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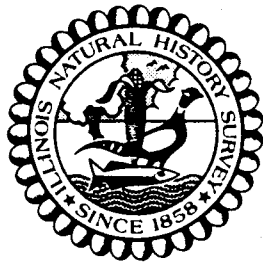
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ILLINOIS NATURAL HISTORY SURVEY

BALD EAGLE USE OF THE HANNIBAL BRIDGE STUDY AREA IN WINTER,
U. S. ROUTE 136, PIKE COUNTY, ILLINOIS (FAP 408).

FINAL REPORT



11 DECEMBER 1986

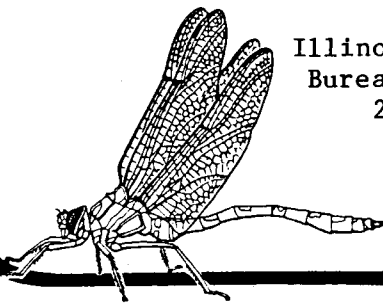
Section of Faunistic Surveys and Insect Identification Technical Report

by

Patti L. Malmborg
Glendy C. Vanderah

For

Illinois Department of Transportation
Bureau of Location and Environment
2300 South Dirksen Parkway
Springfield, Il 62764



Section of Faunistic Surveys and Insect Identification
Technical Report 1986 (9)

INTRODUCTION

As requested by the Illinois Department of Transportation (IDOT), the Illinois Natural History Survey (INHS) conducted a survey for wintering bald eagles at the FAP 408, Hannibal bridge project area, Pike County, Illinois during the 1985-1986 winter season. Based upon past records and knowledge of habitat preferences, bald eagles were known or thought likely to occur in this region.

Objectives of this study were threefold: 1) To determine if bald eagles utilize the FAP 408, Hannibal bridge study area and, if so, in what manner and to what extent. 2) To determine bald eagle distribution, numbers, and areas of concentration within the study area. 3) To provide data to aid in assessing impacts of the proposed bridge replacement on the available habitat and activity of wintering bald eagles within the study area.

METHODS

Bald eagle numbers and activity patterns within the FAP 408 Hannibal bridge project area were identified visually via ground and aerial surveys. Ground surveys were conducted December 1, 1985 through March 7, 1986. Three locations which best facilitated observation of eagles were used to survey the study area (Figure 1). The adjacent floodplain also was visible from these observation points.

Ground observations were performed twice weekly by two biologists, using binoculars and a spotting scope. Observations were conducted in consecutive morning, afternoon, and evening periods. Afternoon and evening observations were made on the same calendar day with morning observations made on the following day. All eagle sightings, activities, and other appropriate information, were recorded for one hour at each observation point. The sequence of observation points was chosen randomly each day. Time between observation periods was spent travelling throughout the study area in search of additional observations and information.

The duration in which a particular eagle was visible was considered one sighting. Age class and activity were recorded for each eagle. Age classes were divided into either adult (white head and tail) or immature (dark or mottled). Activities included flying, feeding, or perching. When perching, tree species, tree height, and perch height were recorded. Adjustments were made in the field to correct for multiple sightings of individual birds.

Seven aerial surveys were conducted by the INHS/River Research Laboratory. Eagles were censused along a 23.7 mile stretch of the river between Lock and Dam 21 and 22, from 15 December 1985 to 17 March 1986. Special emphasis was given to the Hannibal bridge project area. These surveys provided additional information on numbers of bald eagles and their locations in the region of the project area.

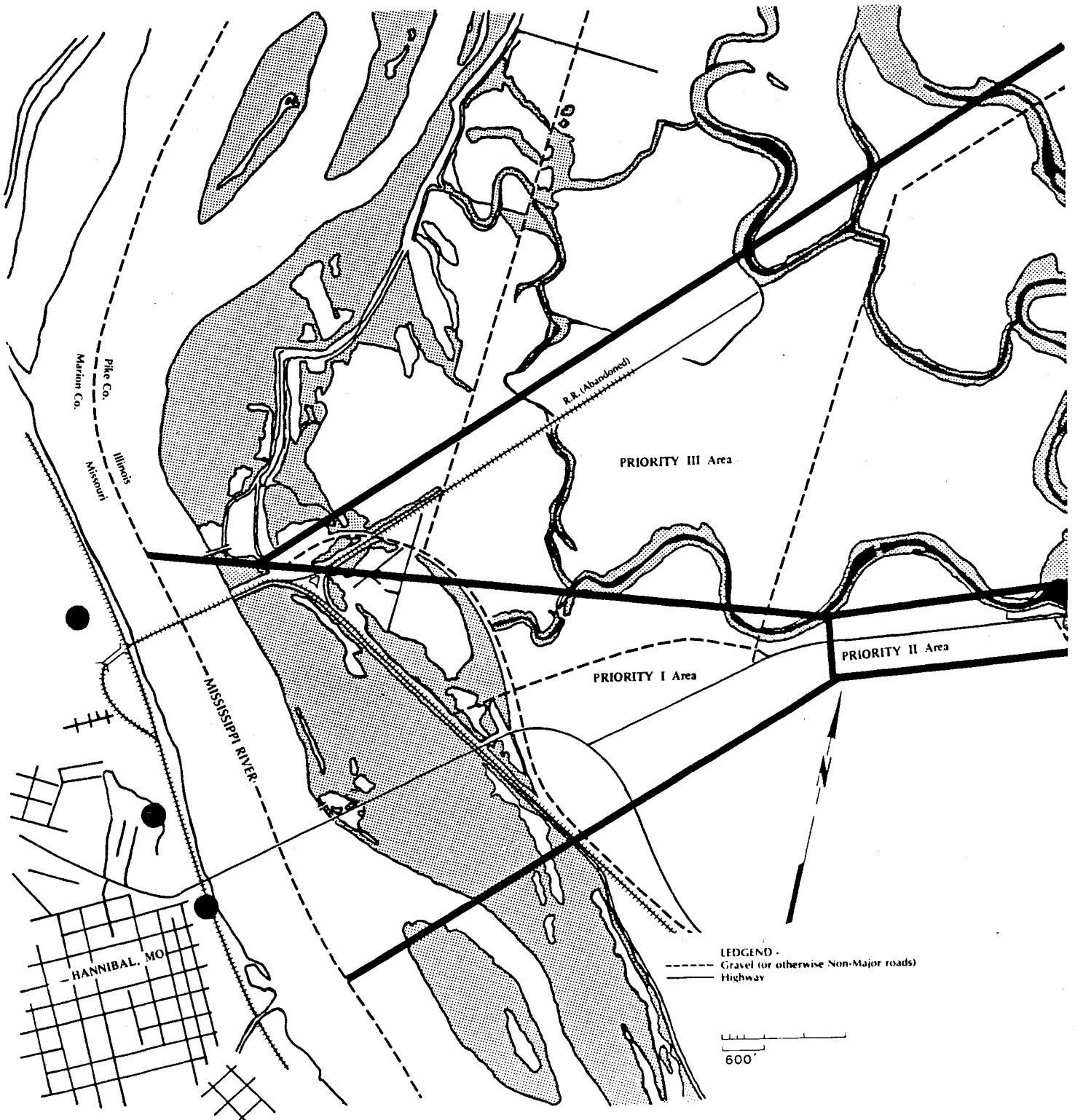


Figure 1. Observation points within the FAP 408 (U.S. Route 36) Hannibal bridge site project area, Pike County, Illinois.

Study Area

The study area (Figure 1) encompasses a one mile segment of shoreline along the east bank of the Mississippi River (River Mile (RM) 309). It extends northeast to its boundary, which converges and ends at the intersection of Illinois Route 336 and Section 9 (T.57N, R.8W, Hannibal East, Mo.-Ill. 7.5' series, 1971 ed., USGS topographic quadrangle map.). As described in a preliminary survey (Eric F. Ulaszek, Biological Survey Transmittal Form 7-9, October 1985), there are three major habitat types: the Mississippi River and its banks, mature second growth floodplain forest, and cropland. Less dominant habitat types scattered throughout the study area include the following: commercial, residential, non-native grassland, native grassland, formland, shrubland, shrub-scrub wetland, palustrine wetland with an unconsolidated bottom, and excavated palustrine wetland.

Two habitat types of principle importance for wintering bald eagles are the Mississippi River and its banks and the mature floodplain forest. Eagle use of, or concentration on, the remaining habitat types was not observed during this study.

RESULTS AND DISCUSSION

Bald Eagle Numbers and Age Class Ratios

Totals of 137 ground and 386 aerial eagle sightings were recorded during this study. Results obtained from ground observations indicated an early (December) peak in the number of eagle sightings followed by a gradual decrease throughout the study period (Figure 2). Of a total of 137 eagle observations, 53 were recorded in December, 43 in January, 38 in February, and 3 in the first week of March. A high count of 17 eagles was recorded on December 30-31. Fourteen of these eagles (11 adults, 3 immatures) were observed during one morning observation period, therefore, we know that there were at least 14 eagles in the area at that time. Table 1 shows the number of bald eagle sightings, recorded from 23 ground survey dates, that were within or adjacent to the study area.

Aerial counts indicated that numbers of bald eagles along the Mississippi River between Lock and Dam 21 and 22 peaked in mid-January (high count was 75 on 21 January, Figure 3). This peak differs from that generated by ground survey data. Table 2 shows numbers of bald eagles recorded during aerial flights between Lock and Dam 21 and 22.

Adult bald eagles outnumbered immatures on all aerial counts but not on all ground surveys. In 8 out of 60 one-hour ground observation periods, immature eagles outnumbered adults within the project area. Of the 137 ground survey sightings, 54% (74) were adults, 42% (58) were immatures and 4% (5) were of unidentified age. Adult sightings outnumbered immatures 2 to 1 in December. Immatures slightly outnumbered adults in January (1.2 to 1), and the two age classes were sighted equally in February.

Of the 386 aerial sightings, 65% (251) were adults and 35% (135) were immature. Adults outnumbered immatures approximately 2 to 1 throughout the study period.

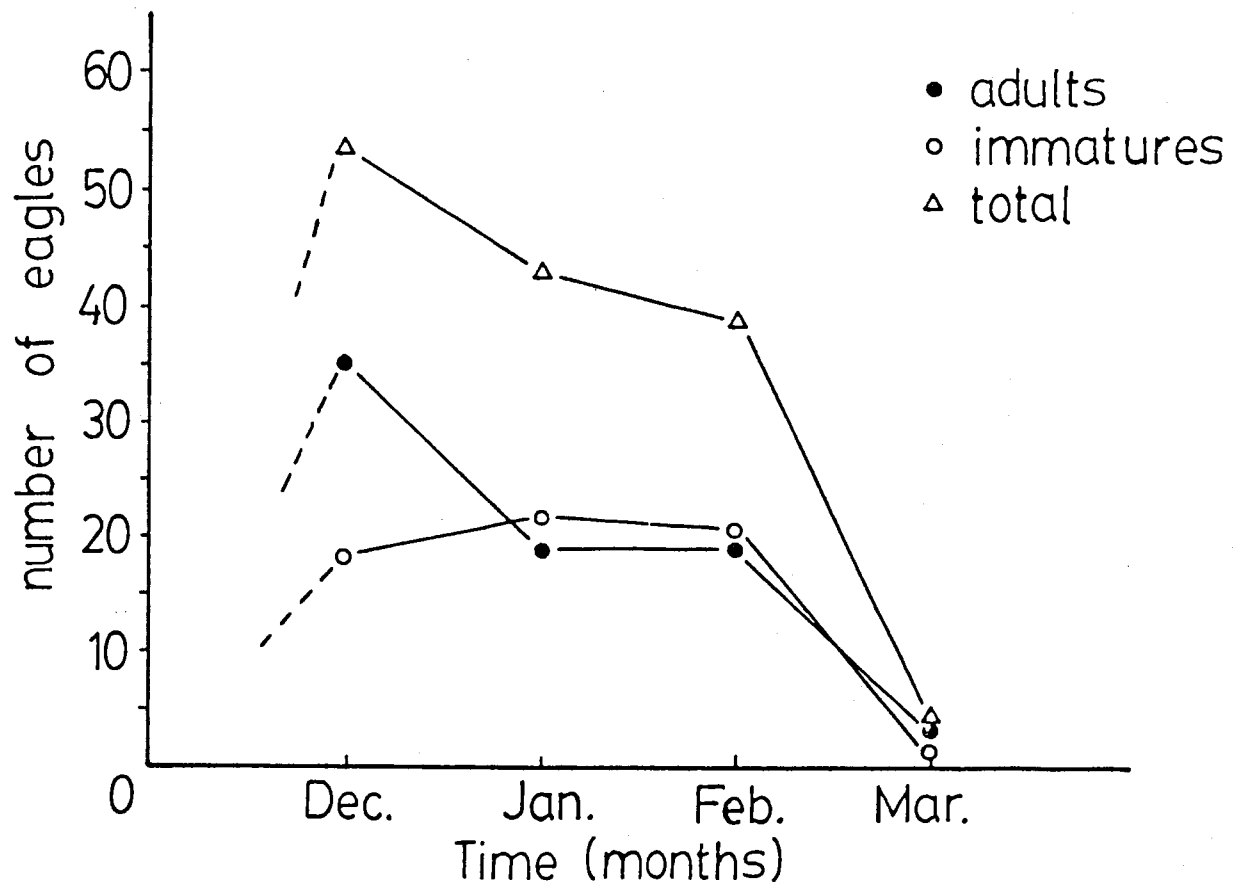


Figure 2. Bald eagle sightings recorded during ground survey period within the FAP 408 (U.S. Route 36) Hannibal bridge project area, Pike County, Illinois, during winter 1985/1986.

Table 1. Bald eagle sightings recorded during ground survey of FAP 408 (U.S. Route 36) Hannibal bridge project area, Pike County, Illinois, during winter 1985/1986.

Date*	adult		immature		unknown		total		Total(I+O)
	I	O	I	O	I	O	I	O	
Dec. 1985									
5-6	2	2	1	1	-	-	3	3	6
9-10	1	-	-	-	-	-	1	0	1
12-13	7	2	4	1	-	-	11	3	14
16-17	3	-	7	-	-	-	10	0	10
19-20	1	3	-	-	-	1	1	4	5
30-31	6	8	3	-	-	-	9	8	17
Jan. 1986									
2-3	-	-	-	-	-	-	0	0	0
6-7	2	2	6	1	-	2	8	5	13
9-10	-	-	1	1	-	-	1	1	2
13-14	3	2	1	-	-	-	4	2	6
16-17	-	-	-	-	-	-	0	0	0
23-24	4	1	9	-	-	-	13	1	14
27-28	2	1	-	-	-	-	2	1	3
30-31	1	-	3	-	1	-	5	0	5
Feb. 1986									
3-4	-	-	-	-	-	-	0	0	0
5-6	-	-	-	-	-	-	0	0	0
10-11	-	-	5	-	1	-	6	0	6
13-14	3	-	6	3	-	-	9	3	12
18-19	4	-	-	2	-	-	4	2	6
24-25	-	-	-	-	-	-	0	0	0
27-28	10	1	2	1	-	-	12	2	14
Mar. 1986									
3-4	-	-	-	-	-	-	0	0	0
6-7	2	1	-	-	-	-	2	1	3
Totals	51	23	48	10	2	3	101	36	137

* afternoon and evening observations made on first calendar date with morning observations made the following date

I = within project area

O = adjacent to project area

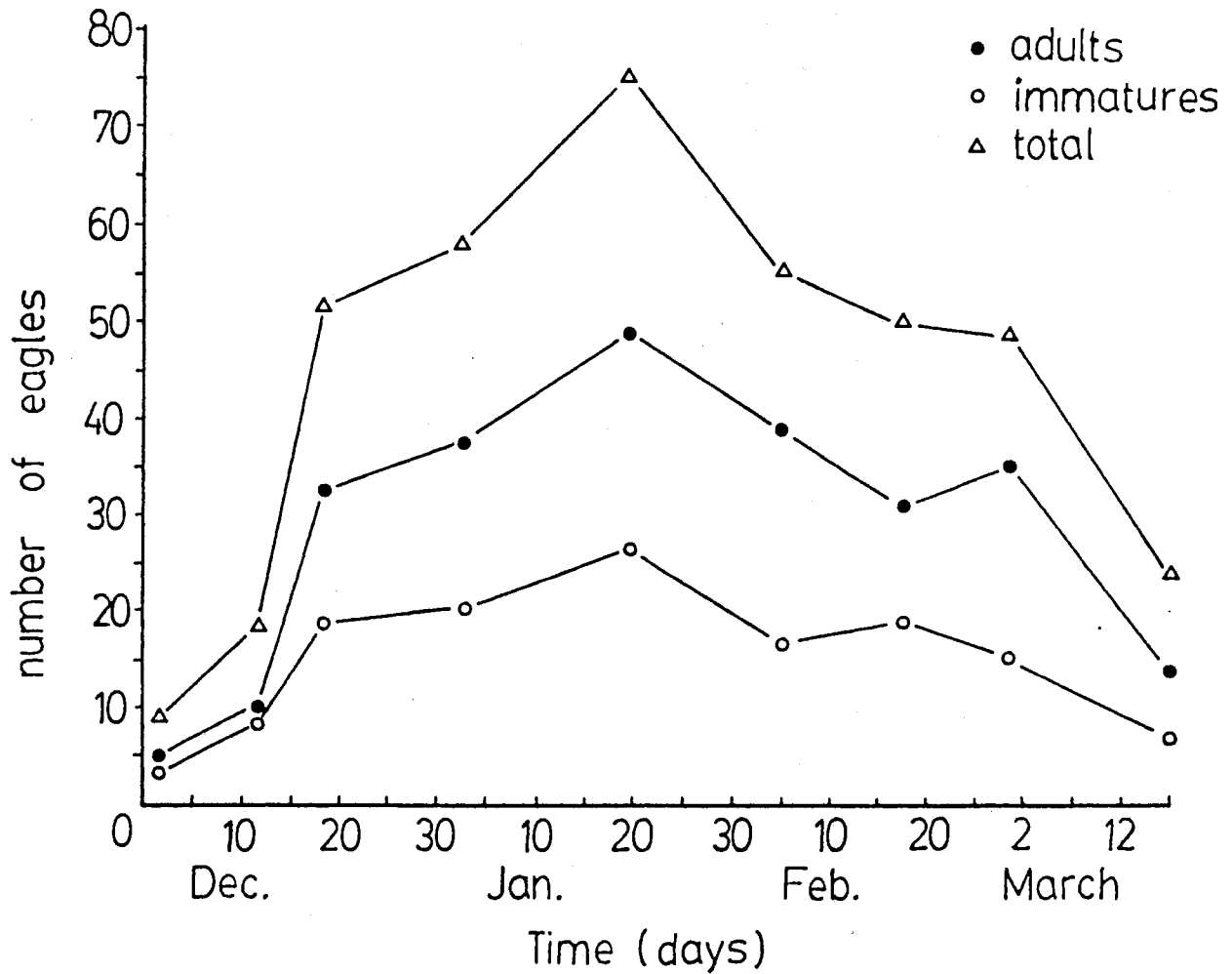


Figure 3. Results of aerial counts flown between Lock and Dam 21 and 22, for the FAP 408 (U.S. Route 36) Hannibal bridge project area, Pike County, Illinois, during winter 1985/1986.

Table 2. Results of aerial censuses flown[†] between Lock and Dam 21 and 22 for the FAP 408 (U.S. Route 36) Hannibal bridge project area, Pike County, Illinois.

Date	Saverton to Hannibal		Gardner Club		Hannibal to Quincy	
	Ad.	Imm.	Ad.	Imm.	Ad.	Imm.
2 Dec. 1985*	3	2	0	0	2	2
12 Dec. 1985*	6	5	0	1	4	2
19 Dec. 1985	12	7	2	1	18	11
	(most eagles were on the Illinois side)					
1 Jan. 1986*	16	9	0	0	21	11
21 Jan. 1986	20	11	2	2	26	14
5 Feb. 1986	16	6	1	0	21	10
18 Feb. 1986	13	8	0	0	18	11
4 Mar. 1986	10	5	1	0	24	9
17 Mar. 1986	5	4	1	0	9	4

* These eagle counts were made in conjunction with waterfowl censuses.
[†] Flown by Robert Crompton, INHS River Research Laboratory.

The age ratio of adults to immatures, as determined from both ground and aerial surveys, was approximately 2 to 1 for this section of the Mississippi River. This ratio differs from the fairly constant 6 to 1, adult to immature, age ratio generated by a 6-year study conducted between Lock and Dam 11 and 22 (Collins *et al* 1984). Observations during this study concluded that the second highest number of immature eagles sighted during the 6 years were observed at Lock and Dam 21 (Table 3). This phenomenon, however, has not been explained.

Approximately one-half (49.6%) of the eagle sightings were recorded during morning hours; adults and immatures were observed in equal numbers during these observation periods. During evening hours, 29.1% of eagle sightings were recorded. Adults were observed more than immatures during both afternoon (1.4 to 1) and evening (2 to 1) observation periods.

General Patterns of Habitat Use

The Mississippi River and the mature floodplain forest were the two habitats in which the greatest numbers of bald eagles were sighted. These two habitats were used primarily by commuting (flying from one place to another) birds. Of the 137 sightings, only 17 accounts of perching or loafing, and 3 accounts of fishing were recorded. Proportionally, these activities were unimportant within the project area.

Eagle Use of the Mississippi River and Its Banks

Ice cover on the main channel of the Mississippi River fluctuated between zero and 100% during the study. The channel was usually flowing with ice chunks or large ice floes, but on 14 and 31 January 1986 it was covered with stationary pack ice. Mean estimated ice cover was 33.4% per day. Despite open water conditions, only three fishing attempts were observed (Figure 4). Two of these attempts were made by immature eagles and one by an adult. None of these fishing attempts appeared successful.

Eleven large trees near the river bank were used for perching or loafing by 17 birds (Figure 5 and Appendix A). The most common tree species used was cottonwood (*Populus deltoides*). Average tree and perch heights and diameter at breast height (dbh) are presented in Table 4. The area that attracted the greatest number of perching eagles was the point and the northern half of Shuck Island (RM 308.5). Typically, one or two birds were recorded perching together. No concentrations of perching or loafing eagles were observed.

Flight Patterns

The FAP Hannibal bridge project area was used by bald eagles principally as a flight corridor. The Hannibal bridge is located 8 miles north of Lock and Dam 22 (RM 301.2) and 15 miles south of Lock and Dam 21 (RM 324.9). These dams may influence eagle movements through the project area. Another factor which may affect eagle travel through the area is the location of isolated areas of floodplain forest and wooded ravines both north and south of the Hannibal bridge. Predominantly southern flights were observed from the onset of the study. During approximately the second week in January the pattern reversed to predominantly northern flights. Flight patterns of eagles observed within the project area are shown in Figures 6 and 7.

Table 3. Total numbers of eagles and age classifications recorded between 1978 and 1984 at Lock and Dam 21 and 22, Adams and Pike counties, Illinois (Collins *et al.* 1984).

	<u>1978/ 1979</u>	<u>1979/ 1980</u>	<u>1980/ 1981</u>	<u>1981/ 1982</u>	<u>1982/ 1983</u>	<u>1983/ 1984</u>	<u>Total</u>
Lock and Dam 21							
Total	274	40	19	256	50	265	904
Adult	210	31	16	194	42	224	717
Immature	64	9	3	62	8	41	187
Lock and Dam 22							
Total	132	14	29	57	62	106	400
Adult	110	13	24	43	52	85	327
Immature	22	1	5	14	10	21	73

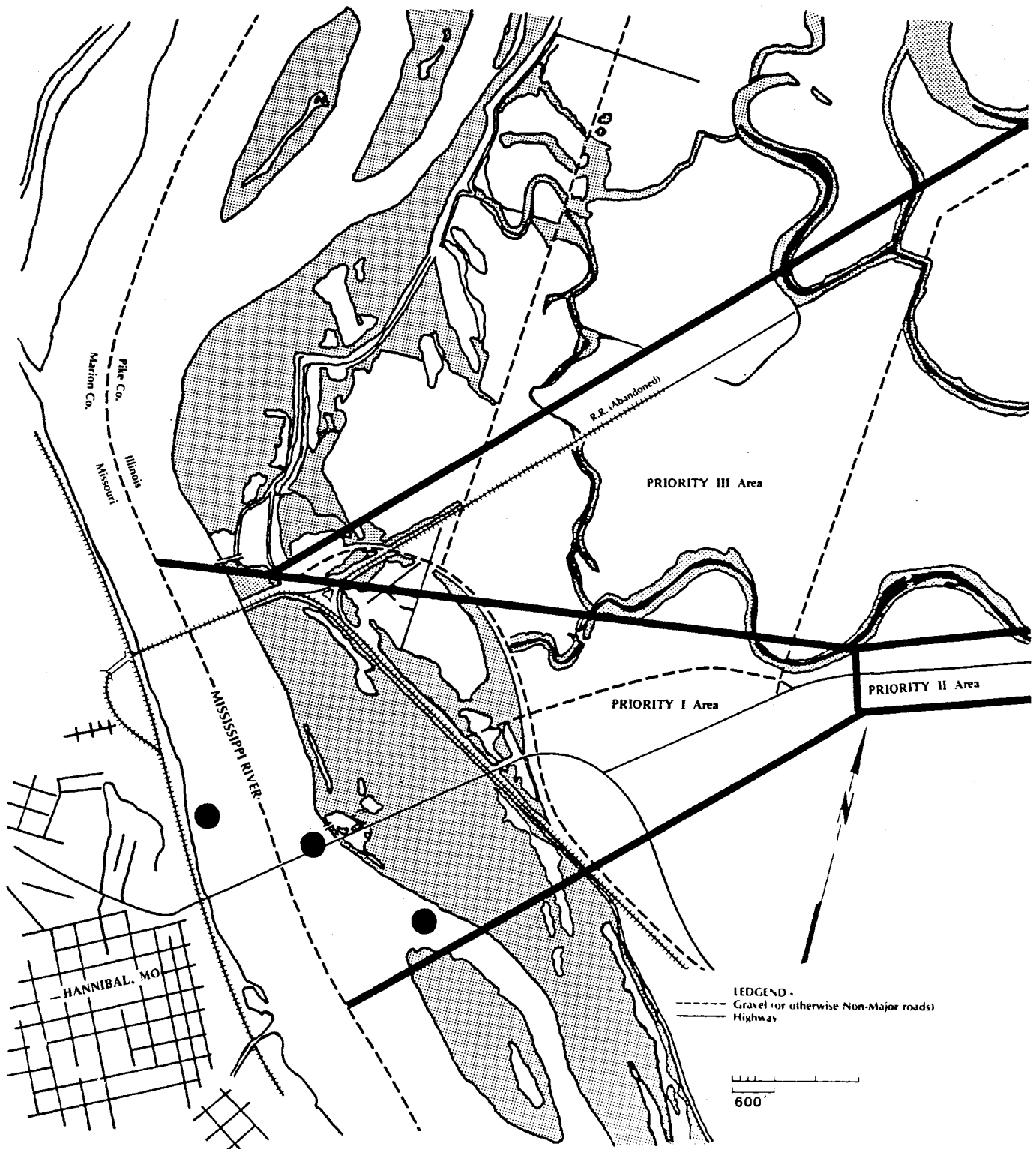


Figure 4. Locations of three fishing attempts made by bald eagles observed during the ground survey period, FAP 408 (U.S. Route 36) Hannibal bridge project area, Pike County, Illinois, during winter 1985/1986.

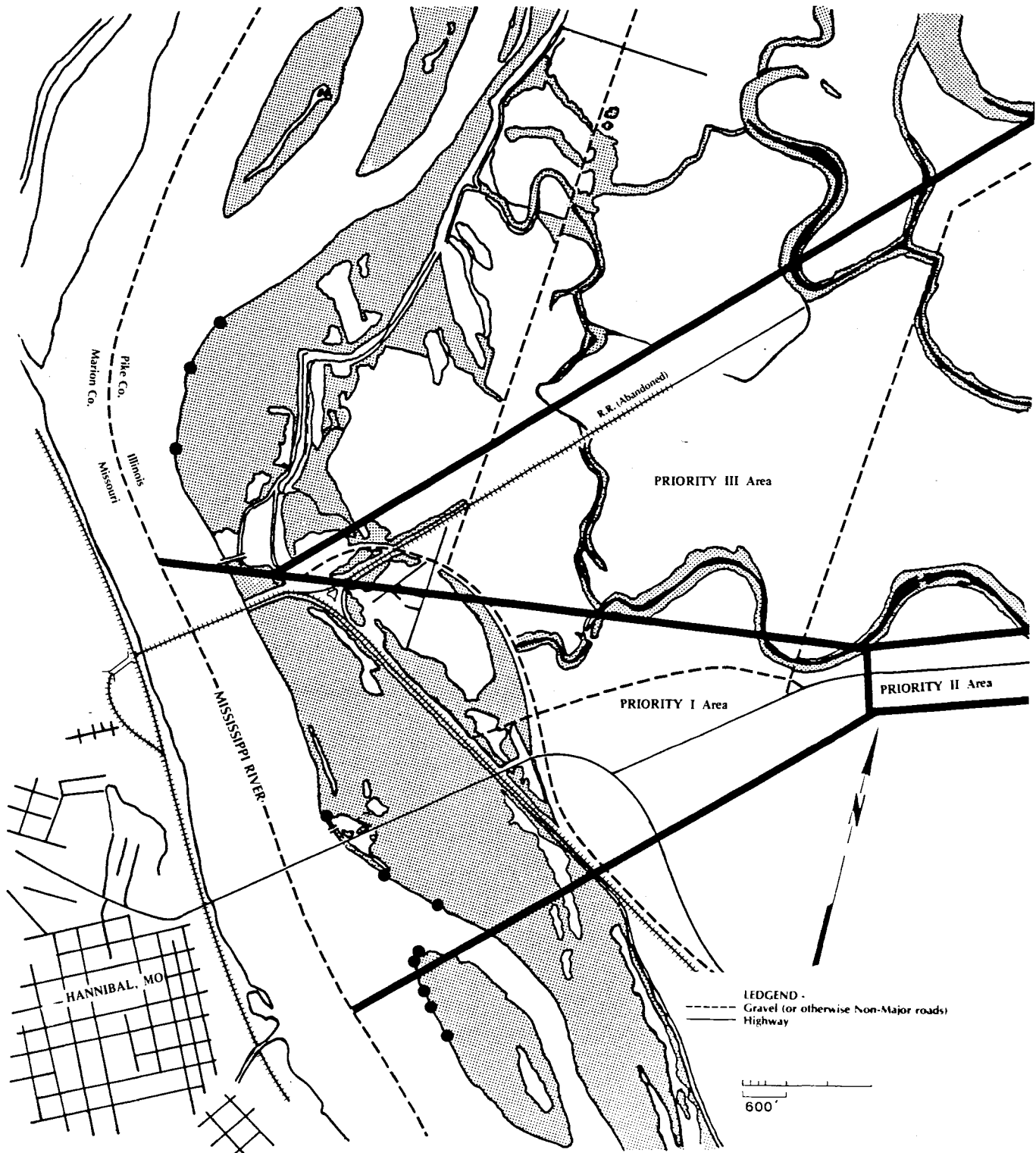


Figure 5. Locations of eleven trees used by perching eagles within the FAP 408 (U.S. Route 36) Hannibal bridge project area, Pike County, Illinois, during winter 1985/1986 (For more detail see Appendix A).

Table 4. Trees species used as perch sites by bald eagles in the FAP 408 (U. S. Route 36) Hannibal Bridge project area, Pike County, Illinois, during winter 1985/1986.

<u>Species</u>	<u># used</u>	<u># perchings</u>	<u>\bar{X} tree height(m)</u>	<u>\bar{X} perch height(m)</u>	<u>\bar{X} dbh (cm)</u>
cottonwood	11	15	18.1	14.9	42.0
sycamore	1	1	19.2	16.2	52.0
silver maple	2	2	11.0	6.1	25.0

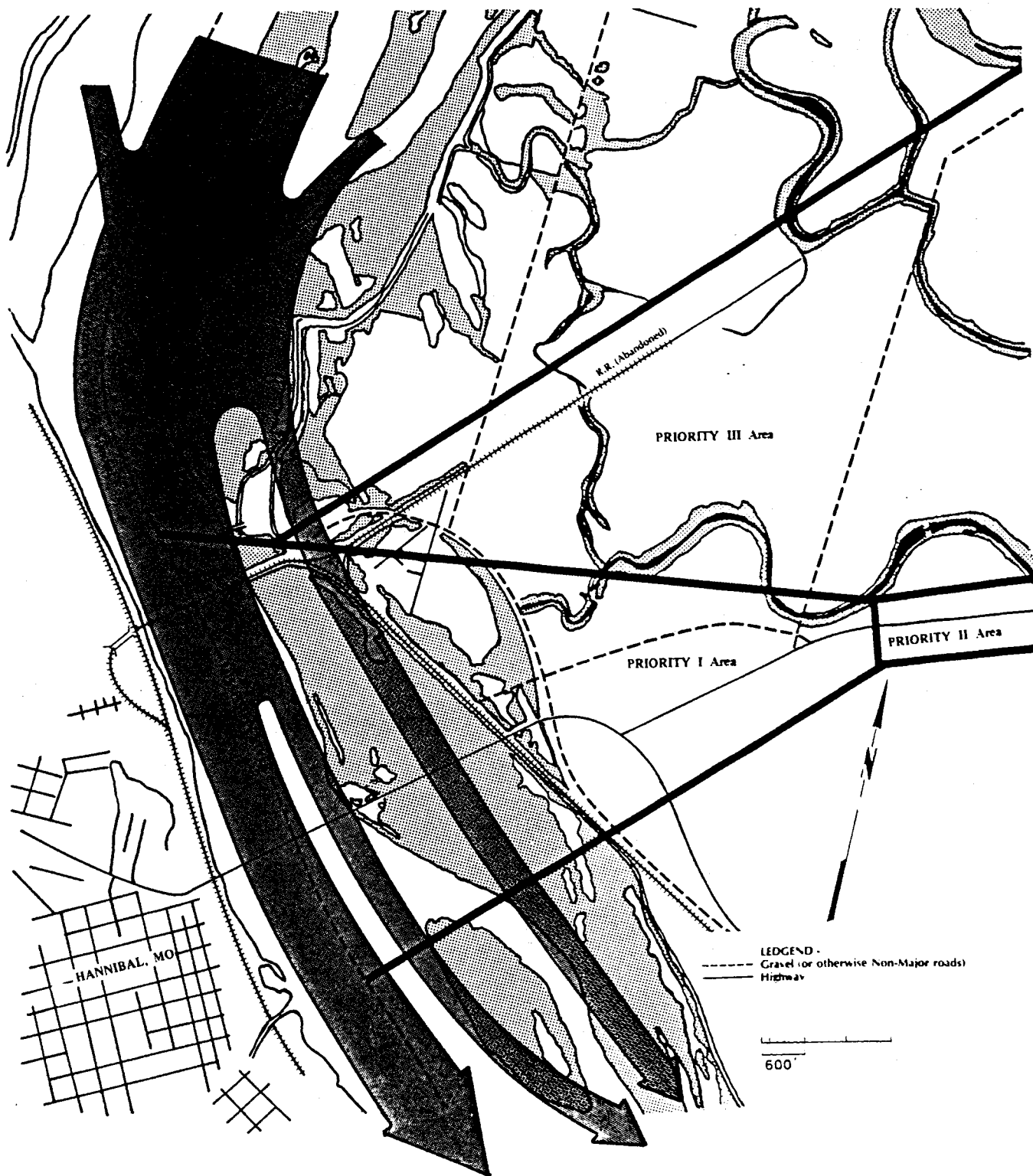


Figure 6. Flight corridors used by bald eagles flying in a southerly direction within the FAP 408 (U.S. Route 36) Hannibal bridge project area, Pike County, Illinois, during winter 1985/1986.

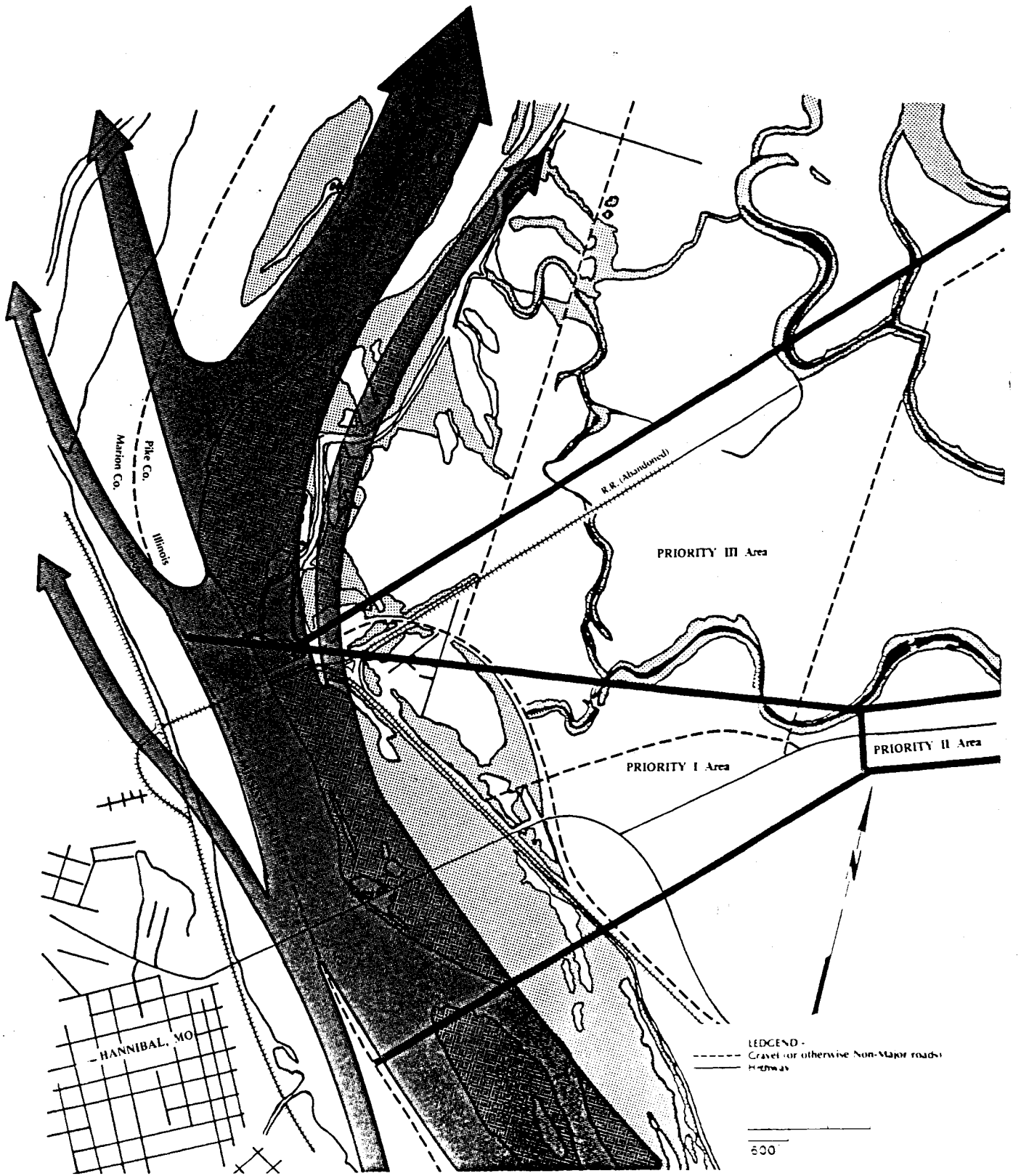


Figure 7. Flight corridors used by bald eagles flying in a northerly direction within the FAP 408 (U.S. Route 36) Hannibal bridge project area, Pike County, Illinois, during winter 1985/1986.

Potential Roost Sites

On the morning of 24 January 1986 three adult and nine immature eagles emerged from the same location within 15 minutes (Figure 8). This was the only event indicating the presence of a roost site. After a ground inspection of the area, no evidence of a permanent roost was found. Possibly, warmer temperatures and a predominance of immature (less selective?) birds prompted the use of this area as a temporary roost site. Occasionally, single birds were observed emerging from this location. No other possible roosting activities were observed within this FAP 408 project area.

Eagle Use of Agriculturally Dominated Areas

Bald eagles were not observed using agriculturally dominated areas adjacent to the Hannibal bridge project site during the winter 1985/1986 study period. Eagle flight corridors were confined mainly to the river or floodplain forest along the river banks. Several patches of trees within these areas could provide temporary roost or perch sites for eagles, however, these stands do not provide the protection of typical eagle roost sites and would not be used on a permanent basis. A discussion of bald eagle use of the project areas outside the limits of the floodplain forest and results of a breeding bird census conducted for the FAP 408 project area will follow in a separate report.

Aerial Census

Aerial census results provide a comparison of numbers of bald eagles within the FAP 408 project area to numbers along the stretch of river between Lock and Dam 21 and 22. Numbers of eagles present along the river between Lock and Dam 21 and 22 peaked at 75 on 21 January (Figure 3). At this time 31 birds were observed within the 8 mile distance between Hannibal and Lock and Dam 22. Thirteen birds were observed flying through the project area during ground observations on 24 January. Though ground sightings within the project area were greatest in December, 1985 (Figure 9), aerial counts showed more birds present in this region in January, 1986.

Aerial flight results indicated that bald eagles occurred within the region of the study area throughout the winter. The mean number of eagles present per aerial count was 45.4. Mean number of eagles present within the project area per ground survey (primarily commuting birds) was six.

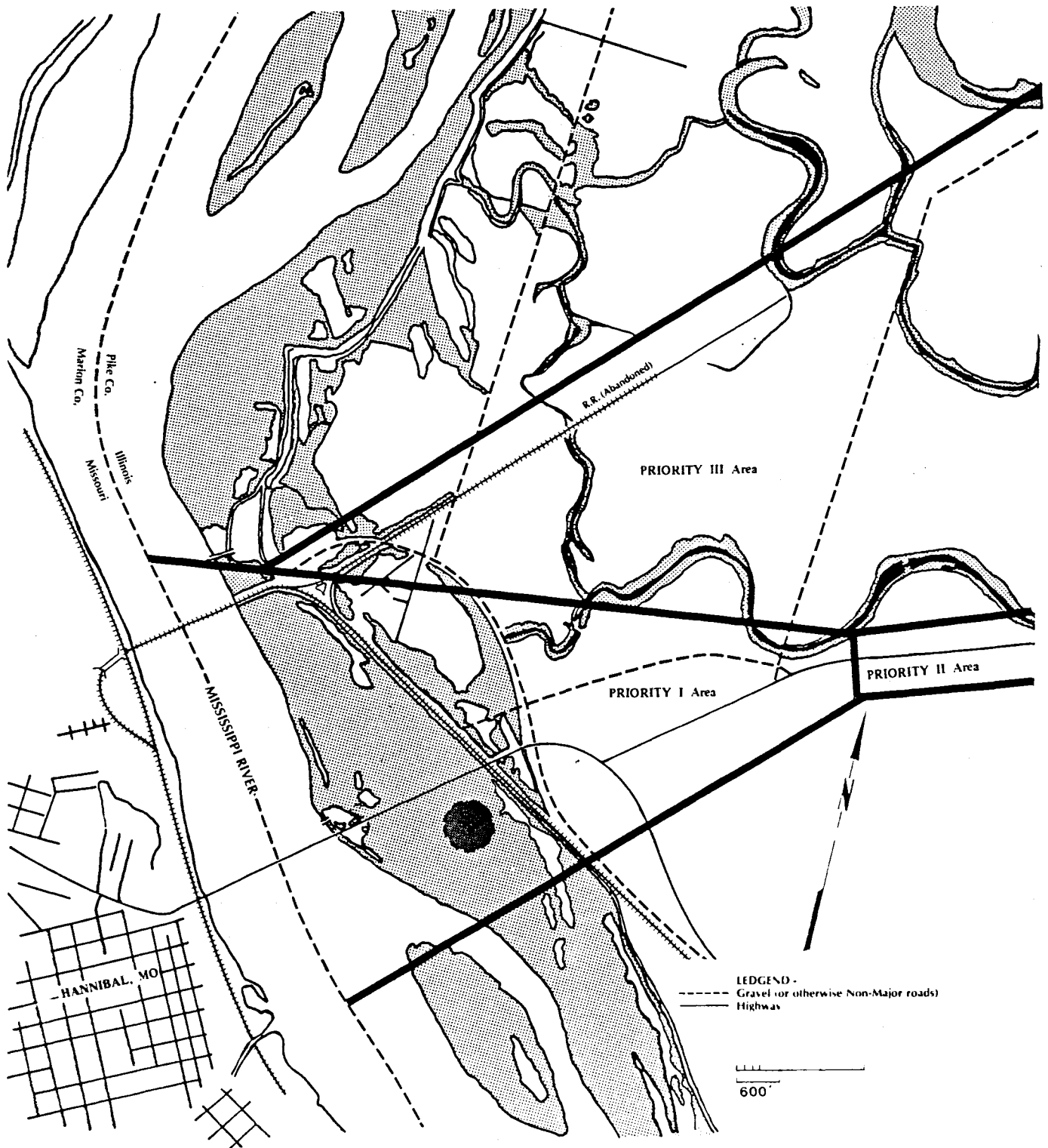


Figure 8. Possible temporary bald eagle roost site within the FAP 408 (U.S. Route 36) Hannibal bridge project area, Pike County, Illinois, during winter 1985/1986.

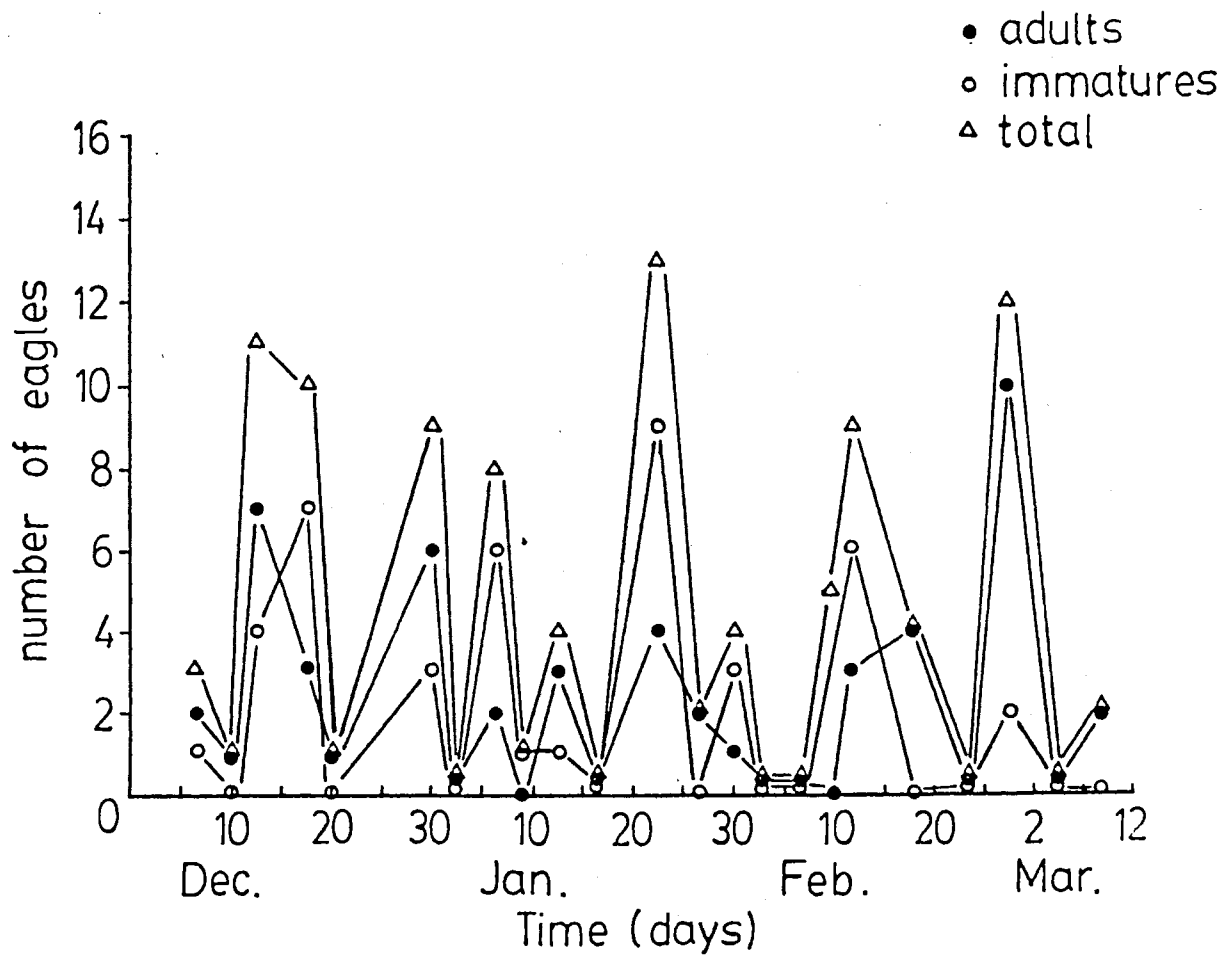


Figure 9. Numbers of bald eagle sightings recorded during the ground survey within FAP 408 (U.S. Route 36) Hannibal bridge project area, Pike County, Illinois, during winter 1985/1986.

CONCLUSIONS

The Mississippi River and the second growth mature floodplain forest within this FAP 408 project area were found to be used as a flight corridor by commuting bald eagles. The floodplain forest could provide suitable temporary roosting habitat for bald eagles; however, this activity was witnessed only once during this study. Aerial counts established the presence of bald eagles in the region between Lock and Dam 21 and 22 throughout the winter. No significant concentrations of roosting, loafing, or feeding birds were observed during the ground surveys. Therefore, we can assume that bald eagles did not concentrate their activities within the FAP 408 project area. Commuting was the principle winter activity observed during this study.

During April 1986, a pair of breeding bald eagles were discovered in Pike County (the nest is not located in the FAP 408 project area). The discovery of this nest proves that suitable breeding habitat for the bald eagle exists in Pike County. The second phase of this study, a breeding bird census, will follow in a separate report.

A species account of the bald eagle (*Haliaeetus leucocephalus*) is included in Appendix B.

ACKNOWLEDGMENTS

We would like to thank Dr. Steve Havera, Robert Crompton, Kathy Belcher, and Dennis Tunis (INHS/River Research Laboratory) for their cooperation in the aerial phase of this study. We also would like to thank Drs. Lawrence M. Page and Wallace E. LaBerge, and Mark J. Wetzel for reviewing this manuscript.

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APPENDIX B

Haliaeetus leucocephalus (Linnaeus) - Bald eagle

The range of the bald eagle extends south to Florida and Baja California, and north to Alaska and northern Canada (Brown and Amadon 1968). Part of the Canadian and north-central United States population (*H. l. alascanus* Townsend) winters in the Mississippi and Illinois River valleys. Cory (1909) and Ridgway (1913) indicated that, historically, the bald eagle in Illinois occurred along the major rivers and unsettled areas, was present year-round, and bred throughout its range. Current distribution in Illinois continues to be strongly associated with major waterways (Bowles and Thom 1981; Havera *et al.* 1984).

Breeding bald eagles are no longer common in Illinois. In 1978, two young eagles were fledged in Alexander county (Kleen 1978). Prior to this, eagles had not been reported nesting in Illinois since the 1940's (Bellrose 1944). A breeding pair has nested successfully, every year since 1980, at the Crab Orchard National Wildlife Refuge in Williamson County (Kleen 1980, 1981, 1982, 1983, 1984). Other (unsuccessful) nesting attempts in recent years have occurred in Union and Jo Daviess counties (Bowles and Thom 1981). In 1986, a bald eagle nest was discovered in Pike County (Sue Lauzon, pers. comm.). Bald eagles begin nest construction in January and lay eggs in March. Young hatch April or May. Adults tend to use the same nesting site every year (Herrick 1932).

Bald eagle use of the Mississippi River valley during winter has increased greatly as a result of alteration of the river by man (Steenhof 1978). Eagles congregate around dams, which are sources of open water and thus provide a plentiful supply of food. Steenhof (1978) believed that food may be the most important requirement of wintering bald eagles, but that distribution also is influenced by the location of preferred perches. Southern (1963) and Jonen (1973) found that eagles on the Mississippi River in northwestern Illinois fed primarily upon fish (usually *Dorosoma cepedianum*). Because eagles also feed on crippled or dead ducks and geese, they are associated with areas of high waterfowl concentration (Griffin *et al.* 1982). Wintering eagles are found in Illinois from late September to early April (Bohlen 1978).

Bald eagles prefer large, tall trees (average 42 to 62 cm dbh) near rivers or reservoirs (1 to 10 km) for roosting and nesting (Jonen 1973; Steenhof 1978; Lehman 1979; Steenhof *et al.* 1980). The tallest trees in an area are usually preferred, especially large dead or dying trees (Jonen 1973; Snow 1973; Steenhof 1978; Steenhof *et al.* 1980). Also, trees which have one or two open edges are favored (eg. riverbank, cropland) because they allow easy surveillance for food and accessibility (Snow 1973; Steenhof 1978; Steenhof *et al.* 1980). Eagles require a buffer zone from human disturbance around their nest sites and feeding perches (Snow 1973; Stalmaster and Newman 1978). During poor weather and winter nights, eagles move to more protected sites such as conifers or floodplains surrounded by riverbluffs (Jonen 1973; Steenhof *et al.* 1980).

In response to its significant decline in the continental United States, the bald eagle has been declared endangered and placed on the federal list of endangered and threatened species. This decline has been attributed to dwindling habitat, illegal shooting, and the adverse effects of pesticides on egg viability (Snow 1973; Stalmaster and Newman 1978; Bowles and Thom 1981).

In 1972 the Illinois Department of Conservation permanently incorporated the bald eagle into its Autumn, Winter, and Spring waterfowl counts. Researchers from the Illinois Natural History Survey - Havana Laboratory conduct annual aerial surveys along the Illinois and Mississippi rivers, including floodplain lakes, wildlife refuges, nature preserves, and cooling reservoirs adjacent to the rivers (Havera, INHS Havana Laboratory, pers. comm.; Havera *et al.* 1984).

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