Enhancing Forecasting Fidelity For Local Emergency Management Directors

Location: Mt Ascutney Community, VT

2025

Community Narratives

Narrative Summary

The Mt Ascutney region is heavily affected by repeated floods exacerbated by limited human resources and outdated water data. FloodSavvy's more user-friendly interface and localized water dashboard can expand access to near-real-time and historically modeled streamflow information.

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Community Context

The Mount Ascutney region in southeast central Vermont spans 10 towns from Windsor south to Springfield, serving a combined population of roughly 24,000 residents. At its heart stands Mount Ascutney, a 3,144-foot mountain that marks the highest point in Windsor County and the most noticeable natural landmark in the area. The region's topography transitions from the steep, forested slopes of Mount Ascutney in the west to the broad Connecticut River on the east. Major waterways include the Black River, which flows through Ludlow, Cavendish, and Springfield and into the Connecticut River, and the Williams River, a 25-mile tributary traveling through Andover, Ludlow, and Chester before joining the Connecticut. Numerous smaller brooks further contribute to the region's network of streams and rivers.

Mount Ascutney and its surrounding areas are increasingly vulnerable to water-related hazards due to more frequent and intense heavy rainfall events. The region's steep slopes cause rapid runoff and fluvial erosion, leading to sudden rises in water levels that trigger flash flooding during storms. Additionally, shifting river channels have altered natural drainage patterns, putting new areas at risk of erosion and flooding that were previously considered safe. Towns within the region, particularly Ludlow and Cavendish, experienced severe flooding during Hurricane Irene in 2011 and July 2023. In the 2023 summer flood, many residents required rescue from inundated homes, either caught unaware or unprepared for such severity. During our interviews, one regional planner observed how perceptions of potential hazards have shifted with each flood surpassing previous severity expectations.

Infrastructure vulnerabilities heighten the risk these extreme events pose to community members. Dam safety represents another significant concern. Ludlow alone has four flood control dams built approximately 50 years ago. According to Ludlow's EMD, recent assessments suggest these dams would not withstand another event of Irene's magnitude. Officials face challenges in communicating dam breaches and flooding risks without causing public alarm, particularly for areas outside traditional FEMA flood zones.

> "
> *We never thought this could happen [severe flood events], and then the next time we have the same feeling.*
>
> *- Regional Planner*

> "
> *In 2023 didn't get hit too badly, but Ludlow did. The road that my mom's on - when they put the culvert back, they put the exact same size culvert back, and I've seen that blow out 3 times in my life.*
>
> *- Resident*

Key Players

Given that Vermont does not have county governments, towns are responsible for planning, infrastructure, and hazard response. They are often supported by Regional Planning Commissions (RPCs) that work collaboratively with government agencies, technical experts, and local communities to translate complex data and regulations into practical guidance for local resilience efforts. The Mt Ascutney Regional Commission (MARC) serves this area by assisting towns with updating their Town Plans and Hazard Mitigation Plans, as well as aligning them with the management of water hazards. MARC also provides funding advice, project management, and technical support for member towns, particularly for large projects.

One ongoing project is a flood resilience study that aims to identify ideas to slow and spread water from the local river closest to the towns of Ludlow and Cavendish. While supporting projects, MARC staff and local organizations regularly use data provided by government agencies, including Federal Emergency Management Agency maps for regulatory use, United States Geological Survey stream gauges, as well as several strategic plans and databases provided by the Vermont Department of Environmental Conservation.

Challenges and Information Gaps

One of the main challenges when it comes to water hazards response and mitigation is that town officials, often in voluntary positions, are overburdened and unable to pursue multiple complex grant opportunities. Small towns struggle with large infrastructure projects, as grants themselves are either unattainable for communities with limited tax bases or too competitive, according to a MARC Planner. This lack of funding, including for flood insurance, prevents communities from effectively relocating from floodplains or developing more resilient housing.

Moreover, as many current residents in the region did not experience the severe impacts of Hurricane Irene, there are differing levels of flood preparedness in the community. Exacerbating this lack of awareness is a distrust of existing water-related data sources, as many residents believe flood maps and weather reports poorly reflect their lived experiences and have become desensitized to warnings.

Overall, more localized data that incorporates the region's mountainous topography and changing river dynamics is needed to enhance flood emergency preparedness and response. Local decision-makers mentioned that existing maps are outdated, failing to reflect changes in river channels or provide detailed information for small drainage areas and erosion-prone zones. Current prediction models also overlook how steep valleys and elevation changes affect flood behavior, resulting in inaccurate risk assessments – particularly in areas like Ludlow, where surrounding mountains and dams further complicate flood forecasting. Lastly, being able to access, understand, and utilize water data

is another challenge expressed by residents and organizational staff alike. Limited staffing capacity among RPCs, town officials, and Emergency Management Directors (EMDs) further complicates the ability to adequately train new personnel and use different monitoring tools like stream gauges, as well as ensure the community's needs are catered to.

> "
> *If you cry wolf too many times, people don't listen to it when it's actually occurring.*
> *- Fire Chief*
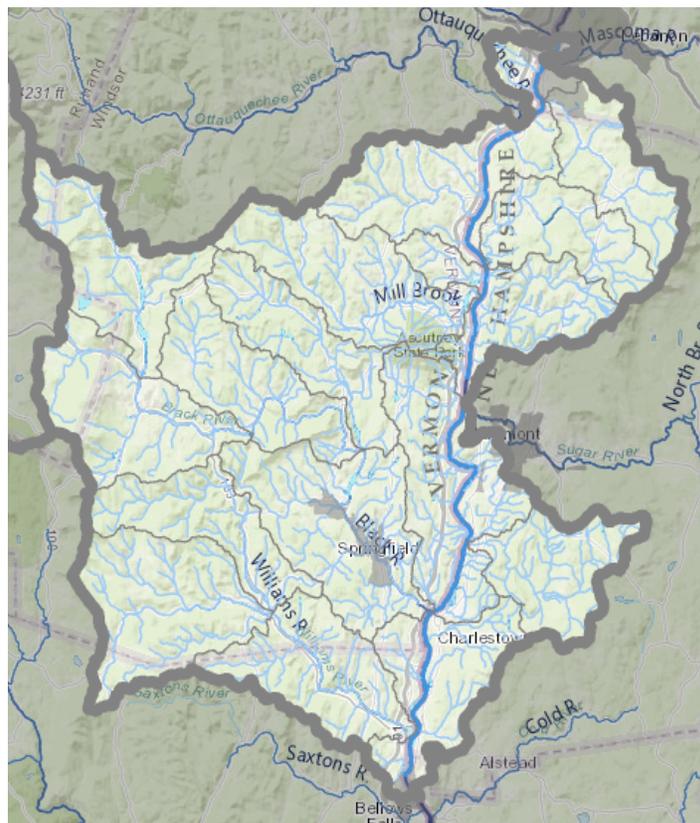
FloodSavvy: A National Water Model-derived Tool for Accessible Flood Risk Information and Water Decision-Making

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 the Windham region 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 Mt Ascutney members to develop *FloodSavvy*, a web interface that translates complex NWM outputs into clear, actionable flood risk insights for this region. We also created a beginner-friendly NWM Tutorial: A 101 Guide to 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 Mt Ascutney stakeholders to ensure they serve as practical, intuitive entry points for applying NWM data to local decision-making. See our project website for more details on *FloodSavvy* and the co-development process.

After piloting these tools with Mt Ascutney stakeholders, they identified how NWM data, *FloodSavvy*, and the NWM Tutorial could be integrated into their flood forecasting and preparation efforts to strengthen local flood resilience.

Leveraging FloodSavvy's Forecasted and Historical Streamflow Data to Support Flood Planning

FloodSavvy simplifies the process of identifying and interpreting forecasted streamflows, as users can select the region and river of interest to display a graph of forecasted streamflow over the next 8 days. MARC regional planners emphasized that local EMDs need a tool, like FloodSavvy, that can provide them with quick, clear answers as well as link out to official sources. For example, how bad is this event compared to what we know from the past? If my area is forecasted to flood, where should I seek further information? By comparison, the existing NWM requires users to navigate several different forecast datasets and independently explore other official sources of data.

Furthermore, stakeholders were interested in exploring past streamflow data (since 2016) to better understand how ungauged rivers behave. By viewing historical streamflow graphs covering ungauged streams, users can monitor and assess the impact smaller tributaries may have on flood risk thresholds and potential infrastructure damage. Being able to contextualize new floods by comparing them to historical peak flows and using smaller tributary-scale data to complement local knowledge of erosion, landslides, and river behavior can help fill gaps where gauges don't exist. Finally, being able to compare flows to known past floods (e.g., 2023) would make it useful for staging and preparedness. Regional planners from MARC anticipate that with some training and support, local EMDs and responders should be able to access information from FloodSavvy themselves, given the tool's intuitive design, to assist with flooding preparation.

Looking ahead, MARC staff are considering holding a training at a Regional Emergency Management Committee meeting and incorporating these resources into Local Emergency Management Plan annexes.

> *Another piece would be working directly with our fire chiefs, EMDs, folks on the ground for pre-planning. We would sit down and go through it with them, so they could start pre-planning and staging with their own teams.*
> *- Regional Planner*
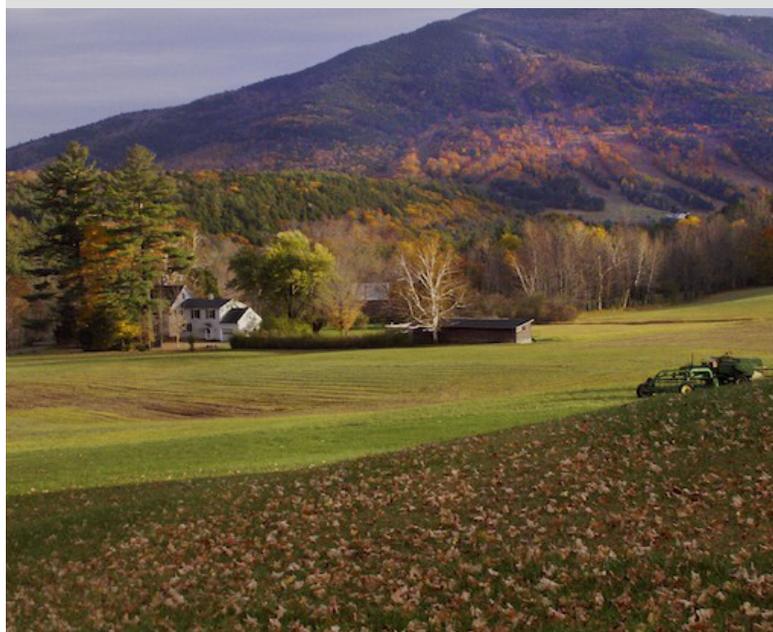
What Can You Do If Your Area Is Not Covered by FloodSavvy?

The Mt Ascutney users' experience with *FloodSavvy* demonstrates how NOAA's National Water Model (NWM) can be made more accessible and useful for different types of end-users. In Mt Ascutney, for example, *FloodSavvy* used NWM data to provide expanded access to improved flood forecasting and flood maps for prioritizing mitigation actions. 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 Mt Ascutney'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.