

# Upper Mississippi River Basin

## Climate Change Brief



decadal increase in mean annual precipitation

### We're Getting More Precipitation

Annual precipitation averages are rising across much of the U.S., and some of the largest increases are in the Upper Mississippi River Basin.

Over the past 30 years, average annual precipitation has increased by +1.34" per decade. This is a big leap from the +0.18" decadal trend from the preceding century (1895-1990).

### Rains are Gaining Intensity

There is a clear pattern of large precipitation amounts being concentrated in high-intensity events. The frequency of heavy precipitation events within the Upper Mississippi River Basin has risen over the past 50 years. In fact, this area saw a 37% increase in the heaviest (1%) events from 1958 to 2012.

This includes mega-rains, which are defined by their high intensity ( $\geq 6"$ ), large coverage area ( $\geq 1,000$  mi<sup>2</sup>), and often catastrophic impacts.

37%

increase in heaviest storms from 1958-2012



Winter

precipitation increased by 0.40" per decade since 1991

### Every Season is Wetter

Rising precipitation has been observed across all seasons over the last 30 years in the Upper Mississippi River Basin. The biggest increases have been in the winter and spring, with +0.40" and +0.41" decadal trends, respectively.

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decadal increase in  
flood magnitude  
as high as **15%**

### The River is Responding

How is the Mississippi River handling all of this extra water? Annual flood magnitudes are increasing across most of the Upper Mississippi River Basin, with decadal rises as high as +15%. This region is seeing the most significant increasing flood trends of any area in the U.S.

### Higher Flows and Longer Floods

In some river reaches, the increased precipitation has resulted in:

- Increased days above flood stage
- Larger mean annual flow
- Higher average peak flow

At several sites, the Mississippi River was above flood stage approximately 5-10x longer in the past decade than on average over the preceding 80 years.



**5-10x**

longer floods observed at some sites on  
Mississippi River in past decade than  
preceding 80 year average

**+4.0"**



increase in average annual  
precipitation projected for  
parts of the Upper Mississippi  
River Basin in 2041-2070

### Where Are We Heading?

Projections for the rest of the century show that many of the observed upward trends will continue.

- Increase in average precipitation
- More intense precipitation events
- Winter and spring will continue to see the largest increases in precipitation

Consequently, high river flows and longer floods may also continue.