

QUAIL, PHEASANT, & TURKEY BROOD SURVEY - 2021

Performance Report

**A Contribution in Part of Pittman-Robertson
Federal Aid in Wildlife Restoration
Grant W-39-R-28**

KANSAS DEPARTMENT OF WILDLIFE, PARKS, and TOURISM

**Brad Loveless
Secretary**

**Mike Miller
Assistant Secretary
Wildlife, Fisheries, and Boating**

**Jake George
Wildlife Division Director**

**Prepared by:
Jeff Prendergast
Small Game Specialist**

September 2021



PERMISSION TO QUOTE

This is an annual progress report that may contain information that is subject to future modification or revision. Persons wishing to quote from this report, for reproduction or reference, should first obtain permission from the Chief of the Wildlife Section, Kansas Department of Wildlife and Parks, 512 SE 25th Avenue, Pratt, KS 67124.

EQUAL OPPORTUNITY STATEMENT

This program receives Federal financial assistance from the U. S. Fish and Wildlife Service. Under Title VI of the Civil Rights Act of 1964, Section 504 of the Rehabilitation Act of 1973, Title II of the Americans with Disabilities Act of 1990, the Age Discrimination Act of 1975, and Title IX of the Education Amendments of 1972, the U. S. Department of the Interior and its bureaus prohibit discrimination on the basis of race, color, national origin, age, disability or sex (in educational programs). If you believe that you have been discriminated against in any program, activity or facility, or if you desire further information, please write to:

**U. S. Fish and Wildlife Service
Office of Diversity and Civil Rights Programs- External Programs
4040 North Fairfax Drive, Suite 130
Arlington, VA 22203**

QUAIL, PHEASANT, AND TURKEY BROOD SURVEY RESULTS – 2021

Prepared by Jeff Prendergast, Small Game Specialist

INTRODUCTION

The Kansas Department of Wildlife, Parks, and Tourism (KDWPT) collects reproductive data for quail (*Colinus virginianus* and *Callipepla squamata*), ring-necked pheasant (*Phasianus colchicus*), and wild turkey (*Meleagris gallopavo*) statewide. Northern bobwhites provide nearly all the quail data; however, scaled quail can be found in extreme southwestern Kansas and observations are included in quail estimates (generally < 1% data). Summer brood surveys were initiated in 1986 focusing on pheasant and quail. Turkey data were not collected and reported until 2006. These summer brood surveys are used to forecast upcoming hunting seasons and to provide consistent monitoring of these important game species. Prairie chickens (greater and lesser; *Tympanuchus* spp.), though recorded opportunistically, cannot be easily assessed using the same methods because they generally do not associate with roads like quail, pheasants, and turkeys.

METHODS

Dates for the 2021 summer brood survey were from July 18 – August 28 (6 weeks). Survey protocol and methodology changed in 2012 to establish permanent brood routes averaging 35 miles (29-49 miles) in 74 randomly selected counties in Kansas (urban counties were removed from the original selection pool). Since the original selection, routes have been added to fill voids where staff has allowed, bringing the current number of routes to 77. Routes were positioned within each county to be representative of the average land cover (rangeland, crop, CRP, etc.) for that county. If public land (e.g., Wildlife Areas) occurred in the county, we attempted to place the route through or adjacent to the property. Routes were sampled 4 times beginning at sunrise, driving the route at a maximum of 25 mph until the entire route was sampled. The 6-week sampling period was separated into 2, 3-week periods where at least 2 samples occurred in each 3-week period. Additionally, observers were asked to have at least one sample completed on a morning with wet vegetation (dew or after a rain the evening/night before). This sampling protocol provides a more stringent standardization of collected data. Indices are reported on a per mile basis (e.g., pheasant/mile, etc.). If a quail or pheasant brood was detected, observers attempted to flush the brood to get the most accurate count of chicks possible. Age of chicks was visually estimated based on aging criteria and recorded in weeks.

Data Analysis

The indices to upland game bird densities were calculated as the mean number of birds observed per mile for each species along routes. Given that observations are recorded on permanently established routes, samples are not independent and thus a paired-sample t-test is used to make inter-annual comparisons. A two-tailed test with an alpha level of 0.10 was used to identify significant differences between years (current vs. previous year). Data was standardized by reporting counts per mile (e.g., pheasants/mile) for routes and regions. Ratio data (chicks/hen

and chicks/brood) can help indicate population productivity, but sample sizes per route are generally limited; as such, ratio data are pooled across each Small Game Region (Figure 1). In considering the brood to hen ratios, broods that are observed without hens are removed to remove bias from the % of hens that successfully hatched broods. While many factors influence these ratios, the broods/hen index is generally an indicator of nest success, while chicks/brood is an indicator of brood survival after hatching. Quail ratio data was reported per adult (male and female) because males also will incubate nests and brood young. Turkey Management Regions (Figure 2) differ from Small Game Regions and data were reported accordingly.

Spatial comparisons were made using an ARC GIS Inverse Weighted Distance technique, which interpolates data across a landscape between known points. Inverse Distance Weighting was used per species by assigning the route-specific index to the centroid of the county sampled. This provides a unique map showing probable densities which are spatially relative. This provides a statewide estimate of upland bird densities but does not account for localized populations and habitats.

RESULTS

Participants sampled all 77 established routes between July 18 and August 30. There were 2 routes that were only completed 3 times during the survey period (Table 1). Results are summarized by Kansas Small Game Regions (Figure 1) or Turkey Regions accordingly (Figure 2).

Pheasants

For 2021, there was a non-significant decrease in the statewide roadside index of pheasants (-13%) compared to 2020. No region recorded a statistically significant change this year (table 2). Pheasants per mile was highest in the Northern High Plains, with the highest index in Greeley County (Table 2). Similar to last year, few pheasants were detected in the Flint Hills or Glaciated plains regions. Most notably though, pheasant's detections were much improved in Dickinson County route. No pheasants were detected in the Osage Cuestas of southeastern Kansas.

Statewide production indices were all increased compared to 2020 (Table 3). Production indices in the major pheasant regions were good and with highest values being observed in the Northern and Southern High Plains regions (Table 3). The Glaciated Plains region had the poorest production values with only 1 brood observation. Pheasant hatch peaked statewide in early to mid-June with 30% of broods estimated hatch date in the first 2 weeks of June (Figure 3). Pheasant indices were generally highest in the Northern High Plains and Southern High Plains (Figure 4).

Quail

There was a significant decrease in the statewide roadside index of quail (-21%) compared to 2020. A statistically significant decrease occurred in the Smoky Hills (-46%, Table 4). No other statistically significant regional changes were observed this year, however apparent large changes were recorded in the Northern High Plains (60%) and Glaciated Plains (-34%). As is common with quail, many regional patterns were obscured by large offsetting changes on routes within the regions. Quail densities were greatest in the Flint Hills followed by South-Central

Prairie Region, with the highest index recorded in Hamilton County (Table 4). Scaled quail were only recorded on the Hamilton County route.

Statewide brood size remained similar to last year. The chicks/adult and broods/ adult measures both improved slightly, with significant improvements in several regions for these measures (Table 5). The Smoky Hills region saw consistent declines across all measures of production this year although remained generally good. The greatest improvement in production indices occurred in the Southern High Plains this year with large increases in chicks/adult and Broods/adult measures (Table 5). Quail hatch peaked in late June although quail broods are much more evenly distributed through the summer as they take advantage when conditions are prime (Figure 5). The highest estimated quail densities are generally in the Flint Hills (Figure 6).

Turkey

There was a non-significant decrease in the statewide roadside index of turkey (-16%) compared to 2020. There were some apparent large declines in the Northcentral and Northwest regions but these were not statistically significant (Table 6). The Northeast region had the highest regional turkey index this being almost double all the remaining regions (Table 6). Jackson county had the highest roadside index to turkeys this year (Table 6).

The statewide turkey production remained stable this year, however overall production has remained low for several years and populations continue to struggle (Table 7). The Southcentral region had the highest production indices which were all improved for the region this year. While the Northeast had the highest density, all measures of production declined this year suggesting that observations were carryover from last year's better production (Table 7). Production indices in the northcentral region increased again this year but remained relatively low (Table 7). Turkey hatch peaked between late May into early June but had a spike in mid-May around the traditional peak (Figure 7). The highest turkey densities will generally be found in northeastern Kansas (Figure 8).

DISCUSSION

Coming out of winter it appeared as Kansas may be plagued by drought through 2021. Approximately 30 counties were registered as D2 on the Drought severity index at the beginning of March. This quickly changed as above average precipitation through the spring kept Kansas free of drought through the breeding season. These conditions led to excellent nesting conditions including record level wheat harvests in many places that extended well beyond the average harvest date. As we progressed later into the summer, conditions turned off more extreme as there were several triple digit days and extended periods without rains. These conditions had the potential to impact chick survival, however this was well after the estimated peak hatch and good spring conditions produced ample cover and invertebrates which can mitigate against these late extremes. These late summer conditions plagued the survey where cool wet mornings are thought to be make birds more visible and fewer surveys were able to be completed under ideal conditions this year (Figure 9). While KDWP is currently working on a cooperative project to evaluate the impact of these conditions, the results are not yet available. Some late heavy rains benefited fall crops that had been struggling and will improve winter cover this year.

Pheasants are an important resource to Kansas. Within the last decade, estimated annual harvests have been at both extreme highs and lows. After a reduced roadside index in 2020 harvest rates for pheasants declined as expected. With spring precipitation being ideal this year there was a lot of optimism that roadside surveys would show increases across much of the range. However, the statewide index of pheasants showed slight decreases. Both the percent of hens with chicks and the total brood size were up this year which serve as indicators of good production. The disparity between the increased estimates of production and the decreased overall observations may be related to survey conditions. Based on the results of the survey overall densities are expected to be lower and harvest success will likely decrease. The Northern High Plains had the highest regional estimate of pheasants in 2021, with most routes showing improvements although a few key routes had large decreases. The roadside index for the Smoky Hills region continued to trend down (Figure 4).

Kansas continues to have one of the strongest quail populations in the country. Recent years have seen improved densities across many of the Great Plains states, including Kansas. This initial boom was caused by habitat changes associated with recovery from the extreme and expansive drought. While the benefits of these habitat changes have largely waned and some states have seen populations decline again, Kansas has largely maintained these higher densities thus far. Spring densities remained high based on spring whistle surveys and saw significant increases in some regions. However, the estimates in the roadside survey were significantly lower this year than last and this was driven by large decrease in the Smoky Hills index. The Smoky Hills had been well above average for several years and held the highest densities in the state. Given the later nesting habits of quail than pheasant, the more extreme conditions observed in early June and late summer had a higher potential to impact production of quail. The statewide production indices remained high suggesting that production was good, and anecdotal reports from area producers and biologists support the production estimates. Similar to pheasants the survey results were potentially impacted by the survey conditions. Regardless, with the large decrease in the Smoky Hills, hunters will likely see noticeably fewer quail. The Flint Hills had the highest roadside density this year, however densities did not appear to be as consistent as the central regions (Figure 6). Based on roadside survey estimates, we expect hunters to find reduced densities from the last few years but maintain relatively good hunter success given we're coming off of high densities.

Roadside estimates for turkeys remained the same this year, with no significant change in any of the major turkey regions. While there was no significant change, there were several regions with large changes in the estimate this year. Unlike with pheasant and quail, we expect that the observations of turkeys are not as influenced by survey conditions given turkeys are larger and often observed off the road. The state-wide production indices also remained stable, remaining very low, particularly in the measure of chicks per hen. This continues the trend that we have seen in recent years with our turkeys struggling to recruit young into the population. Given the early nesting chronology of turkeys, we expected that the spring weather would benefit turkey production this year, however this appeared to not be realized. The Northeast region had the highest roadside estimate this year (Figure 8).

Table 1. Upland game bird brood routes and observers in Kansas, 2021.

Route	Observer	Replicates	Route	Observer	Replicates
Allen	Justin Harbit	4	Marion	Jeff Rue	5
Atchison	Tim Urban	4	Marshall	Megan Smith	4
Barber	Jake George	4	Meade	Aaron Andrews	4
Barton	Jeff Prendergast	4	Miami	Andy Friesen	5
Bourbon	Justin Harbit	5	Mitchell	Cale Hedges	4
Brown	Tyler Warner	4	Montgomery	Ryan Lies	4
Butler	Tyler Burt	4	Morris	Brent Konen	4
Cherokee	David Jenkins	3	Morton	Kraig Schultz	4
Cheyenne	Abby Athen	4	Neosho	Logan Martin	4
Cloud	Matt Farmer	3	Ness	Andy Nelson	4
Coffey	Matt Peek	4	Norton	Luke Winge	4
Comanche	Matt Hanvey	4	Osage	Alex Lyon	4
Cowley	Kurt Grimm	4	Osborne	Chris Lecuyer	4
Decatur	Daniel Howard	5	Pawnee	Kevin Wood	4
Dickinson	Clint Thornton	4	Phillips	Eric Wiens	4
Doniphan	Jesse Morland	4	Pottawatomie	Corey Alderson	4
Elk	Viki Cikanek	4	Pratt	Wes Sowards	4
Ellis	Megan Rohweder	4	Rawlins	Kevin Klag	4
Finney	Angie Reisch	4	Reno	Keith Murrow	6
Franklin	Ryan Tewllman	4	Republic	Rob Unruh	4
Geary	Clint Thornton	4	Rice	Steve Adams	4
Gove	Lynn Davigon	5	Rooks	Joe Lambert	4
Graham	Jake Brooke	4	Rush	Jason Wagner	4
Gray	Jared King	4	Russell	James Svaty	4
Greeley	Kurt Meier	4	Saline	Pat Riese	4
Greenwood	Kent Fricke	4	Scott	Brent Clark	4
Hamilton	Kurt Meier	4	Seward	Jason Vajnar	4
Harvey	Charlie Cope	4	Sheridan	Kevin Klag	4
Haskell	Kelly Lazar	5	Sherman	Abby Athen	4
Hodgeman	Dan Haneke	4	Smith	Kirk Andrews	4
Jackson	Tyler Warner	4	Stafford	Logan Shoup	4
Jefferson	Andrew Page	4	Stanton	Kraig Schultz	4
Jewell	Brandon Tritch	4	Stevens	Kraig Schultz	4
Kearney	Zerick Kuecker	4	Thomas	Jared Ireland	4
Kingman	Troy Smith	4	Trego	Kent Hensley	4
Kiowa	Logan Shoup	4	Wabaunsee	Darin Porter	4
Labette	Rob Roggin	4	Wallace	Abby Athen	4
Lane	Kevin Luhman	4	Wilson	Jordan Wooderson	4
Logan	Leonard Hopper	4			

Table 2. Annual regional changes in mean pheasants per mile (P/M), 2021.

Route	2020 P/M	2021 P/M	% Δ	Route	2020 P/M	2021 P/M	% Δ
<u>Flint Hills</u>				<u>Northern High Plains</u>			
Butler	0.00	0.00	0	Cheyenne ^a	NA	0.17	NA
Cowley	0.00	0.00	0	Decatur	0.34	0.39	15
Dickinson	0.06	0.22	288	Gove	0.30	0.13	-56
Elk	0.00	0.00	0	Graham	1.30	0.14	-89
Gearly	0.00	0.00	0	Greeley	0.28	0.65	129
Greenwood	0.00	0.00	0	Lane	0.09	0.16	74
Marion	0.01	0.00	-100	Logan	0.07	0.08	11
Morris	0.00	0.00	0	Norton	0.21	0.06	-72
Pottawatomie	0.00	0.01	NE	Rawlins	0.24	0.09	-65
Wabaunsee	0.00	0.00	0	Scott	0.35	0.52	48
Region	0.01	0.02	221	Sheridan	0.22	0.28	29
<u>Glaciated Plains</u>				Sherman	0.13	0.39	206
Atchison	0.01	0.01	0	Thomas	0.11	0.08	-29
Brown	0.00	0.00	0	Wallace	0.01	0.12	750
Doniphan	0.00	0.00	0	Region	0.28	0.24	-16
Jackson	0.00	0.00	0	<u>South-Central Prairies</u>			
Jefferson	0.00	0.00	0	Barber	0.23	0.00	-100
Marshall	0.00	0.04	NE	Comanche	0.00	0.00	0
Region	0.00	0.01	247	Harvey	0.00	0.01	NE
<u>Smoky Hills</u>				Kingman	0.04	0.09	117
Barton	0.28	0.21	-27	Kiowa	0.21	0.36	70
Cloud	0.05	0.08	52	Pawnee	0.04	0.16	293
Ellis	0.19	0.03	-83	Pratt	0.14	0.16	10
Hodgeman	0.33	0.42	28	Reno	0.09	0.00	-100
Jewell	0.26	0.04	-83	Stafford	0.13	0.09	-26
Mitchell	0.26	0.31	20	Region	0.10	0.10	-2
Ness	0.15	0.10	-35	<u>Southern High Plains</u>			
Osborne	0.15	0.25	68	Finney	0.14	0.00	-100
Phillips	0.04	0.01	-67	Gray	0.21	0.19	-7
Republic	0.02	0.07	350	Hamilton	0.10	0.19	93
Rice	0.36	0.10	-72	Haskell	0.11	0.03	-68
Rooks	0.39	0.36	-7	Kearny	0.03	0.13	325
Rush	0.20	0.18	-11	Meade	0.05	0.02	-50
Russell	0.09	0.04	-57	Morton	0.09	0.21	131
Saline	0.09	0.05	-45	Seward	0.51	0.34	-33
Smith	0.13	0.16	19	Stanton	0.04	0.07	100
Trego	0.16	0.15	-9	Stevens	0.31	0.22	-30
Region	0.19	0.15	-19	Region	0.16	0.14	-13
				Statewide	0.14	0.13	-13

* = Significant difference ($p < 0.1$)

**The Osage Cuestas region is outside of the pheasant range and is removed for analysis.

^aRoute was not sampled in consecutive years and wasn't included in regional or statewide comparisons

Table 3. Annual regional changes in pheasant chicks per hen (C/H), chicks per brood (C/B), and broods per hen (B/H), 2021.

Region	2020 C/H	2021C/H	%Δ	2020 C/B	2021 C/B	%Δ	2020 B/H	2021 B/H	%Δ
Flint Hills	6.0	4.8	-20	6.0	6.0	0	1.0	0.8	-20
Glaciated Plains	0.0	4.0	0	0.0	4.0	NE	0.0	0.0	0
Northern High Plains	5.7	7.5	33	4.7	4.7	1	0.7	0.7	4
Osage Cuestas	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0
Smoky Hills	5.3	4.8	-10	4.7	4.0	-16	0.6	0.7	9
South-Central Prairies	4.7	5.1	9	4.7	6.8	46	0.7	0.4	-49
Southern High Plains	2.5	9.1	265	2.6	3.7	39	0.6	0.8	36
Statewide	4.7	6.3	33	4.3	4.4	3	0.6	0.7	3

Table 4. Annual regional changes in mean quail per mile (Q/M), 2021.

Route	2020 Q/M	2021 Q/M	% Δ	Route	2020 Q/M	2021 Q/M	% Δ
<u>Flint Hills</u>				<u>Smoky Hills</u>			
Butler	0.07	0.04	-44	Barton	0.13	0.14	5
Cowley	0.27	0.40	49	Cloud	0.39	0.11	-70
Dickinson	0.29	0.31	7	Ellis	0.19	0.10	-49
Elk	0.04	0.08	117	Hodgeman	0.34	0.17	-51
Gearly	0.04	0.02	-50	Jewell	0.25	0.14	-43
Greenwood	0.19	0.29	54	Mitchell	0.25	0.18	-26
Marion	0.17	0.02	-87	Ness	0.15	0.11	-29
Morris	0.19	0.15	-23	Osborne	0.19	0.06	-68
Pottawatomie	0.02	0.11	433	Phillips	0.43	0.02	-95
Wabaunsee	0.21	0.23	7	Republic	0.16	0.07	-57
Region	0.15	0.17	14	Rice	0.05	0.01	-86
<u>Glaciated Plains</u>				Rooks	0.68	0.29	-57
Atchison	0.03	0.08	175	Rush	0.47	0.29	-38
Brown	0.19	0.28	46	Russell	0.16	0.32	104
Doniphan	0.14	0.12	-17	Saline	0.21	0.12	-42
Jackson	0.43	0.11	-73	Smith	0.29	0.19	-33
Jefferson	0.08	0.03	-60	Trego	0.22	0.13	-43
Marshall	0.16	0.05	-69	Region	0.27	0.14	-46*
Region	0.17	0.11	-34	<u>Southern High Plains</u>			
<u>Northern High Plains</u>				Finney	0.04	0.01	-80
Cheyenne	NA	0.00	NA	Gray	0.01	0.01	-25
Decatur	0.15	0.16	7	Hamilton	0.31	0.62	102
Gove	0.09	0.04	-49	Haskell	0.01	0.01	0
Graham	0.20	0.20	4	Kearny	0.00	0.00	0
Greeley	0.00	0.01	NE	Meade	0.17	0.01	-95
Lane	0.00	0.00	0	Morton	0.06	0.03	-56
Logan	0.00	0.00	0	Seward	0.20	0.20	-4
Norton	0.15	0.50	240	Stanton	0.14	0.00	-100
Rawlins	0.00	0.01	NE	Stevens	0.26	0.14	-44
Scott	0.02	0.00	-100	Region	0.12	0.10	-15
Sheridan	0.00	0.02	NE	<u>Osage Cuestas</u>			
Sherman	0.00	0.00	0	Allen	0.08	0.00	-100
Thomas	0.00	0.00	0	Bourbon	0.02	0.01	-47
Wallace	0.00	0.00	0	Cherokee	0.00	0.01	0
Region	0.05	0.07	60	Coffey	0.09	0.05	-45
<u>South-Central Prairies</u>				Franklin	0.00	0.06	NE
Barber	0.27	0.15	-45	Labette	0.02	0.00	-100
Comanche	0.00	0.01	NE	Miami	0.00	0.00	0
Harvey	0.01	0.00	-100	Montgomery	0.05	0.20	260
Kingman	0.06	0.22	244	Neosho	0.01	0.05	800
Kiowa	0.59	0.36	-39	Osage	0.04	0.07	67
Pawnee	0.04	0.17	329	Wilson	0.14	0.08	-42
Pratt	0.09	0.25	169	Region	0.04	0.05	19
Reno	0.12	0.11	-6	Statewide	0.14	0.11	-21*
Stafford	0.39	0.05	-88				
Region	0.18	0.15	-16				

*Values are significant at a $P < 0.10$.

NA = Data Not available

NE = Not estimable

Table 5. Annual regional changes in quail chick per adult (C/A), chicks per brood (C/B), and broods/adult, 2021.

Region	2020 C/A	2021 C/A	%Δ	2020 C/B	2021 C/B	%Δ	2020 B/A	2021 B/A	%Δ
Flint Hills	1.3	2.2	72	7.8	8.8	13	0.13	0.18	37
Glaciated Plains	2.3	2.3	1	8.5	6.0	-30	0.15	0.31	110
Northern High Plains	1.7	1.7	0	8.2	9.2	13	0.07	0.16	137
Osage Cuestas	0.2	0.4	96	3.7	6.0	64	0.04	0.05	34
Smoky Hills	2.0	1.5	-26	9.3	7.4	-20	0.17	0.12	-32
South-Central Prairies	1.8	2.5	42	9.3	10.5	13	0.14	0.20	42
Southern High Plains	1.6	4.0	151	9.5	7.8	-18	0.07	0.19	173
Statewide	1.6	1.8	12	8.8	8.1	-7	0.13	0.15	15

Table 6. Annual regional changes in mean turkey per mile (T/M), 2021

Route	2020 T/M	2021 T/M	^a % Δ	Route	2020 T/M	2021 T/M	% Δ
<u>Northeast</u>				<u>Northcentral</u>			
Atchison	0.10	0.07	-31	Barton	0.00	0.00	0
Brown	0.35	0.00	-100	Cloud	0.21	0.09	-60
Dickinson	0.13	0.26	106	Ellis	0.00	0.06	NE
Doniphan	0.05	0.07	39	Jewell	0.62	0.10	-84
Franklin	0.17	0.20	17	Mitchell	0.01	0.00	-100
Geary	0.28	0.38	37	Osborne	0.58	0.20	-65
Jackson	0.44	0.47	6	Phillips	0.07	0.00	-100
Jefferson	0.02	0.26	1600	Republic	0.02	0.15	567
Marshall	0.10	0.18	70	Rooks	0.10	0.00	-100
Morris	0.03	0.10	250	Rush	0.21	0.00	-100
Osage	0.09	0.13	50	Russell	0.05	0.10	88
Pottawatomie	0.14	0.24	75	Saline	0.49	0.24	-51
Wabaunsee	0.48	0.06	-88	Smith	0.09	0.18	93
Region	0.18	0.19	2	Region	0.19	0.09	-55
<u>Northwest</u>				<u>Southcentral</u>			
Cheyenne	NA	0.11	NA	Barber	0.14	0.11	-23
Decatur	0.00	0.01	NE	Comanche	0.00	0.00	0
Graham	0.00	0.00	0	Harvey	0.32	0.06	-80
Norton	0.00	0.00	0	Kingman	0.04	0.10	180
Rawlins	0.34	0.04	-89	Kiowa	0.03	0.06	125
Sheridan	0.00	0.00	0	Meade	0.00	0.00	0
Sherman	0.00	0.02	NE	Pawnee	0.06	0.09	50
Thomas	0.13	0.02	-88	Pratt	0.00	0.00	0
Region	0.07	0.01	-83	Reno	0.63	0.43	-31
<u>Southwest</u>				<u>Southeast</u>			
Finney	0.00	0.00	0	Rice	0.00	0.19	NE
Gove	0.08	0.00	-100	Stafford	0.05	0.05	0
Gray	0.00	0.00	0	Region	0.11	0.10	-13
Greeley	0.00	0.00	0	Allen	0.01	0.15	2100
Hamilton	0.00	0.00	0	Bourbon	0.03	0.08	140
Haskell	0.00	0.00	0	Butler	0.02	0.28	1067
Hodgeman	0.00	0.00	0	Cherokee	0.00	0.38	NE
Kearny	0.00	0.00	0	Coffey	0.21	0.06	-73
Lane	0.00	0.00	0	Cowley	0.01	0.02	200
Logan	0.00	0.00	0	Elk	0.14	0.01	-95
Morton	0.00	0.00	0	Greenwood	0.21	0.22	6
Ness	0.32	0.00	-100	Labette	0.00	0.20	NE
Scott	0.00	0.00	0	Marion	0.17	0.06	-65
Seward	0.00	0.00	0	Miami	0.36	0.21	-43
Stanton	0.03	0.11	300	Montgomery	0.09	0.05	-44
Stevens	0.00	0.02	NE	Neosho	0.00	0.15	NE
Trego	0.00	0.14	NE	Wilson	0.20	0.16	-18
Wallace	0.06	0.10	88	Region	0.10	0.15	40
Region	0.03	0.02	-20	Statewide	0.11	0.09	-16

*Values are significant at a $P < 0.10$.

NA = Data Not Available

NE = Not estimable

Table 7. Annual regional changes in turkey poult per hen (P/H), poult per brood (P/B), and broods per hen (B/H), 2021.

Region	2020 P/H	2021 P/H	%Δ	2020 P/B	2021 P/B	%Δ	2020 B/H	2021 B/H	%Δ
Northcentral	1.0	1.2	22	3.8	5.8	51	0.22	0.21	-8
Northeast	2.2	0.8	-63	6.0	3.8	-37	0.34	0.19	-44
Northwest	2.8	1.0	-65	8.5	3.3	-61	0.25	0.20	-20
Southcentral	0.6	1.6	159	3.9	5.9	52	0.16	0.26	61
Southeast	0.7	1.5	115	4.9	5.5	11	0.14	0.27	94
Southwest	0.8	0.5	-39	2.8	2.2	-21	0.29	0.14	-54
Statewide	1.1	1.2	6	4.7	4.8	2	0.22	0.22	2

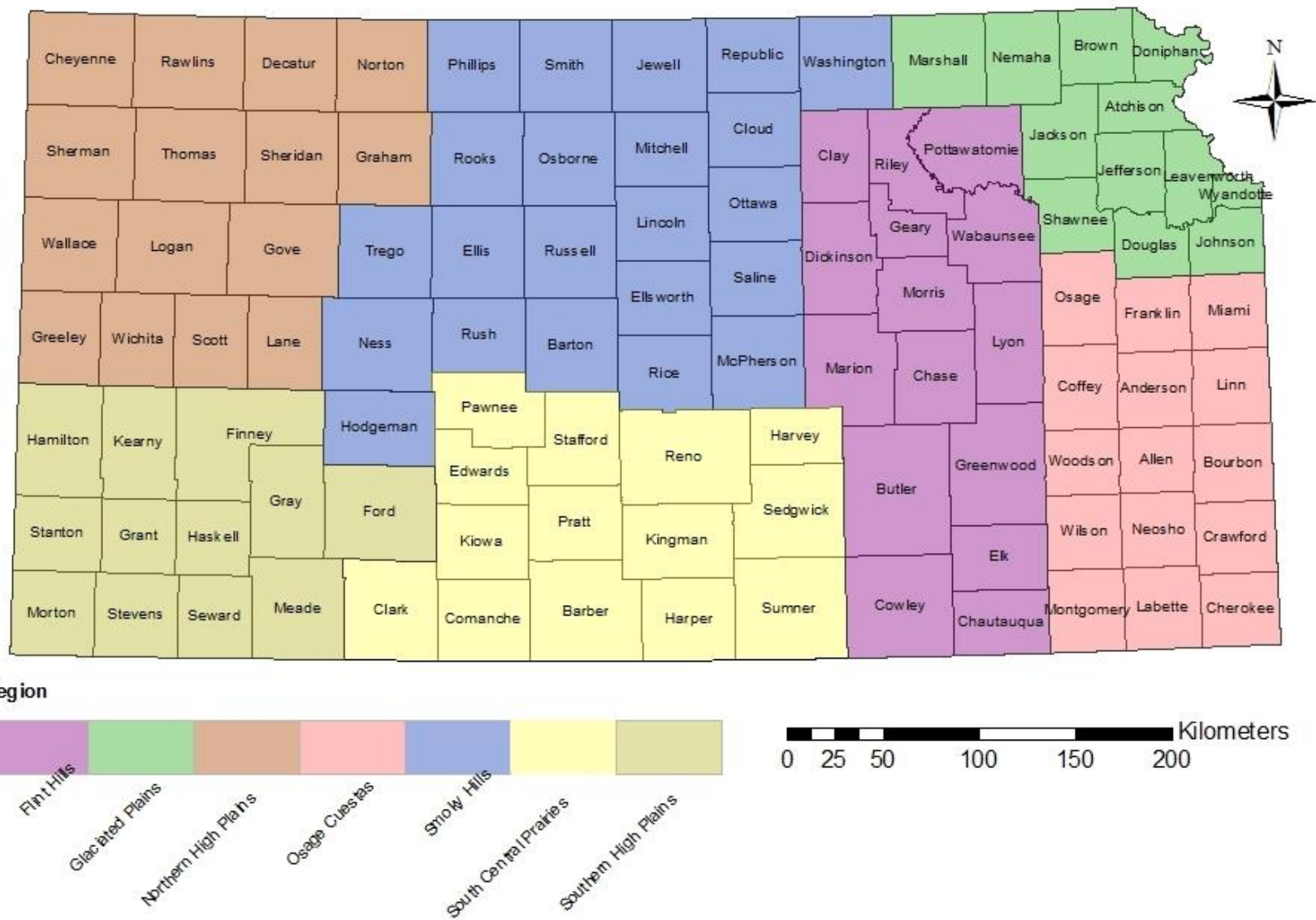


Figure 1. Kansas Small Game Regions.

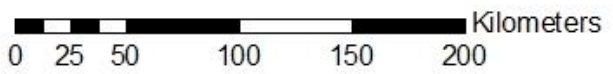
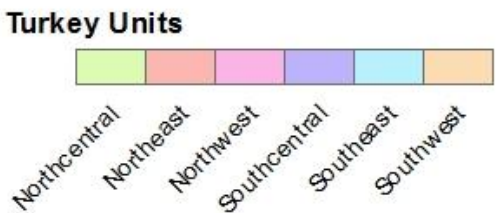
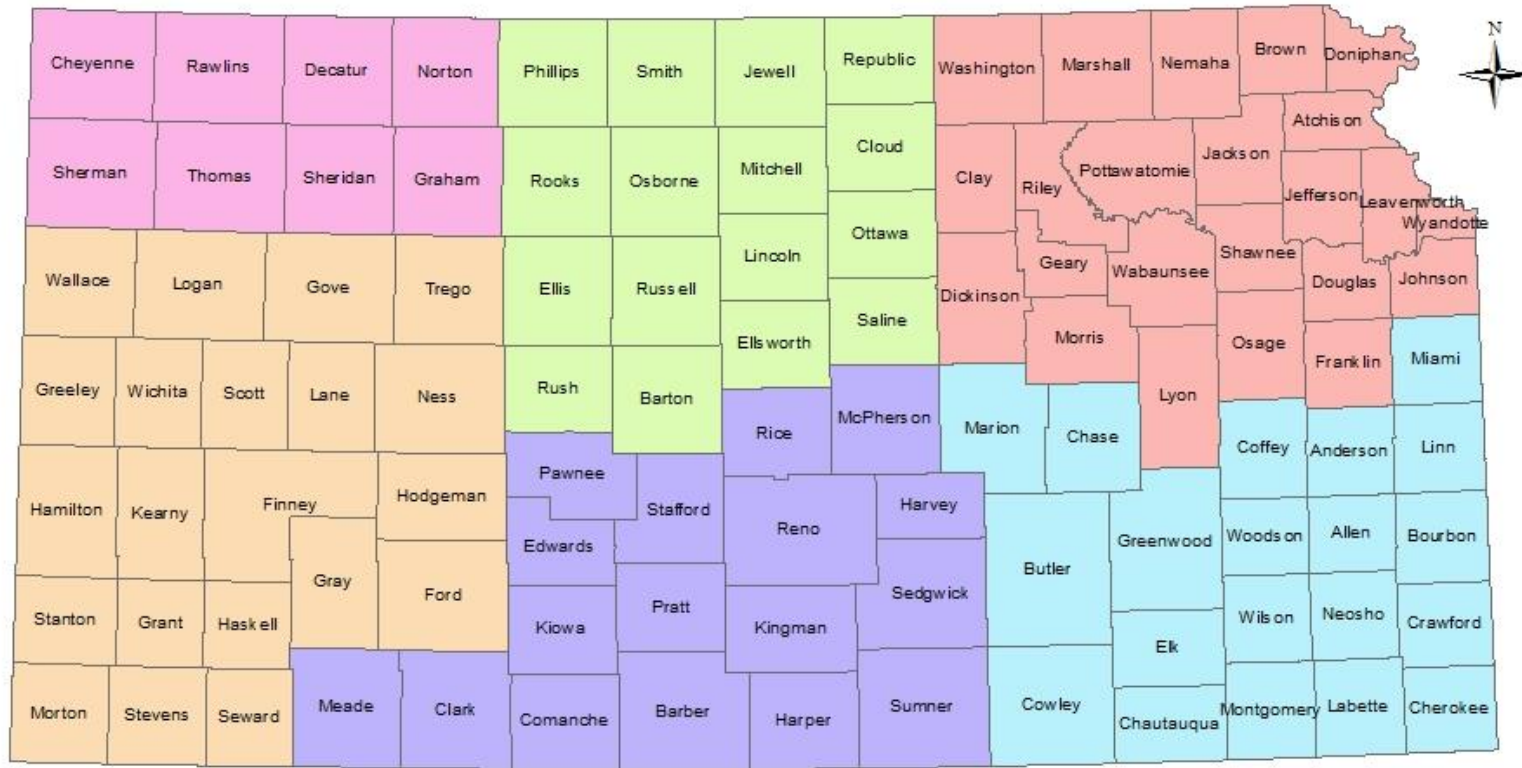


Figure 2. Kansas Turkey Management Regions.

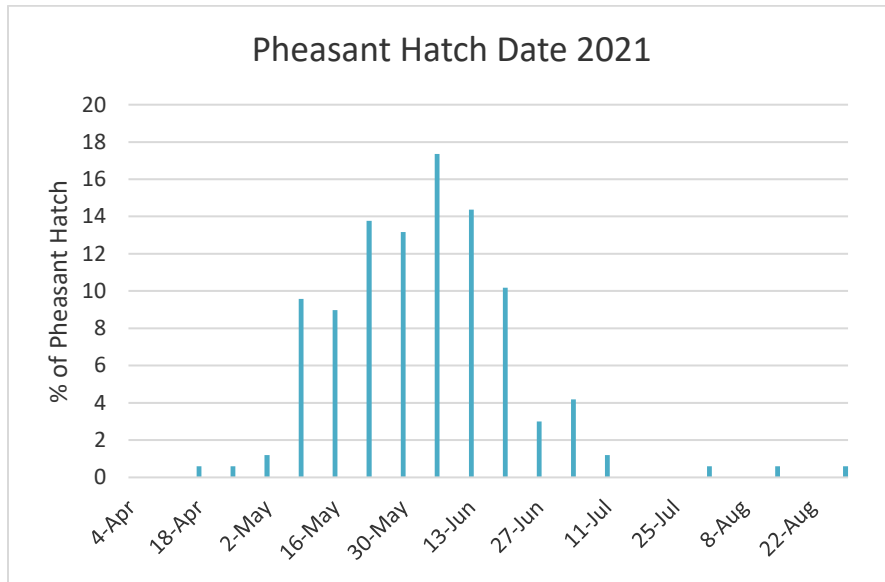


Figure 3. Weekly hatch dates of pheasant broods estimated from age at detection.

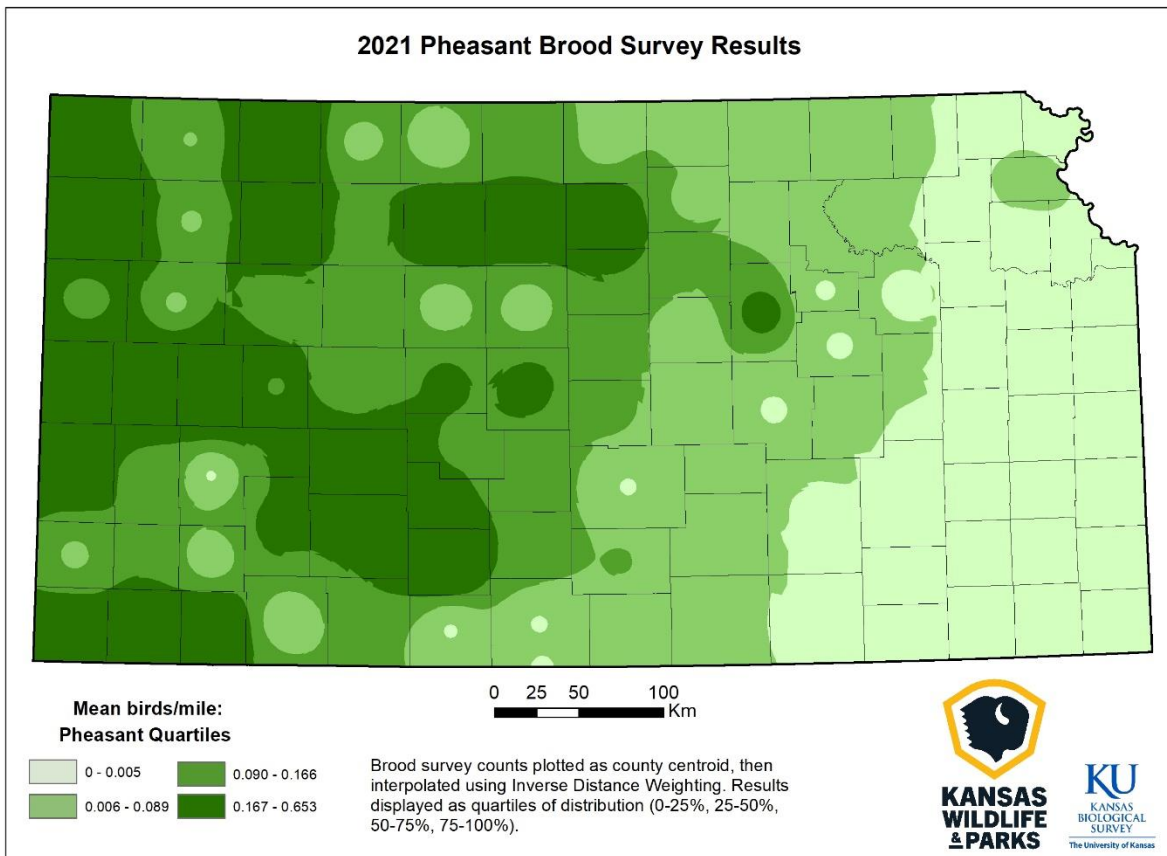


Figure 4. Relative pheasant densities estimated from brood survey routes in Kansas, 2021.

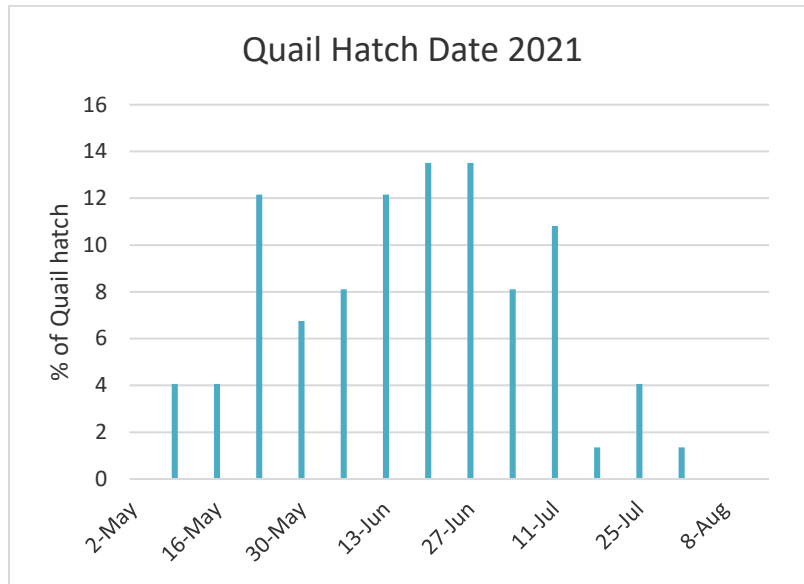


Figure 5. Weekly hatch dates of quail broods estimated from age at detection.

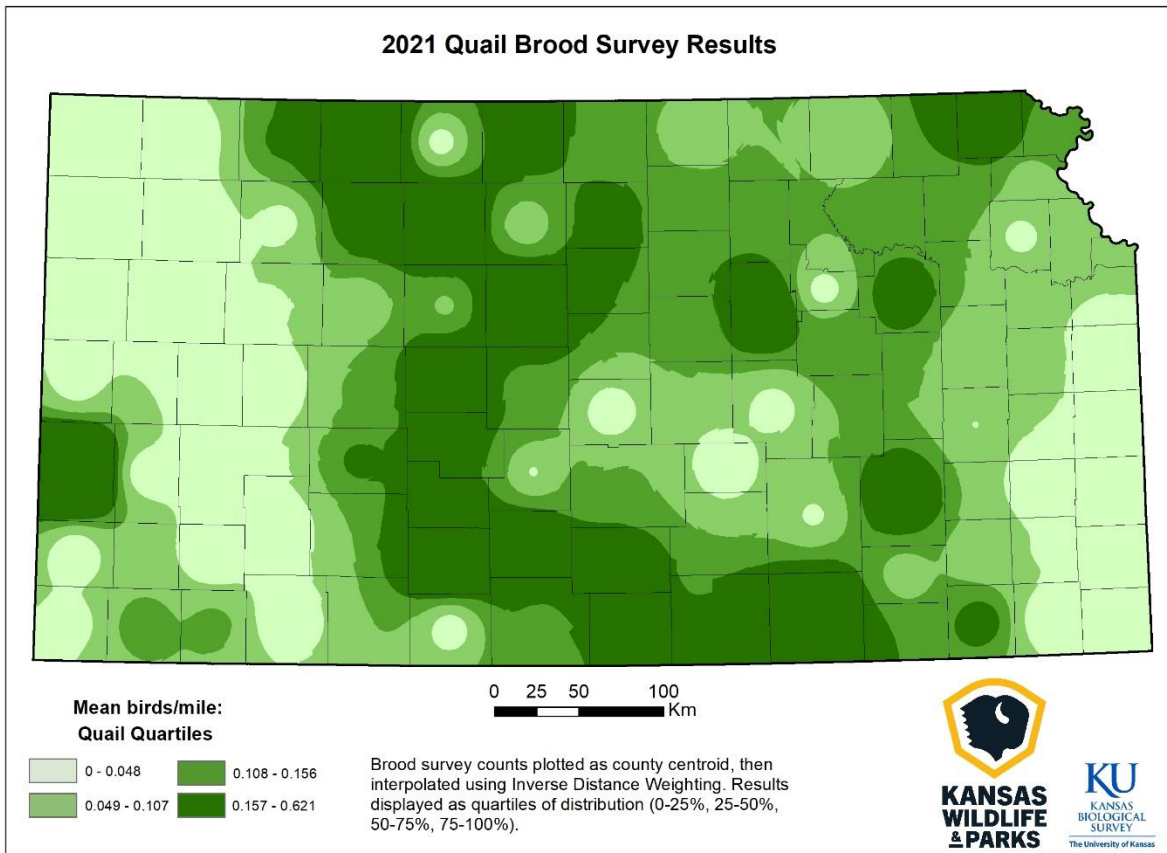


Figure 6. Relative quail densities estimated from brood survey routes in Kansas, 2021.

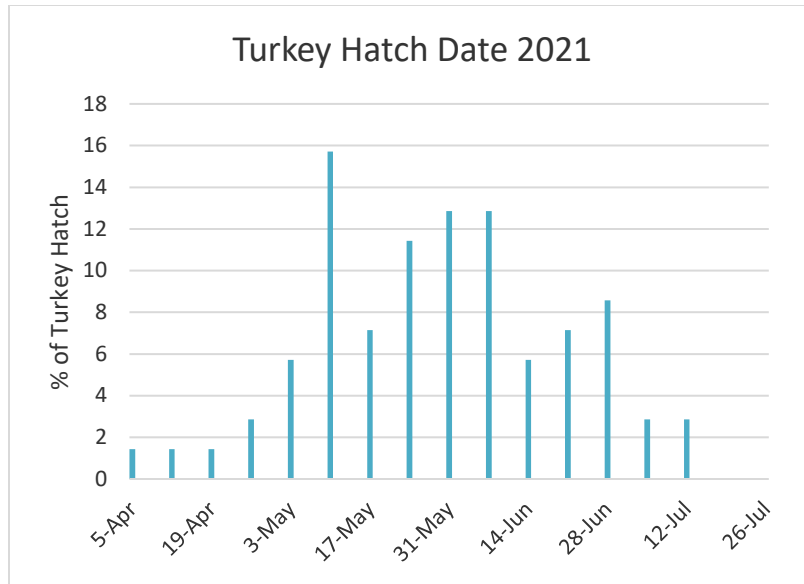


Figure 7. Weekly hatch dates of turkey broods estimated from age at detection.

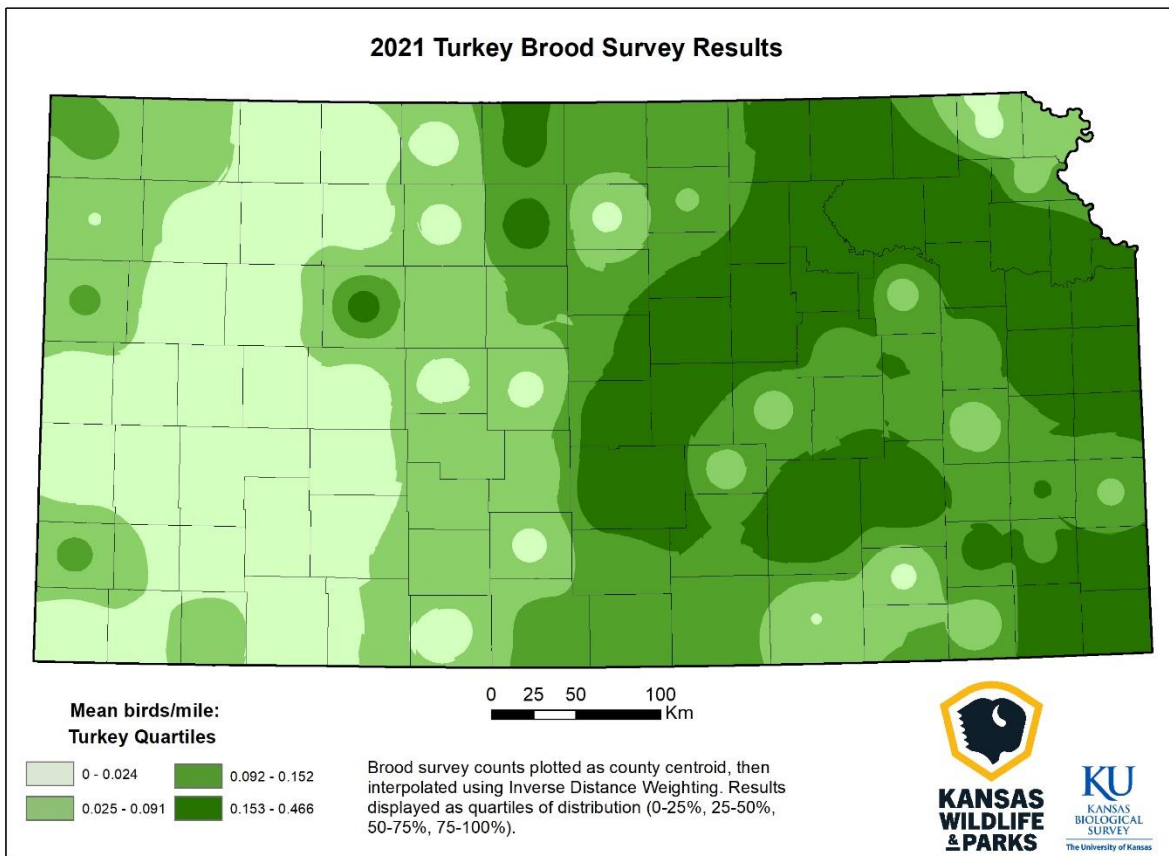


Figure 8. Relative turkey densities estimated from brood survey routes in Kansas, 2021.

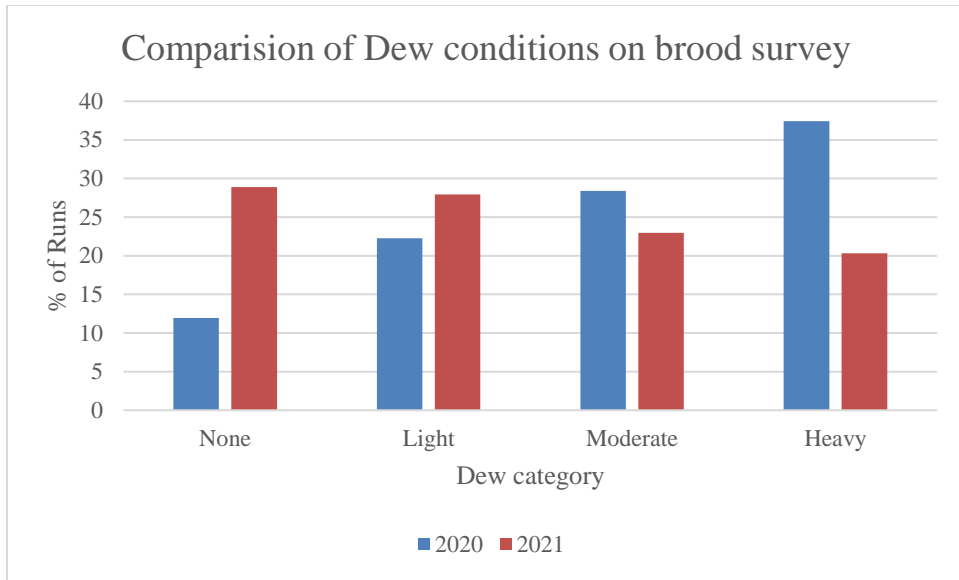


Figure 9. Interannual Comparison of Dew conditions during brood surveys. The presence of dew is one of the largest factor impacting detectability of birds during survey.