

Case Study:
SWAINSON'S THRUSH



MIGRATION GENETICS



PHOTO: NICK SAUNDERS 



SWAINSON'S THRUSH

A Swainson's Thrush is a medium-sized songbird in the Thrush family. They have an omnivorous diet, foraging for insects on the forest floor and fruits and berries in the undergrowth.

LATIN:

Catharus ustulatus swainsoni

FRENCH:

Grive à dos olive

SPANISH:

Zorzal de Swainson

Buffy eye-ring

Round head with short bill

Brown speckled chest

Olive-brown plumage

Click here to view photos, videos and audio

eBird

PHOTO: NICK SAUNDERS

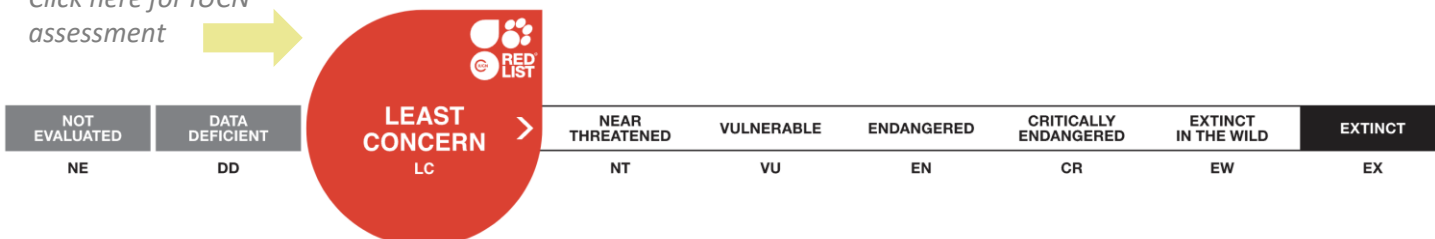
CONSERVATION

Swainson's Thrush are currently designated as a species of 'Least Concern' by the International Union for Conservation of Nature. However, Swainson's Thrush 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:

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

Click here for IUCN assessment



SWAINSON'S THRUSH

ANNUAL CYCLE

[Click here to view Bird Migration Explorer](#)



BREEDING

Swainson's Thrushes nest in dense undergrowth of northern coniferous and deciduous forests. A clutch size of 3-4 speckled blue eggs are laid in a bulky nest cup made of moss, lichen, twigs, and leaves and lined with grass. Nestlings are fed a diet of energy-rich caterpillars, ants and beetles.

COASTAL MIGRATION

Coastal thrushes migrate along the coast of North America, keeping west of the Rocky Mountains.

Coastal thrushes spend the winter in Mexico and Central America.

INLAND MIGRATION

Inland thrushes migrate to the east of the Rocky Mountains and through the center of North America. They encounter many barriers, migrating over part of the Rocky Mountains and crossing the Gulf of Mexico on their trip.

Inland thrushes spend the winter further south in South America.

SUBSPECIES

There are two subspecies of Swainson's Thrush:
The coastal thrushes have russet-brown feathers (Russet-backed Swainson's Thrush).
The inland thrushes have olive-brown feathers (Olive-backed Swainson's Thrush).



The Genetics of Swainson's Thrush Migration

This project investigates the genetic basis of migration with hybrid, juvenile Swainson's Thrush. When young birds leave the nest, they have no prior migration experience to assist their journey, and movements may be determined by alleles inherited from the parents.

SCIENCE GOALS:

1. Describe the variation of migratory directions taken by juvenile Swainson's thrushes in British Columbia.
2. Connect movement behavior with the inherited alleles to identify the genes that control migratory direction.

Russet-backed (Pacific coastal)



Photo: Andrew Reding/Flickr (CC-BY-NC-ND-2.0)

Olive-backed (Inland)

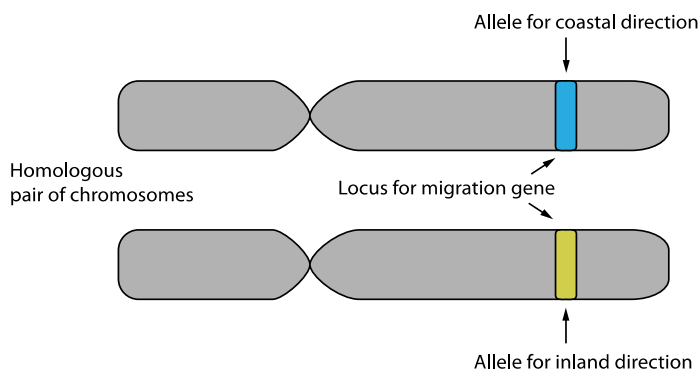


Photo: Kelly Colganazar/Flickr (CC BY ND 2.0)

There are two subspecies of Swainson's Thrush. The Russet-backed Swainson's Thrush are coastal migrants, and the Olive-backed Swainson's Thrush move through the interior of North America.

A first generation hybrid (F1), is the offspring of one coastal and one inland parent. It will have an equal number of coastal and inland alleles at genes controlling migratory direction. The effects of these alleles are likely added together, causing these birds to take a intermediate direction on migration.

Later generation hybrids (one or both parents being hybrid), will have a mixture of alleles. If they have more coastal alleles they will likely take a more coastal direction. If they have more inland alleles they will take a more inland direction.



Genes are specific regions of DNA that are made up of nucleotides (A,T,G or C).

Alleles are different forms of the same gene, inherited from each parent.

The combination of alleles for a specific gene will determine how an organism looks or behaves.
Example: feather color or hair color

PROJECT DESCRIPTION

Fine mist nets are used to catch Swainson's Thrushes in the Coast Mountains of British Columbia, Canada. Juvenile thrushes were identified by the yellow tips on top of their wings, measured and fit with a nanotag. The nanotags are attached like a backpack, with loops around the legs and sits in the centre of the bird's back. The nanotags emit a unique signal, which is detected by radio antennas across the landscape to document a bird's location. A small sample of blood is taken from each bird for genetic analysis. In the lab, DNA is extracted from the cells to sequence the nucleotides and alleles that make up the DNA.



Nanotags were attached to 120 Swainson's thrushes in the hybrid zone (between coastal and inland regions) during the summer of 2019.

As the birds move south, they were detected by a transect of radio antennas that inform us about the direction of migration.

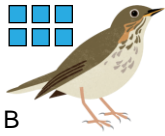


STUDENT ACTIVITY

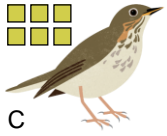
Juvenile hybrid Swainson's Thrushes were released with nanotags near Pemberton, British Columbia. The hybrid birds have different combinations of coastal and inland genes, which control migratory behaviour, including direction. Based on the combination of coastal alleles (blue) and inland alleles (yellow), match the seven hybrid birds below to the routes they would take. Put the answer (letter) in the white circle next to the routes.



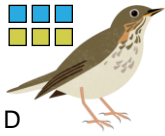
A



B



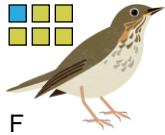
C



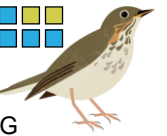
D



E

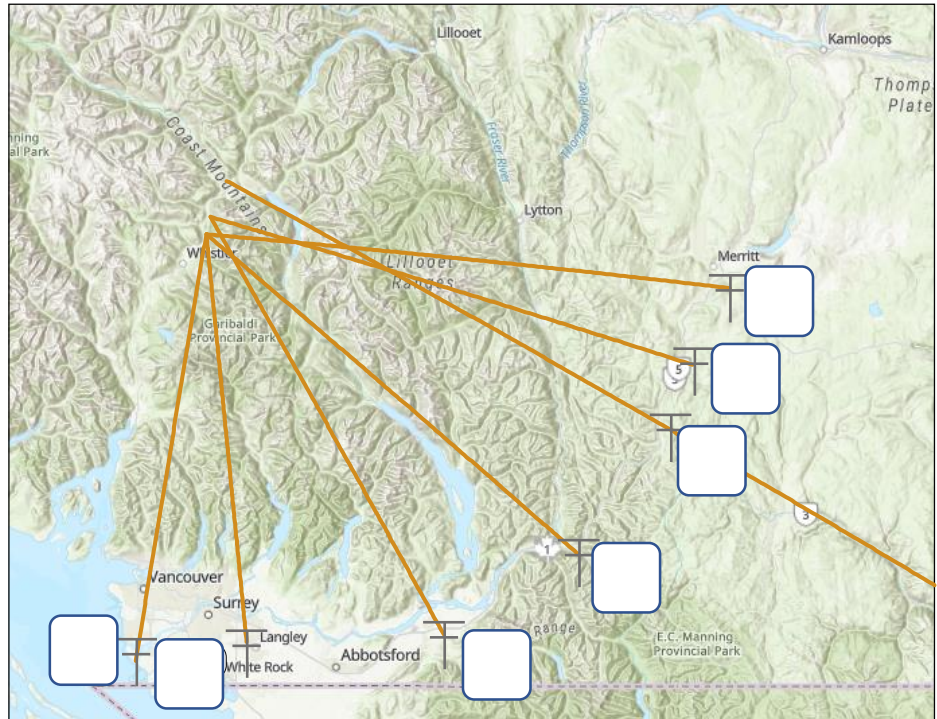


F



G

- Coastal allele
- Inland allele
- Radio tower
- Answer



PROJECT DATA

BIRD	ALLELE COMBINATION C=Coastal; I=Inland	TAG ID #:
A	CCCCCI	25039
B	CCCCCC	25040
C	IIIIII	25026
D	CCCI	25028
E	CCIIII	24980
F	CIIIII	24977
G	CCCCII	24953

View bird tracks to check your answers, here:

www.motus.org/education/track



DISCUSSION

Use the guided discussion boxes below to analyze the project results from this Case Study. Present and discuss as a class, or compare results with other Case Study species.

RESULTS ANALYSIS

- 1 a) If a hybrid has alleles that are mostly coastal, will it take a coastal route on migration, or a different route?

b) Which direction would a hybrid with 50-50 inland-coastal alleles likely fly?

GENETICS COMPREHENSION:

- 2 What is an allele?

What is a gene?

What can they control?

MOVEMENT ECOLOGY

- 3 What is the benefit of studying juveniles when you are after the genes controlling a behavioural trait?

CONSERVATION

- 4 There is a lot of variation in the migratory routes taken by thrushes. How might this help us protect this bird and others like it from habitat destruction?

Hint: birds have to stop on migration to refuel. Will these 'stopovers' be the same for both subspecies?

