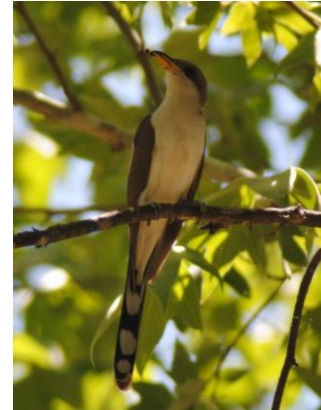




River Pathways Introduces ArcGIS Online

The yellow-billed cuckoo (*Coccyzus americanus occidentalis*) is a slender bird with a bright white chest, a long spotted tail, rufous-tinged wings, and a slightly curved yellow and black bill. It is no bigger than a dove, but its distinctive knocking call can be heard hundreds of meters away. This distinctive call, along with their tendency to call in response to thunder before a storm, has earned them the nickname the “rain crow”.

Each summer, these birds migrate northward from South America to breed in North and northern Central America. In their breeding range, they fall into two distinct populations. East of the Continental Divide, they breed in deciduous woodlands. This eastern population is considered stable and the bird is fairly common. West of the Continental Divide and the Rocky Mountains, they require entirely different breeding habitat. This western population once occurred from British Columbia south into Northern Mexico, but can now only be reliably found in Arizona, California, and New Mexico. Even in this core range, their numbers are much lower than they historically were – so much so that the United States Fish and Wildlife Service listed them as a threatened species under the Endangered Species Act in 2014.



Western yellow-billed cuckoo
(*Coccyzus americanus occidentalis*)

To effectively protect the western yellow-billed cuckoo, wildlife scientists must first determine what type of habitat it requires to successfully breed. Once identified, this habitat must be protected.

In this computer activity, you will:

- Learn the basics of using ArcGIS Online - a computer program that allows you to overlay maps so you can visually interpret geographic data
- Utilize actual western yellow-billed cuckoo data collected by scientists in the field to determine what habitat type the bird requires
- Prepare yourself to use GIS technology to answer other scientific questions



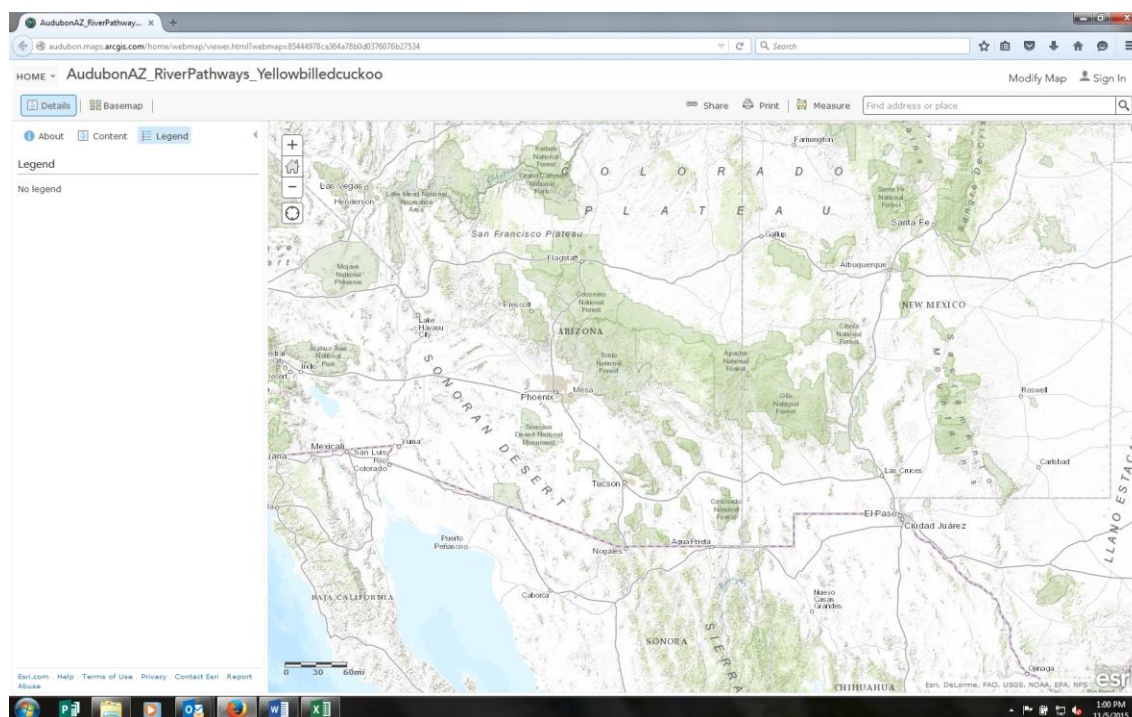
To investigate western yellow-billed cuckoo breeding habitat using ArcGIS Online, you will have to complete the **Five Steps of Geographic Inquiry**

- 1) ASK a question: To protect the western yellow-billed cuckoo, where would you start?
- 2) ACQUIRE geographic resources: Build a map showing cuckoo strongholds, political boundaries, and Audubon resources.
- 3) EXPLORE geographic data: Where has critical habitat for cuckoos been proposed? Does the habitat follow any geographic features?
- 4) ANALYZE: In which counties is cuckoo habitat concentrated? Which Audubon chapters are responsible for those counties?
- 5) ACT: What would you do with this information?

Task 1: Open the map

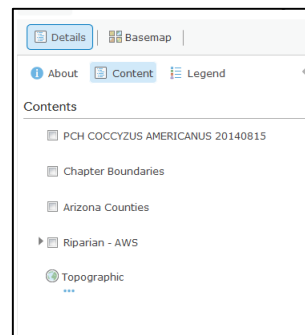
A map has been created for you to use in this exercise. When the map document opens, you see a map of the world.

- I. Launch an internet browser & go to this link: <http://arcg.is/1I9yz5R>
 - o Your screen should look like this:



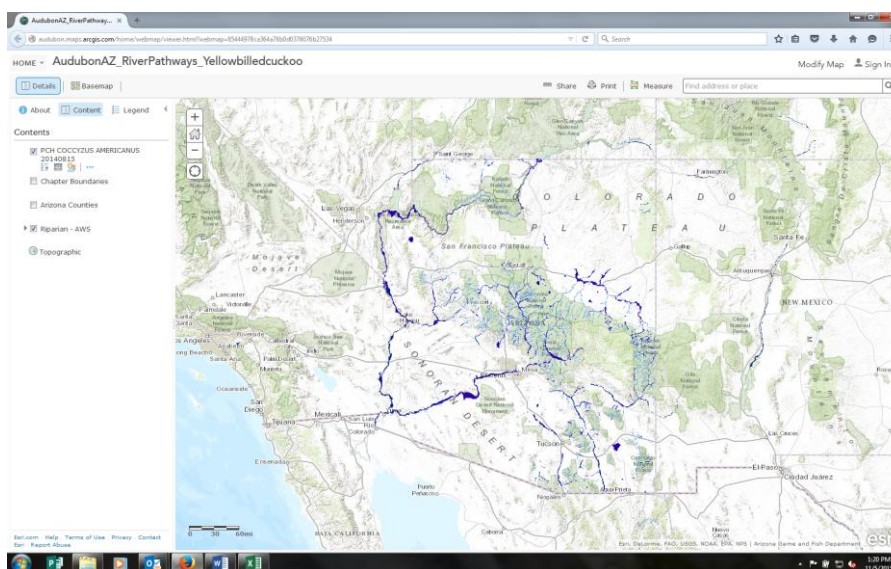
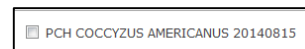


- Look at the ArcGIS Online map window and observe the following:
 - On the right side you see a map.
 - On the left side you see a column that displays the legend for the map.
- In the column displaying the legend information, click the “content” link
- Look at the left hand column which now displays a list of map layers. You will use these layers as you progress through this lesson.



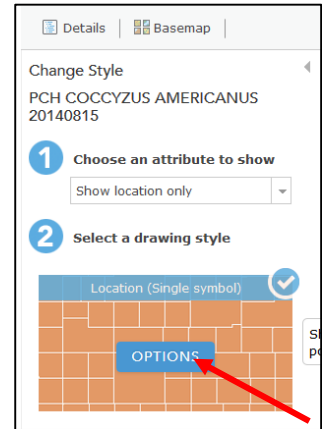
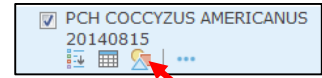
Task 2: Work with layers

- In the list of layers, select the check box to the left of the layer entitled “Riparian – AWS”. The layer will automatically appear on your map.
- Next, check the box to the left of the layer entitled “PCH Coccyzus Americanus 20140815”. The layer displaying critical cuckoo habitat proposed by the US Fish and Wildlife Service will now appear on your map along with the riparian layer. **The cuckoo habitat layer is very difficult to see – why? What does this tell you about cuckoo habitat preference?**

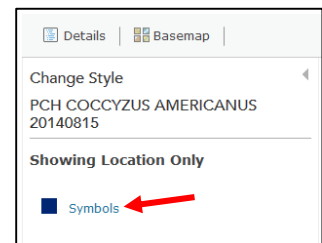




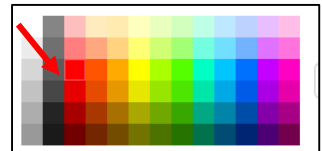
3. Now, hover your cursor over the cuckoo critical habitat layer in the map's left-hand column. Click on the small colored shapes to bring up the "change style" tab.
4. Under option 2 "Select Drawing Style", click the large "options" button



5. Now, click on the "symbols" link next to the dark blue square.

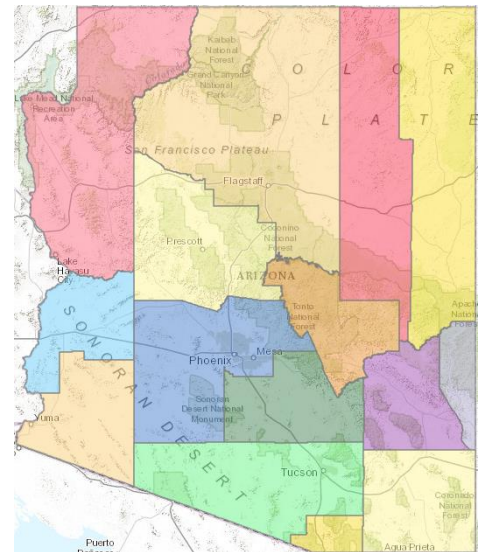
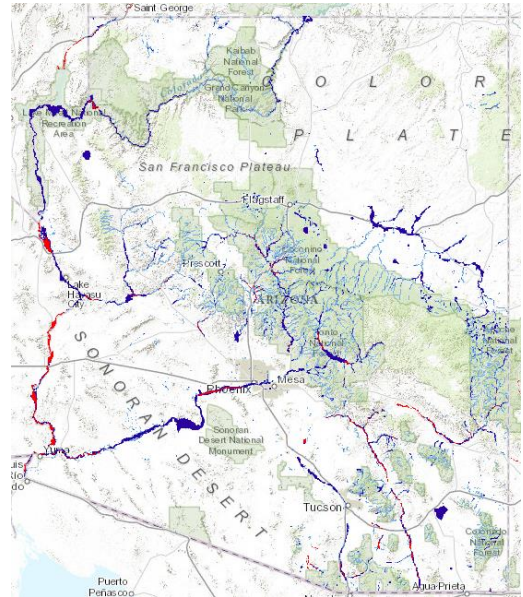


6. In the window that opens, select the brightest red color.



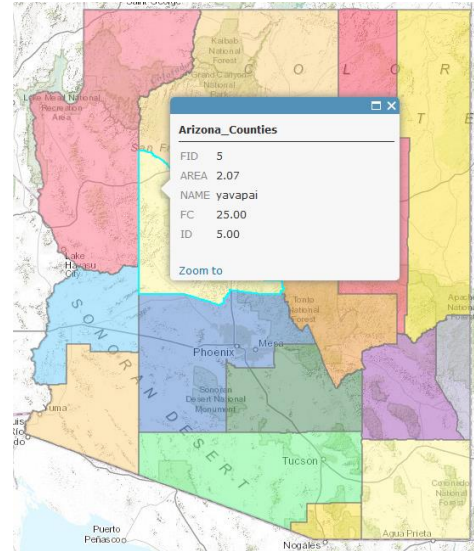


7. Click the “OK” button in the color window, then click the “OK” button in the left-hand column, and then finally click the “Done” button also in the left hand column. Now, the cuckoo critical habitat layer should be much more visible on your map.
8. Notice that you have two more layers at your disposal – an Arizona county layer and an Audubon Chapter Boundary layer. You can turn these layers on and off using the check boxes to their left.
9. In the left hand column, use the check boxes to turn off the critical habitat and riparian layers and to turn on the Arizona county layer.





10. Single-click on one of the shaded areas to reveal a window containing information about the county.



Task 3: Ask geographic questions and develop a hypotheses

You might look at a map and then think of a question that it might help you answer. Or you might think of the question first and then look for maps or GIS layers that might help you answer the question.

In this lesson, you will try to answer the following geographic questions: In which counties does yellow-billed cuckoo critical habitat occur? What habitat type would you work to protect in these counties, and which Audubon Chapters would you recruit to help you? To answer this question, you will have to decide what geographic data you'll need. Take a moment to jot down some ideas:

1) *In which counties does yellow-billed cuckoo habitat exist?*

2) *What habitat type would you protect in order to help conserve this bird?*

3) *Which Audubon Chapters would you recruit to help you in each county containing*



Task 8: Develop a plan of action

The last step of the geographic inquiry process is to act on what you have learned. Your action plan might be simply to repeat the process; thinking about what you've learned often leads to deeper, more interesting geographic questions.

Imagine that you are a bird biologist specializing in yellow-billed cuckoo conservation. You need to propose management plans for county officials in Arizona. What would you suggest? You need to balance the need for communities to grow with the birds need for healthy riparian areas.

EXTRA CREDIT List two new geographic questions that you would like to investigate and describe how you would do it.

For more ArcOnline Exercises, go to <http://edcommunity.esri.com/arclessons>

To learn about how you can work to protect Arizona's rivers, visit: <http://az.audubon.org/western-rivers-action-network-0>

For more information about Audubon Arizona: <http://az.audubon.org>

Get in the field!

You can help yellow-billed cuckoos by applying to be an Audubon Arizona summer field intern! Contact Steven Prager at sprager@audubon.org for more information.



