

Site Fidelity and Natal Philopatry in Dickcissels

Daniel M. Small^{1,*}, Maren E. Gimpel¹, and Douglas E. Gill²

Abstract - *Spiza americana* (Dickcissel) colonized a restored Conservation Reserve Program grassland in Maryland during the second year of restoration and has continued to return in subsequent years. In 2000–2010, we banded 125 adult and hatch-year birds; during this period the population ranged annually from one to 16 individuals. Twenty-one percent of adult male Dickcissels ($n = 38$) returned in a subsequent nesting season, 30% of adult females ($n = 20$) returned, and 1.7% ($n = 67$) of the banded hatch-year individuals returned. A female Dickcissel returned to these grasslands after being banded as a nestling the previous year; this bird is the first nestling Dickcissel ever to be re-sighted in a subsequent year across this species range. This same female Dickcissel nested an average of 196.5 m (range = 84–297 m) from her natal site over four breeding seasons, and now holds the longevity record (4 yrs, 11 months) for the species; she also became the first known female Dickcissel to return to a breeding site in Maryland. At our study site, whether adult Dickcissels returned the following summer was not related to their nesting experience (success or failure) the previous year. However, males that were unsuccessful in procuring mates often did not return the following year, and females returned at a greater rate than males.

Introduction

Interspecific and intraspecific variation in site fidelity and dispersal among grassland passerines is highly variable among species, and even among populations within a species complex. Some variation stems from the availability and quality of breeding sites from one year to the next, success of nesting attempts in previous years (Zimmerman and Finck 1989), and perhaps location of suitable breeding areas within the range of the species. Jones et al. (2007) report 5.4% ($n = 37$) return rates for adult male *Passerculus sandwichensis* (Gmelin) (Savannah Sparrow) in Montana, whereas Bedard and LaPointe (1984) report 38.7% ($n = 86$) and 31.2% ($n = 38$) return rates for male and female Savannah Sparrows, respectively, in Québec, Canada. Jones et al. (2007) report 8.9% ($n = 45$) of the adult male *Ammodramus savannarum* (Gmelin) (Grasshopper Sparrow) returned in Montana compared with an average of 58% ($n = 568$) returning adult males over a nine-year period in Maryland (Small et al. 2009).

Site fidelity in *Spiza americana* Gmelin (Dickcissel) is highly variable, including differences within or between male and females, interannual differences, and variation across geographical regions (Temple 2002). Reasons for Dickcissel site fidelity are numerous and can include but are not limited to previous year's nesting success (Hoover 2003, Sedgwick 2004, Zimmerman and Finck 1989), age of individuals, habitat changes, and possibly adverse weather conditions (i.e., drought;

¹Chester River Field Research Center, The Custom House, 101 South Water Street, Chestertown, MD 21620. ²Department of Biology, University of Maryland, College Park, MD 20742. *Corresponding author - DSmall2@washcoll.edu.

Taber 1947). Site fidelity in the periphery of the range is poorly understood in general, but Dickcissels show much less fidelity to these areas even when habitat conditions remained the same (Temple 2002). Prior to this study, Dickcissels were shown to have no natal site fidelity, and presumably, birds that failed to return either died or dispersed beyond their natal site. Here we document the first banded Dickcissel nestling ever to be re-encountered as a breeding adult, the first known case of a Dickcissel banded as a nestling returning to its natal area, and a new longevity record for this species. We also present Dickcissel return rates for Maryland.

Field Site Description

From 1999–2010, we conducted demographic studies of grassland birds with an emphasis on Grasshopper Sparrows and Dickcissels on 92.4 ha of restored mid-Atlantic grasslands at the Chester River Field Research Center (CRFRC) in Queen Anne’s County, MD (39°23’N, 76°00’W) (Fig. 1; see Gill et al. 2006 for details). In 1998, after 40 previous years of rotational crop production, the CRFRC experimental grasslands were planted with eight species of warm-season grasses and 24 species of prairie forbs. Enrolled in the USDA’s Conservation Reserve Program (United States Department Agriculture 2010), these experimental native

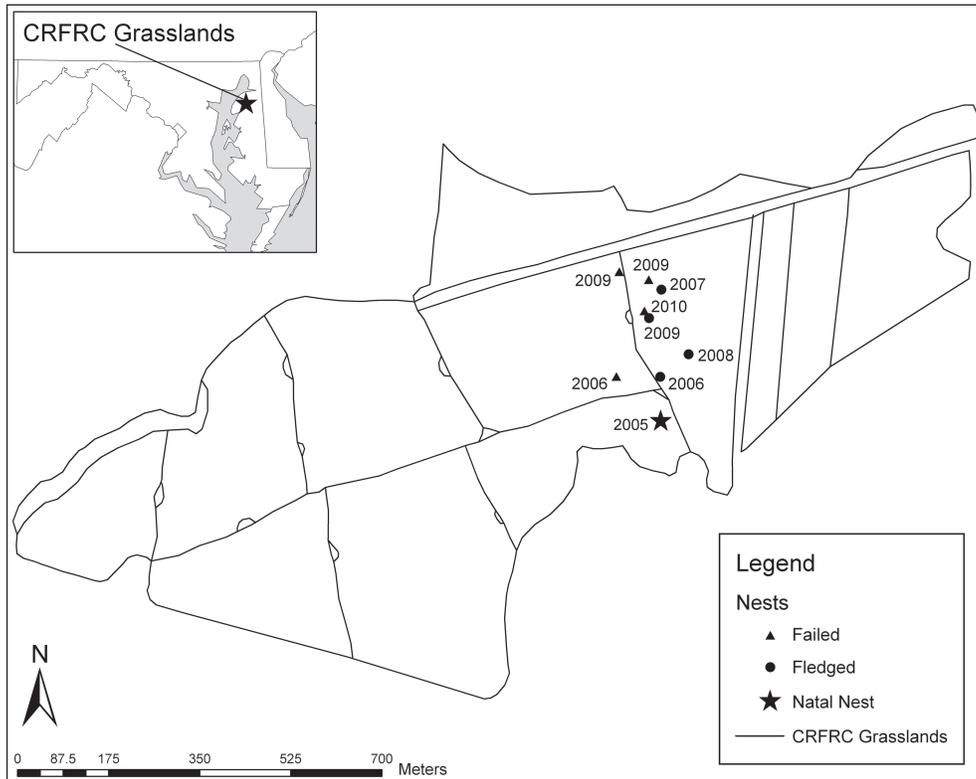


Figure 1. Locations of the eight nests of Dickcissel MMPX from 2006–2010 located on the CRFRC grasslands in Maryland. These eight nests were an average distance of 196.5 m (range = 84–297 m) from her natal nest. The entire 92 ha are included to show other possible nest locations.

grasslands were established to provide critical habitat for species of special concern and they were quickly colonized by several species including Grasshopper Sparrows and Dickcissels. Very little appropriate breeding habitat for Dickcissels exists in the immediate area around the CRFRC grasslands. Surrounding landscape features include row-crop farm fields, mature and second-growth deciduous forest, narrow buffer stripes, horse pastures, a large river, and many small streams.

Methods

Adult Dickcissels were banded with a US Geological Survey (USGS) aluminum band and a unique combination of three colored plastic bands; nestlings were banded with a USGS aluminum band only. In addition, we learned to recognize each singing adult male by his distinctively shaped black bib and song, and thereby were able to keep track of new arrivals whether or not they were previously banded. Nest searching and territory mapping were conducted daily from 1 June through 31 August 2000–2010. The locations of nests and adults exhibiting breeding behaviors (e.g., singing, production of alarm calls, carrying food, etc.) were recorded on Garmin 12XL global positioning systems in the field and mapped using ArcGIS[®] (Environmental Systems Research Institute, Inc. 2004) software. Nests were found by observing females carrying nest material or food, or agitated birds defending an area. Nests were monitored every third day, and nestlings were banded on day five or six after hatching. Nests were determined to be successful if at least one nestling fledged. If a nest was found empty when the nestlings were old enough to fledge, the area was monitored for a female feeding young, and only then was the nest determined to have fledged. The Fisher exact probability test was performed on a 2 x 2 contingency table of adults returning or not, depending on nest success in a previous year.

Results

Twelve adult Dickcissels founded the population on the grasslands in June 2000, during the second year of restoration, and adult Dickcissels in breeding condition have been present every year since (Fig 2). We banded 125 Dickcissels and found 40 nests. Of the male Dickcissels, 21% ($n = 38$) returned in a subsequent nesting season, 30% ($n = 20$) females returned, and 1.7% ($n = 67$, two free-flying hatch-years and 65 locals) of the banded hatch-year individuals returned. Two adult males and two adult females returned in multiple years. The first documented adult Dickcissel to return to its breeding grounds in Maryland was banded as an adult male in 2000 and he returned 2001–2002.

A nestling Dickcissel banded in 2005 returned to the grasslands as a breeding female in 2006–2010. Her breeding season arrival dates were 13 June 2006, 5 July 2007, 16 June 2008, 2 June 2009, and 28 June 2010. She fledged 16 young from half (4) of her 8 nesting attempts; her nests from 2006–2010 varied in distance from her natal site between 84–297 m (Fig. 1).

Twelve of the adult Dickcissels that successfully fledged young returned in subsequent years, whereas 16 birds that fledged young did not return; only two females

have not returned following a failed nesting attempt. The Fisher exact probability test of adults returning or not depending on reproductive success in a previous year was not significant ($P = 0.513$), indicating adults returned arbitrarily after nest success or failure the previous year. Four additional birds exhibited nesting behavior (but their nests were not found) and returned the following year. In addition, 34 individuals were present on the CRFRC grasslands for one breeding season but never found mates, and were not re-sighted in following years. A range of 0–5 different individual adult males each year, and one female during the entire study period, eluded capture and went unbanded; these individuals did not stay on the grasslands for the entire breeding season. Due to the conspicuous nature of singing males and the relative ease of observing females prior to incubation and especially during care of nestlings, we are confident that all Dickcissels that were present on the CRFRC Grasslands were accounted for.

Discussion

Although site fidelity of adult Dickcissels has been confirmed through banding returns in the core of their range, little is known about site fidelity on the periphery of their range. In Kansas, return rates differed significantly between sexes: 26–58% of adult males returned in subsequent years, whereas adult females showed little if any site fidelity (0–4%; Temple 2002). However, in Illinois 20% of adult females returned (Walk et al. 2004). In the periphery of the breeding range there

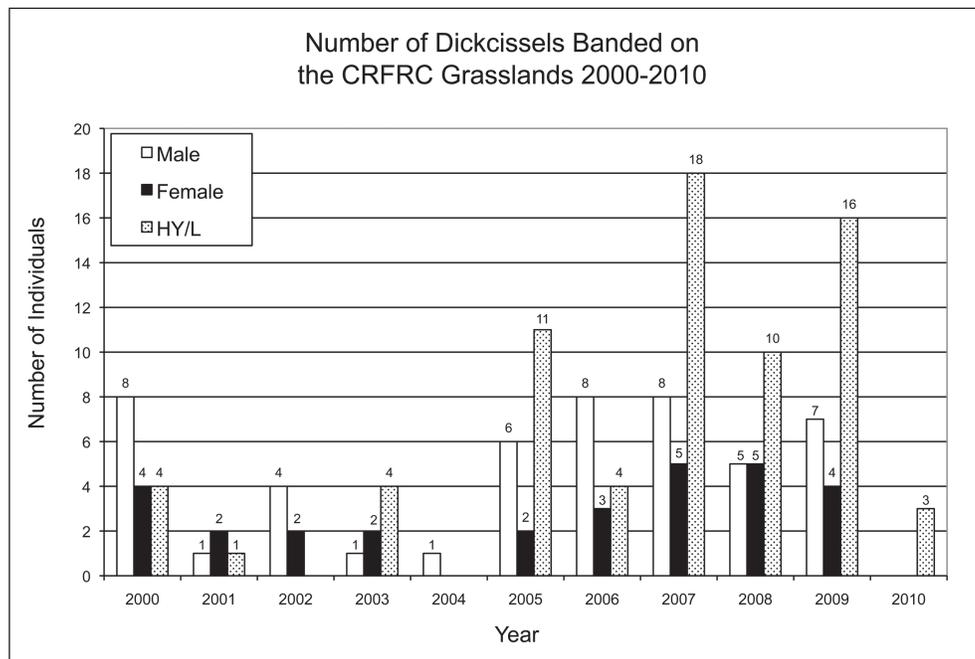


Figure 2. Banded Dickcissel population on the CRFRC Grasslands. HY/L indicates hatching-year (HY) and “local” birds (L: birds banded as nestlings). A range of 0–5 different adult males per year and one adult female during the entire course of the study went unbanded and are not included in these totals.

is reportedly much less site fidelity, even when conditions have not changed in successive years (Mulvihill 1988, Taber 1947, Temple 2002). Occasionally, Dickcissels irrupt east and northeast of the Midwest breeding grounds and are found in larger numbers than usual in states along the eastern seaboard. In 1988, Pennsylvania experienced a large invasion of Dickcissels into the state, including many areas where there had been previous nesting records (Mulvihill 1988). Maryland experienced a similar invasion during the 2004–2005 breeding seasons; many of the observations reported by Ellison (2010) came from those two years.

Over the last three decades, Dickcissel abundance in Maryland has generally increased. During the 1983–1987 Breeding Bird Atlas, Dickcissels were reported as “likely breeding” in 26 blocks, but “confirmed breeding” in only four out of 239 blocks, none of which were on the eastern shore of Maryland (counties on the Delmarva Peninsula; Smith 1996). These early data stand in contrast to reports of likely breeding in 66 blocks and confirmation in 14 blocks, including nine on the eastern shore of Maryland in the 2002–2006 Atlas (Ellison 2010). Few breeding sites used by Dickcissels in the 2002–2006 Atlas were occupied in more than one season. Out of the 66 blocks where Dickcissels were found, only eight (including the two blocks containing the CRFRC grasslands) were occupied in successive seasons (W.G. Ellison, Editor, Second Atlas of the Breeding Birds of Maryland and the District of Columbia, pers. comm.).

Given their status of “state rare” as a breeder in Maryland (Maryland Natural Heritage Program 2010), it was surprising that Dickcissels arrived in the second year of this large-scale restoration of Atlantic Coastal grasslands. Many marked individuals have returned, and many new recruits have appeared every year since. These results demonstrate that providing and maintaining appropriate habitat not only will attract breeding adult Dickcissels, but also will facilitate the return of both breeding adults and, potentially, nestlings. The decision by birds to return to the previous year’s breeding site is often directly related to the reproductive success achieved in the previous year (e.g., Hoover 2003, Sedgwick 2004). Zimmerman and Finck (1989) reported that the fidelity of male Dickcissels to their territory of the previous year may be related to the production of young, whereas females showed no site fidelity.

Here, we report a different and unexpected pattern: males and females returned arbitrarily the following year regardless of whether they had successful nests the previous season, including males holding territories with multiple females. In addition, a greater percentage of females (30%) returned to the CRFRC grasslands than did paired males (21%), regardless of nesting success in the previous year. The higher proportion of returning females at the CRFRC grasslands may be in part due to the relatively small amount of nesting habitat available elsewhere in the region, concentrating the birds in the study area. The CRFRC grasslands are essentially a habitat island, and due to the relatively small population of Dickcissels, we are confident that additional Dickcissels in the general area have not been overlooked. Our observations are thus in accord with those of Walk et al. (2004), who described a Dickcissel population constrained by small amounts of habitat and reported similar return rates for females to those we have found here at CRFRC.

We recovered the only known individual banded as a nestling and later found as a breeder in any part of the range (Temple 2002; USGS Bird Banding Laboratory, Laurel, MD, unpubl. data retrieved 7 September 2010). Prior to the 2010 breeding season, 2542 nestlings/hatch-year Dickcissels were banded in North America and none, aside from this single example, has ever been reported or re-encountered (USGS Bird Banding Laboratory, unpubl., data retrieved 7 September 2010). In addition, this bird now holds the longevity record for the species at 4 yrs and 11 months (Lutmerding and Love 2009).

Providing and maintaining areas of quality habitat for nesting birds remain of utmost importance in conservation. Although much effort and study has been applied to conserving and restoring grasslands in the Midwest, grasslands continue to be fragmented or disappear, and smaller patches of grassland habitat such as the CRFRC grasslands are proving to be an invaluable resource for both site-faithful and dispersing birds.

Acknowledgments

We thank the many seasonal personnel who have worked in the CRFRC grasslands over the years. We are also grateful to Bernard Lohr and two anonymous reviewers for comments that improved the manuscript. In addition, we thank the staff of Chino and Bluestem Farms, Foreman's Branch Bird Observatory, and especially H.F. Sears for his generous ongoing support. This represents Contribution No. 9 from the Chester River Field Research Center.

Literature Cited

- Bédard, J., and G. LaPointe. 1984. Banding returns, arrival time, and site fidelity in the Savannah Sparrow. *Wilson Bulletin* 2:196–205.
- Ellison, W.G. 2010. Dickcissel (*Spiza americana*). Pp. 410–411, *In* W.G. Ellison (Ed.). *Second Atlas of the Breeding Birds of Maryland and the District of Columbia*. John Hopkins University Press, Baltimore, MD.
- Environmental Systems Research Institute, Inc. 2004. ArcGIS®. Version 9. Environmental Systems Research Institute, Inc., Redlands, CA.
- Gill, D.E., P. Blank, J. Parks, J.B. Guerard, B. Lohr, E. Schwartzman, J.G. Gruber, G. Dodge, C. A. Rewa, and H.F. Sears. 2006. Plant and breeding bird response on a managed conservation reserve program grassland in Maryland. *Wildlife Society Bulletin* 34:944–956.
- Hoover, J.P. 2003. Decision rules for site fidelity in a migratory bird, the Prothonotary Warbler. *Ecology* 2:416–430.
- Jones, S.L., J.S. Dieni, M.T. Green, and P.J. Gouse. 2007. Annual return rates of breeding grassland songbirds. *The Wilson Journal of Ornithology* 119:89–94.
- Lutmerding, J.A., and A.S. Love. 2009. Longevity of North American birds. Version 2009.1. Patuxent Wildlife Research Center. Bird Banding Laboratory, Laurel, MD.
- Maryland Natural Heritage Program. 2010. Rare, threatened, and endangered animals of Maryland. April 2010 edition. Maryland Department of Natural Resources, Wildlife and Heritage Service, Annapolis, MD.
- Mulvihill, R.S. 1988. The occurrence of Dickcissels (*Spiza americana*) in western Pennsylvania during the 1988 nesting season: Its possible bearing on the species' unusual history in eastern North America. *Pennsylvania Birds* 2:83–87.

- Sedgwick, J.A. 2004. Site fidelity, territory fidelity, and natal philopatry in Willow Flycatchers (*Empidonax trailii*). *The Auk* 4:1103–1121.
- Small, D.M., J. Parks, J. Gruber, and D.E. Gill. 2009. Grasshopper Sparrow (*Ammodramus savannarum*) longevity record. *North American Bird Bander* 33:186–187.
- Smith, S.A. 1996. Dickcissel (*Spiza americana*). Pp. 386–387, *In* C. Robbins and E.T. Blom (Eds.). *Atlas of Breeding Birds of Maryland and the District of Columbia*. University of Pittsburgh Press, Pittsburgh, PA.
- Taber, R.C. 1947. The Dickcissel in Wisconsin. *Passenger Pigeon* 9:39–46.
- Temple, S. A. 2002. Dickcissel (*Spiza americana*). No. 703, *In* A. Poole and F. Gill (Eds.). *The Birds of North America*. The Birds of North America, Inc, Philadelphia, PA.
- United States Department Agriculture, Natural Resources Conservation Service. 2010. Conservation Reserve Program. Available online at http://www.md.nrcs.usda.gov/programs/crp_crep/crp_crep.html#Technical%20Resources. Version 5 January 2010. Accessed 27 December 2010.
- Walk, J.W., K. Wentworth, E.L. Kershner, E.K. Bollinger, and R.W. Warner. 2004. Renesting decisions and annual fecundity of female Dickcissels (*Spiza americana*) in Illinois. *The Auk* 4:1250–1261.
- Zimmerman, J.L., and E.J. Finck. 1989. Philopatry and correlates of territory fidelity in male Dickcissels. *North American Bird Bander* 14:83–85.