Since the Comeback

A recap of developments in Wisconsin turkey research following 50 years of population growth

INTRODUCTION

After turkeys were reintroduced to Wisconsin in the 1970s, turkey management focused on how to increase and expand the new population. Thanks in part to excellent habitat, turkeys are now present and thriving in all Wisconsin counties. As populations grew, the harvest season structure also evolved and new zones were established along with statewide spring and fall hunting seasons to provide more opportunities for hunters.

Much of our knowledge regarding turkey biology and management stems from issues associated with restoring their populations, but now that turkeys have stabilized after decades of growth, with numbers estimated to range between

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In contrast to perceptions at the time of wild turkey scarcity, abundant wild turkeys are now perceived as adaptive in acclimating to a wide range of landscape conditions. Due to this development, there is growing uncertainty in managing habitats for wild turkeys. There are many dimensions to habitat suitability, and

as land-use change continues to influence land cover on large geographic scales, it will be important that wildlife managers and researchers continue to build our understanding of habitat needs and how landscape characteristics influence population dynamics of established wild turkey populations.

Contemporary ecological and demographic research can assist wildlife managers develop biologically defensible and cost-efficient management strategies for turkeys statewide.

The DNR undertook a trio of studies by Research Scientist Christopher Pollentier and co-authors, published between 2014 and 2017, to address some of these issues. These three studies are detailed in the contents of this publication, and additional forthcoming research is detailed in the conclusion.



Above: male eastern wild turkey in display.

RESEARCHERS AND AUTHORS

- » Chris Pollentier, M.S., is a Natural Resources Research Scientist with the Office of Applied Science in the Wisconsin Department of Natural Resources.
- » Scott Hull, Ph.D., is the Director of the Office of Applied Science in the Wisconsin Department of Natural Resources.
- » David Drake, Ph.D., is an Associate Professor and Wildlife Extension Specialist with the Department of Forest and Wildlife Ecology at the University of Wisconsin-Madison.
- » Scott Lutz, Ph.D., is an Associate Professor with the Department of Forest and Wildlife Ecology at the University of Wisconsin-Madison.



The research also supported the following objectives from the WDNR's current 10-year wild turkey management plan:

- Improve habitat for wild turkeys within the confines of broad land management goals.
- Define spatially explicit turkey habitat enhancement goals for Wisconsin that recognize potentially competing goals for other wildlife species.
- Continue to promote and support oak regeneration and management on public and private lands.

The WDNR's long-range vision for wild turkeys includes sufficient quantity, quality and spatial distribution of habitat to support healthy populations. We also envision continued opportunities for turkey hunters and enthusiasts to enjoy a range of quality experiences.

The following pages in this publication include: summaries of the recent research, additional recommendations for habitat and population management going forward, forthcoming research and resources for further reading.



Above: male eastern wild turkey resting.



Above: Chris Pollentier (left) and Lili Prahl (right) measuring the bill length on a female eastern wild turkey.

SUMMARIES OF THE RESEARCH

"Survival and Productivity of Eastern Wild Turkey Females in Contrasting Landscapes in Wisconsin"

Published: July 12, 2014, The Journal of Wildlife Management. Authors: Christopher D. Pollentier, R. Scott Lutz and Scott D. Hull.

WHAT WE DID

We evaluated female eastern wild turkey demographic parameters and the relationship of these parameters to landscape composition between townships that were forest-dominated and those that were primarily open (e.g., cropland, pasture) in southwest and west-central Wisconsin.

We radiomarked 129 female eastern wild turkeys during a two-year field study from 2010–2012.

BACKGROUND

Eastern wild turkeys (*Meleagris* gallopavo silvestris) have colonized the entire state of Wisconsin since being successfully reintroduced in the 1970s.

Around the time that this study on wild female turkey survival and productivity was published, conservation groups were expressing concerns regarding habitat quantity and quality in association with population plateaus and declines in local abundance in some parts of the state.









Figure 1. Annual survival rates (15 March–14 March) of radio-marked female wild turkeys in forested and open-agricultural landscapes in southwest and west-central Wisconsin, 2010–2012.

WHAT WE FOUND

- Female turkey survival rates were influenced by type of landscape and seasonal variation.
- Annual female survival rates across all study townships was 51.5% ± 3.5% (SE), and survival estimates were lower in forested landscapes (2010 = 45.0% ± 7.5%, 2011 = 27.9% ± 9.4%) than in open landscapes (2010 = 70.7%± 5.3%, 2011 = 65.1% ± 5.4%).
- Predation accounted for 77.8% of all mortalities and was highest during spring; predator-related mortalities were more frequent in forested townships.
- Nest survival rates were similar in forested landscapes (27.3% ± 8.0%) and open landscapes (20.1% ± 7.0%).
- Poult survival rates were lower in forested landscapes compared to open landscapes at 4 weeks post-hatch (42% vs 32%).

MANAGEMENT IMPLICATIONS

Female survival was higher in open agricultural landscapes during the nesting and brood-rearing season than in forested areas. Mortality in each landscape was primarily due to predation; however, an explanation for a 37% increase in predator-related mortalities in forested landscapes is unknown and deserves further attention. Predator abundance and effectiveness may vary across landscapes and impose differential risks to turkey survival between forested and open landscapes. Management of turkeys that focuses on decreasing female mortality during nesting and brood-rearing may lead to a more productive population.

In forest-dominant landscapes, predator control may achieve short-term goals of increased female survival, but is likely not a viable, cost-effective, long-term option.

RECOMMENDATIONS

We recommend managers improve spring nesting and brood-rearing habitat, such as continued management and restoration of herbaceous and grassland habitats, especially those adjacent to mixed deciduous-coniferous woodlands.

Improved nesting and brood-rearing habitat may reduce female vulnerability to predation, assist in increasing the number of females available for nesting and potentially increase reproductive success.









Above: two male eastern wild turkeys running across opening at the University of Wisconsin arboretum in winter.

"Eastern Wild Turkey Demography: Sensitivity of Vital Rates Between Landscapes"

Published: October 14, 2014, The Journal of Wildlife Management. Authors: Christopher D. Pollentier, Scott D. Hull and R. Scott Lutz.

WHAT WE DID

We used demographic data collected during recent studies on wild turkey survival and productivity in two contrasting landscapes with differing proportions of forest and open cover.

We then used demographic population models to identify parameters predicted to have the greatest effect on the rate of population change in both landscapes.

WHAT WE FOUND

- Simulated harvest scenarios suggest manipulations in female harvest during the fall either-sex season had less impact on population growth than did alterations in components of fecundity.
- Our analyses projected population decline for turkeys in predominantly forested landscapes and population increases in more open landscapes.
- Population change was most sensitive to variation in nest and poult survival for populations in both landscapes. A subsequent analysis further indicated that an increase in population growth in open landscapes was largely attributable to greater rates of yearling and adult female survival during the nesting and brood-rearing period.
- Our model results indicated that wild turkey population growth varies across landscapes in southwest and west-central Wisconsin.

MANAGEMENT IMPLICATIONS

The Wisconsin Department of Natural Resources and its conservation partners manage the Wisconsin turkey population through a harvest management framework that is intended to provide quality hunting opportunities while

BACKGROUND INFORMATION

The eastern wild turkey is an economically important upland game bird that has been successfully reintroduced in Wisconsin and now occurs across the entire state. Although populations have become relatively stable across much of the state. concerns were expressed regarding a plateau in total harvest and declines in local abundance across some areas.

Current ecological and demographic parameters were needed to develop biologically justifiable and efficient management strategies.







maintaining a stable population. This approach has allowed turkey populations to persist through a limited harvest permit system within 7 harvest zones based on geography of the state. The results of our modeling provide several important pieces of information that could be useful for managing the Wisconsin turkey harvest framework:

- Our population models and harvest simulations suggest that a reduction or elimination of female harvest may increase survival, but would have little immediate effect on population growth.
- We found a significant difference in population growth and multiple demographic parameters between forested and open landscapes.
- Sensitivity analyses suggested that management actions aimed at components of fecundity,

specifically nest and poult survival, will have the greatest influence on population growth.

• If female survival is enhanced concurrent to increases in nesting success and poult survival, the largest positive effect on population growth may be realized.

RECOMMENDATIONS

We contend that the greatest potential to simultaneously reduce female risk to mortality and increase reproductive success may lie in continued restoration and maintenance of quality herbaceous and early successional habitats, especially those in predominantly forested landscapes.

We further recommend that harvest management regimes in forested landscapes may require a more conservative approach, possibly 5%, as opposed to a harvest rate cap of 10%.

Populations may never get a chance to stabilize if harvest and/or management objectives are continuously adjusted over short time spans (e.g. 3–5 years). We recommend a management approach that would allow time for populations to adjust to changes.

Finally, harvest zones in Wisconsin may be most appropriately organized by the amount of open versus forested landscapes instead of geographically as they are organized now. This change would ensure that harvest prescriptions would be matched with expected turkey population growth.



Figure 3. Sensitivity of vital rates for populations of wild turkeys in southwest and west-central Wisconsin, 2010–2012. Higher sensitivity values indicate greater influence on population growth.



"Female Wild Turkey Habitat Selection in Mixed Forest-Agricultural Landscapes"

Published: January 15, 2017, The Journal of Wildlife Management. Authors: Christopher D. Pollentier, R. Scott Lutz and David Drake.

WHAT WE DID

We evaluated spring (April 8–July 24) habitat selection of 89 radiomarked female wild turkeys across four study areas (two forestdominated, and two agricultural) in southwest and west-central Wisconsin, from 2010–2011.

We investigated habitat selection at three hierarchical spatial scales. From large to small, our spatial scales were study areas, within spring areas of use (SAUs) and within 200 meters of nest sites. We obtained 3,605 radio-telemetry relocations and monitored 79 nesting attempts.

WHAT WE FOUND

- In both landscapes, female turkeys used edges between cover types, and in forested landscapes females used deciduous forests with numerous and dispersed forest openings. Female turkeys generally established SAUs where an even mixture of forest and open-herbaceous cover was available.
- Telemetry locations within SAUs indicated female turkeys selected land cover types in proportion to availability, but selection of specific cover types was variable within and among study areas.
- At the nest site scale, amount of forest-field edge was greater within 200 meters of nest sites compared to random locations.
- Our results suggest that proportion and configuration of forest and open-agricultural cover are essential components of female turkey habitat, and forest-field edge further plays an important role in nest site selection.

RECOMMENDATIONS

We suggest conservation efforts focus on ensuring available usable space through maintaining upland deciduous woodlands or providing herbaceous fields in varying degrees of succession when managing for wild turkey populations in mixed forest-agricultural landscapes.

Additionally, supplementing buffers along forest-agricultural field edges would marginally affect existing agricultural practices and may be of particular value to turkeys.

BACKGROUND INFORMATION

Gradual changes in agricultural and landscape management practices have led to growing uncertainty regarding eastern wild turkey habitat management in contemporary landscapes across parts of Wisconsin.

Nesting and brood-rearing success during spring often influence turkey population trajectories. A better understanding of habitat selection during this period would identify potential habitat characteristics that have the greatest influence on turkey population management objectives.



Above: Chris Pollentier (left) and Lili Prahl (right) placing a leg band on a female eastern wild turkey.



KEY TAKEAWAYS AND FINDINGS

Questions have persisted about long-term changes to turkey habitat quantity and quality in Wisconsin. Our recent studies have helped to address some of the questions surrounding the ecology of turkeys in a post-restoration era and have identified key habitat characteristics to maintain a stable population of turkeys that will ensure future generations of hunters and wildlife enthusiasts can enjoy our wild turkey resource.

KEY TAKEAWAYS

- The largest positive effect on a sustainable turkey population lies with nesting success and poult survival. The best way to increase reproductive success is continued restoration and maintenance of quality herbaceous and early successional habitat, especially those areas in predominantly forested landscapes.
- In mixed forest-agricultural landscapes, conservation efforts should focus on ensuring available usable space through maintaining upland deciduous woodlands and providing herbaceous fields in varying degrees of succession.
- Maintaining healthy, sustainable turkey populations rests largely with rural landowners as they own most land in the state (upwards of 95% in southern WI). We need to establish good relationships with landowners, help them evaluate their property in the context of the broader landscape and identify habitat components that may be limiting.

FUTURE NEEDS

- Evaluate alternative techniques to better monitor and estimate annual productivity and recruitment.
- Better understand factors contributing to poult survival at various ages (e.g., 0–2 weeks of age and 2–4+ weeks of age).
- Assess hunter impact on male turkey phenotype and the potential of harvest-driven differential selection.
- Understanding the contributing factors of northward expansion of turkey populations and development of models to predict population growth and geographic expansion.



Above: male eastern wild turkeys dusting themselves. A dust bath helps to keep their feathers in top condition.





Above: Chris Pollentier removing a captured female eastern wild turkey.

FORTHCOMING RESEARCH FROM THE WISCONSIN DNR

NORTHERN WI RESEARCH PROJECT

"Influence of land cover characteristics on eastern wild turkey distribution and patch occupancy across northern Wisconsin"

This project represents the first major research pertaining to turkeys in northern Wisconsin. Data has been limited, at best, for turkeys in this part of the state where populations have expanded well beyond their historic range.

- Field work conducted from 2014-2017.
- Research objective: evaluate the distribution and likelihood of occupancy of turkeys in heavily forested regions of northern Wisconsin where forest cover often represents more than 70% of the landscape.

SOUTHEAST WI RESEARCH PROJECT

"Evaluate how eastern wild turkey distribution relates to the amount and dispersion of forest cover in southeast Wisconsin"

Forest cover is far less abundant in southeastern Wisconsin compared to most other regions of the state, yet turkey hunters in this area routinely have the highest spring harvest success rates.

Because harvest permit availability is, in part, determined by amount of forest cover within each TMZ (Turkey Management Zone), a better understanding of the ecological drivers behind turkey distribution will lead to more informed decisions regarding how permit levels may influence local turkey populations and hunter densities.

- Field work conducted from 2016-2018.
- Research objective: determine how turkey distribution is influenced in an agriculturally dominated landscape with marginal forest cover.

STATEWIDE RESEARCH PROJECT

"Evaluation of wild turkey productivity and recruitment in Wisconsin using trail cameras"

Our primary research objective is to evaluate the efficacy of using trail camera data as a technique to monitor and estimate annual productivity and recruitment of wild turkeys in Wisconsin.

Specifically, we plan to utilize Snapshot Wisconsin, a growing network of more than 1,800 volunteer-run trail cameras, to acquire trail camera photos and develop new strategies to obtain various metrics of wild turkey reproductive success, including poult-to-hen ratios, proportion of hens with broods and average brood size.

Our goals are to provide robust indices of wild turkey productivity and to assess population trends across Turkey Management Zones (TMZs) that can be incorporated into effective statewide wild turkey management objectives.



SUGGESTED READINGS & REFERENCES

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This article has been reviewed by subject-matter experts

ABOUT THE OFFICE OF APPLIED SCIENCE

WHO WE ARE

In the Office of Applied Science, our name is our mission. We operate within the Division of Fish, Wildlife and Parks to pursue high priority research that informs the management and conservation of Wisconsin's fish and wildlife.

Our team of research scientists and field technicians works to supply the DNR and stakeholders with objective, applied scientific information to support their decision making and to assist in the responsible stewardship of Wisconsin's natural resources.

Work in OAS encompasses a broad range of landscape-scale and species-specific work on land and in our waters. We share our findings in research publications and reports and we dedicate time to consulting within the DNR and with customers on issues from walleye counts to grouse habitat and everything in between.



Above: Chris Pollentier and Lili Prahl collecting data on eastern wild turkeys.

