

OHIO RIVER BASIN PRECIPITATION FREQUENCY PROJECT

Update of *Technical Paper No. 40, NWS HYDRO-35* and *Technical Paper No. 49*

Twenty-fifth Progress Report
1 October 2005 through 31 December 2005

Office of Hydrologic Development
U.S. National Weather Service
National Oceanic and Atmospheric Administration
Silver Spring, Maryland

January 2006

DISCLAIMER

The data and information presented in this report are provided only to demonstrate current progress on the various technical tasks associated with this project. Values presented herein are NOT intended for any other use beyond the scope of this progress report. Anyone using any data or information presented in this report for any purpose other than for what it was intended does so at their own risk.

Table of Contents

1. Introduction	1
2. Highlights	2
3. Progress in this Reporting Period.....	3
4. Issues.....	5
5. Projected Schedule and Remaining Tasks.....	5
References.....	6

OHIO RIVER BASIN PRECIPITATION FREQUENCY PROJECT

Update of *Technical Paper No. 40, NWS HYDRO-35* and *Technical Paper No. 49*

1. Introduction

The final product for the Ohio River Basin and Surrounding States Precipitation Frequency Project, including documentation, is available as NOAA Atlas 14 Volume 2 "Precipitation Frequency Atlas of the United States." It is available on the Internet through the Precipitation frequency Data Server at <http://www.nws.noaa.gov/ohd/hdsc>. NOAA Atlas 14 Volume 2 includes estimates for Delaware, District of Columbia, Illinois, Indiana, Kentucky, Maryland, New Jersey, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, Virginia, and West Virginia.

The Hydrometeorological Design Studies Center (HDSC), Hydrology Laboratory, Office of Hydrologic Development, NOAA National Weather Service updated its precipitation frequency estimates for the Ohio River Basin and surrounding states. Previous precipitation frequency estimates for this area were contained in *Technical Paper No. 40* "Rainfall frequency atlas of the United States for durations from 30 minutes to 24 hours and return periods from 1 to 100 years" (Hershfield, 1961), *NWS HYDRO-35* "Five- to 60-minute precipitation frequency for the eastern and central United States" (Frederick et al., 1977) and *Technical Paper No. 49* "Two- to ten-day precipitation for return periods of 2 to 100 years in the contiguous United States" (Miller et al., 1964). The update included data collection and quality control, dataset formatting, regional frequency analyses, frequency distribution selection and fitting techniques, spatial interpolation and documentation.

The project determined all-season precipitation frequencies for durations from 5 minutes to 60 days, for average recurrence intervals from 2 to 1,000 years. For the project, HDSC reviewed and processed all generally available rainfall data for the project area and used accepted statistical methods. Documentation and project results are published as Volume 2 of NOAA Atlas 14 on the internet (<http://www.nws.noaa.gov/ohd/hdsc>) with the additional ability to download digital files.

2. Highlights

HDSC will calculate and include the 1-year average recurrence interval (ARI) precipitation frequency estimates for this project. Minor updates were made to the software. Additional information is provided in Section 3.1, 1-year Estimates.

HDSC continuously monitors the hits, integrity and performance of the Precipitation Frequency Data Server (PFDS), the on-line portal for all NOAA Atlas 14 deliverables and information. Additional information is provided in Section 3.2, PFDS.

Progress on the development of areal reduction factors remains slow. Additional information is provided in Section 3.3, Areal Reduction Factors.

3. Progress in this Reporting Period

3.1 1-year Estimates

HDSC will calculate and include the 1-year average recurrence interval (ARI) precipitation frequency estimates for this project (see the 24th Progress Report for more details on the method). Software was updated to account for the daily/hourly co-located adjustment that ensures consistency between the 12-hour and shorter quantiles derived from the hourly data and the 24-hour quantile derived from the daily data. The 1-year ARI estimates are still under internal review but will be made available via the PFDS as soon as they are ready.

3.2 Precipitation Frequency Data Server

The Precipitation Frequency Data Server (PFDS), the on-line portal for all NOAA Atlas 14 deliverables and information, did not undergo any changes this quarter.

HDSC continuously monitors the hits, integrity and performance of the PFDS, which continues to receive an increasing number of hits per month. The graph (Figure 1) below summarizes the number of individual data inquires made since April 2004, while the map (Figure 2) indicates the locations of inquires during the past quarter.

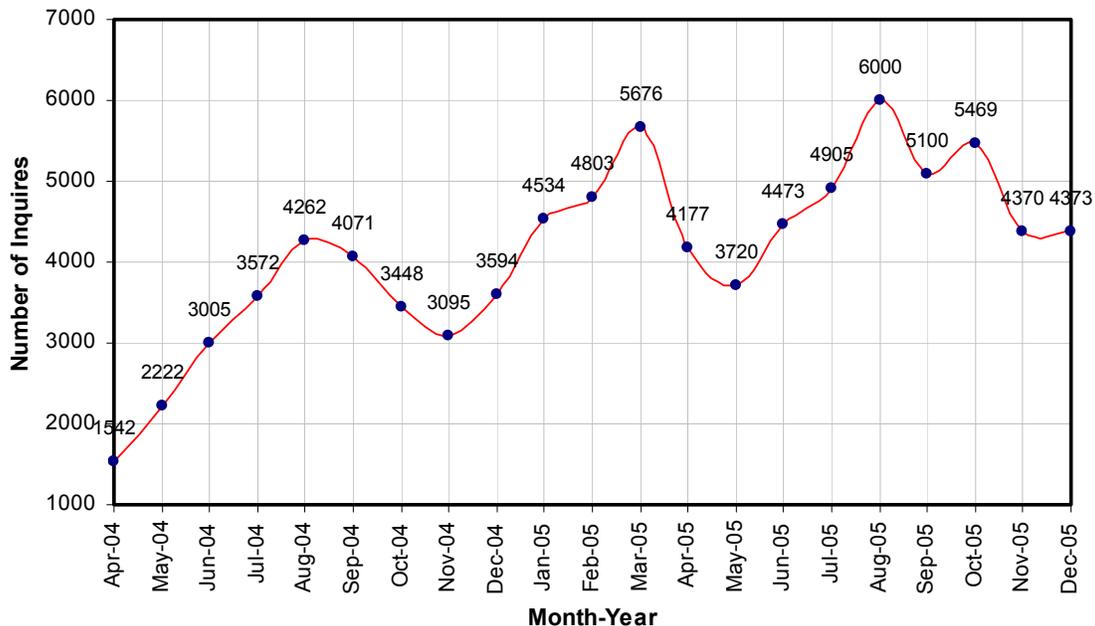


Figure 1: Number of individual PFDS data inquires per month.

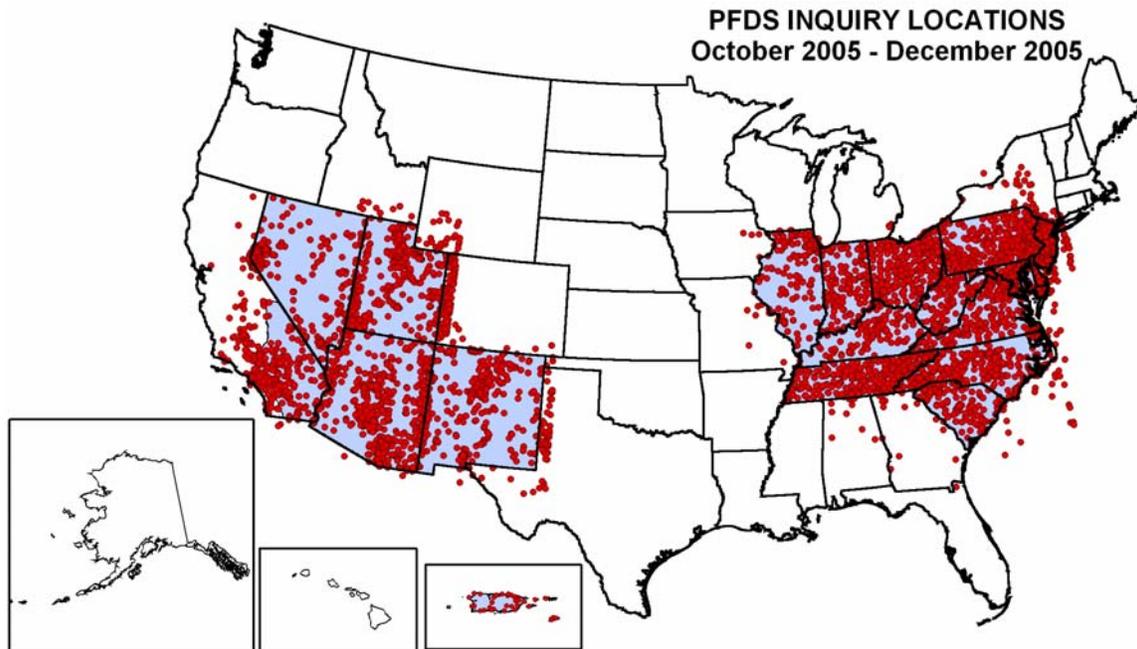


Figure 2: Map of 14,212 PFDS data inquiry locations during the period October-December 2005.

3.3 Areal Reduction Factors

Work continues in the development of geographically-fixed Areal Reduction Factor (ARF) curves for basin area sizes of 10 to 400 square miles. Progress has been slow due to difficulties in completing the software related to the general fit of the underlying ARF curves.

Additional work to locate possible additional basins for use in the ARF project continues. No new sites have been found thus far due to a lack of available and sufficiently dense data.

4. Issues

4.1 HDSC List-server

HDSC has created a list-server to send e-mail to a list of subscribers. It will replace our current process for announcements of progress reports, data updates, documentation and publications. Only HDSC personnel will be able to send messages through the server. The address list will not be available to the public. The list-server is not meant to serve as a discussion forum, but is meant to be a tool for HDSC to distribute information. Details on how to subscribe and un-subscribe from our list server are accessible through the HDSC homepage at <http://www.nws.noaa.gov/ohd/hdsc>. Be aware, if you unsubscribe you will no longer receive announcements of progress reports, documentation or data updates from HDSC.

4.2 Personnel

Ed Zurndorfer, who is the Areal Reduction Factor Project Leader, will be retiring from HDSC in January 2006. Due to budget constraints, his position will not be re-filled. There should be no delay in the release of the Areal Reduction Factors due to this transition.

5. Projected Schedule and Remaining Tasks

The following list provides a tentative schedule with completion dates. Brief descriptions of tasks being worked on next quarter are also included in this section.

1-year Estimates [February 2006]
Spatial Relations (Areal Reduction Factors) [April 2006]

5.1 1-year Estimates

1-year estimates will be calculated and internally reviewed during the next quarter. They will then be made available through the PFDS.

5.2 Areal Reduction Factors (ARF)

Computations for the ARF curves will be completed for 14 areas. The resulting curves will be tested for differences to determine if a single set of ARF curves is applicable to the entire U.S. or whether curves vary by region.

References

- Arkell, R.E., and F. Richards, 1986: Short duration rainfall relations for the western United States, Conference on Climate and Water Management-A Critical Era and Conference on the Human Consequences of 1985's Climate, August 4-7, 1986. Asheville, NC.
- Bonnin, G., D. Todd, T. Parzybok, B. Lin, D. Riley, and M. Yekta, 2004: Precipitation frequency atlas of the United States. NOAA Atlas 14 Volume 1, Silver Spring, Maryland. <http://hdsc.nws.noaa.gov/hdsc/>.
- Chow, V.T., D.R. Maidment, and L.W. Mays, 1988: Applied Hydrology. McGraw-Hill International Editions, 572 pp.
- Frederick, R.H. and J.F. Miller, 1979: Short Duration Rainfall Frequency Relations for California, Third Conference on Hydrometeorology, August 20-24, 1979. Bogata Columbia.
- Frederick, R.H., V.A. Myers and E.P. Auciello, 1977: Five- to 60-minute precipitation frequency for the eastern and central United States, NOAA Technical Memo. NWS HYDRO-35, Silver Spring, MD, 36 pp.
- Hershfield, D.M., 1961: Rainfall frequency atlas of the United States for durations from 30 minutes to 24 hours and return periods from 1 to 100 years, *Weather Bureau Technical Paper No. 40*, U.S. Weather Bureau. Washington, D.C., 115 pp.
- Himmelblau, D.M., 1970. Process Analysis by Statistical Methods: "Sign Test for Median Difference in Paired Observations", 1970, page 68.
- Hosking, J.R.M. and J.R. Wallis, 1997: *Regional frequency analysis, an approach based on L-moments*, Cambridge University Press, 224 pp.
- Huff, F. A., 1990: Time Distributions of Heavy Rainstorms in Illinois, *Illinois State Water Survey*, Champaign, 173, 17pp.
- Institution of Engineers, Australia, 1987: *Australian Rainfall and Runoff, 3rd Edition*, The Institution of Engineers, Australia. Canberra.
- Lin, B. and L.T. Julian, 2001: Trend and shift statistics on annual maximum precipitation in the Ohio River Basin over the last century. Symposium on Precipitation Extremes: Prediction, Impacts, and Responses, 81st AMS annual meeting. Albuquerque, New Mexico.
- Miller, J.F., 1964: Two- to ten-day precipitation for return periods of 2 to 100 years in the contiguous United States, *Technical Paper No. 49*, U.S. Weather Bureau and U.S. Department of Agriculture, 29 pp.

Miller, J.F., R.H. Frederick and R.J. Tracy, 1973: Precipitation-frequency atlas of the western United States, *NOAA Atlas 2*, 11 vols., National Weather Service, Silver Spring, MD.

Myers, V.A. and R.M. Zehr, 1980: A Methodology for Point-to-Area Rainfall Frequency Ratios, NOAA Technical Report NWS 24, Office of Hydrology, National Weather Service, Silver Spring, MD.

Spiegel, M.R., 1961 *Theory and Problems of Statistics*. "Tests of Significance Involving Sample Differences", pages 170-171.