Spring Ring-Necked Pheasant Survey 2021

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Abstract

Spring ring-necked surveys resumed after a one-year pause in 2020 due to Wisconsin's "Safer at Home" order associated with the COVID-19 pandemic. Seventy-nine of 83 spring pheasant survey routes were completed in 2021. Average number of pheasants recorded during the 6-minute survey at each stop was 0.43 pheasants/stop and was a decrease from 0.64 pheasants/stop in 2019 and was also below the 5-year running average from 2015–2019 (0.60 pheasants/stop). The statewide abundance index estimate was 573.99 roosters in 2021, a decrease from the most recent abundance estimate in 2019 of 826.19 roosters. Abundance indices remained highest in the northwestern counties compared to counties in east-central and southern Wisconsin.

Background

The statewide ring-necked pheasant (*Phasianus colchicus*) survey was redesigned in 2013 based on results of a collaborative study between the Wisconsin Department of Natural Resources (WDNR) and University of Wisconsin-Stevens Point (Dittrich 2013). The revision aimed at improving the accuracy and efficiency of the survey. The redesign includes a modification of data collection procedures so pheasant detection rates and abundance indices can be estimated and account for inherent variability. Estimating detection rates is vital to providing sound information from which to monitor population trends over time (Thompson 2002). Wisconsin is one of the first states to incorporate detection estimates into a statewide annual survey for game birds. This revision has also provided the WDNR with better tools to effectively inform habitat management programs for ring-necked pheasants. The redesigned spring ring-necked pheasant survey had been conducted annually since 2013. However, due to Wisconsin's "Safer at Home" order associated with the COVID-19 pandemic surveys were not performed in 2020.

Methods

Route Layout – Eighty-three permanent routes in 29 counties comprising the core pheasant range were established in 2013 (Fig. 1). Most counties had 2–4 new routes established within representative pheasant habitat. Routes were equally spaced within each county surveyed. Many routes were placed in similar locations or overlapped previous routes to facilitate comparisons with historic data. Each route consisted of 15 stops spaced at least 1 mile apart to minimize double counting of pheasants at adjacent stops.

Survey Protocol – Spring pheasant surveys were conducted during 5 April–30 April 2021. Weather conditions were generally favorable throughout the survey period and there was not a need to extend the survey window as in previous years. Surveys have been conducted annually since 2013 by trained wildlife personnel, including WDNR wildlife managers, wildlife technicians, and Pheasants Forever volunteers. Surveys began approximately 45 minutes before sunrise and were completed within 2 hours after sunrise during good weather conditions (no persistent precipitation, wind speed <10 mph). Surveyors listened for 6 minutes at each stop and recorded all pheasants heard or seen on a datasheet with route locations depicted on an aerial photo. Each 6-minute period was divided into four, 1.5-minute time intervals following the time of detection survey method (Alldredge et al. 2007), which allows for estimation of pheasant detection rates. With the revised data collection procedures and route modifications we are able to reduce the survey effort required so that each route only needs to be surveyed once per year. This is a departure from years prior to 2013 when each route was run twice as an effort to account for imperfect detection rates or bias (Hull 2012). Under the current survey method, each route only needs to be run once during a season because detection probability is accounted for directly in the survey protocol and analysis. Additionally, we doubled the length of each stop from 3 to 6 minutes to increase detection rates (Dittrich 2013).

Analysis – We summarized the number of pheasants heard or seen per stop across all survey routes in Program R (ver. 3.6.0; R Development Core Team 2019). We made general comparisons between 2019 and 2021 survey indices; however, we note that the survey methodology we employed is incapable of reliably detecting small changes (<10%) in annual trends. Thus, we also compared 2021 indices (pheasants/stop) against a 5-year running average (2015–2019) which provides a more robust gauge of pheasant population trends in Wisconsin as opposed to annual comparisons.

We used Huggins closed-capture models in Program MARK (ver. 8.2; White and Burnham 1999) to generate probability of detection and abundance estimates for pheasants across 3 regions of the state (Fig. 1), in addition to statewide estimates. For each regional analysis, we included wind speed, sky condition, stop number, and noise disturbance as possible covariates to detecting a pheasant during a survey. For the statewide analysis, we also included region as a possible covariate. We based model selection on minimization of Akaike's Information Criterion adjusted for small sample size (AIC_c; Burnham and Anderson 2002). We used best-supported statistical models, or model averaging for cases of model selection uncertainty ($\Delta AIC_c<2$), to obtain the probability of detection, identify factors important in determining detection rate, and estimate an index to pheasant abundance for areas surrounding survey routes within each region and statewide.

<u>Results</u>

Trend analysis – In 2021, 79 of 83 (95.2%) survey routes were completed during the spring survey period. Average number of pheasants recorded during each 6-minute survey stop in 2021 was 0.43 pheasants/stop (SE = 0.03), a decrease compared to 2019 (0.64 pheasants/stop, SE = 0.04; Table 1). The overall average number of pheasants per stop was 29% lower compared to the 5-year running average of 0.60 pheasants/stop (2015–2019; Fig. 2).

Detection rates and abundance estimates – Probability of detection slightly varied among regions of the state, ranging from 87.6% to 89.6% (Table 2). Estimated pheasant abundance along survey routes was highest in the northwest portion of the state and lowest in the southern region (Table 2). Overall pheasant abundance derived from the survey was 573.99

roosters (95% CI = 556.1–599.0) and is a decrease compared to the 2019 estimate of 826.19 roosters (95% CI = 809.4–849.1; Table 3). Statistical modeling at the statewide scale suggested that stop number had the greatest impact on a surveyor's ability to detect pheasants. Pheasants were detected at a higher rate at the beginning of a route (i.e., around sunrise) as opposed to the end of a route. At the regional scale, stop number was also a significant factor for Region 1, while noise disturbance (i.e., noise that inhibited a surveyor from being able to hear pheasants) influenced detection probability in Region 2. In Region 3 (southern Wisconsin), there was uncertainty in model selection ($\Delta AIC_c<2$) among potential covariates (stop, wind, and noise); thus model-averaging was used to calculate estimates of pheasant detection.

Discussion

After a one-year pause in 2020 due to Wisconsin's "Safer at Home" order associated with the COVID-19 pandemic, spring ring-necked pheasant surveys resumed in 2021. Average number of pheasants detected per stop appeared to decrease in 2021 compared to the most recent survey in 2019 (Table 1). While annual trend observations from the survey data could be made, we advise caution against using such an approach given annual fluctuations in populations. Making comparisons against the 5-year running average does, however, provide a generally robust and better gauge of the overall pheasant population trend. For 2021, the average number of pheasants per stop (0.43 ± 0.03 [SE]) was 29% lower than the 5-year average from 2015–2019 (0.60 pheasants/stop; Fig. 2). Given that no surveys were conducted in 2020, it is difficult to infer whether this decline is an anomaly or part of a potential downward trend. We note that populations estimates were also quite low in 2014 (0.41 pheasants/stop; Table 1) but quickly rebounded the following year in 2015. Prior to this year's surveys, the statewide pheasant population trend had remained relatively stable over the previous 5-year period of 2015–2019.

With 8 years of data collection under the redesigned survey methodology, the derived abundance estimates are useful for making relative comparisons among regions or over time. For example, the survey has shown much greater disparity in pheasant abundance and detection rates among regions than could be previously seen under the historic survey protocol. Abundance estimates were highest in Region 1 compared to Regions 2 and 3 (Table 2) and have been so consistently since 2013 (Table 3). It is important to remember that these estimates represent an index to abundance and are linked to the area surrounding the current survey routes; they are not a direct or extrapolated estimate of the entire statewide or regional population.

Although survey information is published annually, it is important to remember that long-term trends and comparison to long-term averages are more valuable than year-to-year or area-to-area comparisons. Localized population changes typically cannot be pinpointed to one cause; however, some reasons may include isolated weather conditions or land use changes. When making a comparative analysis, all of these factors must be taken into consideration. Nevertheless, long-term annual index changes for many areas with a similar treatment should provide good indications of the direction of population trends for these treatment areas. Continued emphasis is needed on research, habitat development, management, and maintenance to ensure stable pheasant populations in the future.

Literature Cited

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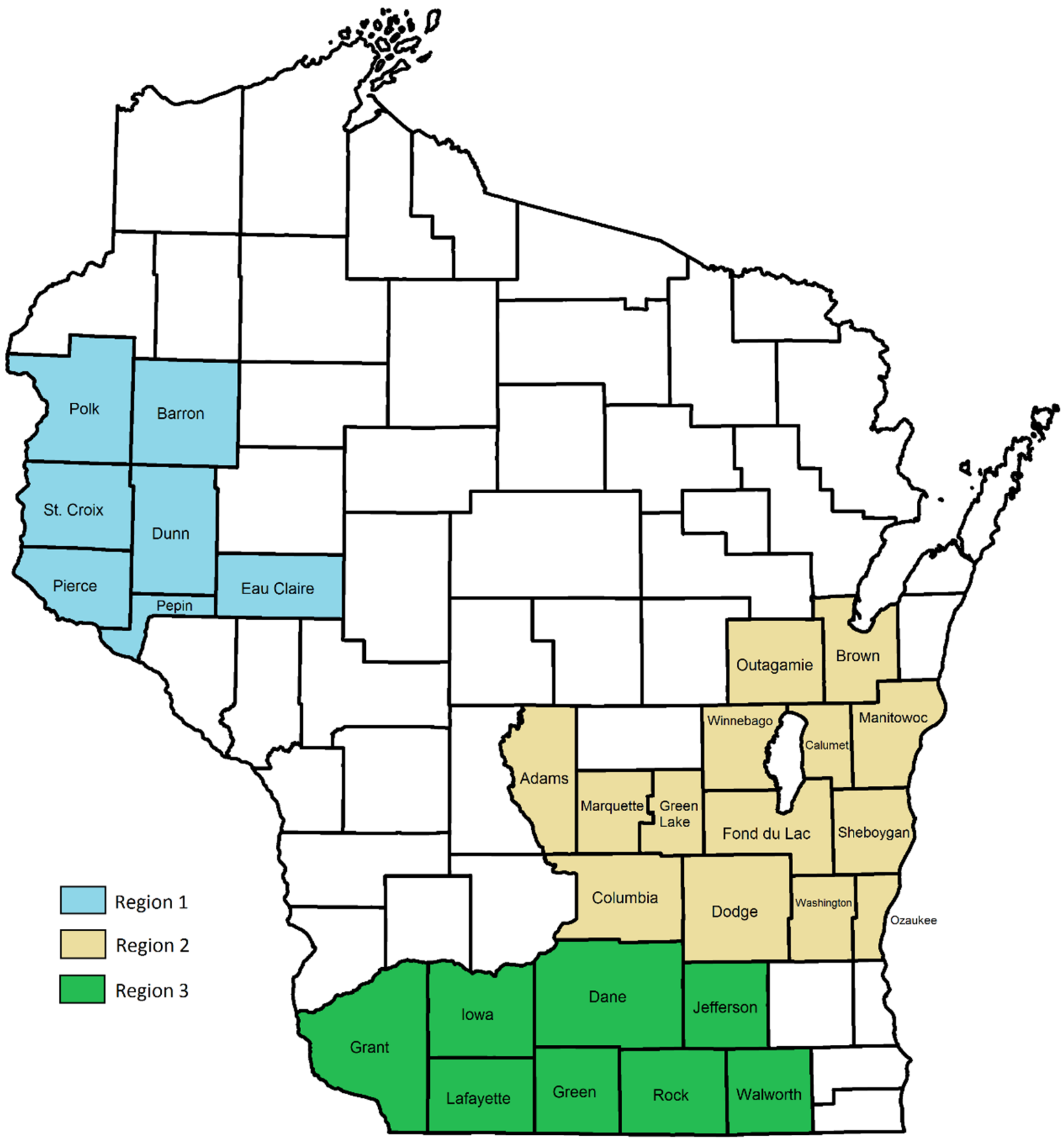

Figure 1. *Core Wisconsin ring-necked pheasant range depicting counties included in the redesigned survey. Counties are grouped into regions for trend analyses.*

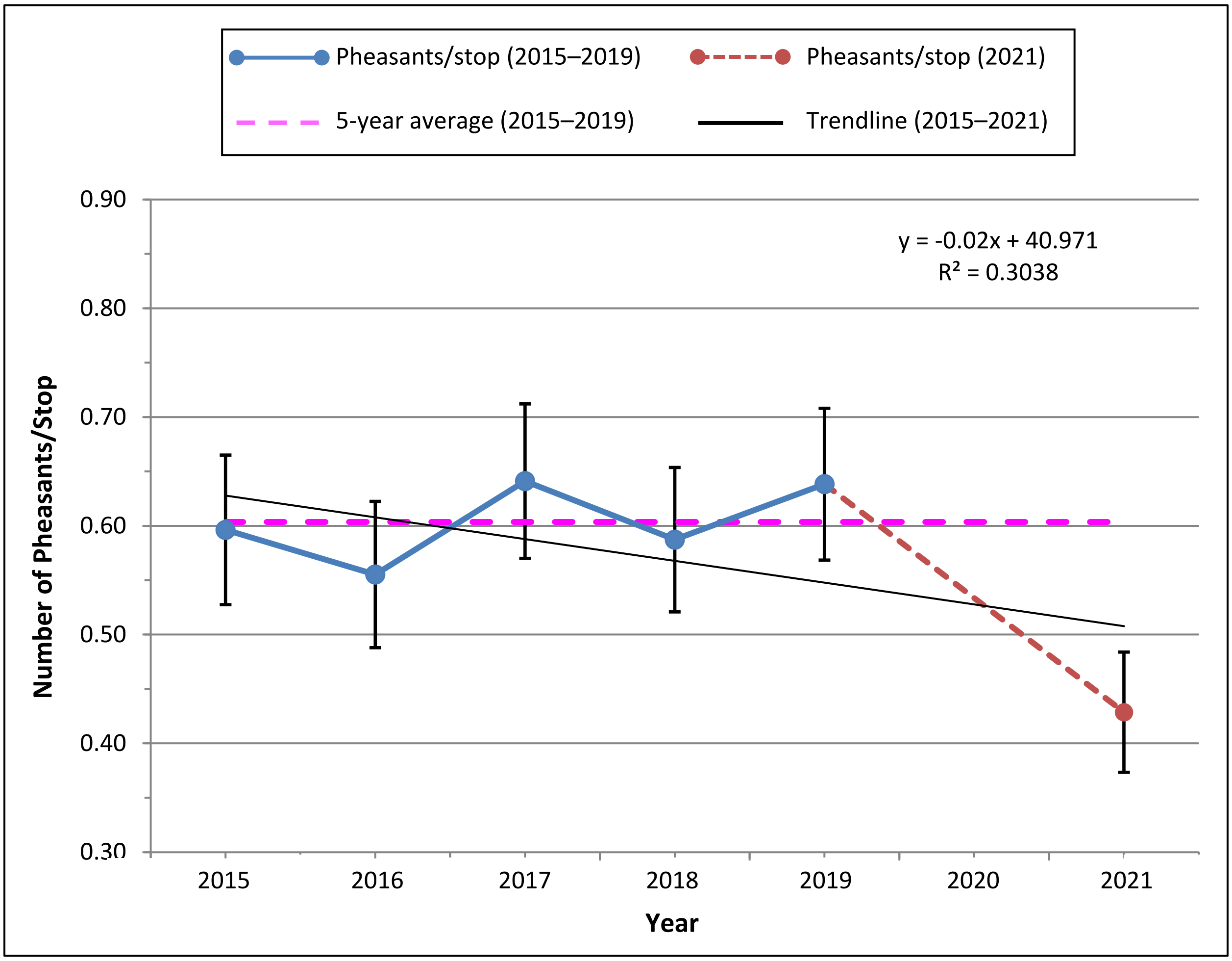

Figure 2. *Average number of individual ring-necked pheasants recorded per 6-minute survey stop in Wisconsin from 2015–2021. The horizontal dashed line indicates the 5-year average during 2015–2019 ($\bar{x}$ = 0.60 pheasants/stop). The trendline includes all data from 2015–2021, and the associated linear equation and R^2 value for the trendline are each included for reference. Error bars indicate 95% confidence intervals for each annual estimate. Surveys were not conducted in 2020 due to Wisconsin's "Safer at Home" order associated with the COVID-19 pandemic.*

Table 1. *Mean number of ring-necked pheasants detected per 6-minute survey stop in Wisconsin, 2013–2021.*

Year[a]	Routes Surveyed[b]	Number of Pheasants Detected Per Stop		
		Mean	SE	95% CI
2013	82	0.593	0.032	0.530–0.657
2014	76	0.407	0.027	0.353–0.461
2015	72	0.596	0.035	0.528–0.665
2016	82	0.555	0.034	0.488–0.623
2017	81	0.641	0.036	0.570–0.712
2018	79	0.587	0.034	0.521–0.654
2019	80	0.638	0.036	0.569–0.708
2021	79	0.429	0.028	0.373–0.484

[a] Surveys were not conducted in 2020 due to the COVID-19 pandemic.

[b] Number of ring-necked pheasant routes surveyed per year; each survey route consists of 15 stops.

Table 2. *Probability of detection and estimated spring abundance (standard error and 95% confidence interval) of ring-necked pheasants along survey routes in Wisconsin, 5 April–30 April 2021.*

Region	Counties	Detection Probability	Abundance[a]		
			Estimate	SE	95% CI
1	Barron, Dunn, Eau Claire, Pepin, Pierce, Polk, St. Croix	89.6%	411.78	9.34	396.82–434.02
2	Adams, Brown, Calumet, Columbia, Dodge, Fond du Lac, Green Lake, Manitowoc, Marquette, Outagamie, Ozaukee, Sheboygan, Washington, Winnebago	87.6%	97.81	14.54	83.05–148.59
3	Dane, Grant, Green, Iowa, Jefferson, Lafayette, Rock, Walworth	89.5%	76.07	3.77	68.68–83.47
Statewide		89.6%	573.99	10.83	556.08–599.03

[a] Abundance estimates obtained from the best-supported statistical models based on AIC_c. Each regional model set includes covariates to account for wind speed, sky condition, stop number, and noise disturbance as possible contributors to detection bias; the statewide analysis also includes a region covariate in the model set. Stop number had the most influence on pheasant detectability for Region 1 and the statewide analysis. In Region 2, noise disturbance was the most significant covariate. In Region 3, there was model selection uncertainty ($\Delta AIC_c < 2$), so model-averaging was used to estimate detection probability and abundance.

Table 3. *Annual abundance estimates of ring-necked pheasants in Wisconsin derived from the redesigned spring roadside survey protocol, 2013–2021.*

		Abundance Estimate[a,b]							
Region	Counties	2013	2014	2015	2016	2017	2018	2019	2021
1	Barron, Dunn, Eau Claire, Pepin, Pierce, Polk, St. Croix	531.72	294.90	359.44	503.24	576.24	463.98	501.79	411.78
2	Adams, Brown, Calumet, Columbia, Dodge, Fond du Lac, Green Lake, Manitowoc, Marquette, Outagamie, Ozaukee, Sheboygan, Washington, Winnebago	164.65	125.23	181.53	144.99	144.95	114.64	164.56	97.81
3	Dane, Grant, Green, Iowa, Jefferson, Lafayette, Rock, Walworth	230.60	132.88	176.54	106.07	113.35	176.94	175.07	76.07
Statewide		884.84	547.85	707.42	745.25	829.46	742.23	826.19	573.99

[a] Abundance estimates obtained from the best-supported statistical model based on AIC_c. Each model set includes covariates to account for wind speed, sky condition, stop number, noise disturbance as possible contributors to detection bias; the statewide analysis also includes a regional covariate in the model set. In cases of model selection uncertainty ($\Delta AIC_c<2$), model-averaging is used to obtain abundance estimates.

[b] Surveys were not conducted in 2020 due to the COVID-19 pandemic.