QGIS Workflows

QGIS and Python… like peanut butter and jelly

Peanut Butter (QGIS)

- It’s Smooth (all the basics of GIS)
- It’s Organic (by the people for the people)
- Grow your own (it is encouraged!)

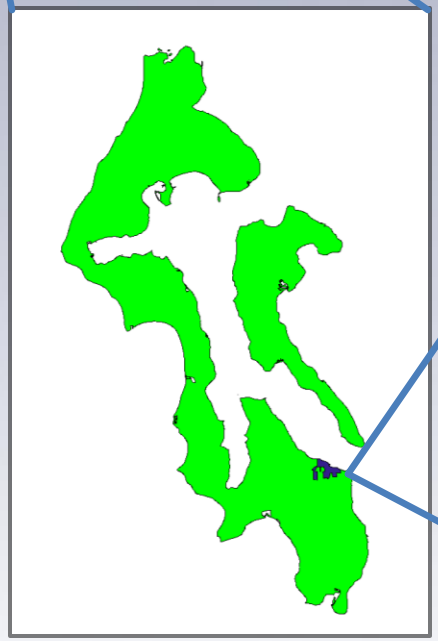
Jelly (Python)

- Everything tastes better with it
- Holds your sandwich together

Goals

- Basic GIS (viewing and interacting with data)
  - Data Sources, Speed, and Projects
- Editing (creation and editing of data)
  - Creating and correcting data layers
- Leveraging (utilizing GRASS within QGIS)
  - Data path => QGIS -> GRASS -> QGIS
- Extending (smearing Jelly on your sandwich)
  - Python plugins… fTools, RefMap, Plugin Builder
- Embedding (new Jelly apps with QGIS inside)
  - Custom App Deployment… OpenOceanMap, QGISLite

Demo Dataset

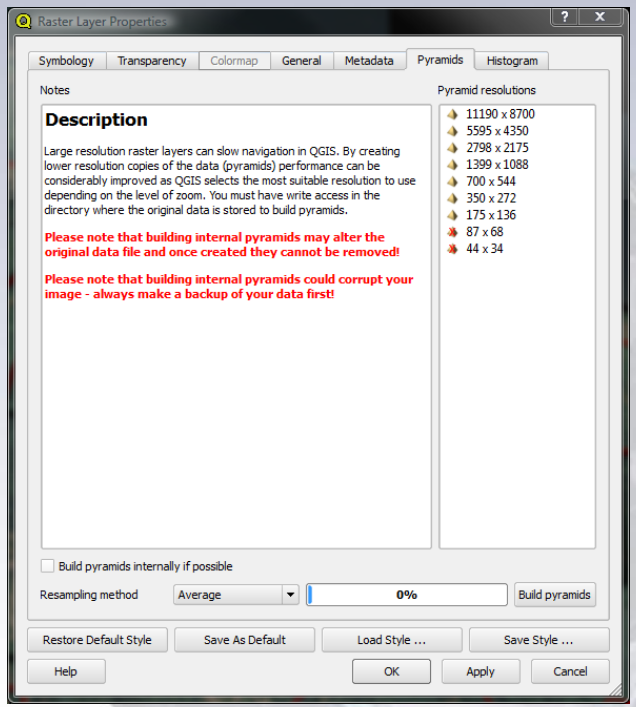


Langley Washington

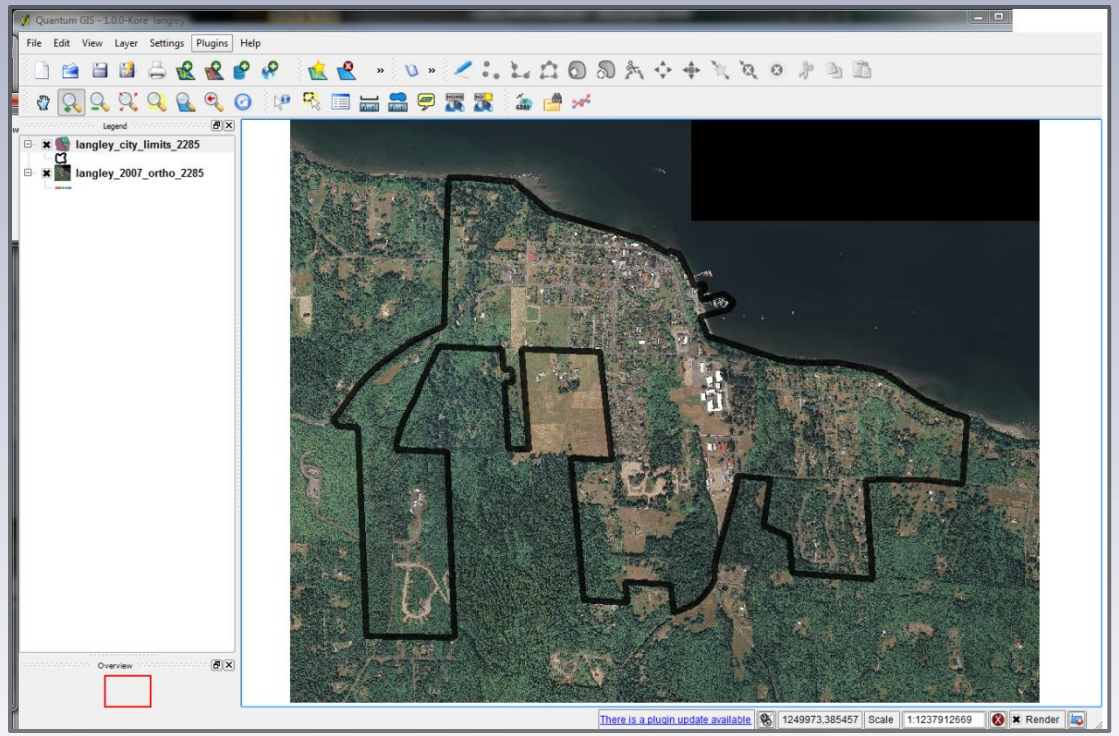
http://www.reprojected.com/presentations/Presentations/waurisa_2009/waurisa_os_workshop_6inch.tar.gz
http://www.reprojected.com/presentations/Presentations/waurisa_2009/waurisa_os_workshop_basedata.tar.gz

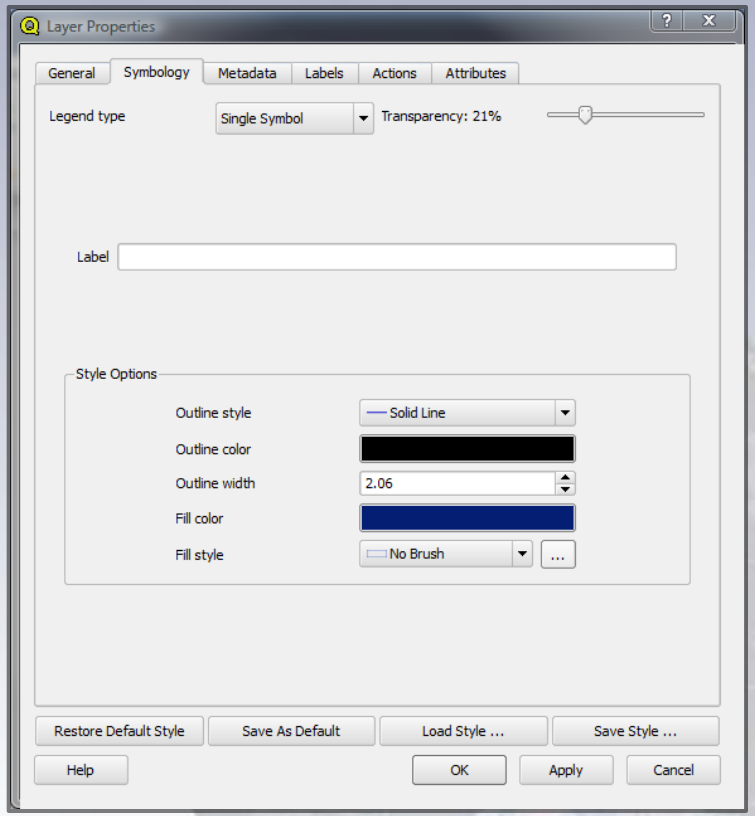
The Basics

- Open a Raster
  - langley_2007_ortho_2285.tif
  - Over 1 gig, but with overviews (Pyramids) for speed
    - gdaladdo langley_2007_ortho_2285.tif 2 4 8 16 32 64 128
    - Right-Click layer in legend, Properties, Pyramids Tab



- Open a Vector
  - langley_city_limits_2285.shp
  - Need to style via the properties dialog
    - Right-Click layer in legend, Properties, Symbology Tab





Projections

- Project Projection vs. Layer Projection
- Vector “On the fly” Projection

In this demo we are using EPSG:2285

Washington State Plane North (ft)

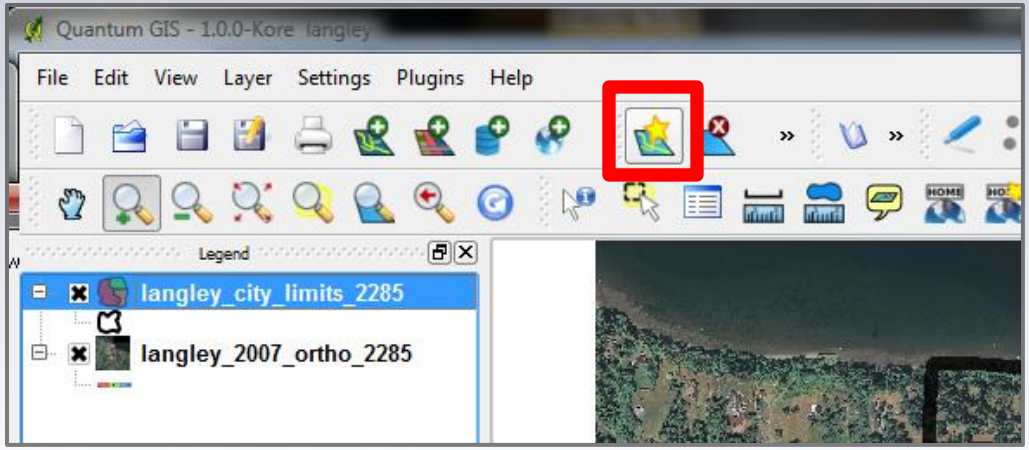
```
PROJCS["NAD83 / Washington North (ftUS)",
    GEOGCS["NAD83",
        DATUM["North_American_Datum_1983",
            SPHEROID["GRS 1980",6378137,298.257222101,
                AUTHORITY["EPSG","7019"]],
            AUTHORITY["EPSG","6269"]],
        PRIMEM["Greenwich",0,
            AUTHORITY["EPSG","8901"]],
        UNIT["degree",0.01745329251994328,
            AUTHORITY["EPSG","9122"]],
        AUTHORITY["EPSG","4269"]],
    UNIT["US survey foot",0.3048006096012192,
        AUTHORITY["EPSG","9003"]],
    PROJECTION["Lambert_Conformal_Conic_2SP"],
    PARAMETER["standard_parallel_1",48.73333333333333],
    PARAMETER["standard_parallel_2",47.5],
    PARAMETER["latitude_of_origin",47],
    PARAMETER["central_meridian",-120.8333333333333],
    PARAMETER["false_easting",1640416.667],
    PARAMETER["false_northing",0],
    AUTHORITY["EPSG","2285"],
    AXIS["X",EAST],
    AXIS["Y",NORTH]]
```

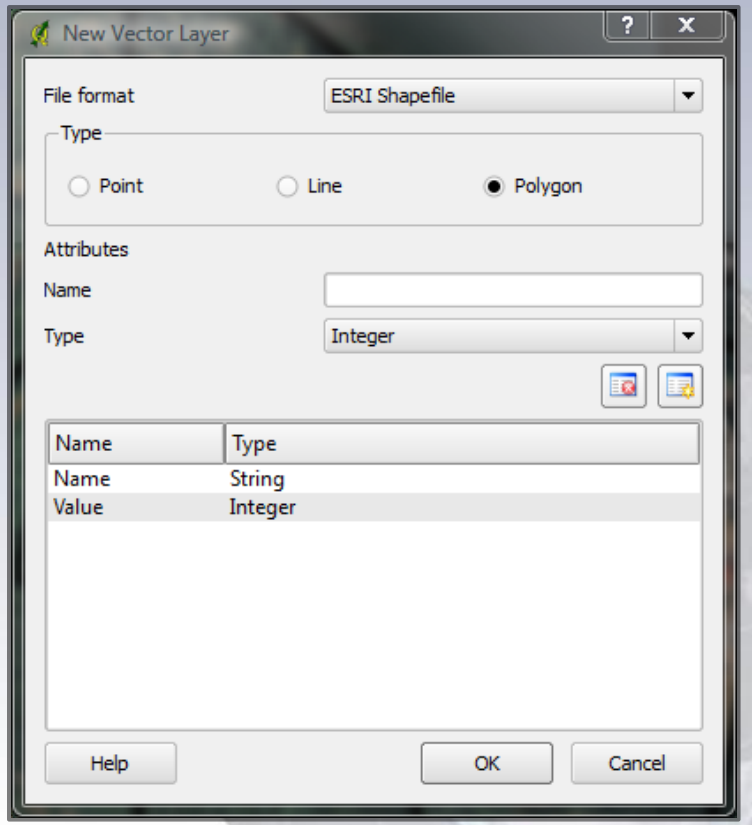
Play with the data…

- Zoom, Pan, Identify
- Open Attribute Tables
- Select
  - Click on map
  - Query Builder in attribute table
- Label
  - Label tab in Properties Dialog
- Style
  - Modify and Save

Editing

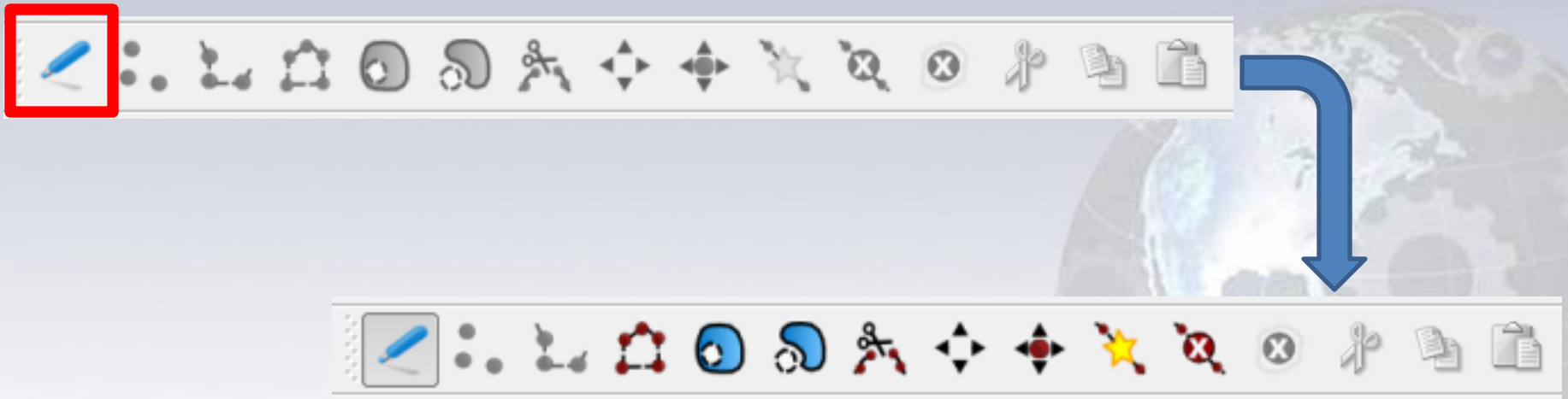
- Create New Dataset
  - Give at least one attribute
  - Select name of new shapefile
  - Toggle editing
  - Draw your shapes!



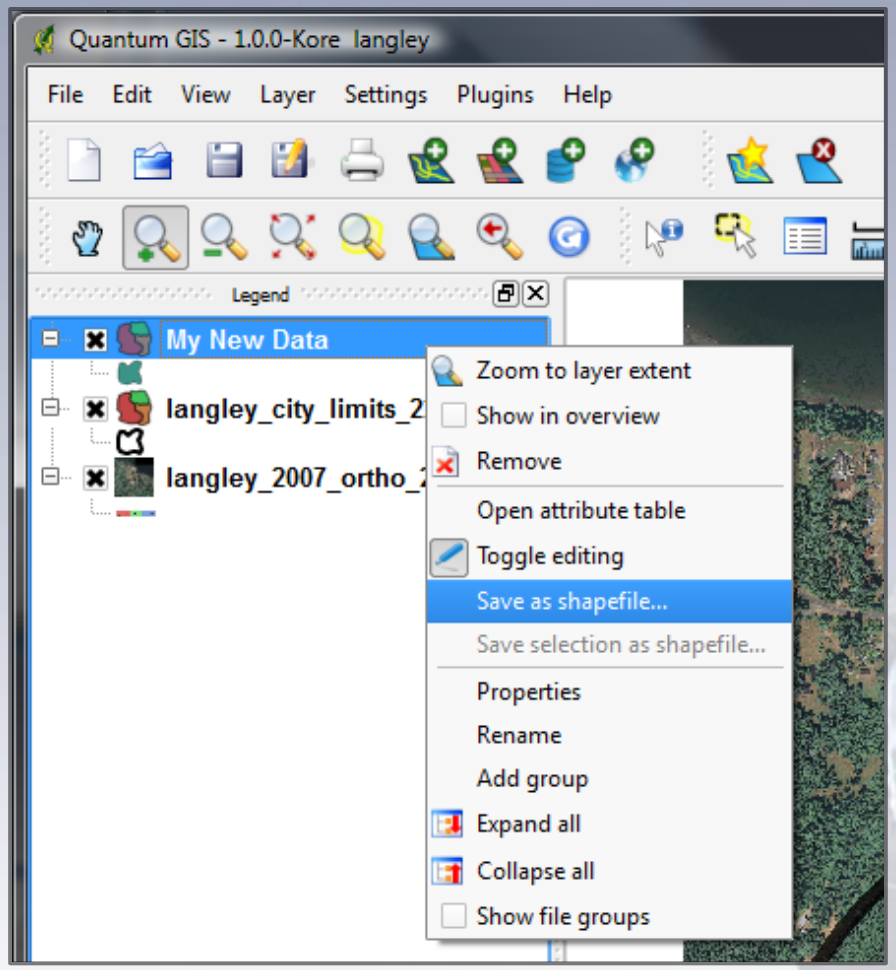


Editing

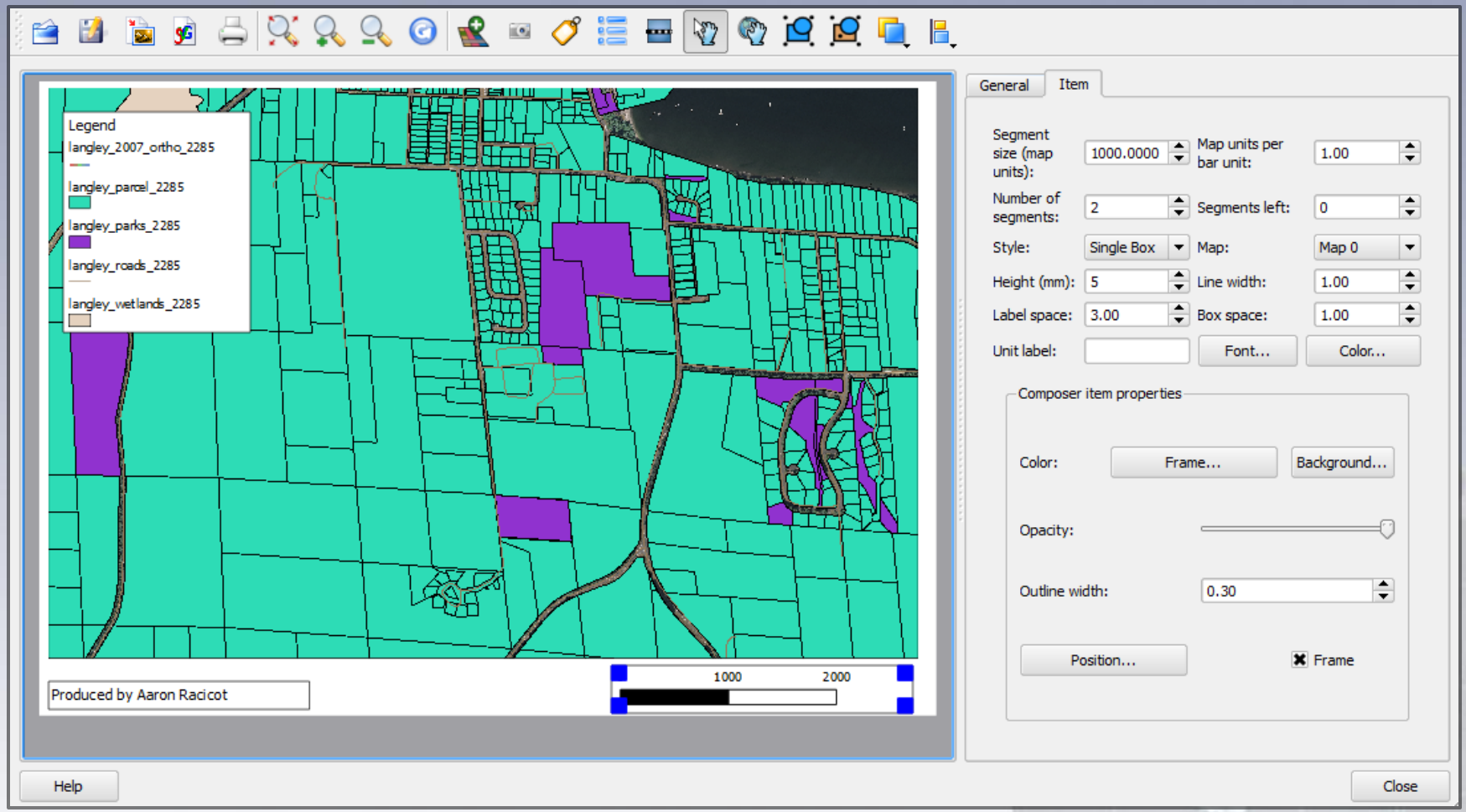
- Modify Dataset
  - Select dataset in legend
  - Toggle editing
  - Modify existing dataset



Save… Save Often

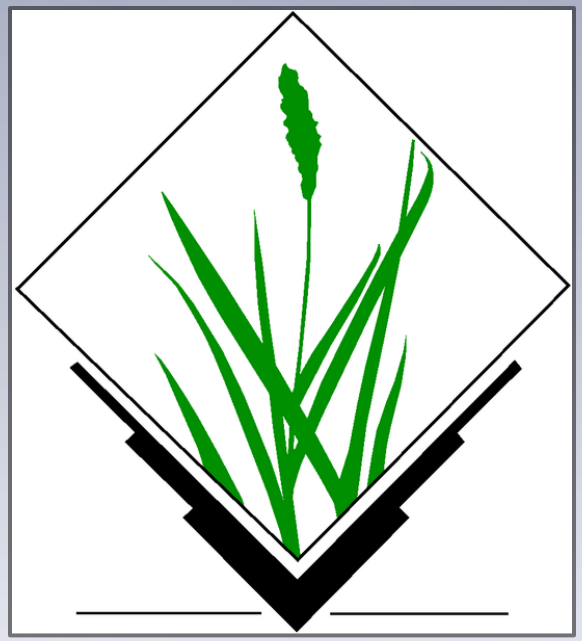


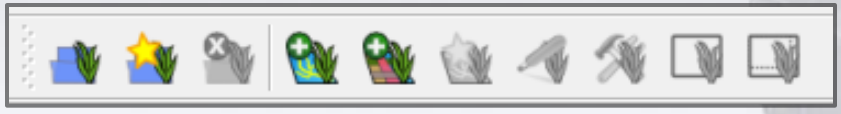
Printing


Legend
langley_2007_ortho_2285
langley_parcel_2285
langley_parks_2285
langley_roads_2285
langley_wetlands_2285
Produced by Aaron Racicot
1000
2000
General
Item
Segment size (map units):
1000.0000
Map units per bar unit:
1.00
Number of segments:
2
Segments left:
0
Style:
Single Box
Map:
Map 0
Height (mm):
5
Line width:
1.00
Label space:
3.00
Box space:
1.00
Unit label:
Font...
Color...
Composer item properties
Color:
Frame...
Background...
Opacity:
Outline width:
0.30
Position...
Frame
Help
Close

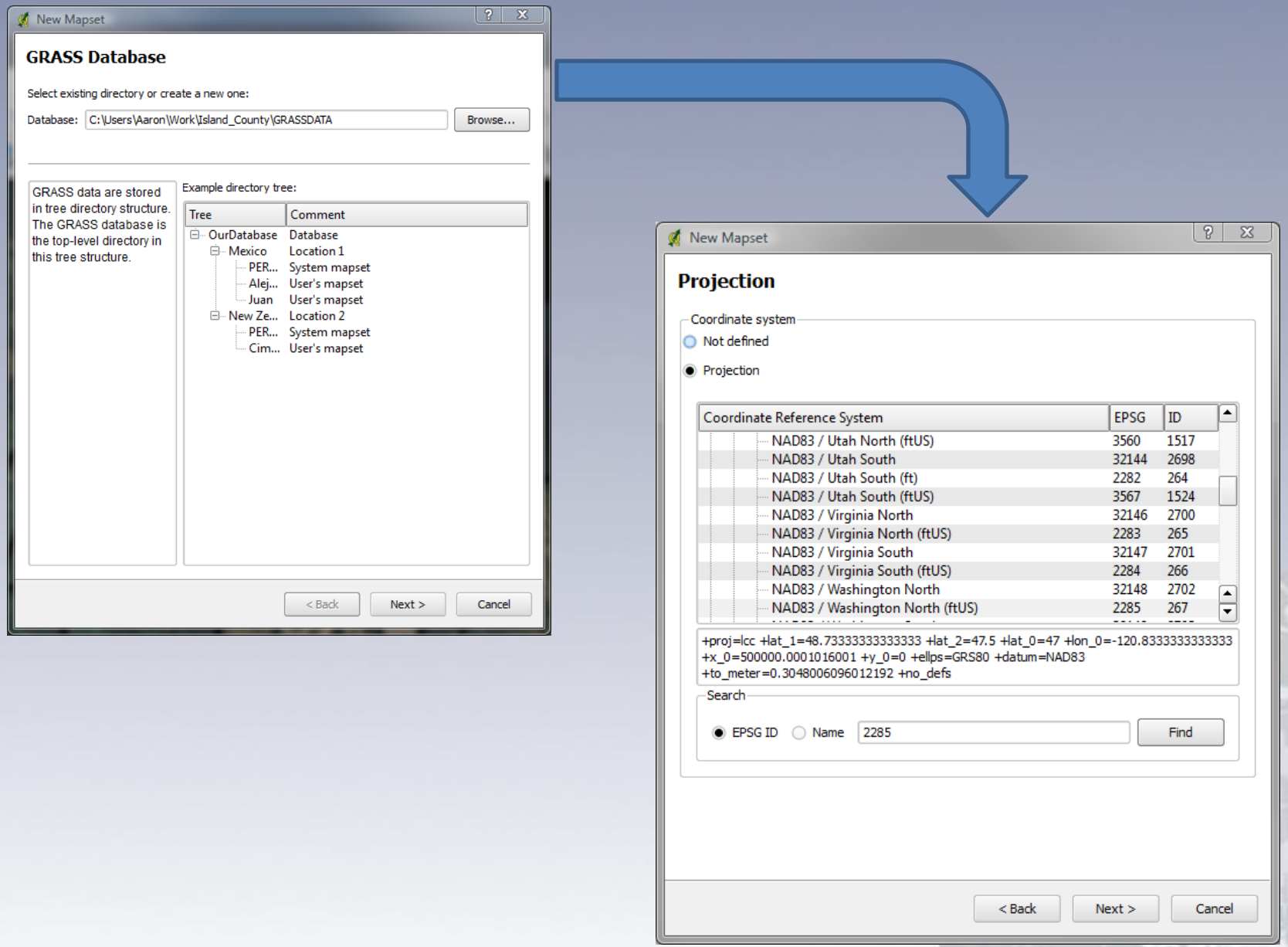
GRASS

The crunch in the Peanut Butter…



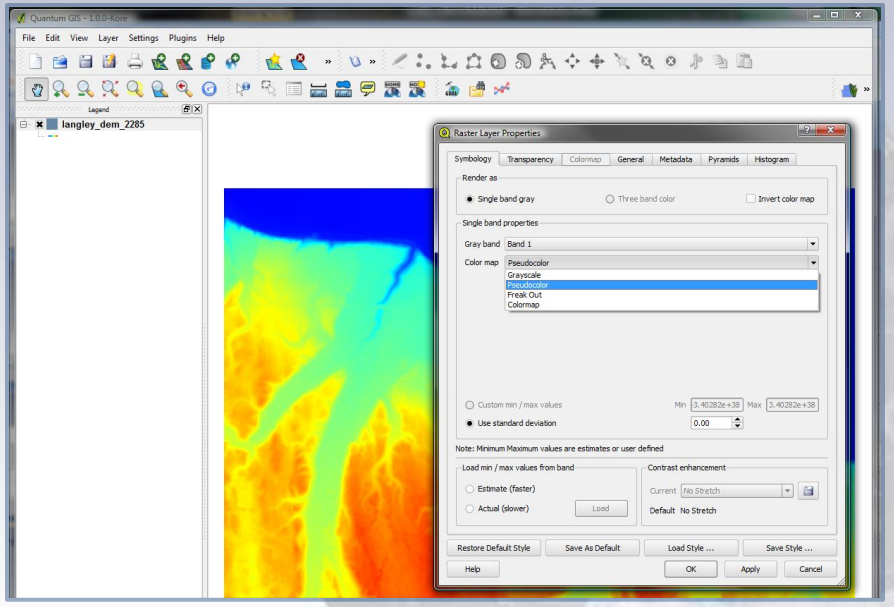


Enable via Plugin Manager…


New Mapset
GRASS Database
Select existing directory or create a new one:
Database: C:\Users\Aaron\Work\Island_County\GRASSDATA
Browse...
GRASS data are stored in tree directory structure. The GRASS database is the top-level directory in this tree structure.
Example directory tree:
Tree
Comment
OurDatabase Database
Mexico Location 1
PER... System mapset
Alej... User's mapset
Juan User's mapset
New Ze... Location 2
PER... System mapset
Cim... User's mapset
< Back
Next >
Cancel
New Mapset
Projection
Coordinate system
Not defined
Projection
Coordinate Reference System
EPSG
ID
NAD83 / Utah North (ftUS) 3560 1517
NAD83 / Utah South 32144 2698
NAD83 / Utah South (ft) 2282 264
NAD83 / Utah South (ftUS) 3567 1524
NAD83 / Virginia North 32146 2700
NAD83 / Virginia North (ftUS) 2283 265
NAD83 / Virginia South 32147 2701
NAD83 / Virginia South (ftUS) 2284 266
NAD83 / Washington North 32148 2702
NAD83 / Washington North (ftUS) 2285 267
+proj=lcc +lat_1=48.73333333333333 +lat_2=47.5 +lat_0=47 +lon_0=-120.8333333333333 +x_0=500000.0001016001 +y_0=0 +ellps=GRS80 +datum=NAD83 +to_meter=0.3048006096012192 +no_defs
Search
EPSG ID
Name
2285
Find
< Back
Next >
Cancel

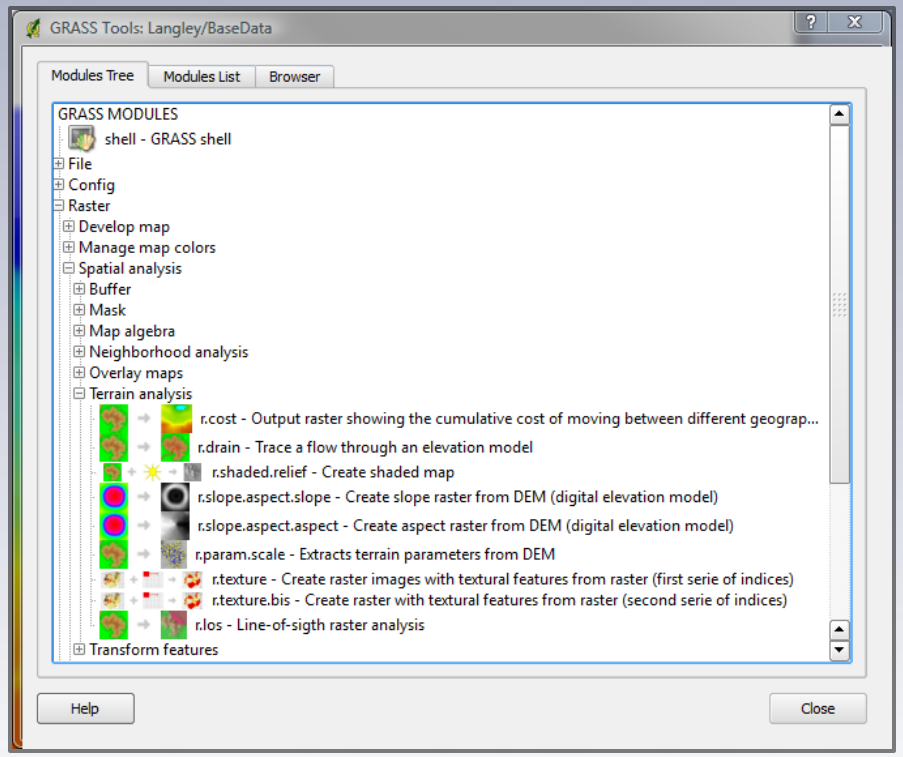
Contours and shaded relief from DEM

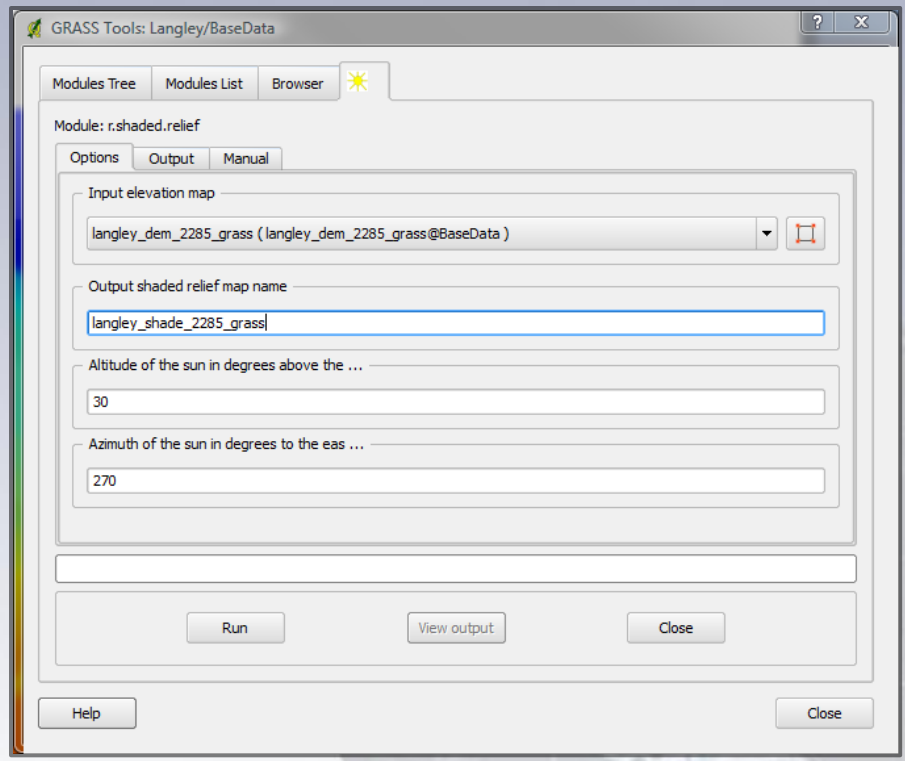
- Load DEM (tif) into QGIS
- Style the DEM to be pseudocolor
- Load the DEM into GRASS via GRASS toolbar
  - NOTE: Layer must be loaded into QGIS before it can be loaded into the GRASS plugin



Shaded relief

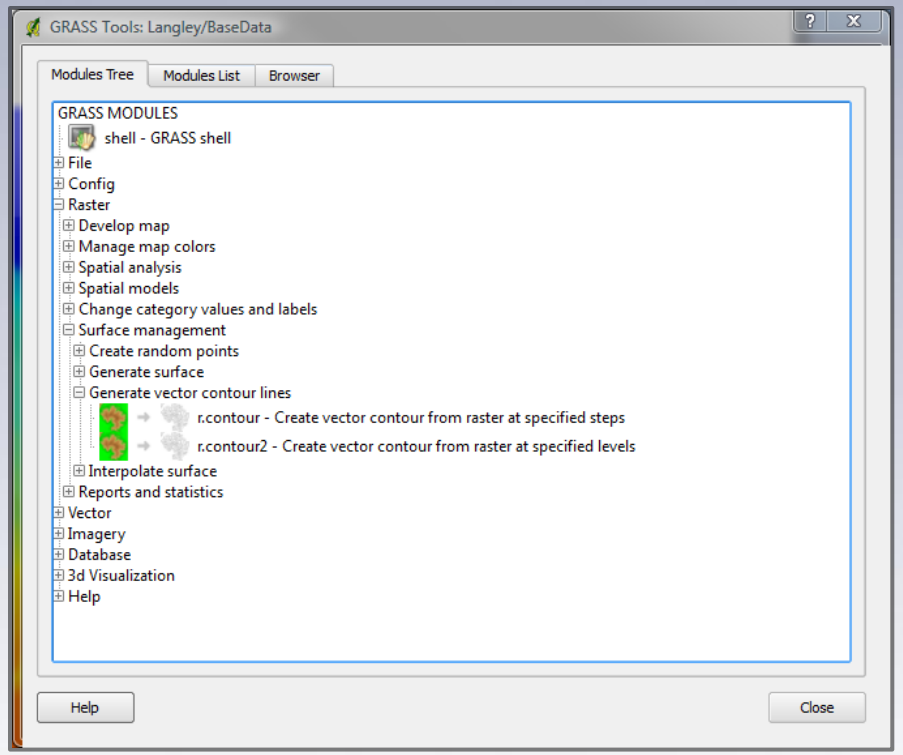
- Open GRASS Toolbox
- Raster->Spatial Analysis->Terrain Analysis
- r.shaded.relief

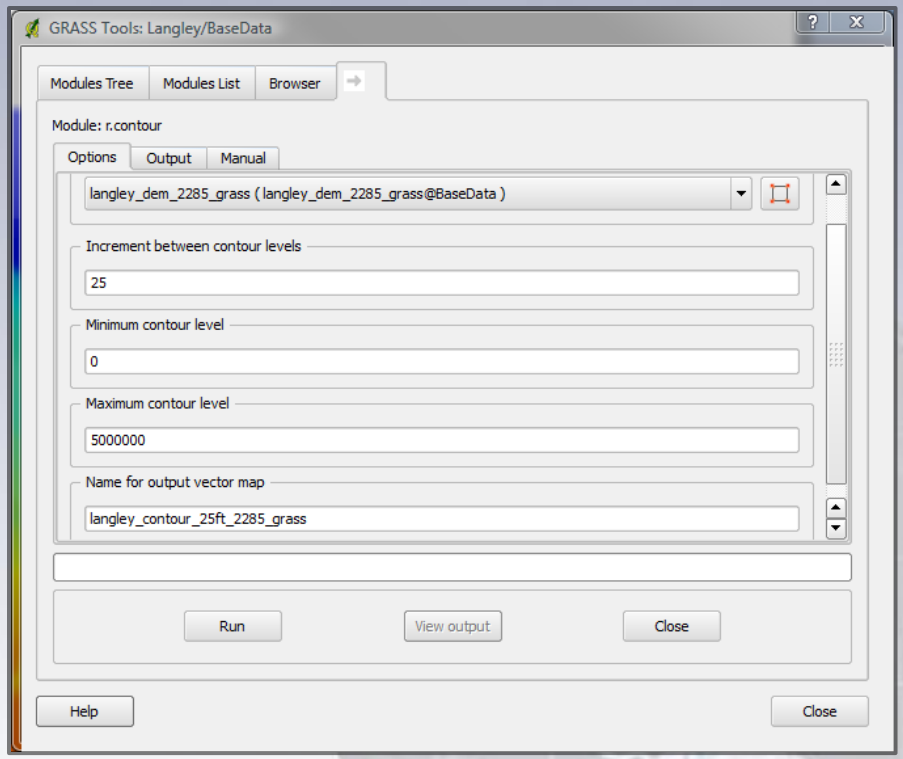




Contours

- Open GRASS Toolbox
- Raster->Surface Management->Generate vector contour lines
- r.contour





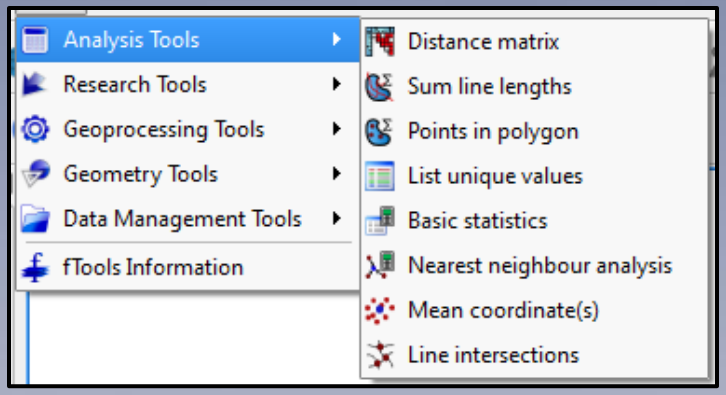
Saving from GRASS

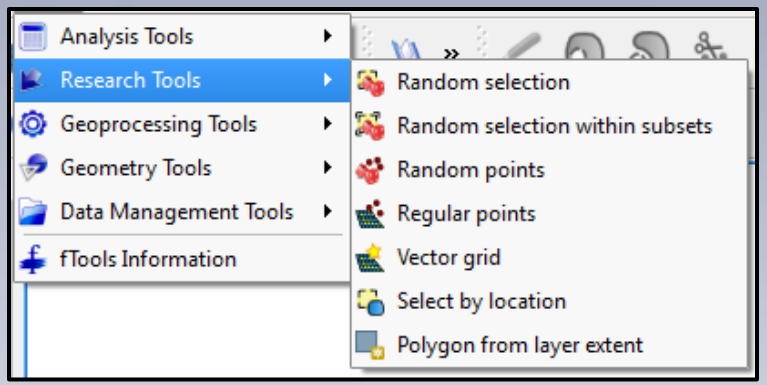
- Vectors
  - Right click in legend and “Save as shapefile…”
  - GRASS toolbox
    - File->Export->Export Vector->v.out.ogr
- Rasters
  - GRASS toolbox
    - File->Export->Export Raster->r.out.gdal.gtiff

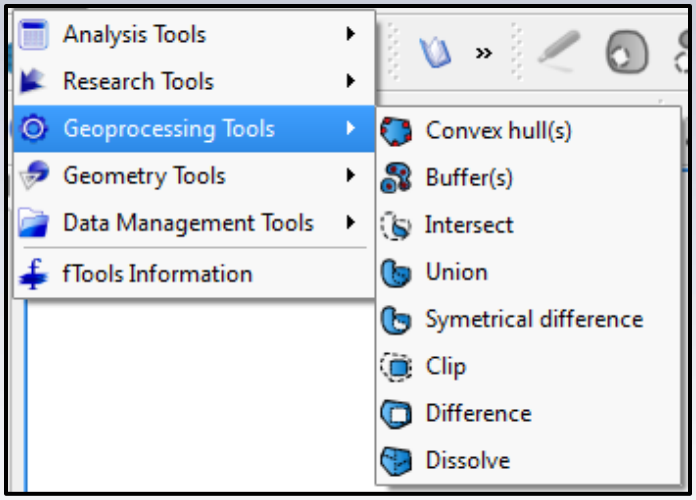
Extending

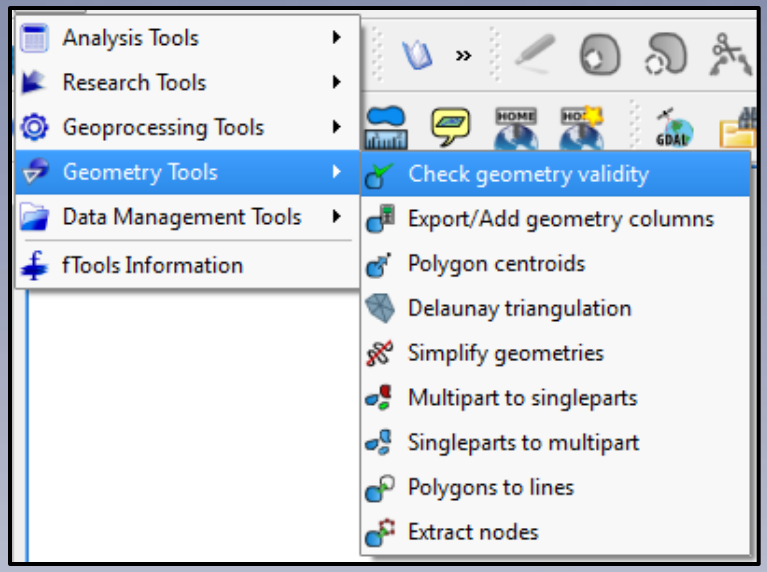
Slapping some Jelly on that dry sandwich…

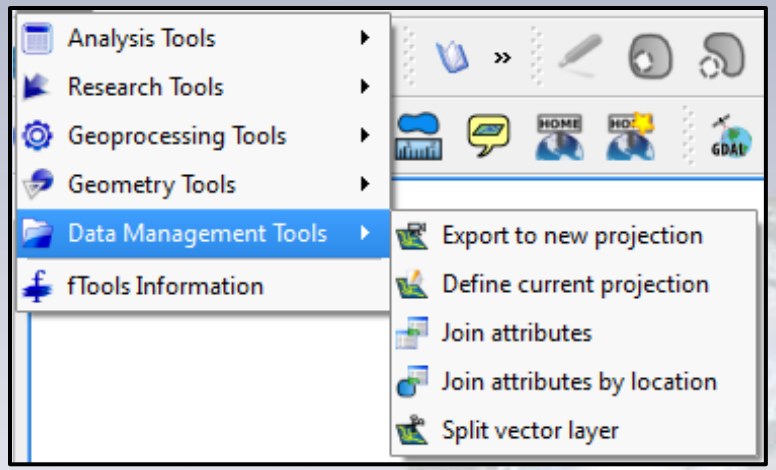
fTools Python Plugin
Carson Farmer


Analysis Tools
Research Tools
Geoprocessing Tools
Geometry Tools
Data Management Tools
fTools Information
Distance matrix
Sum line lengths
Points in polygon
List unique values
Basic statistics
Nearest neighbour analysis
Mean coordinate(s)
Line intersections


Analysis Tools
Research Tools
Geoprocessing Tools
Geometry Tools
Data Management Tools
fTools Information
Random selection
Random selection within subsets
Random points
Regular points
Vector grid
Select by location
Polygon from layer extent


Analysis Tools
Research Tools
Geoprocessing Tools
Geometry Tools
Data Management Tools
fTools Information
Convex hull(s)
Buffer(s)
Intersect
Union
Symetrical difference
Clip
Difference
Dissolve

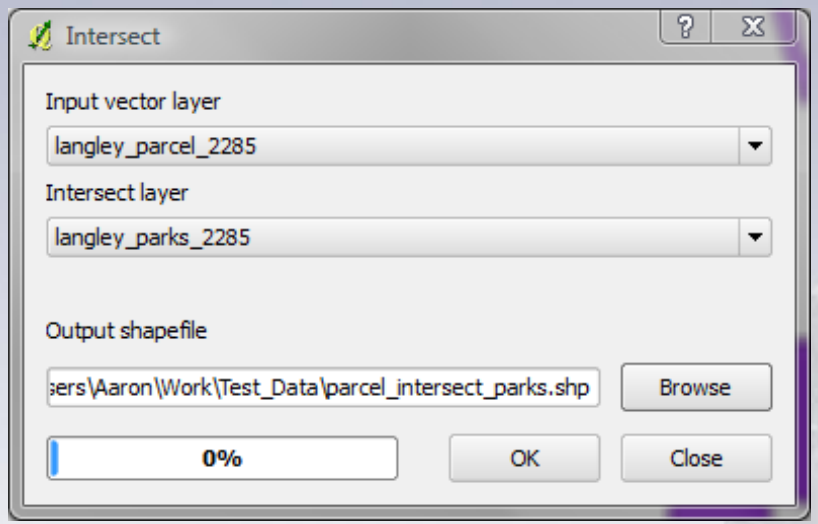

Analysis Tools
Research Tools
Geoprocessing Tools
Geometry Tools
Data Management Tools
fTools Information
Check geometry validity
Export/Add geometry columns
Polygon centroids
Delaunay triangulation
Simplify geometries
Multipart to singleparts
Singleparts to multipart
Polygons to lines
Extract nodes


Analysis Tools
Research Tools
Geoprocessing Tools
Geometry Tools
Data Management Tools
fTools Information
Export to new projection
Define current projection
Join attributes
Join attributes by location
Split vector layer

WOW

Intersect

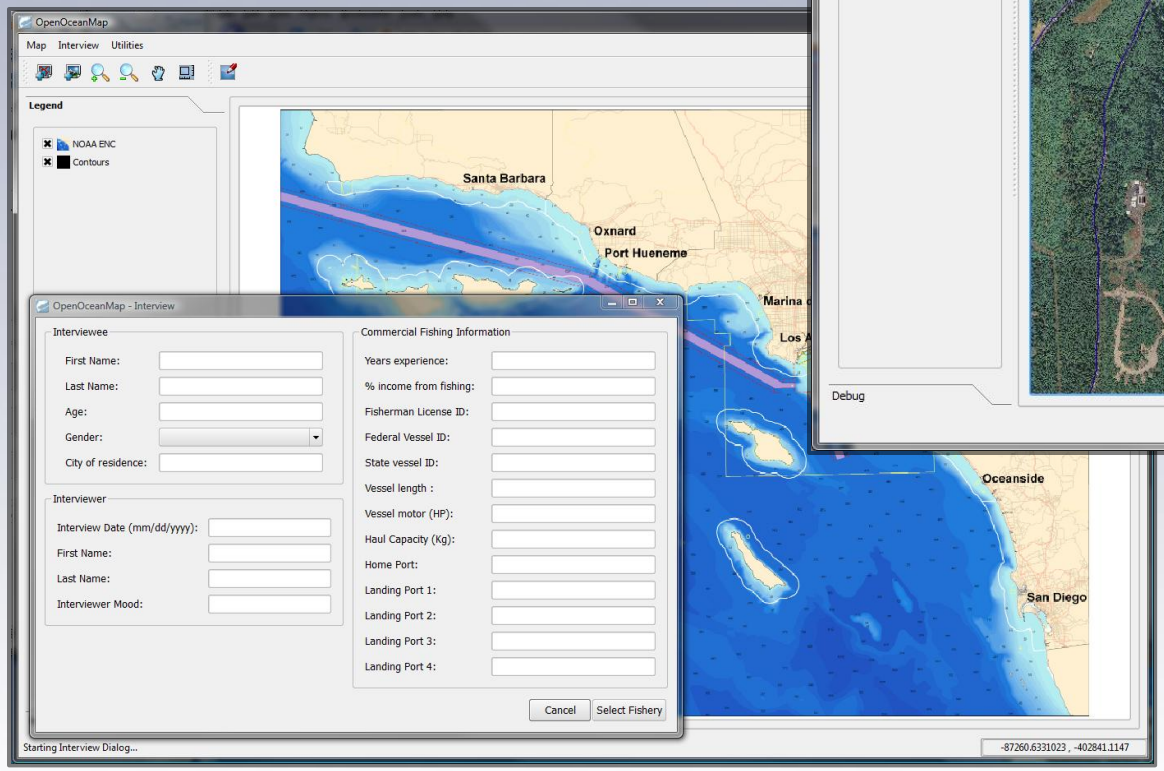
- “Get all parcels that intersect a park”
- Tools->Geoprocessing Tools->Intersect

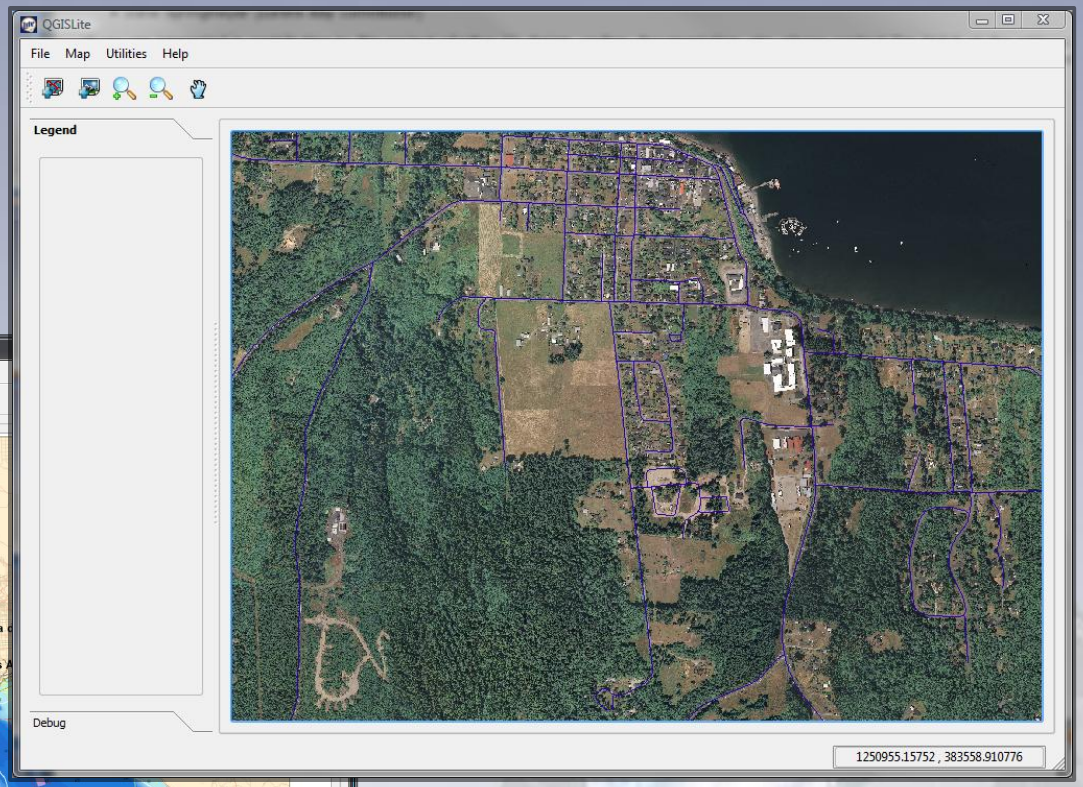


Embedding

Jelly on the outside… Peanut Butter on the inside…

OpenOceanMap





QGISLite

Other Formats

- Great support for PostGIS
- GDAL Plugins supported (.sid, .ecw, etc.)
- VRT's are your friend

Things we are still searching for…

- Great print production
  - New work on composer
  - Integration with Mapnik
- More spatial functions in Core or Python… less reliance on GRASS
- Raster “on the fly” projection
- Better labeling
- Relative paths in project files
- Many many many more …

References

PyQGIS

Bindings - http://wiki.qgis.org/qgiswiki/PythonBindings
API - http://doc.qgis.org/head/classes.html
QT API - http://doc.trolltech.com/4.5/index.html
PyQT Docs - http://www.riverbankcomputing.co.uk/static/Docs/PyQt4/pyqt4ref.html
SIP Docs - http://www.riverbankcomputing.co.uk/static/Docs/sip4/sipref.html

Official Plugin Repo - http://pyqgis.org/
Plugin Builder - http://pyqgis.org/builder/plugin_builder.py

Help

- #qgis on freenode IRC
- http://www.qgis.org/community/mailing-lists.html
- http://www.qgis.org/index.php
- http://blog.qgis.org/
- http://forum.qgis.org/
- https://trac.osgeo.org/qgis/

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