American Radio Relay League

Georgia Section Amateur Radio Emergency Service®

Emergency Communications Operations Plan

September, 2002

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Introduction-Response vs. Reaction

One of the many corollaries to "Murphy's Law" is that the need always outgrows the available capacity to satisfy it. This is especially true in disaster situations, which always seem to stress emergency responders to their limits and beyond.

There are two ways to handle a disaster: react or respond. All too often, we find ourselves scrambling to get stations ready on short notice ("where did I leave those batteries?"). In "react-mode," one starts "behind the power curve" and never seems to catch up.

Have you ever noticed the difference between the reactor and the responder? The reactor says, "It's about to go crazy here! Skies are dark, heavy and lots of lightning everywhere! Never seen so much hail. Heard on the police radio that there is a tornado nearby."

The responder, on the other hand might be heard to say, "I am currently located at the crossing of Main and First Streets, and am observing a wall cloud with rotation. Wind was steady at about 40 to 50 miles per hour (estimated, large trees bending over) until about 5 minutes ago, but has how stopped. Golf-ball sized hail, approximately one-inch diameter. Time of report, current time."

Which operator is the more valuable asset in an emergency?

The key to one's ability to respond instead of having to react comes with planning. The responder knew what information to communicate because he understood his served agency and know what information they needed. He knew how to communicate it because he had studied the nature of the threat (a tornado) ahead of time and had prepared himself for what he might need to observe and communicate.

Establishing effective plans-at the section, district and county jurisdiction levels-is the precise purpose of this document. The next section describes the planning necessary for a generalized response at the Georgia Section level. The next section is a guide to establishing district and county jurisdiction plans. Effective planning requires that all of these levels be addressed.

The appendices of this document provide additional detail designed help further define the plan, or make effective execution of it.

Figure 1 outlines the very simple emergency communications planning process that has been adopted for the Georgia Section. Key to this process is the initial definition of need, and the assessment of how systems could fail. All of the communications planning in the world will be for naught if it does not meet the needs of the specific disaster situation. Good planning means making a best effort at understanding what potential problems could be, and designing plans and systems to address those problems.

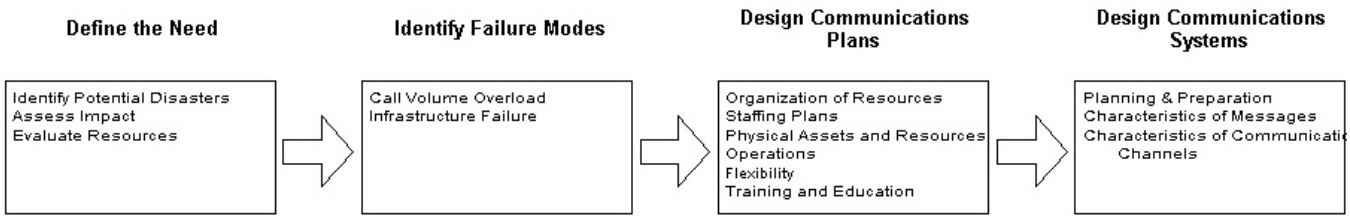

Figure 1. The Emergency Communications Planning Process.

This model for planning can be used at any level of response needed. This specific document addresses the needs for emergency communications response at the Georgia Section level, that is communications emergencies that occur on a broad scale and require the services and coordination at a section level.

The same model can be very effectively used for local planning, both specific and general. In the specific case, it can be used to plan a specific event, activity or drill (say Field Day). In the general case, it is a very useful tool for local Emergency Coordinators to establish plans for their county and district jurisdictions.

The challenges faced by each emergency communications group will be different. Some will face a low probability of a communication emergency, others will know with certainty that one or more large-scale disasters will occur each decade (or sooner), depending on the location and size of their jurisdiction. In addition to frequency, the size and impact of potential disasters will vary widely. The first task of any emergency communication manager is to identify all potential disasters, the likelihood of each occurring in your area, and the probable impact on the communication needs of served agencies.

Defining the Need

Identifying Potential Communications Problems

The first step in good planning is to define the problem. In emergency communications planning, this is best done in three steps:

1. List all of the possible disasters that could occur in your area, and assign each a level of probability.
2. Assess how each of these disasters would impact the community and its communication infrastructure.
3. Evaluate the resources your community already has to meet a communication emergency (our "served agencies").

Assessment of Potential Disasters in Georgia

One must treat any assessment of potential disasters with extreme care. As recent history has shown, just because a particular disaster has a low probability of occurring, it does not mean that the disaster cannot occur. However, the assessment can be used as a guide towards effective planning, training and deployment of amateur radio resources.

This section lists the possible disasters and assesses how they could impact the community primarily on a statewide level. The disasters in this section are presented in alphabetical order, and not in any order of precedence or probability of occurring. A model, which takes in to account disasters with the highest probability of occurrence, impact to the community and need for statewide resources is presented in the last section along with the 25 counties in Georgia assessed to be at highest risk for potential disasters.

The potential disasters discussed in this section include:

- Airline Crash
- Disease
- Drought
- Earthquakes
- Extreme Heat
- Floods and Flash Floods
- Hazardous Materials
- Hurricanes
- Terrorism
- Thunderstorms and Lightning
- Tornadoes
- Winter Storms

Airline Crash

The most recent major commercial airline disaster in Georgia occurred April 4, 1977 in Paulding County when a DC-9 lost power in a violent thunderstorm and crashed killing 68 people on board and eight on

the ground. A commuter airline crash in Carroll County in 1985 left eight people dead and 13 seriously injured. In 2001, 21 people were killed in the crash of a Florida Air National Guard plane near Unadilla.

Even before September 11, 2001, airline crashes are almost always handled by local law enforcement and fire departments. The most likely impact to communications is call volume overload. Post 9/11, the potential for infrastructure damage and failure becomes more likely, as was seen in the collapse of the World Trade Center towers.

Airline crashes can occur in just about any area of the state, including remote, sparsely populated areas. On the other hand, although a large number of aircraft travel through Georgia on a daily basis, the probability of airline crashes remains very small.

Disease

The most significant threat from disease, as identified by Georgia Emergency Management Agency (GEMA), is from the West Nile Virus. While of concern to the general public, this disease threat has low risk of affecting the communications infrastructure.

A local outbreak of disease, whether from natural causes or from bio-terrorism could cause stress on a local area telecommunications infrastructure. For example, call volume overload could bring down the PBX of a hospital or county public health service. In some counties, Amateur Radio Emergency Service® (ARES®) groups have trained with local medical services for such potential communications failures.

Drought

Drought is defined as "abnormal dry weather for a specific area that is sufficiently prolonged for the lack of water to cause serious hydrological imbalance." Although eased by 2002 spring and summer rains, Georgia has not seen a drought of the duration or magnitude ever, not even in the disastrous mid-1980s as that seen in the summers of 2001 and 2002. With the exception of the southeastern coastal areas, most of the state remains at moderate to severe drought levels (Palmer Drought Severity Indexes of -2.0 to -3.9), particularly in the northeast, central and southwest areas of the state.

Severe drought, per se, rarely causes impacts to communications infrastructures. However, wildfires are more common in drought-affected areas, which in turn could create situations where ARES® support is required.

Earthquakes

Although earthquakes occur less frequently in the eastern United States than in California, historical records indicate that earthquakes and their associated seismic hazards exist in Georgia. Major damages have not taken place in this region since the last great earthquake over 100 years ago that killed 60 people and devastated the city of Charleston in 1886.

While large earthquakes are less frequent, some seismologists argue that earthquakes in the eastern United States can cause more damage than similar size earthquakes in the western United States. The greater population density in the eastern United States also increases the damage potential. Calculations of seismic hazard indicate that large distant earthquakes are likely to cause as much damage in Georgia, as earthquakes of any size with epicenters within the state.

The greatest threat for earthquakes is in the northwest part of the state, along the Southeastern Tennessee Seismic Zone. This area currently experiences one magnitude 4.0 earthquake about every 10 years (may rock objects off of shelves and cause some cracking of plaster).

In the event of a strong earthquake, damage to communications infrastructure and/or call volume overload can be expected. The damage may be limited in scope, near the epicenter, for example, or could be spread over a wide area. Although the risk of earthquake is moderate to low, the potential exists for widespread demands for ARES® resources.

Extreme Heat

GEMA identifies extreme heat as a significant threat in Georgia. People are at risk for heat-related illnesses when their bodies' temperature control system is overloaded. The body normally cools down by sweating. However, sweating alone does nothing to cool the body unless the water is removed by evaporation. High relative humidity slows down evaporation. Under extreme heat and high humidity, the body temperature quickly spirals resulting in potential damage to the brain or other vital organs.

Several factors impact the body's ability to cool down during extremely hot weather. When the humidity is high, as typical in Georgia, sweat will not evaporate as quickly preventing the body from efficiently releasing heat.

In general, extreme heat would not be expected to damage communications infrastructure, unless coupled with some other threat (such as fire, severe storms, etc.). However, it is possible that under severe conditions, the American Red Cross or public health agencies may open public shelters, and ARES® resources may be required to assist with these efforts.

Floods and Flash Floods

Floods are the most common and widespread of all natural disasters--except fire. Most communities in the United States can experience some kind of flooding after spring rains, heavy thunderstorms, or winter snow thaws. Floods can be slow, or fast rising but generally develop over a period of days.

Dam failures are potentially the worst flood events. A dam failure is usually the result of neglect, poor design, or structural damage caused by a major event such as an earthquake. When a dam fails, a gigantic quantity of water is suddenly let loose downstream, destroying anything in its path.

Flash floods usually result from intense storms dropping large amounts of rain within a brief period. Flash floods occur with little or no warning and can reach full peak in only a few minutes.

Floodwaters can be extremely dangerous. The force of six inches of swiftly moving water can knock people off their feet. Flash flood waters move at very fast speeds and can roll boulders, tear out trees, destroy buildings, and obliterate bridges. Walls of water can reach heights of 10 to 20 feet and generally are accompanied by a deadly cargo of debris.

In the summer of 1994, Tropical Storm Alberto came ashore from the Gulf of Mexico through Alabama and the Florida peninsula. Over a span of two weeks the storm-which, never reached hurricane strength, dumped over two feet of rainfall as far north as the Atlanta metro area. The storm killed 34 people and caused more than $1 billion in damage. More than 40,000 people were evacuated and a presidential disaster area was declared in 55 Georgia counties. There was significant communications infrastructure damage, with telephone central offices and long-lines switching stations damaged by floodwaters. The Georgia Section ARES® was activated on a statewide basis for several days.

Eighty percent of Georgia's 159 counties have had presidential disaster declarations involving flooding, since 1990.

Hazardous Materials

Hazardous materials are chemical substances, which if released or misused can pose a threat to the environment or health. These chemicals are used in industry, agriculture, medicine, research, and consumer goods. Hazardous materials come in the form of explosives, flammable and combustible substances, poisons, and radioactive materials. These substances are most often released as a result of transportation accidents or because of chemical accidents in plants.

There are many chemical plants throughout the State of Georgia and hazardous materials are transported on Georgia's numerous state and interstate highways. A hazardous materials accident is usually a localized event, and is usually managed by local law enforcement. It is possible that the communications infrastructure could be damaged, especially if there is explosion or fire.

Georgia is also host to the Southern Company's Plant Hatch, in Baxley (Appling County) and Plant Vogle, in Augusta (Richmond County), both nuclear power plants, and the US Department of Energy's Savannah River Site-a nuclear weapons facility-is located very near Augusta in Aiken, South Carolina. In addition to the potential hazardous materials threats that these plants themselves could present, on occasion, nuclear material is transported on interstate and state highways, particularly to and from the Savannah River site.

Through funding from a Department of Justice Grant, GEMA is purchasing equipment to outfit 21 Hazardous Material (HazMat) teams throughout the state. The equipment is being supplied with the understanding that these teams will agree to respond to incidents around the state where such equipment and expertise are not available.

Hurricanes

Georgia is impacted from tropical systems from both the Atlantic Ocean and Gulf of Mexico.

During a hurricane, wind gusts exceeding 74 mph and torrential rain can cause damage to Georgia's shoreline. The direct hit of a hurricane also can cause storm surge, a large dome of water more than 50 miles wide that sweeps across the coastline near the area where the eye of a hurricane makes landfall. Storm surge remains the greatest threat to human life, but effective evacuations have reduced the number of fatalities. Most deaths now are the result of inland flooding.

The six coastal counties at highest risk of evacuation because of storm surge are Bryan, Camden, Chatham, Glynn, Liberty and McIntosh.

Although hurricanes weaken as they move inland, the remnants of the storm can bring 6 to 12 inches or more of rain and hurricane-force winds (74 MPH or greater) as far north as the mountain regions of Georgia. Hurricanes also can produce damaging tornadoes. Major hurricanes were a fairly frequent occurrence in the 1800's, when Georgia was struck by five major hurricanes. The last Category 3 hurricane to make landfall in Georgia struck Savannah on August 31, 1898, killing an estimated 179 people. Although Georgia was spared the direct hit of a major hurricane in the 1900's, it experienced four direct hits from minor hurricanes:

1. In 1911, a Category 2 hurricane hit Savannah, killing 17.
2. In 1940, a Category 2 hurricane hit Savannah, killing 50.

3. In 1947, a Category 2 hurricane hit Savannah, killing 1.

Hurricane David, a Category 2 hurricane, hit Savannah in 1979. No major damage was reported.

The explosion of population growth along the coast has complicated the evacuation and sheltering process. Millions of residents and tourists from Georgia and its neighboring states of Florida, North Carolina and South Carolina jam highways in search of safety and shelter when evacuation orders are issued.

Improved forecasting and warning capabilities have diminished hurricane-related deaths in the 20th century; however, damage to property has increased with the rapid growth along our coastal regions.

The threat of hurricane, and the resulting evacuation of populated coastal areas of Georgia is perhaps the most stressing of all potential disaster threats on the state communications infrastructure. In the days leading up to landfall, there is significant call volume overload. (During the Hurricane Floyd evacuation in 1999, the Southern Linc system was brought down due to call volume overload).

A significant amount of information traffic must be communicated between the affected coastal areas, shelters (primarily along the I-16 and I-75 corridors) and Atlanta (most state agencies are coordinated through the GEMA State Operations Center in Atlanta, and the American Red Cross Hurricane Watch Team is also based at the Southern Region HQ in Atlanta).

Terrorism

While terrorism has taken center stage in the United States since September 11, 2001, the GEMA has addressed terrorism preparation and training since before the 1996 Olympics and continues to assess and coordinate the state's preparedness activities for terrorism and weapons of mass destruction. Response protocols are addressed in the Georgia Emergency Operations Plan (GEOP), the State's official guidelines for dealing with preparedness, response and recovery for dealing with natural and manmade hazards impacting Georgians. GEMA has been designated as the lead agency for consequence management of terrorism and the Georgia Bureau of Investigation (GBI) is the lead agency for crisis management of terrorism.

Atlanta has the highest risk for impact due to terrorism. In addition to being the state capital, Atlanta hosts the US Centers for Disease Control (CDC) a few miles northeast of downtown, the worlds busiest airport, Hartsfield-Jackson International Airport, south of downtown, and three major sports arenas (Turner Field, Philips Arena and the Georgia Dome) all downtown.

The potential impact to the communications infrastructure can be expected to be both system failure and call volume overload. It is expected that whatever response is required will significantly stress GA Section ARES® resources.

Thunderstorms and Lightning

Many hazardous weather events are associated with thunderstorms. Normally, the area affected by any single storm is fairly small and, most of the time, the damage is fairly light. Rainfall from thunderstorms can cause flash flooding, which can change small creeks into raging torrents in a matter of minutes, washing away large boulders and most man-made structures. Hail up to the size of softballs can damage cars and windows, and kills wildlife caught out in the open. Strong (up to more than 120 mph) straight-line winds associated with thunderstorms knock down trees and power lines.

In Georgia, the threat of severe storms is high, particularly in the spring and summer months, although the can occur at any time. Like many of the Gulf Coast states, Georgia tends to receive strong inflows of moisture from the Gulf of Mexico, as well as instability from storm fronts advancing to the east from the mid-west and southern states. Particularly in the late afternoon and evening, many thunderstorms can reach severe levels quickly.

While thunderstorms usually only cause localized damage, storm fronts can advance rapidly across the state, often entering Georgia from either the northwest corner of the state (Dade, Walker and Catoosa Counties) and along the I-20 corridor (Haralson, Carroll, Heard Counties). However, the risk of severe storms should be considered high in all counties in Georgia, as severe storms can develop with or without the existence of frontal boundaries.

The National Weather Service office in Peachtree City provides forecasts and warnings for approximately 2/3 of the state, with 96 counties in its County Warning Area. The remainder of the state is serviced by the Jacksonville, FL; Greenville, SC; Columbia, SC; Charleston, SC; or Tallahassee, FL National Weather Service offices.

Thunderstorms and lightning can damage the local power-grid and can also damage the local telecommunications infrastructure. They rarely result in call volume overload.

The Georgia SKYWARN service activates whenever the National Weather Service requires spotter activity as the result of storms observed by radar or on the ground. The Georgia Section ARES® activates as needed to support the SKYWARN nets.

Tornadoes

Georgia is vulnerable to a range of severe and potentially life-threatening weather, including tornadoes. Over the past 50 years, a total of 1,220 tornadoes were reported in Georgia, including 33 in the year 2000.

In Georgia, tornadoes mainly occur during the spring and summer months, usually between the hours of 3:00 p.m. and 9:00 p.m., however they can, and do, occur at any time of the day at any time of year. While tornadoes have occurred in every month of the year in Georgia, the months of March through May are the most active period of tornado activity in the state.

A tornado is a violently rotating column of air extending from a thunderstorm to the ground. The most violent tornadoes are capable of tremendous destruction with wind speeds of 250 mph or more. Damage paths can be in excess of one mile wide and 50 miles long. Tornadoes typically move from southwest to northeast at an average forward speed of 30 mph, but they can sometimes be dangerously unpredictable and move in any direction.

Tornadoes are generally produced by thunderstorms, which develop in warm, moist air in advance of eastward-moving cold fronts. These thunderstorms can be dangerous, producing heavy rains, damaging straight-line winds and hail. The most treacherous ones can generate tornadoes. Occasionally, large outbreaks of multiple tornadoes can develop from these systems. Tornadoes can also be generated hundreds of miles inland by hurricanes and tropical storms, for up to a day after they make landfall.

Advances in technology, such as Doppler radar, have steadily improved tornado forecasting over the years, and the warning time has improved. But radar has its limitations and the terrain in many parts of Georgia, particularly the northern part of the state, also makes it difficult to clearly identify a developing

tornado and issue a timely warning. For this reason, amateur radio operators trained to identify developing tornadoes are extremely important to the NWS in Georgia.

Since 1950, only two (Taliaferro and Glascock) counties in Georgia have not had at least one tornado event. 53 counties have had at least one presidential disaster declaration due to tornadoes. While tornadoes usually only cause localized damage, storm fronts can advance rapidly across the state. Therefore, the risk of tornado should be considered high in all counties in Georgia, even those with a limited number of historical events.

Tornadoes can damage the local power-grid and can also damage the local telecommunications infrastructure. They rarely result in call volume overload.

The Georgia SKYWARN service activates whenever the National Weather Service requires spotter activity as the result of storms observed by radar or on the ground. The Georgia Section ARES® activates as needed to support the SKYWARN nets. Because in some areas, cellular phone and other radio service is limited due to terrain, even when infrastructure damage has not occurred local American Red Cross chapters may need communications assistance with damage assessments and/or shelter communications after the storm has passed.

Winter Storms

A major winter storm can last for several days and be accompanied by high winds, freezing rain or sleet, heavy snowfall, and cold temperatures. People can become trapped at home, without utilities or other services. Heavy snowfall and blizzards can trap motorists in their cars.

Winter storms can make driving and walking extremely hazardous. The aftermath of a winter storm can have an impact on a community or region for days, weeks, or even months. Storm effects such as extremely cold temperatures and snow accumulation, and sometimes coastal flooding, can cause hazardous conditions and hidden problems for people in the affected area.

Georgia is particularly vulnerable to winter storms. The typical winter storm pattern is a front of cold, winter air, advancing from the west/northwest accompanied by a mass of moist, tropical air flowing northeast from the Gulf of Mexico. The nature of the storm depends on where and when the two systems meet.

The threat of winter storm is moderate to high in all areas of the state. 96 counties, including all of the Atlantic Coast counties in southeast Georgia-have had presidential disaster declarations due to winter storms since 1990.

Winter storm conditions can damage the local power-grid and can also damage the local telecommunications infrastructure. Also, conditions could trap operators in their homes, reducing the available ARES® resources to respond if needed.

Highest Risk Counties in Georgia

Table 1 shows an assessment of the top 25 risk counties in Georgia. The entire assessment of all 159 counties can be found in Appendix A.

The purpose of this ranking is to ensure that focus is maintained on the areas of the state with the highest risk. This does not mean that focus should be taken away from counties that do not have the highest risk-in truth, a disaster can happen anywhere at any time. But it does help prioritize for section leadership where to start new ARES® groups, and where to plan for staging and deployment of ARES® mutual assistance teams.

This assessment takes into account the four most significant (from the perspective of likelihood of occurrence, impact to the community and requirement for amateur radio resources) disaster threats: floods, hurricanes, tornadoes and winter storms. Each threat was assigned a number corresponding to low risk (1), medium risk (2), or high risk (3). The numbers were assigned on a county basis, based on several risk factors for the county with regards to the specific threat:

- All counties were first assigned a low risk (1) for each threat.
- The GEMA report indicating number of tornado events by county from 1950 - 2000 was used to establish a risk for tornado for each county-the numbers were assigned as follows: counties with 13 to 23 events were assigned a high risk (3); counties with 5 to 12 events were assigned a medium risk (2) and counties with 0 to 4 events were left at a low risk (1).
- The risk was increased by .5 for counties that had received a presidential disaster declaration (according to GEMA) for a tornado from 1990 - 2000.
- The risk was increased to medium risk (2) for counties that had received a presidential disaster declaration for flood, hurricane or winter storm from 1990 - 2000 were The risk was increased from medium risk (2) to high risk (3) for the 6 coastal counties identified by GEMA as highest risk of storm surge in a hurricane for the two categories, Floods and Flash Floods, and Hurricane.
- The risk for all four categories of threat were aggregated and averaged.
- The list of counties was then sorted first by aggregated risk, then by the 2001 US Census estimate of county population.

County	2001 Population	ARES® District	Average Risk	Aggregate Risk	Floods and Flash Floods	Hurricanes	Tornadoes	Winter Storms
Chatham	232,064	8	3	11	3	3	3.0	2
Glynn	68,217	8	3	11	3	3	3.0	2
Liberty	60,107	8	3	11	3	3	2.5	2
Fulton	816,638	3	2	10	2	2	3.5	2
Cobb	631,767	3	2	10	2	2	3.5	2
Carroll	91,956	1	2	10	2	2	3.5	2
Floyd	91,183	1	2	10	2	2	3.5	2
Bryan	24,552	8	2	10	3	3	1.5	2
Meriwether	22,625	4	2	10	2	2	3.5	2
Hall	145,664	2	2	9	1	2	3.5	2
Whitfield	85,248	1	2	9	2	2	2.5	2
Bartow	80,026	1	2	9	1	2	3.5	2
Walker	61,884	1	2	9	2	2	2.5	2
Spalding	59,066	5	2	9	2	2	2.5	2
Gordon	45,555	1	2	9	2	2	2.5	2
Camden	44,061	8	2	9	2	3	2.0	2
Colquitt	42,201	7	2	9	2	1	3.5	2
Polk	38,843	1	2	9	2	2	2.5	2
Murray	37,747	1	2	9	2	2	2.5	2
Habersham	37,153	2	2	9	1	2	3.5	2
Decatur	28,175	7	2	9	1	2	3.5	2
Upson	27,711	5	2	9	2	2	2.5	2
Haralson	26,255	1	2	9	2	2	3.0	2
Pickens	24,716	1	2	9	2	2	2.5	2

Table 1. Top 25 Risk Counties in Georgia

Statewide Community Resources

- Georgia Emergency Management Agency
- American Red Cross
- National Weather Service
- Association of Public-Safety Communications Officials-International
- National Communications System
- Salvation Army
- REACT (Radio Emergency Associated Communication Teams)

Other Amateur Radio Resources

- Georgia Baptist Disaster Relief Communications
- Military Amateur Radio Service (MARS)
- Hurricane Watch Net

Georgia Emergency Management Agency

The Georgia Emergency Management Agency (GEMA), a part of the Office of the Governor, has primary responsibility in the State of Georgia to provide assistance to local jurisdictions in emergency and disaster planning and operations, and operates under authority of the Georgia Emergency Management Act of 1981.

GEMA has responsibility for maintaining the Georgia Emergency Operations Plan (GEOP), , based on the authority of the state government for emergency management and contains specific Emergency Support Functions (ESFs). Standard Operating Procedures (SOPs) are the responsibility of the primary state agency or organization for each ESF in coordination with other supporting agencies and organizations. The GEMA Director assumes responsibility for direction and coordination of ESFs at the State Operations Center (SOC), 935 East Confederate Avenue, Building 2, Atlanta, Georgia. At the discretion of the GEMA Director and in concurrence with the Governor, a designated alternate SOC may become operational. Each ESF is assigned to a primary state agency and support agencies through the Executive Order of the Governor. All primary and support agencies responding to an emergency or disaster will be coordinated by GEMA. In addition, other assistance through private agencies/organizations will be coordinated as a part of this process.

The American Radio Relay League (ARRL) is listed as a support organization in the GEOP under ESF #2, Communications. The Georgia Section Amateur Radio Emergency Service® is delegated the responsibility for providing this support on behalf of the ARRL by the Section Manager. The Georgia ARES® maintains an amateur radio station in the communications center of the GEMA SOC in Atlanta.

A Forward Emergency Operations Center (FEOC), Mobile Communications Vehicle (MCV) and/or a Mobile Command Post (MCP) may be established at or near an emergency or disaster site. In the event a local jurisdiction is unable to perform responsibilities, the GEMA Director may provide support to assist during an emergency or disaster. Presently, the GEMA Mobile Communications Vehicle has Amateur Radio 2-Meter FM capability, but does not routinely have licensed amateur radio operators on staff to use this equipment in a local area. GA ARES® operators may be called upon and authorized to operate this equipment depending on the needs of local officials.

American Red Cross

ARRL and the American Red Cross have had cooperative agreements since 1940. The current statement was signed in 1994. Chartered by Congress in 1905, the Red Cross provides relief to victims displaced by disaster, from the onset of disaster conditions to the recovery phase. Their national headquarters is located in Washington, but most of the action occurs at the state and local chapter levels, where the rubber meets the road. Local ARES® Emergency Coordinators should work closely with their counterparts in the chapter offices.

All American Red Cross activities in the State of Georgia are coordinated through the Southeastern Region/Georgia Unit Headquarters building at 1955 Monroe Dr NE, Atlanta, Georgia. The Metropolitan Atlanta Chapter and the Georgia Hurricane Watch Team are also located in this building.

The American Red Cross has primary responsibility for the GEOP ESF #6, Mass Care and is coordinated with other Georgia state and private agencies through the GEMA SOC. Although not listed in the GEOP, the ARRL provides support to the American Red Cross under ESF #6 through a statement of understanding between the two organizations.

National Weather Service

The SKYWARN program is the "eyes and ears" of the National Weather Service during severe weather emergencies. Hams comprise the majority of SKYWARN volunteers, who report "ground truths" to local NWS offices, supplementing their sophisticated weather monitoring equipment. ARRL has had an agreement with the National Weather Service, effecting this support, since 1986.

The majority of SKYWARN activity in the State of Georgia is coordinated through the NWS Peachtree City (NWSPTC) office, 4 Falcon Drive, Peachtree City, Georgia. NWSPTC has a county warning area (CWA) of 96 of the 169 counties in Georgia, but issues forecasts for most of the state. The remaining counties fall under the jurisdiction of Jacksonville, FL, Greenville, SC, Columbia, SC, Charleston, SC or Tallahassee FL.

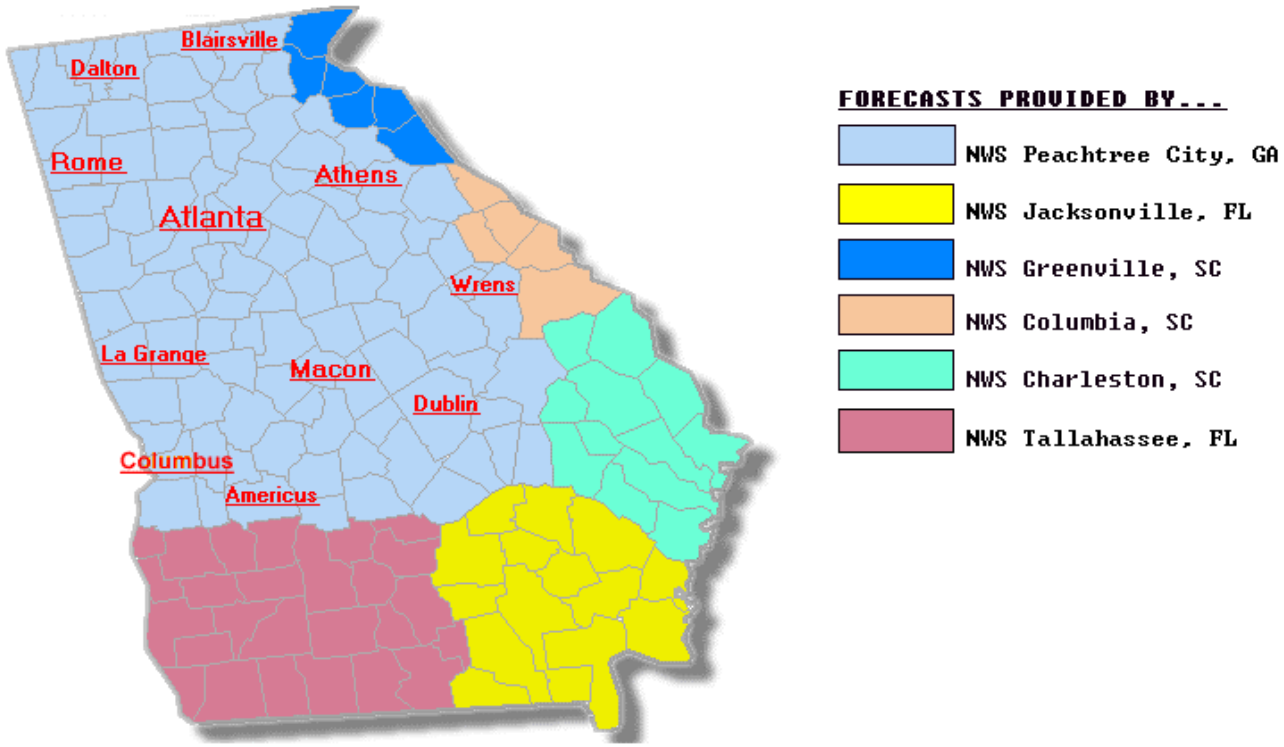

Figure 2. National Weather Service County Warning Areas in Georgia

Association of Public-Safety Communications Officials-International

The Association of Public-Safety Communications Officials-International (APCO) is comprised of communications professionals in emergency medical, law enforcement, fire, SAR, and other public safety fields. Headquartered in South Daytona, Florida, the organization has numerous chapter offices across the country, the level at which ARRL volunteers interface with the organization. APCO-International promotes standardization, education, and information exchange. Amateur Radio is often represented at the organization's annual convention.

The ARRL/APCO MOU calls for pre-planning between local ARRL officials and APCO chapter officers to provide for supplemental communications services by amateurs during emergencies. A new MOU was signed in 1996. National-level coordination occurs between standing committees of both organizations.

National Communications System

The National Communications System is a confederation of 23 organizations across the Federal Government tasked with ensuring the availability of a viable national security and emergency preparedness telecommunications infrastructure. The President designates member organizations that own or lease telecommunications facilities/services of significant value to emergency response or that have important telecommunications policy, regulatory, or enforcement responsibilities. The assets of these 23 organizations comprise the bulk of the Federal Government's telecommunications resources.

Ordinarily, the GA ARES® does not directly work with the National Communications System. As necessary, liaisons will be appointed by the Section Emergency Coordinator, at the request of NCS and/or the GEMA.

Salvation Army

The Salvation Army is primarily active in the recovery stage of disasters, and has communications needs, often filled by ARRL volunteers. ARRL staff meets with Salvation Army representatives each year at the annual NVOAD meeting in Washington. NVOAD is the National Voluntary Organizations Active in Disaster, of which ARRL is a member-organization. The ARRL and the Salvation Army revised its MOU in 1996.

REACT (Radio Emergency Associated Communication Teams)

While REACT has been associated primarily with Citizens Band in the past, the organization has widened its focus to embrace amateur and other services. ARRL and REACT share common goals in terms of emergency communication. The primary mission of REACT is "to provide public safety communications to individuals, organizations, and government agencies to save lives, prevent injuries, and give assistance wherever and whenever needed."

The memorandum of understanding calls on the two organizations to "cooperate and utilize their resources from time to time to optimum mutual benefit to both parties." Among specific principles, the agreement will involve cooperation during emergencies and disaster relief and the elimination of "duplicative or technically inferior service" during such responses. "The parties will generally encourage ongoing liaison with each other and urge members of both organizations to develop increasingly effective communications and cooperation," the agreement states.

Georgia Baptist Disaster Relief Communications

Southern Baptist Disaster Relief includes but is not limited to:

- 65 mobile feeding kitchens, capable to providing up to 50,000 meals a day.
- 13 childcare units, capable of providing temporary emergency child care for 100 children a day.
- 12 communication and command units equipped with ham radio, business band and other means of communication.
- 50 cleanup and recovery units. Some of these units are designed to do mud-out of homes following a flood. Others are chainsaw units that remove trees from homes and yards following windstorms. A portions of these units are designed to do repair or reconstruction of homes following a disaster.
- 20 other types of units. These are shower units, utility units, water purifiers, generators, and airlift kitchens.

There are 15,000 volunteers who are involved in the following additional ways:

- damage assessment
- shelter management
- family assistance
- crisis counseling
- literacy
- interpreting
- case management
- and others

In Georgia, the Southern Baptist Disaster Relief Communications groups have two well-equipped mobile communications trailers. In a disaster, they provide communications support for the feeding units, and other disaster relief operations.

Although no formal memorandum of understanding exists between ARES® and Southern Baptist Disaster Relief Communications, they work very closely in many disaster situations. Several members of the section ARES® leadership are also actively involved with the Disaster Relieve Communications groups. This can only serve to enhance the amateur radio response to the community in a disaster, as each group can rely upon the strengths of the other.

Military Affiliate Radio System (MARS)

MARS is a US Department of Defense sponsored program, established as a separately managed and operated program by the Army, Navy, and Air Force. The program consists of licensed amateur radio operators who are interested in military communications on a local, national, and international basis as an adjunct to normal communications.

MARS has a long and proud history of providing worldwide auxiliary emergency communications during times of need. Our volunteer force of over 5,000 dedicated and skilled amateur radio operators is the backbone of our program. The benefit of MARS membership is enjoying an amateur radio hobby through the ever-expanding horizon of MARS. Our affiliate members' continued unselfish support of our mission keeps Army MARS Proud, Professional, and Ready.

The Georgia Section ARES® has District Emergency Coordinators assigned to all three MARS groups, with the specific responsibility to establish liaisons with MARS in the event of a disaster. Although any necessary traffic will be passed, health and welfare traffic is expected to be the predominate type of message flow.

Hurricane Watch Net

The purpose of the Hurricane Watch Net is to:

- To disseminate hurricane advisory information to marine interests, Caribbean Island nations, emergency operating centers, and other interest for the Atlantic and Eastern Pacific as promulgated by the National Hurricane Center in Miami, Florida.
- To obtain weather information from reporting stations and observers who are not part of the routine network for the National Weather Service, or the World Meteorological Organization, and forwarding it to the National Hurricane Center.
- To function as a backup communication link for the National Hurricane Center, emergency operating centers, the National Weather Service, and other vital interests involved in the protection of life and property before, during and after hurricane events.
- To relay initial damage assessments of hurricane damage to the National Hurricane Center.

The Georgia Section ARES® does not have a formal liaison to the Hurricane Watch Net (HWN), since it's primary mission is to disseminate advisory and gather weather information from affected areas. As such, it is a very narrow focused net. All ARES® members should monitor the net whenever it is in session on 14.325 MHz or 3.950 MHz (when band conditions warrant). When a liaison to the HWN (or National Hurricane Center in Miami, Florida) is required, that liaison will be assigned as needed by the Section Emergency Coordinator (or appropriate District EC as needed).

Section Emergency Communications Response Plan

Georgia Section ARES® Organization and Structure

There are four levels of ARES® organization--national, section, district and local. National emergency coordination at ARRL Headquarters is under the supervision of the ARRL Field and Educational Services Manager, who is responsible for advising all ARES® officials regarding their problems, maintaining contact with federal government and other national officials concerned with amateur emergency communications potential, and in general with carrying out the League's policies regarding emergency communications.

Georgia ARES® Organization Levels

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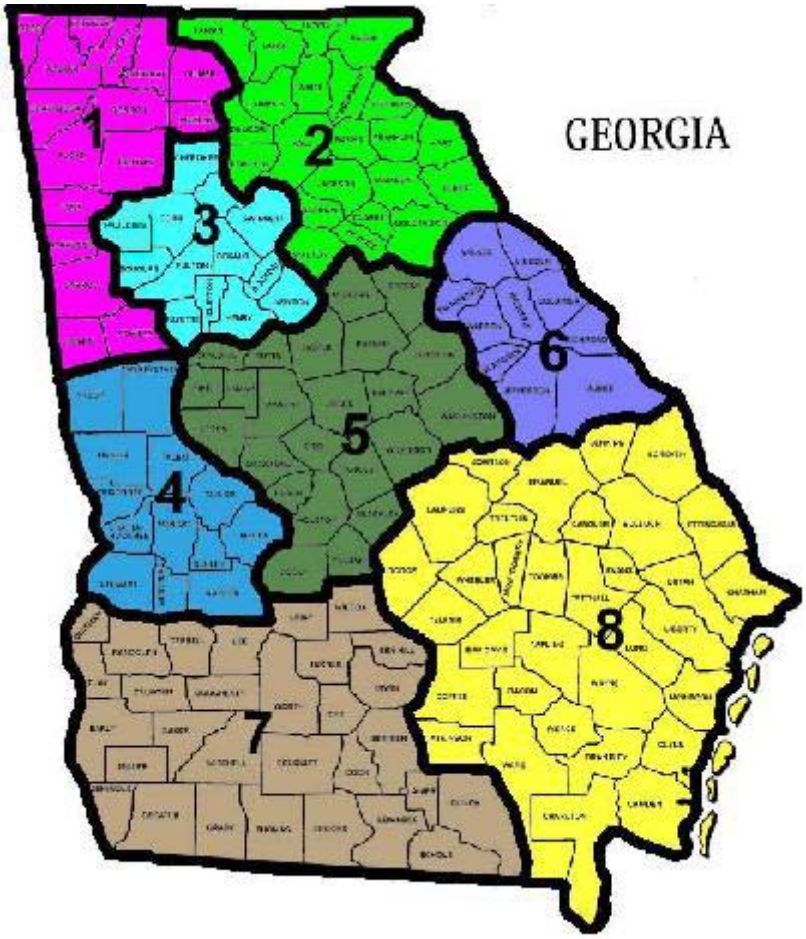
Section Level

At the section level, the Section Emergency Coordinator is appointed by the Section Manager (who is elected by the ARRL members in his or her section) and works under his/her supervision. In Georgia, the SM delegates to the SEC the administration of the section emergency plan and the authority to appoint District and local ECs.

District Level

Geographic District Emergency Coordinators
The State of Georgia is the largest state east of the Mississippi River and has 159 counties. Simply keeping track of all the activities in all of the counties is more than a full-time chore, not to mention the idea of trying to coordinate them in an actual emergency. To this end, the Emergency Coordinator county jurisdictions in Georgia have been grouped into geographic districts each with a District EC who coordinates the activities of the local ECs in the district.

The assignment of counties to districts has evolved over the history of the Georgia Section ARES®, and can be changed at the discretion of the Section Emergency Coordinator in cooperation with the District EC's affected by the changes. The current district structure (as of August, 2002) is shown in Figure 3.



Click image for full-sized district map.

1. Northwest District
2. Northeast District
3. Metro Atlanta District
4. West Central District
5. Central District
6. East Central District
7. Southwest District
8. Southeast District

Figure 3. Georgia ARES® Geographic Districts

Specific Needs District Emergency Coordinators

At various times, it may be necessary and appropriate to appoint District Emergency Coordinators to meet certain specific, section-wide needs. Standing positions exist to represent the GA Section ARES® to the following served agencies:

- Georgia Emergency Management Agency
- American Red Cross
- National Weather Service
- Salvation Army
- Navy/Marine Corp, Army and Air Force MARS

Additional District EC positions may be created (or removed) by the Section Emergency Coordinator to address specific needs outside the responsibilities of any one district or served agency. Examples may include areas such as Digital Communications, ARES® Mutual Assistance Teams, etc.

Local Level

Emergency Coordinators
It is at the local level where most of the real emergency organizing gets accomplished, because this is the level at which most emergencies occur and the level at which ARES® leaders make direct contact with the ARES® member-volunteers and with officials of the agencies to be served. The local Emergency Coordinator is therefore the key contact in the Amateur Radio Emergency Service®. The EC is appointed by the SEC, usually on the recommendation of the DEC. In Georgia, EC's have responsibility for one or more counties in their local area. The EC is in charge of all ARES® activities in his or her area, not just one interest group, one agency, one club or one band.

Assistant ECs
Special-interest groups are headed up by Assistant Emergency Coordinators, designated by the EC to supervise activities of groups operating in certain bands, especially those groups that play an important role at the local level, but they may be designated in any manner the EC deems appropriate.

Staffing Plans

The Section Emergency Coordinator, in cooperation with the District Emergency Coordinators, is responsible for identifying the resources necessary to support a statewide activation of the Georgia Section ARES®. The SEC or other delegated section official will work with the ARES® Net Manager to identify critical operational locations to support the specific needs of a particular disaster situation and the resources needed to support net operations and other statewide communications on behalf of state agencies.

Whenever a local ARES® group activates for a disaster, the county Emergency Coordinator is responsible for advising the District Emergency Coordinator of the activation and of the scale and scope of the disaster. The District EC should assess the situation to determine if adequate resources exist within the district to meet the needs of the local activation, and assess the potential for statewide impact.

The District Emergency Coordinator is responsible for advising the Section Emergency Coordinator, as well as other District EC's that could possibly have impact in their jurisdictions of the nature, size and scope of a disaster, as soon as possible after local activation.

The Section Emergency Coordinator will be responsible for assigning ARES® Mutual Assistance Teams to help staff jurisdictions without sufficient resources to meet the needs of served agencies-particularly those with which the ARRL has formal memoranda of understanding for support-inside or outside of an affected area as appropriate.

Physical Assets and Resources

The primary focal point for statewide activations of the Georgia Section ARES® will be the amateur radio station located in the GEMA SOC. The GEMA station should not be used as the Net Control Station (NCS) for operational nets, unless absolutely necessary (such as to initially call the net into session, activate the statewide ARES®, and for tests and drills). Should the SOC station be required to act as NCS, control should be transferred to another station that can serve as NCS, as soon as possible.

The Georgia Section ARES®/SKYWARN group also maintains a permanent amateur radio station at the National Weather Service Office, Peachtree City, that is activated whenever severe weather threatens the state. It's primary function is to provide SKYWARN spotter reports from amateur radio stations throughout the NWS PTC County Warning Area (CWA), and to disseminate warning information to amateurs in the field. However, it also provides a backup communications link between the NWS PTC office and the GEMA SOC, should normal communications channels break. The District EC for the National Weather Service is responsible for managing resources necessary to staff this station.

The American Red Cross is considering establishing an amateur radio station at its Southern Region Headquarters in Atlanta, Georgia. As of July, 2002, the discussions of setting up this station were just beginning with Section ARES® leadership.

Each DEC is responsible for maintaining an amateur radio station capable of amateur radio communications with

1. the Emergency Coordinators within the DEC's district,
2. the GEMA SOC station, and
3. any other stations necessary to address the specific communications needs of the DEC's jurisdiction.

This station should be located where the DEC most regularly needs to operate to effectively manage a disaster situation in the district. This may be at a served agency, EOC, the DEC's home station or even may be a mobile station as appropriate. The station must be capable of operating under emergency power for a minimum of 24 hours.

Each EC is responsible for establishing an amateur radio station within the EC's county jurisdiction(s). This station must be capable of amateur radio communications with

1. the Emergency Coordinators within the DEC's district,
2. the GEMA SOC station, and
3. any other stations necessary to address the specific communications needs of the DEC's jurisdiction.

This station should be located where the EC most regularly needs to operate to effectively manage a disaster situation in the county jurisdiction(s). This may be at a served agency, EOC, the EC's (or an AEC's) home station or even may be a mobile station as appropriate. The station must be capable of operating under emergency power for a minimum of 24 hours.

Georgia Section Disaster Operations

Disaster Time Line

In nearly all disasters, there is a fairly regular progression of events that occur. These are shown in the Table 2. In many cases, however, there may be little or no time for warning and mitigation. Any member of ARES® (or non-member in a rare emergency time of need) may activate the Section ARES®, in cases of extreme need. However, the decision to activate the Georgia Section Amateur Radio Emergency Service® should be made, whenever possible, by an Emergency Coordinator, District Emergency Coordinator or Section Emergency Coordinator, as appropriate.

Phase	When	Activities
Preparedness	Before a disaster occurs	Write & test plans; develop resource lists; install equipment; train staff
Warning	As soon as it becomes evident a disaster will or has occurred	Assess likelihood will be called upon to help; put team members on alert to make early preparations for activation
Mitigation	As time permits, before the disaster occurs, e.g. evacuation period before a hurricane	If time allows, take action to reduce potential impact of impending disaster; install & test equipment; develop staffing lists; identify assistance needs
Operational	Once disaster occurs; note this could actually be prior to actual damage or loss of life, such as shelter openings prior to a hurricane	Satisfy needs of served agencies; teams should keep themselves safe;
Recovery	Event has passed and cleanup and restoration has begun	Continue to satisfy needs of served agencies; develop longer term staffing plans; implement recovery communications systems
Stand-down	Conventional communication facilities resume normal operation and served agencies no longer require assistance	Discharge staff as stations are secured or need no longer exists; close nets; write after action reports

Table 2. Disaster Time Line

Any ARES® member who for any reason suspects that a communications emergency exists or may soon exist (e.g. after having been put on alert) should monitor the assigned ARES® net frequency(s) for activity.

If local telephone service is available, the District Emergency Coordinator assigned to GEMA or their assistant(s) should be called. They should be notified of the emergency as to type, location, and any GEMA needs.

In an emergency in which amateur radio might serve the community, amateur radio operators may be alerted through ARES® by any city, federal or state agency, the Red Cross, the Civil Preparedness Agency, or any similar official notifying the GEMA District Emergency Coordinator for ARES® or their assistant(s) to request assistance.

Note: Local Emergency Management Agencies (EMA) are charged by state law with the management of local emergencies and serve as the controlling agency for the emergency. The local EMA may request assistance from the State but still retains overall responsibility for the event. Georgia Emergency Management Agency (GEMA) acts as the primary coordination point for activities requiring State of Georgia support and may be activated to monitor events and to provide the Governor of the State of Georgia with status information and to coordinate State support as authorized. GEMA personnel may be dispatched to assist the local EMA. The Governor may declare, in advance, a state of emergency that allows certain emergency provisions of law to be effected.

GEMA State Operations Center Activation Levels

The Georgia Emergency Management Agency maintains a State Operations Center at its headquarters in Atlanta. As a support organization under the Georgia Emergency Operations Plan, ESF #2 (Communications) GEMA will alert the ARES® when its current activation level changes and SOC staffing may or will be necessary.

GEMA maintains three activation levels:

Level 3 (Red)	Full Scale Activation	All Primary and Alternate Emergency Coordinators, GEMA Staff and local EMA directors will be notified of a full-scale activation. The necessary State Agency Coordinators will also be notified to report to and staff the SOC. All GEMA SOC positions will be staffed.
Level 2 (Yellow)	Partial Activation	All Primary and Alternate Emergency Coordinators, GEMA staff, and local EMA Director's will be notified of a Partial Activation. The necessary State Agency Coordinators and necessary GEMA Staff will be notified to report to and staff the SOC.
Level 3 (Green)	Normal Activities	GEMA is operating under normal day-to-day operations. The GEMA communications center is monitoring all events and will be reporting them to the appropriate personnel.

Table 3. GEMA Activation Levels

Emergency Communications Systems

Characteristics of Messages

In a Section-wide communications emergency, there many kinds of messages might need to be handled. These messages (tactical messages, manpower requests, welfare inquiries, medical information, casualty lists, requests for supplies, shelter resident lists, etc) will need to be carried on the most appropriate communication mode(s) that will best address the needs of our served agencies (packet or other digital modes, FM phone, CW, HF SSB, etc.).

The table below shows the most common types of messages expected in a statewide activation of the Georgia ARES® and the most appropriate communications modes to use to relay and deliver them.

Message Type	**Appropriate Communications Modes**
Tactical Messages	The most likely kind of message that will need to be handled. Tactical messages may be local (related to incident command) or may need to be exchanged between a remote EMA office and the GEMA SOC in Atlanta; these messages must be accurately transmitted. Because Georgia is so large propagation paths for the various modes become an issue. The following modes, in priority/preference order have been tested. Most appropriate mode for local tactical messages is FM phone (VHF) Second most appropriate mode is FM phone via linked-repeater network; note that this has some advantages of FM phone (most esp. quieting), but some of the disadvantages of HF SSB propagation (noise on the channel, introduced by various links and controllers; multiple courtesy tones; dropped links). For intra-state traffic of this type, HF SSB is currently the most used. For most traffic it is appropriate, however, at times, specifically during the day, the communications channels suffer from poor propagation paths. Experiments

	show that there are times that a CW mode can successfully transfer the information when the phone modes cannot. The Signal-to-Noise requirements of PSK31 are so much better than other modes that it may be an effective mode, especially when all the others fail
Manpower Requests	Second most likely kind of message to be expected. These usually come in the form of tactical messages; as such, the tactical discussion above applies. For more complex requests, packet radio modes (APRS is most common of the packet modes in Georgia) are most appropriate. PSK31 should be considered a fallback mode when other digital modes cannot propagate messages between southeast and northwest.
Welfare Inquiries	Best handled by store-and-forward modes; most requests come early in a disaster, but Red Cross et al do not take H/W for 36 hours after a disaster. Note that NTS is one form of store-and-forward mode; when relay operators are available, this can effectively handle this kind of traffic. However, precision IS important, since a H/W inquiry is usually directed at a particular individual; mistaken identity can create serious problems under many circumstances (at least, it can cause unnecessary worry for the people involved).
Medical Information	Rarely handled; best left to a secure mode. Red Cross & by GEMA have asked at times for totally secure communications, but Part 97 rules do not allow this. Digital modes (including Digital Voice, as in Alinco VHF radios) while not completely secure may be helpful modes for secure traffic.
Casualty Lists	Rarely handled; best left to a secure mode. Red Cross & by GEMA have asked at times for totally secure communications, but Part 97 rules do not allow this. Digital modes (including Digital Voice, as in Alinco VHF radios) while not completely secure may be helpful modes for secure traffic.
Requests for Supplies	Best handled by one of the digital modes, because of the complexity and need for precision; priority and urgency may dictate that some requests fall into the category of tactical messages
Shelter Resident Lists	Same discussion as medical and casualty lists; these require secure channels
Disaster Assessments	Typically these are very much like tactical messages; best handled by FM phone, due to portability; GPRS-tracked APRS stations can also be very effective in assisting with these assessments.

Table 4. Message Types and Appropriate Communications Modes in Georgia

Section Emergency Communications Systems

HF Phone Communications

The primary communications mode for statewide communications in Georgia is 75-meter SSB phone (40-meter SSB phone as an alternate depending on propagation). The primary operating frequency on 75-meters is 3975KHz and on 40-meters it is 7275KHz. Should a communications emergency exist requiring statewide activation of the Georgia Section ARES®, the Section Manger and Section Emergency Coordinator will work with the appropriate ARRL Headquarters officials to request a clear frequency, +/- 3KHz for statewide operations.

The SEC or appropriate DEC will call the Section Emergency Net to order. The ARES® Net Manager will be responsible for Section HF net operations, scheduling net control stations and liaison stations as

needed. Members of Georgia Section ARES® are to check into the net from their mobile or home stations until local nets are activated and liaison established with the Section net. Coordination of logistics operations crossing local boundaries will be coordinated using the Section net. As resources are moved to an assigned staging area to await further instructions by net control, stations may be instructed to move coordination activities to regional or local net frequencies. Mobiles are dispatched as needed by the net control. Those operators with pre-assigned duties or locations may report there prior to checking into the state net. When not assigned to an operating location, ARES® members should make their availability known on an appropriate coordination net frequency then (silently) monitor the net frequency until given an assignment.

Liaison stations to the National Traffic System, Hurricane Watch Net, or other nets may be assigned if needed by the ARES® Net Manager or Net Control Station, as appropriate.

Operators of home stations or amateurs that cannot drive may check-in and be given assignments aligned with their ability and situations. If possible, they will be picked up for service. Operators of home stations not on emergency power are coordinated to effectively maintain relief or other duties as the emergency moves past the "first alert" (first 72 hours) time. Please check-in however you can and declare if you will be available to help or know of a need.

Linked Repeater Net Operations
A system of linked 2-meter FM repeaters (linked using 440MHz links) has been established covering a large portion of the state, primarily in the Central and Northern areas. This system is widely used by the SKYWARN program to support the National Weather Service by relaying observed severe weather reports and disseminating severe weather warnings.

This system may be used as an alternative to HF Phone communications, especially when unfavorable HF propagation exists. However, the needs of the NWS SKYWARN program should not be impacted except in very extreme situations, as this is a critical communications function for NWS (public warnings are very often issued based on SKYWARN operator reports).

Packet Radio Operations
Georgia has a unique geological situation, in that the north and west of the state are physically separated from the south and east. A "fall-line" where the mountainous north and west drops off to the flat coastal plain effectively cuts the state in two. There is very little digital communication across the fall-line. Hence, manpower requests or other requirements for digital communication have a difficult time being transmitted from southeast to northwest. The most common situation that generates these kinds of requests is hurricane threatening Savannah and the GA coast, in the southeast. The GEMA State Operations Center (where most of the requests need to be communicated to) is in Atlanta, in the northwest.

A project is ongoing to establish a system of linked digipeaters from Macon to Savannah down the Interstate-16 corridor. It is hoped that this system will provide a vital communications link from the Southeast coast to the Central and Northern sections of the state, and especially to Atlanta.

The two primary digital communications systems are the SEDAN (Southeast Emergency Digital Association Network) and the APRS (Automated Position Reporting System). Both networks are currently under utilized, but should be considered as part of the overall Section Emergency Communications System.

PSK31
PSK31 is a communications mode that offers a new and higher level of performance in conversational

communications (keyboard-to-keyboard) than is available via HF phone. Computer hardware and software is used to decode the signal using DSP, and often it is possible to receive a signal that is much weaker than could be copied in other modes (even CW). The data transfer rate is comparable to CW (Morse Code).

The key advantage of PSK31 is the ability of Digital Signal Processing software to discern a signal despite unfavorable signal to noise ratios. This could possible allow reliable HF communications, statewide, when phone propagation is unfavorable (such as during daytime hours).

Local Emergency Communications Response Plans

Emergency Communications Planning

Georgia Section ARES® District Emergency Coordinators and Emergency Coordinators are responsible for developing and maintaining an emergency communications response plan for their jurisdiction. This plan should be developed with input from active ARES® members in the jurisdiction, and with leadership officials of jurisdictions which may be affected by the plan or whose plan may affect the plan being developed.

All elements of the plan must be coordinated by the DEC or EC to ensure a unified and effective response. These include training, a system for call-up, job assignments, equipment needs, types of nets and communication patterns, resource nets and staging areas, and personnel management. It is appropriate for DEC's and EC's to appoint assistants in their jurisdiction with the responsibility for this planning. The persons writing the local emergency communications response plans are encouraged to have taken the ARRL Amateur Radio Emergency Communications Course, levels EC001, EC002 and EC003.

The emergency communication planning process involves three steps:

1. Making contact with currently and potentially served agencies.
2. Learning the agencies probable communication needs in time of emergency.
3. Developing a plan that will best meet these needs with the resources available.

Effective plans are never developed in a "vacuum." This means that the EC must work in concert with the served agency's personnel and other ARES® officials to be sure that everyone understands and agrees with the goals, capabilities, and limitations of the plan.

Working cooperatively builds mutual trust and respect, and provides a greater likelihood of everyone's expectations being met.

Defining Local Needs

The challenges faced by each emergency communication group will be different. Some will face a low probability of a communication emergency, others will know with certainty that one or more large-scale disasters will occur each decade, depending on the location and size of their jurisdiction. In addition to frequency, the size and impact of potential disasters will vary widely. The first task of any emergency communication manager is to identify all potential disasters, the likelihood of each occurring in your area, and the probable impact on the communication needs of served agencies.

The first step in solving any problem is to clearly define it.

1. Write down a list of all the possible disasters that could occur in your area, and then assign each a level of probability. If you don't have the skills or information to estimate probability, your local, regional or state emergency manager may already have this information in some form. Otherwise, make your best guess based on history and other known factors.

2. Think about how each of these disasters would impact the community and its communication infrastructure. Here are some examples of issues to consider: In a hurricane, all systems would suffer damage and overload at some level over a fairly wide area. A tornado would cause damage in a relatively small area. A telephone PBX system failure at the county hospital would have implications both within the hospital and for the community as a whole. Some communication system failures will result from call volume overload, and others from physical damage to the infrastructure, or both. Recovery time from overload is fairly quick-repair to physical damage may take days or weeks.
3. Evaluate the resources your community already has to meet a communication emergency. Do local and state governments, and VOAD agencies already have backup communication plans and resources in place? Are they adequate?

Preventing Duplication of Effort

If you are thinking about expanding or starting a new organization, do other emergency communication support groups already exist? Are they capable of meeting the needs? Is there really a need for a separate (and cooperative) organization? Will there be political difficulties between the groups if another is created, and how can this be handled constructively? How will this affect the ability of all groups to accomplish their missions? Remember that competition between groups to serve the same agencies is always counter-productive.

Communications Systems Failure Modes

Once you decide which types of disasters are most likely to occur, you need to determine which communication systems will likely fail, when, and how. This information allows you to create a disaster communication response plan that fits the need.

There are two general modes of communication system failure to consider. In a hurricane the first to occur is usually "call volume overload", followed by infrastructure damage and failure. A tornado will likely produce the same two results, but in the opposite order. This is significant for two reasons. In the hurricane example, you will have time to "ramp up" your support as the communication systems deteriorate. In the tornado example, the maximum effect will be almost immediate. For planning purposes, these two situations could be characterized as having "gradual" and "immediate" needs.

Telephone network overload occurs when the number of attempted calls exceeds the system's simultaneous call capacity. Most telephone networks are designed so that at normal peak loads, your probability of being able to make a call is 90% to 95%. When a disaster occurs, the call volume can increase more than a hundred-fold beyond the normal peak load, and the probability of being able to complete a telephone call drops tremendously.

Cellular telephone networks fail for the same reasons wireline networks do, with the additional liability of a more fragile infrastructure. Antennas and towers can fail, and microwave links between cells and switching centers can be damaged quite easily. Add in call volume overload, and you can quickly understand why cellular networks should never be relied upon as a replacement for landline (wired) networks in a disaster situation.

Public safety communication networks suffer from the same general modes of failure as telephone systems. In addition, public safety agencies are labor-intensive operations, and quickly run short of personnel to do the communicating. Available personnel work around the clock with adrenaline pumping, they become physically exhausted, tempers grow short, and the ability to cope with the disaster diminishes.

Organizations like the American Red Cross and Salvation Army have minimal communication systems of their own, and are not equipped to deal with the large volume of message traffic a disaster brings. American Red Cross has limited national communication assets that can be moved into a large disaster area as needed, but this takes considerable time and is seldom enough. Since they are generally dependant on telephone service and very limited radio systems in a disaster situation, these organizations are almost automatically in "overload" mode without outside radio communication support.

Designing Local Emergency Communications Plans

At this point, you should know which communication systems could fail, when, why, and how, for each potential disaster on your list. Using what you will learn in the next LU, Network Theory and Design of Emergency Communication Systems, you can begin to design the networks necessary to supplement and replace failing systems. This should include a list of different types of nets, station locations, equipment, and staffing needs.

Staffing Plans

The staffing plans will help you determine how many operators you will need for the various assignments in your plan, which skills will be required, and when they will be needed. Begin by estimating how many operators will be required to staff each net, allowing enough in reserve to work all shifts, replace those who cannot remain on duty, and cover other contingencies. This information is covered in ARECC Level I.

Do you have enough local members and other hams to meet your staffing needs in all cases? Probably not. This means that you will need some outside assistance, and the time to plan for that is now, not when your world is coming apart at the seams. Whenever it is possible, have more than one back-up plan in place.

A major emergency usually brings unsolicited offers of help. Suggestions for handling this are covered in Appendix F, Receiving and Processing Walk-Ins.

A call to your DEC or SEC can bring more aid from an ARESMAT or neighboring areas, so be sure to discuss your response plan with them to learn what resources may be available. Ask your DEC or SEC to help you make contact with any ARESMAT teams or other groups just outside your region to learn their capabilities. Remember that these capabilities may be different from one day to the next. If the emergency affects them as well, they may not be able to help at all. Even if it does not, key members of the team or certain equipment may not be available.

Use your core team members for the most critical assignments. You know their skills, level of training and commitment, and the physical resources they bring along. They know each other, the area, your response plan, and local resources better than outside "reserve" help will. Less critical positions can be filled from outside the core team. In a disaster situation, you never know who will be available. Avoid

making "cast in stone" assignments. Rather, group your members into "skill areas." Instead of assigning Joe as net control for the tactical net, create a list of potential net control operators. In addition to skills, consider equipment. A member with only a hand-held radio might not be a good choice to quickly establish a net control station in the field, but fine for the same job at a fully equipped EOC.

Physical Assets and Resources

These will include possible operating locations, including EOCs and shelters, group and individually owned equipment, repeaters, vehicles, temporary shelters, feeding equipment, or any other assets you might need. Create a list of potential needs first, and then identify resources. You might choose to list equipment by source, or by type, or both. For instance, you might list your members and other sources, and then the assets each have available. This way, you will know that when you ask Joe to set up a station at the local shelter, he will likely have a dual band radio, portable antennas, and backup batteries. On the other hand, if you need a particular asset, such as a portable HF station, you could look up "HF Stations, portable" on your asset list, and see that Mike and Harry have them.

Time Lines

For every disaster, there is a fairly predictable progression of events that involve responders. The duration of each phase will depend upon the type of disaster - hurricanes last longer than tornadoes. For each potential disaster on your list, develop a time line and the actions that must be taken by your team during each phase. Also note that not every disaster has all phases.

Preparedness » Warning » Mitigation » Operational » Recovery » Stand-down

The preparedness phase takes place in the months and years before a disaster occurs. Plans are written, exercised and refined, resource lists developed, equipment installed, and staff trained.

The warning phase may occur before the event has occurred, such as with a storm, or afterward as would happen with a chemical incident. In the case of a storm, this phase includes both the storm watch and storm warning periods. During this phase, emergency communications groups should assess the likelihood that they will be called upon to help. If appropriate, team members should be put on alert and asked to make early preparations.

In the mitigation phase, the community takes action to reduce the potential impact of the impending disaster. In a hurricane, boarding up windows and shoreline evacuations would take place. During this phase, emergency communications groups are moving in and setting up. With a tornado, this phase would barely exist, and emergency communications set up would occur in either the operational or recovery phase.

The operational phase begins when the disaster occurs. During this time, emergency communications teams do their best to meet the needs of the served agency and keep themselves safe.

The recovery phase begins once the "storm" has passed and the cleanup begins. The emergency communications team's job doesn't end here, because it will take a while for communication systems to recover. Telephone and power will remain out of service for some time, and served agencies will continue to assist the public.

The stand-down phase begins as conventional communication facilities resume normal operation and the served agencies no longer require your services. Networks are gradually closed and the teams begin to head home as they are released.

Flexibility

No two disasters are ever the same, and no two will have exactly the same effect on communication needs. Generals are often accused of "fighting the last war", something we would do well to avoid. Keep plans simple and flexible enough to adapt and survive as the situation changes. Provide alternatives to every plan should the situation go beyond the capabilities of the primary plan. For example, your telephone tree notification system could be rendered useless by a tornado uprooting utility poles, and destroying local repeater towers. A backup plan might involve one or more distant but useable repeaters that members should tune to for instructions once they become aware of the disaster, or a designated simplex frequency.

Training and Education

The best plan will fail unless all involved know their part in it. This is where a training program comes in. Training never stops - it is a continuous cycle that ensures that all team members are able to do their best when called upon. Some training program elements might include:

1. All three levels of the ARRL Amateur Radio Emergency Communications Course, (ARECC), for all members, over time.
2. General understanding of the plans and how they work.
3. Specific skills, such as message formatting, equipment operation, and emergency field repairs.
4. Net operations, both tactical and formal traffic handling.
5. Implementing or testing operational elements, such as message routing and forms,
6. Full scale drills and simulations, including the annual SET.
7. Communication support for public service events such as walk-a-thons and parades.
8. Backup plans and "work-arounds."

District Emergency Coordinators and Emergency Coordinators are responsible for ensuring that all ARES® members in their jurisdictions are properly trained. The following guidelines should be considered minimum training levels:

Position	Suggested Minimum Training Level
District Emergency Coordinator	ARECC Levels EC001, EC002
County Emergency Coordinator	ARECC Level EC001
Assistant EC for Planning (county/district)	ARECC Levels EC001, EC002, EC003
ARES® members	ARECC Level EC001 (suggested)

Table 5. Suggested Minimum Training Levels

Designing Emergency Communications Systems

Planning and Preparation-The Keys to Success

Serious communications planners should give advance thought to the kinds of information that might need to be passed during each kind of emergency they wish to consider. Will maps need to be

transferred? What about long lists of names, addresses, supplies, or other detailed identification? Will the communication consist mostly of short status reports? Will the situation likely require transfer of detailed instructions, directions, or descriptions? Will they originally be in verbal, written, or electronic form?

Planners should next consider the origins and destinations of the messages. Will one station be disseminating information to multiple remote sites? Will there be a lot of one-to-one messages? Will one station be overloaded while others sit idle? Will a store-and-forward system, even via voice, be useful or necessary?

The content of the messages should also be considered. Will a lot of confidential or sensitive information be passed? Will there be a need for break-in or interruption for pressing traffic or can one station utilize (tie up) the communications link for a while with no adverse consequences?

Along with the message analysis described above, the frequency of occurrence (count of messages) of each type should also be estimated.

Then, in the most important step, the characteristics of the high-volume messages should be matched to one or more appropriate communication pathways.

Once you have identified the ideal pathways for the most common messages, the next step is to take action to increase the likelihood that the needed modes will be available during the emergency. Hams take pride in their "jump kit" emergency packs containing their 2-meter radios, extra batteries and roll-up antennas. How about doing the same thing for some additional communication modes, too? Put a list of critical phone numbers (including fax numbers, pager numbers, cellular numbers) in your kit. Make sure your local packet digipeater has battery backup. If you are likely to be assigned to a school, church, or office building, see if you can get a copy of the instructions for using the fax machine to keep in your kit. If the phones are out, know how to interface the fax machine to your radio.

Advance scouting may be needed. It is a good idea to see if fax machines are in place and whether they will be accessible in an emergency. Is there a supply of paper available?

Are the packet digipeaters within range of every likely communication post? Can computers be made available or will hams have to provide their own? How will backup power be provided to the computers? Can a frequency list be developed, along with guidelines of when and how to use each frequency?

Contingency planning is also of critical importance. How many times has a repeater gone down, and only then did the communicators wish they had agreed in advance on an alternate simplex frequency? What will you do if you need to send a map and the fax machine power fails? Suppose you are relying on cellular phones and the cellular network fails? Remember, if you plan for problems, they cease to be problems and become merely a part of the plan.

The final step is training. Your manning roster, assignment lists, and contingency plans need to be tied in to the training and proficiency of your volunteers. Questions you might want to ask are: Who knows how to use a cellular phone? Who knows how to use fax software? Who knows how to upload or download a file from a packet BBS? Who knows how to touch-type?

By matching your needs with your personnel, you can identify areas where training is needed. Club meeting programs and field trips provide excellent opportunities for training, as well as building enthusiasm and sharing knowledge of the plans. You will be surprised at how a little advance planning

and effort can go a long way to turning a volunteer mobilization into a versatile, effective, professional-quality communication system.

Characteristics of Messages

Single versus Multiple Destinations

There are major differences between broadcasting and one-to-one (exclusive) communication channels. Some messages are for one single addressee while others need to be received by multiple locations simultaneously. And some messages addressed to one destination can be useful and informative to "incidental" listeners, like the National Weather Service. A specific instruction to a particular shelter manager is a completely different kind of communication than an announcement to all shelters. Yet, it is common to hear these messages on the same communications channel.

High Precision versus Low Precision

Precision is not the same as accuracy. All messages must be received accurately. But sending a list of names or numbers requires precision at the "character" level, while a report that "the lost hiker has been found" does not. Both may be important messages and must be transferred accurately. But one involves more precision.

Over low-precision communications channels (such as voice modes) even letters of the alphabet can be misinterpreted unless a phonetic system, feedback, or error-correcting mechanism is used. Conversely, typing out a digital message that "the delivery van containing the coffee has arrived at this location" on a high-precision packet link can be more time consuming (and inefficient) than a simple voice report.

Complexity

A doctor at a hospital may use a radio to instruct an untrained field volunteer how to splint a fractured leg. A shelter manager may report that he is out of water. The level of complexity varies greatly between these two messages.

Some messages are so long and complicated that the recipient cannot remember or comprehend the entire message upon its arrival. Detailed maps, long lists, complicated directions, and diagrams are best put in hard copy or electronic storage for later reference. This avoids the need to repeat and ask for "fills," activities that tie up the communication channel. Some modes, such as fax and packet radio, by their very nature generate such reference copy. Others (such as voice modes) do not, and require a time-consuming conversion step.

Timeliness

Some messages are extremely time-critical, while others can tolerate delays between origination and delivery without adverse effect. Relief workers and their communicators can be very busy people. Requiring a relief worker to handle a non-time-critical message may prevent them from handling a more pressing emergency. Also, a message might need to be passed at a time when the receiving station is tied up with other business, and by the time the receiving station is free the sending station is then occupied. In these cases, provision can be made for "time shifting"-the message can be left at a drop point for pickup when the receiving station becomes free. Conversely, highly time-critical messages must get through without delay.

Timeliness also relates to the establishment of a communications link. Some modes, such as telephones, require dialing and ringing to establish a connection. An operator of a base station radio may need to track down a key official at the site to deliver a message. What matters is the total elapsed time from the time the message originates to the time it is delivered to its final party.

Priority
The concept of priority as used by Network Theory is better known to hams as QSK, the ability to "break in" on a communication in progress. For example, a communication pathway is in use with a lengthy, but low-priority, message. A need suddenly arises for a high-priority message. Can the high-priority message take precedence and interrupt the low priority one to gain access to the channel? Some communications modes allow for this; others do not.

Characteristics of Communication Channels

Now that we have looked at the different message characteristics, let's consider the communication channels that might be used in an emergency. In addition to the concepts of destination, precision, complexity, timeliness, and priority, communication channels also can be evaluated in terms of their reliability and ease of use. Communications on this mode come to a halt, regardless of priority or criticality.

Cellular Phones
Cellular phones offer advantages that make them attractive: they are simple to operate and do not require a separate, licensed communication volunteer. They are lightweight and can be carried in a pocket, eliminating the need for tracking individuals as they move around.

Like landlines (and unlike devices used in Amateur Radio), cellular phones are ideally suited to one-on-one communications, avoiding distraction to stations not involved in the message exchange. They are unsuitable for multiple-recipient messages that are better handled on a broadcast-capable communications mode.

Like the landline telephone system, cellular phones are not self-contained communications units. They are reliant on a complex central switching and control system. If the central base station goes down, or if its links with the other components of the phone system fail, cellular phone communication comes to a halt. There is no "go to simplex" contingency option with cellular phones.

Fax
Fax machines overcome the limitations of voice communications when it comes to dealing with high-precision, lengthy, and complex information. A four-page list of first-aid supplies, for example, can be faxed much faster than it can be read over a voice channel and transcribed. Fax machines can transfer drawings, pictures, diagrams, and maps, information that is practically impossible to transfer over voice channels.

Today, fax machines are widely available. Most organizations use them as a routine part of their business communications. It is becoming more and more likely that a fax machine will be found at the school, church, hospital, government center, or other institution involved in emergency or disaster-relief efforts. Most of today's computers (even laptops!) are equipped with modems that can send and receive fax information.

Another advantage of fax machines is their production of a permanent record of the message as part of the transfer process. They also facilitate "time-shifting." But they rely on the phone system, and add one more piece of technology and opportunity for failure. Except for laptop modems, they generally require 120-V ac current, which is not always available during emergencies unless plans have been made for it.

Two-Way Voice Radio
Whether on the public service bands or ham frequencies, whether SSB or FM, via repeater or simplex, voice radio is simple and easy to operate. Most units can operate on multiple frequencies, making it a

simple matter to increase the number of available communication circuits as the need arises. Most importantly, the units are generally self-contained, enhancing portability and increasing reliability of the system in adverse environmental conditions.

Radios are ideal for broadcasting. On the flip side, though, while a message is being transferred between two stations, the entire channel is occupied, preventing other stations from communicating. Using radio for one-to-one communication can be very distracting to stations not involved in the exchange. (The most common example of inefficient use of communication resources is a lengthy exchange between two stations on a channel being shared by a large number of users.) Also, radios suffer from the low precision inherent in voice modes of communication.

Trunked Radio Systems

These systems are becoming highly popular with public service agencies. They are similar to the standard voice radio systems described above with two exceptions. Unfortunately, both exceptions have a direct (and adverse) impact on the use of trunked systems in emergency and disaster situations.

The first has to do with the fundamental purpose behind trunking. Trunked systems came into being to allow increased message density on fewer circuits. In other words, more stations could share fewer frequencies, with each frequency being utilized at a higher rate. Under everyday circumstances, this results in more efficient spectrum use. But when an emergency strikes and communication needs skyrocket, the channels quickly become saturated. A priority queue results, and messages are delayed. Medium and low priority messages, and even some high-priority messages, might not get through.

The second difference deals with the way that frequencies are shared. Trunked systems rely on a complex central signaling system to dynamically handle the mobile frequency assignments. When the central control unit goes down for any reason, the entire system ' base and mobile units ' must revert to a pre-determined simplex or repeater-based arrangement. This fallback strategy is risky in emergency situations because of the fewer small number of frequencies of available to the system.

Packet Radio

As already mentioned, voice modes are ideal for low-precision messages. Digital modes, on the other hand, facilitate high-precision message transfer. Modes such as packet radio ensure near-perfect accuracy in transmission and reception. And like fax machines, packet has the ability to provide a relatively permanent record of the message for later reference.

The packet mode has another advantage when dealing with information that is in electronic form: there is no need for a conversion step before transmission. This is especially valuable when the information being sent is generated by machine (such as automated weather sensors, GPS receivers, or shelter management computers).

Packet stations are generally self-contained, and if located within line-of-sight, do not need a central switching system.

Unlike fax machines, packet radio systems are perfect for the distribution of high-precision information to a large number of destinations simultaneously. And the automated retry feature means that several connections can share a single frequency simultaneously, effectively increasing the capacity of the channel.

Among its disadvantages, real-time packet messages require the operator to use a keyboard. This makes the mode unacceptable for low-precision but lengthy messages, such as describing an injury or giving a status report, especially where the operator is not a fast typist. Due to its need for perfect transmission accuracy, it may not be reliable along marginal RF paths. And unlike fax machines, most of today's

common packet protocols are inefficient when transferring precision graphics, drawings, and all but the most rudimentary maps.

Store-and-Forward Systems
Sometimes considered a subset of packet radio, store-and-forward systems (bulletin boards, messaging gateways, electronic mailboxes, etc) can handle non-time-critical messages and reference material, enabling communication in situations where sender and receiver cannot be available simultaneously. These systems also increase the effective capacity of a communication channel by serving as a buffer. When a destination is overloaded with incoming messages, the store-and-forward unit can hold the messages until the receiver is free.

It is important to remember that store-and-forward systems are not limited to digital modes. Voice-answering machines, and even an NTS-like arrangement of liaison stations can function as voice-based store-and-forward systems.

Telephones
The pathway most familiar to non-hams is the telephone. This voice-based mode is surprisingly reliable, and can be operated without the need for specialized communication volunteers. It is often fully operational with plenty of unused capacity during localized and small-scale emergencies, but can quickly become overloaded during large-scale disasters.

The telephone system is very good for transferring simple information requiring low precision. Since this mode utilizes the human voice, transferring a large amount of high-precision data (such as spelling a long list of names or numbers) can become tedious and time consuming.

The telephone system is a one-to-one communication pathway, meaning it cannot be used for broadcasting. But, the one-to-one relationship between sender and receiver makes it ideal for messages containing sensitive or confidential information, such as casualty lists.

The exclusive nature of telephone circuits makes it difficult or impossible to break-in on a conversation to deliver a higher-priority message. And the need for break-in usually precludes leaving the channel open continuously between two points, resulting in the need to dial and answer each time a message needs to be sent.

The major drawback to telephones during emergency situations is that the sending and receiving stations are not self-contained. The system requires wires and cables that can be damaged or destroyed during severe weather. And when the central switching center goes down or becomes overloaded, all

Appendix A. County Threats Assessment Sorted by Aggregate Risk

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Assessment Criteria

This assessment is based on the four most significant (from the perspective of likelihood of occurrence, impact to the community and requirement for amateur radio resources) disaster threats in Georgia: floods, hurricanes, tornadoes and winter storms. Each threat was assigned a number corresponding to low risk (1), medium risk (2), or high risk (3). The numbers were assigned county-by-county, based on several risk factors for the county with regards to the specific threat:

- All counties were first assigned a low risk (1) for each threat.
- The GEMA report indicating number of tornado events by county from 1950 - 2000 was used to establish a risk for tornado for each county-the numbers were assigned as follows: counties with 13 to 23 events were assigned a high risk (3); counties with 5 to 12 events were assigned a medium risk (2) and counties with 0 to 4 events were left at a low risk (1).
- The risk was increased by .5 for counties that had received a presidential disaster declaration (according to GEMA) for a tornado from 1990 - 2000
- The risk was increased to medium risk (2) for counties that had received a presidential disaster declaration for flood, hurricane or winter storm from 1990 - 2000 were The risk was increased from medium risk (2) to high risk (3) for the 6 coastal counties identified by GEMA as highest risk of storm surge in a hurricane for the two categories, Floods and Flash Floods, and Hurricane.
- The risk for all four categories of threat were aggregated and averaged.
- The list of counties was then sorted first by aggregated risk, then by the 2001 US Census estimate of county population.

County populations and aggregate risk are highlighted in color according to the following scale:

- 2001 Population > 500,000 highlighted in RED.
- 2001 Population > 100,000 highlighted in YELLOW.
- 2001 Population > 50,000 highlighted in GREEN.
- 2001 Population > 25,000 highlighted in AQUA.

County Threats Assessment Sorted by Aggregate Risk

County	Population	District	Average Risk	Aggregate Risk	Floods and Flash Floods	Hurricanes	Tornadoes	Winter Storms
Chatham	232,064	8	3	11	3	3	3.0	2
Glynn	68,217	8	3	11	3	3	3.0	2
Liberty	60,107	8	3	11	3	3	2.5	2
Fulton	816,638	3	2	10	2	2	3.5	2
Cobb	631,767	3	2	10	2	2	3.5	2
Carroll	91,956	1	2	10	2	2	3.5	2

County	Population	District	Average Risk	Aggregate Risk	Floods and Flash Floods	Hurricanes	Tornadoes	Winter Storms
Floyd	91,183	1	2	10	2	2	3.5	2
Bryan	24,552	8	2	10	3	3	1.5	2
Meriwether	22,625	4	2	10	2	2	3.5	2
Hall	145,664	2	2	9	1	2	3.5	2
Whitfield	85,248	1	2	9	2	2	2.5	2
Bartow	80,026	1	2	9	1	2	3.5	2
Walker	61,884	1	2	9	2	2	2.5	2
Spalding	59,066	5	2	9	2	2	2.5	2
Gordon	45,555	1	2	9	2	2	2.5	2
Camden	44,061	8	2	9	2	3	2.0	2
Colquitt	42,201	7	2	9	2	1	3.5	2
Polk	38,843	1	2	9	2	2	2.5	2
Murray	37,747	1	2	9	2	2	2.5	2
Habersham	37,153	2	2	9	1	2	3.5	2
Decatur	28,175	7	2	9	1	2	3.5	2
Upson	27,711	5	2	9	2	2	2.5	2
Haralson	26,255	1	2	9	2	2	3.0	2
Pickens	24,716	1	2	9	2	2	2.5	2
McIntosh	11,085	8	2	9	3	3	1.0	2
Talbot	6,703	4	2	9	2	2	2.5	2
Gwinnett	621,528	3	2	8	1	2	2.5	2
Clayton	246,979	3	2	8	2	2	2.0	2
Cherokee	152,170	3	2	8	1	2	3.5	1
Henry	132,581	3	2	8	2	1	2.5	2
Houston	113,391	5	2	8	2	1	3.0	2
Douglas	96,006	3	2	8	2	2	2.0	2
Lowndes	92,250	7	2	8	2	1	3.0	2
Paulding	89,734	1	2	8	1	2	2.5	2
Rockdale	71,798	3	2	8	2	2	2.0	2
Catoosa	55,197	1	2	8	2	2	1.5	2
Effingham	39,616	8	2	8	2	1	2.5	2
Tift	38,634	7	2	8	2	1	3.5	1
Harris	24,548	4	2	8	2	2	3.0	1
Mitchell	24,053	7	2	8	2	1	3.5	1
Grady	23,714	7	2	8	2	1	2.5	2
Monroe	22,153	5	2	8	2	1	2.5	2
Lumpkin	21,855	2	2	8	1	2	2.5	2
White	21,182	2	2	8	1	2	2.5	2
Dodge	19,193	8	2	8	2	1	2.5	2
Dawson	17,176	2	2	8	1	2	2.5	2
Dade	15,508	1	2	8	2	2	1.5	2

County	Population	District	Average Risk	Aggregate Risk	Floods and Flash Floods	Hurricanes	Tornadoes	Winter Storms
Rabun	15,318	2	2	8	1	2	2.5	2
Pike	14,253	5	2	8	2	2	1.5	2
Early	12,282	7	2	8	2	2	3.0	1
Dooly	11,651	5	2	8	2	1	3.5	1
Muscogee	184,134	4	2	7	2	2	2.0	1
Bibb	153,549	5	2	7	2	1	2.0	2
Forsyth	110,296	2	2	7	2	1	2.0	2
Clarke	101,800	2	2	7	2	1	2.0	2
Dougherty	95,723	7	2	7	2	1	3.0	1
Fayette	95,542	3	2	7	2	2	1.0	2
Coweta	94,571	1	2	7	2	2	2.0	1
Newton	68,047	3	2	7	2	1	2.0	2
Troup	59,748	4	2	7	2	2	2.0	1
Bulloch	56,918	8	2	7	2	1	2.0	2
Barrow	48,946	2	2	7	1	2	1.5	2
Laurens	45,378	8	2	7	2	1	2.0	2
Thomas	43,012	7	2	7	2	1	2.0	2
Coffee	37,815	8	2	7	2	1	2.0	2
Ware	35,540	8	2	7	2	1	2.0	2
Wayne	26,945	8	2	7	1	1	2.5	2
Toombs	26,115	8	2	7	2	1	2.0	2
Gilmer	24,349	1	2	7	2	1	2.0	2
Jones	24,203	5	2	7	2	1	2.5	1
Worth	21,938	7	2	7	2	1	3.0	1
Fannin	20,661	2	2	7	2	1	2.0	2
Union	17,902	2	2	7	1	2	1.5	2
Appling	17,472	8	2	7	2	1	2.0	2
Ben Hill	17,242	7	2	7	2	1	2.0	2
Brooks	16,397	7	2	7	2	1	2.0	2
Lamar	16,260	5	2	7	2	1	2.0	2
Berrien	16,091	7	2	7	2	1	2.0	2
Pierce	15,698	8	2	7	2	1	2.0	2
Screven	15,177	8	2	7	2	1	2.0	2
Oglethorpe	12,969	2	2	7	2	1	2.0	2
Crawford	12,559	5	2	7	2	1	2.0	2
Bleckley	11,735	5	2	7	2	1	2.0	2
Telfair	11,692	8	2	7	2	1	2.0	2
Heard	11,229	1	2	7	2	2	1.5	1
Bacon	9,993	8	2	7	2	1	2.0	2
Towns	9,641	2	2	7	1	2	1.5	2
Candler	9,508	8	2	7	2	1	1.5	2

County	Population	District	Average Risk	Aggregate Risk	Floods and Flash Floods	Hurricanes	Tornadoes	Winter Storms
Randolph	7,644	7	2	7	2	2	2.0	1
Marion	7,204	4	2	7	2	2	2.0	1
Calhoun	6,307	7	2	7	2	2	2.0	1
Stewart	5,145	4	2	7	2	2	2.0	1
Taliaferro	2,034	6	2	7	2	1	2.0	2
DeKalb	665,133	3	2	6	2	1	2.0	1
Richmond	198,366	6	2	6	2	1	2.0	1
Baldwin	44,806	5	2	6	2	1	1.0	2
Jackson	44,010	2	2	6	1	1	2.0	2
Sumter	33,319	4	2	6	2	1	2.0	1
Oconee	27,059	2	2	6	1	1	2.0	2
Chattooga	25,901	1	2	6	2	1	1.0	2
Stephens	25,651	2	2	6	1	1	2.0	2
Lee	25,539	7	2	6	2	1	2.0	1
Peach	24,196	5	2	6	2	1	2.0	1
Hart	23,087	2	2	6	1	1	2.0	2
Tattnall	22,385	8	2	6	2	1	2.0	1
Crisp	22,133	7	2	6	2	1	2.0	1
Emanuel	21,859	8	2	6	2	1	1.0	2
Washington	21,042	5	2	6	1	1	2.0	2
Franklin	20,783	2	2	6	1	1	2.0	2
Elbert	20,648	2	2	6	1	1	2.0	2
Butts	20,629	5	2	6	2	1	1.0	2
Jefferson	17,090	6	2	6	2	1	2.0	1
Cook	15,855	7	2	6	2	1	2.0	1
Chattahoochee	15,134	4	2	6	2	2	1.0	1
Brantley	14,877	8	2	6	2	1	1.0	2
Macon	14,133	4	2	6	2	1	2.0	1
Jasper	11,904	5	2	6	2	1	1.0	2
Terrell	10,943	7	2	6	2	1	2.0	1
Evans	10,738	8	2	6	2	1	1.0	2
Twiggs	10,589	5	2	6	2	1	2.0	1
Charlton	10,393	8	2	6	2	1	1.0	2
Hancock	10,065	5	2	6	1	1	3.0	1
Irwin	10,028	7	2	6	2	1	2.0	1
Turner	9,621	7	2	6	2	1	2.0	1
Pulaski	9,598	5	2	6	2	1	2.0	1
Seminole	9,365	7	2	6	2	1	2.0	1
Taylor	8,836	4	2	6	2	1	2.0	1
Jenkins	8,637	8	2	6	2	1	2.0	1
Montgomery	8,361	8	2	6	2	1	1.0	2

County	Population	District	Average Risk	Aggregate Risk	Floods and Flash Floods	Hurricanes	Tornadoes	Winter Storms
Lanier	7,140	7	2	6	2	1	1.0	2
Wheeler	6,183	8	2	6	2	1	2.0	1
Clay	3,390	7	2	6	2	2	1.0	1
Quitman	2,610	7	2	6	2	2	1.0	1
Columbia	92,427	6	1	6	2	1	1.5	1
Putnam	19,094	5	1	6	2	1	1.5	1
Greene	14,914	5	1	6	1	1	1.5	2
Banks	14,847	2	1	6	1	1	1.5	2
Wilkes	10,688	6	1	6	1	1	1.5	2
Walton	65,224	2	1	5	1	1	2.0	1
Madison	26,214	2	1	5	1	1	2.0	1
Burke	22,591	6	1	5	2	1	1.0	1
McDuffie	21,286	6	1	5	2	1	1.0	1
Jeff Davis	12,762	8	1	5	2	1	1.0	1
Long	10,548	8	1	5	1	1	1.5	1
Wilkinson	10,300	5	1	5	2	1	1.0	1
Wilcox	8,709	7	1	5	2	1	1.0	1
Johnson	8,578	8	1	5	2	1	1.0	1
Lincoln	8,424	6	1	5	1	1	1.5	1
Atkinson	7,571	8	1	5	2	1	1.0	1
Clinch	6,833	7	1	5	2	1	1.0	1
Treutlen	6,787	8	1	5	2	1	1.0	1
Miller	6,381	7	1	5	2	1	1.0	1
Baker	4,102	7	1	5	2	1	1.0	1
Schley	3,921	4	1	5	2	1	1.0	1
Echols	3,726	7	1	5	2	1	1.0	1
Webster	2,301	4	1	5	2	1	1.0	1
Morgan	16,153	5	1	4	1	1	1.0	1
Warren	6,274	6	1	4	1	1	1.0	1
Glascock	2,583	5	1	4	1	1	1.0	1

Table 6. Georgia County Threats Assessment Sorted by Aggregate Risk

Appendix B. Disaster Declarations, 1990 - 2000

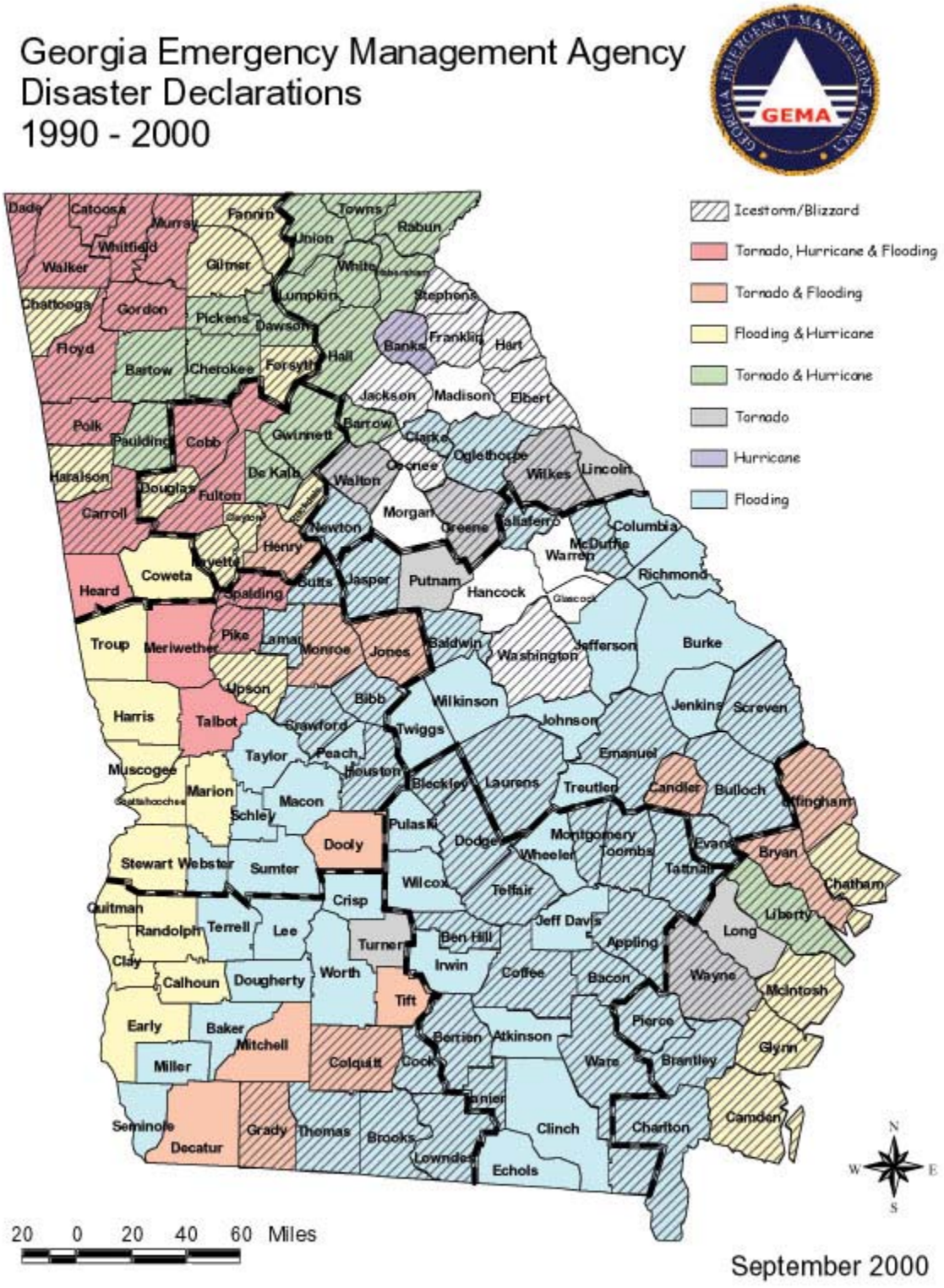

Figure 4. GEMA Disaster Declarations, 1990-2000

Appendix C. Tornado Events 1950 - 2000

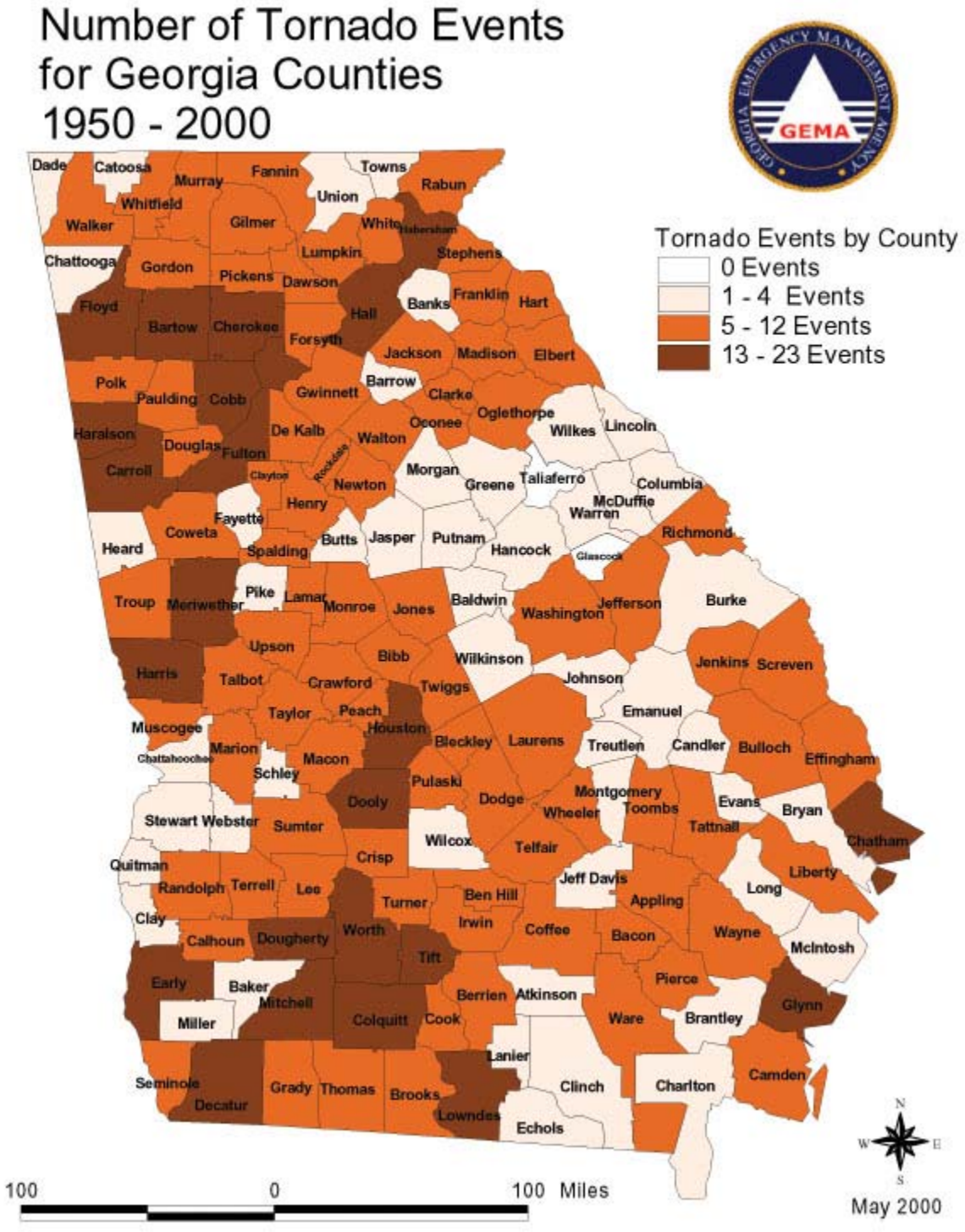

Figure 5. GEMA Tornado Events by County, 1950-2000

Appendix D. Hurricane Disasters

The material in this section comes from ARECC EC003, Learning Unit 15.

Introduction

Hurricanes are a fact of life for coastal and even inland residents from Texas to Maine, and can sometimes affect the west coast as well. A few years ago, one hurricane even bothered Arizona!

A hurricane starts with a weather disturbance, warm tropical oceans, moisture, and light winds aloft. These conditions can lead to the heavy winds, storm surge waves, torrential rains, and floods we associate with hurricanes. Each year, an average of ten tropical storms develop over the Atlantic Ocean, Caribbean Sea, and Gulf of Mexico. Many of these remain over the ocean. An average of six become hurricanes. In an average 3-year period, roughly five hurricanes strike the United States coastline, killing approximately 50 to 100 people anywhere from Texas to Maine. Of these, two are typically "major" or "intense" hurricanes (winds greater than 110 mph).

Amateurs have a long history of heavy involvement in the communication emergencies resulting from these storms. It is essential that ARES® and/or RACES leaders understand and be prepared for the potential rigors of a major hurricane.

What is a Hurricane?

A hurricane is a type of tropical cyclone, which is a generic term for a low-pressure system that generally forms in the tropics. The cyclone is accompanied by thunderstorms and, in the northern hemisphere, a counterclockwise circulation of winds near the earth's surface. The tropical developments leading up to a hurricane are classified as follows:

- **Tropical Wave:** A trough of low pressure in the trade-wind easterlies that can develop into a tropical disturbance.
- **Tropical Disturbance:** A moving area of thunderstorms in the tropics that persists for 24 hours or more. This is a common phenomenon in the tropics. During the summer, these can develop into tropical depressions.
- **Tropical Depression:** An organized system of clouds and thunderstorms with a defined surface circulation and maximum sustained winds of 38 mph (33 knots) or less.
- **Tropical Storm:** An organized system of strong thunderstorms with a defined surface circulation and maximum sustained winds of 39-73 mph (34-63 knots).
- **Hurricane:** An intense tropical weather system of strong thunderstorms with a well-defined surface circulation and minimum sustained winds of 74 mph (64 knots) or greater.

ARES® and RACES leaders must consider the type of storm defined above, and the track and speed of the storm in order to issue the appropriate alerts. Hurricanes are categorized according to the strength of their winds using the Saffir-Simpson scale. A Category 1 storm has the lowest wind speeds, while a Category 5 hurricane has the strongest. These are relative terms, because lower category storms can sometimes inflict greater damage than higher category storms, depending on where they strike, their forward speed, and the particular hazards they bring. In fact, even lowly tropical storms can also produce significant damage and loss of life, mainly due to flooding.

STATUS	WINDSKNOTS	WINDS MPH	PRESSURE	STORM SURGE
Depression	<35 kts	<38 mph	------	-----
Tropical Storm	35-63 kts	38-73 mph	------	-----
Category 1	64-82 kts	74-95 mph	966 mb	> 4 - 5 ft.
Category 2	83-95 kts	96-110 mph	980-965 mb	6 - 8 ft.
Category 3	96-113 kts	111-130 mph	964-945 mb	9 - 12 ft.
Category 4	114-135 kts	131-155 mph	944-920 mb	13 - 18 ft.
Category 5	136 kts+	156 mph+	<920 mb	>18 ft.

Table 7. Saffir-Simpson Scale

Hurricane Names

When the winds from these storms reach 39 mph (34 knots), the cyclone is given a name. The use of easily remembered names greatly reduces confusion when two or more tropical cyclones occur at the same time. Names are repeated on a five-year cycle, with different sets for Pacific and Atlantic storms.

Storm Surge

The "storm surge" is simply water that is pushed toward the shore by the force of the winds swirling around the storm. This advancing surge combines with the normal tides to create the "hurricane storm tide", which can increase the average water level by 15 feet or more. In addition, wind driven waves are superimposed on the storm tide. This rise in water level can cause severe flooding in coastal areas, particularly when the storm tide coincides with the normal high tides. Because much of the United States' densely populated Atlantic and Gulf Coast coastlines lie less than 10 feet above mean sea level, the danger from storm tides is tremendous.

The slope of the continental shelf also determines the level of surge in a particular area.

Storm tides, waves, and currents in confined harbors severely damage ships, marinas, and pleasure boats.

Bi-Directional Winds

Hurricane winds can deliver a "one-two" punch. When the storm first strikes an area, the winds are blowing in one direction. If the eye of the storm passes directly over the area, the "second half" of the storm will bring winds blowing in the opposite direction. Trees and structures that were weakened during the first "pass" are now more likely to fall or collapse as a result of the new forces in a different direction. Areas that are to one side or the other of the eye will not experience this effect.

Weather Service Alerts

One function of the National Hurricane Center and National Weather Service offices is to alert potentially affected residents in the target zone. These alerts must be received and acted upon immediately by ARES®/RACES leaders. The government alerts are categorized as follows:

- Tropical Storm Watch: A weather watch issued for coastal areas when there is a threat of tropical storm conditions within 24 to 36 hours
- Tropical Storm Warning: A weather warning issued for coastal areas when there is a threat of tropical storm force winds within 24 hours.
- Hurricane Watch: A weather watch issued for coastal areas when there is a threat of hurricane conditions within 24 to 36 hours.
- Hurricane Warning: A weather warning issued for coastal areas when there is a threat of hurricane force winds within 24 hours or less.
- Hurricane Local Statement: A weather statement issued by the National Weather Service, which details a hurricanes potential impact on a local area.
- Flash Flood Watch: A weather watch issued when there is a potential for flash flooding in a given area.
- Flash Flood Warning: A weather warning issued when a flash flood is imminent and immediate action is necessary.

Appendix E. Quick Response Teams (QRTs)

The material in this section comes from ARECC EC003, Learning Unit 7.

Introduction

Quick Response Teams (QRTs) can provide the initial amateur radio response to any emergency. The goal is an initial, coordinated operational response within 30 minutes of notification, followed by a more complete response within 3 hours.

The first response, QRT Level I, consists of trained and experienced members activating fully equipped emergency operating centers. By having radio equipment pre-positioned at primary EOCs, you can reduce the time and effort required getting on the air. A limited initial response to affected field locations may be accomplished by using "jump teams", provided that the site of the emergency does not require specialized safety equipment and initial communications can be accomplished with handheld or mobile VHF or UHF radios. QRT Level I members are activated using a telephone and pager notification system designed to reach members at any time of day or night, 365 days a year.

The second response by QRT Level II team builds on the response of the Level I team with a broader range of equipment, logistical supplies and interagency communications capability. Level II teams should be on-site and operational within three hours of the incident, and may need to be deployed in a "jump team" fashion in the field at shelters and temporary command centers. For this reason, Level II amateurs should be equipped and respond with both eight-hour and seventy-two hour packs. These field assignments may be done on the air, or as part of the initial activation as each situation dictates.

Operational Procedures for QRT Level I and II Teams

Emergency activations, or "call- ups", can be done in a number of ways. For Level I call-ups, the EC is usually notified and the notification system goes into action as outlined below. Notification continues to the Level II response, informing team members to monitor the local repeater for progress and assignments.

Sometimes, a team member may become aware of an incident before it becomes widely known. Ideally, team members should report the incident to the EC via telephone or radio. If time is of the essence, the local EC may be notified first, or the individual ham may be required to take more direct action.

Team members need not wait for notification to prepare for deployment. Depending on your local organization, there is also room for judgment on whether a particular emergency may require a physical response well ahead of formal notification. For that reason, having a QRT net on an agreed-upon frequency is important for coordination and real-time flexibility.

A Level I radio net is activated on a local repeater. This provides the EC with a way to coordinate the response and allows real-time reporting of progress while team members move to their assigned locations. As the EOCs and field stations become operational, the QRT Level I net may change into the local command, operations or calling net, as determined by local procedure or need. Soon after these nets become operational, the Level II teams should begin to arrive on-site and set up their stations.

For a given EOC site, separate groups of QRT operators may be identified based on their expected location during normal work and home hours. After initial notification, the assignment of manpower for the initial response is usually handled on an incident-by-incident basis and is coordinated on a local repeater.

Site Preparations for QRT Teams

Emergency Operating Centers (EOCs) with some amount of pre- installed radio equipment is key to the success of the QRT concept. Agencies that expect a communications response within thirty minutes of notification need to make provisions for a permanent station. Preinstalled antennas and coaxial cables are a minimum requirement. Additional equipment, such as radios, power supplies and accessories will mean that the responding amateur would only need to power up the station and do preliminary checks before becoming operational. This is much faster than wasting precious minutes installing personal equipment. Relying on personally supplied equipment also adds to the risk that a particular adapter or accessory cable may have been omitted, preventing the station from becoming immediately operational.

Ideally, the site should have:

- A desk or low counter, comfortable chair, lighting, telephone and access to a copier.
- Generator backup for radios, lights, and copier .
- Complete VHF and UHF FM stations with phone patch for tactical and command nets.
- A complete HF SSB/CW station for the operations net, with at least a 100-watt radio, phone patch, and DSP filter.
- Accessories might include headsets with footswitches for all stations, backup batteries, power amplifiers, etc.

Team Member Assignments

The key assignments included in both Level I and II responses are listed below. For each position, both primary and secondary persons should be assigned. This insures that each function still has coverage if the primary person is away, ill, or otherwise unavailable.

EC - The EC or their assistants provide the initial point of contact for activation, depending on how your section is organized. They usually receive word from the served agencies that an incident has occurred. In the event that another amateur has received information about an incident, the y should notify the EC immediately so that advance preparations can be made.

Notification System Team - The EC initiates the notification system and monitors the progress on the QRT net. Various methods exist for reaching team members. The usual methods use a pager and phone list, and/or an activation tone on a repeater network. To be most effective, the EC should initially contact only three team members. One calls the phone list, a second runs through a list of digital pager telephone numbers, keying in the activation code for the net. A third person can make phone calls to key ECs or their assistants, to ensure that they have been notified and accounted for. Upon completion, the person contacting the EC's should provide the EC and NCS with a list of those who could not be immediately contacted so that other means may be attempted. Each of the three team-members and several alternates must have current lists readily available at all times. Do not rely solely on the Internet for either list access or notification, since it may not be operational due to the conditions that precipitated the activation.

QRT Level I NCS (Net Control Station) - The EC informs the team member assigned as NCS of the situation, and the need to begin net operations. In the early stages of the net, the NCS can serve as both a

net control station and a bulletin station, providing check-ins with a situation assessment. The NCS may operate initially from home, office, or from a car while enroute to an EOC. Other situations may dictate a temporary NCS operating from wherever he happens to be until the permanent NCS can activate his EOC or other station.

Level I and II Radio Operators - Once activated, radio operators check into the QRT net and periodically report progress until they are able to activate their EOC or other assigned position.

Level II Team Member Assignments - In addition to the assignments above, a Level II response also includes these positions:

Public Information Officer (PIO) - The PIO dispenses appropriate information to media contacts on the nature and progress of the amateur radio response without divulging the contents of the communications. Two PIOs may be needed to provide sufficient rotation and backup, and to assure continuous monitoring of developments.

An assistant to collect information for the EC on team deployment and the state of emergency communications nets. If an incident is large enough to invoke mutual aid agreements, assistants to the EC will be needed to communicate and coordinate with other neighboring ECs to arrange and coordinate their response.

Advance Preparations for QRT Level I Teams

The preparations made by Level I team members are critical. Each member will require advance training and practice, a set of primary and secondary assignments, and have appropriate radio equipment and personal gear ready to go at a moment's notice.

Equipment - Each team member should have the following:

- A laminated wallet card containing information on the notification system and key phone numbers and frequencies.
- Identification, including FCC license, ARES®, RACES, Civil Preparedness, or Red
- Cross ID cards.
- Eight and twenty- four hour response packs, including water, food, medication, protective clothing/footwear and cash for personal needs.
- A vehicle equipped with a two- meter or dual band mobile radio. Amateur radio license plates and magnetic identification signs for the doors are desirable. Stop and fill the gas tank while responding, if possible.
- A handheld two- meter or dual band radio, with both spare Ni-Cad and alkaline battery backs, rubber duck antenna, telescoping whip, twenty- five foot RG-58 or mini-8 feedline, ribbon j-pole antenna, earphone/headset in fanny pack, shoulder carry bag or knapsack.
- Two-meter or dual band mobile radio, magnetic mount antenna, fifty feet of coaxial cable and a switching power supply in a portable carrying case or bag.

This is important for longer-range communication at shelters and command posts.

Education and Training - Well in advance of any emergency, all team members should complete the following training:

- The ARRL ARECC Level I course should be a minimum requirement.
- Orientation to local plans, procedures, and served agency missions.

- Specific training for both primary and secondary assignments.
- Experience in operating equipment at assigned EOCs.
- Experience as NCS in several regular and drill net sessions.
- Practice getting assigned stations operational within thirty minutes.
- Participation in a simulated activation designed to test the notification system.
- Periodic "refresher" training sessions.

Advance Preparations for QRT Level II Teams

Equipment - The equipment list for the Level II team can vary to meet the needs of a particular situation, but might include a mix of the following:

- Seventy-two hour personal packs, including water, food, medication, protective
- clothing/footwear and cash for personal needs.
- Portable operations center: tents, tables, chairs, generator, and lighting.
- Basic food preparation and sanitation equipment.
- Team members with more protective clothing, equipment and supplies.
- Long-haul VHF/UHF/Microwave stations.
- Portable HF stations with NVIS antennas.
- Portable repeater(s) with antennas and supports.
- APRS, IP and PSK31 digital communications stations.
- ATV stations.

Education and Training - Level II teams should receive the following training:

- See Level I team training above, plus...
- Training on specific equipment used by the Level II teams.
- Familiarization with field operations, including personal health and safety.

Appendix F. Receiving and Processing Walk-Ins

The material in this section comes from ARECC EC003, Learning Unit 19.

Handling New "Walk-In" Volunteers

One of the realities of emergency communication is that the pool of trained operators is almost always smaller than the need. While we would like to see more advance education and preparation, the reality is that a majority of operators offering to help will be under-trained.

As a result, essential and expedient basic training must be done on the spot. Knowing this, the emergency communication management staff needs to plan ahead. The results won't be perfect, but this is largely beyond our control.

Intake, Training and Orientation

If the operation is large enough to need one, assign a trained, experienced person to handle new volunteer evaluation, and provide some quick orientation and training. This person is often called an "intake coordinator". Based on the evaluation, this person can also make recommendations for potential assignments to the EC or human resources person. For smaller operations various individuals may share this function on as "as-needed" basis, or a single person may act as a general "resource" coordinator.

Publish a short handout in advance for on the spot training, and keep a supply in your group's jump kit. Give one to each walk- in to orient them to your organizational structure and standard procedures. It should include:

- A short discussion of volunteer "attitudes" and how they affect operations.
- Blanks lines for filling in call sign, agency assignment, the name of the agency contact person, and the location to which the person should report.
- General guidelines on Incident Command System (ICS), and the lead agencies involved.
- List of ARES® or RACES officials normally in charge.
- Key frequencies and telephone numbers.
- Key operating practices.
- Sample of a tactical message.
- Sample of the ARRL Radiogram message, and handling instructions.
- Short list of do's and don'ts.

Assigning Under-Trained or Inexperienced Volunteers

Walk-in volunteers without adequate training present both a challenge and an opportunity. We can almost always use more radio operators, but unless they can function well within the pre-established structure of your operation they can become a liability as well. Choose an assignment for each volunteer based on known skills, personality, and available equipment. In general, think about using the walk- in for less critical communications job assignments to free up better-trained operators.

If the walk- in doesn't have a valid ID, police, fire, or National Guard units may not allow them into the operational area. You may have to route the volunteer to another assignment outside the secured perimeter. Alternatively, during disaster operations there are often provisions for identifying walk- in

volunteers, and perhaps a special "communications walk- in" bracelet, tag or other identifying mark can be devised by officials on-the- fly. Another solution is to plan ahead by creating a supply of temporary ID cards to be issued to new volunteers. These should have an expiration date slightly past the anticipated end of operations, or contain the name of the event and date of issue with language such as "Good for above event only." In any event, be prepared to confront difficulties in this area.

Check for local or state emergency regulations dealing with a volunteer driving either their own or another vehicle during an emergency. If there is damage to the vehicle or if the volunteer is hurt in the process, will your local or state government provide coverage? In some jurisdictions, there are provisions for certifying the volunteer as a temporary state emergency worker so that they can be covered by state Worker's Compensation insurance while engaged in the emergency response.

Assignment Ideas

It is best to have the walk-in operate alongside a more experienced person. Shadowing a trained operator is a good way to orient a new volunteer to a particular job. After learning the basics they can act as a relief operator or free up a better-trained individual for a more critical task.

If a disaster involves community evacuation, the walk-in can report with his or her family to the nearest community evacuation shelter and either begin operations or act as relief for existing operators.

The walk-in can monitor frequencies for activity, handle logging in high traffic spots and act as a liaison between nets.

Those who are familiar with the area can provide transportation services while maintaining radio contact. If the volunteer is equipped with an HT or if they are using their own vehicle equipped with a mobile installation, then it can be used when arriving at a location to find key people in the receiving area.

If all other needs are met, or if the individual is not suited for more demanding work, they may be utilized for general assignments. Their radio would be used primarily to keep in touch with the head of operations. These jobs might include:

- Preparing and replenishing rest areas for the workers.
- Moving, handling and channeling in-bound materials and the associated workers.
- Updating status boards and message centers.
- Acting as a message runner.

Appendix G. Designing Successful Exercises

The material in this section is adapted from ARECC EC003, Learning Unit 7. The learning unit is based in part on a QST article by George Washburn, WA6YYM, District Emergency Coordinator and Chief Radio Officer of Santa Clara County, California.

Introduction

Drills, exercises, tests. By any name, periodic exercises are used to evaluate the effectiveness of training and plans just as classroom tests are used to test the effectiveness of teaching. Exercises are particularly important tools used to measure the readiness of trained organizations such as military units, public safety agencies or ARES®/RACES groups. They provide low risk-if not low stress-opportunities for the leadership to determine what works and what needs further development, and for participants to sharpen their communication skills. This is why the ARRL strongly recommends participation in its annual Simulated Emergency Test (SET).

However, exercises are only valuable if three conditions are met:

1. The goals of the exercise must be clearly articulated.
2. The correct type of exercise must be chosen and designed.
3. Feedback on exercise performance must be promptly given to all participants.

Exercise Goals

To be meaningful, exercises must have clearly defined goals. These may include:

- Introducing new procedures.
- Stressing a particular skill or network element.
- Re-testing some aspect of a prior exercise to measure any improvement in performance.
- End-to-end testing of a network system.
- Total system response to a given situation.

Choosing the Type of Exercise

There are three types of exercises most used by ARES® groups: full-scale, tabletop, and functional. Which one you choose depends on your goals. Full-scale exercises can help simulate the stresses that occur to network operations during a disaster. Tabletop and Functional exercises are good alternatives to the full-scale exercise for the introduction of new procedures and systems.

Your first few exercises should never be full-scale. Begin with smaller exercises that focus on individual elements of the response plan first. Once each element has been tested, put it all together in a full-scale exercise.

Full-Scale - SETs may be full-scale exercises with operators responding to EOCs and field locations. They're fun, complex and prone to failure, especially when a new procedure or system is introduced. While identifying areas that need improvement is a valuable part of any exercise, it's equally important that volunteer responders have a positive experience. Consider a full- scale exercise only when individual systems have been adequately tested on a smaller scale.

Tabletop - Tabletop exercises are especially valuable for introducing new procedures or techniques in a classroom setting. Their primary limitation is that fewer participants can be involved.

Tabletop exercises are essentially role-playing meetings. With one person serving as moderator, participants representing various locations or functions review their roles or respond to questions from other participants. No timeline is required although the discussion should follow a typical sequence of events. Tabletops allow the participants the luxury of interrupting the exercise to discuss any aspect of the drill. They are the best way to introduce new procedures because the feedback is immediate and heard by all present. Tabletops should be attended by ARES®/RACES leadership personnel who can take the lessons learned back to their membership for training prior to full- scale exercises.

Functional - Functional exercises may utilize the same facilities as full- scale drills, whether physical facilities such as EOCs or radio nets are used. Most participants perform their typical roles while a smaller group serves as simulators. Functional exercises can also be run with all participants communicating from their homes, simply adopting the roles they would have in a full-scale drill.

Like the tabletop, a net control station can moderate a functional exercise. Functional exercises held on the air can be scaled to allow as many or as few participants as the exercise designers choose, but all ARES®/RACES personnel can monitor the exercise for its training value, and to provide a post-exercise critique.

Consider tabletop or functional exercises as mid-term events to be held prior to the annual full-scale SET. They provide low-stress training opportunities which can be adjusted as they progress, something which is nearly impossible during full-scale exercises.

Design Elements

The success of any exercise is directly related to the amount and quality of planning that goes into it. Keeping in mind the goals of the exercise, a number of exercise design elements need to be considered.

Scenario evolution - Each simulation needs a starting point, one or more tests or challenges in succession, and an ending point. Think through your simulated situation in detail, but don't forget the goal of your exercise.

This is an example of a complex Full Scale hurricane scenario.

- Declaration of a hurricane warning (starting point)
- Pre-landfall preparation (planning test)
- Evacuation monitoring and reports (network test)
- Initial damage reports (network test)
- Shelter overload and supply shortages (network test)
- Communication failure at local hospital (challenge)
- Eye of storm passes over (coffee-break!)
- Further damage reports (network test)
- Health and Welfare traffic increases (network test)
- More shelters are opened for homeless (network test, asset challenge)
- National Guard moves in, requests communication support (asset challenge)
- And so it goes until demobilization occurs...

For each of these elements you will have to create in advance an appropriate number of messages and some background information to create a realistic situation. Since this is usually a "compressed time"

exercise, you won't need to generate as many as might really occur. Depending on your goals, you might need to throw a few "monkey wrenches" into the works, such as a repeater failure, an EOC flooding out, power failures, and so on to test back up systems and team flexibility. If you do this, however, be sure to warn participants ahead of time to expect some challenges, without giving away the actual problems. Surprises add stress, and this might not be desirable in a situation where they are not as ready to handle it as they would be during an actual disaster.

Network Design - Consider the communication networks you wish to test. Will it be only one or two, or every network in your emergency response plan? For instance, if you are testing a communication failure between a triage center and a hospital, you might have both a secure (digital mode) and tactical (voice mode) net. Be sure you have considered all possible communication paths that might be needed for the scenario to work as intended.

Asset Assignment - Among your assets are your team members and available equipment, as well as operating locations and facilities. Design the exercise with both in mind. It is OK to design an exercise that overwhelms your assets, but make sure that your stated goal reflects that.

Unless you are planning the full-scale simulation of a complete disaster response, make sure everyone knows where they are supposed to be and when, and what equipment they will need. Not every exercise needs to be a full simulation of emergency conditions.

Pre-exercise Communication - For your exercise to happen as you plan it, the participants and others who will be affected must be notified well in advance.

1. Develop a written in-house plan with full details of the event for internal use by planners. Create an outline listing the date and time, goals, scenario, responder locations, message types, net structure and exercise evaluation criteria.
2. From the full outline, write an announcement of the exercise with the "who, what, when, where and why" questions answered. List specific equipment participants will require. Be sure to indicate the level of challenge and stress to be encountered so that participants can be mentally prepared. Send this to all participants or to local ECs to be forwarded to their local members.

Develop a total exercise package for use by the simulators that includes a complete scenario. It should include:

- Detailed description of the simulated incident.
- List of conditions affecting field responders, such as whether their response will be impeded by simulated events.
- Timeline with start and stop times, timing of messages to be sent or generated.
- Radio plan with the function of each net, primary and alternate net frequencies
- and CTCSS tones.
- Instructions for field responders.
- Supply of appropriate forms.

Exercise Feedback

Tabletop exercises provide immediate feedback to all participants. On-the-air functional exercises can be immediately followed by critiques. Full-scale exercises, on the other hand, are usually of such a large scope that the demobilization process precludes an immediate critique. Also, SETs have reporting requirements that contribute to delays in providing feedback.

Letting exercise participants know how they did is important. Doing it in a timely manner and in a positive way are equally important. Prior to the exercise, determine what facilities exist to communicate feedback to all participants.

Appendix H. FCC Rules on Emergency Communications

The material in this section comes from ARECC EC003, Learning Unit 21.

Safety of Life and Property

First and foremost, in a situation involving the immediate safety of life and/or the immediate protection of property, and where no normal means of communication are available, the rules permit amateurs to use any means to send essential information [97.403]. This rule is straightforward and needs little interpretation. If someone's life or property is immediately threatened and no telephone is available, the last thing you want to do is waste precious time worrying about government regulations. But, be prepared in the aftermath of an incident to justify your action in a possible FCC or local law enforcement inquiry. If other means of communication such as an emergency call box telephone or public communication system are available, they should be used first, before "anything goes."

Stations in Distress

Another FCC rule states that "an amateur station in distress [is not prohibited from using] any means at its disposal to attract attention, make known its condition and location, and obtain assistance" [97.405(a)]. Also, it states that an amateur station may use any means of radio communication at its disposal to assist another station in distress.

Disaster Communications

The rules say "When normal communication systems are overloaded, damaged or disrupted because a disaster has occurred, or is likely to occur, . . . an amateur station may make transmissions necessary to meet essential communication needs and facilitate relief actions" [97.401(a)]. This rule is also straightforward: the FCC encourages the use of Amateur Radio for disaster communications.

Emergency Declarations

If a disaster disrupts normal communication, the District Director of the FCC Field Office for the area may restrict certain frequencies for use by stations assisting the stricken area only. All amateur transmissions with, or within, the designated area conducted on the FCC-designated emergency frequencies must pertain directly to relief work, emergency service or the establishment and maintenance of efficient networks for handling emergency traffic. If warranted, the FCC will declare a communications emergency. This usually happens several times each year, generally in connection with a severe hurricane, earthquake or other major event. The FCC may also set forth further special conditions and rules during the communication emergency. Only the FCC or its authorized representative can lift the conditions. Authorized amateurs desiring a declaration of a communication emergency should contact the FCC DD of the area concerned [97.401(c)]. There is an extensive discussion of this rule in Level II of this course. A word of caution about requesting a declaration by the FCC: the rules suggest that such protective declarations are intended to prevent or alleviate interference to emergency communications. If no interference is likely to occur, don't waste the FCC's time with a request for protection.

Confusion over "Business Communications"

When a large California forest was destroyed by wildfire, causing the evacuation of tens of thousands of mountain residents, hundreds of ham operators provided support communication for the US Forest Service, the California Department of Forestry, the American Red Cross and other relief agencies. This was a widespread emergency and normal fire and rescue channels were overloaded. Amateurs were called to provide assistance. Once the fires were out, several hams were heard asking, "were we legal?"

Of course they were legal, under both sections 97.401(a) and 97.403 discussed above.

The fact that this question was asked at all, under these circumstances, illustrates the confusing interpretations of the FCC rules within the amateur fraternity. As ARES® and/or RACES leaders, you need to discuss these issues with your members as part of your planning efforts.

The confusion stemmed from some old FCC rules. Around 1970, when amateur repeaters first became popular, concerns about possible abuses by non-amateur and business interests led the FCC to prohibit amateur communications "to facilitate the business or commercial affairs of any party" or "as an alternative to other authorized radio services."

Over time, the interpretations of these rules became progressively more literal until they had a chilling effect even on meritorious public service activities. Something had to be done to put things back on track.

In 1993, the FCC dropped the rather broad "no business" language, and replaced it with a more specific prohibition on communications for compensation, on behalf of one's employer, or in which the amateur has a financial interest [97.113(a)(2)(3)]. In place of the flat prohibition on providing an alternative to other radio services is a less restrictive one against doing so on a regular basis [97.113(a)(5)].

These changes meant a great deal to public service-oriented amateurs. They removed the ambiguities that plagued amateur public-service communications for years, and silenced the endless hair-splitting discussions about whether particular communications were permitted.

The focus now is on whether the amateur, or his or her employer, stands to benefit financially, rather than on the content of the communication. If so, then the communication is still prohibited. If not, then the remaining question is whether the communications need is one that ought to be met by some other radio service. Here, the rule of reason applies. Amateur Radio should not meet a need that arises on a regular basis, and for which other communications services are reasonably available. The FCC declined to define "regular," but this shouldn't pose much of a problem for us since abuses will tend to be self-limiting. Volunteers don't like being taken advantage of, and if they are, they should just say no. One popular activity for which there is no practical communication alternative available, collecting data for the National Weather Service, was singled out by the FCC as an example of what is permitted under the new rules. The new rules do not represent a philosophical departure from our "roots." In fact, they are almost identical to the regulations in effect prior to the "no business communications" rule. They provide latitude in our operating and especially in our public service communications, just as we had for decades before the onset of over-regulation in the early '70s. This is one of those rare times when we get to return to the "good old days."

For a more general discussion of the business rules, see Chapter 2 of the ARRL's The FCC Rule Book.

Tactical Call Signs

Tactical call signs are often adopted during an emergency, or during large public-service activities. Names like "Med Tent," "Fire 1," "Shelter 2," and "Red Cross Staging" quickly identify each function,

and eliminate confusion when working with other agencies for whom amateur call signs are meaningless. They also help prevent confusion when several operators may take turns at a position.

The use of tactical call signs is a good idea, but it in no way relieves you of the obligation to identify your operation under the FCC's Rules for normal station identification. You must still give your FCC-assigned call sign at the end of your communication, and at least every 10 minutes during the contact [97.119].

Working with the Broadcast Media

In a disaster situation where the immediate safety of lives and/or property is at stake, amateurs may provide related communications to the broadcasters for dissemination to the public when no other means of communication is available. Otherwise, under normal conditions, amateurs are prohibited from assisting in program production or newsgathering. [97.113(b)].

Other Emergency-Related Transmissions

Amateurs may exchange messages with stations in other FCC radio services for emergency communications. [97.111(a)(2)].

- Amateurs may make one-way transmissions for emergency communications. [97.111(b)(4)]. Generally, one-way transmissions are prohibited except for certain limited circumstances.
- Amateurs may also send one-way information bulletins, as long as they are directed to amateurs only, with information of interest to amateurs only. [97.111(b)(6); 97.3(a)(25)]. A good example would be a bulletin on the ARES® net to ARES® members during an emergency deployment.

Allowing Critical Responders to Speak Directly Over the Radio

During a Florida hurricane disaster a few years ago, a serious accident at a rural site brought an ARES® response. A paramedic was already administering first aid. Because of the extent of the injuries, the paramedic asked to confer with a physician who happened to be in the vicinity of the amateur net control station at a hospital 10 miles away.

Strangely, the net control operator refused to allow the physician to speak directly over the radio. In spite of complicated medical terminology and the potential for mistakes, the net control operator insisted on verbally relaying each message. The control operator questioned whether it was would be legal for the paramedic to speak directly with the physician.

Not only would this have been legal as communications in connection with the immediate safety of human life when normal communication systems are not available, but it would also have been permitted under normal circumstances by the third party traffic rules as long as the control operators continuously monitored and supervised the doctor's and paramedic's participation. [97.115(b)(1)].

In this case, the ARES® operators should have immediately handed over their microphones to the physician and paramedic.