INTEGRATED WATERBIRD *Management & Monitoring*

A continental landscape where non-breeding waterbirds have the right habitat, in the right place, at the right time.

PUBLICATION SUMMARY

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Evaluating predictors of local dabbling duck abundance during migration: managing the spectrum of conditions faced by migrants.

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THE PROBLEM

Conservationists have targeted waterfowl by providing sanctuary and shallow water habitats for decades. However, to improve delivery and provide a measure of accountability for management actions, waterbird responses need to be evaluated at the local scale and at the scale of the migration. But to date, the ability to link locally collected observation data to the migration scale has been limited by a lack of standardized protocols, biases, uncorrected sources of error, and limited distribution of collection sites.

THE IWMM APPROACH

To address this problem, Integrated Waterbird Management and Monitoring (IWMM) tested the ability of habitat-related variables to predict local dabbling duck abundance. In this effort, migrating and wintering waterbirds were monitored across entire flyways through surveys of bird response and habitat condition targeted at the management unit scale. To indicate the breadth of this work, IWMM pilot data from the 2010 through 2013 migrations represented 13,208,785 ducks counted during 28,000 surveys at nearly 1,000 locations.

Scientific Name	Common Name	Numbers
Anas platyrhynchos	Mallard	7,235,753
Anas carolinensis	Green-winged Teal	1,978,973
Anas acuta	Northern Pintail	1,662,212
Anas strepera	Gadwall	991,693
Anas clypeata	Northern Shoveler	632,362
Anas americana	American Wigeon	266,634
Anas discors	Blue-winged Teal	253,879
Anas rubripes	American Black Duck	187,279

METHODOLOGY

Models of local waterfowl abundance were created for the Atlantic and Mississippi flyways for both spring and fall migration to explore predictors of waterfowl abundance. The models needed to capture the multi-dimensional interaction of eight species with seventeen variables in two flyways across two seasons, and thus were inherently complex. To overcome some of this complexity, the measurements obtained via monitoring were compiled into three categories ("Covariate Groups", Figure 1) possessing potential predictive value: survey (day of year, latitude and wetland area); forage (preferred plant food density, plant cover and total stem density); and habitat (vegetation and interspersion of open water). The resulting models were then used to identify

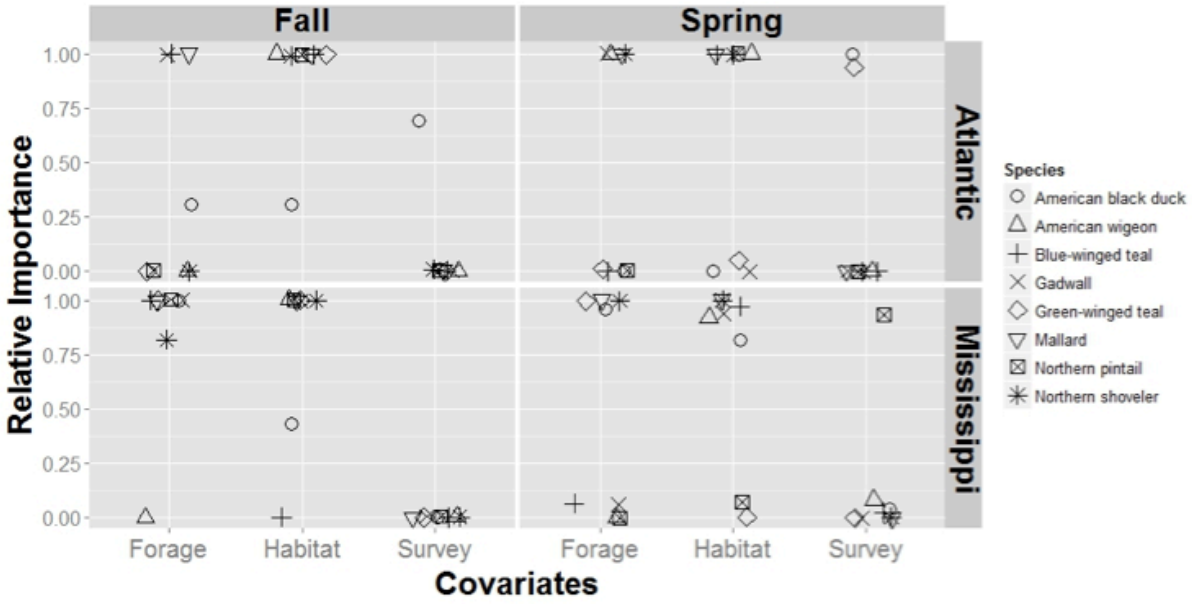
factors relating to habitat structure, forage availability, and migration timing that could potentially influence the abundance of dabbling ducks at the management unit scale.

RESULTS/FINDINGS

All species of dabbling ducks illustrated unique responses to environmental features. Given previously documented observations and conclusions that dabbling duck species generally react similarly to environmental cues, we did not anticipate that the eight species considered here would show such independent responses to the habitat features included in our analysis. Significantly, the pattern observed suggests a "one-size fits all" approach to managing wetland habitats for dabbling ducks would be misguided.

This paper presents a novel approach to evaluate the potential for measured habitat features to serve as predictors of local dabbling duck abundance. However, we note that our results may have been affected by grouping variables into relevant associations to overcome the complexity inherent in the models. Additionally, the variables measured in the surveys do not include the full suite of applicable features for dabbling ducks (e.g., shore and invertebrate forage material). Repeating our approach with variable associations based on management techniques, or using data from revised collection procedures may strengthen or challenge our findings.

Figure 1. Relative importance of covariate groups. Relevant comparisons are between autumn and spring. While few patterns clearly emerged, it is clear that species rarely react moderately to the metrics examined. Symbols representing species that overlapped in a variable were offset for visualization.



FOR MORE INFORMATION

Aagaard, K.J., S.M. Crimmins, W.E. Thogmartin, B.E. Tavernia, and J. Lyons. 2015. Predicting local waterfowl abundance during migration with a national-scale monitoring scheme: what features matter? Wildfowl 65:100-120.

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