



TxGIS Day 2021

# Introduction to QGIS

Presented by Alexander Abuabara  
Nov. 17, 2021



DOWNLOAD!

Presentation and datasets for the exercises at

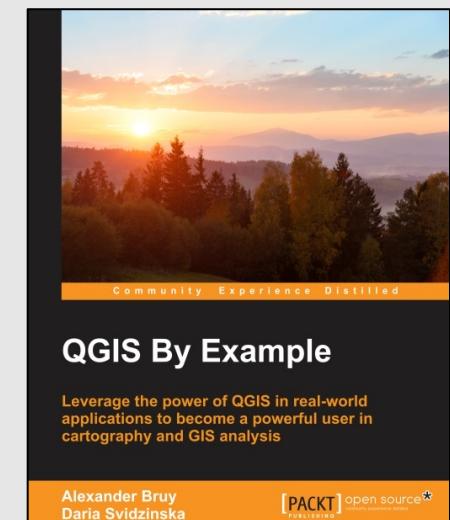
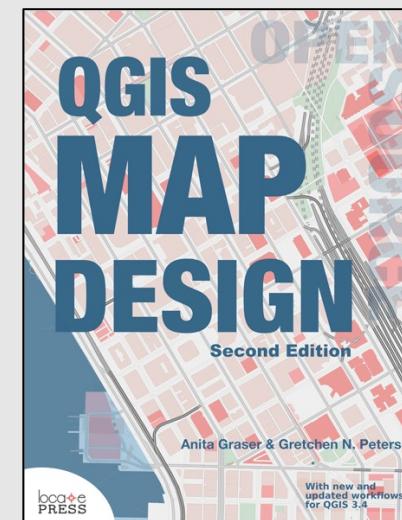
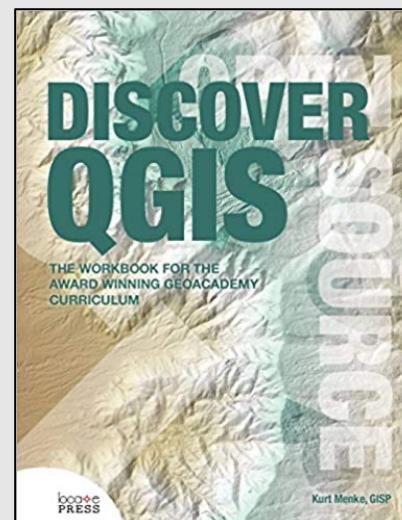
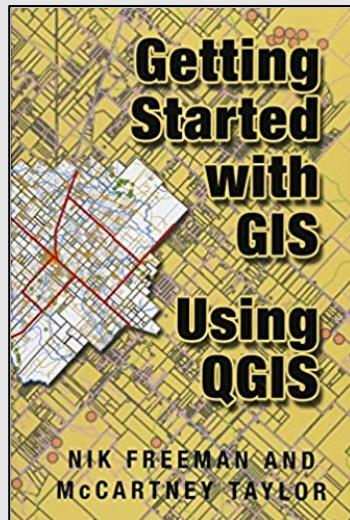
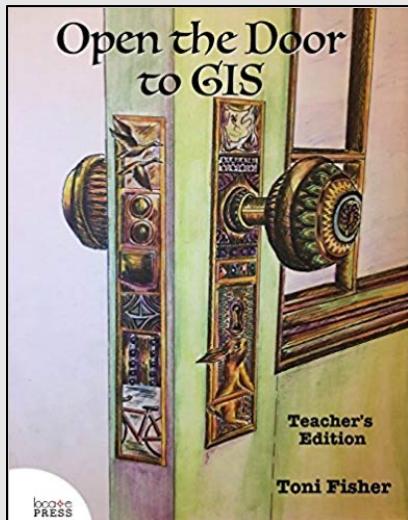
<https://github.com/abuabara/TxGIS-Day-2021>

# DISCLAIMER

This is rather my personal journey.  
My goal is to give new users a working knowledge of QGIS.

So, this probably doesn't properly answer  
“what is QGIS” or “why do I need QGIS” or “how can I use QGIS” ?

For these questions, I recommend:  
GIS Stack Exchange <https://gis.stackexchange.com/>,  
QGIS tutorials <https://www.qgistutorials.com/> by Ujal Gandhi, and:



# Topics covered during the workshop



Historical background



Interface set-up



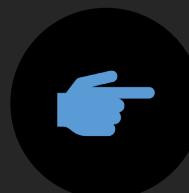
You will learn how to obtain, create, manipulate, edit geospatial data by series of tools and commands



An exercise will be done step by step, along with actual demonstration



The exercise will make you “connect” the theoretical part of GIS to its actual application



I will be using v.3.10, but all commands are present in all versions after v.2.14

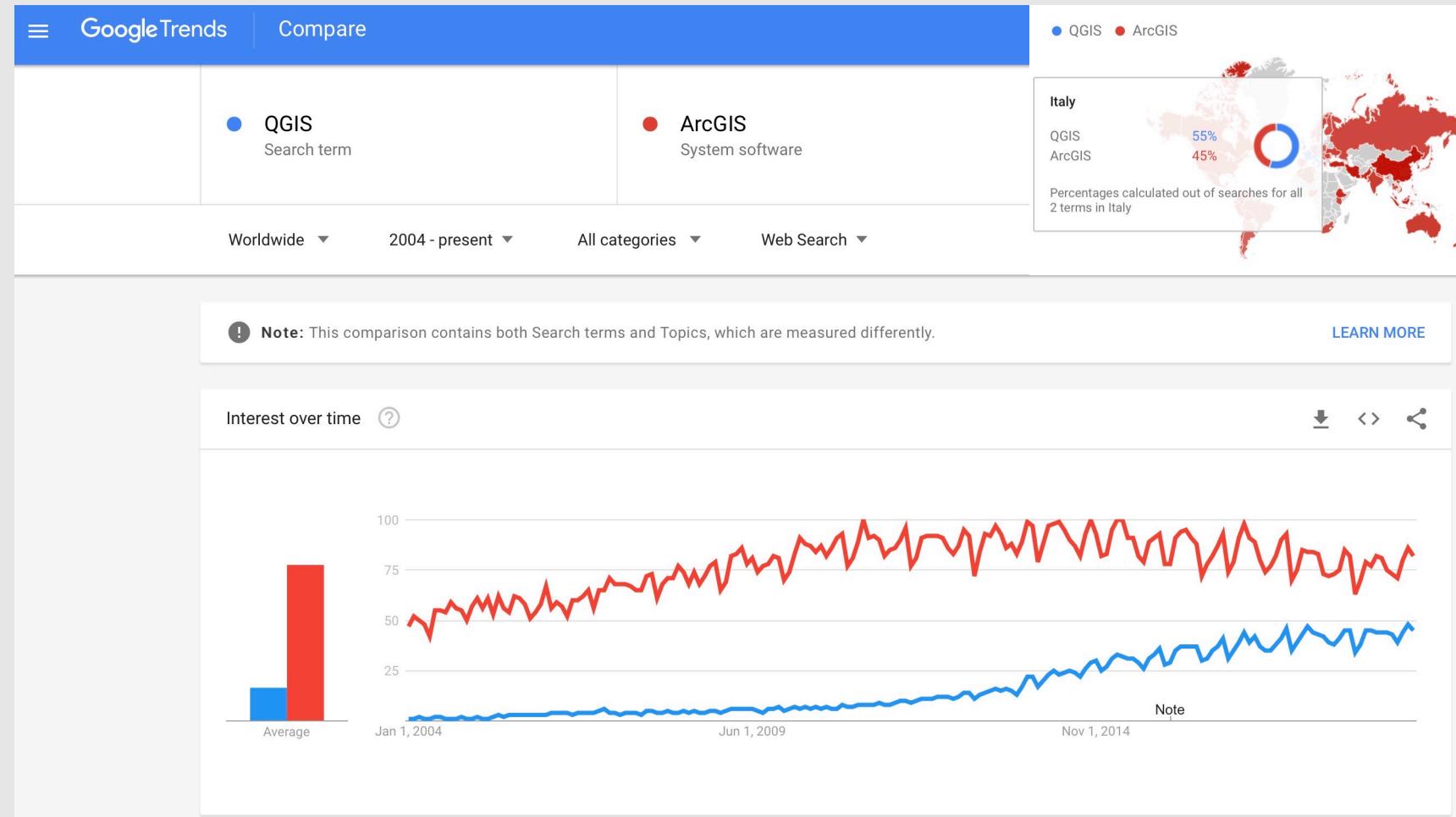
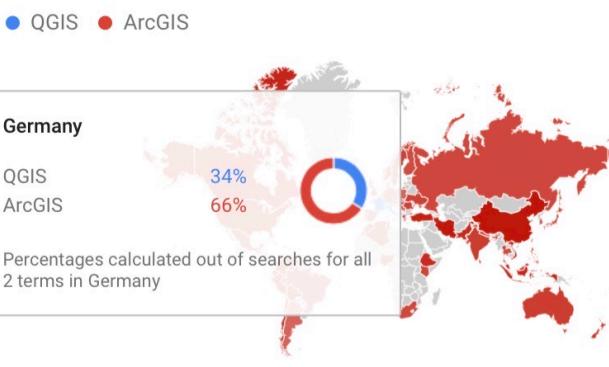
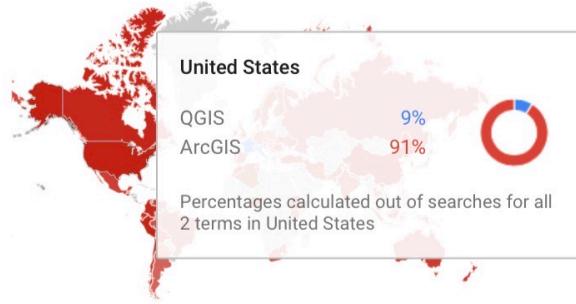
# A brief history ...

- Project began in 2002
- Before v.2 release it was known as Quantum GIS
- Small footprint (*easy to install, even on computers with **few** resources*)
- **64-bit (no limit of memory use)**
- Multi-operating systems: Windows, MacOS, Linux, & Android

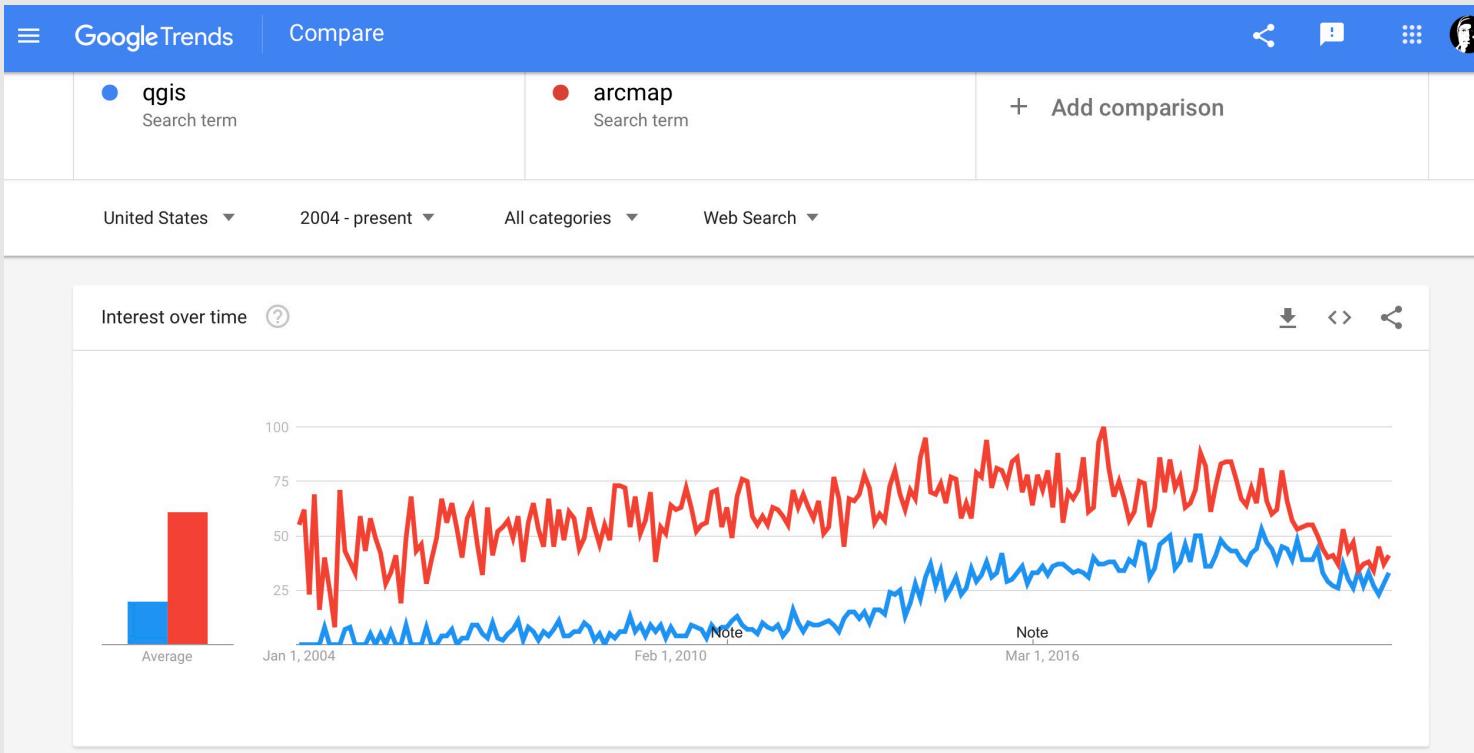


- **Open Source:** GNU General Public License “which guarantees end users (individuals, organizations, companies) the freedoms to use, study, share (copy), and modify the software (**no license harassment!**)

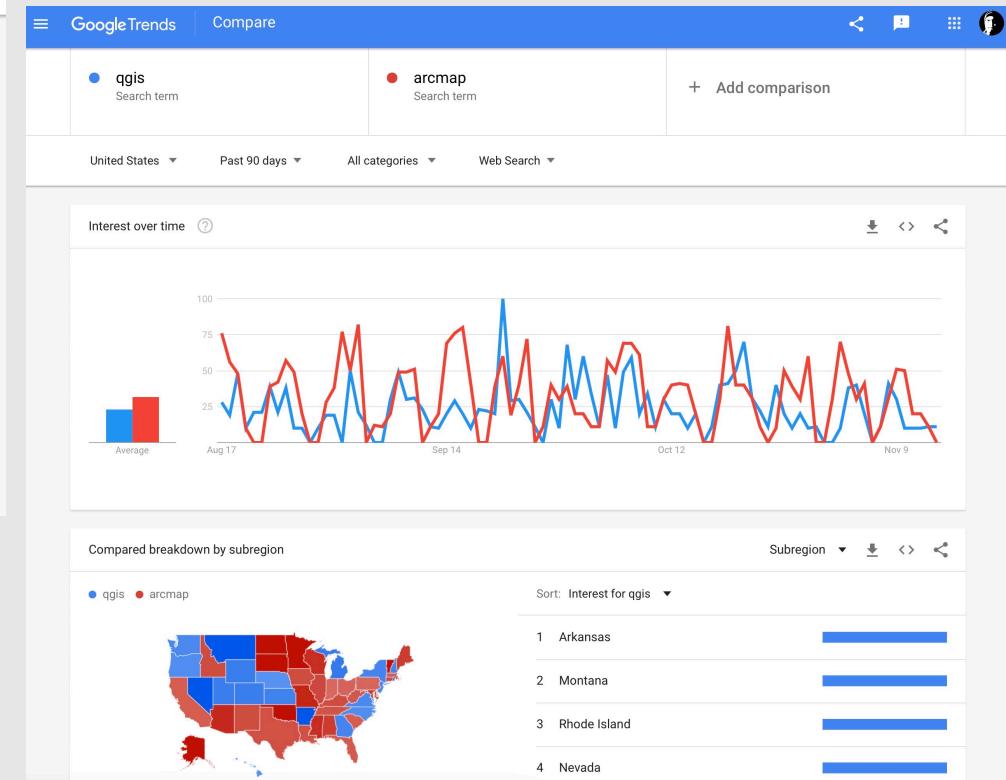
● QGIS ● ArcGIS



~ 2 years ago!



as of today!



# What does QGIS do?

- **View data:**
  - vector (gpkg, shp, MapInfo, SDTS, OGR, etc.)
  - raster (GeoTiff, IMG, ArcInfo Grid, JPEG, PNG, etc.)
  - GRASS data
  - online data served as web services (WMS, WMTS, WCS, WFS, etc.)
- **Explore data:**
  - browse [on-the-fly reprojections]
  - identify and selection tools
  - annotation and labeling
  - edit/view/search attributes
  - save and restore projects
- **Create, edit, manage, and export data:**
  - digitizing vector data
  - create and edit vector, raster, and GRASS data
  - georeferenced images and GPS data tools
  - visualize and download Open Street Map data
  - export to PostGIS, Spatialite Databases, and Atlas (digital and hard-copies)
- **Repeatability/reproducibility:**
  - batch processing made easy: model builder and batch process tool everywhere!

# Goals for today



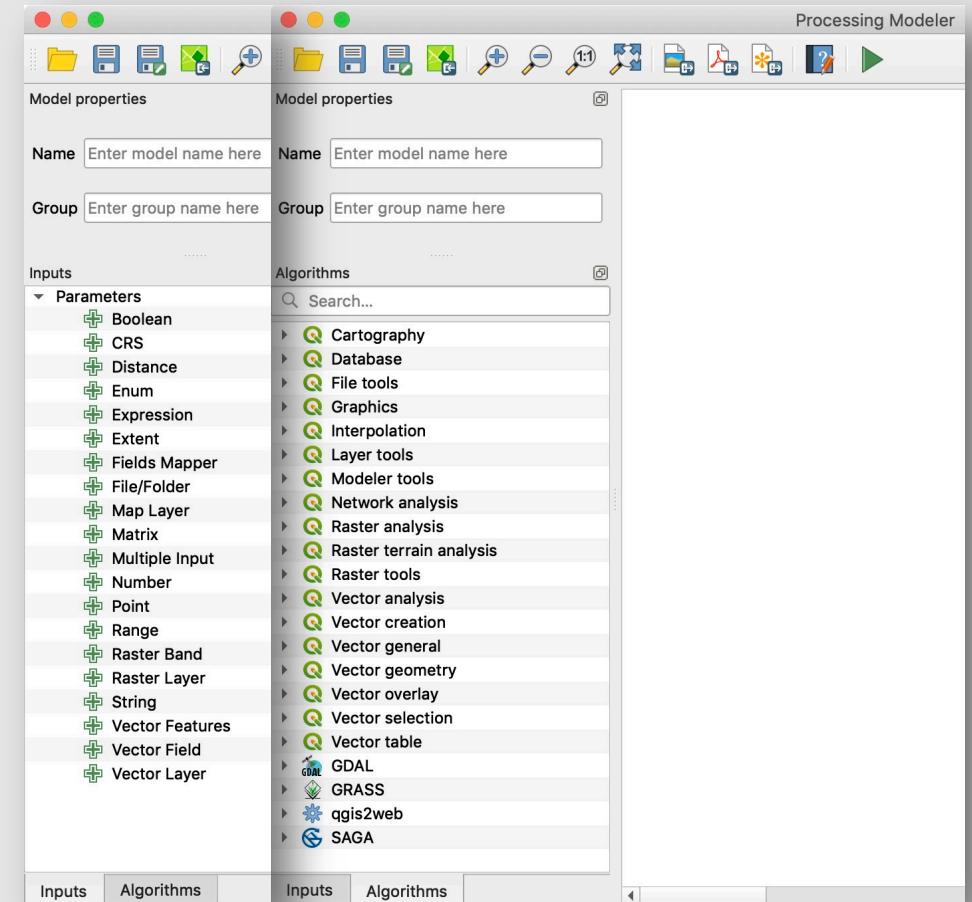
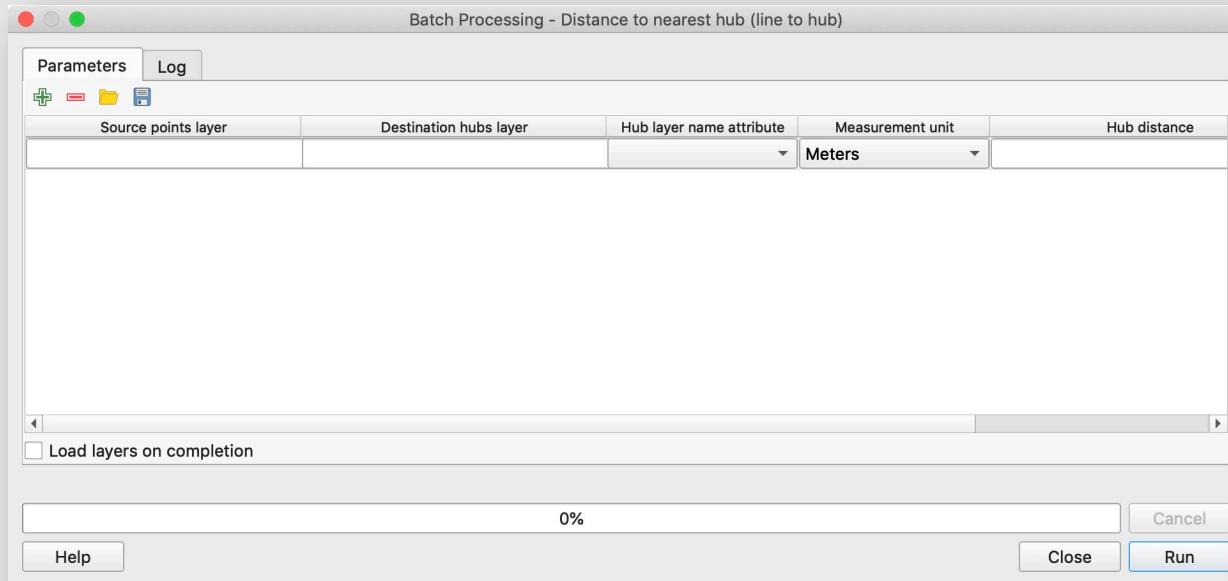
- Import data
- Symbolize it properly (a bit of cartography skills)
- Create bookmarks
- Practice different selection tools  
We'll check for parcel exposure to flood as a proxy to households in risk
- Compose a map that can be used in an atlas or report

# What's after today

- Although we only have time for a handful of operations, I hope that you now have sufficient familiarity with QGIS to explore it further on your own
- QGIS is constantly being developed. I suggest users periodically check for updates to the software, as new tools are often implemented, and processing and data management protocols are often improved
- Explore the **plug-ins** library!
- If you continue expanding your use of QGIS, you may wish to **script** your work for better reproducibility and documentation. **Python** is a common language used for scripting in QGIS. You can find more details on the web (e.g., [http://docs.qgis.org/testing/en/docs/pyqgis\\_developer\\_cookbook/intro.html](http://docs.qgis.org/testing/en/docs/pyqgis_developer_cookbook/intro.html))

# Explore

## Batch processing and Graphical modeler



# Because this workshop is a step-by-step process ...

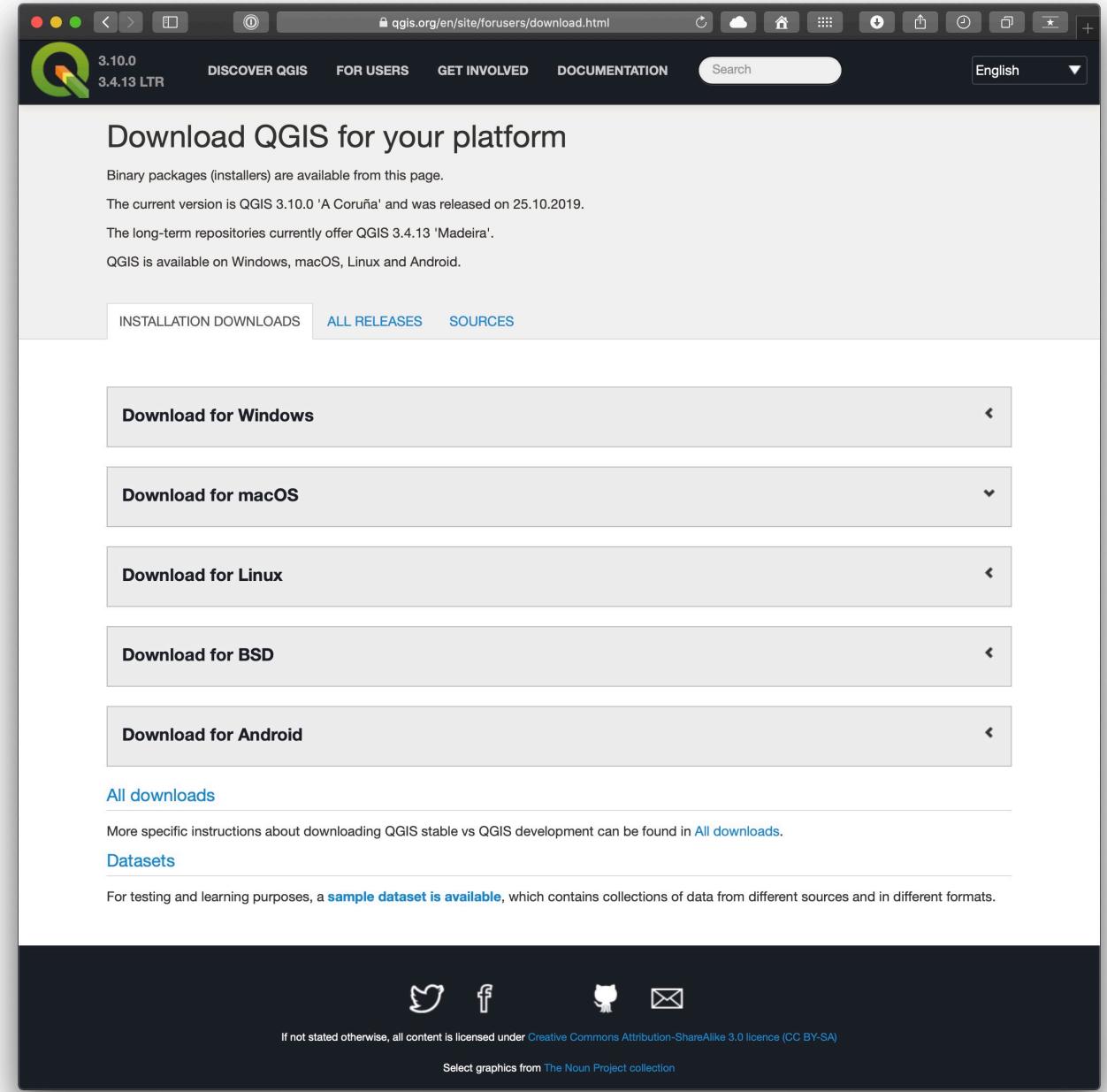
You need to do GIS!



- **G** - Give attention to details
- **I** - It's as easy as 1, 2, 3
- **S** - Stay focused but relaxed

# QGIS installation

QGIS after v3.4 will automatically  
install Python, GDAL, PROJ.4,  
and GRASS  
framework dependencies



The screenshot shows the QGIS download page at [qgis.org/en/site/forusers/download.html](https://qgis.org/en/site/forusers/download.html). The page header includes the QGIS logo, version information (3.10.0, 3.4.13 LTR), navigation links (Discover QGIS, For Users, Get Involved, Documentation), a search bar, and a language dropdown set to English. The main title is "Download QGIS for your platform". Below it, text indicates binary packages are available, the current version is QGIS 3.10.0 'A Coruña' (released 25.10.2019), and long-term repositories offer QGIS 3.4.13 'Madeira'. It also notes QGIS is available on Windows, macOS, Linux, and Android. A navigation bar below the title has tabs for "INSTALLATION DOWNLOADS" (which is selected), "ALL RELEASES", and "SOURCES". The main content area lists download links for various platforms: "Download for Windows", "Download for macOS", "Download for Linux", "Download for BSD", and "Download for Android". Below these, a link to "All downloads" and a note about stable vs development versions. A "Datasets" section links to a sample dataset. The footer contains social media icons for Twitter, Facebook, GitHub, and Email, and a copyright notice: "If not stated otherwise, all content is licensed under Creative Commons Attribution-ShareAlike 3.0 licence (CC BY-SA)". It also credits "Select graphics from The Noun Project collection".

# Interface



QGIS 3 Project Edit View Layer Settings Plugins Vector Raster Web Processing Window Help

Untitled Project - QGIS

Recent Projects

- Digitization\_QGIS\_v5a**  
/Users/alexander/Dropbox/Tamu/\_Graduate\_Assistance/\_CBSA\_Evacuation/GIS/Digitization\_QGIS\_v5a.qgz  
EPSG:2163 (US National Atlas Equal Area)
- DrPtest\_v4a**  
/Users/alexander/Dropbox/R/\_DrP\_test/DrPtest\_v4a.qgz  
EPSG:4326 (WGS 84)
- QGIS**  
/Users/alexander/Dropbox/R/\_DrP\_test/QGIS.qgz  
EPSG:3857 (WGS 84 / Pseudo-Mercator)
- DT\_sf**  
/Users/alexander/Dropbox/R/\_DrP\_test/DT\_sf.qgz  
EPSG:4326 (WGS 84)
- Digitization\_QGIS\_v4f**  
/Users/alexander/Dropbox/Tamu/\_Graduate\_Assistance/\_CBSA\_Evacuation/GIS/Digitization\_QGIS\_v4f.qgs  
EPSG:900913 (Google Maps Global Mercator)

Processing Toolbox

Panels

- Advanced Digitizing Panel
- Browser (2) Panel
- Browser Panel
- GPS Information Panel
- Layer Order Panel
- Layer Styling Panel
- Layers Panel
- Log Messages Panel
- Overview Panel
- Processing Toolbox Panel
- Results Viewer Panel
- Search QMS Panel
- Spatial Bookmarks Panel
- Statistics Panel
- Tile Scale Panel
- Undo/Redo Panel

Toolbars

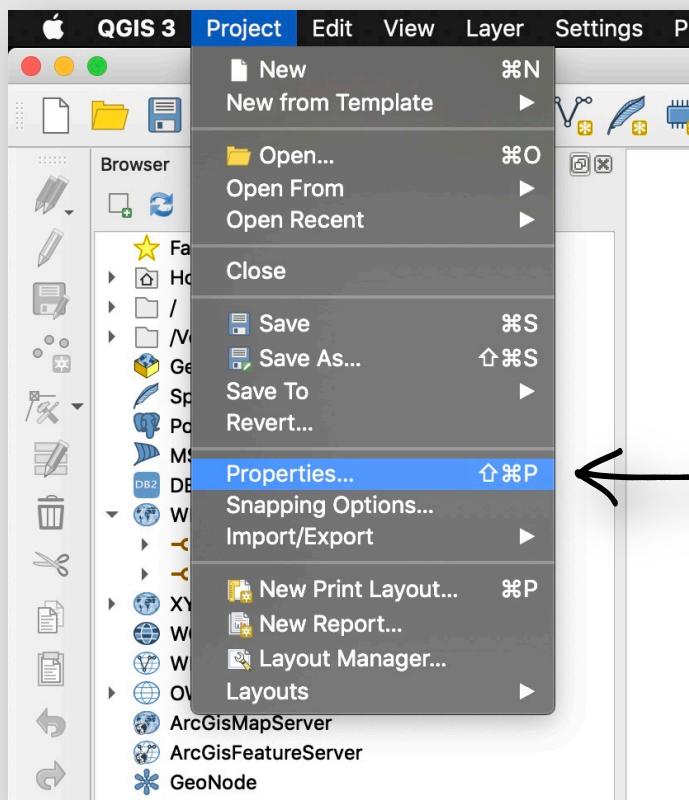
- Advanced Digitizing Toolbar
- Attributes Toolbar
- CartoLineGen
- Data Source Manager Toolbar
- Database Toolbar
- Digitizing Toolbar
- Help Toolbar
- Label Toolbar
- Manage Layers Toolbar
- Map Navigation Toolbar
- Plugins Toolbar
- Project Toolbar
- QuickOSM
- Raster Toolbar
- Shape Digitizing Toolbar
- Snapping Toolbar
- Vector Toolbar
- Web Toolbar

Browser Layers Spatial Bookmarks

Type to locate (%K) Ready

Coordinate Scale :44781436 Magnifier 100% Rotation 0.0° Render EPSG:4326

# Project set-up



The screenshot shows two overlapping dialog boxes: 'Project Properties | General' and 'Project Properties | CRS'.  
**General Settings:**

- Project file: [redacted]
- Project home: [redacted]
- Project title: [redacted]
- Selection color: Red
- Background color: [redacted]
- Save paths: relative
- Avoid artifacts when project is rendered as map tiles (degrades performance)

**Measurements:**

- Ellipsoid (for distance and area calculations): WGS 84
- Semi-major: 6378137
- Units for distance measurement: Meters
- Units for area measurement: Square meters

**Coordinate Display:**

- Display coordinates using: Map units (degrees)
- Precision: Automatic

  
**Project Properties | CRS:**

- Project Coordinate Reference System (CRS): US National Atlas Equal Area (EPSG:2163)
- Coordinate Reference Systems of the world:
  - Slovenia 1996 / Slovene National Grid (EPSG:3794)
  - TM65 / Irish National Grid (deprecated) (EPSG:29900)
  - Universal Transverse Mercator (UTM)
    - Grand Cayman National Grid 1959 (EPSG:6128)
    - Sister Islands National Grid 1961 (EPSG:6129)
- Selected CRS: WGS 84
- Datum Transformations:
  - Ask for datum transformation if several are available (defined in global setting)

**Relative paths!** (Text label with a hand icon pointing to the 'Save paths' dropdown in the General dialog.)

**Projection!** (Text label with a hand icon pointing to the 'Coordinate Reference System' section in the CRS dialog.)

# Projection

Map projections can be deceptive!

EPSG:4326 (WGS84/Mercator) x True size

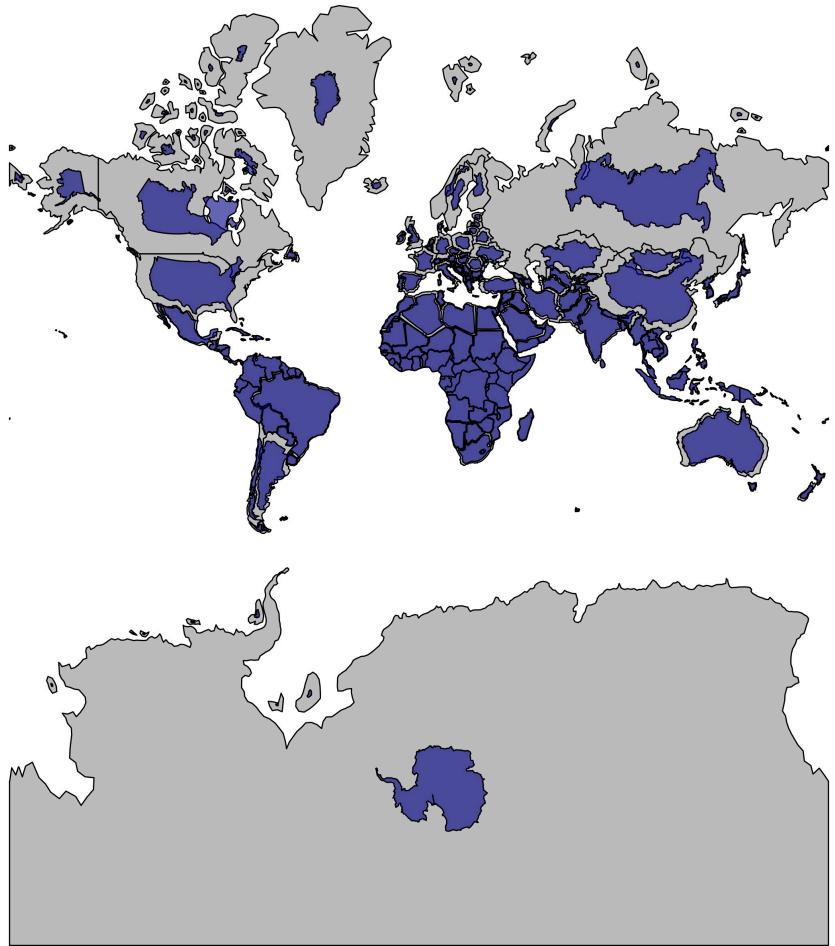
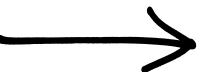
We will use:

Lambert Azimuthal Equal Area: US National Atlas EPSG:2163

<https://epsg.io/2163>

Source code can be found here:

<https://twitter.com/neilrkaye/status/1050722881657864192>



# Introduction for the practice

## Hazard risk investigation

- We will briefly analyze *parcel data* (dwelling lots) in the Brazos County to find ones in risk of inundation due to be in a flood risk area
- Annual chance is the flood that has an annual chance of being equaled or exceeded in any year

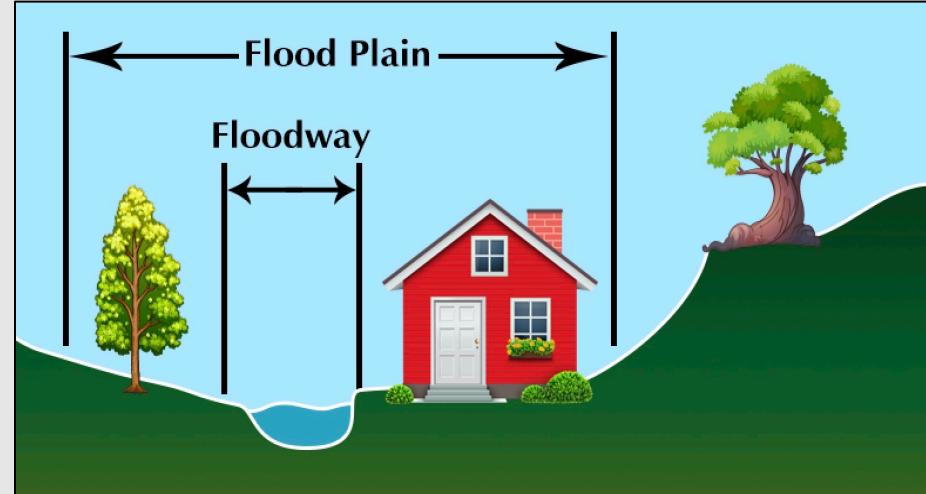
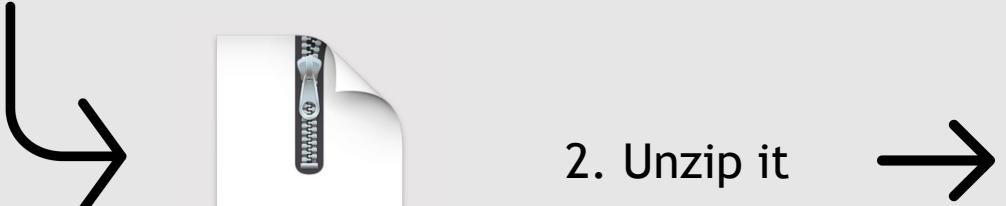


Image source: <http://www.sjra.net/about/facts/what-is-a-flood-plain/>

- The primary risk classifications we will used are:
  - the 1-percent-annual-chance flood event → 100-Year floodplain
  - the .2-percent-annual-chance flood event → 500-Year floodplain
  - and, areas of minimal flood risk → Out of the floodplain

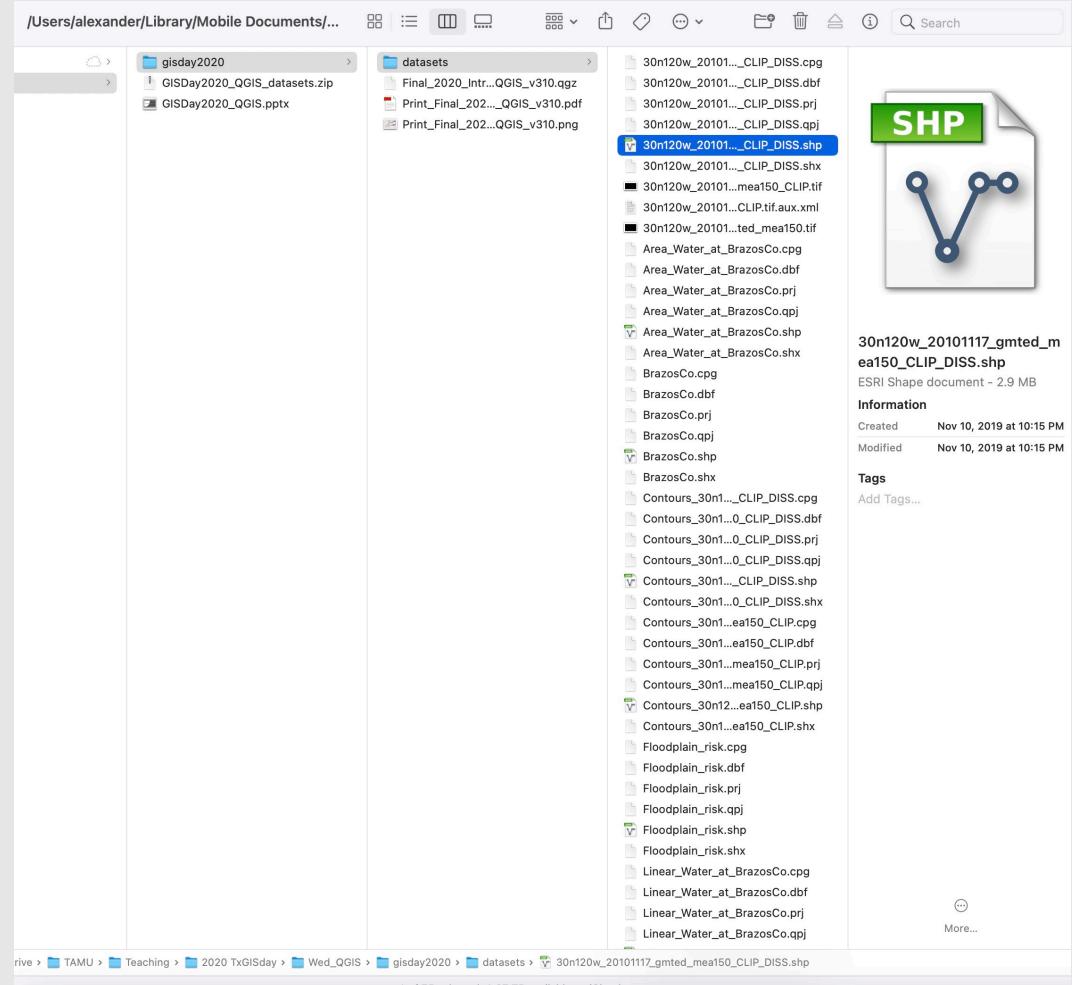
# Data acquisition

1. Download the **TxGISDay2021\_QGIS\_datasets.zip** at  
<https://github.com/abuabara/TxGIS-Day-2021>



2. Unzip it →

3. Save in a work folder.



PS. Source for the original datasets are in the last slide of the presentation!

# Shapefile format (vector)

“Shapefile” really is a set of files sharing a common *basename*.

The extension indicates which part of the information each file carries.

- .dbf (the data table part, editable in dBase, R, Stata, etc)

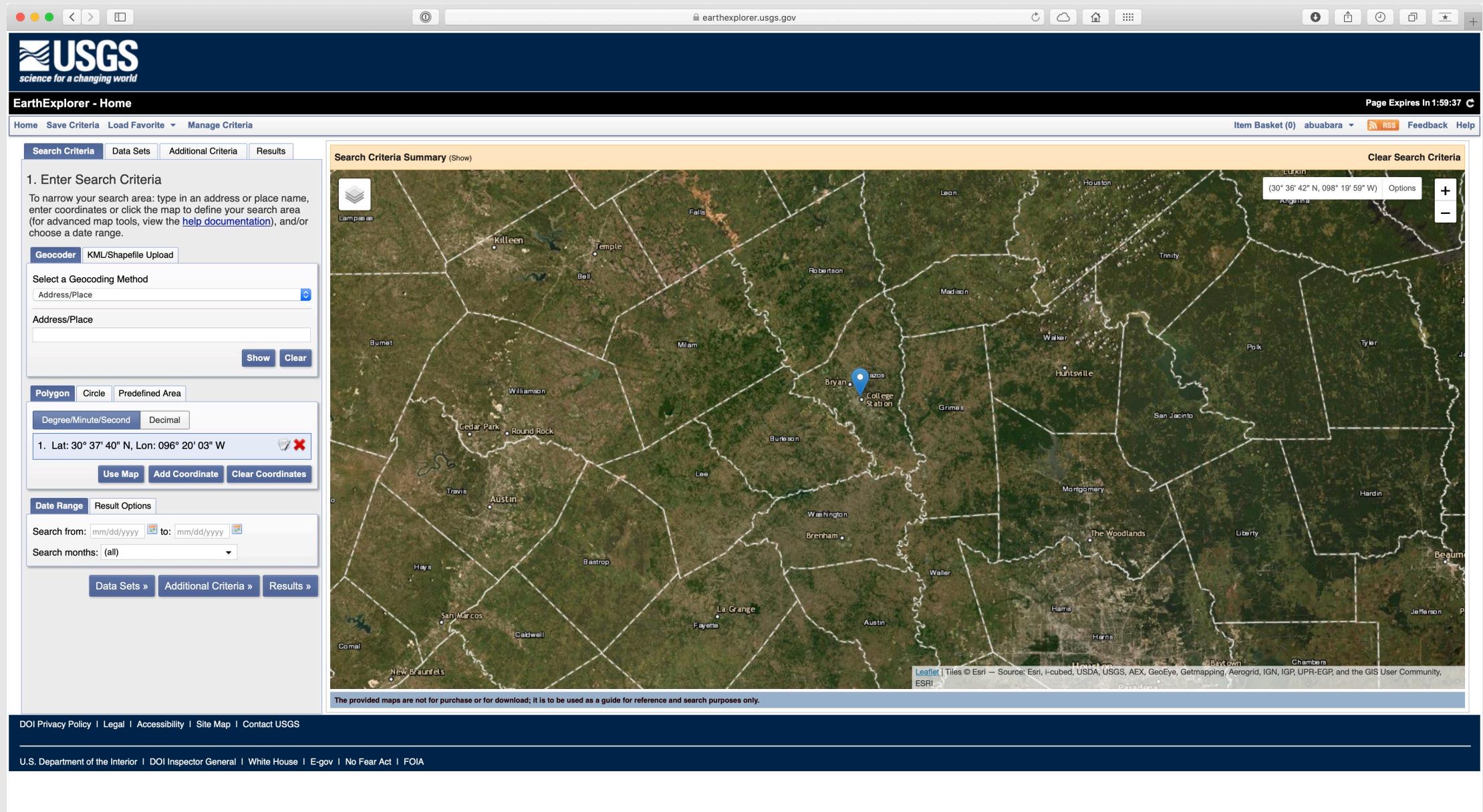
- .prj (the CRS i.e., map projection info)

- .shp (the geometric part)

- .shx (an index linking the dbf+shp parts)

# Raster format (image)

GIS data is commonly stored in a raster format to encode geographic data as the pixel values. Georeferencing information can also be associated with pixels!



USGS science for a changing world

EarthExplorer - Home

Home Save Criteria Load Favorite Manage Criteria

Page Expires In 1:59:50 C

Item Basket (0) abuabara RSS Feedback Help

Search Criteria Data Sets Additional Criteria Results

2. Select Your Data Set(s)

Check the boxes for the data set(s) you want to search. When done selecting data set(s), click the Additional Criteria or Results button below. Click the plus sign next to the category name to show a list of data sets.

Use Data Set Prefilter ([What's This?](#))

Data Set Search:

Aerial Imagery

AVHRR

CEOS Legacy

Commercial Satellites

Declassified Data

Digital Elevation

- CONED TBDEM
- EDNA
- GMTED2010
- GTOPO30
- GTOPO30 HYDRO 1K
- IFSAR Alaska

SRTM

Digital Line Graphs

Digital Maps

EO-1

Global Fiducials

HCMM

ISERV

Land Cover

Landsat

Clear All Selected Additional Criteria » Results »

Search Criteria Summary (Show)

Clear Search Criteria

(29° 51' 00" N, 098° 21' 08" W) Options + -

Map showing satellite imagery of the Texas region, centered around Bryan-College Station. Labeled cities include Killeen, Temple, Bell, Falls, Robertson, Madison, Houston, Milam, Brazos, College Station, Grimes, Bryan, Lee, Burleson, Washington, Brenham, Waller, Austin, San Marcos, Cedar Park, Round Rock, Travis, Bastrop, La Grange, Fayette, and New Braunfels. A zoomed-in view of the Bryan-College Station area is shown in the foreground.

The provided maps are not for purchase or for download; it is to be used as a guide for reference and search purposes only.

Download Options

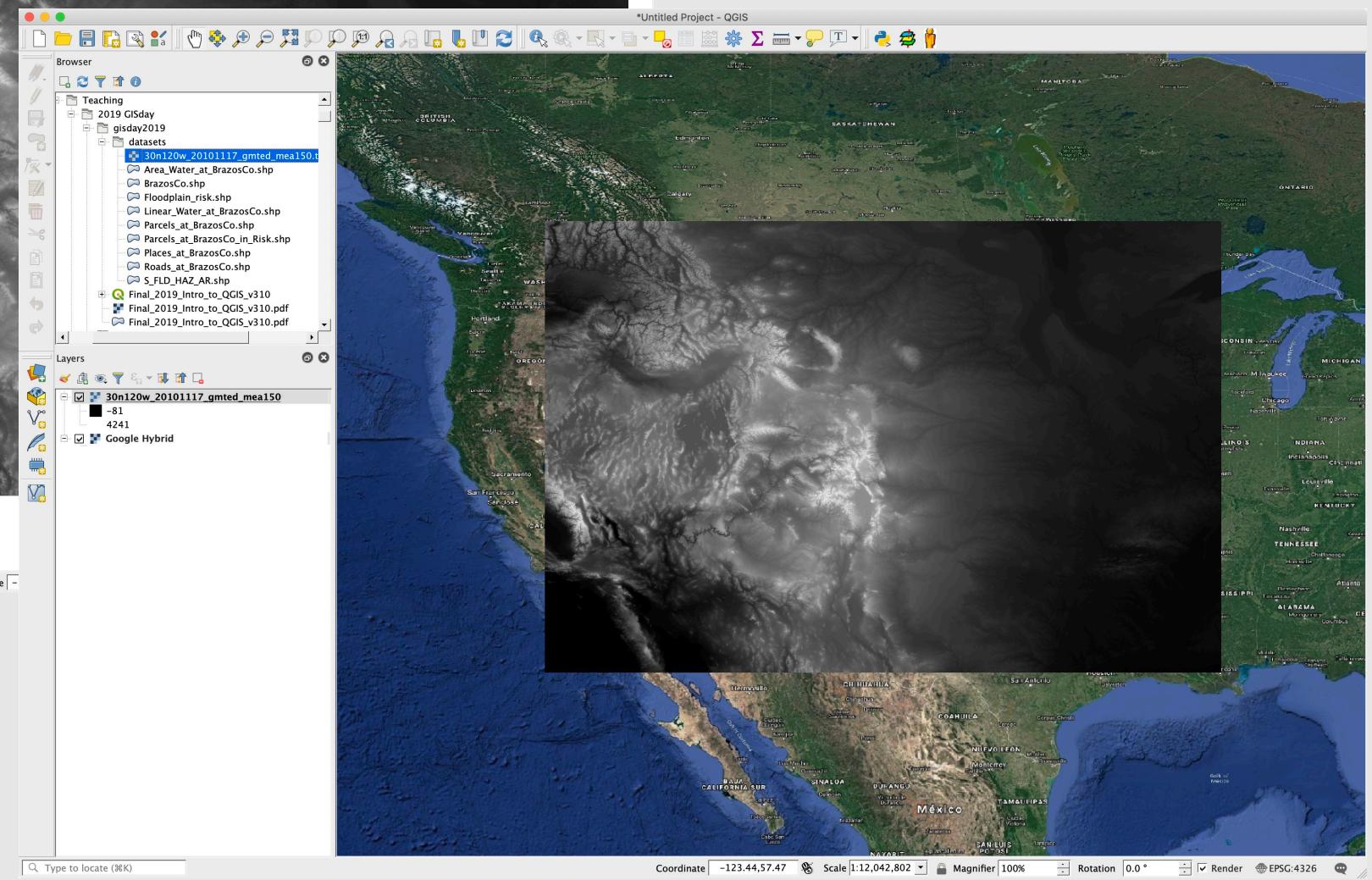
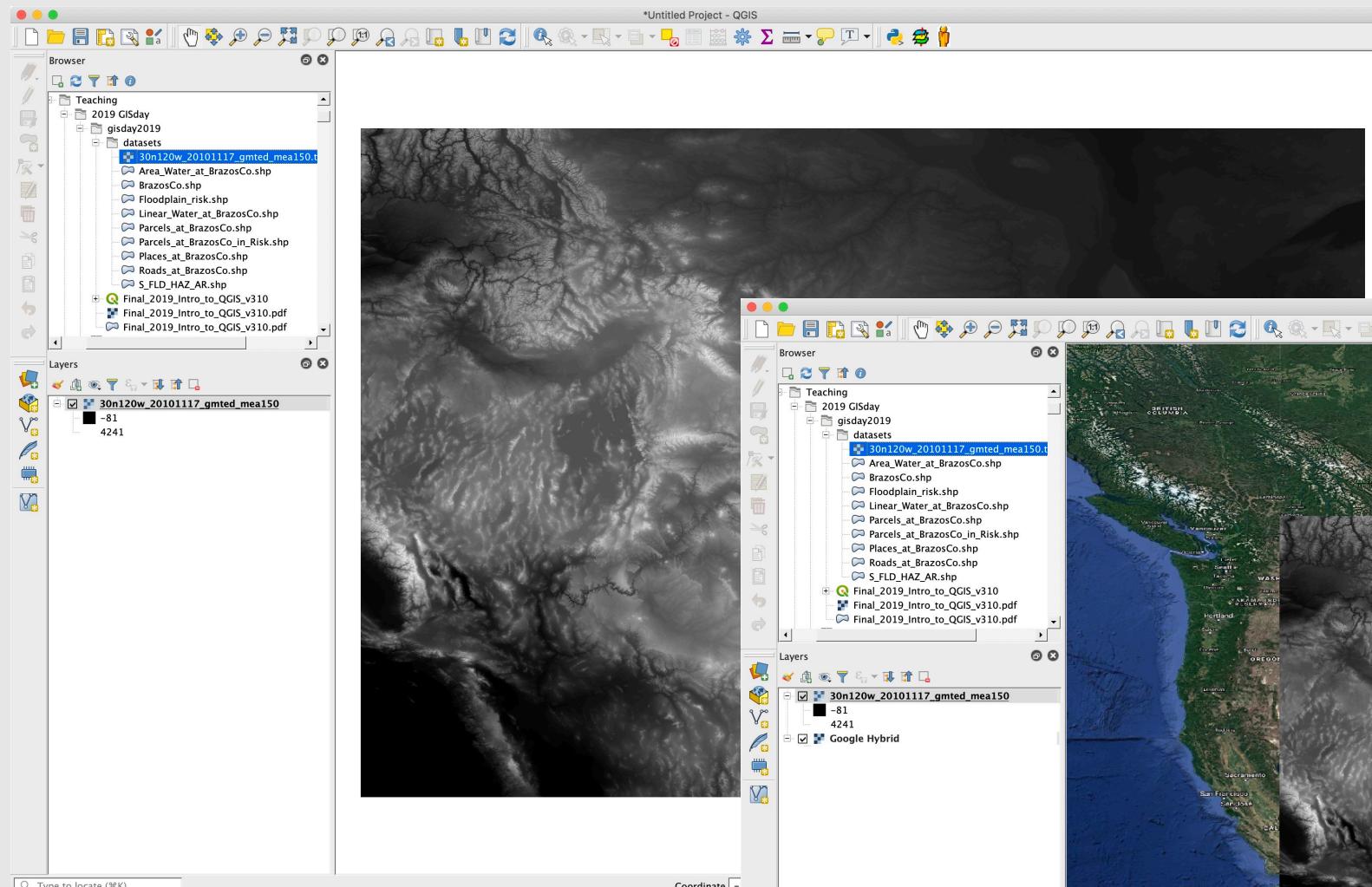
**Download** 7.5 ARC SEC (984.6 MB)

**Download** 15 ARC SEC (225.1 MB)

**Download** 30 ARC SEC (71.4 MB)

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Raster Calculator...

Align Rasters...

Analysis

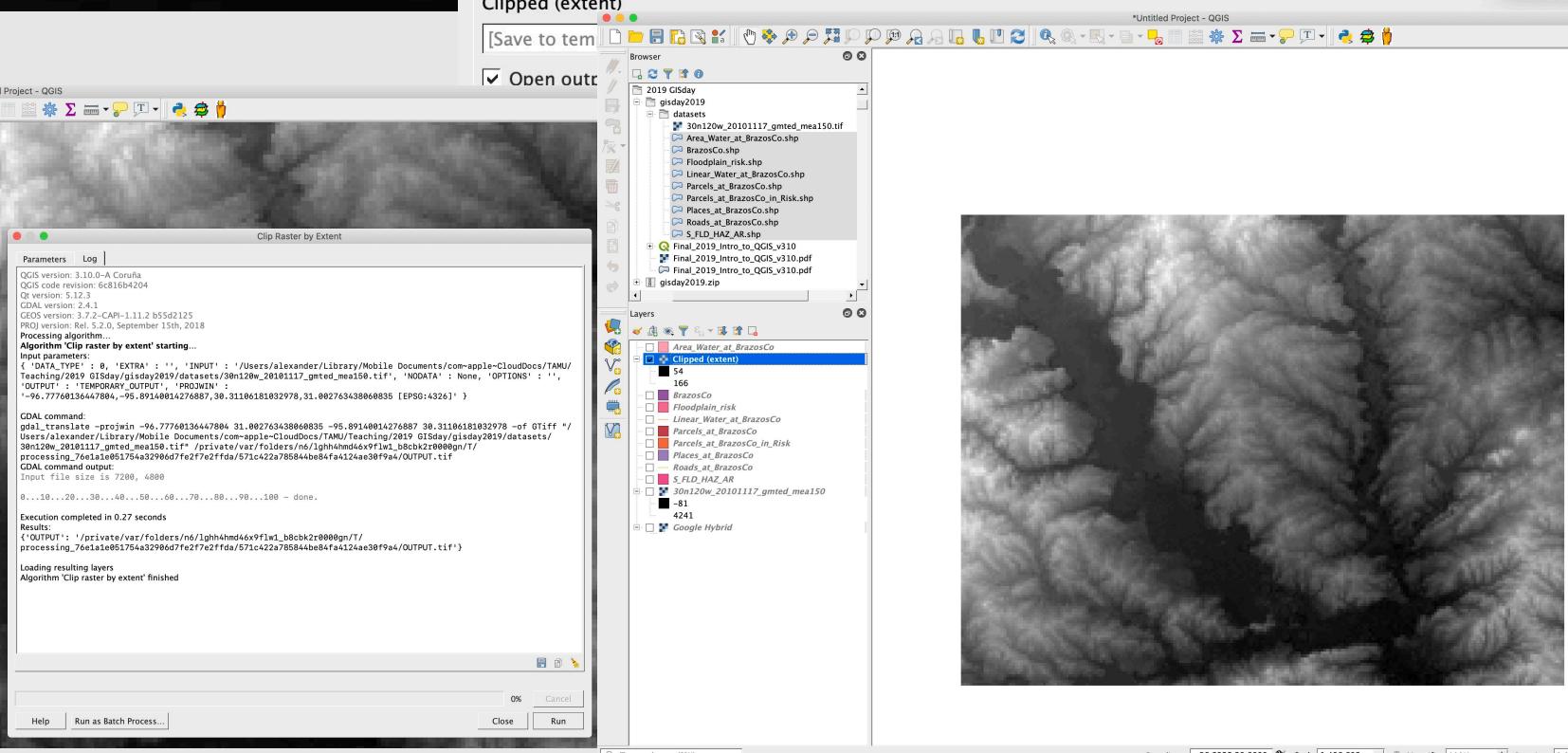
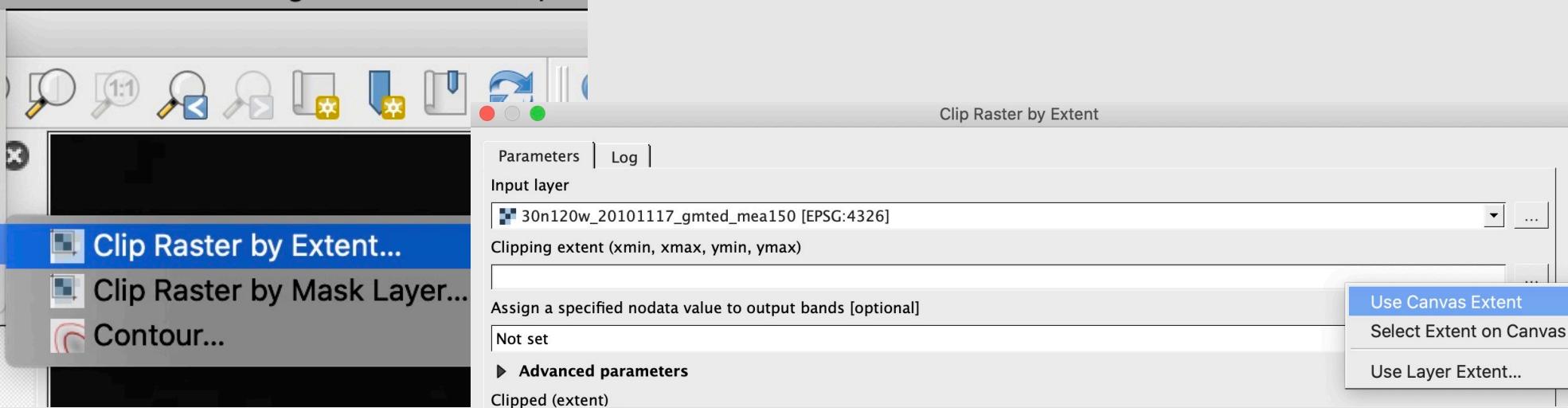
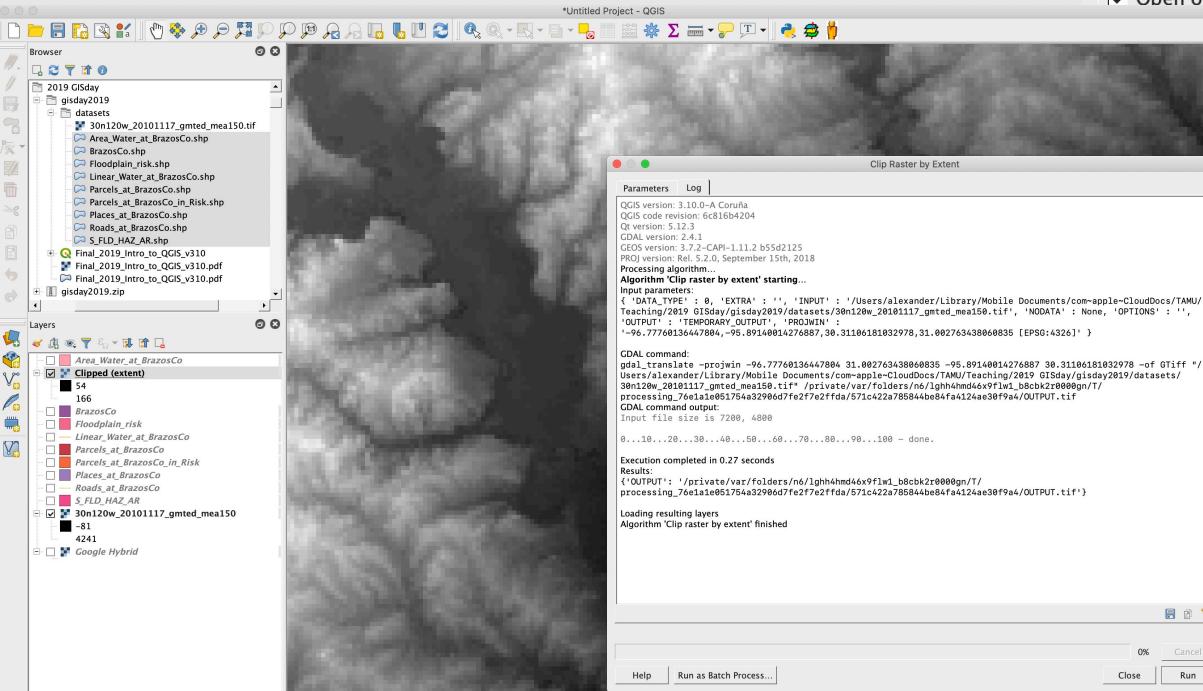
Projections

Miscellaneous

Extraction

Conversion

0101117\_gmted\_mea150.tif



Settings Plugins Vector Raster Database Web Mesh Processing Window Help

\*Untitled Project - QGIS

Raster Calculator... Align Rasters... Analysis Projections Miscellaneous Extraction Conversion Contour...

**Extraction**

Clip Raster by Extent... Clip Raster by Mask Layer... Contour...

Browser

2019 GISday gisday2019 datasets 30n120w\_20101117\_gmted\_mea150.tif Area\_Water\_at\_BrazosCo.shp BrazosCo.shp Floodplain\_risk.shp Linear\_Water\_at\_BrazosCo.shp Parcels\_at\_BrazosCo.shp Parcels\_at\_BrazosCo\_in\_Risk.shp Places\_at\_BrazosCo.shp Roads\_at\_BrazosCo.shp S\_FLD\_HAZ\_AR.shp Final\_2019\_Intro\_to\_QGIS\_v310 Final\_2019\_Intro\_to\_QGIS\_v310.pdf Final\_2019\_Intro\_to\_QGIS\_v310.zip

Layers

Area\_Water\_at\_BrazosCo Clipped (extent) 54 166 BrazosCo Floodplain\_risk Linear\_Water\_at\_BrazosCo Parcels\_at\_BrazosCo Parcels\_at\_BrazosCo\_in\_Risk Places\_at\_BrazosCo Roads\_at\_BrazosCo S\_FLD\_HAZ\_AR 30n120w\_20101117\_gmted\_mea150 -81 4241 Google Hybrid



Contour

Parameters Log

**Input layer** Clipped (extent) [EPSG:4326]

**Band number** Band 1 (Gray)

**Interval between contour lines** 1

Attribute name (if not set, no elevation attribute is attached) [optional] ELEV

Offset from zero relative to which to interpret intervals [optional] 0.000000

**Advanced parameters**

**Contours** [Save to temporary file]

Open output file after running algorithm

**GDAL/OGR console call**

```
gdal_contour -b 1 -a ELEV -i 1.0 -f "GPKG" /private/var/folders/n6/lghh4hmd46x9flw1_b8cbk2r0000gn/T/processing_76e1a1e051754a32906d7fe2f7e2ffda/571c422a785844be84fa4124ae30f9a4/OUTPUT.tif /private/var/folders/n6/lghh4hmd46x9flw1_b8cbk2r0000gn/T/processing_76e1a1e051754a32906d7fe2f7e2ffda/c9d821561f4f4624954c70d95e9b53e7/OUTPUT.gpkg
```

Help Run as Batch Process... Close Run

Layer Properties - Contours | Symbology

Categorized

Value: 1.2 ELEV

Symbol:

Color ramp:

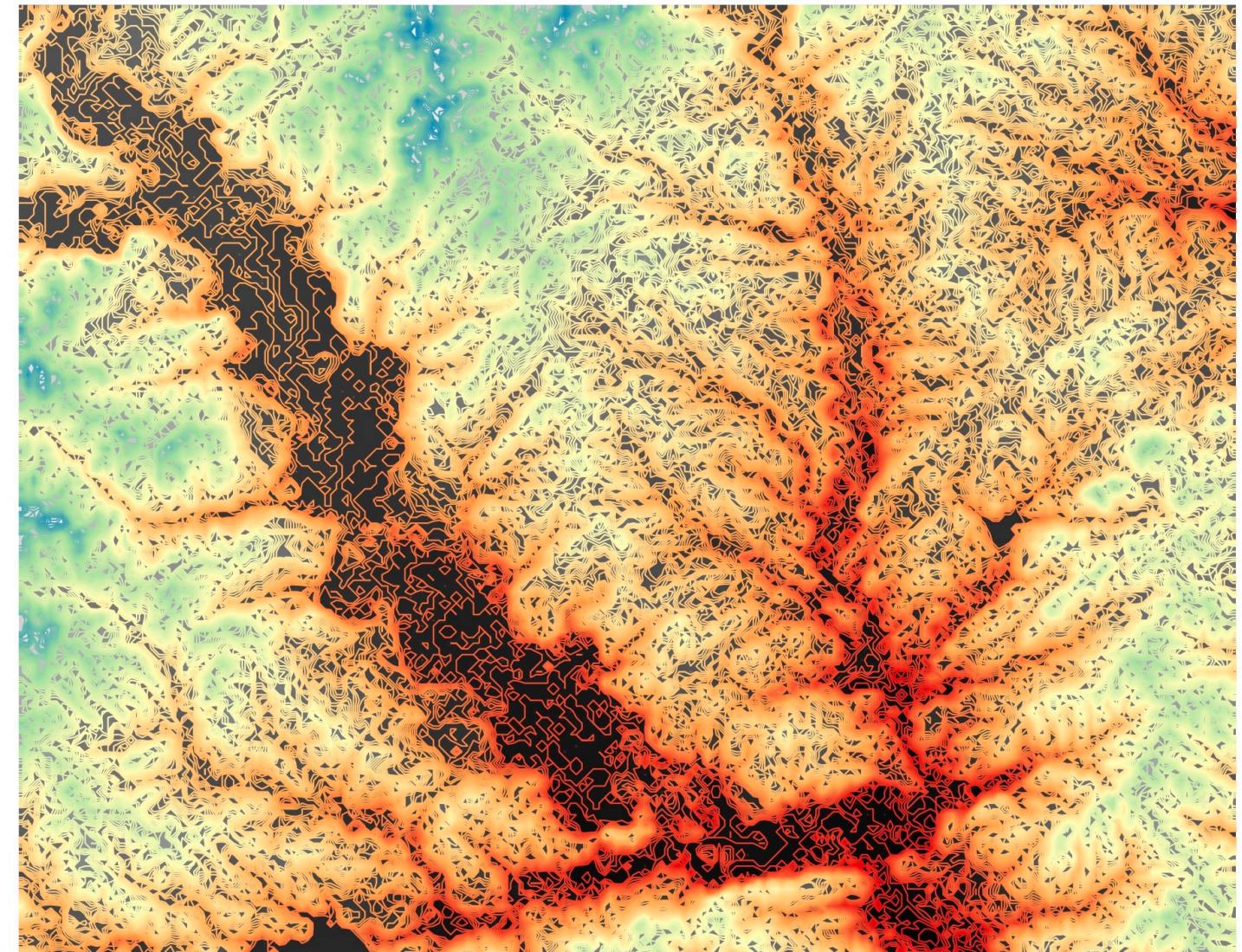
| Symbol                                | Value       | Legend |
|---------------------------------------|-------------|--------|
| <input checked="" type="checkbox"/> — | all othe... |        |
| <input checked="" type="checkbox"/> — | 55          | 55     |
| <input checked="" type="checkbox"/> — | 56          | 56     |
| <input checked="" type="checkbox"/> — | 57          | 57     |
| <input checked="" type="checkbox"/> — | 58          | 58     |
| <input checked="" type="checkbox"/> — | 59          | 59     |
| <input checked="" type="checkbox"/> — | 60          | 60     |
| <input checked="" type="checkbox"/> — | 61          | 61     |
| <input checked="" type="checkbox"/> — | 62          | 62     |
| <input checked="" type="checkbox"/> — | 63          | 63     |
| <input checked="" type="checkbox"/> — | 64          | 64     |
| <input checked="" type="checkbox"/> — | 65          | 65     |
| <input checked="" type="checkbox"/> — | 66          | 66     |
| <input checked="" type="checkbox"/> — | 67          | 67     |
| <input checked="" type="checkbox"/> — | 68          | 68     |
| <input checked="" type="checkbox"/> — | 69          | 69     |
| <input checked="" type="checkbox"/> — | 70          | 70     |
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| <input checked="" type="checkbox"/> — | 77          | 77     |
| <input checked="" type="checkbox"/> — | 78          | 78     |
| <input checked="" type="checkbox"/> — | 79          | 79     |
| <input checked="" type="checkbox"/> — | 80          | 80     |
| <input checked="" type="checkbox"/> — | 81          | 81     |
| <input checked="" type="checkbox"/> — | 82          | 82     |
| <input checked="" type="checkbox"/> — | 83          | 83     |
| <input checked="" type="checkbox"/> — | 84          | 84     |
| <input checked="" type="checkbox"/> — | 85          | 85     |
| <input checked="" type="checkbox"/> — | 86          | 86     |
| <input checked="" type="checkbox"/> — | 87          | 87     |
| <input checked="" type="checkbox"/> — | 88          | 88     |
| <input checked="" type="checkbox"/> — | 89          | 89     |
| <input checked="" type="checkbox"/> — | 90          | 90     |
| <input checked="" type="checkbox"/> — | 91          | 91     |
| <input checked="" type="checkbox"/> — | 92          | 92     |

Classify   Delete All

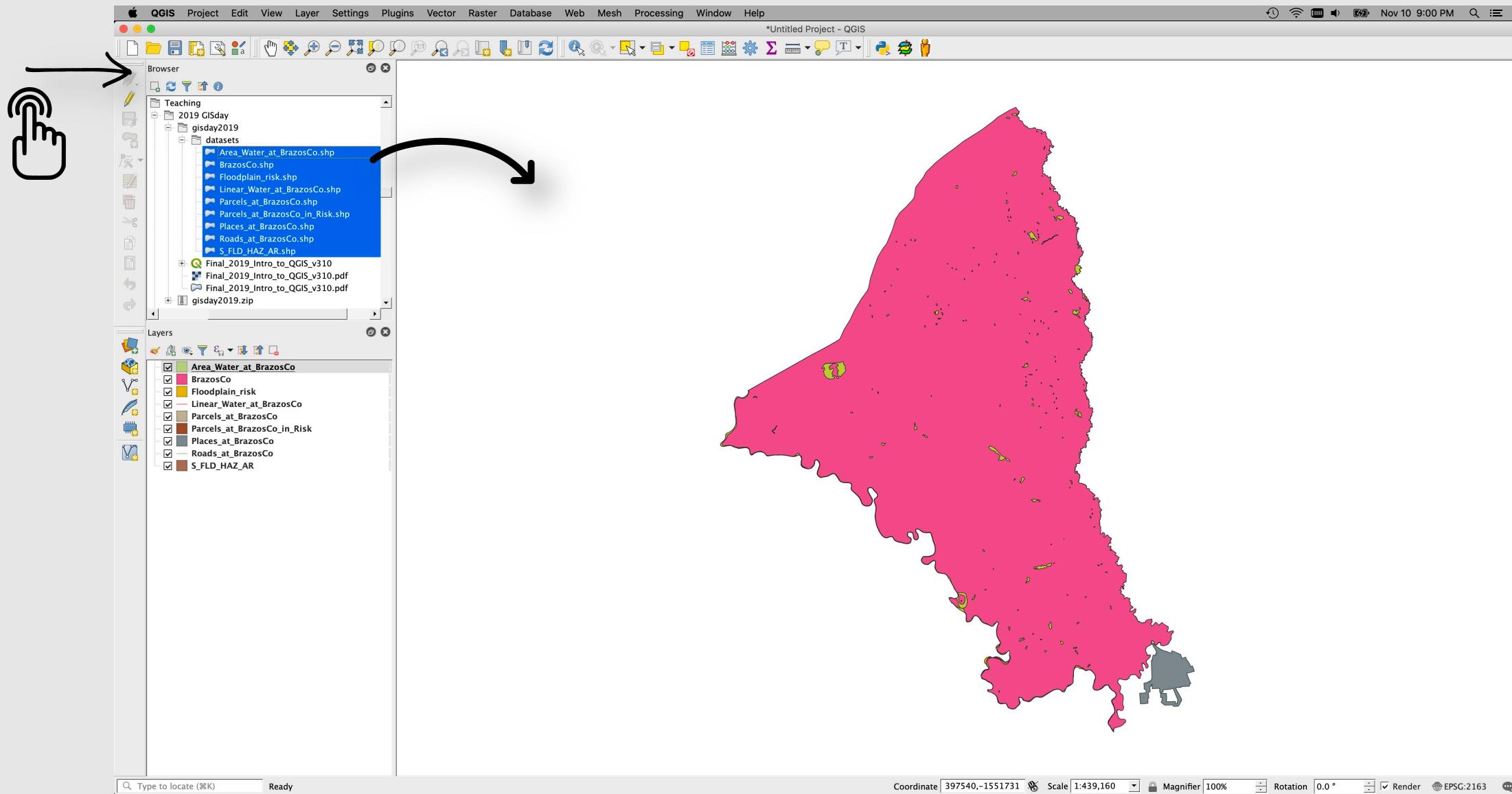
Layer Rendering

Help Style Apply

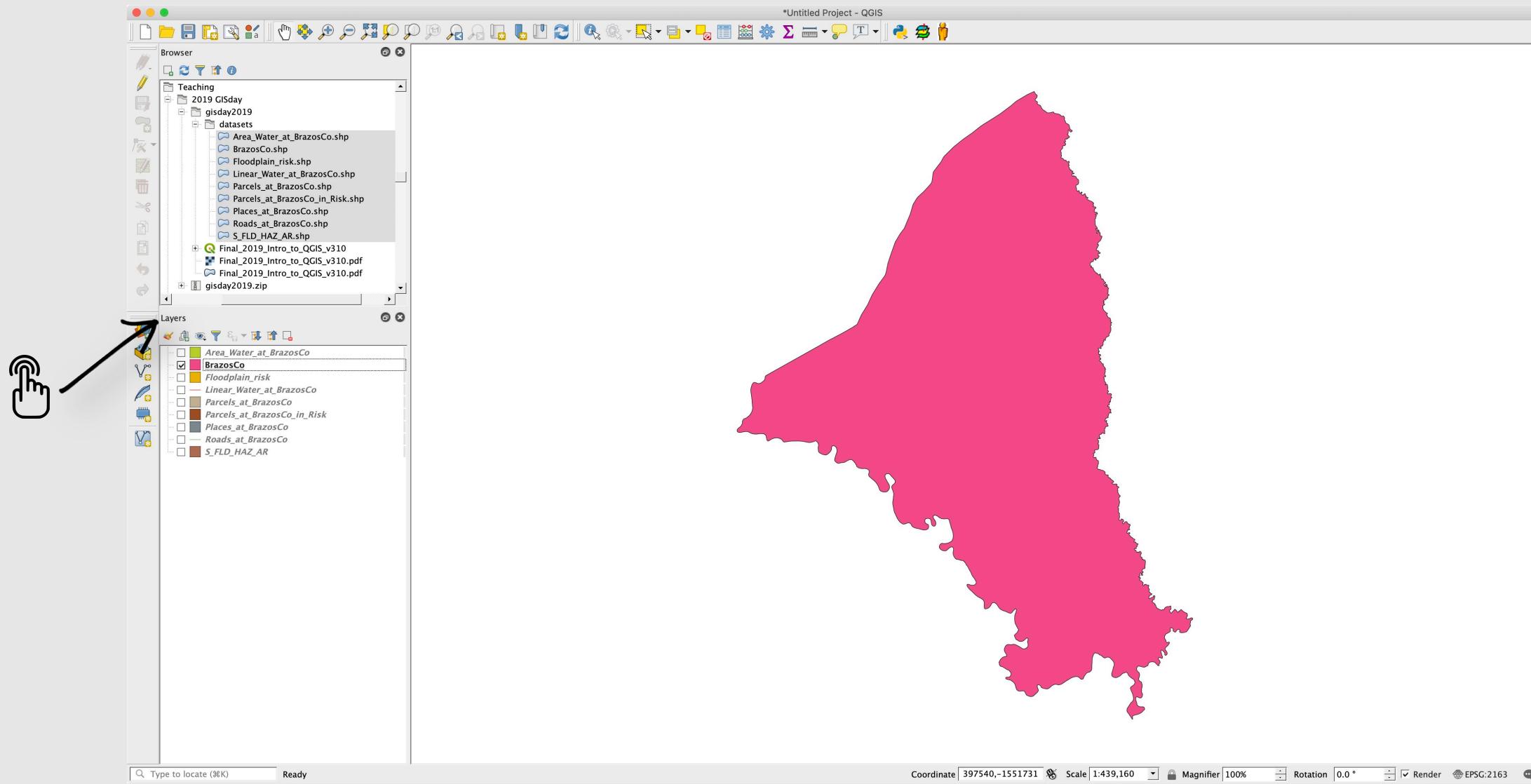
Cancel



# Importing data (colors will vary!)

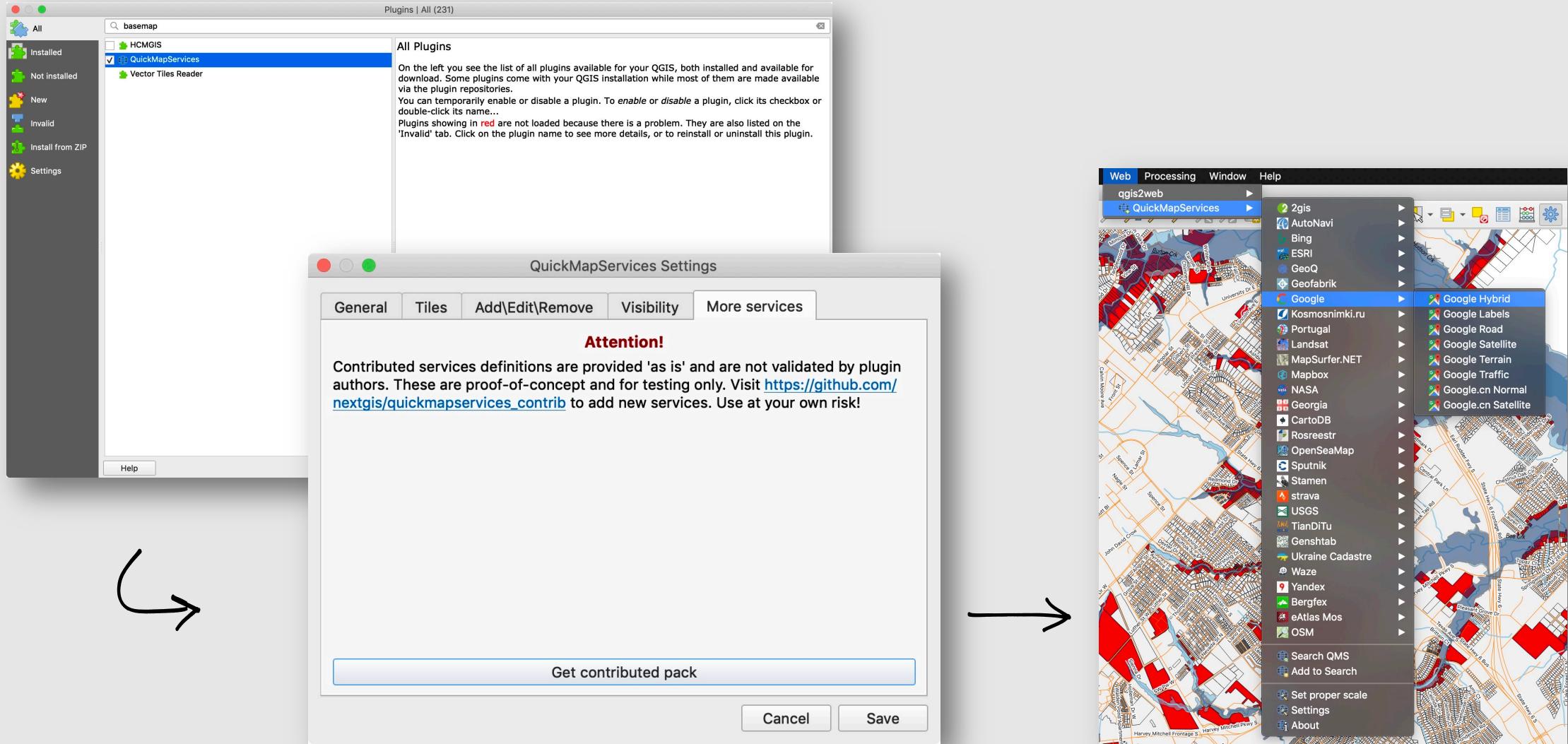


# Importing data (colors will vary!)



# Extra hint

- Install plugins! search *basemaps* to include one basemap in your project



# Let's practice ...

- Turn layers off
- Configure layers and labels
  - Style: simple fill, categorize, lines
  - Labels: change font, size, buffer, position
- Reorder and rename layers
- Try different zooms
  - Zoom to layer
  - Back
  - Bookmark



| Name           | Add bookmark | object                     | xM  | yM |
|----------------|--------------|----------------------------|-----|----|
| Block_sample_1 |              | BN_v2.qgz                  | -10 | 10 |
| Block_sample_2 |              | BN_v2.qgz                  | -10 | 10 |
| Brazos         |              | Digitization_QGIS_v3.qgs   | -9  | 10 |
| Butler Ridge   |              | Digitization_QGIS_v3.qgs   | -9  | 10 |
| CBSA           |              | Digitization_QGIS_v3.qgs   | -9  | 10 |
| m_counties     |              | QGIS_visualization_v1.q... | -10 | 10 |
| MH dots sample |              | DrPtest_v4a.qgz            | -9  | 10 |
| Nueces         |              | Digitization_QGIS_v3.qgs   | -9  | 10 |
| Valley         |              | QGIS_visualization_v1.q... | -9  | 10 |
| Willacy        |              | QGIS_visualization_v2.q... | 19  | 10 |



The image displays two 'Layer Properties' dialog boxes in QGIS:

- Layer Properties - BrazosCo | Symbology**: Shows the 'Single symbol' tab with a 'Fill' section. The 'Symbol layer type' is set to 'Simple fill'. The 'Fill color' is a light gray gradient, 'Fill style' is 'Solid', 'Stroke color' is red, 'Stroke width' is 'Hairline' (1 Millimeter), 'Stroke style' is 'Dash Line', 'Join style' is 'Bevel', and 'Offset' is 0.000000.
- Layer Properties - Roads\_at\_BrazosCo | Labels**: Shows the 'Single labels' tab. The 'Label with' field is set to 'abc FULLNAME'. The 'Text Sample' shows 'Lorem ipsum'. The 'Text' section includes 'Font' (Acme), 'Style' (Regular), 'Size' (70000), 'Color' (black), 'Opacity' (100.0%), 'Type case' (No change), 'Spacing' (letter 0.0000, word 0.0000), and 'Blend mode' (Normal). The 'Formatting' section includes 'Buffer' (checked), 'Background' (red), 'Shadow' (checked), and 'Placement' (checked).

# Create a new field, and calculate it

- Let's work just with the **flood layer** now
- Explore the attribute table
- Open field calculator
  - Create a new field**
  - Attention: "String"

The screenshot shows the QGIS interface with the attribute table for the 'S\_FLD\_HAZ\_AR' layer. The table includes columns like DFIRM\_ID, VERSION\_ID, FLD\_AR\_ID, STUDY\_TYP, FLD\_ZONE, ZONE\_SUBTY, SFHA\_TF, SOURCE\_CIT, New\_code, and Floodplain. A cursor points to the 'Floodplain' column header. Below the table is the 'Field Calculator' dialog. The 'Create a new field' checkbox is checked, and the output field name is 'Floodplain', with a text type and length of 10. The expression editor contains the following code:

```
CASE
WHEN "FLD_ZONE" = 'A' THEN '100Yr'
WHEN "FLD_ZONE" = 'AE' THEN '100Yr'
WHEN "FLD_ZONE" = 'X' THEN CASE
    WHEN "ZONE_SUBTY" = '1 PCT FUTURE CONDITIONS' THEN '100Yr'
    WHEN "ZONE_SUBTY" = '0.2 PCT ANNUAL CHANCE FLOOD HAZARD' THEN '500Yr'
    WHEN "ZONE_SUBTY" = 'AREA OF MINIMAL FLOOD HAZARD' THEN 'Out'
END
ELSE 'problem'
END
```

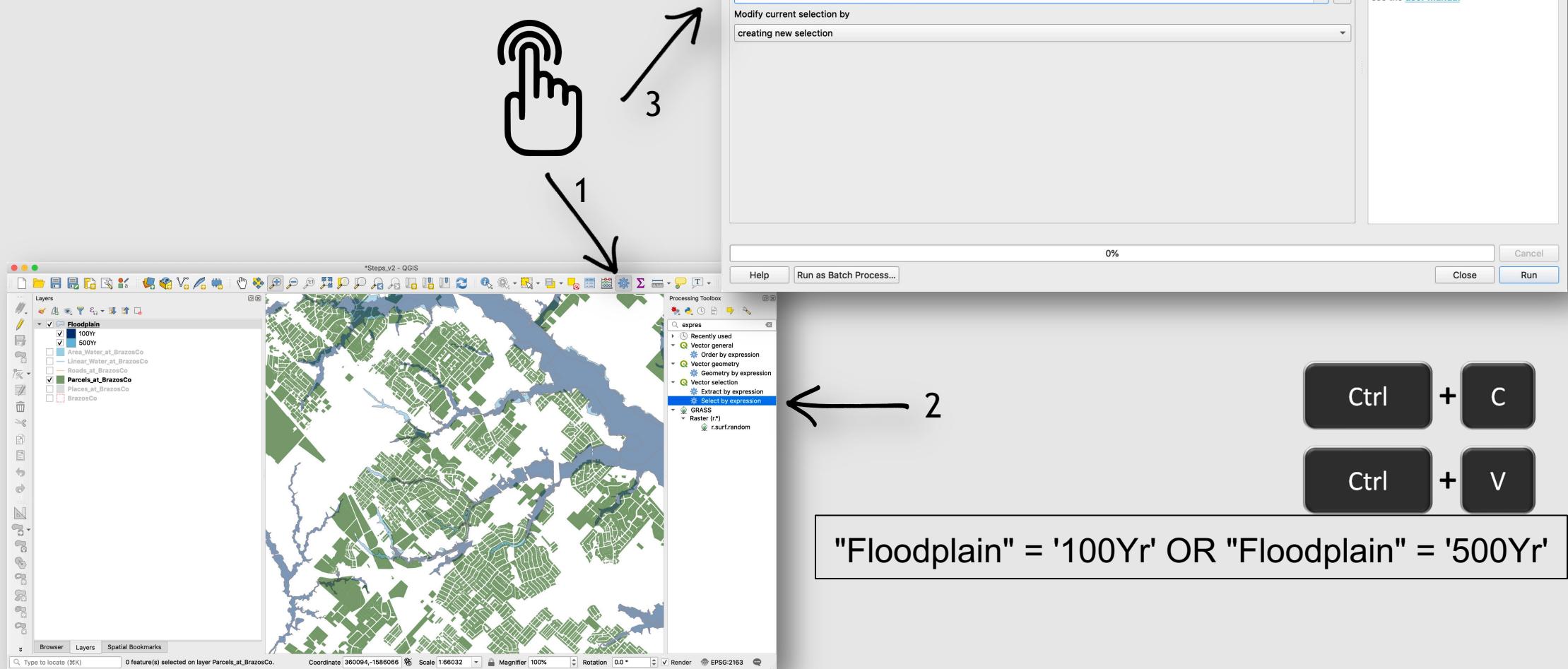
Arrows point from the text in the list above to the 'Floodplain' column header, the 'Create a new field' checkbox, and the expression editor.

```
CASE
WHEN "FLD_ZONE" = 'A' THEN '100Yr'
WHEN "FLD_ZONE" = 'AE' THEN '100Yr'
WHEN "FLD_ZONE" = 'X' THEN CASE
    WHEN "ZONE_SUBTY" = '1 PCT FUTURE CONDITIONS' THEN '100Yr'
    WHEN "ZONE_SUBTY" = '0.2 PCT ANNUAL CHANCE FLOOD HAZARD' THEN '500Yr'
    WHEN "ZONE_SUBTY" = 'AREA OF MINIMAL FLOOD HAZARD' THEN 'Out'
END
ELSE 'problem'
END
```

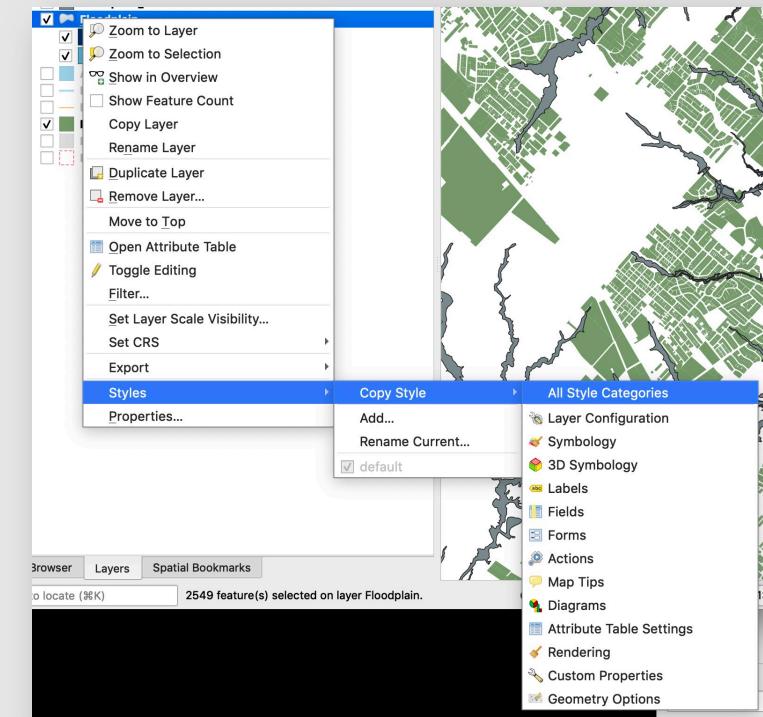
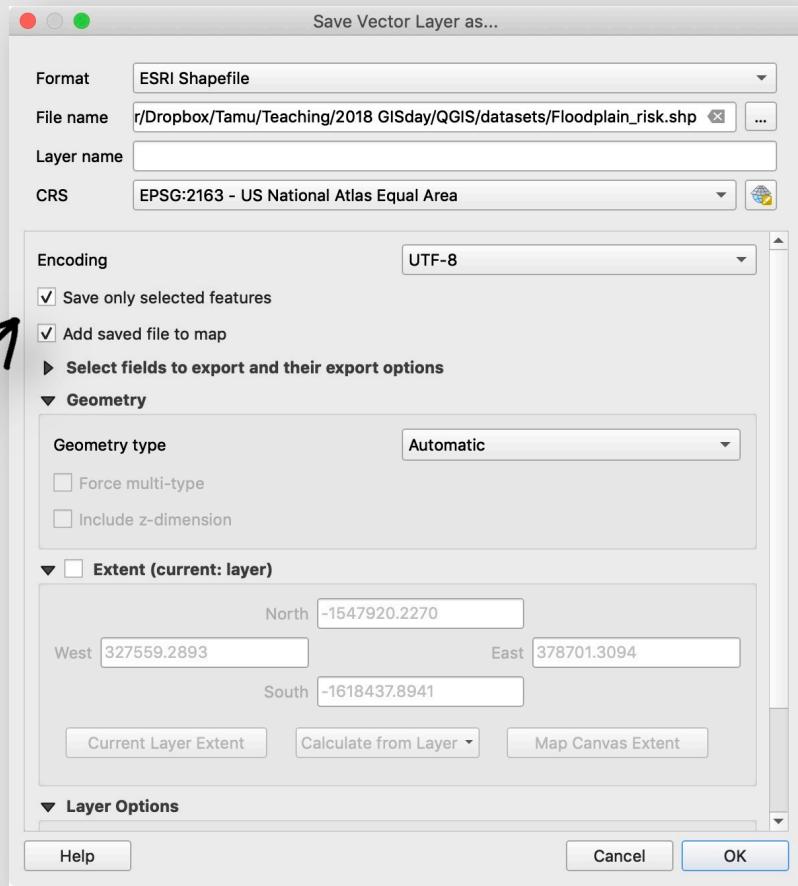
Ctrl + C  
Ctrl + V

# Select tool

- Explore the select tool:
  - Select by expression

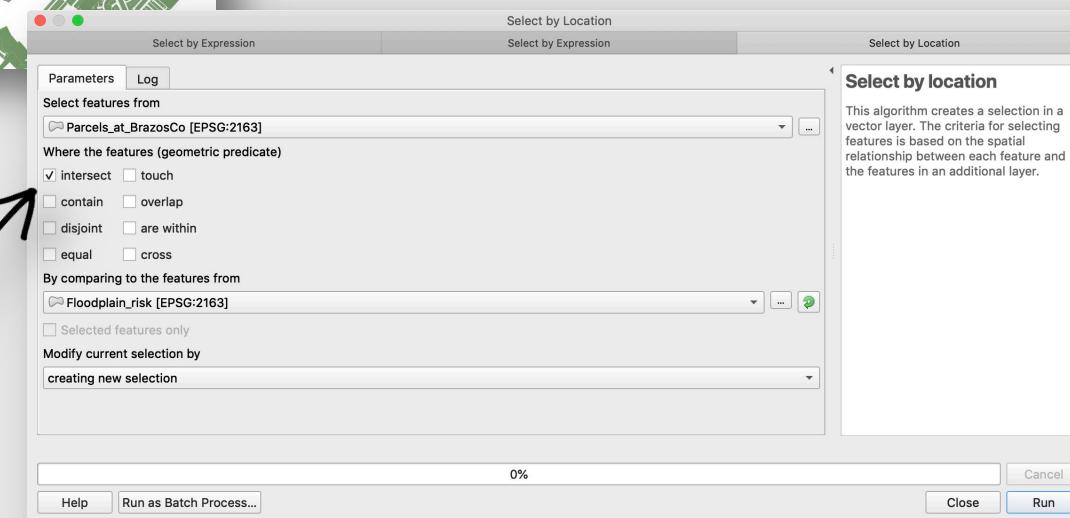
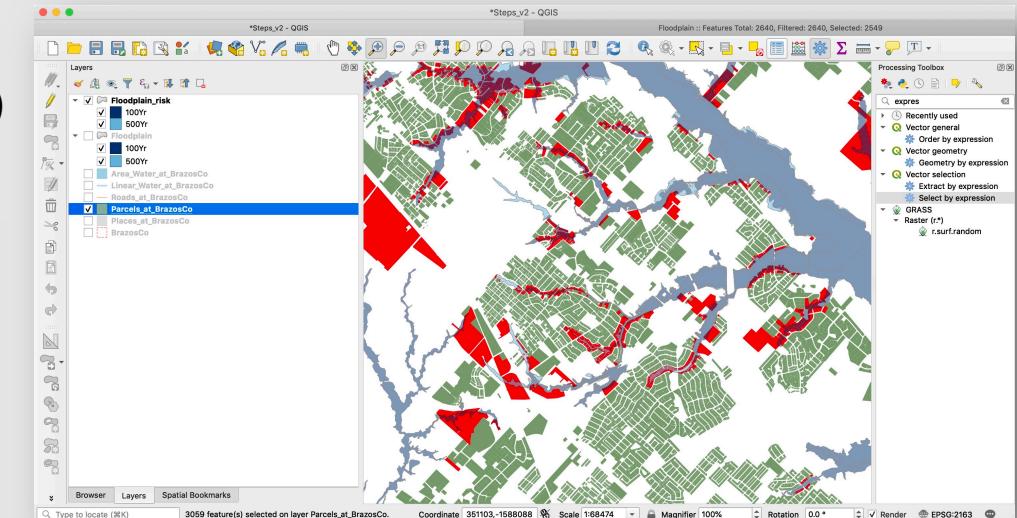
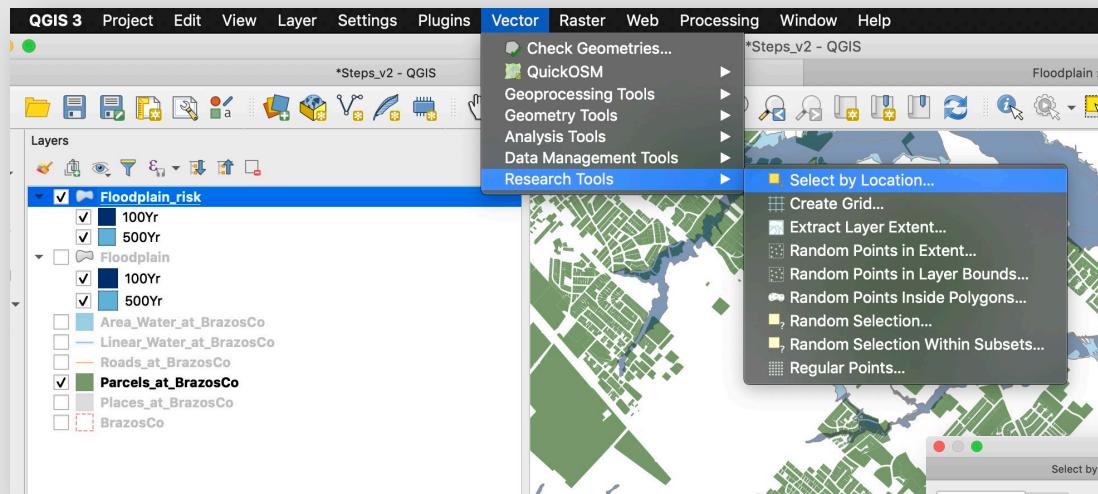


# Export tool and Copy and Paste styles

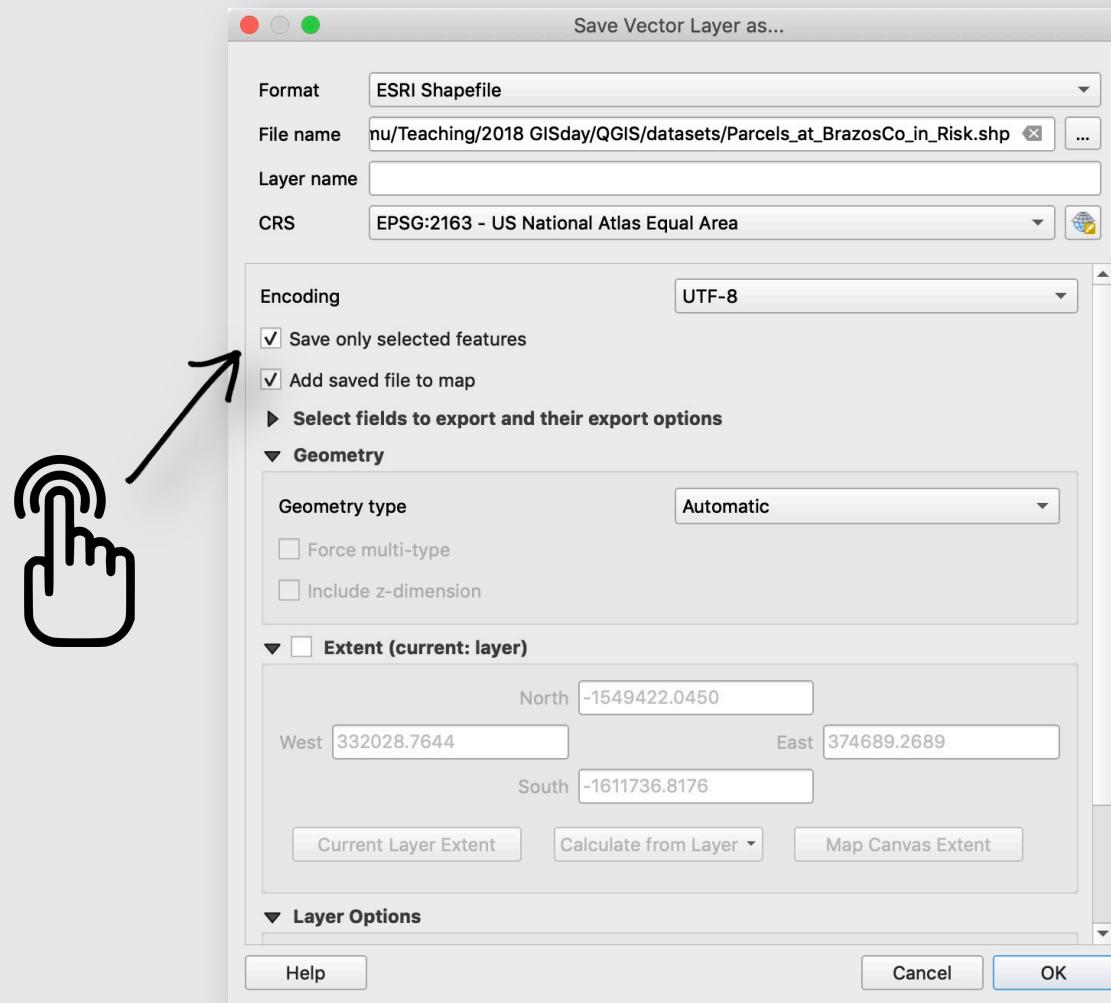


# Select by location

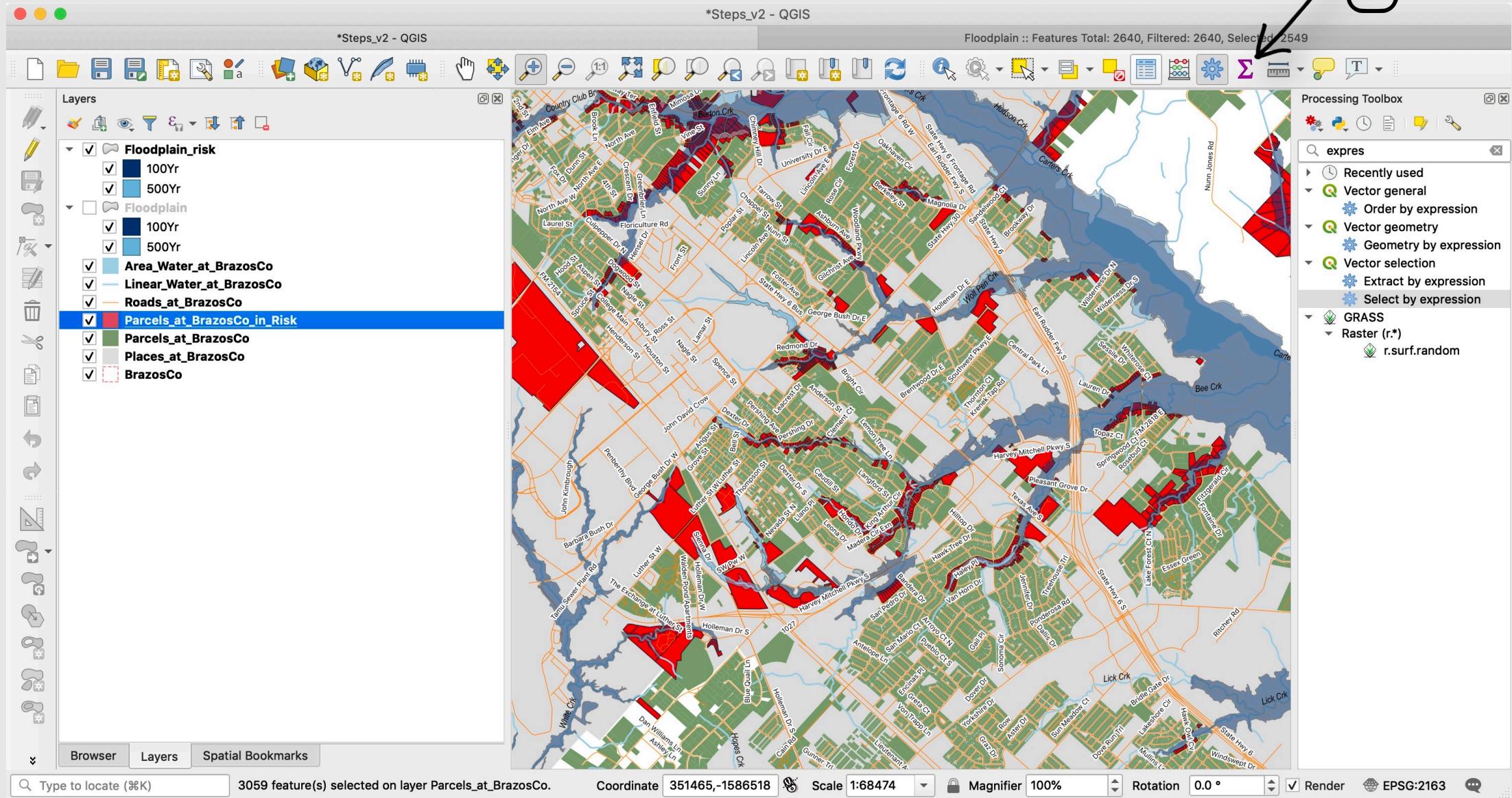
- Processing → Toolbox → Select by location
- Save only selected features (parcels A and B in risk)



# Export tool



# More tools ... statistics



# Basic statistics

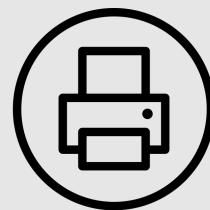
| Statistics            |            |
|-----------------------|------------|
| Parcels_at_BrazosCo   |            |
| 123 yr_built          |            |
| Statistic             | Value      |
| Count                 | 47951      |
| Sum                   | 9.34403e+7 |
| Mean                  | 1948.66    |
| Median                | 1992       |
| St dev (pop)          | 275.763    |
| St dev (sample)       | 275.766    |
| Minimum               | 0          |
| Maximum               | 2017       |
| Range                 | 2017       |
| Minority              | 1870       |
| Majority              | 1981       |
| Variety               | 118        |
| Q1                    | 1974       |
| Q3                    | 2005       |
| IQR                   | 31         |
| Missing (null) values | 0          |



| Statistics                  |            |
|-----------------------------|------------|
| Parcels_at_BrazosCo_in_Risk |            |
| 123 yr_built                |            |
| Statistic                   | Value      |
| Count                       | 3059       |
| Sum                         | 5.85338e+6 |
| Mean                        | 1913.49    |
| Median                      | 1979       |
| St dev (pop)                | 359.525    |
| St dev (sample)             | 359.584    |
| Minimum                     | 0          |
| Maximum                     | 2016       |
| Range                       | 2016       |
| Minority                    | 1920       |
| Majority                    | 1981       |
| Variety                     | 86         |
| Q1                          | 1964       |
| Q3                          | 1998       |
| IQR                         | 34         |
| Missing (null) values       | 0          |

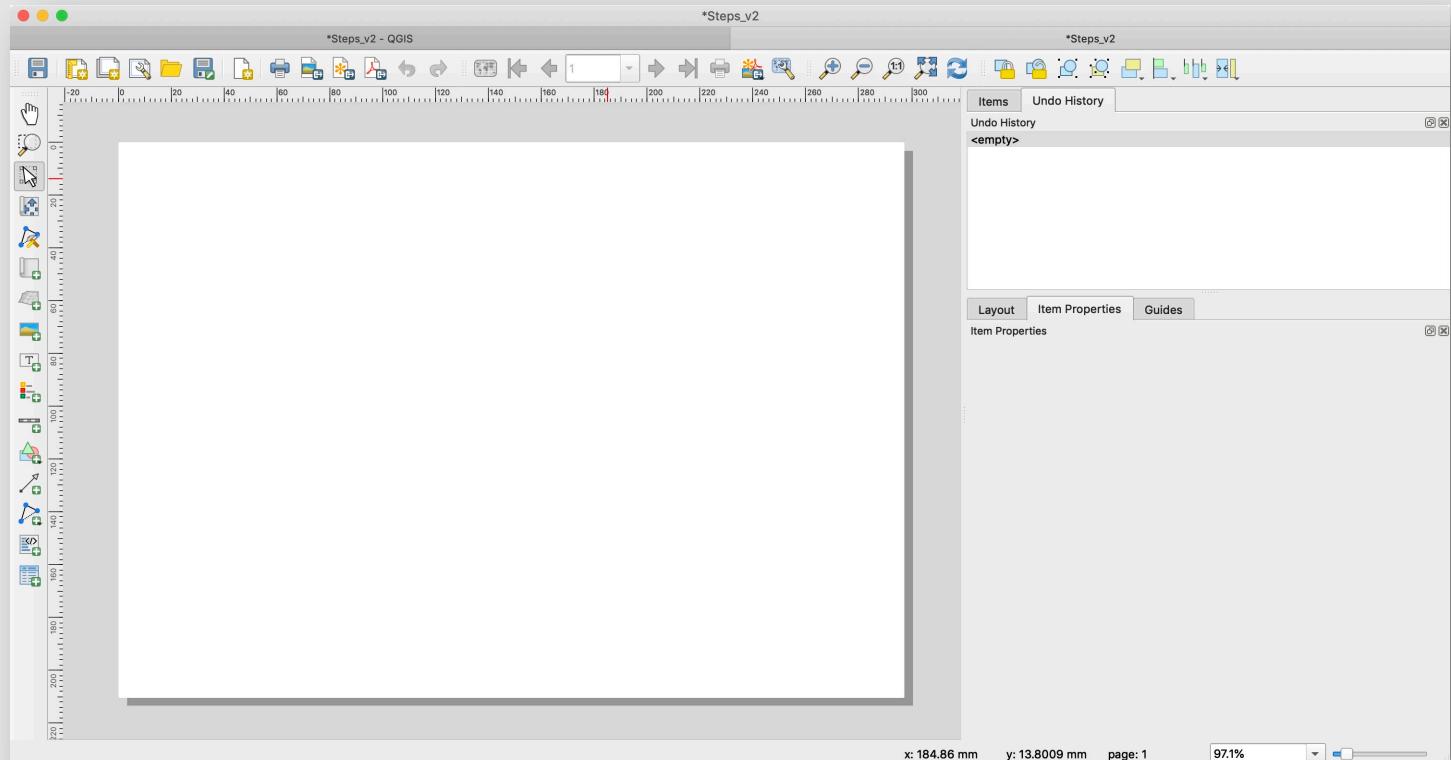
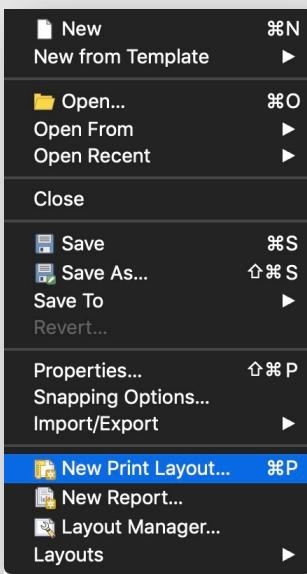


- 3059 out of 47951 houses in risk (6.4%)
- Some evidence that older houses are in greater risk of flood inundation

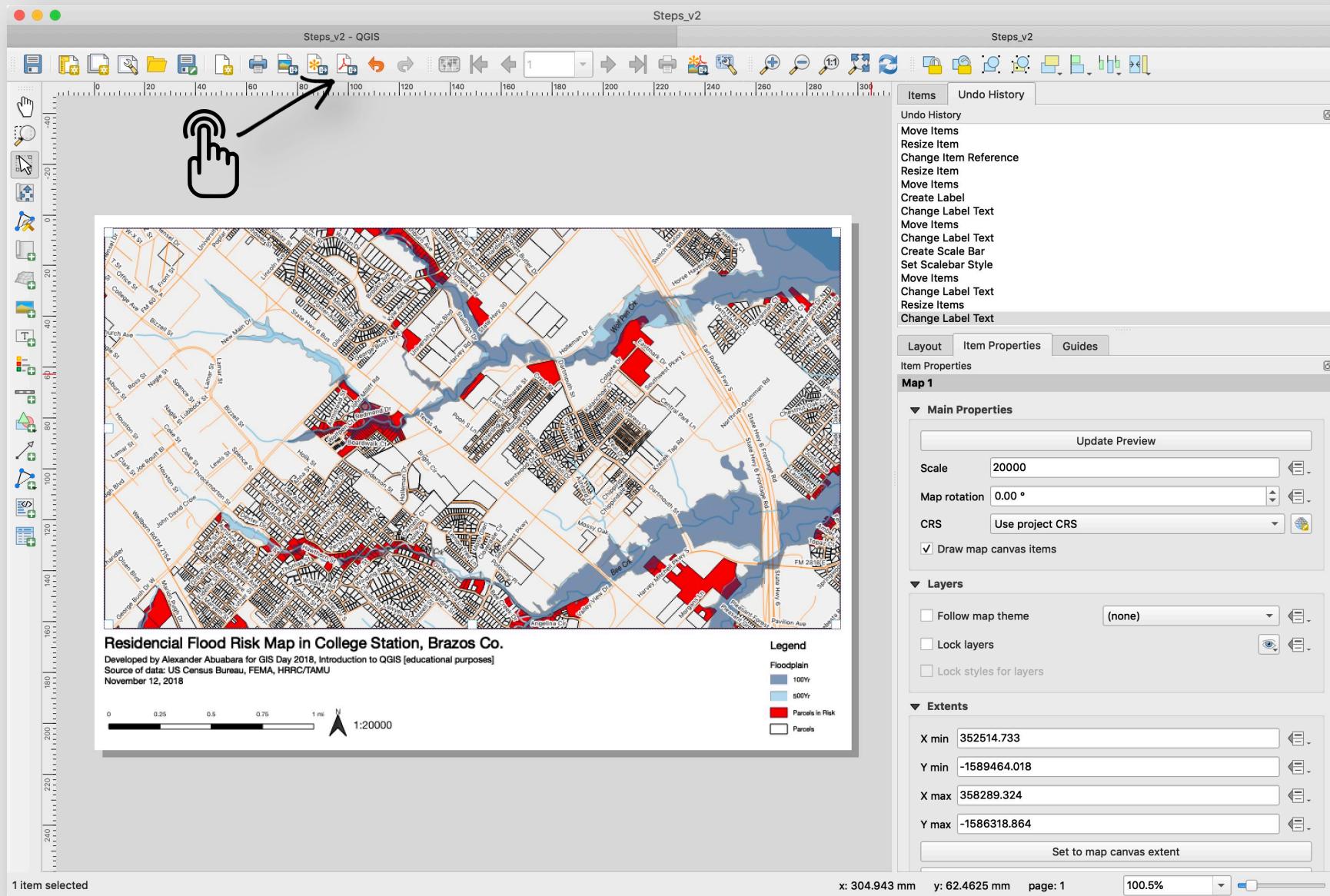


# Print it!

1. Project → New Print Layout
2. New map (scale it!, resolution)
3. Basic map elements:
  1. Legend
  2. Title
  3. Sources
  4. Authorship
  5. Date



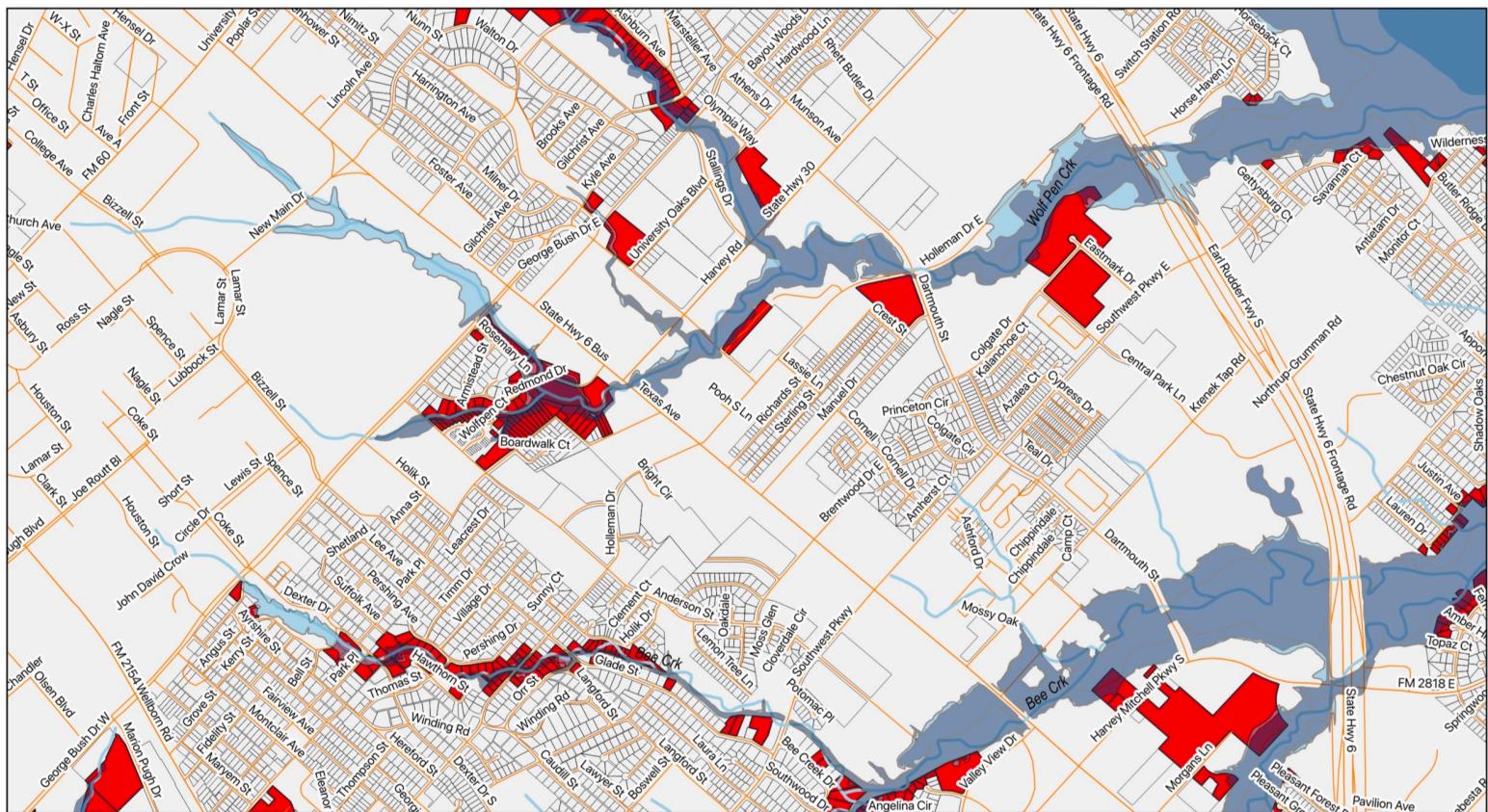
# Final result should be similar to this ...





# PDF Export

Steps\_v2.pdf (1 page)



Residential Flood Risk Map in College Station, Brazos Co.

Developed by Alexander Abuabara for GIS Day 2018, Introduction to QGIS [educational purposes]  
Source of data: US Census Bureau, FEMA, Brazos Central Appraisal District, HRRC/TAMU  
November 12, 2018

0 0.25 0.5 0.75 1 mi

N  
1:20000

#### Legend

|            |
|------------|
| Floodplain |
| 100Yr      |
| 500Yr      |

|                             |
|-----------------------------|
| Parcels                     |
| Residential Parcels in Risk |
| Residential Parcels         |

# Acknowledgements

I am grateful to:

- The QGIS community for constant development and support of the software
- Dr. Daniel Goldberg for getting me involved in
- All people involved in organizing the TxGIS Day 2021 for which this material was first developed
- The Texas A&M Hazard Reduction and Recovery Center which I am part

*"To the children  
the restless sea with its many changes was a new sight."*

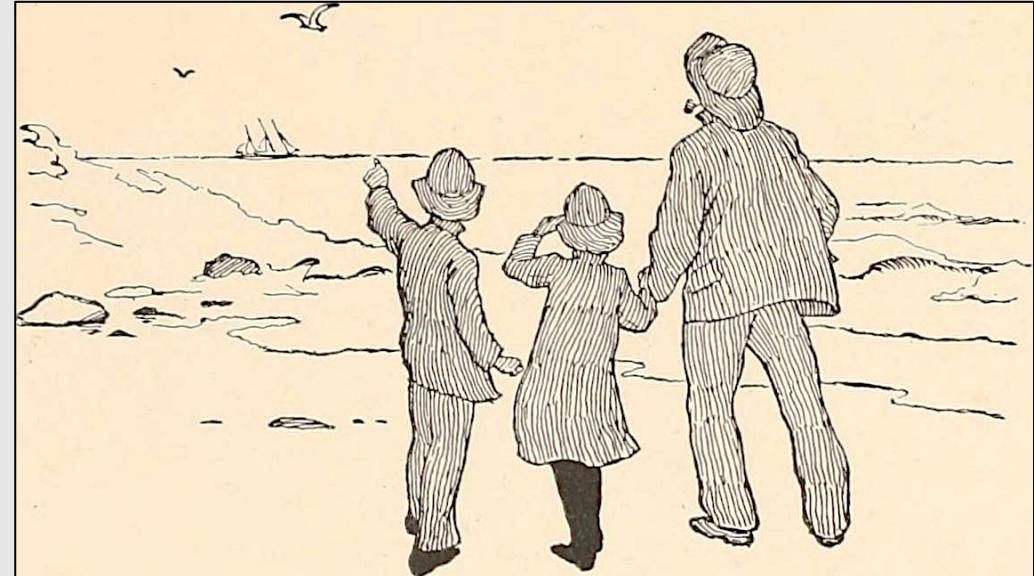


Image and text from page 33 of  
"The Seashore Book: Bob and Betty's summer with Captain Hawes" (1912)



# Data source

- <https://www.brazoscad.org/gis/>
- <https://earthexplorer.usgs.gov>
- <https://www.fema.gov/national-flood-hazard-layer-nfhl>
- <https://www.census.gov/geo/maps-data/data/tiger-line.html>