

# Southern Nevada Impacts Associated with Tropical Moisture from Hurricane Norbert

Michael Paddock, Ph.D.,  
Justin Pullin, and  
Caleb Steele

National Weather Service  
Las Vegas, Nevada

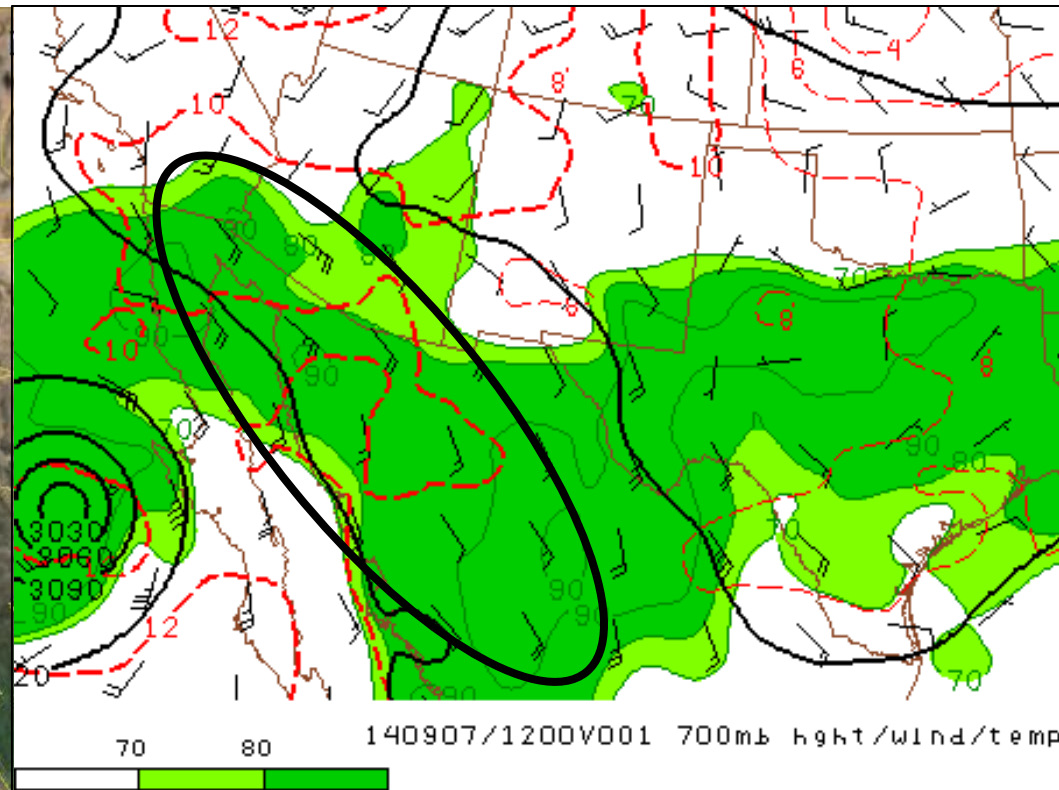
# Outline

- Brief Overview of Key Components Leading to Such a High Impact Event on September 8
- Societal and Economical Impacts
- Discussion of NWS Las Vegas Products and Services



# Moisture Source

Norbert



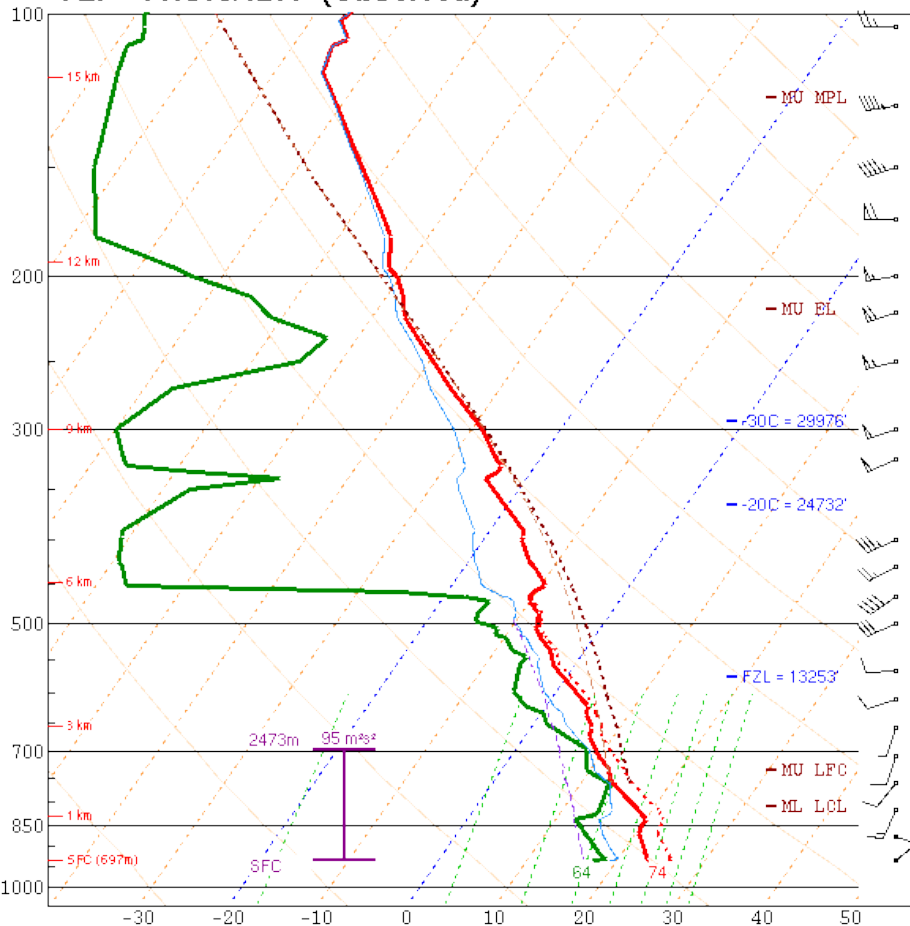
Dolly



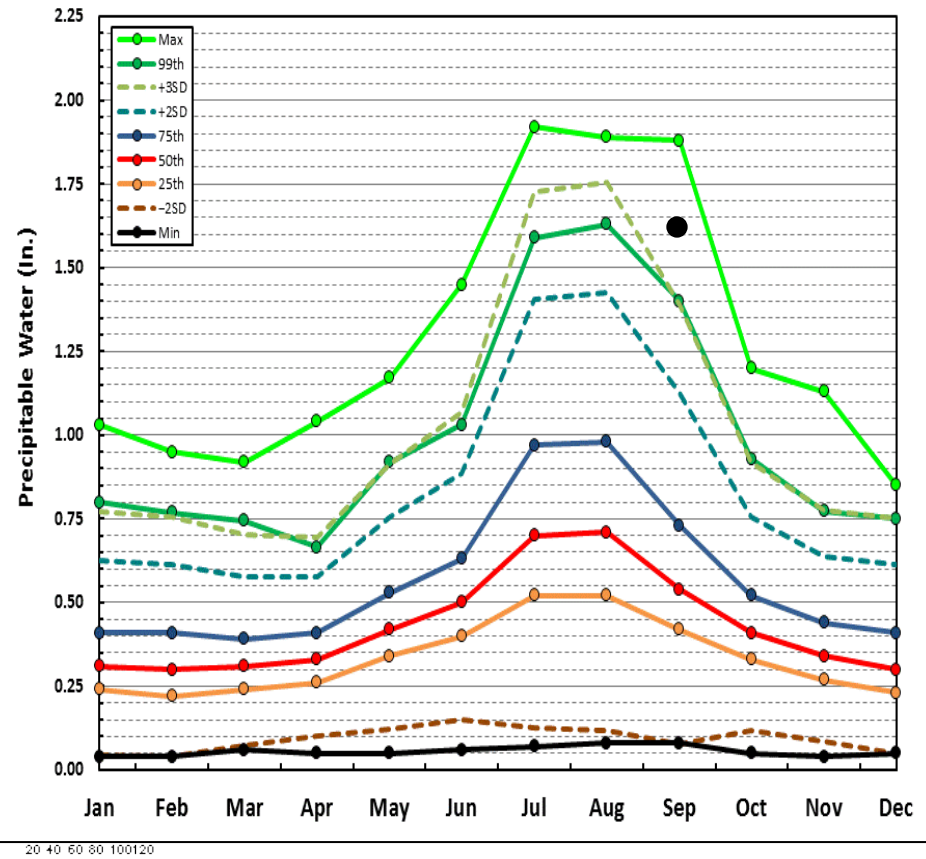
# Sounding and PW Climatology

NOAA/NWS Storm Prediction Center  
Norman, Oklahoma

VEF 140908/1200 (Observed)



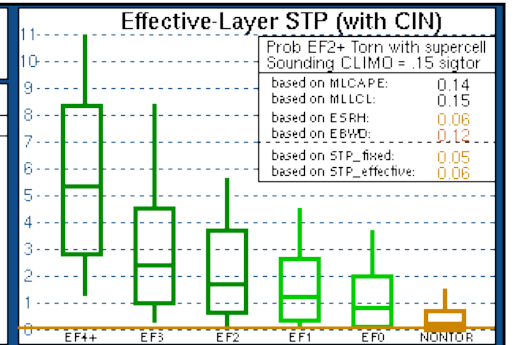
1948-2013 VEF/DRA/UCC/LAS Surface-300-mb Precipitable Water



PARCEL	CAPE	CIN	LCL	LI	LFC	EL
SURFACE	206	-198	769m	-3	7871m	26866'
MIXED LAYER	251	-125	1219m	-3	3176m	26866'
FCST SURFACE	1025	0	1889m	-6	1889m	37394'
MU (759 mb)	781	-0	1821m	-5	2046m	36701'
PW = 1.62 in	3CAPE = 1 J/kg	WBZ = 11752'	WWDG = 0.0			
K = 40	DCAPE = 848 J/kg	FZL = 13253'	ESP = 0.0			
MidRH = 78%	Downt = 62 F	ConvT = 87F	MMP = 0.21			
LowRH = 71%	MeanW = 12.8 g/kg	MaxT = 89F	NCAPE = 0.09			
SigSevere = 4149 m3/s3						
Sfc-3km Agl Lapse Rate = 6.0 C/km						
3-6km Agl Lapse Rate = 5.9 C/km						
850-500mb Lapse Rate = 6.7 C/km						
700-500mb Lapse Rate = 6.6 C/km						

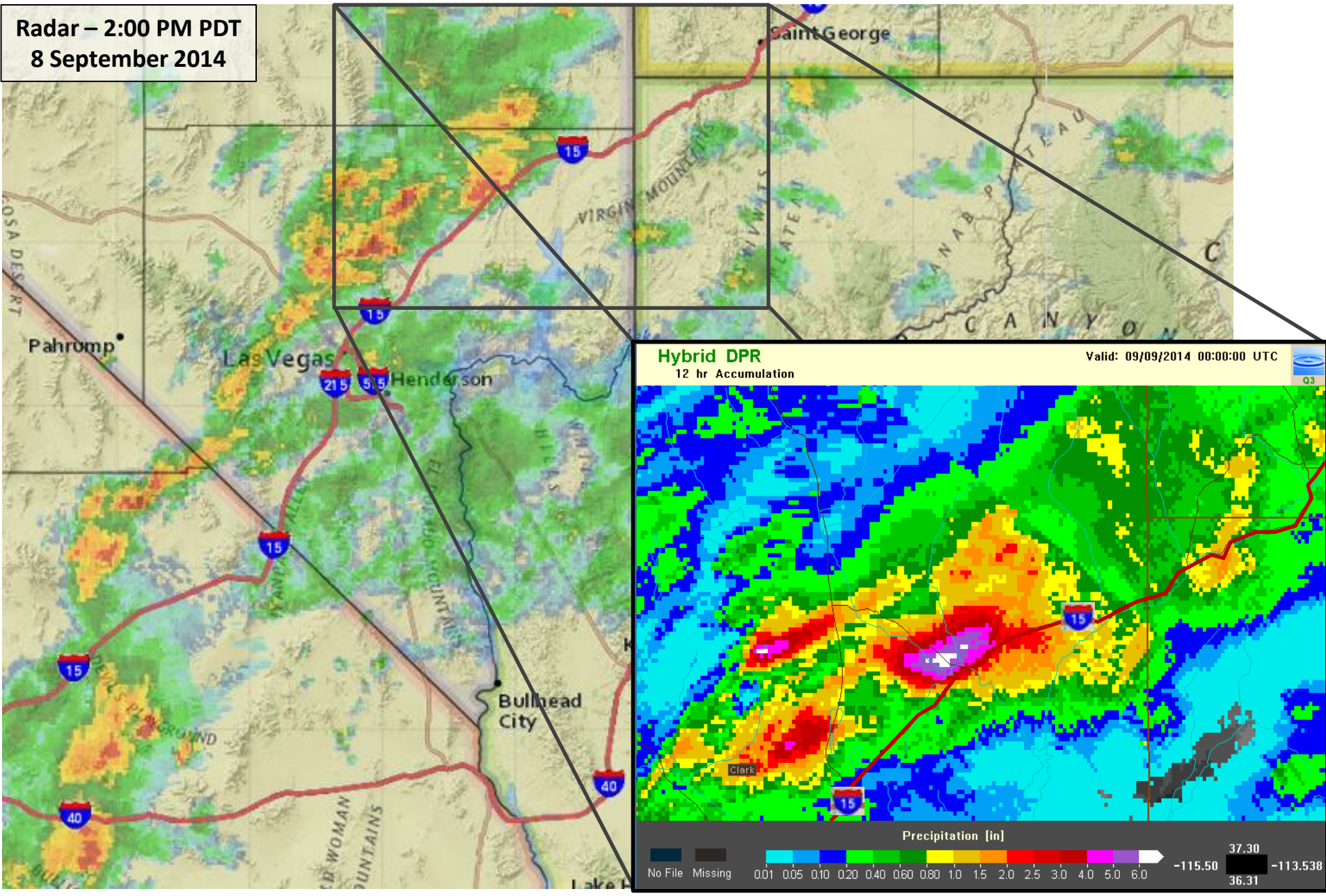
SRH(m2/s2)	Shear(kt)	MnWind	SRW
SFC - 1 km	88	14	141/3
SFC - 3 km	74	9	202/7
Eff Inflow Layer	95	14	202/7
SFC - 6 km	32	227/10	141/15
SFC - 8 km	48	231/13	152/14
LCL - EL (Cloud Layer)	44	233/16	166/15
Eff Shear (EBWD)	43	224/9	137/15
BRN Shear = 25 m/s²			
4-6km SR Wind = 201/17 kt			
Storm Motion Vectors:			
Bunkers Right = 288/17 kt			
Bunkers Left = 185/20 kt			
Corridi Downshear = 244/40 kt			
Corridi Upshear = 252/19 kt			

*** BEST GUESS PRECIP TYPE ***	
Rain.	
Based on sfc temperature of 74.5 F.	
SARS - Sounding Analogs	
SUPERCCELL	SGFNT HAIL
No Quality matches	No Quality matches
(7 loose matches) SARS: 14% TOR	(5 loose matches) SARS: 0% SIG

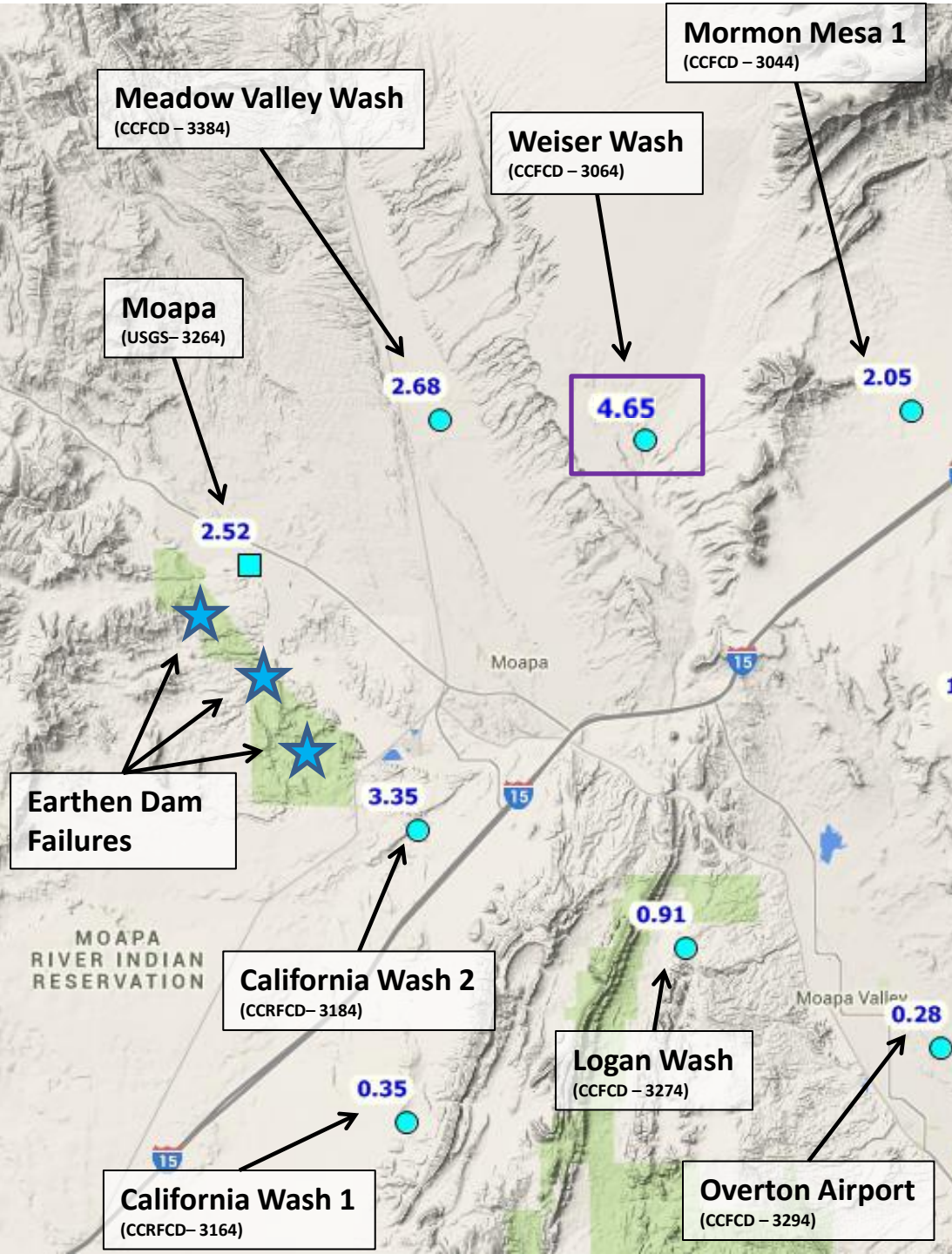


# Moapa Valley Rainfall

Radar – 2:00 PM PDT  
8 September 2014



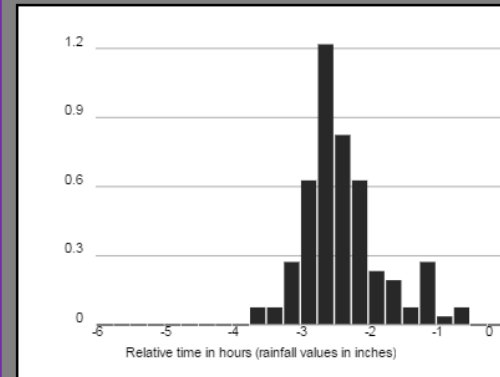


**Station ID 3064**

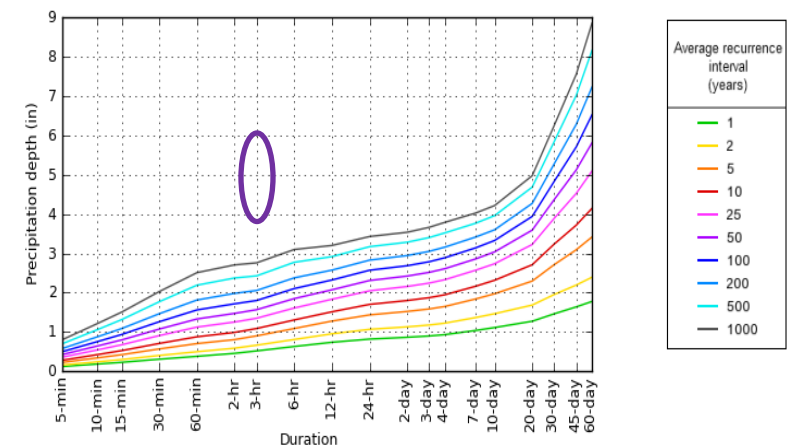
Weiser Wash (Rainfall)

15 minute interval ending 09/08/2014 05:00 PM

Last report: 2014-09-08 16:20:12

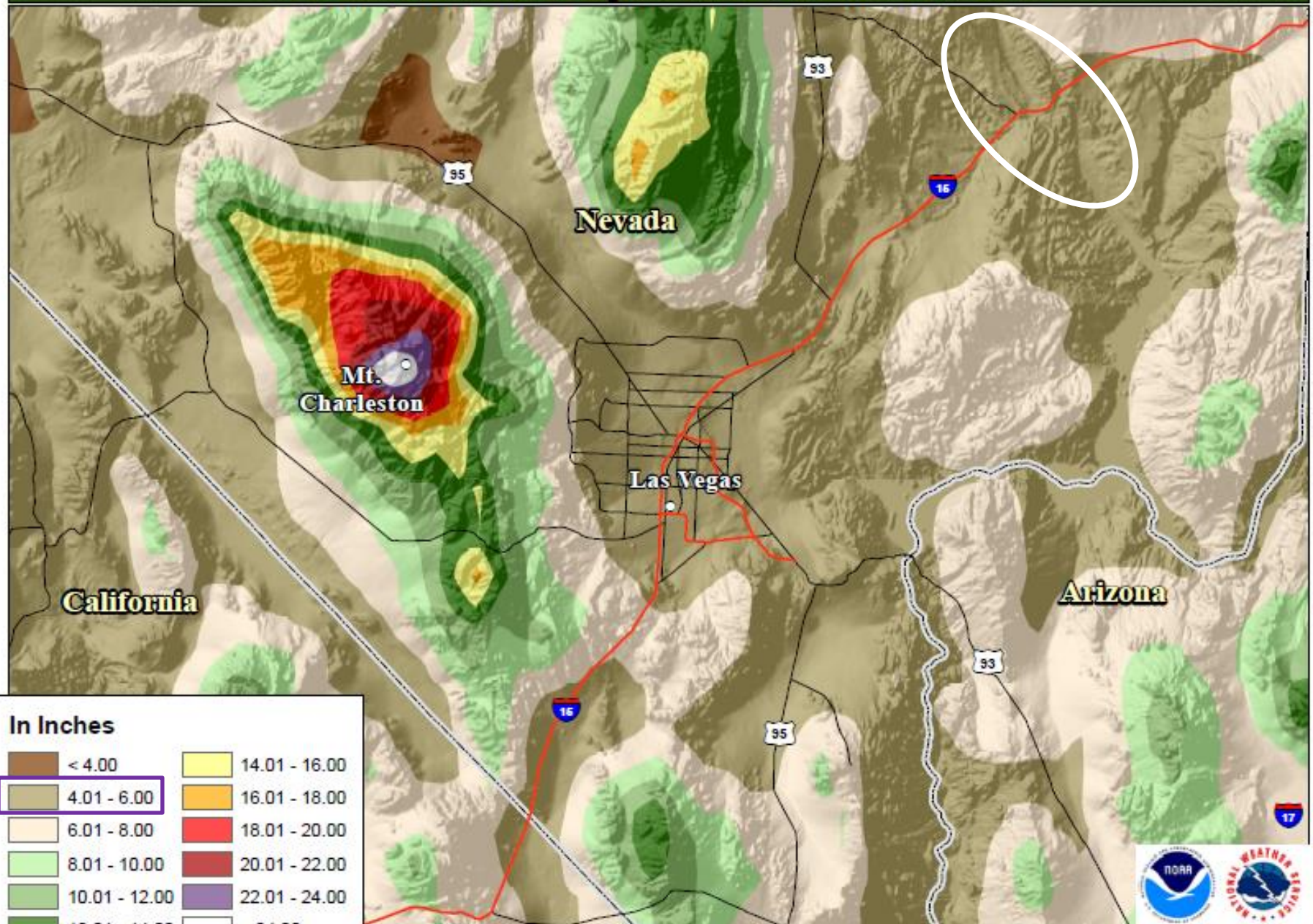
Location  
7 miles north of Glendale.**Rainfall (inches)**

Rainfall (inches)	
Last 5 minutes	0.00
10 minutes	0.00
15 minutes	0.00
30 minutes	0.00
60 minutes	0.12
90 minutes	0.47
2 hours	0.91
3 hours	4.21
4 hours	4.65
5 hours	4.65
6 hours	4.65

[View design rainfall data](#)PDS-based depth-duration-frequency (DDF) curves  
Latitude: 36.6765°, Longitude: -114.5764°



# Normal Annual Precipitation - Southern Nevada



Source: National Climatic Data Center

Created by: The National Weather Service Forecast Office - Las Vegas, NV



# Impacts

- Flood water exceeded the I-15 drainage system

Courtesy: LindiMoo



Courtesy: Shane Dukeman



14FT 10IN



Courtesy: Las Vegas Sun

Courtesy: Las Vegas Sun



Courtesy: 8 News Now



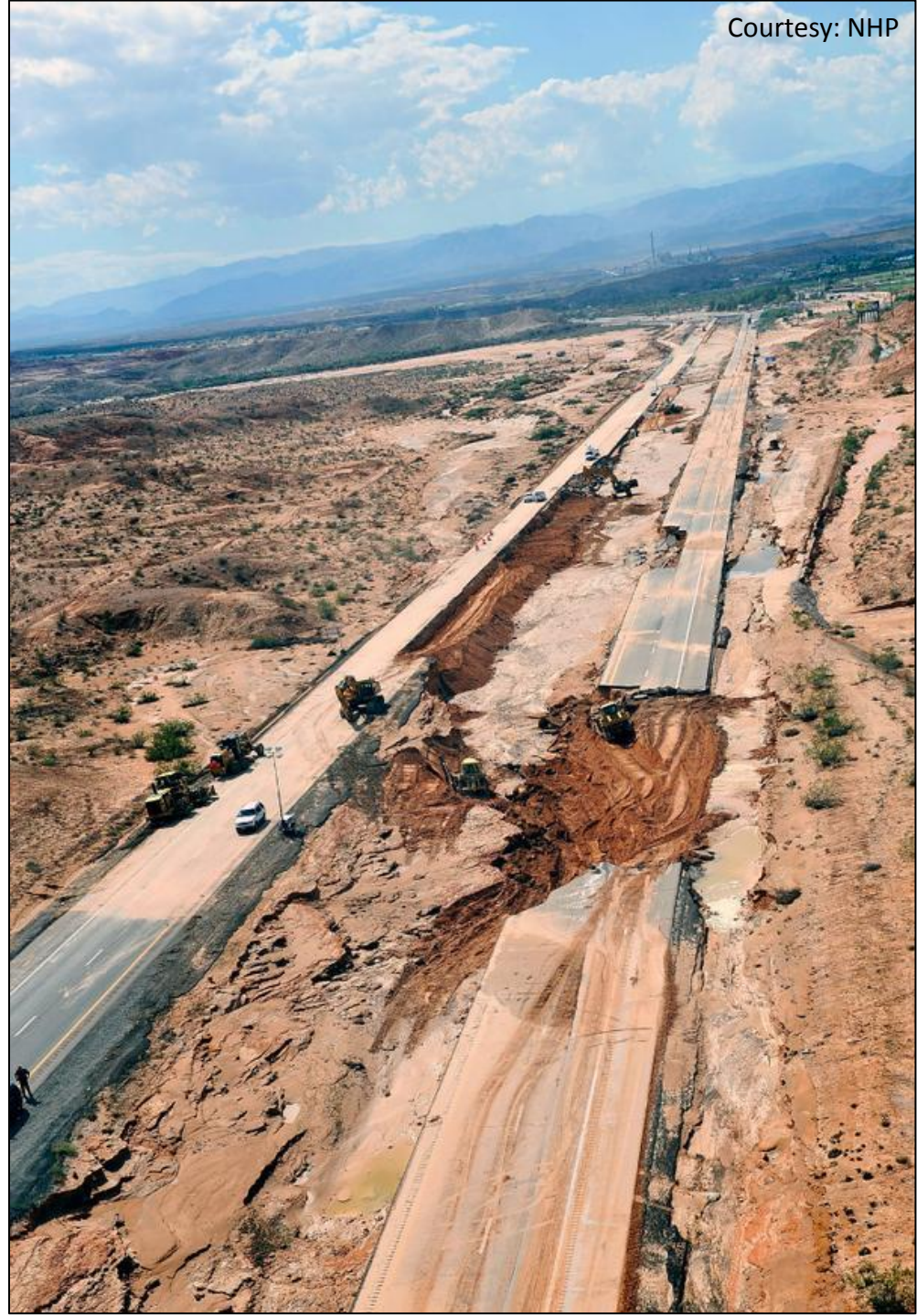


# Impacts

- More that 20 miles of I-15 were washed out
- Nearby residents and travelers had to take a 3-hr detour along rural highways



- **\$5 million** to repair I-15
- One lane of I-15 opened in each direction within 5 days
  - Some long-haul truck restrictions remained





# Impacts

- 91 homes damaged in Moapa
- 48 homes damaged in Overton and Logandale
- More than 190 people evacuated
- More than \$1 million in damages to Clark County infrastructure, ~66% was in the Moapa Valley
- Several swift water rescues
- Power plant employees stranded
- Union Pacific Railroad tracks damaged – services suspended
- Schools opened as shelters
- Red Cross served 209 meals
- 1,449 clean up items distributed to families
- 5 medical and mental health volunteers assisted

The Clark County Commission and Governor's Office declared a state of emergency



Courtesy: Las Vegas Sun



Courtesy: Lexi Leavitt



Courtesy: Rlan Levi



Courtesy: Tom Hawley

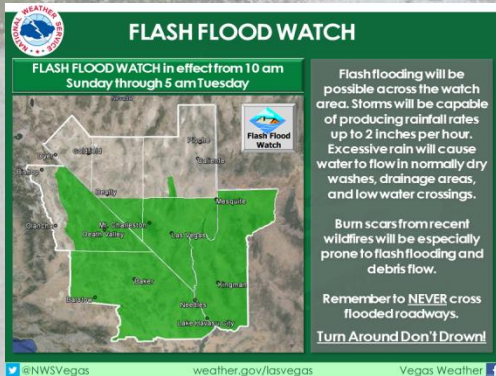


Courtesy: Lexi Leavitt

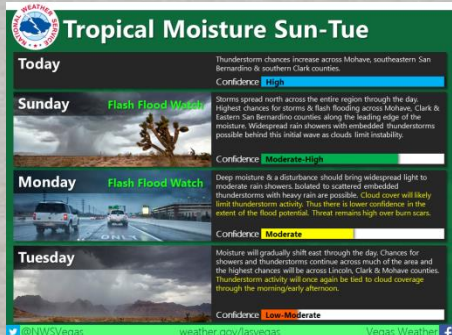


# Products/Services Timeline

- Social media posts and email briefings to core partners continued.



- Social media posts and email briefings to core partners continued.



**3 Sept. 2014**

- First mention of tropical moisture on social media.
- Email weather briefing sent to core partners.

**4 Sept. 2014**



**5 Sept. 2014**

- Social media posts and email briefings continued.
- Held a conference call with core partners.
- Issued a Flash Flood Watch for 7<sup>th</sup> and 8<sup>th</sup>.

**FLASH FLOOD THREAT INDEX**

	Burn Scar	Sat 9/6	Sun 9/7	Mon 9/8	Tue 9/9	Wed 9/10	Thu 9/11
T-storm/Flash Flood Threat Index	Carpenter 1	20	50	60	40	10	5
	Dean Peak	30	70	70	50	20	5

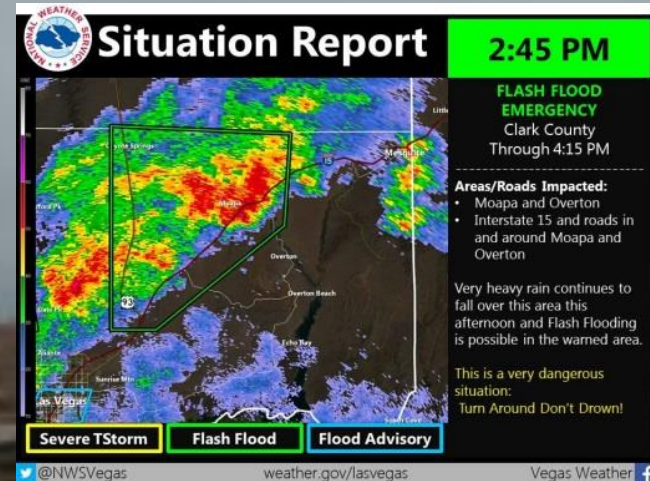
\*Index numbers represent the threat of flash flooding over the burn area. Numbers run from 0-100. Values over 50 indicate that a Flash Flood Watch is possible, while lower numbers mean conditions are marginal. These numbers DO NOT indicate flash flood severity.

**6 Sept. 2014**

**7 Sept. 2014**

- Social media posts and email briefings continued.
- Flash Flood Watch expanded to include Lincoln county.
- Weather Briefings posted in WebEOC.

# Products/Services Timeline



**8 Sept. 2014**

- Social media posts as well as email and WebEOC briefings continued.

**1:17 PM PDT**

- Flash Flood Warning issued for the Moapa Valley and I-15.

**2:30 – 2:40 PM PDT**

- Received reports of possible dam failure and swift water rescues along I-15.
- Contacted Flood Control District.
- Issued Flash Flood Emergency

- Conducted numerous local and national media interviews.

**7:45 PM PDT**

**10:45 PM PDT**

- Participated in Clark County EOC conference calls.

- Event assessment begins.
- Talking points created.

**9 Sept. 2014**

**1:30 AM PDT**

- Participated in Clark County EOC conference calls.
- With treat of additional storms, we deployed to EOC – arriving by 2:30 AM



# Products/Services Timeline

9 Sept. 2014

9:00 AM PDT

- Shift change for EOC liaison.

3:00 PM PDT

- Shift change for EOC liaison.

7:00 PM PDT

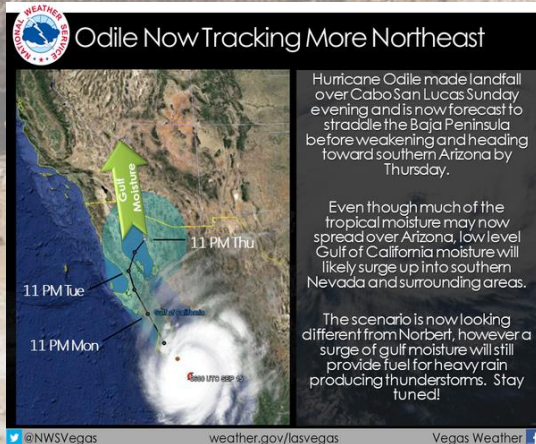
- Final briefing at EOC .
- Transitioned to remote support

10 Sept. 2014

- Local and national media interviews continued.

- Participated in daily Clark County conference calls, sometimes twice a day.
- Provided WebEOC briefings at least twice a day

22 Sept. 2014



- Odile?!?
- #OdileChat – Great idea Tucson!!

*“We are so appreciative of the support we are receiving and thankful for all the personnel and volunteers who have made our recovery a priority”*

- Aletha Tom, Chairwoman of the Moapa Band of Paiutes Tribal Council

*“You guys have been phenomenal”*

- Irene Navis, Clark County Emergency Management Director