

## Thinking Like a Scientist Series

(By Kathryn Green & Molly Phillips)

### ***How Scientists Use Natural History Collections Data to Answer Questions About Plants and Animals***

**Scenario:** You're walking in the woods on a science field trip, and suddenly you hear a rapid tapping noise. Is someone doing construction out here in the woods? As you look around puzzled, your friend remarks that she hears a woodpecker, and suddenly your confusion subsides. Your teacher thinks it's a Red-cockaded woodpecker, but anyone who can build a case for that identification will earn extra credit. You decide to make it your mission to think like a scientist and determine if the Red-cockaded woodpecker lives in these woods.

**What you need:** A computer with internet access. **Goal:** To examine the natural history data of the Red-cockaded Woodpecker.

#### **First:**

- Open an internet browser (e.g., Chrome, Firefox, Safari).
- To find the scientific or Latin name (the binomial name or the combination of the organism's genus and specific epithet) for the Red-cockaded Woodpecker, go to <http://eol.org/> (Encyclopedia of Life).
- Type in *Red-cockaded Woodpecker* into the search bar and click **Go**.
- Copy the scientific name (The Latin name displayed above the common name – it is in italics) here: \_\_\_\_\_

#### **Next:**

- Go to <https://www.idigbio.org/portal>.
- Search for the records of the Red-cockaded Woodpecker by typing *Picoides borealis* into the search box **ScientificName** and hit enter.
- Select the box **Must have a map point** so you will only look at records that have GPS coordinates (they are the points displayed on the map).
- Open the first record from your search by scrolling down past the map and clicking on the blue **View** on the right side of the first row.
- When you click on a specimen record a new window will open. The top of the window will contain a summary of the record. If you scroll down you can find all of the data associated with this particular museum specimen.
  - Look at what kinds of data scientists regularly collect. Under "Data", there are five subheadings. What are they? \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_

- ii. What data would you need if you were a scientist studying the geographic distribution of a species through time?

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- iii. Red-cockaded woodpeckers are listed as a vulnerable species. Why do you think it's important to record this data for a vulnerable or declining species?

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### Then:

- II. Scientists use maps to visualize spatial data about organisms. They create distribution or range maps to understand where organisms occur in space and time. We will create our own range maps next.

- a. Go back to the first portal tab that contains your search results for *Picoides borealis*.
- b. The map displays individual locations where museum specimens were collected in the field. You can zoom into North America by using the + button at the top right of the map and by clicking on the map and moving the view to center North America.
- c. Click on a point on the map. A pop-up will show the data associated with that map point (there might be more than one specimen for each point!). What state is the map point in? \_\_\_\_\_  
What is the latitude and longitude of the map point? \_\_\_\_\_
- d. Now look at how all the points on the map are distributed. Identify the points that seem far away from the majority of the other points. Click on one point that seems far away from the other points. What country and state was the specimen found in?

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Why do you think this "outlier" point occurs such a distance from the others?

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- e. Scientists use museum specimen data to create current maps of an organism's current and former distribution. Click on each of the outliers. Click on **view record** in the small box that appears when you click on the point and read the record. Are there any records you would not include in your range map? Why not?

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- f. Create an image of your map by clicking on the **Camera Icon** at the top right side of the map.

Look at the distribution map at Cornell University's Red-cockaded Woodpecker website:

[https://www.allaboutbirds.org/guide/Red-cockaded Woodpecker/id](https://www.allaboutbirds.org/guide/Red-cockaded_Woodpecker/id). Look at the map you generated using specimen data and the map that was created by scientists using specimen and observational data. What are the differences and why are they different?

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### Finally:

One biotic factor that limits the distribution of Red-cockaded Woodpeckers is their reliance on old-growth pine forests. Research has shown that they prefer the Longleaf Pine over other species for foraging and nesting. We will now conduct an additional search in the iDigBio Portal for Longleaf Pine (*Pinus palustris*) to show the relationship between these two species.

- Search for records of the Longleaf Pine by hitting **Enter** after *Picoides borealis* and typing *Pinus palustris* in the line below in the field **ScientificName**.
- Click on the button **add EOL Synonyms**. This will add records that have slight variations in the name (such as a subspecies), or are still referenced under outdated taxonomy. Note the birds are in blue and the plants are in other colors on the map.
- Examine the map. How does the distribution of the Longleaf Pine relate to the distribution of the Red-cockaded Woodpecker?

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- Remove the Red-cockaded Woodpecker from your search hitting **clear**, re-entering *Pinus palustris* into the **ScientificName** field, and clicking **Add EOL Synonyms**.
- Create a map by zooming into the South Eastern United States and clicking the camera button.
- Compare the map you made with a range map created previously by scientists.  
<http://www.pollenlibrary.com/map.aspx?map=Pinus-palustris.png>  
How does your map compare to the scientists' map?

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**In conclusion:**

1. Based on what you have observed how could people help increase the number of Red-cockaded Woodpeckers?

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2. The Biodiversity Spotlight mentions that Red-cockaded Woodpeckers are a keystone species. Would a decline in Red-cockaded Woodpeckers affect other species in the ecosystem? How so?

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3. Search for *Campephilus principalis* (Ivory-Billed Woodpecker) in the database. In what year was the most recent specimen collected? \_\_\_\_\_ Ivory-Billed Woodpeckers are extinct due to loss of habitat. How does this relate to Red-cockaded Woodpeckers and Longleaf pine?

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4. Design two other research questions that could be answered in part with data from iDigBio.

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5. To earn your extra credit, does the Red-cockaded Woodpecker live in the forests near your school?

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