussions regarding construction of the adjacent Deer Run Industrial Park (see Section 3.4, Affected Environment – Drummond Floodplain – Water Resources). Additional land use data are included in the EA Planning Record for this project.

The ID Team determined that the effects on land use within the Drummond Floodplain and Middle Grant Creek project areas would be positive under the action alternatives. Both project areas lie within Management Area 1, the Prairie Ecosystem Restoration Management Area. This Management Area includes areas to be restored to native prairie. Restoration of the Drummond Floodplain and Middle Grant Creek tracts would meet the objectives of prairie ecosystem restoration for these areas. Alternative 2 includes approximately 230 additional acres within the Drummond Floodplain, and therefore has the potential to restore considerably more acres of rare

dolomite prairie and other native habitat than would Alternative 1. Alternative 3 (No-action) would be inconsistent with the Prairie Plan and Management Area 1 Prescriptions. This alternative would not restore, maintain, or enhance the tallgrass prairie ecosystem; nor would it improve watershed conditions or help to control invasive plant species.

3.15 AIR QUALITY

The ID Team for this EA determined that there would be no long-term impacts to ambient air quality under Alternatives 1 and 2 for the Drummond Floodplain and Middle Grant Creek projects. The use of prescribed fire was authorized under a Forest Service decision for a separate EA and included a portion of the Drummond Floodplain project area. That EA found that prescribed fires at Midewin would have minimal environmental effects. Prescribed burning activities on Midewin will protect air quality through compliance with Federal, state, and local pollution requirements relating to the Clean Air Act (Prairie Plan, p. 2-14). Additional information on air quality can be found in the EA entitled *Managing Vegetation with Prescribed Fire* (USDA Forest Service, 2001c), and is also included in the EA Planning Record for this project.

3.16 ENVIRONMENTAL JUSTICE

Executive Order 12898, titled *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, mandates that Federal agencies take the appropriate steps to identify, address, and mitigate all disproportionately high and adverse impacts of Federally funded projects on the health and socioeconomic condition of minority and low-income populations. Environmental justice concerns have been considered and evaluated pursuant to this Executive Order. As the result of this analysis, it has been determined that the minority and low-income populations in Will County are not sufficiently concentrated to be affected by this project.

3.17 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

As the result of restoration actions at the Drummond Floodplain and Middle Grant Creek sites, there would not be an **irreversible** commitment of, or damage to, resources that cause the loss of future options (for instance, extinction of a species or use of nonrenewable resources such as minerals). There would also not be an **irretrievable** commitment of, or damage to, renewable resources (for instance, from the loss of production, harvest, or use of natural resources over a period of time).

4.0 MITIGATION AND MONITORING

The following mitigation measures would be implemented to minimize or eliminate potential adverse impacts from restoration of the Drummond Floodplain and Middle Grant Creek project areas.

4.1 MITIGATION

1. Woody plant stands would not be removed during the breeding season of birds (30 March - 15 August).
2. Whenever possible, seed and plant material sources should be of local provenance, such as from an original wild source in northeastern Illinois or northwestern Indiana.
3. When possible, salvage native plant materials (seeds, rhizomes, seedbanks, other propagules) from ditches and other disturbed sites for reuse in topdressing and seeding restored habitats.
4. Fertilizers or other nutrient amendments should not be included as part of any seeding or soil preparation practices.
5. High quality native vegetation remnants would be protected from impacts such as mechanical disturbance and inundation.
6. Restrict management and restoration activities that occur within 82 feet of known sensitive wetland bird nests during the breeding season.
7. Plan project management and restoration activities to avoid or minimize adverse impacts to leafy prairie-clover during the growing season (April 30th to October 30th). Such activities include, but are not restricted to, monitoring, prescribed burning, mowing, herbicide treatment, grazing, and hydrologic alterations.
8. Prior to burning, mowing, or herbicide applications, surveys would be made of the target area in order to locate any Threatened, Endangered, or RFSS plants, nests of ground-nesting birds, and other sensitive species (including insect species), to prevent or reduce impacts on these species.
9. Native vegetation remnants and high quality wetlands would be surveyed and marked, then protected from disturbance with construction fences and/or silt fences.

10. West Patrol Road would remain in place to provide a hydrological barrier between Midewin's population of leafy prairie clover (and other sensitive plant species along the western boundary) and potential flooding.
11. Species-specific restoration will be conducted in such a way that the activities involved (collecting seeds, capturing and translocating adult animals) will not have adverse effects on source populations.
12. Minimize adverse impacts on sensitive plant species from grazing management (Middle Grant Creek project only).
13. Site stabilization (vegetation, netting) will take place at all disturbed sites. Erosion and sediment control measures will be used to prevent bank erosion. If needed, erosion control fencing will be installed on the edges of all existing wetlands to prevent siltation or damage from heavy equipment.
14. All seeds or plant materials used in either restoration project should be free of noxious weeds and invasive plant species.
15. When conducting prescribed burns in either project area, burn no more than 1/3 of all grassland habitat per year.
16. Minimize mowing activities between April 15th and August 15th to reduce impacts on nesting grassland birds.
17. Minimize removal of woody plant stands between March 30th and August 15th to reduce impacts on nesting birds.
18. Implement prescribed burns so as to produce maximum habitat benefits by: killing above-ground portions of encroaching shrubs and small trees, reducing cover of exotic plant species, temporarily reducing litter/duff accumulations, and stimulating growth, reproduction, and recruitment of native forbs and grasses.
19. If management objectives require that portions of either project area should receive prescribed burning treatment during the March 15th – November 15th period, then these areas should be surveyed for nests or populations of any species of concern. Burn plans should then be redesigned to minimize or eliminate any potential adverse effects on these species.
20. If prescribed burns are conducted during the March 1st – April 15th period, then these areas should be surveyed for nesting northern harriers and short-eared owls before action. If active nests of either species are present, there are two possible mitigation measures.

The prescribed burn can be postponed until after August 15th, or the nest location can be protected with firebreaks and an unburned buffer (up to 300 feet).

21. Minimize prescribed burning activities between March 15th and November 15th to reduce impacts on nesting birds, growing plants, and active invertebrates, reptiles, and amphibians.
22. Do not burn more than 1/3 of any known sensitive insect-occupied areas at one time, or half of any potential occupied areas. If any patches within these areas remain unburned, they should be left unburned and not fired, as they serve as refugia for insects.
23. Minimize mechanized activities (e.g., soil and landscape reconstruction, bunker demolition and removal, grading) that cause dust, noise, fumes and movements of machinery near bird breeding areas during the breeding season (April 15th through August 15th).
24. If a sensitive plant or animal species is likely to be adversely affected by bunker demolition, then appropriate restrictions will be placed on the demolition process. Bunker demolition contracts will include a clause to ensure sufficient flexibility for any additional environmental protection that may be needed.
25. Prior to any restoration or management activities, a survey would be made of the target area by a Midewin resource expert in order to identify, locate, and mark (if necessary) any Threatened, Endangered, or Sensitive plants or animals (including active nests) to prevent or reduce adverse impacts on these species. The resource expert would also identify and mark populations of food plants for sensitive insects (e.g., prairie dropseed for the red-veined prairie leafhopper). Restoration activities could include, but are not restricted to, prescribed burning, herbicide treatment, bunker demolition and removal, filling ditches, and grading.
26. Restored habitats would be evaluated for potential to support additional species of conservation concern (Threatened, Endangered, or Sensitive). Such evaluations would consider potential effects on existing populations of Threatened, Endangered, and Sensitive species.
27. Species-specific restoration would be conducted in such a way that the activities involved (seed collecting, capturing and translocating adult animals) would not have adverse effects on source populations.
28. If necessary, erosion control fencing would be installed on the edges of existing wetlands to prevent or minimize siltation, compaction, or damage from heavy equipment; removal of ground cover would be minimized to prevent erosion and other soil impacts. If

possible, work would be performed when the ground is dry or frozen to prevent soil compaction. Traffic that could cause rutting would be avoided.

29. All heritage resource sites located during archaeological surveys of the project areas and determined to be potentially eligible or eligible for listing in the National Register of Historic Places would be avoided. Any other sites located during project implementation would be reported to the Forest Service archaeologist and further activity at such locations would not occur pending an analysis of the situation.
30. Fill material for ditches would be material of native origin and local source. Ditch fill material would be selected, placed, compacted, and leveled to have permeability, porosity, and bulk structure comparable to that of native soil.

Herbicide Use:

1. Use only herbicides analyzed for use in controlling invasive species on Midewin (2,4-D, glyphosate, triclopyr, clopyralid, pelargonic acid, sethoxydim, fosamine ammonium salt, and imazapic).
2. A Midewin resource specialist will conduct a plant survey, before treatment and during an appropriate time of year, to identify new locations or confirm the presence of known populations of threatened and endangered or sensitive plants.
3. Spot application will be used in sites with sensitive plant species. All herbicide applications within sensitive plant areas will be with hand-held spray wands or wiper-type applicators to reduce the chances of non-target species being adversely affected.
4. When using herbicides in leafy prairie-clover habitat, preferentially use wiper-type applicators or other techniques to eliminate drift onto these non-target species.
5. Herbicides will be applied in strict compliance with the product label.
6. All herbicide application will be performed by certified personnel able to identify threatened, endangered, and sensitive plant species.
7. Temporary covers may be used to protect individuals or populations of threatened, endangered or sensitive plant species during nearby application of herbicides.
8. Only those herbicides registered for aquatic use will be applied in open water.
9. Herbicide treatment will not occur near active nest sites for threatened, endangered, and sensitive bird species.
10. All spraying will occur with hand-held or back-pack devices rather than with boom-type sprayers mounted on vehicles.
11. The Forest Service will monitor treated areas for success in invasive species reduction through herbicide treatment. Monitoring may include establishment of permanent vegetation plots, use of Habitat Suitability Index evaluations, or estimates of the severity of invasive

species infestations using ocular estimates or GPS (Global Positioning System) measurements.

12. To minimize herbicide drift and protect sensitive wildlife species, herbicides will be applied only when wind speeds are less than 10 mph. Where possible, the applicator will select the lowest nozzle pressure and largest droplet size permitted by label to reduce drift.
13. Herbicides will not be applied during days of high temperatures (greater than 85° F) as the heat may cause some herbicides to vaporize and drift to areas outside of the site of application.
14. Herbicide applicators will obtain a weather forecast prior to any treatment for the purpose of preventing herbicide runoff onto adjacent sites and aquatic systems.
15. Pre-emergent herbicides will not be used. (None of the proposed herbicides are approved for use as pre-emergent herbicides.)

4.2 MONITORING

- Vegetation in restored areas would be monitored to ensure that the resulting habitat is what is intended. Appropriate monitoring techniques would be implemented.
- The dolomite prairie remnant containing the Federal Endangered leafy prairie clover would be monitored to ensure that West Patrol Road and the constructed berm are providing adequate protection from flooding.
- Restored habitats will be evaluated for potential to support additional species of conservation concern (threatened, endangered, or sensitive). Such evaluations should consider potential effects on existing populations of threatened, endangered, and sensitive species.
- Hydrological and soil monitoring would be performed periodically during the first three years following project implementation and less frequently thereafter and would include:

Inspection of sites where drain tiles have been removed or disabled to detect concentrated surface or subsurface flow, erosion, or other aberrations.

Monitoring of the extent, depth, or duration of ponding or saturation in comparison with previous observations.

Installation of monitoring wells at specific locations or use of existing wells to detect changes in depth to the water table.

Inspection of filled drainage ditches for signs of runoff and erosion or sediment deposition.

Inspection of planted surfaces for signs of overland flow or erosion.

Monitoring of hydrology and native plant health in existing wetland and prairie remnants.

Monitoring the effects of invasive species control.

5.0 CONCLUSION

This Environmental Assessment (EA) analyzes the effects of proposed restoration actions on the Drummond Floodplain and Middle Grant Creek project areas. Through external public scoping and internal scoping of resource specialists, issues were raised that helped define the alternatives for this project. Three alternatives were developed as a result. The Action Alternatives would restore native plant communities and associated habitat for wetlands on lands totaling up to 470 acres within Midewin National Tallgrass Prairie. The No-action Alternative would defer management or wetland restoration activities at 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, which contains direction for the long-term management of Midewin. It is also tiered to EAs covering the use of prescribed burning and herbicides at Midewin. This EA discloses the direct, indirect, and cumulative environmental impacts that would result from either the Action or No-action Alternatives. Comprising the effected environment, Midewin's natural and human resources have been addressed as they relate to issues raised during scoping for this EA. The environmental consequences of the alternatives have been analyzed and, based on the analysis completed for this EA. The Prairie Supervisor will decide whether or not to authorize the restoration projects at the Drummond Floodplain and Middle Grant Creek project areas.

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FIGURES

Key to Project Areas Map Showing Proposed Action Locations
(Reference Table for use with Figure 2)

Drummond Floodplain

1. Primary stormwater discharge from Deer Run.
2. Secondary historic stormwater discharge from Deer Run.
3. Removal of road, floodplain excavation along Jackson Creek cutoff.
4. Grading of floodplain swale to connect Jackson Creek to culvert under rail bed.
5. Removal of Drummond Road.
6. Fill/block minor ditch.
7. Removal of rail bed; grading of swale to carry stormwater.
8. Retention of West Patrol Road to protect dolomite prairie and private property.
9. Fill/block drainage ditch.
10. Routing of stormwaters to the south along TNT Road.

Middle Grant Creek

21. Stabilization and floodplain excavation along Grant Creek.
22. Block/fill drainage ditch exiting the project area.
23. Remove/restore various bunkers, rail beds, roads, ditches.

Key to Wetland Cover Type Classification (Cowardin, 1979)
(Reference Table for use with Figures 5 and 7)

Palustrine Emergent Class – PEM	
PEMA	Temporarily flooded
PEMAd	Temporarily flooded, partially drained/ditched
PEMC	Seasonally flooded
PEMCx	Seasonally flooded, excavated
PEMCd	Seasonally flooded, partially drained/ditched
PEMF	Semipermanently flooded
PEMFx	Semipermanently flooded, excavated
PEMFd	Semipermanently flooded, partially drained/ditch
Palustrine Forested, Broad-Leaved Deciduous Class –PFO1	
PFO1A	Temporarily flooded
PFO1Cd	Seasonally flooded, partially drained/ditched
PFO1Cx	Seasonally flooded, excavated
PFO1F	Semipermanently flooded
Palustrine Scrub – Shrub - PSS	
PSS1A	Broad-leaved deciduous, temporarily flooded
Riverine, Lower Perennial, Unconsolidated Bottom– R2UB	
R2UBH	Permanently flooded
R2UBHx	Permanently flooded, excavated