QGIS

Open Source GIS on the Desktop

qgis.org

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http://geoapt.com
http://locate.press

Slides: http://geoapt.net/usgs/USGS_2017.pdf

Let’s get this out of the way first…

How do you pronounce *QGIS*?

1. *Q-G-I-S*
2. *Q-jis*
3. *Q-giss (giss* as in *give)*

QGIS is Open Source

Sponsors of the 2017 Free and Open Source Software for GIS (FOSS4G) conference

QGIS is Mainstream

- Project is 15 years old with stable developer community
- Worldwide installed user base estimated to exceed 250K
    - Likely much higher
    - Difficult to track since there is no purchase or registration requirement
- Used by academia, NGOs, media, United Nations, NASA, NSA, and more
- Supported by both the community and commercial entities

A Brief History

- Project founded in 2002 as an open source endeavor
- Originally named “Quantum GIS” with QGIS acronym
- Primary motivation for creating: A PostGIS spatial database viewer on Linux
- First versions didn’t support other vector formats or rasters—no projection support or cartography capabilities
- Version 1.0 in 2007 added support for plugins written in Python
- Current Long Term Release (LTR) version is 2.14.x
- Latest release 2.18.13—will become LTR at 3.0 release
- Version 3.0 is due end of 2017

Project Governance

- QGIS Board (legal entity)
- QGIS Project Steering Committee (PSC)
- PSC consists of a number of positions, including:
    - Chair and Co-chair
    - Release Manager
    - Treasurer
    - Infrastructure Manager
    - Design Adviser
- The PSC manages the project and it’s goals/direction, with continual involvement of the community

Development

- Currently 38 developers with direct commit access
- 240 contributors overall (submit patches, pull requests, etc)
- Translators—QGIS supports 39 languages

Cross Platform by Design

- Decision of language and toolkit driven by cross platform requirement

- Core is written in C++, with Python interface to the majority of classes

- Uses the Qt widget library

- Runs on Windows and any POSIX system: Linux, Fedora, Mac OSX, Unix

Versions

- The QGIS team maintains long-term, release, and development versions
- The long term versions are called “Long Term Release” (LTR) and maintained with patches for a period of 3-4 years
- Release versions build upon the LTR and eventually lead to another long-term version
- The development version is the bleeding edge code
    - Prior to release, available by nightly or weekly snapshots
- Release schedule can be found under “Get Involved” on qgis.org

License and Fees

- Cost: $0
- Annual maintenance fee: $0
- Upgrade fee: $0
- License: GNU General Public License
  - www.gnu.org/licenses

Data Formats

QGIS Supports tons of data formats

- Access to data stores is through a *data provider*

- The provider is written using a standard interface, and serves as the bridge between QGIS and the data

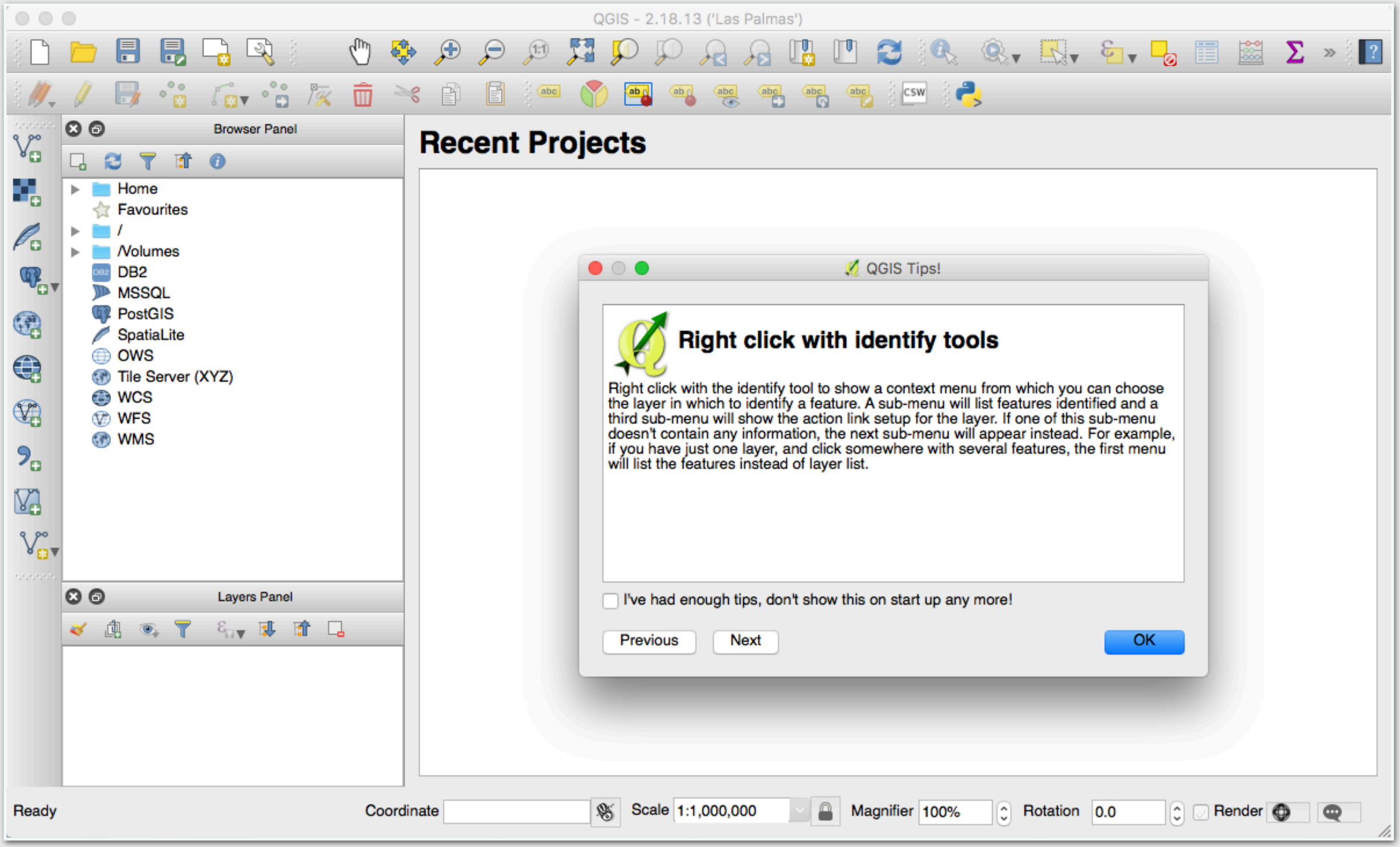
- Currently data providers are written in C++

Data Providers

- **ArcGIS Feature Server provider**
- **ArcGIS Map Server provider**
- **DB2 Spatial Extender provider**
- **Delimited text data provider**
- **GDAL provider (134 raster formats)**
- **GPS eXchange format provider**
- **GRASS 7 raster provider**
- **GRASS 7 vector provider**
- **MSSQL spatial data provider**
- **Memory provider**
- **OGC Web Coverage Service provider**
- **OGC Web Map Service data provider**
- **OGR data provider (78 vector formats)**
- **OWS meta provider**
- **PostgreSQL/PostGIS data provider**
- **SpatiaLite data provider**
- **Virtual layer data provider**
- **WFS data provider**

New in QGIS 3.0

QGIS at Startup

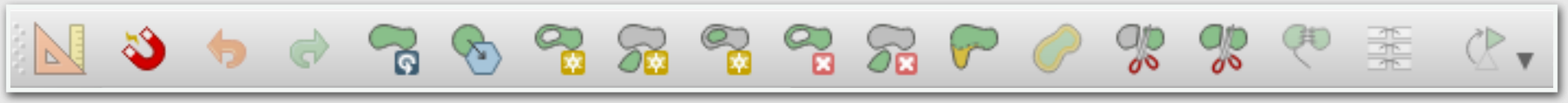


Features

A few of them anyway…

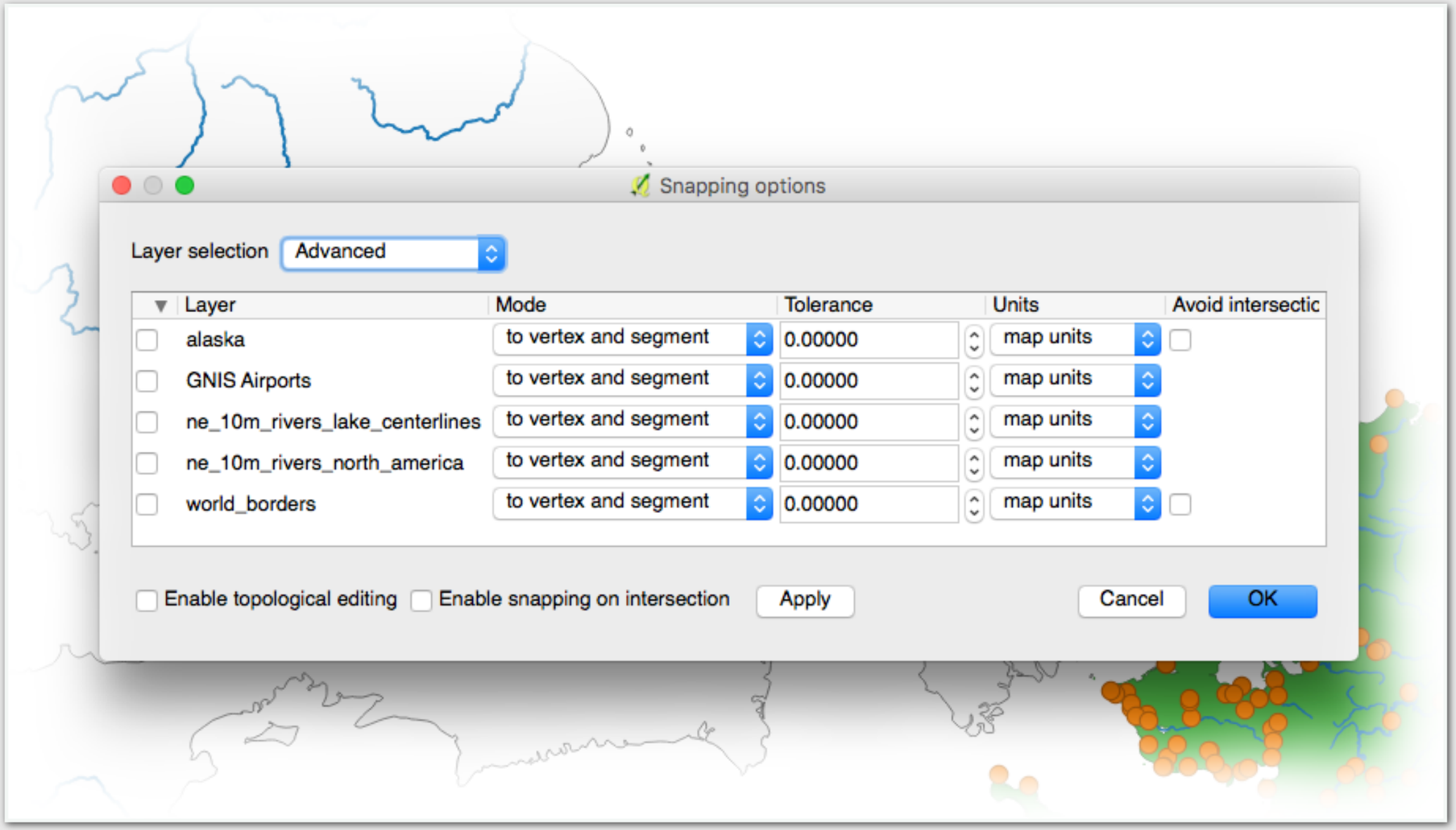
- Advanced digitizing/editing tools
- Advanced layer rendering/styling
- Expression-based viewing/filtering/styling
- Query Builder
- Data defined settings for nearly all styling/labeling settings
- Feature-rich labeling
- Map compositions
- Export map canvas/composition to image formats
- Vast array of Python plugins to extend capabilities
    - Fully extensible through Python scripts and plugins
- Graphic modeler for geoprocessing
- Export to web map (OpenLayers or Leaflet)
- QGIS Server—web map server for QGIS projects

Advanced Editing Tools



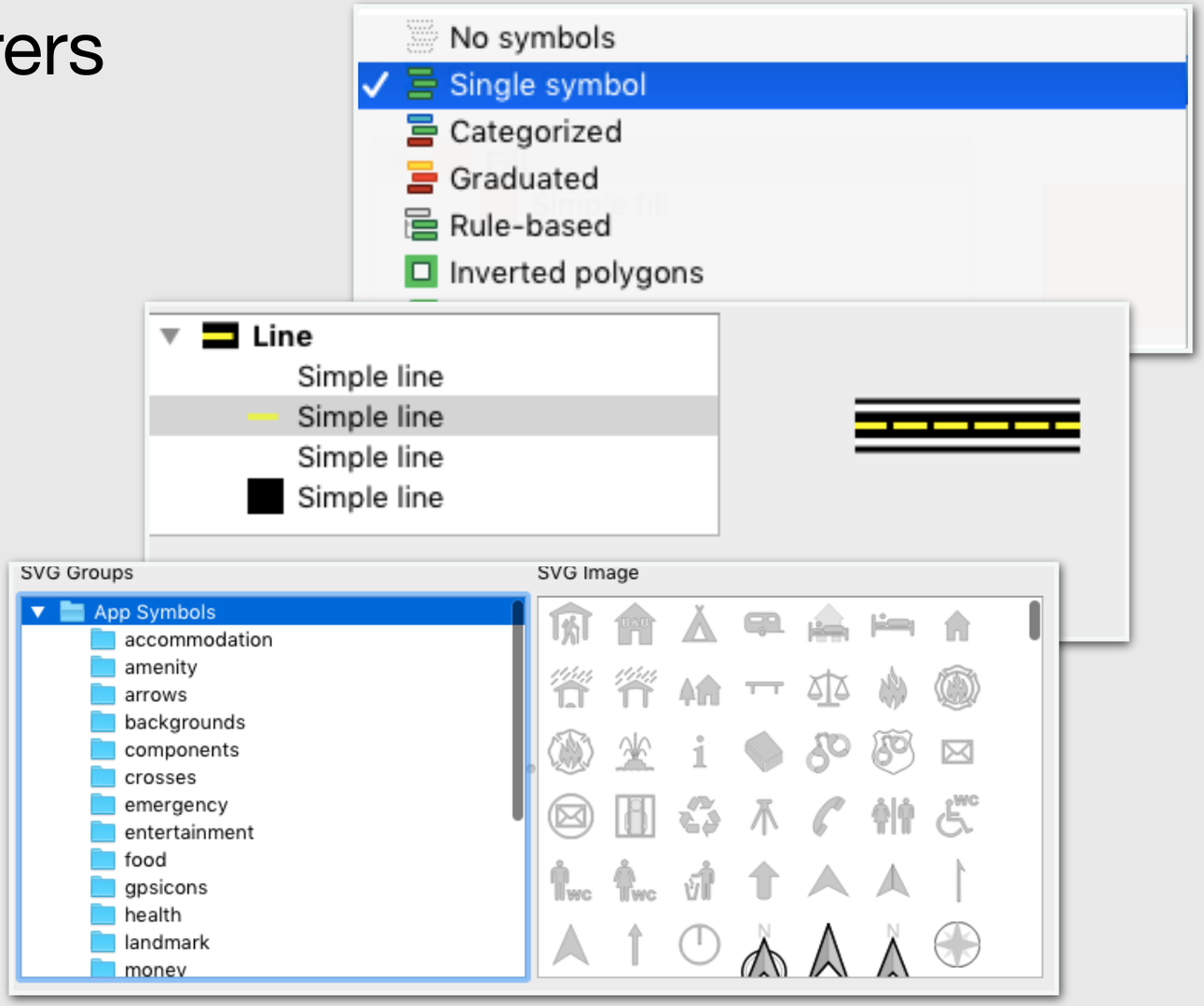
- Tracing
- Undo/redo
- Rotate features
- Simplify features
- Add ring
- Add part
- Fill ring
- Delete ring
- Delete part
- Reshape features
- Offset curve
- Split features
- Split parts
- Merge attributes
- Rotate point symbols

Topology

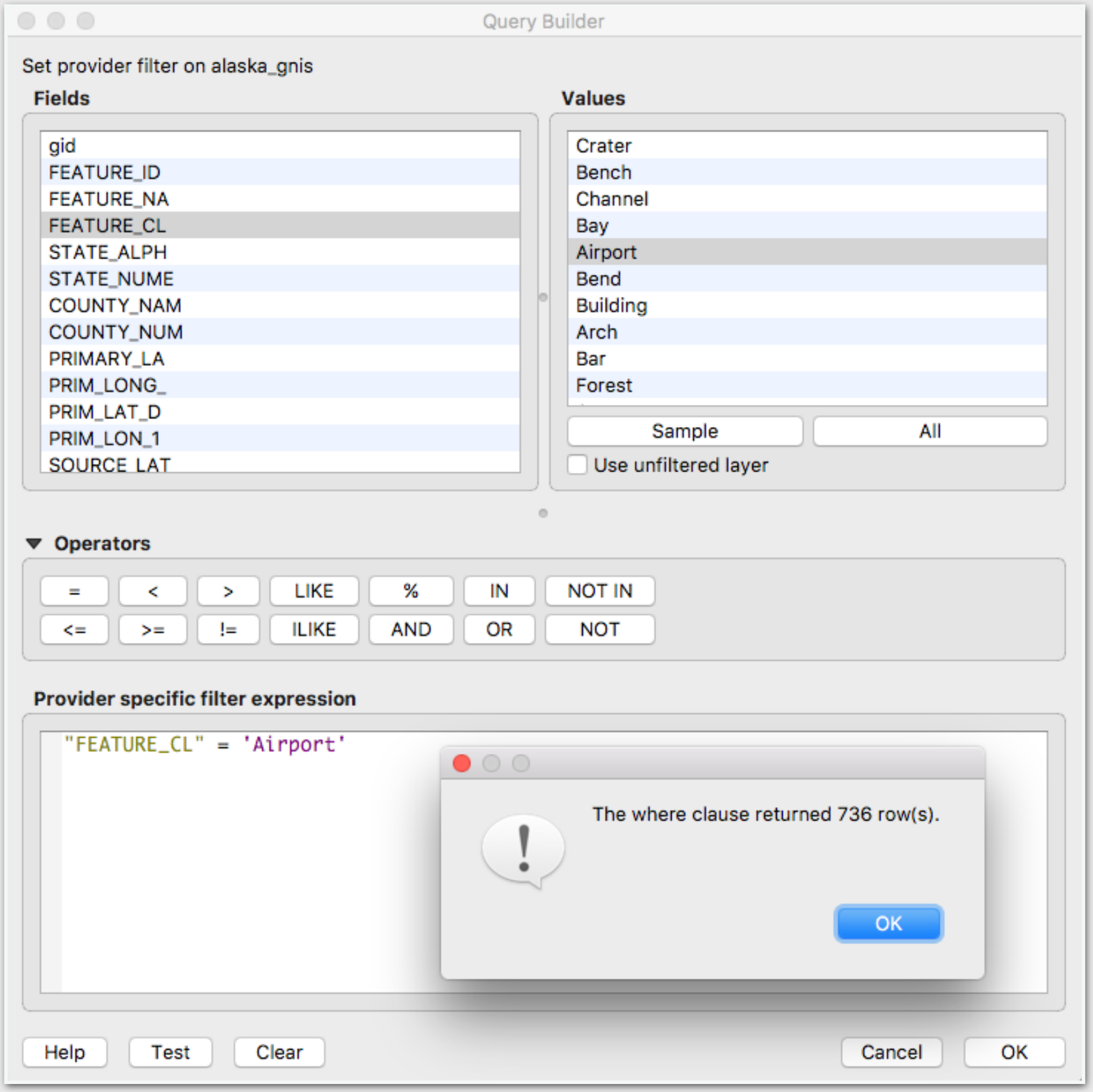

Snapping options
Layer selection
Advanced
Layer
Mode
Tolerance
Units
Avoid intersectic
alaska
to vertex and segment
0.00000
map units
GNIS Airports
to vertex and segment
0.00000
map units
ne_10m_rivers_lake_centerlines
to vertex and segment
0.00000
map units
ne_10m_rivers_north_america
to vertex and segment
0.00000
map units
world_borders
to vertex and segment
0.00000
map units
Enable topological editing
Enable snapping on intersection
Apply
Cancel
OK

Layer Styling

- QGIS has multiple renderers
- Rule-based renderers
- Layered symbols
- SVG symbol libraries



Query Builder



Labels

- Font, size, opacity
- Word wrap
- Placement options and offsets
- Buffers and drop shadows
- Backgrounds (rectangle, square, ellipse, circle, SVG)
- Expression-based labeling
- Scale dependent rendering

QGIS edf7346

Layers Panel

- ne_10m_rivers_north_ameri...
- ne_10m_rivers_lake_centerl...
- rivers
- lakes
- alaska

Layer Styling

ne_10m_rivers_north_america

Show labels for this layer

Label with name || ' River'

abc

Buffer

Draw text buffer

Size 1.0000

Millimeter

Color

Color buffer's fill

Opacity 100.0 %

Pen join style Round

Blend mode Normal

Draw effects

Live update Apply

Chulitna River

Susitna

Yentna River

Matanuska River

Copper

Lake George

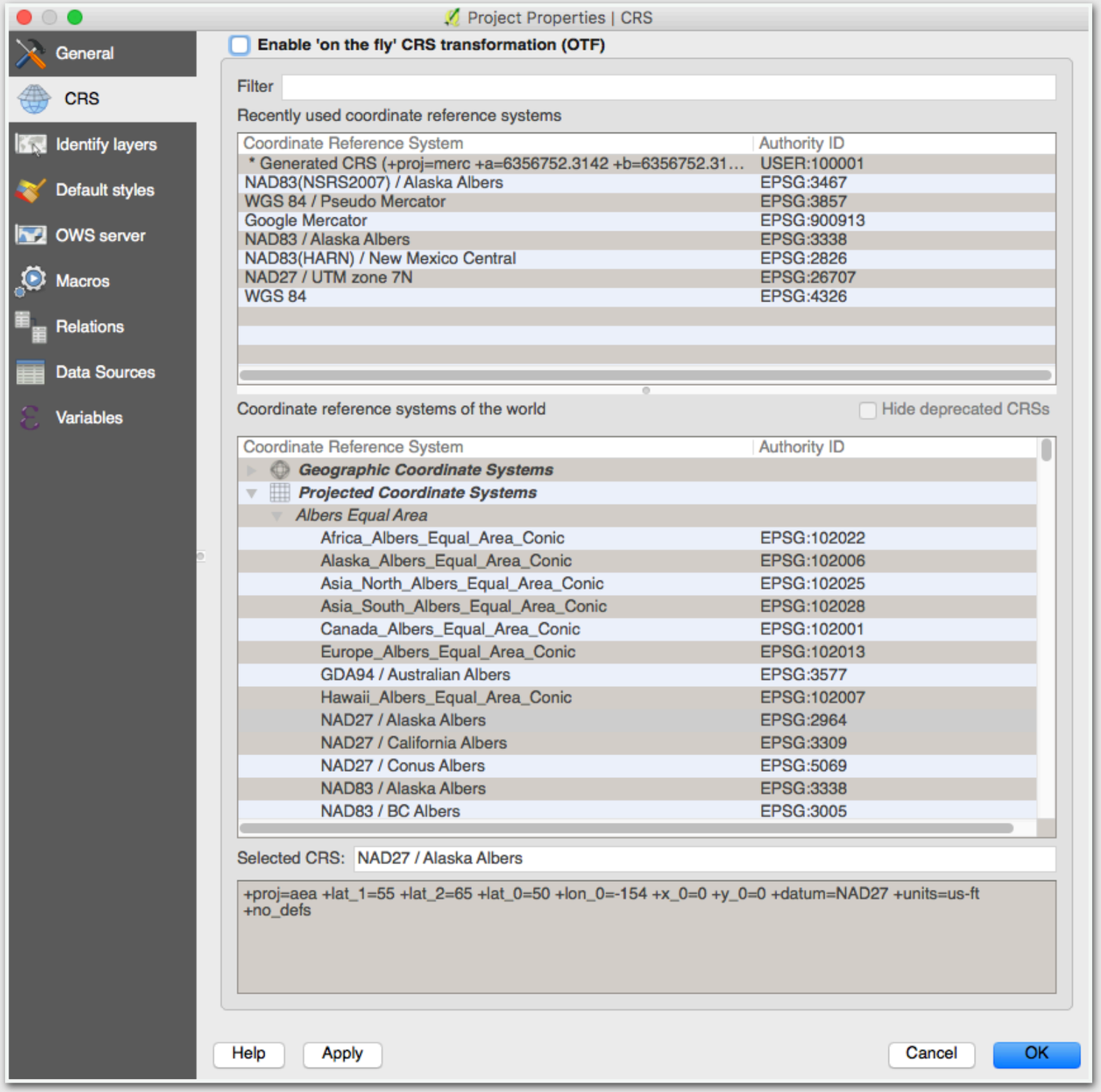
Skilak Lake

Kenai Lake

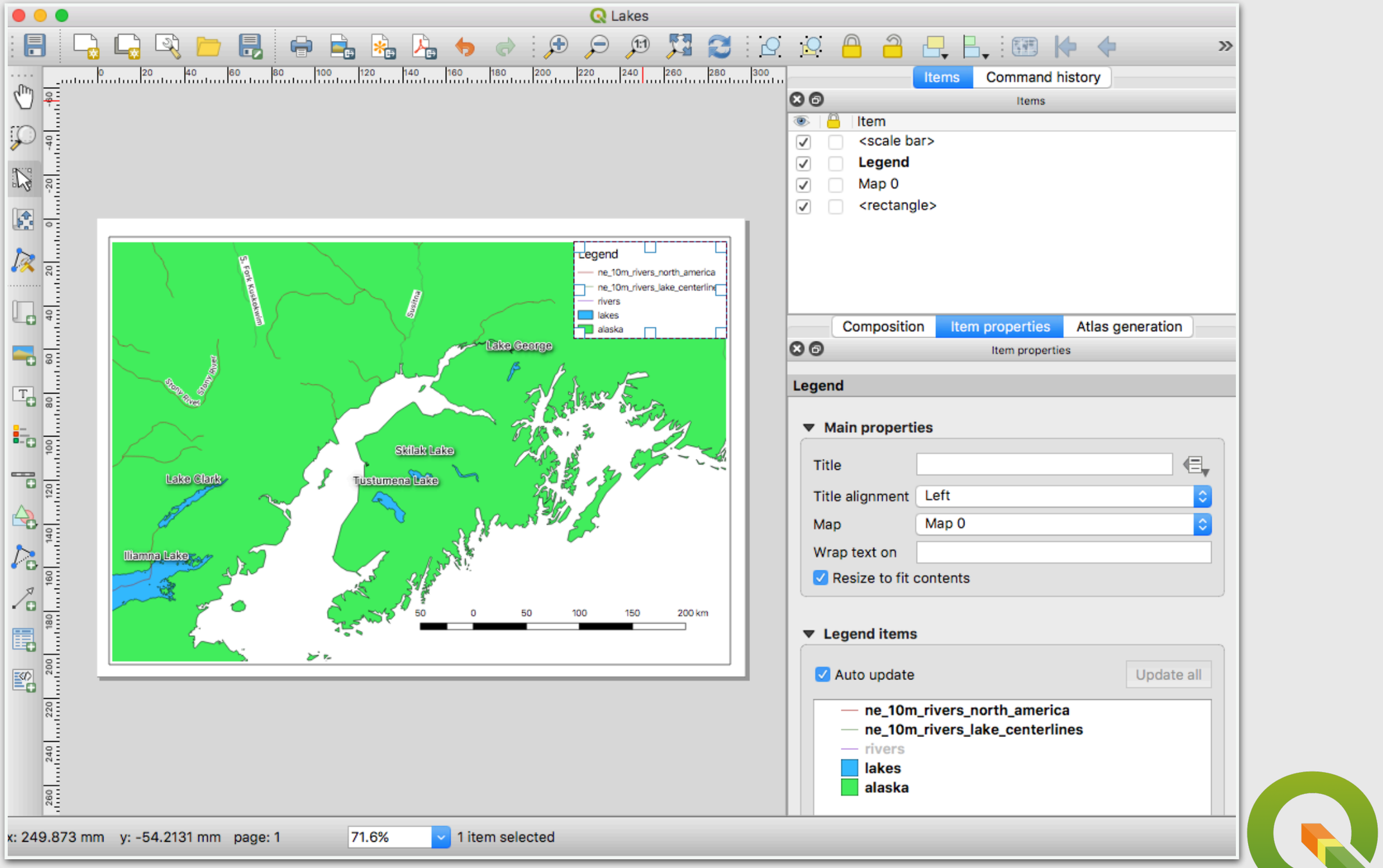
Tustumena Lake

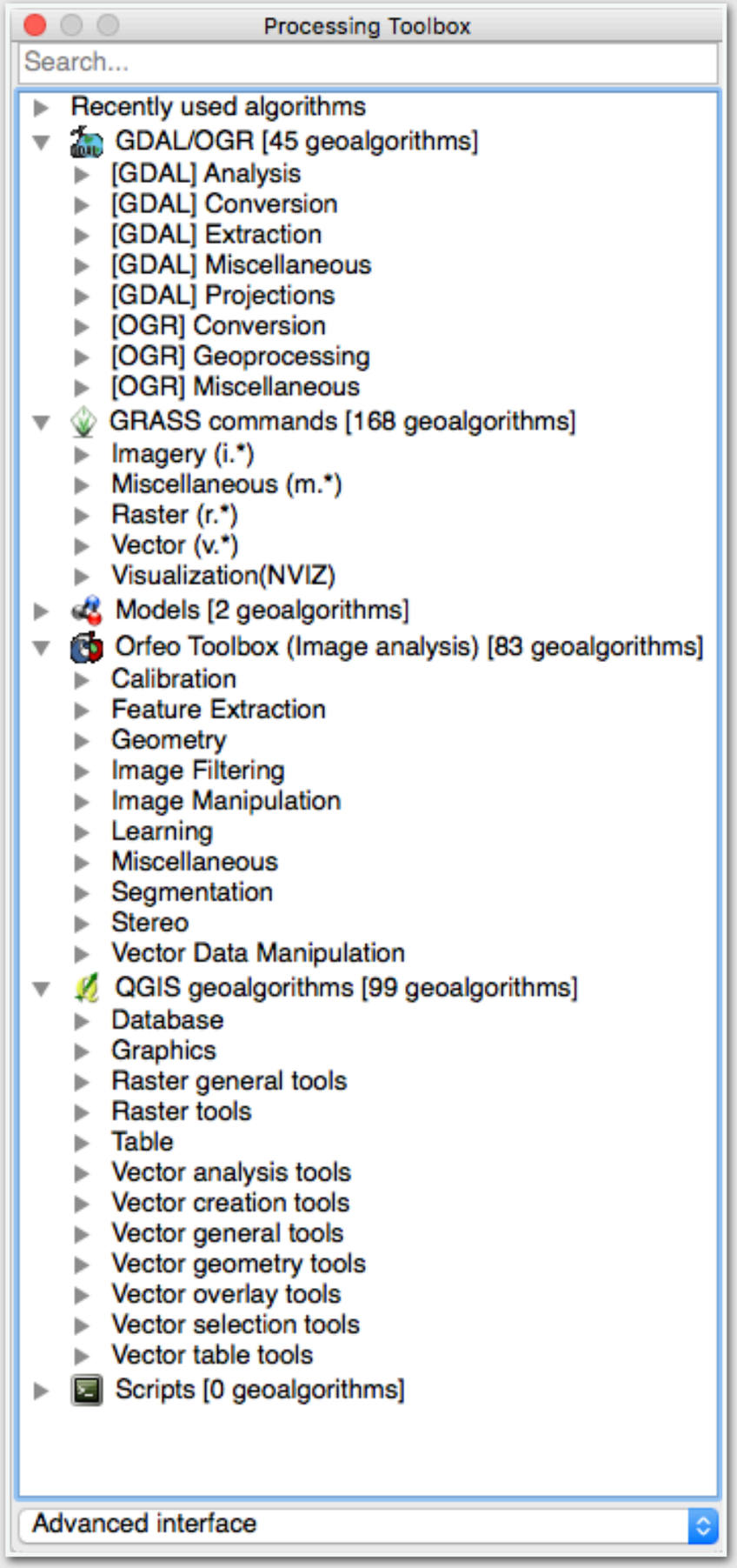
Type to locate (⌘K) Ready Coordinate 311440,3862082 Scale 1:1,287,599 Magnifier 100% Rotation 0.0 ° Render EPSG:2964

Projections



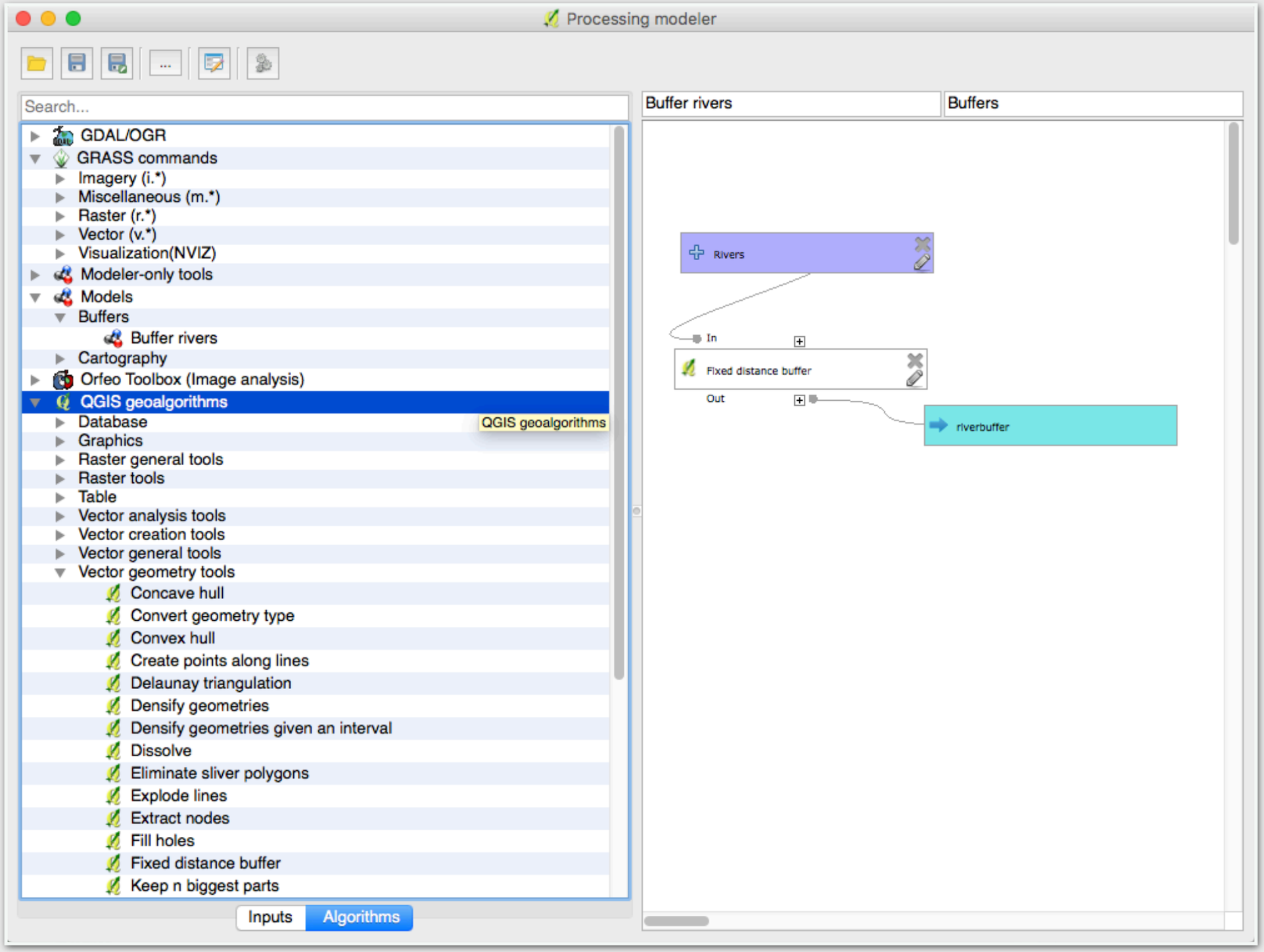
Cartography





Processing and Analysis Tools

Modeler


Processing modeler
Search...
GDAL/OGR
GRASS commands
Imagery (i.*)
Miscellaneous (m.*)
Raster (r.*)
Vector (v.*)
Visualization(NVIZ)
Modeler-only tools
Models
Buffers
Buffer rivers
Cartography
Orfeo Toolbox (Image analysis)
QGIS geoalgorithms
Database
Graphics
Raster general tools
Raster tools
Table
Vector analysis tools
Vector creation tools
Vector general tools
Vector geometry tools
Concave hull
Convert geometry type
Convex hull
Create points along lines
Delaunay triangulation
Densify geometries
Densify geometries given an interval
Dissolve
Eliminate sliver polygons
Explode lines
Extract nodes
Fill holes
Fixed distance buffer
Keep n biggest parts
QGIS geoalgorithms
Inputs
Algorithms
Buffer rivers
Buffers
Rivers
In
Fixed distance buffer
Out
riverbuffer

Web Mapping

- Two options:
  - Using the qgis2web plugin
  - QGIS Server

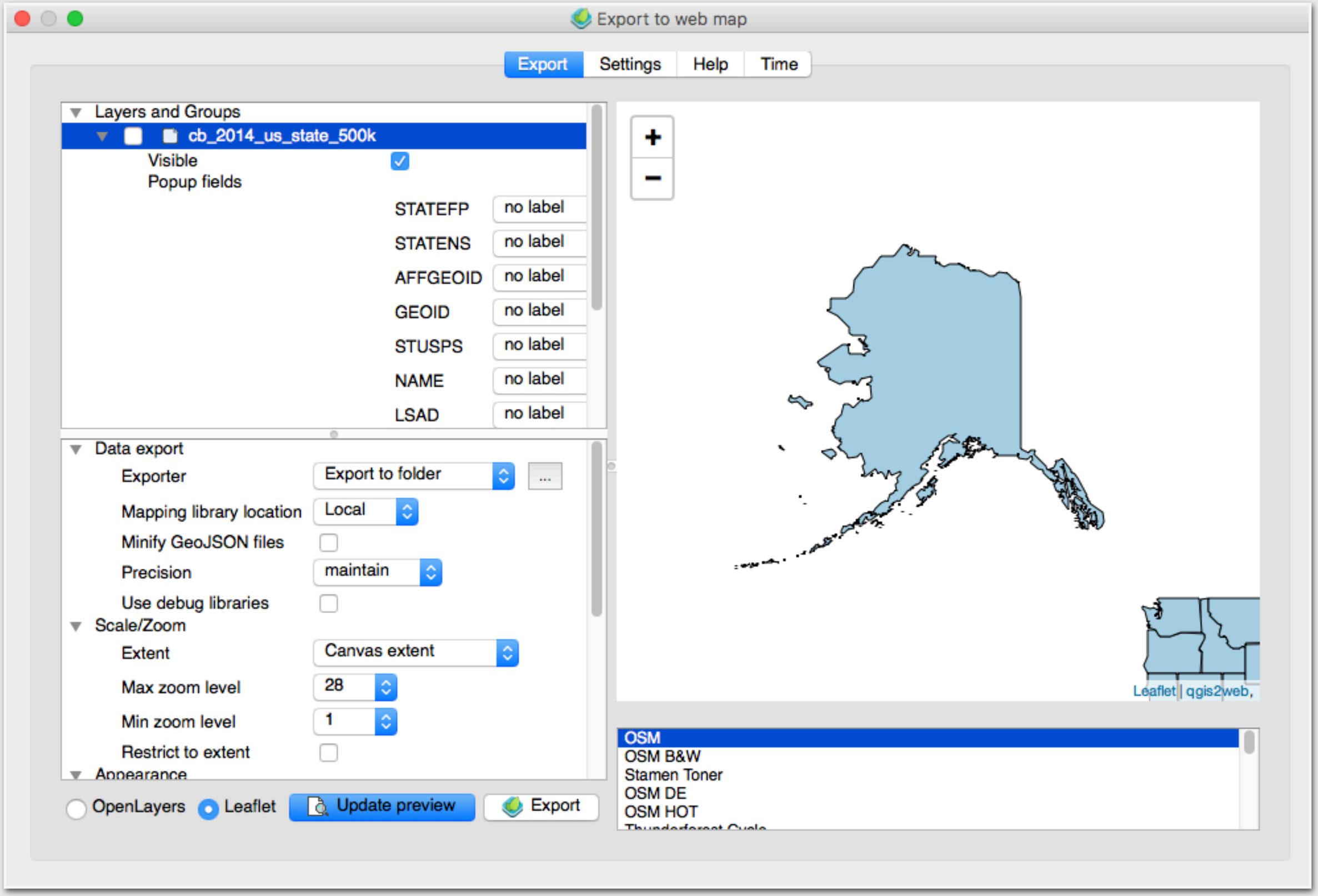
Web Mapping
qgis2web

- Generates a web map from your current QGIS project

- Can be used with either OpenLayers or Leaflet

- No server-side software required

qgis2web


Export to web map
Export
Settings
Help
Time
Layers and Groups
cb_2014_us_state_500k
Visible
Popup fields
STATEFP
STATENS
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STUSPS
NAME
LSAD
no label
Data export
Exporter
Export to folder
...
Mapping library location
Local
Minify GeoJSON files
Precision
maintain
Use debug libraries
Scale/Zoom
Extent
Canvas extent
Max zoom level
28
Min zoom level
1
Restrict to extent
Appearance
OpenLayers
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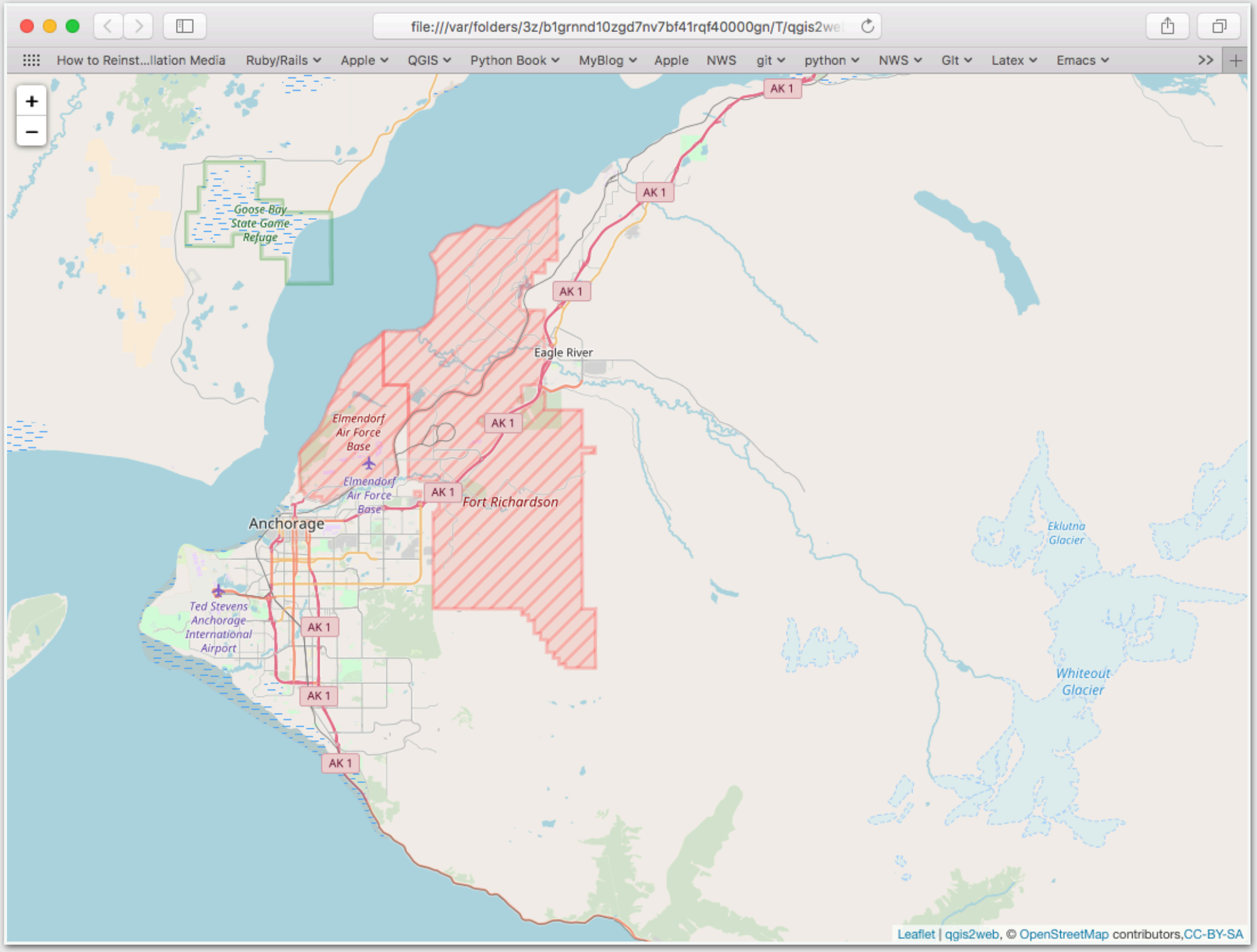
OSM HOT

qgis2web


file:///var/folders/3z/b1grnnd10zgd7nv7bf41rqf40000gn/T/qgis2web
How to Reinst...llation Media
Ruby/Rails
Apple
QGIS
Python Book
MyBlog
Apple
NWS
git
python
NWS
Git
Latex
Emacs
AK 1
Goose Bay State Game Refuge
Eagle River
Elmendorf Air Force Base
Fort Richardson
Anchorage
Ted Stevens Anchorage International Airport
Eklutna Glacier
Whiteout Glacier
Leaflet | qgis2web, © OpenStreetMap contributors,CC-BY-SA

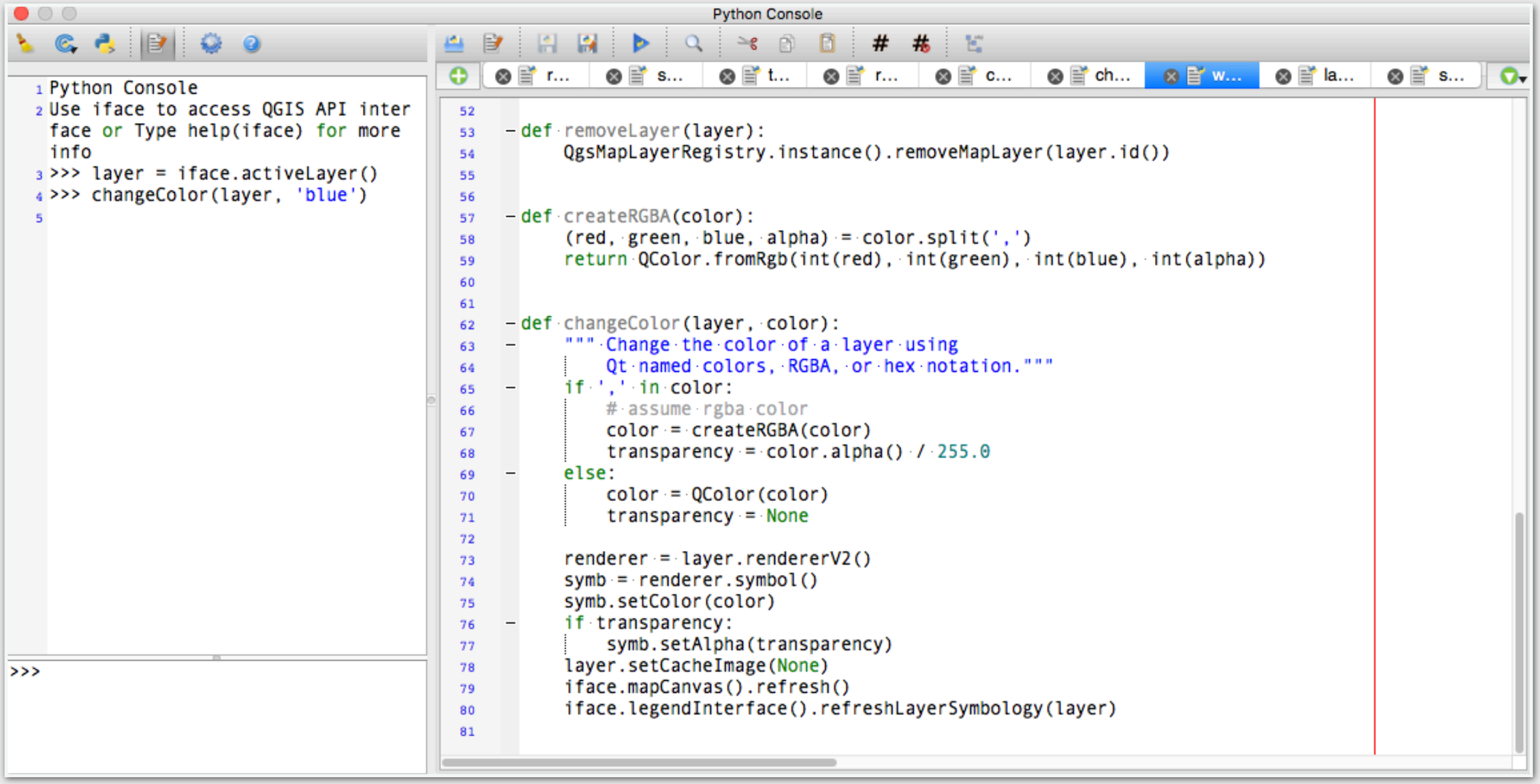
Web Mapping
QGIS Server

- QGIS Server is an open source WMS 1.3, WFS 1.0.0 and WCS 1 1.1.1 implementation
- Publishes your QGIS project to the web
- Implements advanced cartographic features for thematic mapping
- Is a FastCGI/CGI (Common Gateway Interface) application written in C++
- Works together with a web server (e.g., Apache, Lighttpd)
- Requires server side deployment

Python

- QGIS has Python bindings to most of the underlying API
- The Python Console allows you to interact directly with QGIS
- Includes a script editor

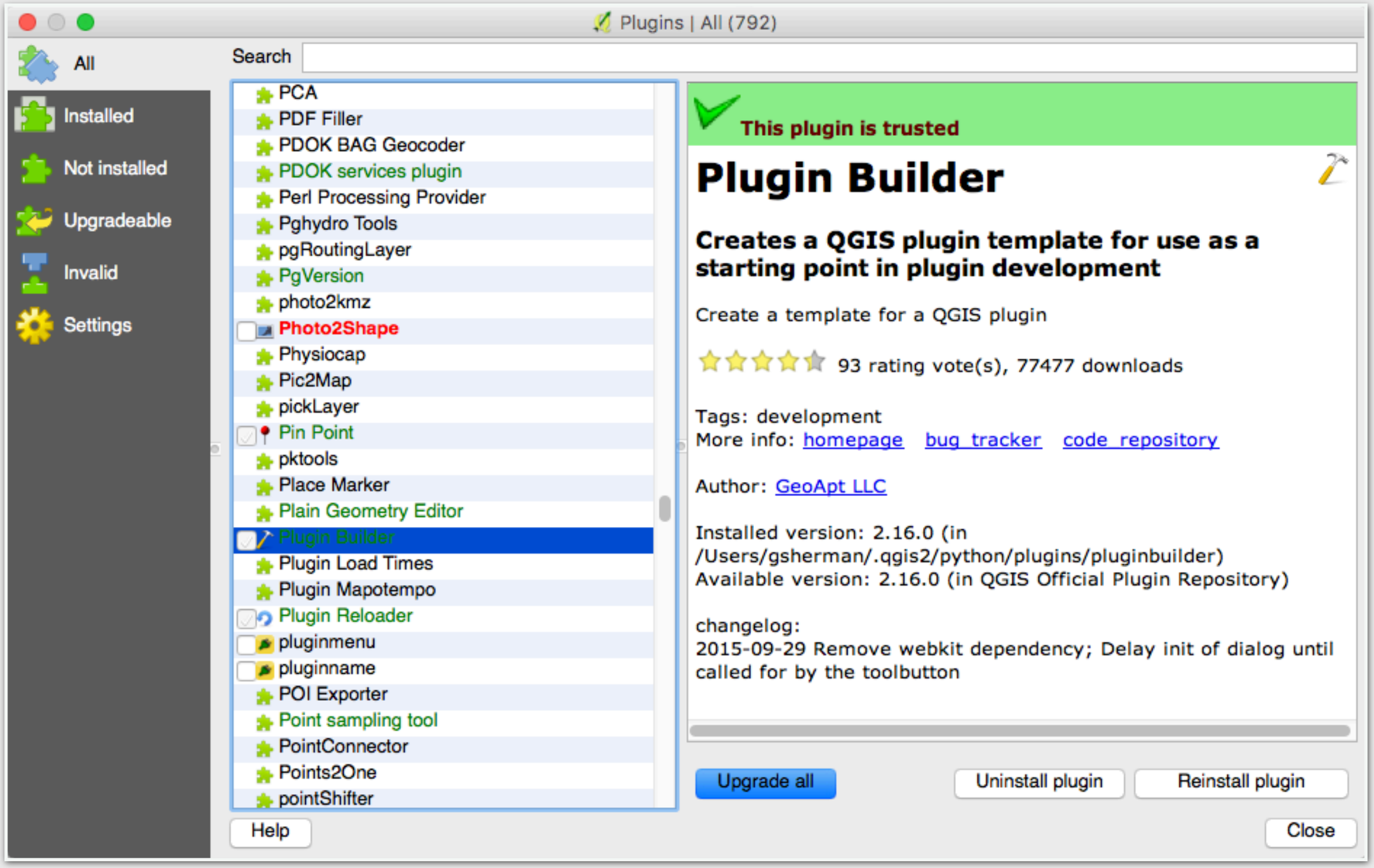
Python Console



Extending with Python

- Plugins have access to the majority of the QGIS API
- User contributed plugins are stored in a repository, accessible from the QGIS Plugin Manager
- The repository currently houses over 800 plugins, targeting QGIS 1.x through 3.x

Extending with Python



Future Roadmap

QGIS 3.x

- Change widget toolkit (GUI) from Qt4 to Qt5
- Change from Python 2.7 to Python 3.x
- This breaks the underlying API, requiring update to existing Python scripts and plugins
- Why the move?
- Qt4 and Python 2 are going away
  - Python 2.7 end of life: 2020
  - There will be no 2.8
  - Qt4 already at end of life

“End of life”

- No new versions
- No patches or fixes
- No support

What’s New in 3.0

- Live layer styling via the Layer Styling panel

  This has been backported into 2.18

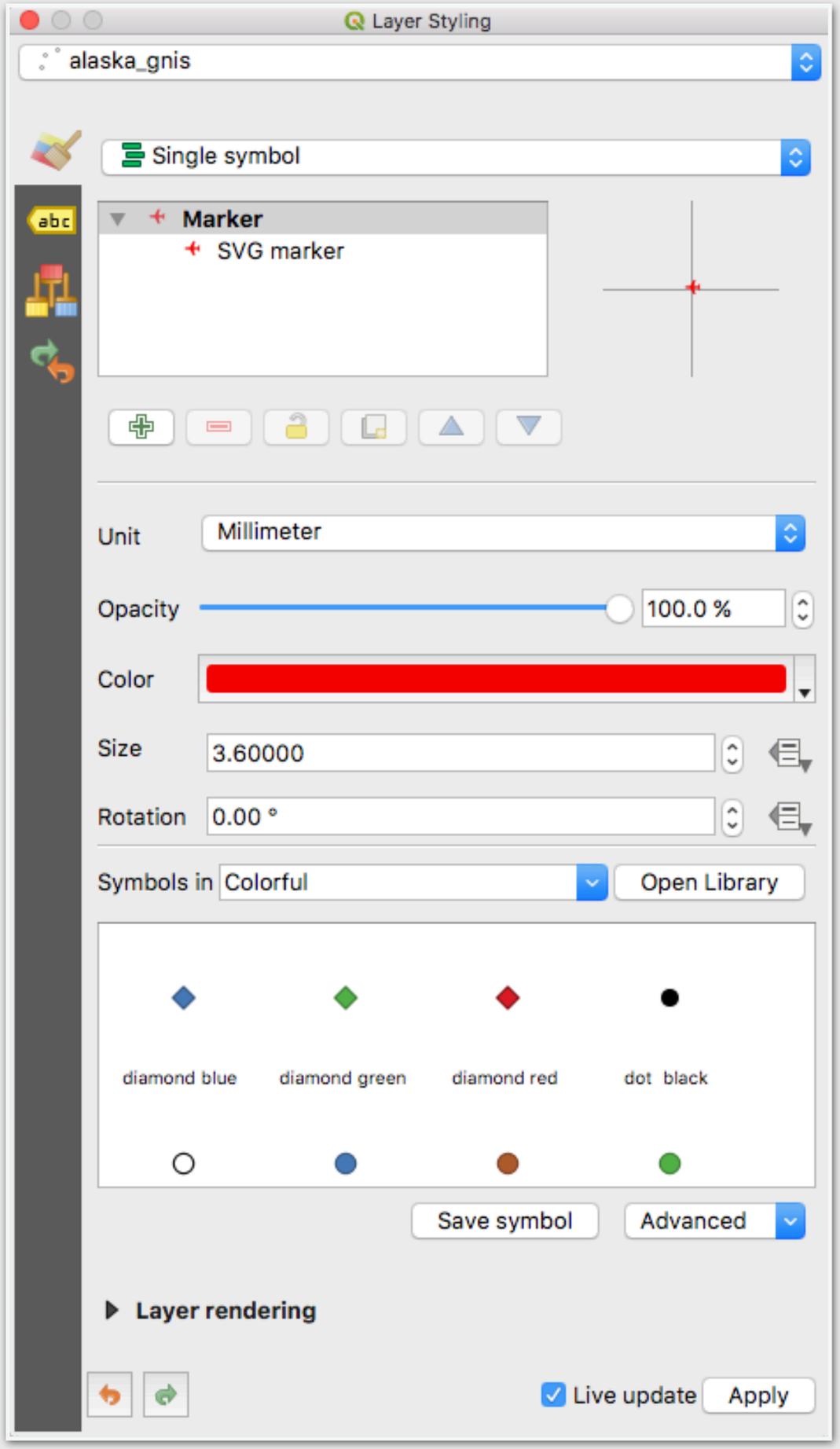
- Unified Data Source Manager/Browser

- New symbols and predefined symbol groups

- Save map images at custom sizes

- 3D support

- A whole lot more…



Live Layer Styling

QGIS edf7346

Layers Panel

alaska_gnis

alaska

Overview Panel

Layer Styling

alaska_gnis

Single symbol

Marker

SVG marker

Unit Millimeter

Opacity 100.0 %

Color

Size 3.60000

Rotation 0.00 °

Symbols in Colorful Open Library

diamond blue diamond green diamond red dot black

Save symbol Advanced

Layer rendering

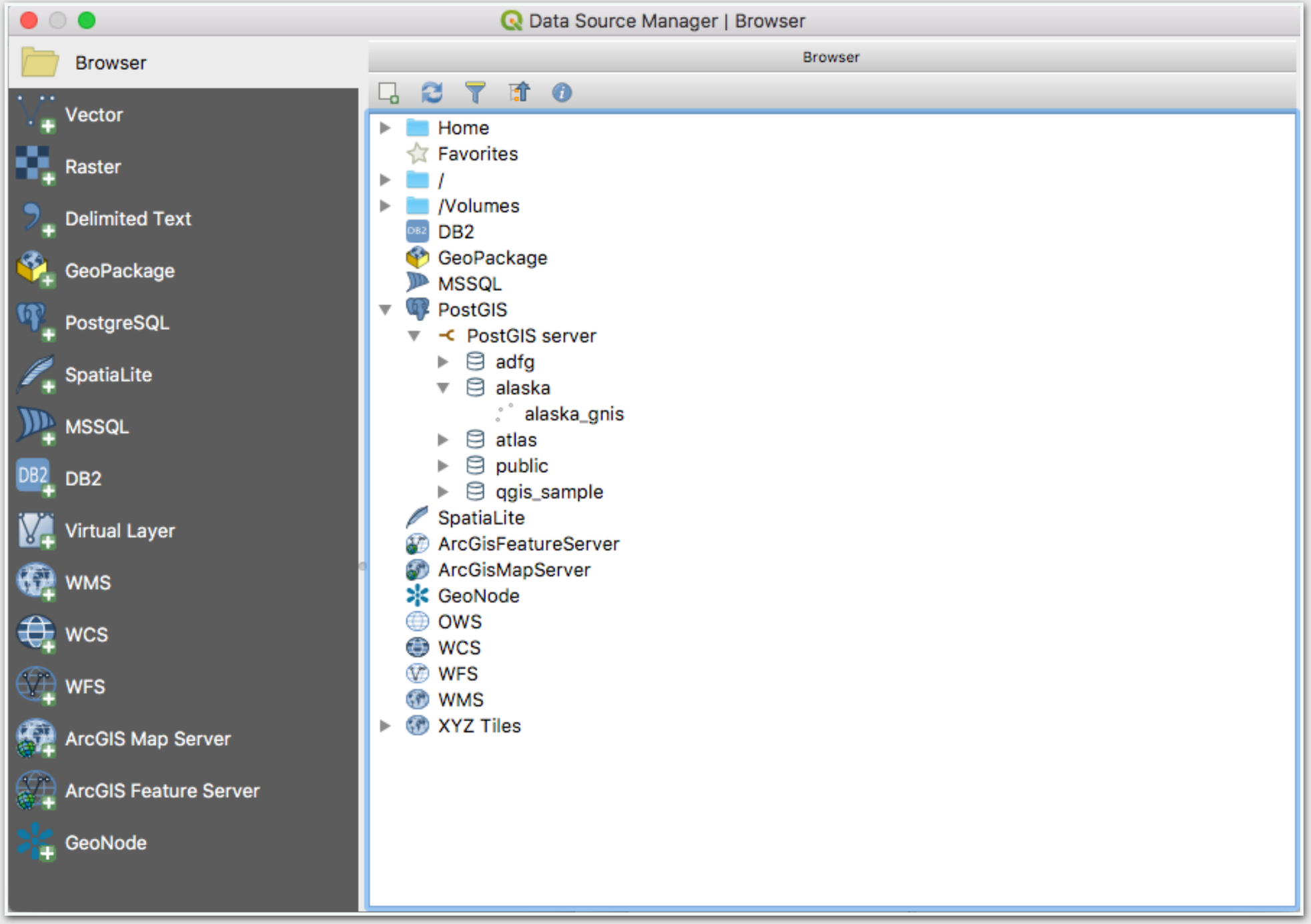
Live update Apply

There is a new plugin available

Type to locate (⌘K)

Ready Coordinat 602244,1399144 ical 1:6,774,145 agnifi 100% otati 0.0 ° Render EPSG:3338

Unified Browser



Support

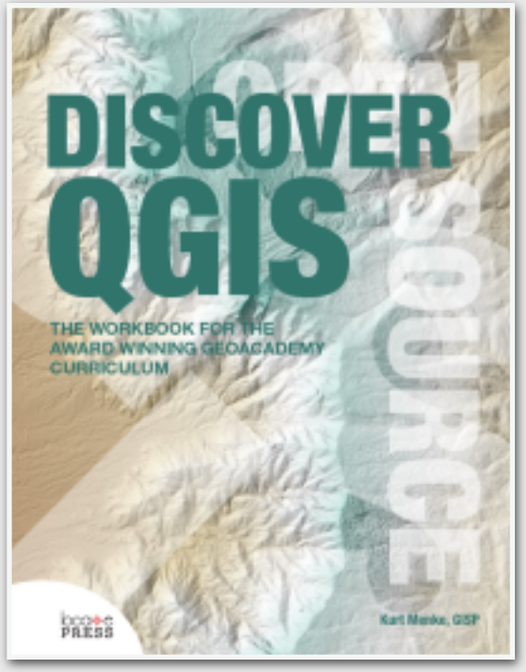
- Mailing lists (searchable)
- StackExchange (gis.stackexchange.com)
- Chat—#qgis channel on freenode.net (IRC)
- User Groups
- Website
- Commercial support (see list on qgis.org)

Try it

- **Install the current release 2.18.13 from download.qgis.org**
  - Windows, Mac, Linux
- **Install the nightly development build (soon to be 3.0) using the OSGeo4W installer**
  - Download Windows OSGeo4W Network Installer (download.qgis.org)
  - Select Advanced Install, then choose qgis-dev from the list of Desktop Packages
- **OSgeo Live (live.osgeo.org)**
  - Self-contained bootable DVD, USB thumb drive or Virtual Machine
  - Try QGIS and a bunch of other FOSS4G software without installing anything
- **Portable GIS (portablegis.xyz)**
  - Windows-only set of FOSS4G packages ready to install or copy onto a USB stick

Books

(shameless plug)



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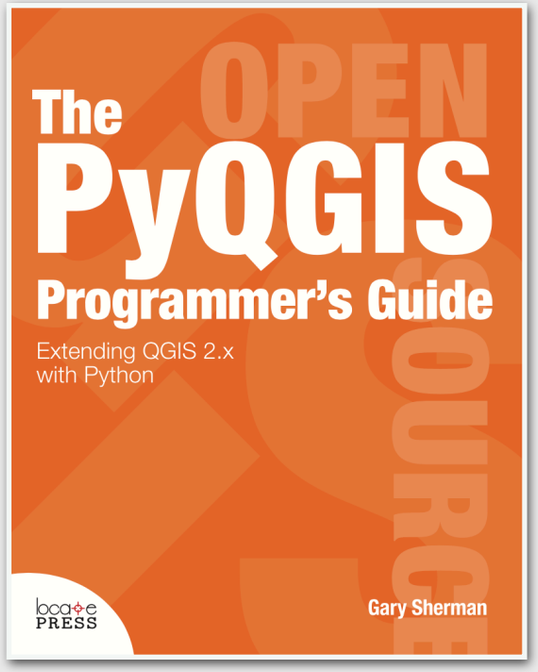

http://geoapt.net/usgs/USGS_2017.pdf