

# GIS Wildlife Data Tutorial

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



This Tutorial was Created by  
**Jennifer Anne Lentz, Ph.D.**  
Education Specialist at the Aquarium of the Pacific

*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

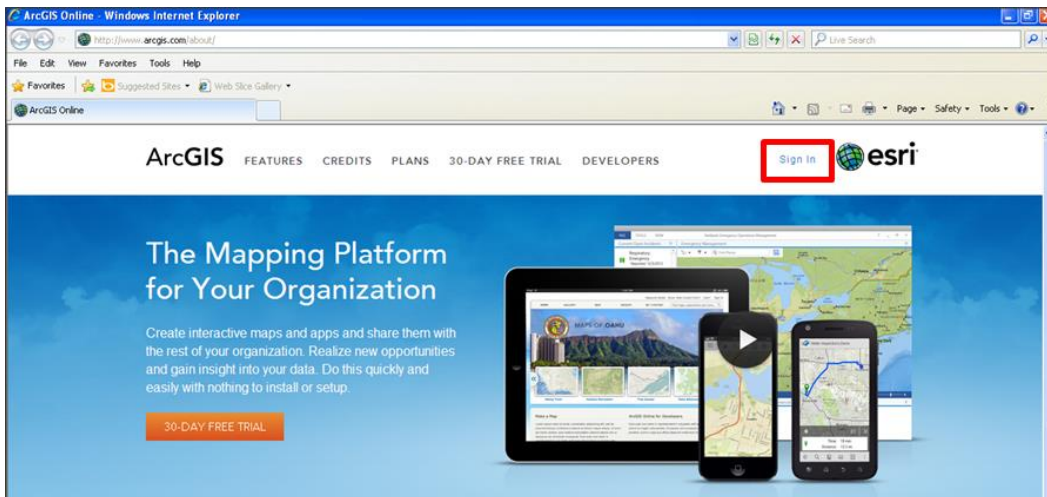
## Part 1: Setting up the GIS Software

- First you will need to set up and/or log into your **ArcGIS Online 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)

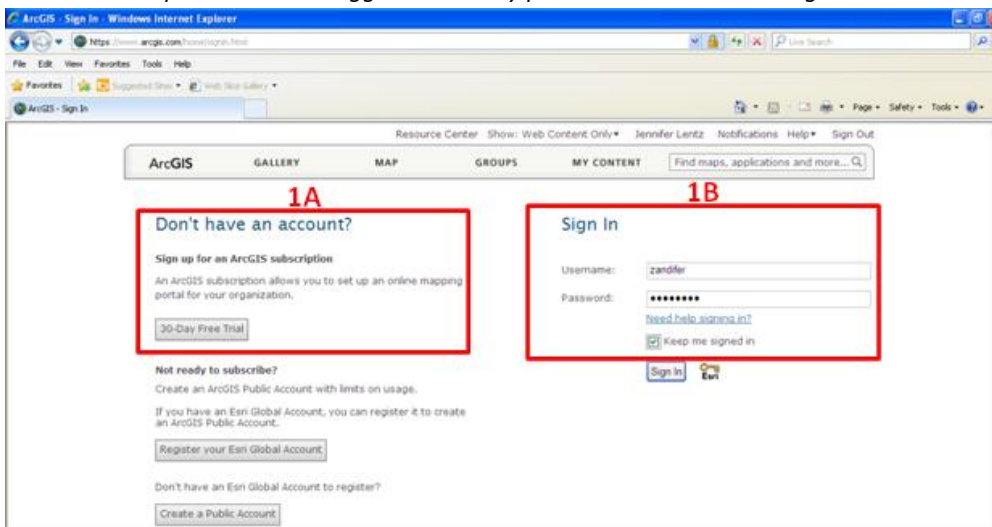
1. Go to the following website: <http://www.arcgis.com/>

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>

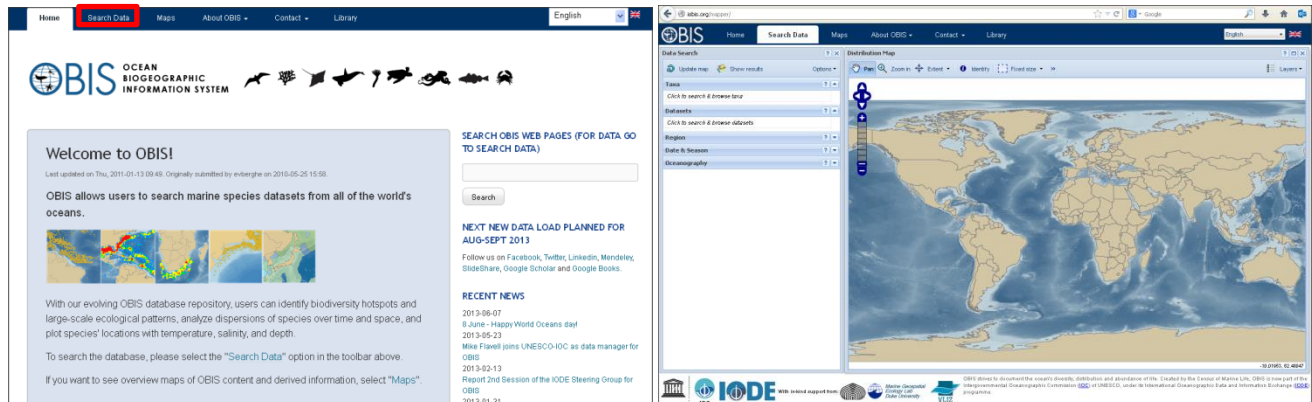
- If you do not have this version of excel, you can go straight to “Part 4” of this tutorial

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

## Part 2: Find and Download Spatial Data

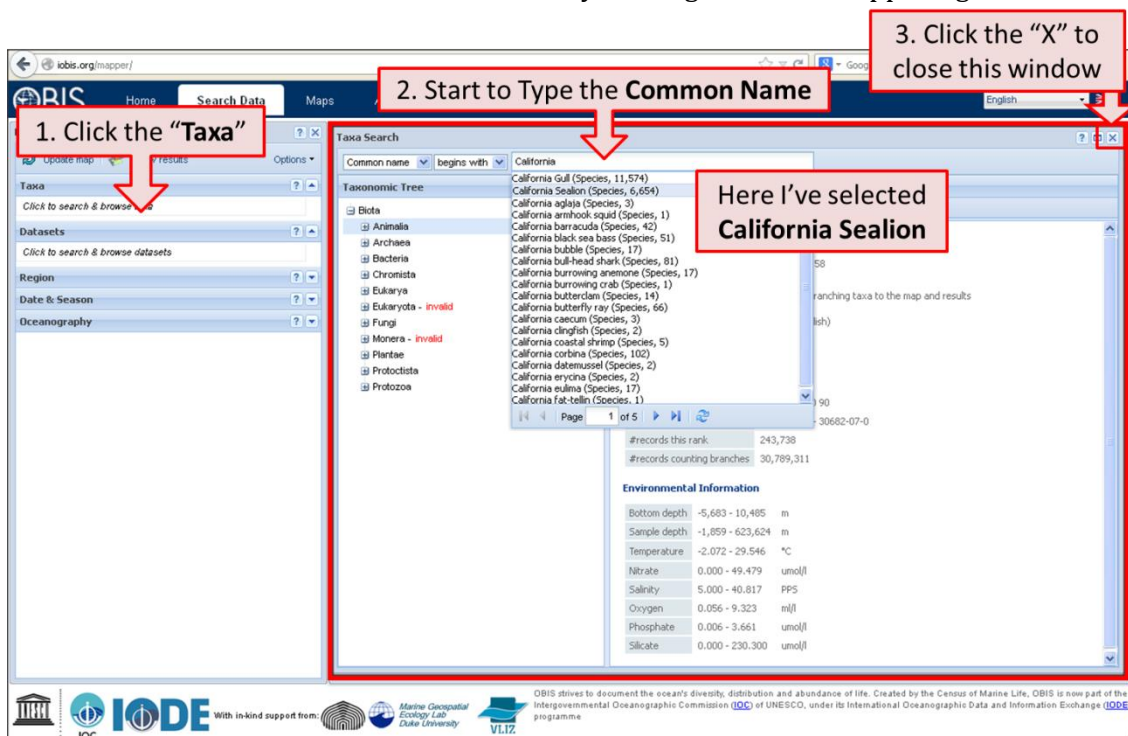
This part of the tutorial provides websites with free spatial wildlife data, and gives step-by-step instructions for how to search within these websites and download the data.

- Go to the following website: <http://iobis.org>
- Select the “Search Data” Tab



- Search for your Animal in the iOBIS database

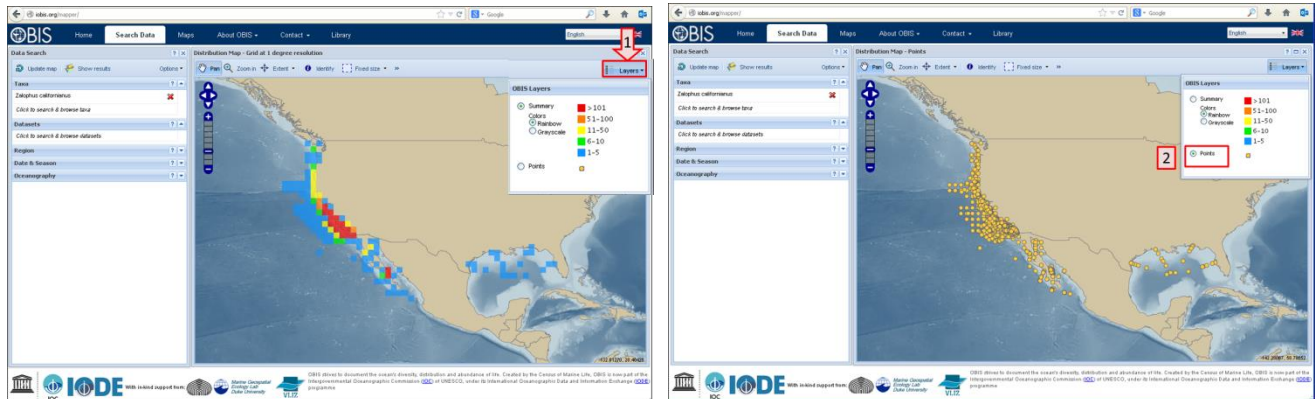
1. Click the “Taxa” Window
2. Select “Common Name” (or “Scientific Name”) from the pull down menu
  - Start to type the name of the animal you are interested in
  - Then select that animal from the list provided
  - Information on the animal you just searched should appear in the Taxa Search window.
3. Go ahead and close the Taxa Search window by clicking the X in the upper right corner





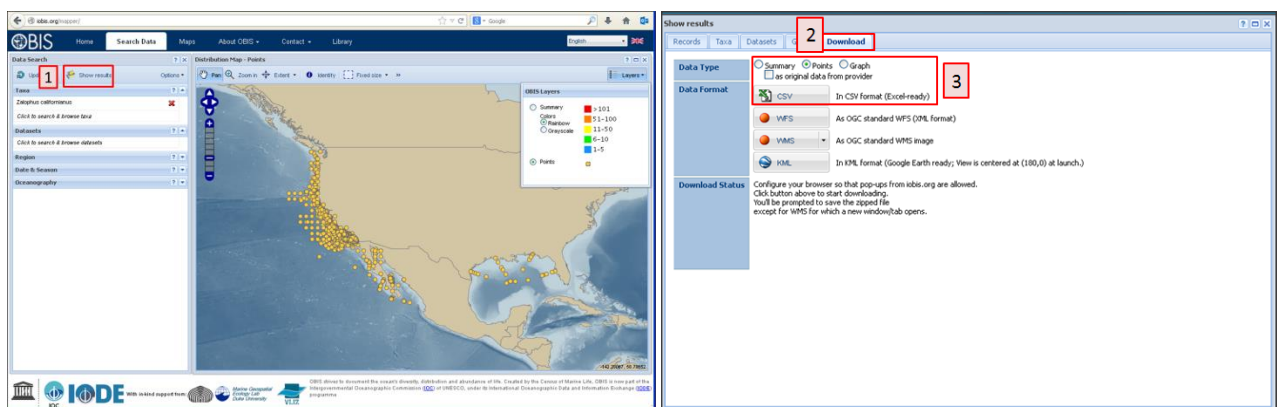
# How to Find, Map, & Analyze Wildlife Data in a GIS System

- **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**

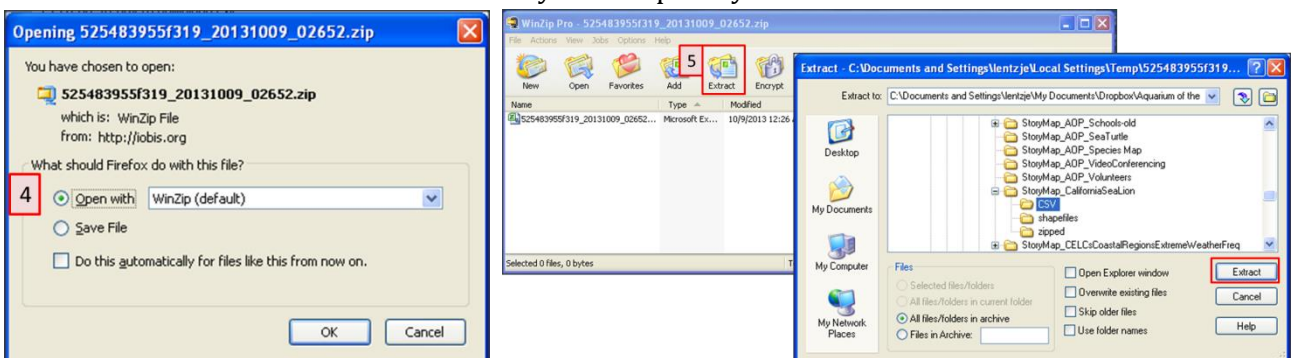


- **Downloading this Spatial Dataset**

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



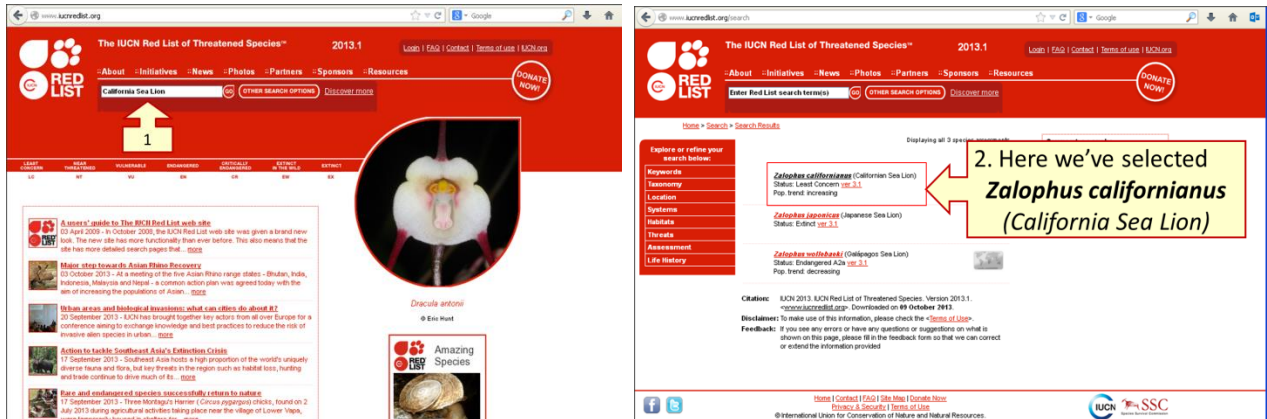
4. Click to **Open** with your computer’s default un-zipping program
5. Select to **Extract** the file select where on your computer you would like the CSV file saved



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

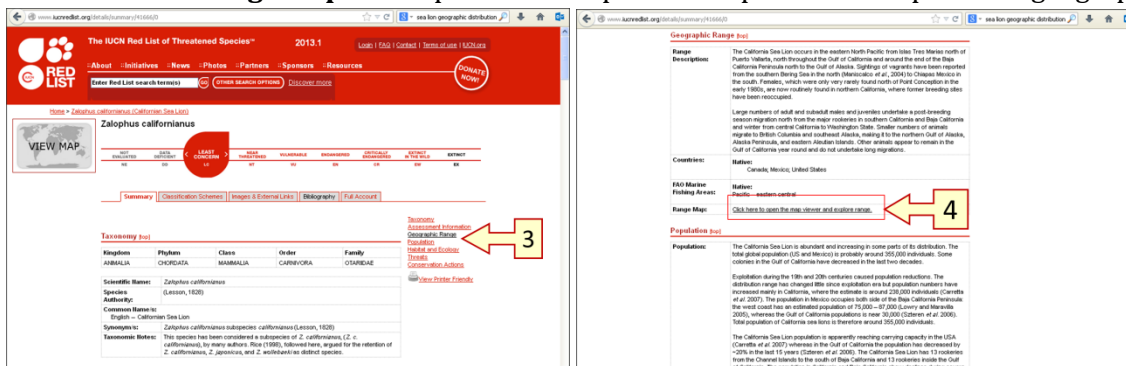
Next we are going to locate and download spatial data on the typical geographic range for the animal. The site we are using provides free, publically available data for threatened and endangered animals

- Go to the following website: [www.iucnredlist.org](http://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

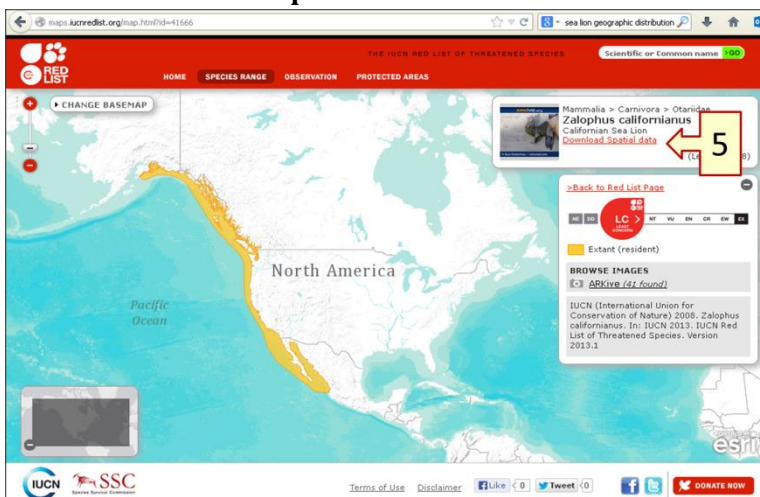


A Window should appear with information on your animal

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



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

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

The screenshot shows the 'Export Data Request Form' on the IUCN Red List website. The form is titled 'Export Data Request Form' and contains several sections for user input. At the top, there is a search bar and navigation links. The main content area includes the following questions and options:

- Is the data requested for a one-off reproduction of information for a book, a game, a product, zoo signage, etc.? (Yes/No)
- Will the data be redistributed, in its entirety or in part, to a third party? (Yes/No)
- Will the data be reposted, in its entirety or in part, electronically on a website, bulletin board, blog, FTP site, or other means of posting on the Internet? (Yes/No)
- Will the data requested be used to create a derivative work? (Yes/No)
- Is your request for an export of data related to activities within, or conducted on behalf of, or to the benefit of, or to assist the activities of any entity other than a not-for-profit organization? (Yes/No)

There is a text area for 'Please give a comprehensive description of your intended usage of the data requested.' with a sample text about a workshop. A checkbox at the bottom states: 'Should my request be approved, I agree to the Terms of use, except where otherwise answered above and as expressed in writing by IUCN, for the information obtained from the IUCN Red List. My answers above accurately reflect my use of the data I am requesting from the IUCN Red List.' A 'CREATE DATA REQUEST FORM' button is located at the bottom right.

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.

The screenshot shows the search results page on the IUCN Red List website. The page title is 'The IUCN Red List of Threatened Species™ 2013.1'. The search bar contains 'sea lion geographic distribution'. Below the search bar, there is a section for 'Saved Searches' which indicates 'You have no saved searches.' and a button to 'Add your current search'. The main section is 'Available spatial downloads', which contains a table with the following data:

Request date/time	Download link
2013-09-15 18:26:44 UTC	<a href="#">Download</a>
2013-10-09 20:30:36 UTC	Pending approval by IUCN
2013-10-09 20:30:50 UTC	Pending approval by IUCN

A yellow callout box with a red arrow points to the 'Download' link in the first row of the table, with the text 'Click the "Download" link'. Below the table is an 'Other Actions' section with a 'Log Out' link. The footer contains social media icons, navigation links, and the IUCN logo.

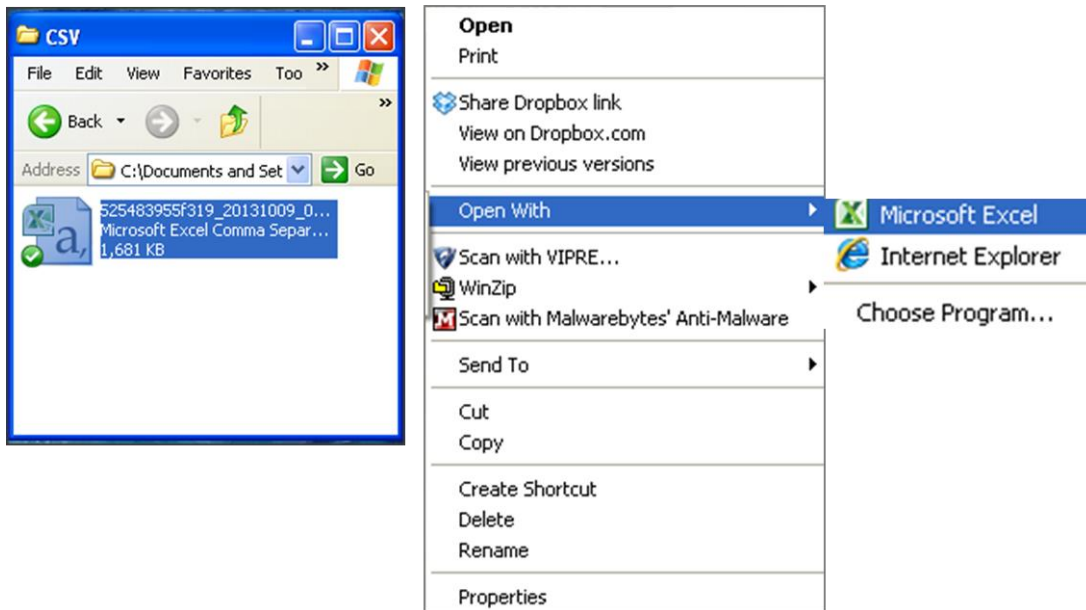


# How to Find, Map, & Analyze Wildlife Data in a GIS System

## 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

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
	id	valid_id	sname	sauthor	tname	tauthor	resource	resname	datecoller	latitude	longitude	lifestage	basisofrec	datelastca	datepreci	datelastm	depth	depthprec
2	10362236	701396	Zalophus californian	Zalophus (Lesson, 1	130	iziko Sout	#####	34.0333	-120.367				#####	12:00:00	2/6/2006			
3	1971348	701396	Zalophus californian	Zalophus (Lesson, 1	130	iziko Sout	#####	33.25	-119.5				#####	15 days	2/6/2006			
4	4392081	701396	Zalophus californian	Zalophus (Lesson, 1	130	iziko Sout	3/3/1968	34.0333	-120.367				#####	12:00:00	2/6/2006			
5	22251855	701396	Zalophus californian	Zalophus (Lesson, 1	1507	Video Anr	#####	36.76403	-122.048			M	#####	0:00:00	8/7/2009	25.07	0	
6	12665639	701396	Zalophus californian	Zalophus (Lesson, 1	1507	Video Anr	#####	36.75374	-121.973			M	#####	0:00:00	8/7/2009	9.42	0	
7	20593636	701396	Zalophus californian	Zalophus (Lesson, 1	1507	Video Anr	#####	36.75674	-121.971			M	#####	0:00:00	8/7/2009	9.56	0	
8	19495823	701396	Zalophus californian	Zalophus (Lesson, 1	1507	Video Anr	#####	36.72002	-122.053			M	#####	0:00:00	8/7/2009	139.2	0	
9	18430357	701396	Zalophus californian	Zalophus (Lesson, 1	1507	Video Anr	#####	36.7199	-122.052			M	#####	0:00:00	8/7/2009	117.79	0	
10	18710686	701396	Zalophus (Lesson	Zalophus (Lesson, 1	1545	Biodiversity of the G		26.51178	-94.6645			D	#####		#####			
11	21449477	701396	Zalophus (Lesson	Zalophus (Lesson, 1	1545	Biodiversity of the G		27.47028	-82.6907			D	#####		#####			
12	21474003	701396	Zalophus (Lesson	Zalophus (Lesson, 1	1545	Biodiversity of the G		28.1369	-92.045			D	#####		#####			
13	21934340	701396	Zalophus (Lesson	Zalophus (Lesson, 1	1545	Biodiversity of the G		27.6921	-91.756			D	#####		#####			
14	22348114	701396	Zalophus (Lesson	Zalophus (Lesson, 1	1545	Biodiversity of the G		29.47259	-87.1689			D	#####		#####			
15	22468123	701396	Zalophus (Lesson	Zalophus (Lesson, 1	1545	Biodiversity of the G		29.74851	-93.0899			D	#####		#####			
16	19567593	701396	Zalophus (Lesson	Zalophus (Lesson, 1	1545	Biodiversity of the G		27.30174	-83.2079			D	#####		#####			
17	12535578	701396	Zalophus (Lesson	Zalophus (Lesson, 1	1545	Biodiversity of the G		27.7368	-88.2854			D	#####		#####			
18	17834541	701396	Zalophus (Lesson	Zalophus (Lesson, 1	1545	Biodiversity of the G		26.79914	-84.7157			D	#####		#####			
19	19582022	701396	Zalophus (Lesson	Zalophus (Lesson, 1	1545	Biodiversity of the G		30.41911	-86.5596			D	#####		#####			
20	19376117	701396	Zalophus (Lesson	Zalophus (Lesson, 1	1545	Biodiversity of the G		26.72112	-84.9392			D	#####		#####			
21	19360901	701396	Zalophus (Lesson	Zalophus (Lesson, 1	1545	Biodiversity of the G		25.7039	-90.4661			D	#####		#####			
22	19957119	701396	Zalophus (Lesson	Zalophus (Lesson, 1	1545	Biodiversity of the G		29.01935	-92.6141			D	#####		#####			

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

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

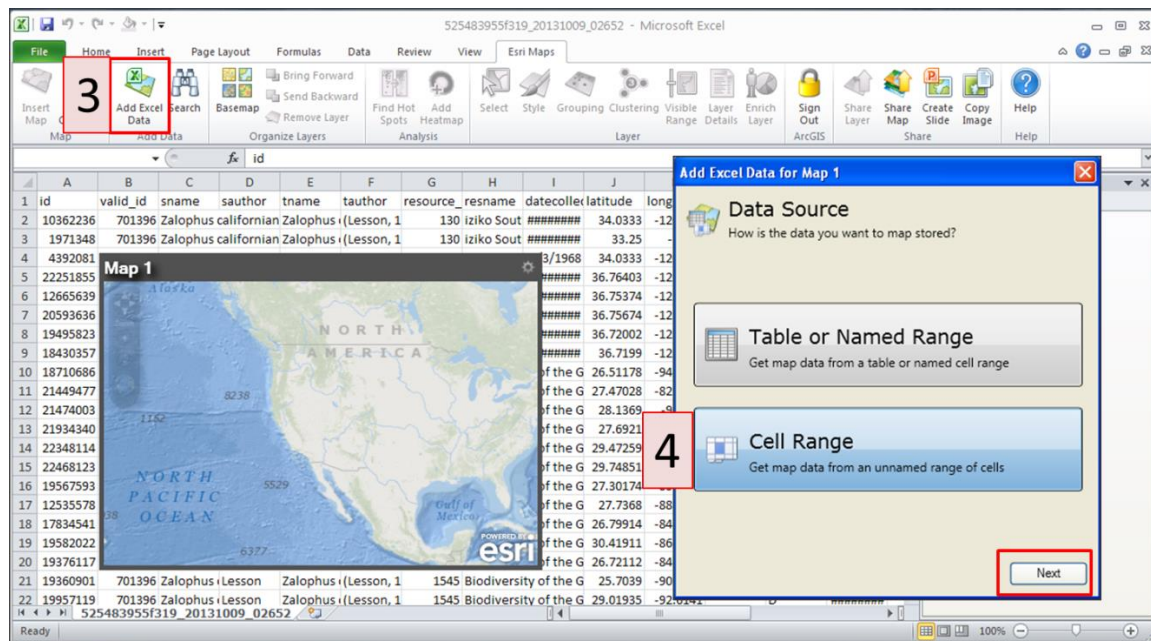
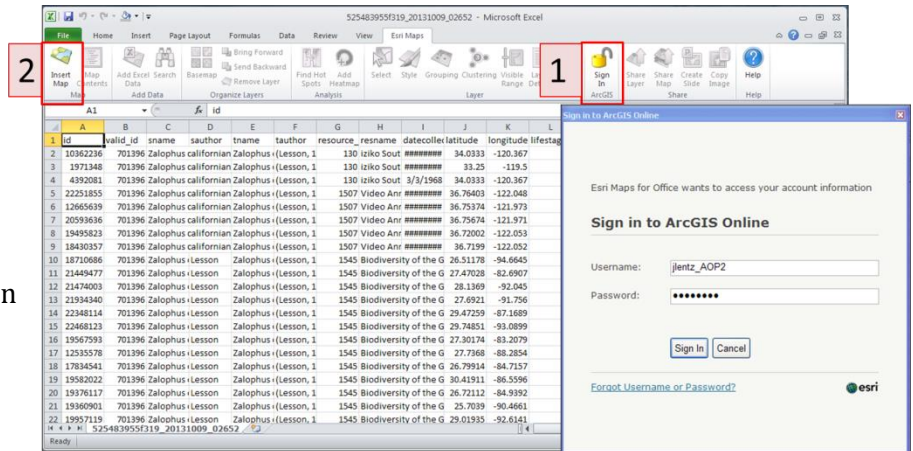
## 2. Then click "Insert Map"

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

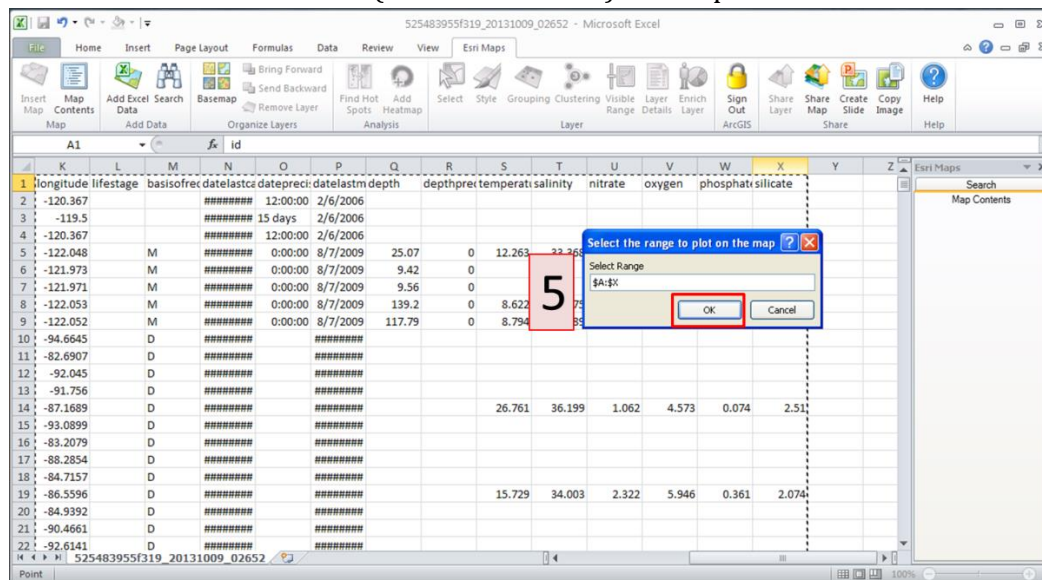
## 3. Click the "Add Excel Data" button

## 4. Click "Cell Range"

then click the "Next" button



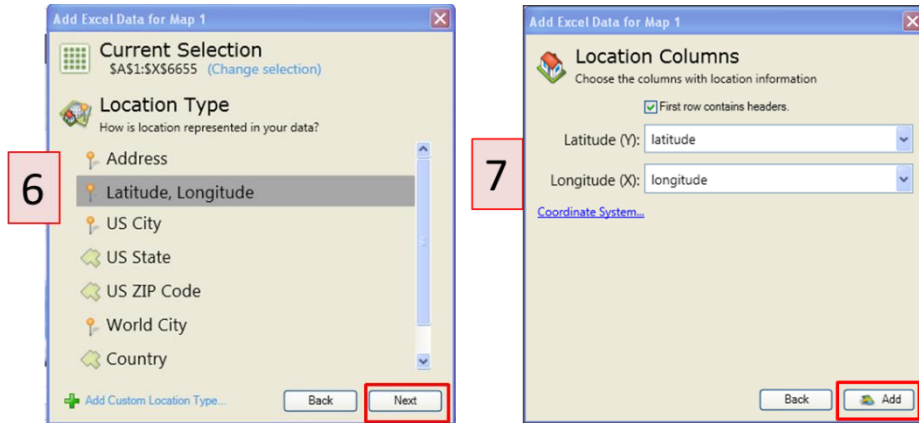
## 5. Select all the data columns (with data in them) in the spreadsheet and click "OK"



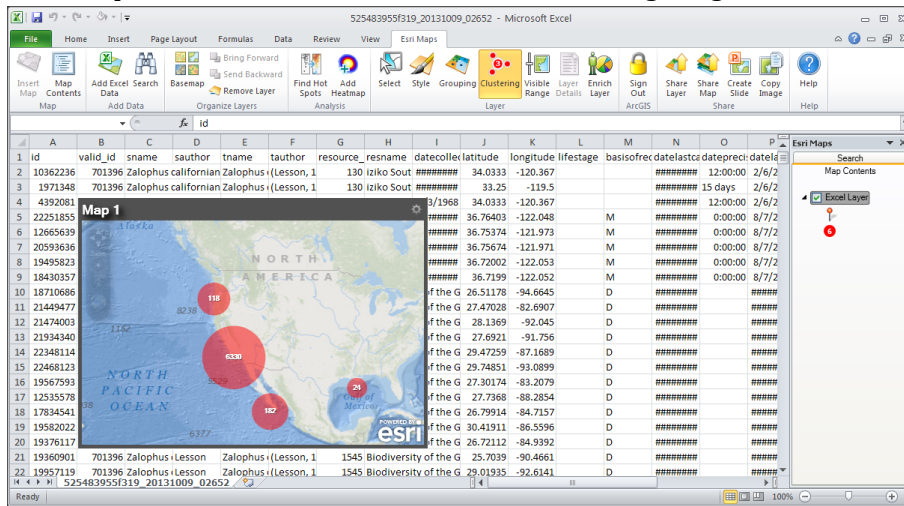


# How to Find, Map, & Analyze Wildlife Data in a GIS System

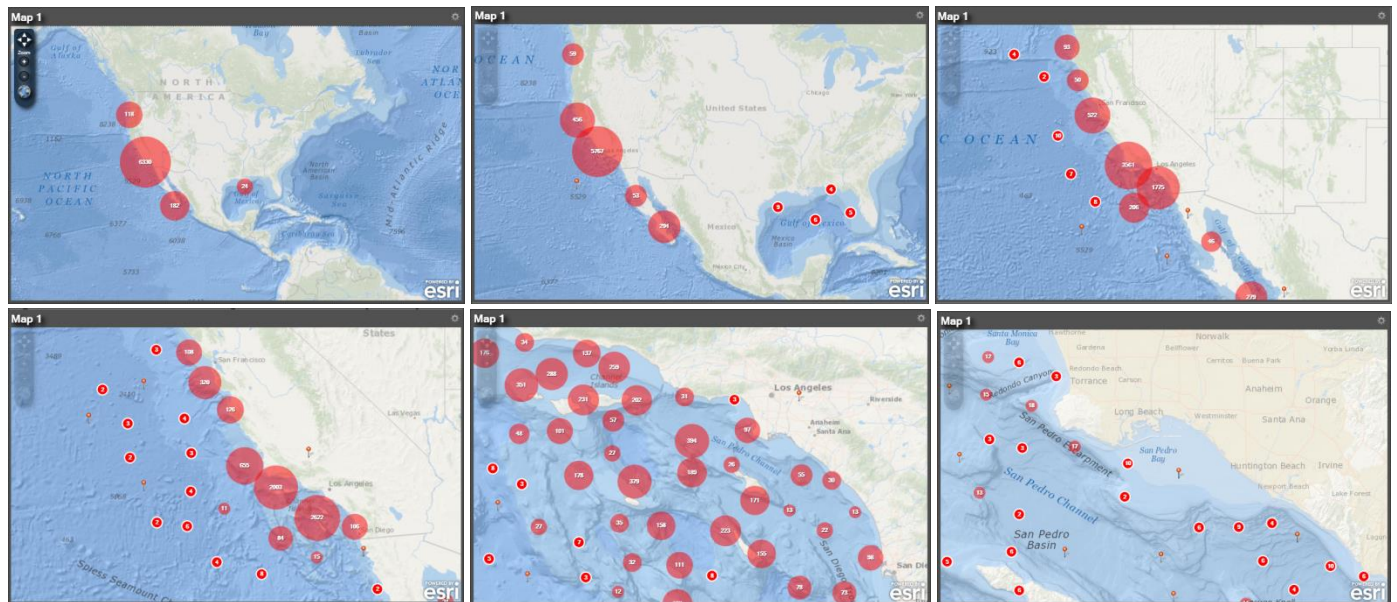
6. Select **“Latitude, Longitude”** from the pop-up window, and then click the **“Next”** button
7. Make sure the names of the data columns match the label, and then click the **“Add”** button



- Your map should now show **“Clusters”** of animal sighting locations

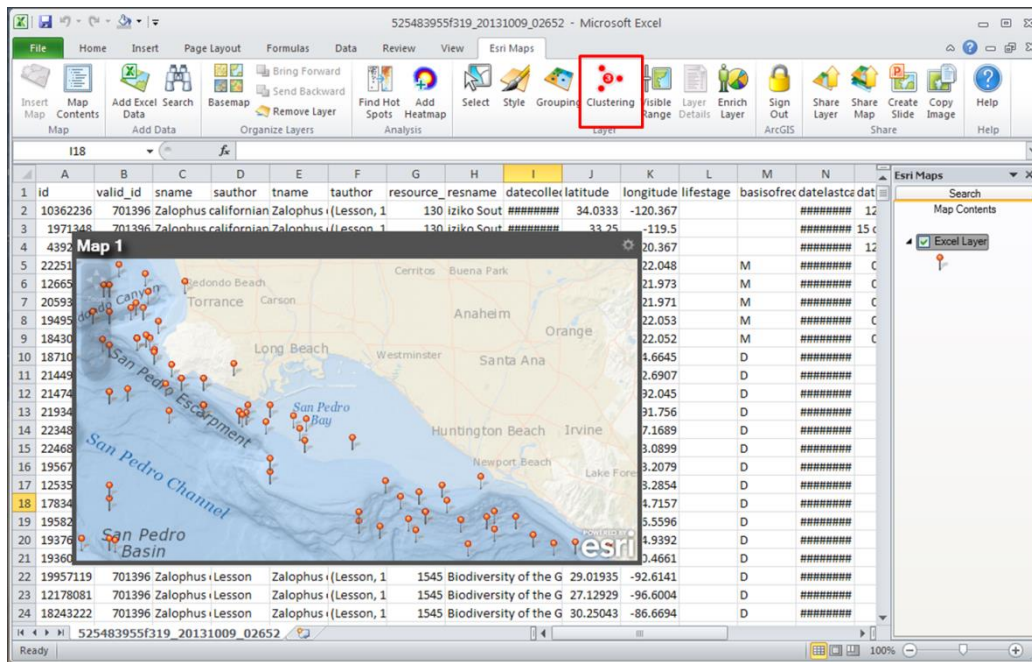


- Use the **zoom controls** (or scroll with your mouse) to explore these clusters at different spatial scales

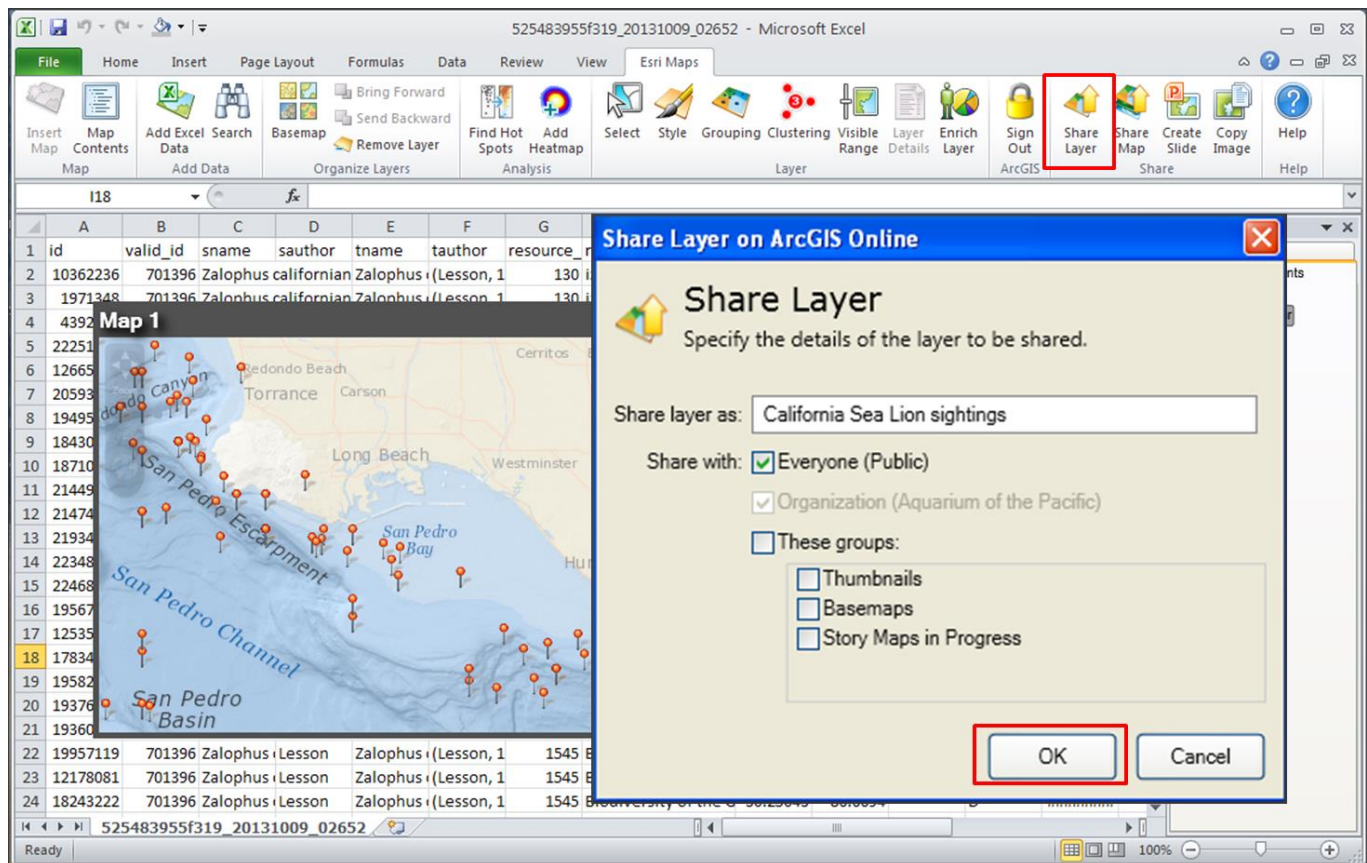


# How to Find, Map, & Analyze Wildlife Data in a GIS System

- To show the **Individual Point Locations** un-select the “Clustering” button



- Select the “Share Layer” button to bring this dataset into ArcGIS Online
  - fill in the layer name and click “OK”



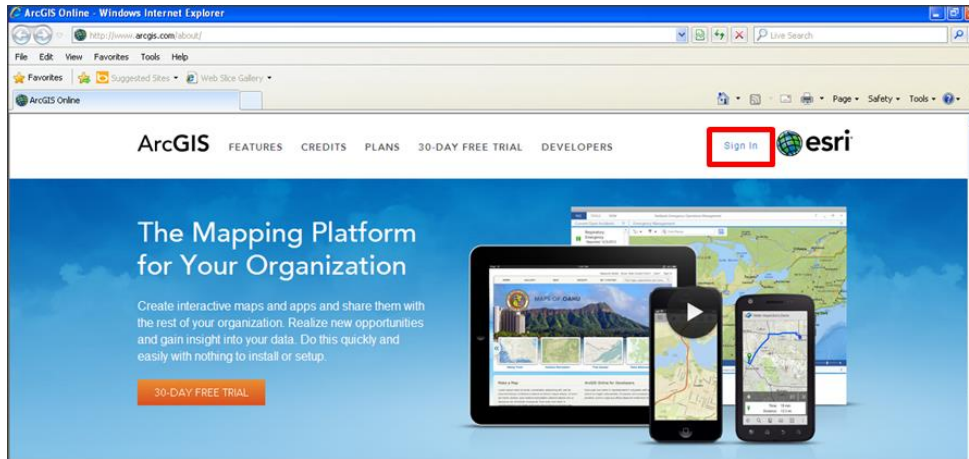


# How to Find, Map, & Analyze Wildlife Data in a GIS System

## 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



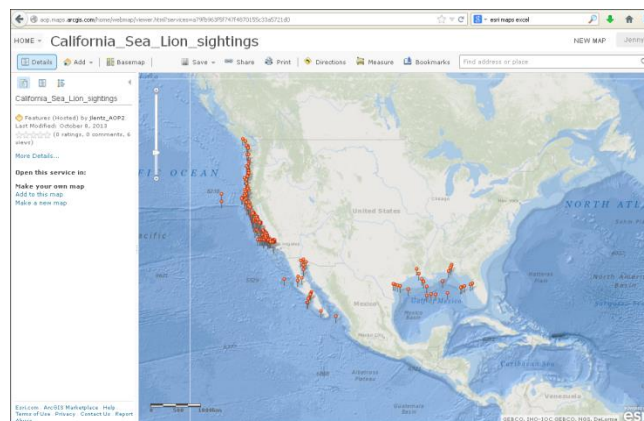
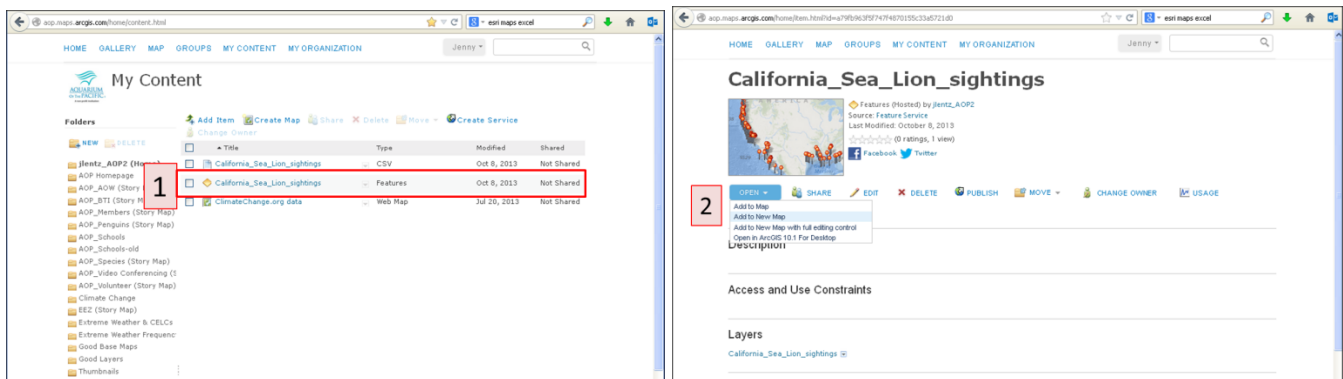
- Displaying your data in ArcGIS Online

**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

- Click the “My Content” tab at the top of the screen and select the “Features” layer from Excel
- Click the “Open” button and select the “Add to New Map” option

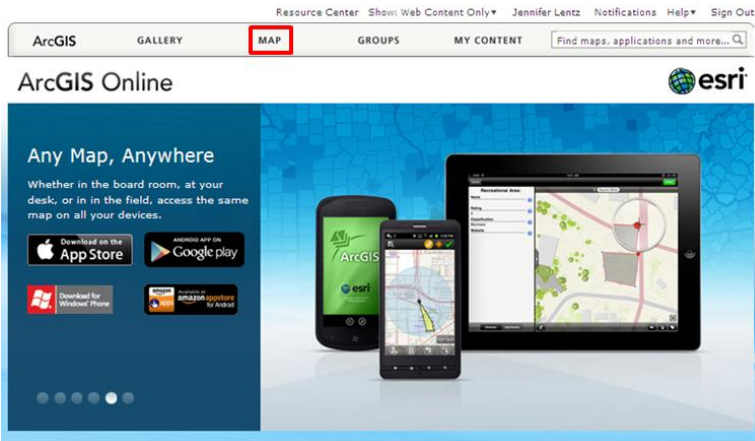




# How to Find, Map, & Analyze Wildlife Data in a GIS System

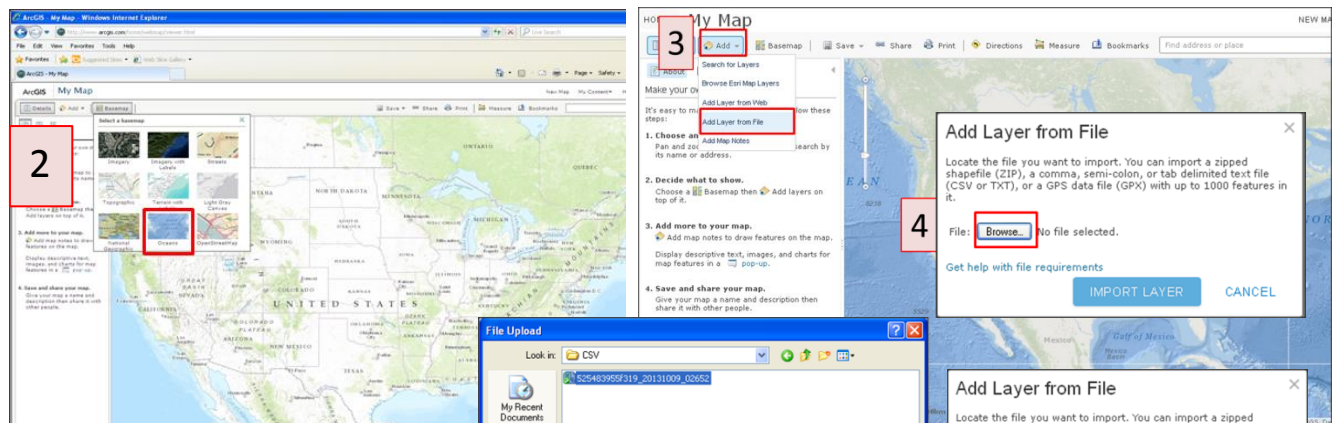
## Option B

1. Click the “Map” Tab at the top of the screen

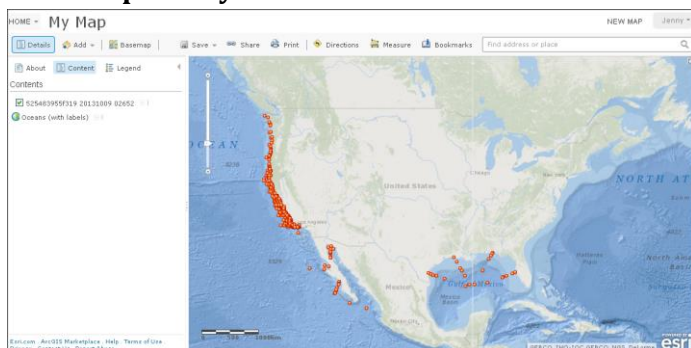
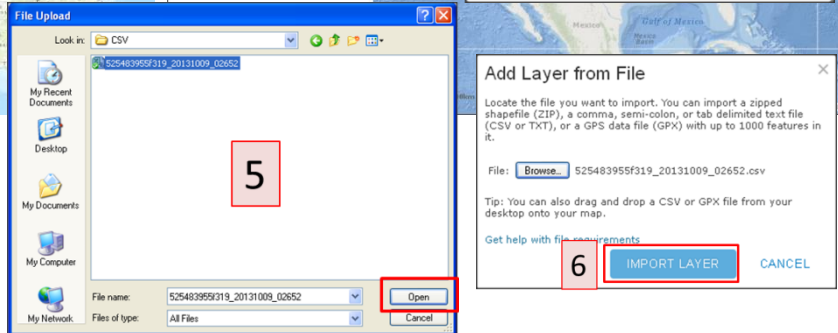


- A window like the one below should appear when you click the “Map” tab

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

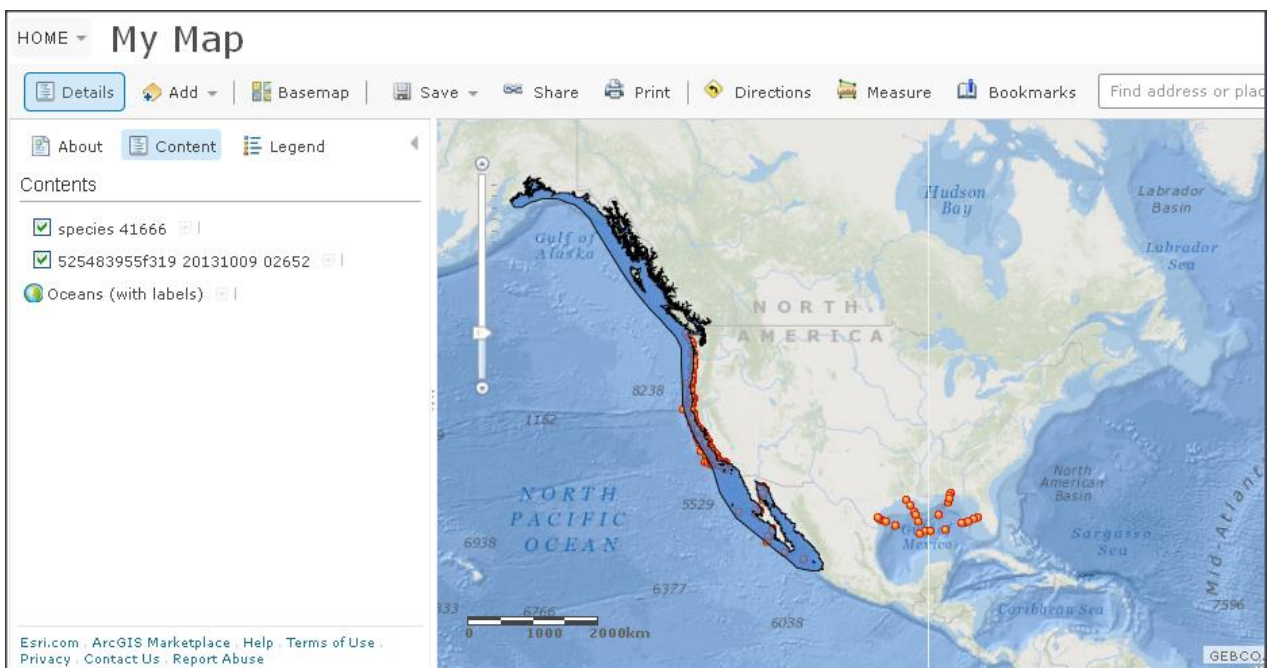
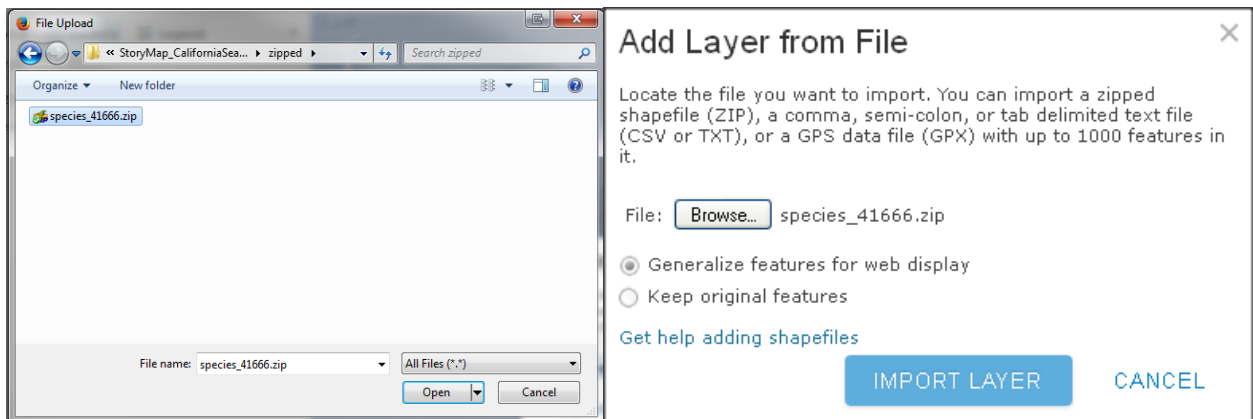
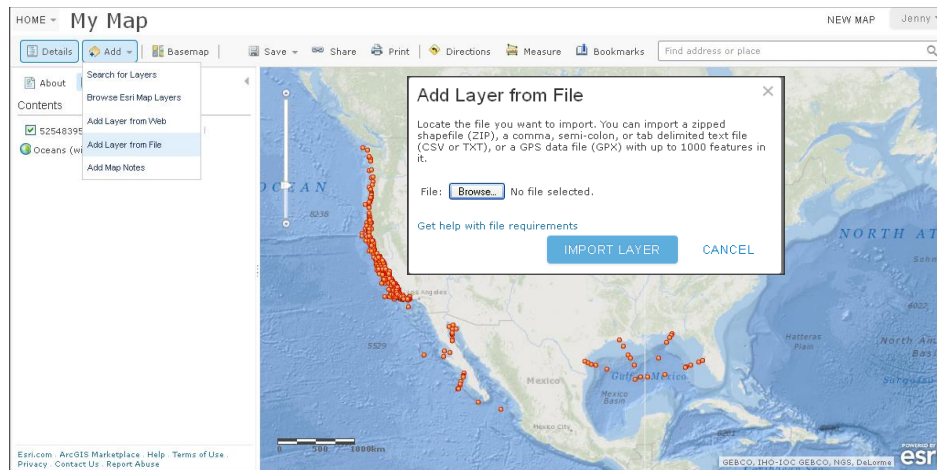


4. Click the “Browse” button
5. Navigate to the iOBIS datafile select the file and click “Open”
6. Click “Import Layer”



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

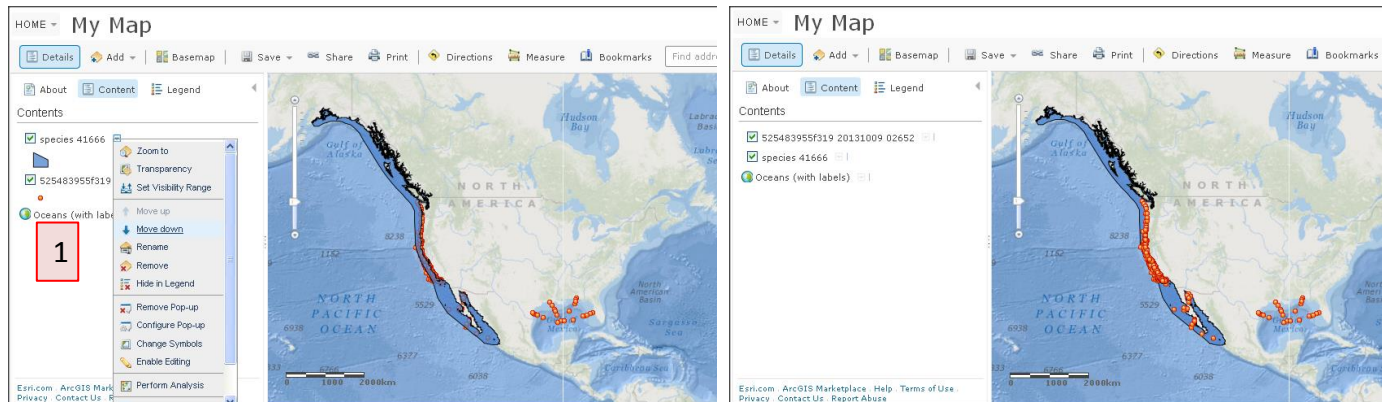
- Next add the **Geographic Range** data file you downloaded in Part 2 from the IUCN Redlist site
  - Click the “**Add**” button and select the “**Add Layer from File**” option
  - Click the “**Browse**” button, Navigate to the **zipped IUCN Redlist file** , Click “**Import Layer**”



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

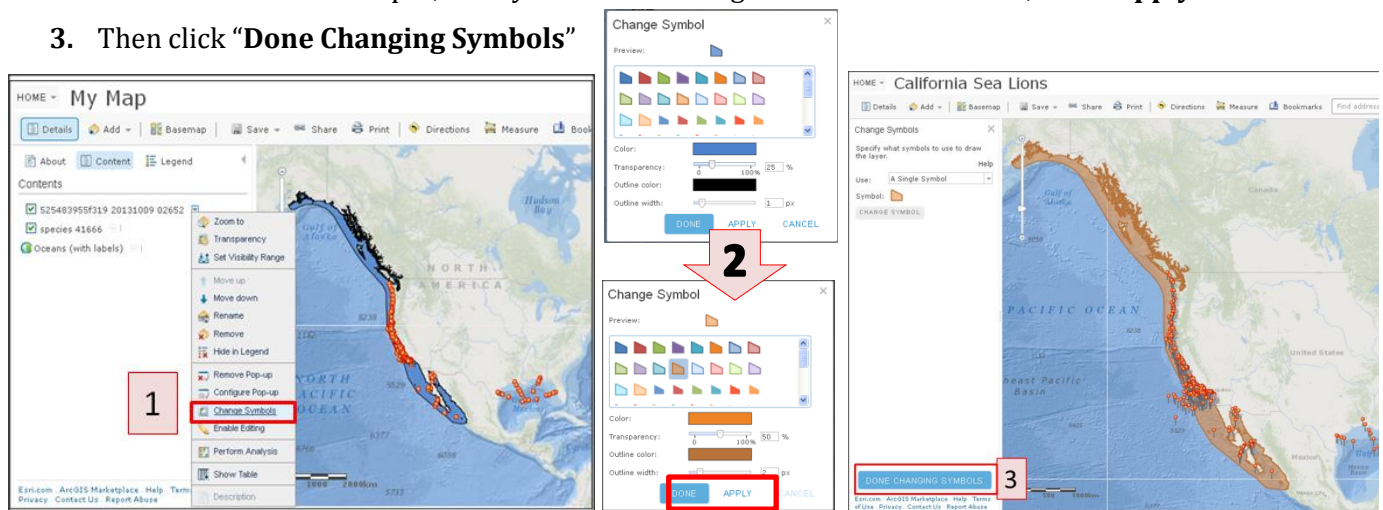
## • Changing the Order of the Displayed Layers

- 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 underneath the sighting locations

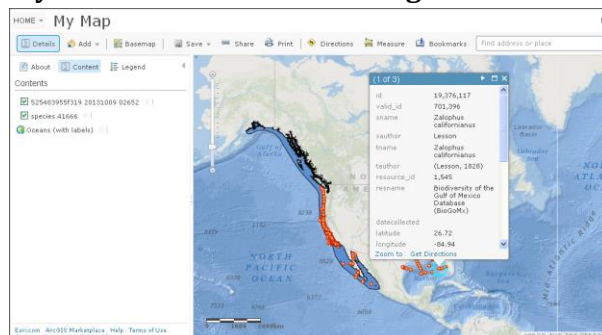


## • Changing the color of the geographic range layer

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



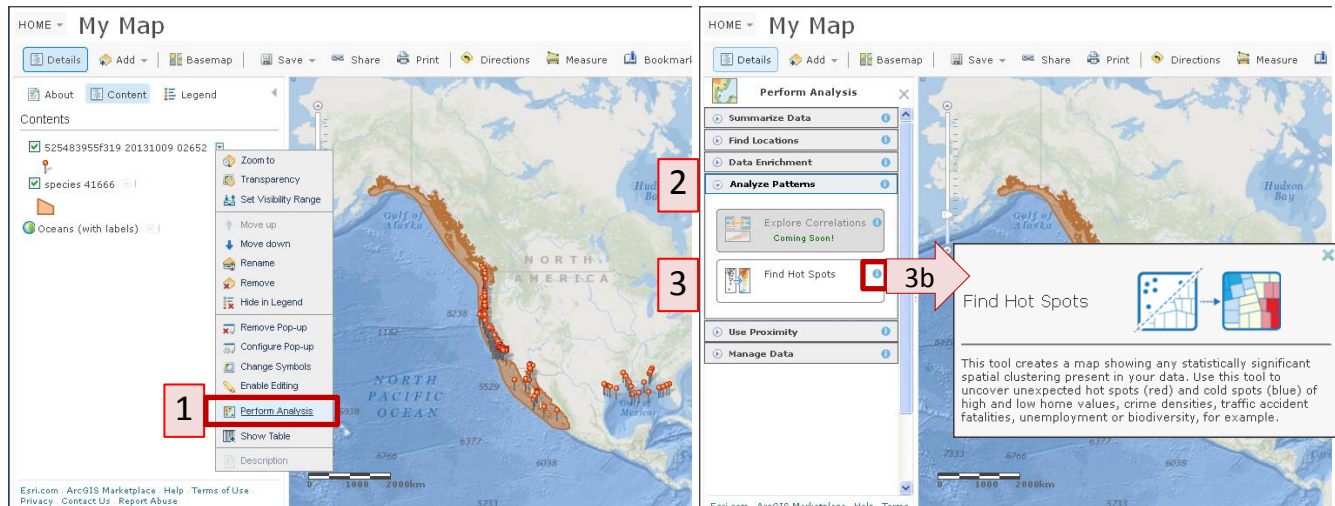


# How to Find, Map, & Analyze Wildlife Data in a GIS System

## • 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

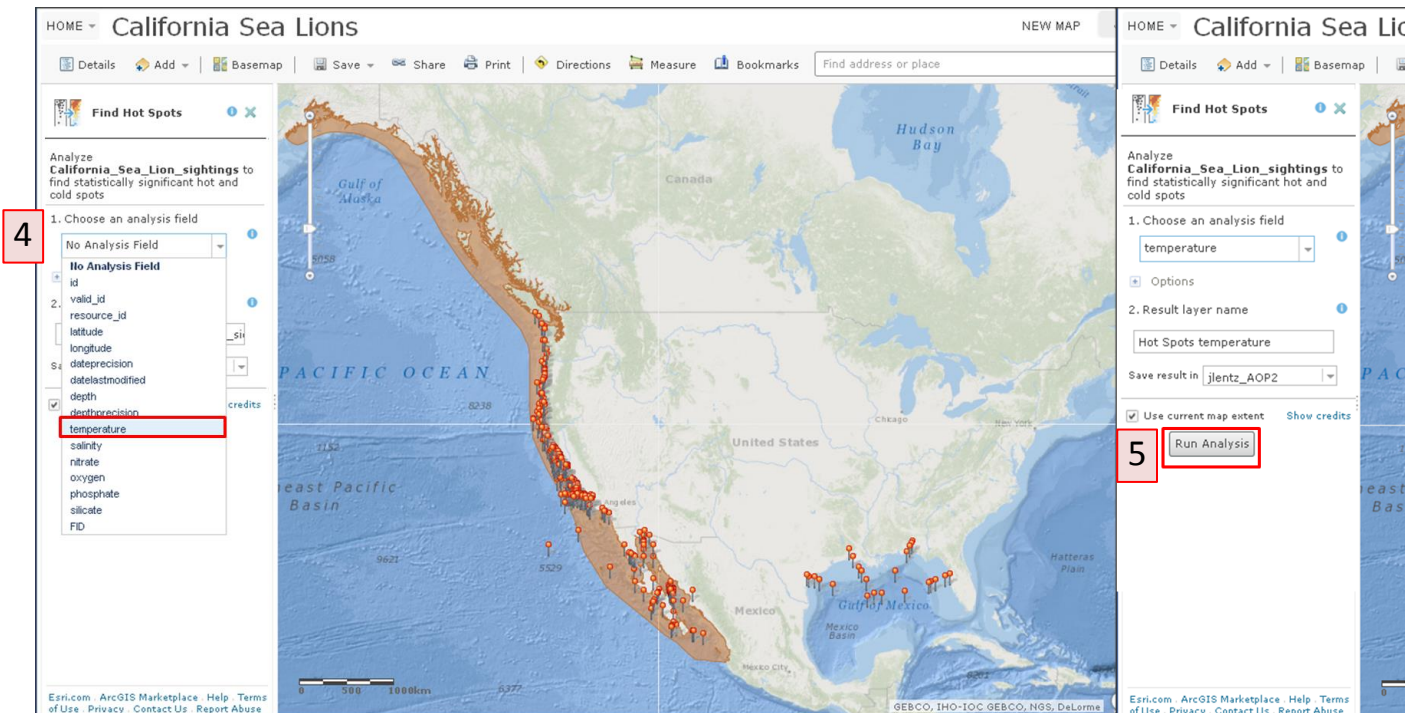
**3B.** To find out more information about the type of analysis click the “**blue information**” button



## 4. Select the **data field** to be analyzed

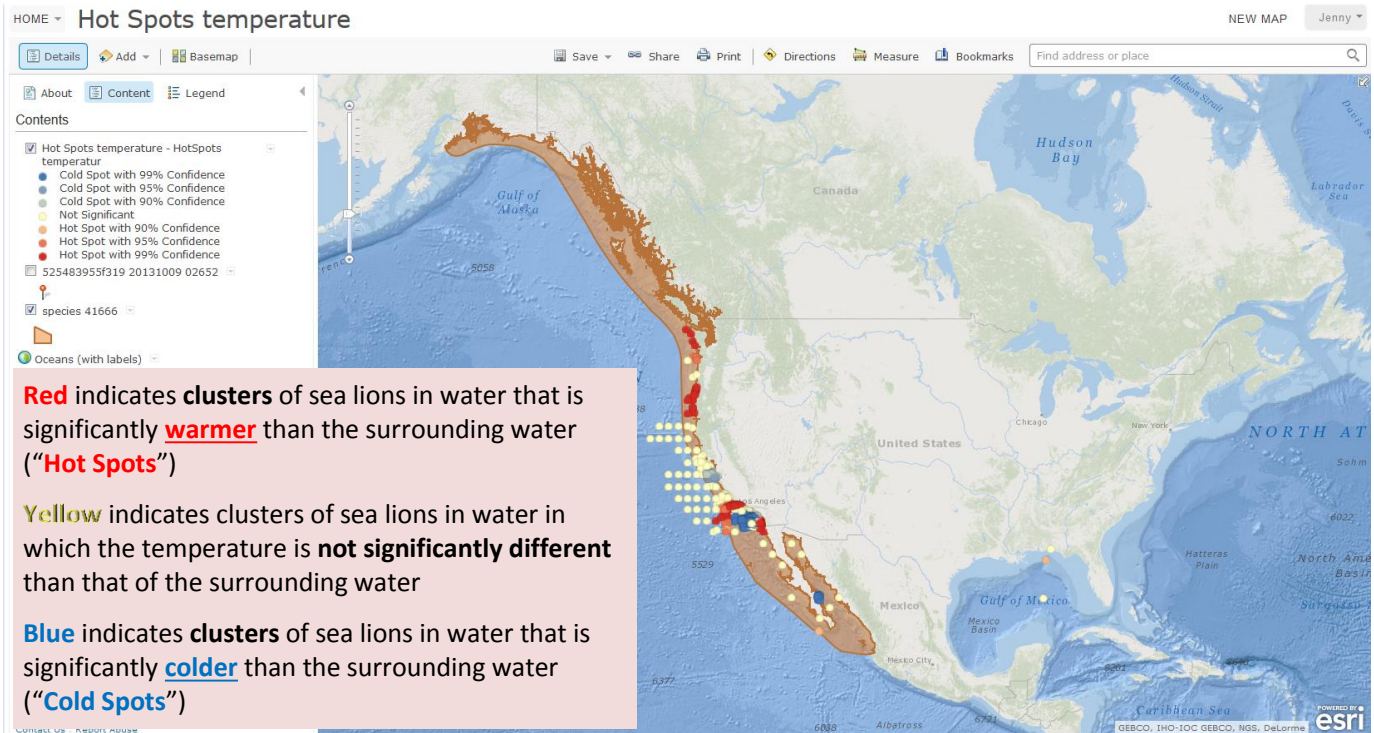
- here we’re going to see whether we find spatial clusters of sea lions at different **temperatures**
- so we’ve selected the “**temperature**” field

## 5. Click the “**Run Analysis**” button



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

## The results of the "Find Hot Spots" Analysis



## The Finished Product





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

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## 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 Free K-12 GIS Lesson Plans

### ➤ For Geography 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](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](http://edcommunity.esri.com/software-and-data/Lessons/G/Geocaching_Geography_Meets_E)

### ➤ For History 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](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](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](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](http://edcommunity.esri.com/software-and-data/Lessons/W/War_of_1812_Web_lesson)

### ➤ For Earth Science Teachers

- “Coral Reefs” – K-12 [http://edcommunity.esri.com/software-and-data/Lessons/C/Coral\\_Reefs](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](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](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](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\\_Extre](http://edcommunity.esri.com/software-and-data/Lessons/I/Investigating_Temperature_Extre)
- “Learning about Dams-Reservoirs Using ArcGIS Online” – 5-12 grades [http://edcommunity.esri.com/software-and-data/Lessons/L/Learning\\_about\\_Dams\\_Reservoirs](http://edcommunity.esri.com/software-and-data/Lessons/L/Learning_about_Dams_Reservoirs)
- “Learning about Flood Zones Using ArcGIS Online” – 5-12 grades [http://edcommunity.esri.com/software-and-data/Lessons/L/Learning\\_about\\_Flood\\_Zones\\_Usi](http://edcommunity.esri.com/software-and-data/Lessons/L/Learning_about_Flood_Zones_Usi)
- “Learning About Local Water Quality w/ArcGIS Online” – 5-12 grades [http://edcommunity.esri.com/software-and-data/Lessons/L/Learning\\_About\\_Local\\_Water\\_Qua](http://edcommunity.esri.com/software-and-data/Lessons/L/Learning_About_Local_Water_Qua)
- “Learning about Oceans Using ArcGIS Online ” – 5-12 grades [http://edcommunity.esri.com/software-and-data/Lessons/L/Learning\\_about\\_Oceans\\_Using\\_Ar](http://edcommunity.esri.com/software-and-data/Lessons/L/Learning_about_Oceans_Using_Ar)
- “Learning about Rivers Using ArcGIS Online” – 5-12 grades [http://edcommunity.esri.com/software-and-data/Lessons/L/Learning\\_about\\_Rivers\\_Using\\_Ar](http://edcommunity.esri.com/software-and-data/Lessons/L/Learning_about_Rivers_Using_Ar)
- “Learning about Watersheds Using ArcGIS Online” – 5-12 grades [http://edcommunity.esri.com/software-and-data/Lessons/L/Learning\\_about\\_Watersheds\\_Usin](http://edcommunity.esri.com/software-and-data/Lessons/L/Learning_about_Watersheds_Usin)
- “Learning About Weather & Streamflow: ArcGIS Online ” – 5-12 grades [http://edcommunity.esri.com/software-and-data/Lessons/L/Learning\\_About\\_Weather\\_Strea](http://edcommunity.esri.com/software-and-data/Lessons/L/Learning_About_Weather_Strea)
- “Learning about Wetlands Using ArcGIS Online” – 5-12 grades [http://edcommunity.esri.com/software-and-data/Lessons/L/Learning\\_about\\_Wetlands\\_Using](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](http://edcommunity.esri.com/software-and-data/Lessons/W/World_Temperature_Extreme_Anal)