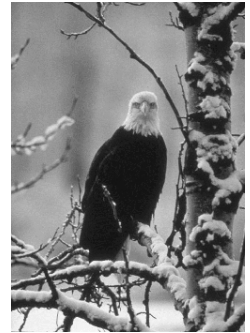




# 2005 Minnesota Bald Eagle Surveys

## Summary

The Minnesota Department of Natural Resources' Nongame Wildlife Program (DNR), working in cooperation with U.S. Fish and Wildlife Service (FWS) and U.S. Geological Survey (USGS) biologists, conducted two statewide bald eagle surveys in the spring of 2005. A survey of all known nest sites identified 872 nests with adult eagles present, a 28% increase over the 681 active nests found in 2000, the year of the most recent similar survey. A separate, first-time survey of 61 random plots yielded an estimate of 1,312 active bald eagle nests within Minnesota, indicating that the locations of only 66% of the state's nests had been found in the survey of known nests. With the support of the results of these and similar surveys in Maine, Florida, and Washington, the FWS on February 16, 2006 reopened the comment period on its 1999 proposal to remove the bald eagle from its threatened species list.



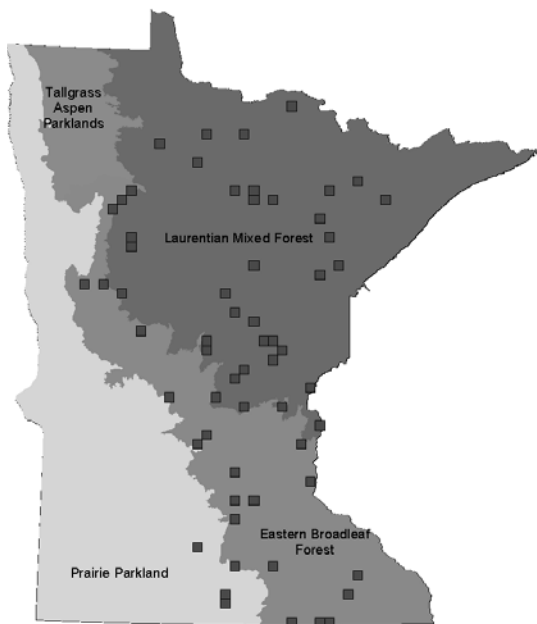
## Methods

### *Known Nest Survey*

In early 2005, DNR staff distributed emails and press releases requesting bald eagle nest reports from the public and natural resource professionals throughout the state. Regional Nongame Wildlife Program staff combined these reports with historical nest data to create lists of known nests, which were assigned to one of 14 DNR, FWS, National Forest, or National Park Service survey teams. Surveyors in fixed-wing aircraft visited 1,933 nest locations between March 22<sup>nd</sup> and May 4<sup>th</sup> to determine the status of each nest (i.e., active, empty, or unable to be found). At each nest, geographic coordinates and the activity of adults were noted on a touch-screen laptop computer displaying a map of the plot and synchronized with the aircraft's GPS unit.

### *Random Plot Survey*

A stratified random sample of sixty-one 100 km<sup>2</sup> survey plots was drawn from a 10 km by 10 km grid overlaying 3 of the state's 4 ecological provinces (Fig. 1). Thirty-five plots were allocated to the Laurentian Mixed Forest Province (LMF), and 22 were allocated to the Eastern Broadleaf Forest Province (EBF). With the exception of 4 plots in its southeast corner, the Prairie Parkland Province (PP) was excluded because of the small number of eagle nests known from that region. Plots were assigned to one of two 3-person survey crews who were not familiar with eagle nests within the plots. Crews used aerial photos to identify all potential eagle habitat within each plot, and designed flight paths to cover those areas. Surveys to find all nests within each plot were conducted from fixed-wing aircraft between April 5<sup>th</sup> and 15<sup>th</sup>. Each survey crew included a pilot and two observers. To provide an estimate of detectability, each crew member recorded their observations independently, with observations compared only after a nest was passed. Observations were recorded on a touch-screen laptop as in the known nest survey.

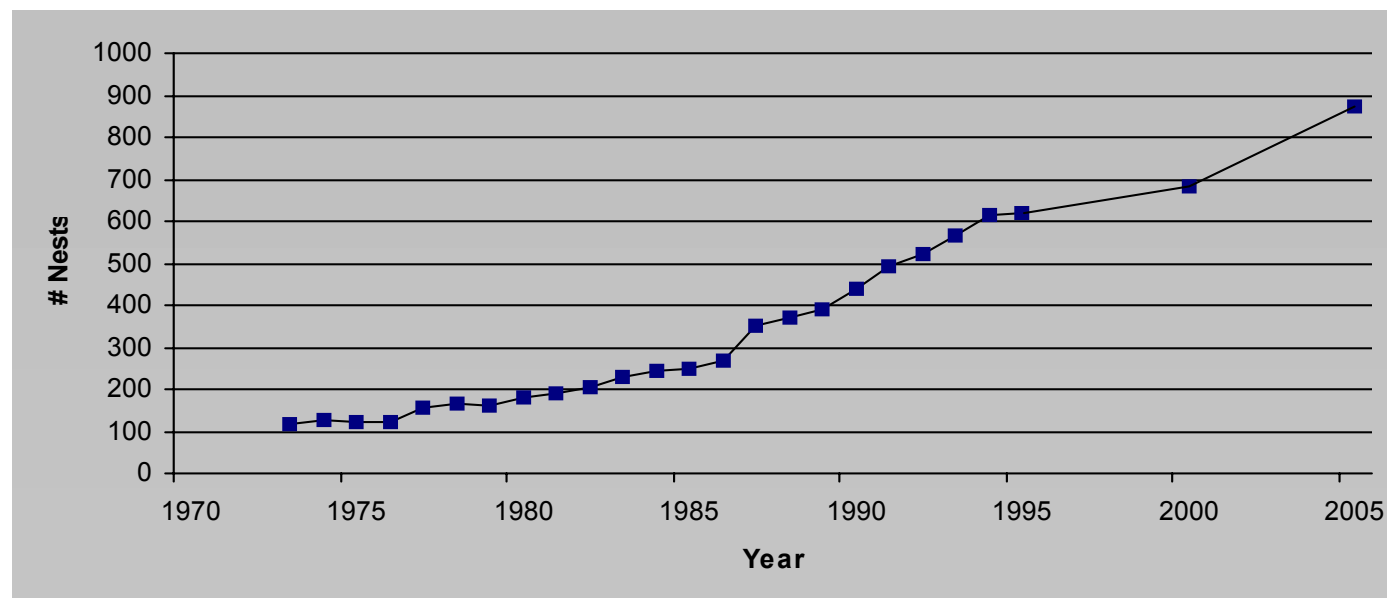


**Figure 1.** Locations of 61 random plots, in relation to Minnesota's four ecological provinces.

### *Data Reconciliation and Analysis*

All survey data were submitted to DNR staff for reconciliation. To identify nests within random plots that were not previously known, results of the two surveys were systematically compared using GIS software (ArcView 3.3) and with the aid of notes and data provided by the observers. Nests within 1 mile of each other were reconciled in consultation with surveyors. Once reconciled, the data were sent to FWS and USGS statisticians for analysis.

## Results



**Figure 2.** Number of known active bald eagle nests in Minnesota, 1973–2005

### Known Nest Survey

A total of 1,933 nest sites were surveyed during 109 hours of flight time. In addition to 872 nests with evidence of reproductive activity, surveyed sites included 32 nests with adults present (but with no sign of reproductive activity), 464 inactive nests, and 565 nests either in disrepair, fallen, or reported but not found. Statewide, there has been a steady increase in known active nests since 1973 (Fig. 2). The number of known active nests increased 28% from 2000, with >100% increases along the lower Mississippi River, in southwestern Minnesota, and in the Twin Cities metropolitan area (Table 1). Known active nests were located in 10 additional counties in which they had not been found in 2000. The number of known active nests increased beyond the 2000 figure in 42 counties, declined in 13 counties, and remained unchanged in 6 counties. No eagle nests were reported in 16 counties (Figures 3 & 4).

**Table 1.** Results of the 2005 Known Nest Survey (active nests only) - comparison with 2000 survey results

	2000	2005	% CHANGE
<b>MAJOR FEDERAL LAND UNITS</b>			
Chippewa National Forest (USDA, Forest Service)	143	150	4.9%
Superior National Forest (USDA, Forest Service)	78	90	15.4
Tamarac National Wildlife Refuge (USDI, Fish and Wildlife Service)	21	19	-9.5
Upper Mississippi River National Wildlife and Fish Refuge (USDI, Fish and Wildlife Service)	15	36	140.0
Voyageurs National Park (USDI, National Park Service)	25	26	4.0
<b>SURVEYED LANDS OUTSIDE OF MAJOR FEDERAL LAND UNITS</b>			
NW Minnesota	110	160	41.8
NE Minnesota	56	62	10.7
Central Minnesota	148	163	10.1
SW Minnesota	30	67	123.3
SE Minnesota	20	21	5.0
Twin Cities Metro Area	35	78	122.9
<b>TOTALS</b>	<b>681</b>	<b>872</b>	<b>28%</b>

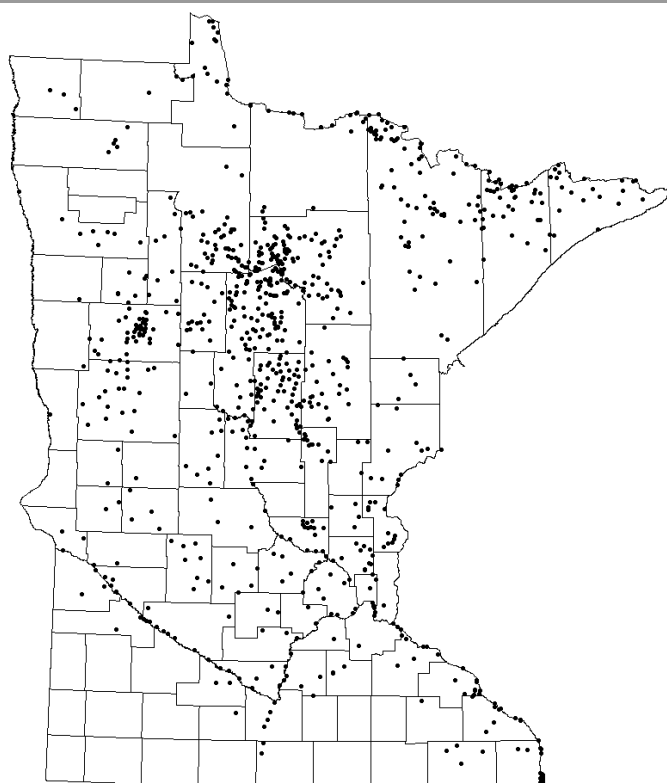


Figure 3. Locations of known active nests, 2005

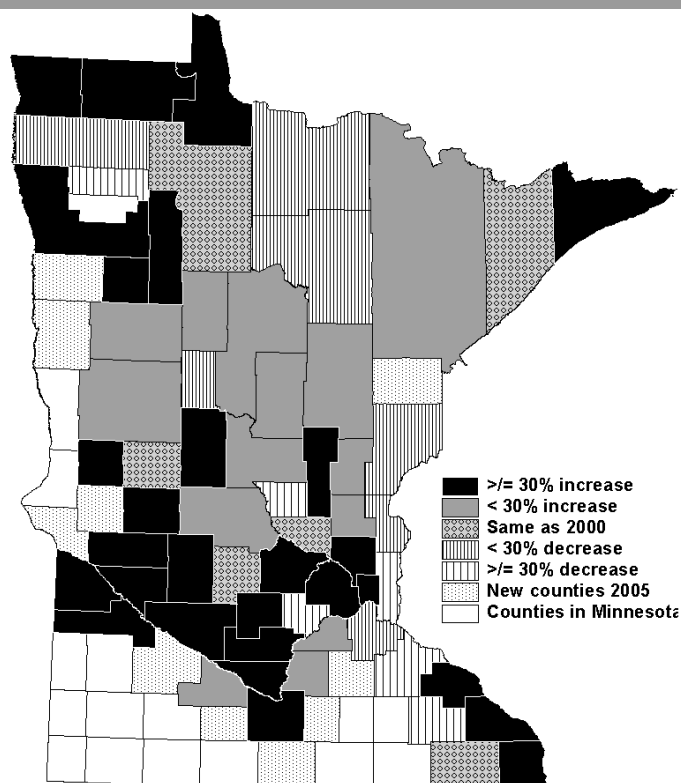


Figure 4. Change in number of known active nests from 2000 to 2005, by county.

### Random Plot Survey

The 61 random plots were surveyed during 55 hours of flight time, and 60 active bald eagle nests were observed. Of these, surveyors found 16 active nests that were not previously known, including 10 within the LMF province, and 6 within the EBF province (Table 2). An analysis of the “capture history” of each of the 60 nests (i.e., if a nest was seen by some observers, but missed by others) provided an estimate of surveyors’ ability to detect eagle nests within the random plots. This analysis indicated that 96% of the nests in the plots were seen by at least one observer, and this adjustment for probability of detection was incorporated into the final population estimate (Table 2). These results provide an estimate (and 95% confidence interval) of 1,312 ( $\pm 220$ ) active bald eagle nests in Minnesota in 2005.

Table 2. Results of the 2005 Random Plot Survey

Province (see Fig. 1)	# plots surveyed	# previously unknown active nests found in surveyed plots	average # previously unknown nests per surveyed plot	total # plots	estimated total # previously unknown nests, adjusted for probability of detection	total # known nests	estimated total # nests
Laurentian Mixed Forest	34	10	$10/34 = 0.294$	1003	$(1003 \times 0.294) / 0.96 = 307$	592	$307 + 592 = 899$
Eastern Broadleaf Forest	23	6	$6/23 = 0.261$	491	$(491 \times 0.261) / 0.96 = 133$	197	$133 + 197 = 330$
Prairie Parkland	4	0	0	703	0	73	73
Tallgrass Aspen Parklands	0	—	—	—	—	10	10
<b>Total</b>	<b>61</b>	<b>16</b>	—	—	<b>440</b>	<b>872</b>	<b>1312</b>

## Discussion

The results of the 2005 Known Nest Survey reflect a steady increase in Minnesota's bald eagle population over the past thirty years. In addition to a 28% statewide increase in known active nests since 2000, the survey documented an increase in known active nests within 52 (60%) of Minnesota's 87 counties during that period. As in 2000, the greatest increases in numbers of known nests were observed at the edge of the bald eagle's range in the state, indicating that the species is continuing to expand into southern and western Minnesota, regions from which it disappeared over 100 years ago.

The 2005 Random Plot Survey provides the first-ever estimate of Minnesota's bald eagle population. The 1,312 ( $\pm 220$ ) nest estimate indicates that the 2005 Known Nest Survey detected approximately 2/3 of the state's bald eagle nests. Given the consistency in methodology over the years, it is likely that this proportion applies to past Known Nest Surveys as well.

The DNR hopes to conduct Random Plot and Known Nest Surveys in 2010 in order to continue to monitor the recovery of the bald eagle in Minnesota. The FWS has renewed its effort to remove the bald eagle from the federal threatened species list, and is using the results of surveys in Minnesota and elsewhere to support this effort.

Other recent research sponsored by the DNR and FWS demonstrates that bald eagles are tolerant of human presence near their nests, and that nesting eagles tend to utilize large trees in close proximity to water. Minnesotans must continue to treat bald eagles with respect, protect nesting habitat, and avoid unnecessary disturbance to nests if eagles are to continue to be enjoyed by Minnesotans as a significant component of our state's natural heritage.

## Acknowledgements

Minnesota's 2005 Bald Eagle Surveys depended upon the cooperative efforts of many individuals. We thank the following for their contributions:

### Known Nest Survey:

Brad Bolduan, MNDNR Nongame Wildlife  
Al Buchert, MNDNR Enforcement  
Tom Buker, MNDNR Enforcement  
Gaea Crozier, MNDNR Nongame Wildlife  
Lowell Deede, Tamarac NWR  
Melissa Driscoll, MNDNR Nongame Wildlife  
Jaime Edwards, MNDNR Nongame Wildlife  
Jerry Engelbrecht, MNDNR Enforcement, retired  
Lisa Gelvin-Innvaer, MNDNR Nongame Wildlife  
Lee Grim, Voyageurs NP

Maya Hamady, MNDNR Nongame Wildlife  
Katie Haws, MNDNR Nongame Wildlife  
John Heineman, MNDNR Enforcement  
Steve Kittelson, MNDNR Nongame Wildlife  
Bruce Lenning, MNDNR Nongame Wildlife  
Ed Lindquist, USFS, Superior NF  
Eric Nelson, Upper Mississippi NFWR  
Barb Perry, MNDNR Nongame Wildlife  
Pam Perry, MNDNR Nongame Wildlife

Tom Pfingsten, MNDNR Enforcement  
Tom Rusch, MNDNR Wildlife  
Rich Staffon, MNDNR Wildlife  
Brian Stemper, Upper Mississippi NFWR  
Dick Stoltman, MNDNR Enforcement, retired  
Frank Swendsen, MNDNR Wildlife  
Al Williamson, USFS, Chippewa NF  
Steve Windels, Voyageurs NP  
Kevin Woizeschke, MNDNR Nongame Wildlife

### Random Plot Survey:

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Laurie Fairchild, USFWS  
Carl Ferguson, USFWS

Joan Galli, MNDNR Nongame Wildlife, retired  
Steve Kittelson, MNDNR Nongame Wildlife  
Brian Lubinski, USFWS  
Jody Millar, USFWS

Tom Pfingsten, MNDNR Enforcement  
Nick Rowse, USFWS  
Mike Trenholm, MNDNR Enforcement

### General Support:

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Sharon Nelson, MNDNR Heritage

### Computer Support:

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Chris Scharenbroch, MNDNR MIS

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