Using QGIS to Create Avenza Maps

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Version 1.0

1. Introduction

This document provides a lay persons guide to creating Bing or Google Sat ortho image based PDF maps using QGIS that can be loaded into the popular Avenza Maps app on tablets and phones.

Avenza provides an effective low to moderate accuracy GPS environment on tablets and phones that have an active SIMM chip.

QGIS is a freely distributed GIS program. The authors stress that is it not free-ware. If you find it useful, consider making a donation to their project.

There are other ways of accomplishing the task at hand than the one described here. This is the simplest method I can figure out so far.

You need an active, fairly fast internet connection to do this work, as the ortho images are from on-line image servers.

Should the process fail for you, please inform me. I did a fresh install of QGIS on a system to test this process, in case some previously applied settings in my main work system were "coloring" the outcome, but sometimes even that does not result in a clean slate.

2. Download and Install QGIS

Not going to guide you through the QGIS install process in detail.

Search for QGIS on web, go to site, download appropriate version for your OS, install.

3. Map Making Process

3.1 *First Step: Get Imagery Running*

After QGIS is installed, close down the program.

Download

> http://www.woodfor.com/QGIS/QGIS.qgz

to a folder you can find on your hard drive.

Go to that folder and double click QGIS.qgz. QGIS will start and open the qgz file.

Why? QGIS.qgz contains links to the Bing and Google satellite image servers. This is an easy way to get those imager services running on your system.

3.2 *Navigate to Woodlot*

QGIS.qgz opens at a random location in southern BC. You need to navigate to your woodlot. Two ways to do this:

### 3.2.1 Use Your Shape File of WL Boundary

You have a shape file of the woodlot boundary on your hard drive? Well, rummage in the QGIS Browser window and navigate to that shape file. Mine is creatively named "Boundary.shp". Double click the shape file in Browser to add it to the list in Layers
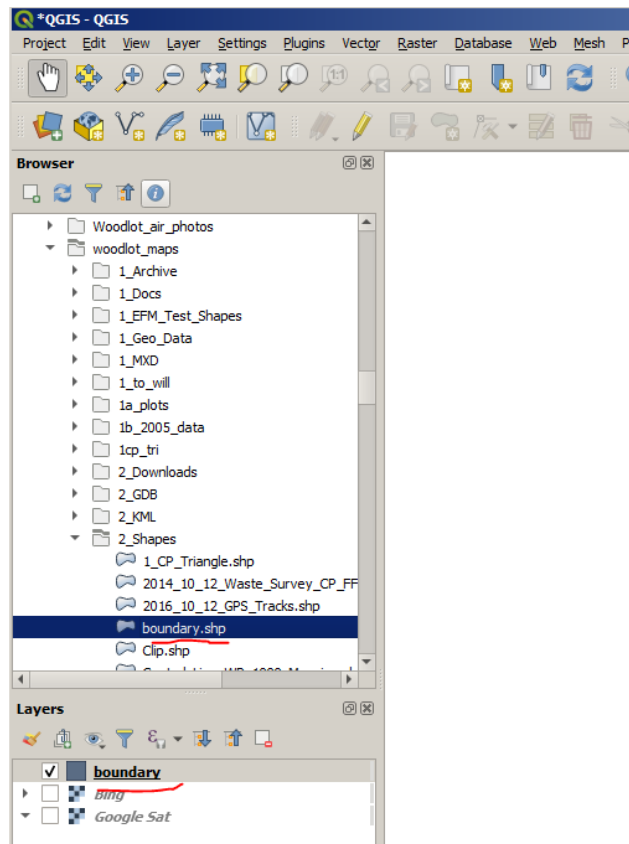
Once it is in layers list, alternate click the file name in Layers to open the Zoom to Layer option, and choose it.
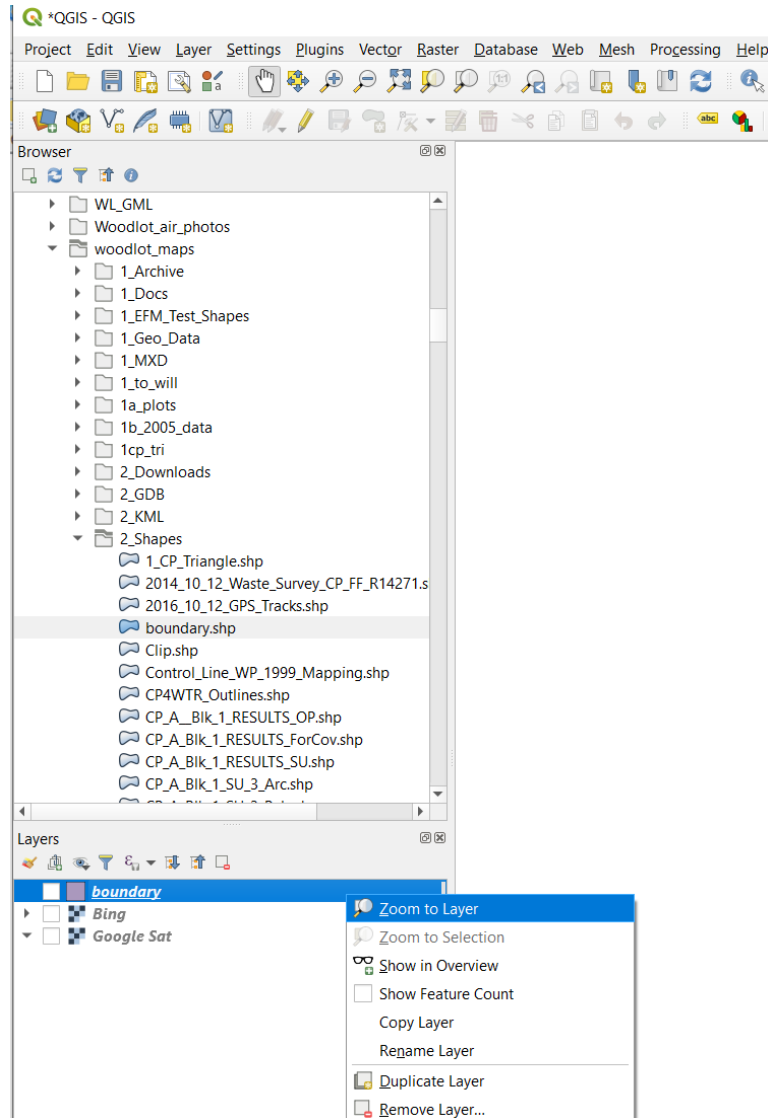

The display zooms to the selected shape file, which you will hopefully recognize as the WL in question.
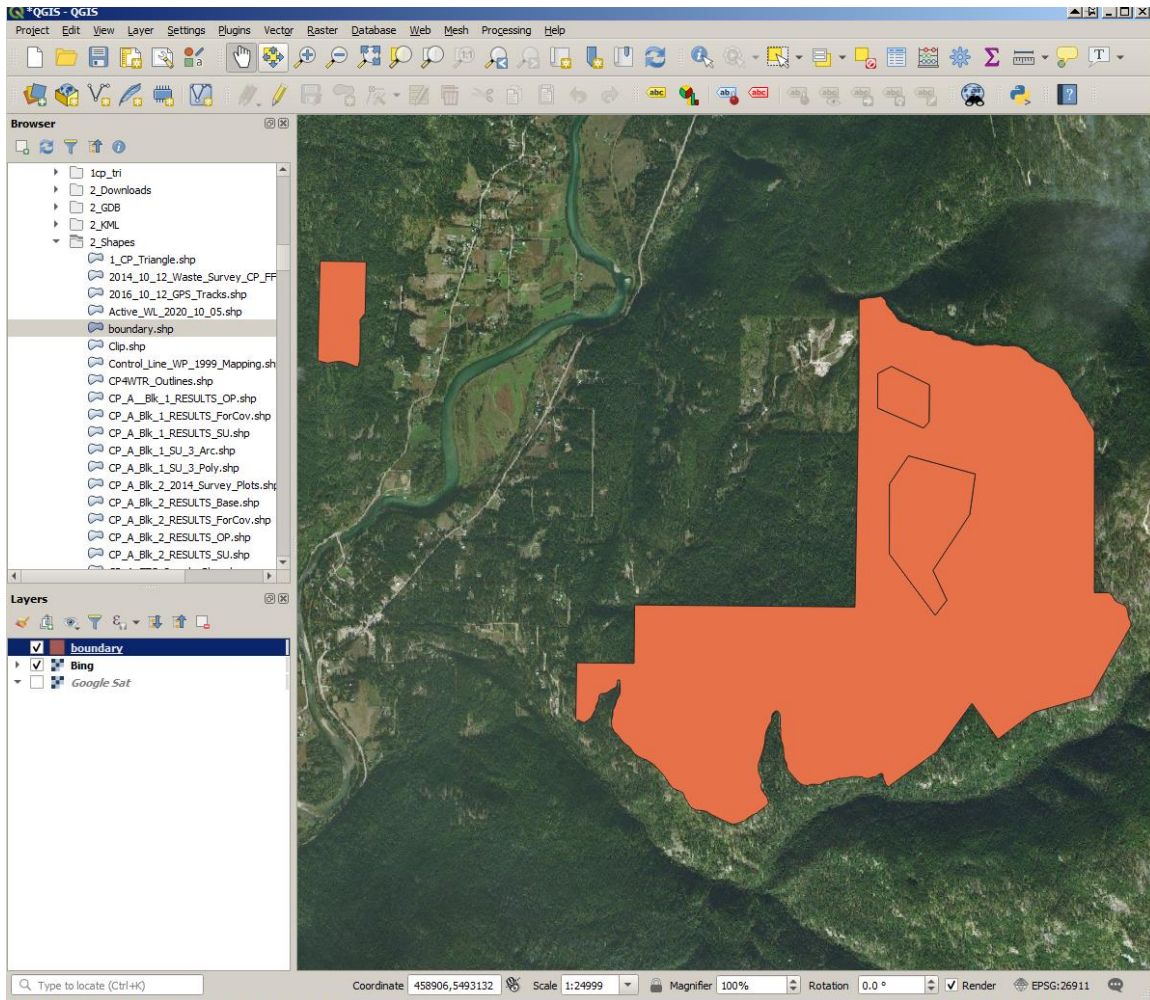
Default display is solid fill. Solid fill NOT terribly helpful, so double click the shape file in Layers to bring up some simple themeing options. Assign one of the Outline options to your shape file.
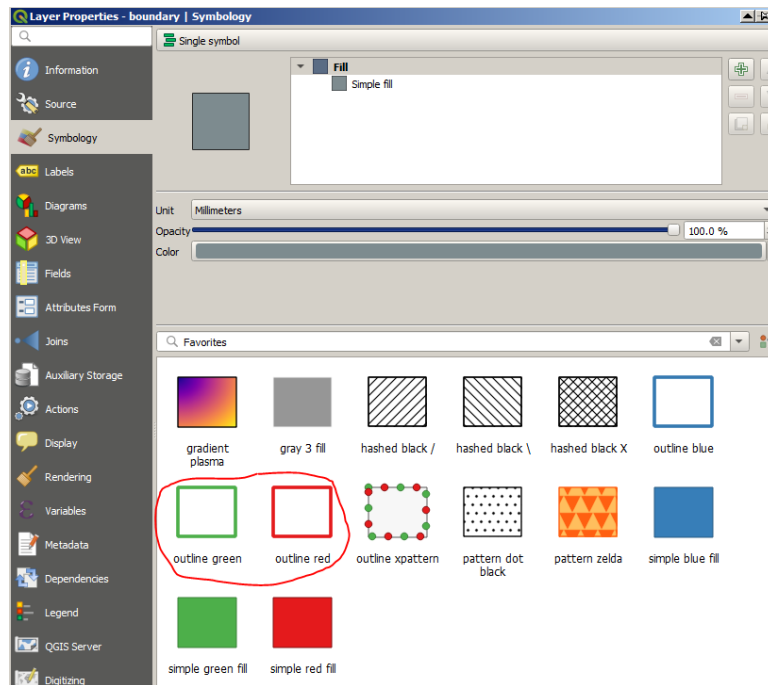
The default Outlines are thick and clunky. So click on the words Simple Line to bring up the outline options, and drop the stroke weight from 0.96 to 0.3.
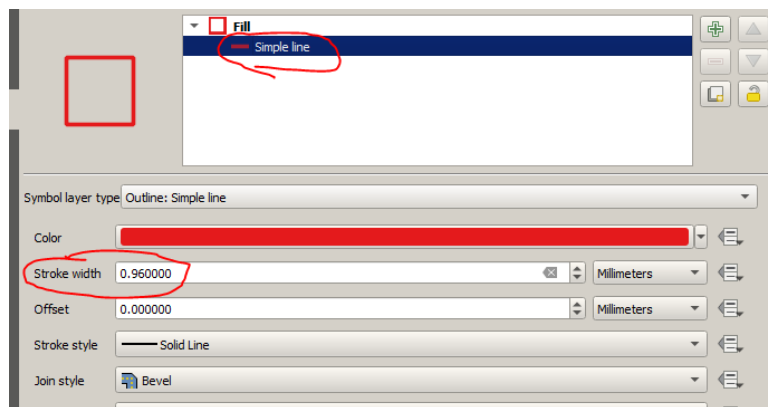
Reasonable display!
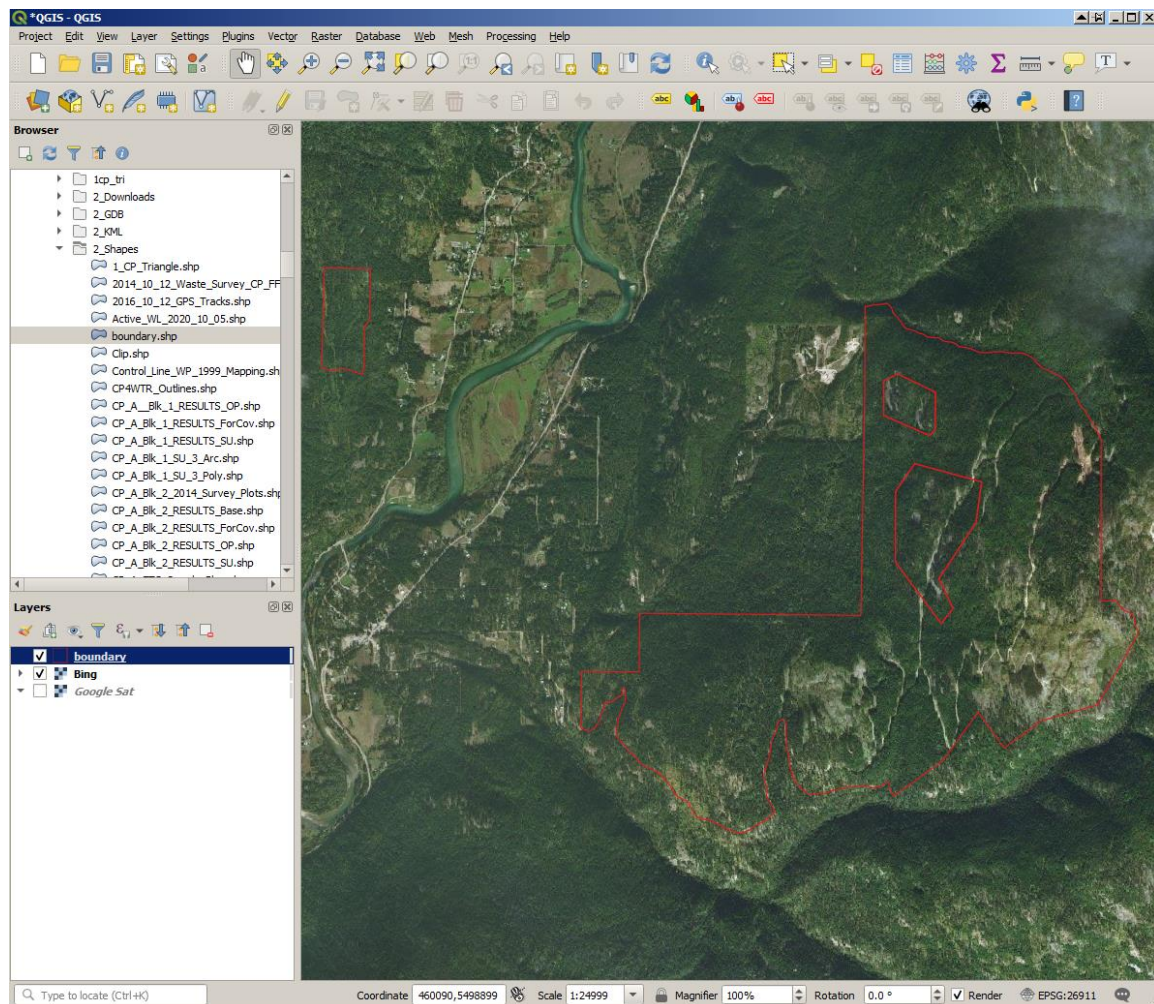
3.2.2 You Have No Shape File On Hand?

You got no shape files lying around? No worries. Go to
> http://www.woodfor.com/QGIS/

and download the *.zip file that says it is "Active WL" to a folder on your hard drive that you can find. The *.zip is spatial data for all active Woodlot Licence tenures in the province at date of creation.

(The file is a PK Zip compressed archive. It contains a set of files with the same name and differing file extensions. This group of files makes up "the Shape File". A shape file is not a single file, it is a herd of files. Process to get into zips varies by operating system. If you do not know how to get into a *.zip file, Google "Zip Files" and choose/download an option.)

Unzip the *.zip file to that a folder on your hard drive that you can find.

Go back to QGIS Browser and hunt down the Active WL shape file. Double click it to add it to Layers, Zoom to Layer if needed, and you see:
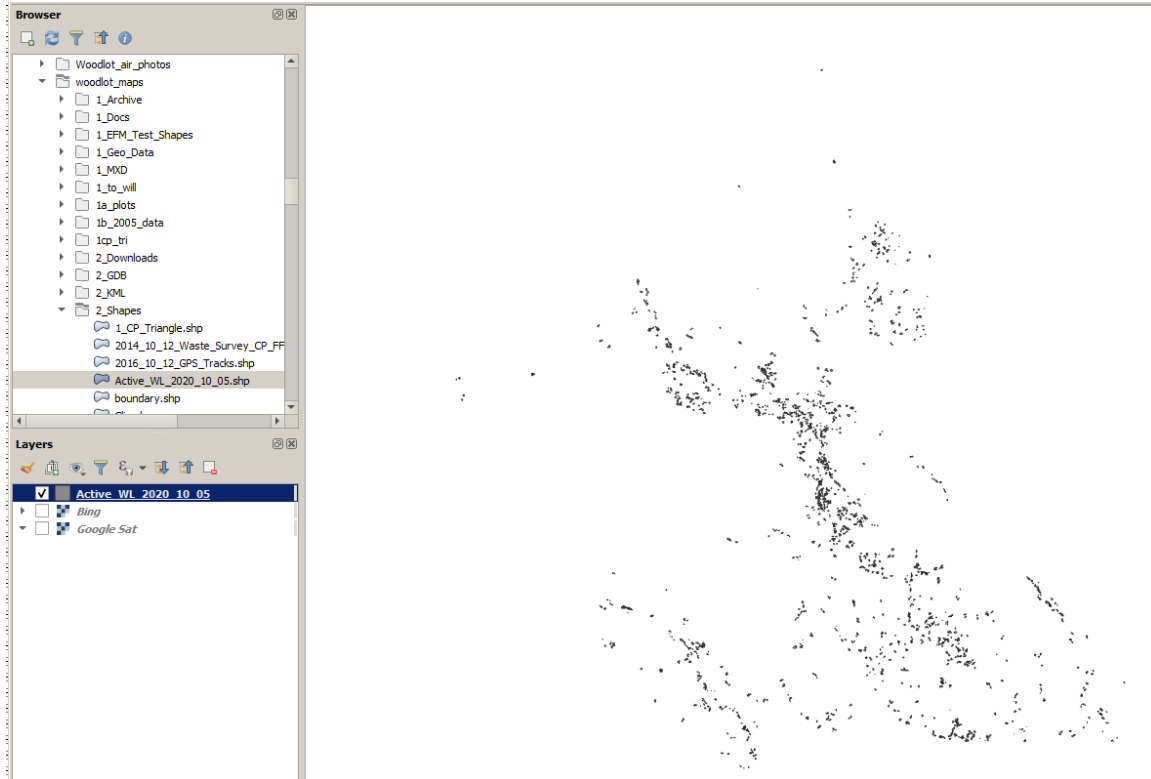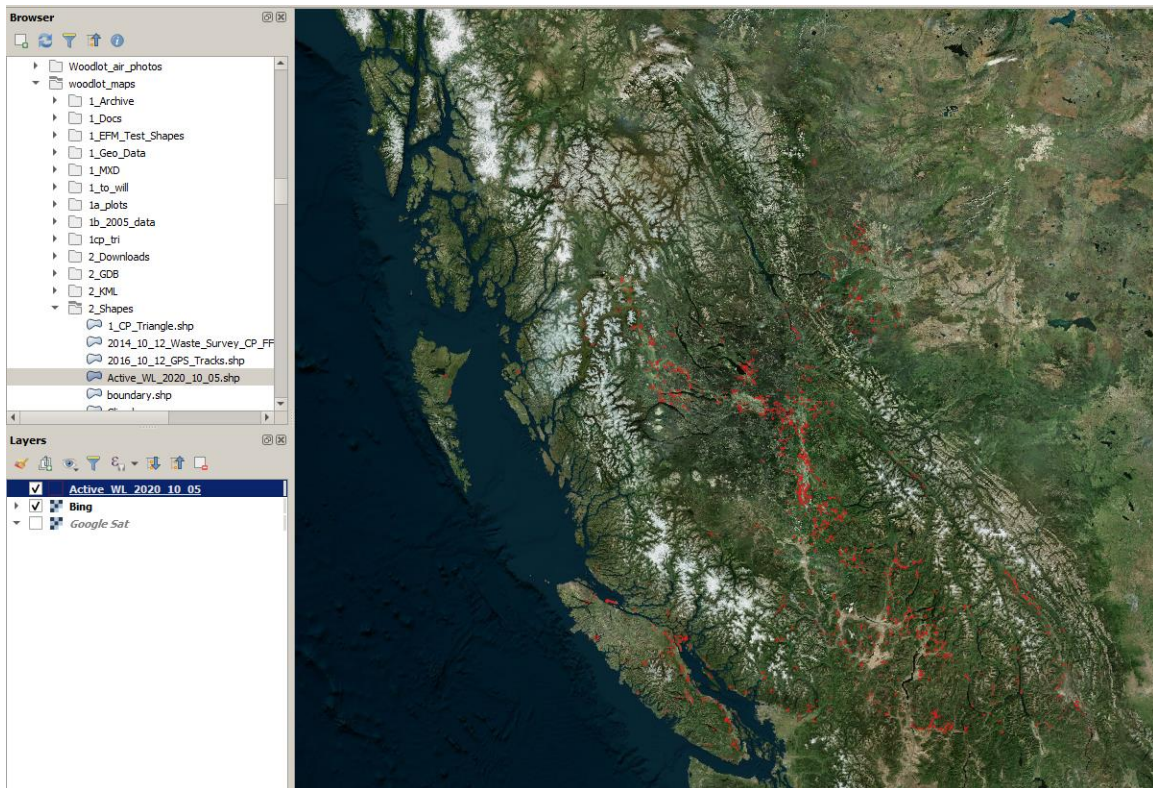
Hmm. Dots. If I cross my eyes do I see the hidden animal? Nope. But you can kind of make out the ghost of Vancouver Island there in the SW corner, etc. The dots are all the WL in the province.

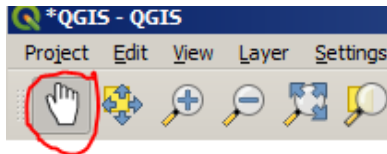You can turn on one of the imagery layers to illustrate.
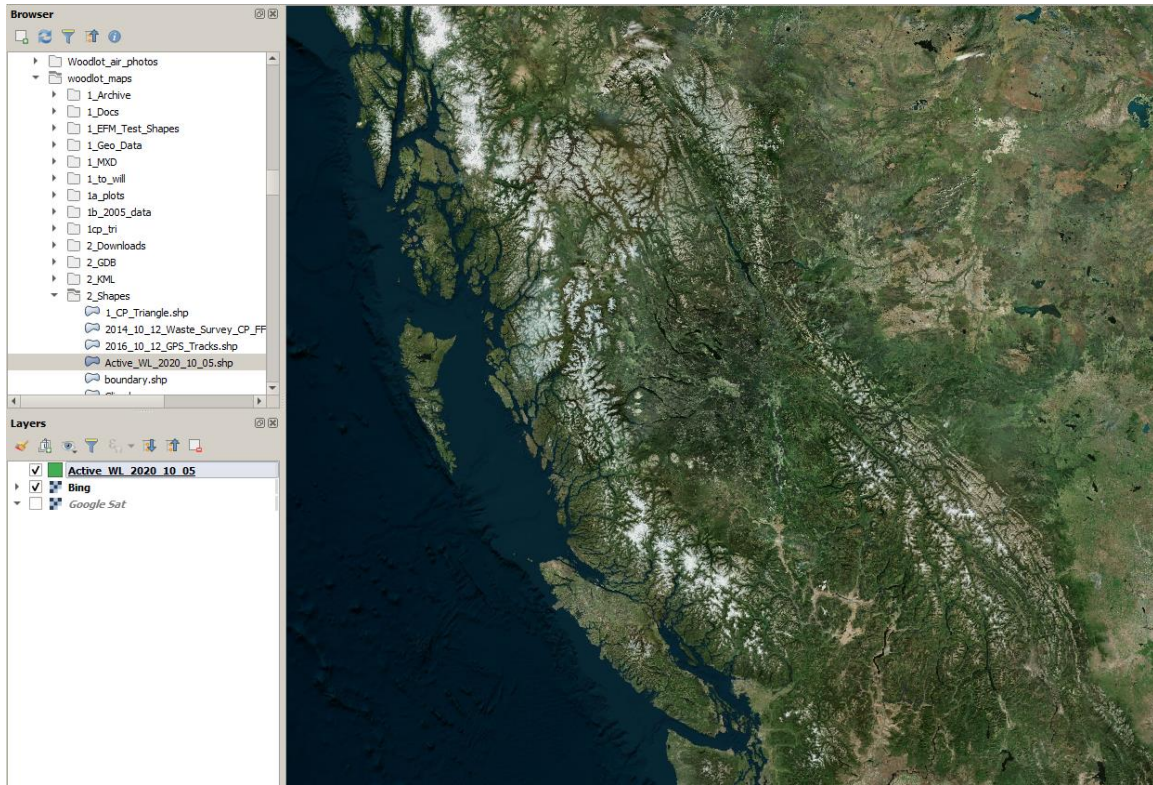
Or not. WL are green, BC is green, this is a not working. Change the WL to a thin red outline, as discussed above.
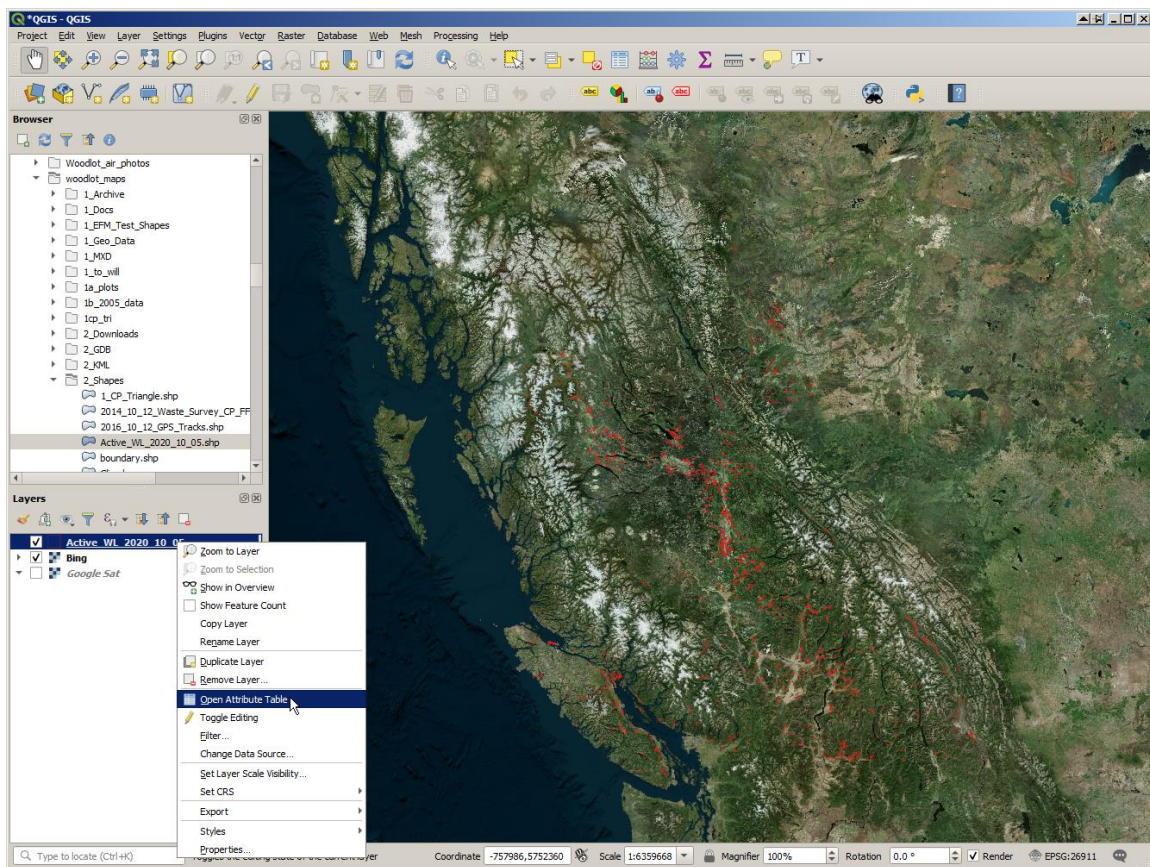
OK, that is better.

You can just "drive around" on the map to find your WL if that suits your taste. Use the Hand icon in the top menu

and the mouse scroll wheel. Drag the view frame around and zoom in and out. You can get to your WL that way.

You can also Alternate Click on the Active WL shape file in the Layers window and choose Open Attribute Table.

Data!! FRSTFLD is obviously WL number.

The entries are an unsorted mess though. Simple fix: double click on the FRSTFLD column title and the table sorts by FRSTFLD.

Helpful.. Scroll down to your WL. I am going for… W1657 Random selection. I do not remember who holds W1657. Hold down your PageDown key on keyboard to scroll effectively.

Target acquired. Click on the far left column/bar (where is says 1795) to select the W1657 row. You can click select multiple rows if WL has multiple spatial units. Then click on that little magnifying glass icon in top row to Zoom to Selection.
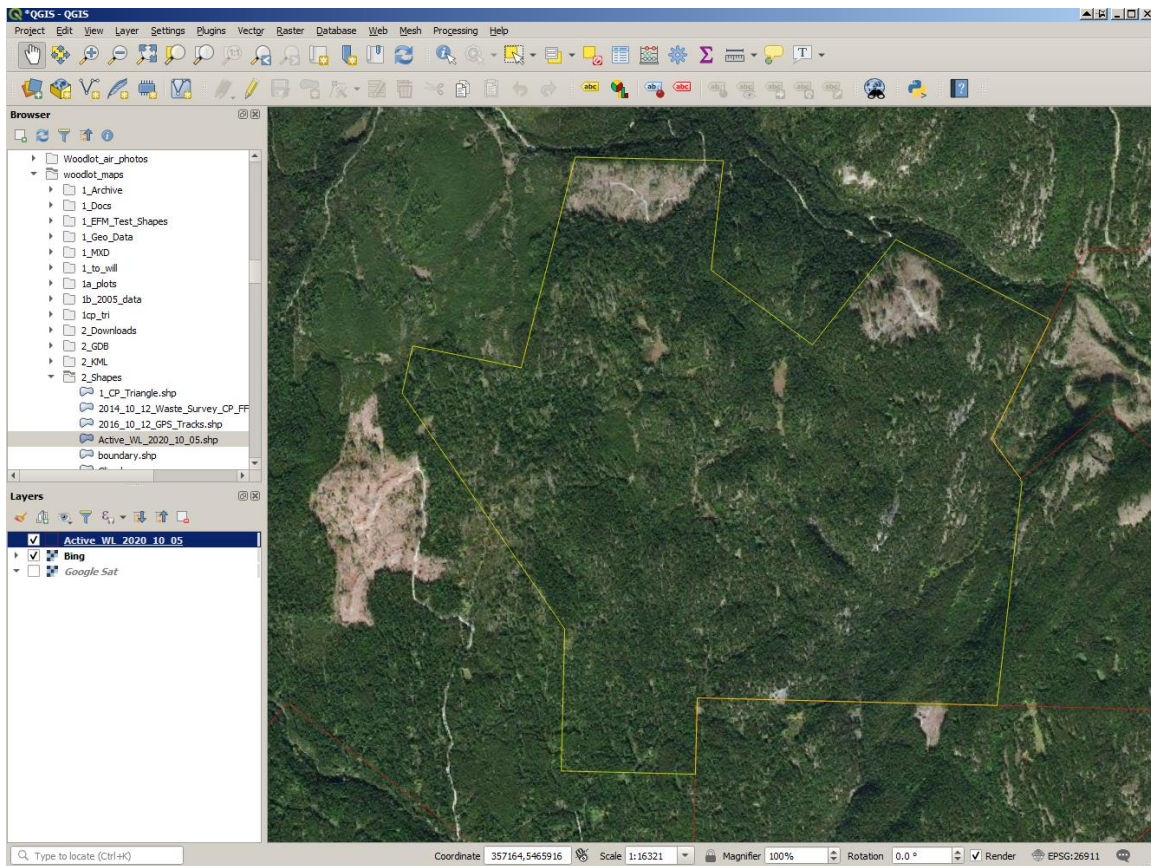
Screen display zooms to W1657, and helpfully outlines the selected polygon in yellow.

3.3 *Save*

Save. You have navigated to your area of interest. You do not want to repeat this every time, so Save.
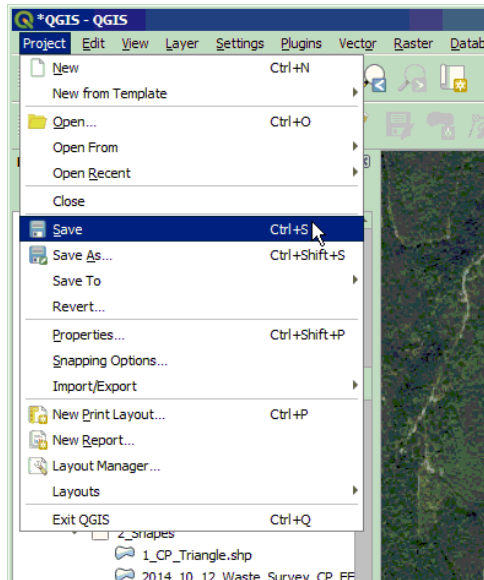
If you go with just Save, you will resave QGIS.qgz file with this new location. No harm in that.

Or you can Save As to call it something like W1657_Overview.qgz. That is more my style: give everything a name. It helps me later to figure out what the file is for.

Your choice.

3.4 *Map Projection*

Map projections are a bit rocket sciencey, but there is no need to become an expert. Most mapping in BC uses one of 5 projections:

- BC Albers.
- UTM 11 NAD 83
- UTM 10 NAD 83
- UTM 9 NAD 83
- WGS

Albers covers the entire province in a single accurate map projection, BUT has the shortcoming that east-west and north-south lines are often severely tilted. As WL boundaries often follow cardinal bearings, this can be very irritating.

UTM projections nicely show north as up-ish, but the province is divided between UTM zones 9, 10 and 11 (with a bit of 8 - Haida Gwaii and Atlin).
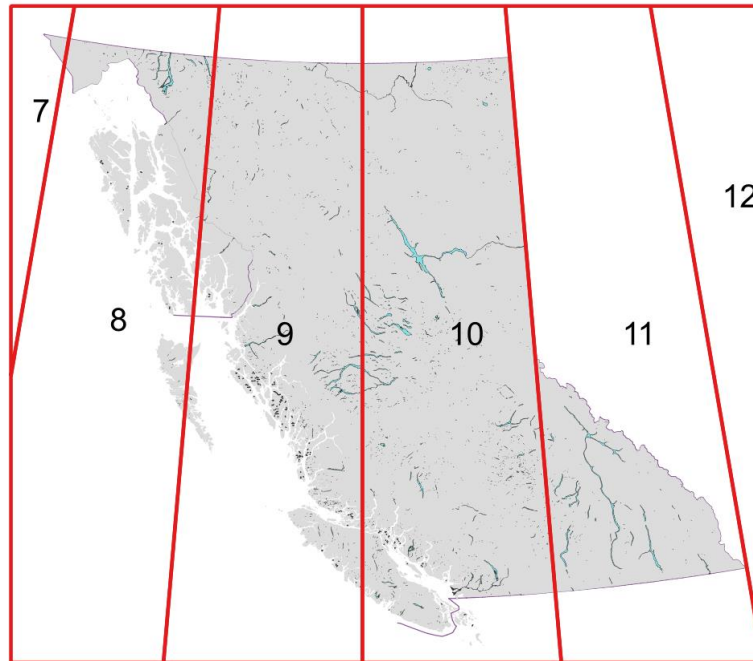
UTM Zones in BC

WGS is the native projection used by many GPS devices, including Avenza. So when you export points and tracks from Avenza, the info is coming out in WGS.

I prefer the UTM projections for my mapping work, but everyone has their personal favorite.

The file you opened to access the image servers - QGIS.qgz - is in UTM11 NAD 83. Unless your WL is in the SE corner of the province, you are going to want to reset it to a more appropriate projection.

What I realized at this point is that W1657 is in fact in the UTM 11 zone, so the projection that QGIS.qgz is in is perfect for it. But W1657 thus makes a terrible example for "changing projection" discussion. So, I need to switch WL. I chose W0355, again at random, I do not know who holds W0355. I do know that W0355 is not in the UTM 11 zone, it is way further west.

Here is W0355 in UTM11 NAD 83 projection. How do I know what projection it is in? Well, I am still using the QGIS_ggz file as a base, and it comes in UTM 11. Also, there is a small code bottom right: EPSG: 26911 . That code stands for UTM 11.
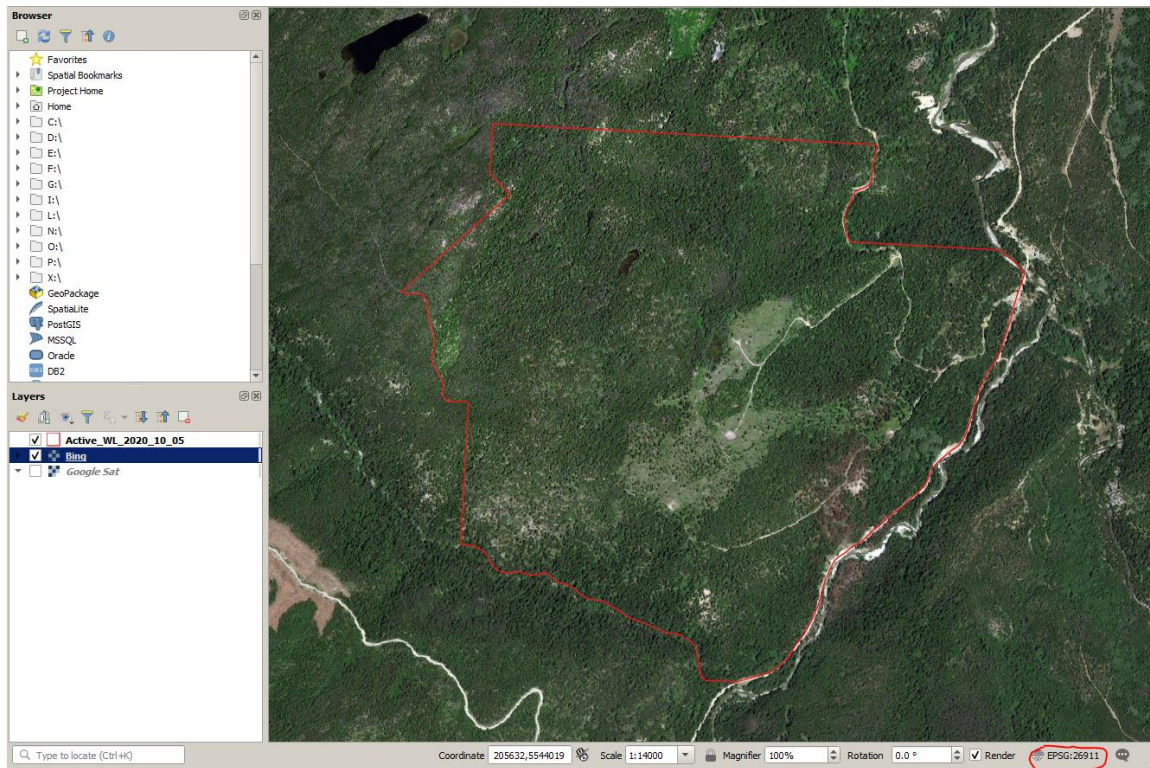
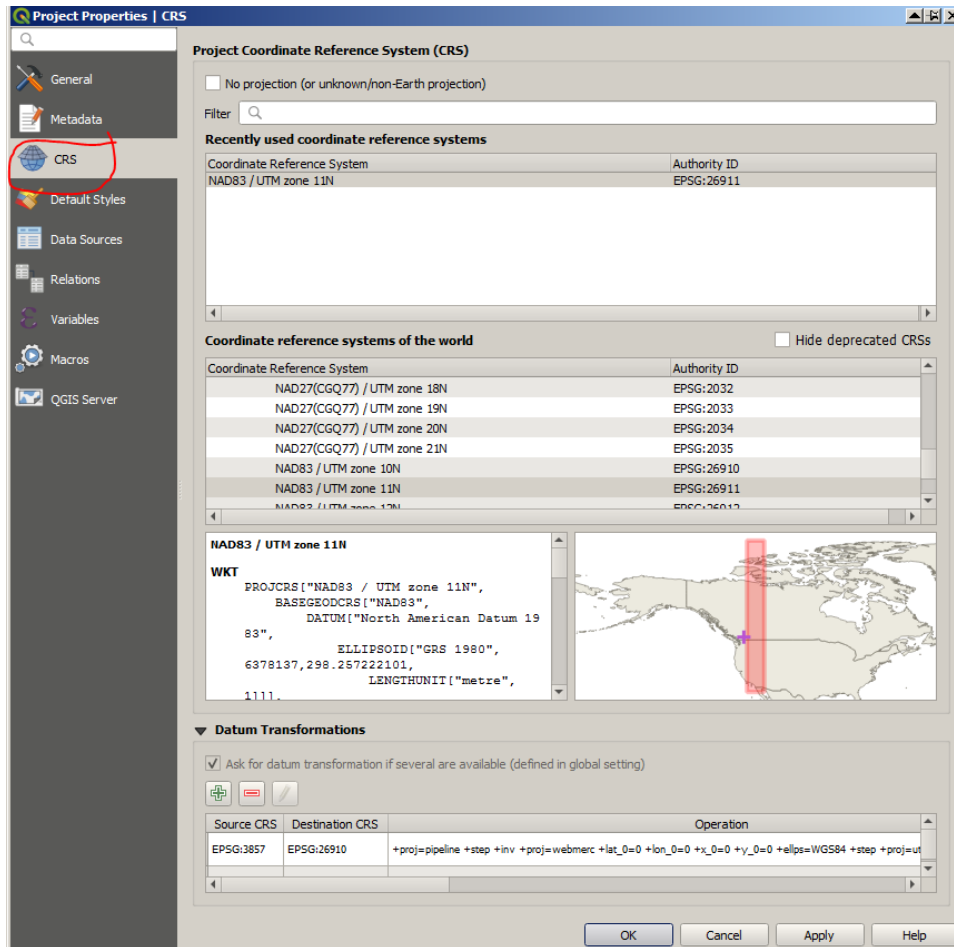Note how the east west boundaries of the WL are tilted. Let's try another projection.
Maybe Albers? Open Project Properties in top menu bar.
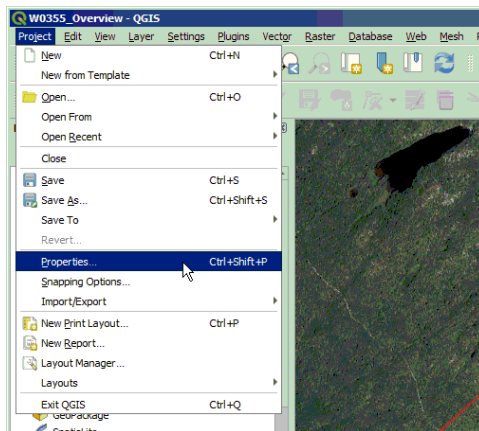
Go to the CRS[1] tab in the Properties, and one singularly impressive screen opens. I did
mention rocket science……

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[1] CRS = Coordinate Reference System

No Albers there. But, enter BC Albers in the Filter window and:
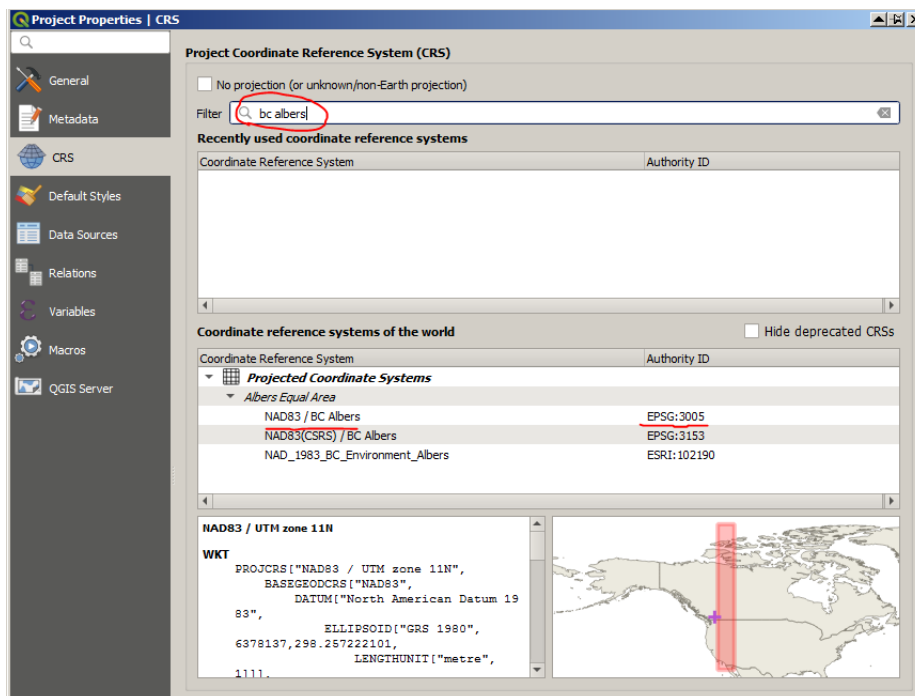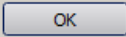
So I click the NAD1983/BC Albers option to select it. (Why not one of the other two? Above my pay grade. They may be the same, they may be different. I know that NAD83/BC Albers works.)

I can see in the mini-map that the selected projection applies to my location; location showed by the purple **+**. So I click Apply.

And something like this appears:

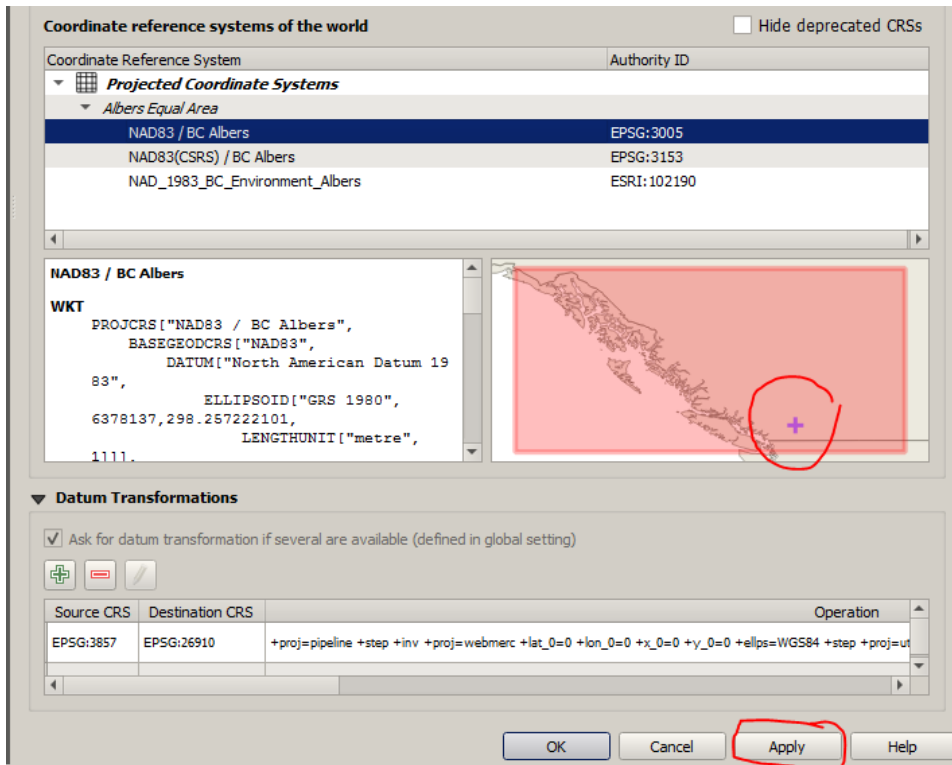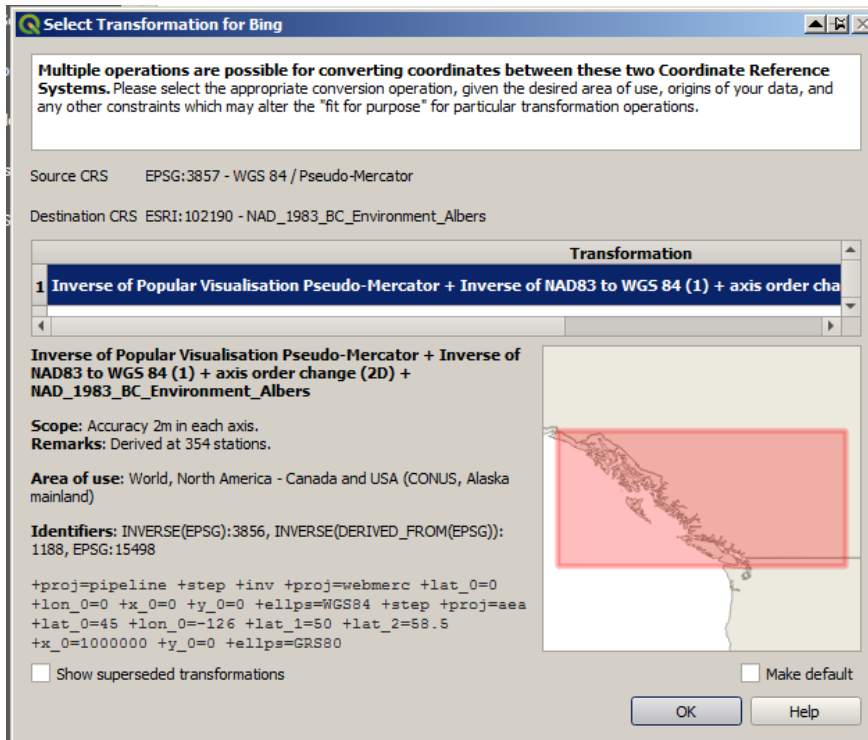Wow. I have come to trust QGIS to propose a suitable transformation system, and critiquing the possibilities listed is also above my pay grade. I go with ⟨OK⟩. Has worked for me every time so far.

So, W0355 is now shown in BC Albers projection. It looks different - tilt is worse - and you can see the little EPSG: 3005 for BC Albers in bottom right corner.
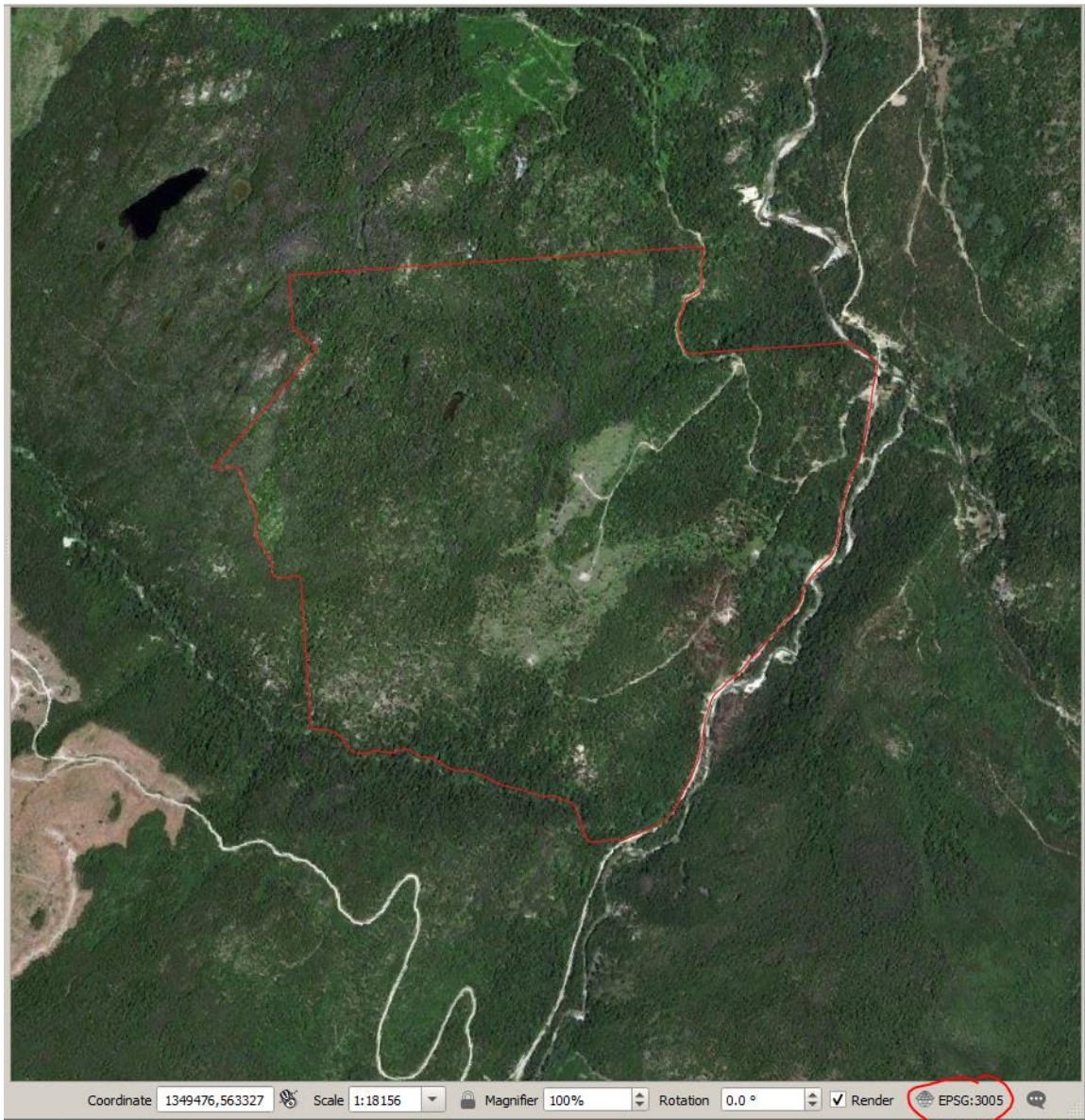
Not an improvement, in my opinion. OK, let's try the correct UTM projection. How do I know which is correct? Well, first, if it is not UTM11 and I am not on Haida Gwaii, it is either UTM 9 or UTM 10. And second, that mini-map is very helpful.

Back into Properties / CRS . Filter by NAD83 / UTM:
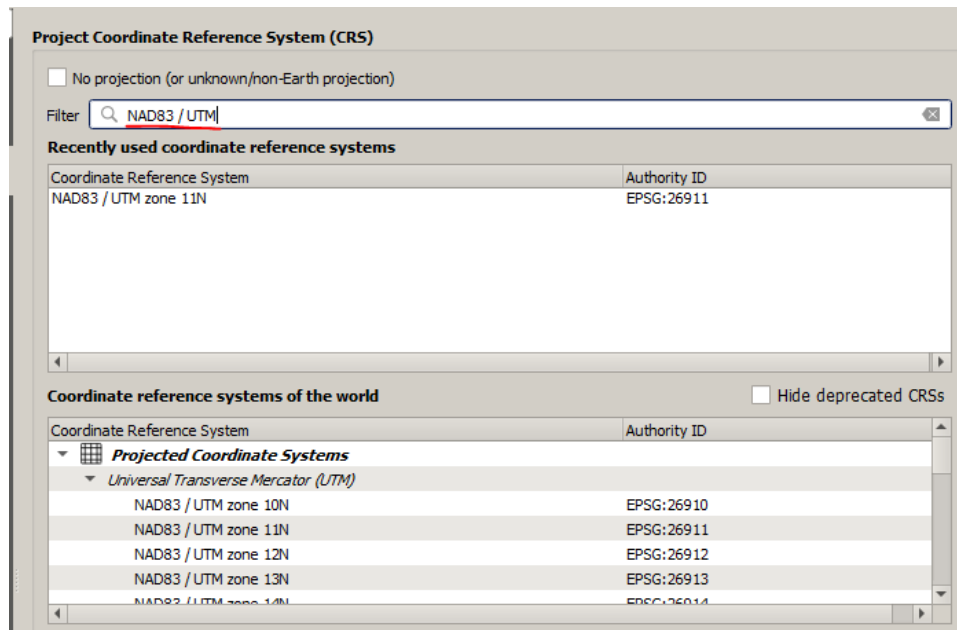
UTM 10 is at the top of the list, UTM 9 is way down at the bottom, off the screen. Select UTM 10. Mini-map seems to say the **+** is in UTM 10.
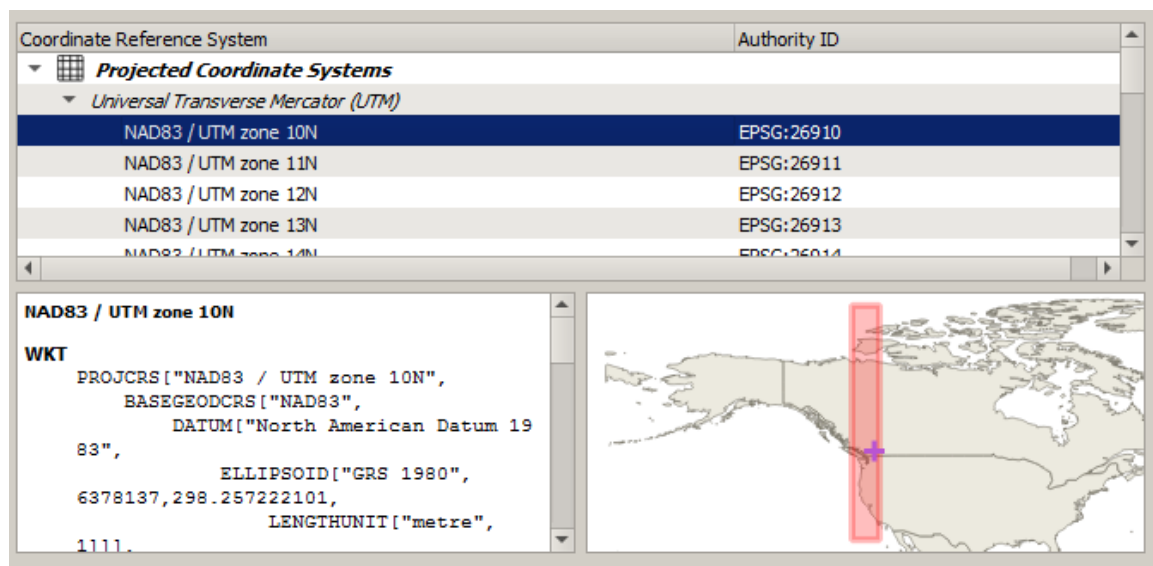
Mini-map is very small and hard to see. Turns out there is scroll wheel zoom in the mini-map:
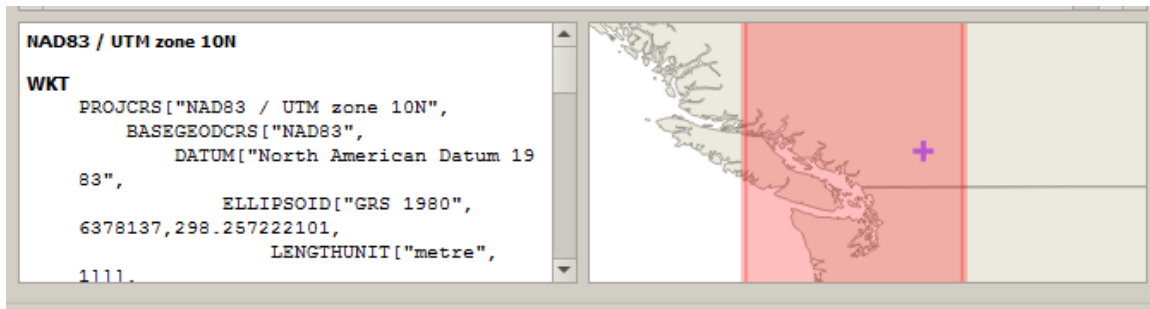
OK, that is clearly a hit. W0355 is in UTM Zone 10. Apply.
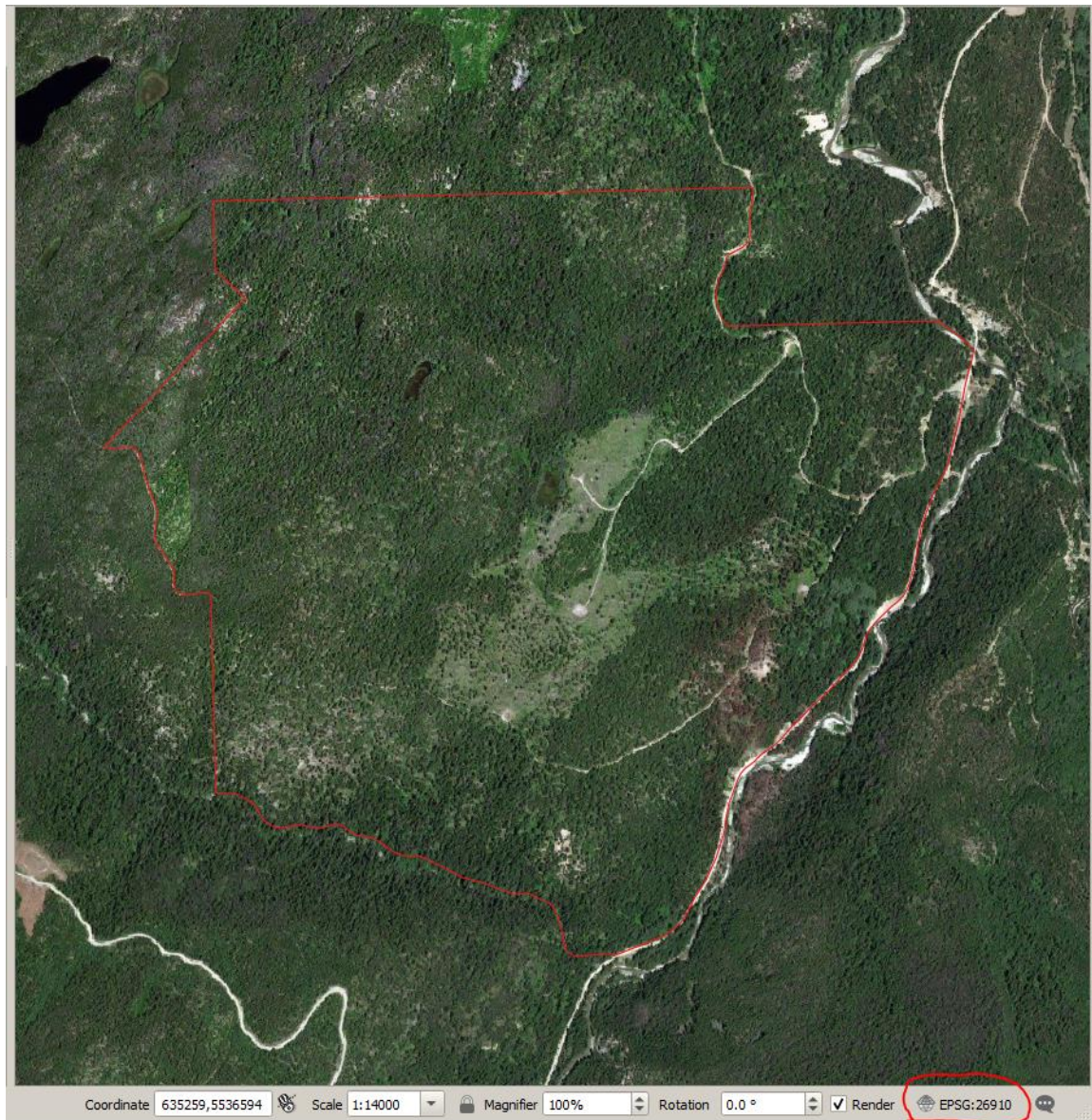
Still tilted, but (a) less tilt than Albers and (b) we know W0355 really is in UTM Zone 10 from the mini-map. So this projection would be my choice.

3.5 *Choose Imagery*

Have been showing screenshots with Bing and Google Sat listings this whole time, with only Bing turned on. The images from the two services can be very different quality and date. You need to choose between them.

Here is a side by side for W0355:
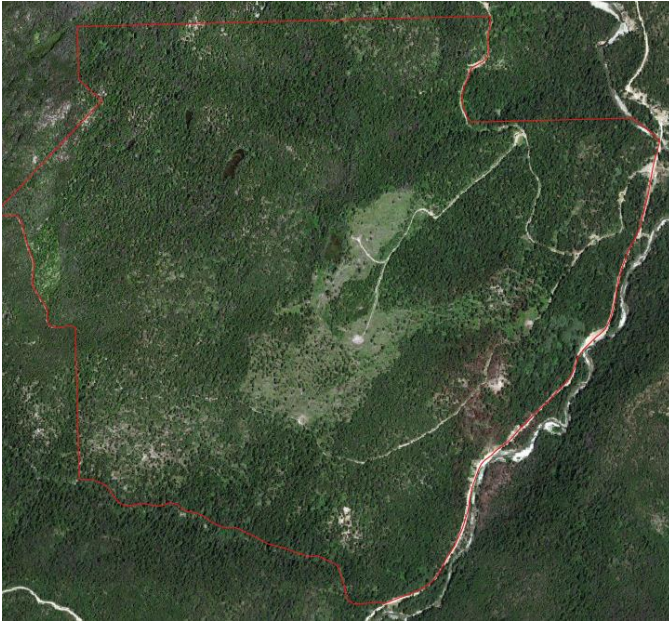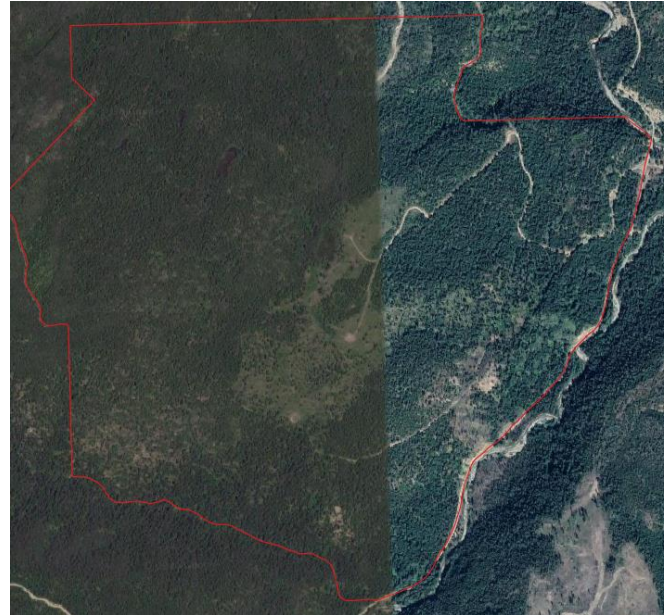
| Bing | Google Sat |

Here is what I see:

The Bing and the Google Sat images for the west half of WL are the same image. The Google version is horribly muddy and muted, Bing image is way more vibrant and conveys detail.

Bing West - Zoomed In

Easy choice: I am going with Bing in west.

However, the Google Sat image for the east is plainly newer (shows road and harvesting not on Bing image), and is good quality. Google Sat colors are muted, but the sun angle causes shadows that hilite the trees very well.

Google Sat West - Zoomed In

Bing East - Zoomed In

If I am working in east WL, I go with Google Sat.

Google Sat East - Zoomed In

Digression:

Those of you who use Google Earth are probably wondering why we do not change the date of imagery in Google Sat to see the image options there. I know of no way to control image date for Google Sat in QGIS. It shows the same images as you can see in Earth, but without any date controls. What you see is what you get. You can go to Earth to figure out the image date if you wish to / need to.

As for Bing, while I love their vibrant image processing, I have yet to find a date stamp in free Bing. And I have yet to give them money.

4. Make Avenza Map

So, we have a WL boundary, imagery, and a correct / good map projection.

Now we make a PDF for Avenza.

You can make one map of the entire WL. The outcome will have less detail and resolution than is possible, though. I prefer to make maps of my current area of interest.

I am going o pretend my area of interest is the lower NE corner of the WL, down by the river. So, pan and zoom in to go there:
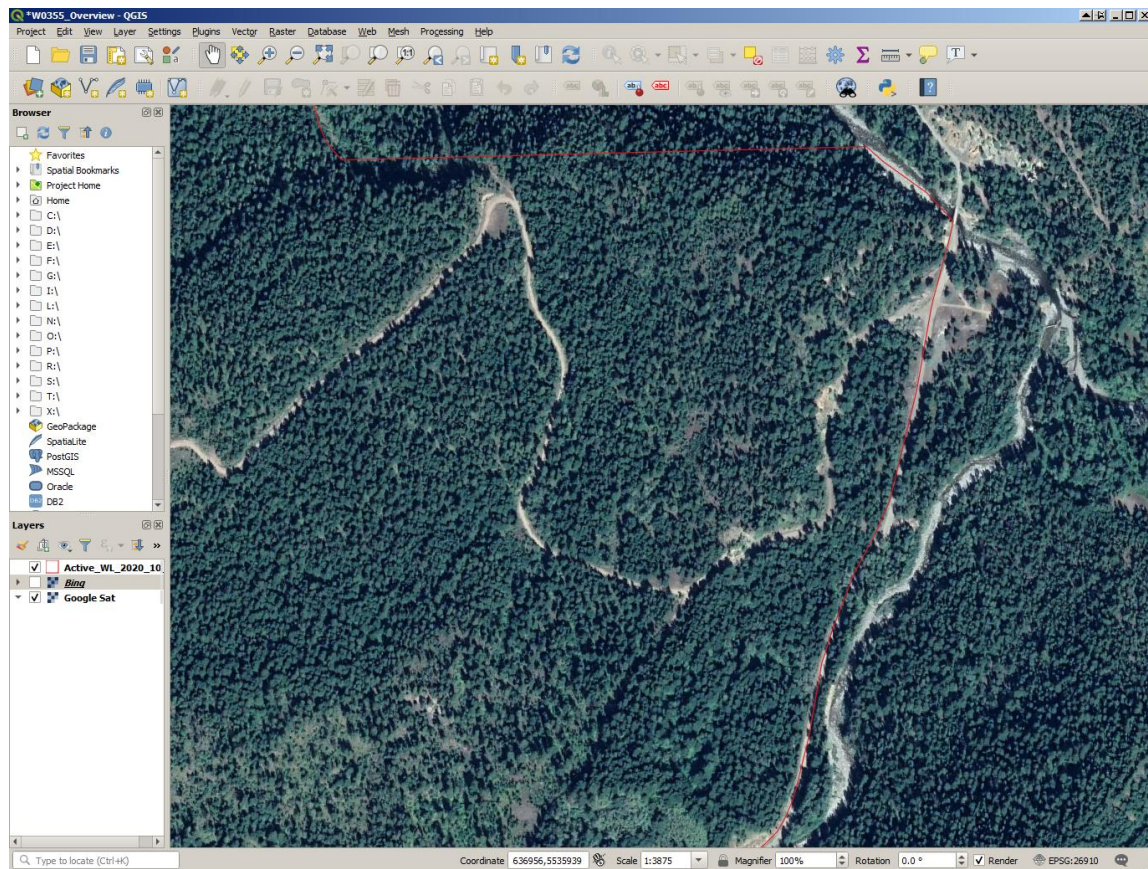
Something you will soon notice is that the QGIS zoom controls are traditional: They do Too Big and Too Small and Just Right is not an available option. Solution: Tell it to "zoom" by entering map scale in bottom menu. Hilite the map scale with a mouse sweep
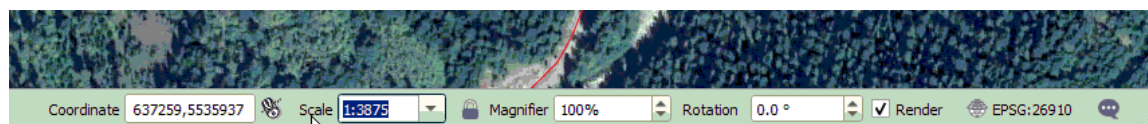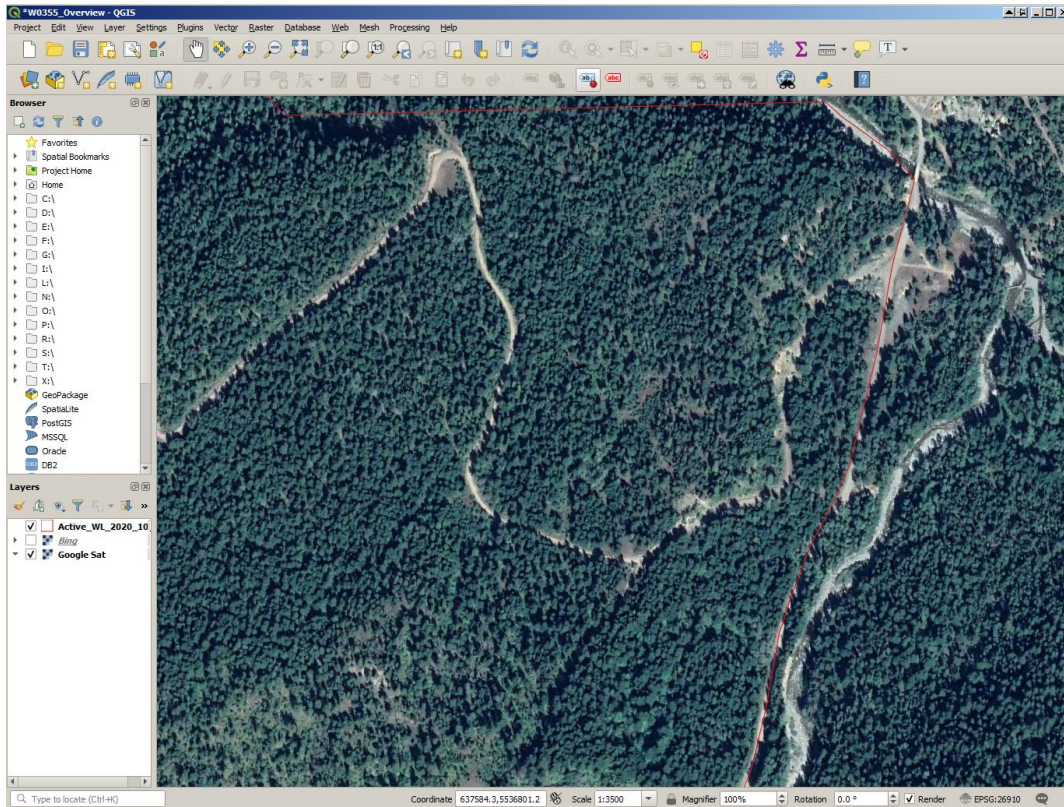

and then overwrite the scale by typing in a new one. For example, you can type 3500 (not 1:3500) and press Enter.
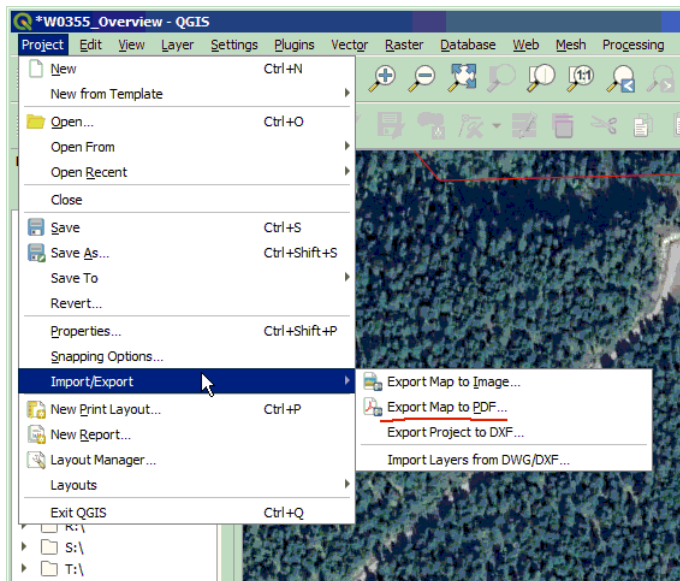
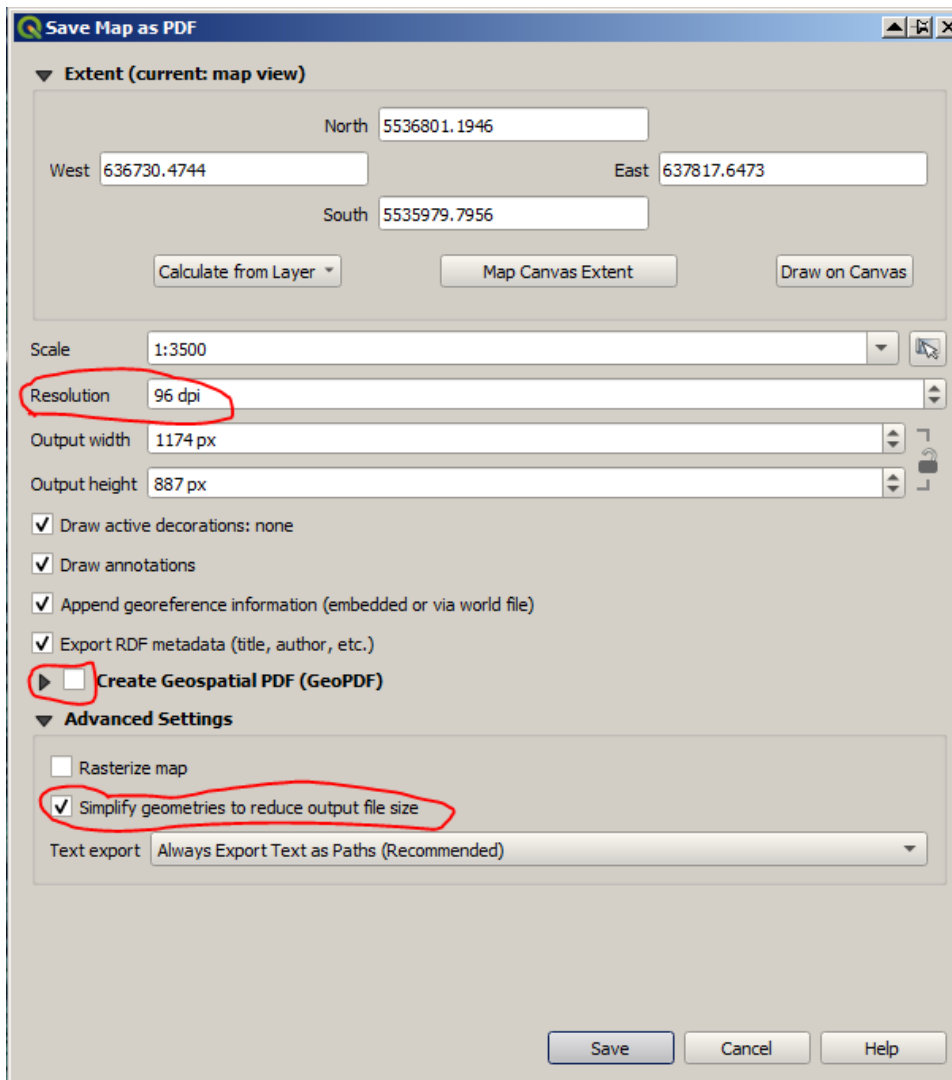Gives nice precise control over your map scale and extent.

So, map to put in Avenza is ready.

Project / Import/Export / Export Map to PDF :

Here is what opens. Things you should reset are hilited:

The map extent is Current Map View. No issues. We panned and zoomed to what we want in Avenza.

Boost 96 DPI to 300, 450 or 600 dpi. Just enter the new number. Frankly, I always use 600 DPI. I am probably asking for detail that is not even there in the Google Sat or Bing image, but I am loath to throw out detail. I play it safe.
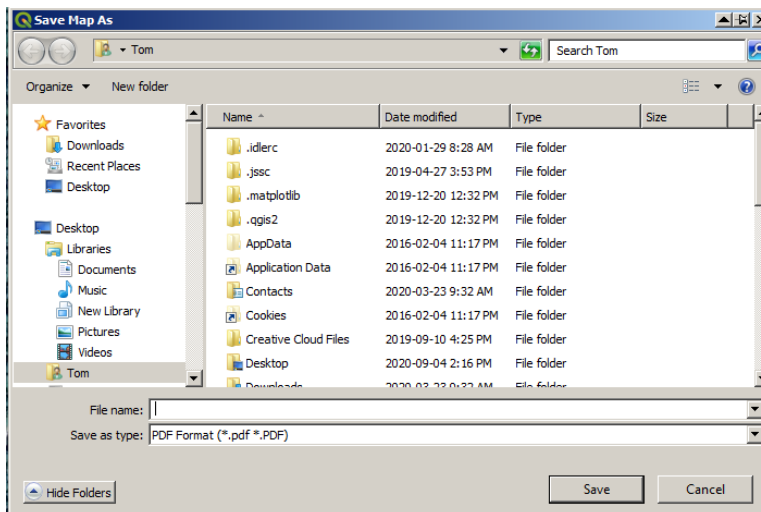
Toggle Create Geospatial PDF on. That is the point of this exercise.

I urn off Simplify Geometries. I do not even know if it matters. Like I said, I want every scrap of detail I can have.
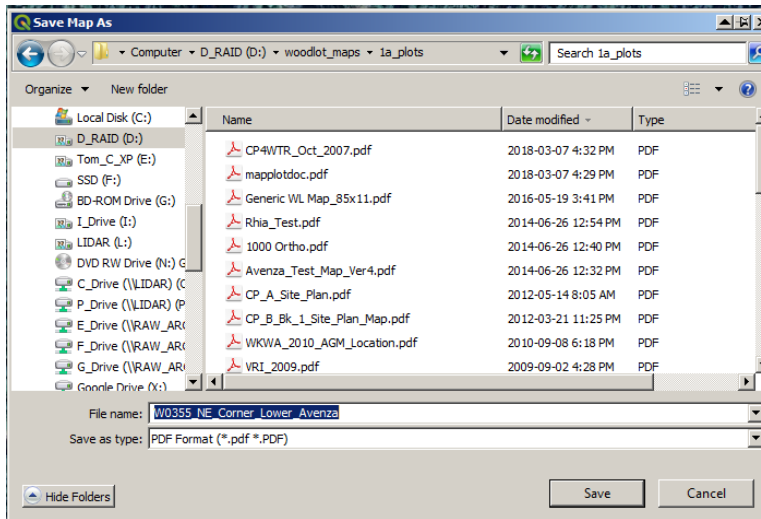
So, my settings are:
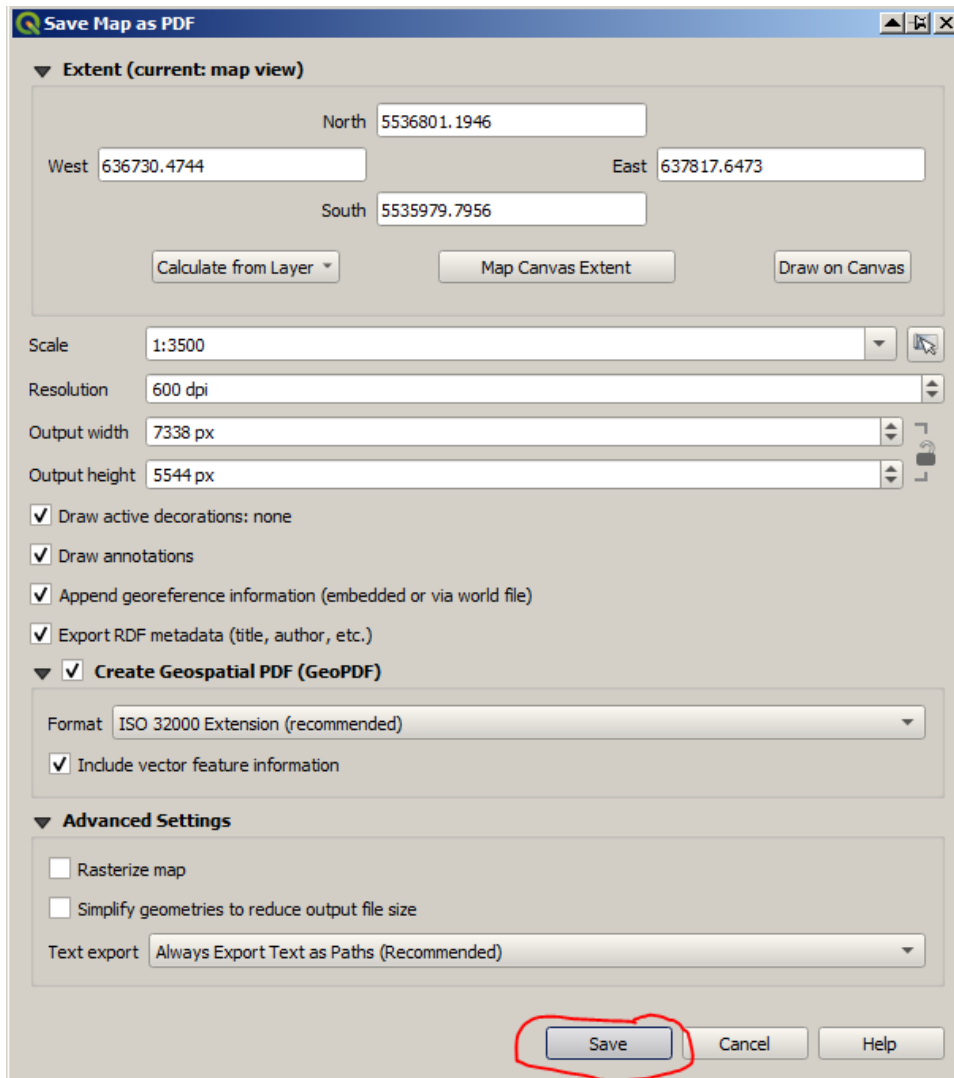
I go with Save . QGIS says "Save where?"

Again, navigate to a folder you can find later on your hard drive, and save it there.

A descriptive file name is also a good plan.

QGIS works for a while, and you are done. Save your QGIS project file!

5. Load it Into Device

Details are outside of scope for this Version 1 manual.

Email it to yourself, use Dropbox, or if your device is Android, just hook the device up to the computer with a USB cable and use Windows Explorer to copy and paste the new PDF map file to a folder on your Android device.

My Androids have a Maps folder on their storage card into which the drifts of Avenza maps I create and the tracks and points I export from Avenza go. A bit cluttered, but I know where to go to put or get spatial data.