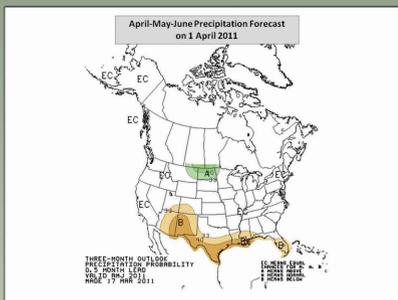
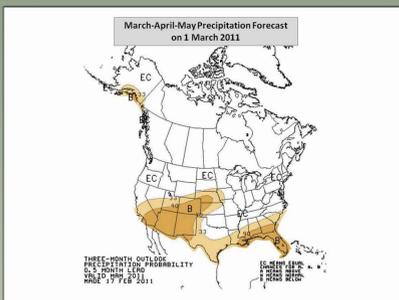




US Army Corps of Engineers  
**BUILDING STRONG**

# Missouri River Mainstem Reservoir System

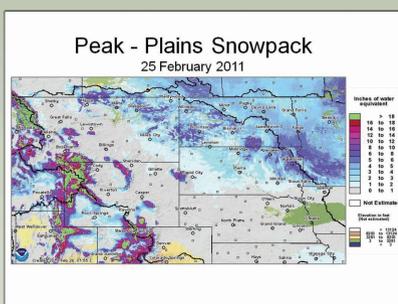
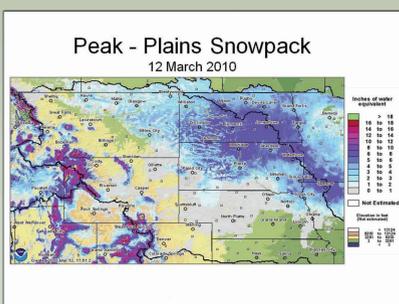
## Spring 2011: March/April Flood Season Begins



### How the Corps Assesses Its Long-Term Climate Forecast

The precipitation probability levels are: Above Normal (A), shown in shades of green; Below Normal (B) shown in shades of brown; and Equal Chances (EC), equal chance of (A) and (B), shown in white.

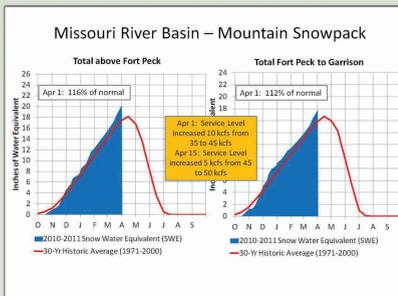
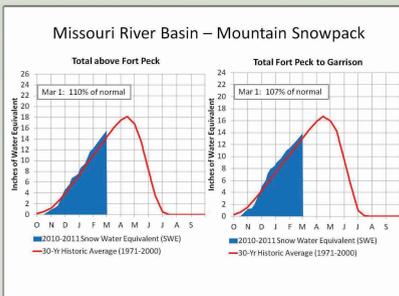
**In March, the three-month outlook was for Below Normal (B) precipitation in the lower Missouri River basin and Equal Chances (EC) precipitation in the upper Missouri River basin. In April, the outlook was Equal Chance (EC) for precipitation in most of the Missouri River basin and Above Normal (A) in North Dakota and eastern Montana.**



### Plains Snowpack

Runoff from plains snowpack occurs throughout the Missouri River basin, including above all six Mainstem projects. That snowpack is measured in terms of Snow Water Equivalent (SWE), e.g. how many inches of water the snow equals when melted.

**The plains snowpack peaked about Feb. 25, 2011. In general, the plains snowpack in 2011 was "heavy" - similar to 2010, and "very heavy" in some areas of the upper basin.**



### Mountain Snowpack

The Corps began evacuating floodwaters from the upper reservoirs even before the large May storms. During high water years, the rate at which floodwater is evacuated is calculated monthly, or more frequently if needed, to facilitate a smooth transition in releases.

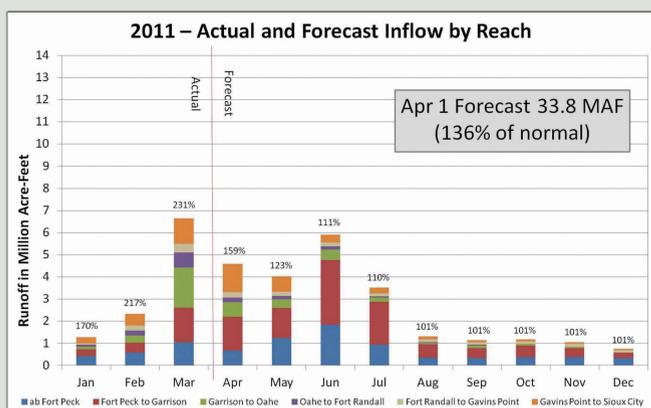
Because the ability to evacuate water is severely restricted during the winter months, most floodwater evacuation is accomplished during the navigation season (April 1 to Dec. 1). Thus, floodwater evacuation rates are defined as an increment of release above navigation flows.

The floodwater evacuation rate is based on a computation of water supply that considers the volume of water already stored in the mainstem and tributary reservoirs and the forecast runoff for the remainder of the year. The goal is to evacuate floodwater at the lowest rate possible over a long period of time to provide flood damage reduction for downstream communities.

**On April 1, the rate of flood water evacuation was set at 10,000 cfs above full service navigation flows. As the mountain snowpack continued to climb during late April, the evacuation rate was increased to 15,000 cfs above navigation levels on April 15, and to 25,000 cfs on May 1.**

## Corps' Runoff Forecast

### Reach-by-Reach Runoff Forecast



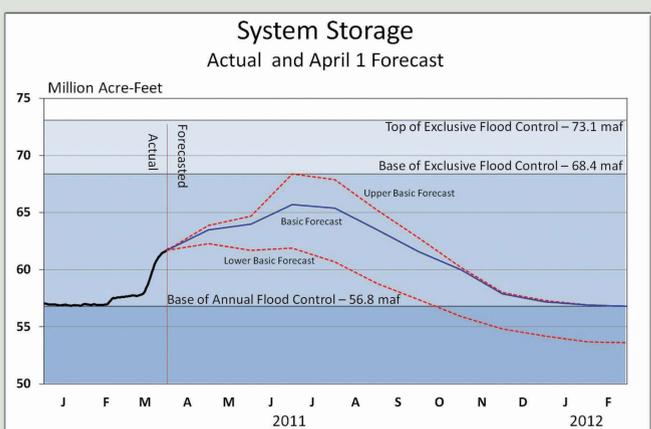
The Corps uses information from plains snowpack, mountain snowpack and the long-term climate forecast to develop a monthly runoff forecast.

### Reservoir Computer Model

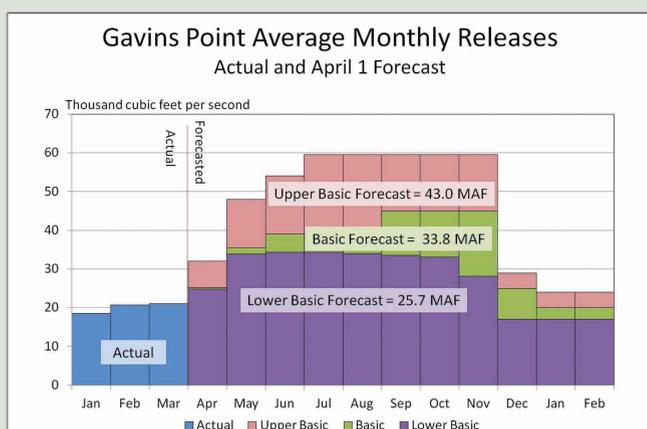


After developing the monthly reach-by-reach forecast for the basin, the Corps enters this information into a reservoir model to develop the reach-by-reach expected storage and reservoir release levels.

## Storage and Releases



The Corps develops a basic forecast which assumes expected precipitation (snow and rain). The Corps also develops two contingency forecasts that set a plan for reservoir storage and release rates in the event of above and below expected precipitation.



The graphic at left shows actual storage for 2010 and projected storage for 2011. The graphic at right shows projected Gavins Point releases for 2011.