

Tracking the migratory movements of North American Birds

Birha Farooqi — November 2023



Birds...where do they go?

Movement Ecology

- Birds move or 'migrate' in large groups
 - Food
 - Mating
 - Nesting/Brooding
 - Raising Young
- Low resources → High resources



Types of Migration



Permanent Residents

- Do not migrate.
- Find adequate supplies of food year-round.



Short-distance migrants

- Make relatively small movements
- I.e. from higher to lower elevations



Medium-distance migrants

- Cover distances that span a few hundred miles.



Long-distance migrants

- move from breeding ranges to wintering grounds
- 350+ species of North American birds.



Tracking methods

Bird Banding

- 340,000 birds are banded in Canada/year
- 1.2 million birds banded per year in both Canada and U.S.

Helps to:

- monitor bird populations & rates of survival
- monitor ecosystem health
- set regulations for hunted species
- monitor endangered species
- maintain longevity records



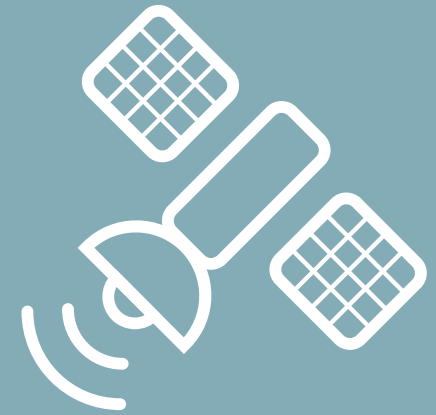
Types of Tracking Technologies



Archival



Radio Telemetry



GPS and Satellite



Geolocation

- Lightweight tags
- Record timing of:
 - ✓ Sunrise
 - ✓ Sunset
 - ✓ Midday
- Determine location based on length of day
- Large scale movements



A boreal songbird's 20,000 km migration across North America and the Atlantic Ocean

Blackpoll Warbler (*Setophaga striata*)

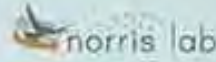
Geolocator



Blackpoll Warbler southward migration

- Breeding sites
- ▲ Stopover sites
- Estimated over-wintering grounds
- Migration tracks (do not represent actual migratory paths)

DeLuca, WV, Woodworth, BK, Mackenzie, SA, Newman, AEM, Cooke, H, Phillips, LM, Freeman, N, Sutton, AO, Tauzer, L, McIntyre, C, Stenhouse, I, Weidensaul, S, Taylor, PD & Norris, DR. 2019. A boreal songbird's 20,000 km migration across North America and the Atlantic Ocean. *Ecology*.



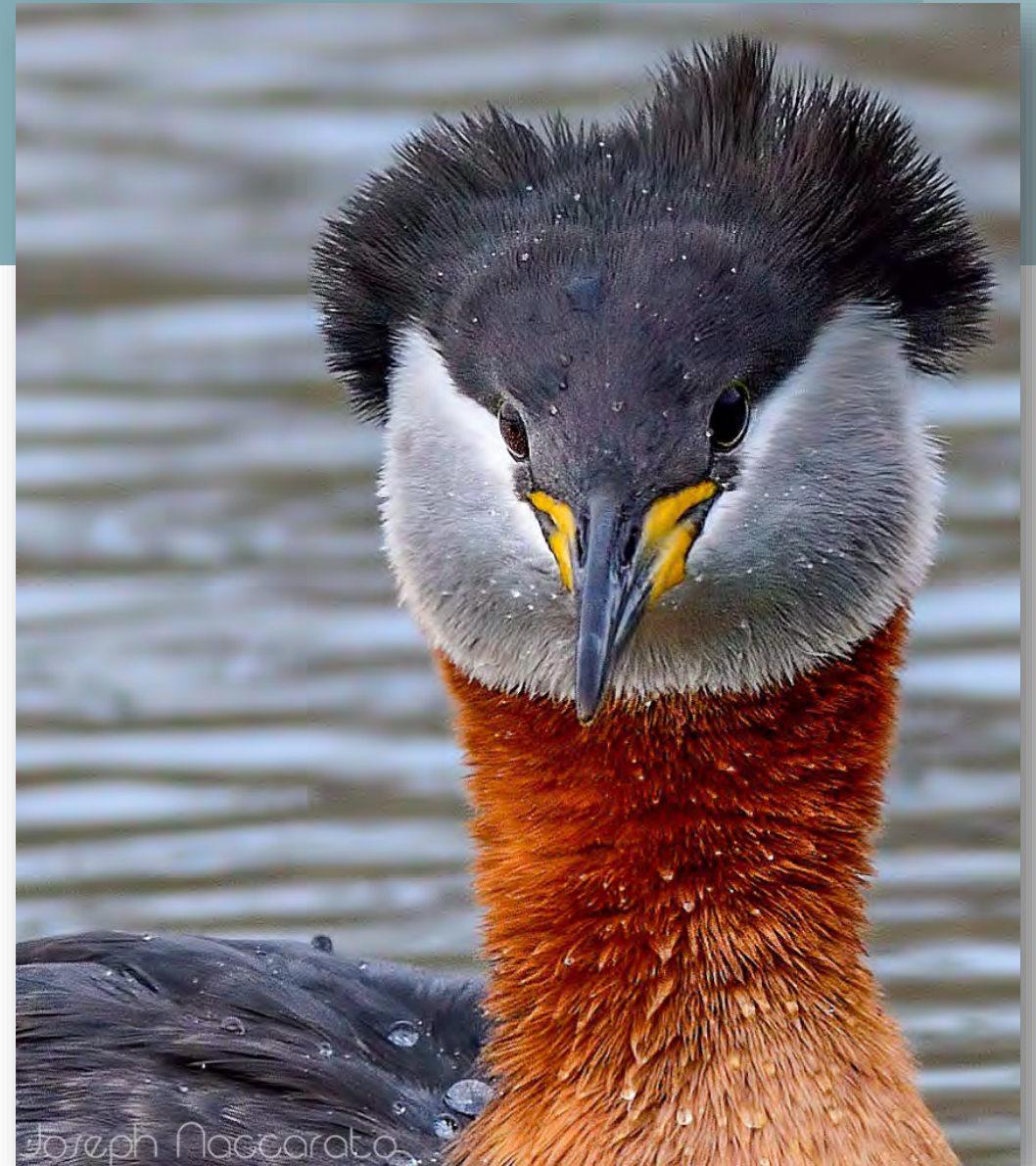
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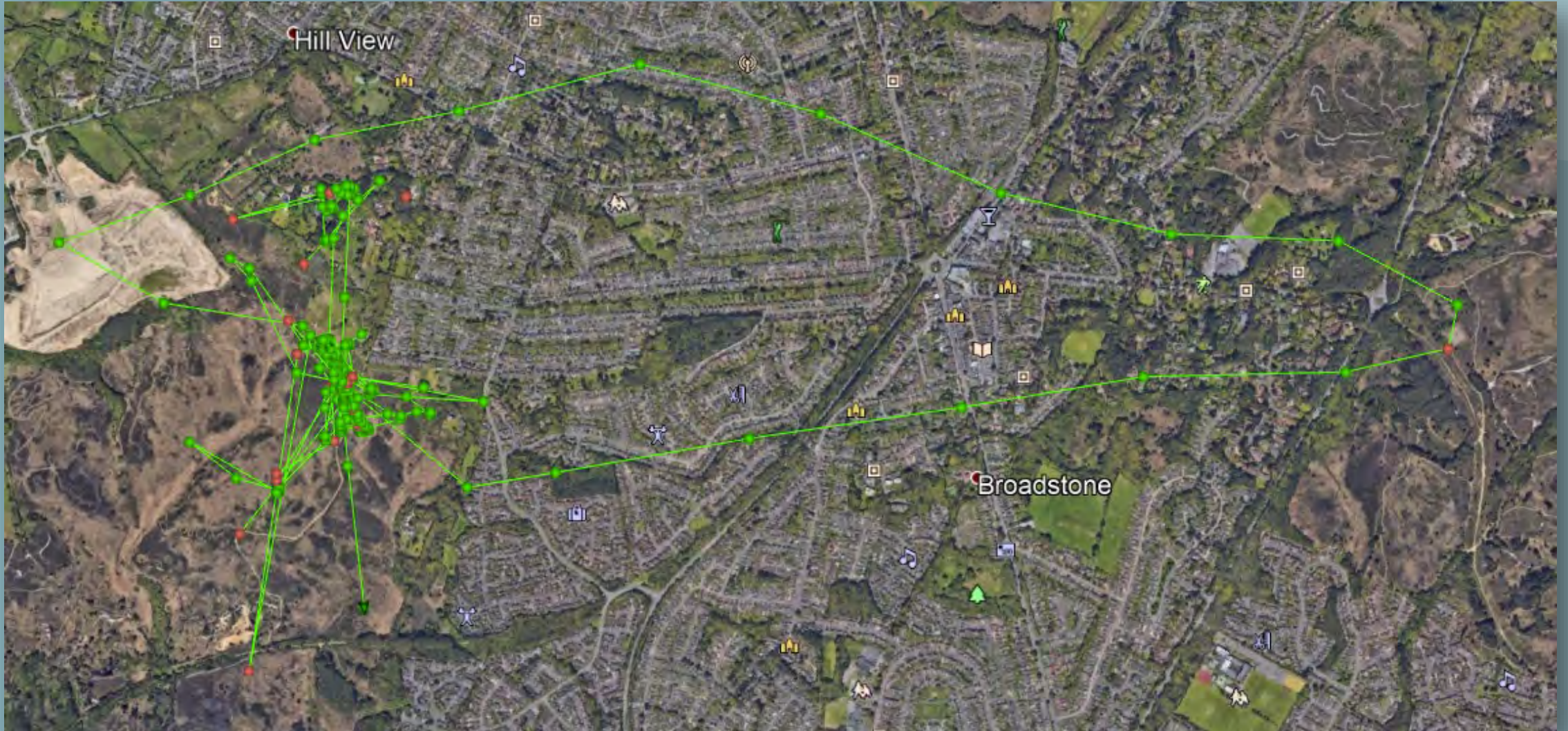
GPS & Satellite

- Accurate locations
- New innovations: Remote download options
 - VHF
 - Argos
 - Iridium
 - GSM (Cell networks)
- Medium to large birds





GPS – Common Nighthawk Track





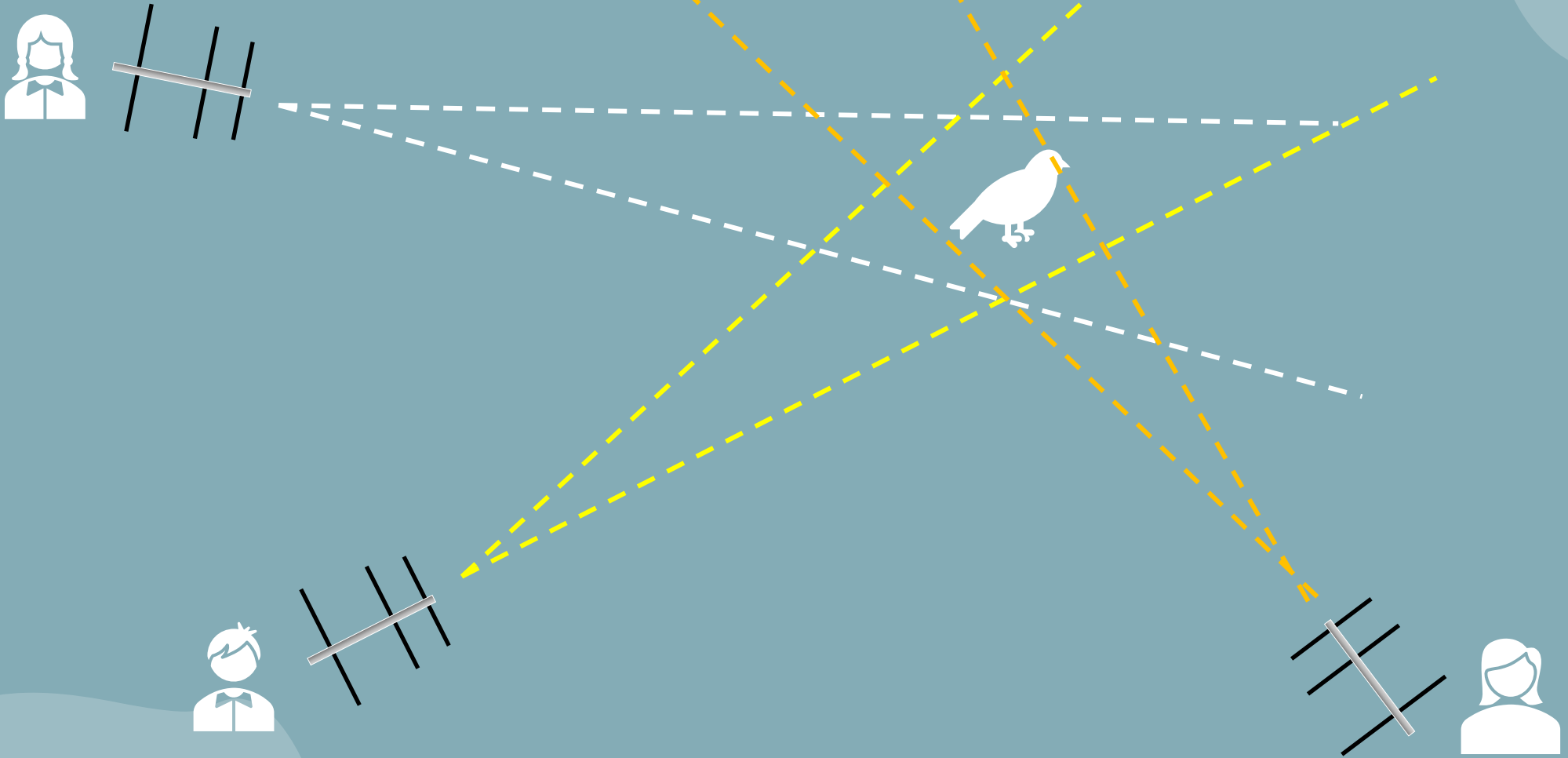
Radio Telemetry

Customisable, reliable tags for all types of birds, lizards, bats and bugs

- Small enough to be used on insects
- Allows you to locate the tagged individuals in the field
- Limited range, but can directly observe your species



Radio Telemetry Triangulation





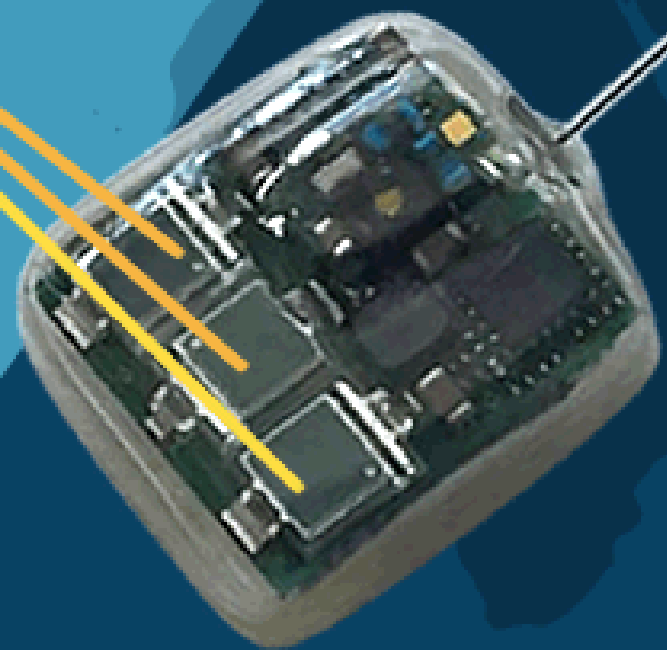
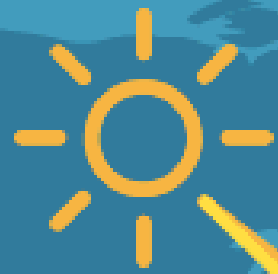
Coded VHF (Radio Tags)

- NanoTags transmit unique 3 digit code embedded in their signal
- Longer life spans than traditional Beeper tags
- Start from 0.13g



© Darin J. McNeil

Transmits Day and Night



Solar NanoTags - Powered by the sun



NanoPin

The smallest coded VHF tag at just 0.13g

- Long lifespan
- Coded transmission
- Monarch Butterflies, Bumblebees & Asian Hornets!

Motus

Motus

A collaborative research network tracking wildlife movement for conservation

Radio tags are put on animals.

Stations collect data from tags.

Data are processed and used for research and conservation.

A. Ontario

- Lake Huron
- Lake Ontario
- Lake Erie
- Silver-haired Bat
- Monarch Butterfly
- Blackpoll Warbler

B. Europe

- North Sea
- Northern Wheatear
- Nathusius' pipistrelle

Red Knot

Monarch Butterfly

Silver-haired Bat

Northern Wheatear

Darner

Tags

- Battery
- Solar

A program of
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Learning about Motus Video:

<https://youtu.be/kqx85gL2Dek?si=1s4Y3b42OM6ceOQZ>





Motus Network...growing by the day

The Motus Wildlife Tracking System: a collaborative research network to track wildlife movement



Taylor et al. 2017. The Motus Wildlife Tracking System: a collaborative research network to enhance the understanding of wildlife movement. *Avian Conservation and Ecology* 12(1):8. <https://doi.org/10.5751/ACE-00953-120108>

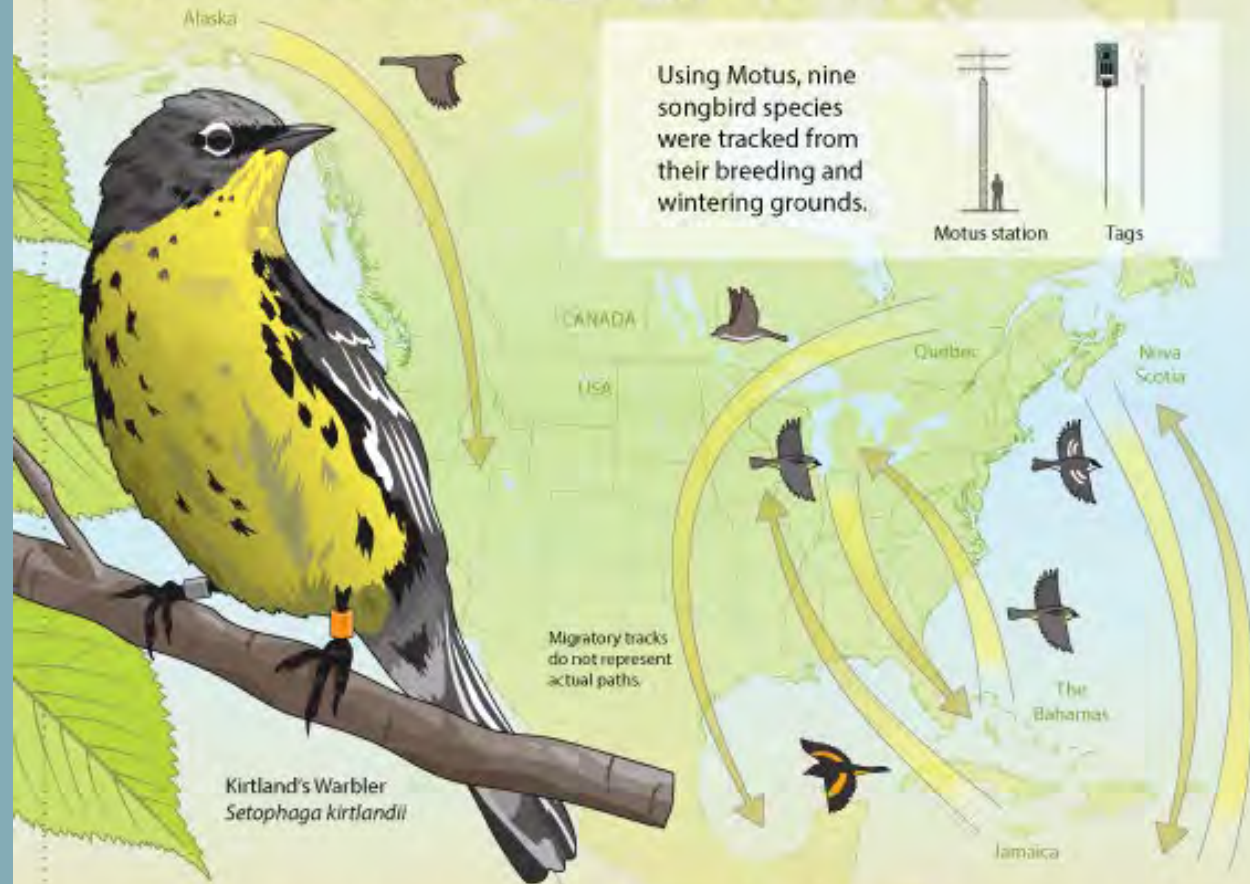


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@BirdStudiesCan

Tracking data reveal when and why songbirds begin their massive journeys

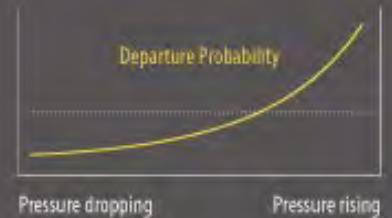
Every year, billions of birds fly thousands of miles to reach their breeding and wintering grounds. In two large collaborative studies, new information is revealed about when and why migratory flights are initiated.



KEY FINDINGS

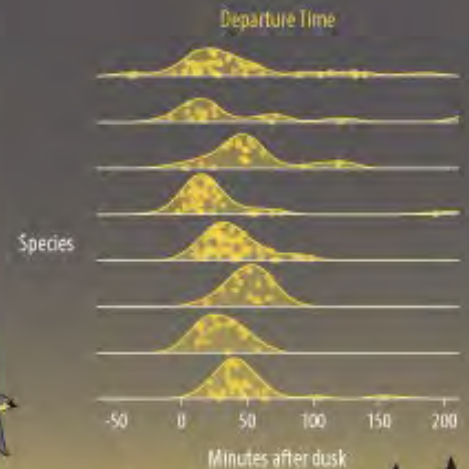
How birds decide to take to the sky

Birds depart when atmospheric pressure rises which means good weather in the days ahead



When birds take to the sky

90% of birds started their migratory flights within a 69-minute window after dusk to maximize flight duration



Cooper, N.W., B. C. Dossman, L. E. Berrigan, J. M. Brown, D. A. Cormier, C. Bégin-Marchand, A. D. Rodewald, P. D. Taylor, J. A. Tremblay and P. P. Marra. 2023. Atmospheric pressure predicts probability of departure for migratory songbirds. *Movement Ecology*. <https://doi.org/10.1186/s40462-022-00356-2>

Cooper, N.W., B. C. Dossman, L. E. Berrigan, J. M. Brown, A. R. Brunner, H. E. Chmura, D. A. Cormier, C. Bégin-Marchand, A. D. Rodewald, P. D. Taylor, C.M. Tonra, J. A. Tremblay, and P. P. Marra. 2023. Songbirds initiate migratory flights synchronously relative to civil dusk. *Movement Ecology*. <https://doi.org/10.1186/s40462-023-00382-5>

Smithsonian Conservation Biology Institute
Migratory Bird Center

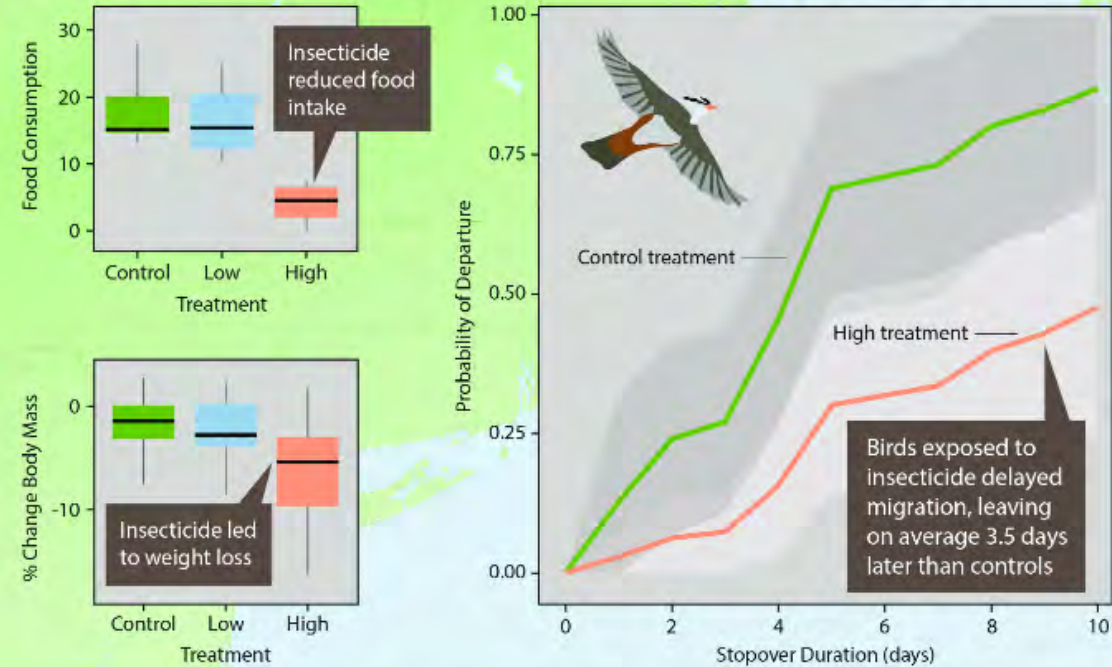
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Motus

A neonicotinoid insecticide reduces fueling and delays migration in songbirds

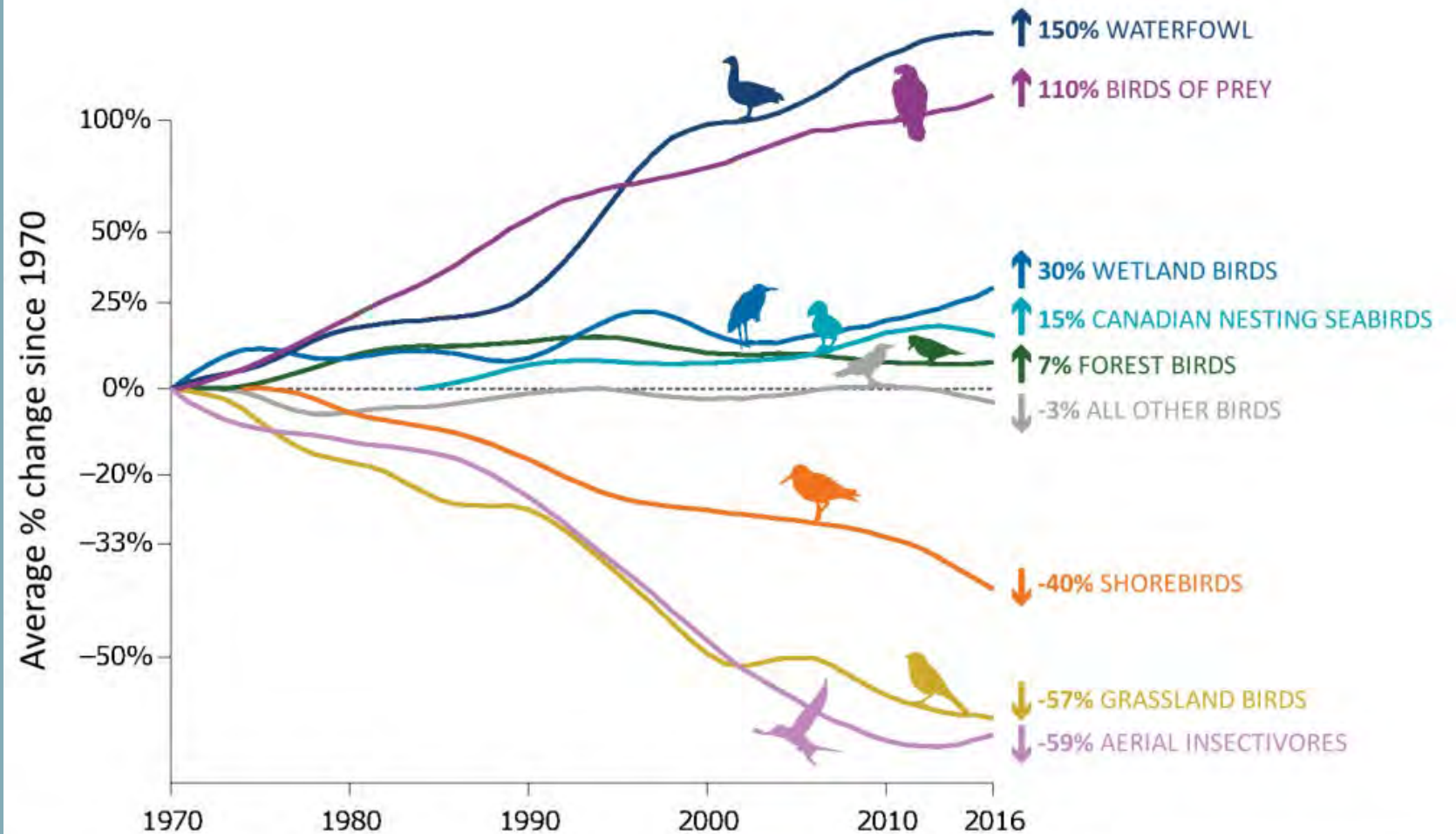


Effect of exposure to insecticide on fueling, body condition, and migration timing



Migration is a critical period and timing matters. Reduced body mass and delayed migration may affect survival and breeding success. This may explain, in part, why farmland and migratory birds are in decline.

Bird populations are changing





Many bird populations across North America are in sharp decline, including some of the most common birds.

Graph courtesy of the North American Bird Conservation Initiative (NABCI-Canada) and Environment Canada

What can we
do to help?



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Greater Flamingo *Phoenicopterus roseus* © Ali Atahan Macaulay Library eBird

FEATURES

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Citizen Science – eBird Website Link:
[eBird - Discover a new world of birding...](#)

Learning about eBird Video:

<https://youtu.be/-t-0xAjxakw?si=dwbGZyxVjpBHgRfZ>



Prevent Window Strikes

- Many birds are killed when they fly into windows.
- Clear glass or reflective glass can be invisible to them.
- Turn lights off at night, which disorient migrating birds.

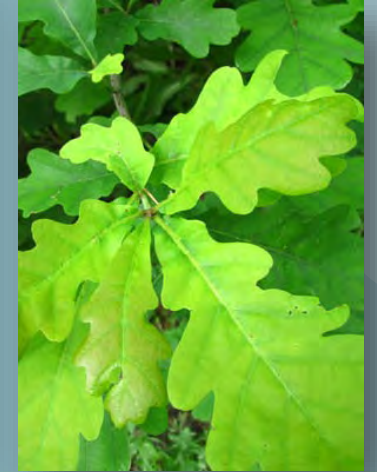


[Link: Home - FLAP Canada](#)



Plant Native Species

- Plant a variety of native plants.
- These will provide food in the form of:
 - ❖ seeds
 - ❖ berries
 - ❖ nuts
 - ❖ nectar
 - ❖ insects
- ❖ Learn more at:
 - ❖ [Bird Gardens - Birds Canada | Oiseaux Canada](#)



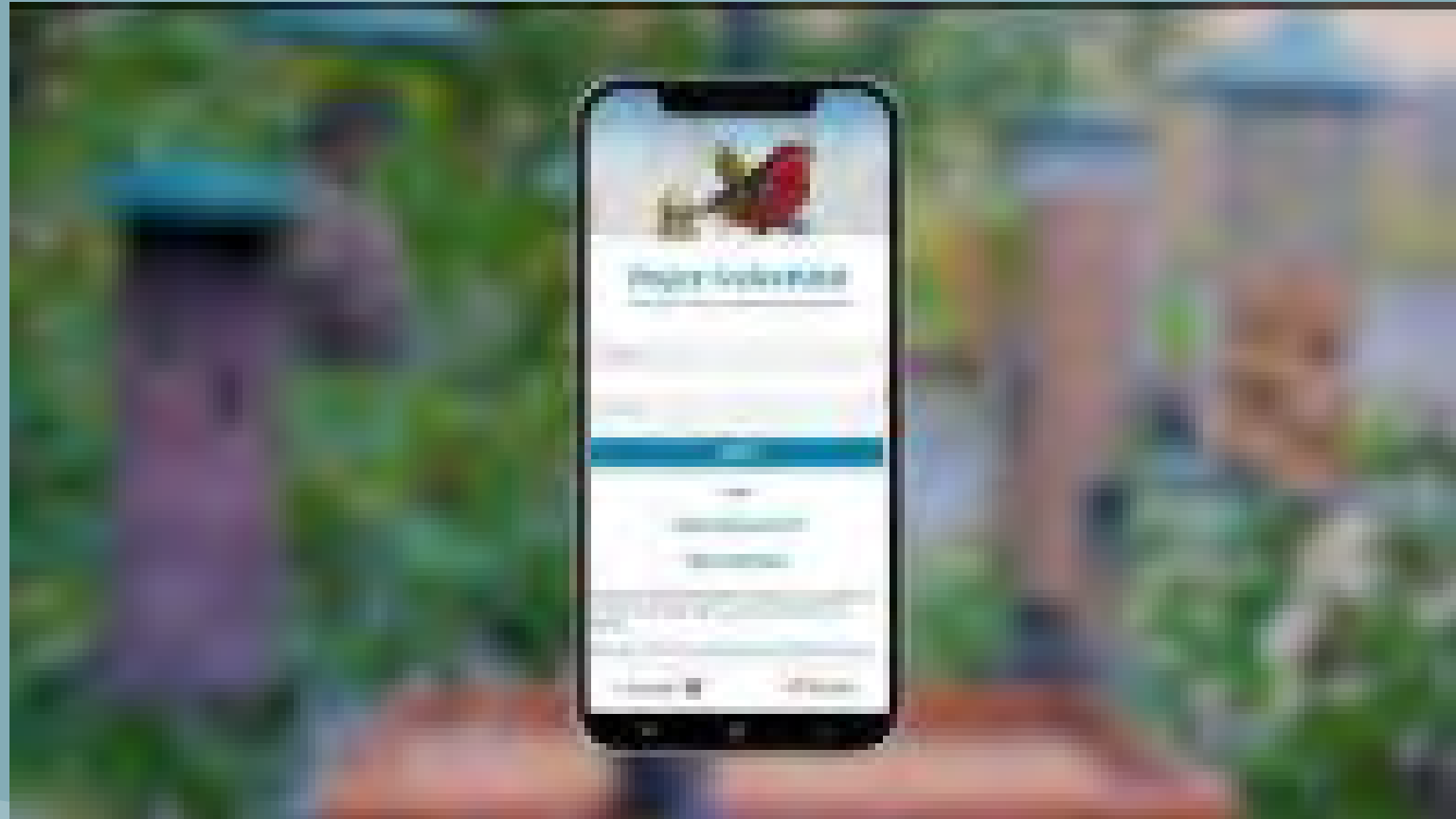
Fill a Feeder

- supplement food source in winter
- create great bird viewing opportunities
- hygiene
 - *If you are **not** able to keep a feeder **clean**, choose native plants instead of a feeder.
- **Hummingbird Feeders:**
 - ❖ Only use plain sugar water.
 - ❖ **NEVER USE** red dye, red syrup or fruit juices. These can cause negative health issues.



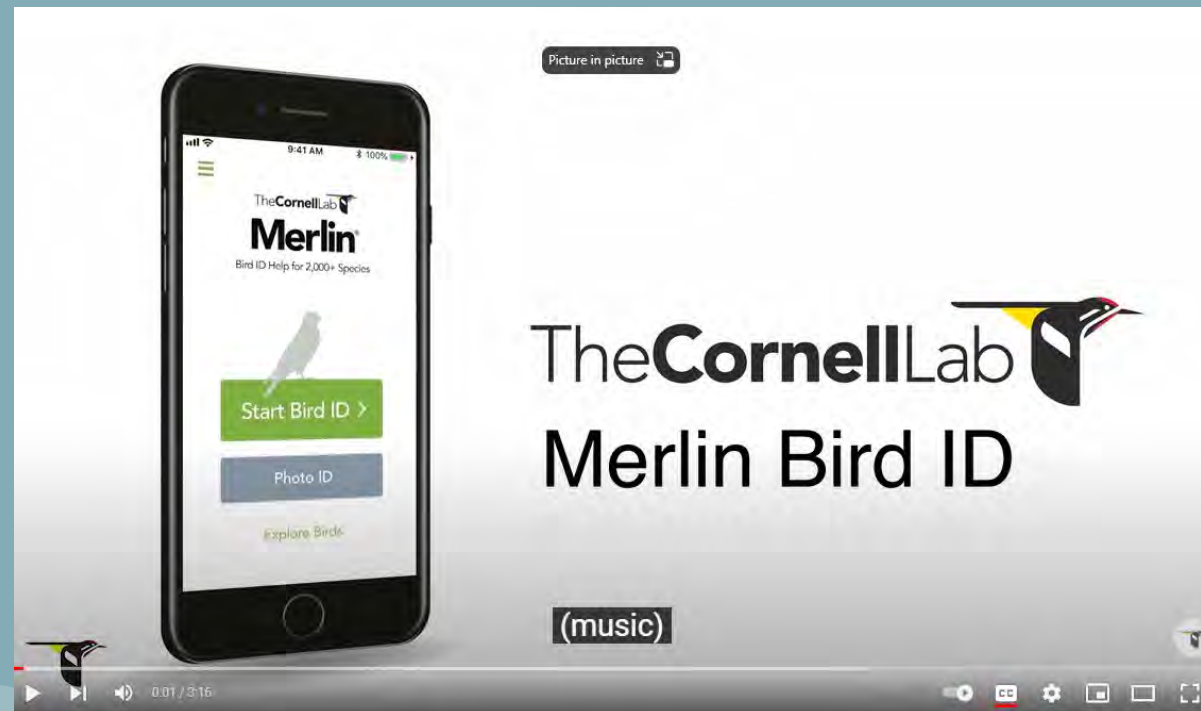
Project FeederWatch

Link: [FeederWatch Getting started with the app - YouTube](#)



To Identify Birds by sound, download the Merlin app on your phone. There is a free version available.

Video Link: https://youtu.be/J1C-Q-z_np0?si=nHLjWPwgJGJnle28



Disclaimer

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Thank you.