# Effect of Point versus Area Sampling of NDVI across the Intermountain West

1. This study was performed to understand the effects of point vs area sampling on the MODIS NDVI data across the intermountain west study area. For the purpose of this study, a total of 12 large 125 km x 125 km polygons were used (fig. 1). Each polygon likely covered multiple ecosystems (e.g. managed (agriculture) and natural (forests)). A goal of this study was to determine important driver variables of biomass production relative to wildland fire. Managed ecosystems such as agriculture are thus not a focus on this study. Therefore, numerous sample points ($n = 30$) were created inside each polygon to avoid sampling managed landscapes. While polygon sampling in ArcGIS is very easy and fast, if the extracted NDVI values differ from those identified using specific point sampling, then polygon sampling should be avoided for studies such as this. To determine this, the mean of point NDVI sampling will be compared with the mean of area NDVI sampling.
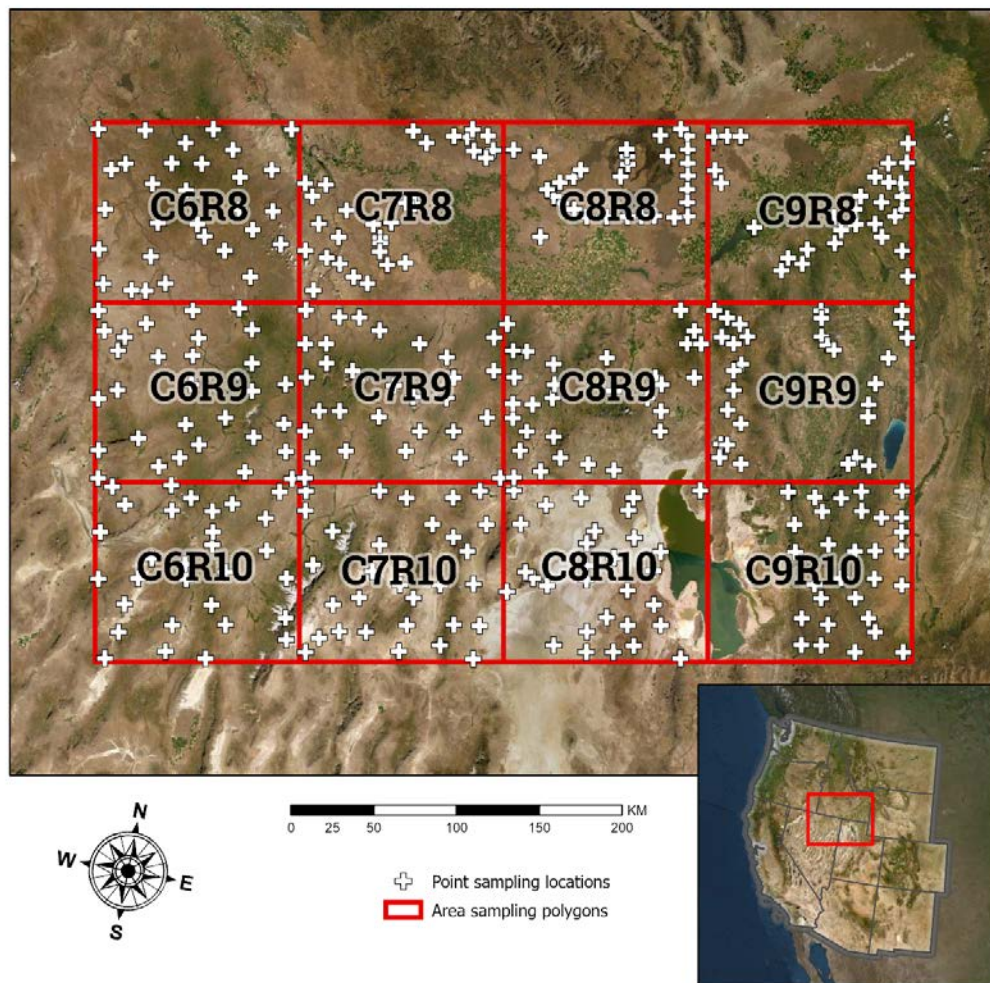
Figure 1. The Intermountain West study area showing both polygon and point sampling areas. There are 30 point samples within each polygon.

2. The "Zonal Statistics as Table" tool in ArcGIS Pro was used to calculate mean NDVI for each polygon during the sampling period of 2001 - 2019. Similarly, the "Sample" tool was used to extract the NDVI values at each point during the same time period. The output of both analyses was exported to Microsoft Excel using the "Table to Excel" tool. Line graphs were developed to visualize the difference between these sampling methods. Furthermore, a single factor ANOVA test was conducted to determine if a difference exists between these data with $P < 0.05$ considered significant.

3. Out of a total of 12 polygons, 4 polygons (labeled. C8R10, C9R10, C7R8, and C8R8) were found to have different mean NDVI values compared to the values obtained from point sampling ($P < 0.05$). Thus, the two sampling methods arrive at different results. Using the point sampling method there was a higher mean NDVI for polygons C8R10 and C9R10 relative to area sampling method. In contrast, mean NDVI calculated using point sampling within polygons C7R8, and C8R8 was lower than the area sampling method. These differences could be explained by the landcover type in each of the polygons. Land cover within polygons C7R8 and C8R8 are dominated by agricultural areas and coniferous forests. These results support the use of point sampling in studies of biomass production relative to wildfire susceptibility.