REPORT ON RED-SHOULDERED HAWK NESTING WITHIN THE MILAN BOTTOMS AND POOLS 9-16 OF THE UPPER MISSISSIPPI RIVER VALLEY DURING 1999

submitted by

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To

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Illinois Department of Natural Resource Wildlife Preservation Fund

Upper Mississippi National Wildlife and Fish Refuge

National Audubon Society's Upper Mississippi River Campaign

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ABSTRACT/EXECUTIVE SUMMARY

During our investigations along the Upper Mississippi River during 1999 we located Red-shouldered Hawks (*Buteo lineatus*) in a total of 32 of the 51 areas searched. We confirmed Red-shouldered Hawk nesting in 16 sites; of these, nine nesting attempts were successful (56.25%) producing 19 nestlings for an average of 2.11 nestlings per successful nest and 1.19 per known nesting attempt. We suspect Red-shouldered Hawk nesting in 16 additional sites where we observed territorial activity but could not confirm nesting.

We searched eight sites where we found no evidence of Red-shouldered Hawk activity; in five of these sites we had documented Red-shouldered Hawk activity in previous years. Our searches in eleven sites were considered incomplete; we had documented Red-shouldered Hawk activity in five of these eleven sites in previous years.

Of the 32 territories where we confirmed or suspected Red-shouldered Hawk nesting along the Upper Mississippi River, fifteen were in Iowa, seven were in Wisconsin, and ten were in Illinois. Of the sixteen confirmed nesting sites, fifteen were on federal land (thirteen on U.S. Fish & Wildlife Refuge Lands and two on Effigy Mounds National Monument property), and one was on private property.

Three of the active Red-shouldered Hawk nests were located within the Milan Bottoms/Mill Creek study area; two of these nesting attempts were successful (66.7%), producing six fledgling Red-shouldered Hawks for an average of 3.0 per successful nest and 2.0 per known nesting attempt. Two of these nesting attempts were located within 1/2 mile of the the 11 acre timber harvest which was completed in 1994.

DEDICATION

This year's Red-shouldered Hawk field work and this report are dedicated to Bill and Pat Heidenreich of Marquette, Iowa. Their dedication to political awareness and their commitment to conservation action have provided new hope for environmental improvement on the Mississippi River and for the building a new "Culture of Conservation."

ACKNOWLEDGEMENTS

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Field investigations were conducted by Jon Stravers and Kelly McKay. A variety of volunteers contributed field assistance including Pam Heidenreich, David Kester, Larry Stone, Jay Stravers, and Lisa Stravers-Seeliger, and Scott Gritters and Karen Aulwes from IDNR Guttenberg Fish Hatchery. Gary Swenson, Casey Kohrt and Joe Lundh from the USCOE provided valuable technical and logistic support and assisted in field observations throughout the 1999 field season.

BACKGROUND ON RED-SHOULDERED HAWKS

At the time of European settlement, Red-shouldered Hawks were probably one of the more common raptors in the Upper Midwest (Anderson 1907: Bailey 1918). With the development of the floodplains into cropland, the clearing of many of the forests, and channelization of many streams, many floodplain forests were fragmented and consequently became more suitable for the more common Red-tailed Hawk (*Buteo jamaicensis*) which utilizes edge habitats and is more adapted to agricultural activity (Brown 1964: Hands et al 1989; Palmer 1988).

By the early 1960's, Red-shouldered Hawks remained in only a few sites along some of the larger streams in eastern Iowa and in isolated habitats in various portions of Iowa (Brown 1964 & 1971; Roosa & Stravers 1989). Further population declines occurred during an era when pesticide contamination caused population declines in other raptors such as Peregrine Falcons and Bald Eagles (Henny & Anderson 1968; Hickey 1969). However, since no specific research was being conducted on Red-shouldered Hawks in this region during that period, we are not certain of the cause and affect or the specific populations dynamics.

Red-shouldered Hawks have been on the state endangered species list in Iowa since 1977 (Roosa 1977) and in Illinois since 1981 (Bowles & Thom 1981). They are considered an important indicator species since they nest in large tracts of mature floodplain forests (Bednarz & Dinsmore 1981: Stravers & McKay 1993). A variety of factors contribute to their presence or absence such as forest size and age, and the availability of suitable wetland habitats for foraging. During the nesting season, their diet consists largely of frogs, crayfish, snakes and small mammals; they also take birds and possibly fish on some occasions (Bednarz & Dinsmore 1981; Crocoll 1994; Stravers 1996).

Because of the long-term stability of refuge habitats along the Upper Mississippi River, some sections of the Upper Mississippi River Valley support apparently healthy populations (Stravers & McKay 1993). During the past few years there has been an apparent increase in the number of Red-shoulders in the Iowa Bird Life field reports, and we have observed Red-shoulders in several locations that were not previously considered active nesting sites.

BACKGROUND ON MILAN BOTTOMS STUDY AREA AND RED-SHOULDERED HAWK RESEARCH

The Milan Bottoms/Mill Creek study area includes an area of approximatley 1200 acres in Rock Island County, Illinois, near the confluence of Mill Creek and the Mississippi River (river miles 476-478) between the towns of Milan and Andalusia and just below the confluence of the Rock and Mississippi Rivers.

Several small streams flow into each other and into the Mississippi River within the study area. There are several slightly elevated ridges within the study area that remain exposed during most flooding; however, the elevation of the study area is low enough so that much of it is under water during typcial spring flooding. Depth of the flood waters in the study area may be anywhere from two inches to twelve feet and the duration of flooding during some years may be as brief as a few days or as long as several months.

Although there has been some selective timber harvests within the study area at various times in the past, there has been no large scale timber production from this area. Tree age diversity and tree species diversity within the study area are perhaps as high as any of the floodplain forests along the Mississippi River in this region.

The U.S. Army Corps of Engineers Natural Resources Management Division had planned to complete three small timber harvests for a total of 28 acres in 1994. Because of concerns about the affects on Red-shouldered Hawk nesting, plans for two of those cuts were abandoned. Instead, an 11 acre cut was completed in the western edge of the Milan Bottoms complex, and an additional 8 acre cut was also completed on a nearby island.

Since the timber harvests were completed, individuals from the Midwest Raptor Research Fund have been monitoring the raptor activity and reproductive success within the study area in order to determine the affects of small clear cuts on Red-shouldered Hawk nesting success. The investigations for Red-shouldered Hawks within the Milan Bottoms have been conducted each year since 1992 and are part of an on-going research and monitoring project on Red-shouldered Hawks conducted each spring since 1983.

This report summarizes the findings for 1999. For more details, readers should examine reports for 1995, 1996, 1997, 1998, or the summary of Red-shouldered Hawk surveys for the Upper Mississippi River Valley between 1983-1995 (available from the U.S. Army Corps of Engineers Natural Resources Division at Pleasant Valley, Iowa, or the Midwest Raptor Research Fund at P.O. Box 32, Pella, Ia 50219).

RESEARCH OBJECTIVES

1. Search previously active Red-shouldered Hawk nesting sites and potentially new nesting sites within the Milan Bottoms/Mill Creek study area and other portions of the Upper Mississippi National Widlife and Fish Refuge.

2. Monitor the progress at the known Red-shouldered Hawk nesting attempts and determine their reproductive success.

3. Compare Red-shouldered Hawk reproductive success during 1999 within the Milan Bottoms with those found in other areas of the Mississippi River.

4. Compare reproductive success at nest sites within the interior portion of forest tracts and those nest sites situated on the forest edge.

5. Compare Red-shouldered Hawk reproductive success in 1999 with those found in previous years.

RATIONALE FOR PROPOSED RESEARCH:

1. Red-shouldered Hawks are considered endangered in Iowa and Illinois. Although some stretches along the Mississippi River, such as Pool 10 in the McGregor District, have fairly high densities of nesting Red-shoulders, there are only a few known active nesting sites in most sections of the Upper Mississppi River, especially below Savanna.

2. Red-shouldered Hawks are indicators of high quality habitat. They prefer large tracts of mature flood-plain forests and they have a strong nest-site fidelity, often returning to the same nest site each spring. They are considered an "Umbrella Species" and management practices that favor Red-shouldered Hawks are likely to benefit several species of concern that require large unfragmented forest tracts, especially some of the neotropical migrant passerines which may be more difficult to monitor.

3. Our understanding of habitat requirements for Red-shouldered Hawks has increased and changed somewhat during the last five years. We feel long-term monitoring yields valuable information concerning Red-shouldered Hawk reproductive success, as well as information on the relationship between these hawks and a changing forest structure. Increased understanding of Red-shouldered Hawks should reduce the potential for conflict with planned forest harvests in this region.

METHODS

Methodology for Red-shouldered Hawk inventories generally followed the protocal suggested by Craighead & Craighead (1956) and Fuller & Mosher (1987). Because of the changing water levels within the Mississippi floodplain, some modifications were necessary.

Initial inventories for suitable Red-shouldered Hawk nesting areas were conducted using topographic maps, aerial photos, and notes from previous searches in this region. Previously known Red-shoulder nesting locations, areas of suspected nesting, and other areas of high potential were searched for evidence of Red-shouldered nesting. Several other randomly selected areas were also searched.

Searches were conducted in mid and late March prior to leaf out during the period when Red-shouldered Hawks are the most vocal. All areas of suspected activity were then searched again in April following the period when the birds usually lay their eggs.

Active nests were visited periodically during the nesting cycle to document progress and determine productivity. All observations were conducted in a manner that minimized disturbances to the nesting hawks. Duration of the visits to active nests was kept to a minimum and, in most cases, observations were not conducted during inclement weather.

In order to make preliminary estimates on the possible affects of research observation disturbance on Red-shouldered Hawk reproductive success and nest-site re-occupation, we divided the active nests into three distinct categories of visitation. Six of the nests were visited approximately once each week; six other nests were visited approximately once every fifteen days; four other nests were visited only twice - once to determine occupancy and once to determine reproductive success.

We banded the nestlings at four nests with U.S. Fish & Wildlife Service aluminum bands, and we continued to monitor the activity of the nestling Red-shoulders at four nest sites between 10 June and 30 June during the first three weeks following the period when they had left the nest.

All known active raptor nests and suspected breeding territories were plotted on topographic maps or aerial photos or Mississippi River Navigational charts. We also attempted to determine the history of forest management at each known Red-shouldered Hawk nesting territories.

RESULTS

During our investigations for Red-shouldered Hawk nesting along the Upper Mississippi River in 1999 we searched a total of 51 areas (186 visits) and located Red-shouldered Hawks in 32 areas. We confirmed nesting in 16 sites (Table 1); of these, nine nesting attempts were successful (56.25%) producing 19 nestlings for an average of 2.11 nestlings per successful nest and 1.19 per known nesting attempt. We suspected Red-shouldered Hawks nesting in 16 additional sites where we observed territorial behavior but could not confirm nesting (Table 2).

We searched eight sites where we found no evidence of Red-shouldered Hawk activity (Table 3A). In five of these sites we had documented Red-shouldered Hawk activity in previous years.

Our searches in eleven sites were considered incomplete (Table 3B); we had documented Red-shouldered Hawk activity in four of these eleven sites in previous years. We did not search seven areas where we suspect or had previously documented Red-shouldered Hawk nesting (Table 3C).

DISTRIBUTION OF NESTING SITES BY STATE, USCOE DISTRICTS, AND U.S.FISH & WILDLIFE SERVICE DISTRICTS

Of the thirty two territories where we confirmed or suspected Red-shouldered Hawk nesting along the Upper Mississippi River, fifteen were in Iowa, seven were in Wisconsin, and ten were in Illinois. Seventeen were in the Rock Island District of the U.S. Army Corps of Engineers Natural Resources Division (Pools 11-19), and fifteen were in the LaCrescent District (Pools 4-11).

Twenty one of the thirty two territories were in the U. S. Fish & Wildlife McGregor District (Pools 9-11), six were in the Savanna District (Pools 12-14), and five were in the Wapello District (Pools 16-19).

Of the sixteen confirmed nesting sites, fifteen were on federal land (thirteen on U.S. Fish & Wildlife Refuge Lands and two on Effigy Mounds National Monument property), and one was on private property.

TIMING OF THE RED-SHOULDERED HAWK NESTING CYCLE

The timing of most Red-shouldered Hawk nesting attempts we monitored during 1999 was similar to that found in previous years. Definition of territorial boundaries, courtship activities, copulation, and nest building takes place in March. Eggs are generally laid the last few days in March or the first few days in April. Incubation generally lasts about 32 days, and the young Red-shoulders usually hatch during the first few days in May.

Typical fledge dates for young Red-shouldered Hawks during 1999 were between June 8 and 14. The earliest fledge date was June 3 or 4 at the Glen Lake/Wyalusing nest, while the latest fledge date was June 21 at the Wisconsin River nest (the closest nest to the north of the Glen Lake/Wyalusing nest).

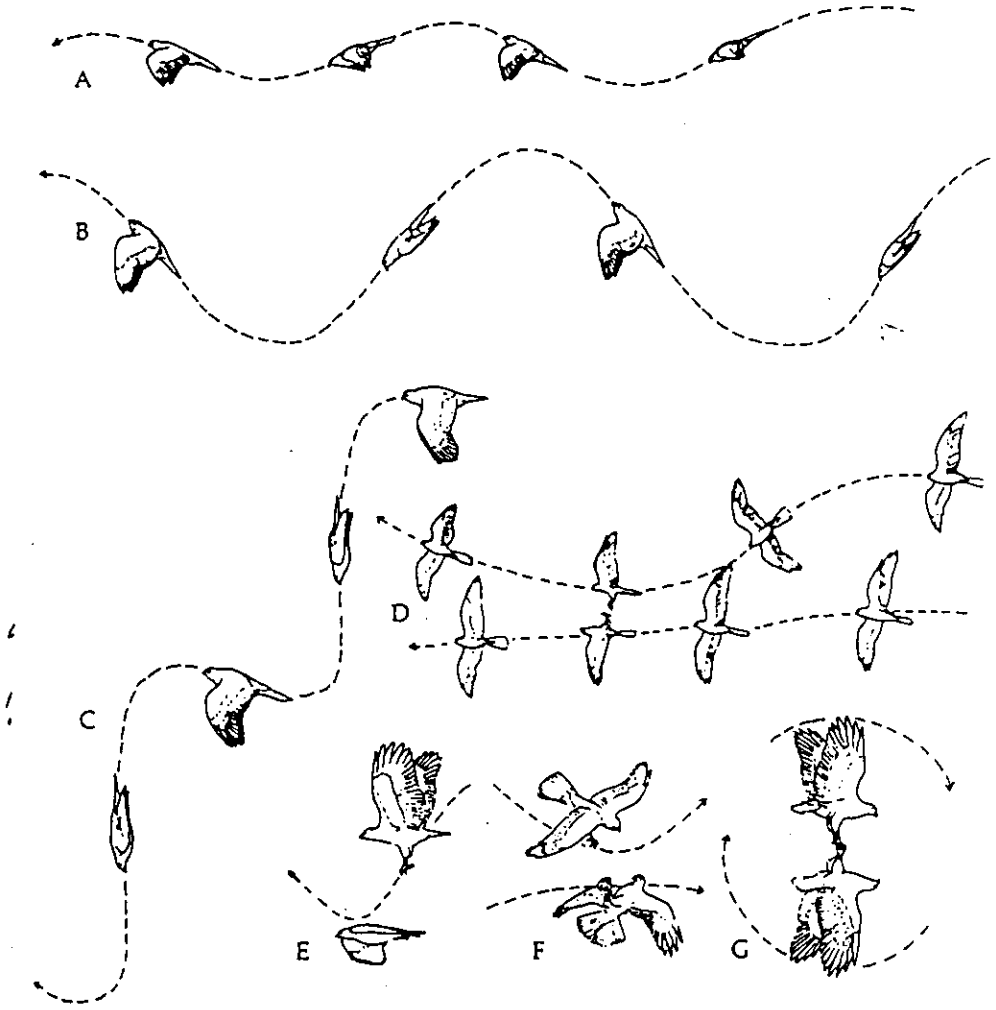

Figure 16. Aerial displays of accipitrid falconiforms, including shallow (A) and deep (B) undulating flight or "sky dancing," "pothook" dives and swoops (C), mutual soaring, diving and foot touching (D), "parachuting" (E), talon grasping (F), and "whirling" or cartwheel: (G). After Brown and Amadon (1968), except for F, which is after Cramp and Simmons (1980). See also Figure 53 for aerial displays of falcons.

RESULTS - McGREGOR DISTRICT

During our 1999 investigations in the McGregor District area we confirmed Red-shouldered Hawks nesting in twelve areas. Of the twelve confirmed nesting attempts, six (50%) were successful producing eleven nestlings for an average of 1.83 per successful nest and 0.92 per known nesting attempt. We observed Red-shouldered Hawk territorial activity but could not confirm nesting in an additional nine sites within the McGregor District.

We documented Red-shoulder nesting in three sites that had not previously been recorded (North Bertom Lake, Wisconsin River Bluff, Lower Sny Magill/Clayton). However, we also found no evidence of Red-shouldered Hawk nesting in three sites where we had previously confirmed active and successful nesting (Paint Creek, Chase Creek, and Bluff Chute/Turkey River Mounds).

We found eight active territories between river miles 632 and 625 in the middle portion of Pool 10. This area includes the Wyalusing/Wisconsin River confluence and the Sny Magill/Johnson Slough complex. Both sides of the river have extensive floodplain forests as well as suitable bluff and valley slope forests. All of active nest sites we located were relatively close to the interfacing edge of floodplain and valley forests.

It also appears that Red-shouldered Hawks in this specific area spend considerable time foraging on the nearby islands. Islands #176 in particular was frequently used by Red-shoulders. We found a variety of suitable foraging habitats and a significant frog diversity on this particular island.

RESULTS - MILAN BOTTOMS

During our investigations in 1999, we located three active Red-shouldered Hawk nesting attempts within the Milan Bottoms/Mill Creek study area. Each of the nest sites were located near areas of previously known Red-shouldered Hawk nesting attempts (Map 1). Of these three nesting attempts, two were successful (66.7%) producing 6 fledglings (an average of 3.0 per successful nest and 2.0 per known nesting attempt).

During March of 1999, water levels within the study area were somewhat lower than previous years and much of the study area was reasonably dry. Water levels rose to typical spring flooding levels in mid-April and stayed relatively high until mid-June.

RED-SHOULDERED HAWK NESTING SITES WITHIN MILAN BOTTOMS.

Cooter Slough - just south of the small side channel. This may be the same pair that nested on the island just west of the timber harvest in 1998. Nest tree was 16.1" dbh green ash (smallest nest tree we have recorded as RSH nest tree). Four nestlings reached the age of 35 days. This is the first 4 nestling nesting attempt we have recorded since 1984, and the first ever within the Wapello District and the Milan Bottoms. This site had between three and four feet of water on the nest tree for most of the time between mid-April through mid-June.

Confluence of Mill and Sand Creek - private property west of Mill Creek.
Various nesting sites within this area have been used between 1992 and 1999. The nest tree in 1999 was a Silver Maple. At least two nestlings reached the age of 33 days. This nest site was in the driest location of the three Milan Bottoms nesting sites. It was relatively dry during the early part of the nesting cycle, and then had about 6-10 inches of water on the nest tree during the highest water levels.

Powerline/Brandt's - This nest site was situated on USCOE property just west of the Powerline and just south of Charlie Brandt's property. This site has been an active nest site for three consecutive years. The nest tree was a 19" green ash. This site had between three and four feet of water on the nest tree for most of the time between mid-April and mid-June. This nesting attempt failed; we are uncertain of the cause of the failure, but it may have been due high winds and falling branches near the nest tree. Also, we observed several episodes of conflictual interaction between these Red-shoulders and an adult Red-tailed Hawk.

DISCUSSION OF RED-SHOULDERED HAWK REPRODUCTIVE SUCCESS IN 1999

The Red-shoulder reproductive success rate for known nesting sites along the Mississippi River in 1999 of 56.25% was slightly lower than the overall average from 1983-1998 (68.7%). We consider the average of 2.11 nestlings per successful attempt as suitable however, the average of 1.19 nestlings per known nesting attempt is below the overall average for Red-shoulder nesting attempts along the Mississippi River 1983-1998 (2.12 per successful nest and 1.46 per known attempt).

Red-shouldered Hawk reproductive success within the Milan Bottoms in 1999 (3.0 per successful nest and 2.0 per known nesting attempt) was considerably higher than the average reproductive success from this area between 1992-1998 (1.71 per successful nest and 0.92 per known attempt).

The weather during the 1999 was typically wet. The timing of extended periods of cool wet weather was perhaps disadvantageous since it occured at the onset of incubation and again during the first few days following hatch. Previous observations indicate that extended periods of inclement weather during these particular periods of the nesting cycle can have a direct impact on reproductive success.

The McGregor District was hit rather hard by storms with heavy rain and strong winds in mid-May. Water levels along the Mississippi River during 1999 were typical, although the duration of the high water was perhaps a consideration (mid-April through mid-June).

One of the failures in the McGregor District (Lower Sny Magill) may have been attributed to being a first-time nesting attempt since one of the adults appeared to be a second year bird.

COMPARISON OF REPRODUCTIVE SUCCESS AT INTERIOR AND EDGE NESTING SITES

Five of the six Red-shoulder nesting attempts at interior sites (those situated within a large forest tract) were successful -(83.3% success rate - 1.85 nestling per successful nest and 1.4 per known nesting attempt).

Two of the six Red-shoulder nesting attempts situated near a soft edge (pond or narrow slough) were successful (33.3% success rate, 2.5 nestlings per successful attempt, 0.8 per known nesting attempt).

Two of the four Red-shoulder nesting attempts that were situated near a hard edge (highway or agricultural land) were successful (50% success rate, 2.5 nestlings per successful nest, 1.25 per known nesting attempt).

COMPARISON OF REPRODUCTIVE SUCCESS AND RESEARCH DISTURBANCE

Although our observations were preliminary and our sample size was relatively small, our comparative observations appear to show no negative affects from our research methods. Four of the six nesting sites that were visited approximately once each week throughout the nesting season were successful (66/7%), producing ten nestlings (2.5 per successful nest and 1.67 per attempt).

Two of the five active nests that were visited approximately once every fifteen days were successful (40%), producing 3 nestlings (1.33 per successful nest and 0.6 per attempt).

Three of the five nesting attempts that were visited only twice during the entire nesting season (once to determine occupancy and once to determine reproductive success) were successful (60%), producing five nestlings (1.4 per successful nest and 1.0 per attempt).

DISCUSSION - RSH REPRODUCTIVE SUCCESS AND RESPONSE TO TIMBER HARVESTS.

This year's study documented the second straight year we have found three Red-shouldered Hawk nesting attempts within the Milan Bottoms. The six Red-shoulder nestlings to reach fledging age marks the highest productivity we have recorded within the study area since observations began in 1992. In previous years, we have found a lower reproductive success for Red-shoulders nesting within the Milan Bottoms than in other portions of the Upper Mississippi. However, in 1998 and again in 1999, reproductive success within the Milan Bottoms was better than in other regions of the Upper Mississippi River.

Two of the known nesting attempts within the Milan Bottoms were within 1/2 mile of the timber harvest that was completed in 1994. One of these has been occupied for three consecutive seasons, and the other nesting attempt is the first nesting attempt that we have found to contain four nestlings since 1984. Consequently, it appears there has been no unfavorable reaction to the two timber harvests on Red-shouldered Hawks in terms of reproductive success and especially in terms of nest site selection.

Previous research has suggested that fragmentation of large forest tracts that are suitable for Red-shoulder habitat may favor Red-tailed Hawks due to the increase in edge habitat. Timber cuts within core Red-shoulder nest-site habitat may disrupt established territorial boundaries and could eventually discourage Red-shoulder nesting (Bednarz & Dinsmore 1981; Hands et al 1989; Jacobs & Jacobs 1993). However, studies in some locations have also suggested that Red-shoulders may benefit from small cuts of less than 20 acres. Such cuts may provide suitable foraging habitat and also help to insure suitable nest site habitat in 50-70 years (DiJack et al 1990: Jacobs & Jacobs 1993; Stravers et al 1996).

In some respects it appears that Red-shouldered Hawks within the Milan Bottoms are selecting nest site locations closer to the forest edge than in other locations along the Upper Mississippi River. We can only speculate as to some of the factors that might be influencing Red-shoulder nest site selection. However, it may be related to significant avian activity within the core area of mature timber within the Milan Bottoms during March when territorial boundaries are being defined.

Wintering Bald Eagle counts during February and March of 1999 showed at least 100 Bald Eagles wintering within the Milan Bottoms (Ann Mankowski, Illinois DNR Biologist, pers com.). In addition, Great Blue Herons return in March to an active herony in this area which has a significant concentration of active nests (probably between 60-150). Their nest site selection within the study area has changed somewhat during the past four years as they have moved closer to the heart of the most mature timber which is slightly east and north from the original location.

Red-shouldered Hawks seek safe territorial space when selecting nest sites (Crocoll 1994; Palmer 1998), and they may be selecting nesting sites that are away from areas where hundreds of Bald Eagles and Great Blue Herons are constantly passing overhead.

RECOMMENDATIONS FOR FUTURE RESEARCH AND MONITORING

From our observations during the past four years within the Milan Bottoms, it appears that the USCOE's methods of timber management, which incorporates small clear of less than 20 acres, may cause a minimum of disturbance to nesting Red-shouldered Hawks, especially in cases where the timber harvests are completed between November and February. We agree with this approach to timber management as long as the overall plans provide for a protected core area, and as long as the core Red-shouldered Hawk nesting sites are protected.

We would like to continue our observations of Red-shouldered Hawk nesting and reproductive success within the Milan Bottoms in the coming years. We feel this site and this research can provide some important, and previously lacking, long-term data on Red-shouldered Hawk nest-site selection, nest-site re-occupation, and reproductive success.

We would like to continue our observations within the Milan Bottoms and we are considering several additional aspects:

1) In previous years, we have made only casual observations on Red-shouldered Hawk prey selection. We would like to define more closely the critical areas of Red-shouldered Hawk foraging and the specific prey items that Red-shoulders might be utilizing.

2) It may be beneficial to look more closely the rate of Red-shouldered Hawk foraging within the two timber harvests during the period of five years after the cut.

3) We have made a few casual observations during the fall and winter, but we may be able to add to our knowledge of Red-shoulder habitat utilization by increasing the amount of observation time during the fall and winter.

4) We should spend more time in the eastern portion of the study area (mature forest east of Mill Creek and west of I-280 bridge) in order to determine the factors that may be influencing the lack of Red-shouldered Hawk nesting in that area.

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TABLE 1. AREAS WHERE WE CONFIRMED RED-SHOULDERED HAWK NESTING ALONG THE UPPER MISSISSIPPI RIVER DURING 1999 - (16 TOTAL AREAS)

SITE NAME - DISTRICT/POOL - STATE/RIVER MILE	RESULTS - #NESTLLINGS
Kain's Siding north - McGregor/9 - IA/669.7	successful - 1
Yellow River lower/EFMO - McGregor/10 - IA/638.0	failed
Wyalusing Bluff - McGregor/10 - WI/631.0	successful - 2
Wyalusing/Glen Lake - McGgregor/10 - WI/629.7	successful - 3
Upper Johnson Slough - McGregor/10 - IA/629.1	successful - 2
Sny Magill Middle/EFMO - McGregor/10 - IA/627.4	successful - 2
Sny Magill Lower - McGregor/10 - IA/626.8	failed
Wyalusing Slough/Clayton - McGregor/10 - IA/625.4	failed
Cassville Slough - McGregor/11 - WI/610.3	failed
Dead Lake/Spring Lake - McGgregor/11 - IA/605.7	failed
Bertom Lake North - McGregor/11 - WI/602.8	failed
Plum Creek - McGregor/11 - IA/602.3	successful - 1
Sinsinawa River - Savanna/12 - IL/569.0	successful - 2
Milan/Mill Creek - Wapello/16 - IL/477.5	successful - 2
Milan/Charlie's - Wapello/16 - IL/476.5	failed
Milan/Cooter Slough - Wapello/16 - IL/476.1	successful - 4

TOTALS: 16 known attempts - 9 successful 56.25%
19 nestlings = 2.11 per successful nest, 1.19 per known attempt

TABLE 2. AREAS WHERE WE FOUND RED-SHOULDERED HAWKS PRESENT AND OBSERVED TERRITORIAL ACTIVITY BUT COULD NOT CONFIRM NESTING. (16 TOTAL AREAS)

SITE NAME - DISTRICT/POOL - STATE/APPROXIMATE RIVER MILE

Kain's Siding south - McGregor/9 - IA/669.5

Kain's Siding west - McGregor/9 - IA/669.8

* Wexford Creek - McGregor/9 - IA/650.0

Yellow River/Ferguson - McGregor/10 - IA/upriver

* Wyalusing East - McGregor/10 - Wisconsin River

Johnson Middle - McGregor/10 - IA/628.6

* Sandy Creek - McGregor/10 - WI/621.3

* Eagle Valley/Spring Branch - McGregor/11 - WI/611.2

Muddy Creek - McGregor/11 - WI/611.8

Menominee Slough - Savanna/12 - IL/570.3

Galena River Upper - Savanna/12 - IL/up river

Galena River Lower - Savanna/12 - IL/564.4

Smallpox Creek - Savanna/12 - IL/563.2

Wapsipinicon North/Folletts - Savanna/14 - IA/upriver

Lower Thunder Chute - Wapello/16 - IL/464.0

Pope Creek - Wapello/18 - IL/427.7

* territories where nest may be located off the refuge on valley slope

TABLE 3. SUMMARY OF "NO FIND" AREAS FOR RED-SHOULDERED HAWKS - 1999

A. AREAS WHERE WE FOUND EVIDENCE OF RED-SHOULDERED HAWK NESTING (8)

SITE - STATE - F&WS DISTRICT - POOL

* Paint Creek - IA - McGregor - 10
Railroad track Slu - WI - McGregor - 10
* Chase Creek - WI - GHO - McGregor - 10
Frenchtown Lake/Eckard's - IA - McGregor - 10
Goetz Slough - IA - McGregor - 11
* Turkey River Mounds - IA - McGregor - 11
* Shawandasse Slough - IA - Savanna - 12
* Wapsipinicon River/South - IA - Savanna - 14

3B. AREAS WHERE OUR SEARCHES CONDSIDERED INCOMPLETE (11)

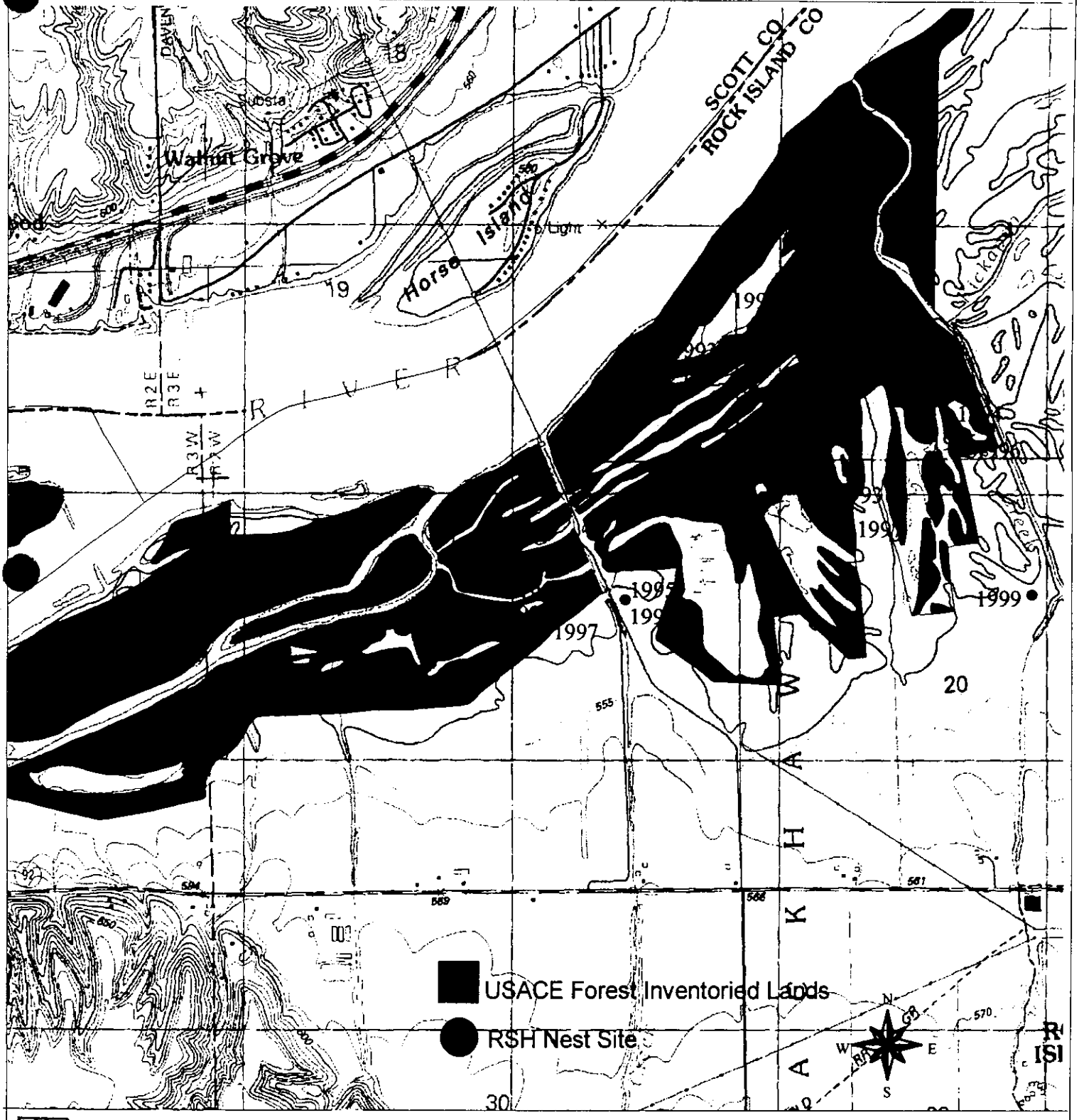
* Upper Iowa confluence/Big Slough - IA - McGregor - 9
Rush Creek - WI - McGregor - 9 - uncertain
Ambrough Slough - WI - McGregor - 10 - uncertain
Gassner Lake - WI- McGregor - 10 - uncertain
* Schliker's/Waterfall Creek - McGregor - 11
Jack Oak Slough - IA - McGregor - 11 - uncertain
Snyder Slough - WI - McGregor - 11 - uncertain
Big Menominee River - IL - Savanna - 12 - uncertain
* Savanna Army Depot - IL - Savanna - 12
* Wapsipinicon River Middle - IA - Savanna - 14
* Lake Odessa/Iowa River - IA - Wapello - 17

3C. AREAS THAT WERE NOT CHECKED DURING 1999 - (7)

Running Slough - IA - McGregor - 9 - previously suspected nesting
Little Maquoketa - IA - McGregor - 11 - uncertain
Stumpf Island - IL - Savanna - 12 - uncertain
Lainsville Slough - IA - Savanna - 13 - previously suspected nesting
Marcus Bottoms - IL - Savanna - 13 - uncertain
* Esamy Slough - IA - Savanna - 13
* Patterson Lake/Blachawk - IA - Wapello - 19

- areas where we have previously confirmed Red-shouldered Hawk nesting

Location of Red Shouldered Hawk Nests in the Milan Bottoms Complex



US Army
Corps of Engineers
Rock Island District
Mississippi River Project
Natural Resources Management Section

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