



A hydrologic analysis of Big Bear Creek watershed in Iowa

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Abstract. This study focused on examining how well Big Bear Creek watershed (at Ladora in Central Iowa) fits classic hydrological response and models. Peak flow response and recession, unit hydrographs, and SCS curve number approaches deconstructed hydrologic response. Data from more than 70 years were obtained from the USGS National Water Information System and analyzed for monthly, seasonal, and annual trends with the Mann-Kendall test for statistical significance and the Theil-Sen's slope estimate. Streamflow in the watershed was reconstructed within the HEC-HMS model using the SCS curve number approach to quantify the patterns of flood flow recession of Big Bear Creek. Maximum streamflow data were the only streamflow values without significant change. Median, mean, and minimum streamflow data were all determined to have statistically significant streamflow changes at $p < 0.05$ with the minimum streamflow values experiencing the most significant flow difference. Median streamflow rate of change was $0.01730 \text{ m}^3/\text{s}/\text{yr}$ and $0.1740 \text{ m}^3/2/\text{decade}$, mean streamflow rate of change was $0.02870 \text{ m}^3/\text{s}/\text{yr}$, and $0.2870 \text{ m}^3/2/\text{decade}$, minimum streamflow rate of change was $0.003800 \text{ m}^3/\text{s}/\text{yr}$ and $0.03800 \text{ m}^3/2/\text{decade}$. Over the years, streamflow increased which creates implications for more severe or extensive flooding, as reflected in statistically significant minimum streamflow values. HEC-HMS modeled streamflow recession fits the observed patterns very well and will ultimately be used to model and predict streamflow patterns to aid in water management and flood warnings.