Iowa Spring Spotlight Survey: 2026 Summary

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ABSTRACT

The Iowa Department of Natural Resources conducts nocturnal spotlight surveys from mid-March to mid-May, annually. Surveys are completed in all 99 Iowa counties and total ~4,780 mi ($\bar{x}$ = ~50 mi/county) of surveyed rural roads. In 2026, a total of 19,690 wildlife observations were recorded, with white-tailed deer (n = 13,336), raccoon (n = 5,414), opossum (n = 407), striped skunk (n = 189), and house cat (n = 141) most frequently observed. Estimated statewide relative abundance decreased for deer, skunk, mink, and bobcat, and increased for red fox, opossum, badger, coyote, and house cat.

INTRODUCTION

Data capable of estimating wildlife abundance are often difficult, expensive, and time consuming to collect, particularly for rare or elusive species, or species distributed across large geographic areas. Standardized sampling methods, however, can provide consistent population indices over time. Reliable indices are important for understanding population trends and the factors influencing them, including environmental conditions (Progulske and Duerre 1964, Fujisaki et al. 2011), regulated harvest (Carrillo et al. 2000), and disease (Gehrt et al. 2006). One common method, the nocturnal spotlight survey, has been used since the mid-20th century and provides wildlife managers with a cost-effective and easily implemented option to sample wildlife populations (SDDGFP 1950; Anderson 1959). Spotlight counts have been used to produce indices for species, including opossum (*Didelphis virginiana*; Gehrt et al. 2006), raccoon (*Procyon lotor*; Gehrt et al. 2002), red fox (*Vulpes vulpes*; Ruette et al. 2003), and white-tailed deer (*Odocoileus virginianus*; Rybarczyk 1978, Kaminski et al. 2019).

In 1978, the Iowa Department of Natural Resources (Iowa DNR; formerly the Iowa Conservation Commission) initiated the spring spotlight survey due to concerns that record-high raccoon pelt prices could lead to overharvest and negatively impact population sustainability (Rybarczyk 1978). Spotlight routes were established along forested areas to survey raccoons, although white-tailed deer were also included. In general, 85 spotlight routes were surveyed across the state from 1978-1990, and five additional routes were added from 1991-1995 (Appendix A). This original survey specifically targeted forested areas within an agriculturally dominated landscape. Given the close association of raccoons (Pedler et al. 1997, Beasley et al. 2007) and deer (Volk et al. 2007, Walter et al. 2009) with forest cover, statewide counts likely exhibited spatial bias (McShea et al. 2011). Regardless, trends resulting from this survey provided key insights into these growing populations beginning in the 1970s (Appendix B through Appendix E).

In 2006, a new survey was developed to address limitations in the original design. Rather than using survey routes perpendicular to forest cover, routes were oriented longitudinally in an east–west direction to achieve a representative sample of land cover types across the state. Several mesocarnivores were added to the survey, including badger (*Taxidea taxus*), bobcat (*Lynx rufus*), coyote (*Canis latrans*), red fox, gray fox (*Urocyon cinereoargenteus*), mink (*Neogale vison*), opossum, river otter (*Lontra canadensis*), striped skunk (*Mephitis mephitis*), and spotted skunk (*Spilogale putorius*). The new design was tested concurrently with the original survey and produced similar trends with less variability (Iowa DNR, unpublished data). Therefore, in 2012, the new survey routes were adopted in all 99 Iowa counties. The redesigned survey results in relatively large counts of deer, coyotes, opossums, raccoons, striped skunks, and red foxes. Observations of other species (e.g., gray foxes, bobcats, river otters, minks), however, are more variable due to the secretive nature, low density, or low visibility of animals. Thus, a low count for these species does not necessarily indicate low population abundance.

The goal of the spring spotlight survey is to collect reliable, standardized, and long-term data on select wildlife species that can be used to inform science-based management decisions in Iowa. The objectives of the survey are to 1) collect systematic observations of deer, raccoons, and select furbearer species as independent population indices or as

supplements to harvest and other survey data collected by the Iowa DNR, and 2) monitor the long-term distribution and relative abundance of select wildlife species to guide population management and conservation efforts.

STUDY AREA

The spring spotlight survey is conducted in each of 99 counties in the 56,239-mi^2 state of Iowa (Figure 1). The climate is humid continental, characterized by hot, humid summers and cold winters. Average annual precipitation ranges from 24.4 inches in the northwest to 37.2 inches in the southeast (NOAA 2002a). Average annual temperature ranges from 45.5°F in the northwest to 50.7°F in the southeast (NOAA 2002b). Land cover consists of row crops (68%), grassland and pastureland (14%), forest (8%), urban and other developed lands (8%), and wetlands, shallow lakes, and open water (<2%; National Land Cover Database 2025; Jin et al. 2019).

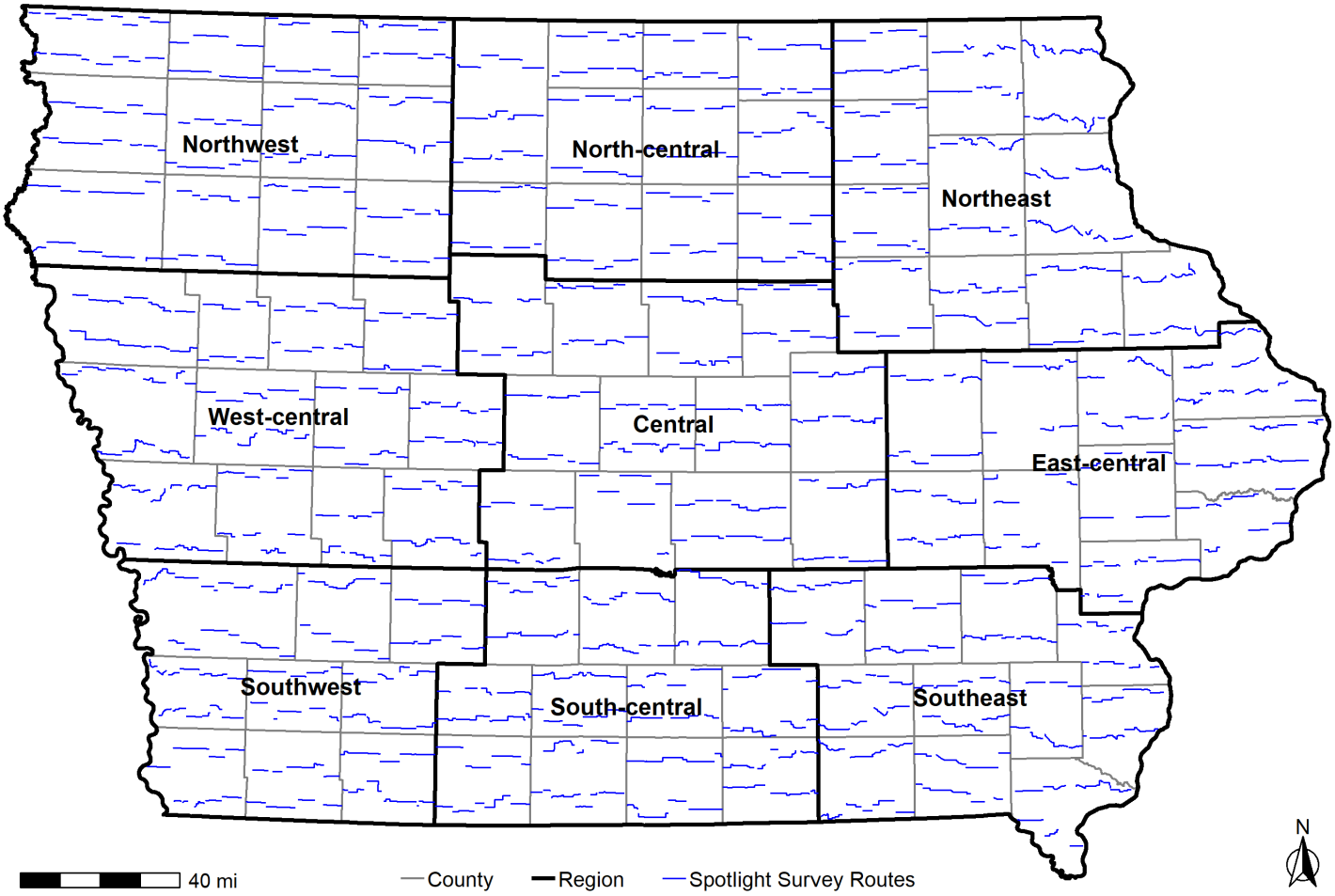


Figure 1. Spring spotlight survey routes (n = 199) in each county of Iowa and 9 regions of the state used for summarizing spotlight count data.

METHODS

The spring spotlight survey is conducted annually between mid-March and mid-May, usually after snowmelt and before spring green-up. Selected survey dates in each county are dependent on local weather conditions and the latitudinal timing of vegetation leaf-out across the state. Surveys are standardized according to weather conditions (Rybarczyk 1978) and conducted during periods of no precipitation, wind speeds <15 mph, and temperatures >32°F, and relative humidity generally ≥40%. Surveys consist of two east-west driving routes, one across the northern half and one across the southern half of each county (except Kossuth County, which has three routes; *n* = 199; Figure 1). Routes follow along rural unpaved roads totaling ~4,780 miles statewide ($\bar{x}$= 24.0 mi/route; range: 13.0–41.9 mi; SD=4.3 mi) and are sampled once each spring. Surveys begin one hour after sunset and are conducted at speeds ≤20 mph. Surveys are conducted by two observers (1 driver and 1 passenger), both of whom search for wildlife using a spotlight along their respective side

of the road. From 2006-2018, the number and location of animals were recorded at the observer location using a Global Positioning System (GPS) device. For deer, the distance and bearing to each group of deer (≥1 individual) were also recorded to estimate deer density across the state. Beginning in 2019, observations were recorded digitally (e.g., smartphones, tablets) in a geospatial database (ArcGIS Field Maps; Environmental Systems Research Institute, Redlands, CA), which allowed for the collection of more precise wildlife locations and increased survey efficiency.

Table 1. Survey year, number of miles surveyed, and total number of animals observed for select species during the spring spotlight survey in Iowa, 2006-present.

Year	Miles	Deer	Badger	Bobcat	Coyote	Mink	Opossum	Raccoon	Red Fox	Skunk	House Cat
2006[a]	4,290	9,279	9	4	56	9	136	2,417	41	133	15
2007	4,795	11,284	23	2	49	6	164	2,817	32	144	383
2008	4,793	13,329	22	5	51	13	118	3,143	46	148	511
2009	4,784	12,935	15	4	66	11	136	3,219	32	174	405
2010	4,787	10,888	16	4	53	10	86	3,621	43	217	392
2011	4,780	11,054	9	4	64	6	85	4,197	55	211	490
2012	4,764	9,322	9	3	92	11	114	3,282	37	171	599
2013	4,738	13,053	15	2	94	6	172	3,347	42	140	479
2014	4,800	11,401	12	3	65	3	88	3,793	28	116	391
2015	4,790	12,354	12	2	66	1	162	3,537	29	155	337
2016	4,799	12,522	16	1	110	13	273	3,672	27	144	252
2017	4,793	13,017	16	4	108	5	297	3,695	38	138	200
2018	4,790	15,102	18	0	99	2	295	4,683	46	181	209
2019	4,772	16,164	28	4	88	11	149	5,314	58	193	230
2020	4,781	15,746	26	8	86	8	179	4,454	24	173	161
2021	4,781	13,765	27	6	103	8	142	5,284	47	169	118
2022	4,783	17,103	27	4	119	7	268	6,486	48	270	143
2023	4,752	15,550	19	3	104	3	249	5,526	54	246	122
2024	4,783	16,920	36	2	122	4	442	5,601	43	252	155
2025	4,783	15,445	14	2	109	2	322	5,464	41	200	117
2026	4,782	13,336	32	5	115	4	407	5,414	31	189	141

[a]In 2006, species other than white-tailed deer and northern raccoon, particularly house cat, were not recorded in all counties and species counts may not be comparable to subsequent years.

Spotlight observations can vary based on factors such as weather and land cover. Therefore, evaluating trends directly from raw counts may fail to account for the survey conditions that influence animal behavior or their likelihood of being seen on a given night (i.e., detectability), independent of true population changes. To account for variable survey conditions, we estimated annual relative abundance (i.e., the expected wildlife count under average survey conditions) along each survey route using a multi-scale Bayesian hierarchical Negative Binomial state-space model with an observation process (adapted from Stuber et al. 2017; Program R 4.5.0, R Core Team 2025).

First, to estimate the expected number of animals available for detection (ecological process), our model accounted for three weather and landscape factors that may affect animal survival or population carrying capacity: winter weather severity (using the Accumulated Winter Season Severity Index; Boustead et al. 2015) and the proportion of grass and forest cover surrounding each survey route. The model also accounted for broad geographic differences across counties and regions (such as underlying habitat quality, land-use patterns, or local harvest effort) to ensure that baseline population densities could vary across the state. Second, to estimate the observability of wildlife (detection process), the model accounted for five weather factors and one survey factor that may affect the sightability of wildlife through changes to animal behavior or vegetation green-up: survey route order (whether a route was driven first or second on a

given night), temperature and humidity during the survey, growing degree days, and total rainfall in the days leading up to each survey. The model also accounted for differences across counties (such as variation in observers, equipment, or visible area along each transect) to ensure that changes in sightings accurately reflected real population trends rather than differences in local survey methods.

Environmental conditions may influence wildlife and survey sightings at various spatial or temporal scales. Therefore, we measured grassland and forest cover across six spatial buffers surrounding each route (300 m and 1-5 km in 1 km increments) and total rainfall across six temporal windows leading up to each survey (1, 3, 7, 10, 14, and 21 days). Models were iteratively estimated several thousand times, where each scale was considered simultaneously and the most informative measure was selected for estimating the model at each iteration.

We ran all species models three times simultaneously (chains) using Markov chain Monte Carlo sampling to ensure that relative abundance estimates were consistent and stable. For deer, models were run for 150,000 iterations per chain, discarding the first 50,000 iterations as model tuning (burn-in) and saving every 40th iteration thereafter to reduce redundancy and calculate final estimates. For mesocarnivores, models were run for 100,000 iterations per chain, discarding the first 30,000 and saving every 20th iteration thereafter.

We further estimated the average relative abundance across years to contextualize annual observations and to map the distribution of species across the state. For the most recent 5 years, we calculated average relative abundance and interpolated estimates using inverse distance weighting (IDW; function gstat in Program R 4.5.0; R Core Team 2025) and 9 nearest neighbors. To determine the IDW power used to weight nearest neighbors for each species, we iteratively tested power values from 0.2-5.0 in 0.2 increments and estimated the root mean square error (RMSE) for each IDW estimate. We selected the power value from the IDW estimate with the lowest RMSE for producing the final IDW map. We further averaged the final IDW map using a focal analysis (function focal in Program R) and a 29.8-mi moving window to produce a smoother and more readily interpretable trend surface across Iowa.

RESULTS

In 2026, 4,782 miles of rural roads were surveyed across all 99 Iowa counties, resulting in a total of 19,690 animals reported (Table 1). Estimated relative abundance decreased for deer, raccoon, bobcat, skunk, and mink, and increased for badger, coyote, opossum, red fox, and house cat (Figure 2 through Figure 42).

Relative abundance for deer was 13,511, which was a 20% decline from last year and the lowest estimate since 2013. Relative abundance decreased in all regions of the state in 2026. Long-term, relative abundance has been relatively stable to increasing in all regions, except the south-central and western regions, where estimates have declined the past 3 or more years (Figure 2 through Figure 6).

Relative abundance for badgers was 27 ($\bar{x}$ = 19.7) and has steadily increased by an average of 4.8% per year since 2014 (R^2 = 0.93, P < 0.001). Relative abundance has been low across most of the state, except the west-central region, where relative abundance has increased 297% since 2007 (2.6-10.1 animals; 8.2% annual increase; Figure 7 through Figure 10).

Relative abundance for coyote was 113 and remained unchanged compared with 2025 ($\bar{x}$ = 88.6). Estimates remained stable-to-increasing in all regions of the state, with the most notable increases in the west-central (6.5% annual change; R^2 = 0.88, P < 0.001), southwest (5.2%; R^2 = 0.87, P < 0.001), central (4.9%; R^2 = 0.84, P < 0.001), east-central (3.8%; R^2 = 0.54, P < 0.001) and northwest (3.6%; R^2 = 0.71, P < 0.001) regions (Figure 15 through Figure 18).

Relative abundance for opossums was 405, which was the second highest estimate in survey history and remained above the long-term average ($\bar{x}$ = 209). Despite considerable annual variability, the statewide trend increased by an average of 6.7% per year since 2007 (R^2 = 0.65, P < 0.001). Since the mid-2010s, relative abundance has increased in all nine regions of the state (Figure 23 through Figure 26).

Relative abundance for raccoons was 5,524, which was similar to the previous two years and above the long-term average ($\bar{x}$ = 4,339). The statewide trend increased by an average of 3.7% per year since 2007 (R^2 = 0.87, P < 0.001),

although estimates have been relatively stable around an average of 5,627 raccoons since 2021. Long-term, relative abundance increased in all regions during the 2010s and has since stabilized or decreased during the past 5 years (Figure 27 through Figure 30).

Relative abundance for red fox was 49.9, which was an all-time high estimate for the species ($\bar{x}$ = 40.3). In general, statewide estimates have remained relatively stable since 2007 (0.73% increase, R^2 = 0.19, P = 0.058). The most notable regional changes occurred in the south-central (3.2% annual change; R^2 = 0.69, P < 0.001), east-central (3.2%; R^2 = 0.72, P < 0.001), north-central (2.35%; R^2 = 0.51, P < 0.001), northeast (2.0%; R^2 = 0.52, P < 0.001), southeast (-2.64%; R^2 = 0.32, P < 0.001), and northwest (-4.34%; R^2 = 0.68, P < 0.001) regions (Figure 31 through Figure 34).

Relative abundance for skunks was 193, which was a slight decline from 2025, but above the long-term average ($\bar{x}$ = 182). Regional estimates averaged 18–28 skunks and displayed stable-to-increasing trends across most regions, except the southeast, which averaged only 9 animals and exhibited a significant long-term decline of 1.72% per year (R^2 = 0.23, P = 0.034; Figure 35 through Figure 38).

Relative abundance for free-ranging house cats was 152 and similar to the past five years. Since 2007, relative abundance declined 7.7% per year (R^2 = 0.88, P < 0.001), with the most pronounced declines occurring across northern Iowa (Figure 39 through Figure 42).

Observations for other species tend to be opportunistic due to ecological or behavioral constraints of the species. Relative abundance for bobcat (3.7) was stable ($\bar{x}$ = 3.4) and generally low for this survey (Figure 11 through Figure 14). Relative abundance for mink (5.5) was below the long-term average ($\bar{x}$ = 6.7) and reflective of a prolonged decline of 1.45% per year (R^2 = 0.41, P = 0.0025; Figure 19 through Figure 22). Five weasels, two otters, and two woodchucks were reported, whereas no gray fox or jackrabbit were reported.

DISCUSSION

Relative deer abundance declined 20% from 2025, a drop similar to that observed in 2012. However, the reason for these declines remains unclear. First, Iowa deer are exposed annually to hemorrhagic disease (Epizootic Hemorrhagic Disease and Bluetongue viruses), which can cause considerable mortality during dry years. Nevertheless, reported mortality in 2025 was exceptionally low, particularly in comparison to the previous two years, when reported mortality was high yet relative abundance remained stable. Second, although survey night conditions were standardized and the relative abundance model accounted for several landscape and weather factors, unaccounted environmental variability may still influence deer activity or sightability in some years. Following the 2012 survey, relative abundance rebounded 49% in 2013, which is a biologically improbable change for a wild deer population. Therefore, incorporating additional environmental variables available across the duration of our study (e.g., moon phase, barometric pressure) may explain remaining variability in deer activity and detection.

Statewide deer estimates have remained largely stable over the past five years, although this trend masks regional changes. Relative abundance has generally increased in eastern and north-central Iowa, whereas estimates have declined in all western regions, as well as south-central Iowa, where historically the most deer have been observed. Despite efforts to limit female (doe) harvest and encourage population growth, relative abundance has declined over the past five to eight years across western regions. Among all regions, the only long-term decline occurred in the southwest, where relative abundance has dropped by 2.2% annually since 2007 (R^2 = 0.67, P < 0.001). As a result, in 2026, a new regional hunting zone was implemented covering eight western Iowa counties where harvest on resident general licenses is primarily restricted to antlered deer only. Additionally, county-specific antlerless tag quotas have been greatly reduced or eliminated altogether throughout much of western Iowa. Although deer have a high reproductive potential, it remains unclear whether limiting harvest alone will promote population growth in western Iowa, or how quickly recovery will be observed in the spotlight survey trends.

Badger relative abundance has steadily increased since 2014, primarily driven by likely population growth in west-central and southeastern Iowa. A species distribution model derived from badger spotlight observations (e.g., Figure 6 for deer) indicated that habitat is concentrated across the western one-third of the state. In addition to abundant

habitat, western Iowa populations are adjacent to more contiguous populations in eastern South Dakota and Nebraska (Huxoll 2024), which likely supplements Iowa populations through dispersal. As a whole, badgers are solitary and exist at low densities across the state, with sightings occurring largely as chance encounters. Nevertheless, relative abundance is increasing in central (3.2% annual increase; $R^2 = 0.81$, $P < 0.001$) and north-central (3.1%; $R^2 = 0.81$, $P < 0.001$) regions, suggesting that the statewide population may be expanding eastward.

Three indices are used to track coyote population trends in Iowa: spring spotlight survey observations, bowhunter survey observations (Harms et al. 2022), and reported harvest. Spotlight survey estimates indicate that relative abundance has increased by 2.4% per year over the past decade, whereas bowhunter observations suggest that populations have remained relatively stable statewide. The reason for this discrepancy remains unclear, though it is likely driven by multiple methodological and behavioral factors: 1) spring spotlight surveys are conducted at night when coyotes are most active, whereas bowhunter observations occur during daylight or crepuscular periods; 2) bowhunters are primarily located in or along forest cover where local occupancy may be more stable than in the open agricultural or grassland landscapes sampled during spring spotlighting; 3) coyotes may exhibit higher nocturnal detectability during the spring spotlight survey as they move through open land cover; 4) spring pup-rearing demands likely necessitate greater foraging activity, increasing spotlight detection rates; and 5) spring observations represent post-winter, pre-reproduction sub-adult and adult populations, whereas fall observations represent post-reproduction, pre-harvest populations comprising both juveniles and adults. Regardless of these factors, both surveys indicate that relative abundance is generally uniform across most of the state and lowest in southeastern Iowa. Additionally, although reported harvest has historically been used to track populations as well, reports dropped by 75% in 2021, coinciding with a 50% drop in average pelt values. Anecdotal reports suggested that harvest did not appreciably decline during the past five years, but rather fur harvesters opted to retain pelts rather than market them at depressed prices. As a result, the DNR initiated annual furharvester surveys to more accurately estimate harvest; these data are currently being summarized and will help improve population inferences across the state.

Opossums are sensitive to winter temperatures (Gillette 1980, Gehrt et al. 2006), yet populations can rebound quickly following harsh winters because females can produce two litters per year with large litter sizes (up to 13 young per litter; Gipson and Kamler 2001). For this survey, relative abundance was negatively correlated with winter weather severity at both county ($r = -0.56$, $P < 0.001$, 95% CI [-0.59, -0.53]) and statewide levels ($r = -0.73$, $P < 0.001$, 95% CI [-0.89, -0.43]). The 2026 estimate was the second highest in survey history and represented a 19.5% increase from 2025. This sharp increase was largely due to unusually warm temperatures (8.1°F above normal) and low snowfall (0.86 inches below normal) during February, which ranked as the 13th warmest and 10th driest in recorded history. Similarly, conditions in February 2012, 2016, 2020, and 2024 were mild, and relative abundance increased 60%, 47%, 37%, and 68% in subsequent surveys, respectively (Hillaker 2012, Glisan 2020, Glisan 2024). Conversely, estimates decreased 36%, 37%, and 27% in 2014, 2019, and 2021, respectively, following Februaries that ranked within the top 16th coldest on record (Glisan 2019, Glisan 2021, Hillaker 2014). Overall, reported opossum harvest has remained below the 25-year average for the past decade; thus, statewide population trends are likely driven by winter severity, among other non-harvest-related factors.

Relative abundance for raccoons has steadily increased since 2006, coinciding with depressed pelt values in international fur markets and reduced harvest over the past decade (Evelsizer 2022). The largest increases occurred across the lower two-thirds of Iowa, where relative abundance grew by 3.4-4.9% per year. Across all regions, estimates peaked between 2022 and 2024, before declining in recent years. The reason for this recent decline is unknown; however, it is unlikely driven by harvest pressure given that furharvester survey data indicate trapping and hunting effort remained relatively low in recent years. Continued monitoring may clarify whether these declines represent long-term stabilization near their ecological carrying capacity or reflect other mechanisms.

Spotlight observations for red foxes are challenging to collect due to their small size and evasive behavior (Ruette et al. 2003). Although raw observations fluctuate with local survey conditions, statewide relative abundance has remained relatively stable since 2007. Similar to bowhunter survey trends, regional estimates have remained mostly stable, with notable increases in the south-central (3.2% annual change) and east-central (3.2%) regions, and decreases in the northwest (-4.3%) and southeast (-2.6%) regions.

Spotlight surveys for skunks (as well as other small mesocarnivores) are challenging because spotlighting is most effective for species that are readily detectable by eyeshine (e.g., deer, raccoons). Skunks are rarely identified by eyeshine and must be close to the observer for identification (Gehrt et al. 2006). Nevertheless, spotlighting effectively captures relative skunk abundance in Iowa because of their tendency to use open areas at night, their slower movements, and their distinct black-and-white coloration. Furthermore, several environmental variables were significant predictors of abundance and detection for skunks, including the proportion of forest and grassland cover, survey-night humidity and temperature, growing degree days, and total precipitation in the 7 days leading up to surveys. As a result, our model accounts for these multiple sources of variability and successfully produces estimates of relative abundance with smooth temporal transitions. Thus, relative abundance appears to fluctuate in multi-year cycles both regionally and statewide. Currently, statewide relative abundance is above the long-term trend, although estimates appear to be in downward cycles overall.

The spotlight survey provides one of the only monitoring indices for mink in Iowa. Mink observations are rare along survey routes ($\bar{x}$ = 6.7 observations per year) because routes do not target riparian or wetland habitats typically used by mink. Although raw counts are variable, reliable population trends for mink are attainable using spotlight observations (Waller 2010). Relative abundance has declined 2.0% per year over the past decade (R^2 = 0.57, P = 0.012), with stable trends observed only in the northeast (R^2 = 0.12, P = 0.13) and southwest (R^2 = 0.15, P = 0.088) regions. Reported mink harvest has similarly declined since 2007; consequently, finalization of the annual furharvester surveys will enable a more robust comparison of harvest data against spotlight survey trends.

Spotlight observations for bobcats are collected incidentally because spotlighting is less likely to detect forest obligates. However, the spatial distribution of spotlight observations aligns with the known species distribution in Iowa, indicating a population concentrated primarily in the southern half of the state and along the Missouri and Mississippi River corridors. Relative bobcat abundance is also consistent between spotlight and bowhunter surveys, indicating a relatively stable population across the lower third of the state.

For this survey house cats are defined as free-ranging domestic cats located in rural areas unconfined and away from farmsteads and human developments. House cat observations have declined 71% since 2012 (8.1% annual decline) and have remained stable at low levels over the past six years. A similar pattern was observed in bowhunter observations; although the reason for these declines is unclear, it may be related to several interacting factors, including disease, predation, or declining rural human populations (Warner 1985). Predation by house cats on native fauna poses a serious conservation concern in North America, particularly for birds and small mammals (Dauphine and Cooper 2009). The ecological impact of declining rural cat populations on native fauna remains unknown, though a reduction in free-ranging cats is likely beneficial for a variety of wildlife taxa across the state.

MANAGEMENT IMPLICATIONS

The spring spotlight survey provides consistent long-term population indices for several wildlife species in Iowa. Population trends derived from the survey are critical for monitoring populations and informing science-based management decisions. When paired with long-term harvest and other survey data, the development of population abundance or growth models may be possible and provide more robust metrics for evaluating populations in the future.

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FIGURES

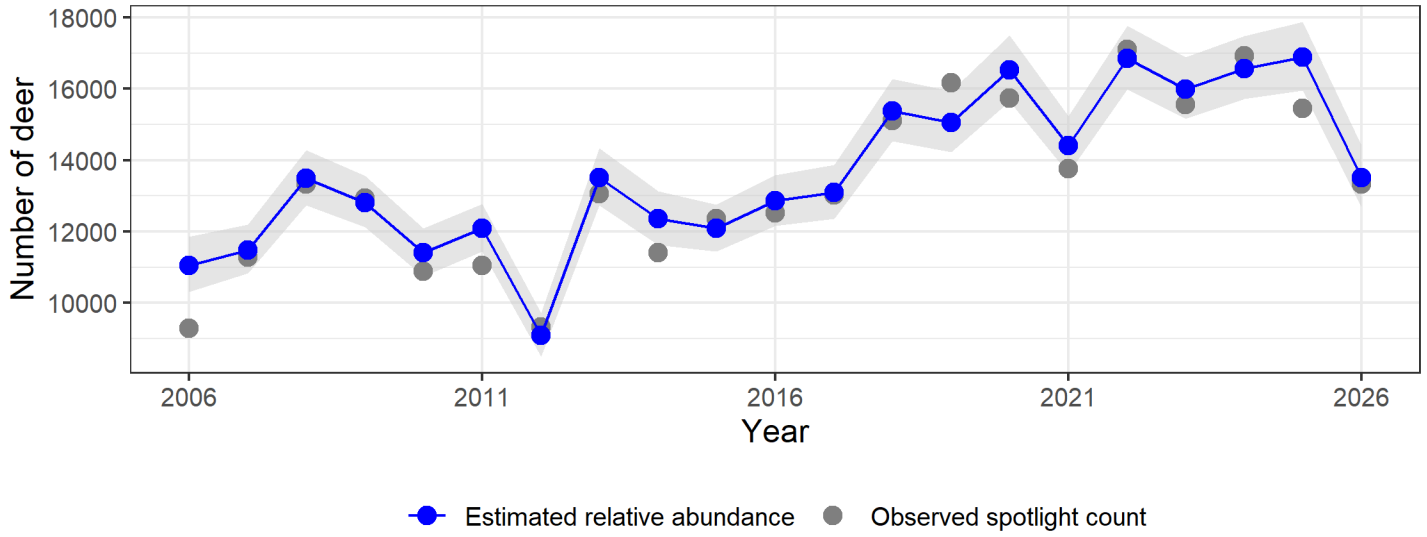


Figure 2. Relative white-tailed deer abundance during the Iowa spring spotlight survey, 2006-2026. 95% credible interval in gray.

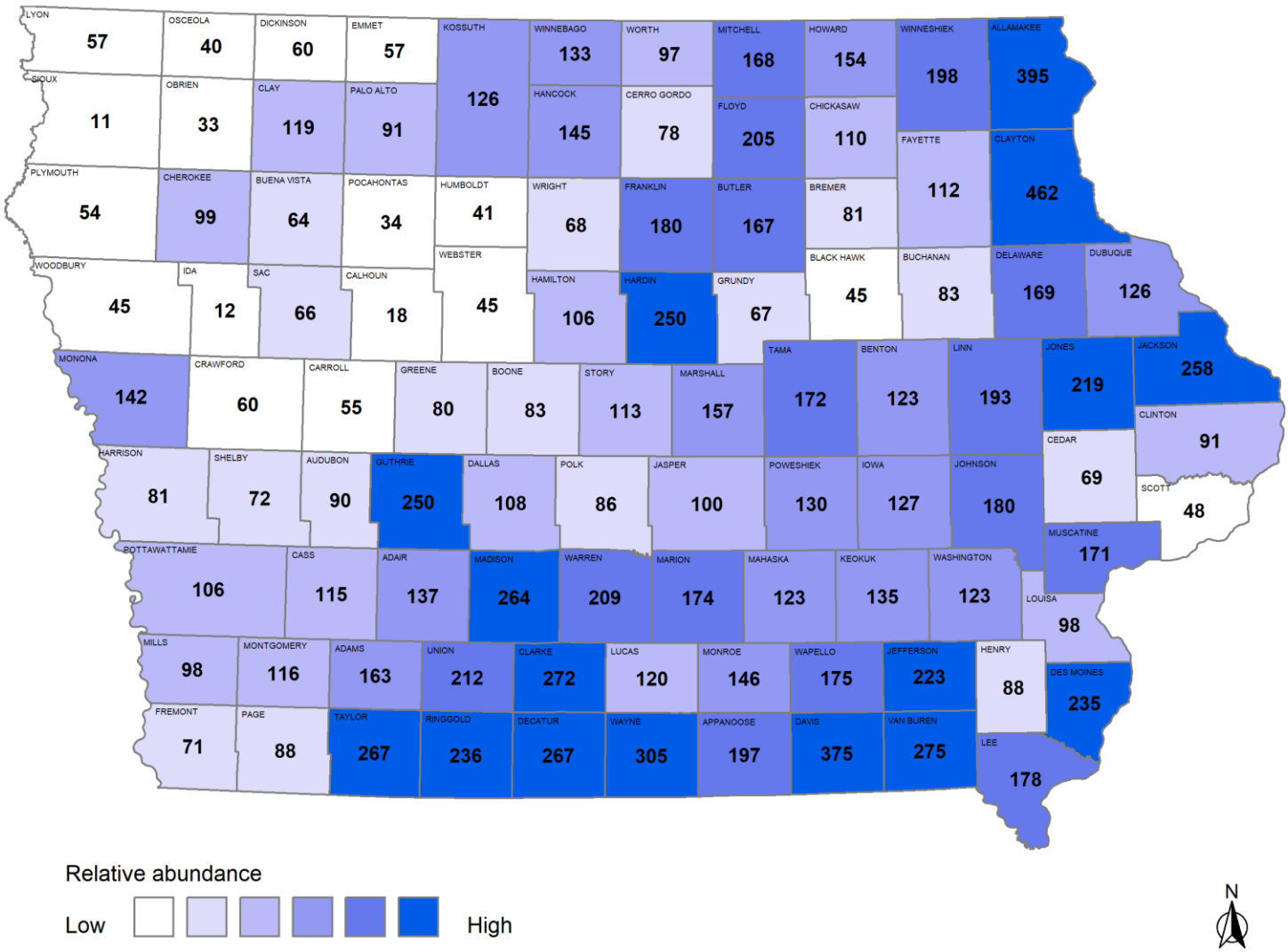


Figure 3. Relative white-tailed deer abundance per county during the Iowa spring spotlight survey, 2026.

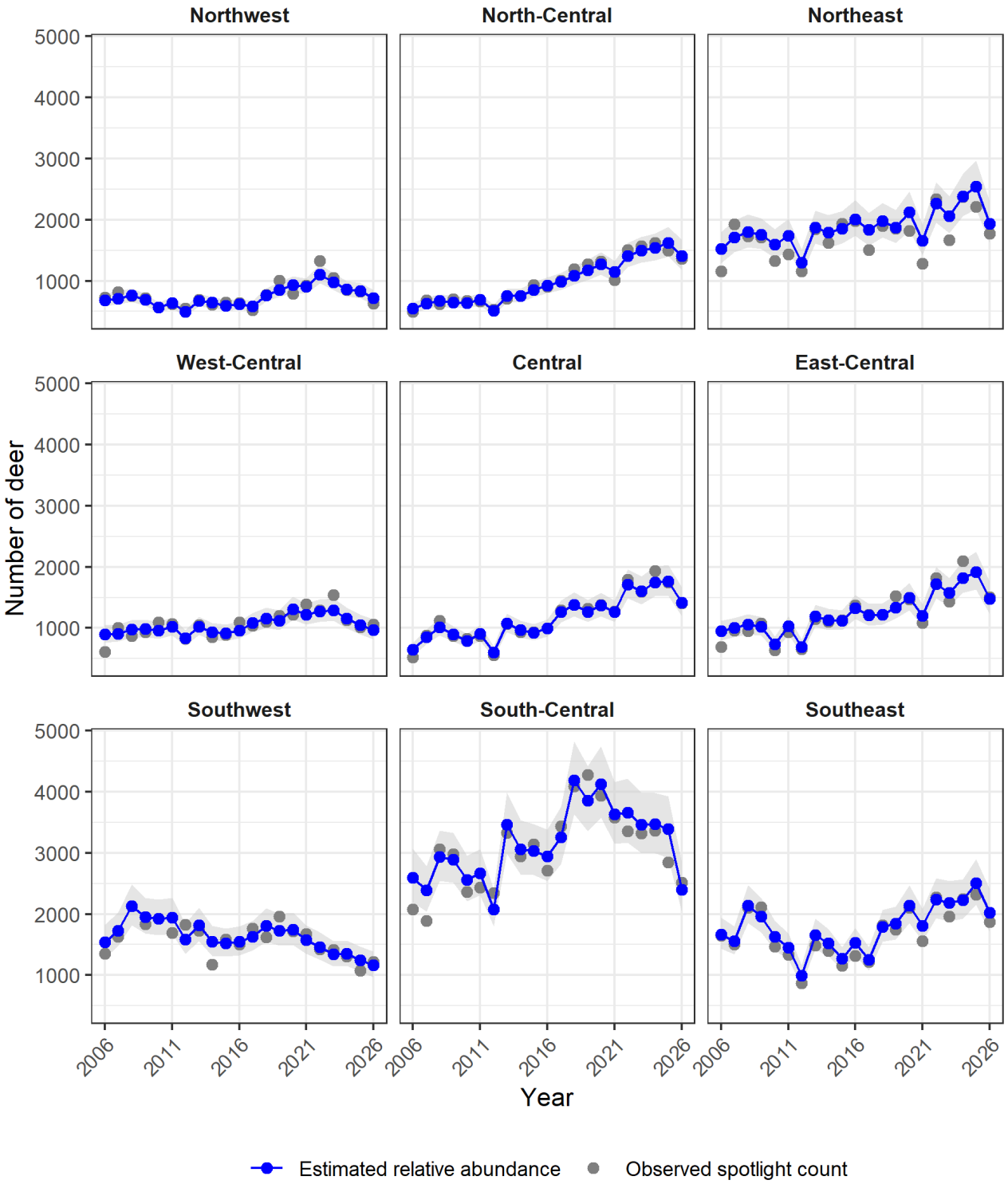


Figure 4. Relative white-tailed deer abundance during the spring spotlight survey for nine regions of Iowa, 2006-2026. 95% credible interval in gray.

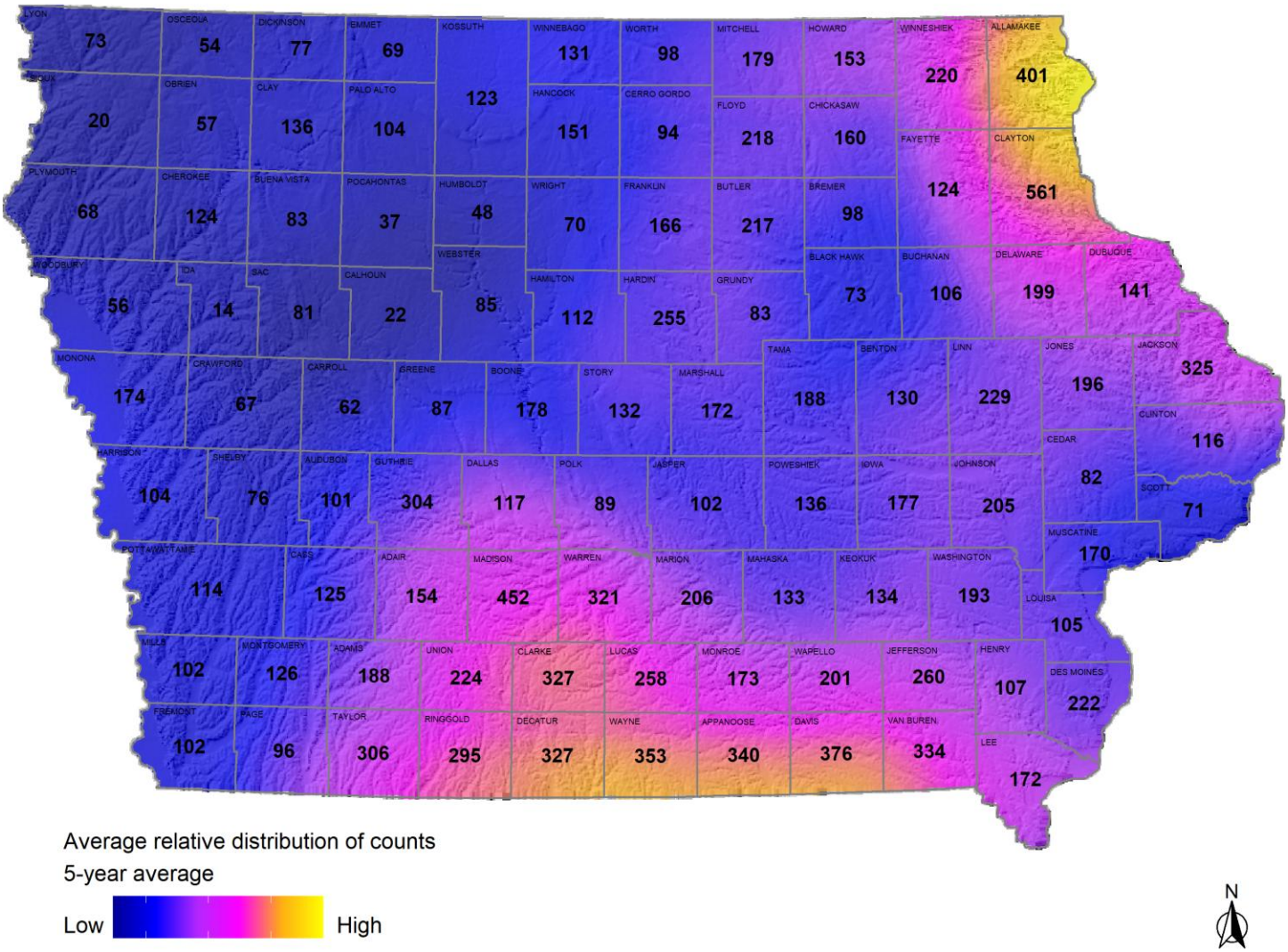


Figure 5. Average 5-year relative abundance of white-tailed deer during the spring spotlight survey in Iowa. Estimates are relative to the highest and lowest estimates across all counties and may not represent an over- or under-abundance of the species (i.e., high abundance is considered high relative to estimates in all other counties).

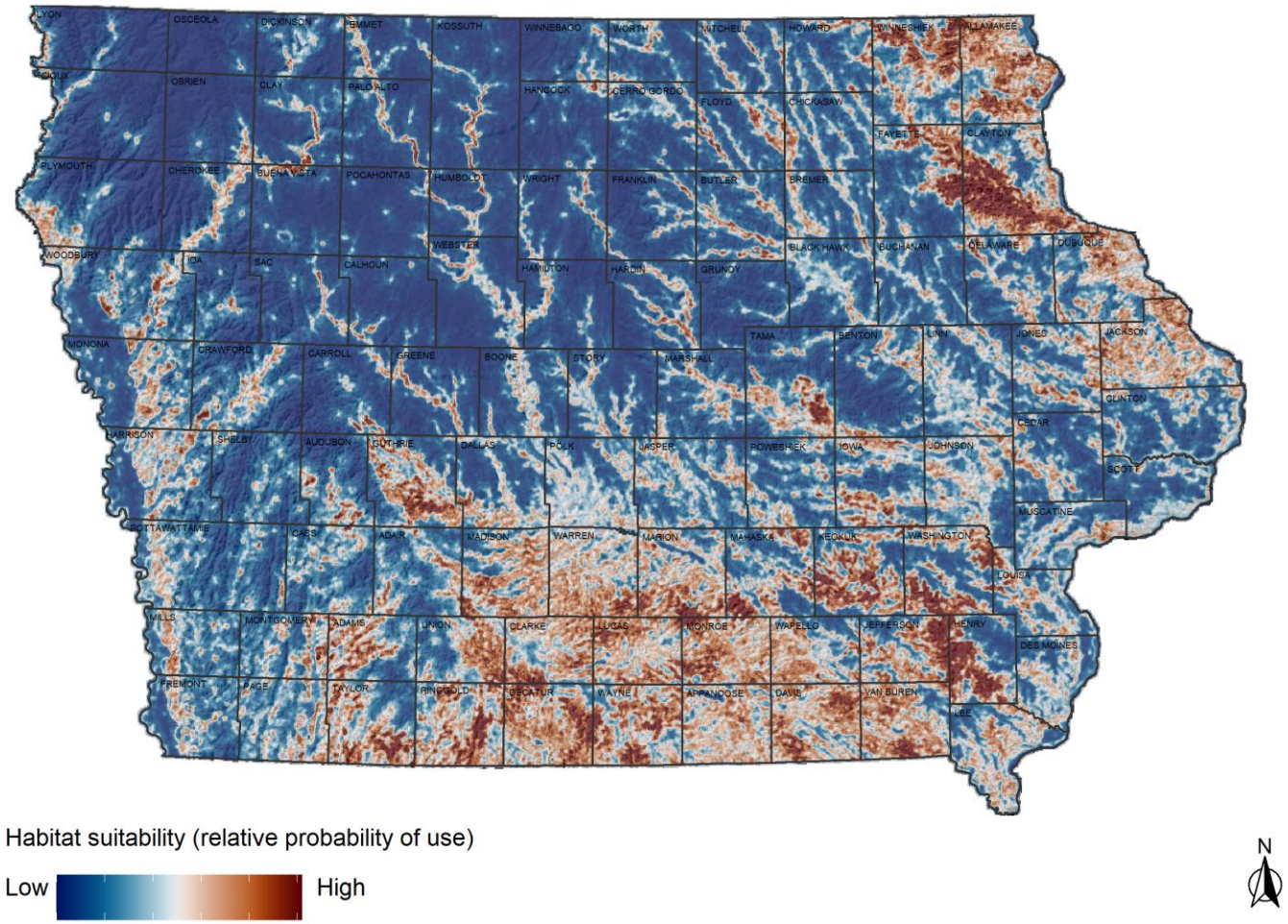


Figure 6. Habitat suitability (i.e., relative probability of use) for white-tailed deer in Iowa based on a resource selection function (RSF; see Kaminski et al. [2019] for details). The RSF model was predicted using spotlight observations for deer from 2012-2016 and the accuracy of the model was tested using 2017 observations (R^2 = 0.95). High values indicate areas of higher relative habitat quality for deer and low values indicate lower habitat quality.

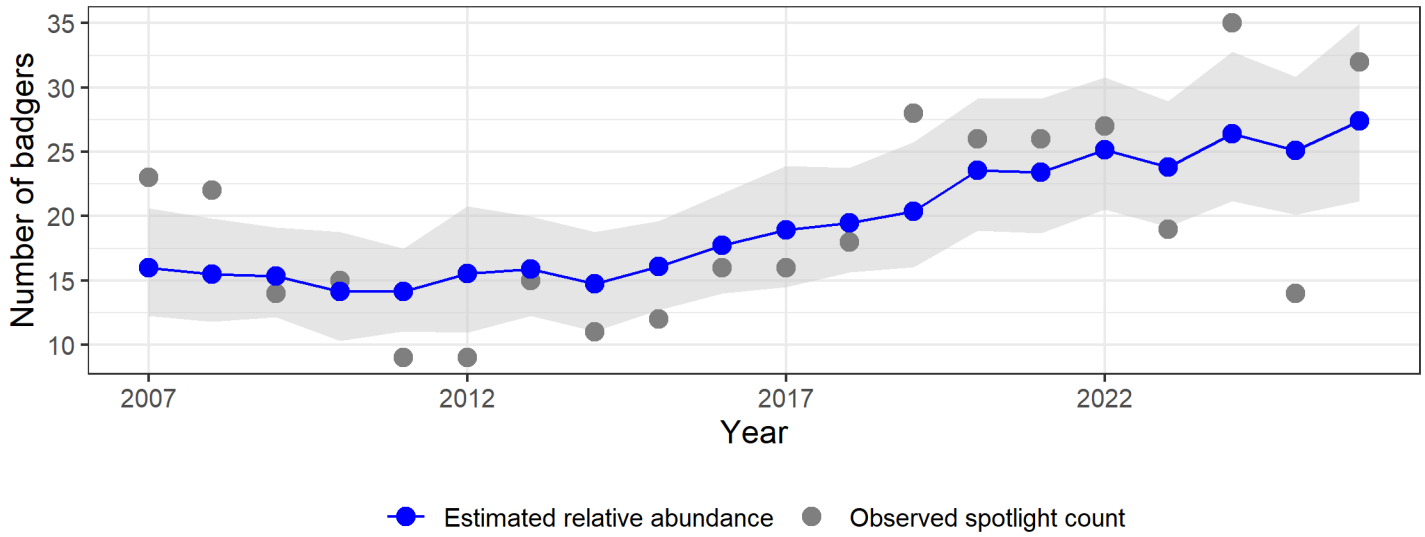


Figure 7. Relative badger abundance during the Iowa spring spotlight survey, 2006-2026. 95% credible interval in gray.

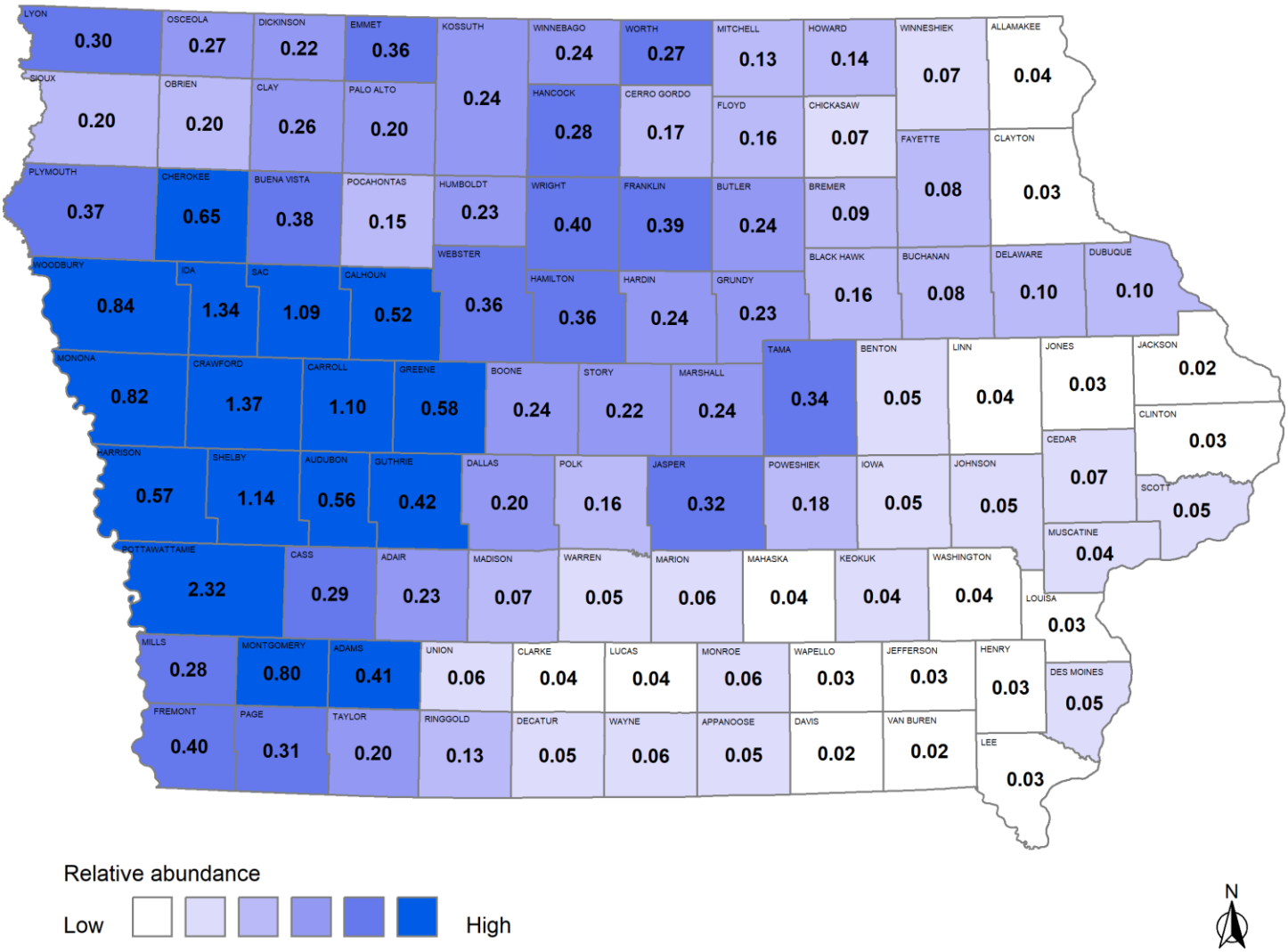


Figure 8. Relative badger abundance per county during the Iowa spring spotlight survey, 2026.

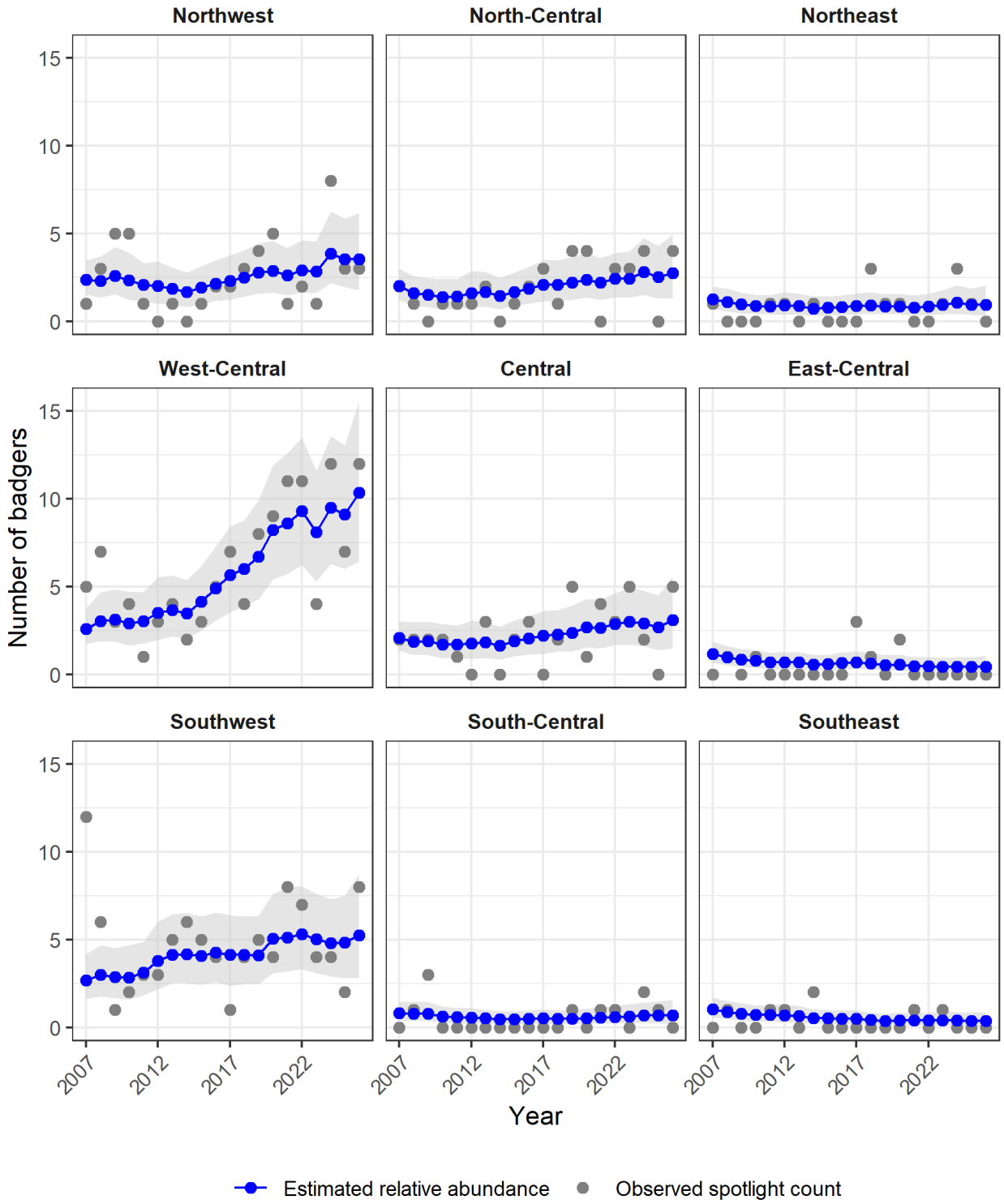


Figure 9. Relative badger abundance during the spring spotlight survey for nine regions of Iowa, 2006-2026. 95% credible interval in gray.

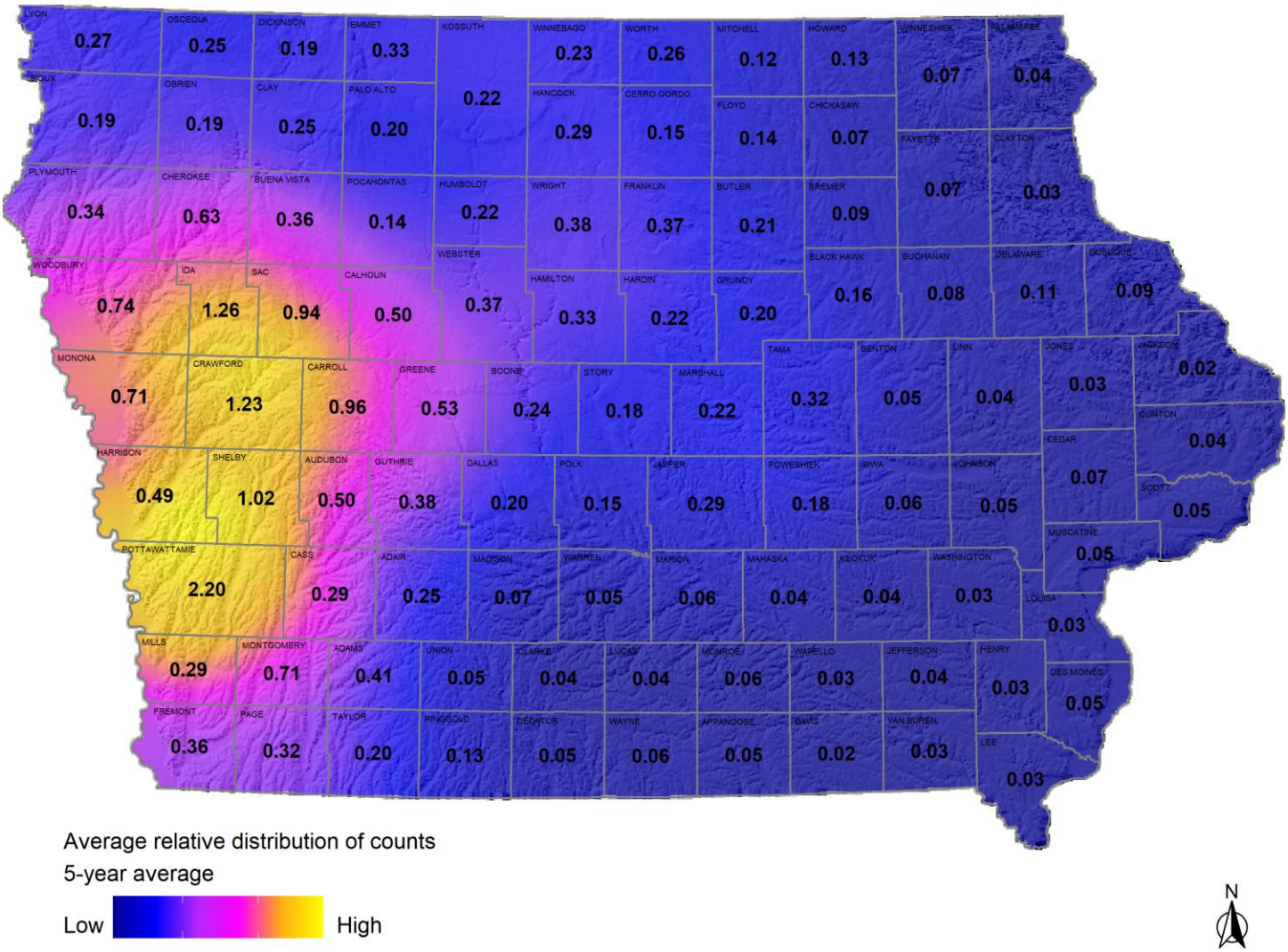


Figure 10. Average 5-year relative abundance of badgers during the spring spotlight survey in Iowa. Estimates are relative to the highest and lowest estimates across all counties and may not represent an over- or under-abundance of the species (i.e., high abundance is considered high relative to estimates in all other counties).

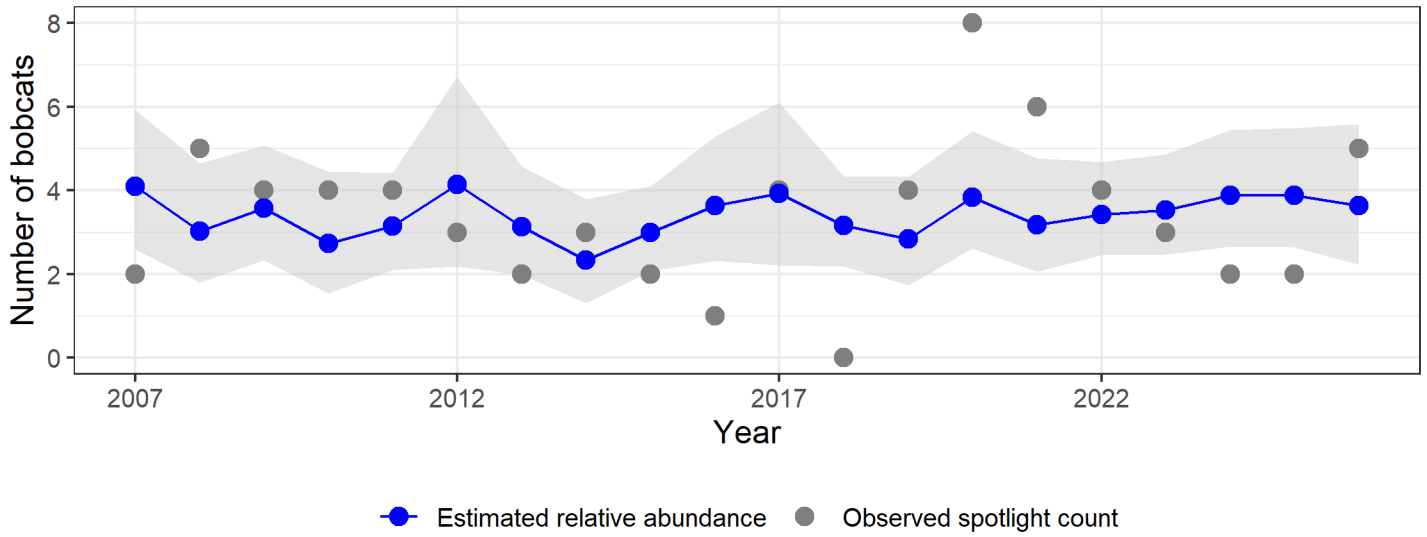


Figure 11. Relative bobcat abundance during the Iowa spring spotlight survey, 2006-2026. 95% credible interval in gray.

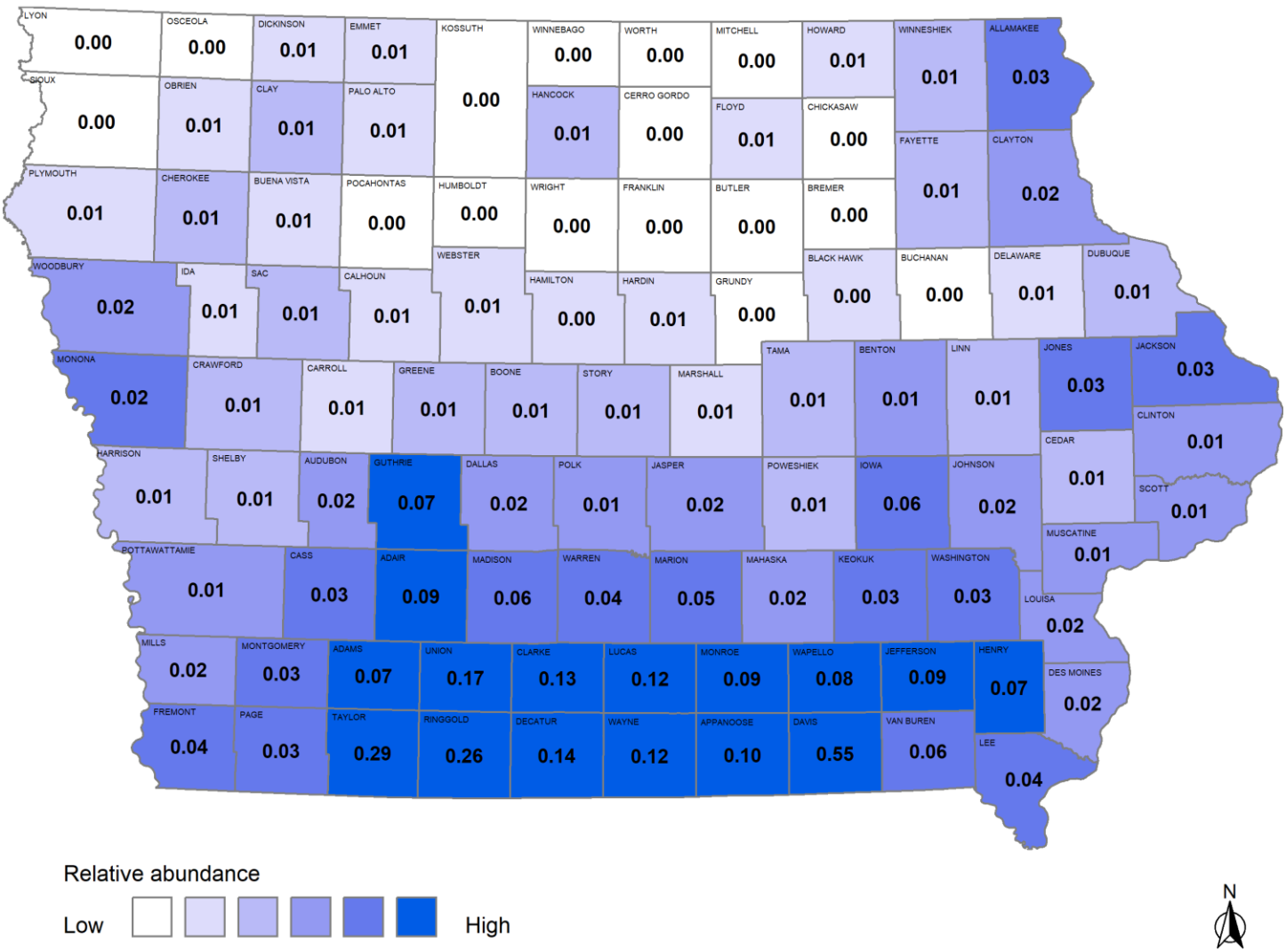


Figure 12. Relative bobcat abundance per county during the Iowa spring spotlight survey, 2026.

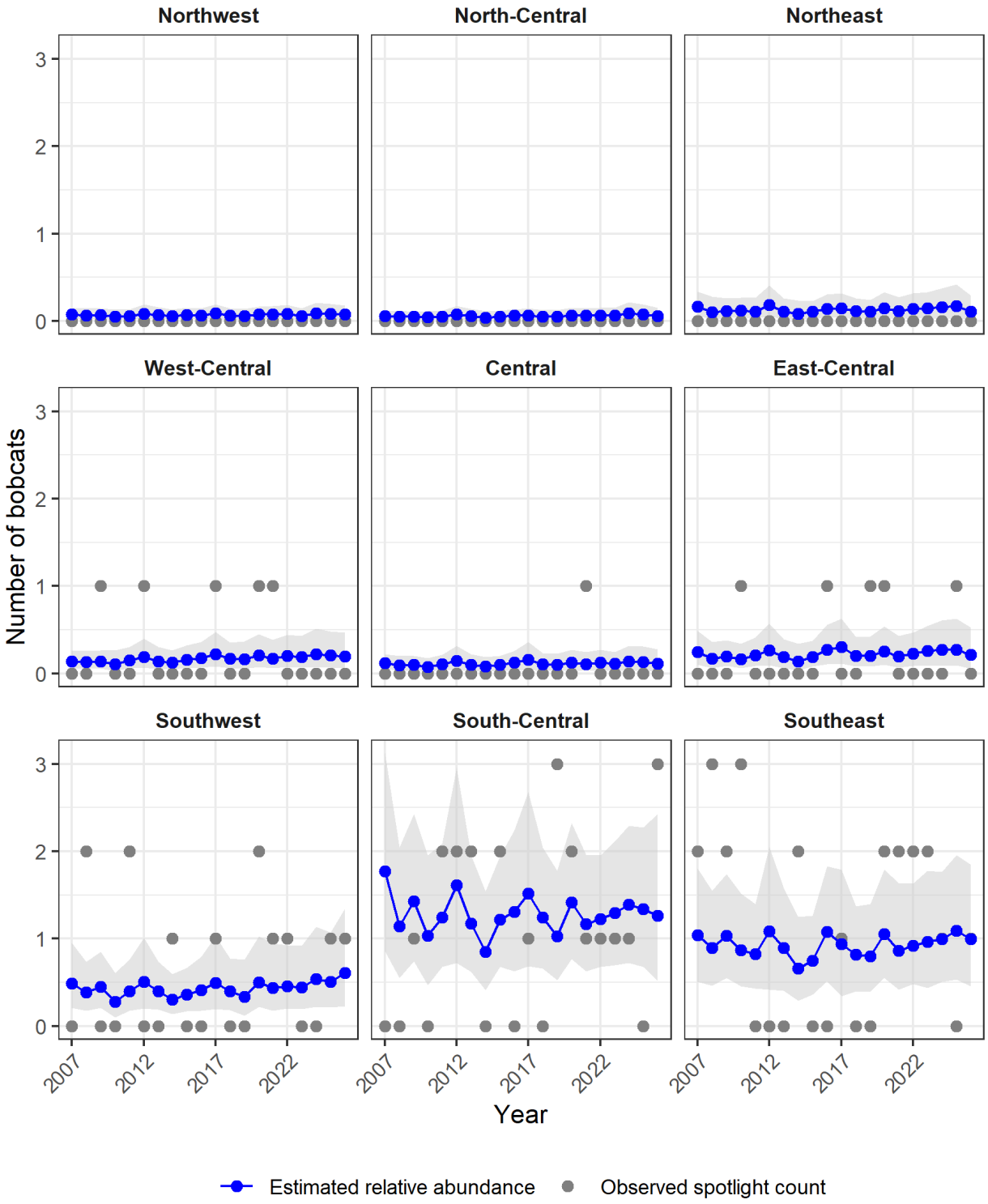


Figure 13. Relative bobcat abundance during the spring spotlight survey for nine regions of Iowa, 2006-2026. 95% credible interval in gray.

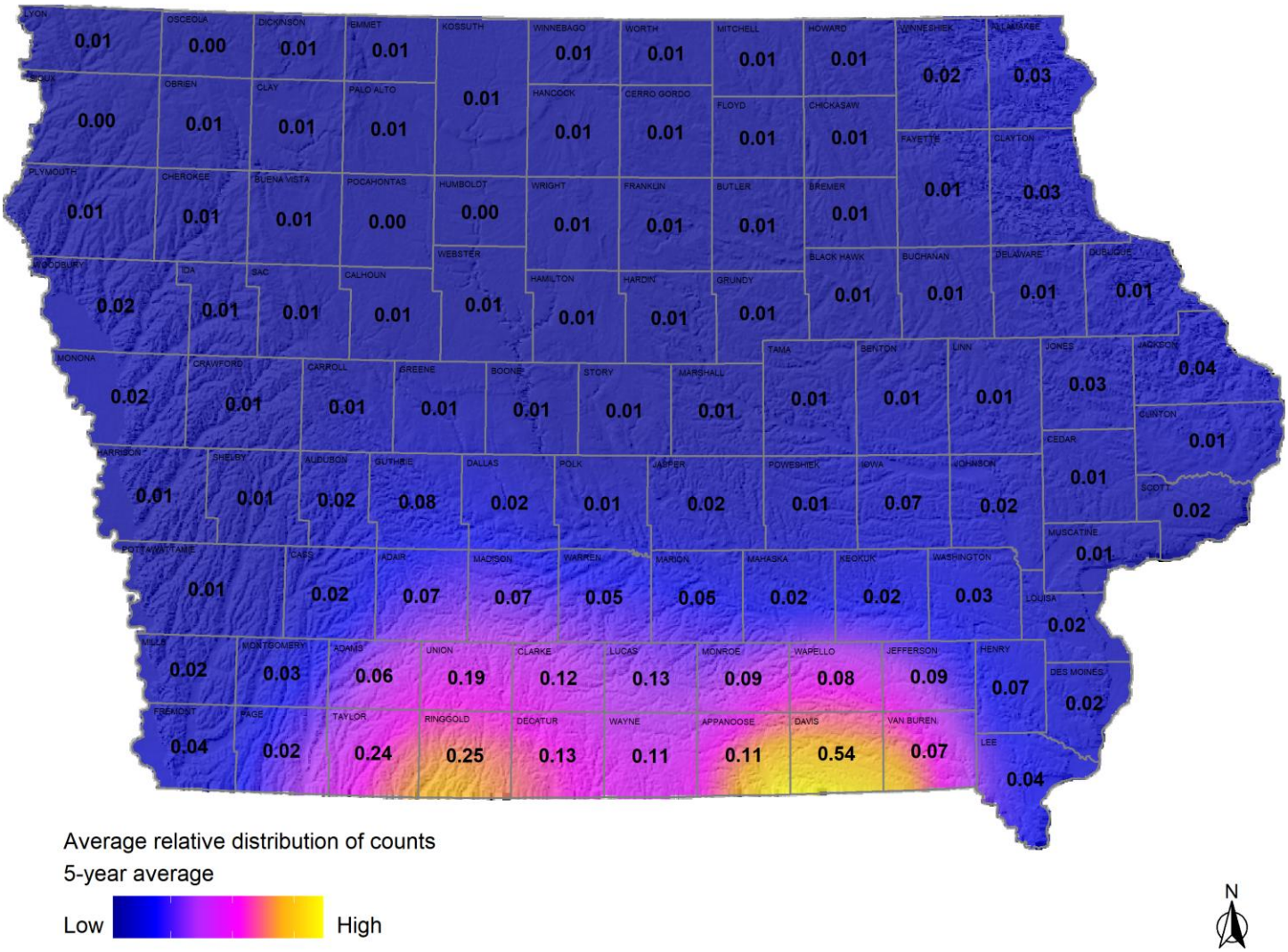


Figure 14. Average 5-year relative abundance of bobcats during the spring spotlight survey in Iowa. Estimates are relative to the highest and lowest estimates across all counties and may not represent an over- or under-abundance of the species (i.e., high abundance is considered high relative to estimates in all other counties).

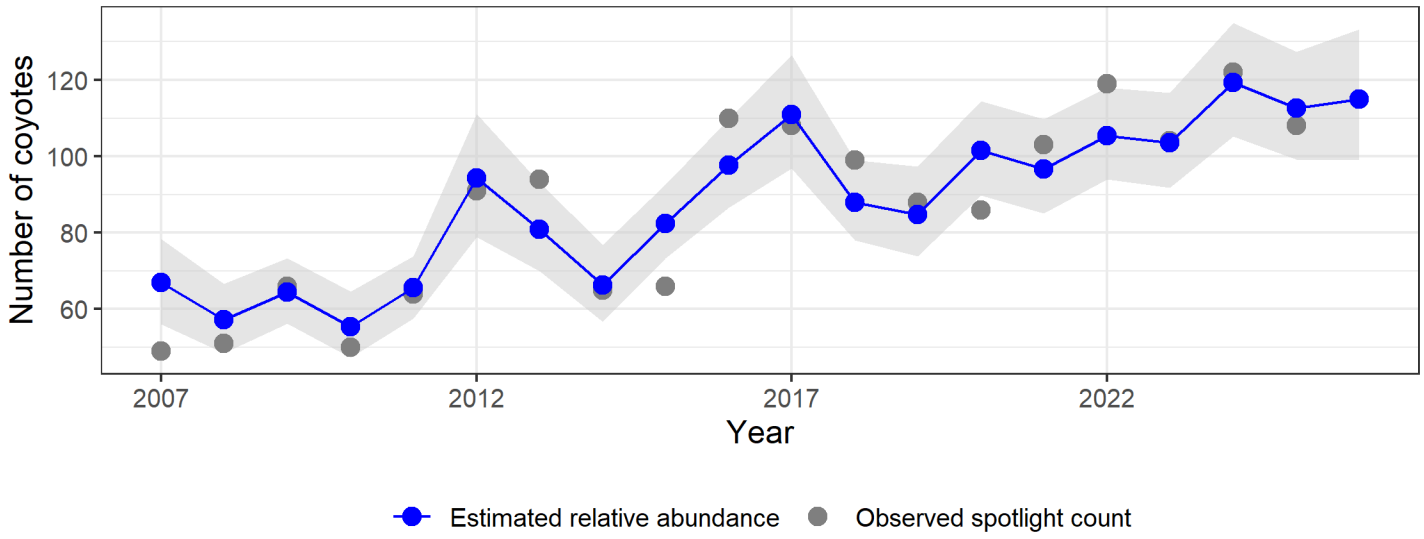


Figure 15. Relative coyote abundance during the Iowa spring spotlight survey, 2006-2026. 95% credible interval in gray.

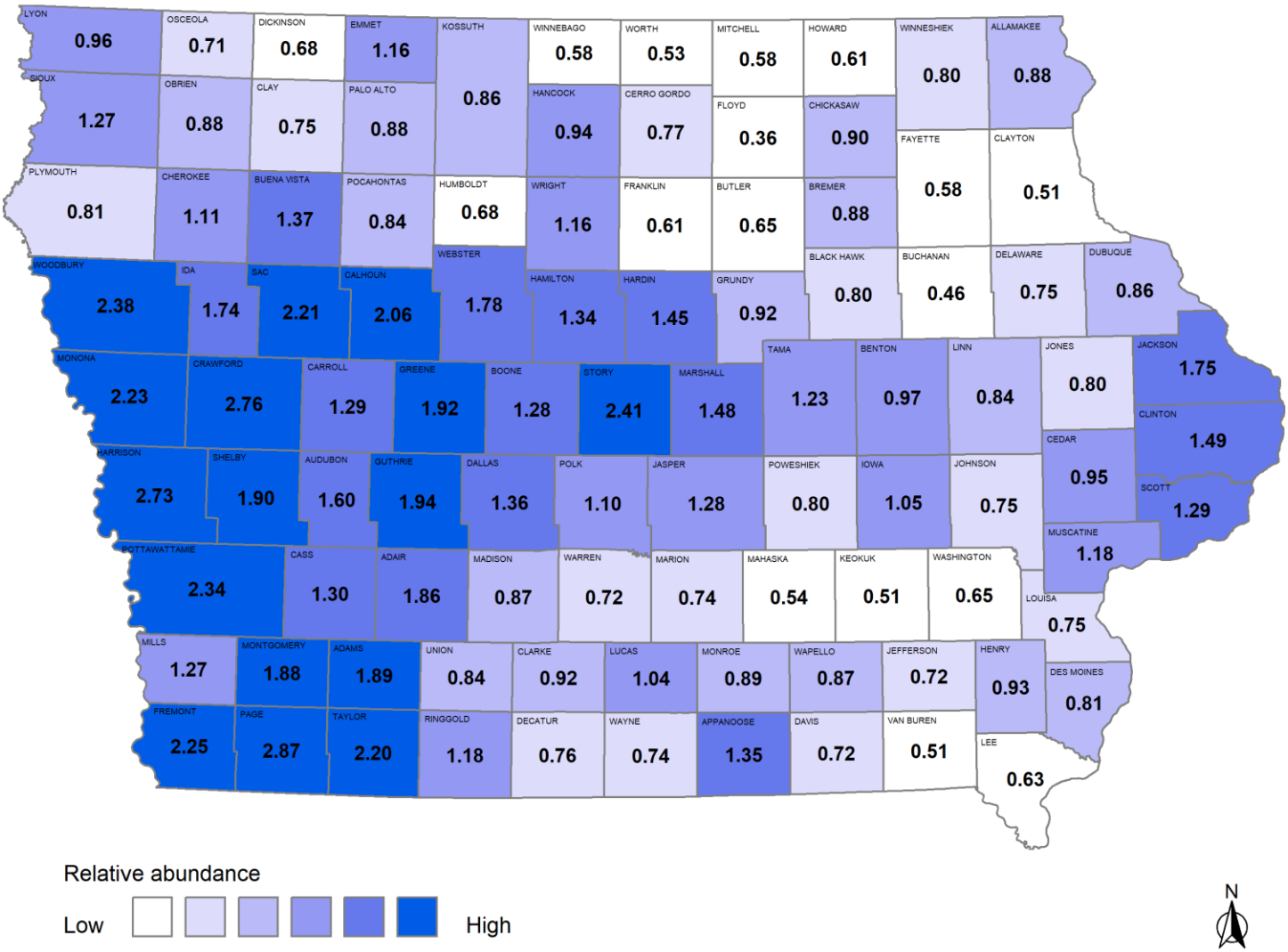


Figure 16. Relative coyote abundance per county during the Iowa spring spotlight survey, 2026.

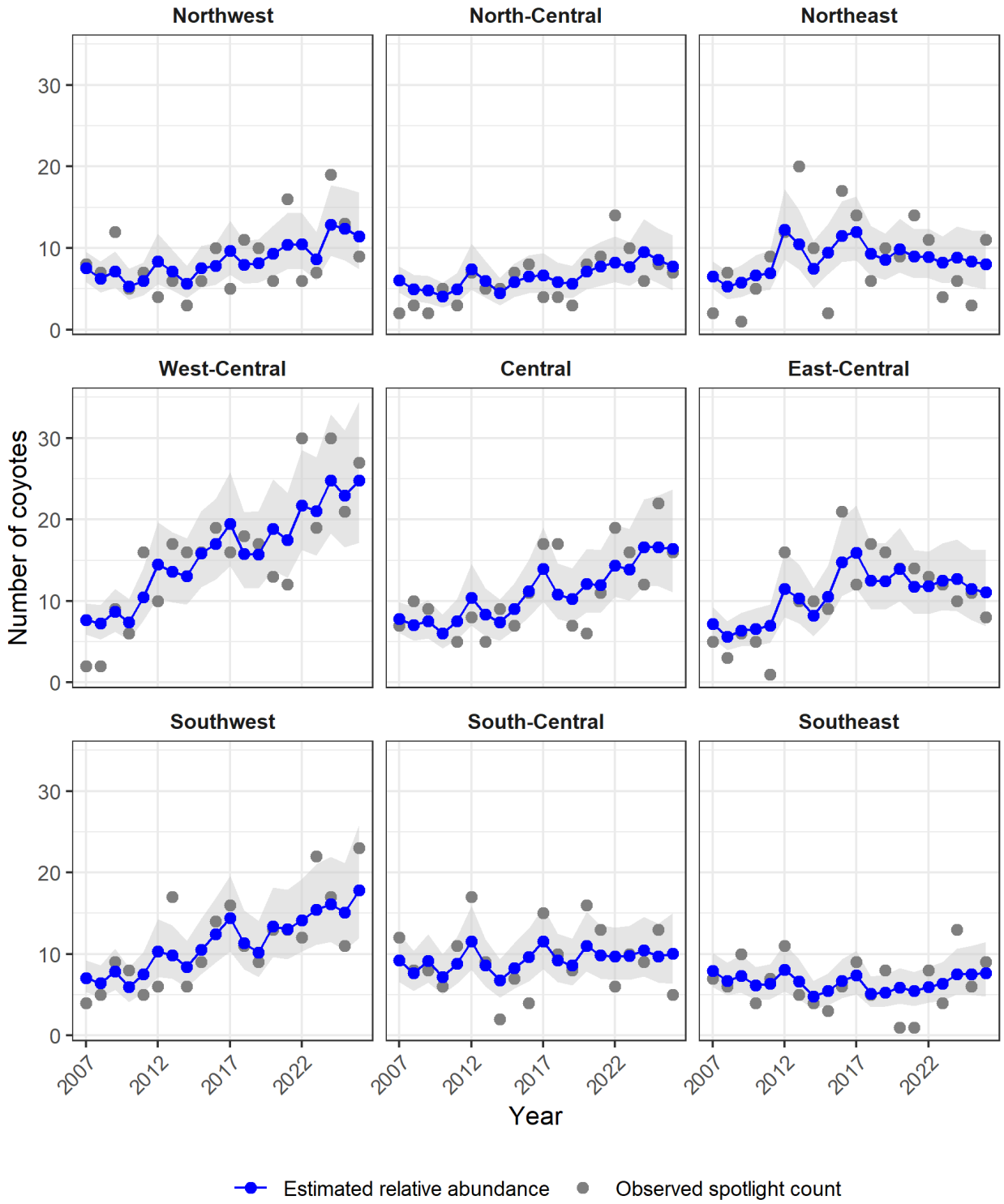


Figure 17. Relative coyote abundance during the spring spotlight survey for nine regions of Iowa, 2006-2026. 95% credible interval in gray.

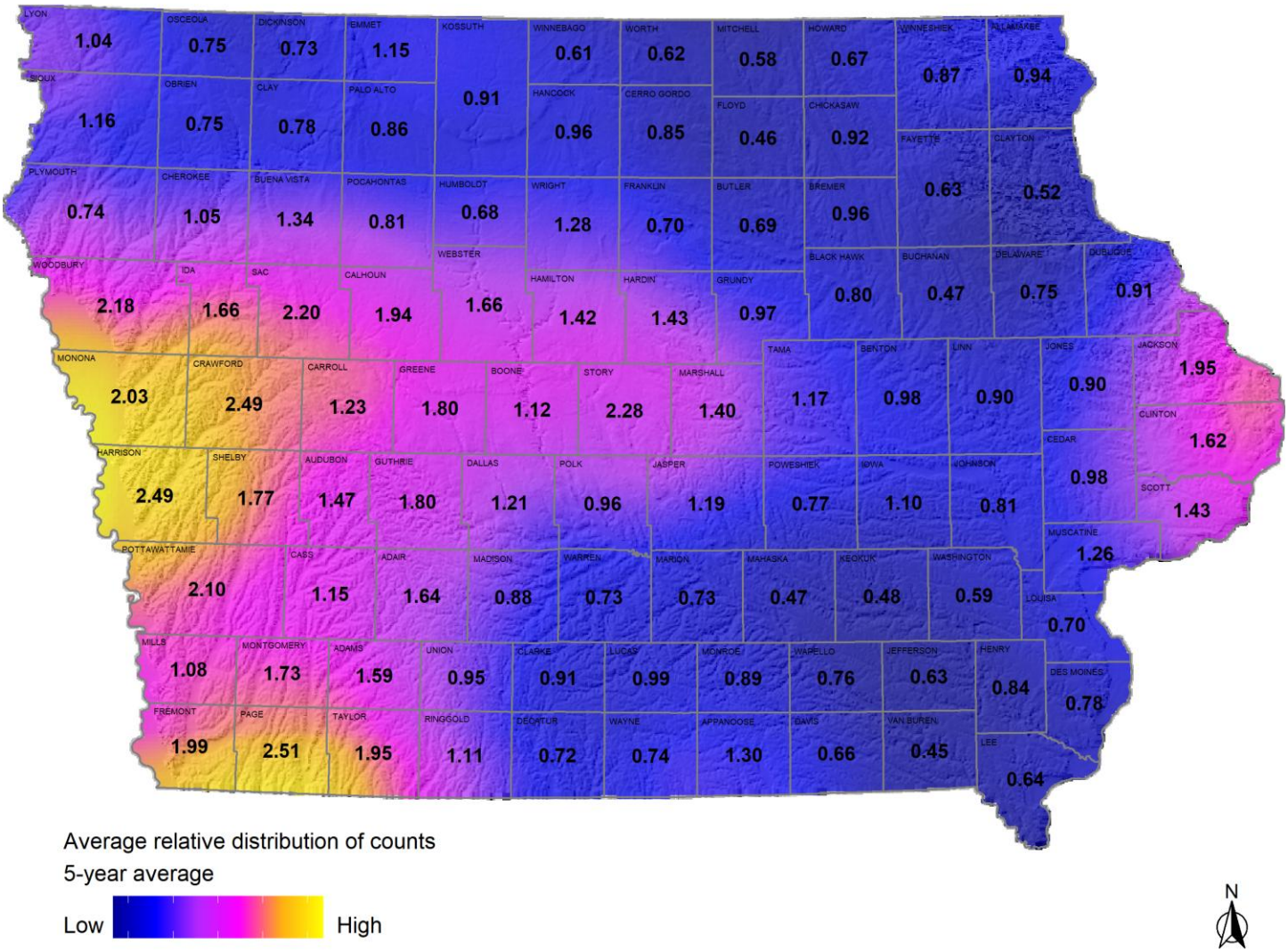


Figure 18. Average 5-year relative abundance of coyotes during the spring spotlight survey in Iowa. Estimates are relative to the highest and lowest estimates across all counties and may not represent an over- or under-abundance of the species (i.e., high abundance is considered high relative to estimates in all other counties).

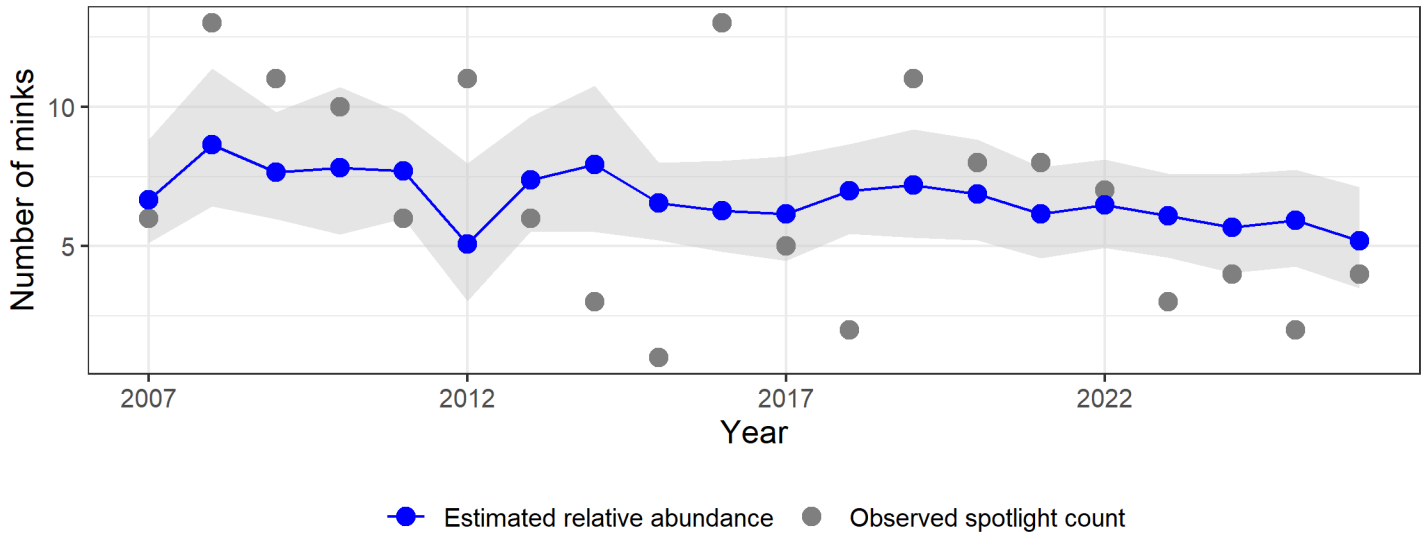


Figure 19. Relative mink abundance during the Iowa spring spotlight survey, 2006-2026. 95% credible interval in gray.

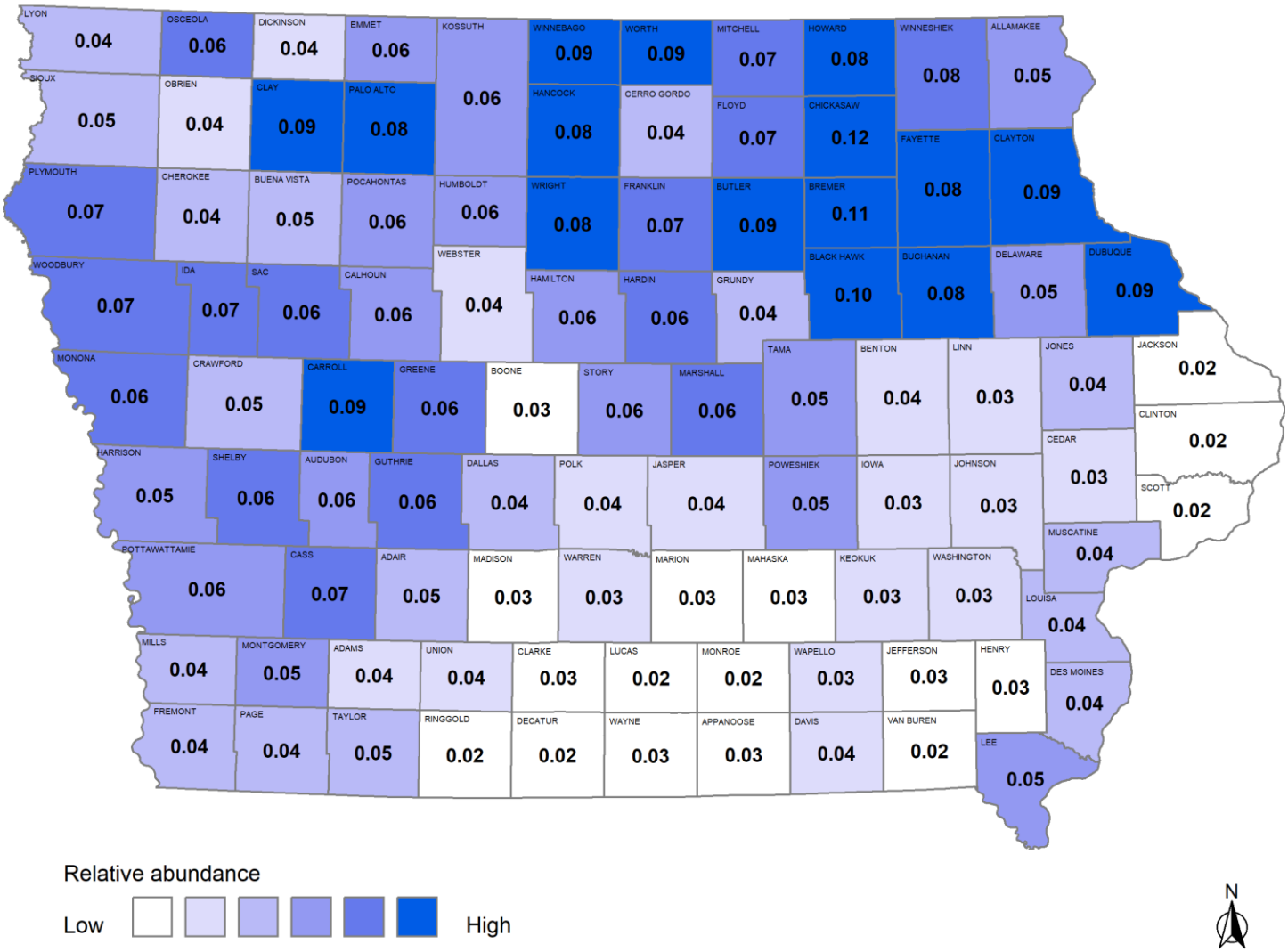


Figure 20. Relative mink abundance per county during the Iowa spring spotlight survey, 2026.

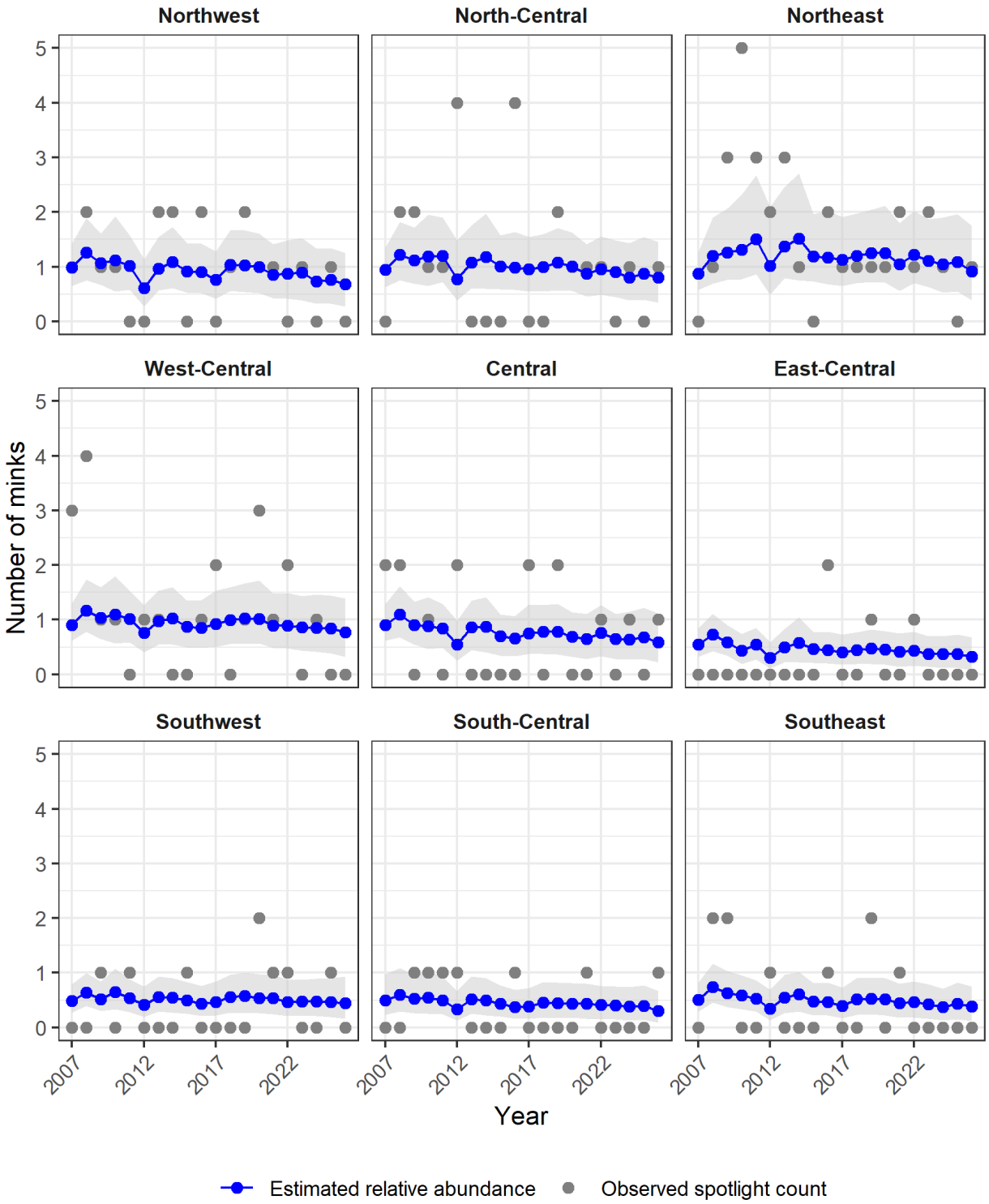


Figure 21. Relative mink abundance during the spring spotlight survey for nine regions of Iowa, 2006-2026. 95% credible interval in gray.

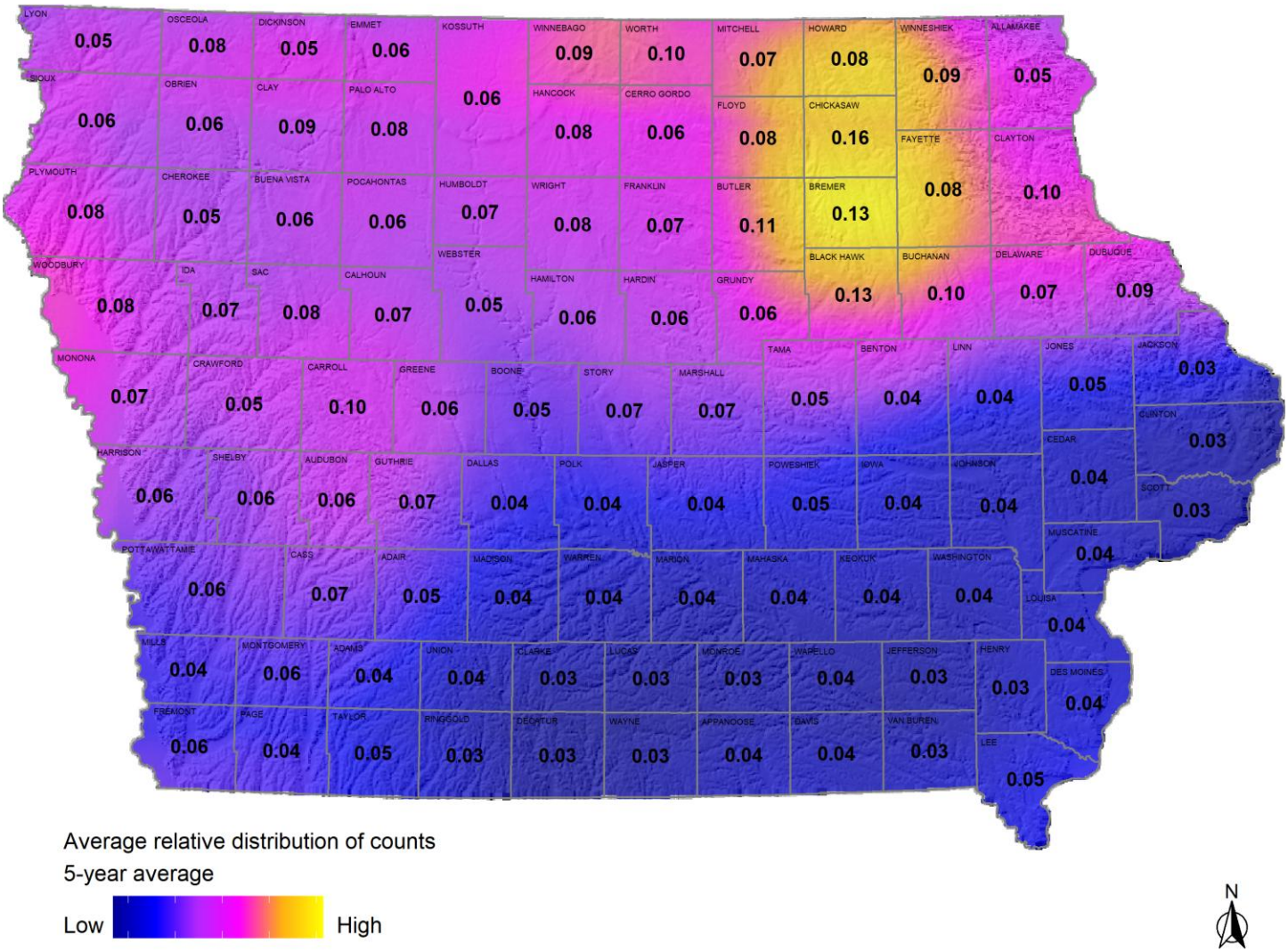


Figure 22. Average 5-year relative abundance of minks during the spring spotlight survey in Iowa. Estimates are relative to the highest and lowest estimates across all counties and may not represent an over- or under-abundance of the species (i.e., high abundance is considered high relative to estimates in all other counties).

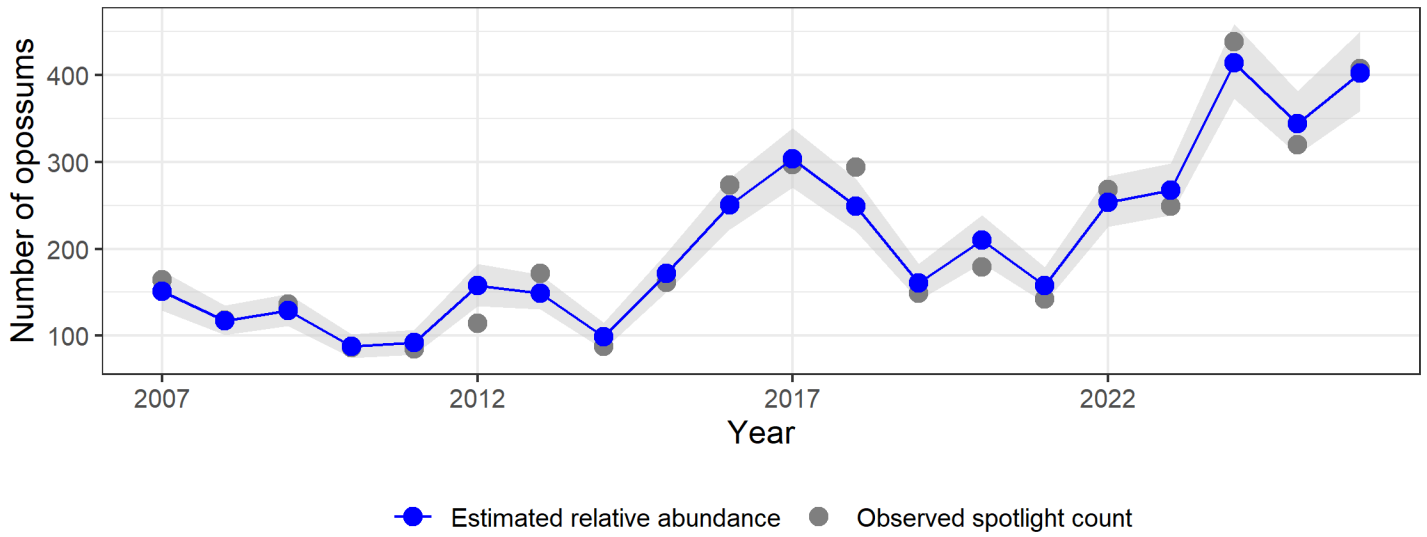


Figure 23. Relative opossum abundance during the Iowa spring spotlight survey, 2006-2026. 95% credible interval in gray.

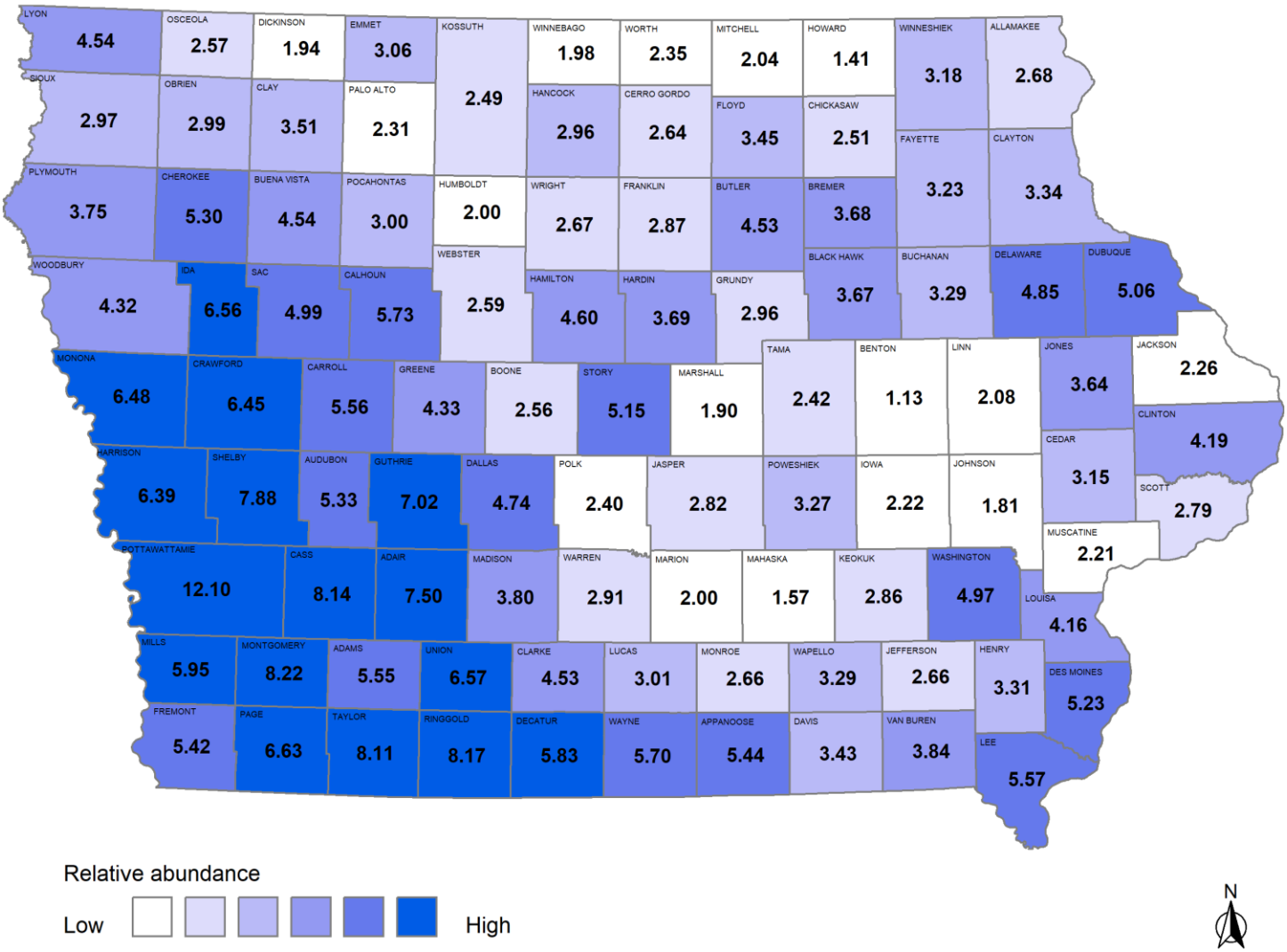


Figure 24. Relative opossum abundance per county during the Iowa spring spotlight survey, 2026.

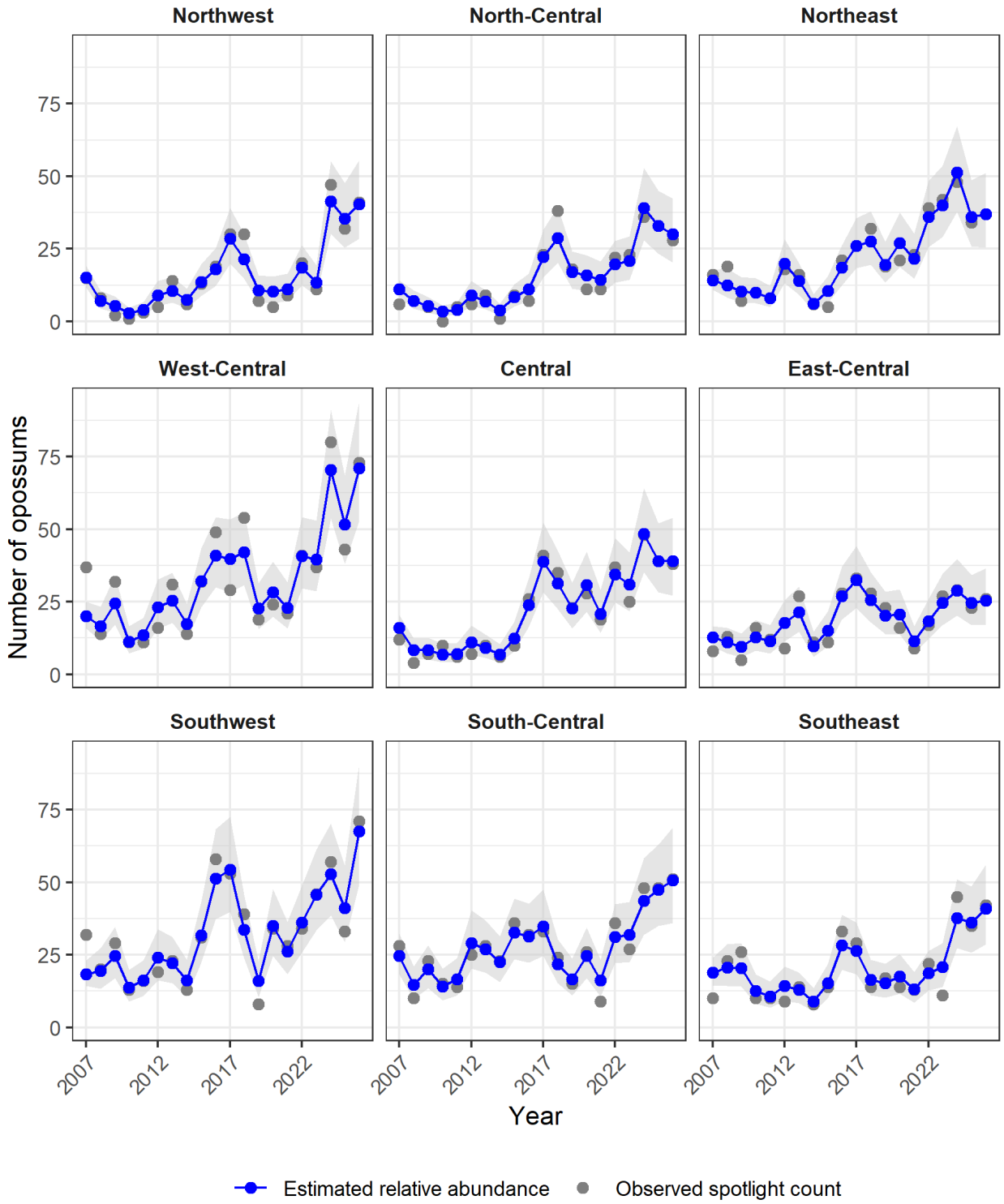


Figure 25. Relative opossum abundance during the spring spotlight survey for nine regions of Iowa, 2006-2026. 95% credible interval in gray.

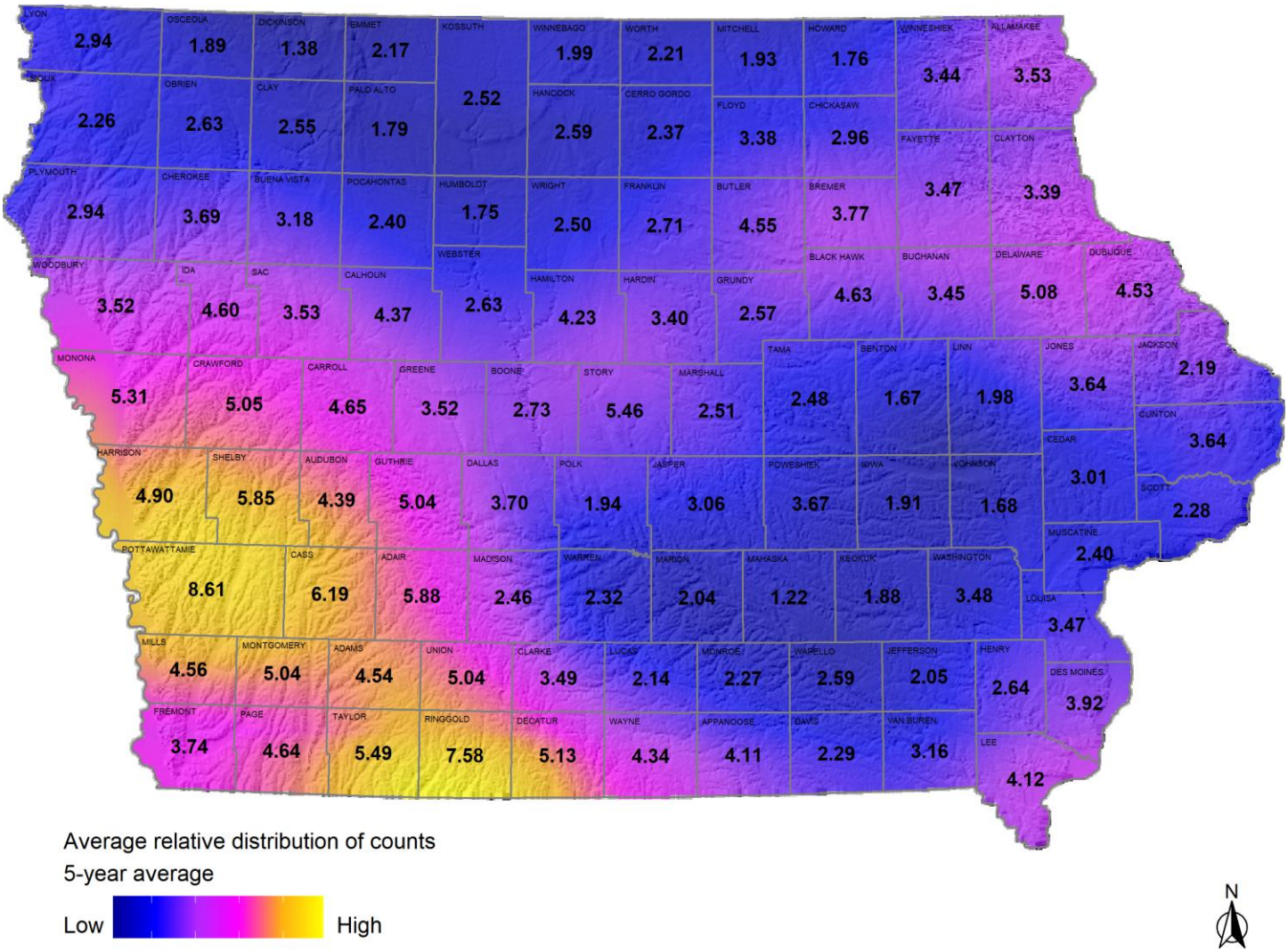


Figure 26. Average 5-year relative abundance of opossums during the spring spotlight survey in Iowa. Estimates are relative to the highest and lowest estimates across all counties and may not represent an over- or under-abundance of the species (i.e., high abundance is considered high relative to estimates in all other counties).

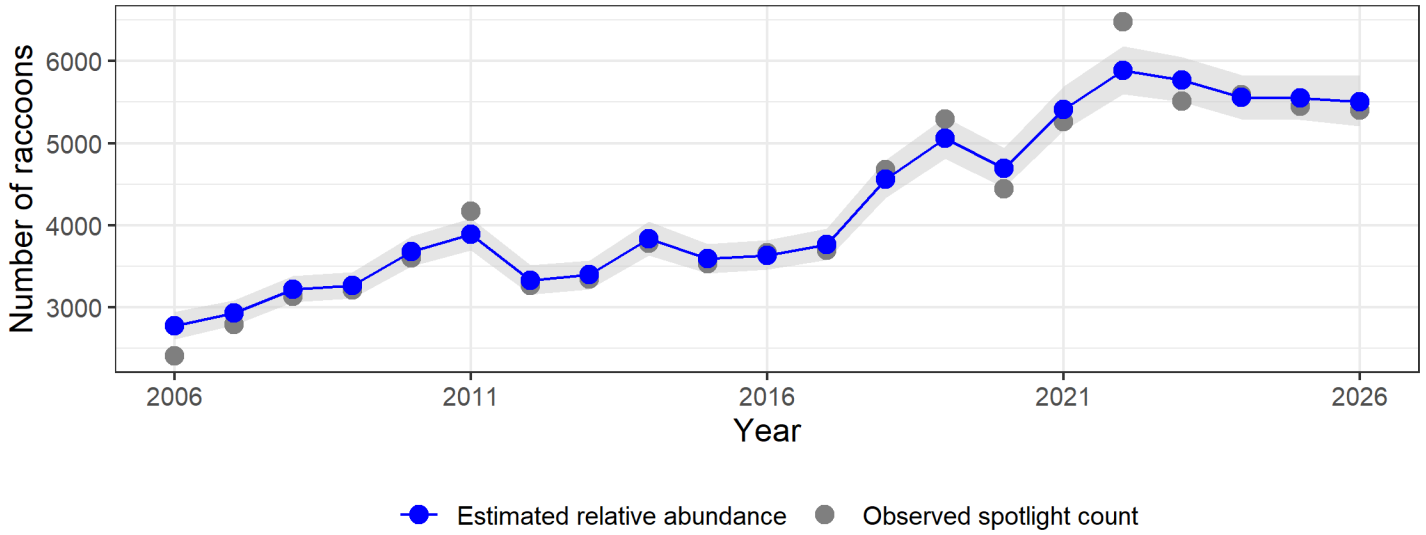


Figure 27. Relative raccoon abundance during the Iowa spring spotlight survey, 2006-2026. 95% credible interval in gray.

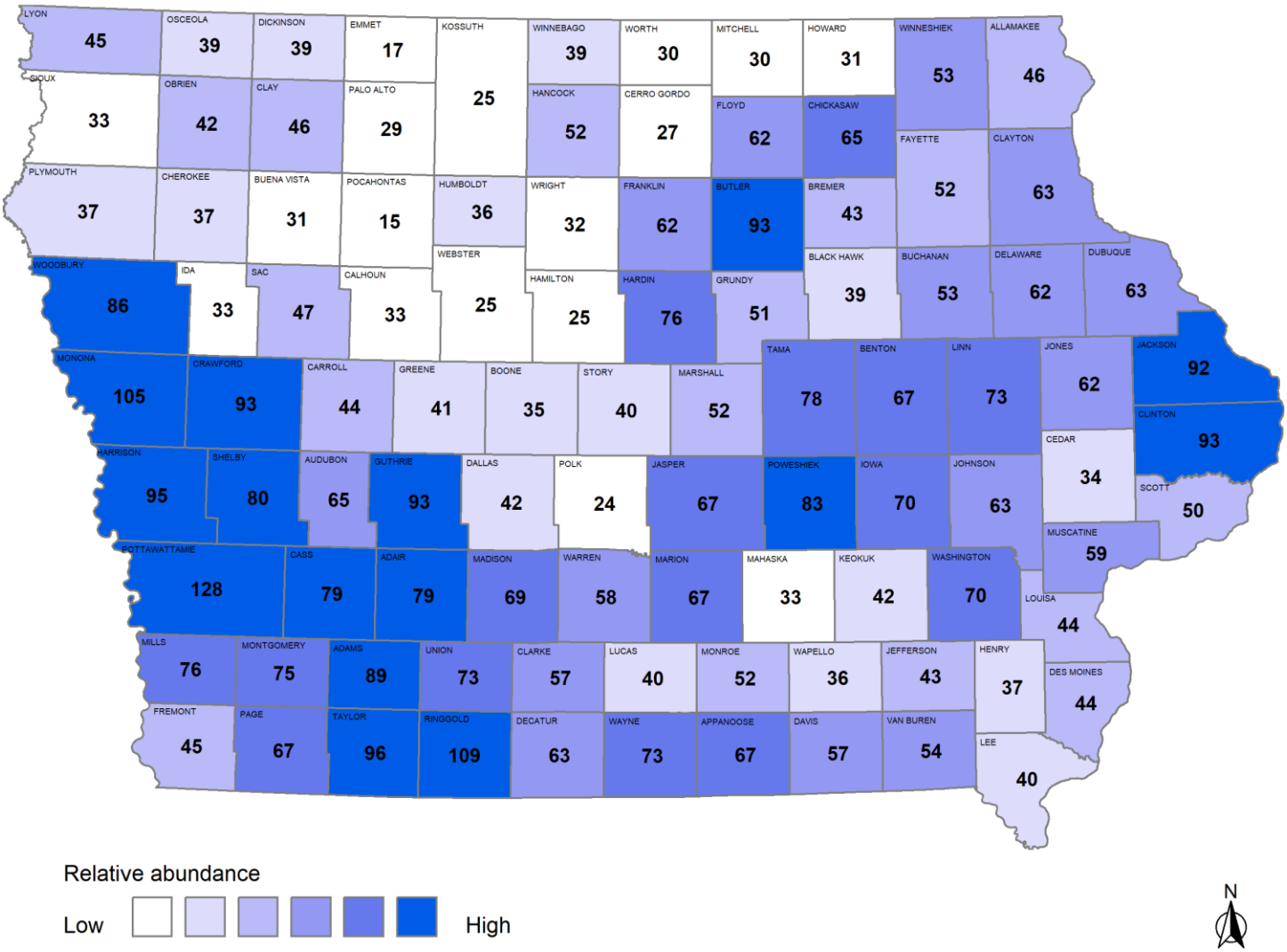


Figure 28. Relative raccoon abundance per county during the Iowa spring spotlight survey, 2026.

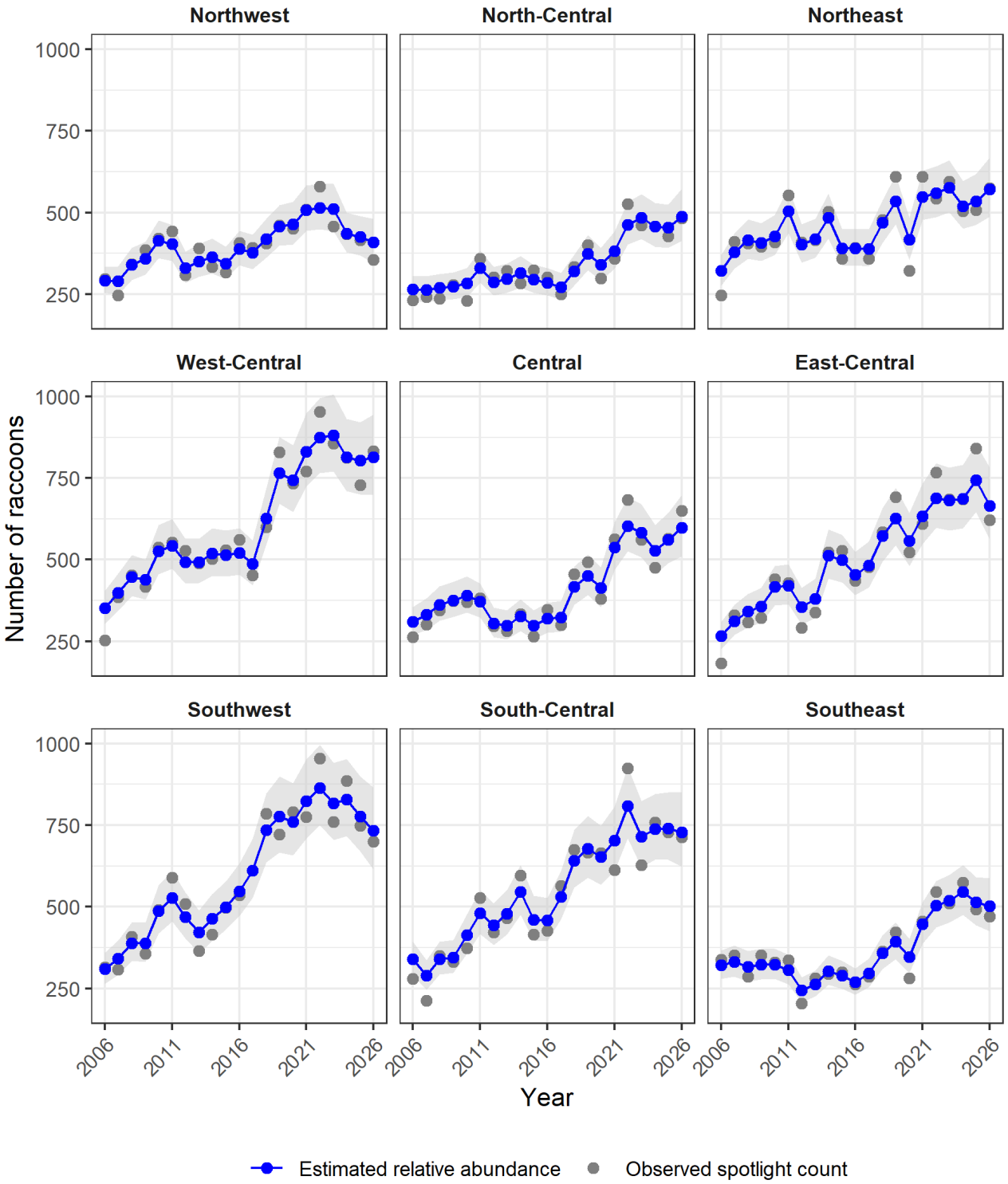


Figure 29. Relative raccoon abundance during the spring spotlight survey for nine regions of Iowa, 2006-2026. 95% credible interval in gray.

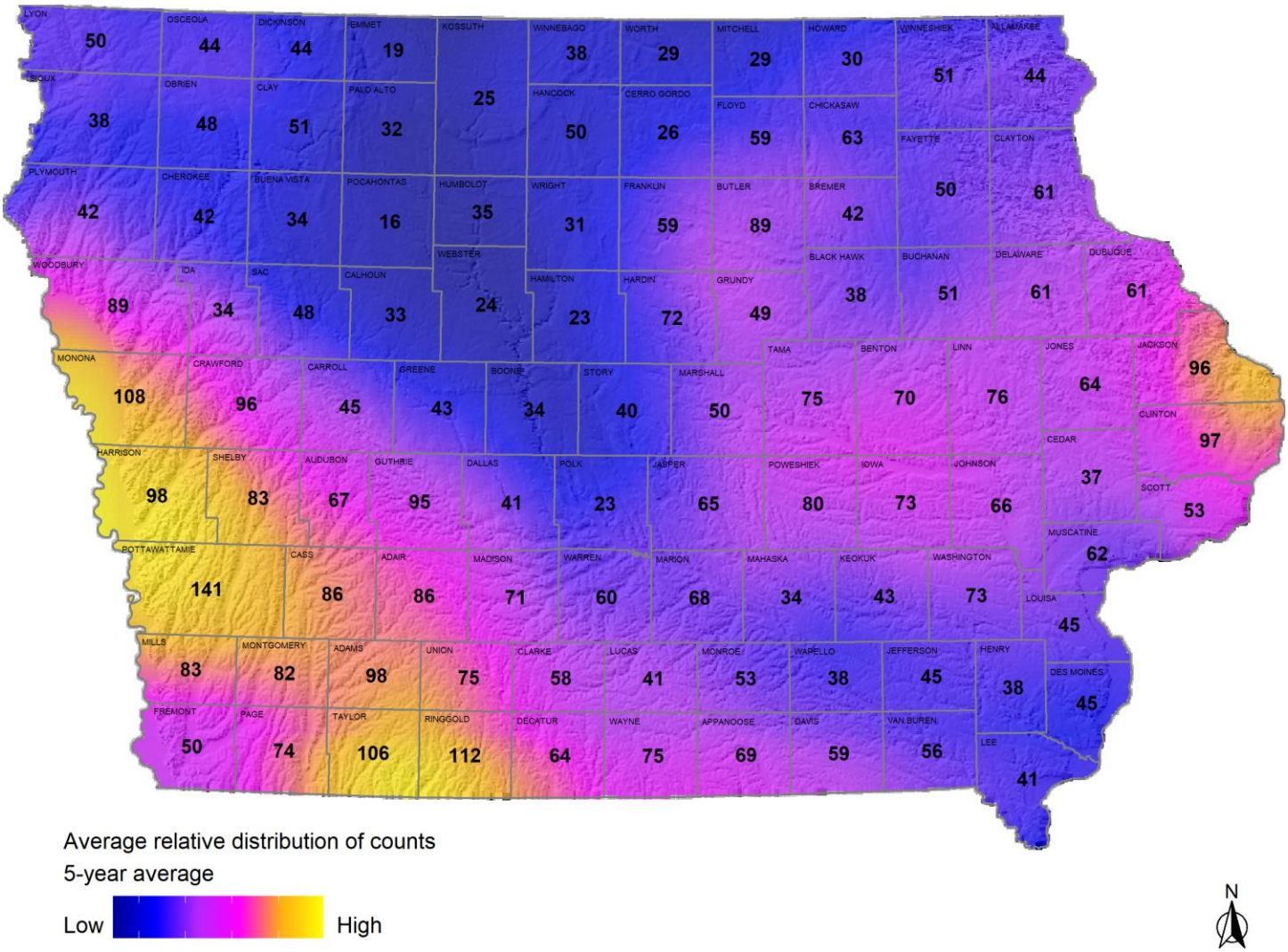


Figure 30. Average relative abundance of spring spotlight observations for raccoon during the past 5 years in Iowa. The number of observations per county is relative to the highest and lowest number of observations across all counties during the survey and may not represent an over- or under-abundance of the species (i.e., high counts are considered high relative to those observed in all other counties).

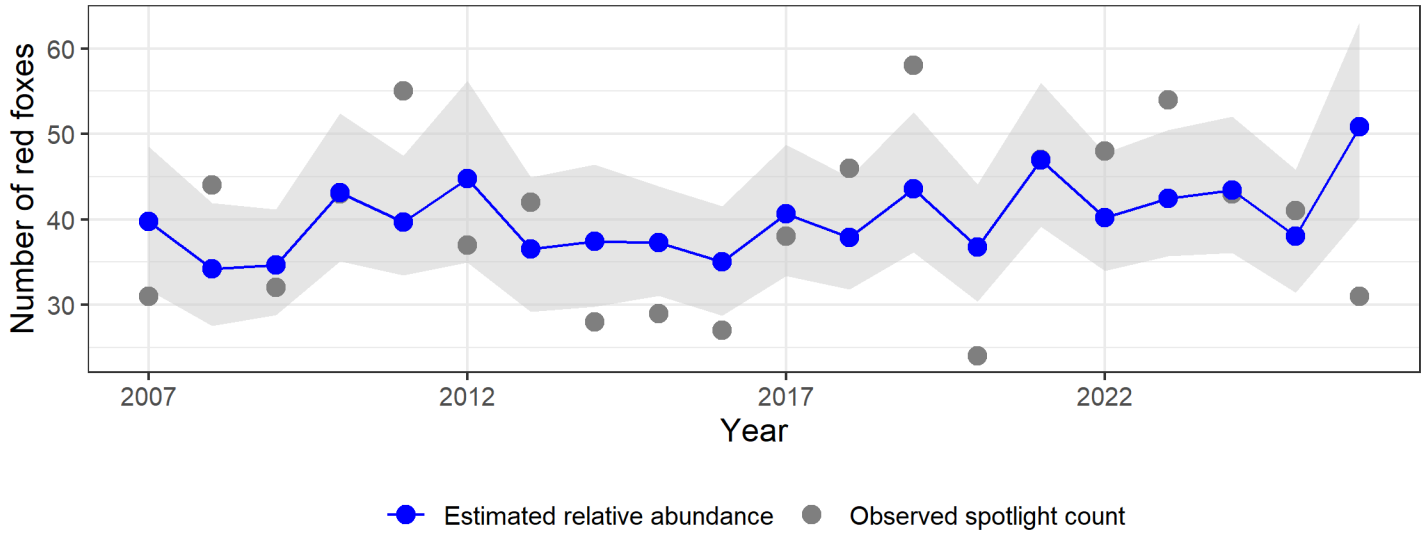


Figure 31. Relative red fox abundance during the Iowa spring spotlight survey, 2006-2026. 95% credible interval in gray.

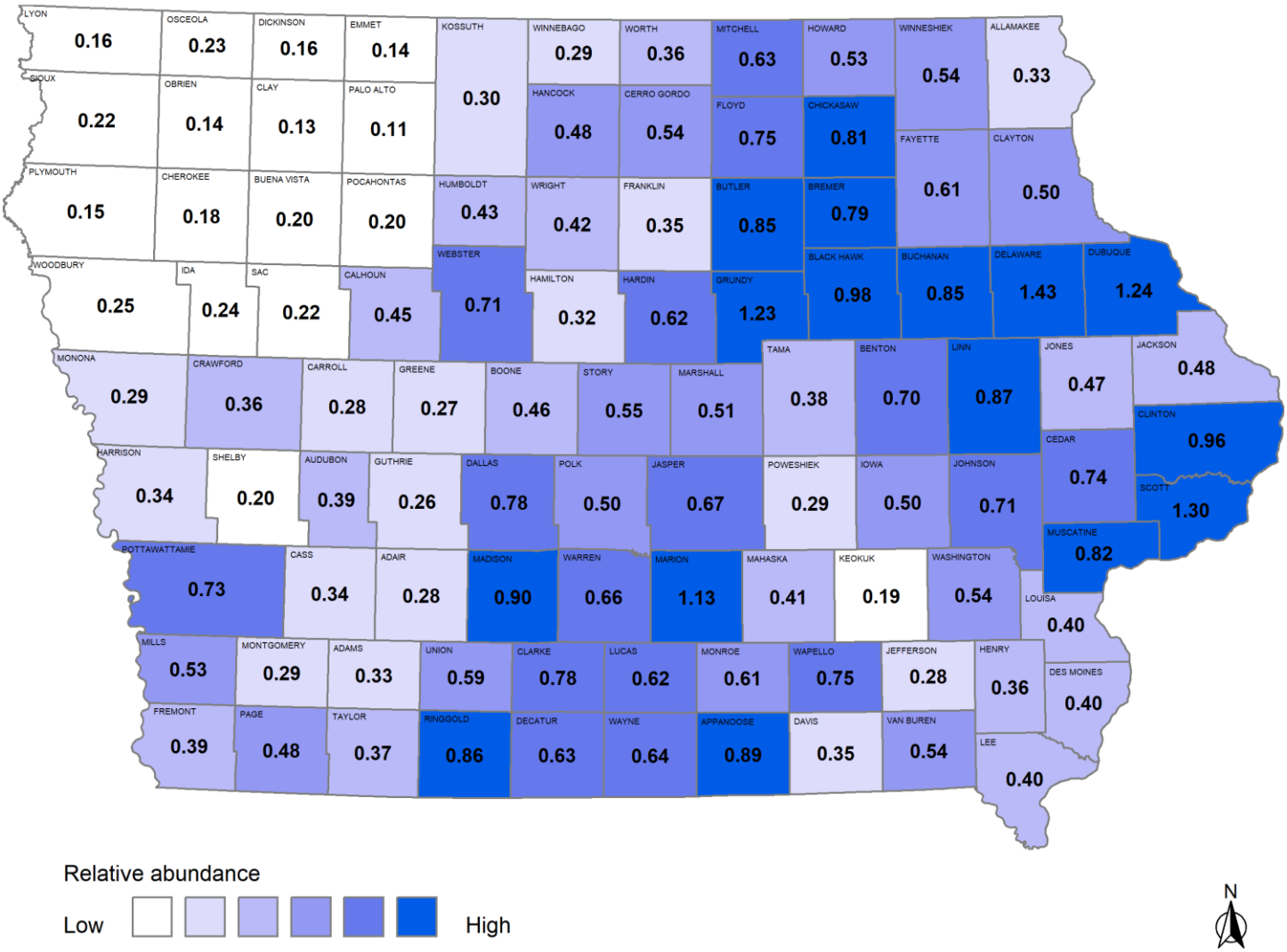


Figure 32. Relative red fox abundance per county during the Iowa spring spotlight survey, 2026.

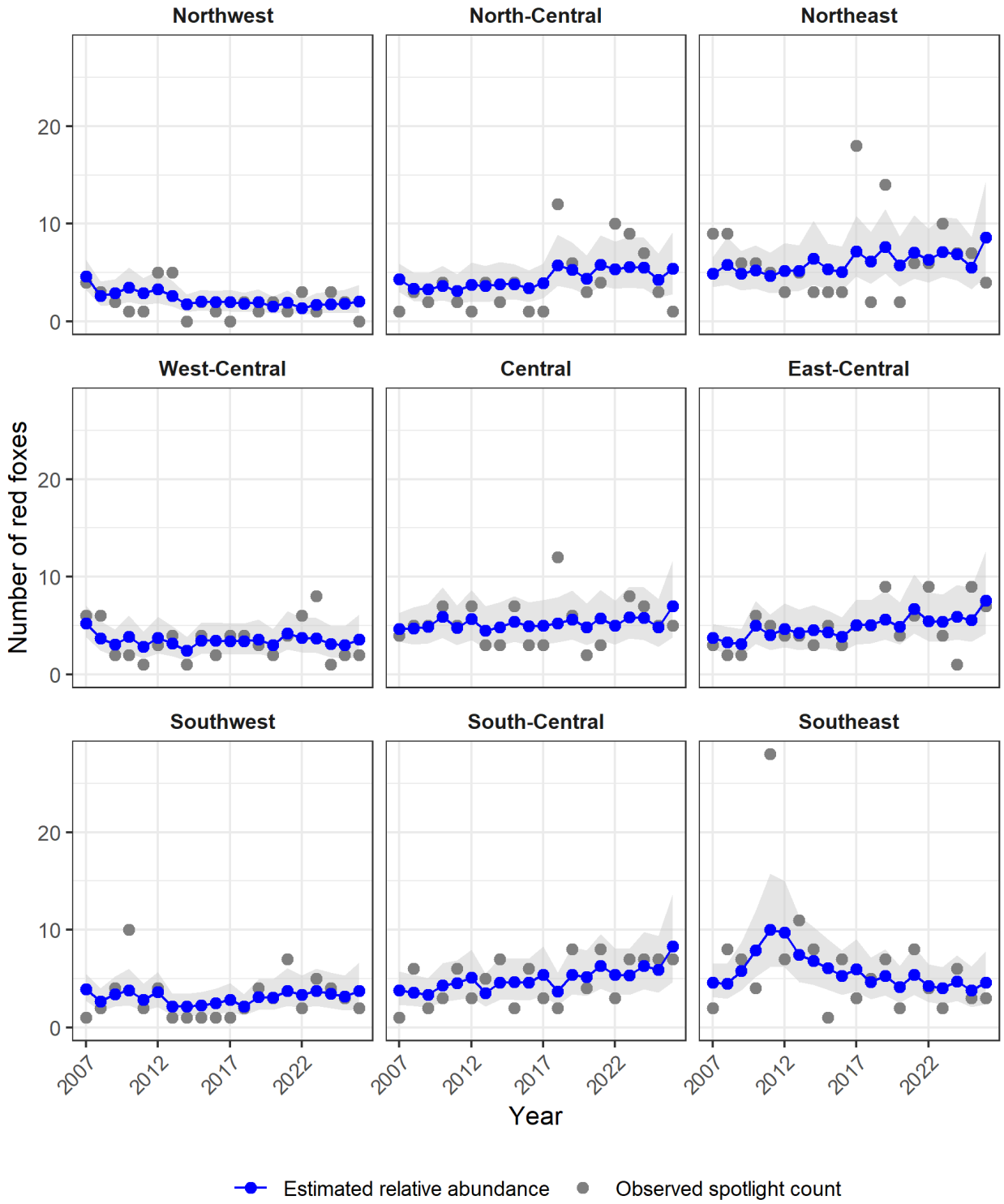


Figure 33. Relative red fox abundance during the spring spotlight survey for nine regions of Iowa, 2006-2026. 95% credible interval in gray. Red fox includes observations listed as "fox" due to the rarity of gray fox in the state.

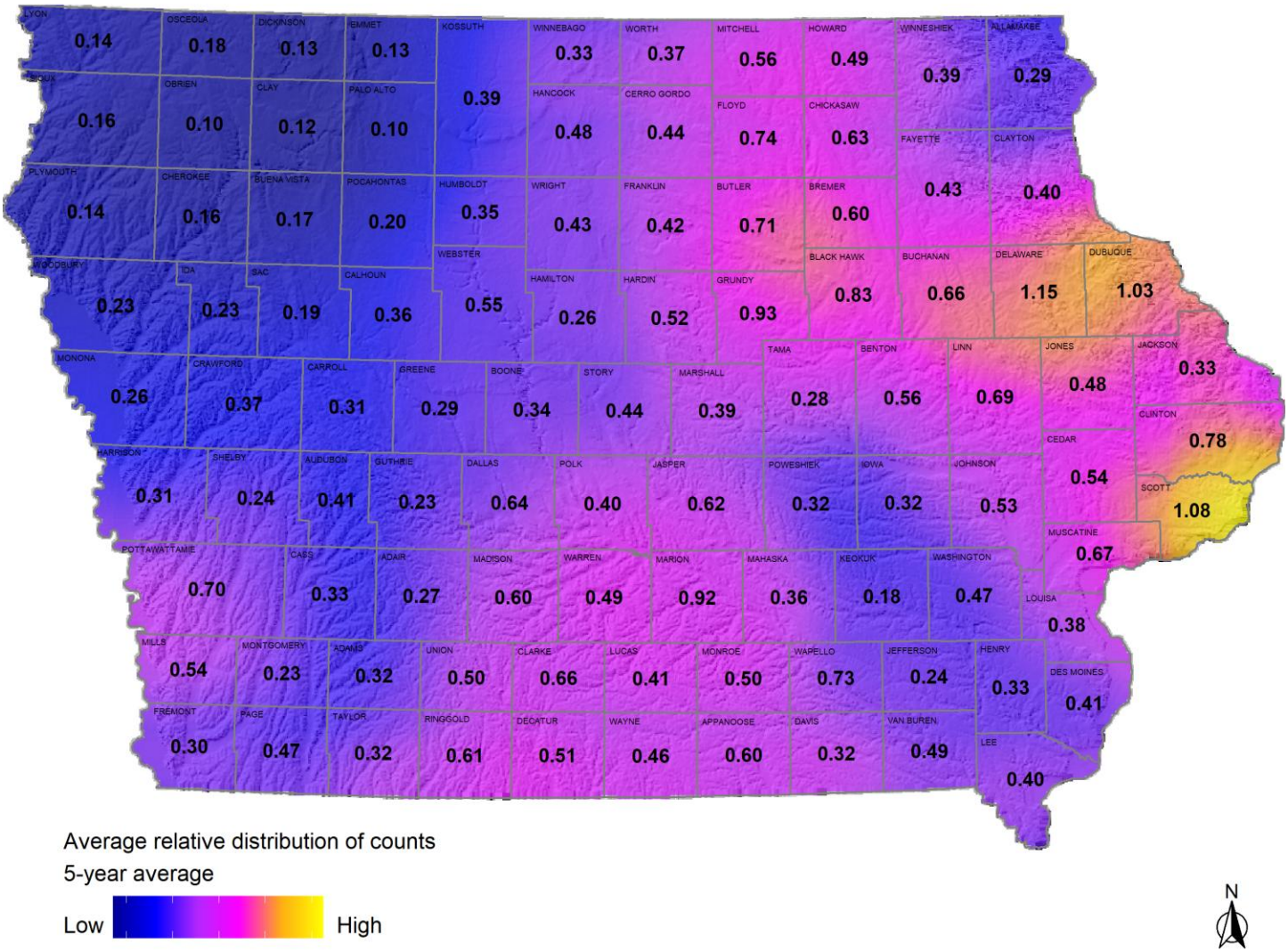


Figure 34. Average 5-year relative abundance of red foxes during the spring spotlight survey in Iowa. Estimates are relative to the highest and lowest estimates across all counties and may not represent an over- or under-abundance of the species (i.e., high abundance is considered high relative to estimates in all other counties).

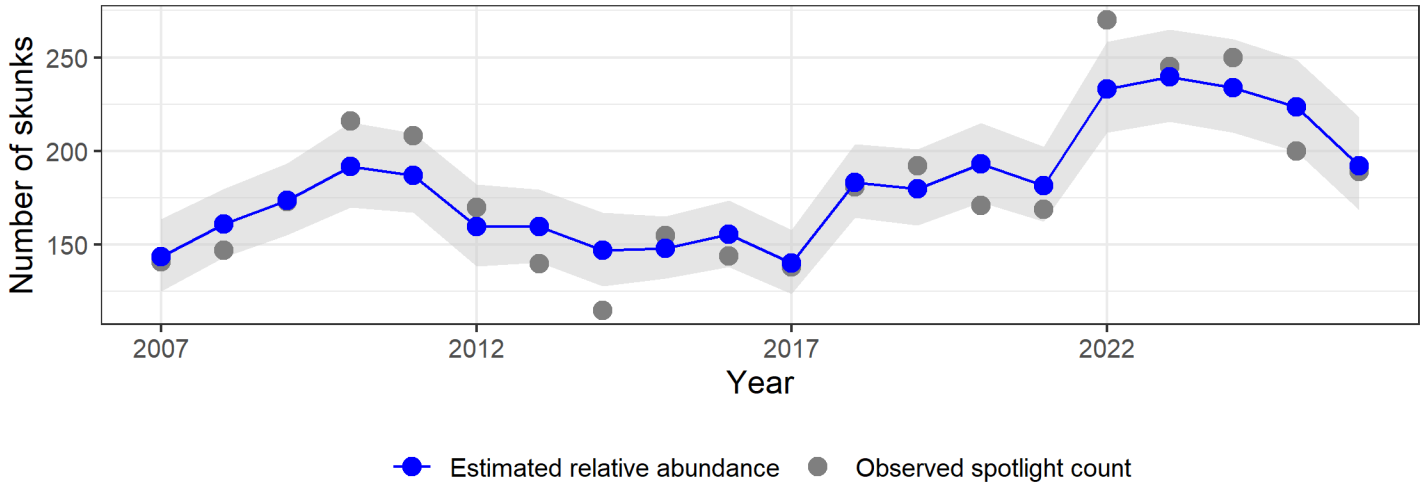


Figure 35. Relative skunk abundance during the Iowa spring spotlight survey, 2006-2026. 95% credible interval in gray. Counts likely include few or no spotted skunk.

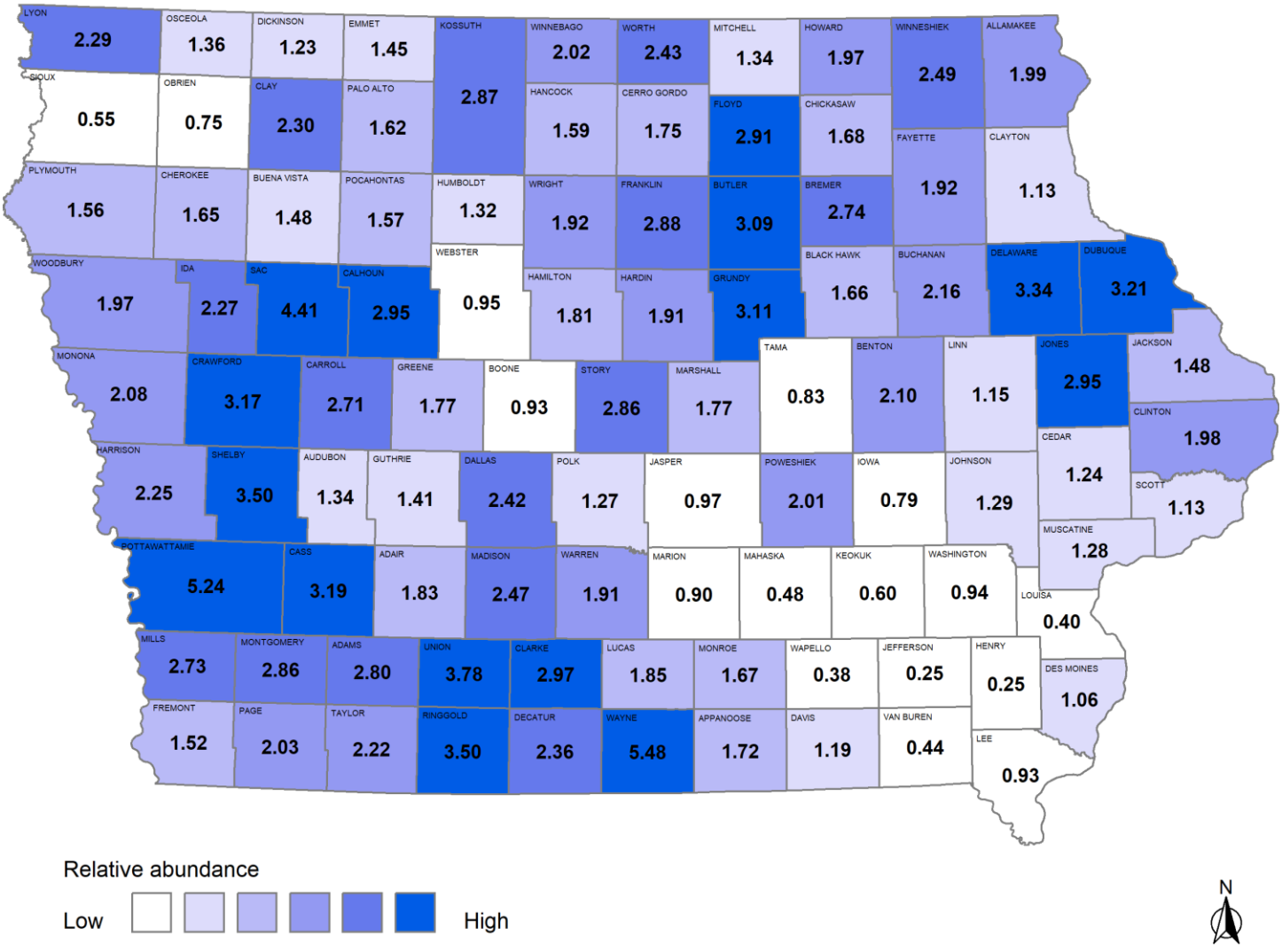


Figure 36. Relative skunk abundance per county during the Iowa spring spotlight survey, 2026. Counts likely include few or no spotted skunk.

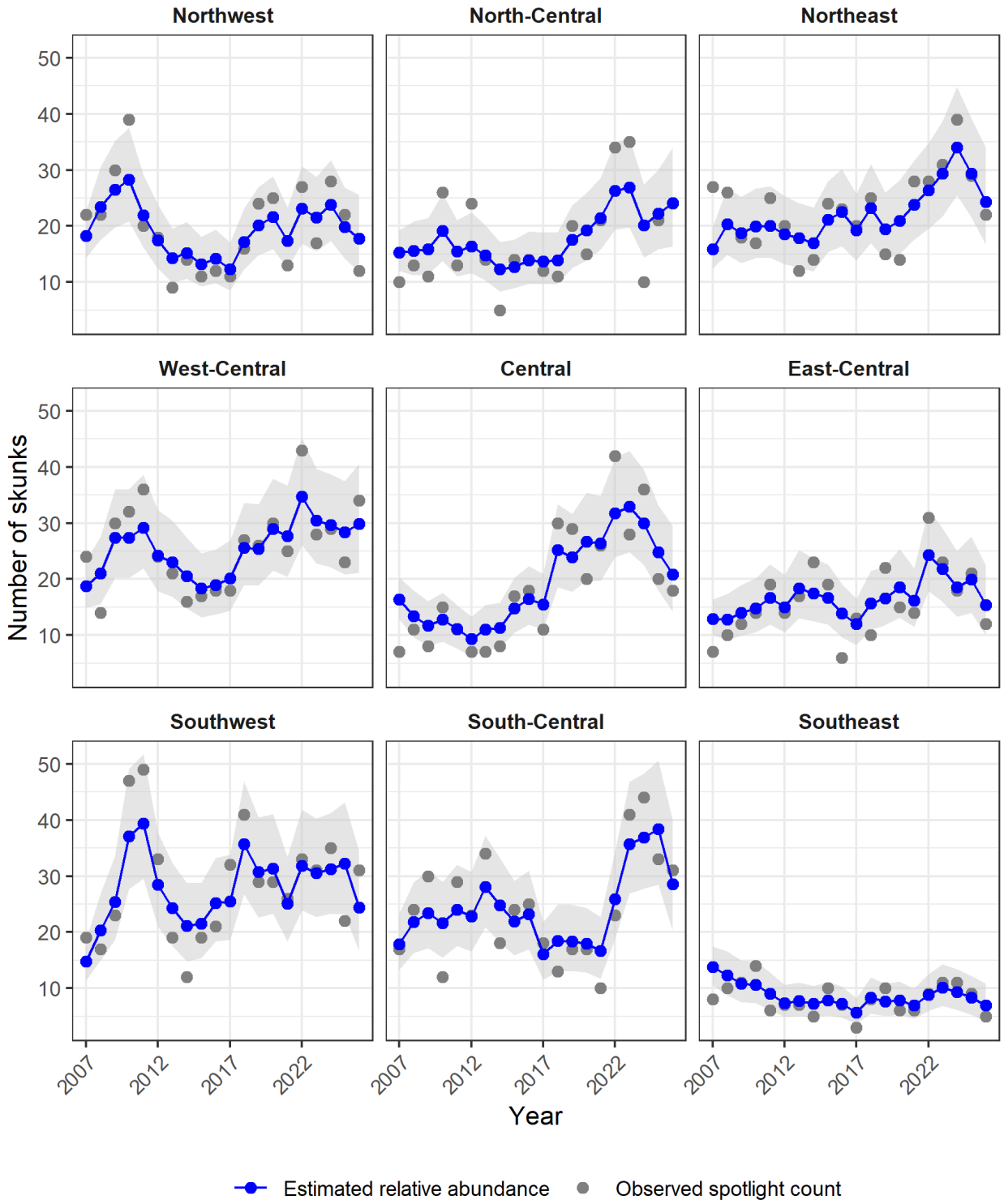


Figure 37. Relative skunk abundance during the spring spotlight survey for nine regions of Iowa, 2006-2026. 95% credible interval in gray. Skunk includes all observations recorded as "striped skunk" and "skunk" and likely includes no or few spotted skunk observations due to the rarity of the species in Iowa.

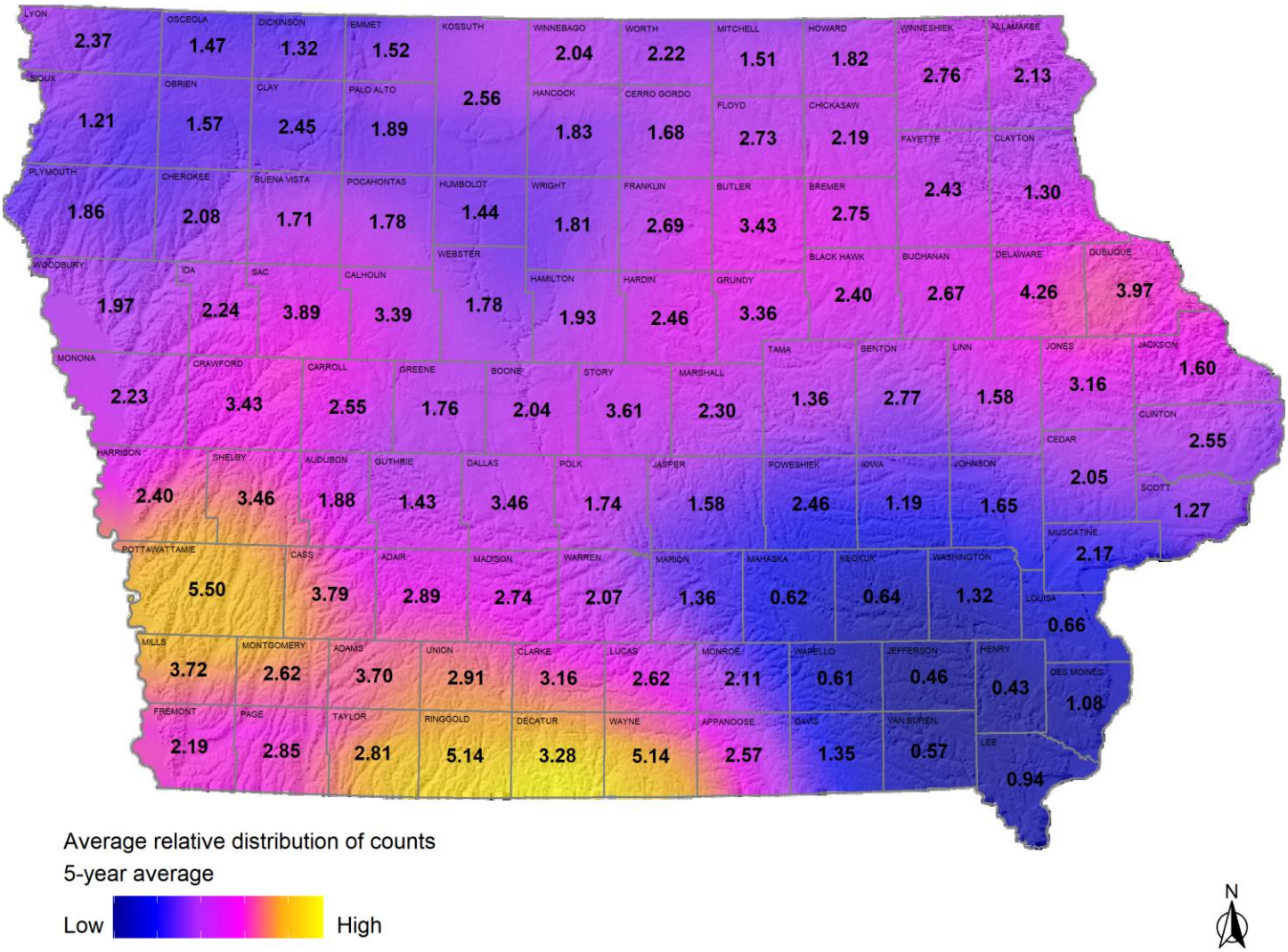


Figure 38. Average 5-year relative abundance of skunks during the spring spotlight survey in Iowa. Estimates are relative to the highest and lowest estimates across all counties and may not represent an over- or under-abundance of the species (i.e., high abundance is considered high relative to estimates in all other counties). Counts likely include few or no spotted skunk observations due to their rarity in the state.

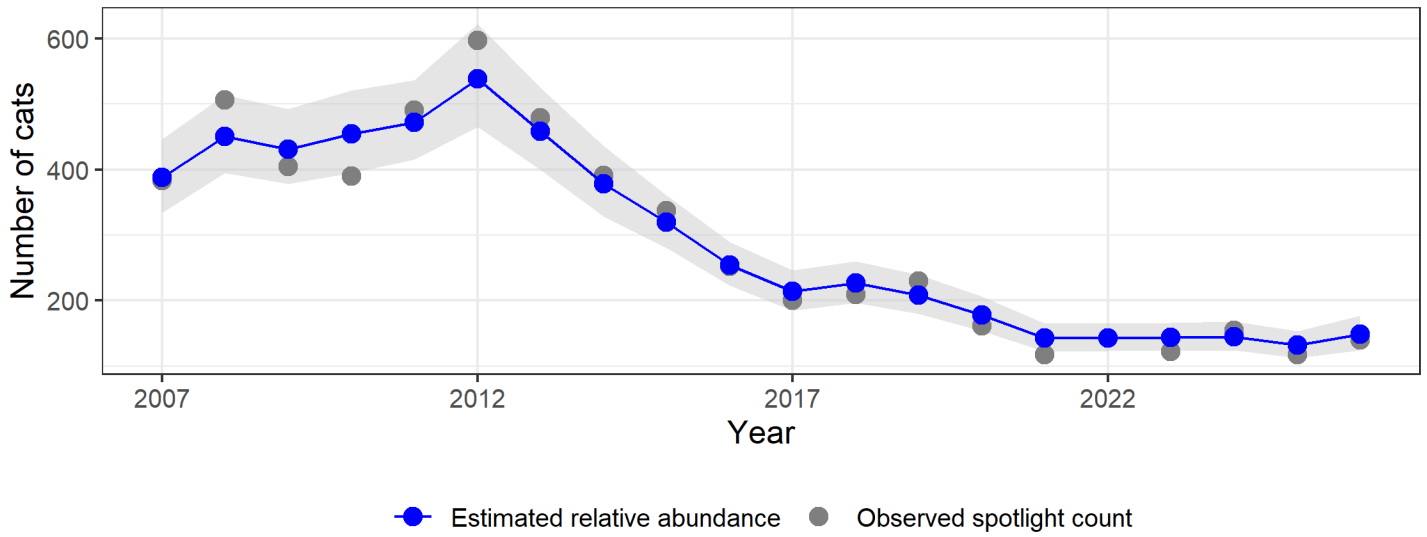


Figure 39. Relative house cat abundance during the Iowa spring spotlight survey, 2006-2026. 95% credible interval in gray.

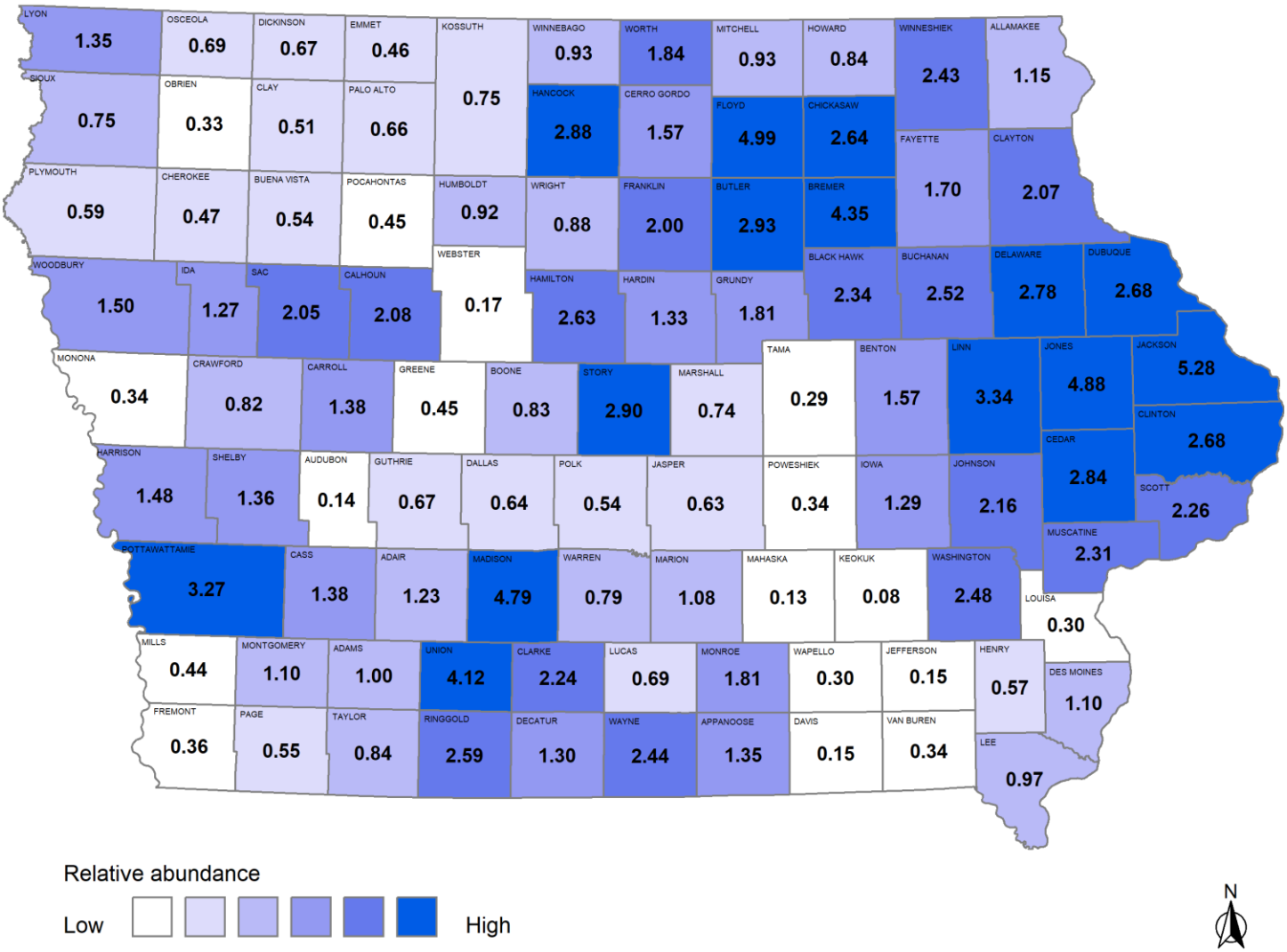


Figure 40. Relative house cat abundance per county during the Iowa spring spotlight survey, 2026.

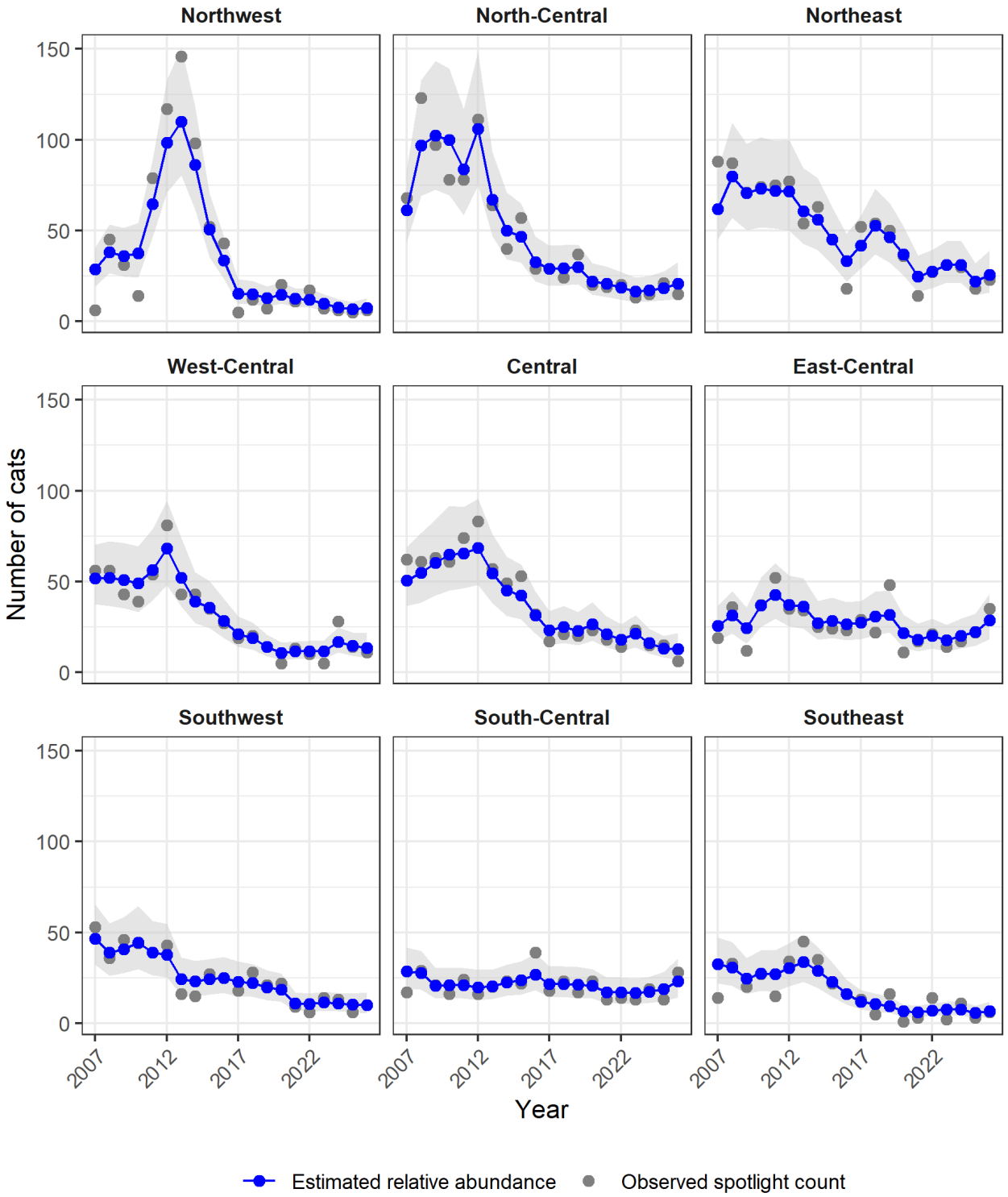


Figure 41. Relative house cat abundance during the spring spotlight survey for nine regions of Iowa, 2006-2026. 95% credible interval in gray. Cats located at farmsteads or human developments were not included in counts. Observations were not recorded in most counties during 2006.

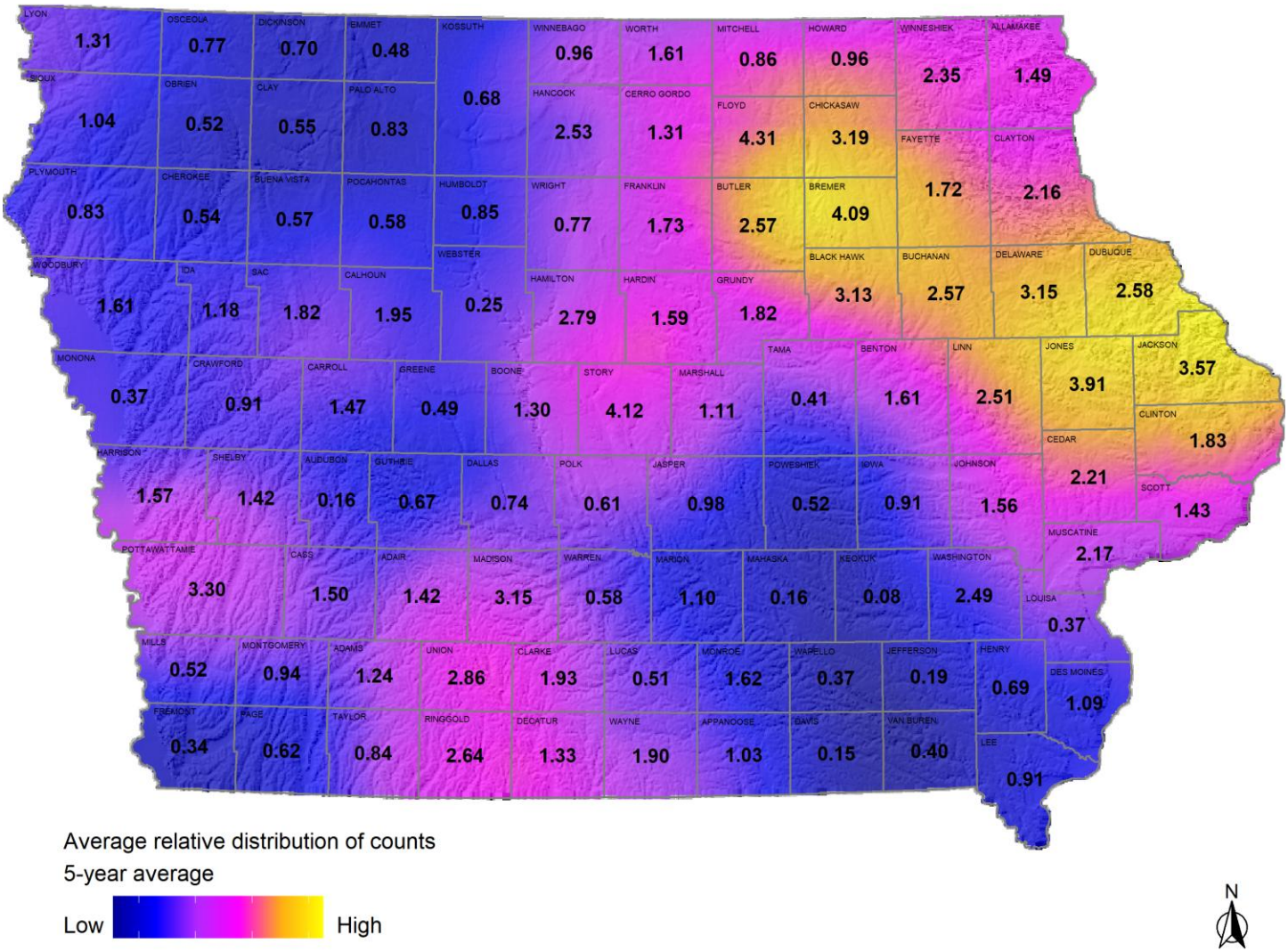
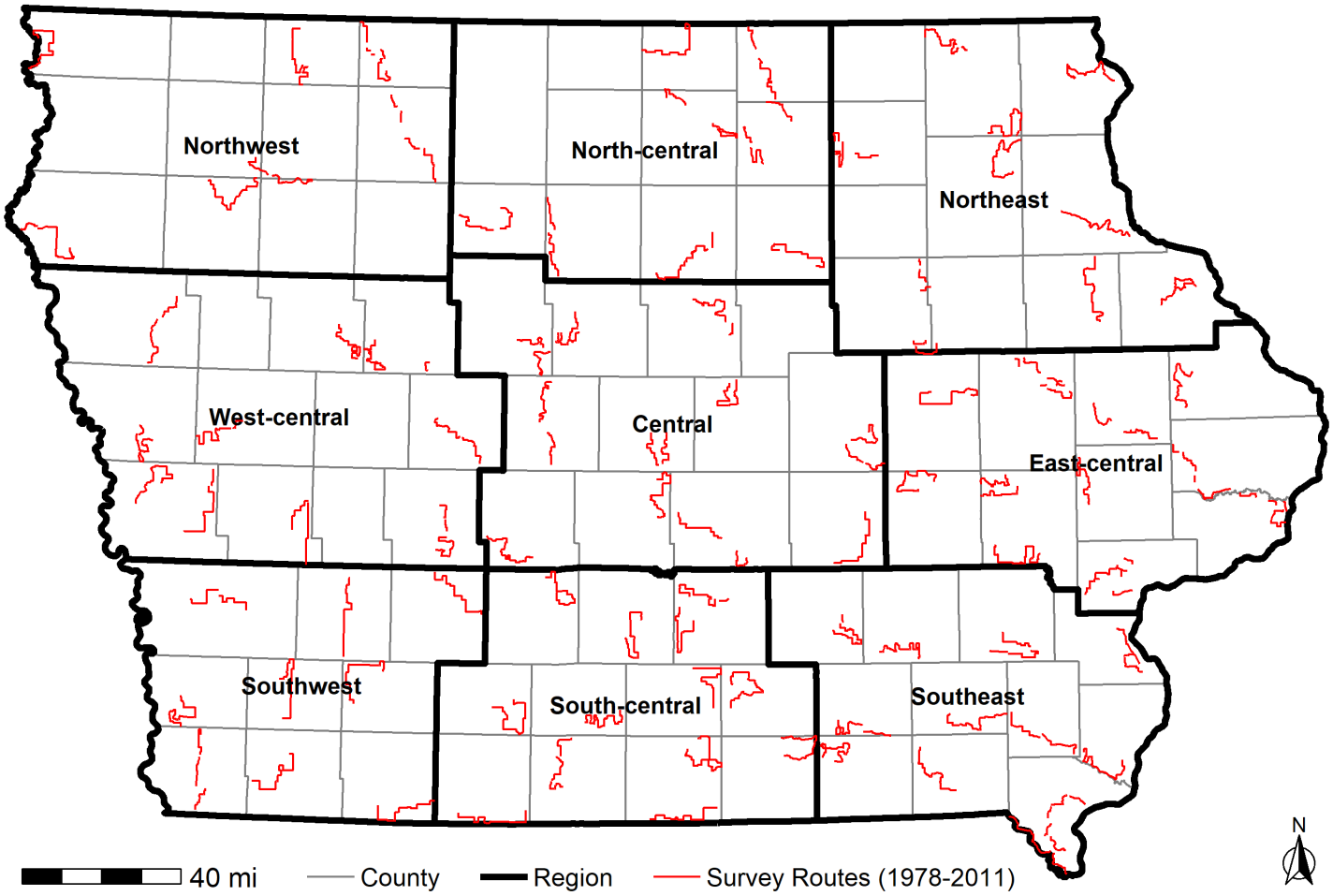


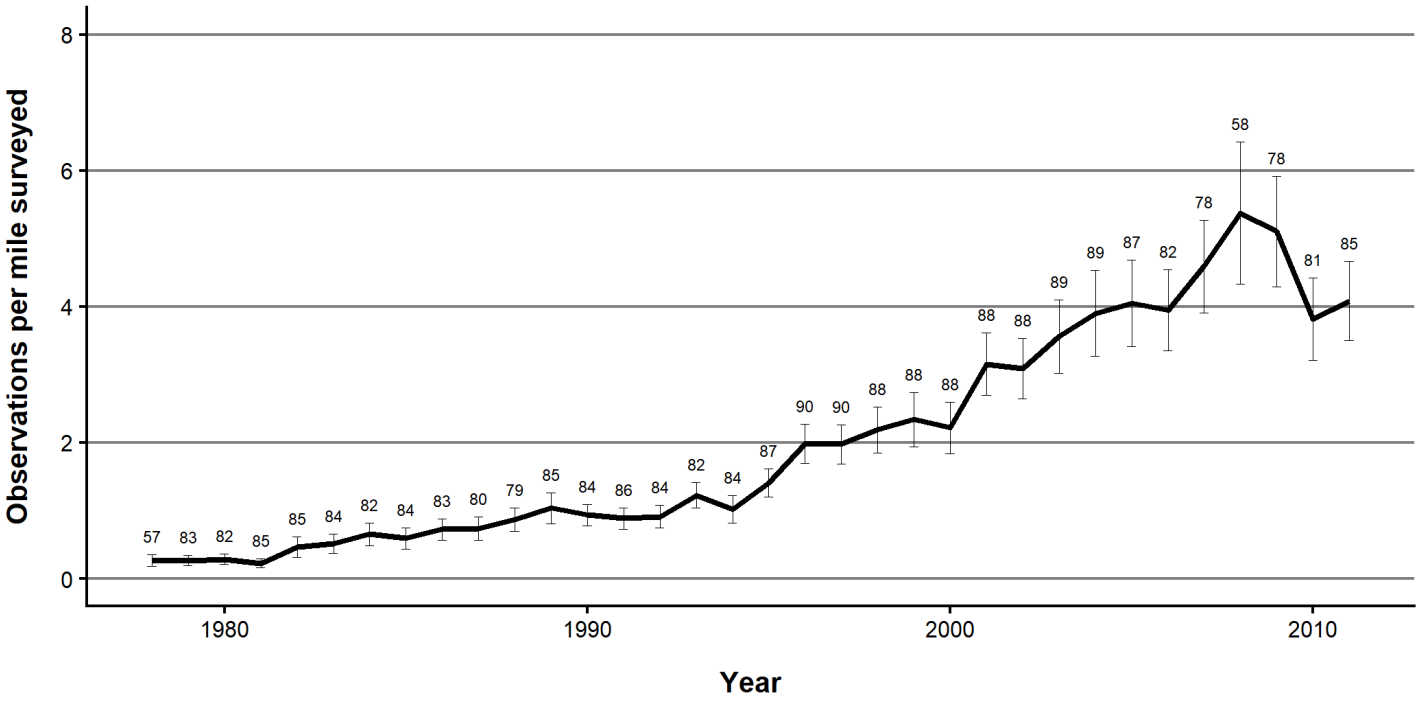
Figure 42. Average 5-year relative abundance of house cats during the spring spotlight survey in Iowa. Estimates are relative to the highest and lowest estimates across all counties and may not represent an over- or under-abundance of the species (i.e., high abundance is considered high relative to estimates in all other counties). House cats located at farmsteads or human developments were not included in counts.

APPENDICES



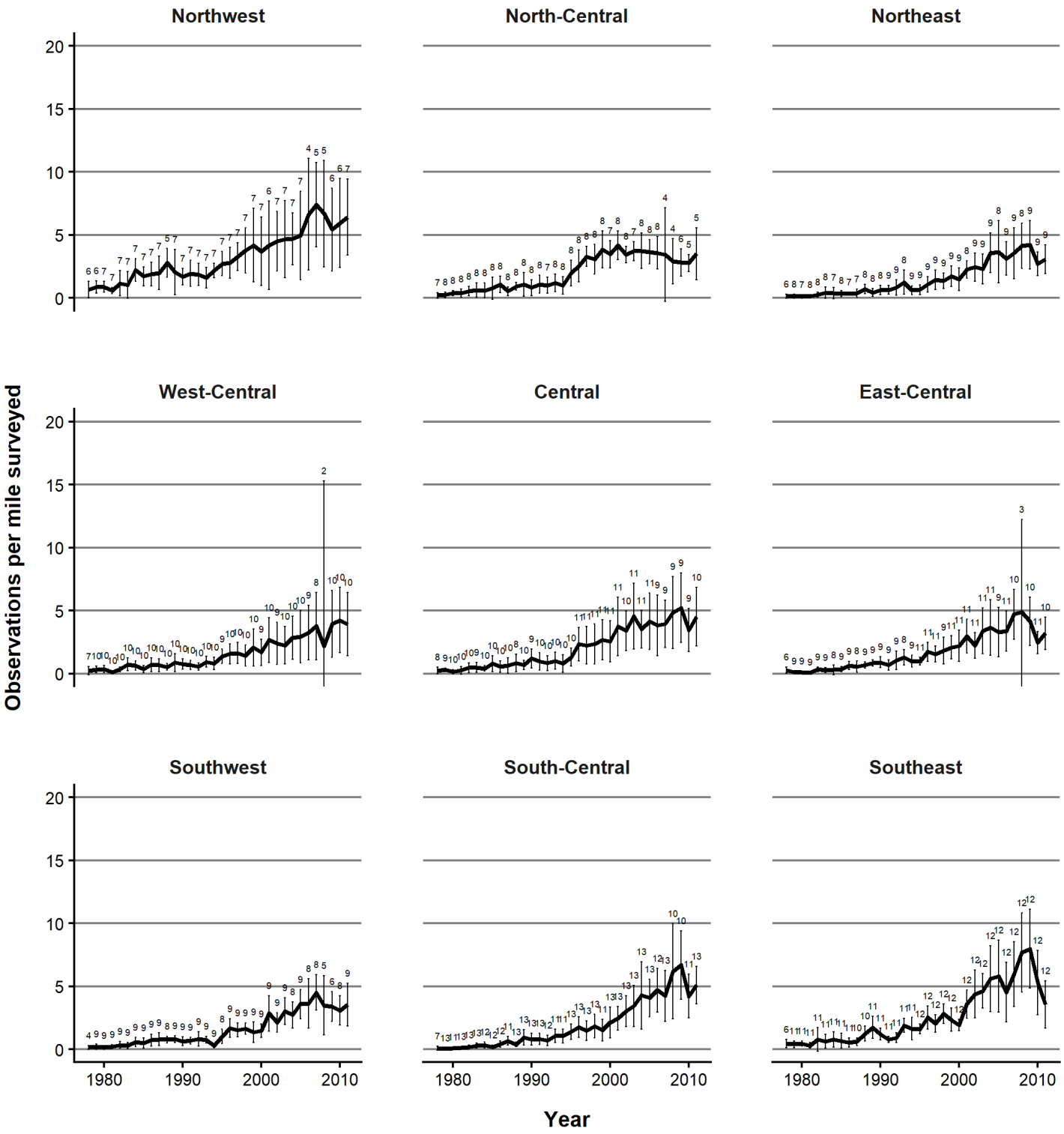
Appendix A. Regions used for summarizing spring spotlight survey observations in Iowa and historical spring spotlight survey routes sampled from 1978-2011.

Appendix B



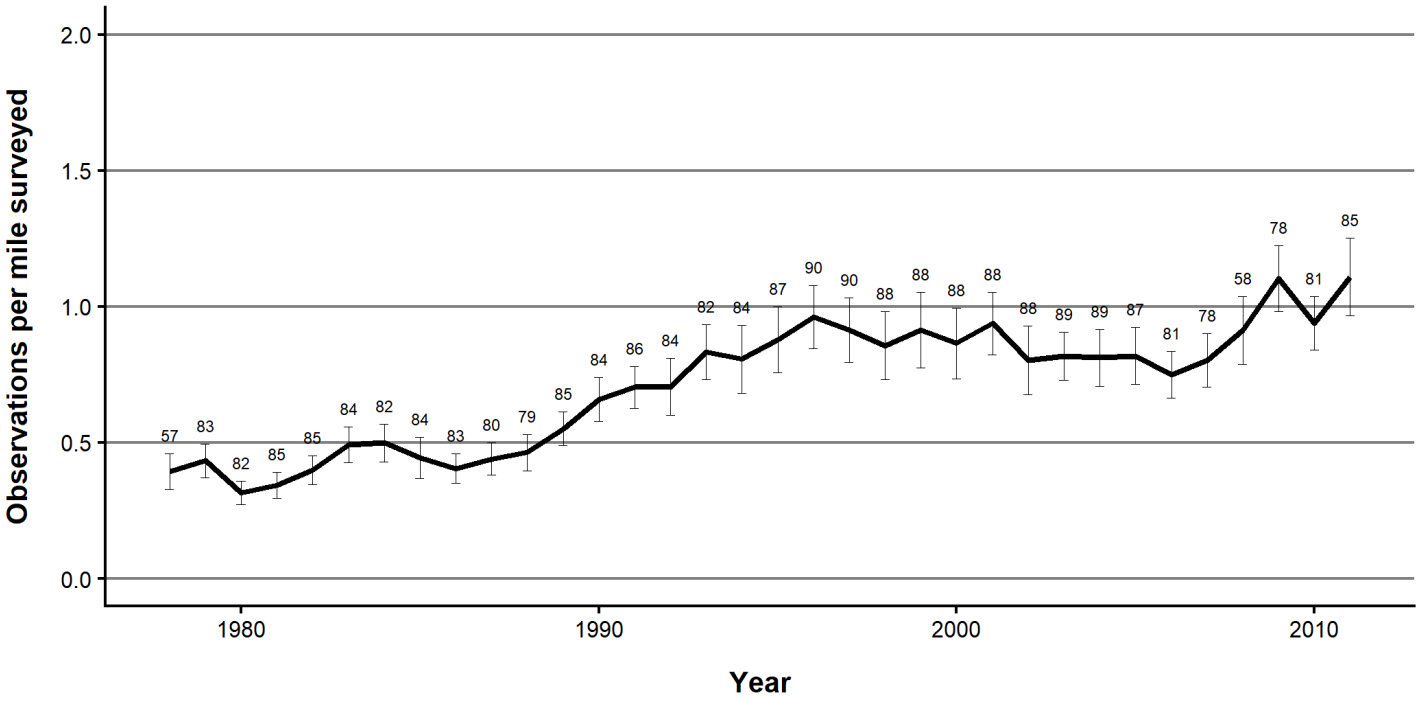
Appendix B. Statewide average white-tailed deer observations per mile surveyed during the Iowa spring spotlight survey, 1978-2011. Observations were standardized by mile surveyed to account for regions in which counties were not surveyed. Error bars indicate 95% confidence intervals. Numbers above error bars indicate the number of transects surveyed each year.

Appendix C



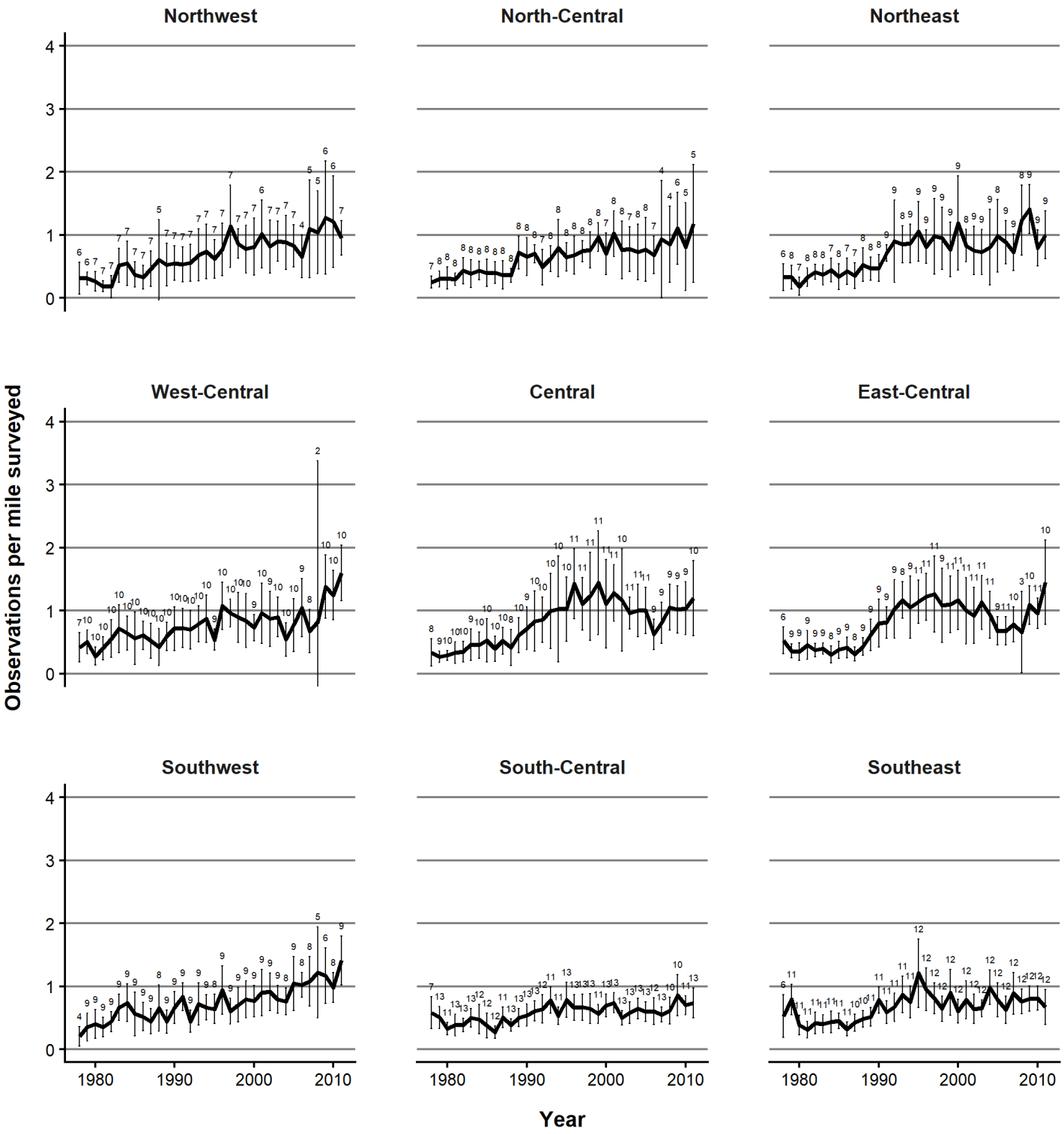
Appendix C. Average white-tailed deer observations per mile surveyed during the Iowa spring spotlight survey, 1978-2011. Error bars indicate 95% confidence intervals. Numbers above error bars indicate the number of transects surveyed each year. Surveys were conducted parallel to forest cover and not standardized by the amount of available habitat in each region.

Appendix D



Appendix D. Average raccoon observations per mile surveyed during the Iowa spring spotlight survey, 1978-2011. Observations were standardized by mile surveyed to account for variable number of transects surveyed each year. Error bars indicate 95% confidence intervals. Numbers above error bars indicate the number of transects surveyed each year.

Appendix E



Appendix E. Average raccoon observations per mile surveyed during the Iowa spring spotlight survey, 1978-2011. Error bars indicate 95% confidence intervals. Numbers above error bars indicate the number of transects surveyed each year. Surveys were conducted parallel to forest cover and not standardized by the amount of available habitat in each region.