Base-Flow Characteristics of Streams in the Valley and Ridge, Blue Ridge, and Piedmont Physiographic Provinces of Virginia

WSP 2457

Low-Flow Characteristics of Streams in Virginia

WSP 2374
Purpose

• Describe base-flow characteristics of streams in Virginia
• Identify regional differences
• Describe the potential surface-water and ground-water yields of basins on the basis of base-flow characteristics
“The distribution of low flows is controlled chiefly by the geology of the basin. Thus, the lower end of the flow-duration curve is a valuable means for studying the effect of geology on the ground-water runoff to the stream.”

WSP 1542-A
Base-Flow Characteristics

- Mean base flow
- Effective recharge
- $Q_{50}$
- $Q_{90}$
- $Q_{95}$
- $7Q_2$
- $7Q_{10}$
- Base-flow variability
Determination of Base-Flow Characteristics at Partial-Record Sites
Regions Used in Analysis of Base-Flow Characteristics

(modified from Hayes, 1991, fig. 7)
Distribution of Median Discharges

- VR
- BR
- PIEDMONT / BR TRANSITION
- PIEDMONT NORTHERN
- PIEDMONT SOUTHERN

Legend:
- MEAN BASE FLOW
- Q50
- Q90
- 7Q2
- Q95
- 7Q10
Group Ranking from Tukey’s Multiple Comparison Test
Spatial Distribution of Potential Surface-Water Yield
Base-Flow Variability Index

- BFVI\(^{(NH^2)}\) = $\log\left(\frac{Q_{50}}{Q_{90}}\right)$

- Similar to Lane’s Variability Index for the lower end of the flow-duration curve.
Base-Flow Variability Index for the Mid-Atlantic Region
Relation Between Areal Diffusivity and Base-Flow Variability Grouped by Potential Surface-Water Yield
Relation Between Areal Transmissivity and Storage Coefficient Grouped by Potential Surface-Water Yield
Study Conclusions

- Potential ground-water yield is directly related to potential surface-water yield.

- Base-flow characteristics may provide a relative indication of the potential ground-water yield for areas that lack sufficient specific capacity or well-yield data.