Bald Eagle (*Halieetus leucocephalus*) status in Iowa, 2023

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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 2023 nesting season, Iowa had 619 active Bald Eagle territories. A total of 66% of the active nests surveyed were successful and on average 1.77 young were fledged per nest. This was an improvement over 2022's record poor numbers. In January of 2023, a total of 2,901 Bald Eagles were counted on the Bald Eagle Midwinter survey, averaging 1.7 birds observed per mile of river surveyed. These numbers are similar to the previous 10 – year's average. The 2022 nesting season was one of the poorest on record, while 2023 was more in line with an average wintering and nesting year. This suggests that the effects of the Highly Pathogenic Avian Influenza, that was prevalent in the state in 2022 and was the likely cause of the poor nesting season, do not appear to have lingered.

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 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 2023 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 2023, standardized data was collected on 329 Bald Eagle territories in 78 Iowa counties (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 2023, 1,663.5 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.

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. The public can report eagle nests they find using an electronic form on the DNR website. 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. 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.

There were some differences between the sentinel and non-random nests. The percent of nests that were active was lower for the sentinel nests while the percentage of those nests that were successful was higher than the non-random territories. However, even with a higher success rate, the average number of young per sentinel nest was lower than the non-random nests. It should be noted that less than 50% of the sentinel territories were monitored this year and that represents a sample of less than 14% of total active nests when the goal is 25%. The numbers presented here are the data from all monitored nests combined which obviously falls in the middle. The numbers for the non-random and random nests are not hugely different so the combined data is still a fairly accurate estimate.

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 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 2023, the dates for the survey were January 4-18th with target dates of the 6th and 7th.

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 slow speed 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 1,332 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 211, has the highest number of nests reported, followed by Clayton County with 76 (figure 5). Following the 2023 nesting season, 619 territories have an overall designation of active, 291 are designated inactive, and 422 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 2023, a total of 329 nests were monitored; 70 sentinel territories and 259 non-random nests.

Within the 329 territories monitored, 281 were active (85%), 47 were inactive (14%) and two were reported as activity unknown (table 1). The outcome of the nesting season for the 281 active territories broke down as follows: 185 nests successful, 34 failed and 61 were unknown (table 1, figure 6).

Out of the 137 territories that had reliable reports of young fledged, 242 young were produced: 30 nests fledged no young, 46 nests fledged 1 young, 78 nests fledged 2 young, 12 nests fledged 3 young and one nest fledged 4 young. The estimated number of young produced per nest was 1.77 (table 1). It is notable that there was a nest that produced 4 young, which is very rare and was the first that was documented during this survey. An additional 52 nests included reports of fledglings but with some uncertainty. Usually this uncertainty is skewed towards perhaps missing a fledgling. If these records are added in, there was a minimum of 308 fledglings produced by monitored nests.

For 96 territories, monitors were able to collect solid data on the number of chicks and the number of fledglings. Eight young were lost before fledging in these nests. Eaglet survival to fledging was high; 96% of the chicks observed in these nests reached fledging (181 total young counted, 173 fledged), which was better aligned to the average than last year's lower rate (88%). 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 2023, 50 routes were completed, covering 1,663.5 miles of habitat. A little over 1/3rd (17) of the 50 surveys were conducted on the target dates of January 6-7th and the average survey took 160 minutes to complete. Weather conditions during the survey were closer to the norm than last year with an average temperature at 28^{o} Fahrenheit. The average percentage of ice cover on the waterways was also lower than last year at 57%.

A total of 2,901 Bald Eagles were counted during the count, which is just a little lower than the previous 10 year's average (3,291 birds, figure 8). The average number of birds counted per route was 58 or 1.7 eagles per mile surveyed (figure. 9). A total of 1,933 of the birds counted, or 67%, were adults and 930 (32%) were immatures (figure 10). The remaining 38 birds counted could not be aged. Two Golden Eagles were also observed on the survey.

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 2023, 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 Iowa River had the highest density of eagles with an average of 4.25 birds counted per miles.

Discussion

This year could be characterized as a return to normal for bald eagles in Iowa after a year of extremes in 2022. Both the wintering and nesting season were average.

Bald Eagle Nesting

The 2022 nesting season was one of the least successful in recent years and marked the first time the average number of young per nest had dropped below 1 in the history of the survey. Because of this the data collection this year was especially important in order to gauge how last years poor nesting season would affect the population. Based on numbers it appears that at least this nesting season was not impacted by last year's difficulties.

There was no surge in inactive nests; in fact, it was the lowest percentage of inactive and highest percentage of active in the last 3 years. The percentage of nests that failed and succeeded was also back in the normal range. The number of young produced this year was over twice the number from 2022 and an estimated 720 eaglets were fledged from Iowa nests this year.

This is hopefully a good indicator that bald eagles are resilient to singular setbacks like the outbreak of disease.

Without a comprehensive survey, it is hard to estimate how many active territories there are in Iowa. However, 282 actively nesting pairs were reported by monitors, and 399 total were reported including opportunistic reports. Almost 620 territories have been active at least once during the last three years. A conservative estimate would be between 600 and 700 active territories in the state with the true number likely being higher.

These numbers meet or exceed 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.

The number of nests monitored and reported on in was a good bit higher in 2023, helped in part by a training workshop and an influx of new monitors to the program. A total of 130 volunteer monitors collected data on 329 nests! This represents 53% of known active nests in the state.

As a whole, 2023 was an average year for bald eagle nesting, which was a big improvement over last year's season.

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 (figure 8). In 2021, there was the lowest count since 2002, while 2022 results set a record for the highest number of birds, and now in 2023 numbers were back to average. 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 and the last couple of years have seen an increase in the number of birds using the Iowa River.

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. For example, 2022 was colder and the

highest ice coverage of recent years and it is logical that this might increase numbers 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 2023, a mix of 81 volunteers and natural resources professionals spent over 133 collective hours surveying 1,663 miles of waterbody shoreline.

Management Implications

The documentation of how a new threat (the HPAI disease outbreak in 2022) 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 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, County Conservation Board and Army Corps of Engineers staff which also help with both these surveys.

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Figures

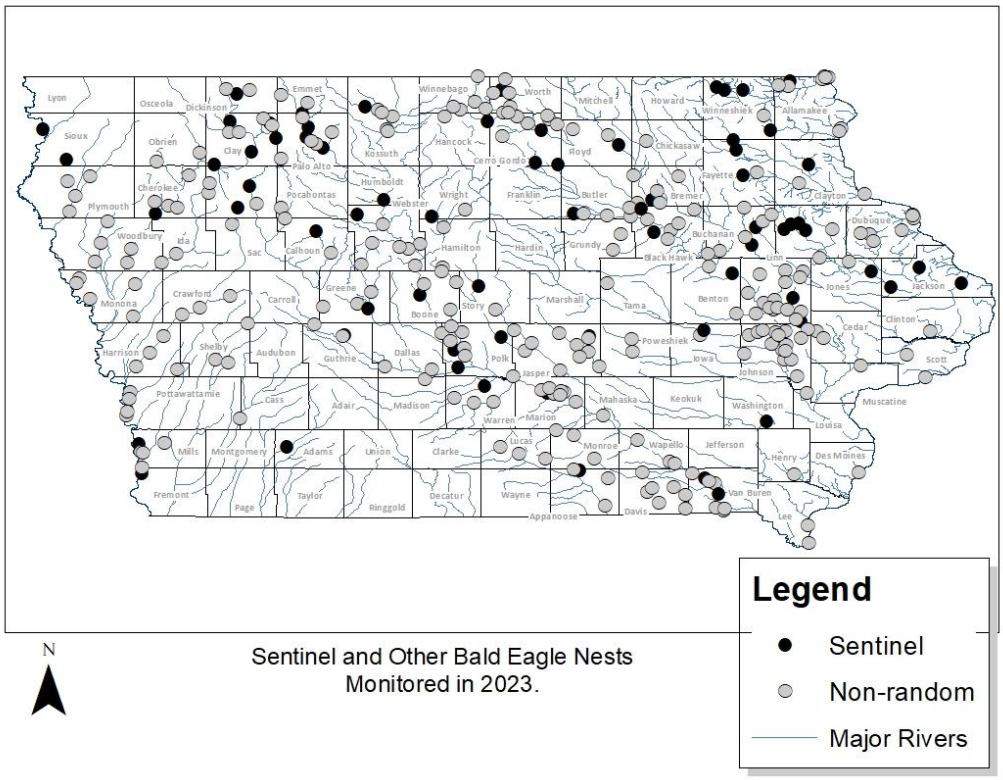

Figure 1. Data was collected on 329 nests in 78 Iowa Counties in 2023. Sentinel Nests were randomly selected, other nests were non-random.

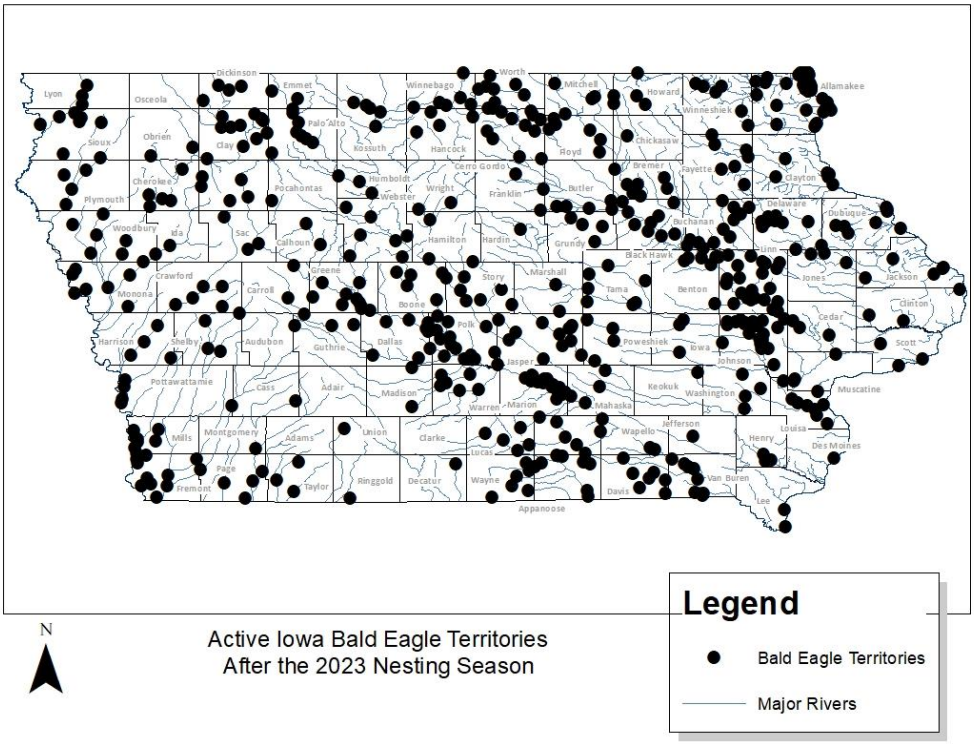

Figure 2. Active Bald Eagle Nests in Iowa after 2023 nesting season (619 nests).

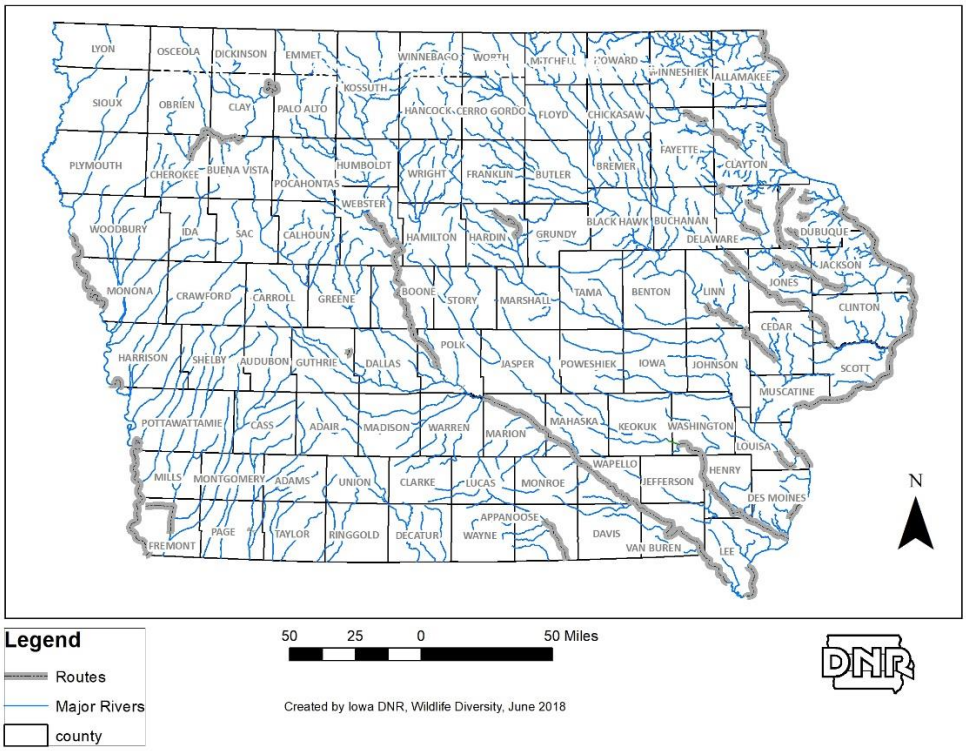

Figure 3. Bald Eagle Midwinter Routes in Iowa.

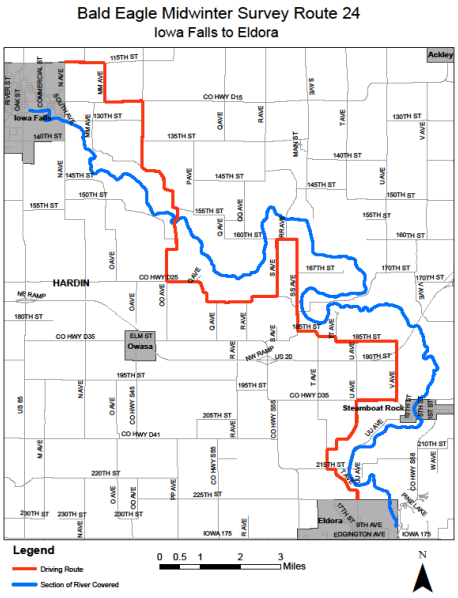

Figure 4. Example of a Midwinter Survey Route (in red)– Route 24 – The portion of river (eagle habitat covered) and the driving route.

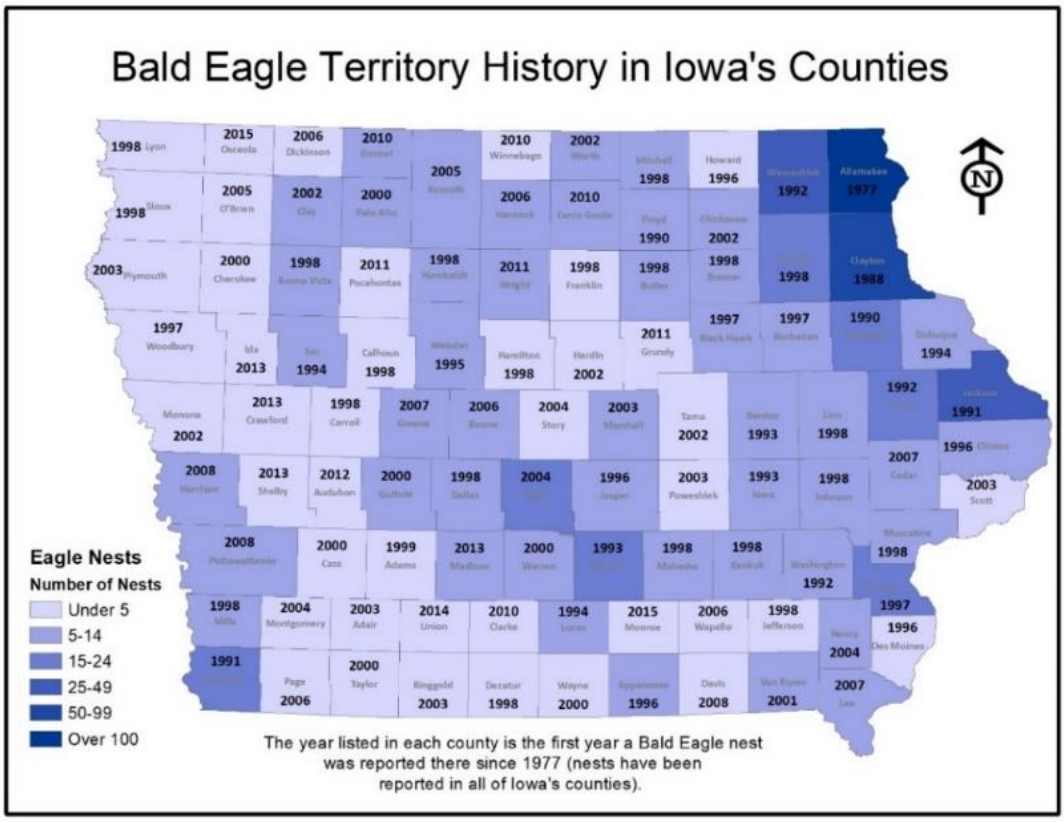

Figure 5. Number of eagle nests and first year reported for each county in Iowa.

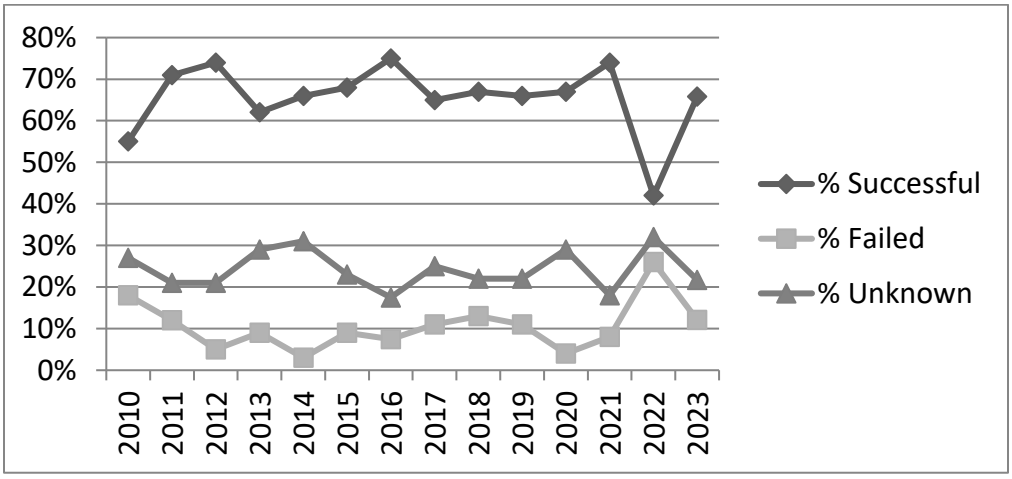

Figure 6. Percent of monitored Eagle nests that were successful versus failed, 2010 to present.

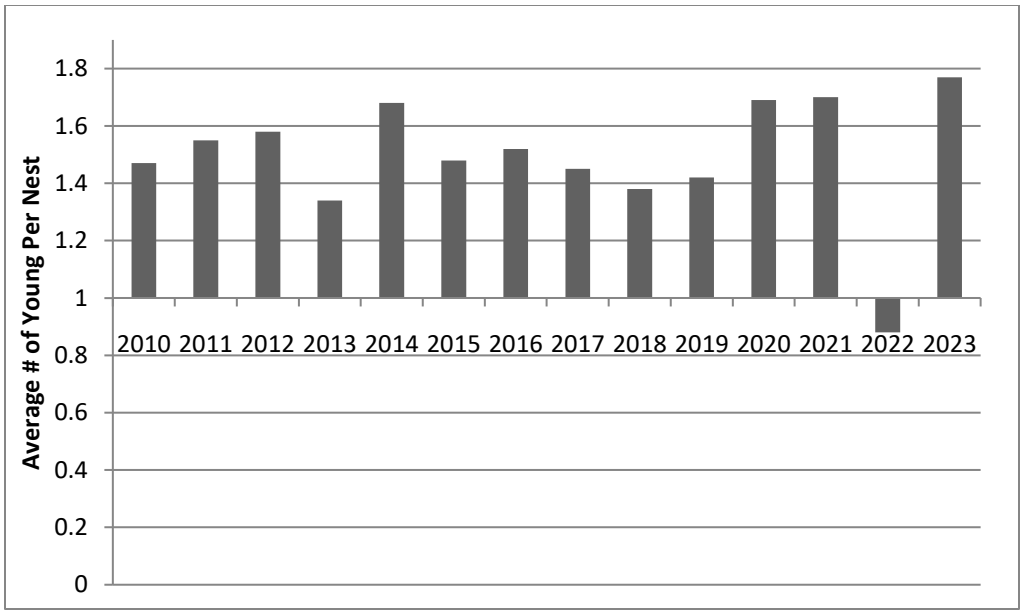

Figure 7. Average number of young produced per nest by monitored Bald Eagle nests.

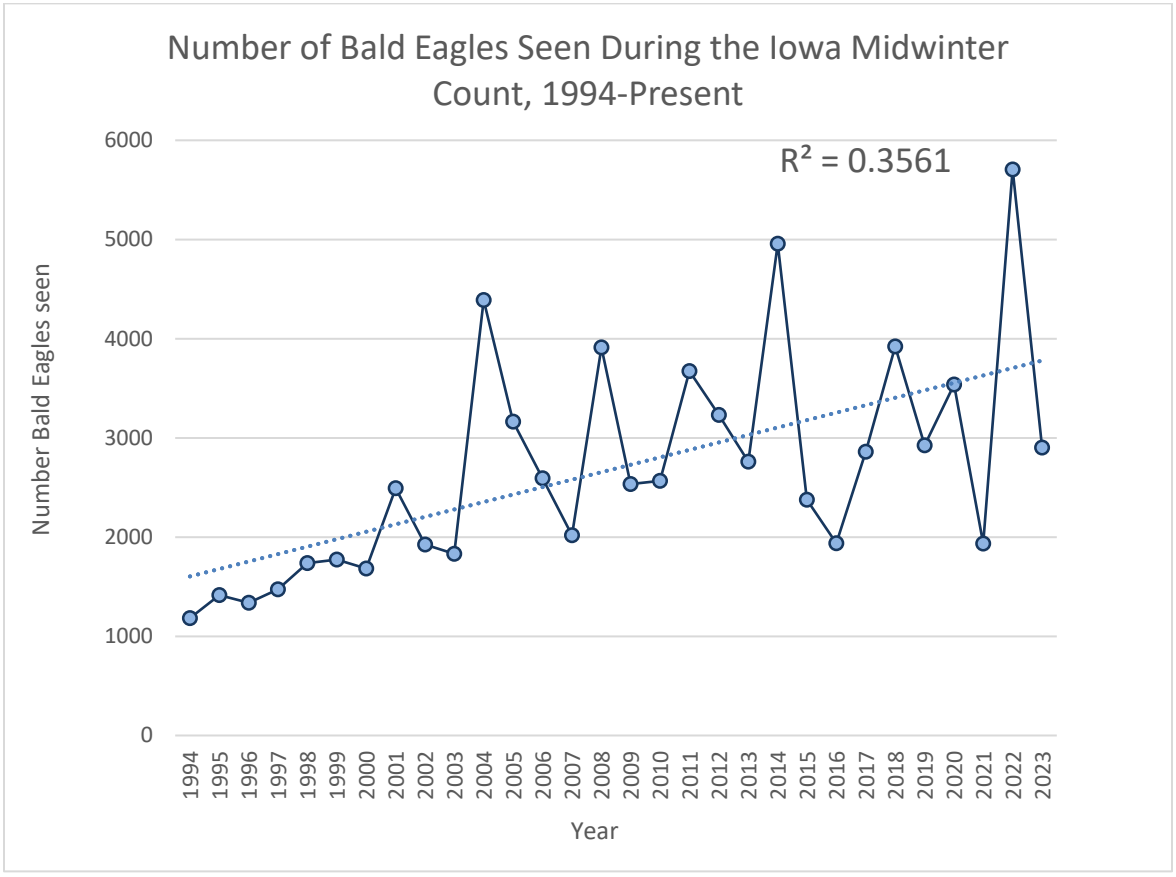

Figure 8. Total Bald Eagles counted during the Bald Eagle Midwinter survey, 1994 to present.

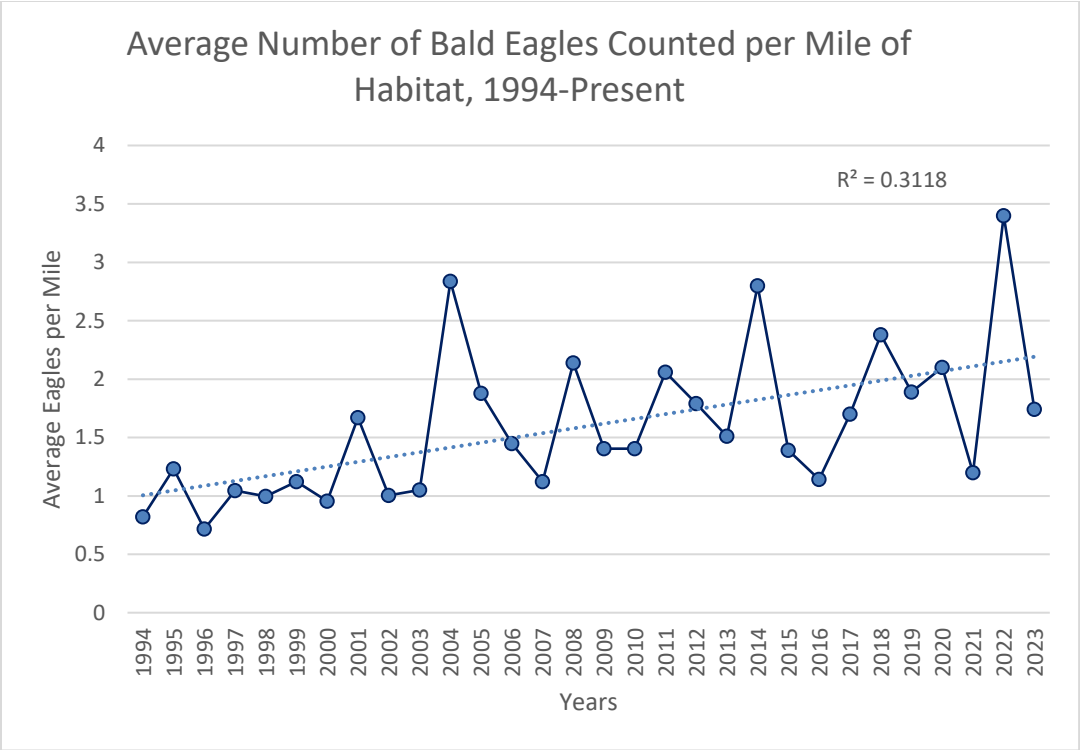

Figure 9. Average number of Bald Eagles per survey mile counted during the Bald Eagle Midwinter survey, 1994 to present.

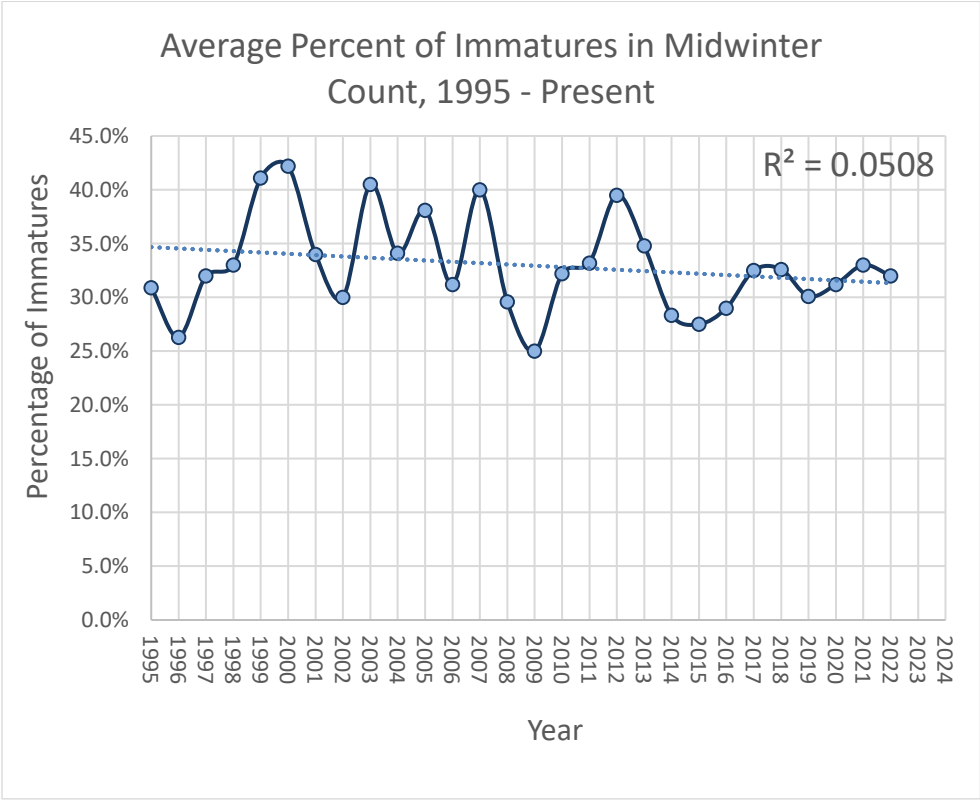

Figure 10. Percentage of immature bald eagles counted during the Bald Eagle Midwinter survey 1995 to present.

Tables

Table 1. Summary of data collected by volunteer monitors on Bald eagle nests, 2016 to 2023.

	2016	2017	2018	2019	2020	2021	2022	2023
# of Territories With Data Collected	84	172	182	262	286	354	292	329
Active Territories	80	160	165	227	254	291	245	281
Successful	60(75%)	104(65%)	111(67%)	149(66%)	170(67%)	216(74%)	103(42%)	185(66%)
Failed	6(7.5%)	17(11%)	17(13%)	26(11%)	10(4%)	22(8%)	63(26%)	34(12%)
Outcome Unknown	14(17.5%)	40(25%)	37(22%)	52(23%)	74(29%)	53(18%)	79(32%)	61(22%)
Number of Young	107	175	170	240	253	282	104	242
Avg. # of Young/Nest	1.52	1.45	1.38	1.40	1.69	1.7	0.88	1.77
Inactive Territories	4	11	15	28	25	59	43	47
Unknown Territories	0	1	2	7	7	4	4	2

Table 2. Summary of data collected during the 2023 Bald Eagle Midwinter Survey by waterbody, listed in descending order from most eagles to least.

2023 Midwinter Bald Eagle Survey Results for Iowa									
Water Body*	% of Total BE	Total BE	Adult BE	Imm BE	Unk Age BE	Total GE	Un-ID Eagle	Miles Surveyed	Average Bald Eagles Per Mile
State Total	**100%**	**2,901**	**1,933**	**930**	**38**	**2**	**15**	**1,663.5**	**1.74**
Mississippi River	34%	998	574	404	20	0	0	258	3.87
Des Moines River	30%	882	654	221	7	0	0	320.5	2.75
Iowa River	10%	289	219	70	0	1	0	68	4.25
Cedar River	6%	167	94	68	5	0	0	68	2.46
Missouri River	5%	142	93	49	0	0	0	182	0.78
Skunk River	4%	102	74	28	0	0	0	72	1.42
Maquoketa	2%	68	49	18	1	1	0	133	0.51
Lakes and Other	1.7%	49	27	22	0	0	4	170	0.29
Turkey River	1.6%	45	30	13	2	0	0	40	1.13
Wapsipinicon River	1.5%	43	29	11	3	0	11	106	0.41
Chariton River	1.3%	39	37	2	0	0	0	45	0.87
Lake Rathbun	1.2%	36	24	12	0	0	0	85	0.42
Little Sioux River	1.2%	34	24	10	0	0	0	65	0.52
S. Maquoketa River	0.2%	5	4	1	0	0	0	50	0.10
Nodaway River	0.1%	2	1	1	0	0	0	1	2.00
Age Composition		100%	67%	32%	1%	NA	NA	NA	NA