Elected Officials Floodplain Seminar and CRS Users Group

July 18, 2018
WELCOME & INTRODUCTIONS
OneRain, Inc. was awarded a contract to provide a regional flood software platform for North Central Texas. This platform allows cities who already have flood gauge/low water crossing hardware in the field to share their data with other cities in the region and track storms across NCT, making coordination during storms easier. It also provides a subscription to OneRain’s services at a significantly lower cost than obtaining it alone.
How Much Does Joining the Common Flood Software Platform Cost?

- **Yearly Subscription Fee:** $4950
- **$500 permanent yearly discount for the first 10 communities**
- **One-time Services (some optional)**
  - Custom Dashboards: $1000
  - Custom Serial to IP Kit: $1500
  - Client Setup and Configuration: $1500
- **Quotes from OneRain:**
  - Historical Data Load
  - Custom Data Feed
  - Optional Datasight Software License
How Does a Community Sign Up for this Service?

- Communities must be a member of North Texas Share
  - Joining North Texas Share is free.
- Order form will be available in August at https://www.northtexasshare.org/
  - Completed order forms can be sent to Craigan Johnson, Purchasing Supervisor, at NCTCOG. cjohnson@nctcog.org.
- The first 10 communities to send in a signed form will receive a permanent $500 yearly discount off of the subscription fee.
Regional Low Water Crossing Map

www.nctcog.org/envir/watershed-management/low-water-crossing-reporter
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Extreme Precipitation, NOAA Atlas 14, Other InFRM Initiatives
What Can You Do?

Date: 18 July 2018
Audience: NCTCOG Elected Official’s Training
Jerry L. Cotter P.E., Chief Water Resources
U.S. Army Corps of Engineers, Fort Worth District
Components of Flood Impact Determinations

- Meteorology • How much precipitation
- Watershed Hydrology • How much runoff
- River Hydraulics • How deep will the water get
- Consequences • Critical infrastructure • Homes, Businesses, Hospitals

Emergency Response/Recovery
- Observed & Future Rainfall
- Real-time Runoff
- Real-time Inundations
- Real-time Impacts

Emergency Preparedness
- Historical Events W/in Region
- What-if Runoff Scenarios
- What-if Inundations
- Preparedness Impacts

Infrastructure Planning
- Design Standard “100yr Rainfall”
- 100-year Runoff
- 100-year Inundations
- Planning Infrastructure
Beginning in 2015, Texas has experienced a growing trend toward extreme weather and weather anomalies.

Hurricane Harvey was unprecedented in the history of the United States!
Hurricane Harvey Storm

Could Harvey Happen in DFW?

- Rainfall totals up to 60"
- Approaching or exceeding what scientists believed was the maximum amounts of rainfall possible!
- 23,000 + mi² (CT, RI, DE, NJ)
- Largest storm in continental US history
- OFF THE CHARTS!
Harvey Weather Patterns

85% PMP - Growing trend toward extreme weather and weather anomalies

Blocking Ridge of High Pressure

Northwest Wind Flow Aloft

Little Rock

Harvey

Blocking Ridge
Growing trend toward extreme weather and weather anomalies

Tropical Storm Patricia - Corsican, TX – October 2015

Legend

- 24” - 26”
- 23” - 24”
- 21” - 23”
- 20” - 21”
- 19” - 20”
- 17” - 18”
- 15” - 17”
- 14” - 15”
- 12” - 14”
- 11” - 12”
- 9” - 11”
- 6” - 8”

Dallas - Fort Worth

22” Rainfall Center
Brenham Storm, May 26-27, 2016 (Not Tropical)

Growing trend toward extreme weather and weather anomalies
Tropical Storm Norma, Clyde, TX – October, 1981

18" of rainfall in Dallas - Fort Worth area.
Central and East Texas, May-June 2015
Why InFRM - Storms Exceeding Infrastructure and NFIP Standards

- Regional observed storms
  - USACE extreme storm database
- 24-hour rainfall for 10 mi²
- Plotted in descending order
- Grey band is current design standard (100-year) for all of TX
- Blue X’s points are 2010-2017 storms that exceed 100-year
- 18 events exceeded the 100-yr design standard
Storm Analysis

2010 - 2017
Dallas-Fort Worth - Flood Control and Water Supply System

- Devastating floods, 1908, 1942, 1949
- 6 multi-purpose reservoirs
- 2 federal levee systems
- DFW Flood Control System
  - $100 billion in damages prevented
  - $2 - $3 billion annually
- Water supply system
  - 7 million served
- Total cost $2.5 billion
Tropical Storm Hermine – Arlington, Texas September 2010

- 2010 Tropical Storm Hermine
- Extensive flooding
- No fatalities
- Buy-outs for 150 residences
- $17+ M
Need to Manage and Understand Uncertainty Better

- Why have we had 3 100-year events in the last 10 years?
- Who is at risk during an extreme storm event?
News Clips – Recent Storm Events
News Clips – Recent Storm Events
Interagency Flood Risk Management (InFRM)

- Established 2014
- Integrated Water Resources Science and Services (IWRSS) program
- Regional (FEMA Region 6)/Statewide/Basin-wide approaches & support
- Supports common missions
- Collaboration
- Leveraging resources and information
- Limit duplication of effort
- [www.InFRM.US](http://www.InFRM.US)
InFRM Initiatives

- NOAA Atlas 14
- Watershed Hydrology Assessments (WHA)
- Inundation Mapping/Mitigation Planning Tool
InFRM – Meteorology Research Initiatives

**What is it:**
- Precipitation frequency estimates
- Informs us of how much rain to expect in a 100-yr storm event
- Non-regulatory product

**Benefits**
- Better understanding of the risk from extreme precipitation events
- Infrastructure design, bridges, culverts, wastewater, water supply
- Floodplain mapping (NFIP), where can we safely construct new neighborhoods
- Preparedness or mitigation planning

**Ongoing studies**
- NOAA Atlas 14 (September 2018)
- Extreme storm HHT & Extreme storm DB

**Studies still needed ($3 - $4 M)**
- Other methods to estimate precipitation frequency (check)
- Trend analysis
- Storm studies
## Why does Texas need NOAA Atlas 14?

### Why NOAA Atlas 14?
- Today’s USA de-facto national standards
- Endorsed by federal water agencies
- Current products are outdated
- Wider range of duration and return intervals
- Modern Web-based data access platform
- More stations – better technology
- More years of observations
- Improved statistical techniques

### Limitations
- Texas is falling behind surrounding states
- Not in the NOAA/NWS federal budget
- Developed at request of end users
- Funded by end users
- Basic technology is dated
- Granularity of data
- Need additional verification studies
2-year 24-hour Precipitation Estimates

To access NOAA Atlas 14 data

- Navigate to:
  
  http://hdsc.nws.noaa.gov/hdsc/pfds/

  Or thru
  
  www.InFRM.US

- Click on a study location
- Access tables, and other forms of data in electronic format

Utilize USACE applications that incorporate NOAA Atlas 14 data

Use an updated NFIP map
- Communities update design manuals, incorporating NOAA Atlas 14 data
- TXDOT updates design manuals, incorporating NOAA Atlas 14 data
- New NFIP maps produced which incorporate NOAA Atlas 14 data

NOAA Atlas 14 – How Does It Become Regulatory
NOAA Atlas 14 Precipitation Changes

Questions?
Watershed level vs. community level

Current Basins
- Guadalupe
- Trinity
- Neches
- Colorado

Provides
- Frequency Flows for Design & NFIP 2-yr, 5-yr, 10-yr, 25-yr, 50-yr, 100-yr, 250-yr, 500-yr
- Existing, future and climate change conditions

Benefits
- FEMA NFIP
- Supports all infrastructure groups
- Independent non-political science based result using multiple methods

Follow-up -> Increased resolution in urban areas

What is the 100-year flood?
Demonstration of uncertainty (variability) associated with each method (actual location, actual records)
InFRM – Inundation Map Server (What You Will See)
InFRM – Web Based Mitigation Planning
Your Strategy to Decrease Risk and Manage Uncertainty

- Participate with the NCTCOG
- Better manage and understand potential for and impacts of extreme storms
- Pool funds and budget funds for the 3 areas
  - Meteorology (how much rain?)
  - Hydrology (watershed response?)
  - Hydraulics (how deep?)
- Planning - develop NFIP mapping (100-year)
- Emergency mitigation and preparedness
  - Inundation map libraries
  - Apply regional storms (storm transpositions)
  - What is the potential for flooding
What Can You Do?

- Consider adoption of higher standards - Freeboard
  - 2’, 3’, 4’ or more above the 1% exceedance or 100-year level
- Adopt stormwater management policies (decrease risk)
- COG, TFMA and USACE
  - Promoting higher standards
  - Promoting stormwater management policies
- Why
  - Decrease risk and manage uncertainty
  - Decrease future losses and costs
  - Lower insurance premiums
Embracing Technology Changes
Infrastructure Decision Pyramid

- **FOUNDATION** - data, observations, reference materials
- **ANALYSIS TOOLS** - evaluation, performance
- **GUIDANCE and POLICIES** - criteria, methods, requirements, needs, safety
- **DECISIONS** - new policies, better performance, new methods

**Invest**
- CWMS Modeling
- NOAA Atlas 14
- Stream and Rainfall Observations
- QPE Data

**Invest**
- Watershed Hydrology Assessments
Questions?

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Visualizing Risk & Resilience

Flood Economics and behavioral science: Case Studies in Community Mitigation
July 2018; NCTCOG Elected Officials Floodplain Seminar

FEMA
The public in the United States doesn't speak with a single voice. They have very different perspectives [...] 

If you want to engage the public effectively, you've got to start where they are—not where you are.

— Anthony Leiserowitz, Director of the Yale Project on Climate Change Communication
Data, Templates, Plans, & Maps Aren’t Enough

- Our brains are complicated
- Understanding how our brains receive and process information helps us understand people’s motivations and how they may think about and receive information about their risks
- We need to be aware of the cognitive biases and heuristics that will affect how each community member thinks about flood risk
Resilience Requires Behavior Change
Changing the Conversation: Floodeconomics.com

- Increase decision-makers’ awareness of flood risk and its relevance to their communities;
- Increase their knowledge of how to mitigate a community’s flood risk; and
- Encourage people to share this knowledge with key industry experts and affected stakeholders, creating a ripple effect.
Audiences

- Nontechnical Decision-makers
  - Mayors
  - Local council members

- Community Leaders
  - Association presidents
  - Community advocates

- Technical Experts
  - Floodplain Administrators
  - Planners
  - Hazard Mitigation Staff
  - Advisors
Case Studies

Profiles of 21 communities across the US that mitigated flood risk

Houston, Texas

**Acquisitions and elevations help to reduce Hurricane Harvey’s impact**

Because many communities in Houston were built before flood regulations were enacted, thousands of homes are at risk of flood damage. Since 1989, Houston and Harris County officials have worked with FEMA on grants to acquire or elevate more than 1,600 of the hardest-hit homes in the area.
Flood Economics Tools

State summary for Texas

- Average return on investment: 81%
- Average benefit-cost ratio: 1.81
- Number of projects: 753
- Total investment: $1.4b
- Total benefits: $2.0b

Source: FEMA Hazard Mitigation Assistance Grants database

Flood mitigation goes beyond dollars and cents

The benefits of mitigation cannot be overstated. Community leaders are driven to take action in order to revitalize neighborhoods, improve public spaces, enhance public safety and boost the community’s competitiveness.

- Avoided property losses
- Avoided business & education interruption
- Ecosystem benefits
- Avoided loss of critical infrastructure
- Rebuilt neighborhoods
- Improved public spaces
- Enhanced public safety
- Increased competitiveness for the community

Flood mitigation projects, 1996–2016

Total investment and number of projects by type of project

- Planning and Education
  - Mitigation planning: 163 projects ($23,181,169 invested)
  - Public awareness and education: 23 projects ($6,389,612 invested)
- Building-related
  - Stormwater acquisition and reduction: 177 projects ($505,533 invested)
  - Elevations: 9 projects ($47,022,811 invested)
  - Floodproofing (wet or dry): 15 projects ($12,105,338 invested)

Cumulative

1996 – 2016
Why Storytelling?

Because storytelling is better than fact-sharing.

Because there are powerful stories to tell about how communities can drive mitigation action.

Stories that are

More memorable  More powerful  More persuasive  More effective
“Risk is not a static thing. Risk is dynamic. It moves, and we have to constantly stay alert and understand that you have to be prepared for that change.”
Luis Valdez, Fire Chief, Leon Valley, TX

“All communities have to have tremendous respect for Mother Nature. You’ve got to learn and embrace changes. Nobody expected the issue of Sea Level Rise. It happens.”
Bruce Mowry, City Engineer, Miami Beach, FL

“We are keenly aware that we’ve got a huge responsibility to our community in keeping good floodplain management practices, with hundreds of millions of dollars in property at stake if something were to fail.”
Stan Polivick, Assistant Public Works Director, Cape Girardeau, MO
How can we help?

- Peter Herrick, FEMA Risk Management Directorate
  - Peter.herrickjr@fema.dhs.gov

- Meg Bartow, Resilience Action Partners
  - Meg.bartow@ogilvy.com

- Fontaine Bland, Resilience Action Partners
  - Fontaine.bland@ogilvy.com
The best way to prepare for a disaster is to learn from experience.
Every $1 spent preparing for a flood right now will save an average of $6 later on.
· Discovery Meetings
· Resilience Meetings
· Hazard Mitigation Planning Meetings
### Feed for The FEMA Podcast

Federal Emergency Management Agency (FEMA) ➤

#### From the Provider

Telling the story of what FEMA does and how we do it, and providing a call to action for the nation to prepare for potential disasters.

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