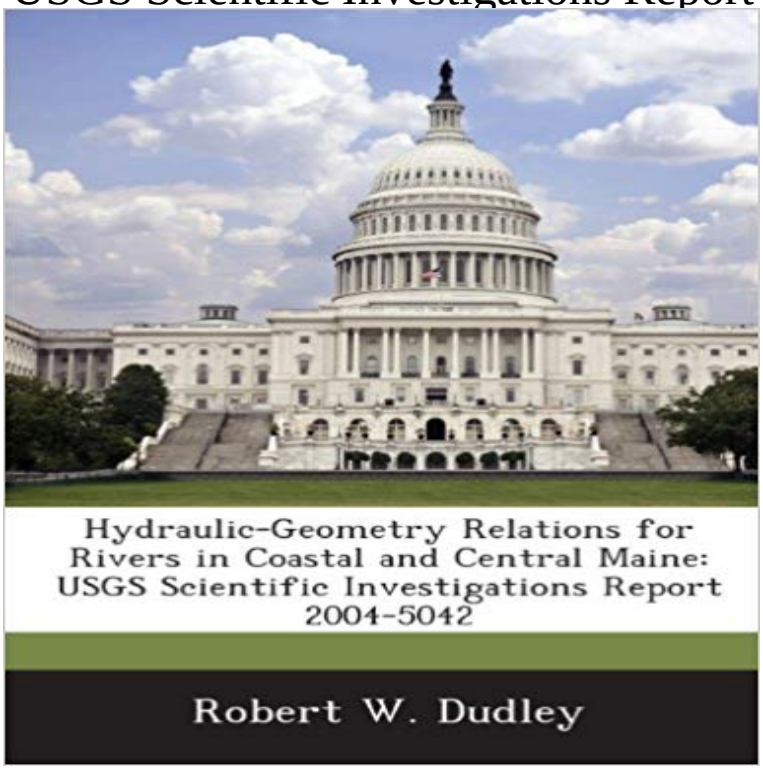
Hydraulic-Geometry Relations for Rivers in Coastal and Central Maine: USGS Scientific Investigations Report 2004-5042



Hydraulic-geometry relations (curves) were derived for 15 sites on 12 rivers in coastal and central Maine on the basis of site-specific (at-a-station) hydraulic-geometry relations and hydraulic models. At-a-station hydraulic-geometry curves, expressed as well-established power functions, describe the relations between channel geometry, velocity, and flow at a given point on a river. The derived at-a-station hydraulic-geometry curves indicate that, on average, a given increase in flow at a given river cross section in the study area will be nearly equally conveyed by increases in velocity and channel cross-sectional area. Regional curves describing the bankfull streamflow and associated channel geometry as functions of drainage area were derived for use in stream-channel assessment and restoration projects specific to coastal and central Maine. Regional hydraulic-geometry curves were derived by combining hydraulic-geometry information for 15 river cross sections using bankfull flow as the common reference streamflow. The exponents of the derived regional hydraulic-geometry relations indicate that, in the downstream direction, most of the conveyance of increasing contribution of flow is accommodated by an increase in cross-sectional area?with about 50 percent of the increase in flow accommodated by an increase in channel width, and 32 percent by an increase in depth. The remaining 18 percent is accommodated by an increase in streamflow velocity. On an annual-peak-series basis, results of this study indicate that the occurrence of bankfull streamflow for rivers in Maine is more frequent than the 1.5-year streamflow. On a flow-duration basis, bankfull streamflow for rivers in coastal and central Maine is equaled or exceeded approximately 8.1 percent of the time on mean?or about 30 days a year. Bankfull streamflow is roughly three times that of

the mean annual streamflow for the sites investigated in this study. Regional climate, snowmelt hydrology, and glacial geology may play important roles in dictating the magnitude and frequency of occurrence of bankfull streamflows observed for rivers in coastal and central Maine.

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