

GIS Tutorial for Atmospheric Sciences

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Section 2: Intermediate GIS Functionality

Exercise 2

Web Mapping with Climate Data

Use Case: Using The Living Atlas to access climate data for creating web maps

ArcGIS Living Atlas of the World is an online collection of spatial geographic information hosted by Esri. It contains basemaps, demographic, and infrastructure data, just to name a few, that can be combined with your own data to create, and share maps, scenes, apps, layers, analytics, and data.

ArcGIS online is part of Esri's Cloud services which enables you to make maps perform analysis and share insights. ArcGIS Online includes everything you need to create maps, scenes, and apps. Through the map viewer and scene viewer, you can access a gallery of basemaps and tools for adding your own layers and configuring mashups that you can share with others. You also have access to easy-to-use tools for creating apps that you can be published.

Thousands of data layers are already available and discoverable in ArcGIS Online and The Living Atlas, including climate-related data that can be easily brought into ArcGIS Pro. In this exercise you will explore both the Living Atlas of the World and ArcGIS Online.

Sub-Sections in Exercise 2:

1. *Establishing a free ArcGIS public account*
2. *Creating web maps in ArcGIS Online*

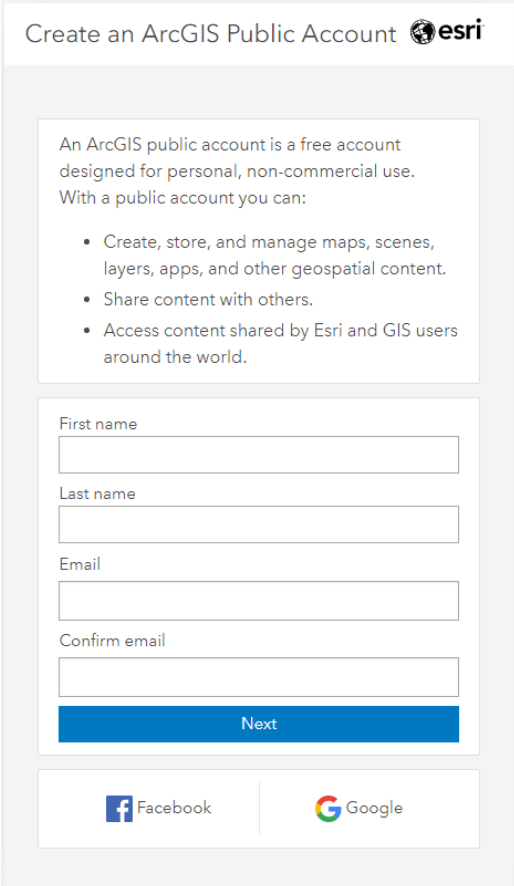
Establishing a free ArcGIS public account

Step 1 Getting started with ArcGIS Online

In order to access Esri's ArcGIS Online, and download data from The Living Atlas, you need to have a free ArcGIS public account. If you already have an ArcGIS account, please skip to Step 2 in the next section.

- Open a web browser and navigate to <http://www.arcgis.com/home/index.html>.
- In the upper right, click the **Sign In** button.
- Click **CREATE A PUBLIC ACCOUNT**.
- Click **ENTER YOUR INFORMATION**.
- Enter your information, check the "...terms of use" box, and click the **CREATE MY ACCOUNT**.

Your new account is created.



The screenshot shows the 'Create an ArcGIS Public Account' page. At the top, it says 'Create an ArcGIS Public Account' with the Esri logo. Below this, a text box explains that an ArcGIS public account is a free account for personal, non-commercial use and lists benefits: creating/management maps, scenes, layers, apps, and other geospatial content; sharing content with others; and accessing content shared by Esri and GIS users. The form fields include 'First name', 'Last name', 'Email', and 'Confirm email', each with a corresponding input box. A blue 'Next' button is at the bottom of the form. Below the form, there are links for 'Facebook' and 'Google'.

Creating basic web maps with ArcGIS Online

With a free ArcGIS public account you can use ArcGIS Online to create and share web maps.

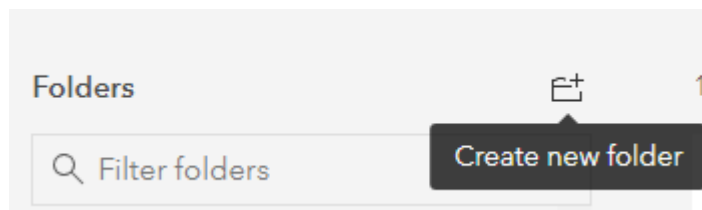
Step 2 Adding basic content to a new map

The My Content section of ArcGIS Online is where all of your content is stored. Your content consists of “items”, which can include layers you uploaded such as shapefiles, web maps and scenes, apps, tabular data, and other types of data.

- Click the **Content** tab at the top of the page.

You can organize your content through the use of folders similar to how you organize your files in a Windows Explorer environment.

- Click on the “Create new folder” icon in the upper left of the page.

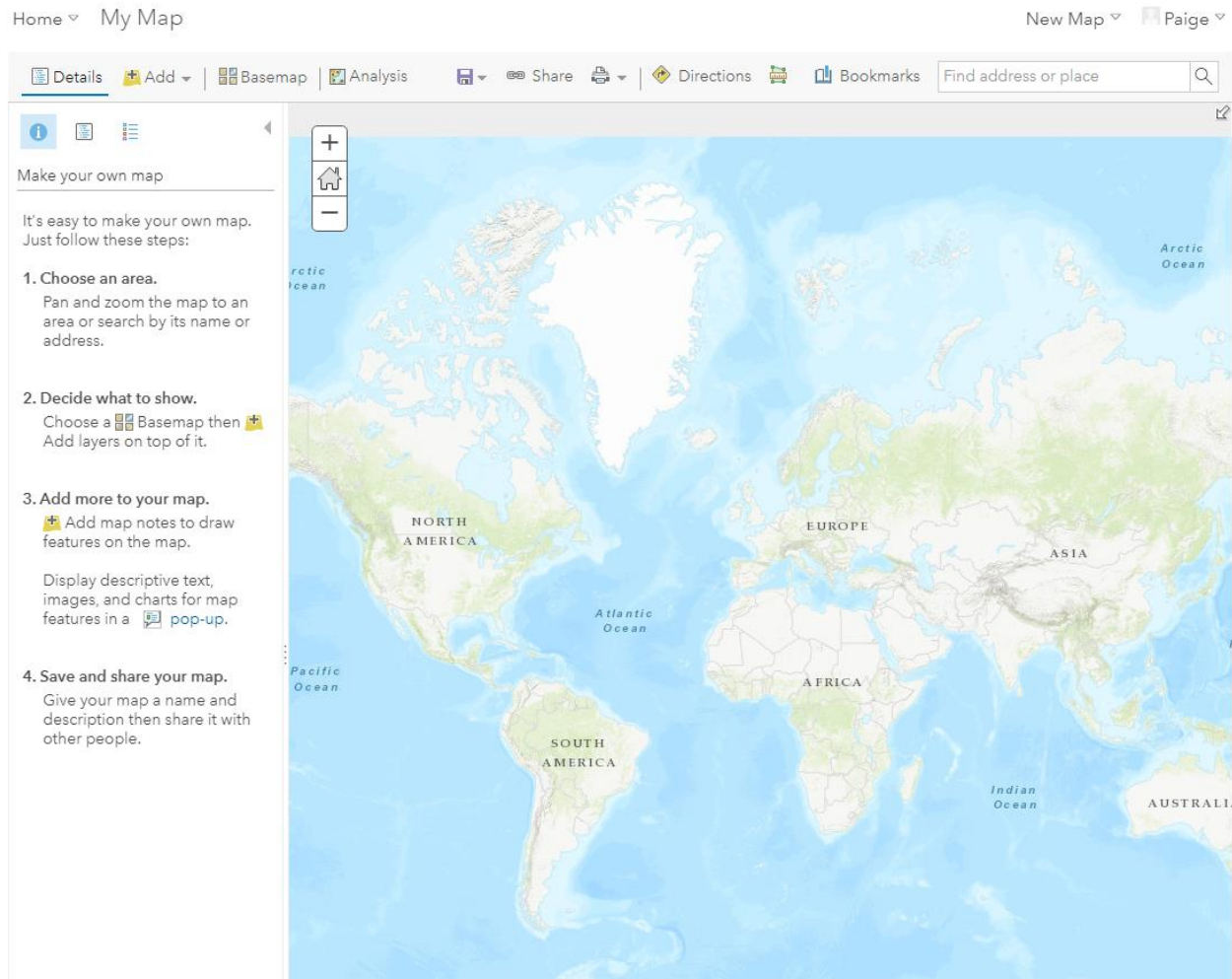


- Name the new folder *NCAR Workshop*.

One of the main features of ArcGIS Online is the Map. The Map is a web map that you can add content to, explore content, perform basic analysis, control map symbology, and create custom web maps.

- Click **Map** at the top of the page.

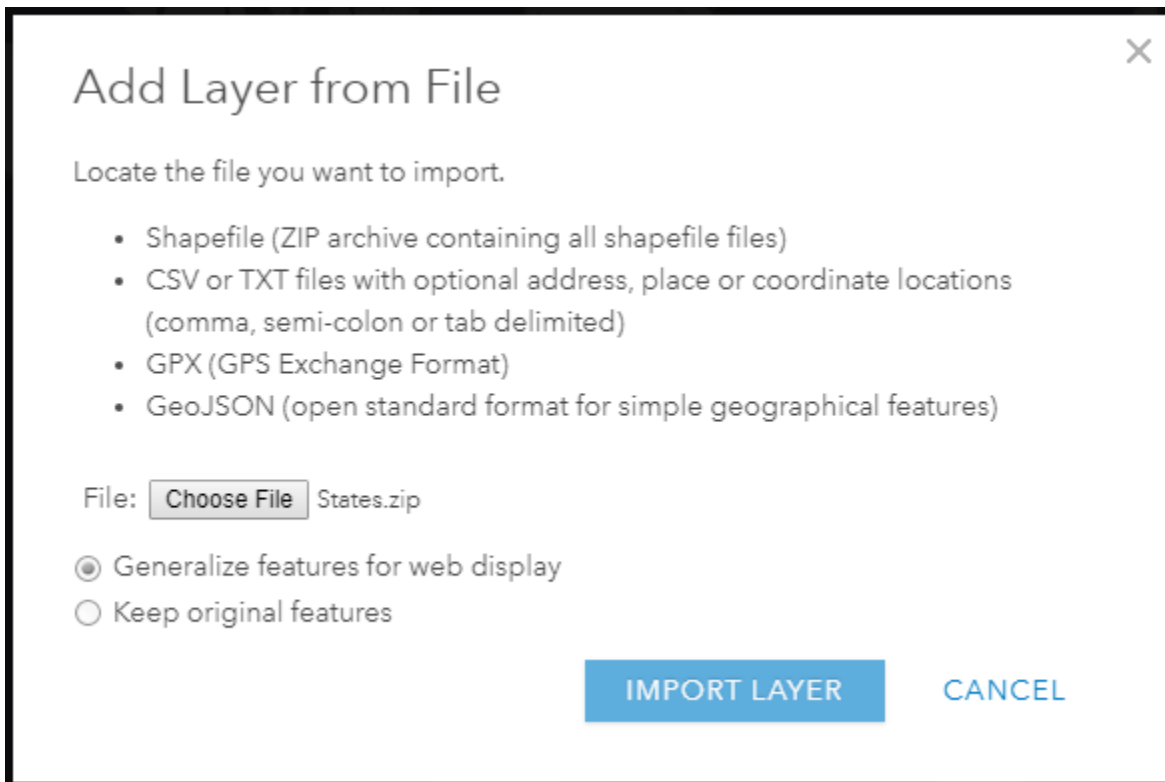
The default web map appears with the Esri Topographic basemap.



- In the upper left, click the **Basemap** button to activate basemap selection window.
- Choose a different Basemap.

Next we want add some basic content to our map. There are multiple methods for adding content to your map. You can search for layers in ArcGIS Online or The Living Atlas that have been shared publically, stored in your My Content folders, by searching on a known GIS Server. You can also add layers from the web that are available through a web server, such as through an ArcGIS Server Web Service or through an OGC web service. Additionally you can add a KML or CSV file. Perhaps the most basic method of adding content to a map is to directly add a layer from a file on your computer. This could include a shapefile, CSV or TXT file, or a GPX file.

- Click the dropdown menu next to the Add button at the top of the left pane.
- Click **Add Layer from File**.
- Click the Choose File button and browse to the **C:\Section2\Exercise2\data** or wherever you stored the data for this exercise.
- Click on the **States** zip file and then click **Open**.



Add Layer from File

Locate the file you want to import.

- Shapefile (ZIP archive containing all shapefile files)
- CSV or TXT files with optional address, place or coordinate locations (comma, semi-colon or tab delimited)
- GPX (GPS Exchange Format)
- GeoJSON (open standard format for simple geographical features)

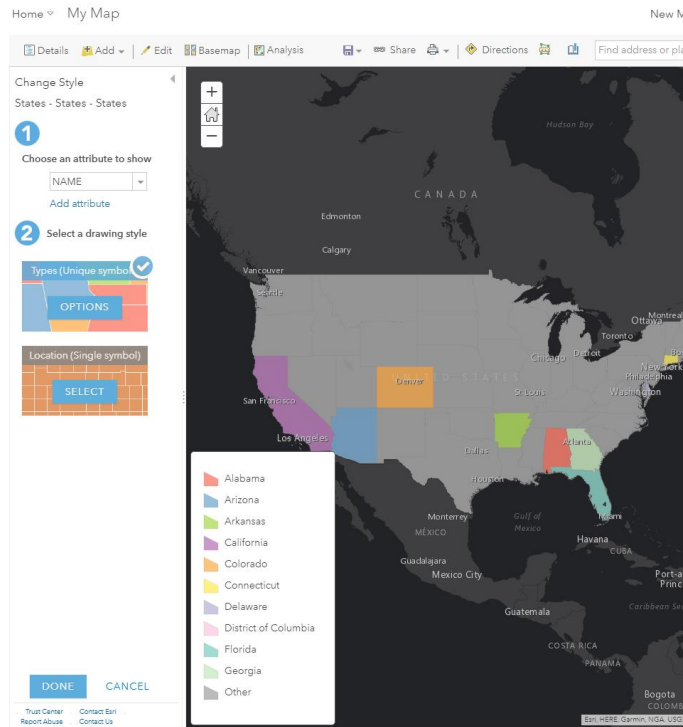
File: States.zip

☒ Generalize features for web display
☐ Keep original features

Shapefiles need to be in a zip file in order to be directly added to a map in ArcGIS Online. You can have more than one shapefile in the zip file, but they all must be contained in the root. That is, do not organize your zip file with sub-folders. Note that you are limited to shapefiles with no more than 1000 features.

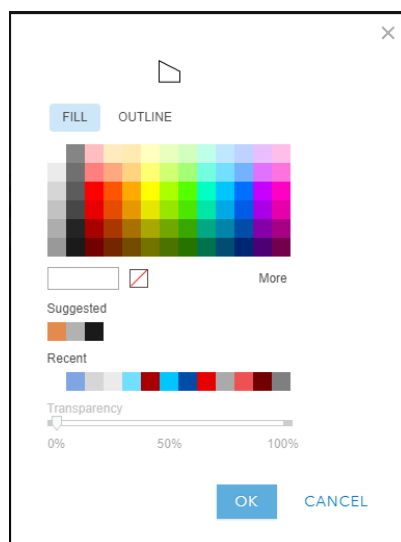
- Click the radio button to generalize features for web display.
- Click **IMPORT LAYER**.

When you directly add a shapefile to your web map, the **Change Style** window on the left is automatically activated. The Change Style window is where you can change and edit map layer symbology.



We now want to change the symbology of the **States** layer to be hollow with black outlines.

- Click the **SELECT** button on the “Location (Single symbol)” drawing style option.
- Click **OPTIONS**.
- In the upper left, click **Symbols**.
- Click the **FILL** tab at the top of the Symbols window
- Under the color palate, click the box that has a diagonal red line through it to set the fill color to “No color”.



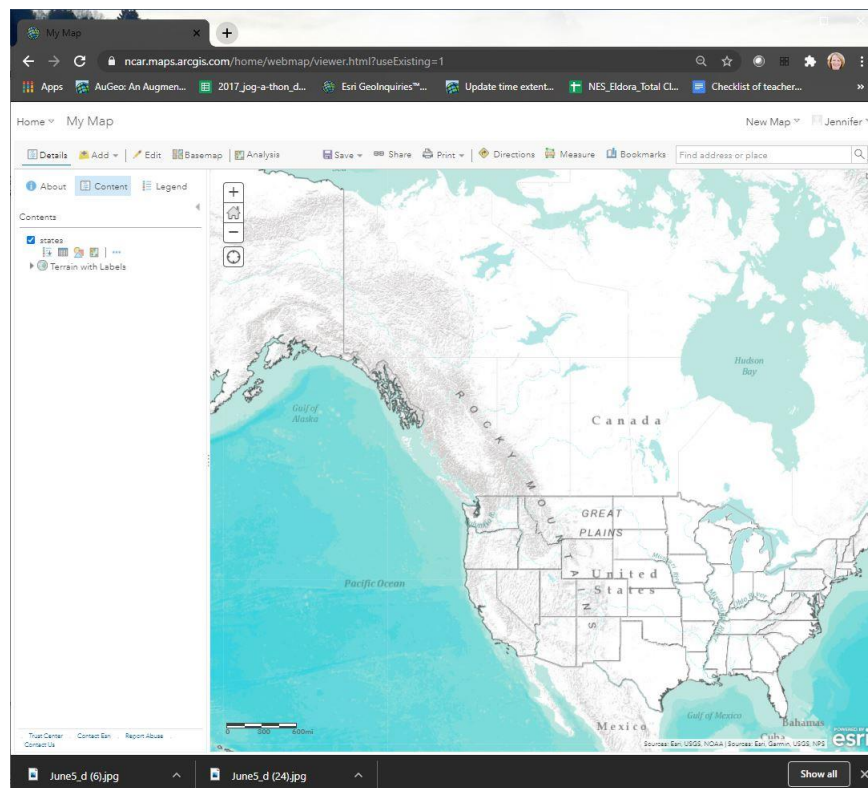
- Next, click the **OUTLINE** tab.
- Choose a black color from the color palate. Make sure the transparency is set to 0 for outline.
- Click **OK** at the bottom of the Symbols window.
- Click **OK** at the bottom of the Change Style window.
- Click **Done** at the bottom of the Change Style window.

Notice at the top of the left window that the Content tab is active. When this tab is active you can toggle layers on and off and access layer properties. The Legend tab will display the layer names and their symbology. Keep the Content tab active for now.

- Hover your mouse over the **States** layer.
- Click the three horizontally aligned dots to access more options for this layer.



- Click **Zoom to**.
- Switch your basemap back to “Terrain with Labels”.

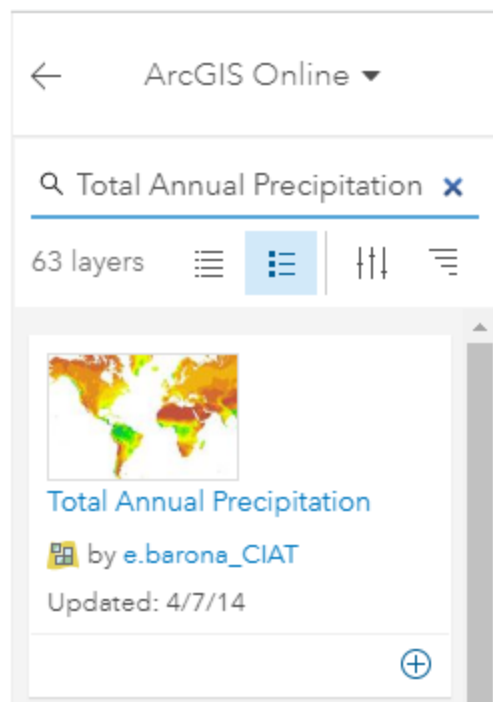


Step 3 Searching for and adding climate-related content to your map

As previously mentioned, another way for adding content to a map is to search for it in ArcGIS Online. Next we will search for climate data and add a precipitation layer to the web map.

- Click the dropdown menu to the **Add** button.
- Click **Search for Layers**.
- Change the location for searching from **My Contents** to **ArcGIS Online**.
- In the Search for Layers window, type “**Precipitation**” into the Find: box and click **Enter**.

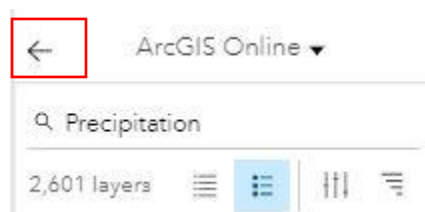
Near the top of the list you should see the **Total Annual Precipitation** layer.



- To the right of this layer, click **the plus sign in a circle to add it to your map**.

The layer is added.

- At the top of the Search for Layers window, click **the back arrow** to finish adding layers.



The Total Annual Precipitation layer shows annual average precipitation for the entire world. You can click the Show Map Legend tab at the top of the left window to see the precipitation values. Note that they are in millimeters. You can access more details about a layer the layer properties.



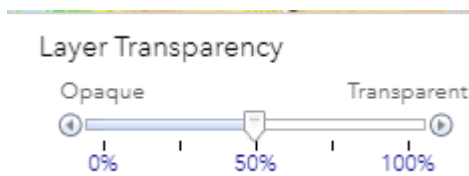
- Switch back to Show Contents View if you are not there already.
- Hover over the *Total Annual Precipitation* layer and click the three horizontally aligned dots, **More Options**.
- At the bottom of the list click **Show Item Details**.

A new page appears displaying more information about this layer, including a description, author, date, and other additional metadata.

Step 4 Working with transparency

Similar to symbol options in Desktop ArcGIS, you can control how layers are display in ArcGIS Online. You will set a transparency to the Precipitation layer to see how terrain and elevation influences precipitation.

- Back in the Map Display tab, make sure the Content tab is active.
- Hover over the *Total Annual Precipitation* layer and click the three horizontally aligned dots.
- Click **Transparency**.
- In the Layer Transparency window, drag the slider to 50%.



You can now see the terrain through the precipitation layer.

- Click **Save**.



- Enter “Total Annual Precipitation” for the Title.
- Enter “NCAR Pro Tutorial” in the Tags box and hit **Enter** on your keyboard
- Also type “Precipitation” and hit **Enter** on your keyboard

Tags can be used to search for your content items in ArcGIS Online. You can create new tags as you just did, or you can choose from already stored tags.

- In the Summary: box, type “A web map displaying total annual precipitation”.

- In the Save in folder: box, be sure to select the **NCAR Workshop** folder that you created earlier.

Save Map

Title: Total Annual Precipitation

Tags: NCAR Pro Tutorial x Precipitation x
Add tags

Summary: A web map displaying total annual precipitation

Save in folder: NCAR Workshop

SAVE MAP CANCEL

- Click **SAVE MAP**.

Step 5 Sharing web maps

Once you have created a web map in ArcGIS Online, you can share it so that it can be disseminated to others through a web link, embedded in a website, or used to create a web app.

- Click **Share**.
- Check the box to share with Everyone (public).

Now you have the option to link to your web map or share it on Facebook and Twitter, embed it in a website, or create a web app, such as a story map.

- Click **DONE**.
- **Save** your map to save the “share” changes you just made.

Step 6 Create sea level rise web map

You will create a second web map that displays sea level rise data for Miami, Florida. Since we already have an open web map that contains a layer we would like to include in the new map (**States**), we can save the map with a new name, remove the precipitation layer, and add a sea level rise layer.

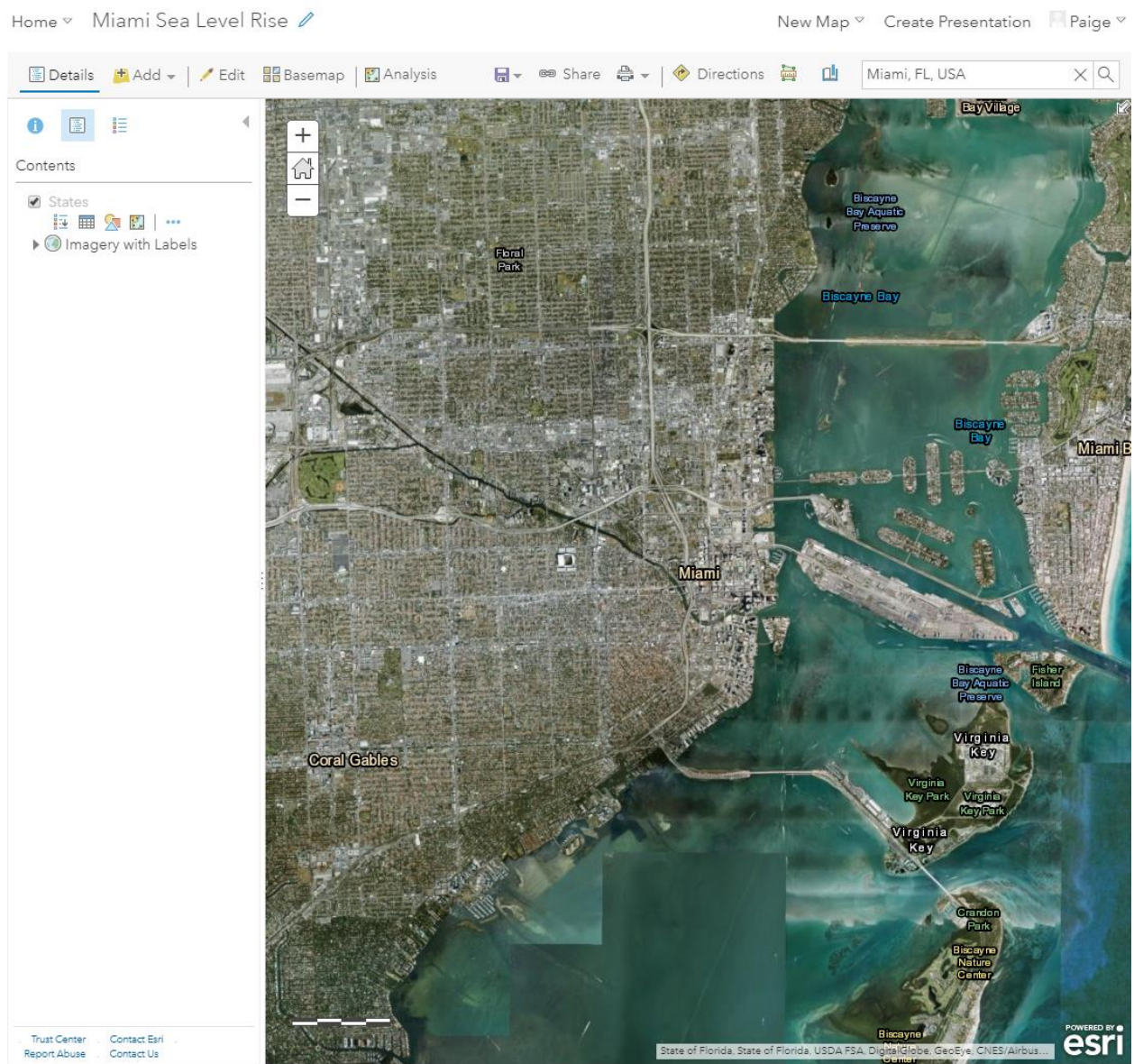
- Click **Save As**.
- Change the Name to “Miami Sea Level Rise”.
- Remove the tag “Precipitation” and add a new tag “Sea level rise”.
- Change the Summary to “A web map displaying sea level rise data for Miami, FL”.
- Click **SAVE MAP**.

Notice in the upper left that the name of the map has changed.

- Hover over the *Total Annual Precipitation* layer and click the three horizontally aligned dots.
- Click **Remove**.
- In the dialog box that appears, conform to remove the layer.
- In the Find address or place search box in the top right corner type **Miami, FL** and hit Enter.



- Change the basemap to *Imagery with Labels*.



- Click **Add > Search for Layer**.
- Make sure you are search in **ArcGIS Online**.
- In the Search for Layers window, type “**sea level rise**” and hit Enter.
- Select the layer “**Sea Level Rise Inundation -3ft Above MHHW**”.

Make sure the author of the layer is SLR_noaa

- To the right of this layer, click the **plus** to Add.

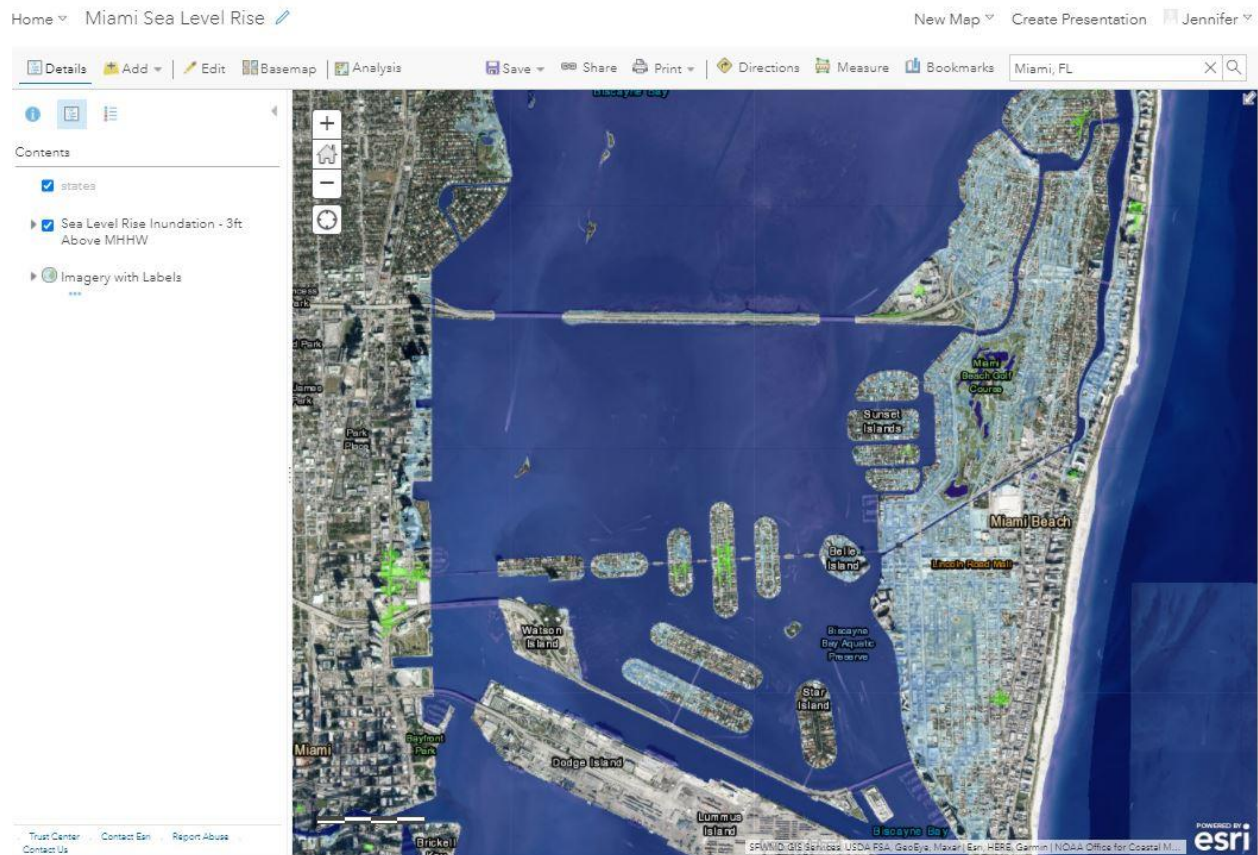
The layer is added to your map.

- Click the back arrow at the top of the Layer Search window

This **3 ft Sea Level Rise** layer from NOAA shows what 3ft of sea level rise would look like for the U.S. coast. You can click the Legend tab at the top of the left window to see the depth categories. You can learn more about this layer by clicking the **Show Item Details** in the layer properties as you did earlier.

Next let’s change the transparency of the **3 ft Sea Level Rise** layer to be able to see the impacts on the ground.

- Make sure the **Content** tab is still active.
- Hover over the **Sea Level Rise Inundation – 3ft Above MHHW** layer and click the three horizontally aligned dots.
- Click **Transparency**.
- In the Layer Transparency window, drag the slider to ~50%.
- Zoom into Miami Beach, just east downtown Miami.



Now you can see that with a 3ft rise in sea levels, a significant part of Miami Beach and the surrounding area would be inundated with water.









- Click **Save**.
- Above the center of the map, click **Share**.
- Check the box to share with Everyone (public).
- Click **DONE**.
- **Save** your map.

You have now created two web maps. They can be accessed through the My Content section of ArcGIS Online.

- In the upper left, click the dropdown **Home**.
- Click **My Content**.
- Be sure that your NCAR Workshop folder is the active folder.

You will see the two web maps listed with some basic information about them.

You can access individual items, such as a web map, by clicking the dropdown arrow to the left of the item type listed in the Type field.

1 - 2 of 2 in NCAR Workshop						
<input type="checkbox"/>	Title		Modified ▼			
<input type="checkbox"/>	 Miami Sea Level Rise	Web Map				May 9, 2019
<input type="checkbox"/>	 Total Annual Precipitation	Web Map				May 9, 2019

- Click on the title of the web map “Miami Sea Level Rise”.

Here you can see all the metadata about the web map, open the web map, open the web map in Desktop, change sharing, or create web app.

- Close your web browser.