QUAIL, PHEASANT, & TURKEY BROOD SURVEY - 2014

Performance Report

A Contribution in Part of Pittman-Robertson
Federal Aid in Wildlife Restoration
Grant W-39-R-21

KANSAS DEPARTMENT OF WILDLIFE, PARKS, and TOURISM

Robin Jennison
Secretary

Keith Sexson
Assistant Secretary
Wildlife, Fisheries, and Boating

Prepared by:
Jeff Prendergast
Small Game Specialist

Joe Kramer, Director
Fisheries & Wildlife Division

Mike Mitchener, Chief
Wildlife Section

September 2014

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 – 2014

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, in extreme southwestern Kansas scaled quail do provide some (< 1%) of the 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 the other game birds.

METHODS

Dates for the 2014 summer brood survey were from July 20 – August 30 (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 a minimum of 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. A folded F-test was used to determine if the variance differed between 2013 and 2014 indices. If unequal variance existed ($P < 0.05$) then a Satterthwaite's adjustment was used to adjust the degrees of freedom prior to conducting a two sample t-test. If variance did not differ across years then a standard two sample t-test was used to draw comparisons. Data were 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 ratio's, broods that are observed without hens are removed to remove bias from the % of hens that successfully hatched broods. Turkey management regions differ from small game regions and data were reported accordingly. Quail ratio data were reported per adult (male and female) because males also will incubate nests and brood young.

Spatial comparisons were made using an ARC GIS Inverse Weighted Distance technique, which interpolates data across a landscape between known points. 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 73 of the 74 established routes between July 20 and September 3 (Table 1). Equipment problems and road conditions led to 5 of the 73 routes not being sampled 4 times. The Cloud, Jewell, Labette, and Trego county routes were sampled 3 times each and the Osage 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 (71%). Statistically significant increases also occurred within the Smoky Hills (76%) and the South Central Prairies (173%) regions (Table 2). Pheasant per mile was highest in the Smoky Hills with the highest index in Mitchell County (Table 2). Few pheasants were detected in the Flint Hills region except in Dickinson county which produced an uncharacteristically high index this year. No pheasants were detected in the Osage Cuestas.

Statewide production indices were improved this year compared to 2013 (Table 3). Chicks/hen and broods/hen were highest in the Smoky Hills while the chicks/brood ratio was highest in the Flint Hills (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). The brood/hen ratio increased across the major pheasant regions except in the Southern High Plains, indicating higher productivity in these areas this year (Table 3). Pheasant hatch peaked toward the first week of June (Figure 3). Pheasant densities will generally be highest in north-central Kansas during the fall of 2014 (Figure 4).

Quail
No region showed statistically significant changes in the quail indices compared to 2013 (Table 4). Large changes were observed on several routes however apparent regional changes could have been solely due to variability associated with the sampling scheme. Quail densities were greatest in the Flint Hills and Osage Cuestas regions, with the highest densities recorded in Cowley County (Table 4). Scaled quail were only recorded on the Hamilton county route this year.

All Statewide production indices increased compared to 2013 (Table 5). No chicks were detected in the Southern High Plains in 2013 therefore we were unable to estimate a percent change from 2013 to 2014. The Chicks/adult ratio was highest in the Smoky Hills and Flint Hills both of which were greatly improved from 2013 (Table 5). Chicks/brood was highest in the Northern High Plains with the Smoky Hills and South-Central Prairies regions also having high ratios (Table 5). Quail hatch peaked in mid to late June (Figure 5). The highest quail densities will generally be in the Flint Hills and Osage Cuestas during fall 2013 (Figure 6).

Turkey
No region showed statistically significant changes in the turkey indices compared to 2013 (Table 6). Large changes were observed on several routes, however apparent regional changes could have been solely due to variability associated with the sampling scheme. The Northeast and North-central region had the highest indices while the Northwest and Southwest regions had the lowest densities. The counties with the highest indices were Jewell, Osage, Saline, and Harvey (Table 6).

The statewide production ratios were similar to 2013 (Table 7). The Southwest region had the lowest regional poult:hen index densities and all production rates decreased in 2013. In contrast all production rates in the Northwest region increased from 2013 (Table 7). Production appeared to be slightly better in the Southeast and South-central regions and decreased slightly in the Northeast from 2013 (Table 7). The highest poult/hen ratios were in the Southeast and South-

central regions (Table 7). Turkey hatch peaked first week of June (Figure 7). The highest turkey densities will generally be found in the Flint Hills and Northeastern Kansas during fall 2014 (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. Quail have also seen declines, particularly in south-central and south-west Kansas, although populations increased in the eastern regions where heavy precipitation in spring/summer often hinders bobwhite reproductive output. Game birds are known for their explosive reproductive potential under good conditions. With the improved conditions this year some areas experienced this explosive reproductive output with large improvements on routes and in regions. However despite large increases, given the limited breeding populations, game birds will still be at low densities this fall across most of western Kansas.

Pheasant populations are an important resource to Kansas. In 2010, pheasant populations reached our highest levels in nearly 20 years. Since 2010 harvest has steadily decreased as conditions have not been favorable for summer production. In 2013 harvest was at near all time lows, second only to the first modern pheasant season in 1957, which was a 3-day season in limited counties. Range wide increases in pheasant populations should result in improvements in the harvest this year, although 2014 will be another below average season. The South-Central Prairies showed the greatest improvement compared to 2013 with densities increasing 173%. The best hunting areas will be portions of the Smoky Hills with limited opportunities scattered throughout other regions (Figure 4).

In recent years, Kansas has harvested more wild bobwhites than any other state. Quail harvest has been steadily declining as conditions have been unfavorable for production throughout much of the western portion of the state. In 2010, the highest densities of Bobwhites were in the Southern High Plains and the South-Central Prairies. Densities have taken the sharpest declines in these two regions as Bobwhite populations have struggled with the severe drought. Bobwhites in eastern Kansas have fared well during the drought. Populations in the Glaciated Plains and the Osage Cuestas have been steadily increasing over the last 3-4 years. With the later nesting chronology of quail compared to pheasant, precipitation created conditions that were good to excellent for production across most of the state in 2014. The Flint Hills showed the highest densities this year with good regional densities also being found in the Osage Cuestas (Figure 6). The Flint Hills and Osage Cuestas should provide good hunting opportunity this year (Figure 6). Despite low densities from brood surveys for many of the other regions good hunting opportunities should exist where quail habitat occurs.

Turkey populations in eastern Kansas had been responding relatively well to drought conditions, but densities appeared to have stalled to slightly decreased from 2013. Given the increase in production indices in some of the regions (Table 7), the apparent decreases in the eastern part of the state may be partially due to decreased sightability with the improved vegetation. Production in western regions has been limited where the drought was more severe. Improved

conditions in 2014 led to better production and general numbers in the Northwest region. However, the southwest region showed declines in production and overall numbers (Table 41 & 7). Portions of the North-Central and South-Central regions will have the highest densities this fall.

Table 1. Upland game bird brood routes and observers in Kansas, 2014.

Route	Observer	Position	Route	Observer	Position
Allen	Jason Deal	Public Lands	Marshall	James Svaty	Public Lands
Atchison	Tim Urban	Biologist	Meade	Aaron Andrews[a]	Fisheries
Barber	Charlie Swank	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	Scott Stoughton	Law Enforcement	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	JR Glenn	Public Lands
Decatur	Alex Heeger	Non KDWPT (PF)	Osborne	Chris Lecuyer	Public Lands
Dickinson	Clint Thornton	Biologist	Pawnee	Matt Stucker	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	Jake Danner[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[a]	Law Enforcement	Rice	Steve Adams	Biologist
Graham	Jake Brooke	Law Enforcement	Rooks	Alex Lyon[a]	Biologist
Gray	Manuel Torres	Public Lands	Rush	Jason Wagner[a]	Biologist
Greenwood	Justin Anderson[a]	Biologist	Russell	Viki Cikanek	Biologist
Hamilton	Daryl Fisher	Biologist	Saline	Matt Smith	Biologist
Harvey	Charlie Cope	Biologist	Scott	Brent Clark[a]	Public Lands
Haskell	Jake Danner[a]	Biologist	Seward	Josh Jagels	Fisheries
Hodgeman	Dan Haneke	Law Enforcement	Sheridan	Daniel Howard[a]	Law Enforcement
Jackson	Tyler Warner[a]	Law Enforcement	Sherman	Kurt Meier	Biologist
Jefferson	Andrew Page[a]	Public Lands	Smith	Brad Odle	Biologist
Jewell	Luke Kramer[a]	Biologist	Stafford	Mike Mitchener	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[a]	Public Lands	Wabaunsee	Brad Rueschhoff	Biologist
Lane	Eric Wiens[a]	Non KDWPT (KFS)	Wallace	Kurt Meier	Biologist
Logan	Leonard Hopper	Public Lands	Wilson	Bob Funke	Law Enforcement
Marion	Jeff Rue	Biologist			

[a]New observer in 2014

Table 2. Annual regional changes in mean pheasants per mile (P/M), 2014.

Route	2013 P/M	2014 P/M	% Δ
	Flint Hills		
Cowley	0.00	0.01	NA
Dickinson	0.06	0.54	744
Elk**	NA	0.00	NA
Geary	0.00	0.01	0
Greenwood	0.00	0.00	0
Marion	0.25	0.11	-56
Morris	0.00	0.00	0
Pottawatomie	0.00	0.00	0
Wabaunsee	0.00	0.00	0
Region	**0.04**	**0.08**	**115**
	Glaciated Plains		
Atchison	0.01	0.01	0
Brown[a]	NA	0.00	NA
Doniphan[a]	NA	0.00	NA
Jackson[a]	NA	0.00	NA
Jefferson[a]	NA	0.00	NA
Marshall	0.26	0.07	-72
Region	**0.14**	**0.04**	**-68**
	Smoky Hills		
Barton	0.23	0.33	46
Cloud	0.14	0.15	12
Ellis	0.08	0.10	25
Hodgeman	0.03	0.13	350
Jewell	0.26	0.58	126
Mitchell	0.92	1.01	11
Ness	0.04	0.30	720
Osborne	0.12	0.43	250
Phillips	0.02	0.16	633
Republic	0.24	0.16	-32
Rice	0.10	0.50	400
Rooks	0.22	0.49	120
Rush	0.04	0.26	620
Russell	0.05	0.04	-25
Saline	0.22	0.22	0
Smith	0.22	0.21	-8
Trego	0.03	0.13	300
Region	**0.17**	**0.31**	**76***

Route	2014 P/M	2014 P/M	% Δ
	Northern High Plains		
Decatur	0.19	0.33	72
Gove	0.00	0.07	NA
Graham	0.36	0.35	-5
Lane	0.01	0.12	1500
Logan	0.00	0.14	NA
Norton	0.06	0.06	0
Rawlins	0.05	0.25	403
Scott	0.19	0.02	-88
Sheridan	0.36	0.13	-63
Sherman	0.04	0.32	740
Thomas	0.17	0.35	105
Wallace	0.02	0.01	-67
Region	**0.12**	**0.18**	**48**
	South-Central Prairies		
Barber	0.01	0.01	-53
Comanche	0.00	0.00	0
Harvey	0.09	0.12	43
Kingman	0.02	0.19	744
Kiowa	0.06	0.19	189
Pawnee	0.11	0.05	-56
Pratt	0.04	0.37	940
Reno	0.09	0.15	75
Stafford	0.01	0.09	1263
Region	**0.05**	**0.13**	**173***
	Southern High Plains		
Finney	0.04	0.00	-100
Gray[a]	NA	0.19	NA
Hamilton	0.01	0.00	-100
Haskell	0.14	0.29	105
Kearny	0.00	0.02	NA
Meade	0.16	0.21	29
Morton	0.00	0.00	NA
Seward	0.36	0.71	96
Stanton	0.00	0.01	NA
Region	**0.09**	**0.16**	**71**
Statewide	**0.11**	**0.19**	**71***

* = 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), 2014.

Region	2013 C/H	2014 C/H	%Δ	2013 C/B	2014 C/B	%Δ	2013 B/H	2014 B/H	%Δ
Flint Hills	10.5	5.1	-51	21.0	6.4	-69	1.00	0.80	-20
Glaciated Plains	8.0	2.3	-71	32.0	3.5	-89	NA	0.33	NA
Northern High Plains	4.8	4.4	-7	1.9	5.2	171	0.33	0.57	70
Osage Cuestas	0.0	0.0	0	0.0	0.0	0	0.00	0.00	0
Smoky Hills	5.5	7.5	35	6.6	5.5	-17	0.85	0.89	5
South-Central Prairies	4.0	4.7	17	2.0	4.5	125	0.44	0.59	35
Southern High Plains	4.2	5.4	30	4.2	3.6	-13	0.69	0.50	-28
Statewide	4.6	5.9	26	5.3	5.0	-6	0.60	0.70	18

Table 4. Annual regional changes in mean quail per mile (Q/M), 2014.

Route	2013 Q/M	2014 Q/M	% Δ	Route	2013 Q/M	2014 Q/M	% Δ
	Flint Hills				Smoky Hills		
Cowley	0.25	0.71	182	Barton	0.00	0.13	NA
Dickinson	0.01	0.26	1700	Cloud	0.12	0.11	-6
Elk	NA	0.53	NA	Ellis	0.00	0.10	NA
Geary	0.24	0.17	-31	Hodgeman	0.00	0.00	0
Greenwood	0.08	0.32	289	Jewell	0.05	0.30	492
Marion	0.04	0.22	417	Mitchell	0.02	0.35	1400
Morris	0.08	0.01	-91	Ness	0.00	0.00	0
Pottawatomie	0.12	0.02	-83	Osborne	0.00	0.09	NA
Wabaunsee	0.01	0.22	1450	Phillips	0.00	0.01	NA
Region	**0.11**	**0.24**	**127**	Republic	0.22	0.17	-21
	Glaciated Plains			Rice	0.00	0.07	NA
Atchison	0.10	0.01	-85	Rooks	0.01	0.02	233
Brown[a]	NA	0.24	NA	Rush	0.03	0.01	-50
Doniphan[a]	NA	0.13	NA	Russell	0.03	0.01	-75
Jackson[a]	NA	0.05	NA	Saline	0.03	0.00	-100
Jefferson[a]	NA	0.13	NA	Smith	0.27	0.11	-61
Marshall	0.28	0.16	-41	Trego	0.00	0.00	0
Region	**0.19**	**0.09**	**-52**	**Region**	**0.04**	**0.09**	**100**
	Northern High Plains				South-Central Prairies		
Decatur	0.00	0.00	0	Barber	0.01	0.01	89
Gove	0.10	0.00	-100	Comanche	0.00	0.10	NA
Graham	0.00	0.00	0	Harvey	0.02	0.01	-74
Lane	0.00	0.00	0	Kingman	0.01	0.18	1463
Logan	0.00	0.00	0	Kiowa	0.01	0.00	-100
Norton	0.00	0.10	NA	Pawnee	0.00	0.00	0
Rawlins	0.00	0.00	0	Pratt	0.01	0.09	550
Scott	0.02	0.00	-100	Reno	0.23	0.30	31
Sheridan	0.00	0.00	0	Stafford	0.06	0.00	-100
Sherman	0.00	0.00	0	**Region**	**0.04**	**0.08**	**97**
Thomas	0.00	0.00	0		Osage Cuestas		
Wallace	0.00	0.00	0	Allen	0.05	0.55	1029
Region	**0.01**	**0.01**	**-13**	Bourbon	0.06	0.08	33
	Southern High Plains			Cherokee	0.03	0.17	476
Finney	0.00	0.19	NA	Coffey	0.44	0.36	-17
Gray[a]	NA	0.00	NA	Franklin	0.02	0.07	233
Hamilton	0.05	0.01	-71	Labette	0.49	0.03	-94
Haskell	0.00	0.00	0	Miami	0.09	0.05	-49
Kearny	0.00	0.00	0	Montgomery	0.03	0.16	396
Meade	0.00	0.01	0	Neosho	0.35	0.24	-29
Morton	0.00	0.00	0	Osage	0.03	0.00	-100
Seward	0.02	0.02	50	Wilson	0.23	0.15	-33
Stanton	0.01	0.00	-100	**Region**	**0.16**	**0.17**	**3**
Region	**0.01**	0.03	**199**	**Statewide**	**0.06**	**0.10**	**50**

*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, 2014.

Region	2013 C/A	2014 C/A	%Δ	2013 C/B	2014 C/B	%Δ	2013 B/A	2014 B/A	%Δ
Flint Hills	0.6	2.8	380	7.3	10.2	40	0.08	0.15	92
Glaciated Plains	5.6	1.8	-67	7.8	6.9	-12	0.14	0.12	-18
Northern High Plains	0.8	0.0	-100	6.0	14.0	133	0.10	0.00	-100
Osage Cuestas	1.3	1.7	29	7.5	9.3	24	0.16	0.14	-10
Smoky Hills	1.2	2.9	143	8.4	8.3	-2	0.10	0.23	131
South-Central Prairies	1.6	2.6	64	10.0	10.0	0	0.05	0.11	111
Southern High Plains	0.0	0.6	NA	0.0	5.5	NA	0.00	0.00	NA
Statewide	1.2	2.2	91	7.8	9.1	17	0.12	0.15	25

Table 6. Annual regional changes in mean turkey per mile (T/M), 2014.

Route	2013 T/M	2014 T/M	[a]% Δ	Route	2013 T/M	2014 T/M	% Δ
	Northeast				Northcentral		
Atchison	0.04	0.33	800	Barton	0.00	0.00	0
Brown[a]	NA	0.30	NA	Cloud	0.56	0.64	15
Dickinson	0.42	0.14	-68	Ellis	0.11	0.20	76
Doniphan[a]	NA	0.01	NA	Jewell	0.02	1.21	5383
Franklin	0.01	0.03	100	Mitchell	0.25	0.13	-48
Geary	0.22	0.65	200	Osborne	0.32	0.21	-35
Jackson[a]	NA	0.43	NA	Phillips	0.07	0.12	78
Jefferson[a]	NA	0.20	NA	Republic	0.06	0.17	196
Marshall	0.19	0.42	127	Rooks	0.00	0.18	NA
Morris	0.31	0.53	71	Rush	0.06	0.02	-67
Osage	0.76	1.46	92	Russell	0.00	0.02	NA
Pottawatomie	0.18	0.13	-30	Saline	0.73	0.89	21
Wabaunsee	0.29	0.30	5	Smith	0.29	0.44	49
Region	**0.27**	**0.44**	**65**	**Region**	**0.19**	**0.32**	**70**
	Northwest				Southcentral		
Decatur	0.09	0.10	12	Barber	0.21	0.00	-100
Graham	0.00	0.06	NA	Comanche	0.11	0.00	-100
Norton	0.01	0.25	1600	Harvey	0.72	0.88	22
Rawlins	0.34	0.45	32	Kingman	0.11	0.26	143
Sheridan	0.00	0.10	NA	Kiowa	0.01	0.00	-100
Sherman	0.00	0.00	0	Meade	0.19	0.06	-67
Thomas	0.04	0.00	-100	Pawnee	0.32	0.14	-56
Region	**0.07**	**0.14**	**97**	Pratt	0.00	0.00	0
	Southwest			Reno	0.40	0.41	4
Finney	0.14	0.00	-100	Rice	0.60	0.69	15
Gove	0.07	0.00	-100	Stafford	0.36	0.16	-55
Gray[a]	NA	0.00	NA	**Region**	**0.28**	**0.24**	**-14**
Hamilton	0.00	0.00	0		Southeast		
Haskell	0.00	0.00	0	Allen	0.42	0.03	-93
Hodgeman	0.00	0.06	NA	Bourbon	0.52	0.16	-70
Kearny	0.00	0.00	0	Cherokee	0.03	0.23	695
Lane	0.00	0.00	0	Coffey	0.06	0.11	75
Logan	0.00	0.00	0	Cowley	0.33	0.26	-21
Morton	0.00	0.00	0	Elk	NA	0.26	NA
Ness	0.04	0.00	-100	Greenwood	0.06	0.13	100
Scott	0.00	0.00	0	Labette	0.32	0.11	-65
Seward	0.00	0.00	0	Marion	0.20	0.33	62
Stanton	0.00	0.00	0	Miami	0.17	0.71	325
Trego	0.00	0.00	0	Montgomery	0.07	0.00	-100
Wallace	0.12	0.20	71	Neosho	0.44	0.20	-55
Region	**0.02**	**0.02**	**-27**	Wilson	0.10	0.14	37
				Region	**0.23**	**0.20**	**-13**
				Statewide	**0.17**	**0.22**	**25**

*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), 2014.

Region	2013 P/H	2014 P/H	%Δ	2012 P/B	2013 P/B	%Δ	2012 B/H	2013 B/H	%Δ
Northcentral	1.1	1.1	2	6.7	7.0	5	0.15	0.16	9
Northeast	2.5	1.7	-31	7.3	5.4	-25	0.34	0.30	-13
Northwest	0.4	1.5	257	5.5	5.9	8	0.08	0.25	231
Southcentral	2.1	2.5	21	6.9	5.2	-24	0.28	0.45	60
Southeast	1.6	2.6	61	4.5	6.1	37	0.35	0.41	14
Southwest	4.0	0.3	-92	5.3	1.5	-72	0.75	0.16	-79
Statewide	1.7	1.7	5	6.1	5.7	-6	0.26	0.29	10

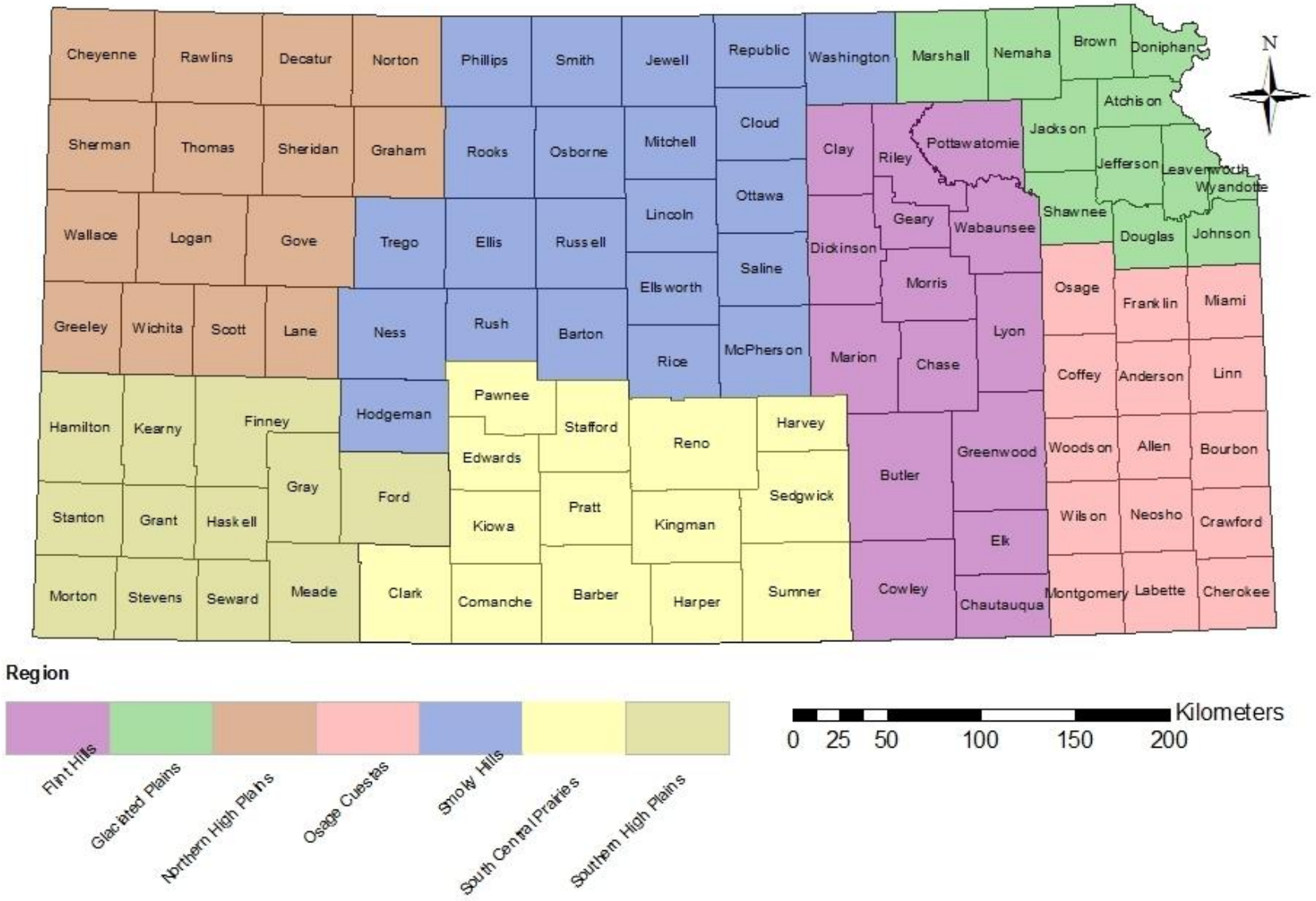

Figure 1. Kansas Small Game Regions, 2014.

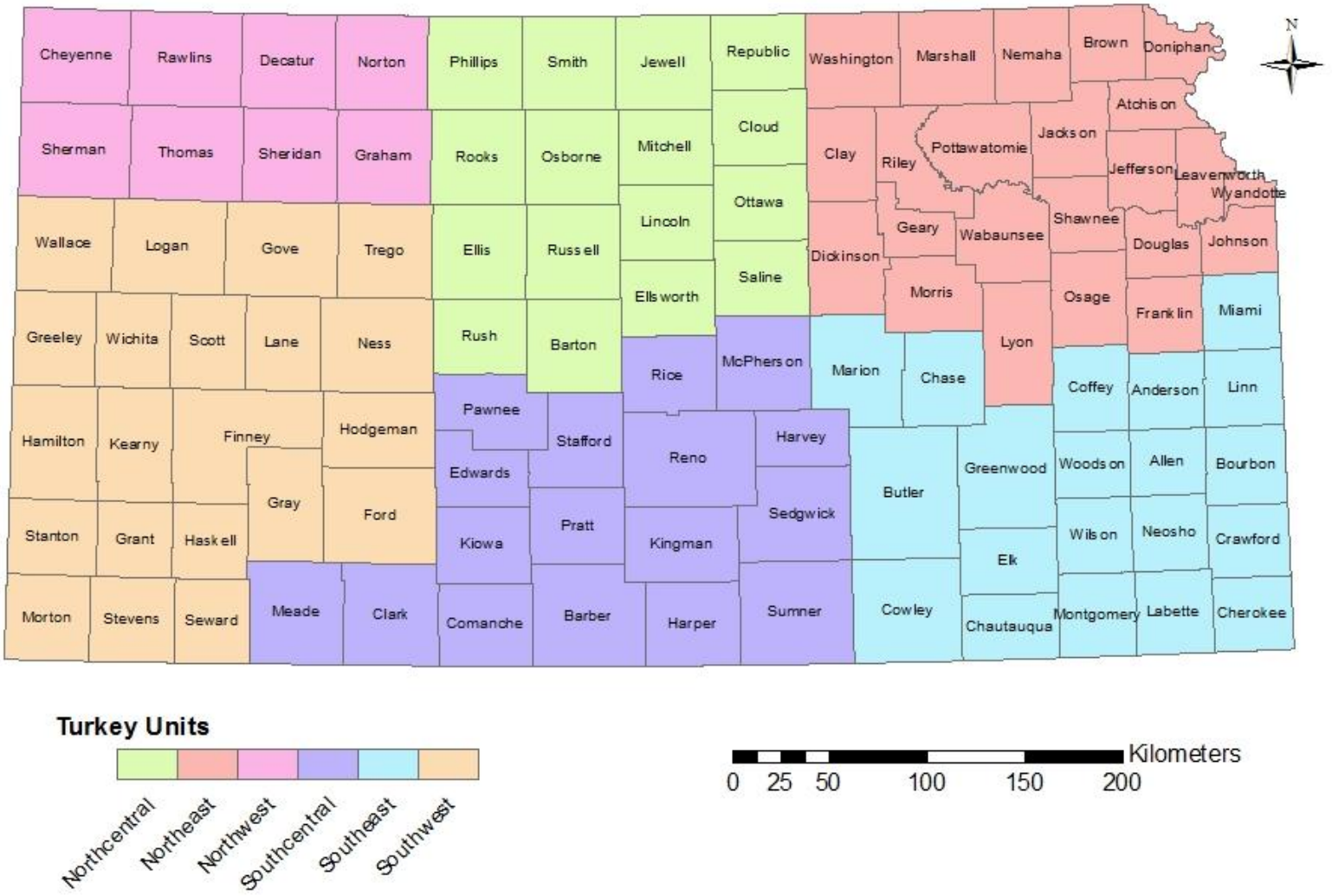

Figure 2. Turkey Management Regions, 2014.

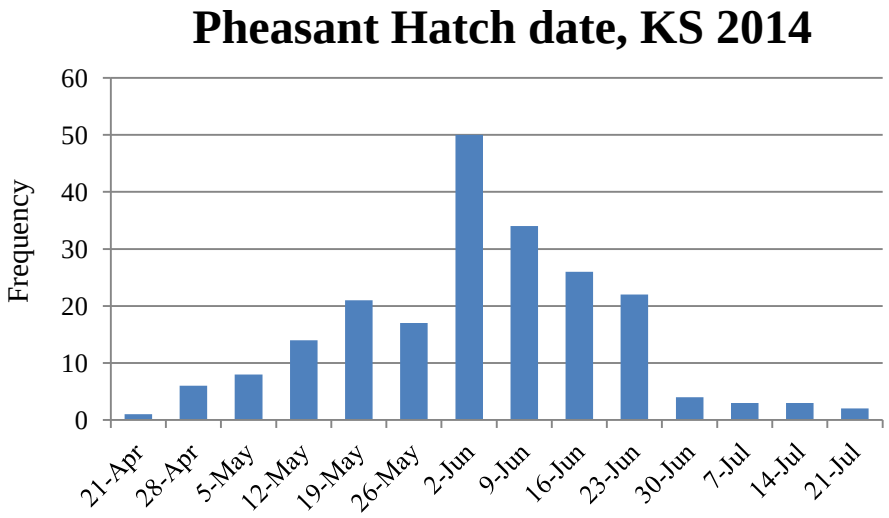

Figure 3. Weekly hatch dates of pheasant broods estimated from age at detection.

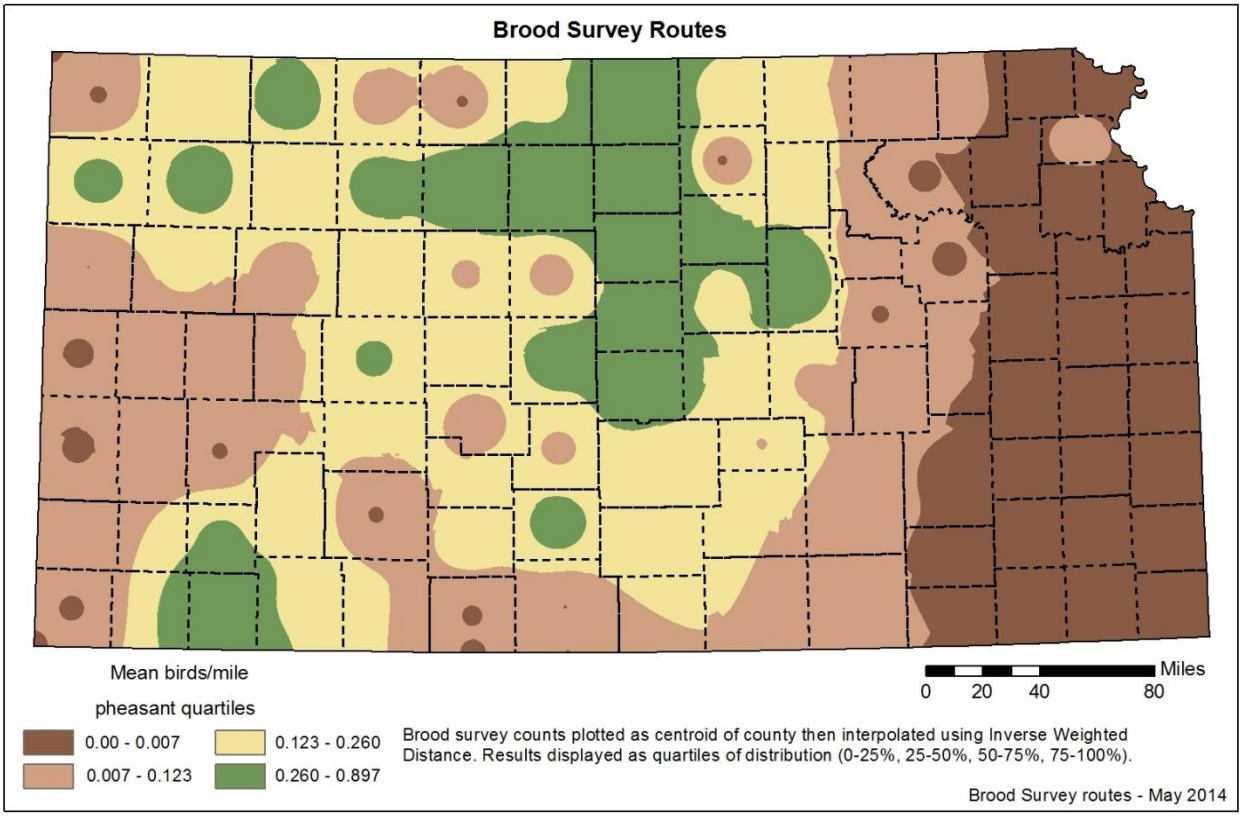

Figure 4. Relative pheasant densities recorded from brood survey routes in Kansas, 2014.

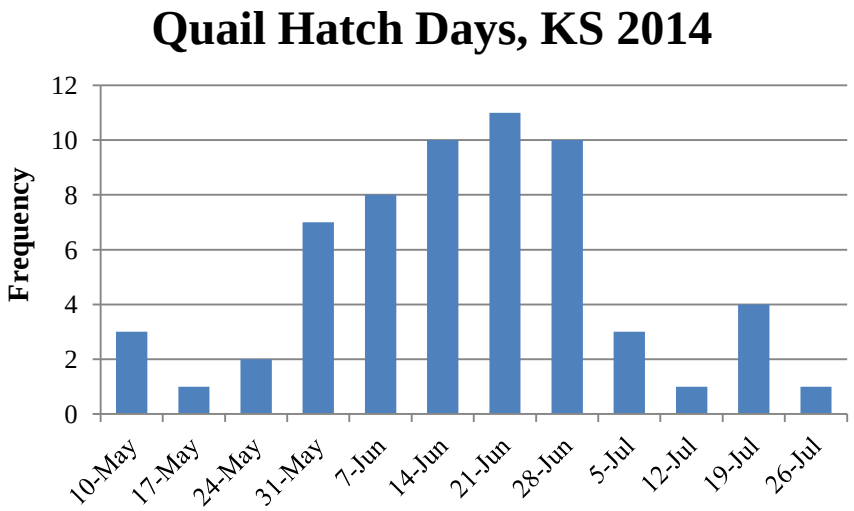

Figure 5. Weekly hatch dates of quail broods estimated from age at detection.

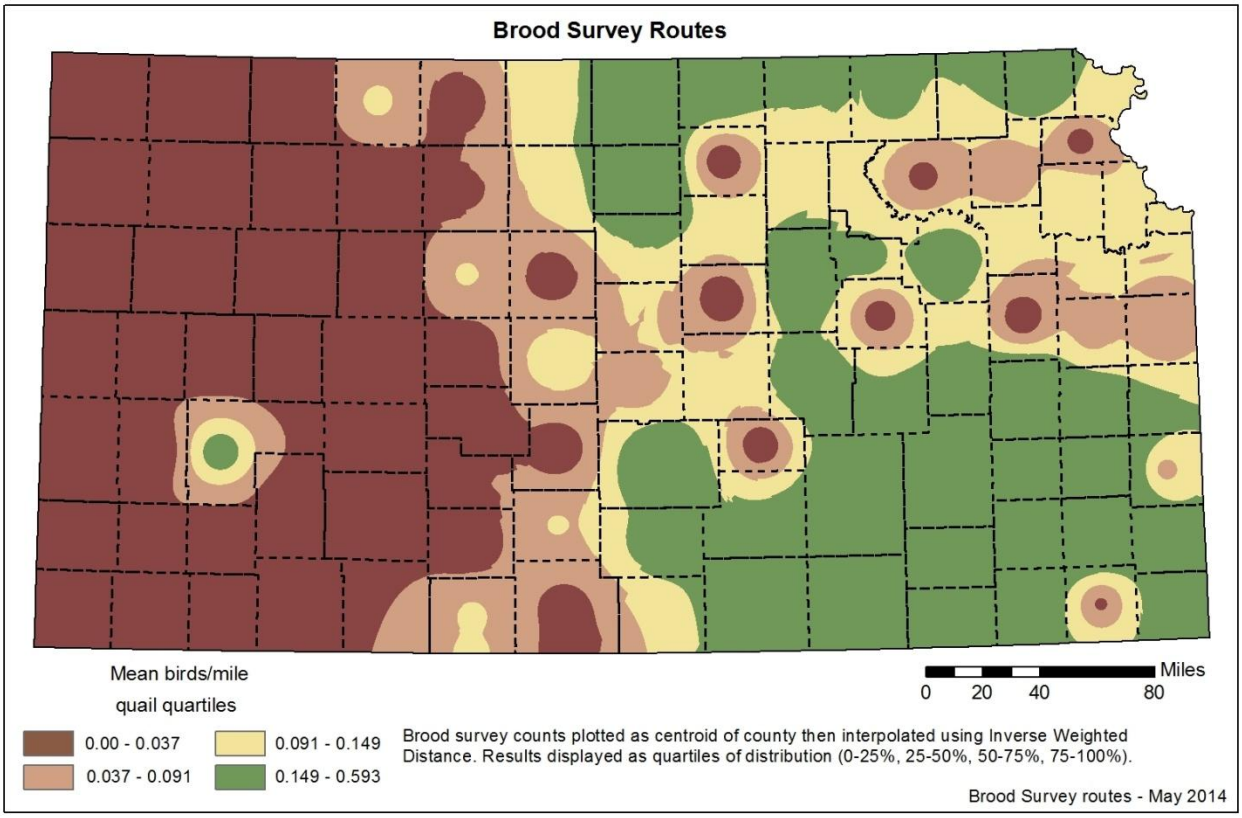

Figure 6. Relative quail densities recorded from brood survey routes in Kansas, 2014.

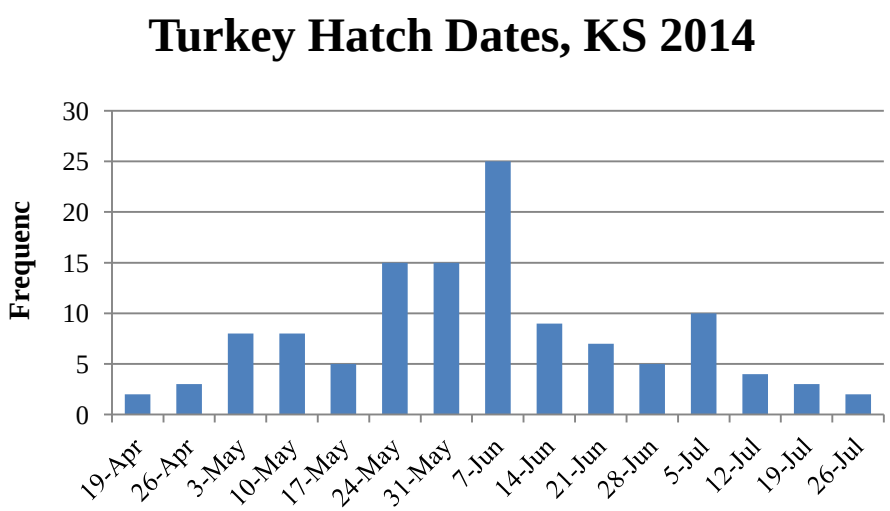

Figure 7. Weekly hatch dates of turkey broods estimated from age at detection.

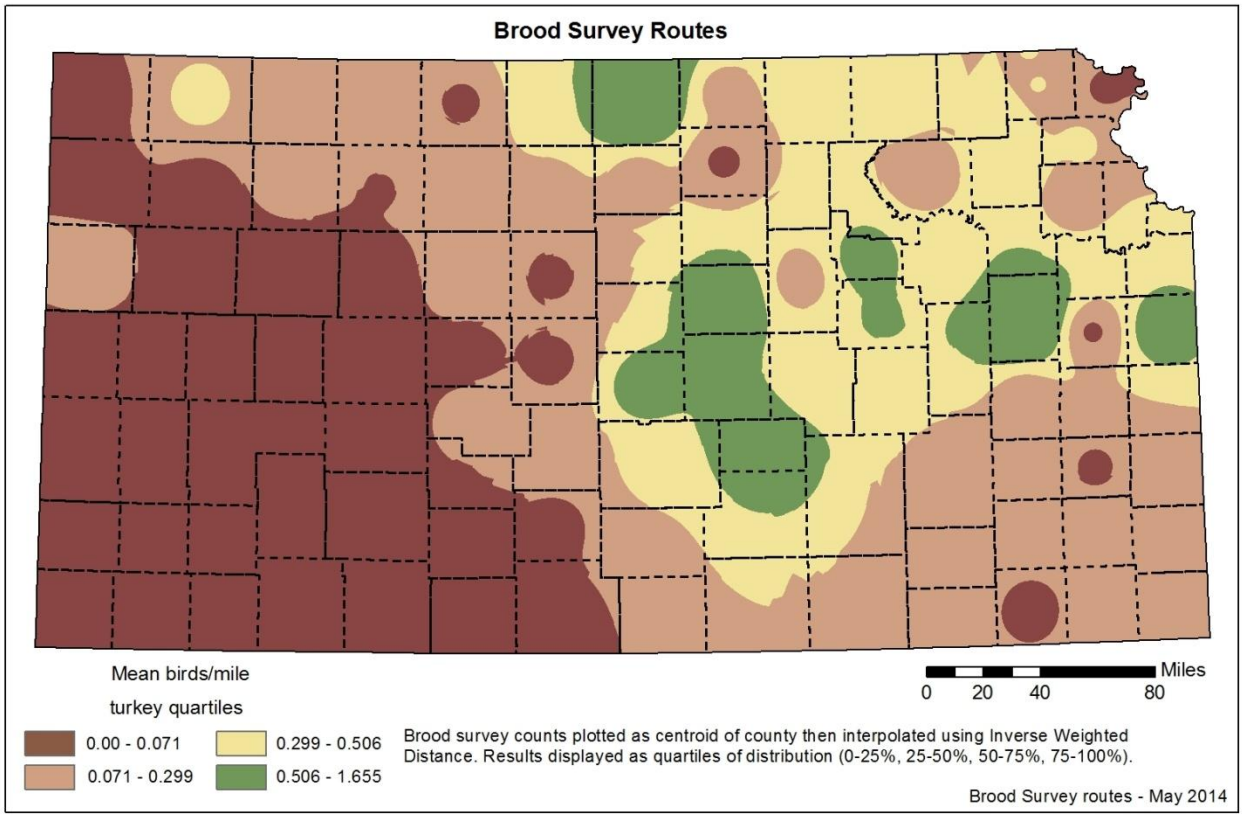

Figure 8. Relative turkey densities recorded from brood survey routes in Kansas, 2014.