

# Expanding Access to Hydrological Data for Improved Flood Forecasting

Location: DeSoto Community, Missouri



# Narrative Summary

DeSoto is located along Joachim Creek, which is vulnerable to highly unpredictable flash flooding. By combining and comparing *FloodSavvy* streamflow data with other official sources, DeSoto can improve its flood forecast fidelity and response.

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# Community Context

De Soto is a small city in Jefferson County, Missouri, which is located about 45 miles south of St. Louis. The surrounding terrain features rolling hills and a network of creeks and streams that ultimately drain into the Mississippi River. The city sits at the downstream end of the Upper Joachim Creek watershed, which spans approximately 39,154 acres, and Joachim Creek itself runs through the heart of DeSoto. Within the Creek's watershed, around 1,642 acres are designated by FEMA as flood hazard zones – most of which fall within city limits. As of the 2020 Census, De Soto is home to 6,449 residents.

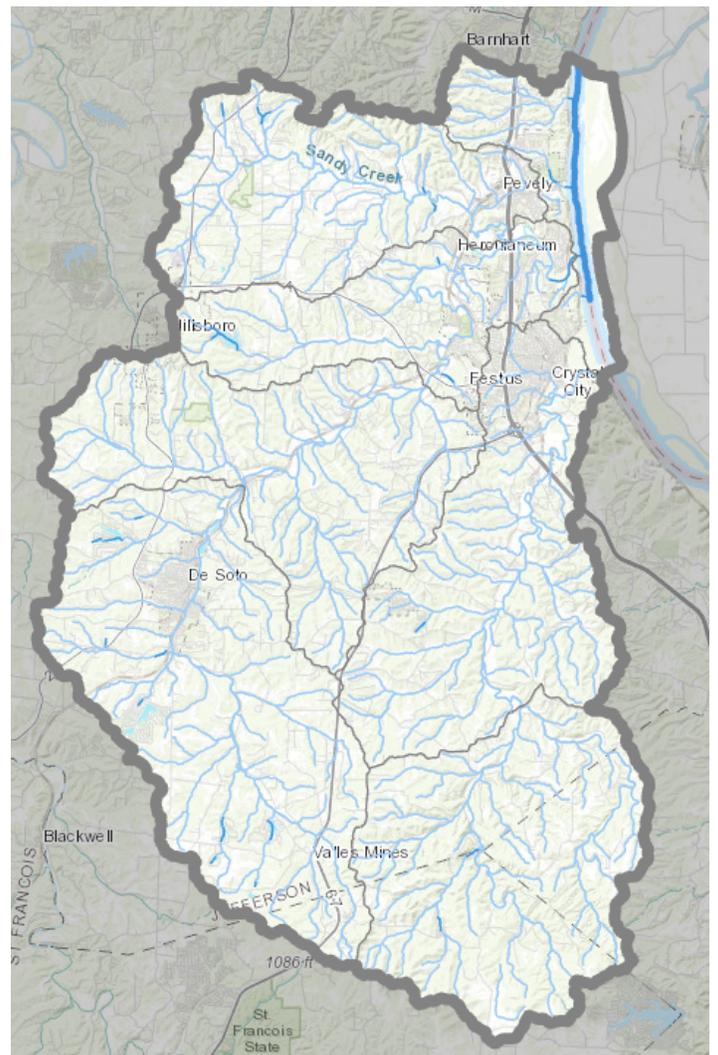
DeSoto's proximity to the Mississippi River and its tributaries heightens its vulnerabilities to flash flooding, pluvial flooding, and backflow flooding. Joachim Creek, which borders the city, is highly unpredictable and prone to rapid rises, even during minor rain events.

The city has been disrupted by repeated flooding events from Joachim Creek, as recently as Spring 2025, consistently putting a strain on residents and public institutions responsible for mitigating the impacts in the community. Existing and future development in the region raises concerns over increased volume and velocity of stormwater runoff, which could further intensify flood risks. According to a city administrator, "approximately a third of the municipality are located directly in the emergency floodway," with many being low-income households. The city is also surrounded by 15 dams, where sediment buildup presents an under-explored risk, increasing the potential for flooding.



*[Joachim Creek] is a very small creek in a small watershed that turns into a raging river when it rains hard.*

*- Local University Professor*





## Key Players

DeSoto town officials are responsible for local decision-making, including hazard mitigation, coordinating emergency response, and supporting buy-out efforts. They are often supported by the Missouri Hydrologic Information Center (MoHIC). MoHIC was launched in 2022 under the Missouri Department of Natural Resources (MoDNR) to make hydrologic and climate data more accessible, actionable, and user-friendly for MO communities. DeSoto is also serving as a model for better emergency notification systems by partnering with MoHIC to improve public communication channels.

Water-related response and decision-making in the city also involve other city departments, regional agencies, and local organizations. DeSoto works closely with the Jefferson County Stormwater Management Department on long-term planning, while also relying on data from the U.S. Geological Survey to monitor stream conditions in real time. Regional partners like the East-West Gateway Council of Governments and the Economic Development Corporation provide grants and technical support to strengthen mitigation efforts. At the community level, the Citizen's Committee for Flood Relief plays an active role by sharing timely flood alerts and helping secure outside expertise and funding for flood studies and grant applications.

# Challenges and Information Gaps

Interviews with community members, planners, and town officials emphasized the need for better on-ground data and forecasting to support flood-related decision-making and emergency planning, including clearer guidance on accessing and using data. Additionally, more information on stormwater runoff, flooding patterns, creek behavior, and precipitation models would further enable decision-makers to prepare for and predict the impacts of future flood events. One city official noted that studying the “ebbs and flows” of the local reaches of Joachim Creek can help them be “proactive,” particularly in flash flooding situations.

Flood resilience efforts face a range of structural and community-level challenges. Infrastructure vulnerabilities include frequent flooding leading to damaged properties, disruptions in wastewater management, and blocked evacuation routes during emergencies. Existing homes in the floodplain require relocation, and while local buyout programs are underway, limited funding has slowed progress, with only four homes being bought out as of 2024, according to a local citizen group member. Balancing buyout goals with limited funding is difficult, as town resources are stretched across competing priorities, and the high costs of buyouts and infrastructure repairs add financial strain. One of these competing priorities is addressing the lack of public sewage and reliance on septic systems, which can become compromised during flooding events.

Resistance to buyout programs and lack of consensus among residents further complicate progress, especially in engaging those who have not directly experienced flooding or who live outside designated floodplains. In smaller-capacity towns, one local planner explained that

“a lot of times people are overwhelmed because they don't really know what we're talking about,” adding that they try to emphasize the importance of community participation in flood mitigation planning meetings. At the same time, for some members in the southern part of Jefferson County, a lack of internet access can become a barrier to participation and accessing resources to improve awareness. City staff are also unable to address this awareness gap adequately because many local departments are understaffed, with key roles often filled by a single person.



# FloodSavvy: A National Water Model-derived Tool for Accessible Flood Risk Information and Water Decision-Making

NOAA's National Water Model (NWM) simulates streamflow at 18-hour, 10-day, and 30-day intervals, while also storing 40 years of retrospective data for both gauged and ungauged rivers across the U.S. While stakeholders in DeSoto recognized the value of NWM data, they also noted that its technical complexity creates accessibility barriers for first-time users or users without hydrological expertise.

To address this, our team worked together with DeSoto to develop *FloodSavvy*, a web interface that translates complex NWM outputs into clear, actionable flood risk insights for this community. We also created a beginner-friendly NWM Tutorial: A 101 Guide for Understanding and Using the NWM, available in both PDF and video format, to help new users navigate the model. Both

resources were shaped with input from DeSoto stakeholders to ensure they serve as practical, intuitive entry points for applying NWM data to local decision-making. See the [project website](#) for more details on *FloodSavvy* and co-development process.

After piloting these tools with regional water response stakeholders, participants identified several ways they could integrate *FloodSavvy* and the NWM tutorial to meet their challenges of access to readily available flooding information. Users found the tools particularly helpful for obtaining simplified and forecasted data and connecting this information to other official NOAA sources to strengthen local flood resilience and decision-making prior to potential flood events.



## Leveraging FloodSavvy to Expand Access to Forecasting Data and Complement Existing Tools

*FloodSavvy* allows users to select a local region and access forecasted (up to 8 days) streamflow on both gauged and ungauged rivers and streams. Town officials are interested in using these simplified datasets and graphics to better understand which water bodies are contributing most to the rise in the water levels of the Joachim Creek. DeSoto's City Manager and Floodplain Administrator highlighted that De Soto often faces flash floods, and the tool's streamflow projections can help fill that gap. He also noted its usefulness in comparing against trusted sources like USGS gauges, increasing the confidence in the tool for rapid decision-making. By incorporating partner datasets, like USGS flood inundation mapping, combined data could improve visibility of at-risk structures.

Additionally, given that *FloodSavvy* users have the option to simulate flood inundation extents under different streamflow conditions, town officials mentioned it would be a helpful feature during rain events. Town planners are also interested in using these inundation models as a way to anticipate which areas may be vulnerable to flooding if heavy rains are forecasted.

The tutorial was also seen as a useful tool to lower barriers for new and non-expert users. DeSoto city officials mentioned that the NWM tutorial's step-by-step approach was essential for accessing and understanding the National Water Model. MoHIC echoed this feedback, highlighting that the tutorial was well received by people less familiar with NWM or FIM products.

MoHIC officials noted that tools like *FloodSavvy* create important entry points that boundary organizations like MoHIC can use to connect

local data with state-level decision-making. They described *FloodSavvy* as most useful for local officials who want information about nearby creeks and streams. Because of its local focus, they explained that if someone like DeSoto's City Manager wanted to understand a local creek, MoHIC would direct them to *FloodSavvy*. But if the question was about a different river outside the area, they would recommend another resource.



*I think it's just another great tool especially when you can use it to compare against other, forecasted datasets...like I said, most of my information is off the stream gauge with the level of the creek, and so it'd be good to start comparing data.*

*- DeSoto's City Manager & Floodplain Administrator*



*I think the biggest aspect for daily use [is] the inundation aspect when it's raining (...). [it can be] helpful to compare [with other data sources].*

*- DeSoto's City Manager & Floodplain Administrator*



*There was really good reception from folks who weren't super familiar with the site [NWPS], and learning how to use the different services.*

*- MoHIC*

## What Can You Do If Your Area Is Not Covered by FloodSavvy?

The DeSoto users' experience with *FloodSavvy* tool demonstrates how NOAA's National Water Model (NWM) can be made more accessible and useful for different types of end-users. In DeSoto, for example, FloodSavvy provided expanded access to hydrological data that supported improved flood forecasting.

If your community is outside the six currently served by FloodSavvy, you can still leverage the NWM in your work. The NWM Tutorial is publicly available and designed for first-time users.

**01** Access our NWM Tutorial [here](#).

**02** For users interested in DeSoto's experience, Sections 1–3 walk through how to access streamflow forecasts for both gauged and ungauged rivers via the National Water Prediction Service website.

**03** Other useful resources include:

- [National Weather Service Latest Alerts](#): Active flood warnings across the U.S.
- [U.S. Geological Survey's Water Data](#): Comprehensive hydrological data at gauged sites.

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