

**NATIONAL WEATHER SERVICE MANUAL 10-950
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**Operations and Services
Hydrologic Services Program, NWSPD 10-9**

DEFINITIONS AND GENERAL TERMINOLOGY

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SUMMARY OF REVISIONS: This directive supersedes NWS Manual 10-950, “Definitions and General Terminology,” dated September 8, 2008. The following revisions were made to this manual:

- 1) Deletes the definition for alert stage, as this stage is no longer used by NWS field offices.
- 2) Changes the definition of flood stage from “an established gage height for a given location at which a rise in water surface level begins to *create a hazard to* lives, property, or commerce” to “an established gage height for a given location at which a rise in water surface level begins to *impact* lives, property, or commerce.”
- 3) Deletes the sentence “The first three of these flood categories – minor, moderate, and major flooding – are bounded by an upper and lower stage” from the definition of flood categories.
- 4) Modifies the staff gage graphic in Figure 1 to indicate that some overbank flow may occur below flood stage and there is no upper limit to the major flood category.
- 5) Adds a definition for “flood inundation map.”
- 6) Slightly modifies the definition of “monitor stage” to conform to the definition used by the State of California.

(Signed)

October 22, 2010

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Date

Definitions and General Terminology

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1. Introduction. This directive provides official definitions of key policy-related terminology used in the Hydrologic Services Program.

2. Definitions.

Action Stage - the stage which when reached by a rising stream, lake, or reservoir represents the level where the NWS or a partner/user needs to take some type of mitigation action in preparation for possible significant hydrologic activity. The appropriate action is usually defined in a weather forecast office (WFO) hydrologic services manual. Action stage can be the same as forecast issuance stage (see *forecast issuance stage*).

Bankfull Stage - an established gage height at a given location along a river or stream, above which a rise in water surface will cause the river or stream to overflow the lowest natural stream bank somewhere in the corresponding reach. The term “lowest bank” is however, not intended to apply to an unusually low place or a break in the natural bank through which the water inundates a small area. Bankfull stage is not necessarily the same as flood stage.

Critical Low Flow Threshold - the stage or flow at which a low water level begins to have significant negative impacts on a water-related concern (user community). These concerns can include, but are not limited to, water supply, agriculture, recreation, water quality, power generation, navigation, and environment. The threshold may vary through the year because each concern has its own time period when they are most impacted by low flow, as well as its own water level at which negative impacts of low flow begin. At a given time during the year, the highest stage or flow among all concerns at which low water begins to have a significant negative impact determines the critical low flow threshold for that time.

Data Point – in the context of hydrologic observations, a location on a river/stream for which observed data is input to RFC or WFO hydrologic forecast procedures, or included in public hydrologic products. Flood forecasts and warnings are not issued for data points (see *forecast point*).

Flash Flood - a rapid and extreme flow of high water into a normally dry area, or a rapid water level rise in a stream or creek above a predetermined flood level, beginning within six hours of the causative event (e.g., intense rainfall, dam failure, ice jam). However, the actual time threshold may vary in different parts of the country. Ongoing flooding can intensify to flash flooding in cases where intense rainfall results in a rapid surge of rising flood waters.

Flood - any high flow, overflow, or inundation by water which causes or threatens damage.

Flood Stage - an established gage height for a given location at which a rise in water surface level begins to impact lives, property, or commerce. The issuance of flood (and in some cases flash flood) warnings is linked to flood stage. Not necessarily the same as bankfull stage.

Flood Categories – terms defined for each forecast point which describe or categorize the severity of flood impacts in the corresponding river/stream reach. The severity of flooding at a given stage is not necessarily the same at all locations along a river reach due to varying channel/bank characteristics or presence of levees on portions of the reach. Therefore, the upper and lower stages for a given flood category are usually associated with water levels corresponding to the most significant flood impacts somewhere in the reach. The flood categories used in the NWS are (see Figure 1):

Minor Flooding - minimal or no property damage, but possibly some public threat.

Moderate Flooding - some inundation of structures and roads near stream. Some evacuations of people and/or transfer of property to higher elevations.

Major Flooding - extensive inundation of structures and roads. Significant evacuations of people and/or transfer of property to higher elevations.

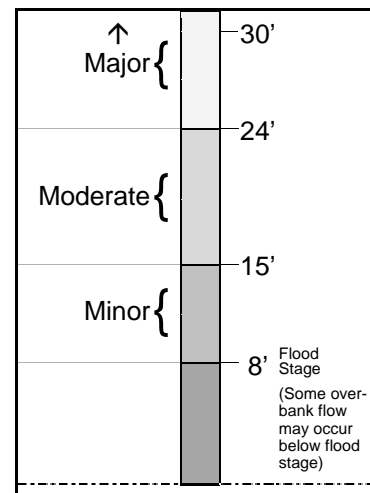


Figure 1. Stage - flood category relationship.

Record Flooding - flooding which equals or exceeds the highest stage or discharge observed at a given site during the period of record keeping. The highest stage on record is not necessarily above the other three flood categories – it may be within any of them or even less than the lowest.

Note: all three of the lower flood categories (minor, moderate, major) do not necessarily exist for a given forecast point. For example, at the level where a river reaches flood stage, it may be considered moderate flooding. However, at least one of these three flood categories starts at flood stage.

Flood Inundation Map - A map estimating the areal extent of flood waters and depth of flooding for a river reach relative to a given river stage at a point of interest. The process of delineating areal extent of flooding often involves use of geographic information systems and the interdisciplinary application of hydrology and hydraulics. A static flood inundation map is produced prior to flooding while a dynamic flood inundation map is produced during a flood event.

Forecast Issuance Stage - the stage which, when reached by a rising stream, represents the level where RFCs need to begin issuing forecasts for a non-routine (flood-only) forecast point. This stage is coordinated between WFO and RFC personnel and is not necessarily the same as action or alert stage. The needs of WFO/RFC partners and other users are considered in determining this stage.

Forecast Point - a location along a river or stream for which hydrologic forecast and warning services are provided by a WFO. The observed/forecast stage or discharge for a given forecast point can be assumed to represent conditions in a given reach (see *reach*).

Gage Datum - a horizontal surface used as a zero point for measurement of stage or gage height. This surface usually is located slightly below the lowest point of the stream bottom such that the gage height is usually slightly greater than the maximum depth of water. Because the gage datum is not an actual physical object, the datum is usually defined by specifying the elevations of permanent reference marks such as bridge abutments and survey monuments, and the gage is set to agree with the reference marks. Gage datum is a local datum that is maintained independently of any national geodetic datum. However, if the elevation of the gage datum relative to the national datum (North American Vertical Datum of 1988 or National Geodetic Vertical Datum of 1929) has been determined, then the gage readings can be converted to elevations above the national datum by adding the elevation of the gage datum to the gage reading.

Hydrometeorology - an interdisciplinary science involving the study and analysis of the inter-relationships between the atmospheric and land phases of water as it moves through the hydrologic cycle.

Monitor Stage - For non-leveed streams, the stage at which initial action must be taken by concerned interests (e.g. livestock warning, removal of equipment from lowest overflow areas, or general surveillance). This level may produce overbank flows sufficient to cause minor flooding of low-lying lands and local roads. For leveed streams, the stage at which patrol of flood control levees by the responsible levee maintaining agency becomes mandatory, or the

stage at which flow occurs into bypass areas from project overflow weirs. “Monitor Stage” is only used in the State of California.

Reach - a section of river or stream between an upstream and downstream location, for which the stage or flow measured at a point somewhere along the section (e.g., gaging station or forecast point) is representative of conditions in that section of river or stream.

Stage - the level of the water surface of a river or stream above an established datum at a given location.