

## FLOOD FORECASTING - WEBQUEST

*Scientists are always trying to get better at forecasting catastrophic events like earthquakes, volcanoes, landslides, and floods. In some ways, floods are perhaps the easiest of these because they are often tied to weather events, especially those with heavy precipitation. For this webquest, you will examine how scientists try to use historical data to analyze the risk for flooding. They have been collecting data on the strength, the frequency, and location of storms and flooding for many decades, and are slowly getting better at forecasting dangerous flood events.*

*(NOTE – if any of the links give you trouble, just copy and paste the URL into a tab.)*

First go to this website - [https://www.usgs.gov/faqs/how-are-floods-predicted?qt-news\\_science\\_products=0#qt-news\\_science\\_products](https://www.usgs.gov/faqs/how-are-floods-predicted?qt-news_science_products=0#qt-news_science_products)

According to this page, what **types of data** do scientists need to predict floods?

Obviously, heavy rainfall is a major factor that can cause flooding. Go to <http://www.nssl.noaa.gov/education/svrwx101/floods/detection/> To find out what the **main tools** are that scientists use to determine if the rainfall is particularly heavy.

Let's find out if our area has received years of high rainfall. Go to: <https://www.ncdc.noaa.gov/cag/>, called "Climate At A Glance". Then, click on "Time Series" and click on "County". Finally, plug in the following information:

Parameter – precipitation  
Time scale – annual  
Start Year – 1895  
End Year – 2019  
State/Region – Massachusetts  
County – Dukes County

Hit the "Plot" button and wait for the graph to emerge. Study the graph – what is this graph showing?

What are the **three years** (roughly) of greatest rainfall?

What are the **three years** (roughly) of lowest rainfall?

What is the "**mean**" amount of annual rainfall for our area of Massachusetts?

Go to the following website: <https://water.usgs.gov/floods/> Here you find a map of today's flood conditions in the United States – click on it for a large view. Are there any areas with rivers **above** the flood stage? If so, what states are they in?

Click on “Massachusetts”. This close-up of our state shows stream-gauges that are measuring various stream heights. Study the explanation to understand these data. Now **summarize** the “stream flow” situation in our state today:

**Heavy rainfall** is one of the largest causes of inland flooding, while severe coastal storms are one of the largest causes of coastal flooding. Saturated soil can also make the problem worse. On August 28, 2011, **Tropical Storm Irene** hammered the inland state of Vermont, with a combination all three of these conditions. Vermont is known for its nearly 100 beautiful antique covered bridges, several of which were destroyed by Irene – a storm considered a “100-year flood”. Go to the following website - <https://pmm.nasa.gov/education/videos/gpm-hurricanes-beyond-tropics> - to watch the video and answer these questions:

What does **GPM** stand for and what does it show?

How is **GPM** better than **TRMM**?

Go the following website on “100-year floods” -

[https://pubs.usgs.gov/gip/106/pdf/100-year-flood\\_041210web.pdf](https://pubs.usgs.gov/gip/106/pdf/100-year-flood_041210web.pdf)

Browse through this page.

What is a “**100-year flood**” and how have scientists decided to determine when a storm is one?