Another Desert Mapping Trip

Now that the snow is melting and road access is opening up in Utah, I decided to make another trip into the remote parts of Utah for some field-mapping and ground-truthing. April is one of the snowiest months here in the Colorado Rockies, and most remote highways are buried till mid June or later.

Lately I've been working on conflating external datasets from the US Forest Service and the BLM for my <u>OSM Merge project</u>. I found some issues while processing the data that I wanted to validate on the ground. One issue was that sometimes the highway name in OpenStreetMap was very different from the one in the official sources. In Manti-La Sal National Forest, if the official highway reference number was already in OpenStreetMap, it was usually wrong. There was a bug in the official sources that prefixed a number to many of the references, and they had been imported into OpenStreetMap that way many, many years ago. After comparing with other official datasets, it appeared that all the 5 digit reference numbers were invalid, and could be fixed by just dropping the extra digit. To me the official reference number is what's on the sign (and other maps), as that's what is used for navigation when hiking or driving. And the only way to validate that is to go there.



I've made several field mapping trips to this part of Utah in the past. There are always places you don't get to and I wanted to fill in the gaps.

The other big motivation was a shake down trip in my new (used) slide-in truck camper. My old topper was falling apart, and during my last mapping trip in the Nevada desert I was confined to the topper a lot due to cold and windy weather. Dust storms aren't good for your laptop keyboard either. Luckily there wasn't much to map in rural Nevada other than updating amenities in remote towns and adding campsites as I stumbled across them. I came across a good deal on a used camper back here in Colorado, and decided to upgrade to a mobile office.

This trip was a big loop, down past Moab into Manti-La Sal National Forest, then into Bear's Ears National Monument, and back up Utah Rt 24 back towards Colorado. In Manti-La Sal access was



limited due to a foot of snow! And as that snow melts (it is Spring...) the roads turn into a slippery muddy mess. In addition, it's not good to tear up the roads and leave big ruts. I did manage to ground-truth the reference number corrections I made in OpenStreetMap, which was the goal. After a week or so of low temperatures and bad weather, I then headed into Bears Ear's National Monument to do some field-mapping and more ground-truthing. Lately I've been digging into BLM highway & trail datasets, and it's usually good to add some reality to obscure values in the data. For example, some highways are both BLM and Forest Service, but have totally different names! The issue there is what does the sign at the intersection say? What the sign says becomes the **name** tag, and the other becomes **alt_name**, Also both reference numbers get added to the **ref** tag, so you wind up with *ref=BLM 1234;FR 4321* in OpenStreetMap. It's this flexibility of OpenStreetMap to support all these variations that has made me a big fan over all the commercial map data schemas. And several of the the commercial datasets that imported this data into their maps have the wrong reference number. A classic example of why often OpenStreetMap is often more accurate.

Ground Truthing Highways

When analyzing external datasets, it's good to have a base understanding to properly convert some

data fields to their proper OpenStreetMap equivalent. In the US Forest Service datasets, there are values for the surface type (*surface*=*), the road condition (*smoothness*=*), and whether a high clearance vehicle (*4wd_only*=yes) is recommended. All 3 of these tags are important, but are also open to interpretation. *Surface* in particular varies. What was once a gravel road may have become unmaintained, so now it's just dirt. Sometimes even old paved roads have become simple dirt tracks. *Smoothness* is the same. Unless the road is actively maintained, the value in the official dataset is probably not accurate anymore. And many, many remote roads have been dropped from maintenance over the last 20 years. As far as I can tell the official datasets were never



updated for this particular data item. OpenStreetMap has multiple possible values for this tag, the ones we're interested in are *bad*, *very_bad*, *horrible*, *very_horrible*, and *impassable*. The subtle differences between *bad*, *very_bad*, and *horrible* are very important if you are trying to figure out if your vehicle can safely use the road. Usually anything *horrible* and above is just ridiculous, you might as well walk.



If a high clearance vehicle is required, that can also be critical. Usually these roads have exposed rocks, deep ruts, etc... that can make them impassable to vehicles with limited clearance, like your average passenger car. Without the proper clearance, you may get high centered on rocks, or stuck in a ditch, neither of which is any fun. This picture shows what was once a county maintained road! Unfortunately this tag is a bit open to interpretation, as an experienced off-road driver can drive most anything to places most people shouldn't. *Smoothness=very_bad* is probably doable in a passenger care that doesn't require high clearance. The tow truck companies that rescue stuck vehicles in remote areas are very expensive, and sometimes require special equipment, so you want to avoid that. And you're also stuck there for however much time it takes, so hopefully you're prepared. You should always make your

own decisions based on your vehicle, your level of experience and the weather of course. But good map data is a tool to making an informed decision. The road condition in front of you may look fine,

but the map can show you if the condition deteriorates further where you can't see. I've made that mistake in the past, having to back up long distances on *highway=very_bad*, *4wd_only=yes* roads, unable to turn around.

These values truly require ground-truthing, and over time will probably change again. So all we can do is get a snapshot of the current road conditions. And often this data is lacking in OpenStreetMap, so it improves existing highway features. In remote areas, the majority of the highways in OpenStreetMap lack any tags but *highway=track*.

Working Outside

This trip I added something new, a big 90,000AH powerbank. Since processing map data or compiling code eats up my laptop battery pretty quickly, this lets me keep it running for much longer. I just charge the powerbank off the camper solar power system when not using it so it's usually always topped off. Most modern laptops require 19VDC to charge, so you need a powerbank with Power Delivery (PD) output, which this one has. This gives me more flexibility when chasing shade and trying

to get some mapping or programming done. While I had used my new Starlink Mini a little on my previous mapping trips, that was limited due to the smaller solar power system on my previous camping setup. I wanted to test with the new power system, plus I was curious about how much bandwidth I'd use if I was seriously trying to get work done.

I really did try to abuse having internet access, watching streaming video, downloading big software packages, and work as if I was in my home office. After two weeks I was still under 20GB (there's a 50GB limit), which was very encouraging for future road trips. When the sun is shining and the camper batteries are fully charged, you get a concept called *PV Direct*, ie... the power from the sun goes directly into whatever devices are connected. I wound up leaving the Starlink powered up all day long with no problems. Plus of course using it at night. The range of the Starlink wifi was good enough to use it from about 20M (~65ft) away, useful when trying to find the perfect spot to work.



Finding Shade

One of the problems with working outdoors is finding sufficient shade. Otherwise the glare on the laptop screen makes it unreadable. When I'm mapping in a forested area this isn't a problem as there are big trees. In the desert however, it's not uncommon to be camping where there are no trees, or they are so short they can't give any shade. In these areas how you park your vehicle is important, as it may be the only available shade. This wouldn't work well for most passenger cars, but a truck with a topper or camper is tall enough to provide adequate shade. When I'm parking where I plan to camp I try to be conscious of the sun. Since I usually try to get to a good camping/work spot by early



afternoon, what works for me is to try to park facing the sun. There isn't much shade this way at first, but I'm usually setting up camp anyway. By the time I'm ready to work, there's usually enough shade. I just shift from one side to the other as the sun moves.

Course this requires a flat parking spot, and often in a remote area there is only one way to park to be relatively level. Sometimes you have to just deal with it... It's also possible to escape into the camper to avoid the sun, but I prefer to work outside whenever possible. I use a small folding wooden table and camp chair as my outside workspace. Sometimes it's also possible to be creative and make the most of

what little tree shade you can find. Course it's also not a bad idea to focus on enjoying where you are, and not obsessively staring a laptop screen.

The New Camper

My previous field mapping camper setup was a topper on a Tacoma TRD off-road. My old topper was tall enough that I could sit up (sort-of) in it. It had a foam pad for a mattress, and a smaller 130W solar power system. It worked great for about 15 years, but as the topper was falling apart it was time to replace it. After many years of working off my truck tailgate, I was getting tired of dealing with bad

weather which would trap me in the back of my truck for days. When I came across a good deal on a used slide-in camper that met my needs, I decided to upgrade to something more like a mobile office. Something I could sit up in and cook or work, and still go anywhere. Being able to stand up is also a big improvement. And it's got a much bigger power system.

Being a very small camper, it fits within the weight limits of the Tacoma. It isn't big, but fine for one person. Plus I added a propane heater, which makes a huge difference. I could actually get it warm enough in below freezing



temperatures to take my hat and jacket off. Now if I want to work and the weather sucks, I still can. I kind-of miss living off the tailgate though as more adventurous, but it sure beats trying to cook dinner in a dust storm.

It got a good road test this trip, from cold and snowy to hot and dusty. I was also curious if it'd be steaming hot out in the desert with no shade. With the windows open, it actually ventilated pretty well, even in the sun. I bought the camper from <u>Phoenix Popup</u> in Denver, who also nicely made a bunch of modifications for me. It's been great to be able to deal with a local company.

Organization

Like any small camper you have to make the best use of what little storage space you have. I travel with at least 2 weeks of food supplies, climbing gear, and weather appropriate clothing. Camping, especially with a bunch of digital devices and cables needs organization or you go crazy after a while. I



built some simple open top shelves to hold random stuff that I access frequently. There was a good place on the back wall to mount it. For the wood I cut up the old plywood sheet from my previous camper that I'd slept on for many years, so part of the old camper is still with me.

There was a surprising amount of spaces to store everything. The biggest problem in a camper is the stuff you've stored slides around on bad roads. I put in brackets to stop movement in the cabinets, plus use a big plastic bin for some food supplies. This kept

everything accessible and stable when off-road. I did have to put an additional strap on the cabinet doors though, as they kept shaking open on *highway=very_bad* roads.

External Monitor

I had some strange requirements, like where to mount a larger monitor. When mapping it's nice to have the bigger monitor than my laptop screen. Plus if I want I can watch videos while waiting for long running data processing to complete. This monitor runs off 19VDC (USB-C PD), so it's easy to power. I use a USB-C to HDMI dongle to hook it up to either my tablet or my laptop. The big problem was how



to store it for transport. The interior of the camper isn't very wide, and all the wall or roof mounts I looked at would have it sticking out impending moving around in the tiny camper.

Then I discovered pole mounts. This camper is a pop-up because I wanted something with a low profile. It's not unusual on remote roads to have



problems with low lying branches. This pop-up uses vertical poles to lift the roof (it's electric), which turned out to be a perfect spot to mount the monitor in an out of the way place. I keep it mounted here when driving, and it's easy to pop off the mount and put it elsewhere. The monitor has a stand, so I just set it on the counter. It also will run off the new powerbank, so I can setup outside if I want.

For Starlink power, there's a 24VDC step-up transformer with an external power connector. The satellite antenna travels in hard shell case. I just pop it out of the case and set it on the roof before raising the top. It takes about 5 minutes or so for it to connect to the network. Then you need to use the app to align it for the best connection. Once that is done, I raise the top, and the antenna conveniently stays aligned.

On this trip I discovered a small advantage to this mounting location, I could stash some small items behind the monitor so they wouldn't slide around while driving. Turns out to be the perfect spot to store my down booties so they're accessible if getting up in the middle of the night to step outside.

Navigating

I like to compare navigation, routing, and map details across multiple map sources. OpenStreetMap on the tablet of course, an old Garmin, and my Gen 3 Tacoma (HERE maps). The Garmin uses HERE data

and routing too, so similar results, often bad... Both the Garmin and my Tacoma often try to route me down roads I know are closed, or are actually ATV tracks. Their data in remote areas is very poor. Google does a slightly better job, but has the same problem with routing me down roads I really don't want to drive... There's billboards in South West Colorado that say "don't use navigation software!" as it often gets people stuck way down jeep trails.

OpenStreetMap has been an order of magnitude better, often ignoring the roads I shouldn't take a Tacoma down, and sticking to the more passable roads. This is due to better metadata, a huge



advantage of being crowd sourced. As part of my <u>OSM Merge project</u> I've been improving this metadata as well. This often require ground-truthing, which is the entire reason for these mapping trips. And good camping of course.