Introduction to ArcGIS Pro

Fondren Library
GIS/Data Center

Objectives

1. Familiar with GIS terms and concepts
2. Navigate ArcGIS Pro software
3. Know where to go for further assistance

Road map

GDC → GIS overview → Examples of GIS → **Hands-on workshop**

GIS/Data Center

Fundamentals

What is GIS?

A geographic information system (GIS) is a system designed to create, store, manipulate, analyze, manage, and visualize spatial data.

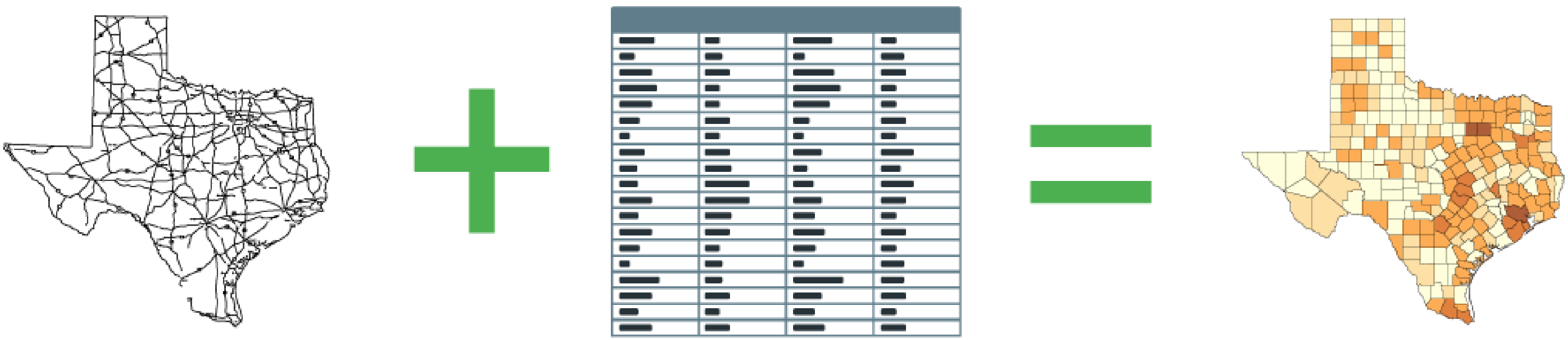


Photo source:
https://mangomap.com/what-is-gis

What is GIS?

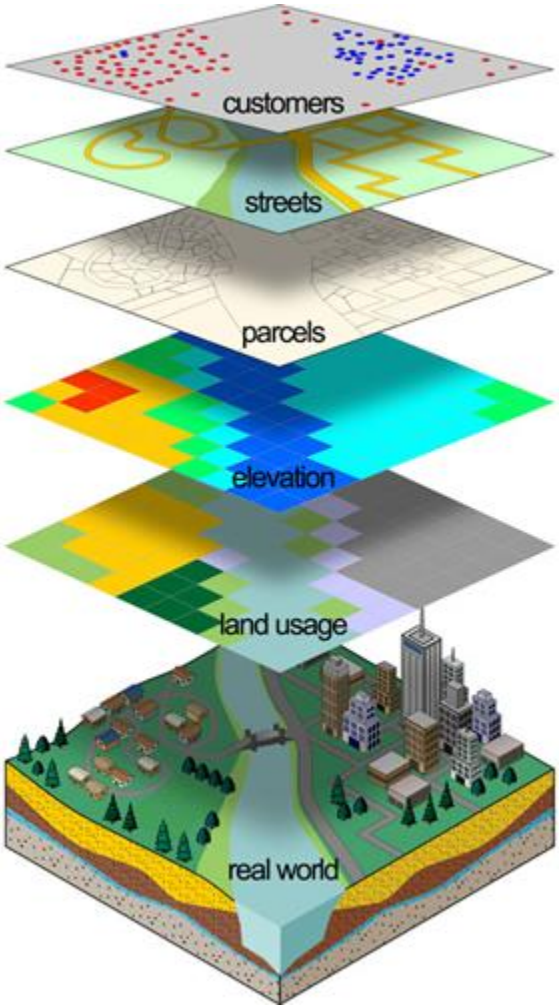


Photo source:
https://geoawesomeness.com/gis-underwater/

GIS components

Software

- Esri ArcGIS, QGIS, ERDAS IMAGINE, ENVI

Hardware

- Desktops, servers, smartphones, tablets, GPS devices

Data

- Publicly available, purchased, created

People

- GIS professional, data providers, and audiences

Methods

- Workflows; plans and rules for how technology is applied

GIS functions

Visualization

- Getting information by looking at a map

Geospatial analysis

- Performing detailed analysis regarding the spatial relationships between and within datasets

Geospatial data management

- Organizing and updating spatial information

GIS data

Components → Types → Formats → Coordinate systems

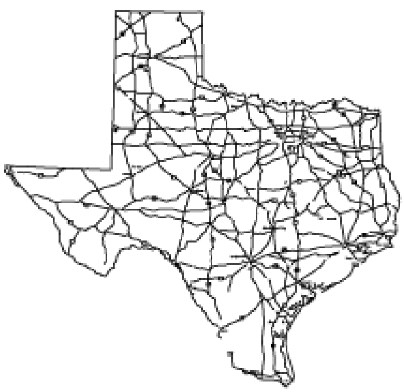
GIS data components

Features

- Graphic spatial representation of real-world physical features

Attributes

- Non-spatial data describing the features



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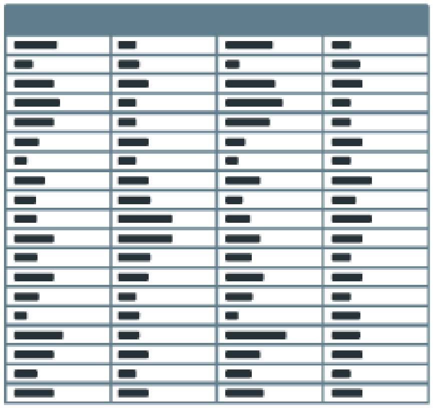

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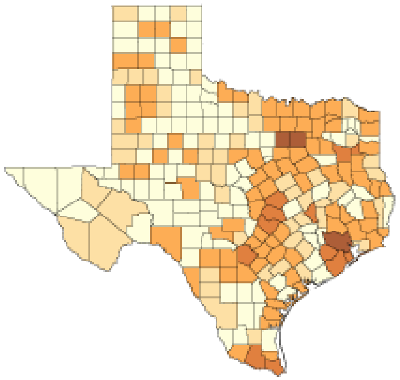

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GIS data components

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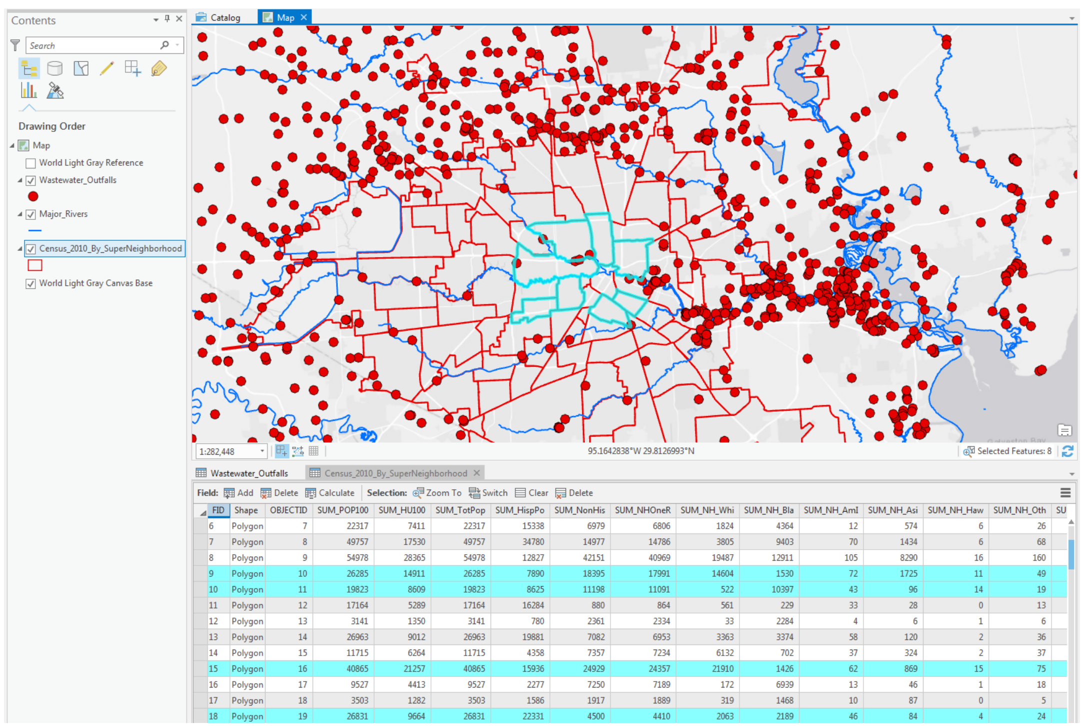
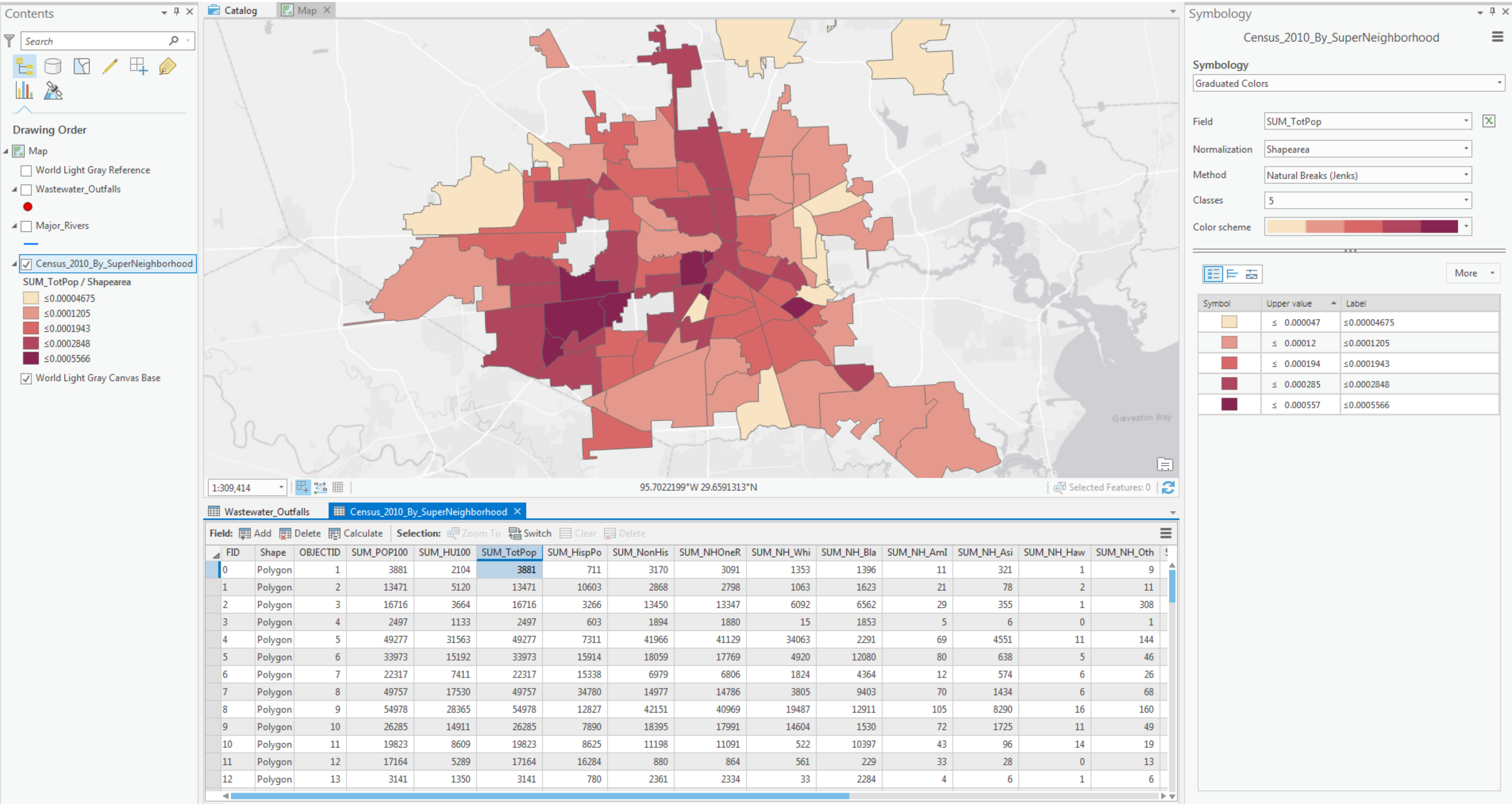
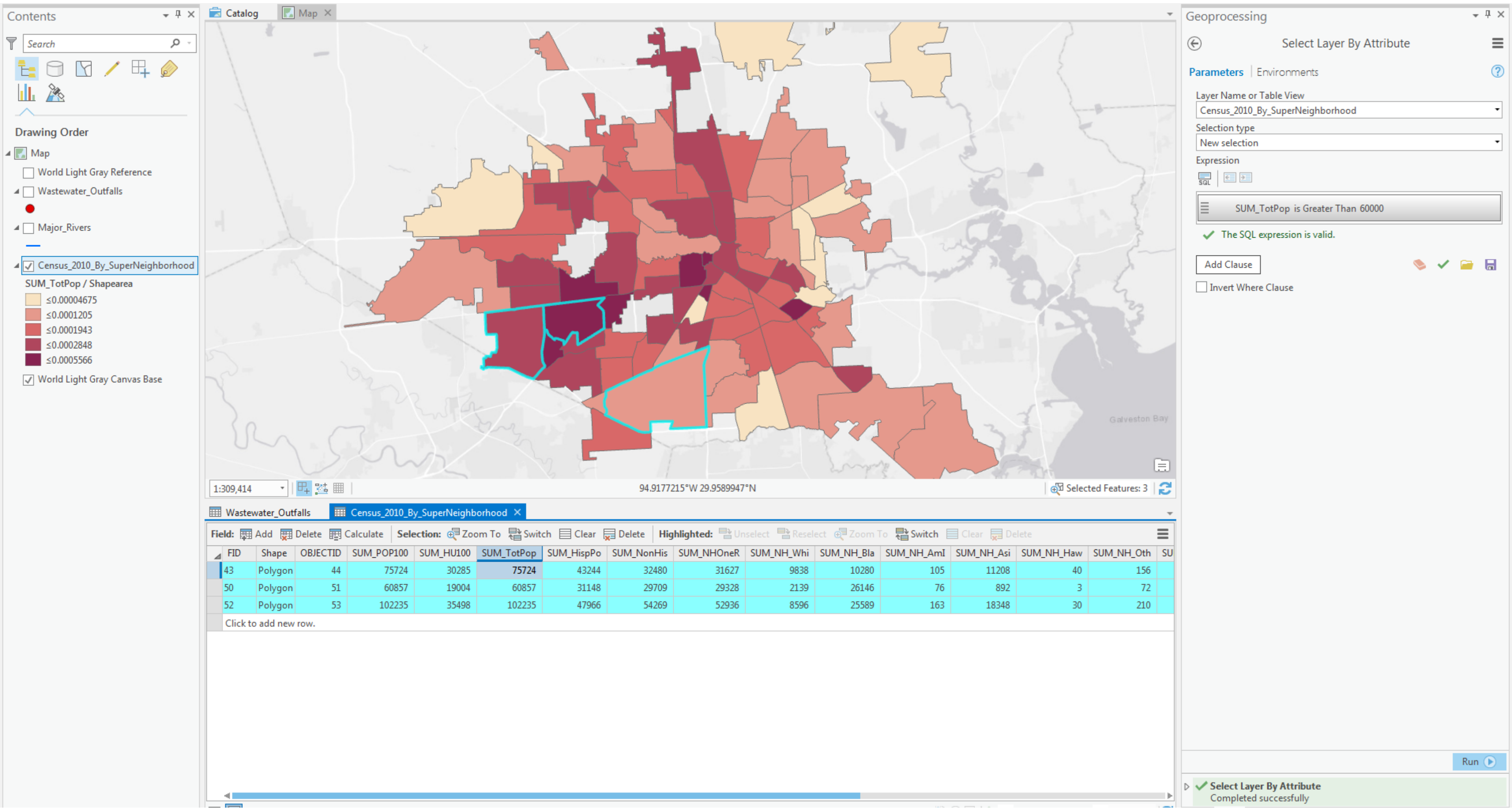


Symbolize data by attributes



Select data by attributes



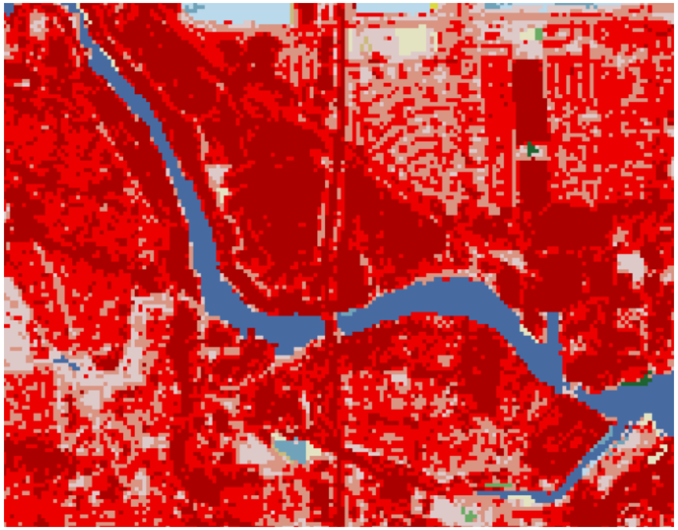
Data types

Vector

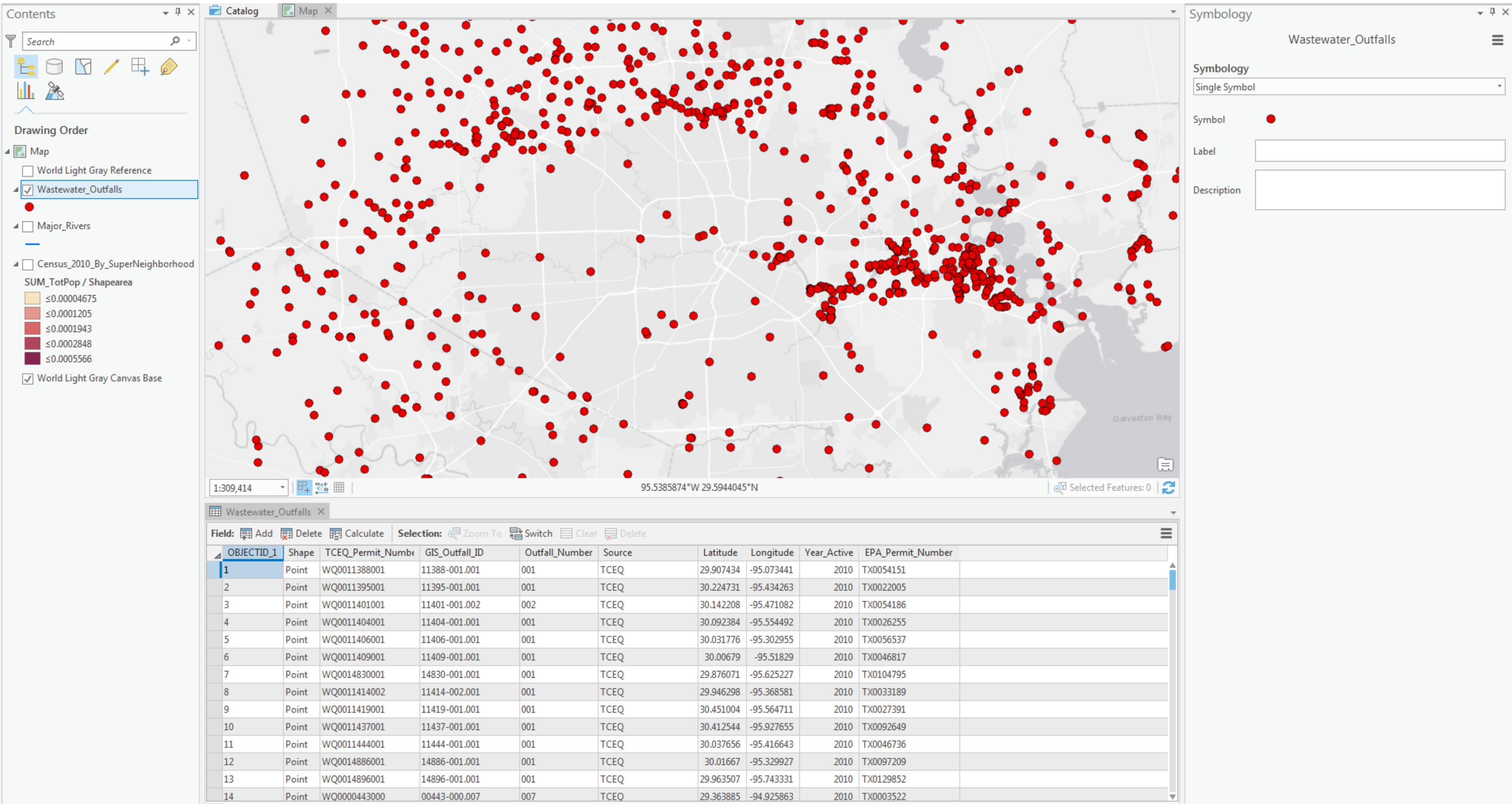
- Uses points, lines, and polygons to represent real features on the earth's surface. Ideal for discrete themes with definite boundaries.
- Examples: light poles, roads, buildings

Raster

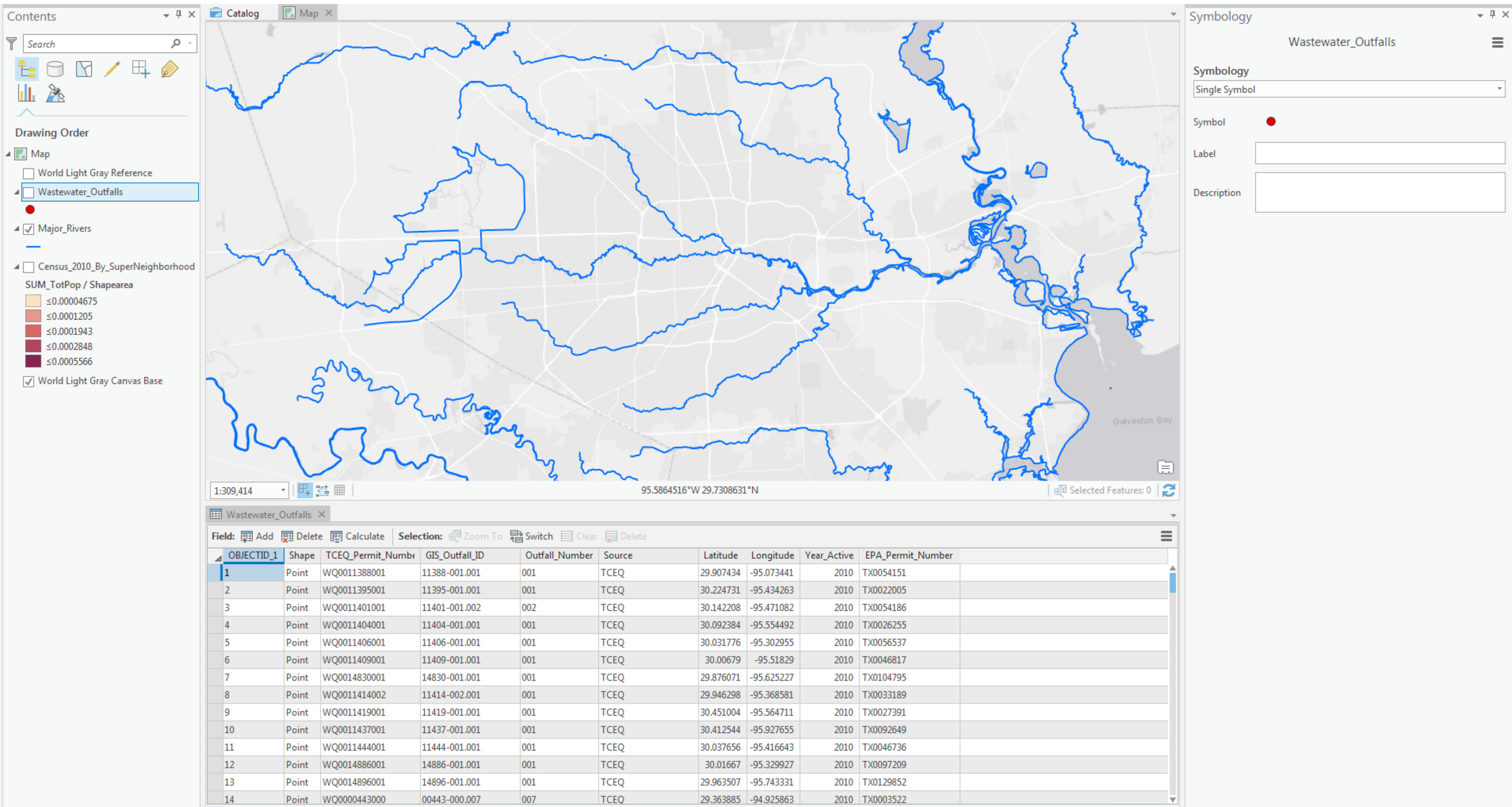
- Composed of a continuous grid of cells that represent a value for a portion of the earth's surface. Ideal for continuous themes of change
- Examples: elevation, rainfall



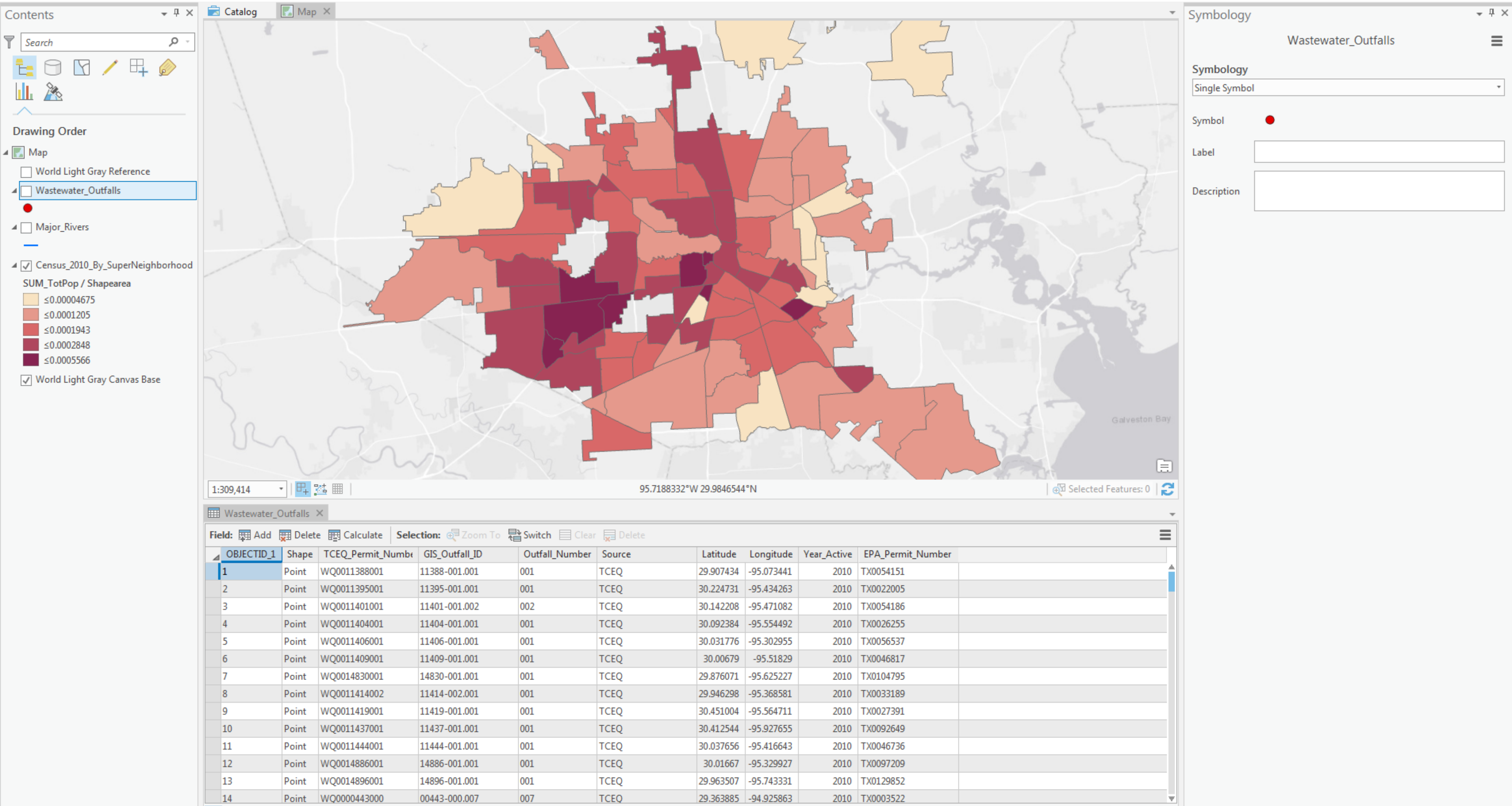
Vector data - points



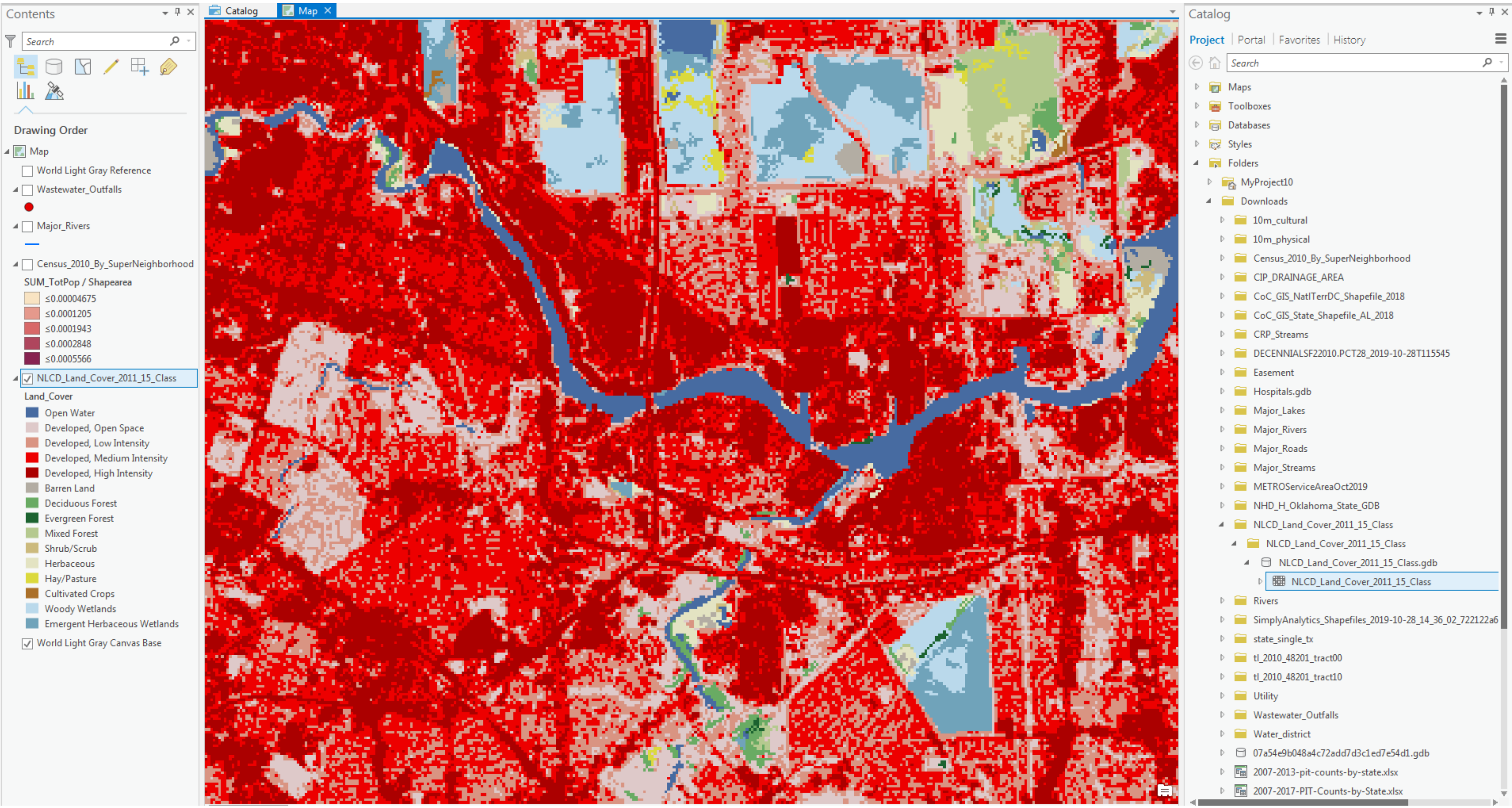
Vector data - lines



Vector data - polygons



Raster data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Search
Drawing Order
Map
World Light Gray Reference
Wastewater_Outfalls
Major_Rivers
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Land_Cover
Open Water
Developed, Open Space
Developed, Low Intensity
Developed, Medium Intensity
Developed, High Intensity
Barren Land
Deciduous Forest
Evergreen Forest
Mixed Forest
Shrub/Scrub
Herbaceous
Hay/Pasture
Cultivated Crops
Woody Wetlands
Emergent Herbaceous Wetlands
World Light Gray Canvas Base
Catalog
Map
Catalog
Project
Portal
Favorites
History
Search
Maps
Toolboxes
Databases
Styles
Folders
MyProject10
Downloads
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10m_physical
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CIP_DRAINAGE_AREA
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CoC_GIS_State_Shapefile_AL_2018
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Major_Roads
Major_Streams
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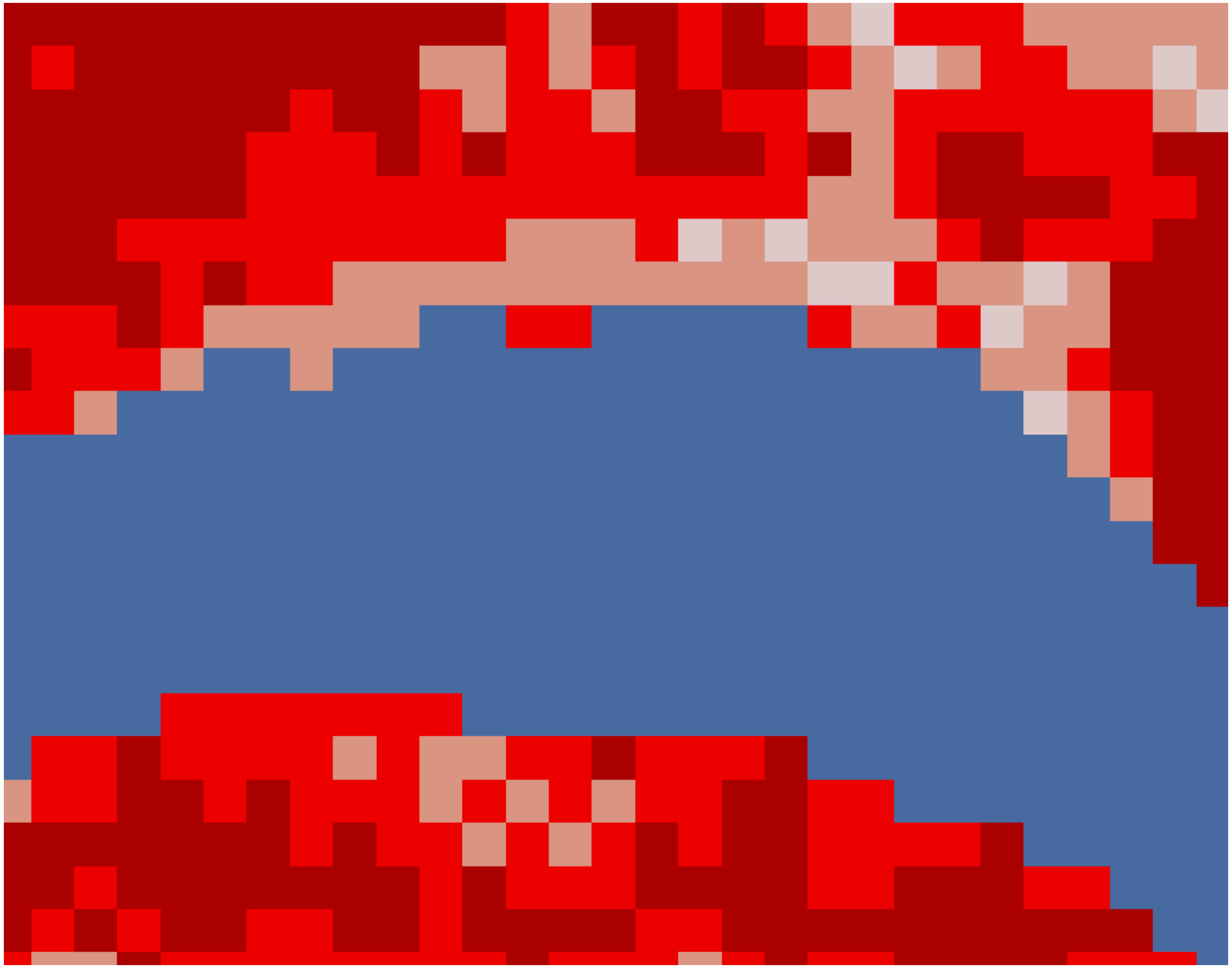
2007-2017-PIT-Counts-by-State.xlsx

Raster data



Data formats

Feature class

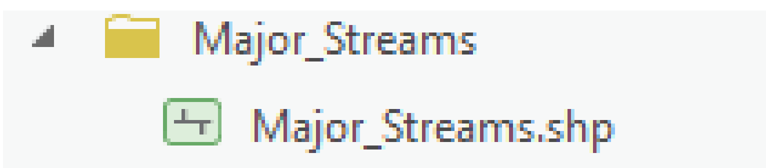
- Vector storage data format; points, lines, polygons
- Homogenous collection of common features

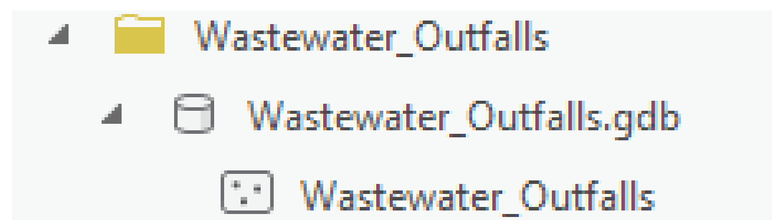
Shapefile feature class

- Open source

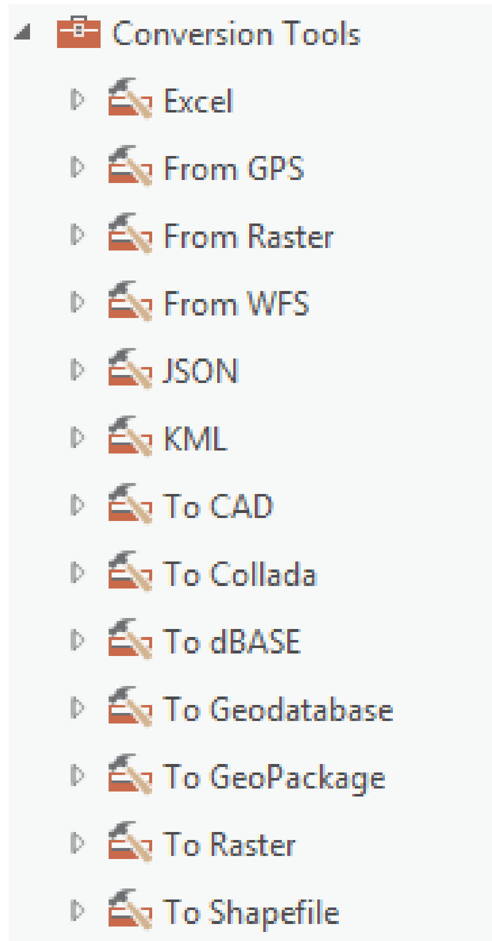
Geodatabase feature class

- Esri, proprietary





Data formats



Coordinate systems

Geographic (3D)

- A method of representing points in a space of given dimensions using spherical measures of lat/long
- Measured in degrees

Projected (2D)

- A method of representing the earth's 3D surface as a 2D surface
- Measured in feet/meters

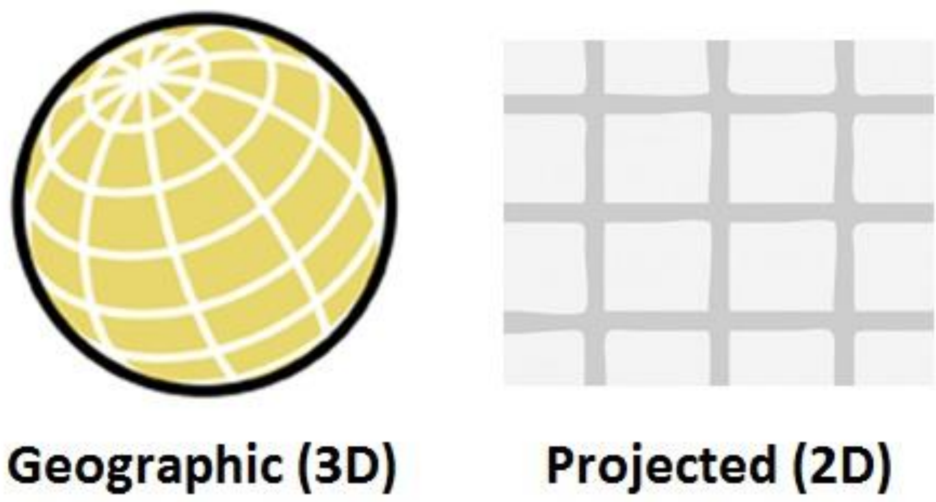


Photo source:
https://communityhub.esriuk.com/geoxchange/2012/3/26/coordinate-systems-and-projections-for-beginners.html

Geographic coordinate systems

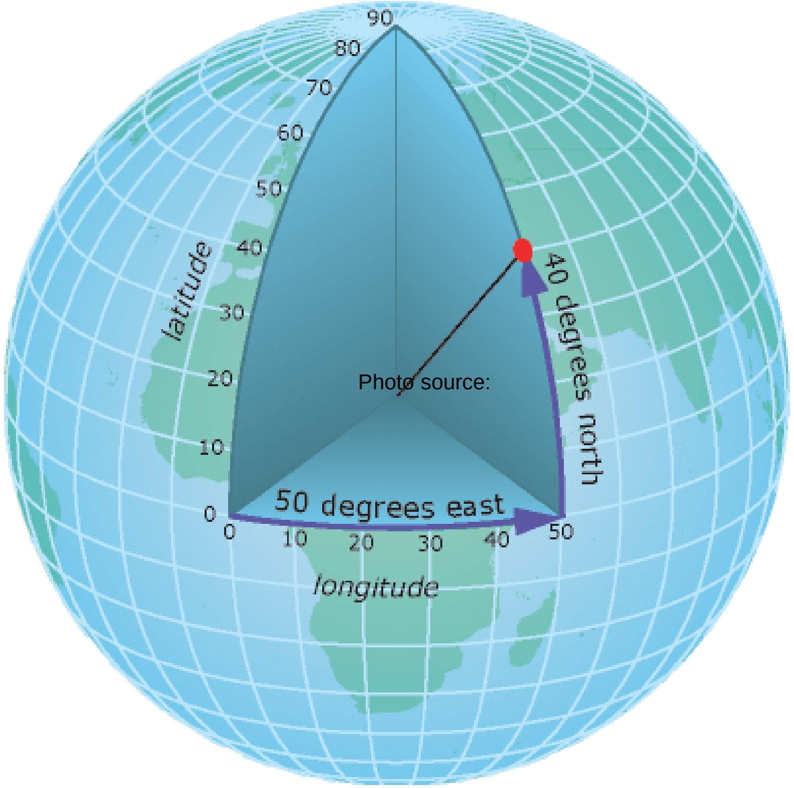


Photo source:
https://desktop.arcgis.com/en/arcmap/latest/map/projections/geographic-coordinate-system.htm

Projected coordinate systems

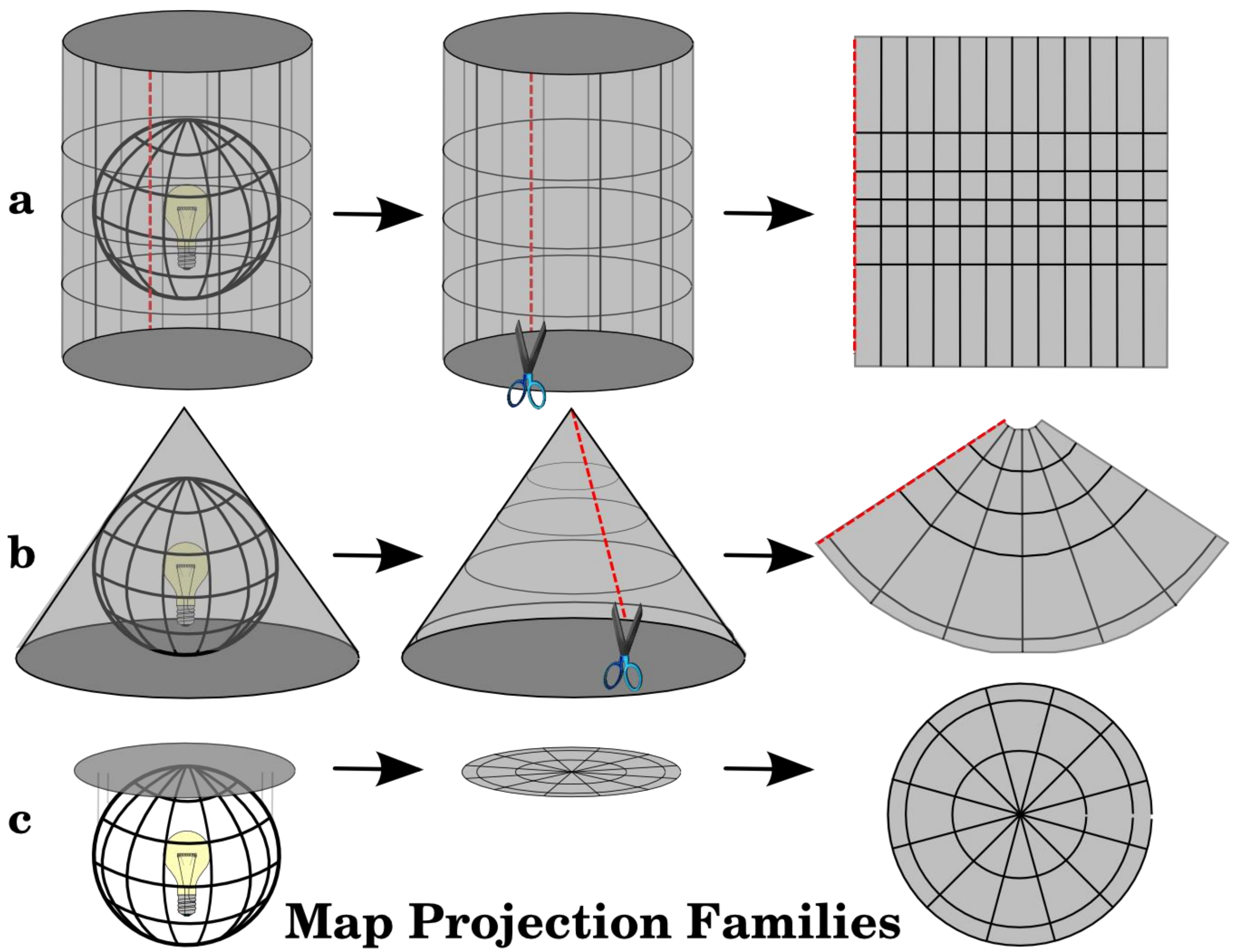


Photo source:
https://docs.qgis.org/2.8/en/docs/gentle_gis_introduction/coordinate_reference_systems.html

Projected coordinate systems

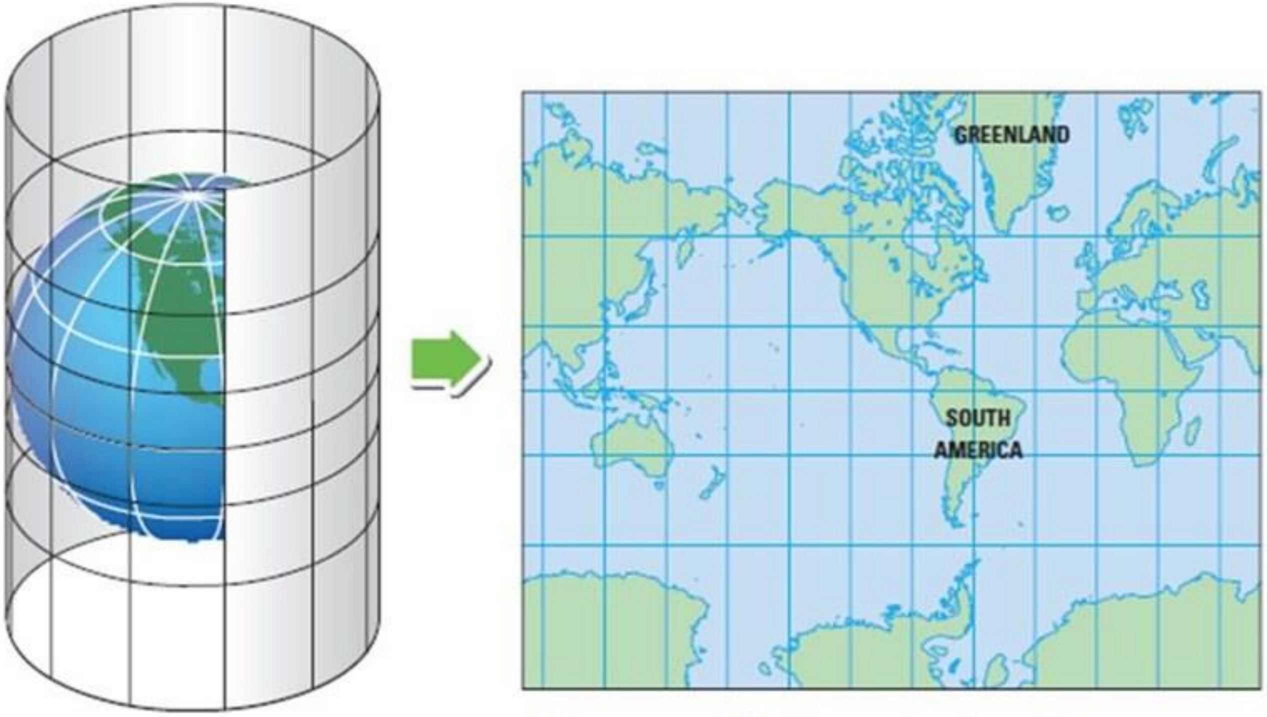


Photo source:
https://www.flickr.com/photos/81965286@N07/34044117016

Esri ArcGIS software

ArcGIS products

Desktop GIS

- ArcGIS Pro, *ArcMap*, *ArcCatalog*

Web-based GIS

- ArcGIS Online (AGOL): web maps, web apps

Mobile GIS

- Collector for ArcGIS
- Survey123 for ArcGIS

ArcGIS software @ Rice

On campus access

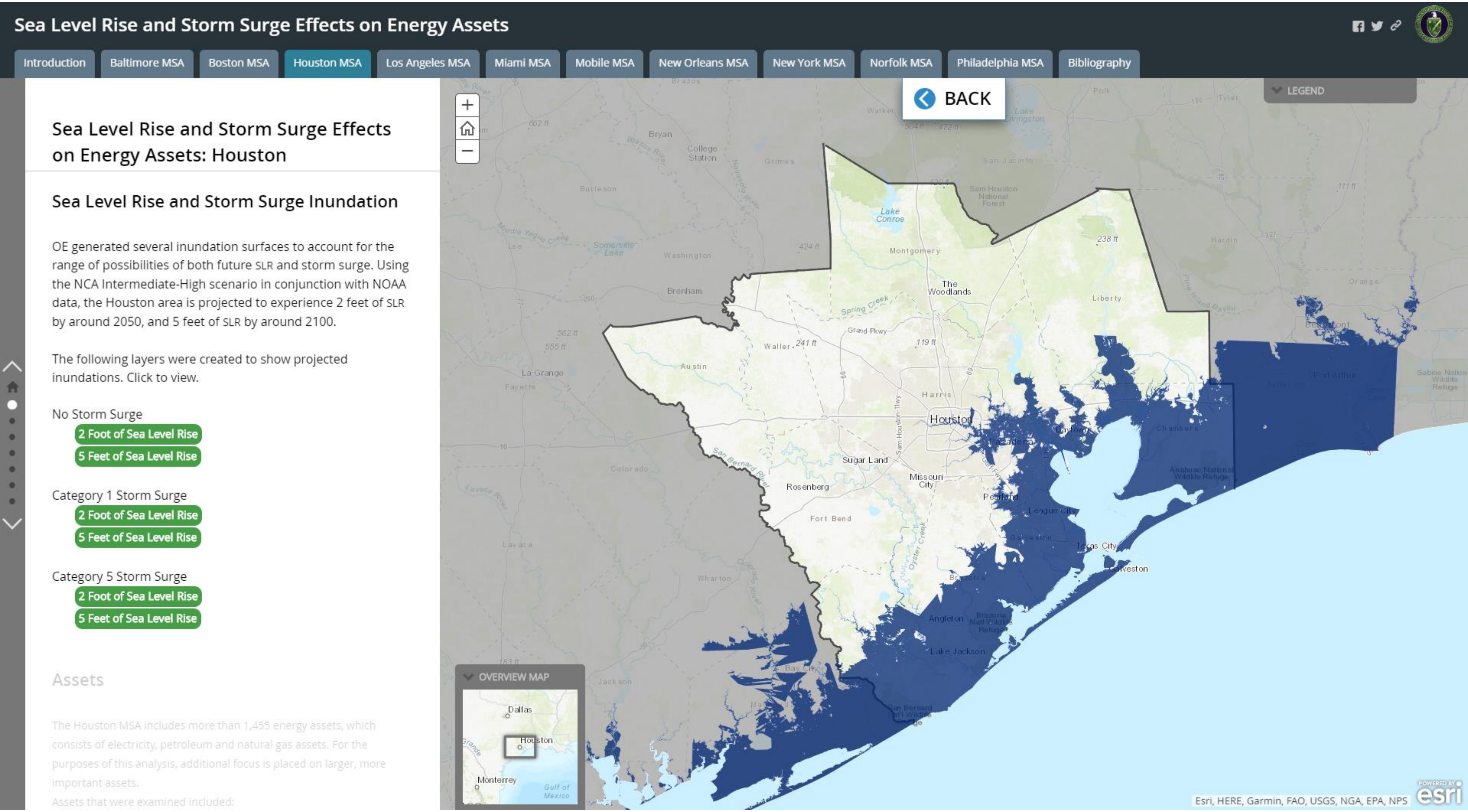
- GIS/Data Center
- Fondren Library 1st Floor Rice Computers
- Mudd Lab
- Various Department Labs (ARCH, CEVE, ESCI)

Personal use

- Request a 1-year student trial by e-mailing gisdata@rice.edu
- Windows only

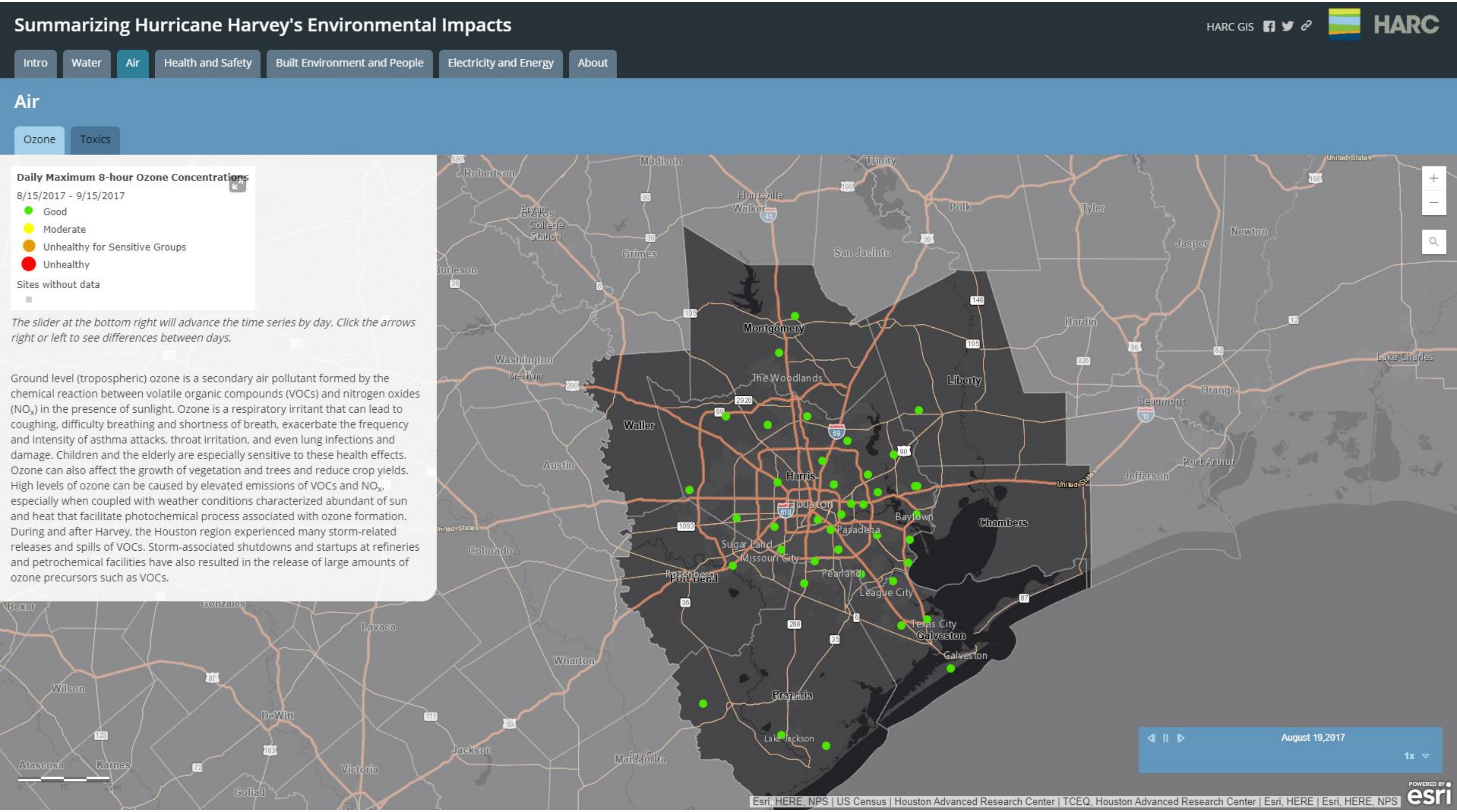
GIS in practice

Nature and Conservation



https://icfgeospatial.maps.arcgis.com/apps/MapSeries/index.html?appid=58f90c5a5b5f4f94aaff93211c45e4ec

Environmental Impacts



https://harcresearch.maps.arcgis.com/apps/MapSeries/index.html?appid=d6b0a3d762ec46ef8ea676f1008f7028/

Business and Economics

A story map

Optimizing Home Delivery with Location Services

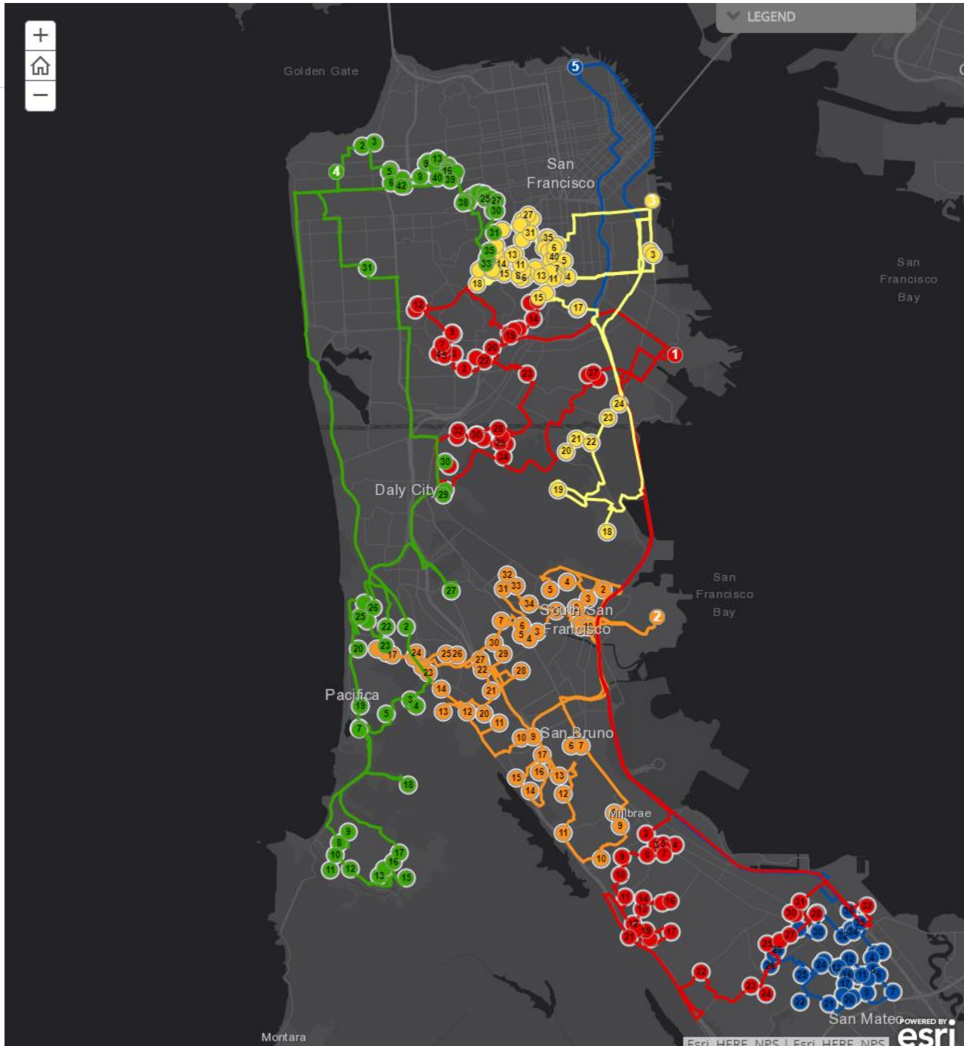
Blending Deliveries for All Customers

If the service strategies were simply combined by giving all the unassigned deliveries to a second vehicle at any of the DCs, there would be 63 hours of work but only approximately 8 hours allocated to DC5.

A strategy to minimize vehicles but ensure all DCs are used is not optimal because the second vehicle is often driving long distances to start deliveries. DC5 could serve some of those customers while more vehicles at some DCs might reduce time and distance.

DC	Stops	Work Hours	Minutes Driving	Miles Driven	Start Time	End Time
DC1	67	14:56	225.97	77.84	9:00 AM	4:55 PM
DC2	53	11:56	186.22	57.11	9:00 AM	4:53 PM
DC3	63	13:05	154.59	41.13	9:00 AM	4:56 PM
DC4	71	15:30	220.91	65.98	9:00 AM	4:53 PM
DC5	35	7:51	121.32	54.77	9:00 AM	4:51 PM
Totals	**289**	**63:18**	**909.01**	**296.82**		

Servicing All Customer Deliveries from Existing DCs (Blend)



https://esribizteam.maps.arcgis.com/apps/MapJournal/index.html?appid=c81dfbf908d84eb89ec52351415c4dea

Hands-on workshop

Wiki tutorial print-outs in the back of room!

Summary

1. Familiar with GIS terms and concepts
2. Navigate ArcGIS Pro software
3. Know where to go for further help