Information Services and Flood Warning Program Notes

Kevin Stewart, PE, Program Manager

The Lower North Fork Fire in Jefferson County destroyed 23 homes and caused $11 million in damages. (The Denver Post | Helen H. Richardson)

Ten years ago once familiar names like Missionary Ridge, Coal Seam, and Hayman (Colorado's largest recorded wildfire) were headline news items that prompted Colorado's governor to tell reporters, ''It looks as if all of Colorado is burning.'' This past year—2012—was reminiscent of that terrible 2002 wildfire season when two Front Range wildfires, High Park in Larimer County and Waldo Canyon near Colorado Springs, forced the evacuation of thousands and respectively destroyed 259 and 345 homes. Both of these events surpassed the property losses experienced in Boulder County's 2010 Labor Day blaze known as the Fourmile Canyon Fire, which until this past year was considered Colorado's most costly wildfire. Closer to Denver three lives were tragically lost in Jefferson County in March in the Lower North Fork Fire that also claimed 23 homes. Another ominous-looking wildfire near Boulder in June, the Flagstaff Fire, seriously threatened nearby residents but fortunately, no homes were lost due to the rapid response of firefighters and support personnel.

The connection between wildfires and floods is generally well accepted with regard to the heightened potential for mud/rock/debris slides and the increased flash flood threat due to the absence of vegetative cover previously offered by a healthy forest; the transformation of a once deep forest duff layer to ash; and in some extremely high temperature burns, the creation of hydrophobic soil conditions. However, not all fires are created equal and consequently, knowing precisely which rainstorms pose real flash flood danger remains a challenge for forecasters as well as emergency managers. The District continues to grow in its understanding of this phenomenon and in 2012, implemented some more proactive ways to predict and detect the onset of flash floods. This experience and other accounts from the 2012 flood season are highlighted in this article.

Information services provided by the District rely heavily on a strong IT foundation. Derrick Schauer has made that happen and continues to serve as the District's IT master, implementing equipment updates, new operating systems and software applications, and website enhancements. System security and disaster recovery remain a priority for Derrick as we roll into 2013. Be sure to visit www.udfcd.org to see Derrick's handiwork and watch for future changes.

Julia Bailey has been is the District's Information Services Engineer since 2010. Accessibility of District publications and other information via the Internet are among Julia's talents and responsibilities. She also oversees District GIS activities and facilitates staff trainings. Julia is currently working very closely with Amelia in the front office on developing new and better ways of maintaining and accessing official District records. Some useful changes to the EDM (Electronic Data Management) mapping interface are also underway. Be sure to read Julia's related article to see what lies ahead.

Jeremy Deischer is one of the District's gifted student interns who began working with the IS/FWP in 2012 and was instrumental in analyzing the ALERT system streamflow data to determine weekly, annual and record peaks (see http://www.udfcd.org/FWP/ALERT/wl/). He also became our executive producer for UD-Tube flood videos. Jeremy is a civil engineering graduate student at the University of Colorado at Denver.

2012 Flood Season Recap

Like the wildfire experience of 2012, the corresponding flood season also felt very similar to the notorious 2002 drought with a near record-low number of threat days (see table), high summer temperatures, and precipitation totals

26 days/25 periods with flood potential in 2012

April	26	1
May	5, 19	2
June	2, 6-7, 7-8, 15, 16, 27 Note: Total of six time periods over 7 days	7
July	5, 6, 7, 8, 9, 16, 24, 25, 27, 29, 30, 31	12
August	1, 2, 23	3
Sept	12	1

Red dates are days when rainfall measured by automated gages exceeded alarm thresholds. Yellow highlighted dates indicate that heavy rainfall measurements only affected areas outside the District's main area of concern, i.e. Hayman Burn Area in Douglas and Jefferson Counties, and the St. Vrain Creek basin in northern Boulder County. Blue boxes designate NWS flash flood watches that affected the District and red boxes designate flash flood warnings.

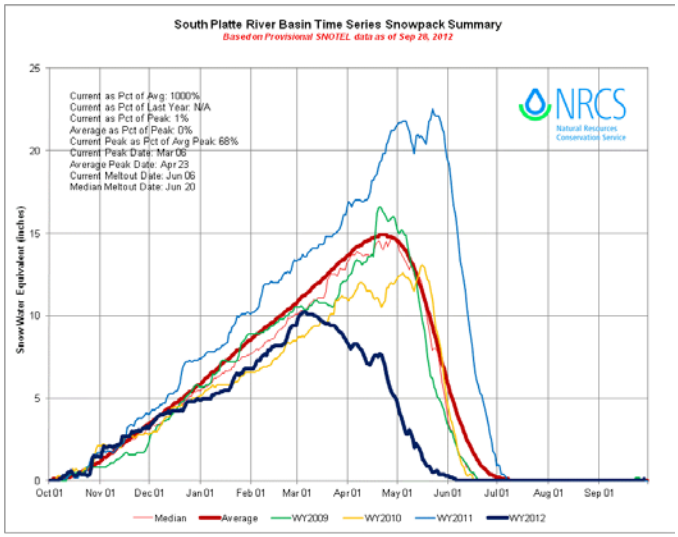
running well below average. The late evening storm of June 6-7 in Arapahoe, Douglas and Jefferson Counties was the most notable of 2012; and a much smaller event on July 30 did raise a few eyebrows when another surge of water occurred on Fourmile Creek and Fourmile Canyon Creek in Boulder County due to runoff from the Fourmile Burn Area.

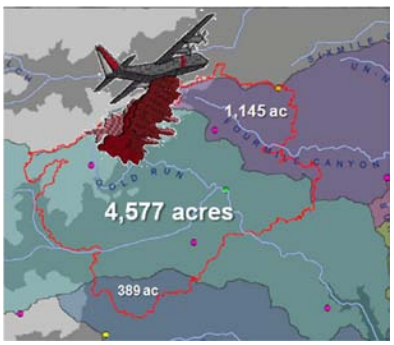
Heavy rainfall activity exceeded ALERT System alarm thresholds on only 13 days in 2012 between April 15 and September 15 compared to 34 days the prior year. Specific alarm dates are shown in red in the table above. Rare post flood season rainfall rate alarms (not shown in the table) were also logged for 3 consecutive days in late September.

Twenty-four hour measured rainfall totals from the ALERT/CoCoRaHS combined dataset exceeded 3 inches on four days in 2012 (June 6; July 7, 9 & 30). Only two other days (July 6 & 8) had 24-hour rain totals between from 2 to 3 inches. A storm summary table and corresponding maps are available for every day identified as having flash flood potential. Alarm maps and tables were newly added this year to show where and when various ALERT System rainfall rate thresholds were exceeded.

The 2012 Snowpack

In stark contrast to the prior year's notably high and long-lasting mountain runoff, 2012 was uneventful for the Denver area as shown on the graph below.

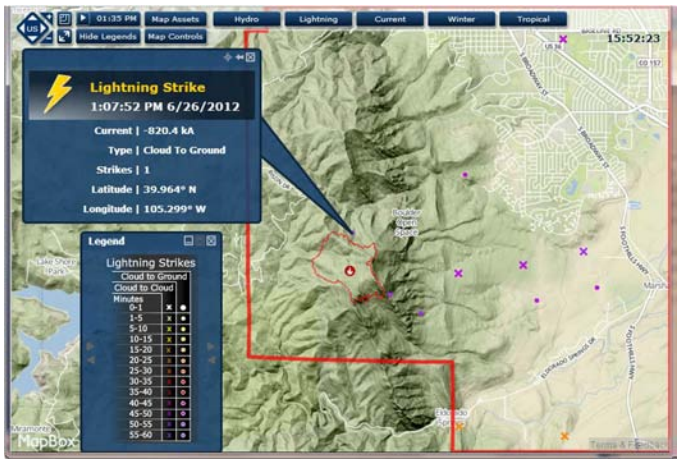




SPECIAL REPORT: The Fourmile Burn Area Flood Threat Two Years Later

With the July 13 flash flood experience now behind us (see 2011 *Flood Hazard News*), Boulder County's first responders, emergency managers, and flood forecasters all seem well-prepared to face future threats. The Fourmile community and their neighbors have also taken significant steps to prepare for a repeat performance and other possibilities. While county officials, mountain fire districts and other support agencies deserve much credit for implementing mitigation measures, improving early warning systems and educating the citizens at highest risk, another highly motivated advocacy group—the InterMountain Alliance—merits special recognition. The IMA has played a huge part in helping the Fourmile community and other mountain towns in Boulder County prepare for the next disaster, be it fire, flood or other misfortune, and to education people on how to keep safe and accept personal responsibility when emergency situations arise. Be sure to read the article by Rebecca Lawrence in this issue of *Flood Hazard News* to learn about what the IMA has accomplished.

Prior to the 2012 flood season the District upgraded its lightning detection capabilities to assist with storm tracking and recognizing storm intensity with respect to heavy rainfall potentials. This new technology was also able to estimate strike coordinates and display archived data. Soon after the March 26 Lower North Fork Fire in Jefferson County, the District shared this capability with both Jefferson and Boulder Counties with the hope the wildfire suppression activities could also benefit. Subsequently, the Boulder Office of Emergency Management acquired their custom designed web-based application and informed State OEM officials and the governor's office of this action. News about this capability spread very quickly as the High Park and Waldo Canyon fires were raging. It is likely that many other Colorado communities have by now adapted similar tools.



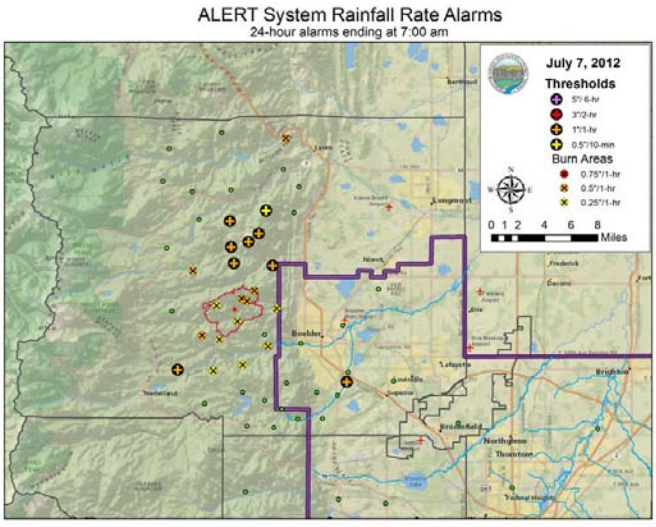
The 2012 flood season had an extremely quiet start for the entire District, but this was particularly true with respect to the Fourmile Burn Area where officials stood ready for more flooding from relatively small rainstorms. April, May

and June passed without incident in Boulder County and then the summer monsoon made its appearance the day after July 4th with a string of five consecutive threat days.

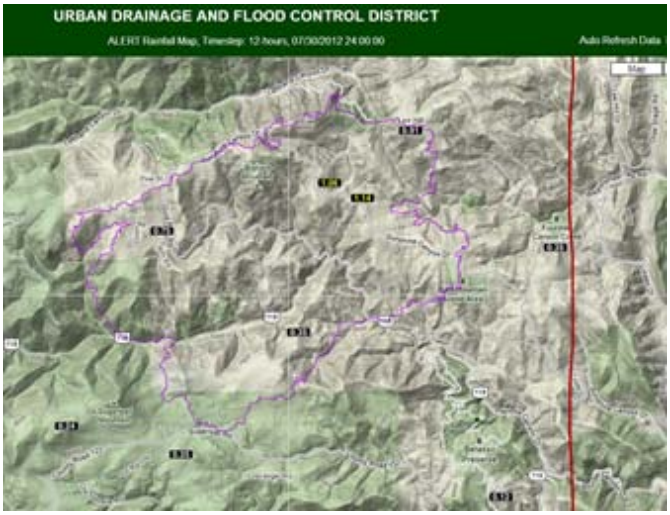
On Thursday, **July 5**, the NWS issued its first flash flood warning of the season for the FMBA at 4:17 PM. Ten-minute rainfall intensities of 3.5 inches/hour were measured over the burn area with rain totals approaching 1-inch. Fourmile Creek rose 1.3 feet at the Salina gage, peaking at 5 PM. Only minor flooding was reported from this event with a mudslide forcing the closure of Fourmile Canyon Drive (see UD-Tube news video).

The next day, **July 6**, was a repeat performance with another FMBA-only flash flood warning being issued at 9:06 PM. While rain totals this day exceeded 1-inch, the rainfall rates were much less than the preceding day (maximum 10-minute intensities < 1 inch/hour). Many low threshold rain alarms occurred within a 5-mile radius of the FMBA, but no flooding was reported.

Saturday, **July 7**, produced the greatest flooding threat of the 5-day period. Runoff from rainfall (not snowmelt) caused Boulder Creek to experience its highest peak flow rates of the year with flows through the City of Boulder rising from about 200 cfs to over 650 cfs by 6:30 PM causing streamside trails to overtop. Earlier the NWS issued a flash flood warning at 3:41 PM for the Nederland area and another warning at 4:53 PM for the FMBA, although no noteworthy flooding happened there. A 3.19-inch measurement was reported by the St. Antons rain gage northeast of Nederland while gauges in the FMBA once again approached the 1" mark, with the Lee Hill gauge reporting the highest total of 1.06". Peak 10-minute intensities in the FMBA were less than 1.7" per hour. Many rainfall alarms were triggered by this close-call event.

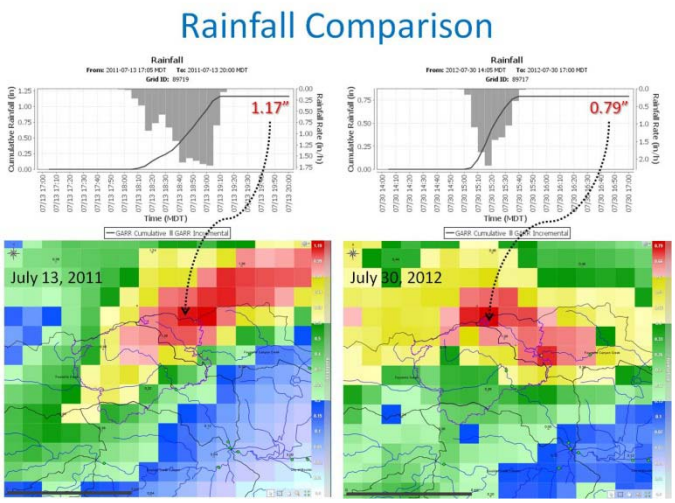


By Sunday, **July 8**, the forecast heavy rain threat was more focused on the plains, prompting the NWS to issue an area-wide flash flood watch beginning at 11 AM. The City of Boulder was the best target this day, thus giving the mountain communities a break from the past 3 days. One CoCoRaHS observer in Boulder recorded a 24-hour rainfall amount of 2.15", but no serious flood problems were reported. The next day, **July 9**, the heavy rain threat moved to south out of Boulder County beginning a week-long dry spell. On Monday, **July 16**, an uneventful short-lived intense thunderstorm passed over the FMBA prompting the NWS to issue another flash flood warning for just the burn area at 4:34 PM. Measured rainfall totals were under 0.6"



After a 2-week hiatus another relatively small rainstorm (see map above) produced the largest runoff of the year from the FMBA. This event occurred on Monday, **July 30**, between 3 and 4 PM, once again prompting the NWS to issue a FMBA-only flash flood warning at 3:27 PM. The rainfall totals were about the same as earlier events, but the rainfall intensities were significantly higher. Peak 10-minute intensities (>5"/hr) were more than twice as high as the storms in early July. Boulder's OEM Director, Mike Chard, requested flood forecasting assistance from District staff at 3:23 PM. The real-time hydromodels that were calibrated after the July 13, 2011 flash flood proved valuable in making accurate flood predictions. Once this information was communicated to EOC officials, field personnel were sent to monitor the situation well ahead of the flooding enabling Boulder County Sheriff's Department and Open Space officials to close public access to trails and capture a very nice video (use Chrome browser of flooding along the Anne U. White trail on Fourmile Canyon Creek.

Post flood season analysis was completed by Vieux, Inc. of Norman, Oklahoma at the request of the District. They were asked to compare hydromodel results from the July 13, 2011 event to July 30, 2012, and to evaluate the potential for increasing forecast lead times by using radar-derived 60-minute future rainfall estimates as opposed to real-time estimates. Initial findings suggest that an additional 40 minutes of lead time is possible depending on the availability of radar data for an approaching storm. For storms that



essentially form over the FMBA like the July 30 event, the additional lead time from QPF (Quantitative Precipitation Forecast) radar would be far less. Click here to read the Vieux report.

Vegetative recovery in the FMBA appears to be progressing well-ahead of expectations as compared to 2002-Hayman and 1996-Buffalo Creek according to paleoflood expert Bob Jarrett, USGS Scientist Emeritus retired. This is certainly good news for the affected residents, but Bob also cautions that it is still a bit too early to let our guard down completely.

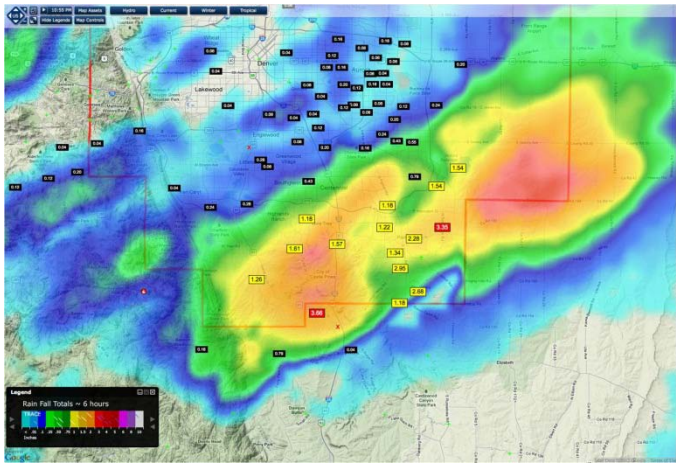
One final note—the District, the Colorado Water Conservation Board, the Boulder Office of Emergency Management, and Boulder County provided funding for a video website entitled: "Building Resilient Communities in the Wildland Interface." This project examines recent Front Range wildland fires and uses the 2010 Fourmile Fire in Boulder County as a case study of risk preparedness, response and recovery. Issues like wildfire and flash flood risk and public water supply are reviewed as well as agency coordination, recovery management, community engagement, and mitigation efforts for specific risks. The website will be released for public viewing soon. The District will post a link from our Flood Safety webpage.

Noteworthy Events Elsewhere in the District

In a gallant attempt to make up for an extremely dry spring, a late evening storm arrived on D-Day, **June 6**, and carried on during the early AM hours of Thursday, **June 7**. This storm primarily affected Jefferson, Douglas and Arapahoe Counties; and to a lesser degree Denver. It was clearly the District's biggest event of the year with lots of hail, a tornado warning for Jefferson County and record flooding for the Town of Parker. Five-inch precipitation totals were reported in the Castle Pines area of Douglas County. Tallman Gulch in Parker produced record flooding and the highest estimated flow rates in terms of flood frequency.

High water impacted the City of Aurora in the Piney Creek and Sand Creek basins. Many ALERT gages experienced their annual peaks from this event. Leonard Rice Engineers prepared a report of the flood damages, conducted high water surveys and estimated flood peaks at many locations at the District's request. Click here to view this report.

The **June 7-8** event was also the first NWS flash flood warning that affected the District in 2012. The initial warning was issued at 7:16 PM for NW Elbert County, NE Douglas County and western Arapahoe County. A maximum 5-minute rainfall intensity of 7.5" per hour was reported by the ALERT weather station at Salisbury Park in Parker with 0.63 inches falling in that short time period ending at 8:43 PM. The following map shows where the heaviest rainfall occurred:



Monday, **July 9**, was the fifth consecutive day of monsoon rainfall. On this day an unusual morning event occurred in Denver prompting F2P2 forecasters to issue a low impact flooding message. The peak flow measured on Cherry Creek at Champa Street at 10:50 AM was the annual high water event of the year at that location.

Wednesday, **September 12**, was the last hurray for the 2012 F2P2 with Denver being issued a special "Cherry Creek Trail Flood Advisory" for low impact flooding due to a general wide-spread low-intensity rainfall over the region.

For more Message Day information on rainfall amounts, alarms, and areas impacted visit the Flash Flood Prediction Program 2012 Season Summary webpage. Streamflow and rainfall intensity summaries are also available online.

Early Flood Prediction and Notification Services

Meteorological support was provided by Genesis Weather Solutions in partnership with Skyview Weather for the sixth consecutive year. This program provides District local governments with early predictions of potential and imminent flood threats along with a variety of related forecast products like daily heavy precipitation outlooks, area-specific quantitative precipitation forecasts (QPF), and storm track maps. Project manager and chief meteorologist

Bryan Rappolt completed his 19th year of service. Bryan's Skyview partners included lead forecaster Brad Simmons, met-techs Jeffrey Auger, Chris Brinson, and Jorel Torres, with Skyview's President Tim Tonge providing backup from his business location and forecast center in Castle Rock. This District program was established after the deadly 1976 Big Thompson Canyon flash flood and has served the Denver/Boulder metropolitan area for the past 34 years.

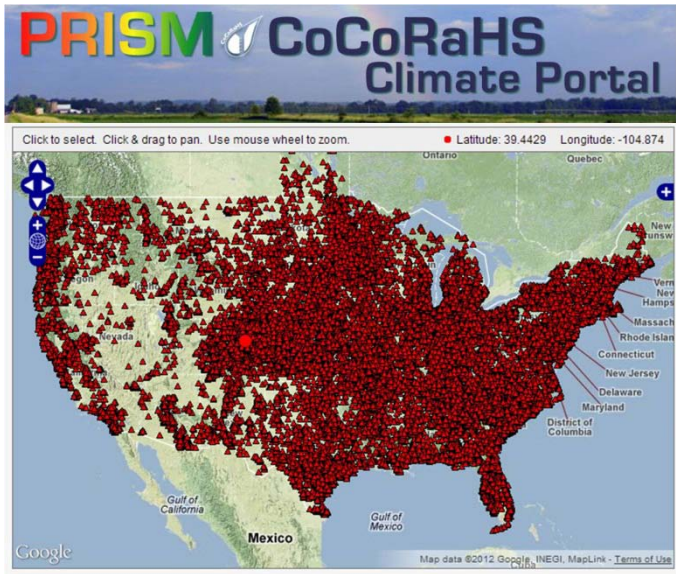
The Flash Flood Prediction Program, a.k.a. F2P2, operates from April 15 through September 15 in close partnership with the National Weather Service Forecast Office in Boulder. The F2P2 forecasts and early notifications focus primarily on heavy rain threats over approximately 3,000 square miles covering the District and watersheds upstream. During the mountain snowmelt runoff season from late spring to early summer, local governments are also kept advised concerning stream conditions and how those high flows increase the flood potential when heavy rain threatens. F2P2 notifications concerning high reservoir releases by the Tri-Lakes Office of the U.S. Army Corps of Engineers from Chatfield, Cherry Creek and Bear Creek dams are also disseminated to affected jurisdictions downstream.

F2P2 products and services were evaluated for the sixth consecutive year by Judy Peratt of JP Consulting, located in Windsor, Colorado. Judy was the director of emergency management in Jefferson County for many years. Her face-to-face interview process has helped the District learn more about what works well and what could use improvement from an end-user perspective. The District greatly appreciates the valuable time taken by all the participating local officials representing emergency management, communications, public works and emergency services.

Upon completion of Judy's survey, the program changes made for 2012 were declared a success. All standard message forms were revised and sectioned to more clearly communicate where, when, and what predicted flood threats means. Use of plain language was made a priority with terms like "Red Flood Alert" being replaced by "Low Impact Flooding." While more individualized training for 911 dispatchers is desired, the F2P2 message products have certainly set a new high standard with only very minor formatting changes being suggested for 2013. A complete archive of these and other F2P2 products can be found at f2p2.udfcd.org.

CoCoRaHS Update

The Community Collaborative Rain, Hail & Snow Network continues to grow in popularity national-wide and now has over 10,000 volunteers in all 50 states and Canada. New to CoCoRaHS in 2012 is a unique relationship with the PRISM Climate Portal developed by Oregon State University. This exclusive feature is only available to CoCoRaHS participants. It helps connect daily precipitation measurements (*weather*) to seasonal patterns, long term averages and year to year variations (*climate*). This portal provides access to estimates of "normal" precipitation for any location in the contiguous United States. PRISM also provides estimates of total precipitation for each month and year since 1895. So if you are not currently a volunteer, this may motivate you to sign up today.

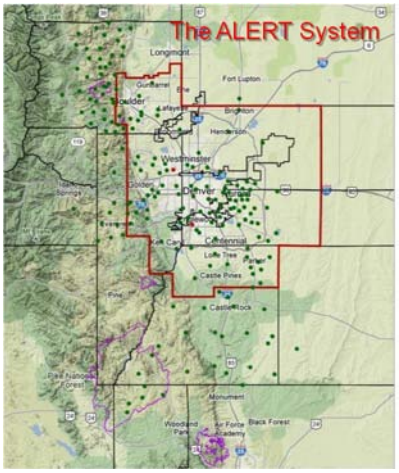


Click here to view a series of slides illustrating how PRISM can be used at a specific CoCoRaHS station (red star above) in Douglas County by putting into context the rainfall event of June 6, 2012.

The District has been a long-term sponsor of CoCoRaHS and routinely makes use of this valuable resource. The past 6 years of storm summary maps are good examples. See also the ALERT/CoCoRaHS display feature at the District's ALERT Rainfall Map webpage. And finally, be sure to visit www.cocorahs.org to become a CoCoRaHS volunteer.

EMWIN-Denver Update

The Emergency Managers Weather Information Network continues to provide 22 northeast Colorado communities with timely NWS weather warnings and advisories. EMWIN-Denver's steering committee meets quarterly under the leadership of Rick Newman, Deputy Director of Emergency Management for Jefferson County. Julia Bailey and Kevin Stewart of UDFCD's staff are members of the steering committee. Adams County hosts the satellite downlink equipment, which is linked to a message dissemination server hosted by the District.

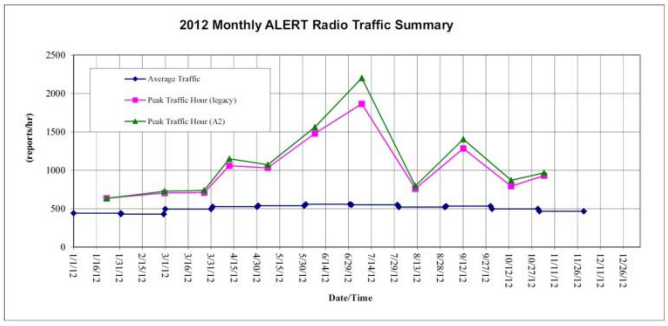


UDFCD also supports the email subscription service for this regional system.

ALERT System News

The ALERT system currently collects data from 225 gaging stations that host 194 rain gages, 107 stream gages and 26 full weather stations. The gaging network experienced some growth in 2012. On the District's south side, the Douglas County Public Works Department installed two new stations in the upper Cherry Creek watershed above Castlewood Canyon State Park at the Colorado Highway 83 crossings of Antelope Creek and West Cherry Creek. Both stations measure water levels of their respective streams. The West Cherry Creek station also hosts a suite of weather sensors including a rain gage. In Boulder County the District installed two new rain gages at Lee Hill and Whispering Pines in the Fourmile Burn Area to further enhance early flood detection for this high risk area.

OneRain and Water & Earth Technologies (WET) provided preventative maintenance and repair services for 2012, enabling the District to successfully process a high volume of ALERT data reports. For example, the storm activity on July 7 caused a peak 10-minute traffic rate that exceeded 2,946 reports per hour (RPH) between 5:07 and 5:17 PM. Another noteworthy event was a 1,000-plus RPH rate that was sustained for more than 6 hours between 4 and 11am on 9/12. The figure below shows the peak and average hourly ALERT radio traffic for the year. Annual reports and other documents concerning 2012 maintenance activities can be downloaded from the ALERT_Reports directory.



In 2012 the District made some significant changes with regard to how ALERT base stations will be managed in the future with the transition from NovaStar4 to NovaStar5 nearing its final stages. Most of the 12-year-old NS4 platforms previously supported by the District have already been discontinued. These include the base stations located in Boulder, Denver and Lakewood. The new NS-5 platforms make Internet data communications the preferred delivery method, thus eliminating the need to maintain a large number of radio receivers and data collection points. When completed, the District will maintain only three radio reception stations with their corresponding data collection platforms. For critical facility end-users like local government EOC's and dispatch centers, redundant Internet links can be established using either cellular or satellite communications.

Two different types of servers are currently supported. The public website that can be accessed from the District's homepage is a Contrail Web platform developed and maintained by OneRain. Two redundant NS5 platforms were developed primarily for public safety agency use. These platforms are maintained by WET. Both base station types ingest data from satellite-monitored stream gages operated by the USGS. In 2013 we may also include data collected by the Colorado Division of Water Resources (DWR), or at least provide convenient links to this data from our websites.

Text/email messaging continues to be a popular means for receiving alarm notifications from the ALERT System. The USGS also provides a convenient way to receive alarms from their stations known as WaterAlert. Anyone interested in receiving USGS stream level alerts should sign up at http://water.usgs.gov/wateralert.

The District believes it is well-positioned to continue providing quality information services to all of our partners and the public. Your ideas on how we might better serve are always welcome.

Resources

A complete archive of daily forecasts, flood threat notifications, storm track predictions, storm summary maps, and other products can be found at f2p2.udfcd.org. See www.udfcd.org/FWP/ALERT/wl/annual_peaks.xlsx for an up-to-date table of annual and record water level/streamflow peaks measured by the ALERT system. For detailed operation and maintenance reports visit:

www.udfcd.org/FWP/ALERT_Reports/ and
www.udfcd.org/FWP/F2P2_Reports/

Like The Phoenix Rising Out of the Ashes

By Rebecca Lawrence, InterMountain Alliance, Ward, CO

On Labor Day Monday, September 6th, 2010, a wildfire broke out in the rural Fourmile Canyon area west of Boulder, Colorado. Dry conditions combined with excessively high winds fanning the flames, led to an explosive situation. By the time total containment was reached 6,200 acres had been consumed, 168 homes were completely destroyed and thousands of residents had been displaced/evacuated. Fortunately no lives were lost. This unexpected Class 1 Federal Disaster has taught the rural Rocky Mountain residents a lot about emergency preparedness.

In March of 2011 mayors and citizen leaders from six surrounding mountain communities; Nederland, Gold Hill, Ward, Jamestown, Allenspark and Lyons, held the first meeting of the InterMountain Alliance (IMA). Unincorporated historic Gold Hill (population-230, altitude- 8,300 feet) lost over 20 homes and had been directly threated by a 100' wall of flame. Because of this, the IMA convened to learn lessons from the leaders in Gold Hill about their emergency response; what was in place prior to the fire, what was put in place during the fire, and what was being created after the fire. The IMA participants began to review and share their community preparedness plans.

The first step was to meet with local fire chiefs and law enforcement officials to present the desire to create volunteer action groups that would complement and support their efforts. It needed to be done in a way that would insure public safety and allow them to focus on the situation at hand. One chief shared a scenario in which he wished he could have called someone when one of his volunteer fire fighters was worried about his dog, who been left behind in his home and was potentially in harm's way. The chief wanted someone in his community he could contact to evacuate the dog so his firefighter could continue to focus on his own safety and the front line of the fire. This example led the group to look at the many ways community members could assist and simultaneously maintain public safety. The following emerged:

Basic Preparedness

1) Individual Family

Citizens cannot reach out to assist their communities until they know their own families are safe. Staff from the Boulder Office of Emergency Management (OEM) made themselves available to present information to community groups about individual/family emergency preparedness planning. This included lists of items to pack in a "go kit" (i.e. paperwork such as car titles, insurance information, prescription medication, family photos, clothing, water, snacks).

Being familiar with the school district's emergency evacuation plans is an important part of family planning, as well as designating a safe location where the family will meet if they are separated when an emergency occurs.

2) Neighborhood

Knowing one's neighbors, the number of members in the household, any special needs (i.e. disabilities, medical conditions and critically needed medications), the number of animals in the household that may require evacuation, and contact information (work/cell phone numbers) is key in an emergency situation. Gold Hill developed a Neighbor Link Program which has a "pod" leader for every 8 to 10 households. The leader gathers pertinent information about the members within his/her "pod". A phone tree is also set up within that "pod" and between other "pods" in town. The other IMA members took this Neighbor Link concept, made modifications to better suit their locales and applied them to their own communities.

During this process it became apparent that it is important to respect individual privacy and allow community members to select their level of

involvement. Many of the rural inhabitants chose their living situation to protect/maintain their privacy. Their choice not to participate has to be respected. No matter how important this seemed to the organizers it was important to remember that "not everyone has to play if they don't want to."

3) Community

The communities participating in the IMA vary greatly in population (from 150 to 2,033), geographical terrain and local governmental infrastructures (two are unincorporated). Each one began taking inventory of local assets. The larger towns have schools, community centers, local summer camps, etc. that can be used as information centers (Safe Sites) or even Red Cross shelters. It became apparent that the local rural populations prefer to stay in the mountains, if at all possible, making local resource exploration a crucial task.

The Boulder County Sheriff's Office, OEM and local fire departments stepped forward to support the IMA efforts with the attitude of "what do you need from us?" vs. "here is what you have to do." They were instrumental in helping make connections to county offices/staff, resource information and training opportunities.

Trainings were offered to local residents in Weather Spotting (see Flood Preparedness), HAM Radio operation (see MERN) and First Aid/CPR. These classes continue to be offered as citizen interest increases.

Large and small animal evacuation scenarios were reviewed. The Boulder County Sheriff's Department Animal Protection staff members shared resource information with local organizers. An agreement between the Sheriffs of Boulder County and neighboring Gilpin County was reached in regards to using the Gilpin County Fairgrounds, located in the mountains, as an alternate animal evacuation site in the event that routes to the Boulder County Fairgrounds, down in the plains, were cut off.

Three sheds were provided by the OEM to selected rural mountain locations. These sheds house backup generators and emergency supplies in the event that access is temporarily cut off from the resources down in the plains. Lists of locally accessible large equipment (i.e. backhoes, earthmovers, large trucks) and licensed operators were compiled, again in the event that supply routes were cut off and the equipment was needed during the emergency response effort.

As leaders emerge to organize specific areas, the planned approach is to build the leadership role two to three people deep so the onus doesn't fall on any one person. This is done to insure that the success of implementation doesn't hinge on one individual's presence. It was important to ask each organizer if his/her portion could stand alone, without their being in the lead.

The Fourmile Canyon Fire exposed how quickly neighborhoods and communities are scattered in the event of an evacuation. Preserving that cohesiveness and support for victims is a challenge both during and after an evacuation. Some of the neighborhoods were totally destroyed. Some returned to rebuild afterwards and others never came back. Some didn't lose their homes, but as neighboring houses were lost they lost their community. During the fire, as well as after, the town websites had been either created or modified to keep people informed and to maintain the sense of community despite physical separation. Residents are able to stay informed about evacuation status, community meeting locations in other parts of the county, emergency supply centers for food/clothing/shelter, links to related websites and services.

Communication

Information is gold in an emergency situation. The IMA members looked at the various levels of communication:

- Between the fire chiefs/fire department to local residents
- Between the residents/among neighborhoods
- Between Law Enforcement/Emergency Services and communities
- Between mountain communities/IMA members

The loss of communication for residents at the onset of the fire due to downed telephone and power lines along with already sporadic cell phone coverage in the rugged mountain terrain made it difficult to provide or receive accurate information. In this age of social media it was difficult to stop the "rumor mill", which in this scenario as people were looking at evacuation routes, could have cost lives.

In reviewing the Fourmile Canyon Fire operations, the key role Boulder County Amateur Radio Emergency Services (BCARES) members played

in providing information to emergency services was apparent. At one time during the fire two BCARES members were able to radio in and provide authorities with GPS coordinates for a slurry drop to save a house from the encroaching fire. It was a situation that only they could see from their vantage point, at a safe distance, high above the fire. BCARES has their own table in the OEM Command Post to provide information through their network of HAM radio volunteers.

The IMA began to look at this BCARES model of collecting and providing accurate, updated information by using equipment that can work in the mountains when other forms of communication are lost. Also key is the fact that it is a volunteer staffed effort. This was the beginning of the Mountain Emergency Radio Network (MERN).

Mountain Emergency Radio Network (MERN)

Since communication can be so easily lost in the mountains it made sense to turn to BCARES given their established success in providing accurate information to the OEM and law enforcement during emergencies. The idea emerged to train volunteers in the mountain communities in HAM radio operation. Classes were held in basic radio operation to obtain an FCC license. These classes were taught by BCARES members, who also administered the subsequent licensure test. Additional training was then provided regarding equipment operation and how the MERN participants can dovetail with BCARES and the OEM during an emergency situation.

Because emergency radio frequencies were changed from wideband to narrowband as the result of an FCC directive, many of the local fire departments had obsolete equipment. Thus they were able to donate radios to the MERN project. These older radio sets were converted for HAM radio use, making it possible to give equipment to the newly licensed volunteer operators, thus avoiding excessive personal out of pocket expenditures.

Grant money and private party donations also funded the installation of repeaters at strategic mountain locations. This effort is ongoing to ensure HAM radio connection between the mountain communities and emergency personnel in Boulder. There are currently over 60 licensed HAM MERN operators and the goal is to reach 100 by the spring of 2013.

Flood Preparedness in the Fourmile Burn Area

The community emergency preparedness efforts for potential wildfires also led to planning for eminent flooding danger in the Fourmile Canyon Fire burn area caused by loss of vegetation. The OEM developed a warning system through Everbridge, the local reverse 911 calling service, to contact homes in high flood risk areas giving one of four possible warning messages, which range from “flood watch” to “immediate evacuation-seek higher ground.” Updated information is also provided to OEM and the National Weather Service by the network of 50+ trained Weather Spotters from the nearby communities of Nederland, Gold Hill and Ward (all situated at elevations above and west of the Fourmile burn area). One hundred twenty weather radios were given to households identified by the Fourmile Fire Chief as being directly in harm’s way during a flood. These radios were funded by Foothills United Way in Boulder as part of their Fourmile fire recovery efforts.

Gold Hill, which is the closest community to the Fourmile area, combined their Neighbor Link Program with their Safe Site efforts to create Safe Link. This gives evacuated flood victims a short term place to convene away from flood danger to get a cup of coffee, a snack, and most importantly, obtain information. The Safe Link volunteers will keep track of who has utilized the Safe Link facilities and share that information with the OEM and local emergency personnel. This will help authorities account for those who have evacuated and those whose whereabouts are still unknown. In addition, the evacuees can be matched with pre-identified Gold Hill residents (approximately 20) willing to open up their private residences to those who need immediate housing. This also addresses the reluctance of residents to leave the mountains by giving them shelter in a neighboring community located away of the flood’s path.

Mitigation Efforts

In 2013 the IMA will also begin focusing their efforts on fuel mitigation in the mountainous regions of western Boulder County that encompasses the IMA communities. Predictions for continuing drought conditions combined with trees downed by recent beetle-kill make this a high priority. The effort will begin by sitting down with staff from the Boulder County Forest Health office and representatives from the U.S. Forest Service to explore ways in which all levels of effort can be

combined. This would include local grassroots “Saws and Slaws” events (where neighbors gather to mitigate properties followed by a potluck) and to formalized approaches in reducing slash on USFS land.

Conclusion

The IMA continues to meet monthly and has been recognized by state senators and county agencies as a means for opening dialog with the rural mountain communities. This has also created an avenue to provide needed human resources in previously unidentified regions. Efforts to promote community emergency preparedness plans are ongoing and ever evolving. It is important to adhere to the KISS (Keep It Simple and Sustainable) approach on all levels.

The greatest benefit has been the open communication that now exists between the individual mountain communities. This continues to grow as word spreads about the IMA activities. It has fostered respect and an understanding regarding the varying strengths each town has to offer each other. Our definition of “community” has broadened beyond town limits and personal boundaries, like the Phoenix from the Ashes.

Related Web Sites

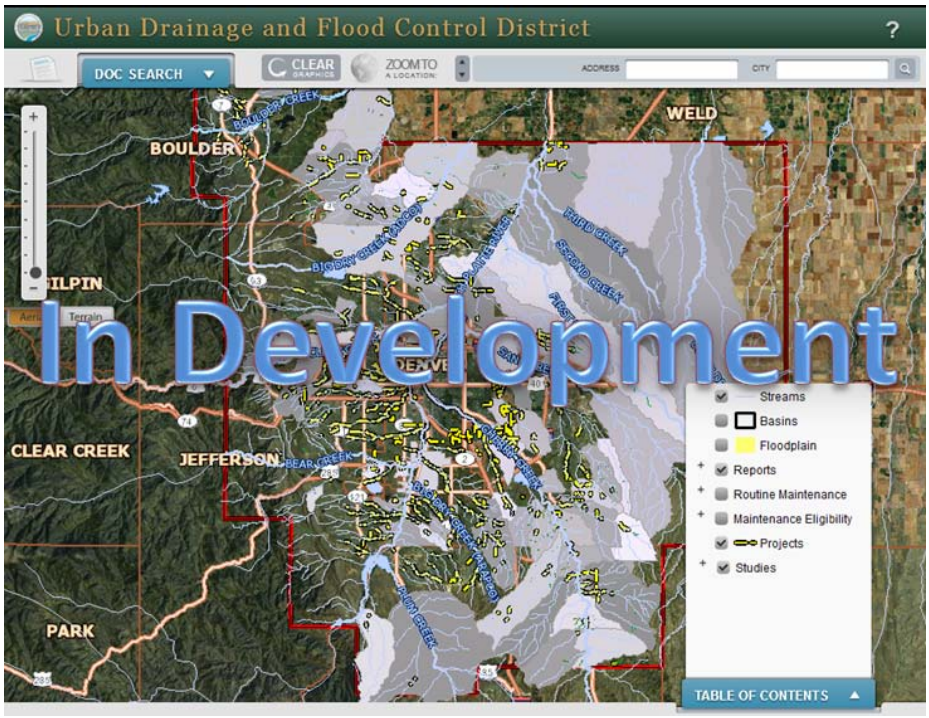
For updated information on Mountain Community Resources, IMA meetings, the MERN project, and IMA community member activities visit bouldermountainresources.org.

For information on organizing a “Saws and Slaws” event go to sawsandslaws.com.

More photos of Parker Jordan Centennial Open Space

Electronic Data Management Application Update

Julia Bailey, Information Services Engineer, Information Services and Flood Warning Program



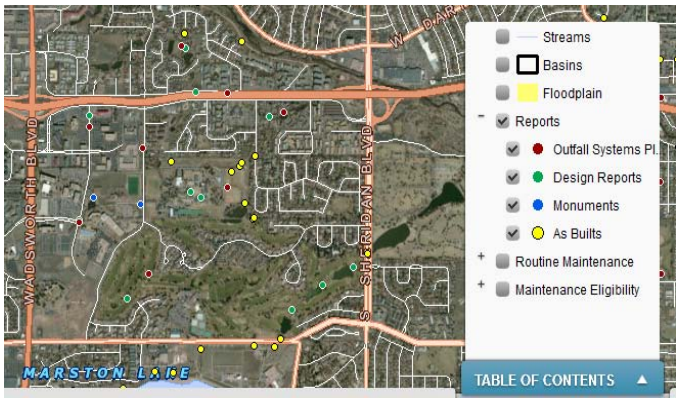
Developmental symbology of new project lines and study areas.

There are three reasons to replace the report dots. First, lines and polygons better describe project and study limits. Second, some report formats have changed and now embed drawing pages which cannot be linked to directly. Third, dot layers do not exist for all report types.

In an effort to simplify the design while providing more accurate map information, the report dots are being replaced by a Design, Construction, and Maintenance Projects line layer and a Master Planning Studies polygon layer. Multiple documents can be linked to a single feature. For example, both the As Built and Design Report for a project can be linked to from the same project line.

Also new in this development phase, the Maintenance Eligibility layers are now clickable. A popup will appear and display the project name, acceptance level, and District identification numbers.

Exciting new updates to the District's web map application will be ready for testing in January 2013. The application has been used to find and retrieve District report documents since 2010. The current application has three different ways to find documents using the web interface: enter text attributes in the search form, click on a stream or basin feature to return all related documents, or click on a report specific feature to open one of the three report types: Outfall Systems Plan, As Built, or Design Report. The report specific features are color coded dots that represent the centroid of a report drawing. When reports are opened using this search method, they open to the page represented by the centroid dots. This process will soon be replaced.



Page centroid dots do not describe the study or project areas well

This airport feature is covering up aerial information that is important in defining a maintenance eligibility project on the property.

Users have the ability to control whether a layer is visible or not through the table of contents (TOC). There are several new layers being added to the TOC. Currently the map includes lake and airport features, however, these features are opaque and not part of the TOC. Since these layers are opaque, users are not able to obtain ground information from the map as shown in Figure 3. Four layers will be added to the TOC with 50% transparency: Lakes, Airports, Municipalities, and Counties. As always comments are appreciated. (Email:Jbailey@udfcd.org)