Recovery Potential Metrics
Summary Form

Indicator Name: WATERSHED SHAPE

Type: Ecological Capacity

Rationale/Relevance to Recovery Potential: A more circular watershed shape has been associated with degraded water quality primarily due to greater risk of a more frequently destabilized channel. Runoff from rounder watersheds tends to concentrate and reach the mouth more quickly and with greater erosive power and velocity. Further, the shortened channel length associated with rounder watersheds enables less travel time to naturally process excess nutrients. Elongate watersheds tend to lessen the effects described above, which would lower the risk of repeated destabilization during recovery efforts.

How Measured: see Potter below**.** Other measurement method involves locating the watershed centroid, measuring the axis (A) through the centroid that is most nearly parallel to the main channel, measuring three additional axes (B, C, D) in 45 degree increments from the first, then calculating the variability in length of these axes as A divided by the mean of the four axes. Nearly round watersheds approach a value of 1, elongate watersheds have higher values.

Data Source: Watershed boundary datasets are available from the NRCS Geospatial Data Gateway (See: http://datagateway.nrcs.usda.gov/GDGHome.aspx). Watersheds at smaller scales can be delineated using the National Elevation Dataset (See: http://ned.usgs.gov/).

Indicator Status (check one or more)

___x__ Developmental concept.
_____ Plausible relationship to recovery.
___x__ Single documentation in literature or practice.
_____ Multiple documentation in literature or practice.
_____ Quantification.

Comments: Measurement needs to be explored and the effect needs to be verified with more waterbody types and watershed sizes. Most applicable for small to medium streams and rivers. Measurement could be automated.

Examples from Supporting Literature (abbrev. citations and points made):

- (potter et al 2004) The opposite is true with watershed shape, a dimensionless measure of watershed elongation, defined as *Ws* _ *A*/2 where *A* is the area of the watershed, and *l* is the length of the watershed from its outlet to the farthest point parallel to the main river channel. Higher values indicate greater roundness in watershed shape, whereas lower values occur with greater elongation parallel to the main channel. Greater circularity in watershed shape, therefore, had a positive relationship with tolerant macroinvertebrate taxa, and a negative relationship with water quality. This was expected, because runoff from rounder watersheds tends to concentrate and reach the mouth more quickly and with greater erosive power (Ward 1995, Brooks and others 1997). Additionally, the velocity of runoff is greater with more circular watersheds, resulting in a shorter delivery time of diffuse pollutants to the mouth of the watershed, and a lessened ability of the watershed to “self-purify” itself of a portion of the pollutant load (Ha and Bae 2001).