

Bald Eagle (*Haliaeetus leucocephalus*) status in Iowa, 2022

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Abstract

The Iowa DNR coordinates two different surveys, which are designed to monitor Bald Eagles in the state. The Bald Eagle Nest Monitoring Survey employs volunteer community scientists to annually monitor at least 25% of the nests in Iowa excluding those found on the Upper Mississippi Wildlife Refuge. The Bald Eagle Midwinter Survey occurs in January along most of the major rivers in Iowa. These two surveys together provide a dataset that can be used to evaluate the Bald Eagle population in Iowa. After the 2022 nesting season, Iowa had 509 active Bald Eagle territories. Only 42% of the 292 nests surveyed were successful and on average 0.88 young were produced per nest. In January of 2022, a record total of 5,709 Bald Eagles were counted on the Bald Eagle Midwinter survey, averaging 3.4 birds observed per mile of river surveyed. The results of the surveys were very mixed with a record number of eagles being counted in the midwinter survey and a normal start to the nesting season, which was then followed by an abnormally high level of nest failure and the first time the average number of young per nest has dropped below 1 since the survey started in 2010. The poor nesting success may have been because of the prevalence of Highly Pathogenic Avian Influenza in Iowa though this has not been confirmed as the cause.

Introduction

In the last 25 years, Iowa has witnessed a dramatic increase in the number of nesting and wintering Bald Eagles. Nationally, the Bald Eagle has recovered enough from the dangerously low numbers of the 1960's and 1970's that the U.S. Fish and Wildlife Service removed it from the Threatened and Endangered species list (T&E list) in 2007 (Removing the Bald Eagle, 2007). Iowa followed suit by moving the eagle from a status of Threatened to a status of Special Concern on the state T&E list in 2009. Since that time the bald eagle population has remained on an upward or stable trajectory.

The Iowa DNR uses two different surveys to monitor Bald Eagle Populations in Iowa:

- Bald Eagle Nest Monitoring
- Bald Eagle Midwinter Survey.

The goal in monitoring Bald Eagle nesting data is to measure reproductive success while also building a robust, though not comprehensive, database of eagle nest locations. For monitored nests, data is collected on annual activity and the number of young successfully produced and these data can then be used as indices of the resident population's health.

The Bald Eagle Midwinter Survey, focuses on the Eagles that use Iowa's rivers as winter foraging habitat. This survey is national in scope and [is coordinated at that scale by the U.S. Army Corps of Engineers](#). Iowa's rivers hold some of the largest congregations of wintering Eagles in the lower 48 states. The same segments of river have been surveyed since the early 1990s and the survey provides a long-term trend which when combined with data from other states is a helpful index of eagle population trends at a larger scale.

This report summarizes data collected on Bald Eagles during January 2022 and the nesting season that followed.

Study Area

The Iowa DNR's formal nest monitoring program focuses on monitoring nests statewide, excluding nests located on the Upper Mississippi Wildlife Refuge. Opportunistic reports of new nests or existing nest activity from various sources are accepted. However, for most summary and analyses, monitoring data collected by trained volunteers and staff are used. In 2022, standardized data was collected on 292 Bald Eagle territories in 76 Iowa counties spaced across the state (figure 1).

The Bald Eagle Midwinter Survey also has statewide coverage and includes survey routes along the following rivers in Iowa: Mississippi, Des Moines, Skunk, Maquoketa, Missouri, Wapsipinicon, Chariton, Iowa, Cedar, Little Sioux, South Maquoketa, Turkey, Nodaway, as well as Lakes Saylorville, Red Rock and Rathbun and a few other smaller waterbodies. Routes were not randomly mapped but were intentionally designed to cover primary Bald Eagle habitat. In 2022, 1,673.5 miles of river or lake shore were surveyed on 50 standardized routes (figure 3). This survey is part of a larger nationwide survey currently being coordinated by the U.S. Army Corps of Engineers. As of 2010, 44 states participated in the nationwide survey.

Methods

Bald Eagle Nest Monitoring

Since eagles returned to nest in Iowa in the late 1970's, the DNR has engaged in opportunistic data collection on eagle nesting territories. Opportunistic data collection includes casual monitoring of some eagle nests by DNR personnel as well as reports of nest locations and activity from all Iowans. These data are not systematically collected so the data available for each breeding territory varies. Additionally, the territories reported on may not be representative (i.e. people may be more likely to report an active nest versus an inactive nest).

To complement the opportunistic reports received, the Iowa Department of Natural Resources (DNR) has a program to collect data on bald eagle nesting territories in a more systematic manner. This data collection method relies heavily on trained volunteers who monitor nests that are assigned to them in their area. Summaries and analysis are done on all nests monitored by volunteers, both random (sentinel) and non-random. To make sure non-random territories do not skew the data, the two sets of nests were first analyzed separately and then together and it was determined that no differences in the data would provide an overly positive or negative result.

Volunteer monitors visit their assigned nest site at least 3 times during the nesting season and collect data on the nest's activity, number of young and number of fledglings. Nests are observed using optics from a distance to avoid disturbance and as such, not all of the required data can be collected on each site; the number of young hatched is particularly challenging to collect. Volunteers monitor the same nests annually and they continue to monitor an inactive nest for 3 years of inactivity before that nest is retired from monitoring and is designated as an inactive breeding territory.

Monitoring focuses on Bald Eagle breeding territories and not necessarily individual nests. Eagles are known to rebuild downed nests in close vicinity to the original nest and sometimes even build alternate nest sites when the original nest appears in good condition. Our working definition of a breeding territory based on evidence from the dataset and other literature (Buehler 2000): "A habitat area up to 1 mile in radius (though sometimes

smaller in good habitat) that is defended by a pair of eagles and used for breeding. Meets all breeding habitat needs including appropriate trees (or very occasionally other structures) to build nests and a nearby food source. A territory may hold more than 1 nest but may not house more than 1 pair of eagles within the same breeding season. The pair of eagles need not be the same pair across years.”

The metrics used to assess the relative health of the nesting Bald Eagle population are the proportion of nests that fail to produce young versus successful nests and the average number of young fledged per nest. If the percent of failed versus successful nests moves closer together or the average number of fledged young per nest drops below 1 for three years in a row this would trigger some additional conservation actions.

Bald Eagle Midwinter

The Bald Eagle Midwinter survey is conducted each year during the first two weeks of January. There are two dates in the middle of the two-week period that are designated as target dates, and surveyors are encouraged to run the survey on those dates if possible, but the survey can be run on any day during the two-week period. The survey is designed so that surveyors can also run the standardized route at the same time as conducting another national survey, the Midwinter Waterfowl Survey, which is usually scheduled on one day during the first week of January. The survey is meant to ideally be run on clear sunny days with no fog or precipitation impairing visibility. In 2022, the dates for the survey were January 5-19th with target dates of the 7th and 8th.

There are 52 active standard routes in Iowa, of varying lengths and this includes two fixed point routes (routes that only cover 1 mile of habitat, usually a roost site). To conduct the survey, volunteers and staff move along their assigned route at a moderate pace and count all adult and immature eagles that are spotted. All of the routes in Iowa (that aren't fixed point) are driven by car or truck (figure 4). Data is also collected on the amount of time spent surveying, the weather conditions and the percentage of ice coverage along the route. The habitat covered and route driven should be the same each year though detours are sometimes required because of winter road conditions or other road maintenance issues.

Results

Bald Eagle Nest Monitoring

Since 1977, approximately 1,164 bald eagle territories have been recorded by the Iowa DNR. In 2015, the state hit the milestone of having had at least one eagle nest reported in all of Iowa's 99 counties (figure 5). Allamakee County, with 148, has the highest number of nests reported, followed by Clayton County with 71 (figure 5). Following the 2022 nesting season, 509 territories have an overall designation of active, 263 are designated inactive, and 393 have an unknown status (this usually means they have not been reported on >3 years but the nest was active at last report). A territory is considered active if it has had some activity in at least one of the last three nesting seasons.

In 2022, a total of 292 nests were monitored; 81 sentinel territories and 211 non-random nests.

Within the 292 territories monitored, 245 were active (84%), 43 were inactive (13%) and four were reported as activity unknown (table 1). The outcome of the nesting season for the 245 active territories broke down as follows: 103 nests successful, 63 failed and 79 were unknown (table 1, figure 6). Failed nests usually had birds at the nest early but they either abandoned or did not produce young.

Out of the 118 territories which had reliable reports of young fledged, 104 young were produced: 53 nests fledged no young, 25 nests fledged 1 young, 32 nests fledged 2 young and 5 nests fledged 3 young. The estimated number of young produced per nest was 0.88 (table 1).

For 36 territories, monitors were able to collect data on the number of chicks and the number of fledglings. Seven young were lost before fledging in these nests. Eaglet survival to fledging was high; 88% of the chicks observed in these nests reached fledging (58 total young counted, 51 fledged), however this was a lower rate than recent years. It should be noted that accurately counting the number of young in the nest, right after hatching, is not always possible from the ground so the accuracy of this analysis is probably low. Survival of immature birds after fledging is not tracked.

Bald Eagle Midwinter Survey

In 2022, 50 routes were completed, covering 1,673.5 miles of habitat. Nineteen (38%) of the 50 surveys were conducted on the target dates of January 7-8th and the average survey took 150 minutes to complete. Weather conditions during the survey were colder than the previous 3 years with an average temperature at 14^o Fahrenheit. Along with the colder temperature, the average percentage of ice cover on the waterways was high at 83%.

A total of 5,709 Bald Eagles were counted during the 2022 Bald Eagle Midwinter Count, which is the highest number ever recorded in Iowa's survey history (figure 8). The next highest count was 4,957 in 2014's survey. The previous 10-year average count is 3,044 birds. The average number of birds counted per route was 114 or 3.4 eagles per mile surveyed (figure. 9). A total of 3,658 of the birds counted, or 64%, were adults and 1,900 (33%) were immatures (figure 10). The remaining 151 birds counted could not be aged. Four Golden Eagles were also observed on the survey on 3 different waterbodies.

The most highly surveyed rivers, which also usually host the highest numbers and density of eagles are the Mississippi and the Des Moines. The Mississippi has traditionally held the most birds but the Des Moines has been more highly used in recent years. In 2022, the total number of birds counted was highest on the Mississippi River, followed by the Des Moines River and then the Iowa River (Table 2). The eagles counted on the Mississippi and Des Moines river accounted for 76% of the total count but the Iowa river had the highest density with an average of 12.1 eagles seen per mile.

Discussion

Bald Eagle Nesting

The 2022 nesting season was one of the least successful in recent years. An average number of monitored nests were reported as active but nest success was much lower than normal. For the first time in the 12-year history of the survey the average number of young per nest dropped below the threshold of 1 and nest success was below 50%. The estimated total number of young produced from the 245 nests reported active was under 200 and the percent of young successfully fledged which is usually above 95% was at 88%.

Considering how different this year's rates were compared to the last ten years (table 1), it suggests that there was some new variable that had an impact on nesting success. Highly Pathogenic Avian Influenza (HPAI) is a virus affecting primarily birds and it was present at high rates in the Midwest in 2022. It was the most likely factor affecting nest success.

HPAI was most present in waterfowl but it also infected birds, like bald eagles and other raptors, that fed on infected waterfowl. We can't say conclusively that HPAI was the cause for the relatively poor nest success rate but the virus was confirmed as present in bald eagles in Iowa. It's unknown whether the virus mostly impacted the eaglets or if there was also high mortality among the nesting adults. Monitoring data collected in 2023 may help to answer this question.

Despite a poor year of nest success there were still 245 actively nesting pairs reported, which meets or exceeds early goals set for the species in the Midwest and in Iowa. The original Northern States Bald Eagle Recovery Plan (Grier et al., 1983) set recovery goals at 1,200 nesting pairs across 16 states with an average of 1.0 young produced per nest. Iowa's specific goal identified in the regional plan was 10 pairs by the year 2000 (over 100 nesting pairs were recorded by that time) and the birds have certainly exceeded that. Adding nesting pairs on the Upper Mississippi Wildlife refuge to the nests monitored through VWMP there is likely a minimum of 550-650 nesting pairs in Iowa alone. Hopefully this robust population will be resilient and recover from the setback of a poor nesting season.

The number of nests monitored and reported on in 2022 were about the same as in 2020 and were a slight decrease from 2021. A total of 105 volunteer monitors collected data on these 292 nests! This represents 57% of known active nests in the state.

As a whole, 2022 was not a good year for bald eagle nesting but a healthy population can recover from a poor year of reproduction. Future years of monitoring will be important to documenting how Iowa's bald eagles respond.

Bald Eagle Midwinter

The long-term Midwinter Survey results suggest that the number of eagles that winter in Iowa, particularly since 2003, fluctuates widely from year to year. Last year, 2021, was the lowest count since 2002 while the eagle numbers in the winter of 2022 were the highest recorded since the survey began. There has also been a lot of variability in the distribution of eagles, with the Mississippi and Des Moines Rivers often switching which has the highest count of birds.

Unfortunately, the survey does not do a good job of clearing up what might be driving these fluctuations. The obvious culprit is weather if only because harsher winters with more ice should drive more birds south from northern stronghold states (Minnesota, Wisconsin) and also create ideal conditions for counting by concentrating birds at limited areas of open water. However, only a very weak correlation exists between more birds and more ice and there is virtually no correlation with temperature. 2022 was colder and the highest ice coverage of recent years and that may have had an influence on the number of birds counted but the long-term trend does not necessarily support this connection. It doesn't necessarily mean that weather doesn't have an effect but the survey design may not be appropriate for measuring it. For example, the availability of food is the most obvious root motivation for Bald Eagles to change which rivers they are concentrated on but we do not collect data on the food availability so can't know for sure why eagles concentrate where they do. Availability of food, could also be part of the explanation for the huge fluctuations from year to year as well.

Despite the increasingly large fluctuations, the overall trend across the survey since 1994, is upwards. This upward trajectory is settling into a flatter trend in recent years which is to be expected as eagles may be getting close to carrying capacity. This state trend mirrors the results of a recent national analysis of the first 25 years of the survey which suggests that Bald Eagle population trends may be flattening as the bird's numbers reach a level that can be supported by the existing habitat available (Eakle et al. 2015). If this is the case we would expect to see the trend to continue to become more level in future years.

In 2022, a mix of 78 volunteers and natural resources professionals spent over 125 collective hours surveying 1,674 miles of waterbody shoreline.

Management Implications

For Bald Eagles, 2022 was a bit of a roller coaster in Iowa. To start the year, a record number of eagles were counted in the state but it was followed by the worst nesting season in recent memory. Future year's surveys will be important to document how this year's poor nesting season may have impacted the population. The robustness of the population leading up to this challenge suggests that they will be resilient to this threat. The metrics set for monitoring the eagle population stipulate that declines in nest activity and success occurring in three consecutive years would trigger further conservation action, so for now we will continue to monitor the situation.

The documentation of how a new threat may have impacted Bald Eagles in Iowa demonstrates how valuable both breeding season and winter monitoring are for this species. Monitoring has also been crucial in demonstrating this species' incredible recovery. Discussions are underway to perhaps scale back our Bald Eagle monitoring efforts starting **in 2027**, which is 20 years after they were delisted from the Endangered Species Act. Leading up to this milestone, it will be important to continue monitoring as robustly as possible and we will keep a close eye on how the birds are doing as we make plans for how to proceed after 2027. In a perfect world, we would indefinitely continue monitoring as we currently do but there are many species that require conservation attention and many are not faring as well as the Bald Eagles.

Acknowledgments

Monitoring the eagle population in Iowa is not a small task and it would not be possible without the help of an army of caring community scientists who volunteer their time. A huge thanks goes out to all the volunteers who generously make such important yearly contributions of time and energy to the knowledge of this species! You

are invaluable and we cannot appreciate you enough! Thanks also goes out to DNR, U.S. Fish and Wildlife Service, and Army Corps of Engineers staff which help with both these surveys.

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Figures

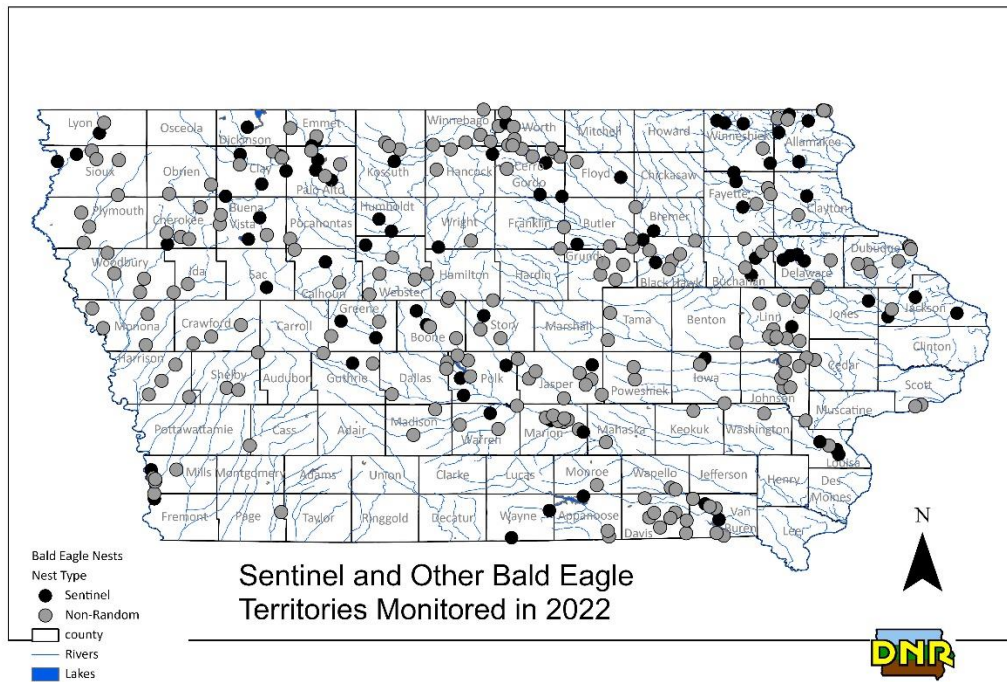


Figure 1. Data was collected on 292 nests in 76 Iowa Counties in 2022. Sentinel Nests were randomly selected, other nests were non-random.

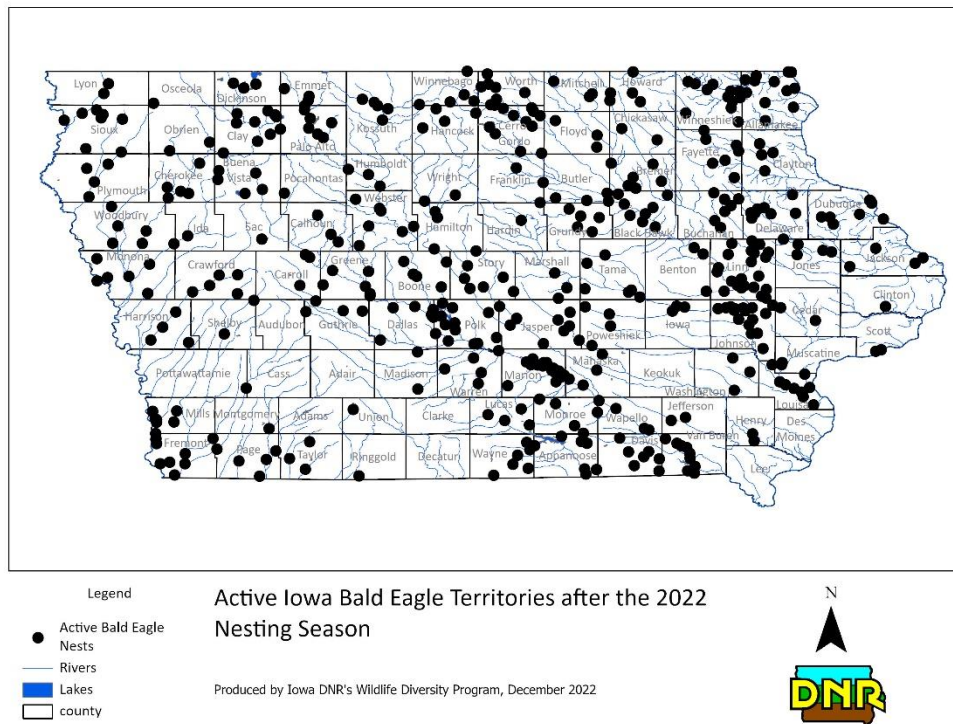


Figure 2. Active Bald Eagle Nests in Iowa after 2022 nesting season (472 nests).

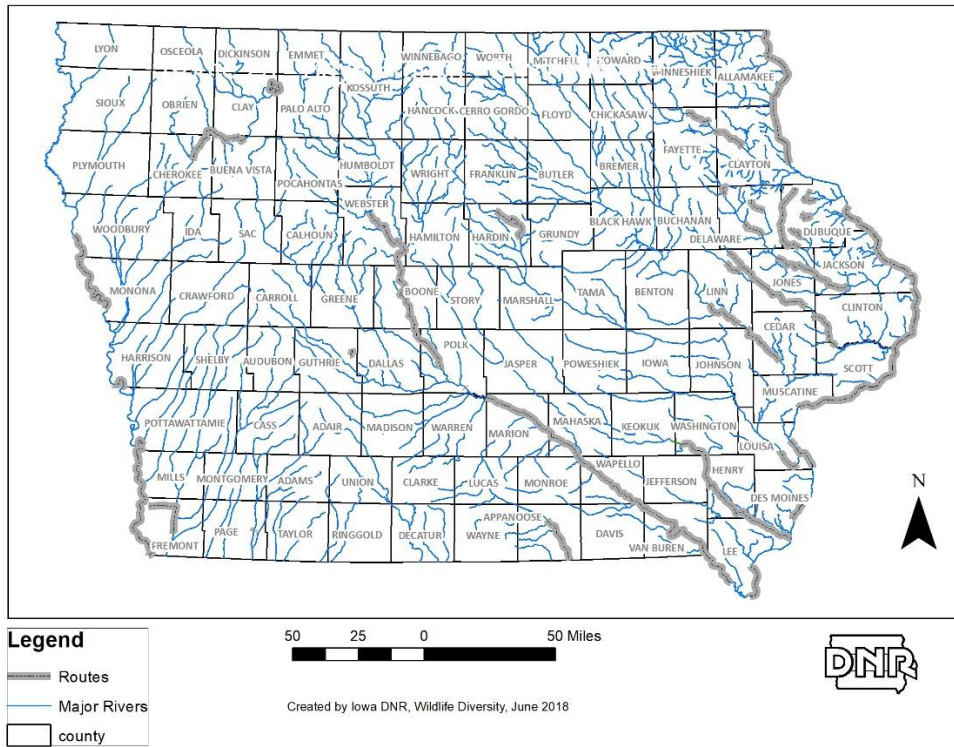


Figure 3. Bald Eagle Midwinter Routes in Iowa.,

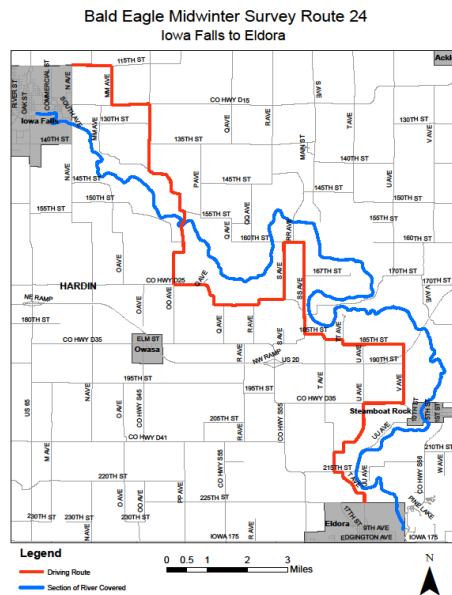


Figure 4. Example of a Midwinter Survey Route (in red)– Route 24 – The portion of river (eagle habitat covered) and the driving route.

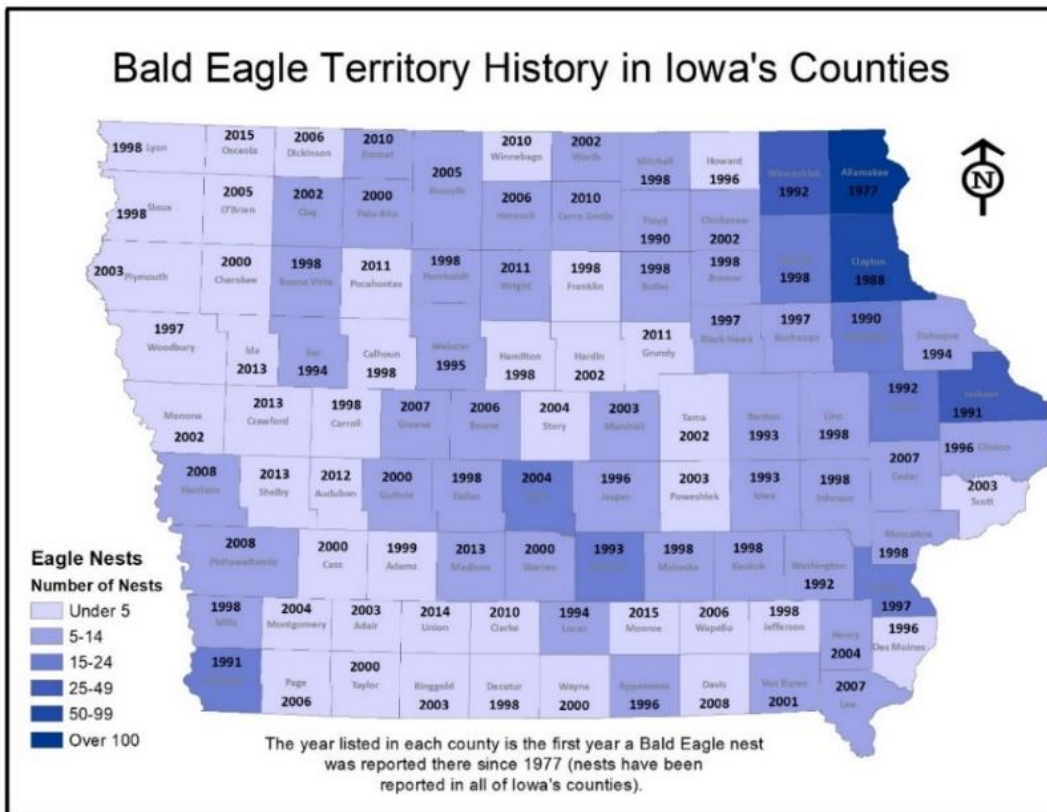


Figure 5. Number of eagle nests and first year reported for each county in Iowa.

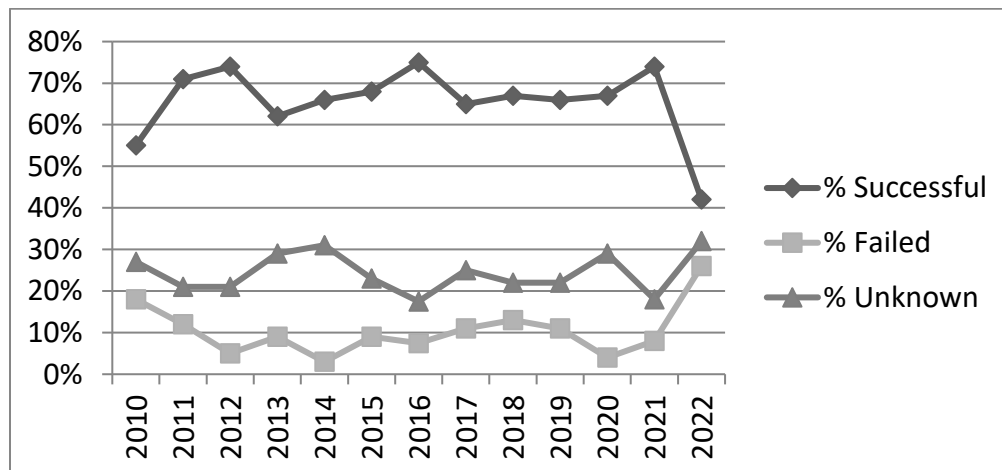


Figure 6. Percent of monitored Eagle nests that were successful versus failed, 2010 to present.

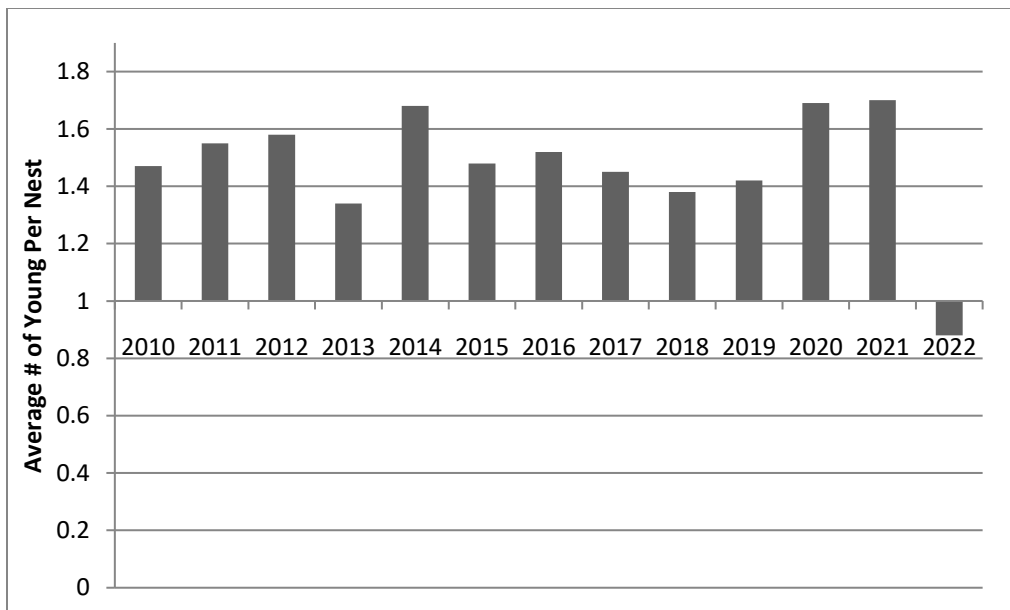


Figure 7. Average number of young produced by monitored Bald Eagle nests.

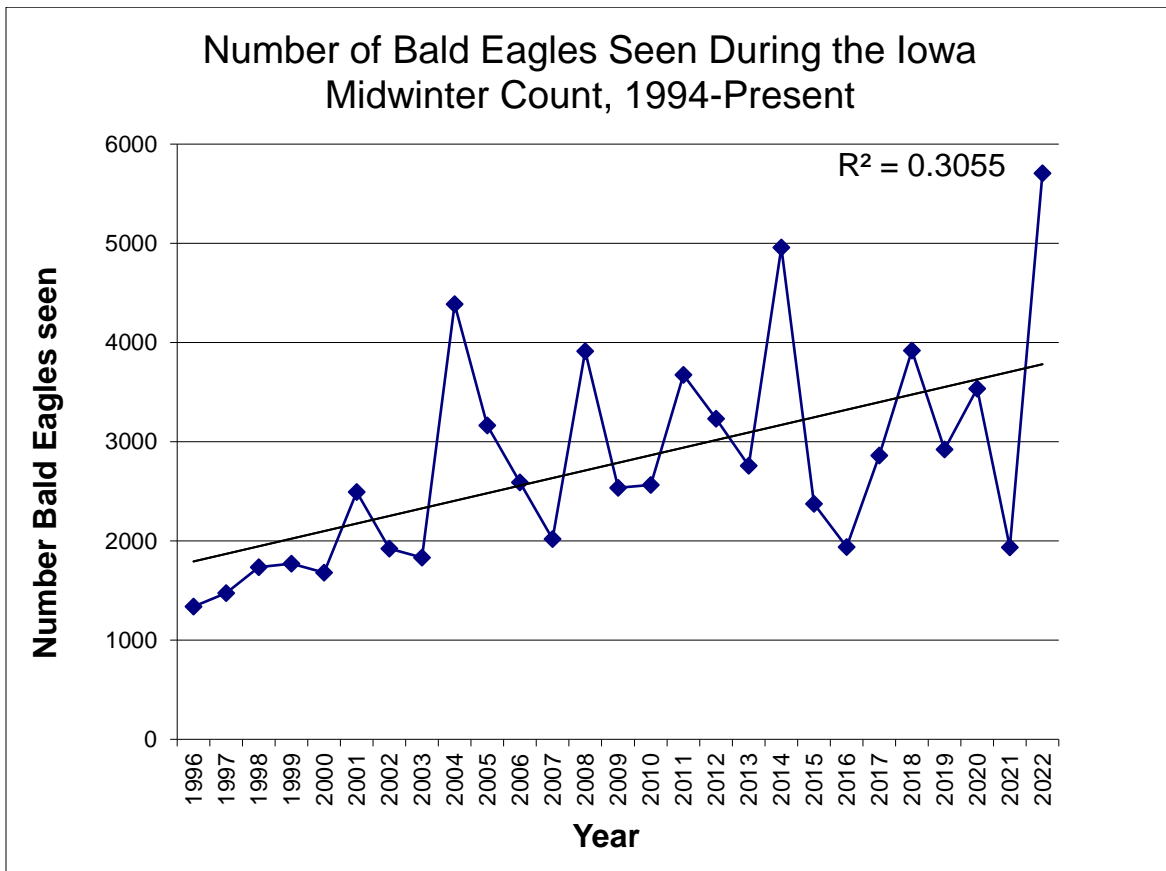


Figure 8. Total Bald Eagles counted during the Bald Eagle Midwinter survey, 1994 to present.

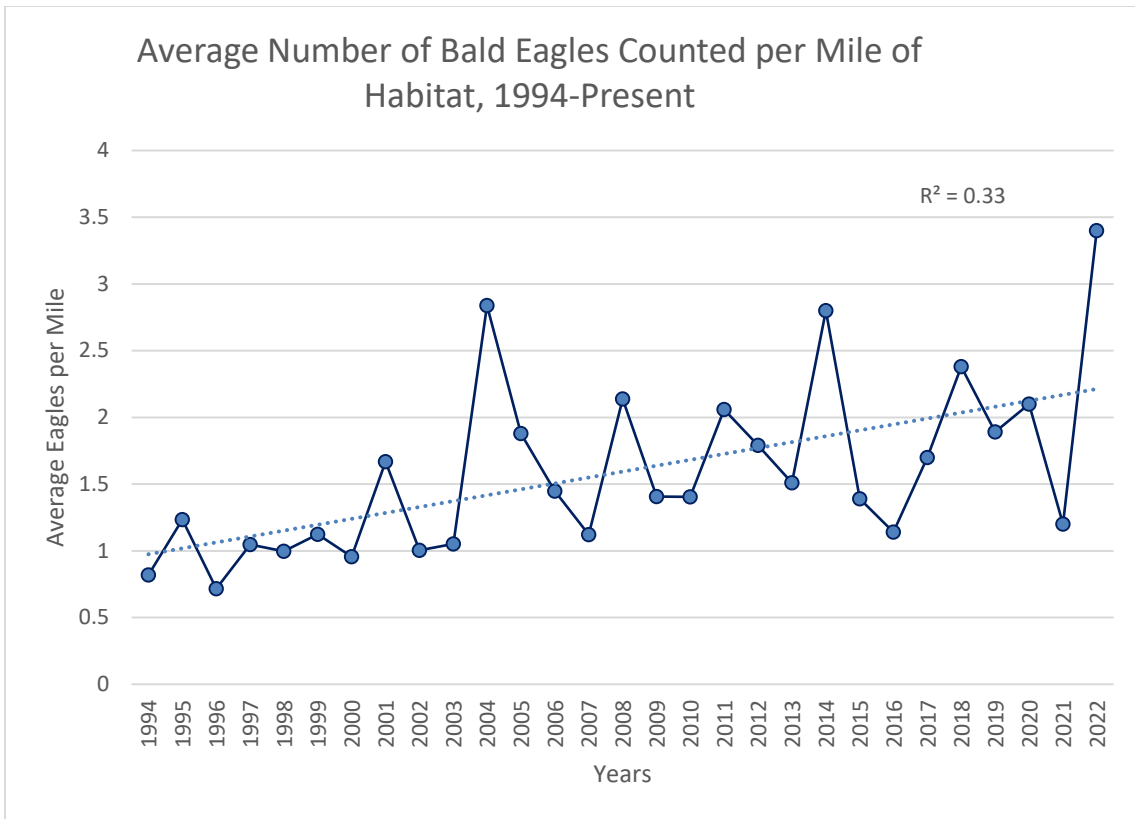


Figure 9. Average number of Bald Eagles per survey mile counted during the Bald Eagle Midwinter survey, 1994 to present.

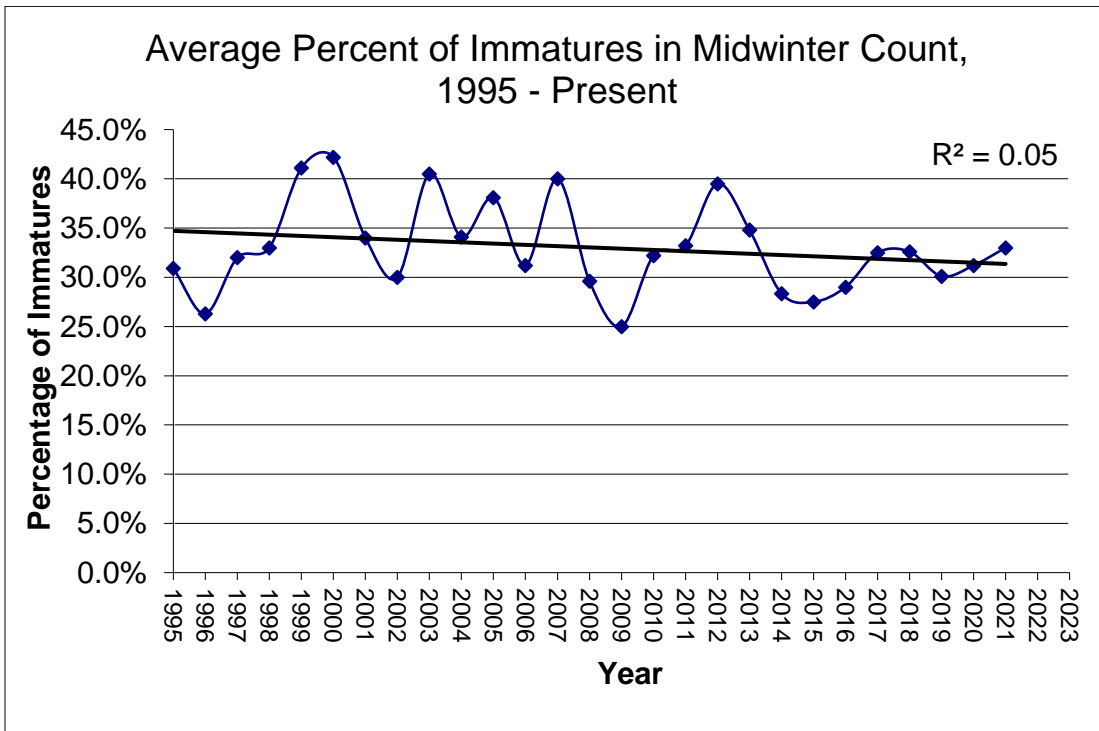


Figure 10. Percentage of immature bald eagles counted during the Bald Eagle Midwinter survey 1995 to present.

Tables

Table 1. Summary of data collected by volunteer monitors on Bald eagle nests, 2015 to 2022.

	2015	2016	2017	2018	2019	2020	2021	2022
# of Territories With Data Collected	85	84	172	182	262	286	354	292
Active Territories	78	80	160	165	227	254	291	245
Successful	53(68%)	60(75%)	104(65%)	111(67%)	149(66%)	170(67%)	216(74%)	103(42%)
Failed	7(9%)	6(7.5%)	17(11%)	17(13%)	26(11%)	10(4%)	22(8%)	63(26%)
Outcome Unknown	18(23%)	14(17.5%)	40(25%)	37(22%)	52(23%)	74(29%)	53(18%)	79(32%)
Number of Young	88	107	175	170	240	253	282	104
Avg. # of Young/Nest	1.48	1.52	1.45	1.38	1.40	1.69	1.7	0.88
Inactive Territories	7	4	11	15	28	25	59	43
Unknown Territories	0	0	1	2	7	7	4	4

Table 2. Summary of data collected during the 2022 Bald Eagle Midwinter Survey by waterbody, listed in descending order from most eagles per mile to least.

2022 Midwinter Bald Eagle Survey Results for Iowa									
Water Body*	% of Total BE	Total BE	Adult BE	Imm BE	Unk Age BE	Total IGE	Un-ID Eagle	Miles Surveyed	Average Bald Eagles Per Mile
State Total	100%	5,709	3,658	1,906	151	4	7	1,673.5	3.4
Mississippi River	42%	2,406	1,479	919	8	0	0	258	9.3
Des Moines River	34%	1,941	1,223	604	114	1	0	320.5	6.1
Iowa River	14%	822	639	178	5	0	0	68	12.1
Maquoketa	1.6%	93	56	32	5	0	0	133	0.7
Lakes and Other	1.4%	82	45	37	1	0	4	170	0.5
Wapsipinicon River	1.2%	70	44	26	0	0	3	106	0.7
Cedar River	0.9%	56	29	26	1	0	0	68	0.8
S. Maquoketa River	0.9%	54	29	23	2	1	0	105	0.5
Lake Rathbun	0.8%	49	21	16	12	0	0	85	0.6
Skunk River	0.7%	43	33	10	1	0	1	77	0.6
Missouri River	0.7%	43	25	18	0	0	0	182	0.2
Turkey River	0.5%	26	20	4	2	2	0	40	0.7
Chariton River	0.3%	18	10	6	2	0	0	45	0.4
Little Sioux River	0.1%	6	5	1	0	0	0	15	0.4
Nodaway River	0	0	0	0	0	0	0	1	0
Age Composition		100%	64%	33%	3%	NA	NA	NA	NA