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INTEGRATING THE SPOTTER PROGRAM INTO THE MODERNIZED NATIONAL WEATHER SERVICE

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Abstract

The modernization of the National Weather Service (NWS) has provided forecasters with a number of new observation tools including ASOS, NEXRAD, and GOES. However, much of the available data are remotely sensed or automated, and the forecaster must often extrapolate and infer the actual surface conditions. While the modernization has provided significant benefits, ground truth reports are still an essential part of the forecast and warning process. As such, the need for volunteer weather spotters has increased in the modernized NWS and this need will continue well into the future.

In the past, spotters were mainly viewed as a resource that would call the NWS office when they observed significant weather (e.g., large hail, tornadoes, heavy snow, etc.). Such reports would be integrated into the warning and forecast process, manually logged by NWS personnel and/or transmitted in a Local Storm Report (LSR). As the NWS transitions to more remotely sensed and automated observations in place of manual observations, the need for spotter reports of "non-severe" weather has increased. In order to form the most complete picture of surface conditions across a given area, NWS personnel must be proactive and initiate calls to spotters. New tools and techniques are available that allow forecasters to do this in a more efficient manner.

The authors are developing a system for updating, improving, and maintaining a spotter database, then integrating it into the modernized NWS. The key components are spotter sources, spotter information, spotter database, map generating software, WSR-88D, and automatic dialing software. These tools and techniques are presented here in an integrated package.

Introduction

The weather spotter program is an integral part of the NWS forecast and warning process which allows the forecaster to verify "severe" and "non-severe" weather events. The program, in some respects, has not kept pace with the modernization of the NWS.

In the past, spotters were mainly viewed as a resource that would call the local NWS office whenever significant weather was observed. As the NWS continues to modernize, and more remotely sensed observations replace manually observed data, the need for spotter reports of both "severe" and "non-severe" weather increases. In order to form the most complete picture possible of surface conditions across an area, NWS personnel need to initiate calls to spotters. Many times this will occur in non-severe weather situations (e.g., light snow, fog, winds) when spotters would not normally call into the office. Various tools must be in place in order to allow forecasters to do this in an efficient manner.

There are several components to the spotter program that can be added or modified to achieve this. The key components and necessary actions are as follows:

- ➜ Expand the information maintained on each spotter in the spotter binder;
- ➜ Set up and maintain a master database of all spotters and other contacts, accessible to all users on the office local area network (LAN). This information is then used to update and maintain the spotter binder, maps, and dialer;
- ➜ Create and maintain computer-based maps, a large wall map, and hard copy maps for the spotter binder;
- ➜ Input and maintain spotter locations and identifications on an unused 124 nautical mile 4X background map on the WSR-88D Principle User Processor (PUP); and
- ➜ Set up and maintain an automatic dialing program on operations area personal computers that uses Windows-based point and click type software to initiate and log calls to spotters. This software should be compatible with OS/2

Spotter Sources

Sources of volunteer spotters have come from various groups who have an interest in weather and helping the NWS with its mission. The general public is an obvious source. These people are often recruited by newspapers, booths at conferences/shows, and in a variety of other methods.

Ham radio clubs are another good source of spotters. The lead member of a club can activate a ham radio net among the members to report on significant weather.

Another source available in most areas are the Civil Air Patrol (CAP) and the Coast Guard Auxiliary (CGA). CGA squadrons are found not only along the ocean but also in most inland lakes that have recreational boating. The advantage to these spotters is that they often have meteorological training. Each state has numerous chapters of the CAP and CGA, thus making it easier to recruit spotters in many areas.

In rural areas, Granges are another source of spotters. A Grange is a rural association of farmers. Members of the Grange are usually knowledgeable in the sensible weather as it directly affects their livelihood. Since the population density is very low in rural areas, spotters recruited from Granges are a very valuable source of information.

Sources of untrained spotters are 24-hr truck stops, gas stations, and motels. These resources are not trained due to high turnover and they are not expected to call the NWS with reports. However, they can provide the forecaster with simple current weather conditions. When called, these people have been very cooperative and have proved to be a valuable source of weather information. Another plus is that they often hear weather reports from motorists and truckers who are stopping for gas and supplies.

Spotter Information

Most NWS offices have a spotter binder which typically contains the necessary information on each spotter, often grouped by county. In order to effectively use spotters, the following information is recommended:

* Spotter ID, including county and number;
* First and last name of the primary contact;
* Primary contact's ham radio call sign (if applicable);
* First and last name of the secondary contact (if applicable);
* Secondary contact's ham radio call sign (if applicable);
* Primary phone number and location (home, work, etc.);
* Secondary phone number and location (home, work, etc.);
* Plain language description of location referenced to cities, major town, rivers and creeks;
* Elevation;
* Special instructions (do not call times, work hours, etc.); and
* Meteorological equipment.

Figure 1 shows an example of a spotter listing.

Spokane-98H
John Doe KC7GHI
Home - 509-555-1111
Home - 5 miles SE of downtown Spokane on Hangman Creek
Elevation - 2465 ft
Rain Gauge, Max/Min Thermometer
Work - 509-555-2222
Work - In Deer Park
Do not call midnight - 400 am

Figure 1. Spotter Information Example

Spotter Database

The spotter database is part of a larger outreach database that will be maintained in support of all outreach activities. In addition to spotters, it contains media contacts, elected officials, emergency manager contacts, sheriff's offices, federal legislative contacts, cooperative observers, and other miscellaneous contacts. This database will be used as the basis for the spotter binder.

At NWSO Spokane, Quattro Pro is the database software that is currently being used, with the primary export of data to WordPerfect. Data can also be exported to other software packages. Each record has many fields which can be expanded based on the need to sort and extract the entries. For example, when it was determined that some contacts would receive the quarterly newsletter and others would not, then a field for newsletter receipt is added, and a "Y" or "N" is entered for each record.

The master file is kept in a specified location on the office LAN as a "read only" file. Anyone who wishes to use it, invokes the Quattro Pro software, reads the file, and performs the desired operations. Because the file is "read only", it cannot be over-written or corrupted. Updates and corrections are handled by the focal point, who has full rights to read and write to the file.

Using the master database, various subsets can be extracted for various purposes, such as:

- A mailing to all emergency managers to allow them access to the office HydroMet computer. Mailing labels and personalized letters were generated;
- Creation of a comma delimited ASCII file for ingest into the Maptitude software for generation of maps of spotters for each county; and
- Creation of a flat file for input into the dialing program.

Computer Based Maps

Both a large wall map and individual county maps are used to locate spotters. The large wall map provides an overview, but lacks the detail for accurate location of spotters, especially in urban areas where spotters are numerous and relatively close together.

Individual computer generated county maps will be located in the spotter binder. Maptitude is the software used to generate these maps. Information from the master outreach database is exported in a comma delimited ASCII file. Maptitude has the capability to create maps of a county, city, and neighborhood. Maptitude will then plot the spotters on each map. These maps are inserted into the spotter binder before the first page of each county listing for quick reference.

Figures 2 and 3 show examples of maps created by the Maptitude software. Figure 2 shows a map of Bonner County, Idaho. Figure 3 shows a map of the Post Falls/Coeur d'Alene area in Idaho.

Background Maps on the WSR-88D PUP

As previously mentioned, spotters can be used with remotely sensed data to form a more complete picture of the surface weather. The combination of spotter reports and WSR-88D is an excellent example. To make this easy to do, spotter locations and ID's can be put on a unused 124 nautical mile 4X background map on the WSR-88D PUP. Accurate location of spotters on this map helps the forecaster rapidly find a spotter where significant weather exists.

Figures 4 and 5 illustrate this point. Figure 4 shows a composite reflectivity picture in which a severe thunderstorm is located in Northeast Washington. The forecaster identifies an area of interest, marks it, and clicks on "recenter mag 4x" on the graphic tablet. The forecaster then clicks on "restrctd area" on the graphics tablet. The various spotters are identified on this map (Fig. 5). The forecaster then clicks on "product off/on" on the graphics tablet. The forecaster can then identify the spotter that is closest to the area of interest. In this example, spotter "Stevens-1" is located in the most intense portion of the thunderstorm cell. The forecaster can then call this spotter utilizing the automatic dialing software described in the next section.

Automatic Dialing Program

Dialing and reaching spotters to get information in a time critical warning situation can delay the issuance of important information. Reaching spotters to get critical information such as hail diameter, snow amounts, visibilities, wind speeds, etc., can be very time

consuming. To help with this, an automatic dialing program run on a personal computer is recommended.

The Severe Weather Dialer (SWD) (Hirsch, 1996) is a software package that will automatically dial spotters. Information from the spotter database in the form of a text file is inputted into the SWD. This software is currently being used at NWSO Quad Cities, Iowa, and NWSO Corpus Christi, Texas. Using a point and click method, the SWD dials the spotter and provides a note pad for the forecaster to log the reported information.

Conclusion

An important and sometimes overlooked tool in the forecasting and verification process is the weather spotter program. The tools used in the weather spotter program in many NWS offices have not kept pace with the modernization of the NWS.

The authors have developed the above framework for updating, improving, and maintaining a spotter database, and integrating this resource into the operations of a NWS office. Utilizing off the shelf technology in computer database development, map generation, WSR-88D, and automatic dialing, the weather spotter program will become more efficient. This would save valuable time during significant weather events and enable the forecaster to issue needed warnings or advisories in a more timely manner. Additionally, in the modernization of the NWS, spotters are needed not only for "severe" weather but also for "non-severe" weather too. This framework will also improve the efficiency of gathering information for "non-severe" weather events. The spotter binder should still be used as a back-up in case of system failure.

Utilizing the framework being developed at NWSO Spokane, the spotter program will become fully integrated into the modernized NWS.

Acknowledgment

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References

Hirsch, B. and A. Patrick, 1996: Verification using the Severe Weather Dialer (SWD). *NWSO Quad Cities and NWSO Corpus Christi.*

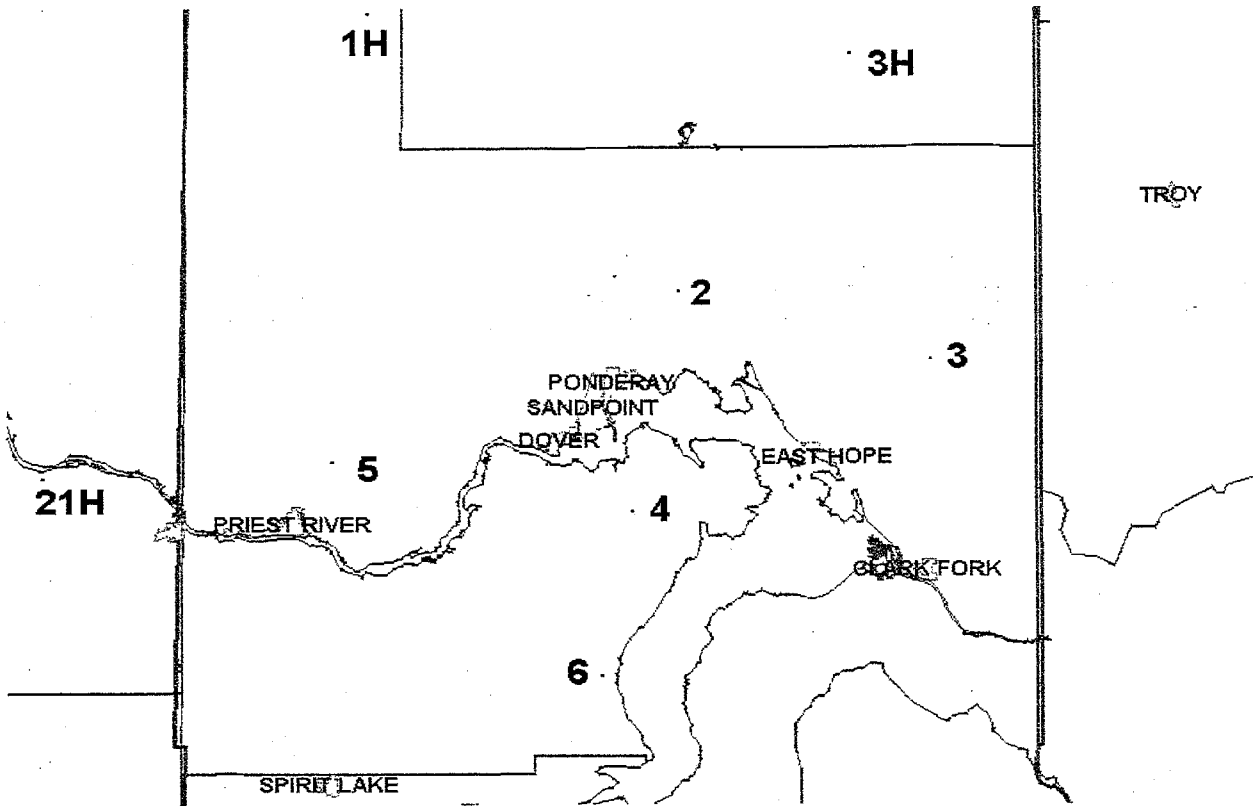

Figure 2. Spotter Locations on Map of Bonner County Idaho

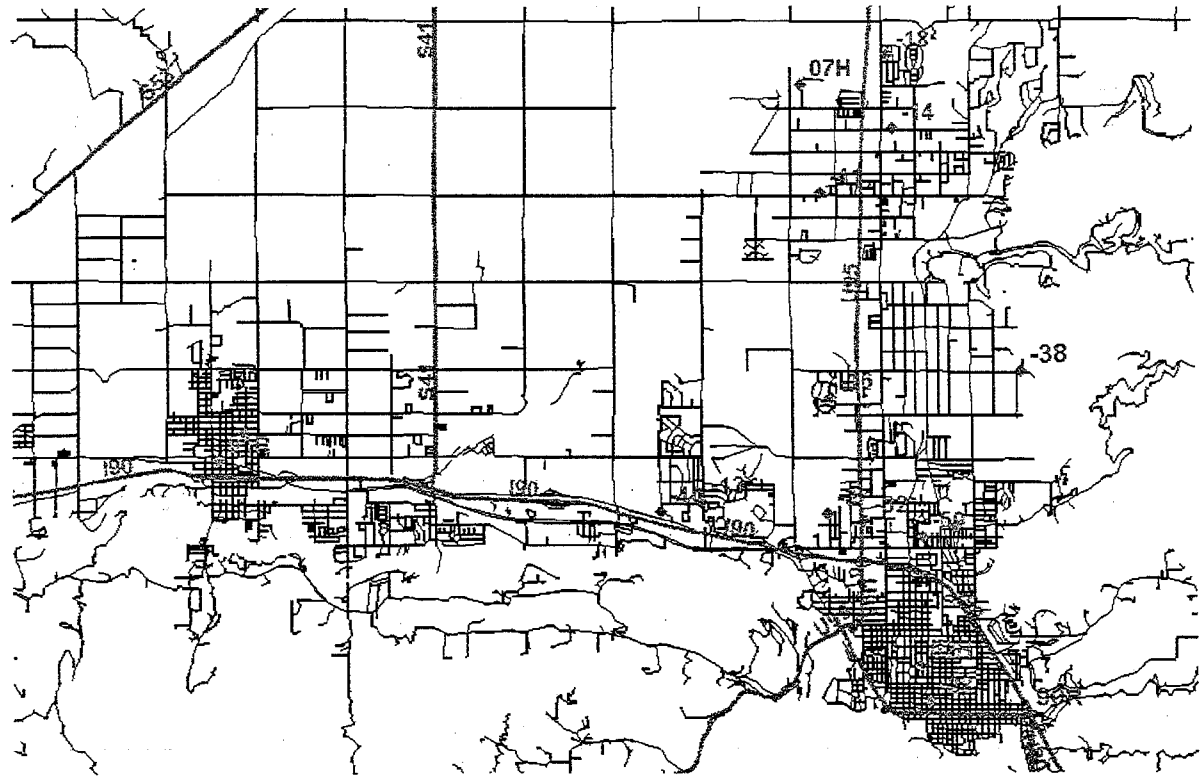

Figure 3. Spotter Locations on Zoomed In Map of Post Falls and Coeur d'Alene Idaho

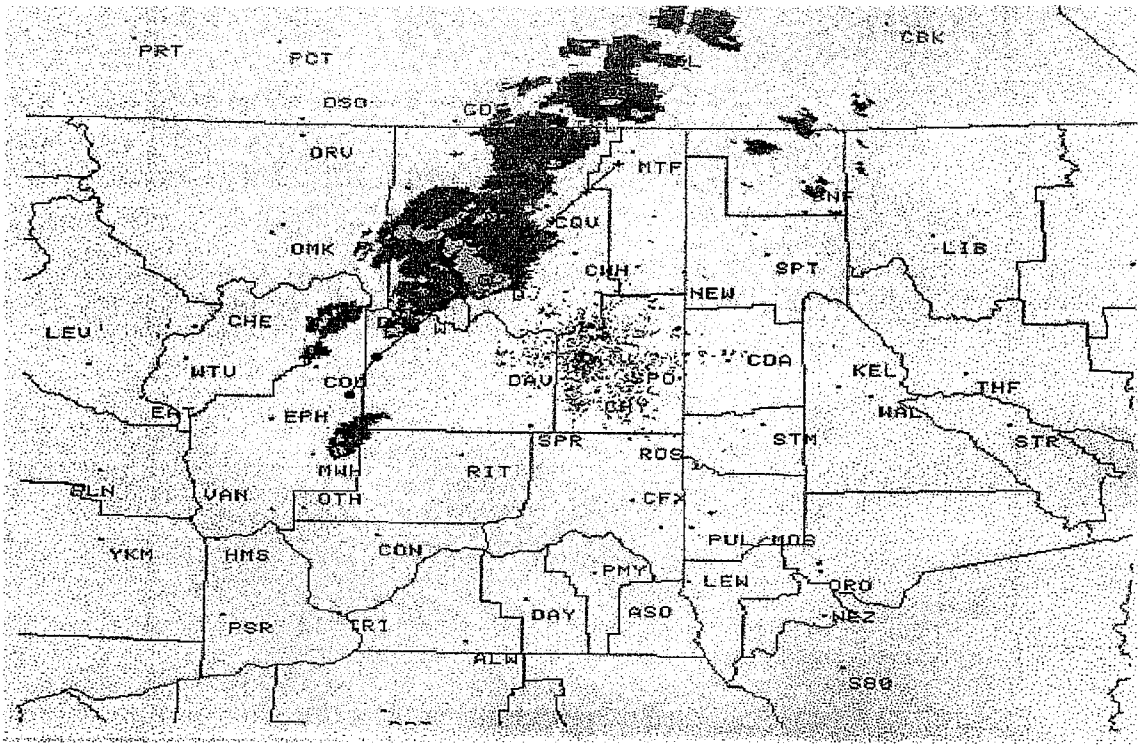

Figure 4. Composite Reflectivity Showing Thunderstorm Activity over NWSO Spokane's County Warning Area

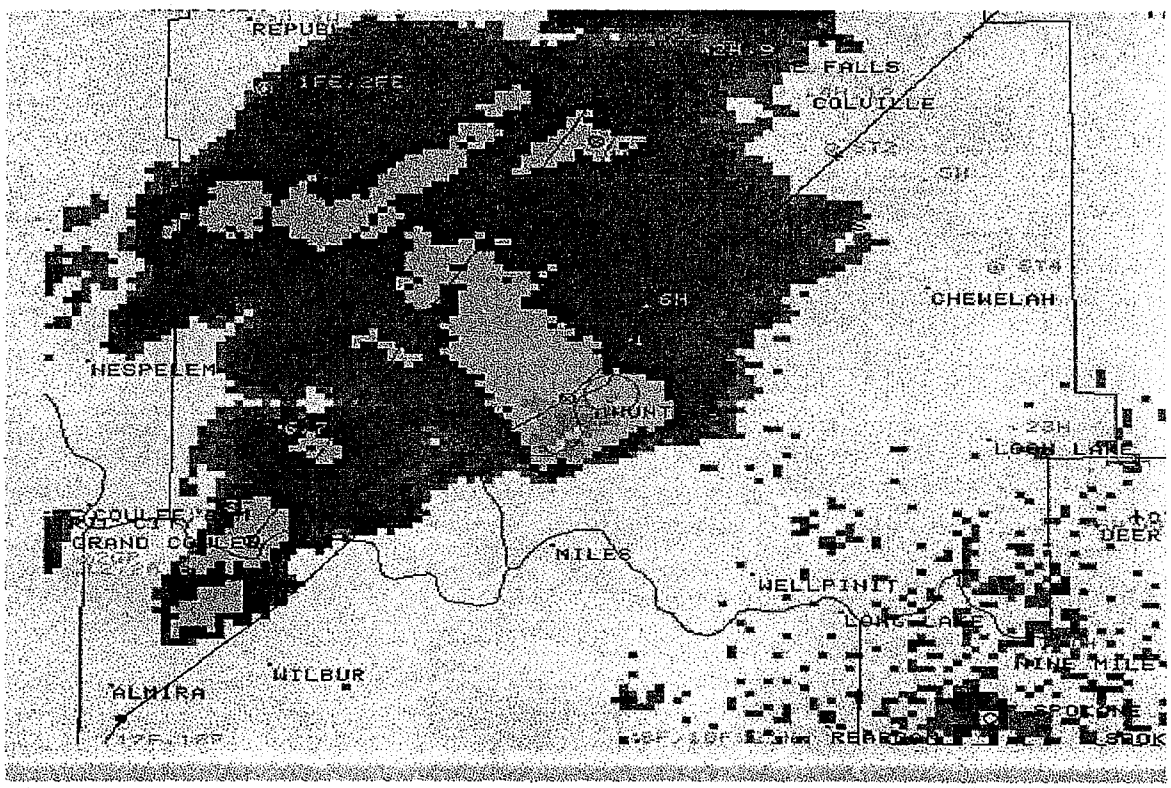

Figure 5. Zoom of Thunderstorm Activity in Figure 4 Showing Spotter Locations.