Rocky Mountain Section - 72nd Annual Meeting - 2020

Paper No. 7-16
Presentation Time: 8:30 AM-4:30 PM

THE EFFECTS OF FLOOD EVENTS ON FLOODPLAIN AND CHANNEL FORM ON THE GALLATIN RIVER IN NORTHWESTERN YELLOWSTONE

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Wolves were removed from Yellowstone National Park in the early 20th century. The loss of wolves and subsequent rise and expansion of the elk population is attributed to have caused a decline in willow and beaver along streams in elk wintering habitat. It has been hypothesized that this trophic cascade has also affected the geomorphology of Yellowstone rivers by way of separating rivers from their floodplains. Previous research on Yellowstone rivers has claimed that the rivers are slowly recovering, but that there has been a noticeable change in the geomorphic system of the area. This research seeks to evaluate that claim by investigating floodplain inundation for floods of different recurrence intervals. To do so, cross sections were collected along the Gallatin River in northwestern Yellowstone. These cross sections were then used with HEC-RAS software to estimate the discharge for the typical 2-year, 5-year, and 10-year flood depths at each cross section. Five separate reaches were identified in this study, each with distinct discharge values and basin areas. Basin areas were calculated from upstream to downstream as 7.91 square miles, 11.24 square miles, 69.41 square miles, 106.21 square miles, and 111.68 square miles respectively. The discharge values used in this study were calculated using the PeakFQ software from the USGS. Flood frequency was estimated at the Gallatin Gateway gauge site. Then the basin area for each reach was used to estimate discharge at the ungauged reaches. The calculated discharges for the 2-year, 5-year, and 10-year floods range from 87-886 cfs, 181-1386 cfs, and 272-1791 cfs respectively. Each reach was then run through a simulation for each flood frequency. Analysis of the results of each simulation indicates that the Gallatin River consistently achieves bankfull stage in 0 out of 5 reaches during the 2-year flood, 2 out of 5 during the 5-year flood, and 5 out of 5 during the 10-year flood. These results indicate that the river is not currently separated from its floodplain. However, the Gallatin only achieves bankfull stage in all five reaches during the 10-year flood, which may indicate that the stream has incised over time or that larger floods are responsible for the shape of the channel.

Session No. 7--Booth# 52

T17. Undergraduate Research II (Posters)
Monday, 4 May 2020: 8:30 AM-4:30 PM

Ballroom A (Utah Valley Convention Center)

Geological Society of America *Abstracts with Programs.* Vol. 52, No. 3
doi: 10.1130/abs/2020RM-346782

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