



Hubbard Brook Research Foundation's
Migratory Bird Science and Math Lessons

Introduction to Migratory Birds





This slide show introduces migratory birds by describing what they are and why they migrate as well as exploring recent research on bird abundance from the Hubbard Brook Experimental Forest, New Hampshire.

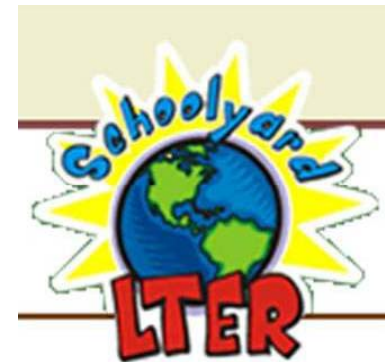
Also included in this set:

- *Methods of Bird Research*
- *Where Have All the Songbirds Gone?*



Migratory Bird Science and Math Lessons were developed in partnership between the Hubbard Brook Research Foundation and the USDA Forest Service/Northern Research Station. Funding was also provided by the Long Term Ecological Research (LTER) Network's Schoolyard Program.

Unless otherwise noted, all photos and images are courtesy of the scientific community of the Hubbard Brook Ecosystem Study (www.hubbardbrook.org).





Neotropical migratory birds of New Hampshire



Why study migratory birds?



Examples of ecosystem services



What are Neotropical migratory birds?



Why do they migrate?



Who studies migratory birds, and what are they learning?



Why have the numbers of birds decreased at Hubbard Brook?

Neotropical migratory birds of New Hampshire

Neotropical migratory birds of New Hampshire



Blue-winged Teal

Neotropical migratory birds of New Hampshire



Green Heron

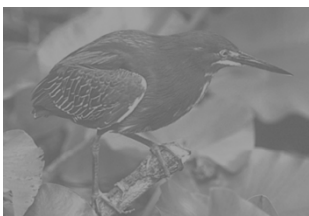


Blue-winged Teal

Neotropical migratory birds of New Hampshire



Blue-winged Teal



Green Heron



Broad-winged Hawk

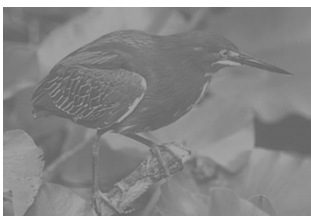
Neotropical migratory birds of New Hampshire



Sora Rail



Blue-winged Teal



Green Heron



Broad-winged Hawk

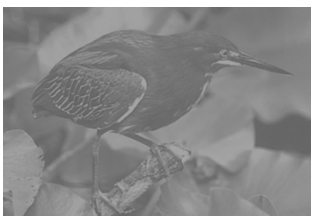
Neotropical migratory birds of New Hampshire



Sora Rail



Blue-winged Teal



Green Heron



Upland Sandpiper



Black Tern



Broad-winged Hawk

Neotropical migratory birds of New Hampshire



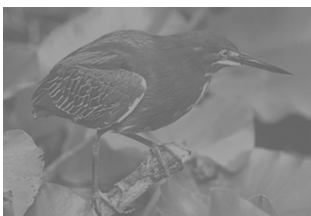
Sora Rail



Black-billed Cuckoo



Blue-winged Teal



Green Heron



Upland Sandpiper



Black Tern

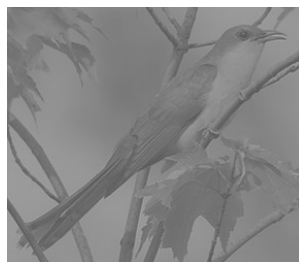


Broad-winged Hawk

Neotropical migratory birds of New Hampshire



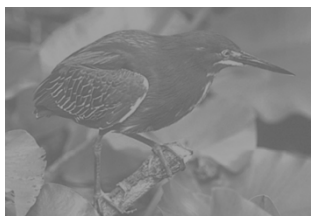
Sora Rail



Black-billed Cuckoo



Blue-winged Teal



Green Heron



Whip-poor-will



Upland Sandpiper



Black Tern



Broad-winged Hawk

Neotropical migratory birds of New Hampshire



Sora Rail



Black-billed Cuckoo



Blue-winged Teal



Green Heron



**Ruby-throated
Hummingbird**



Whip-poor-will



Upland Sandpiper



Chimney Swift



Black Tern



Broad-winged Hawk

Neotropical migratory birds of New Hampshire



Sora Rail



**Yellow-bellied
Sapsucker**



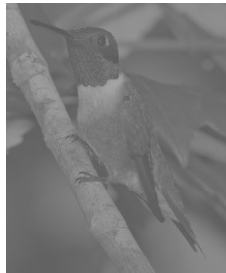
Black-billed Cuckoo



Blue-winged Teal



Green Heron



Ruby-throated
Hummingbird



Whip-poor-will



Upland Sandpiper



Chimney Swift



Black Tern

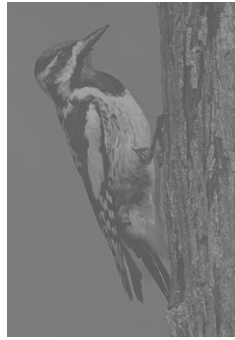


Broad-winged Hawk

Neotropical migratory birds of New Hampshire



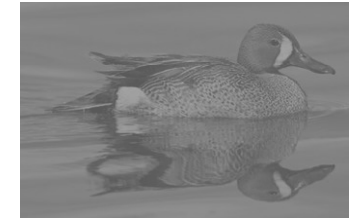
Sora Rail



Yellow-bellied
Sapsucker



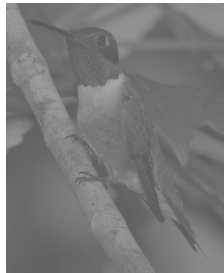
Black-billed Cuckoo



Blue-winged Teal



Green Heron



Ruby-throated
Hummingbird



Whip-poor-will



Upland Sandpiper



Chimney Swift



Black Tern



Olive-sided
Flycatcher

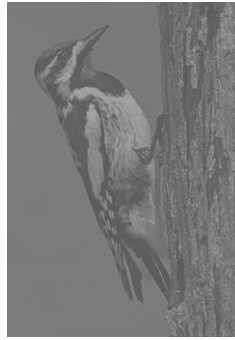


Broad-winged Hawk

Neotropical migratory birds of New Hampshire



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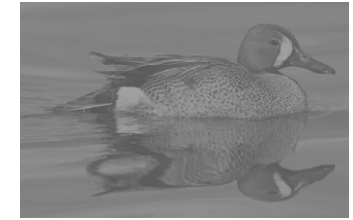
Yellow-bellied
Sapsucker



Black-billed Cuckoo



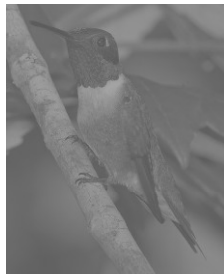
Red-eyed Vireo



Blue-winged Teal



Green Heron



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Whip-poor-will



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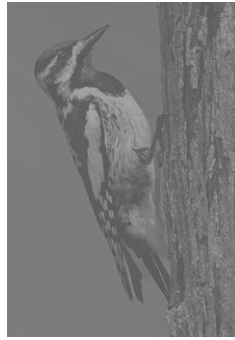
Neotropical migratory birds of New Hampshire



Tree Swallow



Sora Rail



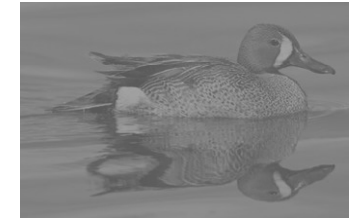
Yellow-bellied Sapsucker



Black-billed Cuckoo



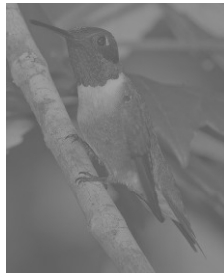
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Whip-poor-will



Upland Sandpiper



Chimney Swift



Black Tern

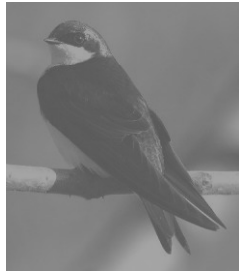


Olive-sided Flycatcher



Broad-winged Hawk

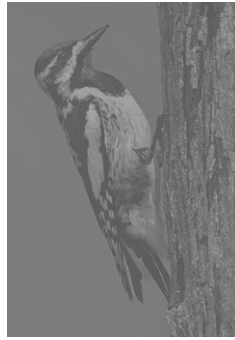
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Tree Swallow



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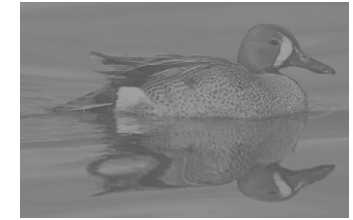
Yellow-bellied
Sapsucker



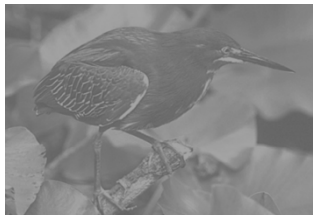
Black-billed Cuckoo



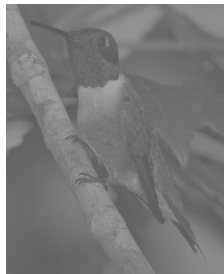
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Ruby-throated
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Whip-poor-will



Upland Sandpiper



Chimney Swift



Whip-poor-will



Black Tern



Blue-gray Gnatcatcher

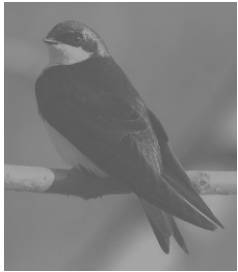


Olive-sided
Flycatcher



Broad-winged Hawk

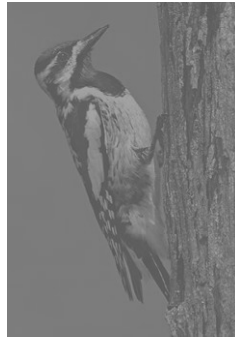
Neotropical migratory birds of New Hampshire



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Sora Rail



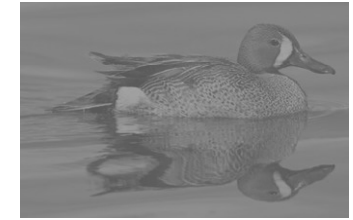
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Sapsucker



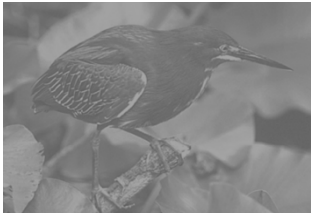
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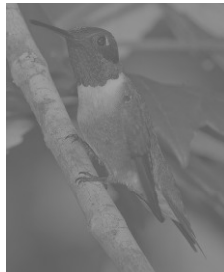
Red-eyed Vireo



Blue-winged Teal



Green Heron



Ruby-throated
Hummingbird



Whip-poor-will



Bicknell's Thrush



Upland Sandpiper



Chimney Swift



Black Tern



Blue-gray Gnatcatcher

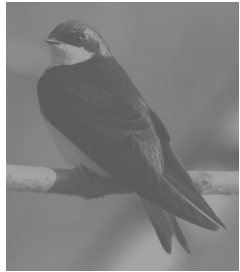


Olive-sided
Flycatcher



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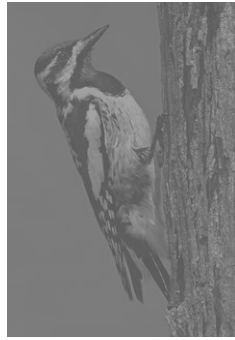
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Tree Swallow



Sora Rail



Yellow-bellied Sapsucker



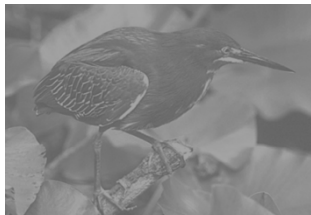
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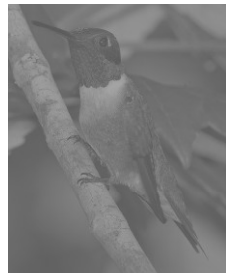
Red-eyed Vireo



Blue-winged Teal



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Ruby-throated Hummingbird



Whip-poor-will



Bicknell's Thrush



Upland Sandpiper



Chimney Swift



Black Tern



Blue-gray Gnatcatcher



Olive-sided Flycatcher

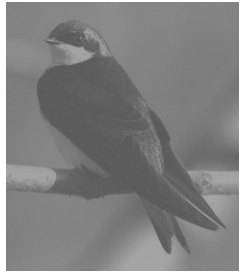


Gray Catbird



Broad-winged Hawk

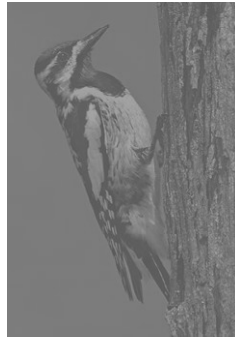
Neotropical migratory birds of New Hampshire



Tree Swallow



Sora Rail



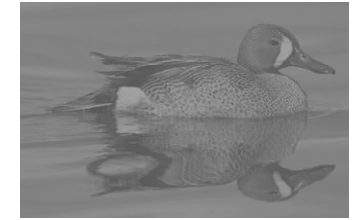
Yellow-bellied
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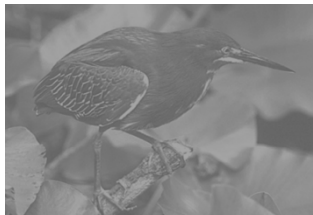
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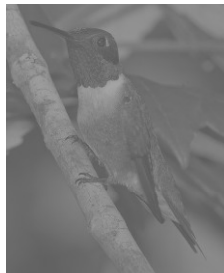
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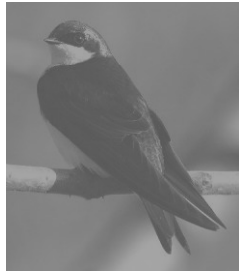


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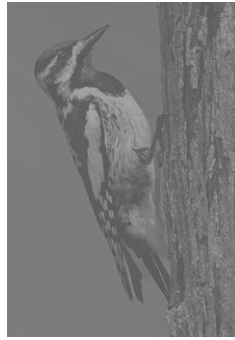
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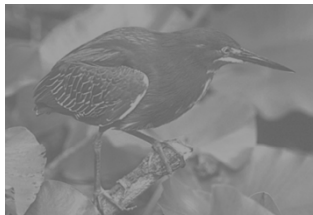
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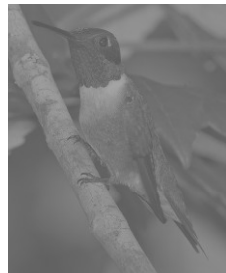
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Bicknell's Thrush



Scarlet Tanager



Upland Sandpiper



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Blue-gray Gnatcatcher



Olive-sided
Flycatcher



Rose-breasted Grosbeak



Indigo Bunting



Lincoln's Sparrow

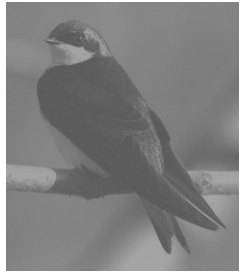


Gray Catbird



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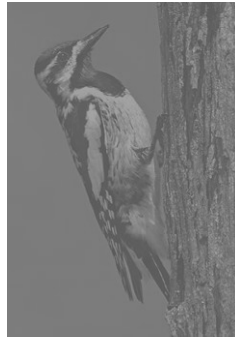
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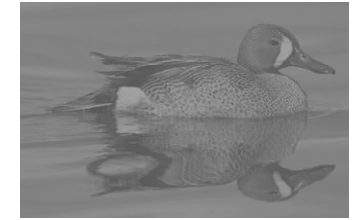
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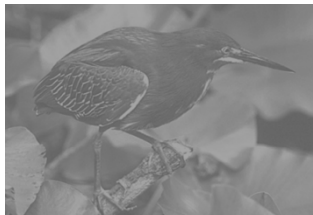
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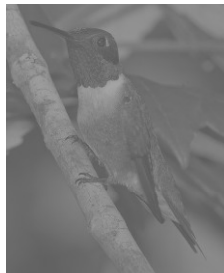
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Bobolink



Whip-poor-will



Bicknell's Thrush



Scarlet Tanager



Upland Sandpiper



Chimney Swift



Baltimore Oriole



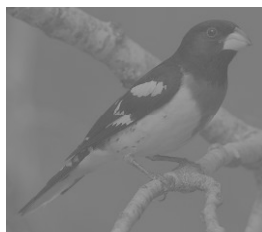
Black Tern



Blue-gray Gnatcatcher



Olive-sided Flycatcher



Rose-breasted Grosbeak



Indigo Bunting



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Broad-winged Hawk

Neotropical migratory birds of New Hampshire



There are over 104 species of Neotropical migratory birds in New Hampshire!





Neotropical Migratory Birds of New Hampshire



Why study migratory birds?



Examples of ecosystem services



What are Neotropical migratory birds?



Why do they migrate?



Who studies migratory birds, and what are they learning?



Why have the numbers of birds decreased at Hubbard Brook?

Why study migratory birds?

Birds are well-known organisms.

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Birds are relatively easy to see, identify, and count.

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Birds are relatively easy to see, identify, and count.

People like birds. (Over 50 million Americans are birdwatchers!)

Birds provide valuable *ecosystem services*.

Birds are at the top of their food web/chain and can inform us if there's a problem lower down on the food chain.



Neotropical Migratory Birds of New Hampshire



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Examples of ecosystem services



What are Neotropical migratory birds?



Why do they migrate?

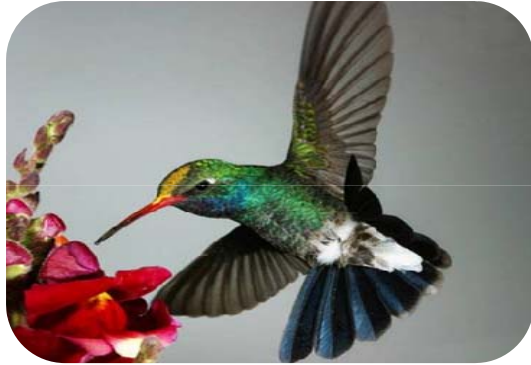


Who studies migratory birds, and what are they learning?



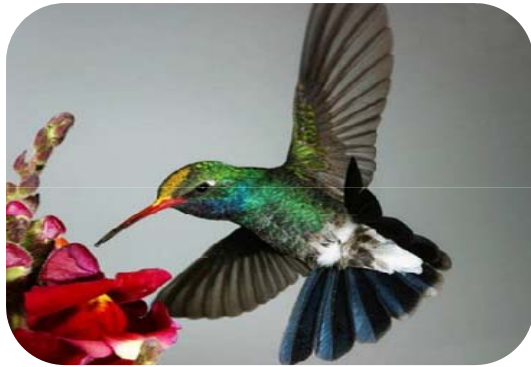
Why have the numbers of birds decreased at Hubbard Brook?

Examples of ecosystem services provided by birds



Pollination

Examples of ecosystem services provided by birds

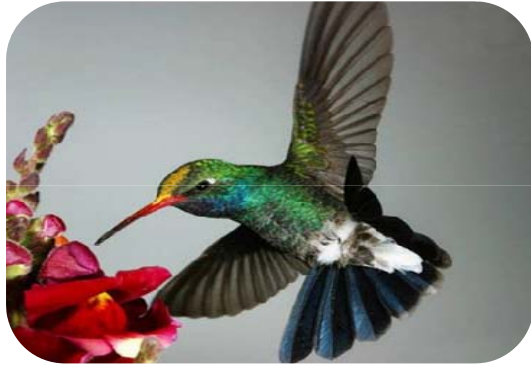


Pollination



Seed dispersal

Examples of ecosystem services provided by birds



Pollination

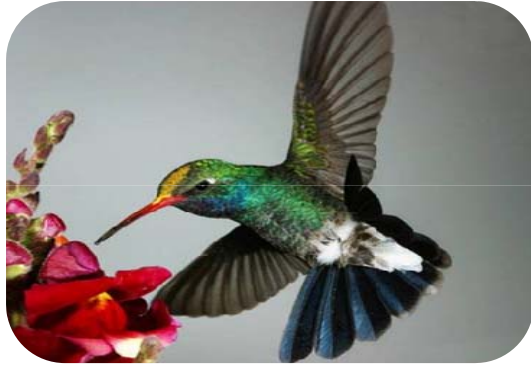


Seed dispersal



Insect control

Examples of ecosystem services provided by birds



Pollination



Seed dispersal



Insect control



Rodent control



Neotropical Migratory Birds of New Hampshire



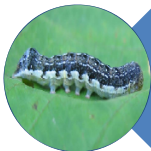
Why study migratory birds?



Examples of ecosystem services



What are Neotropical migratory birds?



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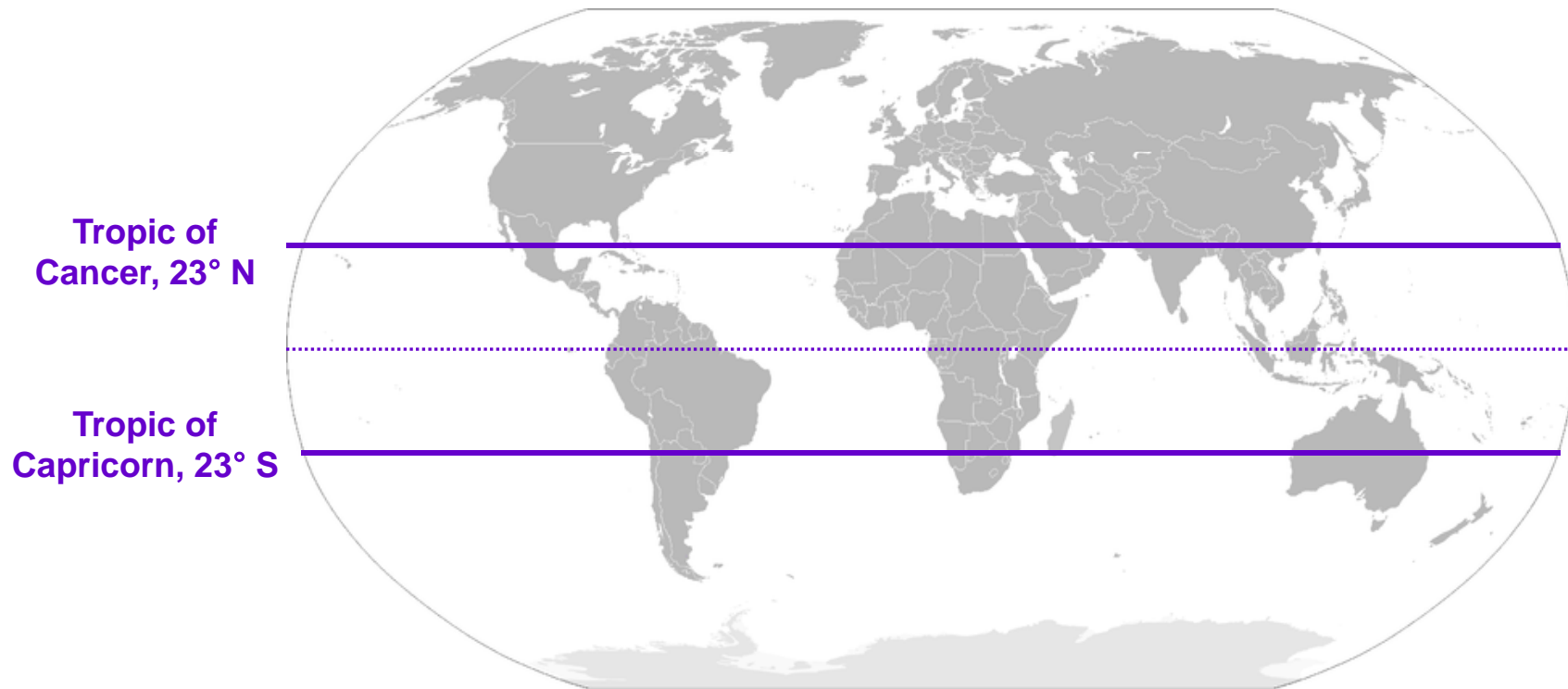


Who studies migratory birds, and what are they learning?



Why have the numbers of birds decreased at Hubbard Brook?

What are Neotropical migratory birds?



Neotropical migratory birds breed, lay eggs and raise young **north** of the Tropic of Cancer and then migrate to the **Neotropics** (area in western hemisphere between the Tropics of Cancer and Capricorn) during the non-breeding season.



Neotropical Migratory Birds of New Hampshire



Why study migratory birds?



Examples of ecosystem services



What are Neotropical migratory birds?



Why do they migrate?



Who studies migratory birds, and what are they learning?



Why have the numbers of birds decreased at Hubbard Brook?

Why do some birds migrate?

Why, do you think, do some birds risk an average round-trip distance of thousands of miles each year?



Too hot?

Why do some birds migrate?

Why, do you think, do some birds risk an average round-trip distance of thousands of miles each year?



Too hot?



Too cold?

Why do some birds migrate?

Why, do you think, do some birds risk an average round-trip distance of thousands of miles each year?



Too hot?



Too cold?



Not enough food?

Why do some birds migrate?

Why, do you think, do some birds risk an average round-trip distance of thousands of miles each year?



Too hot?



Too cold?



Not enough food?



Don't like the food?

www.victorialodging.com/files/images/bird, http://www.winter-pictures.net/snow_pictures.html

Hubbard Brook Research Foundation, www.hubbardbrookfoundation.org

Why do some birds migrate?

Many Neotropical birds eat insects during the breeding season. Because temperatures are cold and fresh green leaves are scarce during our winter, birds cannot rely on insects as a food source.



Birds migrate to find the most abundant and best food. The availability of the most nutritious and caloric food changes when the seasons change.



Neotropical Migratory Birds of New Hampshire



Why study migratory birds?



Examples of ecosystem services



What are Neotropical migratory birds?



Why do they migrate?



Who studies migratory birds, and what are they learning?



Why have the numbers of birds decreased at Hubbard Brook?

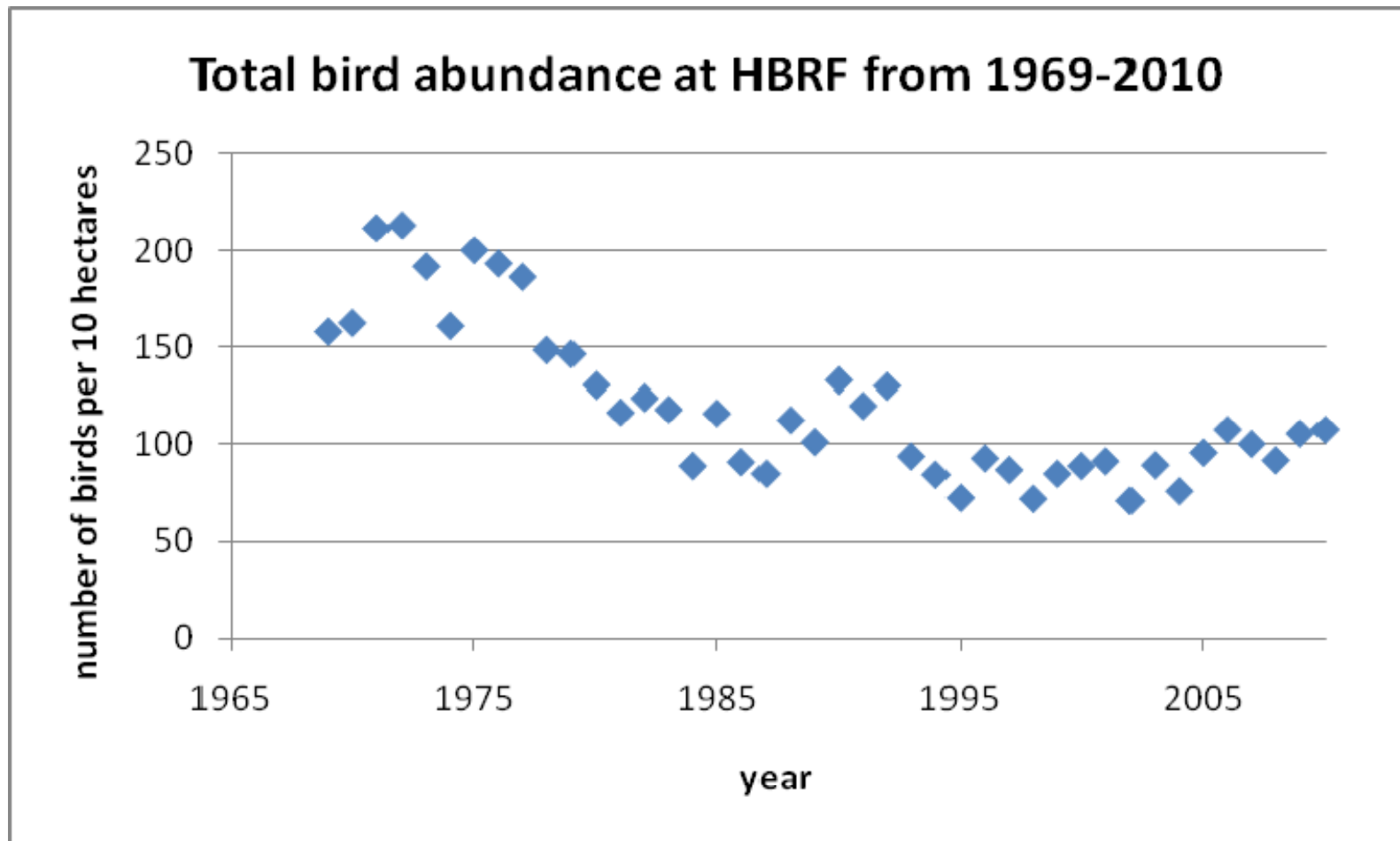
Who studies migratory birds, and what are they learning?

Researchers from Dartmouth College, the Smithsonian, and many other places around the country have been studying birds at the Hubbard Brook Experimental Forest in Woodstock, New Hampshire since 1969.



Who studies migratory birds, and what are they learning?

What has happened to the total abundance of birds at Hubbard Brook in the past 40 years?



Data courtesy of Dr. Richard T. Holmes



Neotropical Migratory Birds of New Hampshire



Why study migratory birds?



Examples of ecosystem services



What are Neotropical migratory birds?



Why do they migrate?



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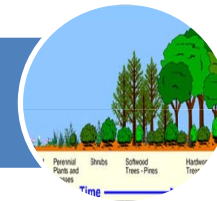


Why have the numbers of birds decreased at Hubbard Brook?

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Researchers at Hubbard Brook have identified factors such as:

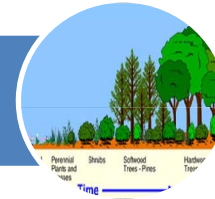
Natural forest changes



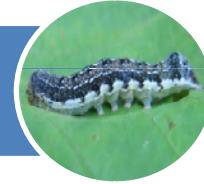
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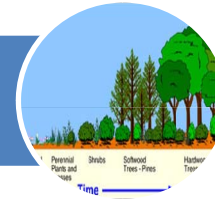
Food availability



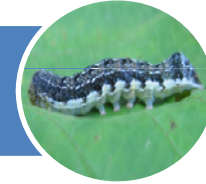
Why have the numbers of birds decreased at Hubbard Brook?

Researchers at Hubbard Brook have identified factors such as:

Natural forest changes



Food availability



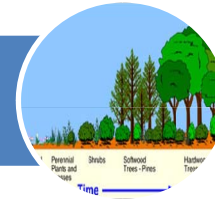
Events that occur during migration and winter periods



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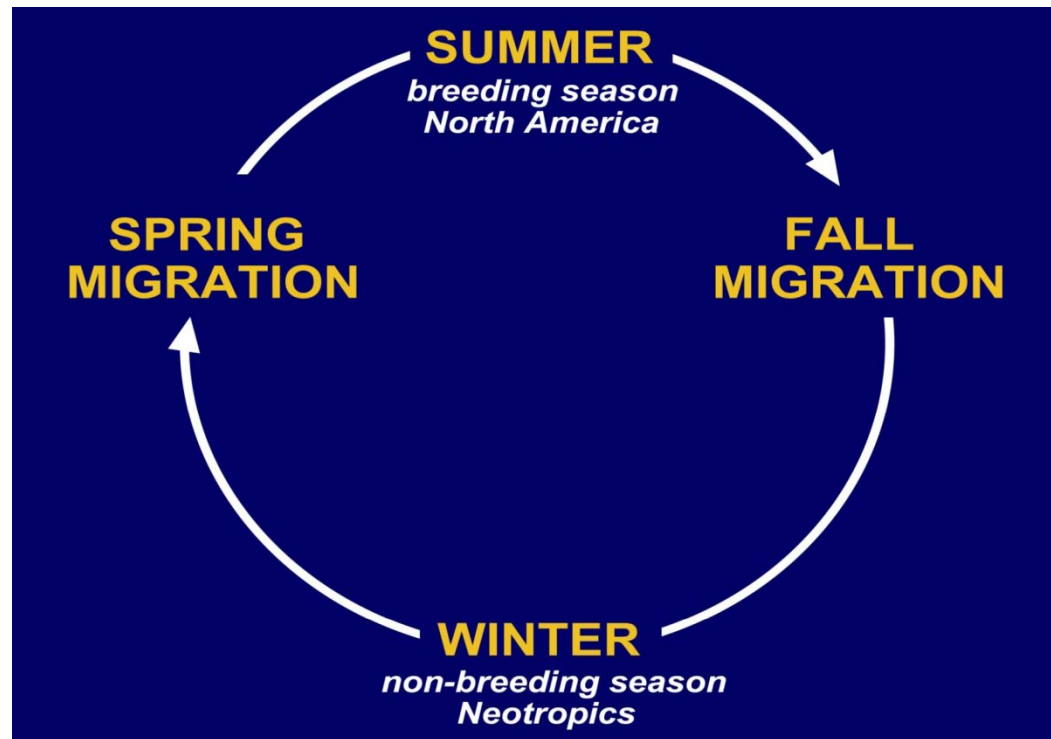
Atmospheric pollution and climate change



All have an impact on migratory bird abundance.

Why have the numbers of birds decreased at Hubbard Brook?

For the full story, we must think about what the birds experience during the entire year:



Every phase of a bird's yearly cycle is important!



For more information, view the following slide shows included within this lesson set:

- *Methods of Bird Research*
- and
- *Where Have All the Songbirds Gone?*



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