GIS Wildlife Data Tutorial

How to find, Map, & Spatially Analyze Wildlife Data in a GIS System

This Tutorial was Created by

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This tutorial, and other teaching-related materials by Dr. Lentz are available online at:
http://JenniferALentz.info/Teaching.html

How to Find, Map, & Analyze Wildlife Data in a GIS System

Part 1: Setting up the GIS Software

- **First you will need to set up and/or log into your <u>ArcGIS Online</u> Account**

  Many K-12 schools (or School Districts) have accounts through ESRI (the GIS company), so you may want to check to see if there is a log-in you can use (see 1B). Or you can sign-up for a free 30 day trail (see 1A)
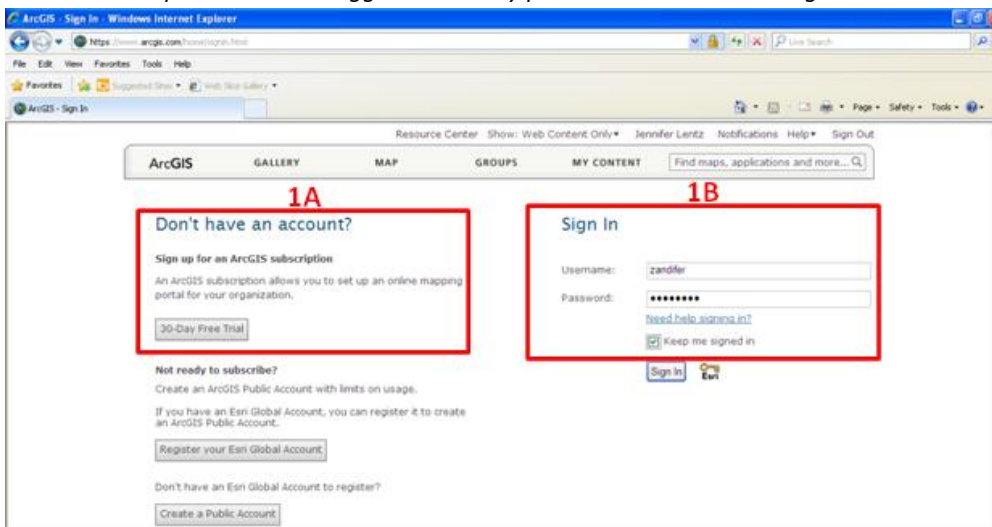
  1. **Go to the following website:** http://www.arcgis.com/
     Click the "Sign in" link in the upper right hand corner
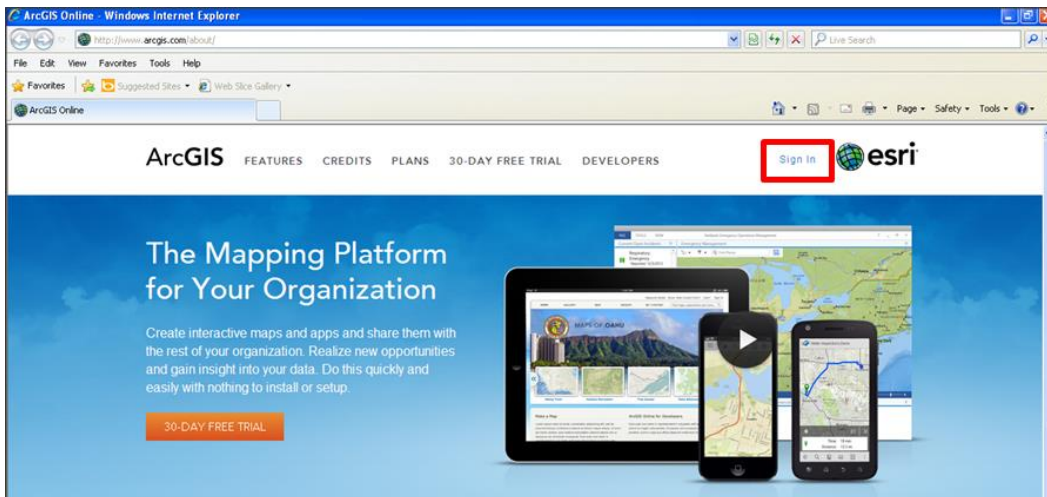
     1A. register for a free 30 day trial

     1B. Log in with your personal OR organization's ArcGIS online (AGOL) account
     For example here I have logged in with my personal AGOL account log-in

- **If you have Access to the 2010 version of Microsoft Office you will want to download and install the free "ESRI Maps" Add-in for Excel from the following website:**
 **http://www.esri.com/software/arcgis/arcgisonline/apps/download**

- **If you do not have this version of excel, you can go straight to "Part 4" of this tutorial**

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Part 2: Find and Download Spatial Data

This part of the tutorial provides websites with free spatial wildlife data, and gives step-by-step instructions for how to search within these websites and download the data.

- **Go to the following website: http://iobis.org**

  - Select the **"Search Data"** Tab
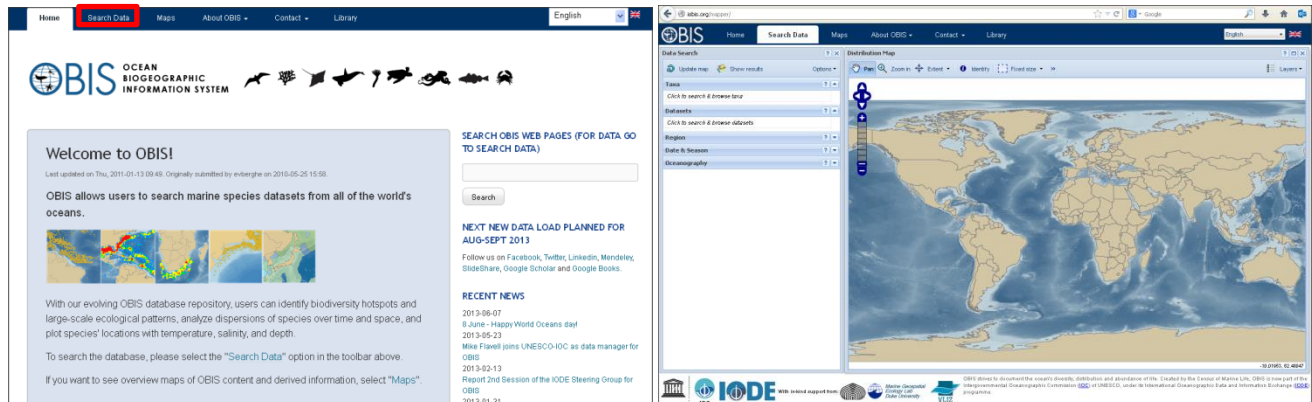
- **Search for your Animal in the iOBIS database**

  1. Click the **"Taxa"** Window

  2. Select "**Common Name**" (or "**Scientific Name**") from the pull down menu
     - Start to type the name of the animal you are interested in
     - Then select that animal from the list provided
     - Information on the animal you just searched should appear in the Taxa Search window.

  3. Go ahead and close the Taxa Search window by clicking the X in the upper right corner
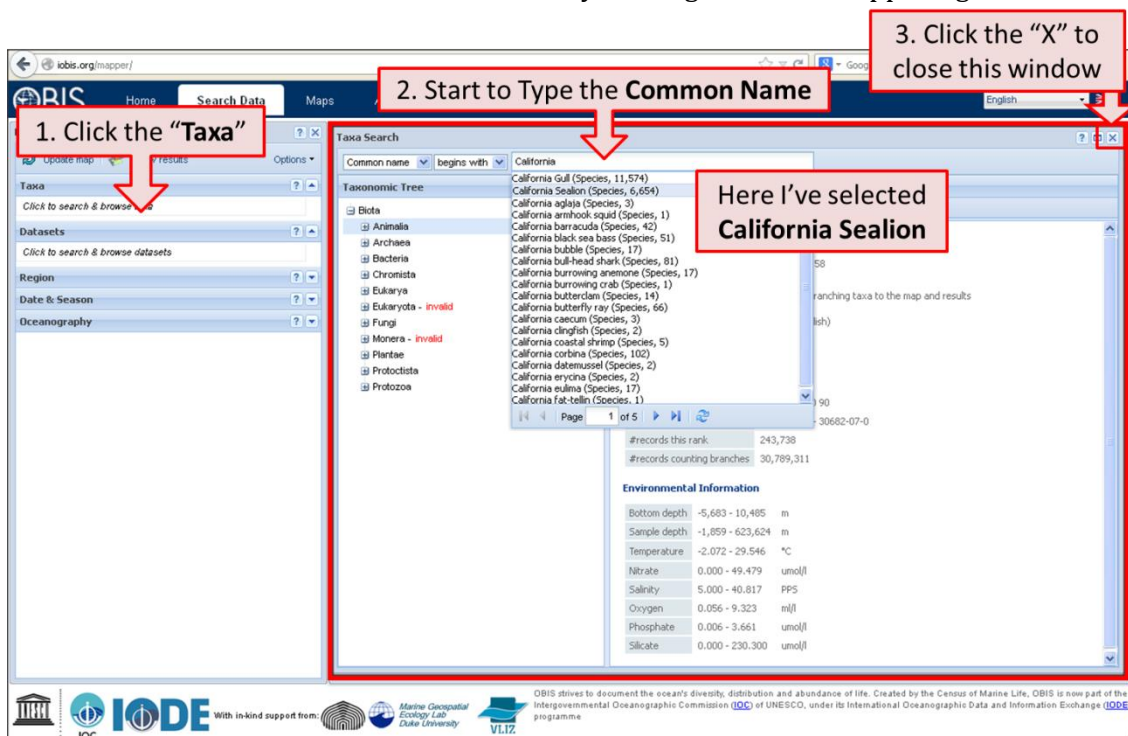
- **Navigating the Map of your Animal locations**
    - You should now have a map showing the locations where your animal has been sighted
1. Click the legend box to see what the colors mean
2. Try viewing the data based on their **Point Locations**
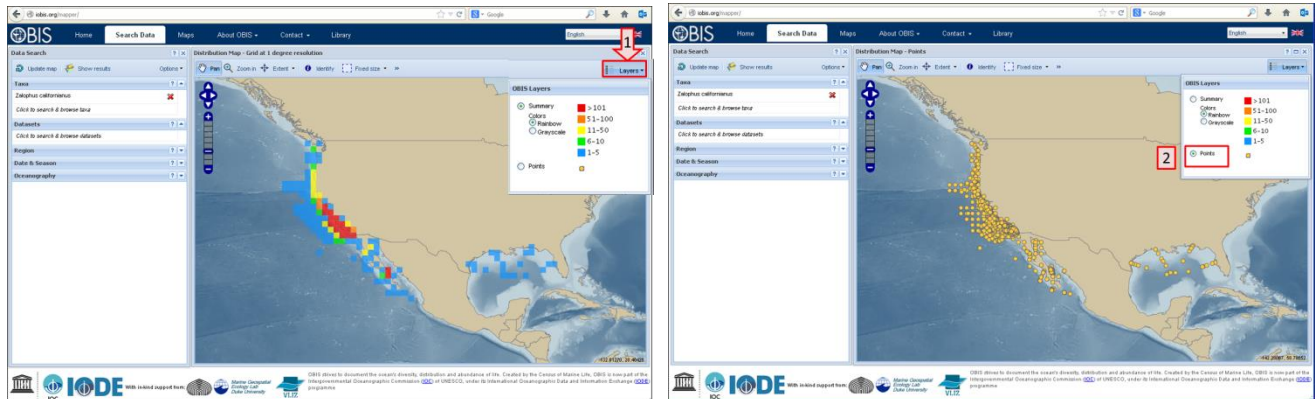
- **Downloading this Spatial Dataset**
    1. Click the "**Show Results**" button, a window should appear entitled "Show Results"
    2. Select the "**Download tab**"
   3. Click to download the data as "**Points**" in "**CSV**" format
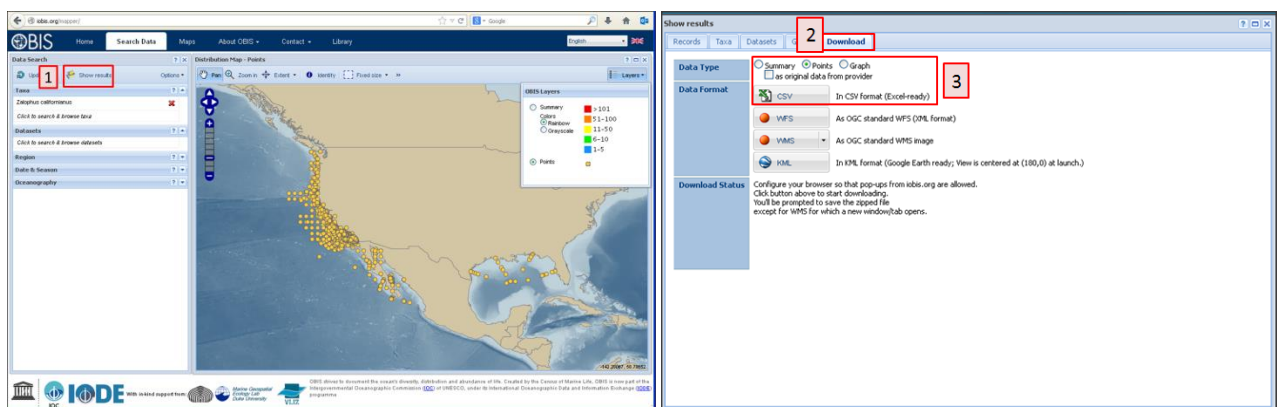
    4. Click to **Open with** your computer's default un-zipping program
    5. Select to **Extract** the file select where on your computer you would like the CSV file saved
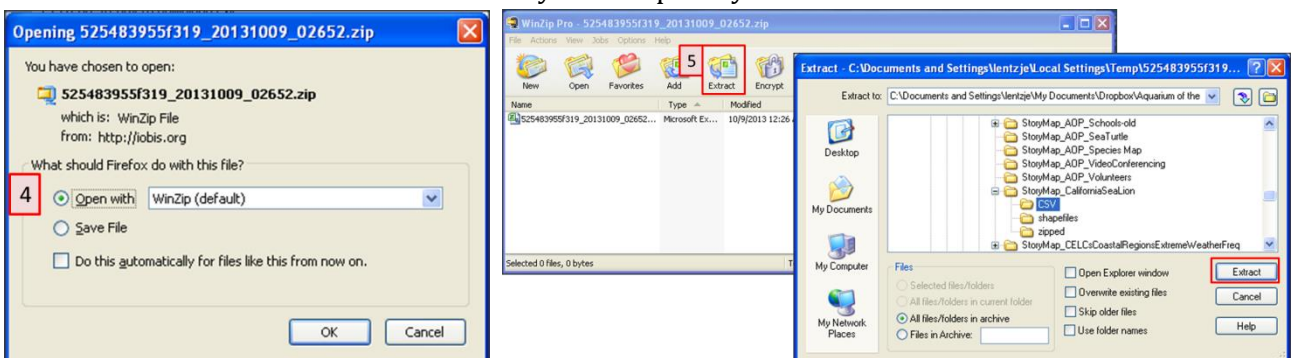
Next we are going to locate and download spatial data on the typical geographic range for the animal. The site we are using provides free, publically available data for threatened and endangered animals

- **Go to the following website: www.iucnredlist.org**

  1. Enter the **name** (common or scientific) of the animal in the search box and click the **go** button

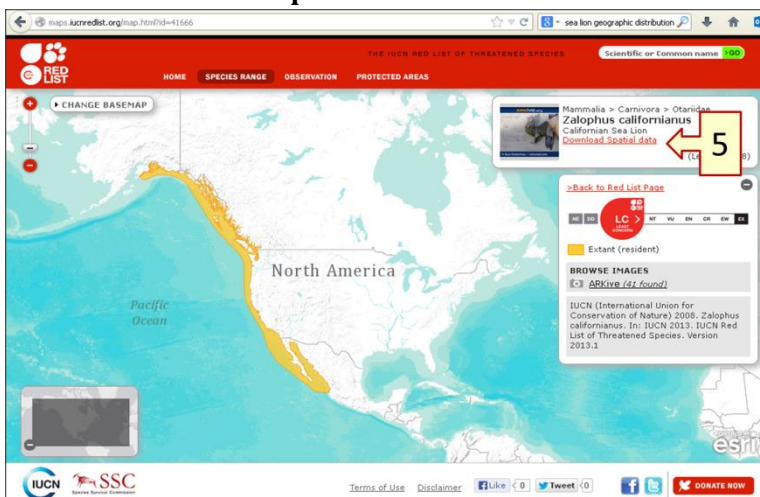 2. Select the animal you're interested in from the list provided
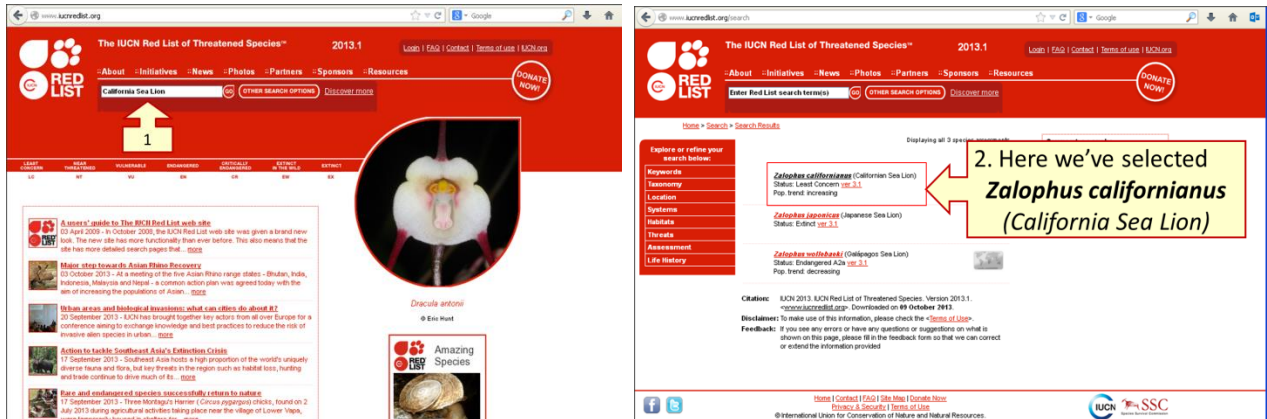
A Window should appear with information on your animal

3. Select the "**Geographic Range**" link

4. Then click the "**Range Maps**" **link** provided to open the map viewer & explore the geographic range
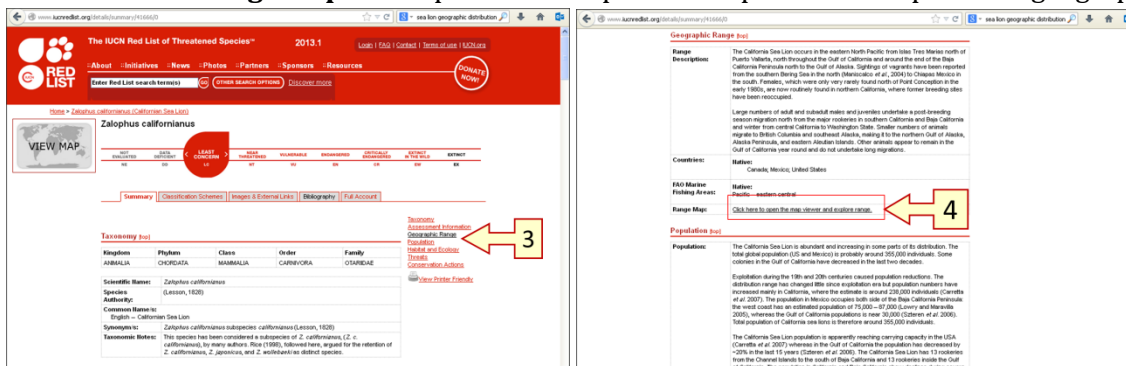
5. Click the **"Download Spatial Data"** link to download the data file for your animal's geographic range

When downloading data for individual animals you must fill out the following form to get the data

When your request has been approved (3-7 days) you will be notified via email and sent a link to download the data. Download this datafile but leave it in its zipped format.

Part 3: Exploring the Location Data in Excel using the ESRI Maps Add-in

*If you do not have access to the 2010 version of Microsoft Excel with the free ESRI Maps Add-in, go to **Part 4***

- Locate the **point locations dataset** for your animal that you downloaded in step 5 of Part 2(pg. 3)

    - **Right-click** on the **CSV file** that you downloaded from iOBIS and extracted from its Zipped format

    - Scroll down to "**Open With**" and select "**Microsoft Excel**"
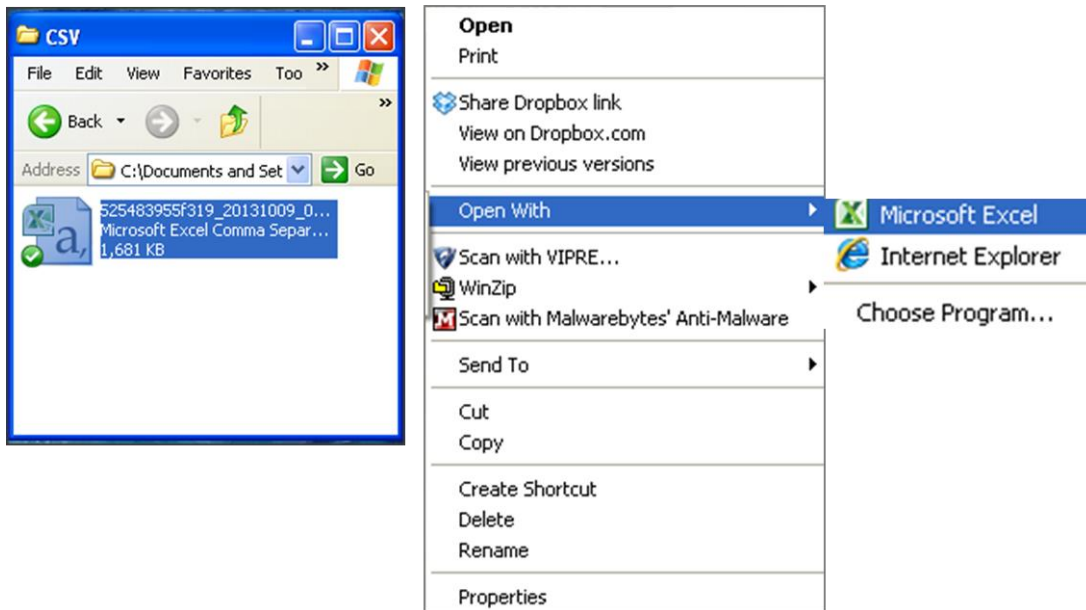
- Once your data file opens click the "**ESRI Maps**" tab

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1. **Sign In** to your "Arc GIS Online" Account"

2. Then click "**Insert Map**"

   - A map should appear on top
     of your spreadsheet
     (like the one shown below)

3. Click the "**Add Excel Data**" button

4. Click "**Cell Range**"

   then click the "**Next**" button
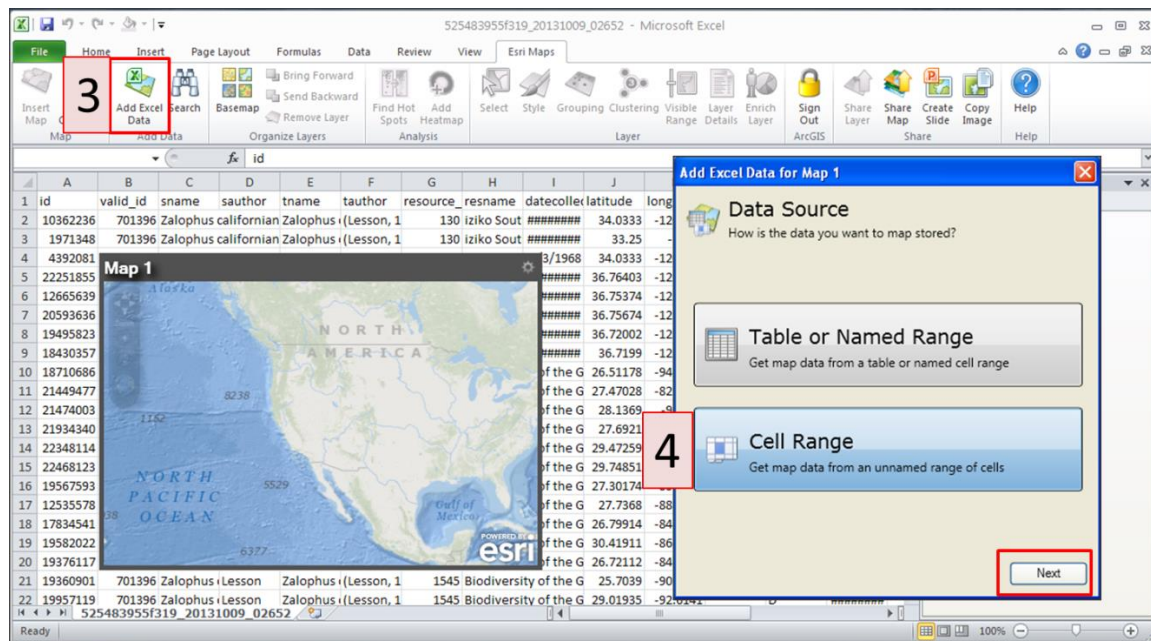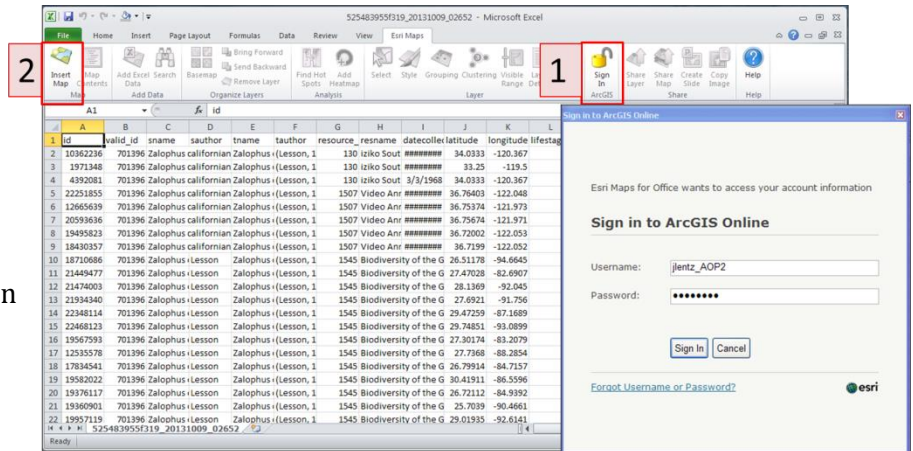
5. **Select all the data columns** (with data in them) in the spread sheet and click "**OK**"
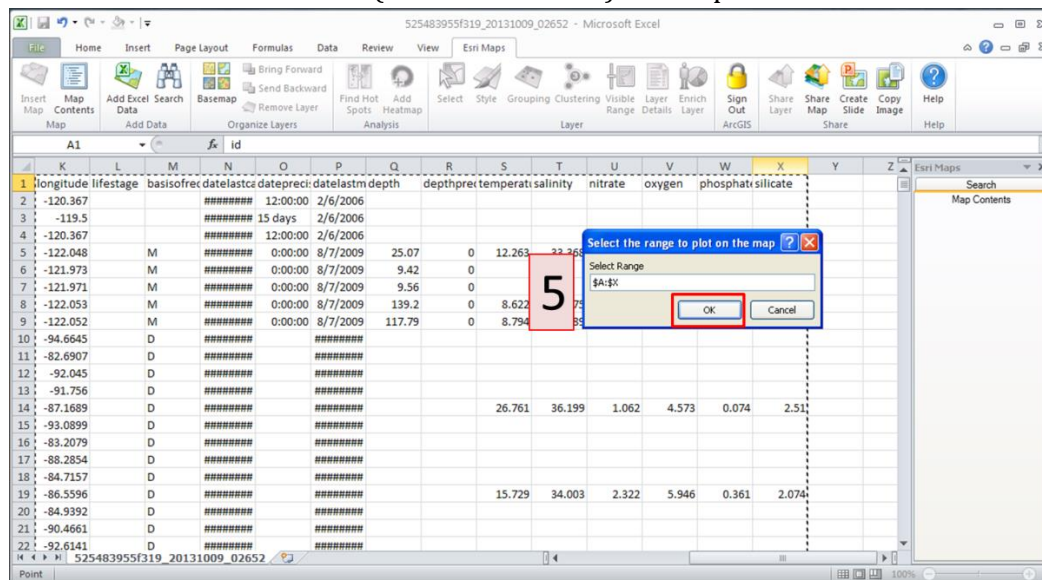
6. Select "**Latitude, Longitude**" from the pop-up window, and then click the "**Next**" button

7. Make sure the names of the data columns match the label, and then click the "**Add**" button
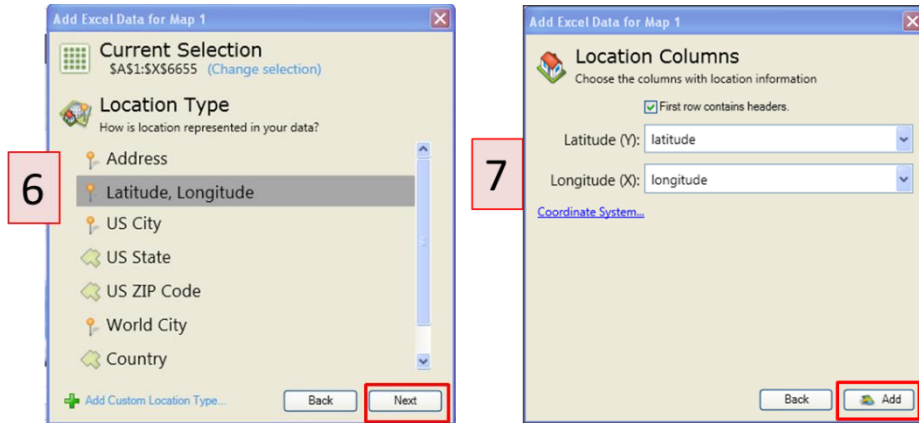
- Your map should now show "**Clusters**" of animal sighting locations
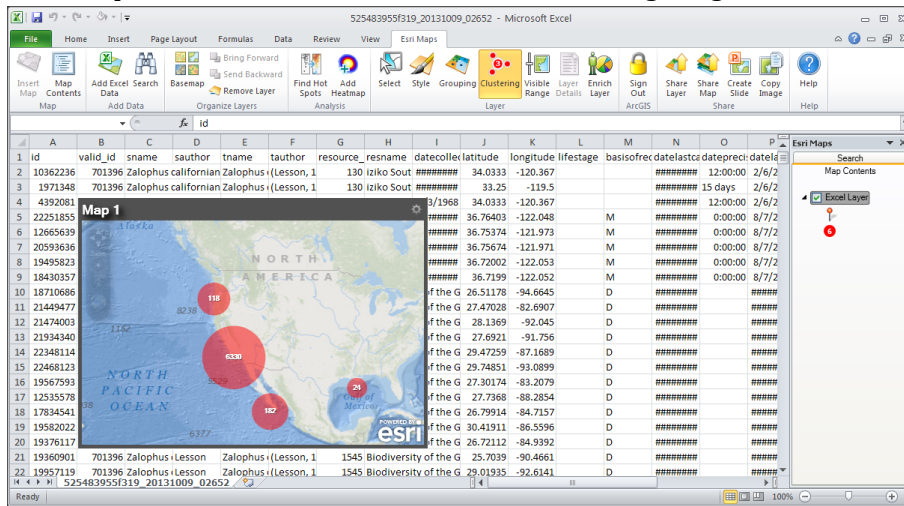
- Use the **zoom controls** (or scroll with your mouse) to explore these clusters at different spatial scales
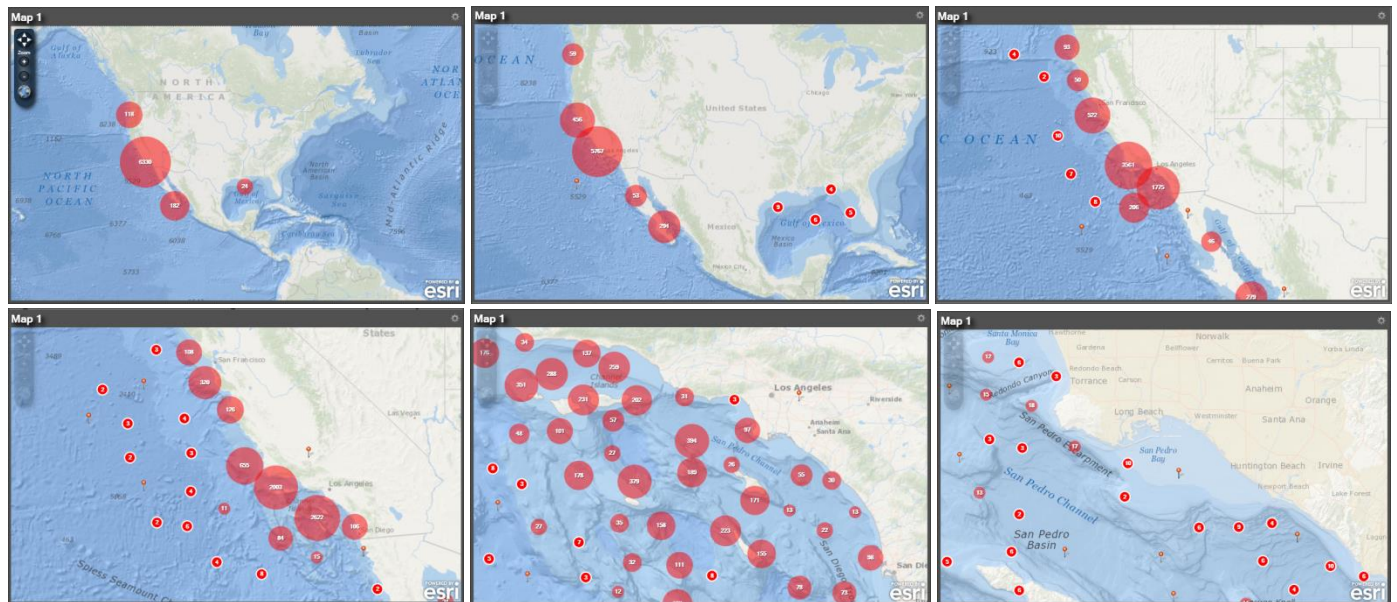
- To show the **Individual Point Locations** <u>un-select</u> the "**Clustering**" button
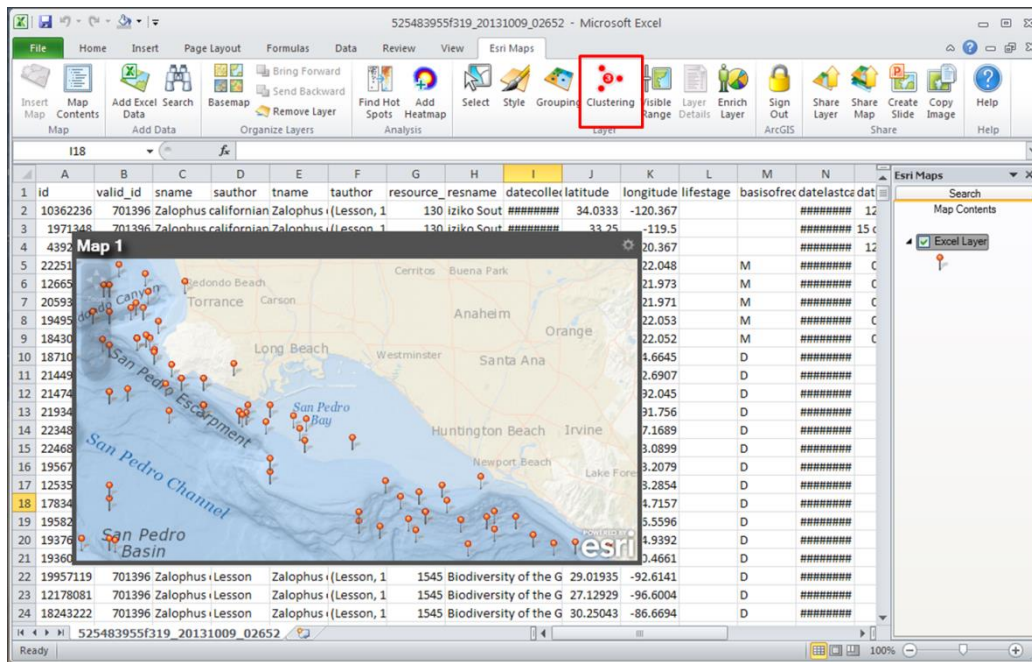
- Select the "**Share Layer**" button to bring this dataset into **ArcGIS Online**

  - fill in the layer name and click "OK"
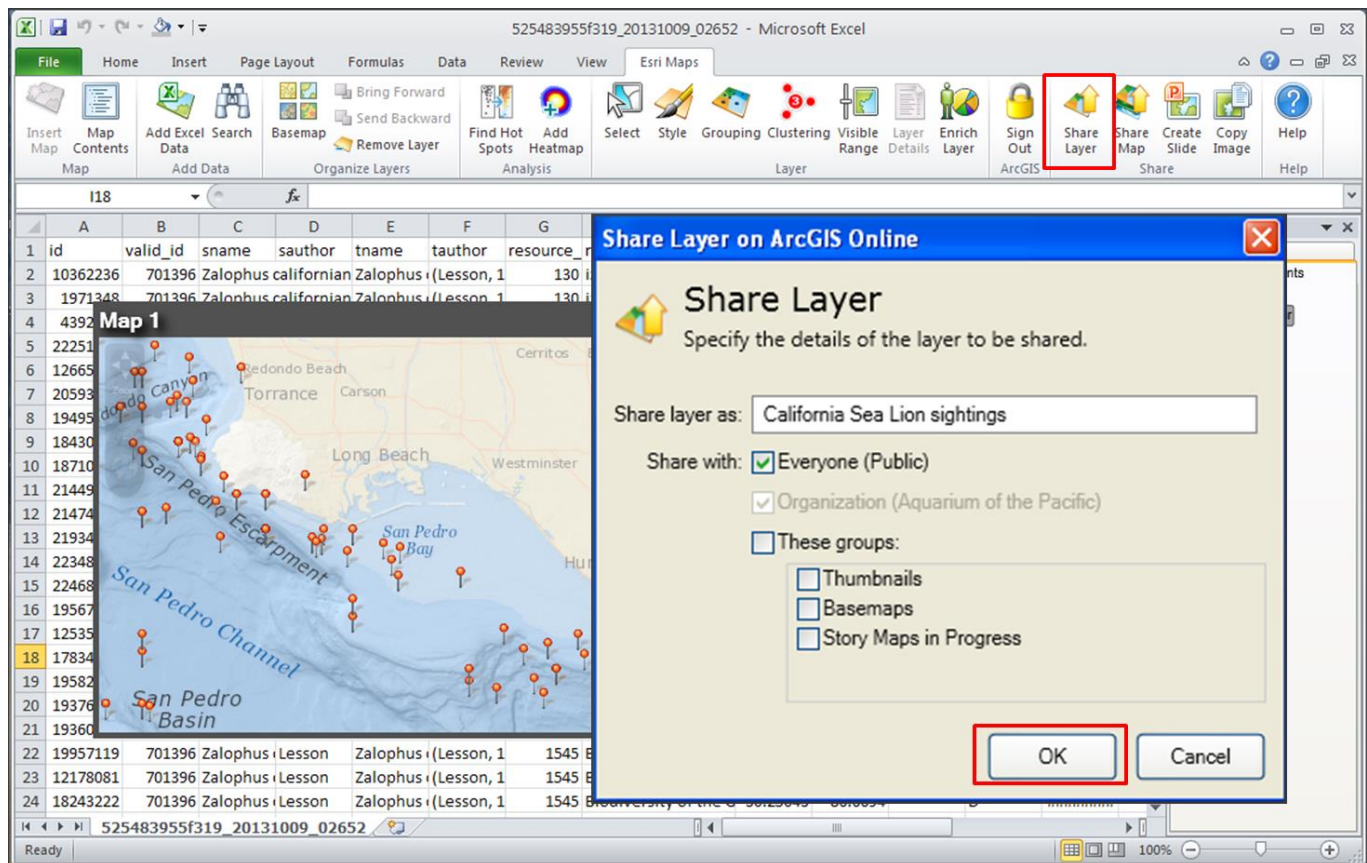
Part 4: Exploring all the Spatial Data in ArcGIS Online

- **Go to the following website:** http://www.arcgis.com/

  Click the "Sign in" link in the upper right hand corner & log-into your ArcGIS online account
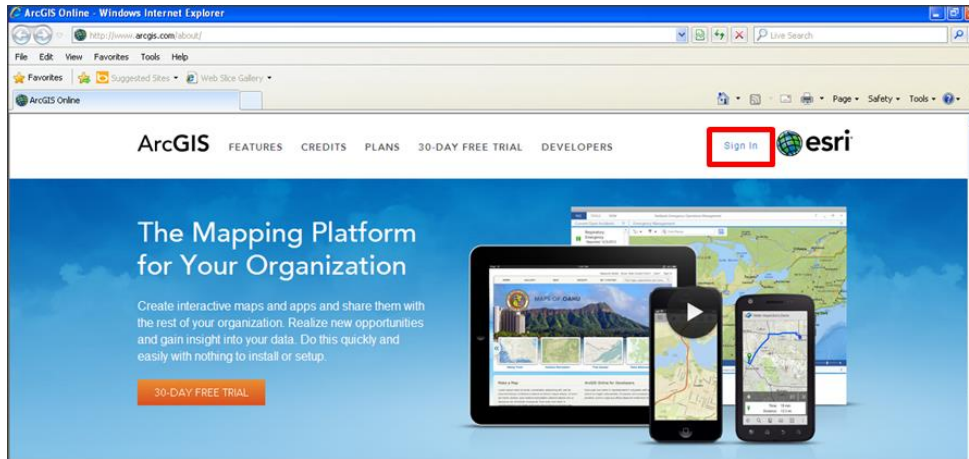
- **Displaying your data in ArcGIS Online**

  Option A. Display the data layer you exported from Excel using the "Share Layer" function (on page 10)

  Option B. Make a map and add the downloaded data to the map (use this option if you skipped Part 3)

Option A

1. Click the "**My Content**" tab at the top of the screen and select the "**Features**" layer from Excel

2. Click the "**Open**" button and select the "**Add to New Map**" Option
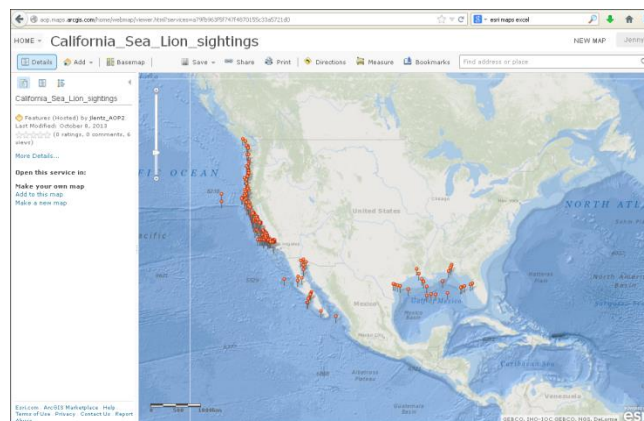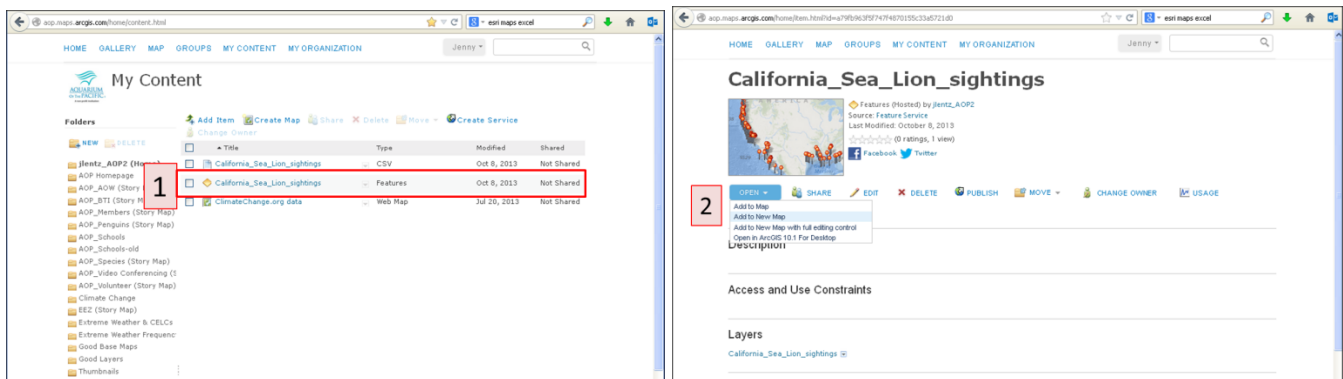
Option B

1. Click the "**Map**" Tab at the top of the screen
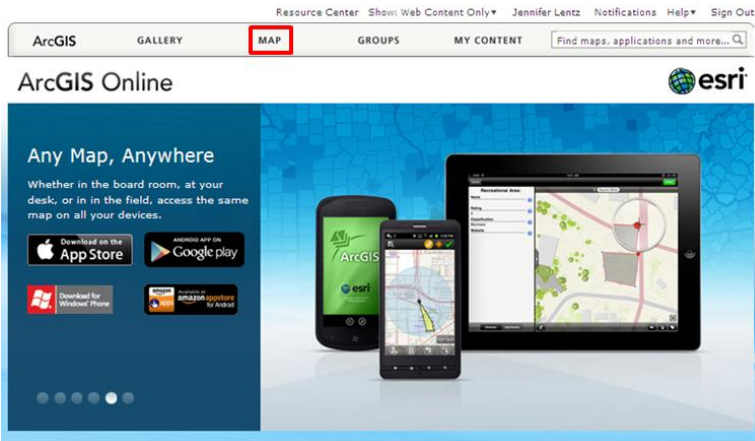
- A window like the one below should appear when you click the "Map" tab

2. Click the "**Basemap**" button and Select a base map (don't worry you can play around with this latter)
   - For this example I have selected the "**Oceans**" base map shown in

3. Click the "**Add**" button and select the "**Add Layer from File**" option
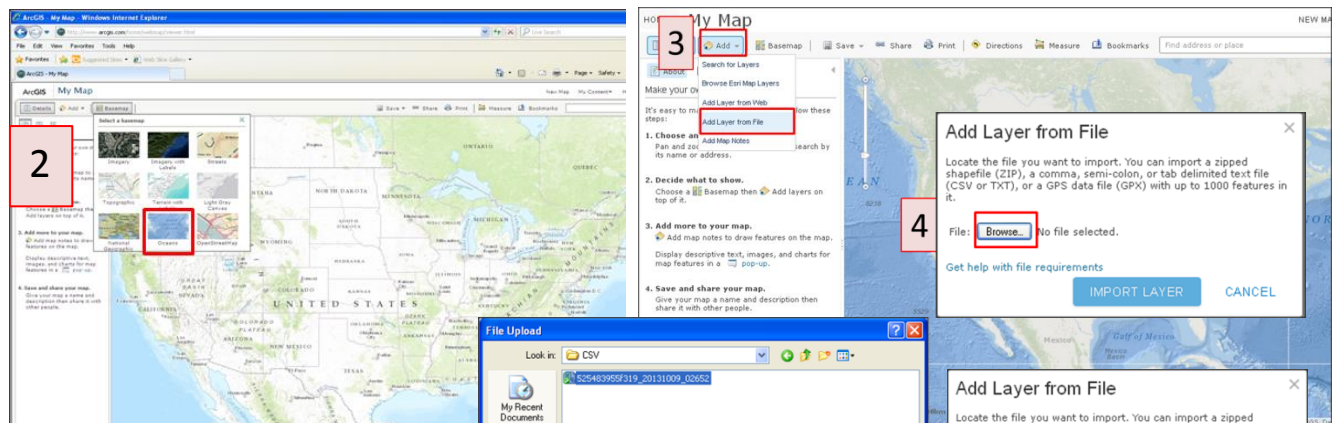
4. Click the "**Browse**" button

5. Navigate to the iOBIS datafile
   select the file and click "**Open**"

6. Click "**Import Layer**"
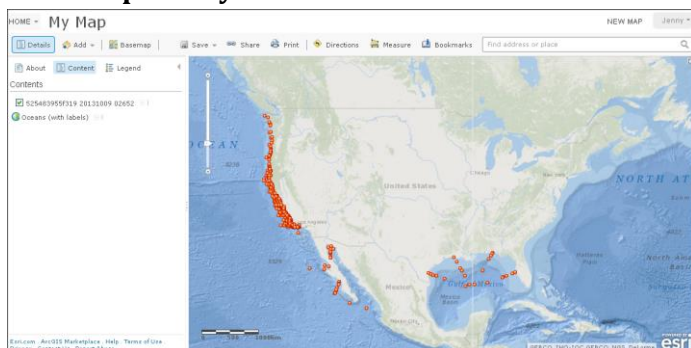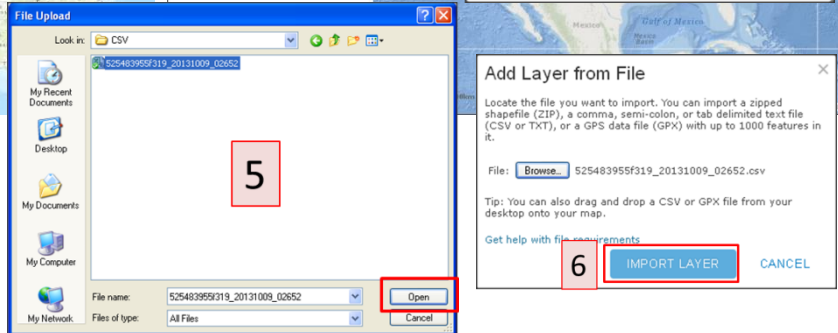
- Next add the **Geographic Range** data file you downloaded in Part 2 from the IUCN Redlist site
  - Click the "**Add**" button and select the "**Add Layer from File**" option
  - Click the "**Browse**" button, Navigate to the **zipped IUCN Redlist file** , Click "**Import Layer**"
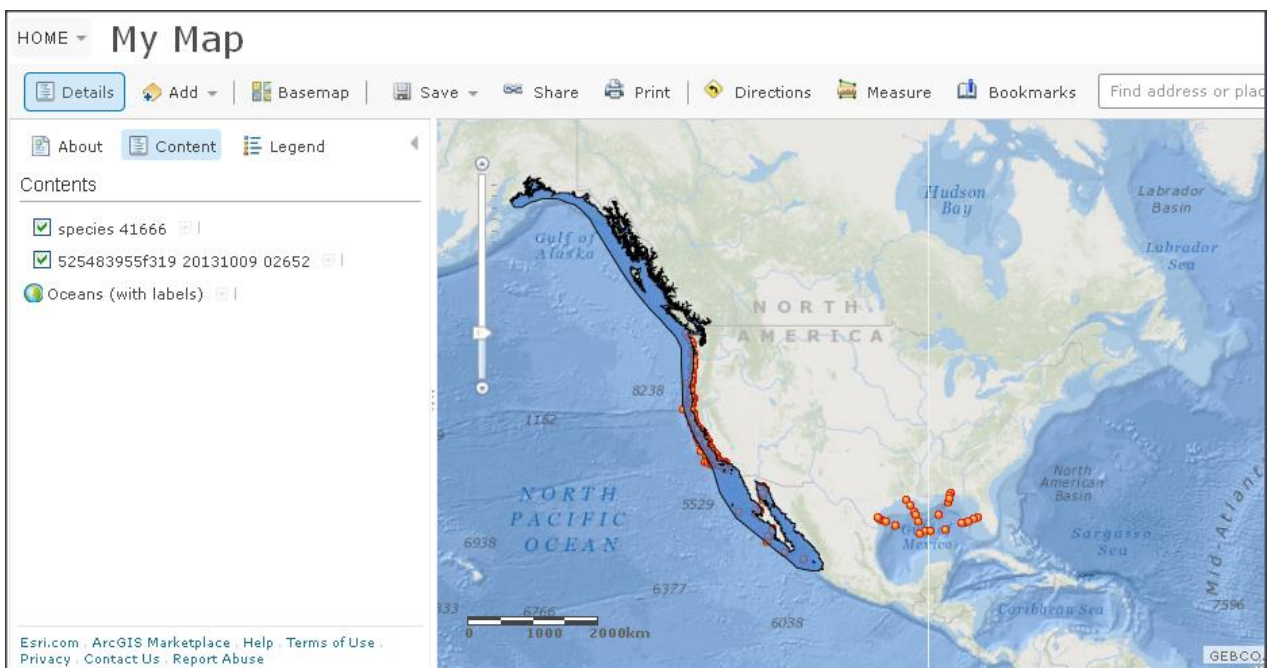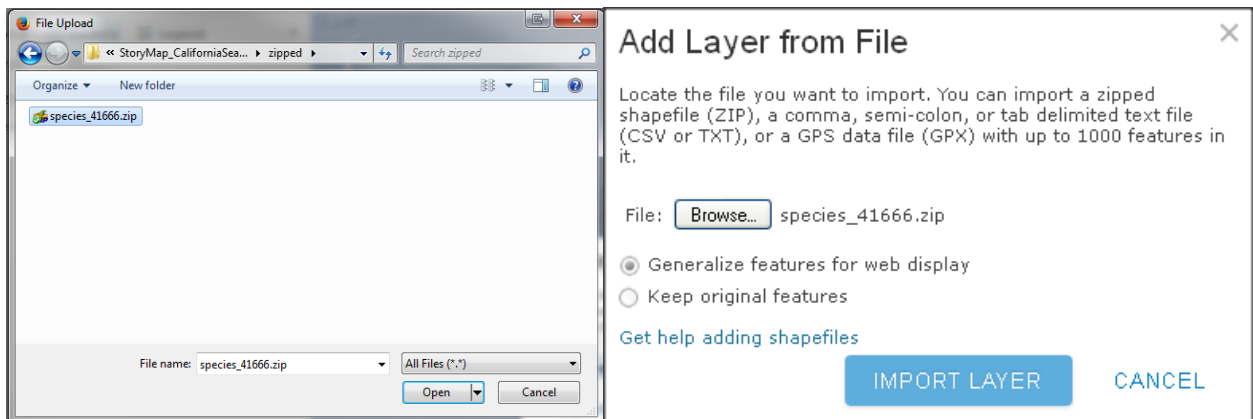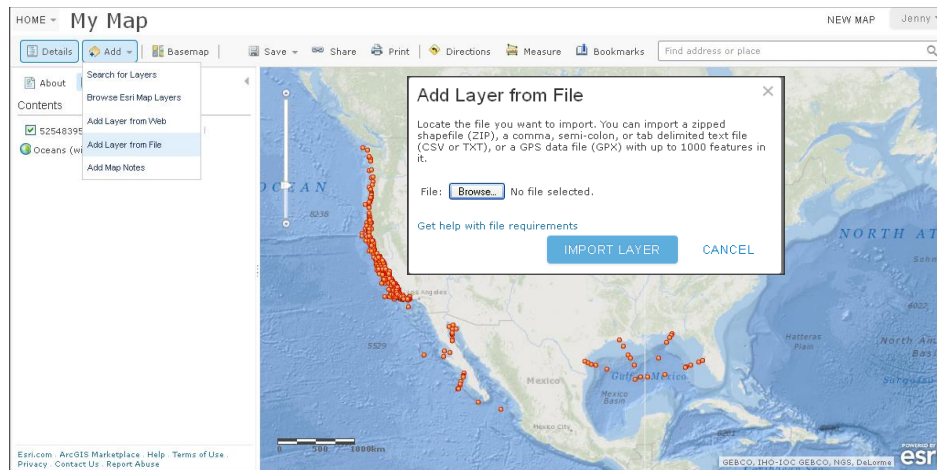
- **Changing the Order of the Displayed Layers**
    - Click the **down arrow** to the right of the geographic range layer
    - Select the "**Move Down**" option
    - Now the geographic range layer should be shown <u>underneath</u> the sighting locations
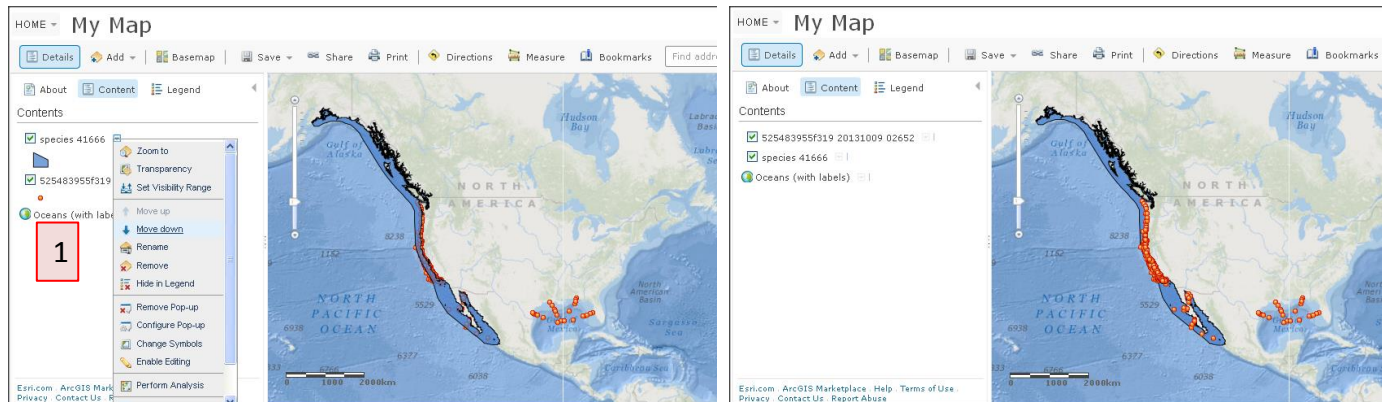
- **Changing the color of the geographic range layer**
    1. Click the **down arrow** to the right of the geographic range layer, & select the "**Change Symbols**" option
    2. Since we are looking at the habitat of a **marine mammal** we should select a color that won't be confused with ocean depth, once you've selected a good color combination, click "**Apply**" & "**Done**"
    3. Then click "**Done Changing Symbols**"
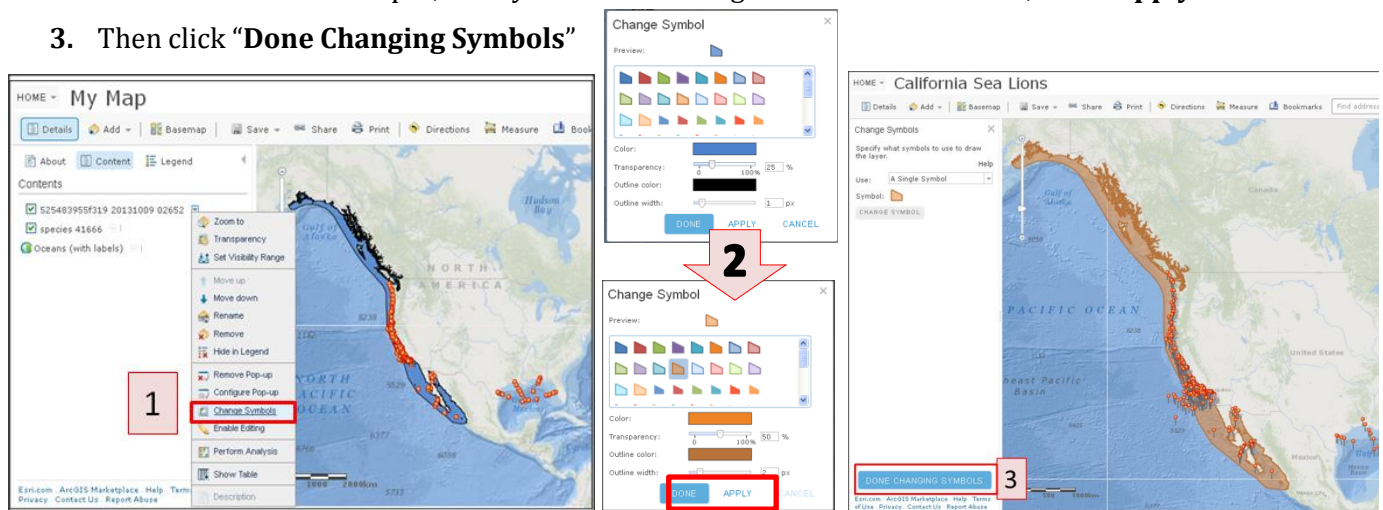
- **If you're interested in learning more about any of the sighting locations simply click on the point**
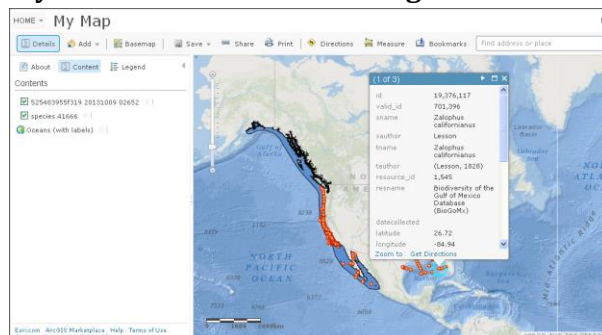
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- **Looking for Spatial Trends** using **Spatial Analysis**

  1. Click the **down arrow** to the right of the sightings layer, & select the "**Perform Analysis**" option

  2. Click "**Analyze Patterns**"

  3. Select the "**Find Hot Spots**" button

     3B. To find out more information about the type of analysis click the "**blue information**" button
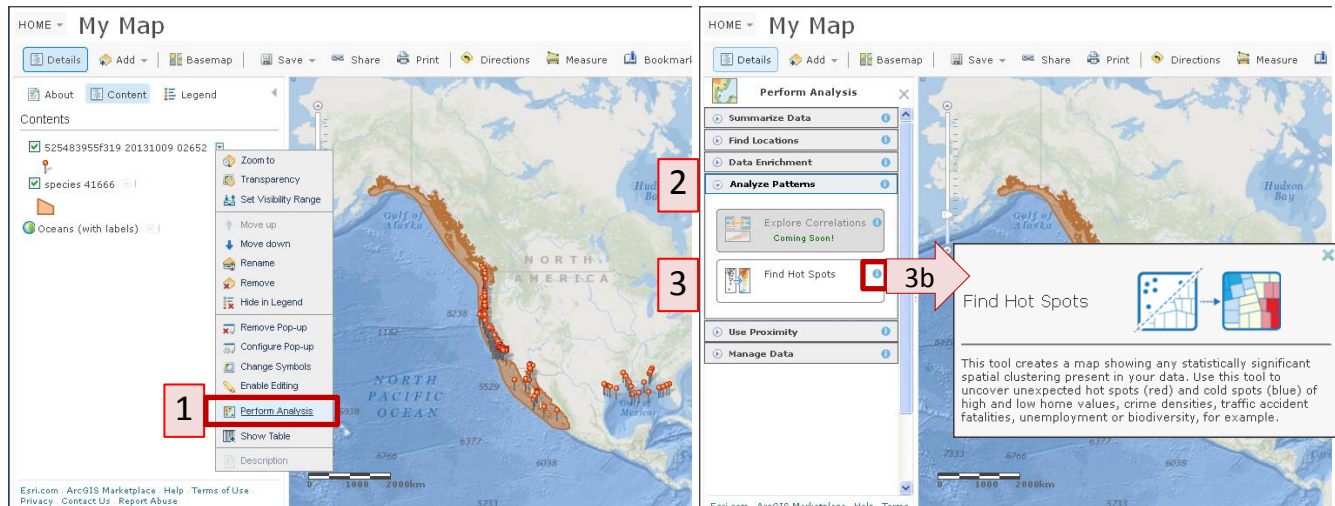
  4. Select the **data field** to be analyzed
     - here we're going to see whether we find spatial clusters of sea lions at different **temperatures**
     - so we've selected the "temperature" field

  5. Click the "**Run Analysis**" button
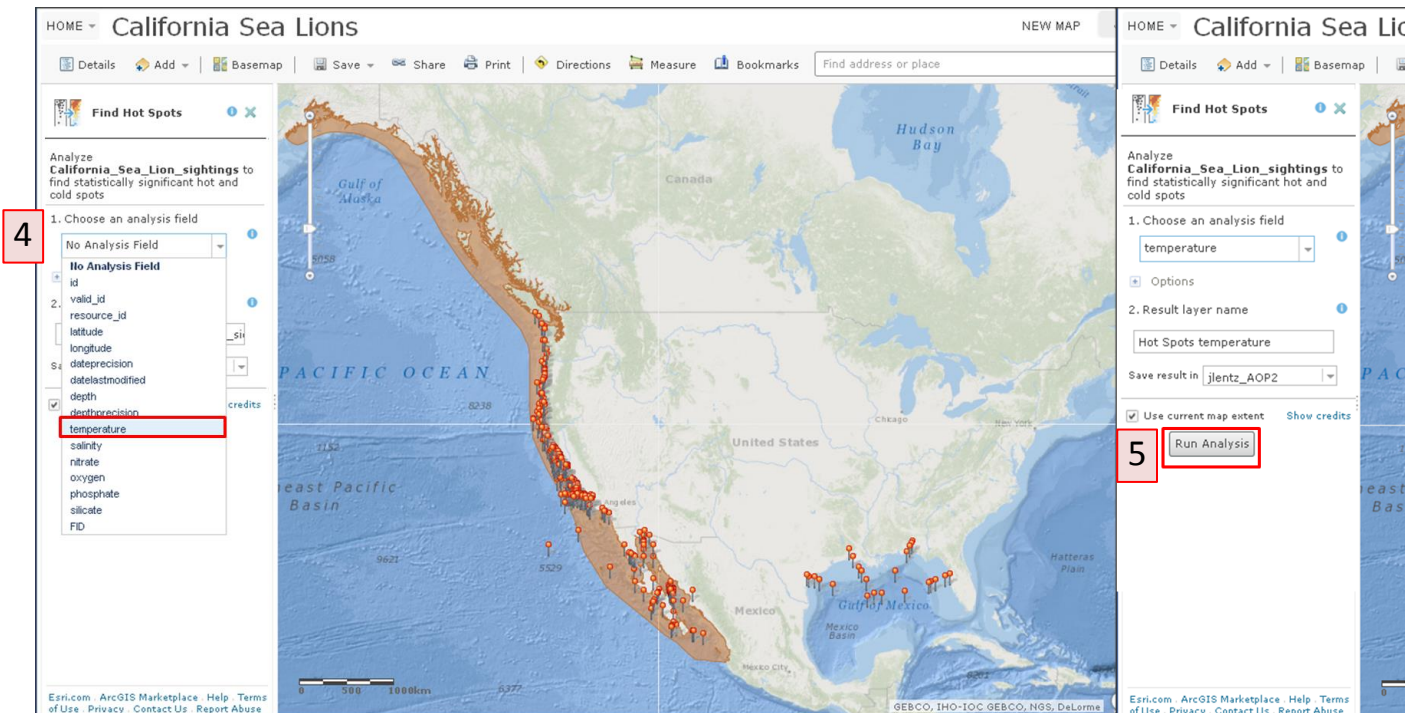
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The results of the "Find Hot Spots" Analysis

Red indicates **clusters** of sea lions in water that is significantly **warmer** than the surrounding water ("**Hot Spots**")

Yellow indicates clusters of sea lions in water in which the temperature is **not significantly different** than that of the surrounding water

Blue indicates **clusters** of sea lions in water that is significantly **colder** than the surrounding water ("**Cold Spots**")

The Finished Product

How to Find, Map, & Analyze Wildlife Data in a GIS System

Online Tutorials & Training Modules

- **Teaching with GIS: Introduction to Using GIS in the Classroom**
  (http://training.esri.com/gateway/index.cfm?fa=catalog.webCourseDetail&courseid=2198)

- **"Mapping with ArcGIS Online" Tutorial & "ArcGIS Online: Using Subscription Accounts with Statewide/District wide Licenses for K-12 Schools"**(http://esriurl.com/mappingwithago)

- **ArcGIS info for Maryland K-12 Public Schools** (http://www.washcoll.edu/centers/ces/gis/esri-k-12-software.php)

Links to <u>Free</u> K-12 GIS Lesson Plans

➢ For <u>Geography</u> Teachers

- **Geography Lesson Plans & Worksheets** by Lesson Planet   http://www.lessonplanet.com/lesson-plans/geography
- **GIS day — Activities for different Age Groups**   http://www.gisday.com/activities.html
- "**Why Geography Education Matters**" – *High School*
  http://edcommunity.esri.com/software-and-data/Lessons/W/Why_Geography_Education_Matter
- "**Geocaching: Geography Meets Environmental Ed**" – ***5-12 grades***
  http://edcommunity.esri.com/software-and-data/Lessons/G/Geocaching_Geography_Meets_E

➢ For <u>History</u> Teachers

- **"A New Look at Lewis & Clark with Online GIS"** – ***High School***
  http://edcommunity.esri.com/software-and-data/Lessons/A/A_New_Look_at_Lewis_Clark_wi
- **"Lewis and Clark Elevation Lesson"** – *High School*
  http://edcommunity.esri.com/software-and-data/Lessons/L/Lewis_and_Clark_Elevation_Less
- "**Underground Railroad Lesson Plan**" – *3-5 grades*
  http://edcommunity.esri.com/software-and-data/Lessons/U/Underground_Railroad_Lesson_Pl
- "**War of 1812** (Web lesson)" – Middle School
  http://edcommunity.esri.com/software-and-data/Lessons/W/War_of_1812_Web_lesson

➢ For <u>Earth Science</u> Teachers

- "**Coral Reefs**" – ***K-12***   http://edcommunity.esri.com/software-and-data/Lessons/C/Coral_Reefs
- "**Examining World Temperature Extremes**" – ***High School***
  http://edcommunity.esri.com/software-and-data/Lessons/E/Examining_World_Temperature_Ex
- "**Geocaching:Geography Meets Environmental Ed**" – ***5-12 grades***
  http://edcommunity.esri.com/software-and-data/Lessons/G/Geocaching_Geography_Meets_E
- "**Investigating Historical and 1 Modern Tornado**" – ***High School***
  http://edcommunity.esri.com/software-and-data/Lessons/I/Investigating_Historical_and_1
- "**Investigating Temperature Extremes in the USA** " – ***5-12 grades***
  http://edcommunity.esri.com/software-and-data/Lessons/I/Investigating_Temperature_Extr
- "**Learning about <u>Dams-Reservoirs</u> Using ArcGIS Online**" – ***5-12 grades***
  http://edcommunity.esri.com/software-and-data/Lessons/L/Learning_about_Dams_Reservoirs
- "**Learning about <u>Flood Zones</u> Using ArcGIS Online**" – ***5-12 grades***
  http://edcommunity.esri.com/software-and-data/Lessons/L/Learning_about_Flood_Zones_Usi
- "**Learning About <u>Local Water Quality</u> w/ArcGIS Online**" – ***5-12 grades***
  http://edcommunity.esri.com/software-and-data/Lessons/L/Learning_About_Local_Water_Qua
- "**Learning about <u>Oceans</u> Using ArcGIS Online** " – ***5-12 grades***
  http://edcommunity.esri.com/software-and-data/Lessons/L/Learning_about_Oceans_Using_Ar
- "**Learning about <u>Rivers</u> Using ArcGIS Online**" – ***5-12 grades***
  http://edcommunity.esri.com/software-and-data/Lessons/L/Learning_about_Rivers_Using_Ar
- "**Learning about <u>Watersheds</u> Using ArcGIS Online**" – ***5-12 grades***
  http://edcommunity.esri.com/software-and-data/Lessons/L/Learning_about_Watersheds_Usin
- "**Learning About <u>Weather & Streamflow</u>: ArcGIS Online** " – ***5-12 grades***
  http://edcommunity.esri.com/software-and-data/Lessons/L/Learning_About_Weather_Strea
- "**Learning about <u>Wetlands</u> Using ArcGIS Online**" – ***5-12 grades***
  http://edcommunity.esri.com/software-and-data/Lessons/L/Learning_about_Wetlands_Using
- "**USGS Education Resources**" – K-12
  http://education.usgs.gov/
- "**World Temperature Extreme Analysis** " – ***High School***
  http://edcommunity.esri.com/software-and-data/Lessons/W/World_Temperature_Extreme_Anal