Summary of Key Hydrologic Characteristics in Forested Watersheds[1]

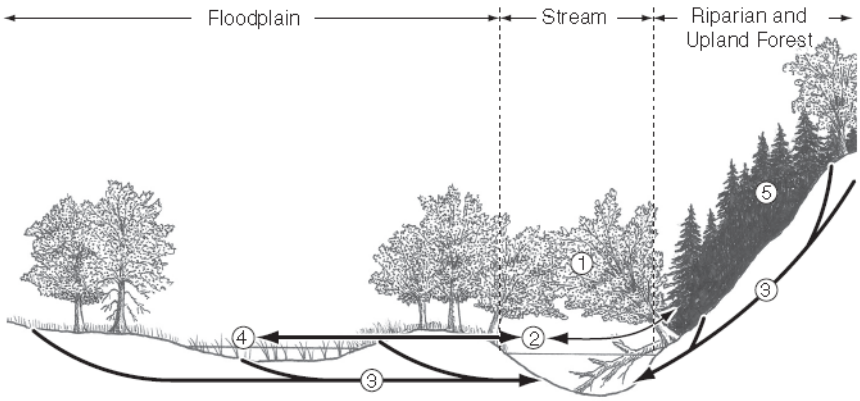

FIGURE 5.1 (1) Streamside vegetation shades the stream channel, moderating water temperature. Roots stabilize streambanks. Fallen leaves supply organic matter. Coarse woody debris stabilizes the channel and provides habitat. (2) Nutrients and sediment enter the stream channel from riparian areas and are returned to riparian areas during flood events. (3) Subsurface flow from the uplands passes through riparian areas and enters the stream as baseflow. (4) Riparian areas include wetlands that process nutrients (denitrification) and provide storage and infiltration sites for floodwaters. (5) Riparian and upland forests minimize erosion and sediment transport and store nutrients. (Original drawing by Ethan Nedeau.)

(de la Crétaz and Barten 2007:105)

	Upland Forest	Riparian Forest	[Forested] Wetland
1	mineral soil (...etc)	mineral and organic soils	organic and/or mineral soil
2	Unsaturated (very dry ↔ very wet)	Seasonally variable	**1** = seasonally variable (aerated ...aerobic); **2** = saturated (~anaerobic)
3	Plant available water limits vegetation type and growth	Vegetation is "irrigated and fertilized"	Surfeit of water limits vegetation type and growth
4	Actual ET < Potential ET	Actual ET → Potential ET	Actual ET ≈ Potential ET
5	Shallow subsurface flow (overland flow very rare)	Shallow subsurface flow (saturation overland flow, if any)	Saturation overland flow or shallow subsurface flow
6	Flow rate influenced by soil type, available storage, slope, and landform	Flow through riparian area influence by upland inflow *and* wetland water level	Slope ...per mil (‰) hummocks and hollows ...a labyrinth for water
7	Darcy's Law & Water Balance	Darcy's Law & Water Balance	Darcy's Law & Water Balance ...with "reservoir routing"

<u>Reservoir routing</u> ...to mathematically model hydrological processes:

1. inflow to wetland = f (upland contributing area, season, rain or snowmelt volume, etc.)
2. water table elevation in wetland = f (controlling elevation, initial storage, inflow)
3. outflow from wetland = f (water table elevation and hydraulic characteristics of outlet)
4. ...back to 1 (...filling? ...spilling? ...static? ...evaporation loss? ...seepage losses?)

[1] Paul K. Barten, Ph.D., Associate Professor of Forest Resources, University of Massachusetts Amherst, Holdsworth Hall, Amherst, MA 01003-9285, pkbarten@nrc.umass.edu, 2008©