Spring Ring-Necked Pheasant Survey 2015

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The statewide ring-necked pheasant (*Phasianus colchicus*) survey was redesigned in 2013 based on the 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 can be estimated. 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 will also provide the WDNR with better tools to effectively manage harvest and 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 birds at adjacent stops.

Survey Protocol – Spring pheasant surveys were conducted between 6 April and 1 May, 2015. Observers initiated counts approximately 45 minutes before sunrise and finished within 2 hours during good weather conditions (no precipitation, wind <10 mph). Observers listened for 6 minutes at each stop and recorded all birds 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 new 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. With the new survey method, each route only needs to be run once during a season because we are accounting for detection probability directly in the survey protocol and analysis. We also doubled the length of each stop from 3 to 6 minutes to increase detection rates (Dittrich 2013).

Analysis – We used 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 model 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. From the top models we were then able to obtain the probability of detection, identify factors important in determining detection rate, and estimate pheasant abundance for each region and statewide.

We used raw uncorrected pheasant data from 2008–2012 to calculate the number of birds/stop for comparison to pheasant data collected via the redesigned surveys from 2013–2015. For consistency we only used pheasant observations during the first 3 minutes (i.e., first 2 1.5-

minute time intervals) at each stop during 2013–2015 for comparison to the 2008–2012 data from historic routes. Comparing raw data uncorrected for detection has been roundly criticized in the past (Anderson 2001, 2003). However, we do so here because it is the only method we know of to make direct comparisons between historic data and those collected with the redesigned survey implemented in 2013. We will move away from the comparison of raw uncorrected data in future years as more data is collected under the revised protocol. We have also chosen to report this data as the number of birds/stop and have moved away from reporting pheasant data per square mile or using a hen index (see Hull 2012) to further reduce sources of error associated with uncorrected index data (see Anderson 2001, 2003, and Thompson 2002). Further, we are moving away from reporting annual percent changes in statewide pheasant population trends because neither the current survey or historic survey can reliably detect small changes (<10%) in annual trends at multiple scales (personal communication, Joe Dittrich). Instead, we will begin to compare the current year of pheasant data against a 5-year moving average of pheasant abundance (mean birds/stop) across the state as we acquire additional data from the redesigned surveys. This is a more meaningful comparison and still provides the necessary data needed to make appropriate harvest framework adaptations over the long-term.

Results

Abundance estimates and detection rates – In 2015, 74 of 83 (89.2%) survey routes were completed during the spring survey period. Detection rates were variable across the state, ranging from 85.1% to 94.5% (Table 1). Estimated pheasant abundance along survey routes was highest in the west-central portion of the state and lower in the south-central part of the state (Table 1). Overall pheasant abundance derived from the redesigned survey was 707.4 roosters (95% CI = 689.2–732.9), and is higher than the estimate of 547.9 roosters (95% CI = 521.4–574.3) obtained in 2014. Statistical modeling suggested that wind speed had the greatest impact on a surveyor's ability to detect pheasants in Regions 2, 3, and statewide (e.g., increased wind speed resulted in a decreased ability to detect crowing pheasants). In Region 1, stop number likely influenced pheasant detections (e.g., most pheasants were detected during the first few stops of a route).

With 3 years of data collection under the redesigned survey, the derived abundance estimates are useful for making general comparisons between regions. However, 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 population. The estimates are useful for making relative comparisons between regions of the state and over time (Table 2). Although annual trend observations from the redesigned survey data could be made, we currently advise caution against using such an approach because just 3 years of directly comparable data are available. Data will become more useful in making trend observations as additional years of the survey are implemented.

Trend analysis – The number of pheasants recorded during the first 3 minutes of each stop in 2015 (0.45 birds/stop, SE = 0.03) was higher than in 2014 (0.30 birds/stop, SE = .02), but remained slightly below the 5-year average of 0.48 birds/stop during 2008–2012 (Fig. 2). However, 2015 marks the highest average number of pheasants heard per stop under the redesigned survey.

Discussion

Beginning in 2013, we have incorporated estimates of detection with associated abundance estimates per region with 95% confidence intervals for the Wisconsin statewide pheasant survey. This data will be extremely useful for evaluating the impacts of harvest and habitat management on pheasant numbers across multiple spatial and temporal scales. For example, data collected during 2013–2015 with the redesigned survey show much greater disparity in pheasant abundance and detection rates among regions than could be previously seen under the historic survey protocol. This will aid wildlife managers in adapting habitat management protocols specific to a certain part of the state.

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.

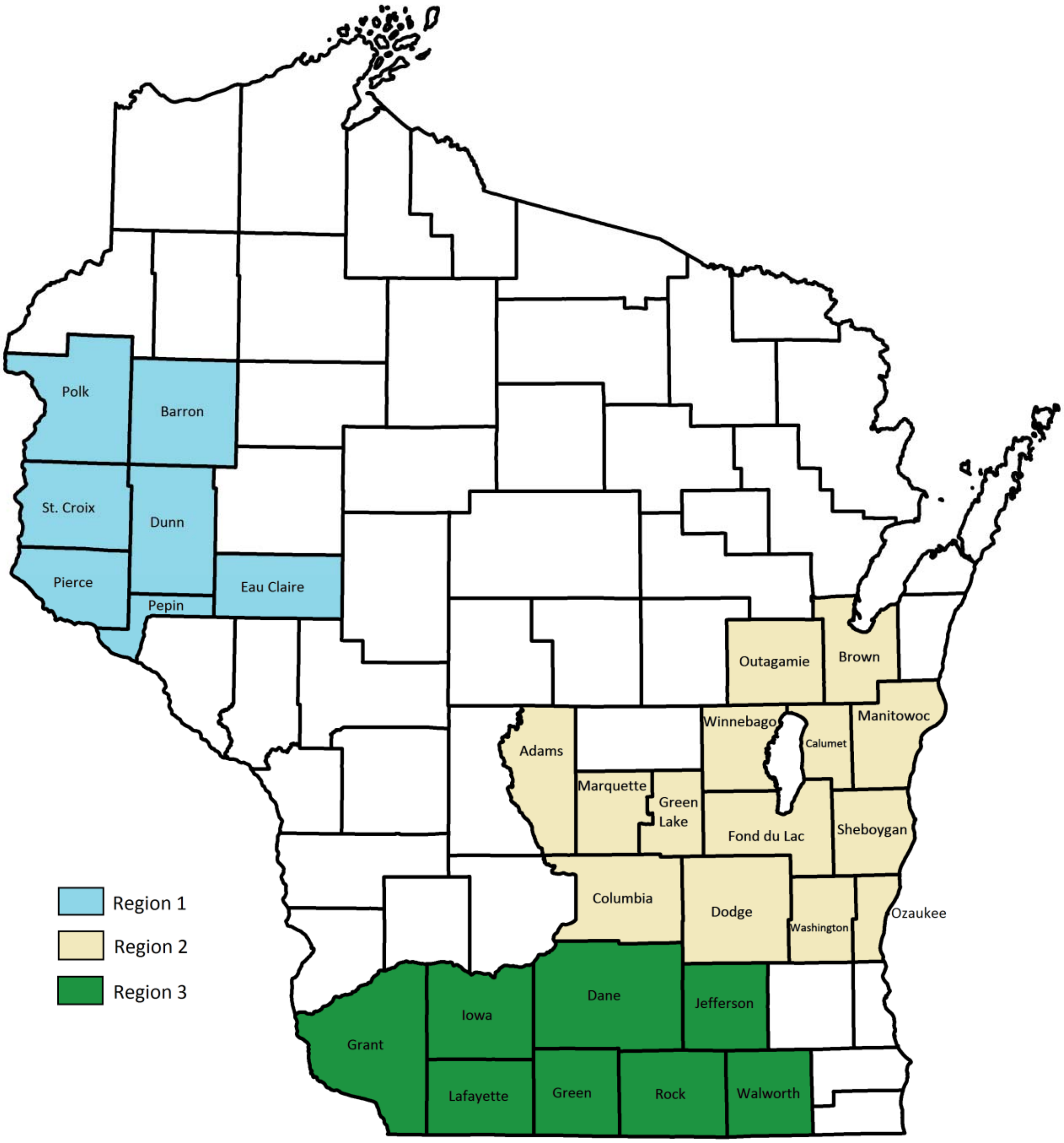

Figure 1. *Core Wisconsin pheasant range depicting counties included in the redesigned survey. Counties are grouped into regions for trend analyzes.*

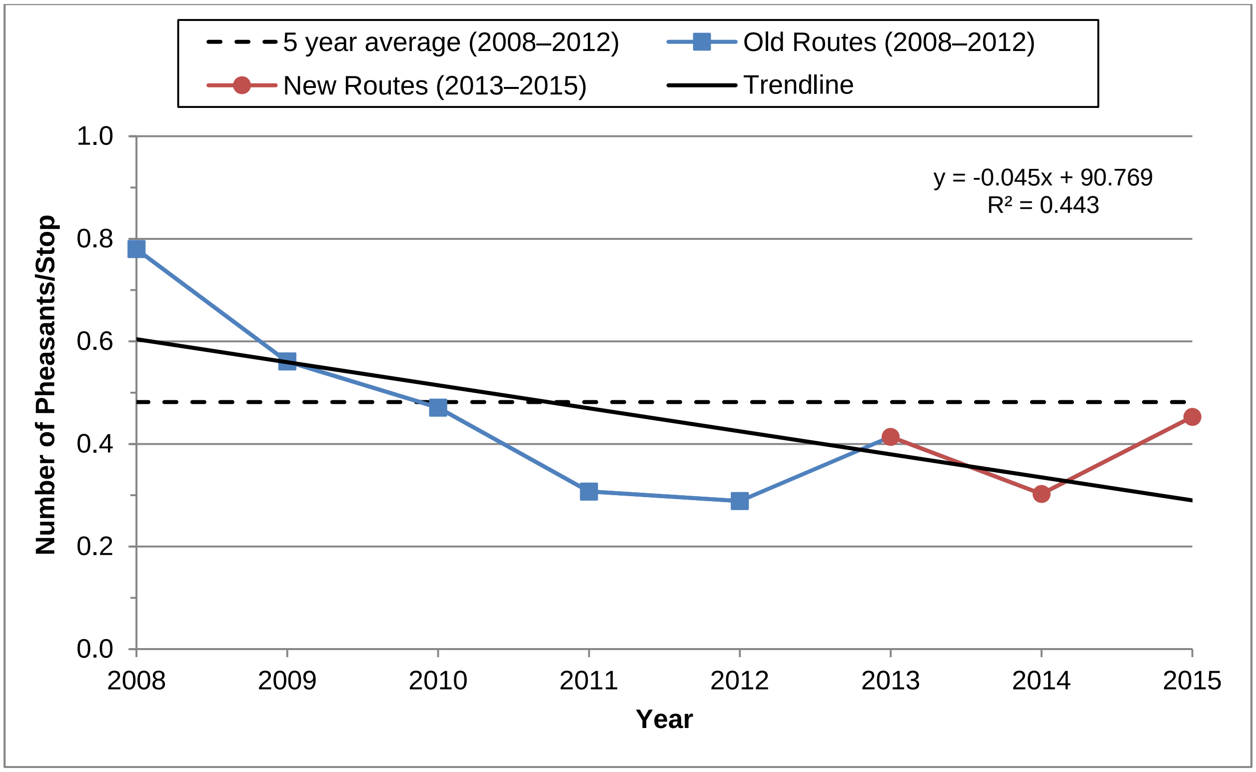

Figure 2. *Average number of individual ring-necked pheasants recorded per survey stop in Wisconsin. Data from 2008–2012 are from the historic pheasant survey protocol where each stop was surveyed for 3 minutes (see Hull 2012). Data from 2013–2015 were collected under the revised survey protocol where each stop was surveyed for 6 minutes, but we only include the first 3 minutes per stop here for comparative purposes. The horizontal dashed line indicates the 5-year average during 2008–2012. The 8-year trend line includes all data from 2008–2015. The associated linear equation and R^2 value for the trend line are also included for reference.*

Table 1. *Probability of detection and estimated spring abundance (standard error and 95% confidence interval) along ring-necked pheasant survey routes in Wisconsin, 6 April–1 May, 2015.*

Region	Counties	Detection Probability	Abundance[a]		
			Estimate	SE	95% CI
1	Barron, Dunn, Eau Claire, Pepin, Pierce, Polk, St. Croix	94.5%	359.44	5.95	350.46–374.42
2	Adams, Brown, Calumet, Columbia, Dodge, Fond du Lac, Green Lake, Manitowoc, Marquette, Outagamie, Ozaukee, Sheboygan, Washington, Winnebago	85.1%	181.53	10.81	165.97–209.88
3	Dane, Grant, Green, Iowa, Jefferson, Lafayette, Rock, Walworth	90.2%	176.54	5.51	165.75–187.34
Statewide		92.1%	707.42	11.03	689.17–732.89

[a] Abundance estimates derived from the top AIC_c statistical model for each regional and statewide analysis. Each 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 regional covariate in the model set.

Table 2. *Annual abundance estimates of ring-necked pheasants in Wisconsin derived from the redesigned spring roadside survey protocol, 2013–2015.*

Region	Counties	Abundance Estimate		
		2013	2014	2015
1	Barron, Dunn, Eau Claire, Pepin, Pierce, Polk, St. Croix	531.72	294.90	359.44
2	Adams, Brown, Calumet, Columbia, Dodge, Fond du Lac, Green Lake, Manitowoc, Marquette, Outagamie, Ozaukee, Sheboygan, Washington, Winnebago	164.65	125.23	181.53
3	Dane, Grant, Green, Iowa, Jefferson, Lafayette, Rock, Walworth	230.60	132.88	176.54
Statewide		884.84	547.85	707.42

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