WILDLIFE MANAGEMENT AND RESEARCH NOTES

Indiana Department of Natural Resources

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2080	Title: Wild Turkey Summer Brood Production Indices – 2023.	5/22/2024

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 difficulties with the pre-survey registration, 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 2,202 observation reports during the 2023 July and August survey period, a 6.6% decrease from 2,358 observations in 2022. The number of 2023 observations are 55% lower than the 4,950 reports received during 2021. The 2021 breeding season was an exceptional summer of high turkey production related to 17-year cicada emergence (*Magicicada spp.*) and conducive weather during the critical early brood period of June. The 2,202 usable observations of at least one wild turkey in 2023 were used to calculate the wild turkey Production Index (PI; total poults/total hens) and related metrics (Table 1). The brood observations were distributed across the state with 35 counties reported at least 25 observations and were highly associated with the distribution of forest cover in the state (Figure 1a and 1b.) In 2023, a total of 5,452 hens and 14,477 poults were reported. This included 1,862 broods (at least 1 hen/1 poult) and 340 broodless hens being reported. The average brood size in 2023 was 10.2

(*SE* = 0.14) birds, which is higher than 2022 at 9.7 (*SE* = 0.13) birds but less than 11.2 (*SE* = 0.10) birds in 2021. The 1,862 broods reported in 2023 was 139 fewer (-7%) than the 2,001 broods reported in 2022.

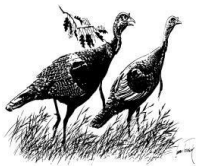
In 2023, the percent of hens with poults (Figure 2), the production index (Figure 3), and the number of observations were very similar to the values calculated for the average of the previous five years (Table 2). The 2023 production index (PI) was 2.7, with 85% of hens observed with at least one poult. 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 2023 PI of 2.7 is very close to the 2.8 mean PI for the previous 5 years (2018-22) and the 2022 annual PI of 2.8.

The number of 2023 brood observations 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 (85 observations) and southeast region (188 observations) not reaching the >200 observations/region goal (Figure 4). The regional PIs ranged from 2.43 to 2.84, compared to the wider 2022 range of 2.1 to 3.5 across the regions. The southern half of the state, in general, has experienced relatively lower production for almost 2 decades except for 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 the observation benchmark from ≥ 25 observations (used in 2021) to ≥ 15 observations in 2022 and 2023, poult to hen ratios were determined for 59 counties (64%) in 2023 (Table 3). County-level poult-to-hen ratios ranged from a high of 3.8 in Elkhart and Pulaski counties to a low of 1.8 in Washington County, with 23 counties showing PI values greater than the statewide average of 2.7. Two counties had no observations: Marion and Howard.

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. A large holdover population of males from 2023 spring season may lead to a strong reproductive year in 2024.

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 difficult 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 2023

Jul-23	Adult Hens	Poults	Brood Size*	Poults/Hen**
Total	2681	7470		**2.8**
No. Observations	1168	1168	972	
Mean	2.3	6.4	9.9	
SE	0.06	0.16	0.20	

Percent hens with broods	83%
Mean No. broodless hens in a group	2.6
Observations of broodless hens	196

Aug-23	Adult Hens	Poults	Brood Size*	Poults/Hen**
Total	2771	7007		**2.5**
No. Observations	1034	1034	890	
Mean	2.7	6.8	10.5	
SE	0.06	0.17	0.20	

Percent hens with broods	86%
Mean No. broodless hens in a group	3.2
Observations of broodless hens	144

July & August Combined	Adult Hens	Poults	Brood Size*	Poults/Hen**
Total	5452	14477		**2.7*** **
No. Observations	2202	2202	1862	
Mean	2.5	6.6	9.2	
SE	0.04	0.12	0.15	

Percent hens with broods	85%
Mean No. broodless hens in a group	2.8
Observations of broodless hens	340

* 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 = 2,203) for July and August 2023.

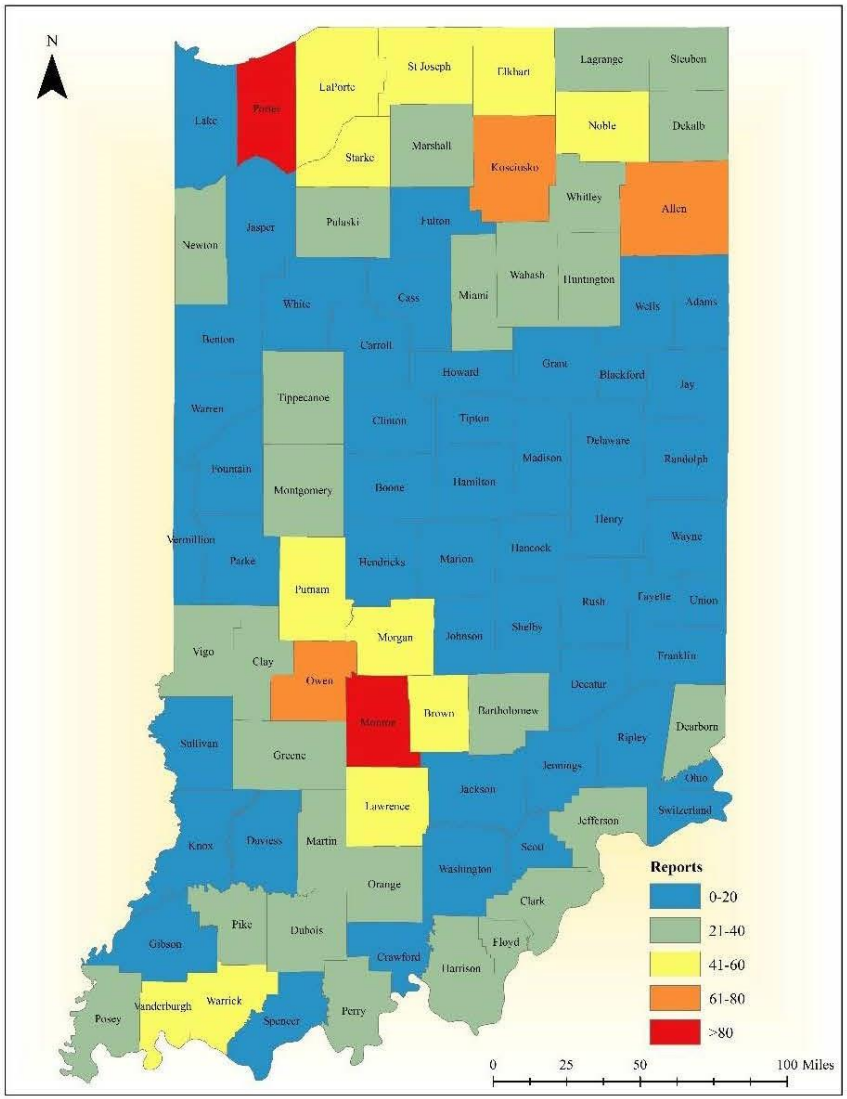
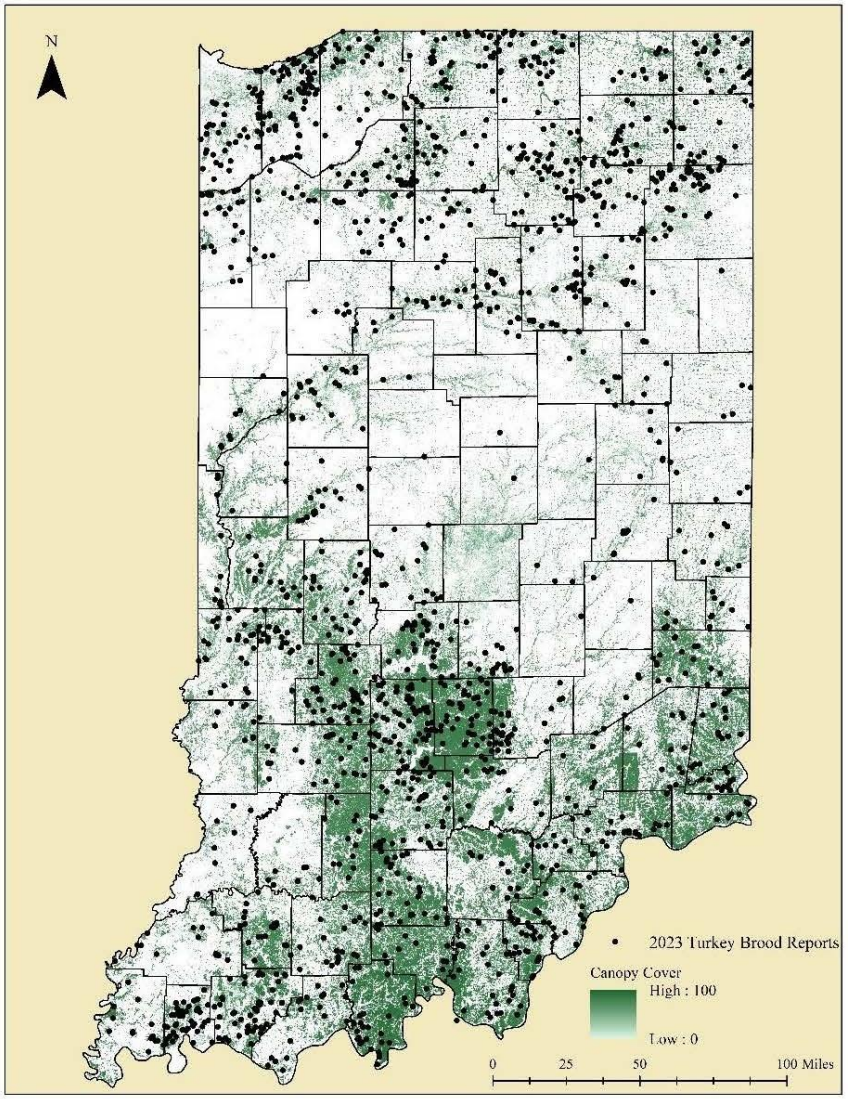


Figure 1b. Distribution of wild turkey observation reports by forest cover, (n = 2,203) for July and August 2023.



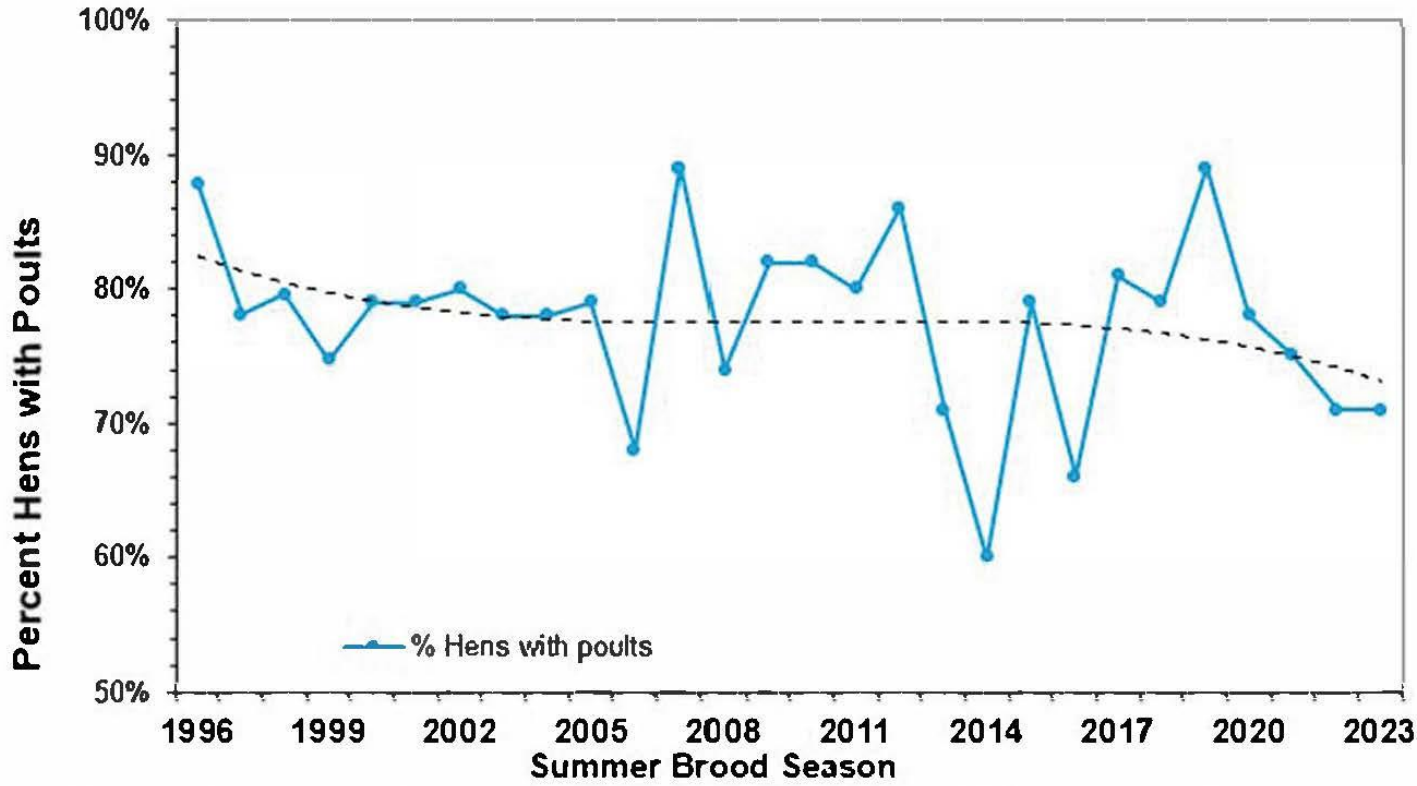


Figure 2. Percent of turkey hens with poults in Indiana 1993-2023. Dashed trendline was fitted using locally weighted polynomial regression.

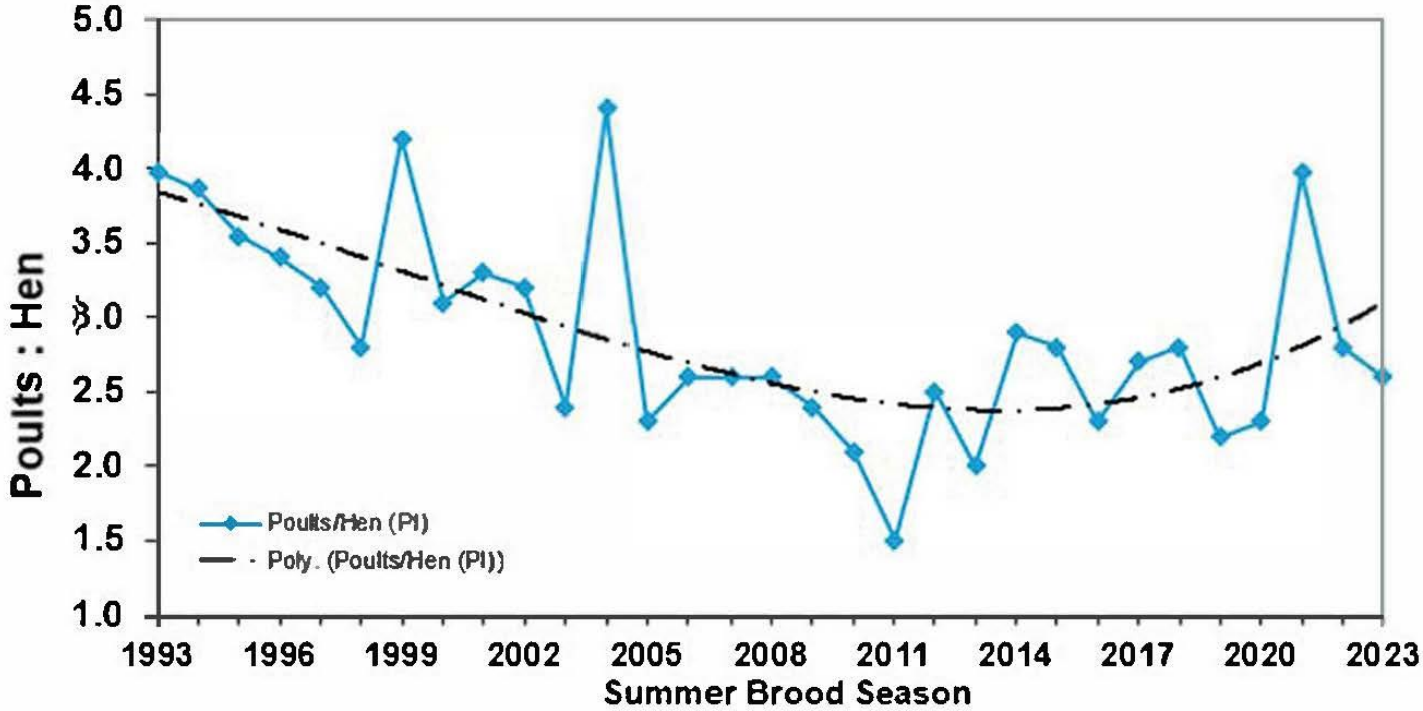


Figure 3. Annual wild turkey production in Indiana 1993-2023. Dashed trendline fitted using locally weighted polynomial regression.

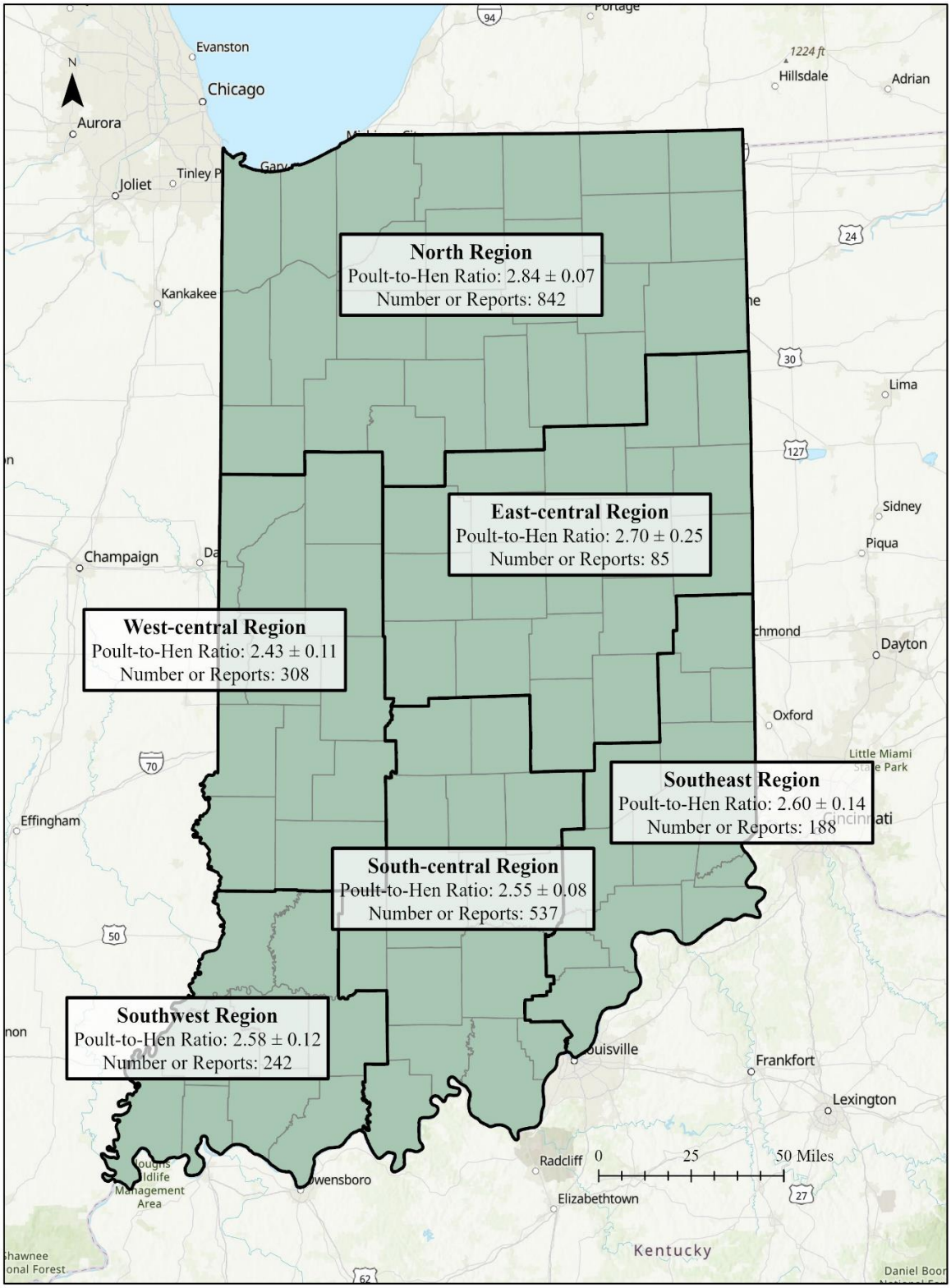
Table 2. Wild turkey production indices in Indiana, 1993-2023.

Year	Poults/Hen[a] (PI)	% Hens with poults	No. Observations
1993	4	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	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	90	4,435
2022	2.8	83	2,358
2018-2022 Mean (SE)	2.8 (0.32)	78 (3.7)	1,816 (726.8)
2023	2.7	85	2,202

[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 2023.



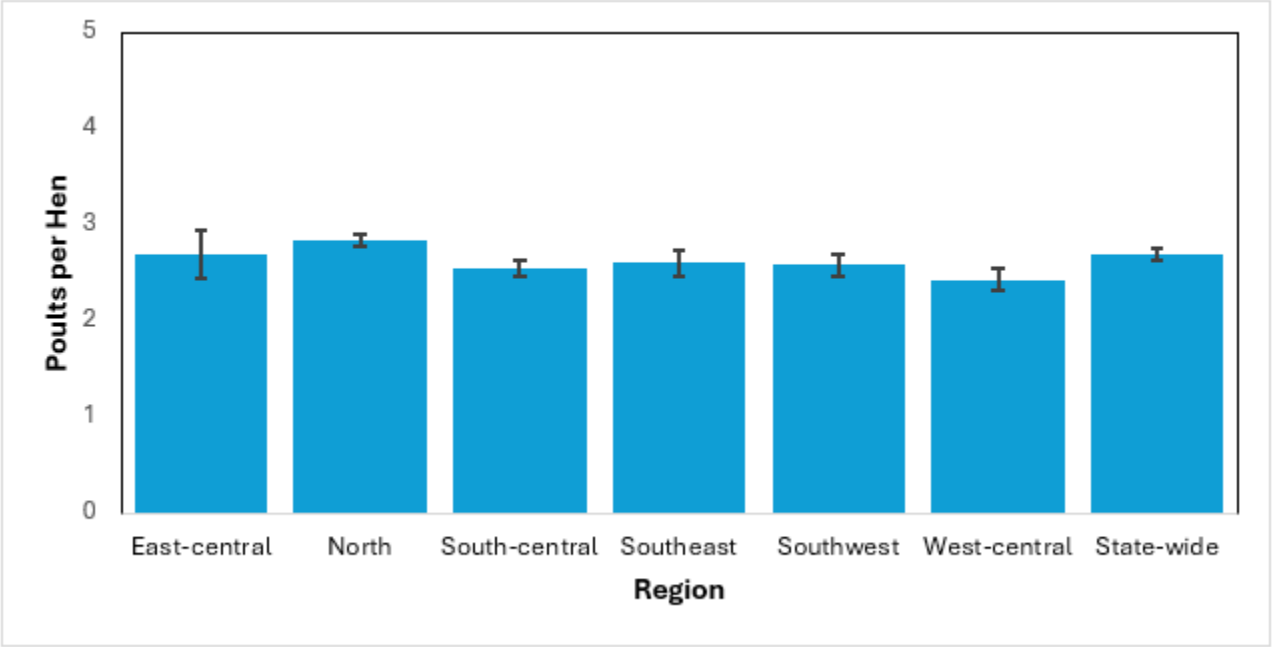


Figure 5. Wild turkey production (95% confidence interval) during the 2023 summer brood season in Indiana by region.

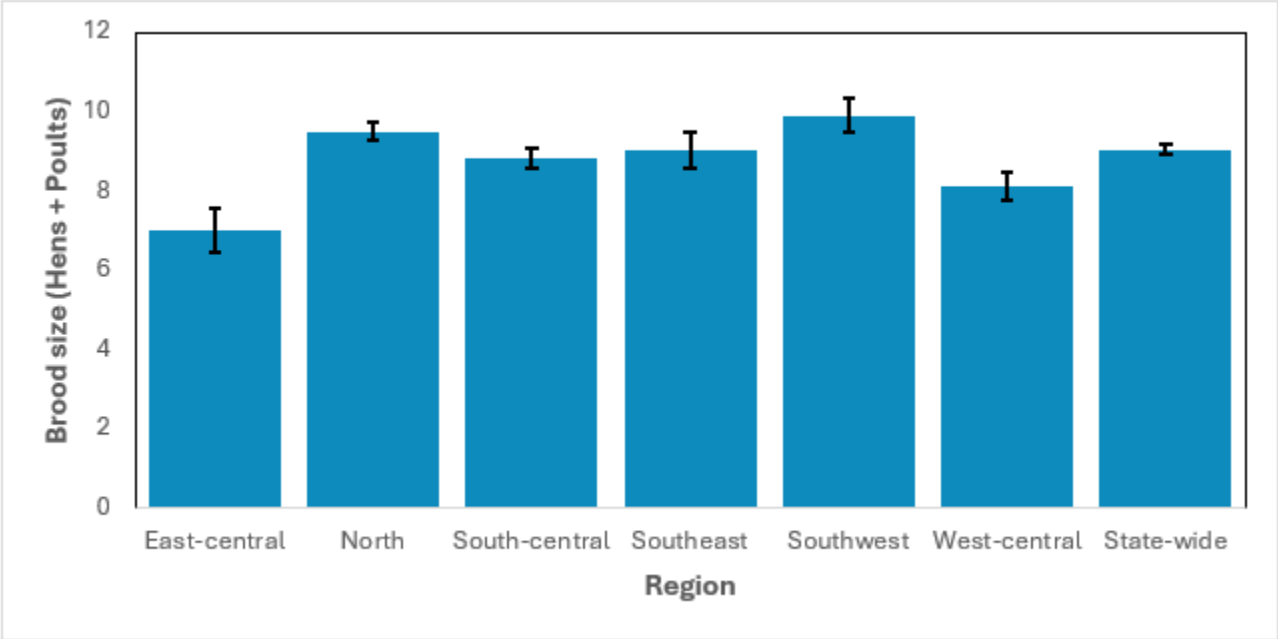


Figure 6. Wild turkey brood sizes (95% confidence interval) during the 2023 summer brood season in Indiana by region.

Table 3. Indiana wild turkey brood production by county for July and August 2023.

County	No. Observations	No. Broods	Hens	% Observations with Broods	Poults	Poults/Hen*
Adams	2	2	2	100%	12	N/A
Allen	74	58	174	78%	463	2.7
Bartholomew	31	23	102	74%	160	1.6
Benton	2	2	5	100%	33	N/A
Blackford	4	4	9	100%	30	N/A
Boone	1	0	1	0%	0	N/A
Brown	53	49	136	92%	369	2.7
Carroll	7	6	16	86%	31	N/A
Cass	15	14	33	93%	79	2.4
Clark	28	19	74	68%	150	2.0
Clay	26	22	54	85%	140	2.6
Clinton	1	0	2	0%	0	N/A
Crawford	18	16	38	89%	105	2.8
Daviess	9	7	19	78%	39	N/A
DeKalb	23	20	54	87%	127	2.4
Dearborn	23	19	74	83%	138	1.9
Decatur	7	6	11	86%	54	N/A
Delaware	8	8	24	100%	64	N/A
Dubois	24	21	55	88%	121	2.2
Elkhart	44	43	102	98%	387	3.8
Fayette	6	6	13	100%	28	N/A
Floyd	31	25	89	81%	251	2.8
Fountain	4	3	9	75%	26	N/A
Franklin	18	18	38	100%	102	2.7
Fulton	20	19	50	95%	145	2.9
Gibson	17	17	38	100%	133	3.5
Grant	10	5	18	50%	43	N/A
Greene	33	28	85	85%	265	3.1
Hamilton	1	0	1	0%	0	N/A
Hancock	5	4	11	80%	19	N/A
Harrison	40	33	99	83%	244	2.5
Hendricks	20	15	29	75%	83	2.9
Henry	9	9	15	100%	82	N/A
Huntington	21	17	40	81%	123	3.1
Jackson	18	16	44	89%	158	3.6
Jasper	14	12	28	86%	86	N/A
Jay	5	5	14	100%	25	N/A
Jefferson	24	19	57	79%	172	3.0
Jennings	11	7	25	64%	59	N/A
Johnson	19	14	39	74%	94	2.4
Knox	8	8	25	100%	62	N/A
Kosciusko	63	53	175	84%	405	2.3
LaPorte	40	33	90	83%	294	3.3
Lagrange	17	16	46	94%	170	3.7
Lake	56	46	152	82%	384	2.5
Lawrence	52	43	108	83%	241	2.2

Table 3 continued next page

Table 3 con't. Indiana wild turkey brood production by county for July and August 2023.

County	No. Observations	No. Broods	Hens	% Observations with Broods	Poults	Poults/Hen*
Madison	1	0	1	0%	0	N/A
Marshall	32	31	81	97%	244	3.0
Martin	38	30	126	79%	271	2.2
Miami	35	32	79	91%	273	3.5
Monroe	100	86	215	86%	672	3.1
Montgomery	24	19	71	79%	149	2.1
Morgan	52	41	126	79%	282	2.2
Newton	26	23	69	88%	198	2.9
Noble	42	35	101	83%	251	2.5
Ohio	13	13	28	100%	110	N/A
Orange	36	33	101	92%	272	2.7
Owen	65	46	165	71%	362	2.2
Parke	18	16	38	89%	85	2.2
Perry	32	30	75	94%	217	2.9
Pike	21	18	46	86%	117	2.5
Porter	84	75	234	89%	644	2.8
Posey	28	26	93	93%	282	3.0
Pulaski	28	26	59	93%	223	3.8
Putnam	41	32	91	78%	210	2.3
Randolph	7	6	14	86%	34	N/A
Ripley	16	15	44	94%	128	2.9
Rush	3	1	4	33%	7	N/A
Scott	14	11	51	79%	102	N/A
Shelby	1	1	1	100%	3	N/A
Spencer	20	17	50	85%	174	3.5
St Joseph	51	42	141	82%	377	2.7
Starke	42	39	108	93%	292	2.7
Steuben	28	26	56	93%	184	3.3
Sullivan	18	16	44	89%	117	2.7
Switzerland	8	7	18	88%	63	N/A
Tippecanoe	22	17	38	77%	93	2.4
Tipton	1	1	1	100%	9	N/A
Union	9	9	19	100%	47	N/A
Vanderburgh	57	48	188	84%	396	2.1
Vermillion	13	10	28	77%	73	N/A
Vigo	33	29	74	88%	187	2.5
Wabash	38	32	95	84%	242	2.5
Warren	11	8	32	73%	62	N/A
Warrick	58	47	155	81%	404	2.6
Washington	17	11	38	65%	68	1.8
Wayne	11	11	19	100%	73	N/A
Wells	6	3	14	50%	23	N/A
White	5	4	17	80%	46	N/A
Whitley	35	29	81	83%	215	2.7
Statewide	2,202	1,862	5,452	85%	14,477	2.7

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