

# Lena Gulch/MGR Flood Exercise

June 30, 2015

# Objectives

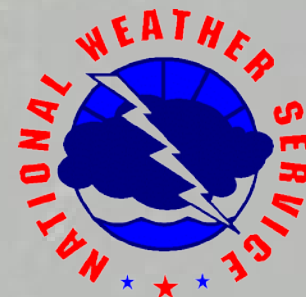
1. Review decision support components
2. Test local response to developing weather scenario using NWS & Skyview injects
3. Test local response to forecast and rising lake levels at Maple Grove Reservoir
4. Evaluate decision process and procedures for notification and evacuation of impact zones above and below MGR
5. Hotwash and identify next steps

The Local Flood Warning System & Response Plan

# **DECISION SUPPORT**



# A Federal/Regional/Local Early Warning Partnership



## Urban Drainage & Flood Control District Flood Warning Program



*Serving the greater Denver/Boulder metropolitan area since 1979  
in cooperation with NOAA's National Weather Service*





Search ...

## RECENT POSTS

NHWC newsletter

Twitter Rain Alarms

News Release

New ArcGIS Map

System Status

## ARCHIVES

June 2015

April 2015

March 2015

August 2014

July 2014

May 2014

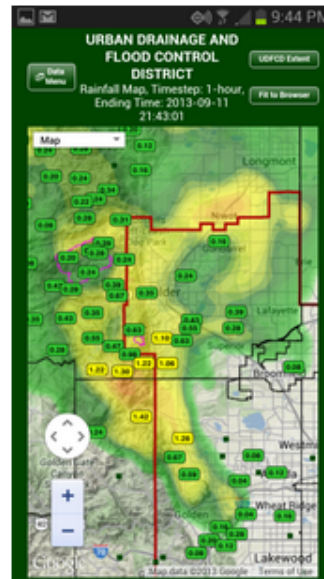
## CATEGORIES

FRAUG Emails

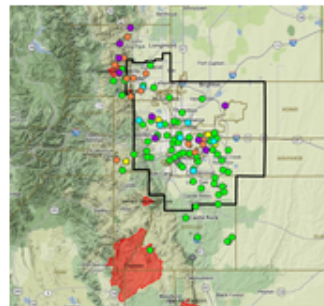
News Release

Newsletters

# MAPS



[ALERT GMap](#) is smartphone friendly. Some touch features, however, are difficult to navigate with smartphones. Desktop and laptop users should find this webpage easy to use. ALERT maps are also available from the [Conrail website](#) supported by [OneRain](#). A “[light](#)” version of GMap designed for Twitter is also available (*follow UDFCD\_FWP*).



The [AHPS-like webmap](#) is designed for monitoring stream and reservoir water levels. A Google Earth™ option is also available. The [NWS AHPS](#) webpage is another good option. AHPS is an NWS acronym that stands for “Advanced Hydrologic Prediction Service.”

## RECENT POSTS

NHWC newsletter  
Twitter Rain Alarms  
News Release  
New ArcGIS Map  
System Status

## ARCHIVES

June 2015  
April 2015  
March 2015  
August 2014  
July 2014  
May 2014

## CATEGORIES

## HYDROMODELS



[RainVieux, PreVieux & Vflo](#) are not handheld-friendly yet and require a user ID and password to access. The Vflo hydromodel for the Boulder Creek basin

includes the Fourmile Burn Area (Gold Run, Fourmile Creek and Fourmile Canyon Creek). These products are supported by [Vieux, Inc.](#) in Norman, OK.



[Real-Time Rainfall/Runoff Models](#) for Boulder Creek, Cherry Creek, Harvard Gulch, Goldsmith Gulch and Lena Gulch are supported by [Leonard Rice Engineers, Inc.](#) in Denver, CO.



Coming soon... the Sacramento Soil Moisture Accounting (SSMA) model was developed and tested in 2014

for the East Plum Creek watershed in Douglas County. This model is resident to the NovaStar5 data collection platform and is supported by [Water & Earth Technologies](#) in Fort Collins, CO.



## RECENT POSTS

[NHWC newsletter](#)[Twitter Rain Alarms](#)[News Release](#)[New ArcGIS Map](#)[System Status](#)

## ARCHIVES

[June 2015](#)[April 2015](#)[March 2015](#)[August 2014](#)[July 2014](#)[May 2014](#)

## CATEGORIES

[FRANC Email](#)

# F2P2

*F2P2 is short for UDFCD's Flash Flood Prediction Program. The program operates from May through September providing daily heavy rain forecasts and early flood threat notifications to affected local governments. The F2P2 has served the Denver/Boulder metropolitan area continuously since 1979.*

## F2P2 DOCUMENTS

### [Current and Archived Products](#)

[Forecast Product Descriptions](#)

[Slides on F2P2 Messages](#)

[Message-day Summaries](#)

[Annual Reports](#)

## CONTACTS

UDFCD Flood Prediction Center 303-458-0789

UDFCD Main Office 303-455-6277

Genesis/Skyview Weather Center 303-688-9175

Email: [f2p2@skyview-wx.com](mailto:f2p2@skyview-wx.com)

[www.genesisweathersolutions.com](http://www.genesisweathersolutions.com) & [www.skyview-wx.com](http://www.skyview-wx.com)



## RECENT POSTS

[NHWC newsletter](#)  
[Twitter Rain Alarms](#)  
[News Release](#)  
[New ArcGIS Map](#)  
[System Status](#)

## ARCHIVES

[June 2015](#)  
[April 2015](#)  
[March 2015](#)  
[August 2014](#)  
[July 2014](#)  
[May 2014](#)

## CATEGORIES

# NOTIFICATIONS

## UDFCD's Email Subscription Service

### Instructions:

Select the desired "List Subscription Page" to sign-up for emails and text messages from UDFCD's Flood Warning Program and NOAA's National Weather Service.

List Subscription Page	Description
<a href="#">Flash Flood Prediction Program (F2P2)</a>	Jurisdiction-specific notifications concerning flood threats, storm tracks, daily outlooks and other products.
<a href="#">ALERT System Alarms</a>	Regional and system-wide rainfall rate and water level alarms from the ALERT System.
<a href="#">EMWIN-Denver Regional</a>	Regional and county-specific severe weather and flood warnings from the NWS Emergency Managers Weather Information Network. Visit <a href="#">EMWIN-Denver</a> for more information.

**EXERCISE BEGINS**

URGENT - IMMEDIATE BROADCAST REQUESTED  
FLOOD WATCH  
NATIONAL WEATHER SERVICE DENVER CO  
637 AM MDT TUE JUN 30 2015

COZ035-036-038>041-010600-  
/O.NEW.KBOU.FF.A.0002.150630T1237Z-150701T0600Z/  
/00000.0.ER.000000T0000Z.000000T0000Z.000000T0000Z.OO/  
LARIMER AND BOULDER COUNTIES BETWEEN 6000 AND 9000 FEET-  
JEFFERSON AND WEST DOUGLAS COUNTIES ABOVE 6000 FEET/GILPIN/CLEAR  
CREEK/NORTHEAST PARK COUNTIES BELOW 9000 FEET-  
LARIMER COUNTY BELOW 6000 FEET/NORTHWEST WELD COUNTY-  
BOULDER AND JEFFERSON COUNTIES BELOW 6000 FEET/WEST BROOMFIELD  
COUNTY-  
NORTH DOUGLAS COUNTY BELOW 6000 FEET/DENVER/WEST ADAMS AND  
ARAPAHOE COUNTIES/EAST BROOMFIELD COUNTY-  
ELBERT/CENTRAL AND EAST DOUGLAS COUNTIES ABOVE 6000 FEET-  
NORTH PARK...SOUTH PARK...WINDY HILLS...HIGHLANDS...  
RED FEATHER LAKES...BAILEY...CENTRAL CITY...EVERGREEN...  
GEORGETOWN...IDAHO SPRINGS...WESTERLY...FORT COLLINS...  
LAKESIDE...LOVELAND...LONGMONT...AURORA...BOULDER...GOLDEN...  
LAKEWOOD...LONGMONT...AURORA...BRIGHTON...CITY OF DENVER...  
DENVER INTERNATIONAL AIRPORT...HIGHLANDS RANCH...LITTLETON...  
PARKER...CASTLE ROCK...ELBERT...FONDIS...KIOWA...LARKSPUR  
637 AM MDT TUE JUNE 30 2015

**Read 0355 and 0637 advisories**

**NWS WEATHER INJECTS**

...FLASH FLOOD WATCH IN EFFECT FROM NOON TODAY THROUGH  
MIDNIGHT TONIGHT...



## F2P2

*F2P2 is short for UDFCD's Flash Flood Prediction Program. The program operates from May through September providing daily heavy rain forecasts and early flood threat notifications to affected local governments. The F2P2 has served the Denver/Boulder metropolitan area continuously since 1979.*

### F2P2 DOCUMENTS

[Current and Archived Products](#)

# F2P2 WEATHER INJECTS

# 0637-M2



Time: 637 AM Tuesday June 30, 2015

Forecaster: Bryan Rappolt

---

## MESSAGE 2

### Flash Flood Prediction Program

---

### FLASH FLOOD WATCH

### **FLOOD WARNING EXERCISE – THIS IS ONLY A TEST**

The National Weather Service has issued a **FLASH FLOOD WATCH** for the following counties: **Boulder (City of Boulder affected, Four Mile Burn Area affected), Jefferson, Broomfield, Douglas, Adams, Denver, Arapahoe** including: **DIA, the City of Aurora, Arvada, Wheat Ridge, Lakewood**

from: **Current** to **1159 PM**. **The National Weather Service in Boulder has issued a Flash Flood Watch that includes the entire District from Current until 1159 PM tonight.**

Prime time for flooding: **Current** to **1000 PM**.

Forecast rainfall: **Rain showers and training thunderstorms will have the potential to produce very heavy rainfall of 2.50-7.00" of rain in 3-6 hours.**

The most likely areas to be impacted by flooding are:

Mountain streams & floodplains; road crossings; canyon roads & highways; recreational trails; adjacent open space areas/campgrounds/parks; fishing access points & stream reaches; buildings near streams; utilities

# 0637-M2 (cont.)

Urban streams/gulches; road crossings; recreational trails; adjacent open space areas/campgrounds/parks; floodplain properties; utilities

Urban streets, intersections, low lying areas, known trouble spots

Mountain locations subject to mud/rock/debris slide

Additional information: **Flash flooding of District watercourses will be possible today and tonight as well as significant urban and street flooding from slow moving thunderstorm cells.**

A Flash Flood Watch means that flash flooding is possible within the watch area.

This message is not intended for public dissemination. Please pass this information along to affected emergency response organizations (police, fire, public works, etc.) within your area.

Also, please take appropriate actions to prepare for possible flooding.

Further information will be provided to you as it becomes available.



# 0836-IMS



Time: 836 AM Tuesday June 30, 2015

Forecaster: Bryan Rappolt

## Internal Message Status

### Flash Flood Prediction Program

#### MESSAGES 2'S ISSUED FOR THE ENTIRE DISTRICT

#### **FLOOD WARNING EXERCISE – THIS IS ONLY A TEST**

- An upper level low located over southern Nevada will continue to pump sub-tropical moisture over the District today and tonight. As was the case yesterday and earlier this morning, the result will be copious amounts of rain showers and embedded thunderstorms that will move from south to north across the District throughout the day.
- Message 2's and NWS Flash Flood Watch have been issued for the entire forecast District, valid until Midnight.
- The wet weather pattern, and heavy rainfall threat, is expected to continue through Friday.

**STORM RAINFALL POTENTIAL AND DURATION:** Rain showers will produce rainfall amounts of 0.08" to 0.35" in 10-30 minutes, while thunderstorms will produce heavy rainfall of 0.40" to 1.60" in 10-30 minutes. Heavy rainfall of up to 3.50" of rainfall in 1-3 hours will be possible, due to thunderstorm training.

**WORST CASE SCENARIO:** A slow moving thunderstorm complex or multiple strong thunderstorms track over a single location resulting in up to 6.00" of rainfall in 3-6 hours.

County	Message	Valid Times	Prime Time
<i>Boulder County</i>	2	Current TO 1200 AM	Current TO 1000 PM
<i>Jefferson County</i>	2	Current TO 1200 AM	Current TO 1000 PM
<i>Broomfield County</i>	2	Current TO 1200 AM	Current TO 1000 PM

# 0836-IMS (cont.)

<i>Douglas County</i>	2	Current TO 1200 AM	Current TO 1000 PM
<i>Adams County</i>	2	Current TO 1200 AM	Current TO 1000 PM
<i>Denver County</i>	2	Current TO 1200 AM	Current TO 1000 PM
<i>DIA</i>	2	Current TO 1200 AM	Current TO 1000 PM
<i>Arapahoe County</i>	2	Current TO 1200 AM	Current TO 1000 PM
<i>the City of Aurora</i>	2	Current TO 1200 AM	Current TO 1000 PM
<i>Arvada</i>	2	Current TO 1200 AM	Current TO 1000 PM
<i>Wheat Ridge</i>	2	Current TO 1200 AM	Current TO 1000 PM
<i>Lakewood</i>	2	Current TO 1200 AM	Current TO 1000 PM
County-specific Quantitative Precipitation Outlook	Precipitation Time	30-Minute Rainfall and % Probability	Message Potential
<b>Plains</b>			
Adams	Current TO 1200 AM	0.1" (100%) to 0.4" (80%) to 1.2" (50%)	<b>ISSUED</b>
Arapahoe	Current TO 1200 AM	0.1" (100%) to 0.4" (80%) to 1.2" (50%)	<b>ISSUED</b>
Boulder	Current TO 1200 AM	0.1" (100%) to 0.4" (80%) to 1.2" (50%)	<b>ISSUED</b>
Broomfield	Current TO 1200 AM	0.1" (100%) to 0.4" (80%) to 1.2" (50%)	<b>ISSUED</b>
Denver	Current TO 1200 AM	0.1" (100%) to 0.4" (80%) to 1.2" (50%)	<b>ISSUED</b>
Douglas	Current TO 1200 AM	0.1" (100%) to 0.4" (80%) to 1.2" (50%)	<b>ISSUED</b>
Jefferson	Current TO 1200 AM	0.1" (100%) to 0.4" (80%) to 1.2" (50%)	<b>ISSUED</b>
<b>Foothills above 6500ft</b>			
Boulder	Current TO 1200 AM	0.1" (100%) to 0.4" (80%) to 1.2" (50%)	<b>ISSUED</b>
Douglas	Current TO 1200 AM	0.1" (100%) to 0.4" (80%) to 1.2" (50%)	<b>ISSUED</b>
Jefferson	Current TO 1200 AM	0.1" (100%) to 0.4" (80%) to 1.2" (50%)	<b>ISSUED</b>

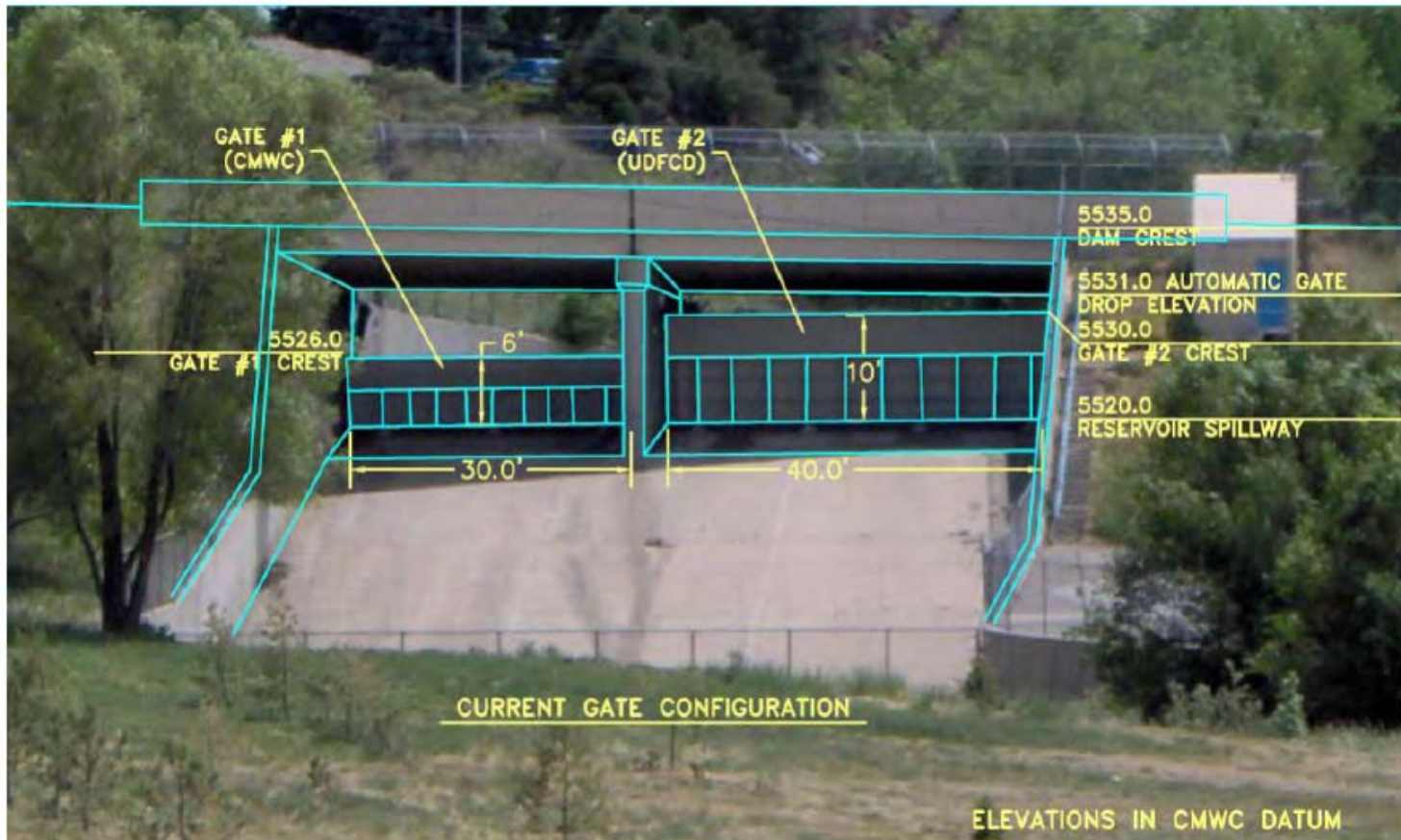
MONITOR NATIONAL WEATHER SERVICE FOR SEVERE WEATHER STATEMENTS.





# Activity

- Determine MGR lake level



# 0920-ST



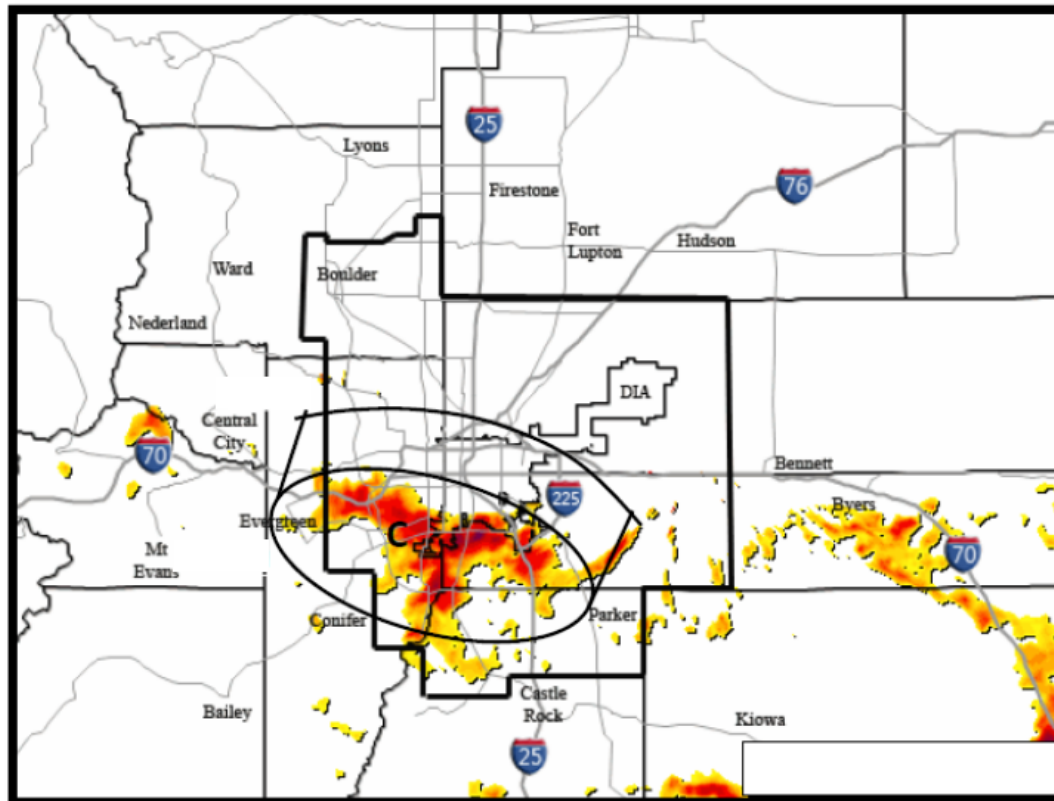
Date/Time: June 30<sup>th</sup>, 2015 920 AM

Meteorologist: Bryan Rappolt

## Storm Track Prediction

Flash Flood Prediction Program

VALID PERIOD: 930 AM – 1100 AM



# 0920–ST (cont.)

**Storm C:** Very heavy rain of 2.50-5.00" likely over the next 1-2 hours. Storm motion is very slowly to the north/northeast. Large hail and active cloud to ground lightning will be likely as well. Flash Flooding will be likely across central Jefferson County, western Arapahoe County and Denver County.

**FLOOD WARNING EXERCISE – THIS IS ONLY A TEST**

UDFCD Flood Prediction Center: 303-458-0789 (voice) 303-458-5309 (fax) Website: <http://f2p2.udfcd.org>

Genesis Weather Solutions/Skyview Weather Prediction Center: 303-688-9175 (voice)

Consultant Email: [f2p2@skyview-wx.com](mailto:f2p2@skyview-wx.com)

Website: <http://skyview-wx.com> & <http://www.genesisweathersolutions.com>



BULLETIN - EAS ACTIVATION REQUESTED  
FLASH FLOOD WARNING  
NATIONAL WEATHER SERVICE DENVER CO  
945 AM MDT TUE JUN 30 2015

THE NATIONAL WEATHER SERVICE IN DENVER HAS ISSUED A

\* FLASH FLOOD WARNING FOR...

NORTHEASTERN JEFFERSON COUNTY IN NORTHEAST COLORADO...

\* UNTIL 1200 PM MDT

\* AT 945 AM MDT, MULTIPLE RAINGAUGES INDICATED THAT 2 TO 4 INCHES OF RAIN HAS FALLEN IN THE PAST 2 HOURS BETWEEN ARVADA AND LAKEWOOD. VERY HEAVY RAIN CONTINUES IN THE WARM SPRINGS AREA. UP TO 5 INCHES OF RAIN POSSIBLE IN THE NEXT 2 TO 4 HOURS.

**Read 0945 warning message**

**NWS WEATHER INJECT**

\* SOME LOCATIONS THAT WILL EXPERIENCE FLOODING INCLUDE...

LAKWOOD...ARVADA AND WHEAT RIDGE.

# 0945-M3



---

Time: 945 AM Tuesday June 30, 2015

Forecaster: Bryan Rappolt

---

## MESSAGE 3

### Flash Flood Prediction Program

---

### FLASH FLOOD WARNING

**PRIORITY DISSEMINATION RECOMMENDED**

### FLOOD WARNING EXERCISE – THIS IS ONLY A TEST

The National Weather Service has issued a **FLASH FLOOD WARNING** for the following counties: **Jefferson**, including: **The City of Lakewood and Wheat Ridge**.

from: **Current** to **1200 PM**. **The National weather service has issued a Flash Flood Warning effective until 1200 PM for central Jefferson County. 2.00 to 4.00 inches of rain has been observed across the warned area over the last 2 hours. Flash flooding is expected as additional heavy rain of 2.50 to 5.00" is expected over the next 2-4 hours.**

Prime time for flooding: **Current** to **1230 PM**.

Forecast rainfall: **2.50 to 5.00" of rainfall is expected over the next 2-4 hours.**

The **most likely** areas to be impacted by flooding are:

Urban streams/gulches; road crossings; recreational trails; adjacent open space areas/campgrounds/parks; floodplain properties; utilities

# 0945-M3 (cont.)

Urban streets, intersections, low lying areas, known trouble spots

---

Additional explanation: **Flooding of creeks, rivers and streams is occurring or imminent.**

Please pass this information along to affected emergency response organizations (police, fire, public works, etc.) within your area.

Also, please take appropriate actions to prepare for possible flooding.

Further information will be provided to you as it becomes available.



# 1015-IMS



Time: 1015 AM Tuesday June 30, 2015

Forecaster: Bryan Rappolt

## Internal Message Status Flash Flood Prediction Program

**MESSAGES 2'S CONTINUE VALID...MESSAGE 3'S IN AFFECT FOR PORTIOS OF THE DISTRICT**

### **FLOOD WARNING EXERCISE – THIS IS ONLY A TEST**

- An upper level low located over southern Nevada will continue to pump sub-tropical moisture over the District today and tonight. As was the case yesterday and earlier this morning, the result will be copious amounts of rain showers and embedded thunderstorms that will move from south to north across the District throughout the day.
- Message 2's and NWS Flash Flood Watch have been issued for the entire forecast District, valid until Midnight.
- A Flash Flood Warning and Message 3's have been issued for central Jefferson County, western Arapahoe County and Denver County.

**STORM RAINFALL POTENTIAL AND DURATION:** Rain showers will produce rainfall amounts of 0.08" to 0.35" in 10-30 minutes, while thunderstorms will produce heavy rainfall of 1.00" to 2.50" in 10-30 minutes. Heavy rainfall of up to 7.00" of rainfall in 3-5 hours will be possible, due to thunderstorm training.

**WORST CASE SCENARIO:** A slow moving thunderstorm complex or multiple strong thunderstorms track over a single location resulting in up to 8.00" of rainfall in 4-6 hours.

County	Message	Valid Times	Prime Time
<i>Boulder County</i>	2	Current TO 1200 AM	Current TO 1000 PM
<i>Jefferson County</i>	3	Current TO 1200 PM	Current TO 1200 PM
<i>Broomfield County</i>	2	Current TO 1200 AM	Current TO 1000 PM

# 1015-IMS (cont.)

<i>Douglas County</i>	2	Current TO 1200 AM	Current TO 1000 PM
<i>Adams County</i>	2	Current TO 1200 AM	Current TO 1000 PM
<i>Denver County</i>	3	Current TO 1200 PM	Current TO 1200 PM
<i>DIA</i>	2	Current TO 1200 AM	Current TO 1000 PM
<i>Arapahoe County</i>	3	Current TO 1200 PM	Current TO 1200 PM
<i>the City of Aurora</i>	2	Current TO 1200 AM	Current TO 1000 PM
<i>Arvada</i>	2	Current TO 1200 AM	Current TO 1000 PM
<i>Wheat Ridge</i>	3	Current TO 1200 PM	Current TO 1200 PM
<i>Lakewood</i>	3	Current TO 1200 PM	Current TO 1200 PM
County-specific Quantitative Precipitation Outlook	Precipitation Time	30-Minute Rainfall and % Probability	Message Potential
<b>Plains</b>			
Adams	Current TO 1200 AM	1.0" (100%) to 2.5" (80%) to 5.0" (50%)	ISSUED
Arapahoe	Current TO 1200 AM	1.0" (100%) to 2.5" (80%) to 5.0" (50%)	ISSUED
Boulder	Current TO 1200 AM	1.0" (100%) to 2.5" (80%) to 5.0" (50%)	ISSUED
Broomfield	Current TO 1200 AM	1.0" (100%) to 2.5" (80%) to 5.0" (50%)	ISSUED
Denver	Current TO 1200 AM	1.0" (100%) to 2.5" (80%) to 5.0" (50%)	ISSUED
Douglas	Current TO 1200 AM	1.0" (100%) to 2.5" (80%) to 5.0" (50%)	ISSUED
Jefferson	Current TO 1200 AM	1.0" (100%) to 2.5" (80%) to 5.0" (50%)	ISSUED
<b>Foothills above 6500ft</b>			
Boulder	Current TO 1200 AM	1.0" (100%) to 2.5" (80%) to 5.0" (50%)	ISSUED
Douglas	Current TO 1200 AM	1.0" (100%) to 2.5" (80%) to 5.0" (50%)	ISSUED
Jefferson	Current TO 1200 AM	1.0" (100%) to 2.5" (80%) to 5.0" (50%)	ISSUED

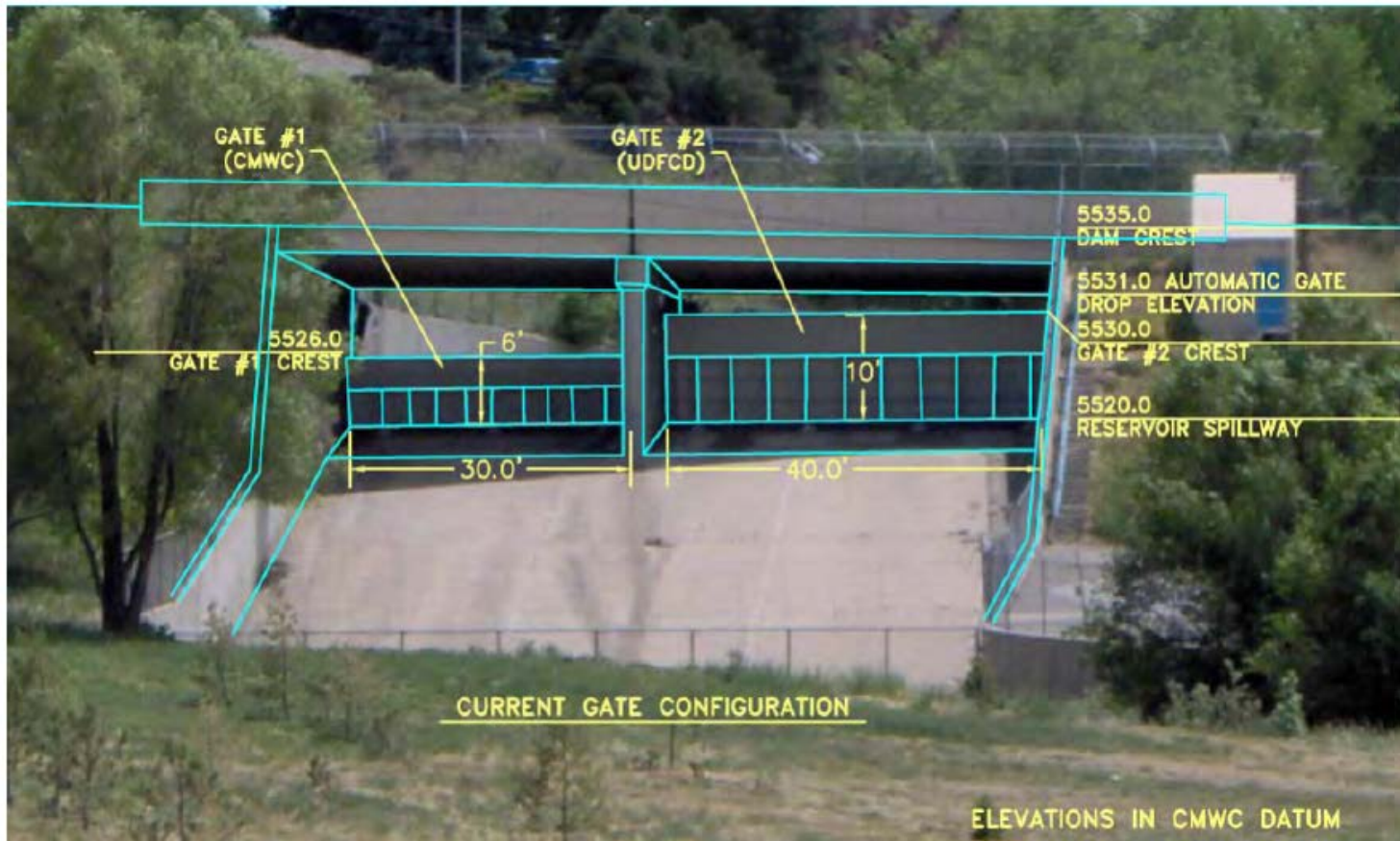
UDFCD Flood Prediction Center: 303-458-0789 Website: <http://f2p2.udfcd.org>





# Activity

- Predict spillway flows from MGR
- Is gate lowering expected and if so, when?
- Then what?



**A POTENTIAL NEXT STEP**

# Proposed Interim MGR Spillway Gate Operations Plan

1. Staged sequential lowering of crest gates to begin when lake level reaches 31 feet
2. Gate #2 to be lowered in two 2-foot increments until it equals the height of Gate #1
3. Proceed with incremental lowering of both gates concurrently in 1-foot increments

*It is our opinion that this plan, or something similar, will 1) assure the safety of the dam in a manner consistent with DWR/SEO requirements; 2) be relatively easy to implement by CMVC operators; 3) will prevent MGR outflows from exceeding inflows for events larger than the 100-year design storm; 4) provide maximum flood control benefit for impact areas downstream of MGR; and 5) offer greatest protection for the water supply stored below W.S. 25 (MGR's conservation pool level).*

CURRENT GATE CONFIGURATION

ELEVATIONS IN CMVC DATUM