QUAIL, PHEASANT, & TURKEY BROOD SURVEY - 2015

Performance Report

A Contribution in Part of Pittman-Robertson
Federal Aid in Wildlife Restoration
Grant W-39-R-22

KANSAS DEPARTMENT OF WILDLIFE, PARKS, and TOURISM

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September 2015

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QUAIL, PHEASANT, AND TURKEY BROOD SURVEY RESULTS – 2015

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 2015 summer brood survey were from July 19 – August 29 (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 71 of the 73 established routes between July 15 and September 1 (Table 1). Road conditions and personnel changes led to 5 of the 73 routes not being sampled 4 times. The Allen, Cherokee, Cloud, Comanche, county routes were sampled 3 times each and the Rawlins 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 was a statistically significant increase in the statewide density of pheasants (51%) compared to 2014. Statistically significant increases also occurred within the Northern High Plains (130%) and the South Central Prairies (67%) regions (Table 2). Pheasant per mile was highest in the Northern High Plains with the highest index in Rawlins 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 2014index. No pheasants were detected in the Osage Cuestas.

Statewide production indices were relatively similar this year compared to 2014 (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 greatly improved in the Northern High Plains and South-Central Prairies regions, indicating higher productivity in these regions (Table 3). Despite slight decreases in many regions, brood/hen ratios remained relatively high across most of the pheasant regions (Table 3). Pheasant hatch peaked toward the first week of June (Figure 3). Pheasant densities will generally be highest in north-west and central Kansas during the fall of 2015 (Figure 4).

Quail

There was a statistically significant increase in the statewide density of quail (48%) compared to 2014. Statistically significant increases also occurred within the Smoky Hills (92%) and the Southern High Plains (297%) regions (Table 4). Extremely large increases were observed on several routes across the state. This can largely be explained by areas where densities had become extremely low during the recent weather induced population declines and rebounded to good densities. Quail densities were greatest in the Flint Hills and South-Central Prairie regions, with the highest densities recorded in Cowley County (Table 4). Scaled quail were only recorded on the Stanton county route this year.

All statewide production indices remained relatively similar compared to 2014 (Table 5). The chicks/adult ratio was highest in the Southern High Plains showing great improvements from 2014 (Table 5). Chicks/brood was highest in the South-Central Prairies, but was good across all the primary quail regions (Table 5). Quail hatch peaked in late June/early July (Figure 5). The highest quail densities will generally be in the Flint Hills and South Central Prairies during the fall of 2015 (Figure 6).

Turkey

There was a non-significant increase in the statewide index of turkeys compared to 2014. The Southwest region was the only region that showed a significant increase, however, despite this increase, the density of turkeys remained extremely lower than any of the other 5 regions (Table 6). Large changes were observed on some routes; however apparent regional changes could have been solely due to variability associated with the sampling scheme. The North-Central region had the highest index this year with relatively good densities also being observed in the Northeast, Southeast, and South-Central. The counties with the highest indices were Cloud and Harvey (Table 6).

The statewide production ratios were similar to 2014 (Table 7). The Northwest region had the lowest regional poult:hen index densities being much lower than in 2014. In contrast, production rates in the Southwest region increased from 2014 (Table 7). Production appeared to be slightly better in the North-Central and decreased slightly in the Southeast from 2014 (Table 7). The highest poult/hen ratios were in the South-Central region (Table 7). Turkey hatch peaked at the end of May (Figure 7). The highest turkey densities will generally be found in Northcentral Kansas during fall 2015 (Figure 8).

DISCUSSION

Several years of severe drought has had its impact on upland game populations in Kansas. Pheasants have been hurt most by the drought conditions, especially in the high plains of western Kansas. While quail initially saw declines in the west, conditions were very good for production across the state in 2014 and resulted in better quail densities. Game birds are known for their explosive reproductive potential under good conditions. With the spring precipitation greatly improving conditions across much of the state, some areas experienced this explosive reproductive output with large improvements on routes and in regions.

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 near all time lows. Conditions in 2014 were improved and as a result pheasant harvest in KS increased, but remained well below average. Increases in pheasant populations across most of the major pheasant regions should result in improvements in harvest this year, although 2015 will likely be another below average season. The Northern high plains showed the greatest improvement compared to 2014 with densities increasing 130%, although the southern portion of this region remained low. The best hunting areas will be Northern High plains and in central Kansas along the border of the Smoky Hills/South Central Prairies regions with good to fair opportunities scattered throughout other regions (Figure 4). Despite large increases, given the limited breeding populations, pheasant densities will remain below average across most of western Kansas this year.

In recent years, Kansas has harvested more wild bobwhites than any other state. Quail had been steadily declining as drought conditions were unfavorable for production throughout much of the western portion of the state. Bobwhites in eastern Kansas fared well during the drought and precipitation in mid-May and early June of 2014 created excellent conditions for production statewide. Statewide spring breeding populations were the highest they have been in several years with all regions being at or above long-term averages. Nesting conditions were good across most of the state this year, however heavy rainfall in the Northeast and Southeast portion of the state limited brood survival in these areas. The Flint Hills showed the highest densities this year with good regional densities also being found in the South-Central Prairies and the Smoky Hills (Figure 6). There should be good hunting opportunities across the state this year where appropriate habitat exists (Figure 6).

Turkey populations in eastern Kansas had been responding relatively well to drought conditions, but heavy precipitation this summer appears to have reduced production this year. While precipitation in the western regions improved conditions, timing of rainfall in the Northwest region appears to have limited production in this area. Densities and production in the Southwest were much better, but populations were extremely limited to start with and relative densities remain low compared to other regions (Table 4 & 7). Portions of the North-Central and Northeast regions will have the highest densities this fall.

Table 1. Upland game bird brood routes and observers in Kansas, 2015.

Route	Observer	Position	Route	Observer	Position
Allen	Jason Deal	Public Lands	Marshall	Megan Smith	Biologist
Atchison	Tim Urban	Biologist	Meade	Aaron Andrews[a]	Fisheries
Barber	Kyle Austin[a]	Biologist	Miami	Andy Friesen	Biologist
Barton	Karl Grover	Public Lands	Mitchell	Toby Marlier	Public Lands
Bourbon	Justin Harbit	Biologist	Montgomery	Darin Porter	Public Lands
Brown	Tyler Warner	Biologist	Morris	Brent Konen	Public Lands
Cherokee	David Jenkins	Public Lands	Morton	Kraig Schultz	Biologist
Cloud	Matt Farmer	Public Lands	Neosho	Logan Martin	Biologist
Coffey	Bob Culbertson	Biologist	Ness	Aaron Baugh	Biologist
Comanche	Matt Hanvey	Law Enforcement	Norton	Blake Klema	Public Lands
Cowley	Kurt Grimm	Public Lands	Osage	Alex Lyon[a]	Public Lands
Decatur	Daniel Howard[a]	Law Enforcement	Osborne	Chris Lecuyer	Public Lands
Dickinson	Clint Thornton	Biologist	Pawnee	Kevin Wood	Law Enforcement
Doniphan	Kirk Thompson	Public Lands	Phillips	Michael Zajic	Public Lands
Elk	Pat Riese	Biologist	Pottawatomie	Corey Alderson	Biologist
Ellis	Mike Nyhoff	Public Lands	Pratt	Jake George	Biologist
Finney	Abe Loller[a]	Biologist	Rawlins	Mitch Falls[a]	Law Enforcement
Franklin	Jeff Cakin	Law Enforcement	Reno	Kyle McDonald	Biologist
Geary	Clint Thornton	Biologist	Republic	Rob Unruh	Public Lands
Gove	Owen Johnson	Law Enforcement	Rice	Steve Adams	Biologist
Graham	Jake Brooke	Law Enforcement	Rooks	Jeff Prendergast[a]	Biologist
Gray	Manuel Torres	Public Lands	Rush	Jason Wagner	Biologist
Greenwood	Eric Wiens[a]	Biologist	Russell	Viki Cikanek	Biologist
Hamilton	Abe Loller[a]	Biologist	Saline	Matt Smith	Biologist
Harvey	Charlie Cope	Biologist	Scott	Brent Clark[a]	Public Lands
Haskell	Angie Reisch[a]	Law Enforcement	Seward	Jason Vajnar	Fisheries
Hodgeman	Dan Haneke	Law Enforcement	Sheridan	Wes Sowards[a]	Biologist
Jackson	Tyler Warner	Law Enforcement	Sherman	Kurt Meier	Biologist
Jefferson	Andrew Page	Public Lands	Smith	Adam Pack[a]	Biologist
Jewell	Luke Kramer	Biologist	Stafford	Charlie Swank[a]	Biologist
Kearney	Kurt Hudson	Law Enforcement	Stanton	Kraig Schultz	Biologist
Kingman	Troy Smith	Public Lands	Thomas	Wes Sowards	Biologist
Kiowa	Charlie Swank	Biologist	Trego	Kent Hensley	Public Lands
Labette	Rob Roggin	Public Lands	Wabaunsee	Brad Rueschhoff	Biologist
Lane	Anna Esch[a]	Volunteer (PF)	Wallace	Kurt Meier	Biologist
Logan	Leonard Hopper	Volunteer	Wilson	Bob Funke	Law Enforcement
Marion	Jeff Rue	Biologist			

[a]New observer in 2015

Table 2. Annual regional changes in mean pheasants per mile (P/M), 2015.

Route	2014 P/M	2015 P/M	% Δ
	Flint Hills		
Cowley	0.01	0.01	0
Dickinson	0.54	0.29	-46
Elk	0.00	0.00	0
Geary	0.01	0.03	100
Greenwood	0.00	0.00	0
Marion	0.11	0.02	-81
Morris	0.00	0.00	0
Pottawatomie	0.00	0.00	0
Wabaunsee	0.00	0.00	0
Region	**0.07**	**0.04**	**-48**
	Glaciated Plains		
Atchison	0.01	0.05	250
Brown	0.00	0.01	NA
Doniphan	0.00	0.00	NA
Jackson	0.00	0.01	NA
Jefferson	0.00	0.00	NA
Marshall	0.07	0.02	-70
Region	**0.01**	**0.02**	**9**
	Smoky Hills		
Barton	0.33	0.26	-22
Cloud	0.15	0.25	63
Ellis	0.10	0.19	93
Hodgeman	0.13	0.31	150
Jewell	0.58	0.24	-59
Mitchell	1.01	0.78	-23
Ness	0.30	0.41	37
Osborne	0.43	0.43	2
Phillips	0.16	0.38	136
Republic	0.16	0.08	-48
Rice	0.50	0.86	71
Rooks	0.49	0.35	-29
Rush	0.26	1.00	289
Russell	0.04	0.46	1067
Saline	0.22	0.05	-77
Smith	0.21	0.38	83
Trego	0.13	0.27	119
Region	**0.31**	**0.39**	**29**
	Northern High Plains		
Decatur	0.33	0.83	151
Gove	0.07	0.09	33
Graham	0.35	0.49	43
Lane	0.12	0.13	10
Logan	0.14	0.02	-83
Norton	0.06	0.12	100
Rawlins	0.25	1.57	525
Scott[a]	0.02	NA	NA
Sheridan	0.13	0.29	120
Sherman	0.32	0.73	129
Thomas	0.35	0.42	20
Wallace	0.01	0.17	2400
Region	**0.19**	**0.44**	**130***
	South-Central Prairies		
Barber	0.01	0.09	1180
Comanche	0.00	0.01	NA
Harvey	0.12	0.08	-38
Kingman	0.19	0.31	63
Kiowa	0.19	0.26	38
Pawnee	0.05	0.09	71
Pratt	0.37	0.48	29
Reno	0.15	0.23	52
Stafford	0.09	0.42	357
Region	**0.13**	**0.22**	**67***
	Southern High Plains		
Finney	0.00	0.01	NA
Gray	0.19	0.36	91
Hamilton	0.00	0.00	0
Haskell	0.29	0.11	-61
Kearny[a]	0.02	NA	NA
Meade	0.21	0.25	19
Morton	0.00	0.07	NA
Seward	0.71	1.27	79
Stanton	0.01	0.00	-100
Region	**0.18**	**0.26**	**47**
Statewide	**0.18**	**0.27**	**51***

* = 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), 2015.

Region	2014 C/H	2015 C/H	%Δ	2014 C/B	2015 C/B	%Δ	2014 B/H	2015B/H	%Δ
Flint Hills	5.1	4.4	-15	6.4	5.0	-22	0.80	0.75	-6
Glaciated Plains	2.3	1.5	-36	3.5	3.0	-14	0.33	0.25	-25
Northern High Plains	4.4	4.9	11	5.2	5.7	9	0.57	0.47	-18
Osage Cuestas	0.0	0.0	0	0.0	5.5	0	0.00	0.00	0
Smoky Hills	7.5	6.0	-20	5.5	5.5	1	0.89	0.79	-11
South-Central Prairies	4.7	5.2	12	4.5	4.9	8	0.59	0.61	3
Southern High Plains	5.4	5.2	-4	3.6	4.4	20	0.50	0.35	-30
Statewide	5.9	5.4	-8	5.0	5.2	4	0.70	0.60	-15

Table 4. Annual regional changes in mean quail per mile (Q/M), 2015.

Route	2014 Q/M	2015 Q/M	% Δ	Route	2014 Q/M	2015 Q/M	% Δ
	Flint Hills				Smoky Hills		
Cowley	0.71	0.90	27	Barton	0.13	0.29	118
Dickinson	0.26	0.14	-47	Cloud	0.11	0.25	117
Elk	0.53	0.69	NA	Ellis	0.10	0.12	20
Geary	0.17	0.28	68	Hodgeman	0.00	0.01	0
Greenwood	0.32	0.39	19	Jewell	0.30	0.15	-51
Marion	0.22	0.11	-48	Mitchell	0.35	0.21	-40
Morris	0.01	0.16	2100	Ness	0.00	0.18	NA
Pottawatomie	0.02	0.22	1000	Osborne	0.09	0.20	107
Wabaunsee	0.22	0.23	3	Phillips	0.01	0.04	150
Region	**0.27**	**0.35**	**27**	Republic	0.17	0.10	-43
	Glaciated Plains			Rice	0.07	0.01	NA
Atchison	0.01	0.17	1050	Rooks	0.02	0.38	1460
Brown	0.24	0.19	-19	Rush	0.01	0.21	1400
Doniphan	0.13	0.02	-83	Russell	0.01	0.08	1100
Jackson	0.05	0.05	0	Saline	0.00	0.23	NA
Jefferson	0.13	0.03	-76	Smith	0.11	0.35	233
Marshall	0.16	0.20	22	Trego	0.00	0.09	NA
Region	**0.12**	**0.11**	**-9**	**Region**	**0.09**	**0.17**	**92***
	Northern High Plains				South-Central Prairies		
Decatur	0.00	0.02	NA	Barber	0.01	0.19	1340
Gove	0.00	0.00	0	Comanche	0.10	0.06	NA
Graham	0.00	0.01	0	Harvey	0.01	0.04	650
Lane	0.00	0.01	0	Kingman	0.18	0.29	64
Logan	0.00	0.00	0	Kiowa	0.00	0.76	NA
Norton	0.10	0.01	-86	Pawnee	0.00	0.10	NA
Rawlins	0.00	0.00	0	Pratt	0.09	0.04	-62
Scott[a]	0.00	NA	NA	Reno	0.30	0.06	-79
Sheridan	0.00	0.00	0	Stafford	0.00	0.32	NA
Sherman	0.00	0.00	0	**Region**	**0.08**	**0.21**	**169**
Thomas	0.00	0.00	0		Osage Cuestas		
Wallace	0.00	0.00	0	Allen	0.55	0.13	-76
Region	**0.01**	**0.01**	**-46**	Bourbon	0.08	0.09	8
	Southern High Plains			Cherokee	0.17	0.02	-87
Finney	0.19	0.27	41	Coffey	0.36	0.39	7
Gray	0.00	0.01	NA	Franklin	0.07	0.00	-100
Hamilton	0.01	0.14	850	Labette	0.03	0.09	181
Haskell	0.00	0.01	0	Miami	0.05	0.07	63
Kearny[a]	0.00	0.00	0	Montgomery	0.16	0.21	34
Meade	0.01	0.14	0	Neosho	0.24	0.27	8
Morton	0.00	0.02	0	Osage	0.00	0.34	NA
Seward	0.02	0.31	1267	Wilson	0.15	0.07	-54
Stanton	0.00	0.04	NA	**Region**	**0.17**	**0.15**	**-11**
Region	**0.03**	**0.12**	**297***	**Statewide**	**0.11**	**0.16**	**48***

*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, 2015.

Region	2014 C/A	2015 C/A	%Δ	2014 C/B	2015 C/B	%Δ	2014 B/A	2015 B/A	%Δ
Flint Hills	2.8	2.4	-13	10.2	7.7	-24	0.15	0.22	45
Glaciated Plains	1.8	1.1	-40	6.9	9.0	31	0.12	0.07	-38
Northern High Plains	0.0	1.0	NA	14.0	2.0	-86	0.00	0.25	NA
Osage Cuestas	1.7	1.2	-28	9.3	7.2	-23	0.14	0.12	-13
Smoky Hills	2.9	2.7	-7	8.3	9.1	10	0.23	0.18	-20
South-Central Prairies	2.6	2.3	-13	10.0	10.9	9	0.11	0.20	76
Southern High Plains	0.6	3.8	585	5.5	8.2	48	0.00	0.15	NA
Statewide	2.2	2.2	-3	9.1	8.5	-7	0.15	0.17	19

Table 6. Annual regional changes in mean turkey per mile (T/M), 2015.

Route	2014 T/M	2015 T/M	[a]% Δ	Route	2014 T/M	2015 T/M	% Δ
	Northeast				Northcentral		
Atchison	0.33	0.18	-47	Barton	0.00	0.24	NA
Brown	0.30	0.13	-56	Cloud	0.64	1.53	140
Dickinson	0.14	0.33	142	Ellis	0.20	0.29	47
Doniphan	0.01	0.25	1600	Jewell	1.21	0.61	-49
Franklin	0.03	0.32	1025	Mitchell	0.13	0.59	344
Geary	0.65	0.49	-24	Osborne	0.21	0.22	3
Jackson	0.43	0.19	-56	Phillips	0.12	0.61	419
Jefferson	0.20	0.19	-7	Republic	0.17	0.02	-87
Marshall	0.42	0.31	-27	Rooks	0.18	0.16	-11
Morris	0.53	0.75	42	Rush	0.02	0.29	1233
Osage	1.46	0.51	-65	Russell	0.02	0.50	2433
Pottawatomie	0.13	0.34	168	Saline	0.89	0.52	-42
Wabaunsee	0.30	0.48	60	Smith	0.44	0.49	14
Region	**0.38**	**0.34**	**-9**	**Region**	**0.32**	**0.47**	44
	Northwest				Southcentral		
Decatur	0.10	0.14	46	Barber	0.00	0.17	NA
Graham	0.06	0.10	63	Comanche	0.00	0.00	NA
Norton	0.25	0.09	-65	Harvey	0.88	1.20	36
Rawlins	0.45	0.34	-24	Kingman	0.26	0.39	49
Sheridan	0.10	0.00	-100	Kiowa	0.00	0.00	0
Sherman	0.00	0.04	NA	Meade	0.06	0.02	-75
Thomas	0.00	0.27	NA	Pawnee	0.14	0.07	-50
Region	**0.14**	**0.14**	**2**	Pratt	0.00	0.00	0
	Southwest			Reno	0.41	0.32	-22
Finney	0.00	0.10	NA	Rice	0.69	0.81	18
Gove	0.00	0.00	0	Stafford	0.16	0.65	296
Gray	0.00	0.00	0	**Region**	**0.24**	**0.33**	**39**
Hamilton	0.00	0.08	NA		Southeast		
Haskell	0.00	0.00	0	Allen	0.03	0.00	-100
Hodgeman	0.06	0.05	-22	Bourbon	0.16	0.05	-71
Kearny[a]	0.00	NA	NA	Cherokee	0.23	0.19	-17
Lane	0.00	0.00	0	Coffey	0.11	0.10	-7
Logan	0.00	0.00	0	Cowley	0.26	0.15	-42
Morton	0.00	0.00	0	Elk	0.26	0.19	-27
Ness	0.00	0.07	NA	Greenwood	0.13	0.13	0
Scott[a]	0.00	NA	NA	Labette	0.11	0.18	55
Seward	0.00	0.00	0	Marion	0.33	0.28	-15
Stanton	0.00	0.00	0	Miami	0.71	0.06	-92
Trego	0.00	0.00	0	Montgomery	0.00	0.29	NA
Wallace	0.20	0.22	7	Neosho	0.20	0.27	33
Region	**0.02**	**0.04**	**93***	Wilson	0.14	0.51	270
				Region	**0.21**	**0.18**	**-10**
				Statewide	**0.22**	**0.25**	**15**

*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), 2015.

Region	2014 P/H	2015 P/H	%Δ	2014 P/B	2015 P/B	%Δ	2014 B/H	2015 B/H	%Δ
Northcentral	1.1	1.7	49	7.0	5.5	-22	0.16	0.30	90
Northeast	1.7	1.6	-10	5.4	5.6	3	0.30	0.28	-8
Northwest	1.5	0.2	-87	5.9	5.0	-16	0.25	0.04	-85
Southcentral	2.5	2.6	3	5.2	5.8	11	0.45	0.42	-7
Southeast	2.6	1.8	-31	6.1	5.6	-9	0.41	0.30	-26
Southwest	0.3	1.1	259	1.5	4.3	183	0.16	0.13	-16
Statewide	1.7	1.7	-3	5.7	5.6	-2	0.29	0.29	0

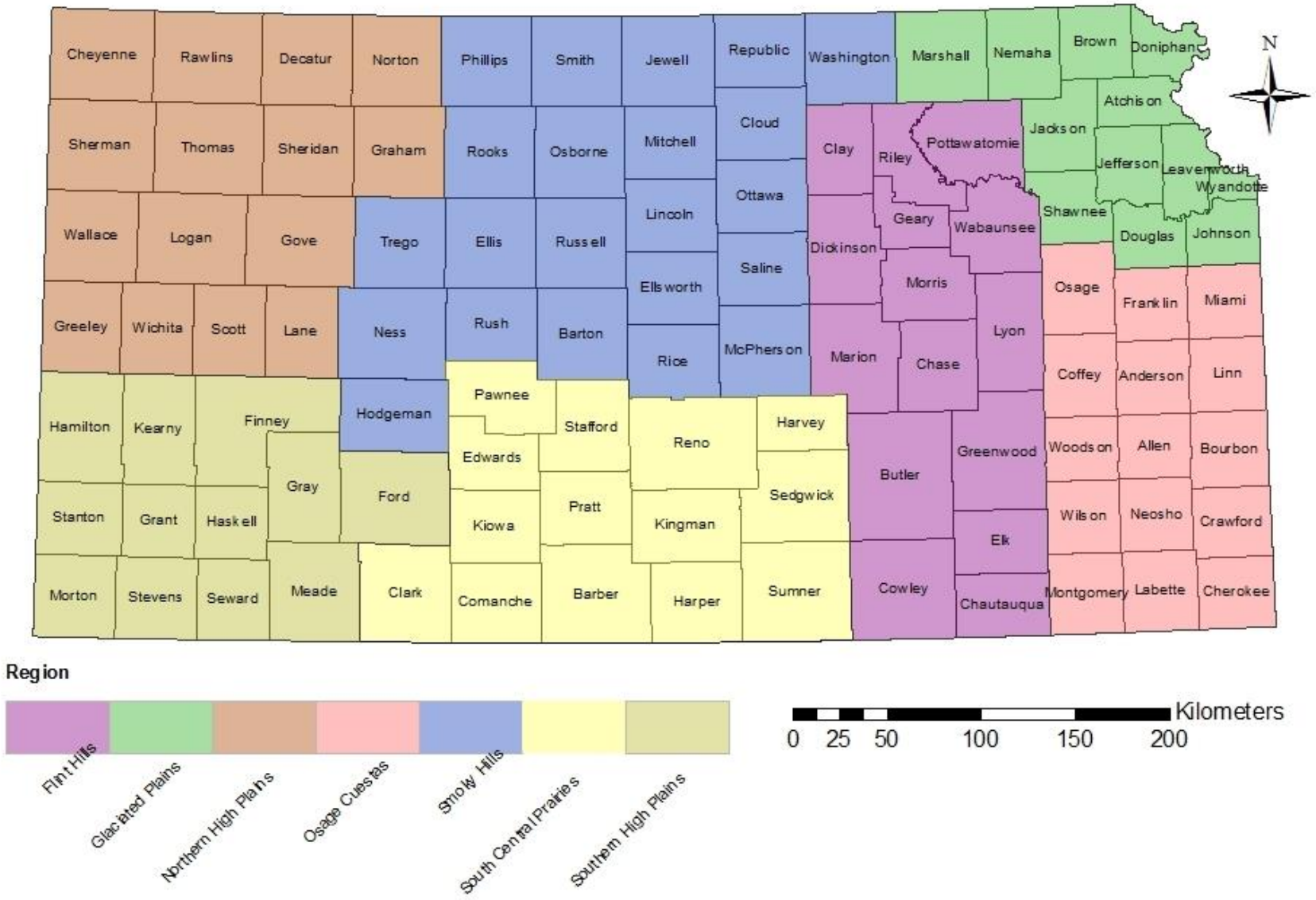

Figure 1. Kansas Small Game Regions.

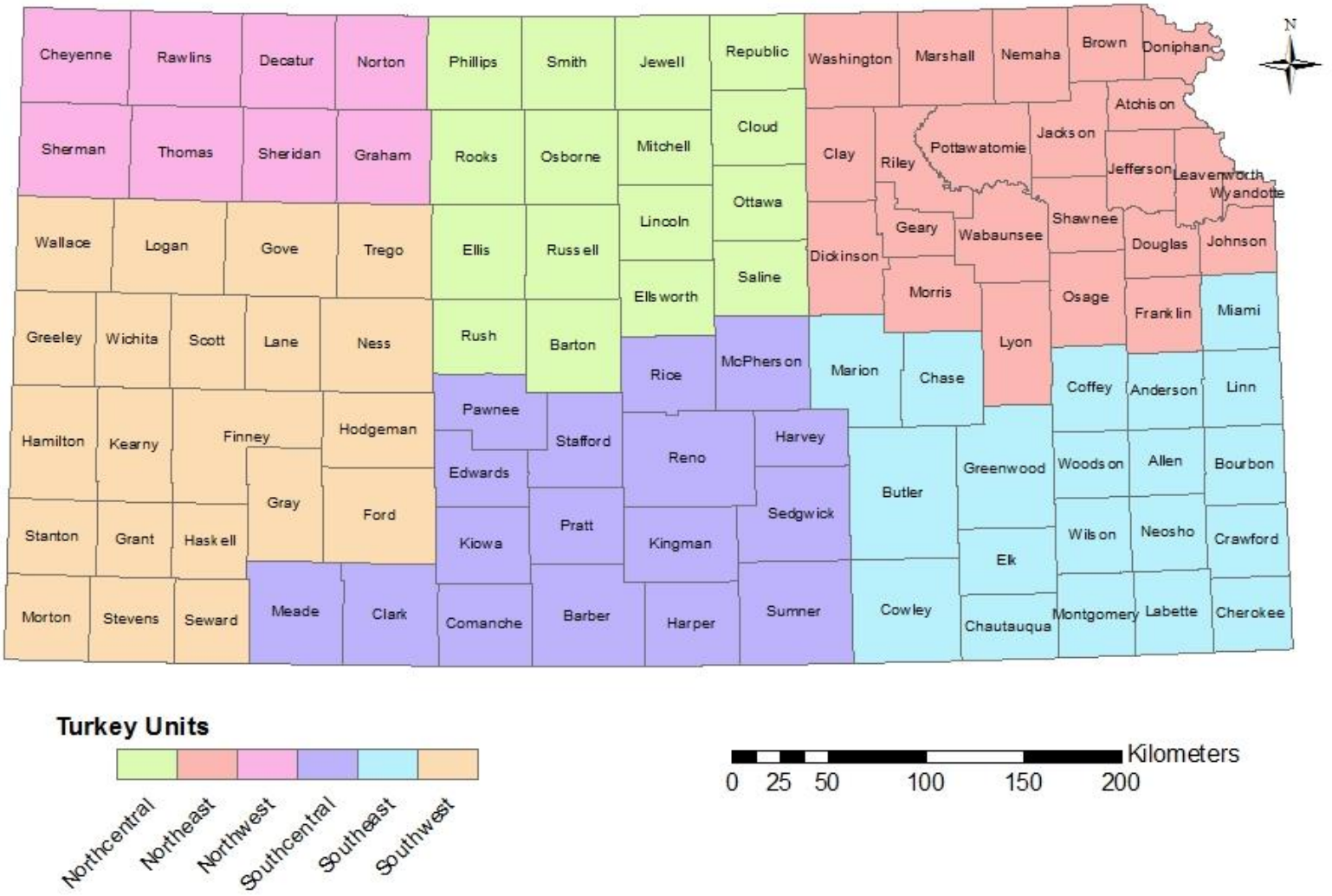

Figure 2. Turkey Management Regions.

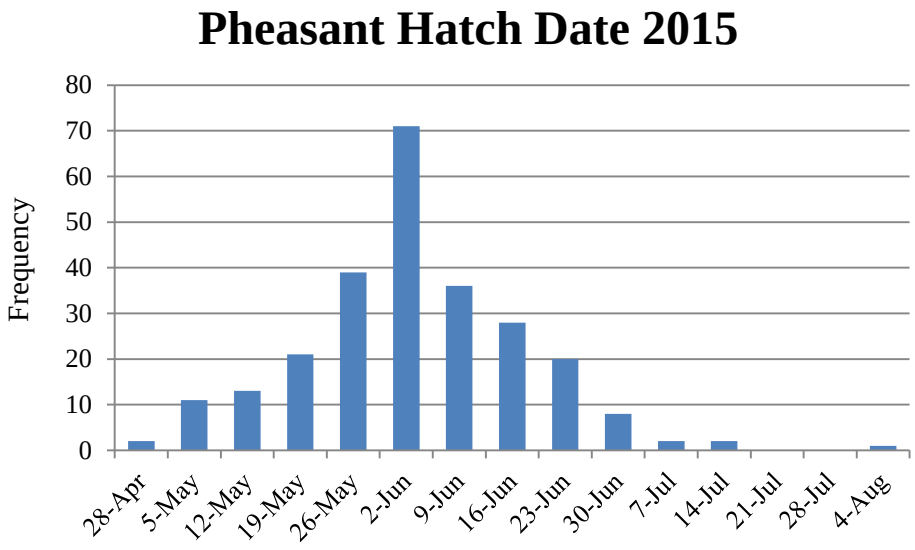

Figure 3. Weekly hatch dates of pheasant broods estimated from age at detection.

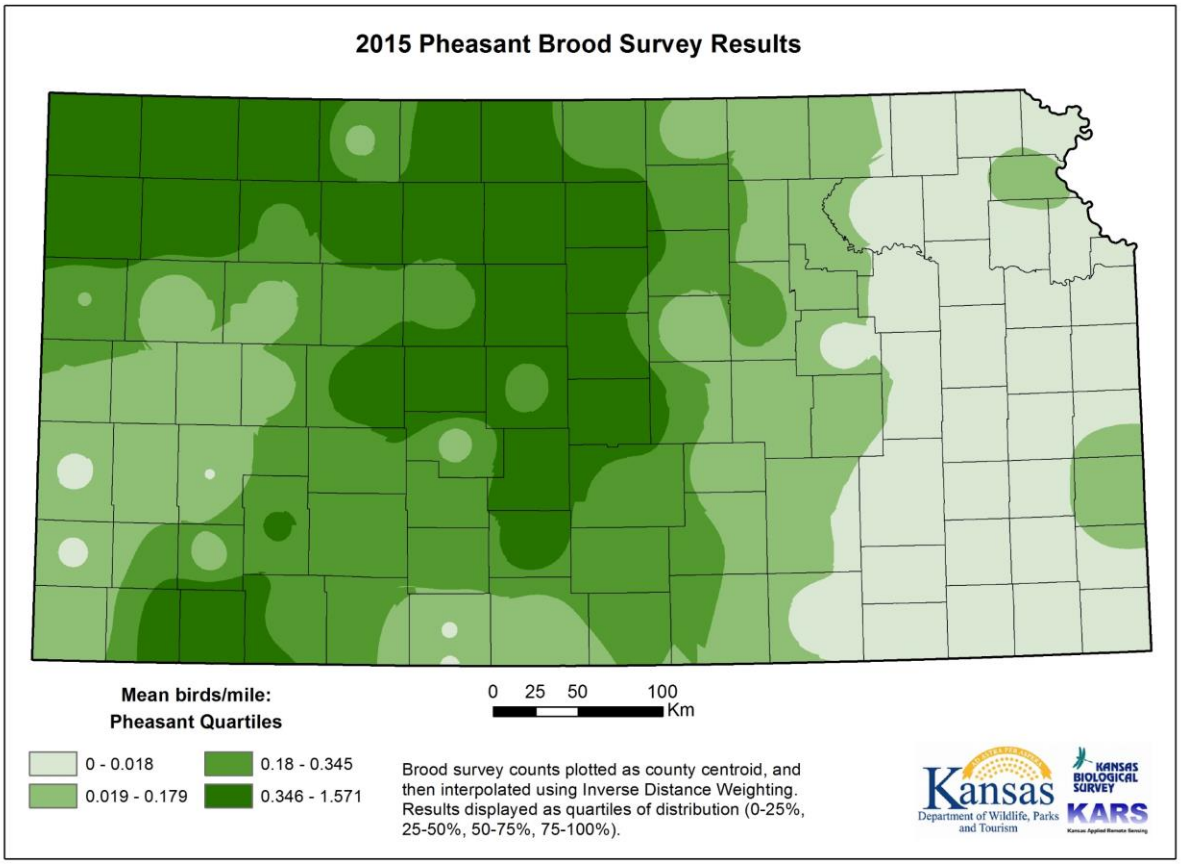

Figure 4. Relative pheasant densities recorded from brood survey routes in Kansas, 2015.

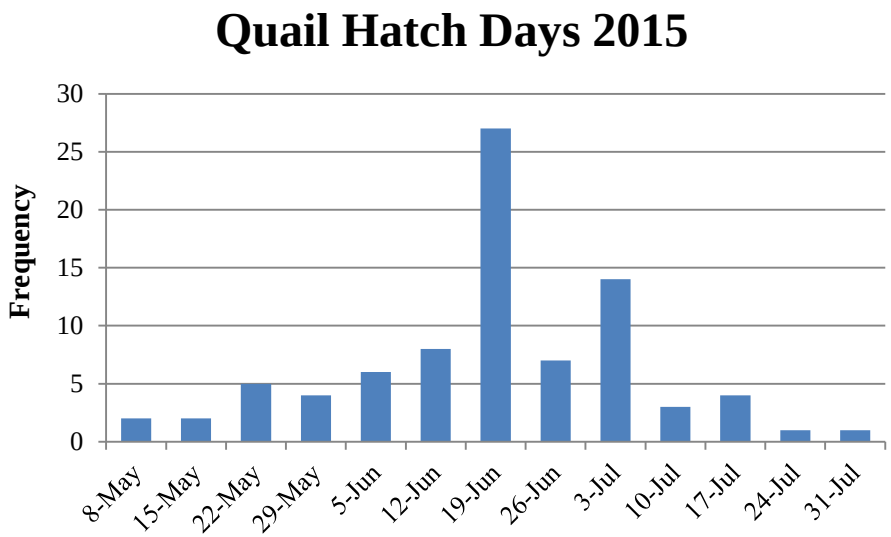

Figure 5. Weekly hatch dates of quail broods estimated from age at detection.

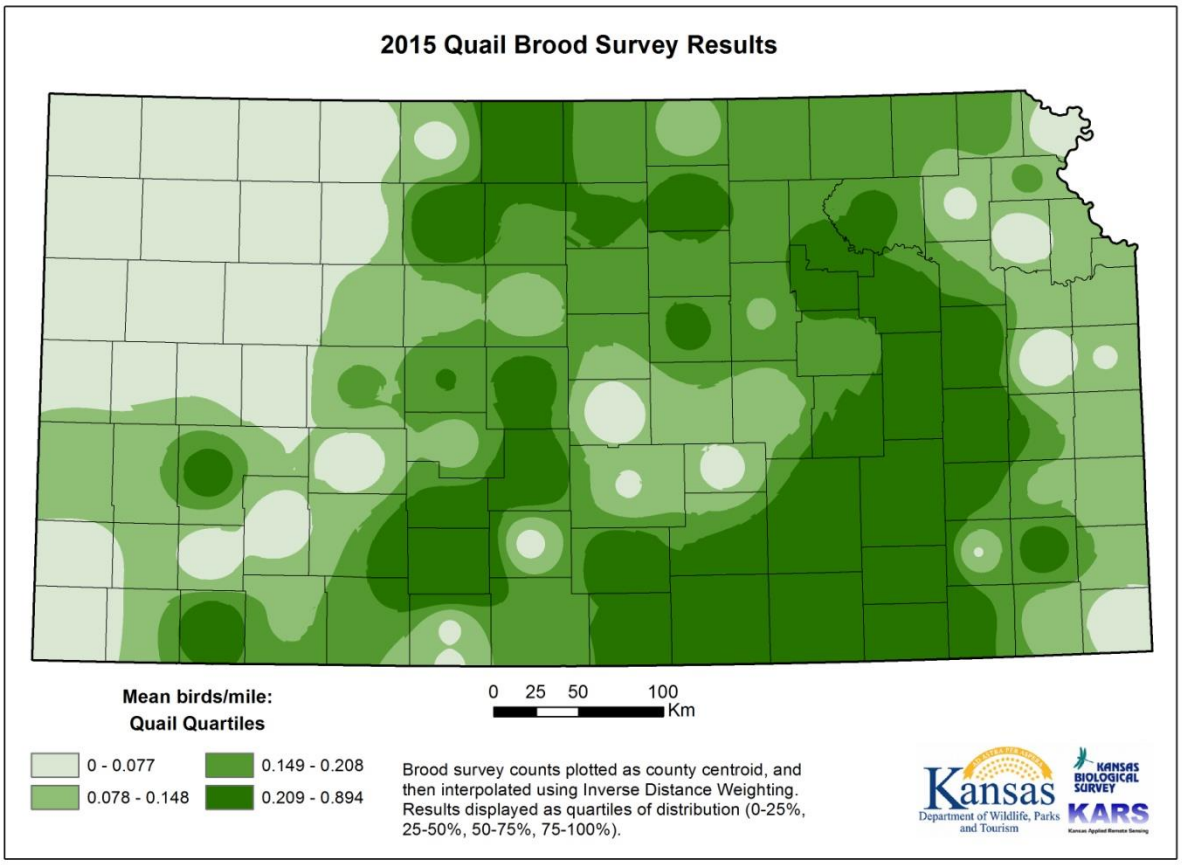

Figure 6. Relative quail densities recorded from brood survey routes in Kansas, 2015.

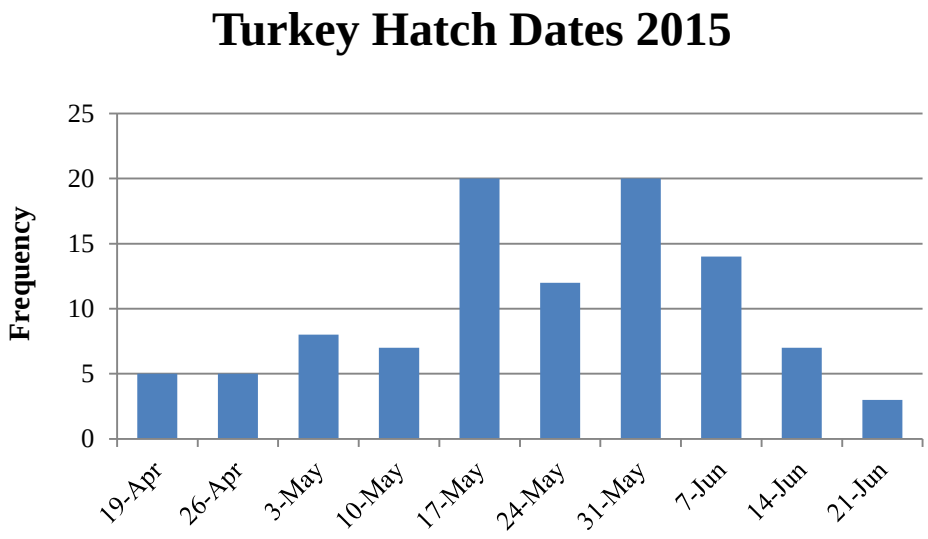

Figure 7. Weekly hatch dates of turkey broods estimated from age at detection.

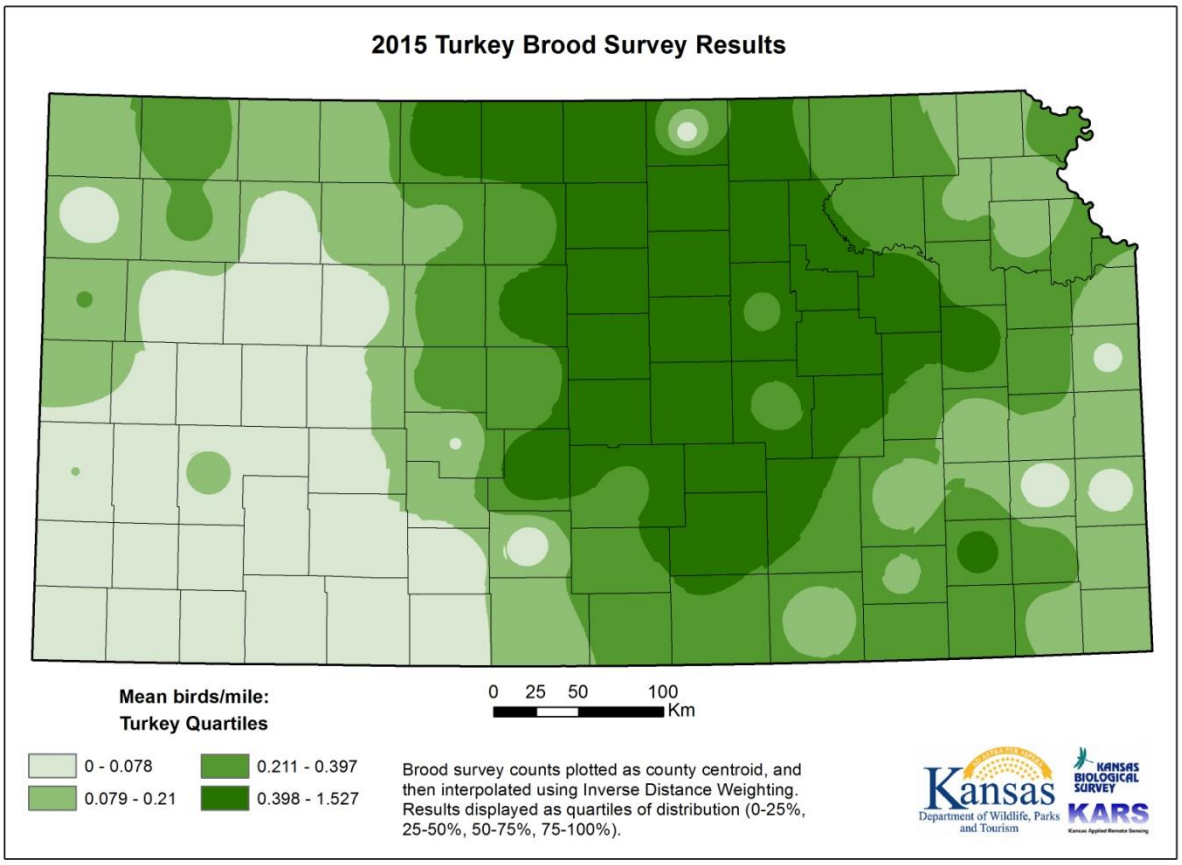

Figure 8. Relative turkey densities recorded from brood survey routes in Kansas, 2015.