



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

Methods of Bird Research





This slide show describes the methods that researchers at the Hubbard Brook Experimental Forest and elsewhere use to study birds.

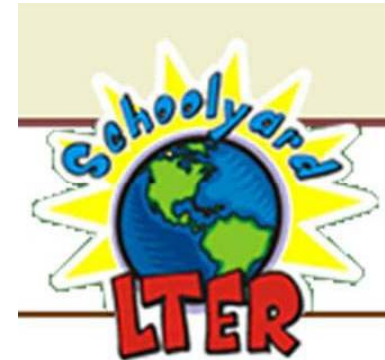
Also included in this set:

- *Introduction to Migratory Birds*
- *Where Have All the Songbirds Gone?*



Migratory Bird Science and Math Lessons were developed in partnership between the Hubbard Brook Research Foundation and the U.S. 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).



What are some ways that people study bird populations and individual birds?



Populations of Birds

- A. Transects
- B. Standardized Timed Census



Individual Birds

- A. Tracking the movements of birds
 - Mist nets
 - Bird banding
 - Geolocators
 - Radio transmission
 - Videotaping
- B. Nest observations
 - Black-throated Blue Warblers at the Hubbard Brook Experimental Forest



Populations of Birds

- A. Transects
- B. Standardized Timed Census

Populations of Birds: transects

Transects are used in many types of ecological field studies and are an important tool used to study populations of birds. Transects are paths or lines that researchers walk along to count and record occurrences of the objects under study.



http://mainegov-images.informe.org/doc/publications/images_field/Plots.jpg



http://www.countrysideinfo.co.uk/biol_sampl_cont.htm

Populations of Birds: transects

Transects are useful when a complete survey of an entire area is not practical because it would take too much time and effort. There are several types of transects; the photo below shows a *belt transect*.



http://mainegov-images.informe.org/doc/publications/images_field/Plots.jpg

Populations of Birds: Standardized Timed Census



Bird researchers at the Hubbard Brook Experimental Forest use a method called a *standardized timed census*:

- Researchers spread out 100 meters apart from each other and walk transects at the same time and speed through the study plot.
- Every bird seen or heard within 50 meters on each side of her or his transect is recorded, as is the bird's species, gender, age, activity, time of observation, and location.

Populations of Birds: Standardized Timed Census

What questions do you think researchers are trying to answer with the data they gather from a standardized timed census?



Photos courtesy of Robert Royse, used with permission (<http://www.roysephotos.com>).



Individual Birds

A. Tracking the movements of birds

- Mist nets
- Bird banding
- Geolocators
- Radio transmission
- Videotaping

B. Nest observations

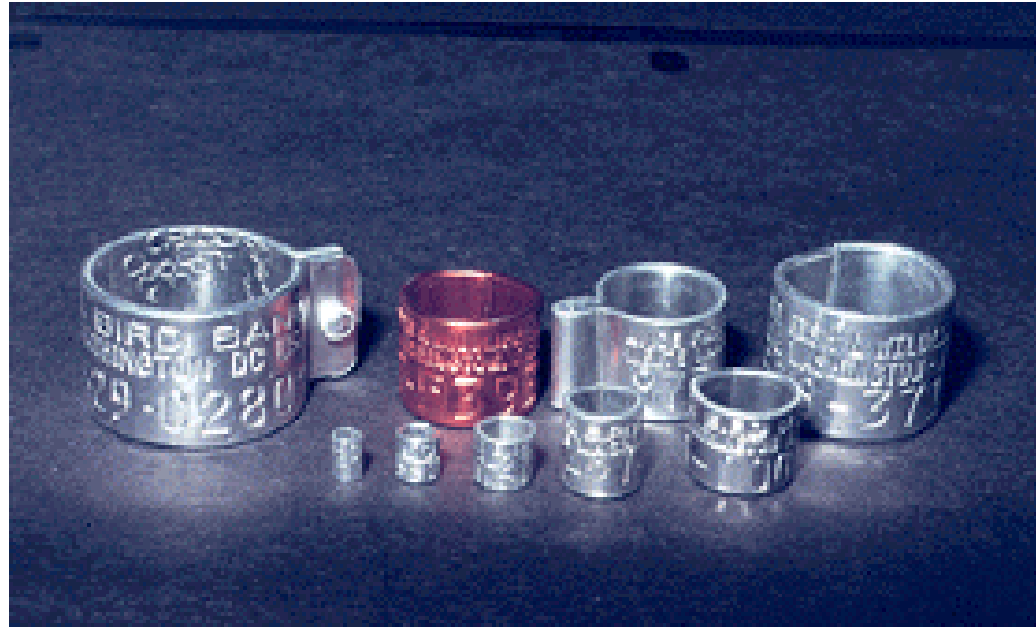
- Black-throated Blue Warblers at the Hubbard Brook Experimental Forest

Individual birds: Tracking the movements of birds



John Audubon was the first known person in North America to mark, or band, a bird; he tied yarn around the leg of an Eastern Phoebe in the early 1800's.

Individual birds: Tracking the movements of birds



<http://www.pwrc.usgs.gov/BBL/homepage/btypes.cfm>

Today, people use lightweight aluminum bands instead of yarn. Each bird's band has a unique number engraved on it as well as an address to which it can be sent by a member of the public in the event that the bird is found: live, dead, or injured.

Individual birds: Tracking the movements of birds

Before a bird can be banded, it must first be caught in a mist net.



http://meggangould.net/blog/mnt/w0605/d02/s02/a0002vtd/www/blog/wp-content/uploads/2007/11/forsgren_chickadee.jpg

Individual birds: Tracking the movements of birds

Mist nets are used to capture flying animals for research purposes. When used properly by trained people, this method presents little risk for the birds and bats captured.



Banding a Bicknell's Thrush



A mist net is set out before dawn,



a Bicknell's Thrush is captured,



and colored aluminum bands are placed on its leg.

What can we learn by banding birds?



<http://www.pwrc.usgs.gov/BBL/homepage>

Banded birds can be tracked over time to:

learn about migration
routes

Banded birds can be tracked over time to:

learn about migration
routes

learn about behavior and
ecology

Banded birds can be tracked over time to:

learn about migration
routes

learn about behavior and
ecology

monitor populations

Banded birds can be tracked over time to:

learn about migration
routes

learn about behavior and
ecology


monitor populations

restore endangered
species

People use bird banding data to:

assess the
effects of
environmental
disturbances

People use bird banding data to:



assess the
effects of
environmental
disturbances



set hunting
regulations

People use bird banding data to:

assess the
effects of
environmental
disturbances

set hunting
regulations

educate
people about
the
environment

People use bird banding data to:

assess the effects
of environmental
disturbances

set hunting
regulations

educate people
about the
environment

address concerns
about human
health, safety
and economy
such as: West
Nile disease, bird
hazards at
airports, and
crop
depredations



Individual Birds

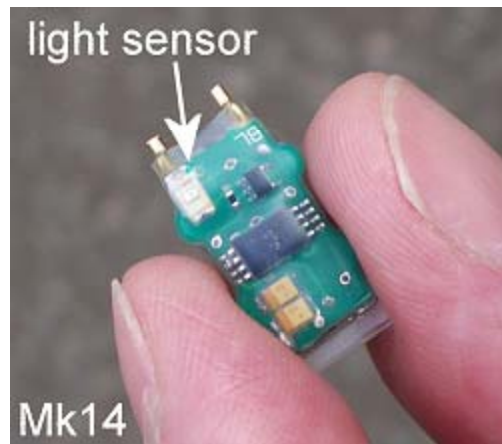
A. Tracking the movements of birds

- Mist nets
- Bird banding
- **Geolocators**
- Radio transmission
- Videotaping

B. Nest observations

- Black-throated Blue Warblers at the Hubbard Brook Experimental Forest

Geolocators



- Geolocators are very small devices that record the change in light levels at different latitudes and longitudes.
- They can be placed on a bird before migration collected when the bird returns.
- What sorts of questions would this allow you to answer?



Individual Birds

A. Tracking the movements of birds

- Mist nets
- Bird banding
- Geolocators
- **Radio transmission**
- Videotaping

B. Nest observations

- Black-throated Blue Warblers at the Hubbard Brook Experimental Forest

Radio transmission



A radio transmitter is placed on this Bicknell's Thrush to track its movements within a one-mile radius.



A receiver is used to pick up signals from the radio transmitter.



Individual Birds

A. Tracking the movements of birds

- Mist nets
- Bird banding
- Geolocators
- Radio transmission
- **Videotaping**

B. Nest observations

- Black-throated Blue Warblers at the Hubbard Brook Experimental Forest

Videotaping



This Blackpoll Warbler's nest was videotaped from the time the mother incubated her eggs to the moment her young fledged (left the nest).



Courtesy of Bill DeLuca, University of Massachusetts

Individual birds: Tracking the movements of birds



There are several ways to track the movements of birds: by banding with aluminum bands or geolocators, by using radio transmission, or by videotaping nests.

Can you think of when each method is most appropriate to use? Or, what types of questions are trying to be answered with each method?



Individual Birds

A. Tracking the movements of birds

- Mist nets
- Bird banding
- Geolocators
- Radio transmission
- Videotaping

B. Nest observations

- Black-throated Blue Warblers at the

Hubbard Brook Experimental Forest

Individual birds: Nest observations

An closer look at research methods used to study the Black-throated Blue Warbler at the Hubbard Brook Experimental Forest, New Hampshire



Individual birds: Nest observations

Because the Black-throated Blue Warbler is a common bird that nests close to the ground, it is an ideal bird to study.



Individual birds: Nest observations

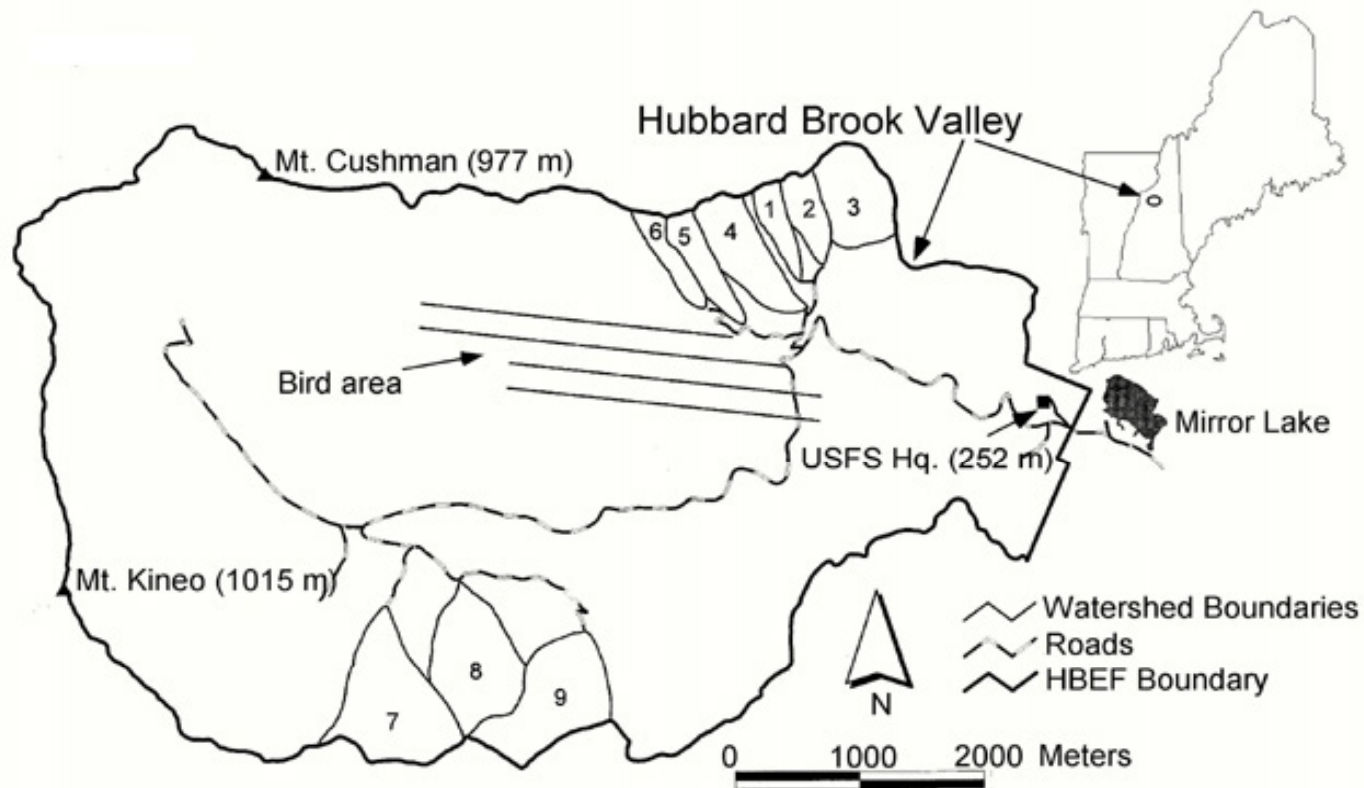


Researchers from Dartmouth College and other places around the country have been studying the Black-throated Blue Warbler at Hubbard Brook since 1969.

Individual birds: Nest observations

Map of the Hubbard Brook Experimental Forest (HBEF)

The "bird area" is marked by the diagonal lines within the HBEF boundaries. Numbered areas indicate small research watersheds used by Hubbard Brook scientists. The HBEF is owned and operated by the United States Forest Service (USFS).



Map created by R. Holmes
Hubbard Brook Research Foundation, www.hubbardbrookfoundation.org

Individual birds: Nest observations

To get background information about the quality of the birds' habitat, researchers measure many variables:

Food abundance



Caterpillar larvae

Vegetation



Nest predators



Catching adult insects in Malaise trap



Individual birds: Nest observations

Dr. Richard Holmes of Dartmouth College initiated the study in 1969 and every spring since, crews of researchers walk the area in the early mornings when birds are active, and listen for bird songs.



Individual birds: Nest observations



This researcher arrived to work in the forest at Hubbard Brook before the birds returned from migration in the spring.

Individual birds: Nest observations

The researcher listened for the song of a male, and then found him with her binoculars. By watching the male, she found his female mate.



She also may have spotted the female flying with materials, such as a birch tree bark, to build a nest.

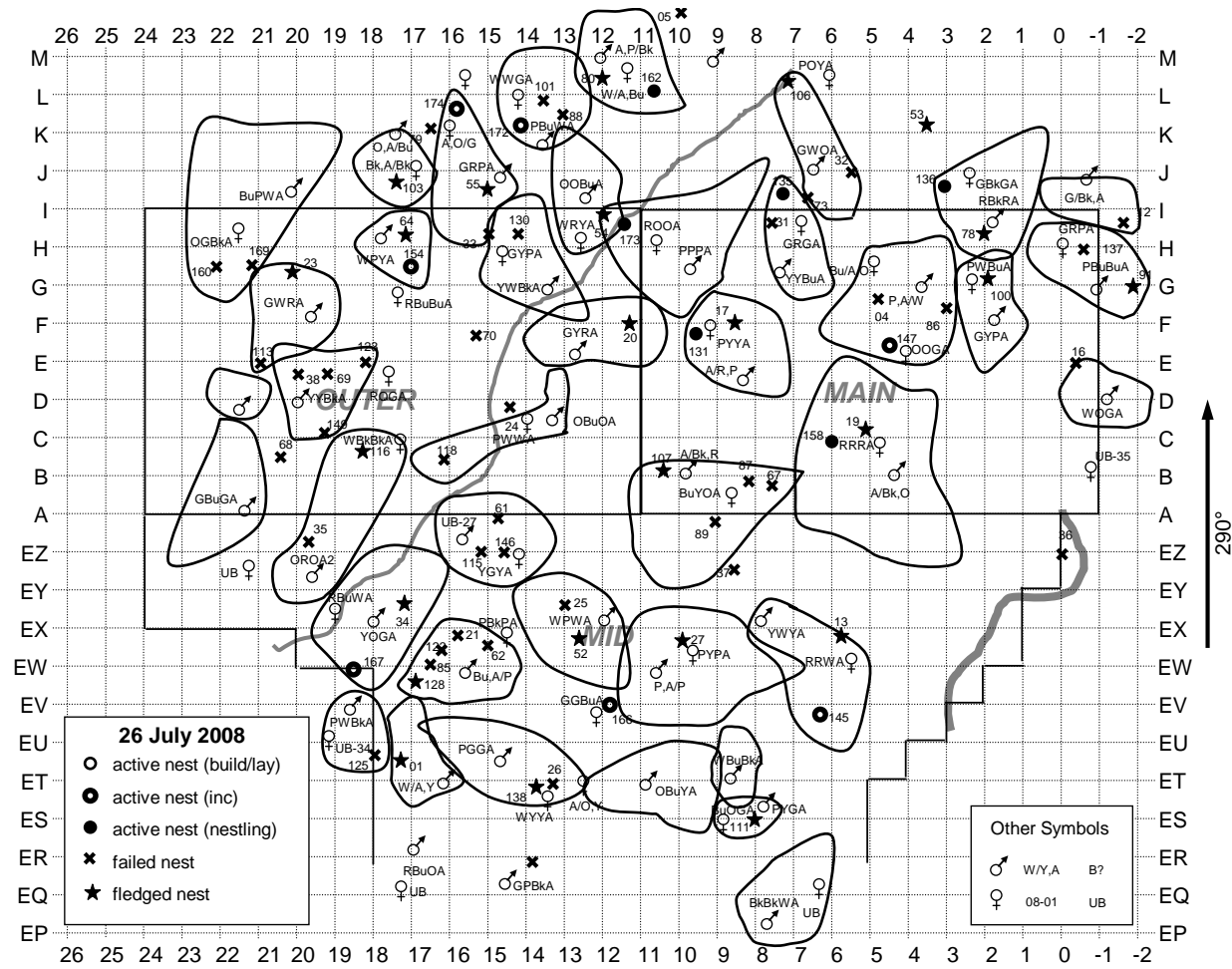
Individual birds: Nest observations



Once a nest is located, researchers place flagging on trees near the nest and write directions upon it to help them locate the nest again.

Individual birds: Nest observations

The location of the nest is also drawn on a map. The male bird's territory is drawn as well.



Individual birds: Nest observations

Researchers will visit each nest often to check for new developments.

Major milestones:



The female lays a clutch of eggs.



Eggs hatch; baby birds are called *nestlings*.



Nestlings leave the nest; now they are called *fledglings*.

Individual birds: Nest observations



This researcher is holding a nestling that just hatched from an egg.

The nestling is weighed on a balance



and a band with a unique number is attached onto its leg.



Individual birds: Nest observations

The nestling will grow into a fledgling, leave the nest and migrate to the Caribbean.

Black-throated Blue Warbler
Dendroica caerulescens



Researchers will try to find this bird again when it returns next spring!



Map by Cornell Lab of Ornithology
Range data by NatureServe



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

- *Introduction to Migratory Birds*
- and
- *Where Have All the Songbirds Gone?*



The Hubbard Brook Research Foundation gratefully acknowledges the following people for their assistance in the development of this slide show:

- Dr. Scott Sillett, Smithsonian Migratory Bird Center
- Dr. Nick Rodenhouse, Wellesley College
- Dr. Chris Rimmer, Vermont Center for Ecostudies
- Dr. Scott Schwenk, University of Vermont
- Dr. Pamela Hunt, NH Audubon
- Dr. Len Reitsma, Plymouth State University
- Bill DeLuca, Ph.D. candidate, University of Massachusetts
- Robert Royse, bird photographer