Peak Performance

NWS Office of Climate, Water, and Weather Services
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Fall 2011

Performance Branch Leads Effort to Conduct National Weather Service 2011 Customer Satisfaction Survey

By Sal Romano and Doug Young,
NWS Headquarters

The 2011 Customer Satisfaction Survey undertaken by National Weather Service (NWS) Office of Climate, Water, and Weather Services (OCWWS) had 32,572 respondents. This NWS Customer Satisfaction Survey was conducted, via a link from the NWS web sites, from May 31, 2011 to June 23, 2011. The survey covered the following core areas: Hazardous Services; Routine Climate, Water and Weather Services, User Support Services; Customer Support Services; Dissemination Services; Outreach and Weather Education. There were four optional parts of this survey containing questions for specific NWS service areas: Climate Services, Fire Weather Services, Hydrologic Services, and Tsunami. The NWS will undertake similar Customer Satisfaction Surveys every year. The questions for the core areas will be similar so as to measure the amount of change in our customer satisfaction annually. However, the optional parts of next year's survey will change to include questions for similar NWS service areas that were included in the 2010 survey: Aviation Weather Services, Marine and Coastal Weather Services, and Routine Forecast and

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Performance Branch Leads Effort to Conduct National Weather Service 2011 Customer Satisfaction Survey – Continued from Page 1

Hazardous Weather Services. Questions contained in the optional parts of the survey will rotate annually between these two groups of NWS service areas. The NWS Performance Branch would be happy to receive your comments concerning the results of this 2011 survey and/or to receive suggested questions for next year's survey.

The NWS contracted with the Claes Fornell International (CFI) Group, as we did for the 2010 survey, to assist in the development and implementation. The CFI Group staff are experts in the science of customer satisfaction and use the American Customer Satisfaction Index (ACSI) methodology. The ACSI was created by CFI Group's founder, Claes Fornell, under the auspices of the University of Michigan. It is the only uniform measure of customer satisfaction in the U.S. economy and includes more than 200 companies and government agencies. CFI presented the results of the survey at NWSHQ, on Wednesday, August 10, 2011.

Key Survey Results

The overall NWS ACSI score resulting from this survey was 84—19 points higher than the overall federal government score of 65. This survey showed that dissemination services has the highest impact on satisfaction with the NWS. Dissemination services survey questions included: the perceived reliability of satellite and radar data available through NWS web sites, ease of locating and understanding information on the NWS Web pages, whether the information is current, whether the NWS Web page is the primary source of weather information, and any suggested improvements to any NWS Web page.

Another key finding was that the NWS is doing a good job with general customer service and more specific, decision support services. The recommended action was to communicate survey results to NWS employees and highlight both their importance and the great job they are doing.

The 2011 survey results (briefing slides and full report in PDF and Powerpoint), will be available on the OCWWS, Performance Management Web page at:

https://verification.nws.noaa.gov/content/pm/evaluation/program.aspx

Web links to results from previous NWS customer satisfaction surveys are also provided on that OCWWS, Performance Management Web page. In addition, it is expected that a subset of the full report will be posted to the same NWS Web pages that originally hosted the survey link.◄

The Importance of Uncertainty

The Juneau Alaska Flood, July 2011

By Tom Ainsworth, WFO Juneau, Alaska

On Wednesday, July 20, 2011 in Juneau, Alaska, the water level of the glacier-fed Mendenhall Lake and Mendenhall River was rising 1 foot every six hours. Crowds were gathering on bridges over the Mendenhall River awestruck by the raging, silt-colored river. The volume of water had increased by some 14,000 cfs over the course of two days. Community emergency responders had already evacuated a flooded neighborhood and closed a US Forest Service lake-front campground. Forecasters at WFO Juneau collaborated with the Alaska-Pacific River Forecast Center in Anchorage. When it was over, Mendenhall Lake and Mendenhall River crested at their *second highest* levels on record.

There was one problem—it wasn't raining. In fact, the entire month of July 2011 was drier than normal in Juneau. The Juneau Forecast Office, situated less than a mile from the lake and river, received 4.71 inches for the entire month, which is 84% of normal.

So what caused a near record flood? A Jokulhlaup (YO-kul-loip) is an Icelandic term for "glacier lake burst flood." A lake formed in a basin adjacent to the Mendenhall Glacier about two miles above its terminus. Melting glacier ice and summer precipitation filled the basin and eventually increased water pressure enough to allow the water trapped in the basin to drain out underneath the glacier and into the telemetered lake and down the winding, seven mile long river.

Jokulhlaups are common in southeast Alaska. In fact, they occur annually on several large coastal rivers that originate in the ice fields along the Alaska border with British Columbia. But a Jokulhlaup of this magnitude on the Mendenhall system has not occurred since telemetry was installed in the 1990s (and probably not for decades before that). Based on physical evidence gathered during a site survey the day the lake and river crested, the sub-glacial lake was as much as 200 feet deep and covered approximately 175 acres. An estimated 37 million cubic meters of water drained into the Mendenhall system **(Figure 1)**. And just for good measure, it appears a second, smaller Mendenhall Jokulhlaup occurred one month later on August 20.

It was suspected that the July flood in Juneau was caused by a glacial lake outburst flood from the outset. However, the location, and more importantly, the volume of the ice-marginal lake were unknown until the very end of the event. Uncertainty as to the exact source, potential magnitude, and duration of the flood was repeatedly communicated to response agencies and mentioned in public hydrologic statements. Interestingly enough, a post-event assessment revealed the community felt well served despite the large uncertainty.

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The Importance of Uncertainty – The Juneau Alaska Flood, July 2011– Continued from Page 3

Several valuable lessons emerged from the Mendenhall Jokulhlaup flood.

1. Established personal relationships between the Juneau WFO and a diverse range of community partners helped facilitate communication and trust throughout the flood event. Despite the number and diversity of parties involved—including campground hosts, university experts, city officials, helicopter pilots, and the media—the consistent message of uncertainty of the ultimate magnitude of the event led people to stay engaged. The diversity of inputs ultimately pinpointed the source of the flood water and the accurate prediction of when water levels would crest and recede.

2. Conveying uncertainty in the NWS hydrologic products was critical to emergency response agencies decision making. Uncertainty of the flood water source, how much water was coming, and how long water levels would continue rising prompted serious response actions across the community. Orderly evacuations were carried out early. The local electrical utility turned off underground power facilities before certain neighborhoods were impacted from flooding.

3. Follow up after a rare event is crucial in building rapport with the community. There was a high level of community curiosity after the Mendenhall Jokulhlaup. Emergency responders and the NWS conducted a "hot wash" review just a week after the flood to determine what response actions were most effective and where improvements could be made. In September, a public lecture on the event was held at the University of Alaska. Faculty, NWS, and City of Juneau personnel explained physical and dynamic characteristics of glaciers, factors that may affect the possibility of recurrence, and the type of hydrologic monitoring in place already and what (if any) additional monitoring could be done.

The Mendenhall Jokulhlaup events in July and August, 2011, provided an interesting examination of uncertainty. First of all, not all hazards are, or can be, predicted. And perhaps equally important, we were reminded that human response to announcements of caution and warning *varies* depending on a) the person's level of comfort with uncertainty and risk, and b) their trust in the source of information.

Figure 1: All Downhill: The Mendenhall Glacier, Lake, and River System in Juneau, AK.

(photo by Chip Kalvin)◄

Great Tornado Resources for Outreach and Education

By Brent MacAloney, NWS Headquarters

Storm Prediction Center (SPC) Warning Coordination Meteorologist (WCM) Greg Carbin created some great graphics that can be used in outreach and education events to hammer home the point that tornadoes do occur all over the United States. These graphics reside on the SPC website at:

http://www.spc.noaa.gov/wcm/

The first graphic **(Figure 1)** reveals "tornado hot spots" around the country by listing the annual number of tornadoes per state from 2001 – 2010. As one might expect, the mid Plains area of the United States has the most events, but there are some outliers, such as California, that one probably would not expect to see. Texas and Kansas are the leaders by far with an annual average of 142 and 116 tornado events respectively.

Now, compare that graphic to the next one **(Figure 2)**, which shows the same data, but over a 30-year period instead of a 10-year period. The trends are definitely similar, except that Kansas averages a more modest 78 tornadoes a year over the 30-year record as opposed to the astounding 116 tornadoes a year in the 10-year record. Is Kansas posing to take over the crown of "Tornado Capital" from Texas? Only time will tell.

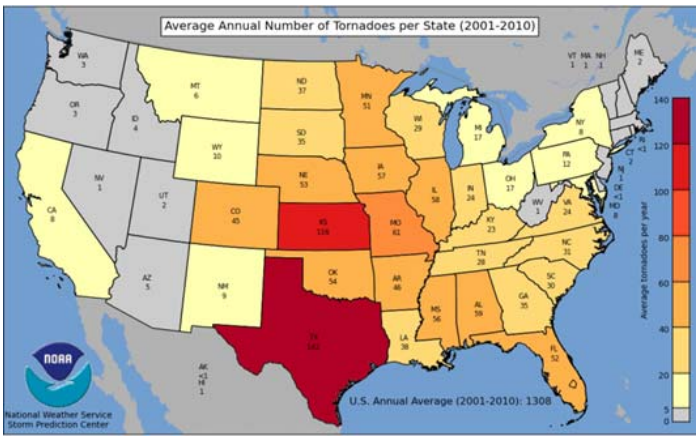

Figure 1: *Tornado hot spots* around the country, showing the annual number of tornadoes per state from 2001 – 2010.

Grab high resolution image here: http://www.spc.noaa.gov/wcm/ustormaps/2001-2010-states.png

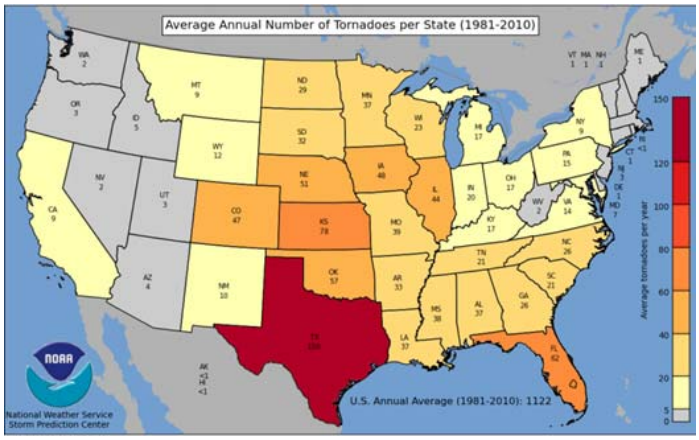

Figure 2: *Tornado hot spots* around the country, showing the annual number of tornadoes per state, over a 30 year period.

Grab high resolution image here: http://www.spc.noaa.gov/wcm/ustormaps/1981-2010-states.png

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Great Tornado Resources for Outreach and Education – Continued from Page 5

On this page, you will find a graphic **(Figure 3)** showing the number of tornado related fatalities each state had over the last 10 years (2001 – 2010). Even though Texas and Kansas take the lead in the average number of tornadoes every year, it seems as if Tennessee and Missouri have the dubious distinction of experiencing the deadliest tornadoes as shown in this graphic.

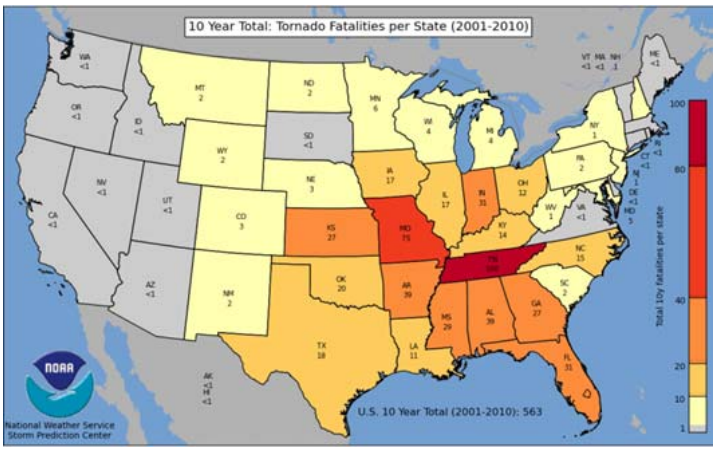

Figure 3: Graphic showing the number of tornado related fatalities each state had over the last 10 years (2001 – 2010).

Grab high resolution image here: http://www.spc.noaa.gov/wcm/ustormaps/2001-2010-fatals.png

These are just a few of the graphics on the SPC WCM webpage that are available for you to use. Other graphics, or items of interest on this page include:

- Annual average number of state tornado reports per 10k square miles over the 10-year period of 2001 – 2010
- All county-based tornado reports over the 59-year period of 1952 – 2010
- Tornado counts in the United States by month from 1950 – 2010
- Annual maps of tornados from 1950 – 2010
- Daily tornado counts and annual running trends
- SPC watch frequency maps
- GIS data sets of severe weather events

We hope you find some of these items useful, as you head into your springtime severe weather awareness campaigns.

Questions on any of these graphics can be directed to Greg Carbin, WCM at SPC, at: Gregory.Carbin@noaa.gov .◄

"Without continual growth and progress, such words as improvement, achievement, and success have no meaning."
Benjamin Franklin

Eastern Region Develops an Objective Method to Verify Mixed Precipitation Events (Maglaras Method)

By Rick Watling, Eastern Region Headquarters

There are times when freezing rain, sleet and snow all occur within a storm, yet none of the phenomena meet their individually established WSW criteria. When such situations occur, the question arises "Has a winter storm (versus winter weather) event occurred?"

In 2008, George Maglaras of WFO Albany, NY developed an objective method to answer this question. The partial contribution of each precipitation type towards its own warning threshold (in percent) is added to the other partial contributions; if they sum up to 100% or more, a winter storm event is deemed to have occurred.

The Eastern Region procedure is as follows:

1. Use 1/3 of your 12-hour snow warning threshold (rounded to the nearest 1 inch) as a proxy for the sleet warning threshold (or choose a threshold for your CWA using whatever method is found appropriate).
2. For each precipitation type (snow, sleet and freezing rain) determine the amount that fell as a percentage of the corresponding winter storm threshold for that type.
3. Add each of the percentages together; if they equal or exceed 100 percent, then a winter storm event has occurred.

Here's an example of how the method works:

1. Albany's 12 hour snow threshold is seven inches; 7/3 = 2.33, so 2 inches is used as the sleet warning threshold.
2. Snow component:
   a. Four inches of snow falls in 12 hours, and
   b. the 12-hour criteria is 7 inches, thus
   c. 57 percent of the snow criteria has been met.
3. Sleet component:
   a. One-half inch of sleet falls, and
   b. the proxy warning threshold for sleet is 2 inches, thus
   c. 25 percent of the sleet criteria has been met.
4. Ice component:
   a. Ice accretion at the same location is 0.25 inches, and
   b. the freezing rain criteria is 0.50 inches, thus
   c. 50 percent of the freezing rain criteria has been met.
5. Total:
   a. Adding these three percentages (57 + 25 + 50) results in a total of 132 percent of the various warning thresholds, combined.
   b. This event is classified as a winter storm event.

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Eastern Region Develops an Objective Method to Verify Mixed Precipitation Events – Continued from Page 7

The Maglaras Method of determining whether a winter storm event has occurred is optional, not mandatory, and is intended to be used on those rare occasions when simpler objective / subjective methods fail to deliver an answer to the question.

The method makes sense because while each individual phenomenon only creates advisory level impacts, the combined effect of all of them is worthy of a warning.

George reports that the method has worked well in the Albany area for the past two years. Nelson Vaz of WFO Upton, NY has also used the method to assist in Storm Data preparation. He reports that it helped him decide how to classify events for the mixed precipitation event that occurred in the New York City area on January 17, 2011.

Graphics (**Figures 1 and 2**) for the *example* are shown below:

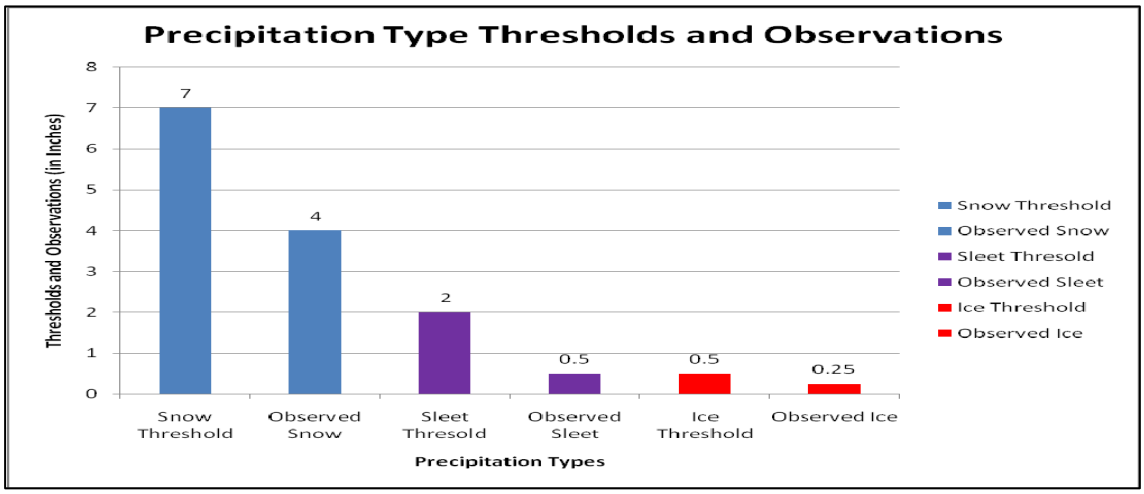

Figure 1: Example of the Maglaras Method, depicting *Precipitation Type Thresholds and Observations*.

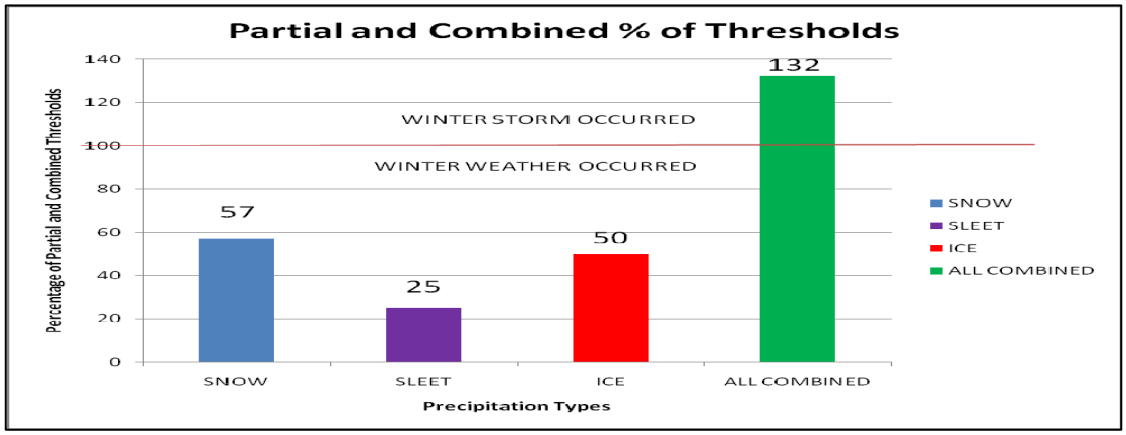

Figure 2: Example of the Maglaras Method, depicting *Partial and Combined % of Thresholds*.◀

Real Time Monitoring of Tsunamis

By Joel Curtis, WFO Juneau, Alaska

Working a shift in a WFO during a tsunami warning is certainly stressful. If you are the warning coordinator during the ongoing event, you can help to instill confidence in the centers' forecasts for emergency managers by monitoring the tsunami using the National Ocean Services (NOS) tide gauges.

During the March 3, 2011 Tohuku mega-earthquake and tsunami, the West Coast and Alaska Tsunami Warning Center (WC/ATWC) issued a "Tsunami Advisory" for the coast of Southeast Alaska. This forecast meant that the wave height would be 1 meter or less, and arrival times were issued for various towns. It was surreal to be watching the devastation in Japan live while giving direct decision support to emergency managers.

By showing the arrival, and wave heights from distant tide gauges to the engaged emergency managers, these partners were able to view for themselves that the predicted wave heights and arrival times were on track. This evidence heightened their confidence, and in turn, was a great aid for them to make decisions for their respective communities. Although the method of sharing this information was crude—either directing the EM to the website, or describing the observation over the phone—the presentation of the progress of the waves and the accuracy of the forecasts was critical to confident decision making.

Note: First the drawback occurring at high tide, then the arrival of the first wave on the Obs-Pred line **(Figure 1)**. The WC/ATWC forecast was very accurate for both a wave less than 1 meter and the arrival time. The Gulf of Alaska sloshed for days!

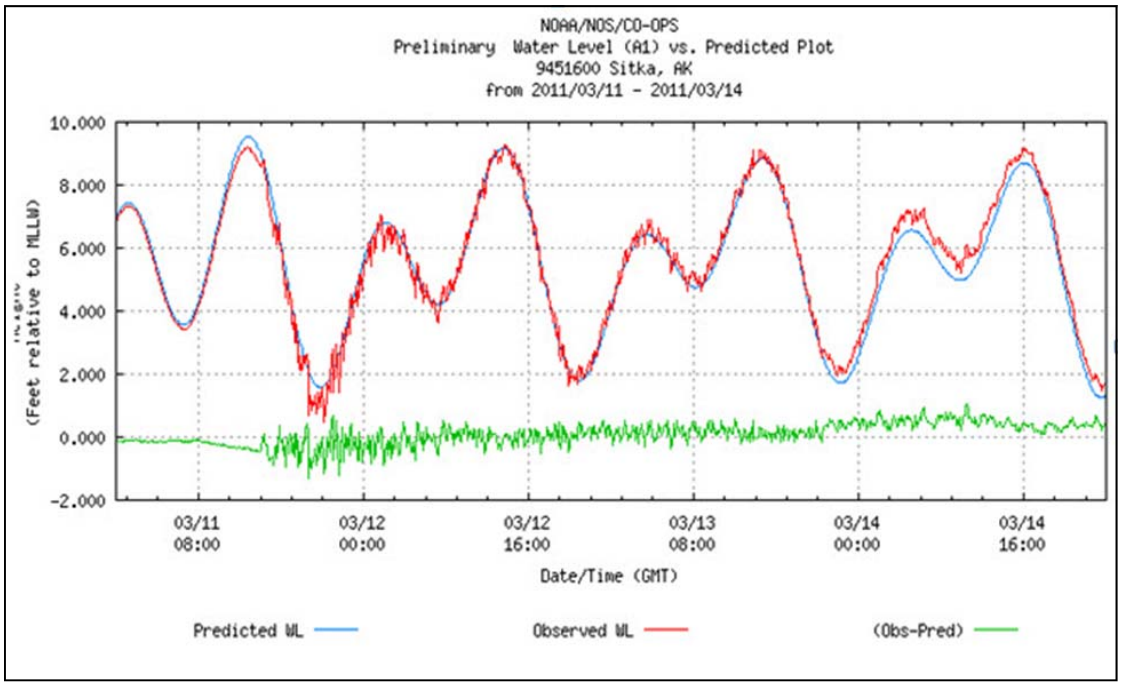

Figure 1: Graphic depicting the predicted and observed water levels and arrival time of waves.◀

Fly...with Ointment

Beth McNulty, NWS Headquarters

First a quick quiz:

QMS?

1) the latest acronym of many

2) a performance management tool

3) stands for "Quality Management System," which is a method to ensure the user is considered when determining how forecasts and products perform

The entire QMS program came about as a response to an International Civil Aviation Organization (ICAO) audit of the Federal Aviation Administration's (FAA) role as meteorological authority for the United States. QMS is a management tool for FAA and NWS management that summarizes performance measures already available through Stats-on-Demand reports. The QMS summary allows upper management to track how responsive NWS aviation products are to user needs. Part of the report includes user feedback on the products.

The NWS and FAA work together under the QMS umbrella to ensure all aviation weather products are reviewed for accuracy, timeliness, and effectiveness from the user viewpoint.

The first aviation product to move under the QMS umbrella is the Terminal Aerodrome Forecast (TAF). A QMS procedure signed in mid-September details the QMS TAF reports. The process uses existing Stats-on-Demand services, and focuses on quarterly reviews. The TAF QMS looks at ceiling, visibility, wind direction, and thunderstorms. The FAA QMS monitor, with input from a NWS counterpart, requests the Stats-on-Demand data and creates a graphic, spreadsheet based report for FAA management. The NWS QMS monitor prepares a similar report for NWS and provides it to the Aviation Services Branch and Performance Management Branch for review.◄

"Quality is never an accident; it is always the result of high intention, sincere effort, intelligent direction and skillful execution; it represents the wise choice of many alternatives."

William A. Foster
United States Marines
Medal of Honor Recipient, World War II

Service Assessment Program

By Sal Romano, NWS Headquarters

This has been a very busy year for NWS service assessments. As of this writing, there are three national service assessments in various stages of completion—one for tornado outbreaks, one for river flooding, and the last for Hurricane Irene.

1) Historic Tornado Outbreaks of April 2011

The Historic Tornado Outbreaks of April 2011 Service Assessment was started on Thursday, May 5, 2011 for the massive outbreak of 362 reported tornadoes, during April 25 – 28, 2011. The team's focus, in the body of the service assessment report was on locations most severely affected by the weather-related hazards on April 27, 2011. This encompassed Alabama, Arkansas, Georgia, Kentucky, Illinois, Mississippi, Missouri, and Tennessee. Two regional service assessments were included in the appendices of the service assessment report. One of these regional service assessments focused on the NWS Eastern Region Event Review of the tornado outbreaks on April 26, 2011. This encompassed North Carolina, South Carolina, and Virginia. The other regional service assessment focused on the St. Louis Metropolitan Area tornado event of April 22, 2011. A third regional service assessment has been completed for tornadoes affecting Joplin, Missouri on May 22, 2011. The Joplin Service Assessment was referenced in the Historic Tornado Outbreaks of April 2011 Service Assessment, but it was not contained within it as an appendix.

The team leaders of all four of these service assessments briefed the NWS Corporate Board on October 4, 2011. A final draft of the Historic Tornado Outbreaks of April 2011 Service Assessment is expected to be publicly released before the end of the month (November 2011). The Joplin Service Assessment has already been publicly released.

2) Spring 2011 Mississippi River Floods

Widespread flooding occurred across the lower Ohio and mid- and lower-Mississippi Valleys during the spring of 2011 due to a combination of runoff from record snowmelt across the northern Plains and unprecedented widespread heavy rainfall in late April and in early May across portions of the central Mississippi River Basin and Ohio River Basin. Extreme precipitation amounts were recorded in some tributary basins, which received more than 20 inches (700-1000% above normal precipitation) within a two-week period.

As water drained into the Ohio and Mississippi Rivers, channels already full from a wet spring were unable to handle the

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Service Assessment Program – Continued from Page 11

additional water. Record flooding was experienced in lower portions of the Ohio River and associated tributaries as well as along the mainstem of the Mississippi from the confluence of the of the Ohio and Mississippi Rivers at Cairo, Illinois downstream to the Gulf of Mexico.

In the Lower Mississippi RFC's hydrologic service area alone, record levels were equaled or newly established at 16 NWS river forecast locations, with 28 sites experiencing major flooding, 25 sites experiencing moderate flooding, and 33 sites experiencing at least minor flooding. Many NWS WFOs were involved in long-term significant hydrologic operations, with five offices (i.e., Paducah, KY; Memphis, TN; Jackson, MS; Lake Charles, LA; and Slidell, LA) particularly impacted.

A draft of this service assessment document has been sent to the NWSHQ's Performance Branch for review.

3) Hurricane Irene

On Saturday, August 20, 2011 Hurricane Irene was a tropical wave east of the Lesser Antilles. Irene affected the U.S Virgin Islands and Puerto first as a tropical storm and then strengthened into a Category 1 hurricane late Sunday night and on Monday morning, August 22. The storm continued to strengthen into a Category 2 hurricane and then began to weaken before making landfall near Cape Lookout, NC on the morning of August 27, 2011 as a Category 1 hurricane. After moving across the Outer Banks of North Carolina and extreme Southeastern Virginia, Irene traveled off the Eastern Seaboard until reaching Little Egg Inlet on the New Jersey Coast where it made landfall early Sunday morning, still as a Category 1 hurricane. By 9 a.m., Sunday morning, Irene, now a tropical storm with 65 mph winds, was centered over New York City. Irene continued to travel northeast through New England and reached the Canadian border as an extra-tropical cyclone, with sustained winds of 50 mph, around Midnight Sunday. In addition to producing strong, damaging winds along its path, Irene dropped copious amounts of rain, and produced damaging storm surges.

The assessment team is focusing on those locations most severely affected by the weather-related impacts of Irene. These include the U.S. Virgin Islands, Puerto Rico, and North Carolina to southeastern Canada. The team is currently working on a draft of the service assessment document.◀

Contributors to this Fall 2011 Issue include . . .

Tom Ainsworth
Meteorologist in Charge
WFO Juneau, Alaska
Tom.Ainsworth@noaa.gov

Joel Curtis
Warning Coordination Meteorologist
WFO Juneau, Alaska
Joel.Curtis@noaa.gov

Brent MacAloney
Performance Branch, NWS Headquarters
Verification
Brent.Macaloney@noaa.gov

Beth McNulty
Performance Branch, NWS Headquarters
Aviation Performance and Verification
Beth.Mcnulty@noaa.gov

Sal Romano
Performance Branch, NWS Headquarters
Service Assessment and Evaluation
Salvatore.Romano@noaa.gov

Freda Walters, Co-Editor and Designer
Performance Branch, NWS Headquarters
Service Assessment and Evaluation
Alfreda.Walters@noaa.gov

Rick Watling
Eastern Region Headquarters
Meteorological Services Division
Richard.Watling@noaa.gov

Doug Young, Editor
Performance Branch Chief
NWS Headquarters
Douglas.Young@noaa.gov

Web Links

Stats on Demand

https://verification.nws.noaa.gov

NDFD Verification:

https://bestpractices.nws.noaa.gov/contents/ndfd-stats/verification/

(National Verification)

https://bestpractices.nws.noaa.gov/contents/ndfd-stats/wfosummary/

(WFO Verification)

Real-Time Forecast System:

http://rtvs.noaa.gov/

Please consider contributing to our next edition:

Articles Due : Tuesday, December 20 , 2011