

## **Project Summary - American Woodcock Migration Ecology in the Eastern United States**

**Need:** American woodcock populations have declined throughout their range, perhaps most prominently in the eastern flyway. These declines are generally attributed to changes in habitat suitability across the range, however not all aspects of the woodcock life cycle are equally understood. Lack of knowledge from the woodcock's full annual cycle may impede management and woodcock conservation.

**Background:** Recent technological advances in animal bio-telemetry have facilitated tracking of increasingly smaller animals at larger scales across longer time intervals. Within the last 3 to 5 years, satellite- and GPS-enabled tracking devices have become small enough (3-5% of body mass) to permit safe use on woodcock. This for the first time enables us to follow individual woodcock from their breeding areas to their wintering grounds and back again, and provides detailed information on timing of migration, habitat use pre-, during, and post-migration, location of stopover areas, and mortality during migration. These methods were used during a successful multi-year study in the central management region, and our objective is to extend this work and address similar objectives within the eastern management region.

**Objectives:** With this research our broad goal is to increase information on woodcock migration ecology to inform woodcock management in the eastern management region. Our specific objectives are to 1) characterize migratory pattern (timing and pathway) during both spring and fall migrations, 2) analyze landscape pattern affecting migratory stopover decisions (both location and duration), 3) estimate survival of woodcock during migration and evaluate characteristics that increase individual mortality risk (e.g. choice of migration route, age or sex of bird), and 4) integrate information on migratory behavior and survival into larger-scale population models that evaluate the relative contribution of migration to woodcock population trends.

**Approach:** We plan to capture and GPS-mark woodcock throughout the eastern region at breeding, migration, and over-wintering sites, using both mist netting and night spotlighting as capture methods. Birds will be marked with either 4g or 5g LOTEK GPS transmitters equipped with satellite upload capabilities (PTT). These transmitter packages have a fixed battery life with expectations of 75 (4g) or 100 (5g) GPS locations collected over the life of the transmitter. Locations are transmitted via the ARGOS satellite network after every third point is collected. The transmitters will be programmed to record GPS locations under one of two strategies. Strategy 1 will collect one location each day, whereas Strategy 2 will collect locations once every 5<sup>th</sup> day. These transmission schedules are designed to meet alternative project objectives, with Strategy 1 focused on fine-scale migration data and Strategy 2 focused on year-round monitoring of individuals. We plan to mark at least 160 woodcock throughout the eastern region over the next 3 years.

**Collaborative Nature:** Because of the large scale and ambitious nature of this project, partnerships with a diverse suite of collaborators are crucial to meet our goals. To that end we've assembled a network of collaborators across the eastern US and Canada with interest in woodcock conservation. These include representatives from state and federal wildlife agencies, universities, and conservation NGOs, with roles that include land access, logistic support, assistance with capture, contributed funding, and input on study design. A full list of current (11/12/2017) collaborators is provided below.

**Expected Outcomes:** From this work we expect to gain a comprehensive understanding of woodcock migration and linkages among seasonal use areas that was not possible to achieve even five years ago. The data we collect will be directly useful for a number of applications. For example, more detailed information on the timing of spring migration will help to refine the USFWS-coordinated Singing Ground Survey, which is the primary dataset used to track woodcock populations. Migration timing data will also help to inform state decision-making for the timing of hunting seasons. Information on migratory pathways will highlight linkages among states and conserved areas, and information of locations of mortality during migration may identify geographic areas in need of conservation focus. This work will contribute to several graduate theses and should result in a number of peer-reviewed publications, and we will also produce annual progress reports to distribute among cooperators and others interested in the project. We will maintain project outreach to the general public via our collaboration with the Ruffed Grouse Society.

**Pilot Season:** During fall 2017 we conducted a pilot field season to test transmitter packages, attachment methods, and data collection. We captured and GPS-marked 5 woodcock at Moosehorn National Wildlife Refuge and a 6<sup>th</sup> bird near Old Town, Maine. As of mid-November we have obtained approximately 75 locations from these birds, including a large amount of pre-migratory habitat use data (see Figure 1) and initial migration paths (Figure 1). We expect to obtain additional data on migration paths and wintering locations from all birds by mid-January.

**Project Collaborators:** University of Maine, University of Rhode Island, SUNY – Cobleskill, Virginia Tech, The Ruffed Grouse Society, The American Woodcock Society, Maine Department of Inland Fisheries and Wildlife, United State Fish and Wildlife Service, United State Geological Survey, New York State Department of Environmental Conservation, New Jersey Department of Environmental Protection, Maryland Department of Natural Resources, Virginia Department of Game and Inland Fisheries, Pennsylvania Game Commission, Canadian Wildlife Services, Penn State University.

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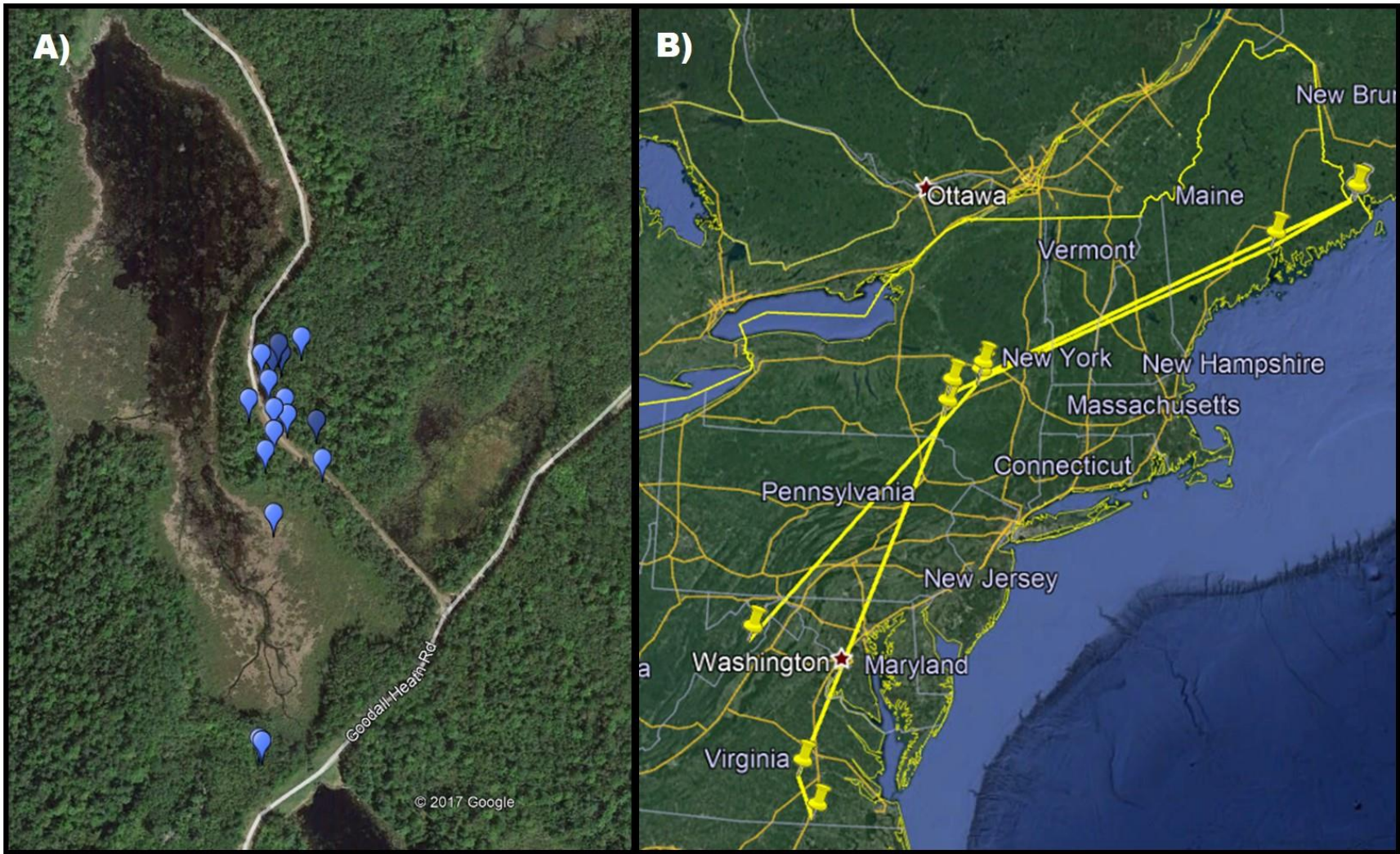


Figure 1. Example of pre-migration habitat use data collected from a hatch year (HY) male woodcock at Moosehorn National Wildlife Refuge (MNWR), and migration paths of two woodcock from MNWR to the southeastern United States. These birds left MNWR on 4 November and reached West Virginia and Virginia by 7 November.