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Dr. David Ewert
The Nature Conservancy
101 East Grand River
Lansing, MI 48906
Phone: (517) 316-2256
Email: dewert@tnc.org

ABSTRACT: The goal of our project is to provide key information regarding the nature of the linkage between wintering and breeding habitats for the federally endangered Kirtland's Warbler (*Dendroica kirtlandii*), which breeds almost entirely within Michigan, and winters in The Bahamas. With our team of volunteers, we searched Michigan jack pine stands for Kirtland's Warblers banded on The Bahamas during May-June 2005, and located eight of these males (a total of 848 males and 104 females were observed closely enough to check for bands). Five of the banded birds located this year were newly located in 2005, and three were birds that had also been found in Michigan in 2004, the first year of our study. The other six banded males located in 2004 were not re-sighted in 2005 in repeated visits to their 2004 territories, and are presumed to have died or (less likely) to have dispersed to new territories in areas that we did not search. With the cooperation of our team members in The Bahamas, for one of the three birds first located in 2004 we were able to document a maximum duration of migration from The Bahamas of 36 days. In addition, we located three birds originally banded in Michigan, and documented that two of these birds are now 10 and 11 years old. The previous longevity record for Kirtland's warblers was 9 years, and 11 years ties the record for North American warbler species. The specific purpose of our work is to evaluate the degree to which birds banded within four locations on Eleuthera (The Bahamas), wintering areas are spatially associated on the Michigan breeding territories and to determine duration of migration from The Bahamas to Michigan. Thus far the birds appear to widely distributed across the Michigan breeding grounds (not clumped); these analyses are ongoing. One Kirtland's Warbler took no longer than 36 days to migrate from Eleuthera to Michigan.

INTRODUCTION

One of the major constraints to developing comprehensive conservation programs for migratory birds is the lack of knowledge linking breeding, stopover and wintering areas. Use of stable isotope chemistry, satellite telemetry, and genetic analyses are providing initial and important suggestions for broad-scale linkages (Webster et al. 2002) but there is often insufficient resolution for conservation programs to apply this information at a site or landscape scale. Thus, data on individually marked birds can be helpful for the fine scale spatial resolution frequently needed to make conservation decisions.

Development of a comprehensive conservation program to protect the endangered Kirtland's Warbler (*Dendroica kirtlandii*) requires protecting breeding and wintering grounds and migratory stopover sites. The results presented here are part of a comprehensive program to protect the endangered Kirtland's Warbler on

its breeding and wintering ground, including The Kirtland's Warbler Research and Training Program which has initiated studies of habitat requirements of over wintering Kirtland's Warblers in The Bahamas.

A key step toward development of a comprehensive program involves evaluating the degree of linkage between specific breeding and wintering areas of Kirtland's Warblers. The immediate purpose of this work is to determine if birds banded on the Eleuthera, The Bahamas wintering areas are also associated with each other on the Michigan breeding grounds. Thus, the focus of this work was to search occupied areas throughout the breeding range to locate as many of these banded birds as possible to further this objective. Ultimately, we expect these data will also help us to better evaluate Kirtland's Warblers survival, correlate arrival dates of Kirtland's Warblers with condition of Kirtland's Warblers immediately prior to spring migration, and to document duration of migration for individual birds. In addition, future surveys to locate banded birds could provide a second estimate of the number of singing males present in occupied stands for comparison to the estimates derived from established line transect count methods.

By documenting both the wintering and breeding territory locations of banded Kirtland's warblers, we hope to add key pieces of information to what is known about this endangered species, such as duration of migration, and timing of mortality. Although sample sizes are small, this information can only be obtained in this manner, and these data would contribute to both our understanding of this species of great management concern in Michigan, as well as to the understanding of songbird life histories in general.

OBJECTIVES

1. To locate Kirtland's Warblers (*Dendroica kirtlandii*) banded in The Bahamas on breeding colonies in Michigan to observe the extent to which birds banded within the same wintering sites are also spatially associated during the breeding season. Locations of birds to be determined with Global Positioning Systems (GPS) units in both The Bahamas and Michigan, and to be mapped to determine the degree of association.

2. To assess the point within the yearly cycle when mortality of Kirtland's Warblers occurs by noting when color-banded Kirtland's Warblers were last seen; in Michigan or The Bahamas.

3. To document duration of spring 2005 migration for those individual Kirtland's Warblers where both departure date from The Bahamas and arrival date in Michigan can be determined.

METHODS

Kirtland's Warbler sites in the Lower Peninsula were searched for birds which had been banded in The Bahamas. Guidelines, specified by Federal Endangered Species Permit PRT-697830 (subpermit 04-09) and reviewed by members of the Kirtland's Warbler Recovery Team and others, were provided to a team of observers to ensure that surveys were a minimal source of disturbance to Kirtland's Warblers. These guidelines included instructions that no playback was to be used to attract birds, observers were to retreat from birds that appeared to be agitated by the presence of observers, and to travel through sites using a route least likely to disturb Kirtland's Warblers (e.g. avoid edges of openings). We checked each site, or part of a site, only once. We only deviated from this approach when checking arrival dates of banded birds that had been located in 2004, as multiple visits to a site were needed until either the individual arrived or we concluded that the bird did not arrive (i.e., if the bird was still not present in late May, when populations seemed to have reached typical breeding season densities). Checking of sites was coordinated by D. Ewert and K. Hall with observers instructed to report back as soon as they had completed a survey of an area.