

Subcommittee on Hydrology (SOH)

2008 Report

February 10, 2009

Mary Greene

**SOH Vice-Chair
NRCS / National Water and Climate Center**

Subcommittee on Hydrology

- The purpose ... is to analyze relevant issues and facts and to draft proposed position papers or recommendations for improving the availability and reliability of surface-water quantity information.
- Carry out purpose by:
 - (a) sharing valuable water related information through the meetings and activities, and
 - (b) organizing working groups to accomplish tasks as needed.

Subcommittee on Hydrology

- Chair – Steve Blanchard
 - U.S. Geological Survey
- Vice Chair – Mary Greene
 - National Resources Conservation Service
 - National Water and Climate Center
- Very active committee
- Met 4 times in 2007
 - January, April, July, October
 - Meet 4x per year
 - Non-Federal Participants for about a decade
 - Federal participation since the early 1970's
 - Roots extend back to the Federal Inter-Agency River Basin Committee (1945)

Subcommittee on Hydrology

4 Work Groups

- Hydrologic Modeling
(Don Frevert – retired, BOR)
- Satellite Telemetry Interagency
(Ernest Dreyer – USGS)
- Hydrologic Frequency Analysis
(Will Thomas – ASFPM)
- Hydrologic and Hydraulic GIS Applications
(Bill Merkel – NRCS)

Formed a new workgroup

- Extreme Storms
(Tom Nicholson – NRC)

Subcommittee on Hydrology - Membership

- Agricultural Research Service
- American Forests
- Association of State Floodplain Managers
- Bureau of Land Management
- Bureau of Reclamation
- Defenders of Property Rights
- Federal Emergency Management Agency
- Federal Energy Regulatory Commission
- Federal Highway Administration
- NASA/Goddard Space Flight Center
- National Hydrologic Warning Council
- Natural Resources Conservation Service
- National Science Foundation
- National Weather Service
- Nuclear Regulatory Commission
- Office of Surface Mining
- US Army Corps of Engineers
- US Environmental Protection Agency
- US Forest Service
- US Geological Survey

SOH - Activities

Published
newsletter

“The SOH
Connections”

March,
July,
December

 			
Volume 2		Issue 1	
		December 2007	
Newsletter of the Subcommittee on Hydrology available on-line at: http://acwi.gov/hydrology/index.html			
In this Issue:		Welcome from the Chair	
<i>Welcome from the Chair</i>1		 <p><i>Incoming Chair, Steve Blanchard (left), USGS, and Outgoing Chair, Sam Lin (right), FERC.</i></p> <p>As I begin my term as Chair of the Subcommittee, I want to first state that I count it a real privilege to be able to serve in this capacity. I look forward to working with Mary Greene, the Vice-Chair, and all the members of the Subcommittee and its Workgroups to accomplish our purpose, which is to “improve the availability and reliability of surface-water quantity information needed for hazard mitigation, water</p> <p>of Workgroups under the Subcommittee, development and distribution of the Subcommittee newsletter, and generally raising the energy level of the Subcommittee and its sphere of influence. On behalf of the whole Subcommittee, I want to express a big “Thank You” to Sam for all of his hard work and the excellent leadership he provided to the Subcommittee.</p>	
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SOH – Hydrologic Modeling Work Group

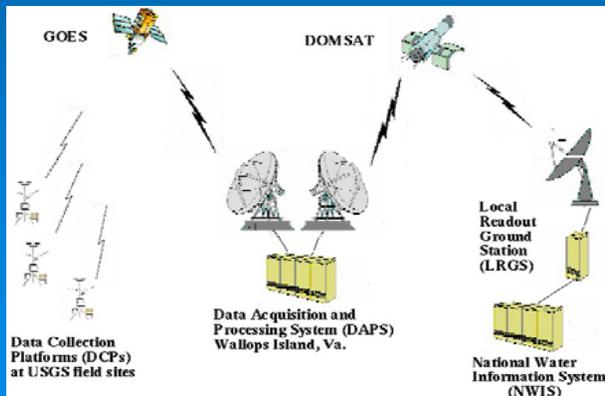
- Federal Interagency Hydrologic Modeling Conferences proceedings from 1998, 2002, 2006 scanned and posted on web site.
- Working with Subcommittee on Sedimentation to plan the 2010 Joint Hydrologic Modeling and Sedimentation Conference; Las Vegas NV June 27- July 1, 2010 at Riviera Hotel and Casino

SOH – Hydrologic Modeling Work Group

- Call for papers for 2010 conference is being distributed among member organizations, abstracts are due June 30th
- Conference Planning Meeting scheduled for July 7-9, 2009 in Las Vegas
- SOH will meet July 7th in Las Vegas in conjunction with the planning meeting

SOH – Satellite Telemetry Interagency Work Group (STIWG)

- Developed an Emergency Data Distribution System (EDDN) at the USGS's EROS Data Center
 - *Development was jointly funded by the USGS and NOAA/NESDIS.*
 - *Installation completed and operational in June 2008*
 - *Integration of the EDDN into existing real-time processing systems.*



Technical Improvements to the GOES DCS System

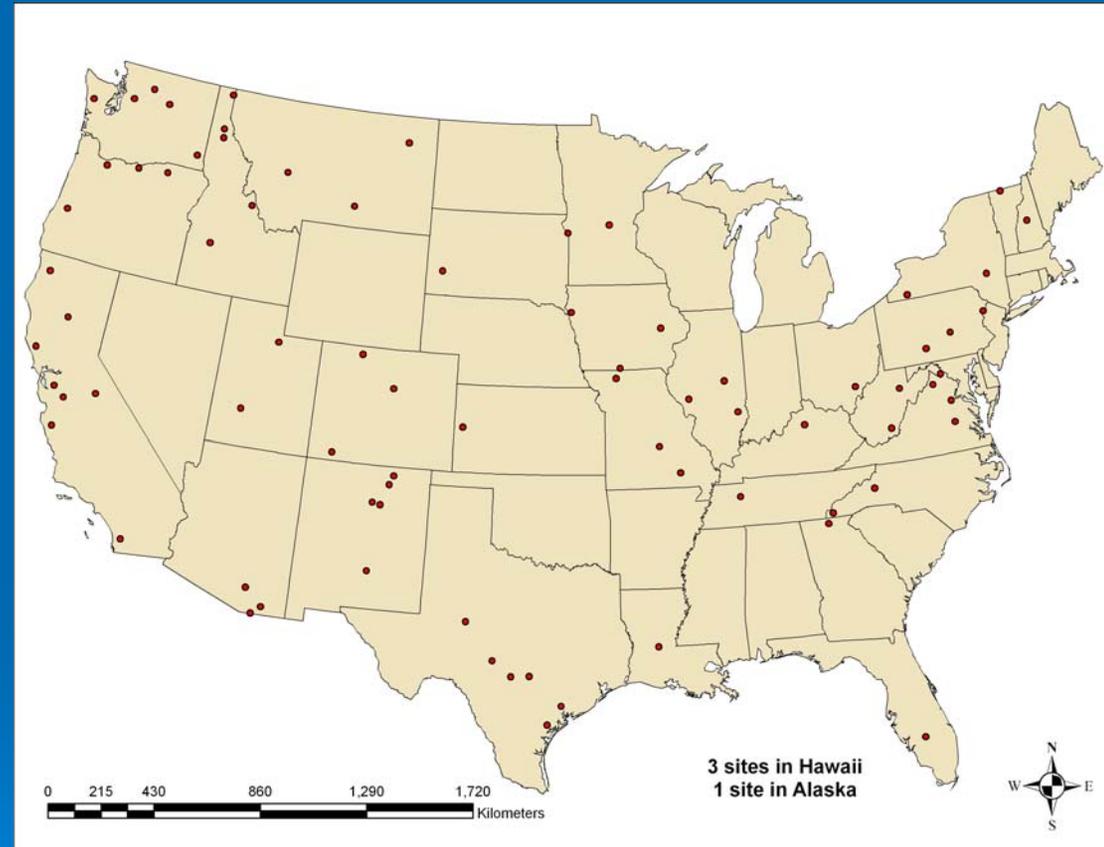
- Development of a 2-way communications capability for GOES DCS.
 - *Small Business Innovation Research (SBIR) contract was awarded to Sutron Corp. to build prototype.*
 - *Contract managed by NOAA/NOS.*
 - *Prototypes expected in June 2009.*
- **Development of a binary protocol for use on the GOES DCS.**
- Development of a standard format for expressing metadata about remote sites for information sharing.

SOH - Hydrologic Frequency Analysis Work Group (HFAWG)

- The HFAWG has developed a plan to evaluate improvements in Bulletin 17B (see HFAWG web site <http://acwi.gov/hydrology/Frequency>):
 - **Expected Moments Algorithm (EMA)** = new statistical technique for fitting the Pearson Type III distribution
 - Evaluate and compare EMA and Bulletin 17B for analyzing data sets with historic and paleoflood data, low outliers and zero flows

SOH - Hydrologic Frequency Analysis Work Group (HFAWG)

- Testing EMA for:
- 82 gaging stations with an average record length of 80 years (see map for locations of stations)
- Monte Carlo simulations for assumed frequency distributions



SOH - Hydrologic Frequency Analysis Work Group (HFAWG)

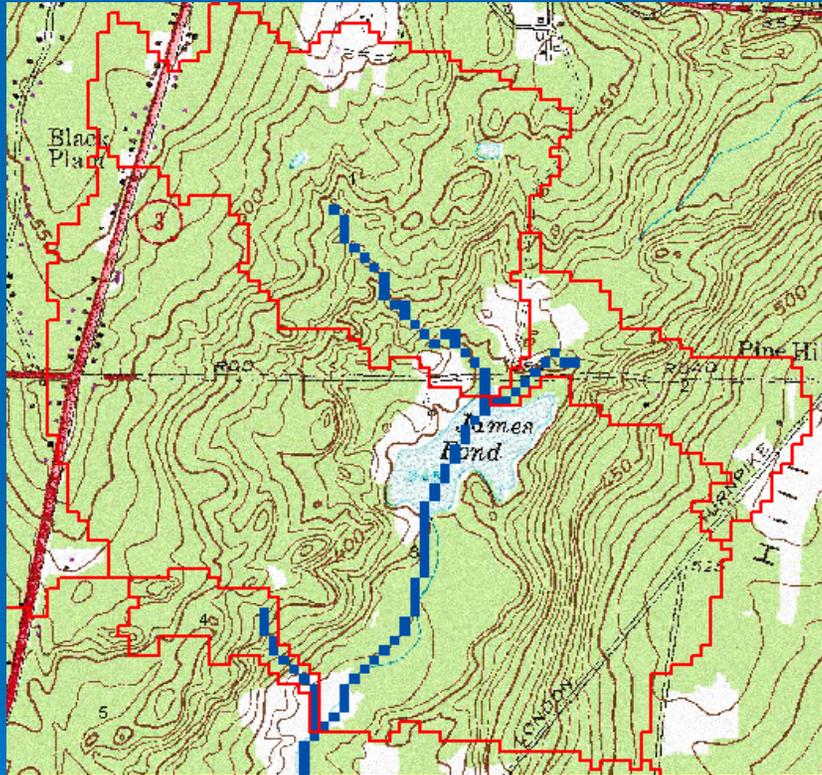
➤ Plan for improvements to Bulletin 17B:

- Describe improved procedures for estimating generalized/regional skew
- Describe improved procedures for defining confidence limits
- Develop an electronic version of a new Bulletin 17C

SOH - Hydrologic and Hydraulic GIS Applications Work Group

- Present paper at AWRA conference
- Agencies Demonstrate GIS applications
- Compiling an inventory of GIS applications
- Develop web page with web links to major GIS applications

Hydrologic and Hydraulic GIS Applications Work Group



Chair: William Merkel
USDA-NRCS

SOH web page

Subcommittee on Hydrology



PURPOSE

Improve the availability and reliability of surface-water quantity information needed for hazard mitigation, water supply and demand management, and environmental protection.

CURRENT ACTIVITY

 [Membership](#)

 [Minutes](#)

 [Meetings - Conferences - Workshops](#)

 [Products](#)

- [Newsletter](#) - December 2007 (PDF 341KB)
- [Publications](#)

WORK GROUPS

 [Hydrologic Frequency Analysis Work Group](#)

 [Satellite Telemetry Interagency Work Group](#)

 [Hydrologic Modeling Work Group](#)

 [Hydrologic and Hydraulic GIS Applications Work Group](#) 

Current Model List

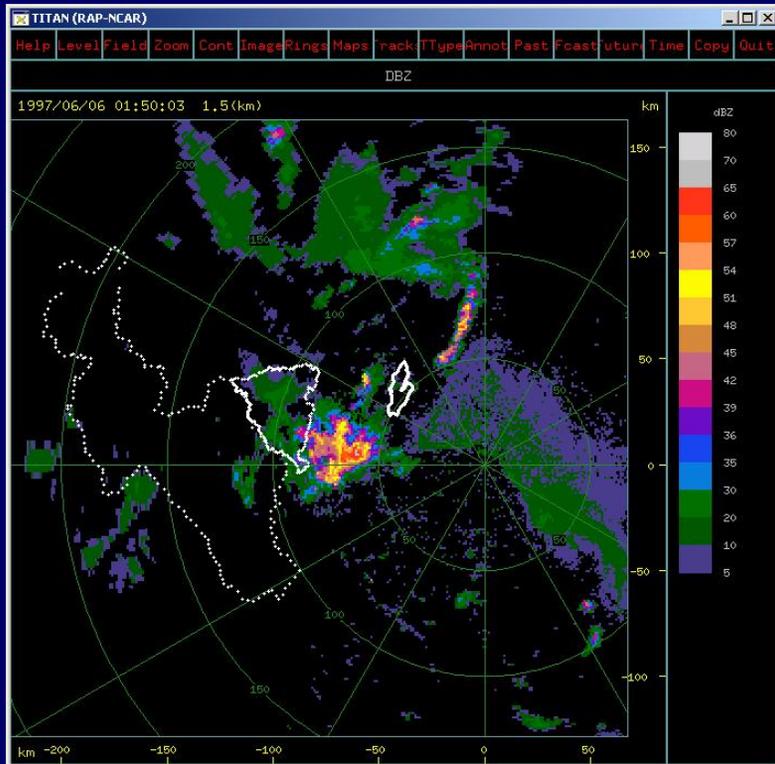
- EPA Basins EPA
- Map Window Open Source
- HEC-Geo RAS COE
- HEC-Geo HMS COE
- StreamStats USGS
- NRCS Geo-Hydro NRCS
- AGWA ARS

Current Model List

- GIS Weasel USGS
- eCoastal COE
- HAZUS FEMA
- GIS Hydro U of MD
- NHD Plus USGS
- SWAT ARS

Subcommittee on Hydrology, ACWI

New Extreme Storm Work Group



Outline of Presentation

Background, Need and Recent Workshops

Proposal Approved by SOH – July 31, 2007

Work Group Objectives

Work Group Membership

Initial Activities

Extreme Storm Events

Background

Federal Agencies developed cooperative Probable Maximum Precipitation (PMP) studies beginning in 1940s

National Weather Service (USWB) developed Depth-Area Duration (D-A-D) storm data analysis techniques, followed by storm transposition and maximization

Cooperating agencies, Corps of Engineers and Bureau of Reclamation, for design of large Federal dams

Generalized PMP studies began in 1960s and used today

Cooperative PMP Methods summarized in papers by Stallings et al. (1986) and Hansen (1987)

Extreme Storm Events

Background

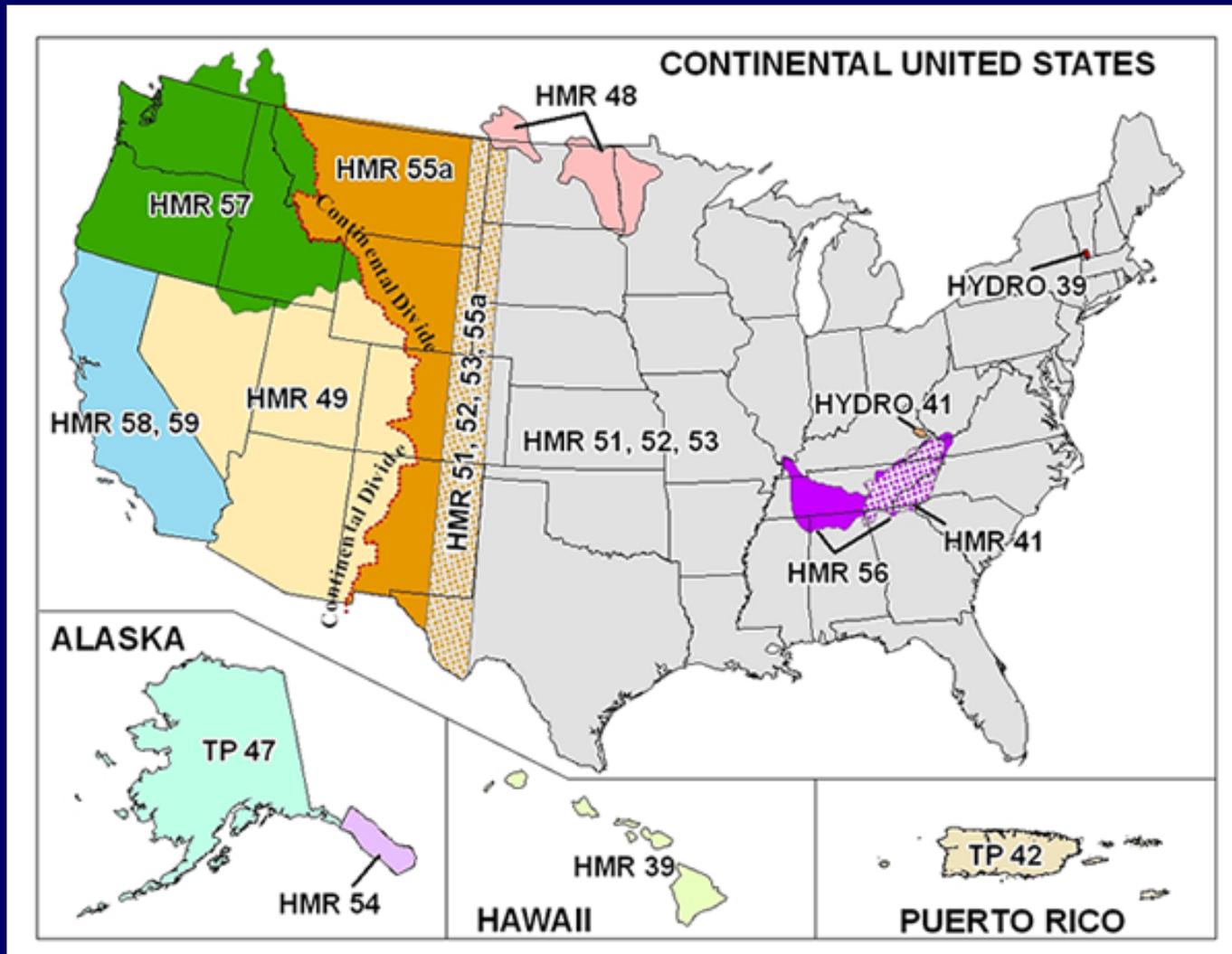
National Research Council (1994) endorsed current operational PMP methods but suggested further research on radar data, storm-based probability methods and numerical modeling in mountainous regions

U.S. PMP methods are basis for World Meteorology Organization (WMO) approach

U.S. PMP methods are being challenged by some private consultants

Private consultants conduct site-specific PMP studies with substantially reduced rainfall amounts; some studies accepted by regulatory agencies

Current Generalized PMP HMR Reports



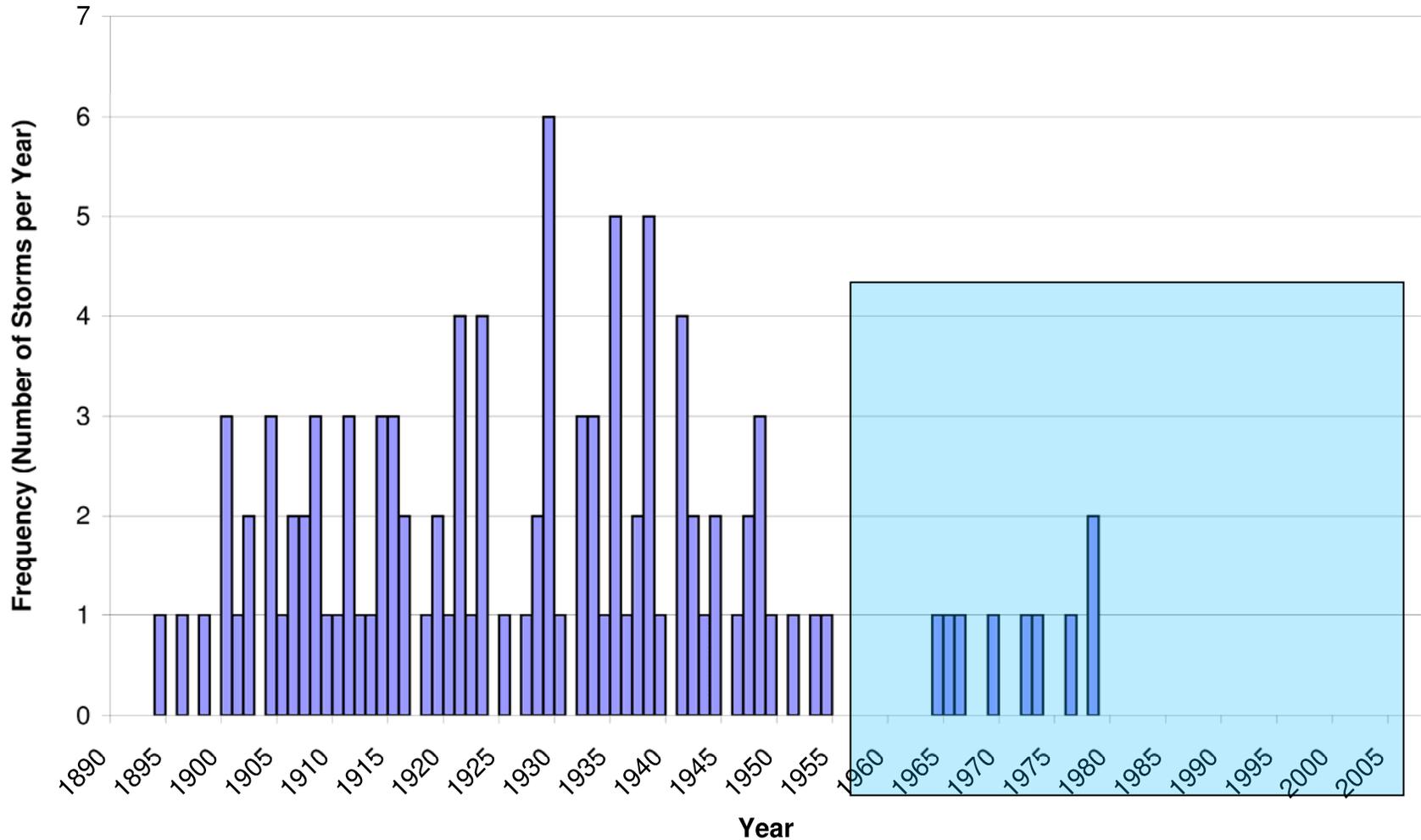
Generalized HydroMet Report Status

HMR No.	Report Publication Date	Latest Storm Used
49	1977	Sept. 3-7, 1970
51	June 1978	June 19-23, 1972
55A	June 1988	Aug. 1-4, 1978
57	October 1994	Dec. 24-26, 1980 (general) Aug. 16, 1990 (local)
59	February 1999	Feb. 14-19, 1986

over 20 to 40 YEARS more data since generalized reports!

Example Data Gaps – HMR 55A

Number of Storms per Year: HMR 55A



Recent Extreme Storm Workshops & Needs Identified

National Research Council, **1988** “Estimating Probabilities of Extreme Floods” Nuclear Regulatory Commission Sponsor

National Research Council, 1994 “Estimating Bounds on Extreme Precipitation Events” FERC Sponsor with Workshop

Bureau of Reclamation, 1999 “A Framework for Characterizing Extreme Floods for Dam Safety” Report from 1997 Utah State Univ. Workshop, Reclamation Sponsor

FEMA, 2001 “Hydrologic Research Needs for Dam Safety” Report from 2001 Workshop, USACOE & FEMA Sponsor

NAS/COHS, **2008** “Workshop on Research and Application Needs in Flood Hydrology Science”

2001 FEMA Workshop Priorities

Meteorology

<i>Number</i>	<i>Name</i>	<i>Weighted Value</i>
1	Precipitation Analysis	43.9
2	Antecedent Storm Analysis	29.5
3	Real Time Storm Analysis	19.6
4	Rainfall Frequency Analysis to Return Periods > 1000 yr	26.0
5	Analysis of last 10 Yrs Data	31.6
6	Analysis of Older Storms	30.1
7	Manual for Orographic Areas	25.1
8	Standardize Storm Development	23.2

Top Ten Priorities

<i>SUBJECT</i>		<i>Weighted Value</i>	<i>Group</i>
<i>Number</i>	<i>Name</i>	<i>Value</i>	
1	Historical Database of Storms and Floods	35.8	Risk
2	Extend Frequencies	20.6	Risk
3	Develop Regional Hydrology Parameters	12.4	Risk
4	Develop Paleo models and extend to Eastern US	11.4	Risk
5	Dam Break Parameters	13.6	Risk
6	Precipitation Analysis	12.4	Met
7	Rainfall Frequency Analysis to Return Periods > 1000 yr	21.1	Met
8	Improve Model Development and Training	19.8	Standards
9	Improve Technology Transfer of GIS, NEXRad and Meteorological Data	11.5	Standards
10	Regional Database of Storm Amounts, Durations and Patterns	24.8	Standards

Extreme Storm Events Work Group

Objectives:

- Coordinate studies and databases for reviewing and improving methodologies and data collection techniques used to develop design precipitation estimates of large storm events up to and including the Probable Maximum Precipitation (PMP).
- Develop a detailed work plan of study, and determine the necessary funding requirements to update the *Catalog of Extreme Storms* and *Hydrometeorological Reports* (HMR) for estimating PMP.

Work Group Membership:

Tom Nicholson, USNRC, Interim Chair

John England, Bureau of Reclamation, Vice-Chair

Geoffrey Bonnin, NOAA/NWS

Eugene Stallings, National Hydrologic Warning Council

Douglas Clemetson, USACE

John Onderdonk , FERC

Nancy Steinberger, FEMA

Christopher Cook, USNRC

Robert Mason, USGS

John McClung, USDA/ARS

Initial Work Group Activities

Review and analyze Depth-Area-Duration (DAD) data sets used to develop generalized PMP estimates

Update generalized HMRs and PMP estimates

Estimate extreme storm exceedance probabilities

Commence Pilot Extreme Storm Study in Southeast U.S. for application to flood assessments of nuclear facilities

Compare recent storm data and PMP estimates to published HMR
51 PMP

Initial Activities (continued)

Develop prototype for creating an electronic database for existing USACE DAD data (1945 - 1973) & for new DAD data

Examine new extreme storm developments (e.g. mesoscale models; individual storms; transposition; moisture maximization) for implications to PMP assumptions

Investigate potential effects of climate variability and change on DAD relationships and PMP specific procedures (transposition, maximization and envelopment)

Develop a national database of extreme storm events related to flooding (Pilot Study for the Missouri River Basin)

Summary

The Extreme Storm Workgroup will be promoting:

Collecting and reviewing extreme storm data

Updating Probable Maximum Precipitation (PMP) estimates

Updating the generalized Hydrometeorological Reports (HMR's)

Creating a national database of extreme storm events to support analysis and modeling

Investigating potential effects of climate variability and change on the PMP

Subcommittee on Hydrology

(SOH)

Additional information and contacts:

<http://acwi.gov/hydrology/index.html>

Questions?