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# DISPERSAL OF PEN-REARED MISSISSIPPI SANDHILL CRANES

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**Abstract:** Dispersal patterns of juvenile parent-reared, captive produced Mississippi sandhill cranes (*grus canadensis pulla*) were monitored using radiotelemetry. Dispersal chronology and distance traveled by cranes differed among 4 releases and seemed to be influenced by rearing methods. Most cranes that had been placed in communal pens before release formed flocks when released. Cranes released without communal pen experience did not flock, but individually associated with native cranes. Nonflocking released cranes dispersed more rapidly and to a greater distance, but had lower survival.

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Historicaly, nonmigratory sandhill cranes occupied suitable habitat along the Pamlico Plain in Louisiana, Mississippi, Alabama and Florida, but only the Florida and Mississippi population remain (Beyer et al. 1908; Valentine 1970; Aldrich 1972). The deme in Mississippi, is classified as endangered. In 1974, the Mississippi Sandhill Crane National Wildlife Refuge (MSCNWR) was established to secure habitat for the remaining native population.

Beginning in the 1960's, 1 egg was collected annually from nests with 2 egg cLutches in Jackson County, Mississippi to develop a captive flock of Mississippi sandhill cranes at Patuxent Wildlife Research Center (PWRC) in Laurel, Maryland. A program of releasing progeny from this captive flock on the MSCNWR was initiated in 1981 to augment the native population (Zwank & Derrickson 1982).

By fall 1983, cranes hatched during 5 seasons, designated by hatching years as HY79, HY80, HY81, HY82, and HY83, had been released on 4 occasions. Rearing techniques differed for all releases, and in this paper we compare the dispersal pattern of cranes from the 4 releases and discuss dispersal relative to rearing techniques.

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## METHODS

From 1981 to 1983, 24 young of the year and 1 yearling captive-hatched Mississippi sandhill cranes were shipped by commercial airlines from PWRC to MSCNWR for release (Table 1). Prerelease conditioning after arrival was similar among years and has been described by Zwank & Derrickson (1982). Before brails were removed all cranes were tagged with solar-powered radio transmitters banded with colored and numbered plastic leg bands per Reynolds (1979) and a USFWS metal leg band. HY81 cranes also were marked with numbered plastic neck collars.

Telemetric monitoring of dispersal started when wing brails were removed and cranes could voluntarily leave or return to the acclimation pen. Monitoring began in February 1981 for the HY79 and HY80 birds, in February 1982 for HY81 birds in December 1982 for HY82 birds, and in December 1983 for HY83 birds. Status and location of radio-tagged birds were determined at least weekly for the year after release. Suppemental dispersal information was obtained between December 1983 and January 1984 from sightings of released cranes along an 80 km vehicular route that

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extended 10 km north of the refuge.

## RESULTS

The 9 cranes released in 1981 (HY79; HY80) were reared at PWRC in pens (N = 8) or in a woodlot (N = 1) by Florida (*G. c. pratensis*) (N = 8) or Mississippi sandhill crane parents (N = 1) (Table 1). Fostering was chosen because hand-reared cranes had proven unsuitable for release (Nesbitt 1979). The HY80 cranes were confined with their parents for 90-144 days after hatching and then placed together in a flight pen for 96 days before being shipped to the refuge. The single HY79 yearling crane spent no time with the HY80 birds before being shipped but had been reared with 2 other juveniles at PWRC.

After leaving the acclimation pen on the refuge most 1981 - released cranes moved as a flock and remained within about 2 km of the release pen for the first 90 days (Fig. 1). During that time they often fed at the release pen in the mornings and evenings. Initially, released cranes seemed disoriented but within 2 months they adopted movement patterns similar to those of native cranes that centered their activity on the refuge. However, the released birds did not closely associate with native cranes. By October 1981, cranes of this release were seen 2.5 km from the release pen. Further dispersal was gradual and occurred primarily on the refuge through 325 days.

All cranes released in 1981 survived 6 months and at least 6 lived for 2 years (Zwank & Wilson 1987). By 3 years, post-release ranges of the remaining cranes released in 1981 had expanded to include most of the current confirmed range of the native Mississippi sandhill cranes.

The 5 HY81 cranes were reared in pens (N = 4) or in a woodlot (N = 1) with Florida (N = 3) or Mississippi (N = 2) sandhill crane foster parents until shipped at 194-245 days of age (Table 1). HY81 cranes were not formed into a single juvenile flock to estabish social bonds before arrival on the refuge. It was thought that individual cranes might disperse and integrate with native cranes more rapidly.

HY81 cranes did not form a flock after leaving the release pen but were often observed individually associating with native cranes. Within 1 month after leaving the acclimation pen, 1 HY81 crane had been recorded as far as 8.9 km from the release site (Fig. 2). Two others had been seen 3.5 km away in 43 days. The remaining 2 HY81 cranes dispersed to a mesic savanna 0.6 km from the release site but continued to feed dialy within the acclimation pen. No association with native cranes was noted after dispersal (Mitchel & Zwank 1987). Ony 1 HY81 crane survived more than 2 months after leaving the acclimation pen; it was found in a shopping mall in Gautier Mississippi during July 1981. After capture this bird was considered unsuitable for re-release and returned to PWRC. The high mortaity associated with this second release was attributed to increased vulnerability to predation and man-induced mortality associated with individual rather than group post-release dispersal behavior (Zwank & Wi lson 1987).

The 7 HY82 cranes were reared in pens (N = 6) or a woodlot (N = 1) by Florida (N = 4), greater (*G. c. tabida*) (N = 2), or Mississippi (N = 1) sandhill crane foster parents for 83-131 days. After separation from their parents, all were placed in a communal flight pen for 24 days before being shipped to the refuge. When HY82 cranes were released, 5 HY80 cranes were still often sighted at the release site.

For the first 30 days after release, HY82 cranes remained within 2 km of the release site (Figs. 3 & 4). By 54 days, 4 had begun roosting 4.8 km to the northeast in the Pascagoula River Marsh. During the first year, maximum observed distance (9.1 km) from the release pen for any of the HY82 cranes was recorded 75 days after release. Four of the HY82 juveniles remained as a flock. In addition, association was maintained between most of these birds and 2 adult native cranes. One of the HY82 cranes however did not associate with the other pen-reared cranes and displayed a different dispersal pattern after 35 days (Fig. 4). By 63 days post-release, this crane had been seen only 2.0 km from the release site. Eighty-two days after release it had moved 5 km south to establish residency outside the refuge perimeter on adjacent farm land. During the next 12 days, it became quite tame. On day 94 post-release, this crane collided with the farmer's barn after being flushed by dogs. Refuge personnel captured the bird and returned it to the release site and released it again. For 66 days after this second release it was never observed more than 3.2 km from the release site.

Six of 7 HY82 cranes lived for more than 60 days. Five birds from this release survived 2 years after release.

The 4 HY83 cranes were reared in pens by greater (N = 1), Florida (N = 2) or Mississippi (N = 1) sandhill crane foster parents for 119-135 days and spent 29 days in a communal flight pen before being shipped to the refuge (Table 1). Brails were

removed from these birds on 14 December 1983. One was recaptured on 19 December for removal of a second, previously unnoticed, wing brail. For the first 3 months after release, these birds were repeatedly sighted feeding as a flock near the release site and at other locations on the refuge, but they were never seen off the refuge. All HY83 released cranes survived 2 years after release.

## DISCUSSION

Dispersal chronology and distance differed among years for released juveniles. Birds kept in communal flight pens before release dispersed slowly from the release site; maximum distance recorded for the first 60 days was 4.8 km for cranes from these 3 releases. Cranes from the cohort, without communal flight pen experience, dispersed 8.9 km within 1 month after release. Cranes with communal pen experience for the most part formed pen-reared flocks after release, while those without communal pen experience functioned individually after release. We hypothesize that individuals without communal pen experience accompanied native cranes on foraging flights off the refuge and thereby dispersed rapidly. By March, however, mated pairs of native Mississippi sandhill cranes became aggressive towards other cranes (Mitchell & Zwank 1987). The HY81 cranes were probably excluded at this time and forced to fend for themselves in unfamiliar habitats.

Within 2 months after leaving the acclimation pen, all but 1 of the HY81 release had died. During their 2-month post-release period, only 10% of other releases had died. Further, 6 of 8 cranes released in 1981, 5 of 7 cranes released in 1982 and 4 of 4 cranes released in 1983 were known to survive for 2 years. Survival did not differ among these releases ($X^2 = 1.38$, 2df, $P = 0.5$). The 1981 release was in February, while the 1982 and 1983 releases were in December. As dispersal and survival were similar for the 3 releases, release date appears to have little influence. Differences in dispersal or survival were also not noted among cranes who differed in rearing location, foster parents' subspecies or time spent with foster parents.

We recommend that juvenile cranes be placed in communal flight pens before release. Although dispersal may be delayed, survival is increased.

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**Table 1. Rearing information for pen-reared Mississippi sandhill cranes while at the Patuxent Wildlife Research Center, Laurel, Maryland.**

| Hatch year | Released | Hatch date | Rearing location | Foster parents' subspecies | Days with | |
|---|---|---|---|---|---|---|
| | | | | | Foster parents | Juvenile group |
| 1979 | Feb. 81 | 6/28/79 | Pen | Florida | 122[a] | 0 |
| 1980 | Feb. 81 | 6/22/80 | Pen | Florida | 115 | 96 |
| | Feb. 81 | 7/8/80 | Pen | Mississippi | 99 | 96 |
| | Feb. 81 | 6/25/80 | Pen | Florida | 112 | 96 |
| | Feb. 81 | 6/15/80 | Pen | Florida | 121 | 96 |
| | Feb. 81 | 5/25/80 | Pen | Florida | 143 | 96 |
| | Feb. 81 | 6/10/80 | Woodlot | Florida | 126 | 96 |
| | Feb. 81 | 6/2/80 | Pen | Florida | 136 | 96 |
| | Feb. 81 | 5/24/80 | Pen | Florida | 144 | 96 |
| 1981 | Feb. 82 | 6/2/81 | Pen | Florida | 232 | 0 |
| | Feb. 82 | 5/20/81 | Pen | Florida | 245 | 0 |
| | Feb. 82 | 7/1/81 | Pen | Mississippi | 204 | 0 |
| | Feb. 82 | 7/11/81 | Pen | Mississippi | 194 | 0 |
| | Feb. 82 | 6/10/81 | Woodlot | Florida | 224 | 0 |
| 1982 | Dec. 82 | 5/19/82 | Woodlot | Florida | 131 | 24 |
| | Dec. 82 | 7/5/82 | Pen | Mississippi | 84 | 24 |
| | Dec. 82 | 6/23/82 | Pen | Florida | 96 | 24 |
| | Dec. 82 | 6/1/82 | Pen | Florida | 119 | 24 |
| | Dec. 82 | 6/17/82 | Pen | Greater | 102 | 24 |
| | Dec. 82 | 7/6/82 | Pen | Greater | 83 | 24 |
| | Dec. 82 | 5/26/82 | Pen | Florida | 124 | 24 |
| 1983 | Dec. 83 | 6/4/83 | Pen | Florida | 135 | 29 |
| | Dec. 83 | 6/6/83 | Pen | Greater | 133 | 29 |
| | Dec. 83 | 6/4/83 | Pen | Florida | 135 | 29 |
| | Dec. 83 | 6/20/83 | Pen | Mississippi | 119 | 29 |

[a]*Placed in a flight pen with 2 other juveniles until shipped.*

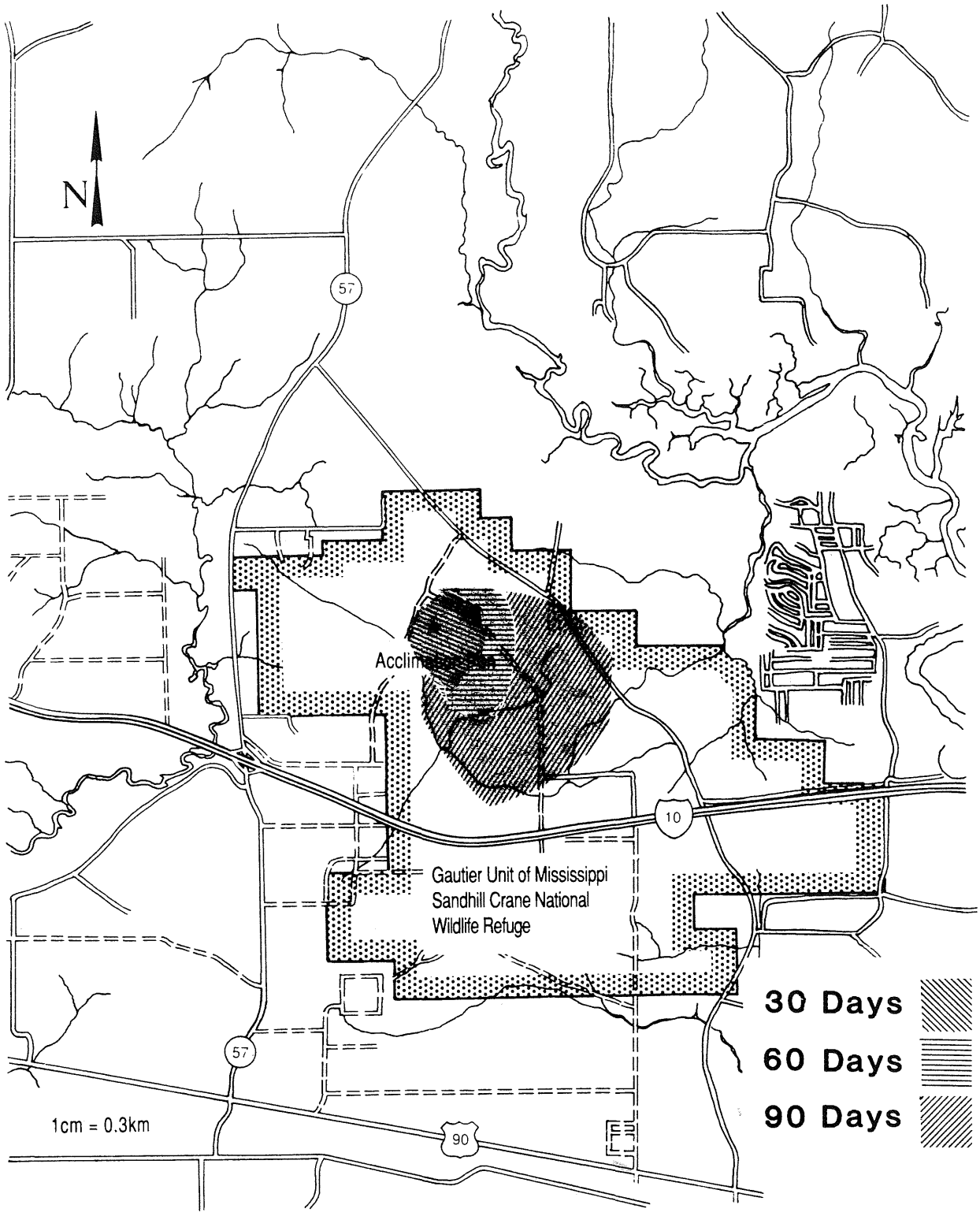


*Figure 1. Dispersal by 30-day intervals of HY80 pen-reared Mississippi sandhill cranes after release on the Mississippi Sandhill Crane National Wildife Refuge.*

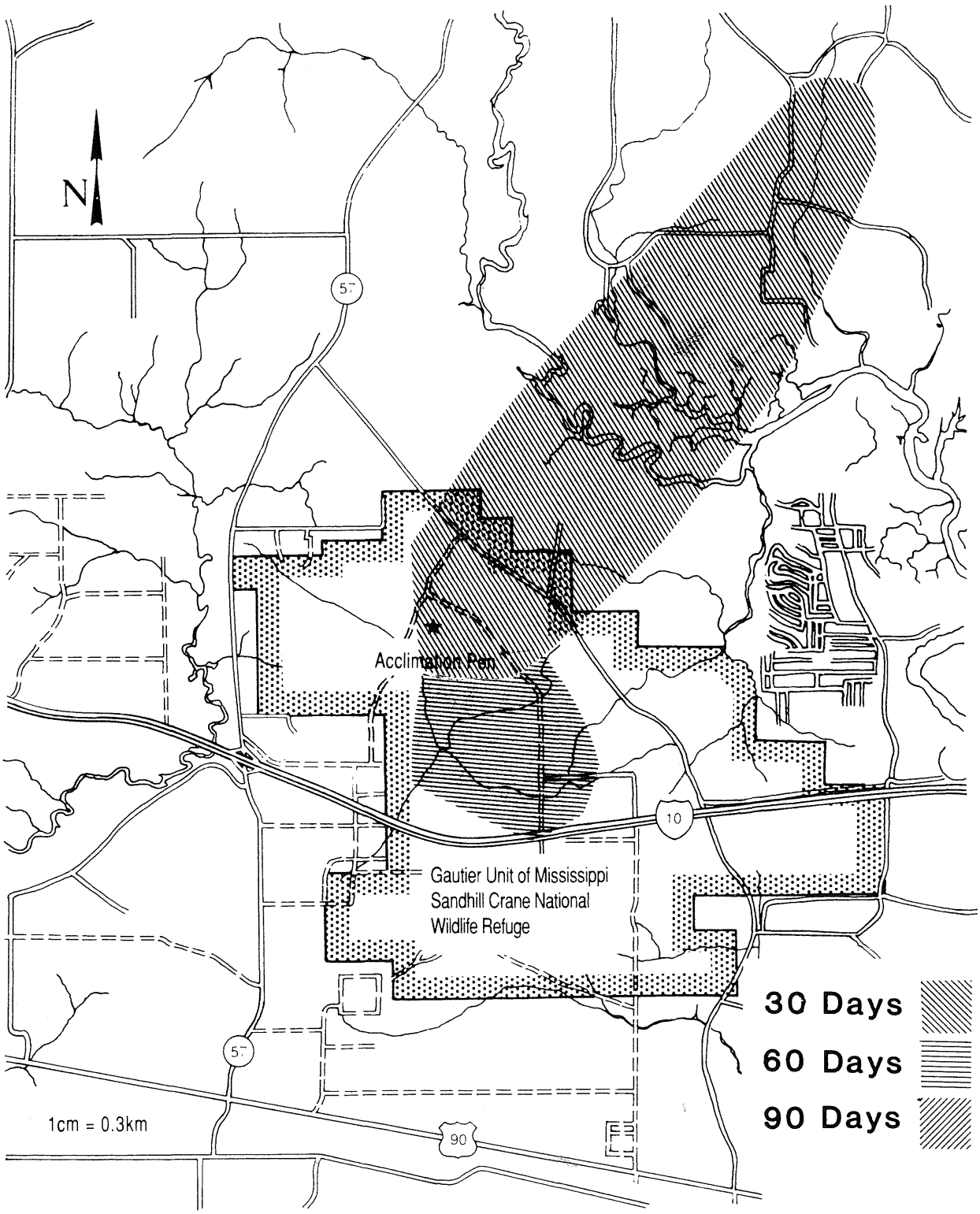


***Figure 2.*** *Dispersal by 30-day intervals of HY81 pen-reared Mississippi sandhill cranes after release on the Mississippi Sandhill Crane National Wildlife Refuge.*

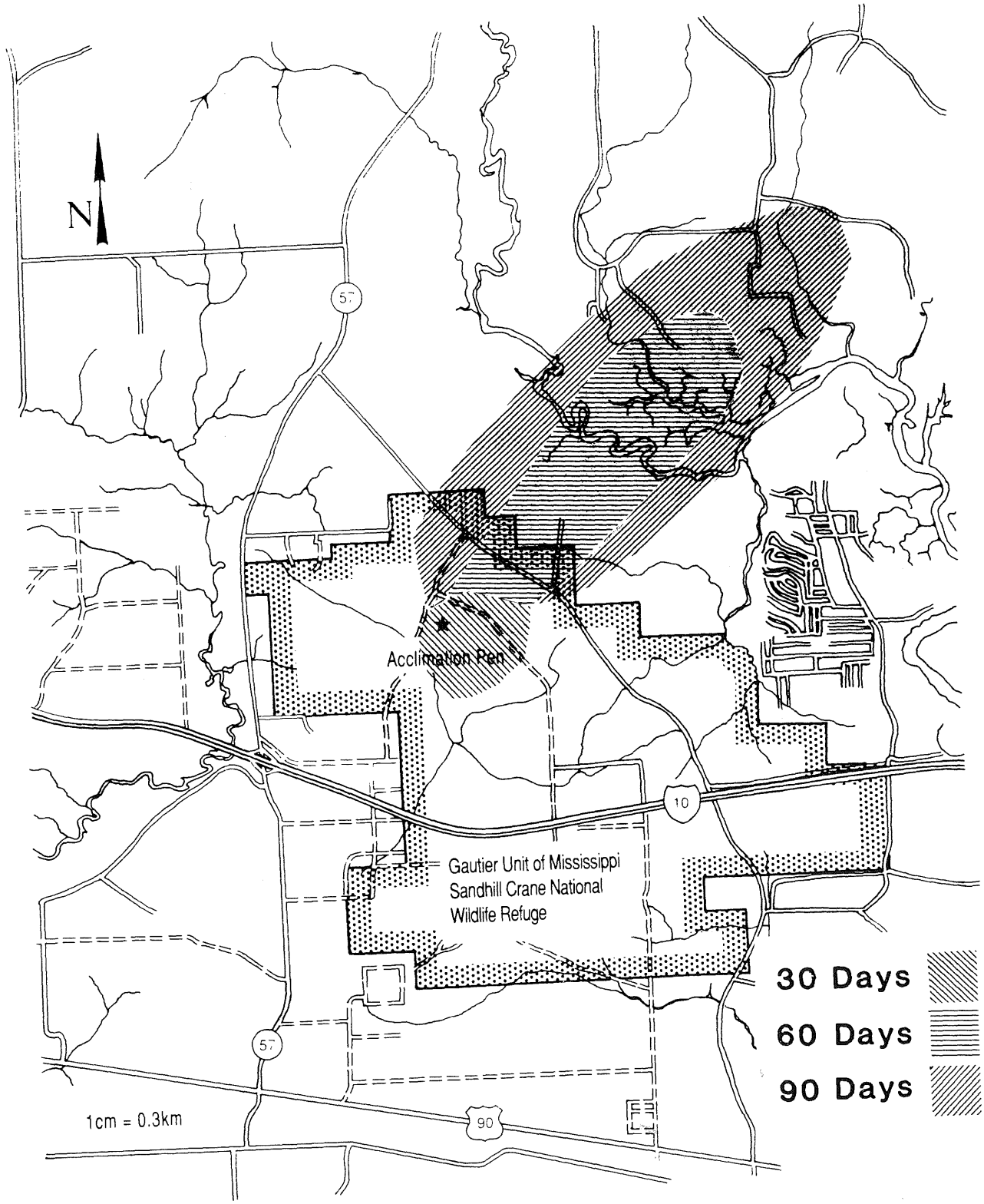


*Figure 3. Dispersal by 30-day intervals of 4 HY82 pen-reared Mississippi sandhill cranes after release on the Mississippi Sandhill Crane National Wildlife Refuge.*

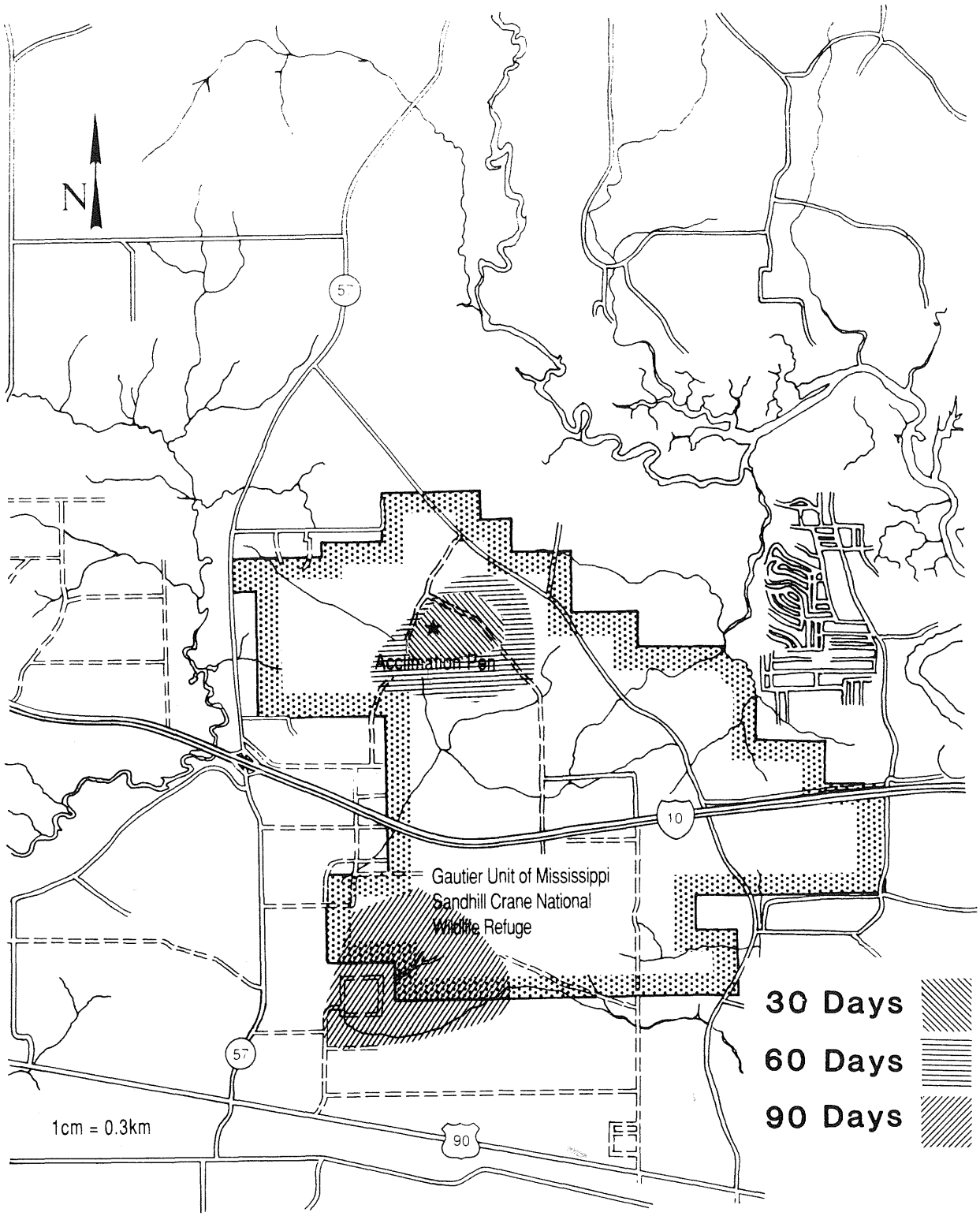


***Figure 4.*** *Dispersal by 30-day intervals of a single HY82 pen-reared sandhill crane after release on the Mississippi Sandhill Crane National Wildlife Refuge.*