

An Overview of the Missouri Basin River Forecasting Center

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The NOAA National Weather Service is responsible for hydrologic forecasting throughout the nation. The Hydrologic Service Program’s mission is to “save lives, reduce property damage, and contribute to the optimum use of the nation’s water resources.” The program accomplishes this through the thirteen River Forecast Centers throughout of the United States. (See the May Intermountain West Climate Summary for a focus on the Colorado Basin River Forecast Center.) The RFCs generate many products including flood forecasts, general river forecasts, navigation forecasts, reservoir inflow forecasts, water supply outlooks, spring flood outlooks, and flash flood guidance. In addition, the RFCs provide many other services, such as developing new forecast procedures, forecast techniques, computer systems, data handling techniques, and hydrologic-related hardware.

The Missouri Basin River Forecast Center (MBRFC) is co-located with the

Weather Forecast Office in Pleasant Hill, Missouri near Kansas City. It provides hydrologic services for an area of 530,000 square miles, which includes the entire Missouri River Basin and the Saint Mary Basin in Montana. The Rocky Mountains form the western boundary, and the basin includes parts of ten states (Figure 14a) and two Canadian Provinces. In the Intermountain West region, the north-eastern Colorado and central and western Wyoming are in the Missouri River basin. The major rivers that are tributaries of the Missouri in this area include the South Platte (CO), North Platte, Powder, and Big Horn (WY). These watersheds are home to the cities of the Northern Front Range. The elevation of the Missouri basin ranges from 14,000 feet above sea level at the continental divide to 2,000 feet above sea level where the Missouri River flows into the Mississippi River in Missouri. The MBRFC forecasts for 522 river and reservoir locations within an area of a total

elevation fall of 3,630 feet, averaging 1.5 feet per mile.

Flooding can be a common Spring problem in the Missouri Basin due to snowmelt, ice jams, high soil moisture, and heavy precipitation. The MBRFC issues several summary products based on their gathered information and models. The Spring Outlooks discuss the potential for flooding during the spring snowmelt. The Water Supply Outlook provides water supply guidance to the region in order to plan ahead for the planting of irrigated crops, municipal water supply, reservoir operations, and to establish the length of the navigation season along the Missouri River. These outlooks, forecasts, and current data can all be found on the MBRFC web page (<http://www.crh.noaa.gov/mbrfc/>).

The temperature and precipitation differences across the Missouri River basin can make it difficult to forecast river flows in this region. The MBRFC uses both observation data and sophisticated models to produce streamflow guidance products. Water supplies come from both rain and snowmelt, so the MBRFC has a diverse observational network to accurately assess the water supplies at any given time in the basin. Snow cover data is used by hydrologists at the MBRFC to assess the impact of winter snow cover on spring flood potential. The observational data used in hydrological forecasting for the Missouri Basin is gathered in many different ways: ground measurements of snow depths and water equivalents, airborne flights using gamma radiation, geostationary satellite 1km resolution reflectivity data to make snow cover maps, and WSR-88D radar precipitation estimates from more than 25 sites across the basin. The forecasters then review the precipitation data for quality control and process it along with a soil



Figure 14a. This map outlines the area covered by the MBRFC and includes the locations of several major cities within the basin, including Denver, Colorado; Cheyenne, Wyoming; Lincoln and Omaha, Nebraska; Kansas City, Missouri; and many others. The MBRFC office, marked in light purple on the map, is located in Pleasant Hill, Missouri.



moisture accounting model to determine the amount of runoff from rainfall. The MBRFC uses the NWS River Forecast System hydrologic model to create runoff forecasts based on snow. Snowmelt outlooks are produced using two major meteorological scenarios: (1) melt based on future probable temperatures and “normal” future precipitation for the season; and (2) melt based on future probable temperatures and no additional precipitation (rain or snow). The rainfall and snowmelt runoff forecasts are combined to form a flow forecast for a specific point of interest along a river. The accuracy and timing of these forecasts are very important, especially in flooding situations. Water supply forecasts are coordinated with the Natural Resources Conservation Service (NRCS) in Portland Oregon, and issued monthly January through May and/or June. Each February and March, spring snowmelt outlooks are made for those areas with historical and potential snow problems. In addition to daily, monthly, and seasonal forecasts, the MBRFC will make reservoir inflow fore-

casts upon request. Even in non-flood periods, efficient operation of water control structures, riverside industry, and navigation depends on the accurate and timely forecasts of changes in river stages, and thus has considerable economic impact

The MBRFC provides information in the form of streamflow and flood outlooks to several federal and state agencies and to the general public on its website (Figure 14b). Specifically, the MBRFC provides guidance tailored to the needs of the National Weather Service and other federal government agencies such as the division and district offices of the U.S. Army Corps of Engineers, the Natural Resources Conservation Service, the Bureau of Reclamation, and the U.S. Geological Survey. The MBRFC website also contains other hydrologic resources and educational materials.

This article was adapted from a MBRFC publication, which can be found at <http://www.crh.noaa.gov/mbrfc/compend.htm>.

6-Hour Flash Flood Guidance -- July 19, 2005

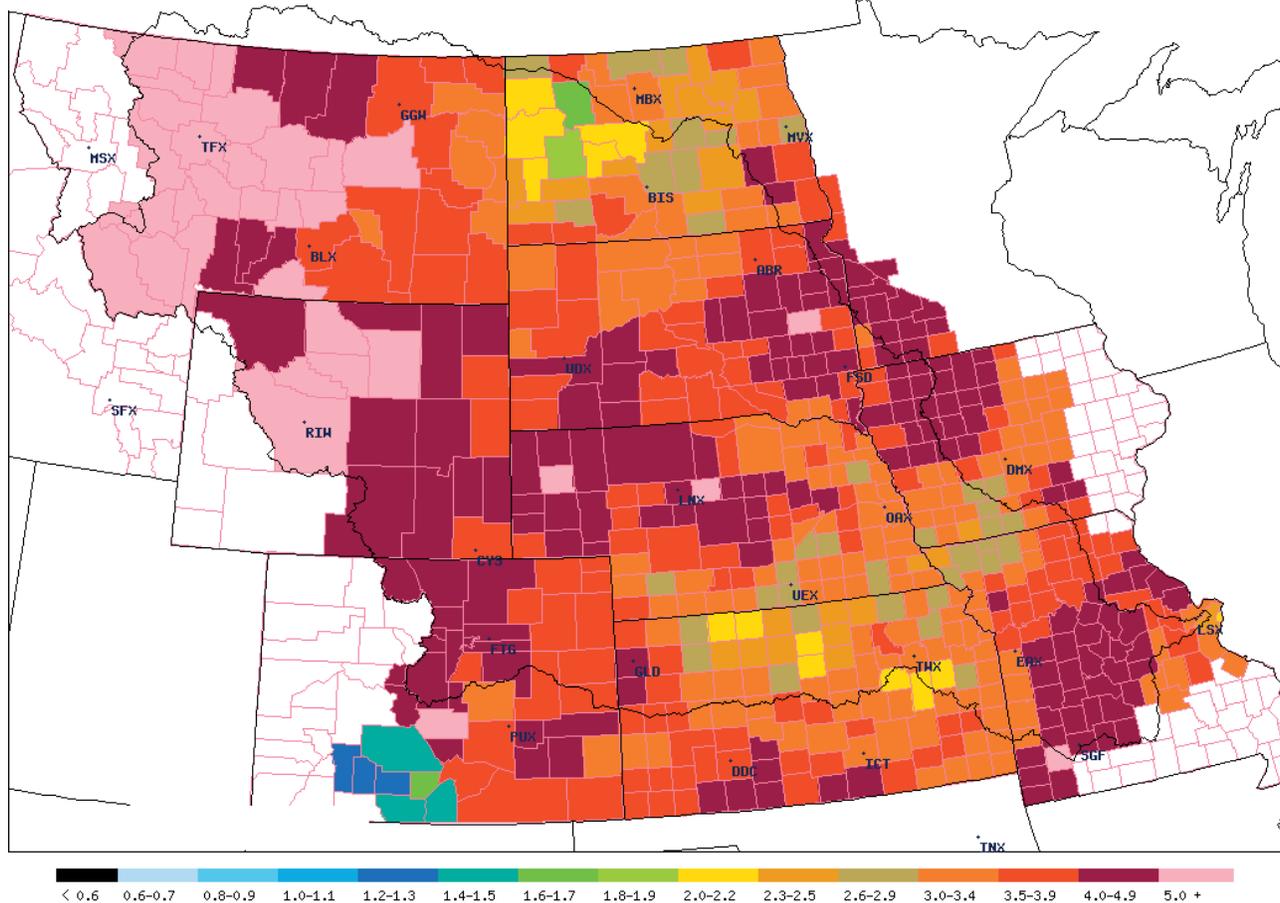


Figure 14b. This MBRFC product is a six-hour flash flood guidance map. The different colors represent 6-hour estimated rainfall totals in inches for all counties within the MBRFC region. Flash Flood Guidance products are issued twice a day by the MBRFC and then used by the Weather Forecast Offices when issuing flash flood watches and warnings to the public. This product can be found on the MBRFC website located at: http://www.crh.noaa.gov/mbrfc/wfo-ffg_files/ffg-6hr.htm

On the Web

<http://www.crh.noaa.gov/mbrfc/>

