



# MarkHitsTheRoad

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## Exploring the Great Basin Road Trip (N21A-1)

I had planned out a new Great Basin (central and northern Nevada, eastern California, southeast Oregon, southern Idaho) road trip a few years ago, but life and then the pandemic got in the way. I finally took the trip in June 2021, after making slight modifications to the itinerary before I set off. Unexpected wintry weather wiped out my original Oregon plans. Then, the night before my day trip out of Ely, Nevada, I stumbled on a couple interesting destinations, and modified the next day's plans as a result. So, it wasn't quite the trip that I originally planned, but it was a great trip.

It covered my usual interests in geology, pre-Columbian archaeology and paleontology. Not as much as usual, and there were no dinosaur-related stops. But I did hit a number of ghost towns, and I even visited two nuclear test sites.

I started by heading north on US 95 for what would be a clockwise loop through the Great Basin area. I only went as far as Tonopah, NV that first day, though, as I had some sites to see between Tonopah and Hawthorne, NV that would fill a day.



*The Central Nevada Museum in Tonopah divides its displays between local mining history and work at the nearby Air Force base where new technology is tested. This is a first generation "smart bomb", a radio-controlled bomb glider capable of dropping a 2,000-pound payload. It was developed at Wilbur Wright Field in Ohio (now part of Wright-Patterson AFB, near Dayton, Ohio) and tested near Tonopah.*



*Tonopah's "world famous" Clown Motel. What could be more relaxing than a stay at a clown-themed motel?*



*If you think that an "assayer" is something akin to a "horse whisperer", only a bit louder, you'd be wrong. In mining towns like Tonopah, an assayer used a number of tools and tests to determine the type and quality of ore samples from mines. This helped stakeholders determine how much time, effort and money to invest in specific mines and operations.*

On my drive to Hawthorne, I stopped at Monte Cristo's Castle. This was a return visit, as I wanted to check out a different area of this colorful landscape. Several years ago, there was a push to make this area

another Nevada State Park, but the effort failed. As a result, there is no signage for it along the highway, and it does not appear on most maps, so I've had the place to myself for both visits.



*Hiking around Monte Cristo's Castle*

I visited several ghost towns on this trip – several more, if you also include the ones that I drove through without realizing it. Nevada has more ghost towns than any other state in the country, and in fact it has more ghost towns than living towns. I stopped at five just between Tonopah and Hawthorne, and a couple more that afternoon after reaching Hawthorne.



*Main Street ruins in Candelaria, an old mining camp ghost town*



Remains of an old Candelaria house. I think that people were a lot shorter in the olden days.

Due to the lack of enough water for both mine operations and the people to drink, the stamp mill at Candelaria operated as a “dry mill”, which allowed its toxic dust to spread throughout the community, ultimately killing many of the people who worked the mines.



*The Magnum Mill ruins near Aurora*

Aurora peaked at about 10,000 residents. It was so close to the border that it was claimed by both California and Nevada until a survey put it on the Nevada side of the border. Samuel Clemens a.k.a. Mark Twain and his brother Orion (who Abraham Lincoln had appointed to be secretary of the Nevada Territory) were among those who owned mining claims at Aurora, but their claims proved to be near worthless, and Clemens moved on from Aurora to Virginia City, Nevada, where he wrote for the local newspaper. It was while living in Nevada that Clemens began using the name Mark Twain.

I was in Hawthorne for two nights, using it as a base for a return visit to the Mono Lake Basin area, just across the border in California on the eastern edge of Yosemite National Park, for a few new and a couple repeat stops.



*It took wild horses to make me take this picture at River Spring Lakes Ecological Reserve, California.*



*The last mile of the drive to the summit of Bald Mountain, California, was “interesting”, to say the least, but it was worth it for its outstanding views of distant Mono Lake, the Sierra Nevada Mountain Range at Yosemite, pictured, and some Mono Basin volcanic features, including Crater Mountain, center right.*



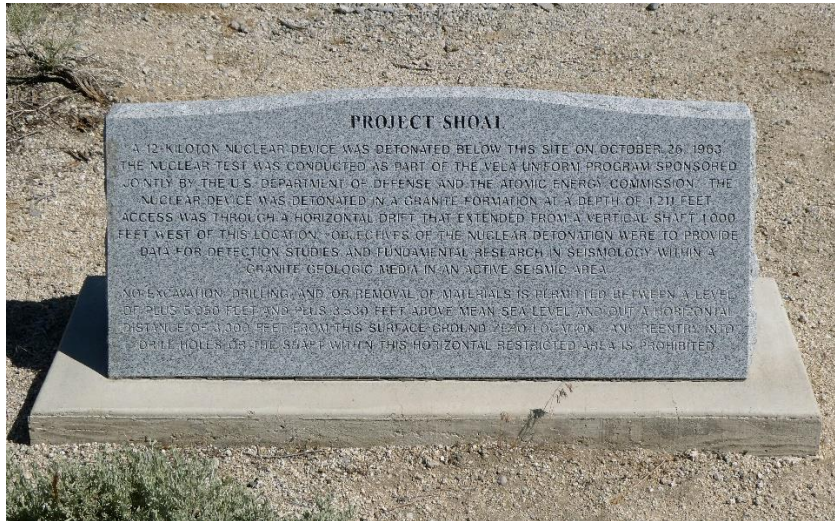
*I repeat-hiked the trail at the South Tufa Area at Mono Lake. When the lake was deeper, calcium carbonate minerals in springs that fed the lake produced tufa spires and formations that were exposed when lake water levels dropped.*



*I was standing at the base of 13,000-year-old Black Point Volcano as I took this picture of Negit Island in Mono Lake and its 2,000-year-old volcanic cone.*

I left Hawthorne the next morning, heading north on one of Nevada's many unpaved backroads towards my first destination of the day, the Project Shoal Atomic Testing Site. I found a reference to Project Shoal a few years ago on one of my maps, and impulsively tried to check it out then, but I didn't come across

any signage, let alone monuments. I found the specific location after I got home, so I added it to the itinerary for this trip. Project Shoal was an underground nuclear test in 1963 in an area known for its seismic activity. The purpose was to help the Defense Department and Atomic Energy Commission learn how to detect, locate and measure underground detonations. The 12-kiloton bomb was detonated in granite rock 1,211 feet below ground surface.



*The Project Shoal Memorial*



*Standing atop the debris pile at the Project Shoal site where the shaft was drilled for putting the bomb in place*

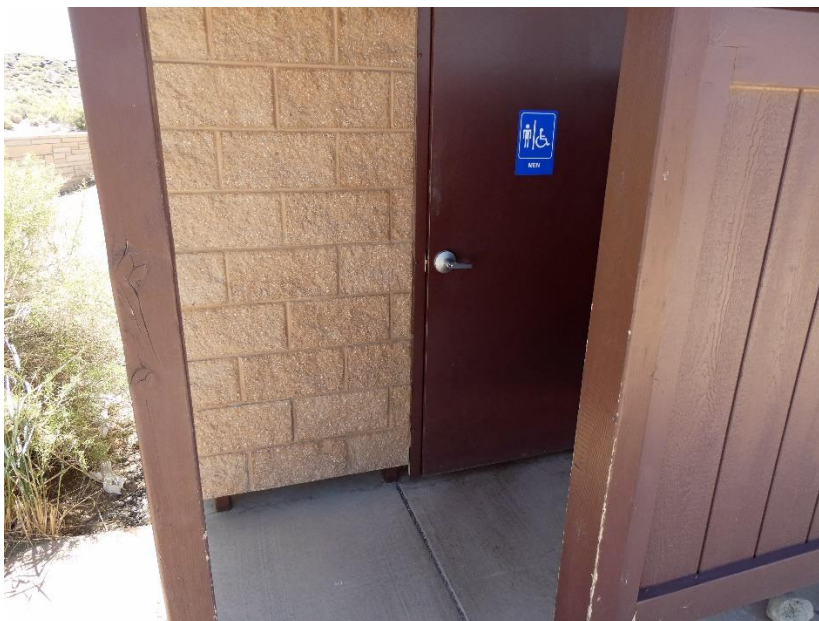
Excavation, drilling and collecting rocks and soil is strictly forbidden for 3,300 feet in all directions surrounding this spot, so I didn't bring any of you souvenirs from this stop.

It was already Day 4, and I realized I had been to more atomic testing sites than petroglyph sites on this trip, so I made a repeat stop at the nearby Grimes Point Archaeological Site to hike its Petroglyph Trail.



*Many petroglyphs at Grimes Point are believed to be 500 to 3,000 years old. These “pit and groove” style petroglyphs may be as much as 7,000 years old.*

The oldest known petroglyphs in North America are located on the edge of dry Lake Winnemucca on the Pyramid Lake Indian Reservation in northwest Nevada. They have been dated to between 10,500 and 14,800 years old. Both that site and Grimes Point were on the edge of the massive Ice Age Lake Lahontan, which supported more robust living conditions than are found in the area today.



*Southwest visitors are encouraged to check outhouses for rattlesnakes and scorpions before use, because such critters seek them out for refuge from the midday heat of the desert. But door handles and thresholds have proven to be impediments to snakes and scorpions. The folks at Grimes Point addressed this problem by providing a 3-inch gap below the walls and doors, more than enough of an opening for rattlesnakes and scorpions to easily escape the relentlessly hot sun.*



The hydrographic Great Basin is an area that covers most of Nevada, large parts of Utah, Oregon and California and small parts of Idaho, Wyoming and Mexico, where there is no natural flow of water to the sea. All precipitation evaporates, soaks into the ground or flows into (generally salty) lakes. The Humboldt River is the longest river with the biggest watershed in Nevada, flowing from east to west across central Nevada until it runs out of lower places to flow and ends at the Humboldt Sink. The Sink sometimes is dry, and sometimes is home to a shallow, evaporating lake, depending on how much water reaches it.



*Nevada farm country, irrigated with water from the Humboldt River*



*The Humboldt Sink*

Lovelock Cave, like Grimes Point, is located on the edge of the former Ice Age Lake Lahontan. It is also close to the Humboldt Sink. It was occupied as much as 4,500 years ago and used for over 4,000 years. More than 10,000 items have been excavated from the site, including 11 duck decoys made of bundled grasses, most painted and covered with feathers and dating back more than 2,000 years.



*Lovelock Cave comes into view*



*The artifacts already excavated, what you mostly will find in the cave is soot on the ceiling from ancient fires, a common feature of rock shelters. I didn't find any rock art at the site.*

A weather system moved into the region that night, bringing with it cold rain and even snow in the higher elevations. I had planned on exploring some Oregon back country sites associated with the Owyhee River and its canyons, but the roads are impassable when wet. I came up with a different route through Oregon.

I skirted the storm with a more westerly route that took me past Steens Mountain and through Malheur National Wildlife Refuge, repeat visits. Steens Mountain is about 50 miles long and rises to over 9,700 feet. It is one of a number of mountains in this area created when big blocks of the earth's crust separated and then tilted, followed by erosion that helped fill broad valley floors – classic Basin and Range Province fault block mountain formation.



*East-facing side of Steens Mountain*



*The west-facing Catlow Rim of Steens Mountain rises above Catlow Valley.*

Most of what I had planned to see in Idaho were repeat visits, but it had been years – even decades in some cases – since I had seen many of these places.



*In the 1950s, a lone parking meter was installed in front of the Owyhee County Courthouse in Murphy, Idaho, as a gag to discourage people from parking in front of a gate-entrance that was there at the time. The meter has stuck around even though the gate is long-gone. And it actually works. And not just in terms of collecting money. It was a weekday when I stopped by, and most of the parking spots were taken, leaving just the space where I parked and the spot in front of the meter.*



*I'm not sure if this is the source of the expression "an utter disaster". But when you read about what happened to the folks in the Utter Wagon Train along the Oregon Trail, and most things that people call utter disasters don't begin to compare to this original Utter Disaster.*



*I guess that there's more than one way to turn a bull into a steer.*



*If I had been hit by one of those falling objects when crossing the Saylor Creek Bombing Range, it would have been an utter disaster.*

There's a volcanic hotspot that the North American tectonic plate has been moving over for millions of years. It was located under the southwest corner of Idaho about 15 million years ago, and as the plate moved the hotspot moved northeast across southern Idaho. Today, it is located beneath Yellowstone National Park. During this time, it produced numerous calderas and associated volcanic activity. As a result, much of this area sits atop a thick layer of basalt rock. Most of what I'd see during the rest of my trip through Idaho was tied to this past volcanic activity.



*I risked getting hit by falling objects crossing a bombing range to see the Bruneau River, which has carved this 800-foot-deep canyon into thick layers of volcanic basalt and rhyolite rock. The top of the canyon is about 1300 feet wide.*



*Volcanic rock can be porous, so a lot of water soaks into it in the region. At Thousand Springs, visible across the Snake River from Highway 30, you can see a wall of flows like these, where water pours out of the volcanic rock and into the Snake River below.*

Some volcanic flows helped create a large pond system whose sediments preserved fossils from the Pliocene epoch (starting about 3.5 million years ago). This is the period when many modern plants and animals began emerging. This is the world's richest source of such fossil deposits, and it is protected by Hagerman Fossil Beds National Monument. I've stopped here a handful of times over 30 years now, and

have been disappointed due to the limited display of such fossils – or, as was the case this time, its off-site visitor center was completely closed. The site itself is worth visiting for a couple reasons, but you won't see any fossils there.



*At Hagerman's Snake River Overlook, you can see some of the sediment layers from the ancient ponds from which many fossils have been excavated.*



*From Hagerman's Oregon Trail Overlook, you can see a small section of the original Oregon Trail.*

There is a large expanse of south-central Idaho that is roadless. Not just due to the volcanic activity as the hotspot passed under the region, but because of the much more recent eruptions of Idaho's Great Rift Zone. Over the past 15,000 years, major eruption periods have occurred here about every 3,000 years. Get there early – the next eruption period is expected in less than 1,000 years!



*This Google Satellite image shows the large roadless expanse as well as areas where the more recent volcanic activity occurred. (Twin Falls is in the lower left corner.)*

This was my fourth visit to Craters of the Moon National Monument and Preserve, which includes the largest expanse of recent volcanic activity in the satellite image. This was primarily a sightseeing visit with a couple short hikes, just because I like checking out the place now and then.







*Snow at the bottom of a spatter cone (left); lava field with a pair of cinder cones (right)*



*Tree with "witches' brooms". Dwarf Mistletoe settled on this tree. It's a parasite plant that draws nutrients from its host tree, weakening it but not killing it. It also secretes a hormone into the host tree, which causes the tree to grow several more branches where the mistletoe is, bringing more nutrients to the mistletoe. A clump of these branches is what is known as a witches' broom.*

A lava tube is created when the surface of a channel of flowing lava begins to harden while what's underneath is still flowing. If what is flowing underneath completely flows out, the result is a tunnel called a lava tube. There are miles of these at Craters of the Moon, although they all eventually will collapse.



*According to the sign along Caves Trail, this lava tube “collapsed like peanut brittle”.*



*And this lava tube “collapsed like a soufflé”.*



*Food for thought should you decide to explore one of the lava tubes, like here in Indian Tunnel.*

As I was preparing my final trip itinerary, my Windows 10 PC greeted me with a beautiful picture of Shoshone Falls in Idaho. Where in Idaho, I wondered, only to find that it is on the Snake River in Twin Falls, Idaho. Oh. I've passed through Twin Fall several times over the years, and never thought to actually look for any falls. But I was staying there for two nights on this trip, using it as my base for visiting Craters of the Moon. On my return to the city, I checked out the falls. Alas, not as pretty as on Window 10, because the volume of water going over the falls was pretty low at the time of my visit.



*Shoshone Falls, in Shoshone Falls Park, Twin Falls, Idaho*

I headed south into Nevada, with the Ruby Lake National Wildlife Refuge area and the backroad leading south out of it being my primary focus en route to Ely, Nevada. I had briefly visited the area before, but missed Fort Ruby.



*The Ruby Lake area is one of a number of wetlands in the valleys between mountain ranges in central and northern Nevada. This is along a major bird migratory route.*



*Snow melt from the Ruby Mountains feeds both Ruby Lake as well as the Humboldt River. No rubies were found here, but garnets found here look kind of like rubies.*

Little survives of Fort Ruby, which was built in the 1860s to protect miners' interests in the Ruby Mountains as well as a segment of the passing California and Overland Stage Line trails. The Pony Express also passed by here, but it was shut down the year before Fort Ruby was built.



*A civilian merchant's cabin survives at the Fort Ruby site*



*A rather small portion of the Bald Mountain Mine, which produces about 50 tons of gold per year. With all the push for electric cars, we'll need to mine a whole lot more lithium for car batteries than we currently do, which Nevada also has, so we could see a lot more mines the scale of this one. But one lithium mine needs about 1.5 to 2 billion gallons of water per year, water that can be contaminated for hundreds of years afterwards. As Kermit the Frog once said, it's not easy being green.*

I planned on two nights in Ely, where I'd head out on Highway 6 in the morning to the Lunar Crater Volcanic Field, and then double back to Ely to head out on Highway 50 to look for the Hamilton Ghost Town. But while I was in the hotel perusing one of my maps, I spotted a dot well off Highway 6 labeled Project Faultless Nuclear Test Site. I looked up some information on that and decided that I wanted to see it. I pulled up Google Satellite so that I could sketch out a decent map to get to it. That's when I spotted something labeled Petroglyph Butte not far from there, certainly a name intended to catch my eye. I looked that up and found that not only was it was a petroglyph site, but likely also a ritual site. I sketched out more map instructions, and scrapped my plans for Hamilton.



*Ground Zero, site of the Project Faultless Nuclear Test Site*

The Nevada Test Site north of Las Vegas was the site of numerous above and below ground nuclear tests for several years. In addition to its military use, nuclear scientists were exploring whether and how atomic explosions might be used for more peaceful endeavors, such as for large-scale excavation projects or for fracking to boost oil and gas yields.

Once it was determined that testing at that site posed safety risks for Las Vegas, the Atomic Energy Commission looked for more remote locations for such testing. They felt that they found one here in Hot Creek Valley, the Central Nevada Test Area. But they needed to test it in order to verify this.

They drilled down about 3200 feet, and then sideways, lining the opening with a reinforced steel tube. They put a nuclear device down there, one that yielded almost 1 megatons (67x more than the bomb dropped on Hiroshima). They detonated the device on January 19, 1968. Things didn't go as expected.

Ground in a radius of several miles collapsed several feet, creating a number of fault lines. It actually dropped about 9' at the steel tube, whose top was originally flush with the ground. Underground it created a 2,460-foot-tall "rubble chimney" that's about 820 feet wide, and not unlike the core of a nuclear reactor, all expected to be highly radioactive for thousands of years.

Let's take a closer look.



*The top of the steel tube, sealed with concrete. You can see how much the earth dropped here.*



*Marker on one of two nearby bore holes used to determine the makeup of the underlying rock (I had to Photoshop the heck out of it to make it at all readable)*



*Plaque mounted on the steel tube. Again, no souvenirs from the site, as excavation, drilling and collecting are prohibited within 3300 feet. That said, someone had set up a grazing cattle watering station just a couple hundred yards away.*

The Moore's Petroglyph site at Petroglyph Butte was a bit different than other rock art sites I've been to. The style of many of the petroglyphs is Desert Archaic, and may be thousands of years old. In addition to the more common wavy lines, circles and dots are a number of female fertility symbols, including some abstract and not so abstract depictions of female genitals. With these, other characteristics of the site and traditions of the local native populations, and some believe that this site was used for rituals associated with girls reaching puberty.





*The biggest rock art panel at Moore's Petroglyph Site*

I made a return visit to the Lunar Crater Volcanic Field, which last erupted about 38,000 years ago.



*Easy Chair Crater*



*400-acre Lunar Crater has been used for astronaut training and for testing Mars landers.*



*Nevada has a relatively small oil industry. It perhaps could be more productive with the help of a little nuclear fracking.*

I had three planned stops for the drive home on my last day of the trip. But the last couple miles of the road to remote Delamar Ghost Town were narrow and strewn with tire-shredding rocks, so I didn't get as close as I wanted. My stop at Black Point Petroglyph Site was limited as most of the panels were on top of the butte, and I was only about halfway up when my still-problematic foot made it clear that I should turn around. And for reasons unknown, the petroglyph trail at Pahrnagat National Wildlife Refuge was closed. So, I didn't have quite the last day that I had planned on.



*Delamar ghost town*

There are mill ruins on the hillside, building foundations in the distance and numerous other ruins scattered around here for what was a town of more than 3,000 people with a lot of stone buildings. But water was limited, and like Candelaria, the mill was a dry operation that put a lot of fine dust in the air – and in the lungs of the people who lived here. Delamar earned the nickname “Widow-maker” because of the number of miners who died from the silicosis that results from breathing the dust.

The first recorded reference to a slot machine happened in Delamar, where the slot machine made its debut in a Delamar saloon.

Gold was discovered here in 1889, but the mines had pretty much played out in 20 years, and Delamar quickly faded into history.



*I was not terribly impressed by this rock art panel I found at ground level at Black Point*



*But the petroglyphs here were old enough that many had been re-covered by desert varnish, making ones near the top of the ridge difficult to see from ground level, such as the petroglyph towards the left on this rock near the top that I saw from the ground.*

Although the last day was a bit of a letdown, it was still a great trip. And a pretty good way for me to mark turning 60.