

# Iowa Bow Hunter Observation Survey: 2018 summary

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**ABSTRACT** Each year, the Iowa Department of Natural Resources (DNR) solicits responses from bow hunters as part of the Bow Hunter Observation Survey conducted from 1 October to 2 December. The primary objectives of this survey are 1) to collect observations of white-tailed deer which serve as an independent index of regional deer populations across the state and supplement other deer data collected by the DNR, and 2) to collect observations of other select species to develop a long-term database of relative abundance used to monitor population trends of these species. The DNR selects survey participants each year using a two-stage, stratified-random sampling design in which a sample of 9,000 individual bow hunters are selected from the list of all hunters who purchased an archery hunting license in each of the preceding three years. Each participant receives a diary for recording the number of hours hunted during each hunting trip, as well as the number of deer, wild turkey, and select furbearer species seen during each trip. Reminder postcards are sent to all non-respondents by November 15 each year, and respondents are asked to return all surveys by December 2. Observations for 12 species are standardized by 1,000 hours hunted, and the mean number of observations per 1,000 hours hunted (95% confidence interval) are estimated statewide and by survey region. In 2018, we collected responses from 2,098 bow hunters consisting of 20,907 hunting trips and 67,202 hours of total observation time ( $3.21 \pm 0.029$  hours/trip). The total number of deer observations increased between 2017 and 2018 in all nine survey regions, and the 10-year trend is increasing in seven of nine survey regions. Wild turkey observations increased in northwest, northeast, west-central, and south-central Iowa between 2017 and 2018 but decreased in all other regions. According to 10-year trends, bobcat and opossum observations are increasing while raccoon and red fox observations are decreasing statewide. Data from this survey are extremely valuable in monitoring population trends for harvested species such as white-tailed deer and raccoon and serve as the only index for monitoring population trends for uncommon species such as gray fox.

## INTRODUCTION

Reliable long-term indices of wildlife population trends are critical for making informed decisions on management of harvested species such as white-tailed deer (*Odocoileus virginianus*) and bobcat (*Lynx rufus*) and for monitoring population status of rare species or species of conservation concern such as gray fox (*Urocyon cinereoargenteus*). Data to generate such indices, however, can be logistically challenging to collect at a statewide scale. Hunter observation surveys have been implemented by several natural resource agencies throughout the U.S. as a means for collecting data to successfully monitor population trends for a variety of species including white-tailed deer (Winchcombe and Ostfeld 2001, Haskell 2011), moose (*Alces alces*; Ericsson and Wallin 1999, Crum et al. 2017), and gray wolf (*Canis lupus*; Rich et al. 2013). These citizen-science surveys provide a wealth of information at broad spatial scales for a small cost relative to other standardized surveys using paid staff. Therefore, hunter observation surveys are an extremely cost-effective approach for obtaining quality data to guide management decisions for both harvested species and species of conservation concern.

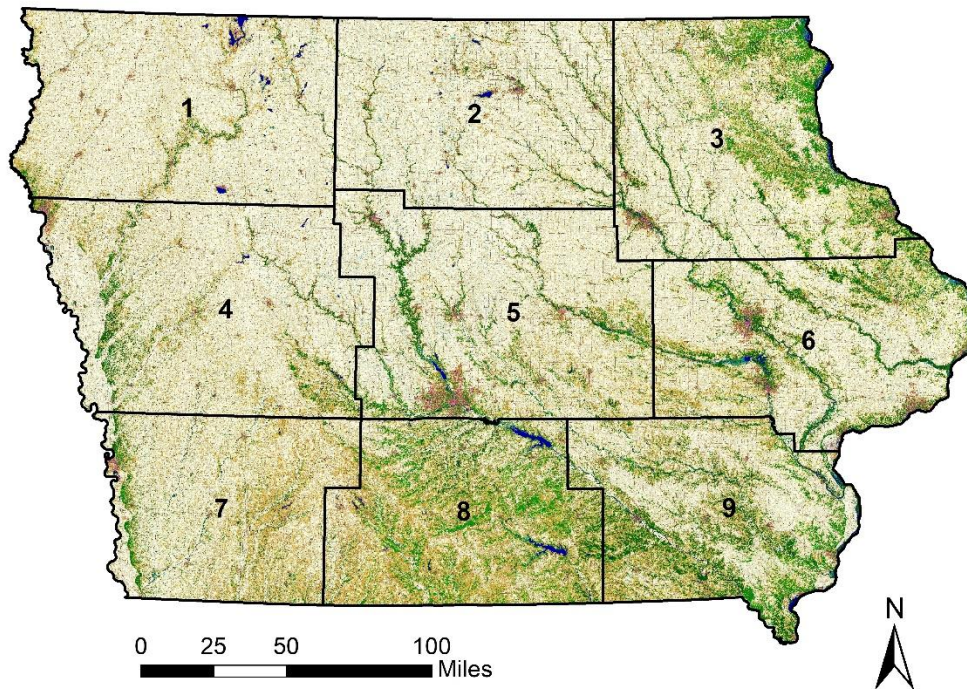
In 2004, the Iowa Department of Natural Resources (DNR) implemented the annual Iowa Bow Hunter Observation Survey. Designed in cooperation with Iowa State University, the survey had two primary objectives: 1) to collect observations of white-tailed deer to serve as an independent supplement to other deer indices used by the DNR, and 2) to develop a long-term database of observations for other select species to monitor trends in relative abundance. Since the development of the Iowa survey, several other Midwest states have implemented similar surveys including Illinois (Bluett 2013), Indiana,

Missouri, Minnesota (Norton et al. 2017), Ohio (Ohio DNR 2015), and Wisconsin (Rees Lohr 2017). Bow hunters are ideal for collecting wildlife observational data because they typically employ stationary hunting methods (e.g., camouflage, scent masks, etc.) from a ground blind or tree stand which is conducive to observing wildlife in an undisturbed state and because they have access to privately-owned lands that may not be accessible by paid staff, therefore increasing the coverage area of the survey. Furthermore, the archery season in Iowa (October 1 to early December and mid-December to January 10) is longer than any other deer hunting season and, as a result, bow hunters often spend more time in the field than other types of hunters. This allows for collection of repeated observations that can be used for a variety of purposes related to monitoring both short- and long-term wildlife population trends.

The purpose of this report is to summarize results from the 2018 survey and relative abundance trends of surveyed species for the past 10 years.

## STUDY AREA

The Iowa Bow Hunter Observation Survey was conducted statewide and administered to participants in each of nine regions in Iowa (Figure 1).

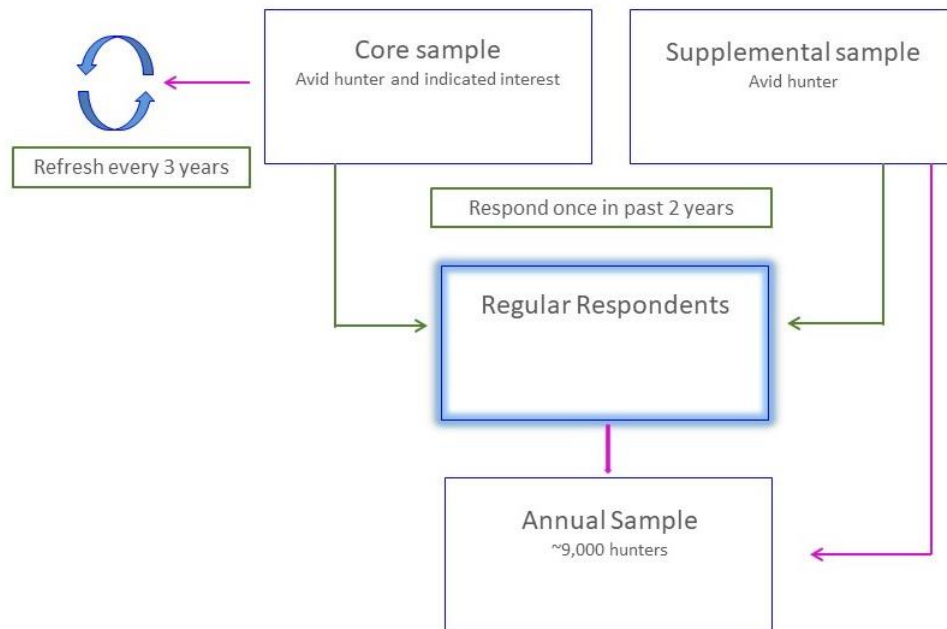


**Figure 1. Survey regions in Iowa used for distributing the Iowa Bow Hunter Observation Survey, 2018.**

## METHODS

Survey participants were selected using a two-stage, stratified random sampling design (Figure 2). The first stage of the sampling process involved selecting a list of bow hunters that 1) indicated interest in participating on a pre-survey sent to all avid bow hunters (i.e., individuals who purchased an archery hunting license in Iowa for each of the past three years) in Iowa in 2016 or 2) responded to the survey in one of the last two years (“core” sample; Figure 2). The core sample is refreshed every three years to maintain a consistent response rate and was last refreshed in 2016. Therefore, 2018 is the final year for the current core sample. For the second sampling stage, we selected individuals from a list of bow hunters who were not on either of the aforementioned lists as the “supplemental” sample (Figure 2). We selected a total of 999 individuals from the combined core and supplemental samples for each of the nine climate regions in Iowa (Figure 1) which resulted in approximately 91 survey participants selected for each of Iowa’s 99 counties. Our final statewide sample size

was 8,991, which is approximately 15% of the population of all archery hunters in recent years (N = ~60,000 individual hunters annually).



**Figure 2. Sampling process schematic for Iowa Bow Hunter Observation Survey, 2018.**

The survey consisted of a two-page diary in which hunters were asked to record the four counties they most frequently hunted, and subsequently the date, county (one of the four already listed above), number of hours spent hunting, and the number of individuals of 12 different species observed during each hunting trip (see Appendix for species surveyed). For white-tailed deer, hunters were asked to record the number of antlered (i.e., buck) and antlerless (i.e., doe or fawn) deer observed during each hunting trip, as well as the number of deer in which sex could not be determined (i.e., unknown). We mailed surveys, along with a cover letter explaining the purpose of the survey, to hunters prior to the start of the Iowa archery season on October 1 each year. Reminder postcards were mailed to hunters who had yet to return their survey by November 15. Hunters were asked to return their survey by December 2 or when they were finished hunting, whichever came first.

We standardized observations for each species by 1,000 hours hunted to account for differences in the number of hunting trips taken and number of hours per hunting trip by region of the state. We reported the mean observations per 1,000 hours hunted and 95% confidence intervals (CI) for each species and summarized 10-year trends for each species.

## RESULTS

A total of 226 surveys were returned as undeliverable in 2018. Therefore, the realized sample size in 2018 was 8,765. We obtained responses from 2,098 bow hunters statewide for a response rate of 24%. Statewide, participants spent a total of 67,202 hours hunting on 20,907 trips for an average of 3.18 (95% CI = 3.02, 3.36) hours per trip. Participants reported a median of 11 trips during the 63-day hunting season. The number of trips and hours hunted varied by region and ranged from 1,423 trips (4,413 total hours) in northwest Iowa (Region 1) to 3,110 trips (10,789 total hours) in south-central Iowa (Region 8; Appendix).

White-tailed deer were the most frequently observed species on the survey with a total of 16,730 (95% CI = 14,881, 18,580) observed per 1,000 hours hunted statewide, which includes a statewide total of 4,678 (95% CI = 4,154, 5,201) antlered deer

and 10,854 (95% CI = 9,524, 12,183) antlerless deer observed per 1,000 hours hunted. The 10-year trend of antlered deer observations is increasing in all regions except southwest Iowa (Region 7; Appendix), whereas the 10-year trend for both antlerless and total deer observations is increasing in all regions except west-central (Region 4) and southwest (Region 7) Iowa.

Wild turkey (*Meleagris gallopavo*) are the second-most frequently observed species on the survey. Observations ranged from 329 birds (95% CI = 252, 406) per 1,000 hours hunted in southeast Iowa (Region 9) to 654 birds (95% CI = 469, 840) per 1,000 hours hunted in northwest Iowa (Region 1). Between 2017 and 2018, wild turkey observations increased in northwest (Region 1), northeast (Region 3), west-central (Region 4), and south-central (Region 8) Iowa (Appendix). The 10-year trend for wild turkey shows increases in four of nine regions in Iowa mostly in the northern and central parts of the state.

Bobcat (*Lynx rufus*) observations are increasing statewide according to the 10-year trend with the most pronounced increases occurring in northwest and southeast Iowa (Regions 1 and 9, respectively; Appendix). Statewide, a total of 43 bobcats (95% CI = 21, 65) were observed per 1,000 hours hunted in 2018, an increase nearly 50% since the survey was initiated in 2004. Observations for other furbearer species such as badger (*Taxidea taxus*), coyote (*Canis latrans*) and opossum (*Didelphis virginiana*) are mostly stable or increasing statewide according to 10-year trends, whereas observations of raccoon (*Procyon lotor*), red fox (*Vulpes vulpes*), and striped skunk (*Mephitis mephitis*) are decreasing statewide (Appendix).

## DISCUSSION

Our survey response rate of 24% in 2018 was approximately 2% higher than last year and comparable to response rates from similar surveys in other states (Ohio DNR 2015, Norton et al. 2017). Despite the increased response rate, the number of hunting trips and hours reported decreased between 2017 and 2018 likely due to extended periods of unfavorable weather during the 2018 archery season. The fall of 2018 was the 3<sup>rd</sup> wettest on record in Iowa with the statewide precipitation total 6.48 inches above normal (Glisan 2018). Not only did increased precipitation likely reduce the number of favorable days for hunters to spend in the field, it also resulted in a delayed crop harvest statewide that likely impacted deer behavior and hunters' ability to effectively pattern deer due to the persistence of dense agricultural cover throughout the fall. A decline of 6% in the statewide reported deer harvest for the archery season between 2017 and 2018 was the largest decline since 2013 and supports that unfavorable weather contributed to a decreased archery harvest in 2018. Nevertheless, bow hunters still recorded more than 67,000 hours of observations statewide, which would cost the DNR nearly \$2 million to collect using field staff.

White-tailed deer observations increased in all regions between 2017 and 2018 and the 10-year trends indicate a slightly increasing population in all regions except west-central and southwest Iowa. This trend is corroborated by the Iowa Spring Spotlight Survey conducted in 2018, which also documented an increase in deer observations statewide between 2017 and 2018 (Kaminski et al. 2018). Deer populations are mostly impacted by harvest and winter weather severity. While statewide reported harvest has remained stable since 2013, winters have been relatively mild in Iowa since 2012 which likely resulted in above-average winter survival for deer and, in turn, led to slight population increases in certain areas over time.

Trends for wild turkey are increasing in northern and central Iowa but are decreasing across the southern portion of the state (Appendix). Similar patterns are currently being observed in neighboring states. Both Minnesota and Wisconsin reported growth and expansion of wild turkey populations in recent years, whereas Missouri populations have been declining slightly since 2007 largely due to poor poult production (Isabelle 2017). In addition, a new disease called Lymphoproliferative Disease (LPDV) has recently been documented in wild turkeys in some Midwest states including Iowa. While the extent of the disease in the Midwest is largely unknown, biologists are concerned about its potential long-term impacts on wild turkey populations. Further investigation into the mechanisms driving declines in turkey populations are needed, and continued monitoring of turkeys in Iowa will help guide future management decisions and research efforts to address these concerns.

Bobcat observations are steadily increasing statewide according to 10-year trends in each region (Appendix), further documenting the successful recovery of this species in Iowa. These increases are especially pronounced in northwest Iowa as bobcats expand north along the Des Moines, Little and Big Sioux, and other major river systems, and in southeast Iowa as bobcats continue to thrive in suitable habitat. Bobcat harvest has also increased annually since the implementation of the harvest season in 2007. The original harvest zone consisted of the southern-most two tiers of counties in Iowa. However, in response to growing and expanding populations in the state, the harvest zone has been expanded to include the southern 4 tiers of counties in the state as well as counties adjacent to Missouri River in western Iowa.

While raccoon observations increased throughout much of Iowa between 2017 and 2018, the 10-year trends show declines in all regions except south central Iowa. Observations of raccoons on the annual spring spotlight survey also increased between 2017 and 2018, although it's unknown whether this increase is an artifact of survey conditions or driven by a decrease in harvest due to low pelt prices (Kaminski et al. 2018). Similar to the spring spotlight survey, observations of badger, coyote, and opossum are mostly stable or increasing statewide; however, observations of red fox on the spring spotlight survey are increasing whereas observations from this survey are stable to slightly decreasing statewide. Canids, both the red and gray fox especially, are challenging to detect on most wildlife surveys such as the spotlight survey due to their elusive behavior. Therefore, the Bow Hunter Observation Survey likely provides a better index to populations of these species than the spring spotlight survey. This survey continues to be the best, and in some cases the only data set used to monitor population trends of Iowa's furbearers.

Interestingly, domestic house cat (*Felis catus*) observations are declining statewide, a trend that is also demonstrated by the spring spotlight survey (Kaminski et al. 2018). The mechanism for this decline is largely unknown but is likely a combination of several factors. House cats have been shown to have significant negative impacts on native wildlife populations, especially birds and small mammals (Loss et al. 2013). It is uncertain, however, what impact this decline has on bird and small mammal populations in Iowa due to the lack of population estimates these groups of species statewide.

## MANAGEMENT IMPLICATIONS

Effective management of wildlife populations must be based on sound science. This survey provides a consistent, long-term data set for monitoring trends and spatial distribution of Iowa wildlife populations and allows for future modeling and analysis that provide robust metrics to guide harvest management and conservation decisions for some of Iowa's most charismatic species.

## ACKNOWLEDGEMENTS

We are extremely grateful for the effort and time of the many Iowa bow hunters who assisted this year with collecting valuable observations to guide wildlife management in Iowa. Thanks also to S. Roberts and W.R. Clark for their thoughtful design of this survey. The survey would not be possible without the help of P. Fritzell and S. Sussex, who assisted with survey distribution, and R. Hainfield, who spent countless hours entering survey data.

## LITERATURE CITED

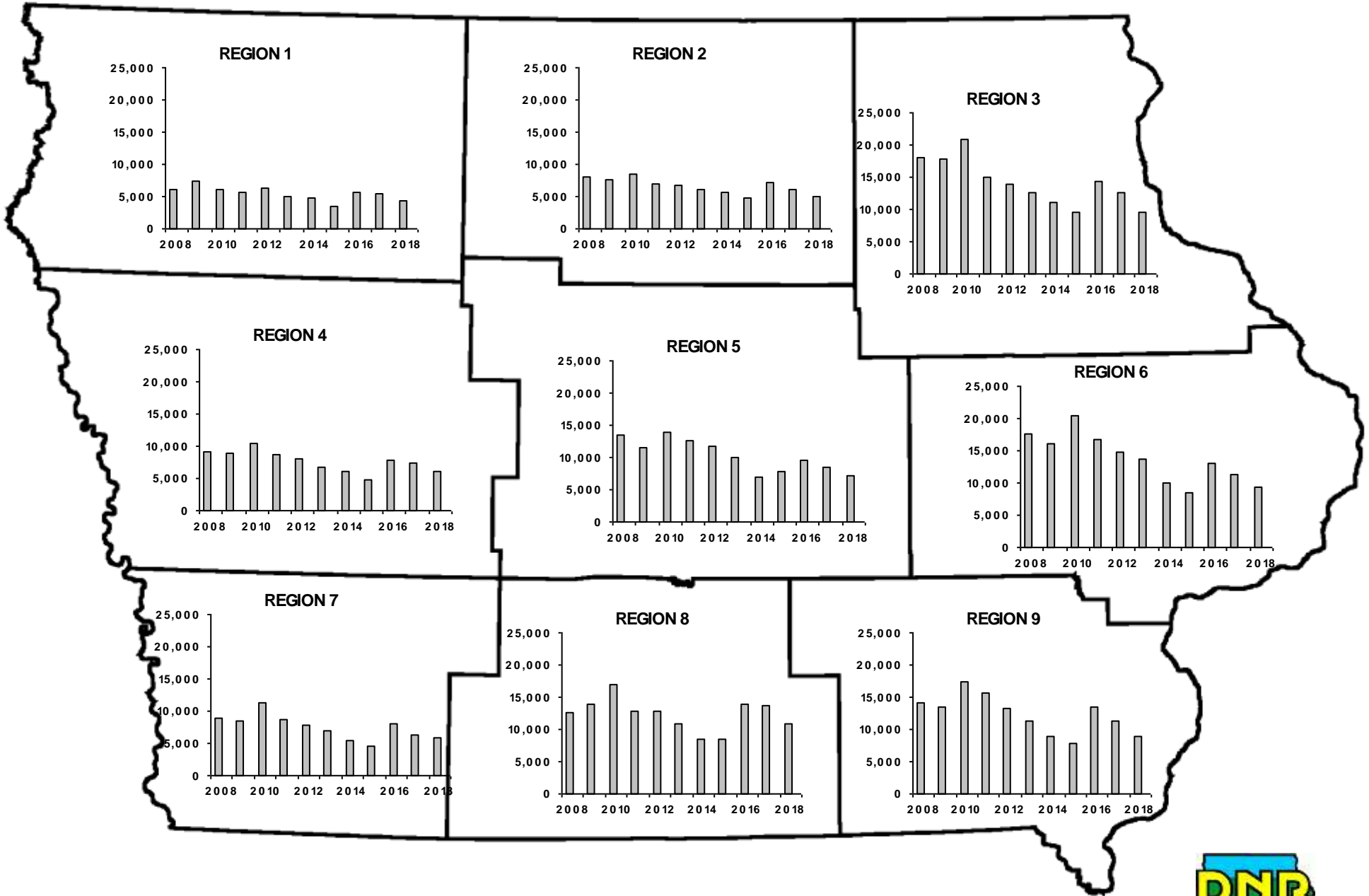
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**Appendix:** Summary of trips, hours hunted, hours per trip, and species observations per 1,000 hours hunted (95% confidence interval) by region from the Iowa Bow Hunter Observation Survey, 2018.

# Hours Hunted by Survey Participants

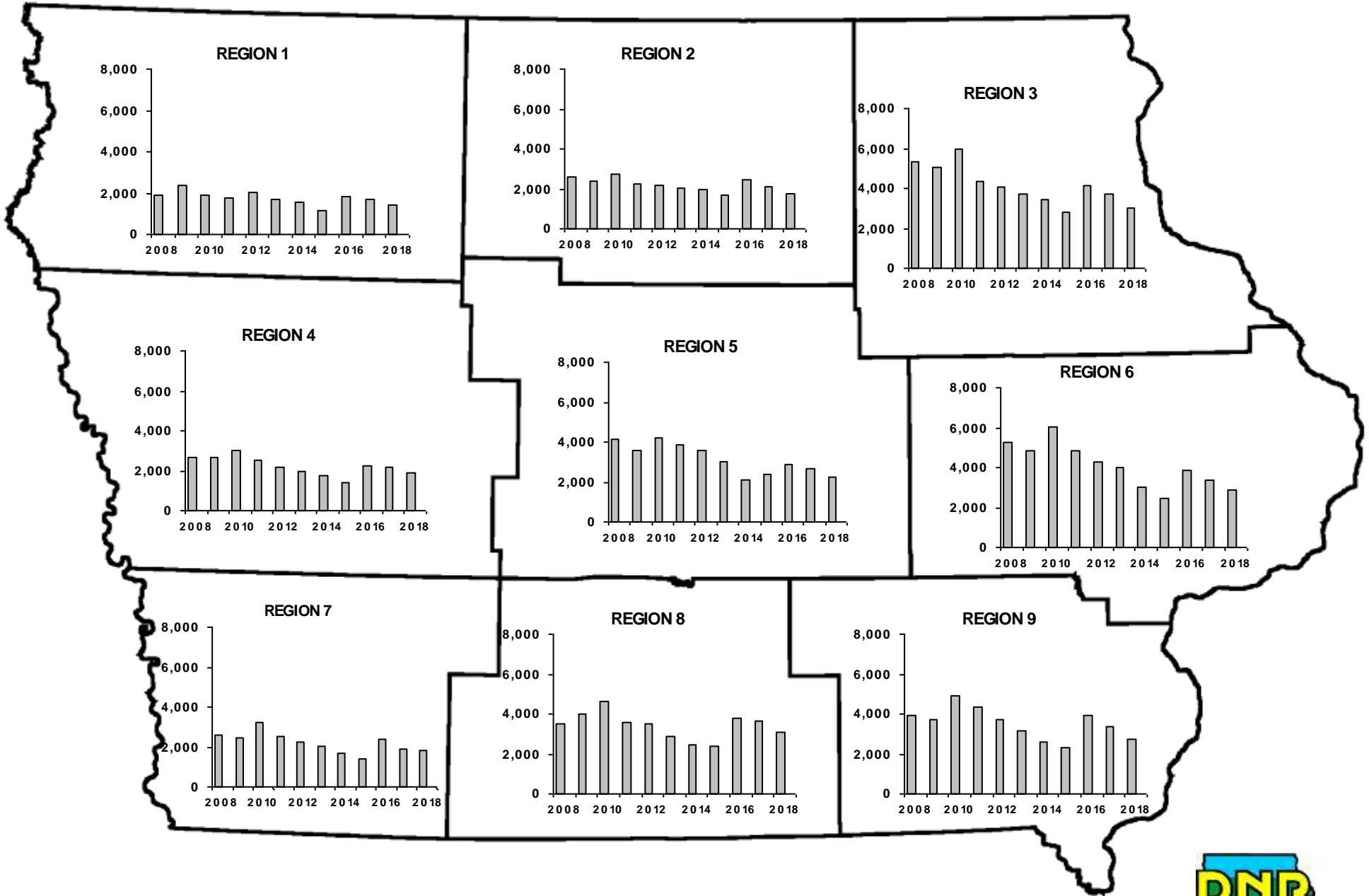
## Bow Hunter Observation Survey, Iowa Dept. of Natural Resources





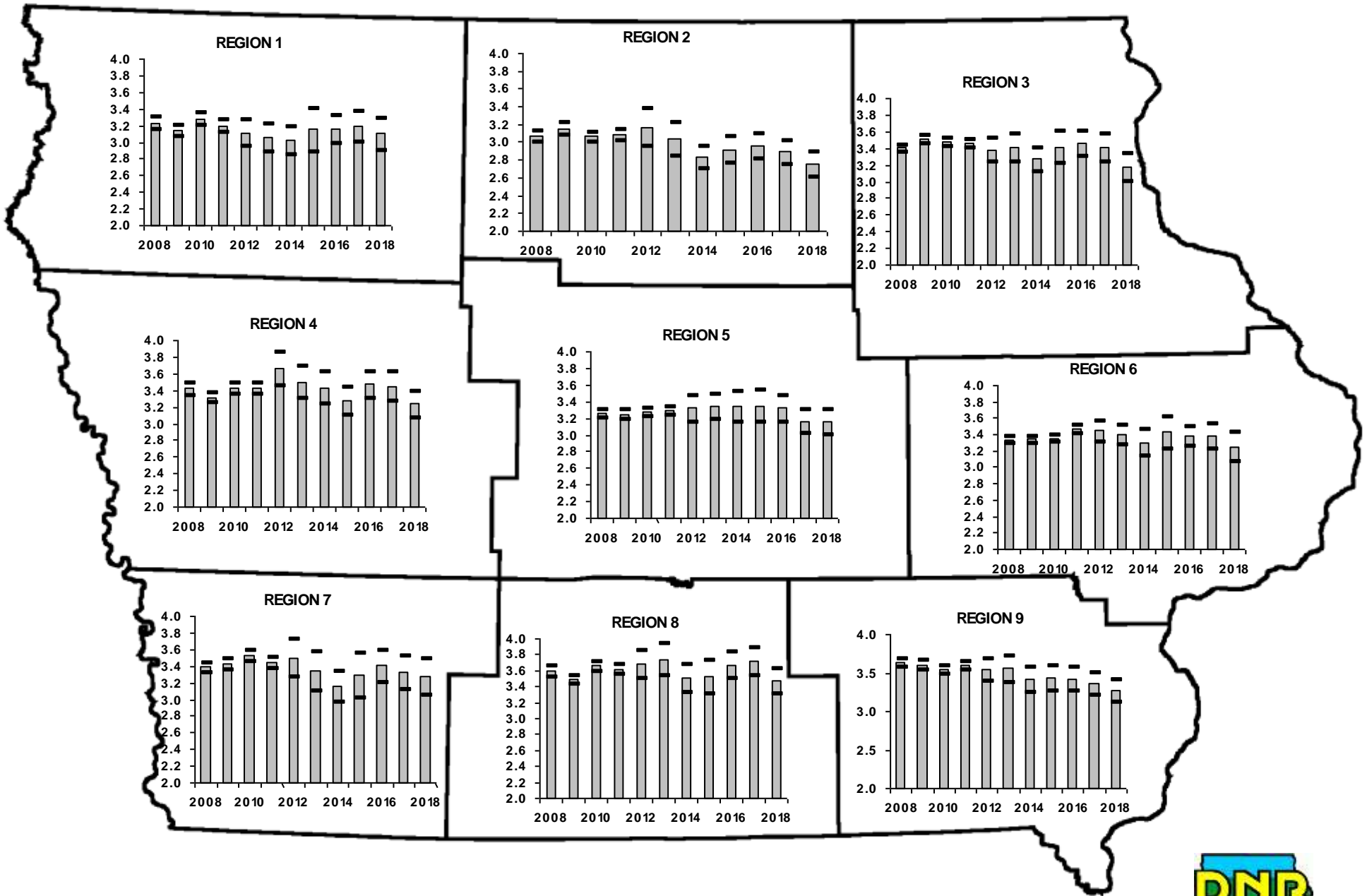
# Bowhunting Trips by Survey Participants

## Bow Hunter Observation Survey, Iowa Dept. of Natural Resources



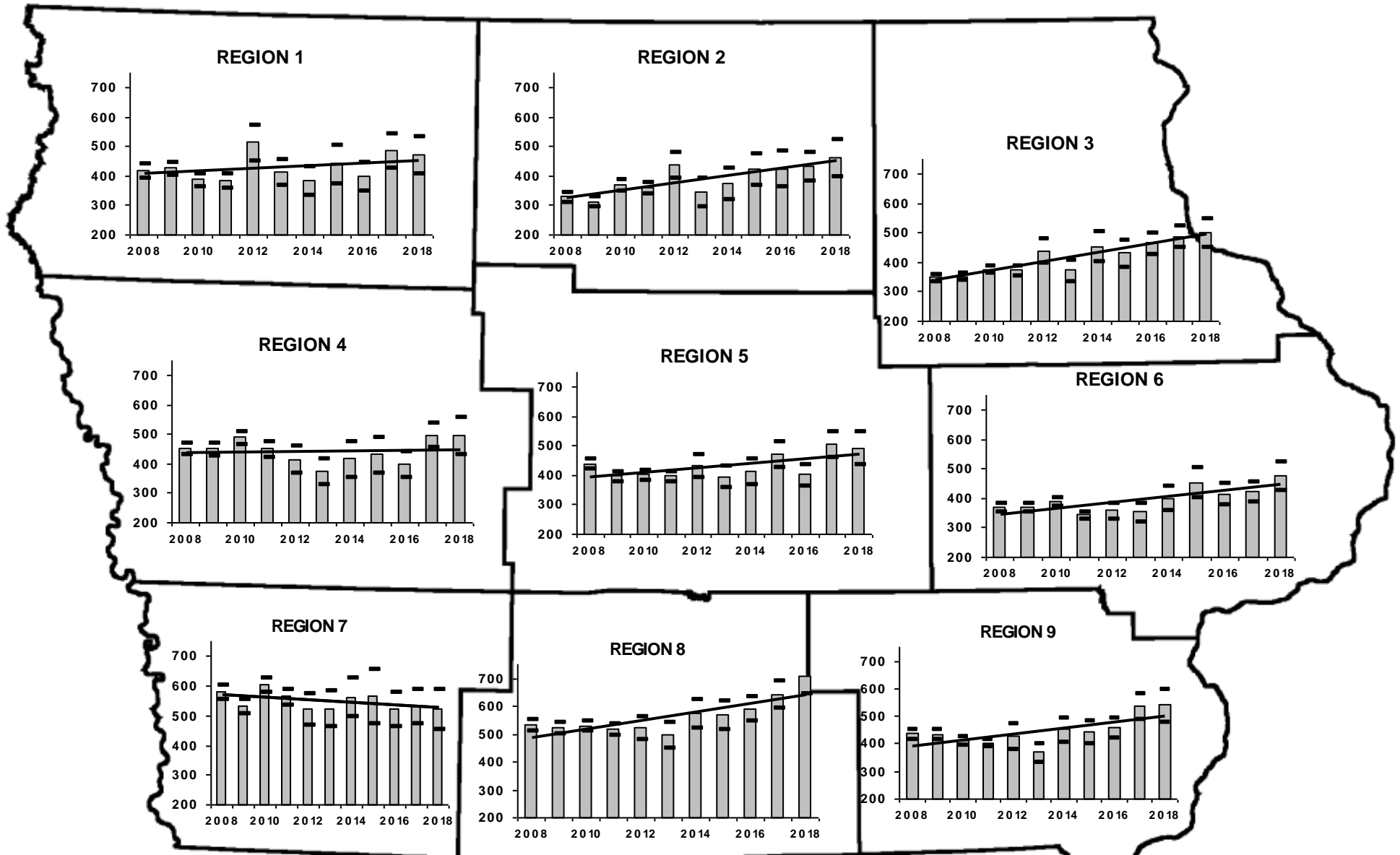
# Average Hours Hunted/Bowhunting Trip

## Bow Hunter Observation Survey, Iowa Dept. of Natural Resources



# Antlered Deer Observations Per 1,000 Hours Hunted

Bow Hunter Observation Survey, Iowa Dept. of Natural Resources

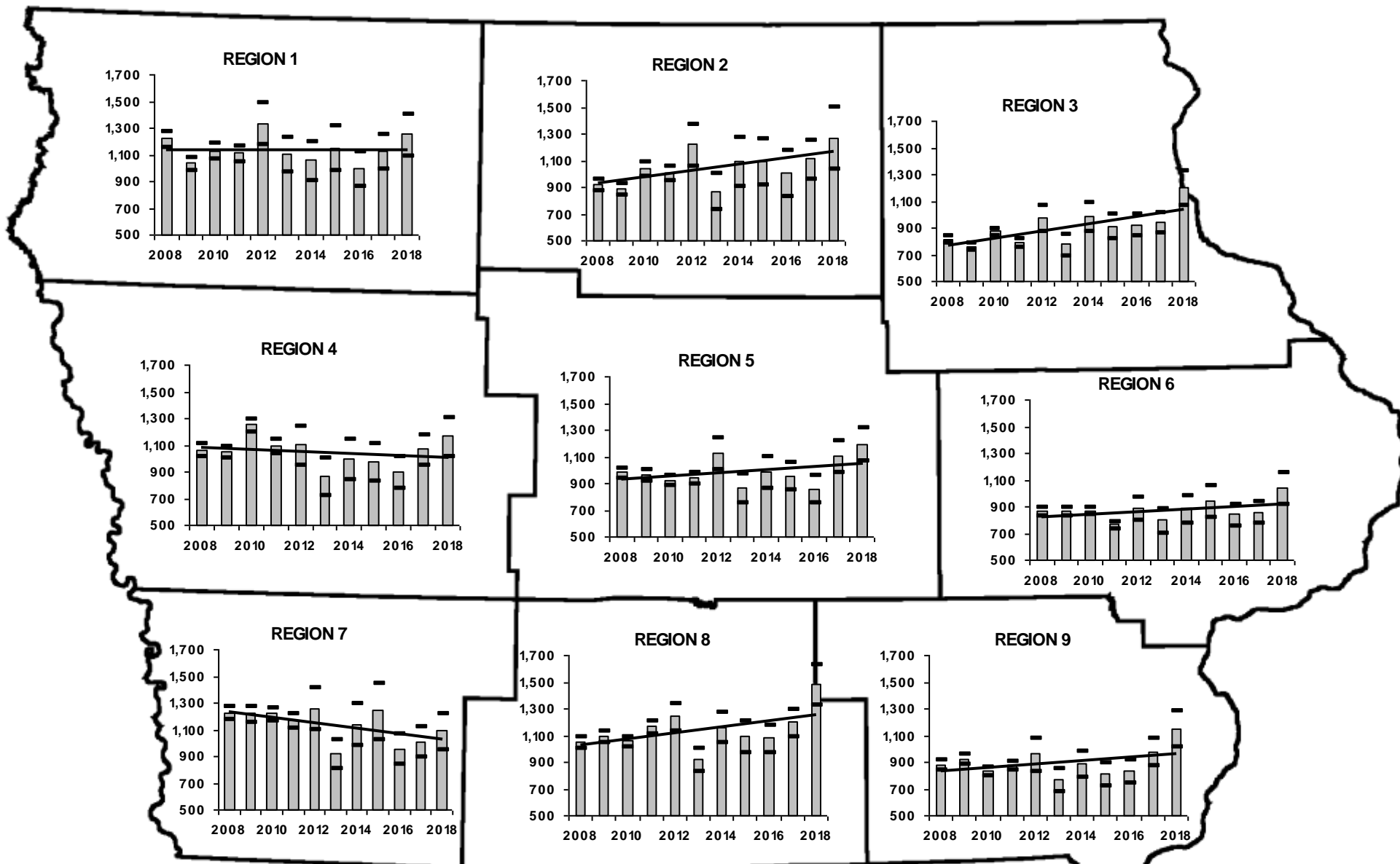


Many factors can influence the sightability of animals, such as population density, habitat characteristics, topography, land use, etc. As a result, differences between regions may NOT be attributed solely to population size/density.



# Antlerless Deer Observations Per 1,000 Hours Hunted

## Bow Hunter Observation Survey, Iowa Dept. of Natural Resources

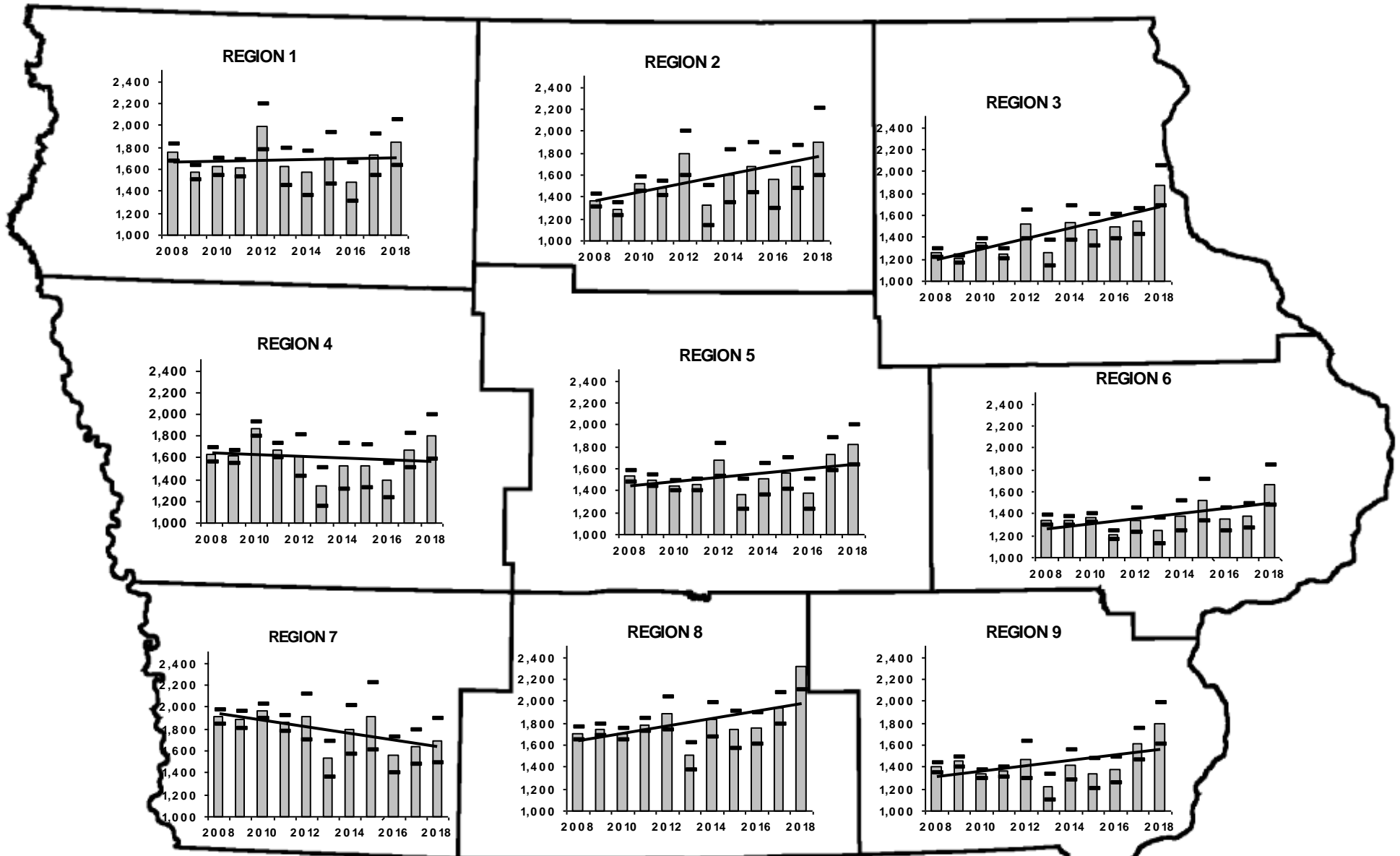


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# Total Deer Observations Per 1,000 Hours Hunted

## Bow Hunter Observation Survey, Iowa Dept. of Natural Resources

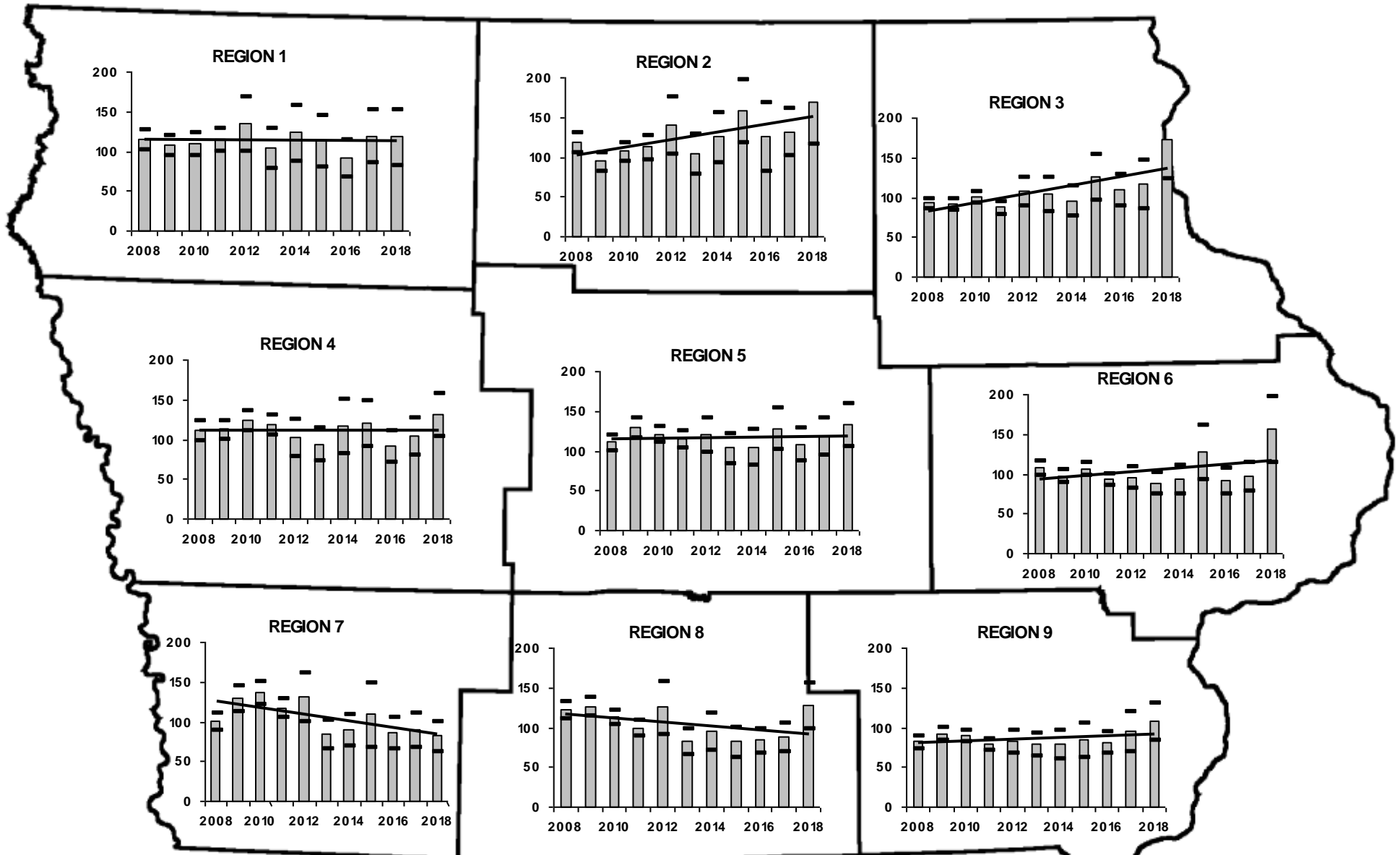


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# Unknown Deer Observations Per 1,000 Hours Hunted

## Bow Hunter Observation Survey, Iowa Dept. of Natural Resources

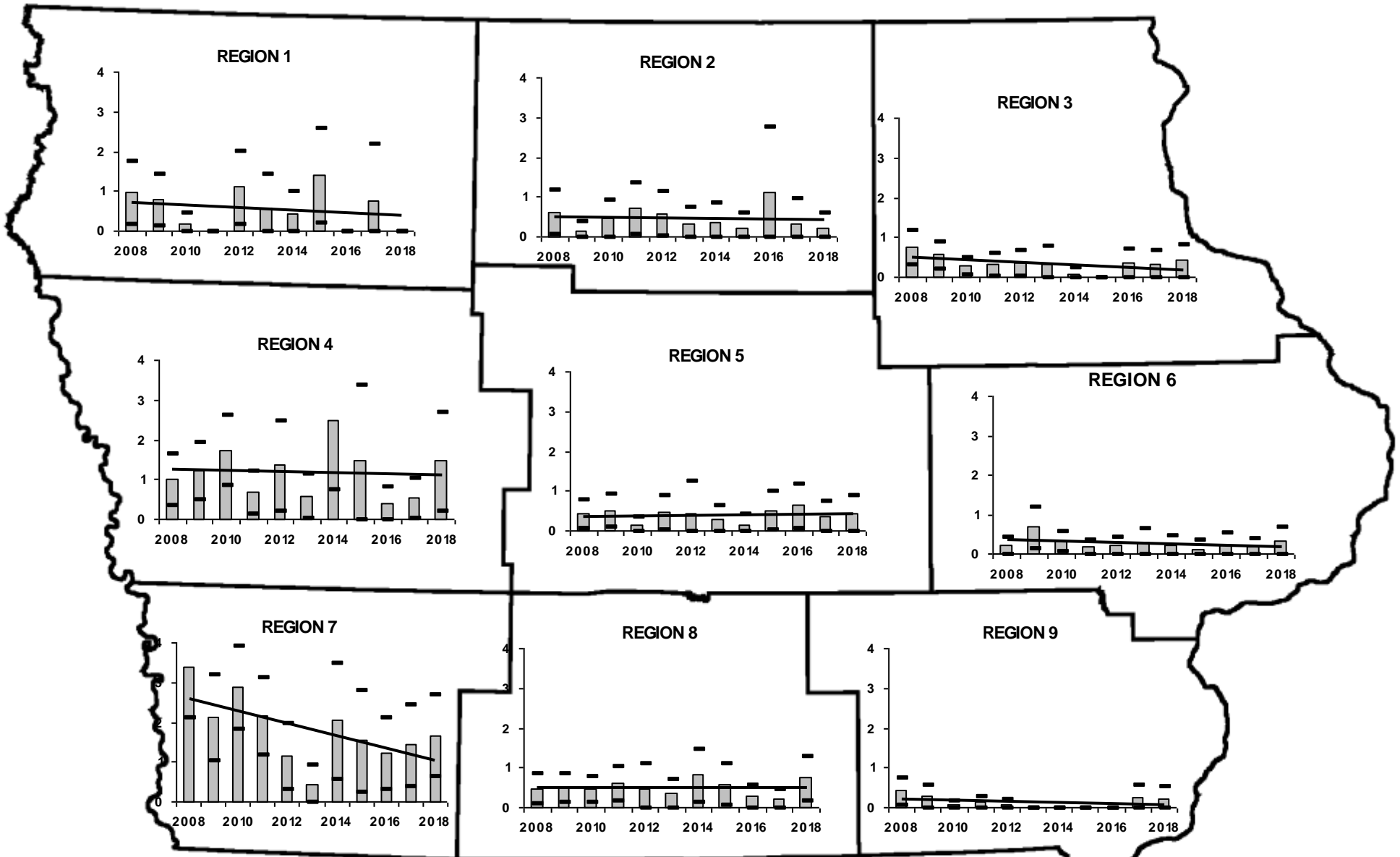


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# Badger Observations Per 1,000 Hours Hunted

## Bow Hunter Observation Survey, Iowa Dept. of Natural Resources

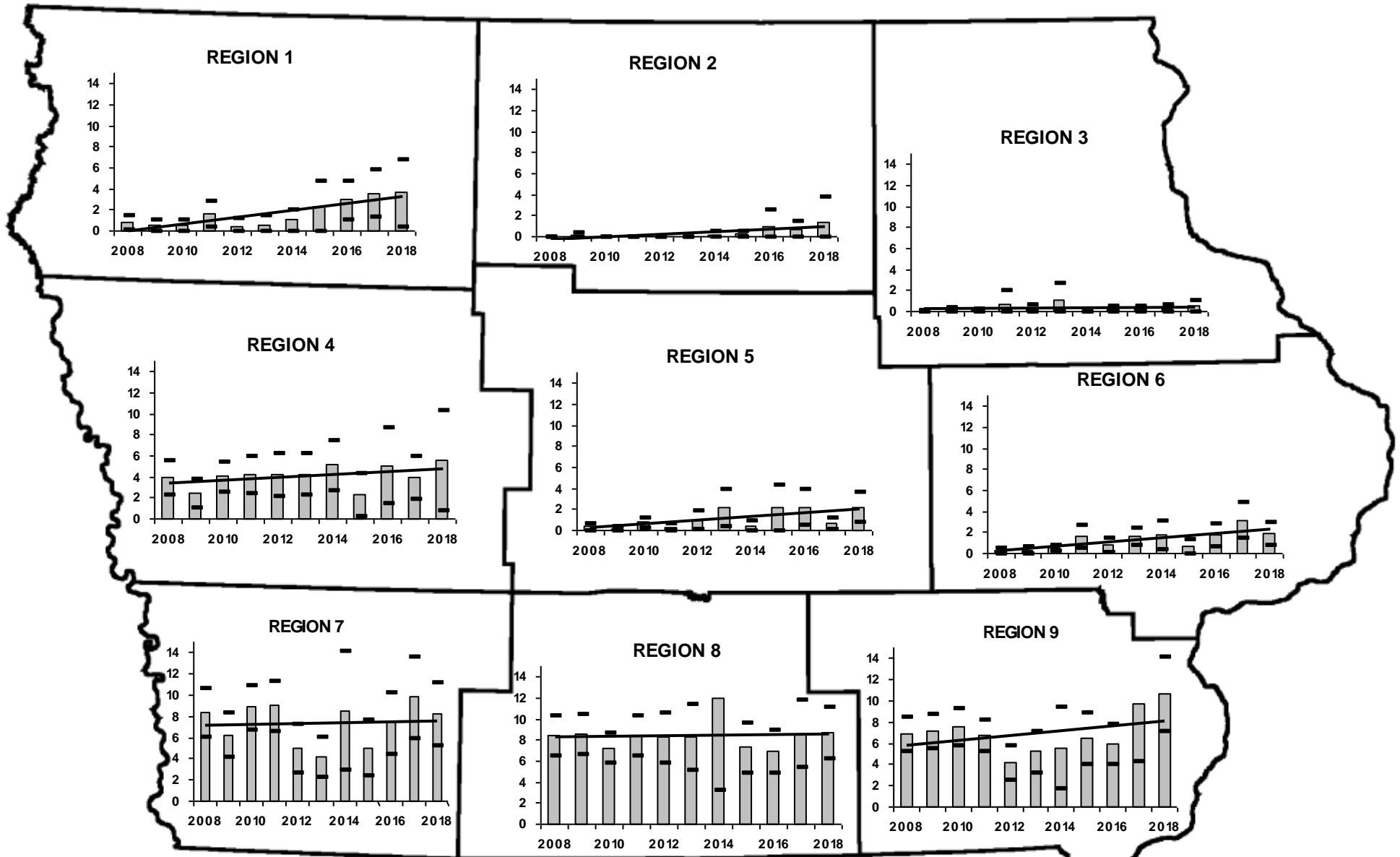


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# Bobcat Observations Per 1,000 Hours Hunted

## Bow Hunter Observation Survey, Iowa Dept. of Natural Resources



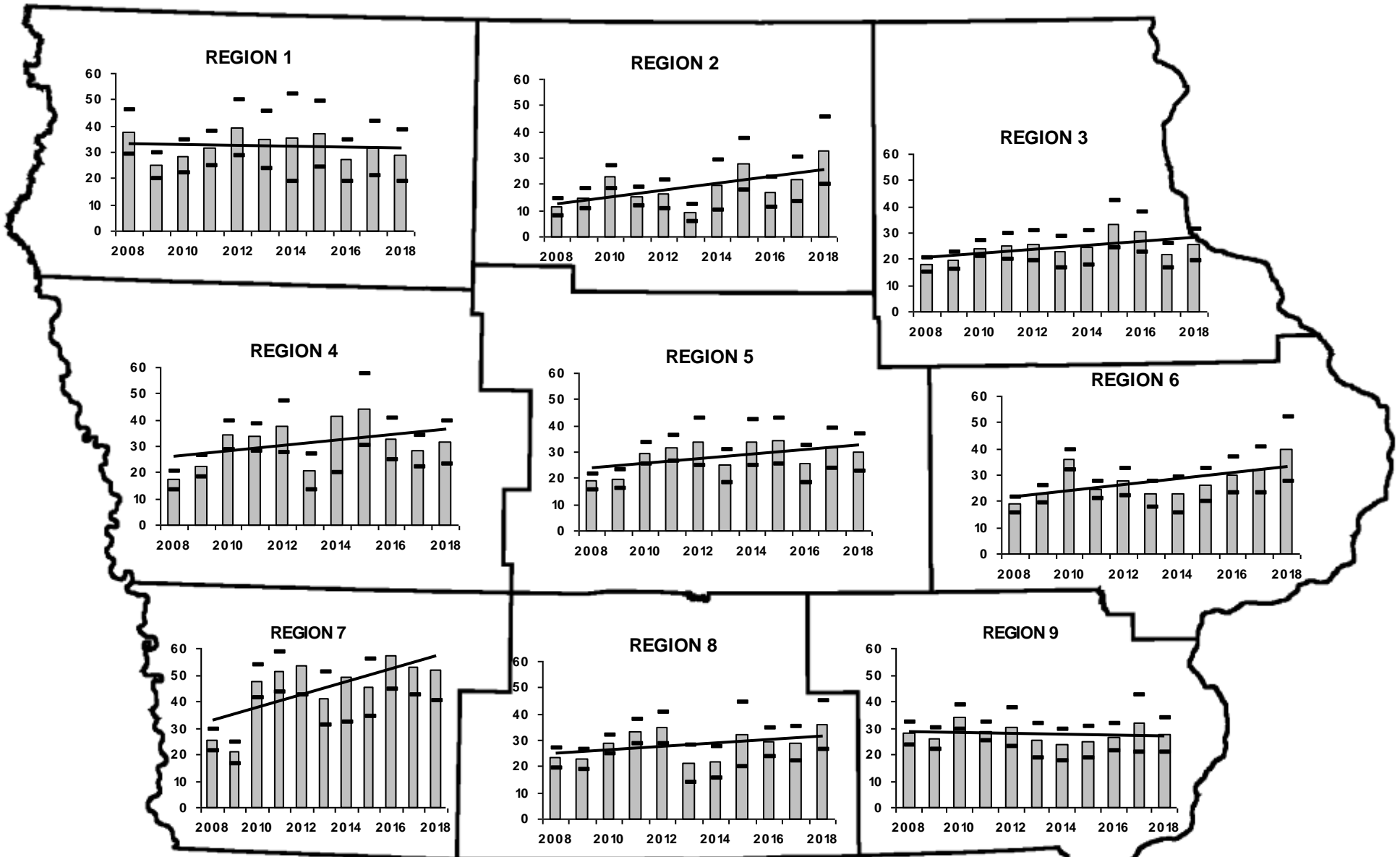
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# Coyote Observations Per 1,000 Hours Hunted

## Bow Hunter Observation Survey, Iowa Dept. of Natural Resources

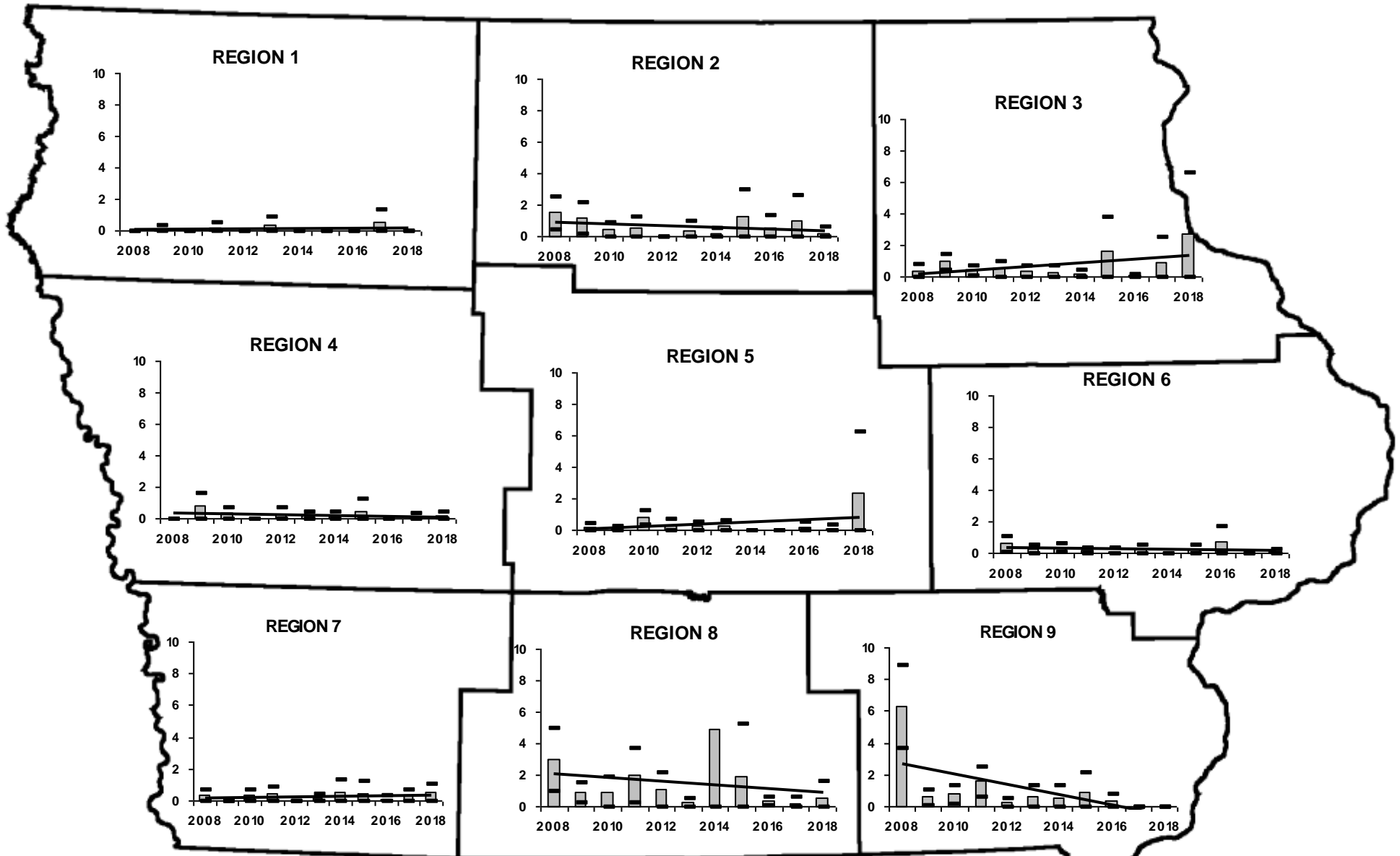


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# Gray Fox Observations Per 1,000 Hours Hunted

## Bow Hunter Observation Survey, Iowa Dept. of Natural Resources

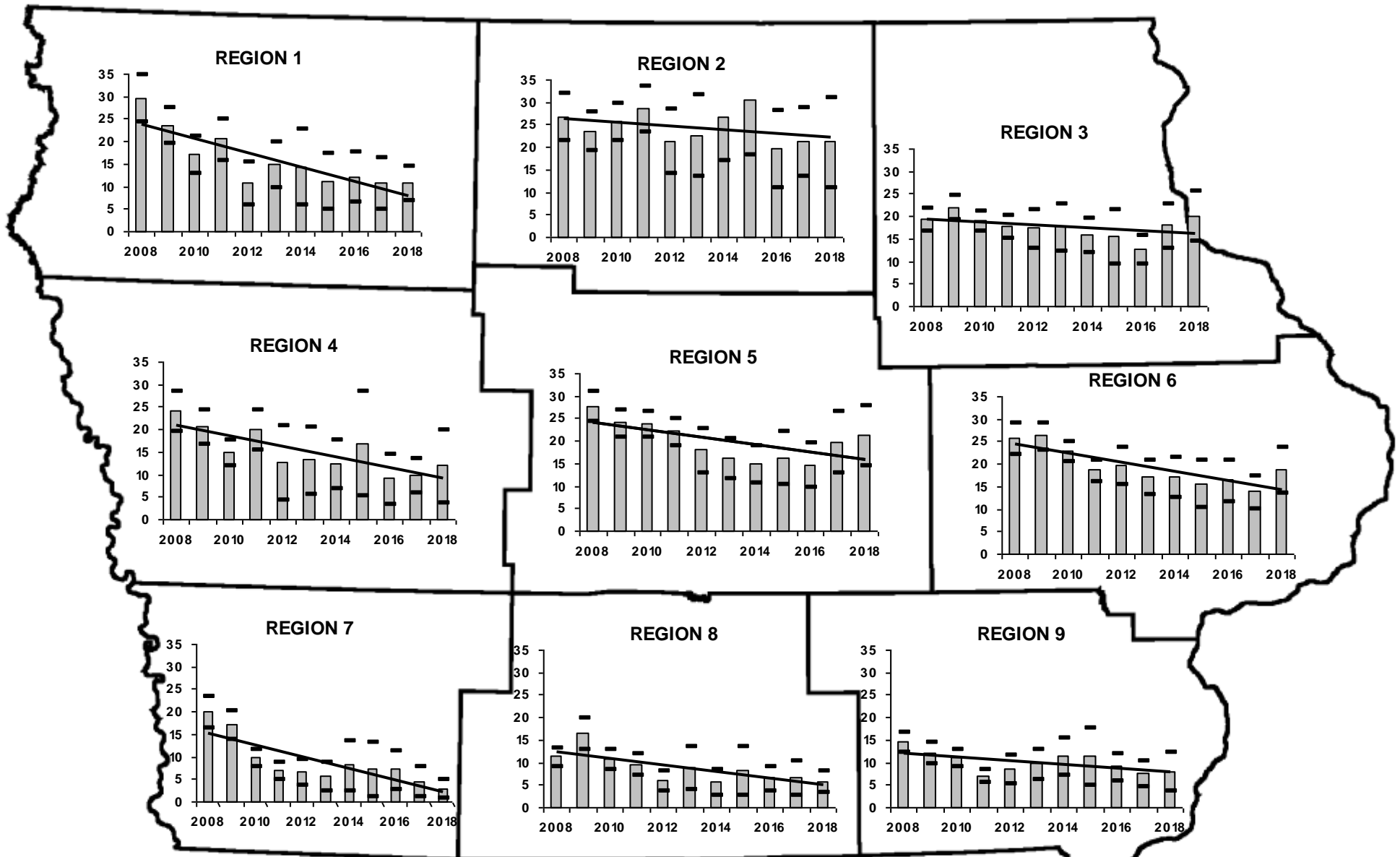


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# House Cat Observations Per 1,000 Hours Hunted

## Bow Hunter Observation Survey, Iowa Dept. of Natural Resources

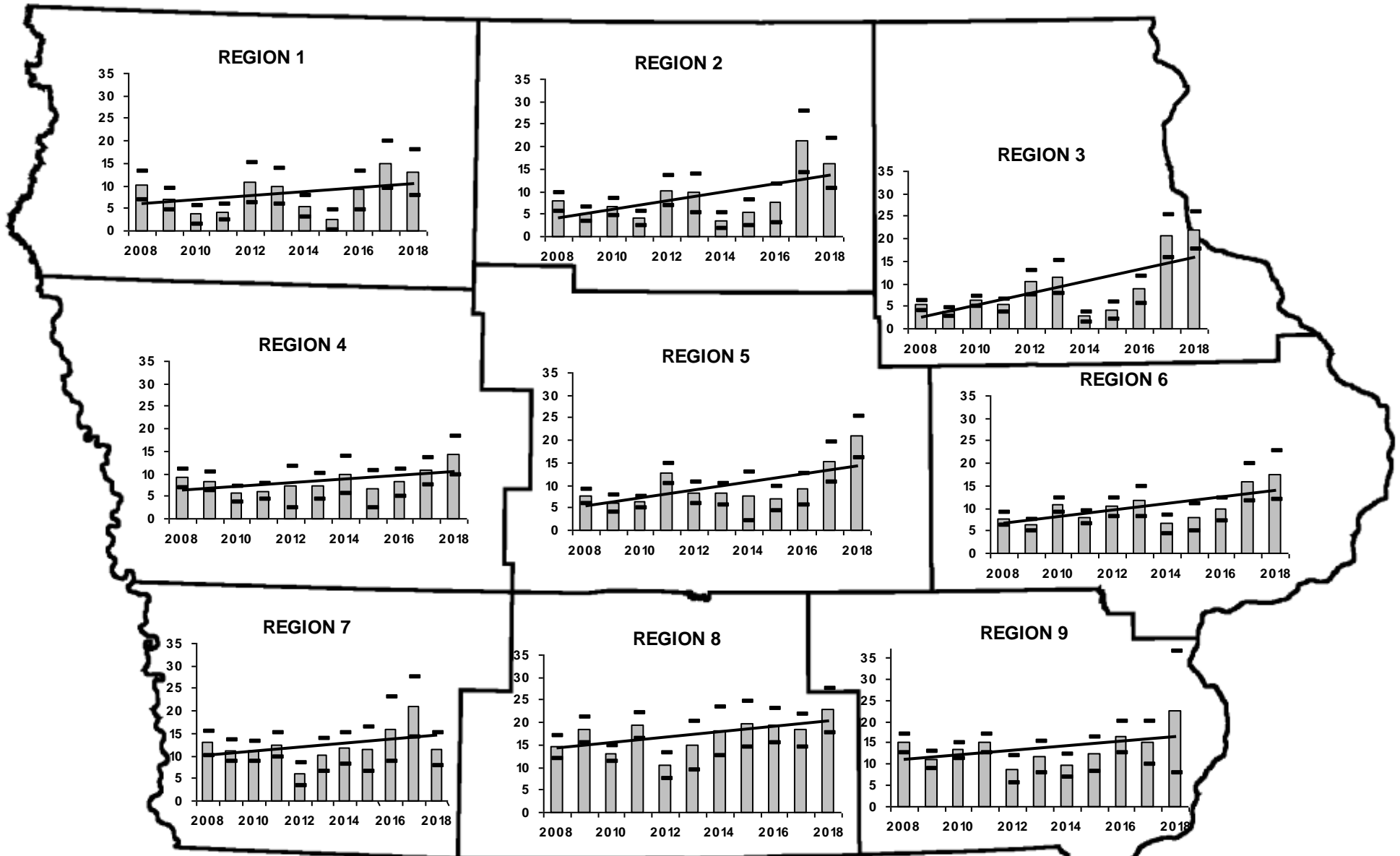


Many factors can influence the sightability of animals, such as population density, habitat characteristics, topography, land use, etc. As a result, differences between regions may NOT be attributed solely to population size/density.



# Opossum Observations Per 1,000 Hours Hunted

## Bow Hunter Observation Survey, Iowa Dept. of Natural Resources

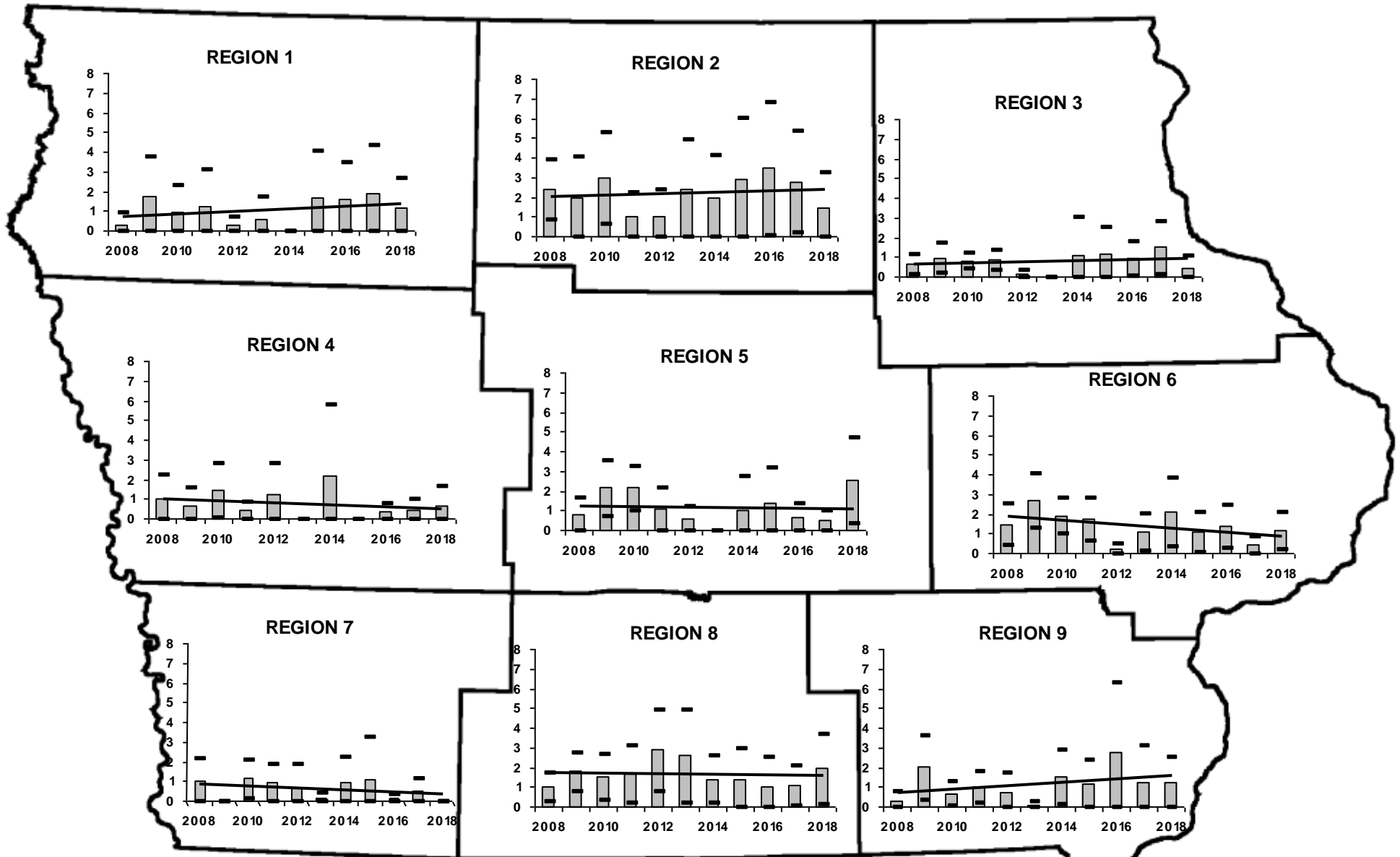


Many factors can influence the sightability of animals, such as population density, habitat characteristics, topography, land use, etc. As a result, differences between regions may NOT be attributed solely to population size/density.



# River Otter Observations Per 1,000 Hours Hunted

## Bow Hunter Observation Survey, Iowa Dept. of Natural Resources

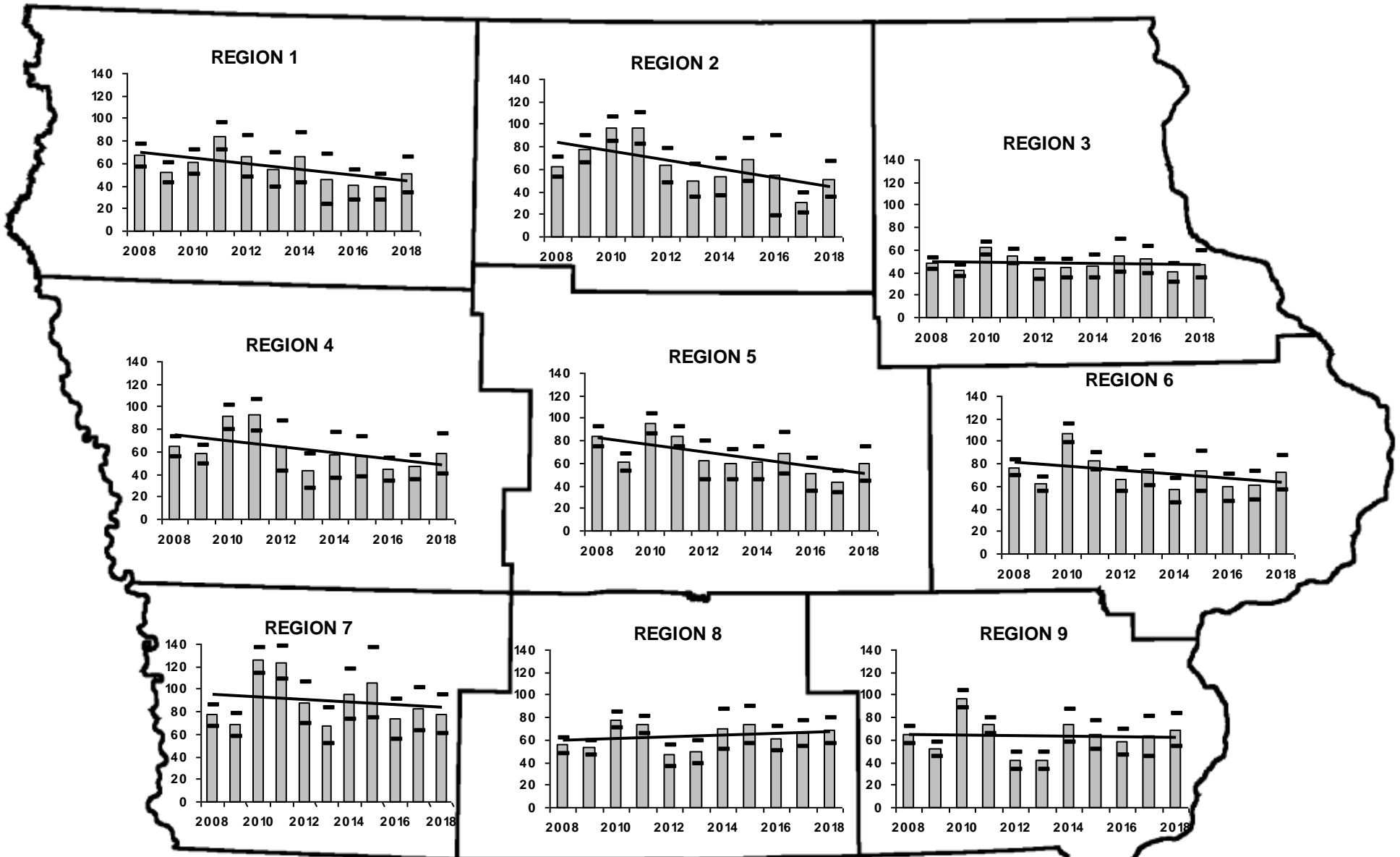


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# Raccoon Observations Per 1,000 Hours Hunted

## Bow Hunter Observation Survey, Iowa Dept. of Natural Resources

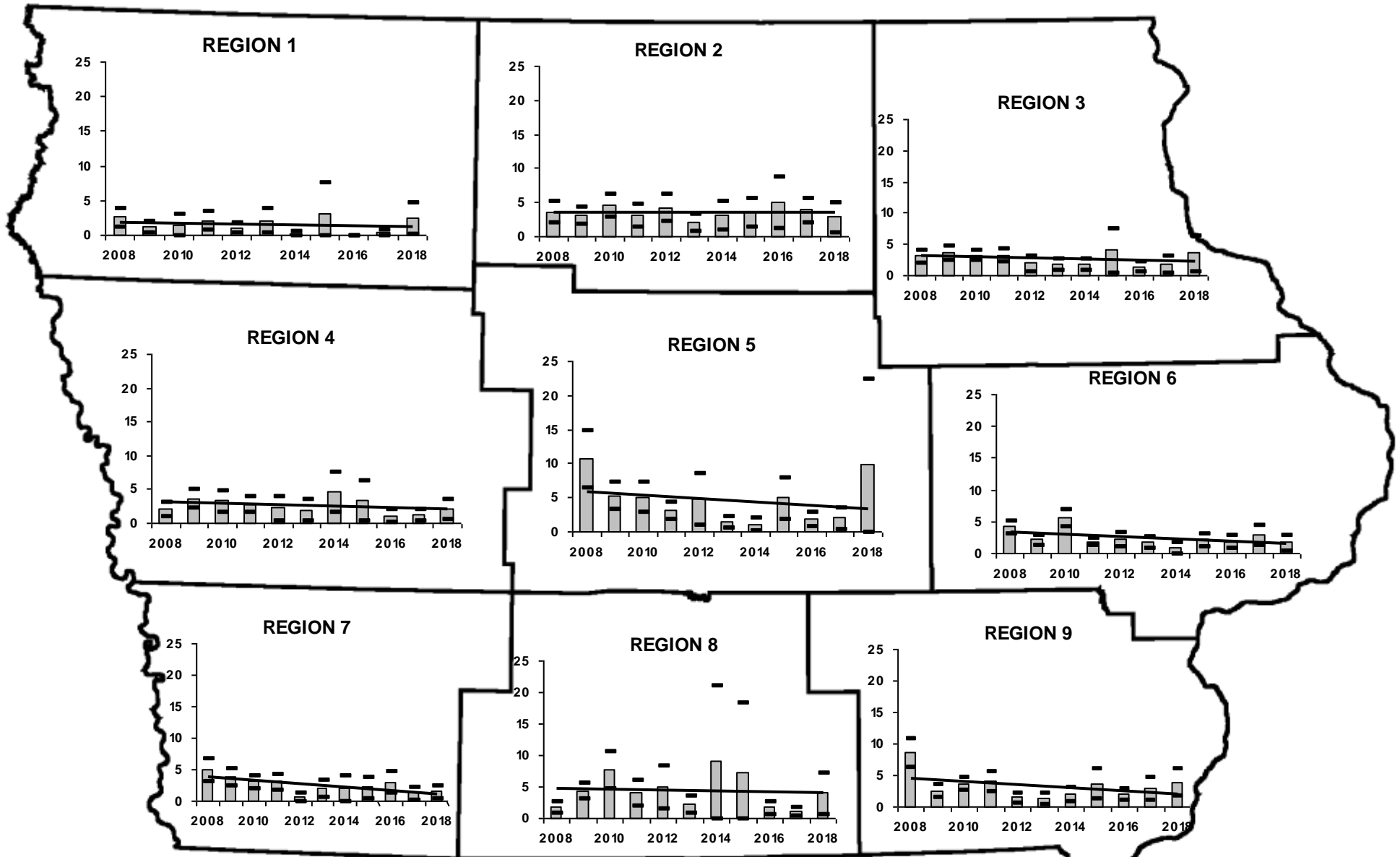


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# Red Fox Observations Per 1,000 Hours Hunted

## Bow Hunter Observation Survey, Iowa Dept. of Natural Resources

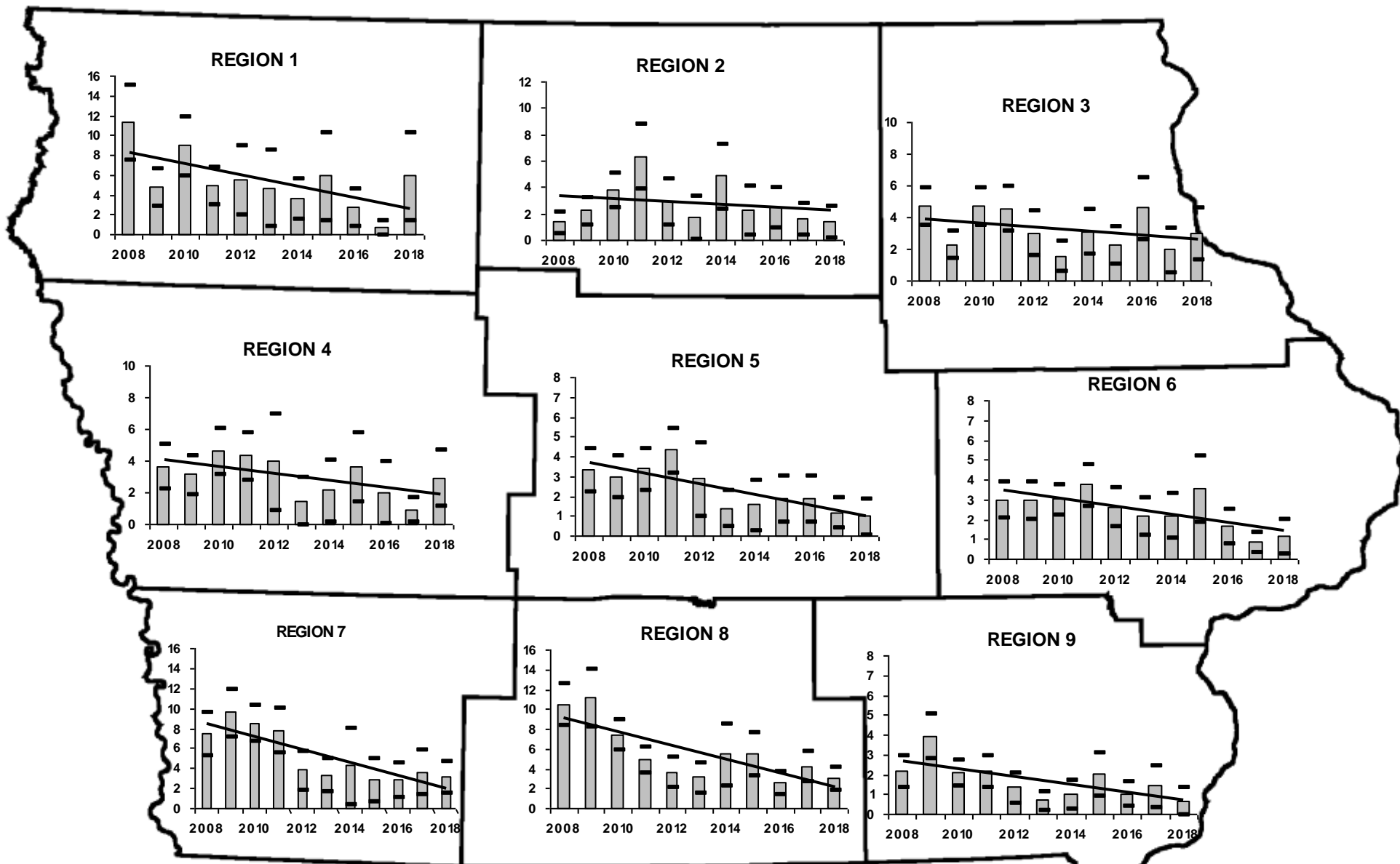


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# Striped Skunk Observations Per 1,000 Hours Hunted

## Bow Hunter Observation Survey, Iowa Dept. of Natural Resources



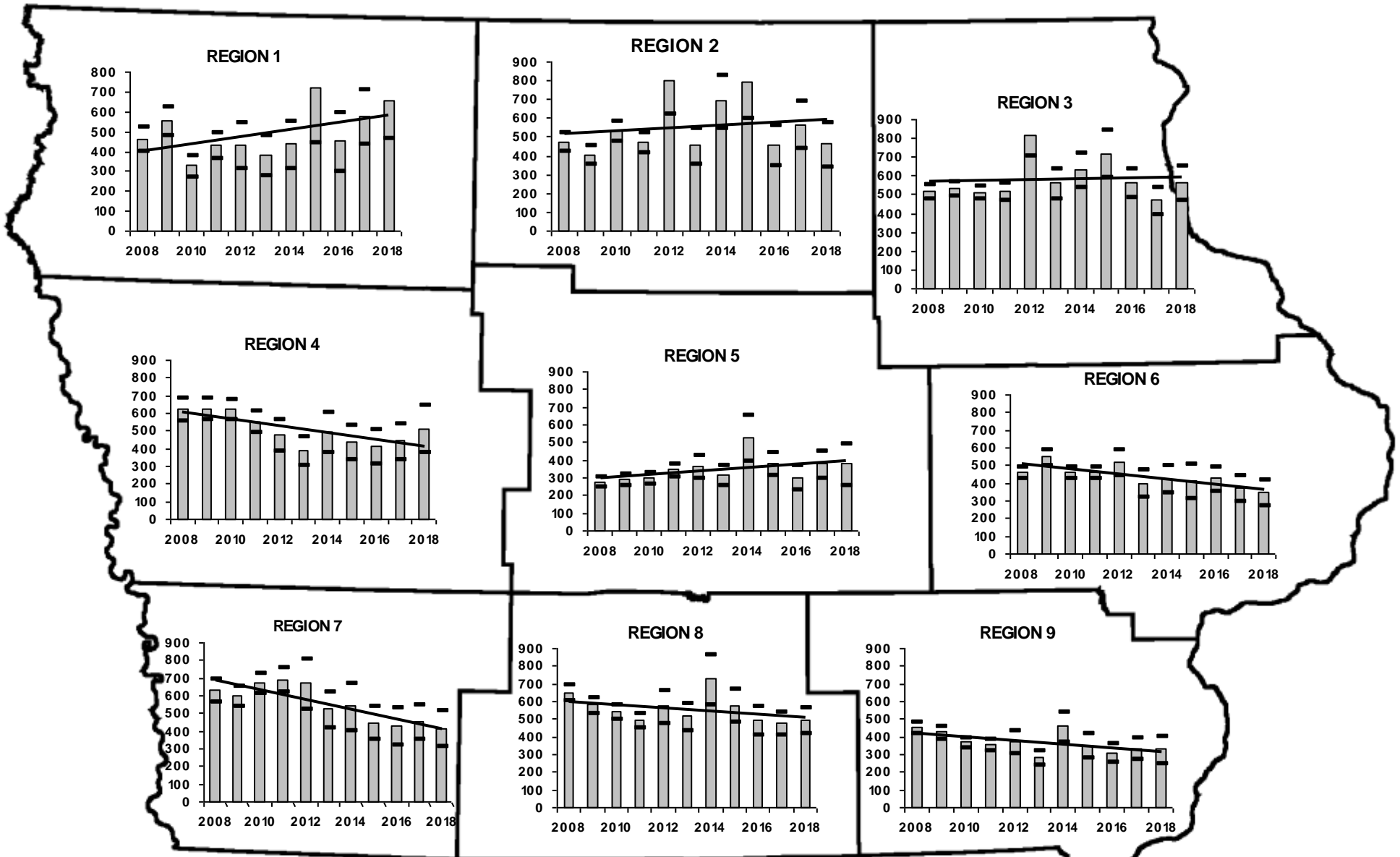
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# Wild Turkey Observations Per 1,000 Hours Hunted

## Bow Hunter Observation Survey, Iowa Dept. of Natural Resources



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