

California And Back

This trip was very different than my usual field mapping trips, mostly remote paved highways across the desert instead of obscure dirt tracks in the forest. I was going to speak at conference on my [OSM Merge project](#). I've flown over Utah, Nevada, Eastern California many times, and often have looked out the window of the plane at remote highways in the desert and mountains of Nevada and the Eastern Sierra Mountains. I figured I'd drive out and back, a week or so each way, no rush and do some mapping and camping. I haven't had decent vacation in years. Even though the remote highways are well, remote, they do get a lot of recreational users, and being close to pavement are well mapped in OpenStreetMap already. Some of the amenities had changed in the small towns along the highway, so I collected updates using ODK Collect. There isn't much mapping content in here, it was way too cold to work on a laptop, and the usual places cafes, libraries, etc... were all closed.

The desert has much nicer temperatures in November than July, and it hasn't starting snowing too heavily yet. Yes, it snows in the desert, and the roads can get really bad with blowing snow cause there's nothing to stop the wind. The only problem with getting to Nevada is it's 1300km (860 miles) from my house! Since much of the route through Colorado and Utah I had mapped on previous field mapping trips, I just blasted out across Colorado and Utah on the Interstate, using a campsites I had mapped on previous trips through Utah.

There are only two highways not the main interstates 70 or 80, The [Loneliest Highway in America](#) (SR-50) and the [Extraterrestrial Highway](#) (SR-6). SR-6 has a sign that says "Watch out for low flying aircraft!". Then there was the [Alien Research Center](#) near [Area 51](#). Most of the small towns have few if any amenities in OpenStreetMap, so I'll add or update those. For that I use ODK Collect with a custom XLSForm for Amenity mapping that uses data extracts from OpenStreetMap so when I collect more data on a building, I can conflate the data I collect with the building polygon on OpenStreetMap for more efficient validation. I find ODK Collect the best mobile data collection for Android for me personally, but I'm not a typical mapper.



Trip Prep

I did my usual pre-trip planning and data mining. Once I got out of Utah this would be new territory to find camping. Most camping near a highway is usually noisy, but that's not really a problem on these remote highways. I dug around on freecampsite.net, and looked at data extracts from OpenStreetMap of known camping spots. While waiting for various data processing runs to finish, I'll use JOSM to view satellite imagery of possible camping spots in the areas I plan to camp.

I also wanted to avoid major cities, so researched a preferred route, and a few backup ideas. The highways across the Sierra Mountains often close this time of the year, so the direct routes are now already closing. I did make it over [Tioga Pass](#) through [Yosemite National Park](#) heading westward, but it was closed when I was heading eastward, so I had to do plan B, a long detour through [Death Valley National Park](#).



I took a few fun data extracts I use as layers in [OsmAnd](#). All the [natural hot springs](#) and [ghost towns](#), since are many on this route. When looking at satellite imagery, I'll make nodes on a layer in JOSM, then I [convert](#) that to a Favorites.gpx file for OsmAnd. That way my custom locations will display with the right icons, and I can use them for navigation.

Navigating

I use a mix of OsmAnd and a commercial Garmin GPS for navigating. The Garmin unfortunately has more amenities like cafes and gas stations that I need when traveling. OsmAnd is better generally for the actual route, but you need the other data too when gas stations and restaurants are far apart. This is why I update amenities in OpenStreetMap whenever possible. For this trip, OpenStreetMap had pretty good data already, these highways have been well mapped in OpenStreetMap. Usually I'm in an area with really poor map data, and trying not to get lost.

Mentioning getting lost, don't trust your Garmin in remote areas. Garmin uses [HERE](#) maps, but it has major problems in remote areas. It often tries to send me down closed roads through private property or ATV trails., This is where OsmAnd is way better. [Organic Maps](#) would probably be OK too, since it uses OpenStreetMap data.

I noticed that when routing, my Garmin GPS always picked a longer route, where OsmAnd or Google maps would pick the shortest route possible.

Life On A Battery

Being a heavy digital user and being forced to live off a 12VDC battery is good to make one moderate their digital addiction. My power system has a voltmeter wired in so I'm constantly watching the supposed battery level. I mostly ignore it because every time I plug in a device to charge, it drops! It's a bit of an illusion. It'd be possible to calculate the actual Amp Hours being used at 12VDC, which is the key figure. I mostly use the voltmeter when recharging the truck battery with nothing plugged in and pulling down power.

It's an inaccurate monitor of your power usage. An example, I jump in the back of my truck and great, it's at 12.9VDC! (it's been a sunny day, 12.6 is more normal). So I plug in my laptop, and it drops to 11.9VDC! Course that's cause my laptop had a low battery, and was starting heavy



charging. Once the battery is mostly charged, it'll go back up to around 12.3VDC, and once charged back up to 12.4VDC or more which is all good. Once your devices are fully charged anything about 12.0VDC I think is fine, especially at the end of the night,

Keeping everything charged in the winter can be difficult due to less hours of sun and the cold effecting the batteries. After several weeks on the road in bad weather, my spare battery started to not fully recharge every day. While I do try to ignore the voltmeter, when it starts dropping down to 10.5, I do get a little worried. Several days of overcast and snowy weather didn't help.

Cold



Batteries do not like the cold. It's been so cold camping on the westward trip, my laptop and phone won't charge overnight. When I get up in the morning there is ice in my water bottles. I have to remember to have them fully charged before going to sleep. That way I have at least a half charge in the morning. Since this trip is more driving than usual, I also charge them off the truck power in the cab (where it's warm) while driving to save on the solar power as it's been very overcast and snowy. The other problem with cold is once you

need to wear gloves, you can't type on a keyboard. And it's often really windy in the desert in the winter.

Heat

On the return trip I had the opposite problem, over-heating. I was in Death Valley camping, and noticed my laptop's fan was running non-stop. It had also stopped charging. Part of the problem turned out to be my laptop was in the full sun charging, which contributed to the over-heating. Then it hung, and I had to do a hard power off. And then it wouldn't reboot. I unplugged it from the power supply, and let it cool off for several hours. The battery was dead too, so I had to charge it for awhile before it would boot.

Dead Battery

Something to be aware of if you wake up in the morning and your laptop battery is dead, and it won't boot even when plugged into DC power. What happens is that charging a dead battery with the 19VDC adapter takes more power, and when booting Linux, it wants to boot in power saving mode with massively reduced performance. Rather than panicking, the trick is let it charge to at least 30% with it turned off (make breakfast, go hiking, read a book, etc...), and when you boot it, unplug the DC power adapter until you get a login screen. Then you can plug in the laptop, and it'll continue charging, and you can use it.

Another issue is when using a cigarette lighter plug to charge while driving off your solar power system, it may vibrate out, leaving you with a dead battery in the evening right when you thought you were going to get some mapping done.

Phantom Loads

Anything plugged in to charge should be unplugged before going to sleep so it doesn't draw power. The laptop's 19VDC step up transformer is a potential problem. Especially in the winter, I unplug everything, since between the cold and less hours of sun for solar power, you have to be extra conscious of any power leakage. If you accidentally pull the battery really far down in winter, it's hard to recharge, although solar panels love old weather, and get a bit more efficient.

There is little worse having your LED lights die long before you are ready to go to sleep, which means your battery is critically low. LEDs will continue working down to 9.6VDC usually, but this is going to require a major charging session. For this reason I always carry candles and a headlight.

Conflating With OpenStreetMap

Data collected with [OpenDataKit](#) is a single POI, where in OpenStreetMap it may be a building polygon tagged with only building=yes, and you want to add amenity=restaurant, cuisine=pizza. If ODK Collect was used with a data extract of buildings, then tags added to an existing building will be merged with the existing building polygon.

There's a lot of existing features in OpenStreetMap where there is a POI for a restaurant in the middle of a building polygon. It's best to handle this appropriately by merging the tags from the POI into the building polygon, and deleting the POI. The conflation software does this too, works great in rural areas where everything is spread out, but has problems in dense urban areas identifying the correct building.

Dixie National Forest

On the way eastward, I was driving through the southern part of Dixie National Forest when my Garmin GPS started giving me bad directions. I had previously noticed that in the official forest service datasets, many of the reference numbers were wrong! I've documented it in the OSM Merge documentation, but for some reason many of the reference numbers have a 30, 31, 32, 33, 34 prefixed making them useless. It gets confusing when the map data doesn't match the street signs. I have not seen this problem in Colorado, or other states (yet), but in Utah it actually affects multiple national forests.

After staring at the data for quite a while, I saw a pattern and decided to see if I could reverse engineer the problem. None of these reference numbers was in OSM, so no conflict there. But since I'm going to update the tags for these highways in OSM, I figure I should use the correct reference number. I modified the code I use for converting the MVUM and RoadCore datasets to fix the reference numbers, and it appears to have worked better than I thought possible. I could check various areas within Dixie National Forest where I had previously seen this problem. I can validate the fix

because in the newer [GeoPDFs](#) or [VTPK tile packages](#) do have the correct reference number. Neither of those formats are suitable for conflation as they have to be viewed with other tools like [QGIS](#).

The older [MVUM and RoadCore datasets](#) have been imported into a variety of mobile apps, and of course my Garmin, so the current reference numbers are wrong. I tracked this down to HERE maps, which is used by Garmin, and most automotive navigation devices. So be warned using any of these in Utah national forests. OSM was I guess luckily lacking any reference numbers at all, mostly all the highways were just **highway=track**. Course that was enough to have OSM not send me down jeep tracks, so did proper navigation. Since I plan to merge the names, reference numbers, and other useful metadata into OSM, I want to make sure I get this right. Once this updated data is merged into OSM, OSM will be the only map with the correct reference value. I also found a contact that uploads corrections to HERE maps, so once I have this validated and in OSM, I'll submit this fixed dataset to them to fix navigation for everyone else.