Title: Linked Micromaps: Statistical Summaries in a Spatial Context

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Communicating summaries of spatial data to decision makers and the public is challenging. We present a graphical method that provides both a geographic context and a statistical summary for such spatial data. Monitoring programs have a need for such geographical summaries. For example, the National Aquatic Resource Surveys (NARS), generate large volumes of geospatial data. Linked micromap plots (LMplots) provide a way to simultaneously present geographic context and statistical summaries of data from such surveys. LMplots were named and described in 1998, but then, as now, plot production convenience is a bottleneck to the process of creating and using such plots. While some limited methods exist to make LMplots, such as at: http://gis.cancer.gov/tools/micromaps/, we take advantage of the open-source software R, specifically the R package ggplot2, to overcome this bottleneck so that environmental scientists can readily produce LMplots. Some issues to be solved prior to producing LM plots include dealing with highly detailed polygon boundaries that can lead to slow graphics production and correctly filling 'island' polygons in complex spatial features. To deal with slow graphics, plotting polygons need to be thinned or generalized. The boundaries of the micromaps in LMplots only need to convey region identity and neighbor relationships. In order to deal with 'island' polygons, plotting methods need to correctly over-plot the 'island' polygons. LMplots also require structuring the geographical and statistical data such that both sets of data share a unique identifying variable that links the geographical data of the polygon with the statistical display for that polygon. LMplots provide a way to display such geographically indexed statistical summaries in a spatial context and can be applied to summaries from spatial surveys of

streams in watersheds. These plots can also be applied to summaries for administrative units, such as counties and states. Our examples of LMplots summarize estimates over ecoregions and watersheds.

Comment [mg1]: I have always been trained that "will be presented" should never be found in an abstract. This both simplifies and avoids the statement.