Spring Ring-Necked Pheasant Survey 2018

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Abstract

Seventy-nine of 83 spring pheasant survey routes were completed in 2018. Average number of pheasants recorded during the 6-minute survey at each stop was 0.59 pheasants/stop and was above the 5-year running average from 2013–2017 (0.56 pheasants/stop), but was down slightly from 0.64 pheasants/stop in 2017. The statewide abundance index estimate was 742.32 roosters in 2018, a decrease from the 2017 estimate of 829.46 roosters. Abundance estimates remained highest in the northwest 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.

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 2 April–27 April 2018. However, winter weather inhibited many surveys from being completed, particularly in northwest Wisconsin, so the survey window was extended 1 week to 4 May 2018. This roadside survey has been conducted annually since 2013 by trained wildlife personnel, including DNR 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 4, 1.5-minute time intervals following the time of detection survey method (Alldredge et al. 2007). This method 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. 3.3.3; R Development Core Team 2017). We made general comparisons between 2018 and 2017 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 2018 indices (pheasants/stop) against a 5-year running average (2013–2017) which provides a more robust and better gauge of pheasant population trends in Wisconsin as opposed to annual comparisons.

We used Huggins closed-capture models in Program MARK (ver. 6.1; 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 models 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 2018, 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 2018 was 0.59 pheasants/stop (SE = 0.03), a slight decrease compared to 2017 (0.64 pheasants/stop, SE = 0.04). However, 2018 indices were 5% higher compared to the 5-year running average (2013–2017) of 0.56 pheasants/stop (Fig. 2).

Detection rates and abundance estimates – Probability of detection varied among regions, ranging from 87.0% to 96.0% (Table 1). Estimated pheasant abundance along survey routes was highest in the northwest portion of the state and lowest in the east-central region (Table 1). Overall pheasant abundance derived from the redesigned survey was 742.23 roosters (95% CI = 728.3–762.1), and is a decrease compared to the 2017 estimate of 829.46 roosters (95% CI = 815.0–849.8; Table 2). 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 a significant factor for Region 1, while stop number and sky conditions (i.e., cloud cover) both influenced detection probability in Region 2. Noise disturbance was the most influential factor in Region 3 – noise inhibited a surveyor's ability to hear crowing pheasants.

<u>Discussion</u>

Average number of pheasants detected per stop appeared to decline slightly in 2018 compared to 2017. While annual trend observations from the redesigned survey data could be made (Fig. 2), we advise caution against using such an approach because the current survey methodology is unreliable at detecting small changes (<10%) in annual trends. However, making comparisons against the 5-year running average does provide a robust and better gauge of the overall pheasant population trend. For 2018, the average number of pheasants per stop (0.59 ± 0.03 [SE]) was 5% greater than the 5-year average from 2013–2017 (0.56 pheasants/stop), suggesting the statewide pheasant population has been sustainable, or even slightly increasing, in recent years.

With 6 years of data collection under the redesigned survey, 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 1), and have been so consistently since 2013 (Table 2). It is important to remember that these estimates represent an index to abundance and are linked to the area surrounding the new survey routes; they are not a direct estimate of the entire statewide or regional population. We note the marked decrease in the abundance estimate in Region 2, which is the lowest estimate for this region since the survey redesign (Table 2). Reduced detection probability coincided with low abundance estimates as well. Direct cause is speculative, but a late winter storm during the third week of April, and consequently poor survey conditions, may have negatively influenced pheasant activity and could have resulted in fewer pheasants being detected during those surveys.

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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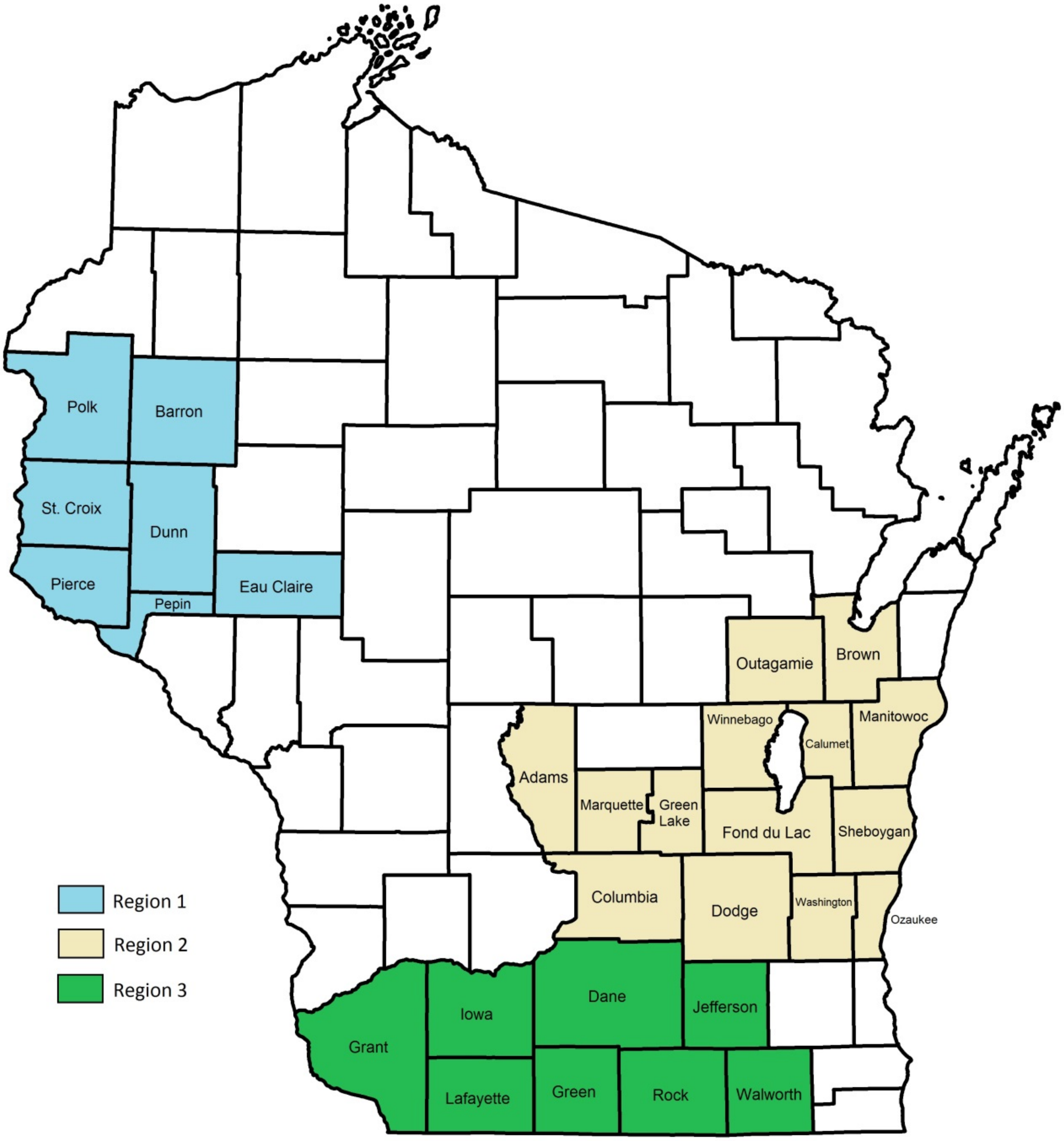

Figure 1. *Core Wisconsin ring-necked pheasant range depicting counties included in the redesigned survey. Counties are grouped into regions for trend analyses.*

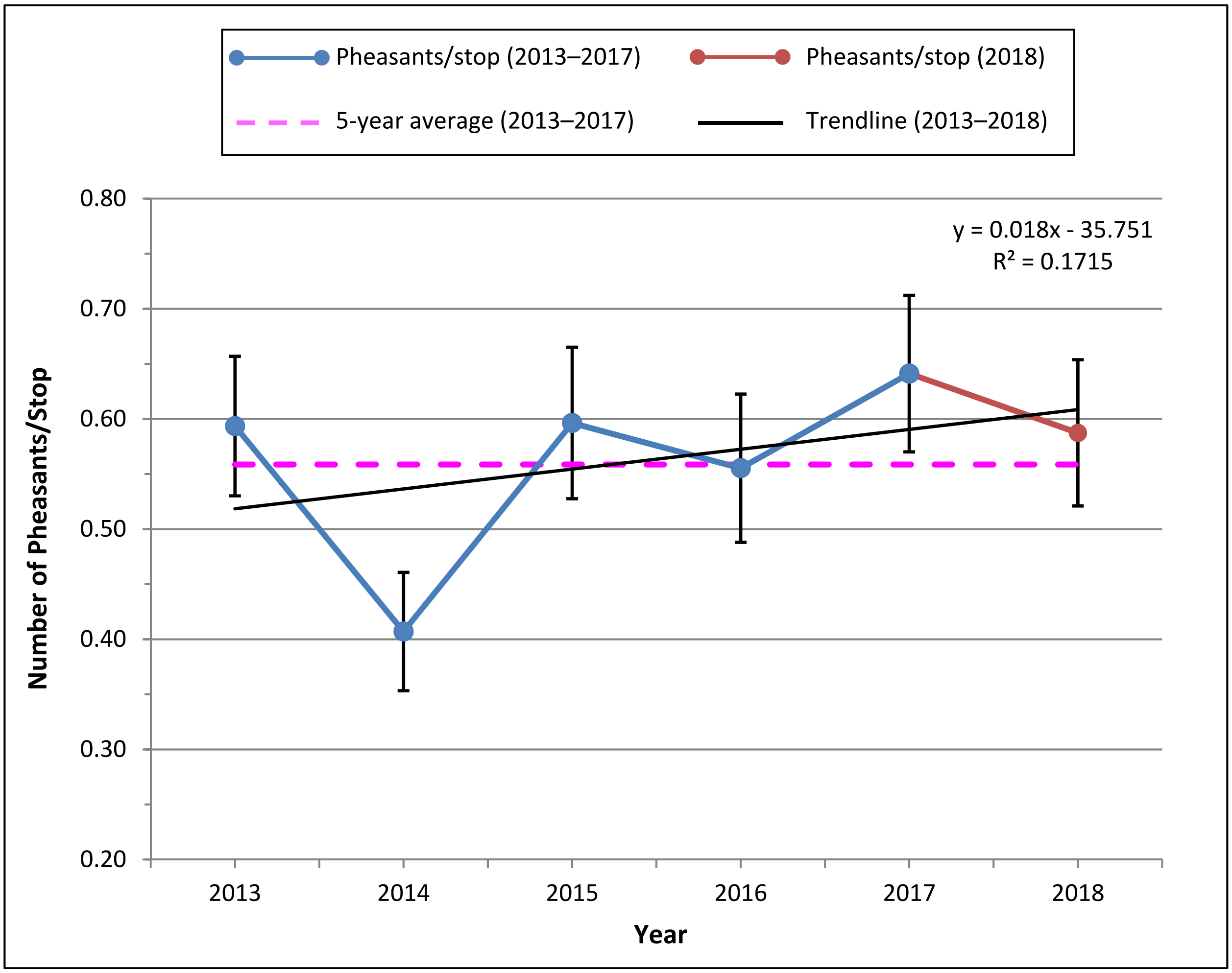

Figure 2. *Average number of individual ring-necked pheasants recorded per 6-minute survey stop in Wisconsin from 2013–2018. The horizontal dashed line indicates the 5-year average during 2013–2017 ($\bar{x}$ = 0.56 pheasants/stop). The trendline includes all data from 2013–2018, and the associated linear equation and R^2 value for the trendline are each included for reference. Error bars indicate 95% confidence intervals.*

Table 1. *Probability of detection and estimated spring abundance (standard error and 95% confidence interval) of ring-necked pheasants along survey routes in Wisconsin, 2 April–4 May, 2018.*

Region	Counties	Detection Probability	Abundance[a]		
			Estimate	SE	95% CI
1	Barron, Dunn, Eau Claire, Pepin, Pierce, Polk, St. Croix	96.0%	463.98	6.16	454.60–479.36
2	Adams, Brown, Calumet, Columbia, Dodge, Fond du Lac, Green Lake, Manitowoc, Marquette, Outagamie, Ozaukee, Sheboygan, Washington, Winnebago	87.0%	114.64	8.06	98.30–130.98
3	Dane, Grant, Green, Iowa, Jefferson, Lafayette, Rock, Walworth	91.6%	176.94	5.90	168.73–192.88
Statewide		94.5%	742.23	8.51	728.32–762.13

[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, stop number and sky condition (i.e., cloud cover) were both significant covariates, thus we used model averaging to obtain estimates. Noise disturbance was the most significant covariate in Region 3.

Table 2. *Annual abundance estimates of ring-necked pheasants in Wisconsin derived from the redesigned spring roadside survey protocol, 2013–2018.*

Region	Counties	Abundance Estimate[a]					
		2013	2014	2015	2016	2017	2018
1	Barron, Dunn, Eau Claire, Pepin, Pierce, Polk, St. Croix	531.72	294.90	359.44	503.24	576.24	463.98
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
3	Dane, Grant, Green, Iowa, Jefferson, Lafayette, Rock, Walworth	230.60	132.88	176.54	106.07	113.35	176.94
Statewide		884.84	547.85	707.42	745.25	829.46	742.23

[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.