Migration Chronology Distribution of Eastern Population of Sandhill Cranes[1]

2013 Annual Report

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Abstract: The Eastern Population (EP) of sandhill cranes (*Grus canadensis*) is rapidly expanding in size and geographic range. The core of their breeding range occurs in Wisconsin, Michigan, and southern Ontario; however, the EP range has expanded in all directions as the population has grown. Little is known about the geographic extent of breeding, migration, and wintering ranges of EP cranes, or migration chronology and use of staging areas. In December of 2009, we began trapping and attaching solar Global Positioning System (GPS) satellite Platform Transmitting Terminals (PTTs) on EP sandhill cranes to assess movements throughout the year. We continued trapping throughout the spring and fall of 2010, the winter of 2010-2011, the fall of 2011 and winter of 2011-2012. To date, we have rocket-net trapped and attached PTTs (n = 33) to cranes in Indiana: Goose Ponds Fish and Wildlife Area (FWA), Greene County and Jasper-Pulaski FWA, Jasper and Pulaski Counties; Minnesota: Sherburne National Wildlife Refuge (NWR), Sherburne County; Tennessee: Hiawassee Wildlife Refuge, Meigs County and Hop-In Wildlife Refuge, Obion County; and Wisconsin: Crex Meadows Wildlife Area, Burnett County. Location data for these birds are currently being received from Collecte Localisation Satellites (CLS) America Inc., MD, translated by software developed by NorthStar Science and Technology LLC, MD, and viewed using Environment System Research Institute (ESRI) ArcGIS software. Data are currently being analyzed, with a target of spring 2014 to provide a final project report.

INTRODUCTION

At the turn of the 20th century, the Eastern Population (EP) of greater sandhill cranes (*Grus canadensis tabida*, hereafter cranes) was nearly extirpated from its historic breeding range due to habitat alteration and unsustainable harvest levels (Walkinshaw 1955, Lumsden 1971, Hunt et al. 1976). Since the early 1900s, the EP of cranes has increased in size and its breeding range has expanded (Tacha 1985). This population increase has been attributed to actions such as habitat conservation by state and federal agencies and non-government organizations and protection from uncontrolled hunting following passage of the Migratory Bird Treaty Act of 1916. However, an increase in population size has also been accompanied by management issues related to crop depredation and other nuisance activity, and an interest in allowing sport harvest

(Van Horn et al. 2010). However, similar to many other sandhill crane populations, basic biological and annual life cycle information is needed to better manage EP cranes, especially information related to spatial distribution of the population, current migration patterns, potential overlap with neighboring migratory and non-migratory populations, and identification of important habitats during the annual life cycle (D. J. Case and Associates 2009).

In 2009, the Migratory Shore and Upland Game Bird Task Force under the direction of the Association of Fish and Wildlife Agencies identified information priority needs that were specific to developing a better monitoring program for EP cranes. An essential need was recognized to document the geographic extent of breeding, migration, and wintering ranges to make appropriate changes to the spatial-temporal design of the current U.S. Fish and Wildlife Service (USFWS) Cooperative Fall Abundance Survey to reflect current distributions and migration patterns (D. J. Case and Associates 2009).

Our objective was to address this priority information need by capturing a representative sample of EP cranes on 2 major stopover areas, affix Global Positioning System (GPS) satellite Platform Transmitting Terminals (PTTs), and monitor crane movements over multiple years. Specifically, we addressed two questions: (1) what are the current EP sandhill crane migration staging areas, travel routes, and migration chronology and (2) what are the current breeding and wintering areas and duration of stay for EP sandhill cranes. We monitored PTT-marked EP cranes for 2 years and described summer and winter distributions and migration routes, identified key staging and stopover areas, and summarized migration chronology throughout their annual cycle.

STUDY AREA

We conducted the majority of trapping for sandhill cranes on the Jasper-Pulaski Fish and Wildlife Area (JP FWA), IN and the Hiwassee Wildlife Refuge (HWR), TN, which are 2 major staging and stopover areas within the EP range (Fig. 1). In addition to these 2 primary sites, we also trapped and placed PTTs on EP cranes at Goose Ponds FWA, IN (39.0 N, -87.2), Sherburne National Wildlife Refuge, MN (45.5 N, -93.8), Crex Meadows Wildlife Area, WI (45.8 N, -92.6) and Hop-In Wildlife Refuge, TN (36.2 N, -89.0) (Fig. 1). Similar to both JP FWA and the HWR, these areas encompassed sufficient protected roosting and feeding habitats for EP cranes to stage, stopover, and winter. However, cranes do not concentrate or stopover at these locations to the extent they do at either JP FWA or HWR.

METHODS

Trapping: We used a rocket-propelled net assembly as described by Wheeler and Lewis (1972) and modified by David A. Brandt (USGS Northern Prairie Wildlife Research Center, pers. com.) as the primary method to capture EP cranes. In addition to using a rocket-propelled net, we used a Coda NetLauncher (Coda Enterprises INC., Mesa, AZ) and modified Victor #3 softcatch leghold traps (King and Paulson, 1998) to capture cranes in locations where using a rocket-propelled net was not feasible.

We affixed a 30-g, 3-solar-paneled GPS satellite PTT (North Star Science and Technology LLC., Baltimore, MD) mounted on a 7.6-cm, 2-piece, polyvinyl chloride (PVC), flanged halves of color-coated, alpha-numeric engraved coded leg band (Haggie Engraving, Crumpton, MD) above the distal tibio-tarsus joint (Krapu et al. 2011) to captured cranes identified for marking. PTT and flanged auxiliary marker weighed approximately 80 g, ≤ 2% of average body mass at capture ($\bar{x}$ = 4.68 kg, SE = 1.07 kg) and under the 3% of body-mass-recommended guidelines by the U.S. Geological Survey Bird Banding Laboratory (2012). We captured EP cranes under protocol no. 1103A97333 of the University of Minnesota Institutional Animal Care and Use Committee.

Data: We are currently using satellite location data to describe EP sandhill crane migration staging areas, routes, and chronology from 32 cranes captured during fall migration. Satellite data consist of 5 GPS locations per day during spring and fall migration (October – May) and 4 GPS locations per day during the summer months (June – September). In addition, PTTs transmit standard ARGOS satellite-system-estimated Doppler locations and diagnostic data every 3 days for an 8-hour period. Doppler locations will be filtered to obtain reliable locations using the Douglas ARGOS-Filter Algorithm developed by Dave Douglas (USGS, Anchorage, AK, USA).

We download satellite data every 2 days from the CLS America, Inc. website. Data are translated by software developed by NorthStar Science and Technology LLC., viewed using ESRI ArcGIS software (2009), and maintained in a database of location and sensor data as a GIS shapefile. We employ ArcGIS (ESRI, Redlands, CA, USA) to analyze satellite data to estimate migration departure dates, distance between stopovers, frequency of stopovers, duration of stay at a stopover, and total distance of spring and fall migration, similar to the analysis described in Krapu et al.'s (2011) study of Mid-Continent Population cranes. Breeding and wintering grounds for tagged EP cranes will be defined by the geographic terminus of migration as in Krapu et al. (2011).

Timeline: Satellite data through 2012 and 2013 have been collected through the CLS America satellite system's website, and processed through a satellite decoding program created by North Star Science and Technologies LLC.. We anticipate a final project report to be completed by spring 2014.

RESULTS

To date, we captured and marked 33 EP cranes with satellite transmitters during the spring and fall migration and the winter months of 2009 through 2012. We initiated a pilot project during the months of December 2009 and January 2010 and marked 6 EP sandhill cranes on the Armstrong and Blythe's Ferry Units, Hiawassee Wildlife Refuge. In addition, we marked 1 crane in March 2010 at Goose Pond FWA, IN. After the pilot project was completed, we analyzed preliminary satellite movements and evaluated the previous trapping events. Based on this preliminary assessment, we focused subsequent capture during the initial and peak arrival dates at JP during fall of 2010 and

at Hiawassee Wildlife Refuge during winter of 2010-2011, to better describe the spatial and temporal aspects of EP crane migration.

In the fall of 2010, we marked 1 crane at Sherburne NWR, MN prior to the anticipated trapping schedule to assure representation for the northwest extent of the EP range. We then marked 4 cranes at Jasper-Pulaski FWA in late October 2010 and 3 cranes in late November 2010. We marked 6 cranes at Hiawassee Wildlife Refuge in early December 2010. We concluded marking birds by trapping 1 EP crane during the fall staging period of 2011 at Crex Meadows Wildlife Area, WI, and by trapping 2 cranes that winter at the Hop-In Wildlife Refuge, TN and 2 cranes that wintered at Hiawassee Wildlife Refuge, TN, 2011-2012.

In total, we captured approximately 190 sandhill cranes: 178 with rocket nets, 11 with the Coda NetLauncher, and 1 with a softcatch leghold trap. We fitted 61 EP cranes with a 1-800 aluminum USGS band and a 7.6-cm, black-with-white-lettering, 3-digit alpha-numeric-coded tarsus auxiliary band. We fitted 30 EP cranes with an 80-g, 7.6-cm, single black-with-white-lettering, 2-digit alpha-numeric tarsus auxiliary band with attached solar-powered GPS PTT and a 1-800 aluminum USGS band. The remainder of sandhill cranes caught received a 1-800 aluminum USGS band.

Preliminary analysis of GPS movement data show that the cranes returned to their summer territories using routes and staging areas similarly among years and comparable to southward movements in the fall (Fig. 2). The GPS location data also indicated that of 23 marked cranes that established breeding territories following capture and marking, 3 cranes established territories in Minnesota, 9 cranes settled throughout Wisconsin, 3 cranes settled in the Lower Peninsula of Michigan, 2 cranes settled in the Upper Peninsula of Michigan, 3 cranes settled on the north shore of Lake Huron, Ontario, Canada and 3 cranes settled in north-central Ontario, Canada (Fig. 3).

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Figure 1. Trap Locations for auxiliary marking Eastern Population of sandhill cranes, 2009-2012. Unpublished data, 2010

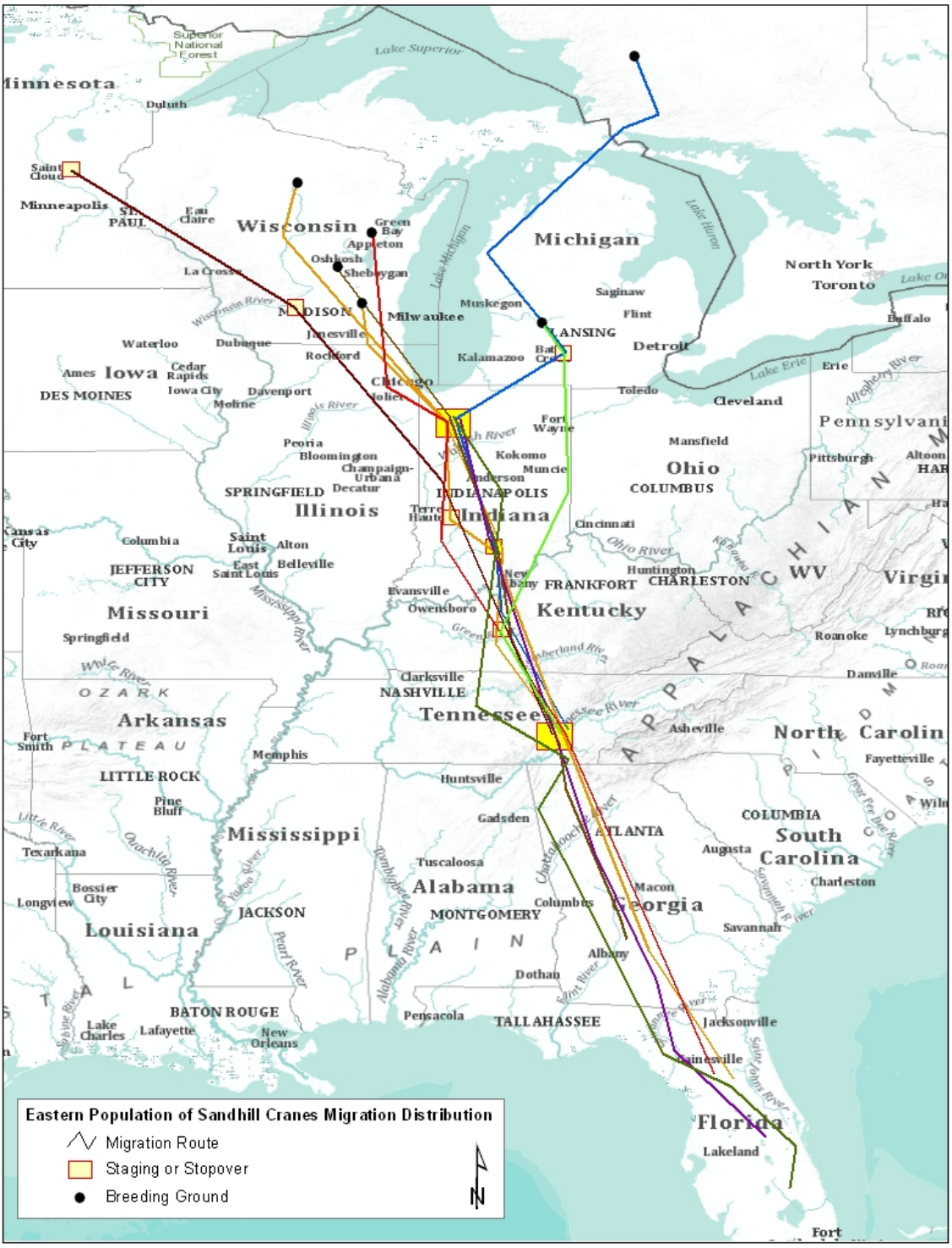

Figure 2. Preliminary breeding and wintering areas, migration routes, and staging areas for Eastern Population of sandhill cranes, 2009-2010. Unpublished data, 2010.

Figure 3. Breeding territories and winter areas for all satellite marked Eastern Population of sandhill cranes, 2012. Unpublished data, 2013.