



United States Department of Agriculture



**Hurricane Preparation and Recovery  
for North Carolina**

# Poultry Producers Guide



Forest Service  
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Hurricane Preparedness Guide  
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**\*DISCLAIMER\***

**Information in this document was provided by USDA and various university Extension staff and based on shared experiences preparing for and recovering from hurricane impacts. However, individual producer situations will vary, and STATE OR LOCAL GUIDANCE OR REGULATIONS, AND INSURANCE POLICIES SUPERCEDE THE RECOMMENDATIONS IN THIS GUIDE. This guidance should not be interpreted as required actions by regulatory or insurance agencies. Check with your local Extension agent; county, State, or Federal contact; consultant; or insurance agent regarding the appropriateness of these recommendations to your specific situation.**

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## **Hurricane Preparation and Recovery for North Carolina**

# **Poultry Producers Guide**

This guide will focus on:

- Emergency Planning for your poultry farm
- Long- and short- term recommendations for preparing for and recovering from hurricanes and flooding events on poultry farms
- How to carefully assess your farm after a hurricane and what steps to take if it is possible to manage your birds safely and effectively until the flood waters recede

# Contents

<b>Introduction</b>	<b>1</b>
<b>Building a Resilient Operation (Section 1)</b>	<b>3</b>
Personal Safety	3
Recordkeeping, documentation, and insurance	3
Infrastructure	4
Livestock concerns	8
Emergency planning	10
<b>Long-Term Operation Maintenance (Section 2)</b>	<b>14</b>
Prior to hurricane season	14
Monthly considerations during hurricane season	16
<b>Short-Term Preparedness (Section 3)</b>	<b>18</b>
Bracing for the hurricane	
Personal safety the day before the hurricane hits	22
<b>Post-Hurricane Recovery (Section 4)</b>	<b>23</b>
Immediately after the hurricane has passed	23
Within a week following hurricane impacts	25
Within a month after hurricane impacts	30
<b>Appendix</b>	<b>33</b>
Farm Emergency Plan	33
Initial Site Planning	38
Emergency Contacts List	41
Resource Links	44



# Introduction

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Preparing for and recovering from hurricane events

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People who live and work in the Southeastern United States are unfortunately familiar with the devastation and loss of life and property that can accompany a hurricane event. While hurricanes have always been a threat to the Southeast, with an average of over two strikes per year since 1900, the threat posed by hurricanes is growing. Recent studies suggest that as ocean temperatures continue to rise, hurricane intensity is increasing. Hurricanes of the future will likely be slower-moving, higher category hurricanes that produce destructive winds and flooding.

To help producers remain resilient and productive in the face of this threat, the U.S. Department of Agriculture (USDA) Southeast Climate Hub developed this manual containing steps that can be taken to prepare for and recover from hurricane events. This manual is separated into four primary sections:

- The **Building a Resilient Operation** section outlines a range of considerations and systems that producers can put in place to increase their resilience to hurricanes.
- The **Long-Term Operation Maintenance** section lists specific pre-hurricane actions and periodic checks to be done on an annual basis (before hurricane season) and monthly basis (during hurricane season).
- The **Short-Term Preparedness** section lists specific actions to be done in the week before a hurricane arrives.
- The **Post-Hurricane Recovery** section outlines activities that producers can take to minimize their losses following a hurricane. It begins with actions immediately following a hurricane that are focused on safety and continues with ongoing actions a week out and a month out.

The guide also includes four appendices, including two customizable templates for a **Farm Emergency Plan** and an **Emergency Contacts List**. Directions on what to include in these two documents is outlined in the **Building a Resilient Operation** section. Their use is described in the **Short-term Preparedness** section. Both the plan and list should be periodically reviewed, as mentioned in the **Long-term Operation Maintenance** section. The appendix also includes an **Initial Site Planning** guide that can be referenced if purchasing or leasing new land, and **Resource Links** to helpful Federal, State and university Extension websites that are also referenced throughout the guide.

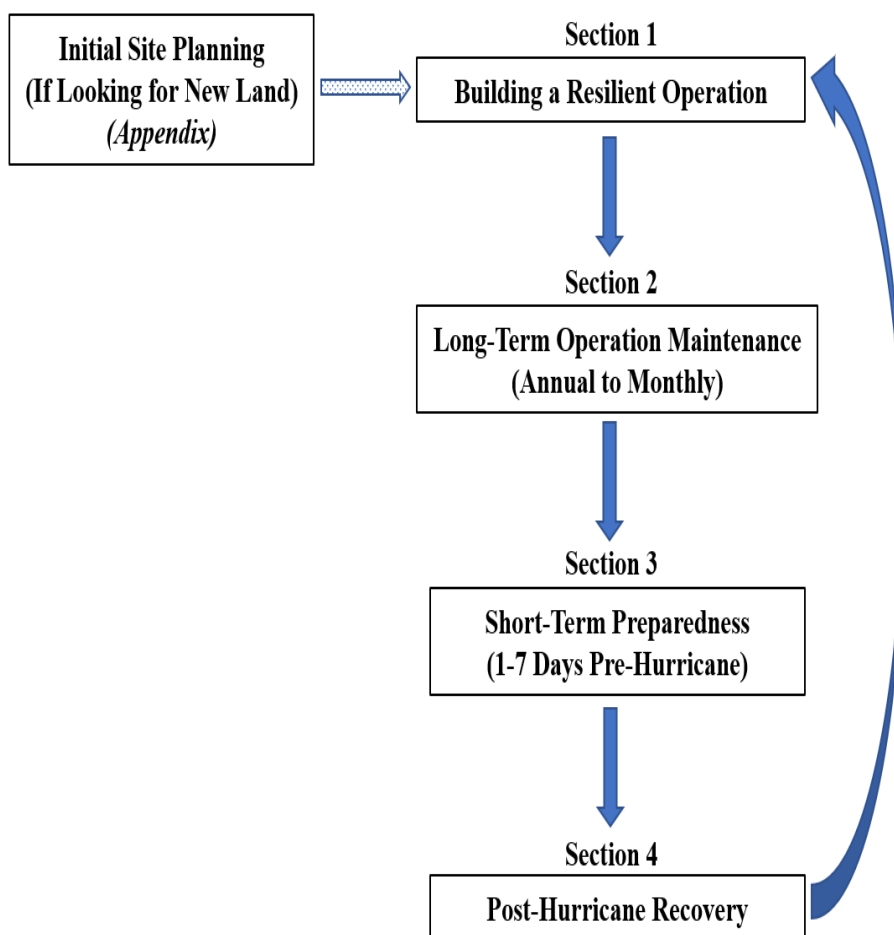


Figure 1. Flowchart for Poultry Producers Guide

# Building a Resilient Operation

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Systems that are recommended to be put in place well before the arrival of any hurricane to increase productivity and reduce your risk of damage and reduce recovery time

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**Agricultural operations in the Southeast U.S. can implement a range of measures to increase their resilience to hurricanes and tropical storms. Contact your local Extension office and other State and Federal resources for further information.**

## Personal Safety

- For safety tips and resources that facilitate informed decision making before, during, and after a hurricane strikes, see the U.S. Department of Homeland Security (DHS) [Ready.gov website](#) and NOAA National Weather Service [Weather-Ready Nation Hurricanes website](#).

## Recordkeeping, documentation, and insurance

- The importance of pre- and post-hurricane documentation cannot be overstated. Assistance for disaster recovery may not be available until weeks or months after a hurricane. Therefore, it is important for purposes of insurance compensation and recovery assistance to do thorough record keeping of the damages and losses sustained on your farm as well as your cleanup and recovery efforts.
- Review your business plan. The worst time to find out that you do not have enough insurance, or the right insurance, to cover your damages is when you need help recovering. Regularly review your insurance policies with your agent to be sure you have adequate coverage, including flood insurance, for your facilities, vehicles, farm buildings and other structures, and livestock. Be aware that there are limitations on how soon insurance coverage will take effect. Generally, insurance policies will not cover damage if the policy was not in place before a hurricane has formed.
- Documentation is discussed multiple times throughout this guide and its importance cannot be overstated. Establish an inventory system so that you know exactly what's on your farm at all times for potential insurance claims and disaster recovery assistance. It is critical to have a documented inventory (photos, videos, and written lists and descriptions) of your farm buildings, vehicles, and valuable equipment on your farm before a disaster occurs. Maintain accurate records of harvest, equipment inventories, and supplies purchased. This inventory and documentation will be essential for filing insurance claims after the hurricane. Keep copies of this inventory in multiple places such as on your computer, off-site in waterproof containers in a safe

location, and on a cloud-based server using an established procedure to update and transmit the information weekly.

- Pictures are invaluable to prove what you have. Take pictures of both the inside and outside of your poultry houses. This will document your feeding and drinking systems, fans, brooders, and other inside equipment. Don't forget your outside equipment such as tractors, farm vehicles, de-caking machines, litter handling equipment (such as blades, windrowing equipment, and pulverizing machines), fuel storage tanks, feed bins, and backup generators. Take pictures of your spare parts inventory as well. Do you have spare feed line motors or fan motors in stock on your farm? What about spare brooders, spare fan blades, spare sections of drinker pipe and nipple drinkers, and spare cool cell pads? Document everything you have no matter how minor it may seem. You can't file a claim for it if you can't prove that you had it to begin with.
- Take these records with you when evacuating for a hurricane:
  - Inventories and documentation for insurance and disaster recovery
  - Farm Emergency Plan
  - Emergency Contacts List
- For more information, see:
  - The U.S. DHS Federal Emergency Management Agency (FEMA) National Flood Insurance Program [website](#) to learn more about flood insurance options for qualifying home and business owners.

## Infrastructure

### Buildings

- Consult topography and flood maps when building new facilities, storing feed and hay, and moving animals. Consider the potential for higher elevation areas on the property to become evacuation sites.
- Locate buildings above the 100-year flood zone whenever possible, and construct buildings and other structures to a minimum wind rating of 140 miles per hour (mph), preferably 180 mph. For more guidance on protecting farm structures and buildings from winds and flooding, see the FEMA [Compilation of Wind-resistant Provisions and Design Guide for Improving Critical Facility Safety from Flooding and High Winds](#).
- Check local, county, and State codes for any requirements to supply backup power during short-term emergencies.

### Poultry houses

- Consider raising poultry houses when built to better accommodate flood waters—even 1 foot would be beneficial. At least raise the floor level above the surrounding ground.



## Water storage

- Put in place enough bulk water storage, either permanently designed in place (which if elevated can also provide its own pressure) or portable storage, to provide at least 24 hours of water needs when wells or municipal systems are offline or contaminated. This can provide needed time for repairs or other solutions to water needs.

## Power and backup power

### Circuit Breakers

- Know the location of your main circuit breaker and breaker box. The box is generally located inside of buildings, but additional breakers may be located outside.
- Ensure that the breakers, including the main breaker, are correctly labeled. Correct labeling will help you ensure power is cut to the appropriate appliances or to the entire building.

### Back-up power

- Create a Backup Power Plan, and store with your Farm Emergency Plan (see “Emergency planning and creation of Farm Emergency Plan” below).
- How many backup generators are on your farm and how many kilowatts of power do they provide? They must be big enough to run everything on your farm. Consider having your equipment “staged” so that, in event of a power failure, the generator does not try to start everything all at once. You might stage on one house of fans and in a few seconds, stage on another house. Don’t try to turn on four houses of fans and feeders and lights all at the same time, as that may overwhelm the generator. If you have more than four commercial poultry houses, you likely have more than one backup generator, each with its own separate fuel tank and automatic transfer switch.
- Check local, county, and State codes for any requirements to supply backup power during short-term emergencies.
- To provide power when the main power goes out, supply critical operating areas with a standby generator wired with an automatic transfer switch. Install generators with enough fuel storage for at least 2 weeks of full operation. Maintain at least 2-week’s supply of fuel.
- Post the operating procedures near each generator. Consult your owner’s manual for specific safety, maintenance, and operational recommendations.

## Roads

- If roads in your area and the driveway to your farm typically wash badly, possibly preventing access to your farm, have a plan in place to get feed, fuel, and other necessities to your farm via alternative route(s).
- The primary driveway into the farm should have adequate drainage to prevent flooding. The road should be well packed with a solid base that will hold up to heavy equipment and trucks during extreme conditions. For more information on maintaining unpaved roads, see the USDA [Environmentally Sensitive Road Maintenance Practices for Dirt and Gravel Roads](#).
- If you do not have a secondary entrance to your farm, construct one if possible to provide alternative access from a different road in the event the primary entrance is blocked.
- If the farm is in a location where all roads leading in and out may flood, purchase or make arrangements to rent or borrow a boat that can safely navigate the floodwaters to gain faster post-hurricane access to your property.

## Drainage

- Total water management is essential, including irrigation and drainage systems, and must take into account the water table and soil drainage.
- Increased sand content improves drainage, whereas higher silt and clay contents reduce drainage. In soils prone to developing a hard pan, perform deep tillage using a subsoil implement such as a ripper-bedder, or strip tillage to help improve soil percolation and reduce the time that water stands in flooded areas.
- Develop surface and subsoil drainage including a system of canals, ditches, beds, and/or drain tiles. Ditches between beds must have enough capacity to accommodate and channel excess water.
- Consider creating water retention areas to reduce overall flooding during small to moderate-intensity hurricanes.
- Make sure culverts are properly designed and sized by a natural resource technical specialist or civil engineer. Culverts must be properly sized to carry the maximum amount of water that may flow through them depending on the location. The construction company or installer should understand this and size the culvert accordingly, but that is not always a given. If in doubt, check with your county Extension agent, who can help you find someone who can verify the necessary culvert size.
- For more information about water management, see:
  - Sustainable Agriculture Research & Education's (SARE) *Building Soils for Better Crops* [Irrigation](#) and [Drainage](#) chapters

### Water table

- The amount of flooding will be determined by your land's topography, the amount of precipitation received, and the pre-hurricane water table. The higher the pre-hurricane water table, the more likely that flooding will occur for a given amount of precipitation. The chance of flooding can be estimated by measuring the pre-hurricane water table and considering the effects of varying precipitation amounts:

A general rule of thumb is that 1 inch of rain will cause the water table to rise about 10 inches in fine-textured soils, 6 inches in most of the flatwoods sandy soils, and 4 inches in coarse sands. It may take 4 to 6 days for the water table to return to its desired levels following rains of 1 inch or more. For example, if the water table is at 50 inches, 6 inches of precipitation will cause localized flooding on fine textured soils, but no flooding would occur on sandy soils.

### Trees and windbreaks

- Remove trees that could potentially blow down and block the entrance to the farm.
- If land is elevated and unprotected, consider creating windbreaks along the edge of fields. This is particularly valuable if adjoining land has bare soil and can prevent or reduce sandblasting of plants, feed supplies, and animals during a hurricane.
- Trees and shrubs used as windbreaks should be native species that will develop strong, deep root systems and be hardy enough to resist breaking during high winds. For example, red cedar (*Juniperus virginiana*) resists strong winds very well. Keep trees or shrubs pruned and free of dead or dying branches.
- For more information about how windbreaks can protect crops and provide economic, environmental, and commercial benefits, see the USDA National Agroforestry Center [website](#).

### Debris disposal

- Create a plan for salvage operations including a method of debris disposal. Learn what materials and the specifications regarding composition of materials the landfill nearest your farm will accept, and identify alternatives if needed. For disposal of chemicals or other hazardous materials, follow specific procedures to meet U.S. Environmental Protection Agency (EPA) requirements.

## Livestock concerns

### Carcass disposal

- Immediately after a hurricane, poultry farmers may face losses or major damage to their homes, farm equipment, poultry houses, and possibly the birds inside those houses. Some farmers may lose entire flocks, which can amount to hundreds of thousands of birds on farms with four or more poultry houses. Although the poultry company that a farmer contracts with owns the birds while they are alive, the birds become the farmer's responsibility if they die on the farm. Therefore, in the event of catastrophic flock losses associated with a hurricane, the burden and risks of disposing of all those hundreds of thousands of carcasses in a timely and safe manner falls on individual farmers. Cleanup efforts of this magnitude can be both challenging and expensive.
- Know your disposal options, and make sure you have a mass mortality plan. Some states require that poultry producers have an approved emergency disposal plan in place before disposing of carcasses following a catastrophic event. The plan should include who to contact for approval and assistance. For more information contact the North Carolina [State Veterinarian](#).
- There are several options for disposal of catastrophic bird losses depending on the situation and your location. Check with your State's Department of Agriculture or Board of Animal Health well in advance of any hurricane and know what the options are in your area. Each has advantages and disadvantages.

### Composting

- Composting is simple, is relatively inexpensive, and provides a high level of biosecurity. Composting will likely be the disposal method of choice following a hurricane because of the high-water table in many hurricane-prone areas, which prevents the use of other options such as burial. In a catastrophic loss situation, a large amount of carbon material will be needed to mix with the carcasses. If you choose composting as your disposal method, it is important to identify that carbon source now and have it on standby. Composting massive numbers of mortality losses may require the assistance of a skilled subject matter expert to monitor the process and troubleshoot any issues. Contact your State's Department of Agriculture or Board of Animal Health for guidance and assistance as needed.
- To learn more about on-site composting of animal carcasses, see the USDA APHIS [Livestock Mortality Composting Protocol](#).

## Burial

- Burial is quick but is not recommended (and may be unlawful) in coastal plain areas or other locations where the water table is high because of the risk of soil and water contamination. Have an approved burial site for catastrophic losses pre-approved by your State's Department of Agriculture. Your local Natural Resource Conservation Service (NRCS) office can assist with locating an acceptable burial site on your property based on soil type and water table properties. Burial site regulations vary by State, but it is likely that the birds are required to be buried a certain distance below the ground, a certain distance above the seasonal high-water table, and a certain distance from any wells, streams, or public bodies of water. Again, it is critical to know this information well ahead of time because things will be chaotic after the hurricane and it may be difficult to retrieve this information then. After the avian influenza outbreak in 2014-2015, some States required poultry growers to develop a catastrophic burial plan as part of their Nutrient Management Plan with the assistance of their local Natural Resources Conservation Service office. If you have developed such a plan, keep it in a safe, accessible location because you will need it if you need to bury carcasses.

## Landfill burial

- Some landfills will accept carcasses, but others will not. This option may be less environmentally risky than some other options but may also be quite expensive. Verify with the landfill ahead of time whether they accept carcasses in event of an emergency and, if so, how many and what conditions may apply.

## Incineration

- Incineration may work well for small numbers of daily mortality, but it has not proven to be very effective in a catastrophic loss situation. Most incinerators are quite small and not designed to handle large volumes of carcasses, and they are also not designed for large amounts of totally saturated birds, which would make them very inefficient. In addition, incineration can be very expensive due to higher fuel costs following a natural disaster.

## Rendering

- Rendering, the use of heat to convert carcasses into useful commercial products, may be a possibility if the following conditions apply: the rendering plant is operational after the hurricane, the birds can reach the plant in a timely manner (less than 48 hours), and there is not a lot of litter mixed in with the carcasses. However, rendering may be impractical or expensive for large numbers of carcasses. Again, call the rendering plant outside of hurricane season to learn whether rendering is an option, the maximum number of birds they accept at one time, what transportation fees would apply, and any other associated costs or restrictions.



## Emergency planning

### Farm Emergency Plan

- Have a written crisis management plan and make sure everyone knows their part should it become necessary to engage that plan. U.S. Department of Labor Occupational Safety and Health Administration (OSHA) regulations require an employer with more than 10 employees to have a printed copy of an emergency action plan readily accessible to all employees. (If you have ten employees or fewer, the emergency plan may be reviewed orally.) For more information about emergency preparedness for farm workers, see the OSHA [Agricultural Safety Fact Sheet](#).
- Consider bringing together a disaster planning team, which could consist of the farm owner and engaged family members, the farm manager, herd veterinarian, an insurance representative, county Extension agent, and other individuals.
- Create your Farm Emergency Plan. See **Appendix: Farm Emergency Plan** for a sample plan that you can customize for your operation. The plan should include a checklist of tasks necessary to secure the facilities, fuel supplies, chemical supplies, and equipment; protect any animals on site; disconnect electricity and gas service; ensure that critical supplies are well stocked; etc.
- Make sure all of your employees know the formats (electronic or hard copy) and locations where the Farm Emergency Plan is stored.
- Document procedures to account for all people and employees after an emergency evacuation.
- Consider creating a “hurricane suggestion box” where employees can place ideas for training and planning they believe would increase the operation’s resilience and safety in the face of a hurricane, based on their previous experience.

### Maps and signage

- Prepare or update maps for all facilities, including locations of alternate entry/exit routes, electrical equipment (with shut-off options), fuel storage tanks (both above and below ground), propane tanks, compressed gas (for welding, etc.), and chemical spill equipment.
- Post signs around the premises stating that trespassing is not permitted. Following a disaster, unauthorized and unwanted visitors such as onlookers, rescue agencies, or humane organizations, or persons trying to assess damage or gain information about animal care may be attempting to access your property. Agriculture authorities can assist with proper language and signage.

## Hurricane tracking apps

- Download one or more computer and mobile device applications (apps) that model hurricane track predictions, send alerts, and track hurricane impacts. Given the rapid advance of mobile technologies, check for new options each year prior to hurricane season. The NOAA National Hurricane Center [website](#) is a good source for keeping up to date on the latest hurricane activities. For more information about emergency alerts, see the U.S. DHS Ready.gov [website](#).

## Roles and responsibilities

- Designate an Emergency Response Team for your farm. Members of the team should be:
  - Thoroughly trained and physically capable of performing assigned duties
  - Knowledgeable about the hazards found on the farm
  - Trained in decision making regarding when to take actions themselves and when to wait on outside
- Define a chain of command with clearly defined primary and secondary roles and each person's responsibilities. Some individuals may not be reachable after a hurricane, so alternative levels of authority need to be established to resolve critical issues quickly. In your Farm Emergency Plan, list who will be responsible for each task and how they'll report fire, flooding, building collapses, and other emergencies. Identify procedures to be followed by the people who remain to handle critical operations.

## Communication

### Emergency Contacts List

- Develop and maintain a list of all people connected with your operation that should be contacted in an emergency. See **Appendix: Emergency Contacts List** for a template that you can customize. The Emergency contacts list should include names, phone numbers, email addresses, locations, and all other pertinent information for individuals (owners, family members, employees, employee family members), local law enforcement, fire departments, emergency medical responders, State and local agencies, contractors and suppliers, gas and electric providers, hospitals and insurance companies, poultry company representatives, feed mill personnel, State Department of Agriculture or Board of Animal Health officials, local county Extension personnel, and anyone else who is on your farm on a regular basis or provides crucial emergency services.
- The key is to always have an emergency contact list close at hand. Keep copies of your Emergency Contacts List—hard copies as well as electronic copies—in multiple locations including your home, office, and vehicle; with all family members and key employees; and in additional safe locations. It is a good idea to have this information stored on your and your employees' mobile devices.

- It is important to have developed relationships with these State and local agencies over time. If the local agencies don't know you're there, they don't know to check on you or how they could help you in an emergency.

#### Lines of communication with local businesses and officials

- Establish communication with your local law enforcement and fire departments, electricity and gas providers, and other key groups to help them understand the nature of your business so that they can respond as needed in the event of a hurricane. Let them know the number of employees typically on site, the potential impact of the hurricane on animal welfare, and the potential hazards that could lead to environmental contamination in the event of a flood or structural damage.
- Work with local emergency management to confirm a plan for getting to your farm if needed. For example, do they have a helicopter they'd be willing to take you up in to do a site assessment of your farm and birds if roads are washed out? Do they have other large utility vehicles like Humvees?

#### Post-hurricane Communications

- Since cell towers will likely be down, consider having a landline that does not require electricity to operate. Have all important contact information printed, as the internet may not be accessible.
- Purchase a battery-powered or hand-crank radio to stay up to date about conditions beyond your property in case you lose electricity for an extended period of time.
- Consider ahead of time the locations where producers and others could meet if all communication lines are down (e.g., a local feed or equipment supplier).
- Contact a local AM radio station to see whether it could serve as a communication channel in the aftermath of a hurricane.
- For more information about communicating before, during, and after a major disaster, see the [FEMA website](#).

#### Identification of evacuation sites

- Identify potential evacuation sites well in advance of hurricane season, keeping in mind that public facilities normally used for agriculture or exhibition purposes may be allocated for other purposes during a disaster situation. Collaboration with other poultry producers to provide evacuation space will help free up the usual public facilities for housing rescued animals or other uses.

## Electricity and gas

- Contact your local utility company for guidance on how to disconnect power in the event of downed lines. Know where and how to access utility cutoffs and transfer switches on the farm. Train employees to handle this and have written instructions for anyone including emergency responders to follow (and included in your Farm Emergency Plan).
- If certain equipment requires specialized shutdown procedures, train employees in these procedures.

## Equipment operation

- Train personnel in the safe operation of unfamiliar equipment (such as generators or drainage pumps) that they may have to use in case of a hurricane.
- Make sure the appropriate employees are prepared to set up your backup generators. They should refer to your Backup Power Plan for information about where generators and generator fuel can be found, where they should be placed in preparation for a hurricane, and how they are to be connected to the electrical loads they will power.

## Drones

- Consider getting an unmanned aerial vehicle (UAV) (i.e., drone) pilot license and to purchase a UAV. Small UAV quadcopters or hexacopters that can be equipped with visual or RGB cameras are relatively cheap (\$500 to more than \$2,000). Use of UAVs will help with damage assessment if accessing your operation directly is impossible or unsafe. For regulations and more information about operating a UAV, see:
  - U.S. Department of Transportation Federal Aviation Administration [Unmanned Aircraft Systems website](#)
  - University of Florida IFAS Extension [Preflight and Flight Instructions on the Use of Unmanned Aerial Vehicles \(UAVs\) for Agricultural Applications](#)

## Chemical safety

- Take the necessary steps to prevent chemical spills from storage tanks containing fuel, herbicides, pesticides or other potentially dangerous liquids.

## Basic emergency response skills

- Train all members of your Emergency Response Team in the use of various types of fire extinguishers, first aid, and CPR (cardiopulmonary resuscitation).

# Long-Term Operation Maintenance

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Periodic checks of systems already in place  
(described in the previous section)

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## Prior to hurricane season

Survey your operations to assess the potential impact that high wind or heavy rain or flooding would have on livestock and facilities, and identify any changes that should be addressed. If in doubt, contact your local Extension office and other State and Federal resources for further information specific to your circumstances.

## Annual review of emergency planning tasks

### Farm Emergency Plan review and reassessment

- Review your Farm Emergency Plan with your employees to ensure that they are familiar with all elements. Make any necessary additions or updates.
- Review your Emergency Contacts List with your employees, and update it with current names and contact information.
- Review items provided in the “hurricane suggestion box,” and add them to your Farm Emergency Plan or training list as relevant.

### Employee training

- Identify key tasks that employees will need to complete during hurricane preparation and recovery operations.
- Once each year, provide training for all employees who will participate in the key tasks identified above.

### Personal health and safety tasks

- Make sure you and your employees have up-to-date tetanus shots.
- For information and links to time-specific guidance for preparing yourself and your home, visit the Ready.gov Hurricanes [website](#).
- Download the FEMA [Mobile App](#) to learn emergency safety tips, receive real-time weather alerts and important disaster planning reminders, information about shelters and recovery centers, and more.

## Recordkeeping, documentation, and insurance

- At the time of renewal, review insurance policies with your insurance agent and update coverage as needed. Make sure you have adequate flood insurance and coverage for vehicles, farm buildings and structures, and livestock.



- Keep records of harvest, equipment inventories, and purchases of supplies up to date. Long-term records will help to establish a production baseline from which losses can be determined. Be sure that copies of each are in a safe location as described in the **Building a Resilient Operation** section above.

## Infrastructure

### Buildings and facilities

- Inspect all buildings and all facilities for structural soundness. Perform maintenance on facilities and infrastructure to repair items such as loose roofing materials or improperly/inadequately grounded electrical equipment to reduce hazard risk during a hurricane.
- Older poultry houses may not be equipped with knee braces and hurricane straps. If not, consider adding these to strengthen the building and perhaps lower your insurance premiums. Some Insurers are not renewing policies until hurricane straps and knee braces are added to structures.
- Check items that would be of importance during a hurricane: liquid petroleum (LP) tanks, grain bins, water storage.

### Drainage

- Make sure that all drainage issues have been resolved. Standing and ponding water are sources for disease vectors and should be eliminated for biosecurity purposes, and areas where ponding or standing water occur regularly during normal rain events may lead to localized or increased flooding and should be addressed.
- Clean out culverts and ditches and other drainage areas especially before and during the peak hurricane season. Keep ditches clear through a good maintenance program including chemical weed control. Regrade areas of the property that are prone to flooding to improve drainage.
- Check any new construction areas, housing developments, or Department of Transportation projects nearby to see whether they are affecting your land's drainage. Determine where the water is draining now, and address any new drainage needs before hurricane season begins.

### Maintenance of trees, windbreaks, and fences

- Be sure to trim trees and remove debris.
- Maintain windbreaks with regular pruning, especially if they are close to aerial power or telephone lines. To learn more about proper pruning practices, see:
  - Inland Urban Forest Council [A Practical Guide to Proper Pruning of Trees and Shrubs](#)
  - The OSHA Line-Clearing Tree Trimming Operations [website](#)
- Evaluate roads for any repairs or improvements that need to be made before hurricanes arrive.

## Generators

- Do routine annual maintenance on backup generators. Replace old stored fuel with new, fresh fuel. Replace fuel filters, test all generator circuits, and make sure you have all necessary supplies on hand, including spare belts and fuel filters. Drain sediment and water out of fuel tank, be sure fuel tanks are full, check that current generator batteries are fully charged, and procure portable charging units if necessary.
- Diesel tanks can accumulate condensation and or algae growth at the bottom of the tank that only becomes an issue when tanks get low or when fuel is added to tank. Mixing the sediment layer while generator is running can lead to clogged fuel filters, causing generator to shut down or be unable to maintain RPMs required to carry electrical load.
- Consider having separate generators covering half of every house. Although this is an additional expense, it provides half of each house with a different power source, allowing you to have at least half of the fans running, feed lines operating, etc. in the event of a generator failure or main breaker loss.
- Ensure that all essential equipment functions when powered by the backup generator.

## Emergency equipment and supplies

- Maintain an ample supply of emergency medical supplies, and have raincoats and boots available for employees.
- Maintain a supply of drinking water and dry and canned food sufficient for at least 2 weeks for employees who become stranded at the farm or who need to return to the farm before utility and emergency services are restored.
- Maintain an ample supply of weather-proofing supplies such as tarps and sandbags; fencing supplies; plumbing supplies; lumber, construction tools, nails, and ropes; portable lights; batteries; and battery-powered or hand-crank radios.

## Monthly considerations during hurricane season

See **Appendix: Resource Links** for local Extension offices and other State and Federal resources which you may consult for further information.

## Weather monitoring

- During the June to November hurricane season, pay regular attention to long-term weather forecasts. Check your weather tracker daily if a hurricane is forecast to move closer to your area.

## Drainage

- Pick up loose equipment that could clog up drainage areas and culverts.
- Clean out culverts and ditches and other drainage areas especially during peak hurricane season.

## Equipment and supplies

- Check list of equipment and supplies for repairs that may be needed after the hurricane.
- Note supplies that take longer to deliver and order early to ensure they are available after a hurricane. Stockpile chemicals that are essential for your operation.
- Refresh emergency medical supplies, water, and dry and canned food supplies.
- Obtain sufficient quantities of plywood to protect windows and doors and store in a dry area. As the hurricane gets closer, plywood may be scarce or unavailable.

## Farm equipment

- Contact your equipment manufacturers to establish procedures for dealing with damaged equipment. Make sure you won't invalidate your warranty if you attempt repairs yourself.

## Fuel

- Consider fuel needs for tractors, generators, and farm vehicles. Any fuel stored on site poses a contamination risk if storage tanks are not adequately protected from flooding, especially if stored at a low elevation. However, if secure storage facilities are available on site, arrange for fuel deliveries several days prior to the expected hurricane impact.

## Generators

- Verify there is adequate fuel to power generators for at least 2 weeks.

# Short-Term Preparedness

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Specific actions to be done in the week  
before a hurricane arrives

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## Bracing for the hurricane

### (1-7 days before a hurricane is forecast to strike)

The safety of your family and your own personal safety are more important than your farm or your chickens, so first and foremost, take whatever precautions necessary to protect your family, your employees, and yourself. After that is accomplished, focus on protecting your farm. Once forecasters have put your area in a hurricane's path, there are several precautions poultry growers should take to prepare for the hurricane. As a poultry grower, you should take the following steps to ensure the safety of your poultry farm.

### Employees' roles and responsibilities

- Review your Farm Emergency Plan with all employees and discuss each person's responsibilities.
- Continue to monitor hurricane track and strength updates. Listen closely for evacuation orders in your area.
- Develop a care schedule for the animals. At no time should any employee be expected to put their life in danger to care for the animals.
- Determine whether individual employees plan to evacuate or stay during the hurricane. For those who evacuate, establish a schedule for checking in after the hurricane so that they know the extent of the damages and when it is safe to return. For employees who stay, be sure they have safe lodging, sufficient food and water, and an established plan for checking in.
- Ensure that all managers know their responsibilities prior to, during, and after the hurricane. Handling the hurricane damage is too much work for 1 or 2 people.
- Ensure that personnel have training in first aid and key personnel know how to operate unfamiliar equipment (for example, a chainsaw to remove trees blocking roads).

### Communications

- Ensure that all communication equipment, including weather radio, AM/FM radio, and other devices, is in good working order. Keep mobile devices fully charged. Have rechargeable battery packs or charging cables for your

vehicle to maintain communication. Texting may be a more valuable form of communication than calling when the phone networks may be overwhelmed.

### Food, water, and cash

- Make sure your operation still has at least a 2-week supply of drinking water as well as dry and canned food.
- Have some cash on hand. Merchants without electricity at their place of business will likely be unable to process credit or debit card transactions. Don't forget to fill up your personal vehicles with gas or fuel as gas stations may be overwhelmed, not in service, or flooded.

### Recordkeeping, documentation, and insurance

- Ensure that important documents, including important legal documents, bank records, and identification documents, are in a safe, dry place and that duplicates are in alternative locations off site.
- Document the condition of your facilities and your livestock. Take photographs and video (where helpful), record forage crop maturity, and estimate yield, as this will aid with insurance claims and disaster recovery assistance.
- If you have insurance through FEMA's National Flood Insurance Program, your policy may cover up to \$1,000 in loss avoidance measures such as sandbags and water pumps to protect insured property. Check with your insurance provider to confirm. Keep copies of all receipts and a record of the time spent performing the work and submit these documents to your insurance adjuster when you file a claim to be reimbursed.

### Equipment

- Make sure farm equipment you will need after the hurricane, such as tractors with front-end loaders, skid-steer loaders, compressors, etc., is fully fueled, operational, and parked in an area you know likely won't flood. Move tractors, spreaders, and other large equipment to the highest ground nearby.
- Make sure chainsaws are in good working condition, and have on hand other tools, gloves, and safety supplies for removing and handling debris. Stock up on fuel mixture for chainsaws as well as bar and chain oil. Sharpen the chain, keep the saw file and saw wrench close at hand, and make sure you have a spare chain.
- Move all non-critical farm equipment to higher elevations or store in secure buildings.
- Move pesticides, herbicides, and fertilizers to a secure place, on high ground above any potential flooding if possible.
- Ensure that tanks containing fuel, fertilizer, and other liquids are kept full and tied down.



- Make sure that farm equipment you will need after the hurricane, such as tractors with front-end loaders or skid-steer loaders, is fully fueled and operational.
- Unplug computers and other electronic equipment to protect from electrical surges and store these items safely.

## Infrastructure

### Backup generators

- Be sure your backup generators are fully operational, with full fuel tanks and portable fuel storage tanks. Your generators may have to run for several days until the power company can restore electricity. Review the owner's manual for the maximum run time and other unit specifics.

### Fuel

- Make sure you have a minimum of a 2-week supply of diesel and gas. Running out of fuel for the generator is one of the greatest threats if the farm cannot be reached for several days.
- Service stations will not be able to supply fuel if they do not have electric power for the pumps, so make sure portable fuel storage tanks are full.
- Any fuel stored on site poses a contamination risk if storage tanks cannot be adequately protected from anticipated flooding. Move them to higher ground or secure in place.

### Electricity and gas shut-off

- Consult your Farm Emergency Plan and follow procedures for disconnecting electrical power and gas to some or all buildings and any non-critical equipment in danger of being flooded.
- Do not shut off the power to poultry houses. Without ventilation, your birds will likely die in about 15 minutes.

### Buildings and grounds

- Secure building components—Check on the security of roofing and siding materials and windows and doors, and make sure all other building components are tied down securely.
- Secure outdoor objects—Secure outside objects around your farm—signage, feeder lids stacked outside, tools, etc.—so that they don't blow away or become hazardous projectiles. Anchor into place all water (tanks / wells), feed, and propane tanks as they can be blown around in high winds and float away during flooding.

### Roads

- If the roads leading to the farm are likely to flood, stage your boat in a secure, easy-to-access location.

### Drainage

- Make sure drainage ditches and culverts around your chicken houses are free of debris and can carry away the maximum amount of water from near your houses.
- Pump down all water from ditches to the maximum extent possible.

### Supplies

- Review inventories and order any additional supplies that can be delivered before the hurricane.
- Contact your poultry company if you think you will need any additional medical supplies.

### Poultry concerns

#### Poultry feed

- Make sure you have enough feed and water to last at least 2 weeks. Running out of feed for the birds is one of the greatest threats if the farm cannot be reached for several days.
- Check your feed inventory yourself and call the feed mill if you are low to schedule a delivery ahead of the hurricane. Do not depend on someone else to do this, as your service tech and feed mill personnel will likely have their hands full.

#### Poultry houses

- Check poultry houses and make sure that everything is tied down, doors are well sealed, and curtains are not flapping.
- If poultry house flooding is imminent, raise equipment if possible: If your houses do flood, not having your equipment raised makes clean up much more difficult. For example, cables snap when trying to lift equipment out of muck after flooding and feed pans can be full of wet litter.
- Move brooding chicks to the highest end of the house, if possible.

#### Adjustments to poultry management

- Birds may have to be held on the farm longer than expected if flooding prevents live haul trucks from reaching the farm or processing plants are unable to operate. Expect disruptions to your normal routine and plan accordingly.
- Talk with your integrator to see whether chick placement can be delayed or whether your larger birds can go out a few days early. Discuss what previous issues have been (for example, flooding, prolonged power outages, being unable to access farm because of road closures, loss or unsafe water supply) and how you can mitigate them on your farm. Many of these steps will be based on what your integrator will allow from their standpoint of owning the birds.

- If the above does not work for their management timeline, move the birds to another part of the farm, if possible, or to another farm for the duration of the hurricane and its aftermath.

#### Mass mortality plan

- Review your mass mortality plan so that it is fresh in your mind. Note that your State's Department of Agriculture takes the lead on this, and they will need to be contacted immediately if you have bird loss due to the hurricane.

### **Personal safety the day before the hurricane hits**

- Perform a final verification of the hurricane track and strength. Listen closely for evacuation orders for your area.
- Obey all mandatory evacuation orders. Failure to do so, can put you and your workers at risk, and could tie-up rescue resources. Do not require your personnel to be present on the farm either, since they also have to prepare themselves and their families.
- Make sure your employees have evacuated to secure areas at least 1 day prior to hurricane impact. If some staff will remain on site, confirm that they have access to structures on high ground or elevated slabs or pylons that can withstand hurricane winds and rain, sufficient stores of clean water and food, medical supplies, working radios or cell phones, and sufficient battery or generator power. Those workers remaining on site will likely need to rely on mobile device communication with evacuated supervisors and colleagues, since local radio and television communications often black out for several hours as a hurricane passes. Local first responders may also be out of communication at the time of hurricane impact.
- Personnel remaining on site to monitor the farm until the last moment should keep an eye on water levels in low-lying areas so that they may give sufficient warning and allow workers to exit the operation before levees, surrounding roads, and highways are blocked with floodwaters.

# Post-Hurricane Recovery

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Activities that can be taken to minimize losses immediately after, a week after, and a month after a hurricane

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## Immediately after the hurricane has passed

### Safety

- Make safety your first priority. Chicken houses and chickens can be replaced, but you, your family, and your employees cannot. Never take unnecessary risks! Never enter collapsed or damaged chicken houses until their structural integrity can be verified. Use extreme caution due to the unsafe conditions presented by weakened trees and damaged structures, equipment, and electrical and gas systems. Be wary of downed power lines, especially downed power lines in standing water.
- While it is essential to have your farm emergency plan in place, it is just as important to remain flexible and be able to rapidly adjust as conditions change to meet the unique situations associated with each natural disaster.
- Continue to watch the weather forecast. Are waters still forecast to rise more than they are now? Some floodwaters peak up to a week after the hurricane.
- Can you safely access your farm? If so, after checking for downed power lines, check house conditions (intact, damaged, destroyed), flock conditions (alive, flooded, drowned), status of feed and water lines, building ventilation, LP tanks, and generators.
- What is the status of your birds? Are they still alive? If so, your focus is on feed, water, ventilation, and keeping them dry.

### Electricity and gas

- Avoid downed power lines, as these may still be live and represent an electrocution hazard. Operate on the assumption that all downed power lines are live. Remember that a downed power line on a fence may energize the fence.
- When restoring electricity to buildings that have flooded, use extreme caution and consult with an electrician and your power provider. See the Alabama Cooperative Extension System guidance on [restoring electrical power after flooding](#).
- Natural gas or liquefied petroleum (LP) gas leaks can cause deadly explosions. Check for natural gas or LP gas leaks, and if a leak is suspected, turn off the gas,

evacuate the area, and notify your gas company and local law enforcement. Tell employees to stay clear.

### Groundwater

- After a flood event, groundwater should be used with caution if contamination is suspected anywhere in the general vicinity.

### Roads and buildings

- Clear roadways. If trees are down blocking roadways after the hurricane, carefully clear debris and make roadways around poultry houses accessible to vehicles (feed, chick delivery, and live haul trucks) as soon as it is safe to do so. Avoid downed power lines in or near roadways as these may still be live and represent an electrocution hazard. Treat all downed power lines as live.
- Before entering any buildings, check for levee breaches, rising or incoming water, and evidence of structural fire or damage.
- As soon as it is safe, call in the employees needed for inspection and clearing debris from roads. Cordon off areas that are unsafe.

### Security

- Watch your farm for unwelcome visitors like looters. Secure your equipment and farm entrances, and make sure your security cameras are operational.

### Communication

- Contract producers should stay in constant contact with their service tech or poultry company representative. Feed mills and processing plants could be flooded or without power and unable to operate, disrupting normal operations.

### Recordkeeping, documentation, and insurance

- Do not begin cleaning up or repairing damage until you have thoroughly documented the damage. Contact your insurance adjuster as soon as possible to decide on the best plan moving forward with potential damage to your farm. (See “Within a week following hurricane impacts” below regarding post-hurricane documentation.)
- If you have experienced flooding and have flood insurance through the FEMA National Flood Insurance Program, visit their [website](#) for information about starting a claim.

### Poultry mortality

- If there has been significant mortality, document the numbers and follow the procedures outlined in your Farm Emergency Plan for the disposal of the carcasses, according to your State’s regulations. (Refer to the **Building a Resilient Operation** section for details and links to the relevant State office.)

## Within a week following hurricane impacts

### Personal health and safety

- Take care of yourself during recovery. Disasters and the recovery period afterward take a toll on human health. Disaster recovery takes a long time and can be very stressful. For guidance to help you through this difficult time, see:
  - Colorado State University Extension’s [Coping with Natural Disasters](#)
  - North Carolina State University Extension’s [Tips for Handling Family Stress After Disasters](#)
- If you have been in contact with flood waters, you and others may require a tetanus shot.

### Communications

- The local supply/seed stores are often natural sources of information if the power is down and electronic communication is limited. In addition, radio stations have generators that allow them to transmit if their towers are not damaged.

### Recovery assistance

- Before beginning cleanup, talk with your insurance company and consult with disaster assistance program agents to learn about available programs, eligibility requirements, and application procedures (see “Disaster assistance” below for more information about assistance programs).

### Documentation of damage

- Many disaster assistance programs will become available after the disaster, perhaps even years later, and an operation can only receive assistance for damage that was documented. For instance, the [Emergency Conservation Program \(ECP\)](#), administered by the FSA can compensate farmers for repairing damage due to a natural disaster or severe drought which would create new conservation problems. The work must be documented, and farmers must have received authorization from their local USDA office in advance.

#### *Photos and video*

- Document everything. Take photos or video first before beginning any cleanup or repairs. Photograph and take video of damage, with written notes describing what is in the pictures and where they were taken. This “after” documentation will be used with your pre-hurricane, “before” documentation to clearly show your losses. Log the hours you and others work.
- Document all losses both inside and outside the poultry houses (making sure to never enter a poultry house or any other building that is structurally unsound and at risk of collapse). In addition to taking photographs of damage, write down details such as the number of birds lost per house and the total number of

carcasses that need to be disposed. Keep a logbook of the number of hours spent by yourself and others that may assist you and keep any receipts for work done on your behalf. You will need all this information when the time comes to apply for assistance programs such as the Livestock Indemnity Program and others that can help recover some of your losses.

#### *Drones*

- If you own and have a license to operate a UAV (i.e., drone), utilize it now to take aerial photographs of damage to your operation.

#### *Written records*

- Keep a notebook with you throughout the recovery period. Describe the work you did and record all expenses. Keep a running log of names and what was discussed during conversations with insurance, State, and Federal agency contacts to create a valuable, third-party record of your recovery efforts that can be used later as documentation for disaster assistance programs. You may not remember everything that was discussed at these meetings, so have a second person involved in the conversations if possible so that one can ask questions and the other can take notes.

#### Disaster assistance

- Communicate early and often with recovery assistance contacts. Check in with them throughout the recovery process. Note that assistance will vary from one hurricane to the next and one budget year to the next.
- Call your local FSA Office to report any losses or damages and inquire about available assistance programs, application procedures, and deadlines.
- Check in with your local Cooperative Extension office, USDA agencies, and your State department of agriculture to see what assistance may be available following the hurricane.
- Consult the following resources:
  - FEMA Individual Disaster Assistance website to find the closest recovery center and other resources to assist you during your recovery
  - USDA Disaster Resource Center's Storms website for updates on emergency designation areas and available assistance programs
  - Farmers.gov, including the five-step Disaster Assistance Discovery Tool to learn which USDA disaster assistance programs are available to assist you with your recovery
  - U.S. Department of Labor's Disaster Unemployment Assistance Program website
- To learn more about USDA Disaster Assistance Programs that may be right for you, see:
  - Livestock Indemnity Program (LIP)—FSA program for eligible livestock owners and contract growers who experience above-normal livestock deaths due to specific weather events as well as disease. To receive benefits, producers



- must file a “notice of loss” within 30 days of livestock death or injury and submit an application for payment within 60 days after the calendar year in which the loss condition occurred.
- Emergency Assistance for Livestock, Honey Bees, and Farm-raised Fish Program (ELAP)—FSA program that provides payments to qualifying producers to help compensate for losses
  - Emergency Farm Loans—FSA program that provides eligible farmers and ranchers low-interest loans to help them recover from production and physical losses
  - Disaster Set-Aside Program—FSA program that allows eligible FSA borrowers to skip an annual installment payment and move it to the end of the loan repayment period
  - Emergency Watershed Protection (EWP) Recovery Assistance—USDA Natural Resources Conservation Service (NRCS) program that provides financial and technical assistance to quickly address serious and long-lasting damage to infrastructure and land
  - EWP Floodplain Easement Program (EWPP-FPE)—NRCS program option for converting land to permanent easements for the purpose of improving floodplain management and reducing the threat to life and property
  - Environmental Quality Incentives Program (EQIP)—Year-round NRCS rehabilitation program with funding authority to provide financial assistance to repair and prevent excessive soil erosion caused or impacted by natural disasters
  - Emergency Conservation Program (ECP)—FSA program with technical assistance through NRCS that helps eligible farmers and ranchers repair damage to farmlands caused by natural disasters

## Poultry

### Assessment and reporting of damage to poultry houses and flock

- When safe to do so after the hurricane, assess the damage to your farm and flock and notify your poultry company representative with a damage report.
- Be as specific as possible:
  - How many houses were affected, how many birds were lost?
  - Is the power on or off?
  - How are generator fuel levels, are roads passable?
  - Are houses flooded with water inside?
  - Is the backup generator functioning?
  - Is there feed available if the birds are still alive?
  - What is the house damage (flooding, wind damage, house destroyed)?
  - Are live birds trapped in destroyed houses?
- Service technicians and poultry company representatives should check with all their growers to assess damages on farms. This information should be relayed to

feed mills and processing plants that are still operational to determine the best course of action.

- Feed mills, hatcheries, and processing plants should coordinate with live production personnel on how best to proceed after the hurricane.

### Report losses

- As soon as you know the extent of the damage, contact the following people and offices:
  - Call your local FSA Office to report any losses or damages.
  - Contact your service technician, complex manager, and a poultry company representative to let them know a reasonable estimation of your losses. Depending on the extent of the wind damage and flooding, it may be days before anyone from your poultry company can get to you. However, knowing the extent of the damage and losses as soon as possible will be critical to coordinating efforts associated with feed deliveries, chick deliveries, and live haul scheduling of flocks nearing harvest age.
  - Contact the
  - North Carolina Department of Agriculture and Consumer Services Veterinarian Division to report losses and get guidance on poultry disposal.
- If you have chickens that are trapped inside collapsed poultry houses that may have to be euthanized, notify your poultry company and/or your State's Department of Agriculture or Board of Animal Health.
- Euthanizing large numbers of birds is usually done with firefighting foam or carbon dioxide and requires special equipment and specially trained personnel. Some states have the equipment to do so or can borrow equipment from a neighboring state. The process can be expedited, and unnecessary confusion avoided, if you learn your options for euthanization before the hurricane impacts your facility

### Dispose of carcasses

- If you plan to compost your birds (note that your plan must have been approved ahead of time, as noted in the **Building a Resilient Operation** section above), the State's Department of Agriculture will be your contact for that process. They may help source your shavings (carbon source) as well as send subject matter experts out to your farm to help you establish and monitor your compost piles.
- If you utilize on-site burial (which also has to be pre-approved), keep a record of the site and the burial history (how many birds, age, type (broilers, breeders, pullets), date, soil type, permit number from the State, coverage depth, and any other records required by the State.

### Flood damage to houses

- Dry houses out as soon as possible if they were flooded. Watch out for rising ammonia levels and other gases in your houses, which can reach toxic levels. Always take someone with you in houses that have flooded and are still flooded and/or have dead birds, for safety.

### Feed

- Check feed for mold. If it was flooded, order more if trucks are able to access your farm.

### Supply Chain Disruptions

- Chick and feed deliveries and live haul scheduling is done by the poultry company. If the company is damaged, this will impact your operation and could threaten the life of the flock. Stay in constant contact with our poultry company as decisions must be made by the company and relayed to you.

### Pests and insects

- Watch for insects, such as fire ants, as well as displaced wildlife. Rodents can cause a problem in your poultry houses, feed, feed lines, etc. and will be more prevalent after a hurricane and flooding.

### Back-up power

- Continue to be careful of electricity. Make sure your LP tanks and generators are functioning well.
- If operating on generator power, monitor poultry house conditions frequently until electricity is restored. Make sure equipment such as feeders, well pumps, fans, lights, etc. continues to operate properly.

### Insurance claims process

- Begin the insurance claims process (Federal, private, or both). Accurate losses of inventory and equipment may not be fully documented yet, but insurance claims can take months to resolve following hurricane events, so start the paperwork now

### Infrastructure assessment and repairs

- Assess damage to equipment and infrastructure and form a prioritized list of needed repairs.
- Gather quotes from qualified vendors to make repairs to facilities and equipment. Vendors are often overwhelmed in the months following a hurricane, so making contact soon after the hurricane is important for an expedient response.
- Monitor fuel levels in backup generators and order additional fuel as needed.

## Floodwater contamination

- “Floodwater” refers to the overflow of external sources of water such as rivers or canals and not to direct precipitation that may pool in or near your fields or facilities.

### Water supply

- All water should be tested prior to use for drinking, cleaning food contact surfaces or produce, or for production activities. Ground water sources should be submitted for microbial and chemical testing, regardless of whether the wellhead was flooded, to ensure that the aquifer was not contaminated and to monitor wells for coliform contamination. This is particularly critical for drinking water and water that will come into contact with food. Some growers on municipal water systems, particularly those a substantial distance from the distribution center, may be advised to submit a microbial water test (after boil water advisories are no longer in effect) to verify the integrity of the distribution line to their farm or operation. If a surface water source was flooded, water should undergo microbial and chemical testing prior to reuse for production activities. If microbial levels exceed acceptable levels, a water treatment system (e.g., ultraviolet [UV] light, peroxyacetic acid) may need to be used until subsequent tests indicate the levels have stabilized.
- If you have a well, regardless of whether the wellhead was flooded, submit groundwater samples for microbial and chemical testing to ensure that the aquifer was not contaminated. Also monitor wells for coliform contamination.

## Within a month after hurricane impacts

### Recovery assistance and insurance claims

- After many natural disasters that result in widespread damage, additional programs often become available to aid with agricultural losses. These programs are not guaranteed, however, and are generally handled on a case-by-case basis depending on the hurricane’s impact. In addition, some programs require additional processing time for a special appropriation from the U.S. Congress and Presidential approval.
- While a special allocation may not be immediately available, it is important to document losses and to illustrate to your legislators the impact of the hurricane on your operation. This information will help promote policy decisions and additional allocations that may become available.
- Stay in touch with your local FSA office throughout the recovery process.
- Continue to follow up on the insurance claims process. Begin filing for any additional State or Federal disaster assistance programs for hurricane recovery.

- Visit the USDA Disaster Resource Center Storms [website](#) for updated information about FEMA aid and other disaster programs.
- Continue to document everything and keep a record of conversations with agency contacts. This creates a valuable, third-party record of your recovery efforts that may be used later as documentation for assistance programs.

#### Damage to litter sheds

- If your farm suffered damage to litter sheds, contact your local NRCS office as soon as possible to see if you are eligible for the following programs.
  - If the original structure was built through NRCS, then the ECP may be the best fit for structural repairs. For a total rebuild of the structure, the EQIP may be a better fit.
  - If the structure was not originally constructed through NRCS, then it may not be eligible for either ECP or EQIP unless it requires a complete tear down and re-build, in which case EQIP may be a good fit. Check with your local NRCS office for eligibility.

#### Organic certification

- If your farm is organic, it is important to consider how the hurricane impacts may affect your certification. Temporary variances from some organic practices are possible, so contact your certifier to determine whether your practices qualify. It is most important to report prohibited substances that may have infiltrated your farm during the hurricane.

#### Infrastructure and equipment

- Continue to check for any structural or equipment damages or losses and document each incident when discovered. Check feed storage bins for any damage or leaks that may have developed, and repair as needed.
- Continue to gather quotes from qualified vendors to make repairs to facilities and equipment. Vendors are often overwhelmed in the months following a hurricane, so making contact soon after the hurricane is important for an expedient response.
- Monitor buildings for water damage or mold development, and monitor wells for coliform bacteria.
- Continue to refill fuel tanks and check backup generators until full power is restored.
- Perform general and preventative maintenance on any equipment that was flooded. Keep all receipts for parts and labor as well as a list of any equipment that is determined to be a total loss.
- Examine drainage ditches and canals to determine to what extent they were silted in by floodwaters and need repair and cleaning of debris. Clean and/or repair drainage ditches if necessary.

### Inspections of poultry houses

- Always take someone with you when entering houses that have flooded, or are still flooded and have dead birds, as ammonia levels can be high and reach toxic levels. Dry out livestock houses as soon as possible if they were flooded and monitor ammonia levels and other gases.

## Appendix

# Farm Emergency Plan

Hurricane preparedness can have a direct effect on your farm's profitability and long-term survival. For agricultural operations in hurricane-vulnerable regions, it is critical to have a Farm Emergency Plan in place outlining key tasks and different people's roles and responsibilities as you brace for the hurricane. Your Farm Emergency Plan can save valuable time in a chaotic situation when multiple challenges clamor for immediate attention, helping you prioritize your actions and recover from the hurricane as efficiently as possible.

Use this sample plan to customize for your operation. Preparation for these tasks—putting the systems in place—is described in the main guide (see “Emergency planning and creation of Farm Emergency Plan” in the **Building a Resilient Operation** section). Though there is some overlap with the tasks listed in the **Short-Term Preparedness** section, this sample plan is intended to be a document you can use during an actual emergency.

## Before the hurricane

### Tracking the hurricane

- Use your storm tracking app. The NOAA National Hurricane Center [website](#) is a good source for keeping up to date on the latest hurricane activities. Learn more about emergency alerts at the U.S. DHS Ready.gov [website](#).

### Emergency Response Team

- Gather the members of your farm's Emergency Response Team, who have been thoroughly trained in their respective tasks and are knowledgeable about the hazards found on the farm.
- Review the chain of command and individuals' primary and secondary roles and responsibilities.
- Discuss modes of communication as well as alternatives in case any communication channels become unusable during or after the storm.
- Review your farm's Emergency Contacts List.



## Employees' status and location

- Review procedures to account for all people and employees after an emergency evacuation. Determine who will evacuate and who (if anyone) will stay during the storm. For those who evacuate, establish a schedule for checking in after the storm. For those who stay, be sure they have safe lodging and sufficient food and water and establish a clear plan for them to check in.

## Maps and emergency escape routes

- Using the map of your farm with all buildings and contents, review emergency escape routes and hurricane preparation procedures for each building, facility, and area of the operation.

## Emergency equipment and supplies

Locate the following equipment and supplies:

- Emergency medical supplies
- Raincoats and boots
- Weather-proofing supplies such as tarps and sandbags
- Fencing supplies
- Plumbing supplies
- Lumber, construction tools, nails, and ropes
- Portable lights, batteries, and battery-powered or hand-crank radios

## Food, water, and cash

- Make sure there is at least a 2-week supply of dry and canned food and drinking water (at least  $\frac{1}{2}$  gallon per person per day) stored on site if personnel will be staying on site.
- Secure cash reserves to use for purchasing supplies after the storm.

## Facility security

- Ensure that important documents are in a safe, dry place.
- Check on the security of roofing and siding materials and windows and doors, and make sure all other building components are tied down securely.
- Secure outside objects around your farm, so that they don't blow away or become hazardous projectiles.
- If there is a perimeter gate to the facility, close it to ensure that any animals that get loose during the storm are contained within the center area (e.g., pens, pasture).
- Protect greenhouses [if applicable].

- Check drainage ditches and culverts around your facilities for debris.
- Pump down all water from ditches.

## Equipment

- Ensure that all emergency equipment is ready (chainsaws, compressors, heavy machinery, etc.).
- Move all non-critical farm equipment to higher elevations or store in secure buildings.
- Move pesticides, herbicides, and fertilizers to a secure place, on high ground if possible.
- Make sure that farm equipment you will need after the storm, such as tractors with front-end loaders or skid-steer loaders, is fully fueled.
- Be sure your backup generator(s) are fully operational. Fill the fuel tank(s) and portable fuel storage tanks.

## Fuel

- Make sure you have a minimum of a 2-week supply of diesel and gas. Be sure the supplier understands how much you use daily and that it is necessary for farm operations. If secure storage facilities are available on site, arrange for fuel deliveries several days prior to the expected storm impact. Consider fuel needs for tractors, generators, and farm vehicles.
- Any fuel stored on site poses a contamination risk if storage tanks cannot be adequately protected from anticipated flooding. Move to higher ground or secure in place.
- Since fuel may be unavailable if service stations have no power, make sure portable fuel storage tanks are full.
- Ensure that tanks containing fuel, fertilizer, and other liquids are kept full and are tied down.

## Backup generators

- Retrieve backup generators and fuel and place them where needed.
- Connect generators to critical electrical loads as outlined in your Backup Power Plan.

## Electricity and gas shutdown

- [Outline the shutdown procedures for electricity and gas, according to instructions you are given by your utilities and other experts.]
- [Outline the shutdown procedures for specific equipment.]

Service or equipment to be shut down	Procedures for shutdown

## Forage Crop

- [Add actions specific to your crop.]

## Animal care

- Develop a care schedule for the animals, making sure that your employees' safety comes first.
- Check your feed inventory and schedule a delivery from the feed mill ahead of the hurricane if necessary.

# Immediately after the hurricane

## Safety

- Make safety your first priority. Do not rush back into a facility until you are sure it is safe. Use extreme caution due to the potentially injurious situations presented by weakened trees and damaged structures, equipment, and electrical and gas systems.
- Continue to watch the weather forecast. Are waters still forecast to rise more than they are now? Some floodwaters peak up to a week after the hurricane.

## Electricity and gas

- Avoid downed power lines, as these may still be live and represent an electrocution hazard. Operate on the assumption that all downed power lines are live. Remember that a downed power line on a fence may energize the fence.
- When restoring electricity to buildings that have flooded, use extreme caution and consult with an electrician and your power provider. See the Alabama Cooperative Extension System guidance on [restoring electrical power after flooding](#).

- Natural gas or liquid petroleum (LP) gas leaks can cause deadly explosions. Check for natural gas or LP gas leaks, and if a leak is suspected, turn off the main property gas line, evacuate the area, and notify your gas company and the authorities. Tell employees to stay clear.

## Roads and buildings

- Before entering any buildings, check for levee breaches, rising or incoming water, and evidence of structural fire or damage.
- As soon as it is safe, call in the employees needed for inspection and clearing debris from roads.
- Cordon off areas that are unsafe.

## Security

- Watch your farm for unwelcome visitors like looters. Secure your equipment and farm entrances, and make sure your security cameras are operational.

## Insurance and documentation

- Do not begin cleaning up or repairing damage until you have thoroughly documented the damage. Contact your insurance adjuster as soon as possible to decide on the best plan for moving forward with potential damage assessment, cleanup, and repair.
- If you have experienced flooding and have flood insurance through the FEMA National Flood Insurance Program, visit their [website](#) to learn how to start a claim.

# Initial Site Planning

Considerations when deciding on a new location to establish or purchase a poultry farm

The National Oceanic and Atmospheric Administration (NOAA) developed a map for illustrating the probability that an area of the country will be hit by multiple hurricanes, expressed as the number of years between hurricanes (known as the return period, Figure A1). While no model can determine when and where hurricanes will strike during any given hurricane season, the map below is a good indication or relative hurricane risk.

It is important to remember that this map represents a long-term average and that even if the average return rate for a hurricane is 25 years, hurricanes could still occur at one spot on successive years or even in the same year. It is also important to understand that while most data show only where hurricanes have made landfall, hurricanes can also move hundreds of miles inland causing significant wind damage and flooding.

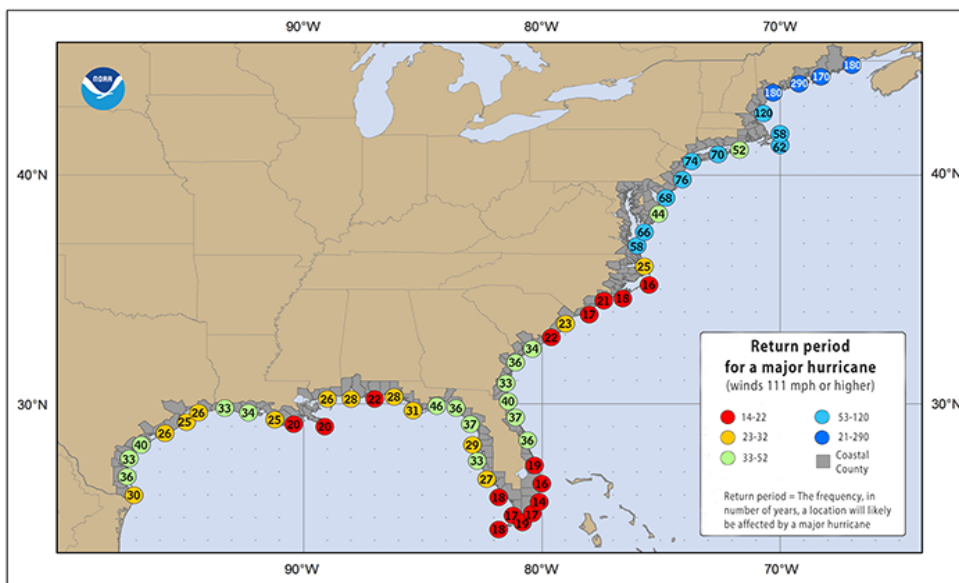


Figure A1. Return period (years) for major hurricanes for the coastal Eastern United States. Graphic provided by the National Oceanographic and Atmospheric Administration (NOAA).

Use NOAA's [Historical Hurricane Tracks tool](#) for a map and dates of hurricanes that have impacted your area in the past 150 years. The timing and track of historic hurricanes may be different than those for future hurricanes and should be used with caution.

## Site characteristics

### Topography

- When planning for long-term preparedness, evaluate a potential site for your operations with an eye toward reducing the risk of surface flooding or coastal storm surge. It is unlikely that all risks can be avoided. However, the negative considerations of an elevated open site are often less than those of low-lying areas susceptible to flooding.
- If you are in a flood prone area, look for higher ground. Land should be gently sloping with adequate drainage. If possible, choose a site that has higher-elevation areas so that farm equipment can be easily moved to avoid flooding. However, avoid areas that are too steep or hilly as this will require additional dirt work when constructing poultry house pads.

### Flood risk and storm surge

- Assess historic and predictable patterns of flooding to determine which areas are at the highest risk of damage during extreme weather.
- Consult the following Federal and State-level resources for estimating flood risk:
  - U.S. Department of Homeland Security Federal Emergency Management Agency (FEMA) [Flood Map Service Center](#)—for official flood maps
  - North Carolina Flood Risk Information System [website](#)
- Determine proximity to bodies of water at risk for storm surge. In some areas, storm surge can cause flooding many miles inland from the coast. View the NOAA [National Storm Surge Hazard Map](#) to assess your risk and plan a safe evacuation route.

### Roads and utilities

- Choose a site with good roads that will allow multiple escape routes when evacuating from hurricanes and tropical storms that can cause rising flood waters, storm surge, or downed trees. Look for a site with proximity to major highways and access roads having minimal river, stream, or floodplain crossings, as this will help maintain normal access and hasten your operation's return to normal access during hurricanes.
- Search for areas with resilient electrical grids. Avoid relatively isolated sites with limited access to electrical utilities. Plan to have utilities and other critical infrastructure permanently constructed on higher ground to avoid equipment and infrastructure damage during flooding.
- If possible, locate utilities underground, or keep right of ways clear of trees, shrubs, and equipment to decrease risk of damage and hasten repairs.

### Proximity to feed mills and processing plants

- The farther away a farm is from feed mills and processing plants, the greater the obstacles you may have to deal with during a hurricane. Roads between the farm and these points may be washed out or blocked by debris, preventing feed deliveries or moving birds to market.

### Natural windbreaks

- If possible, choose a site with natural windbreaks, such as wooded areas surrounding the field.



# Emergency Contacts List

You may customize this for your operation. Delete items that do not pertain to your commodity or location and add companies or organizations specific to your commodity.

## Individuals

Name(s)	Role(s)	Phone number(s)	Notes
	Owner(s)		
	Members of the Emergency Response Team		
	Other key employees or managers		

## Emergency Services

Organization	Name(s)	Phone number(s)	Notes
Emergency medical responders			
Hospitals			
Fire department			
Sheriff's office			
Emergency management agency			
Veterinarian			

### Utilities, Roads, and Trees

Organization	Name(s)	Phone number(s)	Notes
Electric utility or cooperative			
Natural gas utility			
Water utility			
County road department or State Department of Transportation			

### Insurance Companies

Organization	Name(s)	Phone number(s)	Notes
Commodity insurance companies			

### Contractors

Organization	Name(s)	Phone number(s)	Notes
Electrical contractor			
Plumbing contractor			
Mechanic			
Fuel supplier			
Generator servicing			
Equipment dealer			
Equipment rental company (emergency generators, lifts, etc.)			

### Federal, State, and County Organizations

<b>Organization</b>	<b>Name(s)</b>	<b>Phone number(s)</b>	<b>Notes</b>
State Department of Agriculture			
State Board of Animal Health			
County/university Extension office			
County emergency management agency			
County Health Department			
USDA Farm Service Agency			
USDA Natural Resources Conservation Service (NRCS)			
U.S. Department of Homeland Security Federal Emergency Management Agency (FEMA)			
State Department of Agriculture or agency responsible for permits and inspection			

# Resource Links

## North Carolina Resource Links

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University Extension, State, and Federal websites

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University Extension Websites	Purpose
<u>Poultry*</u>	Resources to help poultry farmers improve management and productivity
<u>Extension Office Locator*</u>	Contact information for university Extension Agents in your county
<u>Disaster Information Center*</u>	Resources to help prepare animals for hurricanes and other disasters
<u>Extension Disaster Education Network (EDEN)</u>	Information and program resources to help with hurricane preparedness and recovery

\* North Carolina Cooperative Extension

State Websites	Purpose
North Carolina <u>Governor’s Office</u>	News and information from the Governor, including evacuation orders and emergency declarations
North Carolina Department of Agriculture and Consumer Services (NCDA&CS)	Main source for answers to your agricultural-related questions
<u>NCDA&amp;CS Veterinary Division – Poultry Animal Health Programs</u>	Main source for answers to your animal health-related questions
North Carolina <u>Division of Emergency Management</u>	News and resources to help you prepare for, respond to and recover from emergencies, including hurricanes

## APPENDIX: Resource Links

Federal Websites	Purpose
United States Department of Agriculture ( <a href="#">USDA</a> )	News and announcements related to agricultural commodities and disaster recovery programs
<a href="#">USDA Disaster Resource Center</a>	Resources to help you build long-term resilience to and recover from hurricanes and other disasters
<a href="#">USDA Office Locator</a>	Contact information for USDA offices in your county, including FSA, NRCS, Rural Development, and Conservation Districts
<a href="#">USDA Farm Service Agency (FSA)</a>	Assistance with securing loans, receiving payments, and applying for disaster relief programs
<a href="#">USDA FSA North Carolina</a>	Focus on State FSA resources, including financial and technical information sharing
<a href="#">USDA Natural Resources Conservation Service (NRCS)</a>	Financial and technical assistance for farmers, ranchers and forest landowners
<a href="#">USDA NRCS North Carolina</a>	Focus on State NRCS resources, including financial and technical information sharing
<a href="#">USDA Risk Management Agency (RMA)</a>	Assistance with Federal Crop Insurance and managing risk
<a href="#">USDA RMA Agent Locator</a>	Contact information for local RMA offices in your county
<a href="#">US Department of Homeland Security Federal Emergency Management Agency (FEMA)</a>	News and information to help you prepare for and recover from hurricanes and other disasters
<a href="#">US Department of Homeland Security Hurricane Preparedness</a>	Resources to help individuals prepare for and recover from hurricanes
<a href="#">US Department of Commerce National Oceanic and Atmospheric Administration (NOAA)</a>	Resources to view historical, current and predicted hurricane activity and warnings in your areas
<a href="#">NOAA National Hurricane Center</a>	Current and forecasted tropical cyclone activity, educational resources, and advisory warnings for your area of interest
<a href="#">NOAA National Weather Service Weather-Ready Nation</a>	Latest news, information and technology to enable informed decision-making before, during, and after a hurricane strikes

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**USDA Southeast Climate Hub**

<https://www.climatehubs.usda.gov/hubs/southeast/>

To access this guide, as well as those produced  
for other commodities, please visit:

<https://www.climatehubs.usda.gov/hubs/southeast/topics/>



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