

Flood Frequency Trends and Spatial Patterns across the Western United States

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Abstract. Most of the large federal flood risk reduction projects were designed assuming the historical hydrologic records would adequately represent future flood regimes. As has been noted by several researchers, the assumption of stationarity for design purposes has impacts to the future flood risk reduction effectiveness of these projects. One of the challenges with assessing changes in flood risk is it can be a result of several factors including trends with the forcing variables (e.g., precipitation and temperature); changes in land-use and development; and feedbacks systems which alter the response characteristics of a watershed (e.g., vegetation patterns). In this analysis, there are two topics which are evaluated: 1) The trends in flood frequency magnitudes for several long-term streamflow stations across the Western United States; 2) The regional spatial patterns (based on the station locations) are assessed to help focus future investigations in watersheds with potentially changing response characteristics. Assessment of trends were conducted using streamflow stations with at least 50 years of record and that are minimally impacted by human activities. Evaluating stations which are not impacted by constructed projects (e.g., dams, levees, and irrigation diversions) allows for better detection of trends to be used in the regional assessment. The spatial patterns are initially used only as a culling tool to identify regions which require further investigation. These regions are summarized in this effort however identification of specific watershed characteristics and feedback systems for each region will be discussed in future papers.