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Contributions and Concerns of Concentrated Flow Erosion and Assessment Technologies in Watershed Systems

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Concentrated runoff increases erosion and efficiently transfers sediment and associated agrichemicals from upland areas to stream channels. Ephemeral gully erosion on cropland in the U.S. may contribute 40% of the sediment delivered to the edge of the field. Typically, conservation practices developed for sheet and rill erosion are also expected to treat ephemeral gully erosion, but technology and tools do not exist to account for the separate benefits and effects of practices on various sediment sources. Practices specifically developed to treat ephemeral gully erosion need further testing, when used in conjunction with sheet and rill erosion control practices. Without improved research studies, subjective observations will continue to be used to satisfy quality criteria in lieu of scientifically defensible, quantitative methods to estimate the impact of gully erosion. Some of the more important limiting components are the identification of and relationships for: (1) ephemeral gully width; (2) soil resistance to gully erosion including a definition for non-erosive layers; (3) the effect of root mass and above ground vegetation on erosion resistance; (4) ephemeral gully networks; and (5) the effect of subsurface flow on ephemeral gullies. Currently, these components are represented through widely divergent to non-existent algorithms. The U.S. Department of Agriculture's AnnAGNPS pollutant loading model has been developed to determine the effects of conservation management plans and provide sediment tracking from all sources within the watershed, including ephemeral gullies. Enhanced technology is also needed to identify where ephemeral gullies may form in the watershed using remote sensing technology. Developing enhanced technology and research for concentrated flow assessments is critical for developing and testing conservation practices specifically designed for gully erosion control. This study will describe the current state of concentrated flow assessment and modeling technologies and research needed to provide effective tools to conservation management planners.