

A Framework for Planning and Implementing a
Jaguar (*Panthera onca*) Corridor to Reconnect La Amistad International Peace Park
and Corcovado National Park in Costa Rica

by

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ABSTRACT

Quantifying ecological relationships by gathering and sifting through large stores of data and applying statistical models to them is a substantial first step in identifying optimal habitat for the dispersal of threatened species, but the implementation of the result requires coordination between political, economic, and environmental actors that are further complicated by the margin of error in modeling a wildlife corridor. That is why the partnership between Arizona State University (ASU), the Phoenix Zoo: Arizona Center for Nature Conservation, the National Aeronautics and Space Administration (NASA) DEVELOP, and Osa Conservation needed a framework for identifying and analyzing the forest patches that constituted the least cost path (LCP) modelled to connect the Talamanca Mountains of La Amistad International Peace Park and the Osa Peninsula of Corcovado National Park and allow for the dispersal of jaguars (*Panthera onca*). A framework for selection of forest patches of adequate size was established in ArcMap and data were extracted to further analyze their characteristics and select targets to be ground-truthed. Forest patches were successfully identified and selected using data used for the modelling of the LCP. Patches were selected by the desired size of three hectares or greater, the home range of prey species paca (*Cuniculus paca*). Patches were characterized by patch area, resistance value or cost, distance from LCP, and distance from nearest neighbor across multiple forest density thresholds.

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CHAPTER 1

INTRODUCTION

Background

For the past 10 years, researchers have been collecting field data and in 2018 partnered with NASA DEVELOP to bring all partners together to share data and create a biological corridor to reconnect jaguar populations. This ongoing project aims to establish a jaguar (*Panthera onca*) corridor in Costa Rica between disconnected populations in both La Amistad International Peace Park and the Corcovado National Park. The jaguar's natural habitat spans an area from northern Mexico to northern Argentina, which constitutes 40% of their historic range (Pettracca et al. 2014). The IUCN's Red List of Endangered Species lists the jaguar as Near Threatened as the result of human hunting of prey species, retaliatory killings for predation of livestock, and habitat loss due to deforestation. Corcovado National Park in Costa Rica is known to be home to a critical sink population with as few as four individuals per 100 km² whose connection to neighboring protected areas is vital to the persistence of the species throughout Costa Rica (Salom-Pérez et al. 2007). Furthermore, La Amistad International Peace Park, home to the Talamanca Mountains, supports a source population with the potential to sustain the Corcovado population with the immigration of new individuals (Foster 2008), however, they are separated by human-dominated landscapes including cattle, coffee, and oil palm, among other crop types. For these reasons, it was crucial to gather data on the land use trends between these populations to establish a conservation corridor to facilitate the movement of jaguars through connecting protected areas within an increasingly human dominated landscape.

In 2018-2019, NASA DEVELOP obtained data on vegetation and land-use in the area of study from Landsat 5 Thematic Mapper (TM), Landsat 8 Operational Land Imager (OLI), and PlanetScope for the years 1987, 1997, and 2019. This process identified different vegetation types and distinguished natural from human use. This data was visualized by NASA DEVELOP in TerrSet and its Land Change Modeler was used to project changes in land use into the year 2030. Elevation data was obtained from Terra Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) along with vector data on roads and urban areas. A combination of this data on road distances, population sizes of cantons, forest cover, elevation, and terrain slope informed expert opinion in estimating approximate cost accrued by jaguars passing through every 30 m by 30 m pixel within the study site to construct a resistance raster file of these values ranging from 0 to 8.5. This raster was input to the Linkage Pathways tool of the Linkage Mapper toolbox of ArcMap along with shapefiles representing the boundaries of national parks (Fig. A1) to generate the Least Cost Path (LCP) between the two populations (Fig. 1). The LCP depicts the path along which an individual would accumulate the lowest total cost traveling between core patches. Additionally, the CircuitScape tool of Linkage Mapper was used to identify bottle necks and other pathways (Fig. A2) that could either hinder or assist the movement of jaguars along the corridor, respectively. This process took the same data but passed “circuit” through the resistance raster and mapped the flow between the parks, which represented theoretical networks that jaguars would be able to travel through and where movement is restricted.

The researchers next sought to ground-truth the forest patches the LCP extended across to implement a conservation corridor within a 5 km buffer to aid in jaguar

dispersal. Additionally, they would target education efforts alongside Osa Conservation in a 10 km buffer zone where human villages intersect with potential jaguar habitat. The purpose would be to increase awareness of the benefits of human-jaguar coexistence and potential remedies such as jaguar friendly coffee.

Need

These processes of quantifying ecological relationships by gathering and sifting through large stores of data and applying statistical models to them is a substantial first step in identifying optimal habitat for jaguar dispersal, but the implementation of the resulting corridor model requires coordination between political, economic, and environmental actors that are further complicated by any measuring error in the vegetation and land use data and the subsequent projection of its change. For instance, trees on private property were not able to be distinguished from those that make up forests with the same accuracy as it would be distinguished from crops. Thus, there was another step necessary to translate the results of the corridor model to on-the-ground corridor design and implementation, identification of forest patches. Ultimately, NASA DEVELOP's final result calculates a corridor which crossed several different vegetation types (Fig. A3) across many properties held by multiple stakeholders that needed to be ground-truthed. However, a common barrier to the on the ground implementation of quantitative data is the lack of a bridge between biological and quantitative understanding (Feser et al. 2013). Conservation biology necessitates interdisciplinary cooperation, but issues frequently arise when understanding needs to be repeatedly shared and focus needs to be shared across multiple projects. This disparity is why there has been an

interdisciplinary push in the biological sciences to incorporate the increasingly popular and powerful software and statistical tools available to researchers (Feser et al. 2013, Newing 2010). Additionally, a review of literature on the topic revealed two approaches to reporting on LCP modelling and habitat identification (Rabinowitz et al. 2010, Rouget et al. 2006, Rodríguez-Soto et al. 2013, Ceballos et al. 2013, Morato et al. 2014). The first, forest patches are known from previous research or knowledge and cross referenced with the LCP. In the second, the LCP is plotted from a data set that forest patches are not extracted from and not reported on. The first is particularly true in jaguar conservation where there is a movement away from identifying conservation units based on expert opinions of jaguar counts and habitat (Zeller et al. 2013). The prior research in this study was successful in modeling an LCP, but neither approach provided much guidance in implementing a conservation corridor across the desired 5km buffer region and targeting education outreach in villages in a 10km range. That guidance was the next goal in this study, but a major hurdle was the lack of data preserved by the resistance raster as raster files only store values and not detailed attribute tables. The result is a raster displaying data that are not easily accessible to those unfamiliar with GIS software. That is why this study not only aimed to extract data from the files to guide conservation work at specific and optimal forest patches, but to also provide a framework for analysis of similar datasets.

La Amistad International Peace Park and Corcovado National Park Study Site



Figure 1. Site map depicting La Amistad International Peace Park, Corcovado National Park, and Piedras Blancas National Park connected by least cost path in Costa Rica.

CHAPTER 2

METHODS

ArcMap Procedures

After following the methodology outlined by NASA DEVELOP to obtain the LCP and circuit theory data, analysis of forest patches was performed in ArcMap 10.8.2. The 2019 vegetation raster utilized in Terrset containing categorical data for the vegetation types across the study site was isolated to primary and secondary forest and reclassified to a single forest type. The pineapple, coffee, cattle, and oil-palm vegetation types were reclassified to their own raster files in the same manner (Fig. A20). The raster containing the reclassified forest data that needed to be refined to actual forests was input to the Focal Statistics tool. This calculated the number of 30 m by 30 m pixels within a rectangular neighborhood around every data point that fell into a specific category, in this case forest, and assigned the center pixel that value. Neighborhoods of 6x6 cells were used. This neighborhood size corresponded to an area of 32,400 square meters. The goal of this focal operation was to identify forest patches of at least 30,000 square meters or 3 hectares, the known home ranges of prey species paca (*Cuniculus paca*) (Beck-King et al. 1999, Gutierrez et al. 2017). The categories of the raster were then recategorized to classify cells in 10% increments of forest density (Fig. A4) and separate raster files were generated for the 50-60%, 60-70%, 70-80%, and 90-100% ranges. This operation reduced the raster to pixels that were surrounded by forest for their respective percentage range within the home range of the jaguar prey species. Below 50%, it was assumed pixels were beyond forest edges and simultaneously removed trees scattered across developed areas.

The Raster to Polygon tool was used to generate shapefiles from each range. With the Select by Attribute tool, polygons were isolated to forest patches with areas greater than or equal to three hectares and selected for patches of sufficient size to support jaguars and their prey species. The Buffer tool was applied to the least cost corridor shape file produced by NASA DEVELOP to establish 5-kilometer and 10-kilometer buffer zones around the corridor. This buffer zone served as the clip feature for applying the Clip tool to the forest patch shapefile to obtain the patches nearest the corridor using a “hard” cutoff. The circuit and resistance raster data were clipped in the same manner. Additionally, the Select by Location tool was utilized to select polygons that intersected the 5km buffer but could also extend outside of it. Clipping polygons to the exact extent of the buffer zone reduced the final size of patches and was suspected of reducing connectivity and skewing resistance values. This buffer cutoff was distinguished from the “hard” cutoff as the “inter” cutoff. The Select by Attribute tool isolated patches with areas greater than or equal to 3 hectares, which selected for patches of sufficient size to support jaguars and their prey species. To add resistance values and data to the forest polygons shape files, the resistance raster was resampled at a 5x5 level to achieve a resolution that ensured at least one data point laid entirely within the area of a polygon to allow for calculations. The original raster file had a pixel size of 392 m by 392 m, which meant pixels were larger than some forest patches, but at least one pixel needs to lay entirely in a forest patch for the Zonal Statistics as Table tool to calculate statistics of the forest polygons relative to the resistance raster. Mean resistance value of every pixel within each forest patch was calculated along with other distribution data. The data were added to the attribute table of the forest polygons using the Joins tool. An identical

process was used to add the results of the Generate Near Table tool to the forest patch shape file attribute table after calculating patch distance from the LCP and patch distance from nearest neighbor.

RStudio Procedures

The attribute table for each shapefile was exported to RStudio 4.3.1. Using tidyverse packages, the data was wrangled, and statistics were calculated and compared for each patch selection method (see Appendix B). Summary statistics were calculated for each buffer type and density threshold (Table 1-4). Linear models were run for each interaction between the variables: patch area, patch mean resistance (average of resistance values within individual patches), distance from LCP, and distance from nearest neighbor. All but area were centered on their mean. Relationships between variables were plotted to depict trend. See Appendix B for methods, formulas, and raw outputs.

CHAPTER 3

RESULTS

Within the 5km and 10km buffer hard border polygons and the 5km buffer intersect polygons, forest patches were assigned their corresponding attribute values for area, patch mean resistance, distance from LCP, and proximity to their nearest neighbor. Averages of each attribute were calculated for each percentile range (Table 1-4). The number of forest patches identified (n) for each buffer type (5 km intersection, 5 km hard cutoff, and 10 km hard cutoff) increased from the 90% threshold to the 80% threshold and then decreased to the 50% threshold.

Consistently, within each buffer type, the average and maximum area increased as the percentile threshold decreased to 50% (Table 1). All were skewed positively, while the mode hovered around the desired 3 hectares. The average area of the hard border 5km buffer patches ranged from 200 to 400 hectares (10km was slightly lower on the upper end), while it ranged between 800 and 1,500 hectares when patches were allowed to extend outside of the 5km buffer.

The minimum forest patch distance from the LCP for every analysis was 0 meters, indicating the LCP intersected patches (Table 2). The average distance from the LCP ranged between 2,100 and 2,300 meters for the 5km buffer intersection, 2,000 and 2,200 meters within the 5km buffer with a hard cutoff, and 4,700 and 5,000 meters within the 10 km hard cutoff. The average distance from the LCP was not consistently skewed from the median; however, the mode was 0, indicating many forest patches directly on the LCP. The maximum distance was approximately 4,900 for the intersection buffer, 4,800 for the 5km hard cutoff, and 9,800 for the 10km hard cutoff. These values were expected,

as the nearest point of any patch must be within the buffer for the hard cutoffs, but the intersection extends plots outside the 5km and shifts the center point of forest patches.

Resistance values averaged between 2.3 and 3.0 within each buffer range with it increasing as the forest density was lowered towards 50% (Table 3). The mean exhibited the same trend. All buffer types had their minimum resistance values spike at .90 from .79 as density was decreased from 90 to 80% but decreased to .82 at 50%. The maximum exhibited no such trend but hovered around 5.0.

All buffer types had positively skewed mean proximity measures and it decreased with the density threshold (Table 4). The minimum distance between neighboring plots was 0 meters for all thresholds and the maximums were identical within the 5km buffer types and increased to the 10km buffer.

Regression analysis ($P \leq .05$) inside the 5km buffer intersection, showed patch area had a significant negative linear relationship with mean resistance, distance from LCP, and distance from nearest neighbor in both directions and at all thresholds but 90 percent where distance from LCP was not included. At the 70% threshold, distance from LCP and mean resistance were significantly positively related and distance from LCP and distance from nearest neighbor were significantly positively related in the 50% threshold.

The 5km hard buffer had the same relationships with the addition of the 90% threshold including the relationship between distance from LCP and area. The 70% threshold also demonstrated a significant positive relationship between distance from nearest neighbor and mean resistance and distance from LCP.

The 10km hard buffer had a significant negative relationship between area and all variables at all density thresholds. In the 90% threshold, distance from LCP had a

significant positive relationship with distance from nearest neighbor and mean resistance. The 80% threshold experienced a significant positive relationship between distance from LCP, distance from nearest neighbor, and mean resistance. Distance from LCP and mean resistance had a significant positive relationship in the 70% threshold. For the 60% threshold, the relationships between distance from LCP and mean resistance and distance from nearest neighbor and mean resistance was significantly positive. Distance from LCP and mean resistance were significantly positively related in the 50% threshold.

Distribution of Patch Area										
Buffer	Density	Min	Q1	Median	Mean	Mode	Q3	Max	Std	n
Inter5km	90%	3.02	4.66	9.23	827.74	3.37	25.61	84105.70	6760.61	219
Inter5km	80%	3.02	4.97	9.23	937.24	3.28	26.76	128905.00	9233.62	231
Inter5km	70%	3.02	5.24	9.23	1068.17	3.73	28.89	173830.00	12249.79	215
Inter5km	60%	3.02	5.37	10.21	1261.85	5.24	35.95	192076.00	14002.28	199
Inter5km	50%	3.02	4.88	9.76	1450.79	3.37	26.63	201098.00	15184.34	185
Hard5km	90%	3.02	4.64	9.19	227.95	3.37	22.35	20301.30	1678.16	210
Hard5km	80%	3.02	4.90	8.70	250.32	5.33	25.89	35907.40	2510.96	222
Hard5km	70%	3.02	5.21	8.62	288.49	3.73	27.99	49846.90	3459.48	208
Hard5km	60%	3.02	5.30	10.16	339.38	5.24	32.00	53160.00	3842.77	192
Hard5km	50%	3.02	4.77	9.10	382.12	3.37	25.27	55254.00	4129.67	180
Hard10km	90%	3.02	4.79	9.23	209.69	3.02	20.24	37613.10	2127.77	428
Hard10km	80%	3.02	4.97	9.08	221.01	3.55	21.08	64264.30	3081.80	467
Hard10km	70%	3.02	5.24	9.67	243.46	3.73	25.74	83493.60	3939.37	457
Hard10km	60%	3.02	5.46	10.56	280.78	3.91	29.11	88946.30	4322.26	431
Hard10km	50%	3.02	4.82	9.23	328.33	3.37	26.80	92604.50	4734.74	390

Table 1. Summary data for area of forest patches. Grouped by buffer type and then forest density threshold.

Distribution of Distance from Least Cost Path										
Buffer	Density	Min	Q1	Median	Mean	Mode	Q3	Max	Std	n
Inter5km	90%	0	751.38	2217.62	2265.45	0.00	3713.10	4972.52	1597.22	219
Inter5km	80%	0	895.52	2324.73	2272.71	0.00	3581.91	4998.27	1540.72	231
Inter5km	70%	0	916.19	2042.28	2177.93	0.00	3300.57	4961.75	1493.78	215
Inter5km	60%	0	853.88	2107.77	2208.38	0.00	3574.71	4972.36	1556.14	199
Inter5km	50%	0	966.24	2005.13	2131.26	0.00	3200.44	4991.39	1493.39	185
Hard5km	90%	0	729.15	2163.92	2151.94	0.00	3503.59	4806.82	1531.64	210
Hard5km	80%	0	882.72	2234.78	2167.40	0.00	3374.86	4825.84	1477.93	222
Hard5km	70%	0	904.45	1960.06	2086.83	0.00	3064.20	4865.11	1431.99	208
Hard5km	60%	0	797.10	1990.43	2110.53	0.00	3272.37	4830.46	1495.54	192
Hard5km	50%	0	815.07	1957.89	2054.07	0.00	3113.80	4775.94	1439.00	180
Hard10km	90%	0	2194.28	4910.00	4781.27	0.00	7429.33	9850.66	2962.65	428
Hard10km	80%	0	2347.82	5066.69	4878.79	0.00	7487.87	9825.32	2945.19	467
Hard10km	70%	0	2214.13	5350.52	4941.79	0.00	7473.10	9824.14	2961.74	457
Hard10km	60%	0	2279.84	5373.31	5035.05	0.00	7740.94	9894.06	2991.80	431
Hard10km	50%	0	2172.65	5361.07	4952.70	0.00	7687.49	9864.96	3034.72	390

Table 2. Summary data for distance of forest patches from least cost path. Grouped by buffer type and then forest density threshold.

Distribution of Patch Resistance										
Buffer	Density	Min	Q1	Median	Mean	Mode	Q3	Max	Std	n
Inter5km	90%	0.80	1.71	2.20	2.39	1.50	2.98	5.15	0.85	219
Inter5km	80%	0.91	1.92	2.52	2.56	1.08	3.13	5.30	0.81	231
Inter5km	70%	0.83	1.96	2.64	2.67	1.70	3.21	4.78	0.84	215
Inter5km	60%	0.82	2.22	2.71	2.73	2.70	3.25	5.10	0.74	199
Inter5km	50%	0.83	2.30	2.76	2.88	2.70	3.32	5.83	0.85	185
Hard5km	90%	0.80	1.68	2.20	2.39	1.50	3.00	5.15	0.85	210
Hard5km	80%	0.91	1.83	2.52	2.55	1.04	3.13	4.70	0.82	222
Hard5km	70%	0.83	1.94	2.64	2.66	1.70	3.22	4.78	0.87	208
Hard5km	60%	0.82	2.18	2.70	2.73	2.70	3.30	5.10	0.77	192
Hard5km	50%	0.83	2.29	2.79	2.87	2.70	3.33	5.83	0.86	180
Hard10km	90%	0.80	1.85	2.55	2.67	2.50	3.26	5.85	1.00	428
Hard10km	80%	0.91	1.99	2.75	2.80	2.50	3.36	5.90	0.99	467
Hard10km	70%	0.83	2.10	2.85	2.89	4.70	3.42	5.88	0.99	457
Hard10km	60%	0.82	2.33	2.89	2.97	2.70	3.46	5.87	0.93	431
Hard10km	50%	0.83	2.38	3.01	3.09	2.70	3.63	5.86	0.97	390

Table 3. Summary data for resistance values of forest patches. Grouped by buffer type and then forest density threshold.

Distribution of Patch Distance from Nearest Neighbor										
buffer	density	min	q1	median	mean	mode	q3	max	std	n
Inter5km	90%	0	89.38	160.43	213.87	29.79	294.17	1034.17	179.61	219
Inter5km	80%	0	66.62	148.96	187.53	59.58	246.49	868.58	149.73	231
Inter5km	70%	0	86.82	148.96	178.92	29.79	242.93	830.98	133.26	215
Inter5km	60%	0	59.58	122.84	152.58	29.79	220.86	773.45	121.76	199
Inter5km	50%	0	42.13	119.17	138.10	29.79	190.76	759.55	116.23	185
Hard5km	90%	0	90.58	160.43	220.09	29.79	297.92	1034.17	184.01	210
Hard5km	80%	0	66.62	148.96	186.80	29.79	240.19	868.58	150.18	222
Hard5km	70%	0	84.26	148.96	182.55	29.79	245.67	830.98	135.79	208
Hard5km	60%	0	59.58	148.96	159.06	29.79	232.68	773.45	122.75	192
Hard5km	50%	0	59.58	119.17	136.02	29.79	181.75	759.55	113.91	180
Hard10km	90%	0	94.21	179.98	235.56	29.79	311.04	1074.58	199.66	428
Hard10km	80%	0	84.26	151.91	201.14	29.79	268.13	2050.25	181.73	467
Hard10km	70%	0	89.38	148.96	182.84	29.79	238.34	2026.08	164.63	457
Hard10km	60%	0	59.58	122.84	151.46	29.79	212.75	791.59	119.85	431
Hard10km	50%	0	59.58	119.17	135.68	29.79	186.62	759.55	108.95	390

Table 4. Summary data for distance of forest patches from nearest neighbor. Grouped by buffer type and then forest density threshold.

CHAPTER 4

DISCUSSION

The goal of this study was to identify forest patches that were optimal targets for conservation efforts and to develop a workflow that would produce those outcomes for this vegetation and resistance data set and hopefully others. A 5km buffer was wanted for land conservation purposes and a 10km buffer was wanted for education and public outreach purposes. The 5km buffer intersection method was introduced to preserve potential connectivity lost to the hard cutoff and to identify patches that may be the target of the conservation efforts of both buffer zones. Therefore, little weight should be afforded to the comparison between the different buffer ranges, as the primary focus was on the forest density thresholds and which produced the most robust network of patches. Ultimately, these results were produced with the intent of being ground-truthed and leading researchers in the right direction to do so.

Result Analysis

The area analysis demonstrated decreasing the density threshold increased the area of forest patches while decreasing the final number of patches over 3 hectares. This relationship possibly implies patches are growing at the edges as they incorporate less dense forest until they are connected to neighbors and become one single forest patch, increasing size while reducing total count. This finding reinforces the expectation that higher thresholds sacrificed viable forest for the sake of higher certainty. Although decreasing the threshold retains forest near edges that may become increasingly patchy, careful analysis can assure distinction from non-forest trees and adequate connectivity to

surrounding forest. The regression analysis showed area had a significant negative relationship with all variables almost universally, suggesting patches get smaller or more costly to cross as distance from the LCP increases and patches move further from each other.

Decreasing the threshold increased the average resistance of plots by less than half a resistance point which could range from 0 to 8.5. However, the minimum and maximum values do not follow this trend and can fluctuate around the 70% and 80% thresholds. The lack of a consistent trend suggests including less dense forest and spanning patches across larger areas does not necessarily produce patches that are more difficult to traverse. If the fluctuations are in fact inflection points where interactions between variables peak and begin to diminish, it may be possible to optimize the multiple factors. Every regression model showed resistance increased in the smaller plots and was rather consistent in increasing as plots moved further out and apart.

The average forest patch distance from the LCP fluctuates, including the 70% to 80% range as well. If the plots are growing as the threshold decreases, it would be expected for the distance from the LCP to decrease as the edges move outwards. It is possible this fluctuation is the result of the number of patches decreasing, especially if the convergence of multiple plots is occurring nearer the LCP, resulting in a smaller n denominator. The distance between patches supports the convergence hypothesis as they would be decreasing with the threshold as the plots grow closer to each other. Both distance variables in the regression analysis support that small patches are far from the LCP and each other and that they have higher resistance values (possibly more so with distance from LCP).

Regression analysis overall showed, as the distance from the LCP increased, patch size decreased, and resistance value increased. Furthermore, patch size had an inverse relationship with resistance value. This suggests habitat fragmentation is already occurring across this landscape by the creation of small, difficult to cross patches outside of national parks and validates the identification of the LCP as a priority target containing the densest forest around and between the national parks.

Framework Analysis

In comparison to the literature reviewed (Rabinowitz et al. 2010, Rouget et al. 2006, Rodríguez-Soto et al. 2013, Ceballos et al. 2013, Morato et al. 2014), this framework provided a product that guides ground truthing and demonstrates a need for a more robust forest patch selection criterion. Multiple shapefiles were created containing polygons with data on the forests they represent, but little weight can be attributed to any one density threshold or buffer method. Distance from LCP could be more important in the 5km hard buffer and there is a rather consistent trend occurring around the 70% and 80% forest density thresholds, but there is not strong evidence to select any method over the others and a selection criteria would be based on flimsy reasoning. However, Billionnet 2010 outlined a methodology that could provide a stronger selection criterion, if a framework for creation of forest patches can be chosen. They outline a detailed methodology for optimal forest patch selection that utilizes many of the same variables used in this study and pulled directly from the shapefiles. Using mean proximity index (MPI), mean nearest neighbor distance (MNND), mean shape index (MSI), and the interactions between them, Billionnet thoroughly outlines the calculation of these values

and their analysis. As similar data has been obtained in this study, it would be a trivial task to adapt it for this more robust method and more efficiently guide the implementation of the least cost path.

5 Kilometer Buffer Intersection with 90% Forest Density

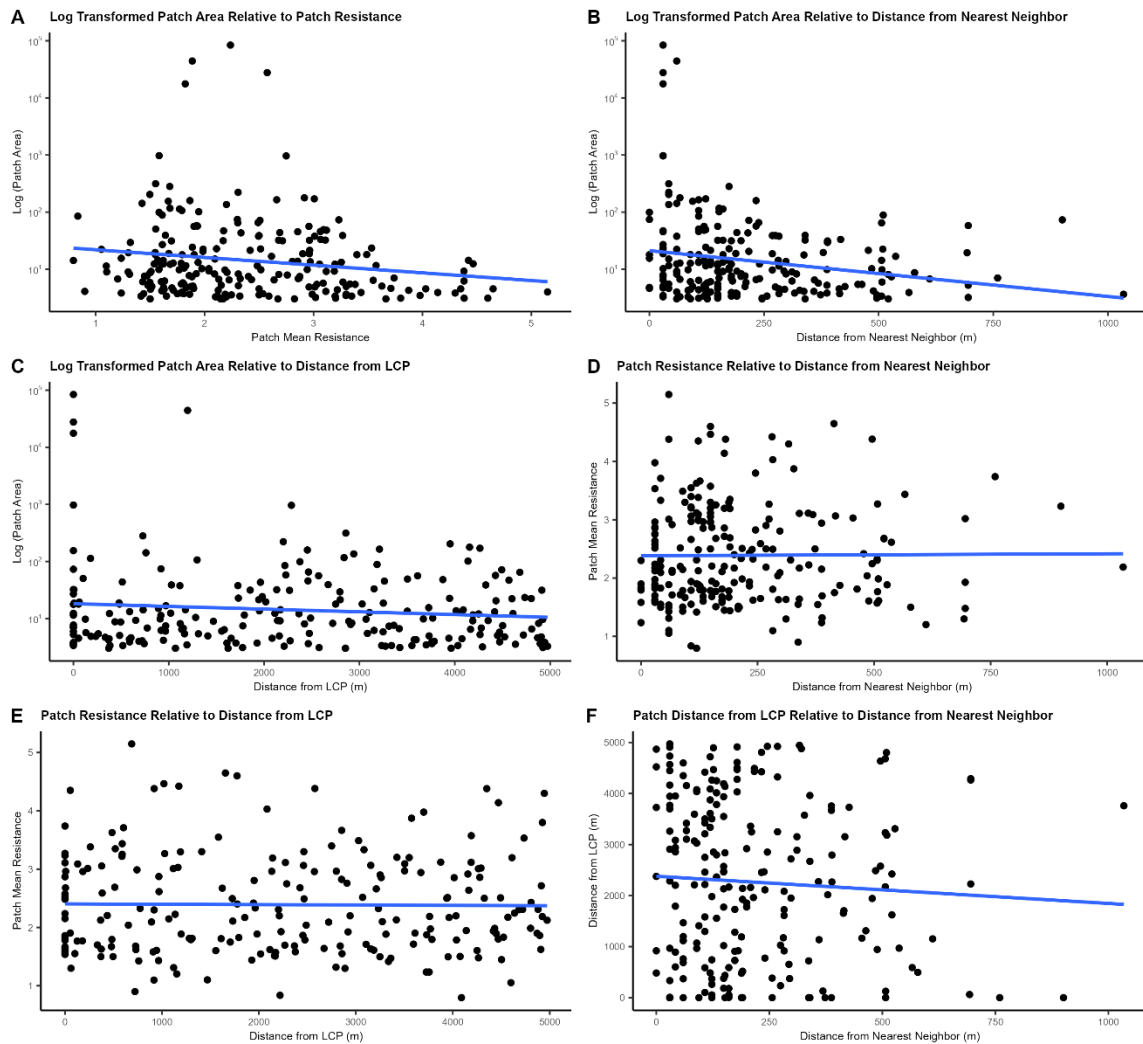


Figure 2. **A:** Mean resistance of forest patches plotted against log transformed forest patch area (n=219). **B:** Patch distance (m) from nearest neighbor plotted against log transformed patch area (n=219). **C:** Patch distance (m) from least cost path (LCP) plotted against log transformed patch area (n=219). **D:** Patch distance (m) from nearest neighbor plotted against mean resistance of forest patches (n=219). **E:** Patch distance (m) from least cost path (LCP) plotted against mean resistance of forest patches (n=219). **F:** Patch distance (m) from nearest neighbor plotted against patch distance (m) from least cost path (LCP) (n=219). **Blue Line:** Regression line.

5 Kilometer Buffer Intersection with 80% Forest Density

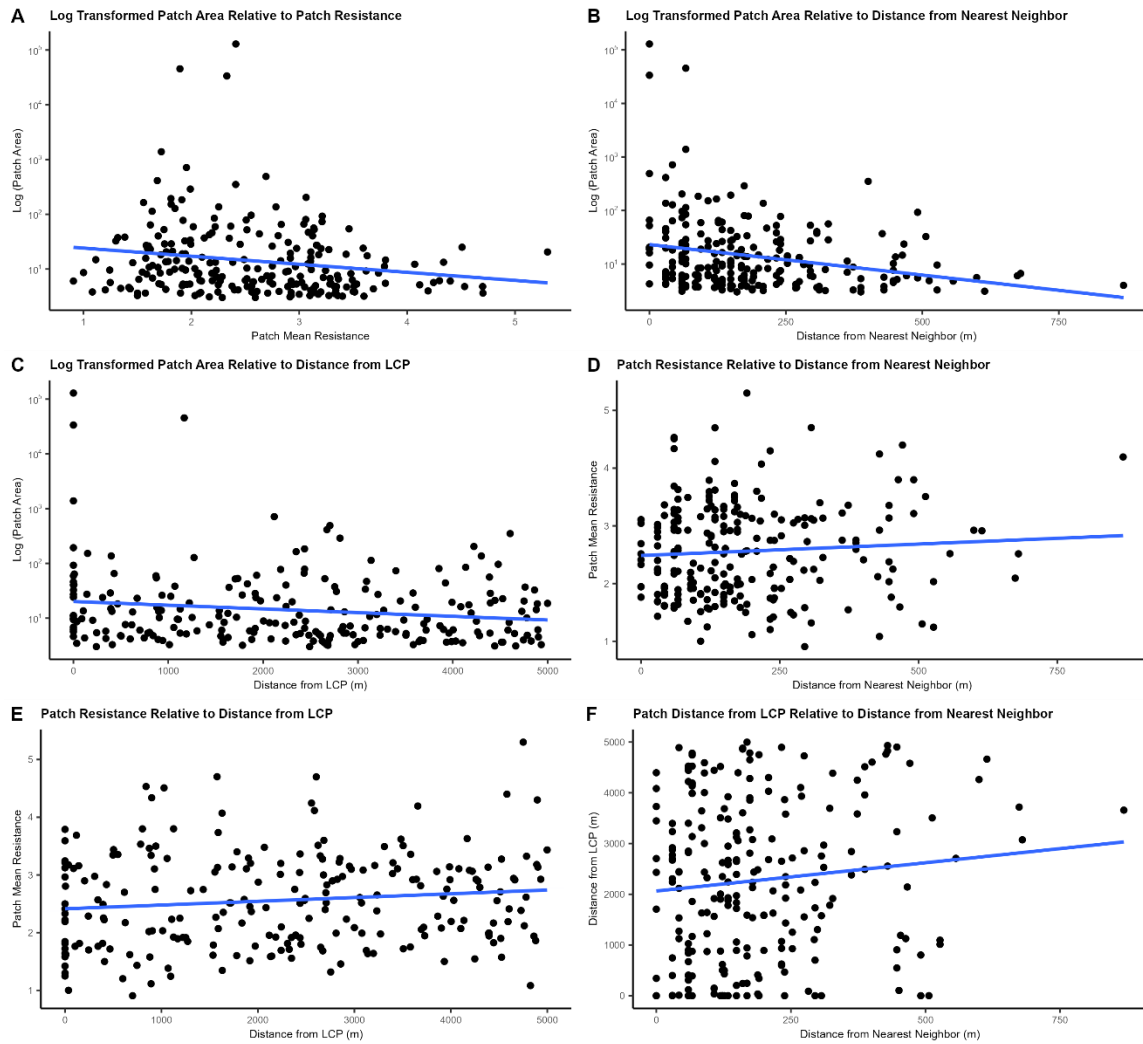


Figure 3: **A:** Mean resistance of forest patches plotted against log transformed forest patch area (n=231). **B:** Patch distance (m) from nearest neighbor plotted against log transformed patch area (n=231). **C:** Patch distance (m) from least cost path (LCP) plotted against log transformed patch area (n=231). **D:** Patch distance (m) from nearest neighbor plotted against mean resistance of forest patches (n=231). **E:** Patch distance (m) from least cost path (LCP) plotted against mean resistance of forest patches (n=231). **F:** Patch distance (m) from nearest neighbor plotted against patch distance (m) from least cost path (LCP) (n=231). **Blue Line:** Regression line.

5 Kilometer Buffer Intersection with 70% Forest Density

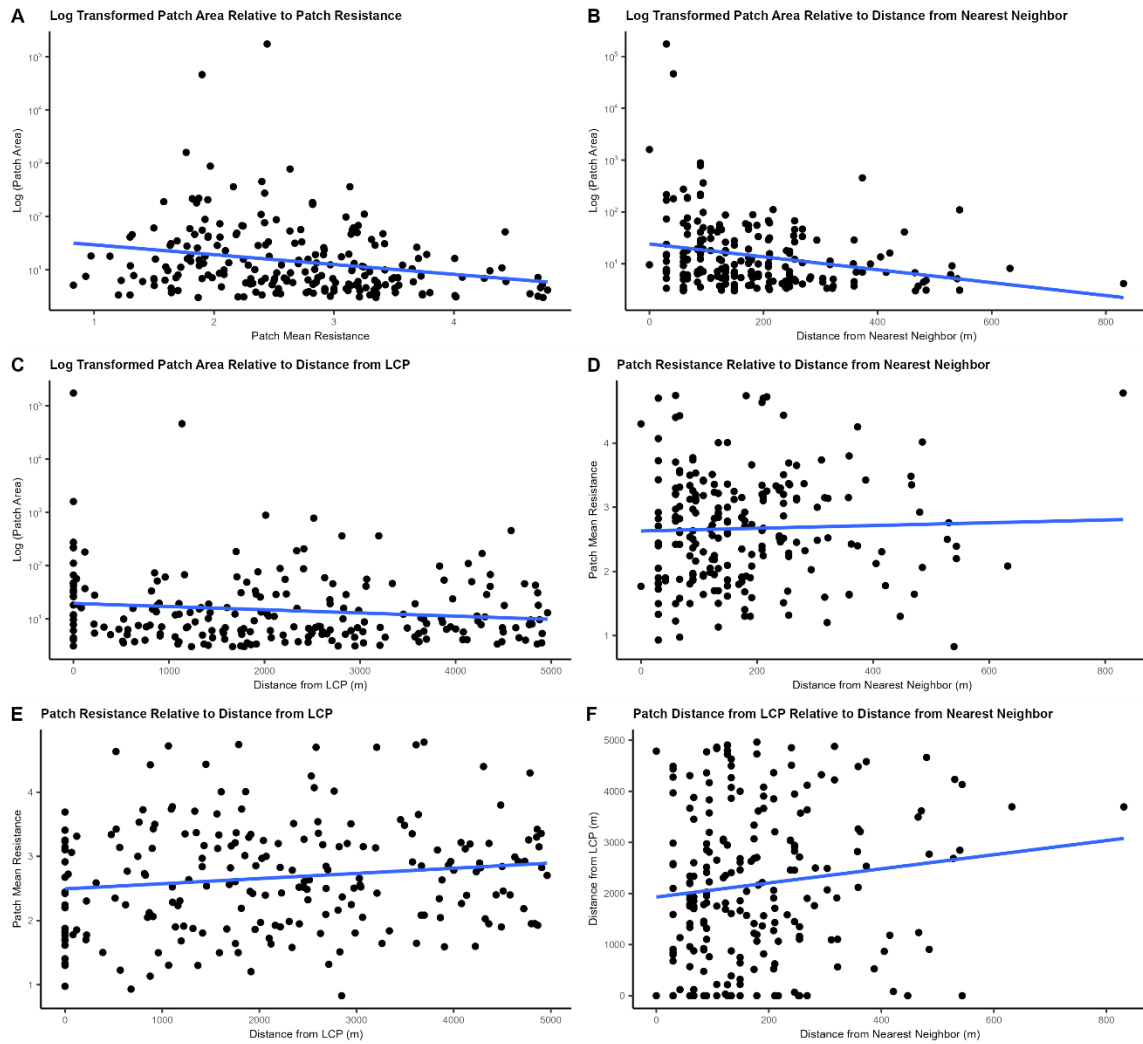


Figure 4: **A:** Mean resistance of forest patches plotted against log transformed forest patch area (n=215). **B:** Patch distance (m) from nearest neighbor plotted against log transformed patch area (n=215). **C:** Patch distance (m) from least cost path (LCP) plotted against log transformed patch area (n=215). **D:** Patch distance (m) from nearest neighbor plotted against mean resistance of forest patches (n=215). **E:** Patch distance (m) from least cost path (LCP) plotted against mean resistance of forest patches (n=215). **F:** Patch distance (m) from nearest neighbor plotted against patch distance (m) from least cost path (LCP) (n=215). **Blue Line:** Regression line.

5 Kilometer Buffer Intersection with 60% Forest Density

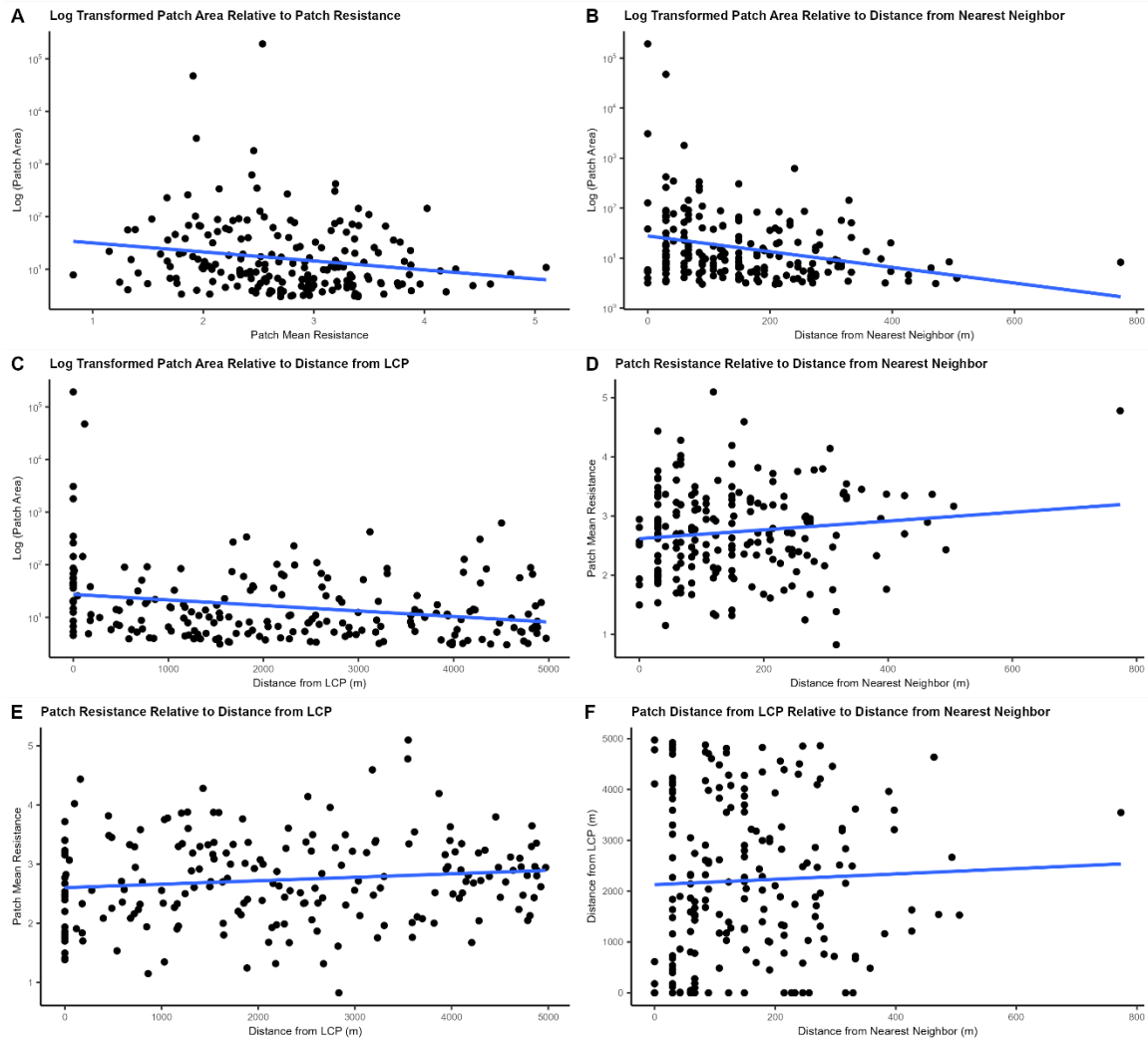


Figure 5: **A:** Mean resistance of forest patches plotted against log transformed forest patch area (n=199). **B:** Patch distance (m) from nearest neighbor plotted against log transformed patch area (n=199). **C:** Patch distance (m) from least cost path (LCP) plotted against log transformed patch area (n=199). **D:** Patch distance (m) from nearest neighbor plotted against mean resistance of forest patches (n=199). **E:** Patch distance (m) from least cost path (LCP) plotted against mean resistance of forest patches (n=199). **F:** Patch distance (m) from nearest neighbor plotted against patch distance (m) from least cost path (LCP) (n=199). **Blue Line:** Regression line.

5 Kilometer Buffer Intersection with 50% Forest Density

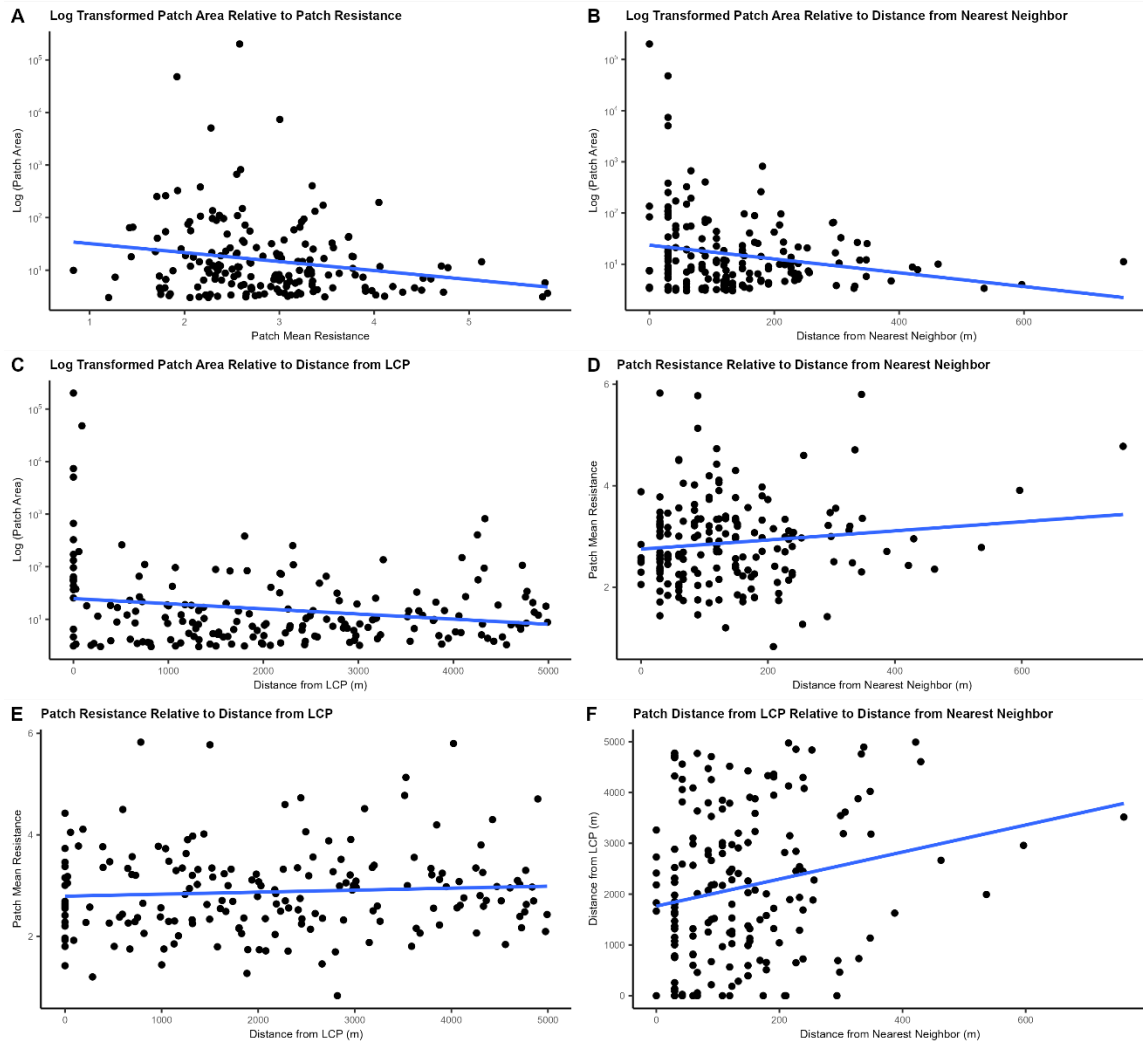


Figure 6: **A:** Mean resistance of forest patches plotted against log transformed forest patch area (n=185). **B:** Patch distance (m) from nearest neighbor plotted against log transformed patch area (n=185). **C:** Patch distance (m) from least cost path (LCP) plotted against log transformed patch area (n=185). **D:** Patch distance (m) from nearest neighbor plotted against mean resistance of forest patches (n=185). **E:** Patch distance (m) from least cost path (LCP) plotted against mean resistance of forest patches (n=185). **F:** Patch distance (m) from nearest neighbor plotted against patch distance (m) from least cost path (LCP) (n=185). **Blue Line:** Regression line.

5 Kilometer Buffer Hard Cutoff with 90% Forest Density

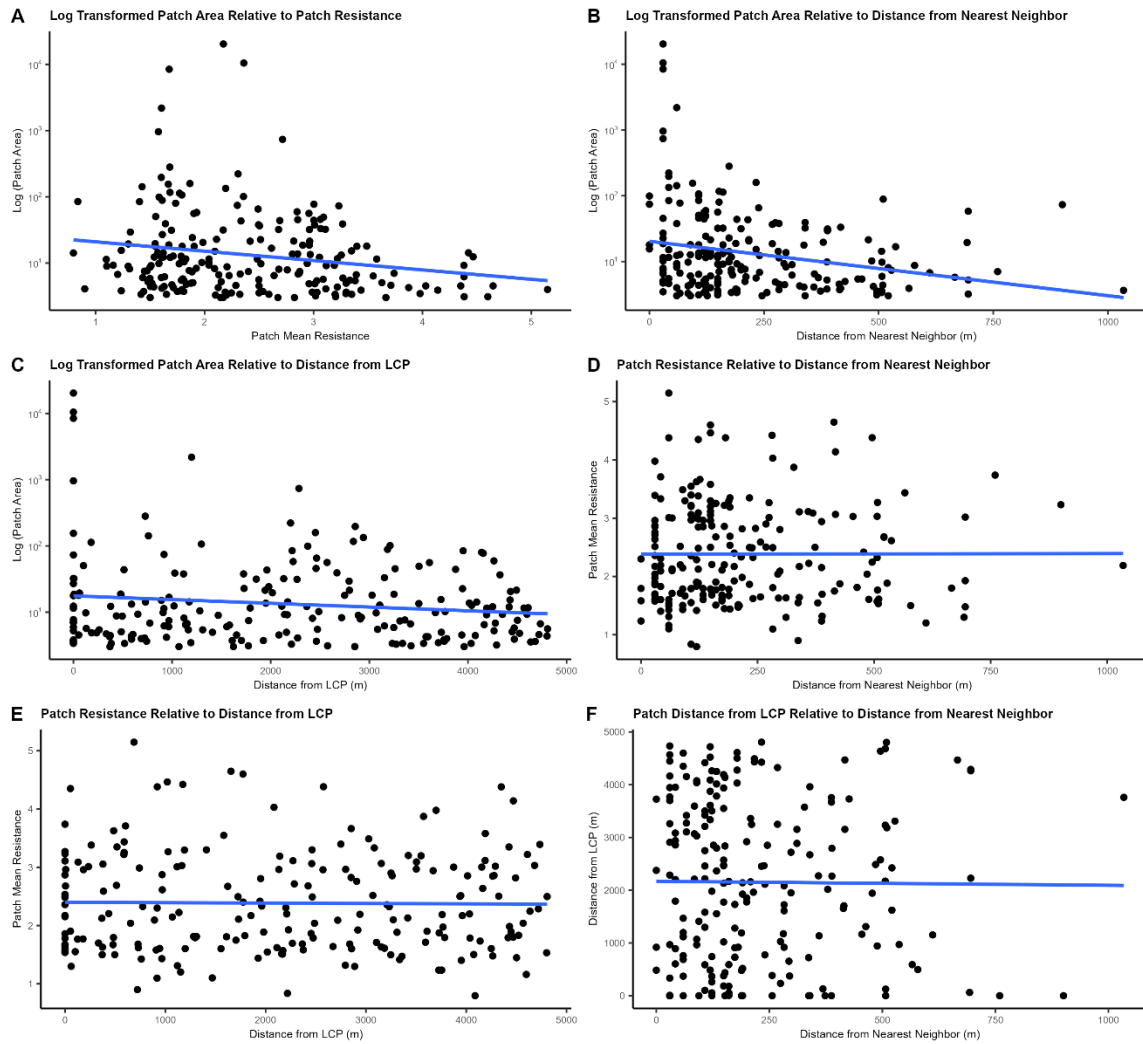


Figure 7: **A:** Mean resistance of forest patches plotted against log transformed forest patch area (n=210). **B:** Patch distance (m) from nearest neighbor plotted against log transformed patch area (n=210). **C:** Patch distance (m) from least cost path (LCP) plotted against log transformed patch area (n=210). **D:** Patch distance (m) from nearest neighbor plotted against mean resistance of forest patches (n=210). **E:** Patch distance (m) from least cost path (LCP) plotted against mean resistance of forest patches (n=210). **F:** Patch distance (m) from nearest neighbor plotted against patch distance (m) from least cost path (LCP) (n=210). **Blue Line:** Regression line.

5 Kilometer Buffer Hard Cutoff with 80% Forest Density

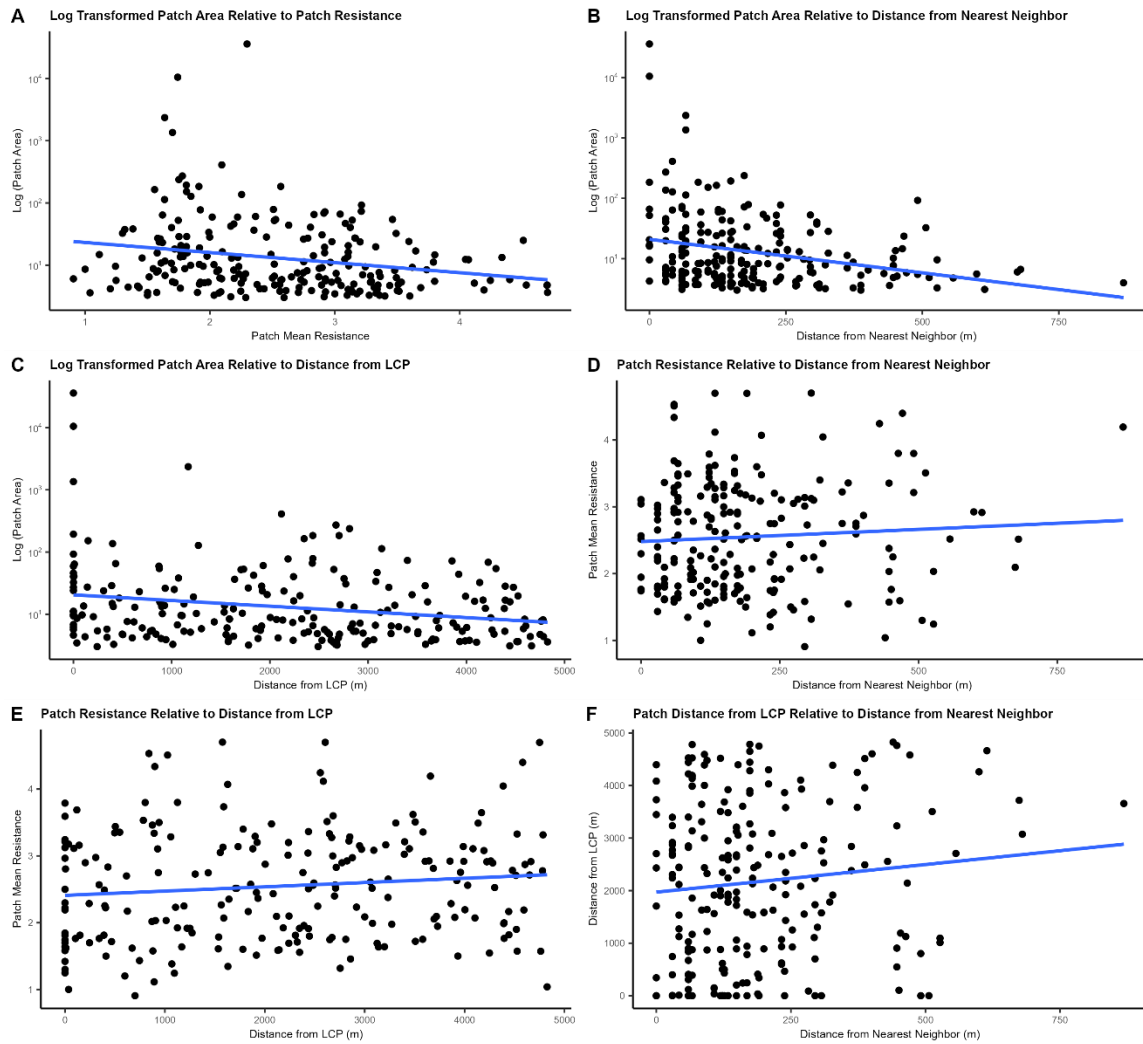


Figure 8: **A:** Mean resistance of forest patches plotted against log transformed forest patch area (n=222). **B:** Patch distance (m) from nearest neighbor plotted against log transformed patch area (n=222). **C:** Patch distance (m) from least cost path (LCP) plotted against log transformed patch area (n=222). **D:** Patch distance (m) from nearest neighbor plotted against mean resistance of forest patches (n=222). **E:** Patch distance (m) from least cost path (LCP) plotted against mean resistance of forest patches (n=222). **F:** Patch distance (m) from nearest neighbor plotted against patch distance (m) from least cost path (LCP) (n=222). **Blue Line:** Regression line.

5 Kilometer Buffer Hard Cutoff with 70% Forest Density

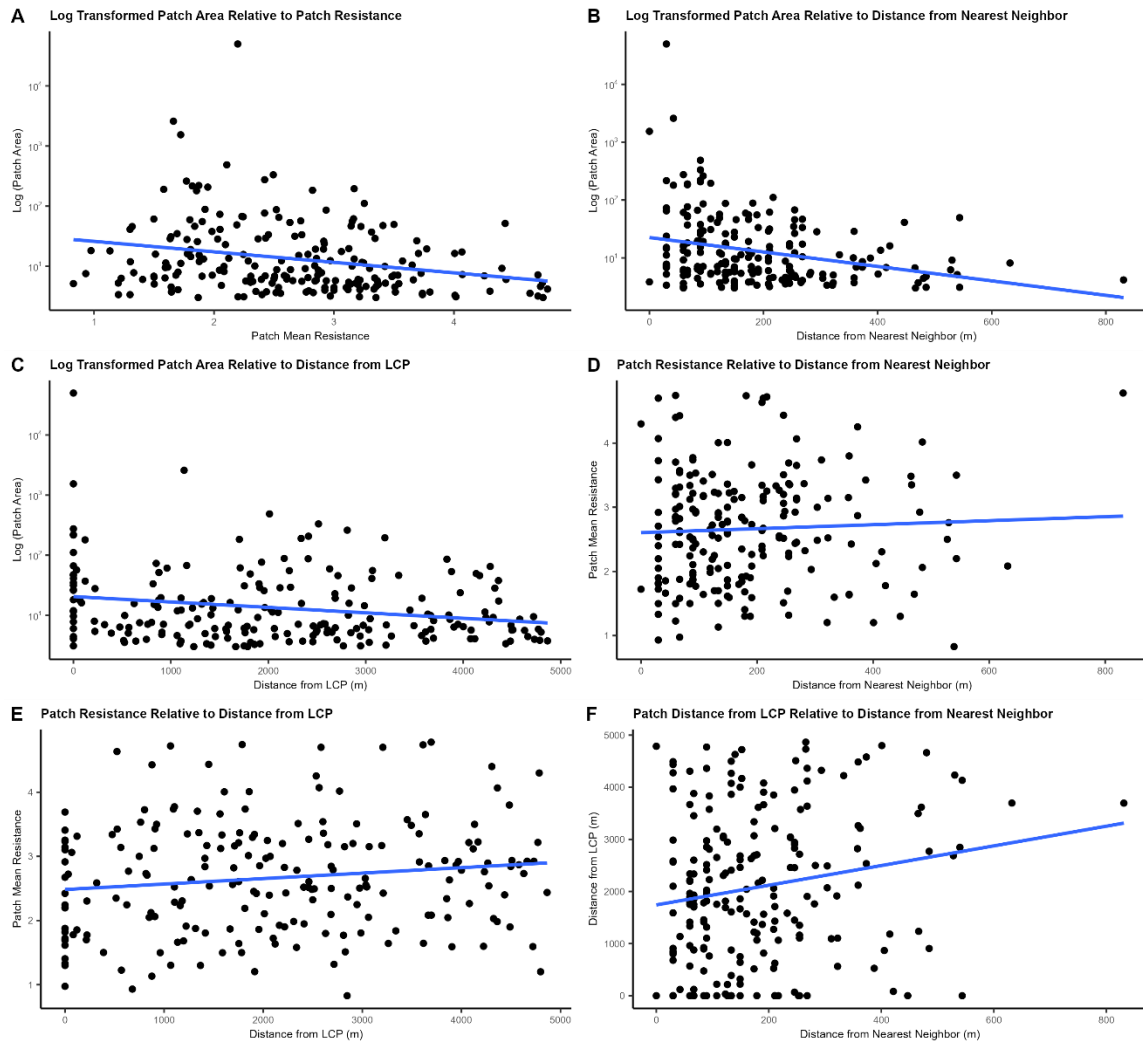


Figure 9: **A:** Mean resistance of forest patches plotted against log transformed forest patch area (n=208). **B:** Patch distance (m) from nearest neighbor plotted against log transformed patch area (n=208). **C:** Patch distance (m) from least cost path (LCP) plotted against log transformed patch area (n=208). **D:** Patch distance (m) from nearest neighbor plotted against mean resistance of forest patches (n=208). **E:** Patch distance (m) from least cost path (LCP) plotted against mean resistance of forest patches (n=208). **F:** Patch distance (m) from nearest neighbor plotted against patch distance (m) from least cost path (LCP) (n=208). **Blue Line:** Regression line.

5 Kilometer Buffer Hard Cutoff with 60% Forest Density

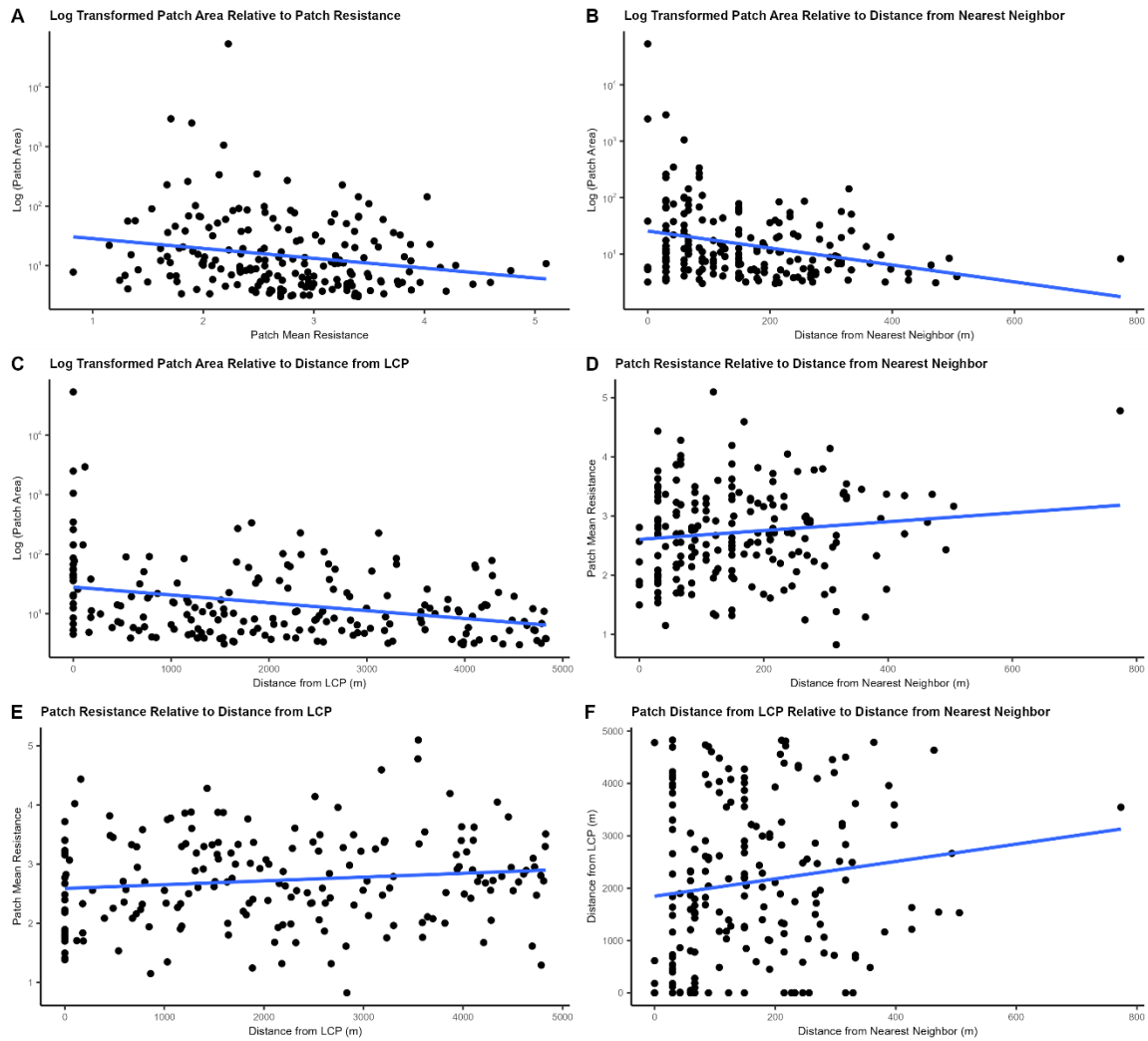


Figure 10: **A:** Mean resistance of forest patches plotted against log transformed forest patch area (n=192). **B:** Patch distance (m) from nearest neighbor plotted against log transformed patch area (n=192). **C:** Patch distance (m) from least cost path (LCP) plotted against log transformed patch area (n=192). **D:** Patch distance (m) from nearest neighbor plotted against mean resistance of forest patches (n=192). **E:** Patch distance (m) from least cost path (LCP) plotted against mean resistance of forest patches (n=192). **F:** Patch distance (m) from nearest neighbor plotted against patch distance (m) from least cost path (LCP) (n=192). **Blue Line:** Regression line.

5 Kilometer Buffer Hard Cutoff with 50% Forest Density

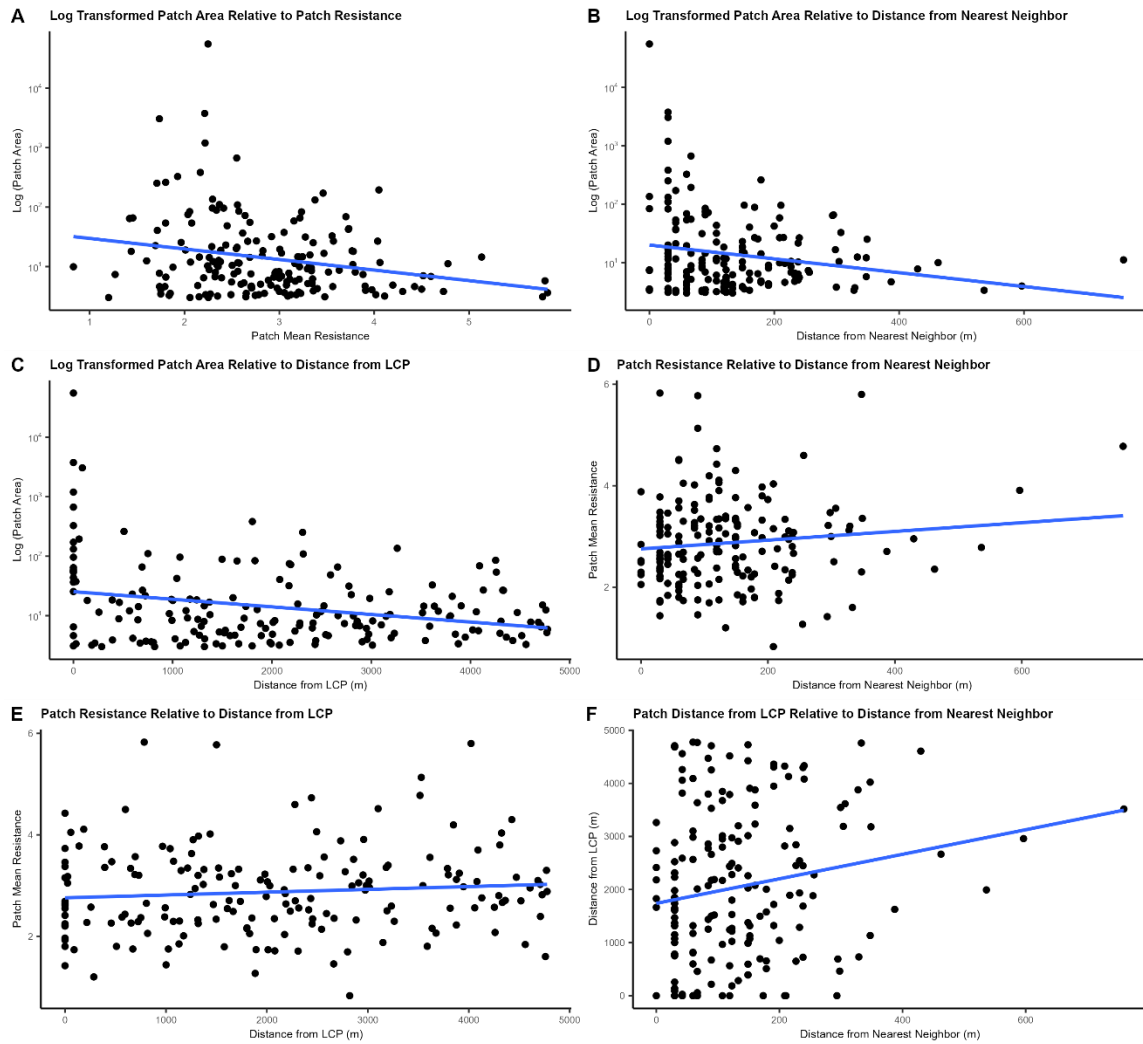


Figure 11: **A:** Mean resistance of forest patches plotted against log transformed forest patch area (n=180). **B:** Patch distance (m) from nearest neighbor plotted against log transformed patch area (n=180). **C:** Patch distance (m) from least cost path (LCP) plotted against log transformed patch area (n=180). **D:** Patch distance (m) from nearest neighbor plotted against mean resistance of forest patches (n=180). **E:** Patch distance (m) from least cost path (LCP) plotted against mean resistance of forest patches (n=180). **F:** Patch distance (m) from nearest neighbor plotted against patch distance (m) from least cost path (LCP) (n=180). **Blue Line:** Regression line.

10 Kilometer Buffer Hard Cutoff with 90% Forest Density

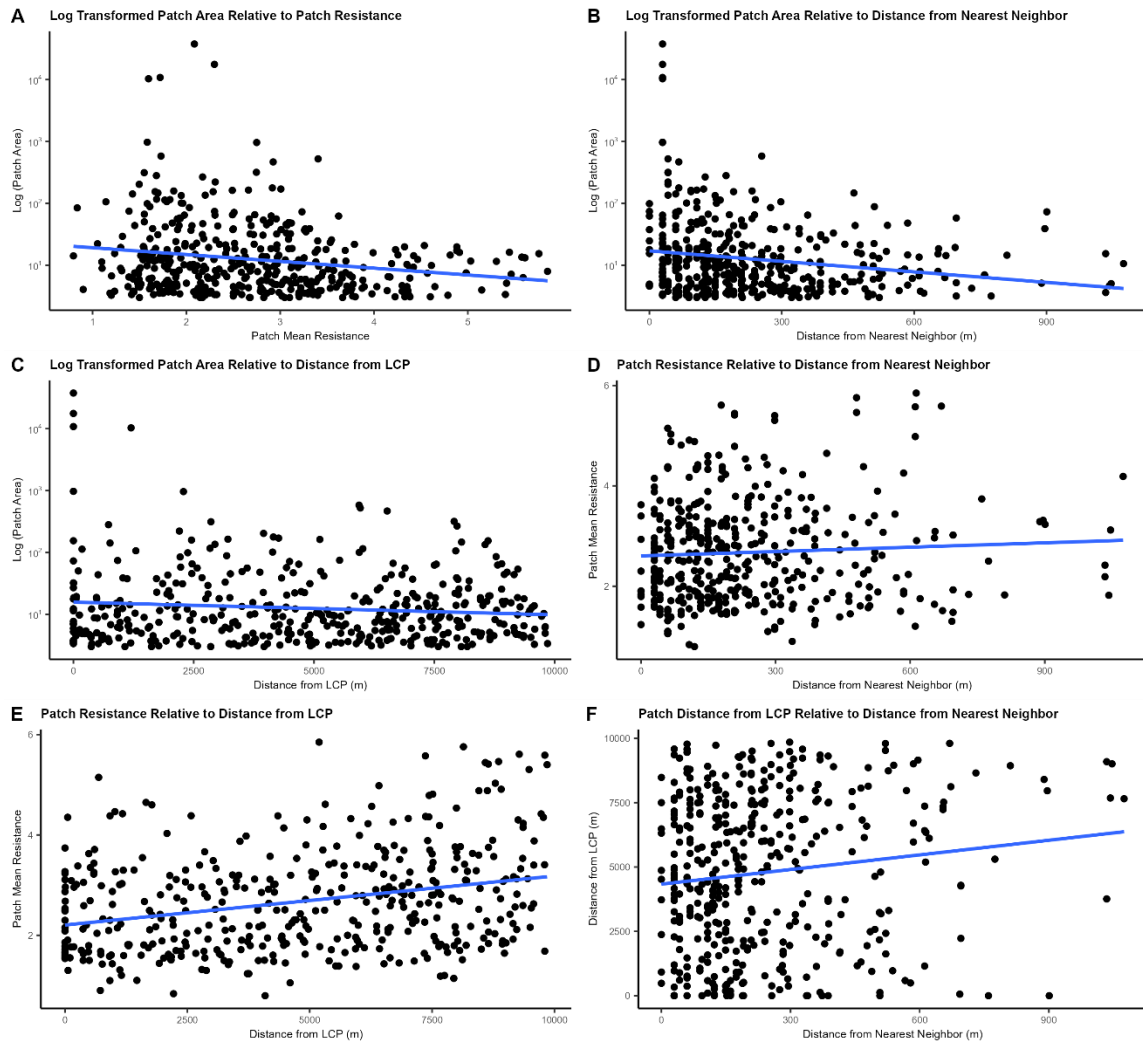


Figure 12: **A:** Mean resistance of forest patches plotted against log transformed forest patch area (n=428). **B:** Patch distance (m) from nearest neighbor plotted against log transformed patch area (n=428). **C:** Patch distance (m) from least cost path (LCP) plotted against log transformed patch area (n=428). **D:** Patch distance (m) from nearest neighbor plotted against mean resistance of forest patches (n=428). **E:** Patch distance (m) from least cost path (LCP) plotted against mean resistance of forest patches (n=428). **F:** Patch distance (m) from nearest neighbor plotted against patch distance (m) from least cost path (LCP) (n=428). **Blue Line:** Regression line.

10 Kilometer Buffer Hard Cutoff with 80% Forest Density

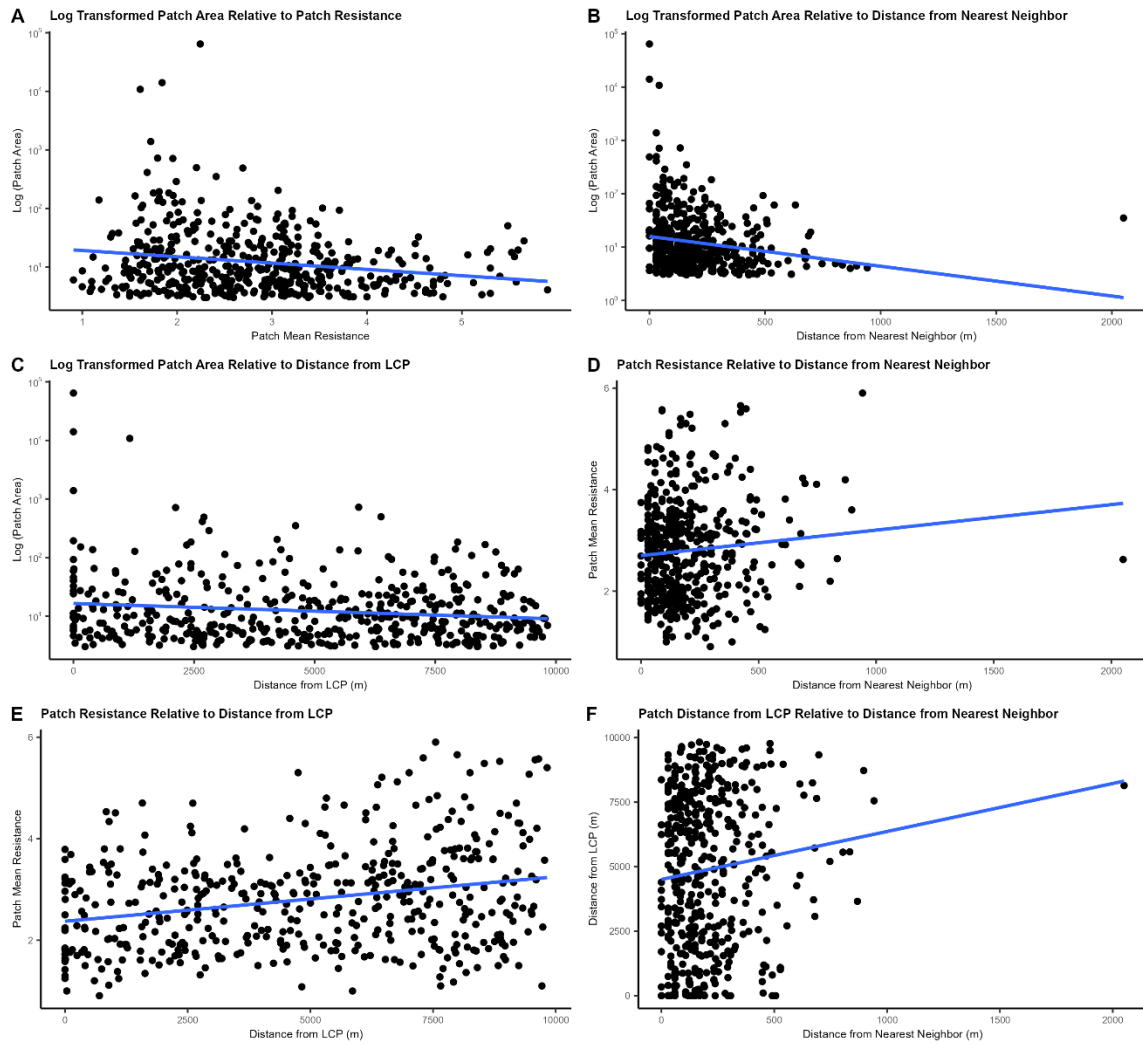


Figure 13: **A:** Mean resistance of forest patches plotted against log transformed forest patch area (n=467). **B:** Patch distance (m) from nearest neighbor plotted against log transformed patch area (n=467). **C:** Patch distance (m) from least cost path (LCP) plotted against log transformed patch area (n=467). **D:** Patch distance (m) from nearest neighbor plotted against mean resistance of forest patches (n=467). **E:** Patch distance (m) from least cost path (LCP) plotted against mean resistance of forest patches (n=467). **F:** Patch distance (m) from nearest neighbor plotted against patch distance (m) from least cost path (LCP) (n=467). **Blue Line:** Regression line.

10 Kilometer Buffer Hard Cutoff with 70% Forest Density

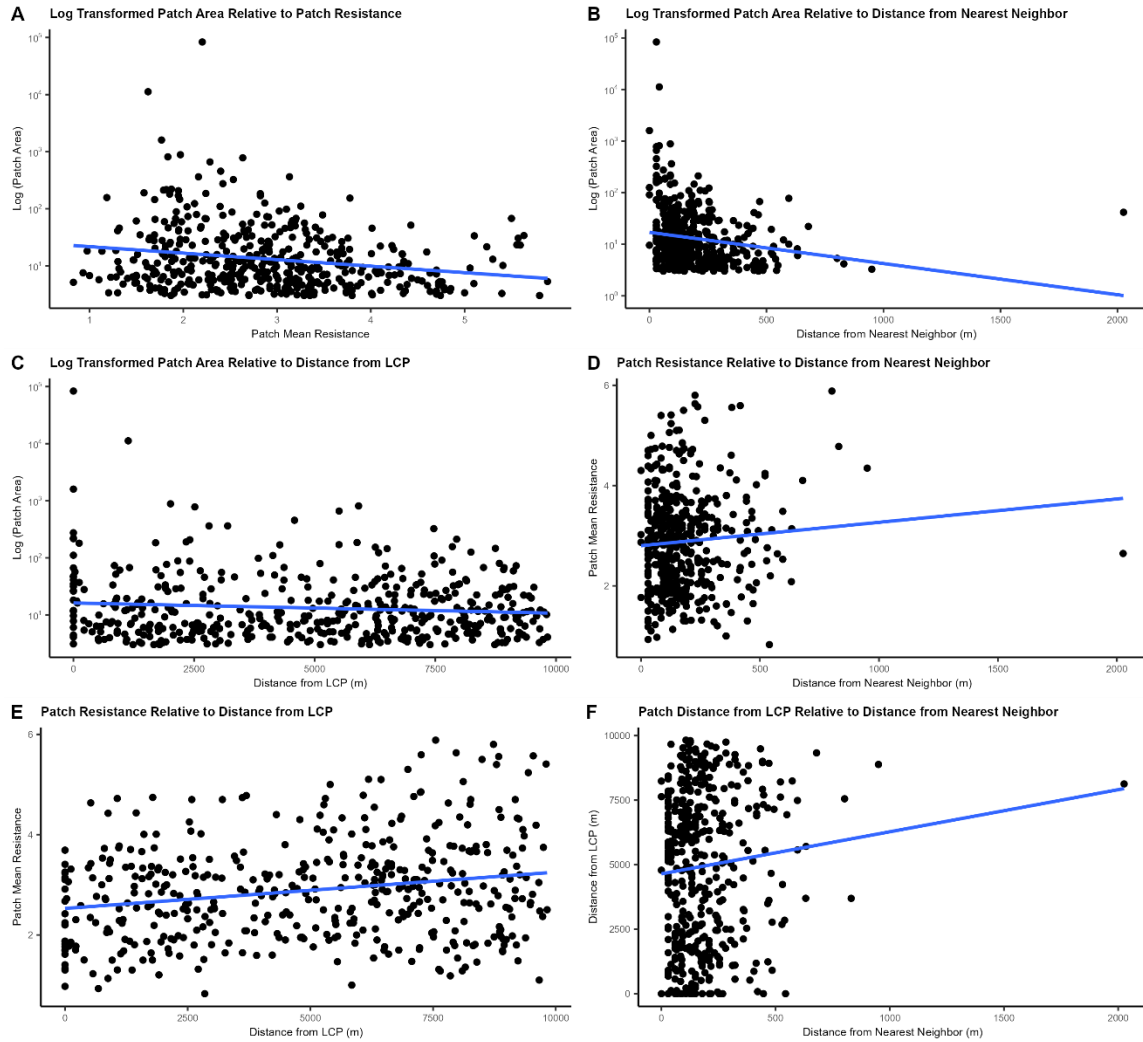


Figure 14: **A:** Mean resistance of forest patches plotted against log transformed forest patch area (n=457). **B:** Patch distance (m) from nearest neighbor plotted against log transformed patch area (n=457). **C:** Patch distance (m) from least cost path (LCP) plotted against log transformed patch area (n=457). **D:** Patch distance (m) from nearest neighbor plotted against mean resistance of forest patches (n=457). **E:** Patch distance (m) from least cost path (LCP) plotted against mean resistance of forest patches (n=457). **F:** Patch distance (m) from nearest neighbor plotted against patch distance (m) from least cost path (LCP) (n=457). **Blue Line:** Regression line.

10 Kilometer Buffer Hard Cutoff with 60% Forest Density

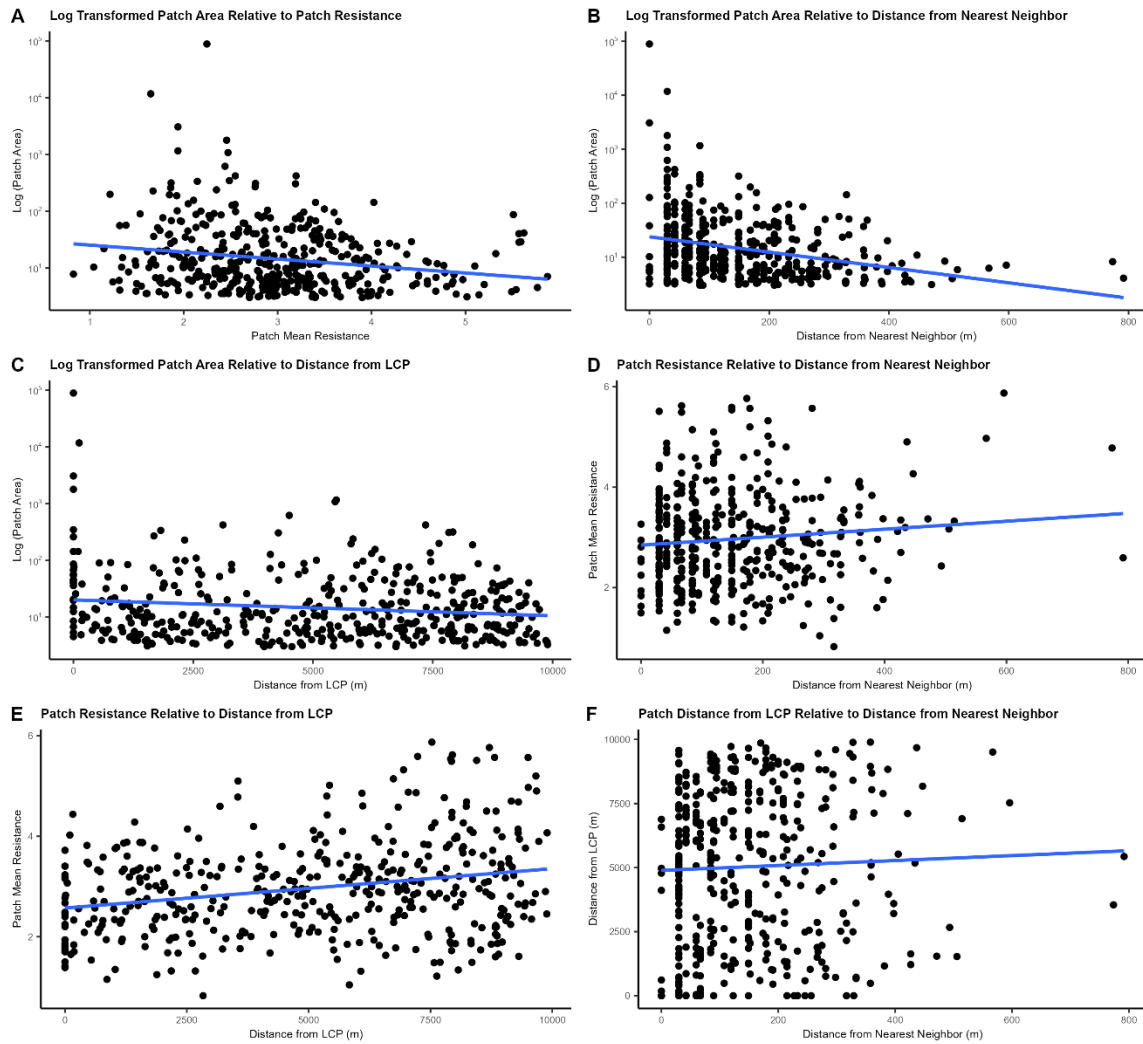


Figure 15: **A:** Mean resistance of forest patches plotted against log transformed forest patch area (n=431). **B:** Patch distance (m) from nearest neighbor plotted against log transformed patch area (n=431). **C:** Patch distance (m) from least cost path (LCP) plotted against log transformed patch area (n=431). **D:** Patch distance (m) from nearest neighbor plotted against mean resistance of forest patches (n=431). **E:** Patch distance (m) from least cost path (LCP) plotted against mean resistance of forest patches (n=431). **F:** Patch distance (m) from nearest neighbor plotted against patch distance (m) from least cost path (LCP) (n=431). **Blue Line:** Regression line.

10 Kilometer Buffer Hard Cutoff with 50% Forest Density

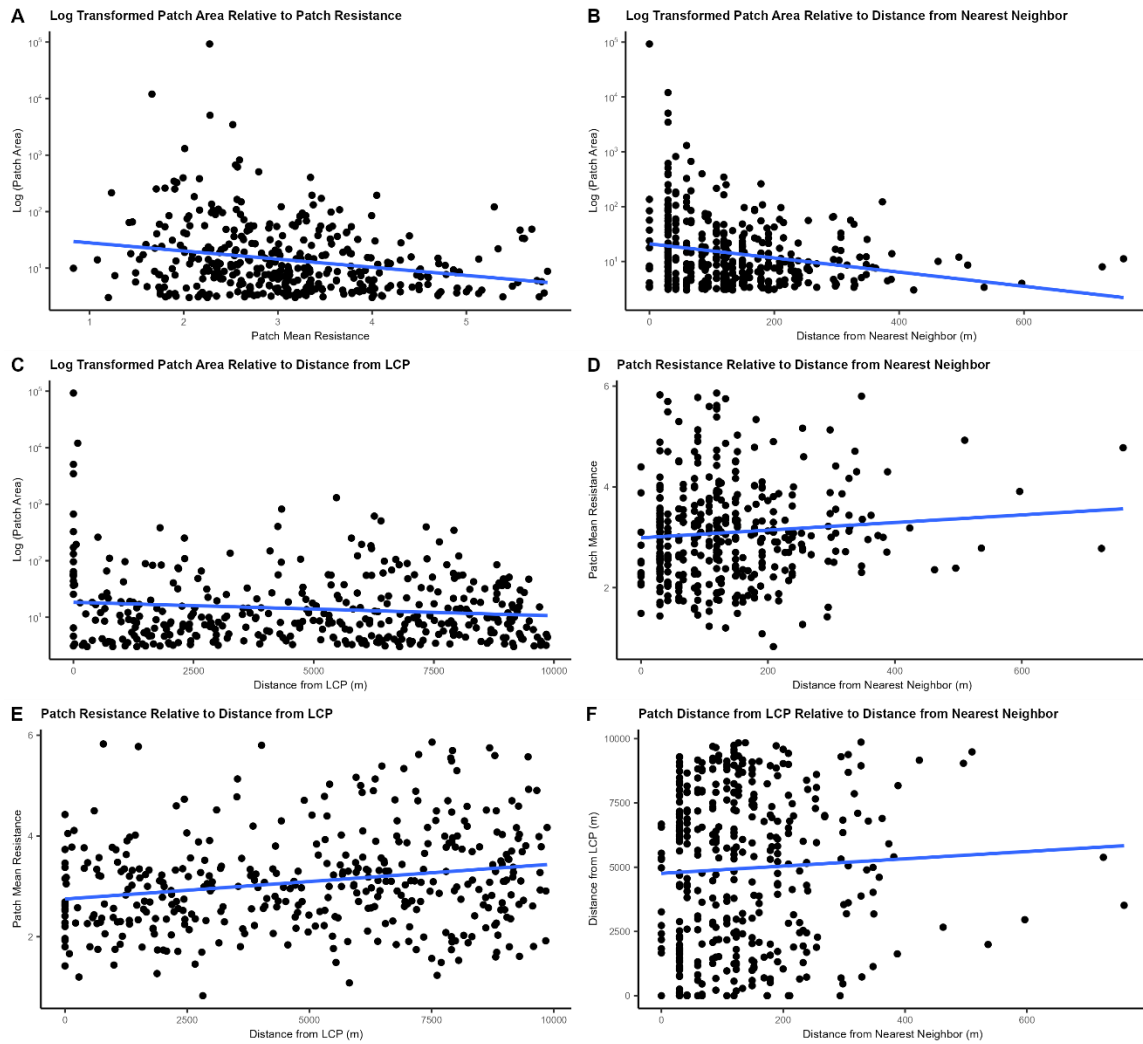


Figure 16: **A:** Mean resistance of forest patches plotted against log transformed forest patch area (n=390). **B:** Patch distance (m) from nearest neighbor plotted against log transformed patch area (n=390). **C:** Patch distance (m) from least cost path (LCP) plotted against log transformed patch area (n=390). **D:** Patch distance (m) from nearest neighbor plotted against mean resistance of forest patches (n=390). **E:** Patch distance (m) from least cost path (LCP) plotted against mean resistance of forest patches (n=390). **F:** Patch distance (m) from nearest neighbor plotted against patch distance (m) from least cost path (LCP) (n=390). **Blue Line:** Regression line.

CHAPTER 5

CONCLUSION

A final product was achieved that identified and characterized a network of forest patches within the buffer regions of the least cost path. The network of forest patches will guide a ground truthing effort to identify targets for jaguar conservation efforts and the characteristic data gathered can guide development of selection criteria and prioritization following the methodology outlined by Billionnet 2010 or something of the like.

Furthermore, a framework for deriving these results by filtering and converting raster files into shapefiles that were in turn filtered was developed. This is by no means a new methodology that will revolutionize least cost path analysis or wildlife corridor development but highlights the need for applying similar methods to more datasets. The observation that many publications reported on the modelling of a hypothetical LCP without describing the forests within to guide the establishment of the corridor pointed to a blind spot in the conservation pipeline as it does not establish next steps for future researchers or stakeholders in the region. The addition of these findings to the prior work guides not only the researchers involved, but those who wish to aid as well. The methods outlined are accessible to ArcMap and RStudio users of all experience levels and produce invaluable data to guide the implementation of a wildlife corridor.

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APPENDIX A
SUPPLEMENTARY FIGURES

Landscape Resistance

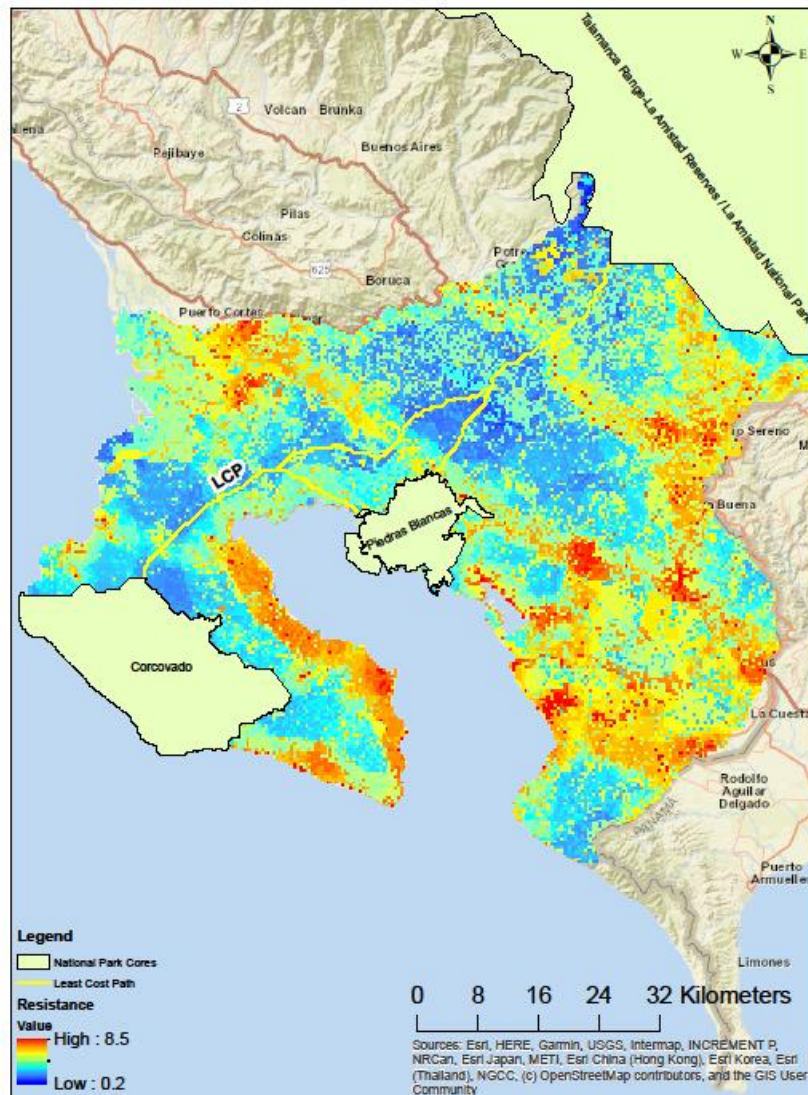


Figure A1: Mapped resistance raster representing cost of crossing pixel (900m²) to jaguar.

Circuit Theory

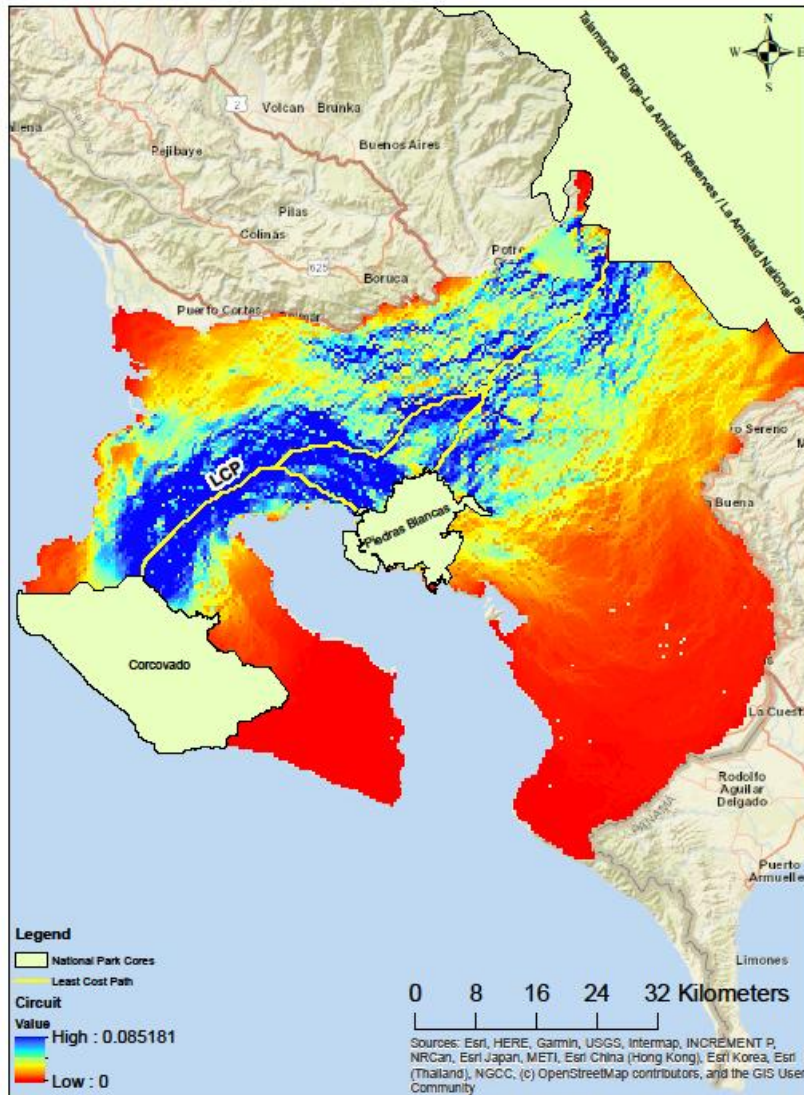


Figure A2: Mapping of circuit theory output depicting bottlenecks.

Vegetation and Land Use

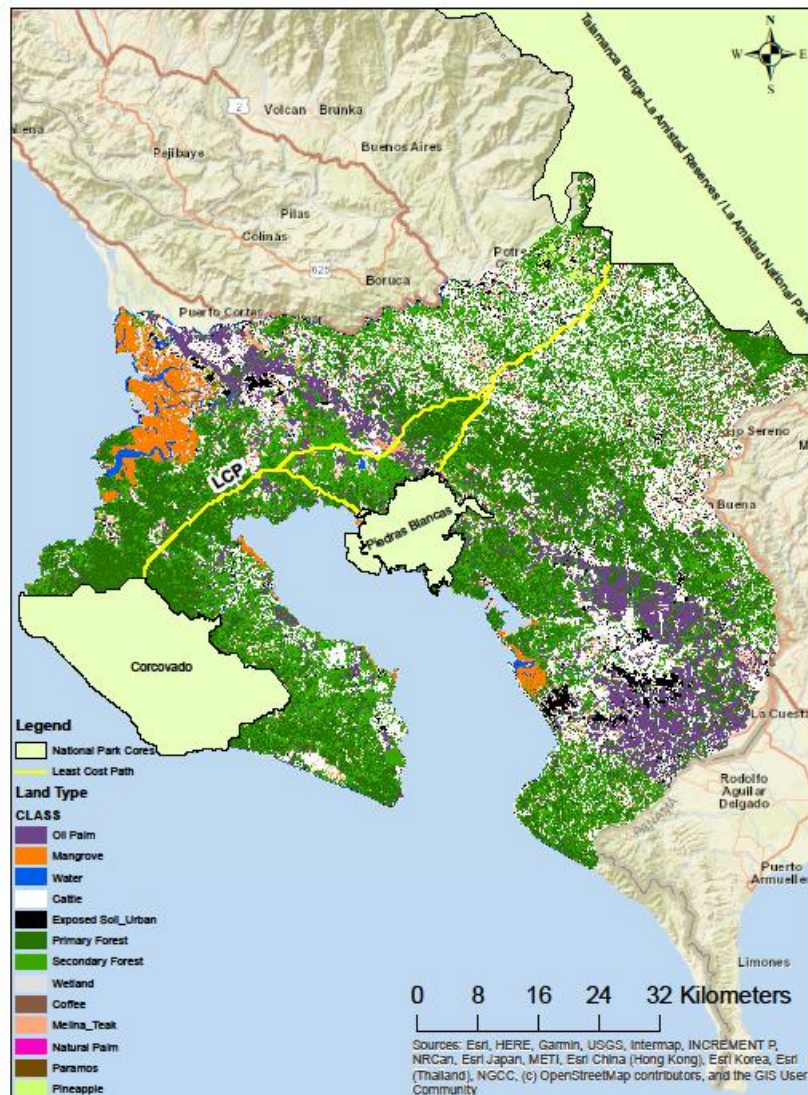


Figure A3: Mapping of vegetation types derived from 1987, 1997, 2019 satellite images gathered by NASA DEVELOP instrumentation.

Forest Density (32,400m²)

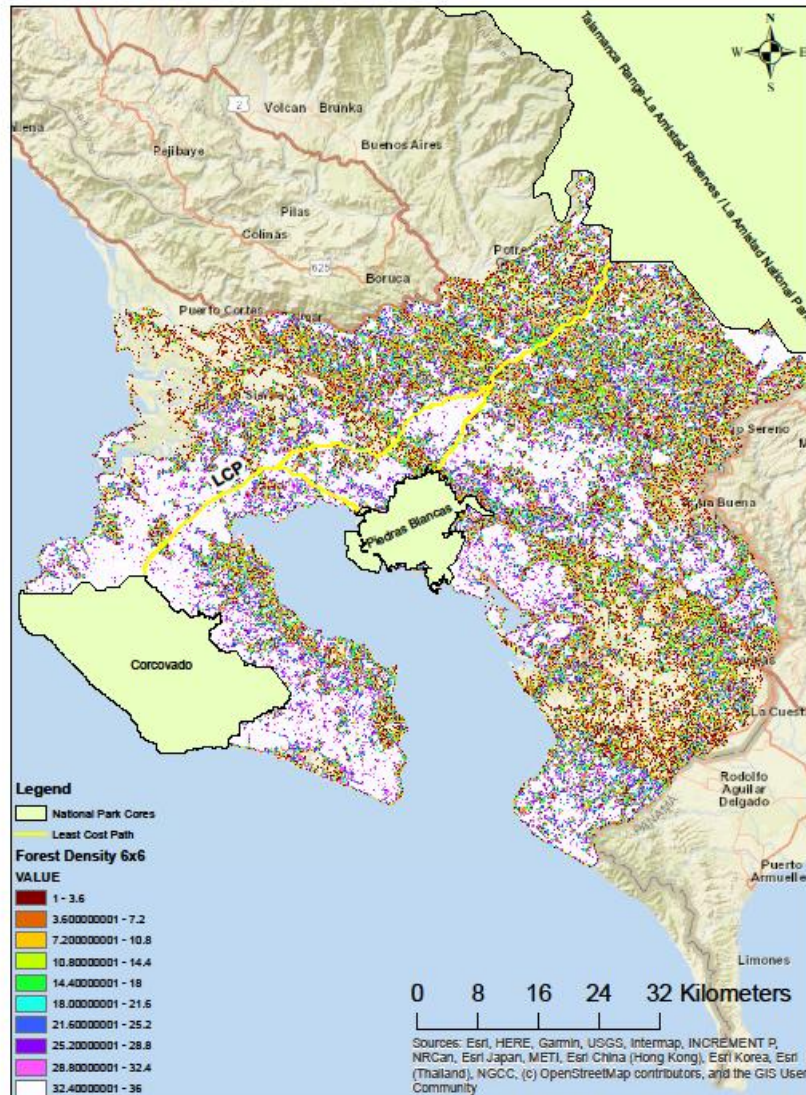


Figure A4: Mapping of forest type after processing by Focal Statistics tool. Pixel assigned sum of forest pixels in 6x6 neighborhood (32,400 m²). Categorized in ten percent increments.

5km Buffer Intersection (3 hectares-90%)

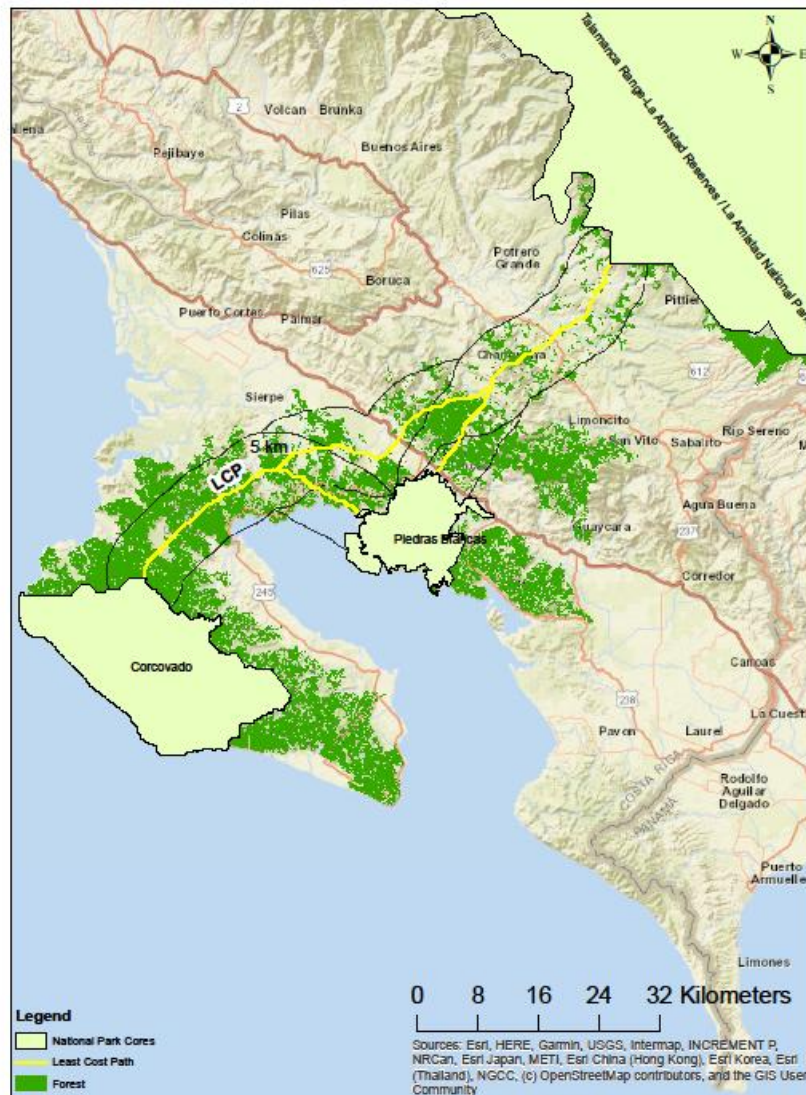


Figure A5: Forest patches greater than 3he and 90-100% forest density intersecting with 5km buffer region.

5km Buffer Intersection (3 hectares-80%)



Figure A6: Forest patches greater than 3he and 80-90% forest density intersecting with 5km buffer region.

5km Buffer Intersection (3 hectares-70%)



Figure A7: Forest patches greater than 3he and 70-80% forest density intersecting with 5km buffer region.

5km Buffer Intersection (3 hectares-60%)



Figure A8: Forest patches greater than 3he and 60-70% forest density intersecting with 5km buffer region.

5km Buffer Intersection (3 hectares-50%)

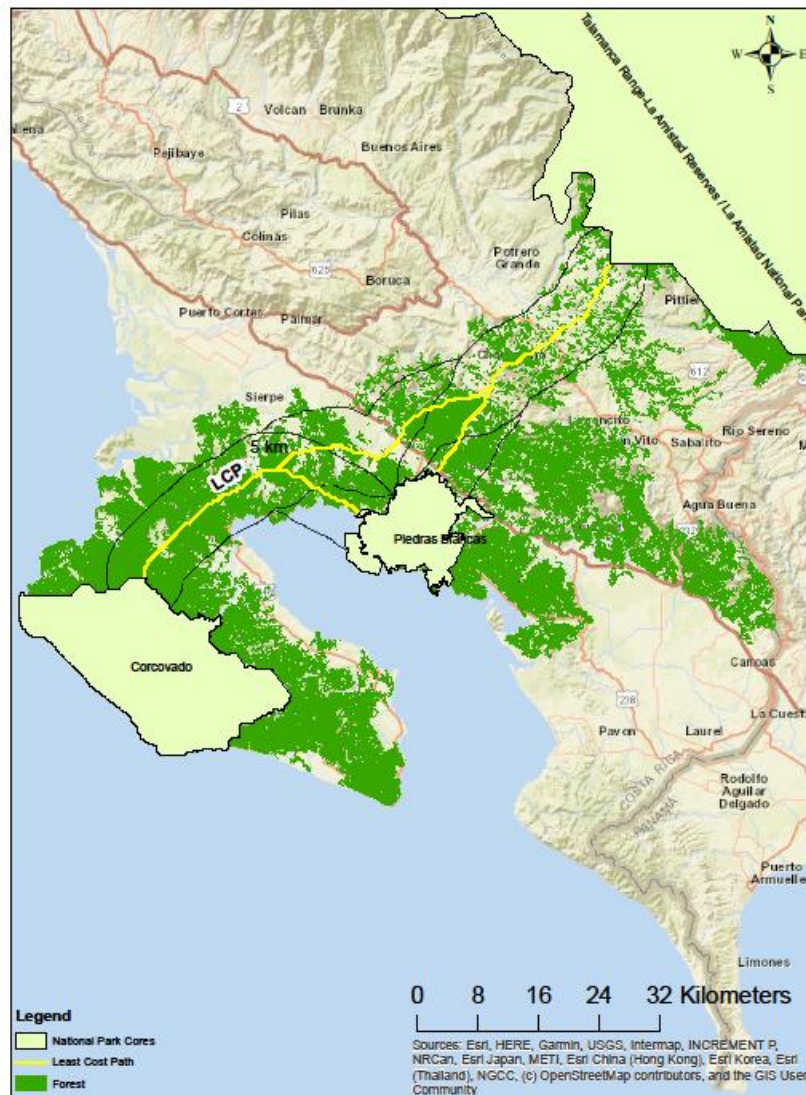


Figure A9: Forest patches greater than 3he and 50-60% forest density intersecting with 5km buffer region.

5km Buffer Hard Cutoff (3 hectares-90%)

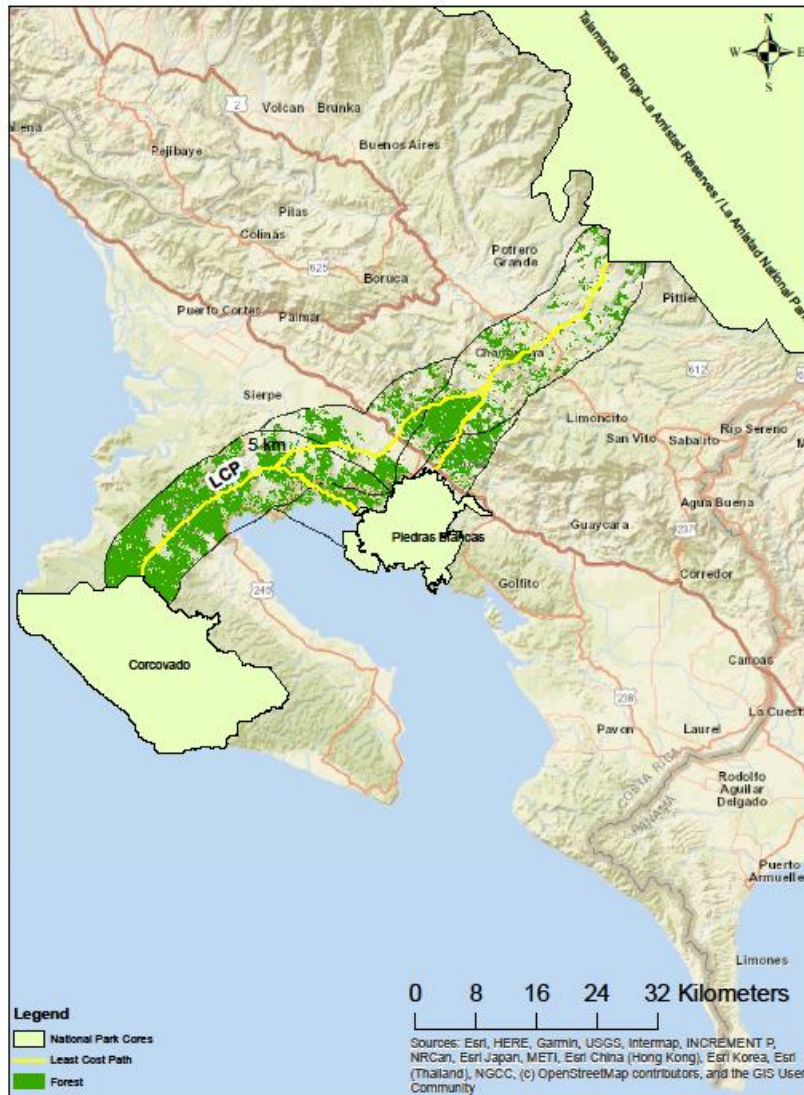


Figure A10: Forest patches greater than 3he and 90-100% forest density within 5km buffer region.

5km Buffer Hard Cutoff (3 hectares-80%)

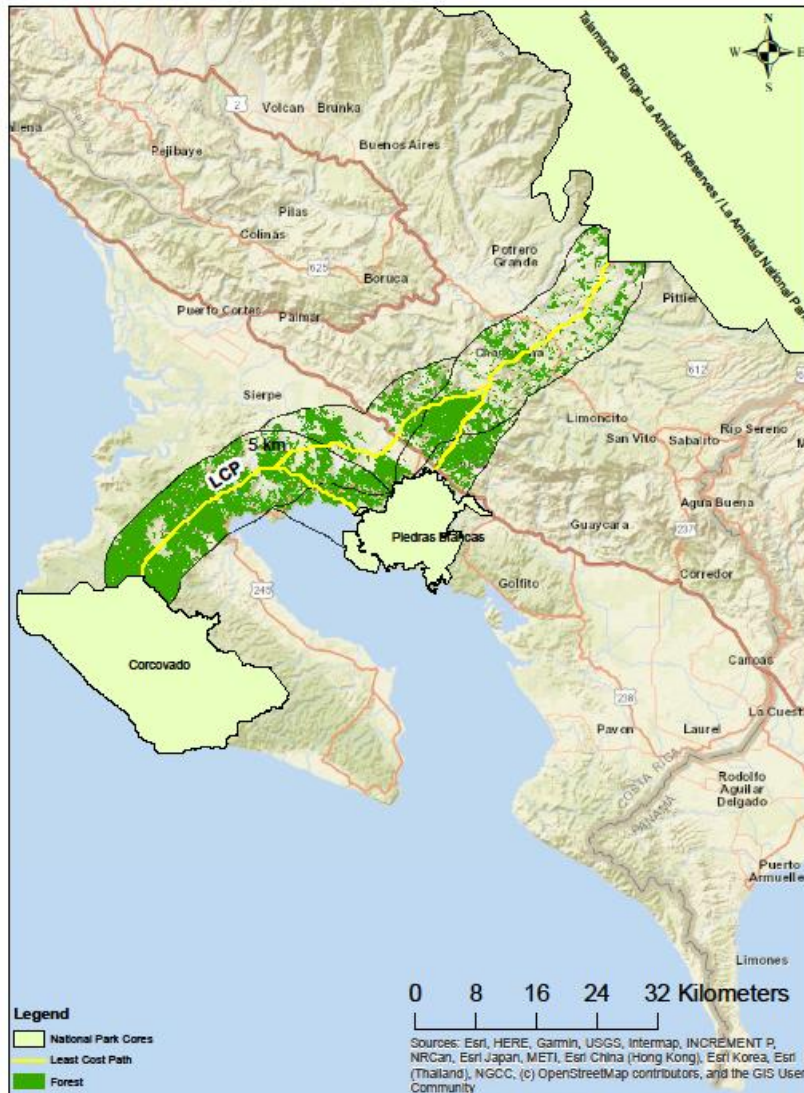


Figure A11: Forest patches greater than 3he and 80-90% forest density within 5km buffer region.

5km Buffer Hard Cutoff (3 hectares-70%)

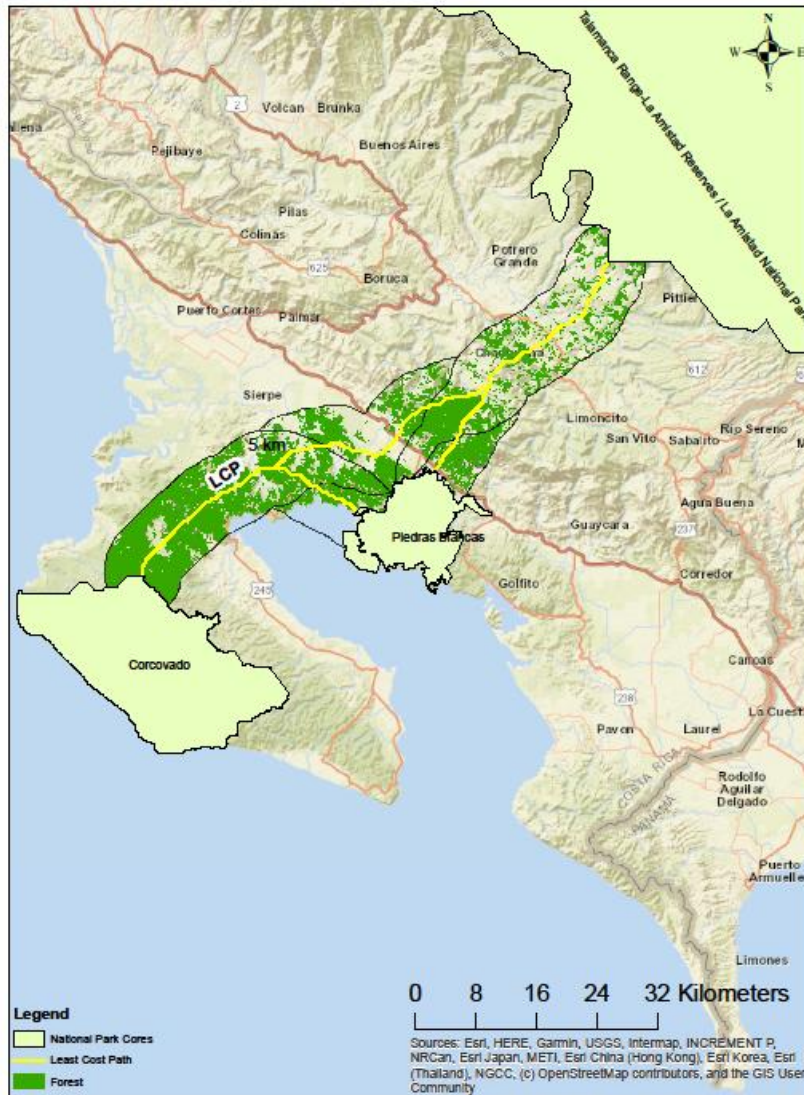


Figure A12: Forest patches greater than 3he and 70-80% forest density within 5km buffer region.

5km Buffer Hard Cutoff (3 hectares-60%)

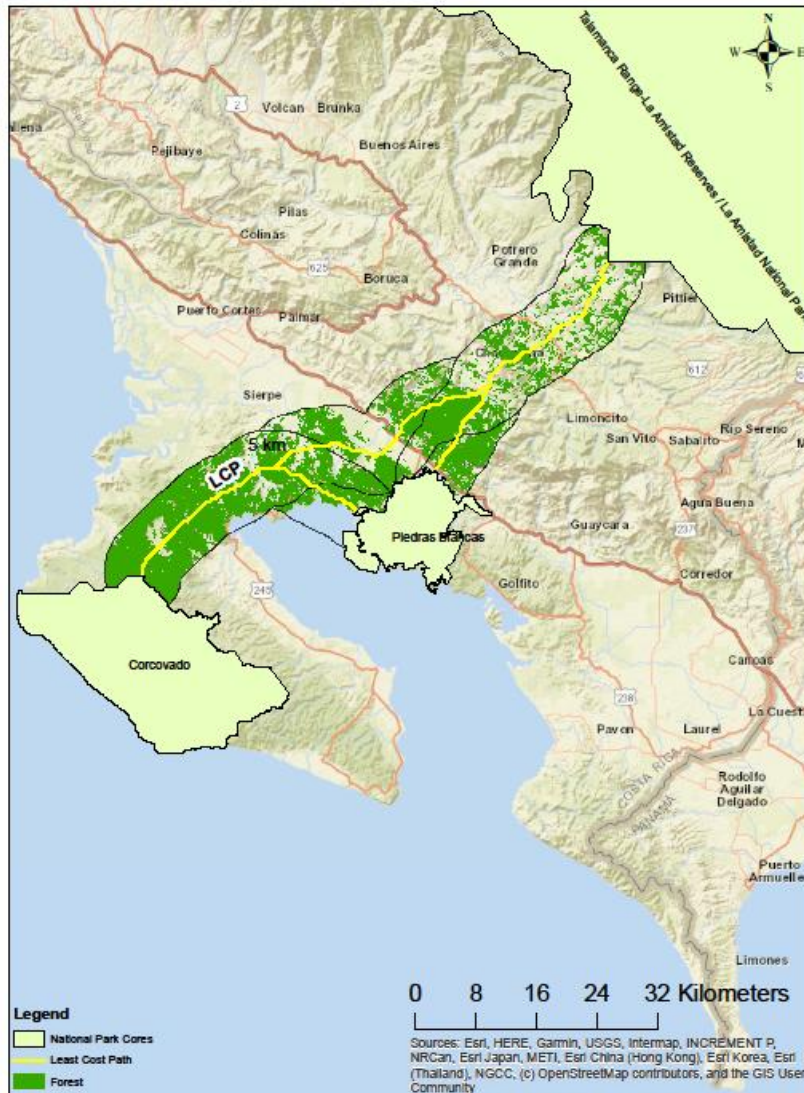


Figure A13: Forest patches greater than 3he and 60-70% forest density within 5km buffer region.

5km Buffer Hard Cutoff (3 hectares-50%)

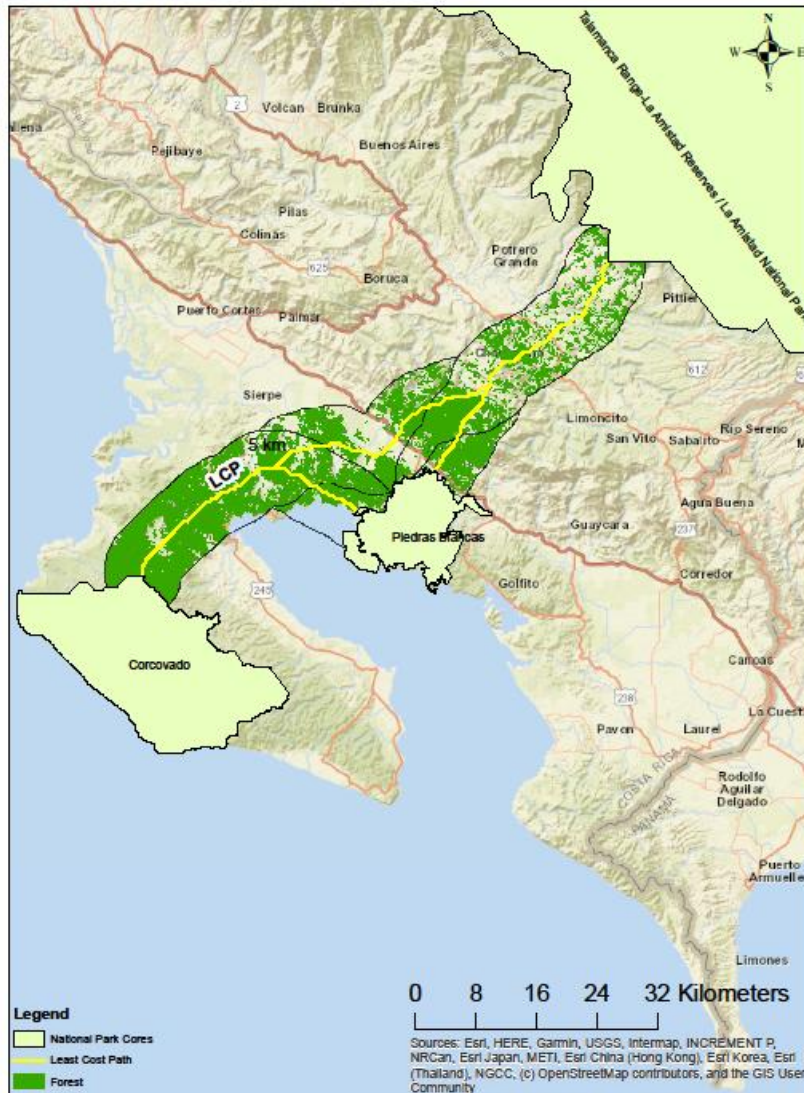


Figure A14: Forest patches greater than 3he and 50-60% forest density within 5km buffer region.

10km Buffer Hard Cutoff (3 hectares-90%)

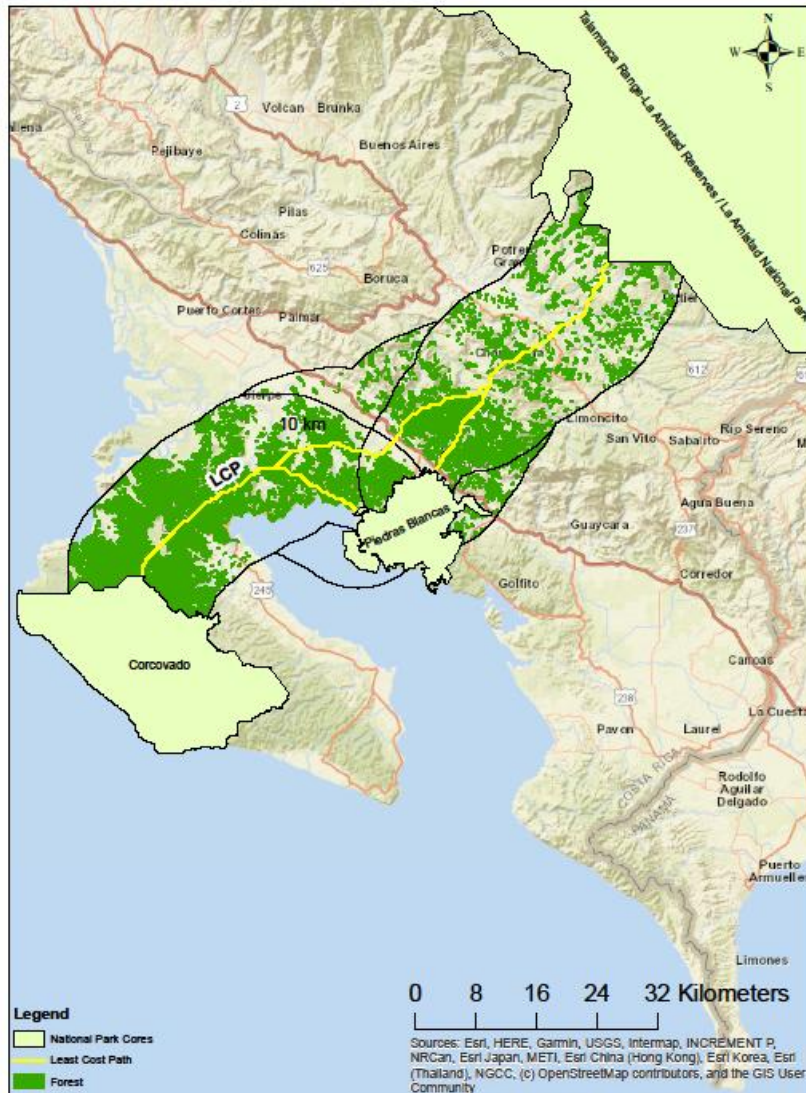


Figure A15: Forest patches greater than 3he and 90-100% forest density within 10km buffer region.

10km Buffer Hard Cutoff (3 hectares-80%)

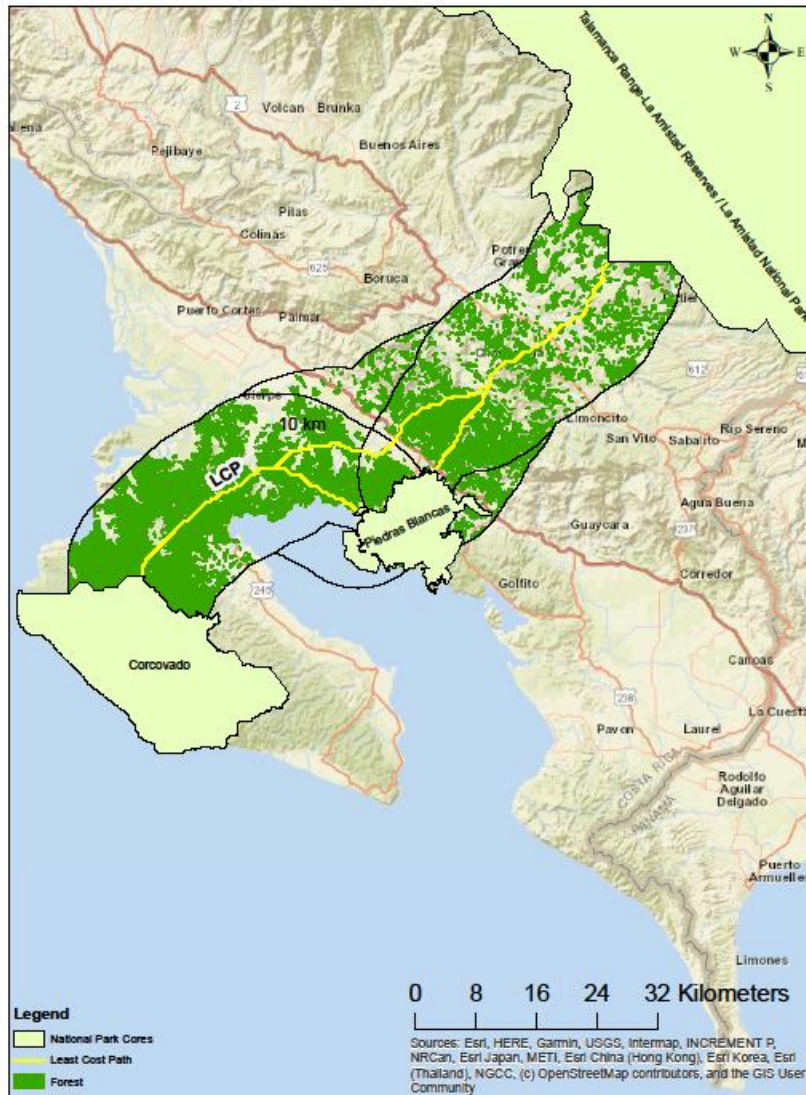


Figure A16: Forest patches greater than 3he and 80-90% forest density within 10km buffer region.

10km Buffer Hard Cutoff (3 hectares-70%)

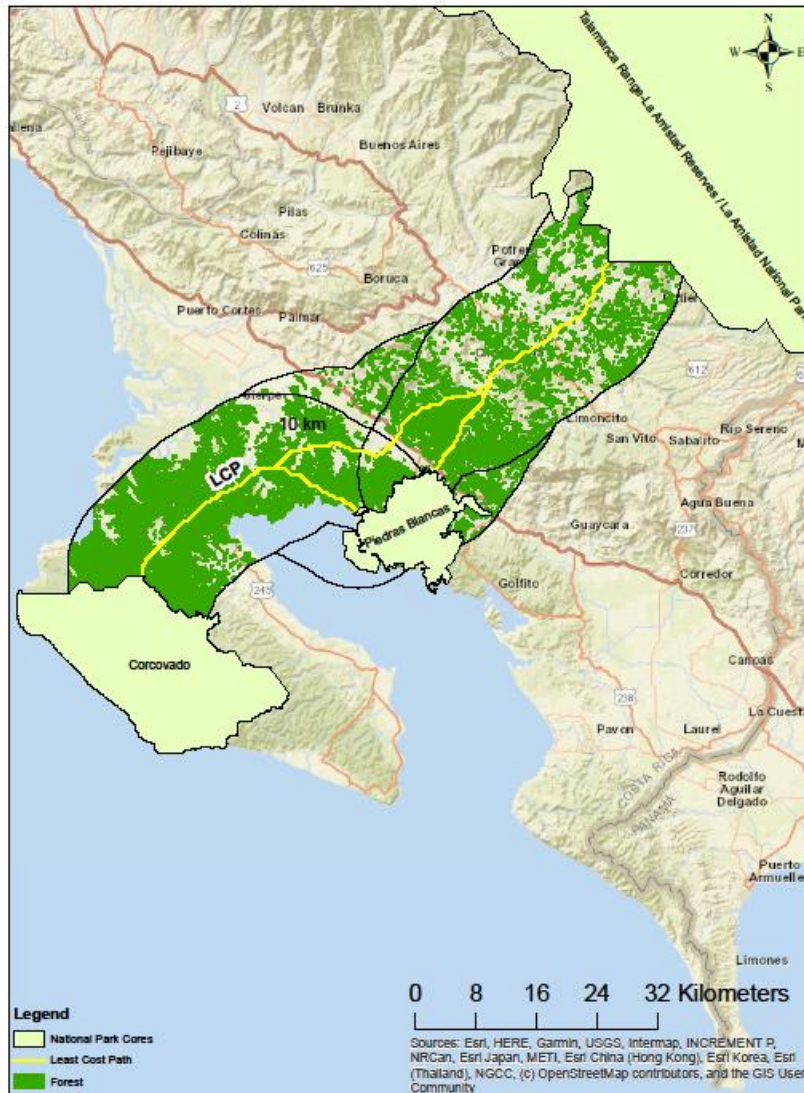


Figure A17: Forest patches greater than 3he and 70-80% forest density within 10km buffer region.

10km Buffer Hard Cutoff (3 hectares-60%)

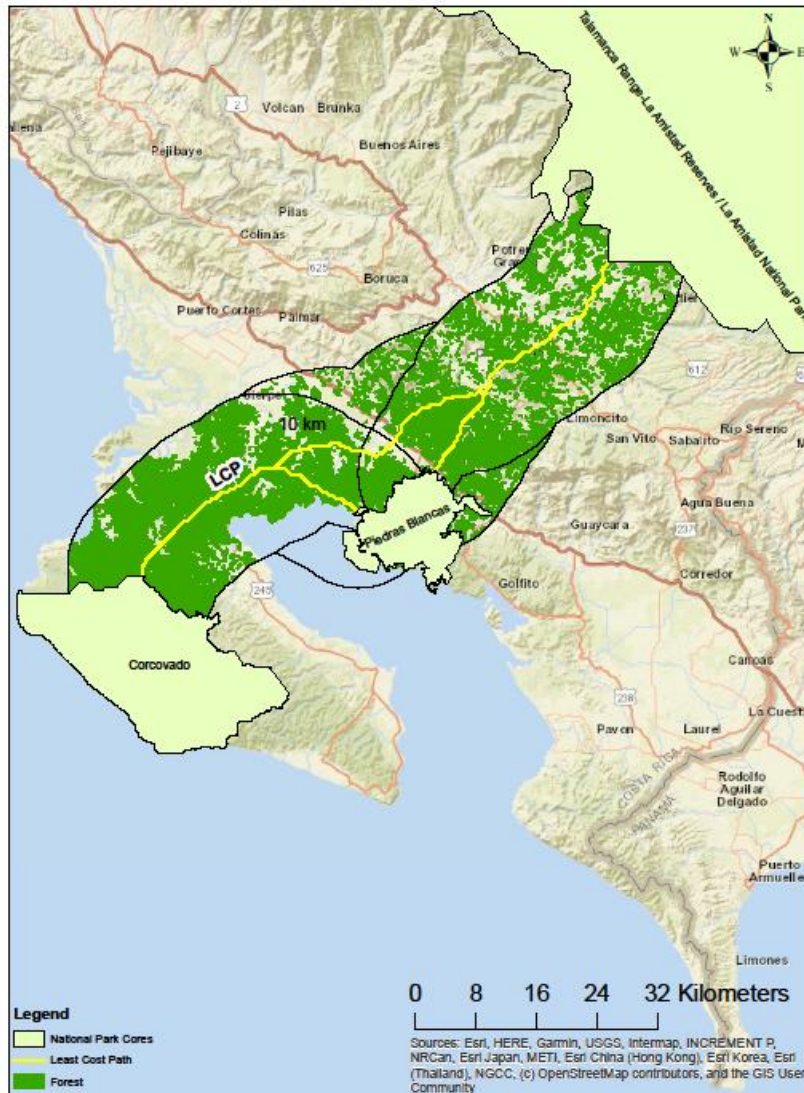


Figure A18: Forest patches greater than 3he and 60-70% forest density within 10km buffer region.

10km Buffer Hard Cutoff (3 hectares-50%)

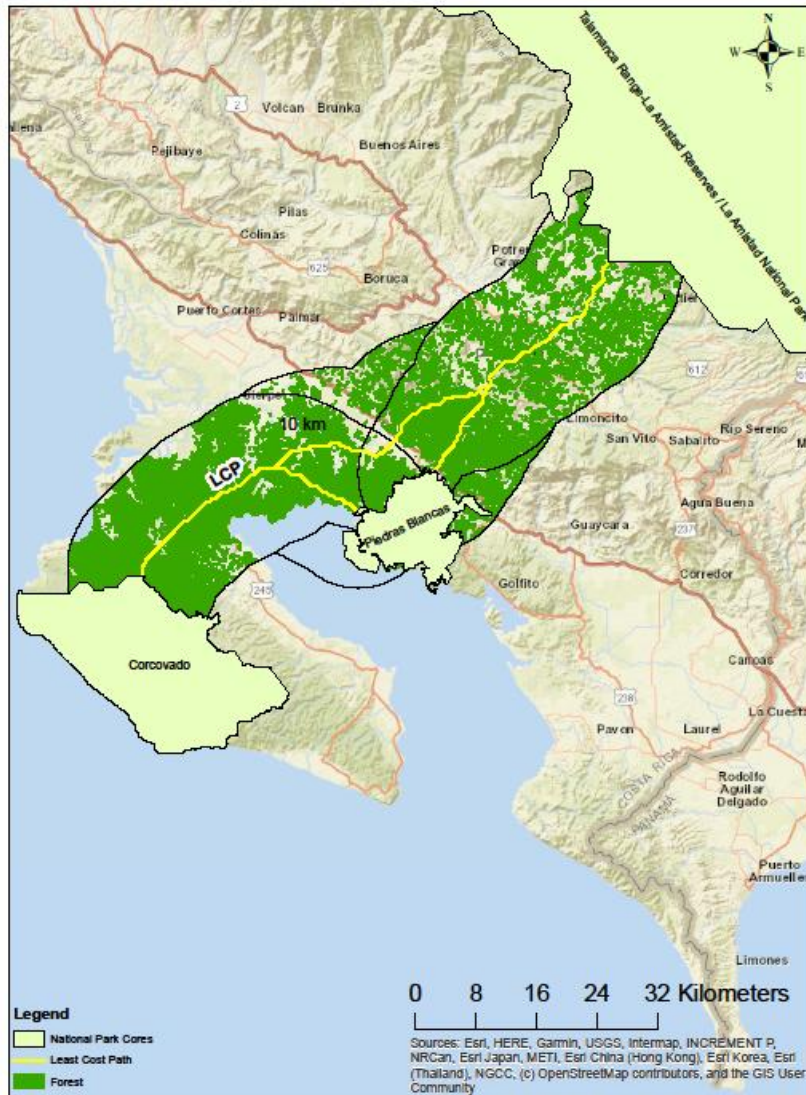


Figure A19: Forest patches greater than 3he and 50-60% forest density within 10km buffer region.

Vegetation of Concern

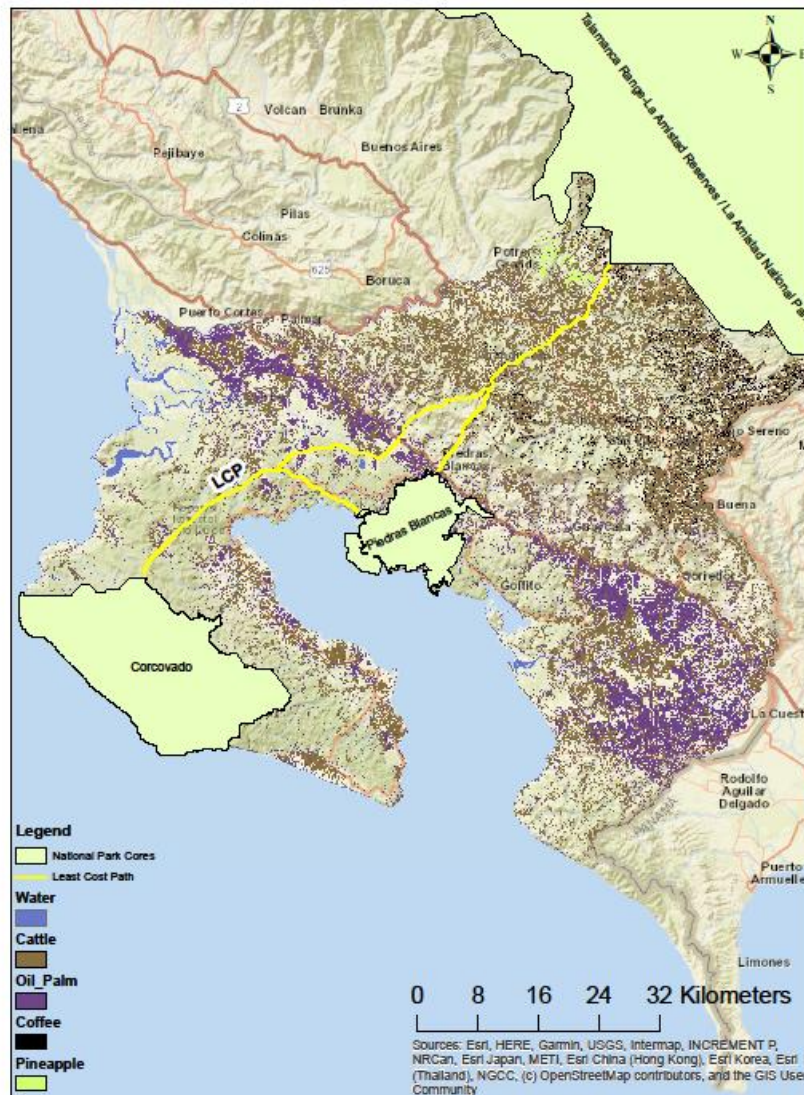


Table A20: Mapping of vegetation types of particular interest (cattle, oil-palm, coffee, pineapple).

APPENDIX B
R MARKDOWN

CulmProj

Patrick Serna

2023-09-30

Packages

```
library(tidyverse) #Load packages
library(readr)
library(cowplot)
library(tidyverse)
library(readr)
library(forcats)
library(dplyr)
library(skimr)
library(moderndiver)
library(scales)
```

Data

```
PatDist5kmInter90 <- read_csv("Pat_Dist_6x6_90_5km_inter.csv")
#Read in the dataset from folder
PatDist5kmHard90 <- read_csv("Pat_Dist_6x6_90_5km_hard.csv")
PatDist10kmHard90 <- read_csv("Pat_Dist_6x6_90_10km_hard.csv")
PatDist5kmInter80 <- read_csv("Pat_Dist_6x6_80_5km_inter.csv")
PatDist5kmHard80 <- read_csv("Pat_Dist_6x6_80_5km_hard.csv")
PatDist10kmHard80 <- read_csv("Pat_Dist_6x6_80_10km_hard.csv")
PatDist5kmInter70 <- read_csv("Pat_Dist_6x6_70_5km_inter.csv")
PatDist5kmHard70 <- read_csv("Pat_Dist_6x6_70_5km_hard.csv")
PatDist10kmHard70 <- read_csv("Pat_Dist_6x6_70_10km_hard.csv")
PatDist5kmInter60 <- read_csv("Pat_Dist_6x6_60_5km_inter.csv")
PatDist5kmHard60 <- read_csv("Pat_Dist_6x6_60_5km_hard.csv")
PatDist10kmHard60 <- read_csv("Pat_Dist_6x6_60_10km_hard.csv")
PatDist5kmInter50 <- read_csv("Pat_Dist_6x6_50_5km_inter.csv")
PatDist5kmHard50 <- read_csv("Pat_Dist_6x6_50_5km_hard.csv")
PatDist10kmHard50 <- read_csv("Pat_Dist_6x6_50_10km_hard.csv")

Near5kmInter90 <- read_csv("Near_5kminter90.csv")
Near5kmHard90 <- read_csv("Near_5kmhard90.csv")
Near10kmHard90 <- read_csv("Near_10kmhard90.csv")
Near5kmInter80 <- read_csv("Near_5kminter80.csv")
Near5kmHard80 <- read_csv("Near_5kmhard80.csv")
Near10kmHard80 <- read_csv("Near_10kmhard80.csv")
Near5kmInter70 <- read_csv("Near_5kminter70.csv")
Near5kmHard70 <- read_csv("Near_5kmhard70.csv")
Near10kmHard70 <- read_csv("Near_10kmhard70.csv")
Near5kmInter60 <- read_csv("Near_5kminter60.csv")
Near5kmHard60 <- read_csv("Near_5kmhard60.csv")
Near10kmHard60 <- read_csv("Near_10kmhard60.csv")
```

```
Near5kmInter50 <- read_csv("Near_5kminter50.csv")
Near5kmHard50 <- read_csv("Near_5kmhard50.csv")
Near10kmHard50 <- read_csv("Near_10kmhard50.csv")
```

Functions

```
getmode <- function(v) {
  uniqv <- unique(v)
  uniqv[which.max(tabulate(match(v, uniqv)))]
} # Create function to calculate mode
```

Mean Area Distribution

5km Interesection

```
AreaInter5km90 <- (PatDist5kmInter90 %>% summarize(buffer = "Inter5km",
  density = "90%", min = min(Area),
  q1 = quantile(Area, 0.25),
  median = median(Area),
  mean = mean(Area),
  mode = getmode(Area),
  q3 = quantile(Area, 0.75),
  max = max(Area),
  std = sd(Area),
  n = n()))
# Create new table with summary data
AreaInter5km80 <- (PatDist5kmInter80 %>% summarize(buffer = "Inter5km",
  density = "80%", min = min(Area),
  q1 = quantile(Area, 0.25),
  median = median(Area),
  mean = mean(Area),
  mode = getmode(Area),
  q3 = quantile(Area, 0.75),
  max = max(Area),
  std = sd(Area),
  n = n()))
AreaInter5km70 <- (PatDist5kmInter70 %>% summarize(buffer = "Inter5km",
  density = "70%", min = min(Area),
  q1 = quantile(Area, 0.25),
  median = median(Area),
  mean = mean(Area),
  mode = getmode(Area),
  q3 = quantile(Area, 0.75),
  max = max(Area),
  std = sd(Area),
  n = n()))
AreaInter5km60 <- (PatDist5kmInter60 %>% summarize(buffer = "Inter5km",
  density = "60%", min = min(Area),
  q1 = quantile(Area, 0.25),
  median = median(Area),
```

```

    mean = mean(Area),
    mode = getmode(Area),
    q3 = quantile(Area, 0.75),
    max = max(Area),
    std = sd(Area),
    n = n()))
AreaInter5km50 <- (PatDist5kmInter50 %>% summarize(buffer = "Inter5km",
  density = "50%", min = min(Area),
  q1 = quantile(Area, 0.25),
  median = median(Area),
  mean = mean(Area),
  mode = getmode(Area),
  q3 = quantile(Area, 0.75),
  max = max(Area),
  std = sd(Area),
  n = n()))

AreaInter5kmTable <- bind_rows(AreaInter5km90, AreaInter5km80, AreaInter5km70,
                                AreaInter5km60, AreaInter5km50)
# Combine all summary tables

```

5km Hard

```

AreaHard5km90 <- (PatDist5kmHard90 %>% summarize(buffer = "Hard5km",
  density = "90%", min = min(Area),
  q1 = quantile(Area, 0.25),
  median = median(Area),
  mean = mean(Area),
  mode = getmode(Area),
  q3 = quantile(Area, 0.75),
  max = max(Area),
  std = sd(Area),
  n = n()))
AreaHard5km80 <- (PatDist5kmHard80 %>% summarize(buffer = "Hard5km",
  density = "80%", min = min(Area),
  q1 = quantile(Area, 0.25),
  median = median(Area),
  mean = mean(Area),
  mode = getmode(Area),
  q3 = quantile(Area, 0.75),
  max = max(Area),
  std = sd(Area),
  n = n()))
AreaHard5km70 <- (PatDist5kmHard70 %>% summarize(buffer = "Hard5km",
  density = "70%", min = min(Area),
  q1 = quantile(Area, 0.25),
  median = median(Area),
  mean = mean(Area),
  mode = getmode(Area),

```



```

      q3 = quantile(Area, 0.75),
      max = max(Area),
      std = sd(Area),
      n = n()))
AreaHard5km60 <- (PatDist5kmHard60 %>% summarize(buffer = "Hard5km",
      density = "60%", min = min(Area),
      q1 = quantile(Area, 0.25),
      median = median(Area),
      mean = mean(Area),
      mode = getmode(Area),
      q3 = quantile(Area, 0.75),
      max = max(Area),
      std = sd(Area),
      n = n()))
AreaHard5km50 <- (PatDist5kmHard50 %>% summarize(buffer = "Hard5km",
      density = "50%", min = min(Area),
      q1 = quantile(Area, 0.25),
      median = median(Area),
      mean = mean(Area),
      mode = getmode(Area),
      q3 = quantile(Area, 0.75),
      max = max(Area),
      std = sd(Area),
      n = n()))

AreaHard5kmTable <- bind_rows(AreaHard5km90, AreaHard5km80, AreaHard5km
70,
                              AreaHard5km60, AreaHard5km50)

```

10km Hard

```

AreaHard10km90 <- (PatDist10kmHard90 %>% summarize(buffer = "Hard10km",
      density = "90%", min = min(Area),
      q1 = quantile(Area, 0.25),
      median = median(Area),
      mean = mean(Area),
      mode = getmode(Area),
      q3 = quantile(Area, 0.75),
      max = max(Area),
      std = sd(Area),
      n = n()))
AreaHard10km80 <- (PatDist10kmHard80 %>% summarize(buffer = "Hard10km",
      density = "80%", min = min(Area),
      q1 = quantile(Area, 0.25),
      median = median(Area),
      mean = mean(Area),
      mode = getmode(Area),
      q3 = quantile(Area, 0.75),
      max = max(Area),
      std = sd(Area),

```

```

      n = n()))
AreaHard10km70 <- (PatDist10kmHard70 %>% summarize(buffer = "Hard10km",
  density = "70%", min = min(Area),
  q1 = quantile(Area, 0.25),
  median = median(Area),
  mean = mean(Area),
  mode = getmode(Area),
  q3 = quantile(Area, 0.75),
  max = max(Area),
  std = sd(Area),
  n = n()))
AreaHard10km60 <- (PatDist10kmHard60 %>% summarize(buffer = "Hard10km",
  density = "60%", min = min(Area),
  q1 = quantile(Area, 0.25),
  median = median(Area),
  mean = mean(Area),
  mode = getmode(Area),
  q3 = quantile(Area, 0.75),
  max = max(Area),
  std = sd(Area),
  n = n()))
AreaHard10km50 <- (PatDist10kmHard50 %>% summarize(buffer = "Hard10km",
  density = "50%", min = min(Area),
  q1 = quantile(Area, 0.25),
  median = median(Area),
  mean = mean(Area),
  mode = getmode(Area),
  q3 = quantile(Area, 0.75),
  max = max(Area),
  std = sd(Area),
  n = n()))

AreaHard10kmTable <- bind_rows(AreaHard10km90, AreaHard10km80, AreaHard
10km70,
                              AreaHard10km60, AreaHard10km50)

AreaTable <- bind_rows(AreaInter5kmTable, AreaHard5kmTable, AreaHard10k
mTable)
# Combine summary data for all buffer types

FacAreaTable <- AreaTable %>%
  mutate(Buffer = factor(buffer), Density = factor(density),
         #Rename factors, convert to factors, and rename levels
         Min = factor(min),
         Q1 = factor(q1),
         Median = median,
         Mean = mean,
         Q3 = factor(q3),
         Max = factor(max),

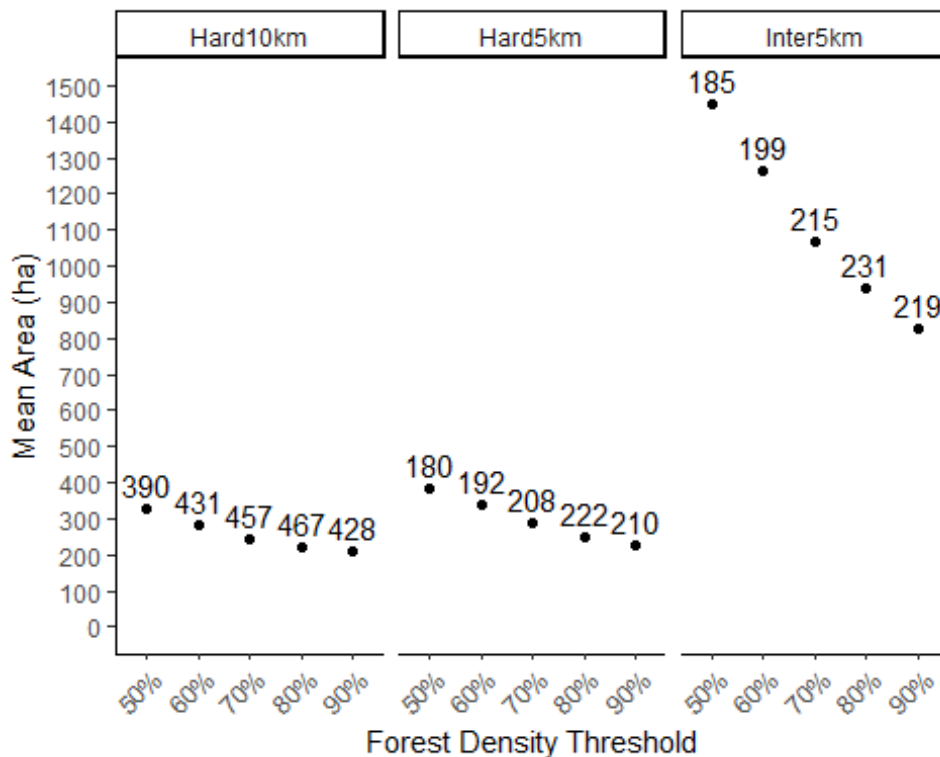
```

```

    STD = factor(std),
    n = factor(n)
  ) %>%
  select(Buffer, Density, Min, Q1, Median, Mean, Q3, Max, STD, n)
# Redefine variables and convert to factors when needed

ggplot(FacAreaTable, aes(x = Density, y = Mean)) +
  geom_point(aes(label = n)) +
  theme_classic() +
  xlab("Forest Density Threshold") +
  ylab("Mean Area (ha)") +
  coord_cartesian(ylim = c(0, 1500)) +
  scale_y_continuous(breaks = seq(0, 1500, by = 100)) +
  theme(axis.text.x = element_text(angle = 45, vjust = 1, hjust=1)) +
  geom_text(aes(label = n), vjust = -0.5) +
  facet_wrap(vars(Buffer))

```



```

# Plot means by buffer type and threshold

```

Mean Resistance Distribution

5km Intersection

```

ResInter5km90 <- (PatDist5kmInter90 %>% summarize(buffer = "Inter5km",
  density = "90%", min = min(MEAN, na.rm = TRUE),
  q1 = quantile(MEAN, 0.25, na.rm = TRUE),
  median = median(MEAN, na.rm = TRUE),

```

```

    mean = mean(MEAN, na.rm = TRUE),
    mode = getmode(MEAN),
    q3 = quantile(MEAN, 0.75, na.rm = TRUE),
    max = max(MEAN, na.rm = TRUE),
    std = sd(MEAN, na.rm = TRUE),
    n = n())
ResInter5km80 <- (PatDist5kmInter80 %>% summarize(buffer = "Inter5km",
density = "80%", min = min(MEAN, na.rm = TRUE),
q1 = quantile(MEAN, 0.25, na.rm = TRUE),
median = median(MEAN, na.rm = TRUE),
mean = mean(MEAN, na.rm = TRUE),
mode = getmode(MEAN),
q3 = quantile(MEAN, 0.75, na.rm = TRUE),
max = max(MEAN, na.rm = TRUE),
std = sd(MEAN, na.rm = TRUE),
n = n()))
ResInter5km70 <- (PatDist5kmInter70 %>% summarize(buffer = "Inter5km",
density = "70%", min = min(MEAN, na.rm = TRUE),
q1 = quantile(MEAN, 0.25, na.rm = TRUE),
median = median(MEAN, na.rm = TRUE),
mean = mean(MEAN, na.rm = TRUE),
mode = getmode(MEAN),
q3 = quantile(MEAN, 0.75, na.rm = TRUE),
max = max(MEAN, na.rm = TRUE),
std = sd(MEAN, na.rm = TRUE),
n = n()))
ResInter5km60 <- (PatDist5kmInter60 %>% summarize(buffer = "Inter5km",
density = "60%", min = min(MEAN, na.rm = TRUE),
q1 = quantile(MEAN, 0.25, na.rm = TRUE),
median = median(MEAN, na.rm = TRUE),
mean = mean(MEAN, na.rm = TRUE),
mode = getmode(MEAN),
q3 = quantile(MEAN, 0.75, na.rm = TRUE),
max = max(MEAN, na.rm = TRUE),
std = sd(MEAN, na.rm = TRUE),
n = n()))
ResInter5km50 <- (PatDist5kmInter50 %>% summarize(buffer = "Inter5km",
density = "50%", min = min(MEAN, na.rm = TRUE),
q1 = quantile(MEAN, 0.25, na.rm = TRUE),
median = median(MEAN, na.rm = TRUE),
mean = mean(MEAN, na.rm = TRUE),
mode = getmode(MEAN),
q3 = quantile(MEAN, 0.75, na.rm = TRUE),
max = max(MEAN, na.rm = TRUE),
std = sd(MEAN, na.rm = TRUE),
n = n()))

```

```
ResInter5kmTable <- bind_rows(ResInter5km90, ResInter5km80, ResInter5km70,
                              ResInter5km60, ResInter5km50)
```

5km Hard

```
ResHard5km90 <- (PatDist5kmHard90 %>% summarize(buffer = "Hard5km",
        density = "90%", min = min(MEAN, na.rm = TRUE),
        q1 = quantile(MEAN, 0.25, na.rm = TRUE),
        median = median(MEAN, na.rm = TRUE),
        mean = mean(MEAN, na.rm = TRUE),
        mode = getmode(MEAN),
        q3 = quantile(MEAN, 0.75, na.rm = TRUE),
        max = max(MEAN, na.rm = TRUE),
        std = sd(MEAN, na.rm = TRUE),
        n = n()))
ResHard5km80 <- (PatDist5kmHard80 %>% summarize(buffer = "Hard5km",
        density = "80%", min = min(MEAN, na.rm = TRUE),
        q1 = quantile(MEAN, 0.25, na.rm = TRUE),
        median = median(MEAN, na.rm = TRUE),
        mean = mean(MEAN, na.rm = TRUE),
        mode = getmode(MEAN),
        q3 = quantile(MEAN, 0.75, na.rm = TRUE),
        max = max(MEAN, na.rm = TRUE),
        std = sd(MEAN, na.rm = TRUE),
        n = n()))
ResHard5km70 <- (PatDist5kmHard70 %>% summarize(buffer = "Hard5km",
        density = "70%", min = min(MEAN, na.rm = TRUE),
        q1 = quantile(MEAN, 0.25, na.rm = TRUE),
        median = median(MEAN, na.rm = TRUE),
        mean = mean(MEAN, na.rm = TRUE),
        mode = getmode(MEAN),
        q3 = quantile(MEAN, 0.75, na.rm = TRUE),
        max = max(MEAN, na.rm = TRUE),
        std = sd(MEAN, na.rm = TRUE),
        n = n()))
ResHard5km60 <- (PatDist5kmHard60 %>% summarize(buffer = "Hard5km",
        density = "60%", min = min(MEAN, na.rm = TRUE),
        q1 = quantile(MEAN, 0.25, na.rm = TRUE),
        median = median(MEAN, na.rm = TRUE),
        mean = mean(MEAN, na.rm = TRUE),
        mode = getmode(MEAN),
        q3 = quantile(MEAN, 0.75, na.rm = TRUE),
        max = max(MEAN, na.rm = TRUE),
        std = sd(MEAN, na.rm = TRUE),
        n = n()))
ResHard5km50 <- (PatDist5kmHard50 %>% summarize(buffer = "Hard5km",
        density = "50%", min = min(MEAN, na.rm = TRUE),
        q1 = quantile(MEAN, 0.25, na.rm = TRUE),
        median = median(MEAN, na.rm = TRUE),
```

```

mean = mean(MEAN, na.rm = TRUE),
mode = getmode(MEAN),
q3 = quantile(MEAN, 0.75, na.rm = TRUE),
max = max(MEAN, na.rm = TRUE),
std = sd(MEAN, na.rm = TRUE),
n = n())

```

```

ResHard5kmTable <- bind_rows(ResHard5km90, ResHard5km80, ResHard5km70,
                             ResHard5km60, ResHard5km50)

```

10km Hard

```

ResHard10km90 <- (PatDist10kmHard90 %>% summarize(buffer = "Hard10km",
          density = "90%", min = min(MEAN, na.rm = TRUE),
          q1 = quantile(MEAN, 0.25, na.rm = TRUE),
          median = median(MEAN, na.rm = TRUE),
          mean = mean(MEAN, na.rm = TRUE),
          mode = getmode(MEAN),
          q3 = quantile(MEAN, 0.75, na.rm = TRUE),
          max = max(MEAN, na.rm = TRUE),
          std = sd(MEAN, na.rm = TRUE),
          n = n()))

```

```

ResHard10km80 <- (PatDist10kmHard80 %>% summarize(buffer = "Hard10km",
          density = "80%", min = min(MEAN, na.rm = TRUE),
          q1 = quantile(MEAN, 0.25, na.rm = TRUE),
          median = median(MEAN, na.rm = TRUE),
          mean = mean(MEAN, na.rm = TRUE),
          mode = getmode(MEAN),
          q3 = quantile(MEAN, 0.75, na.rm = TRUE),
          max = max(MEAN, na.rm = TRUE),
          std = sd(MEAN, na.rm = TRUE),
          n = n()))

```

```

ResHard10km70 <- (PatDist10kmHard70 %>% summarize(buffer = "Hard10km",
          density = "70%", min = min(MEAN, na.rm = TRUE),
          q1 = quantile(MEAN, 0.25, na.rm = TRUE),
          median = median(MEAN, na.rm = TRUE),
          mean = mean(MEAN, na.rm = TRUE),
          mode = getmode(MEAN),
          q3 = quantile(MEAN, 0.75, na.rm = TRUE),
          max = max(MEAN, na.rm = TRUE),
          std = sd(MEAN, na.rm = TRUE),
          n = n()))

```

```

ResHard10km60 <- (PatDist10kmHard60 %>% summarize(buffer = "Hard10km",
          density = "60%", min = min(MEAN, na.rm = TRUE),
          q1 = quantile(MEAN, 0.25, na.rm = TRUE),
          median = median(MEAN, na.rm = TRUE),
          mean = mean(MEAN, na.rm = TRUE),
          mode = getmode(MEAN),
          q3 = quantile(MEAN, 0.75, na.rm = TRUE),
          max = max(MEAN, na.rm = TRUE),

```

```

    std = sd(MEAN, na.rm = TRUE),
    n = n()))
ResHard10km50 <- (PatDist10kmHard50 %>% summarize(buffer = "Hard10km",
density = "50%", min = min(MEAN, na.rm = TRUE),
q1 = quantile(MEAN, 0.25, na.rm = TRUE),
median = median(MEAN, na.rm = TRUE),
mean = mean(MEAN, na.rm = TRUE),
mode = getmode(MEAN),
q3 = quantile(MEAN, 0.75, na.rm = TRUE),
max = max(MEAN, na.rm = TRUE),
std = sd(MEAN, na.rm = TRUE),
n = n()))

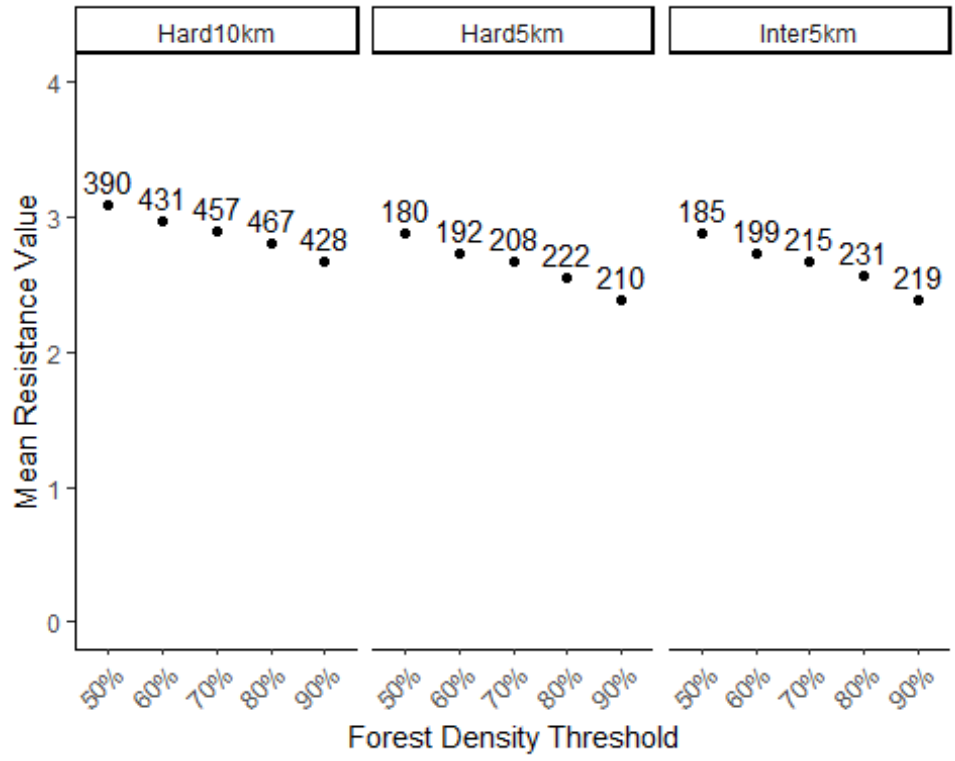
ResHard10kmTable <- bind_rows(ResHard10km90, ResHard10km80, ResHard10km
70,
                             ResHard10km60, ResHard10km50)

ResTable <- bind_rows(ResInter5kmTable, ResHard5kmTable, ResHard10kmTab
le)

FacResTable <- ResTable %>%
  mutate(Buffer = factor(buffer), Density = factor(density),
         #Rename factors, convert to factors, and rename levels
         Min = factor(min),
         Q1 = factor(q1),
         Median = factor(median),
         Mean = mean,
         Q3 = factor(q3),
         Max = factor(max),
         STD = factor(std),
         n = factor(n)
         ) %>%
  select(Buffer, Density, Min, Q1, Median, Mean, Q3, Max, STD, n)

ggplot(FacResTable, aes(x = Density, y = Mean)) +
  geom_point(aes(label = n)) +
  theme_classic() +
  xlab("Forest Density Threshold") +
  ylab("Mean Resistance Value") +
  coord_cartesian(ylim = c(0, 4))+
  scale_y_continuous(breaks = seq(0, 4, by = 1)) +
  theme(axis.text.x = element_text(angle = 45, vjust = 1, hjust=1)) +
  geom_text(aes(label = n), vjust = -0.5) +
  facet_wrap(vars(Buffer))

```



Mean Distance Distribution

5km Intersection

```

DistInter5km90 <- (PatDist5kmInter90 %>% summarize(buffer = "Inter5km",
  density = "90%", min = min(NEAR_DIST),
  q1 = quantile(NEAR_DIST, 0.25),
  median = median(NEAR_DIST),
  mean = mean(NEAR_DIST),
  mode = getmode(NEAR_DIST),
  q3 = quantile(NEAR_DIST, 0.75),
  max = max(NEAR_DIST),
  std = sd(NEAR_DIST),
  n = n()))
DistInter5km80 <- (PatDist5kmInter80 %>% summarize(buffer = "Inter5km",
  density = "80%", min = min(NEAR_DIST),
  q1 = quantile(NEAR_DIST, 0.25),
  median = median(NEAR_DIST),
  mean = mean(NEAR_DIST),
  mode = getmode(NEAR_DIST),
  q3 = quantile(NEAR_DIST, 0.75),
  max = max(NEAR_DIST),
  std = sd(NEAR_DIST),
  n = n()))
DistInter5km70 <- (PatDist5kmInter70 %>% summarize(buffer = "Inter5km",
  density = "70%", min = min(NEAR_DIST),

```



```

q1 = quantile(NEAR_DIST, 0.25),
median = median(NEAR_DIST),
mean = mean(NEAR_DIST),
mode = getmode(NEAR_DIST),
q3 = quantile(NEAR_DIST, 0.75),
max = max(NEAR_DIST),
std = sd(NEAR_DIST),
n = n())
DistInter5km60 <- (PatDist5kmInter60 %>% summarize(buffer = "Inter5km",
density = "60%", min = min(NEAR_DIST),
q1 = quantile(NEAR_DIST, 0.25),
median = median(NEAR_DIST),
mean = mean(NEAR_DIST),
mode = getmode(NEAR_DIST),
q3 = quantile(NEAR_DIST, 0.75),
max = max(NEAR_DIST),
std = sd(NEAR_DIST),
n = n()))
DistInter5km50 <- (PatDist5kmInter50 %>% summarize(buffer = "Inter5km",
density = "50%", min = min(NEAR_DIST),
q1 = quantile(NEAR_DIST, 0.25),
median = median(NEAR_DIST),
mean = mean(NEAR_DIST),
mode = getmode(NEAR_DIST),
q3 = quantile(NEAR_DIST, 0.75),
max = max(NEAR_DIST),
std = sd(NEAR_DIST),
n = n()))

DistInter5kmTable <- bind_rows(DistInter5km90, DistInter5km80, DistInter5km70,
                               DistInter5km60, DistInter5km50)

```

5km Hard

```

DistHard5km90 <- (PatDist5kmHard90 %>% summarize(buffer = "Hard5km",
density = "90%", min = min(NEAR_DIST),
q1 = quantile(NEAR_DIST, 0.25),
median = median(NEAR_DIST),
mean = mean(NEAR_DIST),
mode = getmode(NEAR_DIST),
q3 = quantile(NEAR_DIST, 0.75),
max = max(NEAR_DIST),
std = sd(NEAR_DIST),
n = n()))
DistHard5km80 <- (PatDist5kmHard80 %>% summarize(buffer = "Hard5km",
density = "80%", min = min(NEAR_DIST),
q1 = quantile(NEAR_DIST, 0.25),
median = median(NEAR_DIST),
mean = mean(NEAR_DIST),

```

```

mode = getmode(NEAR_DIST),
q3 = quantile(NEAR_DIST, 0.75),
max = max(NEAR_DIST),
std = sd(NEAR_DIST),
n = n())
DistHard5km70 <- (PatDist5kmHard70 %>% summarize(buffer = "Hard5km",
density = "70%", min = min(NEAR_DIST),
q1 = quantile(NEAR_DIST, 0.25),
median = median(NEAR_DIST),
mean = mean(NEAR_DIST),
mode = getmode(NEAR_DIST),
q3 = quantile(NEAR_DIST, 0.75),
max = max(NEAR_DIST),
std = sd(NEAR_DIST),
n = n()))
DistHard5km60 <- (PatDist5kmHard60 %>% summarize(buffer = "Hard5km",
density = "60%", min = min(NEAR_DIST),
q1 = quantile(NEAR_DIST, 0.25),
median = median(NEAR_DIST),
mean = mean(NEAR_DIST),
mode = getmode(NEAR_DIST),
q3 = quantile(NEAR_DIST, 0.75),
max = max(NEAR_DIST),
std = sd(NEAR_DIST),
n = n()))
DistHard5km50 <- (PatDist5kmHard50 %>% summarize(buffer = "Hard5km",
density = "50%", min = min(NEAR_DIST),
q1 = quantile(NEAR_DIST, 0.25),
median = median(NEAR_DIST),
mean = mean(NEAR_DIST),
mode = getmode(NEAR_DIST),
q3 = quantile(NEAR_DIST, 0.75),
max = max(NEAR_DIST),
std = sd(NEAR_DIST),
n = n()))

DistHard5kmTable <- bind_rows(DistHard5km90, DistHard5km80, DistHard5km
70,
                             DistHard5km60, DistHard5km50)

```

10km Hard

```

DistHard10km90 <- (PatDist10kmHard90 %>% summarize(buffer = "Hard10km",
density = "90%", min = min(NEAR_DIST),
q1 = quantile(NEAR_DIST, 0.25),
median = median(NEAR_DIST),
mean = mean(NEAR_DIST),
mode = getmode(NEAR_DIST),
q3 = quantile(NEAR_DIST, 0.75),
max = max(NEAR_DIST),

```

```

      std = sd(NEAR_DIST),
      n = n()))
DistHard10km80 <- (PatDist10kmHard80 %>% summarize(buffer = "Hard10km",
density = "80%", min = min(NEAR_DIST),
q1 = quantile(NEAR_DIST, 0.25),
median = median(NEAR_DIST),
mean = mean(NEAR_DIST),
mode = getmode(NEAR_DIST),
q3 = quantile(NEAR_DIST, 0.75),
max = max(NEAR_DIST),
std = sd(NEAR_DIST),
n = n()))
DistHard10km70 <- (PatDist10kmHard70 %>% summarize(buffer = "Hard10km",
density = "70%", min = min(NEAR_DIST),
q1 = quantile(NEAR_DIST, 0.25),
median = median(NEAR_DIST),
mean = mean(NEAR_DIST),
mode = getmode(NEAR_DIST),
q3 = quantile(NEAR_DIST, 0.75),
max = max(NEAR_DIST),
std = sd(NEAR_DIST),
n = n()))
DistHard10km60 <- (PatDist10kmHard60 %>% summarize(buffer = "Hard10km",
density = "60%", min = min(NEAR_DIST),
q1 = quantile(NEAR_DIST, 0.25),
median = median(NEAR_DIST),
mean = mean(NEAR_DIST),
mode = getmode(NEAR_DIST),
q3 = quantile(NEAR_DIST, 0.75),
max = max(NEAR_DIST),
std = sd(NEAR_DIST),
n = n()))
DistHard10km50 <- (PatDist10kmHard50 %>% summarize(buffer = "Hard10km",
density = "50%", min = min(NEAR_DIST),
q1 = quantile(NEAR_DIST, 0.25),
median = median(NEAR_DIST),
mean = mean(NEAR_DIST),
mode = getmode(NEAR_DIST),
q3 = quantile(NEAR_DIST, 0.75),
max = max(NEAR_DIST),
std = sd(NEAR_DIST),
n = n()))

DistHard10kmTable <- bind_rows(DistHard10km90, DistHard10km80, DistHard
10km70,
                             DistHard10km60, DistHard10km50)

DistTable <- bind_rows(DistInter5kmTable, DistHard5kmTable, DistHard10k
mTable)

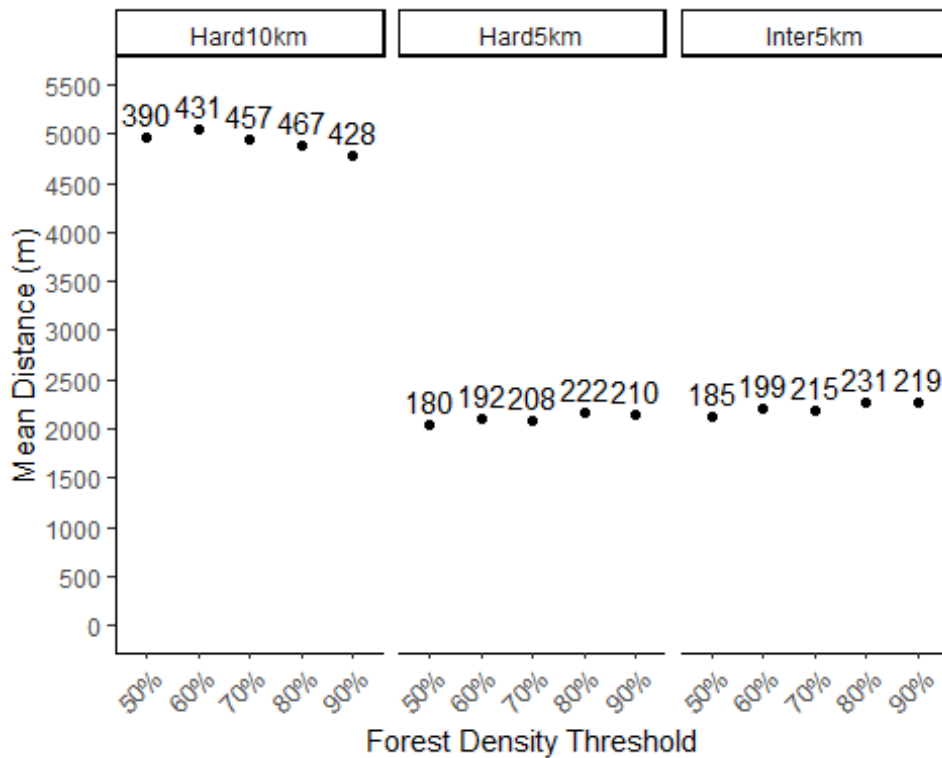
```

```

FacDistTable <- DistTable %>%
  mutate(Buffer = factor(buffer), Density = factor(density),
         #Rename factors, convert to factors, and rename levels
         Min = factor(min),
         Q1 = factor(q1),
         Median = factor(median),
         Mean = mean,
         Q3 = factor(q3),
         Max = factor(max),
         STD = factor(std),
         n = factor(n)
         ) %>%
  select(Buffer, Density, Min, Q1, Median, Mean, Q3, Max, STD, n)

ggplot(FacDistTable, aes(x = Density, y = Mean)) +
  geom_point(aes(label = n)) +
  theme_classic() +
  xlab("Forest Density Threshold") +
  ylab("Mean Distance (m)") +
  coord_cartesian(ylim = c(0, 5500)) +
  scale_y_continuous(breaks = seq(0, 5500, by = 500)) +
  theme(axis.text.x = element_text(angle = 45, vjust = 1, hjust=1)) +
  geom_text(aes(label = n), vjust = -0.5) +
  facet_wrap(vars(Buffer))

```



Mean Proximity Distribution

5km Intersection

```
ProxInter5km90 <- (Near5kmInter90 %>% summarize(buffer = "Inter5km",
  density = "90%", min = min(NEAR_DIST),
  q1 = quantile(NEAR_DIST, 0.25),
  median = median(NEAR_DIST),
  mean = mean(NEAR_DIST),
  mode = getmode(NEAR_DIST),
  q3 = quantile(NEAR_DIST, 0.75),
  max = max(NEAR_DIST),
  std = sd(NEAR_DIST),
  n = n()))
ProxInter5km80 <- (Near5kmInter80 %>% summarize(buffer = "Inter5km",
  density = "80%", min = min(NEAR_DIST),
  q1 = quantile(NEAR_DIST, 0.25),
  median = median(NEAR_DIST),
  mean = mean(NEAR_DIST),
  mode = getmode(NEAR_DIST),
  q3 = quantile(NEAR_DIST, 0.75),
  max = max(NEAR_DIST),
  std = sd(NEAR_DIST),
  n = n()))
ProxInter5km70 <- (Near5kmInter70 %>% summarize(buffer = "Inter5km",
  density = "70%", min = min(NEAR_DIST),
  q1 = quantile(NEAR_DIST, 0.25),
  median = median(NEAR_DIST),
  mean = mean(NEAR_DIST),
  mode = getmode(NEAR_DIST),
  q3 = quantile(NEAR_DIST, 0.75),
  max = max(NEAR_DIST),
  std = sd(NEAR_DIST),
  n = n()))
ProxInter5km60 <- (Near5kmInter60 %>% summarize(buffer = "Inter5km",
  density = "60%", min = min(NEAR_DIST),
  q1 = quantile(NEAR_DIST, 0.25),
  median = median(NEAR_DIST),
  mean = mean(NEAR_DIST),
  mode = getmode(NEAR_DIST),
  q3 = quantile(NEAR_DIST, 0.75),
  max = max(NEAR_DIST),
  std = sd(NEAR_DIST),
  n = n()))
ProxInter5km50 <- (Near5kmInter50 %>% summarize(buffer = "Inter5km",
  density = "50%", min = min(NEAR_DIST),
  q1 = quantile(NEAR_DIST, 0.25),
  median = median(NEAR_DIST),
  mean = mean(NEAR_DIST),
```

```

mode = getmode(NEAR_DIST),
q3 = quantile(NEAR_DIST, 0.75),
max = max(NEAR_DIST),
std = sd(NEAR_DIST),
n = n())

```

```

ProxInter5kmTable <- bind_rows(ProxInter5km90, ProxInter5km80, ProxInter5km70,
                                ProxInter5km60, ProxInter5km50)

```

5km Hard

```

ProxHard5km90 <- (Near5kmHard90 %>% summarize(buffer = "Hard5km",
density = "90%", min = min(NEAR_DIST),
q1 = quantile(NEAR_DIST, 0.25),
median = median(NEAR_DIST),
mean = mean(NEAR_DIST),
mode = getmode(NEAR_DIST),
q3 = quantile(NEAR_DIST, 0.75),
max = max(NEAR_DIST),
std = sd(NEAR_DIST),
n = n()))

```

```

ProxHard5km80 <- (Near5kmHard80 %>% summarize(buffer = "Hard5km",
density = "80%", min = min(NEAR_DIST),
q1 = quantile(NEAR_DIST, 0.25),
median = median(NEAR_DIST),
mean = mean(NEAR_DIST),
mode = getmode(NEAR_DIST),
q3 = quantile(NEAR_DIST, 0.75),
max = max(NEAR_DIST),
std = sd(NEAR_DIST),
n = n()))

```

```

ProxHard5km70 <- (Near5kmHard70 %>% summarize(buffer = "Hard5km",
density = "70%", min = min(NEAR_DIST),
q1 = quantile(NEAR_DIST, 0.25),
median = median(NEAR_DIST),
mean = mean(NEAR_DIST),
mode = getmode(NEAR_DIST),
q3 = quantile(NEAR_DIST, 0.75),
max = max(NEAR_DIST),
std = sd(NEAR_DIST),
n = n()))

```

```

ProxHard5km60 <- (Near5kmHard60 %>% summarize(buffer = "Hard5km",
density = "60%", min = min(NEAR_DIST),
q1 = quantile(NEAR_DIST, 0.25),
median = median(NEAR_DIST),
mean = mean(NEAR_DIST),
mode = getmode(NEAR_DIST),
q3 = quantile(NEAR_DIST, 0.75),
max = max(NEAR_DIST),

```

```

      std = sd(NEAR_DIST),
      n = n()))
ProxHard5km50 <- (Near5kmHard50 %>% summarize(buffer = "Hard5km",
      density = "50%", min = min(NEAR_DIST),
      q1 = quantile(NEAR_DIST, 0.25),
      median = median(NEAR_DIST),
      mean = mean(NEAR_DIST),
      mode = getmode(NEAR_DIST),
      q3 = quantile(NEAR_DIST, 0.75),
      max = max(NEAR_DIST),
      std = sd(NEAR_DIST),
      n = n()))

ProxHard5kmTable <- bind_rows(ProxHard5km90, ProxHard5km80, ProxHard5km
70,
                              ProxHard5km60, ProxHard5km50)

```

10km Hard

```

ProxHard10km90 <- (Near10kmHard90 %>% summarize(buffer = "Hard10km",
      density = "90%", min = min(NEAR_DIST),
      q1 = quantile(NEAR_DIST, 0.25),
      median = median(NEAR_DIST),
      mean = mean(NEAR_DIST),
      mode = getmode(NEAR_DIST),
      q3 = quantile(NEAR_DIST, 0.75),
      max = max(NEAR_DIST),
      std = sd(NEAR_DIST),
      n = n()))
ProxHard10km80 <- (Near10kmHard80 %>% summarize(buffer = "Hard10km",
      density = "80%", min = min(NEAR_DIST),
      q1 = quantile(NEAR_DIST, 0.25),
      median = median(NEAR_DIST),
      mean = mean(NEAR_DIST),
      mode = getmode(NEAR_DIST),
      q3 = quantile(NEAR_DIST, 0.75),
      max = max(NEAR_DIST),
      std = sd(NEAR_DIST),
      n = n()))
ProxHard10km70 <- (Near10kmHard70 %>% summarize(buffer = "Hard10km",
      density = "70%", min = min(NEAR_DIST),
      q1 = quantile(NEAR_DIST, 0.25),
      median = median(NEAR_DIST),
      mean = mean(NEAR_DIST),
      mode = getmode(NEAR_DIST),
      q3 = quantile(NEAR_DIST, 0.75),
      max = max(NEAR_DIST),
      std = sd(NEAR_DIST),
      n = n()))
ProxHard10km60 <- (Near10kmHard60 %>% summarize(buffer = "Hard10km",

```

```

    density = "60%", min = min(NEAR_DIST),
    q1 = quantile(NEAR_DIST, 0.25),
    median = median(NEAR_DIST),
    mean = mean(NEAR_DIST),
    mode = getmode(NEAR_DIST),
    q3 = quantile(NEAR_DIST, 0.75),
    max = max(NEAR_DIST),
    std = sd(NEAR_DIST),
    n = n())
ProxHard10km50 <- (Near10kmHard50 %>% summarize(buffer = "Hard10km",
    density = "50%", min = min(NEAR_DIST),
    q1 = quantile(NEAR_DIST, 0.25),
    median = median(NEAR_DIST),
    mean = mean(NEAR_DIST),
    mode = getmode(NEAR_DIST),
    q3 = quantile(NEAR_DIST, 0.75),
    max = max(NEAR_DIST),
    std = sd(NEAR_DIST),
    n = n()))

ProxHard10kmTable <- bind_rows(ProxHard10km90, ProxHard10km80, ProxHard
10km70,
                                ProxHard10km60, ProxHard10km50)

ProxTable <- bind_rows(ProxInter5kmTable, ProxHard5kmTable, ProxHard10k
mTable)

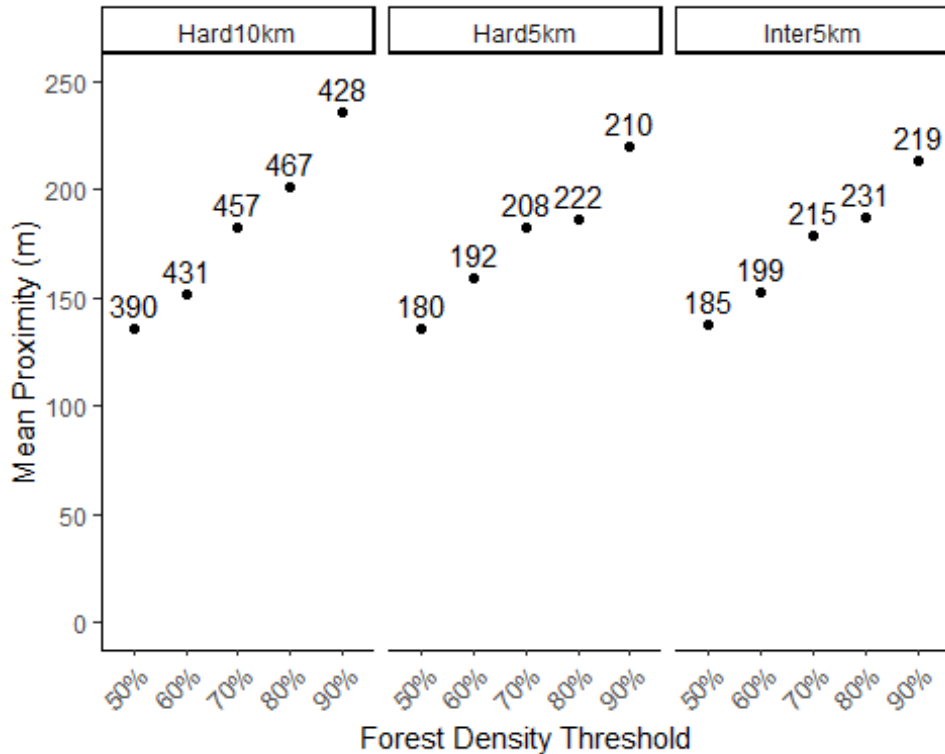
FacProxTable <- ProxTable %>%
  mutate(Buffer = factor(buffer), Density = factor(density),
    #Rename factors, convert to factors, and rename levels
    Min = factor(min),
    Q1 = factor(q1),
    Median = factor(median),
    Mean = mean,
    Q3 = factor(q3),
    Max = factor(max),
    STD = factor(std),
    n = factor(n)
  ) %>%
  select(Buffer, Density, Min, Q1, Median, Mean, Q3, Max, STD, n)

ggplot(FacProxTable, aes(x = Density, y = Mean)) +
  geom_point(aes(label = n)) +
  theme_classic() +
  xlab("Forest Density Threshold") +
  ylab("Mean Proximity (m)") +
  coord_cartesian(ylim = c(0, 250))+
  scale_y_continuous(breaks = seq(0, 250, by = 50)) +
  theme(axis.text.x = element_text(angle = 45, vjust = 1, hjust=1)) +

```



```
geom_text(aes(label = n), vjust = -0.5) +
facet_wrap(vars(Buffer))
```



Tables

```
write.table(AreaTable, file = "AreaTable.csv", sep = ",", quote = FALSE
,
            row.names = F)
# Save table as spreadsheet

write.table(ResTable, file = "ResTable.csv", sep = ",", quote = FALSE,
            row.names = F)

write.table(DistTable, file = "DistTable.csv", sep = ",", quote = FALSE
,
            row.names = F)

write.table(ProxTable, file = "ProxTable.csv", sep = ",", quote = FALSE
,
            row.names = F)
```

5km Intersection Comparison

90% Threshold

```
Near5kmIn90Data <- Near5kmInter90 %>%
  mutate(PID = IN_FID,
         Neigh_Dist = NEAR_DIST)
```

```

    ) %>%
  select(PID, Neigh_Dist)
# Simplify nearest neighbor data

FacPat5In90Data <- PatDist5kmInter90 %>%
  mutate(Buffer = factor("Inter5km"), Density = factor("90"),
         PID = FID,
         AREA = Area,
         MEAN_RES = MEAN,
         Near_DIST = NEAR_DIST
        ) %>%
  select(PID, Buffer, Density, AREA, MEAN_RES, Near_DIST)
# Simplify original data

In5km90Data <- list(FacPat5In90Data, Near5kmIn90Data)
FacPat5In90Data <- In5km90Data %>% reduce(inner_join, by='PID')
# Combine data

P1 <- ggplot(FacPat5In90Data, aes(x = MEAN_RES, y = AREA)) +
  geom_point() +
  theme_classic() +
  scale_y_continuous(trans = log10_trans(),
                    breaks = trans_breaks("log10", function(x) 10^x),
                    labels = trans_format("log10", math_format(10^.x))) +
  scale_x_continuous(breaks = seq(from = 0, to = 5, by = 1)) +
  xlab("Patch Mean Resistance") +
  ylab("Log (Patch Area)") +
  ggtitle("Log Transformed Patch Area Relative to Patch Resistance") +
  theme(plot.title=element_text(size = 8, face = 'bold'),
        axis.title=element_text(size=7), axis.text=element_text(size=6
  )) +
  geom_smooth(method = "lm", se = FALSE)

P2 <- ggplot(FacPat5In90Data, aes(x = Near_DIST, y = AREA)) +
  geom_point() +
  theme_classic() +
  scale_y_continuous(trans = log10_trans(),
                    breaks = trans_breaks("log10", function(x) 10^x),
                    labels = trans_format("log10", math_format(10^.x))) +
  xlab("Distance from LCP (m)") +
  ylab("Log (Patch Area)") +
  ggtitle("Log Transformed Patch Area Relative to Distance from LCP") +
  theme(plot.title=element_text(size = 8, face = 'bold'),
        axis.title=element_text(size=7), axis.text=element_text(size=6
  )) +
  geom_smooth(method = "lm", se = FALSE)

P3 <- ggplot(FacPat5In90Data, aes(x = Neigh_Dist, y = AREA)) +
  geom_point() +

```

```

theme_classic() +
scale_y_continuous(trans = log10_trans(),
breaks = trans_breaks("log10", function(x) 10^x),
labels = trans_format("log10", math_format(10^.x))) +
xlab("Distance from Nearest Neighbor (m)") +
ylab("Log (Patch Area)") +
ggtitle("Log Transformed Patch Area Relative to
Distance from Nearest Neighbor") +
theme(plot.title=element_text(size = 8, face = 'bold'),
axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
geom_smooth(method = "lm", se = FALSE)

P4 <- ggplot(FacPat5In90Data, aes(x = Near_DIST, y = MEAN_RES)) +
geom_point() +
theme_classic() +
xlab("Distance from LCP (m)") +
ylab("Patch Mean Resistance") +
ggtitle("Patch Resistance Relative to Distance from LCP") +
theme(plot.title=element_text(size = 8, face = 'bold'),
axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
geom_smooth(method = "lm", se = FALSE)

P5 <- ggplot(FacPat5In90Data, aes(x = Neigh_Dist, y = MEAN_RES)) +
geom_point() +
theme_classic() +
xlab("Distance from Nearest Neighbor (m)") +
ylab("Patch Mean Resistance") +
ggtitle("Patch Resistance Relative to Distance from Nearest Neighbor"
) +
theme(plot.title=element_text(size = 8, face = 'bold'),
axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
geom_smooth(method = "lm", se = FALSE)

P6 <- ggplot(FacPat5In90Data, aes(x = Neigh_Dist, y = Near_DIST)) +
geom_point() +
theme_classic() +
xlab("Distance from Nearest Neighbor (m)") +
ylab("Distance from LCP (m)") +
ggtitle("Patch Distance from LCP Relative to
Distance from Nearest Neighbor") +
theme(plot.title=element_text(size = 8, face = 'bold'),
axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
geom_smooth(method = "lm", se = FALSE)

plot <- plot_grid(P1, P3, P2, P5, P4, P6,

```

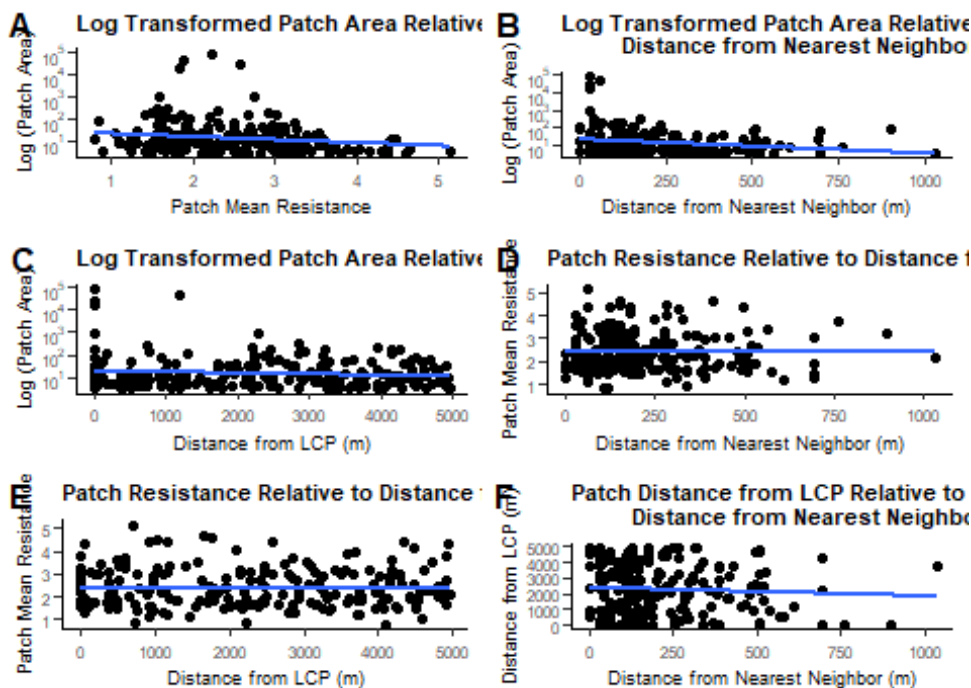
```

      labels = c('A', 'B', 'C', 'D', 'E', 'F'),
      label_size = 12, ncol = 2)
title <- ggdraw() +
  draw_label(
    "5 Kilometer Buffer Intersection with 90% Forest Density",
    fontface = 'bold',
    x = 0,
    hjust = 0
  ) +
  theme(
    # add margin on the left of the drawing canvas,
    # so title is aligned with left edge of first plot
    plot.margin = margin(0, 0, 0, 7)
  )
Plot1 <- plot_grid(
  title, plot,
  ncol = 1,
  # rel_heights values control vertical title margins
  rel_heights = c(0.1, 1)
)
save_plot("Plot1.tiff", Plot1, base_height = 10, base_width = 10)

```

Plot1

5 Kilometer Buffer Intersection with 90% Forest Der



5km Intersection Comparison

80% Threshold

```
Near5kmIn80Data <- Near5kmInter80 %>%
  mutate(PID = IN_FID,
         Neigh_Dist = NEAR_DIST
        ) %>%
  select(PID, Neigh_Dist)

FacPat5In80Data <- PatDist5kmInter80 %>%
  mutate(Buffer = factor("Inter5km"), Density = factor("80"),
         #Rename factors, convert to factors, and rename levels
         PID = FID,
         AREA = Area,
         MEAN_RES = MEAN,
         Near_DIST = NEAR_DIST
        ) %>%
  select(PID, Buffer, Density, AREA, MEAN_RES, Near_DIST)

In5km80Data <- list(FacPat5In80Data, Near5kmIn80Data)
FacPat5In80Data <- In5km80Data %>% reduce(inner_join, by='PID')

P1 <- ggplot(FacPat5In80Data, aes(x = MEAN_RES, y = AREA)) +
  geom_point() +
  theme_classic() +
  scale_y_continuous(trans = log10_trans(),
                    breaks = trans_breaks("log10", function(x) 10^x),
                    labels = trans_format("log10", math_format(10^.x))) +
  scale_x_continuous(breaks = seq(from = 0, to = 5, by = 1)) +
  xlab("Patch Mean Resistance") +
  ylab("Log (Patch Area)") +
  ggtitle("Log Transformed Patch Area Relative to Patch Resistance") +
  theme(plot.title=element_text(size = 8, face = 'bold'),
        axis.title=element_text(size=7), axis.text=element_text(size=6)) +
  geom_smooth(method = "lm", se = FALSE)

P2 <- ggplot(FacPat5In80Data, aes(x = Near_DIST, y = AREA)) +
  geom_point() +
  theme_classic() +
  scale_y_continuous(trans = log10_trans(),
                    breaks = trans_breaks("log10", function(x) 10^x),
                    labels = trans_format("log10", math_format(10^.x))) +
  xlab("Distance from LCP (m)") +
  ylab("Log (Patch Area)") +
  ggtitle("Log Transformed Patch Area Relative to Distance from LCP") +
  theme(plot.title=element_text(size = 8, face = 'bold'),
```

```

        axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
  geom_smooth(method = "lm", se = FALSE)
P3 <- ggplot(FacPat5In80Data, aes(x = Neigh_Dist, y = AREA)) +
  geom_point() +
  theme_classic() +
  scale_y_continuous(trans = log10_trans(),
    breaks = trans_breaks("log10", function(x) 10^x),
    labels = trans_format("log10", math_format(10^.x))) +
  xlab("Distance from Nearest Neighbor (m)") +
  ylab("Log (Patch Area)") +
  ggtitle("Log Transformed Patch Area Relative to
    Distance from Nearest Neighbor") +
  theme(plot.title=element_text(size = 8, face = 'bold'),
    axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
  geom_smooth(method = "lm", se = FALSE)
P4 <- ggplot(FacPat5In80Data, aes(x = Near_DIST, y = MEAN_RES)) +
  geom_point() +
  theme_classic() +
  xlab("Distance from LCP (m)") +
  ylab("Patch Mean Resistance") +
  ggtitle("Patch Resistance Relative to Distance from LCP") +
  theme(plot.title=element_text(size = 8, face = 'bold'),
    axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
  geom_smooth(method = "lm", se = FALSE)
P5 <- ggplot(FacPat5In80Data, aes(x = Neigh_Dist, y = MEAN_RES)) +
  geom_point() +
  theme_classic() +
  xlab("Distance from Nearest Neighbor (m)") +
  ylab("Patch Mean Resistance") +
  ggtitle("Patch Resistance Relative to Distance from Nearest Neighbor"
) +
  theme(plot.title=element_text(size = 8, face = 'bold'),
    axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
  geom_smooth(method = "lm", se = FALSE)
P6 <- ggplot(FacPat5In80Data, aes(x = Neigh_Dist, y = Near_DIST)) +
  geom_point() +
  theme_classic() +
  xlab("Distance from Nearest Neighbor (m)") +
  ylab("Distance from LCP (m)") +
  ggtitle("Patch Distance from LCP Relative to
    Distance from Nearest Neighbor") +

```

```

    theme( plot.title=element_text( size = 8, face = 'bold'),
           axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
  geom_smooth(method = "lm", se = FALSE)

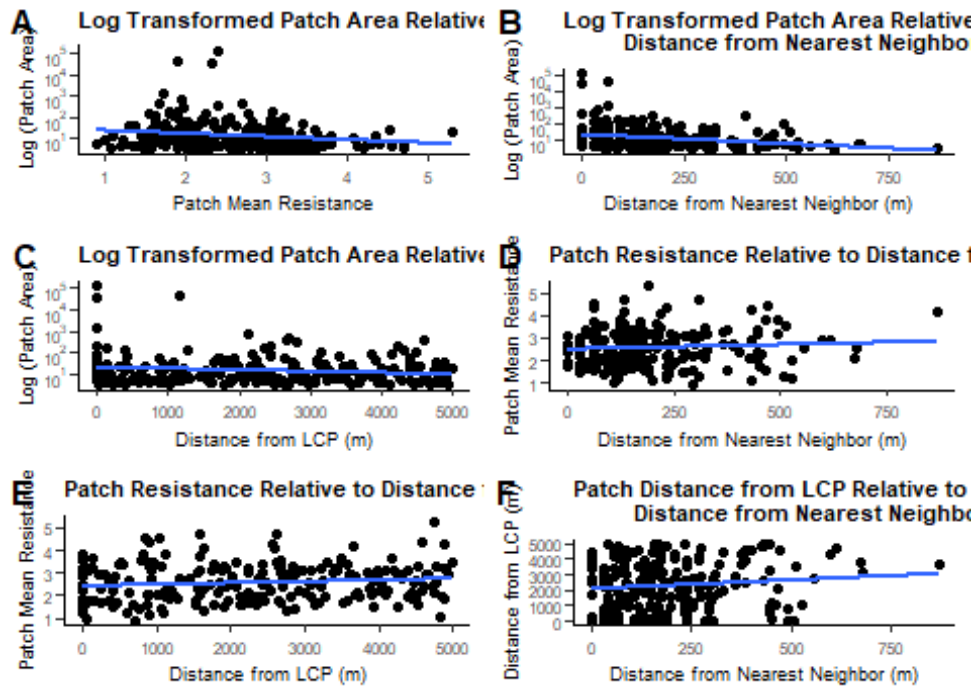
plot <- plot_grid(P1, P3, P2, P5, P4, P6,
                 labels = c('A', 'B', 'C', 'D', 'E', 'F'),
                 label_size = 12, ncol = 2)
title <- ggdraw() +
  draw_label(
    "5 Kilometer Buffer Intersection with 80% Forest Density",
    fontface = 'bold',
    x = 0,
    hjust = 0
  ) +
  theme(
    # add margin on the left of the drawing canvas,
    # so title is aligned with left edge of first plot
    plot.margin = margin(0, 0, 0, 7)
  )

Plot2 <- plot_grid(
  title, plot,
  ncol = 1,
  # rel_heights values control vertical title margins
  rel_heights = c(0.1, 1)
)
save_plot("Plot2.tiff", Plot2, base_height = 10, base_width = 10)

Plot2

```

5 Kilometer Buffer Intersection with 80% Forest Der



5km Intersection Comparison

70% Threshold

```
Near5kmIn70Data <- Near5kmInter70 %>%
  mutate(PID = IN_FID,
         Neigh_Dist = NEAR_DIST
        ) %>%
  select(PID, Neigh_Dist)

FacPat5In70Data <- PatDist5kmInter70 %>%
  mutate(Buffer = factor("Inter5km"), Density = factor("70"),
         #Rename factors, convert to factors, and rename levels
         PID = FID,
         AREA = Area,
         MEAN_RES = MEAN,
         Near_DIST = NEAR_DIST
        ) %>%
  select(PID, Buffer, Density, AREA, MEAN_RES, Near_DIST)

In5km70Data <- list(FacPat5In70Data, Near5kmIn70Data)
FacPat5In70Data <- In5km70Data %>% reduce(inner_join, by='PID')
```

```
P1 <- ggplot(FacPat5In70Data, aes(x = MEAN_RES, y = AREA)) +
  geom_point() +
```



```

theme_classic() +
scale_y_continuous(trans = log10_trans(),
breaks = trans_breaks("log10", function(x) 10^x),
labels = trans_format("log10", math_format(10^.x))) +
scale_x_continuous(breaks = seq(from = 0, to = 5, by = 1)) +
xlab("Patch Mean Resistance") +
ylab("Log (Patch Area)") +
ggtitle("Log Transformed Patch Area Relative to Patch Resistance") +
theme(plot.title=element_text(size = 8, face = 'bold'),
axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
geom_smooth(method = "lm", se = FALSE)

P2 <- ggplot(FacPat5In70Data, aes(x = Near_DIST, y = AREA)) +
geom_point() +
theme_classic() +
scale_y_continuous(trans = log10_trans(),
breaks = trans_breaks("log10", function(x) 10^x),
labels = trans_format("log10", math_format(10^.x))) +
xlab("Distance from LCP (m)") +
ylab("Log (Patch Area)") +
ggtitle("Log Transformed Patch Area Relative to Distance from LCP") +
theme(plot.title=element_text(size = 8, face = 'bold'),
axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
geom_smooth(method = "lm", se = FALSE)

P3 <- ggplot(FacPat5In70Data, aes(x = Neigh_Dist, y = AREA)) +
geom_point() +
theme_classic() +
scale_y_continuous(trans = log10_trans(),
breaks = trans_breaks("log10", function(x) 10^x),
labels = trans_format("log10", math_format(10^.x))) +
xlab("Distance from Nearest Neighbor (m)") +
ylab("Log (Patch Area)") +
ggtitle("Log Transformed Patch Area Relative to
Distance from Nearest Neighbor") +
theme(plot.title=element_text(size = 8, face = 'bold'),
axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
geom_smooth(method = "lm", se = FALSE)

P4 <- ggplot(FacPat5In70Data, aes(x = Near_DIST, y = MEAN_RES)) +
geom_point() +
theme_classic() +
xlab("Distance from LCP (m)") +
ylab("Patch Mean Resistance") +
ggtitle("Patch Resistance Relative to Distance from LCP") +
theme(plot.title=element_text(size = 8, face = 'bold'),

```

```

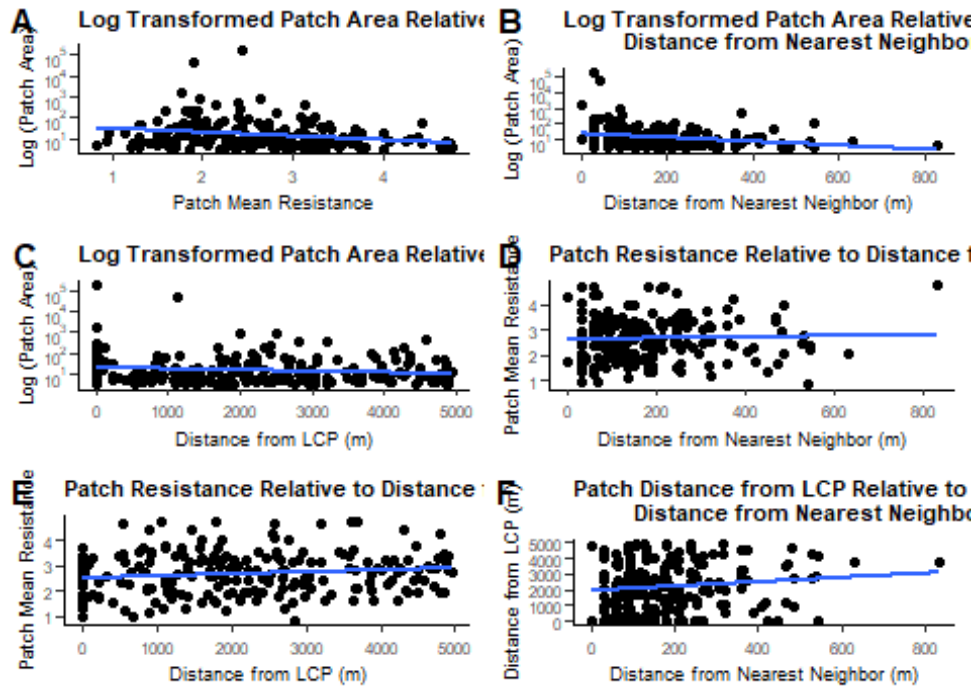
        axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
  geom_smooth(method = "lm", se = FALSE)
P5 <- ggplot(FacPat5In70Data, aes(x = Neigh_Dist, y = MEAN_RES)) +
  geom_point() +
  theme_classic() +
  xlab("Distance from Nearest Neighbor (m)") +
  ylab("Patch Mean Resistance") +
  ggtitle("Patch Resistance Relative to Distance from Nearest Neighbor"
) +
  theme( plot.title=element_text( size = 8, face = 'bold'),
        axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
  geom_smooth(method = "lm", se = FALSE)
P6 <- ggplot(FacPat5In70Data, aes(x = Neigh_Dist, y = Near_DIST)) +
  geom_point() +
  theme_classic() +
  xlab("Distance from Nearest Neighbor (m)") +
  ylab("Distance from LCP (m)") +
  ggtitle("Patch Distance from LCP Relative to
          Distance from Nearest Neighbor") +
  theme( plot.title=element_text( size = 8, face = 'bold'),
        axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
  geom_smooth(method = "lm", se = FALSE)
plot <- plot_grid(P1, P3, P2, P5, P4, P6,
                 labels = c('A', 'B', 'C', 'D', 'E', 'F'),
                 label_size = 12, ncol = 2)
title <- ggdraw() +
  draw_label(
    "5 Kilometer Buffer Intersection with 70% Forest Density",
    fontface = 'bold',
    x = 0,
    hjust = 0
  ) +
  theme(
    # add margin on the left of the drawing canvas,
    # so title is aligned with left edge of first plot
    plot.margin = margin(0, 0, 0, 7)
  )
Plot3 <- plot_grid(
  title, plot,
  ncol = 1,
  # rel_heights values control vertical title margins
  rel_heights = c(0.1, 1)

```

```
)
save_plot("Plot3.tiff", Plot3, base_height = 10, base_width = 10)
```

Plot3

5 Kilometer Buffer Intersection with 70% Forest Der



5km Intersection Comparison

60% Threshold

```
Near5kmIn60Data <- Near5kmInter60 %>%
  mutate(PID = IN_FID,
         Neigh_Dist = NEAR_DIST
        ) %>%
  select(PID, Neigh_Dist)

FacPat5In60Data <- PatDist5kmInter60 %>%
  mutate(Buffer = factor("Inter5km"), Density = factor("60"),
         #Rename factors, convert to factors, and rename levels
         PID = FID,
         AREA = Area,
         MEAN_RES = MEAN,
         Near_DIST = NEAR_DIST
        ) %>%
  select(PID, Buffer, Density, AREA, MEAN_RES, Near_DIST)

In5km60Data <- list(FacPat5In60Data, Near5kmIn60Data)
```

```

FacPat5In60Data <- In5km60Data %>% reduce(inner_join, by='PID')

P1 <- ggplot(FacPat5In60Data, aes(x = MEAN_RES, y = AREA)) +
  geom_point() +
  theme_classic() +
  scale_y_continuous(trans = log10_trans(),
    breaks = trans_breaks("log10", function(x) 10^x),
    labels = trans_format("log10", math_format(10^.x))) +
  scale_x_continuous(breaks = seq(from = 0, to = 5, by = 1)) +
  xlab("Patch Mean Resistance") +
  ylab("Log (Patch Area)") +
  ggtitle("Log Transformed Patch Area Relative to Patch Resistance") +
  theme(plot.title=element_text(size = 8, face = 'bold'),
    axis.title=element_text(size=7), axis.text=element_text(size=6
  )) +
  geom_smooth(method = "lm", se = FALSE)

P2 <- ggplot(FacPat5In60Data, aes(x = Near_DIST, y = AREA)) +
  geom_point() +
  theme_classic() +
  scale_y_continuous(trans = log10_trans(),
    breaks = trans_breaks("log10", function(x) 10^x),
    labels = trans_format("log10", math_format(10^.x))) +
  xlab("Distance from LCP (m)") +
  ylab("Log (Patch Area)") +
  ggtitle("Log Transformed Patch Area Relative to Distance from LCP") +
  theme(plot.title=element_text(size = 8, face = 'bold'),
    axis.title=element_text(size=7), axis.text=element_text(size=6
  )) +
  geom_smooth(method = "lm", se = FALSE)

P3 <- ggplot(FacPat5In60Data, aes(x = Neigh_Dist, y = AREA)) +
  geom_point() +
  theme_classic() +
  scale_y_continuous(trans = log10_trans(),
    breaks = trans_breaks("log10", function(x) 10^x),
    labels = trans_format("log10", math_format(10^.x))) +
  xlab("Distance from Nearest Neighbor (m)") +
  ylab("Log (Patch Area)") +
  ggtitle("Log Transformed Patch Area Relative to
    Distance from Nearest Neighbor") +
  theme(plot.title=element_text(size = 8, face = 'bold'),
    axis.title=element_text(size=7), axis.text=element_text(size=6
  )) +
  geom_smooth(method = "lm", se = FALSE)

P4 <- ggplot(FacPat5In60Data, aes(x = Near_DIST, y = MEAN_RES)) +
  geom_point() +

```

```

theme_classic() +
xlab("Distance from LCP (m)") +
ylab("Patch Mean Resistance") +
ggtitle("Patch Resistance Relative to Distance from LCP") +
theme( plot.title=element_text( size = 8, face = 'bold'),
        axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
geom_smooth(method = "lm", se = FALSE)

P5 <- ggplot(FacPat5In60Data, aes(x = Neigh_Dist, y = MEAN_RES)) +
geom_point() +
theme_classic() +
xlab("Distance from Nearest Neighbor (m)") +
ylab("Patch Mean Resistance") +
ggtitle("Patch Resistance Relative to Distance from Nearest Neighbor"
) +
theme( plot.title=element_text( size = 8, face = 'bold'),
        axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
geom_smooth(method = "lm", se = FALSE)

P6 <- ggplot(FacPat5In60Data, aes(x = Neigh_Dist, y = Near_DIST)) +
geom_point() +
theme_classic() +
xlab("Distance from Nearest Neighbor (m)") +
ylab("Distance from LCP (m)") +
ggtitle("Patch Distance from LCP Relative to
        Distance from Nearest Neighbor") +
theme( plot.title=element_text( size = 8, face = 'bold'),
        axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
geom_smooth(method = "lm", se = FALSE)

plot <- plot_grid(P1, P3, P2, P5, P4, P6,
                  labels = c('A', 'B', 'C', 'D', 'E', 'F'),
                  label_size = 12, ncol = 2)

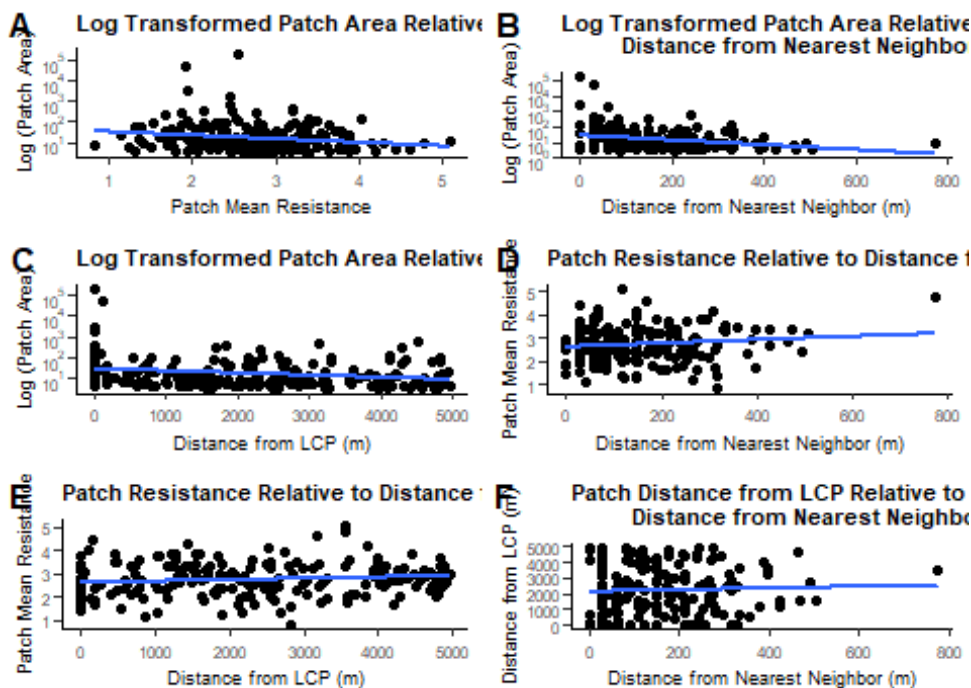
title <- ggdraw() +
draw_label(
  "5 Kilometer Buffer Intersection with 60% Forest Density",
  fontface = 'bold',
  x = 0,
  hjust = 0
) +
theme(
  # add margin on the left of the drawing canvas,
  # so title is aligned with left edge of first plot
  plot.margin = margin(0, 0, 0, 7)
)

```

```
Plot4 <- plot_grid(
  title, plot,
  ncol = 1,
  # rel_heights values control vertical title margins
  rel_heights = c(0.1, 1)
)
save_plot("Plot4.tiff", Plot4, base_height = 10, base_width = 10)
```

Plot4

5 Kilometer Buffer Intersection with 60% Forest Der



5km Intersection Comparison

50% Threshold

```
Near5kmIn50Data <- Near5kmInter50 %>%
  mutate(PID = IN_FID,
         Neigh_Dist = NEAR_DIST
        ) %>%
  select(PID, Neigh_Dist)

FacPat5In50Data <- PatDist5kmInter50 %>%
  mutate(Buffer = factor("Inter5km"), Density = factor("50"),
         #Rename factors, convert to factors, and rename levels
         PID = FID,
         AREA = Area,
         MEAN_RES = MEAN,
```

```

Near_DIST = NEAR_DIST
) %>%
select(PID, Buffer, Density, AREA, MEAN_RES, Near_DIST)

In5km50Data <- list(FacPat5In50Data, Near5kmIn50Data)
FacPat5In50Data <- In5km50Data %>% reduce(inner_join, by='PID')

P1 <- ggplot(FacPat5In50Data, aes(x = MEAN_RES, y = AREA)) +
  geom_point() +
  theme_classic() +
  scale_y_continuous(trans = log10_trans(),
breaks = trans_breaks("log10", function(x) 10^x),
labels = trans_format("log10", math_format(10^.x))) +
  scale_x_continuous(breaks = seq(from = 0, to = 5, by = 1)) +
  xlab("Patch Mean Resistance") +
  ylab("Log (Patch Area)") +
  ggtitle("Log Transformed Patch Area Relative to Patch Resistance") +
  theme(plot.title=element_text(size = 8, face = 'bold'),
axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
  geom_smooth(method = "lm", se = FALSE)

P2 <- ggplot(FacPat5In50Data, aes(x = Near_DIST, y = AREA)) +
  geom_point() +
  theme_classic() +
  scale_y_continuous(trans = log10_trans(),
breaks = trans_breaks("log10", function(x) 10^x),
labels = trans_format("log10", math_format(10^.x))) +
  xlab("Distance from LCP (m)") +
  ylab("Log (Patch Area)") +
  ggtitle("Log Transformed Patch Area Relative to Distance from LCP") +
  theme(plot.title=element_text(size = 8, face = 'bold'),
axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
  geom_smooth(method = "lm", se = FALSE)

P3 <- ggplot(FacPat5In50Data, aes(x = Neigh_Dist, y = AREA)) +
  geom_point() +
  theme_classic() +
  scale_y_continuous(trans = log10_trans(),
breaks = trans_breaks("log10", function(x) 10^x),
labels = trans_format("log10", math_format(10^.x))) +
  xlab("Distance from Nearest Neighbor (m)") +
  ylab("Log (Patch Area)") +
  ggtitle("Log Transformed Patch Area Relative to
Distance from Nearest Neighbor") +
  theme(plot.title=element_text(size = 8, face = 'bold'),
axis.title=element_text(size=7), axis.text=element_text(size=6

```

```

)) +
  geom_smooth(method = "lm", se = FALSE)

P4 <- ggplot(FacPat5In50Data, aes(x = Near_DIST, y = MEAN_RES)) +
  geom_point() +
  theme_classic() +
  xlab("Distance from LCP (m)") +
  ylab("Patch Mean Resistance") +
  ggtitle("Patch Resistance Relative to Distance from LCP") +
  theme(plot.title=element_text(size = 8, face = 'bold'),
        axis.title=element_text(size=7), axis.text=element_text(size=6)
  )
)) +
  geom_smooth(method = "lm", se = FALSE)

P5 <- ggplot(FacPat5In50Data, aes(x = Neigh_Dist, y = MEAN_RES)) +
  geom_point() +
  theme_classic() +
  xlab("Distance from Nearest Neighbor (m)") +
  ylab("Patch Mean Resistance") +
  ggtitle("Patch Resistance Relative to Distance from Nearest Neighbor"
  )
) +
  theme(plot.title=element_text(size = 8, face = 'bold'),
        axis.title=element_text(size=7), axis.text=element_text(size=6)
  )
)) +
  geom_smooth(method = "lm", se = FALSE)

P6 <- ggplot(FacPat5In50Data, aes(x = Neigh_Dist, y = Near_DIST)) +
  geom_point() +
  theme_classic() +
  xlab("Distance from Nearest Neighbor (m)") +
  ylab("Distance from LCP (m)") +
  ggtitle("Patch Distance from LCP Relative to
          Distance from Nearest Neighbor") +
  theme(plot.title=element_text(size = 8, face = 'bold'),
        axis.title=element_text(size=7), axis.text=element_text(size=6)
  )
)) +
  geom_smooth(method = "lm", se = FALSE)

plot <- plot_grid(P1, P3, P2, P5, P4, P6,
                 labels = c('A', 'B', 'C', 'D', 'E', 'F'),
                 label_size = 12, ncol = 2)

title <- ggdraw() +
  draw_label(
    "5 Kilometer Buffer Intersection with 50% Forest Density",
    fontface = 'bold',
    x = 0,
    hjust = 0
  )
) +
  theme(

```



```

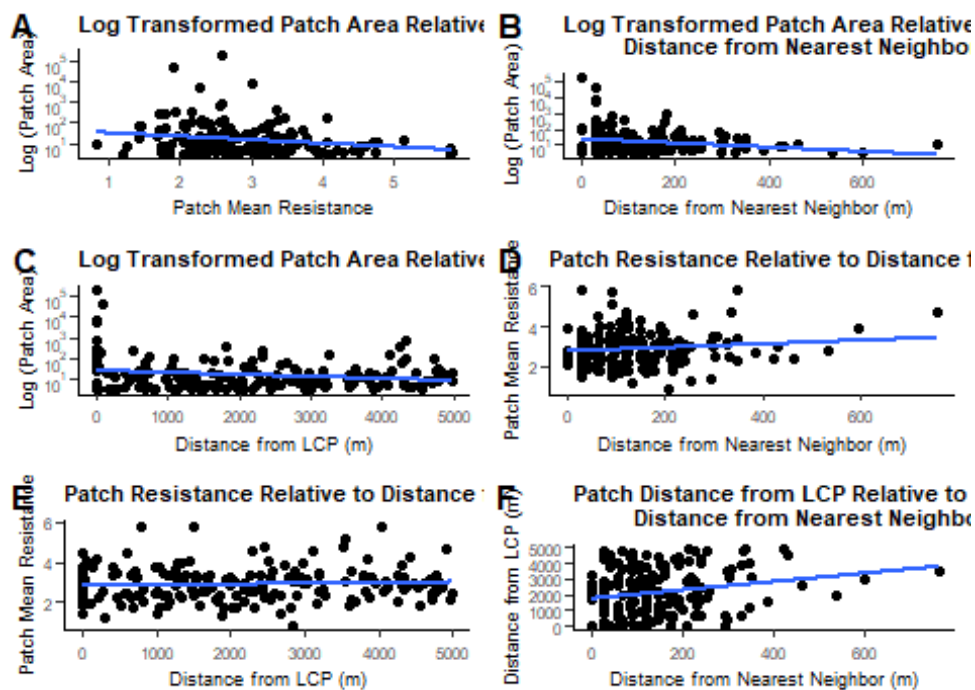
# add margin on the left of the drawing canvas,
# so title is aligned with left edge of first plot
plot.margin = margin(0, 0, 0, 7)
)

Plot5 <- plot_grid(
  title, plot,
  ncol = 1,
  # rel_heights values control vertical title margins
  rel_heights = c(0.1, 1)
)
save_plot("Plot5.tiff", Plot5, base_height = 10, base_width = 10)

Plot5

```

5 Kilometer Buffer Intersection with 50% Forest Der



5km Hard Comparison

90% Threshold

```

Near5kmH90Data <- Near5kmHard90 %>%
  mutate(PID = IN_FID,
         Neigh_Dist = NEAR_DIST
        ) %>%
  select(PID, Neigh_Dist)

FacPat5H90Data <- PatDist5kmHard90 %>%

```

```

mutate(Buffer = factor("Hard5km"), Density = factor("90"),
       #Rename factors, convert to factors, and rename Levels
       PID = FID,
       AREA = Area,
       MEAN_RES = MEAN,
       Near_DIST = NEAR_DIST
       ) %>%
select(PID, Buffer, Density, AREA, MEAN_RES, Near_DIST)

H5km90Data <- list(FacPat5H90Data, Near5kmH90Data)
FacPat5H90Data <- H5km90Data %>% reduce(inner_join, by='PID')

P1 <- ggplot(FacPat5H90Data, aes(x = MEAN_RES, y = AREA)) +
  geom_point() +
  theme_classic() +
  scale_y_continuous(trans = log10_trans(),
                    breaks = trans_breaks("log10", function(x) 10^x),
                    labels = trans_format("log10", math_format(10^.x))) +
  scale_x_continuous(breaks = seq(from = 0, to = 5, by = 1)) +
  xlab("Patch Mean Resistance") +
  ylab("Log (Patch Area)") +
  ggtitle("Log Transformed Patch Area Relative to Patch Resistance") +
  theme(plot.title=element_text(size = 8, face = 'bold'),
        axis.title=element_text(size=7), axis.text=element_text(size=6
  )) +
  geom_smooth(method = "lm", se = FALSE)

P2 <- ggplot(FacPat5H90Data, aes(x = Near_DIST, y = AREA)) +
  geom_point() +
  theme_classic() +
  scale_y_continuous(trans = log10_trans(),
                    breaks = trans_breaks("log10", function(x) 10^x),
                    labels = trans_format("log10", math_format(10^.x))) +
  xlab("Distance from LCP (m)") +
  ylab("Log (Patch Area)") +
  ggtitle("Log Transformed Patch Area Relative to Distance from LCP") +
  theme(plot.title=element_text(size = 8, face = 'bold'),
        axis.title=element_text(size=7), axis.text=element_text(size=6
  )) +
  geom_smooth(method = "lm", se = FALSE)

P3 <- ggplot(FacPat5H90Data, aes(x = Neigh_Dist, y = AREA)) +
  geom_point() +
  theme_classic() +
  scale_y_continuous(trans = log10_trans(),
                    breaks = trans_breaks("log10", function(x) 10^x),
                    labels = trans_format("log10", math_format(10^.x))) +
  xlab("Distance from Nearest Neighbor (m)") +

```

```

ylab("Log (Patch Area)") +
ggtitle("Log Transformed Patch Area Relative to
        Distance from Nearest Neighbor") +
theme( plot.title=element_text( size = 8, face = 'bold'),
        axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
geom_smooth(method = "lm", se = FALSE)

P4 <- ggplot(FacPat5H90Data, aes(x = Near_DIST, y = MEAN_RES)) +
geom_point() +
theme_classic() +
xlab("Distance from LCP (m)") +
ylab("Patch Mean Resistance") +
ggtitle("Patch Resistance Relative to Distance from LCP") +
theme( plot.title=element_text( size = 8, face = 'bold'),
        axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
geom_smooth(method = "lm", se = FALSE)

P5 <- ggplot(FacPat5H90Data, aes(x = Neigh_Dist, y = MEAN_RES)) +
geom_point() +
theme_classic() +
xlab("Distance from Nearest Neighbor (m)") +
ylab("Patch Mean Resistance") +
ggtitle("Patch Resistance Relative to Distance from Nearest Neighbor"
) +
theme( plot.title=element_text( size = 8, face = 'bold'),
        axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
geom_smooth(method = "lm", se = FALSE)

P6 <- ggplot(FacPat5H90Data, aes(x = Neigh_Dist, y = Near_DIST)) +
geom_point() +
theme_classic() +
xlab("Distance from Nearest Neighbor (m)") +
ylab("Distance from LCP (m)") +
ggtitle("Patch Distance from LCP Relative to
        Distance from Nearest Neighbor") +
theme( plot.title=element_text( size = 8, face = 'bold'),
        axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
geom_smooth(method = "lm", se = FALSE)

plot <- plot_grid(P1, P3, P2, P5, P4, P6,
                 labels = c('A', 'B', 'C', 'D', 'E', 'F'),
                 label_size = 12, ncol = 2)

title <- ggdraw() +
draw_label(
"5 Kilometer Buffer Hard Cutoff with 90% Forest Density",

```

```

fontface = 'bold',
x = 0,
hjust = 0
) +
theme(
  # add margin on the left of the drawing canvas,
  # so title is aligned with left edge of first plot
  plot.margin = margin(0, 0, 0, 7)
)

```

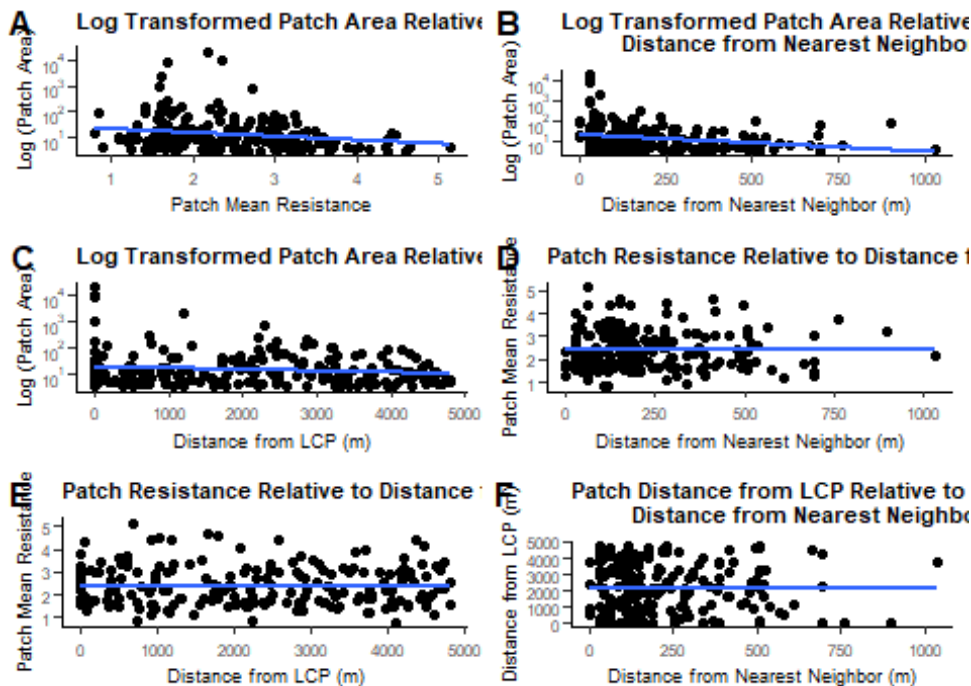
```

Plot6 <- plot_grid(
  title, plot,
  ncol = 1,
  # rel_heights values control vertical title margins
  rel_heights = c(0.1, 1)
)
save_plot("Plot6.tiff", Plot6, base_height = 10, base_width = 10)

```

Plot6

5 Kilometer Buffer Hard Cutoff with 90% Forest Den



5km Hard Comparison

80% Threshold

```

Near5kmH80Data <- Near5kmHard80 %>%
  mutate(PID = IN_FID,

```

```

    Neigh_Dist = NEAR_DIST
  ) %>%
select(PID, Neigh_Dist)

FacPat5H80Data <- PatDist5kmHard80 %>%
  mutate(Buffer = factor("Hard5km"), Density = factor("80"),
         #Rename factors, convert to factors, and rename levels
         PID = FID,
         AREA = Area,
         MEAN_RES = MEAN,
         Near_DIST = NEAR_DIST
  ) %>%
  select(PID, Buffer, Density, AREA, MEAN_RES, Near_DIST)

H5km80Data <- list(FacPat5H80Data, Near5kmH80Data)
FacPat5H80Data <- H5km80Data %>% reduce(inner_join, by='PID')

P1 <- ggplot(FacPat5H80Data, aes(x = MEAN_RES, y = AREA)) +
  geom_point() +
  theme_classic() +
  scale_y_continuous(trans = log10_trans(),
                    breaks = trans_breaks("log10", function(x) 10^x),
                    labels = trans_format("log10", math_format(10^.x))) +
  scale_x_continuous(breaks = seq(from = 0, to = 5, by = 1)) +
  xlab("Patch Mean Resistance") +
  ylab("Log (Patch Area)") +
  ggtitle("Log Transformed Patch Area Relative to Patch Resistance") +
  theme(plot.title=element_text(size = 8, face = 'bold'),
        axis.title=element_text(size=7), axis.text=element_text(size=6
  )) +
  geom_smooth(method = "lm", se = FALSE)

P2 <- ggplot(FacPat5H80Data, aes(x = Near_DIST, y = AREA)) +
  geom_point() +
  theme_classic() +
  scale_y_continuous(trans = log10_trans(),
                    breaks = trans_breaks("log10", function(x) 10^x),
                    labels = trans_format("log10", math_format(10^.x))) +
  xlab("Distance from LCP (m)") +
  ylab("Log (Patch Area)") +
  ggtitle("Log Transformed Patch Area Relative to Distance from LCP") +
  theme(plot.title=element_text(size = 8, face = 'bold'),
        axis.title=element_text(size=7), axis.text=element_text(size=6
  )) +
  geom_smooth(method = "lm", se = FALSE)

P3 <- ggplot(FacPat5H80Data, aes(x = Neigh_Dist, y = AREA)) +
  geom_point() +

```

```

theme_classic() +
scale_y_continuous(trans = log10_trans(),
breaks = trans_breaks("log10", function(x) 10^x),
labels = trans_format("log10", math_format(10^.x))) +
xlab("Distance from Nearest Neighbor (m)") +
ylab("Log (Patch Area)") +
ggtitle("Log Transformed Patch Area Relative to
Distance from Nearest Neighbor") +
theme(plot.title=element_text(size = 8, face = 'bold'),
axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
geom_smooth(method = "lm", se = FALSE)

P4 <- ggplot(FacPat5H80Data, aes(x = Near_DIST, y = MEAN_RES)) +
geom_point() +
theme_classic() +
xlab("Distance from LCP (m)") +
ylab("Patch Mean Resistance") +
ggtitle("Patch Resistance Relative to Distance from LCP") +
theme(plot.title=element_text(size = 8, face = 'bold'),
axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
geom_smooth(method = "lm", se = FALSE)

P5 <- ggplot(FacPat5H80Data, aes(x = Neigh_Dist, y = MEAN_RES)) +
geom_point() +
theme_classic() +
xlab("Distance from Nearest Neighbor (m)") +
ylab("Patch Mean Resistance") +
ggtitle("Patch Resistance Relative to Distance from Nearest Neighbor"
) +
theme(plot.title=element_text(size = 8, face = 'bold'),
axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
geom_smooth(method = "lm", se = FALSE)

P6 <- ggplot(FacPat5H80Data, aes(x = Neigh_Dist, y = Near_DIST)) +
geom_point() +
theme_classic() +
xlab("Distance from Nearest Neighbor (m)") +
ylab("Distance from LCP (m)") +
ggtitle("Patch Distance from LCP Relative to
Distance from Nearest Neighbor") +
theme(plot.title=element_text(size = 8, face = 'bold'),
axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
geom_smooth(method = "lm", se = FALSE)

plot <- plot_grid(P1, P3, P2, P5, P4, P6,

```

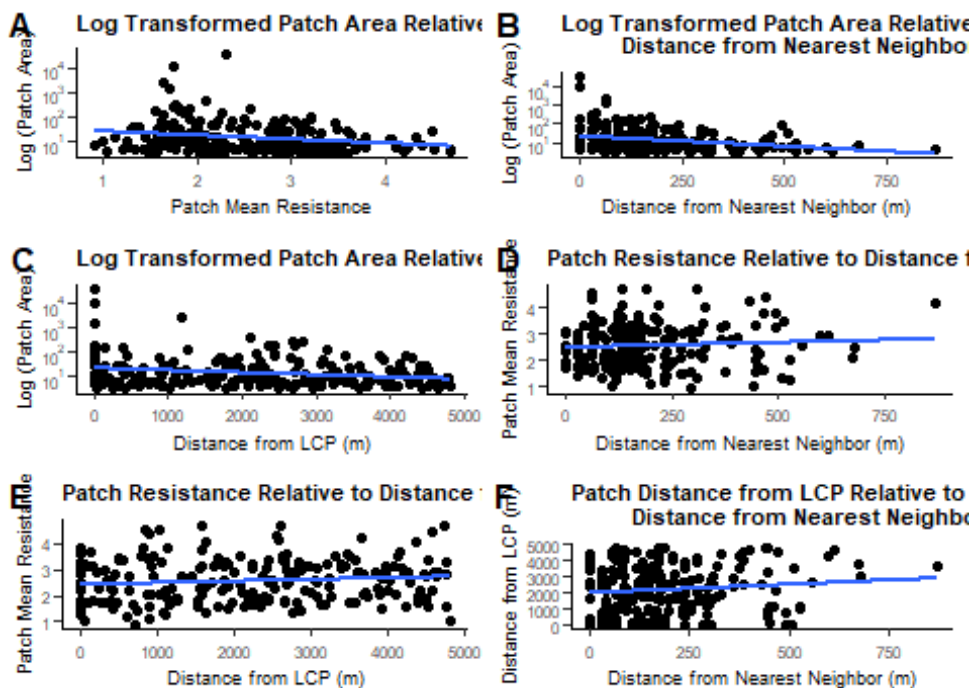
```

      labels = c('A', 'B', 'C', 'D', 'E', 'F'),
      label_size = 12, ncol = 2)
title <- ggdraw() +
  draw_label(
    "5 Kilometer Buffer Hard Cutoff with 80% Forest Density",
    fontface = 'bold',
    x = 0,
    hjust = 0
  ) +
  theme(
    # add margin on the left of the drawing canvas,
    # so title is aligned with left edge of first plot
    plot.margin = margin(0, 0, 0, 7)
  )
Plot7 <- plot_grid(
  title, plot,
  ncol = 1,
  # rel_heights values control vertical title margins
  rel_heights = c(0.1, 1)
)
save_plot("Plot7.tiff", Plot7, base_height = 10, base_width = 10)

```

Plot7

5 Kilometer Buffer Hard Cutoff with 80% Forest Den



5km Hard Comparison

70% Threshold

```
Near5kmH70Data <- Near5kmHard70 %>%
  mutate(PID = IN_FID,
         Neigh_Dist = NEAR_DIST
        ) %>%
  select(PID, Neigh_Dist)

FacPat5H70Data <- PatDist5kmHard70 %>%
  mutate(Buffer = factor("Hard5km"), Density = factor("70"),
         #Rename factors, convert to factors, and rename levels
         PID = FID,
         AREA = Area,
         MEAN_RES = MEAN,
         Near_DIST = NEAR_DIST
        ) %>%
  select(PID, Buffer, Density, AREA, MEAN_RES, Near_DIST)

H5km70Data <- list(FacPat5H70Data, Near5kmH70Data)
FacPat5H70Data <- H5km70Data %>% reduce(inner_join, by='PID')

P1 <- ggplot(FacPat5H70Data, aes(x = MEAN_RES, y = AREA)) +
  geom_point() +
  theme_classic() +
  scale_y_continuous(trans = log10_trans(),
                    breaks = trans_breaks("log10", function(x) 10^x),
                    labels = trans_format("log10", math_format(10^.x))) +
  scale_x_continuous(breaks = seq(from = 0, to = 5, by = 1)) +
  xlab("Patch Mean Resistance") +
  ylab("Log (Patch Area)") +
  ggtitle("Log Transformed Patch Area Relative to Patch Resistance") +
  theme(plot.title=element_text(size = 8, face = 'bold'),
        axis.title=element_text(size=7), axis.text=element_text(size=6)) +
  geom_smooth(method = "lm", se = FALSE)

P2 <- ggplot(FacPat5H70Data, aes(x = Near_DIST, y = AREA)) +
  geom_point() +
  theme_classic() +
  scale_y_continuous(trans = log10_trans(),
                    breaks = trans_breaks("log10", function(x) 10^x),
                    labels = trans_format("log10", math_format(10^.x))) +
  xlab("Distance from LCP (m)") +
  ylab("Log (Patch Area)") +
  ggtitle("Log Transformed Patch Area Relative to Distance from LCP") +
  theme(plot.title=element_text(size = 8, face = 'bold'),
```



```

        axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
  geom_smooth(method = "lm", se = FALSE)
P3 <- ggplot(FacPat5H70Data, aes(x = Neigh_Dist, y = AREA)) +
  geom_point() +
  theme_classic() +
  scale_y_continuous(trans = log10_trans(),
breaks = trans_breaks("log10", function(x) 10^x),
labels = trans_format("log10", math_format(10^.x))) +
  xlab("Distance from Nearest Neighbor (m)") +
  ylab("Log (Patch Area)") +
  ggtitle("Log Transformed Patch Area Relative to
Distance from Nearest Neighbor") +
  theme(plot.title=element_text(size = 8, face = 'bold'),
axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
  geom_smooth(method = "lm", se = FALSE)
P4 <- ggplot(FacPat5H70Data, aes(x = Near_DIST, y = MEAN_RES)) +
  geom_point() +
  theme_classic() +
  xlab("Distance from LCP (m)") +
  ylab("Patch Mean Resistance") +
  ggtitle("Patch Resistance Relative to Distance from LCP") +
  theme(plot.title=element_text(size = 8, face = 'bold'),
axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
  geom_smooth(method = "lm", se = FALSE)
P5 <- ggplot(FacPat5H70Data, aes(x = Neigh_Dist, y = MEAN_RES)) +
  geom_point() +
  theme_classic() +
  xlab("Distance from Nearest Neighbor (m)") +
  ylab("Patch Mean Resistance") +
  ggtitle("Patch Resistance Relative to Distance from Nearest Neighbor"
) +
  theme(plot.title=element_text(size = 8, face = 'bold'),
axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
  geom_smooth(method = "lm", se = FALSE)
P6 <- ggplot(FacPat5H70Data, aes(x = Neigh_Dist, y = Near_DIST)) +
  geom_point() +
  theme_classic() +
  xlab("Distance from Nearest Neighbor (m)") +
  ylab("Distance from LCP (m)") +
  ggtitle("Patch Distance from LCP Relative to
Distance from Nearest Neighbor") +

```

```

    theme( plot.title=element_text( size = 8, face = 'bold'),
           axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
  geom_smooth(method = "lm", se = FALSE)

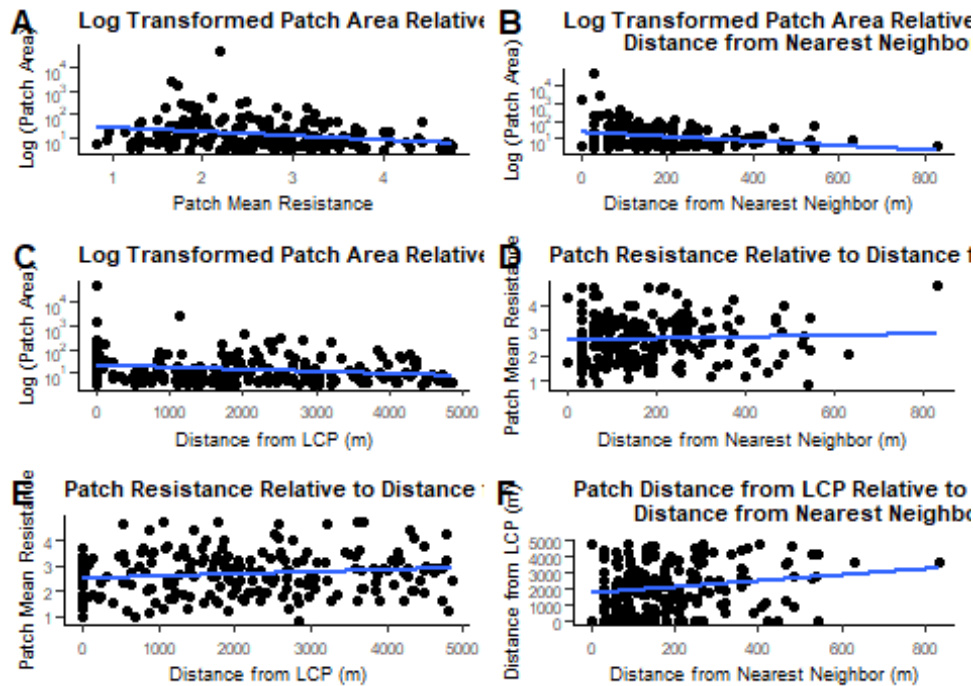
plot <- plot_grid(P1, P3, P2, P5, P4, P6,
                 labels = c('A', 'B', 'C', 'D', 'E', 'F'),
                 label_size = 12, ncol = 2)
title <- ggdraw() +
  draw_label(
    "5 Kilometer Buffer Hard Cutoff with 70% Forest Density",
    fontface = 'bold',
    x = 0,
    hjust = 0
  ) +
  theme(
    # add margin on the left of the drawing canvas,
    # so title is aligned with left edge of first plot
    plot.margin = margin(0, 0, 0, 7)
  )

Plot8 <- plot_grid(
  title, plot,
  ncol = 1,
  # rel_heights values control vertical title margins
  rel_heights = c(0.1, 1)
)
save_plot("Plot8.tiff", Plot8, base_height = 10, base_width = 10)

Plot8

```

5 Kilometer Buffer Hard Cutoff with 70% Forest Den



5km Hard Comparison

60% Threshold

```
Near5kmH60Data <- Near5kmHard60 %>%
  mutate(PID = IN_FID,
         Neigh_Dist = NEAR_DIST
        ) %>%
  select(PID, Neigh_Dist)

FacPat5H60Data <- PatDist5kmHard60 %>%
  mutate(Buffer = factor("Hard5km"), Density = factor("60"),
         #Rename factors, convert to factors, and rename levels
         PID = FID,
         AREA = Area,
         MEAN_RES = MEAN,
         Near_DIST = NEAR_DIST
        ) %>%
  select(PID, Buffer, Density, AREA, MEAN_RES, Near_DIST)

H5km60Data <- list(FacPat5H60Data, Near5kmH60Data)
FacPat5H60Data <- H5km60Data %>% reduce(inner_join, by='PID')

P1 <- ggplot(FacPat5H60Data, aes(x = MEAN_RES, y = AREA)) +
  geom_point() +
```

```

theme_classic() +
scale_y_continuous(trans = log10_trans(),
breaks = trans_breaks("log10", function(x) 10^x),
labels = trans_format("log10", math_format(10^.x))) +
scale_x_continuous(breaks = seq(from = 0, to = 5, by = 1)) +
xlab("Patch Mean Resistance") +
ylab("Log (Patch Area)") +
ggtitle("Log Transformed Patch Area Relative to Patch Resistance") +
theme(plot.title=element_text(size = 8, face = 'bold'),
axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
geom_smooth(method = "lm", se = FALSE)

P2 <- ggplot(FacPat5H60Data, aes(x = Near_DIST, y = AREA)) +
geom_point() +
theme_classic() +
scale_y_continuous(trans = log10_trans(),
breaks = trans_breaks("log10", function(x) 10^x),
labels = trans_format("log10", math_format(10^.x))) +
xlab("Distance from LCP (m)") +
ylab("Log (Patch Area)") +
ggtitle("Log Transformed Patch Area Relative to Distance from LCP") +
theme(plot.title=element_text(size = 8, face = 'bold'),
axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
geom_smooth(method = "lm", se = FALSE)

P3 <- ggplot(FacPat5H60Data, aes(x = Neigh_Dist, y = AREA)) +
geom_point() +
theme_classic() +
scale_y_continuous(trans = log10_trans(),
breaks = trans_breaks("log10", function(x) 10^x),
labels = trans_format("log10", math_format(10^.x))) +
xlab("Distance from Nearest Neighbor (m)") +
ylab("Log (Patch Area)") +
ggtitle("Log Transformed Patch Area Relative to
Distance from Nearest Neighbor") +
theme(plot.title=element_text(size = 8, face = 'bold'),
axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
geom_smooth(method = "lm", se = FALSE)

P4 <- ggplot(FacPat5H60Data, aes(x = Near_DIST, y = MEAN_RES)) +
geom_point() +
theme_classic() +
xlab("Distance from LCP (m)") +
ylab("Patch Mean Resistance") +
ggtitle("Patch Resistance Relative to Distance from LCP") +
theme(plot.title=element_text(size = 8, face = 'bold'),

```

```

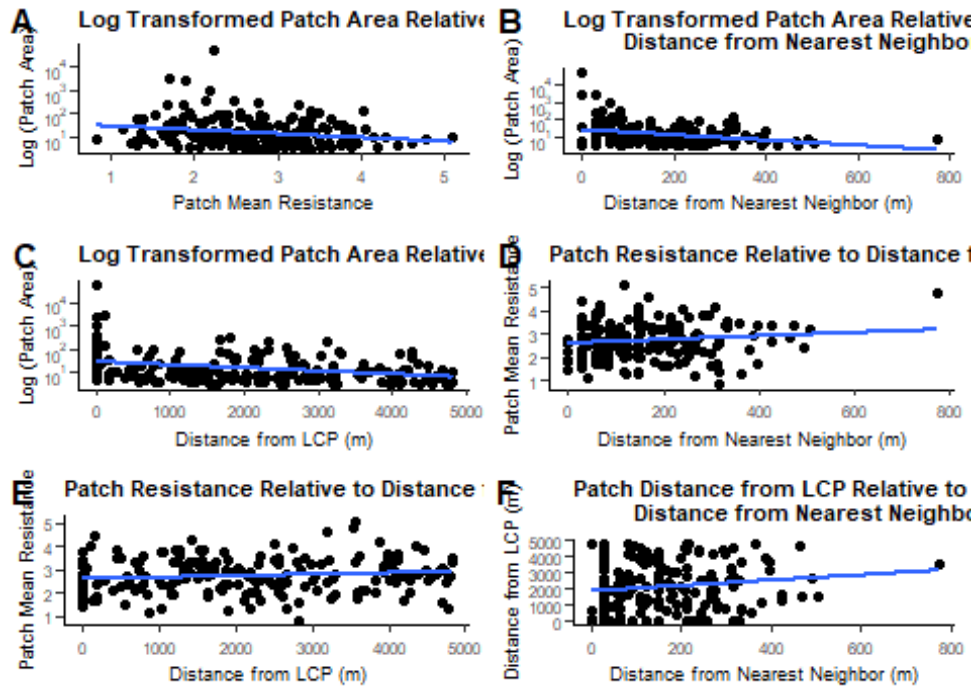
        axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
  geom_smooth(method = "lm", se = FALSE)
P5 <- ggplot(FacPat5H60Data, aes(x = Neigh_Dist, y = MEAN_RES)) +
  geom_point() +
  theme_classic() +
  xlab("Distance from Nearest Neighbor (m)") +
  ylab("Patch Mean Resistance") +
  ggtitle("Patch Resistance Relative to Distance from Nearest Neighbor"
) +
  theme( plot.title=element_text( size = 8, face = 'bold'),
        axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
  geom_smooth(method = "lm", se = FALSE)
P6 <- ggplot(FacPat5H60Data, aes(x = Neigh_Dist, y = Near_DIST)) +
  geom_point() +
  theme_classic() +
  xlab("Distance from Nearest Neighbor (m)") +
  ylab("Distance from LCP (m)") +
  ggtitle("Patch Distance from LCP Relative to
          Distance from Nearest Neighbor") +
  theme( plot.title=element_text( size = 8, face = 'bold'),
        axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
  geom_smooth(method = "lm", se = FALSE)
plot <- plot_grid(P1, P3, P2, P5, P4, P6,
                 labels = c('A', 'B', 'C', 'D', 'E', 'F'),
                 label_size = 12, ncol = 2)
title <- ggdraw() +
  draw_label(
    "5 Kilometer Buffer Hard Cutoff with 60% Forest Density",
    fontface = 'bold',
    x = 0,
    hjust = 0
  ) +
  theme(
    # add margin on the left of the drawing canvas,
    # so title is aligned with left edge of first plot
    plot.margin = margin(0, 0, 0, 7)
  )
Plot9 <- plot_grid(
  title, plot,
  ncol = 1,
  # rel_heights values control vertical title margins
  rel_heights = c(0.1, 1)

```

```
)
save_plot("Plot9.tiff", Plot9, base_height = 10, base_width = 10)
```

Plot9

5 Kilometer Buffer Hard Cutoff with 60% Forest Den



5km Hard Comparison

50% Threshold

```
Near5kmH50Data <- Near5kmHard50 %>%
  mutate(PID = IN_FID,
         Neigh_Dist = NEAR_DIST
        ) %>%
  select(PID, Neigh_Dist)

FacPat5H50Data <- PatDist5kmHard50 %>%
  mutate(Buffer = factor("Hard5km"), Density = factor("50"),
         #Rename factors, convert to factors, and rename Levels
         PID = FID,
         AREA = Area,
         MEAN_RES = MEAN,
         Near_DIST = NEAR_DIST
        ) %>%
  select(PID, Buffer, Density, AREA, MEAN_RES, Near_DIST)

H5km50Data <- list(FacPat5H50Data, Near5kmH50Data)
```

```

FacPat5H50Data <- H5km50Data %>% reduce(inner_join, by='PID')

P1 <- ggplot(FacPat5H50Data, aes(x = MEAN_RES, y = AREA)) +
  geom_point() +
  theme_classic() +
  scale_y_continuous(trans = log10_trans(),
    breaks = trans_breaks("log10", function(x) 10^x),
    labels = trans_format("log10", math_format(10^.x))) +
  scale_x_continuous(breaks = seq(from = 0, to = 5, by = 1)) +
  xlab("Patch Mean Resistance") +
  ylab("Log (Patch Area)") +
  ggtitle("Log Transformed Patch Area Relative to Patch Resistance") +
  theme(plot.title=element_text(size = 8, face = 'bold'),
    axis.title=element_text(size=7), axis.text=element_text(size=6
  )) +
  geom_smooth(method = "lm", se = FALSE)

P2 <- ggplot(FacPat5H50Data, aes(x = Near_DIST, y = AREA)) +
  geom_point() +
  theme_classic() +
  scale_y_continuous(trans = log10_trans(),
    breaks = trans_breaks("log10", function(x) 10^x),
    labels = trans_format("log10", math_format(10^.x))) +
  xlab("Distance from LCP (m)") +
  ylab("Log (Patch Area)") +
  ggtitle("Log Transformed Patch Area Relative to Distance from LCP") +
  theme(plot.title=element_text(size = 8, face = 'bold'),
    axis.title=element_text(size=7), axis.text=element_text(size=6
  )) +
  geom_smooth(method = "lm", se = FALSE)

P3 <- ggplot(FacPat5H50Data, aes(x = Neigh_Dist, y = AREA)) +
  geom_point() +
  theme_classic() +
  scale_y_continuous(trans = log10_trans(),
    breaks = trans_breaks("log10", function(x) 10^x),
    labels = trans_format("log10", math_format(10^.x))) +
  xlab("Distance from Nearest Neighbor (m)") +
  ylab("Log (Patch Area)") +
  ggtitle("Log Transformed Patch Area Relative to
    Distance from Nearest Neighbor") +
  theme(plot.title=element_text(size = 8, face = 'bold'),
    axis.title=element_text(size=7), axis.text=element_text(size=6
  )) +
  geom_smooth(method = "lm", se = FALSE)

P4 <- ggplot(FacPat5H50Data, aes(x = Near_DIST, y = MEAN_RES)) +
  geom_point() +

```

```

theme_classic() +
xlab("Distance from LCP (m)") +
ylab("Patch Mean Resistance") +
ggtitle("Patch Resistance Relative to Distance from LCP") +
theme( plot.title=element_text( size = 8, face = 'bold'),
        axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
geom_smooth(method = "lm", se = FALSE)

P5 <- ggplot(FacPat5H50Data, aes(x = Neigh_Dist, y = MEAN_RES)) +
geom_point() +
theme_classic() +
xlab("Distance from Nearest Neighbor (m)") +
ylab("Patch Mean Resistance") +
ggtitle("Patch Resistance Relative to Distance from Nearest Neighbor"
) +
theme( plot.title=element_text( size = 8, face = 'bold'),
        axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
geom_smooth(method = "lm", se = FALSE)

P6 <- ggplot(FacPat5H50Data, aes(x = Neigh_Dist, y = Near_DIST)) +
geom_point() +
theme_classic() +
xlab("Distance from Nearest Neighbor (m)") +
ylab("Distance from LCP (m)") +
ggtitle("Patch Distance from LCP Relative to
        Distance from Nearest Neighbor") +
theme( plot.title=element_text( size = 8, face = 'bold'),
        axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
geom_smooth(method = "lm", se = FALSE)

plot <- plot_grid(P1, P3, P2, P5, P4, P6,
                 labels = c('A', 'B', 'C', 'D', 'E', 'F'),
                 label_size = 12, ncol = 2)

title <- ggdraw() +
draw_label(
  "5 Kilometer Buffer Hard Cutoff with 50% Forest Density",
  fontface = 'bold',
  x = 0,
  hjust = 0
) +
theme(
  # add margin on the left of the drawing canvas,
  # so title is aligned with left edge of first plot
  plot.margin = margin(0, 0, 0, 7)
)

```



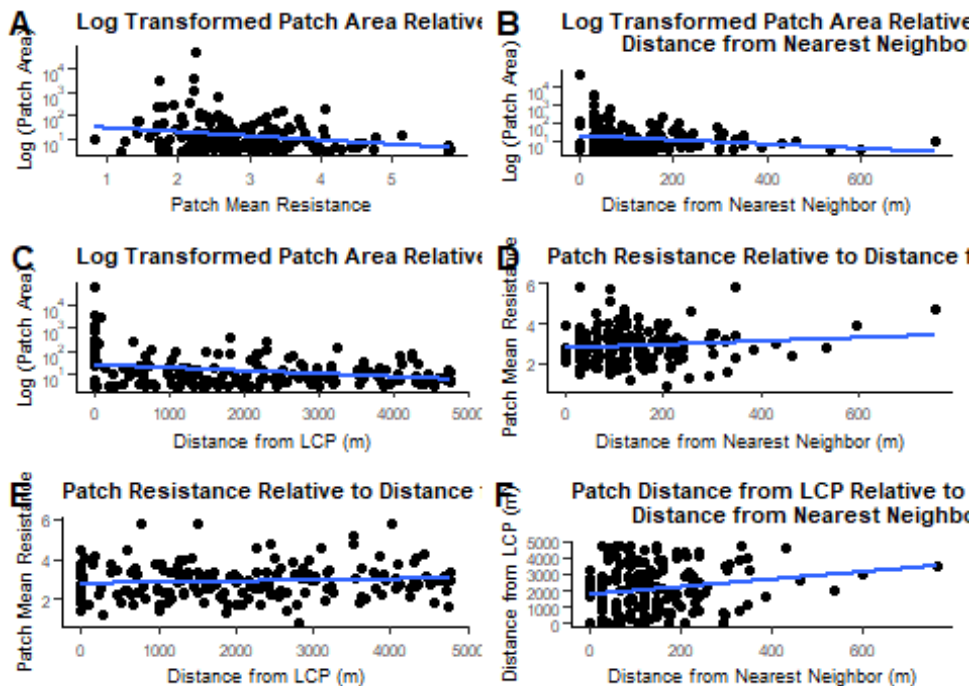
```

Plot10 <- plot_grid(
  title, plot,
  ncol = 1,
  # rel_heights values control vertical title margins
  rel_heights = c(0.1, 1)
)
save_plot("Plot10.tiff", Plot10, base_height = 10, base_width = 10)

```

Plot10

5 Kilometer Buffer Hard Cutoff with 50% Forest Den



10km Hard Comparison

90% Threshold

```

Near10kmH90Data <- Near10kmHard90 %>%
  mutate(PID = IN_FID,
         Neigh_Dist = NEAR_DIST
        ) %>%
  select(PID, Neigh_Dist)

FacPat10H90Data <- PatDist10kmHard90 %>%
  mutate(Buffer = factor("Hard10km"), Density = factor("90"),
         #Rename factors, convert to factors, and rename levels
         PID = FID,
         AREA = Area,
         MEAN_RES = MEAN,

```

```

Near_DIST = NEAR_DIST
) %>%
select(PID, Buffer, Density, AREA, MEAN_RES, Near_DIST)

H10km90Data <- list(FacPat10H90Data, Near10kmH90Data)
FacPat10H90Data <- H10km90Data %>% reduce(inner_join, by='PID')

P1 <- ggplot(FacPat10H90Data, aes(x = MEAN_RES, y = AREA)) +
  geom_point() +
  theme_classic() +
  scale_y_continuous(trans = log10_trans(),
breaks = trans_breaks("log10", function(x) 10^x),
labels = trans_format("log10", math_format(10^.x))) +
  scale_x_continuous(breaks = seq(from = 0, to = 5, by = 1)) +
  xlab("Patch Mean Resistance") +
  ylab("Log (Patch Area)") +
  ggtitle("Log Transformed Patch Area Relative to Patch Resistance") +
  theme(plot.title=element_text(size = 8, face = 'bold'),
axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
  geom_smooth(method = "lm", se = FALSE)

P2 <- ggplot(FacPat10H90Data, aes(x = Near_DIST, y = AREA)) +
  geom_point() +
  theme_classic() +
  scale_y_continuous(trans = log10_trans(),
breaks = trans_breaks("log10", function(x) 10^x),
labels = trans_format("log10", math_format(10^.x))) +
  xlab("Distance from LCP (m)") +
  ylab("Log (Patch Area)") +
  ggtitle("Log Transformed Patch Area Relative to Distance from LCP") +
  theme(plot.title=element_text(size = 8, face = 'bold'),
axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
  geom_smooth(method = "lm", se = FALSE)

P3 <- ggplot(FacPat10H90Data, aes(x = Neigh_Dist, y = AREA)) +
  geom_point() +
  theme_classic() +
  scale_y_continuous(trans = log10_trans(),
breaks = trans_breaks("log10", function(x) 10^x),
labels = trans_format("log10", math_format(10^.x))) +
  xlab("Distance from Nearest Neighbor (m)") +
  ylab("Log (Patch Area)") +
  ggtitle("Log Transformed Patch Area Relative to
Distance from Nearest Neighbor") +
  theme(plot.title=element_text(size = 8, face = 'bold'),
axis.title=element_text(size=7), axis.text=element_text(size=6

```

```

)) +
  geom_smooth(method = "lm", se = FALSE)

P4 <- ggplot(FacPat10H90Data, aes(x = Near_DIST, y = MEAN_RES)) +
  geom_point() +
  theme_classic() +
  xlab("Distance from LCP (m)") +
  ylab("Patch Mean Resistance") +
  ggtitle("Patch Resistance Relative to Distance from LCP") +
  theme(plot.title=element_text(size = 8, face = 'bold'),
        axis.title=element_text(size=7), axis.text=element_text(size=6)
  ) +
  geom_smooth(method = "lm", se = FALSE)

P5 <- ggplot(FacPat10H90Data, aes(x = Neigh_Dist, y = MEAN_RES)) +
  geom_point() +
  theme_classic() +
  xlab("Distance from Nearest Neighbor (m)") +
  ylab("Patch Mean Resistance") +
  ggtitle("Patch Resistance Relative to Distance from Nearest Neighbor"
  ) +
  theme(plot.title=element_text(size = 8, face = 'bold'),
        axis.title=element_text(size=7), axis.text=element_text(size=6)
  ) +
  geom_smooth(method = "lm", se = FALSE)

P6 <- ggplot(FacPat10H90Data, aes(x = Neigh_Dist, y = Near_DIST)) +
  geom_point() +
  theme_classic() +
  xlab("Distance from Nearest Neighbor (m)") +
  ylab("Distance from LCP (m)") +
  ggtitle("Patch Distance from LCP Relative to
          Distance from Nearest Neighbor") +
  theme(plot.title=element_text(size = 8, face = 'bold'),
        axis.title=element_text(size=7), axis.text=element_text(size=6)
  ) +
  geom_smooth(method = "lm", se = FALSE)

plot <- plot_grid(P1, P3, P2, P5, P4, P6,
                  labels = c('A', 'B', 'C', 'D', 'E', 'F'),
                  label_size = 12, ncol = 2)

title <- ggdraw() +
  draw_label(
    "10 Kilometer Buffer Hard Cutoff with 90% Forest Density",
    fontface = 'bold',
    x = 0,
    hjust = 0
  ) +
  theme(

```

```

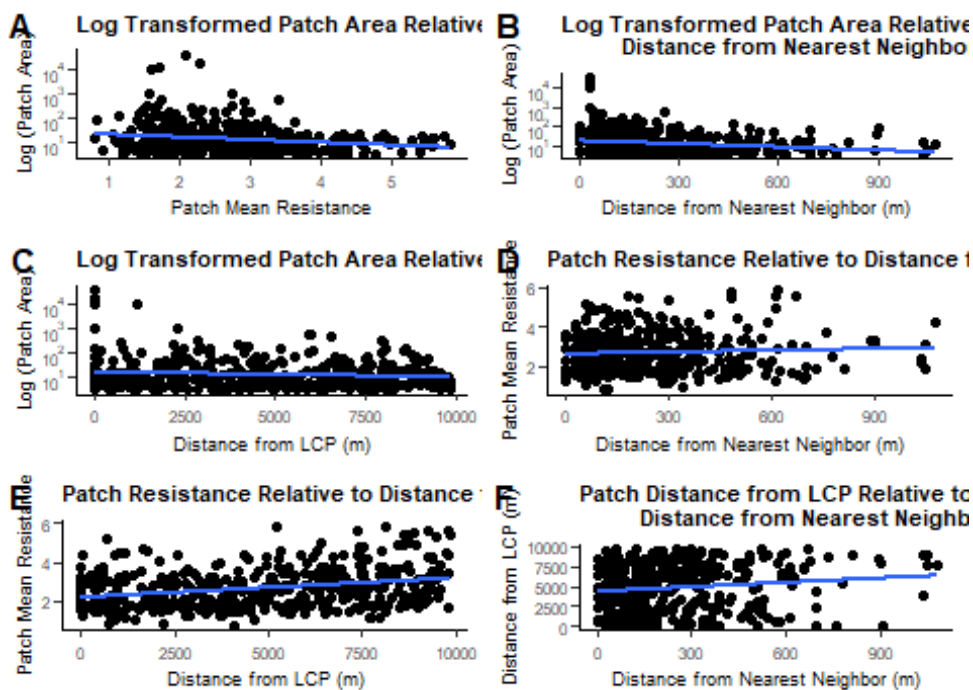
# add margin on the left of the drawing canvas,
# so title is aligned with left edge of first plot
plot.margin = margin(0, 0, 0, 7)
)

Plot11 <- plot_grid(
  title, plot,
  ncol = 1,
  # rel_heights values control vertical title margins
  rel_heights = c(0.1, 1)
)
save_plot("Plot11.tiff", Plot11, base_height = 10, base_width = 10)

Plot11

```

10 Kilometer Buffer Hard Cutoff with 90% Forest De



10km Hard Comparison

80% Threshold

```

Near10kmH80Data <- Near10kmHard80 %>%
  mutate(PID = IN_FID,
         Neigh_Dist = NEAR_DIST
        ) %>%
  select(PID, Neigh_Dist)

FacPat10H80Data <- PatDist10kmHard80 %>%

```

```

mutate(Buffer = factor("Hard10km"), Density = factor("80"),
       #Rename factors, convert to factors, and rename Levels
       PID = FID,
       AREA = Area,
       MEAN_RES = MEAN,
       Near_DIST = NEAR_DIST
       ) %>%
select(PID, Buffer, Density, AREA, MEAN_RES, Near_DIST)

H10km80Data <- list(FacPat10H80Data, Near10kmH80Data)
FacPat10H80Data <- H10km80Data %>% reduce(inner_join, by='PID')

P1 <- ggplot(FacPat10H80Data, aes(x = MEAN_RES, y = AREA)) +
  geom_point() +
  theme_classic() +
  scale_y_continuous(trans = log10_trans(),
                    breaks = trans_breaks("log10", function(x) 10^x),
                    labels = trans_format("log10", math_format(10^.x))) +
  scale_x_continuous(breaks = seq(from = 0, to = 5, by = 1)) +
  xlab("Patch Mean Resistance") +
  ylab("Log (Patch Area)") +
  ggtitle("Log Transformed Patch Area Relative to Patch Resistance") +
  theme(plot.title=element_text(size = 8, face = 'bold'),
        axis.title=element_text(size=7), axis.text=element_text(size=6)) +
  geom_smooth(method = "lm", se = FALSE)

P2 <- ggplot(FacPat10H80Data, aes(x = Near_DIST, y = AREA)) +
  geom_point() +
  theme_classic() +
  scale_y_continuous(trans = log10_trans(),
                    breaks = trans_breaks("log10", function(x) 10^x),
                    labels = trans_format("log10", math_format(10^.x))) +
  xlab("Distance from LCP (m)") +
  ylab("Log (Patch Area)") +
  ggtitle("Log Transformed Patch Area Relative to Distance from LCP") +
  theme(plot.title=element_text(size = 8, face = 'bold'),
        axis.title=element_text(size=7), axis.text=element_text(size=6)) +
  geom_smooth(method = "lm", se = FALSE)

P3 <- ggplot(FacPat10H80Data, aes(x = Neigh_Dist, y = AREA)) +
  geom_point() +
  theme_classic() +
  scale_y_continuous(trans = log10_trans(),
                    breaks = trans_breaks("log10", function(x) 10^x),
                    labels = trans_format("log10", math_format(10^.x))) +
  xlab("Distance from Nearest Neighbor (m)") +

```

```

ylab("Log (Patch Area)") +
ggtitle("Log Transformed Patch Area Relative to
        Distance from Nearest Neighbor") +
theme( plot.title=element_text( size = 8, face = 'bold'),
        axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
geom_smooth(method = "lm", se = FALSE)

P4 <- ggplot(FacPat10H80Data, aes(x = Near_DIST, y = MEAN_RES)) +
geom_point() +
theme_classic() +
xlab("Distance from LCP (m)") +
ylab("Patch Mean Resistance") +
ggtitle("Patch Resistance Relative to Distance from LCP") +
theme( plot.title=element_text( size = 8, face = 'bold'),
        axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
geom_smooth(method = "lm", se = FALSE)

P5 <- ggplot(FacPat10H80Data, aes(x = Neigh_Dist, y = MEAN_RES)) +
geom_point() +
theme_classic() +
xlab("Distance from Nearest Neighbor (m)") +
ylab("Patch Mean Resistance") +
ggtitle("Patch Resistance Relative to Distance from Nearest Neighbor"
) +
theme( plot.title=element_text( size = 8, face = 'bold'),
        axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
geom_smooth(method = "lm", se = FALSE)

P6 <- ggplot(FacPat10H80Data, aes(x = Neigh_Dist, y = Near_DIST)) +
geom_point() +
theme_classic() +
xlab("Distance from Nearest Neighbor (m)") +
ylab("Distance from LCP (m)") +
ggtitle("Patch Distance from LCP Relative to
        Distance from Nearest Neighbor") +
theme( plot.title=element_text( size = 8, face = 'bold'),
        axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
geom_smooth(method = "lm", se = FALSE)

plot <- plot_grid(P1, P3, P2, P5, P4, P6,
                  labels = c('A', 'B', 'C', 'D', 'E', 'F'),
                  label_size = 12, ncol = 2)
title <- ggdraw() +
draw_label(
"10 Kilometer Buffer Hard Cutoff with 80% Forest Density",

```

```

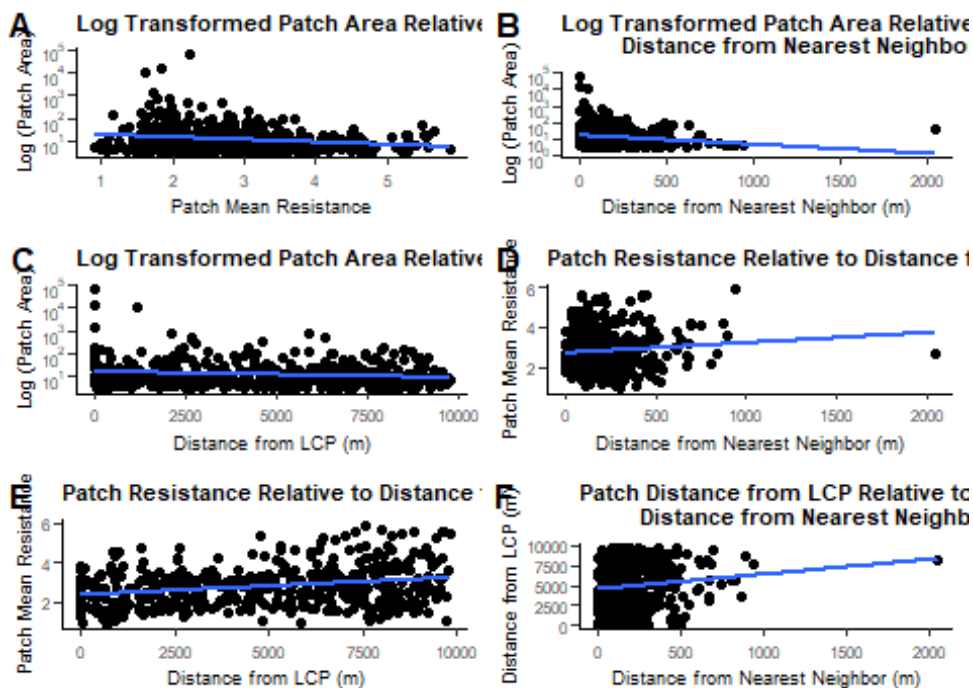
fontface = 'bold',
x = 0,
hjust = 0
) +
theme(
  # add margin on the left of the drawing canvas,
  # so title is aligned with left edge of first plot
  plot.margin = margin(0, 0, 0, 7)
)

Plot12 <- plot_grid(
  title, plot,
  ncol = 1,
  # rel_heights values control vertical title margins
  rel_heights = c(0.1, 1)
)
save_plot("Plot12.tiff", Plot12, base_height = 10, base_width = 10)

```

Plot12

10 Kilometer Buffer Hard Cutoff with 80% Forest De



10km Hard Comparison

70% Threshold

```

Near10kmH70Data <- Near10kmHard70 %>%
  mutate(PID = IN_FID,

```

```

    Neigh_Dist = NEAR_DIST
  ) %>%
select(PID, Neigh_Dist)

FacPat10H70Data <- PatDist10kmHard70 %>%
  mutate(Buffer = factor("Hard10km"), Density = factor("70"),
         #Rename factors, convert to factors, and rename levels
         PID = FID,
         AREA = Area,
         MEAN_RES = MEAN,
         Near_DIST = NEAR_DIST
  ) %>%
  select(PID, Buffer, Density, AREA, MEAN_RES, Near_DIST)

H10km70Data <- list(FacPat10H70Data, Near10kmH70Data)
FacPat10H70Data <- H10km70Data %>% reduce(inner_join, by='PID')

P1 <- ggplot(FacPat10H70Data, aes(x = MEAN_RES, y = AREA)) +
  geom_point() +
  theme_classic() +
  scale_y_continuous(trans = log10_trans(),
                    breaks = trans_breaks("log10", function(x) 10^x),
                    labels = trans_format("log10", math_format(10^.x))) +
  scale_x_continuous(breaks = seq(from = 0, to = 5, by = 1)) +
  xlab("Patch Mean Resistance") +
  ylab("Log (Patch Area)") +
  ggtitle("Log Transformed Patch Area Relative to Patch Resistance") +
  theme(plot.title=element_text(size = 8, face = 'bold'),
        axis.title=element_text(size=7), axis.text=element_text(size=6
  )) +
  geom_smooth(method = "lm", se = FALSE)

P2 <- ggplot(FacPat10H70Data, aes(x = Near_DIST, y = AREA)) +
  geom_point() +
  theme_classic() +
  scale_y_continuous(trans = log10_trans(),
                    breaks = trans_breaks("log10", function(x) 10^x),
                    labels = trans_format("log10", math_format(10^.x))) +
  xlab("Distance from LCP (m)") +
  ylab("Log (Patch Area)") +
  ggtitle("Log Transformed Patch Area Relative to Distance from LCP") +
  theme(plot.title=element_text(size = 8, face = 'bold'),
        axis.title=element_text(size=7), axis.text=element_text(size=6
  )) +
  geom_smooth(method = "lm", se = FALSE)

P3 <- ggplot(FacPat10H70Data, aes(x = Neigh_Dist, y = AREA)) +
  geom_point() +

```



```

theme_classic() +
scale_y_continuous(trans = log10_trans(),
breaks = trans_breaks("log10", function(x) 10^x),
labels = trans_format("log10", math_format(10^.x))) +
xlab("Distance from Nearest Neighbor (m)") +
ylab("Log (Patch Area)") +
ggtitle("Log Transformed Patch Area Relative to
Distance from Nearest Neighbor") +
theme(plot.title=element_text(size = 8, face = 'bold'),
axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
geom_smooth(method = "lm", se = FALSE)

P4 <- ggplot(FacPat10H70Data, aes(x = Near_DIST, y = MEAN_RES)) +
geom_point() +
theme_classic() +
xlab("Distance from LCP (m)") +
ylab("Patch Mean Resistance") +
ggtitle("Patch Resistance Relative to Distance from LCP") +
theme(plot.title=element_text(size = 8, face = 'bold'),
axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
geom_smooth(method = "lm", se = FALSE)

P5 <- ggplot(FacPat10H70Data, aes(x = Neigh_Dist, y = MEAN_RES)) +
geom_point() +
theme_classic() +
xlab("Distance from Nearest Neighbor (m)") +
ylab("Patch Mean Resistance") +
ggtitle("Patch Resistance Relative to Distance from Nearest Neighbor"
) +
theme(plot.title=element_text(size = 8, face = 'bold'),
axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
geom_smooth(method = "lm", se = FALSE)

P6 <- ggplot(FacPat10H70Data, aes(x = Neigh_Dist, y = Near_DIST)) +
geom_point() +
theme_classic() +
xlab("Distance from Nearest Neighbor (m)") +
ylab("Distance from LCP (m)") +
ggtitle("Patch Distance from LCP Relative to
Distance from Nearest Neighbor") +
theme(plot.title=element_text(size = 8, face = 'bold'),
axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
geom_smooth(method = "lm", se = FALSE)

plot <- plot_grid(P1, P3, P2, P5, P4, P6,

```

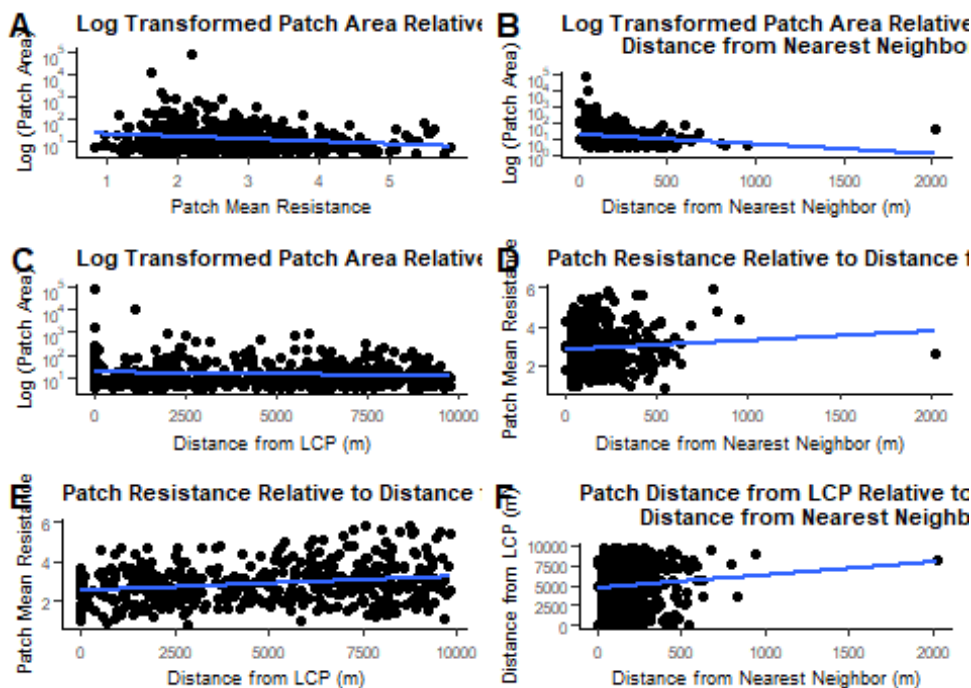
```

      labels = c('A', 'B', 'C', 'D', 'E', 'F'),
      label_size = 12, ncol = 2)
title <- ggdraw() +
  draw_label(
    "10 Kilometer Buffer Hard Cutoff with 70% Forest Density",
    fontface = 'bold',
    x = 0,
    hjust = 0
  ) +
  theme(
    # add margin on the left of the drawing canvas,
    # so title is aligned with left edge of first plot
    plot.margin = margin(0, 0, 0, 7)
  )
Plot13 <- plot_grid(
  title, plot,
  ncol = 1,
  # rel_heights values control vertical title margins
  rel_heights = c(0.1, 1)
)
save_plot("Plot13.tiff", Plot13, base_height = 10, base_width = 10)

```

Plot13

10 Kilometer Buffer Hard Cutoff with 70% Forest De



10km Hard Comparison

60% Threshold

```
Near10kmH60Data <- Near10kmHard60 %>%
  mutate(PID = IN_FID,
         Neigh_Dist = NEAR_DIST
        ) %>%
  select(PID, Neigh_Dist)

FacPat10H60Data <- PatDist10kmHard60 %>%
  mutate(Buffer = factor("Hard10km"), Density = factor("60"),
         #Rename factors, convert to factors, and rename levels
         PID = FID,
         AREA = Area,
         MEAN_RES = MEAN,
         Near_DIST = NEAR_DIST
        ) %>%
  select(PID, Buffer, Density, AREA, MEAN_RES, Near_DIST)

H10km60Data <- list(FacPat10H60Data, Near10kmH60Data)
FacPat10H60Data <- H10km60Data %>% reduce(inner_join, by='PID')

P1 <- ggplot(FacPat10H60Data, aes(x = MEAN_RES, y = AREA)) +
  geom_point() +
  theme_classic() +
  scale_y_continuous(trans = log10_trans(),
                    breaks = trans_breaks("log10", function(x) 10^x),
                    labels = trans_format("log10", math_format(10^.x))) +
  scale_x_continuous(breaks = seq(from = 0, to = 5, by = 1)) +
  xlab("Patch Mean Resistance") +
  ylab("Log (Patch Area)") +
  ggtitle("Log Transformed Patch Area Relative to Patch Resistance") +
  theme(plot.title=element_text(size = 8, face = 'bold'),
        axis.title=element_text(size=7), axis.text=element_text(size=6)) +
  geom_smooth(method = "lm", se = FALSE)

P2 <- ggplot(FacPat10H60Data, aes(x = Near_DIST, y = AREA)) +
  geom_point() +
  theme_classic() +
  scale_y_continuous(trans = log10_trans(),
                    breaks = trans_breaks("log10", function(x) 10^x),
                    labels = trans_format("log10", math_format(10^.x))) +
  xlab("Distance from LCP (m)") +
  ylab("Log (Patch Area)") +
  ggtitle("Log Transformed Patch Area Relative to Distance from LCP") +
  theme(plot.title=element_text(size = 8, face = 'bold'),
```

```

        axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
  geom_smooth(method = "lm", se = FALSE)
P3 <- ggplot(FacPat10H60Data, aes(x = Neigh_Dist, y = AREA)) +
  geom_point() +
  theme_classic() +
  scale_y_continuous(trans = log10_trans(),
  breaks = trans_breaks("log10", function(x) 10^x),
  labels = trans_format("log10", math_format(10^.x))) +
  xlab("Distance from Nearest Neighbor (m)") +
  ylab("Log (Patch Area)") +
  ggtitle("Log Transformed Patch Area Relative to
  Distance from Nearest Neighbor") +
  theme( plot.title=element_text( size = 8, face = 'bold'),
  axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
  geom_smooth(method = "lm", se = FALSE)
P4 <- ggplot(FacPat10H60Data, aes(x = Near_DIST, y = MEAN_RES)) +
  geom_point() +
  theme_classic() +
  xlab("Distance from LCP (m)") +
  ylab("Patch Mean Resistance") +
  ggtitle("Patch Resistance Relative to Distance from LCP") +
  theme( plot.title=element_text( size = 8, face = 'bold'),
  axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
  geom_smooth(method = "lm", se = FALSE)
P5 <- ggplot(FacPat10H60Data, aes(x = Neigh_Dist, y = MEAN_RES)) +
  geom_point() +
  theme_classic() +
  xlab("Distance from Nearest Neighbor (m)") +
  ylab("Patch Mean Resistance") +
  ggtitle("Patch Resistance Relative to Distance from Nearest Neighbor"
) +
  theme( plot.title=element_text( size = 8, face = 'bold'),
  axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
  geom_smooth(method = "lm", se = FALSE)
P6 <- ggplot(FacPat10H60Data, aes(x = Neigh_Dist, y = Near_DIST)) +
  geom_point() +
  theme_classic() +
  xlab("Distance from Nearest Neighbor (m)") +
  ylab("Distance from LCP (m)") +
  ggtitle("Patch Distance from LCP Relative to
  Distance from Nearest Neighbor") +

```

```

    theme( plot.title=element_text( size = 8, face = 'bold'),
           axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
  geom_smooth(method = "lm", se = FALSE)

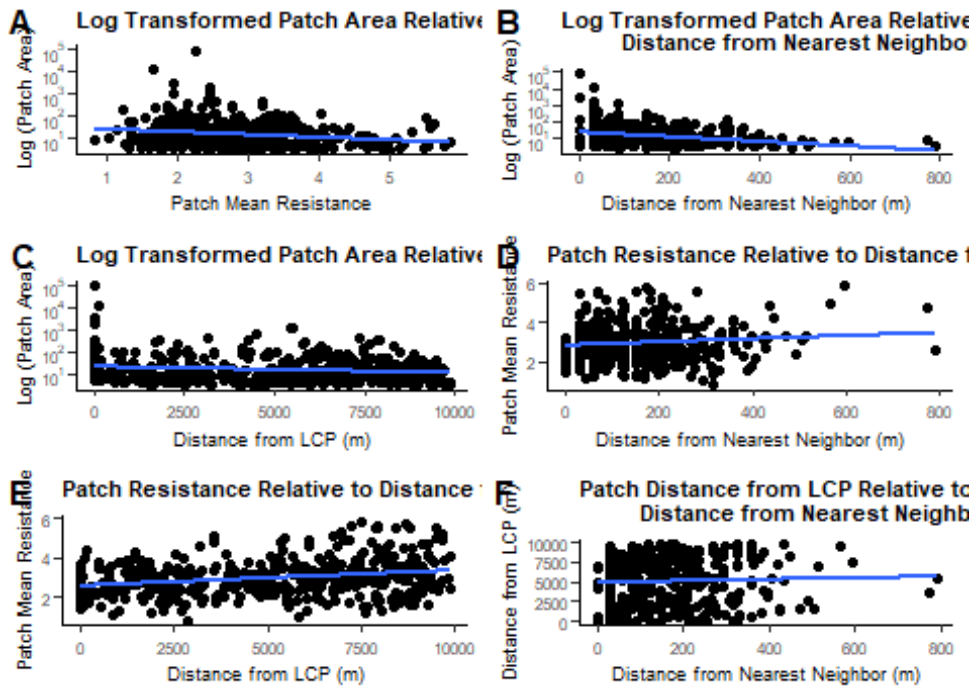
plot <- plot_grid(P1, P3, P2, P5, P4, P6,
                 labels = c('A', 'B', 'C', 'D', 'E', 'F'),
                 label_size = 12, ncol = 2)
title <- ggdraw() +
  draw_label(
    "10 Kilometer Buffer Hard Cutoff with 60% Forest Density",
    fontface = 'bold',
    x = 0,
    hjust = 0
  ) +
  theme(
    # add margin on the left of the drawing canvas,
    # so title is aligned with left edge of first plot
    plot.margin = margin(0, 0, 0, 7)
  )

Plot14 <- plot_grid(
  title, plot,
  ncol = 1,
  # rel_heights values control vertical title margins
  rel_heights = c(0.1, 1)
)
save_plot("Plot14.tiff", Plot14, base_height = 10, base_width = 10)

Plot14

```

10 Kilometer Buffer Hard Cutoff with 60% Forest De



10km Hard Comparison

50% Threshold

```
Near10kmH50Data <- Near10kmHard50 %>%
  mutate(PID = IN_FID,
         Neigh_Dist = NEAR_DIST
        ) %>%
  select(PID, Neigh_Dist)

FacPat10H50Data <- PatDist10kmHard50 %>%
  mutate(Buffer = factor("Hard10km"), Density = factor("50"),
         #Rename factors, convert to factors, and rename levels
         PID = FID,
         AREA = Area,
         MEAN_RES = MEAN,
         Near_DIST = NEAR_DIST
        ) %>%
  select(PID, Buffer, Density, AREA, MEAN_RES, Near_DIST)

H10km50Data <- list(FacPat10H50Data, Near10kmH50Data)
FacPat10H50Data <- H10km50Data %>% reduce(inner_join, by='PID')

P1 <- ggplot(FacPat10H50Data, aes(x = MEAN_RES, y = AREA)) +
  geom_point() +
```

```

theme_classic() +
scale_y_continuous(trans = log10_trans(),
breaks = trans_breaks("log10", function(x) 10^x),
labels = trans_format("log10", math_format(10^.x))) +
scale_x_continuous(breaks = seq(from = 0, to = 5, by = 1)) +
xlab("Patch Mean Resistance") +
ylab("Log (Patch Area)") +
ggtitle("Log Transformed Patch Area Relative to Patch Resistance") +
theme(plot.title=element_text(size = 8, face = 'bold'),
axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
geom_smooth(method = "lm", se = FALSE)

P2 <- ggplot(FacPat10H50Data, aes(x = Near_DIST, y = AREA)) +
geom_point() +
theme_classic() +
scale_y_continuous(trans = log10_trans(),
breaks = trans_breaks("log10", function(x) 10^x),
labels = trans_format("log10", math_format(10^.x))) +
xlab("Distance from LCP (m)") +
ylab("Log (Patch Area)") +
ggtitle("Log Transformed Patch Area Relative to Distance from LCP") +
theme(plot.title=element_text(size = 8, face = 'bold'),
axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
geom_smooth(method = "lm", se = FALSE)

P3 <- ggplot(FacPat10H50Data, aes(x = Neigh_Dist, y = AREA)) +
geom_point() +
theme_classic() +
scale_y_continuous(trans = log10_trans(),
breaks = trans_breaks("log10", function(x) 10^x),
labels = trans_format("log10", math_format(10^.x))) +
xlab("Distance from Nearest Neighbor (m)") +
ylab("Log (Patch Area)") +
ggtitle("Log Transformed Patch Area Relative to
Distance from Nearest Neighbor") +
theme(plot.title=element_text(size = 8, face = 'bold'),
axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
geom_smooth(method = "lm", se = FALSE)

P4 <- ggplot(FacPat10H50Data, aes(x = Near_DIST, y = MEAN_RES)) +
geom_point() +
theme_classic() +
xlab("Distance from LCP (m)") +
ylab("Patch Mean Resistance") +
ggtitle("Patch Resistance Relative to Distance from LCP") +
theme(plot.title=element_text(size = 8, face = 'bold'),

```

```

        axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
  geom_smooth(method = "lm", se = FALSE)
P5 <- ggplot(FacPat10H50Data, aes(x = Neigh_Dist, y = MEAN_RES)) +
  geom_point() +
  theme_classic() +
  xlab("Distance from Nearest Neighbor (m)") +
  ylab("Patch Mean Resistance") +
  ggtitle("Patch Resistance Relative to Distance from Nearest Neighbor"
) +
  theme( plot.title=element_text( size = 8, face = 'bold'),
        axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
  geom_smooth(method = "lm", se = FALSE)
P6 <- ggplot(FacPat10H50Data, aes(x = Neigh_Dist, y = Near_DIST)) +
  geom_point() +
  theme_classic() +
  xlab("Distance from Nearest Neighbor (m)") +
  ylab("Distance from LCP (m)") +
  ggtitle("Patch Distance from LCP Relative to
          Distance from Nearest Neighbor") +
  theme( plot.title=element_text( size = 8, face = 'bold'),
        axis.title=element_text(size=7), axis.text=element_text(size=6
)) +
  geom_smooth(method = "lm", se = FALSE)
plot <- plot_grid(P1, P3, P2, P5, P4, P6,
                 labels = c('A', 'B', 'C', 'D', 'E', 'F'),
                 label_size = 12, ncol = 2)
title <- ggdraw() +
  draw_label(
    "10 Kilometer Buffer Hard Cutoff with 50% Forest Density",
    fontface = 'bold',
    x = 0,
    hjust = 0
  ) +
  theme(
    # add margin on the left of the drawing canvas,
    # so title is aligned with left edge of first plot
    plot.margin = margin(0, 0, 0, 7)
  )
Plot15 <- plot_grid(
  title, plot,
  ncol = 1,
  # rel_heights values control vertical title margins
  rel_heights = c(0.1, 1)

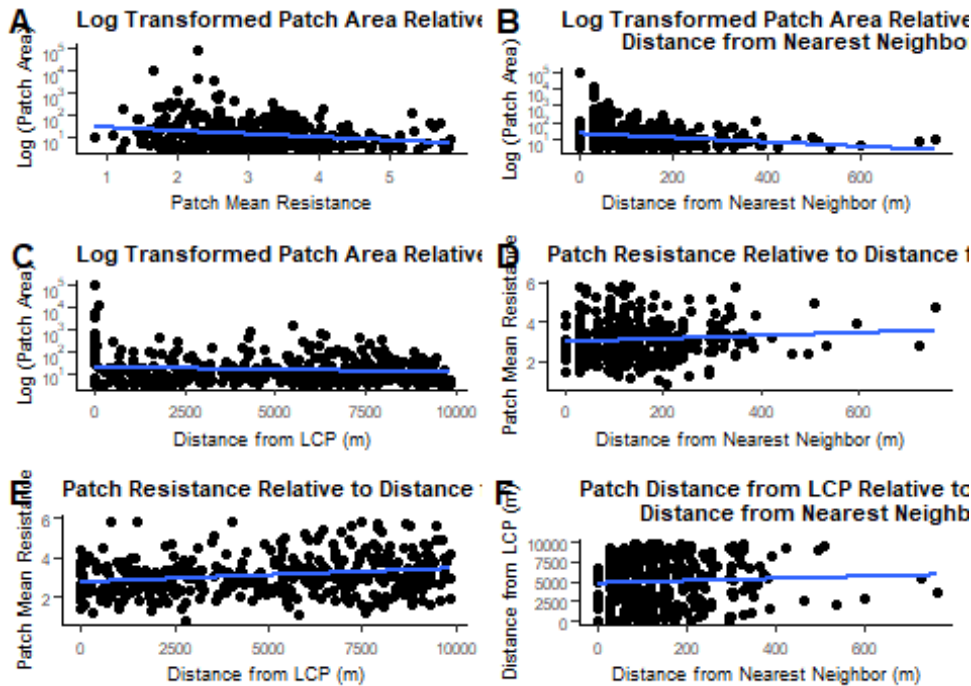
```



```
)
save_plot("Plot15.tiff", Plot15, base_height = 10, base_width = 10)
```

Plot15

10 Kilometer Buffer Hard Cutoff with 50% Forest De



Regression Analysis 5km Intersection

Area

```
model1 <- lm(data = FacPat5In90Data, formula = log(AREA)~scale(MEAN_RES
, scale = F))
summary(model1)
```

```
##
## Call:
## lm(formula = log(AREA) ~ scale(MEAN_RES, scale = F), data = FacPat5I
n90Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.8267 -1.0766 -0.4607  0.5822  8.6376
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.6546     0.1080   24.587  <2e-16 ***
## scale(MEAN_RES, scale = F) -0.3106     0.1273   -2.441  0.0155 *
```

```

## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.598 on 217 degrees of freedom
## Multiple R-squared:  0.02671,    Adjusted R-squared:  0.02223
## F-statistic: 5.956 on 1 and 217 DF,  p-value: 0.01547

model2 <- lm(data = FacPat5In90Data, formula = log(AREA)~scale(Near_DIST,
scale = F))
summary(model2)

##
## Call:
## lm(formula = log(AREA) ~ scale(Near_DIST, scale = F), data = FacPat5
In90Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.7585 -1.1119 -0.4458  0.6775  8.4361
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.655e+00  1.088e-01  24.401  <2e-16 *
##
## scale(Near_DIST, scale = F) -1.100e-04  6.827e-05  -1.611    0.109
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.61 on 217 degrees of freedom
## Multiple R-squared:  0.01181,    Adjusted R-squared:  0.007259
## F-statistic: 2.594 on 1 and 217 DF,  p-value: 0.1087

model3 <- lm(data = FacPat5In90Data, formula = log(AREA)~scale(Neigh_Di
st, scale = F))
summary(model3)

##
## Call:
## lm(formula = log(AREA) ~ scale(Neigh_Dist, scale = F), data = FacPat
5In90Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.8352 -1.0257 -0.3462  0.7221  8.3451
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.6546499  0.1071066  24.785  < 2e-16
##
## scale(Neigh_Dist, scale = F) -0.0018477  0.0005977  -3.091  0.00225

```

```

**
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.585 on 217 degrees of freedom
## Multiple R-squared:  0.04218,    Adjusted R-squared:  0.03777
## F-statistic: 9.556 on 1 and 217 DF,  p-value: 0.002254

model4 <- lm(data = FacPat5In80Data, formula = log(AREA)~scale(MEAN_RES
, scale = F))
summary(model4)

##
## Call:
## lm(formula = log(AREA) ~ scale(MEAN_RES, scale = F), data = FacPat5I
n80Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.8246 -0.9729 -0.4325  0.6142  9.0630
##
## Coefficients:
##
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.65346    0.09988  26.567 < 2e-16 ***
## scale(MEAN_RES, scale = F) -0.33960    0.12321  -2.756  0.00632 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.515 on 228 degrees of freedom
## (1 observation deleted due to missingness)
## Multiple R-squared:  0.03225,    Adjusted R-squared:  0.028
## F-statistic: 7.597 on 1 and 228 DF,  p-value: 0.006318

model5 <- lm(data = FacPat5In80Data, formula = log(AREA)~scale(Near_DIST
T, scale = F))
summary(model5)

##
## Call:
## lm(formula = log(AREA) ~ scale(Near_DIST, scale = F), data = FacPat5
In80Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.8600 -1.0210 -0.5065  0.6529  8.7646
##
## Coefficients:
##
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.648e+00    9.999e-02  26.482 <2e-16 *
**

```

```

## scale(Near_DIST, scale = F) -1.559e-04  6.504e-05  -2.396  0.0174 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.52 on 229 degrees of freedom
## Multiple R-squared:  0.02447,    Adjusted R-squared:  0.02021
## F-statistic: 5.743 on 1 and 229 DF,  p-value: 0.01736

model6 <- lm(data = FacPat5In80Data, formula = log(AREA)~scale(Neigh_Di
st, scale = F))
summary(model6)

##
## Call:
## lm(formula = log(AREA) ~ scale(Neigh_Dist, scale = F), data = FacPat
5In80Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.8501 -1.0693 -0.3109  0.6187  8.6269
##
## Coefficients:
##
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.647964   0.097869  27.056 < 2e-16 *
##
## scale(Neigh_Dist, scale = F) -0.002623   0.000655  -4.005 8.39e-05 *
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.487 on 229 degrees of freedom
## Multiple R-squared:  0.06546,    Adjusted R-squared:  0.06137
## F-statistic: 16.04 on 1 and 229 DF,  p-value: 8.388e-05

model7 <- lm(data = FacPat5In70Data, formula = log(AREA)~scale(MEAN_RES
, scale = F))
summary(model7)

##
## Call:
## lm(formula = log(AREA) ~ scale(MEAN_RES, scale = F), data = FacPat5I
n70Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.0810 -0.9306 -0.3686  0.6033  9.2960
##
## Coefficients:
##
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.6740   0.1010  26.47 < 2e-16 ***

```

```

## scale(MEAN_RES, scale = F)  -0.4251      0.1201   -3.54 0.000491 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.481 on 213 degrees of freedom
## Multiple R-squared:  0.05556,    Adjusted R-squared:  0.05113
## F-statistic: 12.53 on 1 and 213 DF,  p-value: 0.0004914

model8 <- lm(data = FacPat5In70Data, formula = log(AREA)~scale(Near_DIST, scale = F))
summary(model8)

##
## Call:
## lm(formula = log(AREA) ~ scale(Near_DIST, scale = F), data = FacPat5In70Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.8405 -0.9796 -0.3649  0.6569  9.0919
##
## Coefficients:
##
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    2.6739901  0.1029754  25.967  <2e-16 *
##
## scale(Near_DIST, scale = F) -0.0001377  0.0000691  -1.993  0.0475 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.51 on 213 degrees of freedom
## Multiple R-squared:  0.01831,    Adjusted R-squared:  0.0137
## F-statistic: 3.973 on 1 and 213 DF,  p-value: 0.04752

model9 <- lm(data = FacPat5In70Data, formula = log(AREA)~scale(Neigh_Dist, scale = F))
summary(model9)

##
## Call:
## lm(formula = log(AREA) ~ scale(Neigh_Dist, scale = F), data = FacPat5In70Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.9114 -1.0101 -0.3658  0.7504  8.9645
##
## Coefficients:
##
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    2.6739901  0.1006000  26.580  < 2e-16
##
## ***

```

```

## scale(Neigh_Dist, scale = F) -0.0028655  0.0007567  -3.787 0.000198
***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.475 on 213 degrees of freedom
## Multiple R-squared:  0.06308,    Adjusted R-squared:  0.05868
## F-statistic: 14.34 on 1 and 213 DF,  p-value: 0.0001984

model10 <- lm(data = FacPat5In60Data, formula = log(AREA)~scale(MEAN_RE
S, scale = F))
summary(model10)

##
## Call:
## lm(formula = log(AREA) ~ scale(MEAN_RES, scale = F), data = FacPat5I
n60Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.9236 -0.9983 -0.4714  0.7198  9.3153
##
## Coefficients:
##
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)          2.7732    0.1100   25.20 < 2e-16 ***
## scale(MEAN_RES, scale = F) -0.3939    0.1492   -2.64  0.00896 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.552 on 197 degrees of freedom
## Multiple R-squared:  0.03416,    Adjusted R-squared:  0.02926
## F-statistic: 6.968 on 1 and 197 DF,  p-value: 0.008964

model11 <- lm(data = FacPat5In60Data, formula = log(AREA)~scale(Near_DI
ST, scale = F))
summary(model11)

##
## Call:
## lm(formula = log(AREA) ~ scale(Near_DIST, scale = F), data = FacPat5
In60Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.8026 -1.0388 -0.3489  0.6067  8.8593
##
## Coefficients:
##
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)          2.773e+00  1.087e-01  25.502 < 2e-16 *
**

```

```

## scale(Near_DIST, scale = F) -2.414e-04  7.005e-05  -3.446 0.000695 *
**
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.534 on 197 degrees of freedom
## Multiple R-squared:  0.05686,    Adjusted R-squared:  0.05207
## F-statistic: 11.88 on 1 and 197 DF,  p-value: 0.0006948

model12 <- lm(data = FacPat5In60Data, formula = log(AREA)~scale(Neigh_D
ist, scale = F))
summary(model12)

##
## Call:
## lm(formula = log(AREA) ~ scale(Neigh_Dist, scale = F), data = FacPat
5In60Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.1627 -1.0150 -0.3480  0.8302  8.8412
##
## Coefficients:
##
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.7731531   0.1075173   25.793 < 2e-16
***
## scale(Neigh_Dist, scale = F) -0.0036129  0.0008852  -4.081  6.5e-05
***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.517 on 197 degrees of freedom
## Multiple R-squared:  0.07796,    Adjusted R-squared:  0.07328
## F-statistic: 16.66 on 1 and 197 DF,  p-value: 6.503e-05

model13 <- lm(data = FacPat5In50Data, formula = log(AREA)~scale(MEAN_RE
S, scale = F))
summary(model13)

##
## Call:
## lm(formula = log(AREA) ~ scale(MEAN_RES, scale = F), data = FacPat5I
n50Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.2841 -1.0646 -0.3996  0.5318  9.3663
##
## Coefficients:
##
##              Estimate Std. Error t value Pr(>|t|)

```

```

## (Intercept)                2.7295      0.1210  22.560 < 2e-16 ***
## scale(MEAN_RES, scale = F) -0.3934      0.1429  -2.752  0.00651 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.646 on 183 degrees of freedom
## Multiple R-squared:  0.03975,    Adjusted R-squared:  0.0345
## F-statistic: 7.575 on 1 and 183 DF,  p-value: 0.006514

model14 <- lm(data = FacPat5In50Data, formula = log(AREA)~scale(Near_DIST, scale = F))
summary(model14)

##
## Call:
## lm(formula = log(AREA) ~ scale(Near_DIST, scale = F), data = FacPat5In50Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.0759 -1.0394 -0.2998  0.7227  9.0021
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    2.730e+00  1.210e-01  22.566 < 2e-16 *
##
## scale(Near_DIST, scale = F) -2.252e-04  8.121e-05  -2.773  0.00614 *
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.645 on 183 degrees of freedom
## Multiple R-squared:  0.04032,    Adjusted R-squared:  0.03507
## F-statistic: 7.688 on 1 and 183 DF,  p-value: 0.006136

model15 <- lm(data = FacPat5In50Data, formula = log(AREA)~scale(Neigh_Dist, scale = F))
summary(model15)

##
## Call:
## lm(formula = log(AREA) ~ scale(Neigh_Dist, scale = F), data = FacPat5In50Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.9423 -1.0879 -0.3630  0.6367  9.0535
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)

```



```
## (Intercept)                2.729507    0.120573   22.638 < 2e-16 *
## scale(Neigh_Dist, scale = F) -0.003103    0.001040   -2.983  0.00324 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.64 on 183 degrees of freedom
## Multiple R-squared:  0.04637,    Adjusted R-squared:  0.04116
## F-statistic: 8.899 on 1 and 183 DF,  p-value: 0.003242
```

Resistance

```
model16 <- lm(data = FacPat5In90Data, formula = MEAN_RES ~ scale(log(AREA
), scale = F))
summary(model16)
```

```
##
## Call:
## lm(formula = MEAN_RES ~ scale(log(AREA), scale = F), data = FacPat5I
n90Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.5976 -0.6621 -0.1906  0.6173  2.6485
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.39028    0.05681  42.071 <2e-16 ***
## scale(log(AREA), scale = F) -0.08601    0.03524  -2.441  0.0155 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.8408 on 217 degrees of freedom
## Multiple R-squared:  0.02671,    Adjusted R-squared:  0.02223
## F-statistic: 5.956 on 1 and 217 DF,  p-value: 0.01547
```

```
model17 <- lm(data = FacPat5In90Data, formula = MEAN_RES ~ scale(Near_DIST
T, scale = F))
summary(model17)
```

```
##
## Call:
## lm(formula = MEAN_RES ~ scale(Near_DIST, scale = F), data = FacPat5I
n90Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.5827 -0.6842 -0.1863  0.5876  2.7475
##
```

```

## Coefficients:
##
##           Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.390e+00  5.758e-02  41.51  <2e-16 *
##
## scale(Near_DIST, scale = F) -6.513e-06  3.614e-05  -0.18  0.857
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.8522 on 217 degrees of freedom
## Multiple R-squared:  0.0001497, Adjusted R-squared:  -0.004458
## F-statistic: 0.03248 on 1 and 217 DF,  p-value: 0.8571

model18 <- lm(data = FacPat5In90Data, formula = MEAN_RES~scale(Neigh_Di
st, scale = F))
summary(model18)

##
## Call:
## lm(formula = MEAN_RES ~ scale(Neigh_Dist, scale = F), data = FacPat5
In90Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.5915 -0.6793 -0.1861  0.5918  2.7627
##
## Coefficients:
##
##           Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.390e+00  5.759e-02  41.507  <2e-16 *
##
## scale(Neigh_Dist, scale = F) 3.237e-05  3.214e-04  0.101  0.92
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.8522 on 217 degrees of freedom
## Multiple R-squared:  4.675e-05, Adjusted R-squared:  -0.004561
## F-statistic: 0.01015 on 1 and 217 DF,  p-value: 0.9199

model19 <- lm(data = FacPat5In80Data, formula = MEAN_RES~scale(log(AREA
), scale = F))
summary(model19)

##
## Call:
## lm(formula = MEAN_RES ~ scale(log(AREA), scale = F), data = FacPat5I
n80Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.7348 -0.6200 -0.0624  0.5918  2.7756
##

```

```

## Coefficients:
##
##           Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.56111    0.05281  48.492 < 2e-16 ***
## scale(log(AREA), scale = F) -0.09496    0.03445  -2.756  0.00632 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.801 on 228 degrees of freedom
## (1 observation deleted due to missingness)
## Multiple R-squared:  0.03225, Adjusted R-squared:  0.028
## F-statistic: 7.597 on 1 and 228 DF, p-value: 0.006318

model20 <- lm(data = FacPat5In80Data, formula = MEAN_RES~scale(Near_DIST,
scale = F))
summary(model20)

##
## Call:
## lm(formula = MEAN_RES ~ scale(Near_DIST, scale = F), data = FacPat5In80Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.64443 -0.64905 -0.05077  0.55002  2.57892
##
## Coefficients:
##
##           Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.561e+00  5.328e-02  48.071 <2e-16 **
##
## scale(Near_DIST, scale = F) 6.501e-05  3.478e-05   1.869  0.0628 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.808 on 228 degrees of freedom
## (1 observation deleted due to missingness)
## Multiple R-squared:  0.0151, Adjusted R-squared:  0.01078
## F-statistic: 3.495 on 1 and 228 DF, p-value: 0.06285

model21 <- lm(data = FacPat5In80Data, formula = MEAN_RES~scale(Neigh_Dist,
scale = F))
summary(model21)

##
## Call:
## lm(formula = MEAN_RES ~ scale(Neigh_Dist, scale = F), data = FacPat5In80Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.69610 -0.65708 -0.02541  0.56681  2.73963

```

```

##
## Coefficients:
##
## Estimate Std. Error t value Pr(>|t|)
## (Intercept) 2.5603785 0.0535426 47.819 <2e-16 *
**
## scale(Neigh_Dist, scale = F) 0.0003979 0.0003581 1.111 0.268
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.812 on 228 degrees of freedom
## (1 observation deleted due to missingness)
## Multiple R-squared: 0.005387, Adjusted R-squared: 0.001024
## F-statistic: 1.235 on 1 and 228 DF, p-value: 0.2677

model22 <- lm(data = FacPat5In70Data, formula = MEAN_RES~scale(log(AREA
), scale = F))
summary(model22)

##
## Call:
## lm(formula = MEAN_RES ~ scale(log(AREA), scale = F), data = FacPat5I
n70Data)
##
## Residuals:
## Min 1Q Median 3Q Max
## -1.97575 -0.56437 0.02591 0.53543 1.94906
##
## Coefficients:
## Estimate Std. Error t value Pr(>|t|)
## (Intercept) 2.66826 0.05601 47.64 < 2e-16 ***
## scale(log(AREA), scale = F) -0.13071 0.03692 -3.54 0.000491 ***
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.8212 on 213 degrees of freedom
## Multiple R-squared: 0.05556, Adjusted R-squared: 0.05113
## F-statistic: 12.53 on 1 and 213 DF, p-value: 0.0004914

model23 <- lm(data = FacPat5In70Data, formula = MEAN_RES~scale(Near_DIS
T, scale = F))
summary(model23)

##
## Call:
## lm(formula = MEAN_RES ~ scale(Near_DIST, scale = F), data = FacPat5I
n70Data)
##
## Residuals:
## Min 1Q Median 3Q Max
## -1.89429 -0.68916 -0.05892 0.56200 2.14273

```

```

##
## Coefficients:
##
##           Estimate Std. Error t value Pr(>|t|)
## (Intercept) 2.668e+00 5.704e-02 46.776 <2e-16 **
##
## scale(Near_DIST, scale = F) 8.050e-05 3.828e-05 2.103 0.0366 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.8364 on 213 degrees of freedom
## Multiple R-squared:  0.02035, Adjusted R-squared:  0.01575
## F-statistic: 4.424 on 1 and 213 DF, p-value: 0.03662

model24 <- lm(data = FacPat5In70Data, formula = MEAN_RES ~ scale(Neigh_Di
st, scale = F))
summary(model24)

##
## Call:
## lm(formula = MEAN_RES ~ scale(Neigh_Dist, scale = F), data = FacPat5
In70Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.91791 -0.69093 -0.01145  0.56373  2.10013
##
## Coefficients:
##
##           Estimate Std. Error t value Pr(>|t|)
## (Intercept) 2.6682584  0.0575993  46.325 <2e-16 **
##
## scale(Neigh_Dist, scale = F) 0.0002149  0.0004333  0.496 0.62
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.8446 on 213 degrees of freedom
## Multiple R-squared:  0.001154, Adjusted R-squared: -0.003536
## F-statistic: 0.246 on 1 and 213 DF, p-value: 0.6204

model25 <- lm(data = FacPat5In60Data, formula = MEAN_RES ~ scale(log(AREA
), scale = F))
summary(model25)

##
## Call:
## lm(formula = MEAN_RES ~ scale(log(AREA), scale = F), data = FacPat5I
n60Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.96986 -0.45389 -0.02126  0.50508  2.33324

```

```

##
## Coefficients:
##
##           Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.73251    0.05163   52.92 < 2e-16 ***
## scale(log(AREA), scale = F) -0.08672    0.03285   -2.64  0.00896 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.7284 on 197 degrees of freedom
## Multiple R-squared:  0.03416,    Adjusted R-squared:  0.02926
## F-statistic: 6.968 on 1 and 197 DF,  p-value: 0.008964

model26 <- lm(data = FacPat5In60Data, formula = MEAN_RES~scale(Near_DIST, scale = F))
summary(model26)

##
## Call:
## lm(formula = MEAN_RES ~ scale(Near_DIST, scale = F), data = FacPat5In60Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.94422 -0.47483 -0.06548  0.51083  2.28857
##
## Coefficients:
##
##           Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.733e+00  5.214e-02   52.410 <2e-16 **
##
## scale(Near_DIST, scale = F) 5.854e-05  3.359e-05    1.743  0.0829 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.7355 on 197 degrees of freedom
## Multiple R-squared:  0.01519,    Adjusted R-squared:  0.01019
## F-statistic: 3.038 on 1 and 197 DF,  p-value: 0.0829

model27 <- lm(data = FacPat5In60Data, formula = MEAN_RES~scale(Neigh_Dist, scale = F))
summary(model27)

##
## Call:
## lm(formula = MEAN_RES ~ scale(Neigh_Dist, scale = F), data = FacPat5In60Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.02965 -0.54584 -0.03732  0.51107  2.39198
##

```

```

## Coefficients:
##
##           Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.7325086   0.0521425  52.405  <2e-16 *
##
## scale(Neigh_Dist, scale = F) 0.0007435  0.0004293   1.732  0.0849 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.7356 on 197 degrees of freedom
## Multiple R-squared:  0.015, Adjusted R-squared:  0.009997
## F-statistic: 2.999 on 1 and 197 DF,  p-value: 0.08486

model28 <- lm(data = FacPat5In50Data, formula = MEAN_RES~scale(log(AREA
), scale = F))
summary(model28)

##
## Call:
## lm(formula = MEAN_RES ~ scale(log(AREA), scale = F), data = FacPat5I
n50Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.09015 -0.55253 -0.03519  0.41342  2.82647
##
## Coefficients:
##
##           Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.87534   0.06131  46.897  < 2e-16 ***
## scale(log(AREA), scale = F) -0.10103   0.03671  -2.752  0.00651 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.8339 on 183 degrees of freedom
## Multiple R-squared:  0.03975, Adjusted R-squared:  0.0345
## F-statistic: 7.575 on 1 and 183 DF,  p-value: 0.006514

model29 <- lm(data = FacPat5In50Data, formula = MEAN_RES~scale(Near_DIS
T, scale = F))
summary(model29)

##
## Call:
## lm(formula = MEAN_RES ~ scale(Near_DIST, scale = F), data = FacPat5I
n50Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.0735 -0.5414 -0.1418  0.4399  3.0047
##
## Coefficients:

```

```

##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  2.875e+00  6.242e-02  46.066  <2e-16 **
*
## scale(Near_DIST, scale = F) 3.936e-05  4.191e-05   0.939   0.349
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.849 on 183 degrees of freedom
## Multiple R-squared:  0.004797, Adjusted R-squared: -0.0006414
## F-statistic: 0.8821 on 1 and 183 DF, p-value: 0.3489

model30 <- lm(data = FacPat5In50Data, formula = MEAN_RES ~ scale(Neigh_Di
st, scale = F))
summary(model30)

##
## Call:
## lm(formula = MEAN_RES ~ scale(Neigh_Dist, scale = F), data = FacPat5
In50Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.1098 -0.5657 -0.1422  0.4510  3.0492
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  2.8753415  0.0620910  46.31  <2e-16 *
**
## scale(Neigh_Dist, scale = F) 0.0008997  0.0005357   1.68  0.0947 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.8445 on 183 degrees of freedom
## Multiple R-squared:  0.01518, Adjusted R-squared:  0.009801
## F-statistic: 2.821 on 1 and 183 DF, p-value: 0.09474

```

Distance

```

model31 <- lm(data = FacPat5In90Data, formula = Near_DIST ~ scale(MEAN_RE
S, scale = F))
summary(model31)

##
## Call:
## lm(formula = Near_DIST ~ scale(MEAN_RES, scale = F), data = FacPat5I
n90Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2285.04 -1511.98  -59.39  1443.70  2722.21

```



```

##
## Coefficients:
##
##           Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2265.45    108.17   20.94 <2e-16 ***
## scale(MEAN_RES, scale = F)  -22.98    127.51   -0.18   0.857
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1601 on 217 degrees of freedom
## Multiple R-squared:  0.0001497, Adjusted R-squared:  -0.004458
## F-statistic: 0.03248 on 1 and 217 DF,  p-value: 0.8571

model32 <- lm(data = FacPat5In90Data, formula = Near_DIST ~ scale(log(AREA), scale = F))
summary(model32)

##
## Call:
## lm(formula = Near_DIST ~ scale(log(AREA), scale = F), data = FacPat5In90Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2420.04 -1443.20   51.44  1358.68  2732.60
##
## Coefficients:
##
##           Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2265.4    107.5  21.067 <2e-16 ***
## scale(log(AREA), scale = F)  -107.4     66.7  -1.611   0.109
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1591 on 217 degrees of freedom
## Multiple R-squared:  0.01181, Adjusted R-squared:  0.007259
## F-statistic: 2.594 on 1 and 217 DF,  p-value: 0.1087

model33 <- lm(data = FacPat5In90Data, formula = Near_DIST ~ scale(Neigh_Dist, scale = F))
summary(model33)

##
## Call:
## lm(formula = Near_DIST ~ scale(Neigh_Dist, scale = F), data = FacPat5In90Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2363.59 -1483.04  -77.15  1387.50  2733.14
##
## Coefficients:

```

```

##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    2265.4538   107.9843  20.979  <2e-16 *
##
## scale(Neigh_Dist, scale = F)  -0.5331    0.6026  -0.885   0.377
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1598 on 217 degrees of freedom
## Multiple R-squared:  0.003594, Adjusted R-squared:  -0.0009979
## F-statistic: 0.7827 on 1 and 217 DF,  p-value: 0.3773

model34 <- lm(data = FacPat5In80Data, formula = Near_DIST ~ scale(MEAN_RES, scale = F))
summary(model34)

##
## Call:
## lm(formula = Near_DIST ~ scale(MEAN_RES, scale = F), data = FacPat5In80Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2547.32 -1371.60   72.94  1148.12  2907.02
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    2262.0     100.7   22.464  <2e-16 ***
## scale(MEAN_RES, scale = F)    232.2     124.2    1.869   0.0628 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1527 on 228 degrees of freedom
## (1 observation deleted due to missingness)
## Multiple R-squared:  0.0151, Adjusted R-squared:  0.01078
## F-statistic: 3.495 on 1 and 228 DF,  p-value: 0.06285

model35 <- lm(data = FacPat5In80Data, formula = Near_DIST ~ scale(log(AREA), scale = F))
summary(model35)

##
## Call:
## lm(formula = Near_DIST ~ scale(log(AREA), scale = F), data = FacPat5In80Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2458.54 -1360.71   44.51  1202.44  2835.55
##
## Coefficients:

```

```

##               Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2272.7      100.3  22.650  <2e-16 ***
## scale(log(AREA), scale = F)  -157.0       65.5  -2.396  0.0174 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1525 on 229 degrees of freedom
## Multiple R-squared:  0.02447,    Adjusted R-squared:  0.02021
## F-statistic: 5.743 on 1 and 229 DF,  p-value: 0.01736

model36 <- lm(data = FacPat5In80Data, formula = Near_DIST ~ scale(Neigh_D
ist, scale = F))
summary(model36)

##
## Call:
## lm(formula = Near_DIST ~ scale(Neigh_Dist, scale = F), data = FacPat
5In80Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2627.56 -1383.56   16.04  1271.21  2779.95
##
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2272.707    100.995  22.503  <2e-16 **
## scale(Neigh_Dist, scale = F)    1.114     0.676   1.648   0.101
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1535 on 229 degrees of freedom
## Multiple R-squared:  0.01173,    Adjusted R-squared:  0.007411
## F-statistic: 2.717 on 1 and 229 DF,  p-value: 0.1006

model37 <- lm(data = FacPat5In70Data, formula = Near_DIST ~ scale(MEAN_RE
S, scale = F))
summary(model37)

##
## Call:
## lm(formula = Near_DIST ~ scale(MEAN_RES, scale = F), data = FacPat5I
n70Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2436.3 -1173.4  -100.3  1070.8  2874.9
##
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)

```

```

## (Intercept)                2177.9        101.1  21.549  <2e-16 ***
## scale(MEAN_RES, scale = F)    252.7        120.2   2.103   0.0366 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1482 on 213 degrees of freedom
## Multiple R-squared:  0.02035,    Adjusted R-squared:  0.01575
## F-statistic: 4.424 on 1 and 213 DF,  p-value: 0.03662

model38 <- lm(data = FacPat5In70Data, formula = Near_DIST ~ scale(log(AREA), scale = F))
summary(model38)

##
## Call:
## lm(formula = Near_DIST ~ scale(log(AREA), scale = F), data = FacPat5In70Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2382.7 -1244.5  -137.4  1229.0  2860.9
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2177.9      101.2  21.527  <2e-16 ***
## scale(log(AREA), scale = F)    -132.9       66.7  -1.993   0.0475 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1484 on 213 degrees of freedom
## Multiple R-squared:  0.01831,    Adjusted R-squared:  0.0137
## F-statistic: 3.973 on 1 and 213 DF,  p-value: 0.04752

model39 <- lm(data = FacPat5In70Data, formula = Near_DIST ~ scale(Neigh_Dist, scale = F))
summary(model39)

##
## Call:
## lm(formula = Near_DIST ~ scale(Neigh_Dist, scale = F), data = FacPat5In70Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2681.85 -1167.67  -91.57   976.47  2854.99
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  2177.9340    101.3350  21.492  <2e-16 **
**

```

```

## scale(Neigh_Dist, scale = F)    1.3816    0.7622    1.813    0.0713 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1486 on 213 degrees of freedom
## Multiple R-squared:  0.01519,    Adjusted R-squared:  0.01057
## F-statistic: 3.285 on 1 and 213 DF,  p-value: 0.0713

model40 <- lm(data = FacPat5In60Data, formula = Near_DIST ~ scale(MEAN_RES, scale = F))
summary(model40)

##
## Call:
## lm(formula = Near_DIST ~ scale(MEAN_RES, scale = F), data = FacPat5In60Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2490.21 -1321.35   -60.85  1279.71  2757.88
##
## Coefficients:
##
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)         2208.4      109.7  20.122 <2e-16 ***
## scale(MEAN_RES, scale = F)    259.4      148.8   1.743  0.0829 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1548 on 197 degrees of freedom
## Multiple R-squared:  0.01519,    Adjusted R-squared:  0.01019
## F-statistic: 3.038 on 1 and 197 DF,  p-value: 0.0829

model41 <- lm(data = FacPat5In60Data, formula = Near_DIST ~ scale(log(AREA), scale = F))
summary(model41)

##
## Call:
## lm(formula = Near_DIST ~ scale(log(AREA), scale = F), data = FacPat5In60Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2505.9 -1238.3  -105.3  1362.4  3156.7
##
## Coefficients:
##
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)         2208.38      107.40  20.562 < 2e-16 ***
## scale(log(AREA), scale = F)  -235.51      68.34  -3.446 0.000695 ***
## ---

```

```

## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1515 on 197 degrees of freedom
## Multiple R-squared:  0.05686,    Adjusted R-squared:  0.05207
## F-statistic: 11.88 on 1 and 197 DF,  p-value: 0.0006948

model42 <- lm(data = FacPat5In60Data, formula = Near_DIST ~ scale(Neigh_D
ist, scale = F))
summary(model42)

##
## Call:
## lm(formula = Near_DIST ~ scale(Neigh_Dist, scale = F), data = FacPat
5In60Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2301.4 -1322.9  -134.7   1331.8   2844.4
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2208.3799    110.4974   19.99  <2e-16 *
##
## scale(Neigh_Dist, scale = F)    0.5274     0.9098    0.58    0.563
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1559 on 197 degrees of freedom
## Multiple R-squared:  0.001703,    Adjusted R-squared:  -0.003365
## F-statistic: 0.336 on 1 and 197 DF,  p-value: 0.5628

model43 <- lm(data = FacPat5In50Data, formula = Near_DIST ~ scale(MEAN_RE
S, scale = F))
summary(model43)

##
## Call:
## lm(formula = Near_DIST ~ scale(MEAN_RES, scale = F), data = FacPat5I
n50Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2320.2 -1213.7  -100.1   1123.0   2939.0
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2131.3     109.8   19.405  <2e-16 ***
## scale(MEAN_RES, scale = F)    121.9     129.8    0.939    0.349
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```

##
## Residual standard error: 1494 on 183 degrees of freedom
## Multiple R-squared:  0.004797,    Adjusted R-squared:  -0.0006414
## F-statistic: 0.8821 on 1 and 183 DF,  p-value: 0.3489

model144 <- lm(data = FacPat5In50Data, formula = Near_DIST ~ scale(log(AREA), scale = F))
summary(model144)

##
## Call:
## lm(formula = Near_DIST ~ scale(log(AREA), scale = F), data = FacPat5In50Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2417.0 -1107.0  -213.2   990.0  2942.2
##
## Coefficients:
##
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2131.26     107.85  19.761 < 2e-16 ***
## scale(log(AREA), scale = F)  -179.04      64.57  -2.773  0.00614 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

## Residual standard error: 1467 on 183 degrees of freedom
## Multiple R-squared:  0.04032,    Adjusted R-squared:  0.03507
## F-statistic: 7.688 on 1 and 183 DF,  p-value: 0.006136

model145 <- lm(data = FacPat5In50Data, formula = Near_DIST ~ scale(Neigh_Dist, scale = F))
summary(model145)

##
## Call:
## lm(formula = Near_DIST ~ scale(Neigh_Dist, scale = F), data = FacPat5In50Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2544.6 -1168.3  -112.1  1040.8  2932.9
##
## Coefficients:
##
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2131.2558     107.7080  19.787 < 2e-16 ***
## scale(Neigh_Dist, scale = F)    2.6614      0.9292   2.864  0.00467 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```
##
## Residual standard error: 1465 on 183 degrees of freedom
## Multiple R-squared: 0.04291, Adjusted R-squared: 0.03768
## F-statistic: 8.204 on 1 and 183 DF, p-value: 0.004669
```

Proximity

```
model46 <- lm(data = FacPat5In90Data, formula = Neigh_Dist ~ scale(Near_DIST, scale = F))
summary(model46)
```

```
##
## Call:
## lm(formula = Neigh_Dist ~ scale(Near_DIST, scale = F), data = FacPat5In90Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -225.89 -122.62  -54.10   70.42  830.38
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    213.873950   12.142956   17.613  <2e-16 **
## scale(Near_DIST, scale = F)  -0.006741   0.007620  -0.885   0.377
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 179.7 on 217 degrees of freedom
## Multiple R-squared: 0.003594, Adjusted R-squared: -0.0009979
## F-statistic: 0.7827 on 1 and 217 DF, p-value: 0.3773
```

```
model47 <- lm(data = FacPat5In90Data, formula = Neigh_Dist ~ scale(MEAN_RES, scale = F))
summary(model47)
```

```
##
## Call:
## lm(formula = Neigh_Dist ~ scale(MEAN_RES, scale = F), data = FacPat5In90Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -213.74 -123.42  -54.69   81.10  820.59
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    213.874    12.165   17.582  <2e-16 ***
## scale(MEAN_RES, scale = F)  1.444    14.339   0.101   0.92
## ---
```



```

## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 180 on 217 degrees of freedom
## Multiple R-squared:  4.675e-05, Adjusted R-squared:  -0.004561
## F-statistic: 0.01015 on 1 and 217 DF,  p-value: 0.9199

model48 <- lm(data = FacPat5In90Data, formula = Neigh_Dist ~ scale(log(AR
EA), scale = F))
summary(model48)

##
## Call:
## lm(formula = Neigh_Dist ~ scale(log(AREA), scale = F), data = FacPat
5In90Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -239.56 -118.43  -51.56   75.53  789.19
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      213.874     11.906  17.964 < 2e-16 ***
## scale(log(AREA), scale = F)  -22.829       7.385  -3.091  0.00225 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 176.2 on 217 degrees of freedom
## Multiple R-squared:  0.04218, Adjusted R-squared:  0.03777
## F-statistic: 9.556 on 1 and 217 DF,  p-value: 0.002254

model49 <- lm(data = FacPat5In80Data, formula = Neigh_Dist ~ scale(Near_D
IST, scale = F))
summary(model49)

##
## Call:
## lm(formula = Neigh_Dist ~ scale(Near_DIST, scale = F), data = FacPat
5In80Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -209.88 -108.80  -40.78   62.63  666.47
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      1.875e+02  9.815e+00  19.107 < 2e-16 **
## scale(Near_DIST, scale = F)  1.052e-02  6.384e-03   1.648   0.101
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```

##
## Residual standard error: 149.2 on 229 degrees of freedom
## Multiple R-squared:  0.01173,    Adjusted R-squared:  0.007411
## F-statistic: 2.717 on 1 and 229 DF,  p-value: 0.1006

model50 <- lm(data = FacPat5In80Data, formula = Neigh_Dist ~ scale(MEAN_RES, scale = F))
summary(model50)

##
## Call:
## lm(formula = Neigh_Dist ~ scale(MEAN_RES, scale = F), data = FacPat5In80Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -195.46 -114.45  -34.91   63.06  658.41
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      188.059      9.875  19.043 <2e-16 ***
## scale(MEAN_RES, scale = F)  13.537     12.182   1.111  0.268
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 149.8 on 228 degrees of freedom
## (1 observation deleted due to missingness)
## Multiple R-squared:  0.005387,    Adjusted R-squared:  0.001024
## F-statistic: 1.235 on 1 and 228 DF,  p-value: 0.2677

model51 <- lm(data = FacPat5In80Data, formula = Neigh_Dist ~ scale(log(AREA), scale = F))
summary(model51)

##
## Call:
## lm(formula = Neigh_Dist ~ scale(log(AREA), scale = F), data = FacPat5In80Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -217.44 -100.33  -34.31   65.48  649.53
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      187.534      9.545  19.648 < 2e-16 ***
## scale(log(AREA), scale = F) -24.951      6.230  -4.005 8.39e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##

```

```

## Residual standard error: 145.1 on 229 degrees of freedom
## Multiple R-squared:  0.06546,    Adjusted R-squared:  0.06137
## F-statistic: 16.04 on 1 and 229 DF,  p-value: 8.388e-05

model52 <- lm(data = FacPat5In70Data, formula = Neigh_Dist~scale(Near_D
IST, scale = F))
summary(model52)

##
## Call:
## lm(formula = Neigh_Dist ~ scale(Near_DIST, scale = F), data = FacPat
5In70Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -207.59  -95.65  -28.58   58.55  635.38
##
## Coefficients:
##
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      1.789e+02  9.040e+00  19.792  <2e-16 **
##
## scale(Near_DIST, scale = F) 1.099e-02  6.066e-03   1.813  0.0713 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

## Residual standard error: 132.6 on 213 degrees of freedom
## Multiple R-squared:  0.01519,    Adjusted R-squared:  0.01057
## F-statistic: 3.285 on 1 and 213 DF,  p-value: 0.0713

model53 <- lm(data = FacPat5In70Data, formula = Neigh_Dist~scale(MEAN_R
ES, scale = F))
summary(model53)

##
## Call:
## lm(formula = Neigh_Dist ~ scale(MEAN_RES, scale = F), data = FacPat5
In70Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -187.68  -92.54  -33.68   61.22  640.72
##
## Coefficients:
##
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      178.920     9.104  19.653  <2e-16 ***
## scale(MEAN_RES, scale = F)   5.369    10.824   0.496    0.62
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

##
## Residual standard error: 133.5 on 213 degrees of freedom

```

```

## Multiple R-squared:  0.001154,    Adjusted R-squared:  -0.003536
## F-statistic: 0.246 on 1 and 213 DF,  p-value: 0.6204

model54 <- lm(data = FacPat5In70Data, formula = Neigh_Dist ~ scale(log(AR
EA), scale = F))
summary(model54)

##
## Call:
## lm(formula = Neigh_Dist ~ scale(log(AREA), scale = F), data = FacPat
5In70Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -188.03  -83.96  -29.36   51.55  624.64
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)         178.920      8.817  20.292 < 2e-16 ***
## scale(log(AREA), scale = F)  -22.013      5.813  -3.787 0.000198 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 129.3 on 213 degrees of freedom
## Multiple R-squared:  0.06308,    Adjusted R-squared:  0.05868
## F-statistic: 14.34 on 1 and 213 DF,  p-value: 0.0001984

model55 <- lm(data = FacPat5In60Data, formula = Neigh_Dist ~ scale(Near_D
IST, scale = F))
summary(model55)

##
## Call:
## lm(formula = Neigh_Dist ~ scale(Near_DIST, scale = F), data = FacPat
5In60Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -161.50  -90.38  -29.60   74.20  616.55
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    1.526e+02  8.646e+00  17.65 <2e-16 **
## scale(Near_DIST, scale = F) 3.229e-03  5.570e-03   0.58  0.563
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 122 on 197 degrees of freedom

```

```

## Multiple R-squared:  0.001703,   Adjusted R-squared:  -0.003365
## F-statistic: 0.336 on 1 and 197 DF,  p-value: 0.5628

model56 <- lm(data = FacPat5In60Data, formula = Neigh_Dist ~ scale(MEAN_RES, scale = F))
summary(model56)

##
## Call:
## lm(formula = Neigh_Dist ~ scale(MEAN_RES, scale = F), data = FacPat5In60Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -157.18  -101.42   -21.26    71.58   579.56
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      152.576      8.588  17.765  <2e-16 ***
## scale(MEAN_RES, scale = F)  20.171     11.647   1.732  0.0849 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 121.2 on 197 degrees of freedom
## Multiple R-squared:  0.015, Adjusted R-squared:  0.009997
## F-statistic: 2.999 on 1 and 197 DF,  p-value: 0.08486

model57 <- lm(data = FacPat5In60Data, formula = Neigh_Dist ~ scale(log(AREA), scale = F))
summary(model57)

##
## Call:
## lm(formula = Neigh_Dist ~ scale(log(AREA), scale = F), data = FacPat5In60Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -187.35  -87.24   -23.14    65.70   606.58
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      152.576      8.309  18.362  < 2e-16 ***
## scale(log(AREA), scale = F)  -21.579      5.287  -4.081  6.5e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 117.2 on 197 degrees of freedom
## Multiple R-squared:  0.07796,   Adjusted R-squared:  0.07328
## F-statistic: 16.66 on 1 and 197 DF,  p-value: 6.503e-05

```

```

model58 <- lm(data = FacPat5In50Data, formula = Neigh_Dist~scale(Near_D
IST, scale = F))
summary(model58)

##
## Call:
## lm(formula = Neigh_Dist ~ scale(Near_DIST, scale = F), data = FacPat
5In50Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -156.33  -78.09  -23.82   53.57  599.11
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    1.381e+02  8.383e+00  16.475 < 2e-16 **
## scale(Near_DIST, scale = F) 1.612e-02  5.628e-03   2.864  0.00467 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 114 on 183 degrees of freedom
## Multiple R-squared:  0.04291,    Adjusted R-squared:  0.03768
## F-statistic: 8.204 on 1 and 183 DF,  p-value: 0.004669

model59 <- lm(data = FacPat5In50Data, formula = Neigh_Dist~scale(MEAN_R
ES, scale = F))
summary(model59)

##
## Call:
## lm(formula = Neigh_Dist ~ scale(MEAN_RES, scale = F), data = FacPat5
In50Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -158.12  -90.12  -26.73   50.98  589.36
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    138.104     8.503   16.24 <2e-16 ***
## scale(MEAN_RES, scale = F)  16.874    10.046   1.68  0.0947 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 115.7 on 183 degrees of freedom
## Multiple R-squared:  0.01518,    Adjusted R-squared:  0.009801
## F-statistic: 2.821 on 1 and 183 DF,  p-value: 0.09474

```

```

model60 <- lm(data = FacPat5In50Data, formula = Neigh_Dist~scale(log(AR
EA), scale = F))
summary(model60)

##
## Call:
## lm(formula = Neigh_Dist ~ scale(log(AREA), scale = F), data = FacPat
5In50Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -160.73  -78.74  -26.09   44.79  616.74
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      138.104      8.368  16.505 < 2e-16 ***
## scale(log(AREA), scale = F)  -14.945      5.010  -2.983  0.00324 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 113.8 on 183 degrees of freedom
## Multiple R-squared:  0.04637,    Adjusted R-squared:  0.04116
## F-statistic: 8.899 on 1 and 183 DF,  p-value: 0.003242

```

Regression Analysis 5km Hard

Area

```

model11 <- lm(data = FacPat5H90Data, formula = log(AREA)~scale(MEAN_RES,
scale = F))
summary(model11)

##
## Call:
## lm(formula = log(AREA) ~ scale(MEAN_RES, scale = F), data = FacPat5H
90Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.7740 -1.0099 -0.4013  0.6156  7.2589
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.5902      0.0993  26.085 < 2e-16 ***
## scale(MEAN_RES, scale = F)  -0.3256      0.1164  -2.797  0.00564 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.439 on 208 degrees of freedom

```

```

## Multiple R-squared:  0.03625,    Adjusted R-squared:  0.03161
## F-statistic: 7.823 on 1 and 208 DF,  p-value: 0.005644

model2 <- lm(data = FacPat5H90Data, formula = log(AREA)~scale(Near_DIST
, scale = F))
summary(model2)

##
## Call:
## lm(formula = log(AREA) ~ scale(Near_DIST, scale = F), data = FacPat5
H90Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.7173 -1.0248 -0.3690  0.5706  7.0484
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  2.590e+00  1.002e-01  25.848  <2e-16 *
##
## scale(Near_DIST, scale = F) -1.300e-04  6.558e-05  -1.983  0.0487 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.452 on 208 degrees of freedom
## Multiple R-squared:  0.01855,    Adjusted R-squared:  0.01383
## F-statistic: 3.931 on 1 and 208 DF,  p-value: 0.04873

model3 <- lm(data = FacPat5H90Data, formula = log(AREA)~scale(Neigh_Dis
t, scale = F))
summary(model3)

##
## Call:
## lm(formula = log(AREA) ~ scale(Neigh_Dist, scale = F), data = FacPat
5H90Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.7912 -0.9483 -0.3329  0.6702  6.9660
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  2.590216   0.098207  26.375  < 2e-16 *
##
## scale(Neigh_Dist, scale = F) -0.001903   0.000535  -3.557 0.000464 *
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##

```



```

## Residual standard error: 1.423 on 208 degrees of freedom
## Multiple R-squared:  0.05735,    Adjusted R-squared:  0.05282
## F-statistic: 12.66 on 1 and 208 DF,  p-value: 0.0004638

model4 <- lm(data = FacPat5H80Data, formula = log(AREA)~scale(MEAN_RES,
scale = F))
summary(model4)

##
## Call:
## lm(formula = log(AREA) ~ scale(MEAN_RES, scale = F), data = FacPat5H
80Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.8483 -0.8849 -0.3818  0.6620  7.8294
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.56573    0.09022  28.439 < 2e-16 ***
## scale(MEAN_RES, scale = F) -0.37324    0.11073  -3.371 0.000885 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.344 on 220 degrees of freedom
## Multiple R-squared:  0.04911,    Adjusted R-squared:  0.04479
## F-statistic: 11.36 on 1 and 220 DF,  p-value: 0.000885

model5 <- lm(data = FacPat5H80Data, formula = log(AREA)~scale(Near_DIST
, scale = F))
summary(model5)

##
## Call:
## lm(formula = log(AREA) ~ scale(Near_DIST, scale = F), data = FacPat5
H80Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.8663 -0.8888 -0.4104  0.6642  7.4670
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.566e+00  9.012e-02  28.469 < 2e-16 *
## **
## scale(Near_DIST, scale = F) -2.103e-04  6.112e-05  -3.442 0.000692 *
## **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##

```

```

## Residual standard error: 1.343 on 220 degrees of freedom
## Multiple R-squared:  0.05109,    Adjusted R-squared:  0.04678
## F-statistic: 11.85 on 1 and 220 DF,  p-value: 0.0006916

model6 <- lm(data = FacPat5H80Data, formula = log(AREA)~scale(Neigh_Dist, scale = F))
summary(model6)

##
## Call:
## lm(formula = log(AREA) ~ scale(Neigh_Dist, scale = F), data = FacPat5H80Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.7576 -1.0010 -0.2749  0.5866  7.4452
##
## Coefficients:
##
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.5657307   0.0888383   28.881 < 2e-16
***
## scale(Neigh_Dist, scale = F) -0.0025574   0.0005929   -4.314 2.43e-05
***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.324 on 220 degrees of freedom
## Multiple R-squared:  0.07798,    Adjusted R-squared:  0.07379
## F-statistic: 18.61 on 1 and 220 DF,  p-value: 2.426e-05

model7 <- lm(data = FacPat5H70Data, formula = log(AREA)~scale(MEAN_RES, scale = F))
summary(model7)

##
## Call:
## lm(formula = log(AREA) ~ scale(MEAN_RES, scale = F), data = FacPat5H70Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.9591 -0.8897 -0.3578  0.6553  8.0415
##
## Coefficients:
##
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.58901   0.09265   27.945 < 2e-16 ***
## scale(MEAN_RES, scale = F) -0.40187   0.10730   -3.745 0.000234 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##

```

```

## Residual standard error: 1.336 on 206 degrees of freedom
## Multiple R-squared:  0.06375,    Adjusted R-squared:  0.0592
## F-statistic: 14.03 on 1 and 206 DF,  p-value: 0.0002339

model8 <- lm(data = FacPat5H70Data, formula = log(AREA)~scale(Near_DIST
, scale = F))
summary(model8)

##
## Call:
## lm(formula = log(AREA) ~ scale(Near_DIST, scale = F), data = FacPat5
H70Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.8892 -0.8851 -0.3298  0.6597  7.7940
##
## Coefficients:
##
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    2.589e+00  9.349e-02  27.694 < 2e-16 *
##
## scale(Near_DIST, scale = F) -2.078e-04  6.544e-05  -3.176  0.00172 *
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.348 on 206 degrees of freedom
## Multiple R-squared:  0.04668,    Adjusted R-squared:  0.04205
## F-statistic: 10.09 on 1 and 206 DF,  p-value: 0.001723

model9 <- lm(data = FacPat5H70Data, formula = log(AREA)~scale(Neigh_Dist,
scale = F))
summary(model9)

##
## Call:
## lm(formula = log(AREA) ~ scale(Neigh_Dist, scale = F), data = FacPat
5H70Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.8379 -0.9640 -0.3226  0.6942  7.7887
##
## Coefficients:
##
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    2.5890115  0.0918266  28.195 < 2e-16
##
## scale(Neigh_Dist, scale = F) -0.0028736  0.0006779  -4.239 3.38e-05
##
## ---

```

```

## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.324 on 206 degrees of freedom
## Multiple R-squared:  0.08024,    Adjusted R-squared:  0.07578
## F-statistic: 17.97 on 1 and 206 DF,  p-value: 3.384e-05

model10 <- lm(data = FacPat5H60Data, formula = log(AREA)~scale(MEAN_RES
, scale = F))
summary(model10)

##
## Call:
## lm(formula = log(AREA) ~ scale(MEAN_RES, scale = F), data = FacPat5H
60Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.8287 -0.9576 -0.4071  0.7682  7.9980
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.6931     0.1010  26.677 < 2e-16 ***
## scale(MEAN_RES, scale = F) -0.3809     0.1319  -2.887  0.00433 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.399 on 190 degrees of freedom
## Multiple R-squared:  0.04204,    Adjusted R-squared:  0.03699
## F-statistic: 8.337 on 1 and 190 DF,  p-value: 0.004334

model11 <- lm(data = FacPat5H60Data, formula = log(AREA)~scale(Near_DIST
T, scale = F))
summary(model11)

##
## Call:
## lm(formula = log(AREA) ~ scale(Near_DIST, scale = F), data = FacPat5
H60Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.8246 -0.9058 -0.3006  0.6312  7.5465
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.693e+00  9.776e-02  27.549 < 2e-16 *
##
## scale(Near_DIST, scale = F) -3.039e-04  6.554e-05  -4.637 6.56e-06 *
##
## ---

```

```

## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.355 on 190 degrees of freedom
## Multiple R-squared:  0.1017, Adjusted R-squared:  0.09694
## F-statistic: 21.5 on 1 and 190 DF,  p-value: 6.559e-06

model12 <- lm(data = FacPat5H60Data, formula = log(AREA)~scale(Neigh_Di
st, scale = F))
summary(model12)

##
## Call:
## lm(formula = log(AREA) ~ scale(Neigh_Dist, scale = F), data = FacPat
5H60Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.0822 -0.9495 -0.2829  0.7586  7.6372
##
## Coefficients:
##
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.6931207  0.0984502  27.355 < 2e-16
***
## scale(Neigh_Dist, scale = F) -0.0034626  0.0008041  -4.306 2.66e-05
***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.364 on 190 degrees of freedom
## Multiple R-squared:  0.08892,  Adjusted R-squared:  0.08412
## F-statistic: 18.54 on 1 and 190 DF,  p-value: 2.66e-05

model13 <- lm(data = FacPat5H50Data, formula = log(AREA)~scale(MEAN_RES
, scale = F))
summary(model13)

##
## Call:
## lm(formula = log(AREA) ~ scale(MEAN_RES, scale = F), data = FacPat5H
50Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.2071 -0.9605 -0.3173  0.6235  8.0361
##
## Coefficients:
##
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.6284      0.1085  24.213 <2e-16 ***
## scale(MEAN_RES, scale = F) -0.4085      0.1267  -3.224  0.0015 **
## ---

```

```

## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.456 on 178 degrees of freedom
## Multiple R-squared:  0.05518,    Adjusted R-squared:  0.04987
## F-statistic: 10.4 on 1 and 178 DF,  p-value: 0.001503

model14 <- lm(data = FacPat5H50Data, formula = log(AREA)~scale(Near_DIST,
scale = F))
summary(model14)

##
## Call:
## lm(formula = log(AREA) ~ scale(Near_DIST, scale = F), data = FacPat5
H50Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.0987 -0.9026 -0.2815  0.6361  7.6875
##
## Coefficients:
##
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.628e+00  1.071e-01  24.540 < 2e-16 *
##
## scale(Near_DIST, scale = F) -2.940e-04  7.464e-05  -3.939 0.000118 *
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.437 on 178 degrees of freedom
## Multiple R-squared:  0.08016,    Adjusted R-squared:  0.075
## F-statistic: 15.51 on 1 and 178 DF,  p-value: 0.0001175

model15 <- lm(data = FacPat5H50Data, formula = log(AREA)~scale(Neigh_Di
st, scale = F))
summary(model15)

##
## Call:
## lm(formula = log(AREA) ~ scale(Neigh_Dist, scale = F), data = FacPat
5H50Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.7842 -1.0089 -0.3337  0.7177  7.9209
##
## Coefficients:
##
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.6283548  0.1092395  24.060 < 2e-16
##
##
## scale(Neigh_Dist, scale = F) -0.0027238  0.0009616  -2.832 0.00515

```

```

**
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.466 on 178 degrees of freedom
## Multiple R-squared:  0.04313,    Adjusted R-squared:  0.03775
## F-statistic: 8.023 on 1 and 178 DF,  p-value: 0.005152

```

Resistance

```

model16 <- lm(data = FacPat5H90Data, formula = MEAN_RES ~ scale(log(AREA)
, scale = F))
summary(model16)

```

```

##
## Call:
## lm(formula = MEAN_RES ~ scale(log(AREA), scale = F), data = FacPat5H
90Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.6170 -0.6778 -0.2155  0.6315  2.6286
##
## Coefficients:
##
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.38527    0.05806  41.084 < 2e-16 ***
## scale(log(AREA), scale = F) -0.11131    0.03980  -2.797  0.00564 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.8414 on 208 degrees of freedom
## Multiple R-squared:  0.03625,    Adjusted R-squared:  0.03161
## F-statistic: 7.823 on 1 and 208 DF,  p-value: 0.005644

```

```

model17 <- lm(data = FacPat5H90Data, formula = MEAN_RES ~ scale(Near_DIST
, scale = F))
summary(model17)

```

```

##
## Call:
## lm(formula = MEAN_RES ~ scale(Near_DIST, scale = F), data = FacPat5H
90Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.5763 -0.7113 -0.1851  0.6161  2.7527
##
## Coefficients:
##
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  2.385e+00  5.914e-02  40.335 <2e-16 *

```

```

**
## scale(Near_DIST, scale = F) -6.844e-06  3.870e-05  -0.177    0.86
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.857 on 208 degrees of freedom
## Multiple R-squared:  0.0001503, Adjusted R-squared:  -0.004657
## F-statistic: 0.03127 on 1 and 208 DF,  p-value: 0.8598

model18 <- lm(data = FacPat5H90Data, formula = MEAN_RES ~ scale(Neigh_Dist, scale = F))
summary(model18)

##
## Call:
## lm(formula = MEAN_RES ~ scale(Neigh_Dist, scale = F), data = FacPat5H90Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.5886  -0.7043  -0.1844   0.6194   2.7643
##
## Coefficients:
##
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    2.385e+00  5.914e-02  40.332  <2e-16 *
**
## scale(Neigh_Dist, scale = F) 9.860e-06  3.222e-04  0.031    0.976
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.857 on 208 degrees of freedom
## Multiple R-squared:  4.503e-06, Adjusted R-squared:  -0.004803
## F-statistic: 0.0009366 on 1 and 208 DF,  p-value: 0.9756

model19 <- lm(data = FacPat5H80Data, formula = MEAN_RES ~ scale(log(AREA), scale = F))
summary(model19)

##
## Call:
## lm(formula = MEAN_RES ~ scale(log(AREA), scale = F), data = FacPat5H80Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.74186  -0.63861  -0.00314   0.59211   2.04736
##
## Coefficients:
##
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    2.54780    0.05357  47.563  < 2e-16 ***

```



```

## scale(log(AREA), scale = F) -0.13158    0.03904   -3.371 0.000885 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.7981 on 220 degrees of freedom
## Multiple R-squared:  0.04911,    Adjusted R-squared:  0.04479
## F-statistic: 11.36 on 1 and 220 DF,  p-value: 0.000885

model20 <- lm(data = FacPat5H80Data, formula = MEAN_RES ~ scale(Near_DIST
, scale = F))
summary(model20)

##
## Call:
## lm(formula = MEAN_RES ~ scale(Near_DIST, scale = F), data = FacPat5H
80Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.67769 -0.66377 -0.02234  0.58310  2.19254
##
## Coefficients:
##
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.548e+00  5.456e-02  46.693  <2e-16 **
##
## scale(Near_DIST, scale = F) 6.392e-05  3.700e-05   1.727  0.0855 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.813 on 220 degrees of freedom
## Multiple R-squared:  0.01338,    Adjusted R-squared:  0.008897
## F-statistic: 2.984 on 1 and 220 DF,  p-value: 0.0855

model21 <- lm(data = FacPat5H80Data, formula = MEAN_RES ~ scale(Neigh_Dist
t, scale = F))
summary(model21)

##
## Call:
## lm(formula = MEAN_RES ~ scale(Neigh_Dist, scale = F), data = FacPat5
H80Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.68024 -0.68196 -0.01586  0.57808  2.17173
##
## Coefficients:
##
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.5478050  0.0548096  46.485  <2e-16 **
##
##

```

```

## scale(Neigh_Dist, scale = F) 0.0003647 0.0003658 0.997 0.32
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.8166 on 220 degrees of freedom
## Multiple R-squared: 0.0045, Adjusted R-squared: -2.543e-05
## F-statistic: 0.9944 on 1 and 220 DF, p-value: 0.3198

model22 <- lm(data = FacPat5H70Data, formula = MEAN_RES ~ scale(log(AREA)
, scale = F))
summary(model22)

##
## Call:
## lm(formula = MEAN_RES ~ scale(log(AREA), scale = F), data = FacPat5H
70Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.98397 -0.53352  0.02732  0.55690  1.98073
##
## Coefficients:
##
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.66104    0.05821  45.717 < 2e-16 ***
## scale(log(AREA), scale = F) -0.15863    0.04236  -3.745 0.000234 ***
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.8395 on 206 degrees of freedom
## Multiple R-squared: 0.06375, Adjusted R-squared: 0.0592
## F-statistic: 14.03 on 1 and 206 DF, p-value: 0.0002339

model23 <- lm(data = FacPat5H70Data, formula = MEAN_RES ~ scale(Near_DIST
, scale = F))
summary(model23)

##
## Call:
## lm(formula = MEAN_RES ~ scale(Near_DIST, scale = F), data = FacPat5H
70Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.89796 -0.71224 -0.05785  0.58267  2.14739
##
## Coefficients:
##
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.661e+00    5.956e-02  44.681 < 2e-16 **
##
## scale(Near_DIST, scale = F) 8.517e-05  4.169e-05   2.043  0.0423 *

```

```

## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.8589 on 206 degrees of freedom
## Multiple R-squared:  0.01986,    Adjusted R-squared:  0.0151
## F-statistic: 4.174 on 1 and 206 DF,  p-value: 0.04233

model24 <- lm(data = FacPat5H70Data, formula = MEAN_RES ~ scale(Neigh_Dist,
scale = F))
summary(model24)

##
## Call:
## lm(formula = MEAN_RES ~ scale(Neigh_Dist, scale = F), data = FacPat5
H70Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.94399 -0.71444 -0.01384  0.58200  2.11986
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.6610422   0.0600851   44.29  <2e-16 *
##
## scale(Neigh_Dist, scale = F) 0.0003103  0.0004435    0.70    0.485
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.8666 on 206 degrees of freedom
## Multiple R-squared:  0.002371,    Adjusted R-squared:  -0.002472
## F-statistic: 0.4896 on 1 and 206 DF,  p-value: 0.4849

model25 <- lm(data = FacPat5H60Data, formula = MEAN_RES ~ scale(log(AREA)
, scale = F))
summary(model25)

##
## Call:
## lm(formula = MEAN_RES ~ scale(log(AREA), scale = F), data = FacPat5H
60Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.97074 -0.46198 -0.04493  0.49167  2.34008
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.72526   0.05434  50.150  < 2e-16 ***
## scale(log(AREA), scale = F) -0.11037   0.03822  -2.887  0.00433 **
## ---

```

```

## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.753 on 190 degrees of freedom
## Multiple R-squared:  0.04204,    Adjusted R-squared:  0.03699
## F-statistic: 8.337 on 1 and 190 DF,  p-value: 0.004334

model26 <- lm(data = FacPat5H60Data, formula = MEAN_RES ~ scale(Near_DIST
, scale = F))
summary(model26)

##
## Call:
## lm(formula = MEAN_RES ~ scale(Near_DIST, scale = F), data = FacPat5H
60Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.94660 -0.48279 -0.06211  0.55781  2.28231
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.725e+00  5.509e-02  49.471  <2e-16 **
*
## scale(Near_DIST, scale = F) 6.395e-05  3.693e-05   1.732   0.085 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.7633 on 190 degrees of freedom
## Multiple R-squared:  0.01553,    Adjusted R-squared:  0.01035
## F-statistic: 2.998 on 1 and 190 DF,  p-value: 0.08499

model27 <- lm(data = FacPat5H60Data, formula = MEAN_RES ~ scale(Neigh_Dis
t, scale = F))
summary(model27)

##
## Call:
## lm(formula = MEAN_RES ~ scale(Neigh_Dist, scale = F), data = FacPat5
H60Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.01802 -0.54313 -0.04382  0.53336  2.40417
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.7252552  0.0551241  49.439  <2e-16 **
**
## scale(Neigh_Dist, scale = F) 0.0007463  0.0004502   1.658   0.099 .
## ---

```

```

## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.7638 on 190 degrees of freedom
## Multiple R-squared:  0.01426,    Adjusted R-squared:  0.009068
## F-statistic: 2.748 on 1 and 190 DF,  p-value: 0.09904

model28 <- lm(data = FacPat5H50Data, formula = MEAN_RES ~ scale(log(AREA)
, scale = F))
summary(model28)

##
## Call:
## lm(formula = MEAN_RES ~ scale(log(AREA), scale = F), data = FacPat5H
50Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.08839 -0.56212 -0.03845  0.40497  2.80970
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.87251    0.06242  46.018  <2e-16 ***
## scale(log(AREA), scale = F) -0.13508    0.04190  -3.224   0.0015 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.8375 on 178 degrees of freedom
## Multiple R-squared:  0.05518,    Adjusted R-squared:  0.04987
## F-statistic: 10.4 on 1 and 178 DF,  p-value: 0.001503

model29 <- lm(data = FacPat5H50Data, formula = MEAN_RES ~ scale(Near_DIST
, scale = F))
summary(model29)

##
## Call:
## lm(formula = MEAN_RES ~ scale(Near_DIST, scale = F), data = FacPat5H
50Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.0860 -0.5356 -0.1258  0.4597  3.0249
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  2.873e+00  6.394e-02  44.924  <2e-16 **
##
## scale(Near_DIST, scale = F) 5.542e-05  4.456e-05   1.244   0.215
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```
##
## Residual standard error: 0.8579 on 178 degrees of freedom
## Multiple R-squared:  0.008615,    Adjusted R-squared:  0.003045
## F-statistic: 1.547 on 1 and 178 DF,  p-value: 0.2152

model30 <- lm(data = FacPat5H50Data, formula = MEAN_RES~scale(Neigh_Dist, scale = F))
summary(model30)

##
## Call:
## lm(formula = MEAN_RES ~ scale(Neigh_Dist, scale = F), data = FacPat5H50Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.1060 -0.5636 -0.1179  0.4539  3.0460
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    2.8725078   0.0637984   45.025  <2e-16 *
## **
## scale(Neigh_Dist, scale = F) 0.0008608   0.0005616    1.533    0.127
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.8559 on 178 degrees of freedom
## Multiple R-squared:  0.01303,    Adjusted R-squared:  0.007481
## F-statistic: 2.349 on 1 and 178 DF,  p-value: 0.1271
```

Distance

```
model31 <- lm(data = FacPat5H90Data, formula = Near_DIST~scale(MEAN_RES, scale = F))
summary(model31)

##
## Call:
## lm(formula = Near_DIST ~ scale(MEAN_RES, scale = F), data = FacPat5H90Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2170.55 -1431.22   -0.49  1366.50  2657.34
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    2151.94    105.94   20.313  <2e-16 ***
## scale(MEAN_RES, scale = F)  -21.96    124.20  -0.177    0.86
## ---
```

```

## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1535 on 208 degrees of freedom
## Multiple R-squared:  0.0001503, Adjusted R-squared:  -0.004657
## F-statistic: 0.03127 on 1 and 208 DF,  p-value: 0.8598

model32 <- lm(data = FacPat5H90Data, formula = Near_DIST ~ scale(log(AREA
), scale = F))
summary(model32)

##
## Call:
## lm(formula = Near_DIST ~ scale(log(AREA), scale = F), data = FacPat5
H90Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2348.00 -1365.70   -42.79  1298.22  2531.37
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2151.94     104.96  20.503  <2e-16 ***
## scale(log(AREA), scale = F)  -142.64       71.95  -1.983   0.0487 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1521 on 208 degrees of freedom
## Multiple R-squared:  0.01855, Adjusted R-squared:  0.01383
## F-statistic: 3.931 on 1 and 208 DF,  p-value: 0.04873

model33 <- lm(data = FacPat5H90Data, formula = Near_DIST ~ scale(Neigh_Di
st, scale = F))
summary(model33)

##
## Call:
## lm(formula = Near_DIST ~ scale(Neigh_Dist, scale = F), data = FacPat
5H90Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2166.37 -1423.53    9.28  1343.98  2671.92
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2151.94210    105.94235   20.312  <2e-16
***
## scale(Neigh_Dist, scale = F)  -0.07581     0.57713   -0.131   0.896
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```

##
## Residual standard error: 1535 on 208 degrees of freedom
## Multiple R-squared: 8.295e-05, Adjusted R-squared: -0.004724
## F-statistic: 0.01725 on 1 and 208 DF, p-value: 0.8956

model34 <- lm(data = FacPat5H80Data, formula = Near_DIST~scale(MEAN_RES
, scale = F))
summary(model34)

##
## Call:
## lm(formula = Near_DIST ~ scale(MEAN_RES, scale = F), data = FacPat5H
80Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2427.36 -1303.20   67.36  1136.95  2974.11
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2167.40      98.75  21.948 <2e-16 ***
## scale(MEAN_RES, scale = F)  209.36     121.20   1.727  0.0855 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1471 on 220 degrees of freedom
## Multiple R-squared: 0.01338, Adjusted R-squared: 0.008897
## F-statistic: 2.984 on 1 and 220 DF, p-value: 0.0855

model35 <- lm(data = FacPat5H80Data, formula = Near_DIST~scale(log(AREA
), scale = F))
summary(model35)

##
## Call:
## lm(formula = Near_DIST ~ scale(log(AREA), scale = F), data = FacPat5
H80Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2454.09 -1255.32   58.34  1197.76  2499.12
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2167.40      96.84  22.380 < 2e-16 ***
## scale(log(AREA), scale = F)  -242.89      70.57  -3.442 0.000692 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1443 on 220 degrees of freedom

```



```

## Multiple R-squared:  0.05109,    Adjusted R-squared:  0.04678
## F-statistic: 11.85 on 1 and 220 DF,  p-value: 0.0006916

model36 <- lm(data = FacPat5H80Data, formula = Near_DIST ~ scale(Neigh_Di
st, scale = F))
summary(model36)

##
## Call:
## lm(formula = Near_DIST ~ scale(Neigh_Dist, scale = F), data = FacPat
5H80Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2502.88 -1304.28   53.77  1112.16  2739.04
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    2167.3954    98.8484   21.926  <2e-16 *
## **
## scale(Neigh_Dist, scale = F)    1.0512     0.6597    1.593    0.112
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1473 on 220 degrees of freedom
## Multiple R-squared:  0.01141,    Adjusted R-squared:  0.006916
## F-statistic: 2.539 on 1 and 220 DF,  p-value: 0.1125

model37 <- lm(data = FacPat5H70Data, formula = Near_DIST ~ scale(MEAN_RES
, scale = F))
summary(model37)

##
## Call:
## lm(formula = Near_DIST ~ scale(MEAN_RES, scale = F), data = FacPat5H
70Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2326.84 -1197.64   -94.85  1017.81  3052.39
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    2086.83    98.54   21.178  <2e-16 ***
## scale(MEAN_RES, scale = F)  233.16   114.13    2.043  0.0423 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1421 on 206 degrees of freedom

```

```

## Multiple R-squared:  0.01986,    Adjusted R-squared:  0.0151
## F-statistic: 4.174 on 1 and 206 DF,  p-value: 0.04233

model38 <- lm(data = FacPat5H70Data, formula = Near_DIST ~ scale(log(AREA
), scale = F))
summary(model38)

##
## Call:
## lm(formula = Near_DIST ~ scale(log(AREA), scale = F), data = FacPat5
H70Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2414   -1153    -28     1021    2559
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)         2086.83     97.18  21.474 < 2e-16 ***
## scale(log(AREA), scale = F)  -224.58     70.72  -3.176  0.00172 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1402 on 206 degrees of freedom
## Multiple R-squared:  0.04668,    Adjusted R-squared:  0.04205
## F-statistic: 10.09 on 1 and 206 DF,  p-value: 0.001723

model39 <- lm(data = FacPat5H70Data, formula = Near_DIST ~ scale(Neigh_Di
st, scale = F))
summary(model39)

##
## Call:
## lm(formula = Near_DIST ~ scale(Neigh_Dist, scale = F), data = FacPat
5H70Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2768.8  -1116.7   -34.4    948.4   3043.7
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)         2086.8289     97.9224  21.311 < 2e-16 *
##
## scale(Neigh_Dist, scale = F)    1.8886     0.7229   2.613  0.00964 *
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1412 on 206 degrees of freedom

```

```

## Multiple R-squared:  0.03207,    Adjusted R-squared:  0.02738
## F-statistic: 6.826 on 1 and 206 DF,  p-value: 0.009645

model40 <- lm(data = FacPat5H60Data, formula = Near_DIST ~ scale(MEAN_RES
, scale = F))
summary(model40)

##
## Call:
## lm(formula = Near_DIST ~ scale(MEAN_RES, scale = F), data = FacPat5H
60Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2366   -1261    -136    1176    3024
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)         2110.5      107.4  19.656 <2e-16 ***
## scale(MEAN_RES, scale = F)    242.9      140.3   1.732  0.085 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1488 on 190 degrees of freedom
## Multiple R-squared:  0.01553,    Adjusted R-squared:  0.01035
## F-statistic: 2.998 on 1 and 190 DF,  p-value: 0.08499

model41 <- lm(data = FacPat5H60Data, formula = Near_DIST ~ scale(log(AREA
), scale = F))
summary(model41)

##
## Call:
## lm(formula = Near_DIST ~ scale(log(AREA), scale = F), data = FacPat5
H60Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2506.34 -1164.46   -76.18  1211.96  2724.57
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)         2110.53      102.57  20.577 < 2e-16 ***
## scale(log(AREA), scale = F)  -334.53       72.14  -4.637 6.56e-06 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1421 on 190 degrees of freedom
## Multiple R-squared:  0.1017, Adjusted R-squared:  0.09694
## F-statistic:  21.5 on 1 and 190 DF,  p-value: 6.559e-06

```

```

model42 <- lm(data = FacPat5H60Data, formula = Near_DIST~scale(Neigh_Di
st, scale = F))
summary(model42)

##
## Call:
## lm(formula = Near_DIST ~ scale(Neigh_Dist, scale = F), data = FacPat
5H60Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2392  -1241    -76    1104   2934
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2110.5292   107.2083   19.686  <2e-16 *
##
## scale(Neigh_Dist, scale = F)    1.6581    0.8757    1.894  0.0598 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1486 on 190 degrees of freedom
## Multiple R-squared:  0.01852,    Adjusted R-squared:  0.01336
## F-statistic: 3.586 on 1 and 190 DF,  p-value: 0.0598

model43 <- lm(data = FacPat5H50Data, formula = Near_DIST~scale(MEAN_RES
, scale = F))
summary(model43)

##
## Call:
## lm(formula = Near_DIST ~ scale(MEAN_RES, scale = F), data = FacPat5H
50Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2295.50 -1209.08   -63.81   1055.35   2902.84
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2054.1    107.1   19.180  <2e-16 ***
## scale(MEAN_RES, scale = F)    155.5    125.0    1.244  0.215
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1437 on 178 degrees of freedom
## Multiple R-squared:  0.008615,    Adjusted R-squared:  0.003045
## F-statistic: 1.547 on 1 and 178 DF,  p-value: 0.2152

```

```

model44 <- lm(data = FacPat5H50Data, formula = Near_DIST ~ scale(log(AREA
), scale = F))
summary(model44)

##
## Call:
## lm(formula = Near_DIST ~ scale(log(AREA), scale = F), data = FacPat5
H50Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2461.7 -1083.5  -214.1   1006.5  2696.4
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2054.07     103.16  19.912 < 2e-16 ***
## scale(log(AREA), scale = F)  -272.70      69.24  -3.939 0.000118 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1384 on 178 degrees of freedom
## Multiple R-squared:  0.08016,    Adjusted R-squared:  0.075
## F-statistic: 15.51 on 1 and 178 DF,  p-value: 0.0001175

model45 <- lm(data = FacPat5H50Data, formula = Near_DIST ~ scale(Neigh_Di
st, scale = F))
summary(model45)

##
## Call:
## lm(formula = Near_DIST ~ scale(Neigh_Dist, scale = F), data = FacPat
5H50Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2417.72 -1092.64   -72.97   999.23  2900.64
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2054.0691     105.7436  19.425 <2e-16 *
## scale(Neigh_Dist, scale = F)    2.3104      0.9309   2.482  0.014 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1419 on 178 degrees of freedom
## Multiple R-squared:  0.03345,    Adjusted R-squared:  0.02802
## F-statistic:  6.16 on 1 and 178 DF,  p-value: 0.01399

```

Proximity

```
model46 <- lm(data = FacPat5H90Data, formula = Neigh_Dist~scale(Near_DIST, scale = F))
summary(model46)

##
## Call:
## lm(formula = Neigh_Dist ~ scale(Near_DIST, scale = F), data = FacPat5H90Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -221.92 -128.52  -61.98   78.24  815.84
##
## Coefficients:
##
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    220.093221   12.727536   17.293  <2e-16 *
##
## scale(Near_DIST, scale = F)  -0.001094    0.008330  -0.131    0.896
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 184.4 on 208 degrees of freedom
## Multiple R-squared:  8.295e-05, Adjusted R-squared:  -0.004724
## F-statistic: 0.01725 on 1 and 208 DF,  p-value: 0.8956

model47 <- lm(data = FacPat5H90Data, formula = Neigh_Dist~scale(MEAN_RES, scale = F))
summary(model47)

##
## Call:
## lm(formula = Neigh_Dist ~ scale(MEAN_RES, scale = F), data = FacPat5H90Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -220.05 -129.29  -59.92   77.88  814.17
##
## Coefficients:
##
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    220.0932    12.7280   17.292  <2e-16 ***
## scale(MEAN_RES, scale = F)  0.4567    14.9225   0.031    0.976
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 184.4 on 208 degrees of freedom
## Multiple R-squared:  4.503e-06, Adjusted R-squared:  -0.004803
## F-statistic: 0.0009366 on 1 and 208 DF,  p-value: 0.9756
```

```

model48 <- lm(data = FacPat5H90Data, formula = Neigh_Dist ~ scale(log(AREA), scale = F))
summary(model48)

##
## Call:
## lm(formula = Neigh_Dist ~ scale(log(AREA), scale = F), data = FacPat5H90Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -230.94 -124.11  -52.92   78.55  774.95
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      220.093     12.358  17.810 < 2e-16 ***
## scale(log(AREA), scale = F)  -30.135      8.471  -3.557 0.000464 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 179.1 on 208 degrees of freedom
## Multiple R-squared:  0.05735, Adjusted R-squared:  0.05282
## F-statistic: 12.66 on 1 and 208 DF, p-value: 0.0004638

model49 <- lm(data = FacPat5H80Data, formula = Neigh_Dist ~ scale(Near_DIST, scale = F))
summary(model49)

##
## Call:
## lm(formula = Neigh_Dist ~ scale(Near_DIST, scale = F), data = FacPat5H80Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -210.99 -109.03  -40.36   62.84  665.60
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  1.868e+02  1.004e+01  18.597 <2e-16 **
## *
## scale(Near_DIST, scale = F) 1.085e-02  6.812e-03   1.593   0.112
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 149.7 on 220 degrees of freedom
## Multiple R-squared:  0.01141, Adjusted R-squared:  0.006916
## F-statistic: 2.539 on 1 and 220 DF, p-value: 0.1125

```

```

model50 <- lm(data = FacPat5H80Data, formula = Neigh_Dist~scale(MEAN_RES, scale = F))
summary(model50)

##
## Call:
## lm(formula = Neigh_Dist ~ scale(MEAN_RES, scale = F), data = FacPat5H80Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -193.70 -113.42  -36.54   62.52  661.47
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      186.80     10.08  18.532 <2e-16 ***
## scale(MEAN_RES, scale = F)   12.34     12.37   0.997   0.32
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 150.2 on 220 degrees of freedom
## Multiple R-squared:  0.0045, Adjusted R-squared:  -2.543e-05
## F-statistic: 0.9944 on 1 and 220 DF,  p-value: 0.3198

model51 <- lm(data = FacPat5H80Data, formula = Neigh_Dist~scale(log(AREA), scale = F))
summary(model51)

##
## Call:
## lm(formula = Neigh_Dist ~ scale(log(AREA), scale = F), data = FacPat5H80Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -220.84  -99.76  -39.12   67.72  645.77
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      186.800     9.701  19.257 < 2e-16 ***
## scale(log(AREA), scale = F)  -30.493     7.069  -4.314 2.43e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 144.5 on 220 degrees of freedom
## Multiple R-squared:  0.07798, Adjusted R-squared:  0.07379
## F-statistic: 18.61 on 1 and 220 DF,  p-value: 2.426e-05

```



```

model52 <- lm(data = FacPat5H70Data, formula = Neigh_Dist ~ scale(Near_DIST, scale = F))
summary(model52)

##
## Call:
## lm(formula = Neigh_Dist ~ scale(Near_DIST, scale = F), data = FacPat5H70Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -228.39  -94.33  -25.18   53.93  621.11
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      182.55188     9.28575   19.659 < 2e-16 **
## scale(Near_DIST, scale = F)  0.01698     0.00650    2.613  0.00964 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 133.9 on 206 degrees of freedom
## Multiple R-squared:  0.03207,    Adjusted R-squared:  0.02738
## F-statistic: 6.826 on 1 and 206 DF,  p-value: 0.009645

model53 <- lm(data = FacPat5H70Data, formula = Neigh_Dist ~ scale(MEAN_RES, scale = F))
summary(model53)

##
## Call:
## lm(formula = Neigh_Dist ~ scale(MEAN_RES, scale = F), data = FacPat5H70Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -195.07  -98.42  -33.79   63.41  632.24
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      182.552     9.427   19.36 <2e-16 ***
## scale(MEAN_RES, scale = F)  7.640    10.919    0.70  0.485
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 136 on 206 degrees of freedom
## Multiple R-squared:  0.002371,    Adjusted R-squared:  -0.002472
## F-statistic: 0.4896 on 1 and 206 DF,  p-value: 0.4849

```

```

model54 <- lm(data = FacPat5H70Data, formula = Neigh_Dist ~ scale(log(AREA), scale = F))
summary(model54)

##
## Call:
## lm(formula = Neigh_Dist ~ scale(log(AREA), scale = F), data = FacPat5H70Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -217.24  -83.65  -24.67   51.72  616.02
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      182.552      9.052   20.168 < 2e-16 ***
## scale(log(AREA), scale = F)  -27.923      6.587   -4.239 3.38e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 130.5 on 206 degrees of freedom
## Multiple R-squared:  0.08024,    Adjusted R-squared:  0.07578
## F-statistic: 17.97 on 1 and 206 DF,  p-value: 3.384e-05

model55 <- lm(data = FacPat5H60Data, formula = Neigh_Dist ~ scale(Near_DIST, scale = F))
summary(model55)

##
## Call:
## lm(formula = Neigh_Dist ~ scale(Near_DIST, scale = F), data = FacPat5H60Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -188.89  -92.90  -27.82   78.15  598.35
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  1.591e+02  8.800e+00  18.076 <2e-16 **
## *
## scale(Near_DIST, scale = F) 1.117e-02  5.899e-03   1.894  0.0598 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 121.9 on 190 degrees of freedom
## Multiple R-squared:  0.01852,    Adjusted R-squared:  0.01336
## F-statistic: 3.586 on 1 and 190 DF,  p-value: 0.0598

```

```

model56 <- lm(data = FacPat5H60Data, formula = Neigh_Dist~scale(MEAN_RES, scale = F))
summary(model56)

##
## Call:
## lm(formula = Neigh_Dist ~ scale(MEAN_RES, scale = F), data = FacPat5H60Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -161.98 -101.33  -22.64   67.25  575.13
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      159.058      8.819  18.037 <2e-16 ***
## scale(MEAN_RES, scale = F)  19.101     11.523   1.658  0.099 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 122.2 on 190 degrees of freedom
## Multiple R-squared:  0.01426, Adjusted R-squared:  0.009068
## F-statistic: 2.748 on 1 and 190 DF, p-value: 0.09904

model57 <- lm(data = FacPat5H60Data, formula = Neigh_Dist~scale(log(AREA), scale = F))
summary(model57)

##
## Call:
## lm(formula = Neigh_Dist ~ scale(log(AREA), scale = F), data = FacPat5H60Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -198.38  -85.18  -22.14   65.75  599.43
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      159.058      8.478  18.761 < 2e-16 ***
## scale(log(AREA), scale = F) -25.679      5.963  -4.306 2.66e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 117.5 on 190 degrees of freedom
## Multiple R-squared:  0.08892, Adjusted R-squared:  0.08412
## F-statistic: 18.54 on 1 and 190 DF, p-value: 2.66e-05

```

```

model58 <- lm(data = FacPat5H50Data, formula = Neigh_Dist~scale(Near_DI
ST, scale = F))
summary(model58)

##
## Call:
## lm(formula = Neigh_Dist ~ scale(Near_DIST, scale = F), data = FacPat
5H50Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -153.50  -77.96  -22.41   50.27  602.36
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    1.360e+02  8.371e+00  16.249  <2e-16 **
## scale(Near_DIST, scale = F) 1.448e-02  5.833e-03   2.482   0.014 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 112.3 on 178 degrees of freedom
## Multiple R-squared:  0.03345,    Adjusted R-squared:  0.02802
## F-statistic:  6.16 on 1 and 178 DF,  p-value: 0.01399

model59 <- lm(data = FacPat5H50Data, formula = Neigh_Dist~scale(MEAN_RE
S, scale = F))
summary(model59)

##
## Call:
## lm(formula = Neigh_Dist ~ scale(MEAN_RES, scale = F), data = FacPat5
H50Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -151.29  -87.28  -27.00   51.03  594.71
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    136.017     8.459  16.080  <2e-16 ***
## scale(MEAN_RES, scale = F)  15.132     9.873   1.533   0.127
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 113.5 on 178 degrees of freedom
## Multiple R-squared:  0.01303,    Adjusted R-squared:  0.007481
## F-statistic:  2.349 on 1 and 178 DF,  p-value: 0.1271

```

```

model60 <- lm(data = FacPat5H50Data, formula = Neigh_Dist~scale(log(AREA), scale = F))
summary(model60)

##
## Call:
## lm(formula = Neigh_Dist ~ scale(log(AREA), scale = F), data = FacPat5H50Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -158.38  -73.68  -23.39   46.30  620.15
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      136.017     8.329  16.331 < 2e-16 ***
## scale(log(AREA), scale = F)  -15.834     5.590  -2.832  0.00515 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 111.7 on 178 degrees of freedom
## Multiple R-squared:  0.04313, Adjusted R-squared:  0.03775
## F-statistic: 8.023 on 1 and 178 DF, p-value: 0.005152

```

Regression Analysis 10km Hard

Area

```

model11 <- lm(data = FacPat10H90Data, formula = log(AREA)~scale(MEAN_RES, scale = F))
summary(model11)

##
## Call:
## lm(formula = log(AREA) ~ scale(MEAN_RES, scale = F), data = FacPat10H90Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.7264 -0.9149 -0.3034  0.5819  7.8526
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.53372     0.06391  39.647 < 2e-16 ***
## scale(MEAN_RES, scale = F) -0.25355     0.06382  -3.973 8.34e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.322 on 426 degrees of freedom

```

```

## Multiple R-squared:  0.03573,    Adjusted R-squared:  0.03346
## F-statistic: 15.78 on 1 and 426 DF,  p-value: 8.341e-05

model2 <- lm(data = FacPat10H90Data, formula = log(AREA)~scale(Near_DIST,
scale = F))
summary(model2)

##
## Call:
## lm(formula = log(AREA) ~ scale(Near_DIST, scale = F), data = FacPat1
0H90Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.6373  -0.9564  -0.3121   0.5438   7.7758
##
## Coefficients:
##
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    2.534e+00  6.473e-02  39.144  <2e-16 *
## **
## scale(Near_DIST, scale = F) -4.717e-05  2.187e-05  -2.157  0.0316 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.339 on 426 degrees of freedom
## Multiple R-squared:  0.0108, Adjusted R-squared:  0.008478
## F-statistic: 4.651 on 1 and 426 DF,  p-value: 0.03159

model3 <- lm(data = FacPat10H90Data, formula = log(AREA)~scale(Neigh_Di
st, scale = F))
summary(model3)

##
## Call:
## lm(formula = log(AREA) ~ scale(Neigh_Dist, scale = F), data = FacPat
10H90Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.6583  -0.9412  -0.2893   0.5186   7.7336
##
## Coefficients:
##
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    2.5337182  0.0638532  39.680  < 2e-16
## ***
## scale(Neigh_Dist, scale = F) -0.0013016  0.0003202  -4.065 5.72e-05
## ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##

```

```

## Residual standard error: 1.321 on 426 degrees of freedom
## Multiple R-squared:  0.03734,    Adjusted R-squared:  0.03508
## F-statistic: 16.52 on 1 and 426 DF,  p-value: 5.72e-05

model4 <- lm(data = FacPat10H80Data, formula = log(AREA)~scale(MEAN_RES
, scale = F))
summary(model4)

##
## Call:
## lm(formula = log(AREA) ~ scale(MEAN_RES, scale = F), data = FacPat10
H80Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.6684 -0.8449 -0.3028  0.5881  8.4249
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.50742    0.05759  43.541 < 2e-16 ***
## scale(MEAN_RES, scale = F) -0.24790    0.05851  -4.237 2.73e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.243 on 464 degrees of freedom
## (1 observation deleted due to missingness)
## Multiple R-squared:  0.03725,    Adjusted R-squared:  0.03517
## F-statistic: 17.95 on 1 and 464 DF,  p-value: 2.733e-05

model5 <- lm(data = FacPat10H80Data, formula = log(AREA)~scale(Near_DIST
T, scale = F))
summary(model5)

##
## Call:
## lm(formula = log(AREA) ~ scale(Near_DIST, scale = F), data = FacPat1
0H80Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.6827 -0.9231 -0.2677  0.5555  8.2689
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.505e+00  5.802e-02  43.173 < 2e-16 *
##
## scale(Near_DIST, scale = F) -6.085e-05  1.972e-05  -3.085  0.00215 *
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```

##
## Residual standard error: 1.254 on 465 degrees of freedom
## Multiple R-squared:  0.02006,    Adjusted R-squared:  0.01795
## F-statistic: 9.519 on 1 and 465 DF,  p-value: 0.002155

model6 <- lm(data = FacPat10H80Data, formula = log(AREA)~scale(Neigh_Di
st, scale = F))
summary(model6)

##
## Call:
## lm(formula = log(AREA) ~ scale(Neigh_Dist, scale = F), data = FacPat
10H80Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.5536 -0.8763 -0.2824  0.4940  8.3070
##
## Coefficients:
##
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.5050128   0.0576049   43.486 < 2e-16
***
## scale(Neigh_Dist, scale = F) -0.0012865   0.0003173   -4.054  5.9e-05
***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.245 on 465 degrees of freedom
## Multiple R-squared:  0.03414,    Adjusted R-squared:  0.03206
## F-statistic: 16.44 on 1 and 465 DF,  p-value: 5.899e-05

model7 <- lm(data = FacPat10H70Data, formula = log(AREA)~scale(MEAN_RES
, scale = F))
summary(model7)

##
## Call:
## lm(formula = log(AREA) ~ scale(MEAN_RES, scale = F), data = FacPat10
H70Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.8079 -0.8946 -0.2619  0.6436  8.5710
##
## Coefficients:
##
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.58211    0.05866  44.020 < 2e-16 ***
## scale(MEAN_RES, scale = F) -0.26237    0.05961  -4.402 1.34e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```



```

##
## Residual standard error: 1.254 on 455 degrees of freedom
## Multiple R-squared:  0.04084,    Adjusted R-squared:  0.03874
## F-statistic: 19.38 on 1 and 455 DF,  p-value: 1.339e-05

model8 <- lm(data = FacPat10H70Data, formula = log(AREA)~scale(Near_DIST,
scale = F))
summary(model8)

##
## Call:
## lm(formula = log(AREA) ~ scale(Near_DIST, scale = F), data = FacPat1
0H70Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.6517 -0.9255 -0.2790  0.6698  8.5473
##
## Coefficients:
##
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.582e+00  5.962e-02  43.308  <2e-16 *
##
## scale(Near_DIST, scale = F) -4.110e-05  2.015e-05  -2.039   0.042 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.275 on 455 degrees of freedom
## Multiple R-squared:  0.009059,    Adjusted R-squared:  0.006881
## F-statistic: 4.159 on 1 and 455 DF,  p-value: 0.04198

model9 <- lm(data = FacPat10H70Data, formula = log(AREA)~scale(Neigh_Di
st, scale = F))
summary(model9)

##
## Call:
## lm(formula = log(AREA) ~ scale(Neigh_Dist, scale = F), data = FacPat
10H70Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.6493 -0.9119 -0.2800  0.6747  8.5372
##
## Coefficients:
##
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.5821112  0.0589228  43.822  < 2e-16
## ***
## scale(Neigh_Dist, scale = F) -0.0013930  0.0003583  -3.888 0.000116
## ***
## ---

```

```

## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.26 on 455 degrees of freedom
## Multiple R-squared:  0.03215,    Adjusted R-squared:  0.03003
## F-statistic: 15.12 on 1 and 455 DF,  p-value: 0.0001162

model10 <- lm(data = FacPat10H60Data, formula = log(AREA)~scale(MEAN_RE
S, scale = F))
summary(model10)

##
## Call:
## lm(formula = log(AREA) ~ scale(MEAN_RES, scale = F), data = FacPat10
H60Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.7967 -0.9370 -0.3060  0.7601  8.5153
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.67650    0.06309   42.42 < 2e-16 ***
## scale(MEAN_RES, scale = F) -0.28350    0.06798   -4.17 3.69e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.31 on 429 degrees of freedom
## Multiple R-squared:  0.03896,    Adjusted R-squared:  0.03672
## F-statistic: 17.39 on 1 and 429 DF,  p-value: 3.686e-05

model11 <- lm(data = FacPat10H60Data, formula = log(AREA)~scale(Near_DI
ST, scale = F))
summary(model11)

##
## Call:
## lm(formula = log(AREA) ~ scale(Near_DIST, scale = F), data = FacPat1
0H60Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.7679 -0.9722 -0.3559  0.7432  8.3951
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.677e+00    6.368e-02   42.031 < 2e-16 *
## *
## scale(Near_DIST, scale = F) -6.439e-05    2.131e-05   -3.022  0.00266 *
## *
## ---

```

```

## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.322 on 429 degrees of freedom
## Multiple R-squared:  0.02084,    Adjusted R-squared:  0.01856
## F-statistic: 9.131 on 1 and 429 DF,  p-value: 0.002664

model12 <- lm(data = FacPat10H60Data, formula = log(AREA)~scale(Neigh_D
ist, scale = F))
summary(model12)

##
## Call:
## lm(formula = log(AREA) ~ scale(Neigh_Dist, scale = F), data = FacPat
10H60Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.0109 -0.8849 -0.2640  0.6680  8.2233
##
## Coefficients:
##
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.6765032   0.0615072   43.515 < 2e-16
***
## scale(Neigh_Dist, scale = F) -0.0032750   0.0005138  -6.374 4.77e-10
***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.277 on 429 degrees of freedom
## Multiple R-squared:  0.08651,    Adjusted R-squared:  0.08438
## F-statistic: 40.63 on 1 and 429 DF,  p-value: 4.765e-10

model13 <- lm(data = FacPat10H50Data, formula = log(AREA)~scale(MEAN_RE
S, scale = F))
summary(model13)

##
## Call:
## lm(formula = log(AREA) ~ scale(MEAN_RES, scale = F), data = FacPat10
H50Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.1626 -0.9503 -0.3524  0.6398  8.5256
##
## Coefficients:
##
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.63935   0.06987   37.775 < 2e-16 ***
## scale(MEAN_RES, scale = F) -0.33174   0.07179  -4.621 5.21e-06 ***
## ---

```

```

## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.38 on 388 degrees of freedom
## Multiple R-squared:  0.05216,    Adjusted R-squared:  0.04972
## F-statistic: 21.35 on 1 and 388 DF,  p-value: 5.208e-06

model14 <- lm(data = FacPat10H50Data, formula = log(AREA)~scale(Near_DIST, scale = F))
summary(model14)

##
## Call:
## lm(formula = log(AREA) ~ scale(Near_DIST, scale = F), data = FacPat10H50Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.7911 -1.0423 -0.3885  0.6601  8.5248
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    2.639e+00  7.127e-02  37.035  <2e-16 *
##
## scale(Near_DIST, scale = F) -5.491e-05  2.351e-05  -2.335    0.02 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.407 on 388 degrees of freedom
## Multiple R-squared:  0.01386,    Adjusted R-squared:  0.01132
## F-statistic: 5.453 on 1 and 388 DF,  p-value: 0.02005

model15 <- lm(data = FacPat10H50Data, formula = log(AREA)~scale(Neigh_Dist, scale = F))
summary(model15)

##
## Call:
## lm(formula = log(AREA) ~ scale(Neigh_Dist, scale = F), data = FacPat10H50Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.8266 -0.9783 -0.3005  0.7283  8.3938
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    2.6393493  0.0698654  37.778  < 2e-16
## ***
## scale(Neigh_Dist, scale = F) -0.0029701  0.0006421  -4.626 5.09e-06
## ***

```

```
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.38 on 388 degrees of freedom
## Multiple R-squared:  0.05227,    Adjusted R-squared:  0.04983
## F-statistic: 21.4 on 1 and 388 DF,  p-value: 5.09e-06
```

Resistance

```
model16 <- lm(data = FacPat10H90Data, formula = MEAN_RES ~ scale(log(AREA
), scale = F))
summary(model16)
```

```
##
## Call:
## lm(formula = MEAN_RES ~ scale(log(AREA), scale = F), data = FacPat10
H90Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.93091 -0.76972 -0.07238  0.57031  3.11409
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.67213    0.04764  56.090 < 2e-16 ***
## scale(log(AREA), scale = F) -0.14090    0.03547  -3.973 8.34e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.9856 on 426 degrees of freedom
## Multiple R-squared:  0.03573,    Adjusted R-squared:  0.03346
## F-statistic: 15.78 on 1 and 426 DF,  p-value: 8.341e-05
```

```
model17 <- lm(data = FacPat10H90Data, formula = MEAN_RES ~ scale(Near_DIST
T, scale = F))
summary(model17)
```

```
##
## Call:
## lm(formula = MEAN_RES ~ scale(Near_DIST, scale = F), data = FacPat10
H90Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.8393 -0.7425 -0.1234  0.6142  3.1371
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  2.672e+00  4.645e-02  57.530 < 2e-16 **
*
```

```

## scale(Near_DIST, scale = F) 9.772e-05 1.570e-05 6.226 1.15e-09 **
*
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.9609 on 426 degrees of freedom
## Multiple R-squared: 0.0834, Adjusted R-squared: 0.08125
## F-statistic: 38.76 on 1 and 426 DF, p-value: 1.148e-09

model18 <- lm(data = FacPat10H90Data, formula = MEAN_RES ~ scale(Neigh_Di
st, scale = F))
summary(model18)

##
## Call:
## lm(formula = MEAN_RES ~ scale(Neigh_Dist, scale = F), data = FacPat1
0H90Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.8428 -0.8409 -0.1123  0.5834  3.0679
##
## Coefficients:
##
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.6721274  0.0484343  55.170  <2e-16 *
##
## scale(Neigh_Dist, scale = F) 0.0002893  0.0002429  1.191  0.234
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.002 on 426 degrees of freedom
## Multiple R-squared: 0.003321, Adjusted R-squared: 0.0009813
## F-statistic: 1.419 on 1 and 426 DF, p-value: 0.2342

model19 <- lm(data = FacPat10H80Data, formula = MEAN_RES ~ scale(log(AREA
), scale = F))
summary(model19)

##
## Call:
## lm(formula = MEAN_RES ~ scale(log(AREA), scale = F), data = FacPat10
H80Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.00115 -0.72889 -0.03259  0.56028  2.97657
##
## Coefficients:
##
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.80188  0.04483  62.495  < 2e-16 ***

```

```

## scale(log(AREA), scale = F) -0.15026    0.03546  -4.237 2.73e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.9678 on 464 degrees of freedom
## (1 observation deleted due to missingness)
## Multiple R-squared:  0.03725,    Adjusted R-squared:  0.03517
## F-statistic: 17.95 on 1 and 464 DF,  p-value: 2.733e-05

model20 <- lm(data = FacPat10H80Data, formula = MEAN_RES ~ scale(Near_DIST, scale = F))
summary(model20)

##
## Call:
## lm(formula = MEAN_RES ~ scale(Near_DIST, scale = F), data = FacPat10H80Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.12620 -0.71630 -0.05864  0.59900  2.86609
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    2.801e+00  4.409e-02  63.541 < 2e-16 **
## *
## scale(Near_DIST, scale = F) 8.774e-05  1.497e-05   5.861 8.73e-09 **
## *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.9518 on 464 degrees of freedom
## (1 observation deleted due to missingness)
## Multiple R-squared:  0.06893,    Adjusted R-squared:  0.06693
## F-statistic: 34.35 on 1 and 464 DF,  p-value: 8.731e-09

model21 <- lm(data = FacPat10H80Data, formula = MEAN_RES ~ scale(Neigh_Dist, scale = F))
summary(model21)

##
## Call:
## lm(formula = MEAN_RES ~ scale(Neigh_Dist, scale = F), data = FacPat10H80Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.94146 -0.80912 -0.06506  0.55064  2.82718
##
## Coefficients:

```

```

##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    2.8013691  0.0454961  61.574  <2e-16 *
##
## scale(Neigh_Dist, scale = F) 0.0005021  0.0002505   2.005  0.0456 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.9821 on 464 degrees of freedom
## (1 observation deleted due to missingness)
## Multiple R-squared:  0.008585, Adjusted R-squared:  0.006449
## F-statistic: 4.018 on 1 and 464 DF, p-value: 0.0456

model22 <- lm(data = FacPat10H70Data, formula = MEAN_RES~scale(log(AREA
), scale = F))
summary(model22)

##
## Call:
## lm(formula = MEAN_RES ~ scale(log(AREA), scale = F), data = FacPat10
H70Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.2052 -0.6913 -0.0100  0.5495  2.8928
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    2.88614   0.04518  63.876 < 2e-16 ***
## scale(log(AREA), scale = F) -0.15568   0.03537  -4.402 1.34e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.9659 on 455 degrees of freedom
## Multiple R-squared:  0.04084, Adjusted R-squared:  0.03874
## F-statistic: 19.38 on 1 and 455 DF, p-value: 1.339e-05

model23 <- lm(data = FacPat10H70Data, formula = MEAN_RES~scale(Near_DIST,
scale = F))
summary(model23)

##
## Call:
## lm(formula = MEAN_RES ~ scale(Near_DIST, scale = F), data = FacPat10
H70Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.12789 -0.71427 -0.06971  0.56961  2.80946
##
## Coefficients:

```



```

##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.886e+00  4.503e-02  64.094 < 2e-16 **
*
## scale(Near_DIST, scale = F) 7.237e-05  1.522e-05   4.755 2.67e-06 **
*
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.9626 on 455 degrees of freedom
## Multiple R-squared:  0.04734,    Adjusted R-squared:  0.04524
## F-statistic: 22.61 on 1 and 455 DF,  p-value: 2.668e-06

model24 <- lm(data = FacPat10H70Data, formula = MEAN_RES~scale(Neigh_Di
st, scale = F))
summary(model24)

##
## Call:
## lm(formula = MEAN_RES ~ scale(Neigh_Dist, scale = F), data = FacPat1
0H70Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.22447 -0.79959 -0.02093  0.55547  2.89334
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.8861425  0.0459953  62.749 <2e-16 *
**
## scale(Neigh_Dist, scale = F) 0.0004658  0.0002797   1.666  0.0965 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.9833 on 455 degrees of freedom
## Multiple R-squared:  0.00606,    Adjusted R-squared:  0.003875
## F-statistic: 2.774 on 1 and 455 DF,  p-value: 0.09649

model25 <- lm(data = FacPat10H60Data, formula = MEAN_RES~scale(log(AREA
), scale = F))
summary(model25)

##
## Call:
## lm(formula = MEAN_RES ~ scale(log(AREA), scale = F), data = FacPat10
H60Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.2264 -0.6209 -0.0732  0.5192  2.8097
##

```

```

## Coefficients:
##
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.96590    0.04392   67.53 < 2e-16 ***
## scale(log(AREA), scale = F) -0.13741    0.03295   -4.17 3.69e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.9118 on 429 degrees of freedom
## Multiple R-squared:  0.03896,    Adjusted R-squared:  0.03672
## F-statistic: 17.39 on 1 and 429 DF,  p-value: 3.686e-05

model26 <- lm(data = FacPat10H60Data, formula = MEAN_RES ~ scale(Near_DIST, scale = F))
summary(model26)

##
## Call:
## lm(formula = MEAN_RES ~ scale(Near_DIST, scale = F), data = FacPat10H60Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.98748 -0.64180 -0.06842  0.57032  2.71247
##
## Coefficients:
##
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      2.966e+00  4.335e-02  68.418 < 2e-16 **
##
## scale(Near_DIST, scale = F) 7.845e-05  1.451e-05   5.408 1.06e-07 **
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.9 on 429 degrees of freedom
## Multiple R-squared:  0.06382,    Adjusted R-squared:  0.06164
## F-statistic: 29.24 on 1 and 429 DF,  p-value: 1.062e-07

model27 <- lm(data = FacPat10H60Data, formula = MEAN_RES ~ scale(Neigh_Dist, scale = F))
summary(model27)

##
## Call:
## lm(formula = MEAN_RES ~ scale(Neigh_Dist, scale = F), data = FacPat10H60Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.27220 -0.65361 -0.05853  0.51274  2.78332
##

```

```

## Coefficients:
##
## Estimate Std. Error t value Pr(>|t|)
## (Intercept) 2.9658977 0.0445675 66.548 <2e-16 *
## **
## scale(Neigh_Dist, scale = F) 0.0007940 0.0003723 2.133 0.0335 *
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.9252 on 429 degrees of freedom
## Multiple R-squared: 0.01049, Adjusted R-squared: 0.008183
## F-statistic: 4.548 on 1 and 429 DF, p-value: 0.03353

model28 <- lm(data = FacPat10H50Data, formula = MEAN_RES~scale(log(AREA
), scale = F))
summary(model28)

##
## Call:
## lm(formula = MEAN_RES ~ scale(log(AREA), scale = F), data = FacPat10
H50Data)
##
## Residuals:
## Min 1Q Median 3Q Max
## -2.3174 -0.6334 -0.1143 0.5960 2.8001
##
## Coefficients:
## Estimate Std. Error t value Pr(>|t|)
## (Intercept) 3.09242 0.04810 64.288 < 2e-16 ***
## scale(log(AREA), scale = F) -0.15724 0.03403 -4.621 5.21e-06 ***
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.9499 on 388 degrees of freedom
## Multiple R-squared: 0.05216, Adjusted R-squared: 0.04972
## F-statistic: 21.35 on 1 and 388 DF, p-value: 5.208e-06

model29 <- lm(data = FacPat10H50Data, formula = MEAN_RES~scale(Near_DIST,
scale = F))
summary(model29)

##
## Call:
## lm(formula = MEAN_RES ~ scale(Near_DIST, scale = F), data = FacPat10
H50Data)
##
## Residuals:
## Min 1Q Median 3Q Max
## -2.1156 -0.5970 -0.1125 0.5128 3.0238
##
## Coefficients:

```

```

##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      3.092e+00  4.824e-02  64.103 < 2e-16 **
*
## scale(Near_DIST, scale = F) 6.937e-05  1.592e-05   4.358 1.68e-05 **
*
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.9527 on 388 degrees of freedom
## Multiple R-squared:  0.04667,    Adjusted R-squared:  0.04422
## F-statistic:    19 on 1 and 388 DF,  p-value: 1.68e-05

model30 <- lm(data = FacPat10H50Data, formula = MEAN_RES~scale(Neigh_Di
st, scale = F))
summary(model30)

##
## Call:
## lm(formula = MEAN_RES ~ scale(Neigh_Dist, scale = F), data = FacPat1
0H50Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.31865 -0.70846 -0.09836  0.53792  2.81477
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      3.0924180  0.0492309  62.815 <2e-16 *
**
## scale(Neigh_Dist, scale = F) 0.0007569  0.0004524   1.673  0.0952 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.9722 on 388 degrees of freedom
## Multiple R-squared:  0.007161,    Adjusted R-squared:  0.004602
## F-statistic: 2.798 on 1 and 388 DF,  p-value: 0.09516

```

Distance

```

model31 <- lm(data = FacPat10H90Data, formula = Near_DIST~scale(MEAN_RE
S, scale = F))
summary(model31)

##
## Call:
## lm(formula = Near_DIST ~ scale(MEAN_RES, scale = F), data = FacPat10
H90Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max

```

```

## -6206.6 -2304.1 212.9 2261.9 5865.5
##
## Coefficients:
## Estimate Std. Error t value Pr(>|t|)
## (Intercept) 4781.3 137.3 34.833 < 2e-16 ***
## scale(MEAN_RES, scale = F) 853.4 137.1 6.226 1.15e-09 ***
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 2840 on 426 degrees of freedom
## Multiple R-squared: 0.0834, Adjusted R-squared: 0.08125
## F-statistic: 38.76 on 1 and 426 DF, p-value: 1.148e-09

model32 <- lm(data = FacPat10H90Data, formula = Near_DIST ~ scale(log(AREA), scale = F))
summary(model32)

##
## Call:
## lm(formula = Near_DIST ~ scale(log(AREA), scale = F), data = FacPat10H90Data)
##
## Residuals:
## Min 1Q Median 3Q Max
## -5083.0 -2548.2 84.7 2525.1 4948.6
##
## Coefficients:
## Estimate Std. Error t value Pr(>|t|)
## (Intercept) 4781.3 142.6 33.530 <2e-16 ***
## scale(log(AREA), scale = F) -228.9 106.2 -2.157 0.0316 *
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 2950 on 426 degrees of freedom
## Multiple R-squared: 0.0108, Adjusted R-squared: 0.008478
## F-statistic: 4.651 on 1 and 426 DF, p-value: 0.03159

model33 <- lm(data = FacPat10H90Data, formula = Near_DIST ~ scale(Neigh_Dist, scale = F))
summary(model33)

##
## Call:
## lm(formula = Near_DIST ~ scale(Neigh_Dist, scale = F), data = FacPat10H90Data)
##
## Residuals:
## Min 1Q Median 3Q Max
## -6041.1 -2635.8 232.9 2545.2 5326.8
##

```

```

## Coefficients:
##
##           Estimate Std. Error t value Pr(>|t|)
## (Intercept)      4781.269    142.200   33.624 < 2e-16 **
## *
## scale(Neigh_Dist, scale = F)    1.894     0.713    2.656 0.00819 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 2942 on 426 degrees of freedom
## Multiple R-squared:  0.01629,    Adjusted R-squared:  0.01399
## F-statistic: 7.057 on 1 and 426 DF,  p-value: 0.008194

model34 <- lm(data = FacPat10H80Data, formula = Near_DIST ~ scale(MEAN_RES, scale = F))
summary(model34)

##
## Call:
## lm(formula = Near_DIST ~ scale(MEAN_RES, scale = F), data = FacPat10H80Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -5655.3 -2345.3   72.7  2345.5  6176.9
##
## Coefficients:
##
##           Estimate Std. Error t value Pr(>|t|)
## (Intercept)      4879.1     131.9   36.982 < 2e-16 ***
## scale(MEAN_RES, scale = F)    785.6     134.0    5.861 8.73e-09 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 2848 on 464 degrees of freedom
## (1 observation deleted due to missingness)
## Multiple R-squared:  0.06893,    Adjusted R-squared:  0.06693
## F-statistic: 34.35 on 1 and 464 DF,  p-value: 8.731e-09

model35 <- lm(data = FacPat10H80Data, formula = Near_DIST ~ scale(log(AREA), scale = F))
summary(model35)

##
## Call:
## lm(formula = Near_DIST ~ scale(log(AREA), scale = F), data = FacPat10H80Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
##  -5260   -2599    144   2582   4881
##

```

```

## Coefficients:
##
##           Estimate Std. Error t value Pr(>|t|)
## (Intercept)      4878.8      135.1  36.124 < 2e-16 ***
## scale(log(AREA), scale = F)  -329.7      106.9  -3.085  0.00215 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 2919 on 465 degrees of freedom
## Multiple R-squared:  0.02006,    Adjusted R-squared:  0.01795
## F-statistic: 9.519 on 1 and 465 DF,  p-value: 0.002155

model36 <- lm(data = FacPat10H80Data, formula = Near_DIST ~ scale(Neigh_D
ist, scale = F))
summary(model36)

##
## Call:
## lm(formula = Near_DIST ~ scale(Neigh_Dist, scale = F), data = FacPat
10H80Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -5446.0 -2576.7   45.3  2581.1  5007.2
##
## Coefficients:
##
##           Estimate Std. Error t value Pr(>|t|)
## (Intercept)      4878.7886    135.5328   36.00 <2e-16 *
##
## scale(Neigh_Dist, scale = F)    1.8594     0.7466    2.49  0.0131 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 2929 on 465 degrees of freedom
## Multiple R-squared:  0.01316,    Adjusted R-squared:  0.01104
## F-statistic: 6.202 on 1 and 465 DF,  p-value: 0.01311

model37 <- lm(data = FacPat10H70Data, formula = Near_DIST ~ scale(MEAN_RE
S, scale = F))
summary(model37)

##
## Call:
## lm(formula = Near_DIST ~ scale(MEAN_RES, scale = F), data = FacPat10
H70Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -5560.5 -2540.3   193.9  2303.8  5890.4
##
## Coefficients:

```

```

##               Estimate Std. Error t value Pr(>|t|)
## (Intercept)         4941.8      135.4  36.505 < 2e-16 ***
## scale(MEAN_RES, scale = F)    654.1      137.6   4.755 2.67e-06 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 2894 on 455 degrees of freedom
## Multiple R-squared:  0.04734,    Adjusted R-squared:  0.04524
## F-statistic: 22.61 on 1 and 455 DF,  p-value: 2.668e-06

model38 <- lm(data = FacPat10H70Data, formula = Near_DIST ~ scale(log(AREA), scale = F))
summary(model38)

##
## Call:
## lm(formula = Near_DIST ~ scale(log(AREA), scale = F), data = FacPat10H70Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -5261.1 -2655.5   390.5  2490.1  4804.2
##
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept)         4941.8      138.1  35.793 <2e-16 ***
## scale(log(AREA), scale = F)    -220.4      108.1  -2.039  0.042 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 2952 on 455 degrees of freedom
## Multiple R-squared:  0.009059,    Adjusted R-squared:  0.006881
## F-statistic: 4.159 on 1 and 455 DF,  p-value: 0.04198

model39 <- lm(data = FacPat10H70Data, formula = Near_DIST ~ scale(Neigh_Dist, scale = F))
summary(model39)

##
## Call:
## lm(formula = Near_DIST ~ scale(Neigh_Dist, scale = F), data = FacPat10H70Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -5530.1 -2717.6   374.7  2453.8  5005.3
##
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept)         4941.7901    138.1255  35.778 <2e-16 *

```



```

**
## scale(Neigh_Dist, scale = F)    1.6305    0.8399    1.941    0.0528 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 2953 on 455 degrees of freedom
## Multiple R-squared:  0.008215,    Adjusted R-squared:  0.006035
## F-statistic: 3.769 on 1 and 455 DF,  p-value: 0.05284

model40 <- lm(data = FacPat10H60Data, formula = Near_DIST ~ scale(MEAN_RES, scale = F))
summary(model40)

##
## Call:
## lm(formula = Near_DIST ~ scale(MEAN_RES, scale = F), data = FacPat10H60Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -6071.9 -2557.5   206.5  2346.8  5381.8
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)         5035.0      139.6  36.068 < 2e-16 ***
## scale(MEAN_RES, scale = F)    813.5      150.4   5.408 1.06e-07 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 2898 on 429 degrees of freedom
## Multiple R-squared:  0.06382,    Adjusted R-squared:  0.06164
## F-statistic: 29.24 on 1 and 429 DF,  p-value: 1.062e-07

model41 <- lm(data = FacPat10H60Data, formula = Near_DIST ~ scale(log(AREA), scale = F))
summary(model41)

##
## Call:
## lm(formula = Near_DIST ~ scale(log(AREA), scale = F), data = FacPat10H60Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -5412.6 -2666.5   285.8  2605.5  4797.8
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)         5035.0      142.8  35.268 < 2e-16 ***
## scale(log(AREA), scale = F)   -323.7      107.1  -3.022 0.00266 **

```

```

## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 2964 on 429 degrees of freedom
## Multiple R-squared:  0.02084,    Adjusted R-squared:  0.01856
## F-statistic: 9.131 on 1 and 429 DF,  p-value: 0.002664

model42 <- lm(data = FacPat10H60Data, formula = Near_DIST ~ scale(Neigh_D
ist, scale = F))
summary(model42)

##
## Call:
## lm(formula = Near_DIST ~ scale(Neigh_Dist, scale = F), data = FacPat
10H60Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -5206.2 -2735.5   337.3  2670.0  4807.2
##
## Coefficients:
##
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      5035.0472    144.1701    34.92 <2e-16 *
##
## scale(Neigh_Dist, scale = F)    0.9638     1.2043     0.80    0.424
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 2993 on 429 degrees of freedom
## Multiple R-squared:  0.001491,    Adjusted R-squared:  -0.0008369
## F-statistic: 0.6405 on 1 and 429 DF,  p-value: 0.424

model43 <- lm(data = FacPat10H50Data, formula = Near_DIST ~ scale(MEAN_RE
S, scale = F))
summary(model43)

##
## Call:
## lm(formula = Near_DIST ~ scale(MEAN_RES, scale = F), data = FacPat10
H50Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -6008.1 -2649.7   223.2  2397.3  5673.7
##
## Coefficients:
##
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      4952.7     150.2   32.967 < 2e-16 ***
## scale(MEAN_RES, scale = F)    672.8     154.4    4.358 1.68e-05 ***
## ---

```

```

## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 2967 on 388 degrees of freedom
## Multiple R-squared:  0.04667,    Adjusted R-squared:  0.04422
## F-statistic:    19 on 1 and 388 DF,  p-value: 1.68e-05

model44 <- lm(data = FacPat10H50Data, formula = Near_DIST ~ scale(log(AREA), scale = F))
summary(model44)

##
## Call:
## lm(formula = Near_DIST ~ scale(log(AREA), scale = F), data = FacPat10H50Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -5332.8 -2836.4   294.1  2706.7  4829.0
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      4952.7      152.8  32.414  <2e-16 ***
## scale(log(AREA), scale = F)  -252.4      108.1  -2.335    0.02 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 3017 on 388 degrees of freedom
## Multiple R-squared:  0.01386,    Adjusted R-squared:  0.01132
## F-statistic: 5.453 on 1 and 388 DF,  p-value: 0.02005

model45 <- lm(data = FacPat10H50Data, formula = Near_DIST ~ scale(Neigh_Dist, scale = F))
summary(model45)

##
## Call:
## lm(formula = Near_DIST ~ scale(Neigh_Dist, scale = F), data = FacPat10H50Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -5176.0 -2792.0   415.9  2717.2  4897.5
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      4952.699      153.668  32.230  <2e-16 ***
## scale(Neigh_Dist, scale = F)    1.416      1.412   1.002    0.317
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```
##
## Residual standard error: 3035 on 388 degrees of freedom
## Multiple R-squared: 0.002583, Adjusted R-squared: 1.222e-05
## F-statistic: 1.005 on 1 and 388 DF, p-value: 0.3168
```

Proximity

```
model46 <- lm(data = FacPat10H90Data, formula = Neigh_Dist ~ scale(Near_DIST, scale = F))
summary(model46)
```

```
##
## Call:
## lm(formula = Neigh_Dist ~ scale(Near_DIST, scale = F), data = FacPat10H90Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -267.37 -138.85  -52.32   79.83  814.32
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    2.356e+02  9.583e+00  24.580 < 2e-16 **
## *
## scale(Near_DIST, scale = F) 8.603e-03  3.238e-03   2.656  0.00819 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 198.3 on 426 degrees of freedom
## Multiple R-squared: 0.01629, Adjusted R-squared: 0.01399
## F-statistic: 7.057 on 1 and 426 DF, p-value: 0.008194
```

```
model47 <- lm(data = FacPat10H90Data, formula = Neigh_Dist ~ scale(MEAN_RES, scale = F))
summary(model47)
```

```
##
## Call:
## lm(formula = Neigh_Dist ~ scale(MEAN_RES, scale = F), data = FacPat10H90Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -246.46 -139.57  -54.17   80.57  821.63
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    235.556     9.646  24.419 <2e-16 ***
## scale(MEAN_RES, scale = F)  11.477     9.633   1.191  0.234
## ---
```

```

## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 199.6 on 426 degrees of freedom
## Multiple R-squared:  0.003321, Adjusted R-squared:  0.0009813
## F-statistic: 1.419 on 1 and 426 DF, p-value: 0.2342

model48 <- lm(data = FacPat10H90Data, formula = Neigh_Dist ~ scale(log(AR
EA), scale = F))
summary(model48)

##
## Call:
## lm(formula = Neigh_Dist ~ scale(log(AREA), scale = F), data = FacPat
10H90Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -264.37 -127.75  -53.63   68.40  834.20
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      235.556      9.480  24.847 < 2e-16 ***
## scale(log(AREA), scale = F)  -28.690      7.058  -4.065 5.72e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 196.1 on 426 degrees of freedom
## Multiple R-squared:  0.03734, Adjusted R-squared:  0.03508
## F-statistic: 16.52 on 1 and 426 DF, p-value: 5.72e-05

model49 <- lm(data = FacPat10H80Data, formula = Neigh_Dist ~ scale(Near_D
IST, scale = F))
summary(model49)

##
## Call:
## lm(formula = Neigh_Dist ~ scale(Near_DIST, scale = F), data = FacPat
10H80Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -225.84 -113.98  -40.71   64.78 1826.00
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  2.011e+02  8.363e+00  24.05  <2e-16 **
##
## scale(Near_DIST, scale = F) 7.079e-03  2.842e-03   2.49  0.0131 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```

##
## Residual standard error: 180.7 on 465 degrees of freedom
## Multiple R-squared:  0.01316,    Adjusted R-squared:  0.01104
## F-statistic: 6.202 on 1 and 465 DF,  p-value: 0.01311

model50 <- lm(data = FacPat10H80Data, formula = Neigh_Dist ~ scale(MEAN_RES, scale = F))
summary(model50)

##
## Call:
## lm(formula = Neigh_Dist ~ scale(MEAN_RES, scale = F), data = FacPat10H80Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -217.56 -119.76  -43.91   65.63 1851.88
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)         201.426     8.395  23.993 <2e-16 ***
## scale(MEAN_RES, scale = F)  17.098     8.529   2.005  0.0456 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 181.2 on 464 degrees of freedom
## (1 observation deleted due to missingness)
## Multiple R-squared:  0.008585,    Adjusted R-squared:  0.006449
## F-statistic: 4.018 on 1 and 464 DF,  p-value: 0.0456

model51 <- lm(data = FacPat10H80Data, formula = Neigh_Dist ~ scale(log(AREA), scale = F))
summary(model51)

##
## Call:
## lm(formula = Neigh_Dist ~ scale(log(AREA), scale = F), data = FacPat10H80Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -233.33 -110.36  -42.51   59.15 1877.09
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)         201.137     8.273  24.311 < 2e-16 ***
## scale(log(AREA), scale = F) -26.537     6.546  -4.054 5.9e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##

```

```

## Residual standard error: 178.8 on 465 degrees of freedom
## Multiple R-squared:  0.03414,    Adjusted R-squared:  0.03206
## F-statistic: 16.44 on 1 and 465 DF,  p-value: 5.899e-05

model52 <- lm(data = FacPat10H70Data, formula = Neigh_Dist~scale(Near_D
IST, scale = F))
summary(model52)

##
## Call:
## lm(formula = Neigh_Dist ~ scale(Near_DIST, scale = F), data = FacPat
10H70Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -199.45 -100.03  -40.26   57.79 1827.18
##
## Coefficients:
##
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      1.828e+02  7.678e+00  23.814  <2e-16 **
##
## scale(Near_DIST, scale = F) 5.038e-03  2.595e-03   1.941  0.0528 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 164.1 on 455 degrees of freedom
## Multiple R-squared:  0.008215,    Adjusted R-squared:  0.006035
## F-statistic: 3.769 on 1 and 455 DF,  p-value: 0.05284

model53 <- lm(data = FacPat10H70Data, formula = Neigh_Dist~scale(MEAN_R
ES, scale = F))
summary(model53)

##
## Call:
## lm(formula = Neigh_Dist ~ scale(MEAN_RES, scale = F), data = FacPat1
0H70Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -201.24  -98.20  -41.02   51.96 1846.36
##
## Coefficients:
##
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      182.844     7.686  23.788  <2e-16 ***
## scale(MEAN_RES, scale = F)  13.009     7.810   1.666  0.0965 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 164.3 on 455 degrees of freedom

```

```

## Multiple R-squared:  0.00606,    Adjusted R-squared:  0.003875
## F-statistic: 2.774 on 1 and 455 DF,  p-value: 0.09649

model54 <- lm(data = FacPat10H70Data, formula = Neigh_Dist ~ scale(log(AR
EA), scale = F))
summary(model54)

##
## Call:
## lm(formula = Neigh_Dist ~ scale(log(AREA), scale = F), data = FacPat
10H70Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -190.27  -94.46  -37.20   49.11 1869.75
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      182.844      7.585  24.107 < 2e-16 ***
## scale(log(AREA), scale = F)  -23.082      5.937  -3.888 0.000116 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 162.1 on 455 degrees of freedom
## Multiple R-squared:  0.03215,    Adjusted R-squared:  0.03003
## F-statistic: 15.12 on 1 and 455 DF,  p-value: 0.0001162

model55 <- lm(data = FacPat10H60Data, formula = Neigh_Dist ~ scale(Near_D
IST, scale = F))
summary(model55)

##
## Call:
## lm(formula = Neigh_Dist ~ scale(Near_DIST, scale = F), data = FacPat
10H60Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -154.32  -90.64  -30.94   62.16  639.52
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  1.515e+02  5.775e+00  26.23 <2e-16 **
##
## scale(Near_DIST, scale = F) 1.547e-03  1.933e-03   0.80   0.424
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 119.9 on 429 degrees of freedom

```



```

## Multiple R-squared:  0.001491,   Adjusted R-squared:  -0.0008369
## F-statistic: 0.6405 on 1 and 429 DF,  p-value: 0.424

model56 <- lm(data = FacPat10H60Data, formula = Neigh_Dist ~ scale(MEAN_RES, scale = F))
summary(model56)

##
## Call:
## lm(formula = Neigh_Dist ~ scale(MEAN_RES, scale = F), data = FacPat10H60Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -155.39  -95.68  -30.71   63.29  645.05
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      151.461     5.749   26.345 <2e-16 ***
## scale(MEAN_RES, scale = F)  13.212     6.195    2.133  0.0335 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 119.4 on 429 degrees of freedom
## Multiple R-squared:  0.01049,   Adjusted R-squared:  0.008183
## F-statistic: 4.548 on 1 and 429 DF,  p-value: 0.03353

model57 <- lm(data = FacPat10H60Data, formula = Neigh_Dist ~ scale(log(AREA), scale = F))
summary(model57)

##
## Call:
## lm(formula = Neigh_Dist ~ scale(log(AREA), scale = F), data = FacPat10H60Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -191.47  -80.94  -25.72   62.67  607.04
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      151.461     5.524   27.419 < 2e-16 ***
## scale(log(AREA), scale = F)  -26.415     4.144   -6.374 4.77e-10 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 114.7 on 429 degrees of freedom
## Multiple R-squared:  0.08651,   Adjusted R-squared:  0.08438
## F-statistic: 40.63 on 1 and 429 DF,  p-value: 4.765e-10

```

```

model58 <- lm(data = FacPat10H50Data, formula = Neigh_Dist~scale(Near_D
IST, scale = F))
summary(model58)

##
## Call:
## lm(formula = Neigh_Dist ~ scale(Near_DIST, scale = F), data = FacPat
10H50Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -138.82  -82.30  -19.99   49.05  626.49
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    1.357e+02  5.517e+00  24.592  <2e-16 **
##
## scale(Near_DIST, scale = F) 1.825e-03  1.820e-03   1.002   0.317
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 109 on 388 degrees of freedom
## Multiple R-squared:  0.002583, Adjusted R-squared:  1.222e-05
## F-statistic: 1.005 on 1 and 388 DF, p-value: 0.3168

model59 <- lm(data = FacPat10H50Data, formula = Neigh_Dist~scale(MEAN_R
ES, scale = F))
summary(model59)

##
## Call:
## lm(formula = Neigh_Dist ~ scale(MEAN_RES, scale = F), data = FacPat1
0H50Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -148.01  -81.45  -19.86   50.38  607.94
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    135.676     5.504  24.649  <2e-16 ***
## scale(MEAN_RES, scale = F)  9.461     5.656   1.673  0.0952 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 108.7 on 388 degrees of freedom
## Multiple R-squared:  0.007161, Adjusted R-squared:  0.004602
## F-statistic: 2.798 on 1 and 388 DF, p-value: 0.09516

```

```

model60 <- lm(data = FacPat10H50Data, formula = Neigh_Dist ~ scale(log(AREA), scale = F))
summary(model60)

##
## Call:
## lm(formula = Neigh_Dist ~ scale(log(AREA), scale = F), data = FacPat10H50Data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -160.73  -70.85  -22.35   45.12  619.92
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      135.676     5.378  25.228 < 2e-16 ***
## scale(log(AREA), scale = F)  -17.598     3.804  -4.626 5.09e-06 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 106.2 on 388 degrees of freedom
## Multiple R-squared:  0.05227,    Adjusted R-squared:  0.04983
## F-statistic: 21.4 on 1 and 388 DF,  p-value: 5.09e-06

```