

Characterizing Probabilistic Flood Hazards for Reclamation Dams

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Abstract. In lieu of standards-based designs for dams such as the Probable Maximum Flood (PMF), Reclamation is now utilizing risk analysis to assess its inventory of approximately 350 water storage dams in the western United States. The Reclamation Technical Service Center has formed a Probabilistic Flood Hazard Cadre (Flood Cadre) to assist the Dam Safety Office to estimate probabilistic flood hazards for dam safety. This includes making annual exceedance probability estimates (AEPs) of flood peak discharge and volume, with uncertainties, in the range of 1 in 1,000 to about 1 in 10,000 for input to risk analyses. The Flood Cadre is developing programs for collecting data and methods for estimating probabilities of extreme floods.

The Flood Cadre is building on recommendations made by Reclamation personnel and outside experts at a flood workshop held in Logan, Utah in 1997. The major conclusions and recommendations of this workshop are: no single approach is capable of providing the needed characterization of extreme floods over the full range of AEPs required for risk analysis; assignment of an AEP to the PMF and extension of flood frequency curve to PMF is not recommended; uncertainties need to be honestly represented and portrayed; and greatest gains are from incorporating regional precipitation, streamflow and paleoflood data.

A study for A.R. Bowman Dam in Eastern Oregon illustrates some current methods used by Reclamation to assess spillway adequacy, including paleoflood data with bayesian flood frequency methods and stochastic rainfall-runoff modeling. We are actively striving to improve these methods and are looking to develop other techniques. Ongoing research programs also include a paleoflood database, stochastic modeling, and probabilistic hydrographs, and will be briefly discussed.