# Readiness

## Best Management Practices for Municipalities

N.C. Forest Service Urban and Community Forestry

PROTECTION SERIES

BEST MANAGEMENT PRACTICES

**Are you prepared to respond and recover from a tree-damaging storm event? Storms come in all sizes. Some are wide scale disasters like hurricanes or ice storms. Most, however, are smaller, less damaging storms that can still be equally devastating to a community. To be prepared for any storm event, you need to know the required tasks, resources that will be needed and the organizational structure in place to facilitate an efficient and effective response and recovery.**

We call this process "readiness," the first in a series of three best management practices guidance documents for municipalities (readiness, response and recovery) focusing on the management of tree-damaging storm events.

Disaster management planners divide planning into four phases: mitigation, preparedness, response and recovery. Readiness includes the mitigation and preparedness phases.

- **Mitigation** – *action you can take to reduce tree damage that results from storm events*
- **Preparedness** – *action you can take to prepare for storm response and recovery*

The Incident Command System (ICS) is an organizational structure for the management of emergency incidents in the U.S. including North Carolina. This structure groups tasks to be completed and the resources required to complete each task into areas of responsibility (Figure 1).

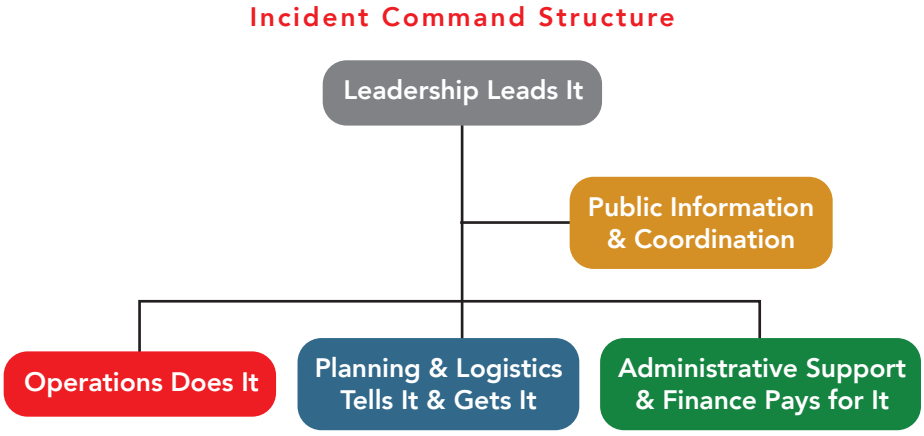



FIGURE 1

This system is designed to expand and contract depending on the scale of an event. All task areas must be completed regardless of an event's size, but as the scale of an event grows, task areas are divided into groups consisting of staff and resources with expertise in these areas to manage the response to the event. The system is also modular. This group of staff and resources becomes a response team that can be inserted under a larger incident command structure.

We will use the incident command system structure as a framework for organizing and guiding you through a readiness decision and action step process. At the end of this process, your community should be prepared to respond and recover from any tree-damaging storm event.

**Resources: Incident Command System**

- County Emergency Management Agencies
- N.C. Department of Public Safety Emergency Management – www.ncdps.gov

## 1. Leadership

**Objective:** Identify the individuals and resources needed to build your urban forestry response team.

What specific tasks, areas of expertise and resources are needed to manage your urban forest and respond to a tree-damaging event? Figure 2 illustrates and lists the expertise needed as well as the tasks to be completed by task area. Have your team secured by the end of this readiness planning process.

Select municipal staff and resources with the skills and abilities needed to complete the required tasks and fill the roles of your team. Where roles cannot be filled or resources are deficient, look outside your organization.

- **Leader** – This individual should be a manager or supervisor. The logical choice is the manager overseeing tree care in your community. Other choices include staff working in public works, parks and recreation or planning.
- **Public Information** – This role should be an intra community staff person. For small storm events, this task could be completed by the team leader.
- **Liaison** – This role should be an intra community staff person. For small storm events, this task could be completed by the team leader.
- **Operations** – Field operations will require expertise in field supervision of tree work crews and support for hazard remediation inspection and tree inventory crews.
- **Planning** – Staff with operational knowledge and urban forestry expertise will be required for large-scale storm events and recovery planning.
- **Administration** – Community administrative staff are the best qualified to provide administrative support. They are familiar with operational, administrative and financial processes.

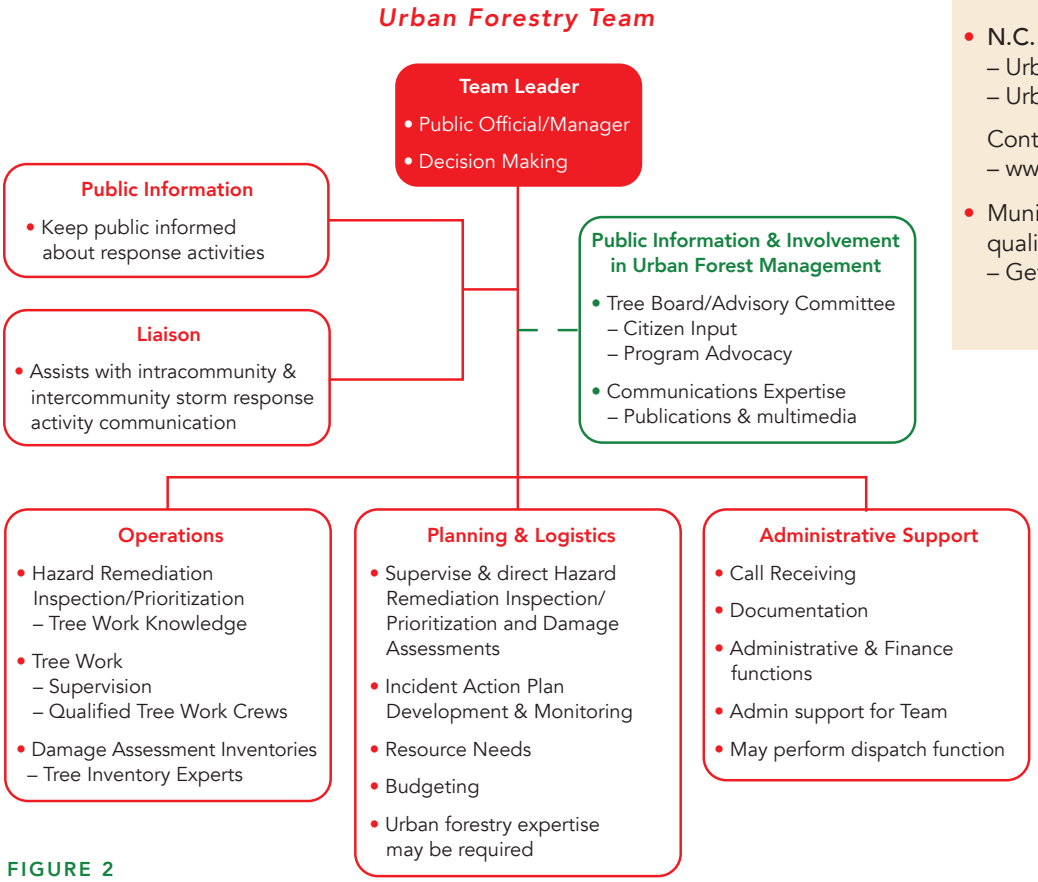



FIGURE 2

### Resources: Tree Work and Qualifications

*Professional Tree Services*

- International Society of Arboriculture Certified Arborists on staff
  – www.treesaregood.org
- Proper insurance
- Specialized equipment
  – Aerial lift trucks, boom loaders, cranes
- Tree Care Industry Association
  – www.tcia.org
  – Membership or the gold standard is a TCIA accredited company.

### Resources: Urban Forestry Expertise and Qualifications

*Planning, Management and Tree Inventory Work*

- International Society of Arboriculture (ISA) www.treesaregood.org
  – Certified arborist with municipal arborist credential
  – ISA tree risk assessment qualification
- American Society of Consulting Arborists
  – www.asca-consultants.org
- N.C. Forest Service
  – Urban & Community Forestry
  – Urban Forest Strike Team

  Contact your NCFS county ranger.
  – www.ncforestservice.gov
- Municipal staff with training/ qualifications
  – Get your staff trained.

## 2. Administrative

### Objectives:

- Build a storm event documentation process.
- Secure emergency tree work services.
- Determine a process to notify the public of storm management activities.
- Develop an urban forestry advisory committee or board to engage the public in the urban forest management process.

**Resources: Storm Documentation Forms**

Find example forms on the **N.C. Forest Service Urban & Community Forestry** website at www.ncforestservice.gov.

### *A. Documentation*

Documentation, in some form, is necessary to manage all the information, tasks and the work to its successful completion. If a storm event rises to the level of a federal disaster, proper documentation will be required for funding reimbursement. There are various types of computer software available that will perform or assist in incident management, but old-fashioned paper forms will work just fine if the forms are prepared in advance and relevant data is collected. Essentially, you will want to collect consistent data across your documentation, recording the chain of tasks from receiving a call from the public or an inspector in the field to completion of the work. Additionally, you should maintain daily dispatch logs for crews and staff. These dispatch logs should detail the personnel on the crew, equipment used and work assignment. The following tables detail examples of task logs and data that should be collected.

**Storm Call Log**

- Call #
- Address/Location
- Caller Name
- Phone #
- Management Unit
- Work Need
  - *TD - Tree Down*
  - *LD - Limb Down*
  - *B - Blocking*
  - *H - Hanger*
  - *On Wires - W*
  - *On House - H*
  - *On Cars - C*
- Planning Received?

**Storm Inspection and Dispatch Log**

- Management Unit
- Call #
- Address
- Location of Tree
- Inspection Results
  - *Species*
  - *Tree Diameter*
  - *Work Need*
  - *Priority*
- Crew Dispatched
- Complete?
- Cleanup?

**Storm Crew Work Log**

- Crew
- Call #
- Management Unit
- Address – Line for Actual Address if correction needed
- Location of Tree
- Species
- Diameter at Breast Height
- Work Completed
- Cleanup Completed?

### *B. Service Contracts*

Fulfilling your tree work and urban forestry expertise needs may require securing contracts with service providers. You may bid for the services on behalf of your community or partner with neighboring communities, or county contracts may be an option. There are also storm mitigation management companies that provide debris cleanup and emergency tree work. These companies are beginning to offer consulting arborist services as well. Some counties in North Carolina have contracts with these companies. The qualifications of the tree crews and arborists that work with these companies should be reviewed before agreeing to have them perform these services.

Term tree work contracts with unit prices specifying routine tree work services and hourly rates for emergency work are an effective strategy to secure tree work and emergency service needs. Lump sum contracts are a good option for large-scale tree work contracts. Clear specifications and supervision are a must to help ensure quality work is delivered by qualified contractors.

**Resources: Contracts & Specifications**

- **N.C. Forest Service Urban & Community Forestry** trees and storms web page
  – Contracts and specifications
  www.ncforestservice.gov
- **ANSI Standards and International Society of Arboriculture** Best Management Practices
  – www.isa-arbor.com

**Urban Forestry Expertise Contracts**

**Consulting and Inventories for Trees & Storms Work** – Consulting contracts can be structured to deliver a specific product, such as an inventory or term contracts with flat fees for individual tree assessment services and hourly pay rates for general consulting or emergency tree assessment work.

**Term Tree Work Contract**

*(Term – 1- to 3-year contract)*

*Regularly Scheduled Tree Work*

- Unit Price for service as defined in specifications by tree diameter class
- Work must be completed within a specified time frame

*Emergency Work*

- Crew Hourly Rate
  – Aerial Lift, chipper and two arborists
  – Boom loader and operator
- Specify response time
- Pay a minimum # of hours for response

*Tree Work Specifications*

**Specifications** – Tree work specifications are written and should be based on ANSI A300 Standards and ISA Best Management Practices.

## *C. Public Information and Community Involvement*

### Public Information

Public communication before, during and after a storm event is critical. Timely and accurate information on how the community is preparing for, responding to, and recovering from storm damage will alleviate public anxiety after the storm strikes. Whether or not your community has a dedicated public information officer, it is good practice to have a communications plan in place to guide what information is being disseminated, to whom, how and when.

**Figure 3** below illustrates the six elements of a communications plan as questions to be answered. Be prepared to answer these questions.

| Event? | Audience? | Communicator? |
|---|---|---|
| Emergency<br>Scheduled | General public<br>Targeted<br>*Specific residents/businesses*<br>*Neighborhood groups* | Public Information Officer<br>Workers |
| **Message?** | **Timing?** | **Tools and Format?** |
| General information<br>Call to action | Emergency<br>*Now, immediate future*<br><br>Scheduled Event<br>*Sufficient time to address concerns from customer* | Press release<br>Website<br>Social media<br>Community boards<br>Local cable TV channel<br>Door hangers<br>Nextdoor app |

Have a press release template with standard statements that can be quickly updated to meet the situation at hand. Provide staff with talking points so they can address questions from the public and be able to provide accurate information that adheres to the community's overall message. The following are example communication outlines.

#### *General public communication*

- Message intended for a broad audience
  - Typical storm preparation and public safety messages
    - *Press release templates and standard statements*
  - Notifications of pre-storm mitigation or post-storm response
- Use communication channels to reach a large segment of the population.
  - Press release
  - Social media and/or website posts
  - Local cable community access channel

#### *Target audience communication*

- Message intended for a specific audience
  - Residents/businesses directly impacted by pre-storm mitigation or post-storm response work
- In addition to communication channels listed above, use communication tools to reach target audience directly.
  - Door hangers or mailed flyers
  - Reverse 911 calls
  - Neighborhood-specific communication channels, such as Nextdoor app and neighborhood social media groups

### Community Involvement

Engaging the public to learn your citizens' needs and wishes as well as community management decision making is a foundational principle of quality public service. Establish a committee or assign the role to an established committee to provide input and guidance in your urban forestry efforts including the Trees & Storms 3Rs planning and implementation process.

**Community Urban Forestry Advisory Committee**

Capture the benefits community involvement can provide in your Trees & Storms 3Rs efforts as well as you broader urban and community forestry efforts.

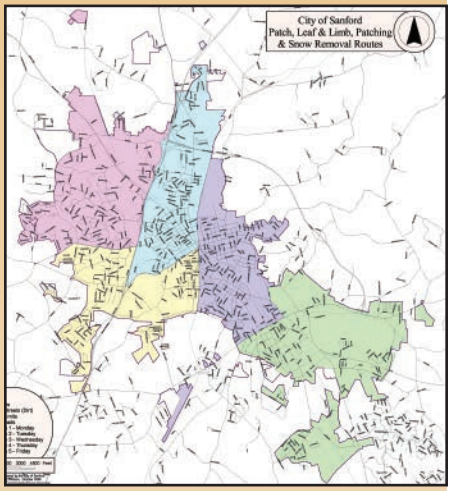
Resources:

- N.C. Forest Service Urban & Community Forestry webpage
  – www.ncforestservice.gov
- North Carolina Urban Forest Council
  – www.ncufc.org

## 3. Planning

### Objectives:

- Develop/select storm damage management units.
- Develop and implement a storm damage mitigation plan.
- Learn about resource inventories and storm damage assessments. Select the assessments you will utilize and the individuals or companies that will complete them.




*The city of Sanford located in Lee County uses their leaf collection/snow removal routes as storm management units. Image courtesy of city of Sanford.*

### *A. Storm Damage Management Units*

Divide your community into geographic work (management) units. Management units divide a large geographic area into smaller areas and many tasks into a smaller number of tasks. The result is smaller more manageable work units. Work is identified and completed by management unit. Work can also be bid by management unit, enhancing competitive bidding. Ideally, you should select management units familiar throughout city government and the public. Snowplow routes and leaf or refuse collection routes are good options. The simplest and largest management units can be four geographic quadrants of your community.

#### Critical Infrastructure Routes and Facilities

As a subset of your management units or as a standalone management unit, identify critical roadways for access to critical facilities and delivery of emergency services. These roadways and facilities will need to be inspected and cleared first.

#### Debris Management Sites

As event severity increases, sites will be required to store storm damage debris and possibly process the debris. Identify suitable large sites geographically distributed around your community and public or available vacant land.

### *B. Storm Damage Mitigation*

Storms will damage trees, but some damage can be prevented. As strong and resilient as trees are, if enough force is applied by winds, snow or ice loading, trees will fail and break. Research has shown that when wind speeds exceed approximately 55 mph, tree breakage increases exponentially. However, structurally defective trees and tree parts will break at lower wind speeds or with less ice or snow loading. These structural defects are readily observable to the professionally trained arborist, therefore if we identify and prune these defective branches or remove the defective trees before they fail, this storm damage can be prevented. The practice of identifying and mitigating structurally defective trees is called tree risk management.

*An ISA Certified Arborist should inspect trees for structural defects. This narrow v-shaped union between the two stems is a structural weakness prone to failure. In fact, this union is splitting, and this tree should be removed. Pruning or removal of problems like these will prevent damage during a storm event.*

#### Risk Tree Inventory

The most effective method to identify structurally defective trees is completing a tree risk inventory. Retain the services of an urban forest expert to complete this type of inventory. A qualified tree inventory expert will systematically inspect street trees and trees located on public property. Trees with defects that pose a threat to public safety will be identified. Management recommendations will be made, and the location of the tree and other management information will be collected. The result will be a prioritized list of defective trees for pruning or removal. With this information, a work plan and budget can be developed to complete the work. The work priority will facilitate spreading the cost of the work, highest priority to lowest priority, over several years if necessary. Lump sum bids can be solicited to complete the work by storm management unit or critical infrastructure routes and facilities. You could also choose to utilize a term tree work contract as described under Service Contracts above to complete the work.

**Resources: Tree Risk Management**

- N.C. Forest Service Urban & Community Forestry webpage – www.ncforestservice.gov
- International Society of Arboriculture
  - www.isa-arbor.com
  - www.treesaregood.org

## Tree Inventory Types & Methods

### Types

- Sample – *statistical sample of tree population*
- Partial – *inventory trees that meet a specific management need*
- Complete – *inventorying all public trees in a community*

### Methods

- Walking – *At least one technician walks each street and property, collecting management information for each tree.*
- Windshield – *A driving inspection conducted with one person driving and another person identifying work needed through walk-around inspections of the trees completed as required.*

### Resources: Tree inventories

- N.C. Forest Service Urban and Community Forestry website – www.ncforestservice.gov
- International Society of Arboriculture website – www.isa-arbor.com

*Restricted rooting space, repeated wounding, a cavity and decay make this tree a likely candidate for windfall in a storm event, prompting removal now to prevent any resulting damage.*

## *C. Tree Damage Assessments*

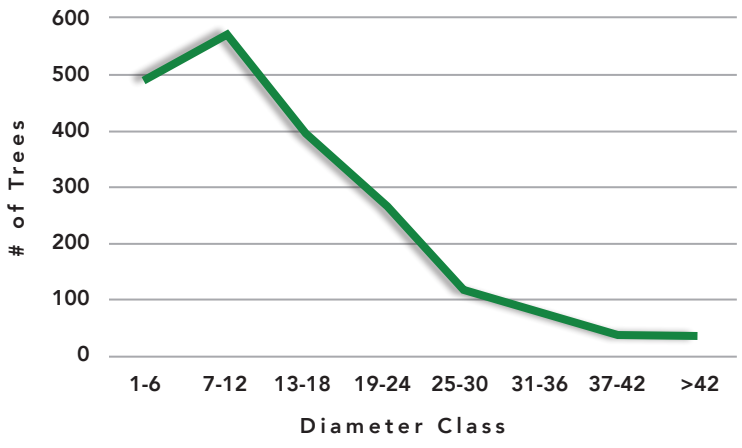
Current and accurate information is vital for effective storm event 3Rs and management planning. The following are types of assessments that may be required, a description and value, and where they can be used in the 3Rs process. Review these and determine how your community will meet the needs.

### Readiness Assessments

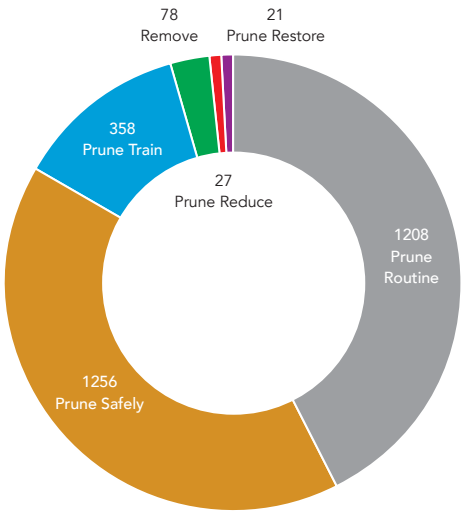
#### *Statistical Sample Tree Inventory*

Sample tree inventories are a relatively low-cost method to provide accurate estimates of numbers of trees, tree canopy volume and management information of public trees. Random sample plots totaling 3-6% of a community's street miles and public property acreage are geographically distributed across the community and tree management information is collected.

**Tree Diameter Distribution**




**Tree Management Need**




Pre-storm inventory data can be used for urban forest management planning, and tree density and debris volume data can provide potential high impact areas for storm response planning. A post-storm reinventorying of the sample plots will provide tree damage and tree debris volume estimates. Using this data and the tree work contract unit prices secured as part of your term tree work contract, a budget estimate to repair and clean up the damage can be developed.

## Response Phase Assessments

### *Initial Storm Damage Assessment*

After a storm strikes, an initial damage assessment is needed to quantify the impact and scale of the event and to dictate the resources you will need for response. To complete the assessment, a windshield survey can be conducted by the team leader or qualified staff.

### Event Classification

The national and state ICS protocol types disasters according to the geographic scale of the event and level of resources that will be required to respond to the event. These disaster types are a trigger that mobilizes implementation of the ICS and the resources necessary for response.

Develop an event classification system for your community. This system immediately communicates a general assessment of the scale of the event to everyone. It should also trigger the processes to secure the resources needed to respond to the event.

### Comprehensive Initial Assessment

As the severity of the event increases, it may be necessary to conduct a more detailed initial damage assessment. With Type 3 disasters when federal assistance will be requested, this will be required. This is where a sample inventory is useful. If a pre-storm sample inventory was designed and completed, resampling the plots would be relatively quick and would provide good damage estimates.

### *Hazard Remediation Assessments*

In an event with widespread damage across your community, resources need to be dedicated to the most hazardous conditions first. To accomplish this, the tree damage will need to be inspected, and the work needs to be prioritized. The findings of these inspections will be relayed to the planning team for scheduling and dispatching the work to tree crews for completion.

### Call Inspection

Tree damage calls from the public and other agencies will need to be assigned to call inspector(s) to inspect these calls, assess the resources required to complete the work and assign a work priority.

### Work Prioritization

Develop a tree damage work prioritization protocol. Prioritization is based on the location of the tree and the consequences of the tree failure or impending tree failure. A simple, defined priority 1-2-3 scale is enough. Depending on the scale of the event, priorities can shift in importance.

### N.C. Disaster Types, NCDPS Emergency Management 2019 North Carolina Disaster Recovery Framework *(paraphrased)*

**Type 1** disasters, *such as tornados or isolated flooding,* are smaller and more localized. The state can respond financially to the emergency and recover without a major federal disaster declaration.

**Type 2** disasters, *such as a hurricane or ice storm that impacts several counties,* cause more damage to a larger area. Federal assistance is required to recover from the disaster.

**Type 3** disasters, *such as a major hurricane,* devastate a widespread area and cause catastrophic damage. Again, federal assistance is required to recover from the disaster.

### Community Tree Damage Event Class Example

- **Class 1** – Damage remediation can be handled by a forestry team.
- **Class 2** – Damage remediation requires all community resources and possibly some outside resources.
- **Class 3** – Damage remediation requires regional/state assistance.

| Priority | Location | Tree Failure |
|---|---|---|
| 1 | Arterial Street, Public Safety Facility, Hospitals, Community Refuge Center over road or building access | Tree down on building, blocking road or building access, large impending tree or tree part failure |
| 2 | Residential street | Small hanging tree part. Tree down partially blocking access. |
| 3 | Rural street, public property | Tree or tree part down but not blocking |

*Storm damage tree work will need to be prioritized to mitigate the most hazardous conditions first.*

### Hazard Survey

Inspecting and prioritizing storm damage calls is not a systematic process of identifying tree damage. It is driven by calls from the public or other agencies. As a result, hazardous tree damage can be missed, particularly if call inspections were completed at night.

As the demand for inspecting these calls and hazard remediation decreases later during emergency response, a systematic method to identify hazard trees may be warranted. This can be accomplished with a windshield survey of each management unit within and adjacent to the damage areas with the objective being to identify tree hazards. The work can be completed by management unit to mitigate the hazard tree work.

### *Tree Damage Inventory*

Late in the emergency phase or the beginning of recovery, a comprehensive inventory of all damaged street trees and trees on public property should be completed. This inventory will include complete walk-around inspections of each damaged tree, classification to damage classes and providing management recommendations. Management recommendations will include removal or pruning to repair storm damage. This inventory data will provide management information to assist in developing recovery plans and budgets.

**FEMA Reimbursement**

If a federal disaster was declared, the cost to complete the inventory should be covered by FEMA. Be sure to notify FEMA representation that work is required and reimbursement is requested. The inventory data will be provided to FEMA to secure authorization for reimbursement for hazard pruning and removal work under Category A funding.

**FEMA 325 Public Debris Management Guidelines for Reimbursement**

Hazardous Limbs

- > 2″ at break and hanging or lodged in tree

Removal Criteria

- Fallen or uprooted
- 30-degree or greater lean
- Exposed heartwood
- 50% of tree crown damaged or destroyed

*These guidelines are subject to change.*

*The collective loss of live branches (crown loss) is an important variable in the preservation versus removal decision of a storm-damaged tree.*

### Recovery Assessments

The need for tree assessments is discussed in detail in the Recovery BMP. In terms of readiness planning, know that tree assessments will be required, and tree damage inventory work may be required, depending on the accuracy of tree damage assessment work during the response phase.

# Trees & Storms: Readiness Checklist

The following is a checklist and worksheet to summarize your work through the planning process. Additional standalone copies can be found on the NCFS Urban and Community Forestry website.

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**1. Build Your Urban Forestry Team** – Enter staff name and title or service provider

*Urban Forestry Team*

- Liaison with Community Departments or Incident Management
- Public Information Officer

**Team Leader**

**Public Information & Involvement in Urban Forest Management**

- Tree Board/Advisory Committee

**Operations**

- Hazard Remediation Inspections
- Tree Work Supervisor
- Tree Work Crews
- Tree Damage Inventory Work

**Planning & Logistics**

**Administrative Support**

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**2. Management Units** – Define and map geographic management units beginning with larger areas working to smaller areas to facilitate managing less significant events to more significant events you will utilize.

| | Quantity | List Complete | Source | Map Complete |
|---|---|---|---|---|
| A. Quadrants | _____ | ☐ | _____ | ☐ |
| B. Storm Management Units | _____ | ☐ | _____ | ☐ |
| C. Critical Infrastructure Routes & Facilities | _____ | ☐ | _____ | ☐ |
| D. Debris Management Sites | _____ | ☐ | _____ | ☐ |

*Continue to back to complete Checklist >*

**3. Service Contracts** – List provider or contractor providing service.

A. Routine Tree Work:

B. Emergency Tree Work:

C. Individual Tree Assessment:

D. Tree Inventory Work:

D. Urban Forestry Consulting:

**4. Mitigation** – Tree Risk Mitigation work completed.

| | Risk Tree Inventory | Tree Work Complete |
|---|---|---|
| A. Critical Infrastructure Routes & Facilities | ☐ | ☐ |
| B. Street Trees | ☐ | ☐ |
| C. Public Property Trees | ☐ | ☐ |

**5. Documentation** – paper forms or digital application performs function and documents

| | Paper Form Complete or | Digital Application Name |
|---|---|---|
| A. Storm Call Log | ☐ | _____ |
| B. Storm Dispatch Log | ☐ | _____ |
| C. Daily Crew Dispatch Log | ☐ | _____ |
| D. Crew Work Log | ☐ | _____ |

**6. Event Classification Definitions**

Class 1

Class 2

Class 3

**7. Damage Assessment Tasks** – Name staff or contractor identified to be responsible for completing the following tasks

Initial Damage Assessment:

Comprehensive Initial Assessment:

Hazard Remediation Inspections:

Tree Damage Inventory:

## Operations Tips and Guidance

The following are points of emphasis and tips regarding management of field operations.

### *Supervision*

Like any operation, adequate supervision will need to be in place to support crews, monitor and verify work is completed safely. The recommended supervisor to crew ratio is one supervisor to five work crews.

### *Debris Management*

Clearing downed debris that is blocking access to tree work must happen first. In severe events, chainsaw crews can cut and pile debris into the road where it can be pushed to intersections, loaded and hauled away. Tree/organic debris and household debris will need to be kept separate for disposal.

**NCFS Chainsaw Crews and Equipment**

The NCFS can supply chainsaw crews and equipment to assist with debris clearance and cleanup.

Contact your NCFS county ranger.
– Statewide contacts on www.ncforestservice.gov

### *Emergency Readiness*

If a storm is forecast, have your resources staged to respond.

- Staff on call
- Emergency contract tree work crews on standby
- Equipment checked, fueled and emptied of debris
- Crews staged on-site if necessary

In severe events, getting "hazards on the ground" and providing suitable access will be priorities. Cleanup can come later. Aerial lift trucks can leave their brush chippers behind to improve their maneuverability, and boom loaders can be requested on-site to move debris.

*Specialized equipment, such as a crane, and operators may be required.*

## *Storm Damage Assessment*

*Unmanned aerial vehicle in use for wildfire management*

### New Technologies

There are emerging technologies to assist with storm damage assessment. Unmanned aerial vehicles (UAVs), satellite remote sensing and analysis are all tools that are becoming more readily available to provide real-time assessment information as well as longer-term planning information. Stay tuned, as they say.

### Tree Damage Inventory

Qualified urban forestry tree inventory experts will be required to complete this work. The NCFS Urban Forest Strike Team consists of qualified staff available to provide this service.

An inspection of each storm-damaged tree will include an assessment of the roots, trunk and branches to determine management needs, pruning or removal (See NCFS T&S Storm-Damaged Tree Assessment BMP). The findings will assist with recovery efforts, FEMA reimbursement if applicable and/or short- and long-term urban forest management for forest health and budgeting.

**Resource: NCFS Urban Forest Strike Team**

Specially trained NCFS foresters and rangers who will manage and complete a storm damage tree inventory

Contact your NCFS county ranger.
– Statewide contacts on www.ncforestservice.gov

*A comprehensive tree damage inventory will include inspecting the **roots/root crown** (roots merge with trunk), **trunk and main branch attachments** and the collection of smaller live branches **(tree crown)**.*

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