Land Cover Characteristics of Dragonfly Microhabitats

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Abstract

This project showcases dragonflies' role as bioindicators of the health of wetland environments. Wetlands are some of the most biologically important habitats. Not only are they some of the most biologically diverse areas, but they also serve key roles in our water cycle by filtering and recycling water. Unfortunately, wetland areas are under extreme threat from continued development and industrialization; according to the South Carolina Department of Natural Resources, "more than half of the wetlands in the United States have been drained or filled for development and farming." This project's intention is to show the effects of development on wetland areas within Greenville County parks as well as on Furman's campus. Data on these wetland areas was collected during a summer research program conducted by Dr. Worthen, a biology professor and entomologist at Furman University. At each wetland area, multiple dragonfly microhabitats were selected and surveyed to determine types of aquatic and shoreline vegetation suitable for dragonflies. Dragonflies were then observed and identified at each site and from this dragonfly richness, abundance, and Simpson's Diversity was then calculated for each habitat and site. In this study, richness is being defined as the number of different species and abundance is defined as the number of individuals within each site. Simpson's Diversity Index is a measure of species diversity calculated using both abundance and richness. These three variables are used in this project to indicate the health of each collection site. Therefore, the objective of this project is to determine how land cover around wetland areas effects their health. This is done by comparing the richness, abundance, and Simpson's Diversity values at each site to their surrounding environments with the National Land Cover Data (NLCD), using ArcGIS, in order to visualize the effects of different land covers in Greenville on wetland health.

Methods

Results

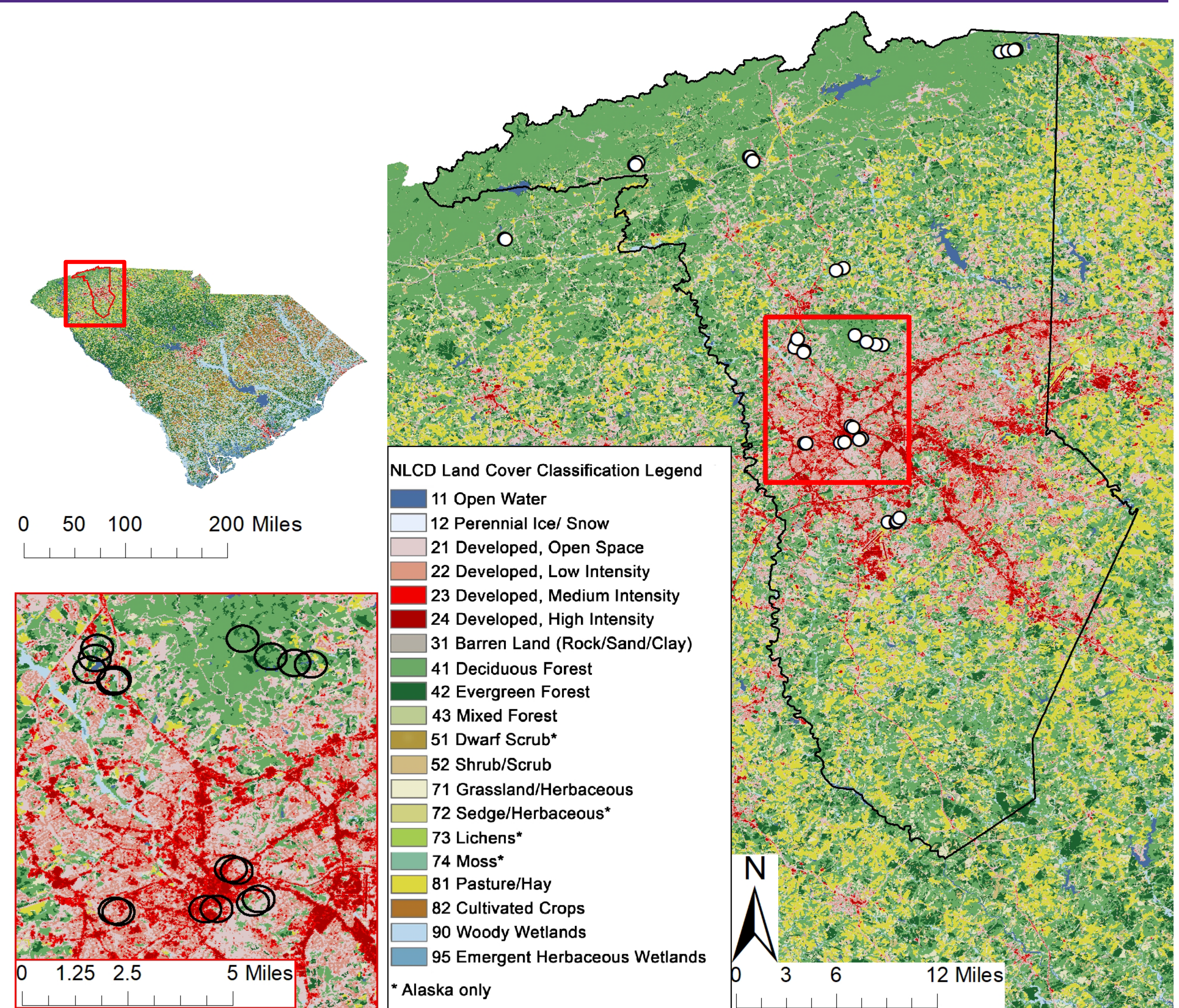| Collection Site	Developed, Medium Intensity	Mixed Forest
Table Rock lake 1	0	18000
Table Rock lake 2	0	3600
Ashmore lake 1	0	215100
Ashmore lake 2	0	32400
Ashmore stream 1	0	36900
Ashmore stream 2	0	10800
Pleasant Ridge lake 1	0	125100
Pleasant Ridge lake 2	2700	0
Pleasant Ridge stream 1	0	9000
Pleasant Ridge stream 2	0	0
Blue Wall lake 1	0	10800
Blue Wall lake 2	0	11700
Blue Wall stream 1	0	0
Blue Wall stream 2	0	0
Bunched Arrowhead stream 1	10800	0
Bunched Arrowhead pond 1	2700	0
Joe Jackson Park stream 1	139500	0
Joe Jackson Park stream 2	11700	0
Falls Park stream 1	306000	0
Falls Park river 1	117900	0
Conestee swamp 1	8100	5400
Conestee lake 1	900	0
Conestee lake 2	18900	0
Conestee river 1	72000	0
Cleveland Park stream 1	90000	0
Cleveland Park stream 2	15300	0
McPherson Park stream 1	197100	0
McPherson Park stream 2	57600	0
Paris Mtn lake 1	0	0
Paris Mtn stream 1	0	4500
Paris Mtn lake 2	0	12600
Paris Mtn stream 2	0	0
Furman Lake 1	27000	0
Furman Lake 2	43200	0
Furman Stream 1	52200	0
Furman Stream 2	9900	0
Furman Pond 1	49500	6300

Figure 1. This table Lists all the data collection sites with the Land Cover Data around each one. The Land Cover Data consists of the number of Medium Intensity Developed and Mixed Forest raster points within 500 m of each site.

Figure 2. This map shows the land cover (NLCD) within South Carolina which is described in the legend. Collection sites as well as the outline of Greenville County are overlaid.

NLCD Land Cover Classification Legend
- 11 Open Water
- 12 Perennial Ice/ Snow
- 21 Developed, Open Space
- 22 Developed, Low Intensity
- 23 Developed, Medium Intensity
- 24 Developed, High Intensity
- 31 Barren Land (Rock/Sand/Clay)
- 41 Deciduous Forest
- 42 Evergreen Forest
- 43 Mixed Forest
- 51 Dwarf Scrub*
- 52 Shrub/Scrub
- 71 Grassland/Herbaceous
- 72 Sedge/Herbaceous*
- 73 Lichens*
- 74 Moss*
- 81 Pasture/Hay
- 82 Cultivated Crops
- 90 Woody Wetlands
- 95 Emergent Herbaceous Wetlands
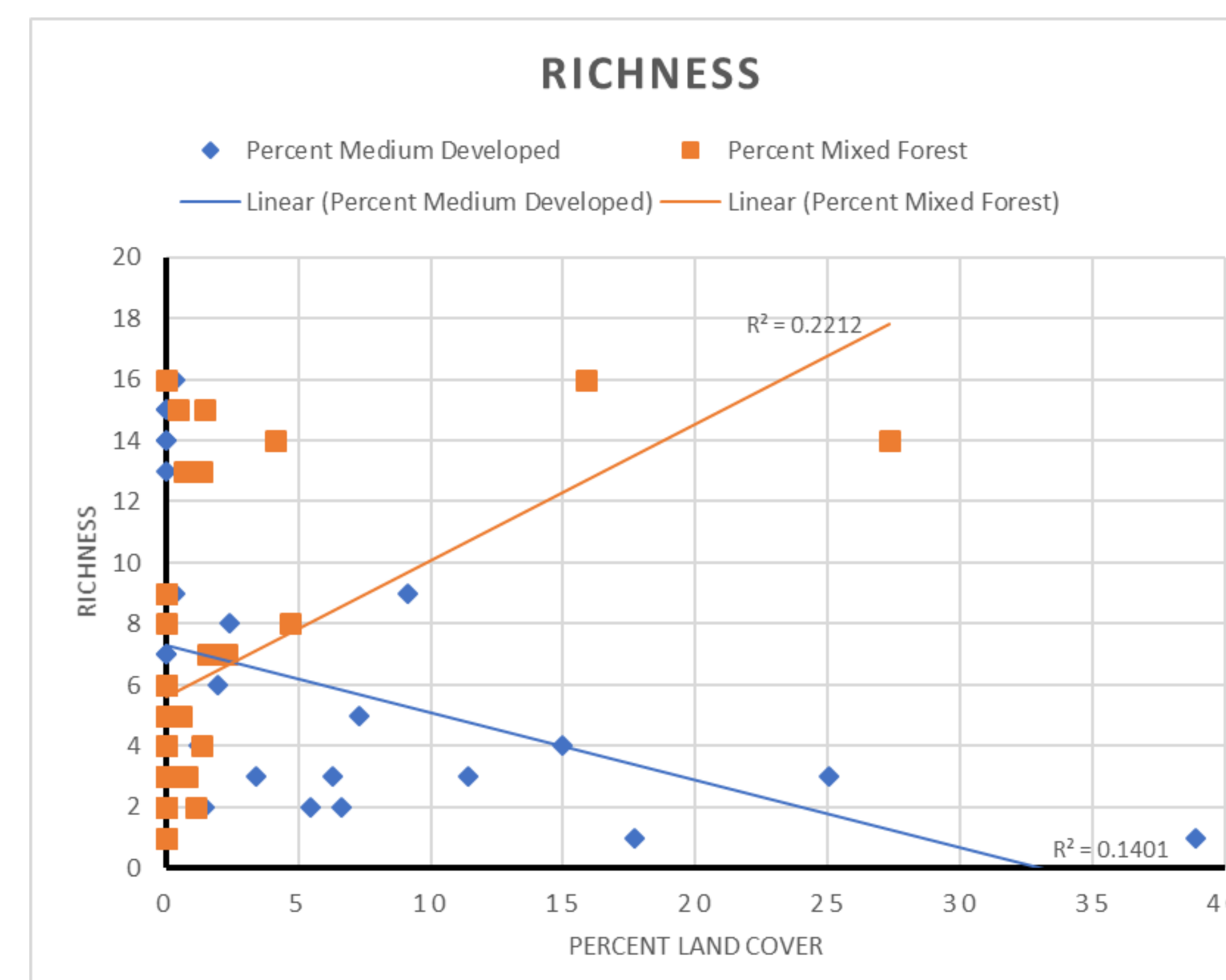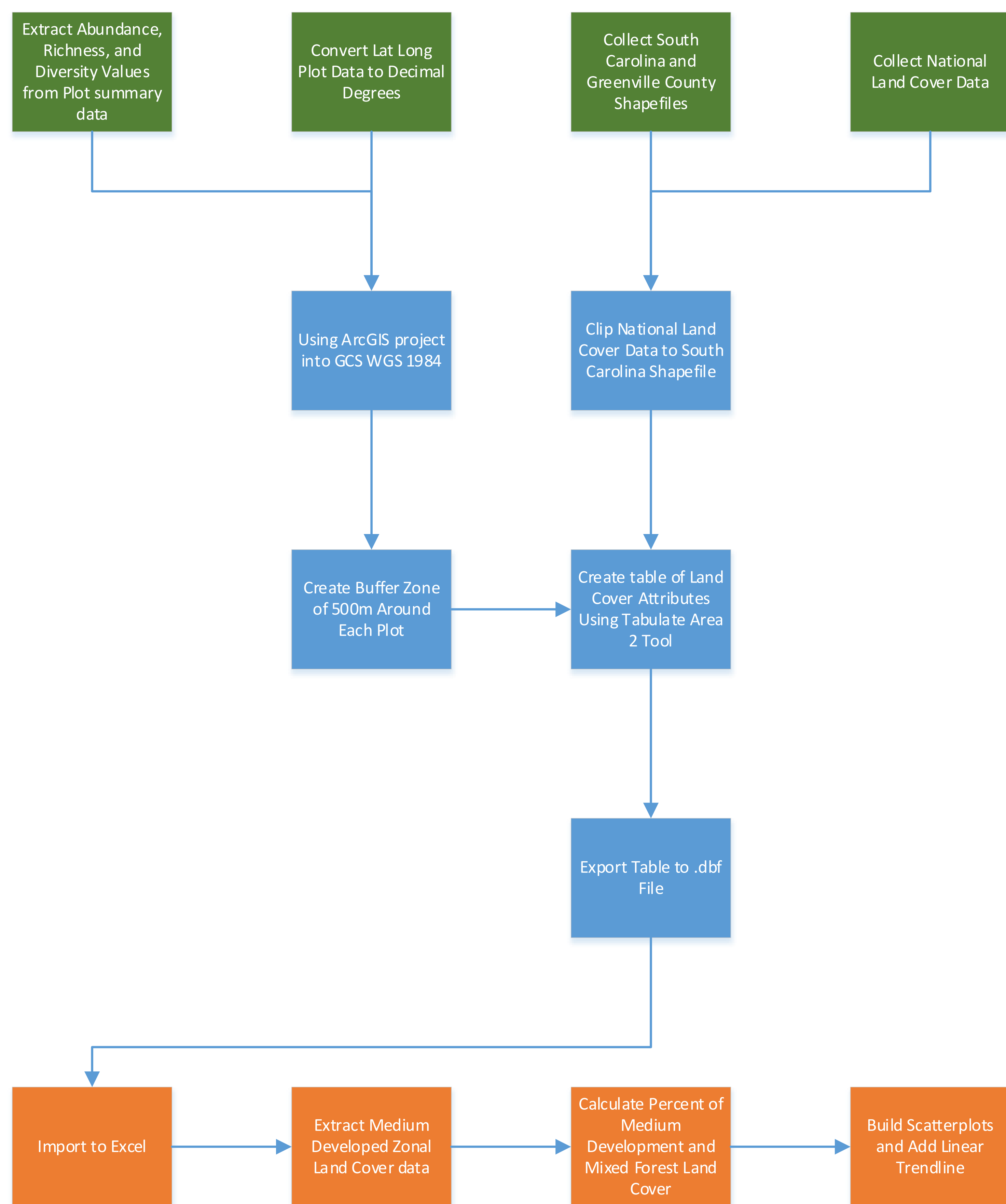* Alaska only

Figure 3. This scatterplots shows the relationship of Richness to the percentage of Medium Intensity Development and Mixed Forest Land Cover within 500m of each site.
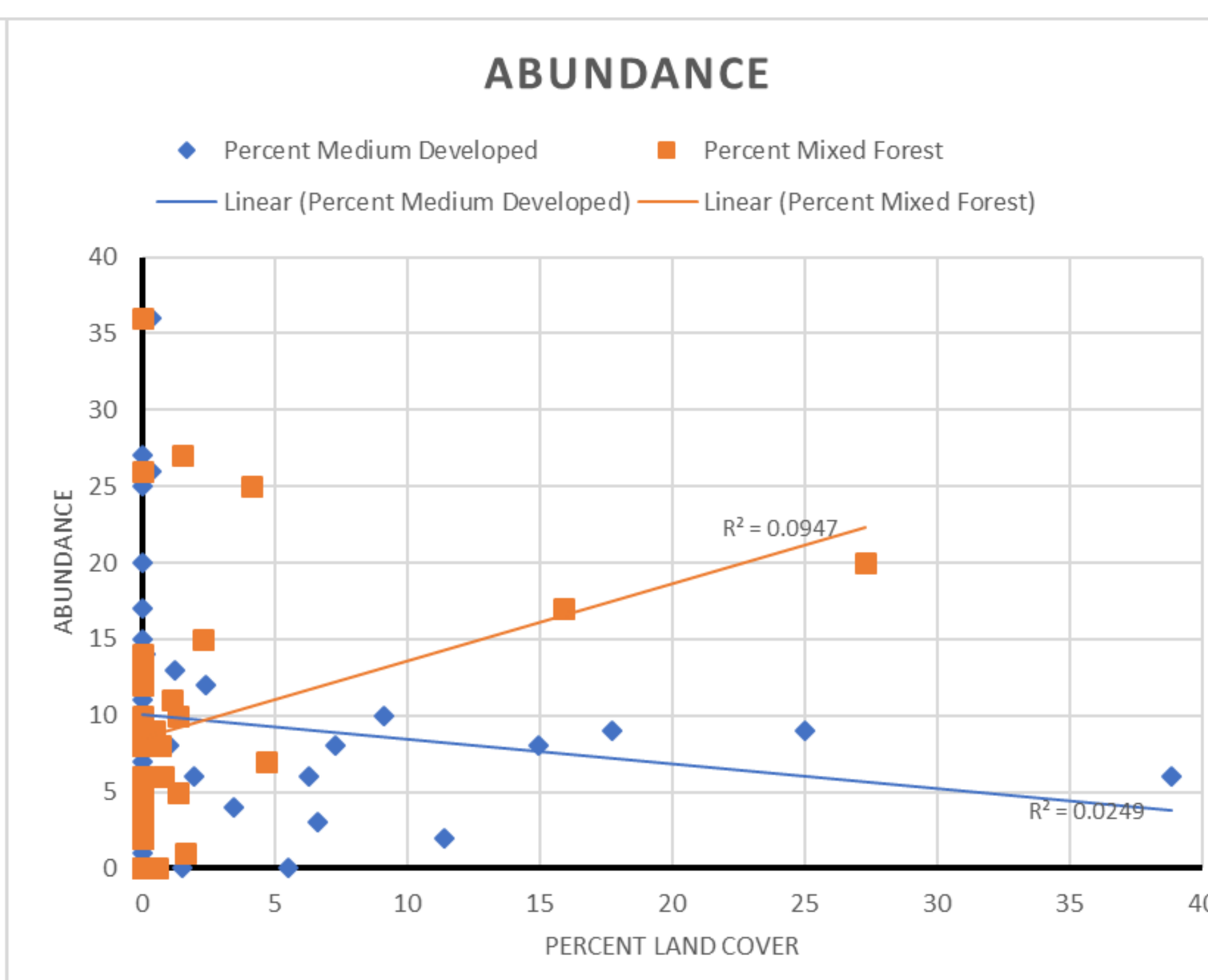

Figure 4. This scatterplots shows the relationship of Abundance to the percentages of Medium Intensity Development and Mixed Forest Land Cover within 500m of each site.
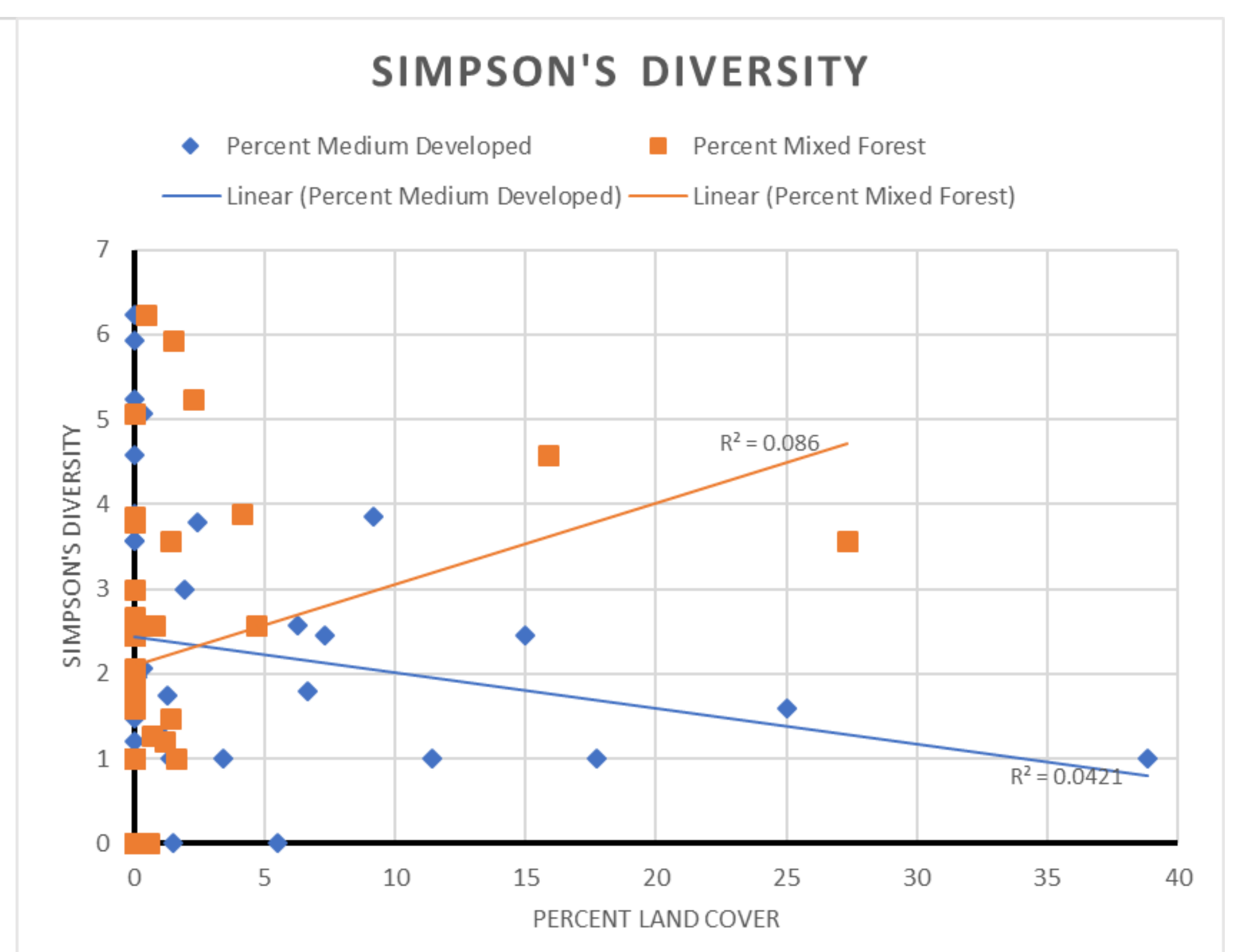

Figure 5. This scatterplots shows the relationship of Simpson's Diversity to the percentages of Medium Intensity Development and Mixed Forest Land Cover within 500m of each site.

Conclusion

The results of this project Indicate that surrounding land cover plays an important role in the health of wetlands. These results were best visualized when comparing richness, abundance, and Simpson's Diversity, to the land cover types: Medium Intensity Development and Mixed Forest. Mixed Forest proved to have a positive benefit on the health of the habitats, while Medium Intensity Development proved to have a negative effect.