Bald Eagle (*Halieetus leucocephalus*) status in Iowa, 2019

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ABSTRACT The Iowa DNR coordinates two different surveys used to monitor Bald Eagles in the state. The Bald Eagle Nest Monitoring Survey employs volunteer citizen scientist monitors to annually observe 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 2019 nesting season, Iowa had 431 active Bald Eagle territories. 66% of the 262 nests surveyed were successful and on average 1.40 young were produced per nest. A total of 2,924 Bald Eagles were counted on the Bald Eagle Midwinter survey, averaging 1.89 birds observed per mile of river surveyed. The results of both surveys suggest that the Bald Eagles that nest and/or winter in Iowa have stable or increasing numbers.

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 upgrading the eagle from a status of Threatened to a status of Special Concern on the state T&E list in 2009. Despite the Bald Eagle population's apparent good health, challenges to their conservation still exist. Strategic monitoring of eagle activity in the state remains a priority.

The Iowa DNR uses two different surveys to monitor Bald Eagle Populations in Iowa. One survey focuses on monitoring Eagle nesting activity and success and the other surveys the population of wintering eagles along Iowa's rivers.

The goal in monitoring Bald Eagle nesting data is to measure reproductive success as well as providing 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 Bald Eagle population's health.

The second survey, called the Bald Eagle Midwinter Survey, focuses on 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 the 2019 winter and nesting season as well as data from previous years.

STUDY AREA

The Iowa DNR's formal nest monitoring program focuses on monitoring nests statewide, excluding nests located on the Upper Mississippi Wildlife Refuge (figure 1). Opportunistic reports of new nests or existing nest activity from various sources are accepted and this overall nest dataset does include U.S. Fish and Wildlife Service data collected on the refuge. However, for most summary and analysis, monitoring data collected by trained volunteers and staff are used. In 2019, standardized data was collected on 262 Bald Eagle territories in 77 Iowa counties spaced across the state (figure 1).

In 2010, a random selection was done of 50% of the known active nests in the inland part of the state (i.e. not in the Upper Mississippi Wildlife Refuge) and stratified by landform. The result is a total of 140 bald eagle breeding sites established as

sentinel territories. The goal is to have at least half of these sentinel nests monitored reliably on an annual basis in addition to the non-random nests monitored by trained volunteers (figure 2). Please note that Iowa's Bald Eagle nest database is not comprehensive so it does not track all eagle nests in the state, just the portion that have been reported to the Iowa DNR.

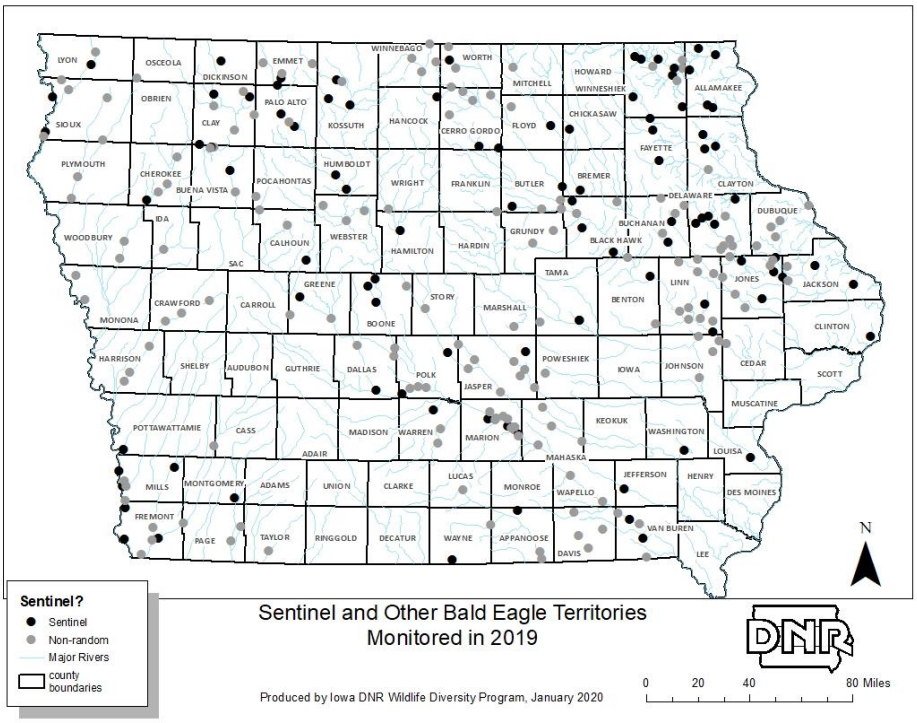

Figure 1. Data was collected on 262 nests in 77 Iowa Counties in 2019. Sentinel Nests were randomly selected, other nests were non-random.

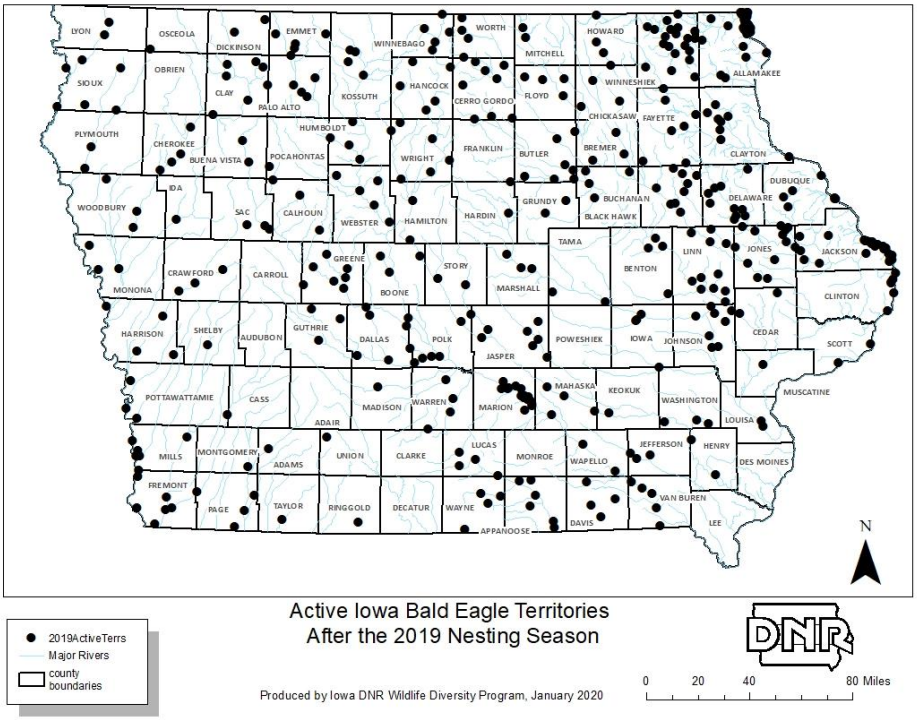

Figure 2. Active Bald Eagle Nests in Iowa after 2019 nesting season (431 nests).

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 2019, 1,546 miles of river or lakeshore were surveyed on 45 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.

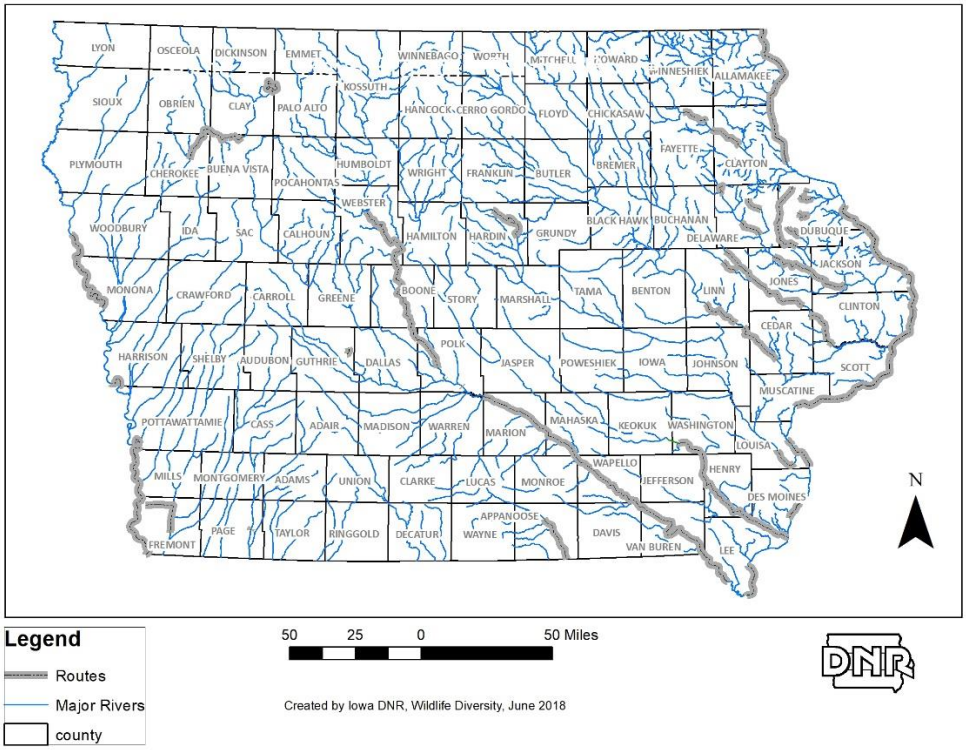

Figure 3. Bald Eagle Midwinter Routes in Iowa.

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 Iowa citizens. These data are not systematically collected so the data available for each breeding territory varies. Additionally, territories reported on may not be representative (i.e. people may be more likely to report an active nest versus an inactive nest). Since 2017, these types of reports have been entered into the dataset at a lower rate than in the past.

Since 2010, to complement the opportunistic reports received, the Iowa Department of Natural Resources (DNR) has had a program to collect data on bald eagle nesting territories in a more systematic manner. This data collection method relies heavily on trained citizen volunteers who monitor a sample of randomly selected nesting territories called "sentinel" sites as well as some non-randomly selected nest sites. As many of the sentinel nest sites as possible are monitored by assigned volunteers and many additional non-sentinel sites are also monitored by trained volunteers. 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 no significant differences were detected in the results.

The training for volunteers is available as a video online: www.iowadnr.gov/vwmp/ or is completed during in-person workshops which are held in March or April in various locations across the state. After training, volunteers are assigned to one or several nests in their area to monitor with sentinel nests being given priority.

Volunteer monitors are instructed to visit their assigned nest site at least 3 times during the nesting season and collect data on whether the nest is active or inactive, how many young hatch and then how many young fledge. Nests are observed using optics from a distance in order to avoid disturbing the nesting birds 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 are instructed to 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. The monitoring focuses on this pair of birds and not on one of the potentially multiple nest sites that could be a part of their territory in time and space. We can't be sure that we are watching the exact same pair of birds as the previous year but what we are focused on is the combination of a defended area of breeding habitat and a pair of eagles. 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 actions to evaluate the health of the nesting eagle population.

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 their 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 2019, the dates for the survey were January 2-16th with target dates of the 11th and 12th.

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.

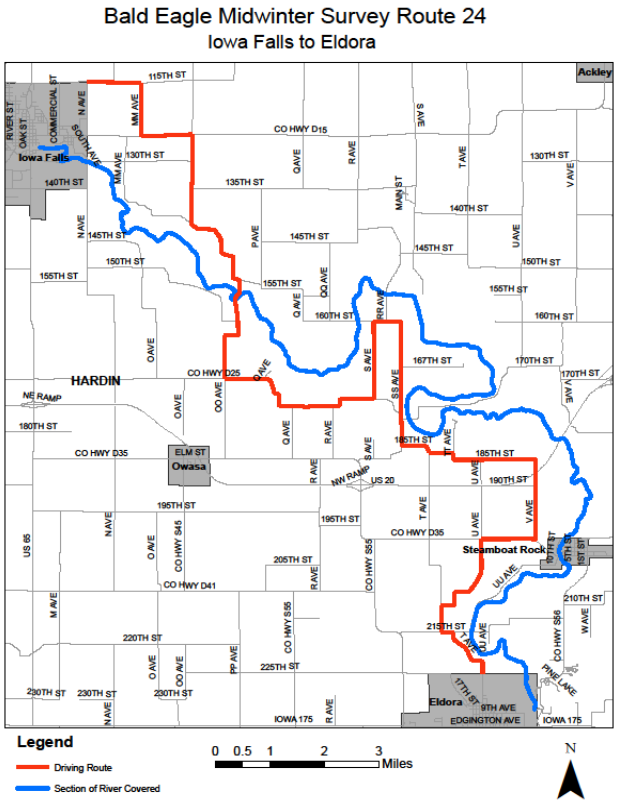

Figure 4. Example of a Midwinter Survey Route (in red)– Route 24 – The portion of river (eagle habitat covered) and the driving route.

RESULTS

Bald Eagle Nest Monitoring

Since 1977, approximately 947 bald eagle territories have been reported to 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 145, has the highest number of nests reported, followed by Clayton County with 71 (figure 5). Following the 2019 nesting season, 431 territories have an overall designation of active (371 "inland", 60 Upper Miss. Refuge), 234 are designated inactive, and 282 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.

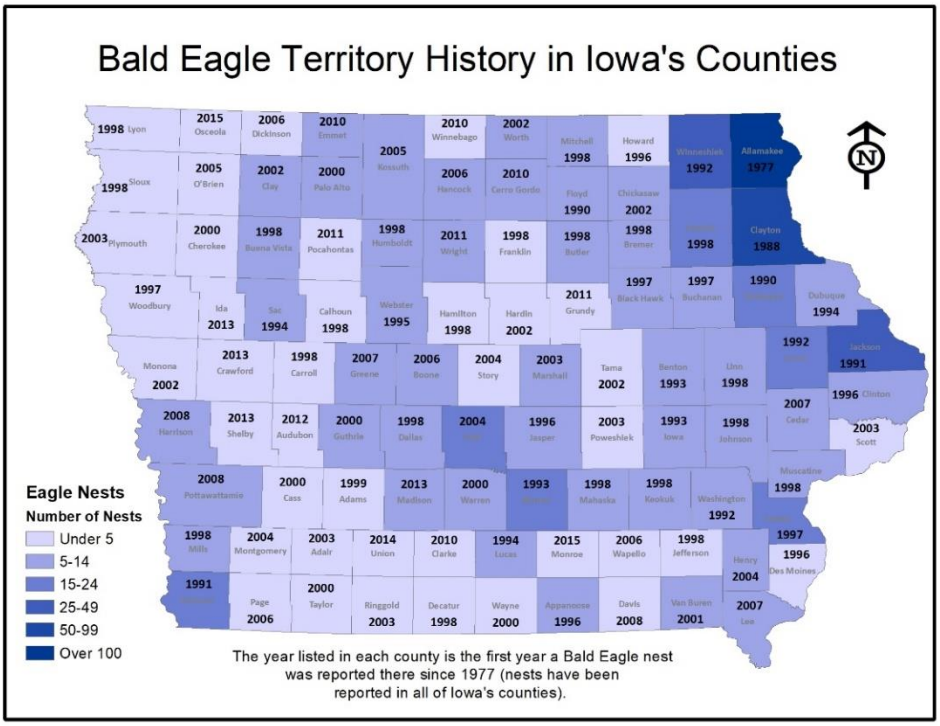

Figure 5. Number of eagle nests and first year reported for each county in Iowa.

In 2019 a total of 262 nests were monitored, 97 of which were sentinel territories and 165 which were non-random. Of these territories 135 have been reported on for 3 consecutive years, 95 for 5 consecutive years and 9 consistently for all 10 years.

Within the 262 territories monitored, 227 were active (87%), 28 were inactive (11%) and seven were reported as activity unknown (Table 1). The outcome of the nesting season for the 227 active territories broke down as follows: 149 nests successful, 26 failed and 52 unknown (Table 1, figure 6). Failed nests usually had birds at the nest early but they either abandoned or did not produce young, except 2 nests that were taken over by owls and 1 nest that blew down.

Out of the 172 territories which had reliable reports of the nest's outcome in producing young, 240 young were produced: 25 nests fledged no young, 63 nests fledged 1 young, 75 nests fledged 2 young and 9 nests fledged 3 young. The estimated number of young produced per nest was 1.40 (table 1).

For 110 territories, monitors were able to collect data on the number of chicks and the number of fledglings. Fifteen young were lost before fledging. From these data it appears that eaglet survival to fledging was high; 92% of the chicks observed in these nests reached fledging (191 total young counted, 176 fledged). Accurately counting the number of young in the nest, right after hatching, is difficult to impossible from the ground so the accuracy of this analysis is probably low. Their survival after fledging is not tracked.

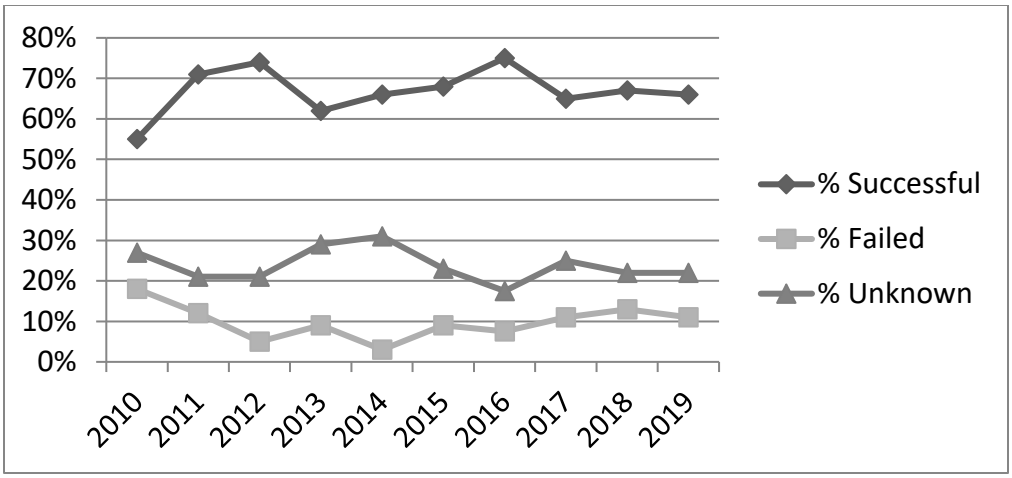

Figure 6. Percent of monitored Eagle nests that were successful versus failed, 2010 to present.

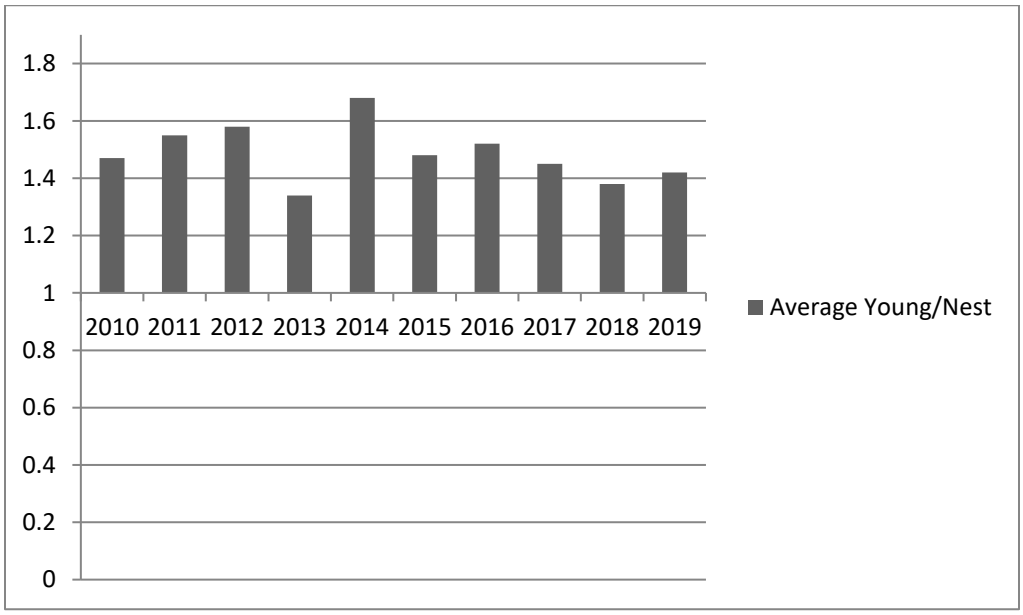

Figure 7. Average number of young produced by monitored Bald Eagle nests.

Table 1. Summary of data collected by volunteer monitors on Bald eagle nests, 2011 to 2018

	2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
# of Territories With Data Collected	77	80	76	85	84	172	182	262
Active Territories	61	65	62	78	80	160	165	227
Successful	*45(74%)*	*40(62%)*	*41(66%)*	*53(68%)*	*60(75%)*	*104(65%)*	*111(67%)*	*149(66%)*
Failed	*3 (5%)*	*6 (9%)*	*2(3%)*	*7(9%)*	*6(7.5%)*	*17(11%)*	*17(13%)*	*26(11%)*
Outcome Unknown	*13(21%)*	*19(29%)*	*19(31%)*	*18(23%)*	*14(17.5%)*	*40(25%)*	*37(22%)*	*52(23%)*
Number of Young	*71*	*72*	*72*	*88*	*107*	*175*	*170*	*240*
Avg. # of Young/Nest	*1.58*	*1.34*	*1.68*	*1.48*	*1.52*	*1.45*	*1.38*	*1.40*
Inactive Territories	14	12	13	7	4	11	15	28
Unknown Territories	3	3	1	0	0	1	2	7

Bald Eagle Midwinter Survey

In 2019, 45 routes were completed, covering 1,546 miles of habitat. A number of routes could not be completed because of the federal government shut-down in January 2019. Nineteen (42%) of the 45 surveys were conducted on the target dates of January 11-12th and the average survey took 160 minutes to complete. Weather conditions during the survey were relatively mild with an average temperature at 25° Fahrenheit. The weather last winter did not become harsh until the second half of January. As a consequence, the mild weather lead to a very low average percentage of ice cover, 18%, on the waterways surveyed.

A total of 2,924 Bald Eagles were counted during the 2019 Bald Eagle Midwinter Count, which is about 1,000 birds lower than 2018's very high count (figure 8) and puts it more in line with the ten-year (2008-2017) average of 3,083. The average number of birds counted per route was 64.9 or 1.89 eagles per mile surveyed (figure. 9). A total of 1,893 of the birds counted, or 65%, were adults and 953 (32.6%) were immatures (figure 10). The remaining 78 birds counted could not be aged. One adult Golden Eagle was counted on a route this year.

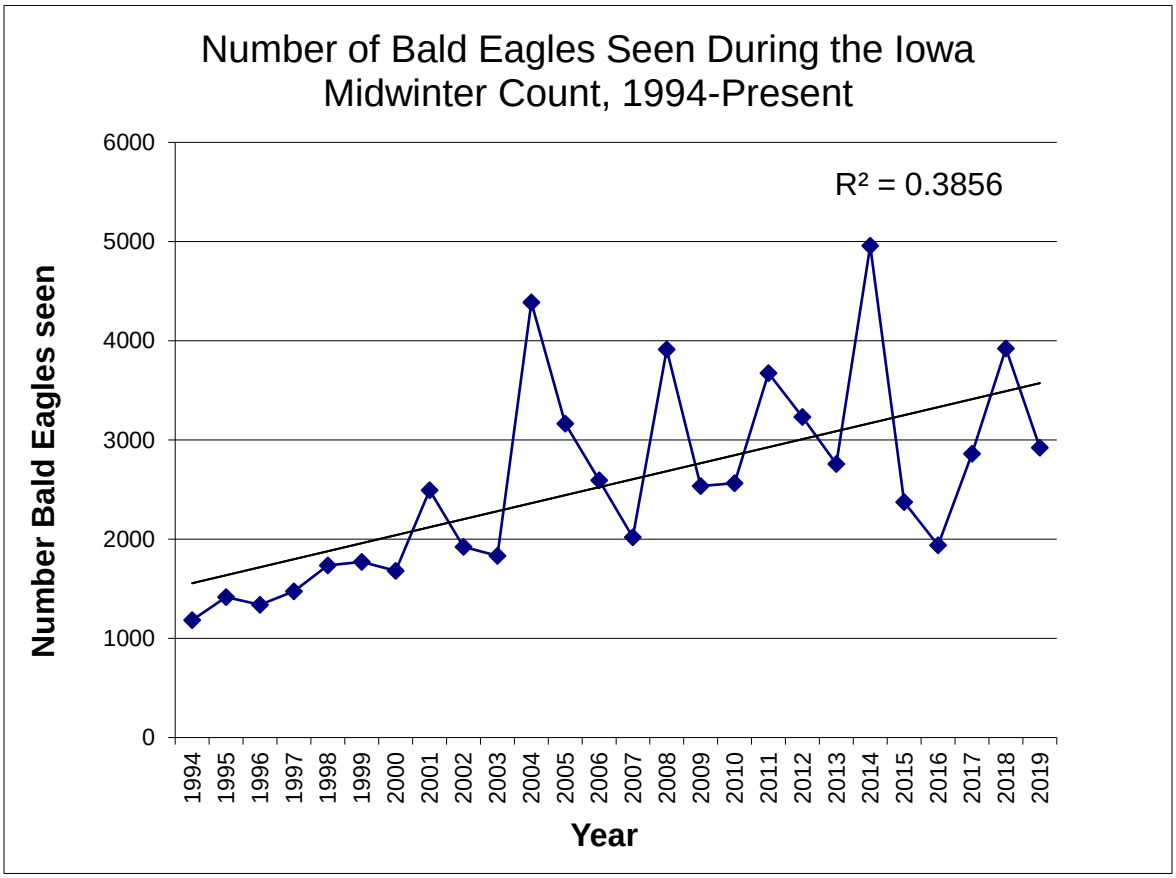

Figure 8. Total Bald Eagles counted during the Bald Eagle Midwinter survey, 1994 to present.

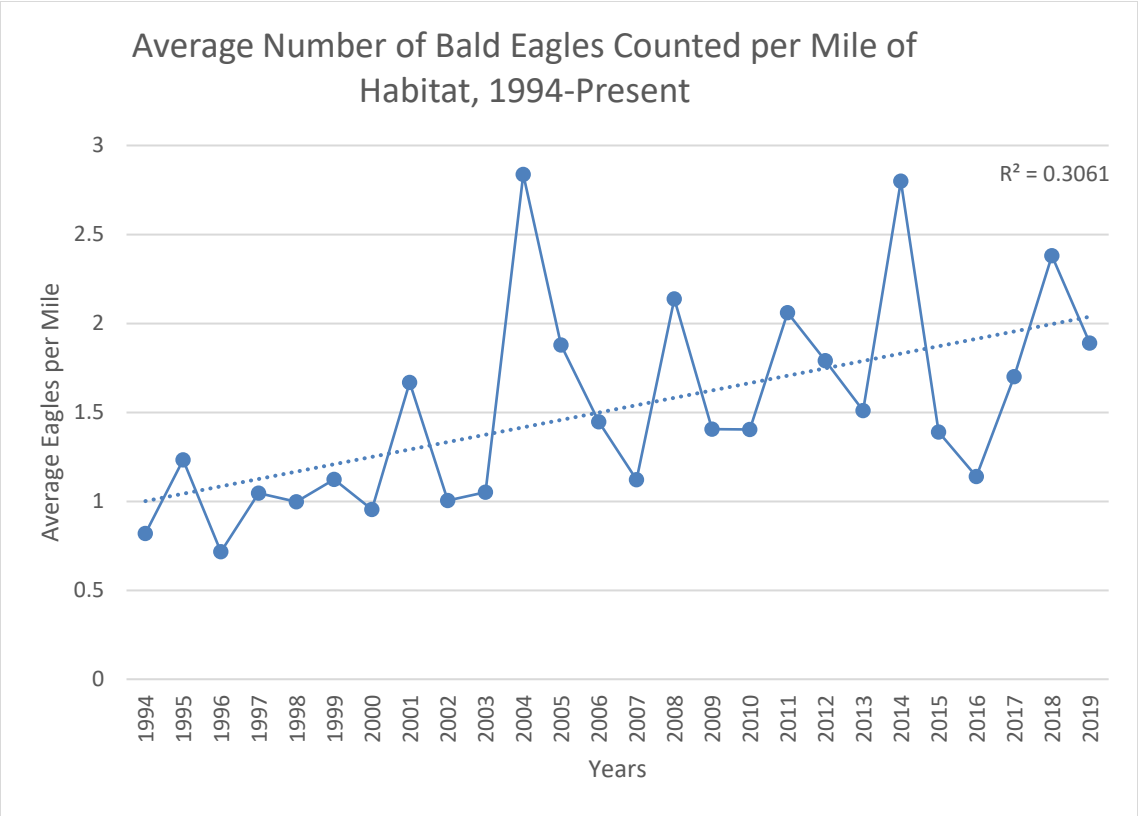

Figure 9. Average number of Bald Eagles per survey mile counted during the Bald Eagle Midwinter survey, 1994 to present.

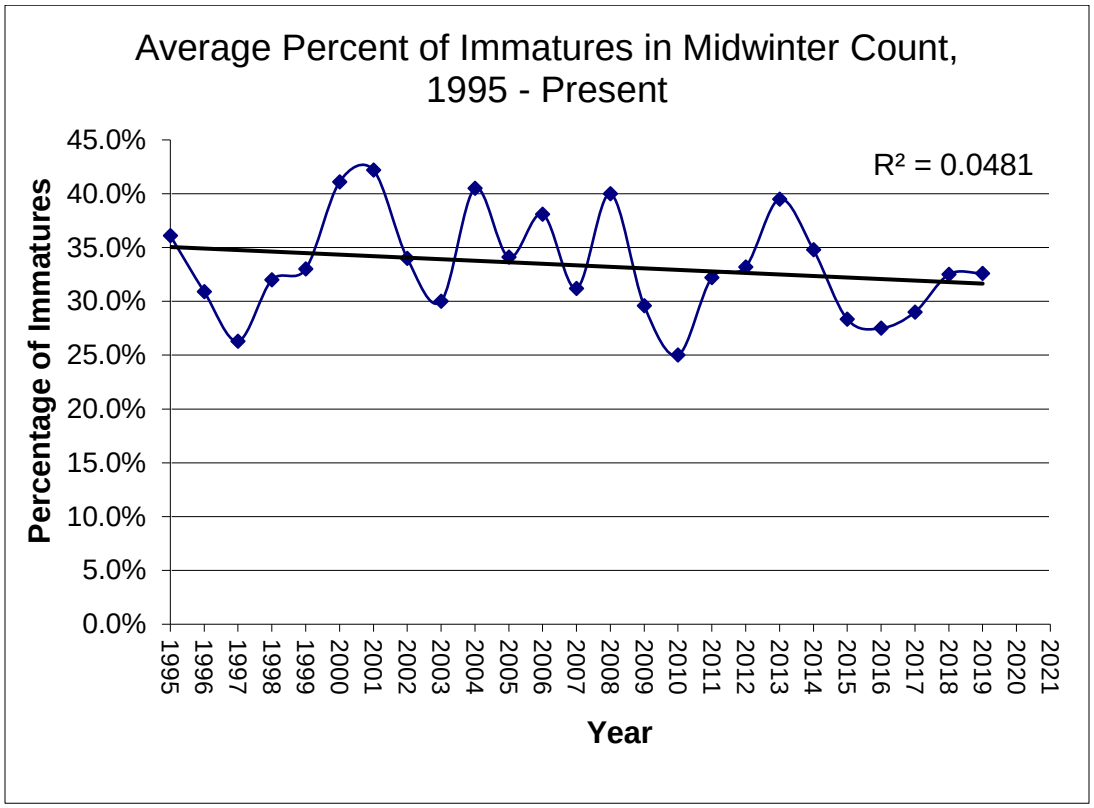

Figure 10. Percentage of immature bald eagles counted during the Bald Eagle Midwinter survey 1995 to present.

Table 2. Summary of data collected during the 2019 Bald Eagle Midwinter Survey by waterbody, listed in descending order from most eagles per mile to least.

2019 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%**	**2,924**	**1,893**	**953**	**78**	**1**	**0**	**1,546**	**1.89**
Mississippi River	23%	671	465	199	7	0	0	182.5	3.7
Des Moines River	37%	1,072	723	327	22	0	0	320.5	3.34
Iowa River	6.5%	191	137	39	15	0	15	68	2.81
Missouri River	17%	498	232	266	0	1	0	182	2.74
Nodaway River	0.06%	2	1	1	0	0	0	1	2
Maquoketa	4.2%	123	95	21	7	0	0	96	1.28
Lake Rathbun	3.5%	101	44	35	22	0	0	85	1.19
Turkey River	0.44%	13	8	5	0	0	0	15	0.87
Cedar River	1.6%	48	33	13	2	0	0	68	0.71
Wapsipinicon River	1.9%	57	48	8	1	0	0	106	0.54
Little Sioux River	1.1%	32	24	7	1	0	0	65	0.49
Skunk River	1.1%	32	23	8	1	0	0	72	0.44
Chariton River	0.62%	18	10	8	0	0	0	45	0.40
Unknown	1.6%	46	36	10	0	0	0	170	0.34
S. Maquoketa River	2.3%	66	20	14	6	0	0	105	0.19
Age Composition		100%	65%	32.6%	2.6%	NA			NA
2019 Weather Averages									
Temp (F)	25								
Percent Ice Cover	17%								
Past Weather (1-5)	3.4	1- very mild; 2- mild; 3- normal; 4- harsh; 5- very harsh							
Past Ice (1-5)	4.1	1-much less than normal; 2-less than normal; 3-normal; 4-more than normal; 5-much more than normal							
Survey Time (Avg. min)	160								

The most highly surveyed rivers, which also usually host the highest numbers 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 2019, the total number of birds counted was highest on the Des Moines but the Mississippi River had more birds per mile surveyed (Table 2). The second highest water body in eagles counted per mile was the Des Moines with the Iowa and Missouri rivers almost tied for third. In general, the birds were more highly distributed across rivers than they were in 2018 when a vast majority of the birds counted were on the Mississippi.

DISCUSSION

Bald Eagle Nesting

The original Northern States Bald Eagle Recovery Plan (Grier et al., 1983) set recovery goals at 1200 nesting pairs across 16 states with an average of 1.0 young produced per nest. With roughly 400-500 nesting pairs in Iowa alone and an average young/nest consistently between 1 and 2, Iowa is definitely contributing to the regional Bald Eagle population and is supporting a stable breeding population. In fact, Iowa far surpassed the state-specific goal identified in the regional plan of 10 pairs by the year 2000 (over 100 nesting pairs were recorded by that time).

While Iowa does not have a comprehensive dataset of Eagle nests in the state throughout the entire recovery, the trend in Iowa has roughly reflected the well-studied Virginia population (Watts et al. 2008). The addition of nesting territories in the 1980s was slow, growing from 1 to 14 nest pairs from 1977-1989, sped up in the 1990s, growing to 100 pairs in 1998 and then has seen huge growth since 2000. However, the Volunteer Wildlife Monitoring Survey is not designed to measure the growth in breeding pairs; it instead shifts the focus towards measuring reproductive success of a sample of nests in the state.

The conservatively estimated nest success rate of 66% is roughly equal to the previous 7 year average of 67% and suggests stability in nesting success. This rate is somewhat lower than that cited for the Chesapeake Bay area (>80%) (Watts 2008) but our rate was calculated using the total number of nests surveyed, including those with an unknown outcome and if those nests are removed, nest success rate jumps to 86%. Considering that the Chesapeake Bay is one of the more productive eagle breeding areas in the country (Grier 1983, Watts 2008) the success rates in Iowa are comparable.

If 87% of the currently 431 active territories in the state were occupied in 2019 (375 nests), and 66% of those were successful (247.5 nests), then using the average of 1.40 chicks per nest, an estimate of 347 total young were produced by nests in Iowa. With 431 territories classified as active in Iowa, the adult population of breeding Bald Eagles at a minimum numbers 862. The Bald Eagle population is four times the original goal set for Iowa in the early recovery plan (Grier et al., 1983) and successful reproduction rates suggest the population is currently stable or growing.

The number of nests monitored and reported on in 2019 was the highest it has been since this program started in 2010. Two well-attended training workshops were held for volunteers in 2019, one in Mahaska County and one in Sioux County which added 17 new volunteers. A total of 82 volunteer monitors collected data on these 262 nests!

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. The 2014 survey saw the highest number of eagles ever counted, while 2015 represented the lowest since 2007 and 2016 was the lowest since 2003. In 2019 the count was very close to the overall average of the last 10 year period. 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. This doesn't necessarily mean that weather doesn't have an effect but the survey design may not be appropriate for picking it up. The availability of food is the most obvious root motivation for Bald Eagles to move across the landscape for which weather just may not be a strong enough predictor. Other factors that are not collected, including the availability of food, could explain the huge fluctuations.

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, at least in the states to Iowa's north which host over 1,000 nesting pairs each year. 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. Regardless, Iowa provides important wintering habitat and resources for the Bald Eagle population in the U.S. and we will continue to monitor their numbers.

In 2019, a mix of 81 volunteers and natural resources professionals spent over 120 collective hours surveying 1,546 miles of waterbody shoreline.

MANAGEMENT IMPLICATIONS

Based on nesting and wintering data, the Bald Eagle population in Iowa, despite annual variability, is stable so there are no immediate actions that need to be taken on behalf of the species. However, there are still a number of challenges to eagles and the DNR will continue to protect nests and nesting habitat as well as monitoring the species to facilitate early detection of any changes to the stable status.

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 citizens who volunteer their time. A huge thanks goes out to all the volunteers who generously make such important yearly contributions of time and energy and 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.

LITERATURE CITED

Removing the Bald Eagle in the Lower 48 States from the List of Endangered and Threatened Wildlife, 72 FR 37345 (final rule August 8, 2007).

Buehler, D. A. (2000). Bald Eagle (Haliaeetus leucocephalus). *The Birds of North America*, (506), 40.

Eakle, W., L. Bond, M.R. Fuller, R. A. Fischer, and K. Steenhof. (2015). Wintering bald eagle count trends in the Conterminous United States, 1986–2010. Journal of Raptor Research 49(3): 259-268.

Grier, J. W. (1980). Modeling approaches to bald eagle population dynamics. *Wildlife Society Bulletin*, 316-322.

Grier, J.W., .J.B. Elder, F.J. Gramlich, N.F. Green, J.V. Kussman, J.E. Mathisen and J.P. Mattsson. (1983). Northern States Bald Eagle Recovery Plan. U.S. Fish and Wildlife Service. 131 pp.

Steenhof, K., L. Bond, K.K. Bates, and L.L. Leppert. (2002). Trends in midwinter counts of Bald Eagles in the Contiguous U.S., 1986-2000. Bird Populations 6: 21-32.

Watts, B.D., G.D. Therres and M.A. Byrd. (2008). Recovery of the Chesapeake Bay Bald Eagle Nesting Population. Journal of Wildlife Management 72(1): 152-158.

Wisconsin Department of Natural Resources. (2017). Wisconsin Bald Eagle Nest Survey – 2017. Retrieved from Wisconsin DNR Website: https://dnr.wi.gov/topic/WildlifeHabitat/documents/reports/eagleospreysurv.pdf.