QUAIL, PHEASANT, & TURKEY BROOD SURVEY - 2016

Performance Report

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QUAIL, PHEASANT, AND TURKEY BROOD SURVEY RESULTS – 2016

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 (< 1% data). Summer brood surveys were initiated in 1986 focusing on pheasant and quail. Turkey data was 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 the other game birds.

METHODS

Dates for the 2016 summer brood survey were from July 17 – August 27 (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). 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 20 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, broods/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 also recorded in weeks.

Historic brood surveys (1986 – 2011) were collected by KDPWT personnel on an opportunistic basis as field personnel spent days in the field (out of the office and off paved roads). Counts were standardized by birds/observer-day and hand recorded. In 2012 we began collecting data with the Cybertracker (http://cybertracker.org/) program using Trimble™ Juno SB units. This is a Windows™ Access database freeware which allows customized digital data capture and spatial referencing for all data. Data transfer occurs over the internet (FTP site), eliminating the need for data entry.

This new protocol improved on historic data collection by:

1. Matching the survey time period with the time when game bird species are most active, during early morning periods, improving detection probabilities, while the old survey data was collected opportunistically throughout the day.
2. Standardizing the survey effort
3. Creating replication along a permanent route, resulting in more spatially comparable data for annual comparisons.
4. Providing a spatial reference for each count, allowing spatial analysis of the data.
5. Eliminates the need for manual data entry and associated errors.

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 samples are taken on permanently established routes, samples are not independent and thus a paired-sample t-test is used to draw inter-annual comparisons. A two-tailed test with an alpha level of 0.10 was used to identify significant differences. 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, generally when interpreting these production indices broods/hen is 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 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 is a large-scale view of upland bird densities, and does not take into account localized populations and habitats.

RESULTS

Participants sampled 72 of the 73 established routes between July 18 and August 29 (Table 1) Kingman county route was not sampled this year. Road conditions and personnel changes led to 3 of the 73 routes not being sampled 4 times. The Doniphan and Rawlins county routes were sampled 3 times each and the Commanche route was only sampled once. All routes were sampled at least once during a wet vegetation morning (dew or rain the previous night). Results are summarized by Kansas Small Game Regions (Figure 1) or Turkey Regions accordingly (Figure 2).

Pheasants

There statewide density of pheasants stayed relatively similar to last year with a non-significant decrease (-10%) compared to 2015. A statistically significant increase occurred within the Southern High Plains (73%) and a statistically significant decrease occured in the Smoky Hills (-31%) regions (Table 2). Pheasant per mile were the same in the Northern High Plains and Southern High Plains which topped the regional densities this year, with the highest index in Scott County (Table 2). Few pheasants were detected in the Flint Hills region except in Dickinson County which remained high for the region despite decreases from 2015 index. No pheasants were detected in the Osage Cuestas.

Statewide production indices were somewhat increased compared to 2015 (Table 3). Chicks/hen and broods/hen were highest in the Smoky Hills while the chicks/brood ratio was slightly higher in the Northern High Plains (Table 3). The chick/brood ratio was greatest in the Flint Hills and the Northern High Plains (Table 3). Most regions saw increases in the brood/hen indicating better production across most regions (Table 3). Pheasant hatch peaked toward the first week of June (Figure 3). Pheasant densities will generally be highest in northwest and southwest Kansas during the fall of 2016 (Figure 4).

Quail

There was a statistically significant increase in the statewide density of quail (45%) compared to 2015. Statistically significant increases also occurred within the Smoky Hills (92%), the South-Central Prairies (94%), and the Northern high plains (891%) regions (Table 4). Extremely large changes were observed on several routes across the state. Quail densities were greatest in the Southern high Plains and South-Central Prairie regions, with the highest densities recorded in Hamilton County (Table 4). Scaled quail were recorded on Morton, Stanton, and Hamilton county routes this year.

All statewide production indices were slightly improved but remained relatively similar compared to 2015 (Table 5). The chicks/adult ratio was highest in the Southern High Plains showing great improvements from 2015 (Table 5). Chicks/brood was also highest in the Southern High Plains, but was good across all the primary quail regions (Table 5). Quail hatch peaked in late June/early July (Figure 5). The south-central prairies will generally have the highest densities across the region, although all regions are at relatively high densities and some regions have localized populations at higher densities (Figure 6).

Turkey

There was a significant decrease (23%) in the statewide index of turkeys compared to 2015. The Northwest region was the only region that did not decline this year. Large increases were observed on some scattered routes across the state but over most of the range densities tended to be declining (Table 6). The Northeast region had the highest index this year with relatively good densities also being observed in the North-Central and South-Central. The counties with the highest indices were Reno and Geary (Table 6).

All statewide production ratios decreased compared to 2015 (Table 7). Production appeared to be greatly improved in the Northwest which had the highest poult/hen and brood/hen ratios in the

state. Production decreased across all other regions and there were no broods recorded in the Southwest region in 2015 (Table 7). Turkey hatch peaked at the end of May (Figure 7). The highest turkey densities will generally be found in Northeast Kansas during fall 2015 (Figure 8).

DISCUSSION

Since drought conditions have subsided, habitat for production has been ideal, particularly for quail, with the setback of succession adding lots of additional weedy cover. While upland birds all saw severe declines with the drought, the improved conditions resulting from the drought have produced equally impressive recoveries. Game birds are known for their explosive reproductive potential under good conditions and we have certainly observed that over the last 3 years. Statewide Quail densities have significantly increased for the 3rd year in a row and pheasant densities are more than double what they were in the worst of the drought.

Pheasants are an important resource to Kansas. In 2010, pheasant populations in Kansas reached the highest levels in nearly 20 years. After this extraordinary season, 3 consecutive years of drought conditions resulted in 2013 harvest falling to lowest recorded level since we've been tracking harvest in 1958. Conditions in 2014 were improved and much better in 2015, as a result pheasant harvest in KS increased, but remained well below average. Despite good rainfall and a lengthy wheat harvest in 2016 the statewide index of pheasants remained the same and even saw decreases in pheasants in some regions. This could indicate that production was hampered by rainfall which if too heavy or poorly timed can impact chick survival. However the increases in the statewide production indices would suggest that this was not the case. Survey conditions this year were tough due to heavy cover that made birds more difficult to see and rainfall that made routes difficult to traverse during ideal survey conditions. Given this information the 2016 season will likely be similar to improved compared to 2015. The Southern high plains showed the greatest improvement compared to 2015 with densities increasing 73%, the best hunting areas in the region will be in the eastern half. The Northern High plains also had good densities of birds, but was better in the northern and southern tiers of counties. While decreases were observed in the remaining regions opportunities are expected to be fair to good given habitat conditions and production indices were improved (Figure 4).

In recent years, Kansas has harvested more wild bobwhites than any other state. The 2015 season saw high densities of quail across the Midwestern and southern states including Kansas. Bobwhites in eastern Kansas fared well during the drought and weather conditions through the last 2 years has created excellent conditions for production in the western regions. Statewide spring breeding populations were very good with all regions being above long-term averages. Nesting conditions were good across most of the state this year, heavy rainfall in the eastern portion of the state may have caused limited brood survival in localized areas, but regional production remained good. The return of standard burning practices in the core of the Flint Hills limited nesting cover and production decreased in these areas, but the region maintained relatively high densities. The South-Central Prairies showed the highest regional densities this year with good regional densities also being found in all of our regions within the primary quail range (Figure 6). There should be good hunting opportunities across the state this year where appropriate habitat exists (Figure 6).

Heavy precipitation across the state appears to have had significant impacts to turkey production in 2016. This has created the situation where turkey densities have declined across all regions except the Northwest, where production was improved. The turkey populations in eastern Kansas had been responding relatively well to drought conditions, but heavy precipitation this summer appears to have reduced production. While precipitation in the western regions improved conditions, timing of rainfall in the central and southwest regions appears to have limited production. Densities in the Southwest were already extremely limited, and with no recorded broods this year, opportunities in coming years could be significantly impacted (Table 4 & 7). Portions of the Northeast region will have the highest densities with the central regions also offering opportunity this fall.

Table 1. Upland game bird brood routes and observers in Kansas, 2016.

Route	Observer	Position	Route	Observer	Position
Allen	Justin Harbit	Wildlife Division	Marion	Jeff Rue	Wildlife Division
Atchison	Tim Urban	Wildlife Division	Marshall	Megan Smith	Wildlife Division
Barber	Charlie Swank	Wildlife Division	Meade	Aaron Andrews	Fisheries Division
Barton	Karl Grover	Public Lands	Miami	Andy Friesen	Wildlife Division
Bourbon	Justin Harbit	Wildlife Division	Mitchell	Toby Marlier	Public Lands
Brown	Tyler Warner	Wildlife Division	Montgomery	Darin Porter	Public Lands
Cherokee	David Jenkins	Public Lands	Morris	Brent Konen	Public Lands
Cheyenne	Kevin Klag	Wildlife Division	Morton	Kraig Schultz	Wildlife Division
Cloud	Matt Farmer	Public Lands	Neosho	Logan Martin	Wildlife Division
Coffey	Jake Christensen	Wildlife Division	Ness	Aaron Baugh	Wildlife Division
Comanche	Matt Hanvey	Law Enforcement	Norton	Luke Winge	Public Lands
Cowley	Kurt Grimm	Public Lands	Osage	Alex Lyon	Wildlife Division
Decatur	Daniel Howard	Law Enforcement	Osborne	Chris Lecuyer	Public Lands
Dickinson	Clint Thornton	Wildlife Division	Pawnee	Kevin Wood	Law Enforcement
Doniphan	Andrew Page	Public Lands	Phillips	Michael Zajic	Public Lands
Elk	Viki Cikanek	Wildlife Division	Pottawatomie	Corey Alderson	Wildlife Division
Ellis	Mike Nyhoff	Public Lands	Pratt	Jake George	Wildlife Division
Finney	Angie Reisch	Law Enforcement	Rawlins	Cody Faulkender	Wildlife Seasonal
Franklin	Ryan Tewllman	Law Enforcement	Reno	Kyle McDonald	Wildlife Division
Geary	Clint Thornton	Wildlife Division	Republic	Rob Unruh	Public Lands
Gove	Lynn Davigon	Fisheries Division	Rice	Steve Adams	Wildlife Division
Graham	Jake Brooke	Law Enforcement	Rooks	Eric Wiens	Wildlife Division
Gray	Manuel Torres	Public Lands	Rush	Jason Wagner	Wildlife Division
Greeley	Kurt Meier	Wildlife Division	Russell	James Svaty	Wildlife Division
Greenwood	Kent Fricke	Wildlife Division	Saline	Brian Serpan	Wildlife Division
Hamilton	Kurt Meier	Wildlife Division	Scott	Abe Lollar	Wildlife Division
Harvey	Charlie Cope	Wildlife Division	Seward	Jason Vajnar	Fisheries Division
Haskell	Abe Lollar	Wildlife Division	Sheridan	Wes Sowards	Wildlife Division
Hodgeman	Dan Haneke	Law Enforcement	Sherman	Brad Whelchel	Widlife Seasonal
Jackson	Tyler Warner	Wildlife Division	Smith	Brad Odle	Wildlife Division
Jefferson	Andrew Page	Public Lands	Stafford	Charlie Swank	Wildlife Division
Jewell	Luke Kramer	Wildlife Division	Stanton	Kraig Schultz	Wildlife Division
Kearney	Zerick Kuecker	Law Enforcement	Thomas	Wes Sowards	Wildlife Division
Kingman	Troy Smith	Public Lands	Trego	Kent Hensley	Public Lands
Kiowa	Charlie Swank	Wildlife Division	Wabaunsee	Brad Rueschhoff	Wildlife Division
Labette	Rob Roggin	Public Lands	Wallace	Kevin Klag	Wildlife Division
Lane	Jacob Greene	Law Enforcement	Wilson	Bob Funke	Law Enforcement
Logan	Leonard Hopper	Non-KDWPT			

Table 2. Annual regional changes in mean pheasants per mile (P/M), 2016.

Route	2015 P/M	2016 P/M	% Δ	Route	2015 P/M	2016 P/M	% Δ
	Flint Hills				Northern High Plains		
Cowley	0.01	0.00	-100	Cheyenne[a]	NA	0.47	NA
Dickinson	0.29	0.22	-24	Decatur	0.83	0.64	-23
Elk	0.00	0.00	0	Gove	0.09	0.15	58
Geary	0.03	0.00	-100	Graham	0.49	0.55	11
Greenwood	0.00	0.00	0	Greeley[a]	NA	0.32	NA
Marion	0.02	0.01	-33	Lane	0.13	0.52	305
Morris	0.00	0.00	0	Logan	0.02	0.14	500
Pottawatomie	0.00	0.00	0	Norton	0.12	0.24	106
Wabaunsee	0.00	0.00	0	Rawlins	1.57	0.47	-70
Region	**0.04**	**0.03**	**-32**	Scott[a]	NA	1.58	NA
				Sheridan	0.29	0.23	-22
	Glaciated Plains			Sherman	0.73	0.42	-42
Atchison	0.05	0.00	-100	Thomas	0.42	1.00	137
Brown	0.01	0.00	-100	Wallace	0.17	0.06	-64
Doniphan	0.00	0.00	0	**Region**	**0.44**	**0.40**	-9
Jackson	0.01	0.01	-50				
Jefferson	0.00	0.00	0		South-Central Prairies		
Marshall	0.02	0.04	100	Barber	0.09	0.22	150
Region	**0.02**	**0.01**	**-47**	Comanche	0.01	0.00	-100
				Harvey	0.08	0.01	-91
	Smoky Hills			Kingman[a]	0.31	NA	NA
Barton	0.26	0.44	71	Kiowa	0.26	0.25	-3
Cloud	0.25	0.16	-34	Pawnee	0.09	0.26	200
Ellis	0.19	0.03	-86	Pratt	0.48	0.17	-64
Hodgeman	0.31	0.28	-9	Reno	0.23	0.14	-38
Jewell	0.24	0.14	-42	Stafford	0.42	0.14	-66
Mitchell	0.78	0.40	-48	**Region**	**0.21**	**0.15**	**-28**
Ness	0.41	0.31	-25				
Osborne	0.43	0.25	-42		Southern High Plains		
Phillips	0.38	0.31	-19	Finney	0.01	0.15	940
Republic	0.08	0.06	-27	Gray	0.36	0.54	51
Rice	0.86	0.54	-37	Hamilton	0.00	0.19	NA
Rooks	0.35	0.32	-6	Haskell	0.11	0.86	656
Rush	1.00	0.41	-59	Kearny[a]	NA	0.75	NA
Russell	0.46	0.37	-20	Meade	0.25	0.12	-53
Saline	0.05	0.00	-100	Morton	0.07	0.18	160
Smith	0.38	0.33	-12	Seward	1.27	1.33	5
Trego	0.27	0.27	-2	Stanton	0.00	0.23	NA
Region	**0.39**	**0.27**	**-31***	**Region**	**0.26**	**0.45**	**73***
				Statewide	**0.27**	**0.24**	**-10**

* = Significant difference (p < 0.1)

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

[a]Route was not sampled in consecutive years and wasn't included in regional or statewide comparisions

Table 3. Annual regional changes in pheasant chicks per hen (C/H), chicks per brood (C/B), and broods per hen (B/H), 2016.

Region	2015 C/H	2016 C/H	%Δ	2015 C/B	2016 C/B	%Δ	2015 B/H	2016 B/H	%Δ
Flint Hills	4.4	3.8	-12	5.0	5.8	15	0.75	0.67	-11
Glaciated Plains	1.5	5.0	233	3.0	5.0	67	0.25	1.00	300
Northern High Plains	4.9	7.7	56	5.7	5.4	-4	0.47	0.65	40
Osage Cuestas	0.0	0.0	0	5.5	0.0	0	0.00	0.00	0
Smoky Hills	6.0	8.4	39	5.5	5.2	-7	0.79	0.84	7
South-Central Prairies	5.2	4.6	-12	4.9	3.4	-29	0.61	0.63	3
Southern High Plains	5.2	4.5	-13	4.4	4.7	8	0.35	0.50	43
Statewide	5.4	6.4	18	5.2	5.0	-5	0.60	0.64	7

Table 4. Annual regional changes in mean quail per mile (Q/M), 2016.

Route	2015 Q/M	2016 Q/M	% Δ	Route	2015 Q/M	2016 Q/M	% Δ
	Flint Hills				Smoky Hills		
Cowley	0.90	0.56	-38	Barton	0.29	0.56	96
Dickinson	0.14	0.16	21	Cloud	0.25	0.52	111
Elk	0.69	0.12	-82	Ellis	0.12	0.11	-6
Geary	0.28	0.27	-5	Hodgeman	0.01	0.01	0
Greenwood	0.39	0.34	-13	Jewell	0.15	0.56	271
Marion	0.11	0.28	156	Mitchell	0.21	0.32	48
Morris	0.16	0.35	114	Ness	0.18	0.01	-92
Pottawatomie	0.22	0.20	-12	Osborne	0.20	0.33	69
Wabaunsee	0.23	0.04	-84	Phillips	0.04	0.04	0
Region	**0.35**	**0.26**	**-26**	Republic	0.10	0.09	-8
	Glaciated Plains			Rice	0.01	0.01	100
Atchison	0.17	0.19	13	Rooks	0.38	0.04	-90
Brown	0.19	0.26	35	Rush	0.21	0.61	183
Doniphan	0.02	0.00	-100	Russell	0.08	0.05	-42
Jackson	0.05	0.52	863	Saline	0.23	0.18	-22
Jefferson	0.03	0.02	-50	Smith	0.35	0.41	16
Marshall	0.20	0.36	79	Trego	0.09	0.08	-13
Region	**0.11**	**0.22**	**101**	**Region**	**0.17**	**0.23**	**92***
	Northern High Plains				South-Central Prairies		
Cheyenne[a]	NA	0	NA	Barber	0.19	0.66	240
Decatur	0.02	0.19	767	Comanche	0.06	0.46	700
Gove	0.00	0.00	0	Harvey	0.04	0.00	-100
Graham	0.01	0.11	1400	Kingman[a]	0.29	NA	NA
Greeley[a]	NA	0.00	NA	Kiowa	0.76	0.59	-23
Lane	0.01	0.01	0	Pawnee	0.10	0.16	57
Logan	0.00	0.00	0	Pratt	0.04	0.16	360
Norton	0.01	0.22	1400	Reno	0.06	0.66	922
Rawlins	0.00	0.02	NA	Stafford	0.32	0.35	10
Scott[a]	NA	0.00	NA	**Region**	**0.20**	**0.38**	**94***
Sheridan	0.00	0.00	0		Osage Cuestas		
Sherman	0.00	0.00	0	Allen	0.13	0.06	-57
Thomas	0.00	0.00	0	Bourbon	0.09	0.11	31
Wallace	0.00	0.00	0	Cherokee	0.02	0.00	-100
Region	**0.01**	**0.05**	**891***	Coffey	0.39	0.07	-81
	Southern High Plains			Franklin	0.00	0.05	NA
Finney	0.27	0.10	-64	Labette	0.09	0.20	140
Gray	0.01	0.02	200	Miami	0.07	0.01	-85
Hamilton	0.14	1.96	1347	Montgomery	0.21	0.06	-72
Haskell	0.01	0.03	100	Neosho	0.27	0.41	54
Kearny[a]	NA	0.00	NA	Osage	0.34	0.26	-23
Meade	0.14	0.56	296	Wilson	0.07	0.30	324
Morton	0.02	0.01	-33	**Region**	**0.15**	**0.14**	**-8**
Seward	0.31	0.29	-7				
Stanton	0.04	0.15	250	**Statewide**	**0.16**	**0.23**	**45***
Region	**0.12**	**0.39**	231				

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

[a]Route was not sampled in consecutive years and wasn't included in regional or statewide comparisions

Table 5. Annual regional changes in quail chick per adult (C/A), chicks per brood (C/B), and broods/adult, 2016.

Region	2015 C/A	2016 C/A	%Δ	2015 C/B	2016 C/B	%Δ	2015 B/A	2016 B/A	%Δ
Flint Hills	2.4	1.9	-22	7.7	8.6	11	0.22	0.19	-15
Glaciated Plains	1.1	3.6	229	9.0	9.4	4	0.07	0.26	250
Northern High Plains	1.0	4.0	300	2.0	8.6	329	0.25	0.33	33
Osage Cuestas	1.2	1.3	8	7.2	7.6	5	0.12	0.14	10
Smoky Hills	2.7	2.7	0	9.1	8.9	-3	0.18	0.18	-2
South-Central Prairies	2.3	2.4	8	10.9	7.8	-28	0.20	0.22	14
Southern High Plains	3.8	4.9	29	8.2	10.2	25	0.15	0.17	10
Statewide	2.2	2.6	18	8.5	8.8	3	0.17	0.19	9

Table 6. Annual regional changes in mean turkey per mile (T/M), 2016.

Route	2015 T/M	2016 T/M	[a]% Δ	Route	2015 T/M	2016 T/M	% Δ
	Northeast				Northcentral		
Atchison	0.18	0.04	-75	Barton	0.24	0.15	-37
Brown	0.13	0.21	61	Cloud	1.53	0.42	-73
Dickinson	0.33	0.19	-43	Ellis	0.29	0.07	-75
Doniphan	0.25	0.08	-69	Jewell	0.61	0.93	51
Franklin	0.32	0.09	-71	Mitchell	0.59	0.25	-58
Geary	0.49	0.99	101	Osborne	0.22	0.30	41
Jackson	0.19	0.72	279	Phillips	0.61	0.27	-55
Jefferson	0.19	0.24	28	Republic	0.02	0.12	433
Marshall	0.31	0.25	-19	Rooks	0.16	0.15	-9
Morris	0.75	0.31	-59	Rush	0.29	0.11	-63
Osage	0.51	0.49	-3	Russell	0.50	0.13	-75
Pottawatomie	0.34	0.10	-71	Saline	0.52	0.27	-48
Wabaunsee	0.48	0.31	-34	Smith	0.49	0.36	-28
Region	**0.34**	**0.31**	**-10**	**Region**	**0.47**	**0.27**	**-42***
	Northwest				Southcentral		
Cheyenne	NA	0.40	NA	Barber	0.17	0.18	2
Decatur	0.14	0.21	47	Comanche	0.00	0.00	NA
Graham	0.10	0.00	-100	Harvey	1.20	0.26	-78
Norton	0.09	0.12	33	Kingman	0.39	NA	NA
Rawlins	0.34	0.44	28	Kiowa	0.00	0.00	0
Sheridan	0.00	0.22	NA	Meade	0.02	0.00	-100
Sherman	0.04	0.00	-100	Pawnee	0.07	0.26	260
Thomas	0.27	0.13	-50	Pratt	0.00	0.00	NA
Region	**0.14**	**0.16**	**14**	Reno	0.32	1.21	278
	Southwest			Rice	0.81	0.15	-82
Finney	0.10	0.03	-71	Stafford	0.65	0.49	-25
Gove	0.00	0.00	0	**Region**	**0.32**	**0.25**	**-22**
Gray	0.00	0.00	0		Southeast		
Greeley	NA	0.00	NA	Allen	0.00	0.08	NA
Hamilton	0.08	0.00	-100	Bourbon	0.05	0.08	71
Haskell	0.00	0.00	0	Cherokee	0.19	0.15	-20
Hodgeman	0.05	0.10	100	Coffey	0.10	0.00	-100
Kearny[a]	NA	0.00	NA	Cowley	0.15	0.28	79
Lane	0.00	0.00	0	Elk	0.19	0.10	-50
Logan	0.00	0.00	0	Greenwood	0.13	0.10	-20
Morton	0.00	0.00	0	Labette	0.18	0.25	42
Ness	0.07	0.19	189	Marion	0.28	0.11	-60
Scott[a]	NA	0.00	NA	Miami	0.06	0.34	490
Seward	0.00	0.00	0	Montgomery	0.29	0.03	NA
Stanton	0.00	0.01	NA	Neosho	0.27	0.16	-38
Trego	0.00	0.00	0	Wilson	0.51	0.30	-41
Wallace	0.22	0.09	-58	**Region**	**0.18**	**0.15**	**-18**
Region	**0.04**	**0.03**	**-19**	**Statewide**	**0.25**	**0.19**	**-23***

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

[a]Route was not sampled in consecutive years and wasn't included in regional or statewide comparisions

Table 7. Annual regional changes in turkey poults per hen (P/H), poults per brood (P/B), and broods per hen (B/H), 2016.

Region	2015 P/H	2016 P/H	%Δ	2015 P/B	2016 P/B	%Δ	2015 B/H	2016 B/H	%Δ
Northcentral	1.7	1.4	-16	5.5	4.5	-19	0.30	0.32	6
Northeast	1.6	0.7	-52	5.6	5.1	-9	0.28	0.13	-54
Northwest	0.2	2.3	1077	5.0	4.8	-4	0.04	0.45	1077
Southcentral	2.6	0.9	-66	5.8	6.4	11	0.42	0.13	-69
Southeast	1.8	1.1	-35	5.6	4.9	-12	0.30	0.22	-26
Southwest	1.1	0.0	-100	4.3	0.0	-100	0.13	0.00	-100
Statewide	1.7	1.1	-37	5.6	5.0	-10	0.29	0.20	-30

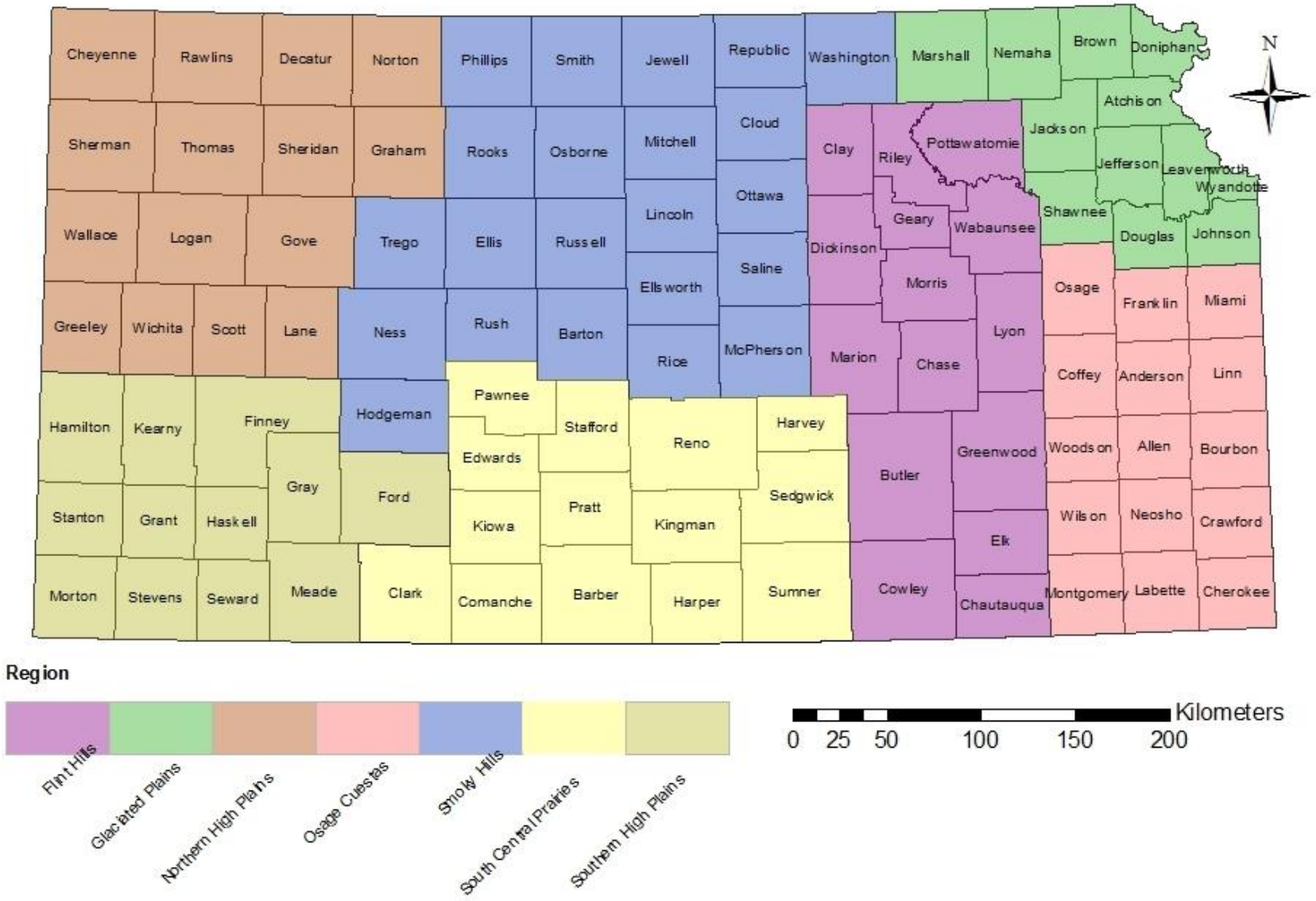

Figure 1. Kansas Small Game Regions.

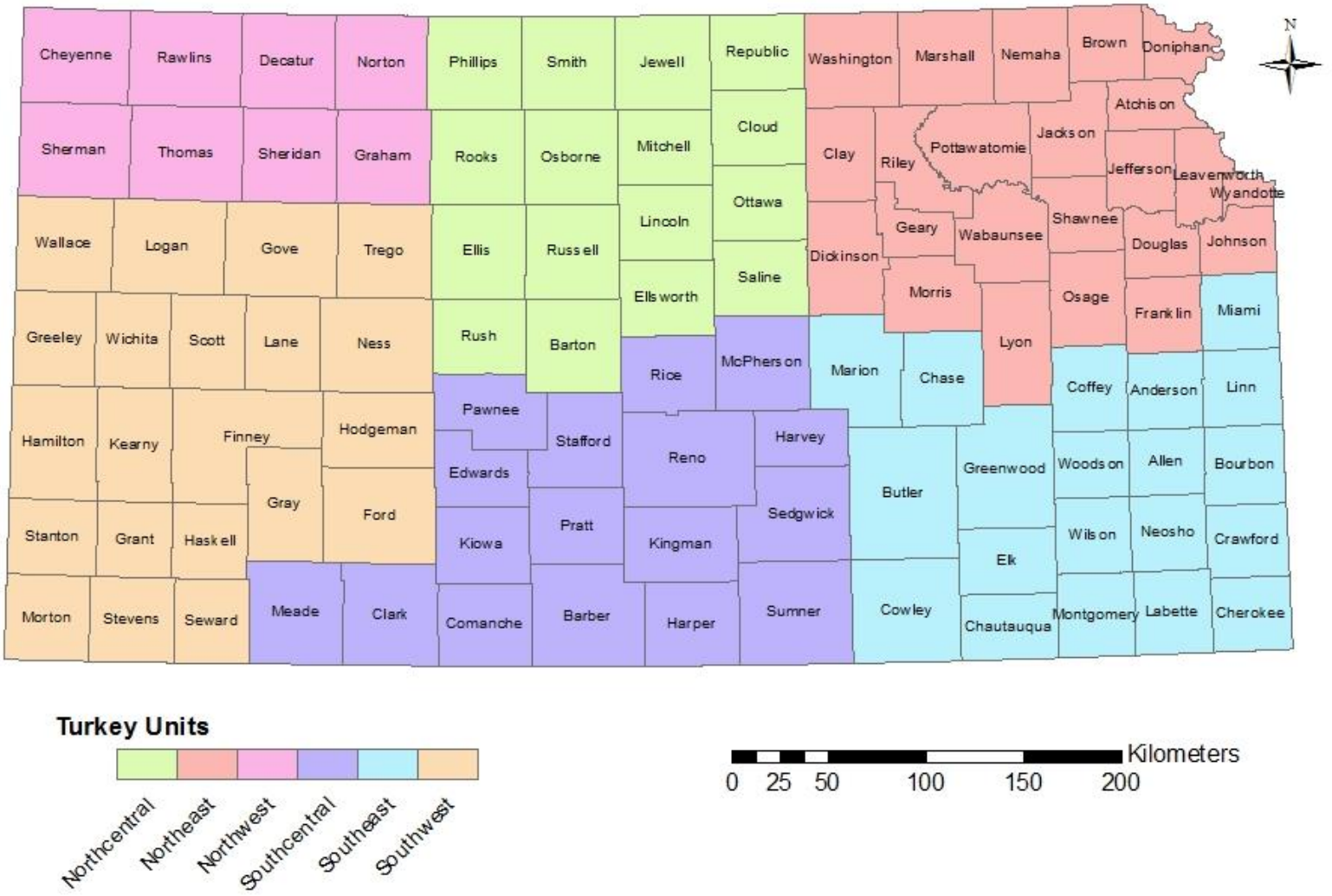

Figure 2. Turkey Management Regions.

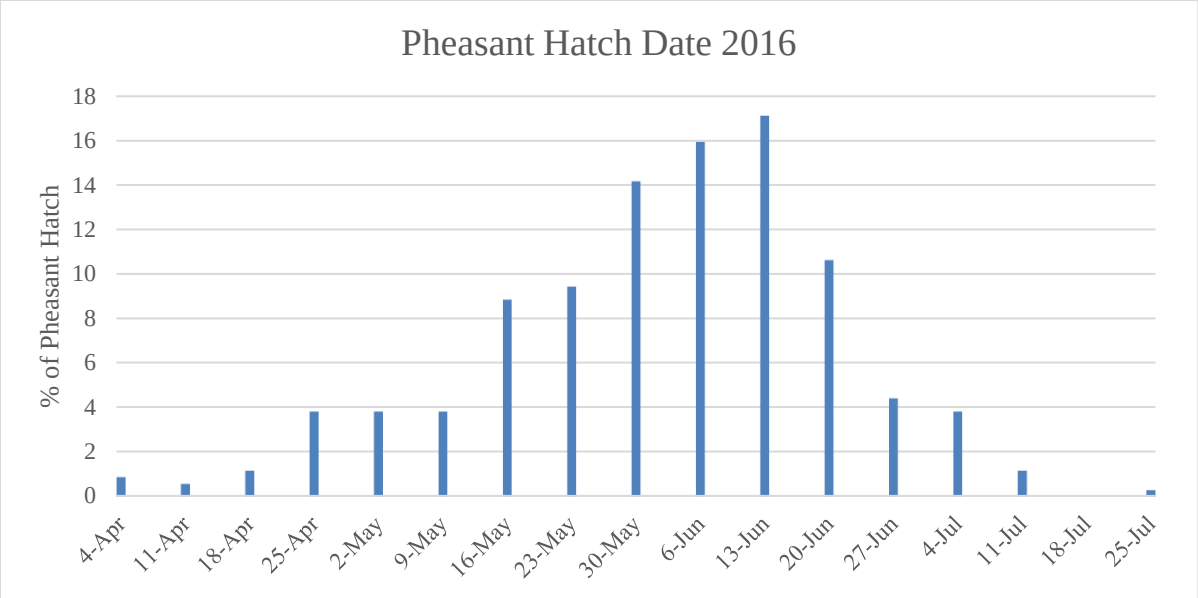

Figure 3. Weekly hatch dates of pheasant broods estimated from age at detection.

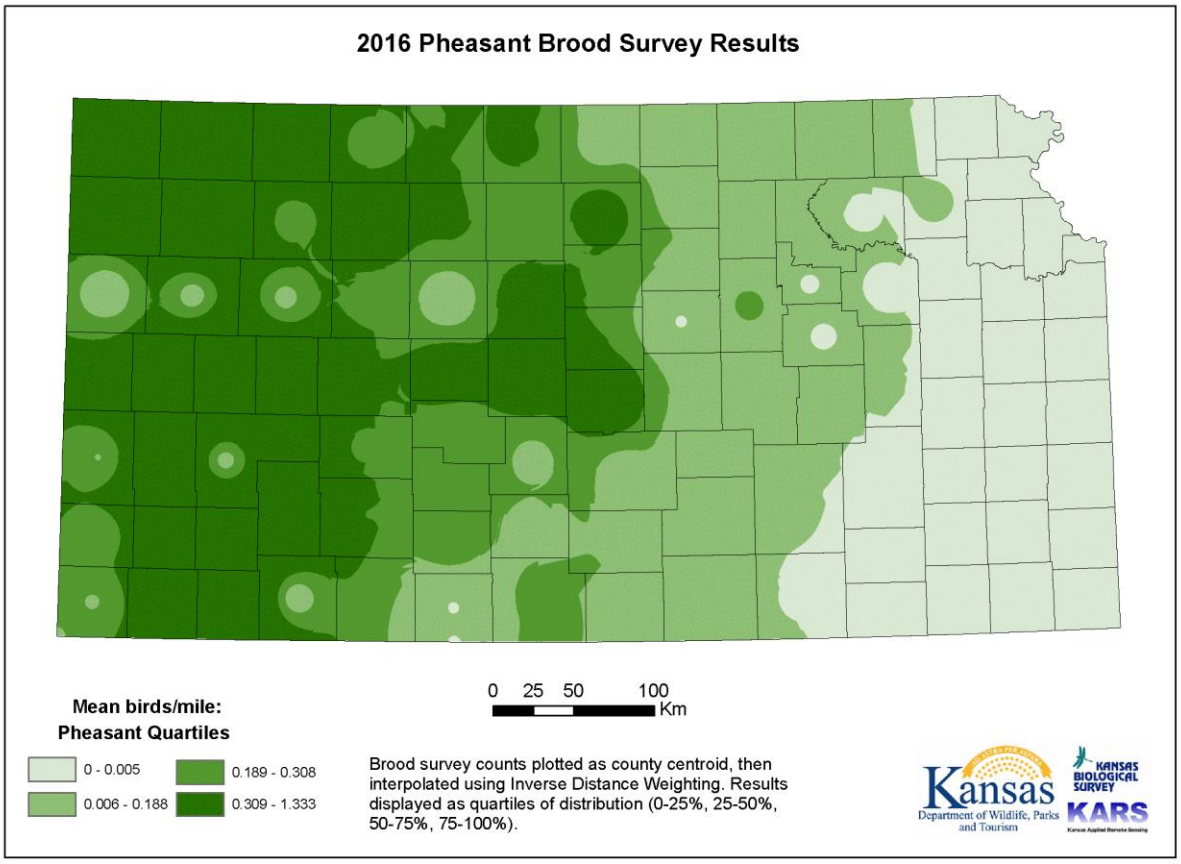

Figure 4. Relative pheasant densities recorded from brood survey routes in Kansas, 2016.

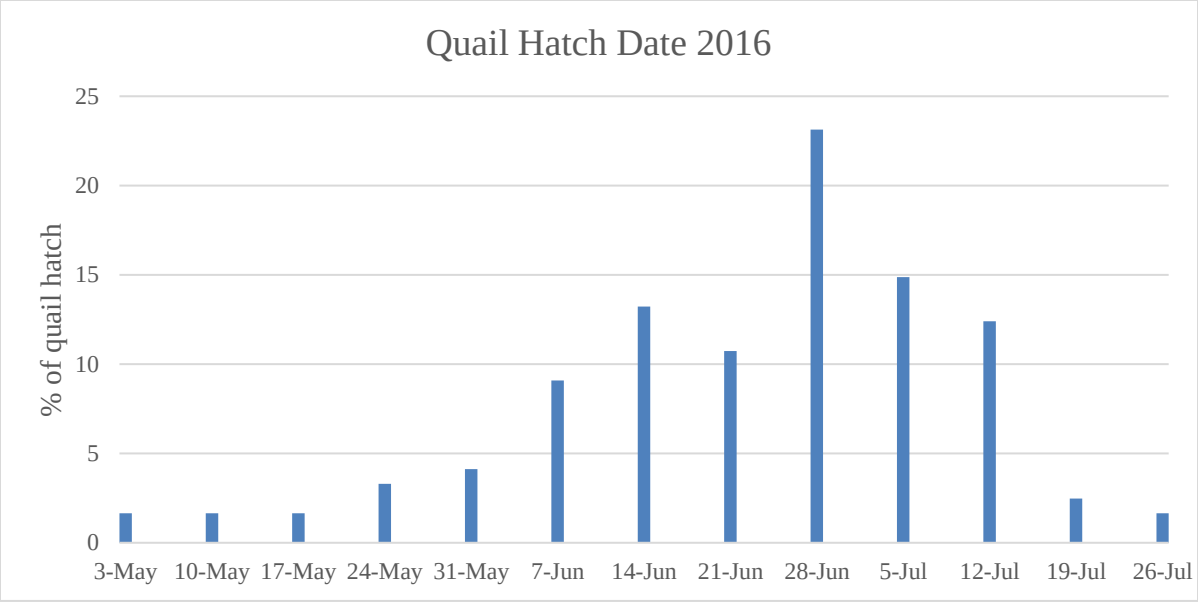

Figure 5. Weekly hatch dates of quail broods estimated from age at detection.

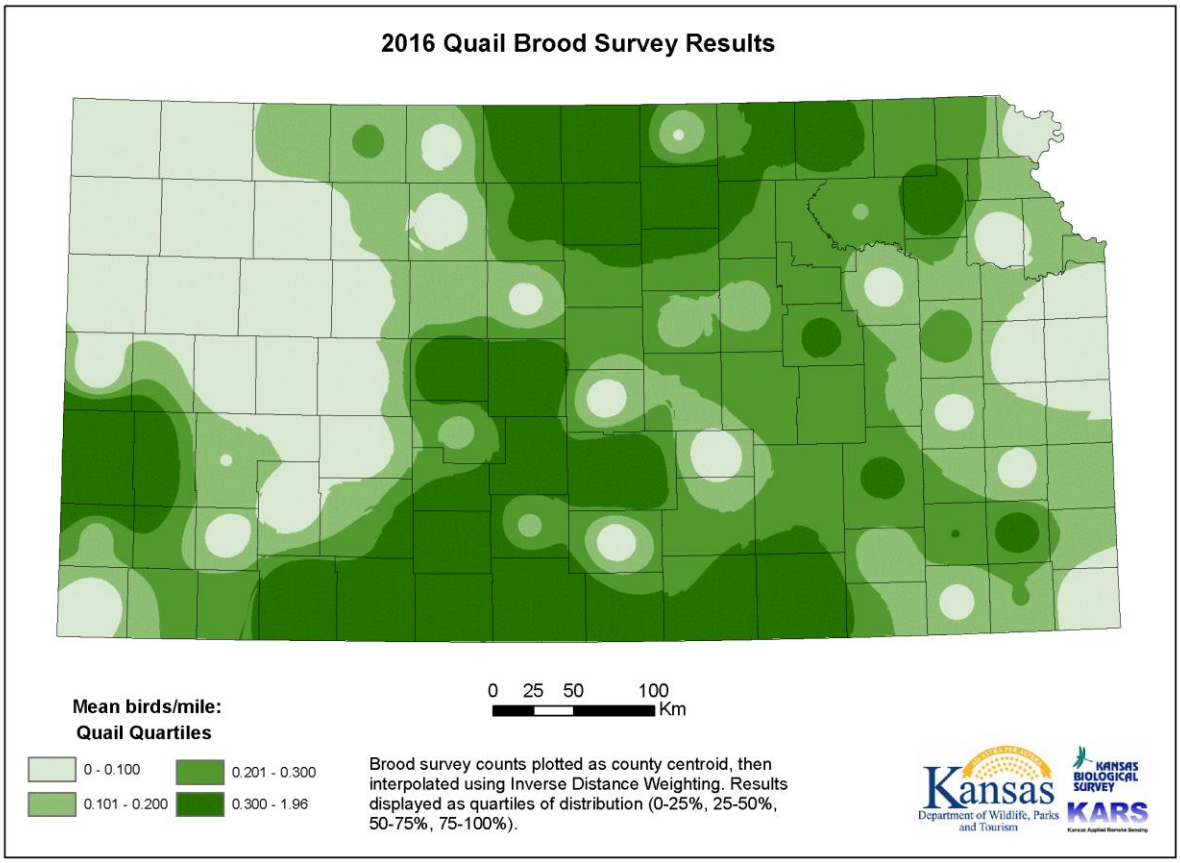

Figure 6. Relative quail densities recorded from brood survey routes in Kansas, 2016.

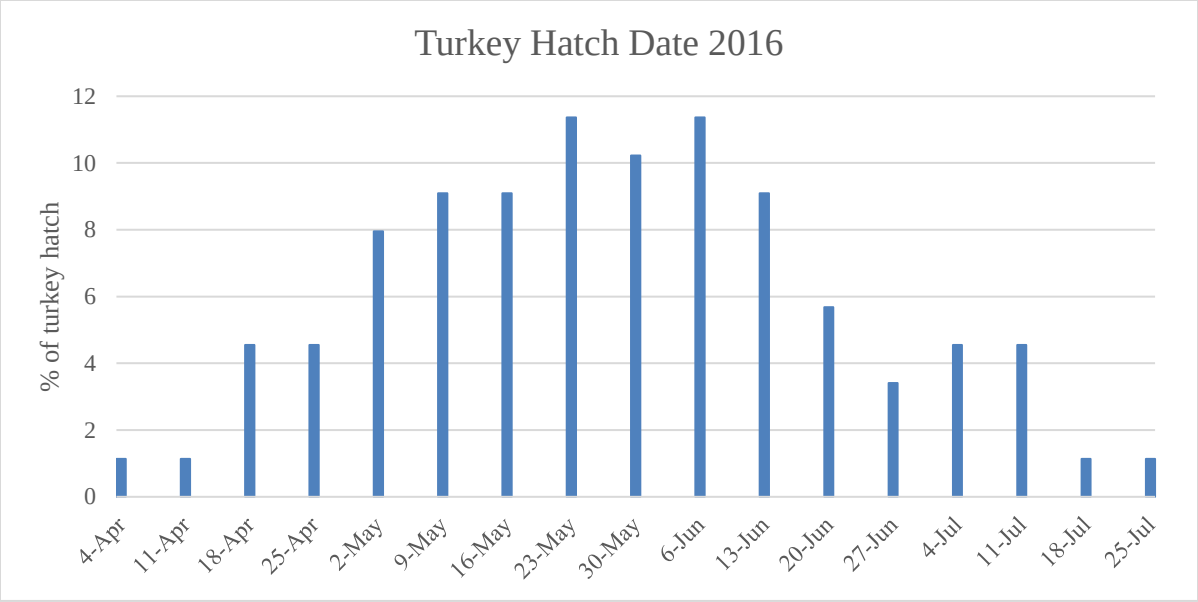

Figure 7. Weekly hatch dates of turkey broods estimated from age at detection.

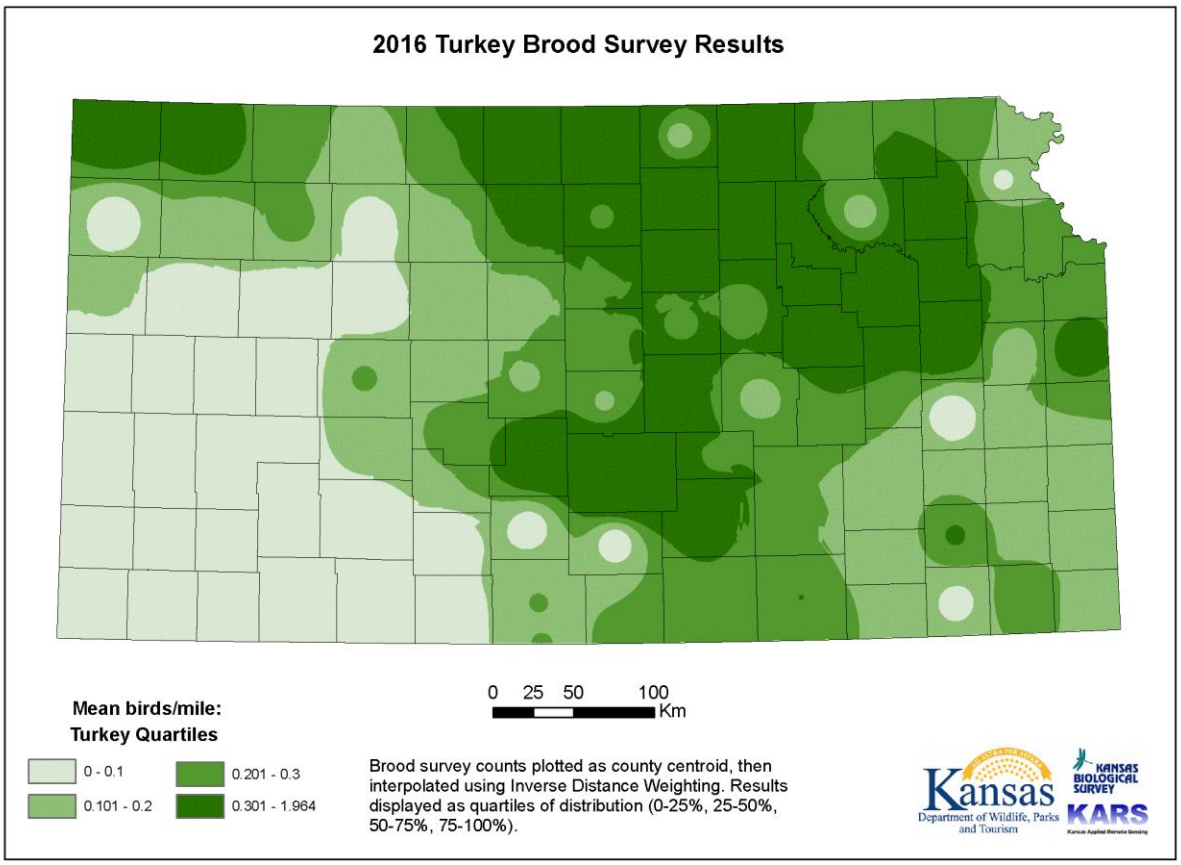

Figure 8. Relative turkey densities recorded from brood survey routes in Kansas, 2016.

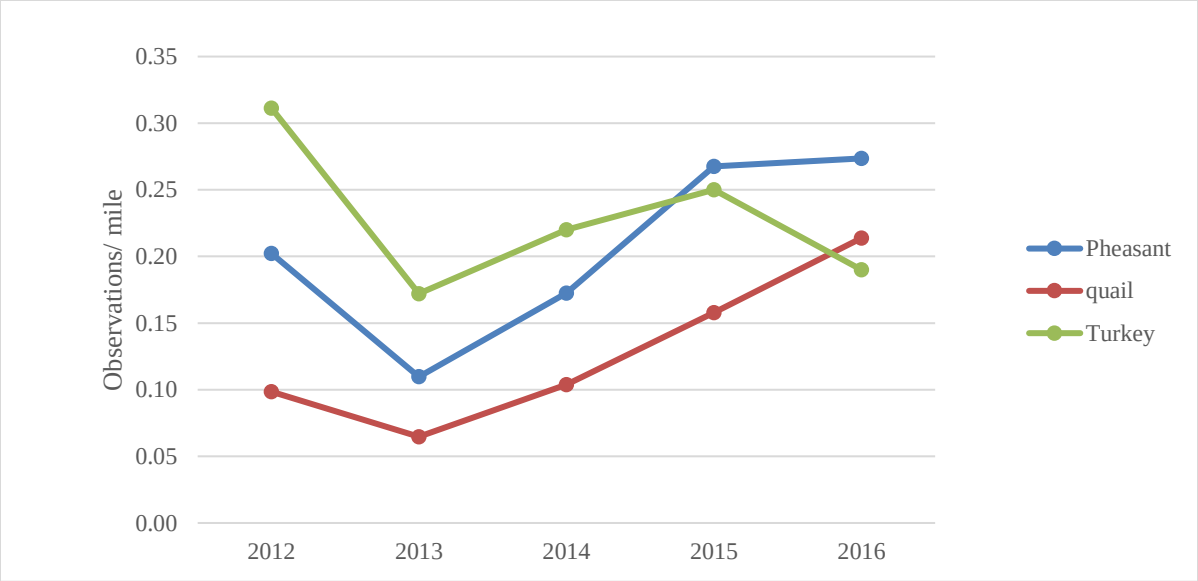

Figure 9. Changes in the statewide birds/mile for Pheasant, quail, and turkey since 2012.