

SURVEYS FOR RED-SHOULDERED HAWK (BUTEO LINEATUS) NESTING WITHIN  
THE SAVANNA DISTRICT (POOLS 12-14) OF UPPER MISSISSIPPI RIVER  
NATIONAL WILDLIFE AND FISH REFUGE

Submitted by

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to

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## ABSTRACT

During this study, we confirmed Red-shouldered hawk (RSH) nesting in six locations and we suspected nesting in an additional three locations. We found no evidence of RSH nesting in 17 of the areas searched. We considered our searches in ten areas to be incomplete; however, at least six of those areas appeared to have potential RSH nesting habitat.

All RSH nest sites located were within 200 meters of the confluence of two streams and were closely associated with lentic water, near springs, back-water pools, and temporary waterways. All nest sites were located in fairly large forest tracts near the edge of the river valley. In contrast, none of RSH territories were within 500 meters of the main channel of the Mississippi River.

Of the nine RSH territories identified, eight were located on U.S. Fish & Wildlife Service Refuge property and one was within the Savanna Army Ordnance Depot. All RSH nesting sites located were in Pool 12 or the upper half of Pool 13; none were located south of Sabula, Iowa (river mile 535), in Pool 14 or the lower part of Pool 13. As we have found in other districts of the Mississippi River, no RSH nesting was found on private property.

Of the six RSH nesting attempts, we determined the outcome of five; three were successful and two nesting attempts failed. A total of seven nestling RSH reached fledging age, for an average of 2.3 fledglings per successful nest, or 1.4 fledglings per nesting attempt.

## ACKNOWLEDGEMENTS

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## INTRODUCTION

The status of Red-shouldered Hawk (Buteo lineatus) populations in some portions of the Upper Midwest is currently not well understood. Prior to 1960, Red-shouldered Hawks (RSH) were considered common or even abundant along rivers in the Midwestern states (Anderson 1907; Craighead & Craighead 1956; Hands et al 1989). However, since 1960, declines in RSH breeding populations have been noted in several Midwestern states, and RSH are currently absent from many areas that were previously considered traditional nesting territories (Brown 1971; Kent & Kent 1975; Stravers 1989; Hands et al. 1989). This species is currently considered endangered in Iowa and Illinois (Roosa 1977; Bowles & Thom 1981).

RSH generally require relatively large tracts of mature riparian or flood-plain forests as nesting habitat; consequently, they are often found only on public lands. Previous inventories for RSH nesting on public lands were conducted in the McGregor and Wapello Districts of the Upper Mississippi River (Stravers 1992 & 1993); however, very little long-term information is available for this species within the Upper Midwest. These recent studies have found a higher than expected number of breeding RSH within the McGregor District (Pools 9-11) of the Upper Mississippi National Wildlife & Fish Refuge (Stravers 1992 & 1993), and low densities in the Wapello District (Pools 16-19).

This current survey for RSH nesting within the Savanna District was co-sponsored by the U.S. Fish & Wildlife Service Nongame Bird Fund, the U.S. Army Corps of Engineers Natural Resource Division, the Illinois Department of Conservation Natural Heritage Division, the Iowa Department of Natural Resources Nongame Program, the Iowa Raptor Foundation, and the Midwest Raptor Research Fund in order to better understand the status of RSH nesting within the Upper Mississippi Refuge.

### OBJECTIVES:

1. Conduct an inventory of Red-shouldered hawk nesting within river miles 494 to 583 of pools 12, 13 & 14 of the Mississippi River.
2. Compare Red-shouldered hawk nesting densities and reproductive success in the Savanna District with those found in other districts of the Mississippi River.
3. Describe a more precise history of previous forest management techniques used in areas where Red-shouldered hawk nesting density is high, and describe habitat characteristics.

### METHODS

Initial inventories for potential RSH nesting areas were conducted using aerial photos and topographic maps. We plotted and then searched previously known RSH nesting locations, areas of suspected RSH nesting, and other potential areas. We also selected and searched various other habitat types.

Searches were conducted between February and June of 1994, both before and after leaf-out (Craighead & Craighead 1956) by a team of two investigators, and occasionally by teams of three or four. Conspecific taped calls were played in order to elicit a response and identify breeding territories (Fuller & Mosher 1987). In some areas we did not locate active nests but verified calling adults present throughout the breeding season. In all situations, we attempted to conduct our investigations with a minimum of impact on the nesting birds (Fyfe & Olendorff 1975).

Active nests were visited at various times during the nesting cycle. In order to determine prey selection, we kept records on prey remains in the nest and in the nest area. We took measurements on tree size, percent of canopy in nest area, and distances to the nearest marsh or canopy clearing, nearest stream, and to the main channel of the Mississippi River and navigable sloughs. We also measured the distance to the nearest agricultural field, logging activity, and other human disturbance. We determined the history of logging by consulting logging records kept by the U.S. Army Corps of Engineers and by interviewing current and former Refuge Managers and District Foresters.

## RESULTS

During this study, we were able to confirm red-shouldered hawk nesting or territorial activity in nine areas within the Savanna District (Table 1; Maps 1-6). We confirmed nesting in six sites and we suspected nesting in the other three areas. Our searches of ten areas were incomplete, but we suspect that RSH may occupy as many as six of those ten areas (Tables 2 and 3). We found no evidence of RSH nesting in 17 (65.4%) of the areas where our searches were complete (Table 4).

Of the nine RSH territories identified, eight were located on U.S. Fish & Wildlife Service Refuge property and one was within the Savanna Army Ordnance Depot. Also of interest, all of RSH nesting sites were either in Pool 12 or the upper half of Pool 13; none were located south of Sabula (river mile 535). Also, as we have found in other districts of the Mississippi River, no RSH nesting was found on private property.

We also documented red-tailed hawk (Buteo jamaicensis), Cooper's hawk (Accipiter cooperii), great-horned owl (Bubo virginianus), barred owl (Strix varia), and American crow (Corvus brachyrhynchos) nesting attempts within the study area.

### RED-SHOULDERED HAWK REPRODUCTIVE SUCCESS IN 1994

We determined the outcome of five of the six RSH nesting attempts; three were successful and two nesting attempts failed. A total of seven nestling RSH reached fledging age, for an average of 2.3 fledglings per successful nest, or 1.4 fledglings per nesting attempt.

### PREY ITEMS FOUND AT RSH NESTS

During 1994, we verified eleven prey items at various RSH nests. None of the items discovered were unexpected. Prey items found at RSH nests included:

- 3 voles (Microtus sp.)
- 2 northern leopard frogs (Rana pipiens),
- 2 beetles (Coleoptera sp).
- 1 juvenile northern brown snake (Storeria dekayi)
- 1 garter snake (Thamnophis sirtalis),
- 1 crayfish (Cambaridae)
- 1 red-winged blackbird (Agelaius phoeniceus),

#### DESCRIPTION OF RED-SHOULDERED HAWK NESTING HABITAT

In all cases, RSH nesting sites were part of relatively large forest tract (>500 acres), but in most cases active nests were placed near the edge of the forest tract and the RSH home range included both flood-plain and riparian forests along the valley slope. As with previous studies in this and other regions, all RSH nesting sites were located in areas which, for the most part, had not been logged for 45-55 years.

RSH generally selected medium to mature even-aged flood-plain forests dominated by silver maples (Acer saccharinum) and/or cottonwoods (Populus deltoides) where the overhead forest canopy is well-developed. All RSH nest sites were closely associated with lentic water, near back-water pools, open marshes, temporary waterways, and all were near the confluence of two streams. In contrast, none of the RSH nesting sites were within 500m of the main channel of the Mississippi River.

Of the 34 Red-shouldered Hawk sightings, 18, or 52.9%, were in flood-plain forests with within 200 meters of various nests. Of the remaining 16 sightings, seven (20.6%) were within or over the adjacent bluff forests, six (19.3%) were on the edge of the forests at open marshes, wet fields, or clearings, and three (8.8%) were on islands in the Mississippi.

#### COMPARISON OF RSH DENSITIES WITH OTHER MISSISSIPPI RIVER DISTRICTS

During surveys for RSH nesting conducted in 1992-1994, we have found varying densities of nesting RSH within various portions of the Mississippi River Valley. We documented or suspected RSH nesting in five of the nineteen (20.8%) areas searched in the Winona & LaCrosse Districts (Pools 4-8; in 14 of the 33 (42.4%) areas searched in McGregor District (Pools 9-11); in nine of 26 (34.6%) in the Savanna District (Pools 12-14), and in only five of 45 (13.3%) areas searched in Pools 16-19 (Wapello District).

## INTERIM MANAGEMENT SUGGESTIONS

Based on our findings during this and previous studies we submit the following suggestions which may help to insure viable habitat for RSH populations within the Savanna District of the UMN&WR.

1. Known RSH nesting sites should be protected from any major disturbance. Limitations should be enforced on logging, agricultural and human activity, and other disturbances in areas that have been documented as repeated RSH nesting sites.
2. The large forest tracts should not be fragmented, especially where the flood-plain forests are adjacent to riparian forests. The fragmentation of such forests creates more edge and eventually favors some of the more common raptor species.
3. In most cases, high grade cuts and selective logging in RSH habitat should be avoided since this contributes to the breakup of the overhead canopy. However, in some cases, selective cuts which help thin out a "crowded" younger forests may assist in the development of the overhead canopy and thus may benefit RSH.
4. It appears that RSH utilize forests that are considered "over mature." However, over mature forest are sometimes susceptible to invasion of reed's canary grass, which can eventually limit forest regeneration and thereby threaten the existence of a healthy forest. Consequently, special forest management techniques may be needed in areas where Reed Canary grass creates an effective canopy that inhibits Silver Maple and Cottonwood regeneration.

#### FUTURE RSH RESEARCH RECOMMENDATIONS - SAVANNA DISTRICT

This study has identified a higher than expected density of RSH nesting within the upper portion of the Savanna District. In fact, this population may be significant in terms of regional populations of this species. In other regions where nesting densities are similar, RSH have maintained an impressive record of nest-site occupation. If properly managed, the Savanna District may indeed continue to support a source population of nesting RSH.

Consequently, we recommend that the U.S. Fish & Wildlife Service adopt a regular system of monitoring RSH occupation of the known nesting sites within this district. Monitoring the known sites could easily be accomplished each spring during the courtship or later during the nesting period. This would provide a valuable record of RSH territory occupation and could eventually help to answer questions concerning RSH use of forest tracts that become "over mature" and could also provide a benchmark density for comparison with other portions of the Mississippi River and other portions of the Midwestern United States.

### LITERATURE CITED

- Anderson, R.M. 1907. The Birds of Iowa. Proceedings of Davenport Academy of Science. Davenport, Iowa 11:125-417.
- Bednarz, J.C. 1979. Productivity, nest sites, and habitat of Red-shouldered Hawks nesting in Iowa. Master's Thesis, University of Iowa State. 105pp.
- Bednarz, J.C. & J.J. Dinsmore. 1981. Status, habitat use, and management of red-shouldered hawks in Iowa. J. Wildl. Manage. 45:236-241.
- Bowles, M.L. and R.T. Thom. 1981. Endangered and threatened birds. Pages 34-48 in M.L. Bowles, ed. Endangered and threatened vertebrate animals and vascular plants of Illinois. Illinois Department of Conservation, Springfield, IL.
- Brown, W.K. 1971. Winter population trends in the red-shouldered hawk. American Birds 25:813-817.
- Craighead, J.J and F.C. Craighead. 1956. Hawks, Owls and Wildlife. The Stackpole Co. and Wildlife Management Institute. 443pp.
- Fuller, M.R. and J.A. Mosher. 1987. Raptor survey techniques. Pages 37-65 in Raptor management techniques manual. National Wildlife Federation, Washington, D.C.
- Fyfe, R.W. and R.R. Olendorff 1975. Minimizing the dangers of nesting studies to raptors and other sensitive species. Canadian Wildlife Service Occasional Paper # 23.
- Hands, H.M., R.D. Drobney and M.R. Ryan. 1989. Status of the Red-shouldered Hawk in the Northcentral United States. Report to U.S. Fish & Wildlife Service, Twin Cities, MN. 21pp.
- Henny, C.J, F.C. Schmid, E.M. Martin and L.L. Hood. 1973. Territorial behavior, pesticides, and the population ecology of Red-shouldered Hawks in central Maryland 1943-1971. Ecology, 54(3):545-554.

Kent, F.W and T.H. Kent. 1975. Birding in Eastern Iowa - 25 years of observations from Iowa City 1949-1975. University of Iowa Press, 150pp.

Malmborg, P.L and G.C. Vanderah. 1991. Illinois Woodland Raptor Survey. Illinois Natural History Survey, Champaign, Il.

Stravers, J.W. & J.B. Bowles. 1985. Surveys of red-shouldered Hawk nesting and raptor migration in Eastern Iowa. Reports Summary reports to the Iowa Conservation Commission. 53pp.

Stravers, J.W. 1989. Report on the status of the red-shouldered Hawk in Iowa. Report to Iowa Department of Natural Resources.

Stravers, J.W. 1991. Surveys for red-shouldered hawks in eastern Iowa. Report to the Iowa Department of Natural Resources.

Stravers, J.W. 1992. Surveys for nesting red-shouldered hawks within Pools 9-11 and 16-19 of the Upper Mississippi River Valley. Report to the U.S. Fish & Wildlife Service. 19pp.

Stravers, J.W. 1993. Relative abundance and nest-site selection for red-shouldered hawks nesting within Pools 10 & 11 of the Upper Mississippi River. Report to the U.S. Fish & Wildlife Service. 32pp.

Stravers, J.W. 1993. Status of the Red-shouldered Hawk within the Upper Mississippi River Valley and management guidelines for nesting habitat. Tech Rep by U.S. Fish & Wildlife Service, Minneapolis, MN. 8pp.

Stravers, J.W. and K.J. McKay. 1993. Surveys for red-shouldered hawk nesting sites within Pools 16-19 of the Upper Mississippi River. Report to U.S. Fish and Wildlife Service, Wapello Dist., U.S. Army Corps of Engineers Nat. Resour. Div., and Illinois Dept. of Cons. 20pp.

Roosa, D.M. and J. Stravers. 1989. Nesting of raptors uncommon in Iowa: summary and new records. Journal of Iowa Academy of Science. 96(2)41-49.

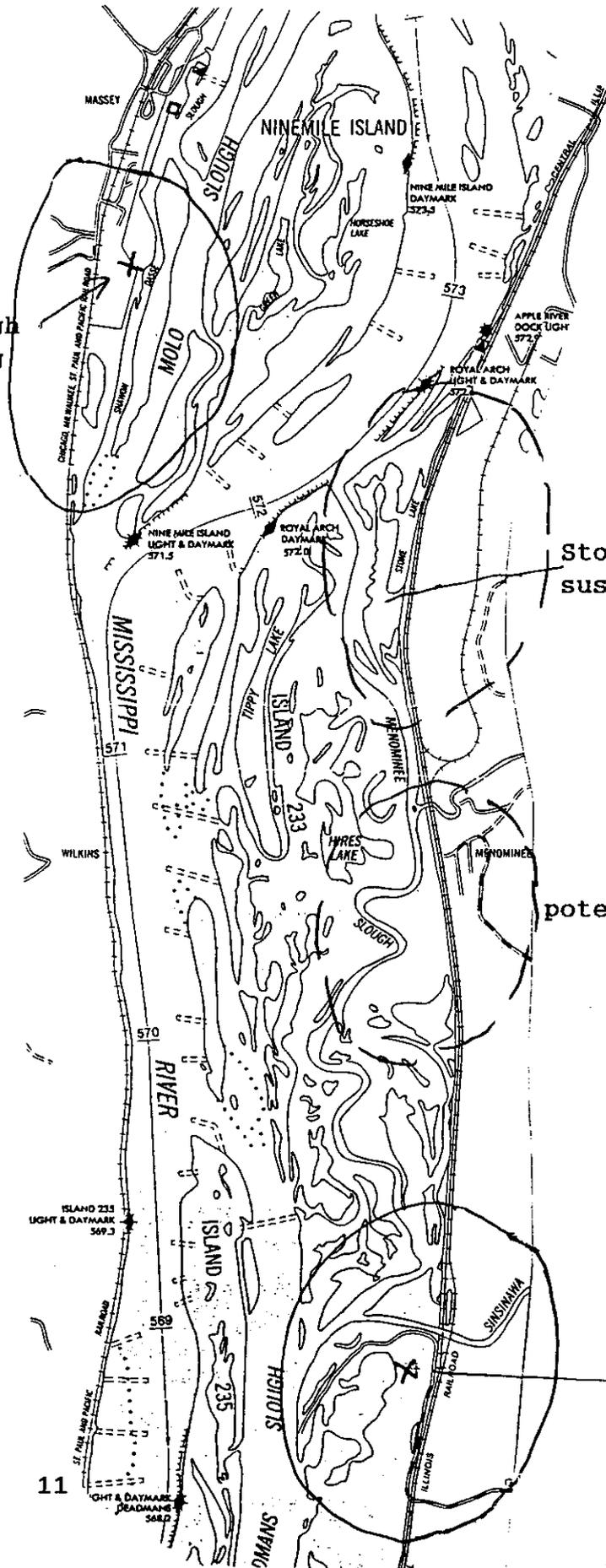
MAP 1. RED-SHOULDERED HAWK NESTING SITES - SAVANNA DISTRICT  
 X = NEST LOCATION. ESTIMATED HOME RANGES ARE CIRCLED

Shawondasse Slough  
 confirmed nesting

Stone Lake/Menominee Slough  
 suspected nesting

Menominee Slough  
 potential nesting habitat

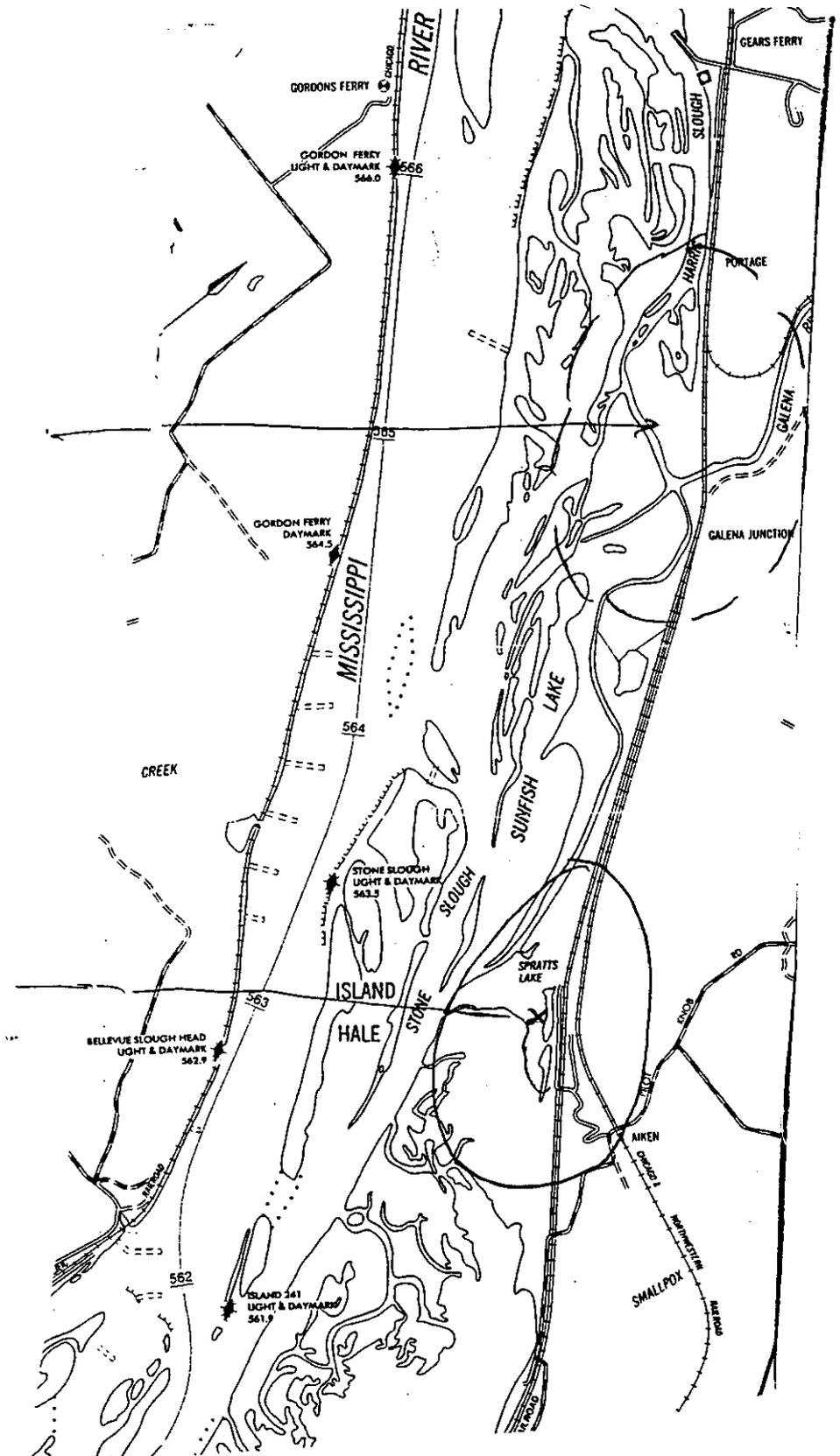
Sinsinawa River  
 confirmed nesting



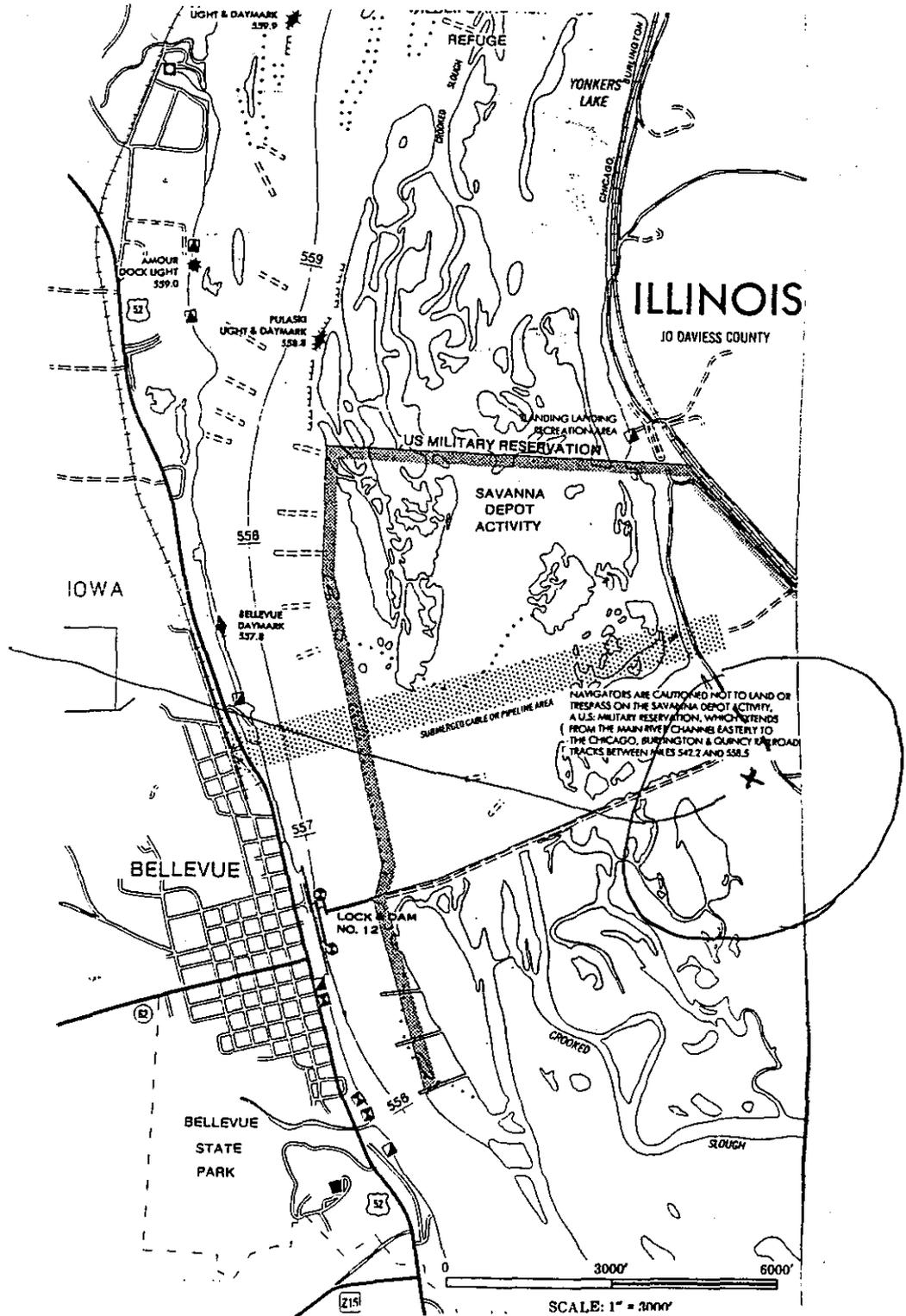
MAP 2. RED-SHOULDERED HAWK NESTING SITES - SAVANNA DISTRICT  
 X = NEST SITES. ESTIMATED HOME RANGES ARE CIRCLED.

Galena River confluence  
 potential nesting habitat

Smallpox Creek confluence  
 confirmed nesting



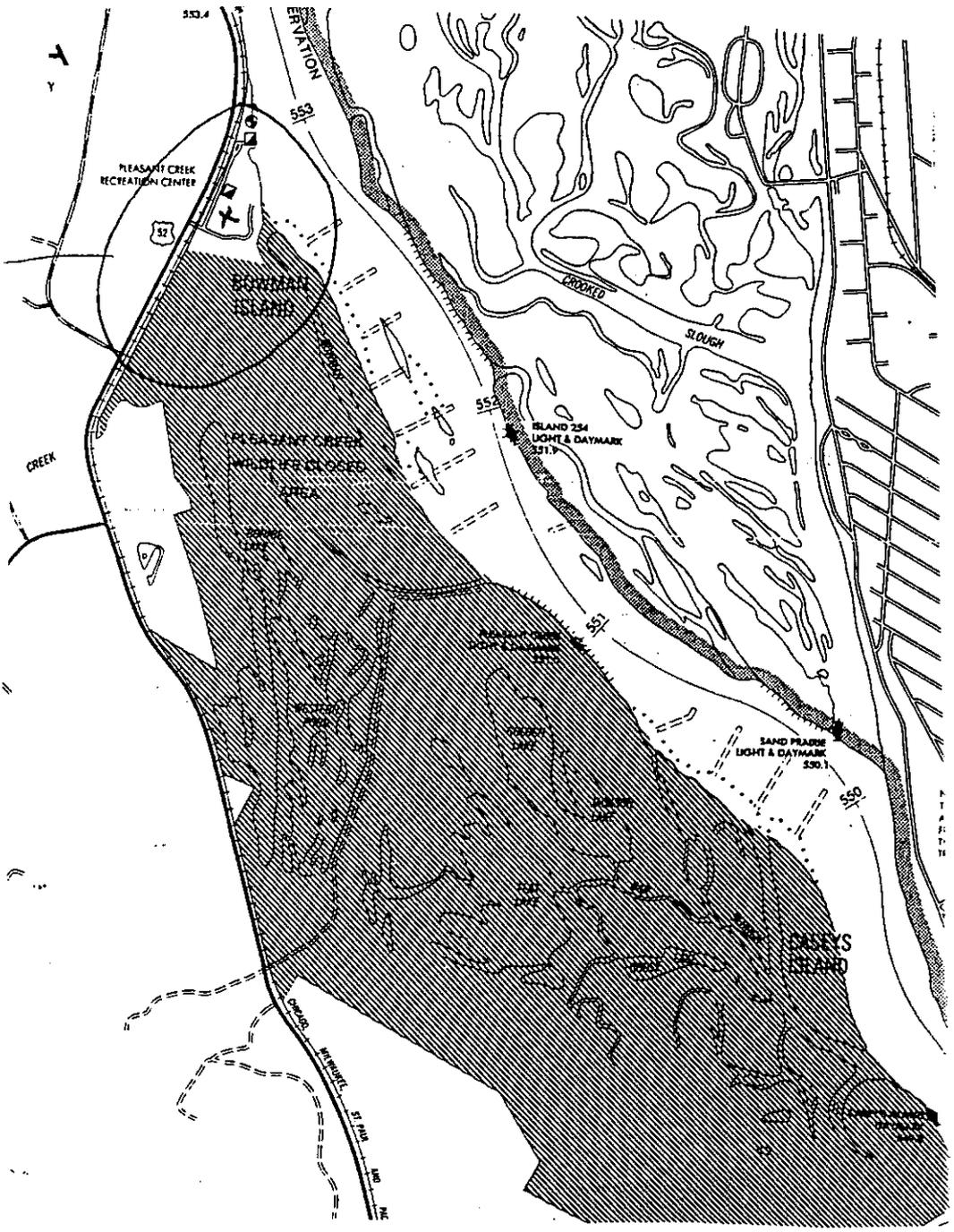
MAP 3. RED-SHOULDERED HAWK NESTING SITES - SAVANNA DISTRICT  
 X = NEST SITES. ESTIMATED HOME RANGES ARE CIRCLED.



Savanna Army Depot confirmed nesting

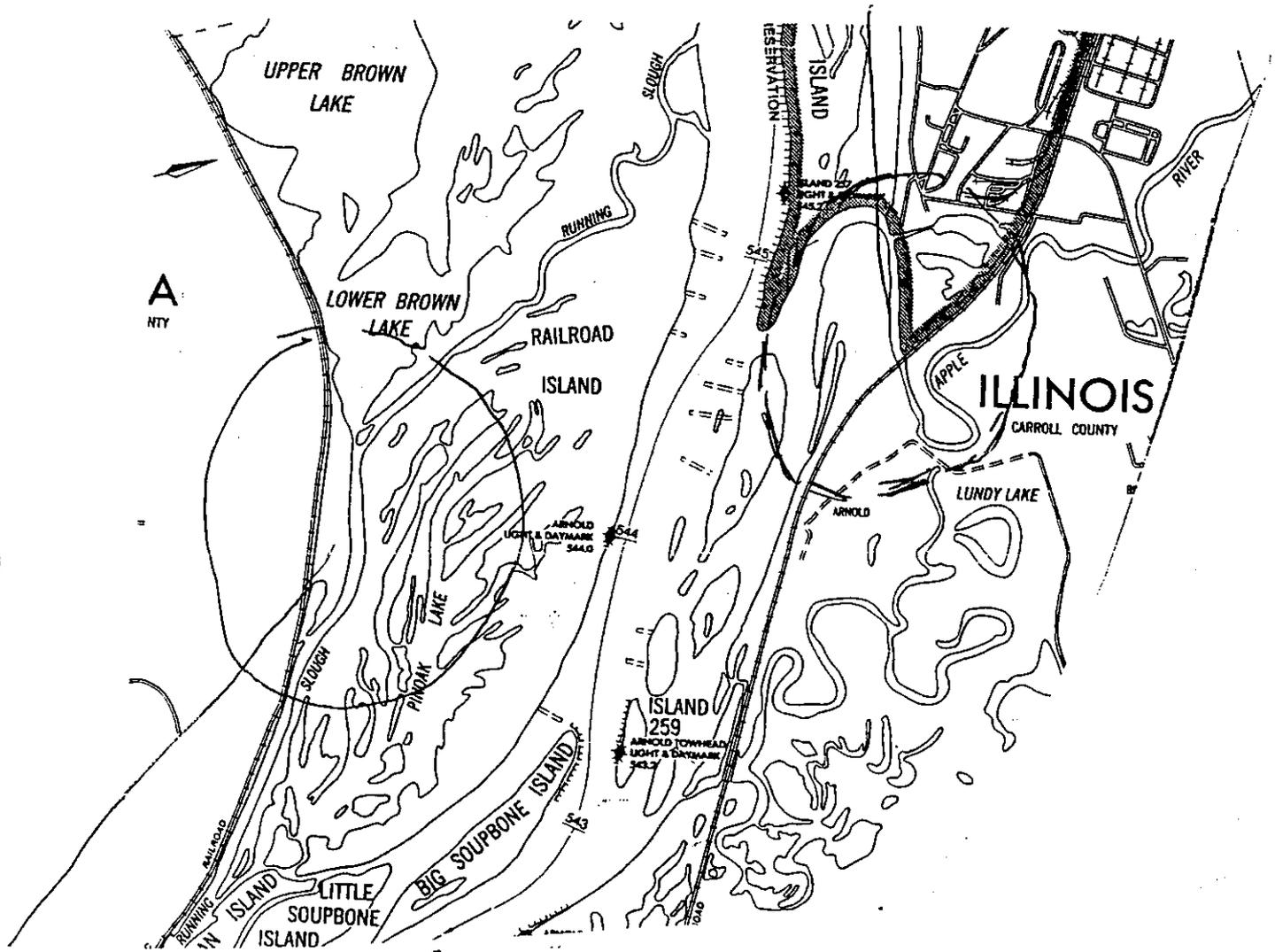
MAP 4. RED-SHOULDERED HAWK NESTING SITES - SAVANNA DISTRICT  
X = NEST SITES. ESTIMATED HOME RANGES ARE CIRCLED.

Pleasant Creek Campground  
confirmed nesting attempt



MAP 5. RED-SHOULDERED HAWK NESTING SITES - SAVANNA DISTRICT  
 X = NEST SITES. ESTIMATED HOME RANGES ARE CIRCLED

Confluence of Apple River  
 potential nesting habitat



Lainsville Slough - suspected nesting  
 Pair of adult Red-shoulders present on two occasions

MAP 6. RED-SHOULDERED HAWK NESTING SITES - SAVANNA DISTRICT  
 X = NEST SITES. ESTIMATED HOME RANGES ARE CIRCLED.

Beaver Creek/Esmay Slough  
 confirmed nesting

Confluence of Plum Creek  
 potential nesting habitat

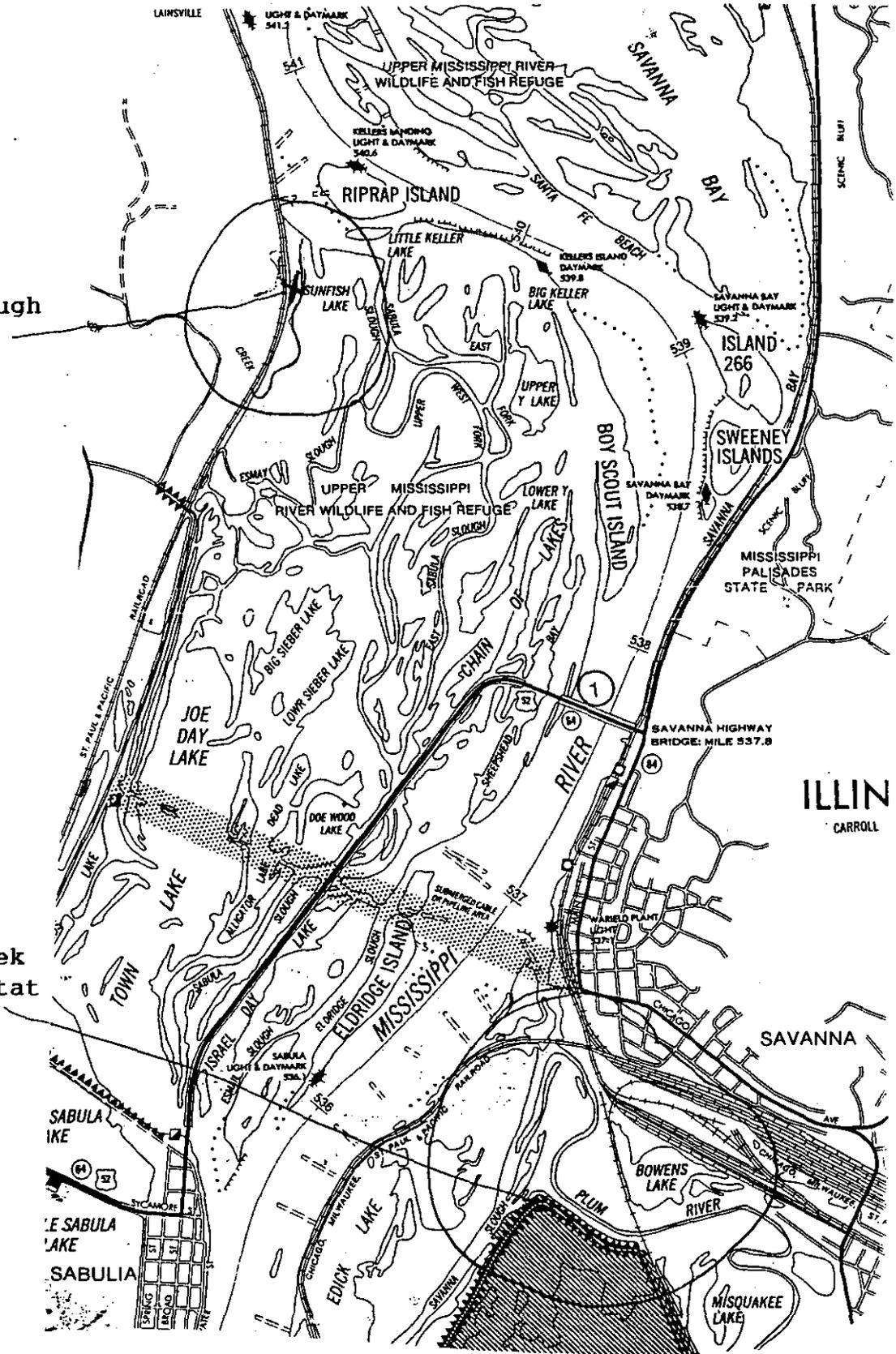


TABLE 1. AREAS IN THE SAVANNA DISTRICT WHERE WE CONFIRMED OR SUSPECTED RED-SHOULDERED HAWK NESTING DURING 1994. (Listed from north to south).

Shawondasse Slough/Massey, Pool 12, r.m. 572.8 IA; refuge property.  
- nest building and incubation observed at this site; however, the nest blew down sometime in mid-May.

Stone Lake/Menominee Slough, Pool 12, - r.m. 572.5 IL  
- calling adult observed on March 25; several possible nests located but nesting not yet confirmed.

Confluence of Sinsinawa River, Pool 12, r.m. 569, USF&WS property,  
- active nest located on April 24; three young Red-shoulders fledged from this nest.

Deadman's Slough/Lower Sinsinawa, Pool 12, r.m. 568.2 USF&WS property.  
- calling adults on April 24, nesting suspected but not confirmed.

Small Fox Creek/Stone Slough, Pool 12, r.m. 562.5-563.5 IL;  
boundary line between refuge and private property.  
- active nest located on March 24; two young Red-shoulders fledged from this nest.

Upper Portion of Savanna Army Depot, Pool 13, r.m. 556.7 IL;  
- calling adults on May 5, active nest located on May 6.  
Nest was abandon by late May.

Pleasant Creek, USCOE campground, Pool 13, r.m. 552.8 IA;  
- nesting initiated but abandon by mid-April.

Lainsville Slough/Lower Brown Lake, Pool 13, r.m. 539.9 IA  
- pair of adult RSH sighted on March 23 and again on April 24;  
two possible nests located but nesting not confirmed.

Beaver Creek, Pool 13, .5 mi S of r.m. 540.5 IA; refuge property.  
- active nest (incubating) on April 1 & April 10; brooding young on May 6; two young Red-shoulders fledged from this nest.

TABLE 2A. POTENTIAL RED-SHOULDERED HAWK BREEDING AREAS. THE HABITAT AT THESE SITES APPEARS SUITABLE, HOWEVER OUR SEARCHES AT THESE LOCATIONS WERE NOT COMPLETE.

Menominee River confluence - Pool 12, r.m. 574-575 IL

Lower Little Menominee confluence - Pool 12, r.m. 570-571 IL

Galena River confluence - Pool 12, r.m. 564.5 IL

Rush Creek/Marcus Bottoms - Pool 13, r.m. 542-543 IL

Lower Apple River/Savanna Army Depot, Pool 13, r.m. 557 IL

Confluence of Plum River - Pool 13, r.m. 536.5 IL

TABLE 2B. AREAS WHERE OUR SEARCHES WERE INCOMPLETE.

Stumpf Island/Slough - Pool 12, r.m. 582-583 IL

Cattail Slough - Pool 14, r.m. 517 IL

Meredosia Slough, Pool 14, r.m. 512 IL

Johnson Creek - Pool 14, r.m. 522 IL

TABLE 3. AREAS WITHIN THE SAVANNA DISTRICT WHERE WE FOUND NO EVIDENCE AND DO NOT SUSPECT RED-SHOULDERED HAWK NESTING.

Confluence of Catfish Creek, Pool 12, r.m. 577.5  
Cattese Hollow, Pool 12, r.m. 576.7 IA  
Confluence of Tete Des Morts Creek, Pool 12, r.m. 567 IA  
Harris Slough/Gear's Ferry Landing, Pool 12, r.m. 566.8-567.2 IL  
Bates Creek confluence - Pool 12, r.m. 563.5 IA  
Blanding Landing - Pool 12, r.m. 558.5 IL  
Middle portions of Savanna Army Depot - Pool 13,  
Middle portion, Pleasant Creek Unit - Pool 13, r.m. 551-552 IA  
Southeast portion, Pleasant Creek Unit - Pool 13, r.m. 549-550 IA  
Hubble Island - Pool 13, r.m. 534 IA  
Cook's Island/Dark Slough - Pool 13, r.m. 532 IA  
Heldt Ditch alluvial fan - Pool 13, r.m. 527 IA  
Elk River alluvial fan - Pool 13, r.m. 528 IA  
Lower north side of Wapsipinicon - Pool 14, r.m. 507 IA  
Lower South side of Wapsipinicon confluence  
Rock Creek County Park along the Wapsipinicon River  
Princeton Marsh, Pool 14, r.m. 504-506 IA