

Reversing Songbird Decline: Overwinter Food Supplementation Significantly Increases Assumed Survival of the Dark-eyed Junco

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Abstract. The North American Breeding Bird Survey indicates a long-term decline of the Dark-eyed Junco (*Junco hyemalis*). Strong flock fidelity and small overwinter home range of juncos makes them exceptional models for studies investigating seasonal mortality. Using varied food supply, I measured the site persistence of supplemented and unsupplemented flocks after a 60-day period using mark and resight methods. The effect of food supplementation on overwinter site persistence was statistically significant in 2011, 2012, and 2013. Additionally, average daily temperature, snowfall, and snow accumulation significantly decreased persistence among unsupplemented flocks in cold winters (2011, 2013) compared to mild winters (2012). The expectation from literature is that absentee birds represent mortality rather than dispersal. Increased overwinter survival may reverse decline.

Introduction

The North American Breeding Bird Survey (BBS), a cooperative between the U.S. Fish and Wildlife Service and the Canadian Wildlife Service, estimates a survey-wide declining trend for Dark-eyed Junco populations. BBS monitoring programs indicate a long-term decline of nearly 2% annually from 1966-2010 [1]. Reduction of any avian population is alarming, because they are indicators of both ecosystem health and productivity, as well as providing ecosystem services, such as decomposition, pollination, and seed dispersal [2,3]. There is a plethora of hypotheses that provide explanations for avian decline, many of which are anthropogenic in nature [4]. One such hypothesis emphasizes that habitat fragmentation and agricultural intensification in the eastern and central United States, the overwinter habitat for *J. hyemalis*, is a major cause of decline for grassland birds [6]. My research objective is to advance current knowledge of avian demographics, particularly in the nonbreeding season. An emphasis on increased overwinter survivorship may halt abating population trends.

Experiment, Results, Discussion, and Significance

Methods

In early December, *J. hyemalis* has completed its fall migration and established overwinter flocks, which are maintained until they begin spring migration in early March [5]. During the previous three years, we captured and uniquely color banded juncos (n=208) at the Wichita State University Biological Field Station, Ninnescah Reserve. Banding was permitted under WSU IACUC authorization #163. Birds were captured and banded at two sites from 1 December-14 December, using mist nets baited with mixed seed. On 15 December, residual seed used for baiting at the unsupplemented site was covered with tarps, while seed at the supplemented site was continually replenished every five days through the overwinter period. Seed availability was constant at supplemented sites, and snow was removed following any accumulation. After a wintering period of 60 days (15 December-15 February), tarps were removed and seed was replenished at unsupplemented sites. We then intensely searched and observed each site for banded birds through 1 March.

Results

The effect of food supplementation was significant in three consecutive years [Figs 1, 2, & 3] Furthermore, average daily wind-chill, snowfall, and snow accumulation also significantly influenced assumed survival on *unsupplemented* flocks between the three years [Fig. 4]

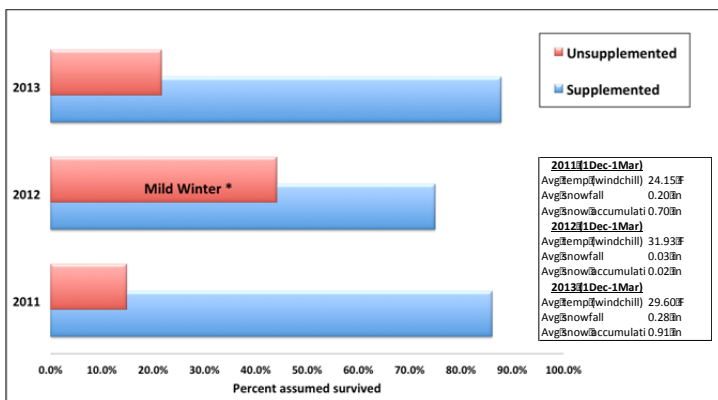
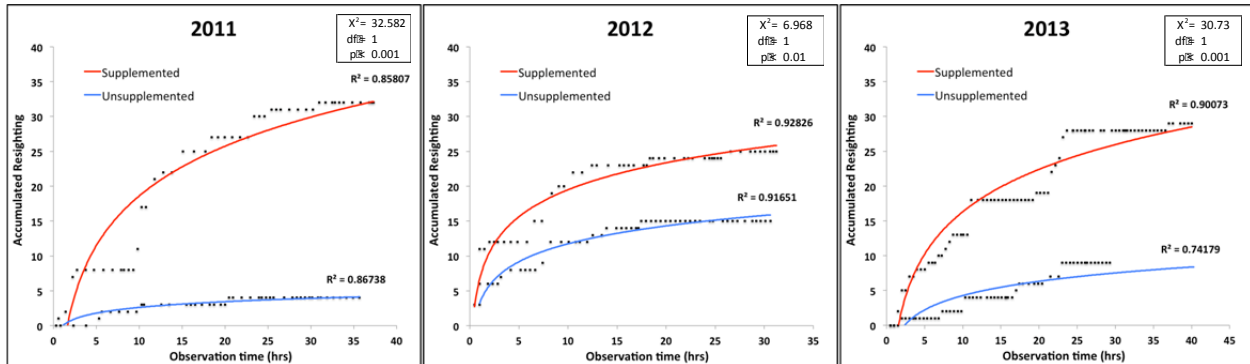


Fig. 4. A comparison of percent assumed survival during the overwintering period between years. NOAA Quality Controlled Local Climatological Data Table seen on right.

Figs. 1, 2, & 3, respectively. Represents marked birds newly accumulated (y-axis) over observation time (x-axis)

Discussion

A lessened density of seed stores could impose an increased habitat size requirement, leaving juncos at a higher risk of predation. The intensification of agricultural practices and an increase in Cooper’s Hawk (*Accipiter cooperii*) populations would make this a likely scenario [1]. Assumed survival of unsupplemented groups is strongly effected in cold years with high snowfall and accumulation.

Conclusions

This study emphasizes that annual decline may be due to decreased survival on the wintering grounds, a causality of habitat degradation and fragmentation (i.e low food availability/quality). Improved understanding of overwinter avian demographics will provide habitat managers with new standards for conservation and restoration.

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