

Utilizing changes in vegetation to identify ice effects on the banks of the Middle Reach of the Susitna River, Alaska

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Abstract. While many studies have been performed regarding variables that contribute to erosion on rivers not affected by a seasonal ice cover (the variables include channel geometry, slope, hydraulics, bank properties), erosion thresholds for river banks in cold regions are less understood. It is generally accepted that the ice break-up regime can exhibit the most high energy events experienced on a cold-regions river system, however quantifying its erosive effects over a large river reach can prove complex; collecting data on a remote river during the winter ice-period can be logistically difficult, costly and dangerous. This study utilizes an extensive dataset previously collected on the Susitna River, in South-central Alaska, to identify the extent ice-processes may lead to or possibly amplify large-scale bank erosion along a 50-kilometer stretch of the river's Middle Reach. The analysis utilizes changes in vegetation over a one-year period (September 2012 to September 2013) in conjunction with reconnaissance videos and photographs at three time periods within the year, to identify ice-driven erosion. Vegetated features from 2012 and 2013 aerial photography are digitized in GIS and overlain to identify bank erosion and channel changes. Videos and photographs are then analyzed at ice freeze-up, ice-break up, and post high-summer flows to identify the timing and likely causation of erosion. The extent of large-scale vegetation change due to ice-processes is shown to be an effective method for delineating ice effects on the banks of the Middle Susitna River.