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Operations and Services

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DEFINITIONS AND GENERAL TERMINOLOGY

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SUMMARY OF REVISIONS: This directive supersedes NWS Manual 10-950, "Definitions and General Terminology," dated August 25, 2017. The following revisions were made to this manual:

1. Added Section 2.5, "Debris Flow".

Signed 11/12/2019

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Definitions and General Terminology

Table of Contents

1 Introduction

This directive provides official definitions of key policy-related terminology used in Water Resources Services.

2 Definitions

2.1 Action Stage - an established gage height which when reached by a rising stream, lake, or reservoir represents the level where action is taken in preparation for possible significant hydrologic activity.

2.2 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 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.

2.3 Critical Low Flow Threshold - the stage or flow at which low water levels begins to have significant negative impacts on a water-related industry or user community. These industries or user communities include, but are not limited to: water supply, agriculture, recreation, water quality, power generation, navigation, and environment. The threshold may vary throughout the year because each industry or user community has its own time period when they are most impacted by low flow, as well as specific water levels at which negative impacts of low flow begin. At a given time during the year, the critical low flow threshold is determined by the highest of all of the negatively impacted low stage or low flow values.

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

2.5 Debris Flow - a slurry of loose soil, rock, organic matter, and water, similar to wet concrete, that is capable of holding particles larger than gravel in suspension. Debris flows can mobilize from landslides on steep, nearly saturated slopes or be triggered by intense rain after wildfires. Debris flows can travel several miles from their source, growing in size as they pick up sediment, boulders, trees, cars, and other material. High velocity flows can transport large boulders in suspension and cause catastrophic damage, but even slower debris flows can rapidly infill channels, divert streams, and destroy automobiles, buildings, and infrastructure. Hyperconcentrated flows can also carry significant amounts of sediment and debris and are frequently mistaken for debris flows. However, unlike hyperconcentrated flows that have anywhere from 5-10 percent up to 20-60 percent sediment by volume, debris flows typically exceed 50 percent sediment by volume and the flow behavior is significantly controlled by the entrained sediment instead of the water. Warning signs that a debris flow is about to arrive include rushing water, mud, unusual sounds such as cracking, breaking, roaring, or a freight

train-like sound. There is not time to protect life and property once a debris flow has initiated, so the best protective action is to get out of a debris flow danger area before it begins.

2.6 Flash Flood - a damaging and life-threatening, rapid rise of water into a normally dry area beginning within minutes to multiple hours of the causative event (e.g., intense rainfall, dam failure, ice jam). Ongoing flooding can have rapid intensification of severity of impacts in cases where excessive rainfall results in a rapid surge of rising flood waters. Flash flooding, such as dangerous small stream or urban flooding and dam or levee failures, requires immediate action to protect life and property.

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

2.8 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 the 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):

2.8.1 Minor Flooding - minimal or no property damage, but possibly some public threat (e.g., inundation of roads).

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

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

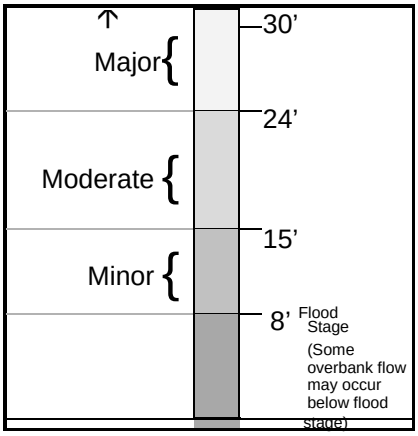

Figure 1. *Stage - flood category relationship.*

2.8.4 Record Flooding - flooding which equals or exceeds the highest stage or discharge observed at a given site during the period of record. 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, particularly if the period of record is short (e.g., a few years).

Note: minor, moderate, and major flood categories do not necessarily exist for all forecast points. For example, a location with a permanent levee may begin to experience impacts at moderate flooding.

2.9 Flood Stage - an established gage height at a given river location at which a rise in water surface level begins to impact lives, property, or commerce. Flood stage is not necessarily the same as bankfull stage.

2.10 Flood Forecast Inundation Map - a graphical depiction of the areal extent and depth of flooding for a specified area relative to a real-time flood forecast. This estimate is contingent on a given flood forecast of the stage, flow, and flood wave.

2.11 Forecast Issuance Stage - the stage which represents when RFCs begin issuing forecasts for a non-routine forecast point, also known as a "flood-only forecast." This stage is coordinated between WFO and RFC personnel. The needs of WFO/RFC partners and other users are considered in determining this stage. Forecast Issuance Stage may be the same stage level as Action Stage.

2.12 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*).

2.13 Gage Zero Datum - a starting point of reference for measurement of stage or gage height. The zero reference point is usually located at the lowest point of the stream, and associated with a known elevation, such as national datum (North American Vertical Datum of 1988 or National Geodetic Vertical Datum of 1929).

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

2.15 Reach - a section of river or stream between an upstream and a 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.

2.16 River Forecasts

2.16.1 Deterministic River Forecast - a single time series representing the best estimate of river stage and/or flow at a given location, derived from known relationships between model states (antecedent conditions) and a single expected event.

2.16.2 Contingency River Forecast - a deterministic forecast or forecasts based on modifications of input data to create a range of forecast values that may occur at a given location.

2.16.3 Probabilistic River Forecast - an analysis of multiple time series derived from combining the known relationships between model states (antecedent conditions) and a number of potential inputs. This analysis represents a range of possible river stages, flows or volumes at a given location as well as the probability of a specific value within that range.

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