WILDLIFE MANAGEMENT AND RESEARCH NOTES

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	Title: Wild Turkey Summer Brood Production Indices – 2024.	11/7/2024

Project ID/Activity: W51R/513

Since 1993, observations of eastern wild turkey (*Meleagris gallopavo sylvestris*) hens and poults, including hens without poults, have been recorded during July and August in Indiana. Initially the brood survey was conducted by agency wildlife biologists and conservation officers recording observations on brood survey cards. A wild turkey summer brood Production Index (PI) was calculated as the total number poults/the total number of adult hens observed in July and August. The PI is a more accurate index of production because it includes all hens, including those observed without poults (broodless hens). One chronic bias in brood observation data is the tendency for observers to report hens with poults more readily than those without poults resulting in a higher reported PI than reality. The August production index is generally greater than in July due to late summer flock behavior where several individual broods and hens without broods combine into larger flocks.

In 2016, the survey moved to an online data entry platform that allowed participation by both state agency personnel and public volunteers. The objectives were to increase the survey coverage across the increasing range of wild turkeys in the state, to increase the number of observations received, and to enhance the robustness of the survey. Instructions for reporting wild turkey observations were posted on the DNR web page and included a link to an illustrative photo guide, “Introduction to documenting turkey broods”. The online observation system was active only during the traditional brood reporting period (July and August).

In 2020, an assessment of volunteer participation and possible barriers to participation was conducted after the brood survey period. Among the factors hindering volunteer observer participation were the pre-survey registration and difficulty with registering, volunteers forgetting usernames and passwords, and problems related to the website reporting form accessibility on mobile devices. Based on these findings, the survey form was simplified and moved to the ArcGIS Survey123 platform. Other changes included allowing the submission of geo-referenced observation locations, allowing the submission of observation photos, and eliminating the pre-survey registration requirement and instead using volunteer observer’s email address as the reporter identifier.

RESULTS AND DISCUSSION

After filtering and censoring data according to nationally adopted brood survey protocol criteria (National Wild Turkey Federation Technical Committee 2019), Indiana DNR received 1,823 observation reports during the July and August 2024 survey period, a 17.2% decrease from 2,202 observations in 2023. The number of 2024 observations is 63% lower than the 4,950 reports received during 2021, which was the highest production year recorded in recent years. The 2021 breeding season was an exceptional summer of high turkey production related to 17-yr cicada emergence (*Magicicada spp.*) and conducive weather during the

critical early brood period of June. The 1,823 usable observations of at least one wild turkey in 2024 were used to calculate the wild turkey Production Index (PI; total poults/total hens) and related metrics (Table 1). The brood observation reports were distributed across the state with 26 counties reporting at least 25 observations. Observations were highly associated with the distribution of forest cover in the state (Figure 1a and 1b.) In 2024, a total of 4,276 hens and 11,476 poults were reported. This included 1,523 broods (at least 1 hen/1 poult) and 300 broodless hens being reported. The average brood size in 2024 was 9.8 (*SE* = 0.14) birds, which is consistent with 2023 at 10.2 (*SE* = 0.14) birds, and higher than 2022 at 9.7 (*SE* = 0.13) birds but less than 11.2 (*SE* = 0.10) birds in 2021. The 1,523 broods reported in 2024 was 339 fewer (-18.2%) than the 1,862 broods reported in 2023.

In 2024, the percentage of hens with poults (Figure 2), the production index (Figure 3), and the number of observations were similar to the values calculated for the average of the previous five years (Table 2). The 2024 production index (PI) was 2.7, with 85% of hens observed with at least one poult. This is consistent with 2023's calculations and is very close to the previous five years' mean PI of 2.8 and 80% hens with poults. Prior to 2021, the average PI had progressively declined over 28 years from a mean of 3.6 (*SE* = 0.18; 1993-1999) to 2.4 (SE = 0.13; 2011-2020) before it began to stabilize in the last several years.

The number of 2024 brood reports fell short of the goal of 3,000 usable, independent brood observations, but still allowed meaningful comparisons among the 6 regions with only the east-central region (80 observations), southwest region (184 observations) and southeast region (193 observations) not reaching the >200 reports/region goal (Figure 4). The regional PIs ranged from 2.11 to 3.07, compared to the narrower 2023 range of 2.43 to 2.84 across the regions. The southern half of the state, in general, has experienced relatively lower production for almost 2 decades with the exception of an increase in 2021. Prior to 2021, southern Indiana had experienced at least 15 consecutive years of above normal precipitation during the critical early brood rearing period of late May to through June.

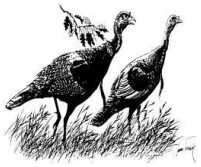
The regional poult to hen ratios (Figure 5) and mean brood size (Figure 6) varied among the regions, with the North region on the high end of the comparisons and southcentral on the low end. By reducing observation benchmark from ≥ 25 observations (used in 2021) to ≥15 observations in from 2022 onward, poult to hen ratios were determined for 52 counties (57%) in 2024 (Table 3). County-level poult-to-hen ratios ranged from a high of 4.1 in Porter county to a low of 1.0 in Washington County, with 25 counties showing PI values greater than the statewide average of 2.7. Only one county had no observations: Tipton County.

Long-term trends in turkey populations are primarily influenced by availability of suitable habitat across the landscape. Other factors such as climate conditions and other periodic factors (e.g., cicada emergences) influence annual fluctuations. Changes in annual production are often reflected in the proportion of juvenile males (jakes) in the following fall and spring harvests and, two years later, in the pre-season gobbling surveys and spring harvest. Two-year-old males are the most active gobbling cohort and generally the most vulnerable to spring harvest. A 50-year examination of Indiana's spring harvests indicated that the proportion of two-year-old gobblers in the population was a principal driver in annual harvest levels. Spring turkey harvest in 2023 was the highest recorded for the state at 16,649 birds harvested. This is attributed to the increased brood success in 2021 leading to higher survival and males reaching 2 years of age. Spring turkey harvest in 2024 was the second-highest recorded at 15,536 birds harvested. This supports the idea that holdover males from 2023 survived until the 2024 breeding season.

The substantial increase in observer participation the last five years has increased the sensitivity of the survey to produce more accurate estimates of wild turkey production. It is hard for volunteers to report broods in areas of low production as they are often scarce or difficult to see. Vegetation, human population, road density, and topography can all effect the ability for volunteers to report turkey broods. Indiana maintains an

objective to obtain a minimum goal of 3,000 brood reports evenly distributed across the regions of the state but will continue to use the likely more attainable objective of a minimum of 25 observations for at least 75% (70 or more) of counties because of the challenges in some areas of seeing broods.

LITERATURE CITED



National Wild Turkey Federation Technical Committee 2019. A standardized protocol for conducting wild turkey brood surveys. National Wild Turkey Federation, Edgefield, SC. 13 pp.

Table 1. Indiana wild turkey brood production - Summer 2024

July 2024	Adult Hens	Poults	Brood Size*	Poults/Hen**		
Total	2,917	8,049		**2.8**	Percent hens with broods	82%
No. Observations	1,294	1,059	1,059		Mean No. broodless hens in a group	2.6
Mean	2.3	6.2	8.5		Observations of broodless hens	235
SE	0.05	0.15	0.17			

August 2024	Adult Hens	Poults	Brood Size*	Poults/Hen**		
Total	1,359	3,427		**2.5**	Percent hens with broods	88%
No. Observations	529	464	464		Mean No. broodless hens in a group	3.1
Mean	2.7	6.8	9.0		Observations of broodless hens	65
SE	0.08	0.21	0.23			

July & August Combined	Adult Hens	Poults	Brood Size*	Poults/Hen**		
Total	4,276	11,476		**2.7*** **	Percent hens with broods	84%
No. Observations	1,823	1,523	1,523		Mean No. broodless hens in a group	2.7
Mean	2.3	6.3	8.6		Observations of broodless hens	300
SE	0.04	0.12	0.14			

* Brood size = all hens + all poults observed as a group at one time.

** The total poults/total hens

*** The total poults/total hens observed each month; July + August combined = annual Production Index (PI)

Figure 1a. Distribution of wild turkey observation reports by counties (n=1,823) for July and August 2024.

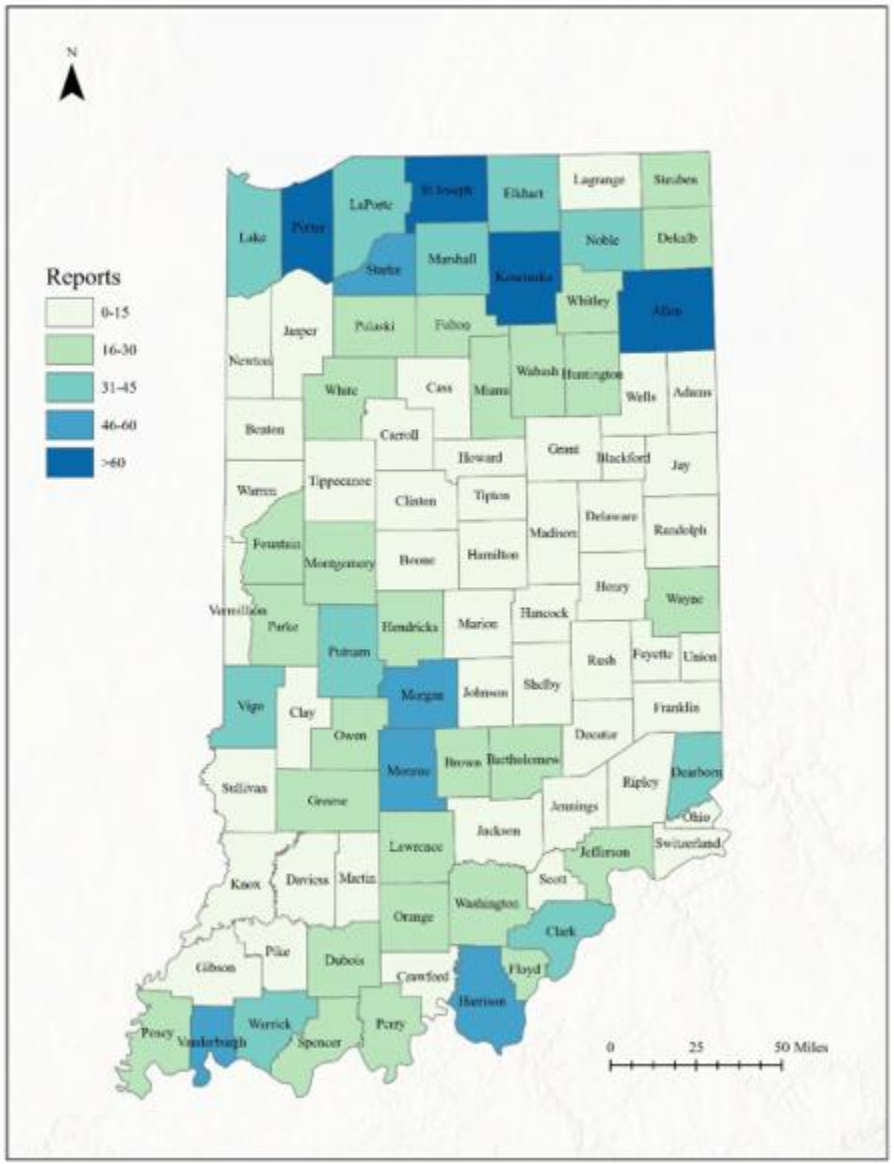
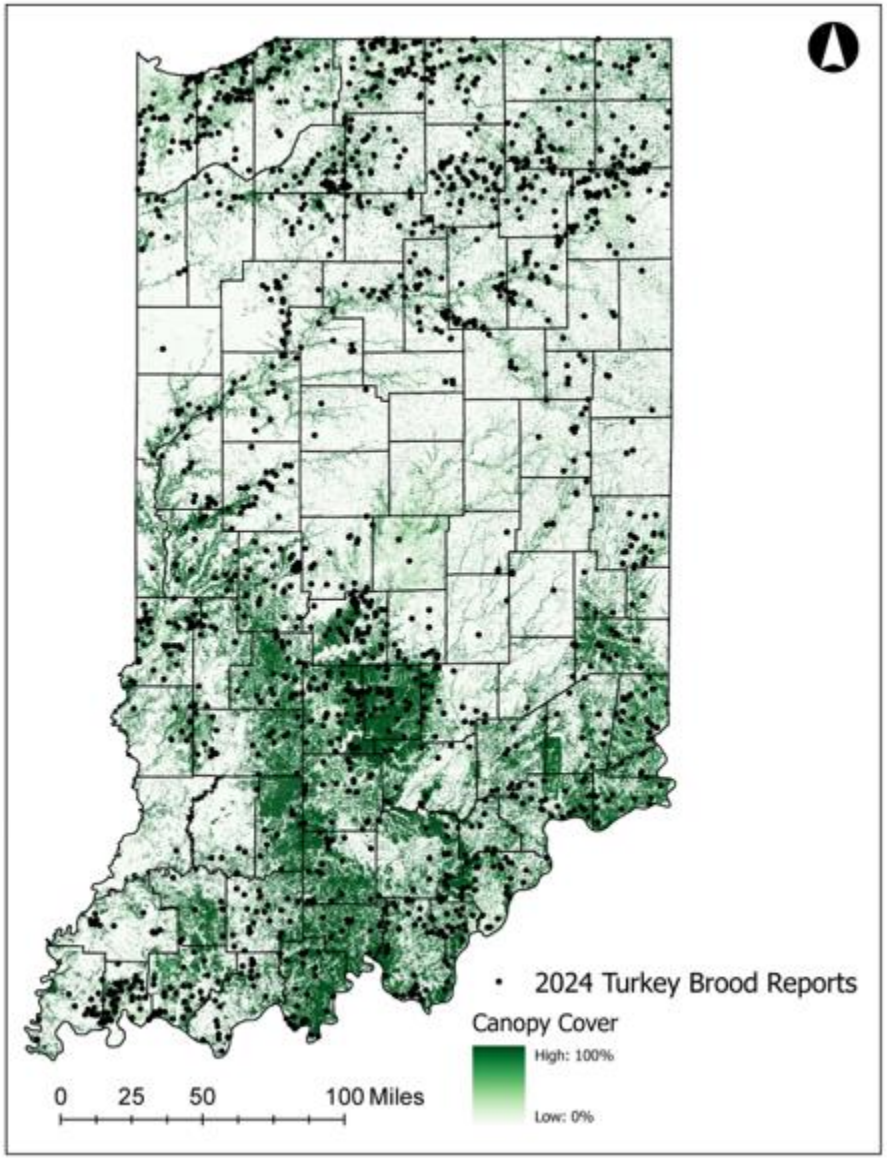


Figure 1b. Distribution of wild turkey observation reports by forest cover (n=1,823) for July and August 2024.



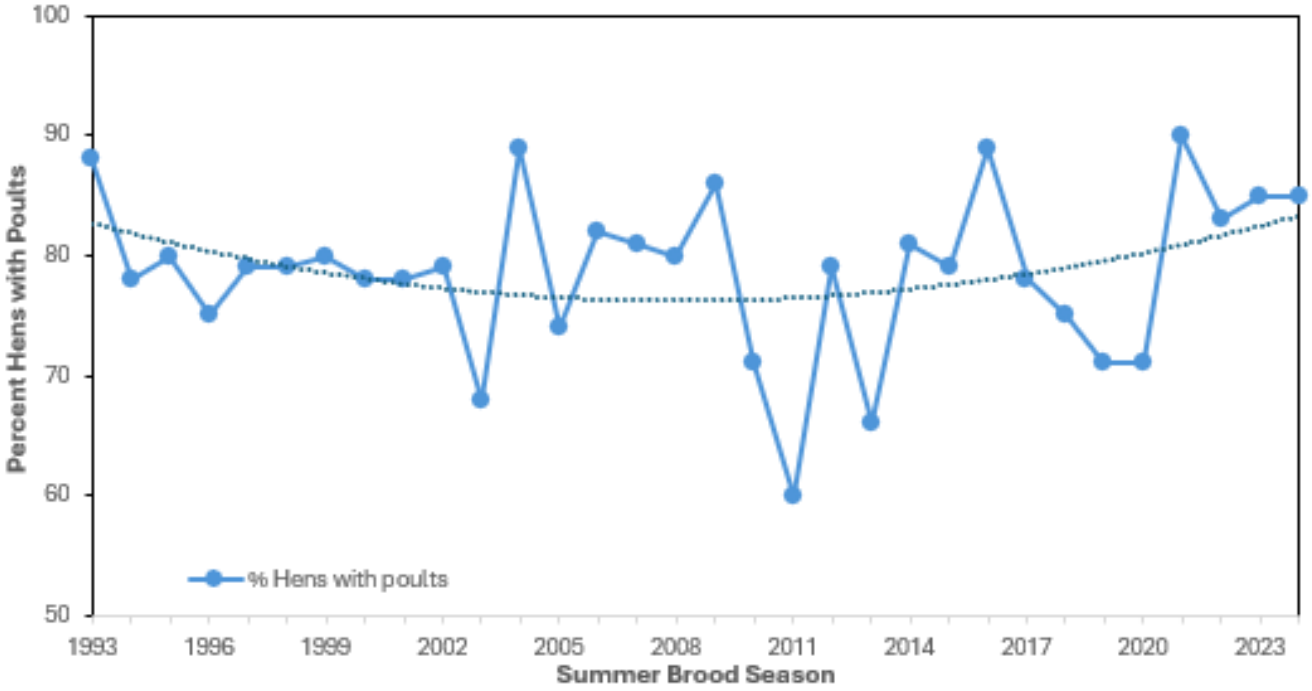


Figure 2. Percent of turkey hens with poults in Indiana, 1993-2024. Dashed trendline was fitted using a locally weighted polynomial regression.

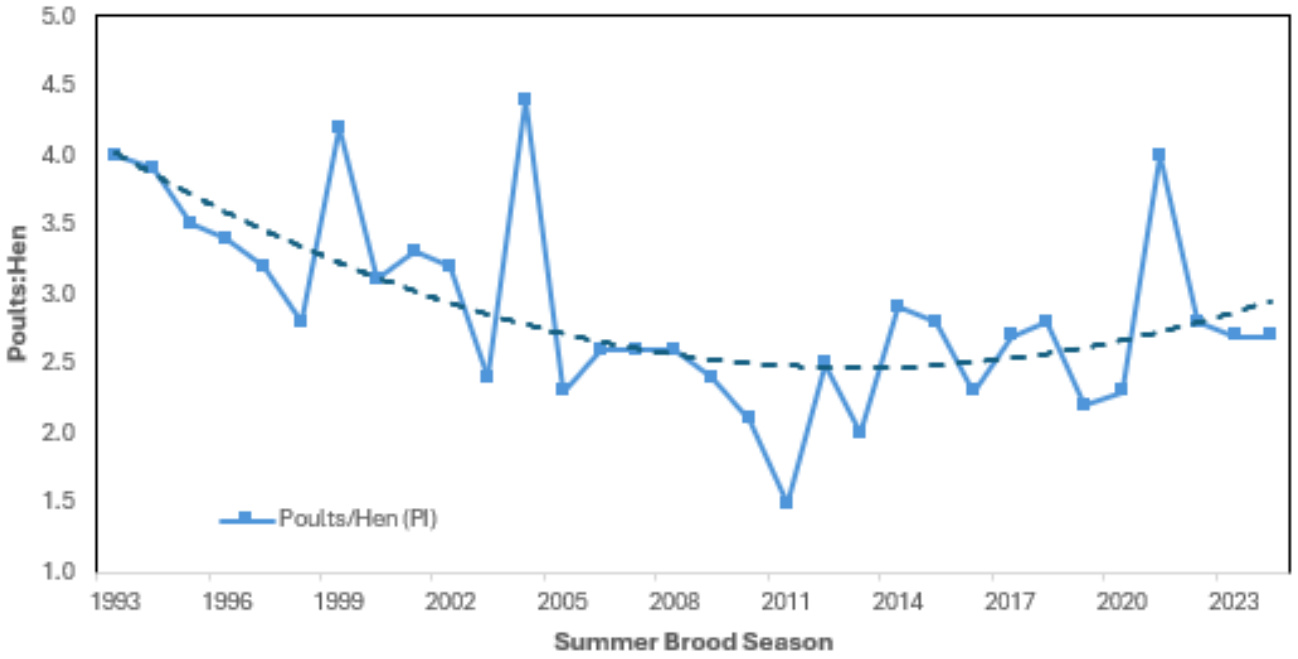


Figure 3. Annual wild turkey production in Indiana, 1993-2024. Dashed trendline was fitted using a locally weighted polynomial regression.

Table 2. Wild turkey production indices in Indiana, 1993-2024.

Year	Poults/Hen[a] (PI)	% Hens with poults	No. Observations
1993	4.0	88	101
1994	3.9	78	175
1995	3.5	80	121
1996	3.4	75	142
1997	3.2	79	126
1998	2.8	79	134
1999	4.2	80	229
2000	3.1	78	227
2001	3.3	78	313
2002	3.2	79	338
2003	2.4	68	312
2004[b]	4.4	89	597
2005	2.3	74	240
2006	2.6	82	477
2007	2.6	81	364
2008	2.6	80	328
2009	2.4	86	311
2010	2.1	71	320
2011	1.5	60	320
2012	2.5	79	318
2013	2.0	66	394
2014	2.9	81	363
2015	2.8	79	302
2016	2.3	89	323
2017	2.7	78	522
2018	2.8	75	527
2019	2.2	71	899
2020	2.3	71	862
2021[b]	4.0	90	4,435
2022	2.8	83	2,358
2023	2.7	85	2,202
2019-2023 Mean (SE)	2.8 (0.32)	80 (3.8)	2,151 (651.6)
2024	2.7	85	1,823

[a] Production Index (PI) is the total poults/total hens observed in July and August.

[b] 2004 and 2021 summers of 17-yr periodic cicada (*Magicicada spp.*; Brood X emergence (Kritskey et al. 2005)

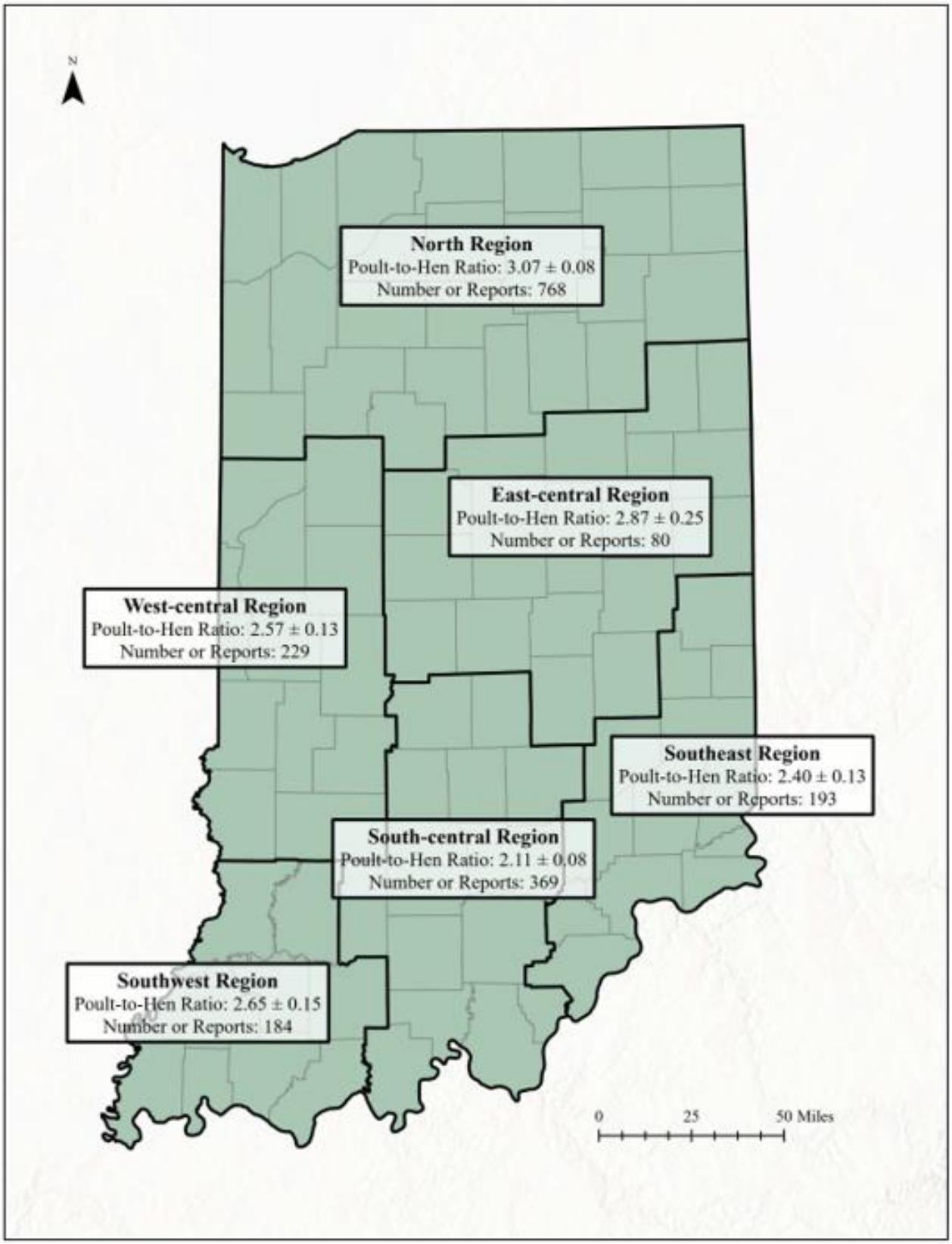


Figure 4. Regional wild turkey production for July and August 2024.

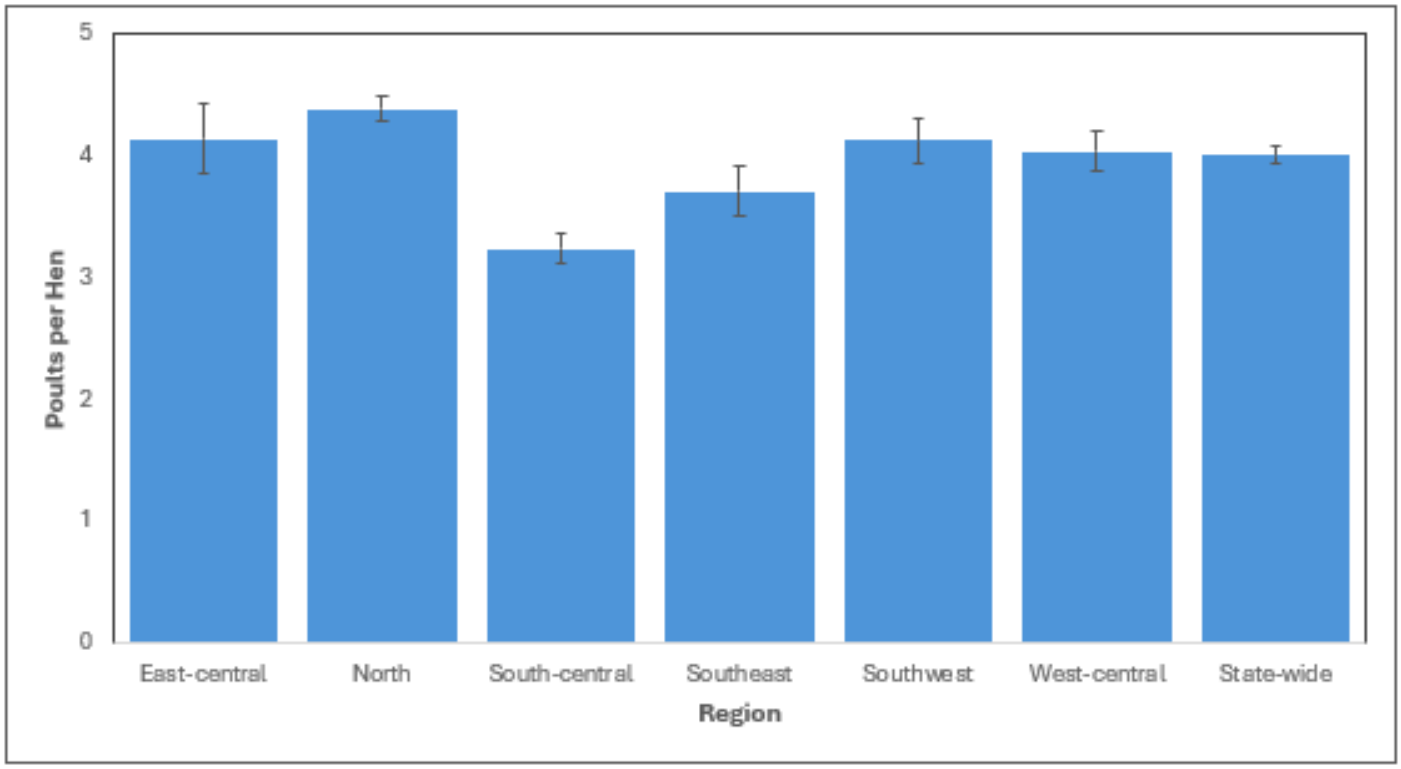


Figure 5. Wild turkey production (95% confidence interval) during the 2024 summer brood season in Indiana by region.

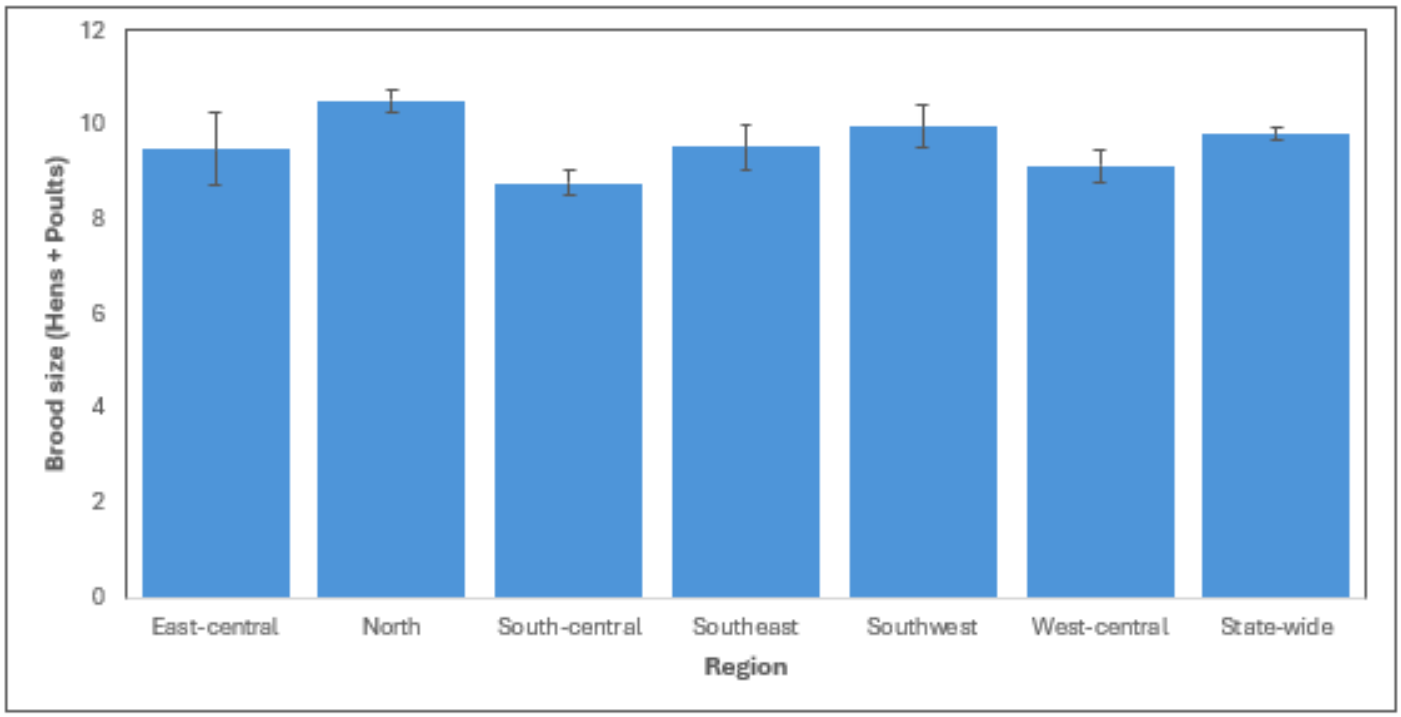


Figure 6. Wild turkey brood sizes (95% confidence interval) during the 2024 summer brood season in Indiana by region.

Table 3. Indiana wild turkey brood production by county for July and August 2024.

County	No. Observations	Hens	No. Broods	% Observations with Broods	Poults	Poults/Hen*
Adams	1	1	1	100%	6	N/A
Allen	70	176	58	83%	409	2.3
Bartholomew	22	53	19	86%	131	2.5
Benton	1	1	1	100%	5	N/A
Blackford	7	12	7	100%	46	N/A
Boone	1	3	1	100%	7	N/A
Brown	29	63	23	79%	161	2.6
Carroll	9	17	8	89%	62	N/A
Cass	11	25	10	91%	90	N/A
Clark	38	79	31	82%	265	3.4
Clay	14	29	12	86%	116	N/A
Clinton	3	6	2	67%	13	N/A
Crawford	11	41	8	73%	45	N/A
Daviess	6	11	5	83%	22	N/A
Dearborn	31	76	23	74%	144	1.9
Decatur	3	8	3	67%	23	N/A
Dekalb	19	58	18	95%	169	2.9
Delaware	12	38	9	75%	81	N/A
Dubois	24	60	21	88%	127	2.1
Elkhart	39	98	38	97%	351	3.6
Fayette	4	6	2	50%	15	N/A
Floyd	20	53	18	90%	131	2.5
Fountain	16	31	14	88%	101	3.3
Franklin	15	28	15	100%	113	4.0
Fulton	20	46	15	75%	129	2.8
Gibson	15	27	13	87%	87	3.2
Grant	5	10	4	80%	33	N/A
Greene	20	51	19	95%	142	2.8
Hancock	4	7	4	100%	15	N/A
Harrison	46	108	44	96%	292	2.7
Hendricks	19	40	16	84%	108	2.7
Henry	7	13	7	100%	69	N/A
Howard	3	3	3	300%	21	N/A
Huntington	29	71	26	90%	172	2.4
Jackson	13	27	10	77%	52	N/A
Jasper	10	29	9	90%	72	N/A
Jay	3	6	3	100%	33	N/A
Jefferson	22	57	21	95%	129	2.3
Jennings	14	35	10	71%	50	N/A
Johnson	15	28	12	80%	75	2.7
Knox	2	5	2	100%	18	N/A
Kosciusko	69	156	63	91%	574	3.7
Lagrange	11	22	10	91%	65	N/A
Lake	43	90	38	88%	295	3.3
LaPorte	35	81	32	91%	308	3.8
Lawrence	21	50	18	86%	114	2.3

Table 3 continued next page

Table 3 con't. Indiana wild turkey brood production by county for July and August 2024.

County	No. Observations	Hens	No. Broods	% Observations with Broods	Poults	Poults/Hen*
Marion	2	7	0	0%	0	N/A
Marshall	31	71	24	77%	211	3.0
Martin	9	21	7	78%	36	N/A
Miami	27	75	21	78%	168	2.2
Monroe	56	153	42	75%	276	1.8
Montgomery	25	52	21	84%	118	2.3
Morgan	58	128	47	81%	324	2.5
Newton	11	20	10	91%	89	N/A
Noble	37	87	34	92%	265	3.0
Ohio	5	20	5	100%	60	N/A
Orange	21	46	16	76%	76	1.7
Owen	27	71	25	93%	176	2.5
Parke	16	53	11	69%	60	1.1
Perry	27	69	24	89%	138	2.0
Pike	11	20	10	91%	79	N/A
Porter	67	147	62	93%	599	4.1
Posey	20	46	18	90%	154	3.3
Pulaski	20	44	17	85%	112	2.5
Putnam	33	71	29	88%	212	3.0
Randolph	3	3	3	100%	14	N/A
Ripley	12	31	8	67%	50	N/A
Rush	3	9	1	33%	12	N/A
Scott	9	22	7	78%	36	N/A
Shelby	2	3	2	100%	7	N/A
Spencer	24	74	18	75%	170	2.3
St Joseph	71	163	56	79%	471	2.9
Starke	54	117	44	81%	308	2.6
Steuben	16	40	13	81%	145	3.6
Sullivan	9	20	7	78%	64	N/A
Switzerland	13	35	9	69%	86	N/A
Tippecanoe	15	34	11	73%	59	1.7
Tipton	0	0	0	0%	0	N/A
Union	3	5	2	67%	11	N/A
Vanderburgh	51	121	40	78%	358	3.0
Vermillion	1	2	1	100%	8	N/A
Vigo	42	84	31	74%	223	2.7
Wabash	22	55	17	77%	124	2.3
Warren	11	20	10	91%	50	N/A
Warrick	31	72	21	68%	142	2.0
Washington	21	70	14	67%	70	1.0
Wayne	24	54	17	71%	114	2.1
Wells	5	12	3	60%	32	N/A
White	16	28	12	75%	79	2.8
Whitley	30	66	27	90%	204	3.1
Statewide	1,823	4,276	1,523	84%	11,476	2.7

*Poult/Hen ratio determined only for counties with ≥ 15 observations.