



Vancouver Avian Research Centre - Motus Application

Project Title: Improving the understanding of migration patterns and behaviour of Swainson's Thrushes in British Columbia

Introduction

The Vancouver Avian Research Centre (VARC) has been conducting bird monitoring activities in Colony Farm Regional Park, in Coquitlam, BC, since 2009. During that time, VARC has deployed and monitored an array of mist-nets and has conducted active bird surveys based on acoustic and visual detections. One of the primary conclusions that can be drawn from VARC's long-term data set is that a wide range of species utilize the old-field habitats within the park as stopover habitat during spring and fall migration. One of the more commonly captured species during VARC's mist-netting program is the Swainson's Thrush (*Catharus ustulatus*), the focus of this research proposal.

Swainson's Thrush - Molt-Migration and Current VARC Research

Research on adult Swainson's Thrushes at Colony Farm over the past 10 years shows that many of the adult birds caught for banding after the breeding season in the fall are in flight feather molt suggesting the old field habitat could be a special molting area for this species. Six subspecies are recognized: four in the russet-backed group (including the BC coastal subspecies *C. u. ustulatus*), and two in the olive-backed group. Plumage variation among subspecies is slight but differences in the coloration of the back, rump and uppertail coverts and colour and density of spotting on the breast may help separate them. VARC collects photographic evidence on each bird to compare and possibly identify each individual to subspecies.

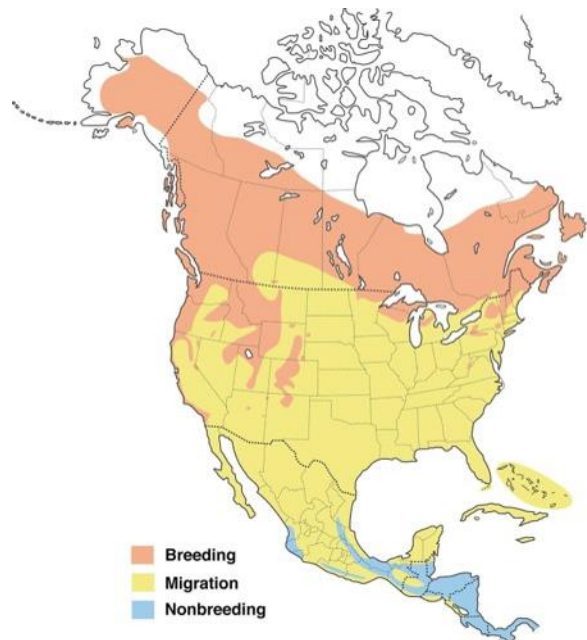


Figure 1. Swainson's Thrush range map.
Source: Cornell Lab of Ornithology

The term molt-migration is given to individuals that leave their breeding grounds and head south to find a suitable location to undergo their annual prebasic molt before continuing southward migration. Unlike many other species which molt either on their summer grounds or on their winter grounds, Swainson's Thrushes overlap their molt with migration. Birds may continue to migrate while actively molting or they may initiate and/or complete their molt in an area south of their breeding grounds (Figure 1).

Where arid conditions on the breeding grounds in late summer are not especially conducive to molting, adults routinely migrate substantial distances to special molting areas. In general, their movement

away from increasingly drought-stricken breeding habitats is timed for their arrival somewhere in the desert Southwest or Mexico during the period of monsoon rains. The flush of insects associated with these rains constitutes a bumper-crop resource for the energy and protein-demanding molt process.

Moreover, it appears from VARC data collected that birds captured during the fall are not local breeders but birds from further north based on the observation that after the local breeding season we see an influx of unbanded birds many of which are in flight feather molt.

Another tool in the tool kit - Automated Radio Telemetry and Motus

Automated radio telemetry uses receivers that automatically record signals from radio transmitters. It is used in a wide variety of ecological applications particularly for tracking migration of small animals, or determining fine scale temporal information about movement or behaviour. It is particularly well suited for studies of aquatic organisms and small flying animals.

Collaborative automated radio telemetry uses coordinated arrays of automated stations that are all monitoring the same frequency to detect tagged animals over broader spatial scales, and maximize the use of equipment operated by many researchers that traditionally may have not had the opportunity to collaborate. Tagged animals are detected on their local array, as well as any other station in the network. Automated radio telemetry harnesses the collective resources of many independent researchers into a much larger collaborative effort that expands the scale and scope of everyone's work while maximizing scarce research and conservation dollars.

Motus is the world's largest collaborative automated radio telemetry array. Motus is the central hub for detection data from more than 750 receiving stations as well as metadata from stations (e.g., location, deployment dates, height, antenna bearing) and tags (e.g., species, location and date deployed). Data from across the network is then provided to researchers and a condensed version shared with the public.

A Motus array was installed at the VARC banding station in March 2021 providing an opportunity for VARC to further study the migratory movement of Swainson's Thrushes along the Pacific Flyway.

Putting it all together

This project will contribute further to define the migratory path of Swainson's Thrushes along the Pacific flyway. In addition, this project will contribute to the continent-wide monitoring efforts of Swainson's Thrushes and establish proof that birds breeding further north in Canada are indeed stopping at Colony Farm to initiate and/or complete their annual molt.

- Objective 1. Continued monitoring of Swainson's Thrush molt-migration at Colony Farm Regional Park.
- Objective 2. Continued monitoring of Swainson's Thrush morphology and colouration to support subspecies identification

- Objective 3. Use Motus-based radio telemetry to identify potential migratory pathways of Swainson's Thrushes captured at Colony Farm with the aim of identifying subspecies-specific patterns of migration and molt-migration.

This project is proposed as a continuation of VARC's ongoing study started in 2013 since no previous monitoring projects have focused on Swainson's Thrushes in the lower mainland of Vancouver area.

Project Activities

Mist netting of Swainson's Thrushes will be conducted at the Colony Farm Banding Station in Coquitlam, BC (49°14'21"N; 122°47'48"W). The site encompasses a mixture of ecosystem types, including marsh and shallow water, riparian areas, upland forest and old-field habitats. Mist-netting takes place up to 4-days each week (dependent on weather and personnel availability) from dawn until 5 hours following during the spring (April 1 to June 15) and fall (August 1 to October 31) migration periods as well as during the summer breeding season (June 16 to July 31).

Up to thirty mist nets are in operation at any one time during banding operations. All monitoring activities will be conducted in accordance with procedures established in the VARC Banding Station Protocol¹ and the North American Banding Council².

Each captured bird will be extracted from the net and transferred into a cloth bag until further processing at the banding table. The banding process will involve the following steps: species identification, band application, age and sex determination, crop fullness, biometrics (e.g., wing and tail length, mass) and photography (if applicable). Each captured Swainson's Thrush will be fitted with a uniquely numbered aluminum band of size 1B supplied by the Bird Banding Office of the Canadian Wildlife Service. Aging will be performed by examination of wing moult patterns. A Motus tag will be attached to each individual according to procedures prescribed by Motus.

Motus Tags

In accordance with published literature on appropriate tag/body weight ratio, the combined tag and harness should weigh less than 3-5% of the individual's mass so as not to harm the bird (Murray & Fuller 2000; Fair et al., 2010).

There is admittedly conflicting evidence regarding the impacts of tracking devices on birds (Calvo & Furness 1992). In a recent meta-analysis, Barron et al. (2010) reported overall negative effects of transmitter devices on bird nest success and productivity, clutch size, offspring quality, body condition, foraging behaviours, energetic expenditure, and survival. However, effects appear to be species-specific;

¹ Matthews, D. 2009. Vancouver Avian Research Centre. Banding Station Protocol, Code of Ethics, Volunteer Levels Assessment - Colony Farm Banding Station. Vancouver Avian Research Centre, North Vancouver, BC. <https://www.birdvancouver.com/banding-volunteer/>

² North American Banding Council. 2001a. The North American Banders' Study Guide. North American Banding Council, Point Reyes Station, California. North American Banding Council. 2001b. The North American Banders' Manual for Banding Passerines and Near Passerines (Excluding Hummingbirds and Owls). North American Banding Council, Point Reyes Station, California.

negative effects seem most pronounced in non-passerines; studies examining passerines indicate minimal or no negative impacts.³

Tag Deployment

Birds will be fitted with uniquely coded NanoTags™ radio transmitters manufactured by Lotek Wireless Inc, operating on frequencies 166.380 MHz (Western Hemisphere). Each tag (12x6x5mm) weighs 0.62 grams with an expected life of 367 days at 29 second intervals (Model NTQB2-3-2). The combined weight of the tag and harness (<1.0 gram) being less than 3% of the bird's body mass (average 31 grams) and thus well within the appropriate range so as not to harm the bird.

Tags will be registered with Motus prior to deployment

Deployment Method

Radio transmitters will be attached using the figure-8 leg loop harness method (Rappole and Tipton 1991). In a comparison of three attachment methods (harness, glued backpack, and tail-mount) on European Starlings, Woolnough et al. (2004)⁴ found the figure-8 harness to be the most reliable in terms of attachment duration. Application of radio tags with figure-8 loop harness generally can be completed within one minute and birds showing any sign of stress or injury will be released without banding or radio-tagging.

All bird capture and handling activities will be conducted according to the requirements set out by the Canadian Bird Banding Office (Canadian Wildlife Service) and Canadian Council on Animal Care.

Collaborations

This project will be conducted in close collaboration between the Vancouver Avian Research Centre, Metro Vancouver, and Motus.

Scientific Permits and Animal Care Approval

Bird banding activities will be conducted under Canadian Wildlife Service Bird Banding Office Scientific Master Permit No. 10720 issued to Derek Matthews (Vancouver Avian Research Centre). In addition, this project will be conducted in accordance with the University of the Fraser Valley Animal Use Protocol and Standard Operating Procedures ACC-010 and ACC-011.

³ Calvo, B., and R.W. Furness. 1992. A review of the use and the effects of marks and devices on birds. *Ring and Migration*. 13(3): 129-151.

Barron, D.G., J.D. Brawn, and P.J. Weatherhead. 2010. Meta-analysis of transmitter effects on avian behaviour and ecology. *Methods in Ecology and Evolution*. 1(2): 180-187.

⁴ Woolnough, A.P., W.E. Kirkpatrick, T.J. Lowe, and K. Rose. 2004. Comparison of three techniques for the attachment of radio transmitters to European Starlings. *Journal of Field Ornithology*. 75(4): 330-336.