

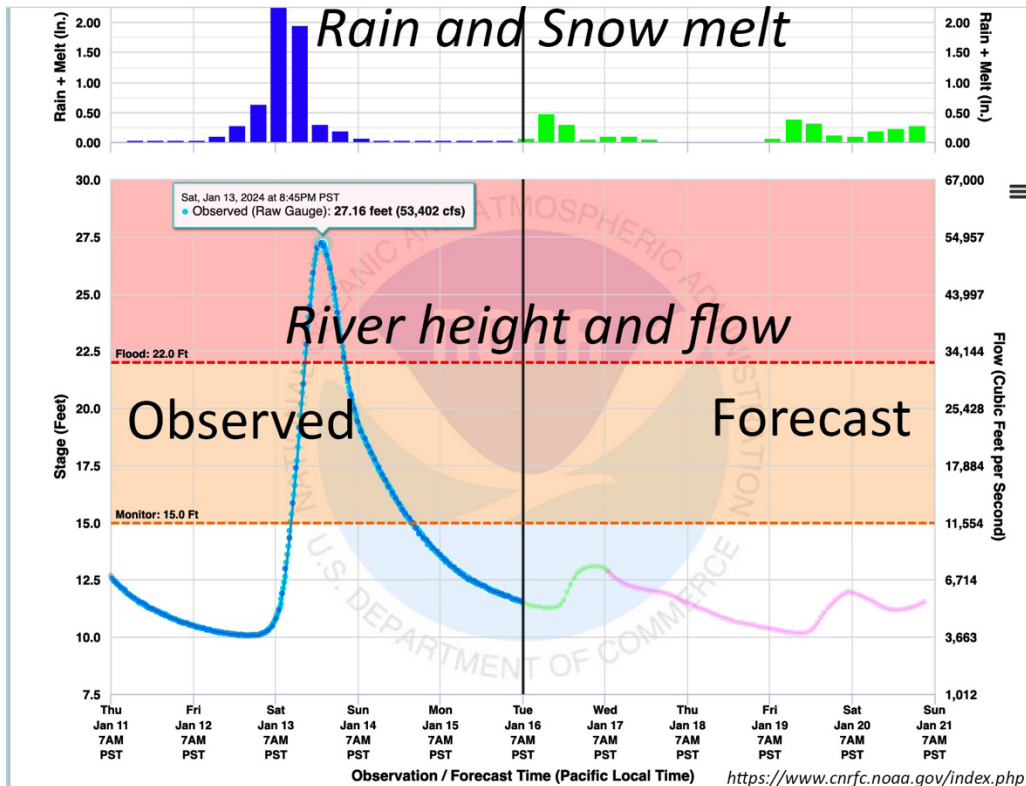
# Times Standard

## Not My Fault: Floods a good prep for earthquakes

Lori Dengler for the Times-Standard

Posted January 20, 2024

<https://www.times-standard.com/2024/01/20/lori-dengler-floods-a-good-prep-for-earthquakes/>



NOAA's California Nevada River Forecast Center snapshot of the Mad River gauge on January 16th. Rainfall and water levels on the left are recorded data and, on the right, are forecast values based on expected rainfall.

This week, residents of Redwood Valley are getting a taste of the isolation that could happen anywhere in Northern California. Last weekend's storm made the record books for regional river systems. For Redwood Valley, flooding took out both roads providing connection to the rest of Humboldt County.

We recorded 4.5 inches of rain a week ago in our unofficial back yard rain gauge. The official 24-hour total on the 13th at the Eureka National Weather Service gauge on Woodley Island was under 3 inches and only ranked 73rd on the list of historic rainfall in Eureka, but it was notable in most of it coming in an eight-hour window.

The USGS maintains a national network of water level gauges on major rivers and National Oceanographic and Atmospheric Administration (NOAA) and the Weather Service is responsible for potential flooding forecasts and issuing alerts. In Humboldt County, larger

rivers systems like the Mad, the Eel, Redwood Creek and smaller creeks around Humboldt Bay rose to alert-level stages.

It was pretty clear two days before the storm hit, we were in for a wet weekend. NOAA's California Nevada River Forecast Center (CNRFC) estimated that several North Coast river systems would reach monitor stage, the height at which some localized flooding is expected and that the Mad River could peak at about 23 feet, just barely into flood stage with more widespread flooding.

I am impressed by how much better our weather and river forecasting has become in the last two decades. The two are closely linked as the precise location and rate of rainfall controls how much water a drainage basin delivers to a river. The forecast made on January 11th correctly predicted the timing and sharpness of the peak flows. Rainfall would be concentrated over a one-day period and the Mad River drainage basin was in the bullseye.

What actually happened was slightly different. Instead of 24 hours, the bulk of the rain fell in less than half that period. The CNRFC forecasts were updated. By Saturday morning the peak estimate on the Mad was 25 feet and at 8 PM, up to 27. The final value just topped 27. It was the highest stage recorded on the Mad River since the Christmas floods of 1964.

Stage level does not give the complete story of a flood. The Mad River gauge is located just upstream of the 299 bridge near the North Bank Road onramp. The water height at the site is a function of the volume of water flowing but also local conditions at the gauge site. Sediment accumulation raises the bed and localized scour can lower it.

A more quantitative measure of flood size is discharge, the volume of water flowing through that section of the river per unit time. Gauging stations don't measure it directly, but discharge can be estimated by using a rating curve. My husband Tom Lisle spent most of his career studying North Coast rivers and developing rating curves was one of his specialties. It requires measurements of water currents along the entire cross section of the river at different stage heights. I remember many a late night in the 1970s and 80s when Tom would have to drag his crew out to Jacoby Creek to get high stage rating curve data.

The 27.12 feet peak Mad River stage at 8:45 PM PST on January 13th translates into a discharge of 53,402 cubic feet per second (cfs) or just about 400,000 gallons of water rushing by every second. In terms of discharge, the storm ranks fifth on the all-time measured Mad River floods, nearly equal to the flood of December 30, 1995.

A flood cause damage by inundation and battering and undermining anything in its path. There isn't just water moving downstream. During the rising limb of a flood, the river will sweep vegetation and anything else in its path into the water as well. We found a safe spot near the end of School Road to watch the rising waters and were impressed by how many logs went by.

Where do the logs end up? The wind during storms comes from the south causing the river waters to veer north when they hit the coast. We got a firsthand view on our Clam Beach

dog walk the next day. The wave slope was littered with logs, duff, and sadly much human detritus. We picked up at least a cubic yard of plastic and other debris.

For people living in Jacoby Creek, the Freshwater Valley, and other low-lying areas of Humboldt County, the Mad River was not your problem. These smaller rivers responded even more quickly to the intense rainfall and near the Bay, impacts were exacerbated by the King tides. The stream gauge at Brookwood bridge on Jacoby Creek reached a height of 7.8 feet, the highest since it was installed in 1978. My friend hydrologist Randy Klein estimates it was a 100-year event.

From the preliminary damage assessments to date, all of the damage in Humboldt County was caused by these smaller river systems. The Mad is tempered by the dam at Ruth Reservoir and an extensive levee system. There was flooding in the Arcata bottom and the County's emergency notification system contacted the residents in those areas and advised them to evacuate. All but one person heeded the advice. Not surprisingly, she was new to the area and not aware of our flooding hazards. She was one of a handful of successful rescues in the County.

We have been fortunate. No deaths or major injuries have been attributed to the flooding. The current tally of public damage is just over 4 million. Last Tuesday, Sheriff Honsal proclaimed a Local Emergency, the first step in getting State assistance for the costs of response and repair. If you had any damage, please report it to the County Office of Emergency Services ( <https://humboldt.gov/2461/Report-Damages> ).

Last week's storm won't rise to the level of a federal disaster declaration and no public funds are likely to be available to help individuals or businesses. Homeowners insurance does not cover losses due to flooding from natural causes such as rivers or tsunamis. Anyone living in flood prone areas should consider coverage through the National Flood Insurance program <https://www.floodsmart.gov/>.

A number of the usual lessons bear reminders. Don't drive through flooded areas. Drive slowly as small landslides and unexpected puddles can be hazardous. Please sign up for County emergency notifications and be careful in venturing out to watch Mother Nature in action.

So many things went right last weekend. There were almost no power outages. Information was readily available on local radio stations and the County's emergency site <https://humboldt.gov/2383/Current-Emergencies>. Redwood Valley is the only area where daily life has been seriously impacted. Don't assume that our next flood or earthquake will be as kind. Ask yourself how you would cope if roads and utilities are out. It's a very good time to make/review disaster plans and store emergency supplies – our new Living on Shaky Ground magazine is a good place to start.

Note: watch near real-time river levels at the California Nevada River Forecast Center <https://www.cnrfc.noaa.gov/index.php>. Click on the gauging site map (or scroll to the location on mobile devices) to see recorded water levels and rainfall to the left and the forecast values for the next few days to the right.

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Lori Dengler is an emeritus professor of geology at Humboldt State University, an expert in tsunami and earthquake hazards. The opinions expressed are hers and not the Times-Standard's. All Not My Fault columns are archived online at <https://kamome.humboldt.edu/taxonomy/term/5> and may be reused for educational purposes. Leave a message at (707) 826-6019 or email [Kamome@humboldt.edu](mailto:Kamome@humboldt.edu) for questions and comments about this column. The new 2023 edition of the preparedness magazine "Living on Shaky Ground" is posted at <https://rctwg.humboldt.edu/prepare/shaky-ground>.