NOAA Atlas 14 Precipitation Frequency Estimates: Tool Overview and Guidance

hdsc.nws.noaa.gov/pfds

GLISA developed this tool guidance based on their experience as a potential user. It is intended to help other users in the Great Lakes region better understand the tool and its potential applications. For an in-depth walkthrough of how to use the tool, please see this tutorial video.

Overview

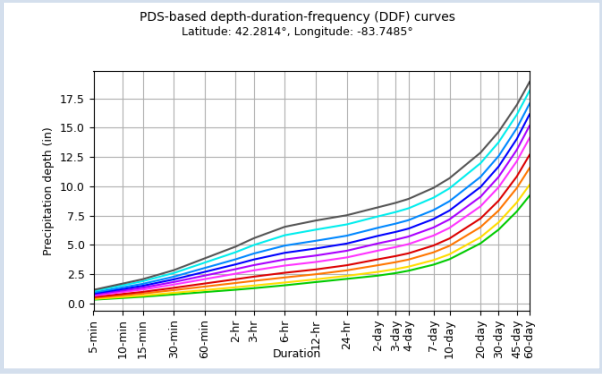
Precipitation frequency estimates are used in development and planning regulations, watershed and stormwater management, and infrastructure design. NOAA Atlas 14 provides estimates of precipitation frequency for a specified location in the United States in graphical or tabular form.

Outputs

- Precipitation frequency estimates are provided as tables or graphs with a 90% confidence interval for any specified location within the United States. Estimates give the average recurrence intervals of precipitation depths for various durations, so that users can understand how often certain design storms are likely to occur (e.g., 4 inches of rain falling in a 24-hour period is estimated to occur every 25 years).
    - Graphs may be viewed using interval or duration curves, or using a 90% confidence interval based on a user-selected duration.
    - Tables display the upper and lower bounds of the 90% confidence interval. Data is also available to download in CSV format.
- Supplementary information is provided on temporal distribution of heavy precipitation, analysis of seasonality, cartographic maps of precipitation frequency, spatially interpolated precipitation frequency estimates in GIS format, and watershed information.

Applications and Use

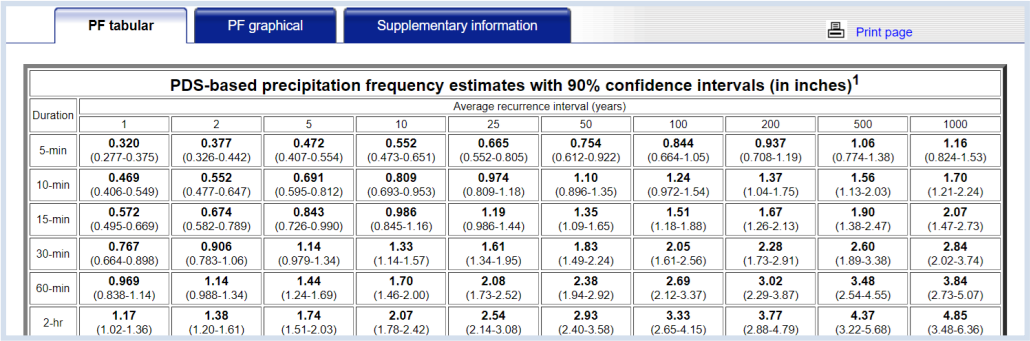
- **Intended audience:** Precipitation frequency estimates and data from this tool may be relevant to stormwater managers, department of public works professionals, and urban planners.
- **Background needed:** Background knowledge in basic statistics may be helpful to more easily interpret the results, but is not required.
- **Example of potential use:** Stormwater managers may use precipitation frequency estimates from the tool when building their systems to handle certain design storms. See tutorial video for example demonstration.



Precipitation depth-duration-frequency curves from NOAA Atlas 14. Credit: NOAA.

Potential Limitations and Considerations

- Data for individual regions were created in Volumes and updated at different times throughout the past 20 years. Estimates are only based on precipitation data up to the most recent update for that region, and would not be reflective of more recent precipitation trends that have happened since.
- The Precipitation Frequency Data Server is compatible with all modern servers, though some might work better than others. Developers of the tool recommend Chrome, Firefox, Internet Explorer 11+, and Safari. Microsoft's Edge is not compatible.
- Upper bounds of the confidence intervals displayed in the table's output have not been checked against probable maximum precipitation and estimates may be higher than currently valid probable maximum precipitation values.



PF tabular | PF graphical | Supplementary information | Print page

PDS-based precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.320** (0.277-0.375)	**0.377** (0.326-0.442)	**0.472** (0.407-0.554)	**0.552** (0.473-0.651)	**0.665** (0.552-0.805)	**0.754** (0.612-0.922)	**0.844** (0.664-1.05)	**0.937** (0.708-1.19)	**1.06** (0.774-1.38)	**1.16** (0.824-1.53)
10-min	**0.469** (0.406-0.549)	**0.552** (0.477-0.647)	**0.691** (0.595-0.812)	**0.809** (0.693-0.953)	**0.974** (0.809-1.18)	**1.10** (0.896-1.35)	**1.24** (0.972-1.54)	**1.37** (1.04-1.75)	**1.56** (1.13-2.03)	**1.70** (1.21-2.24)
15-min	**0.572** (0.495-0.669)	**0.674** (0.582-0.789)	**0.843** (0.726-0.990)	**0.986** (0.845-1.16)	**1.19** (0.986-1.44)	**1.35** (1.09-1.65)	**1.51** (1.18-1.88)	**1.67** (1.26-2.13)	**1.90** (1.38-2.47)	**2.07** (1.47-2.73)
30-min	**0.767** (0.664-0.898)	**0.906** (0.783-1.06)	**1.14** (0.979-1.34)	**1.33** (1.14-1.57)	**1.61** (1.34-1.95)	**1.83** (1.49-2.24)	**2.05** (1.61-2.56)	**2.28** (1.73-2.91)	**2.60** (1.89-3.38)	**2.84** (2.02-3.74)
60-min	**0.969** (0.838-1.14)	**1.14** (0.988-1.34)	**1.44** (1.24-1.69)	**1.70** (1.46-2.00)	**2.08** (1.73-2.52)	**2.38** (1.94-2.92)	**2.69** (2.12-3.37)	**3.02** (2.29-3.87)	**3.48** (2.54-4.55)	**3.84** (2.73-5.07)
2-hr	**1.17** (1.02-1.36)	**1.38** (1.20-1.61)	**1.74** (1.51-2.03)	**2.07** (1.78-2.42)	**2.54** (2.14-3.08)	**2.93** (2.40-3.58)	**3.33** (2.65-4.15)	**3.77** (2.88-4.79)	**4.37** (3.22-5.68)	**4.85** (3.48-6.36)

Precipitation frequency estimates table from NOAA Atlas 14. Credit: NOAA.

Data Sources

Data type	Source
Precipitation Frequency Data	National Weather Service—Hydrometeorological Design Studies Center (HDSC)
Probable Maximum Precipitation	National Weather Service—HDSC
Technical Reports and Publications	National Weather Service—HDSC

More Information on the Tool

NOAA Atlas 14 is publicly available through the National Weather Service under the National Oceanic and Atmospheric Administration (NOAA).Data for the states of Michigan, Wisconsin, and Minnesota were last updated in 2013; data for the states of Illinois, Indiana, Ohio, and Pennsylvania were last updated in 2008; and data for the state of New York were last updated in 2019. Atlas 15, a new version of this tool using updated precipitation data for the entire United States, is set to be released by 2027. For inquiries about NOAA Atlas 14 Precipitation Frequency Estimates contact: HDSC.questions@noaa.gov.

This guidance document and accompanying tutorial video were developed by GLISA, NOAA's Great Lakes Climate Adaptation Partnerships (CAP, formerly RISA) team, under a project funded by Michigan Sea Grant to help make climate, weather, and coastal resilience tools more accessible to end users in the Great Lakes region. They were created for educational purposes only and are in no way affiliated with NOAA Atlas 14 or its developers.

GLISA A NOAA CAP/RISA TEAM

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