

## **APPENDIX C**

### **MANAGEMENT INDICATORS**

#### **INTRODUCTION**

This section documents the choices for the selection of the Management Indicators and Management Indicator Species to be considered during the development of the Midewin National Tallgrass Prairie (Midewin) Land and Resource Management Plan (Prairie Plan).

For the Prairie Plan, Management Indicators are defined as “plant and animal species, communities, or special habitats selected for their emphasis in planning, and which are monitored during forest plan implementation in order to assess the effects of management activities on their populations and the populations of other species with similar habitat needs which they may represent” (FSM 2620.5, WO amendment 2600-91-5). Management indicators provide a means of monitoring and evaluating the effects of actions on biotic resources, including specific species, communities, habitats, and interrelationships among organisms. By selecting a limited but appropriate set of Management Indicators, resources for inventory and monitoring activity can be focused where needed. In addition, the planning regulations require us to consider the use of management indicator species.

(a)(1) In order to estimate the effects of each alternative on fish and wildlife populations, certain vertebrate and/or invertebrate species present in the area shall be identified and selected as management indicator species and the reasons for their selection will be stated. These species shall be selected because their population changes are believed to indicate the effects of management activities. In the selection of management indicator species, the following categories shall be represented where appropriate: Endangered and threatened plant and animal species identified on State and Federal lists for the planning area; species with special habitat needs that may be influenced significantly by planned management programs; species commonly hunted, fished, or trapped; non-game species of special interest; and additional plant or animal species selected because their population changes are believed to indicate the effects of management activities on other species of selected major biological communities or on water quality. On the basis of available scientific information, the interdisciplinary team shall estimate the effects of changes in vegetation type, timber age classes, community composition, rotation age, and yearlong suitability of habitat related to mobility of management indicator species. Where appropriate, measures to mitigate adverse effects shall be prescribed.

#### **SELECTION OF MANAGEMENT INDICATORS**

As part of the planning process, the Forest Service is directed to “select management indicators that best represent the issues, concerns, and opportunities to support recovery of Federally-listed species, provide continued viability of sensitive species,

and enhance management of wildlife and fish for commercial, recreational, scientific, subsistence, or aesthetic values or uses” (FSM 2621.1). Given the current nature of the immediate socioeconomic setting, plus the direction given by the enabling legislation for Midewin, we did not consider commercial or subsistence values or uses.

We used the following methods to select management indicators:

1. We considered all Federal-listed, State of Illinois-listed, and sensitive species that are known to occur on Midewin or are likely to occur on Midewin.
2. We considered species and ecological conditions we considered most likely to provide an indication of management effects.
3. We solicited suggestions and reviewed potential management indicator species using experts from appropriate Federal and State agencies, and from appropriate educational, research, and private organizations. This was conducted as part of the Population Viability Assessment (PVA) conducted on 1 and 2 November 2000, in Champaign Illinois.
4. We considered species and ecological conditions of high public interest identified through the public scoping process and public comments on the development of the Prairie Plan and individual projects.

Thirty-one Federal-listed, State-listed, and sensitive species were first to be evaluated. All but two of these organisms were rejected as management indicators for diverse reasons. These reasons include limited seasonal presence (prairie insects), restricted natural range on site (mussel and certain plants), extreme fluctuations in population size caused by year-to-year climatic differences (many plants), adverse impacts on wintering grounds (grassland birds), and difficulty in monitoring (prairie insects, reptiles, amphibians). However, all these species require tailored monitoring and recovery plans and these actions will provide information on the effects of management. This approach increases the likelihood that unique habitats likely to harbor rare species will be surveyed completely and additional populations of rare species will be located and protected.

Most of the analysis focused on species (and groups of species) that were considered to be most likely to provide indication of the effects of management. Many of these species were considered to be dominants or indicators of specific native vegetation communities (White and Madany 1978) or plant associations (Natureserve 2000) either present on or likely to be restored on Midewin. Other species (and groups of species) considered included birds considered specific to certain types of habitat structure (Brawn 1998) and aquatic organisms (Carr et al. 1986). These approaches do present certain problems. Most native plant species lack specificity within prairie habitats on Midewin; others had extremely narrow requirements that result in very limited distribution. Many grassland, savanna, and forest bird species were considered unreliable indicators because of their vulnerability to impacts occurring on migration or within their wintering range. Other species were considered vulnerable to extreme

population fluctuations resulting from annual variations in climatic conditions, such as timing, amount, and distribution of precipitation.

Additionally, selection of individual species as management indicators appears contrary to the focus of restoration and management at Midewin, and there were concerns that focusing on single species (or small groups of species) would not be sufficient to capture the success (or lack thereof) of these activities. For example, focusing on one MIS for dolomite prairie would not capture the importance of nectar sources throughout the growing season for maintaining a diverse range of insect pollinators. Monitoring specific pollinators for success would be difficult, because of the seasonality and difficulty of monitoring and identifying pollinators.

Another example that illustrates the difficulty of selecting single species as MIS is the native wetland vegetation (wet prairie, sedge meadow, marsh) that are often a mosaic of 2-4 dominant species, each of which forms extensive stands largely exclusive of other characteristic species. Monitoring MIS for these wetlands would require tracking at least six plant species. Similar problems were encountered with other habitats.

The concept of indicator species has been used widely and critiqued in management activities (Landres et al. 1988). As discussed by Landres (1988), the idea of indicator species is a relatively old concept (Hall and Grinnel 1919) and is intuitively pleasing because management for many species may be simplified and made more cost-effective by considering only a small group of indicator species. Unfortunately, as further discussed by Landres et al. (1988), the implicit assumption in the use of indicator species is that habitat quality maintained for the indicator will be suitable for other species. Because these assumptions fail on both conceptual and empirical grounds, Landres et al. (1988) suggest, "this approach should be avoided." Neimi et al. (1997) found that the use of and monitoring MIS in the Chequamegon National Forest with a large database was not useful, and recommend that monitoring be focused on key habitat types instead of a few "representative" species.

For these reasons, we focused on using ecological conditions or selected vegetation communities as management indicators (Table 1). We selected a few species or species groups that would detect effects of restoration and management, and combined with input on data collected from Threatened, Endangered, and Regional Forester sensitive species, would enable us to monitor the relative success and failure of management actions.

We recognize the limitations that the selected biota or ecological conditions may have indicating the effects of resource management activities. However, using management indicators will provide us with a measure of quality and quantity of restoration and management on Midewin. Such knowledge provides us the capacity to adjust management practices so as to preserve and facilitate the biological integrity of existing and restored habitat and communities on Midewin and also to ensure that potentially detrimental activities or projects are conducted or designed in an environmentally sensitive manner.

We selected common conditions that could be applied across many management indicators, and could be easily sampled by following established transects or using spatial information. These types of management indicators allow us to make effective use of our proposed staffing and budget. For species (or groups of species) we will rely on population estimates or, for benthic macro-invertebrates, an index of diversity.

Information concerning species (and groups of species) evaluated as potential MIS included in the official planning records; this information is available for public review at the Supervisor’s Office.

**Management Indicators and associated species of interest**

<b>Management Indicators</b>	<b>Species of interest or other conditions associated with the management indicators.</b>
Dolomite Prairie	tufted hair grass, flattened spikerush, low calamint, prairie dropseed, nodding wild onion, Butler’s quillwort <sup>1,4</sup> , false mallow <sup>1,4</sup> , Pitcher’s stitchwort <sup>1,5</sup> , leafy prairie clover <sup>2,4</sup> , red-veined prairie leafhopper <sup>1,4</sup>
Upland Typic Prairie	prairie dropseed, shooting-star, rattlesnake master, <i>Eryngium</i> stem-borer moth <sup>1,4</sup> , compass plant, prairie gentian, pale purple coneflower, Henslow’s sparrow <sup>1</sup> , red-veined prairie leafhopper <sup>1,4</sup>
Wet Typic Prairie	prairie cordgrass, eastern prairie fringed orchid <sup>3,4</sup> , 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 <sup>1,3</sup> , pied-billed grebe <sup>4</sup> , 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 <sup>1,4</sup> , loggerhead shrike <sup>1,5</sup> , grasshopper sparrow, thirteen-lined ground squirrel
Medium-stature Grassland Habitat	bobolink <sup>1</sup> , eastern meadowlark, savannah sparrow, smooth green snake
Tall-stature Grassland Habitat	Henslow’s sparrow <sup>1,4</sup> , northern harrier <sup>1,4</sup> , sedge wren
Benthic Macroinvertebrates	stream quality, orange-throated darter, slender madtom, northern hogsucker, ellipse <sup>1</sup> , creek heelsplitter, smallmouth bass
Leafy prairie clover <sup>2,4</sup>	mesic dolomite prairie
Henslow’s sparrow <sup>1,4</sup>	prairie management indicator
White-tailed Deer	demand species, may have adverse impacts on certain native plants

<sup>1</sup>Regional Forester’s Sensitive Species

<sup>2</sup>Federal Endangered Species

<sup>3</sup>Federal Threatened Species

<sup>4</sup>Illinois Endangered Species

<sup>5</sup>Illinois Threatened Species

**Management Indicators/Ecological Conditions and selected elements to be monitored.**

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