Flood Warning Program Specialist
Flood Control District of Maricopa County
Chandra Miller, CFM
Background

Post-College

• 2001-2005 Western Oregon University
  • Bachelors of Science in Earth Sciences and a Minor in Chemistry

• 2006-2008 Environmental Specialist

• 2008-Present Hydrologist/Flood Warning Program Specialist
  • Hydrology
  • Meteorology
  • Flood Warning
  • Programming and Software Development
  • Geographic Information Systems (GIS)
Flood Warning & Response in an Arid Environment
The Team

A day in the Flood Warning Branch
Operation Flood Warning Program
FCDMC ALERT System Inventory

Area: 11,505 mi\(^2\)
Perimeter: 395 mi.

Updated 11/14/2023

ALERT Stations – 412

- Rain Sensors – 362
  - Density: 1 gage per 31.8 mi\(^2\)
- Water-level Sensors – 215
  - On Rivers, Washes & Channels – 142
  - On Dams & Basins – 68
  - Status Sensors (dry/wet) – 5
- Weather Stations – 40
  - Temperature/Humidity Sensors – 40
  - Wind Speed/Direction Sensors – 35
  - Barometric Pressure Sensors – 24
  - Solar Radiation Sensors – 23
- Flashing Roadway Signs – 7 pairs
Flood Warning Program

Meteorological Service Program (MSP)

• FCDMC has an in-house meteorologist
• Provide real-time flood-related information to agencies and the public to protect lives, property, and flood control structures.
• Our Responsibilities
  • Flood Structures (Dams and Levees)
  • MCDEM
  • County Departments & Agencies (Local & State)
    • FRPs, EAPs, Weather Messages, Lake Alerts, Maricopa Flooded Roadway Response Program, etc.

Some Things We Don’t Do...
• Warn the Public Directly
• Close Roads or Bridges
• Initiate or Oversee Evacuations
• Deliver or Place Sandbags
### MSP Forecast Zones

**Maricopa County**

- 17 forecast zones
- 6 lake zones

<table>
<thead>
<tr>
<th>Forecast Zone</th>
<th>Chance of Rain (%) through Tomorrow</th>
<th>Prime Time for Heaviest Rain</th>
<th>Maximum Prime Time Rainfall (inches)</th>
<th>Flash Flood Potential</th>
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<tbody>
<tr>
<td>Gila Bend</td>
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<td>Gila River</td>
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<td>Palo Verde</td>
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<td>Rainbow Valley</td>
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<td>West Valley</td>
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<td>Northwest Valley</td>
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<td>Upper Centennial</td>
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<tr>
<td>Wickenburg</td>
<td>60%</td>
<td>After 4pm</td>
<td>1.25”</td>
<td>Moderate</td>
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<td>New River/Cave Cr.</td>
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<td>Phoenix North</td>
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<td>Phoenix South</td>
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<td>Scottsdale North</td>
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<td>East Valley</td>
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<td>Southeast Valley</td>
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<td>Lower Salt R. Lakes</td>
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<td>Superstition</td>
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</tbody>
</table>
03/15/2023 at 9:30 PM HST by Waters, G.  
Phone: 808-335-7804 (Work Cell)  

MESSAGE 3 ALERT
Valid Time: Now-11:00pm

COMMENTS:
- A cluster of strong t-storms are moving east at 20 mph across portions of the Wickenburg forecast zone.
- Rainfall potential: 6.10"-6.25" with localized greater totals around the 6.0" possible if storms stall out. Stronger cells in the cluster will also be capable of intense lightning, small hail, and strong wind gusts.
- This zone has already received a round of rainfall earlier this evening and additional heavy rain may lead to flooding issues.

FLOOD THREAT: 
Moderate/Elevated

AFFECTED WASHES/ROADS/STRUCTURES:
Normally dry washes are flowing in parts of the zone as well as water pooling in low lying areas and on area roadways. Canyonlands and Powder House Washes are already flowing. Side Wash should be given immediate attention. We will keep a close eye on local washes for any excessive runoff and further updates will be issued if necessary.

AREAS OF GREATEST CONCERN (highlighted in green below):
Arava south of US 60.
Purpose of a FRP

Wickenburg Flood Response Plan

- Formalized communications and warnings
- Different departments know what to do
- Plan of action and potential leave time
- Varying levels ready-set-go
Location

Wickenburg Flood Response Plan

- FRP is town and wash/river based
- NW of Phoenix in Maricopa County
- Includes
  - 26 sq mi of incorporated town
  - Total of 166 sq mi that Wickenburg Fire serves
What are the key part to a Flood Warning Program?

1. Alert Protocol
2. Actions Required
3. Potential Trouble Areas
4. Critical Times
• **Flood Vulnerability and Alert Levels**
  
  - Each alert describes an intensity or likelihood of flooding in Wickenburg.
  
  - Weather Outlooks, Message 1, 2 and 3

• **Flood Response Plan Components**
  
  - ALERT protocol
  
  - Actions required
  
  - Potential trouble areas
  
  - Critical times
Dissemination of Information

Wickenburg Flood Response Plan

• Town of Wickenburg Police Dispatch is tasked with declaring Green Alert, Red Alert or Blue Alert

• Town of Wickenburg is tasked with notifying FCDMC and MCDEM at a Red Alert

• MCDEM is tasked with notifying all other agencies that are not within the Town
ArcPro >>> ArcMap

- 2019 started using ArcPro exclusively
- Organization – one project and one geodatabase with multiple layouts/maps
- Cartography and legends way easier
3D Rainfall Animations
Rainfall Maps

1 Day Totals ending 06/16/2022 12pm
Gage Adjusted Radar Totals

Maricopa County Rainfall Totals

11/18/2019 8am - 11/21/2019 8am

Maricopa County Rainfall Totals

Upper New River
Upper ACDC

Skunk Creek
Cave Creek

Maricopa County Rainfall Totals 3 Day

Value (Inches)

<= 1.18  <= 2.28  <= 3.52  <= 5.45
<= 1.45  <= 2.59  <= 3.90  <= 6.15
<= 1.72  <= 3.01  <= 4.33
<= 1.99  <= 3.20  <= 4.84
Historic Rainfall Layer

Problem – Data Request
Solution – Map Overlay

• To get rainfall markers
  • Uses HTML/JavaScript
  • Need Month, Day, Year, Time Ending and Time Stamp.

• To get rainfall layer
  • Uses php/hist_rain_GET.php and Phyton
    • arcpy.GetParameterAsText
    • Arcpy.SpatialReference
    • arcpy.MakeXYEventLayer_management
    • arcpy.FeatureClassToFeatureClass_conversion
    • arcpy.AddField_management
    • arcpy.CalculateField_management
    • arcpy.NaturalNeighbor_3d
    • arcpy.mapping.MapDocument
    • arcpy.mapping.ExportToPNG
Questions

Look what I got you!

Cool!

But what is it?

It is something girls usually do wear.

When they do girl things...

Awesome!