Case Study:

CANADA WARBLER

Motus
Wildlife Tracking System

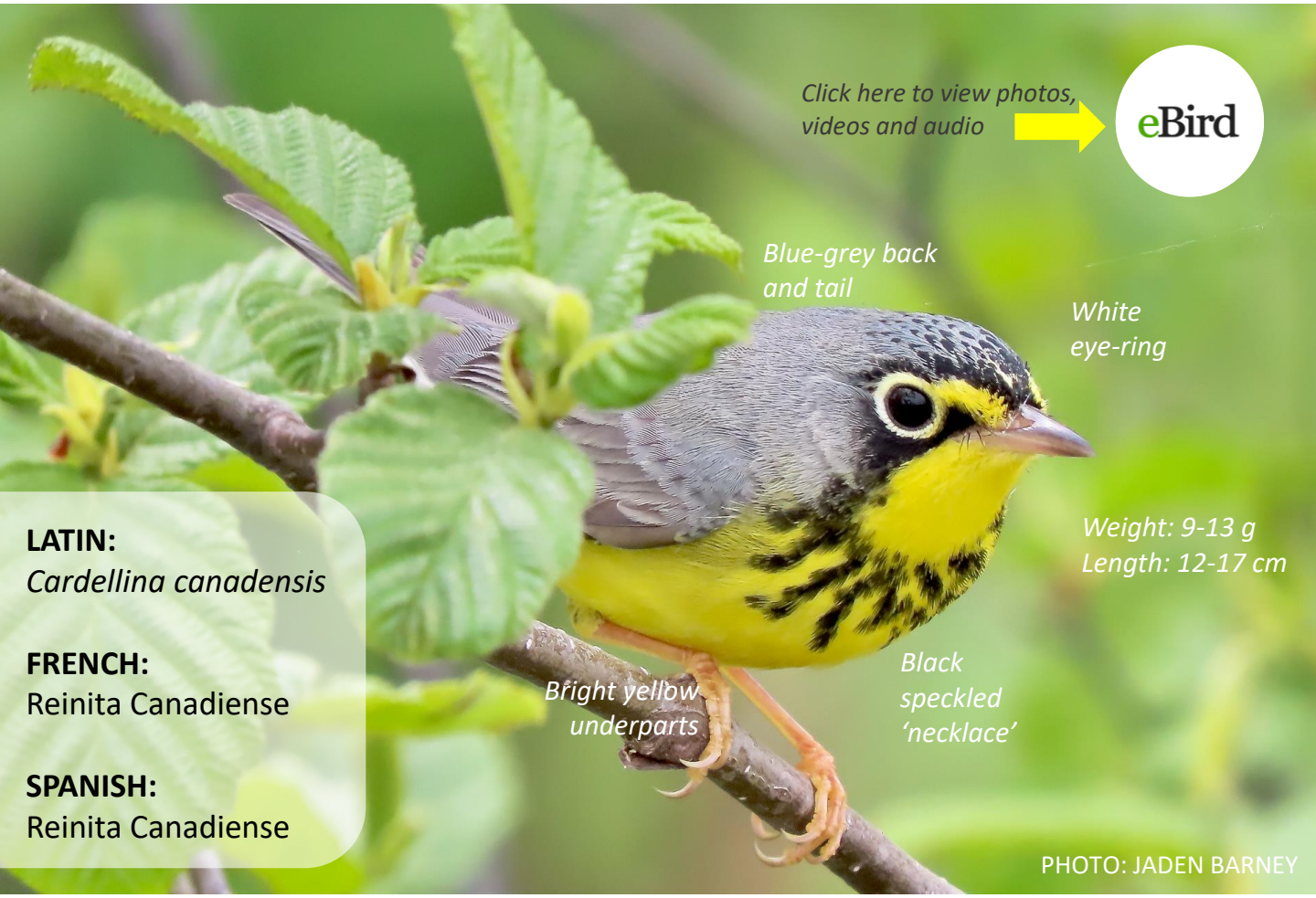
PHOTO: MARK PECK

OISEAUX CANADA BIRDS CANADA

SELVA

CANADA WARBLER

A Canada Warbler is a medium-sized songbird in the Wood-Warbler family. They have an omnivorous diet, foraging for flying insects; spiders, worms and snails on the forest floor, and fruits and berries.



LATIN:
Cardellina canadensis

FRENCH:
Reinita Canadiense

SPANISH:
Reinita Canadiense

CONSERVATION

Canada Warbler's are currently designated as a species of 'Least Concern' by the International Union for Conservation of Nature. However, Canada Warbler and many other neotropical forest birds, are experiencing declining population trends due to a variety of factors across wintering, migrating, and breeding ranges.

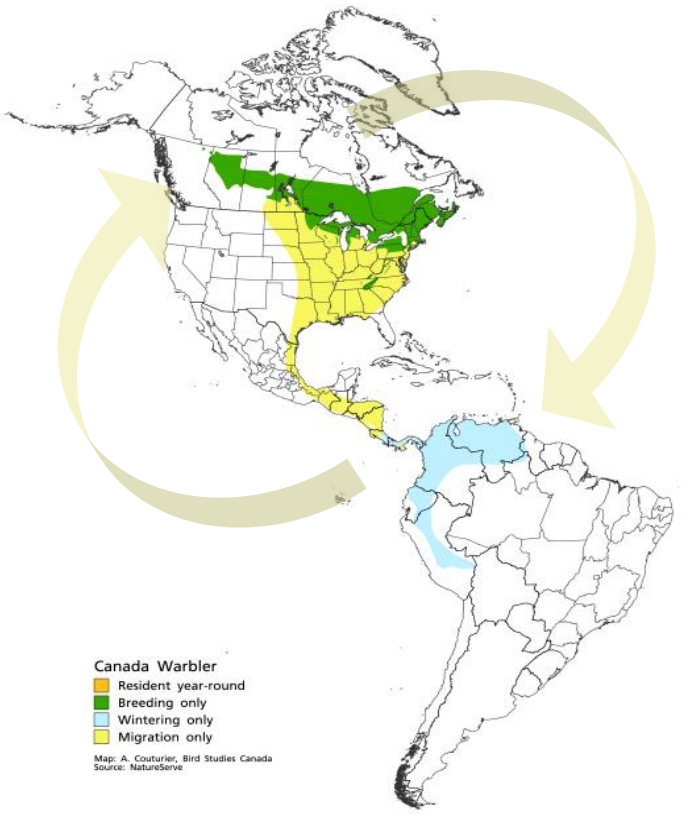
Key conservation concerns include:

- Large-scale habitat loss in South America (clear-cutting; animal agriculture)
- Habitat conversion (changing diverse, mixed-species forests with monocultures such as pine or coffee plantations)
- Collisions with windows and structures along migration

Click here for IUCN assessment

NOT EVALUATED	DATA DEFICIENT	LEAST CONCERN	NEAR THREATENED	VULNERABLE	ENDANGERED	CRITICALLY ENDANGERED	EXTINCT IN THE WILD	EXTINCT
NE	DD	LC	NT	VU	EN	CR	EW	EX

CANADA WARBLER: Annual Cycle



BREEDING

Canada Warbler's nest in mixed forested wetlands or riparian thickets. Females build low nests in stumps, roots or banks, camouflaged with moss. Eggs are incubated for 12 days, and young birds fledge the nest 10 days later.

MIGRATION

Canada Warbler's are neotropical migrants, travelling long distances between their wintering and breeding habitats. They fly at night and stop to rest and feed during the day.

NON-BREEDING

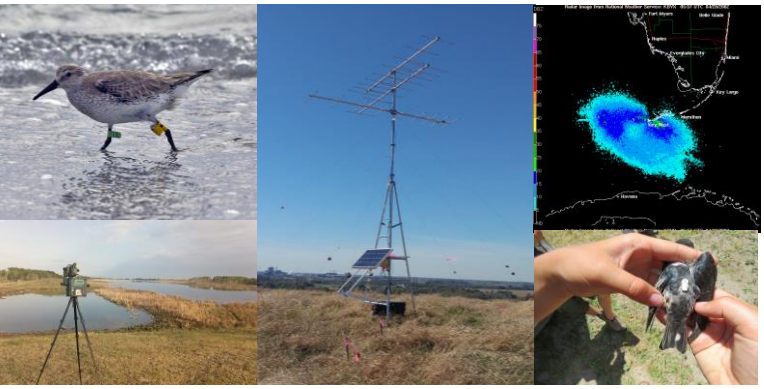
Canada Warbler's spend their non-breeding stage in a variety of habitats of Central and South America, including the dense undergrowth of mature tropical forests, scrubby fields and shade-grown coffee plantations.

Click here to view Bird Migration Explorer → Audubon

PHOTO: ASHLEY WAHLBERG
MACAULAY LIBRARY: https://macaulaylibrary.org/asset/206530381

TRACKING BIRDS:

To learn more about the lives of birds, scientists study their movements and the habitats they require throughout the year. There are many methods and technologies used to track bird movements. Sometimes, these methods can be combined to maximize the information gathered for the question being studied.

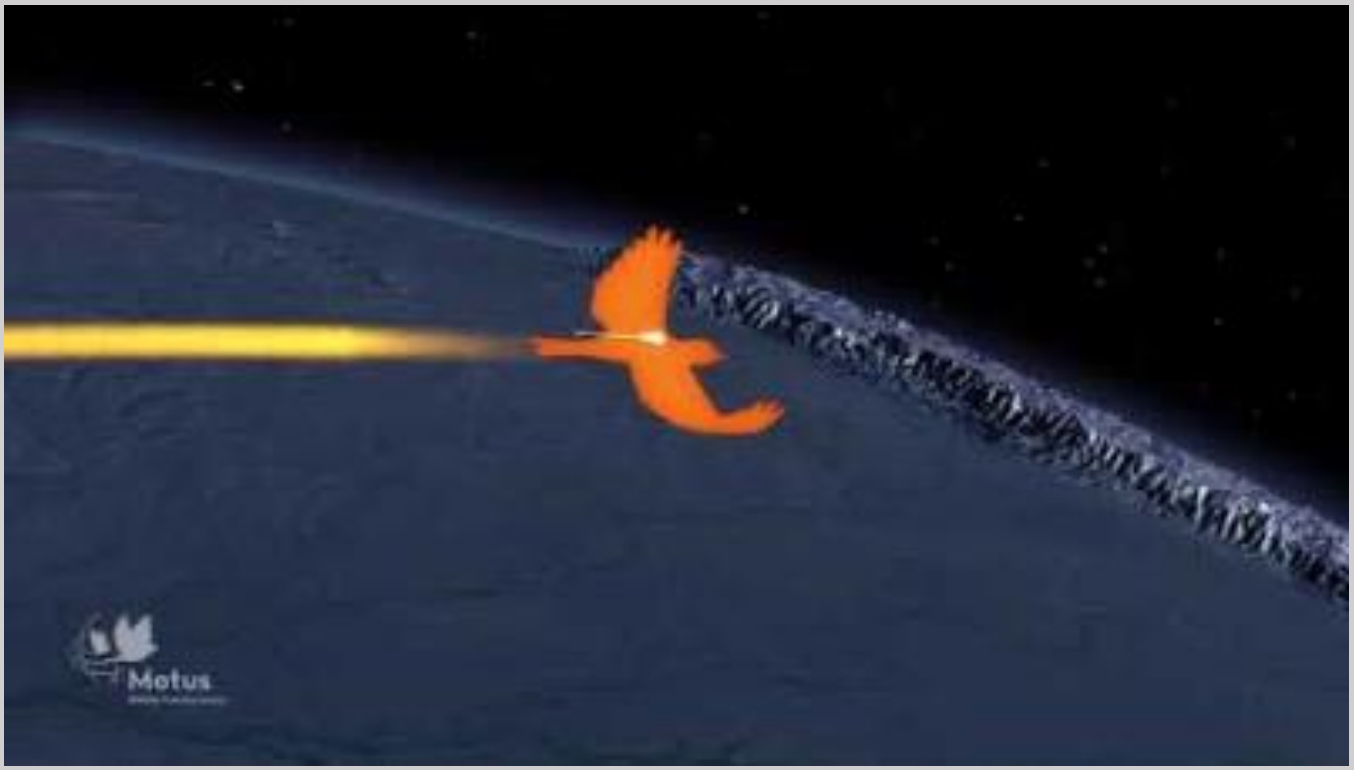


Photos (L-R): Mark Peck, Laura Stewart, Birds Canada; National Weather Service; Liza Barney

- Bird banding
- Color bands or flags
- Citizen Science
- Doppler radar
- Radio telemetry
- Satellite telemetry
- Geolocator
- Acoustic Recordings

Motus
Wildlife Tracking System

This Case Study explores bird research using radio telemetry. The Motus Wildlife Tracking System is a coordinated array of fixed receiving stations across the landscape. Small, coded tags are attached to a small, flying animal (bird, insect, bat), which is then released back into the wild. Each tag emits a unique signal that can be detected by the radio antennas at a determined frequency. If a tagged bird is within 15 km of a receiving station, the unique pulse of its tag is detected by the antenna. This information is sent to the computer stored at the base of the antenna, where it logs the tag identification with the date and time. The data is transmitted to the project scientists for analysis. This information helps to connect the dots of bird movements, identify important stopover sites for resting and feeding, how long it takes to travel, and where they stop to breed or spend the winter.



RESEARCH IN FOCUS:

Adapted from Motus Wildlife Tracking System Project:
Selva CAWA Colombia (#232)

Important Habitat for Canada Warblers

Scientists are investigating habitats of Canada Warblers during different stages of the annual life cycle.

SCIENCE GOALS:

1. Learn about locations and habitat preferences of Canada Warblers
2. Compare the use of wintering habitats (shade-grown coffee plantations and native forests) in the Andes Mountains of Colombia
3. Identify important stopover locations and length of stay during migration


PHOTO: ANA GONZALEZ


PHOTO: ANA GONZALEZ

METHODS:

Fine 'mist nets' are set up in the tropical forests of the Andes Mountains in Colombia during the non-breeding (winter) stage of the birds' cycle. Once birds are caught, they are measured and banded. A nanotag is attached like a backpack, with loops around the legs, and sits in the centre of the bird's back. The bird is released, and the tag will emit a unique signal, which can be detected by the radio antennas across the landscape.

Nanotags have been released on nearly 200 Canada Warbler's since 2016. Detections of these tags indicate the date and location of an individual bird as it moves across the landscape.

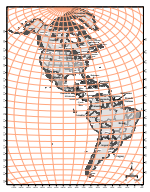
Canada Warbler in the Colombian Andes: SELVA – Research for Conservation in the Neotropics (04:03)
www.youtube.com/watch?v=76ZKcSsP2k0&feature=youtu.be

STUDENT ACTIVITY

The following tracks from individual Canada Warblers, tagged by different research projects, represent a subset of the general population. This data helps to understand the timing and locations of the individuals as they move across the landscape throughout the year. Explore tracks on the provided base map using the following guidelines:

- ❑ **Label the bird species in the top right corner of the map page.**
- ❑ **Draw a star on your location.**
- ❑ **Plot the locations of each bird detection on the attached map**
- ❑ **Connect the dots for each tagged bird with a different color.**
- ❑ **Draw arrows on each track to indicate direction of movement.**
- ❑ **Build a legend in the bottom left corner of the map for each track.**
- ❑ **Circle the breeding location and the non-breeding locations.**
- ❑ **What is the distance between the wintering and breeding locations?**

PROJECT MAPS



Paper:
1. Print selected map slide
2. Follow instructions on activity using colored pencils or markers

PowerPoint:
1. Save the map slide as an image.
2. Open in a new PPT presentation file
3. Follow instructions on activity.
4. Save slide as image, or file.

Smartboard:
1. Open map on smartboard
2. Follow instructions on activity
3. Save annotated map as an image.

Google My Maps:
1. Open My Maps in Google.
2. Copy and paste 'data' into an excel or google sheet. Save.
3. Import the data set into My Maps.
4. Follow instructions on activity. Save.

Google Jamboard:
1. Open Jamboard from Google
2. Save the map slide as an image
3. Open image as base map on Jamboard.
4. Follow instructions on activity. Save.

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PROJECT DATA

NANOTAG ID	DATE	LATITUDE	LONGITUDE	ALPHA-NUMERIC
6096	Feb 16 – APRIL 7	4.32	74.54	J-17
11763	MARCH 21-APRIL 13	4.32	74.54	J-17
11767	APRIL 7	4.32	74.54	J-17
	MAY 3	8.53	76.09	J-16
	MAY 5	9.40	79.86	I-16
11768	MAY 11	9.40	79.86	I-16
	JUNE 9	41.44	82.88	H-9
	JUNE 9	42.28	81.84	H-9
	JUNE 10	43.26	80.65	H-9
12519	JULY 3-SEPT 2	48.21	71.24	I-8
	SEPT 9	39.82	75.72	I-9
	SEPT 24	29.24	90.00	H-12

- ➢ **Check your map by clicking on the individual nanotag to view the animated track.**
- ➢ **Compare your map tracks with the eBird Abundance Animation for Canada Warblers:** https://ebird.org/science/status-and-trends/canwar/abundance-map-weekly


Greenland
(Denmark)
Anchorage
Whitehorse
Yellowknife
Iqaluit
Coats
Island
Canada
Edmonton
Mingan Archipelago
National
Park Reserve
St.
John's
Moosonee
Regina
Winnipeg
Victoria
Olympia
Helena
Québec
Montréal
Kingston
Portland
Nantucket
Island
United
States
Erie
Cape May
Sacramento
Denver
Cincinnati
Phoenix
Atlanta
New
Orleans
Galveston
Mexico
Bahamas
Cuba
Dominican
Republic
Mexico
City
Belize
Jamaica
Haiti
Honduras
Guatemala
El Salvador
Panama
Caracas
Suriname
Guyana
French
Guiana
Nicaragua
Colón
Panama
City
Venezuela
Costa
Rica
Bogota
Colombia
Ecuador
Peru
Brazil
Lima
Bolivia
Brasilia
Sucre
Chile
Paraguay
Argentina
Santiago
Buenos
Aires
Uruguay
Rio
Grande
N
Km
0
1,000
50°N
45°N
40°N
35°N
30°N
25°N
20°N
15°N
10°N
5°N
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5°S
10°S
15°S
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25°S
30°S
35°S
40°S
45°S
50°S
55°S
170°W
160°W
150°W
140°W
130°W
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50°W
40°W
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10°W
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A B C D E F G H I J K L M N O
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
Greenland (Denmark)
Anchorage
Whitehorse
Yellowknife
Iqaluit
Goats Island
Canada
Mingan Archipelago National Park Reserve
St. John's
Edmonton
Moosonee
Regina
Winnipeg
Victoria
Olympia
Helena
Québec
Montréal
Kingston
Nantucket Island
Portland
Erie
Cape May
Sacramento
Denver
Cincinnati
United States
Phoenix
Atlanta
Galveston
New Orleans
Bahamas
Cuba
Dominican Republic
Mexico
Mexico City
Belize
Jamaica
Haiti
Antigua
France
Honduras
Guatemala
Trinidad
Tobago
Suriname
El Salvador
Panama
Caracas
Guyana
Nicaragua
Colón
Panama City
Venezuela
French Guiana
Costa Rica
Bogota
Colombia
Ecuador
Peru
Brazil
Lima
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DISCUSSION

Identify a human-related threat, and a stewardship action that might impact survival at each stage below.

NON-BREEDING (winter)

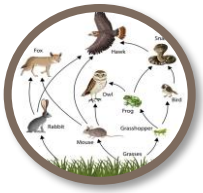
MIGRATION (spring and fall)

BREEDING (summer)

EXTENSION ACTIVITIES

LEARN ABOUT BIRDS NEAR YOU:

Explore and observe local birds. Take note of field marks, colors and patterns, size and shapes, habitats and behaviors. Use field guides, websites and local expertise to help with identification. Have fun!



ECOLOGICAL CONNECTIONS:

Design a food web model to display connections of selected bird species to their ecological community.

BIRD ART:

Sketch or model a selected bird species using pencil; paints; clay; or using computer graphics (using software such as Adobe Illustrator).

SCIENTIFIC LITERATURE:

Use the school library database, or Google Scholar, to explore the peer-reviewed scientific literature related to this Case Study. Search by 'key words' or research personnel, and select one article to review. Summarize each section of the scientific method conducted in this research.

MEET AN ORNITHOLOGIST:

Scientists are excited to share their research! Contact the project team to inquire about a virtual meeting with your classroom.

CITIZEN SCIENCE: eBird

eBird is a real-time, global database of bird observations from around the world! Participate in Citizen Science to learn more about birds in your area and contribute observations for science and conservation:

- www.ebird.org

SCIENCE COMMUNICATION:

Investigate a research topic and present information in a creative communication. For example, an infographic, news article, comic, brochure, slide show, poem, short story, or blogpost.

CELEBRATE BIRDS:

Participate in nature festivals and bird counts in your community!

- World Migratory Bird Day
- Great Backyard Bird Count
- Global Big Day

STEWARDSHIP AND CONSERVATION:

Initiate or participate in a stewardship activity that helps reduce or mitigate impacts of threats to birds in your community.

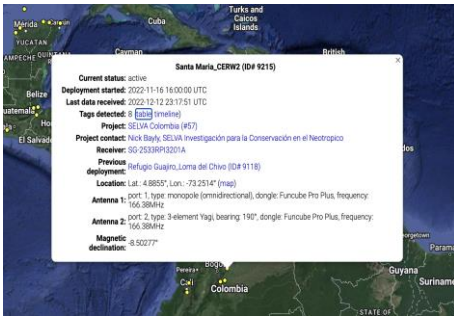
EXPLORE:

MOTUS WILDLIFE TRACKING SYSTEM

Motus Wildlife Tracking System

FIND A STATION

1. Visit: www.motus.org
2. Click: **Explore data**
3. Select: **Receiver Locations**
4. Explore map. Click on dots to view station information.



- *What is the location of the station closest to you?*
- *Click on the 'Project' name. What is the research investigating at this station?*
- *Click on 'Tags Detected'. What species have been detected at this station?*

TRACK A BIRD

SEARCH BY SPECIES:
motus.org/data/species

1. Choose a location
2. Click on a station dot
3. Find 'Tags Detected'
4. Click 'table' view
5. Select a species
6. Show detections in 'map'

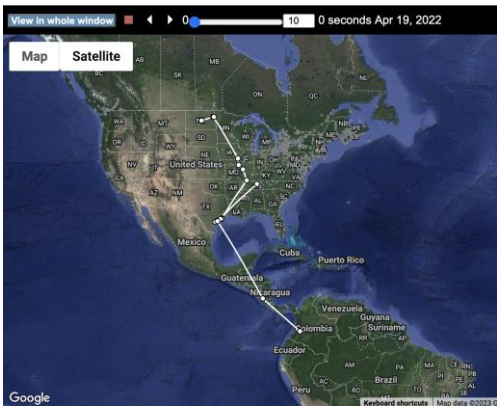
SEARCH BY LOCATION:
motus.org/data/receiversMap

1. Select a species
2. Find 'Tags' and Select 'Table'
3. Select a bird that has a high number of 'receiver locations'
4. Show detections in 'map'

SEARCH BY TAG:
motus.org/education/activities

1. Click 'Explore Motus' activity
2. Click 'Find a Tag'
3. Enter Tag ID #'s:

Taxonomic Order ID	Species ID	Common Name	Scientific Name	Deployments	Projects	Type
154	230	Canada Goose	Branta canadensis	37	1	1
238	360	Wood Duck	Aix sponsa	37	2	1
716	1260	Sharp-tailed Grouse	Tympanuchus phasianellus	72	1	1
955	1650	Western Grebe	Aechmophorus occidentalis	3	1	1
956	1660	Clark's Grebe	Aechmophorus clarkii	1	1	1
962	5970	Rock Pigeon (Feral Pigeon)	Columba livia (Feral Pigeon)	34	4	1
1635	7060	Yellow-billed Cuckoo	Coccyzus americanus	73	5	1
1640	7100	Black-billed Cuckoo	Coccyzus erythropthalmus	3	2	1
1784	7720	Common Nighthawk	Chordeiles minor	216	6	1
1827	7750	Common Poorwill	Phalaenoptilus nuttallii	44	1	1
1828	7810	Chuck-will's-widow	Antrostomus carolinensis	3	1	1
1840	7871	Eastern Whip-poor-will	Antrostomus vociferus	165	5	1
1854	32874	Eurasian Nightjar	Caprimulgus europaeus	60	1	1
1948	8040	Chimney Swift	Chaetura pelagica	161	3	1
2643	3761	King Rail	Rallus elegans	3	2	1
2647	3751	Clapper Rail	Rallus crepitans	55	2	1
2657	3770	Virginia Rail	Rallus limicola	186	6	1
2734	3830	Sora	Porzana carolina	346	4	1
2743	41203	Common Gallinule	Gallinula galeata	6	1	1
2838	3680	Yellow Rail	Coturnicops noveboracensis	16	1	1



- *What is the species name? What project is studying this bird?*
- *Click on the flight track. Where and when was the bird tagged?*
- *Select the longest section of the track. How far did the bird travel? How long did it take? What speed did the bird fly on this track?*