There and back again

Using uDig to perform real world tasks

Foss4G 2008 Lab

Version	Date	Auteur(s)	Etat
1.0	16.09.2008	JER	Valide

Table of Contents

1 Introduction

Two of the main reasons to use a Desktop GIS application rather than a Rich Internet Application like MapFish or CartoWeb are: Better desktop integration and extra processing power provided by desktop (or laptop) computer. This workshop aims to introduce some of the features of uDig that differentiates it from other applications.

Topics covered will include
- Constructing maps from local and web-based sources.
- Editing the vector data.
- Feature Buffering and layer intersection
- SLD styling basics
- Copying data between services, for example copying features between shapefiles, Web Feature Servers and PostGIS

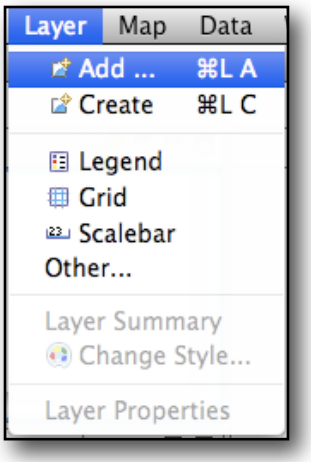
If this lab is too fast paced you can obtain introductory walkthoughs one the uDig website:
- Walkthrough 1 -- Introduction to uDig
- Walkthrough 2 -- Introduction to Editing

2 Introducing uDig

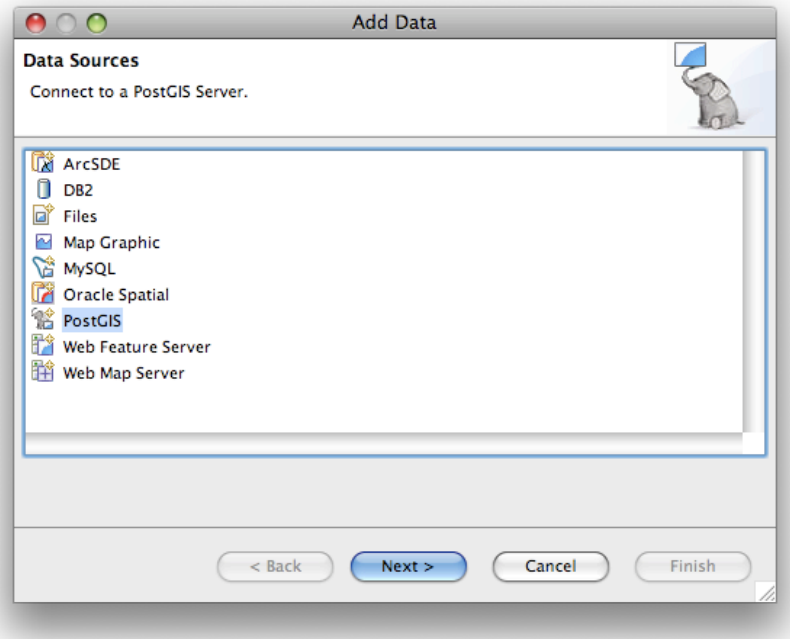
In this starting section we will learn various ways of constructing map with uDig. The goal is to lean how to quickly and efficiently construct maps so that you can start performing the valuable tasks that you have been assigned.

Add Postgis Layer

- To open the Add Data wizard, select the menu item **Layer > Add**

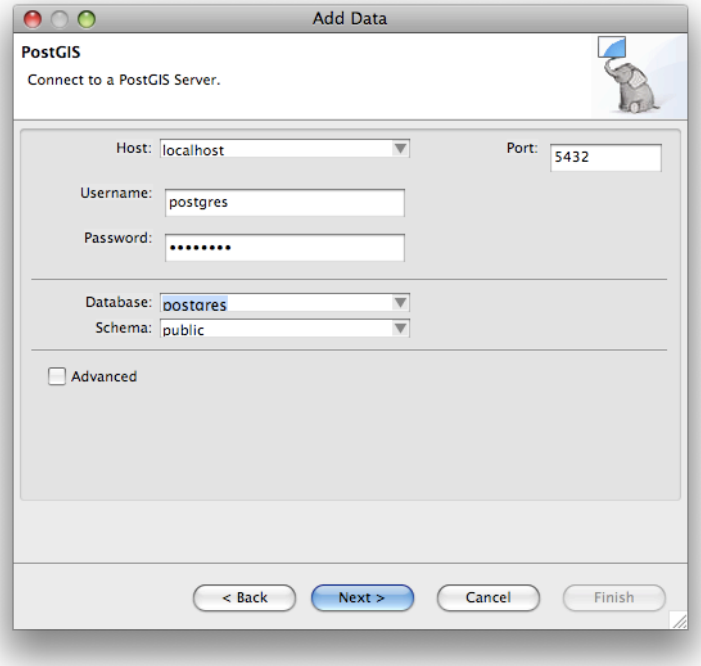


- Select the **PostGIS** option and press the **Next** button

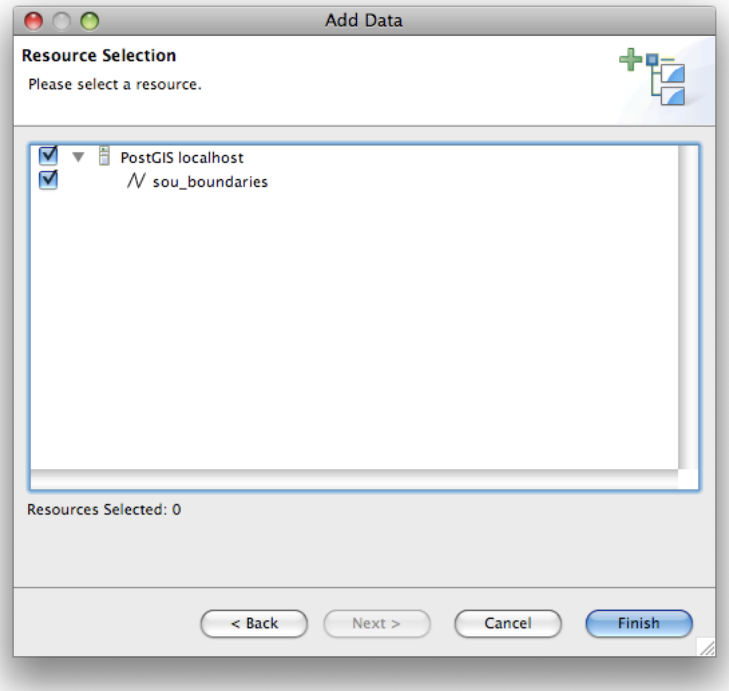


- For performance we will access the postgis on the local host. Enter the following connection information and press the **Next** button:

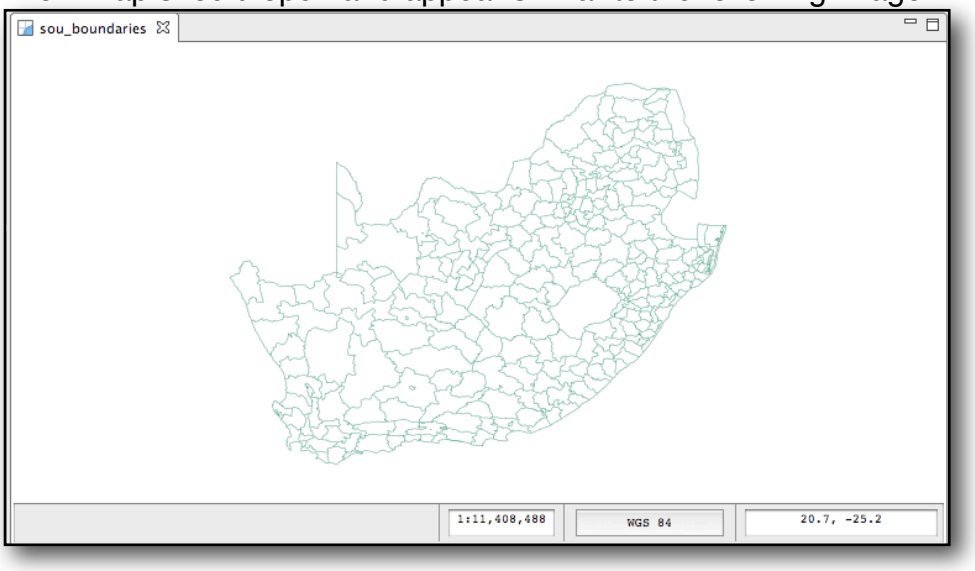
Host: **localhost**	Port: **5432**
Username: **postgres**	Password: **postgres**
Database: **postgres**	Schema: **public**



- Select **sou_boundaries** and press the **Finish** button



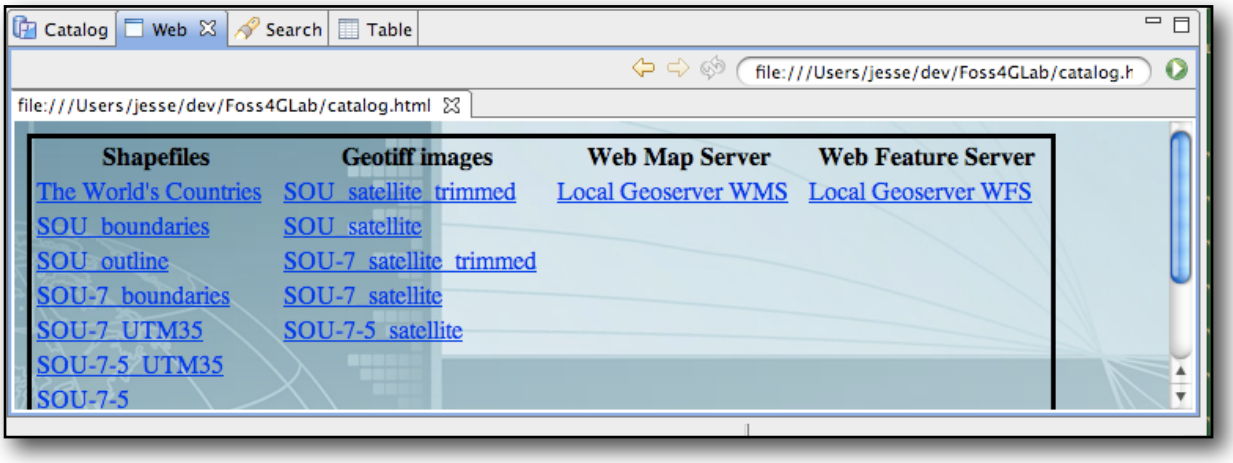
- A new map should open and appear similar to the following image



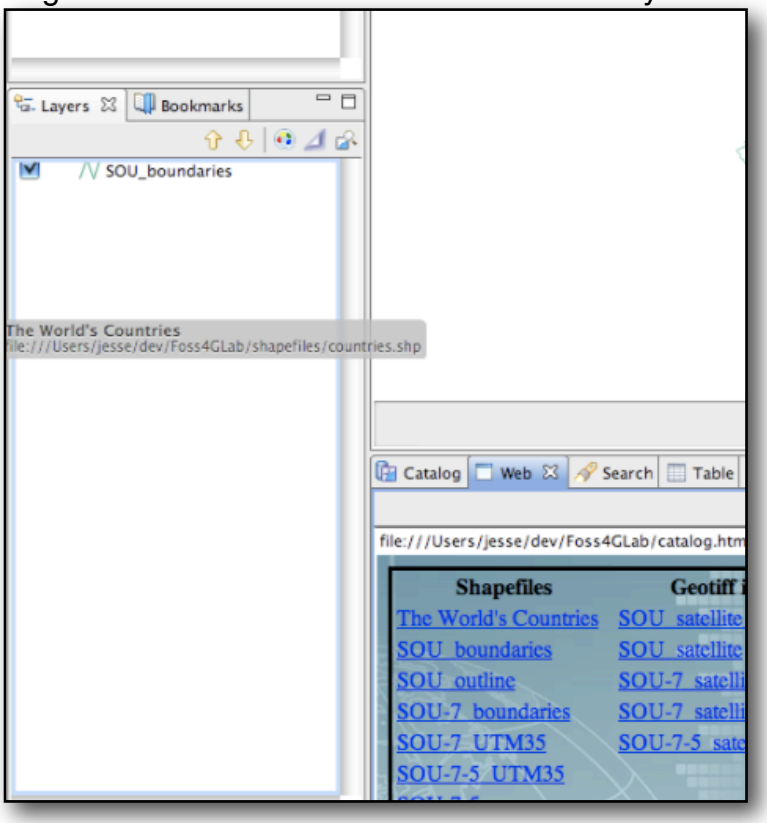
Add Data Using Embedded Web Browser

- Press the Web table placed behind the Catalog View

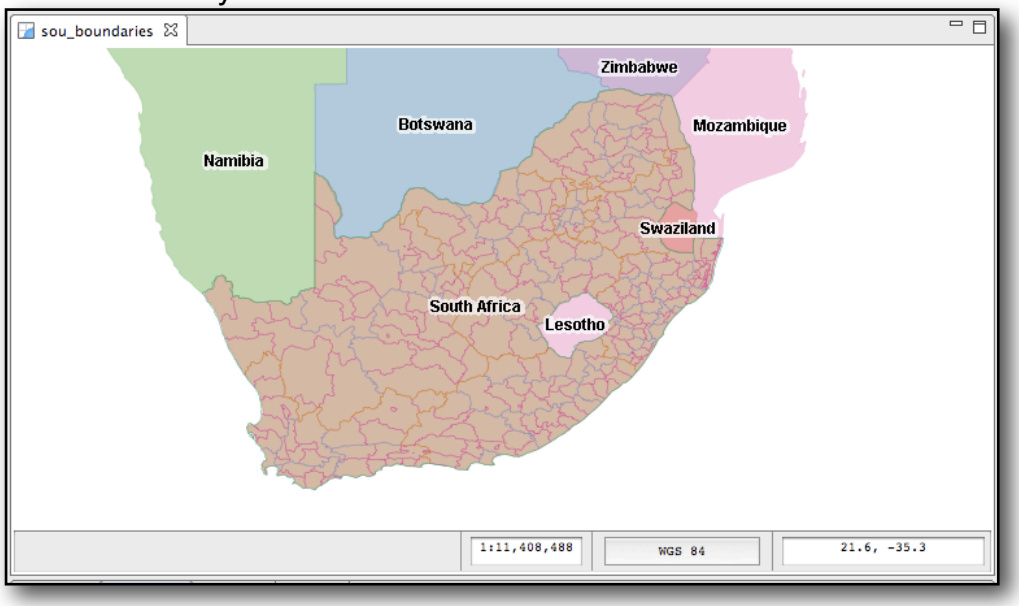
- Enter the path to the catalog.html file in the data directory. (Unfortunately I don't know the path to the catalog.html at the time of this writing.)



- Drag the link **The World's Countries** to the layers view.

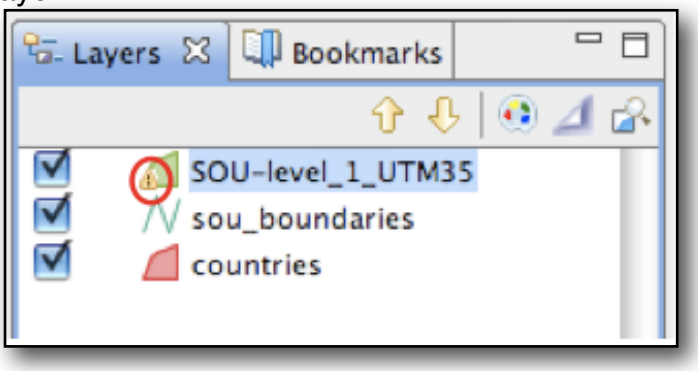


  - The map should now look like the following(the SOU_boundaries layer is probably a different color)
    - Notice the layer has a style already. This is because shapefiles with an associated .sld file will have the style from the sld file automatically applied when the layer is added.

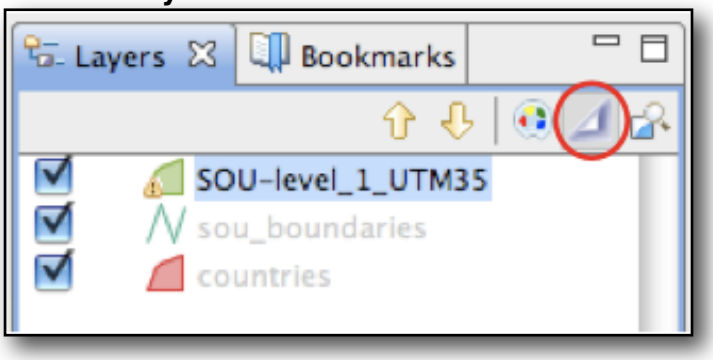


- Drag the **SOU-level_1_UTM35** link to the map:

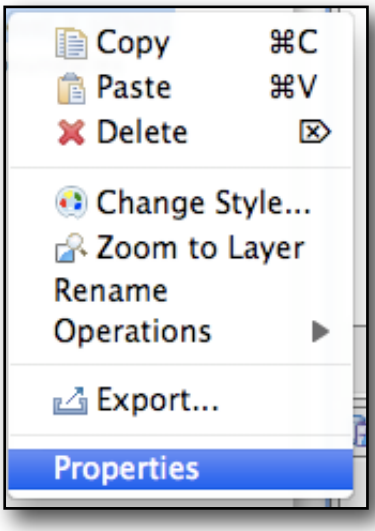
- This layer will not appear in the map display because it does not have a PRJ file associated with it. The layer has a decorator to indicate a potential problem with the layer.

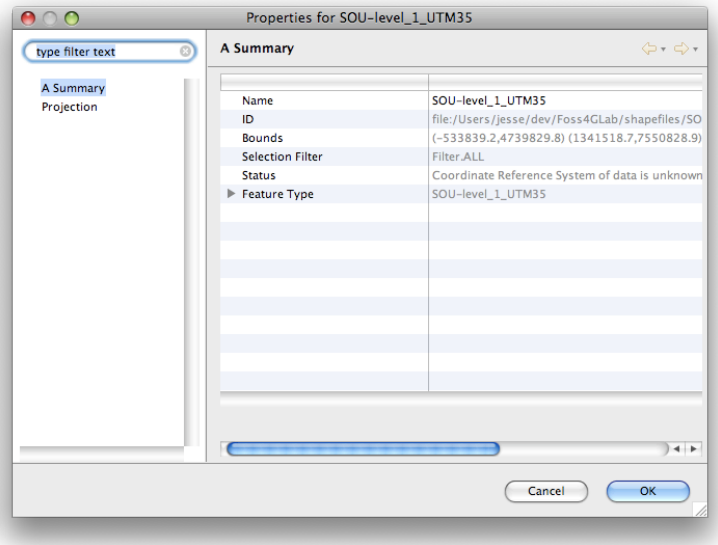


- Press the **Mylar** button

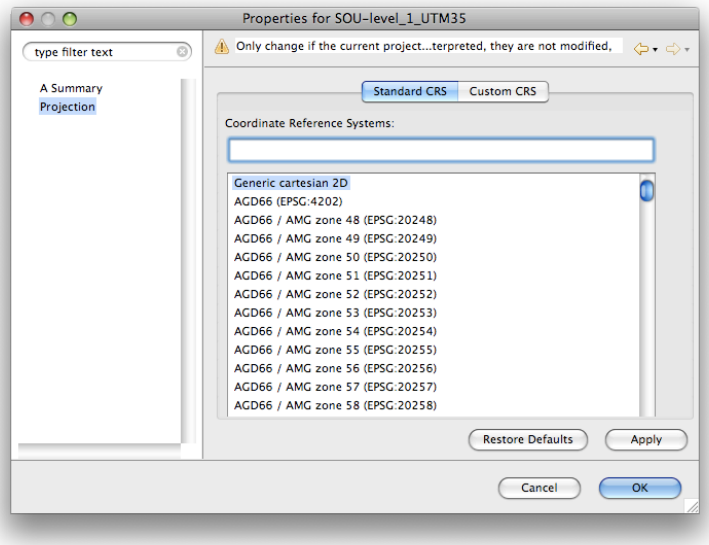


- Right click on the **SOU-level_1_UTM35** layer and select Properties

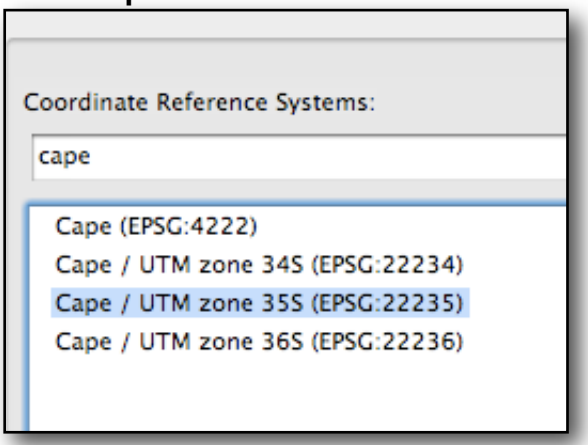




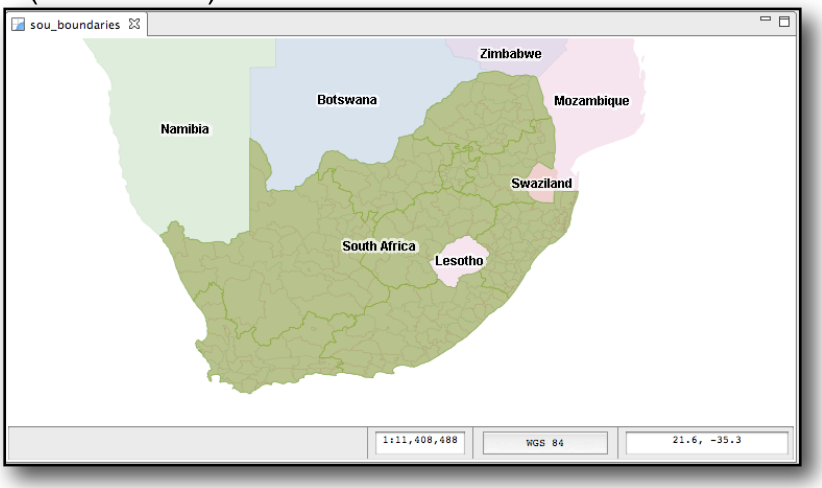
- Select **Projection**



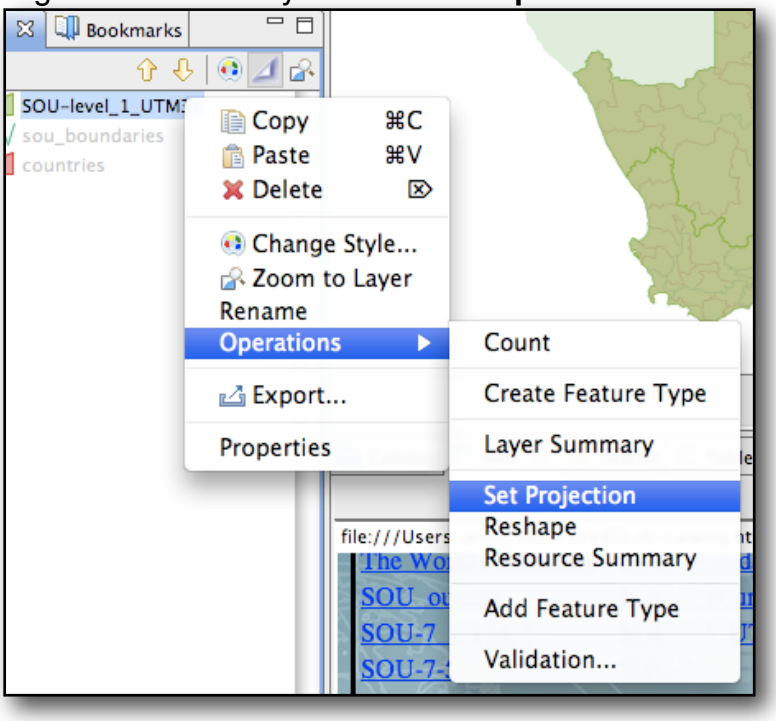
- Enter **cape** into the search bar and select **Cape / UTM zone 35S (EPSG:22235)**



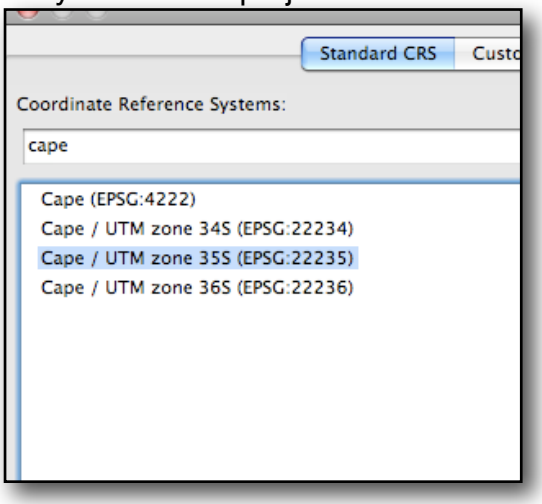
- You should see the data now is correctly repojected from EPSG:22235 to WGS 84 (EPSG:4326)



- Now that we have found the correct projection we need to write it to the shape file. (Setting on the layer only affects the layer. Adding a new layer based on the same data will not have the new projection)
- Right click on the layer and select **Operations > Set Projection**

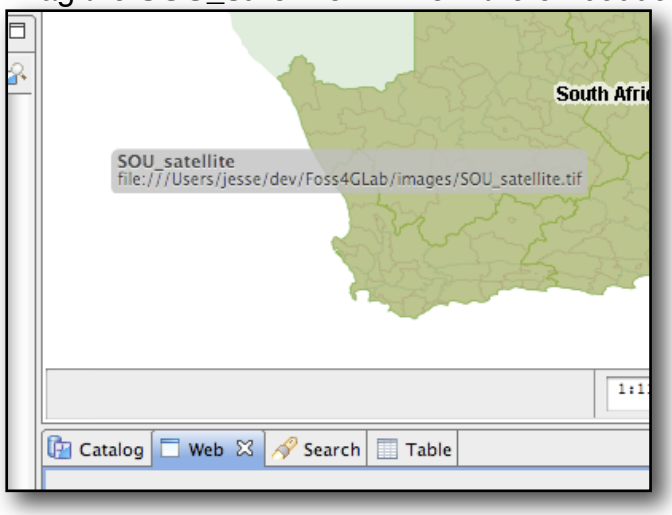


- Verify the correct projection is selected and press the **OK** button

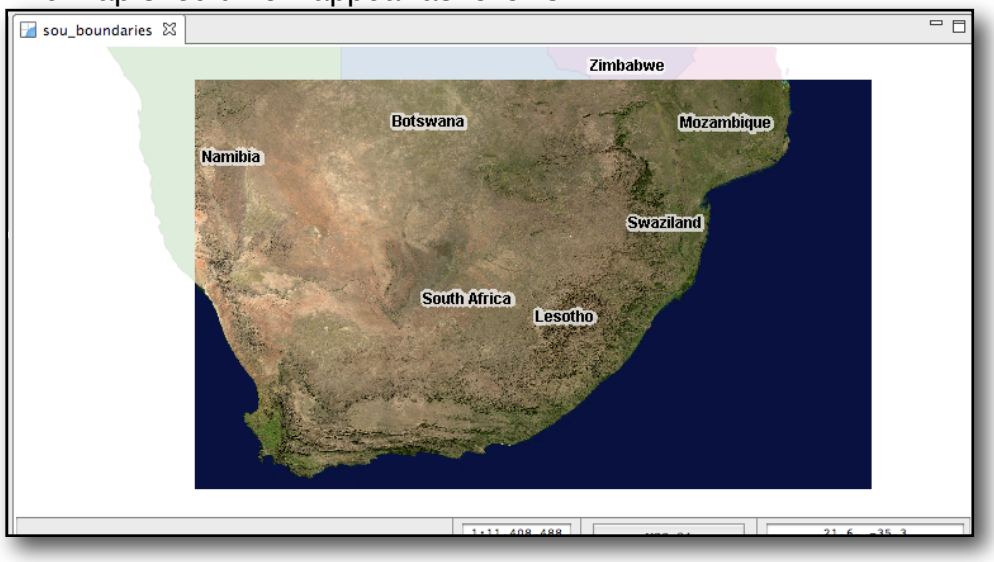


Add raster layers

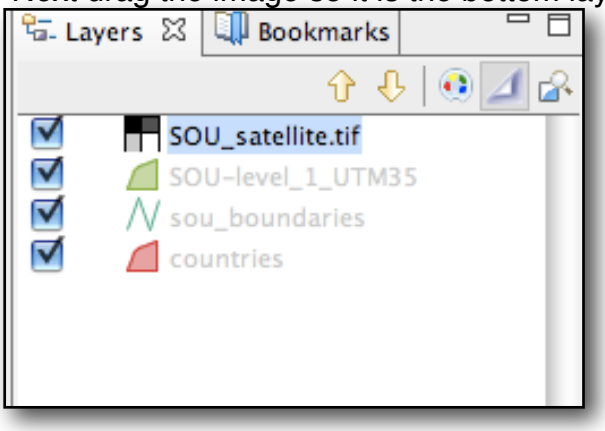
- Drag the **SOU_satellite** link from the embedded web browser to the map

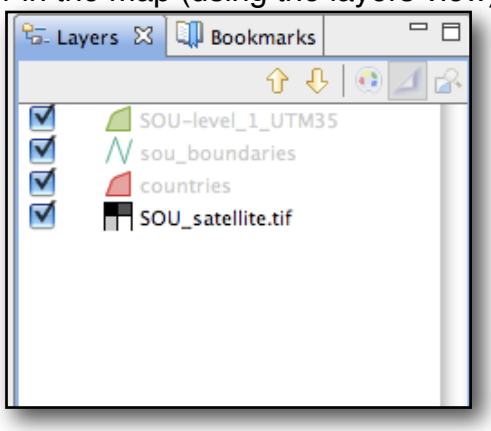


- The map should now appear as follows



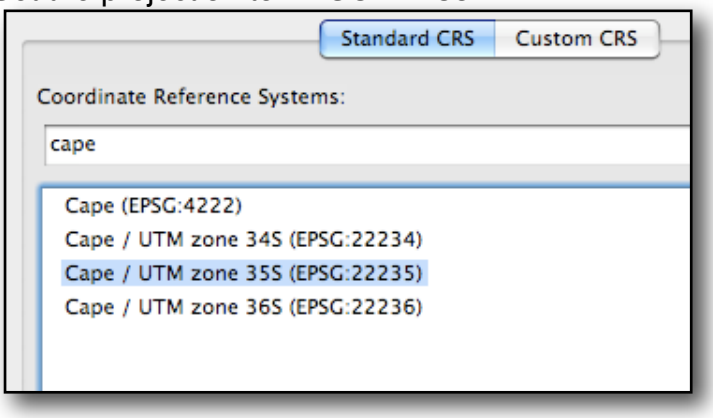
- Next drag the image so it is the bottom layer in the map (using the layers view)



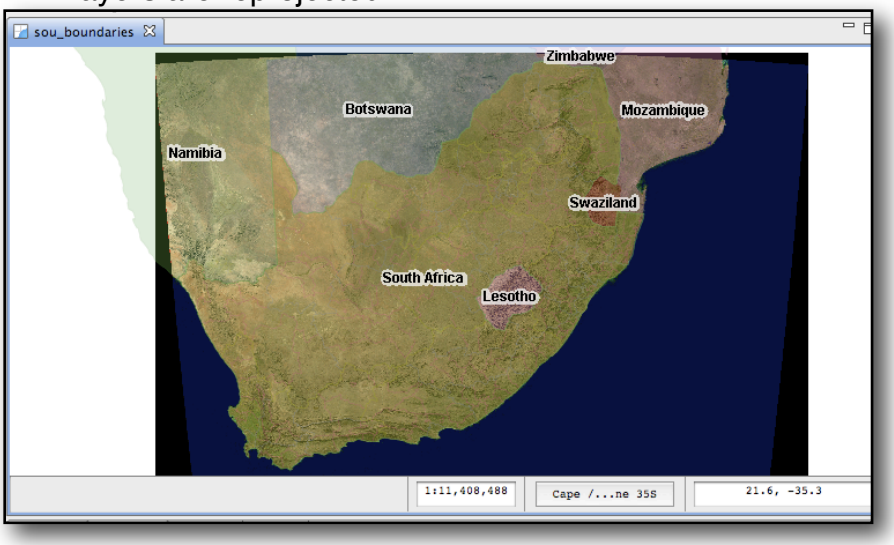


- Press the **Projection** button on the map.

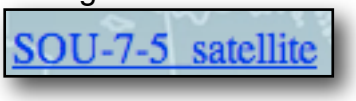
- Set the projection to EPSG:22235



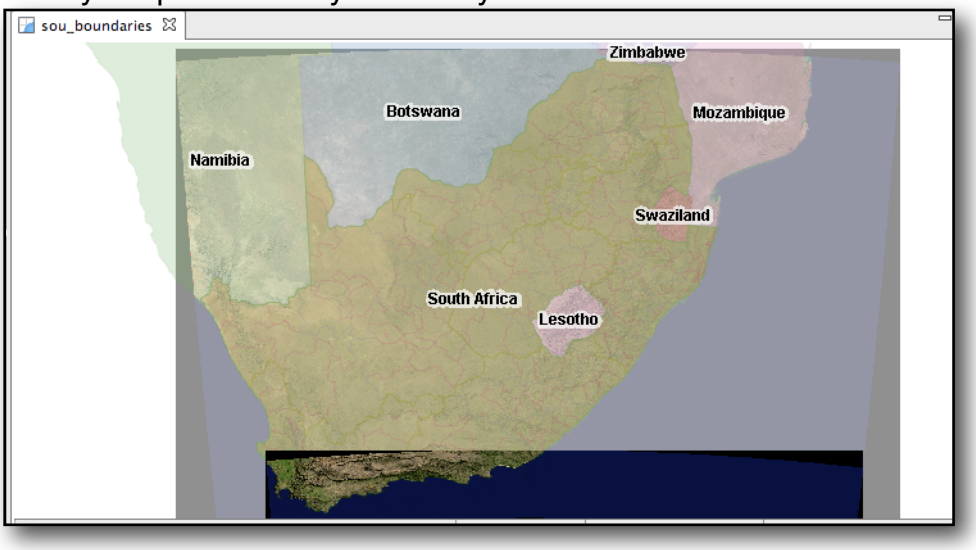
- All layers are reprojected



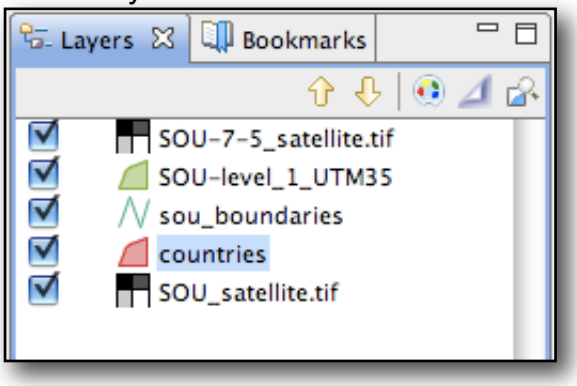
- Drag **SOU-7-5 satellite** to the map



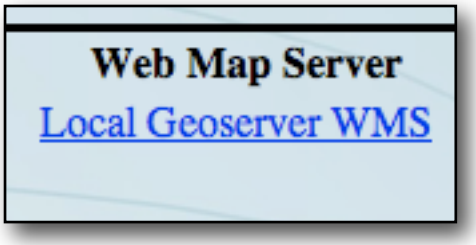
- Notice that the new raster is also reprojected. Also notice how the Mylar effect makes it easy to spot the newly added layer.



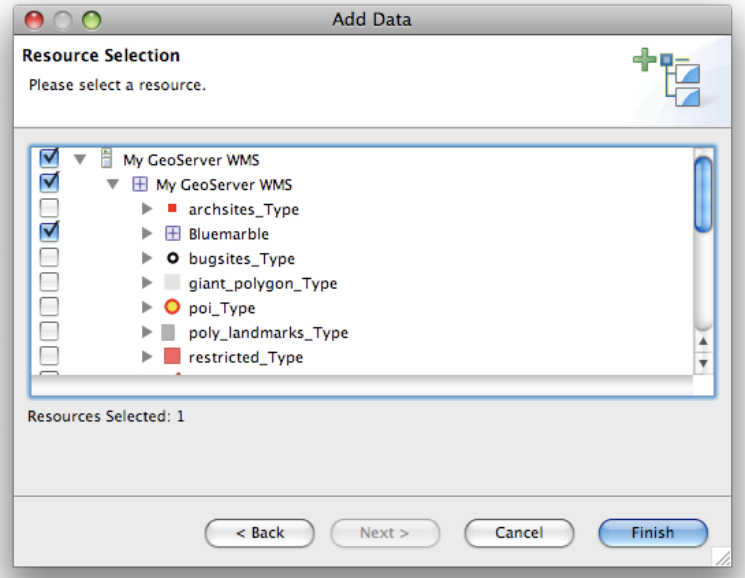
- Change projection back to EPSG:4326
- Turn mylar off
  - The layers view should now look similar to the following



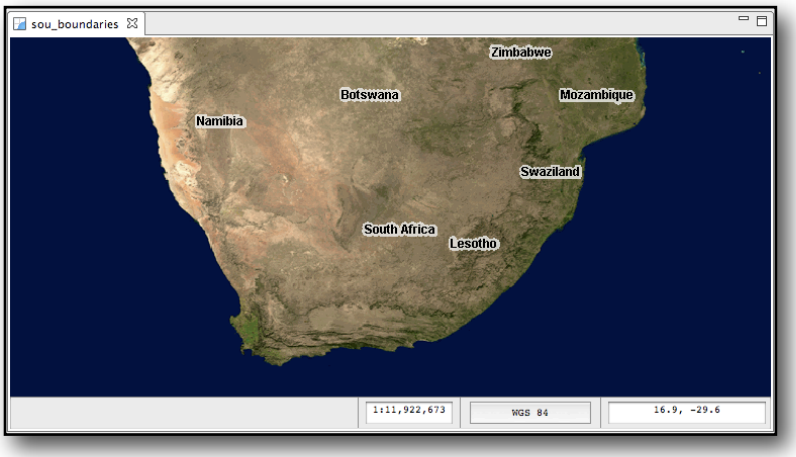
- Draw the **Local Geoserver WMS link** to the Layers View



- Select **Bluemarble** and press the **Finish** button



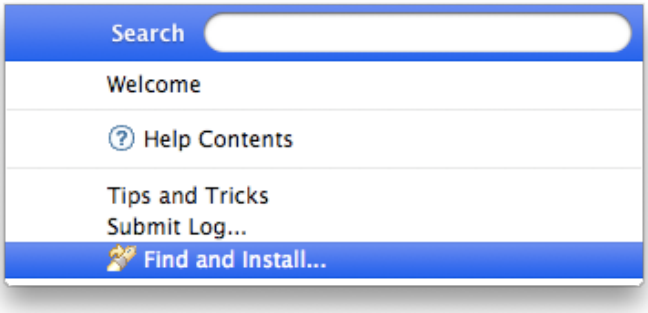
- This adds the bluemarble layer to the top of the map.
- Move the bluemarble layer so it is the bottom layer of the map



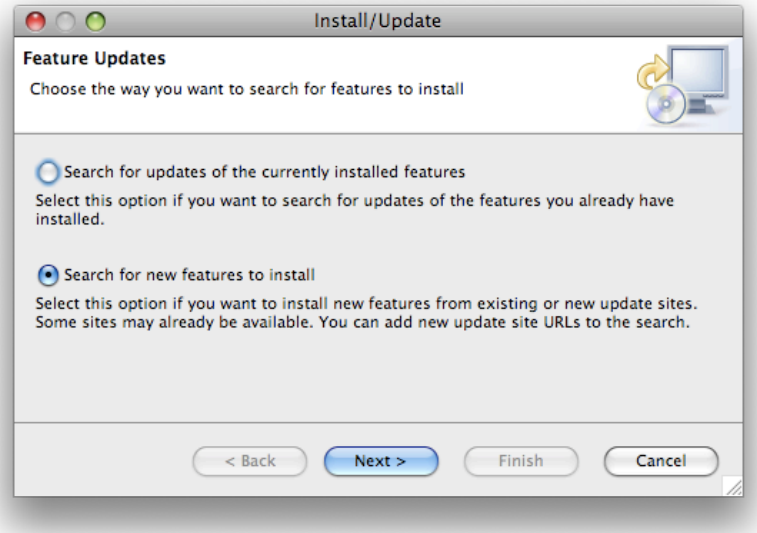
3 Adding functionality to uDig

The out-of-the-box installation of uDig has enough functionality to do basic tasks but for more complex tasks there are plugins that can be installed to assist in performing these tasks. This section shows how to discover plugins and install them

- Select the Menu item **Help > Find and Install**

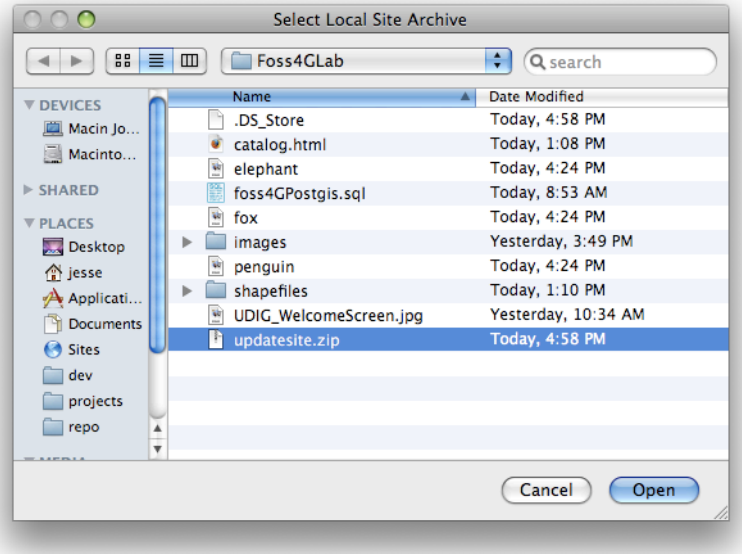


- Select **Search for new features to install** and press the **Next** button

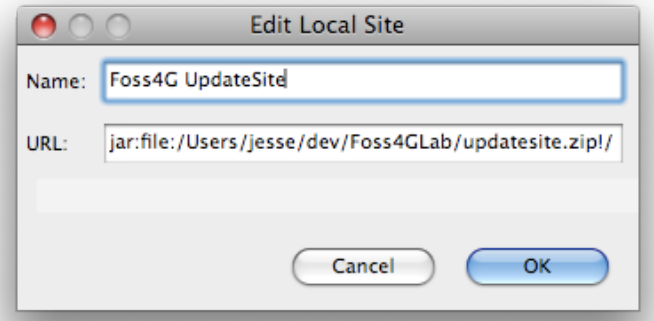


- Normally you can select one of the default options but for performance reasons we will use a update site that is on the local hard drive. The update site I am providing is the combination of the uDig 1.1 Discovery Site and the UWB update site. In the future you may use those sites.
- Press the **New Archived Site...** button
-

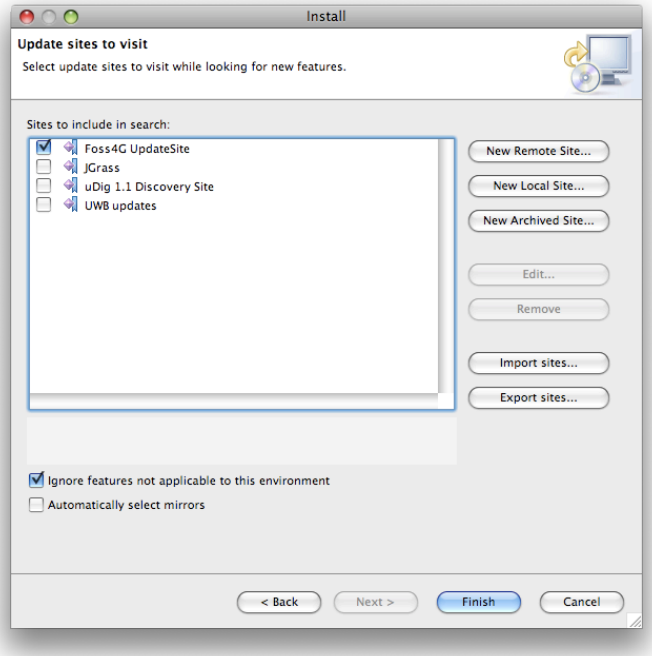
- Select the update site zip file



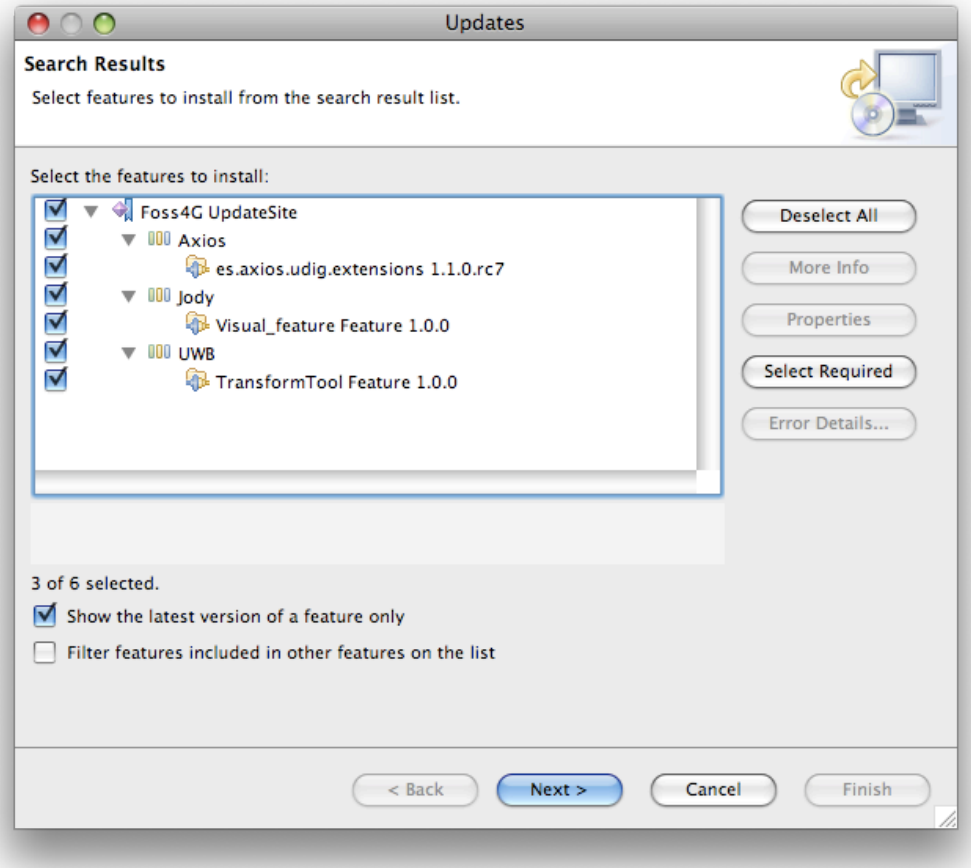
- The default is acceptable but to make the site more recognizable it is recommended that you enter a more readable name: **Foss4G UpdateSite**.
- Press the **OK** button



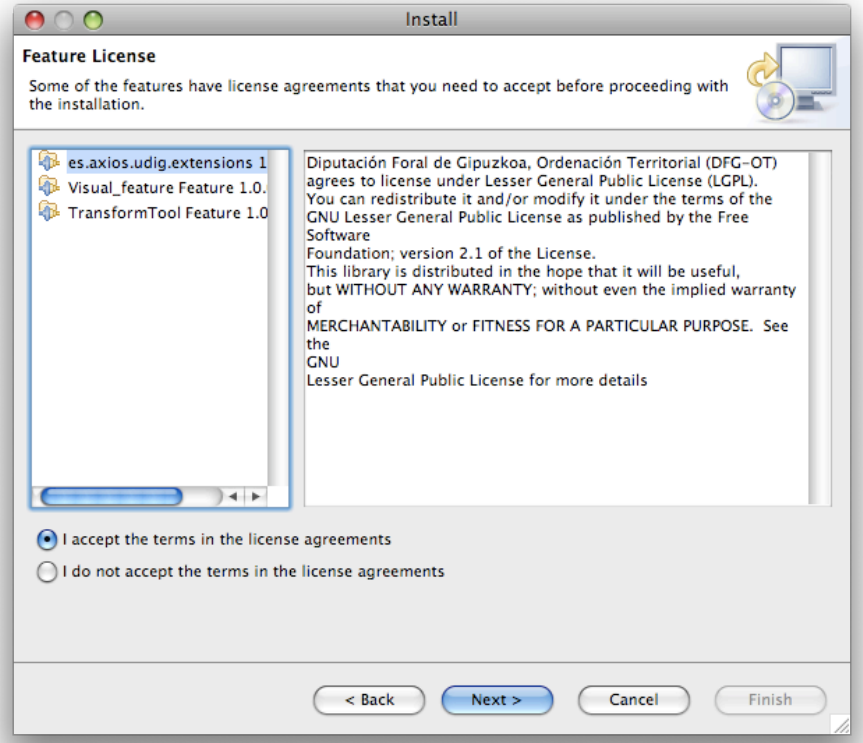
- Press the **Finish** button



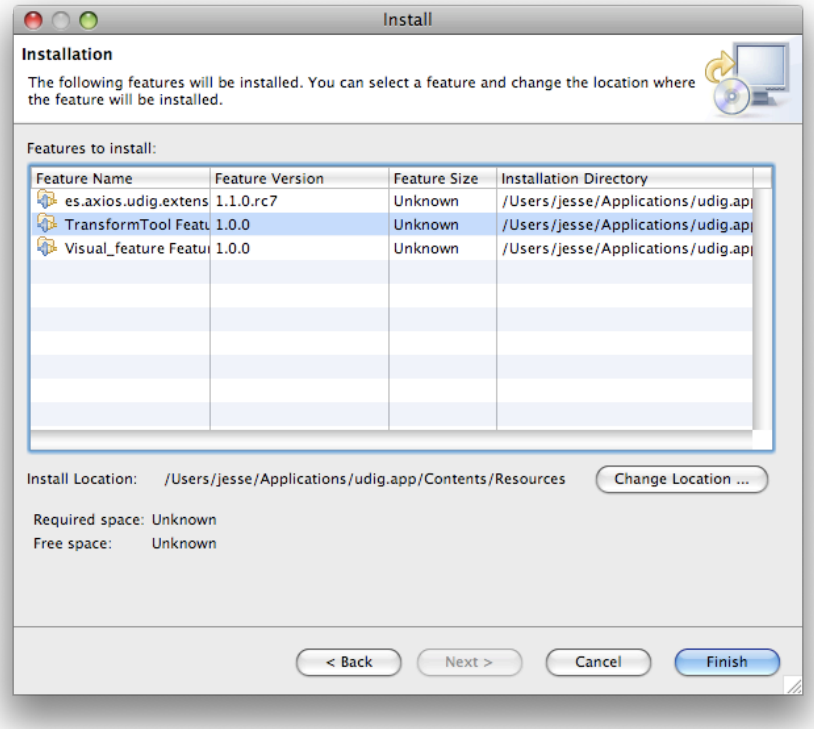
- Check the **Foss4G UpdateSite** element. You do not need to expand the tree but to see what you are installing you may want to.



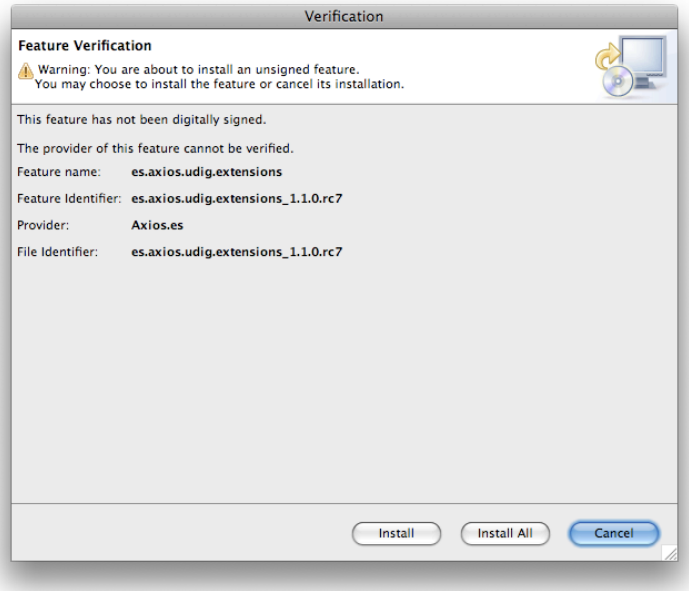
- Select the **I accept the terms in the License Agreement** radio button and press the **Next** button



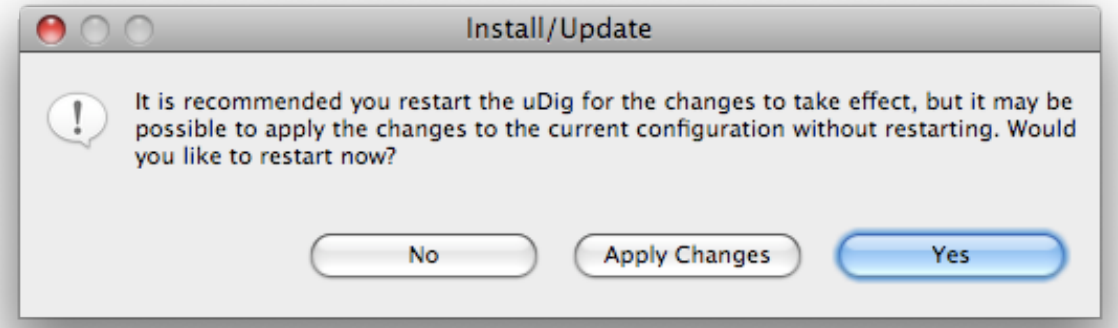
- Press the **Finish Button**



- Wait for the files to download (should be very quick) and press **Install All**



- Press the **Yes** button

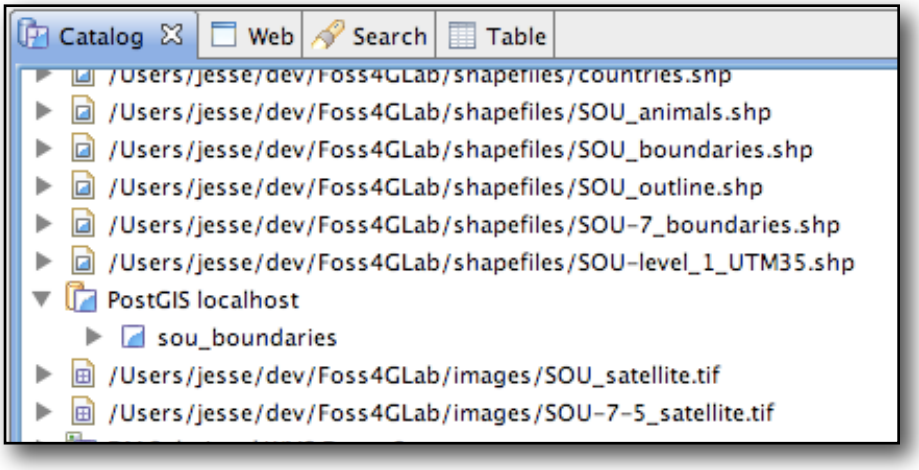


Now there are new features with new functionality available for use in your day to day tasks.
The two features we will use in this lab are the *Transform Tool* and the *Axios Spatial Operations suite.* The next two sections are dedicated to getting familiar with using these tools.

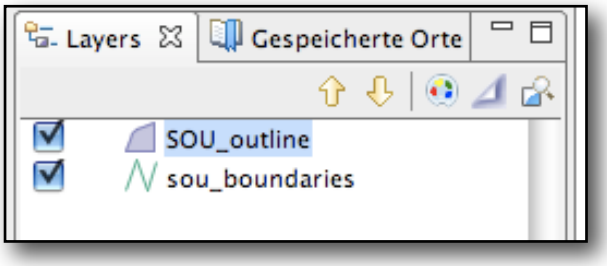
4 Fixing your data

In this section we have a specific task. We have a shapefile (SOU-outline.shp) that has been digitalized in accurately. The goal is to fix the data.

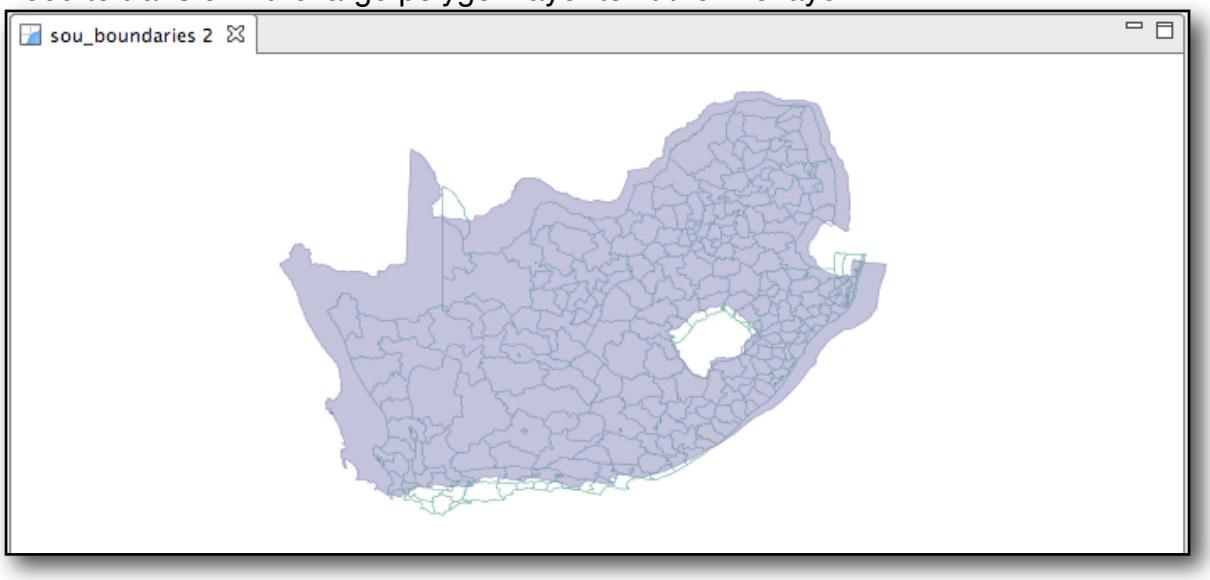
- Create a new map
- Add a layer that we know is accurate. We wil use the sou_boundaries from the postgis. Since we have previously loaded it we can drag the layer from our Catalog
  - Another option if we have many datasources in our catalog is to use the Search view to search the catalog.



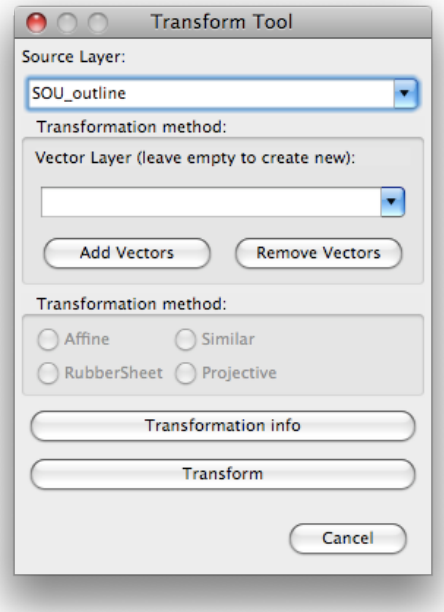
- Add **SOU_boundaries** from the embedded web browser.
  - You should now have two layers in your map



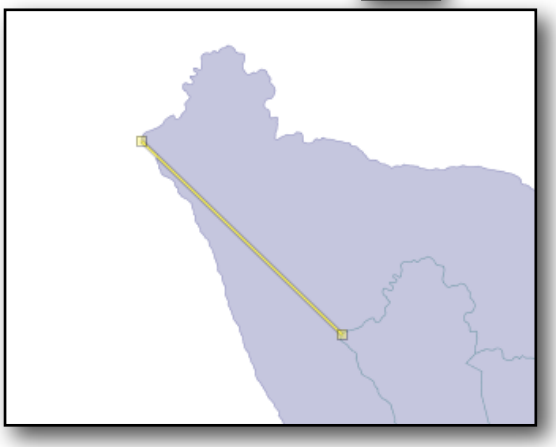
- Notice that the two layers are not aligned. The line layer is the correct layer. We need to transform the large polygon layer to fit the line layer.

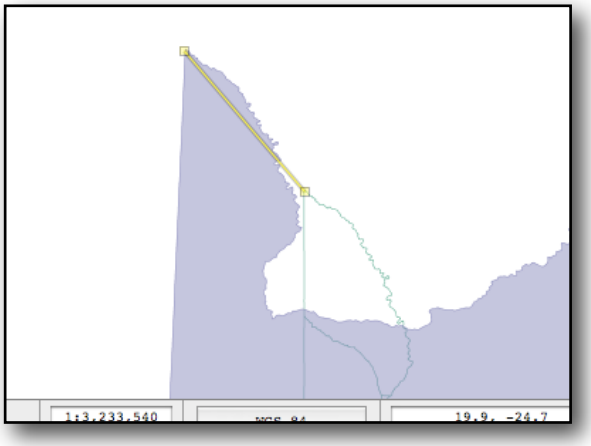


- The transform tool is an excellent choice for this category of problems.
- Make sure that the **SOU_outline** layer is selected in the Layers view
- Press the  button in the tool bar to begin.
- Select **SOU_outline** as the source layer. (The dialog allows a transformation to be constructed from an existing vector layer or create a new vector layer.)

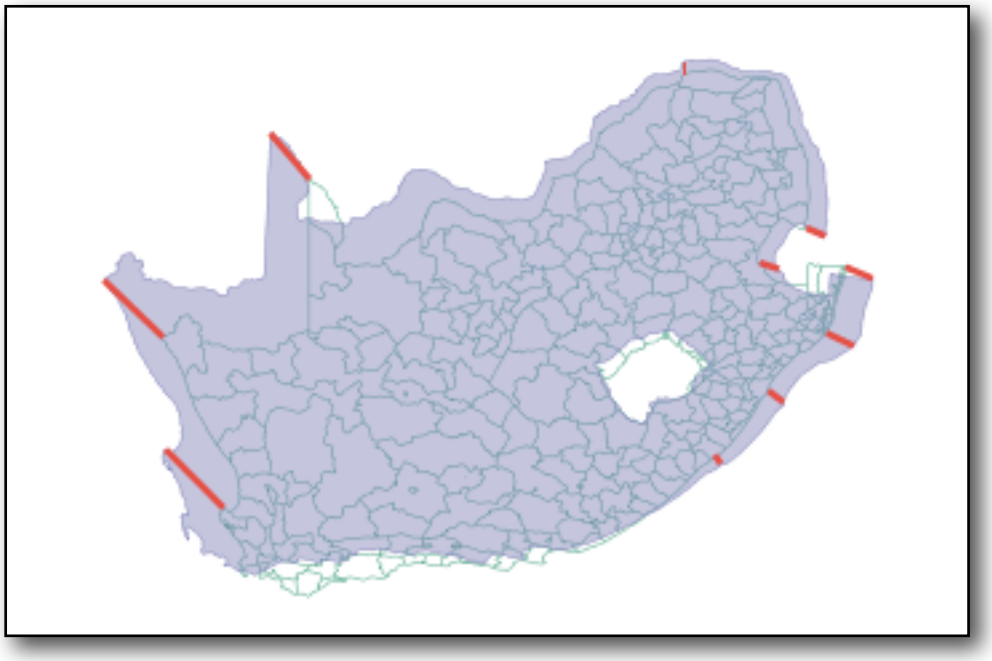


- Press the **Add Vectors** button
  - This will take you back to the Map and allow you to create vectors that indicate how the layer needs to be transformed.
  - You can use the zoom and pan tools to move into the map so you can accurately add the vectors.
  - Zooming also be done with the mouse scroll wheel and panning holding button 3 and dragging the map (if the mouse has 3 buttons)
  - A third way to zoom is to press the CTRL + and CTRL - key combination. CTRL ARROW can be used for panning
- Add Vectors **from SOU_outline** to the corresponding point on the **sou_boundaries** layer.
  - **IMPORTANT** the direction of the vectors are very important if they are drawn the wrong direction then the layer will be transformed in the opposite direction from what is required.
  - If you make a mistake you can:
    - Use CTRL-Z to undo.
    - Use the edit tool  to move the vertex.
    - Use the delete tool  to delete a line.

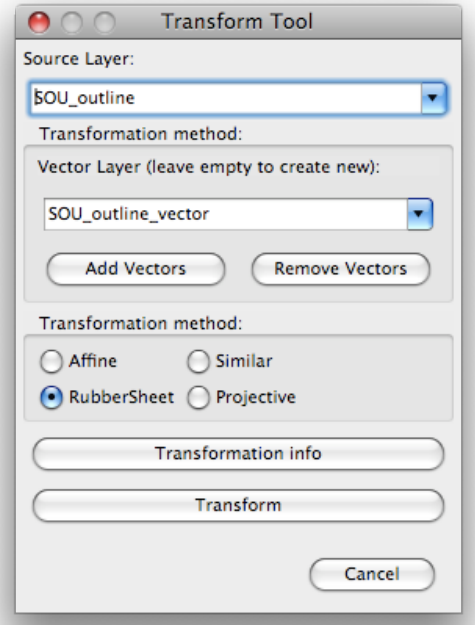




- I have restyled the vector layer so the vectors are in red for clarity. The vectors in the layer always start at the border of **SOU_outline** and end at on the edge of **sou_boundaries.**

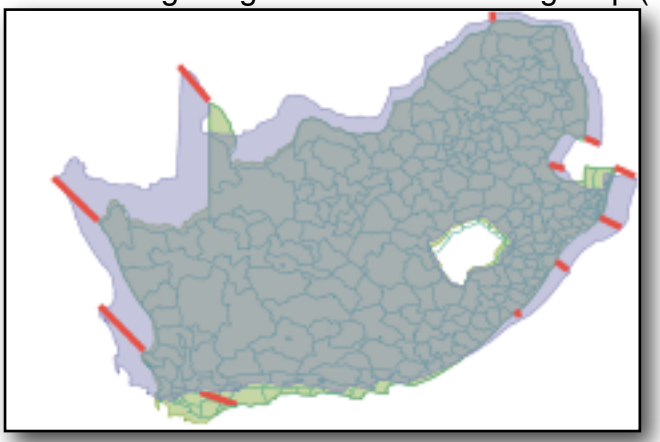


- Double click the mouse with the Create Line tool enabled to exit vector creation mode.

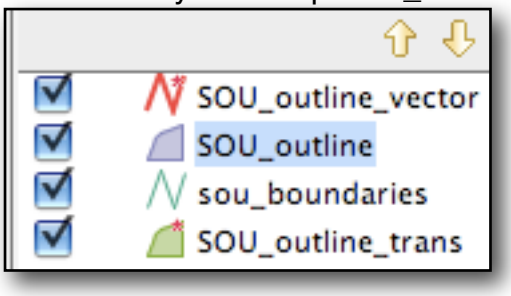


- Select **Rubber Sheet** radio button.
- Press the **Transform** button. This will perform the transformation
  - uDig follows a non-destructive principal. This means that all major transformations will result in a new layer with the resulting transformation.
  - In the current version the new layer is an in memory layer which means that the memory requirements of the transformation must be considered. (The next version will remove this constraint)

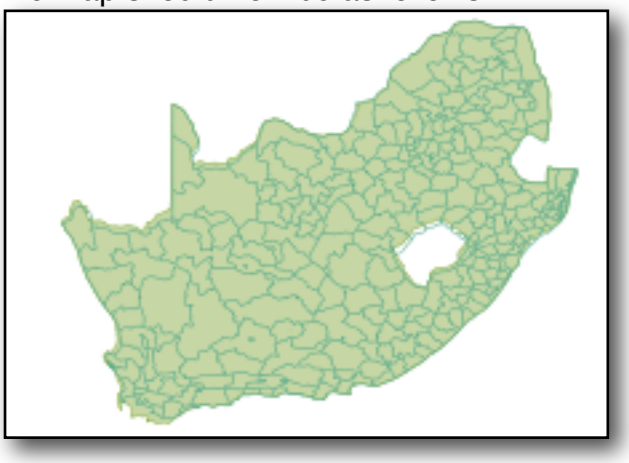
- The following image shows the resulting map (the colors may differ)



- Turn off all layers except **sou_boundaries** and **SOU_outline_trans**

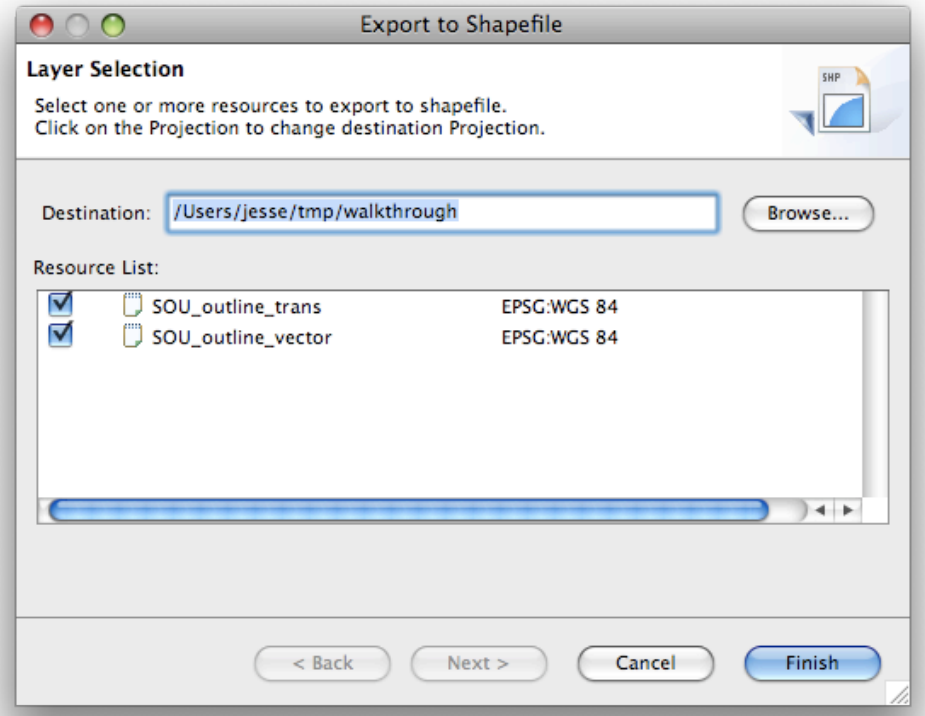


- The map should now be as follows:



-

- To save your map press **CTRL-S** or **File > Save**



- Select the directory to save the file. (Defaults to your workspace)
- Uncheck **SOU_outline_vectors** (Unless you want to use the same transformation at a later date)
  - You my choose an alternative Projection for the output file if you desire, the layer will be transformed to that projection
- Press the **Finish** button

Congratulations you have vastly improved the accuracy of that layer.

5 Looking at animals

In this section we will look at a layer that captures animal sightings and perform some analysis on the data to see if any trends can be detected. In the process we will create several new layers and even write out some of the data to our postgis.

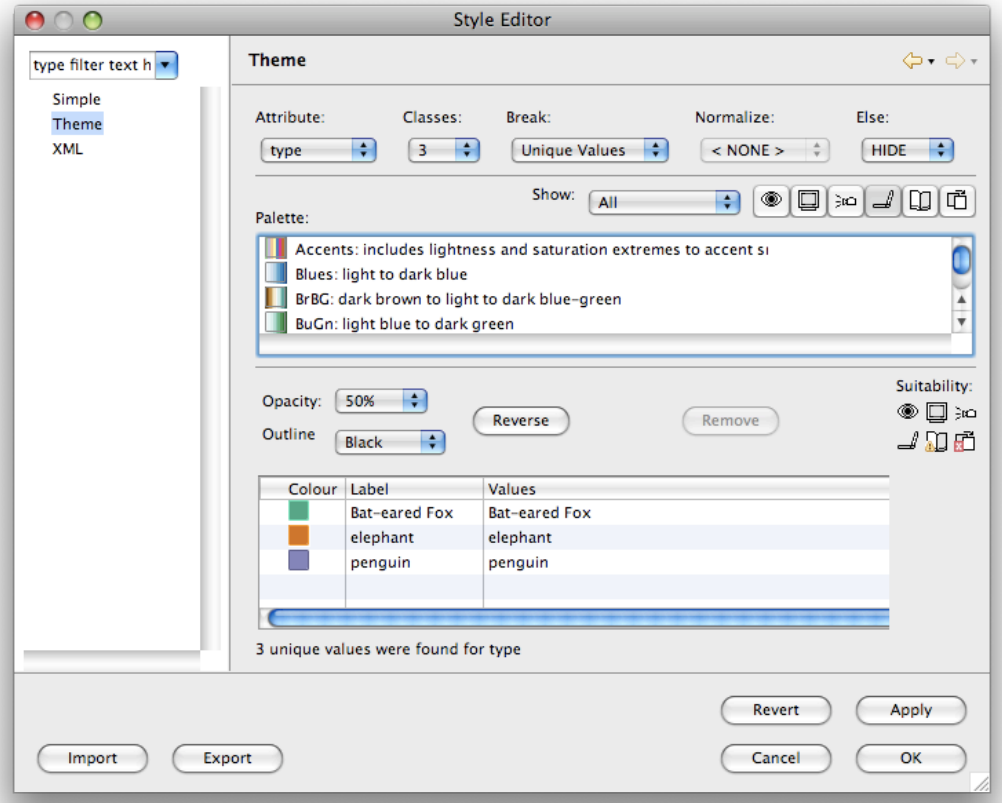
The Data we will look at is **SOU-animals**.

- Create a new map
- Drag the **SOU-animals** link to the map.

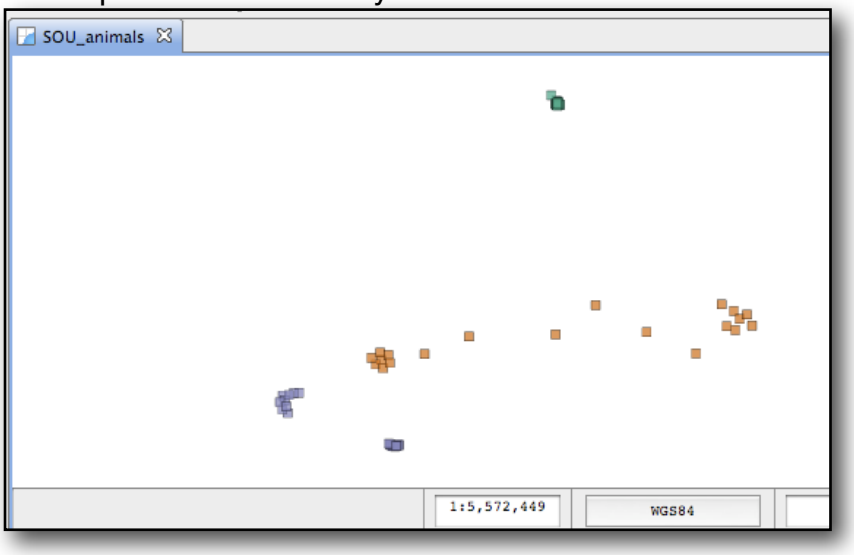
  - The simplest (and often most effective) thing to do is apply a thematic style to the data.

Lots of style

- Create a style that applies to the type attribute
  - I am assuming that you have done this before so I am going through the steps very quickly. If you do not know you can reference Walkthrough 1.
  - Select the **Layers** view
  - Press the **Layer > Change Style** button
  - Click the **Theme** option in the list on the left
  - In the **Attribute** drop box select **type**
  - Ensure that **3** classes are selected
  - Ensure that the **Unique Values** break is selected
  - Select the **Dark** color scheme.
  - Press the **OK** button

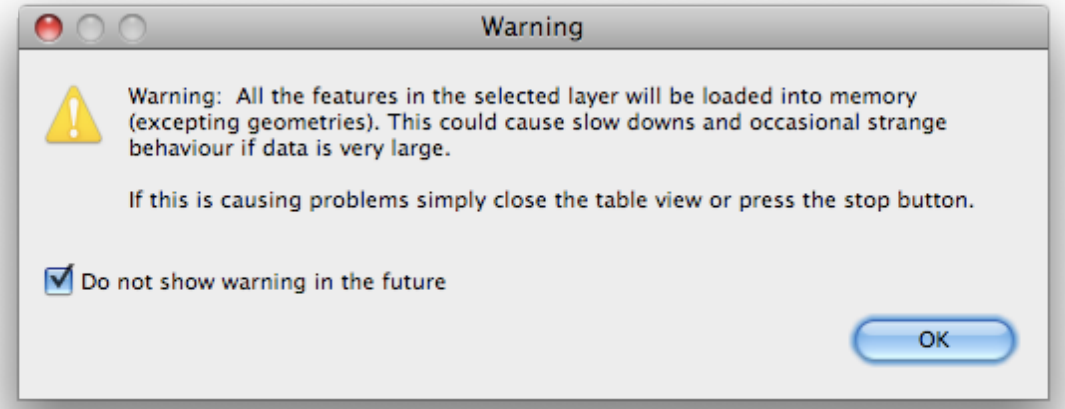


- The map should now clearly show the areas the different animals inhabit.

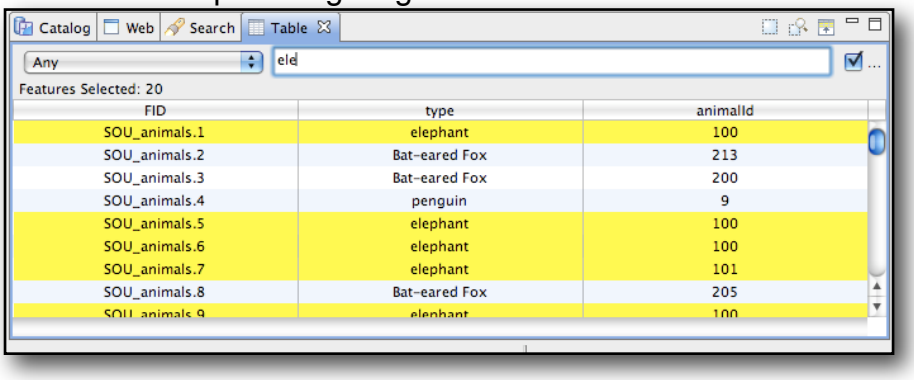


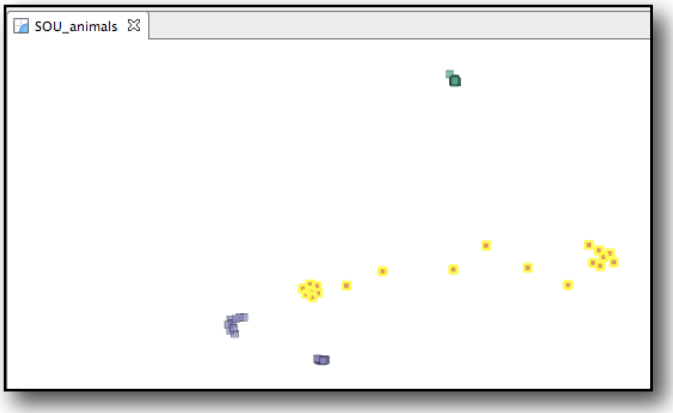
Exploring the table view

- We could label the points but instead we will play with the table view a little in order to learn more about the animal populations.
- Select the **Table** view
- The following dialog will appear. Close the dialog because we know the layer is not too large.

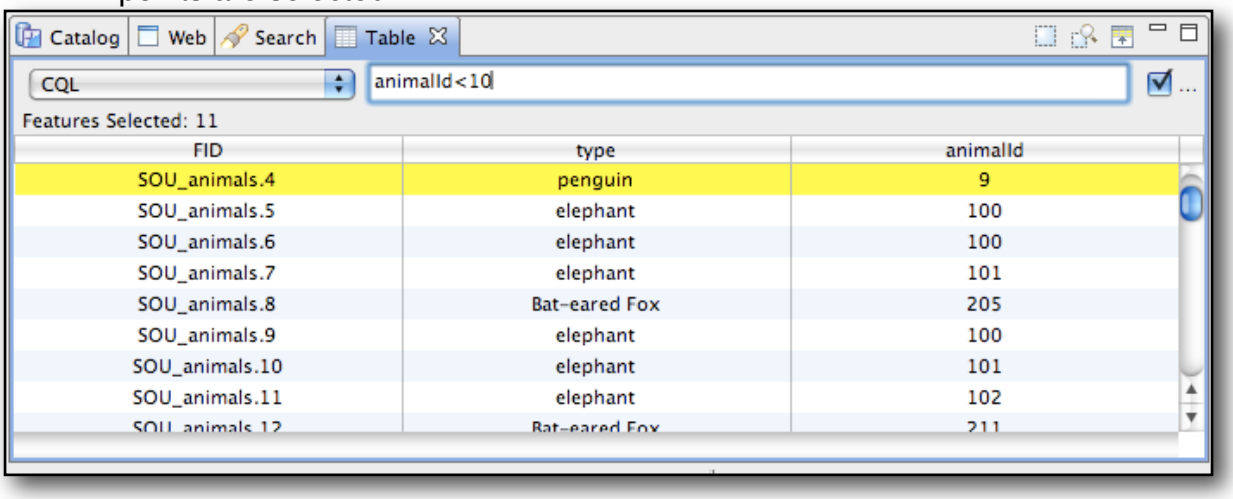


- Type **ele** or **lep** into the text field and press enter
  - all the elephant sightings are selected

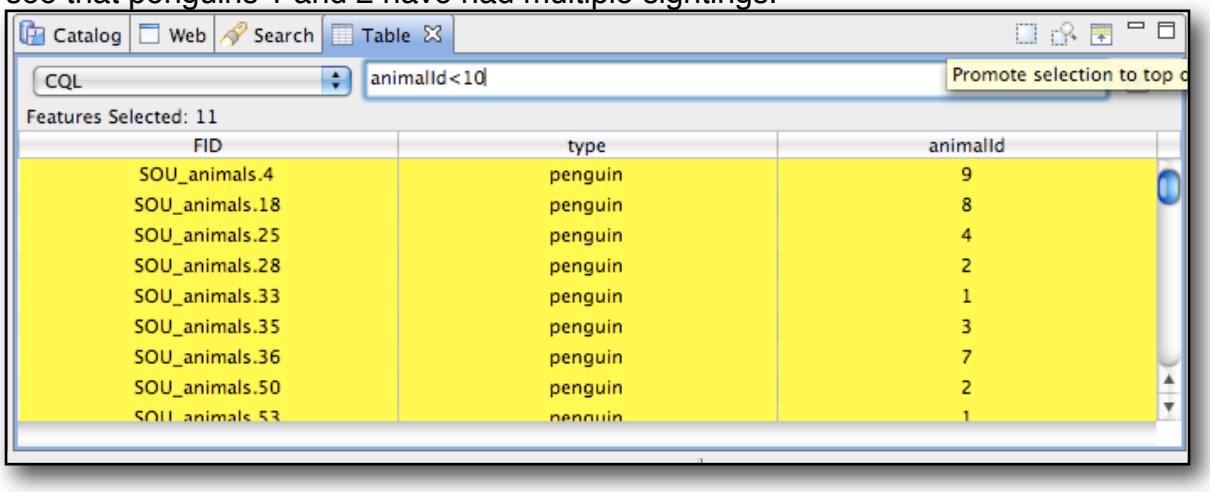




- Now we will introduce searching based on CQL. The Appendix I has links to resources on CQL.
- Select **CQL** in the drop box
- Type **animalId<10** in the text field and press enter.
  - 11 points are selected

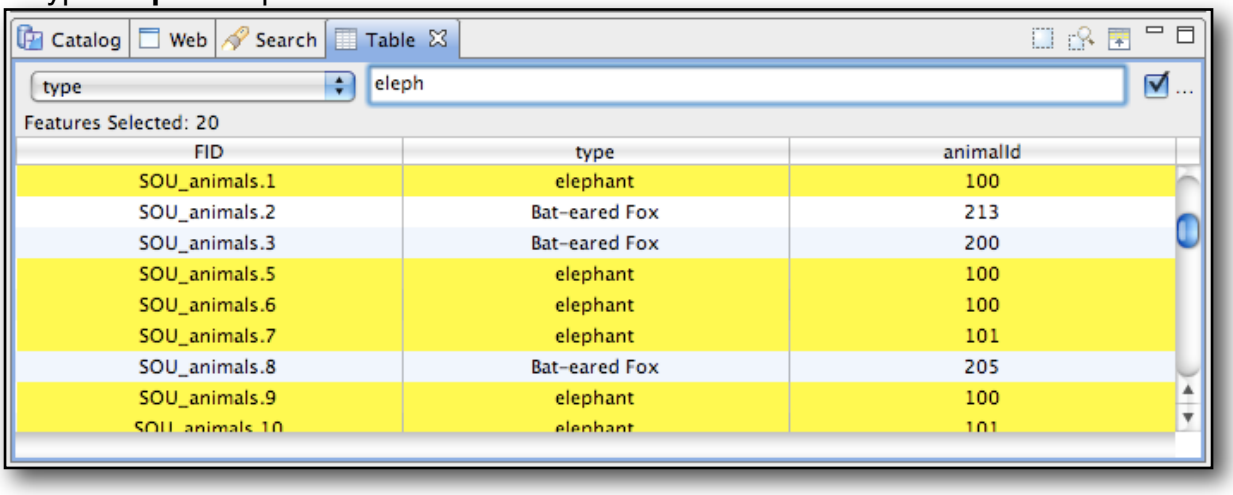


- Press the  button to promote all the selection to the top of the view. We can see that penguins 1 and 2 have had multiple sightings.



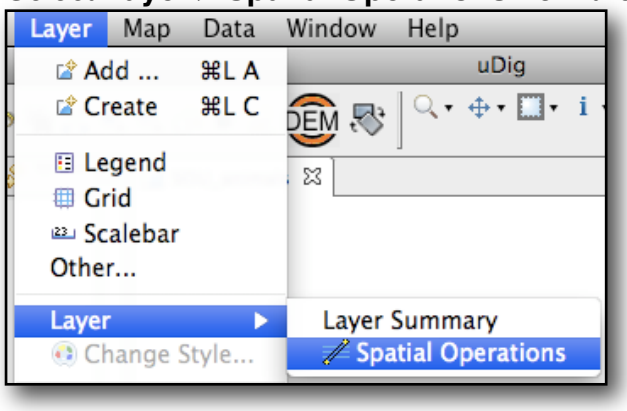
- The  button can be pressed to zoom to the selection.

- Press the  button to go back to the previous map view.
- Select **type** in the drop box
- Type **eleph** and press enter

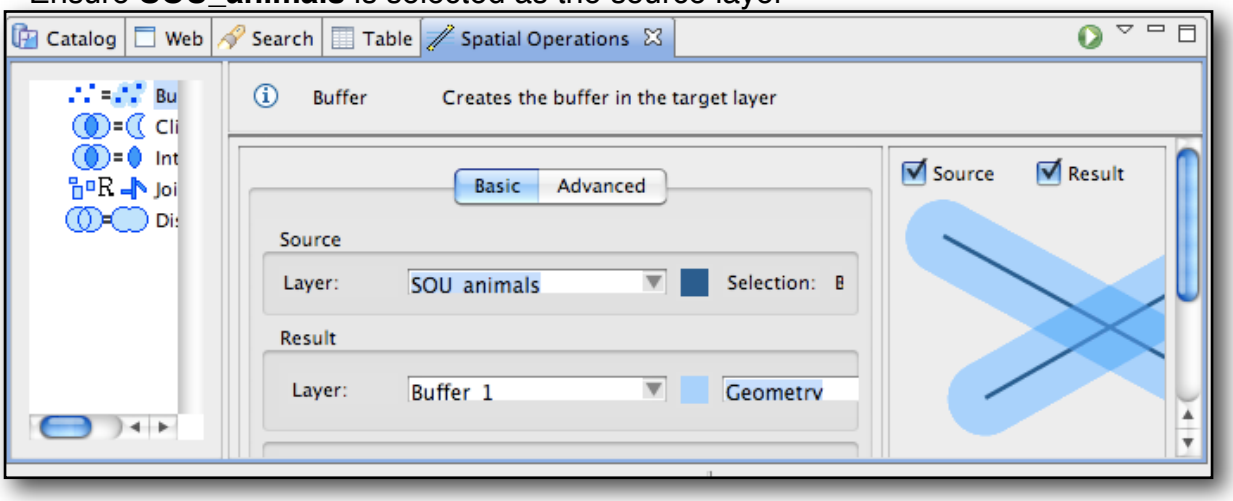


Axios tools (Spatial operations)

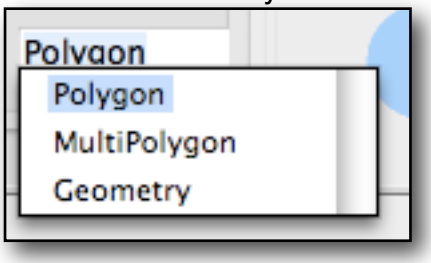
- Select **Layer > Spatial Operations** from the menu



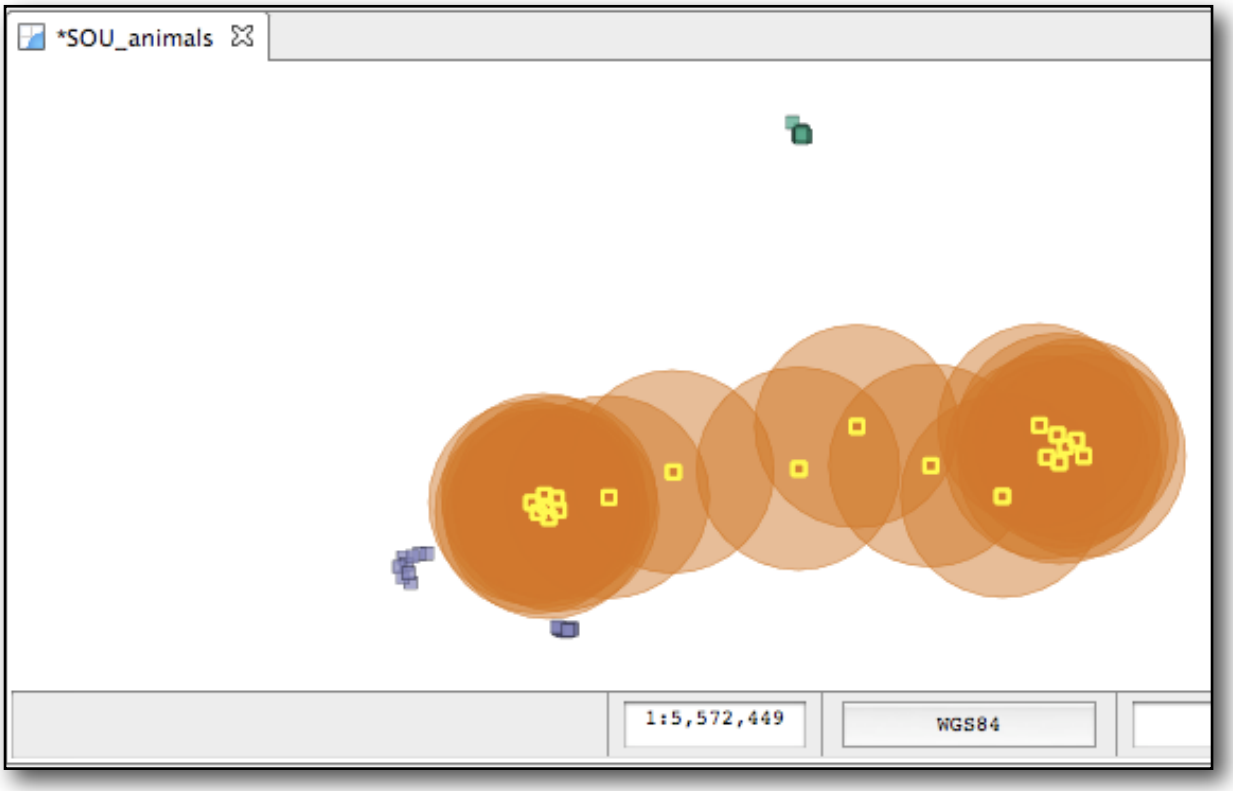
- The Spatial Operations view will open.
- Ensure **Buffer** is selected
- Ensure **SOU_animals** is selected as the source layer



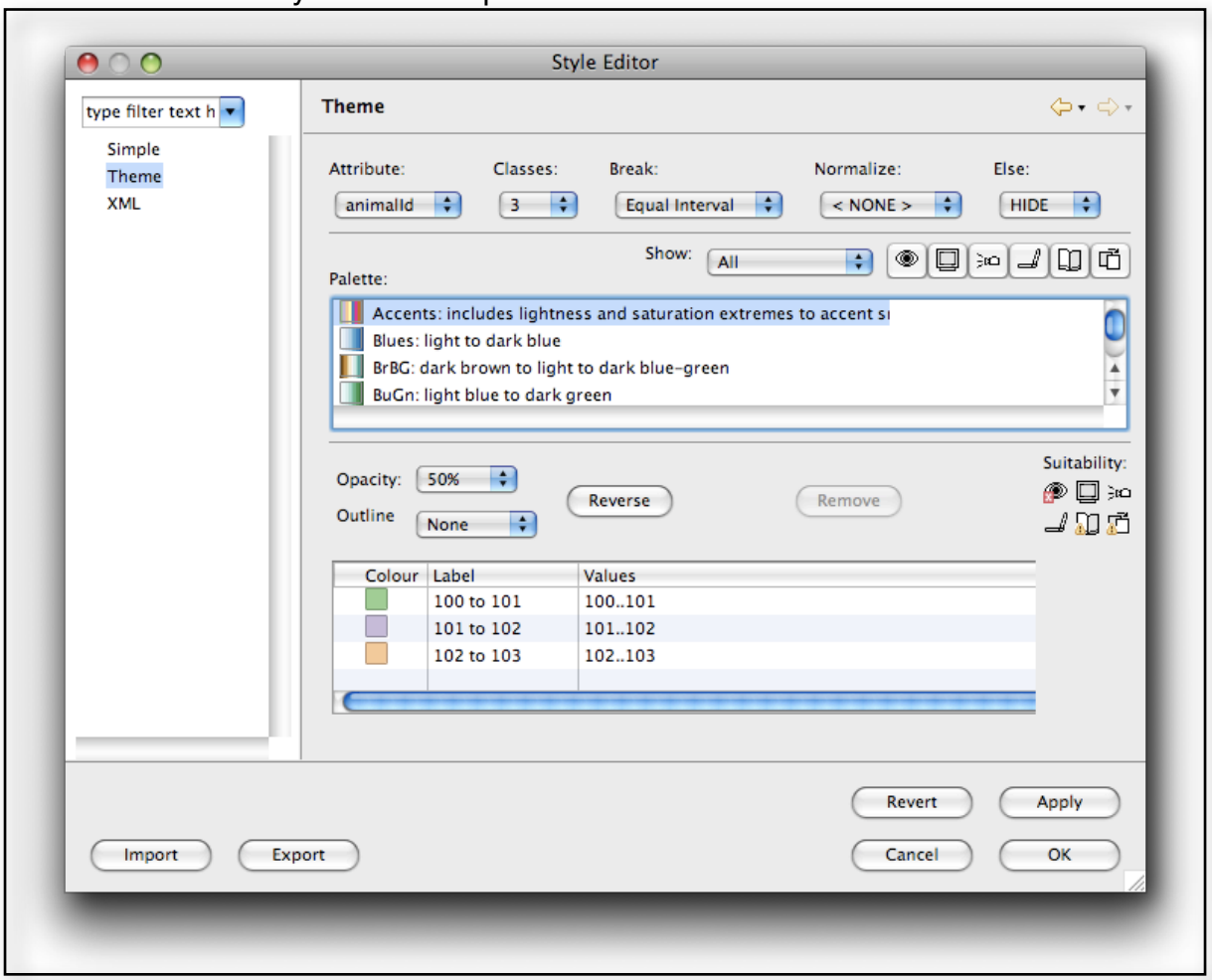
- Set the Result layer to be **Polygon**



- Press the  button to run the operation.
  - As you can see only the selected features are buffered

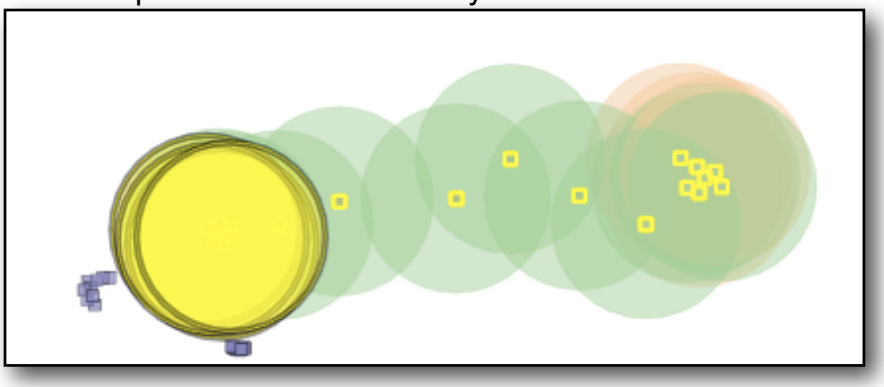


- Create a 3 class style for the elephants

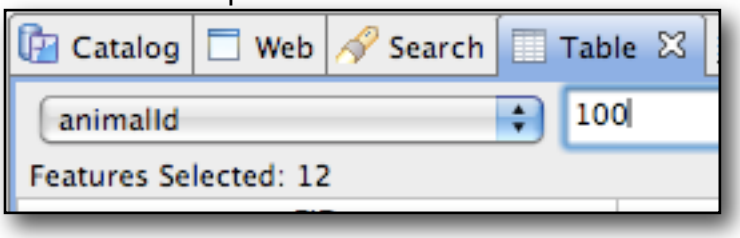


- In the table view select **animalId** and do a search for **101**.

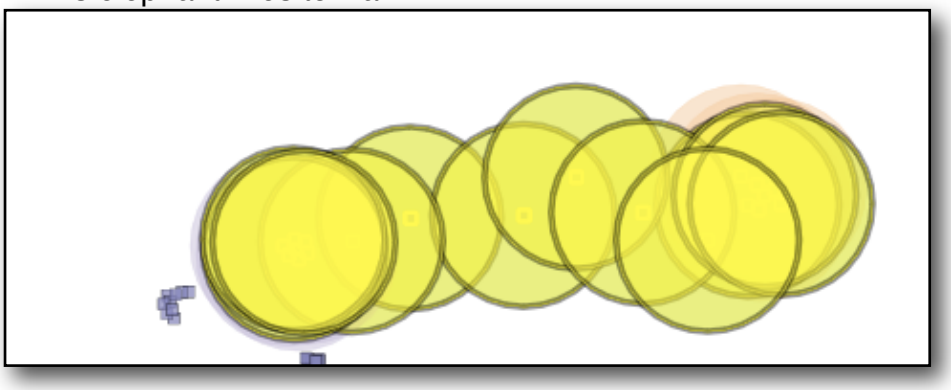
- The elephant 101 seems to stay in the same location.



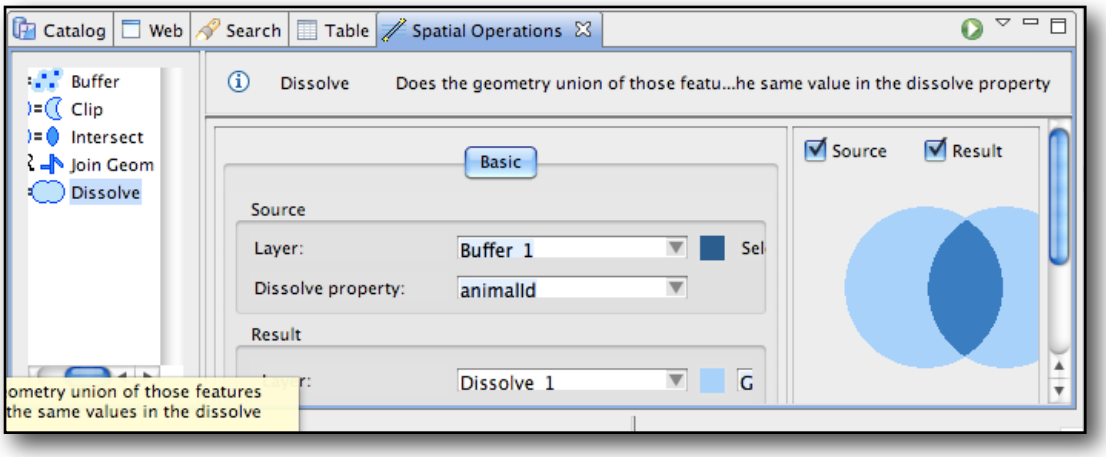
- Search for elephant **101**



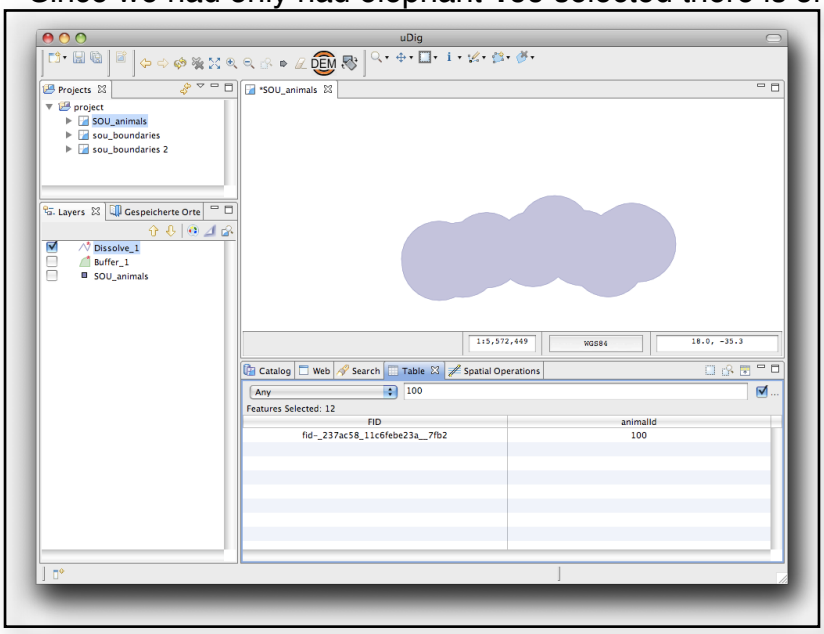
- This elephant likes to walk



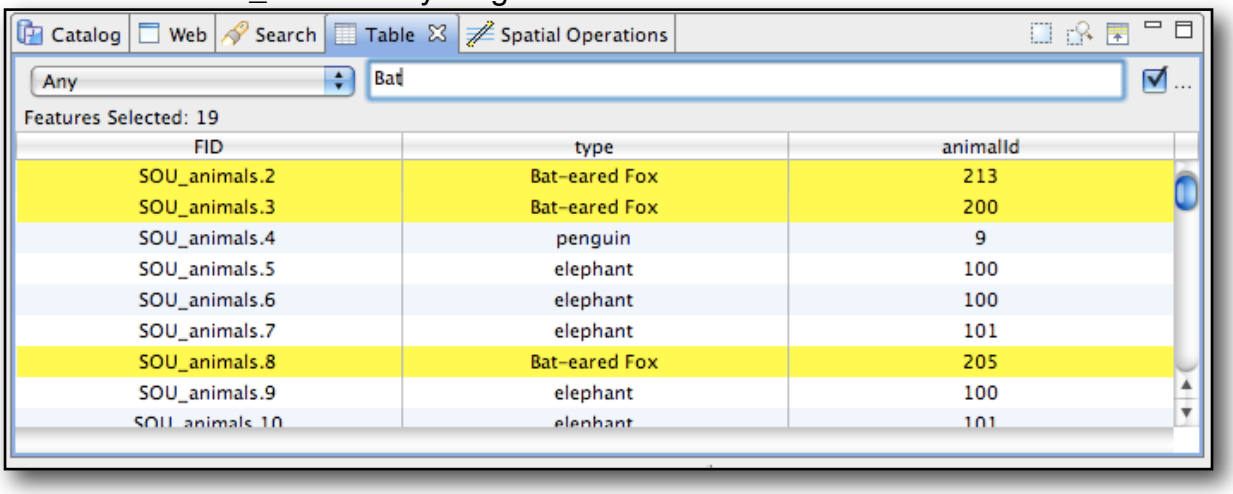
- The dissolve operation will combine all the selected polygons together. The disolve property determines which polygons are joined
- Select **Dissolve**
- Select **Buffer 1**
- Select **animalId**



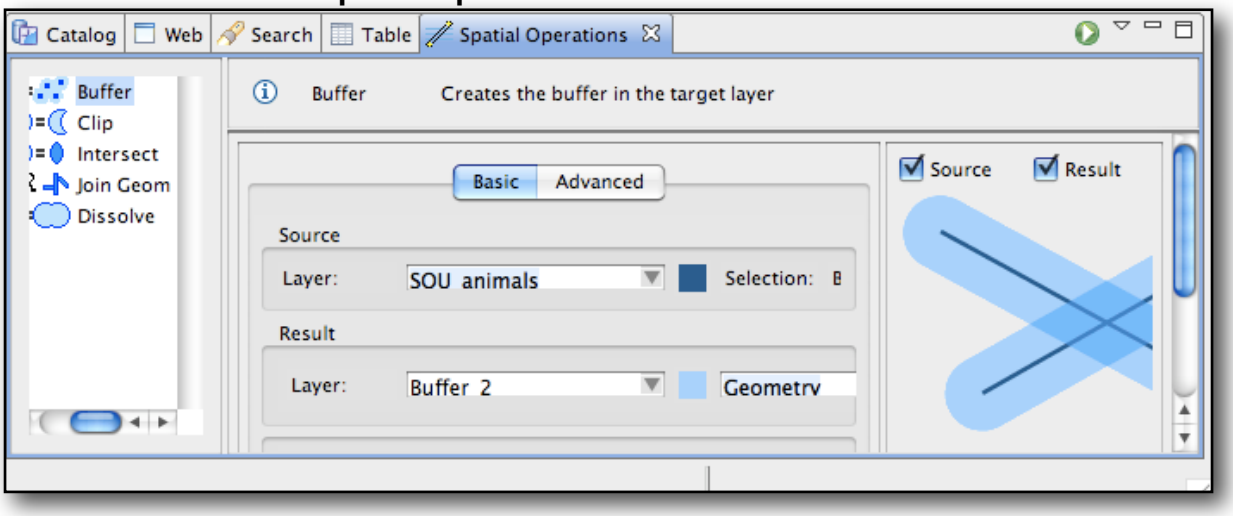
- Since we had only had elephant **100** selected there is only one polygon



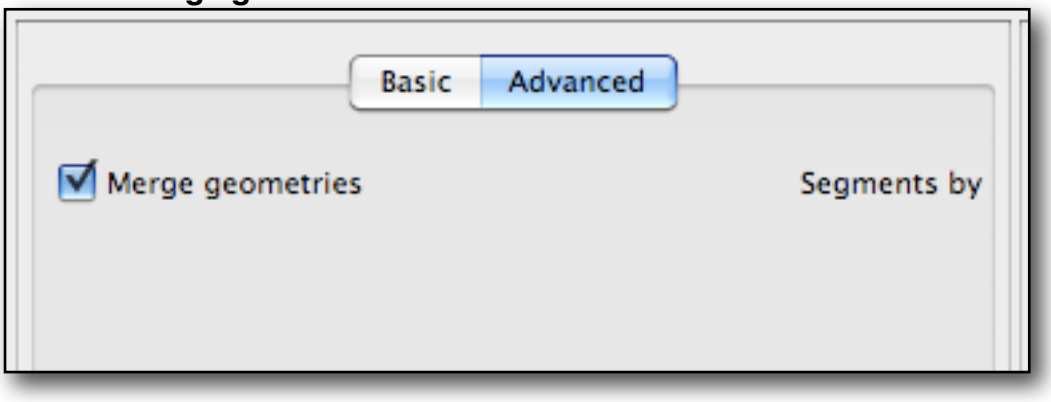
- Select the **SOU_animals** layer again and search for **Bat**



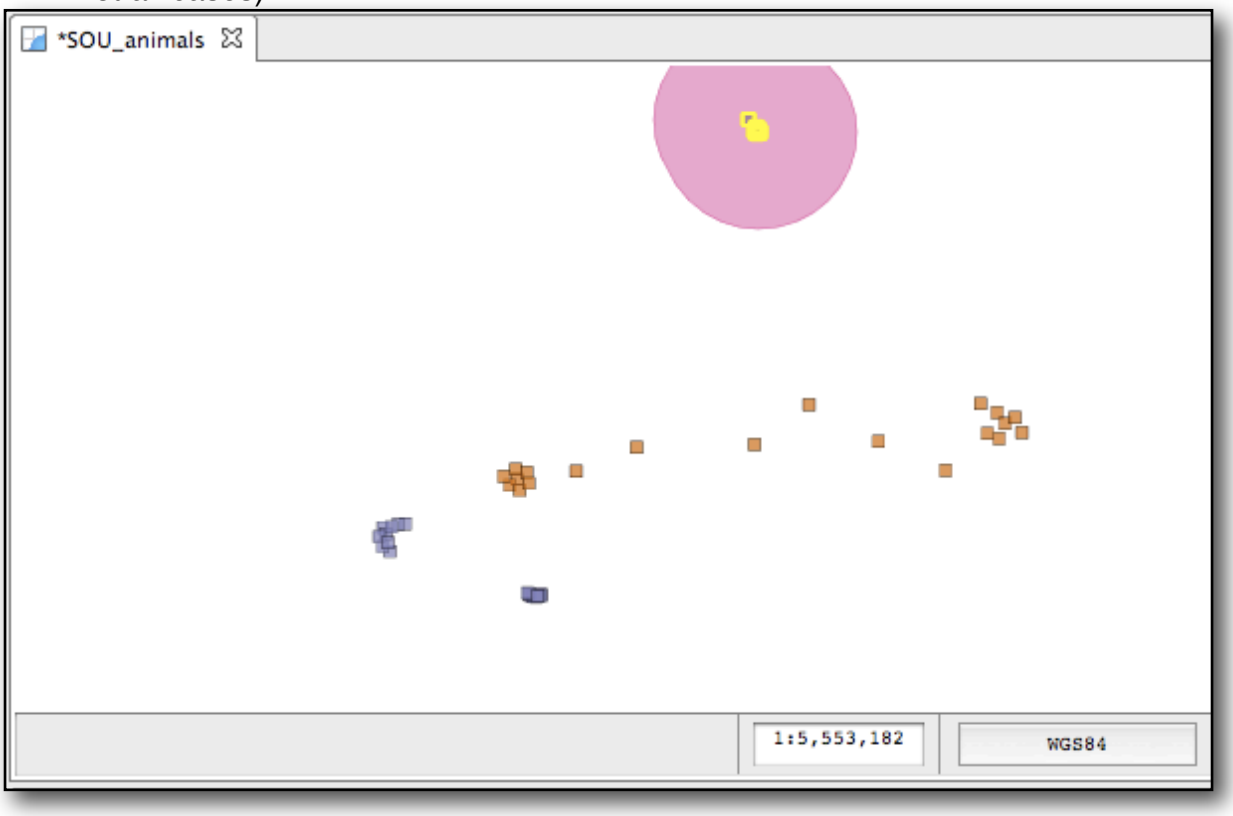
- Select **Buffer** in the **Spatial Operations** view



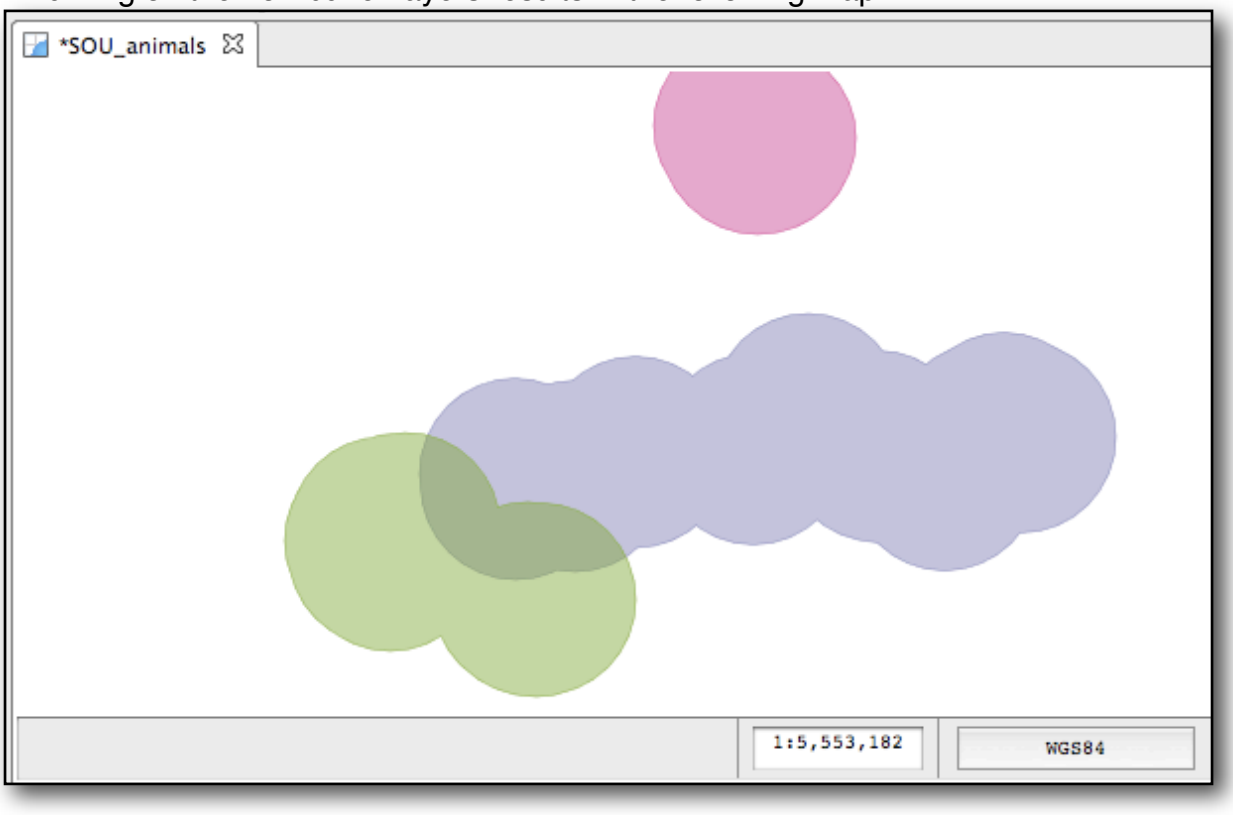
- Switch to the **Advanced** tab
- Check **Merge geometries**



- Run the operation.
  - In certain circumstances this is the same as running the Buffer and dissolve (but not all cases)

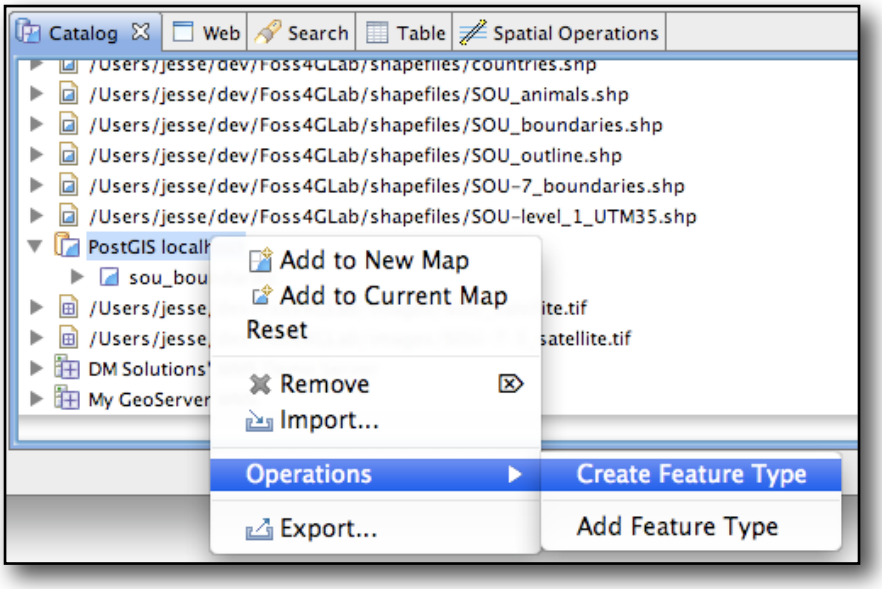


- Run the same operation with Penguin selected in the table view
- Turning off the non-buffer layers results in the following map



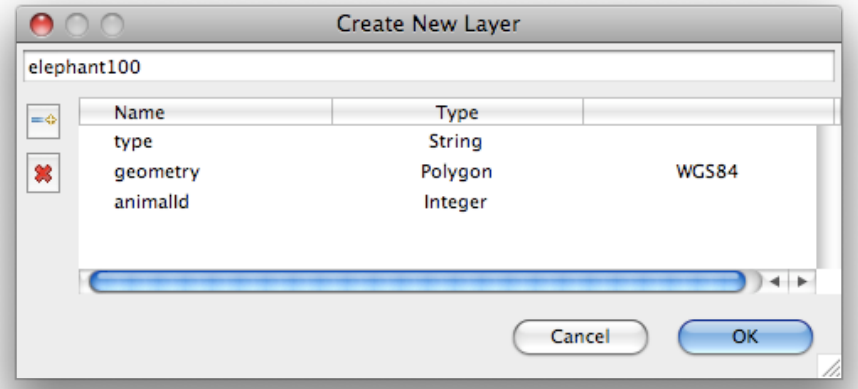
Postgis and copying features

- Instead of saving the buffered layers to shapefiles as is the default, we are going to create a new layer in postgis and copy the layers into the postgis.
- Open the **Catalog** view
- Right-click on the **Postgis localhost** entry and select **Operations > Create Feature Type**

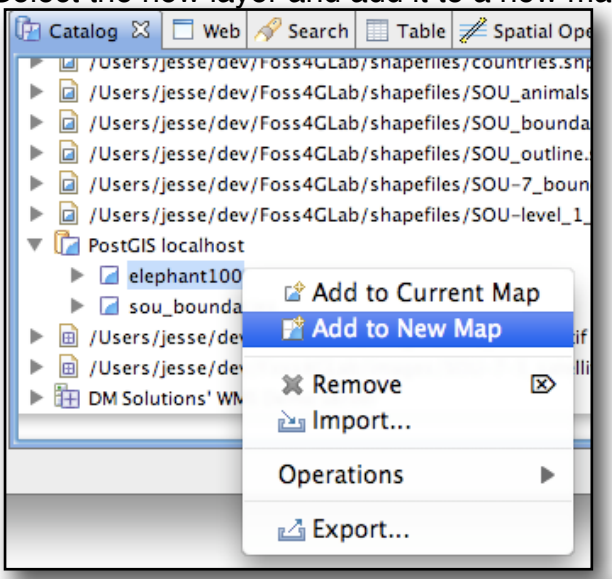


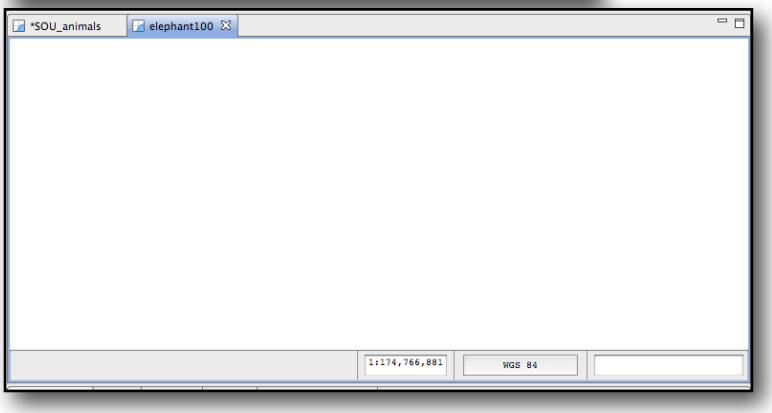
-

- In the Create New Layer dialog set **elephant100** as the feature type name (value in the text area
- Set the name of the first attribute to be **type**
- Set the Type of the geometry attribute to be **Polygon**
- Create a new attribute by pressing the  button
- The attribute should have the Name **animalId** and Type **Integer**
- Press the **OK** button

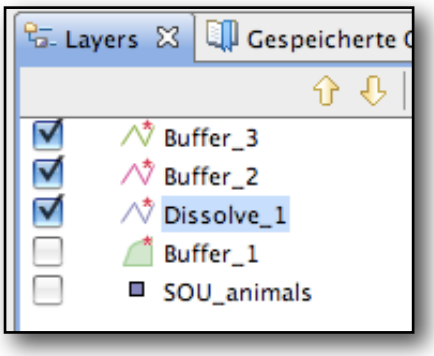


- Select the new layer and add it to a new map

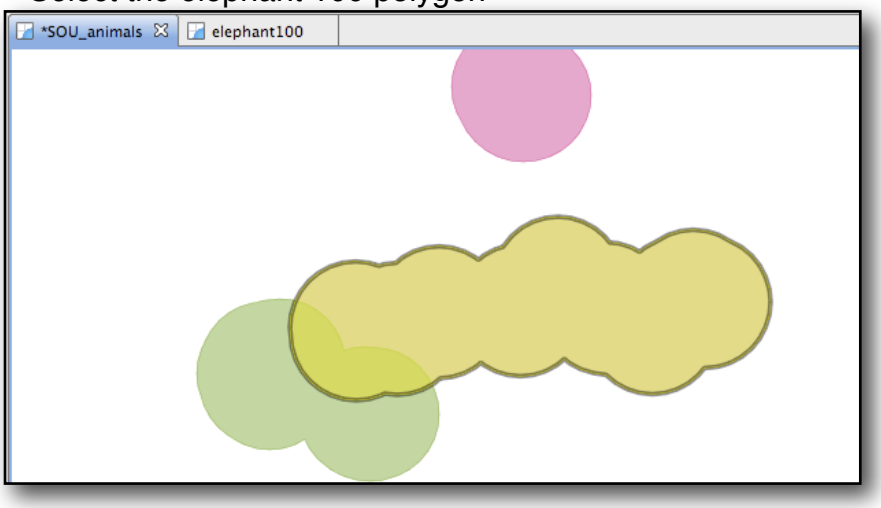




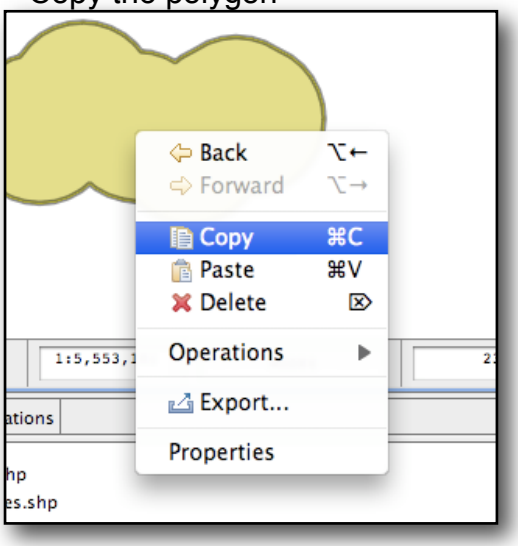
- Change back to the **SOU_animals** map
- Select **Dissolve_1**



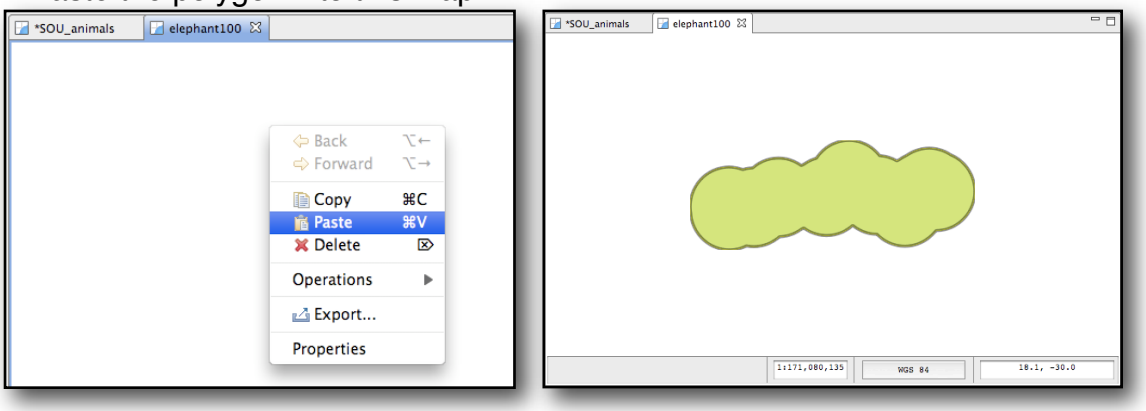
- Select the elephant 100 polygon



- Copy the polygon

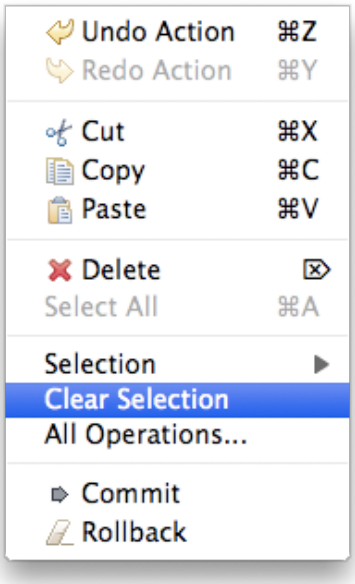


- Change back to the elephant100 map
- Paste the polygon into this map



- Commit the change 

- Clear the selection by ensuring that the map editor/view is selected
- Select the **Edit > Clear Selection** menu item

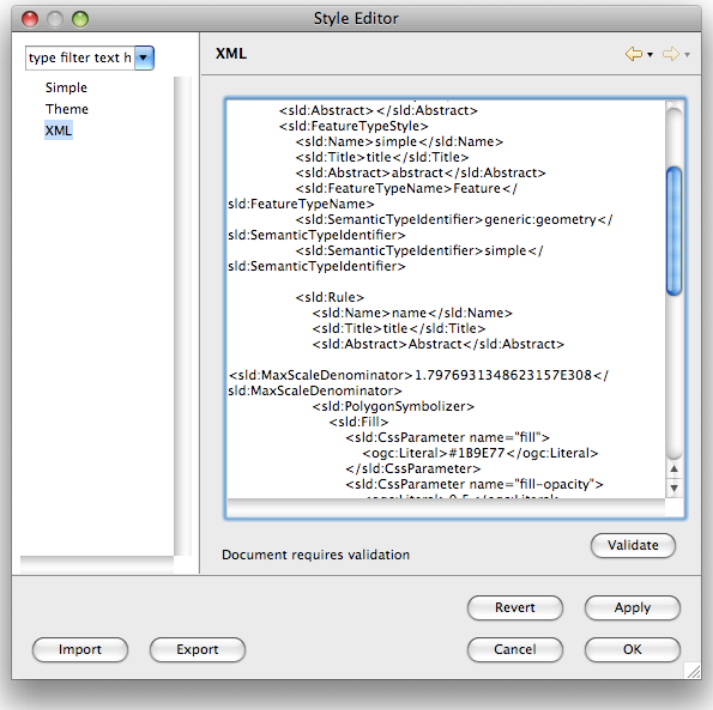


Custom Graphics

Now for no good reason we are going to pretty up our layer by adding an image of an elephant to our elephant polygon.

The real reason for this section is to introduce the *Styled Layer Descriptor* declaration of styles. Styled Layer Descriptor (SLD) is a standard created by the OGC for describing how to style/present a layer. Using the uDig user-interface only a small part of the SLD parameters can be modifed. The XML view is provided to allow knowledgeable users declare very complex styles. For more information on SLD you can download the specification at: http://www.opengeospatial.org/standards/sld

- Open the style dialog and change to the XML view

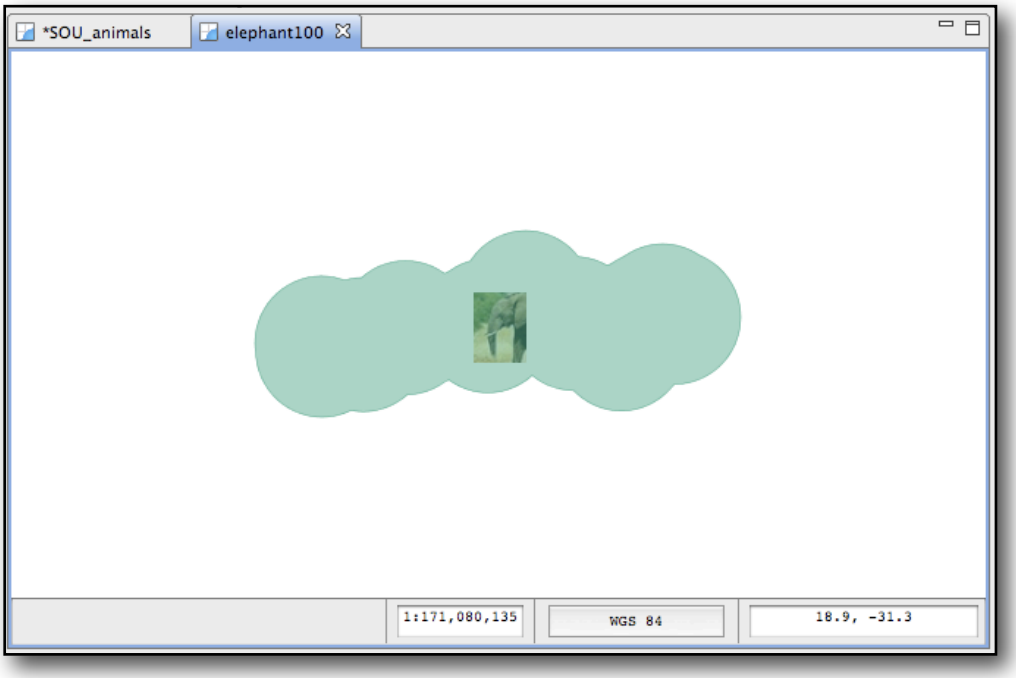


- Find the **<Rule>** tag and place the cursor before the tag.
- Paste the following test at the cursor
  - **NOTE:** There are two lines that have wrapped. They must be on one line. I have hi-lighted the two lines.
  - **NOTE:** The url (hi-lighted in red) must be replaced with the path to the elephant.png file

```
<sld:Rule>
  <sld:Name>name</sld:Name>
  <sld:Title>title</sld:Title>
  <sld:Abstract>Abstract</sld:Abstract>
```

```
    <sld:MaxScaleDenominator>1.7976931348623157E308</
sld:MaxScaleDenominator>
    <sld:PointSymbolizer>
      <sld:Graphic>
        <sld:ExternalGraphic>
          <sld:OnlineResource xmlns:xlink="http://www.w3.org/1999/xlink"
xlink:type="simple" xlink:href="file:c:\udiglab\elephant.png"/>
          <sld:Format>image/png</sld:Format>
        </sld:ExternalGraphic>
        <sld:Opacity>
          <ogc:Literal>1.0</ogc:Literal>
        </sld:Opacity>
        <sld:Size>
          <ogc:Literal>48</ogc:Literal>
        </sld:Size>
        <sld:Rotation>
          <ogc:Literal>0.0</ogc:Literal>
        </sld:Rotation>
      </sld:Graphic>
    </sld:PointSymbolizer>
</sld:Rule>
```

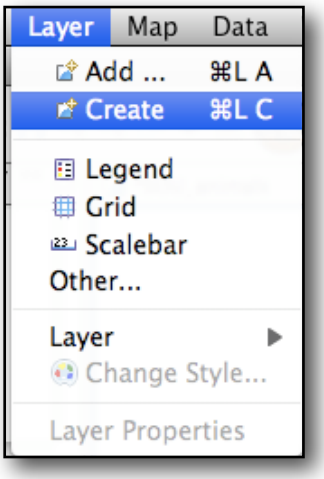
- Press the **OK** button.
  - There should be small image of an elephant in the center of the polygon.

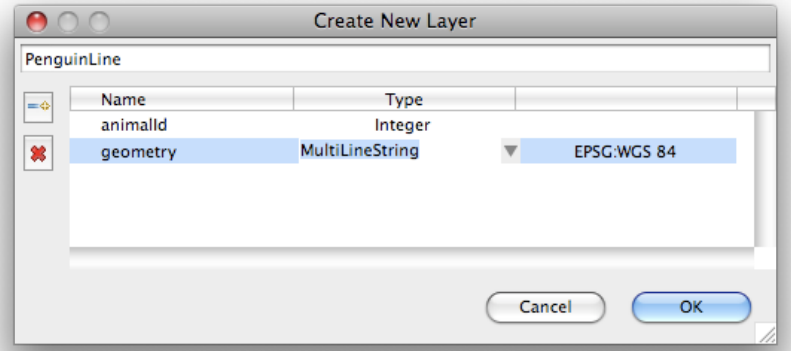


Converting Polygons to Lines

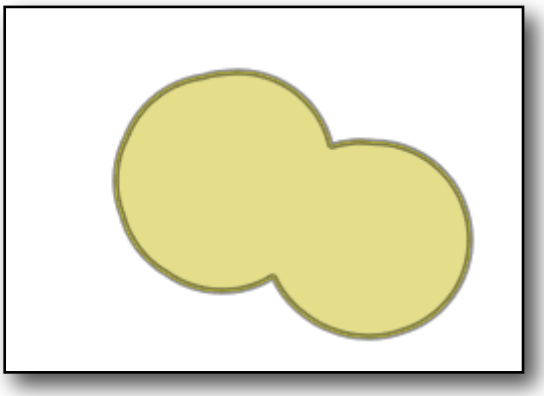
It is possible to convert a Polygon to a LineString by pasting the polygon into a line layer

- Create a new Layer.
  - Name the layer **Penguin line**
  - The attribute can
    - The geometry type can be LineString or MultiLineString

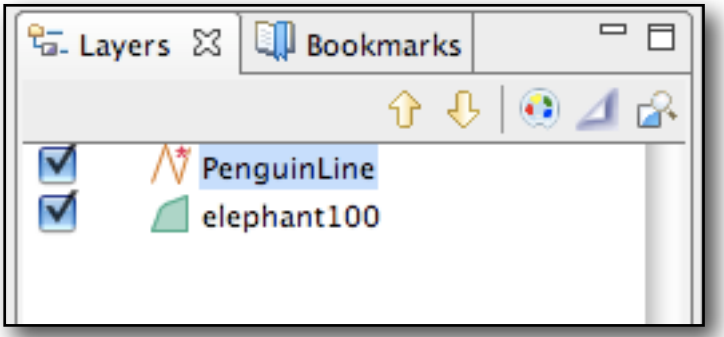


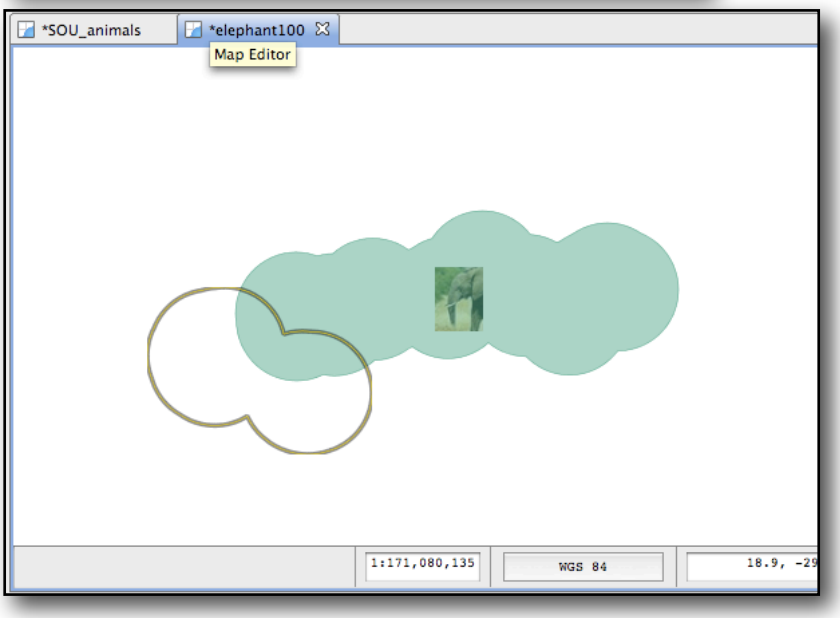


- Switch back to the SOU_animals map
- Select the Penguin polygon and copy it



- Change to the **elephant100** map
- Ensure that the **PenguinLine** layer is selected and paste the polygon onto the layer

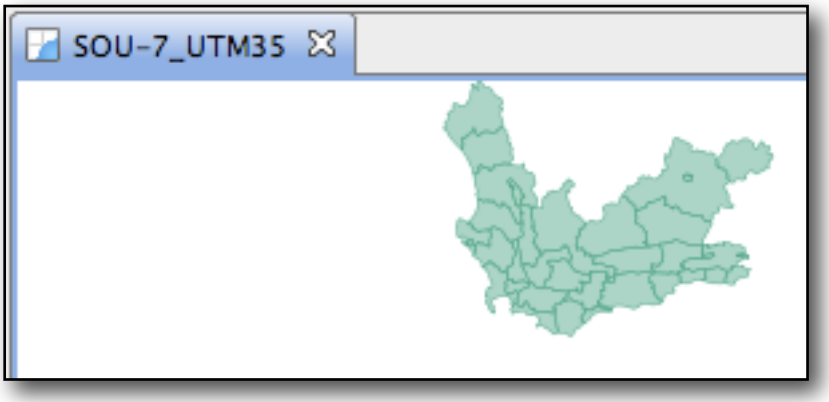




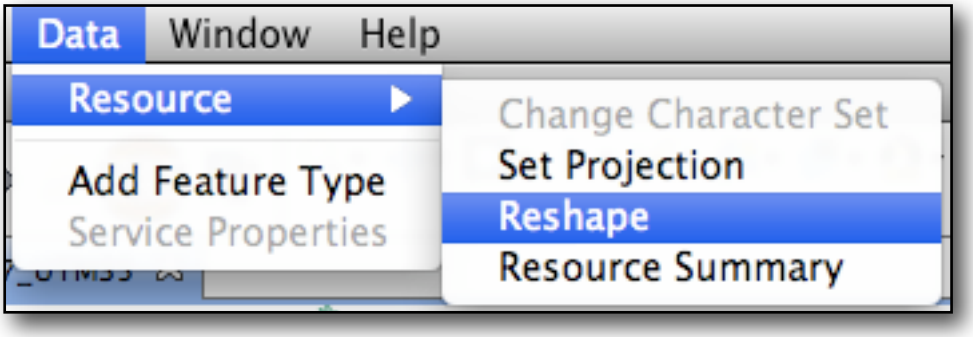
6 Adding new attributes

In this section we will add two new attributes to an existing layer. One attribute will be the computed area of the feature and the other will be a second geometry, the centroid of the geometry.

- Create a new map from the **SOU-7_UTM35** link in the embedded catalog.

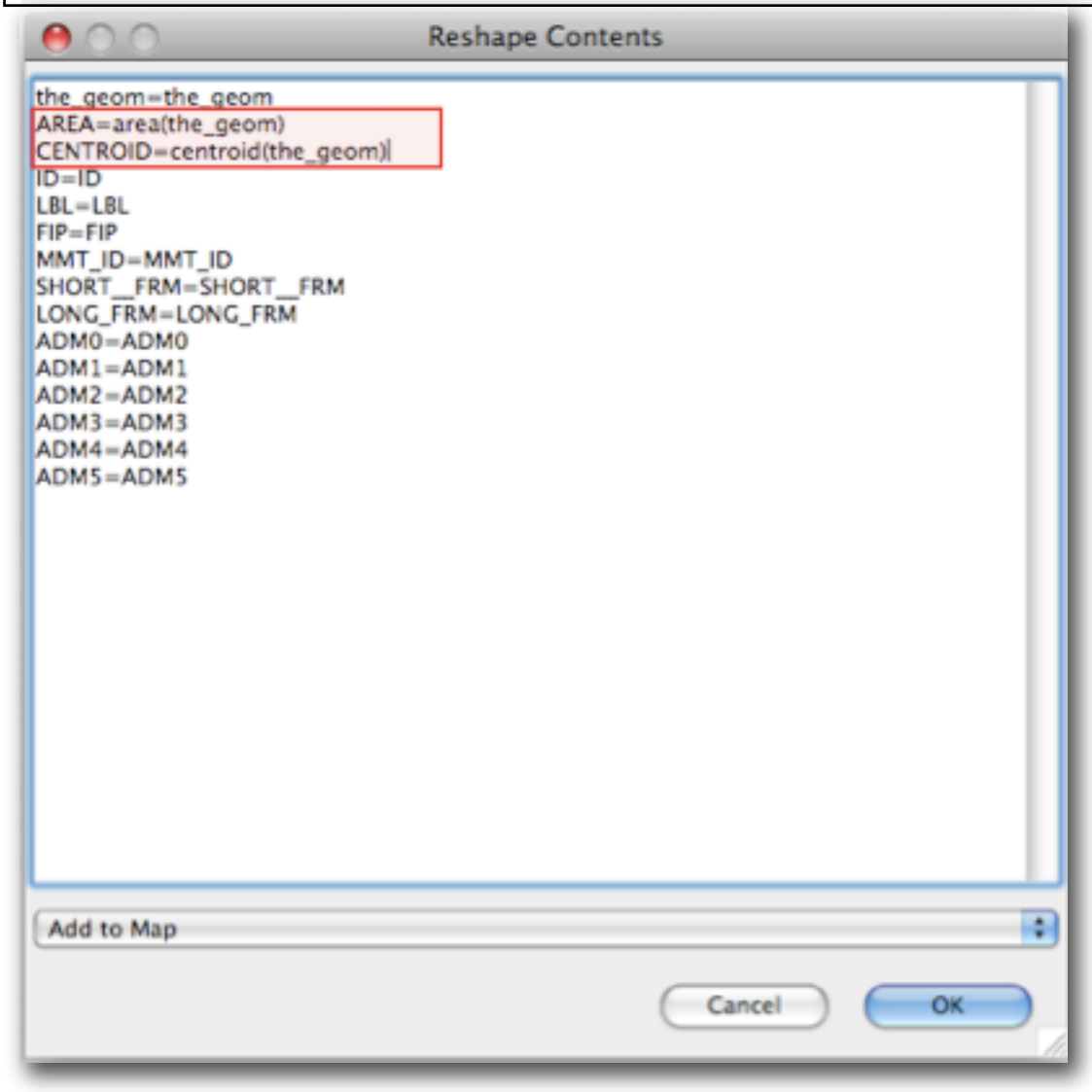


- Select the layer in the **Layers** view



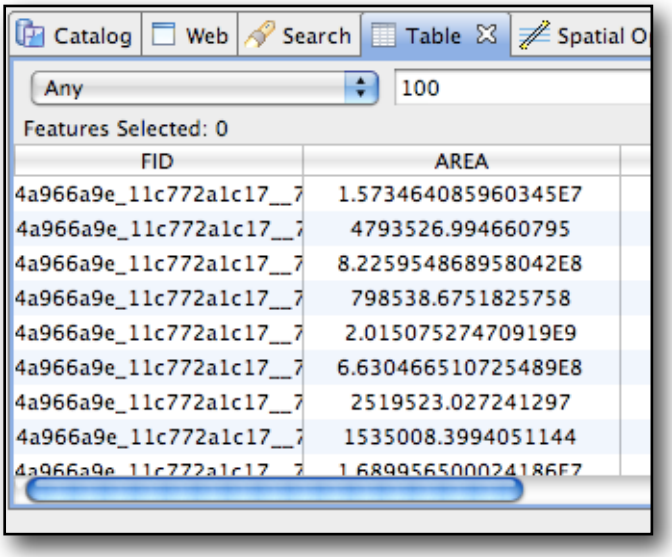
- The Reshape Dialog will by default do a direct copy from one layer to another with all attributes. The new layer is in the Scratch service which is temporary and needs to be saved.
- Add the two new attributes:

```
AREA=area(the_geom)
CENTROID=centroid(the_geom)
```

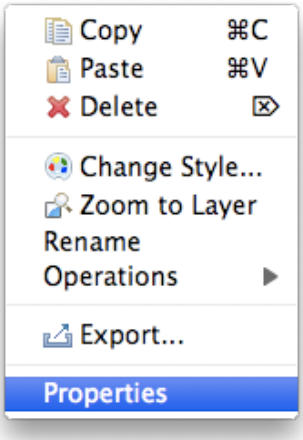


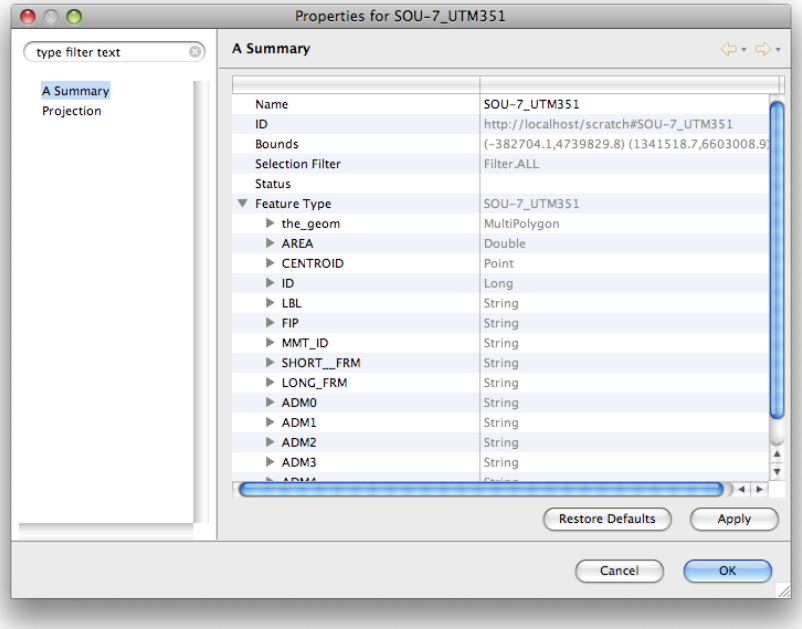
- Change the combo so the new layer will be added to the map
  - If this is not done the new layer can be found in the local catalog as a child of the **Scratch** service

- Select the new Layer and inspect it in the Table view.
  - **IMPORTANT:** The CENTROID attribute is not show because the Table view hides geometries in order to reduce the amount of memory required to display the features.



- The Feature type of the new layer can be inspected by viewing the layer's properties.
- Right click on the layer and select **Properties**





Appendix I -- CQL Resources

- Examples on the GeoTools website: GeoTools CQL Examples
- Examples on the uDig website: uDig CQL Examples
- OGC Catalog Specification contains the CQL specification.