



Operation RubyThroat:



The Hummingbird Project Protocol

Introduction

Have you ever noticed those colorful little birds that fly around flowers in gardens or meadows? They seem to never stop, moving from one flower to the next; they almost look like very large insects. These tiny birds are hummingbirds—fascinating creatures that are common in many areas but about which there is much to learn. When do they migrate in the Spring and Autumn? How do storms affect their migration? Can you imagine how a strong wind might blow these miniature light-weight creatures away from their intended path? Do they even *have* an intended path?

Scientists want to learn about their migration patterns as well as their eating and nesting behavior. What flowers do they prefer to visit for sweet nectar? Will they come to a hummingbird feeder in your schoolyard? How do adult hummingbirds care for their eggs and the young



hummingbirds after they hatch? Does hummingbird behavior within their nesting range in Canada and the United States differ from that on wintering grounds in Mexico and Central America? Your observations may help answer these kinds of questions and greatly help scientists while you enjoy studying hummingbirds and their habits.

When you observe hummingbirds you are also helping scientists to better understand how animals may be responding to weather and longer-term climate change. Hummingbird migration, nesting, and eating behavior are affected by temperature, precipitation, land cover, and many other things. Taking other GLOBE measurements along with hummingbird observations will lead to interesting projects and important science findings in which you can be an important participant.

Have fun while learning about hummingbirds . . . and the natural world around you!

Background

The Ruby-throated Hummingbird (*Archilochus colubris*) is an ideal species for a cross-disciplinary science study involving students from Canada, Mexico, the United States, and all seven Central American countries. Known in Spanish as *mansoncito garganta de fuego* or *chupaflor rub*, ruby-throats are the most widely distributed of all hummingbirds. They come readily to artificial feeders and are tolerant of humans. Ruby-throated Hummingbirds are fascinating creatures that immediately capture a student's imagination and lead him or her into scientific investigation and discovery. Information and photos about RTHU biology, behavior, and ecology can be found on the Web site for "Operation RubyThroat: The Hummingbird Project" at www.rubythroat.org.

Ruby-throated Hummingbirds (RTHUs) are Neotropical migrant insect- and nectar-eaters that range from Central America to Alberta, Canada and from the eastern United States to the middle of the Great Plains. They breed in the U.S. and southern Canada, winter over from Mexico south to the Panama Canal (occasionally in southern Florida and along the U.S. Gulf Coast and very rarely elsewhere). Fig. 1 (right) shows the species' distribution.

Migration and overwintering patterns in RTHUs are poorly understood. Some experts speculate that RTHUs follow similar routes for both northward and southward migrations, with some birds flying across the Gulf of Mexico and others going overland through Mexico. In some years, RTHUs appear to move northward at approximately the same rate as the 1.7 degree C isotherm, which may correlate with availability of small insects and flowering times of several temperate plant species that provide energy-rich nectar.

RTHU migration details remain a mystery. We do not know specifically where populations from various parts of North America overwinter since no one in Mexico or Central America has reported a RTHU banded in the U.S. or anywhere in the tropics. Only about a dozen

RTHUs banded in the U.S. have been recaptured or found dead and reported from sites within the continental U.S. The first RTHU ever recaptured more than 15 kilometers away from its banding site was a young male banded and color-marked in late September 1991 at Hilton Pond Center for Piedmont Natural History near York, South Carolina, and re-trapped 10 days later near Atlanta, Georgia. Color-marked birds from Hilton Pond also have been seen or re-trapped in Mobile, Alabama, and in Cameron, Louisiana.



Figure 1: Distribution of the Ruby-throated Hummingbird (*Archilochus colubris*). RED—Breeding Range; BLUE—Winter Range; GREEN—Year-round Range

It is not clear what triggers the onset of RTHU migration, although photoperiod (length of day) appears to be a major factor. We do not understand the effects of local or regional weather and there are no scientifically useful data about the actual impact of tropical storms and hurricanes on the trans-Gulf Autumn migration of RTHUs. Winds may influence Spring migration to the breeding grounds, but no one has explored this possibility. Likewise, no one has studied extensively how RTHU migration movements may be affected by the end of flower production or by land cover changes in the tropics or North America.

Some participants will be fortunate enough to find an active RTHU nest. If this happens, students may conduct an in-depth observation of nesting behavior. Be careful not to disturb the nest and please do not report an old or abandoned nest where no activity is seen. Although RTHUs have the widest breeding distribution of any of the 338 hummingbird species, there is still much to be learned about their nesting behavior. Males are not known to build nests, incubate eggs, or care for nestlings, so any observation of adult male activity near the nest is potentially important. Female RTHUs are known to lay a second or third clutch of eggs in one breeding season, but it is not clear whether this behavior occurs regularly or because an earlier nest fails from predation or other interference. Little is known about the relationship between re-nesting, weather, and geographic latitude.

Although most observations in the eastern half of the U.S. will be RTHUs, students may encounter “unusual” hummingbirds. These include: 1) RTHUs with abnormal pigmentation, especially albinos, partial albinos, and leucistic individuals (detailed descriptions in the next section); 2) RTHUs that have been color-marked with dye or paint as part of a study of their migration patterns; or, 3) vagrant western hummingbird species other than RTHUs that wander into the eastern U.S., particularly in Autumn and Winter. It is important to record sightings of these “unusual” hummingbirds on the GLOBE data sheets and to immediately report the sightings to research@hiltonpond.org or (803) 684- 5852. Photos and descriptions of some of these “unusual” hummingbirds follow the section below that describes typical RTHUs.

Ruby-throated Hummingbird (RTHU) **Identification**

Common Characteristics

All RTHUs have backs, foreheads, wings, and tails that are dark iridescent green; since this green is a structural color and not green pigment.

Adult male RTHUs (Fig. 2) have iridescent red coloring on the throat, called a gorget, while adult females have white throats (Fig. 3); this makes it easy to determine a bird's sex in Spring when only adult birds are present. Sometimes the iridescent red and green—which are structural colors rather than pigments—appear black or brown in dim light. Newly hatched males and females do not have red on their throats and resemble adult females, making it difficult to determine sex or age among white-throated birds during late Spring, Summer and Autumn. However, young males sometimes have throats streaked with green or black and some even acquire a few red throat feathers prior to Autumn migration (Figs. 4 & 5). Young males and females of any age have white tips to their outer tail feathers. RTHUs of any age may be up to 25% smaller than females, but size should not be used as a factor when sexing hummingbirds. Please visit www.rubythroat.org/RTHUExternalMain.html for more hints on determining sex in RTHUs.

RTHUs with unusual plumage

RTHUs sometimes exhibit color patterns that are very different from their normal green, white, and red. Albino RTHUs are very rare and are completely white with pink eyes, bill, and feet. Occasionally there are also “leucistic” forms that have normal black eyes, bill, and feet (Fig. 6), but in which some or all the feathers are white, gray, or otherwise abnormally colored (Fig. 7). Visit www.rubythroat.org/AlbinoMain.html for more information about hummingbirds with unusual coloration. Record your observations of hummingbirds with unusual plumage on the data sheets and also report your data to the GLOBE Web site. If possible, take a photo of any hummingbird with unusual plumage.

Color-marked RTHUs

As part of “Operation RubyThroat: The Hummingbird Project,” RTHUs captured and banded at Hilton Pond Center for Piedmont Natural History near York, South Carolina, are color marked with temporary green dye on the upper breast or throat (Fig. 8). If you observe

any of these color-marked birds, please immediately contact Hilton Pond Center at research@hiltonpond.org or (803) 684-5852. Record your observations of color-marked hummingbirds on the data sheets and also report your data to the GLOBE Web site. If possible, take a photo of the color-marked hummingbird and try to determine whether it is banded on the left or right leg. Accurate sightings of these color-marked hummingbirds are very valuable in helping us understand Spring and Autumn migration patterns of RTHUs. For more details about the color-marking project, please refer to www.rubythroat.org/NewsRFIColormark00Sp.html.

Winter Vagrant Hummingbirds

RTHUs are the only hummingbirds that regularly breed in the region shown in red in Fig. 1; this includes 38 states east of the Rocky Mountains, plus the District of Columbia and southern Canada. Nonetheless, several western hummingbird species have been known to wander eastward, especially during Autumn migration, and a few vagrant hummingbirds winter over each year in the eastern U.S. If you are within this region and sight a hummingbird species other than RTHU—**or ANY hummingbird from 15 October through 15 March**—please immediately contact Hil-

ton Pond Center for Piedmont Natural History at research@hiltonpond.org or (803) 684-5852. Also record your observations on your hummingbird data sheets and take a photo of the bird if possible. In the eastern U.S. the most likely Autumn and Winter vagrants are Rufous Hummingbirds (see Figs. 9-12). Other possible species include, but are not limited to: Anna's Hummingbird, Black-chinned Hummingbird, Blue-throated Hummingbird, Broad-billed Hummingbird, Broad-tailed Hummingbird, Buff-bellied Hummingbird, Calliope Hummingbird, Green Violet-ear, and Magnificent Hummingbird. Observers in states along the Gulf of Mexico may see unusual hummingbirds that wander in from Mexico. For photos and descriptions of other hummingbird species that may occur in your study area, see www.rubythroat.org/OtherSpeciesMain.html, an refer to www.rubythroat.org/ResearchHummerVagrantMain.html) **NOTE:** As many as ten species of hummingbirds from the western U.S. have been reported east of the Rocky Mountains during winter. Students should make careful observations about any winter vagrant hummingbirds and record specifics about color and patterns. A clear photograph will be useful when experts try to identify the bird.



Figure 2: Adult male Ruby-throated Hummingbird, with full red gorget



Figure 3: Adult female Ruby-throated Hummingbird, with unmarked white gorget (Young female RTHUs and most young males also have unstreaked white throats.)



Figure 4: Young male Ruby-throated Hummingbird, with throat streaking.

Figure 5: Young male Ruby-throated Hummingbird, with few red gorget feathers and throat streaking.



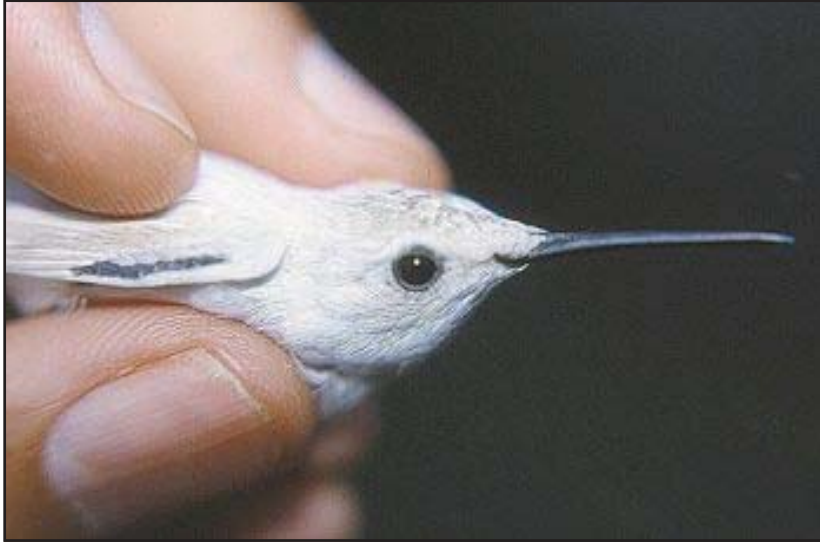


Figure 6: Heavily leucistic Ruby-throated Hummingbird, with white feathers, black eyes, and black bill.

Figure 7: Partially leucistic Ruby-throated Hummingbird, with buffy and brown feathers.



Figure 8: Female Ruby-throated Hummingbird with green color marking on throat and upper breast.



Figure 9: Adult male Rufous Hummingbird (*Selasphorus rufus*). Note overall rusty coloring and iridescent orange gorget (rather than red of Ruby-throated Hummingbirds). This species breeds in western Canada and NW U.S. and normally winters in Central Mexico. Female and young male Rufous are far more likely to be seen than adult males in fall and winter in the eastern U.S.

Figure 10: Female Rufous Hummingbird. Note rusty sides, rust at base of tail (sometimes hidden), and scattered greenish or metallic-greenish feathers on gorget (Notice band on the bird's right leg.)



Figures 11 & 12: First-year male Rufous Hummingbird. Note streaking on throat, hints of rust especially at base of tail, streaking on throat, and sometimes one or more iridescent orange gorget feathers—not red as in the Ruby-throated Hummingbird. Among Rufous Hummingbirds, females and young males vary considerably in the amount of rust color in their plumage. Many individuals may not look like the ones in the photos above.