Lesson Plan
"Geocaching Choropleth Maps"

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Audubon at the Francis Beidler Forest

Overview: Using geocaching as a vehicle, students will analyze and compare choropleth maps showing geocache finds at the county and state level. Using Google Earth, students will view satellite images for areas showing high concentrations of geocache finds on the choropleth maps and interpret what human or physical features make that area popular to geocachers.

Connection to the Curriculum:
F. Ask geographic questions: Where is it located? Why is it there? What is significant about its location? How is its location related to that of other people, places, and environments?
G. Make and record observations about the physical and human characteristics of places
P. Locate, gather, and process information from a variety of primary and secondary sources including maps
Q. Interpret information obtained from maps, aerial photographs, satellite-produced images, and geographic information systems

Suggested Grade Range: 8th

Time: 60 minutes

Materials Needed:
1. Internet connection
2. Google Earth software (free)
3. Geocaching.com account (free)

Objectives:
1. Student will be able to interpret a choropleth map.
2. Student will be able to describe the limitations of a choropleth map by comparing geocache-find maps, at the county level and state level, for the same geocacher.

Procedures:
1. Students need to have an understanding of geocaching prior to this lesson. A PowerPoint presentation on the basics of Global Positioning System (GPS) and geocaching is available through the South Carolina Geographic Alliance (SCGA).
2. Have students log onto the It's Not About the Numbers website. http://www.itsnotaboutthenumbers.com/
    a. Click on "View list of all cachers" near the middle of the screen.
    b. Click on "Full List Lite".
    c. Click on any geocacher listed.
    d. Click on the "Maps" link near the bottom of the page.
    e. Click on "US Completed States" and then "US Completed Counties".
    f. The map can be saved by right clicking on the map and selecting "Save Picture As".
    g. Maps can be printed or saved to a disk or drive and viewed on a computer not linked to the Internet.
3. Have students interpret the maps showing the counties. For example:
    a. Geocacher #1 most certainly lives in the state of Washington near the west coast in one of the counties with over 200 finds. Geocacher #1 appears to have visited southwestern Missouri and crossed state lines to record finds in Kansas, Oklahoma and Arkansas. Geocacher #1 may not have visited Alaska or Texas as some early caches were traveling

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caches that recorded a find in their home state no matter in which state they were actually found.

b. Geocacher #2 most certainly lives in South Carolina and likely near the coast. Geocacher #2 appears to have traveled up the East Coast, but not extensively. The location of several caches in central Florida may indicate a trip to Disney World. Multiple cache finds in the Lake Tahoe area may indicate a trip to the West, possibly a geography conference. Although it appears Geocacher #1 lives near the coast, there are numerous finds in the mountain areas of South Carolina and just across the border in North Carolina with few finds in the intervening Piedmont area. This could indicate job-related travel or vacation preference.

c. Geocacher #3 appears to travel extensively through the South. Geocaching hotspots indicate extended stays in the Atlanta, Georgia; Columbia, South Carolina; Naples, Florida; and north-central New Mexico areas. Travel between these areas appears to be by car as nearly every county along the routes has at least one find recorded. By comparison, visits to the New England area appear to have been by air without the possibility of geocaching along the way.

4. Have students interpret the maps showing the states and compare them to the maps showing the counties. For example:
   a. It remains obvious that Geocacher #1 resides in the state of Washington, though it cannot be determined in what area of the state Geocacher #1 resides. The by-state map gives the impression that Geocacher #1 has traveled more extensively than he/she likely have, since it appears the visits to Kansas, Oklahoma, and Arkansas were merely border incursions.
   b. It is clearer when viewing the by-state map that Geocacher #2 has traveled along the Atlantic Seaboard. It is still apparent that Geocacher #2 lives in South Carolina, but it is no longer apparent in which portion of the state Geocacher #2 resides. It also appears that Geocacher #2 has visited more of North Carolina and Georgia than he/she actually has.
   c. When viewing the by-state map, it no longer apparent precisely where in the southeast Geocacher #3 may have resided nor is it obvious that travel through the South was by car. Texas appears to be extensively traveled for geocaches when actually all the hunting was conducted along narrow interstate highway corridors. Texas and North Carolina are weighted the same though the geocaches in North Carolina were found in a relatively small geographic area, while the geocaches in Texas were found across the entire length of the state.
5. As described in the "Geocaching With Google Earth" lesson, have students view the satellite images with the geocache layer showing. Zooming in on the Florida counties visited by Geocacher #2 shows that it is indeed the Disney World area with a geocache in the Magic Kingdom.

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Suggested Evaluation:

1. Given a set of choropleth maps (by-county and by-state) for a geocacher, the student should:
    a. Describe in which state or states the geocacher lives or lived
    b. Describe in which general area of the state or states the geocacher lives or lived
    c. Describe other areas of the country the geocacher visited
    d. Describe likely modes of travel between areas that the geocacher has visited
    e. Describe what is information is unavailable when moving from the by-county to the by-state map

Extending the Lesson:

1. Prior to the class finding any geocaches, create a choropleth map of the school by classroom for students having found at least one geocache. Continue to update the map (weekly or monthly) throughout the school year and compare the maps. How does the map change if the criteria are changed to "students having found at least 5 geocaches" or "students having found at least 10 geocaches"? Why do some classes have many more students that have found at least one geocache while other classes have few if any?
2. Have students create their own choropleth map for South Carolina using the "South Carolina Counties" map available through the SCGA.

Resources:

1. Geocaching at http://www.geocaching.com/.
2. Google Earth at http://earth.google.com/.
3. Audubon Center at the Francis Beidler Forest at www.beidlerforest.com.
4. South Carolina Geographic Alliance (SCGA) at http://www.cas.sc.edu/cege/.
5. It's Not About the Numbers at http://www.itsnotaboutthenumbers.com/.

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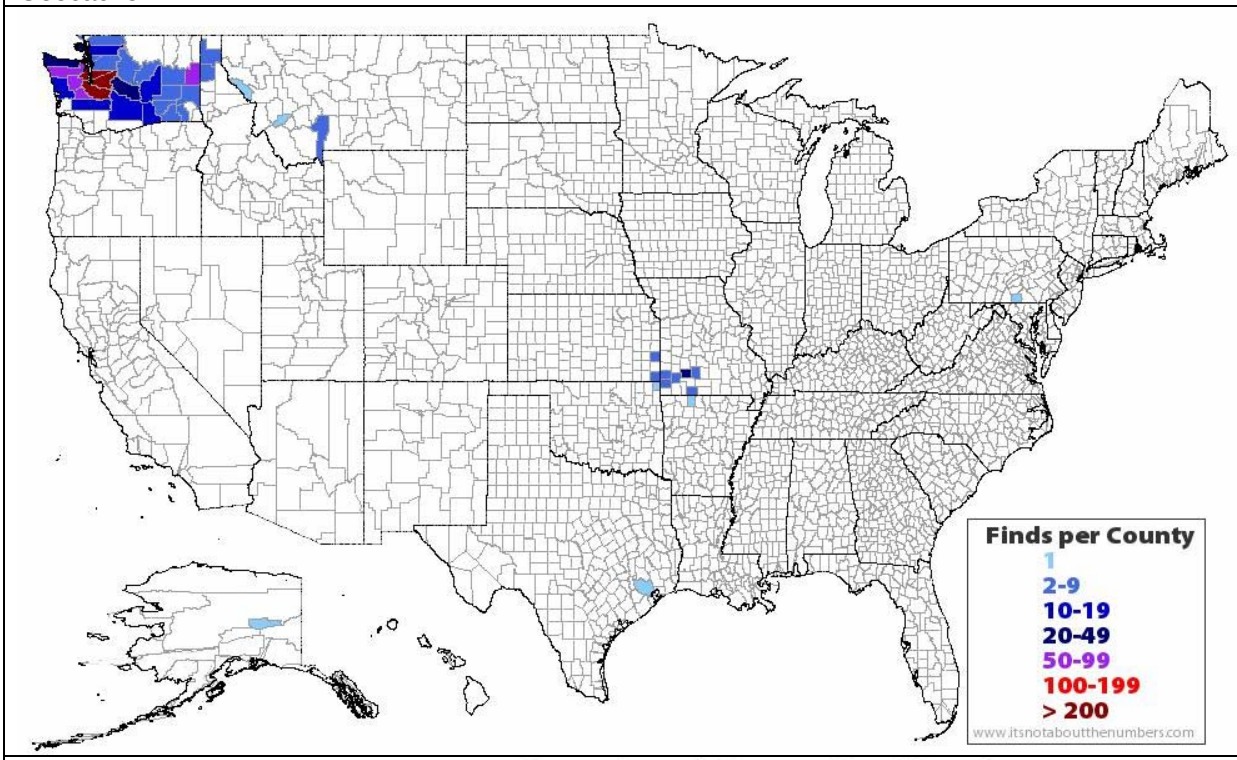
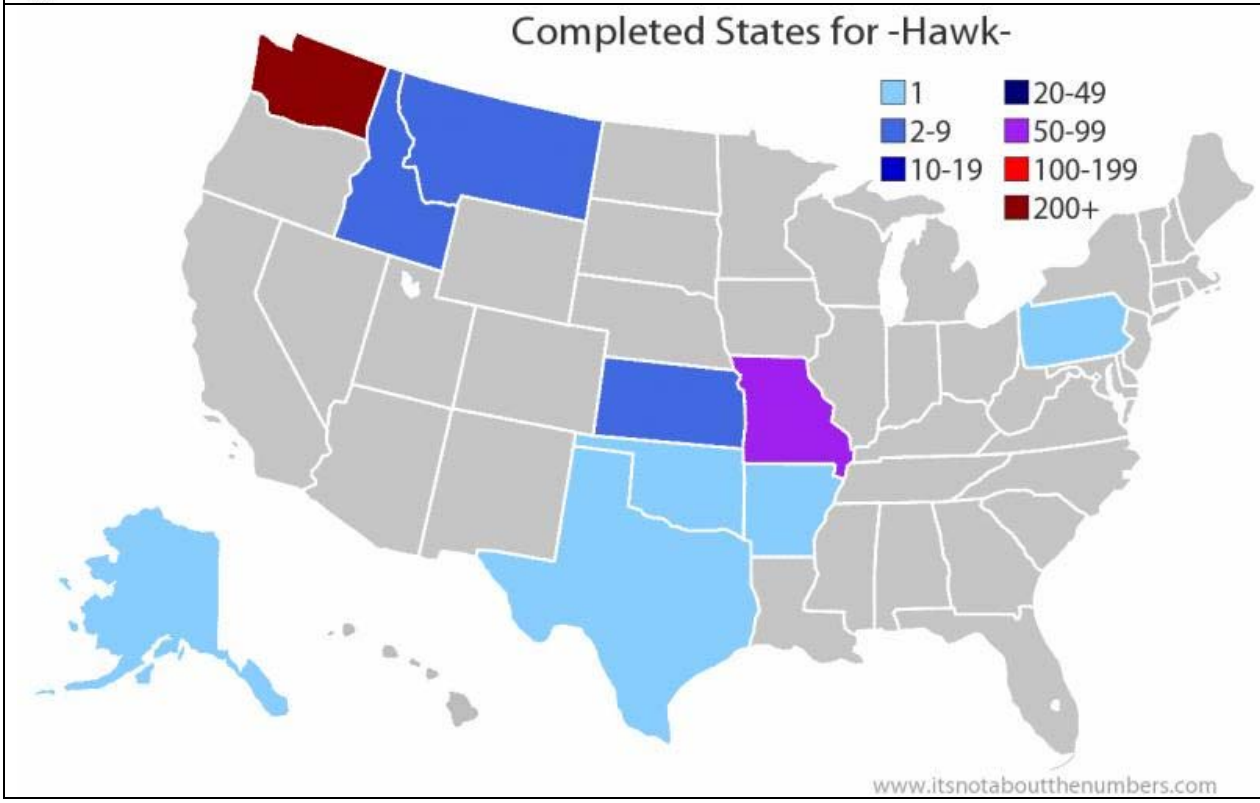
Geocacher #1





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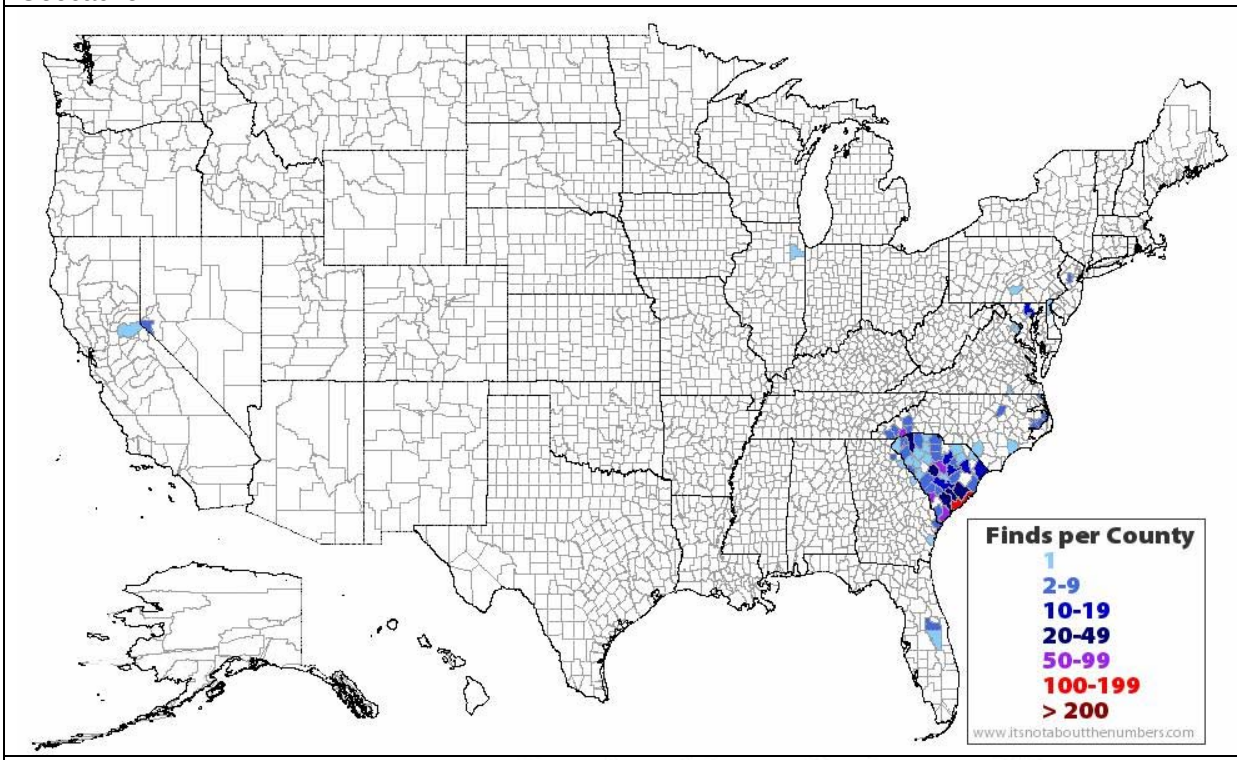
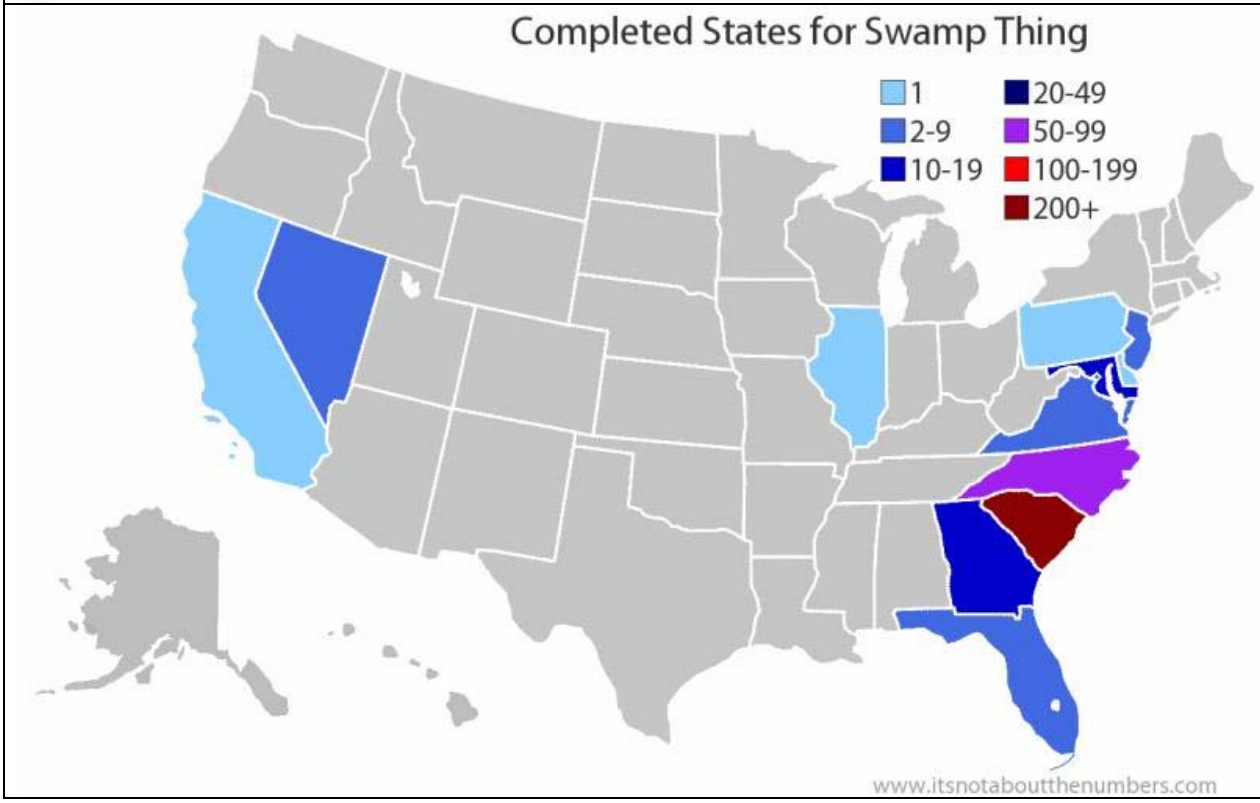
Geocacher #2





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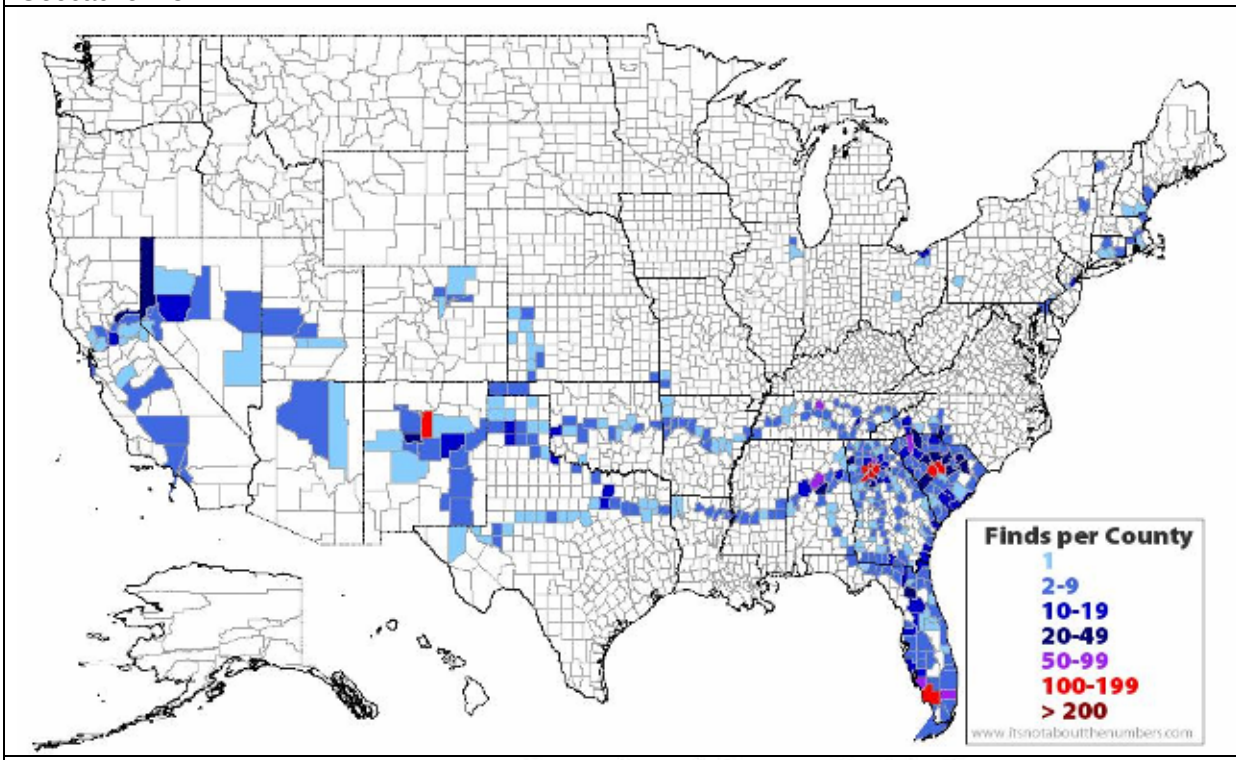
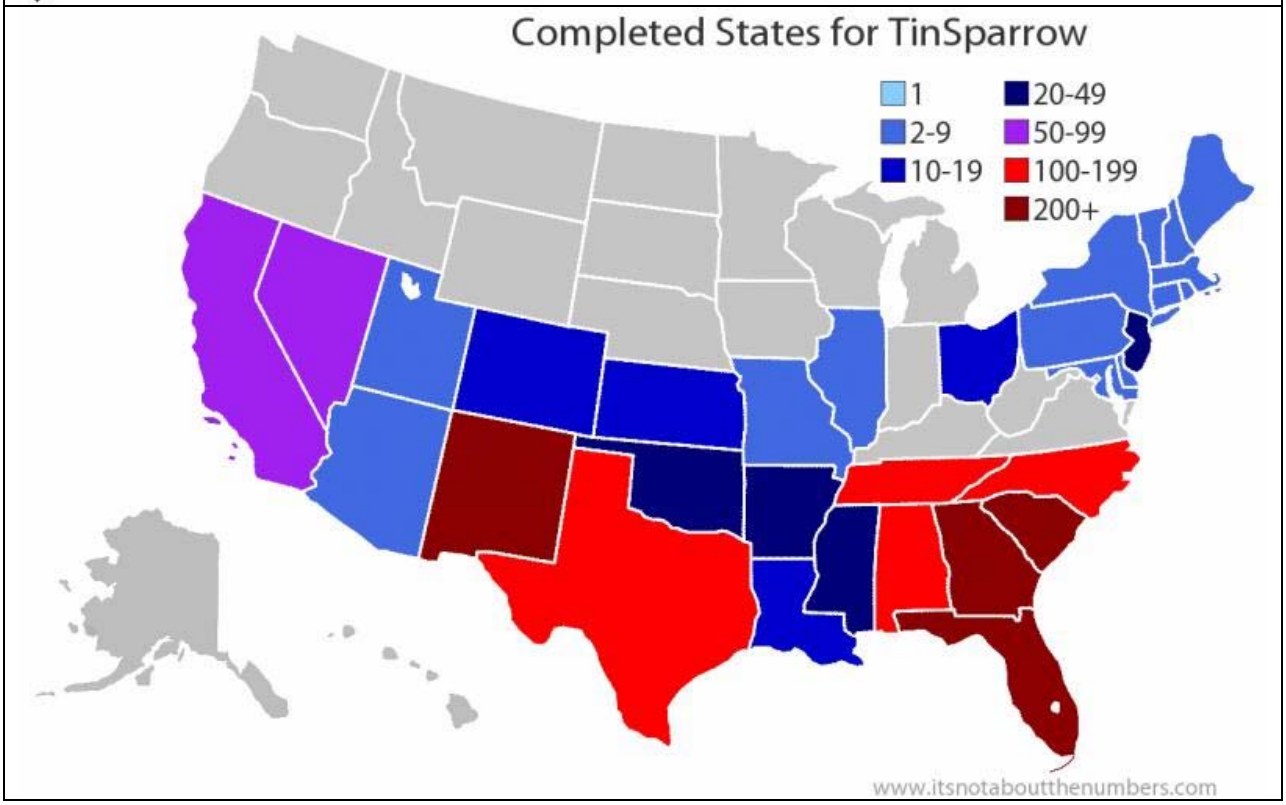
Geocacher #3





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