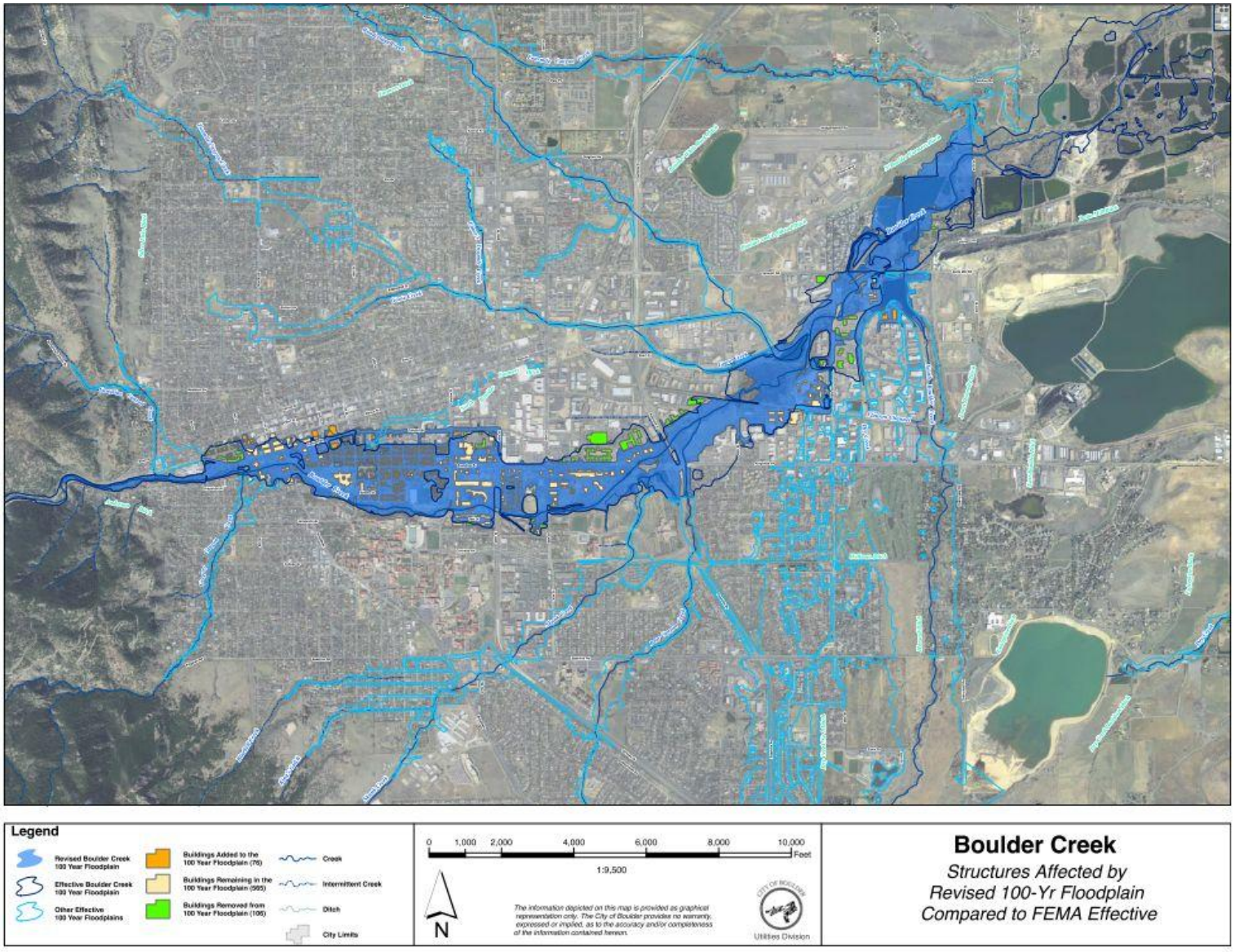

Experts discuss county's flood preparedness, lessons learned

Flood experts agree it's impossible to be 100 percent prepared for natural disasters, but last week's flooding in Boulder County held some valuable lessons for how to be more ready the next time the waters start rising.

They also say that flood modeling and floodplain mapping can only go so far in predicting the paths that the water will take. Each disaster, whether flood or fire, is unique, and when it happens, the silver lining is that it adds to the body of knowledge and historical experience that we rely on for making plans and predictions for future natural hazards.

Dave Gochis, a hydrometeorologist at the National Center for Atmospheric Research in Boulder, says local leaders are vigilant about updating floodplain maps, but those are based on "static depictions" of storms, and "that is very reliant on what happened in the past."

The maps and models of which areas will be inundated are never completely accurate, he says.

"We've never seen an event like this before, where there were so many critical factors that came together and focused heavy rainfall along the mountain front for such a long period," Gochis says. "So I would venture to say that none of the designed storms that were used for floodplain maps accurately depicted this kind of event. And so they're wrong. That's the unfortunate truth. Floodplain science is an imperfect science, because you're trying to wrap your head around everything nature can throw at you, and you can't wrap your head around that."

Clancy Philipsborn, a former Federal Emergency Management Agency employee who went on to serve as a natural disaster recovery consultant for local governments, agrees that our predictions of where the water will flow are always flawed. Philipsborn, a certified floodplain manager who has worked on more than 125 major disasters over his 35- year career, points out that the maps and models assume the water is going to flow cleanly, without any blockages.

"If you get a tree or a propane tank or a VW blocking up a culvert or a bridge, that water backs up and goes where it's not meant to go," he says. "Everybody thought the bridge or culvert would stay clear."

Philipsborn adds that it's practically impossible to have a flood that matches the exact waterflow levels and speeds associated with a 100- year flood. After all, the "100- year" label refers to the characteristics of a specific flood that has a 1 percent chance of occurring every year. Most floods are not going to match up with that particular profile, so the maps are only marginally accurate.

"Every model is wrong, but some are useful," Gochis explains.

Philipsborn says that while some media outlets keep labeling the floods as "100- year" or "500- year," the reality — in the case of Boulder Creek, anyway — is that it was probably about a 50- year flood. He explains that the water along the creek was traveling at around 6,000 cubic feet per second (cfs) at the most, and the figure typically used for modeling 100- year floods along the main stem of Boulder Creek is about 12,000 cfs. In addition, he refers to the "flood stick" — a downtown creekside memorial to the late CU geography professor and "father of floodplain management" Gilbert White — that shows the height of water levels during various floods. Philipsborn, who was integral in getting the memorial funded and built, says the photos he's seen of the water level during last week's flooding shows that Boulder Creek was not quite to the 50- year flood mark.

"It's not as bad as it could have been," he says, adding that it wasn't a surprise, either. "It was expected, it was just a question of when. We haven't had a really good gully- washer since 1894."

Each waterway has a different profile for measuring the 100- and 500- year thresholds, and each experienced different conditions during the flooding, Philipsborn explains, so a 418- year flood on the St. Vrain River may only have been a 48- year flood on Boulder Creek, for example.

Ditch problems

According to Gochis, one of the most important lessons he expects to come out of the recent storms and floods may well be the need for better ditch maintenance and management. Driving around the area on Saturday, he says, he saw lots of standing water and debris in areas outside of the floodplain and far from any creeks or significant waterways.

Some local ditches are old, in need of upkeep and are not managed properly during heavy rains, Gochis explains, and as the water levels rose, many overflowed or failed. He says that with the exception of major ditches, for the most part the local ditch network is ignored when flood modeling is conducted.

"That stuff's not really in the floodplain mapping exercise," Gochis says.

"So a key lesson is to incorporate ditches into the projections. How well are those ditches documented and operated and accounted for in flood scenarios? I hate to say it, but I'm guessing there is going to be a fair amount of litigation over ditch operation as an outcome of this because property was damaged."

Philipsborn says the new information gained from water flow patterns last week, gleaned from aerial photos and satellite images, will be used to adjust maps and models, likely affecting the definition of the floodplain and the types of development allowed in the area. He says the University's controversial 1996 purchase of the Flatiron/ Gateway property, later labeled "CU- Boulder South," is an example of the effect of constantly evolving floodplain maps. Philipsborn recalls that a flood study conducted subsequent to the purchase showed that a larger portion of the 308-acre property was in the floodplain than previously believed, making development on the parcel expensive.

He explains that to make sure residences have access to flood insurance, most major municipalities in the area have ordinances regulating development in floodplains. Boulder residents enjoy lower rates than many, Philipsborn says, because the city has been so proactive about flood safety, like installing warning systems, for instance.

Philipsborn's own house on Pennsylvania Avenue between 55th Street and Eisenhower Drive suffered damage during the floods; he had 14 inches of water in his crawlspace, caused not by overland flooding but a rising groundwater table.

"In my neighborhood, everybody's got their stuff out on the street," Philipsborn says. "You can tell who had a finished basement."

As residents pick up the pieces and begin repairs to their damaged homes, his advice is to determine exactly how the water got in. Whether it was through a sewer backup, a window well or groundwater seepage, in many cases "that's something you can fix."

When asked whether the county could have been better prepared for the flooding, Philipsborn says, "Probably, but it's too early to say. Hindsight's easy. From what I was watching, I thought the emergency services worked well, the public information worked well, public works worked well, sheltering worked well. I got all the information I needed to know."

"I think we did a good job," he concludes. "We've learned a lot from the past."

Gochis is using the lessons from the past to create a new model for predicting such events. His NCAR team has developed a system for using atmospheric conditions to predict hydrologic patterns on the ground, and while the model is still in its early stages, Gochis says it was up and running during that recent week of rain and showed positive signs, just not much detail on the intensity and locations of the rain.

"It wasn't ready for prime time," Gochis says. "But I think there are encouraging results there."

He says he is still in the process of entering data to see how accurate his model would have predicted what happened to the rivers based on the storms.

"We don't have that story done yet," Gochis explains, adding that the ultimate goal is to have a better, more accurate warning system to notify officials when atmospheric conditions are setting up to deliver a serious flooding event.

"Our goal as scientists is to give the maximum amount of lead time possible," he says.

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