We intend to explore the possibility of using Thiessen polygons to weight data as part of weighted areal analyses. This will be done through a series of simulations of several different scenarios to which the method may be applied. It is unclear how many runs will be needed for a given simulation. The proposed general outline for a simulation is:

1. Generate a raster stand-in for a landscape
   1. This may be done using the R package landscapemetrics
   2. Variables
      1. Raster value type
         1. Categorical vs continuous
      2. Raster resolution
2. Create an area of interest (AOI) polygon covering a portion of the raster
   1. Variables
      1. Concave vs convex
      2. Simple polygon vs multipart polygon?
3. Draw one or more sampling designs
   1. Variables
      1. Design type: simple random, spatially-balanced random, 2-stage cluster
      2. Point density/count
   2. We may want to explore scenarios with multiple overlapping designs
      1. Partially vs fully overlapping?
      2. Designs of multiple types?
   3. Designs may be drawn for the entire raster or just a subset of the raster
   4. NOTE! This gets complicated *fast* especially with the possibility of multiple sample frames
      1. Maybe either draw multiple frames and just one sample per frame or one frame and multiple samples for that frame
4. Draw Thiessen polygons
   1. Variables
      1. Thiessen polygon count
         1. Relative to number of sampling points in the AOI, e.g. point count / 2
   2. This involves generating a number of random centroids for the polygons first
   3. All Thiessen polygons should contain multiple sampling points
      1. There may be an elegant solution to this or it may be a matter of brute force
5. Attribute sampling points
   1. Attribute the points with values from the raster
   2. Attribute points with the areas from the Thiessen polygons (i.e., the weights)
   3. NOTE! This becomes significantly more complicated as a step if there are multiple sample designs and multiple sets of Thiessen polygons.
6. Compare the results of weighted analyses
   1. Each simulation run should have three results: weighted analysis using Thiessen polygons, weighted analysis using sampling design polygons, and the true value of the raster within the AOI
   2. Proposed statistical measures include
      1. Single-tail t-test
      2. Wilcoxon signed rank
      3. Chi square

For a simulation run (i.e., for a set of simulations on a single raster) are there:

* Multiple point draws with one Thiessen polygon draw per point draw
* Multiple point draws with multiple Thiessen polygon draw per point draw
  + This gets very complicated to do correctly and efficiently
* Single point draw with one Thiessen polygon draw
* Single point draw with multiple Thiessen polygon draws