AWARE

SUMMER/FALL 1992

NATIONAL WEATHER SERVICE / *Warning Coordination and Hazard Awareness Rep*

"BEING THERE"

This has been an incredible late summer and early fall. It seems that at every turn another natural disaster has swept across the land to reinforce the vulnerability of humankind. First, Hurricane Andrew slammed into south Florida, resulting in 32 deaths, both direct and indirect, and estimated damages of close to $30 billion. Andrew then swept over the Gulf, regained its strength, and pummeled coastal Louisiana, killing three persons and causing damages in excess of $1 billion.

Next, Typhoon Omar battered Guam, damaging 10,000 homes, sending 75 persons to hospitals, and knocking out power across the island. Then, Hurricane Iniki blasted Kauai, causing 3 deaths, $1.6 billion in damages, and leaving 8,000 homeless. As if this were not enough, wildfires raged across California and Idaho. Most notable was the Fountain fire in Shasta County, California, that involved 64,000 acres, while the Foothills fire in Idaho at one point torched 257,000 acres. Finally, Mt. Spurr blew its top in Alaska showering portions of Anchorage with ashes and threatening the international airport.

A while back, one management consultant stressed that to be effective one should "Be there!" The gist, of course, was that we should always be in tune with whatever situation we are in and always attempt to make a positive and substantive contribution. During all of these events, Weather Service personnel were there definitively and professionally providing the critical information necessary to ensure a proper and timely public response.

"Being there" meant working long hours not knowing how one's families and loved ones were faring. During both hurricanes and the typhoon, Weather Service and National Oceanic and Atmospheric Administration (NOAA) personnel lost precious possessions and, in some instances, their homes. In many cases, their lives were dramatically altered as they subsisted in dwellings with no power, no air conditioning, and at times no water or sanitation facilities. During the fires, persons were detailed for long periods with their loved ones concerned over their safety.

Letters of support, gratefulness, and congratulations have poured in from all over the country. The NOAA family opened its doors and hearts with a mountain of aid and support to its needy members. And, through it all, no matter what the hardship, the everyday work kept going on. This kind of dedication underscores the type of people that make up the Weather Service and the NOAA family.

God Bless you all!

Elbert W. Friday, Jr.
Assistant Administrator
for Weather Services

U.S. DEPARTMENT OF COMMERCE • National Oceanic and Atmospheric Administration

AWARE Report is an administrative document, issued by the National Oceanic and Atmospheric Administration, for the information and use of the agency and the natural hazard community.

EDITORIAL

The Greater Mission - *Wernly*

Traditionally, many in the Weather Service have viewed the Warning Preparedness Program to mean preparedness and coordination efforts concerning severe weather. Though severe weather is an inclusive term extending from convective storms to blizzards, the future of the preparedness program involves much more.

Now, Warning Coordination Meteorologists (WCM) in the field will see their mission expanded across the entire range of hydrometeorological services. In order to assess user requirements and develop local office means to accommodate them, they will routinely interface with not only the hazards community but the aviation, marine, water management, forestry, and agricultural interests as well.

The WCM position is one of the most exciting in the modernized Weather Service. It is these people who will help redefine and mold the National Weather Service (NWS) into the type of organization that can best respond to local user concerns.

Starting with this issue of the AWARE Report, articles on future services will be gleaned from the entire spectrum of NWS service programs.

Welcome Chris Adams! - *Wernly*

We want to welcome Dr. Chris Adams to our staff at the Warning and Forecast Branch. Chris is being borrowed from Colorado State University by the NWS for the next several years to help with warning coordination and external user communication projects. Over the last 3 years, he has worked with the NWS to determine emergency manager's information needs prior to and during severe weather and flooding.

Chris received his Masters and Ph.D. in sociology from the University of Denver. There he worked on research documenting how organizations respond to disasters. He has also conducted research for the Federal Emergency Management Agency (FEMA) on training of emergency managers. Chris was the deputy director of the Denver Office of Emergency Preparedness for several years. In that capacity, he worked with local regional and Weather Service Headquarters (WSH) personnel to try and test warning coordination concepts for the modernized NWS. There he also acquired first hand warning experience in winter storms, tornadoes, hail storms, high winds, and urban flash floods.

We are sharing Chris' time with the Transition Program Office (TPO). Currently, he is assigned to work on external communication with emergency management groups, help coordinate work on the Northeast Colorado Integrated Warning System Project, assist in the development of the Warning Coordination Meteorologist Course, explore options for joint severe weather and flood preparedness and response training of emergency managers with FEMA, work with Norman Risk Reduction evaluation committees, conduct post-event user surveys to document emergency managers' information needs prior to and during severe weather and flooding, and complete the report based on the responses to the area redistribution of warnings survey.

group that contains such present products as the state forecast discussions and various forecast discussions from the National Centers.

- Discussions contain considerable technical jargon and are not meant to be disseminated directly to the public. Rather, members of the hazards community can use these products to better understand the hydrometeorological situation and to assist them in their planning and response actions.

By having unique products each with a specific role, users should be noting the title of the product, be able to assess the content of the message, its significance, and its intended audience. Hopefully, this will make for a smooth flow of critical information to enhance the decision process.

Area Weather Update (AWU) Evaluations - *Becker*

Members of the Norman Risk Reduction AWU Evaluation Committee met in Norman, Oklahoma, the last week in July. The purpose was to gather information and interview management and staff of the forecast office and select media and emergency managers in the local area about the AWU (actually, Norman issues a "precursor AWU," the "Short Term Weather Summary and Forecast" under the AFOS [Automation of Field Operations and Services] PIL "NOW"). Discussions centered around format, valid times, time and frequency of issuance, and how to present watch/warning information. These data will be folded into an AWU "Interim Report" to be prepared this fall.

The report will document the chronology of events leading to Norman's full-time production of the "NOW," including significant milestones, staff training, and findings and recommendations. It was recognized from the beginning that starting an ambitious short-term forecast program using new tools (particularly the WSR-88D) would present certain difficulties. Indeed, lessons are already being learned that should help other offices as they begin to evolve into the short-term forecast era.

Toward that end, an Operations Manual Letter (OML), to Weather Service Operations Manual (WSOM) Chapter C-21, "Local and Regional Statements, Summaries, and Tables," on the NOW product (not the AWU) has been approved and, hopefully, will be distributed toward year's end. To emphasize the short-term **forecast** aspect of the NOW and minimize reliance on a summary of past conditions, the product title of the NOW will be changed to "Short Term Forecast." Furthermore, the examples will show the short-term forecast first, while providing current (or some past) conditions only as a basis for or enhancement of the forecast. The OML has considerable flexibility for participating offices to issue a short-term forecast product that meets both users' needs and local office capabilities. Guidelines for implementation suggest that any office equipped with new technology (e.g., WSR-88D and/or Automated Surface Observing System [ASOS]) should issue a NOW. Other offices with county warning area, at regional discretion, may issue it. The NOW/AWU concept is an evolving one. This OML, therefore, will be updated as necessary to reflect lessons learned from offices participating in the NOW program.

In that regard, AWU/NOW evaluations will be expanded to other Next Generation Weather Radar (NEXRAD) offices with differing climates and office structures. As envisioned, these regionally conducted evaluations would be informal (as compared to Norman's rigorous risk reductions) and last about a year. If, after all evaluations are completed, the AWU concept proves to be sound and receives Agency approval, a new WSOM chapter on the AWU will be issued.

At the time of zone downsizing, an important issue yet to be resolved concerns the Local Forecast Products (LFP). One argument is to eliminate the LFP, but always combine the appropriate counties that make up a metropolitan area into a zone forecast grouping. Another possible solution for the elimination of the LFP would be to "hard wire" a metropolitan area into its own zone. This might negate the flexizone concept, however. The best solution, therefore, may be to retain the LFP, which would allow the forecaster the flexibility to combine counties that best reflects the weather, regardless of whether those counties also make up a metropolitan area. This has the added benefit of continuing those LFPs that currently include the locally adapted extended forecast periods. Decisions should be made at the Meteorological Services Division Chiefs Conference to be held the first week of November at WSH.

New NOAA Weather Radio (NWR) Telephone Service - *Becker*

After nearly a year in development, it's exciting to announce the start of an innovative NWR "1-900" telephone service. Now, for the first time, a user may listen to crystal clear NWR broadcasts from many locations throughout the continental United States. It may not be an exaggeration to say this new service will do more to promote NWR nationwide than all previous efforts combined!

Developed by an entrepreneurial group, the "Weather Radio Network" (WRN) based in Nashville, Tennessee, with the full cooperation of the NWS, selected NWR stations across the country, and the "Hurricane Hotline" will be available anywhere via touch-tone telephone. As of this writing (mid-October), the first phase of start-up should occur in late November or December. This phase of implementation will include about 70 NWR facilities that serve coastal and marine interests of the continental United States (Atlantic, Gulf of Mexico, Pacific, Great Lakes). The second phase of the system will occur during 1993 and add major inland business and travel destinations to bring the total count of available NWR stations in the system to around 125. Here's how it works.

Users of WRN's new service will dial "1-900-884-6622" (1-900-88-4[for]-NOAA) from their touch-tone telephones and be directed through an automated "voice response" menu that will allow them to select and listen to the ongoing, live NWR broadcast of their choice. The user only needs to know the normal telephone area code for the location of interest and is prompted through a simple selection process using the telephone key pad. A preamble introduction is first presented, which gives a brief description of the service and the cost ($0.98 per minute), after which the caller can disconnect before any charges are incurred. If the caller knows the area code and NWR number (4 digits total), he/she may immediately punch in those digits and be connected to the appropriate NWR broadcast, bypassing the preamble and menu, saving time and money.

WRN also makes available, direct from NWS's National Hurricane Center (NHC), Tropical Weather Outlooks for both the east and west coasts of the United States through menu choice.

Because the line output originates directly from the NWR console, weather outages of an NWR transmitter will not affect the 1-900 service. The console-direct signal has the added benefit of delivering perfect reception to anyone, including those nominally within range of the local NWR, but who receive poor reception due to inadequacies of location, NWR receiver, or antenna.

WRN has enlisted the aid of "Boat/U.S." (the premier Boat Owners Association of the United States) as a media partner to aggressively promote the new NWR service to its members and millions more through its magazines, reports, and other literature. Boat/U.S. will have use of its own "1-900" telephone number to provide the same live NWR broadcasts. In addition, WRN is

OPERATIONS AND SERVICES

Findings of the Halloween Nor'easter Disaster Survey - *Robert Jacobson, Marine and Applied Services Branch*

For true preparedness to be achieved, all persons involved must be aware of the problem, must know what actions they should take, and, when the time comes, actually be willing to take those actions. Concerning weather emergencies, the persons involved are the National Weather Service personnel, emergency service officials at all affected levels of government, the various media, and the public. When one part fails, preparedness fails.

Beginning on October 28 and lasting until November 1, 1991, a succession of meteorological events combined over the northwest Atlantic Ocean to form a series of extraordinary ocean waves, surges, and swells. Driven and maintained by persistent, near-hurricane force winds, the "Halloween Nor'easter of 1991" spread to the south and southwest before crashing onto the North American Coast and the northern shores of the islands of the western Atlantic. Although New England, closest to the storm, received the hardest blows, damage or destruction occurred as far south as southern Florida and the north coast of Puerto Rico.

Because several people died and because of the damage caused along the east coast, a NOAA Disaster Survey Team was formed. The findings of this Team have recently been released. These findings showed that, overall, the system established to develop and disseminate coastal flood watches, warnings, and statements worked well. However, there were some problems uncovered.

Data Availability. All NWS warning products must begin with reliable and timely observations. The Team found there are not enough water level observation sites along the East Coast. Where these sites do exist, real-time access to the data provided by forecasters is not adequate. Further, the Team found a disturbing shortage of basic marine weather observations.

Guidance Inadequacy. The various numerical models available provided forecasters with very good guidance on open ocean conditions and on the movements and intensity changes of the weather systems affecting the storm. However, the guidance as to coastal conditions was unreliable and, in at least one case, actually inhibited an early warning issuance.

Public Response. Excellent warnings and statements were disseminated by the NWS to emergency service officials and to the media. In general, the response by these people was also excellent. The media forwarded this information in a timely fashion, and the emergency service personnel were ready. However, overall, the public either did not respond or they responded improperly. Several of the deaths caused by this storm were directly attributable to improper actions. Many people did not perceive this coastal storm as a threat to them. This was the major weakness uncovered by the Team.

While all three areas should be addressed, strengthening this last, the weakest link, is a major challenge to all involved in the NWS's preparedness program.

Our Honolulu Forecast Office did likewise by assuming operational duties for the Naval Oceanography Command Center. We at the Office of Meteorology congratulate the Pacific Region for a job well done!

Hurricane Iniki - *Robert Jacobson, Marine and Applied Services Branch*

Hurricane Iniki struck western Hawaii during the afternoon and evening of Friday, September 11, 1992. The main fury of Iniki was felt on the island of Kauai. The eye of the hurricane passed over the western third of the island meaning that the most powerful part of the storm, the right front quadrant, struck its most populated sections. Oahu residents did not escape unscathed as near-hurricane force winds and high waves brought millions of dollars in property damage to Hawaii's most populace island.

As in Hurricane Andrew, however, preparedness again generally paid off. A NOAA/NWS disaster survey team sent to the area found that, although almost every building in the eastern two-thirds of the island appeared to have suffered some effect, only seven deaths and about a hundred injuries resulted from it. Warnings were issued almost a day before the storm hit and the system and the populace were ready. The CPHC, the media, the state and local civil defense authorities, and the local people all worked together to ensure that everyone was warned well in advance and took the necessary precautions.

Iniki was only the fourth hurricane to hit Hawaii in the last 40 years. The last hurricane was Iwa in 1982. Although much weaker than Iniki, Iwa was well remembered by longtime residents, a fact that aided in their preparedness. With initial damage figures running over $1.6 billion, Iniki is one of the most damaging storms of all times to hit the United States.

Mt. Spurr, Alaska, Volcanic Eruption - *Jim Kemper, Alaska Region Headquarters*

After remaining silent for approximately 39 years, Mt. Spurr (80 miles west of Anchorage) erupted for the third time since June just after midnight on September 17, 1992. The ash fallout occurred north of Anchorage in Willow (about 80 miles north of Mt. Spurr), where one quarter of an inch was reported on the ground the morning of the 17th. The ash fallout continued east across the Copper River basin through the towns of Gulkana and Glennallen (about 230 miles east of Mt. Spurr) and north across the Susitna Valley to Talkeetna (about 100 miles north of Mt. Spurr).

Public Special Weather Statements were issued by the Anchorage WSFO staff between midnight and 10 a.m., September 17, with frequent updates as new information became available. These statements provided an excellent avenue to keep the public fully informed on the ash location and fallout, and to decrease the phone calls into the WSFO.

1992 Fire Weather Season - *Nancy Dean, Marine and Applied Services Branch*

The 1992 fire season started slow in Alaska and the lower 48 states. The first dispatch of the Air Transportable Mobile Unit occurred in late May to the Call Box fire in central California. Only seven additional dispatches were required for all of June and July. Starting in August, temperatures soared, humidities dropped, and dry lightning struck areas of the Far West and Intermountain Region. Numerous wildfires started in Washington, Oregon, California, Nevada,

- o be issued for conditions similar to those for which LAAs are currently issued, but with greater resolution and/or specificity. (Minimum AWW criteria, unless declined by the airport's participant to a local agreement, will be thunderstorms, and surface winds in excess of 35 knots.)

- o generally be disseminated directly to a local "fan-out" point of contact, designated by local agreement. The requirement for wider dissemination has not yet been determined.

AWWs will be issued by WFOs for airports, based on local needs, within the WSR-88D coverage area. In general, AWWs will be issued to airport operators and/or managers. They will be used by those responsible for aircraft parked or moving on an airport or for airport service operations, such as refueling.

Dissemination of the AWW will vary from one site to the next depending on requirements and local communications configurations. Ideally in MAR (modernization and associated restructure) Stage 2, the issuance of an AWW will be limited to a one-time AWIPS entry. WFOs will not be required to make multiple computer entries and/or telephone calls particularly during periods of heavy workload.

For the risk reduction effort at Norman, the WFO will transmit the AWW via AFOS to the Oklahoma City WSO. Oklahoma City will then enter the AWW into the local Systems Atlanta Information Display System (SAIDS) which is linked to the Oklahoma City tower and the FAA Academy flight line. WSO Oklahoma City will also telephone the FAA Academy duty officer and WSO Oklahoma City security who, in turn, will fan out the AWW to other users on the field (e.g., commercial air carriers, airport maintenance, and the fixed base operator).

The AFOS/RTA (remote terminal to AFOS) system may eventually be tied directly into SAIDS so that information disseminated from WFO Norman may automatically feed to users without requiring any manual interaction from the WSO.

For the Norman Risk Reduction Project, AWWs will be issued for the Will Rogers World Airport located in Oklahoma City, Oklahoma. Primary users will be those who now receive the LAA. They are the Oklahoma City tower, commercial air carrier operators, airport security, airport maintenance, fixed-base operators, and the duty officer and NWS flight line personnel at the FAA Training Center.

The AWW will be in a plain language, free text format, and will include the triggering phenomenon, location, timing, and remarks. Criteria for issuing the Norman AWW are as follows.

Thunderstorms producing sustained winds or gusts of 35 kts or greater
Thunderstorms with hail of 1/2 inch or greater
Surface wind gusting to 40 kts or more
Sustained surface winds of 35 kts or more
Freezing rain
Onset of heavy snow equal to, or greater than, 2 inches

Status On... - *Alexander*

- **VAXmail:** In the Spring issue of AWARE, I told you about forthcoming changes in how Storm Data will be transmitted to the Severe Local Storms Unit (SELS) and the National Climatic Data Center (NCDC) in the MAR and pre-MAR. We are still working out bugs in VAXmail and expect to have it test-bedded between WSH and the field by the time you read this. Once everything is sorted out and readable instructions (that even I can understand) are written, everyone will have passwords and be in business. We'll keep you posted.

- **Area Redistribution Survey Questionnaire:** The Questionnaire is currently in the field and should be back to OM11 by the middle of October. The purpose of the Questionnaire is to gain a knowledge base on the manner by which NWS weather information is received and retransmitted by sophisticated users throughout county areas of responsibility.

- **SELS Watch-by-County:** The Proposal to issue SELS severe local storm watches by county, rather than the current polygon convention, has completed its second field review. We are still on track for a CY 94 changeover.

- **Advanced Spotter Field Guide:** Gary Woodall's (Warning Preparedness Meteorologist [WPM], WSFO Lubbock, Texas) superb effort to develop an Advanced Spotter's Field Guide is progressing well. After a first field review, several modifications were made to the text. Some additions were made as well, and much slicker (high-resolution color) graphics and photographs are to be included in the final product. This is taking some time, so look for an FY 93 publication date. If all goes well, we should have copies ready well before the Spring 1993 severe storm (spotter training) season.

- **WSOM Chapter C-40, Severe Local Storm Warnings:** By the time you read this, the first draft of the new C-40 will have been sent to the regions for field review. Many of the updates are semantic, e.g., wordsmithing, but quite a few new things crop up as well. We incorporate generic coding in the examples and integrate SRWARN phraseology. References to obsolete systems and policies are swept away, but totally modernized concepts are purposely not included. For example, concrete information about SELS watch-by-county does not appear in this edition of C-40, but references to WSOM E-13 are gone. Field comments about the draft will be exhorted, so sharpen your pencils!

INTERNATIONAL DECADE FOR NATURAL DISASTER REDUCTION

Disaster Awareness Day Observance - *Dombrowsky*

On October 14, 1992, the world observed Natural Disaster Day. Natural Disaster Day will continue to be observed through the decade of the 90's, which have been declared as the International Decade for Natural Disaster Reduction. An interagency group comprised of representatives from FEMA, U.S. Geological Survey (USGS), NWS, Red Cross, the Forestry Department, the Department of Education, and Marilyn Quayle's office had met to develop a pilot project for this special day.

The goal of this pilot project was to reach at least one school from within each of the ten Federal regions and the metropolitan Washington, D.C., area. Each of the participating agencies would have a designated local contact person. The interagency working group provided each local team with identical packages of material to distribute to students in the classroom on Awareness Day. These packages consisted of six Red Cross, one-page, tri-fold brochures addressing specific hazards (flood, fire, earthquake, hurricane, tornado, and winter storms) and five Family Protection Program publications (Your Family Disaster Plan, Your Family Disaster Supplies Kit, the Emergency Preparedness Checklist, Helping Children Cope With Disaster, and the Emergency Preparedness Catalog). Each local team will be asked to select one of the Red Cross hazard-specific brochures to work from.

Ultimately, the focus of the project was how knowledge can help people to help themselves. This would hopefully grow into neighbors helping neighbors, whether it is children helping children, local civic groups helping families from the community, or businesses helping other businesses.

NWS offices participating formally in the multiagency effort included Dallas/Fort Worth and Atlanta of the Southern Region; Chicago, Denver, and Wichita of the Central Region; and Portland, New York City, Pittsburgh, and Washington, D.C., of the Eastern Region. Western Region participation was provided by the Seattle and San Francisco offices. Additionally, many other NWS offices participated as resources allowed.

A Strategy for Reducing the Impacts of Natural Hazards - *Ed Gross, Chief, Constituent Affairs and Industrial Meteorology*

On July 8, 1992, Dr. D. Allan Bromley, Assistant to the President for Science and Technology, and Mrs. Marilyn Tucker Quayle, Member of the Secretary General's Special High Level Council of the U.N. International Decade for Natural Disaster Reduction (IDNDR) jointly released a report entitled: "Reducing the Impacts of Natural Hazards: A Strategy for the Nation."

Citing the continuing loss of life and property each year to our Nation and the world due to earthquakes, hurricanes, wildfires, and other natural hazards, Dr. Bromley and Mrs. Quayle announced a new Federal effort to combat the devastating effects of natural hazards. In 1989, Hurricane Hugo claimed dozens of lives and caused nearly $10 billion in damages. The recent

Agencies participating in the Natural Hazards Strategy include the U.S. Departments of Agriculture, Commerce, Defense, Energy, Health and Human Services, Housing and Urban Development, Interior, and State, the Federal Emergency Management Agency, the Agency for International Development, the Environmental Protection Agency, the National Aeronautics and Space Administration, and the National Science Foundation.

Copies of the report may be obtained by writing to the FCCSET Committee on Earth and Environmental Sciences, c/o National Science Foundation, Attn: Forms and Publications, 1800 G Street N.W., Room 232, Washington, D.C., 20550; or call 202-357-7861.

HAZARD AWARENESS PROGRAM

Two New NWS Publications - *Kremkau*

- ***"Flash Floods and Floods...The Awesome Power" (NOAA PA 92050)*** -- Finally, after almost a year in the making, the flash flood/flood brochure has been completed. This new publication will replace "Floods, Flash Floods, and Warnings (NOAA PA 81010). We expect 50,000 copies to be printed by mid-December 1992. As with the winter storms brochure, we will provide 10,000 copies to the American Red Cross, and they will, in turn, provide to the NWS 100,000 copies of the "Are You Ready for a Flood or a Flash Flood?" for general distribution. We want to thank Roger Stairs, WPM Pittsburgh, Pennsylvania, for his time and effort on this successful project.

- ***Tornadoes...Nature's Most Violent Storms" (NOAA PA 92052)*** -- The new NWS in-depth tornado brochure has been sent to the printer. We expect delivery of the 50,000 copies to the National Logistics Supply Center (NLSC) by mid-December. The NWS will be giving 10,000 copies to the American Red Cross for distribution to their chapters in return for 100,000 copies of the "Are You Ready for a Tornado" pamphlet. Bill Bunting, WSFO Norman, took on this enormous task this summer, and we want to thank him for completing this project under severe time constraints. Bill will now begin putting together the Presenter's Guide on tornadoes with slides, talking points, and slide description. We appreciate his enormous accomplishment and look forward to the delivery of an exciting new tornado slide resource package.

  (For a glimpse at the cover of both brochures, see attachment A.)

My Visit to WSH - *Bill Bunting, WSFO Norman, Oklahoma*

I traveled to WSH during the last 2 weeks in June to assist the Warning and Forecast Branch in the revision of the tornado safety brochure and to work on the tornado slide set and Presenter's Guide. There was much work to be done, and consequently, the time passed very quickly. The staff was very willing to work with me to learn the more complex capabilities of WordPerfect and to offer suggestions to improve the quality of the brochure. While working with the branch staff, I was also able to participate in discussions concerning issues affecting the modernization, ranging from the future of the NWS to methods of disseminating severe weather information to emergency management and law enforcement officials.

In short, my time spent at WSH was very productive. I believe I have a better understanding of the responsibilities and challenges facing those who work there. Despite the difficulties that

HAZARD COMMUNITY FORUM

Federal Emergency Management Agency's "Helping Children Cope With Disaster" -

Wayne Blanchard, Federal Emergency Management Agency

Now available from FEMA is "Helping Children Cope With Disaster," developed by FEMA's Family Protection Program in coordination with the American Red Cross Community Disaster Education Program. This 4-page, tri-foldsize publication provides information on how children respond to disaster, advice to parents on talking to their children about potential disaster hazards and on talking to them after a disaster, and includes an Emergency Phone Numbers page for children.

Roughly 43,000 single copies of this publication is being distributed to the Federal, state, and local emergency management community, the Fire Services community, and to national volunteer organizations active in disasters for the purpose of alerting the receiver of its existence.

This item can be ordered by writing to FEMA, P.O. Box 70274, Washington, D.C., 20024, and asking for L-163. The ceiling on requisitions is currently set at 1,000 copies per request.

This publication is also available through local Red Cross chapters at no charge.

For publications needs above 1,000, we recommend that you have this publication printed locally. To facilitate local printing, we have available "camera-ready" materials which can be loaned out. This would allow you to "localize" the brochure by adding your logo or insignia to the brochure, thus making it more locally relevant.

Though we are trying our best to maintain stocks of Family Protection Program publications, as is the American Red Cross, we know that even with the best efforts of both organizations, we cannot provide enough copies of these publications to meet the needs of your constituents. Our goal is for every American family to be reached with the Family Disaster Preparedness message. For that to happen, state and local emergency management offices, the fire prevention community, and volunteer or community based organizations need to join in with us on making these publications available. We urge you to contact us and request camera-ready materials as well.

Other brochures that FEMA can provide camera-ready copies are:

(1) Your Family Disaster Plan (L-191): A four-page, tri-foldsized publication which leads readers through the four steps of disaster preparedness to enable them and their families to become better prepared if disaster strikes.

(2) Your Family Disaster Plan in Spanish (L-191 S)

(3) Your Family Disaster Supplies Kit (L-189): This four-page tri-foldsized brochure provides checklist of the emergency supplies that should be kept in the home and contained in a Disaster Supplies Kit, and includes suggestions on how to store and maintain these supplies.

(4) Your Family Disaster Supplies Kit in Spanish (L-189 S)

Building Amateur Radio Spotter Groups - *James Kramper, WCM WSFO St. Louis*

I thought you might be interested in some of the work I've had to do with the amateur radio (HAM) people since coming to St. Louis.

Upon arriving in St. Louis, I immediately began work in making contacts with the local HAM community. I also immediately saw some problems that needed to be overcome.

The St. Louis (STL) metropolitan area consists of about ten counties in Missouri and Illinois. Luckily, there are quite a few HAMS in the area. However, I discovered that each county, and in many cases each individual club, was operating its own repeater frequency. They also did not know (in many cases) what frequencies some of their neighboring counties were using or how they were operating their nets.

To solve this coordination problem, I helped form the St. Louis Area Skywarn Consortium. The group is made up of emergency managers and HAM operators from the immediate STL area and from surrounding areas as well. Since the WSFO STL warning area will soon be expanding west to Columbia, Missouri, and northeast toward Springfield, Illinois, after 88D commissioning, I made sure to include these areas to set up soon needed contacts.

Thus far, we have had two meetings, one of which included a tour of the WSFO and a WSR-88D demonstration (they were impressed!). We have made great progress in coordinating frequencies and the relaying of reports to the NWS. We have also begun work on using PACKET radio to disseminate warning information and relaying spotter reports.

I don't know if other areas have similar problems, but if they do, this type of organization to solve the problems may be just what is needed.

Tornado Preparedness Planning in Schools - *Alexander*

Michael Mach, Lead Forecaster and former WPM at WSFO Fort Worth, has sent the Warning and Forecast Branch a copy of his revised "Guide to Tornado Preparedness Planning in Schools." The Guide is a 13-page instrument designed to forward the message of making public schools ready for the worst in severe local storms. Mike has included information on:

- tornado preparedness planning,
- developing a tornado plan,
- sources of weather information,
- internal dissemination,
- severe weather warning signs,
- severe weather terminology,
- actions during a watch,
- actions during a warning,
- safest places in schools,
- potential areas to avoid,
- protective posture during a drill,
- school bus concerns, and
- determining the best available tornado shelter.

The Guide features several valuable illustrations, photographics, and graphics to help the reader understand the message. We at the Warning and Forecast Branch intend to streamline the document and (likely during early FY 93) have it printed. Well done, Mike!!

American Red Cross Publications - *Kremkau*

In our continuing effort to work with the American Red Cross and FEMA to develop natural hazard awareness materials using a consistent message, the NWS has developed two new in-depth brochures (tornado and flash flood/flood). We agreed to supply the Red Cross with 10,000 copies of each of these publications, with FEMA receiving 4,500 copies of both brochures. Red Cross, in turn, has graciously agreed to tri-logo their publications, too, and assured us that they will send NWS 100,000 copies each of the English versions of "Are You Ready for a Tornado?" and "Are You Ready for a Flood or a Flash Flood?" Furthermore, Red Cross has also printed both publications in Spanish and will send 25,000 copies of each to us. All four pamphlets will be available from the Kansas City NLSC by late fall. The NWS Publications listing has been updated to include these four new publications (see attachment D). (Please check with us first before ordering any of these new publications from NLSC to ensure they are available.) By the way, the NWS will provide a set of negatives/camera ready artwork for both FEMA and the Red Cross for additional printing by their agencies.

Emergency Preparedness Materials Catalog - *Kremkau*

The "Emergency Preparedness Materials Catalog" was developed by FEMA's Family Protection Program in cooperation with the American Red Cross and NOAA. All three organizations strongly encourage and support efforts designed to help individuals and families create a disaster plan. What's in this catalog? Booklets and brochures to help people learn now to prepare for disaster--videos, slide presentations, posters, exhibits, and campaign kits to help paid and volunteer professionals get this important information to the people in communities around the Nation.

FEMA has kindly given 3,000 copies to the Weather Service for our field offices. These copies have been placed at NLSC. To order, request NOAA PA 92054 (maximum number has been set at 50 copies). Anyone outside the NWS, please request a copy from your local FEMA Regional Office or local American Red Cross chapter.

Other NWS Hazard Awareness Materials - *Kremkau*

-- These two publications have been reprinted and are now available from NLSC. They are:

Spotter's Guide	NOAA PA 81011
Winter Storms...The Deceptive Killers	NOAA PA 91002

-- The following brochures are out of stock at this time. Our goal is to revamp both of these publications in the near future.

SKYWARN Spotter ID Card	NOAA PA 84001
Hurricane! A Familiarization Booklet	NOAA PA 91001

AWARE Report Roster - *Kremkau*

Attachment E is the AWARE Report Roster. Please review the list of new telephone numbers, and notify me at 301-713-0090 if there are any changes. Also, if you know of someone who would like to be on the AWARE Report distribution list, please have him/her contact the Warning and Forecast Branch.

flash floods and floods...

the Awesome Power!

A PREPAREDNESS GUIDE

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Weather Service

July 1992

American Red Cross

The warning alarm will also be activated in the event of an enemy attack on the United States. In a 1975 White House policy statement, NOAA Weather Radio was designated the sole government-operated radio system to provide direct warnings into private homes for both natural disasters and nuclear attacks. The two National Weather Service offices in Arkansas are on a nationwide emergency hotline to receive such information. The warning alarm may also be activated in the event of nuclear accidents, spills of hazardous chemicals, or other civil emergency messages.

During severe weather the latest watches, warnings and statements receive the highest priority. Some of the regularly scheduled information is deleted to allow more time for the latest bulletins.

The warning alarm is tested each Wednesday between 11 a.m. and noon. If bad weather is occurring or is forecast, the test is postponed until the next good-weather day.

Weather Radio Transmitters Serving Arkansas

Transmitter	Call Sign	Frequency (MHz)
Mountain View	WXL-66	162.40
Little Rock	WXJ-55	162.55
Jonesboro	WXJ-51	162.55
Star City	WXJ-54	162.40
Gurdon	WXJ-48	162.475
Texarkana	WXJ-49	162.55
Fort Smith	WXJ-50	162.55
Winslow	WXJ-52	162.475
Memphis	WXK-49	162.475

Typical Programming Schedule

Local Forecast
Updated at 5 a.m., 11 a.m., 5 p.m., 10 p.m. and other times as necessary

Current Weather Conditions
Updated each hour.

Radar Reports
Whenever precipitation is occurring in the state, updated each hour.

State and Extended Forecasts
Updated at 5 a.m. and 5 p.m. and other times as necessary.

Arkansas Weather Summary
6 - 8 a.m.
Noon - 2 p.m.
5 - 7 p.m.
10 p.m. - 4 a.m.

Arkansas Agricultural Forecast
6 - 8 a.m. : Year -round
6 - 8 p.m. : Growing-Season only

Arkansas Agricultural Advisories
Noon - 3 p.m.

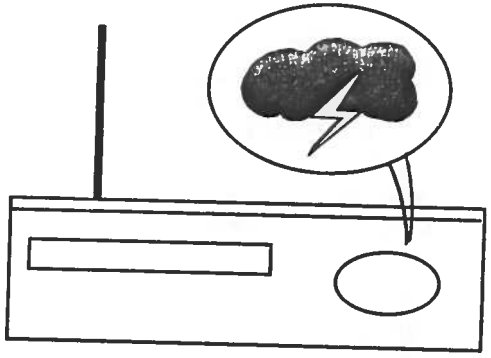
The National Weather Service acknowledges the cooperation of the following state agencies which help make this service possible.

Arkansas Educational Television Commission

NOAA

Weather Radio

The Voice of the National Weather Service



A 24-hour weather information service brought to you by the National Weather Service and the State of Arkansas

Printed by

Attachment B

HURRICANES

Are You Prepared??

Many hurricane-related deaths occur because residents are not prepared for a storm, take lightly the possibility of a storm, or disregard hurricane warnings. The National Weather Service generally gives 12 to 24 hours of warning of an approaching hurricane. How can coastal residents prepare in advance for the likelihood of a hurricane hitting their area?

Experts say you get four choices when a hurricane threatens your coast: One- Stay in your home if it is on relatively high ground far enough inland and protected from wind damage. Two- If you live on a barrier island, in a mobile home or low-lying area, stay with a friend or relative who lives inland and has stocked up on emergency supplies. Three- Go to an evacuation shelter. Four- Leave the area.

HURRICANE PREPAREDNESS CHECKLIST

If you decide that your home is relatively safe and above the storm surge level:

- ☐ HAVE A PLAN! Sit down with family members at the beginning of hurricane season and get ideas on paper. If your family works as a team, more will be accomplished during a storm.
- ☐ Make a video tape of the interior and exterior of house and property. Photograph valuables. Make an itemized list of personal property and their value. Take these with you if you leave your house.
- ☐ Check your insurance coverage. Make sure that you are covered for flood and windstorm damage. You may not be able to change your coverage once a storm threatens your area, as most insurers have a time wait before coverage becomes effective.
- ☐ Have plenty of cash or travelers checks on hand, as banks may be closed and ATM and credit cards may not be used during power losses.
- ☐ Fill car with gas and make sure battery is in good condition. Review area maps in case you need to leave.
- ☐ Check battery powered equipment such as a weather radio, flashlight, and clock. Have many extra batteries on hand.
- ☐ Lower and secure TV or radio antennas, roof turbines, window air conditioners and gutters.
- ☐ Check supply of emergency foods. Plan on a minimum of 2 weeks worth of food and drink for the entire family.
- ☐ Pack important papers and valuables and keep them in waterproof containers.
- ☐ Check prescriptions drug supply.
- ☐ Have battery operated lamps on hand, or oil lamps. DO NOT USE CANDLES DURING A HURRICANE! Many unnecessary deaths during storms occur due to fires attributed to the use of candles. Candles can be used safely once the storm has passed.
- ☐ Make arrangements for safety of pets. Have plenty of pet food on hand, and make water allowances for pets. Have their inoculations up to date. (Remember, pets are not allowed in evacuation shelters)
- ☐ Collect drinking water in plastic containers, cooking pots, bathtubs and washers. Remember, a gallon per person, per day.
- ☐ Turn refrigerator/freezer to the coldest setting to preserve food as long as possible in case of a power failure. Keep a cooler handy with ice available.
- ☐ Have emergency cooking facilities on hand for use AFTER THE STORM HAS PASSED.
- ☐ Do not empty inground swimming pool. Keep it full to approximately 12 inches below the edge.
- ☐ Wedge sliding glass doors and brace garage doors to prevent them from being lifted from their tracks.
- ☐ Protect appliances and furniture by elevating them off floor level.
- ☐ Remove all objects surrounding the house, such as garbage cans, lawnmowers and patio furniture. Secure them inside so they will not become flying objects.
- ☐ Early in the season have storm shutters or exterior plywood (minimum of 5/8" thickness) that is cut to fit each window. Use duct tape to strengthen interior windows. (Tape each window diagonally from corner to corner, and then in a checkerboard pattern.) DO NOT TAPE WINDOWS COVERED WITH SOLAR FILM.
- ☐ Trim surrounding trees of dead or overhanging branches.
- ☐ If possible, remove at least 75 percent of screens in your patio enclosure. They can be rehung after the storm and will avoid tearing and excessive damage during the storm.
- ☐ Be alert for tornado watches. Stay tuned to local radio and tv stations as well as NOAA weather radio for up to date weather statements and emergency instructions.
- ☐ DO NOT OPEN A WINDOW ON THE OPPOSITE SIDE OF THE HURRICANE WINDS. The damage done by a hurricane is not due to the difference in pressure of the hurricane and the house interior.
- ☐ Avoid standing near windows and glass doors during the storm.
- ☐ Wait for OFFICIAL WORD that the danger is over. Do not be fooled by the calm conditions as the hurricane's eye passes over. Many people are killed because they went out during the eye to "fix something" and were caught unexpectedly in the opposite eyewall.

IF YOU PLAN TO LEAVE HOME AND GO TO AN EVACUATION SHELTER:

- ☐ Don't leave home without: Unplugging electrical appliances, except for the refrigerator/freezer. Shutting off gas appliances. Disconnecting electricity, water and sewer lines, and turning off gas lines. Taking down tv antennas after unplugging tv. Packing indoor valuables and breakables in padded cartons and crumpled newspaper. Removing bulbs from lamps and taping mirrors with duct tape. Boarding up your windows or use shutters or duct tape. Anchoring or removing all outdoor items. Unplugging electricity to pool. Locking doors and windows when you leave.
- ☐ Have a large meal before you leave home. Don't come to the shelter hungry, as emergency rations will be available only as the storm progresses. No candy or sweets will be furnished.
- ☐ Please take personal identification papers and proof of residency with you. If your area is especially hard-hit, you may need these to enter back into your neighborhood.
- ☐ Bring the following items to the shelter: Water for 24 hours in plastic containers (2 gallons per person), medicines, blankets, pillows, sleeping bags, a complete change of clothing, personal toiletries, baby diapers and baby items, flashlights, batteries, bulbs, radio, toys and games, plastic trash bags, paper goods, rain gear, eating utensils, can and bottle opener, folding cots or lounge chairs, personal identification, first aid kit, sterno and cooking utensils, and non-perishable foods, such as canned meats, chicken and fish, crackers, dried fruit and nuts, canned juices, canned and powdered mild, breads, peanut butter, baby foods and formulas, puddings, cheeses, fresh fruit, and other snack foods and canned items.

REMEMBER, NO ALCOHOLIC BEVERAGES, WEAPONS OR PETS ARE ALLOWED IN EVACUATION SHELTERS.

IF YOU DECIDE TO LEAVE THE AREA:

- ☐ Plan to stay away AT LEAST 2-3 weeks. It could take that long or longer for public safety personnel to secure the area for re-entry.
- ☐ Let your out-of-state relatives know where you are going in case of an emergency. To reduce load on the phone system, make one call and ask that relative to phone the others.
- ☐ Have a plan! Call hotels ahead of time to see if they take pets and have available rooms.
- ☐ Keep a current road map and know where you are going.
- ☐ Bring cash or travelers check.
- ☐ Stay away from large bodies of water in case of flooding.
- ☐ If you need to travel in tall vehicles such as vans and motor homes, leave before the winds pick up. You may be unable to complete your journey in high winds.
- ☐ Remember, bridges are closed to traffic in high winds. If you intend to leave, travel early during the hurricane watch to avoid traffic, possible flooding, and high winds.
- ☐ Place pets in carriers. Check with vet about tranquilizers and their usage to calm pets. Bring along their food, water, vitamins, toys and medications. Do not put two normally friendly pets together in the same carrier, especially different species. Stress can cause a pet to act erratically.

AFTER THE STORM

- ☐ Do not sightsee. You may be mistaken for a looter.
- ☐ Be patient and cooperate with authorities. It may require time to allow access to the area before safety hazards are cleared.
- ☐ Have valid identification with you and proof of residency.
- ☐ Avoid driving, as roads will be needed for emergency vehicles and may also be treacherous.
- ☐ Beware of snakes, insects and wild animals driven to higher ground.
- ☐ Avoid downed or dangling utility wires.
- ☐ Enter homes with caution, and avoid using matches in case of gas leaks.
- ☐ Do not use the telephone unless absolutely necessary.
- ☐ Be suspicious of tap water. Do not use until authorities give the word. Use chlorine bleach (1 teaspoon for 5 gallons of water), iodine (2% strength- 20 drops per gallon), or water purification tablets. For emergency usage, water in the hot water heater may be used as well as the water in the flush tank of the toilet (not the bowl).
- ☐ Emergency toilet facilities should be planned for. If you are without water and sewer for a week, waste could become a real health problem. A pail or can-type toilet with a lid is one type of facility.
- ☐ Use caution when eating any foods affected by the storm. If flood water has entered your freezer or refrigerator, throw away all foods not sealed in metal cans or metal vacuum or cyro packaging. Foods will stay frozen during a power loss for 1-3 days in the freezer. Full refrigerators and freezers keep food cold longer.
- ☐ Undamaged cans need to be washed in strong detergent then immersed in a chlorine solution for 15 minutes before opening. Discard all leaky, bulging and dented canned goods.
- ☐ Do not use electricity or gas until house has been checked by repairman or authorities.
- ☐ Keep tuned to radio or tv stations for advice and instructions about emergency, medical, food, housing and other forms of assistance.
- ☐ For further information on home, pets and boating preparedness in case of a hurricane, please contact your local Red Cross, Humane Society or the Coast Guard.

Attachment D

NWS Publications

NOAA PA	NAME
70027	Survival in a Hurricane (Wallet Card)
74025	Tornado Safety Rules in Schools
76015	NOAA Weather Radio
77014	Flash Flood (Wallet Card)
77015	Flash Flood (Wallet Card) Inundaciones Repentinas (Spanish 77014)
77020	Hurricane Tracking Chart (Atlantic)
77021	Hurricane Tracking Chart (Eastern and Central Pacific)
78019	Storm Surge and Hurricane Safety with North Atlantic Tracking Chart
79017	Naming of Hurricanes
81011	Spotter's Guide for Identifying and Reporting Severe Local Storms
82002	Dust Storm Driving Safety (Wallet Card)
82004	Watch Out Storms Ahead
84001	SKYWARN Spotter ID Card
85001	Heat Wave
85002	Hawaiian Hurricane Safety Measures with Central Pacific Tracking Chart
85005	Tornado Safety Tips (Como Protegerse En Caso De Tornado) (WC)
85006	Survival in a Hurricane (Como Sobrevivir En Un Huracan) (Spanish 70027) (WC)
86001	Natural Hazard Watch & Warning Poster (English/Spanish)
91001	Hurricane! A Familiarization Booklet
91002	Winter Storms...The Deceptive Killers
91003	Red Cross - Are You Ready for a Winter Storm?
91004	Red Cross - Are You Ready for a Winter Storm? (Spanish Version)
91005	Red Cross Poster - Are You Ready for a Winter Storm? (English/Spanish)
92050	Flash Floods and Floods...The Awesome Power!
92051	SKYWARN Decal
92052	Tornadoes...Nature's Most Violent Storms
92053	Thunderstorms and Lightning...The Underrated Killer!
92054	FEMA's Emergency Preparedness Materials Catalog
92055	Advanced Spotter's Field Guide
92056	Mariner's Guide to Marine Weather Services
92057	Red Cross - Are You Ready for a Tornado?
92058	Red Cross - Are You Ready for a Tornado? (Spanish)
92059	Red Cross - Are You Ready for a Flood or a Flash Flood?
92060	Red Cross - Are You Ready for a Flood or a Flash Flood? (Spanish)
92501	NOAA Brochure

Attachment E

AWARE Report Roster

SUMMER/FALL 19

NWS Headquarters Staff, W/OM11

301-713-0090

Donald Wernly	Chief, Warning & Forecast Branch
Linda Kremkau	Editor
Rainer Dombrowsky	Synoptic Scale Meteorologist
Bill Alexander	Mesoscale Meteorologist
Therese Pierce	OM NEXRAD Radar Focal Point
Rodney Becker	Public Weather & Dissem. & Program Leader
Ron Berger	Public Weather & Dissem. Met.
Chris Adams	Senior Social Scientist
Estella Speaks	Secretary
LaShone Darden	Clerk Typist

Eastern Region

		TELEPHONE NO.
Sylvia Graff	Regional (Focal)	516-244-0123
Solomon Summer	(Acting) Regional Hydrologist	516-244-0113
Steven Naglic	Cleveland (Focal)	216-267-3900
Mary Jo Parker	Columbia, SC (WPM)	803-822-8135
Martin Ross	Philadelphia (WPM)	215-627-5575
Rod Gonski	Raleigh (WPM)	919-840-0450
Barbara McNaught	Washington (Focal)	703-260-0209
Anthony Gigi	New York City (Focal)	212-315-2705
Stanley Levine	Albany (WPM)	518-869-6394
Walter Drag	Boston (Focal)	617-561-5753
Tom Dunham	Buffalo (Focal)	716-632-1319
Rich Webber	Buffalo (Focal)	716-632-1319
Roger Stairs	Pittsburgh (Focal)	412-644-2881
Fred Ronco	Portland, ME (Focal)	207-773-0352
John Rimkunas	Portland, ME (Focal)	207-773-0352
Jerry Orchanian	Charleston, WV (Focal)	304-342-7771

Southern Region

Steven Cooper	Regional (Focal Point)	817-334-2812
Dave Smith	Regional Hydrologist	817-334-2674
Patricia Brown	Atlanta (WPM)	404-763-7886
Tom King	Birmingham (WPM)	205-290-7305
John Cockrell	Fort Worth (WPM)	817-334-3884
Ron Stagno	Houston (WPM)	713-534-2157
James Butch	Jackson (WPM)	601-965-4639
Vacant	Little Rock (WPM)	501-740-5331
Gary Woodall	Lubbock (WPM)	806-743-7361
Dennis Decker	Melbourne (WCM)	407-259-7589
Andrew Sniezak	Memphis (WPM)	901-757-6441
Jim Purpura	Norman (WCM)	405-366-6583
Mario Valverde	San Antonio (WPM)	512-730-5026
Ada Monzon	San Juan (WPM)	809-253-4589
Larry Vannozzi	Albuquerque (Focal)	505-766-2170
Mike Koziara	New Orleans (Focal)	504-589-6891
Wayne Colin	Miami (Focal)	305-536-4303
Cliff Brock	Miami (Focal)	305-536-4303
Jose Garcia	Amarillo (WCM)	806-376-2360
Vacant	Tulsa (WCM)	918-581-7748

Central Region

		TELEPHONE N
David Runyan	Regional (WPM)	816-426-323
Lee Larson	Regional Hydrologist	816-426-322
Jim Allsopp	Chicago (WCM)	815-834-060
William Babcock	Ann Arbor (Focal)	313-668-222
Joe Sullivan	Des Moines (Focal)	515-284-449
Shawn Harley	Indianapolis (Focal)	317-248-403
Norman Reitmeyer	Louisville (Focal)	502-361-140
Jim Kramper	St. Louis (WCM)	314-447-187
Mike Dircksen	Sioux Falls (Focal)	605-330-424
Mike Akulow	Topeka (WCM)	913-295-263
Todd Heitkamp	Denver (Focal)	303-361-066
Mike Weiland	Cheyenne (Focal)	307-772-246
Todd Krause	Minneapolis (Focal)	612-725-609
Jeff Last	Milwaukee (Focal)	414-297-324
Richard May	Bismarck (Focal)	701-223-458
Gary Wiese	Omaha (Focal)	402-221-420
Steve Shurr	Wichita (WCM)	316-942-310
Mike Szkil	Dodge City (WCM)	316-227-331

Western Region

Richard Douglas	Regional (WPM)	801-524-400
Bob Tibi	Regional Hydrologist	801-524-513
Maux Barnes	Boise (Focal)	208-334-986
Nicholas Leivers	Los Angeles (WPM)	310-575-721
John Lovegrove	Phoenix (Focal)	602-379-460
Tom Ainsworth	Portland (Focal)	503-326-234
Roger Lamoni	Reno (Focal)	702-784-579
Mike Lewis	Salt Lake City (Focal)	801-524-513
John Quadros	San Francisco (Focal)	408-291-776
Robert Doherty	Seattle (Focal)	206-526-608
Lynn Valtinson	Great Falls (Focal)	406-453-995

Alaska Region

Jim Kemper	Regional (WPM)	907-271-5131

Pacific Region

Vacant	Regional (WPM)	808-541-1671
Robert Larson	Hydrology (Focal)	808-541-1671
Thomas Heffner	Honolulu (Focal)	808-541-1698

NCDC - Storm Data

Lanny Dimmick		704-259-0458