# Information Services and Flood Warning Program

## Kevin Stewart, PE, Program Manager

With enormous challenges facing affected Colorado communities following the 'September-to-Remember' floods of 2013, efforts in 2014 were undertaken by many to further document and better understand this epic event. The cover story by Wright Water Engineers is a great example. For those of us in the flood business, the experience opened a sundry of opportunities to talk about what happened. Many careerfirst moments will be long remembered. For me this included two "inside-the-beltway" encounters. The first trip was made at the request of the U.S. Geological Survey to brief both houses of Congress on the importance of streamgages and how they provide critical information to the public, emergency responders, and resource managers needed to protect, manage and sustain our Nation's surface waters. This event was hosted by New York Senator Charles E. Schumer and California Congresswoman Grace Napolitano. The second trip was in response to an invitation from the White House Office of Science and Technology Policy, National Security Council, and FEMA to attend the White House Innovation for Disaster Response and Recovery Initiative Demo Day at The White House. The goal of this initiative, launched in the wake of Hurricane Sandy, is to find the most effective ways technology can empower survivors; first responders; and local, state, tribal, territorial, and Federal government with critical information and resources. Prior to the main event I was selected to arrive early to participate in a small group workshop focused on 'predictive analytics' and tasked with developing challenges for technologists and innovators.



These two events were certainly seminal moments in my rewarding career at UDFCD and marking my 30th year of service. I am honored to have had these unique opportunities to represent the District in our Nation's capital. Our Information Services Engineer Julia Bailey continues to make creative improvements to the way our electronic documents and data are made widely available. Be sure to read Julia's article in this issue of *Flood Hazard News* to learn more about the most recent enhancements. Julia is also the technical lead on implementing UDFCD's records management software, <u>OnBase™ by Hyland</u>.

On the IT-front, Derrick Schauer continues to keep a close eye on the District's current and future needs. Efforts in 2014 focused on new software implementations for the finance & accounting department and records management. For an update on new website developments soon to debut, see Derrick's short news clip in this FHN issue.

## 2014 Flood Season Recap

Last year's 2013 recap reported a record number of threat days since UDFCD instituted its flash flood prediction program some 35 years prior. Would you believe 2014 surpassed that record? Well, it did, but with far less drama than 2013, which left the region reeling to recover from the disastrous floods brought by the record-breaking rains of September 9-15. Overall, the 2014 floods were relatively small causing mostly street flooding and minor damage.

This past year the ALERT System generated rainfall rate alarms on 32 days, surpassing the 2013 statistic by one day. By comparison, the 2012 count was only 13. The table below identifies the specific alarm dates for 2014.

## Record 61 days with flood potential in 2014

April	27	1
May	7-8 (single period), <b>20, 21, 22, 23</b> , <mark>24</mark> , 25, <mark>26</mark> , 29, <mark>30</mark> , <b>31</b>	12
June	5, 6, <mark>8</mark> , 12, 14, 18, 21, <mark>22</mark> , <mark>23</mark> , <b>24</b> , 25, 27	12
July	<mark>3</mark> , 4, <mark>7</mark> , 8, 9, <b>11</b> , <mark>12</mark> , 13, 14, 15, 16, 23, 24, <mark>25</mark> , <mark>27</mark> , 28, <mark>29</mark> -30	18
August	<mark>5, 7,</mark> 8, <mark>10</mark> , 14, 15, 19, 22, <b>23</b> , <b>25-</b> <mark>26</mark> , 27, <b>28</b> , 29	14
Sept	20. 21. 22. <b>29</b>	4

**Red dates** are when automated rain gauges exceeded alarm thresholds. Yellow highlighted dates indicate heavy rainfall only affected areas outside UDFCD's main area of concern such as the Hayman Burn Area in SW Douglas County and watersheds in northern Boulder County. Blue boxes are when a NWS flash flood watch was the highest threat level reached and red designates a flash flood warning. Hyphenated dates indicate a late night threat period extending into early AM the <u>next day</u>. ALERT and CoCoRaHS rain gauges only recorded 2 days in 2014 with 24-hour rainfall totals exceeding 3 inches (July 12 & July 30). This compares with the 2013 stat of 6 days, 4 of which happened during the September floods. Seven other days (May 21, June 8, July 7, 11, 12&29 and August 25) measured 24-hour rain totals between from 2 to 3 inches. A <u>storm summary table</u> and corresponding maps are available for every day that heavy rainfall was predicted.



The 2014 snowpack for the South Platte River basin was well above normal and the spring runoff was well-behaved with no flood warnings needed for the Denver metro area. Boulder County runoff was the primary concern for the region due to the high water tables and the large amount of debris and loose soils left by the September floods. Stream levels were carefully monitored by the Boulder Office of Emergency Management after massive volumes of woody debris and sediment were moved away from the stream channels over the winter months. Many fingers were crossed as the meltout progressed hoping that the expected high streamflows would recede well before heavy rains threatened. All worked out as hoped.

An early season downpour that few people noticed occurred south and east of DIA early Sunday morning between 5AM and 7AM on **April 27**. One ALERT rain gage west of Watkins recorded 1.3 inches. Further east <u>radarestimated rainfall</u> amounts approached 3.5 inches that nearby rain gages were unable to verify.

The May thunderstorms held off until Tuesday, May 20, when a 7-day period of severe weather brought tornadoes, hail and minor flooding to the region. The greatest 24-hour rainfall measurement of 2.0 inches occurred in Aurora on May 21 and the most intense 5-minute rainfall for the month occurred on May 22 at 4:37PM at the Lakewood County Club (8.0 in/hr). <u>ALERT rainfall statistics</u> for 2014 are summarized in a convenient MS-Excel workbook online. A number of local news reports and YouTube <u>videos</u> were also captured to document this interesting week of weather.

NWS flash flood warnings were issued on the last two Fridays in May (5/23 and 5/30) for the Fourmile Burn Area (FMBA) in Boulder County, but fortunately no serious flooding occurred. This is the area that experienced a tragic wildland fire in 2010, following by a damaging flash flood in 2011, and then devastated again by the September floods of 2013. Consequently, all concerned parties including residents have been very sensitive about the potential for flooding when heavy rainfall threatens this area. Some good news here is that the watershed is recovering nicely and the flash flood potential appears to be fading. However, the NWS will likely continue issuing conservative warnings until they are assured that the elevated flood threat cause by the fire has ended.



June delivered a number of bouts of severe weather with tornado warnings being issued for 5 days. Sunday, **June 8** was the biggest rain day of the month with Aurora being the primary target. The Piney Creek at Liverpool streamgage, first installed in May of 2008, measured a rather unimpressive record peak flow of 360 cfs at 6:30 PM. The rains that produced this runoff came in two waves and yielded between 2 and 2.5 inches with maximum 5-min intensities of 5.2 in/hr occurring around 1PM.

July is Colorado's summer monsoon month with Independence Day announcing its arrival with heavy rains over the foothills of Jefferson County and near Broomfield. This was followed by a weekend of nice weather, and then Monday, **July 7** produced one of the more notable big rain days of 2014. The Jefferson County Mountains south of Evergreen and north of Buffalo Creek (location of the 1996 wildfire and deadly flash flood) received some of the most intense rainfall with totals approaching 3 inches near the 2012 Lower North Fork burn area. A 9News report of flooding along Cub Creek near the Brook Forest Inn contains an interesting interview with a resident (@ 5-minute point in video) contrasting this flood and the 2013 event. Arvada and Aurora also measured some of the higher rainfall amounts of the day. NWS issued a flash flood warning for northeast Elbert County and a portion of central Arapahoe County east

of the UDFCD boundary effective from 8PM to just past midnight.



Saturday, **July 12** was the 2014 record-holder for the number of rainfall rate alarms generated by ALERT System with 14 stations triggering 32 alarms between 4:30 and 8:15PM. The activity prompted the NWS to issue a flash flood warning for northwestern Douglas County effective until 10PM. <u>Rainfall totals</u> exceeded 3 inches. No significant damages were reported.

Wednesday, **July 30** did not record any intense <u>rainfall</u> but amounts totaled over 1.5 inches over much of Lakewood causing Lakewood Gulch in Denver to record its annual peak of 700 cfs at 12:35PM. A second high water measurement of 400 cfs occurred later that same day.

While August delivered a number of heavy rain threats, storm totals were low and no noteworthy floods happened. Monday, **August 25** recorded the <u>highest daily rainfall</u> of the month with storms lasting into the early AM hours Tuesday. Denver and Aurora experienced some minor street flooding.

Monday, **September 29** brought the last hurrah of the 2014 flood season and the fourth post-season flood threat day, which normally ends on September 15 when UDFCD stops providing its daily flood prediction and notification services. Intense rainfall in Adams County, Denver and Aurora between 2:30 and 3:30PM caused 11 rate alarms with a few rain totals exceeding 2 inches. Quite a remarkable event for this time of year! September 29 was also the latest "Message Day" in the 36-year history of the F2P2. It might also be noted that no flood threat days occurred during the first two weeks of this month. What a contrast to 2013!

## Understanding Extremes—Part IV

Seven years ago I wrote a short opinion piece about the frequency of so-called extreme rainstorms, and what it takes to cause an equally rare flood. Two years later I expanded on those ideas by suggesting some ways that subject matter experts could more effectively talk with people about flood risk. Then, after the 2010 Labor Day Fourmile Canyon Wildfire in Boulder County, I took a third shot at this subject with a slightly different twist inspired by an elevated flood risk caused by the fire, and the very high likelihood that a dangerous flash flood would severely impact this area in the next few years. As it turned out, the floods did come and the property damage was extreme, but thankfully, no lives were lost.

The Colorado STR (September-To-Remember) floods of 2013 created many opportunities to continue this conversation in Colorado and across the Nation. This year's STR-13 cover story by Wright Water Engineers explains well how an extreme 1/1000 annual chance rainfall can cause flood magnitudes far less extreme. A small localized flood this past July in the Jefferson County foothills spurred this writer to share one "final" real-world example.

The STR-13 rains brought nearly 7.5 inches to the mountain community of Brook Forest over a 7-day period. Brook Forest is located along Cub Creek south of Evergreen. Cub Creek flows into Bear Creek just downstream of Evergreen Lake. An intense thunderstorm occurred on July 7 (*see previous discussion & video*) that dropped a mere 2.1 inches of rain. Yet, as one resident reported, the flooding that occurred was more severe than the STR-13 event. How can this be?



The figure above compares the 2013 and 2014 events. Both events generated about the same amount of rain, but the 2014 storm did so in just over 30 minutes while the STR-13 storm took much longer. Rainfall intensity once again was the primary factor affecting the flood's impact, not the amount or the storm's return period. Rainfall frequency <u>never</u> equals flood frequency in real events.

## **Meteorological Support**

The 2014 flood prediction and notification services were provided by Genesis Weather Solutions in partnership with Skyview Weather for the 8th consecutive year. This program has served UDFCD local governments for the past 36 years with early predictions of potential and imminent flood threats. A variety of forecast products including daily heavy precipitation outlooks, quantitative precipitation forecasts (QPF), and storm track maps are routinely disseminated. GWS President Bryan Rappolt has participated actively as an F2P2 forecaster for the past 21 years through various business enterprises. Bryan's Skyview partners included lead forecaster and 8-year veteran Brad Simmons supported by Alan Smith, Andrew Muniz, Alex Trellinger, Zach Paiz and Skyview's president Tim Tonge. The Flash Flood Prediction Program, a.k.a. F2P2, was established after the deadly 1976 Big Thompson Canyon flash flood. The program operates in close partnership with the National Weather Service from mid-April through mid-September focusing primarily on heavy rain threats.

The trends of the past two flood seasons suggest that it may be time to make some adjustments to the F2P2 calendar. The September 2013 floods occurred during the last week of the program, followed by 2 weeks that yielded 4 additional threat days. The 2014 season ended much softer with no threats during the first half of September, but the last 2 weeks again produced 4 threat days with 9-29 (news video) delivering a very interesting last hurrah. UDFCD reactivated the F2P2 for all of these late season threats. Rather than reactivating the services for post-season events, Jefferson County Emergency Management recommended changing the program to begin on May 1 and end on September 30. UDFCD likes this suggestion and is taking steps to prepare for this change in 2015, including making sure the system stands ready for early operations in late April should the need arise. Acceptance by affected local governments will be sought.

Another change being considered for 2015 is to stop making phone calls to 911 communication centers that concern the potential for heavy rainfall that may cause nuisance flooding later in the day. These messages are nonemergency in nature and are only intended to inform local officials of the possibility. We have also learned that it is not common practice for comm centers to disseminate nonemergency information. Given the success of UDFCD's Internet subscription service, the need to bother busy dispatchers with non-emergency information no longer exists. By dropping these calls we estimate that approximately 60 calls per year for each 911 communication center can be avoided. Over the last 2 flood seasons that number represents over 1,000 calls. Email and text messages will continue to reach all key players. Phone calls concerning imminent flood threats and high threat potentials will continue to be made.

In 2014 Boulder County expanded the F2P2 service area to include the Left Hand Creek and Saint Vrain Creek watersheds in the northern Boulder County. The F2P2 protocols were the same for this region. Boulder County provided the funds for this expanded service area. This was largely in response to the 2013 flood disaster that severely affected this portion of the county where Longmont and Lyons are located.

An <u>annual report</u> and a complete <u>archive</u> of F2P2 messages and related products are available.

## CoCoRaHS Update



Google Map display of 24-hr CoCoRaHS measurements at ending time of 7AM, July 31, 2014.



Combined ALERT-CoCoRaHS Google Map display for same time period. Note 2.53" maximum value matches the red dot scale maximum in previous map. CoCoRaHS measurements are displayed as white on green.

Since 2001 UDFCD has been a proud sponsor of CoCoRaHS, now a large nationwide network of over 10,000 volunteer observers of rain, hail and snowfall events. A new Google Map display being developed by CoCoRaHS staff in Fort Collins will make viewing CoCoRaHS observations easy from a large national scale perspective down to state and local levels. This webmap application is certain to evolve. If you are not yet a CoCoRaHS observer, please consider becoming one soon by visiting www.cocorahs.org.

#### **EMWIN-Denver Regional Update**

Under the leadership of Jefferson County's deputy director of emergency management Rick Newman, EMWIN-DR has become a stable and dependable warning notification tool used by 22 Colorado counties serviced by the NWS Denver/Boulder warning and forecast office. EMWIN is supported nationally by the NWS and stands for the Emergency Managers Weather Information Network. The software and satellite downlink equipment is hosted by UDFCD. Rick's steering committee, which now meets semiannually, guides how the customized delivery of NWS weather warnings will occur. UDFCD also maintains the EMWIN-DR email subscription lists available to all 22 counties. NWS conference calls concerning high threat weather systems approaching the region are routinely announced using this system. EMWIN-DR also supports a secure web-based application for formatting non-weather emergency messages for public broadcast via the Emergency Alert System.

## **ALERT System News**

The ALERT system operated by UDFCD currently consists of 9 repeaters that receive transmissions in real-time from 222 gaging stations hosting 199 rain gages, 107 stream gages and 26 full weather stations. In Douglas County three new stations were installed in 2014—two on Sellers Gulch and a backup legacy repeater at Castle Rock. The Sellers Gulch stations were installed by the County as part of their East Plum Creek flood detection network. One of these stations hosts a streamgage and both stations are equipped with 1mm tipping bucket rain gauges. The Castle Rock repeater provides as low cost redundant radio path to safeguard against data loss should the newer ALERT2<sup>™</sup> repeater backbone become disabled.



Havana Pond at RMA Wildlife Preserve Rain/Stage Gage

In response to the STR-13 floods causing so many dam spillways to spill, many for the first time, three new stage gages were installed for the Arvada/Blunn Reservoir in Arvada, Westerly Creek Dam in Aurora and Havana Pond at the Rocky Mountain Arsenal Wildlife Preserve. Havana Pond was one of the larger impoundments that failed during the 2013 event, posing a serious threat to Commerce City residents and prompting a partial evacuation of the city. Fortunately a railroad embankment downstream of this dam held back the surge of water, preventing damages that would have occurred otherwise. The new ALERT station was added as part of the dam repairs. The Havana Pond and Westerly Creek Dam station are also equipped with rain gages.

A number of stations were damaged during the STR-13 floods. Many stations maintained by Boulder County on James Creek, Left Hand Creek and North & South Saint Vrain Creeks were completely destroyed. District-maintained stations were damaged or destroyed in 2013 on the following streams: Boulder Creek, Fourmile Creek and South Boulder Creek in Boulder County; Bear Creek and Van Bibber Creek in Jefferson County; Cherry Creek in Denver; and Sand Creek in Commerce City near its confluence with the South Platte River. The Sand Creek station was severely damaged and abandoned because a relocated USGS streamgage effectively eliminated the need to continue supporting both stations. Also, near real-time data from USGS satellite-linked sites are now routinely displayed by the ALERT System websites.



OneRain and Water & Earth Technologies (WET) provided preventative maintenance and repair services for 2014, enabling successfully data collection of over 11 million ALERT data reports. The '<u>Resources</u>' box at end of this article contains links to annual reports and other pertinent documents.

Record high water measurements were set for only three stations in 2014: Piney Creek in Aurora (360 cfs on June 8), Lakewood Gulch in Denver (700 cfs on July 30) and East Plum Creek in Douglas County (a mere 44 cfs on May 26). These relatively small "record" flow rates reflect how uneventful the 2014 flood season really was, with 7/30 being the most impressive event of this group. All three stations have been in operation for short term periods of 9 years or less, with the East Plum Creek station having the shortest record of only 5 years. The Lakewood Gulch record peak is somewhat missleading given that an indirect flow measurement of 970 cfs was made for an event the prior year (7/13/2013). It was later determined that the station was not reporting due to a radio failure. It happens!

A <u>MS-Excel<sup>™</sup> workbook</u> of annual and record peak water level measurements for the ALERT System is available.

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	RECORD HIGH WATER				2014					
STATION NAME	INSTALL	TYP	PEAK STAGE	PEAK FLOW	PEAK DATE	PEAK TIME	PEAK STAGE	PEAK FLOW	PEAK DATE	PEAK TIME
Carr Street	30-May-1988	PS	27.20	3,010	7/22/1991	15:11	22.49	250	7/8/2014	0:07
Ralston Reservoir	23-Sep-1988	PS	49.87	865	9/12/2013	21:08	44.35	0	7/18/2014	18:27
West Woods	2-Aug-1989	PS	3.92	264	9/13/2013	3:33	2.97	160	7/8/2014	0:00
Simms Street	25-Oct-1990	S	3.68	1,227	9/13/2013	4:47	2.68	742	7/8/2014	1:47
Leyden Reservoir	30-May-1988	PS	5.00	0	5/18/1995	3:28				
Leyden Reservoir	16-Dec-2002	PS	108.92	1,351	9/12/2013	19:12	97.18	130	5/13/2014	11:33
Leyden Confluence	2-Aug-1989	PS	4.20	3,520	8/6/1995	20:36	2.49	86	7/30/2014	20:14
Sports Complex	3-Jul-1989	PS	3.70	440	7/22/1991	14:22	3.08	354	5/30/2014	17:14
Van Bibber @ Hwy 93	14-Aug-1990	PS	4.30	665	7/29/2003	14:51	1.86	575	7/7/2014	23:39
Montview Park	9-Jun-1988	PS	10.45	1,211	9/12/2013	12:53	6.22	430	5/22/2014	17:17
Kelly Dam	22-Sep-1988	PS	62.81	820	9/12/2013	12:08	50.25	72	7/30/2014	21:21
Expo Park	21-May-1988	PS	65.88	133	9/12/2013	9:22	57.34	32	9/29/2014	20:00

#### The ALERT System

### Website Innovations

Two primary websites

were supported during 2014.

software package developed

The public website uses a

**REAL-TIME FLOOD DETECTION &** FORECASTS



Welcome to the Urban Drainage and Flood Control District's new ALERT System website developed to better accommodate handheld devices such

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iPads and Windows Tablets. Some of the linked webpages from this site require Adobe Flash. Apple and Android users will not be able to view these pages. Other links are designed primarily for desktop and laptop users, but may also work well with smaller devices. In time these applications will become more handheldfriendly

Smartphone users can begin using this website by touching the menu icon in the upper right corner. We hope you enjoy your browsing experience and can easily find the information you are looking for. We welcome your comments and recommendations

Most of the features from the previous 'alert5.udfcd.org' website have been migrated to this new page. Click here if you prefer to use the old alert5 website or use the public Contrail website.



and maintained by OneRain called Contrail Web. The second website used primarily by UDFCD Flood Warning Program partner agencies displays ALERT data as smartphones, Apple

collected by two NovaStar-5 base stations, one located at UDFCD and a backup remote site supported by Green House Data in Cheyenne, Wyoming. The NS-5 platforms and the popular ALERT GMap display feature are maintained by WET. Data from satellite-monitored stream gages operated by the USGS and Colorado's **Division of Water Resources** can also be viewed from both

ALERT websites. Improvements made in 2014 were largely driven with handheld users in mind. WordPress was selected for NS-5 users featuring a cascading style sheet (CSS) look and feel along with

blogging capabilities to keep users apprised of new developments and other items of interest.



The GMap display was enhanced to capture as much critical information as practicable for a firstlook assessment. The cell phone screen capture image shows a NWS Severe Thunderstorm warning area as a yellow box, a Tornado warning as a red box, a current looping radar image, and one hour rainfall totals. All of these features are activated by default. The settings can be easily changed using the Data Menu. Touching the NWS

warning box icons will display the text associated with the warning. Touching the rainfall values will produce a corresponding data plot along with other useful information and related links (see example below).



Another useful GMap feature enhancement for 2014 is the blinking active alarms that occur whenever a 3 inch/hour rainfall rate is exceeded within a 10-minute time period or when rainfall amounts exceed 1-inch with a 60-minute time period. Rain gauges in burn areas like the example above have alarms thresholds set somewhat lower and adjusted as watershed conditions improve.

The ALERT streamgage map display supported by Leonard Rice Engineers (LRE) was updated in 2014 to make it more handheld device friendly. The color codes represent potential impacts related to current stream levels, emulating the highly acclaimed NWS Advanced Hydrologic Prediction Service (AHPS)

#### **Beyond ALERT**

For the second consecutive year the City and County of Denver made good use of radar-derived precipitation estimates to be notified when an approaching storm is expected to exceed critical rainfall thresholds. ALERT rain gauge measurements are used to improve the accuracy of the rainfall estimates for each 1km radar grid. A storm-tracking algorithm is used to forecast rainfall expected 30 minutes in the future. The notification criteria is set equal to the ALERT rainfall rate alarm thresholds so, in theory, officials can receive warnings of imminent low impact flooding for a very specific area up to 30 minutes before heavy rainfall occurs.

Another practical and cost-saving use of this technology is for post-storm evaluation. When local governments are threatened with litigation following a localized flood, the web-based application can be used to quickly quantify the nature of the event that caused the alleged damages. Early discovery of storm facts can, on occasions, bring a rather quick halt to superfluous claims. This application was developed by Vieux, Inc. of Norman, Oklahoma.

Various real-time hydrologic models have been implemented and continue to evolve. Usage of these models to date has been sparse and the opportunities to interact with these models are limited. This should change in the future as more push products are developed to engage decision-makers sooner. A separate article in this issue of Flood Hazard News is devoted to a new model developed for East Plum Creek in Douglas County. The Lena Gulch model in Jefferson County supported by LRE was updated late last year to improve its performance, to better accommodate postevent evaluations, and to make possible rainfall inputs from radar or other sources. The Vflo hydromodel by Vieux continues to provide threat assessment and automatic notifications for the Boulder Creek watershed including Fourmile Creek and Fourmile Canyon Creek, which sustained heavy losses in the September 2013 floods.

Wednesday Webinars were introduced in 2014 to provide training and to demonstrate firsthand how to best make use of the wide variety of UDFCD-supported web-based applications developed to anticipate, recognize and evaluate flood threats. These useful tools consist of multiple radar applications, real-time hydrologic models, data-rich mapping utilities, etc. Each 'GoToWebinar' session is recorded and available for later viewing. UDFCD plans to continue this service in 2015.

The City of Aurora prompted District staff to help develop a graphically jam-packed <u>instruction manual</u> in 2014 for UDFCD's Flood Warning Program using Microsoft PowerPoint<sup>™</sup>. Sections of the manual covered many of the more popular features of UDFCD-supported websites, F2P2 information, the ALERT System, radar display options, email subscriptions, and flood preparation and monitoring expectations. The slide show was designed for hard copy reproduction and can easily be modified and adapted for use by other local governments.



UDFCD's Flood Hazard Information Tool or <u>FHIT</u> has grown substantially since the STR-13 floods. This easy to use webdriven tool provides a convenient way to document floods; identify damage thresholds; show conveyance capacities of stream channels and crossing structures; view photos and videos; and read pertinent documents. In 2014, local governments began assuming more direct responsibility to keep their records up-to-date and administer the online SQL database. Individualized training is available for all UDFCD's partner agencies that would like to get involved.

As always, UDFCD welcomes your ideas on how we can continue providing all of our partner agencies and the public with high quality information services.

#### Resources

A complete archive of daily forecasts, flood threat notifications, storm track predictions, storm summary maps, and other products can be found at the <u>F2P2 website</u>. A MS-Excel workbook containing <u>annual and record stream</u> <u>levels and peak flows</u> measured by the ALERT System is available. Open directories are provided for downloading detailed annual reports concerning the maintenance of the <u>ALERT System</u> and <u>F2P2 operations</u>.