Habitat Use and Spring Migration Chronology of Lesser Scaup in Minnesota and Iowa

A Research Note prepared by:

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Background

Scaup (*Aythya marila* and *A. affinis*) populations have declined significantly over the last 20 years (Afton and Anderson 2001), alarming both wildlife managers and the hunting public. Although several hypotheses have been proposed (Austin et al. 2000), one explanation – the "Spring Condition Hypothesis" – is quickly gaining credibility. This hypothesis asserts that female scaup are arriving on breeding areas with depressed levels of endogenous nutrient reserves, which results in delayed nesting, reduced incidence of re-nesting, and/or smaller clutch sizes. Anteau (2002), who has been evaluating nutrient reserves during spring migration in the Mississippi Flyway, concluded that female scaup body condition was significantly lower in the 2000's than during the 1980's in Manitoba and northwestern Minnesota. Minnesota is the first location in the spring migration corridor where depressed body condition was detected. It has been suggested that reductions in the quality and quantity of wetland habitat in Minnesota has contributed to the decline in scaup body condition (Anteau 2002). Fieldwork on the spring condition hypothesis continues in the Mississippi Flyway migration corridor as well as farther west in South Dakota (Chipps 2002).

While research continues, wildlife management agencies and conservation organizations are pushing forward with plans to restore wetlands in the prairie and transition zones of Minnesota and in northern Iowa. Some of these restorations are components of operational programs put in place to meet the goals of the North American Waterfowl Management Plan, and funded through sources like the North American Wetlands Conservation Act. Many new restorations are also being implemented under conservation provisions of the federal Farm Bill such as the Wetlands Reserve Program (WRP). Regardless of the funding source, many managers are anxious to adapt their wetland restorations to better address the needs of migrating scaup. Unfortunately, there is considerable uncertainty about what constitutes suitable spring migration habitat for this species. For example, some biologists believe that scaup may not use wetlands below a certain size, although there is little scientific basis to define the minimum size threshold. Other biologists point to the need to be able to manage wetland hydrology and fish populations to promote the aquatic invertebrate foods consumed by scaup, but are concerned with their ability to effectively manage wetlands above a certain size. Lastly, most managers acknowledge that disturbance can discourage scaup habitat use regardless of wetland size, and is a factor that needs to be considered when undertaking any wetland restoration project.

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Justification

Our knowledge of the scaup spring migration corridor in Iowa and Minnesota is sketchy at best, and we have little quantitative data on scaup habitat use in relation to wetland size, type, location, or proximity to landscape features related to fragmentation or disturbance. In addition, even though scaup are reputed to have the most extended spring migration chronology of any North American duck species, the timing of their migration has been poorly quantified. All of this confounds our ability to design appropriate wetland restorations, locate them in the key migration corridors, and understand the magnitude of resources necessary to accommodate spring migrants. With the ongoing expenditures in wetland restoration, and the extraordinary but time-limited opportunity provided by programs like WRP, it is essential that we begin research on these topics.

Project Description

We designed and implemented a spring aerial survey of migrating ducks in the prairie and transition zones of Minnesota, and the northern prairie zone of Iowa. The focus was on scaup, other migrating waterfowl were not enumerated. The primary objectives of the survey were to:

1. Determine the spatial distribution of migrating scaup, leading to better definition of the key spring migration corridors.

2. Determine the timing of spring migration, quantifying when and where peak migratory concentrations occur.

3. Quantify scaup presence/absence and abundance on individual wetlands, noting the consistency of use based on repeated sampling (multiple surveys).

4. Relate scaup use to individual wetland attributes and the landscape features surrounding the wetland, with the ultimate objective of developing a model that reliably predicts scaup use of individual wetland basins.

Project Methods

Weekly, aerial transect surveys were employed for this research, following methodologies similar to the May breeding survey conducted annually by the U.S. Fish and Wildlife Service (Smith 1995). Survey routes are mapped in the appendix. LANDSAT scenes were to be obtained however climate conditions and satellite schedules did not cooperate. Transects, wetlands, and scaup use data were geo-referenced and incorporated into a GIS for analysis of spatial correlates.

Year one was considered a pilot year, although the design and implementation was tightly controlled to yield the maximum amount of useful information. Given the annual vagaries of weather (spring thaw), moisture (wetland) condition, and migration chronology, at least three years of surveys may be necessary to develop valid wetland use models and understand movements and migration chronology. This report is for year one only. Due to budget constraints

and priorities, the data collection was not funded for subsequent years to complete the intent of the study design.

Project Outcomes

The project resulted in information on the chronology of scaup migration and identification of the most important spring migration wetlands. We observed use of individual wetlands by scaup, and used these data to develop a model that predicts wetland use based on basin size and wetland type. Associated landscape features including disturbance factors and habitat fragmentation were not tested. These data were to be derived from the unsuccessful Landsat data acquisition. The intent was to obtain information critical for guiding wetland restorations and management by better understanding (1) where to restore wetlands to maximize the likelihood of use by scaup, (2) when we would expect use by scaup, and the amount of usage we would anticipate, and (3) how one might design/identify wetland restorations of a size and hydrology, and within a landscape setting, that would maximize the probability of use by scaup.

The distribution of wetlands by type that are observed with scaup are significantly different ($p < 0.05$) than the distribution of wetlands intersecting the transects, as well as, the population of wetlands in the overall study area. Scaup were observed 59% of the time on lakes whereas the number of lakes in the study area accounted for 13% of wetlands.

Table 1: Distribution of Observations

Lacustrine	Semi-Permanent	Seasonal	Temporary
59%	29%	7%	5%

Table 2: Distribution of Transect Wetlands

Lacustrine	Semi-Permanent	Seasonal	Temporary
13%	17%	52%	18%

The frequency of observing scaup on wetlands increased throughout the month of April. Inclement winds may have resulted in dissimilar counts during the week of April 19th. In the highly windy conditions more and larger flocks of birds were counted on fewer wetlands. The total number of birds counted increased as the season progressed though flock sizes were somewhat decreased, none of these changes were statistically significant. There was no evidence of a spatially significant corridor. All transects had similar probabilities of occurance, as well as, little north south bias when truncated at the freeze-thaw line.

Table 3: Weekly Summary by NWI Wetland

Wetlands w/ Scaup	April 5-12	April 19-26	April 27-30	All Weeks
Groups	45	15	74	136
Individuals	623	275	677	2114

Table 4: Weekly Summary by Bird Count includes non-NWI Wetlands

Raw Bird Counts	April 5-12	April 19-26	April 27-30	All Weeks
Groups	65	88	93	246
Individuals	625	824	730	2179

There were several identifiable features that may have management implications drawn from these pilot data. Scaup were more likely to be observed at least once on wetlands larger than 100 acres and were more likely to be observed on more than 1 occasion on wetlands greater than 80 acres and smaller than 6 square miles in size. Semi-permanent were more likely to have consistent use than other wetland classes but the use decreased as the wet acreage fell below the 60 acre threshold value. The probability of presence by scaup favored more permanent water with Lake ($p = .59$) and Semi-permanent ($p = .29$) account for the majority of observed of use. When wetland sizes exceeded 320 acres the number of ducks per wetland observed increased.

These observations may lead to some insights about the presence of scaup on specific wetland demographic categories. The presence though does not explain the reason for their use. It is entirely possible that the birds are in several different body conditions on these wetlands:

1. Decreasing body condition
2. Stable body condition
3. Recovering body condition

The linkage between wetland use and these conditions may lead to the answer to the key questions limiting strategic habitat restoration in answer to the spring condition hypothesis. There are several questions that may require future attention. Are the basin classifications sufficient for this type of analysis? This question is relevant since size is a significant determinant for use and many basins in the classes where use is expected had no observed birds. Do these data need to be tied directly to concurrent invertebrate studies? Since the anecdotal evidence given by the observers suggests water quality was a significant issue in observing scaup, this question has additional significance for the management of fish populations or nutrification that may impact the availability of preferred food resources for scaup. Answering these questions will indicate whether presence implies properly functioning conditions of the wetlands and beneficial use by scaup in relation to body condition.

Project Issue - Tribal Lands

This study had only one incident that raised issues with the public. During the flights over Lower Red Lake the low flight of the aircraft was mistakenly reported as a landing aircraft. This type of public alarm can be avoided in the future by contacting all governing entities that the survey path intersects. As a part of this study I attempted to decompose the habitat use information specifically for the tribal lands but there were not sufficient observations to segregate meaningful data from the overall study. Anecdotally the use of tribal resource by the birds was not different than the use throughout the rest of the study area.

Literature Cited

Afton, A. D., and M. G. Anderson. 2001. Declining scaup populations: a retrospective analysis of long-term population and harvest survey data. Journal of Wildlife Management 65:781-796.

Anteau, Michael J. 2002. Nutrient Reserves of Lesser Scaup During Spring Migration in the Mississippi Flyway: A Test of the Spring Condition Hypothesis. M.S. Thesis, Louisiana State University, Baton Rouge, LA.

Austin, J. E., A. D. Afton, M. G. Anderson, R. G. Clark, C. M. Custer, J. S. Lawrence, J. B. Pollard, and J. K. Ringelman. 2000. Declining scaup populations: issues, hypotheses, and research needs. Wildlife Society Bulletin 28:254-263.

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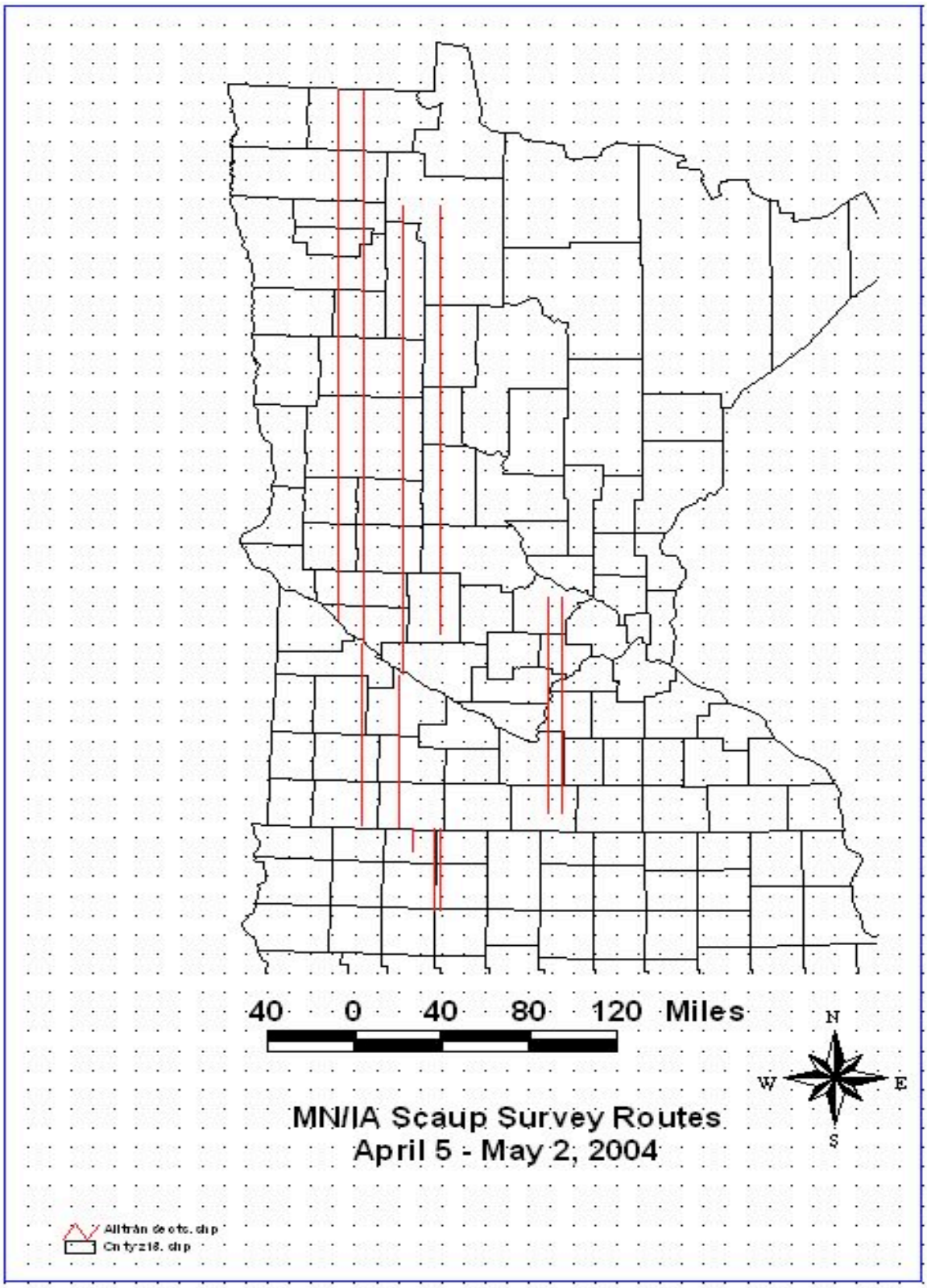
Smith, G. W. 1995. A critical review of the aerial and ground surveys of breeding waterfowl in North America. National Biological Survey, Biological Science Report 5. 252 pp.

Appendix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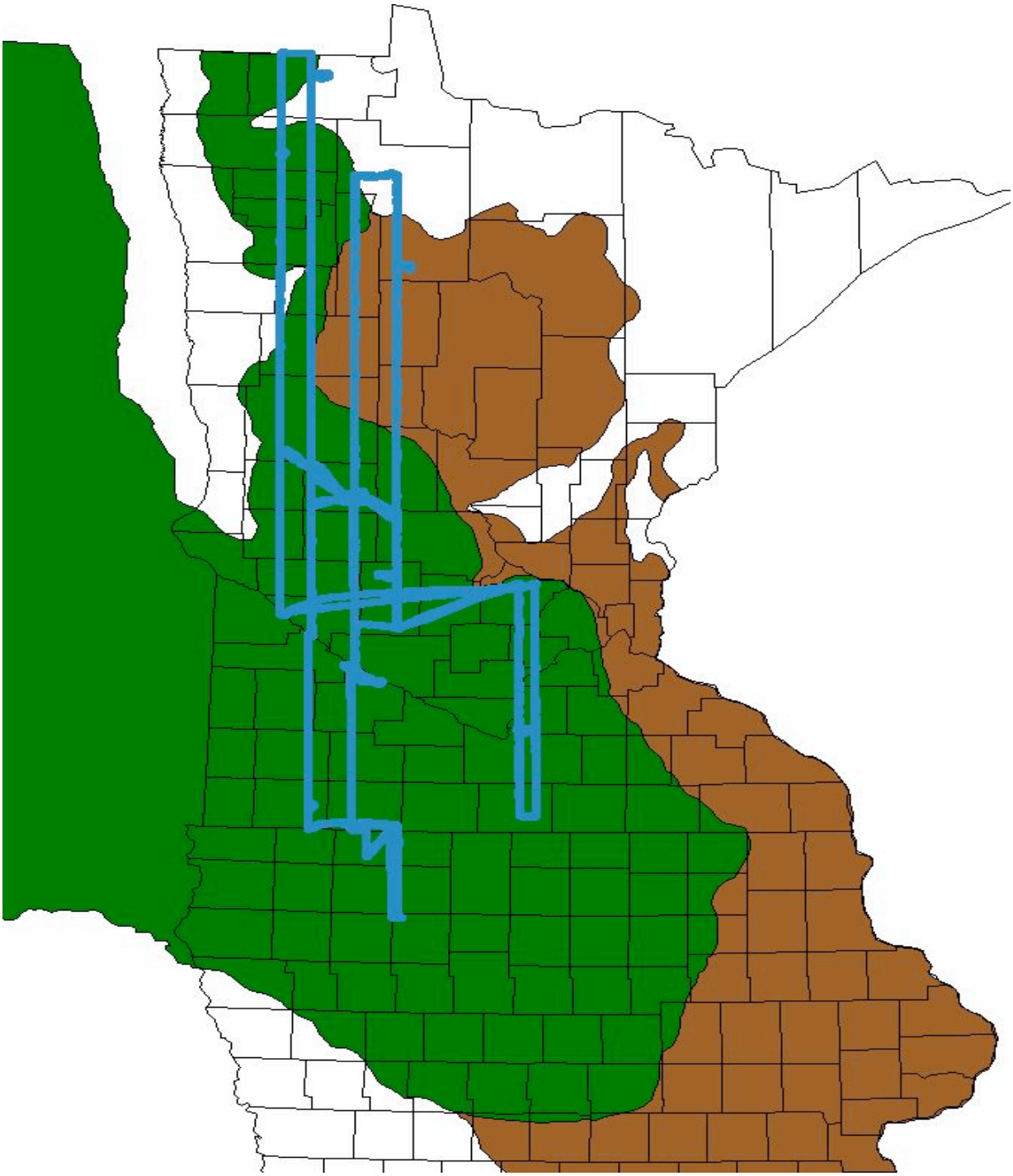
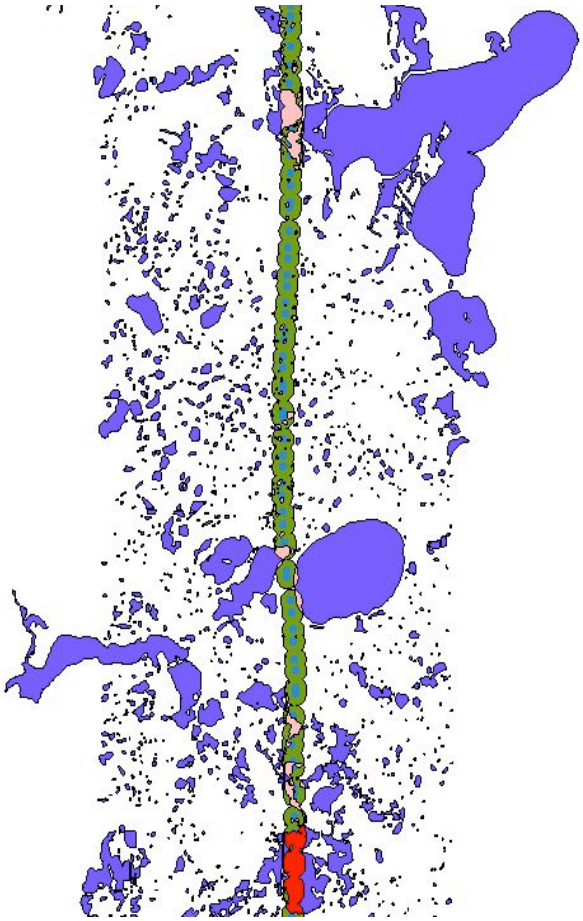
MN/IA Scaup Survey Routes
April 5 - May 2, 2004

Prairie Pothole Joint Venture in green and Upper Mississippi Joint Venture in brown with the Aerial Survey Fight Lines in blue.



Example of the survey area in green buffer and the wetland landscape intersected. Scaup counts in red shades. NWI Basins in Blue.



Survey Notes:

The week of April 5th the study commenced. Week one, scaup were recorded using wetlands larger than 30 acres in size and the majority of birds were encountered in the southern 1/3 of MN and northern IA. Approximately 1000 birds were counted within _ mile of the study transect routes. Areas north of Lake Christina were still frozen and few birds were encountered other than dabblers on smaller wetlands. Many of the lakes where scaup were expected were devoid of birds and turbidity and carp were evident from the flight altitudes in many of the larger wetlands. The wetlands where the birds were observed were predominately black or clear water lakes.

Week 2 observations were similar to week one with the ice-line having moved to just north of Detroit Lakes. More birds were still observed in the lower latitudes of MN and northern IA. Habitat choice was still consistent with the observations of week one. There were very few lakes with the expected large rafts of staging scaup and those with larger numbers were still fewer than expected. No color-marked birds from Pool 19 have been observed. Many of the wetlands identified by NWI for this study are cattail choked or otherwise altered. These will be noted on subsequent flights for later comparisons of habitat availability.

Week 3 observers report the numbers declining in the southern areas and increasing in the northern portions of MN. By the weekend the numbers had dropped off in the northern areas as well. Indications are the birds moved through very quickly.