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Fall Wild Turkey Population Survey, 2010

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Summary of Findings

The purpose of this survey is to calculate a wild turkey (*Meleagris gallopavo*) population index based on the proportion of deer (*Odocoileus virginianus*) hunters seeing wild turkeys (PST) in 13 turkey permit areas (TPAs) in Minnesota to assess wild turkey population trends over time. We surveyed 25,417 randomly selected firearm deer hunters and received useable responses from 66%. Based on temporal changes in PST, turkey populations in the northern TPAs H and I appear to be growing at a rate of 7% (±6; TPA I) to 12% (±4; TPA H) per year and expanding northward. Turkey populations in the southeastern TPAs A and B appear to be stable to declining modestly. Turkey populations in the remaining TPAs appear to be stable to growing modestly.

Introduction

Changes in distribution and abundance of wild turkeys in Minnesota are monitored using a mail survey of hunters of white-tailed deer in the State's wild turkey range and potential range. The survey is typically scheduled once every 2 years and consists of asking randomly selected deer hunters where they hunted (deer kill block [DKB]) and if they saw wild turkeys while hunting. The purpose of the survey is to calculate a wild turkey population index based on the proportion of deer hunters seeing wild turkeys (PST) in 13 TPAs, qualitatively describe changes in PST indices over time, and estimate the average finite rate of population change (λ; Eberhart and Simmons 1992) over the last 5 surveys (12 years).

Methods

Prior to 2006, the survey consisted of a stratified sample of antlerless deer hunters, where the DKB of each hunter was known prior to drawing the sample (i.e., hunters mostly hunted in the DKB for which they had an antlerless permit). Because of regulation changes in 2006 (antlerless permits were no longer required in managed or intensive areas, which allowed these hunters to hunt in multiple DKBs), the sampling frame was modified from antlerless hunters to all regular firearm deer hunters. But because most hunters pursue deer within relatively small, traditional areas (Welsh and Kimmel 1990), we used DKBs listed in the Electronic Licensing System as a stratification variable and we selected a random sample of regular firearm deer hunters from each DKB.

We mailed selected hunters a postcard questionnaire requesting information on DKB hunted, number of days hunted, and whether or not turkeys were observed while hunting. We delivered the first mailing on 3 November 2010 and a second mailing on 18 January 2011 to all non-respondents.

We estimated PST for each TPA and compared estimates to those of the previous surveys (Kimmel and Brinkman 2000, Kruger and Dingman 2003, Isackson et al. 2007, Dunton and Snyder 2008). We used log-linear models (Eberhardt and Simmons 1992) to estimate the mean annual rate of change (λ) in PST during the past 5 surveys (1999-2010). We constructed 95% confidence intervals (CI) for parameter estimates at the TPA scale.

The validity of the PST estimator is based on the assumption that hunter effort is constant over space and time. However, mean days hunted has increased in many TPAs since 2004, likely due to liberalized deer-hunting regulations. To account for differences in mean hunter effort, we used an ad hoc adjustment to PST (i.e., after the fact, rather than being incorporated as part of a maximum likelihood estimator of PST). We assumed that $PST = 1-(1-\theta)^D$, where θ = probability of a hunter seeing a turkey on any given day in some TPA, and D = mean days hunted. Rearranging the equation gives $\theta = 1-(1-PST)^{1/D}$ and plugging in estimates of PST (unadjusted) and mean days hunted (based on a running average of days hunted for each year and TPA) provides an estimate of θ, which we used to compute a PST index that was adjusted to a constant hunter effort of D = 3 days: $PST.3d = 1-(1-\hat{\theta})^3$.

Annual changes in DKB boundaries and identification numbers have resulted in changing analysis units (mostly TPAs). We attempted to document and account for such changes over time, but linking historic data with current data remains problematic, especially at the northern edge of Minnesota's turkey range. A major consolidation of TPAs will be implemented in 2012, which will reduce the number of TPAs from 106 to 12 (Fig. 1). Because the primary purpose of this survey is to provide estimates of population change (λ) for future turkey permit allocation decisions, we used the 2012 TPA boundaries as our analysis unit for this report.

Results

Survey cards were mailed to 25,417 randomly selected firearm deer hunters. The overall response rate (% useable returns) was 66%. Of the total returns, 98% provided useable survey information; 2% were from respondents that reported not hunting in 2010 or returned incomplete survey cards.

The proportion of deer hunters that reported seeing turkeys ranged from 64% in TPA A to 13% in TPA I, whereas <4% of deer hunters saw turkeys in the portion of the State without a turkey season (Fig. 1; NONRANGE area).

Qualitative summaries of PST by year suggested that most TPAs have stable or increasing turkey populations (Fig. 2). However, population growth rates based on the standard PST estimator (unadjusted for hunter effort) may be overly optimistic. Using our ad hoc PST estimator (gray lines) based on constant effort (mean days hunted = 3) suggested slightly lower population trajectories in most TPAs. Estimated trends in northern areas bordering on the edge of turkey range were more difficult to estimate because of small PSTs and small sample sizes (deer hunters). However, temporal plots (Fig. 3) generally suggested that turkey populations in DKBs with established turkey seasons had increased, and turkey populations in DKBs with no previous history of turkey hunting were stable.

Estimates of λ based on PST ranged from 0.98 (TPA B; Table 1) to 1.27 (MLWMA; Table 1), but 6 of the confidence intervals included 1 (no change; Table 1). When estimates of λ were adjusted for constant hunter effort (PST.3d), 2 TPAs (H and I) showed an increasing population trend, 2 TPAs (A and B) showed a decreasing trend, and the confidence intervals for the remaining TPAs included 1 (no change).

Discussion

Population indices from this survey are used to predict future population levels, allocate turkey-hunting permits, and provide information to make management decisions (Kimmel 2000). Our measures of turkey abundance have changed over time as we have identified potential biases and attempted to correct for them. Given the liberalization of deer hunting regulations, it is not

surprising that deer hunters are spending more days afield in many areas of Minnesota's turkey range. Thus, positive trends in PST indices should be interpreted cautiously because the increase in PST may partly reflect increasing days hunted.

Changes in PST indices suggest that wild turkey populations are increasing in 7 TPAs. However, when estimates of λ were adjusted for constant hunter effort, only 2 TPAs (H and I) showed evidence of an increasing population trend and 2 other TPAs (A and B) showed evidence of a decreasing population trend. Turkey populations in TPAs H and I were more recently established than other TPAs, and appear to be growing at a rate of 7% (±6; TPA I) to 12% (±4; TPA H) per year and expanding northward. Turkey populations in TPAs A and B are well established and appear to be stable to declining modestly. Turkey populations in the remaining TPAs appear to be stable to growing modestly.

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Table 1. Estimates of average finite rates of change (λ) and associated confidence intervals based on proportion of deer hunters seeing wild turkeys (PST) and PST adjusted for constant hunter effort (PST.3d) for 13 Turkey Permit Areas (TPAs) in Minnesota over 5 survey periods, 1999-2010.

TPA	Interval	n (years)	λ(PST)	95% CI	λ(PST.3d)	95% CI	Mean PST.3d
A	(1999-2010)	5	0.99	(0.98, 1.00)	0.97	(0.96, 0.99)	0.528
B	(1999-2010)	5	0.98	(0.96, 1.00)	0.96	(0.94, 0.99)	0.517
C	(1999-2010)	5	1.03	(1.01, 1.05)	1.00	(0.98, 1.02)	0.471
D	(1999-2010)	5	1.05	(1.01, 1.09)	1.01	(0.97, 1.06)	0.287
E	(1999-2010)	5	1.04	(1.00, 1.08)	1.01	(0.97, 1.05)	0.445
F	(1999-2010)	5	1.09	(1.03, 1.14)	1.04	(0.98, 1.11)	0.258
G	(1999-2010)	5	1.09	(1.04, 1.15)	1.06	(1.00, 1.12)	0.274
H	(1999-2010)	5	1.12	(1.08, 1.16)	1.12	(1.08, 1.16)	0.128
I	(1999-2010)	5	1.10	(1.01, 1.20)	1.07	(1.01, 1.14)	0.067
M	(1999-2010)	5	1.06	(1.02, 1.10)	1.04	(0.99, 1.10)	0.312
CAWMA[a]	(1999-2010)	5	1.01	(0.89, 1.14)	0.99	(0.87, 1.13)	0.193
MLWMA[b]	(1999-2010)	5	1.27	(0.78, 2.06)	1.23	(0.78, 1.92)	0.169
SNWR[c]	(1999-2010)	5	1.07	(0.91, 1.25)	1.08	(0.91, 1.27)	0.377

[a]Carlos Avery Wildlife Management Area
[b]Mille Lacs Wildlife Management Area
[c]Sherburne National Wildlife Refuge

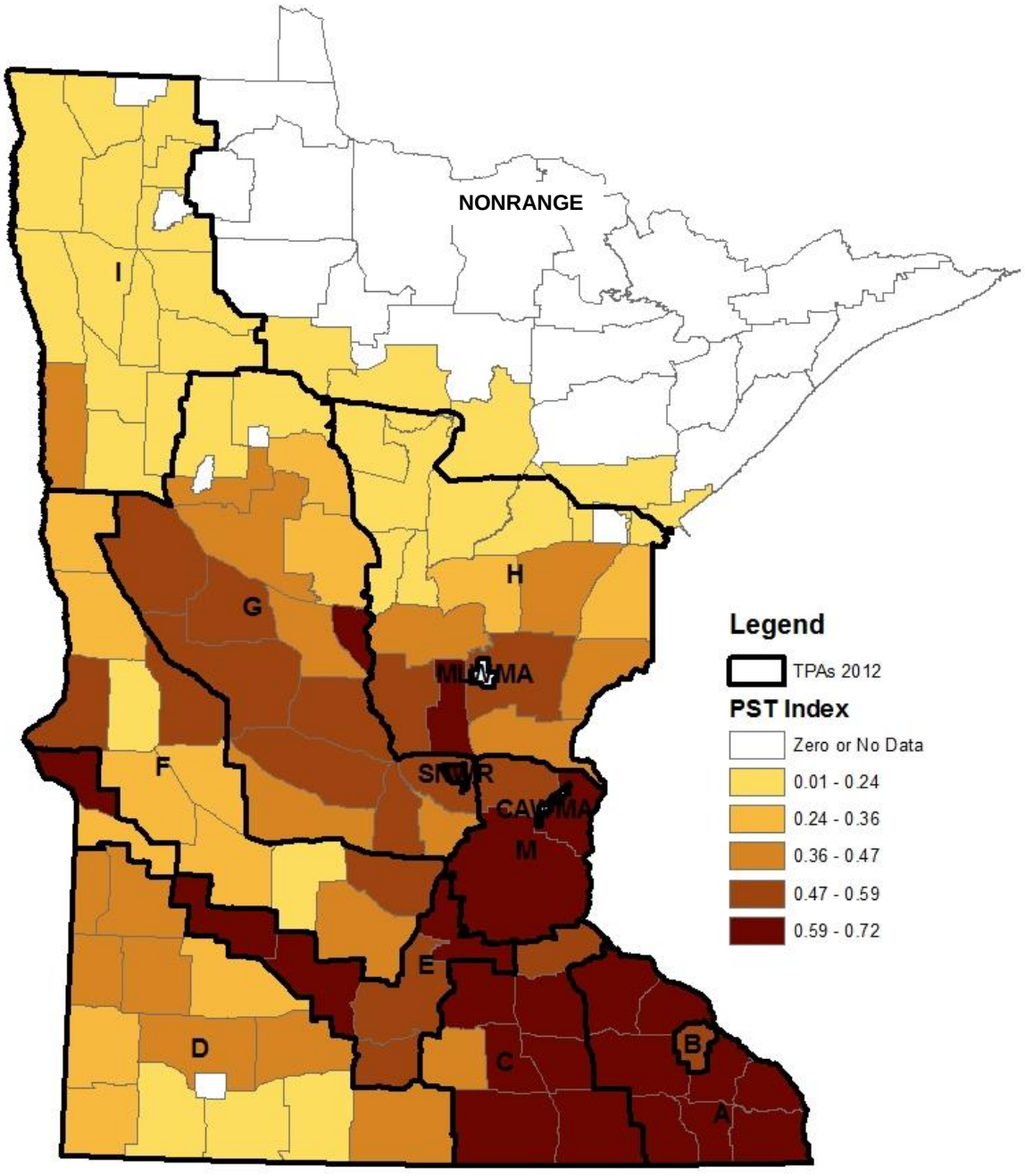

Fig. 1. Turkey population indices (PST unadjusted for hunter effort) by deer kill block (DKB; small units with gray borders) for Minnesota's wild turkey range, 2010. Also shown are Turkey Permit Areas (TPAs; large units with black borders) for the 2012 spring hunting season, including the Mille Lacs Wildlife Management Area (MLWMA), Sherburne National Wildlife Refuge (SNWR), and Carlos Avery Wildlife Management Area (CAWMA).

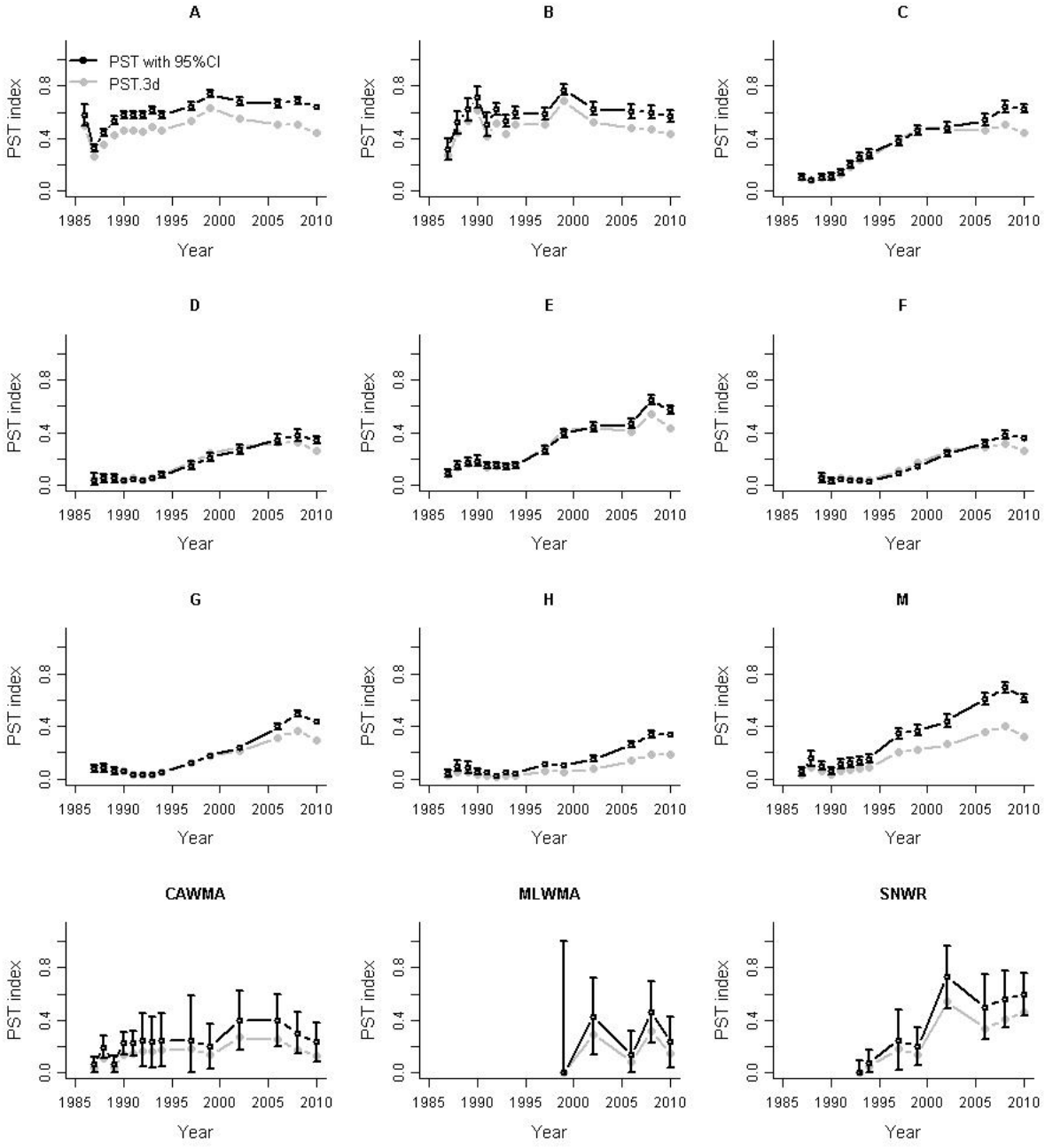

Figure 2. Trends in wild turkey population indices based on the PST estimator (unadjusted for effort; black lines) and PST.3d estimator (adjusted to a constant mean effort; gray lines) for 12 Turkey Permit Areas (TPA) in Minnesota, including the Carlos Avery Wildlife Management Area (CAWMA), Mille Lacs Wildlife Management Area (MLWMA), and Sherburne National Wildlife Refuge (SNWR). TPA I was omitted due to limited historical data. Black error bars are 95% CIs (only shown for the PST estimator).

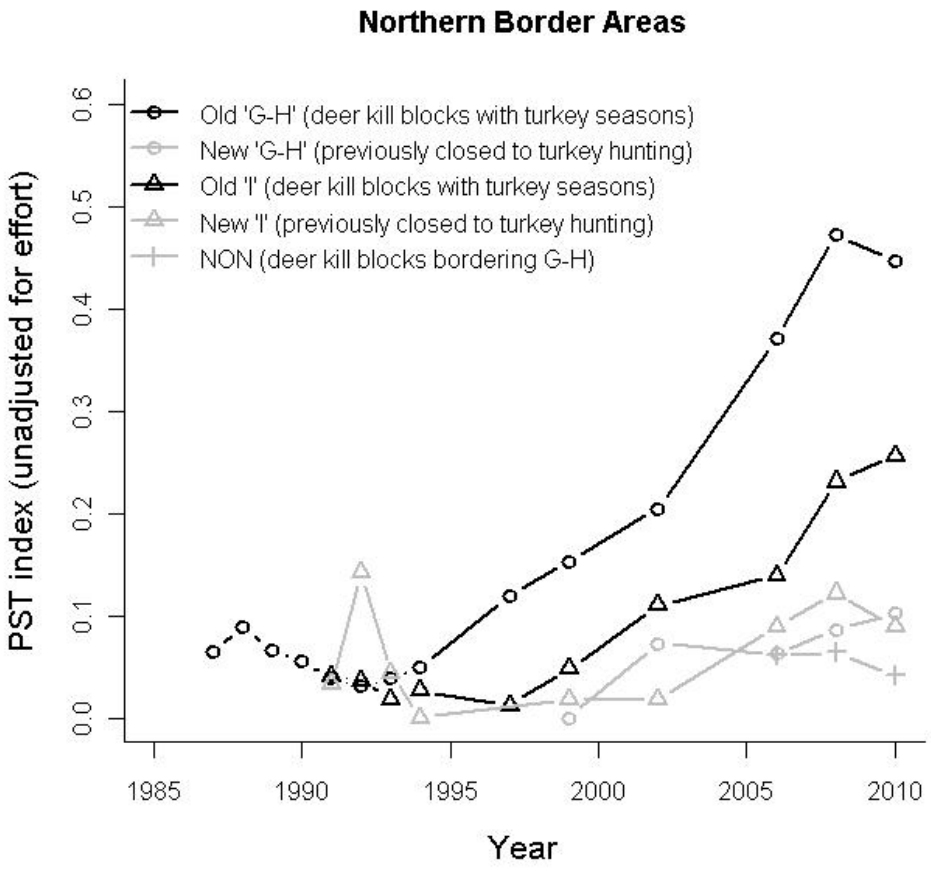

Figure 3. Trends in Minnesota turkey population indices for aggregations of northern deer kill blocks located within established turkey-hunting zones versus deer kill blocks with no previous history of turkey hunting.