Georeferencing in QGIS

Overview:

- 1. Searching for historical maps
- 2. Installing QGIS
- 3. Enabling Plugins
- 4. Georeferencing

1. Searching for historical maps

- Search from:
 - Old Maps Online portal for historical maps from five US and European map libraries, including the David Rumsey Map Collection from Stanford University, the British Library...etc.: <u>https://www.oldmapsonline.org/</u>
 - topoView current and historical topographic maps from USGS: <u>https://ngmdb.usgs.gov/topoview/viewer/#4/40.01/-100.06</u>
 - ProQuest digital Sanborn fire insurance maps 1867-1970: <u>http://sanborn.umi.com/about.html</u>
 - Library of Congress: <u>https://www.loc.gov/maps/collections/</u>
- Download your high-resolution (300dpi or greater) image, in .tiff or .jpeg formats
- If you have multiple images that comprise a single map (such as commonly seen in Sanborn maps), consider stitching together and color correcting in Adobe Photoshop

2. Installing QGIS

 QGIS is a free and open source GIS software. Download the latest version for your OS here: <u>https://qgis.org/en/site/forusers/download.html</u>. (Current version QGIS 3.10.1 "A Coruña" released 6/12/2019)

3. Enabling Plugins

• In QGIS, in the top bar *Plugins >> Manage and Install Plugins*

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• In the Plugins window, search and enable (check) Georeferencer GDAL and QuickMapServices

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4. Georeferencing

- Scanned historical maps and images often don't have any spatial reference georeferencing is the process of defining the geographic location of these maps by anchoring locations in the historical images with map coordinates.
- In QGIS, *Raster >> Georeferencer*, prompts the Georeferencer window

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• In the *Georeferencer* window, click **Open Raster** I. Then select your historical map.

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• The next window is the *Coordinate Reference System Selector*, where you will be prompted to enter the coordinate reference system (CRS). Our source image doesn't have any spatial reference, so click **Cancel**.

Coordinate Reference System Selector	×
Specify CRS for layer Raster	
Filter	
Recently used coordinate reference systems	
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Unknown datum based upon the Everest (1830 Definition) ellipsoid	EPSG:4042
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WGS 72BE	EPSG:4324
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Proj4: +proj=longlat +datum=WGS84 +no_defs	
	OK Gancel Help

• The image is loaded in the top section of the Georeferencer window, you can zoom/pan to



• Define the transformation settings under *Settings >> Transformation Settings*

Q Georeferencer - sanborn1884_northampton.tif



- Set the following parameters (learn more about each here: <u>https://docs.qgis.org/testing/en/docs/user_manual/plugins/core_plugins/plugins_georeference</u> <u>r.html#defining-the-transformation-settings</u>)
 - Transformation Parameters:
 - Transformation type: Polynomial 2
 - Resampling method: Nearest neighbour
 - Target SRS: EPSG:4326 WGS 84
 - *Output Settings*:
 - Compression: LZW
 - Check Save GCP Points and Load in QGIS when done

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 In the main QGIS window, click on QuickMapServices to add a basemap from OpenStreetMap (<u>https://www.openstreetmap.org/about</u>). Pan/Zoom to your contemporary map area.

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- Criteria for choosing GCPs:
 - Right angles or places of known and identifiable immobile features, such as: street corners, road intersections (right angle more accurate than acute), edges of buildings
 - Polynomial 2 transformation requires at least 6 points
 - Distribute points across the entire image, with focus on points closer to the corners of the image to minimize distortion. However, if one area of the map is more important to you, privilege placing points there and accept distortion in other areas.
- Add Ground Control Points (GCPs) with ²⁰
 When you add a point, the *Enter Map Coordinates* window will pop-up, click on **From Map Canvas**. Then add the corresponding

location in the contemporary map.

Enter X a correspo hen click	and Y coordinates (DMS (<i>dd mm ss.ss</i>), nd with the selected point on the imag < a corresponding point on map canvas	, DD (<i>dd.dd</i>) or p ie. Alternatively, s of QGIS to fill ir	projected coordinates (<i>mmmm.</i> , dick the button with icon of a n coordinates of that point.	<i>mm</i>)) which pencil and	
(<mark>/Eas</mark> t	-8085677.20828038733452559	Y / North	5209606.82337929122149944		
Auto	matically hide georeferencer window				

- In the *GCP Table*, each GCP has dX, dY, and Residual error values. Verify if there are unusually high Residual values, in which case, delete and re-add a point.
- When you finished adding GCPs, start the georeferencing process
- When the process is finished, the georeferenced image will load in the main QGIS window.