

Theo Ross

Lighthouses of Great Britain

For the final project of the course, I decided to create an interactive web map displaying the standing lighthouses around the island of Great Britain. Although seemingly a somewhat obscure topic, there is a significant amount of geographic meaning in the placement of lighthouses. Additionally, with the advancements of technology onboard modern ships as well as the decommission of many lighthouses, the distribution of lighthouses has changed significantly over the last few decades. With regards to data presentation, using a map to display this data allows the user to explore and find patterns that would be hard to accomplish with other forms of presentation techniques. For the scope of the project, I decided to focus on Great Britain as it is both manageable in terms of geographic size and is also home to many of the world's lighthouses. With the nations of the island having a significant amount of global economic influence, lighthouses have been essential for operating shipping lanes and guiding ships into ports or coastal towns.

When thinking about the overall design aesthetic of the project, I wanted to create a relatively clean map with little distractions. This meant that I would work more on creating small intuitive visual differences that would allow for an easier interpretation of the data. However, I wanted to include more information if the user desired it, and therefore I decided pop ups would be the best way to do this. Pop ups allow for a clean map when desired, but offer more information when queried. Another aesthetic goal was emphasizing location without turning the project into a reference map. It was important for the user to be able to get their bearings yet focus more on the point locations of lighthouses. This meant including layers such as roads and

city names but using map scale to limit distractions and provide only the necessary geographic information to understand the geographic location and importance of each lighthouse.

Finding the data for this project was one of the many challenges encountered. Ultimately, I ended up finding a dataset from 2017 by the University of Edinburgh that provided location and name attributes of each lighthouse. The original files were in the form of a zipped shapefile with a UTM projection centered around Great Britain. Although this projection might work if I had been using a different software to display the data, Mapbox would not work with this specific projection and therefore I reprojected the data to a web mercator projection using ArcGIS Pro. From there, I converted the data to KML and eventually CSV in order to best edit the data within Microsoft Excel. I then split the data into two CSV files, one containing the active and one containing the inactive lighthouses. In order to design the map I had envisioned, I needed to source some extra data from Wikipedia including year constructed, tower height, focal height, light range, and light intensity for some lighthouses. For this project, I did not have the time to source this data for all 319 lighthouses and instead decided to fill in the attributes for around 10 individual lighthouses to give an idea of the intended outcome.

Additionally, I wanted to include an image and a link to more information (such as the history of the lighthouse) as part of the popup. For the pictures included in the project, I used Wikimedia Commons and CC Search to find images that are licensed under creative commons. For the external link with more information, I found great historical information on many lighthouses from the United States Lighthouse Society's page titled Lighthouses in the United Kingdom. The site links to pdfs of individual lighthouses in the United Kingdom with detailed information.

When thinking about user interactivity for this project, my goal was to maintain a simple interaction system on the front end by carefully designing the interaction elements within the HTML document. Aside from the basic interactivity of zooming and panning, popups were designed to be clickable as well as closable and fit into frame by recentering the map. This posed a challenge as I had to calculate the vertical offset when using the flyTo function within Mapbox. The solution I found was to recenter the map on the latitude and longitude of the clicked popup and then use the current zoom level as a variable in an equation to calculate an offset for the latitude to fit the popup height. In order to limit the maximum popup height, I used CSS to limit the max height of the images within the popups based on the user's screen height (the image takes up 20% of the available screen height).

The other main interactive element of the map is the collapsing description panel. Integrating this element allows for the user to limit visual distractions when exploring yet allows the user to return to the information if desired. This process involved adapting the description panel used in a previous lab to fit with my end goal.

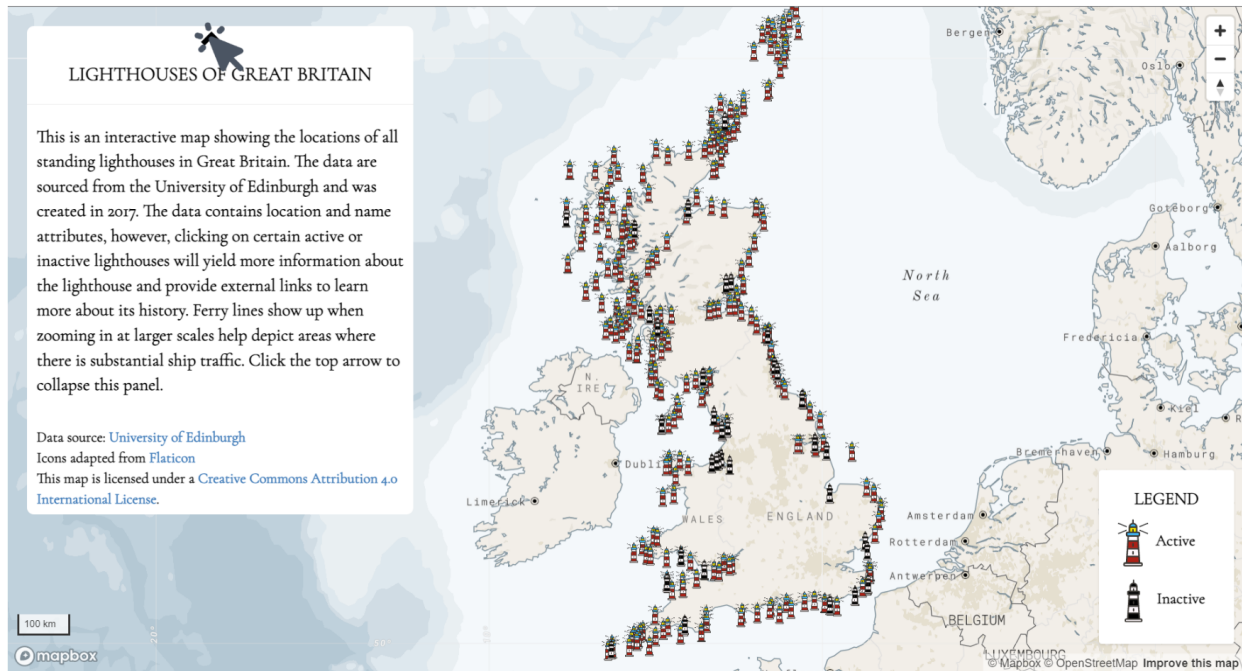
For the base map, I wanted a simplistic map that emphasized oceanographic features. In searching I found a great base map titled North Star which fit my needs and which was easily adaptable within Mapbox studio. Adding on to the basemap I loaded in the CSV point data that I wanted to appear as lighthouse icons. Depending on if the lighthouse is active or inactive, I decided to give the point a different icon. I then explored different lighthouses icons and found one on Flaticon that I could adapt to fit my needs. I used Adobe Fresco to add different colors for each icon as well as adding light beams for the active icon.

When selecting colors for the icons, I used an extension on Google Chrome to make sure that the icons were visually distinguishable for color vision deficiency users. Additionally, for

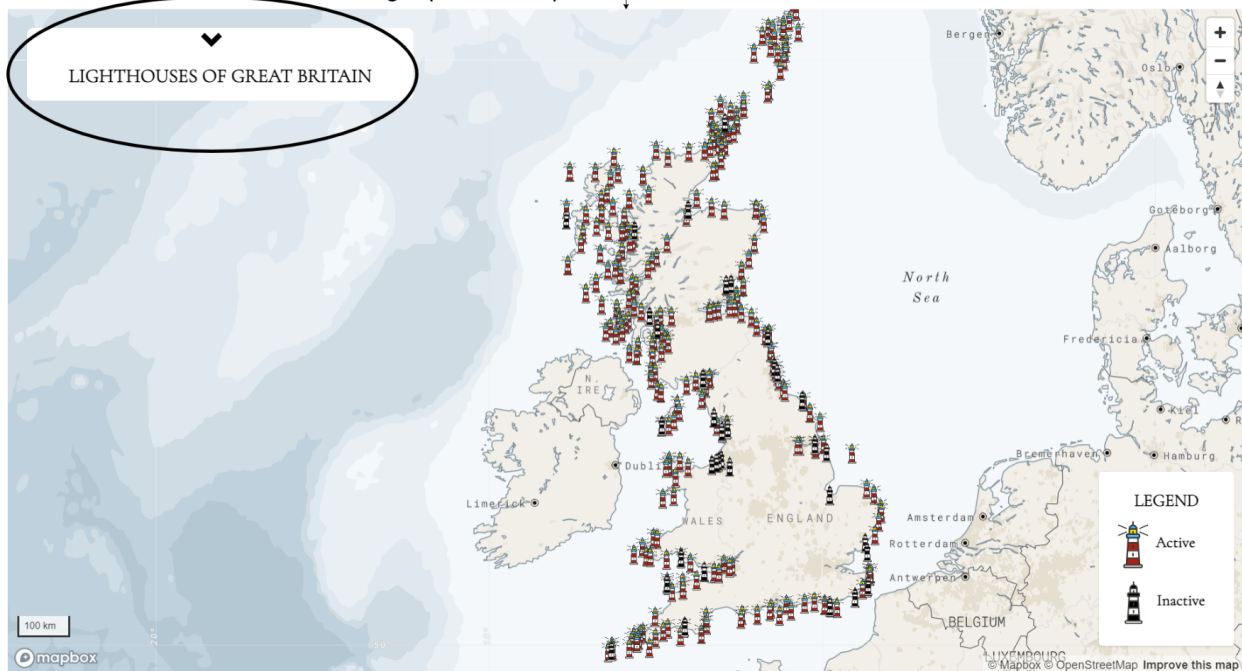
the images included in popups, I added appropriate alt text in the HTML. Although these are limited steps toward better accessibility of the web map, they are important and can make the difference for someone being able to interpret the map.

Below is a UI/UX diagram of the possible user interactions.

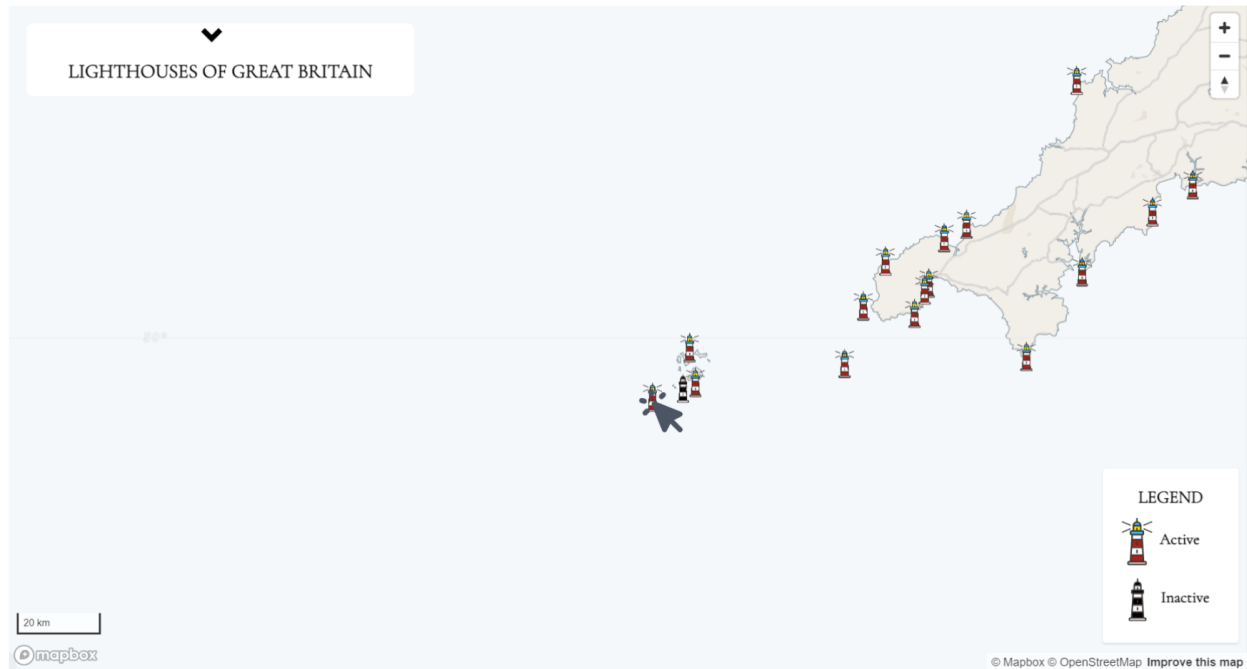
1. User reads introduction and decides to collapse the information panel



Change: panel collapses



2. User zooms to an area of interests and clicks on a lighthouse to learn more



Change: map recenters on icon and popup opens

