

SKYWARN

Operations Manual



NWS Binghamton, NY
Amateur Radio Operators Manual

Table 1. Frequencies of Regional Hubs

Ch.	Area Served	Priority	Frequency	PL	Callsign	Location	Hdg
1	WX2BGM Local Calling Freq	Pri	148.820-		WA2QEL	Binghamton NY	xxx
2	Binghamton Regional Hub (Broome, Tompkins Tioga, Susquehanna)	Pri	146.73-		K2TDV	Binghamton NY	xxx
3		Sec	147.075+		KB2KW	Binghamton NY	xxx
4	Elmira Regional Hub (Chemung, Steuben, Yates Schuyler, Bradford)	Pri	147.015+		N2IED	Corning NY	270
5		Sec	146.70-		W2ZJ	Elmira NY	260
6	Cortland Regional Hub (Cortland, Cayuga, Seneca Onondaga, Madison, Oneida)	Pri	147.180+		K2IWR	Cortland NY	360
7		Sec	146.670-	151.4	AK2K	Sempronius NY	360
8	Delaware Valley Regional Hub (Wayne, Pike, Sullivan)	Pri	147.27+	179.9	WB2YGA	Waymart, PA	145
9		Sec	145.310-	179.9	WB2YGA	Pleasant Mt, PA	140
10	Oneonta Regional Hub (Otsego, Chenango, Delaware)	Pri	146.85-	167.9	W2SEU	Oneonta, NY	70
11		Sec	146.640-		WA2SAF	Cooperstown NY	60
12	Scranton Regional Hub (Lackawanna, Luzerne Wyoming)	Pri	146.940-		K3CSG	Scranton PA	210
13		Sec	147.000+	141.3	K3KAW	Scranton PA	165
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Table 2. Frequencies of Local County Spotter Networks

Ch.	County	Priority	Frequency	PL	Callsign	Location	Hdg
14	Bradford	Pri	147.285+		KZ2Z	Evergreen, PA	210
15	Bradford	Sec	145.130-	100.0	N3GXD	Canton, PA	225
16	Bradford	Alt	145.130-	100.0	N3GXD	Athens, PA	235
17	Broome	Pri	146.820-		WA2QEL	Binghamton NY	Xxx
18	Broome	Sec	147.075+		KB2KW	Binghamton NY	Xxx
19	Broome	Alt	146.730-		K2TDV	Binghamton NY	Xxx
20	Cayuga	Pri	147.000-	71.9	W2QYT	Auburn NY	360
21	Cayuga	Sec	145.230-	71.9			315
22	Cayuga	Alt	147.225	71.9			
23	Chemung	Pri	146.700-		W2ZJ	Elmira NY	260
24	Chemung	Sec	147.360+		N3AQ	Elmira NY	260
25	Chemung	Alt	147.015+		N2IED	Corning NY	265
26	Chenango	Pri	146.685-		WA2EYH	Guilford NY	65
27	Chenango	Sec	146.715-	167.9	W2SEU	Laurens, NY	70
28	Chenango	Alt	146.955-	127.3	N2NK	Walton NY	90
29	Cortland	Pri	147.180+		K2IWR	Cortland NY	360
30	Cortland	Sec	145.49	151.4	AK2K	Cortland NY	360
31	Cortland	Alt	146.67	151.4	AK2K	Sempronius NY	360
32	Delaware, South	Pri	146.955	127.3	W2LZ	Walton NY	90
33	Delaware, South	Sec	147.315		W2LZ	Walton NY	90
34	Delaware, North	Alt	145.37		W2SEU	Stamford NY	80
35	Lackawanna	Pri	146.940-		K3CSG	Scranton PA	165
36	Lackawanna	Sec	147.000+	141.3	K2KAW	Scranton PA	165
37	Lackawanna	Alt	146.655-	146.2	WB3KGE	Waymart PA	135
38	Luzerne	Pri	145.410-	100.0	N3DAX	Wilkes-Barre PA	180
39	Luzerne	Sec	146.610-		WB3FKQ	Wilkes-Barre PA	180
40	Luzerne	Alt	146.670-		K3PGI	Hazleton PA	180
41	Madison	Pri	145.170-		KA2NIL	Oneida NY	15
42	Madison	Sec	145.450-		W2JIT	Utica NY	20
43	Madison	Alt	146.880-		W2OFQ	Rome NY	20
44	Oneida	Pri	145.17-		W2JIT	Utica NY	30
45	Oneida	Sec	145.45		W2OFQ	Utica NY	20
46	Oneida	Alt	146.880-		W2OFQ	Rome NY	20
47	Onondaga	Pri	147.300+		N2ACO	Syracuse NY	360
48	Onondaga	Sec	147.210+		KB2TLD	Syracuse NY	330
49	Onondaga	Alt	none				
50	Otsego	Pri	146.850-	167.9	W2SEU	Oneonta NY	70
51	Otsego	Sec	146.640-		NC2C	Cooperstown NY	60
52	Otsego	Alt	146.715-		NC2C	Laurens, NY	70
53	Pike	Pri	145.350-	100.0	K3TSA	Shohola PA	130
54	Pike	Sec	146.715-	82.5			130
55	Pike	Alt	147.270+		WB2YGA	Waymart PA	135

Ch.	County	Priority	Frequency	PL	Callsign	Location	Hdg
56	Schuyler	Pri	147.360+		W3AQ	Elmira NY	260
57	Schuyler	Sec	147.165+		WA2IFE	Watkins Glen NY	315
58	Schuyler	Alt	none				
59	Seneca	Pri	147.000-	71.9	W2QYT	Auburn NY	360
60	Seneca	Sec	145.130-		N2POH	Seneca Falls NY	315
61	Seneca	Alt	none				
62	Steuben	Pri	145.190-		KV2W	Hammondsport NY	270
63	Steuben	Sec	147.330+		KA2GEH	Dansville NY	285
64	Steuben	Alt	147.045+	110.9			
65	Sullivan	Pri	147.135+	94.8	N2APX	Grahamsville PA	105
66	Sullivan	Sec					
67	Sullivan	Alt					
68	Susquehanna	Pri	147.375+	136.5	N3HPY	Montrose PA	180
69	Susquehanna	Sec	147.240+	127.3	N3HPY	Elk Mountain PA	180
70	Susquehanna	Alt	none				
71	Tioga	Pri	146.760-		W2VDX	Owego NY	250
72	Tioga	Sec	146.730-		K2TDV	Binghamton NY	xxx
73	Tioga	Alt	none				
74	Tompkins	Pri	146.970-		AF2A	Ithaca NY	305
75	Tompkins	Sec	146.895-	107.2	K2ZG	Ithaca NY	305
76	Tompkins	Alt	146.610-		W2CXM	Ithaca NY	305
77	Wayne	Pri	146.655	146.2	WB3KGE	Waymart PA	145
78	Wayne	Sec	none				
79	Wayne	Alt	none				
80	Wyoming	Pri	145.450-	82.5	K3YTL	Bunker Hill Pa	180
81	Wyoming	Sec	147.000+	141.3	K3KAW	Scranton PA	180
82	Wyoming	Alt	147.240+	127.3	N3HPY	Elk Mountain PA	160
83	Yates	Pri	145.370-	110.9	WA2UKX	Penn Yan NY	300
84	Yates	Sec	146.835-		KE2BV	Bluff Point NY	315
85	Yates	Alt	none				

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Table 3. Other Frequencies

Ch.	County	Priority	Frequency	PL	Callsign	Location	Hdg
86	Simplex Calling Frequency		146.520s				
87	Simplex Emergency Frequency		147.540s				
88	Emergency Monitor Frequency		147.540s	100.0			
89	Cortland		146.670-	151.4	AK2K	Sempronius NY	315
90	Binghamton Regional Airport		146.865-		WA2QEL	Maine NY	xxx
91	Binghamton Regional Airport	REVRSD	146.265+		WX2BGM	Maine NY	xxx
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I. Introduction and Organization:

This manual is designed to be used as a reference to enhance and provide for efficient SKYWARN Amateur Radio operations within the NWS warning area served by NWS Binghamton. Since SKYWARN Amateur Radio operations is a dynamic program, this manual will change and grow with the program. This manual may cover operations that do not affect you directly. Please be aware of procedures outside of your area so you may assist, if necessary. Each county should supplement this manual with that county's own internal policies and procedures.

Comments/Updates:

Informational updates to this manual should be routed through the County EC and sent to the address listed below. We also welcome comments and suggestions from all spotters.

**SKYWARN
National Weather Service
32 Dawes Drive
Johnson City, NY 13790**

Authority:

SKYWARN is a volunteer program run by the NWS to receive reports of severe weather for advising the public about impending danger due to severe thunderstorms or tornadoes, and floods.

Amateur radio operators participate in SKYWARN as trained severe weather spotters and provide a primary radio emergency communications network for relay of severe weather reports to the NWS. SKYWARN spotters need not be ARES members to participate in SKYWARN nets or to attend spotter training. However, ARES is the primary amateur radio organization with whom the NWS works to establish the SKYWARN communications networks.

Authority to establish and operate SKYWARN networks through ARES is given in the Memorandum of Understanding between NWS and ARRL (See Appendix A).

This operations manual is based on the recommendations of the Binghamton weather service office SKYWARN committee, composed of NWS Personnel and ARRL ARES leaders in the twenty-four county warning area served by the NWS Binghamton (See Appendix B).

Organization:

<p><u>SKYWARN Executive Committee</u></p>	<p>Responsible for final approval of SKYWARN policies and procedures within the NWS Binghamton area of responsibility.</p>
<p><u>SKYWARN Advisory Committee</u></p>	<p>Responsible for developing policies and procedures of the SKYWARN Amateur Radio Net to ensure an efficient operation in accordance with the goals of ARES and NWS Binghamton.</p>
<p><u>SKYWARN Amateur Radio Coordinator</u></p>	<p>Organizes and responsible for the day-to-day operation of the entire SKYWARN Amateur Radio Net in accordance with established policies and procedures. Specific duties include:</p> <ul style="list-style-type: none"> ▪ Serve at NWS Binghamton station when requested by the NWS. ▪ Ensure that volunteers are available to ensure NWS BGM station is properly set up and all operators are trained. ▪ Coordinate SKYWARN communications

	issues and resolve problems with the impacted counties. Unresolved problems should be referred to the Executive Committee.
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Mission:

To provide timely and accurate reports of severe weather to NWS Binghamton through the use of trained amateur radio operators. To provide interested amateur radio operators with training in severe weather spotting and radio procedures. NWS Binghamton is responsible for issuing severe weather and flash flood warnings for the following counties:

Table 4. NWS Binghamton, NY Forecast Area

State of New York			State of Pennsylvania
Broome	Oneida	Tioga	Bradford
Cayuga (Southern)	Onondaga	Tompkins	Lackawanna
Chemung	Otsego	Yates	Luzerne
Chenango	Schuyler		Pike
Cortland	Seneca		Susquehanna
Delaware	Steuben		Wayne
Madison	Sullivan		Wyoming

Safety:

All stations should follow basic safety rules while engaged in spotting storms.

Heed all warnings issued by the NWS.

NWS-BGM Station will attempt to issue a warning to each county when potentially severe weather is approaching; however each spotter is responsible for his or her own safety. Remember to keep a low profile during lightning events and during possible tornadic events.

II. Observation Guidelines:

What is Reportable:

Notice: The threshold for "reportable" weather may be changed by the NWS Binghamton station to provide more meaningful information to the NWS and Make the reporting system more efficient.

SKYWARN spotters are requested to take the "Basic Spotter Course" every other year , and no less than once every three years. These courses are available throughout the warning area. Contact your county EC for details on getting the course in your area. EC's, clubs, and hamfest organizers should contact the NWS Binghamton office for information on providing a course in your area.

The "Basic Spotter Course" covers the subject of what is considered "Reportable, Significant, or High Priority" weather. A basic definition of what is considered to be "Reportable":

Table 5. Reportable Weather

Reportable Weather
<ul style="list-style-type: none">▪ Winds 32 mph or greater (measured or estimated, see Appendix C - Beaufort Wind Scale)▪ Rain in excess of 1 inch per hour▪ Hail (report any hail along with size and duration)▪ Any wall cloud, funnel cloud or tornado▪ Any flooding (except normal ponding of water)▪ Downed tree limbs (give estimated limb diameter)▪ Downed power lines and trees (give estimated trunk diameter)▪ Structural damage due to weather conditions

As stated above this is only a basic definition, and the requests for information from NWS Binghamton may include requests that would not be normally be considered "Reportable or Significant".

All reports from trained or untrained operators should be accepted by the NCS. If the information is considered non-reportable then, the NCS should record but not pass on the information unless asked by the liaison station or NWS Binghamton Station. This is a particularly troublesome part of the system and care must be taken not to "flood" NWS Binghamton station with unnecessary reports, yet encourage participation by accepting reports that need not be passed along. In any case, the decision to hold or pass a marginal report is up to the NCS and is a judgment call. If there is any doubt, pass on the report.

The NWS Binghamton Station (WX2BGM) will advise the NCS at the regional level on what type of information is needed. Regional NCS and liaison stations should pass this information on to the county nets as quickly as possible. If the NWS Binghamton Station is extremely busy in another area the regional NCS may get a brief "Do you have any

'SEVERE' reports, over", this is indicative that there is trouble in another area and they are just checking with you to make sure that nothing has popped up while they have been on another frequency. The best answer is "negative, over" when you may be holding marginal or non-reportable information.

How to Report:

Reports should be sent to the county NCS as soon as possible. The reports should be sent in the following format;

- Time of Event
- Callsign of Station Reporting
- Location of Event
- Event Description

Table 6. Station Report Format

Time of event	Time is to be given in Local 24 hour format. Since the entire warning area is within the Eastern (US) time zone no reports should carry the time in UTC. The time of event is considered to be the beginning of the event. Duration of the event should be noted at the end of the description.
Callsign of Station Reporting	Callsign is to be given phonetically. NWS Binghamton Station has the capability to check location and spotter training status by callsign. This can also be used to identify a report if a question needs to be asked.
Location of event	<p>Location is to be given in easily understood terms. Remember that the NWS Binghamton operators may not be familiar with your area.</p> <p>The best type of descriptive location is in the format of (x) miles (direction) of (town), where a town is either easily found on a map or is a known location to the NWS Binghamton operators. Direction should be simple i.e.: north or northeast not north-north-east.</p>

Event Description	<p>The event description must be concise and accurate description including duration.</p> <p>Use quantitative descriptions such as 1" hail as opposed to large hail.</p> <p>Wind descriptions should include whether it is recorded or estimated, if estimated then a description of how in addition it was estimated. Include gusts, in addition to, steady winds.</p> <p>Be as descriptive as possible without being "wordy". It is considered good practice to write down your report before sending it.</p>
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What Not to Report:

Be very careful in sending in reports. The intention is not to discourage all reports but to make sure that the reports that are sent are useful in nature. Some of the reports that have been received at the NWS Binghamton office that should not have been sent were;

- "Dark clouds"
- "Heavy Wind"
- "Lots of Lightning"
- "Rain"
- "Marble or Ball-Size Hail" (Marbles and balls come in many sizes; instead give actual size or relate to a coin size, e.g.. dime size hail)

Use common sense in giving reports. Think of how the person receiving these reports will interpret them, and how useful they will be in determining the severity of the weather.

III. Activation of SKYWARN:

SKYWARN can be activated by one of the following methods;

1. By request of NWS Binghamton
2. Automatically upon issuance by NWS Binghamton of a Tornado Warning, Severe Thunderstorm Warning, or Flash Flood Warning for a given county
3. Upon NWS Binghamton confirmation of the need for activation after request from local Emergency Management officials, ARES Emergency Coordinator or designee, or SKYWARN spotter with visual sighting of severe weather

Procedure for Activation by NWS Binghamton:

NWS Binghamton requests Broome County Emergency Services to contact the first available operator from list made available by the ARES Broome County Emergency Coordinator.

The "first contact" operator contacts NWS Binghamton to determine type and scope of the situation, and to determine a time frame if possible. In situations of immediate threat and, if available, the first contact operator will respond and continue the operation while mobile en route to the NWS.

If the "first contact" operator is unable to respond, then the "first contact" operator uses the contact list to find an operator who is able to respond. In the rare event that no one is able to respond immediately, a few of the home stations in Broome County are authorized to handle a "remote activation". This is used as a last resort or in certain cases where the event is of such short duration or affects a small geographical area that a response to NWS Binghamton is unwarranted. Remote activation is also used as an expedient to activate counties while the NWS operator is en route. Care should be taken by the station activating a county that the NWS operator is notified.

Procedure for Requesting Activation by ARES EC, designee, or SKYWARN Spotter with Visual Sighting of Severe Weather:

1. Upon sighting of severe weather by a SKYWARN spotter or upon recognition of possible need for activation by an ARES Emergency Coordinator, the person will contact NWS Binghamton via the 1-800 hotline telephone number. After conferring, NWS Binghamton will decide before the telephone conversation is ended, if activation is warranted.
2. If NWS Binghamton approves the request for activation, the reporting station will activate the county net on the appropriate frequency. NWS Binghamton will request an operator following above "Procedure for Activation by NWS Binghamton."
3. In the event that NWS Binghamton decides activation is not warranted, all subsequent communications with NWS Binghamton will be via telephone.

County Activation/De-activation Guidelines:

To activate/de-activate a particular county, NWS Binghamton will normally follow these procedures:

1. NWS Binghamton forecaster will notify amateur operator at NWS or home station to activate/de-activate net in a county or counties.
2. NWS Binghamton station operator will contact the Regional Hub on their frequency with an activation/de-activation request for one or more counties.
3. The Regional Hub will follow its own procedures to contact and activate/deactivate the requested counties.
4. The Regional Hub will notify NWS Binghamton station of successful activation/de-activation (county, time, NCS call, liaison call, and number of participants) once net is activated/de-activated.
5. If the Regional Hub or county has not received any communication from NWS Binghamton operators for more than 30 minutes, and there does not appear to be any severe weather imminent, NWS Binghamton may be contacted either by radio or failing that, by the 1-800 Hotline to request de-activation.

In addition to being activated or de-activated, counties may be put on standby alert. This means SKYWARN reports are not currently needed, and no severe weather is expected during the next 30 minutes. However, severe weather is possible in the near future, and everyone is asked to monitor frequencies for possible activation.

Table 7. SKYWARN Activation Levels

SKYWARN Activation Levels	
SKYWARN Standby Alert	Severe weather possible within 30 minutes to 2 hours ----- SKYWARN reports are not currently needed
SKYWARN Activation	Severe weather is occurring or is possible within the next 30 minutes
SKYWARN De-activation	No severe weather is expected within the next 2 hours

IV. Regional Hub Guidelines:

Overview:

Regional Hubs have a unique responsibility in the SKYWARN program.

Generally administered by the EC of the host county each Regional Hub provides the interface between the NWS Binghamton operator and the Local nets. In addition, there is also the local county net to administer, and any of the myriad problems that may crop up.

Each Regional Hub should establish its own procedures for activating its member counties. Usually this is done through a liaison station contacting the member county on its own primary repeater. Arrangements should be made for alternate means of activation in case of repeater failure or inability to reach a repeater. These can include activation via the HF net, telephone contact, or requesting the NWS Binghamton Station to make an attempt at contacting the county directly.

For optimum efficiency and backup purposes the system should have enough liaisons to have at least one assigned to each member county. The Regional Hub has the responsibility to provide liaison when possible. Activations should be handled individually by the best practical means.

In addition to the normal activation's, the Regional Hub may be requested by NWS Binghamton to cross contact an area that is inaccessible by normal means.

Division of the Binghamton NWS Warning Area by Region:

Based on the recommendations of the SKYWARN committee the twenty four county coverage area was divided into six regions, each with a Regional Hub. These six regions are;

- Binghamton
- Cortland
- Delaware Valley
- Elmira
- Oneonta
- Scranton

Table 8. Division of the Binghamton NWS Warning Area by Region

		Region					
		Binghamton	Cortland	Delaware Valley	Elmira	Oneonta	Scranton
Counties Within Region	Broome, NY	Cayuga, NY	Pike, PA	Chemung, NY	Chenango, NY	Lackawanna, PA	
	Susquehanna, PA	Cortland, NY	Sullivan, NY	Schuylers, NY	Delaware, NY	Luzerne, PA	
	Tioga, NY	Madison, NY	Wayne, PA	Steuben, NY	Otsego, NY	Wyoming, PA	
	Tompkins, NY	Oneida, NY		Yates, NY			
		Onondaga, NY		Bradford, NY			
		Seneca, NY					

In addition to having a local (county) spotter net, each of the Regional Hubs also maintains liaison with its member counties. These liaison positions may come from either

county depending on the situation and have been implemented in innovative ways over the past years.

The operational standard does not specifically qualify which method is used as long as the information is readily available.

Some counties have found that combining two counties on one repeater works well, while other counties having a larger geographical area to cover require two or more repeaters to fully cover the area. Some areas have extensive linked repeater systems.

As long as the Regional Hub is aware of the technique and the procedure provides timely transfer of information to NWS Binghamton, there should be no problem.

NWS Binghamton Regional Hubs are also expected to maintain a good working relationship with their member counties. Reviews of activation's, call-up procedures, unique situations and overall performance can improve coordination within the region.

Activation of Individual Counties by Regional Hubs:

Activation of an individual county is requested by the NWS Binghamton personnel. They notify the NWS Binghamton station operator that a county needs to be activated. NWS Binghamton then contacts the Regional Hub responsible for that county and advises the Regional Hub of the activation

The Regional Hub in turn contacts the county to be activated using a liaison and requests activation. The NCS callsign and time of activation are recorded and returned to the NWS Binghamton station via the Regional Hub. Reports of severe weather are passed through the liaison to the Regional Hub and then to NWS Binghamton. Regional Hub NCS operators are instructed to remove non-severe reports at this point.

In certain cases NWS personnel request information directly from the county affected. The NWS Binghamton station may at any time enter an active county net to request information.

Alternate Activation Methods:

If there is no response from the Regional Hub, NWS Binghamton may request activation on the affected county repeaters. If there is a prolonged lack of response from the Regional Hub, NWS Binghamton may assign an alternate Regional Hub. For example, if Broome County does not respond within a time frame required by NWS Binghamton, then Tompkins County may be designated the operating Regional Hub, and collect reports from counties within the Binghamton Region. In extreme cases, counties may be asked to act as a Regional Hub outside its own region.

In addition, each county EC is requested to provide up to 6 (six) phone numbers of ARES members for such emergencies as required.

Note that these are rare cases and only to facilitate the timely operation of SKYWARN. These operational considerations are noted to provide a flexible procedure to follow in extreme cases.

Each county EC should prepare to provide such coverage in the event it becomes necessary.

V. County Operations Guidelines:

NCS Duties:

Each NCS station should keep a record of the following;

- Time of activation and reason for activation
- Stations involved in net and their locations
- Stations that have had training and what kind of training
- Stations with special capabilities
- liaison stations
- Watches or Warnings during activation
- All reports from spotters
- De-activation time and station authorizing deactivation

Liaison Duties (VHF):

- Each county should have a liaison station that can monitor and transmit to the county repeaters and the Regional Hub repeater.
- The liaison station should take reports from the county NCS and pass them to the Regional Hub NCS in the form above as soon as possible.
- The liaison station should notify any problems in reaching the Regional Hub repeater to the county NCS.
- If necessary, the liaison should also handle calling the SKYWARN 1-800 hotline to pass along reports.

Liaison Duties (HF):

Each county NCS should attempt to have one of their stations monitor and participate in the HP net on 3925 KHz (+ or -QRM) if operational.

- The HP NCS should be the first operator to find a clear frequency near the suggested frequency.
- NWS Binghamton Operator may check into the net and offer observations or requests for assistance.
- NWS Binghamton Operator will not be the NCS of the HP (or any other nets) because of the numerous duties already required of them.
- The HP net is a secondary outlet for information.

Appendix A: Memorandum of Understanding:

MEMORANDUM OF UNDERSTANDING BETWEEN THE NATIONAL WEATHER SERVICE AND THE AMERICAN RADIO RELAY LEAGUE, INC. *

I. PURPOSE

The purpose of this document is to state the terms of a mutual agreement (Memorandum of Understanding) between the National Weather Service (NWS) and the American Radio Relay League, Inc. (ARRL), that will serve as a framework within which volunteers of the ARRL may coordinate their services, facilities, and equipment with NWS in support of nationwide, state, and local early weather warning and emergency communications functions. It is intended, through joint coordination and exercise of the resources of ARRL, NWS, and Federal, State and local governments, to enhance the nationwide posture of early weather warning and readiness for any conceivable weather emergency.

II. RECOGNITION

The National Weather Service recognizes that the ARRL is the principal organization representing the interests of more than 400,000 U.S. radio-amateurs and because of its Field Organization of trained and experienced communications experts, can be of valuable assistance in early severe weather warning and tornado spotting.

The American Radio Relay League recognizes the National Weather Service with its statutory responsibility for providing civil meteorological services for the people of the United States. These services consist of:

1. Issuing warnings and forecasts of weather and flood conditions affecting the nation's safety, welfare and economy; and,
2. Observing and reporting the weather of the U.S. and its possessions.
To perform these functions and many related, specialized weather services, NWS operates a vast network of stations of many types within the U.S.; it cooperates in the exchange of data in real time with other nations, including obtaining of weather reports from ships at sea.

III. ORGANIZATION OF THE AMERICAN RADIO RELAY LEAGUE

The American Radio Relay League is a noncommercial membership organization of radio amateurs, organized for the promotion of interest in Amateur Radio communication and experimentation, for the establishment of networks to provide communications in the event of disasters or other emergencies, for the advancement of the radio art and of the public welfare, for the representation of the radio amateur in legislative matters, and the maintenance of fraternalism and a high standard of conduct. A primary responsibility of

the Amateur Radio Service, as established by the Federal Communications Commission, is the rendering of public service communications for the general public, particularly in times of emergency. Using Amateur Radio operators in the amateur frequency bands, the ARRL has been serving the public, both directly and through government and relief agencies, for more than fifty years. To that end, the League created the Amateur Radio Emergency Service (ARES) and the National Traffic System (NTS). The League's Field Organization consists of sixty-seven administrative sections managed by elected Section Managers. A Section is a League-created political boundary roughly equivalent to states (or portions thereof). The Section Manager appoints expert assistants to administer the various emergency communications and public service programs in the section. Each section has a vast cadre of volunteer appointees to perform the work of Amateur Radio at the local level, under the supervision of the Section Manager and his/her assistants.

IV. ORGANIZATION OF THE NATIONAL WEATHER SERVICE

The National Weather Service consists of a National Headquarters in Washington, D.C., and six regional offices in the United States: Eastern, Southern, Central, Western, Alaska, and Pacific. An NWS Public Information Office is located at Weather Service Headquarters. Fifty-two Weather Service Forecast Offices and 209 Weather Service Offices provide warnings and forecasts to the Nation.

SKYWARN is the spotter program sponsored by the NWS. Radio amateurs have assisted as communicators and spotters since its inception. In areas where tornadoes and other severe weather have been known to threaten, NWS recruits volunteers, trains them in proper weather spotting procedures and accepts the volunteers' reports during watches and episodes of severe weather. By utilizing the SKYWARN volunteers, the NWS has "eyes and ears" throughout the affected area in conjunction with NWS sophisticated weather monitoring equipment.

V. PRINCIPLES OF COOPERATION

A. The American Radio Relay League agrees to encourage its volunteer Field Organization appointees, especially the Amateur Radio Emergency Service, to contact and cooperate with Regional Weather Service Headquarters for the purpose of establishing organized SKYWARN networks with radio amateurs serving as communicators and spotters.

B. ARRL further agrees to encourage its Section management teams to provide specialized communications and observation support on an as-needed basis for NWS offices in other weather emergencies such as hurricanes, snow and heavy rain storms, and other severe weather situations.

C. The National Weather Service agrees to work with ARRL Section Amateur Radio Emergency Service volunteers to establish SKYWARN networks, and/or other specialized weather emergency alert and relief systems. the principle point of contact between the

ARRL Section and local NWS offices is the Meteorological Services Division of the appropriate NWS Regional Office. The addresses of the Regional offices are listed below.

The national contact for ARRL is the Public Service Branch, ARRL Headquarters,

Newington, CT 06111.
National Weather Service Eastern Region
NOAA
585 Stewart Avenue
Garden City, New York 11530
Tel: 516-228-5400

National Weather Service Southern Region
NOAA
819 Taylor Street, Rm. 10A26
Fort Worth, Texas 76102
Tel: 817-334-2668

National Weather Service Central Region
NOAA
601 E. 12th St., Rm. 1836
Kansas City, Missouri 64106
Tel: 816-374-5463

National Weather Service Western Region
NOAA
Box 11188, Federal Bldg.
125 S. State Street
Salt Lake City, Utah 84147
Tel: 801-524-5122

National Weather Service Alaska Region
NOAA
Box 23, 701 C St.
Anchorage, Alaska 99513
Tel: 907-271-5136

National Weather Service Pacific Region
NOAA
P.O. Box 50027
Honolulu, Hawaii 96850
Tel: 808-546-5680

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Page author: rwhite@arrl.org

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* Document copied from <http://www.arrl.org/FandES/field/mou/weather.html> 6/11/2004 by KC2JZL

Appendix B: NWS Binghamton SKYWARN Amateur Radio Leadership:

SKYWARN Executive Committee:

- Barbara Watson, KI4ADY, Meteorologist in Charge, NWS Binghamton
- Dave Nicosia, KC2PLQ, Warning Coordination Meteorologist, NWS Binghamton
- Scott Bauer, W2LC, ARRL Section Manager, Western New York
- Eric Olena, WB3FPL, ARRL Section Manager, Eastern Pennsylvania

SKYWARN Advisory Committee:

- Dave Morford, KB2TTT , NWS SKYWARN Program Leader, NWS Binghamton
- Ford Drake, AB2HS, SKYWARN Amateur Radio Coordinator
- Joseph Tedesco, KC2DKP, WNY SEC
- Eric Olena, WB3FPL, EPA SEC
- County EC for each of the 24 counties served by NWS Binghamton.

Appendix C: Modified Beaufort Scale For Use in SKYWARN Reporting

Table 9. Beaufort Wind Scale for Observations at Land Stations

Force	Explanatory Title	Specification for use	Wind Speed (mi/hr)
0	Calm	<ul style="list-style-type: none"> ▪ Smoke rises vertically 	<1
1	Light	<ul style="list-style-type: none"> ▪ Air Direction of wind shown by smoke drift, but not by wind vanes. 	1-3
2	Light Breeze	<ul style="list-style-type: none"> ▪ Wind felt on face; ▪ leaves rustle; ▪ ordinary wind vanes moved by wind 	4-7
3	Gentle Breeze	<ul style="list-style-type: none"> ▪ Leaves and small twigs in constant motion; ▪ Wind extends light flag 	8-12
4	Moderate Breeze	<ul style="list-style-type: none"> ▪ Raises dust and loose paper; ▪ Small branches are moved 	13-18
5	Fresh Breeze	<ul style="list-style-type: none"> ▪ Small trees in leaf begin to sway; ▪ wavelets formed on inland waters 	19-24
6	Strong Breeze	<ul style="list-style-type: none"> ▪ Large branches in motion; ▪ Whistling in telegraph wires; ▪ Umbrellas used with difficulty 	25-31
7	High Wind	<ul style="list-style-type: none"> ▪ Whole trees in motion; ▪ inconvenience felt when walking against the wind 	32-38
8	Fresh Gale	<ul style="list-style-type: none"> ▪ Breaks twigs off trees; ▪ generally impedes progress 	39-46
9	Strong Gale	<ul style="list-style-type: none"> ▪ Slight structural damage occurs (chimney, pots and slates removed) 	47-54
10	Whole Gale	<ul style="list-style-type: none"> ▪ Seldom experienced inland; ▪ trees uprooted; ▪ considerable structural damage occurs 	55-63

Force	Explanatory Title	Specification for use	Wind Speed (mi/hr)
11	Storm	<ul style="list-style-type: none"> ▪ Very rarely experienced; ▪ accompanied by widespread damage 	64-72

Appendix D: Generic County SKYWARN Net Preamble

When the NWS requests that a county be activated for SKYWARN, the NWS-BGM station will contact the appropriate Regional Hub and request them to activate that county. Each county should have several NCS operators available but there are circumstances when none is available. Should any spotter find themselves in a situation where they are the only station capable of assuming net control then they should take it. The following preamble is provided for this type of situation. In a case such as this, attempt to contact the county EC or any of his assistants for instructions and help. This preamble is not intended to replace any existing preamble in use by any county. The EC of any county has the final authority on any ARES nets.

Identify yourself first, and then state the situation and response.

“This is” (callsign)

“The National Weather Service at Binghamton has requested activation of a SKYWARN net. There is a” (insert one of the following;) **“for ”** (your county)
“county.”

- **“Severe Thunderstorm Watch”**
- **“Tornado Watch”**
- **“Severe Thunderstorm Warning”**
- **“Tornado Warning”**
- **“Threat of Severe Weather”** (if unknown)

“This is a directed net, and I am the net control station.”

“Are there any stations experiencing SEVERE WEATHER at this time?”

Listen, and take any replies

“Is there a station that can contact the” (your county’s regional hub) **“repeater and act as liaison?”**

Listen, and take any replies

Maintain a minimum of one VHF liaison station and try to have someone monitor the appropriate NWS Weather Radio broadcast. Keep a log of all contacts and report to the EC of your county as soon as possible. Maintain net operation by announcement every ten minutes;

“This is “ (callsign) **“for “** (your county) **“County SKYWARN”**

“Are there any reports of SEVERE WEATHER at this time?”

Listen, and take any replies

“Any stations wishing to check in, give your callsign and location.”

Listen, and take any replies

Appendix E: NOAA Weather Radio

Specific Area Message Encoding (SAME)

Some NWR receivers have the ability to use SAME codes. These codes allow you to program your radio to screen out alerts which do not include your county. Weather radios without SAME capability are always activated by the 1050 Hertz tone, preceding any alert in transmitter's coverage area, no matter what counties the alert includes.

To use SAME Codes your radio must have SAME capability. SAME codes are broadcast by the NWR transmitter, at the beginning of the alert, ahead of the 10 second 1050 Hertz warning alarm tone. The radio, if it has SAME capability and has been properly programmed, scans the list of SAME codes received and if one or more SAME codes in the received list match SAME codes programmed into the radio, the radio switches from standby to alert mode. In alert mode the radio, depending on its features will issue a NWR message (or message code) and other alert related information by audio, digital display, or other means.

In the NWS Binghamton forecast area, each county has a unique numeric SAME code. The tables which follow list the counties and their SAME code. The NWS transmitters which cover the county, and issue alerts for that county, are also listed.

Use the instructions which came with your radio to enter the proper SAME number for your county. Some radios allow you to maintain a list of more than one SAME code. If you also need to enter a frequency for an NWS transmitter which you can receive, be sure to use one of the transmitters listed for your county in the tables below. Do not choose a transmitter frequency on signal strength alone since a transmitter which does not issue alerts for your county (issuing the SAME code for your county) will not cause your radio to activate when an alert for your county is issued.

Table 10. NWR Transmitter Coverage Cross Reference for New York Counties in the Binghamton Forecast Area

COUNTY	SAME #	TRANSMITTER	FREQ.	CALLSIGN
Broome	036007	Binghamton, NY	162.475	WXL38
		Elmira, NY	162.400	WXM31
		Honesdale, PA	162.500	WNG705
		Ithaca, NY	162.500	WXN59
		Norwich, NY	162.525	KHC49
		Walton, NY	162.425	WWH34
Cayuga	036011	Ithaca, NY	162.500	WXN59
		Rochester, NY	162.400	KHA53
		Syracuse, NY	162.550	WXL31
Chemung	036015	Binghamton, NY	162.475	WXL38
		Elmira, NY	162.400	WXM31
		Ithaca, NY	162.500	WXN59
		Mt. Washington, NY	162.450	WXN55
Chenango	036017	Binghamton, NY	162.475	WXL38
		Cooperstown, NY	162.450	WWH35
		Norwich, NY	162.525	KHC49
		Stamford, NY	162.400	WWF43
Cortland	036023	Binghamton, NY	162.475	WXL38
		Ithaca, NY	162.500	WXN59
		Norwich, NY	162.525	KHC49
		Syracuse, NY	162.550	WXL31
Delaware	036025	Binghamton, NY	162.475	WXL38
		Cooperstown, NY	162.450	WWH35
		Honesdale, PA	162.500	WNG705
		Norwich, NY	162.525	KHC49
		Stamford, NY	162.400	WWF43
		Walton, NY	162.425	WWH34
		Wilkes-Barre, PA	162.550	WXL43
Madison	036053	Cooperstown, NY	162.450	WWH35
		Middleville, NY	162.425	WXM45
		Norwich, NY	162.525	KHC49
		Syracuse, NY	162.550	WXL31

COUNTY	SAME #	TRANSMITTER	FREQ.	CALLSIGN
Oneida	036065	Cooperstown, NY	162.450	WWH35
		Middleville, NY	162.425	WXM45
		Syracuse, NY	162.550	WXL31
Onondaga	036067	Syracuse, NY	162.550	WXL31
Otsego	036077	Binghamton, NY	162.475	WXL38
		Cooperstown, NY	162.450	WWH35
		Middleville, NY	162.425	WXM45
		Norwich, NY	162.525	KHC49
		Stamford, NY	162.400	WWF43
		Walton, NY	162.425	WWH34
Schuyler	036097	Elmira, NY	162.400	WXM31
		Ithaca, NY	162.500	WXN59
		Mt. Washington, NY	162.450	WXN55
Seneca	036099	Elmira, NY	162.400	WXM31
		Ithaca, NY	162.500	WXN59
		Mt. Washington, NY	162.450	WXN55
		Rochester, NY	162.400	KHA53
		Syracuse, NY	162.550	WXL31
Steuben	036101	Call Hill, NY	162.425	WXN29
		Elmira, NY	162.400	WXM31
		Mt. Washington, NY	162.450	WXN55
Sullivan	036105	Hardyston, NJ	162.500	KZZ31
		Highland, NY	162.475	WXL37
		Honesdale, PA	162.500	WNG705
		Walton, NY	162.425	WWH34
		Wilkes-Barre, PA	162.550	WXL43
Tioga	036107	Binghamton, NY	162.475	WXL38
		Elmira, NY	162.400	WXM31
		Ithaca, NY	162.500	WXN59
Tompkins	036109	Binghamton, NY	162.475	WXL38
		Elmira, NY	162.400	WXM31
		Ithaca, NY	162.500	WXN59
Yates	036123	Elmira, NY	162.400	WXM31
		Ithaca, NY	162.500	WXN59
		Mt. Washington, NY	162.450	WXN55
		Rochester, NY	162.400	KHA53

Table 11. NWR Transmitter Coverage Cross Reference for Pennsylvania Counties in the Binghamton Forecast Area

COUNTY	SAME #	TRANSMITTER	FREQ.	CALLSIGN
Bradford	042015	Binghamton, NY	162.475	WXL38
		Elmira, NY	162.400	WXM31
		Towanda, PA	162.550	WXM95
		Wilkes-Barre, PA	162.550	WXL43
Lackawanna	042069	Honesdale, PA	162.500	WNG705
		Wilkes-Barre, PA	162.550	WXL43
Luzerne	042079	Wilkes-Barre, PA	162.550	WXL43
Pike	042103	Allentown, PA	162.400	WXL39
		Hardyston, NJ	162.500	KZZ31
		Honesdale, PA	162.500	WNG705
		Wilkes-Barre, PA	162.550	WXL43
Susquehanna	042115	Binghamton, NY	162.475	WXL38
		Wilkes-Barre, PA	162.550	WXL43
Wayne	042127	Binghamton, NY	162.475	WXL38
		Hardyston, NJ	162.500	KZZ31
		Honesdale, PA	162.500	WNG705
		Walton, NY	162.425	WWH34
		Wilkes-Barre, PA	162.550	WXL43
Wyoming	042131	Wilkes-Barre, PA	162.550	WXL43

NWR Alert Messages and Codes

The following messages are always alerted on a NWR transmitter if they apply to any part of the coverage area. These messages represent hazards urgent enough to warrant waking people up in the “middle of the night” or otherwise interrupting someone’s activities at any time.

Table 12. NWR Messages Which Are Always Alerted.

Alert Message	Message Code
Severe Thunderstorm Watch	SVA
Severe Thunderstorm Warning	SVR
Tornado Watch	TOA
Tornado Warning	TOR
Flash Flood Warning	FFW
Hurricane Watch	HUA
Hurricane Warning	HUW
National Emergency	EAN 2

The following messages are sometimes alerted if they apply to the coverage area of the transmitter, depending on the circumstances and the area of the country. Only events which are applicable to the NWS Binghamton forecast area are shown.

Table 13. NWR Alarm Messages Which Are Sometimes Alerted

Alert Message	Message Code
Flash Flood Watch	FFA
Winter Storm Warning	WSW
High Wind Warning	HWW
River Flood Watch	FLA
River Flood Warning	FLW
Special Marine Warnings	-none-
Local non-weather emergencies	CEM

Coverage Maps for the NWS Binghamton Forecast Area

The coverage statistics and maps are calculated using a computer model and station data assuming ideal conditions. Coverage may be 5 to 10 percent below the computer predicted coverage for the following reasons:

- The computer model is sensitive to antenna performance. Antenna performance is a function of local conditions, causing signals to be stronger signal level in some directions than others.
- Most NWR stations are at existing antenna towers, provided at little or no cost. Placement of NWR antennas is dictated by the tower owner, which may result in a less than ideal set up.
- The antenna may be affected by nearby structures or bodies of water.
- In some special instances, the antenna may have been intentionally adjusted to be "directional" and provide better coverage to a specific area to the detriment of other areas.
- Most of the stations employ equipment technology more than 20 years old. Because of variations in local site conditions, the performance of an individual transmitter and antenna may be less than predicted or expected.
- Seasonal environmental conditions, such as icing or heavy rain, affect performance of a transmitter station and its various components, particularly those subject to continuous weather exposure.

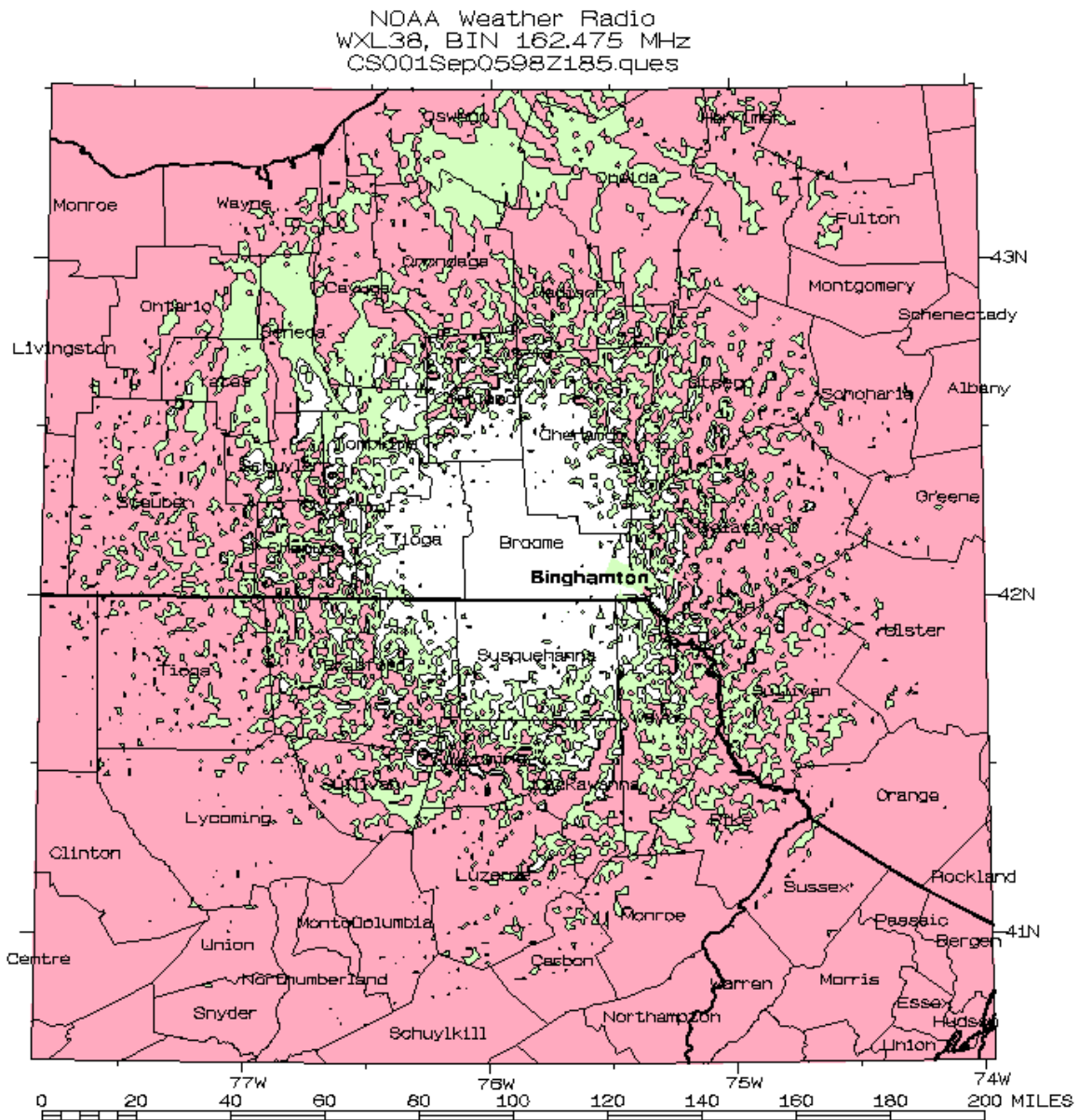
The coverage maps are shown in a three color format, which relates to three estimated signal levels.

- **White:** Signal level of greater than 18dBuV: Reliable coverage
- **Green:** 0dBuV to 18dBuV: picking up a signal is possible but unreliable
- **Red:** Less than 0dBuV: Unlikely to receive a signal

WXL38

Binghamton, NY

162.475 MHz

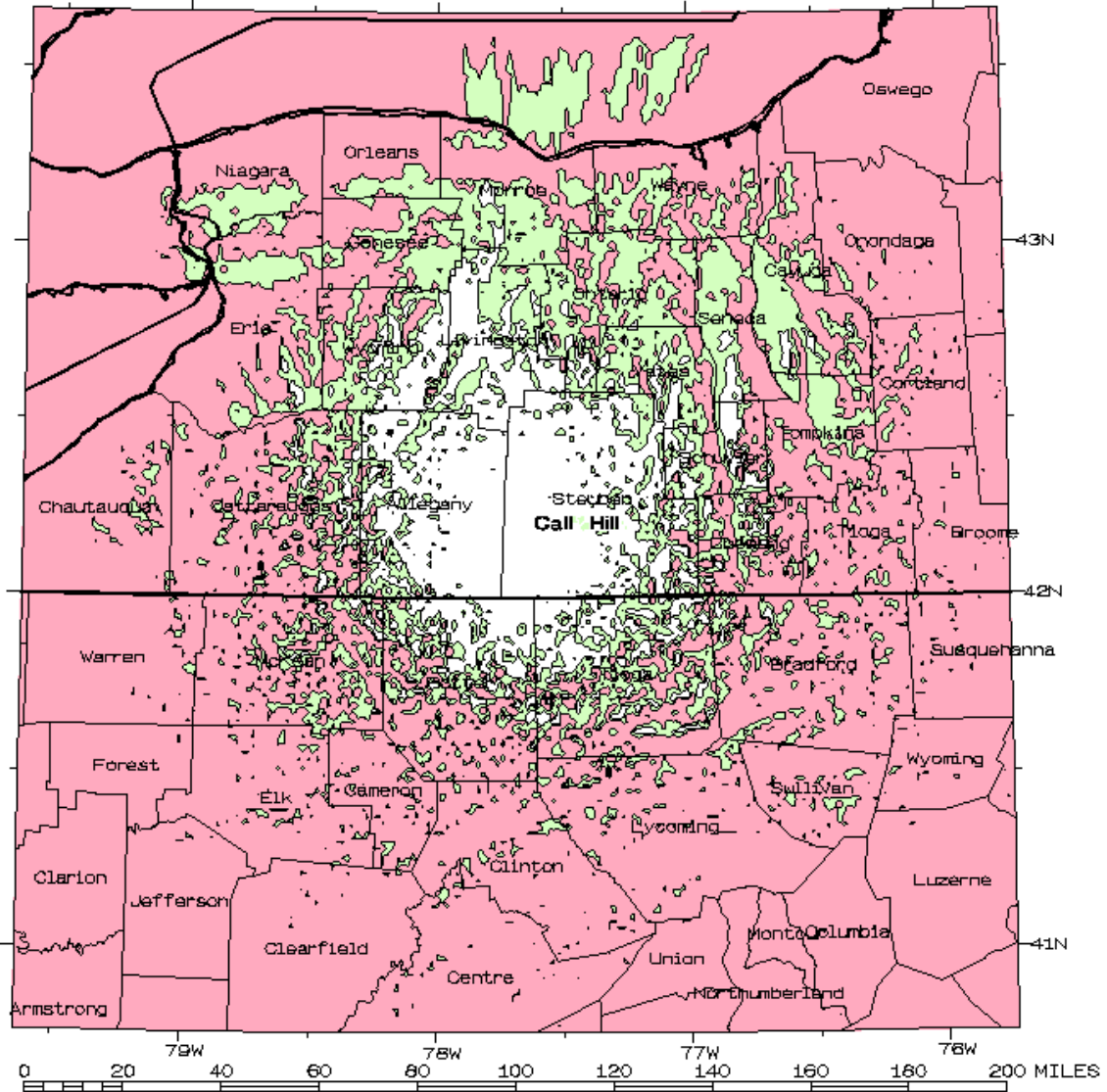


WXN29

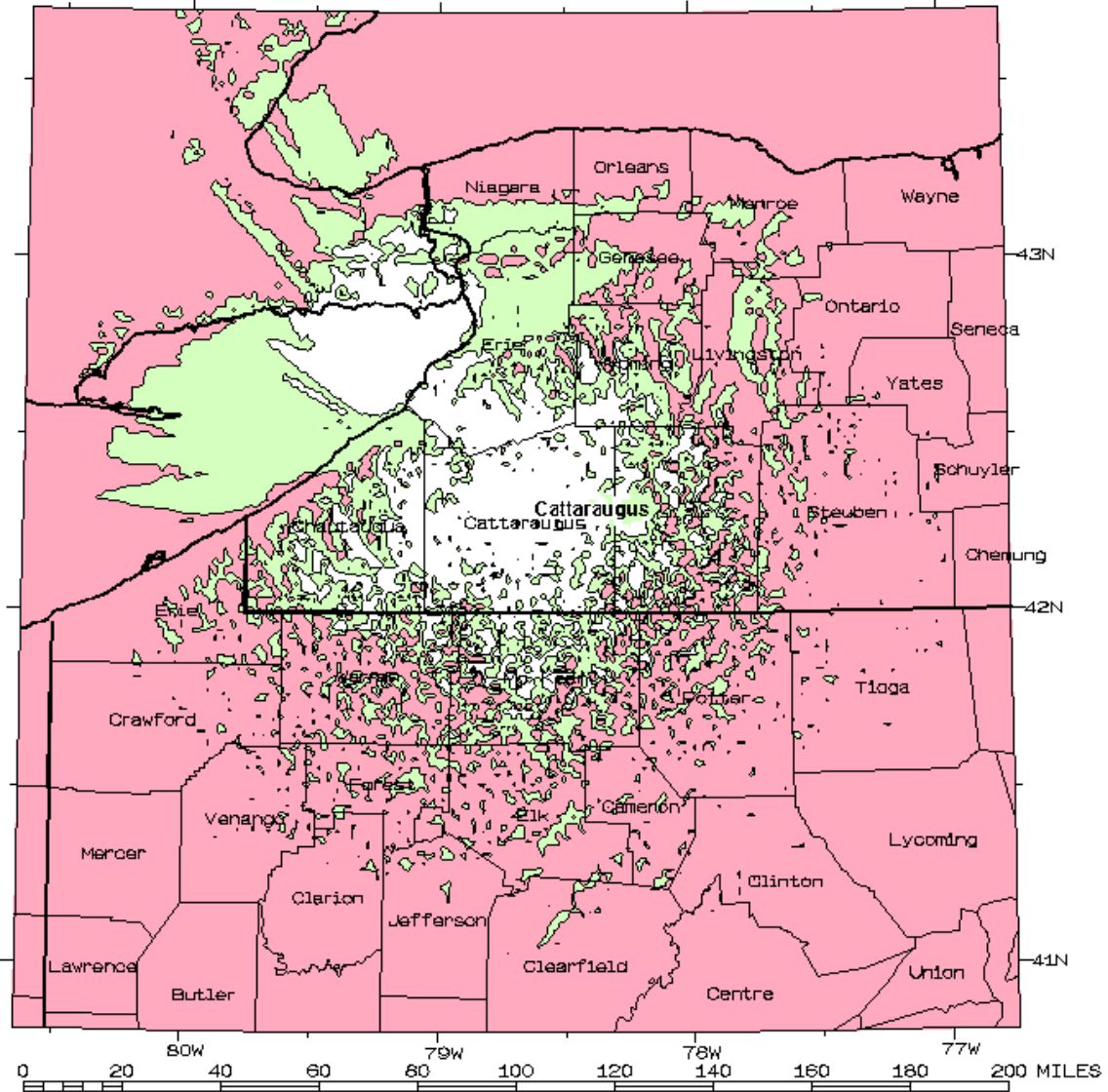
Call Hill, NY

162.425 MHz

NOAA Weather Radio
WXN29 162.425 MHz
CS001Ju12302C.ques



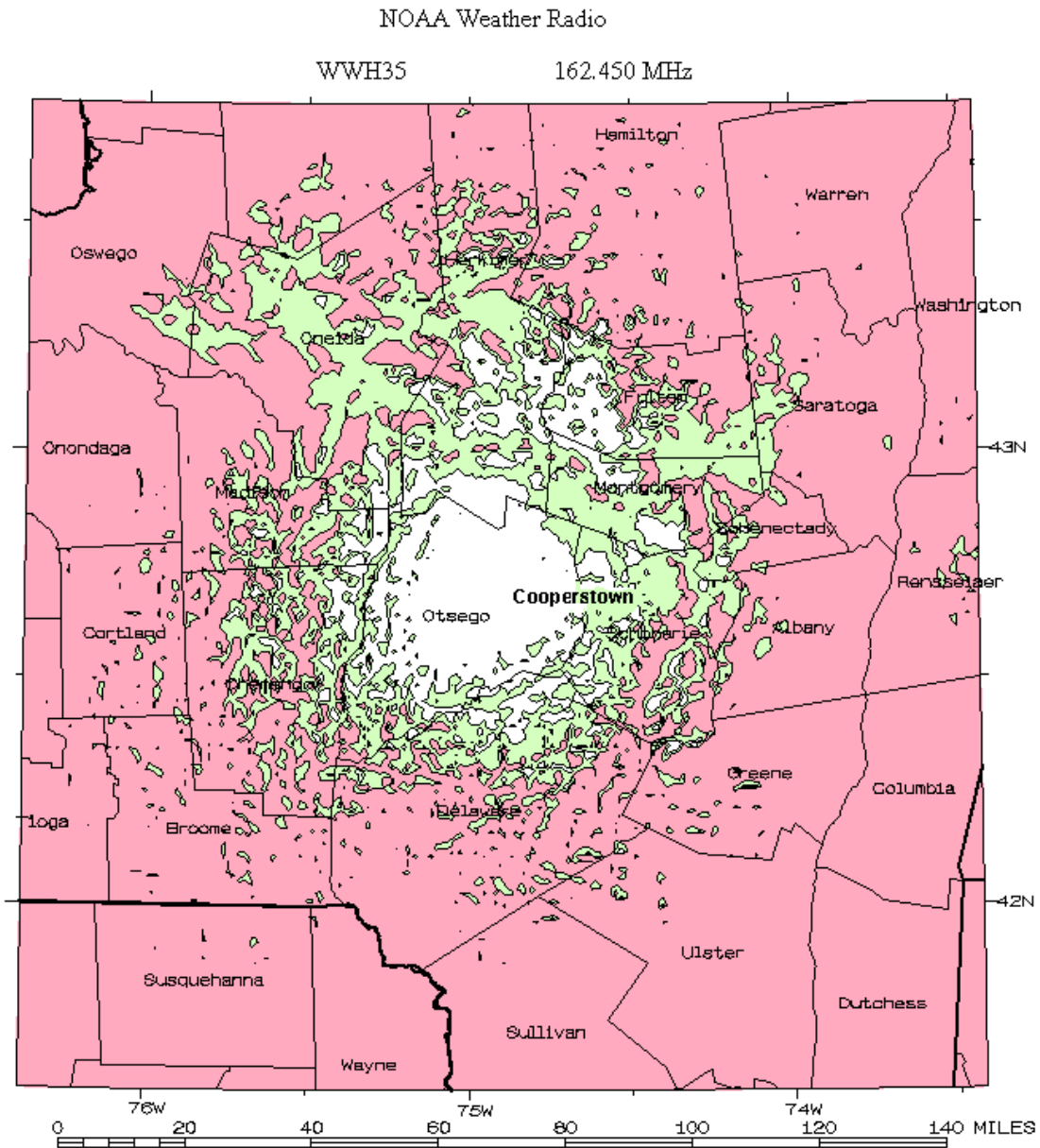
NOAA Weather Radio
WWG32, LIT 162.425 MHz
CS001Sep0598Z188.ques



WWH35

Cooperstown, NY

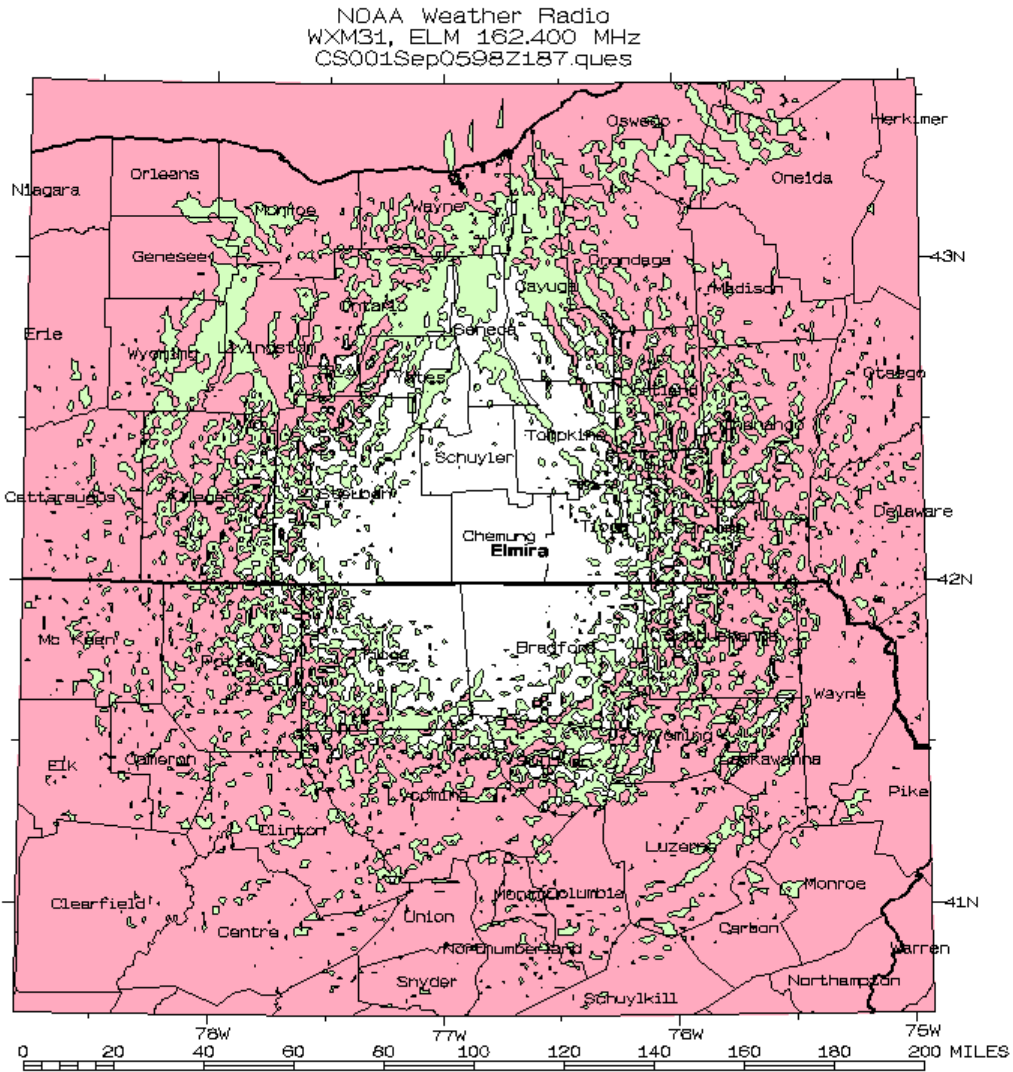
162.450 MHz



WXM31

Elmira, NY

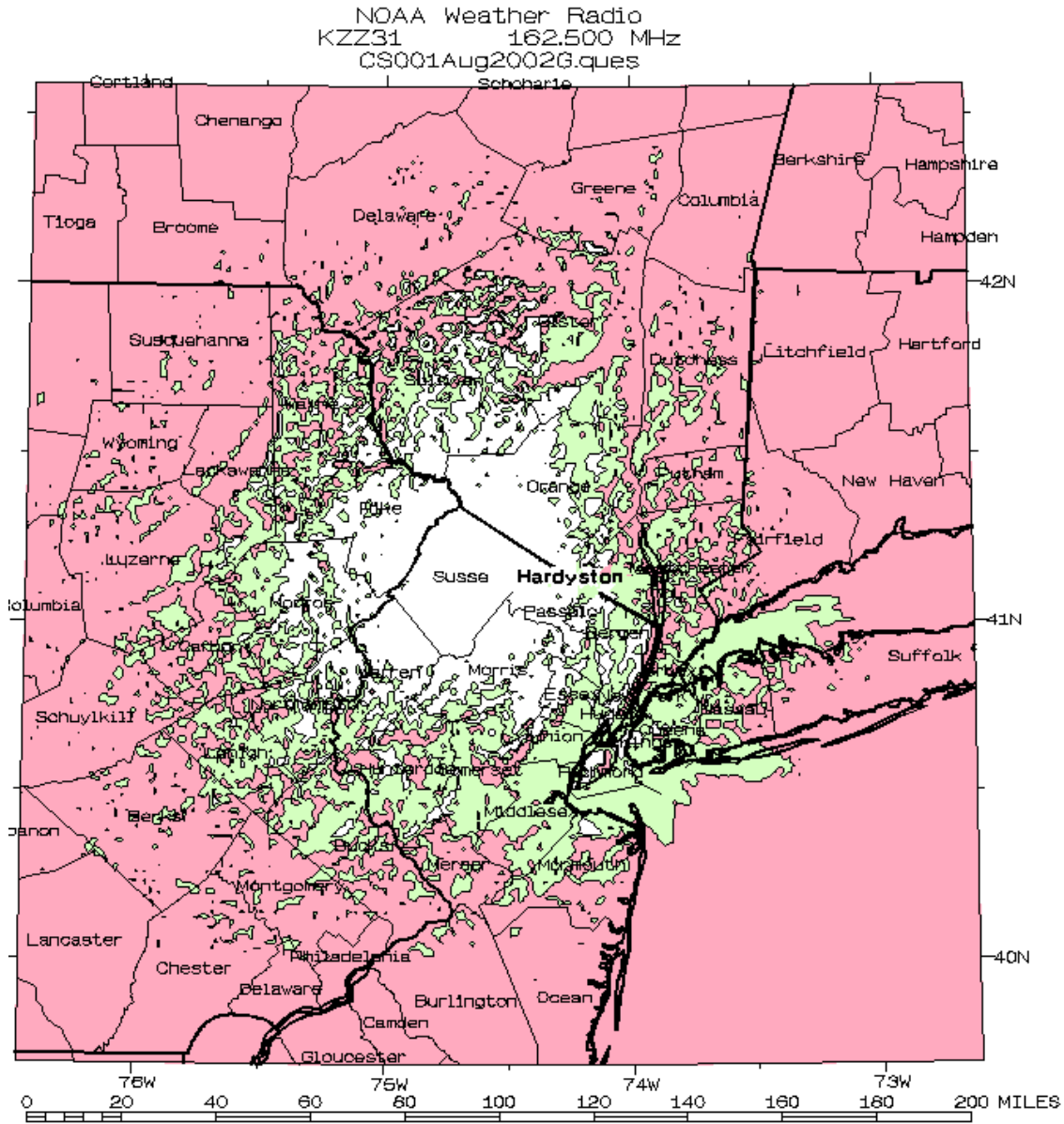
162.400 MHz



KZZ31

Hardyston, NJ

162.500 MHz

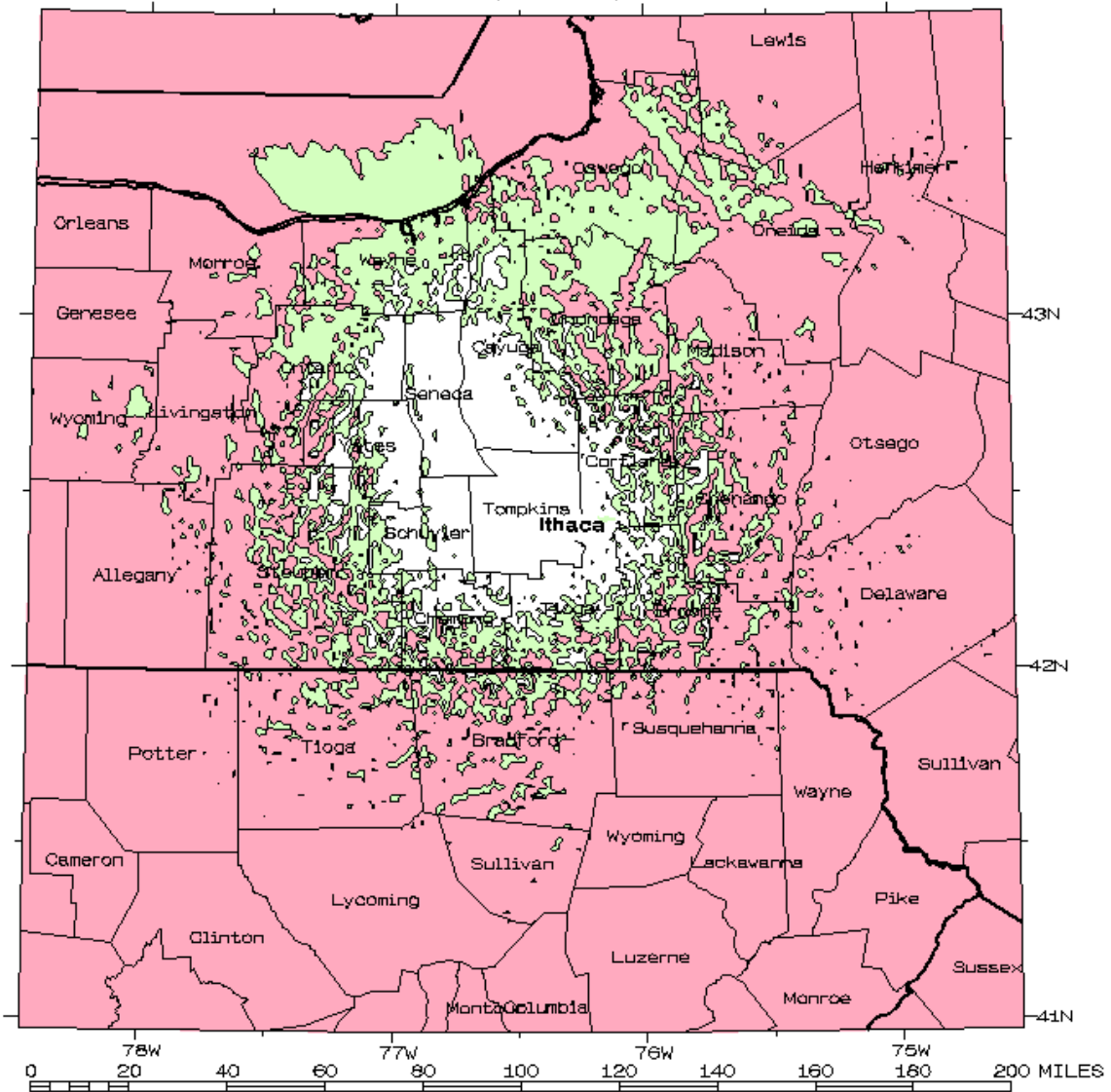


WXN59

Ithaca, NY

162.500 MHz

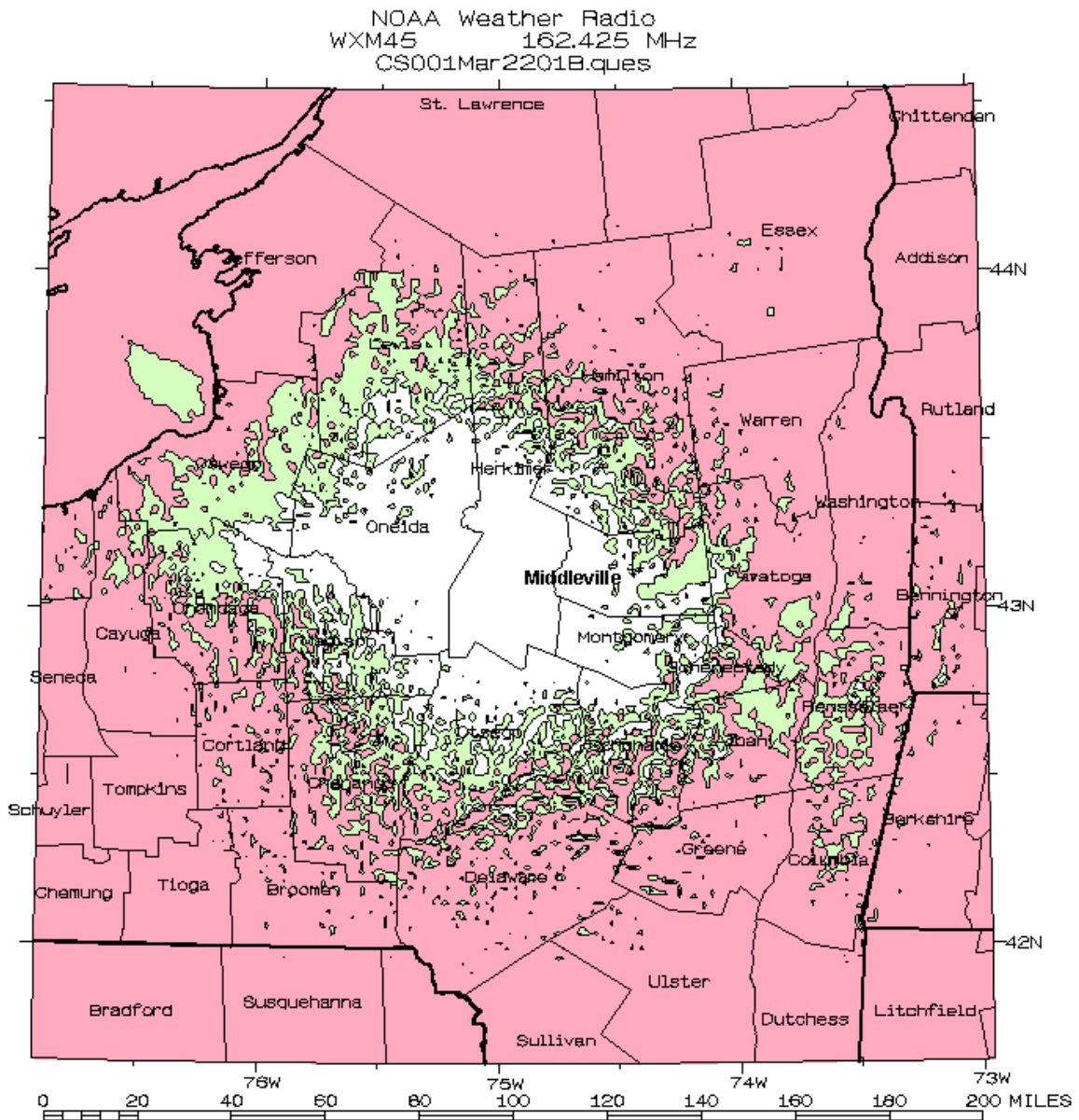
NOAA Weather Radio
WXN59 162.500 MHz
CS001Sep1002B.ques



WXM45

Middleville, NY

162.425 MHz

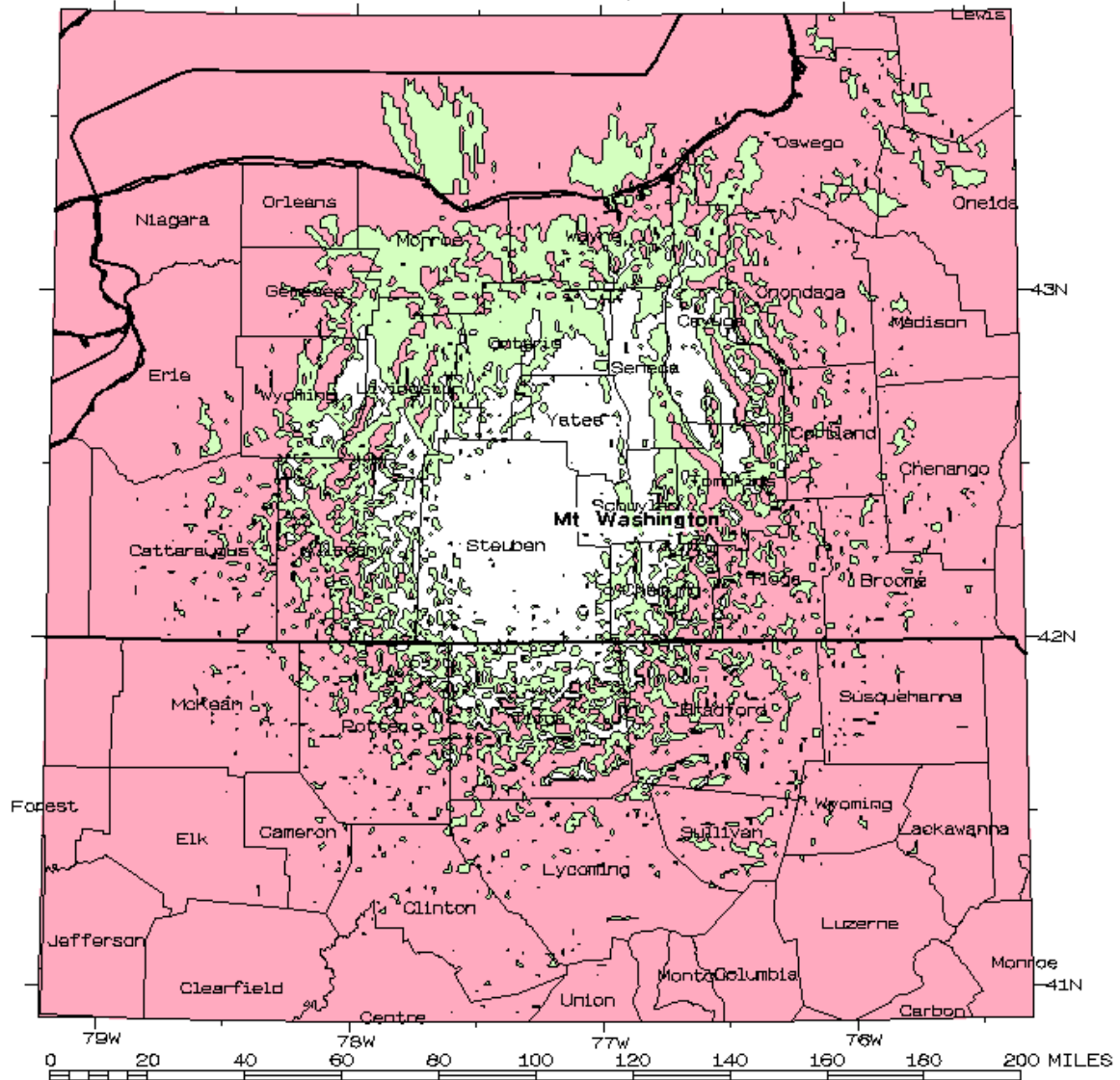


WXN55

Mt. Washington, NY

162.450 MHz

NOAA Weather Radio
WXN55 162.450 MHz
CS001Jul2302D.ques

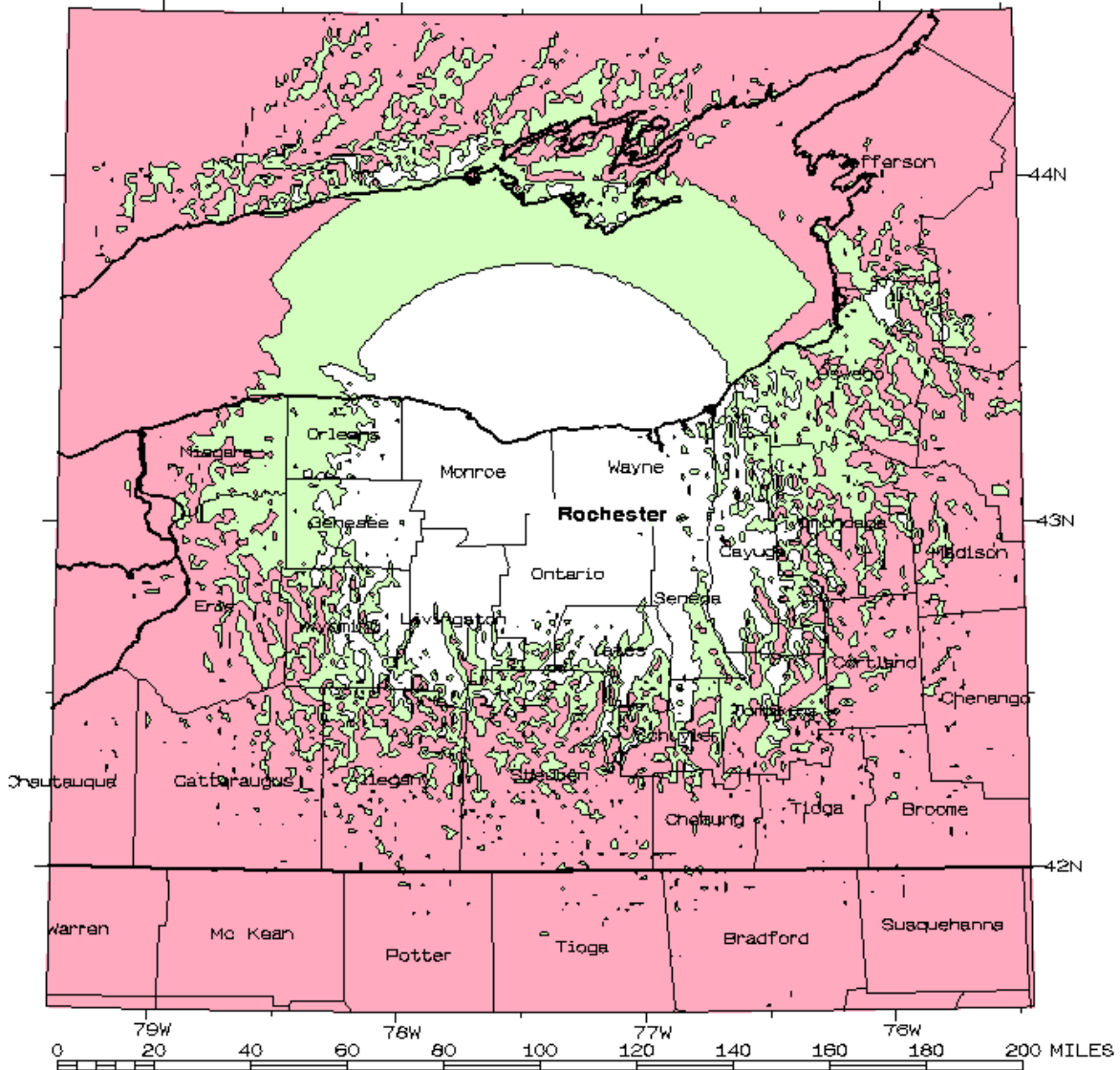


KHA53

Rochester, NY

162.400 MHz

NOAA Weather Radio
KHA53, ROC 162.400 MHz
CS001Sep0598Z189.ques

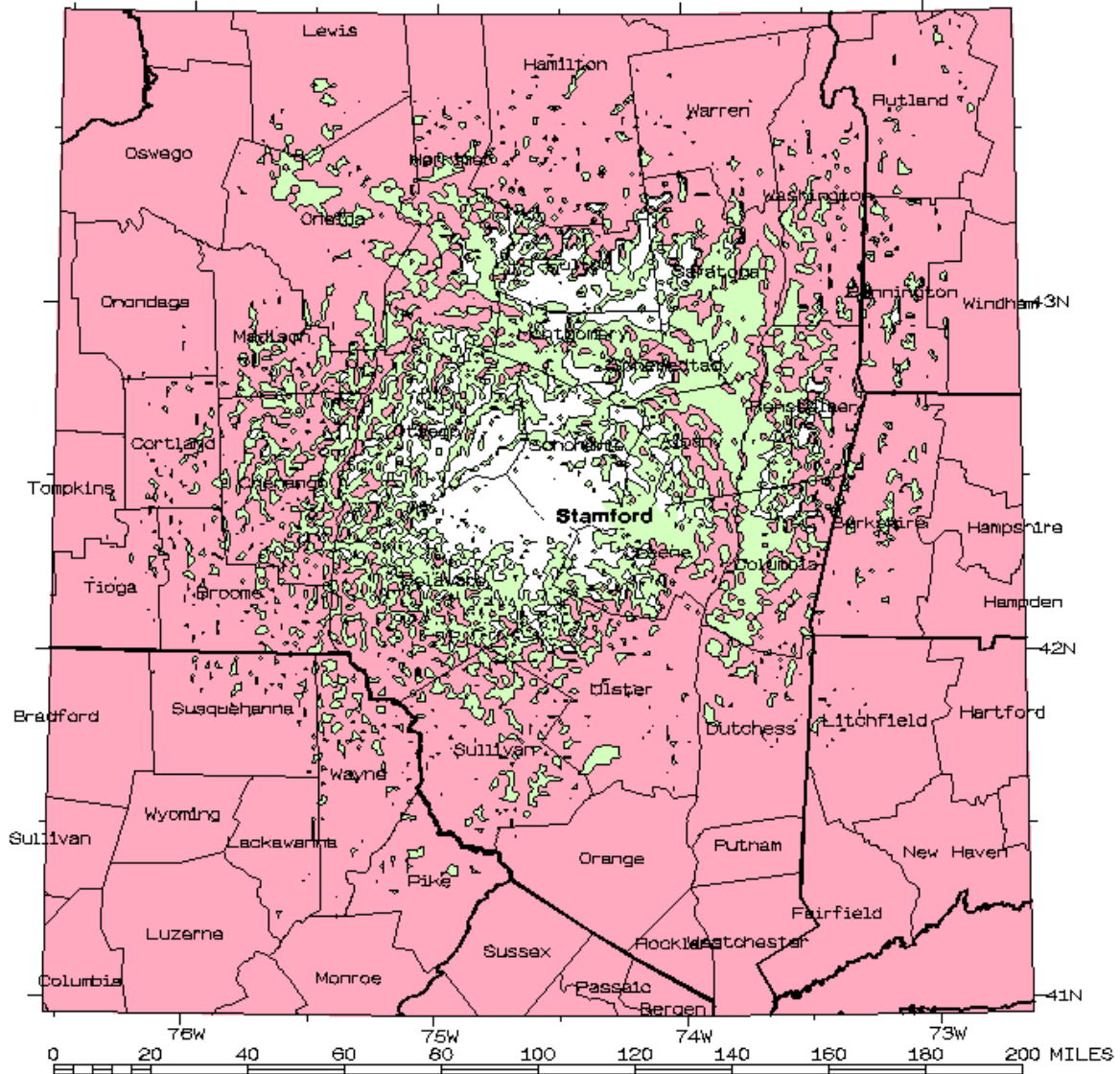


WWF43

Stamford, NY

162.400 MHz

NOAA Weather Radio
WWF43, STA 162.400 MHz
CS001Sep0598Z190.ques

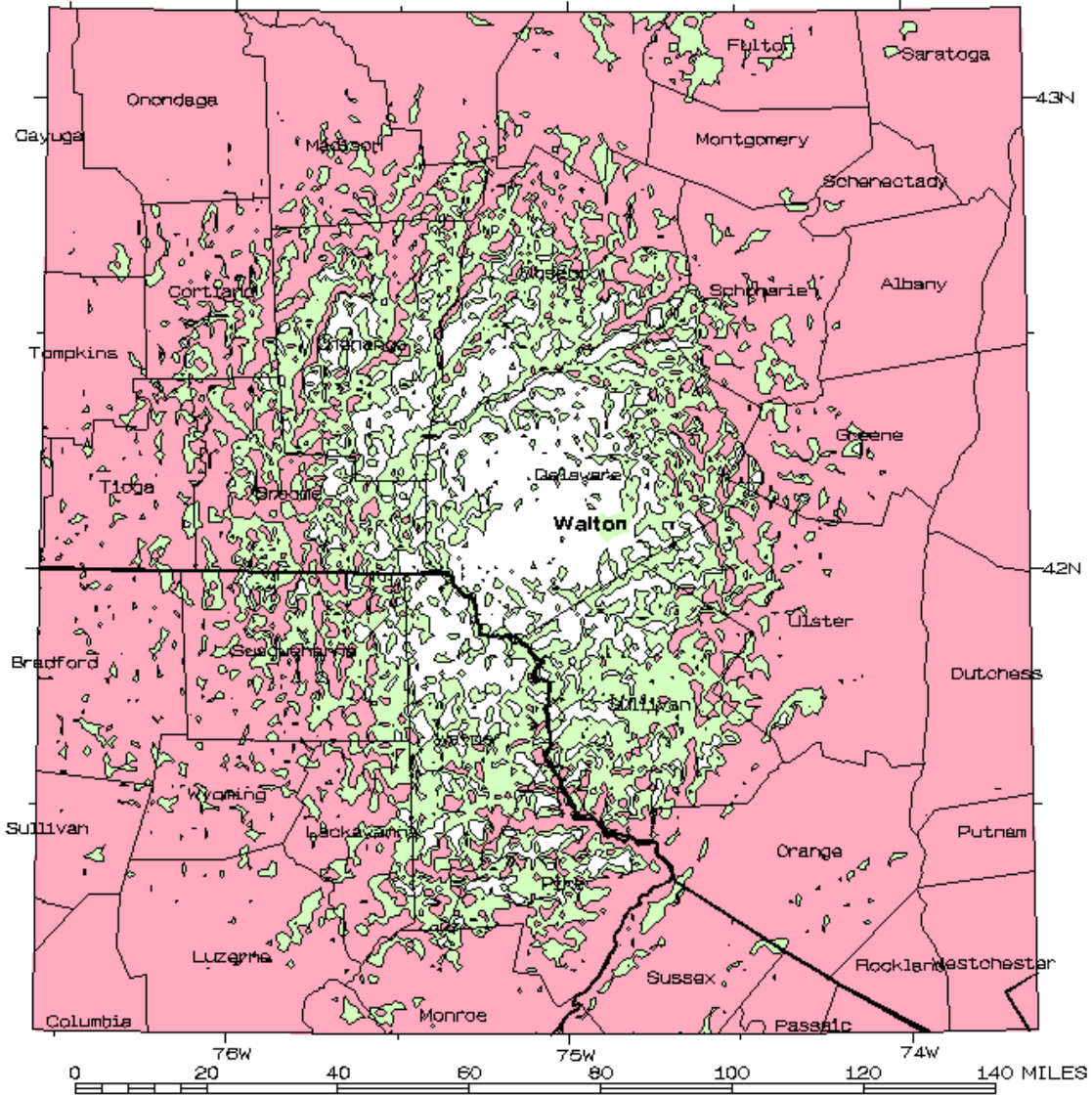


WWH34

Walton, NY

162.425 MHz

NOAA Weather Radio
WWH-34 162.425 MHz
CS001Jan0700A.ques

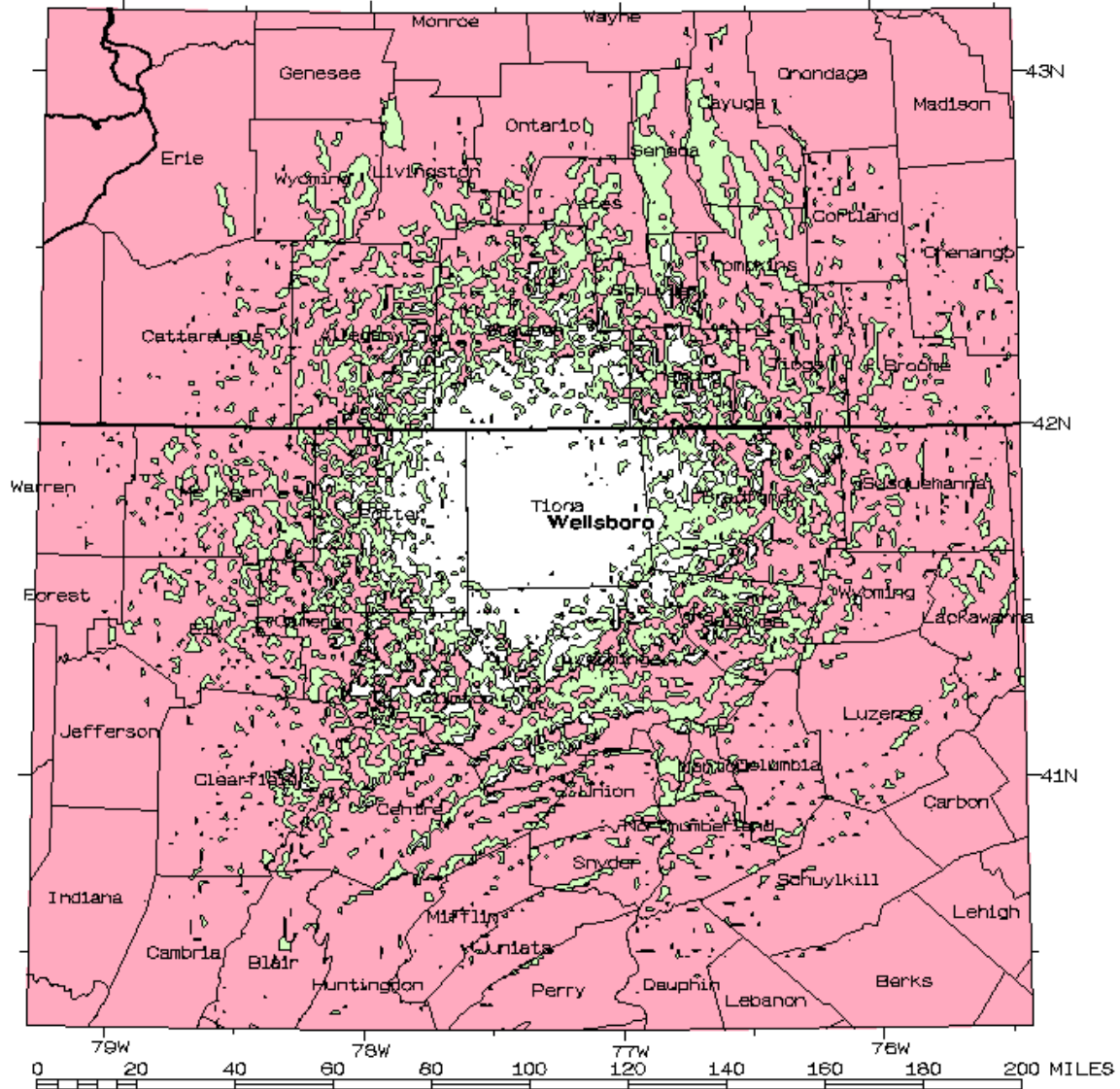


WXM94

Wellsboro, PA

162.475 MHz

NOAA Weather Radio
WXM94, WEL 162.475 MHz
CS001Sep0598Z235.ques

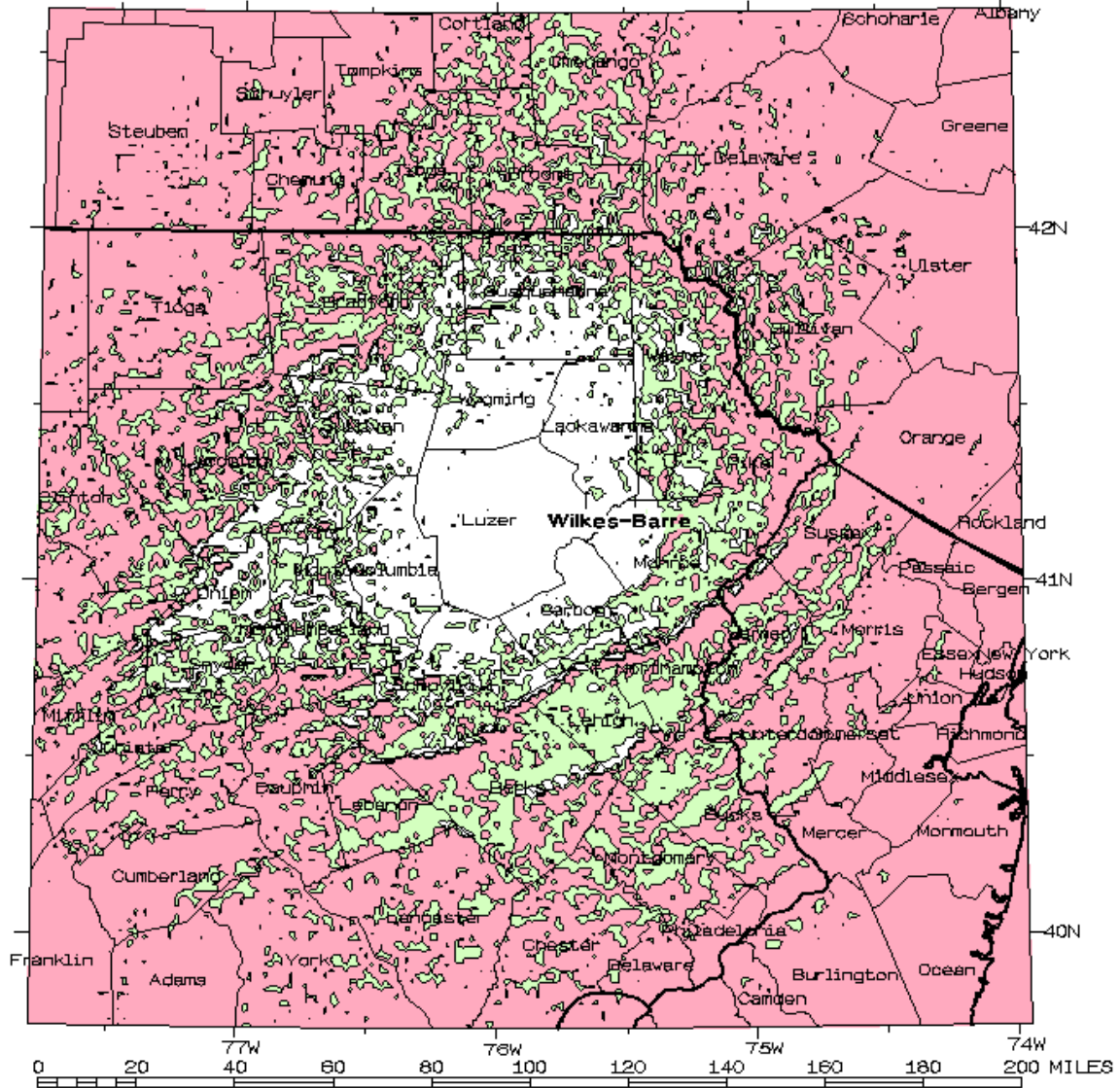


WXL43

Wilkes-Barre, PA

162.550 MHz

NOAA Weather Radio
WXL43, WIL 162.550 MHz
CS001Sep0598Z236.ques

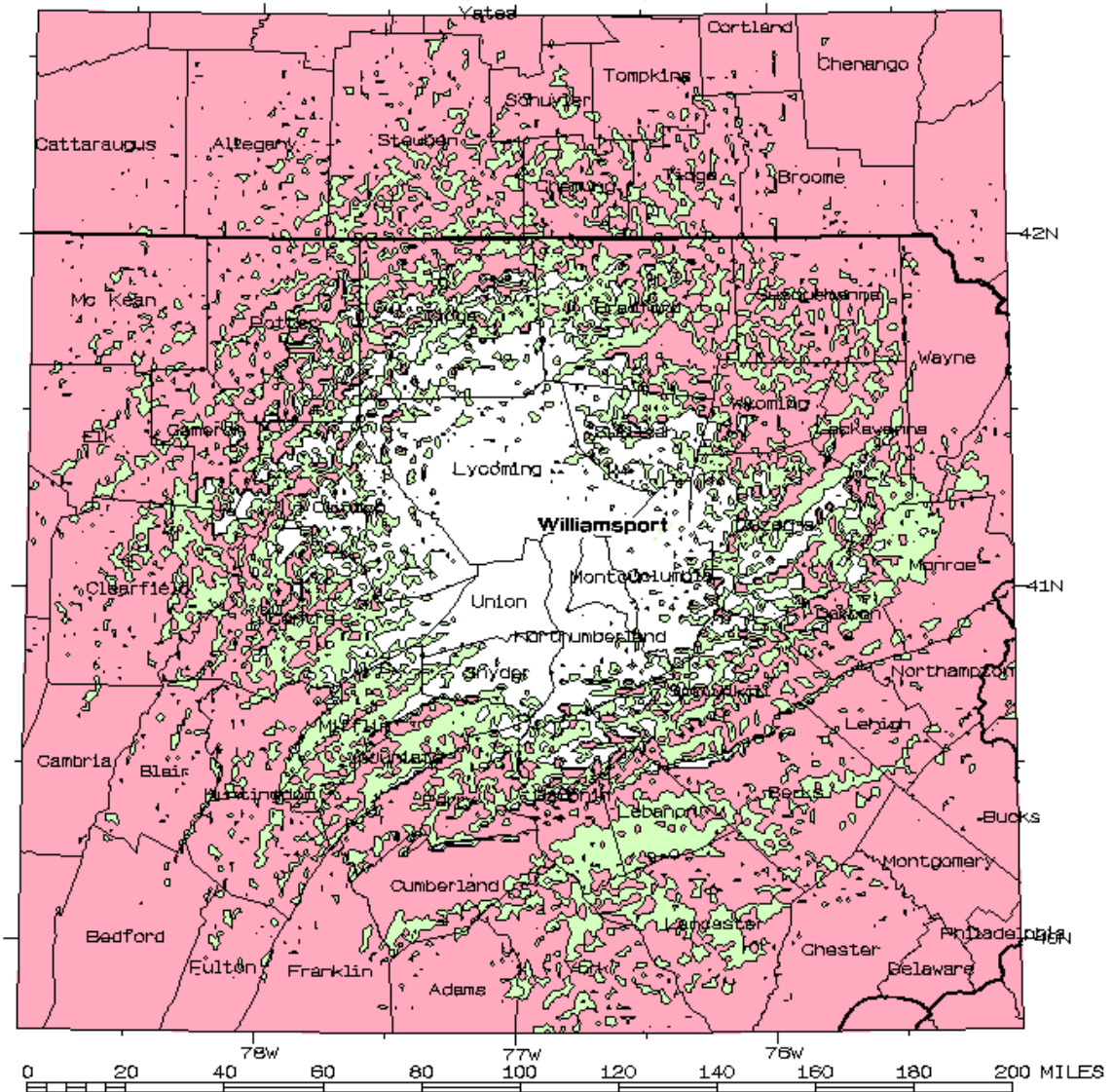


WXL55

Williamsport, PA

162.400 MHz

NOAA Weather Radio
WXL55, WIL 162.400 MHz
CS001Sep0598Z237.ques



Appendix F: Links to Additional Information

Weather Information

- [National Weather Service Forecast Office - Binghamton, NY](#)
- [National Weather Service Eastern Region Headquarters](#)
- [NOAA's National Weather Service](#)

SKYWARN Related Links

- [SKYWARN National Home Page](#)
- [NWS NWSO Binghamton SKYWARN](#)

Rain and Snow Spotter Information

- [National Weather Service Binghamton Spotter Network](#)

NOAA Weather Radio

- [NOAA Weather Radio](#)
- [NOAA Weather Radio List coverage](#)
- [NOAA Weather Radio SAME Info](#)
- [Emergency Alert System \(EAS\) Event Codes/WR Specific Area Message Encoding NWR-SAME\) Codes](#)

Glossary:

Activate	To begin a net to provide information to the NWS
AEC	Assistant Emergency Coordinator (ARES)
ARES	Amateur Radio Emergency Service
ARRL	Amateur Radio Relay League
Beaufort Scale	Scale used in estimating wind speed
Close	To end a net providing information to NWS
CWA	County Warning Area for an NWS office
De-activate	To end a net providing information to NWS
EC	Emergency Coordinator (ARES)
Funnel Cloud	A rotating visible extension of cloud pendant to a cumulus or Cumulonimbus with circulation <u>not reaching</u> the ground
High Priority	Weather of a Severe Nature that needs to be transmitted by the fastest possible means to the NWS
Liaison	Amateur Radio station relaying information from one net or operator to another
Local Net	A net responsible for a single county
Member County	A county that is part of a Regional Hub
NCS	Net Control Station
Net	A group of Amateurs working together under standard protocols for a particular purpose
NWR	National Weather Radio
NWS	National Weather Service
Power Outage	Lack of power to an area (more than one house) for an extended period of time, more than one or two minutes

Preamble	Statement at beginning of a net that explains the purpose and protocols.
Primary Repeater	A repeater recognized as the main repeater used in an area
RACES	Radio Amateur Civil Emergency Service
Region	Counties grouped together to pool information
Regional Hub	Area designated to receive information from a Region
Remote Activation	Activation of a SKYWARN net by selected stations not at NWS
Reportable	Weather that meets or exceeds designated "reportable" threshold
SAME	Specific Area Message Encoding (see Appendix F for more information)
Severe Thunderstorm	A thunderstorm that produces a tornado, winds of at least 58 mph, and/or hail at least three-quarter inch in diameter.
SKYWARN	A program run by the NWS to report Severe Weather
Spotter	A person trained to report severe weather
Standby	Severe weather is not expected within the next 30 minutes, and an active net is not required, however stations are requested to prepare for possible activation.
Tornado	A violently rotating column of air, usually pendant to a cumulonimbus, with circulation <u>reaching</u> the ground
WX2BGM	Operating license of the NWS station. All NWS operators use this call sign for SKYWARN

