DIVISION OF
AVIATION

Hurricane Helene After-Action Report:

Western North Carolina General Aviation Airports

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PREPARED BY:

fountainworks
FACILITATION • MANAGEMENT CONSULTING

Executive Summary

This After-Action Report (AAR) provides an in-depth review of North Carolina general aviation airports' response to Hurricane Helene. The scope of this AAR is limited to airport-related operations and does not encompass the full support NCDOT Aviation provided during the response, such as aerial imagery. Observations and recommendations are intended to support North Carolina's broader efforts to strengthen preparedness and response for future hurricanes and emergency events.

Hurricane Helene brought historic flooding, landslides, and widespread infrastructure loss to Western North Carolina (WNC). With hundreds of roads closed and entire communities temporarily isolated, general aviation airports played a key role in maintaining access to emergency supplies, supporting evacuations, and enabling critical coordination across agencies.

In response, NCDOT Aviation worked alongside local airport staff, emergency managers, and partner organizations to adapt quickly. Some of these partner organizations included:

- Federal Aviation Administration
- North Carolina Emergency Management
- North Carolina National Guard
- Civil Air Patrol

In many cases, airports served as operational hubs for incoming aid and general aviation resources were mobilized to support relief efforts in ways not previously anticipated. Some outlying airports served as distribution hubs, accepting aid and distributing it into the affected area.

This AAR captures key lessons and challenges across six focus areas:

- Airport Infrastructure
- Communication & Coordination with Diverse Stakeholders
- Staffing
- Media, Rumors, & Misinformation
- Safety
- Resources

Key lessons underscore the importance of early coordination with airport stakeholders, flexible staffing plans, redundant communication systems, and better-defined airport roles in emergency planning. Recommendations throughout offer actionable ways to improve readiness, build on existing partnerships, and strengthen the integration of aviation assets into future disaster response operations.

The experience of Hurricane Helene presented unfamiliar challenges—but also demonstrated the willingness and capacity of the aviation community to adapt and contribute meaningfully under pressure. This document reflects both the operational realities and the collective effort that emerged in a time of crisis.

Helene in Western North Carolina: The Storm and Aviation's Response

In late September 2024, Hurricane Helene swept through the southeastern United States, leaving devastation in its path. After making landfall in Florida on Thursday, September 26, the storm moved northward, bringing its full force to North Carolina by Friday. What followed was a catastrophic weather event that tested the limits of infrastructure, emergency response systems, and the communities they serve—particularly in Western North Carolina (WNC).

Figure 1 A ground level image of the damage of Interstate-40 at Pigeon River Gorge caused by Hurricane Helene and rising river waters.

In the mountainous terrain of WNC, the impact was especially severe. With the ground already saturated from earlier rains, Helene brought between 8 to 12 inches or more of additional rainfall in just three days. The result was widespread flooding, landslides, tornadoes, and structural collapse across dozens of counties. Over 70,000 homes were damaged; roads, bridges, and power lines were destroyed; hospitals were forced to evacuate; and more than a million residents lost power. Tragically, Helene became one of the deadliest hurricanes of the 21st century, claiming over 100 lives in North Carolina alone.

In the face of this unprecedented crisis, general aviation became more than just a transportation option—it became the state's lifeline.

As roads disappeared under rising waters or gave way to mudslides, dozens of small and rural communities were cut off from the rest of the state by ground transportation. Supplies couldn't get in. Emergency services couldn't reach people. But aviation could. The North Carolina Department of Transportation's Division of Aviation, in partnership with general aviation airports, stepped in to fill this critical gap.

Airports across WNC transformed overnight into hubs of emergency logistics—receiving and distributing food, water, medicine, and fuel. Aircraft evacuated patients, transported responders, and enabled communication with otherwise-isolated communities. In many cases, these airports were the only accessible points of contact with the outside world for several days.

This report captures the Division's collective efforts—not only successes but also the challenges faced and the lessons learned that will strengthen future emergency preparedness. It reflects a moment when general aviation rose to meet a generational crisis, and when coordination, adaptability, and commitment carried the day.

Purpose

This AAR is intended to support the state, NCDOT Aviation, and airports in continuously improving disaster response. The goals of this document are to:

- Enable other agencies and organizations to learn from the challenges and successes
- Memorialize experiences and lessons learned to a range of potential audiences
- Capture recommendations for improvement
- Support readiness for future events

This AAR is organized into the following sections:

- Introduction
  - Methodology
- Helene in Western North Carolina: The Storm and Aviation's Response
- Lessons Learned
  - What went well?
  - What did not go well?
  - What could we do better in/for the future?
- Conclusion

Methodology

The North Carolina Department of Transportation (NCDOT) Division of Aviation initiated an After-Action Review of the Hurricane Helene responses to document lessons learned and recommendations to improve future disaster responses. On November 22, 2024, NCDOT Aviation hosted a workshop at Hickory Regional Airport with general aviation airport managers and staff, NCDOT leadership, staff from the NCSU Institute for Transportation Research and Education, and others. In addition to the workshop, information was collected in interviews and a survey.

Observations and recommendations within this AAR are based on qualitative information collected from the workshop, interviews, and a survey.

Figure 2
Hickory Regional Airport Manager Chad Hunsucker, NCDOT Secretary of Multi-Modal Transportation Julie White, NCDOT Board Member Lisa Mathis, and others discuss the challenges they faced during Helene and the novel ways they addressed them.

Figure 3
Former NCDOT Aviation Director Becca Gallas facilitates a conversation with airport managers and other partners at the Hurricane Helene After-Action Workshop on November 22, 2024.

Lessons Learned

The following lessons were learned from the Hurricane Helene disaster response. These lessons may help other airports responding to disasters or emergencies in the future. While all emergencies are unique, the lessons below should be considered in continuous improvement efforts.

What went well?

Airport Infrastructure

- **Prior Permission Required (PPRs) vetted and metered operations and flights**. Airports that instituted PPRs reported that instituting them immediately improved the situation and made traffic manageable.
- **Reducing and removing the non-critical operations** from airports improved the function of the airport.
  - For example, some airports had **off-site collection** for supplies and resources rather than collecting them at the airport.
- **Bucket brigades** helped unload planes quickly.
- **Prioritizing fuel and getting aircraft in and out efficiently and safely** helped airports manage the situation.
- **Separating the ramp into sections** for different sizes and types of aircraft.
- **Monitoring the gate** and instituting a one-in-one-out policy helped keep flights moving in and out and reduced unsafe situations.
- **Some churches and fire departments picked up and stored supplies,** rather than storing them at the airports.
- Some airports **staged aircraft strategically for departures and arrivals,** which improved efficiency**.**
- **Extra fuel trucks** provided airports with a higher fuel capacity and flexibility in fueling aircraft.
- **Dedicating areas of the airport for rotary aircraft operations versus fixed-wing aircraft** improved safety.

Bucket Brigades

In response to the emergency, NCDOT Aviation, general aviation airports, and community-based organizations formed ad hoc partnerships and collaborated on a range of issues, including quickly coordinating logistics. The picture to the left shows bucket brigades made up of volunteers unloading critical supplies and ensuring essential resources like food, water, first aid, and hygiene items reached the most vulnerable households efficiently.

Communication & Coordination with Diverse Stakeholders

- **Coordinating supply drop-off locations with communities** reduced unnecessary foot traffic and non-critical operations at the airport.
- **Clearly marked areas showed community-based organizations where to operate when assisting with donations.**
- **Meeting with airport tenants** supported safe and proper operations.
- **Clearly communicating airport personnel roles and responsibilities** facilitated smoother operations.
- **The Division of Aviation called airports and asked if they needed specific equipment, resources, and staffing.** This helped airports articulate their needs.
- **Pre-existing strong relationships between NCDOT Aviation and individual airports** created a foundation of trust and communication that was leveraged during the event.
- NCDOT Aviation **supporting search and rescue operations and state emergency management** by getting daily updates from airports and sharing the information with AirSERT, FEMA, and the FAA.
- **The FAA provided information on airspace and the aviation system.** The FAA informed NCDOT Aviation of issues and then the Division of Aviation was able to help address concerns with other agencies or units.

Staffing

- Airport managers **prioritized staff safety and security**.
- **Volunteers marshaled cars and organized ground traffic**, which kept planes moving.
- **Staff were briefed daily** on roles, responsibilities, and the ongoing situation.
- **NCDOT Aviation helped secure skilled staff** from unaffected airports across North Carolina and out-of-state.
- **Staffing uncontrolled airports with an air traffic manager** helped handle the increased traffic.
- The **Flight Standards District Office (FSDO) helped oversee safe operations**.
- Staff were **well-trained and skilled**.
- **Local pilots helped with marshaling**.
- **FEMA provided contractors to manage the PPRs**, who also helped with other airport operations as well.
- **Airports created temporary housing to immediately address staffing needs.**

Staff Augmentation

Throughout the event, airports from across the state sent their trained personnel to support airports in Western North Carolina and NCDOT Aviation provided the coordination support to make it happen. This allowed airports to give their exhausted staff a break by cycling in others who were likewise familiar with state regulations and airport operations.

Media, Rumors, & Misinformation

- **NCDOT Communications provided good information** to the public via social media and website creation.
- **NOTAMs were established to inform pilots of quickly evolving critical info regarding airport operations.**
- **Regular situation reports** and communicating directly with key groups operating at airports (like volunteer groups) kept individuals aligned.

Safety

- Volunteers were given **temporary badges** for identification and security purposes.
- Some airport managers put **an individual in charge of safe airfield movement**.
- **NCDOT quickly coordinated needed inspections** to keep airport operations going**.**
- Local **law enforcement provided personnel** to help manage the influx of people.

Resources

- **NCDOT provided airports with generators and other needed equipment, like radios**.
- **Roads were cleared quickly** to gain access to airports and transport needed resources.
- **Local government agencies provided equipment.**
- **Strong, pre-existing relationships with fuel vendors helped** to secure fuel, extra equipment, and support with maintenance.
- **Emergency PO for aircraft fueling and invoicing** allowed for quick and efficient fueling of aircraft**.**

What did not go well?

Airport Infrastructure

- Some affected airports have **neither air traffic control nor dedicated staff**.
- An aircraft fire **shut a runway down** for two hours.
- When some airports told community members not to bring supplies to the airports, **rumors started** that airports were declining aid to their communities. This could have been due to a lack of staff, congestion of the facility, or inefficient storage space at the airport.
- **Distrust of FEMA** made some communities and airports **reluctant to utilize assistance** that would have improved operations.
- Various airport staff were **unfamiliar with or misunderstood emergency aid and operational tools** that were available, such as the PPR.
- Airports **lacking a parallel taxiway** struggled to keep up with the increase in traffic.
- When no one was managing the gate, **unauthorized people and vehicles** would let themselves through.

Disaster Relief

During Hurricane Helene, many airports acted as ad hoc collection and distribution hubs for emergency supplies, as shown in the picture to the right. As a result, airports saw a significant increase in the amount of foot traffic as well as a significant decrease in hangar space dedicated to aircraft. The increase in non-airport personnel also increased the need for additional safety precautions and coordination.

Communication & Coordination with Diverse Stakeholders

- Some **hangar tenants did not coordinate with their airports**.
- **Many people arrived wanting to volunteer** but were unaffiliated with an organization and uncoordinated.
- **Missions were not well communicated between different groups**. This increased the number of aircraft arriving with cargo below their maximum capacity levels—increasing traffic, congestion, and fuel usage while reducing efficiency.
- Volunteers had **many questions and required a lot of management and coordination**.
- Groups **struggled to communicate where specific aid was needed**.
- Some airports reported **confusion around command structure**, with several individuals (including individuals without airport management experience) seeking to have leadership command at the airport.
- When airports implemented a PPR, **nearby airports without PPRs experienced increased traffic**.
- Some airports with only the main phone line had **challenges establishing a secondary line for the PPR.**

Staffing

- Without relief staff, **staff were overwhelmed and exhausted**.
- Airports **did not have enough linemen** to fuel and marshal aircraft.
- Some newer staff did not know what to do in disaster events. Some airports found themselves having to train on specific issues during the emergency.
- Some volunteers, including retired military persons, were **misunderstood to be from active-duty relief efforts**.
- A lack of amenities, like lodging and food, made it difficult to secure staffing support.

Media, Rumors, & Misinformation

- Airport **phone numbers were shared on social media**, which complicated airports' ability to communicate with key partners effectively.

Safety

- Some airports experienced **inundated Common Traffic Advisor Frequencies (CTAFs)**.
- Speed was sometimes prioritized over safe operations.
- Higher-than-normal levels of people at some airports created **safety concerns** and a need for security staff.

Resources

- An airport was **unable to use its fuel truck** because it did not have the proper inspection.
- Some airport infrastructure did not have **connections for generators**.
- Some **equipment was not able to meet airport needs**. For example, one airport had two radios with batteries that only lasted 30 minutes at a time.
- **Lack of runway lights slowed down and/or stopped operations**.

Complex, Congested Air Traffic

Not only did WNC airports experience increased air traffic, they saw increased diversity of aircraft, helicopters in particular. PPRs helped airports manage the increased air traffic, and Temporary Control Towers made the situation on the ground more manageable and efficient.

What could we do better in/for the future?

Airport Infrastructure

- **Create community and communication plans** to ensure only necessary goods are coming through airports.
  - This should include **establishing non-airport locations to accept, store, and distribute donations and supplies** and include **identifying and securing a trusted agency/organization to oversee donations and relocation of goods**.
- Ensure airports are **incorporated into their local community emergency plans**.
  - This should **specify the role of airports** over time throughout the disaster response.
- Ensure staff are **certified to pump fuel and marshal aircraft**.
- Equip airports with **lists of community resources and maintain proper contact lists**.
- Address issues associated with **PPR requirements for search and rescue operations**.
- **Train airports on emergency aid and operations**, including PPRs.
- **Create airport ramp plans that include an overflow area for airplanes to be loaded and unloaded and the length of time aircraft can occupy those spots.** Ramp plans should include a physical layout and reservation times.

Communication & Coordination with Diverse Stakeholders

- Create a method for **easily communicating road openings and closures**.
- Include **airports in local emergency management operation groups and seasonal planning efforts**.
- **Streamline NCDOT communications**, including a central website for all needed information.
  - This website could include:
    - Information for unaffiliated pilots, so they do not need to communicate directly with airports
    - Road status information
    - A reporting tool for airports to provide routine updates on power, fuel, and open status
    - A regularly updated map of airport status (PPR, open, etc.)
    - Emergency PO information
  - This website should go live on day one of an event.
- **Vet organizations** seeking to operate at airports and have them **sign temporary leases**.
- Establish an **official point of communication for volunteer groups to coordinate with their staff**.
- Create **airport mutual aid agreements**.
- Assign **a point of contact** for airport customers and organizations.
- Create a resource listing the capacity and ability of airports across the state. This should include staff certifications, systems they use, equipment, etc.
- Maintain **up-to-date contact information for all airports**.
- Communication **systems like Starlink could help facilitate communication** when the internet and/or phone service are interrupted.
- Develop **Primary, Alternate, Contingency, and Emergency (PACE) communication plan**.

Air State Emergency Response Team (AirSERT)

The NC AirSERT acted as a central emergency command coordinating NCDOT, FAA, NC National Guard, NC Emergency Management, and the Civil Air Patrol. The photo below shows Wes Powell, the AirSERT Emergency Services Coordinator with NC Emergency Management, discussing the air traffic deconfliction plan in Hurricane Helene affected areas.

Staffing

- Create **contract templates for staff and volunteer support**.
- Create **vetted list of skilled and certified individuals** who can help with airport management and operations.
- Create **standard operating procedures for out-of-state outreach**.
- Establish a **protocol for paying volunteer staff**.
- Deploy **extra staffing support before an event or as early** into it as possible.
- Create a **Memorandum of Agreement for certification in an emergency**.
- Ensure staff are **cross-trained.**

Media, Rumors, & Misinformation

- Provide **training for airport Public Information Officers**.

Safety

- Create **airport continuity plans and airport surge plans**.
  - Regularly **review plans**.
- Provide **training in Incident Command System (ICS) and National Incident Management System (NIMS)**.
- Perform **annual emergency drills**.

Resources

- Equip airports with **scales to weigh supplies**.
- Ensure **critical airport infrastructure can be connected to a generator**. This includes fuel farms, runway lights, and the FBO.
- Equip airports with **necessary emergency equipment and resources**.

Conclusion

Figure 4
The airport managers and staff, NCDOT Aviation staff, and other partners who participated in the Hurricane Helene After-Action Retreat at the Hickory Regional Airport on November 22, 2024.

Hurricane Helene brought unfamiliar challenges to general aviation in Western North Carolina.

The combination of mountainous terrain and widespread infrastructure failure created conditions few were prepared for, pushing airport teams into new roles under difficult circumstances.

While the storm exposed gaps in readiness, it also revealed what's possible when people respond with flexibility, collaboration, and commitment. The experience offered valuable lessons that will continue to shape how North Carolina prepares for and responds to future emergencies, including the crucial role airports play in emergency response and resilience.