

Assessing Wetland Anthropogenic Stress Using GIS; A Multi-Scale Watershed Approach

Watersheds are widely recognized as essential summary units for ecosystem research and management, particularly in aquatic systems. As the drainage basin in which surface water drains toward a lake, stream, river or wetland at a lower elevation; watersheds represent spatially explicit areas within which terrestrial stressors can be quantified and linked to measures of aquatic ecosystem condition. Traditionally watersheds were delineated manually using maps of streams, lakes, and elevation contours, but more recently watersheds are digitally delineated within a geographic system using digital elevation data. Using flow direction and flow accumulation grids derived from elevation maps, stream networks are identified based on a minimum flow accumulation threshold. This allows for selectively delineating streams at either broad scales or very fine scales, depending on the size of the flow accumulation threshold. Once the stream networks are delineated, flow direction is used to delineate the contributing area or sub-catchment for each stream reach between stream confluences. Each sub-catchment is given a unique “hydro-id” and the next down hydro-id is identified for the next catchment a particular catchment flows into. These attributes are also transferred to the corresponding stream reach and pour points. Because the data contains the “nextdown” id, it is possible, to accumulate information (i.e. number of pt. sources etc.) about each catchment as the streams are followed down the drainage network. This also allows us to trace the drainage network either upstream from a particular point or downstream from that point providing custom watershed delineations for locations of interest. Examples of various watershed delineation tools, sources for data and example applications will be presented.

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