2006 ACWI MEETING

SUBCOMMITTEE ON HYDROLOGY (SOH)

Annual Report

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Federal Energy Regulatory Commission
January 18, 2006
Herndon, Virginia

*****Purpose Statement**

(1) Significance and Importance

Surface-water has the significant impact on our daily lives. Quantified surface-water information including precipitation, streamflow, etc. is critical to the professional decision making. This information plays a vital role (a) in the planning and designs of the Nation's water-related infrastructure and (b) in the management of the environments, such as hazard mitigation, water demand and supply management, environmental protection, and other water usages.

(2) Overall goal

The Subcommittee's overall goal is to improve surface-water quantity information in both availability and reliability.

More specifically, the purpose is to analyze surface-water relevant issues and facts and to draft proposed position papers/recommendations for improving the referenced availability and reliability. This Subcommittee then forwards those draft papers/recommendations to the ACWI for deliberation and approval as advice to the Federal Government. The Subcommittee's HFAWG later will present such a proposal to the ACWI for agreement.

The Subcommittee considers and develops a wide range of policies, programs, and activities for the collection and analysis, assessment, archiving, distribution, reporting, and use of precipitation, streamflow and related information in an effective way. The Subcommittee's HMWG and STIWG later will also present their activities and progresses which have been achieved in the past year and new activities in this year.

*****Meeting held Quarterly**

(1) Seasonal Meetings

The SOH meetings remain effective ways for member organizations to discuss concerned issues, recommend work groups' draft papers to the ACWI, share and exchange information, etc. The meeting is held quarterly on average in past years.

Last year we were fortunate to have met four times and will meet next on March 31 in Reno, NV in conjunction with 2006 Federal Interagency Joint Conference. The meeting minutes have been posted on the Subcommittee's web site for public information.

(2) Special subject – Post-meeting Activity

In the past year, the meetings have been well attended. In the last two meetings, a special subject for presentation or tour of an interesting place was arranged following the regular meeting. Those activities were very impressive and informative. We will keep on this type of post-meeting activity if it is available.

*****Present Officers**

I am the chair of SOH. We are fortunate to have Steve Blanchard with USGS as the subcommittee's Vice Chair. The terms both extend through September 2007.

*****Current Member Organizations**

The SOH membership is a diverse group. Last week we just gained a new member organization, the NRC. Now the SOH includes representatives from over 14 federal agencies and 4 interest groups in partnership to discover new ways to improve water information quantity, quality and management. Member organizations will implement recommendations and voluntarily use the guidelines and procedures developed by the Subcommittee and approved by the ACWI.

To fulfill this mission of the subcommittee, these member organizations (a) share valuable water related information to keep up with changing technologies, science and programs of each other's organizations through the meetings and activities, and (b) organize work groups to accomplish tasks as planed. These two functions have been very successfully undertaken in past years.

*****Current Work Groups**

(1) Work groups

The subcommittee has 3 active work groups. They are:

Hydrologic Frequency Analysis Work Group (HFAWG) (Chair: Will Thomas (Michael Baker, Jr.))

Hydrologic Modeling Work Group (HMWG) (Chair: Donald Frevert (BOR)), and

Satellite Telemetry Interagency Work Group (STIWG)(Chair: Stan Brua (USACOE)).

(2) Subcommittee's main achievements

The most significant accomplishments the SOH has achieved are through the efforts within its work groups. These work groups accomplish a great deal through the collaboration of their diverse,

dedicated group members who have invested their efforts and resources tremendously to create outstanding results.

*****Hydrologic Modeling Work Group**

(1) Meetings

This group has alternative face-to-face meetings and teleconferences upon their work needs. This work group has most recently held a meeting in April of last year and a conference call last week with the next scheduled for March 30.

(2) Previous conferences

The key milestones this group has achieved, are successfully holding the 1st and 2nd Federal Interagency "Hydrologic Modeling Conferences" in 1998 and 2002 in Las Vegas, Nevada. New ideas, new technology, and new approaches were presented in those conferences. They were beneficial to the participants from governmental, industrial and academic sectors.

(3) Next conference

On an every-4–years-basis, the upcoming 3rd hydrologic modeling conference is scheduled for this April 2nd through the 6th, 2006 in Reno, NV. The conference format will be a combined conference with the Federal Interagency Sedimentation Conference. Hotel and logistical arrangements are now complete.

This Subcommittee and Subcommittee on Sedimentation have worked together to hold this Joint Interagency Conference with the theme of Interdisciplinary Solutions for Watershed Sustainability. This Joint Conference will provide conference participants with the opportunity to share and discuss recent accomplishments and progresses in research and technical developments to enhance the availability and reliability of water related information.

The plenary session of the conference will be on Monday morning, April 3rd. A series of four presentations on Hurricane Katrina are scheduled, including the meteorology and hydrology of the event as well as the sedimentation and water quality aspects.

There will be approximately 120 technical papers presented on hydrologic modeling. Both poster and demonstration sessions are planned. A total of ten short ctheses on state-of-the-art technology and fthe field trips will be offered.

The conference registration website is now open at www.jfic.org/. Our member Jerry Webb will share more information about this conference in tomorrow's roundtable section.

*****Satellite Telemetry Interagency Work Group (STIWG)**

Now I will let Jerry Webb present the annual report for the STIWG. Mr. Webb is with USACE as the H&H principle engineer, representing the member organization, USACE.

(See **Attachment I,** "**STIWG Annual Report Outlines"**)

*****Hydrologic Frequency Analysis Work Group**

Now Will Thomas will present the annual report for the HFAWG. He will present the group's activities and Bulletin 17B revision proposal for the ACWI's approval. Mr. Thomas, with Michael Baker Corporation in Alexandria, Virginia, represents the member organization, Association of State Floodplain Managers.

(See **Attachment II, "Proposed Improvements to Bulletin 17B**")

*****Closing Remarks**

Thank you very much for this opportunity to report on the subcommittee's progresses and activities.

Attachment I. STIWG Annual Report Outlines (prepared by Stan Brua)

- Chartered jointly by the Office of the Federal Coordinator for Meteorology (OFCM) and the Advisory Committee on Water Information (ACWI).
- Reports to OFCM's Committee for Environmental Services, Operations and Research Needs (C/ESORN) and ACWI's Subcommittee on Hydrology.
- Acts as a user's group for major users of the GOES DCS.
- Coordinates funding for user-desired improvements to the GOES DCS.
- Members include BOR, USGS, Corps of Engineers, BLM, Forest Service , NOAA, and others.
- Met twice during 2005 (Sacramento, CA in May; Baltimore, MD in Nov)
    - Presented concerns for the GOES-DCS system at a NOAA Stakeholders meeting in March.
    - Developed a funding agreement template to enable STIWG agencies to fund the DOMSAT component of the GOES-DCS, in light of new funding requirements.
    - Coordinated funding from OFCM to pre-pay the DOMSAT contract through FY 08.
    - Continued to investigate the needs for a DCP with 2-way satellite communication capabilities. This would enable isolated land and marine based DCP's to be programmed remotely. A SBIR proposal to conceptually develop a low cost, low power and reliable DCP transceiver was submitted by NOAA/NOS and approved. The GOES-R satellite requirements for these DCP's were also investigated and identified.
    - STIWG member agencies invested considerable effort and restheces toward the "cooperative" development of a web-based Emergency Data Distribution Network (EDDN) to resolve many of STIWG's GOES-DCS backup concerns. The EDDN would enable users to receive DCP data on a short-term basis during non-satellite related GOES-DCS outages at Wallops. The EDDN would utilize networked Direct Readout Ground Stations (DRGS's) and central data repositories operated by STIWG agencies.
        - Successful prototype was developed by COE. Interagency firewall issues still need to be addressed.
        - An inventory of suitable STIWG agency DRGS's was conducted.
        - A joint USGS/NESDIS project to develop full DRGS capabilities at USGS's EROS facility in Sioux Falls, SD has been proposed and is currently being evaluated.
    - STIWG members continue to be concerned about the future of the GOES-DCS program, in light of a NOAA RFI to the private sector soliciting input for a "new approach" and, more recently, a recommendation by NOAA to examine the transitioning of its own observing networks to commercial satellite. A document is currently being prepared for submittal to STIWG parent committees to (1) address the criticality of the GOES-DCS tor member agencies and others, (2) present STIWG concerns, and (3) request guidance on ways to strengthen relationships with NOAA and become more involved in NOAA's budgeting and strategic planning processes.

Attachment II. Proposed Improvements to Bulletin 17B (prepared by Will Thomas)

Flood Frequency Research Needs

The Hydrologic Frequency Analysis Work Group (HFAWG) was formed in December 1999 to recommend procedures to increase the usefulness of the current guidelines for Hydrologic Frequency Analysis computations (e.g., Bulletin 17B) and to evaluate other procedures for frequency analysis of hydrologic phenomena. The HFAWG currently has 17 members from Federal agencies, academia, interest groups and private citizens who attend meetings in person or by teleconference. An additional 10 members are kept informed of HFAWG activities through emails and other correspondence. The membership of the work group and other information is provided on the following web site http://water.usgs.gov/wicp/acwi/hydrology/Frequency/).

Bulletin 17B, *Guidelines For Determining Flood Flow Frequency*, provides a list of additional research needs (Interagency Advisory Committee on Water Data, 1982). The list in Bulletin 17B and HFAWG knowledge of the subject suggests the following research needs:

- Frequency analysis for ungaged watersheds using hydrologic models based on design rainfall storms and continuous simulation and computation of measures of uncertainty,
- Frequency analysis for regulated watersheds and computation of measures of uncertainty,
- Procedures for determining that the annual peak flows are a representative time sample of random homogeneous events,
- Procedures for adjusting for the effects of watershed change such as urbanization and deforestation,
- Identification and treatment of mixed populations,
- Comparative analysis approaches that can be used to validate Bulletin 17B results such as the use of flood estimates from rainfall records,
- Procedures for identification and treatment of outliers, zero flows, and historic/paleoflood information,
- Procedures for computation of regional or generalized skew,
- Selection of alternative frequency distributions and fitting methods such as L-Moments, Maximum Likelihood and Expected Moments,
- Procedures for computation of confidence limits that reflect the uncertainty in the skew coefficient.

After discussing the above list of research needs, the HFAWG decided on a plan for investigating possible improvements in Bulletin 17B. The HFAWG limited their initial efforts to a subset of the above research needs that could be accomplished in a reasonable time frame and with limited restheces. The concept is to maintain the spirit of Bulletin 17B through fitting the Pearson Type III distribution to the logarithms of the annual peak flows using a method of moments approach. Any deviation from this base method would require significant testing and evaluation. Other research areas requiring significant research include developing guidance for ungaged watersheds, procedures for evaluating nonhomogeneity in the annual peak flows, treatment of mixed populations, and comparative analyses to validate Bulletin 17B results

The following plan was discussed with the Subcommittee on Hydrology on January 12, 2006 and determined to be a reasonable initial effort for improving Bulletin 17B guidelines. As funding and restheces become available, more comprehensive research will be undertaken. The following plan is

presented to the Advisory Committee on Water Information (ACWI) to inform the members of investigations that the HFAWG will undertake in 2006. Results of these investigations will be reported at subsequent ACWI meetings.

Hydrologic Frequency Analysis Work Group Plans to Investigate Possible Improvements to Bulletin 17B

Issue

The Hydrologic Frequency Analysis Work Group (HFAWG) met on November 14 and 15, 2005 in Alexandria, Virginia to discuss possible revisions to Bulletin 17B, published in 1982 (Interagency Advisory Committee on Water Data, 1982). The HFAWG requests the approval of the Subcommittee on Hydrology (SOH) and, subsequently the Advisory Committee on Water Information (ACWI), to evaluate possible improvements to Bulletin 17B.

Background

Some thirty years have passed since parts of Bulletin 17 were assembled in response to the administration's and congress's (House Document No. 465) concern for the development of uniform procedures for flood frequency analysis. As stated in the FOREWARD of Bulletin 17B, "An accurate estimate of the flood damage potential is a key element to an effective, nationwide flood damage abatement program." Motivation for national flood frequency guidelines was to reduce flood damages. As stated in the FOREWARD, "This present revision is adopted with the knowledge and understanding that review of these procedures will continue. When warranted by experience and by examination and testing of new techniques, other revisions will be published." It is with this spirit that the following investigations are proposed.

Approach

Bulletin 17B guidelines were developed by Federal agencies, requested for use by Federal agencies, so Federal agencies should provide the leadership and funding in investigating revisions to the current guidelines. The motivation and approach are as follows:

- Why - revised guidelines may provide more robust procedures with improved accuracy and consistency (to be demonstrated with limited testing).
- How – evaluation and testing by HFAWG members with the major effort provided by Federal members of the HFAWG.
- Cost - contributed time of Federal and non Federal HFAWG members, no additional funding is being requested.
- When – evaluation and testing and draft revisions to Bulletin 17B to be completed by December 31, 2006; coordination, review and approval process to be completed in 2007.
- Product – a revised Bulletin 17C (assuming revisions are warranted).
- Review and approval process – coordination with SOH, ACWI, Office of Management and Budget (OMB) and a public comment period.

Proposed scope of work

Based on recently completed research, the HFAWG proposes to investigate the following possible improvements in Bulletin 17B:

1. Evaluate and compare the performance of the Expected Moments Algorithm (EMA) (Cohn and others, 1997) to the weighted-moments approach of Bulletin 17B (Appendix 6) for analyzing data sets with historic information and paleoflood data.

- Apply EMA and Bulletin 17B to gaging station data that include low and high outliers and historic data and those that do not. Develop criteria for determining if EMA provides more accurate and consistent flood estimates.
- Review and evaluate the published literature for comparisons of EMA to conventional Bulletin 17B procedures.
- Recommend improved plotting position formula when historic data are available.

2. Evaluate and compare the performance of EMA to the conditional probability adjustment of Bulletin 17B for analyzing data sets with low outliers and zero flows.

- Apply EMA and Bulletin 17B to gaging station data that include low and high outliers and historic data and those that do not (same data set as noted above). Develop criteria for determining if EMA provides more accurate and consistent flood estimates.

3. Describe improved procedures for estimating generalized/regional skew.

- Evaluate revisions needed in Bulletin 17B to describe improved procedures for estimating generalized/regional skew based on recently completed research.

4. Describe improved procedures for defining confidence limits.

- Evaluate revisions needed in Bulletin 17B to describe new procedures for defining confidence limits that include the uncertainty in the skew coefficient.
- Describe confidence limit procedures for EMA (if adopted).

Summary

Possible improvements to Bulletin 17B will be based on recently published literature and limited testing using gaging station data. The HFAWG considers the above investigations to be those that can be accomplished in a short period of time with limited resources. Revisions (that are justified by the limited testing and evaluation) to Bulletin 17B will be made by HFAWG members with Federal members providing the major support. Any consensus revisions of Bulletin 17B will be completed by December 31, 2006 and submitted to the SOH, and the ACWI for approval with appropriate coordination with OMB. The review and approval process will be completed in 2007. The possible changes are considered significant improvements that would warrant the publication of a new Bulletin 17C.

References

References that describe recent research that will serve as the basis for possible improvements to Bulletin 17B are available at: ftp://ftp.usbr.gov/jengland/HFAWG/

Cohn, T. A., W. L. Lane, and W. G. Baier, 1997, *An algorithm for computing moments-based flood quantile estimates when historical flood information is available*: Water Restheces Research, 33(9):2089-2096.

Interagency Advisory Committee on Water Data, 1982, *Guidelines For Determining Flood Flow Frequency*: Bulletin 17B of the Hydrology Subcommittee, Office of Water Data Coordination, U.S. Geological Survey, Reston, Virginia, 183 p.