



## Quantitative Assessment of Floodplain Functionality Using an Index of Integrity

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**Abstract.** Floodplain integrity can be defined as the ability of a floodplain to support essential functions that maintain biodiversity and ecosystem services. Human development alters floodplain functionality by changing the physical landscape or by altering river flow regimes and therefore floodplain inundation. The typical approach to evaluating the integrity of a natural environment requires comparison of the environment in question to a “reference” environment that is considered to be free of human influence. However, identifying a suitable unaltered reference floodplain is often infeasible due to the extent of development in floodplains. This ongoing research involves developing a novel framework to quantitatively assess floodplain integrity based on changes to hydrologic and landscape attributes that impact critical floodplain functions. Critical floodplain functions include attenuating floods, storing groundwater, regulating sediment, organic matter, and solutes, and providing habitat. For each floodplain function, measurable stressors that inhibit the floodplain function are identified. The integrity index for a given floodplain function is determined by the magnitude or abundance of each stressor variable, with the relationship between the stressor and the function informed by existing research on floodplain health. Each stressor variable is quantified relative to its theoretical maximum value using datasets available at large spatial scales. The overall floodplain integrity index for the given floodplain is calculated with a weighted combination of the indices of integrity for each of the five floodplain functions. This research demonstrates the floodplain integrity index by applying this methodology to floodplains in the state of Colorado. Both the overall floodplain integrity index and the index for each floodplain function can be compared across Colorado to assess spatial trends in floodplain resilience to human activity.