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THE EFFECT OF DATA DENSITY ON HYDRAULIC CONVEYANCE CALCULATIONS

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Summary. The estimation of coefficients of roughness (**n**) for open channel hydraulics remains largely an art. In the absence of an adequate quantitative procedure, the ability to determine roughness coefficients must be developed through practice and experience. With the growing availability and increasing detail of high resolution geospatial data, it is necessary to examine the effect this will have on computed water surface elevations.

Open channel modeling schemes use 19th century empirical equations, 20th century numerical procedures, and 21st century spatial data acquisition. Although modern models are significantly more sophisticated, they still require the same flow equations and resistance to flow variables that were used in the 19th and 20th century to relate hydraulic geometry and boundary roughness to velocity. Since the originating flow equations were developed to use sparse data, any modeling using dense geometric data introduces unintended error unless resistance parameters are adjusted lower. Since dense data is available, it is assumed that the quality of a one-dimensional model will be improved by denser data. It is demonstrated that hydraulic conveyance is sensitive to spatial data density and that modifications to the Manning's roughness coefficient is necessary when using dense data sets. This finding has implications to all open-channel modeling because the resistance parameters developed for all models were based on sparse data. This report proposes a quantitative methodology for adjusting resistance parameters as a function of increasing geospatial data.