FLOW ALTERATION: SIMPLE CONCEPTUAL MODEL NARRATIVE

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Sources or human activities affecting flow include agricultural, forestry, mining, construction, residential, commercial, recreational, and industrial practices. These activities can alter both discharge patterns (i.e., watershed-scale or hydrologic variables) and local flow characteristics associated with structural habitat changes (reach-scale or hydraulic variables), via direct discharges into surface waters, increases in overland transport efficiency and surface runoff, decreases in groundwater and surface water inputs, and increased discharge regulation. Watershed land cover alteration, for example, often involves conversion of forested or vegetated landscapes to cleared areas or impervious surfaces, which can increase surface runoff during precipitation events and increase the magnitude and frequency of peak discharges.

Flow interacts with other causal agents. Watershed-scale flow variables such as discharge can affect ionic strength and sediment accumulation, in addition to the concentrations and bioavailability of toxic compounds, metals, and nutrients. For example, higher discharges can contain high levels of metals, toxics, and ions associated with surface runoff, but higher discharges also can dilute these substances or reduce their bioavailability. Consult CC.7 Flow Alteration for more stressor interaction examples.

To properly assess changes in flow regime, the investigator must consider multiple aspects of water flow and timing. At the watershed-scale, common alterations include changes in magnitudes, frequencies, or durations of low- and/or high-flow events, increases or decreases in flow variability (daily and seasonally), and/or changes in the timing and sequencing of discharge patterns. Parameters commonly affected at the reach-scale include changes in water depth and velocity. Watershed- and reach-scale flow alterations both can affect plant, invertebrate, and fish assemblages, ultimately contributing to biological impairment of a system.