NWS Flood Operations

Bob Carle, Senior Service Hydrologist
National Weather Service Fort Worth, TX
Flood Operations At The WFO

• There are 2 distinct flood programs at the WFO: River Flood and Flash Flood
• The Flash Flood Program is handled strictly at the WFO
• Forecasters use the same software to issue Flash Flood Warnings as other severe weather products
• WFO has specialized software (FFMP) to monitor heavy rainfall on a small drainage basin scale
• Also monitor real-time rainfall data from local networks
Flood Operations At The WFO

- The river flood forecasts are produced at the WGRFC and issued by the WFO.
- The WFO produces both text and graphic forecast products.
- River forecast point flood stages and damage levels are set by the local Weather Forecast Office (WFO) in coordination with county officials and river authorities.
- River Forecast Centers produce a suite of rainfall products as well.
River Forecast Centers

Click RFC area for local information
AHPS Web Graphics

ELM FORK TRINITY RIVER NEAR CARROLLTON

Universal Time (UTC)

Latest observed value: 8.05 ft at 9:15 AM CDT 6 Aug 2015. Flood Stage is 8 ft

Stage (ft)

Site Time (CDT)

Graph Created (10:33AM Aug 6, 2015)  
Observed  
Forecast (issued 8:55AM Aug 9)

CART2 plotting software |  [NOAA]  |  [US Department of Commerce]  |  Observations courtesy of US Geological Survey
RFC Precipitation Products

Rainfall Reports for the Dallas / Fort Worth Hydrologic Service Area
National Weather Service...West Gulf RFC...Fort Worth, TX
1031 AM CDT Sun Aug 02 2015

Precipitation for the 24 hours ending about 7 a.m. Sunday August 02, 2015

DFW Metroplex...
Waco/Temple/Killeen Corridor...
Red River Valley/Far North Texas...
Wichita Falls/Upper Red River Valley/Far Northwest Texas...

<table>
<thead>
<tr>
<th>Location</th>
<th>Precipitation (in)</th>
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<tbody>
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<tr>
<td>Benjamin 0.2 SSE</td>
<td>1.39</td>
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<tr>
<td>Seymour 3 NW</td>
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<td>Seymour 11 NN - Wichita River</td>
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<td>Greens 0.1 NW</td>
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<tr>
<td>Seymour 15 SE</td>
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<tr>
<td>Ocil 4 ENE</td>
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<td>Lake Remp</td>
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Western North Texas...

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<td>Woodson</td>
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Eastern North Texas...

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<td>Comanche County Airport</td>
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Remainder of Dallas / Fort Worth HSA...
CASA Radar Project

- Original plan called for 8 radars around the Metroplex
- 5 are currently installed and operational, 2 more installed in October
- Data is 1 minute interval
- Radar rotates but does not tilt, beam height is around 800 feet, radar range is about 25 miles
- Precipitation Estimate products have recently been added
- Data has only been available via the Internet but software upgrade at the WFO will allow us to see the data in out AWIPS displays
Questions???

Bob Carle
bob.carle @noaa.gov
817-429-2631  x228
FEMA Community Rating System (CRS)

Flood Insurance Rate Adjustments

SAMANTHA LAMANNA, NCTCOG
National Flood Insurance Program (NFIP)

Created in 1968 by Congress to provide a means for property owners to financially protect themselves from flood losses

Administered by Federal Emergency Management Agency (FEMA)

The NFIP offers flood insurance to homeowners, renters, and business owners if their community participates in the NFIP.

Participating communities agree to adopt and enforce ordinances that meet or exceed FEMA requirements to reduce the risk of flooding.
FEMA’s Community Rating System (CRS)

Voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements.

- Partnership between Floodplain Managers and Elected Officials is essential

Flood insurance premium rates are discounted to reflect the reduced flood risk resulting from the community actions meeting the three goals of the CRS:

- Reduce flood damage to insurable property;
- Strengthen and support the insurance aspects of the NFIP, and
- Encourage a comprehensive approach to floodplain management.
CRS Program Basics

4 Series of Activities:

300 Public Information
400 Mapping and Regulations
500 Flood Damage Reduction
600 Warning and Response

Communities are scored on:

19 Activities
94 Elements
Activities with Ordinance Credits

The following activities can receive CRS credit for ordinance language submitted to FEMA:

Activity 340: Hazard Disclosure
Activity 410: Floodplain Mapping
Activity 420: Open Space Preservation
Activity 430: Higher Regulatory Standards
Activity 450: Stormwater Management
Activity 510: Floodplain Management Planning
Activity 540: Drainage System Maintenance
## CRS Program Basics

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<th>Points</th>
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<td>8</td>
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<td>10</td>
<td>&lt; 500</td>
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CRS Program Benefits

Money stays in the community
Insurance savings offset costs
Better floodplain management program
More organized program
Public information builds awareness
Incentive to keep implementing
Becoming a CRS Community

Must be a member of the NFIP

Designate a CRS Coordinator
  ◦ Keep records, initiate public information programs, develop higher regulatory standards

Complete Application letter, signed by the community’s Chief Executive Officer

Schedule an Initial Verification Visit with FEMA

FEMA completes Verification Visit and determines CRS Class

Annual recertification occurs yearly
CRS Program Participation

United States: 1,296 Communities
FEMA Region 6 (TX, OK, AR, LA, NM): 156 Communities
Texas: 63 Communities
NCTCOG Area: 21 Communities
<table>
<thead>
<tr>
<th>Entity</th>
<th>CRS Rating</th>
<th>CRS Savings</th>
<th>Policies in Force</th>
<th>Insurance in Force</th>
<th>Annual Premiums</th>
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</table>
CRS Users Groups

38 Groups formed in US

- Share how activities done
- Discuss common concerns
- Talks by ISO/Tech reviewer
- Joint projects
- Get new communities in CRS
- Organize training
- Discuss webinar content together
- 2013 Manual change feedback
## North Central Texas CRS Users Group - Past Meetings

<table>
<thead>
<tr>
<th>Date</th>
<th>Title</th>
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<tr>
<td>10/22/2014</td>
<td>Developing Outreach Projects (Activity 330)</td>
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<tr>
<td>11/19/2014</td>
<td>Flood Warning &amp; Response (Activity 610)</td>
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<tr>
<td>12/17/2014</td>
<td>Developing a PPI, CIP, and Using FloodSmart</td>
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<tr>
<td>01/20/2015</td>
<td>Preparing for a Verification Visit</td>
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<tr>
<td>02/17/2015</td>
<td>Introduction to CRS</td>
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<tr>
<td>03/18/2015</td>
<td>Developing a PPI and CIP</td>
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<tr>
<td>04/22/2015</td>
<td>Drainage System Maintenance (Activity 540)</td>
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<td>05/20/2015</td>
<td>CRS and Higher Regulatory Standards</td>
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<tr>
<td>06/17/2015</td>
<td>CRS and Natural Floodplain Functions</td>
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<tr>
<td>07/22/2015</td>
<td>Preparing an Impact Adjustment Map</td>
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North Central Texas CRS Users Group – Next Meeting

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<tbody>
<tr>
<td>8/19/2015</td>
<td>Preparing an Annual Recertification</td>
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Thank You
Development and Floodplain Management

Steven Eubanks, P.E., CFM
Chief Stormwater Engineer
City of Fort Worth
Development and Floodplain Management

HISTORIC DEVELOPMENT
Development and Floodplain Management

LAWS AND REGULATIONS
National Flood Insurance Program

• Established in 1968 to cover flooding (not covered on homeowners policies)
• Administered by FEMA
• Voluntary community participation
• To participate, a community must adopt a floodplain protection ordinance
• Subject to periodic review by FEMA
Section 404, Clean Water Act

- U.S. Army Corps of Engineers
- Protects “Waters of the United States”
- Includes wetlands and small streams
- Requires permits to disturb “Waters”
- Must mitigate loss of habitat
- Discourages stream channelization and concrete lining
Texas Water Code §11.086

a) No person may divert or impound the natural flow of surface waters in this state, or permit a diversion or impounding by him to continue, in a manner that damages the property of another by the overflow of the water diverted or impounded.

b) A person whose property is injured by an overflow of water caused by an unlawful diversion or impounding has remedies at law and in equity and may recover damages occasioned by the overflow.
Lawsuits over drainage have been common.
No Adverse Impact

• “No Adverse Impact floodplain management takes place when the actions of one property owner are not allowed to adversely affect the rights of other property owners.” (ASFPM, 2008)

• Consistent with Texas Water Code §11.086 and similar laws in other states.
Development and Floodplain Management

DEVELOPMENT TRENDS
Development and Floodplain Management

DETENTION AND
GREEN INFRASTRUCTURE
Not like this!
Aesthetics and water quality
Neighborhood Open Space
Conclusion

• “Don’t make things worse.”

• Open space is a community asset and drives up property values.

• In areas of redevelopment, cities and development interests should look for partnership opportunities.
Questions?
Dallas Flood Management

August, 2015
Overview

- Brief System Description
- Recent Flood Hydrology
- Flood Warning Communications
- System Operations
- Continuous Improvement
System Description
Flood Management in Dallas:

- Is a combination of:
  - **Regional Drainage Infrastructure:** Dams, multi-purpose reservoirs, channels and wetlands on the river-side of the levees to convey large volume events and protect urbanized areas; and
  - **Local, “Interior” Drainage Infrastructure:** local drainage systems (pump stations, pressure sewers, streams, creeks, channels, and storm sewers) to address runoff from the land-side of levees to convey it into the Trinity River).
Trinity River Watershed

- Trinity River watershed extends from near Oklahoma border to Galveston Bay (shown in aqua)
- Trinity River drains a total area of >16,000 square miles
- About 6,050 square miles drain through Dallas Floodway
Four Sub-watersheds Meet Above Dallas Floodway

- Clear Fork
- West Fork
- Lake Grapevine
- Elm Fork
- East Fork
Less than 5% of the Trinity River watershed is developed (red outline on maps)

Dominant land use is agricultural range land.
Local Drainage System Description

- Phase 1 Municipal Separate Storm Sewer System (TCEQ permit to discharge to Trinity River)
- 32 12-Digit HUC sub-watersheds in/ near Dallas – 700 square miles
- Drains portions of Dallas, Collin, Denton, Kaufman and Rockwall Counties
- 385 square miles in Dallas proper
Storm Drainage

- 1,800 miles of Storm Drainage Pipes
- 115 miles of City owned creeks
- 48 miles of lined channels
- 180 ponds
- 11,000 outfalls
- 65,000 inlets
The majority of the needs in the City are associated with areas developed with inadequate standards.
Recent Flood Hydrology
Recent Rainfall Distribution

- May 2015:
  - 28.9 inches – upper part of watershed
  - 16.96 inches – DFW Airport

- 2014 @ DFW: 21.3 inches/year

- Average DFW Rainfall: 35.6 inches/year

City of Dallas
Flood Warning System
Flood Risk Reduction

- 200,000 people work or live behind the levees
- $12.2 billion in floodplain investment

2015 May/June Event
Pumping Systems

- At peak of event through Dallas, 33 pumps were operating
- Provided opportunity to thoroughly test/run Baker and Pavaho Pump Stations
- System functioned as designed
### Pumping Operations – SCADA

<table>
<thead>
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<th>Location</th>
<th>Elev Rise</th>
<th>Intrud</th>
<th>Low Flow</th>
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<th>3rd Pump</th>
<th>4th Pump</th>
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</table>

- **Sumps Graph**
- **ACK ALARMS**
- **NEWS MASTER**
Flooded Roadway Warning System (FRWS)

40 FRWS Locations Citywide
8 Underground lift stations
Recent Flooding
Localized Flooding

- Loop 12/Singleton Area (West Fork Trinity River)
- Luna Road/I35 (Elm Fork Trinity River)
- Peavy Road (Dixon Branch u/s White Rock Lake)
- Goforth & Lawther (White Rock Creek)
- Other Street Flooding
Loop 12/Singleton Area

- Identified Flood prone Area in Needs Inventory
- Flood peak occurred on May 30, 2015
- TxDOT, TRA, TWM used 26 pumps at height of storm to pump down adjacent sump
Elm Fork Area Flooding

- Closed Roads on May 30, 2015 due to high water on Elm Fork
- DAS Animal shelter
- No homes in area
- Also in an area with identified flood risk
Community Response Management System (CRMS)

- Over 750 calls received:
  - 670 – Flooded roadways
  - 27 – Rescues, no boat
  - 18 – Boat rescues
  - 5 – Swift Water Rescue
Continuous Improvement
Successes

- System performed as designed
- Protected majority of areas from flooding
- Communication and teamwork with all internal and external partners including USACE, TXDOT, Dallas County, DISD, Hospitals, Red Cross, Downtown agencies and all related emergency task forces
- Support from internal departments
- Trained work force – pro active actions
Future Opportunities for Improvement

- Work with UTA in combining data of the region
- Upgrade flood warning system
- Evaluate new technologies
- Upgrade electronics hardware and software
Common Challenges

- Funding
- Aging Infrastructure
- Floodplain Development
- Hiring Talent
- New Regulations and Policies
- New Technology
Questions?

City of Dallas
Trinity Watershed Management
- Susan Alvarez, PE, CFM – Susan.Alvarez@dallascityhall.com
- Dhruv Pandya, – Dhruv.Pandya@dallascityhall.com
- 214-671-9500