

**The Texas Senate – House Select Committees
on Disaster Preparedness and Flooding
Joint Hearing in Kerrville Texas, 31 July 2025**

**Testimony Presented by David R. Maidment
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Chairman Perry, Chairman King, Members of the Committees. I am David Maidment, Professor Emeritus of Civil Engineering, representing the Center for Water and the Environment, of The University of Texas at Austin.

Like my fellow Texans, I have been shocked and devastated by the awful flood disaster that occurred on the Guadalupe River and elsewhere on Independence Day. The loss of 137 lives, many of them children, marks a heartbreaking chapter in our state's history.

For me, this is especially poignant because for the past ten years I have led a flood science research team at the Center for Water and the Environment. Our team is collaborating with our state agencies, the National Weather Service, and the US Geological Survey, to enhance real-time flood information. We focus on assessing what happens to the water once it hits the ground, flows through rivers and streams, and creates flood impacts. We do not work on weather or precipitation forecasting.

During these years, we have worked closely with Chief Kidd and TDEM. I served in the State Operations Center throughout Hurricane Harvey helping to provide improved flood information. Since 2017, our research has been sponsored by TxDOT. This is the largest single research project in the history of that agency. We thank the TxDOT Research and Technology Implementation program for their strong and sustained support of our research effort.

Over the past ten years, steady progress has been made in the following areas:

- **National Water Model**

In 2015, the National Weather Service established a new National Water Center in Tuscaloosa, AL, to improve national flood forecasting. We led the engagement of the academic community with the National Weather Service to create the National Water Model. A prototype of this model was developed in Austin at the Texas Advanced Computing Center or TACC in 2015, and the model was made operational by the National Weather Service in 2016. The National Water Model continually forecasts flow throughout the stream network of the United States, including 200,000 miles of streams and rivers in Texas. Water has become like weather, forecast everywhere, all the time.

- **Statewide Flood Inundation Mapping**

With the support of TDEM, we created in 2016 the first version of large - scale real-time flood inundation mapping. This methodology was adopted by the National Weather Service, and is now being deployed in an improved form across the country. Real-time flood inundation mapping is operational across half of Texas, with the coverage of the rest of our state expected shortly. Publicly accessible flood map services from the National Weather Service depict current flood inundation, and worst-case future flood inundation.

- **Flood Decision Support Gauges**

Since 2017, with TxDOT's support via research funding, we have initiated a consistent program that deploys novel radar stream gauges on TxDOT bridges. These gauges measure both water level and velocity, rather than water level alone. TxDOT later expanded this program to 80 gauges, which are installed and operated by the US Geological Survey. We call these Flood Decision Support Gauges because they measure streamflow discharge during flood events.

These gauges are particularly applicable for flash flooding because they can potentially detect the velocity spike that often precedes the rise in water level during rapidly rising flood flow. The nearest TxDOT Flood

Decision Support Gauge is on the Guadalupe River at Comfort, downstream of Kerrville. Provisional data provided by the USGS for the July 4 flood show that the water level began rising there at 8AM, the velocity spike happened at 8:10AM, and the water level peaked at 9:45AM, 1 hour and 35 minutes later.

Although not suitable for all gauge sites, these gauges have the potential to be less expensive than the full-range gold standard USGS gauges, and they collect water level and velocity, as compared to local flood alert gauges, which measure only water level. The TxDOT network is the largest deployment of such radar stream gauges in the United States.

While significant progress has been made, our work with TxDOT is still in the research phase, and is not fully ready for operational use today. Integrating all the components into a seamless, unified system remains a challenge.

To improve resiliency for future flood events, I recommend the following:

- **Statewide Flood Decision Support Gauges**
Texas has 25,000 bridges over water, more than any other state. We can use this as the foundation for a statewide coverage of Flood Decision Support Gauges by equipping more bridges with radar streamflow sensors.
- **Texas Flood Hub**
Data from all the real-time precipitation, streamflow and water level gauge networks operating in Texas should be ingested into a single system that is publicly accessible.
- **Improved Flood Inundation Mapping**
Over the past five years, Texas has developed Base Level Engineering models for state-wide flood planning. In parallel, we have developed methods to translate the output of these models into real-time flood inundation maps. The application of these translation methods should be accelerated.

- **Training Center**

A technological transformation is happening in which real-time flood map services from the National Weather Service have become publicly accessible to everyone. The existence of these services is not well known and they are underutilized. A Training Center is needed for public officials and first responders to learn how to get accurate, reliable and timely information during flood emergencies.

Thank you for the opportunity to make this statement. I would be pleased to answer any questions you may have.