Hydrostation Monthly Report – January 2025

Project Summary:

Since 1988, Iowa has experienced over 1,000 flood-related, county-level Presidential Disaster Declarations requiring billions of dollars in recovery funds. The enhanced monitoring, data visualization, online communications systems, and map-based flood forecast system implemented in this project will lessen the impacts of future floods by protecting property and lives and reducing recovery costs from future floods.

Figure 1: Hydrostation in a crop field near West Union, IA

To better understand and monitor hydrologic conditions, this project has expanded the Iowa Flood Center's network of hydrologic stations by installing one hydrologic station in each county in congressional Districts 1 and 2 that did not previously have a station (31 counties). The second project activity includes the completion of a hydrologic assessment. Watershed groups across Iowa need technical resources to prioritize areas most frequently impacted by floods. Through this funding, the project team conducted a hydrologic assessment for two newly formed watershed management authorities (WMAs), the Maquoketa River and Lower Cedar River watersheds. This modeling helps communicate what areas are vulnerable to flooding. The WMA Boards will use this information for decision-making to prioritize funding within their watershed.

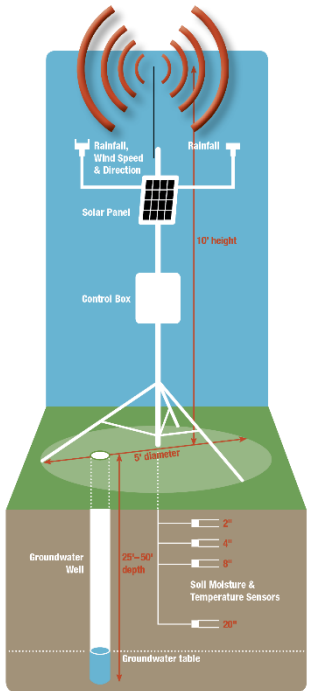

Figure 2: Graphic of Iowa Flood Center hydrologic station components.

Hydrologic Monitoring

Each hydrologic station measures rainfall, wind speed and direction, soil moisture and temperature, and water levels in a shallow groundwater well. The network informs our forecast models and provides critical publicly available data to local landowners, researchers, and agencies. The hydrologic stations connect directly with one of NOAA's primary focus areas – Unscrewed Research – by providing critical data to help researchers monitor and understand our global environment. The central U.S. does not have a robust and/or uniform array of hydrologic sensors to help researchers and local stakeholders monitor local hydrologic conditions at the onset of flooding in real time. These hydrologic stations are low cost, low maintenance, robust, and collect and transmit reliable data every few minutes (as programmed).

Data collected by these sensors is immediately useful to local agencies and community members, who have access to the data through existing online visualization systems developed and maintained by the Iowa Flood Center at the University of Iowa. Data are visualized on the **Iowa Flood Information System.**

Data from the robust network of hydrologic stations help researchers monitor the short and long-term impact of climate change on water resources above and below ground.

The hydrologic stations were installed in the following 31 Eastern Iowa counties in 2024 in Congressional Districts 1 and 2 that did not previously have a station. These counties are: Benton, Blackhawk, Butler, Cedar, Cerro Gordo, Chickasaw, Clayton, Clinton, Delaware, Des Moines, Dubuque, Floyd, Hardin, Henry, Howard, Jackson, Jasper, Jefferson, Jones, Lee, Linn, Louisa, Mahaska Marion, Mitchell, Muscatine, Scott, Van Buren, Warren, Washington, and Worth. The hydrologic stations that were installed through the **Iowa Watershed Approach** in 2018 include the following counties: Allamakee, Audubon, Bremer, Buchanan, Buena Vista, Calhoun, Fremont, Greene, Grundy, Iowa, Johnson, Keokuk, Mills, Pocahontas, Pottawattamie, Poweshiek, Shelby, Tama, Winneshiek.

Administrative information for the 31 new Hydrostations in eastern Iowa:

Project Title: Advanced Hydrologic Monitoring, Assessment, and Flood Forecasting for Eastern Iowa

Project Award Number: Community Project Funding FY23: NOAA-NWS-NWS-CIPO-2023-20

Map of Hydrologic Station Deployment

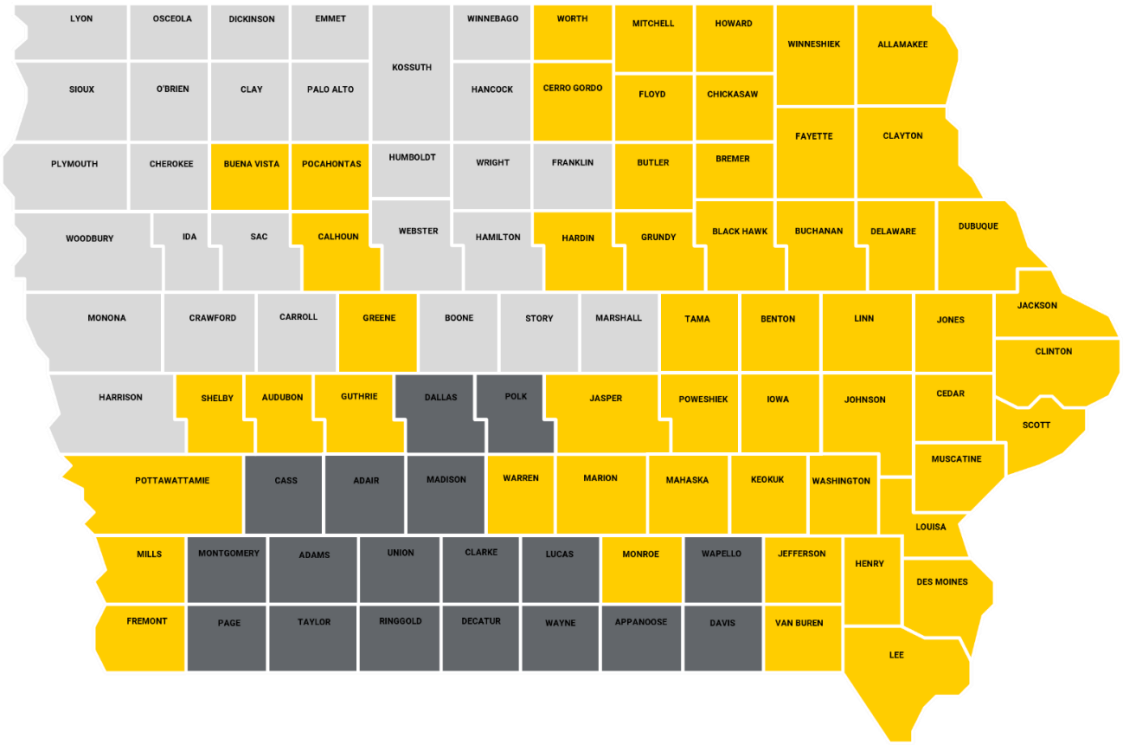

Figure 2: All gold-colored counties have an operating hydrostation. Through this funding, eastern Iowa counties in Congressional Districts 1 and 2 received 31 new hydrostations. Dark gray counties in Congressional District 3 will potentially receive funding for FY25.

Description of Measurements:

Wind Speed & Direction: Measures how fast the wind is blowing and the direction it is coming from, which helps understand weather patterns and their effects on the environment.

Rainfall: Tracks the amount of rain that falls over a specific period, essential for monitoring water availability and predicting flooding or drought.

Soil Moisture: Indicates how much water is present in the soil, critical for predicting flooding or drought conditions, and the soils ability to absorb water, and useful for plant health and agriculture operations. In the below monthly report, soil moisture is reported in volumetric water content (m^3/m^3) .

Soil Temperature: Measures how warm or cold the soil is, an indicator of the soils ability to infilitrate water, depending if soils are frozen or thawed. Also, temperature can affect plant growth, seed germination, and microbial activity.

Shallow Groundwater Well: Monitors the water levels in shallow underground aquifers, providing insight into groundwater availability and its connection to surface water.

January Monthly Report of Statewide Conditions from Iowa Flood Center Hydrostations: