



A Video Guide to Field Identification of Bankfull Stage in the Western United States

Bankfull stage is often difficult to identify in the field. The video, A Guide to Field Identification of Bankfull Stage in the Western United States, produced by the Rocky Mountain Forest and Range Experiment Station, Stream Systems Technology Center, discusses key steps and demonstrates techniques that can be used to consistently identify bankfull levels for a variety of different streams and rivers in the western United States.

Technical presenters include:

- Luna B. Leopold - Emeritus Professor of Geology, University of California, Berkeley
- William W. Emmett - Research Hydrologist (Retired), U.S. Geological Survey, Water Resources Division
- Hilton L. Silvey - Consulting Hydrologist, Western Hydrology
- David L. Rosgen - Consulting Hydrologist, Wildland Hydrology Consultants

Bankfull discharge is important because the bankfull stage is the level at which water begins to flow over the floodplain. When water flows over the floodplain, then it is by definition a flood. Bankfull discharge is also important because of its role in forming the physical dimensions of the channel. Flows near bankfull stage move the most sediment over the long-term and the processes of sediment transport and deposition are most active in forming the channel.

The 31-minute video focuses on identification of bankfull stage as one of the important field observable characteristics of rivers. In the video, Luna Leopold defines bankfull stage and discusses the importance of bankfull discharge. Bill Emmett and Lee Silvey demonstrate a procedure in the field to consistently identify or estimate bankfull levels using available data and indicators. The video briefly touches on various applications of bankfull determinations in design, construction, planning, and resource management.

The video emphasizes identification of the relatively flat depositional surface of the floodplain over a reach of stream channel as the best way to identify bankfull stage. The use of supplementary indicators, such as the top of point bars, edge of perennial vegetation, and slope breaks, are only recommended for determining bankfull stage when floodplains are absent or poorly expressed. Zeroing in on the flat depositional features of the floodplain, will greatly improve consistency among field personnel in field identification of bankfull stage.

The video advocates the use of regional relationships between bankfull discharge and channel characteristics, such as those found in the book *Water in Environmental Planning* by Dunne and Leopold, as a good beginning point to help determine where to look for the floodplain and bankfull stage in specific geographic regions of the country.

Dave Rosgen discusses the selection of stream reaches for making the determination and the importance of recognizing common geomorphic features, including abandoned floodplains and terraces. It is especially critical not to confuse the level of the low terrace, located at approximately 2

to 4 feet above the present stream, with that of the floodplain and to be able to recognize disturbed and incised channels.

Finding bankfull stage in the field requires a rigorous and complete observation process demonstrated for various stream types in Wyoming and Colorado. The video points out that floodplains do not exist along all stream channels and that they are most prominent along low-gradient streams. In steep-gradient channels, floodplains may be intermittent, on alternate sides of meander bends, or completely absent. Consequently, identification of bankfull stage in steep gradient channels is difficult. In these channels, other indicators may serve as surrogates to identify bankfull stage. Only use surrogates, however, if they have been verified for the local area of interest through direct observation to establish that the inundation level of the surrogate indicators occurs simultaneously with the inundation of the floodplain.

The video presents several side-by-side comparisons of channels at low flow compared to what they look like when filled to bankfull.

Bill Putnam, Watershed Program Manager, Region 1, coordinated the video production. Lee Silvey, consultant with Western Hydrology, provided technical coordination and arranged the field shooting schedule.

Closed captioned copies of the 31-minute VHS format videos have been mailed to hydrologists and fishery biologists on the National Forests, Forest Service Research Stations, and Stream Systems Technology Center cooperators. Copies are available from the Stream Systems Technology Center.



Dr. Luna Leopold discusses the importance of bankfull discharge on the New Fork River near Boulder, Wyoming.

