Iowa Bow Hunter Observation Survey: 2019 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 6 December. The primary objectives of this survey are to 1) collect observations of white-tailed deer which serve as an independent index of regional deer populations across the state, 2) supplement other deer data collected by the DNR, and 3) collect observations of other select species to monitor long-term 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. To standardize observations, the mean number of animals seen per 1,000 hours hunted (95% confidence interval) is estimated statewide and by survey region for 12 species. In 2019, we collected responses from 2,549 bow hunters (29% response rate) consisting of 25,681 hunting trips and 84,951 hours of total observation time (3.28 ± 0.028 hours/trip). With the exception of northwest Iowa, the total number of deer observations decreased between 2018 and 2019. However, the 10-year trend for total deer is increasing in all regions except southwest Iowa. Wild turkey observations increased in northwest, north-central, and central Iowa between 2018 and 2019 but decreased in all other regions. According to 10-year trends, bobcat and opossum observations continue to increase while striped skunk observations are decreasing statewide. Observations for badger, raccoon, and red fox are stable to slightly decreasing across the state, and coyote observations are increasing in all regions except northwest and southeast Iowa. 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 the 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 database of long-term 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 2019 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).
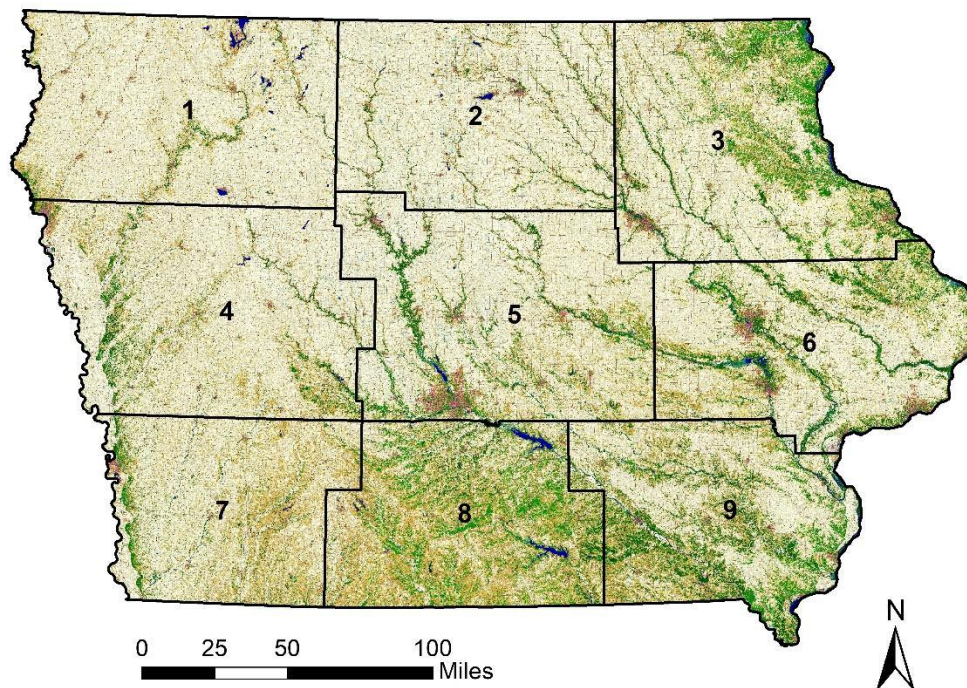

Figure 1. Survey regions in Iowa used for distributing the Iowa Bow Hunter Observation Survey, 2019.

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-

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survey sent to all avid Iowa bow hunters in 2019 (i.e., individuals who purchased an archery hunting license in Iowa for each of the past three years) 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 refreshed prior to the 2019 survey. 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 8,992, which is approximately 15% of the population of all archery hunters in recent years (N = ~60,000 individual hunters annually).
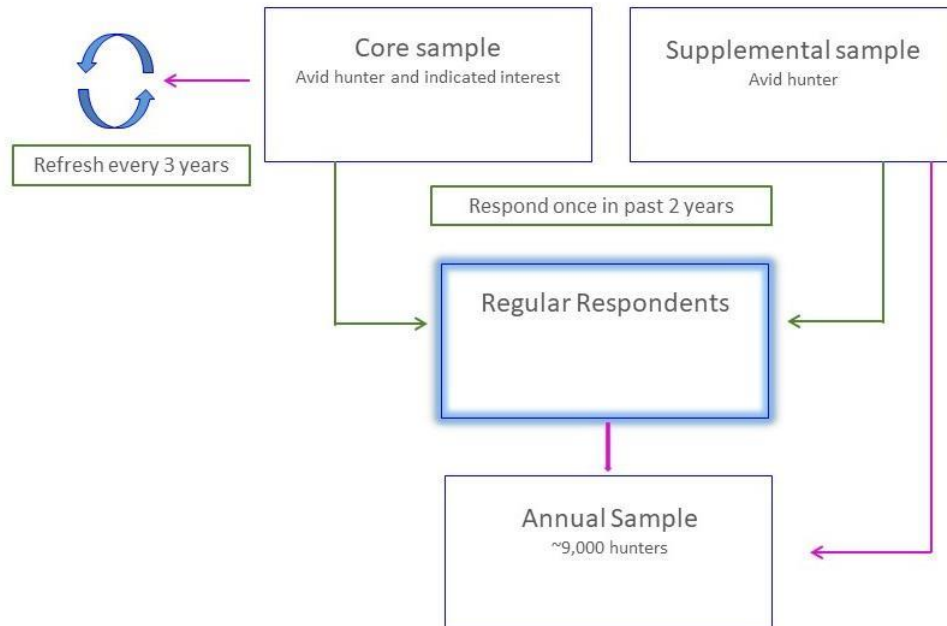
Figure 2. Sampling process schematic for Iowa Bow Hunter Observation Survey, 2019.

The survey consisted of a two-page diary in which hunters were asked to record the four counties in which 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 6 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.

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RESULTS

A total of 134 surveys were returned as undeliverable in 2019. Therefore, the realized sample size in 2019 was 8,858. We obtained responses from 2,549 bow hunters statewide for a response rate of 29%. Statewide, participants spent a total of 84,951 hours hunting on 25,681 trips for an average of 3.28 (95% CI = 3.12, 3.44) hours per trip. Participants reported a median of 12 trips during the 67-day hunting season. The number of trips and hours hunted varied by region and ranged from 1,696 trips (5,245 total hours) in northwest Iowa (Region 1) to 3,768 trips (13,380 total hours) in south-central Iowa (Region 8; Appendix).

White-tailed deer was the most frequently observed species on the survey with a total of 15,433 (95% CI = 13,644, 17,223) observed per 1,000 hours hunted statewide, which includes a statewide total of 4,514 (95% CI = 4,035, 4,992) antlered deer and 9,921 (95% CI = 8,598, 11,244) antlerless deer observed per 1,000 hours hunted. Total deer observed per 1,000 hours hunted ranged from a low of 1,487 (95% CI = 1,314, 1,661) in northeast Iowa (Region 3) to a high of 2,026 (95% CI = 1,747, 2,306) in northwest Iowa (Region 1). The 10-year trend for both antlered and total deer observations is increasing in all regions except southwest Iowa (decreasing; Region 7; Appendix), while the 10-year trend for antlerless deer is increasing in all regions except west-central (stable; Region 4) and southwest Iowa (decreasing; Region 7; Appendix). Despite increasing trends in most regions for both total deer and antlerless deer, observations for both dropped between 2018 and 2019 in all regions except northwest Iowa (Region 1; Appendix).

Wild turkey (*Meleagris gallopavo*) continue to be the second-most frequently observed species on the survey with a total of 3,675 birds (95% CI = 2,747, 4,603) observed per 1,000 hours hunted statewide. Wild turkey observations ranged from a low of 218 birds (95% CI = 173, 263) per 1,000 hours hunted in southeast Iowa (Region 9) to a high of 620 birds (95% CI = 389, 852) per 1,000 hours hunted in northwest Iowa (Region 1). Between 2018 and 2019, wild turkey observations decreased in six of nine regions and the 10-year trend shows long-term decreases in wild turkey observations in six of nine regions, mostly in southern and eastern Iowa (Appendix).

Bobcat (*Lynx rufus*) observations are increasing statewide according to the 10-year trend with the most pronounced increases occurring in northwest, central, and east-central Iowa (Regions 1, 5, 6, respectively; Appendix). Statewide, a total of 44 bobcats (95% CI = 25, 63) were observed per 1,000 hours hunted in 2019, an increase of nearly 50% since the survey was initiated in 2004. Observations of badger (*Taxidea taxus*) are mostly stable statewide according to the 10-year trend with the exception of a sharply declining trend in southwest Iowa (Region 7; Appendix). River otter (*Lontra canadensis*) observations increased drastically between 2018 and 2019 across the northern third of the state (Regions 1-3; Appendix). The 10-year trend across all regions shows a mostly statewide decline in observations of raccoon (*Procyon lotor*), red fox (*Vulpes vulpes*), and striped skunk (*Mephitis mephitis*), whereas trends in observations of both coyote (*Canis latrans*) and opossum (*Didelphis virgiana*) are stable to slightly increasing statewide.

DISCUSSION

Our survey response rate of 29% in 2019 was approximately 5% higher than last year, likely due to refreshing the core sample, and is the highest realized response rate for the survey in the last 10 years. Not surprisingly, both the total number of trips and total hours hunted statewide increased from 20,907 to 25,681 and 67,202 to 84,951, respectively, from 2018 to 2019. Additionally, the average hours per trip increased slightly from 3.18 (95% CI = 3.02, 3.36) in 2018 to 3.28 (95% CI = 3.12, 3.45) in 2019. While the increase in total number of trips and total hours hunted could be an artifact of the increased response rate realized in 2019, one can't ignore the fact that hunting conditions were improved this year compared to last year. The fall of 2018 was the third wettest on record in Iowa with statewide precipitation averaging 6.48 inches above normal (Glisan 2018). This not only reduced the total

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number of favorable days for hunters during the 63-day hunting season but also resulted in delayed crop harvest and considerable flooding of bottomland hardwood forests statewide which likely impacted deer behavior and hunters' ability to effectively pattern deer. In 2019, precipitation averaged 4.41 inches above normal making it the seventh wettest on record in Iowa and again resulting in delayed crop harvest across much of the state (Glisan 2019). Despite the potentially unfavorable weather throughout much of the hunting season in 2019, reported harvest for the 2019 archery season increased by 5% compared to last year, which was the lowest reported harvest for the archery season since 2013.

Total white-tailed deer observations decreased in all regions except northwest Iowa (Region 1; Appendix) between 2018 and 2019 with the most significant decreases observed in northeast and south-central Iowa (Regions 3 and 8, respectively; Appendix). A significant outbreak of Epizootic Hemorrhagic Disease (EHD) was documented throughout much of the state in the late summer and early fall of 2019 with EHD-suspected mortality in deer reported in 60 counties, mostly in the southern and eastern two-thirds of the state. Of the 1,927 total reported deer mortalities, approximately 78% came from south-central Iowa (Region 8; Appendix). This outbreak, which is the second-largest outbreak of EHD recorded in Iowa, was likely the reason for the decreased number of deer observations reported by bow hunters across much of the state. The decrease in deer observations coincided with a 13% decrease in total deer harvest statewide between the 2018–2019 and 2019–2020 hunting seasons, therefore suggesting that EHD negatively impacted the fall deer population this year. However, the 10-year trend shows total deer observations are increasing mostly statewide despite the observed decrease in 2019, which suggests the population should recover quickly.

Trends in wild turkey observations 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 low poult production (Isabelle 2017). Low poult production has also been cited as a reason for earlier turkey population declines in Wisconsin, and researchers there suggested an annual fecundity rate of 2.6 poults per hen was needed to stabilize a declining population in the southwestern part of the state (Rolley et al. 1998). In Iowa, fecundity has ranged from an average of 1.7 poults per hen in southwest Iowa to 2.3 poults per hen in northwest, northeast, and east-central Iowa the past five years (Iowa DNR, unpublished data). In 2019, fecundity dropped to a low of 0.8 poults per hen in southeast Iowa and 0.9 poults per hen in east-central Iowa (Iowa DNR, unpublished data). This suggests, therefore, that declining fecundity across much of the state could be a driving factor of the declining turkey observations. However, 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 continue to increase statewide according to 10-year trends in each region (Appendix). 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 intentionally been kept conservative to allow for continued growth and expansion of the population which has occurred in a south to north direction in Iowa. The first modern-day bobcat harvest season began in 2007 in the southern two tiers of counties in Iowa during which a conservative harvest quota was implemented to allow for continued growth and expansion of the population. As the bobcat population expanded northward, additional counties were added to the bobcat harvest zone to include the southernmost four tiers of counties as well as counties adjacent to the Missouri River in western Iowa. Bobcat harvest has increased annually since the implementation of the harvest season in 2007 and survey data continues to show growth and expansion of the bobcat population in Iowa.

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River otter observations nearly doubled statewide between 2018 and 2019, with the most significant increases occurring in the northern three regions of the state. This, combined with increased reports of river otters made to DNR staff in the southern half of the state, suggests the population is still increasing throughout the state, particularly within the Mississippi River watershed of Iowa, following reintroduction to the state in 1985. Farm pond nuisance complaints related to otters has increased over the past two years across eastern and southern Iowa. Other Midwest states are also experiencing significant increases in river otters following reintroduction including Illinois (Bluett et al. 2004), Missouri (Mowry et al. 2014), and Ohio (Ellington et al. 2018). Although this survey wasn't originally designed to detect river otters, it remains as one of the only indices (in addition to annual harvest data) available for monitoring population trends of this species statewide.

Raccoon observations increased by 29% statewide between 2018 and 2019 despite the 10-year trends showing declines in all regions except south central Iowa. Observations of raccoons on the annual spring spotlight survey also increased between 2018 and 2019, 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. 2019). Although striped skunk observations increased slightly between 2018 and 2019, 10-year trends for this species continue to indicate a statewide decline. In contrast, striped skunk observations have increased in recent years on the spotlight survey, although observations on that survey fluctuate among years (Kaminski et al. 2019). Opossum observations decreased by 13% from 2018 to 2019, a pattern also observed on the spotlight survey that could be the result of harsh winter conditions in 2019 decreasing annual survival of this species (Kaminski et al. 2019).

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

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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, 2019.

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Antlered Deer Observations Per 1,000 Hours Hunted

Bow Hunter Observation Survey, Iowa Dept. of Natural Resources
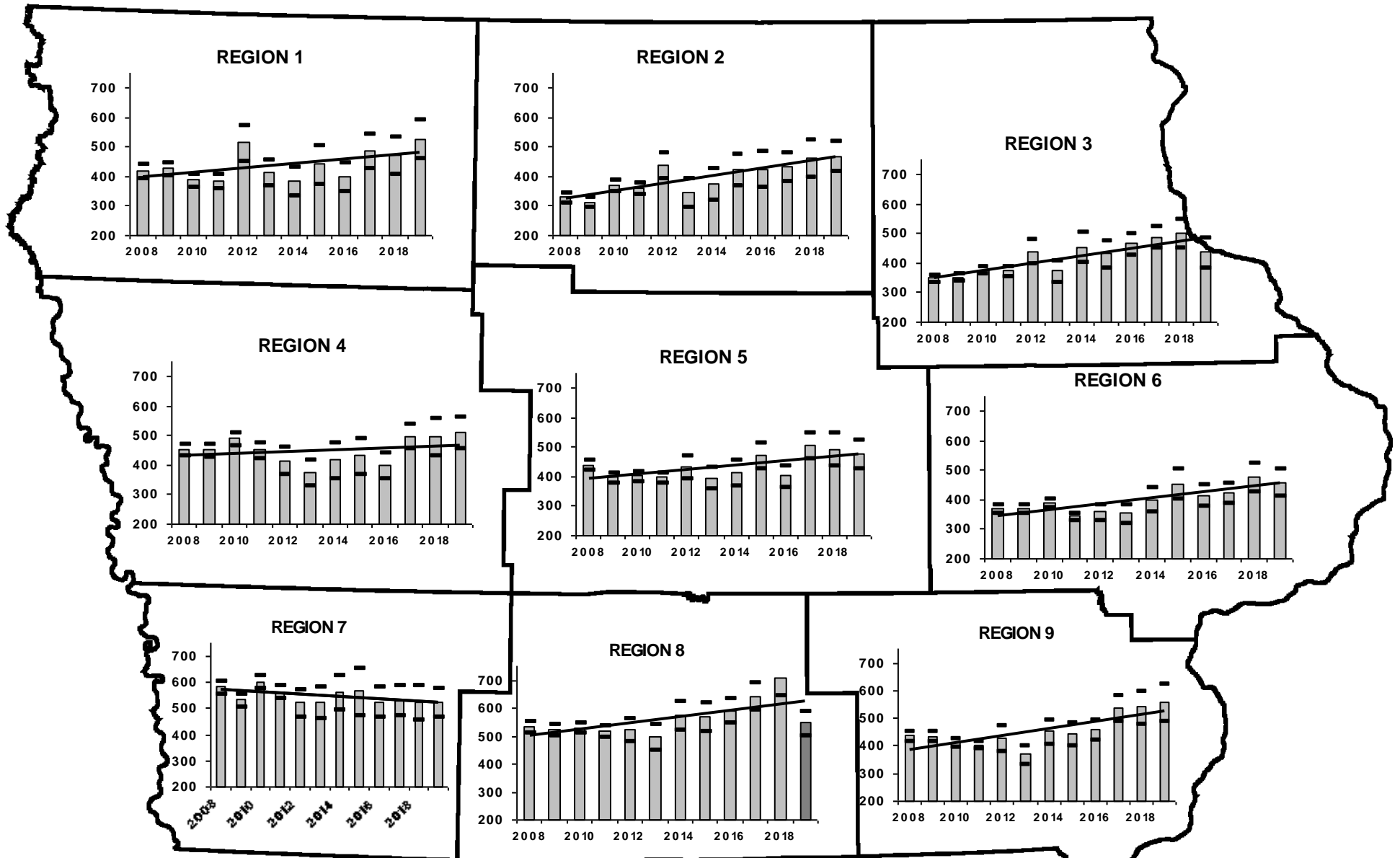
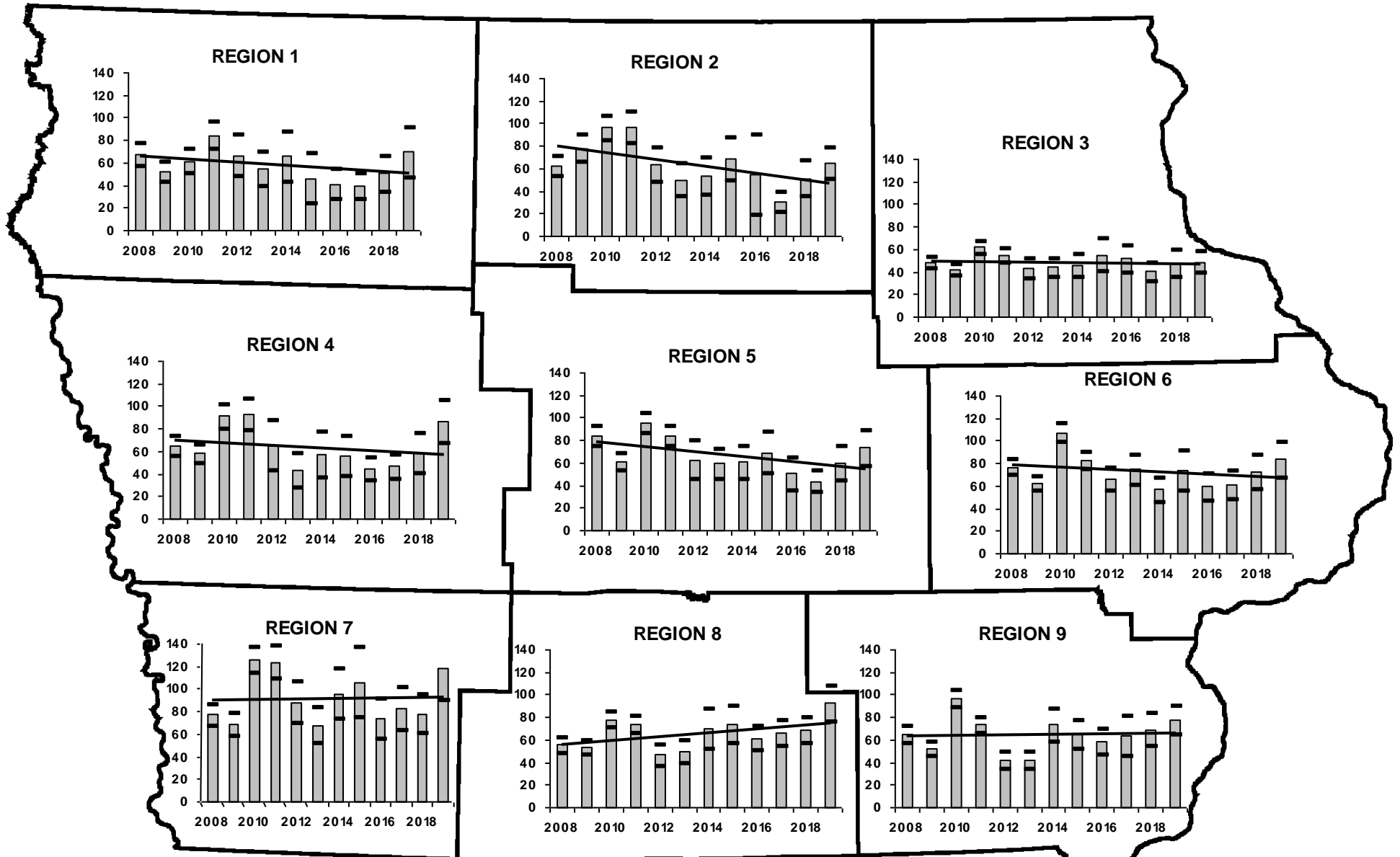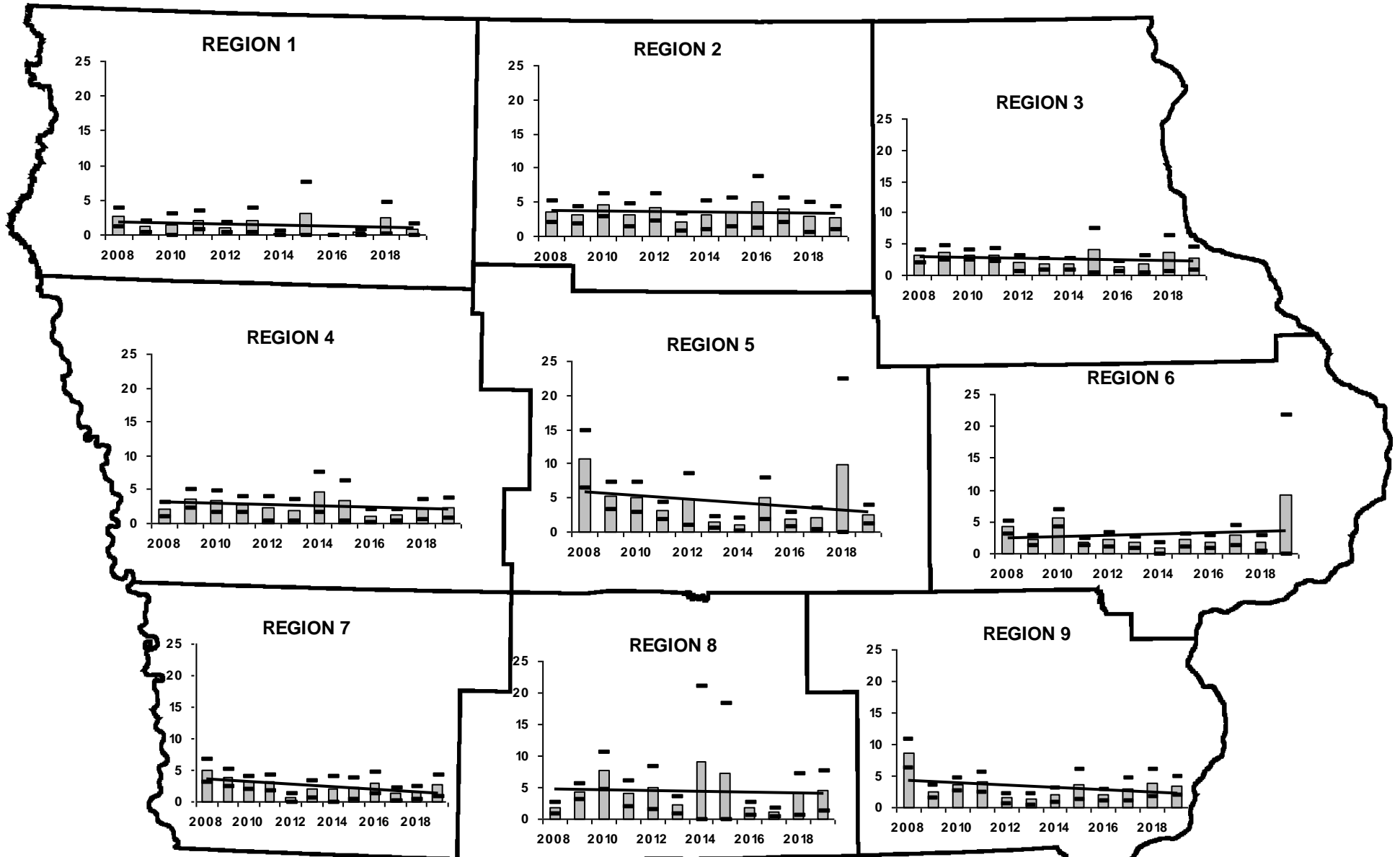*Many factors can influence the sightability of animals, such as population density, habitat characteristics, topography, land use, etc. As a result, differences between regions may NOT be attributed solely to population size/density.*

Antlerless Deer Observations Per 1,000 Hours Hunted

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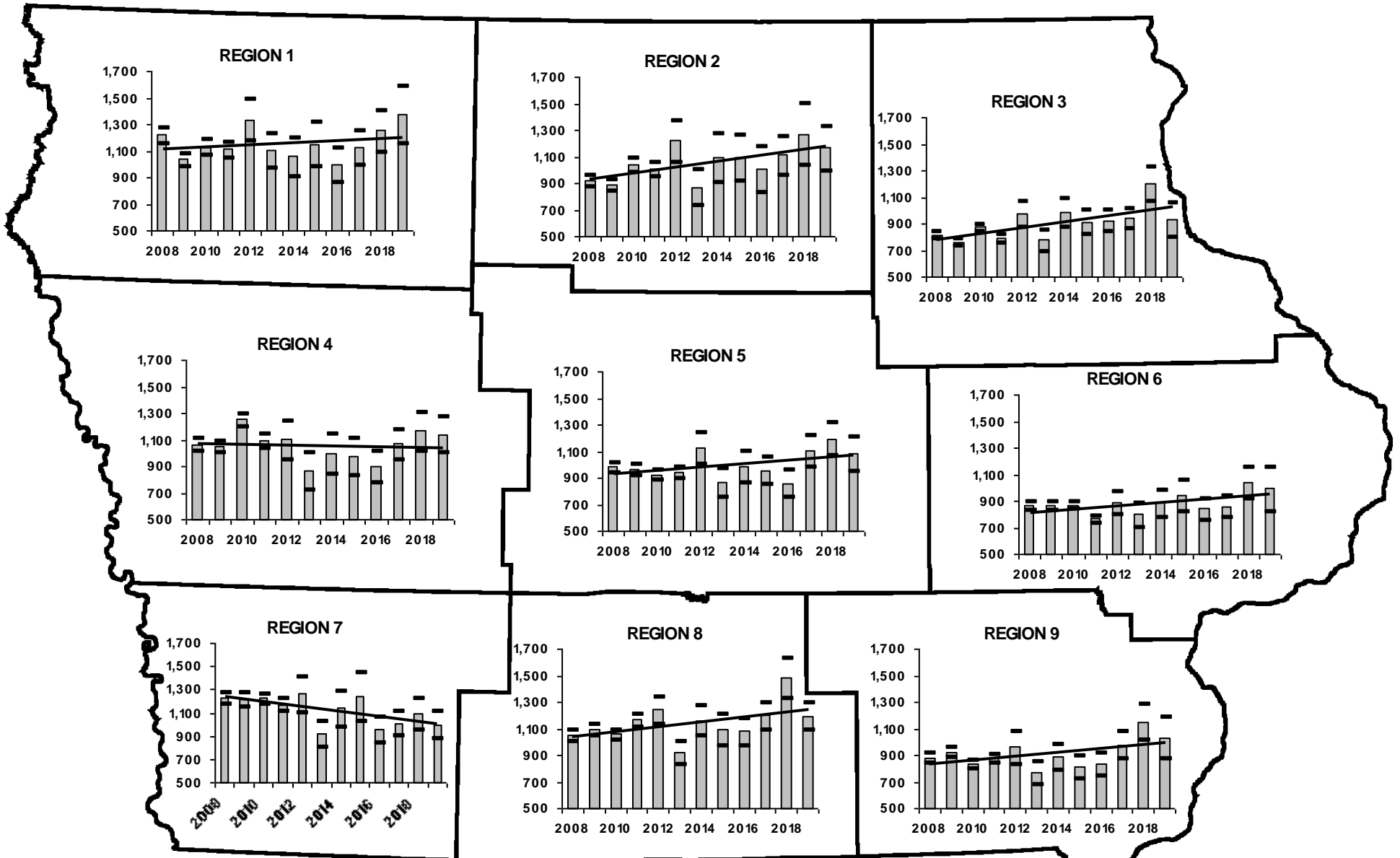
Many factors can influence the sightability of animals, such as population density, habitat characteristics, topography, land use, etc. As a result, differences between regions may NOT be attributed solely to population size/density.

Total Deer Observations Per 1,000 Hours Hunted
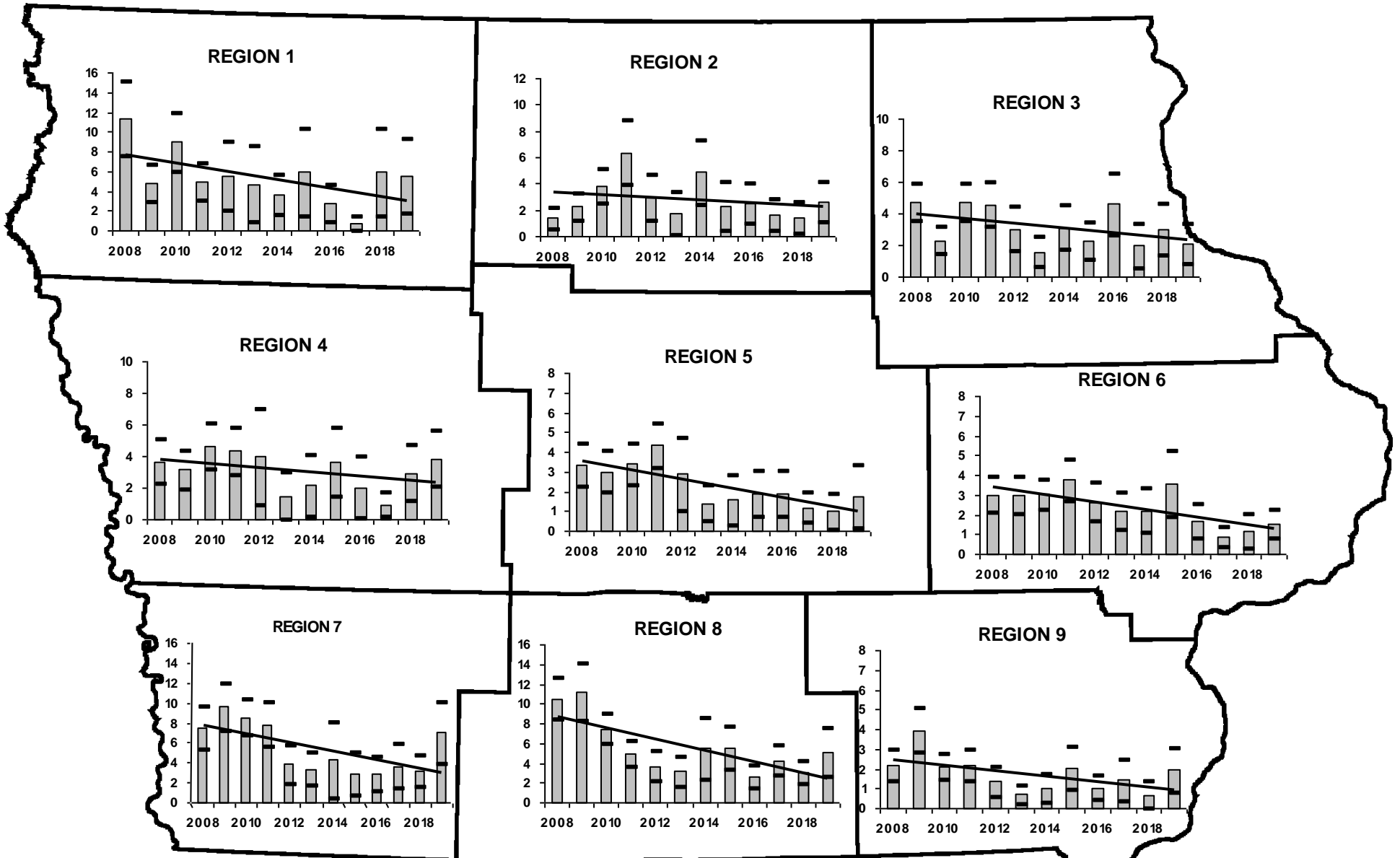## Bow Hunter Observation Survey, Iowa Dept. of Natural Resources
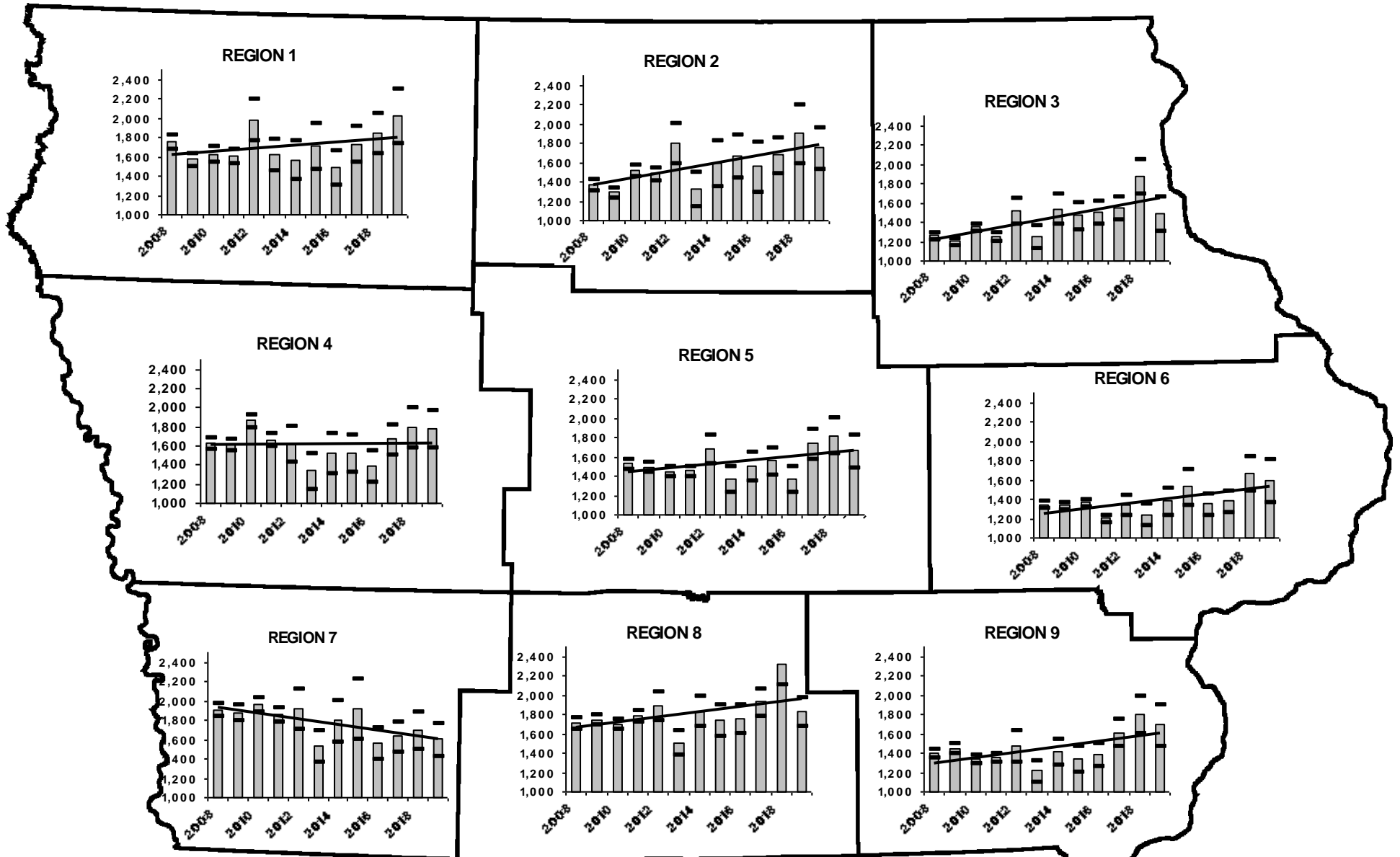
Many factors can influence the sightability of animals, such as population density, habitat characteristics, topography, land use, etc. As a result, differences between regions may NOT be attributed solely to population size/density.

Unknown Deer Observations Per 1,000 Hours Hunted

Bow Hunter Observation Survey, Iowa Dept. of Natural Resources

REGION 1

REGION 2

REGION 3

REGION 4

REGION 5

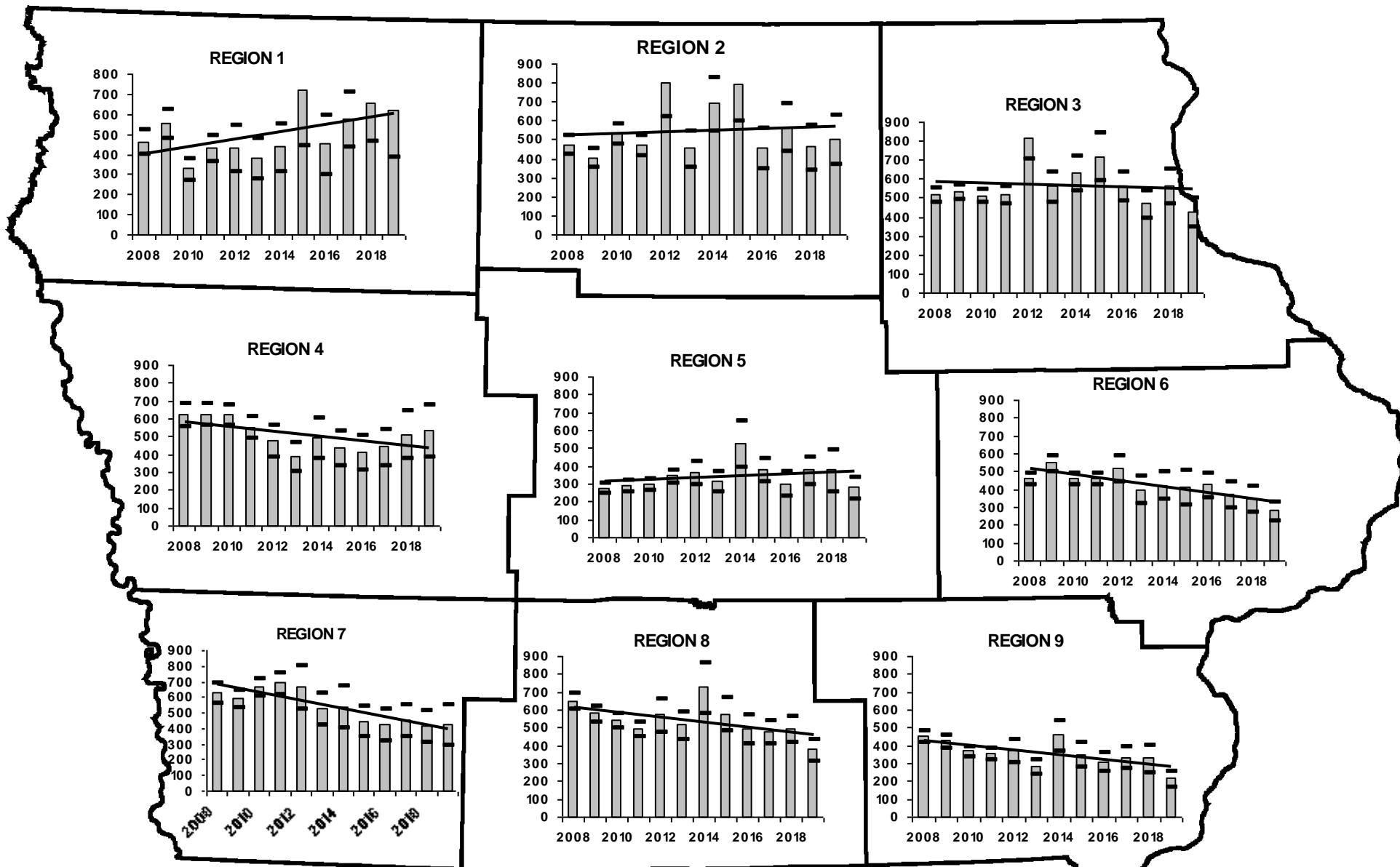REGION 6

REGION 7

REGION 8

REGION 9

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.

DNR
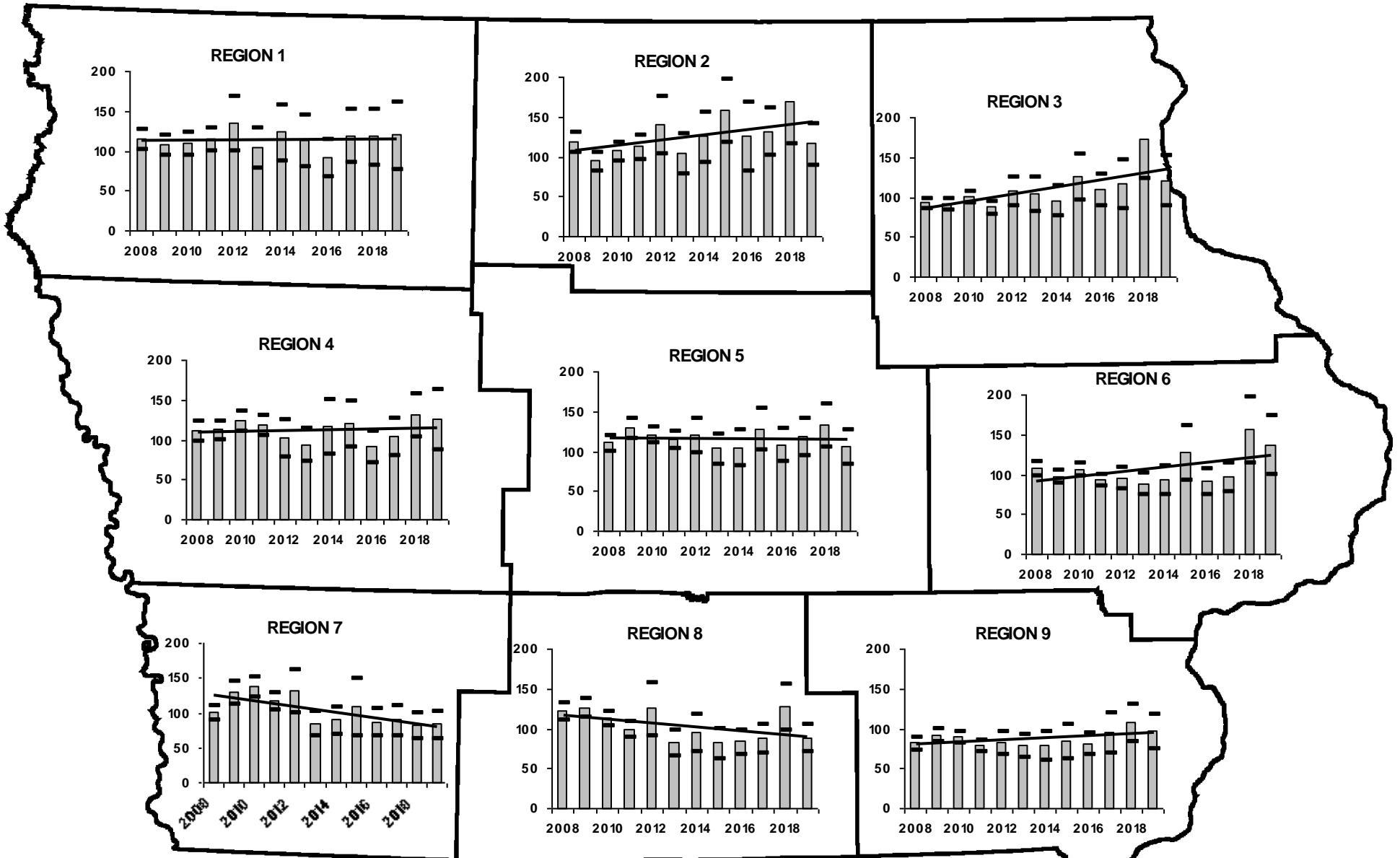
Badger Observations Per 1,000 Hours Hunted
Bow Hunter Observation Survey, Iowa Dept. of Natural Resources


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.

Bobcat Observations Per 1,000 Hours Hunted
Bow Hunter Observation Survey, Iowa Dept. of Natural Resources
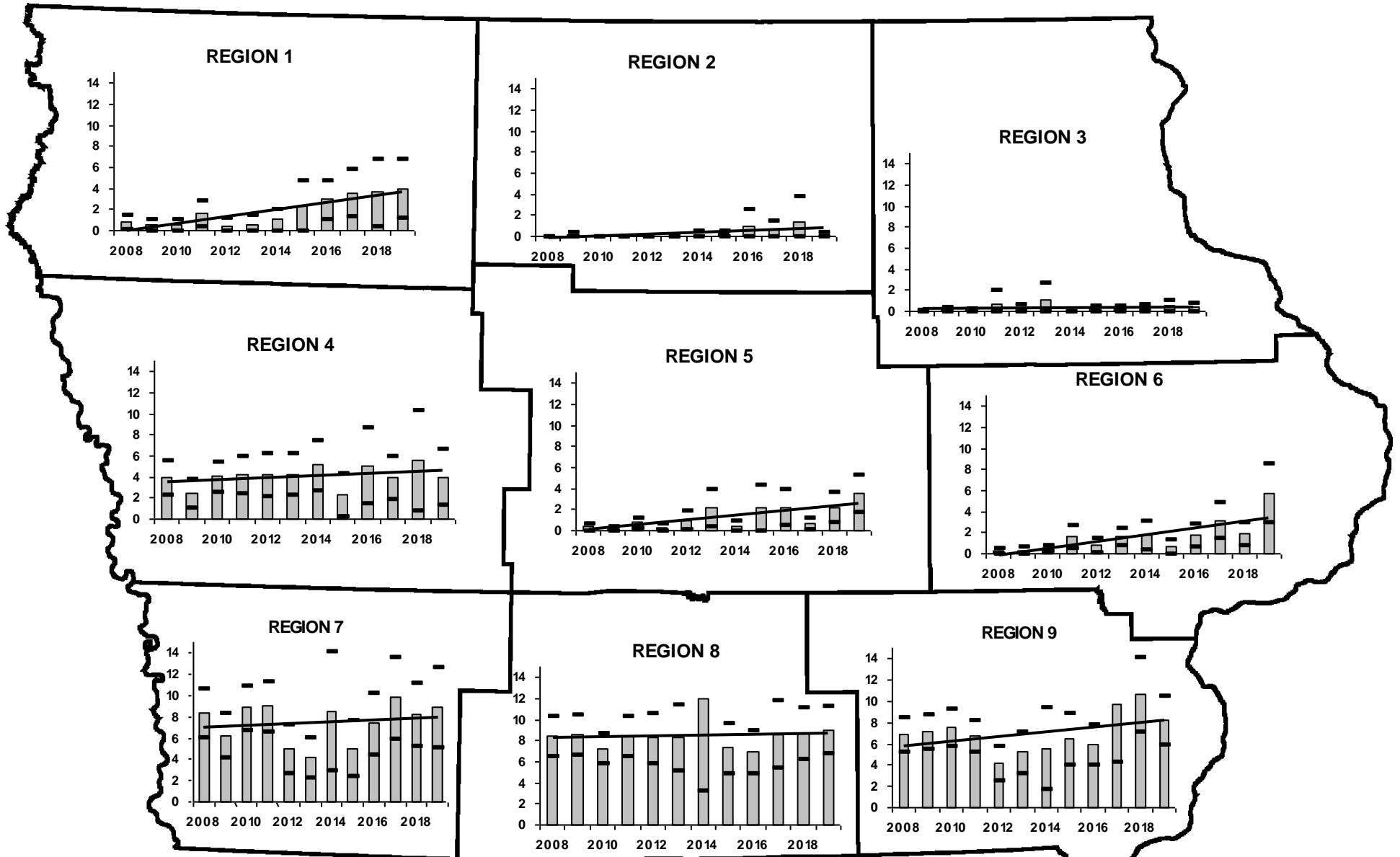
Many factors can influence the sightability of animals, such as population density, habitat characteristics, topography, land use, etc. As a result, differences between regions may NOT be attributed solely to population size/density.

Coyote Observations Per 1,000 Hours Hunted
Bow Hunter Observation Survey, Iowa Dept. of Natural Resources
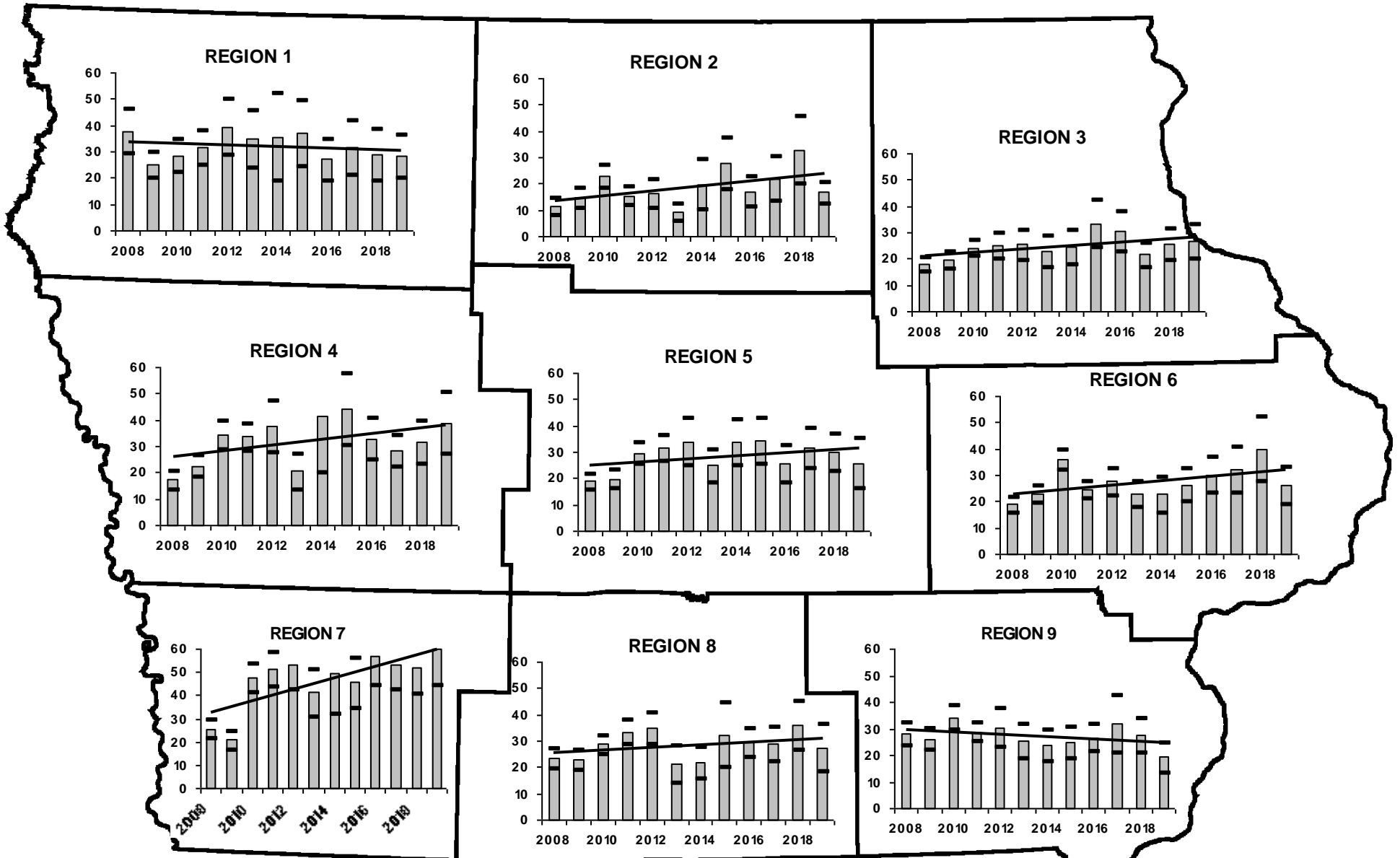
Many factors can influence the sightability of animals, such as population density, habitat characteristics, topography, land use, etc. As a result, differences between regions may NOT be attributed solely to population size/density.

Gray Fox Observations Per 1,000 Hours Hunted
Bow Hunter Observation Survey, Iowa Dept. of Natural Resources
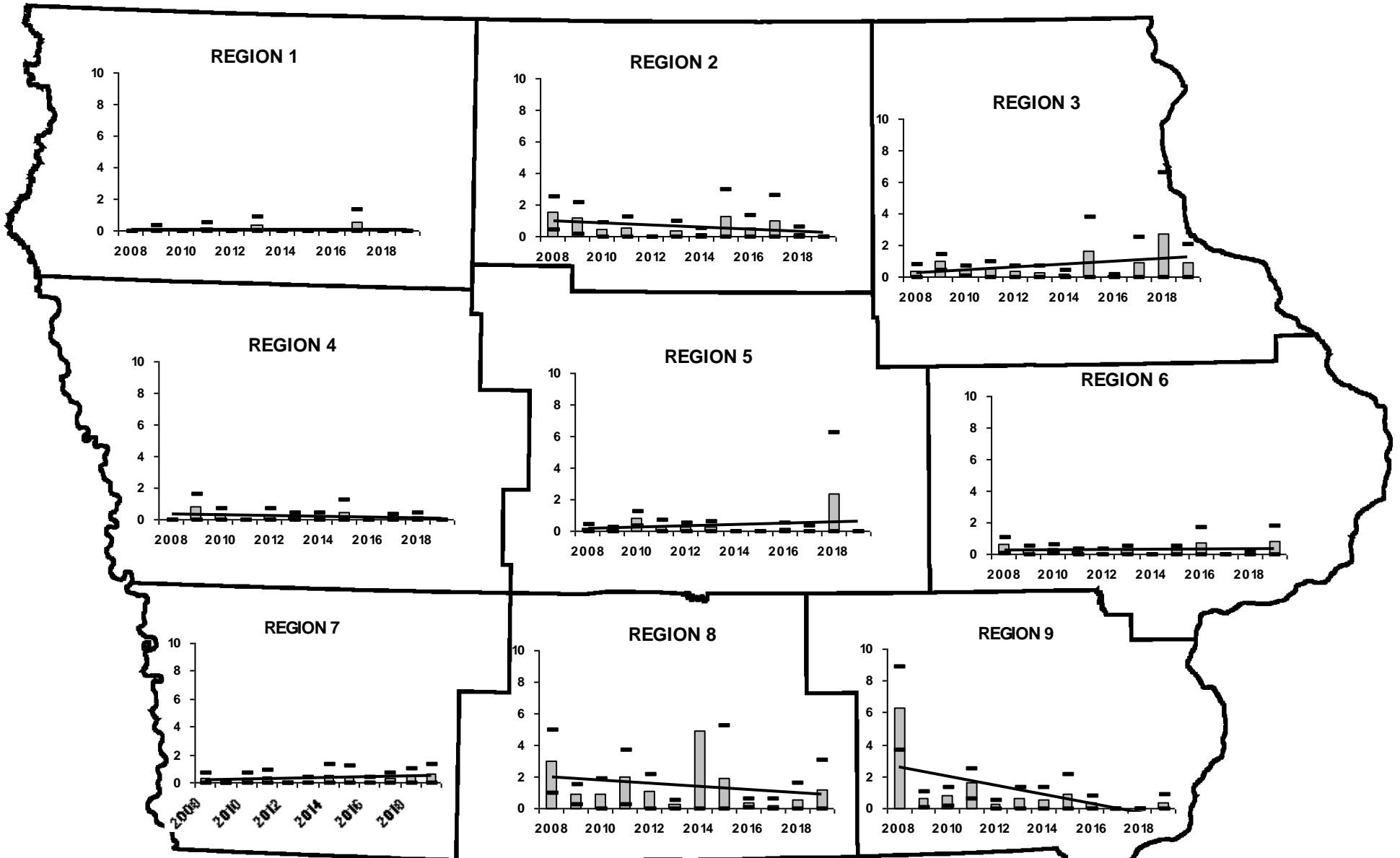
Many factors can influence the sightability of animals, such as population density, habitat characteristics, topography, land use, etc. As a result, differences between regions may NOT be attributed solely to population size/density.

House Cat Observations Per 1,000 Hours Hunted
Bow Hunter Observation Survey, Iowa Dept. of Natural Resources

REGION 1

REGION 2

REGION 3

REGION 4

REGION 5

REGION 6

REGION 7

REGION 8

REGION 9

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.

DNR
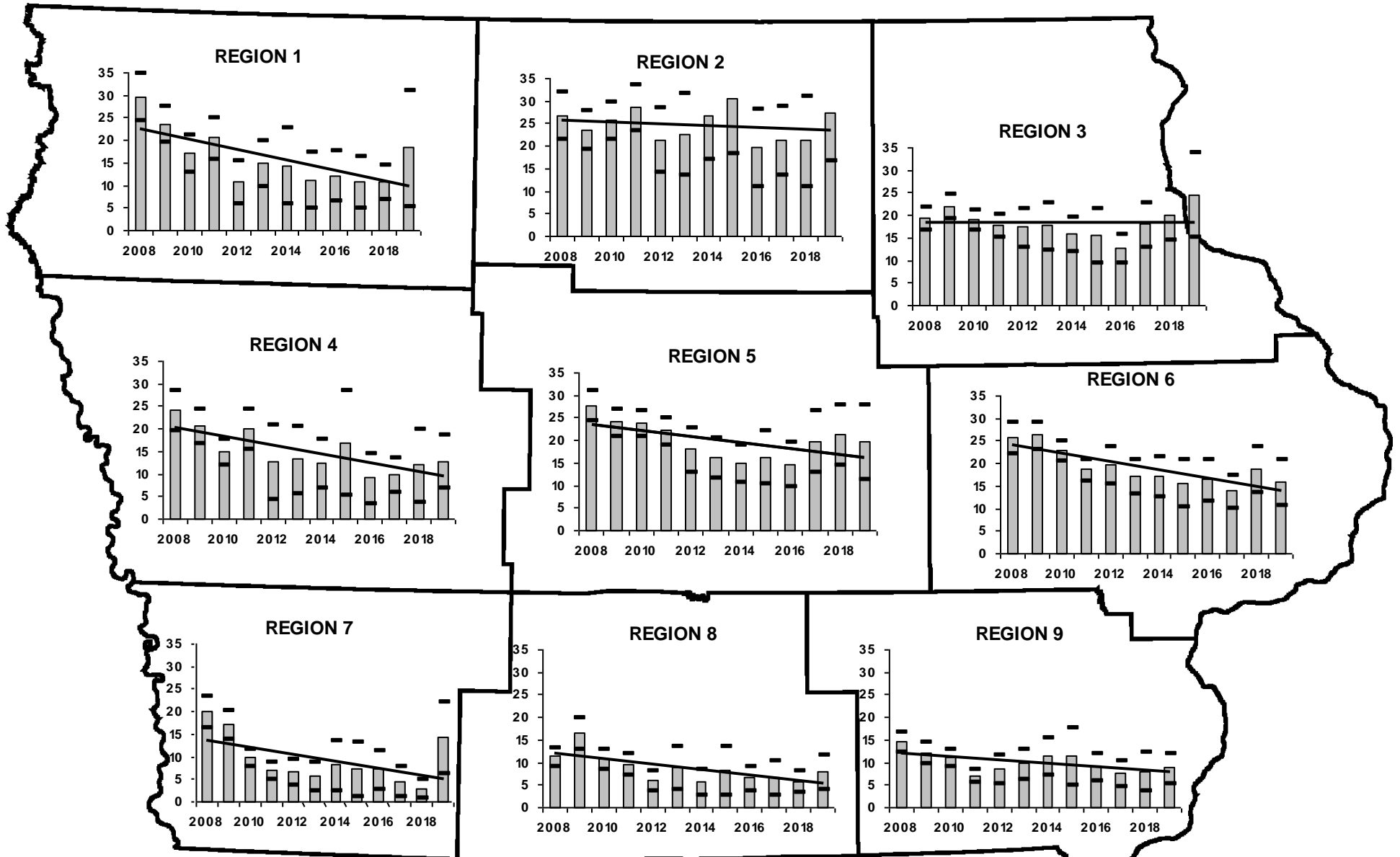
Opossum Observations Per 1,000 Hours Hunted
Bow Hunter Observation Survey, Iowa Dept. of Natural Resources

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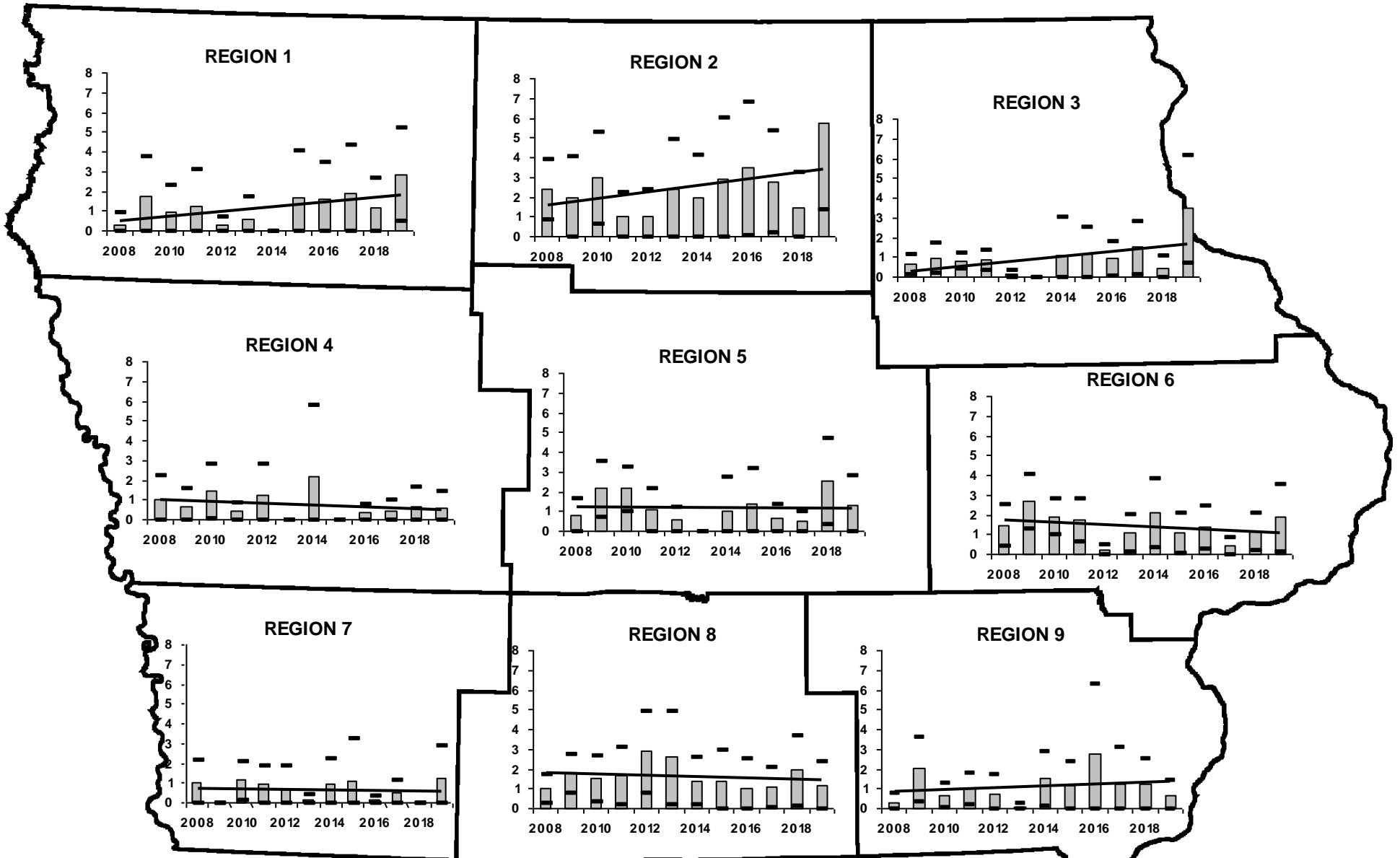
Many factors can influence the sightability of animals, such as population density, habitat characteristics, topography, land use, etc. As a result, differences between regions may NOT be attributed solely to population size/density.

Raccoon 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.

Red Fox 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.

DNR

Striped Skunk 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.

Wild Turkey 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.

DNR

Hours Hunted by Survey Participants
Bow Hunter Observation Survey, Iowa Dept. of Natural Resources
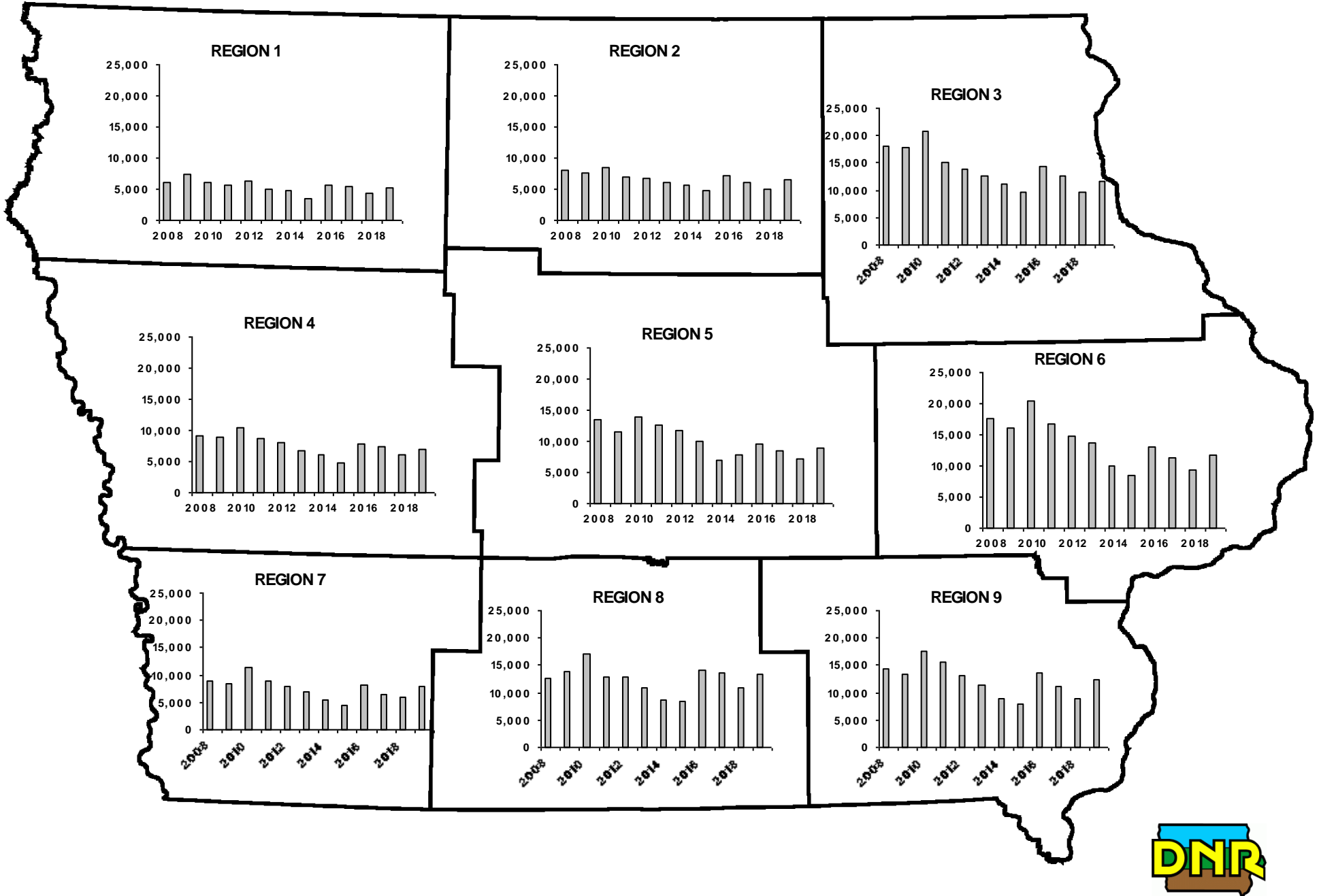
Average Hours Hunted/Bowhunting Trip
Bow Hunter Observation Survey, Iowa Dept. of Natural Resources
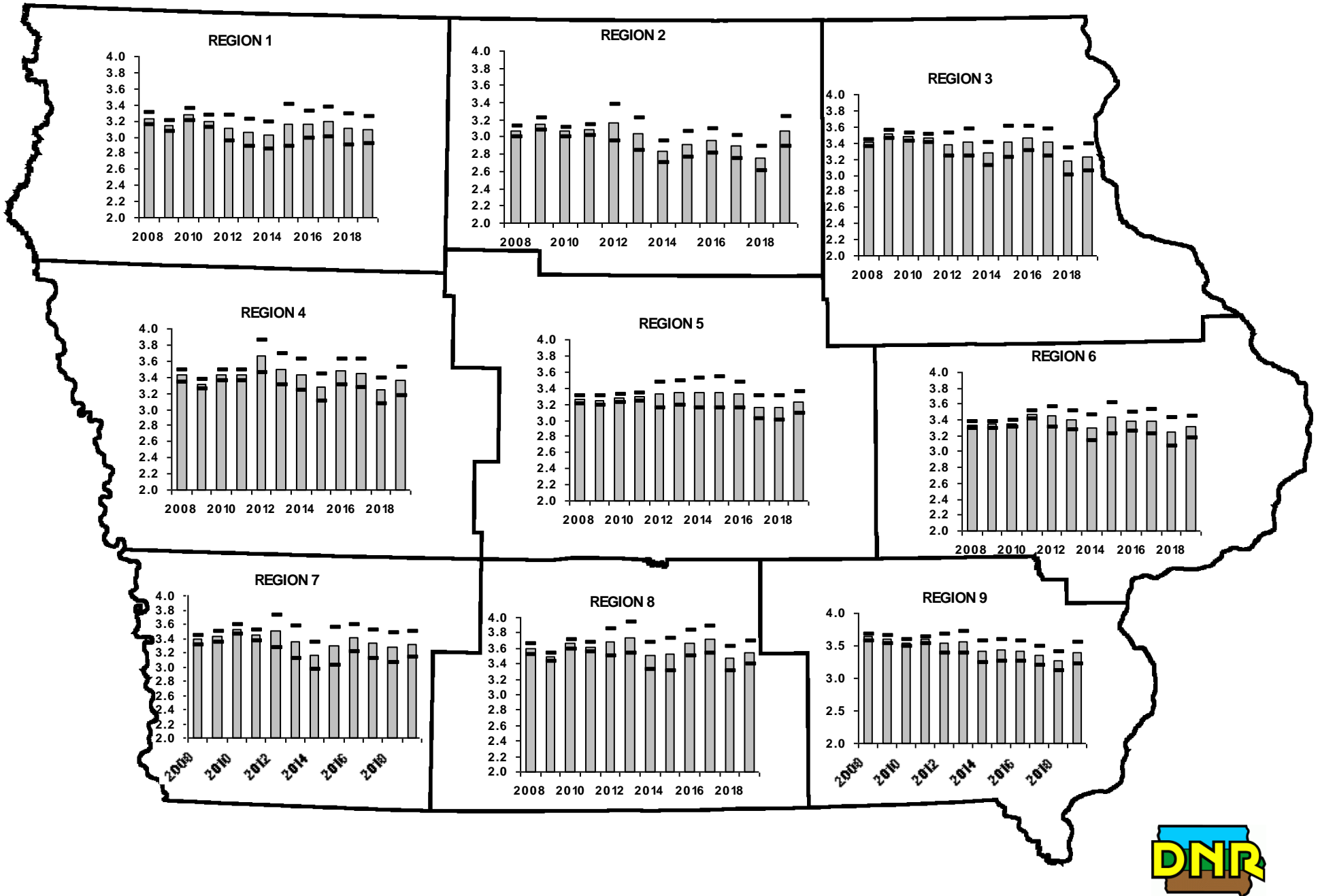
Bowhunting Trips by Survey Participants
Bow Hunter Observation Survey, Iowa Dept. of Natural Resources

BOWHUNTER OBERVATION RECORD 2019
IOWA DEPARTMENT OF NATURAL RESOURCES

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Thank you for participating in the 2019 Bowhunter Observation Survey. Please return this original form (no photocopies) when you have finished bowhunting or by December 6, 2019, whichever comes first. When finished, fold the form into thirds, place it in the postage paid envelope, and return to: Iowa DNR; Wildlife Research Station, 1436 255th St., Boone, IA 50036. For questions, please call (515) 777-5378.

EXTREMELY IMPORTANT: This is a computerized form. Do not make any marks on this form other than to respond in the specified areas. Do not enter zeroes for animals that you did not see, and do not provide observations for species that are not listed. Thank you.

Please PRINT neatly and use BLUE OR BLACK BALLPOINT pens only.

Correct   Incorrect

●   ⊘ ⊘

Ⓐ   A̸

STEP 1: YOUR INFORMATION

What is your DNR number?

(Your 4-9 digit DNR # can be found on any of your DNR Licenses or Tags)

STEP 2: COUNTIES HUNTED

INSTRUCTIONS: Please record the name of each Iowa county where you will bowhunt. When you record observations in STEP 3, you will use the county # (1, 2, 3, or 4) to fill the appropriate bubble indicating which county you hunted.

County #	County (first 6 letters)	County #	County (first 6 letters)	County #	County (first 6 letters)	County #	County (first 6 letters)
1		2		3		4	

STEP 3: YOUR OBSERVATIONS

INSTRUCTIONS: Record observations made **ONLY WHILE BOWHUNTING**. For each bowhunting trip, record the date, fill the appropriate bubble to indicate the county where you hunted, record the number of hours in your bowstand, and record the number of each species seen **(IF ZERO, LEAVE BLANK)**. If you did not see any of the species listed, you must still record the date, county number, and the number of hours. **DO NOT PROVIDE OBSERVATIONS OF SPECIES THAT ARE NOT LISTED.** Keep this form neat and clean... do not take it into the field.

Month	Day	County # (see STEP 2) MARK ONE 1 2 3 4	# Hours in Stand (rounded to nearest 1/2 hr.)	Antlered	Antlerless	Not Sure	Wild Turkeys	Bobcat	Coyote	Red Fox	Gray Fox	Raccoon	Opossum	Striped Skunk	Badger	House Cat	River Otter
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		○ ○ ○ ○	.														
		○ ○ ○ ○	.														

DEER OBSERVED (Antlered, Antlerless, Not Sure)   **OTHER SPECIES OBSERVED**

USE BLUE OR BLACK BALLPOINT PENS ONLY - PLEASE PRINT NEATLY & STAY WITHIN THE WHITE AREAS

STEP 3: YOUR OBSERVATIONS (Continued)

Month	Day	County # (see STEP 2) MARK ONE 1 2 3 4	# Hours in Stand (rounded to nearest 1/2 hr.)	DEER OBSERVED Antlered	Antlerless	Not Sure	OTHER SPECIES OBSERVED Wild Turkeys	Bobcat	Coyote	Red Fox	Gray Fox	Raccoon	Opossum	Striped Skunk	Badger	House Cat	River Otter
		○ ○ ○ ○	.														
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RESPOND ONLY IN THE SPACES PROVIDED, RETURN ORIGINAL FORM (NO PHOTOCOPIES) BY DECEMBER 6, 2019