Stream Flow

What is stream flow?

Stream flow, or stream discharge, is the volume of water passing a fixed point over a unit of time and is usually expressed in cubic feet per second (cfs). Stream flow reflects the amount of water moving off of the watershed and into the channel and the amount being removed from the stream. Flow can be affected by a number of factors and can vary rapidly as those factors change. In turn, stream flow is a factor in some water quality parameters and in habitat for aquatic species.

What makes stream flow change?

Stream flow is affected by both natural and human factors and can respond rapidly to changes in flow parameters. Weather has a significant affect upon stream flow; flows increase shortly after rain storms and decrease during dry periods. Snow accumulations and melting also have a large effect upon stream flow, with high flows coinciding with periods of melting snow. Rainfall and snowmelt vary seasonally, subsequently stream flow also varies. Evaporation and water use by plants also can significantly affect stream flow. Vegetation has the largest impact on flow during summer months when temperatures are high and streamside vegetation uses the most water. August and September are generally the months of lowest flow for most streams and rivers. Flow is also be influenced by subsurface water flow which responds to the same factors, but at a delayed or slower rate.

Water withdrawal for irrigation and municipal water needs, and diversion for hydropower generation are human factors that can significantly affect stream flow. Urbanization also affects flow by changing the rate of water infiltration and runoff during rainstorms.

Why is stream flow important?

Adequate stream flow is vital for aquatic species and affects many water quality parameters. Many species need specific stream flows and conditions for important stages in their life cycles, such as migration, reproduction and growth.

Stream flow can have a direct effect upon water temperature, especially during periods of warm weather and low flow. As flow decreases, the amount of energy needed to change the water temperature also decreases. Therefore adequate flow in the summer is vital for moderating and maintaining stream temperature. If, for example, a large amount of water is diverted for irrigation during the summer, the stream will have lower flow and may increase in temperature. This can be harmful or fatal to many aquatic species that require cool water temperatures.

The concentration of pollutants also varies with stream flow. High flowing rivers can receive pollution discharges and be little affected, whereas small, low flow, streams have less capacity to dilute and degrade the same amount of pollutants.

Adequate steam flow allows for erosion, transport, and deposition of sediment or stream bed load. Sediment introduced to quiet, slow-flowing streams will settle quickly to the

stream bottom. Fast moving streams will keep sediment suspended longer in the water column. Lastly, fast-moving streams generally have higher levels of dissolved oxygen than slow streams because they are better aerated. A naturally dynamic stream is vital to the creation and maintenance of the diverse habitat needed for aquatic species to thrive.

How is stream flow measured?
Flow is usually measured at specific or fixed locations in the watershed. To measure stream flow, the velocity of water passing the location must be measured as well as the width and depth of the stream.

Stream velocity, which increases as the volume of the water in the stream increases, determines the kinds of organisms that can live in the stream (some need fast-flowing areas; others need quiet pools). Velocity also affects the amount of silt and sediment carried by the stream.

Low flow is the "flow of water in a stream during prolonged dry weather", defined by the World Meteorological Organization. Many states use design flow statistics such as the 7Q10 (the lowest 7-day average flow that occurs (on average) once every 10 years) to define low flow for the purpose of setting permit discharge limits.

http://www.epa.gov/volunteer/stream/vms51.html

http://epa.gov/waterscience/models/dflow/flow101.htm#1Q10