Implications for riparian vegetation of potential climate-induced changes to flow regime in a Western stream

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Abstract. Projected effects of climate change on Western U.S. river flows have been the subject of a number of studies. However, the potential effects of such changes on floodplain and riparian habitats are unclear. We investigated potential impacts of changing streamflow under future climate in the historically snowmelt-dominated, mid-elevation Sprague River watershed, Oregon. We used daily simulations of the hydrologic model Soil and Water Assessment Tool (SWAT) forced with downscaled outputs from three general circulation models for 1954-2005 under the future Representative Concentration Pathway 8.5 for meteorological stations in the watershed, to investigate changes between 2030-2059 and the historical baseline period. We characterized streamflow changes at a previously surveyed reach using select Indicators of Hydrologic Alteration statistics and return periods for floods required to inundate present-day riparian vegetation. Results suggest that under models with warmer and wetter future climate scenarios (i.e. CanESM2 and MIROC5), the 1-, 3-, 7-, 30- and 90-day minimum and maximum flow magnitudes as well as frequency of riparian inundation may increase, and dates of minimum and maximum daily flows occur earlier. However, under a somewhat warmer and drier climate model (INMCM4), 1- to 90-day minimum and maximum flow magnitudes could decrease, riparian inundation occur less frequently, and minimum daily flow occur earlier but peak flow timing remain similar to the past. The study has implications for long-term management of riparian vegetation of other rivers.