



The RELAY)))

APRIL
2019

The **Weather Issue**

The Official Publication of the Arrowhead Radio Amateur Club

A.R.A.C. Inc.

P.O. Box 7164 Duluth MN 55807-7164

<http://www.thearac.org>

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Carol Christenson Turns Page on Distinguished Career at NOAA National Weather Service Office

By Steve Waller KEØNQ T
& Kim Waller KEØNQ S

On a cold, piercing day near the long-awaited end of winter, I set off to meet with KCØMAK Carol Christenson, Warning Coordination Meteorologist with the National Weather Service in Duluth. Carol, who leads SKYWARN® spotter training sessions in northeastern Minnesota and northwestern Wisconsin among many other duties, came bounding out to greet me. At once, I was struck with the thought that she can't be retiring with this kind of enthusiasm. But after many years with NOAA, Carol plans to retire on April 30th.

Born in Platteville and raised in Poynette, Wisconsin, Carol studied at UW Madison. According to Carol, "As a little girl, I wanted to be an archeologist." Her first major was actually journalism, but then she applied for a summer job placement program. Carol was assigned to the National Weather Service for the summer and found she truly loved it. The NOAA Program Manager at the time helped Carol enroll in a different program at UW Madison, changing majors from Journalism to Meteorology. Carol never looked back.

What advice does Carol have for young women who want to get into the meteorological sciences? Carol lists 4 things: "Stick with it, latch onto people, take opportunities, be a risk taker."

I asked Carol what it's like being in a position of such importance when all eyes of the community are on her and the National Weather Service. She said, "Partly due to

having been here so long, I'm well known in the community. The folks here have done such a wonderful job that the NWS is very well known as well."

The National Weather Service plays an important role, because they not only provide forecasts and warnings, but also provide weather support to the Sherriff's Department for Search and Rescue, the Tall Ships Festival, Bayfront Park Festivals and other events all across the Northland.



Carol Christenson, KCØMAK at the National Weather Service in Duluth

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facebook!

1. Type ARAC in the search box to find us.

2. Click "Join" to gain access.

Open to all Club Members

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ARAC Board Meeting Minutes for March 5, 2019

Present: Gene Ellefsen-NØVRM, Mike Lovold-NØPDG, Bruce Carlson-KEØNIT, Gary Minter-KD9ABS, Dave Davis-AAØAC, Bob Boyd-KDØYLN, Doug Nelson-AAØAW, Grant Forsyth-KCØWUP, Kim Waller-KEØNQS, Steve Waller-KEØNQT, Robin Davis

Guest: Dennis Anderson-WØDIO, Jeff Nast-KCØMKS, Del Minter-KEØCLI

Meeting called to order at 6:36 pm by President Gene-NØVRM

Minutes:

Posted on web site and in the newsletter. Motion to accept by Dave-AAØAC, seconded by Bruce-KEØNIT, motion passed

Treasurer's Report:

Checking	3,239.61
Savings	1,868.25
Subtotal	\$5,107.86

Outstanding Check (Repeater # 1400)-\$1,100.00

Winter CD.....	1,707.19
CD Subtotal.....	\$1,707.19

Grand Total\$5,715.05

Expenses are a little ahead of our income but that is due to paying the Liability Insurance. \$2,000,000.00 aggregate policy, which covers Club events, Officer's Liability, etc.

Do we have ID/Checking protection against fraud or theft? There is a program the Credit Union charges \$2.50 or so per month. It covers the mobile banking fraud. Bruce-KEØNIT does not believe we have it on our account. Motion to accept Treasurer's Report as presented by Mike-NØPDG, seconded by Bob-KDØLYN, motion passed.

Bob-KDØLYN made a motion to get the insurance for fraud on our checking account at the Credit Union, pending the approval at the March Club membership meeting, seconded by Gary-KD9ABS, motion passed. This will be brought forward to the ARAC Monthly Club meeting.

Membership:

There has been some requests made to publish a Club directory with name and call signs. In the past, the Board has said, no, we don't want to get into publishing a directory. Bruce-KEØNIT made a sample roster with Last Name, First Name and Call Sign. This information is available through ARRL and is public knowledge. We currently have 163 paid members. This would be useful for new hams and/or new members of the Club.

New Business:

Special Request from Jeff-KCØMKS. He is handing out Northland Weather Group Net information sheet. LSAC Network has been run by Jeff-KCØMKS for fourteen (14) years, going for a long time since 1986. It originally started out on the LSAC 2 system and then moved to the LSAC

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ARAC BOARD Meeting Minutes, Continued from Page 2

1 system. Jeff-KC0MKS has been nursing it along. He was recently asked to remove the Northland Weather Group Net off the Echo Link System. Jeff-KC0MKS is looking to move the net to another system. The Weather Net is currently on Sunday nights at 7:30 pm. Looking at another night, possibly Monday nights, at 8:00 pm, to avoid a conflict with other Nets. The net is usually about 45 minutes. Jeff-KC0MKS is looking at the 94 Repeater as a possible home or a link for the Weather Net. There have been many people on the Net via Echo Link. You have to be a member of the ARAC to get access via the Echo Link. For the time of the Net, the Northland Weather Group Net could connect via Jeff-KC0MKS's Echo Link to the ARAC 94 Repeater. The current Echo Link was provided free of charge by the Spirit Valley Amateurs Club. The function and purpose of the 94 Repeater is to provide communication for the Radio Community. The 94 Repeater is quiet without a lot of day- to-day use. No problems with the concept, adding it without any time constraints. A good idea to have it closed to members of the ARAC Club or those with Echo Link access, being monitored and controlled by Jeff-KC0MKS. Mike-N0PDG makes a motion to bring forward the request to the Club, seconded by Bruce-KE0NIT, motion passed. Thank you from Jeff-KC0MKS

Committee Reports:

Ham Fest:

Gene-N0VRM is seeking authorization for expenses for Ham Fest, scheduled for May 4, 2019, \$500.00 for food and beverages. Bob-KD0LYN makes a motion for \$500.00 for food for Ham Fest, seconded by Gary-KD9ABS, motion passed. Motion by Mike-N0PDG for \$500.00 cash door prize for Ham Fest, seconded by Dave-AA0AC, motion passed.

Sky Warn Training:

Suggestion to recognize Carol Christenson-KC0MAK at Sky Warn by purchasing a plaque noting her years of service for Sky Warn training and promoting the hobby of Amateur Radio. We will discuss honoring Carol-KC0MAK at the Membership meeting. The smaller plaque would be under \$40.00, similar to what we purchase for the Thomas J. Reibold Award

Historians:

Kim-KE0NQS and Steve-KE0NQT would like to present a slide show with pictures and information at the Club meeting. Aim to add a section of history, with photos and documents, on the web page. Goal is to scan and add documents to the web page. Gene-N0VRM provided some old newsletters, which included the process of getting the newsletter done. Summary of who we are, here is what we have, update once or twice a year on the History part of the Web Page. They will be talking to Tom Dorr-KE0RHA, Web Page Master

Newsletter:

When do you want "stuff" submitted for the newsletter, a deadline for inclusion? The newsletter needs to be done and sent to Tom-KE0RHA and Doug-AA0AC by the first of each month. Their aim is to get younger people to become Ham Radio Operators and more involved in ARAC. The first suggestion to change the name of the newsletter to "Relay", from the current title "Discharge". There is such a passion for the hobby with a lot of knowledge and a lot of history. Kim-KE0NQS and Steve-KE0NQT see it as a tool to grow the Club to include membership in ARRL. Plans to expand this to outside of the current Club. Popular culture has changed the meaning of discharge to a medical term with some negative connotations. Before Discharge, the newsletter was called Over Modulation. Plans are to go forward using the newsletter as a tool, to strengthen our relationships with the schools, cultivate that relationship. Another effort is in order, new blood/new members is always good. Any other thoughts? Change is good. These changes to be brought up at the meeting as a point of interest. Steve-KE0NQT would like to interview Carol Christenson-KC0MAK as a feature in the newsletter for the next month with her impending retirement from the National Weather Service. Suggestion to set a time limit of the 25th of the month as a deadline for inclusion of items in the Newsletter. Doug-AA0AW used to do a DX Summary on the web page each month. This will be transitioning to the newsletter. Anyone who would like the newsletter emailed to them should send an email request to Doug-AA0AW.

Motion to adjourn by Bruce-KE0NIT, seconded by Mike-N0PDG, motion passed at 7:35 pm

ARAC Club Meeting Minutes

March 14, 2019

President - Gene Ellefsen-N0VRM
Vice President - Mike Lovold-N0PDG
Treasurer / Membership - Bruce Carlson-KE0NIT
Secretary - Robin Davis
Third Year Board - Gary Minter-KD9ABS
Second Year Board - Dave Davis-AA0AC
First Year Board - Bob Boyd-KD0YLN
Parliamentarian - Grant Forsyth-KC0WUP
Special Events – Open / Gene Ellefsen-N0VRM acting
Ham Fest / Education - Bob Schultz-KC0NFB
Newsletter - Kim-KE0NQS & Steve-KE0NQT Waller
Newsletter / Historian - Kim-KE0NQS Waller
Property / Picnic - Scott Ahlgren-N0VYU
Repeater - Randy Wabik-KR0B
Testing - Doug Nelson-AA0AW
Web Site - Thomas Dorr-KE0RHA

Absent:

Repeater Derek McCorison-W0DNF
Repeater Randy Haglin-N0BZZ
Web Site Thomas Dorr-KE0RHA

Meeting called to order at 7:07 pm by President Gene-N0VRM

Silent Key – A moment of silence for Dorothy Anway-KC9LSG, visitation is at 10:00 am with a service at 11:00 am, here at the church, on Saturday

Minutes:

Posted on web site and in the newsletter. Motion to accept by Grant-KC0WUP, seconded by John Cavanaugh-KC0AFE, motion passed

Treasurer's Report:

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Savings.....	1,868.25
Subtotal	\$5,107.86

Outstanding Check (Repeater # 1400)-\$1,100.00

Winter CD	1,707.19
CD Subtotal	\$1,707.19

Grand Total..... \$5,715.05

Motion to approve by Doug-AA0AW, seconded by Gene-N0VRM, motion passed

Membership:

ARRL members, we need to be at 50% to be current with the ARRL. We haven't filed a Membership Report in the last eight (8) years, which is required annually. If you haven't signed up with Bruce-KE0NIT or Gene-N0VRM, please see Bruce-KE0NIT. The Club encourages members to join

Continued on Page 5

ARAC Club Meeting Minutes, Continued from Page 4

ARRL. They are the largest promoter of our frequencies. There are several large corporations that want our 2-meter spectrum, estimated price 13 billion. We keep our frequencies because of ARRL. How many members do we need? They like 50%. We currently have thirty-seven (37) on the list plus a few more tonight. ARRL looks expensive at \$50.00. You get the subscription to QST and they send you a \$10.00 gift certificate for your birthday. There are many new Hams. There has been a request for a list of names with call signs. Bruce-KE0NIT is developing a list - alpha by last name and a second page alpha by call sign. Suggestion to put it on the web site. Something that could be done. If you don't want your name off the list, please let Bruce-KE0NIT know. All the information is available to the public. Any mistakes please let the Treasurer know

Committee:

Education:

About a dozen people in the current class. Testing will be at the Ham Fest. Nothing planned until fall for the next class

Testing:

May 4, 2019, at the Ham Fest. If you want to test earlier, let Doug-AA0AW know. We now have the ability to test individually, per person, when you're ready to test for your license or for an upgrade

Repeater:

Nothing new at this time. We are waiting to get into the site, once the snow melts. Hoping by May to have the radio swapped

Ham Fest:

We have a confirmation from the Fair Board. We have several reservations for tables at this time

Board passed a motion to spend \$500.00 for the food again this year. Seconded by Doug-AA0AW, motion passed. Board passed a motion to spend \$500.00 as the grand prize, Mike-N0PDG seconded, motion passed. Looking for a couple of volunteers to pick up the donuts from Super One on Saturday morning. Kim-KE0NQS and Steve-KE0NQT will pick up the donuts. Mike-N0PDG will put out the signs

Repeater:

Request from Jeff Nast-KC0MKS. In 2005, Jeff-KC0MKS took over a net that had been run for many years prior to his involvement, the Northland Weather Net, on the LSAC system. Jeff-KC0MKS presented a proposal to the Board to move the Net over to the ARAC system, using the 94 Repeater. As part of the process, the Net would be moved from Sunday night to Monday night at 7:00 pm. Question - will the Net be up all the time or just on Monday nights? It was suggested at the Board meeting that Jeff-KC0MKS's Echo Link migrate off Doug-AA0AC's Echo Link (AA0AW-L). Ham Operators from other parts of the country can check in via Echo Link. It is a controlled site and you have to have permission to join the Echo Link. It is a closed system. If you are already approved on the Weather Net, you will automatically be given access to the Echo Link. Not sure as to when exactly this will happen but within a month. There was a second from many to the Board's motion to add the Net and Jeff-KC0MKS's node, motion approved

Comment from the Floor - QRZ gives access to your biography but not your address

This is the year for changing the books on June 30, 2019. Bob-KC0NFB has two (2) books left which he will sell for \$10.00 each

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Newsletter:

We ask for your patience as we work out the bugs. The deadlines for submissions are the 25th of each month. We want to change the name from Discharge to Relay. We need to pass on our information to the younger generation, to reach them. We rely on the "Elmers". Our first ask Elmer was done by Bob-KC0NFB on the slow scan TV and the tie to the Space Station. We welcome any ideas or corrections to names, call signs, etc. The Ask Elmer will stay. What's Your Project to add a column or article showing what's your shack. The Editors (Kim-KE0NQS and Steve-KE0NQT) will visit and do a story on whoever is suggested as an interested party

Winter of the door prize is Glen Nelson-KA0GGG

Motion to adjourn by Dave-AA0AC, seconded by many, motion passed at 7:38 pm

Northland Weather Net UPDATE

New Place, New Time!

As of **April 1st** The **Northland Weather Group Net** has changed its repeater and time from Sundays at 7:30 PM on the LSAC repeater system to Mondays at 8:00 PM on the **ARAC repeater system** (146.940 MHz with a tone of 103.5 and standard offset). There be no noticeable difference for those who are checking in on **EchoLink®** due to movement of the EchoLink® node to ARAC's repeater system.

For those who cannot reach ARAC directly by air, please let KCØMKS Jeff Nast know by emailing him at **kcØmks@gmail.com** . He will add you to the KCØMKS-R EchoLink® authorization list.

For the first four weeks in April, Jeff will still be on the old LSAC frequency taking check-ins to redirect people to the new day, time and repeater system. Jeff will also have the Northland Weather Group Net updated with information.

About EchoLink®

EchoLink® software allows licensed Amateur Radio stations to communicate with one another over the Internet, using streaming-audio technology. The program allows worldwide connections to be made between stations, or from computer to station, greatly enhancing Amateur Radio's communications capabilities. There are more than 200,000 validated users worldwide — in 151 of the world's 193 nations — with about 6,000 online at any given time. Courtesy: EchoLink - Copyright © 2002-2018 EchoLink.org

U.S. AIR FORCE MILITARY AUXILIARY RADIO SYSTEM



Minnesota State MARS Director
Reginald B. Cass / AFS5MN

Gene Ellefsen
NØVRM

Thank you for your time and interest.

Air Force MARS membership could be for you. We do hope that it is.

If you have the following interests, and capabilities, we are interested in recruiting you to become an Air Force MARS member. Completion of the following on line training is mandatory:

Personally, Identifiable Information (PII) <https://iatraining.disa.mil/eta/piiv2/launchPage.htm>

Cyber Awareness https://iatraining.disa.mil/eta/disa_cac2018/launchPage.htm

If you have completed: Incident Command System (ICS) -100, 200, 700, and 800 training, and have obtained certification for Air Force MARS or are willing to obtain this training, again, Air Force MARS could be for you.

You must be interested in joining a group of individuals that are dedicated to amateur radio, emergency communications, and willingness to learn and used military communications procedures for voice and digital communications.

You must have equipment that will meet the minimum requirements for voice and digital operation. The equipment will be: transmitter, receiver, (transceiver) modified to operate out of amateur radio bands, computer, modem, and antenna's that are designed to operate on military assigned frequencies. (The best antenna's will be a dipole cut to the operational frequency. NVIS antennas work best. You will not need a linear amplifier, however if you have one that will operate on out of amateur radio bands that will be a plus)

You must go through and complete training. You are allowed up to 180 days to do so.

Air Force MARS operation's and procedures are based upon "MARS Operating Instruction", (MOI). The MOI manual uses as its basis for instruction a series of Allied Communications Publications (ACP's), Department of Defense Directives, Department of Defense Instructions, and Department of Defense Manual.

If you already belong to a MARS program and would like to consider Air Force MARS, please contact one of the recruiting team members.

For even more information please open and read the attachment.

Our recruitment team is as follows:

AFA5XK Dave, WB7DRU wb7dru@gmail.com

AFA5ZV Randy, KRØB afa5zv@gmail.com

AFA5JY Reg, KAØRJY reg_cass@msn.com

Prez Sez...

Hi everyone,

April is here and its time for our annual **Skywarn Training**. The Skywarn Training will be at our **April 11 Club meeting**. The meeting will start at **6:00 PM** with the Skywarn Training starting at 6:30 PM. This is open to the Public and we expect a good number of guests. We ask that ARAC members let our guests have the seats up front.

Also coming up quick is the **ARAC Hamfest** on **May 4th** over at the **Head of the Lakes Fairgrounds**. The doors open for Vendors at 7:00 AM and for the Public at 9:00 AM. We do setup at 6:00 AM; some us meet at McDonalds on 21st and Tower Ave for breakfast at 5:00 AM.

Reminder: Once the tables are all set up you will have to leave the selling floor unless you have rented a table and have a Vendor Pass. I have been hearing a lot of chatter about our **Hamfest** so it should be a good one!

73's Gene Ellefsen NØVRM



National Weather Service SKYWARN® Program

Skywarn Spotters
for the
National Weather Service
play an important role in our
warning process and help our
communities **stay safe!**

SKYWARN
Annual Training
April 11 @ 6:30 pm
Coppertop Church

Arrowhead Radio Amateur Club HAM FEST!

Sat. May 4th, 2019 9:00am – 1:00pm

**HEAD OF THE LAKES FAIRGROUNDS – MULTI
PURPOSE BUILDING**

4700 Tower Ave. (Wisconsin Hwy 35) Superior, WI 54880
Fairgrounds are located next to the Superior Airport.

Admission: \$7.00 (12 & under FREE!)

Free parking for most vehicles.

Used and like new radios, supplies, equipment, and computer related items including software and hardware! Personalized Ham items also available!

<<< QSL card checking for ARRL awards program by Mike Cizek WØVTT >>>

Mike's email: mgcizek@gmail.com



This is an A.R.R.L. sanctioned event.

Talk-in on WØGKP Repeater:
146.940(-) [103.5] Duluth
147.000(-) [103.5] Mahtowa
146.940(-) [114.8] 2-Harbors

Testing on site!

10:00 AM 4-H Building
Contact: Doug
AA0AW / 218-391-5874
aa0aw@arri.net

**W
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Dealer / Vendor Tables:
4 foot table: \$5.00
8 foot table: \$10.00
Vendor setup starts at: 7:00am

Table Reservations:

Robert Schulz, KC0NFB
115 Eden Lane
Duluth, MN 55805-1533
218-481-7458
arac.hamfest@charter.net

Hourly Drawings!

ROOKIE ROUNDUP

Rookie Roundup is a contest aimed at Amateurs licensed for three years or less. This six-hour event is held three times per year (April, August and December). Rookies can contact anybody, while "Old Timers" make contact with only Rookies. Mentoring is a big part of this event!

Mission: To encourage newly-licensed operators ("Rookies") in North America (including territories and possessions) to operate on the HF bands and experience competitive Amateur Radio operating. Experienced operators ("Non-Rookies") are strongly encouraged to participate and help new operators – either on the air or in person.

Objective: Rookies exchange information with as many other stations as possible on the 80, 40, 20, 15, and 10 meter HF bands. Rookie entrants are encouraged to read all the details in the **ARRL** document [*HF Contesting – Good Practices, Interpretations and Suggestions*](http://www.arrl.org/hf-contesting-guidelines) found at <http://www.arrl.org/hf-contesting-guidelines>

NEW RULES - MORE ROOKIES!

- You can be a Rookie if you were first licensed in 2019, 2018 or 2017 - send the year you were first licensed in the exchange.
- If you were licensed before 2017 you can also be a Rookie if you made your first Amateur Radio contact during 2019, 2018 or 2017 or if you haven't made any contacts on the contest mode (SSB, CW, or RTTY) before the Rookie Roundup contest, send the current year (2018) in your exchange - either of these reasons qualify you as a Rookie for just one year.
- Rookies will attempt to make as many contacts as possible during this 6-hour event. Rookies work everyone - and non-Rookies work only Rookies.

This is a great way to try out contesting in an event designed for newcomers. Hope to work you then! To pre-register teams or submit your score after the event, please visit the [**Rookie Roundup**](http://www.b4h.net/arrlrr/index.php) page hosted by Bruce Horn, WA7BNM by visiting <http://www.b4h.net/arrlrr/index.php>

2019 Rookie Roundup Dates

All events run for 6 hours (from 1800 to 2359 UTC) on the dates shown below.

Sunday, **April 14, 2019**, using SSB
Sunday, **August 18, 2019**, using RTTY
Sunday, **December 22, 2019**, using CW

Contest Calendar 2019

APRIL

Georgia QSO Party	1800 UTC April 13 to 2359 UTC April 14
Rookie Roundup SSB	1800 UTC to 2359 UTC April 14
Michigan QSO Party	1600 UTC April 20 to 0400 UTC April 21
Ontario QSO Party	1800 UTC April 20 to 1800 UTC April 21
Florida QSO Party	1600 UTC April 27 to 2159 UTC April 28

MAY

7th Call Area QSO Party	1300 UTC May 4 to 0700 UTC May 5
Indiana QSO Party	1600 UTC May 4 to 0400 UTC May 5
Delaware QSO Party	1700 UTC May 4 to 2359 UTC May 5
New England QSO Party	2000 UTC May 4 to 2400 UTC May 5

JUNE

ARRL June VHF Contest	1800 UTC June 8 to 0300 UTC June 10
ARRL Field Day	1800 UTC June 22 to 2100 UTC June 23

JULY

CQ Worldwide VHF Contest	1800 UTC July 20 to 2100 UTC July 21
North American QSO Party, RTTY	1800 UTC July 20 to 0559 UTC July 21

AUGUST

ARRL 222 MHz and Up Distance Contest	1800 UTC Aug 3 to 1800 UTC Aug 4
North American QSO Party, CW	1800 UTC Aug 3 to 0600 UTC Aug 4
Maryland-DC QSO Party	1600 UTC Aug 10 to 2400 UTC Aug 11
Rookie Roundup RTTY	1800 UTC to 2359 UTC Aug 18
Hawaii QSO Party	0400 UTC Aug 24 to 0400 UTC Aug 26
Ohio QSO Party	1600 UTC Aug 24 to 0400 UTC Aug 25

SEPTEMBER

Tennessee QSO Party	1800 UTC Sept 1 to 0300 UTC Sept 2
New Hampshire QSO Party	1600 UTC Sept 21 to 2200 UTC Sept 22
Maine QSO Party	1200 UTC Sept 28 to 1200 UTC Sept 29
Texas QSO Party	1400 UTC Sept 28 to 2000 UTC Sept 29

CW Abbreviations

AR End of Message AS Pse QRX BK Back to You SK End of Contact
 TU Thank You PSE Please K Invite to Transmit
 QST Calling all Amateurs QRL Are You Busy? QRU Have anything for me
 QRV Are You Ready? QRX Standby QRS Transit Slower

A	●■■■	M	■■■■	Y	■■■■●
B	■■■■●	N	■■■●	Z	■■■■●●
C	■■■■●●	O	■■■■■	1	●■■■■■
D	■■■■●●●	P	■■■■●●●	2	●●■■■■■
E	●	Q	■■■■●●●	3	●●●■■■■■
F	●●■■■■	R	■■■■●●	4	●●●●■■■■
G	■■■■●●	S	●●●	5	●●●●●
H	●●●●	T	■■■	6	■■■■●●●●
I	●●	U	●●■■■	7	■■■■●●●●●
J	■■■■■■■	V	●●●■■■	8	■■■■●●●●●●
K	■■■■●●■	W	■■■■●●●	9	■■■■■■■■●
L	■■■■●●●	X	■■■■●●●■	0	■■■■■■■■■



US Amateur Radio Bands

US AMATEUR POWER LIMITS

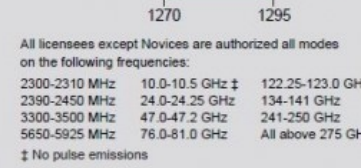
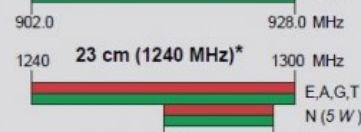
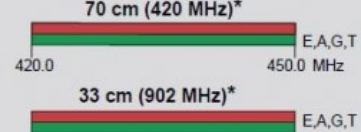
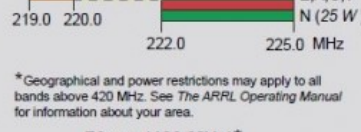
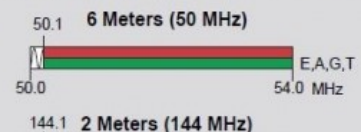
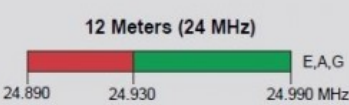
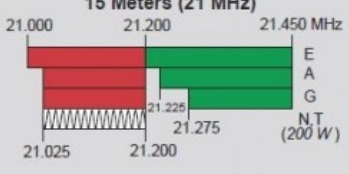
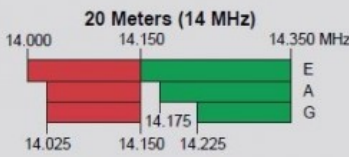
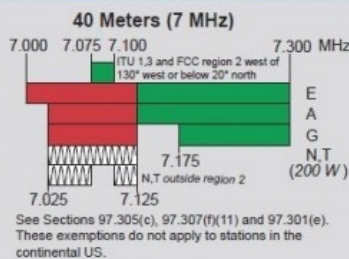
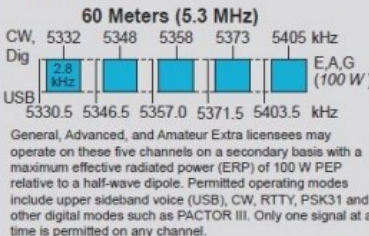
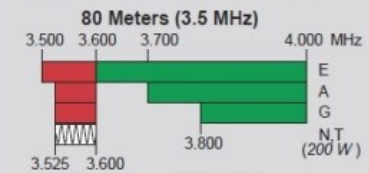
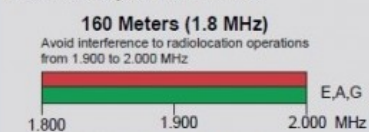
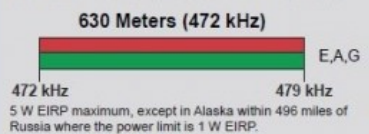
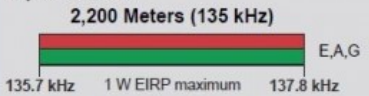
FCC 97.313 An amateur station must use the minimum transmitter power necessary to carry out the desired communications. (b) No station may transmit with a transmitter power exceeding 1.5 kW PEP.

Effective Date for
2,200 and 630 Meters
to be announced



The national association for
ARRL AMATEUR RADIO

On March 28, 2017, the Federal Communications Commission adopted rules that will allow Amateur Radio access to 472-479 kHz (630 meters) and to 135.7-137.8 kHz (2,200 meters). However, amateurs cannot use these frequencies until 30 days after the Report and Order is published in the Federal Register and the final procedures for registering stations with the Utilities Telecom Council (UTC) have been approved and announced. At the time this chart was created, the Report and Order had not been published and the UTC online registration site is not yet available. Follow ARRL news for further information. New charts will be published at www.arrl.org/graphical-frequency-allocations when the bands are fully available for use.



KEY

Note:
CW operation is permitted throughout all amateur bands.
MCW is authorized above 50.1 MHz, except for 144.0-144.1 and 219-220 MHz.
Test transmissions are authorized above 51 MHz, except for 219-220 MHz

- = RTTY and data
- = phone and image
- = CW only
- = SSB phone
- = USB phone, CW, RTTY, and data
- = Fixed digital message forwarding systems only

E = Amateur Extra
A = Advanced
G = General
T = Technician
N = Novice

See ARRLWeb at www.arrl.org for detailed band plans.

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email: membership@arrl.org

Getting Started in Amateur Radio:
Toll-Free 1-800-326-3942 (860-594-0355)
email: nowham@arrl.org

Exams: 860-594-0300 email: vec@arrl.org

Nets... Nets... Nets... Nets... Nets... Nets... Nets... Nets...

Have a favorite HF/6m/2m/1.25m/70cm net that you check into or listen in on? Also, please send corrections and we will add it to the list below - Kim KEØNQS at my email KEØNQSmn@gmail.com.

- **Northland Weather Group Net:** Mondays 2000 on the ARAC repeater (146.940 MHz with a tone of 103.5 and standard offset).
- **Minnesota D-Star Net:** Sundays at 19:30 on Reflector 53A
- **Minnesota Section Net** 1200 and 1730 on 3.860 [Net Manager: NØYR] http://www.mn-section.org/dept_stm.html
- The non-non-net: Evenings 2000 144.200 USB except for Sunday evenings.
- Badger WX Net: 0500-0715 on 3.985. Give 24 hour high/low/current temperature, precipitation and snowfall.
- **PICONET:** 3.925 from 0900-1100 CT Mon-Sat and 1600-1700 CT Mon-Fri. Info at: <http://www.piconet3925.com>
- Michigan Upper Peninsula Net: 1600 (CST) on 3.921 MHz Sun-Sat and 1200 Sun. Info: <http://www.michupnet.com>
- Great Lakes Marine/Maritime Mobile Net: Morning 07:30 - 3.932; 08:15 - 7.261 MHz and evening 18:30 - 3.1730927; 19:15 - 7.268 MHz. Weekend extra net: 10:00 - 7.261/7.268 MHz. All CST, LSB and +/- QRM. See: <http://www.sailblogs.com/member/glimmnet/>
- MIDCARS: 07:30-13:00 - 7.258 MHz. See: <http://www.midcars.net>
- Iowa snowbird net on 14.257MHz, M-W-F at 10:00 am Local Time. This is an open net.
- Spider Web Net (Marco Island FL) on 14.347 every morning at 0730 CST/CDT: <http://www.spiderwebnet.net>
- Maritime Mobile Service Network: Daily at 1100—2100 Central on 14.300. <http://mmsn.org> and <http://www.14300.net>
- RV Radio Network: Every day at 1900 Central on 7.265 MHz. Web site: <http://www.rvradionetwork.com>
- Upper Midwest Ten Meter Net: Every Thursday Evening @ 8 PM – 28.480 MHz USB
- Wisconsin Sideband Net: Daily @ 5:15 PM – 3985 [or 3982.5] KHz LSB
- Upper Midwest Ten Meter Net: Every Thursday Evening @ 8 PM – 28.480 MHz USB
- Hobby Helpers Net - Tuesday @ 8 PM – 28.330 MHz USB (Isanti MN) LSB [Net Manager: WOØA].
- Northstar Trader Net: 3.908 +/- at 0830 CST Sundays
- WARFA: 3.908 +/- Sun/Tue/Thu nights at 2200 CST, <http://warfa.org/>
- Youth Net: 14.320-14330 Sundays 1800-1900 UTC, Net Control: AC8PI
- YACHT: Saturdays 1900 CST on EchoLink #481872, <http://yachthams.webstarts.com>
- Northwestern Ontario ARES Net: Evenings at 20:15 (Central) on +/- 3.750Mhz
- The Iron Range Net: Saturdays at 0800 Central time on or near 3.919 Mhz. Look them up on Facebook!
- FORX Net: Mondays at 1900 Central at 3.941 Mhz +/- QRM. WAØJXT — Grand Forks, North Dakota
- HF CW: Fridays 08:00 CST, 7.112 MHz. Informal slow speed CW Net. W8IRT NCS. Email: w8irt@aol.com
- Minnesota ARES Digital Net: Thursdays at 2000 CST, 3.5835 MHz USB +/- QRM, Mode: Olivia 8/500.
- SARA Digital Net: Sundays at 1900 Local, 3.582.150 MHz USB +/- QRM, Mode: BPSK31/BPSK63
- Spider Web Net (Marco Island FL): 14.347 every morning at 0730 CST/CDT: <http://www.spiderwebnet.net>
- Broadcaster Net: 7.231 or 3.855 M/W/F @ 1500 UTC. 14.255 M-F @ 2130 UTC. <http://www.cbsretirees.com/ham.htm>
- Old Military Radio Net: 7.268 +/- nightly at 0200z. Other times/Frequencies too. See: <http://www.mrca.ar88.net/>
- Rag Chew Crew/Tailgaters/Freewheelers Nets: 3.916 +/- nightly at 1900 CST, <http://www.tailgatersnet.com>
- North South Net: 7.214.6 +/- at 0700 CST, Monday-Saturday

Wanted!

Looking to buy a non-working Icom 706 for parts. Email me: anordin@aol.com

Please email your for sales or wanted items to Kim, KEØNQS, at KEØNQSmn@gmail.com.

KCØNFB, Bob, would like to remind all hams to **make sure your license is current** and up-to-date on your address. You can visit the FCC ULS to check it and make changes at www.fcc.gov/uls.

Contest Calendar at www.contestcalendar.com

National Contest Journal at www.ncjweb.com

QSO Party Note: State/Province/National QSO Parties are abbreviated with the 2 or 3 letter abbreviation for the state/province/national designation followed by QP for QSO Party:

Examples: Minnesota QSO Party is MNQP
British Columbia QSO Party = BCQP

QRZ web site at www.qrz.com
VHF Propagation site at www.aprs.mountainlake.k12.mn.us

Reminder: The **Contest Corral** monthly listing of contests can be found in each issue of **QST**. **ARRL** sponsored contests can be found in Contest Corral, highlighted, or on the ARRL's web site at arrl.org.

Club Repeater
WØGKP
146.94 (-)
CTCSS Tone
103.5

Next ARAC Board Meeting

Tuesday, April 2, 2019
@ 1830
Sammy's West Duluth

Next ARAC Club Meeting

6 p.m. Thursday
April 11, 2019
Copper Top Church

2019 HOLIDAYS

May 18	Armed Forces Day
May 27	Memorial Day
July 4	Independence Day
September 2	Labor Day
November 11	Veteran's Day
November 28	Thanksgiving
December 25	Christmas Day

Upcoming 2019 Local Events

Confirmed Dates for 2019 (Correct as of publication)

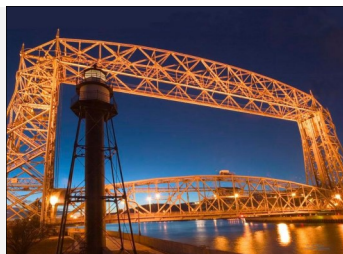
- April 8-12 Severe Weather Awareness
- April 11 Skywarn Training
- May 4 Hamfest

Upcoming 2019 Meeting Programs

TBD

Interested in providing a program, or have an idea for one? Contact Mike NØPDGP at lovoldm@gmail.com

Duluth Area Repeaters



ARAC System WØGKP

Freq.	Offset	Tone	Location
146.940	minus	103.5	Duluth
146.940	minus	107.2	Lakeside (rcv)
146.940	minus	151.4	Two Harbors (rcv)
146.940	minus	100.0	Gary-New Duluth (rcv)
146.940	minus	123.0	Solway (rcv)
146.940	minus	110.9	Cloquet (rcv)
147.000	minus	103.5	Mahtowa
444.100	plus	103.5	Duluth UHF Link

N9MMU/N9QWH System (WI)

145.310	minus	110.9	Duluth
145.490	minus	110.9	Solon Springs
147.255	plus	110.9	Hayward
145.110	minus	110.9	Rice Lake
147.345	minus	136.5	Holcombe
145.230	minus	110.9	Eau Claire

WECOMM – WI Statewide Linked System WE9COM

147.075 plus 110.9 Meteor Hill (closest repeater to Duluth)

LSAC System #1

147.330	plus	151.4	Proctor
147.330	plus	103.5	Duluth (rcv for Proctor)
147.330	plus	156.7	Duluth (North) (Fish Lake)
147.270	plus	114.8	Two Harbors
147.270	plus	103.5	Wales
147.090	plus	114.8	Silver Bay
145.410	minus	114.8	Finland
147.300	plus	114.8	Isabella
145.150	minus	103.5	Washburn, WI
146.700	minus	103.5	Bayfield, WI
443.850	+5.00	none	Bayfield, WI
147.165	plus	110.9	Hurley, WI
146.640	minus	151.4	Ely
443.500	+5.00	141.3	Gilbert
147.060	plus	103.5	Virginia
147.360	plus	162.2	Cook
147.165	plus	114.8	Coleraine
443.925	+5.00	110.9	Brainerd

NARC System NAØRC

145.45Ø	minus	1Ø3.5	Solway Twp
145.45Ø	minus	114.8	Park Point (rcv)
147.135	plus	114.8	Park Point (rcv)
147.135	plus	1Ø3.5	Knife River

Stand Alone Repeaters

145.21Ø	minus	11Ø.9	Clam Lake, WI
146.88Ø	minus	123.Ø	Grand Rapids
146.91Ø	minus	146.2	Duxbury, MN

Fusion and D Star

Fusion (Analog has tone and C4FM digital with no tone)

147.15Ø	plus	151.4	NTØB Gilbert Fusion Rptr
145.17Ø	minus	11Ø.9	WA9KLM Superior – Douglas County RACES/ARES Fusion Repeater

443.1ØØ +5.ØØ 1Ø3.5 KBØYHX Cloquet – Carlton County RACES/ARES Fusion Repeater

444.3ØØ +5.ØØ 1Ø3.5 NØEO Spirit Valley Amateurs Fusion Repeater WIRES-X NØEO

147.375 plus NØEO D Star
442.2ØØ plus NØEO D Star

[Repeater list compiled by Dr. Frequency—KCØWDQ]

ST. Louis County Department of Emergency Services Net Control Roster

N9DMG	Scott Swanson	NØVRM	Gene Ellefsen
AAØAW	Doug Nelson	KCØWDQ	Paul Dallavia
WØNWO	Dave Miller	WØDIO	Dennis Anderson
KØDSL	Diane Saunders	AAØME	Randy Johnson

Sunday Nights at 21ØØ on the ARAC System
(See Calendar for net control schedule)

Ten Meter SSB Net Control Roster

AAØAW	Doug Nelson	WØLWU	Joe Meese
NUØW	Gary Hanson	K9KDK	Al Babcock
WØDIO	Dennis Anderson	NØVRM	Gene Ellefsen
AAØME	Randy Johnson	KØDSL	Diane Saunders

Sunday Nights at 2ØØØ on 28.45Ø MHz USB

Ten Meter CW Net Control Roster

AAØAW	Doug Nelson	NØPDG	Mike Lovold
--------------	-------------	--------------	-------------

Sunday Nights at 193Ø on 28.125 MHz

Northland Weather Group Net Control Roster

KCØMKS Jeff Nast

Monday Nights at 2ØØØ on the ARAC System

Douglas County Net

Tuesday Nights at 2ØØØ on 145.49Ø (N9QWH System)

Central Carlton County Net

Tuesday Nights at 2Ø3Ø on the ARAC System

Lake County RACES/ARES Net

2nd & 4th Wednesday Nights at 19ØØ on the LSAC 1 System



Elmers



El-mer / el-mər/ [el-mer]

1. a male given name: from Old English words meaning "noble" and "famous."
2. an adhesive used to bond like or unlike materials
3. An experienced ham radio operator who mentors new and prospective hams.

<u>Name</u>	<u>Call</u>	<u>Expertise</u>
Jeff Nast	KCØMKS	APRS, EchoLink, WinLink, Fusion, Contesting
Bob Schulz	KCØNFB	Contesting
Jim Anderson	NØJWA	QsoNet
Doug Nelson	AAØAW	HF, VHF/UHF, Contesting, Packet, APRS, Morse Code, VE testing, Echolink, Allstar, EmCom...

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Contact Kim or Steve Waller to include your name in this list-

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Members, please check your name and email address for accuracy. If you are not on this list and want to be on the list, contact me with your info. If you need to make a change, please let us know at KEØNQSmn@gmail.com Or KEØNQT@gmail.com

Co-Editors,
Kim & Steve Waller
KEØNQS & KEØNQT



The greatest gift of life is friendship,
and I have received it.
Hubert H. Humphrey

BrainyQuote

SUNDAY NIGHT NETS
 1930 - CW - 28.125 MHz USB-CW
 2000 - USB 28.450 MHz
 2100 - Southern St. Louis County
 Emergency Services Net
MONDAY NIGHT NETS
 2000 - Northland WX Net LSAC & ARAC

APRIL

CLUB EVENTS

TUESDAY NIGHT NETS
 2000 - Douglas Cnty 145.490 MHz
 2030 - Central Carlton County
WEDNESDAY NIGHT NETS
 1900 - Lake County - LSAC1
 2nd & 4th Wednesdays
 2100 - BWAR

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1	2 ARAC BOARD MEETING 1900 Sammy's West Duluth DC Net 2000 CC Net 2030	3	4	5	6
7 CW 1930 AAØAW USB 2000 NØVRM ES 2100 AAØME	8 DC ARES/ RACES Mtg 1900 DC EOC WX 2000 KCØMKS	9 DC Net 2000 CC Net 2030	10 Lake County ARES/RACES Meeting 1800 Lake County Net 1900	11 ARAC Club Meeting @ 1800 Coppertop Skywarn Training 1830	12	13
14 ARRL Rookie Roundup SSB 1800 to 2359 UTC CW 1930 NØPDG USB 2000 NØPDG ES 2100 KN9DMG	15 WX 2000 KCØMKS	16 DC Net 2000 CC Net 2030	17 St. Louis County ARES/ RACES Mtg 1630 Pike Lake EOC	18	19	20
21 CW 1930 AAØAW USB 2000 AAØAW ES 2100 AAØAW	22 WX 2000 KCØMKS	23 DC Net 2000 CC Net 2030	24 Lake County Net 1900	25 Carlton County ARES/RACES Meeting 1900 CC EOC	26	27 Club Breakfast @ The Chalet 0730-0800
28 CW 1930 NØPDG USB 2000 WØLWU ES 2100 KCØWDQ	29 WX 2000 KCØMKS	30 DC Net 2000 CC Net 2030				

Get this newsletter *faster*
via email!

Email Doug AAØAW at
aa0aw@chartermi.net

Next Meeting: Thursday,
APRIL 11, 2019 - 6 pm

New hams who have joined our community in the last few weeks, as well as those who have newly upgraded — to General or Extra:

Pat Hayden, KC0JRJ, upgraded to General Class

Congratulations to: New members of ARAC:

Scott Palacheck - W4LGG of Duluth

ARAC Committee Chairs

Club License Trustee:

Ray Barnes KEØZN

Control Operators:

AAØAW - NØKXT - KCØNFB

Newsletter:

Kim KEØNQS & Steve KEØNQT Waller

Education Chair:

Bob Schulz KCØNFB

Hamfest Chair:

Bob Schulz KCØNFB

Chaplains:

Visiting Chaplains:

Denny Anderson WØDIO

Parliamentarian:

Grant Forsyth KCØWUP

Website:

Thomas Dorr KEØRHA

Membership:

Bruce Carlson KEØNIT

Property Chair:

Wulf Gar WU1FGR

Testing:

Doug Nelson AAØAW

Field Day:

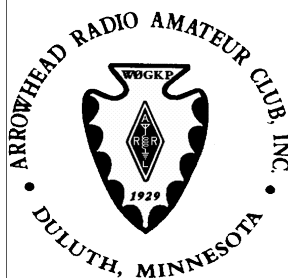
Dennis Anderson WØDIO

Picnic Chair:

Scott Ahlgren, NØVYU

Repeater Chairs:

Randy Haglin NØBZZ
Randy Wabik KAØJZV



The ARAC RELAY

Published monthly and distributed free to members, "The RELAY" is the official publication of the Arrowhead Radio Amateur Club, Inc. Members are encouraged to submit articles, opinions, and classifieds. Your submission will be placed as soon as possible providing it does not conflict with the bylaws of the Arrowhead Radio Amateur Club, Inc. The editors reserve the right to omit any submission that is not a required item. If a submission is questionable, it will be presented to the Board of Directors at the next scheduled board meeting for authorization.





Carol at NWS, Continued from Page 1

Memorable weather events for Carol? “The tornado that hit the Brainerd area back in 1991” Carol says. “I was working radar and that was when we had the old 74-C radar, the one that went around, with the sweep-display and the bleep, bleeping in a blackened room was memorable. I made the call on that one [to issue the tornado warning].” Back then, Carol would issue the alert and had to type it up. The communication system was phone lines, where now they rely on satellites.

Another memorable storm was an intense situation in Siren, Wisconsin:

According to NOAA’s archives, at 8:06 pm on June 18th, 2001, an F3 tornado touched down 2 miles east-northeast of Grantsburg, Wisconsin. The tornado continued east through the towns of Alpha, Falun, and eventually Siren around 8:20 pm. The tornado continued to travel east to 14 miles east of Siren. The most extensive damage was in a six-block wide area in Siren, where numerous homes were leveled. There was also extensive structural damage to many buildings. The average width of the tornado was 1/8 to 1/4 mile, with the widest width being about a half mile. Preliminary indications are that the path length of the tornado was about 27 miles. Two people died as a direct result of the tornado, with another person killed indirectly after the tornado. In all, there were 16 injuries as a result of the tornado.

The National Weather Service issued a tornado warning well ahead of time, with 35 minutes of lead time before it first touched down, and 50 minutes of lead time before it moved through Siren. The National Weather Service works closely with the local law enforcement, SKYWARN and Ham Radio Networks to reduce the loss of life and property during severe weather.

It was that very cooperation that helped to reduce the loss of life with this tornado, as the town’s only civil defense siren was broken at the time, resulting from a lightning strike a few weeks earlier. Police took to the streets, sounding their horns and shouting warnings to local residents. Siren, Wisconsin’s siren system had been scheduled to be repaired the following week.

Are there technologies on the horizon that are coming to the NWS? Carol says NWS has upgraded their radar to Dual-pol a few years ago and upgraded the communication systems fairly recently. Though it is probably cost-prohibitive in the near future, Phased Array Radar will eventually be the standard.

According to **Forbes** magazine Science Contributor Dennis Mersereau, “There are 160 NEXRAD sites across the US and its territories. 122 of those radar sites are operated by NOAA itself, while the rest are operated on military bases by the Department of Defense or near airports by the Federal Aviation Administration. Meteorologists also have access to smaller TDWR (Terminal Doppler Weather Radar) sites located at many major airports across the country to help air traffic controllers direct approaching and departing airplanes around dangerous storms. Unfortunately, this



Siren, Wisconsin - June 18, 2001

Continued on Page 19

radar infrastructure is aging. The current generation of radars is known as WSR-88D (Weather Service Radar-1988 Doppler), which started coming into service in the 1990s. The existing radar sites are beginning to require more intense maintenance as they grow older.

“Radar has come a long way over the past couple of decades,” Mesereau says. “The most important upgrade occurred in the 1990s with the addition of Doppler technology. This allows radars to see the speed and direction of precipitation picked up by the radar, showing the winds within a storm. Doppler technology is a crucial part of detecting damaging winds and tornadoes.

The latest upgrade occurred this decade with dual-polarization technology. Dual-pol, as it’s called, sends out two radar pulses instead of one—one oriented horizontally and another oriented vertically. This dual radar beam lets the radar see the size and shape of objects picked up by the radar. Not only can radar now differentiate between rain, snow, sleet, and hail, but it can also tell forecasters when there’s debris lofted into the air during a tornado.”

Which brings us to the development of Multi-function Phased Array Radar. While current weather radars mechanically rotate and tilt the radar dish to sample different parts of the atmosphere. A phased array radar has a unique flat panel antenna that remains stationary. The panel is made up of a grid of fixed antenna elements, and each can transmit and receive a signal. As a result, the radar beam can be steered electronically, giving users the ability to control how, when and where the radar scans. This means the radar can be controlled to direct its beam only where storms are detected. Focused observations of storms lead to faster updates since the radar does not waste time scanning clear-air regions.

According to NOAA’s National Severe Storms Laboratory (NSSL), “Multi-function Phased Array Radar (MPAR) can scan the sky in less than a minute, revealing critical weather thumbprints that point to the potential of severe weather. Radar scans every minute will make severe weather easier to confirm, making warnings more accurate and reducing false alarms. Forecasters will also be able to watch changes in the storm to know when it is strengthening or weakening. NSSL scientists have already learned more about thunderstorms with MPAR data. An independent study estimates implementation of a combined MPAR network of radars satisfying both FAA and NWS missions will save the taxpayer \$4.8 billion over the life-cycle of the radar.”

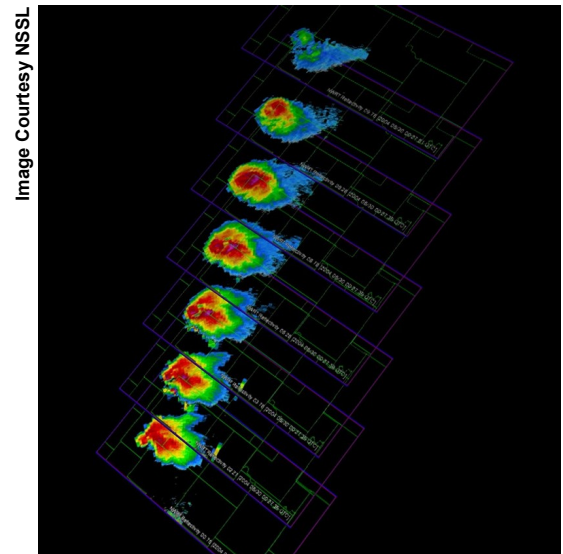
The National Weather Service office in Duluth is still a few years away from MPAR, but recently added a rotor for antenna positioning and radios as well.

Carol explained, “The NWA has spent more money for equipment updates, but we rely on the Ham Radio club to help relay important information to the community. When I first started we had one ham operator come out but now we have two, one covers the North, the other covers the South and they split the duties. I think it’s important for all the meteorologists to understand what the ham operators do for the community. A lot of our folks are young – they have cell phones, they don’t yet realize the importance of the amateur radio community. I don’t ever want to see a widespread disaster happen, but sometimes I think we need one so that they see that there will not be cellular coverage, and see just how vitally important the amateur radio operators are. You plan and plan and hope you never have to use it. But in case we do have to use ham radio for emergency communications, we will have it”.

Carol has been a ham radio operator for about fifteen years. “I got my ham license from prompting by ham operator Tom Currier; he was the impetus for getting me to get my license. Wave theory and some of the science that I study as a meteorologist were very similar in some ways, so all I really needed to focus on was the rules and such. Ham radio operators are smart. They helped me by programming my radio and a few of them still call me ‘young lady’. They are just the nicest people.”

On the cusp of retirement, Carol obviously continues to have a passion for the work she does. “What do you attribute that that to?” I asked. “I see the same spotters every year,” Carol replied. “Having an engaged audience really keeps me going.” Carol admits that she is really an introvert, “but once I get in front of people, and I’m talking weather, you can’t shut me up.”

Carol’s boss Mike will be retiring one month after her, so a change in command is coming at the National Weather



MPAR can scan a tornadic storm at all levels.

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Service in Duluth. Though the final decision will be at a later date, Carol has chosen Joe Moore to be her interim successor as the go-to person at the NWS for the ARAC.

When asked about what she will miss the most, Carol says, "I will miss the people I work with both here and out there. I'll miss some of the adrenalin and excitement that happens when a storm is coming in, talking to the media and newspapers and community."

What does retirement look like to Carol? "I'm starting my last of everything, like my last Lake Superior Rip Current Safety Program, but I now can continue to attend and be involved as a citizen. And I can still do outreach. I want to volunteer at a school and become a reading partner because I just love reading to kids, it's so important that kids read." Carol has a lot of projects at home. "This summer I have to paint our garage and house. I love gardening. I really love to work in a greenhouse--especially this time of year. I look forward to this. One of my goals in retirement is to become a master gardener."

Would Carol consider getting more involved with our club's events as possibly our weather advisor for Grandma's Marathon and other events? "I could do that," she answered, "but don't forget about these guys..." gesturing behind her from the conference room to the fishbowl – the NWS weather control center.

Carol has been an incredible friend and ally to the ARAC. She is a great eyewitness to the importance of the ham radio operators' vital communication links not only to the community but also by providing a well-organized group of weather spotters who are at the ready with disaster-ready communications infrastructure in place providing vital storm information to the NOAA. Thank you Carol, for many years of excellence in service to us and your community.

We are deeply grateful. ★

Carol's last public SKYWARN® spotter training session will be at the ARAC monthly meeting on April 11, 2019 at the Copertop Church at 6:30 PM



Carol shares this photo of herself and Jim Oberstar, captioning it:
"In front of their first WSR-88D Doppler radar display monitor, wearing my red power suit back in the day."

SKYWARN® Training covers the following topics:

- The mission of the National Weather Service and how SKYWARN® spotters play an important role in the warning process.
- Thunderstorm formation and the types of thunderstorms including thunderstorm production and what causes a storm to produce damaging winds, large hail, and tornadoes.
- Visual gauges spotters use to identify possible severe weather. This includes types of clouds associated with specific areas of a thunderstorm, how to identify rotation and differentiate between strong and weak rotation, identifying tornadoes.



Homeland Security and Emergency Management

A Division of the Minnesota Department of Public Safety

Minnesota **Severe Weather Awareness Week** is **April 8-12, 2019**

Are you ready for severe weather? Each year, Homeland Security & Emergency Management, in collaboration with the **National Weather Service** and 16 State and local agencies and organizations sponsors **Severe Weather Awareness Week in Minnesota**. The week is designed to refresh, remind and educate everyone about the seasonal threats from severe weather and how to avoid them. It's also a great time to make and practice your emergency plan and build or refresh your emergency preparedness kit.

Statewide Tornado Drills

The most important events during Severe Weather Awareness Week are the two annual statewide tornado drills. **These drills are scheduled for Thursday, April 11 at 1:45 p.m. and 6:45 p.m.** (Counties may choose to opt out of the drills if actual severe weather is possible in the area)

Outdoor warning sirens and NOAA Weather Radios will sound in a simulated tornado warning. The first drill is intended for institutions and businesses. The evening drill is intended for second shift workers and families.

Why Severe Weather Awareness Week?

According to the National Weather Service, Minnesota experiences an average of 40 tornadoes per year. In 2012, 37 twisters touched down. A record was set in 2010 with 104 tornadoes across the state. Understanding this threat and knowing what to do when a tornado is approaching can save lives.



Take advantage of **Severe Weather Awareness Week** to review your own and your family's emergency procedures and prepare for weather-related hazards.

Each day of the week focuses on a different weather safety topic. Visit the each of the safety topics at the Department of Public Safety's web links below:

Monday: Alerts & Warnings

<https://dps.mn.gov/divisions/hsem/weather-awareness-preparedness/Pages/alerts-warnings.aspx>

Tuesday: Severe Weather, Lightning and Hail <https://dps.mn.gov/divisions/hsem/weather-awareness-preparedness/Pages/severe-weather-lightning-hail-storms.aspx>

Wednesday: Floods

<https://dps.mn.gov/divisions/hsem/weather-awareness-preparedness/Pages/severe-weather-flooding.aspx>

Thursday: Tornadoes (with statewide tornado drills) <https://dps.mn.gov/divisions/hsem/weather-awareness-preparedness/Pages/severe-weather-tornadoes.aspx>

Friday: Extreme Heat <https://dps.mn.gov/divisions/hsem/weather-awareness-preparedness/Pages/severe-weather-heat.aspx>