

TUTORIAL 8 | JUMP INTO MAPBOX

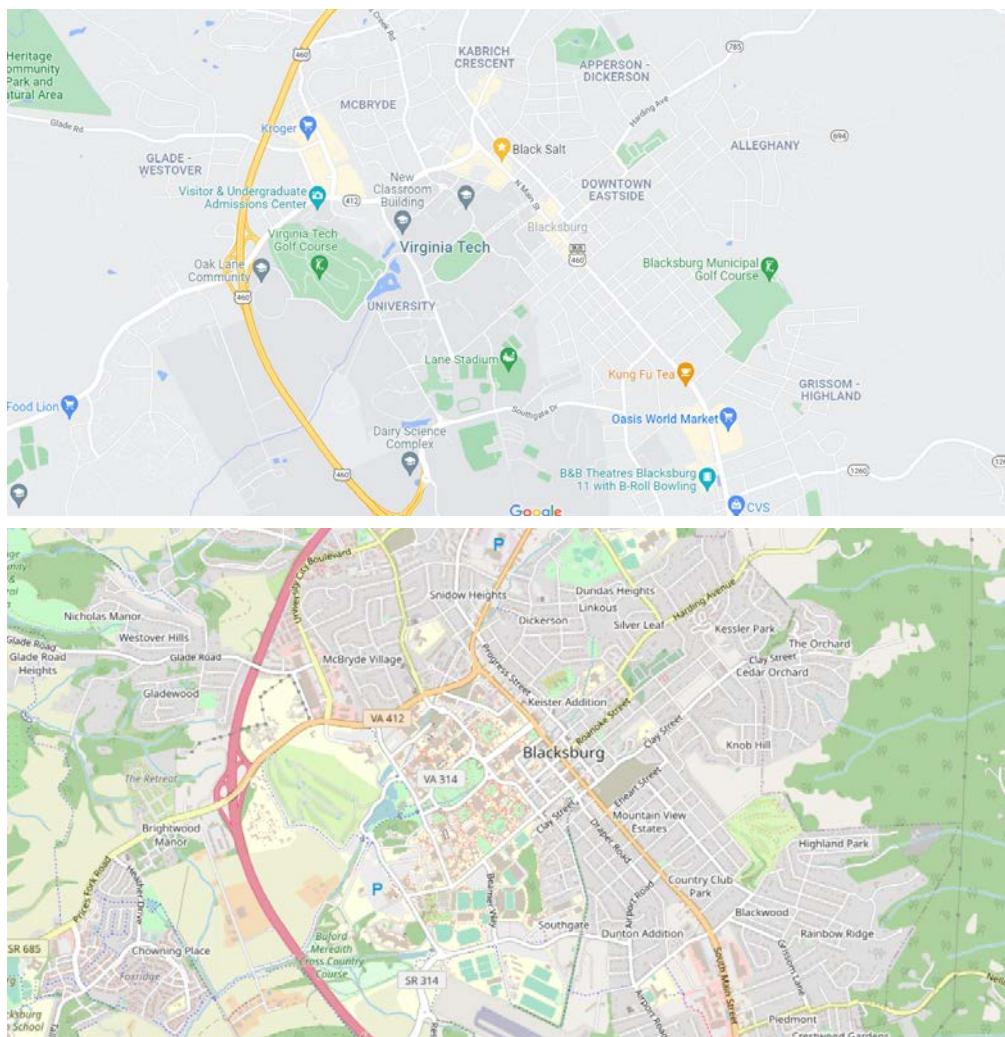
Goals

- Gain familiarity with Mapbox platform.
 - Understand how to style layers and base map.
 - Upload and style data layers from QGIS.

Intro

Today, you're going to create a Mapbox base map style and add some basic data.

Think of your basemap as a styled map background. For example, take a look at the difference between Google Maps and Open Street Maps basemaps. Notice the difference in color, labeling, lineweight, information density, and so on. Your basemap is the canvas for information that you want to show. Google Maps emphasizes roads and points of interest – a car-based perspective. OSM, on the other hand, shows a less hierarchical urban fabric of land use as well as roads and places.



Mapbox terms:

- **Style:** base map
 - **Studio:** where you create and edit basemaps

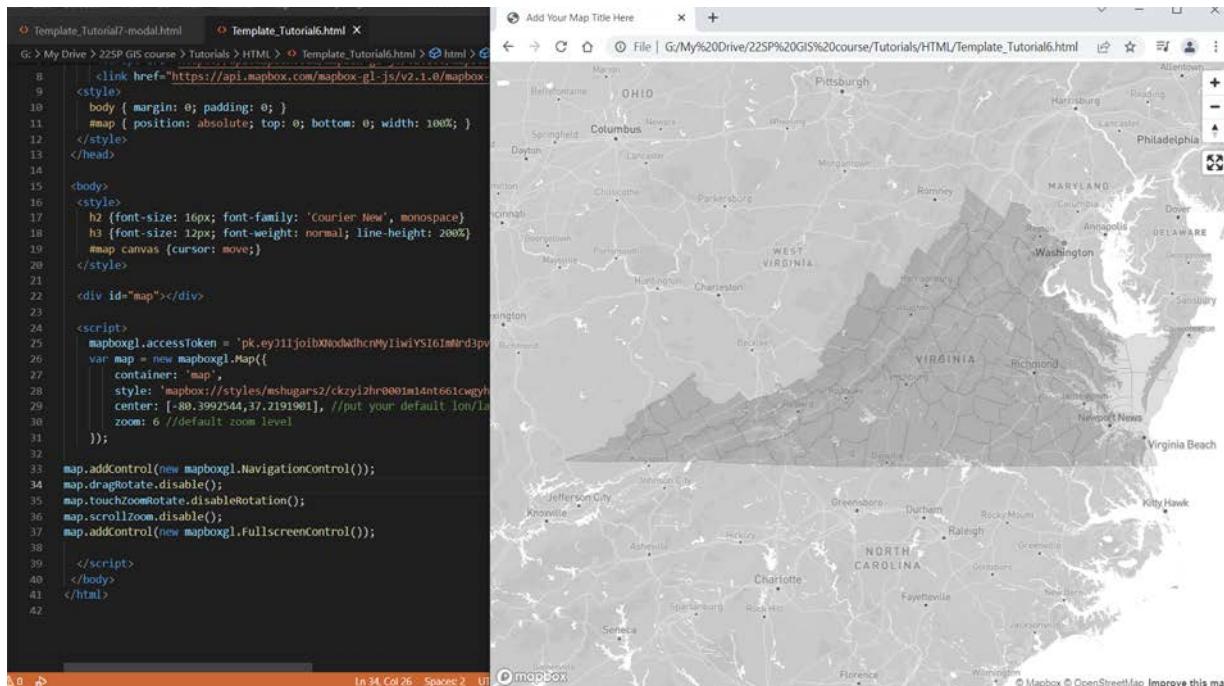
- **Tileset:** map image data that styles by zoom level; generally, basemap information
- **Dataset:** as opposed to tilesets, datasets contain a specific set of data (eg location of community centers, or industrial land use polygons)
- **Access token:** unique id number that you create for your account and use to activate your map in HTML code
- **Component:** groups of shapefile or information layers – generally tilesets – for instance, “land water & sky” or “road network”. These are tilesets made by Mapbox (you can’t upload or make your own component).
- **Layer:** specific subset of data, for instance “water” or “sky” or “bridges”; each component contains multiple layers. When you upload your own shapefile or database information, you can add them as layers to your map.

Visual you can style with Mapbox Studio:

- color and outline of **buildings, waterways, roads, natural features, and ground**
- content, size, font, and color of **labels**
- what content displays at which **zoom** levels
- map **cant** (view angle), and **fog**
- note: Mapbox does not show topography lines by default, but you can add the Tileset as a layer to your basemap

You can also **upload** custom **Datasets** or **Tilesets** to your Mapbox base map. This information can be point data, lines, or polygons – that is, traditional Shapefiles. It can also be csv spreadsheets with geographic information in it (latitude and longitude), or even Geo-located raster images (GeoTIFFs). In this Tutorial you’ll upload some useful census shapefile data from QGIS.

On **Mapbox** you create the map **object** with all of its relevant visual and informational layers. With **code**, you **interact** (and allow other people to interact) with that object. Once you embed the map object in a website, you will add any interactive features, such as on-hover information popups or clicks, with code.



```

<html>
  <head>
    <link href="https://api.mapbox.com/mapbox-gl-js/v2.1.0/mapbox-gl.css" rel="stylesheet"/>
    <style>
      body { margin: 0; padding: 0; }
      #map { position: absolute; top: 0; bottom: 0; width: 100%; }
    </style>
  </head>
  <body>
    <h2>Template_Tutorial5.html</h2>
    <h3>Mapbox GL JS v2.1.0</h3>
    <div id="map"></div>
    <script>
      mapboxgl.accessToken = "pk.eyJ1IjoibXlodWdhcmMyIiwiaSI6Imd3py...
      var map = new mapboxgl.Map({
        container: 'map',
        style: 'mapbox://styles/mshugars2/ccky1zh9001m14nt661cwgk',
        center: [-80.3992544, 37.2191901], // put your default lon/lat
        zoom: 6 // default zoom level
      });

      map.addControl(new mapboxgl.NavigationControl());
      map.dragRotate.disable();
      map.touchZoomRotate.disableRotation();
      map.scrollZoom.disable();
      map.addControl(new mapboxgl.FullscreenControl());

    </script>
  </body>
</html>

```

Step 1: Create a Mapbox account.

Mapbox is free for non-commercial use (ie if your map has fewer than 50,000 loads per month).

<https://account.mapbox.com/>

After confirming your account, you will see the Mapbox home page:

The screenshot shows the Mapbox Account dashboard. At the top, there are navigation links: Dashboard, Tokens, Statistics, Invoices, Settings, and a profile icon. The main content area includes two large cards: "Design a custom map style" (with a "Create a map in Studio" button) and "Create a web map with Mapbox GL JS" (with an "Install Mapbox GL JS" button). To the right, the "Account" section displays the user's name (mshugars2), plan (Pay-as-you-go), and current billing period usage (27 / 50,000 free loads). Below this, the "Tools & resources" section lists "Integrate Mapbox", "Design in Mapbox Studio", "Documentation", and "Help".

1b Navigate to the Mapbox Studio, where the visual magic happens, by clicking on your profile icon in the upper right and selecting "Studio"

This screenshot is identical to the one above, but the "Studio" tab is highlighted in the profile menu at the top right, indicating the user is now in the Mapbox Studio interface. The rest of the dashboard content remains the same, including the "Design a custom map style" and "Create a web map with Mapbox GL JS" cards, the account details, and the "Tools & resources" sidebar.

Step 2: In Mapbox Studio, create a new Map Style.

2a Click “New Style” and scroll down to **Blank** map style.

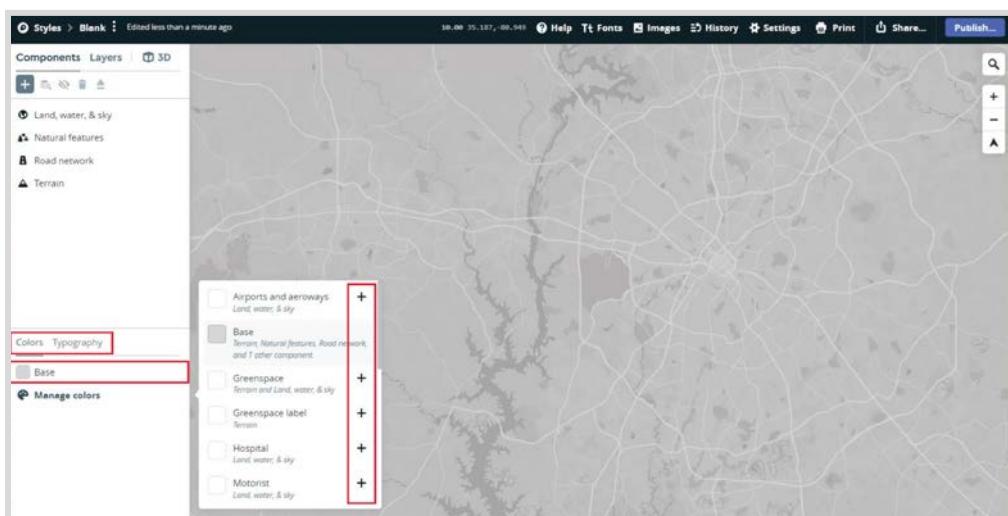
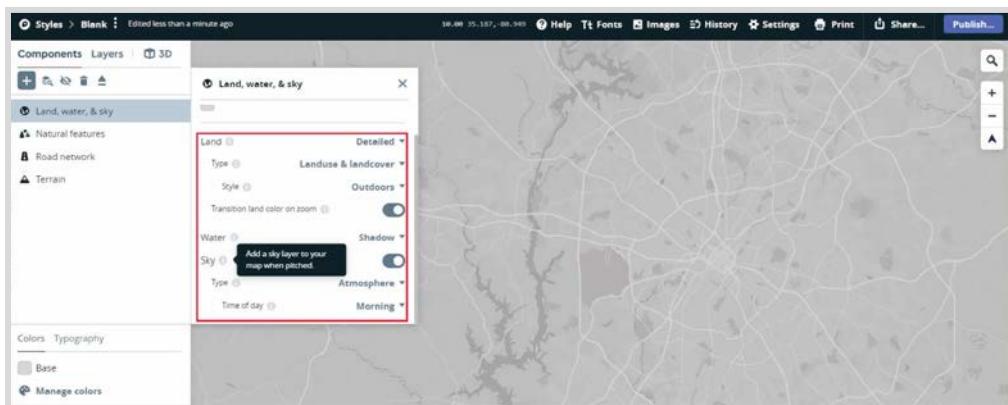
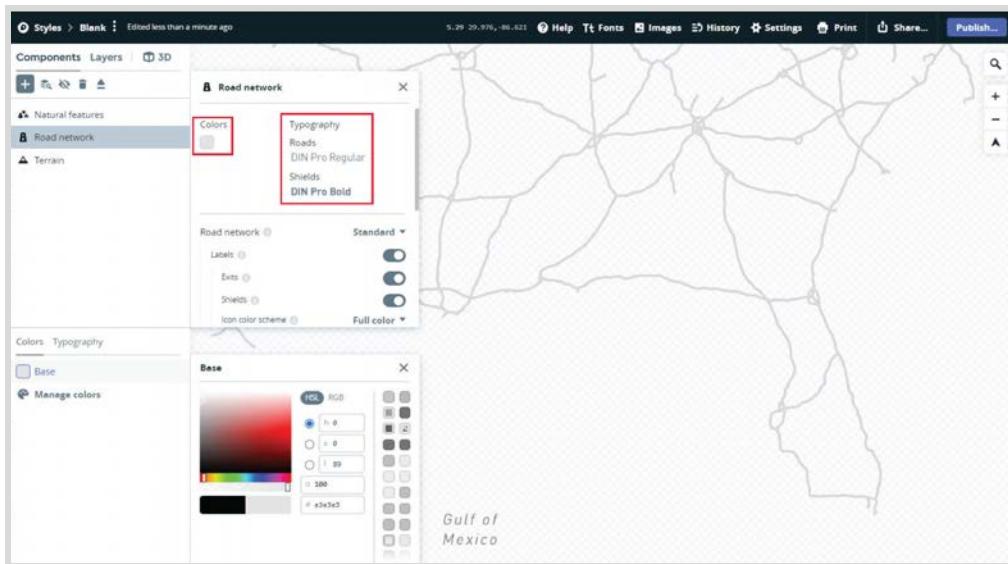
The top image shows the Mapbox Studio interface with the 'Styles' tab selected. A blue button labeled 'New style' is highlighted with a red box. The bottom image shows a modal dialog titled 'Choose a template'. It lists several pre-made styles: 'Basic' (a map of Paris), 'Monochrome' (a map of San Francisco), 'Streets' (a map of San Francisco), 'Outdoors' (a map of a canyon), 'Satellite Streets' (a map of New York), 'Navigation' (a map of New York), and 'Blank' (a blank white canvas). The 'Blank' option is highlighted with a red box. A blue button labeled 'Customize Blank' is at the bottom right of the dialog.

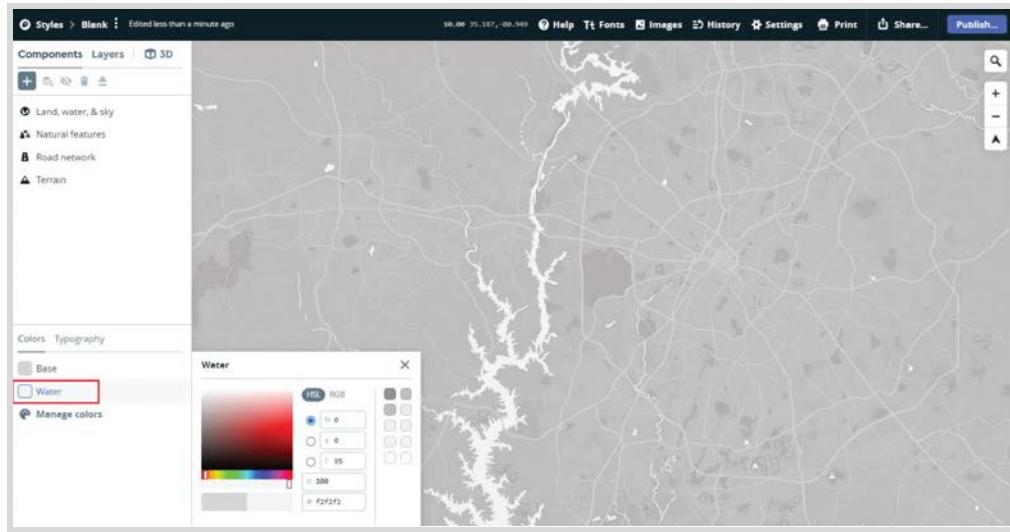
2b Now, add the following **Components**:

- Land, water, & sky
- Natural features
- Place labels
- Road network
- Terrain

The screenshot shows the 'Components' panel in the Mapbox Studio interface. A red box highlights the '+' button. A modal dialog titled 'Choose component to add to your style' is open, listing components: Data visualization, Land, water, & sky, Natural features, Place labels, Point of interest labels, Road network, Satellite imagery, Terrain, Transit, and Walking, cycling, etc. The 'Terrain' option is highlighted with a red box.

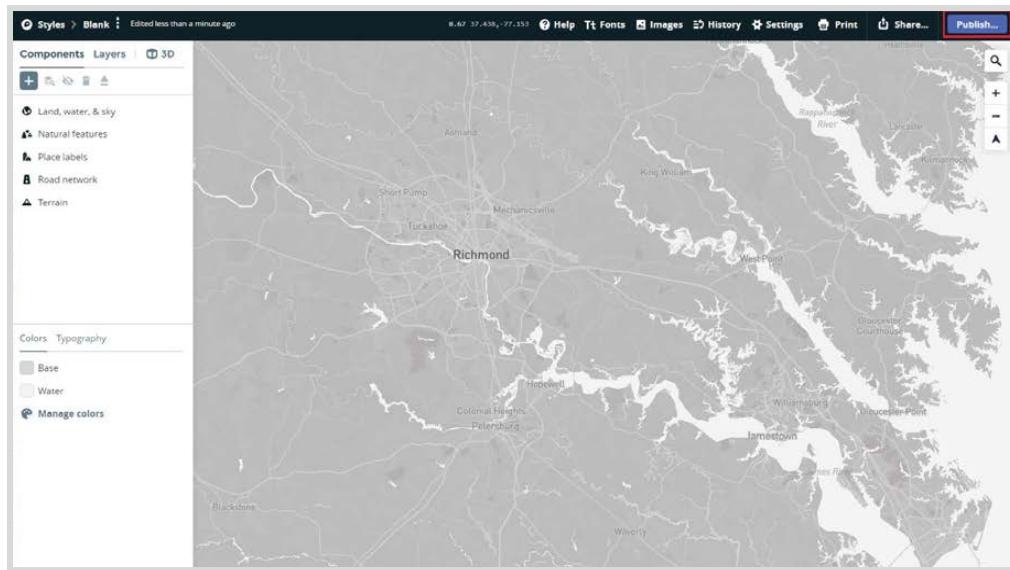
Play around with different styling options by clicking on these components and scrolling down to see the options. **Note: Label components are separated from Line and Polygon components.** This means that you will style the label (font, color, etc.) separately from the polygons that they refer to.





Mapbox's user interface has some redundancy baked in; that is, you can sometimes edit the same thing in two different places. As an example, you'll see **Typography** and **Color** tabs at the bottom of the Component editor area. Think of these as overall controls – you can control the base color of the entire map, or of certain general features (water, roads, etc.); likewise, you can change the fonts and colors of categories of labels. To change more granular information (eg. creeks or streams versus rivers in the “water” category), you will edit the specific component or its layers.

2c Publish your new Map style. This makes your changes live on the web, so you can see your updated map when you embed it. Note that when you make changes to your map, you will not be able to see these changes in your embedded map until you've Published them.



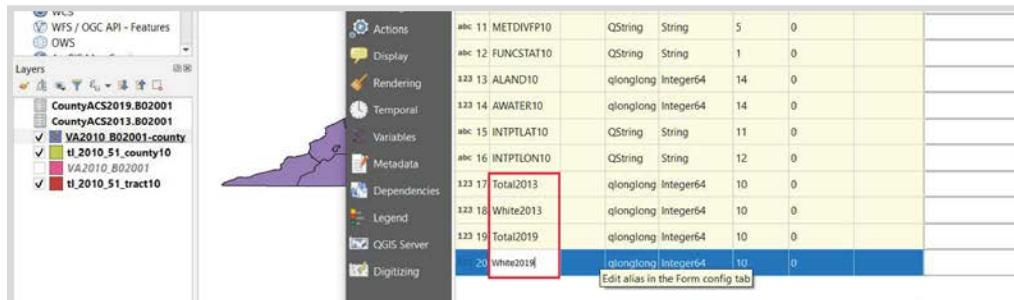
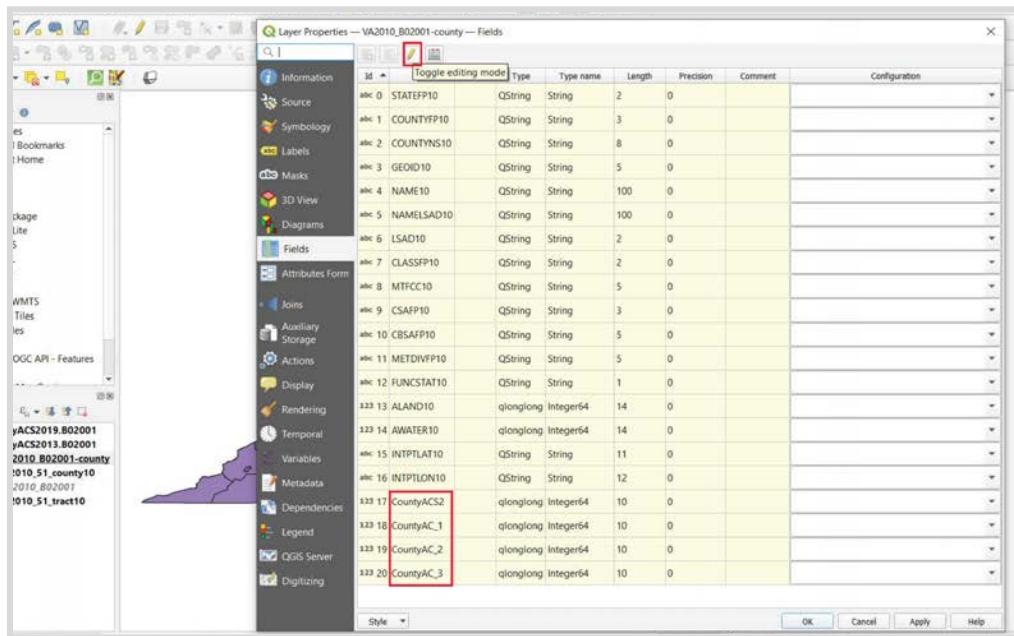
Step 3: In QGIS, create a new attribute column for percentage change in nonwhite population between 2013 and 2019.

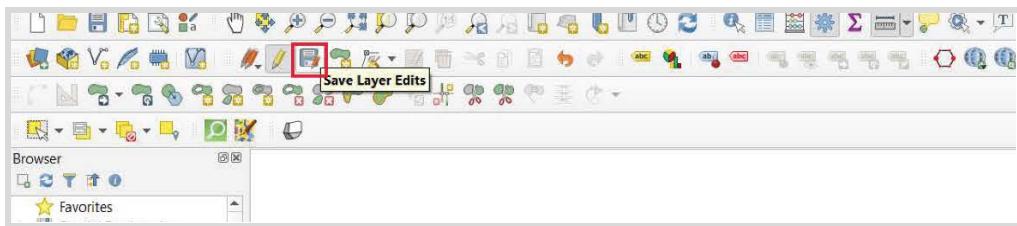
Open the Virginia census file from Tutorial 5.

3a First, join both the 2010 and 2020 race data to the **2010 Shapefile** using the GEOID columns. You can add multiple joins to one shapefile.

3b Open the **Attribute Table** of your 2010 Shapefile and make sure both years of data have joined correctly. If everything looks alright, go to the 2010 layer's **Layer Properties > Fields**. Toggle on “edit”, the pencil in the top toolbar. Delete all the joined columns except “Total” and “White”, and then rename the columns to **Total2010**, **White2010**, **Total2020**, and **White2020** respectively. **Save** your changes with the “Save layer edits” button and **toggle off edit**.

NOTE: It's important to simplify the names of any fields you'll want to use in Mapbox, since Mapbox will automatically shorten the field names and it might become difficult to identify them. For instance, the field name “ROA-DECENNIALPL2020.P1-Data-clean_TOTAL” might be shortened to “ROA-DECCE_1” once uploaded.



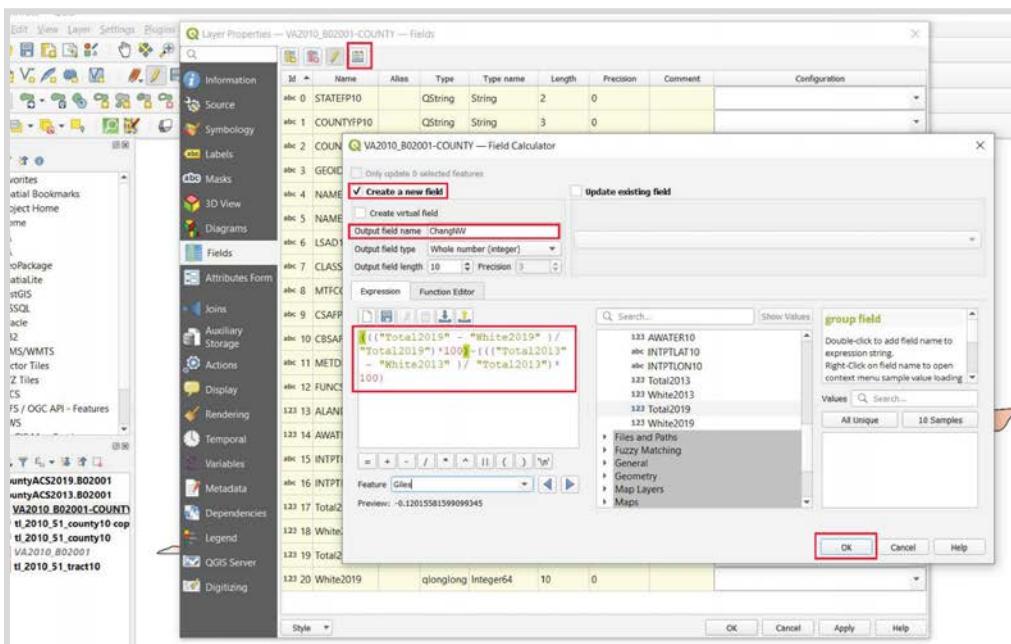


3b Next, you'll add a new data column to the layer to calculate the **percentage change in NonWhite population** between 2010 and 2020. Still in the Fields tab, click the **Field Calculator** (abacus button in the upper toolbar) to add a new column to your layer. **Check “Add New Field”** and name it something short and simple like “**NWChange**”.

To calculate the percentage change, you first need the percentage of each year. You'll then subtract the 2010 percentage from the 2020. This means that a positive number indicates a growth in nonwhite population, and a negative number indicates a decrease from 2010 to 2020.

You'll use the following formula. Remember to double click the fields from the middle column in the expression calculator to input them exactly into the formula: $((("Total2020" - "White2020") / "Total2020") - ((("Total2010" - "White2010") / "Total2010")) * 100)$

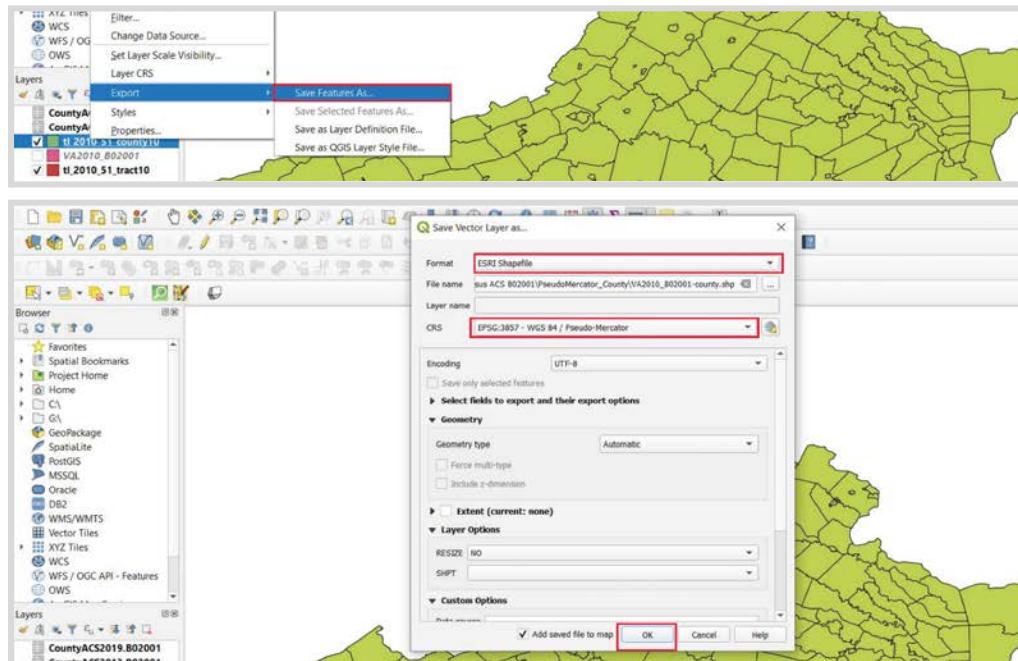
If the “Preview” looks ok, click “OK”.



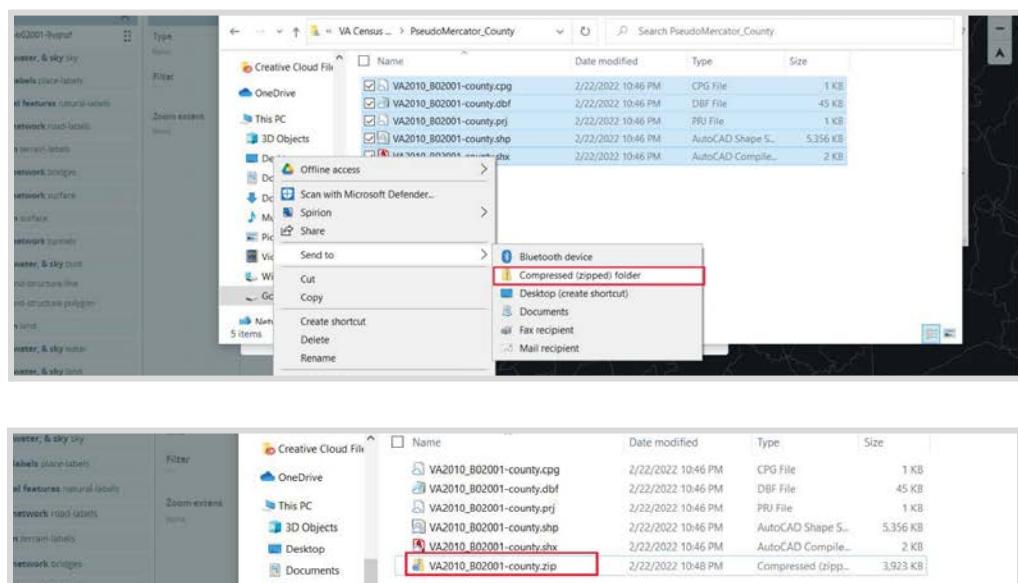
3c Check the 2010 shapefile's Attribute Table to make sure the new column successfully calculated the percentage change.

Step 4: Export the Virginia census data from QGIS

4b Right click the 2010 shapefile with the newly added attributes. Go to **Save Features As...** and export the joined shapefile as an “**ESRI Shapefile**”. Save this in its own folder so you can easily select and zip its several file types. Make sure to set your **export CRS** to “**EPSG 3857 PseudoMercator**”, one of the projection systems Mapbox uses.

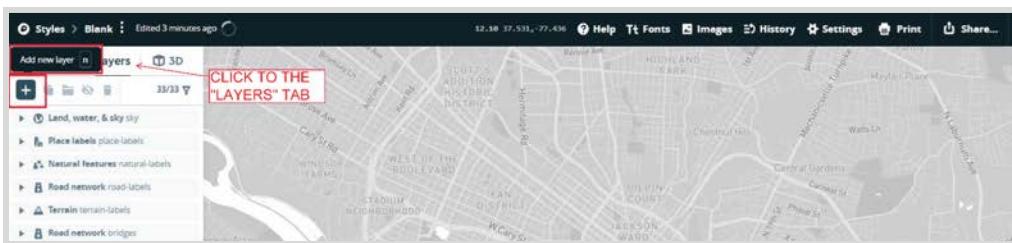


4c Zip your Shapefile, including all 6 or so of its files. Note: If you’re using a mac, you’ll need to download a third-party zipping software like WinZip, or use an online zipping website. Mac’s default zip application, Archive, adds an extra file that confuses Mapbox.

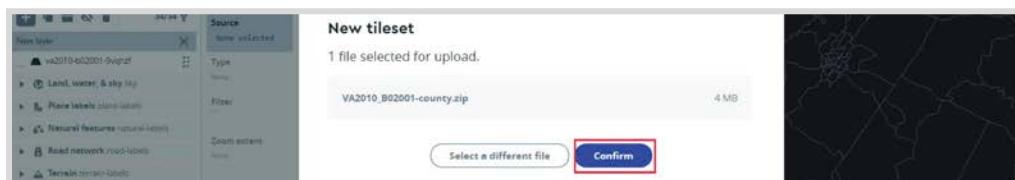
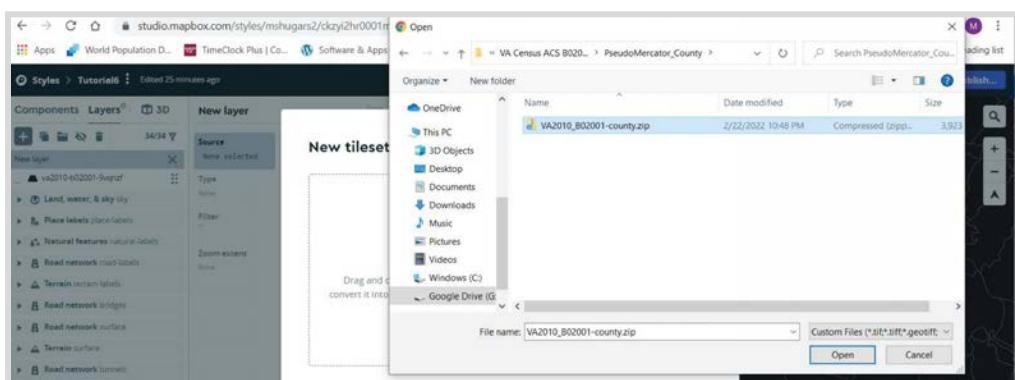
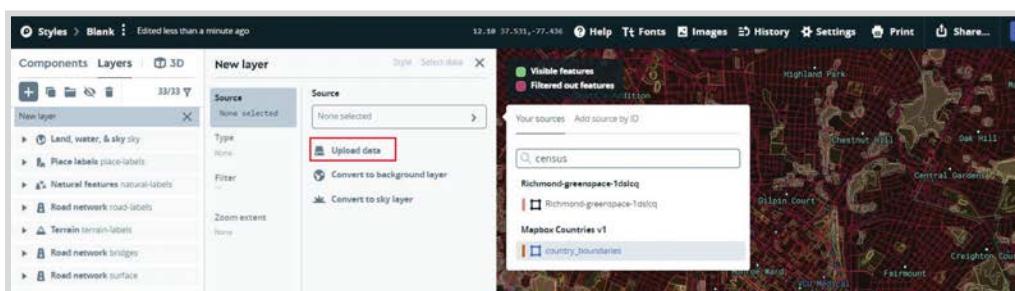


Step 5: Add your zipped Shapefile as a layer to your Mapbox base map.

5a Back in Mapbox, under the **Layers** tab in your Studio view, click the plus sign “Add New Layer”



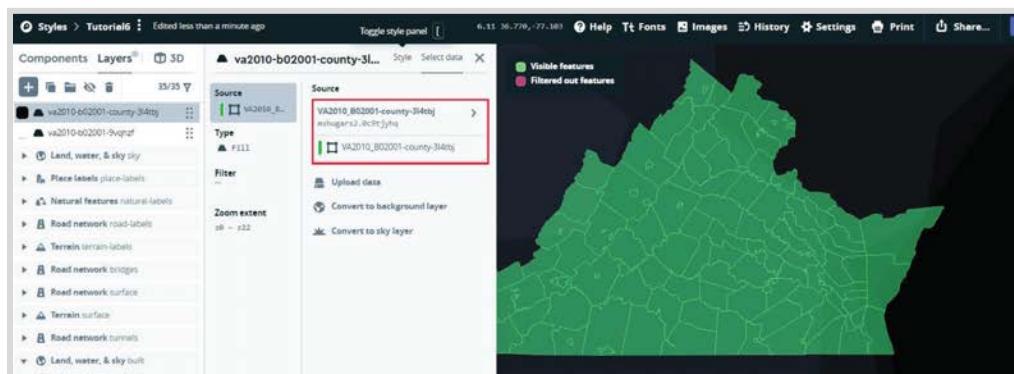
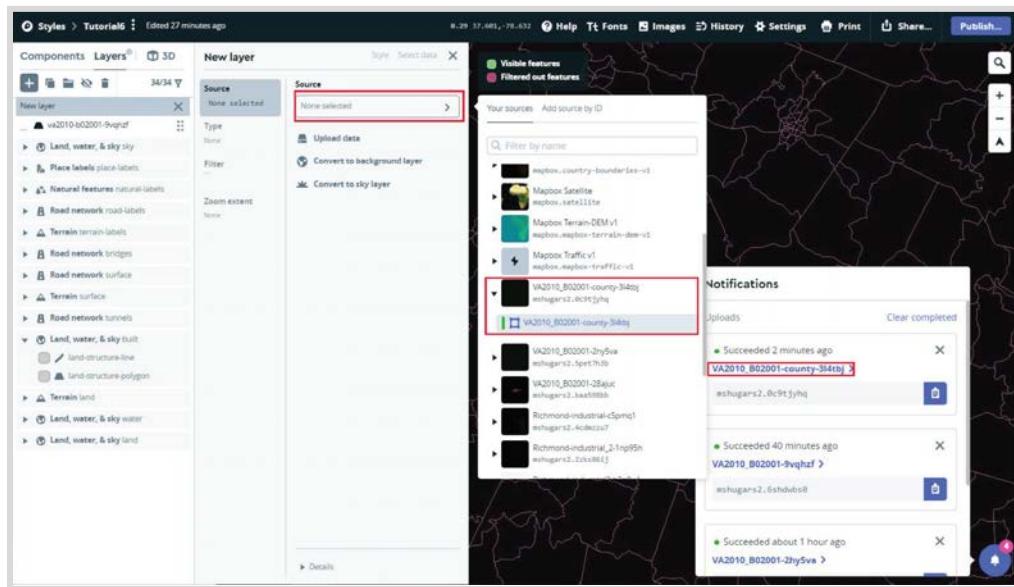
5b In Source, select “Upload Data” and select your zipped shapefile. Click “Confirm” to upload.



5c An upload process window should pop up in the lower right of your screen (if not, click on the alarm bell notification circle there). Once the layer has successfully processed, check the layer name it's been assigned, listed in blue just below the "successful" message.

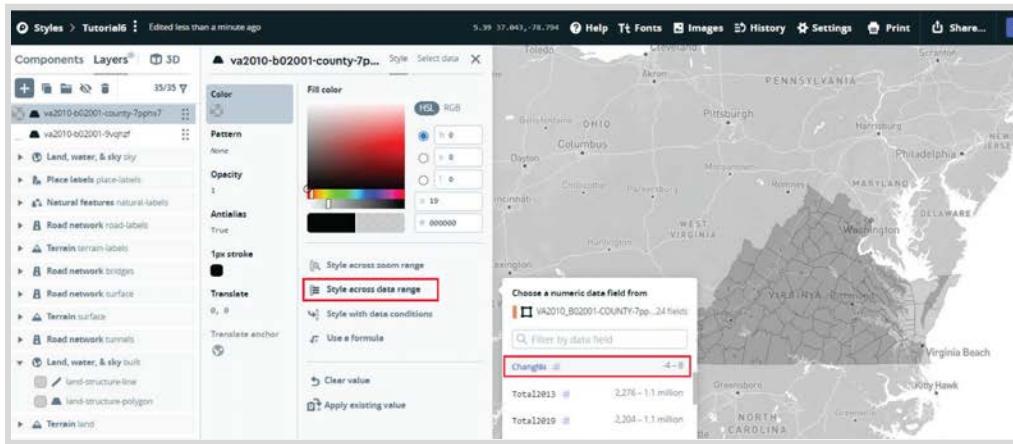


Now, in your new layer, click on "Sources" and scroll down to your newly uploaded tileset. Click on it to expand, and select the **shapefile sublayer**. You should see the outline of your data show up in bright green.

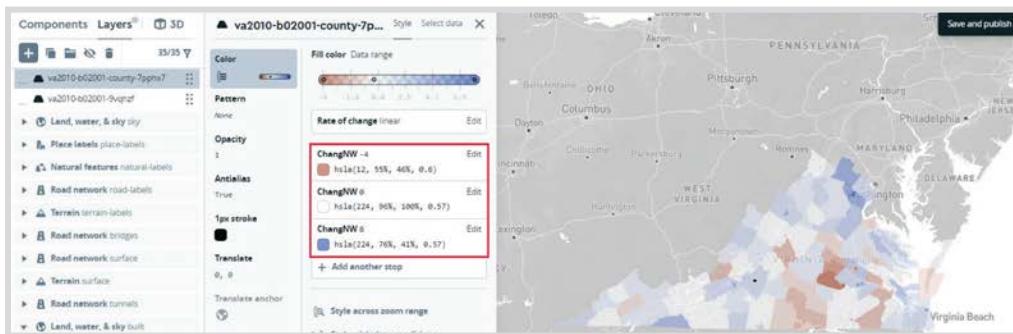
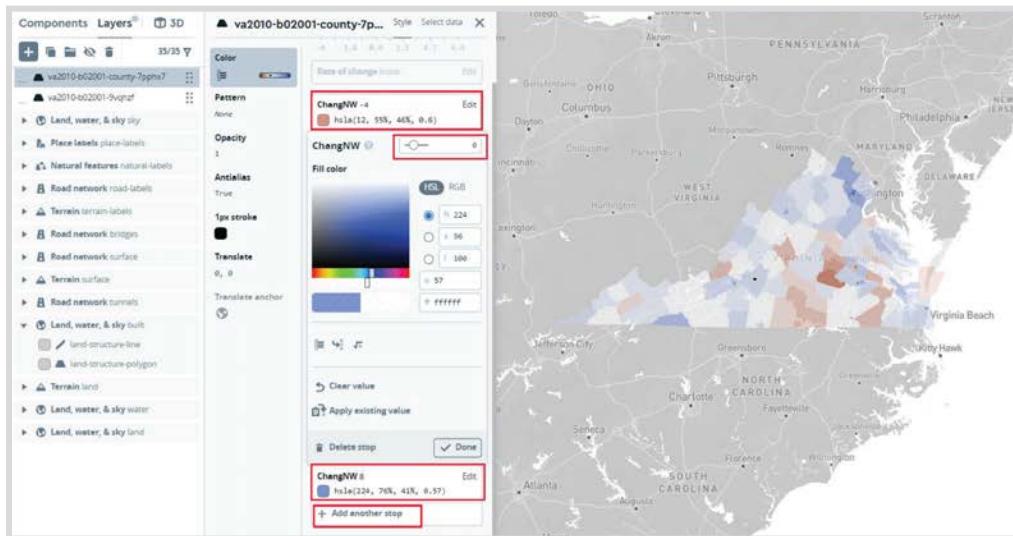


Step 6: In Mapbox, style your newly updated layer by data.

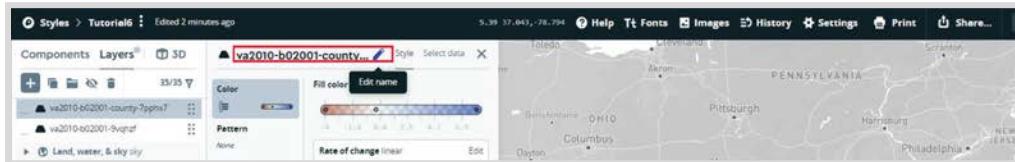
6a In the layer style, select “Style Across Data Range.” Select your new “NWChange” field from the list (scroll down)



6b Choose some endpoint colors (I chose red and blue), and then “Add Another Stop” (below your two colors). Make this one white or some other neutral color, and set the slider at the top to “0” – this color will represent no change between the years (eg 0 percent change).



6c As a last step, **rename your layer** to something short and logical (eg “b02001”, the name of the ACS census data, or “P1” for the decennial census data).



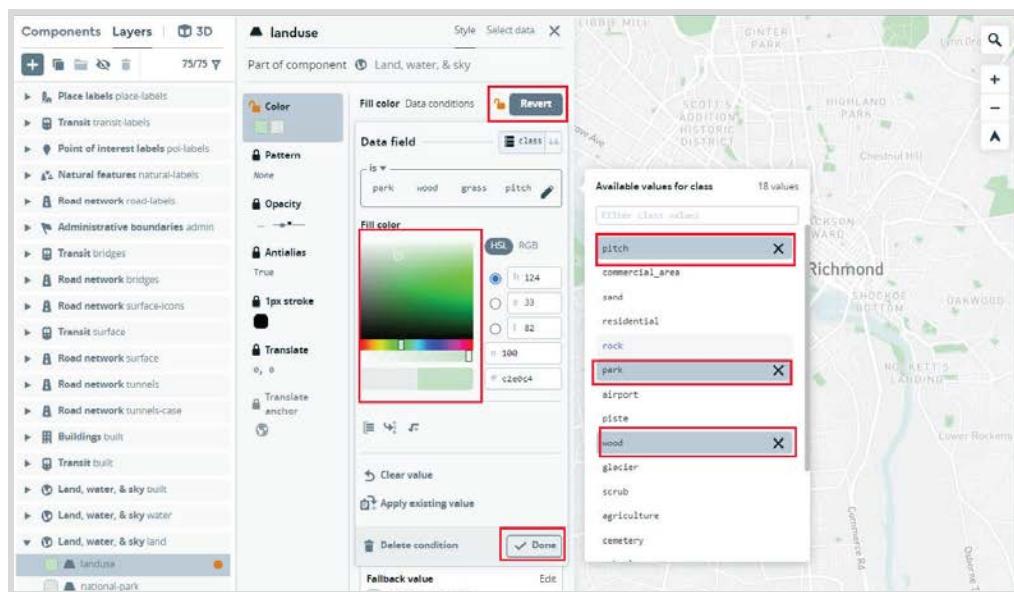
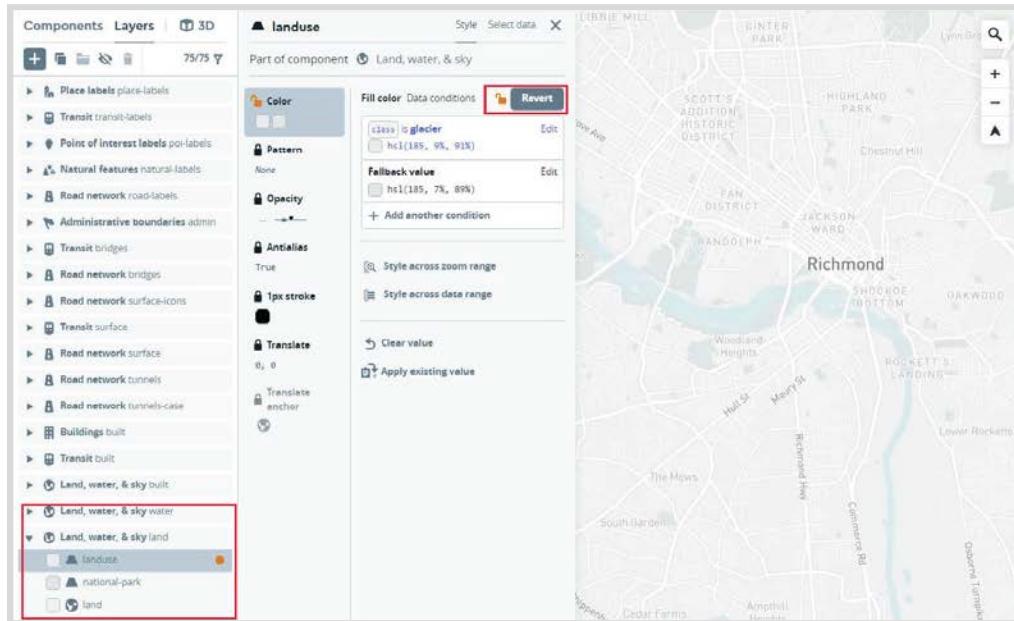
6d If all looks correct, **Publish** your map.

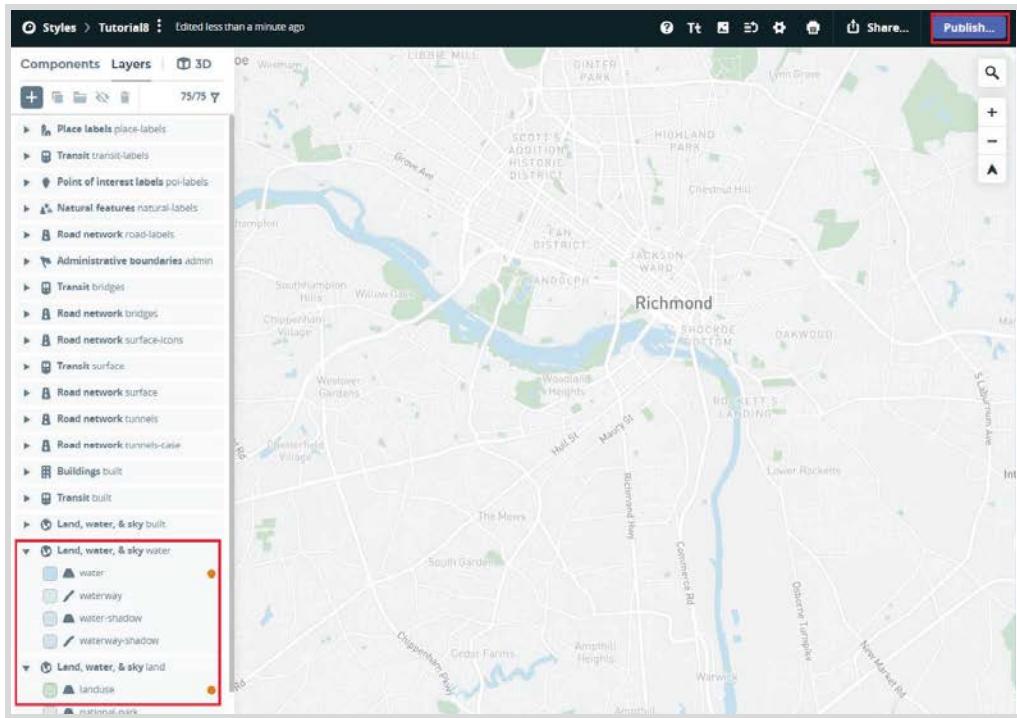


Step 7: Add a few city-level layers on Mapbox.

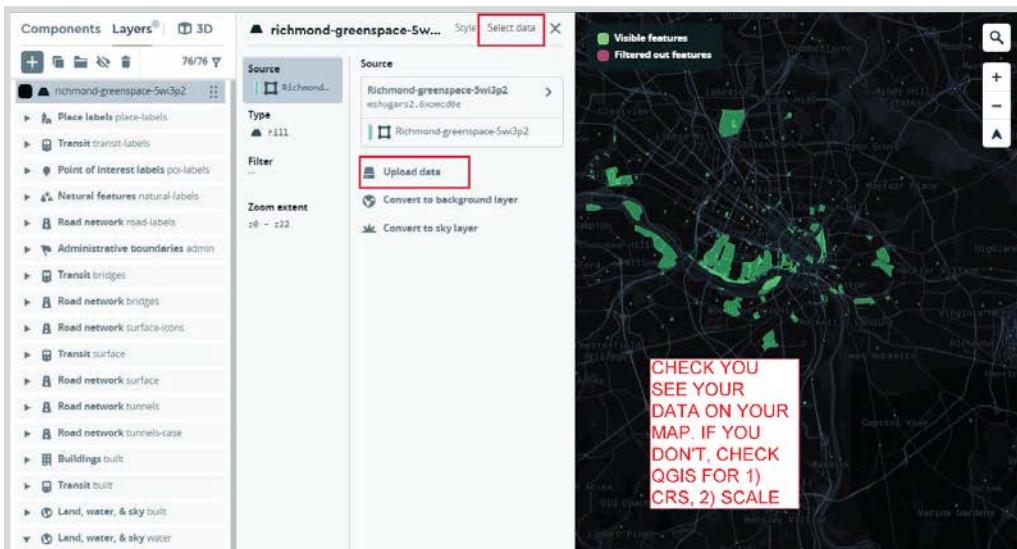
7a Choose 3 city-level layers to upload to Mapbox. One should be a **census layer** (in this example, race), one should be a **vector layer** (eg redlining), and the third should be **another layer of a different data type**, for example point data or raster data (like the heat maps).

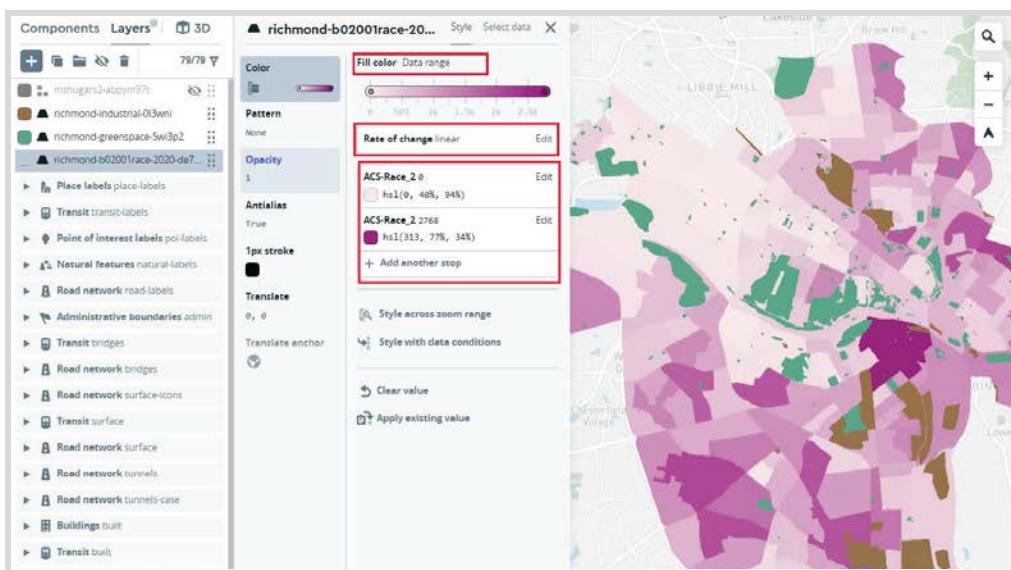
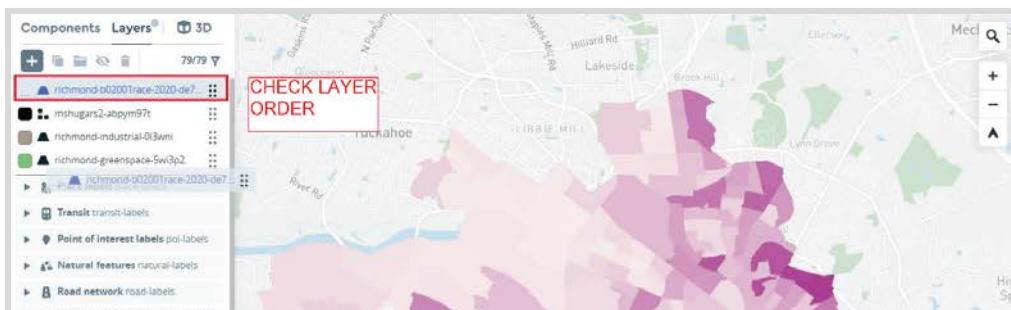
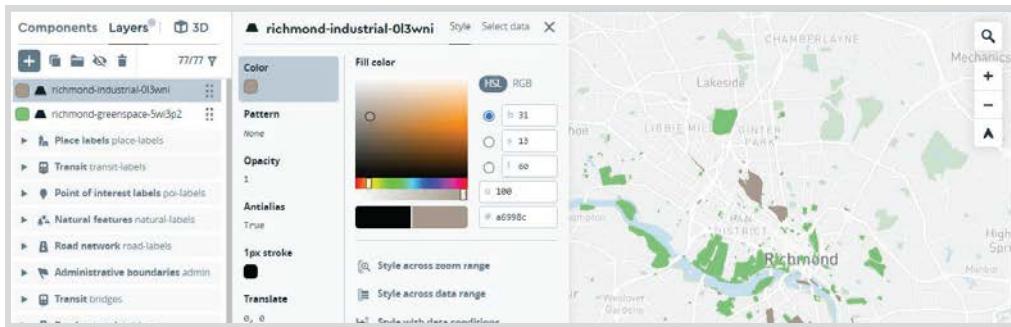
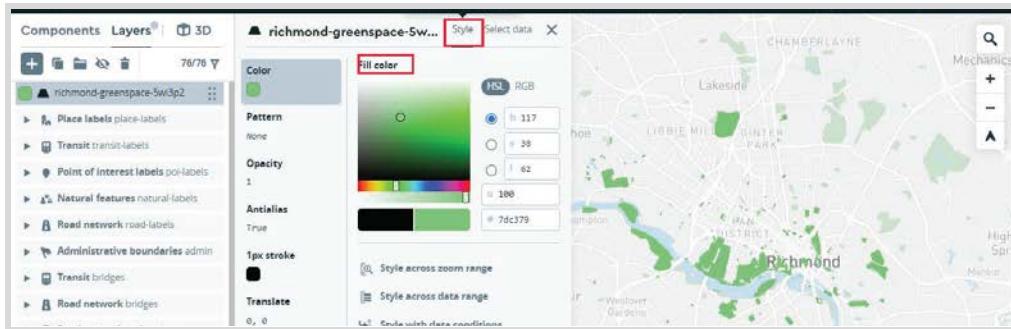
7b First, I made a few changes to the basemap to draw out the water and green spaces. Note that I'm making these changes in the **Layers** tab (not Components), and need to click the lock symbol first to unlock them and make changes. You can see that I select certain features in the landuse category (pitch, park, and wood) to be green, rather than coloring all the landuse as green.





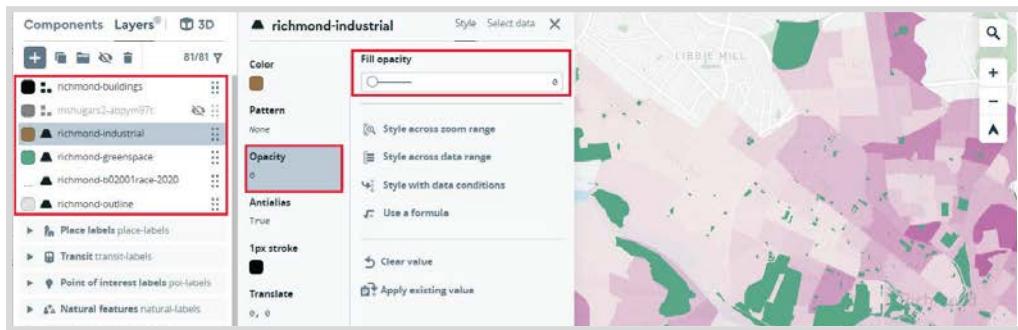
7c Next, upload your QGIS data layers to Mapbox. Remember to set your CRS to **EPSG 3857: Pseudo Mercator when you export**. I chose to upload the layers for parks, industrial space, and census race data.





Note: If your QGIS layer is over 20MB large after zipping it, Mapbox will be unable to display it fully on the map. In this case, you may need to re-export your layers in separate parts. You can also try the QGIS tool Vector > Geometry Tools > Simplify.

Note 2: All layers you want to use should be shown, with their opacity set to 0. This will mean they won't show up by default in your map, but you can turn them on in the html template:



7d Make sure to rename your layers to something simple and easy to remember without spaces or special characters; eg “Richmond-parks”, or just “Parks”.

7e If all looks correct, **Publish** your map.

Step 8: create pdf for Canvas.

8a For your assignment upload, take **screenshots** of the following:

- Mapbox base map
- Each of the 4 layers, 1 state and 3 city, uploaded to Mapbox, with the other uploaded layers turned off (the eye symbol beside the layer name). Make sure each layer is styled the way you want it to look.
- The Attribute table in QGIS with your new NW Change column.

Also include a **short written description** of the 3 city-level layers you chose to upload and why. Combine the screenshots and description in a **single pdf**.