

# The **Mystery** of the **Missing** **Hummingbirds**

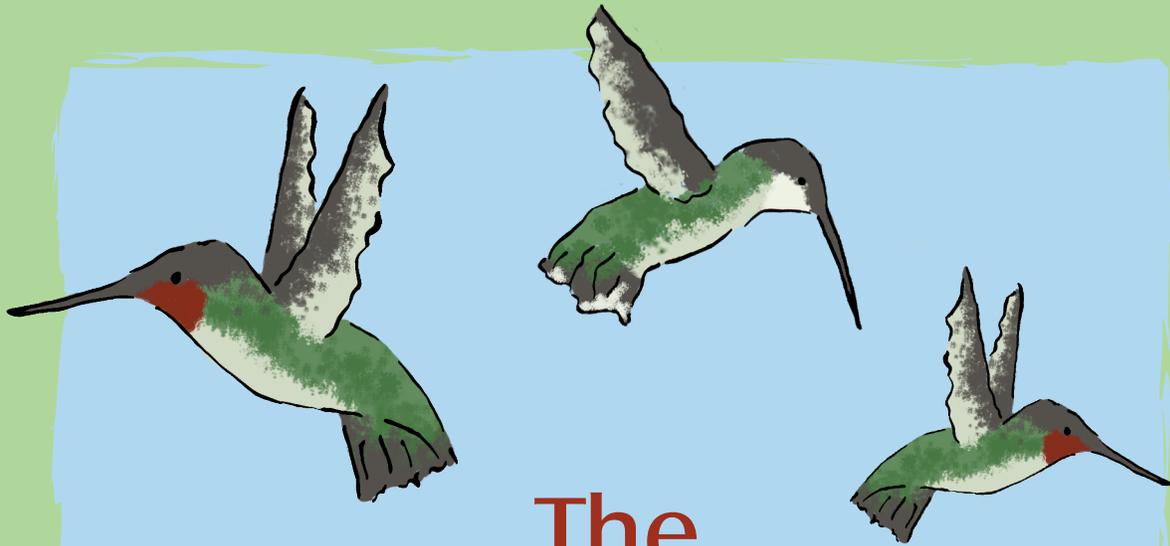


Text by  
Becca Hatheway  
and Kerry Zarlengo

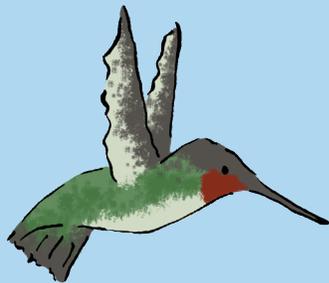
Illustrations by  
Lisa Gardiner

Elementary  GLOBE™



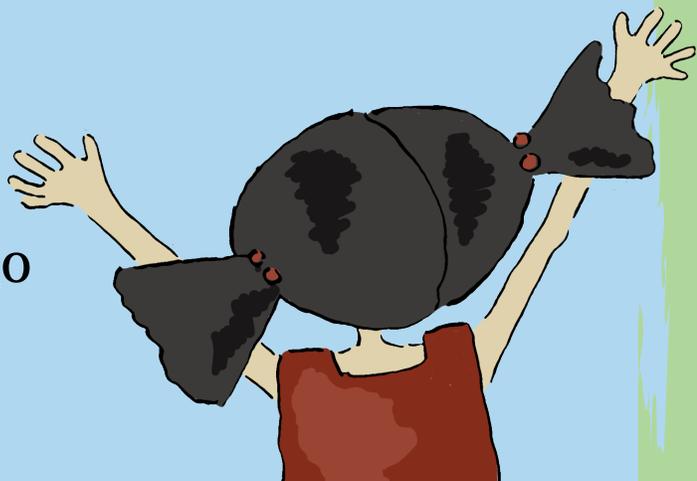


# The Mystery of the Missing Hummingbirds



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“Our classroom is too hot,” complained Simon. He opened a window and a warm breeze rushed in.

Ms. Patel got her students’ attention and said, “Isn’t it funny that even though school has started it is still summer? Class, what does summer mean to you?”

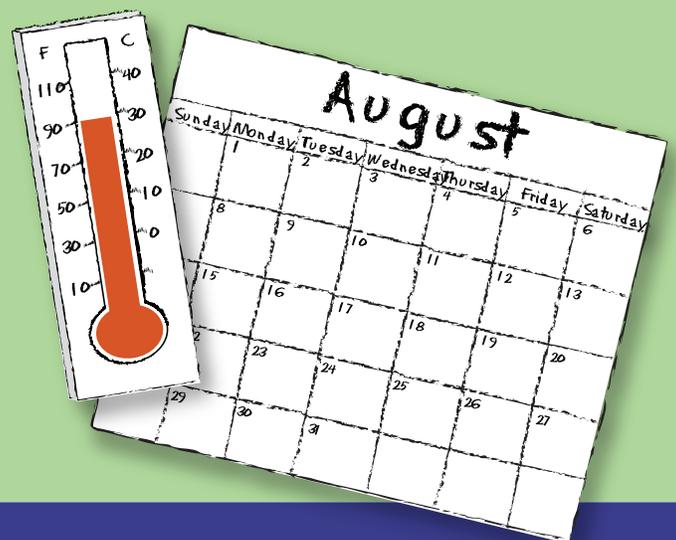
“Not being in school,” blurted Simon. The class giggled.

Dennis raised his hand, “Swimming at the pool makes me think of summer,” he said.

“It is still light out after dinner so I can play outside. That’s what summer means to me,” commented Anita.

Simon added, “Seeing lots of flowers, bees, and butterflies in the garden reminds me of summer.”

“Great ideas, class,” commented Ms. Patel. “One of our projects this school year is to do a scientific investigation about how our school’s garden changes during summer, fall, winter, and spring. Let’s go outside now to observe the garden in summer.”





The class went outside to the garden to make their observations.

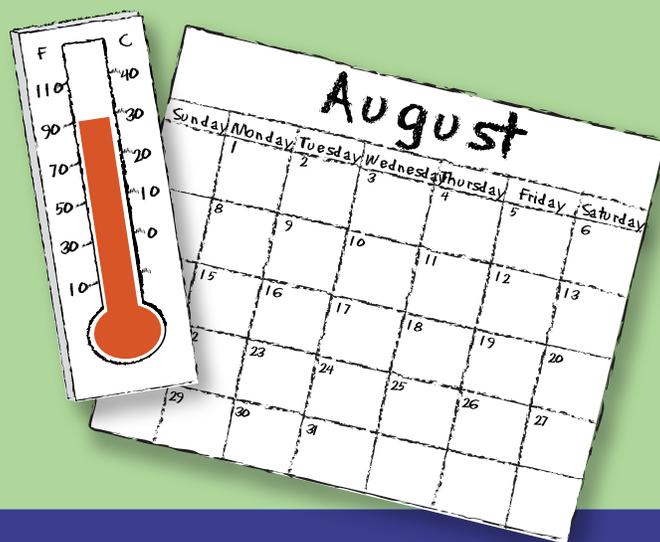
“I smell flowers,” said Simon.

“I hear birds chirping,” said Dennis. “Hey, where did Anita go? She was just here but now I don’t see her.”

Ms. Patel wandered around the garden to watch what the children were recording in their journals. When she got to the bench where Anita sat, Ms. Patel commented, “Wow, Anita, I love all the details you are putting in your hummingbird sketch.”

Anita looked up with a sparkle in her eye. “This bird is so cool, Ms. Patel! Listen to the buzzing from its wings – I had no idea hummingbirds were that noisy! I also didn’t know how small they are – this one is smaller than my hand!”

Simon looked up from his journal and said, “Here we go again! Last year Anita always talked about critters in the soil. I guess this year it’s going to be hummingbirds.”





One autumn morning a few months later, Anita rushed into class to find Ms. Patel.

Ms. Patel said, "Anita, you look upset. What is wrong?"

Anita replied, "They're gone!"

"Who is gone?" asked Ms. Patel.

"The hummingbirds! Ever since I saw them in our garden I have been watching them every day. Sometimes I see them by the flowers and sometimes they are by the hummingbird feeder, but I was always able to see them somewhere. Where are the hummingbirds? It has been three days since I have seen any of them!" Anita exclaimed.

"Slow down, Anita," said Ms. Patel calmly as the bell rang and the other students came into the classroom. "I am not sure what has happened to the hummingbirds, but your question comes at the perfect time. Today our class is going to choose a question for our science investigation. Tell the class about this hummingbird mystery. It might make an interesting investigation."

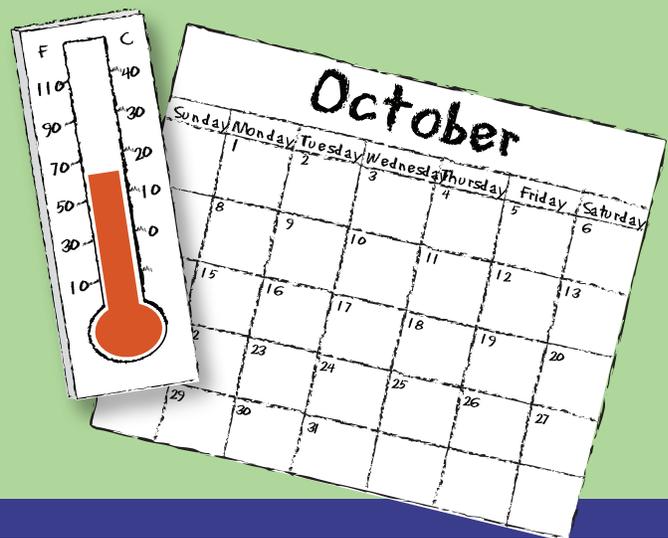


That afternoon Ms. Patel gathered the class together. “We have made observations in our garden during the seasons of summer and autumn,” she told the class. “What kinds of changes have you noticed? Use your journals to come up with some ideas. Then we will choose a question for our science investigation.”

As the students took turns describing their observations and asking questions, Ms. Patel recorded their ideas on a chart. Eventually, Anita raised her hand and said, “I am worried about the hummingbirds. They used to be in the garden or at the feeder, but I haven’t seen them for three days.”

Dennis replied, “Me, too! I wonder if something has changed in our garden that made the hummingbirds go away?” The whole class chimed in that they agreed with Anita and Dennis.

“Well, it sounds like we have our research question. First the hummingbirds were in our garden and now they are gone. We will investigate why they left and where they went.”



A woman with long dark hair, wearing an orange dress with decorative patterns, stands on the left side of the page. She is pointing with a blue marker towards a large white sign on an easel. The sign contains text about autumn. In the background, there is a tree with orange and yellow leaves and some fallen leaves on the ground. The sky is blue with some clouds.

Why are the leaves changing colors?  
Some leaves have fallen off the trees.  
Most flowers aren't blooming anymore.  
There were a lot of butterflies in summer.

The garden has different colors  
in autumn than in summer.

The squirrels are busy gathering nuts.  
Why is it warmer in summer than autumn?  
Some flowers got taller at summer's end.

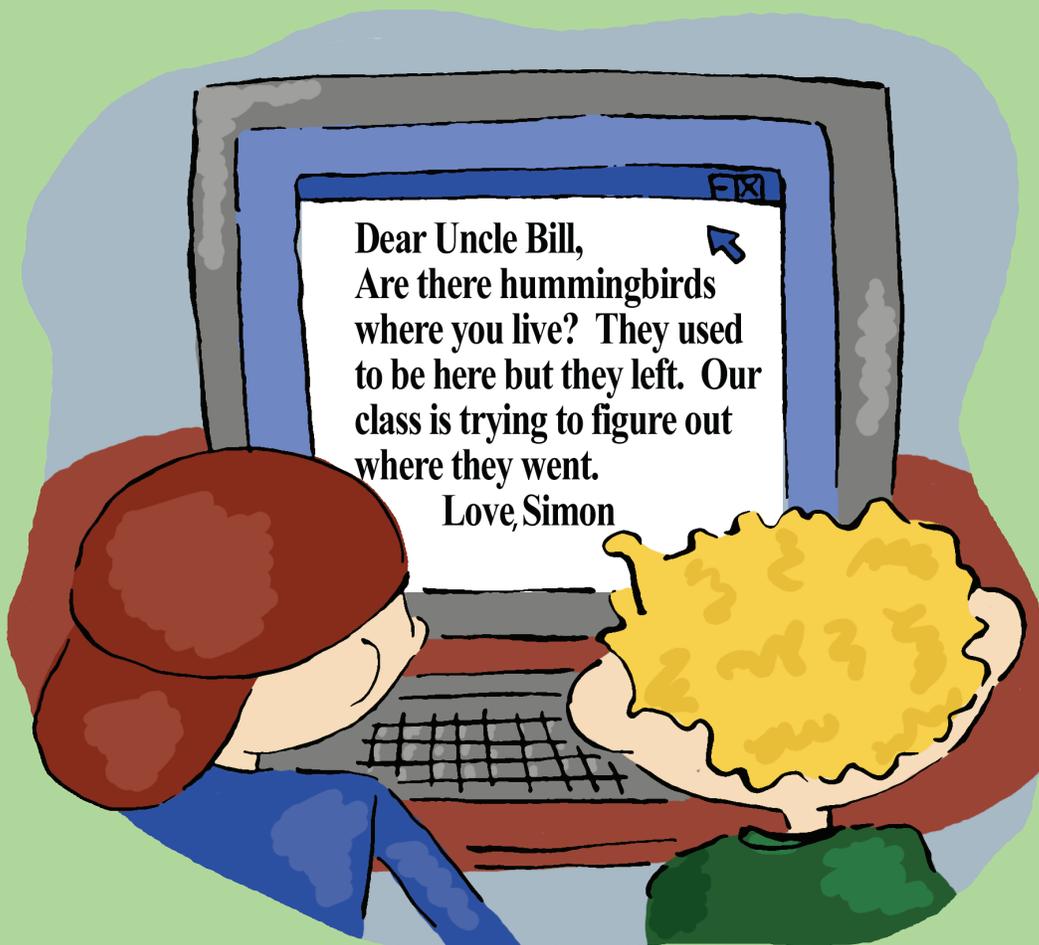
Where did the hummingbirds go?

“It’s going to take some work to answer this question,” said Dennis.

“We’ll all have to work hard,” Anita agreed.

The students broke into three groups. Anita’s group did Internet research in the computer lab. Dennis’ group went to the school library to gather information from books and maps. And Simon’s group sent out emails to friends and family around the country to see if any of them had information on these hummingbirds.



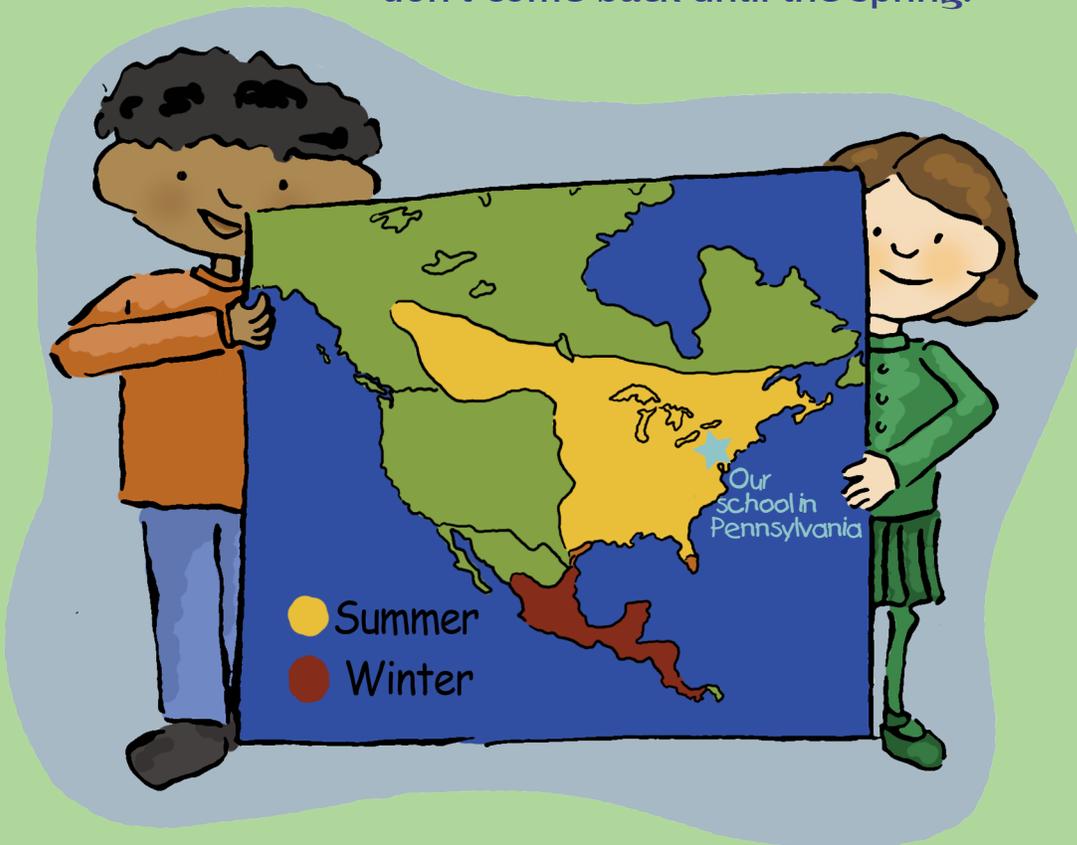




When the class shared their research findings a few weeks later, each group was bursting with excitement about what they had learned.

Ms. Patel asked each group to reveal their most important fact. Anita gushed, “We now know what kind of hummingbird comes to our garden. It is called the ruby-throated hummingbird! Only the adult males actually have a red throat, but that’s how they got their name.”

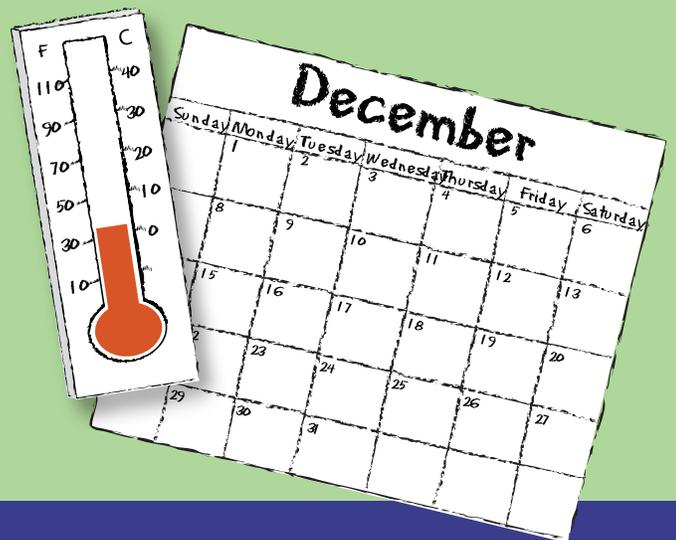
Next, Dennis explained, “We learned that these hummingbirds migrate south to Mexico and other countries in Central America. They leave where we live in Pennsylvania by October and don’t come back until the spring.”





Last, Simon's group shared that they talked to family and friends from around the United States. They learned that the ruby-throated hummingbirds had also left those locations. Simon added, "My Uncle Bill lives in South Carolina, and he saw the last hummingbird there a few weeks after we saw our last one. We also emailed my cousin Ernesto in Costa Rica to find out if ruby-throated hummingbirds live there in the winter."

The class could hardly wait to hear back from Ernesto. They hoped he could help them solve this mystery.



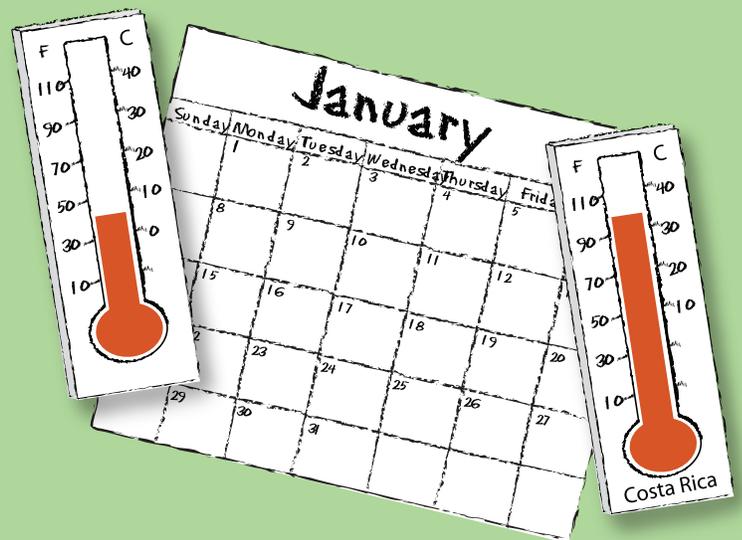
Escuela de Guanacaste



In Costa Rica, Ernesto's teacher Señor Chavez said to his class, "Buenos días, clase. Ernesto has some news for us from his cousin in the United States. They have asked us to do some research for them!"

Ernesto read Simon's email out loud. "My cousin Simon asked us to make some observations outside. We need to find out if the ruby-throated hummingbirds have migrated here. Our Spanish word for this kind of bird is "colibrí garganta rubí." If we find them, Simon wants to know what the birds do down here."

Señor Chavez smiled, "This will be a great way to learn more about what is happening outside of our school! Hopefully we can also learn from Simon's class what it is like where they live. Let's take our journals outside and record what we find."



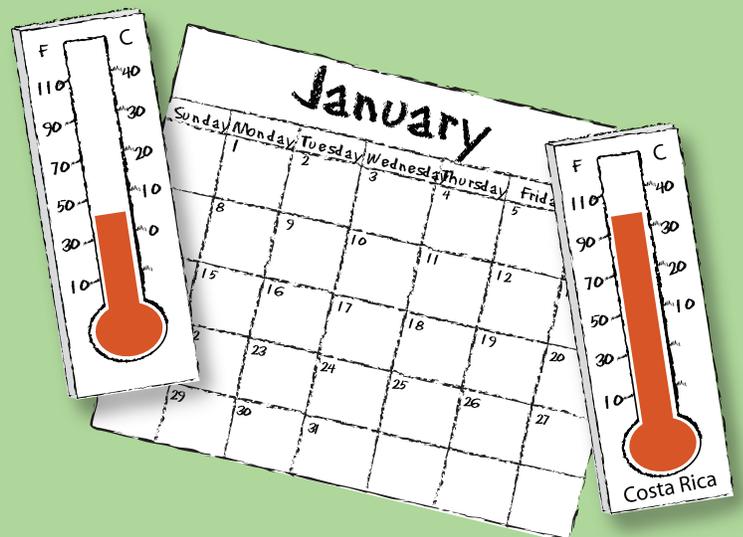


Once outside, some of the students made sketches of the different flowers, trees, and other plants they saw. Others went to their instrument shelter and recorded the current temperature. Ernesto and a few others actually saw some hummingbirds!

Many different kinds of hummingbirds live in Costa Rica, so they made careful observations of what the birds looked like. They knew that adult male ruby-throated hummingbirds have a red throat.

Eventually, they noticed a red-throated hummingbird drinking nectar from a lantana flower. They took a picture of the bird so they could email it to Simon to show that the ruby-throats were in fact in their area.

After finishing their observations, Ernesto's class went inside to record their data and to send information back to Simon's class.



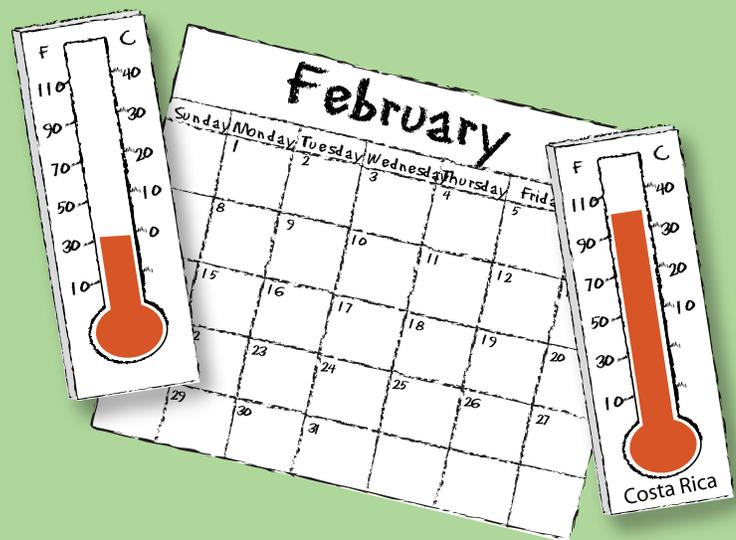
Back in the U.S., it was a cold winter day in Ms. Patel's classroom. Anita was staring at the empty hummingbird feeder covered with snow.

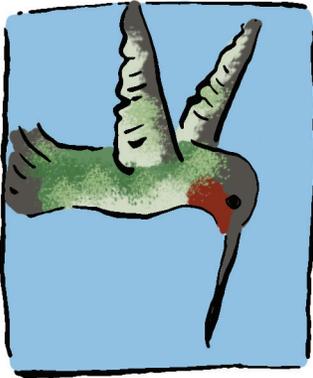
Simon looked up from the computer where he was checking his email. "Ms. Patel! Look at this email I just got from Ernesto. His class has seen some ruby-throated hummingbirds. They made a chart for us of their observations, and he even sent a picture of the bird!"

The class gathered around Simon to see the information. Dennis said, "The landscape looks so different there compared to what it looks like here in winter."

"Do you think they know how different it is here?" asked Anita.

"We should send them a chart about the weather in February where we live," said Simon.





**We saw ruby-throated hummingbirds!**

**Where: Our school's garden in Costa Rica**

**Plants that we saw:  
Jocote trees, turk's cap, and lantana**

**The weather was:  
27 degrees Celsius (80°F), sunny, hot, no rain**

**We saw 7 birds perched in shrubs and on Jocote tree branches. They drank nectar from flowers, hovered around the bird feeder, and flew around the students in the garden.**

**The birds were 8 cm (3 in) long and had long, thin beaks. Some have a red spot on their throats.**



During the next few months, the two classes continued to write to each other. Anita always looked forward to the pictures they received of the ruby-throated hummingbirds. She missed them.

One day, Simon got an email from Ernesto that said, “Be on the alert! The ruby-throated hummingbirds have been eating lots of insects instead of nectar. We learned that’s because they are preparing for their long journey north. There aren’t as many birds here now, so we think you might see some soon! Please let us know what happens....”

The email also said, “Are there any leaves on your trees? Have any flowers bloomed yet? The birds will need food and shelter and we want to make sure they will be okay.”

“Are there enough flowers outside yet?” fretted Anita, “I don’t think I’ve seen many.”

“Let’s go out every day so we can notice when the buds burst on the trees and when the birds arrive,” Ms. Patel replied. “I know it’s hard, but we will have to be patient.”

Dennis smiled, “Hey everyone, I have a feeling we will be able to answer all of our research questions soon.”

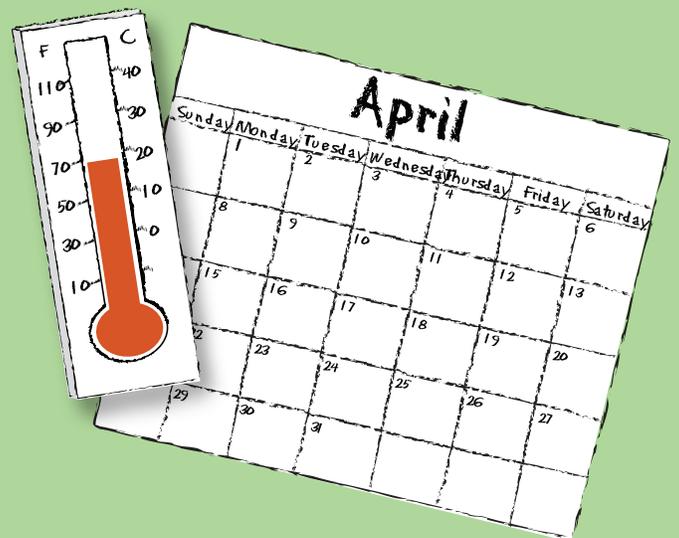


Over the next few weeks, the class started to notice flowers blooming and green leaves on the trees. On one sunny day, the students were scattered throughout the garden, sketching flowers and animals and collecting weather data at the instrument shelter. Anita was concentrating on her drawing of a trumpet honeysuckle vine when she heard a loud buzzing noise. Right away she knew it was a hummingbird!

“They’re back!” Anita exclaimed. The other students rushed over to Anita. They all cheered and jumped up and down with excitement.

Simon added, “Let’s go send an email to Ernesto’s class to let them know the birds are arriving safe and sound.”

Ms. Patel called out, “And after that we can figure out why it was time for the hummingbirds to come back here. In your season journals you have all the information you need to figure out this mystery.”



**HUMMINGBIRDS**

Needs  
blooming flowers  
insects to eat  
tree leaves to live in

They can't get these things here during our winter so they go to Central America

**SUMMER**

lots of hummingbirds

leaves are green

lots of flowers

hot outside

**AUTUMN**

hummingbirds go away

leaves turn colors

plants lose flowers

cool outside



In the classroom the students posted information about the seasons and the hummingbirds. Ms. Patel added information Ernesto's class sent about Costa Rica. Then they stepped back to look at all the information.

They worked together to draw some conclusions from this big research project. The hummingbirds were in their garden only when flowers and other plants were blooming and there were insects around. They decided the hummingbirds could stay there only when they had enough food and shelter.

## WINTER

Here-  
no hummingbirds  
bare trees  
no flowers  
cold outside

in Costa Rica -  
lots of hummingbirds  
green leaves  
blooming  
flowers  
hot outside

## SPRING

Hummingbirds  
return!

leaves bud on trees

flowers  
start to  
bloom

warm outside



"You have done a wonderful job," announced Ms. Patel. "Do you all realize that you have been scientists this year? You made observations, asked a question, collected data, shared your results, and made conclusions. I am very proud of you."

Anita smiled and added, "This was so much fun. And even though the hummingbirds will leave again next autumn, they will always come back in the spring."



A few weeks later, summer vacation was about to begin. The students were busy packing up their supplies.

“Our classroom is too hot,” complained Simon as he opened a window.

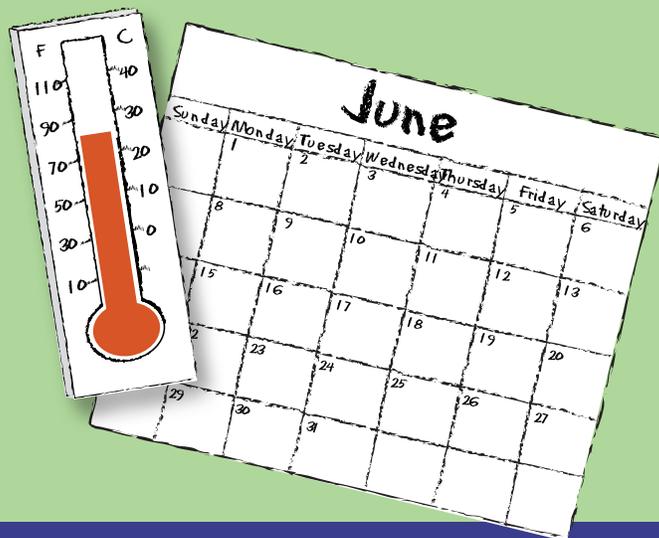
Anita glanced out the window because something caught her eye. She stopped what she was doing.

Dennis called out, “Anita, are you still looking for the hummingbirds? You know they are out there and you will have all summer to watch them.”

Anita turned around with a sparkle in her eye. “No, it is something new this time. I just noticed a long white line trailing behind an airplane in the sky. I wonder what that is....”

Simon put his hand on top of his head and said, “Oh no, here she goes again. Anita, we are going to have to wait until we are together again next school year to answer that question!”

Ms. Patel smiled and said, “That’s for sure. Thankfully we will never run out of things to investigate.”



# Teacher's Notes

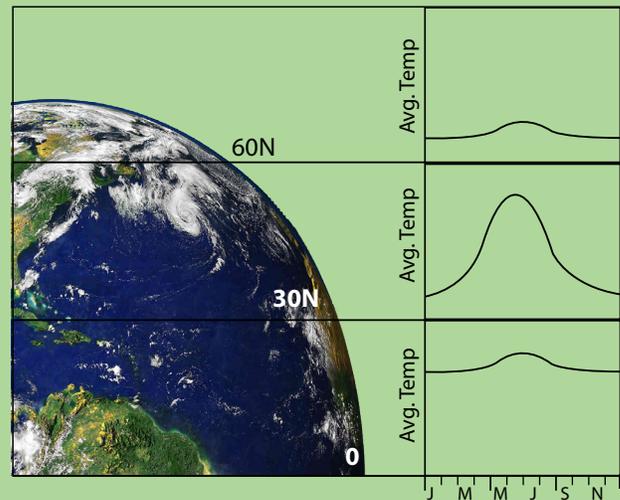
## About Seasonal Changes

Seasonal changes include variations in day length or duration of sunlight, precipitation, temperature, and other factors that impact living things. These factors cause yearly cycles in plants, animals, and other living things such as green-up of plants as temperatures warm in the spring at mid-latitudes and green-down of plants in the autumn as temperatures cool. For animals, cycles include migration of birds, spawning of fish, and hibernation of bears, to name a few.

## Different Latitudes and Regional Climates

This book takes place in two different regions of the planet. The GLOBE school in the United States is in a mid-latitude location with a temperate regional climate and the Costa Rican GLOBE school is at a low-latitude with a tropical regional climate. Seasons are different in these two regions.

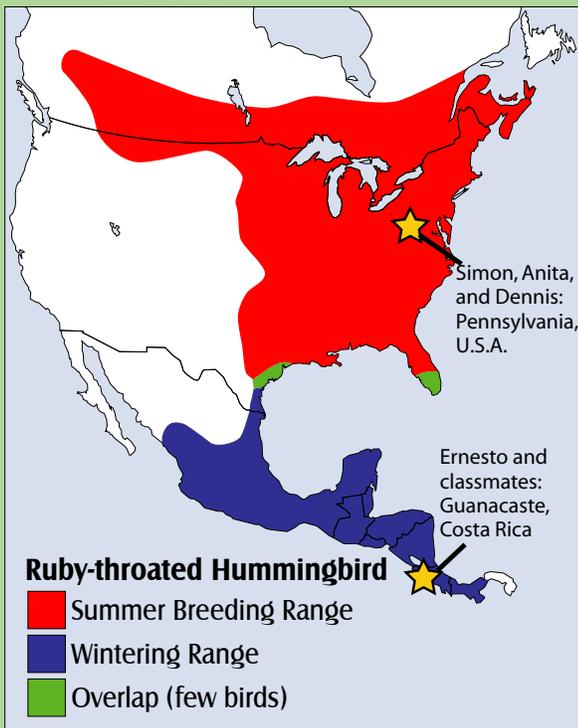
Because Costa Rica is at a low-latitude, it receives relatively consistent amounts of sunlight throughout the year, so there are fewer seasonal changes in temperature and day length than there are at higher latitudes. Costa Rica does have seasonal changes in precipitation with distinct rainy and dry seasons. Much of the continental United States is located in the mid-latitudes where there are four distinct seasons and yearly cycles of plants and animals are pronounced.



Seasonal changes in the amount of sunlight and day length are caused by the Earth's tilt. It's summer in the hemisphere tilted towards the Sun, and winter in the hemisphere tilted away from the Sun. As Earth travels around the Sun, the hemisphere that is tilted towards or away from the Sun changes. Tropical places that are close to the equator get about the same amount of sunlight all year long. Mid-latitude locations get somewhat less sunlight during the winter. At high-latitude locations, such as the Arctic, the Earth's tilt means that there is little or no sunshine during the winter. These locations have a polar regional climate.

## What Is Phenology?

Phenology is the study of how and when living things respond to seasonal changes in their environment. Changes in the timing of plant or animal responses to seasonal changes can be an indicator of climate change. Phenological observations and measurements are often inexpensive and easy to do with students. See the Biosphere section of the GLOBE Teacher's Guide ([www.globe.gov](http://www.globe.gov)) for information about observing seasonal changes such as when plants "green up" in the spring.



## Ruby-throated Hummingbirds and Migration

The birds described in this storybook are ruby-throated hummingbird (*Archilochus colubris*), known in Spanish as the colibrí garganta rubí. They are the most widely distributed of all hummingbird species, come readily to artificial feeders and are tolerant of humans. Ruby-throated hummingbirds are insect- and nectar-eating hummingbirds that range from Central America to Alberta, Canada, and from the East Coast of the United States to the middle of the Great Plains. They breed in the eastern U.S. and southern Canada, and over-winter from Mexico south to the

Panama Canal (occasionally in southern Florida and along the U.S. Gulf Coast). The map at left shows the species' distribution. Some birds fly non-stop across the Gulf of Mexico; others fly overland through Mexico. Scientists think ruby-throated hummingbirds begin their migration north in the spring and south in the autumn due to changes in day length, but are not sure why they migrate instead of staying in Central America year-round like other types of hummingbirds.

## Learn More About Hummingbirds.

More information and photos about ruby-throated hummingbird biology, behavior, and ecology can be found at Operation RubyThroat: The Hummingbird Project ([www.rubythroat.org](http://www.rubythroat.org)).

# GLOSSARY

## **Adaptation**

A biological adaptation is a trait of an animal or plant that is helpful for its survival. For example, the shape of a hummingbird's beak is an adaptation that allows these birds to eat nectar from flowers.

## **Earth System**

All parts of the Earth, including the atmosphere, hydrosphere, geosphere, pedosphere (soils), cryosphere (ice), and biosphere, and the processes that connect them (such as the movement of energy, water, and carbon)

## **Equatorial**

Located at or near the equator

## **Green-down**

When plants start changing colors and/or lose their leaves at the end of a growing season

## **Green-up**

When plants sprout new growth (such as new leaves) and buds burst at the start of a growing season

## **Latitude**

Lines parallel to the equator that are used to describe the location of a region of Earth with respect to the equator. Latitude is measured in degrees. The equator is 0 degrees latitude and the poles are at 90 degrees north or south latitude.

**Mid-latitude**

Locations at latitudes between 30 and 60 degrees north or south of the equator

**Migration**

The movements of an animal from one region to another in order to breed, grow, or find food (most often this is periodic travel to and from a region at a particular season and along a well-established route)

**Phenology**

The study of natural responses of living organisms to seasonal and climatic changes in their environment. Examples of phenological events include migration of birds and butterflies, flowering, and salmon spawning. Plant phenology includes green-up and green-down.

**Polar**

Regions on Earth north of 60 degrees latitude in the northern hemisphere and south of 60 degrees latitude in the southern hemisphere

**Seasonal Cycle**

The regular annual progression through seasons (such as winter, spring, summer, and autumn)

**Tropical**

Of, occurring in, or characteristic of the tropics at locations with a latitude less than 30 degrees north or south of the equator



The GLOBE Program is a hands-on international education and science program that joins students, educators, and scientists from around the world in studying Earth system science (ESS). The core objectives of GLOBE are to improve science education, enhance environmental awareness, and increase understanding of Earth as a system. For more information, please visit [www.globe.gov](http://www.globe.gov).

Elementary GLOBE is designed to introduce K-4 students to the study of Earth system science (ESS). Elementary GLOBE forms an instructional unit that comprises multiple modules that address ESS and interrelated subjects including aerosols, seasons, soils, water, weather, and climate.

Each Elementary GLOBE module contains a science-based storybook, classroom learning activities that complement the science content covered in each book, and teacher’s notes. The storybooks explore a component of the Earth system and the associated classroom learning activities provide students with a meaningful introduction to technology, a basic understanding of the methods of inquiry, and connections to mathematics and literacy skills. For more information, please visit [www.globe.gov/elementaryglobe](http://www.globe.gov/elementaryglobe)

## Book and Learning Activity Credits

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# Anita REALLY likes Hummingbirds

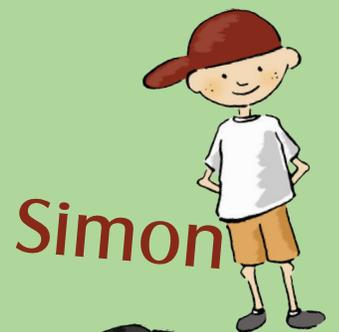
She watches them.

She draws pictures of them.

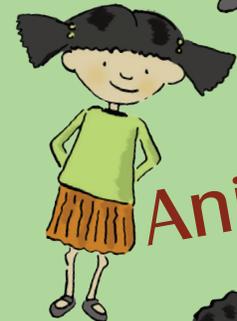
But one day in the fall, the birds are mysteriously gone. Simon, Anita, Dennis, and their classmates discover why the hummingbirds left and where they went.



This storybook is one of several books in the Elementary GLOBE unit. Elementary GLOBE is designed to introduce K-4 students to the study of Earth system science (ESS). The books form an instructional unit that addresses ESS and related subjects including aerosols, weather, water, seasons, soils, and climate. The science content provided in the books serves as a springboard to GLOBE's scientific protocols, and also provides students with a meaningful introduction to technology, a basic understanding of the methods of inquiry, and connections to mathematics and literacy skills. Each book has associated hands-on Learning Activities to support learning exploration. For more information, please visit [www.globe.gov/elementaryglobe](http://www.globe.gov/elementaryglobe).



Simon



Anita



Dennis