

**A FOLLOW-UP STUDY ON NATIONAL WEATHER SERVICE  
K-12 EDUCATION AND OUTREACH PROGRAMS**

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**1. INTRODUCTION**

An important component of the National Weather Service (NWS) mission is their programs that reach out to the community, whether it be to civic and philanthropic organizations, senior citizens, or the marine and aviation community, just to name a few. Commitment remains strong between the NWS and K-12 education. One way that the NWS supports the K-12 education community is through the American Meteorological Society's (AMS') Project ATMOSPHERE educational programs, including the *DataStreme Project* and *Water and the Earth System*. Each summer, the NWS hosts a two week workshop for a group of primary and secondary teachers at the NWS Training Center in Kansas City, Missouri. After this summer's workshop, one high school teacher commented, "The outreach of the NWS to the public, especially the education community, is wonderful and makes my job as an educator so much easier. As far as my meteorology course is concerned, I know I can count on the (National) Weather Service for assistance." (NWS Communications Office, August 26, 2002). The National Oceanic and Atmospheric Administration (NOAA) staffs an information booth at the national and regional National Science Teacher Association (NSTA) meetings, with the assistance and support provided by local NWS offices.

During the summer of 1997, the lead author conducted surveys of the NWS Eastern Region (ER) Weather Forecast Offices (WFOs) and the K-12 educational community in the NWS Taunton County Warning Area (CWA) (Vallier-Talbot, 1998). She found that the NWS ER's commitment to K-12 educational programs was strong. The K-12 educators overwhelming felt that the NWS Taunton program (Vallier-Talbot, 1997) was highly informative and motivational for students at all grade levels. Since that time, the NWS has largely completed their Modernization and Associated Restructuring (MAR) program. This has meant staffing reductions through attrition, leaving fewer opportunities for local offices to reach out to the community, as well as effects on other programs. With these leaner staffing levels, the NWS at the local and regional levels will be carefully prioritizing their implementation of future outreach activities, including K-12 education, SKYWARN

weather spotter training, and other outreach ventures. This paper will present the results of surveys conducted throughout the NWS on education and outreach programs. The survey results will give a historical perspective on the types of programs supported, as well as what can be continued in the future. Specifically on K-12 education, the results will show if there have been local office policy changes in K-12 education programs. Specific past programs and methods on the continuation of K-12 educational outreach, even in these leaner times, will also be presented.

**2. METHODOLOGY***2.1 Eastern Region Follow-Up*

A survey of the NWS ER offices was conducted during the summer of 2002, which was a follow-up to the 1997 survey. The survey was electronically mailed to the Warning and Coordination Meteorologists (WCMS) at the 23 ER WFOs. The WCMs were asked to complete the survey, then return it either by e-mail, telephone facsimile, or regular mail. If they did not manage their office's outreach program, they were asked to pass the survey on to the person that runs it for their WFO. They were asked to evaluate the types of K-12 and other outreach programs conducted by their offices, how many customers had been affected by these programs, how their office's support had changed since the 1997 survey, and what types of programs they felt could be supported in the future. Comments on their local contributions were also solicited.

In the 1997 ER survey, the NWS River Forecast Centers (RFCs) and the Central Weather Service Units (CWSUs) co-located at the Federal Aviation Administration (FAA) Air Route Traffic Control Centers (ARTCCs) were included. The 2002 survey was exclusive to the WFOs. While the RFCs and CWSUs provide another important outreach link for the NWS, their efforts are targeted primarily toward hydrology and aviation. The authors wanted to learn about the wide range of outreach and education efforts conducted by the WFOs.

*2.2 Other Regions*

The NWS divides the country into 6 regions: Eastern Region, Central Region (CR), Southern Region (SR), Western Region (WR), Alaska Region (AR) and Pacific Region (PR). A second similar survey was electronically mailed to the WCMs at the remaining 99 WFOs throughout the United States, including Puerto Rico and Guam. Since this is the first time that the remaining

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WFOs had been surveyed, they were asked to evaluate their level of past outreach support on a *high*, *moderate*, or *low* basis, as well as the remaining questions on the ER survey.

### 3. RESULTS

Out of the 122 surveys sent to the WFOs, a total of 73 responses (60%) were received from the WCMs or their designated representatives. Each NWS region was well represented, as seen in Figure 1, though a lower response rate was noted from Southern Region offices.

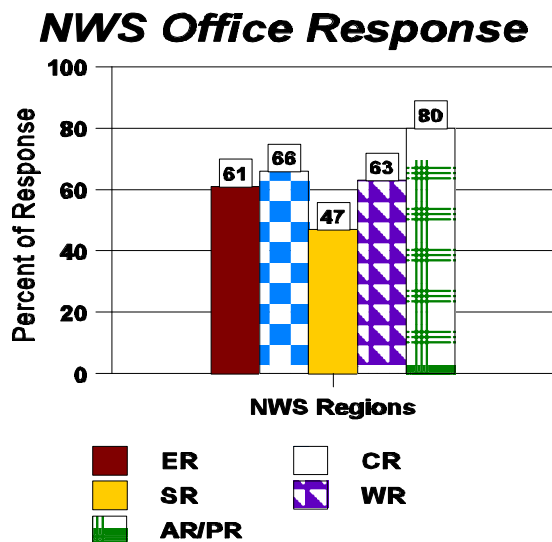


Figure 1. Response Rate from NWS offices to the 2002 Survey

The first question covered the types of K-12 education programs conducted by the WFOs between the Fall of 1999 and Spring of 2002, which covered the previous three school years. Figure 2 shows the different K-12 outreach efforts conducted by the WFOs, including school visits (SV), office tours (OT), science fair participation (SFP), job shadowing (JS), career day presentations (CD), Internet home page information (IH), AMS educational initiatives, internships for high school and college students (INT), open houses (OH) and teacher informational packets (TP). Six offices also mentioned other types of K-12 programs they supported, including non-profit educational initiatives, state science teachers associations and cooperative efforts with other government agencies.

To follow up on the K-12 education programs, the respondents were also asked about the other types of outreach activities accomplished over the last three years. Some of these included civic (CI) and philanthropic (PH) organizations, private clubs (PR), senior citizen groups (SC), SKYWARN spotter training (SKY), aviation (AV) and marine (MAR) organizations,

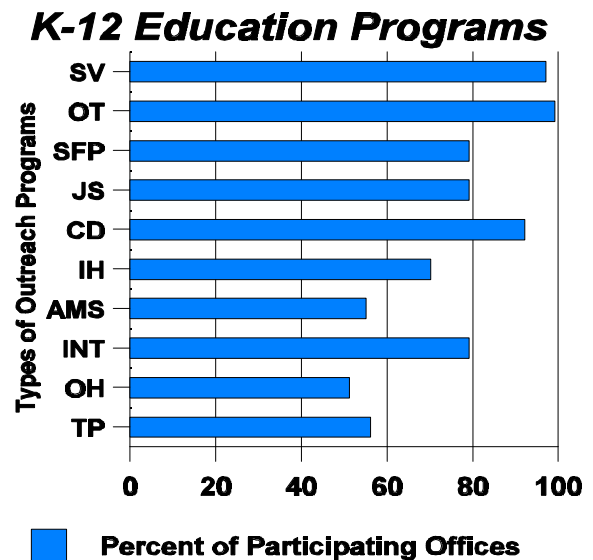


Figure 2. Types of NWS Educational Outreach Programs – 1999 to 2002

state and national fire weather agencies (FIRE), and colleges and universities (C/U), as shown in Figure 3. Other types of non K-12 outreach were mentioned by thirty offices (41%), including running tornado drills, workshops on different weather topics (including hurricanes and winter weather) for a wide variety of customers, presenting at regional emergency management meetings and supporting safety and state fairs, just to name a few.

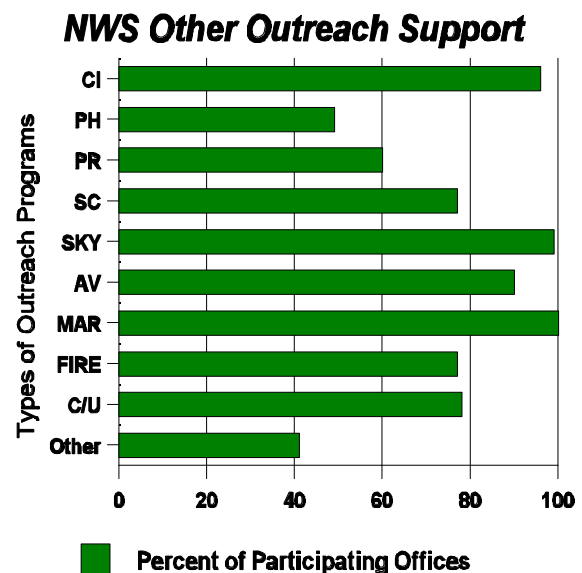


Figure 3. Types of Other Outreach Programs supported by NWS – 1999 to 2002

The next two questions asked about the numbers of people affected by both K-12 education and other outreach programs on a yearly basis. For the K-12

### People Impacted by NWS Outreach

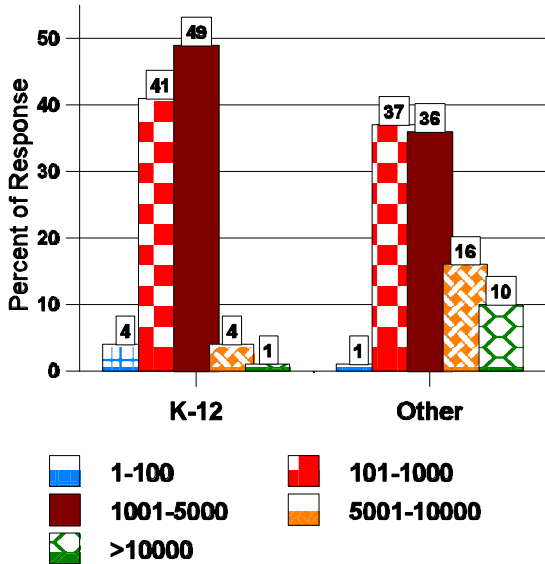


Figure 4. Estimated number of people impacted by NWS Outreach Programs yearly

education responses, most respondents felt they reached between 1001 and 5000 people, as seen in Figure 4. Beyond the K-12 education community, most felt they had reached between 101 and 1000 people.

The next questions asked the respondents to quantify their education and outreach support in terms of a full time equivalent's (FTE) work time. A full time equivalent is defined as the number of hours that one full time employee would work in one year, for a total of 2080 hours. A wide variety of responses came in for these questions, anywhere from one to 130 percent. Figure 5

### NWS Field Office FTE Support

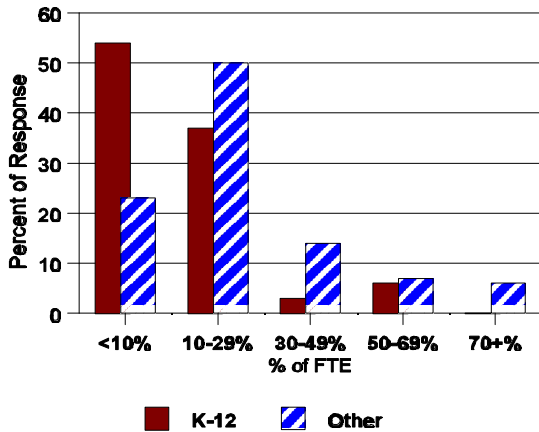


Figure 5. Percent of a FTE used to support NWS Outreach Programs

shows that most respondents felt they contributed up to 10 percent of an FTE toward K-12 education, while there was between 10 and 29 percent FTE support for other outreach activities.

The next question asked about changes in office policy regarding the diversification of outreach activities. The authors wanted to find out about priority changes at the local NWS offices, redirecting resources to other outreach activities and away from K-12 education. Most respondents (77%) felt that there was *no change* in their office's policy in K-12 education, while 23% stated there was.

The final two questions asked about the level and types of K-12 education programs could be supported in the future. Figure 6 shows that most respondents (62%) felt that they could support K-12 programs at a moderate level in the future. Several respondents stated that this would be an increase in support from a low level in the past. At least 70% of the respondents felt they could continue many of the current K-12 education programs, like office tours, school visits, job shadowing, and so on, as seen in Figure 7.

### NWS WFO Support

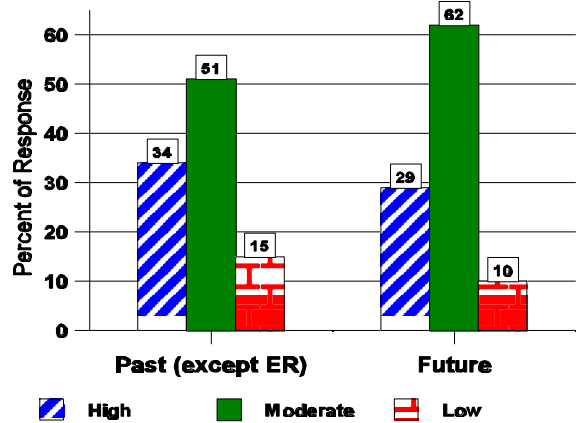


Figure 6. Past and Future NWS WFO Outreach Activity and Support

#### 3.1 Eastern Region Follow-Up

A question exclusive to the ER survey asked if the respondents felt that their level of K-12 education program support had changed since the 1997 survey. One half of the respondents, as Figure 8 shows, felt that their support had increased since the last survey, while over one-quarter stated that there had been no change.

#### 3.2 Other Regions

As mentioned earlier in this preprint, this was the first survey of the WFOs in the other five NWS regions regarding education and outreach programs. One question specifically asked the respondents to rate their past support of K-12 outreach programs. The first part of

Figure 6 shows that most respondents (51%) felt that they gave moderate support to these programs.

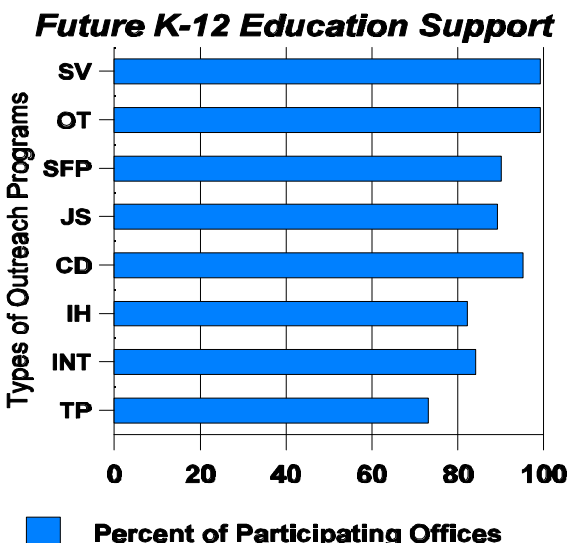


Figure 7. Types of K-12 Outreach Programs that NWS offices felt could be supported in the future (See Section 3 for abbreviations)

### ER Outreach Support Changes

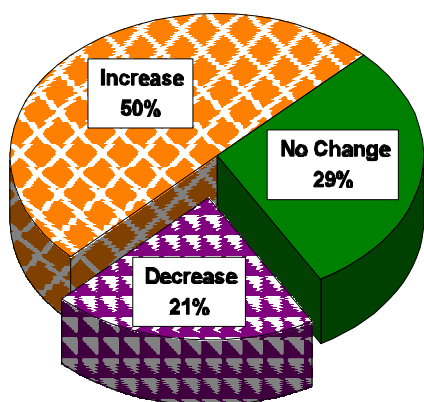


Figure 8. Changes in Eastern Region Office Outreach Support since the 1997 Survey

## 4. DISCUSSION

The authors were surprised and pleased by the amount of WFO support voiced about education and outreach programs through the survey responses. The respondents had *many* comments about their feelings on both outreach programs. Several respondents were

animated about their strong commitment to all outreach programs. They also shared the wide variety of local education and outreach programs conducted by their WFOs. However, there were some disconcerting comments as well, mainly about redistribution of resources away from K-12 educational outreach toward other programs.

### 4.1 Outreach Program Support

Comments from the respondents voiced strong support of all types of outreach programs. One Central Region office stated, "Our office has expanded outreach contacts by 10 to 20 percent per year over the last four years. A lot of the office staff put in lots of their own uncompensated time for preparation, speaking and traveling to outreach events...because they like it!" This same office has also increased their involvement at two tribal colleges, reaching the native American college population in their CWA to spark interest in meteorology careers. Another Central Region office works with a local television station to host a one day weather class for area students. A Western Region WFO mentioned an increased emphasis on water safety education on both the ocean and rivers. Outreach talks at state parks with families camping during the summer was an outreach venture run by an Eastern Region office. This same office participates in a "Kids Summer Camp" with a local university, along with a weather camp for teachers. Another Eastern Region office staffs a booth at their State Fair for the entire event. The respondent noted that this was the "biggest single outreach program performed all year." Yet another Eastern Region office participates in a "Hamvention" for amateur radio operators, called "the largest amateur radio convention in the world." A Southern Region office is working with a local government office to reach special education students, with an emphasis on the deaf community. A "Severe Storm Workshop" is run by another Southern Region office every other year, in cooperation with local emergency management agencies, which is open to the public at a nearby civic center.

Several WFOs from Central and Western Region noted that their overall outreach support may not appear to be as much as their counterparts in other regions. The big reason why is population density. As noted by one respondent, "We have an extremely low population in our CWA, so our numbers don't look too good." Other respondents noted the large distances that had to be traveled, sometimes up to four hours one way, just to get to an outreach event. So, when asked about the WFO's level of past support on a low, moderate, or high basis, the responses became rather subjective for each respondent. For example, if two offices indicated "moderate" outreach support, one office stated that they reached from 101 to 1000 people yearly, while another office said they reached 1001 to 5000 people.

When comparing responses on the past support question, the percentage that responded "high" on the 2002 survey was much lower than the 1997 survey, 34% in 2002 versus 50% in 1997.

#### 4.2 Diversification of Outreach

When asked about the changes in office policy regarding decreased involvement in K-12 educational outreach over the last one to two years, many impassioned responses were received on both sides of this issue.

The majority of responses stated that there were no changes to their office's K-12 outreach policy. If anything, many offered that their involvement in the K-12 education arena had actually *increased* over the last two years. An Alaska Region response voiced the sentiment of many, "Yes, there has been a change to try and improve our outreach plan to include a more diverse section of our outreach base. NO, these changes have NOT been at the expense of K-12 programs in our CWA." The WCM at a Southern Region WFO stated that he anticipated "a solid increase in K-12 support" over the next few years. A Western Region office responded, "We are diversifying outreach – and do not have, nor anticipate decrease involvement (in K-12 education)." "Our office's management team all agree that all outreach is important, and we try to reach as many as possible," noted a Central Region respondent.

On the other side of the coin, several respondents did note changes in K-12 education endeavors. A major reason noted for these changes were due to the tragic events of September 11, 2001, especially with regards to office tours and open houses. A Central Region respondent stated, "We see these (changes) as temporary and will likely resume our aggressive approach in the near future." Shortly after the 9/11 attacks, the Department of Commerce (DOC) Security Office "shut down" all field offices from any type of public access. Even with this order, several respondents did state that office tours did not stop, but were conducted with much higher scrutiny and security. During the spring of 2002, local offices could invite one or two people into the office, mainly for students participating in ongoing job shadowing programs. New guidelines were developed and deployed to offer access to facilities by DOC Security during the summer of 2002. This allowed field offices the ability to offer limited access for small office tours with much higher security.

Beyond the 9/11 effects on outreach, several other offices noted other changes to their K-12 education policy. Several stated that higher priority duties and staffing shortages had reduced outreach activities. An Eastern Region respondent noted, "Changes in curriculum restrictions due to imposed prescribed standards, and less money available for school trips to the WFO." One Eastern Region office even went so far as to make this topic a point in their office's operating plan. The plan stated, "Redirect outreach more to emergency managers and targeted customer entities and less to education. Partner with local non-profit weather education organization to help accommodate and refocus educational outreach demand." Another Eastern Region respondent stated, "I have been told that I must cut back the total number of hours devoted to my outreach program for the next fiscal year."

Even with local changes, national policy makers have examined future trends in education and outreach programs throughout NOAA, along with many other facets of NOAA's mission. The importance of education and outreach programs was stated in a recent NOAA Program Review Report to Vice Admiral Lautenbacher, NOAA Administrator. "In order to accomplish its missions, NOAA needs a focused education and outreach strategy. In the long run, the ability to recruit our future workforce also depends upon an effective education and outreach strategy." (NOAA Program Review Team, 2002) The report noted that NOAA Education had been successfully centralized then decentralized. Suggestions to bring education and outreach into prominence within NOAA were suggested.

#### 4.3 Methods to remain "in touch" in K-12 Education

Even with the "good and bad" news from the field offices, all plan on continuing to reach the K-12 education community, even if on a limited basis. Many respondents gave their methods to remain "in touch" with the schools.

One popular way mentioned by several respondents to remain in touch was via the Internet. Even with recent changes in NWS policy regarding the appropriateness of ".net" and ".edu" hyperlinks on NWS Internet websites, which effectively eliminated at least six WFO web pages dedicated to education, several other offices have been developing programs, presentations and educational publications and made them available on their websites for use by teachers and students. WFO Taunton is developing a series of online publications called "Tools of the Meteorologist," modeled after informational "Fact Sheets" developed in the mid 1980s by the State University of New York (SUNY) in Brockport (SUNY Brockport, 1985). The staff at WFO Memphis, Tennessee, has produced several educational presentations and made them available for download to teachers through their website. Another exciting venture is being formulated at WFO Riverton, Wyoming. Their WCM is developing several presentations and lessons for a computer CD-ROM, which can easily be copied and given to teachers in their CWA.

Several other programs supported by local offices include:

! WFO Fairbanks, Alaska, participated in the "Partners in Science" program, sponsored by the National Science Foundation.

! The new WFO Key West, Florida, will include NOAA environmental displays, showing the wide variety of programs that NOAA offers, and plan on dedicating space for environmental science enrichment for visitors to the office.

! WFO Detroit, Michigan, noted that a lead forecaster has worked closely with the school district, the ninth largest in the United States, to bring weather to the schools.

! The WCM at WFO Honolulu is working with the Hawaii Department of Education to have hazards preparedness added to the K-12 curriculum.

! WFO San Diego, California, participates in the

Science Olympiad and student volunteerships, as well as development of a "career guide" for schools.

! WFO Spokane, Washington, has developed a weather hazards video to present to schools, emergency managers, elected officials, and many other groups. They have also developed a binder for school officials to help them develop action plans for weather related emergencies, similar to publications developed by WFOs in Sterling, Virginia and Taunton for school districts in their CWAs.

! WFO Green Bay, Wisconsin, staffs a yearly booth at the Experimental Aviation Association KidVenture, which attracts thousands of participants with hands-on, educational and fun aviation based demonstrations and presentations.

! WFO Midland, Texas, is in the process of building a "tornado machine" at the office to further enhance students' visits to the WFO. They also participate in a program called "Kids College" at a local college.

! WFOs in Wilmington, Ohio and Grand Junction, Colorado, both participate in poster contests for students. Wilmington participates in a statewide contest for Grades 1 to 6, while Grand Junction's contest covers their CWA for 5th grade students. Winners are announced during severe weather awareness week.

! WFO Taunton participated in "Wild Weather Weekend" at the Museum of Science in Boston. Students spent the weekend learning about weather, using new equipment at the Museum, as well as presentations and demonstrations run by WFO staff.

! Weather conferences are run by several WFOs geared toward a wide range of customers, including weather enthusiasts, teachers, and weather professionals (including the media), just to name a few.

More detailed graphics of the survey results for each region will be made available on the NWS Taunton Internet website, <http://www.erh.noaa.gov/er/box>. Under the Descriptive section of the main page, a hyperlink is available for "Papers and Studies."

## 5. SUMMARY

The survey results and comments received from the respondents show the strong commitment of NWS Weather Forecast Offices to K-12 education and outreach programs throughout the country. Even with recent changes in office policy and the tragic events of September 11, 2001, that caused changes due to security concerns, NWS WFOs remain steadfast in continuing their efforts in the K-12 education arena, even if there is a reduction in the amount of time they are able to commit to them. Efforts can be done while meteorologists remain in their offices, either via the Internet, on computer CD-ROM, or on videotape. As stated by one respondent in Southern Region, "I think that outreach activities focused on our youth are vital to the future success of the National Weather Service. If they grow up with the National Weather Service, they will stick with us in the future."

## 6. ACKNOWLEDGMENTS

The authors gratefully acknowledge the WCMs and their designated representatives from the 73 NWS WFOs that responded to our survey, and gave some insightful and honest comments about their feelings on NWS education and outreach programs. The authors would like to thank David Vallee, Science and Operations Office at NWS Taunton, for his review of the survey questions and this manuscript, along with his critical and informative suggestions for improvements. The authors would also like to thank Heather Hauser at the NWS Eastern Region Headquarters, Scientific Services Division, for her review and comments on this preprint.

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