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There is a tremendous opportunity for the Bike Share program to positively impact underserved individuals and the community as a whole. Bike Share programs can open up employment and education opportunities outside a resident's immediate area, lessen their reliance on cars, increase their freedom, and connect them to their community. This analysis will seek to identify areas within the Eugene-Springfield area that are in greater need of these bike hubs and the mobility and opportunity they bring.

This analysis will consider four main factors: poverty, education, ethnicity, and accessibility by bike vs. car. Additionally, general demand for these Bike Share Hubs will be factored into the analysis. These factors, or "submodels", will often be made up of more than one layer of data.

Access to education is one of the most important factors in economic stability and wellbeing. This submodel will be made up of two layers: the percentage of those with no college degree, and the percentage of those currently pursuing a college degree. Around 40% of Lane County residents have attained a bachelor's degree or higher (LDA Consulting). The first layer will analyze data from the US Census Data Table S1501 (Educational Attainment), which breaks down education levels by age, ethnicity, etc. According to the US Census, roughly one in eleven are enrolled in some form of college. This layer will use the table B14007 (School Enrollment by Detailed Level of School for Population 3 years or Older)

Currently, the average user of the Bike Share system is wealthier than the average Lane County resident. The median salary of annual Bike Share members was tens-of-thousands of dollars higher than the median salary in the county as a whole (LDA Consulting). The Lane Transit District should therefore endeavor to provide better access to its services among individuals below the median salary. This submodel will be broken into two layers: the percentage of individuals below the poverty line, and the percentage of individuals receiving food stamps / SNAP. These layers will correspond to data from US Census Tables S1071 and S2201, respectively. According to the Census, 18.5% of Lane County residents live below the poverty line, and 19.2% of households in Lane County receive food stamps/SNAP.

Overall, Lane County is relatively homogenous, but some diversity does exist. According to the US Census, of the estimated 379,611 residents in Lane County, 324,162, or about 85% are white. This submodel will aim to highlight areas in which non-white residents live. The US Census Table B02001 will be used.

According to the Census, 17.6% of commuters live within a 10-minute drive of their place of employment, with another 21.5% within a 15-minute drive. Barring major geographic obstructions such as highways, these commutes could likely be accomplished by bicycle. This would have a number of positive impacts, including reduced emissions, reduced traffic, improved health of the cyclist, etc. Interestingly, 4.1% more females live within a 10-minute

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commute than males. Prioritizing areas where a large ratio of residents live within a short commute is a realistic way of increasing bike share adoption. This data will correspond to the table S0801 (Commuting Characteristics by Sex).

The 'General Demand' submodel will be divided into four parts: Residence Demand, Workplace Demand, proximity to Bus Stops, and Proximity to existing Bike Share Hubs. Residence Demand information will come from LaneCountyRAC_2017. The dataset LaneCountyWAC_2017 will be used for workplace destination demand. The workplace density per census block will be classified and used to determine points/percentages per census block. LTD_Stops_Fall2019_Boarding will be used to determine proximity to existing bus stops. Buffers will be created around these points. BikeShare_Hub_Points will be used to determine the proximity to existing Bike Share hubs by creating buffers around each point. Areas within close proximity to these hubs will lose points. The combined output of this submodel will ensure that Bike Share Hubs are only put in areas where there is some level of general demand and are not put too close to existing hubs.

Many of these datasets will be vectors. They will be converted to rasters using the Feature to Raster tool in ArcGis, based on the criteria shown below. Proximity-based layers will be generated by creating buffers around the points being analyzed. Each submodel will be represented as a raster, which will be created by performing the Weighted Sum operation on their corresponding layers. These five submodels will then be used as inputs for the Weighted Sum operation, which will create a final output raster for analysis. This raster will be used in combination with topographic information to produce a map for visualization of the results of the analysis. The following table describes how the submodels will be weighted, and how their constituent layers will be used:

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Submodel	Points	Methodology		
Poverty	20	Layer	Pts	Methodology
		% Below Poverty Line	10	1 point assigned for every 2.5% of the population below the poverty line (Areas with >25% below the poverty line receive 10 points)
		% Receiving food stamps/SNAP	10	1 point assigned for every 2.5% of the population receiving food stamps/SNAP (Areas with >25% on SNAP receive 10 points)
Education	20	% Education Attained < Bachelor	10	1 point assigned for every 5% of the population with less than a bachelor's degree (Areas with >50% with no degree receive 10 points)
		% School Enrollment	10	1 point assigned for every 2.5% of the population enrolled in some form of college (Areas with >25% in college receive 10 points)
Ethnicity	20	5 points awarded for every 5% of a population with non-white ethnicity (Areas with 20% or more non-white residents receive 20 points)		
Accessibility by Bike vs. Car	20	% Within 10-minute Commute	15	1 point assigned for every 2% of the population within a 10-minute commute (Areas with >30% within 10-minute commute receive 15 points)
		% Within 10-14-minute Commute	5	1 point assigned for every 10% of the population within a 10-14-minute commute (Areas with >50% within 10-14-minute commute receive 5 points)
General Demand	20	Residence Demand	10	Population density by census block. Census blocks will be assigned scores based on which quartile they are in. Each quartile will be assigned 2.5, 5, 7.5, or 10 points, with the 4th quartile receiving 10/10.
		Workplace Demand	10	Employment location density by census block. Census blocks will be assigned scores based on which quartile they are in. Each quartile will be assigned 2.5, 5, 7.5, or 10 points, with the 4th quartile receiving 10/10.
		Proximity to Bus Stops	10	Locations within 1 mile of bus stops will receive 5 points, locations within 1/2 mile will receive 10 points.
		Proximity to Bike Share Hubs	-10	Locations within 1/2 mile of bikeshare hubs will **lose** 5 points, locations within 1/4 mile will **lose** 10 points.
	= 100			

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Works Cited

LDA Consulting (2013). 2013 Capital Bikeshare Member Survey Report. Accessed online at http://capitalbikeshare.com/assets/pdf/CABI-2013SurveyReport.pdf on January 6, 2014