FINAL REPORT

"Small Mammal Survey of Ark Land Acquisition Property, Perry County, Illinois, with Special Emphasis on the Threatened Rice Rat (*Oryzomys palustris*)"

Wildlife Preservation Fund

Contract #RC04L38W

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Project Title: SMALL MAMMAL SURVEY OF ARK LAND ACQUISITION PROPERTY, PERRY COUNTY, ILLINOIS, WITH SPECIAL EMPHASIS ON THE THREATENED RICE RAT (*Oryzomys palustris*)

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EXECUTIVE SUMMARY

We assessed the distribution and relative abundance of the state-threatened marsh rice rat (*Oryzomys palustris*) in Pyramid State Park and the recently acquired Ark Land Acquisition Area (ALAA). The ALAA consists of four areas: Denmark (1791 ha), Captain (2480 ha), Galum (1160 ha), and East Conant (1140 ha). Small mammal live traps were placed at 24 sites from 6 September through 15 December 2003 in habitats suspected of having rice rats. Habitats included riparian corridors, small streams, lakeshores, marshes, and other permanent or ephemeral wetland areas. Rice rats were documented at 4 of the 24 sites, including Blue Wing Lake (Denmark Area), Bluebill Lake and Galum Creek (Galum Area), and Pipestone Creek North Stream (Captain Area). No rice rats were found in four sites located in the original park. No suitable habitat was located in the East Conant Area to set traps. Rice rats comprised 9.2% of the 130 individual small mammals captured in 1,665 trapnights. In the areas surveyed, the small mammal fauna of ALAA was relatively depauperate with low abundance and a limited number of species. Because suitable habitat for rice rats is limited on the ALAA, we recommend minimizing potentially harmful activities and intrusions in riparian areas and other sites known to have rice rats, or that could support them. To the extent feasible, horseback riders, ATV

traffic, and other recreational activities should be planned to protect the very limited quality riparian areas in the ALAA from such use.

SMALL MAMMAL SURVEY OF ARK LAND ACQUISITION PROPERTY, PERRY COUNTY, ILLINOIS, WITH SPECIAL EMPHASIS ON THE THREATENED RICE RAT (*Oryzomys palustris*)

INTRODUCTION

Rice rats (*Oryzomys palustris*) are currently considered threatened in Illinois (Herkert 1992), where the species reaches its northernmost geographic distribution. They are semiaquatic rodents and are restricted to "permanent or ephemeral wetlands with emergent herbaceous vegetation" (Hofmann et al. 1990:162). In the only extensive survey for rice rats in Illinois, Hofmann et al. (1990) documented their occurrence at wetland sites in 10 counties -- Alexander, Franklin, Hamilton, Jackson, Johnson, Massac, Pope, Saline, White, Williamson. During their work, the species was not taken in Perry County, although only one location east of Pyramid State Park was surveyed.

In 1968, Pyramid, a former unreclaimed strip mine area, became a state recreation area with the acquisition of 374 ha. Smith (1986) surveyed small mammals in this original segment from 1976 to 1979. At that time, he found no rice rats. Recently, an additional 6,475 ha were acquired from the Arch Coal Company in four designated areas (Denmark (1791 ha), Captain (2480 ha), Galum (1160 ha), and East Conant (1140 ha) – see Figure 1) collectively referred to as the Ark Land Acquisition Area (ALAA). About 50% of this land is agricultural. The remaining terrain is rougher with about 200 ha in former strip pit lakes ranging in size from 0.04 to 117 ha. The shorelines and associated emergent wetland vegetation of these lakes offer suitable habitat for rice rats. The ALAA has other potentially suitable habitat for rice rats including wetlands, ditches, and three major stream systems: Galum Creek, Little Galum Creek, and Pipestone Creek.

OBJECTIVES

Our objective was to determine whether rice rats occur within the Ark Land Acquisition Area, and if so, to determine their contribution to overall small mammal species diversity.

METHODS AND MATERIALS

From September through December 2003, live trapping was conducted throughout Pyramid State Park and the ALAA. Potential sites were identified from aerial photographs and then chosen based on the occurrence of riparian habitat, ponds, lakeshores, marshes, or ditches with suitable herbaceous vegetation. Standard-sized Sherman live traps (7.6 x 7.6 x 25.4 cm) were used. Traps were set in transects with a trap every 10 m for a total of 25 traps per transect, with 1 transect per site. Traps were baited with sunflower seeds and cracked corn and positioned adjacent to logs, runways, or other structures to optimize chance of captures. We placed polyester fiberfill in each trap to provide captured animals bedding and protection from hypothermia. Each transect was operated for a 3-day period, checked early each morning, and rebaited or reset as necessary. The following information was recorded for each captured animal: trapping site, species, sex, weight to the nearest gram using a Pesola scale, and reproductive condition. We marked captured animals by clipping a small patch of fur from the rump. Differentiation of white-footed mice (*Peromyscus leucopus*) and deer mice (*P. maniculatus*) was based on tail length relative to head and body length, as well as extent of bicolored tail (Sternburg and Feldhamer 1997). Identification of presumed cotton mice (*P. gossypinus*) was based on body weight, hind foot length, and allozyme analysis of the *GPI-1* locus (Barko et al. 2000) and *MDH* locus. Dominant and secondary overstory and herbaceous vegetation at each site was determined by qualitative visual analysis.

RESULTS

We captured 130 individual small mammals of 6 species in 1,665 trap nights. Trap success for individuals was fairly low at 7.8%. Rodents included: deer mouse (n = 64; 49.2% of the total), white-footed mouse (n = 43; 33.1%), marsh rice rat (n = 12; 9.2%), house mouse (*Mus musculus*; n = 7; 5.4%), prairie vole (*Microtus ochrogaster*; n = 3; 2.3%), and southern bog lemming (*Synaptomys cooperi*; n = 1; 0.8%). Two long-tailed weasels (*Mustela frenata*) were also captured.

We found rice rats at 4 of the 24 sites (see Figures 2 and 3 for all map locations) including: Blue Wing Lake (Denmark Area); Bluebill Lake and Galum Creek (Galum Area); and Pipestone Creek North Stream (Captain Area). The East Conant segment of ALAA contained no suitable habitat in which to set traps. Small mammal species, number of captures, dominant and secondary plant species, and GPS location for each site are given in Appendix I.

There were few habitat types, which resulted in limited mammalian species diversity. The small mammal fauna of the ALAA and original Pyramid study area was relatively depauperate. Several indices were used to quantify faunal diversity. For purposes of these calculations, the four presumptive cotton mice were counted as white-footed mice. Regardless of the index used, all values for the small mammal fauna on the 24 study sites combined were low:

Berger/Parker Dominance Index $[D = 1 / \{(N_{max}) \div N\}]$

$D = 2.03$

Where: N_{max} is total number of individuals in the most common species, N is the total number of individuals of all species captured

Shannon Diversity Index [$H = - \Sigma p_i \ln p_I$]

$H = 1.14$

Where: p_I is the proportion of individuals in each species

Simpson Diversity Index [$D = 1 / \Sigma (n_I (n-1)) \div (N (N-1))$]

$D = 2.79$

Where: N is the total number of individuals captured and n_I is the number of individuals in each species

DISCUSSION

Small mammals are a critical component of grassland and riparian systems. They affect the dynamics of plant communities and act as a prey base for many mammalian carnivores and raptors. The small mammal fauna at Pyramid State Park and the ALAA is typical for the type of habitat in the area, with *Peromyscus* dominating a fairly depauperate fauna. Rice rats were the third most common species encountered and comprised 9.2% of the small mammals captured. This may be somewhat skewed, however, in that we only trapped in places where rice rats could have occurred. Nonetheless, rice rats are a significant component of the small mammal fauna of ALAA, and the area represents the most northern geographic site known for the species in Illinois and the midwest. Rice rats were found in the three portions of ALAA that we surveyed. The East Conant section was not sampled because we could find no suitable habitat in which to set traps. The riparian areas along streams and creeks represent the best habitat for small mammals on Pyramid and the ALAA, and yet surprisingly, no shrews were caught. We expected to catch southern short-tailed shrews (*Blarina carolinensis*), especially given the very wet sites where traps were located.

Deer mice and white-footed mice occurred on our study sites and were very difficult to distinguish. White-footed mice predominate in forested habitats, deer mice in grasslands or disturbed "waste" areas. Both species occurred on 9 of the 24 trap sites; 8 sites had only deer mice. Of the four sites where white-footed mice were taken without deer mice, three were on the more extensively forested habitat of the original Pyramid State Park.

We believed that a third species of *Peromyscus* -- cotton mice — also occurred on ALAA, based on the extremely high body weights of several individuals caught at sites #8 and #9 (north and south streams of Pipestone Creek in the Captain Area; Figure 2). Three adult, nonpregnant females weighed 33, 34, and 35 g. This is nearly twice what a typical white-footed mouse would weigh. An adult male weighed 29 g. However, allozyme electrophoresis of *GPI-1* from one individual showed the *P. leucopus* allele. Unfortunately, cotton mice are difficult to identify in Illinois, possibly because they hybridize with white-footed mice (Barko and Feldhamer 2002). Also, the limited number of allozyme loci available as markers to distinguish hybrids means that the chance of missing backcrosses is quite high. Despite these very limited genetic results, we feel that cotton mice may occur on the ALAA, at least at sites #8 and #9 (Appendix I), based on the abnormally high body weights. Additional work on these two sites is planned to either document or refute occurrence of *P. gossypinus*.

Management Recommendations: Given that rice rats are a state-threatened species and "good" habitat for them is limited on the ALAA, we recommend minimizing potentially harmful activities and intrusions in riparian habitats and sites known to have rice rats. To the extent feasible, horseback riders, ATV traffic, and other recreational activities should

be structured to protect the very limited quality riparian areas in the ALAA from such use.

LITERATURE CITED

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APPENDIX II: Common and scientific names of plant species identified from trapping sites throughout Pyramid State Park and surrounding Ark Land Acquisition Area. Common names of plant species found at each site are given in Appendix I.

Autumn Olive (*Eleaganus umbellata*)

Bead Grass (*Paspalum distichum*)

Big bluestem (*Andropogon gerardi*)

Black Locust (*Robinia pseudoacacia*)

Boneset (*Eupatorium* sp.)

Box Elder (*Acer negundo*)

Broomsedge (*Andropogon virginicus*)

Buckwheat (*Polygonum* sp.)

Cattail (*Typha angustifolia*)

Cocklebur (*Xantheum commune*)

Coontail (*Ceratophyllum demersum*)

Cottonwood (*Populus deltoides*)

Crown Vetch (*Vicia angustifolia*)

Cypress (*Taxodium distichum*)

Dogbane (*Apocynum cannabinum*)

Foxtail (*Setaria* sp.)

Goldenrod (*Solidago canadensis*)

Green Ash (*Fraxinus lanceolata*)

Hackberry (*Celtis occidentalis*)

Honey Locust (*Gleditsia triacanthos*)

Honeysuckle (*Lonicera japonica*)

Horseweed (*Cornyza canadensis*)

Indian grass (*Sorghastrum nutans*)

Lespideza (*Lespediza* sp.)

Milkweed (*Asclepias* sp.)

Multiflora Rose (*Rosa multiflora*)

Narrow-leaved Vervain (*Verbena simplex*)

Oak (*Quercus* sp.)

Phragmites (*Phragmites communis*)

Poison Ivy (*Toxicodendron radicans*)

Pokeweed (*Phytolacca americana*)

Pondweed (*Potamogeton diversifolius*)

Primrose willow (*Ludwigia* sp.)

Ragweed (*Ambrosia artemisiifolia*)

Red Cedar (*Juniperus virginiana*)

Red maple (*Acer rubrum*)

Sea Oats (*Chamanthium latifolium*)

Sowthistle (*Sonchus* sp.)

Sunflower (*Helianthus* sp.)

Swamp Marigold (*Bidens frondosa*)

Sweetgum (*Liquidamber styraciflua*)

Sycamore (*Plantanus occidentalis*)

Thistle (*Cirsium* sp.)

Virginia Çreeper (*Parthenocissus quinquefolia*)

Water Milfoil (*Myriophyllum* sp.)

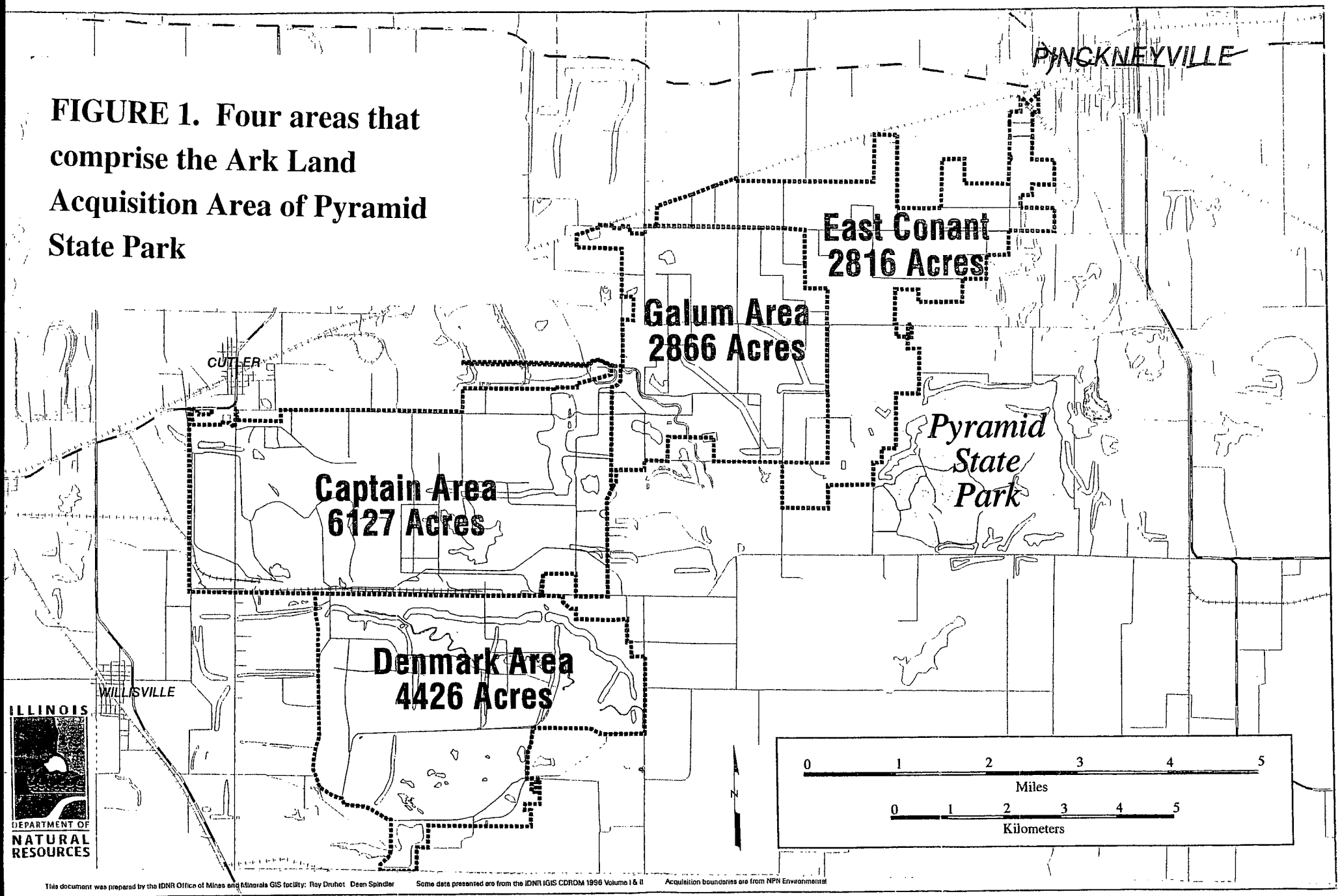
Wild Rye (*Elymus canadensis*)

Willow (*Salix* sp.)

Yellow Ironweed (*Verbesina alternifolia*)

Yellownut Sedge (*Cyperus* sp.)

FIGURE 1. Four areas that comprise the Ark Land Acquisition Area of Pyramid State Park



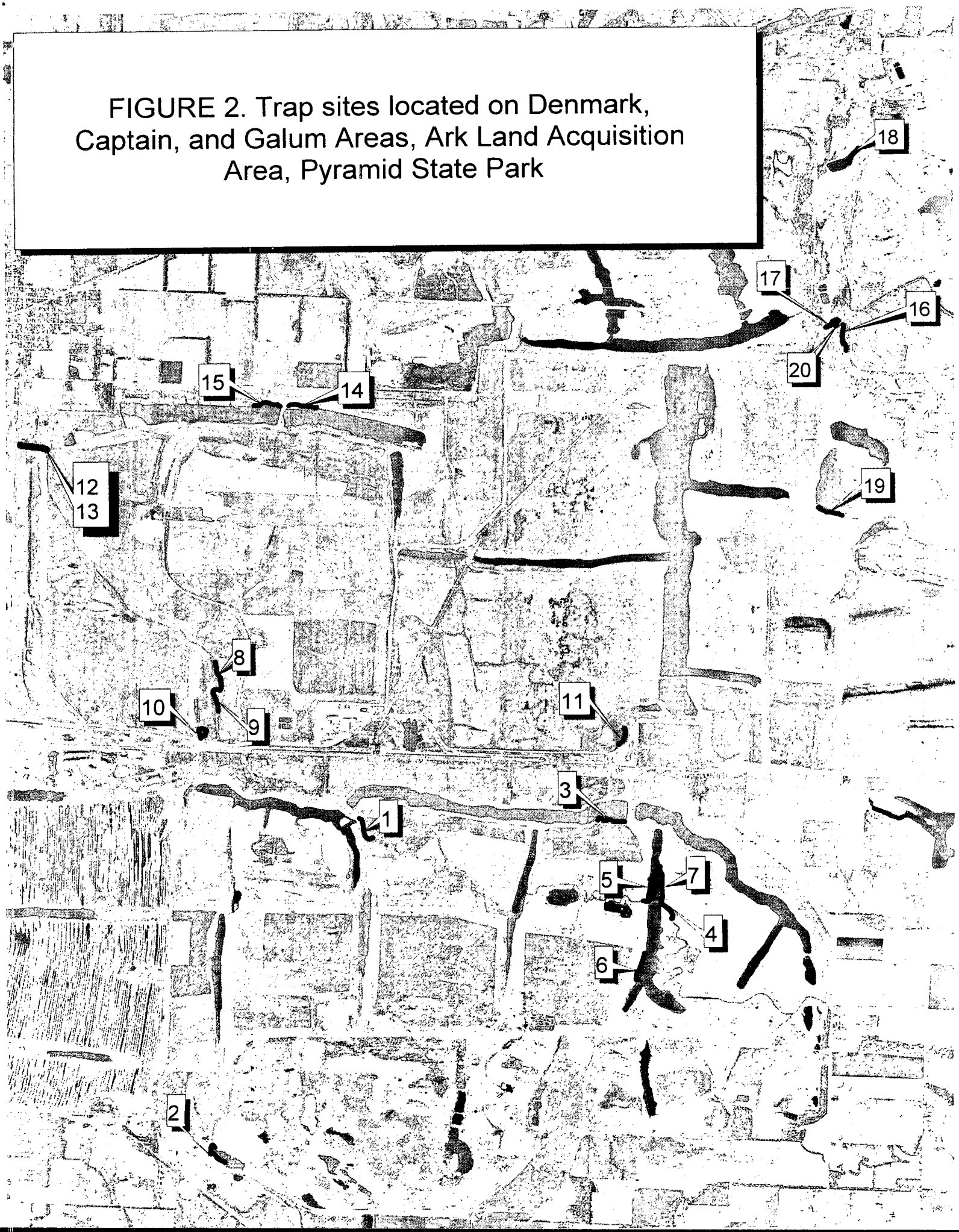
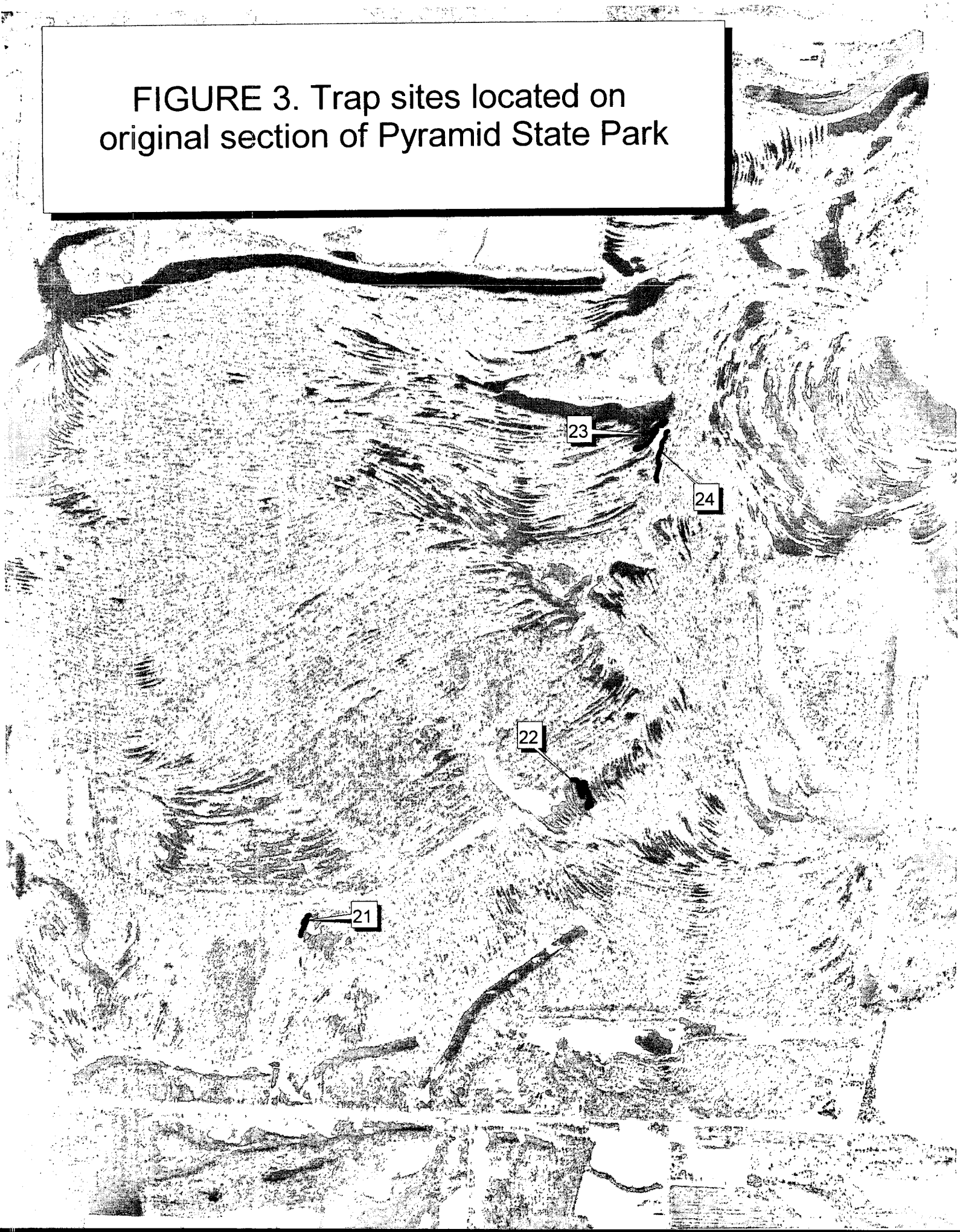


FIGURE 2. Trap sites located on Denmark, Captain, and Galum Areas, Ark Land Acquisition Area, Pyramid State Park

FIGURE 3. Trap sites located on original section of Pyramid State Park



Dr. George Feldhamer and SIUC graduate student Leslie Rodman setting small mammal traps along trap line #5 at Blue Wing Lake, Denmark Area, Ark Land Acquisition Area, Pyramid State Park, Perry County, IL in 2003.

SIUC graduate students Leslie Rodman and Brad Steffen removing a captured small mammal from a trap along trap line #4 at Blue Wing Lake, Denmark Area, Ark Land Acquisition Area, Pyramid State Park, Perry County, IL in 2003.

SIUC graduate students running small mammal traps along trap line #7 at Blue Wing Lake, Denmark Area, Ark Land Acquisition Area, Pyramid State Park, Perry County, IL in 2003.

A captured Rice Rat (*Oryzomys palustris*) from trap line #4 at Blue Wing Lake, Denmark Area, Ark Land Acquisition Area, Pyramid State Park, Perry County, IL in 2003. Note the large hind feet – one key characteristic of this species.

SIUC graduate student Brian Novosak setting small mammal traps along trap line #21 in the original Pyramid State Park, Perry County, IL in 2003.

A captured white-footed mouse (*Peromyscus leucopus*) being weighed from trap line #9 along Pipestone Creek, Captain Area, Ark Land Acquisition Area, Pyramid State Park, Perry County, IL in 2003.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