Local Decision Support Services During a Major Flood Event - Successes Gained and Lessons Learned

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Red River Valley Overview

- Glacial Lake Agassiz
- Silty lakebed soils
- "Valley" is misleading
- Overland Flooding
- 1 foot slope every mile
- Red River flows North

Flood event review

- Record flooding occurred on the Red River at Fargo with crest of 40.82’ on March 28
- Antecedent conditions prime for high flood potential
- Outlooks highlighted likelihood of major flooding, and ultimately of record flooding, well in advance

Decision Support Services

Key Events

1/9/09-3/15/09: WFO FGF and the NCRFC engaged with state/local EM's and congressionals about RRN flood potential

3/24 -4/3; 4/13-16: On-site support at Fargo/Moorhead and Minnesota SEOC

3/25-5/1: On-site support at ND SEOC (*aft 4/20: mornings only)*

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MARCH APRIL

3/20-4/6: Daily DHS/FEMA/NOC briefings from NWS Central Region Headquarters

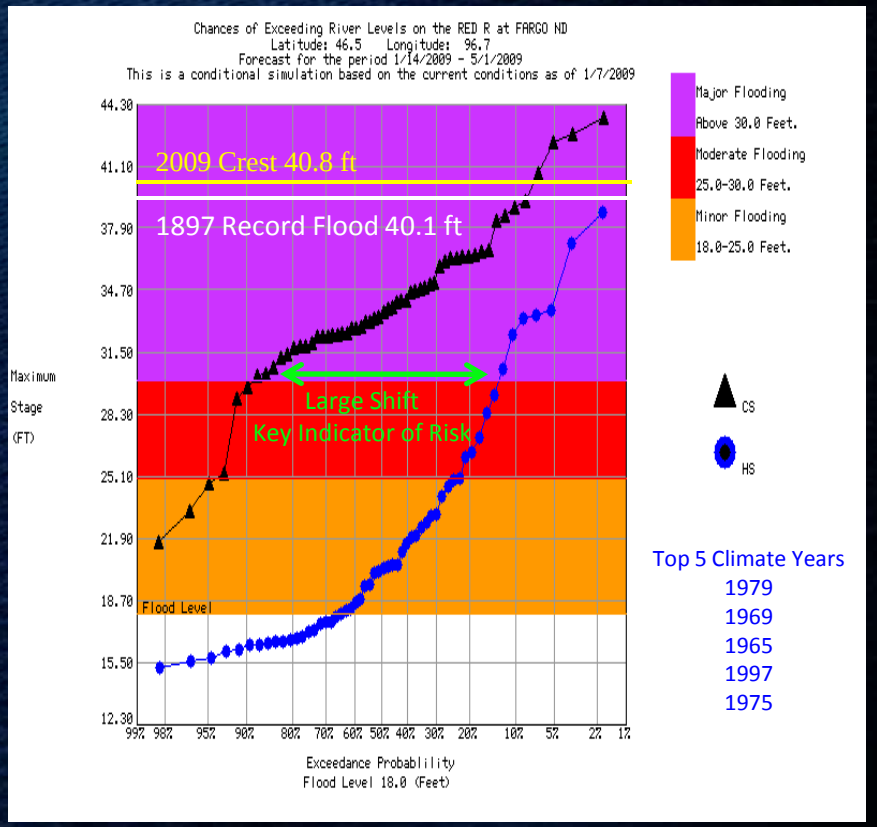
3/26-31: On-site at SD SEOC

4/15-4/16: *Second Crest* On-site support ends at Fargo/Moorhead and scales back at MN SEOC.

Key Briefing on January 8, 2009

Addressed Significant Threat for Major Flooding

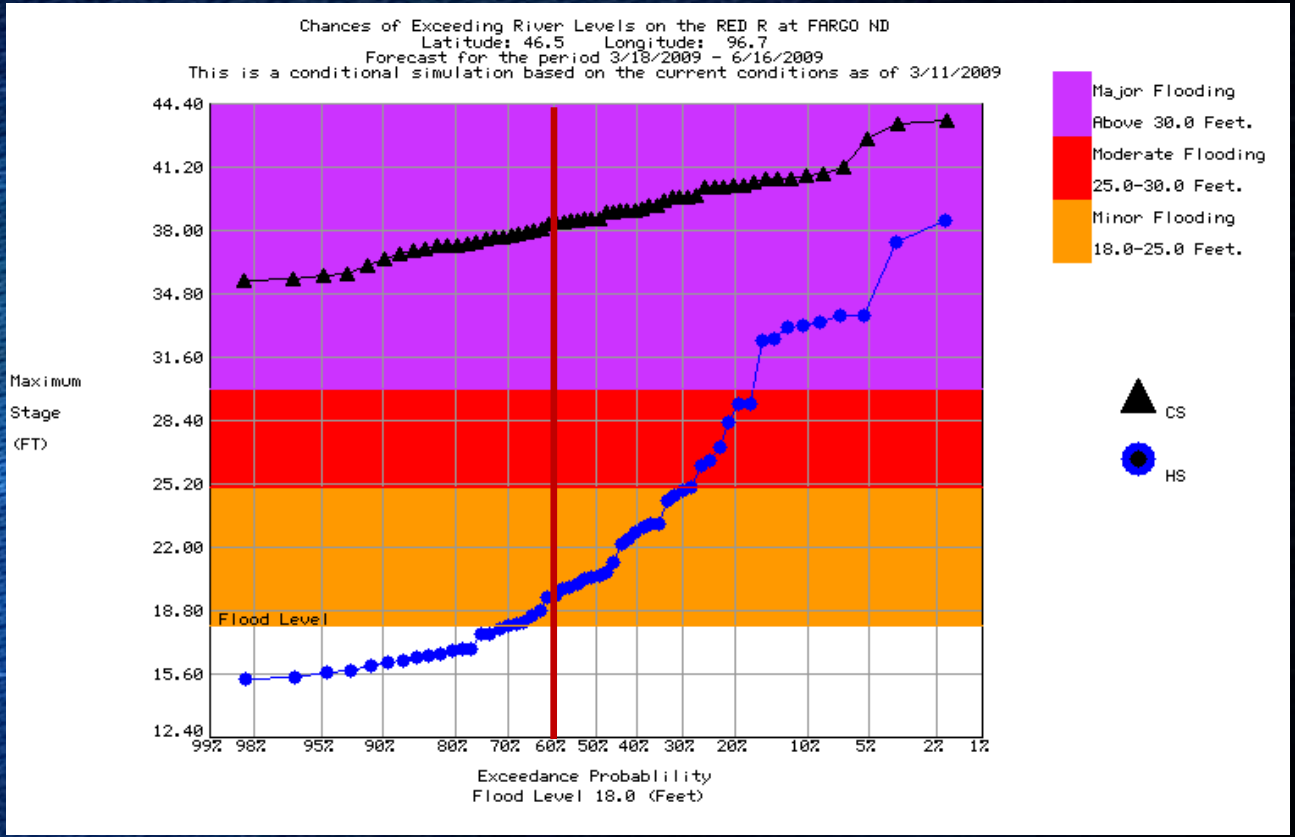
- Focus on Current Conditions in the Red River Valley
- Attendees: NWS, USACE, Minnesota DNR, USGS, FEMA, NDSWC, Manitoba Water Resources, Emergency Managers, Watershed Districts
- As a result, NCRFC issued an early suite of probabilistic forecasts for the Red River Valley on January 9th, 2009



Fargo January 14 - April 30

Fargo flood probability outlook

- 60% chance of reaching 38 feet
- 1 out of 4 chance of eclipsing the flood of record!!



Issued March 11, 2009

Multi-tiered support

- **On-site support provided at three State Emergency Operations Centers (SEOC)**
  - ***North Dakota SEOC staffed by WFO Bismarck from 3/25 to 4/17, and some mornings from 4/20 to 5/8.***
  - ***Minnesota SEOC staffed by WFO Chanhassen from 3/24 to 4/3, and most mornings from 4/6 to 4/15***
  - ***South Dakota SEOC staffed by WFO Sioux Falls from 3/26 to 3/29***

Multi-tiered support

- **On-site support to FEMA Region VIII in Denver**
  - ***Staffed by WFO Boulder from 3/24 – 3/30.***
- **On-site support to Fargo/Cass County EOCs and to Moorhead/Clay County EOC**
  - ***Staffed 3/23 – 4/4 by WFO Grand Forks and Central Region Headquarters***
  - ***Staffed 4/13 – 4/16 by WFO Grand Forks and WFO Grand Rapids***

Regional HQ role

- Central Region ROC (Regional Operations Center) activated for nearly a month
- Roles and responsibilities:
  - *The "grand conductor" of DSS missions*
  - *Coordinate activities and message from all on-site DSS teams*
  - *Brief Headquarters and NOAA staff on evolving situation*
  - *Document information*
  - *Contingency planning*

Why the Fargo focus?

- Social Impact
  - First in 12 years to mirror magnitude of ‘97 flood
  - ~16 to 22% of the State’s population in Fargo
- Economic Impact
  - Fargo represents ~30% of State’s economy
- Communications and Transportation
  - Hub for much of the State’s telecommunications
  - I-94/I-29 & railroads

Typical Fargo/Moorhead schedule

- 7:00 am - *Fargo city staff meeting @ City Hall*
- 8:00 am - *Fargo City Hall open meeting and press conference*
- 9:30 am - *Fargo/Cass County EOC briefing*
- 10:00 am - *Moorhead, MN EOC briefing*
- 11:00 am - *Moorhead press conference*
- NOON - *Grand Forks Media conference call*
- 1:00 pm - *Fargo city staff meeting @ City Hall*
- 2:00 pm - *Fargo City Hall public mtg/press conf.*
- 2:30 pm - *Fargo/Cass County EOC briefing*
- 6:00 pm - *Moorhead, MN EOC briefing*
- 9:00 pm - *Fargo/Cass County EOC briefing*

What was our mission?

- NWS requested to attend numerous meetings/briefings
- Focus on Decision Support of observations and WFO/NCRFC forecasts
  - *Utilization of NOAA web resources*
  - *Interpretation of probabilities*
  - *Being the purveyor of the "uncertain"*

What was our role?

- **What did Decision Support mean to Fargo/Moorhead officials?**
  - ***We were there – before, during and after the BIG events***
  - ***"We" are "They" – a part of the community of locals and veterans of the flood fight***
  - ***Communications and Trust – be open and honest***
  - ***TEAMWORK!!***

Daily meetings in Fargo

Successes

- Presence at various city and county "neighborhood" meetings
  - *Being a part of the team*
  - *"Being there" went a long ways towards removing doubt*
- Early acceptance into the "team" on-site
- Up close with discussions amongst all the Federal agencies involved
  - *Agencies (USACE, USGS, DNRs, Border Patrol, Red Cross, FEMA, State EMAs, etc.)*
  - *Political figures (Governors, Senators, Representatives)*

Successes

- Excellent interagency collaboration involving federal, state and local government officials
  - *Face-to-face work in Fargo (and at North Central River Forecast Center) with USACE, FEMA, USGS and private engineering firm*
  - *Border Patrol → use of UAS aircraft for snow/ice measurements*
- Strong internal collaboration
  - *Unprecedented use of extended precipitation and temperature forecasts into river models*
- Advancements in technology

UAV image from Oslo, ND

Water was 13 miles wide upstream of Oslo

Other Improvements

Technological improvements yielded much better data from which NWS and officials could make better decisions

1997 – Grand Forks	2009 – Fargo
• River gage data latency ~ 12 minutes	• River gage data latency ~ 2 seconds
• Average DCP data refresh 4 hours	• Average DCP data refresh 1 hour
• National network ~6000 locations	• National network ~ 13,800 locations
• Daily data values processed ~400K	• Daily data values processed ~2.5M
• Slow, limited communication links	• Multiple communication networks
• Limited access to collab. agencies	• Extensive access to collab. agencies
• Infancy of Internet	• Extensive distribution via Internet

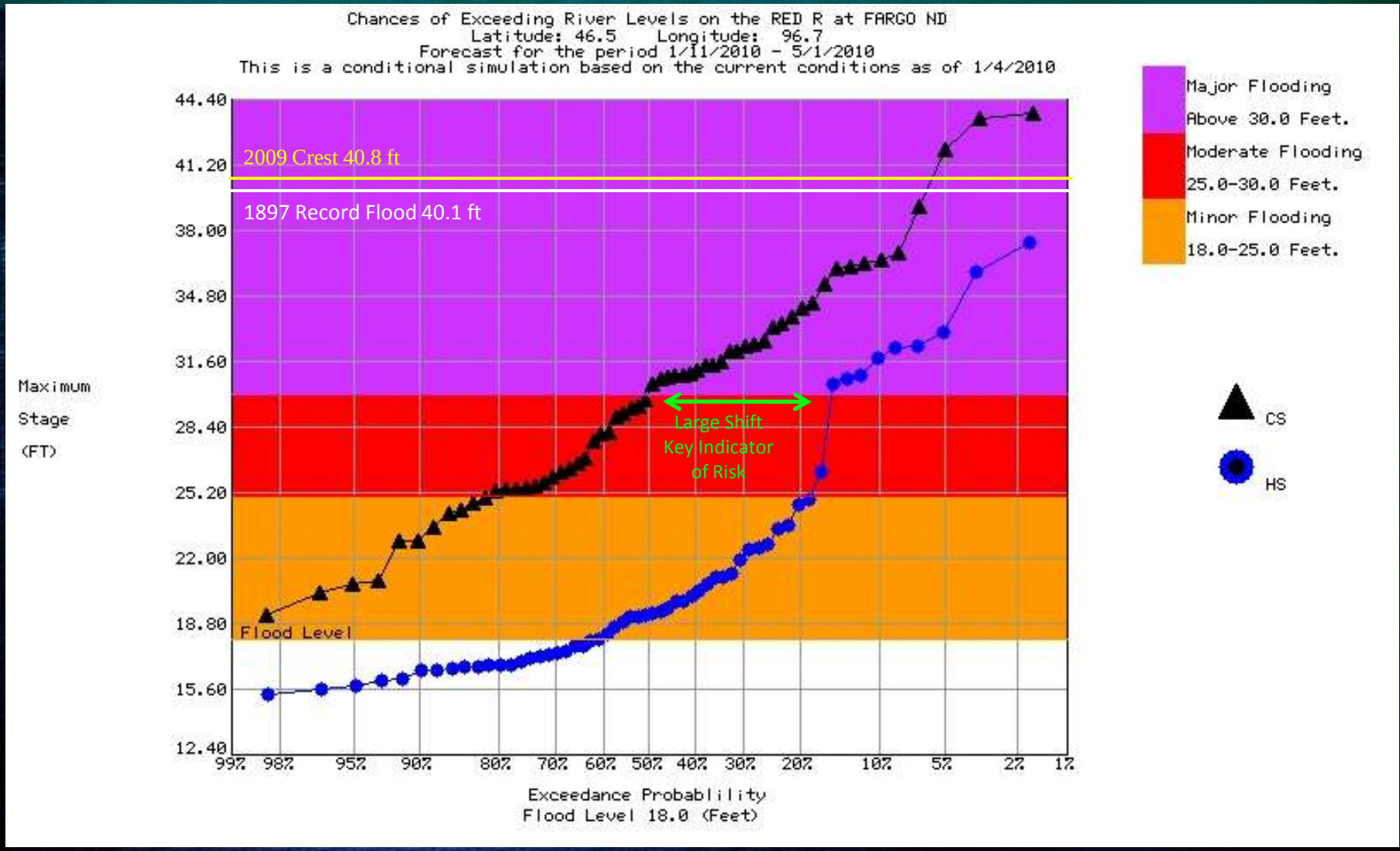
Areas to improve

- **Successful decision support services require effective information management**
  - ***Science/technology advances → improved forecast process***
  - ***Data is interoperable, accessible, reliable and from all available sources***
  - ***Users depend on expert interpretation and reinforcement for effective decision making***
- **The message we intend to communicate is not always conveyed effectively**
  - ***Terminology and graphics can create confusion***
    - **Outlook vs. Forecast**
    - **Probabilistic vs. deterministic**

Summary

- Various NOAA teams were deployed to various state/Federal locations to support the Red River flood effort
  - *Two teams on-site in Fargo/Moorhead, one for each crest*
- On-site Decision Support activities were critical to several key partners during the flood fight
- NOAA/NWS Forecast Offices, NCRFC, and on-site Decision Support Specialists contributed greatly to hazard mitigation during the Flood of 2009

Questions?



Probabilistic flood forecast for Fargo Spring 2010, issued 1/4/10