

NATIONAL WEATHER SERVICE INSTRUCTION 10-932

DECEMBER 27, 2019

Operations and Services

Water Resources Services Program, NWSPD 10-9

NATIONAL WATER RESOURCES WEB PRODUCTS SPECIFICATION

NOTICE: This publication is available at: <http://www.nws.noaa.gov/directives/>

OPR: W/AFS25 (D. Roman)

Certified by: W/AFS25 (M. Mullusky)

Type of Issuance: Routine

SUMMARY OF REVISIONS: This directive supersedes NWS Instruction 10-932, “*National Hydrologic Web Products Specification*,” dated September 27, 2017.

The following revisions were made to this instruction:

- 1) Added Section 2.2.6 to describe experimental short-term probabilistic forecasts provided through the Water Resources Services Program web presence.
- 2) Updated Section 7 to more accurately describe the availability of WPC Probabilistic Quantitative Precipitation Forecasts and to note that these products are also transmitted over the SBN.

Signed

12/13/2019

Andrew D. Stern
Director
Analyze, Forecast and Support Office

Date

National Water Resources Web Products Specification

Table of Contents	<u>Page</u>
1. Introduction.....	2
2. NWS Water Resources Services Program Web Presence	3
2.1 Mission Connection.....	3
2.2 Provision Guidelines	3
2.2.1 Home Page.....	3
2.2.2 Hydrographs	3
2.2.3 Inundation Maps.....	4
2.2.4 Precipitation Analysis.....	4
2.2.5 Long-Term Probabilistic Forecasts	4
2.2.6 Experimental Short-Term Probabilistic Forecasts.....	4
2.3 Partner Attribution.....	5
3. National Hydrologic Assessment.....	5
3.1 Mission Connection.....	5
Provision Guidelines	5
3.3 Content	5
4. National Significant River Flood Outlook.....	5
4.1 Mission Connection.....	6
4.2 Provision Guidelines	6
4.2.1 Colors	6
5. Precipitation Frequency Estimates and Probable Maximum Precipitation Documents	6
5.1 Mission Connection.....	6
5.2 Provision Guidelines	7
6. National Snow Analysis.....	7
6.1 Mission Connection.....	7
6.2 Provision Guidelines	7
7. Weather Prediction Center Probabilistic Quantitative Precipitation Forecasts	7
7.1 Mission Connection.....	8
7.2 Provision Guidelines	8
7.3 Content	8

1. Introduction. This directive describes the national standards for National Weather Service (NWS) water resources products and services on the web. Where necessary, links are provided to online user guides or other documentation for more detailed information. All water resources products and services provided through the web, including those from Weather Forecast Offices (WFO), River Forecast Centers (RFC), NWS headquarters, Office of Water Prediction (OWP), and the National Centers for Environmental Prediction (NCEP), will comply with [NWS Policy Directive 60-1, Technical and Content Requirements for Internet Servers](#), [NWS Instruction 60-101, Standard Web Page Layout](#), and [NWS Instruction 60-102, Content Requirements](#).

2. NWS Water Resources Services Program Web Presence. The NWS Water Resources Services Program web presence, also known as the Advanced Hydrologic Prediction Services (AHPS) website, is a collection of web pages providing access to a wide variety of water resources forecasts and information from WFOs, RFCs, NWS headquarters, OWP and NCEP. More detailed information on specific features and capabilities of NWS water resources products available on the web can be found in the online document “Water Resources Information on the Web – A Manual for Users” at the following web address (URL):

<https://www.weather.gov/media/owlie/Water%20Resources%20Web%20Products%20Manual.pdf>

2.1 Mission Connection. The NWS Water Resources Services Program web presence helps the NWS meet its mission by providing water resources warning and forecast information in a variety of formats and time scales, which meets the needs of a range of partners and other users from the layman to the technically advanced water manager. With access to graphical, text, and numerical products through the web, anyone concerned with current and future water resources conditions can make informed decisions on a timely basis to protect life and property and enhance the United States’ (the Nation’s) economy.

2.2 Provision Guidelines.

2.2.1 Home Page. The home page for the NWS Water Resources Services Program web presence at <https://water.weather.gov/> serves as the national portal to these forecasts and information. This portal can also be accessed through the NWS home page (<https://www.weather.gov/>) by clicking on the RIVERS, LAKES, RAINFALL weblink.

The home page for the NWS Water Resources Services Program web presence prominently features a national map of river/stream locations and other water resources information. Tabs or an equivalent capability are provided on the home page to give users control over whether observed or forecast conditions for individual river/stream locations are displayed on the national map. Other tabs/capabilities provide access to other hydrometeorological information, such as the long-range river flood risk, precipitation, and river download. Observed and forecast conditions for individual locations on the map are color coded according to their current status in reference to flood stage—no flooding, near flood stage, minor flooding, moderate flooding, or major flooding. The national map provides access to more localized maps from which information on individual forecast locations can be obtained.

2.2.2 Hydrographs. Hydrographs provided through the Water Resources Services Program web presence display observed and forecast (if available) stage information for each river/stream location shown on map displays. At least five days of forecast information should be shown on the hydrograph, unless there is a limitation in producing a five-day forecast (e.g., modeling limitations for small basins). The number of days shown on the forecast hydrograph for a stream in a given WFO area should be consistent with the number of days provided for comparable streams in adjacent WFO areas, if their hydro-climatological characteristics are the same or very similar.

On the hydrograph display, users are able to interactively access other types of information for

the river/stream location through tabs or an equivalent capability. This capability to select other types of information does not necessarily have the same number of options for each river/stream location, since some types of forecast information, such as inundation maps and probabilistic forecasts, may not be available for all forecast points.

2.2.3 Inundation Maps. Inundation maps for river/stream reaches are web-based products that are highly desired by partners and other users. However, development of the data libraries needed to generate these products is an expensive process, which explains why they are available for comparatively few river/stream locations. As part of their outreach efforts, WFO Hydrology Program Managers, RFC Service Coordination Hydrologists, and other NWS staff can help make more inundation maps available for their area of responsibility by demonstrating the benefits of this product to Federal, state, and/or local agencies, and encouraging them to support the funding of collaborative efforts to develop the required data sets. These data sets are known as inundation map libraries.

Additional information on the inundation mapping interface is available at the following URL:

https://water.weather.gov/ahps/inundation_mapping_user_guide.pdf

NWS forecast locations with a flood inundation mapping interface can be found at the following URL:

<https://water.weather.gov/ahps/inundation.php>

2.2.4 Precipitation Analysis. The precipitation analysis page provided through the Water Resources Services Program web presence graphically shows the short-term observed and climatic trends of precipitation across the conterminous 48 United States (CONUS) and Puerto Rico. Observed precipitation data is a byproduct of NWS operations at the 12 CONUS RFCs, and is displayed as a gridded field with a spatial resolution of roughly 4 x 4 kilometers (km). It is derived from a multi-sensor approach using radar-based precipitation estimates, satellite-based precipitation estimates, and ground-based precipitation gage data. Observed precipitation data is expressed as a 24-hour total ending at 1200 Universal Coordinated Time (UTC)/Greenwich Mean Time (GMT), with longer periods simply being a summation of multiple 24-hour periods. Normal precipitation is derived from Parameter-elevation Regressions on Independent Slopes Model (PRISM) climate data. “Departure from Normal” and “Percentage of Normal” graphics are generated by simple grid mathematics, where the normal dataset is respectively subtracted from or divided into the observed dataset.

2.2.5 Long-Term Probabilistic Forecasts. Long-term probabilistic forecasts available on the AHPS website include The Weekly Chance of Exceeding Levels and Chance of Exceeding Levels During Entire Period plots. The Weekly Chance of Exceeding Levels plot shows the probability or chance that the maximum stage or level at a point on a river will exceed a particular value in a 90-day period. The Chance of Exceeding Levels During Entire Period plot depicts chances of the river stage, flow, or volume going above various levels during the forecast period labeled above the graph.

2.2.6 Experimental Short-Term Probabilistic Forecasts. Experimental short-term probabilistic

forecasts provided through the Water Resources Services Program web presence depict short- to medium-range river forecast uncertainty. The product displays uncertainty bounds for the river forecast in the context of high and low water thresholds used in AHPS.

2.3 Partner Attribution. Because of the importance of the NWS's strategic relationship with the U.S. Geological Survey (USGS), all National Water Resources Services web presence graphics involving stream gaging stations supported by the USGS will include attribution to the USGS. In many cases, other organizations are involved in cooperative arrangements with the USGS to support stream gaging stations. To the maximum degree possible, attribution should also be provided to these organizations along with the USGS.

In cases where the USGS is not involved in supporting the stream gaging station, attribution may be provided to the other supporting organization(s), as appropriate.

On inundation maps, attribution should also be provided for technical partners who cooperate with NWS to develop inundation map libraries.

3. National Hydrologic Assessment. Many parts of the U.S. experience late winter and spring flooding. Snowmelt and ice jams can be important contributors to this flooding in northern areas. In early spring, the OWP integrates information from WFOs and RFCs and prepares a National Hydrologic Assessment, which summarizes potential for such flooding. National-level media help disseminate the National Hydrologic Assessment, particularly its national map of flood risk, to a wide public audience.

3.1 Mission Connection. The National Hydrologic Assessment helps the NWS meet its mission by highlighting areas of possible flooding during the late winter and spring months, thus providing an integrated assessment, which can be used to initiate mitigation activities.

3.2 Provision Guidelines. The National Hydrologic Assessment is typically issued in mid-March on a date coordinated with RFCs, WFOs, OWP, and the NCEP's Climate Prediction Center (CPC) to accommodate scheduling requirements and flood potential at the local, regional, and national levels. If conditions warrant (e.g., existence of a significant snowpack), additional issuances of the National Hydrologic Assessment may occur on earlier or later dates.

3.3 Content. The National Hydrologic Assessment is based on Hydrologic Outlooks issued by WFOs (see [NWS Instruction 10-922, WFO Water Resources Products Specification](#)), which in turn are based on Extended-Range Streamflow Prediction Products issued by RFCs (see [NWS Instruction 10-912, River Forecast Center Products Specification](#)), and combined into national long-range river flood risk maps available on the AHPS website (see "[Water Resources Information on the Web – A Manual for Users](#)"). CPC's Climate Outlooks are a key input to the extended-range streamflow modeling process at RFCs.

The National Hydrologic Assessment includes a map of expected hydrologic conditions along with a text summary. It also includes links to information on factors affecting the current potential for late winter and spring flooding (e.g., snow cover, soil moisture, stream flow conditions, etc.).

4. National Significant River Flood Outlook. This graphical product broadly identifies

areas where potential exists for significant river flooding over a five-day period. The term “significant” refers to river/stream flooding within the moderate and major categories, as defined in [NWS Manual 10-950 - Definitions and General Terminology](#). The product is assembled by the NCEP Weather Prediction Center (WPC) as a mosaic of individual graphical outlooks from the CONUS RFCs (see Section 10 of [NWS Instruction 10-912 - River Forecast Center Products Specification](#)). A separate outlook is provided for Alaska by the Alaska-Pacific River Forecast Center. Details on the National Significant River Flood Outlook’s content can be found in the manual entitled, "[Water Resources Information on the Web – A Manual for Users](#)".

4.1 Mission Connection. This information helps the NWS to meet its mission by graphically depicting areas of river flood potential over the entire Nation. This helps partners and other users focus and optimize their flood mitigation activities, thus protecting lives and property and enhancing the national economy.

4.2 Provision Guidelines. The National Significant River Flood Outlook will be issued daily at approximately 4 p.m., Eastern Time. The national product can be found at the following URL:

<https://www.wpc.ncep.noaa.gov/nationalfloodoutlook/index.html>

The National Significant River Flood Outlook is also issued under the WMO Header **PENJ88 KWNH** and AWIPS identifier **GPHWNH**.

4.2.1 Colors. Colors and/or patterns will be used to characterize flood potential according to the following criteria:

- a. Possible: Hydrometeorological conditions indicate that significant flooding could occur. Such flooding is neither certain nor imminent.
- b. Likely: Hydrometeorological conditions indicate that significant flooding can be expected during the outlook period.
- c. Occurring/Imminent: Significant flooding is already occurring or is imminent during the outlook period.

5. Precipitation Frequency Estimates and Probable Maximum Precipitation Documents. NWS precipitation frequency estimates and associated information, formerly provided through hard copy Weather Bureau Technical Papers, Weather Bureau Memoranda, and NOAA Atlases, are now made available via the web through the Precipitation Frequency Data Server. Details on the Precipitation Frequency Data Server can be found in the manual entitled, "[Water Resources Information on the Web – A Manual for Users](#)".

Guidelines for deriving probable maximum precipitation documents, formerly provided through hard copy Weather Bureau and National Weather Service Hydrometeorological Reports and Weather Bureau Technical Papers, are now made available via the web through the home page of the Hydrometeorological Design Studies Center in the OWP.

5.1 Mission Connection. NWS precipitation frequency estimates and probable maximum precipitation documents are *de facto* national standards. They are provided in accordance with

NOAA's Strategic Plan Mission Goal 2; "Understand climate variability and change to enhance society's ability to plan and respond."

5.2 Provision Guidelines. Precipitation frequency estimates and related information will be provided on the web through a map-based interface at the following URL:

<https://hdsc.nws.noaa.gov/hdsc/pfds/>

Probable maximum precipitation documents and related information will be provided on the web at the following URL:

<https://www.nws.noaa.gov/oh/hdsc/studies/pmp.html>

As time and resources permit, the Hydrometeorological Design Studies Center will update precipitation frequency estimates and probable maximum precipitation documents by conducting reanalysis studies using more recent environmental data and technical procedures. Updated precipitation frequency estimates, accompanied by additional relevant information, will be published online in new volumes of [NOAA Atlas 14](#). Updates to the derivation of probable maximum precipitation, accompanied by additional relevant information, will also be published via the web.

6. National Snow Analysis. The National Snow Analysis (NSA) is a web-based suite of products from the OWP, which provides comprehensive information on snow conditions in the CONUS and adjacent portions of Canada. Details on the National Snow Analysis can be found in the manual entitled, "[Water Resources Information on the Web – A Manual for Users](#)".

6.1 Mission Connection. The NSA helps the NWS meet its mission by making available analyses of snow pack conditions and data sets that are used by NWS field offices; other federal, state, and local agencies; and the private sector in a variety of applications, including operational and research hydrologic modeling for snowmelt and water supply forecasting. This allows for better forecasting and management of increasingly scarce water resources, thus helping to protect life and property and enhance the national economy.

6.2 Provision Guidelines. Analyses of snowpack conditions provided through the NSA are available at the following URL:

<https://www.nohrsc.noaa.gov/nsa/>

Snowpack summaries from the NSA are available daily. Interactive, time series data plots and user-selected alphanumeric snow pack summaries are available on demand through the web.

7. Weather Prediction Center Probabilistic Quantitative Precipitation Forecasts. Precipitation is a primary driver of operational hydrologic models; therefore, the certainty (or uncertainty) of forecast precipitation directly affects the certainty (or uncertainty) of NWS water resources forecasts. NCEP's WPC produces a web-based interface to probabilistic quantitative precipitation forecast (PQPF) information covering the first 72-hour forecast period. In addition, WPC transmits PQPF grid data across the Satellite Broadcast Network (SBN).

7.1 Mission Connection. PQPF information helps the NWS meet its mission by supporting probabilistic river forecasting operations at RFCs, and helping WFOs issue flood/flash flood watches with more specificity on potential precipitation events. Thus, it enables emergency managers to concentrate their flood mitigation activities on areas of highest threat, and provides water managers with forecast uncertainty information needed to optimize the allocation of scarce water resources. PQPFs may also be useful to commercial weather service companies, the academic community, and the agricultural community. All of these beneficial uses help to protect life and property and enhance the national economy.

7.2 Provision Guidelines. The WPC PQPF suite is updated four times per day after transmission of WPC's QPF products and includes forecasts covering both 6- and 24-hour forecast durations. Preliminary products based on the 0600 UTC and 1800 UTC QPF are available at approximately 0645 UTC and 1845 UTC, respectively. Final products based on the 0000 UTC and 1200 UTC QPF are available at approximately 2115 UTC the day before and 0915 UTC, respectively.

The URL for the probability of threshold exceedance graphics is:

https://www.wpc.ncep.noaa.gov/pqpf/conus_hpc_pqpf.php

The URL for the percentile accumulation graphics is:

https://www.wpc.ncep.noaa.gov/pqpf/conus_hpc_percentile.php

7.3 Content. WPC's web pages provide PQPF data in the form of probability of threshold exceedance and percentile accumulation graphics for 6- and 24-hour forecast durations through 72 hours. Both 6- and 24-hour forecast durations are available in six-hour time increments to facilitate a rolling time window. A more detailed description of this product can be found on the WPC website at:

https://www.wpc.ncep.noaa.gov/pqpf/about_pqpf_products.shtml