

Burrowing owls live in the ground in abandoned mammal burrows and don't mind being near people. They were once common throughout the western US but their numbers are declining due to habitat loss. In addition, the bird is expected to be negatively affected by climate change. To properly protect this bird, biologists need to determine which areas are the most important to protect now AND in the future. **In this lesson, you will try to answer the following geographic question: What areas in Arizona are the most critical to burrowing owl conservation both now and in the future?** This computer activity will show you how to start the ArcGIS Online program. You will be guided through the basics of using ArcGIS Online map viewer to explore maps using real burrowing owl data. After you do this activity, you will be prepared to complete other GIS activities.



Baby Burrowing Owl (*Athene cunicularia*)

To solve this problem, you will complete the 5 steps of Geographic Inquiry:
*ASK a geographic question: "What habitat type do burrowing owls prefer?"
*ACQUIRE geographic resources: build a map showing current owl locations
*EXPLORE geographic data: what is the favored habitat type and where is it found?
*ANALYZE geographic info: how is the location of this favored habitat predicted to change over time?
*ACT: What areas would you recommend for protection?

Open the map: launch an internet browser & go to this link: <http://bit.ly/1DE3vNg>

- Click on the Modify Map link located in the top right corner
- Center the map over Arizona
- Click on "Details" and then the middle icon, below, to display contents

Task 1: Work with layers to determine what habitat burrowing owls prefer

- Click on the **Arizona Vegetation** layer to display AZ's habitat types
- Place cursor on **Arizona Vegetation** and click to display the legend
- Note that each color represents a habitat type. What type is indicated by purple?
- Click the box next to Arizona Counties to turn it on.

What are the two most common vegetation types in Maricopa County? _____

- Turn off counties and click on the e-Bird Burrowing Owl AZ Aug 2014 layer. This layer contains burrowing owl sightings made by citizen scientists, researchers, students and others that have been collected into a huge online dataset called "eBird". Click on eBird Burrowing Owl AZ Aug 2014 to see the legend. What do you think the different colored dots mean?
- Make it easier to determine the owls' favored habitat by combining vegetation data and the number of owl sightings. This layer has been created for you!

Determining burrowing owls favored habitats, continued

- Click on the Add Data down arrow and Search for Layers.
- Then type “AZ Vegetation eBird Burrowing Owl” in the **Find:** box and click on **Go**. (Uncheck the “within map” box)
- Choose **Add** to add layer. Click Done **Adding Layers** button at the bottom of the Contents.
- Currently the “AZ Vegetation eBird Burrowing Owl” layer is one color. You will thematically map (map by color) the layer that will arrange the data by number of owls per habitat. This will enable you to visually explore the data.
- Select the **AZ Vegetation eBird** layer and click on the three-shape icon
- 1. Change style to “sum_obs”
- 2. Select “counts and amounts”, “divided by none”, and “high to low”. Click OK, then Done
- Pick a blue patch on the map and click on it. The name of the habitat will appear, as will the total number of observations (called SUM_OB) in that habitat type.

What vegetation type has the most burrowing owl sightings? How many?

Name two counties you’d target for current burrowing owl conservation work and why:

eBird data (the burrowing owl sightings used in this exercise) is collected largely by volunteers.

Volunteers are more likely to report birds that occur close to their homes and Arizona’s largest

cities are located in Maricopa (Phoenix) and Pima (Tucson) counties. Do you think this factor should cause us to question the validity of these data? Why or why not?

Task 2: Predict future burrowing owl habitat

The National Audubon Society just released a stunning report showing that by 2080, half of our continent’s birds could be in trouble because their habitats will shift due to climate changes. Scientists have been able to model these changes on a continental scale and this information provides land managers with guidance as they try to conserve lands for birds not just now but in the future.

- Click on the “Burrowing Owl Potential Summer Range” layer. Click off the AZ Vegetation eBird Burrowing Owl layer. Hover over the Arizona Counties layer to make the blue arrow on the right appear, then click to access the drop down menu. Select “move up” and click until “Counties” is the top selected layer.

Select the Burrowing Owl Potential Summer Range layer to view the legend. The numbers represent potential habitat value for the owls in 2080—the higher the better. Given this information, would you change your plans for conservation work? Why or why not?