03-L20W

Monitoring Grassland Birds at Pyramid State Park, Perry County, Illinois

Duration of Research: 1 January to 30 July 2003

Location of Research: Pyramid State Park grassland complex, Perry County, Illinois

Annual Report to IDNR

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INTRODUCTION

A primary goal of Conservation Biology is to gain an understanding of how human-induced alterations of the landscape influence the residual biotic communities (Soulé 1986, Wiens 1996). Related goals include the documentation of these influences with appropriate research and the subsequent prioritization of conservation efforts aimed at reducing or ameliorating any negative effects. Loss of habitat is often thought of as the primary factor contributing to wildlife population declines and may be the greatest threat to present day wildlife populations at both global and local scales (Wilcove et al. 1998, Illinois Wildlife Habitat Commission 1985). A related form of landscape alteration, habitat fragmentation, has also become a leading conservation issue (Wilcove et al. 1998) and a vast amount of research has been directed at determining both local and regional effects of fragmentation on populations of organisms in the remnant habitat patches.

The fragmentation of habitat results in a reduction and patchiness of habitat and isolation of remnant habitat patches from each other. The resulting landscape, particularly the land-use surrounding the remaining habitat, can have a profound influence on those organisms remaining in remnant patches. The landscape in the Midwest region of the United States comprises small fragments of native habitat embedded within a matrix of land use that is predominated by agriculture and urban development. Some habitats have been especially hard hit. For example, native grasslands east of the Mississippi River have been reduced by over 90%, with estimates of regional reductions often exceeding 99% (Noss et al. 1995). In Illinois, there is less than 1% of the original native prairie/grassland habitat remaining (Schwegman 1983), and that habitat that remains is typically in small (<50 acres) isolated patches.

The loss and fragmentation of grassland/prairie habitat has been blamed, in part, for the long-term population declines of several species of grassland-dependent birds (Askins 2000). Results from Breeding Bird Survey routes located east of the Mississippi River indicate that since 1966, the abundance of an overwhelming majority of species of grassland and savanna birds in eastern North America has fallen (Askins 1993, Sauer et al. 2001). Some examples of those species suffering the largest decreases in abundance include the Henslow's Sparrow (scientific names given in Tables 2 and 3), Grasshopper Sparrow, Eastern Meadowlark, Short-eared Owl and Dickcissel. These declines have been attributed to a combination of habitat loss (of native and non-native grassland) (Herkert 1991a, Warner 1994), as well as factors associated with habitat fragmentation (e.g., increased rates of nest predation and brood parasitism, area sensitivity). When grasslands are fragmented by non-grassland land use (e.g., row-crop agriculture, urban development), the remaining tracts of grassland habitat may be too small and some species of bird may become absent or less abundant ("area sensitivity"; Herkert 1994a, b; Vickery 1994). These fragmented grasslands may further act as "ecological traps" for those songbirds that still attempt to breed there because they may harbor large populations of nest predators (Hoffman and Heske 2003) and brood parasitic cowbirds (Johnson and Temple 1990). Nesting success of many species of grassland bird may be so low in fragmented landscapes that it is unlikely that their populations could be self-sustaining. An additional difficulty facing grassland birds is that many species are habitat specialists having preferences for a particular vegetation height and/or density (Skinner et al. 1984, Herkert 1991b, Scott et al. 2002). These preferences necessitate management of vast areas of grassland habitat as a mosaic of patches of grassland in different stages of recovery from disturbance in order to support the greatest diversity of grassland species.

Despite the loss of over 99% of the native grassland habitat in Illinois, there are currently 2 programs that result in the creation of grassland habitat. These are the Conservation Reserve Program (CRP) and surface coal mine reclamation. CRP has converted much cropland to grassland habitat (Best et al. 1997), but the program is federally sponsored and affected by politics, with no guarantee that the grassland that is created under the auspices of CRP will remain as grassland habitat in perpetuity. Surface coal mine reclamation is less well-known, but has produced thousands of hectares of grassland habitat in portions of Illinois, Indiana, and Kentucky (Brothers 1990, Scott et al. 2002). Recently, studies in Indiana have demonstrated the potential importance of grassland habitats associated with reclaimed surface coal mines for grassland-dependent birds (Bajema et al. 2001, DeVault et al. 2002). The recent acquisition of a reclaimed mine by the Illinois Department of Natural Resources is also an example of a large site with the potential to benefit grassland-dependent birds and wildlife.

The Ark Land complex in Perry County, Illinois consists of approximately 17,000 acres of mined lands that are in the process of being restored to a matrix of grasslands, shrublands, wetlands, lakes, ponds, pastures, and agricultural fields. The Illinois Department of Natural Resources (IDNR) acquisition of the Ark Land complex was completed in 2001, and the land was added to Pyramid State Park (PSP) creating the largest IDNR site in the state. The Pyramid State Park grassland complex (hereafter referred to as PSP) contains several thousand acres of grassland habitat, making it one of the largest areas of grassland habitat in the state of Illinois. The potential for grassland wildlife on this site is tremendous but only limited information on the species currently using the site is available. Numerous avian species of special concern, including several state listed species, may occur at the site. Surveys of the bird community on the site would document avian use of the PSP complex and identify areas on the site that contain

species of special concern. IDNR personnel could use the information obtained during these surveys to assist with the continued development and implementation of the management plan for the complex. In addition, as different management practices are applied to the grasslands at PSP (e.g., prescribed burning, grazing, removal of autumn olive, etc.), the response of the bird community to the management could be documented. This would provide vital information for the managers at the site, would be one measure of the success of the grassland restoration effort, and the results would be applicable to other sites throughout the state that are being managed as grassland ecosystems. In addition, information on the bird community present prior to the completion and implementation of a management plan for the site provides the unique opportunity to document the response of the bird community to the management occurring on the site.

The specific objectives of this research were:

(1) To conduct a second year of avian surveys at the Pyramid State Park grassland complex, Perry County, Illinois to document all species utilizing the site during the breeding season and winter.

(2) Identify any state listed species and the habitats that they are using, and document any unusually high concentrations of grassland birds present within the complex.

(3) Submit all sightings and confirmed breeding by state listed species at PSP to the Natural Heritage Database.

(4) Complete a report summarizing the presence, abundance and distribution of birds in the PSP grassland complex.

METHODS

The bird community in the Ark Land complex was surveyed during the breeding season (late April-July 2003) and during the winter (January-March 2003). With the assistance of a field technician, I conducted five-minute point counts (Bibby et al. 1992) throughout the grassland complex at PSP. An extensive network of roads (paved and unpaved) is distributed throughout the grassland complex providing access to most areas within the three primary units of the park (Captain, Denmark, and Galum; see Figs. 1-3). In 2002 I established 153 points along these roads, distributing the points at ≥300m intervals (point locations given in Figs. 1-3). In 2003, I resampled each of the 153 roadside points and my assistant added another 133 points off-road (locations of points given on Figs. 1-3). Point counts were confined to a 6-hour period beginning at sunrise on days with little wind and no rain. We stopped at each census point for 5 minutes and recorded all of the birds present within 100m. For each bird detected, we recorded species, mode of detection (song, call, or visual), and the direction and estimated distance of the individual from the center of the census point. Each 100-m radius census point represents approximately 3.14 hectares of area and results from the point count surveys are given as the number of individuals per hectare for each species (Tables 2-3). Data from point counts provide estimates of densities for each species and are the most useful data for documenting changes in abundance over time (as points are revisited in subsequent years). The percentage occurrence (number of census points a species was detected at/total number of census points) was determined for each species (roadside counts only) as an index of how widespread each species was over the entire site. A GPS unit (GARMIN GPS V) was used to document the location of each census point within the complex, so that points can be easily located and surveyed in the future. A qualitative description of the habitat at each roadside census point was recorded (with

assistance from T. Esker) in 2002 and these descriptions are given in Table 1. These descriptions should be updated as the management plan for the site is implemented or as any changes in land use or plant succession occur.

The results of the roadside and off-road censuses provide additional baseline information for comparisons with data collected in a similar fashion in the future to look for relative (qualitative) changes in numbers for each species. Most birds counted during the breeding season were singing, and therefore adult males. However, detections by sight or call note likely included some females, especially for conspicuous species such as the Red-winged Blackbird and the Eastern Meadowlark, so I report count data as "individuals" per hectare.

I tested whether the relative densities of all species recorded at roadside points were correlated with relative abundances off-road. For each species, the density given in Table 2 for 2003 was compared to the density given in Table 3. A highly significant correlation between the values would indicate that the roadside point counts accurately characterize density relationships among the breeding bird assemblage of this habitat (DeVault et al. 2002).

During the winter (January-March of 2003), surveys were conducted similar to Christmas Bird Counts. One other observer and myself surveyed the birds at the PSP grassland complex by driving roads and walking through some sections. We recorded all birds detected (via observation or vocalization) on each of 6 visits (with a special emphasis on raptors, waterfowl, and waterbirds) as well as the number of hours spent surveying the site. The numbers of individuals seen over the course of all visits were documented for each species. As with the breeding season surveys, these values provide a baseline of information and allow for comparisons with data collected in a similar manner in the future.

Locations (date, township, range, and section) of all birds classified as endangered or threatened in Illinois were documented. This information will be submitted to the Endangered Species Protection Board in Illinois, and is also summarized in Table 5 in this report.

RESULTS

Habitat. The habitat was described at the 153 roadside census points distributed throughout the PSP grassland complex (Table 1). The points listed in Table 1 correspond to census points shown in Figures 1-3. The habitat structure and composition was diverse. In a general sense, the prevailing habitat on the site falls into two categories: grassland and successional scrub. Grassland habitat typically included one or more of the following plant species as a dominant component: fescue; brome; broom sedge; annual weeds including boneset, goldenrod, cheatgrass, sunflower, and foxtail; tall grass prairie including big blue stem and Indian grass; and areas of pasture. Tree plantings and autumn olive thickets represent the major forms of woody encroachment that constitute the successional scrub habitat. If left unmanaged, the woody encroachment would likely overrun the site and lead to the conversion of the grasslands to a scrub-shrub and eventually forested complex over time. Areas of row-crop agriculture were scattered throughout the site including corn, wheat, soybeans, and no-till soybeans. Hundreds of acres of open water exist on the site, with much of it surrounded by narrow bands of phragmites.

Breeding Season. A diverse assemblage of birds was again recorded in 2003 on the PSP grassland complex during the breeding season. In total (roadside and off-road counts), 81 species were documented on the site (Tables 2 and 3). The densities of species on roadside point

counts (individuals/hectare in 2003; Table 2) and off-road transects (individuals/hectare; Table 3) were highly positively correlated (r=0.933, N=81 species, P<0.0001). This indicates that the roadside point counts accurately portrayed the breeding bird community throughout the entire complex, especially for those species that are common. Results from the 2003 bird survey were similar to those from 2002 in terms of relative densities of particular species and their distributions throughout the site (Table 2). Red-winged Blackbirds were again the most abundant species on the site, and were also the most widely distributed (Table 2). An additional six species were also present throughout much of the site (i.e., >40% occurrence) including American Goldfinch, Eastern Meadowlark, Indigo Bunting, Dickcissel, Northern Bobwhite, and Mourning Dove. Twenty-four species were uncommon or very narrowly distributed and were recorded at <5% of the census points (Table 2). Most of these species were uncommon because they are typically associated with a non-grassland/shrubland habitat feature (e.g., human structures for Barn Swallows and Eastern Phoebes, a stream for Belted Kingfishers, woody fence rows or forest for woodpeckers, etc). Game birds that were abundant on the site included the Northern Bobwhite and Mourning Dove (Table 2). In general, the two prominent bird communities that exist on the site are grassland and successional scrub, mirroring the prevailing habitat types.

Grassland Birds. Several grassland specialists or grassland-associated species were common on the site (Tables 2 and 3). This includes substantial numbers for some of the species that have undergone significant population decreases throughout the eastern United States in recent decades including the Eastern Meadowlark, Dickcissel, Northern Bobwhite, and Grasshopper and Henslow's Sparrows. Because the roadside census points were systematically placed throughout the site, they are a fairly unbiased sample and are representative of the birds

and habitats that currently exist on the site. Numbers from the point counts can therefore be extrapolated to roughly estimate the number of breeding pairs present on the entire site for each species. Using the data from Table 2 for 2003 and an estimate of 6,000 ha for the area of the complex yields the following estimates for the number of breeding pairs present: Eastern Meadowlark=2,900; Dickcissel=2,300; Grasshopper Sparrow=950, Henslow's Sparrow=400. These estimates represent substantial populations for these particular species with the potential to enhance the populations by enacting a management plan that reduces the woody encroachment of tree plantings and the invasive autumn olive and that also favors the restoration and maintenance of a variety of grassland habitats.

Successional Scrub Birds. Nineteen species of bird that are associated with successional scrub habitat (listed as "SS" in Table 2) were detected by the point counts. Several of these species were quite common (e.g., Northern Bobwhite, Common Yellowthroat, Brown Thrasher, Bell's Vireo, Willow Flycatcher, Yellow-breasted Chat) owing to the vast amounts of woody vegetation present on the site in the form of tree plantings and shrubby growth (much of which is the invasive autumn olive). The Loggerhead Shrike was the only state-listed threatened species present at low densities in open (grassland) areas that had a small component of shrubs. The Bell's Vireo, a Watch List species, was abundant in the many shrubby thickets scattered throughout the complex.

Winter. The site provides over-wintering habitat for a variety of species. Sixty-three species of bird were found on the site during the winter (Table 4). Large numbers of Northern Harriers and Short-eared Owls were found throughout the site for the duration of the winter. Nearly all of these individuals likely are migrants that pack into the site and utilize the grassland

habitat during the winter. The wetlands and lakes on the site provided habitat for a variety of waterfowl (16 species of goose and duck) and waterbirds (e.g., Great Blue Heron and Pied-billed Grebe; Table 4).

State of Illinois' Endangered and Threatened Birds. The dates and locations for observations of Illinois' Endangered and Threatened birds are given in Table 5. Twelve species were documented on the site during the year (winter and summer). Pied-billed Grebes were especially common during the winter but were also sighted during their breeding season in two different locations. A Double-crested Cormorant was seen on 2 dates in July near wetlands in sections 2 and 10 of the "Captain" unit. American Bitterns were seen in May and June in two different sections of the site and it is likely that they are breeding on the site. A Least Bittern was observed in a wetland along Cutler Road in section 17 of the "Captain" Unit, and a group of 6 Little Blue Herons was observed foraging in a wetland west of Super Lake in section 11 of the "Captain" Unit. Northern Harriers were incredibly abundant during the winter and in February there was a one-day count of 64. There was also at least one pair of Northern Harriers present during the breeding season. Bald Eagles were seen at Super Lake during the winter as well as some individual sightings in April and May. An Osprey was observed near the Bald Eagle nest in the "Galum" unit. Upland Sandpipers were seen in two different sections during their breeding season and were associated with lightly grazed pastures. Short-eared Owls were abundant during the winter, but none were seen after March. Loggerhead Shrikes were present during the winter and breeding season with individuals or pairs being seen in eight different sections during the breeding season. The shrikes were typically seen perched on old power lines or on shrubs in grassland habitat that included a small component of shrubs. Henslow's

Sparrows had the largest breeding population of all of the Illinois' E&T species present on the site with at least 59 individuals observed during the breeding season. The Henslow's Sparrows were associated with undisturbed grassland that usually contained a mixture of brome, fescue, switch grass, broom sedge, red top, and other prairie plants.

DISCUSSION AND MANAGEMENT CONSIDERATIONS

The Pyramid State Park grassland complex presently supports large populations of several breeding bird species typical of the grassland, successional scrub, and wetland habitat present on the site. The birds present on the site during the breeding season include game and nongame species, as well as species of special concern. A breeding bird survey of grasslands in 19 reclaimed coal mines in Indiana yielded results similar to the surveys at the PSP grassland complex (DeVault et al. 2002). The reclaimed mine sites in Indiana also supported large populations of four grassland specialists including Eastern Meadowlarks, Dickcissels, Grasshopper Sparrows, and Henslow's Sparrows. These four species are among the top priority migratory grassland species of conservation concern in the Midwest, with Henslow' Sparrows at the top of the list (Herkert et al. 1996). All four of these species have shown significant declines since 1966 based on Breeding Bird Survey data (Sauer et al. 2001). The abundance of grassland birds at PSP and other reclaimed mines in the region, along with the large size of these grasslands (thousands of hectares), suggest that these reclaimed coal mines provide important habitat for grassland birds (Bajema et al. 2001, DeVault et al.2002).

Some of the advantages of managing grasslands on midwestern reclaimed mine sites listed by Devault et al. (2002) include: the large size and minimal development of these sites, the ease of managing for grassland habitat once it is established, the relative resistance to woody

plant succession, ownership by single entities, and the relative scarcity of Brown-headed Cowbirds. Similar to what was found on reclaimed mine grasslands in Indiana (DeVault et al.2002), in 2002 cowbirds were uncommon at the PSP grassland complex and we would have predicted that brood parasitism by cowbirds would be rare on a site as large as PSP (Johnson and Temple 1990). During 2003, however, cowbirds were much more numerous (Tables 2 and 3). It is possible that the cowbirds were using the cattle pastures on the site as foraging habitat, and may have been parasitizing nests off-site. It is uncertain to what extent the cowbirds subsequently parasitized the available hosts on the site. Studies of the nesting success of grassland birds at PSP would be necessary to document the severity of brood parasitism on the site and to determine whether or not the cowbirds pose a threat.

Henslow's Sparrows were abundant in many areas of the grassland complex but their territories tended to be clustered only in those areas with tall, dense, grass-dominated vegetation containing a substantial litter layer. These results are similar to what has been found in grasslands on reclaimed mine sites in Indiana (Bajema et al. 2001) who also suggested that it was important to manage for a diversity of grasses rather than a monoculture. This preferred habitat of the Henslow's Sparrow would disappear as a result of natural plant succession, and active management will be necessary to provide breeding habitat for this species in the long term. The grassland bird community on the site would also benefit from management practices that promote a variety of grassland structure so that species such as Horned Larks and Upland Sandpipers, which prefer short grass and bare areas, would become more abundant on the site. It is possible that haying leases and light grazing by cattle could be effective components of a management plan promoting grassland birds on the site (Herkert et al. 1993, Walk and Warner

2000). The timing of haying operations and the amount of grazing should follow the recommendations given in Herkert et al. (1993).

The encroachment of woody vegetation (in the form of tree plantations and the invasive autumn olive) is possibly the most substantial threat to the grassland habitat at PSP. Autumn olive is encroaching into grassland areas and is the dominant shrub in much of the site. Tree plantings also threaten the grassland habitat, and much of the site will revert to forest habitat is left unchecked. The longer the woody encroachment is allowed to proceed the more difficult it will be to remove it and to promote grassland habitat. There are several management options that may be necessary to remove the woody vegetation from areas where grasslands will be favored including mechanical removal, prescribed burning, and herbicide treatments. For grassland habitat that is already established or that will be restored, prescribed burning, light grazing, and haying are all useful tools for maintaining grassland habitat and for preventing succession of grassland areas to scrub-shrub or forest habitat (Herkert et al. 1993).

Nongame grassland birds are benefited from management strategies centered on protecting or establishing large contiguous grassland blocks, providing structurally diverse habitat, eliminating catastrophic mid-season grassland mowing, reducing edge, and eliminating and controlling woody encroachment (Herkert et al. 1993). Several management guidelines for grassland areas have been presented elsewhere (Herkert et al. 1993, 1996), and below I briefly highlight some of the most pertinent (i.e., important) for managing grasslands at PSP. Some important management guidelines for grassland habitat include:

1) Avoid fragmentation of existing grassland areas and manage in large blocks to maximize the likelihood of providing adequate habitat for area-sensitive species.

2) Grassland restorations should be large (thousands of acres are better than hundreds of acres) to benefit grassland bird species with high sensitivity to habitat fragmentation, to promote higher rates of nesting success (reduced brood parasitism by cowbirds and nest predation), and to allow for a more diverse management scheme.
3) Minimize the amount of linear edge, make the grassland as blocky as possible (circular or square plots are preferable).
4) Use mixtures of tall and short grasses for plantings to accommodate preferences of different grassland bird species. Native warm season grasses are preferred. Recommended tall grasses include big bluestem, Indian grass and switch grass. Recommended short grasses include little bluestem, side oats grama and prairie dropseed.
5) Conduct prescribed burns in a rotation of 20-30% of the area annually.
6) Remove and control woody vegetation that exceeds the normal grass height.
7) Light grazing that is properly controlled can be a valuable technique for managing grassland areas for breeding birds. Keep grazing light and use a rotation system to leave some areas idle while others are grazed.
8) If areas are to be hayed or mowed to control woody vegetation, avoid mowing prior to late July or early August to avoid destroying bird nests. In addition, it is recommended to mow on a rotational system as with grazing.

With much less of than 1% of the state's original 21 million acres of prairie/grassland habitat remaining, it is not surprising that populations of grassland wildlife (especially our grassland birds) have also suffered substantial decreases in abundance. The acquisition and subsequent management of the PSP 6,000 ha reclaimed mine site is a tremendous opportunity to

provide important grassland habitat for grassland-dependent birds. The PSP grassland complex is large enough that it would be possible to manage a substantial acreage (preferably >2000 acres) for nongame grassland birds, to provide habitat (e.g., shrub-scrub and wetland) for other wildlife resources elsewhere on the site, and to simultaneously provide the necessary recreational opportunities for the many different user groups associated with state park lands.

As a management plan for the PSP grassland complex is developed and implemented, and as different management practices are utilized, we now have 2 years of necessary baseline data for the bird community on the site to allow us to document changes in the bird community in relation to changes in land use and habitat management on the site. These data will prove invaluable for documenting changes in the bird community as management on the site proceeds and will further our understanding of how to manage grasslands for a diverse assemblage of grassland and grassland-associated wildlife.

LITERATURE CITED

Askins, R. A. 2000. Restoring North America's birds: lessons from landscape ecology. Yale University Press, New Haven, CT. 320pp.

Askins, R. A. 1993. Population trends in grassland, shrubland, and forest birds in eastern North America. Pages 1-34 in D. M. Power (Ed.), Current Ornithology, Vol. II. Plenum, New York.

Bajema, R. A., T. L. DeVault, P. E. Scott, and S. L. Lima. 2001. Reclaimed coal mine grasslands and their significance for Henslow's Sparrows in the American Midwest. Auk 118:422-431.

Best, L. B., H. Campa, III, K. E. Kemp, R. J. Robel, M. R. Ryan, J. A. Savidge, H. P. Weeks, Jr., and S. R. Winterstein. 1997. Bird abundance and nesting in CRP fields and cropland in the Midwest: a regional approach. Wildlife Society Bulletin 25:864-877.

Bibby, C. J., N. D. Burgess, and D. A. Hill. 1992. Bird census techniques. Academic Press, San Diego, CA.

Brothers, T. S. 1990. Surface-mine grasslands. Geographical Review 80:209-225.

DeVault, T. L., P. E. Scott, R. A. Bajema, and S. L. Lima. 2002. Breeding bird communities of reclaimed coal-mine grasslands in the American midwest. Journal of Field Ornithology 73:268-275.

Herkert, J. R. 1994a. The effect of habitat fragmentation on midwestern grassland bird communities. Ecological Applications 4:461-471.

Herkert, J. R. 1994b. Breeding bird communities of midwestern prairie fragments: the effects of prescribed burning and habitat-area. Natural Areas Journal 14:128-135.

Herkert, J. R. 1991a. Prairie birds of Illinois: population response to two centuries of habitat change. Illinois Natural History Survey Bulletin 34:393-399.

Herkert, J. R. 1991b. An ecological study of the breeding birds of grassland habitats within Illinois. Ph.D. Thesis, University of Illinois, Urbana. 115 pp.

Herkert, J. R., D. W. Sample, and R. E. Warner. 1996. Management of midwestern grassland landscapes for the conservation of migratory birds. Pages 89-116 in F. R. Thompson, III, (Ed.), Managing midwest landscapes for the conservation of reotropical migratory birds. U.S. Forest Service General Technical Report NC-187.

Herkert, J. R., R. E. Szafoni, V. M. Kleen, and J. E. Schwegman. 1993. Habitat establishment, enhancement and management for forest and grassland birds in Illinois. Natural Heritage

Technical Publication No. 1. Division of Natural Heritage, Illinois Department of Conservation. Springfield, IL. 20pp.

Hoffman, C. L., and E. J. Heske. 2003. Relative abundance of mammalian nest predators at Jim Edgar Panther Creek State Fish and Wildlife Area, Cass County, Illinois. Transactions of the Illinois State Academy of Science 96:55-65.

Illinois Wildlife Habitat Commission. 1985. The crisis of wildlife habitat in Illinois today. Illinois Department of Conservation, Springfield. 26pp.

Johnson, R. G., and S. A. Temple. 1990. Nest predation and brood parasitism of tallgrass prairie birds. Journal of Wildlife Management 54:106-111.

Noss, R. F., E. T. LaRoe, III, and J. M. Scott. 1995. Endangered ecosystems of the United States: a preliminary assessment of loss and degradation. Biological Report 28, National Biological Service, Washington, D.C.

Sauer, J. R., J. E. Hines, and J. Fallon. 2001. The North American Breeding Bird Survey, Results and Analysis 1966-2000. Version 2001.2, USGS Patuxent Wildlife Research Center, Laurel, MD.

Schwegman, J. 1983. Illinois prairie, then and now. Illinois Audubon Bulletin 205:2-14.

Scott, P. E., T. L. DeVault, R. A. Bajema, and S. L. Lima. 2002. Grassland vegetation and bird abundances on reclaimed midwestern coal mines. Wildlife Society Bulletin 30:1006-1014.

Skinner, R. M., T. S. Basket, and M. D. Blenden. 1984. Bird habitat on Missouri prairies. Terrestrial Series No. 14. Missouri Department of Conservation. Jefferson City, MO. 42pp.

Soulé, M. E, editor. 1986. Conservation biology: the science of scarcity and diversity. Sinauer, Sunderland, Massachusetts.

Vickery, P. D. 1994. Effects of habitat area on the distribution of grassland birds in Maine. Conservation Biology 8:1087-1097.

Walk, J. W., and R. E. Warner. 2000. Management of Midwestern grasslands for the conservation of songbirds. Biological Conservation 94:165-172.

Warner, R. E. 1994. Agricultural land use and grassland habitat in Illinois: future shock for midwestern birds? Conservation Biology 8:147-156.

Wiens, J. A. 1996. Wildlife in patchy environments: metapopulations, mosaics and management. Pp. 53-84 *in* Metapopulations and wildlife conservation management (D. McCullough, ed.). Island Press, Washington, D.C.

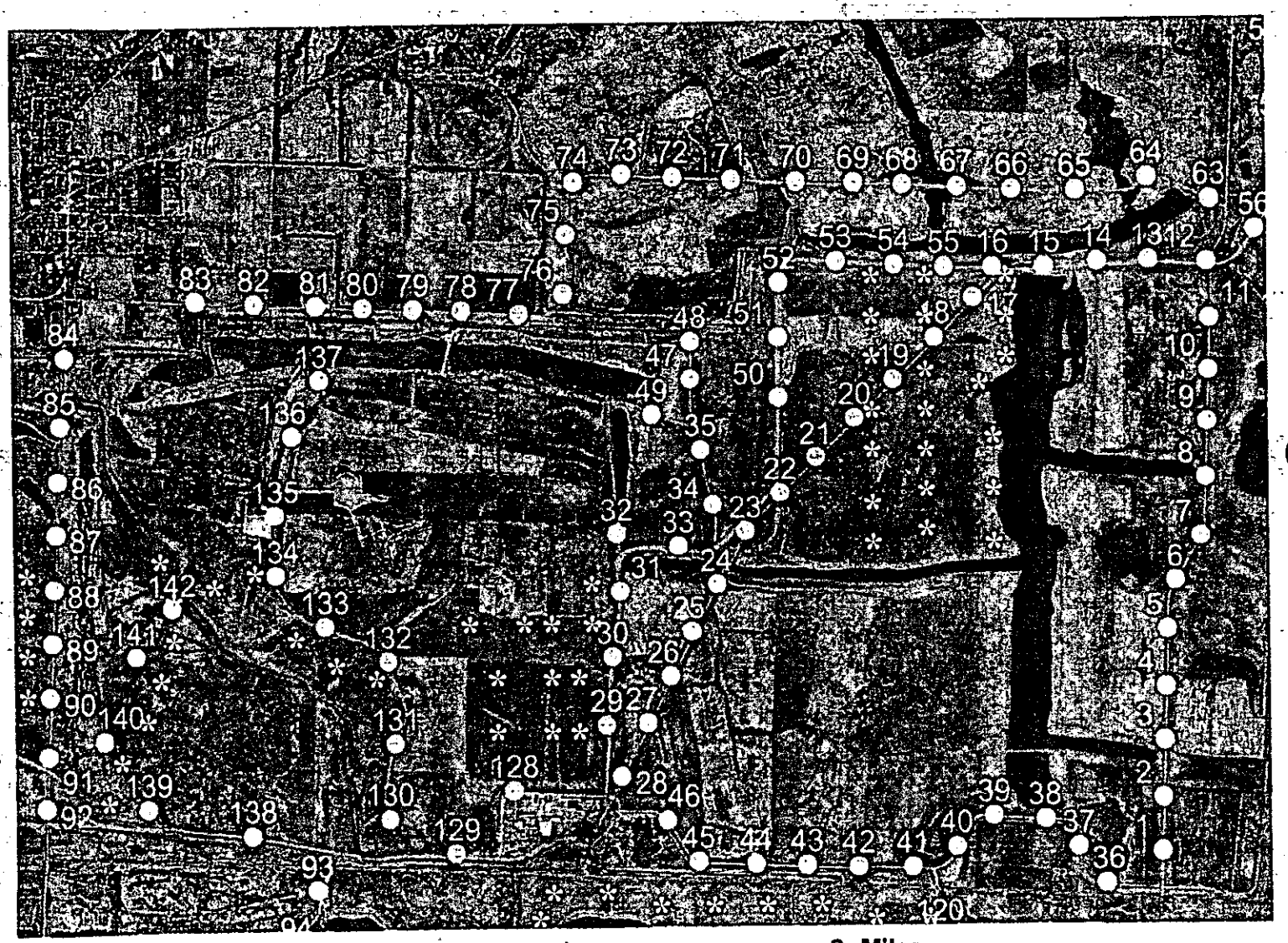
Wilcove D. S., D. Rothstein, J. Dubow, A. Phillips, and E. Losos. 1998. Quantifying threats to imperiled species in the United States. BioScience 48:607-615.

FIGURE LEGENDS

Figure 1. Locations of roadside census points that were surveyed during 2002 on the Captain Unit of the Pyramid State Park grassland complex. Numbers for census points correspond with habitat descriptions given in Table 1. Asterisks indicate off-road census points.

Figure 2. Locations of roadside census points that were surveyed during 2002 on the Denmark Unit of the Pyramid State Park grassland complex. Numbers for census points correspond with habitat descriptions given in Table 1. Asterisks indicate off-road census points.

Figure 3. Locations of roadside census points that were surveyed during 2002 on the Galum Unit of the Pyramid State Park grassland complex. Numbers for census points correspond with habitat descriptions given in Table 1. Asterisks indicate off-road census points.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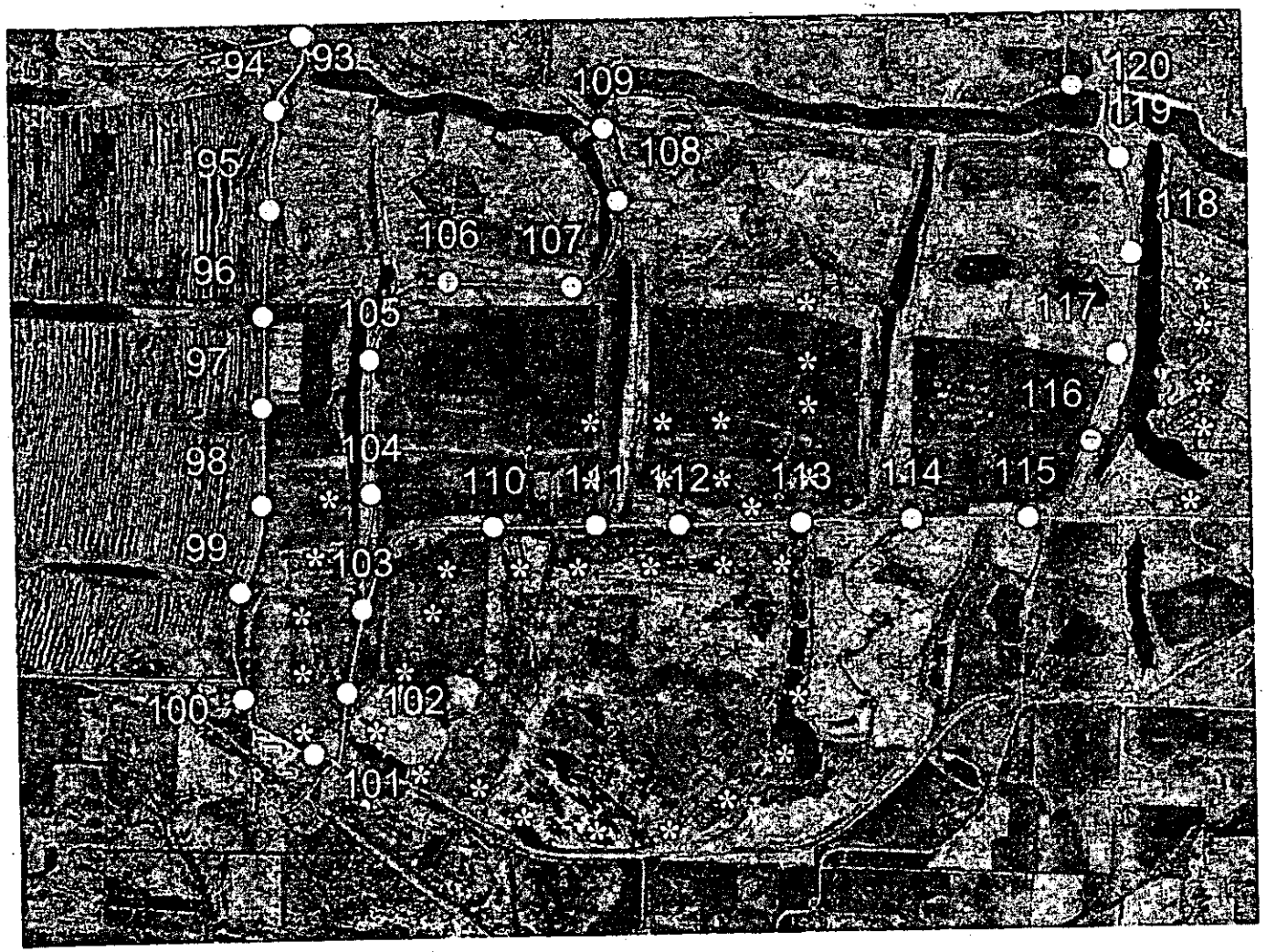

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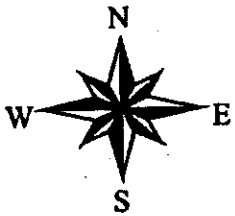

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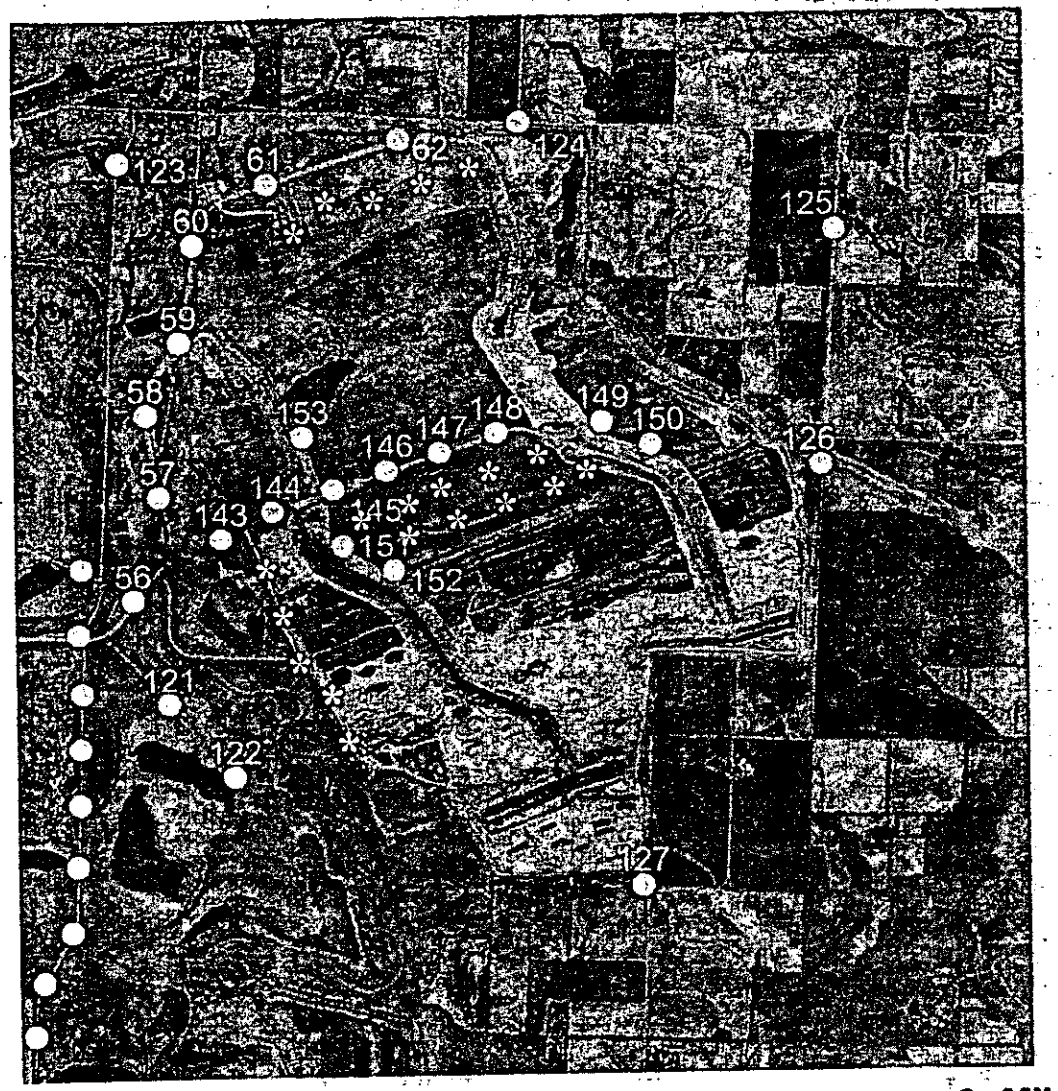

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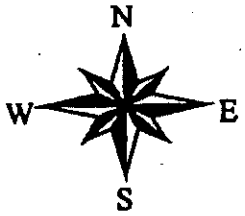

O Census points

Table 1. Qualitative description of habitat for each census point at the Arkland reclaimed mine site (now Pyramid State Park) in Perry County, Illinois, 2002. Each column of habitat description represents the habitat present within one half of a 100m-radius circle centered on the census point.

Point	Qualitative Habitat Description*	Qualitative Habitat Description*
001	E:soybeans, 20m-wide ditch (F,B)	W:soybeans, 20m-wide ditch (F,B)
002	E:soybeans, 20m-wide ditch (SL)	W:soybeans, 20m-wide ditch (SL)
003	E:corn, 20m-wide ditch (F w/shrub mix)	W:corn, 20m-wide ditch (B,F)
004	E:corn, 10m-wide ditch (F w/shrub mix)	W:corn, 10m-wide ditch (B,AO)
005	E:corn, 15m-wide ditch (B w/shrub mix)	W:corn, 10m-wide ditch (B,F)
006	E:F w/shrub mix	W:TP w/ES,B,MG, other perrenial forbes
007	E:warm season pasture, F	W:TP w/B and F
008	E:SG,F	W:F dominant w/B,SC
009	E:TGP w/IG,BBS/ and BS,B, few AO	W:EGG hayed
010	E:TGP w/IG,BBS+10m ditch	W:EGG hayed
011	E:TGP w/IG,BBS+10m ditch	W:EGG hayed
012	N:AW, disturbed area, AO/gravel road	S:EGG,B,RT, few AO/gravel road
013	N:AW, dense AO, PH	S:Br, Rt, AO, EGG hay
014	N:PH, AO, AW, water	S:RT, PH, AW, corn
015	N:AW, PH, AO, water	S:water, RT, PH
016	N:RT, AW, PH, water with vetch slope	S:RT, SG, BS, AO and mixed shrubs
017	E:B, PH, tree plantings, AO scattered	W:AW, F, AO, tree plantings, PH
018	E:AW, SG, middle:aged tree plantings	W:AW, SG
019	E:AW, B, BS, trees	W:AW, B, BS, trees
020	E:AW, B, BS, trees	W:AW, B, BS, trees
021	E:AW, B, BS, trees	W:AW, OF w/goldenrod, cattail, BS, B, trees
022	E:AW, PH, B, trees, BS	W:AW, PH, RT
023	E:AW, B, PH, scatered trees and AO	W:wheat, SL, AW
024	E:B, soybeans, PH	W:AW, B, PH, pond, corn
025	E:soybeans, B, RT	W:corn, B, BS, AW, PH
026	E:B, F, OF w/goldenrod	W:AW, B
027	E:wheat, AW	W:wheat, AW
029	E:PH, wheat, AW	W:PH, B
030	E:PH, B, IG, SG, wheat, AW, 6 AO	W:PH, SG, sunflowers, B
031	E:PH, corn	W:PH, few AO, AW, sunflowers
032	E:pond, PH, AW, prairie grass, wheat stubble	W:PH, AW, sunflower, F
033	N:PH, IG+BBS	S:wheat stubble, AW slope to water
034	E:AW, IG, few AO	W:AW, IG

Table 1. Qualitative description of habitat for each census point at the Arkland reclaimed mine site (now Pyramid State Park) in Perry County, Illinois, 2002. Each column of habitat description represents the habitat present within one half of a 100m-radius circle centered on the census point.

Point	Qualitative Habitat Description*	Qualitative Habitat Description*
035	E:AW, IG	W:PH, AW, IG
036	N:F, SG, pond w/treeline	S:F, AOT w/mixed woodies
037	N:F, pond w/treeline	S:F, AOT, OF, young trees
038	N:F, little TGP, PH, pond	S:F, PH, hayfield, few woodies along fence
039	N:F, PH, pond	S:F, hayfield, pasture, tree row
040	N:PH, SL, W rim around pond	S:F, W, GR, wooded ravine
041	N:F, BS, SL, GR, scattered W	S:F slope, PH, pond, young trees
042	N:F, PH, tree planting w/RT+BS+B	S:F, PH, young trees
043	N:F, PH, tree planting w/cool season grasses	S:F, PH, young trees, pond
044	N:soybeans, ditch w/B+F+SG	S:F, B, woodies, railroad
045	N:B, OF, PH, soybeans	S:mowed F, woodies, road, railroad
046	N:F, PH, OF w/B+F	S:PH, F, woodies, road, shallow water
047	E:PH, prairie grass	W:F, AW roadside
048	E:AW, RT, SG	W:RT, F, PH, AW
049	N:F, RT slope, water	S:F, TGP, AW
050	E:RT, B, tree planting	W:RT, BR, IG+few AO+few W
051	E:RT, SG, prairie	W:RT, PH, B
052	E:RT, PH, tree planting w/B	W:RT, PH, B, scattered woodies
053	N:RT, AW, PH, water with vetch slope	S:RT, SG, tree plantings w/OF
054	N:RT, AW, PH, water with vetch slope	S:RT, SG, PH, few AO
055	N:RT, AW, PH, water with vetch slope	S:RT, SG, BS, few AO and W
056	N:SG,PH,wheat	S:AO w/young mixed woodies, wheat
057	E:wheat, AOT	W:wheat stuble, B, small trees, few AO
058	E:wheat	W:15m of wheat, AOT w/F
059	E:wheat	W:15m of wheat w/AW, AOT w/B
060	E:wheat	W:15m of wheat, AOT, OF w/goldenrod, PH
061	N:OF w/ SL, F, PH, AO	S:slope of lakeside, annuals, disturbed
062	N:wheat w/AW	S:ditch with AW, wheat
063	N:AOT, F, young forest	S:SL, stream, pond
064	N:F, AO, PH, pond	S:F, PH, pond, SC, few AO
065	N:F, few AO sprayed	S:F, few AO
066	N:F, AOT, W	S:PH, F dominant, few mixed shrubs
067	N:PH, pond	S:F, PH, pond

Table 1. Qualitative description of habitat for each census point at the Arkland reclaimed mine site (now Pyramid State Park) in Perry County, Illinois, 2002. Each column of habitat description represents the habitat present within one half of a 100m-radius circle centered on the census point.

Point	Qualitative Habitat Description*	Qualitative Habitat Description*
068	N:PH, pond	S:F, PH, pond, AO in rows
069	N:F, BS, AO rows	S:F, BS, mullen, 3 AO
070	N:BS, F, PH, pond	S:F, BS, AO row
071	N:F roadside, corn	S:F, corn, OF w/goldenrod
072	N:F roadside, soybeans	S:OF w/goldenrod roadside, corn, AO fencerow
073	N:F, OF, AO scattered	S:B roadside, corn
074	N:F, few shrub, cattail	S:OF roadside, corn
075	N:F, AO scattered	S:AW, F, AO scattered, PH
076	N:BS, OF w/goldenrod, AO scattered	S:AW, BS, OF, ditch, few AO
077	N:woody fence row, corn	S:OF w/goldenrod, TGP (IG+BBS)
078	N:F pasture, soybeans	S:OF w/goldenrod, TGP (IG+BBS)
079	N:soybeans, woody fence row	S:RT, OF w/goldenrod, BBS, IG, AO bunch
080	N:woody fence row, soybeans	S:OF w/goldenrod, TGP (IG+BBS)
081	N:soybeans	S:OF w/goldenrod, TGP (IG+BBS), RT
082	N:soybeans, tree fence row	S:OF w/goldenrod, TGP (IG+BBS), F
083	N:soybeans, tree fence row	S:soybeans, OF w/goldenrod, IG, BBS, forest
084	E:F, AOT, W, OF	W:AO, mixed woodies, OF, F
085	E:AW	W:pond, F, SC, OF, 2 AO
086	E:AW, PH, few W	W:pond, AW pasture
087	E:AW	W:F pasture
088	E:AW	W:F pasture
089	E:AW	W:moist soil, F pasture, dropseed
090	E:B, PT, RT, AW	W:PT+SG+AW pasture
091	E:F, AW	W:F, SG, AW, cattail, few mixed shrubs
092	E:B, F, scattered mixed shrubs	W:B, F, black locust, AW
093	E:gravel, AW, woods	W:gravel, AW, woods
094	E:B, AW, gravel, AO clumps	W:AW, AO row, water
095	E:milo, B, F	W:F, AW+F pasture, few shrubs, powerline
096	E:corn, B, F	W:F, mixed grass pasture, powerline
097	E:corn, B, F	W:F, mixed grass pasture, powerline
098	E:B, F ditch, goldenrod	W:F, pasture, powerline
099	E:F, OF, shrubs/trees, TGP w/IG	W:F, pasture, AO along road, powerline
100	E:B, W, CV	W:forest, abandoned homestead

Table 1. Qualitative description of habitat for each census point at the Arkland reclaimed mine site (now Pyramid State Park) in Perry County, Illinois, 2002. Each column of habitat description represents the habitat present within one half of a 100m-radius circle centered on the census point.

Point	Qualitative Habitat Description*	Qualitative Habitat Description*
101	N:W, water, F, AO	S:F
102	E:F, F pasture, OF, woodies	W:B, OF, scattered woodies
103	E:F, pasture, AW	W:B, AW
104	E:F, EGG, few AO	W:RT, B, water, CV
105	E:corn, goldenrod, B, row of AO, EGG	W:B, PH, water
106	N:EGG, B, SL ditch, AO scattered	S:EGG, B, little pasture
107	N:EGG hayed, SC, PH, sunflower	S:EGG hayed, SC, B, PH, goldenrod
108	E:soybean, B, tree planing w/B	W:B, B slope, water, PH, few W
109	N:B, GR, water ditch, EGG hayed	S:water, PH, B
110	N:B, F, F pasture, AO patches	S:B, AO woody thicket, F pasture w/few AO
111	N:F, B, PH, scattered AO	S:B, woody savanna, AO, F pasture
112	N:F, B, PH, scattered AO	S:B, woody savanna, AO, F pasture
113	N:B, F pasture, OF, scattered AO	S:B, OF, scattered trees, AOT
114	N:F, RC, OF, W and AOT	S:F, PH, scattered AO
115	N:PH, OF, scattered trees and AO, notill soybeans	S:B, OF, scattered AO
116	E:F, CV, water, PH	W:B, wheat stubble now soybeans
117	E:B, RT, PH, water	W:corn, B edge
118	E:B, PH, water	W:tree planting w/B, OF
119	E:young tree planting in B+F	W:B ditch, prairie grass hayed
120	N:F	S:water, AW and W strip
121	E:F in ditch, AOT, W, pond	W:F, B, AO scattered
122	E:F, SW, AOT	W:F, AO, lake
123	E:OF, PH, W grove	W:AW, wheat stubble, OF, AO patch
124	N:notill soybeans	S:F, OF, scattered AO, willow ditch
125	E:corn, F, 2 big trees	W:soybeans, F ditch
126	E:prairie planting, F, soybeans	W:AW, RT, disturbed field, woodlot
127	N:soybeans, wheat, AW, 3 AO	S:soybeans, woodlot
128	N:PH, B, AO scattered, water	S:gravel
129	N:AW, PH, water, few trees and shrubs	S:gravel, PH, railroad
130	E:AW, PH, cattails, goldenrod, F	W:B, SG
131	E:soybeans, AW, B, SG	W:B, SG
132	E:soybeans, PH, foxtail, tree plantings	W:B, SG, F, AO scattered
133	E:RT, AW, B, tree plantings	W:B, F, PH

Table 1. Qualitative description of habitat for each census point at the Arkland reclaimed mine site (now Pyramid State Park) in Perry County, Illinois, 2002. Each column of habitat description represents the habitat present within one half of a 100m-radius circle centered on the census point.

Point	Qualitative Habitat Description*	Qualitative Habitat Description*
134	E:corn, AW, PH, treeline	W:SG, IG
135	E:corn, AW, PH	W:RT
136	E:soybeans, AW, foxtail	W:AW, F, sunflower, SG
137	E:soybeans, AW	W:AW, F
138	N:cattail, shallow pond w/willow and shrub	S:AW, F, AO scattered, rail with few trees
139	E:F, OF, scattered large trees	W:AW
140	E:F, CV, little goldenrod and pokeweed	W:AW, PH
141	N:AW, F, goldenrod	S:AW, B, CV, boneset, F
142	E:PT, AW, F, PH, partial tree planting w/B	W:AW, B on levee, F, goldenrod, tree planting
143	N:wheat in ditch, young forest	S:wheat in ditch, young forest, AOT
144	N:F, B, AW, gravel	S:F in ditch, OF w/goldenrod, W
145	N:F, AW, notill soybeans	S:F in ditch, RT, TGP (BBS+IG)
146	N:F in ditch, notill soybeans	S:F in ditch, RT, AW, TGP (IG+BBS)
147	N:F in ditch, notill soybeans	S:F in ditch, TGP (BBS+IG)
148	N:F w/SC, notill soybeans	S:F+AW in ditch, TGP
149	N:AW, B, soybeans	S:F, AW
150	E:AW, F, B	W:F on slope to lake
151	E:TGP (IG), AW roadside	W:AW, SG, bare ground, wheat on slope
152	E:TGP (IG), AW roadside	W:AW, IG, AW, wheat on slope
153	E:F, notill soybeans	W:B, F, SC

*The first letter in each description indicates Northern (N), Southern (S), Eastern (E), or Western (W) half of the circle.

*Key (in alphabetical order) for abbreviations in habitat descriptions.

AO=Autumn Olive
AOT=Autumn Olive Thicket
AW=Annual Weeds (Boneset, Goldenrod, Cheatgrass, Sunflower, Foxtail)
B=Brome
BBS=Big Blue Stem
BS=Broom Sedge
CV=Crown Vetch
EGG=Eastern Gamma Grass
ES=Early Successional
F=Fescue
GG=Grease Grass
IG=Indian Grass
MG=Mixed Grasses
OF=Old Field
PH=Phragmites
PT=Purple Top
RC=Reed Canary Grass

Table 1. Qualitative description of habitat for each census point at the Arkland reclaimed mine site (now Pyramid State Park) in Perry County, Illinois, 2002. Each column of habitat description represents the habitat present within one half of a 100m-radius circle centered on the census point.

Point	Qualitative Habitat Description*	Qualitative Habitat Description*

*Key continued for abbreviations in habitat descriptions.

RT=Red Top
SC=Sweet Clover
SG=Switch Grass
SL=Serecia Lespediza
TGP=Tall Grass Prairie
TP=Tree Planting
W=Willow

Table 2. Summary of 153 breeding bird point counts (100m fixed-radius) at the Arkland reclaimed mine site (now Pyramid State Park) in Perry County, Illinois, 2002-2003. Species listed from most to least abundant in 2002.

		Number of Individuals		Number per Hectare		Percent Occurrence*		Special	Habitat
Species	Scientific Name	2002	2003	2002	2003	2002	2003	Status**	Association***
Red-winged Blackbird	*Agelaius phoeniceus*	1058	874	2.202	1.819	93.5	92.2		W, GA
American Goldfinch	*Carduelis tristis*	246	237	0.512	0.493	69.9	69.3		SS, GA
Eastern Meadowlark	*Sturnella magna*	227	233	0.473	0.481	65.4	69.3		GS
Common Grackle	*Quiscalus quiscula*	224	61	0.466	0.127	21.6	10.5		O
Indigo Bunting	*Passerina cyanea*	199	168	0.414	0.350	72.5	60.8		SS
Dickcissel	*Spiza americana*	185	186	0.385	0.387	53.6	55.6		GS
Northern Bobwhite	*Colinus virginianus*	151	94	0.314	0.196	59.5	63.4		SS,GA
Mourning Dove	*Zenaida macroura*	113	149	0.235	0.310	42.5	52.9		O, GA
Common Yellowthroat	*Geothlypis trichas*	92	64	0.191	0.133	47.7	34.0		SS, GA
Field Sparrow	*Spizella pusilla*	85	72	0.177	0.150	36.6	32.7		SS, GA
Canada Goose	*Branta canadensis*	78	0	0.162	0.000	3.3	0.0		W
American Robin	*Turdus migratorius*	74	32	0.154	0.067	28.8	18.3		O
Grasshopper Sparrow	*Ammodramus savannarum*	74	76	0.154	0.158	23.5	21.6		GS
Brown Thrasher	*Toxostoma rufum*	67	65	0.139	0.135	30.7	24.8		SS
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	62	273	0.129	0.568	19.0	14.4		O
Bell's Vireo	*Vireo bellii*	61	72	0.127	0.150	22.9	30.7		SS
Killdeer	*Charadrius vociferus*	55	74	0.114	0.154	26.8	30.7		O, GA
Willow Flycatcher	*Empidonax traillii*	55	60	0.114	0.125	28.1	28.8		SS
Northern Cardinal	*Cardinalis cardinalis*	51	30	0.106	0.062	27.5	16.3		SS
Eastern Kingbird	*Tyrannus tyrannus*	42	80	0.087	0.167	18.3	28.1		O
Henslow's Sparrow	*Ammodramus henslowii*	41	32	0.085	0.067	13.7	9.2	E	GS
European Starling	*Sturnus vulgaris*	39	72	0.081	0.150	2.6	5.2		O

Table 2. Summary of 153 breeding bird point counts (100m fixed-radius) at the Arkland reclaimed mine site (now Pyramid State Park) in Perry County, Illinois, 2002-2003. Species listed from most to least abundant in 2002.

		Number of Individuals		Number per Hectare		Percent Occurrence*		Special	Habitat
Species	Scientific Name	2002	2003	2002	2003	2002	2003	Status**	Association***
Gray Catbird	*Dumetella carolinensis*	32	13	0.067	0.027	13.1	7.2		SS
Yellow-billed Cuckoo	*Coccyzus americanus*	31	9	0.065	0.019	19.0	12.4		O
Eastern Towhee	*Pipilo erythrophthalmus*	28	37	0.058	0.077	12.4	15.7		SS
Brown-headed Cowbird	*Molothrus ater*	27	40	0.056	0.083	9.8	12.4		O, GA
Song Sparrow	*Melospiza melodia*	23	16	0.048	0.033	11.8	9.8		SS, GA
Yellow-breasted Chat	*Icteria virens*	18	20	0.037	0.042	9.8	11.1		SS
Yellow Warbler	*Dendroica petechia*	17	16	0.035	0.033	8.5	9.8		SS
Common Nighthawk	*Chordeiles minor*	13	13	0.027	0.027	5.2	6.5		O
Eastern Bluebird	*Sialia sialis*	13	3	0.027	0.006	7.8	2.0		O
Great Blue Heron	*Ardea herodias*	13	13	0.027	0.027	7.2	13.7		W
Mallard	*Anas platyrhynchos*	13	5	0.027	0.010	5.2	3.3		W
Warbling Vireo	*Vireo gilvus*	13	0	0.027	0.000	7.2	0.0		O
Horned Lark	*Eremophila alpestris*	12	5	0.025	0.010	4.6	2.0		GS
Northern Mockingbird	*Mimus polyglottos*	12	11	0.025	0.023	5.2	6.5		SS
Barn Swallow	*Hirundo rustica*	10	27	0.021	0.056	2.6	7.2		O
House Sparrow	*Passer domesticus*	10	0	0.021	0.000	2.0	0.0		O
Red-tailed Hawk	*Buteo jamiacensis*	9	15	0.019	0.031	5.9	7.8		O
Blue Grosbeak	*Guiraca caerulea*	8	15	0.017	0.031	5.2	8.5		SS
Blue Jay	*Cyanocitta cristata*	8	8	0.017	0.017	3.3	5.2		O
Green Heron	*Butorides virescens*	8	2	0.017	0.013	5.2	2.0		W
Tree Swallow	*Tachycineta bicolor*	8	62	0.017	0.129	2.6	17.6		O
Eastern Phoebe	*Sayornis phoebe*	6	0	0.012	0.000	3.3	0.0		O

Table 2. Summary of 153 breeding bird point counts (100m fixed-radius) at the Arkland reclaimed mine site (now Pyramid State Park) in Perry County, Illinois, 2002-2003. Species listed from most to least abundant in 2002.

		Number of Individuals		Number per Hectare		Percent Occurrence*		Special	Habitat
Species	Scientific Name	2002	2003	2002	2003	2002	2003	Status**	Association***
Blue-winged Teal	*Anas discors*	5	3	0.010	0.006	0.7	0.7		W
Orchard Oriole	*Icterus spurius*	5	4	0.010	0.008	3.3	2.6		O
Chimney Swift	*Chaetura pelagica*	4	0	0.008	0.000	2.0	0.0		O
Northern Harrier	*Circus cyaneus*	4	1	0.008	0.002	2.0	0.7	E	GS
American Crow	*Corvus brachyrhynchos*	3	0	0.006	0.000	0.7	0.0		O
American Kestrel	*Falco sparverius*	3	6	0.006	0.012	2.0	3.3		O
Downy Woodpecker	*Picoides pubescens*	3	5	0.006	0.010	2.0	3.3		O
Turkey Vulture	*Cathartes aura*	3	1	0.006	0.002	1.3	0.7		O
White-eyed Vireo	*Vireo griseus*	3	1	0.006	0.002	2.0	0.7		SS
Carolina Wren	*Thryothorus ludovicianus*	2	10	0.004	0.021	1.3	6.5		SS
Eastern Wood-Pewee	*Contopus virens*	2	7	0.004	0.015	1.3	3.3		O
Great-horned Owl	*Bubo virginianus*	2	0	0.004	0.000	1.3	0.0		O
Loggerhead Shrike	*Lanius ludovicianus*	2	6	0.004	0.012	1.3	2.6	T	SS
Belted Kingfisher	*Ceryle alcyon*	1	1	0.002	0.002	0.7	0.7		W
Cooper's Hawk	*Accipiter cooperii*	1	0	0.002	0.000	0.7	0.0		O
Double-crested Cormorant	*Phalacrocorax auritus*	1	2	0.002	0.004	0.7	1.3	T	W
Hairy Woodpecker	*Picoides villosus*	1	0	0.002	0.000	0.7	0.0		O
House Wren	*Troglodytes aedon*	1	0	0.002	0.000	0.7	0.0		SS
Red-bellied Woodpecker	*Melanerpes carolinus*	1	3	0.002	0.006	0.7	2.0		O
Red-headed Woodpecker	*Melanerpes erythrocephalus*	1	0	0.002	0.000	0.7	0.0		O
Ruby-throated Hummingbird	*Archilochus colubris*	1	1	0.002	0.002	0.7	0.7		O
Cliff Swallow	*Hirundo pyrrhonota*	0	22	0.000	0.046	0.0	2.6		O

Table 2. Summary of 153 breeding bird point counts (100m fixed-radius) at the Arkland reclaimed mine site (now Pyramid State Park) in Perry County, Illinois, 2002-2003. Species listed from most to least abundant in 2002.

		Number of Individuals		Number per Hectare		Percent Occurrence*		Special	Habitat
Species	Scientific Name	2002	2003	2002	2003	2002	2003	Status**	Association***
Carolina Chickadee	*Parus carolinensis*	0	6	0.000	0.012	0.0	2.0		O
Great Egret	*Casmerodius albus*	0	4	0.000	0.008	0.0	2.6		W
American Bittern	*Botaurus lentiginosus*	0	2	0.000	0.004	0.0	1.3	E	W
Cedar Waxwing	*Bombycilla cedrorum*	0	2	0.000	0.004	0.0	0.7		O
Wood Thrush	*Hylocichla mustelina*	0	2	0.000	0.004	0.0	1.3		O
Sharp-shinned Hawk	*Accipiter striatus*	0	1	0.000	0.002	0.0	0.7		O

* Indicates those species on the Endangered (E) and Threatened (T) species list for Illinois (1999 list).

**Percentage of census points at which a particular species occurred (out of 153 points).

***Characteristic breeding habitat. The first designation is from Sauer et al. (1999): GS=grassland specialist; SS=successional scrub; W=wetlands; O=other or not classified. GA ("grassland associated") designates facultative grassland users that regularly breed in Midwestern grasslands (Herkert 1994: Table 1), but are not grassland specialists.

Table 3. Summary of 133 off-road breeding bird point counts (100m fixed-radius) at the Arkland reclaimed mine site (now Pyramid State Park) in Perry County, Illinois, 2003. Species listed from most to least abundant.

Species	Scientific Name	Number of Individuals	Number per Hectare	Special Status*	Habitat Association**
Red-winged Blackbird	*Agelaius phoeniceus*	804	1.925		W, GA
Eastern Meadowlark	*Sturnella magna*	224	0.536		GS
Dickcissel	*Spiza americana*	146	0.350		GS
Common Grackle	*Quiscalus quiscula*	109	0.261		O
Northern Bobwhite	*Colinus virginianus*	89	0.213		SS,GA
Indigo Bunting	*Passerina cyanea*	77	0.184		SS
Brown-headed Cowbird	*Molothrus ater*	69	0.165		O, GA
American Goldfinch	*Carduelis tristis*	64	0.153		SS, GA
Field Sparrow	*Spizella pusilla*	63	0.151		SS, GA
Mourning Dove	*Zenaida macroura*	57	0.136		O, GA
Barn Swallow	*Hirundo rustica*	51	0.122		O
Grasshopper Sparrow	*Ammodramus savannarum*	50	0.120		GS
Yellow Warbler	*Dendroica petechia*	40	0.301		SS
Bell's Vireo	*Vireo bellii*	35	0.084		SS
American Robin	*Turdus migratorius*	30	0.072		O
Common Yellowthroat	*Geothlypis trichas*	29	0.069		SS, GA
Willow Flycatcher	*Empidonax traillii*	27	0.065		SS
Henslow's Sparrow	*Ammodramus henslowii*	23	0.055	E	GS
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	21	0.050		O
Eastern Kingbird	*Tyrannus tyrannus*	19	0.045		O
Killdeer	*Charadrius vociferus*	18	0.043		O, GA
Brown Thrasher	*Toxostoma rufum*	14	0.034		SS
Northern Cardinal	*Cardinalis cardinalis*	14	0.034		SS
Canada Goose	*Branta canadensis*	13	0.031		W
Horned Lark	*Eremophila alpestris*	10	0.024		GS
Cedar Waxwing	*Bombycilla cedrorum*	10	0.024		O
Yellow-billed Cuckoo	*Coccyzus americanus*	9	0.022		O
Yellow-breasted Chat	*Icteria virens*	8	0.019		SS
Gray Catbird	*Dumetella carolinensis*	7	0.017		SS
Song Sparrow	*Melospiza melodia*	6	0.014		SS, GA
Warbling Vireo	*Vireo gilvus*	6	0.014		O
Blue Grosbeak	*Guiraca caerulea*	6	0.014		SS

Table 3. Summary of 133 off-road breeding bird point counts (100m fixed-radius) at the Arkland reclaimed mine site (now Pyramid State Park) in Perry County, Illinois, 2003. Species listed from most to least abundant.

Species	Scientific Name	Number of Individuals	Number per Hectare	Special Status*	Habitat Association**
Blue Jay	*Cyanocitta cristata*	6	0.014		O
Tree Swallow	*Tachycineta bicolor*	6	0.014		O
Cliff Swallow	*Hirundo pyrrhonota*	6	0.045		O
Eastern Towhee	*Pipilo erythrophthalmus*	4	0.010		SS
Mallard	*Anas platyrhynchos*	4	0.010		W
Green Heron	*Butorides virescens*	4	0.010		W
Blue-winged Teal	*Anas discors*	4	0.010		W
Downy Woodpecker	*Picoides pubescens*	4	0.010		O
Great Blue Heron	*Ardea herodias*	3	0.007		W
House Sparrow	*Passer domesticus*	3	0.007		O
Blue-gray Gnatcatcher	*Polioptila caerulea*	3	0.007		O
Orchard Oriole	*Icterus spurius*	2	0.005		O
European Starling	*Sturnus vulgaris*	1	0.002		O
Common Nighthawk	*Chordeiles minor*	1	0.002		O
Northern Mockingbird	*Mimus polyglottos*	1	0.002		SS
Red-tailed Hawk	*Buteo jamiacensis*	1	0.002		O
Eastern Phoebe	*Sayornis phoebe*	1	0.002		O
Northern Harrier	*Circus cyaneus*	1	0.002	E	GS
American Crow	*Corvus brachyrhynchos*	1	0.002		O
American Kestrel	*Falco sparverius*	1	0.002		O
Turkey Vulture	*Cathartes aura*	1	0.002		O
White-eyed Vireo	*Vireo griseus*	1	0.002		SS
Eastern Wood-Pewee	*Contopus virens*	1	0.002		O
House Wren	*Troglodytes aedon*	1	0.002		SS
Red-bellied Woodpecker	*Melanerpes carolinus*	1	0.002		O
American Bittern	*Botaurus lentiginosus*	1	0.002	E	W
Baltimore Oriole	*Icterus galbula*	1	0.002		O
Least Bittern	*Ixobrychus exilis*	1	0.002	T	W
Purple Martin	*Progne subis*	1	0.002		O
Eastern Bluebird	*Sialia sialis*	0***	0.000		O
Chimney Swift	*Chaetura pelagica*	0***	0.000		O
Carolina Wren	*Thryothorus ludovicianus*	0***	0.000		SS

Table 3. Summary of 133 off-road breeding bird point counts (100m fixed-radius) at the Arkland reclaimed mine site (now Pyramid State Park) in Perry County, Illinois, 2003. Species listed from most to least abundant.

Species	Scientific Name	Number of Individuals	Number per Hectare	Special Status*	Habitat Association**
Great-horned Owl	*Bubo virginianus*	0***	0.000		O
Loggerhead Shrike	*Lanius ludovicianus*	0***	0.000	T	SS
Belted Kingfisher	*Ceryle alcyon*	0***	0.000		W
Cooper's Hawk	*Accipiter cooperii*	0***	0.000		O
Double-crested Cormorant	*Phalacrocorax auritus*	0***	0.000	T	W
Hairy Woodpecker	*Picoides villosus*	0***	0.000		O
Red-headed Woodpecker	*Melanerpes erythrocephalus*	0***	0.000		O
Ruby-throated Hummingbird	*Archilochus colubris*	0***	0.000		O
Carolina Chickadee	*Parus carolinensis*	0***	0.000		O
Great Egret	*Casmerodius albus*	0***	0.000		W
Wood Thrush	*Hylocichla mustelina*	0***	0.000		O
Sharp-shinned Hawk	*Accipiter striatus*	0***	0.000		O
Rough-legged Hawk	*Buteo lagopus*	P****			O
Cattle Egret	*Bubulcus ibis*	P****			W
Little Blue Heron	*Egretta caerulea*	P****		E	W
Spotted Sandpiper	*Actitis macularia*	P****			O
Pied-billed Grebe	*Podilymbus podiceps*	P****		T	W

* Indicates those species on the Endangered (E) and Threatened (T) species list for Illinois.

**Characteristic breeding habitat. The first designation is from Sauer et al. (1999): GS=grassland specialist; SS=successional scrub; W=wetlands; O=other or not classified. GA ("grassland associated") designates facultative grassland users that regularly breed in Midwestern grasslands (Herkert 1994: Table 1), but are not grassland specialists.

***Species documented at roadside census points in either 2002, 2003, or both.

****Species was present (P) and observed on site, but not within 100 m of any of the census points.

Table 4. Summary of a survey (number of individuals seen during 6 visits) of the birds present during the winter at the Arkland reclaimed mine site (now Pyramid State Park) in Perry County, Illinois, 2003. Species listed from most to least observed.

Species	Scientific Name	Number Observed
SNOW GOOSE	*Chen caerulescens*	9662
CANADA GOOSE	*Branta canadensis*	1926
AMERICAN COOT	*Fulica americana*	546
MALLARD	*Anas platyrhynchos*	425
GADWALL	*Anas strepera*	157
LESSER SCAUP	*Aythya affinis*	154
NORTHERN HARRIER	*Buteo lagopus*	128
COMMON MERGANSER	*Mergus merganser*	117
NORTHERN SHOVELER	*Anas clypeata*	116
BLUE-WINGED TEAL	*Anas discors*	103
BUFFLEHEAD	*Bucephala albeola*	51
GREEN-WINGED TEAL	*Anas crecca*	43
RING-NECKED DUCK	*Aythya collaris*	36
SHORT-EARED OWL	*Asio flammeus*	34
KILLDEER	*Charadrius vociferus*	33
REDHEAD	*Aythya americana*	27
AMERICAN KESTREL	*Falco sparverius*	24
RED-TAILED HAWK	*Buteo jamiacensis*	24
GREATER WHITE-FRONTED GOOSE	*Anser albifrons*	21
COMMON SNIPE	*Gallinago gallinago*	20
PIED-BILLED GREBE	*Podilymbus podiceps*	13
LOGGERHEAD SHRIKE	*Lanius ludovicianus*	11
RING-BILLED GULL	*Larus delawarensis*	11
DOUBLE-CRESTED CORMORANT	*Phalacrocorax auritus*	9
GREAT BLUE HERON	*Ardea herodias*	9
TURKEY VULTURE	*Cathartes aura*	4
AMERICAN WIDGEON	*Anas americana*	2
BALD EAGLE	*Haliaeetus leucocephalus*	2
NORTHERN PINTAIL	*Anas acuta*	2

Table 4. Summary of a survey (number of individuals seen during 6 visits) of the birds present during the winter at the Arkland reclaimed mine site (now Pyramid State Park) in Perry County, Illinois, 2003. Species listed from most to least observed.

Species	Scientific Name	Number Observed
COOPER'S HAWK	*Accipiter cooperii*	1
GREATER YELLOWLEGS	*Tringa melanoleuca*	1
HORNED GREBE	*Podiceps auritus*	1
LESSER YELLOWLEGS	*Tringa flavipes*	1
ROUGH-LEGGED HAWK	*Buteo lagopus*	1
RUDDY DUCK	*Oxyura jamaicensis*	1

Table 5. Dates and Locations for Illinois' Endangered and Threatened birds observed at the Arkland reclaimed mine site (now Pyramid State Park) in Perry County, Illinois, 2003.

Species (status*)	Date	Number of Individuals	Location		
			Township	Range	Section
Pied-billed Grebe (T)	02/28/03	1	6S	4W	1
(Podilymbus podiceps)	03/06/03	2	6S	4W	1
	03/19/03	3	6S	4W	1
	03/19/03	3	6S	4W	2
	04/05/03	3	6S	4W	13
	04/05/03	3	6S	4W	1
	06/17/03	1	6S	4W	22
	07/12/03	1	6S	4W	1
Double-crested Cormorant (T)	07/21/03	1	6S	4W	10
(Phalacrocorax auritus)	07/23/03	1	6S	4W	2
American Bittern (E)	05/28/03	1	6S	3W	6
(Botaurus lentiginosus)	05/28/03	1	6S	3W	6
	06/15/03	1	6S	4W	23
	06/15/03	1	6S	4W	1
Least Bittern (E)	06/14/03	1	6S	4W	17
(Ixobrychus exilis)					
Little Blue Heron (E)	06/09/03	6	6S	4W	11
(Egretta caerulea)					
Northern Harrier (E)	01/27/03	19	6S	4W	22-27
(Circus cyaneus)	02/25/03	64	6S	3W,4W	ALL
	02/28/03	15	6S	4W	10-15
	03/06/03	24	6S	4W	10-15
	03/19/03	6	6S	3W	5-8

Table 5. Dates and Locations for Illinois' Endangered and Threatened birds observed at the Arkland reclaimed mine site (now Pyramid State Park) in Perry County, Illinois, 2003.

Species (status*)	Date	Number of Individuals	Location		
			Township	Range	Section
Northern Harrier (E)	04/05/03	4	6S	3W	5, 6
(Circus cyaneus)	07/21/03	1	6S	4W	14
Osprey (E)	06/20/03	1	6S	3W	7
(Pandion haliaetus)					
Bald Eagle (T)	01/27/03	2	6S	4W	12
(Haliaeetus leucocephalus)	04/05/03	1	6S	4W	13
	05/23/03	1	6S	4W	7
Upland Sandpiper (E)	06/17/03	1	6S	4W	27
(Bartramia longicauda)	06/17/03	1	6S	4W	26
Short-eared Owl (E)	01/27/03	7	6S	4W	22
(Asio flammeus)	01/27/03	6	6S	4W	12
	02/28/03	1	6S	4W	2
	03/19/03	20	6S	4W	11
Loggerhead Shrike (T)	01/27/03	1	6S	4W	2
(Lanius ludovicianus)	02/28/03	1	6S	4W	3
	03/06/03	1	6S	4W	3
	03/06/03	1	6S	4W	12
	03/06/03	1	6S	4W	26
	03/19/03	1	6S	4W	26
	04/05/03	1	6S	4W	13
	04/05/03	1	6S	4W	11
	04/05/03	1	6S	4W	21
	04/05/03	2	6S	4W	28
	05/28/03	1	6S	4W	3

Table 5. Dates and Locations for Illinois' Endangered and Threatened birds observed at the Arkland reclaimed mine site (now Pyramid State Park) in Perry County, Illinois, 2003.

Species (status*)	Date	Number of Individuals	Location Township	Range	Section
Loggerhead Shrike (T)	06/14/03	2	6S	4W	17
(Lanius ludovicianus)	06/15/03	1	6S	4W	28
	06/15/03	1	6S	4W	28
	06/20/03	2	6S	4W	28
	07/23/03	2	6S	4W	2
	07/23/03	2	6S	4W	16
Henslow's Sparrow (E)	06/09/03	2	6S	4W	2
(Ammodramus henslowii)	06/09/03	3	6S	4W	2
	06/15/03	3	6S	4W	28
	06/15/03	4	6S	4W	28
	06/15/03	5	6S	4W	12
	06/15/03	2	6S	4W	12
	06/15/03	4	6S	4W	12
	06/15/03	1	6S	4W	1
	06/17/03	2	6S	4W	23
	06/17/03	1	6S	4W	22
	06/17/03	3	6S	4W	22
	06/20/03	3	6S	4W	27
	06/20/03	1	6S	4W	28
	06/20/03	1	6S	4W	33
	06/20/03	2	6S	4W	28
	06/20/03	2	6S	4W	28
	06/20/03	3	6S	4W	28
	06/20/03	1	6S	4W	28
	06/24/03	1	6S	4W	34
	07/12/03	1	5S	4W	36
	07/12/03	2	6S	3W	5
	07/21/03	3	6S	4W	11

Table 5. Dates and Locations for Illinois' Endangered and Threatened birds observed at the Arkland reclaimed mine site (now Pyramid State Park) in Perry County, Illinois, 2003.

		Number of	Location		
Species (status*)	Date	Individuals	Township	Range	Section
Henslow's Sparrow (E)	07/21/03	2	6S	4W	11
(Ammodramus henslowii)	07/21/03	2	6S	4W	10
	07/23/03	1	5S	4W	11
	07/23/03	1	6S	4W	10
	07/23/03	3	6S	4W	9

* E indicates endangered and T indicates threatened species in Illinois (1999 list).