

The Upper Esopus Creek watershed covers a 192 mi² area in the South-central Catskill mountain region of southeast New York State. The entire 26-mile course of the creek flows “clockwise” in a sweeping arc from the headwaters at Winnisook Lake on Slide Mountain to the Ashokan Reservoir.

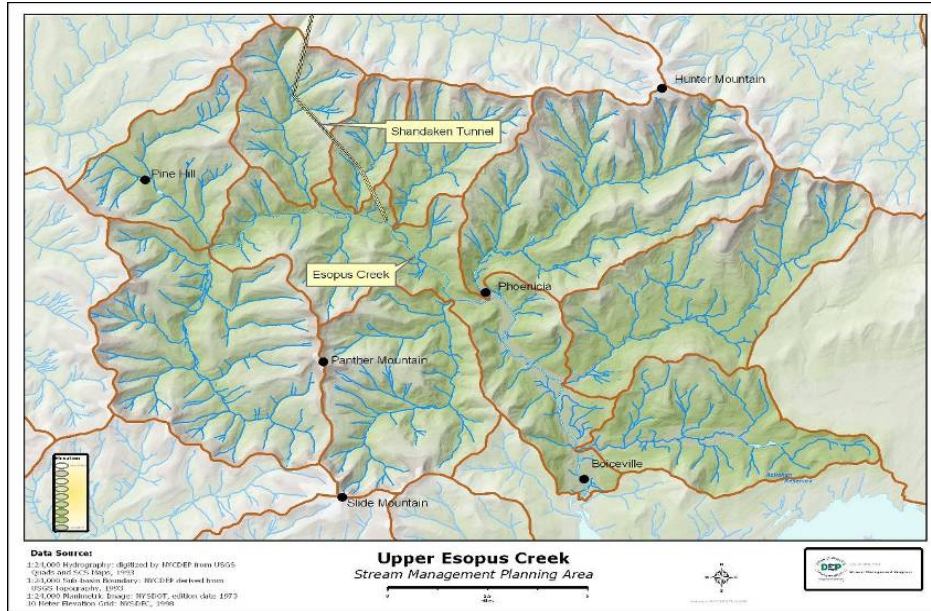


Figure 1 Upper Esopus Creek Stream Management Planning Area

Upper Esopus Creek and its tributary network drain some of the most rugged terrain in the Catskill Mountains. There are 21 peaks greater than 3000 feet above sea level (ft asl) that are drained by this network. Among them is Slide Mountain, the highest peak in the Catskills at 4,120 ft asl. The base elevation in the watershed at Ashokan Reservoir is 633 ft asl. The resulting streams are steep erosive forces as water and sediment make the quick descent from mountain top to the base of the watershed at the reservoir. The watershed includes at least 330 miles of stream.

Climate and Hydrology

Mean annual precipitation for the Upper Esopus watershed ranges from ~52 inches at Ashokan Reservoir to ~63.5 inches at Slide Mountain (among the highest in the northeast). Typical winters have a snowpack in the mountains and snow melt is an important factor in the stream hydrology. Most of the peak floods of a given year occur from snow melt. The region is also in the path of tropical storm events with consequent flooding in late summer and fall. While local impacts are more difficult to predict, current climate change models indicate that, in the Catskills, increases in the frequency and magnitude of storm events with rainfalls greater than 1” is likely (Frumhoff, et al., 2006). Paradoxically, drought periods are also likely to become more extreme. Snowpack amount and duration is also expected to be less.



Land Use – Land Cover

Forested land exceeds 95% of the total watershed land cover, ranging from 95.5% to 99%. (Although in the 1800's the watershed had been significantly logged and the streams consequently altered by the sediment eroding from the landscape.) In the valley bottom, forest cover still tends to dominate the land cover along most of the stream's course, however along the Route 28 corridor, development associated with roads, residences, businesses, and town centers increases the percentage of impervious surfaces. There is no large-scale agricultural land use in the watershed.

Geology

Streams and glaciers sculpted the rugged Upper Esopus Creek Watershed. Much of the current character of the watershed is a consequence of the most recent ice ages of 12,000 – 25,000 years ago, when the Catskills were mostly occupied by glacial ice or the meltwater streams and lakes that followed the ice's retreat. These mountains are composed of sedimentary rock. The broken bits of this bedrock is the source of almost all of the stream sediment you see today - from clay to boulders. The reddish layered clays exposed in stream banks are ancient glacial lake sediments eroded from the red siltstones and shales that often form the mountain slopes; the cobbles and boulders eroded from the thick-bedded sandstones that form the mountain cliffs. The nature of the glacial lake deposits and the dense, clay-rich glacial till that can also form channel boundaries makes them variably susceptible to stream erosion and the main contributor to turbidity in the Catskill streams. In particular, the lake and till sediments are sensitive to natural or man made disturbances which can have a long lasting negative effect on channel stability, water quality and stream ecology.



Water Supply and the Catskill District System

Upper Esopus Creek is a regulated river by inter-basin transfer of water. The Shandaken Tunnel, also referred to as the "Portal," is a handmade aqueduct that connects the Schoharie Reservoir to the Esopus Creek. The Catskill District of New York City's West-of-Hudson water supply system is one of three systems that supply water to New York City and includes the Schoharie Reservoir, Shandaken Tunnel, Ashokan Reservoir and the Catskill Aqueduct west of the Hudson River. Approximately 40% of the City's average water supply demand is provided by the Catskill System.

New York City must abide by two regulatory documents administered by the New York State Department of Environmental Conservation (DEC) when operating the Shandaken Tunnel: 6 NYCRR Part 670 “Reservoir Release Regulations: Schoharie Reservoir - Shandaken Tunnel – Esopus Creek” and a State Pollution Discharge Elimination System or “SPDES” permit, which together provide for flows, temperatures, and turbidity thresholds to protect aquatic biota. Part 670 also allows up to four (4) recreational releases for whitewater recreation to be granted per year to be granted by the DEC.

It is important to note that a separate “Catskill Turbidity Control Study” has been conducted in parallel with this effort. The recently concluded Phase II of the Catskill Turbidity Study has structural and operational modifications options for controlling turbidity releases from the Shandaken Tunnel that are currently being considered by NYC and the U.S. EPA.

