What's so Special about Spatial Analysis?

ArcGIS in the Reporting Process

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Analytics & Institutional Reporting

Using ArcGIS and SPSS to Evaluate and Conduct Analyses on Student Headcount

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Using ArcGIS in the Reporting Process

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Using ArcGIS in the Reporting Process

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Using ArcGIS in the Reporting Process

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About Lone Star College

Lone Star College

- 84,000 credit students each semester, total enrollment of more than 95,000 (credit and non-credit).
- Largest institution of higher education in the greater Houston area.
- One of the fastest-growing college systems in the U.S.
- 86% increase in student headcount in ten years (Fall 2005 to Fall 2015) Adding 38,810 students
- 11 school districts, 1,400 square miles, population of 2.4 million.
- 6,300+ employees (part-time and full-time).

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About Lone Star College

Lone Star College

- Six colleges, seven centers, two University Centers.
- Top 10 associate degree producer, ranked 5th among all community colleges in the U.S. (2013-14).
- Leads state-wide Texas Completes and Texas Reverse Transfer student success initiatives.
- Maintains AAA bond rating with S&P.
- Economic impact of $3.1 billion annually.
- Recognized as a 2015 Military-Friendly School and helps veterans fast-track to new careers with special grant funding.

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Software/Programs Used

- **ArcGIS 10.2 for Desktop**
  Created buffers, clipped zip code areas, to determine any overlap between the colleges
- **SPSS v.23**
  Used data collected from zip code areas to see if any predictors stood out positive or negative on student headcount

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Why did we choose this Study?

- Increased headcount for most colleges but one.
- We wanted to see if we could determine any underlying factors related to a decrease in student headcount
- And…USE the data to make informed decisions!

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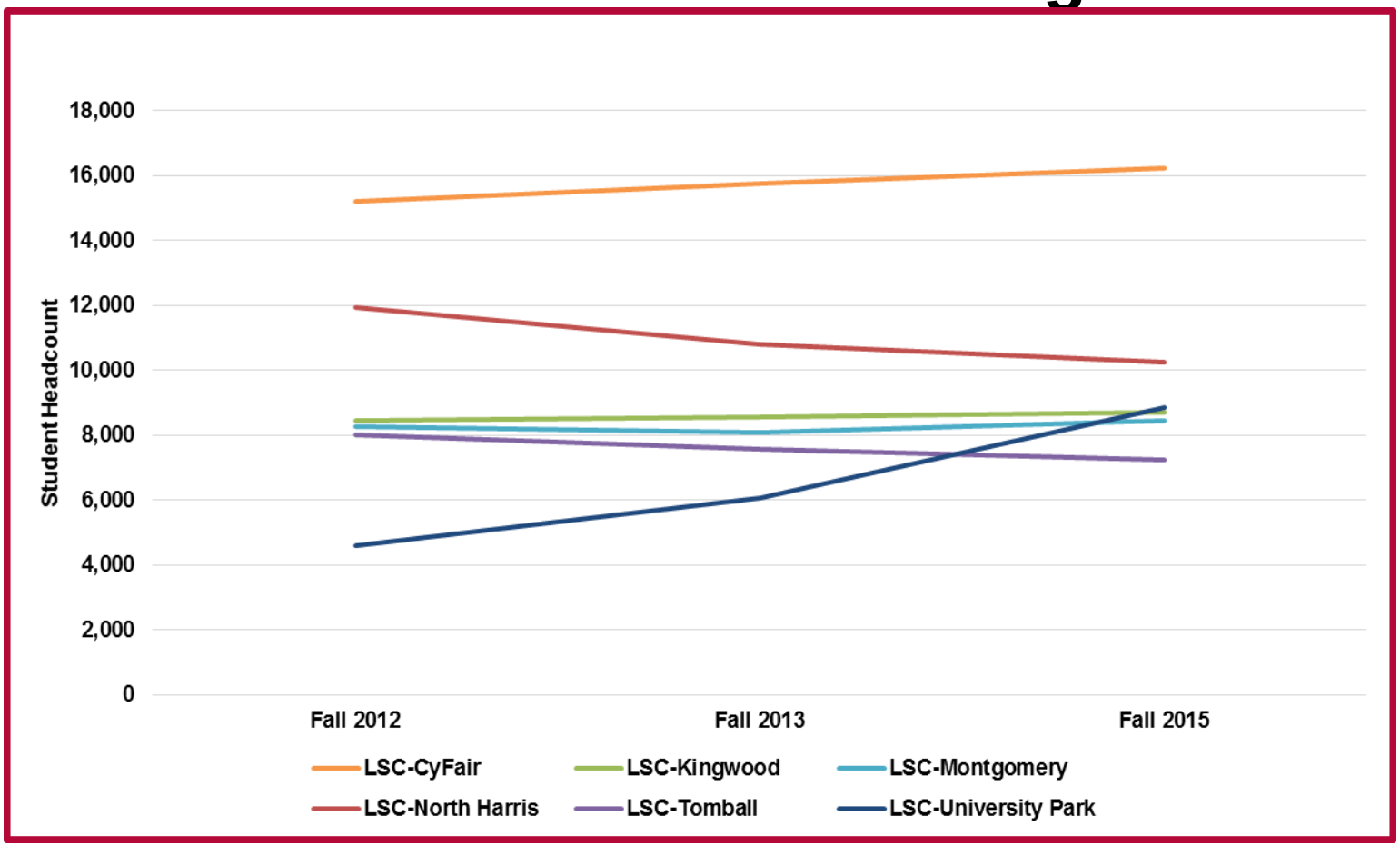
Why did we choose this Study?

Headcount at all 6 colleges



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Theories gone wild

Theories began to surface as to why this one college was down while everyone was up

- Shallow Pond Theory

- Stealing Students Theory

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Study Area

- We had to look at all 6 colleges
- All 6 colleges: 68 Zip Code Service Area
- Too large to manage
- Needed to figure out how to narrow down the area to study around each college

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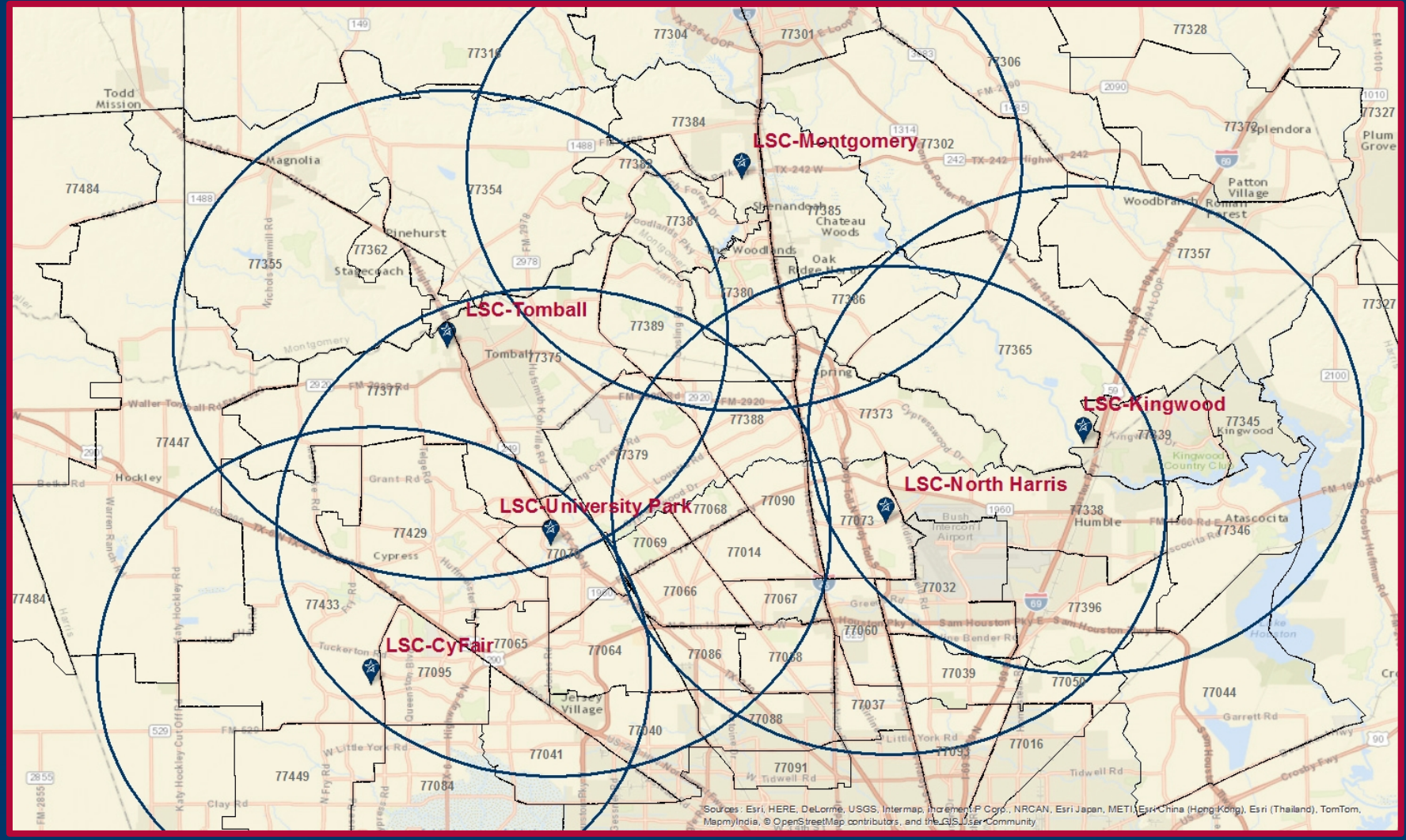
Study Area: 10 Mile Radius



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Study Area: 5 Mile Radius

- Narrow down our study area further
- How would this affect enrollment by zip narrowing down the zip code pool almost in half
- Creating a 5 mile radius took our 68 zip code area down to 38

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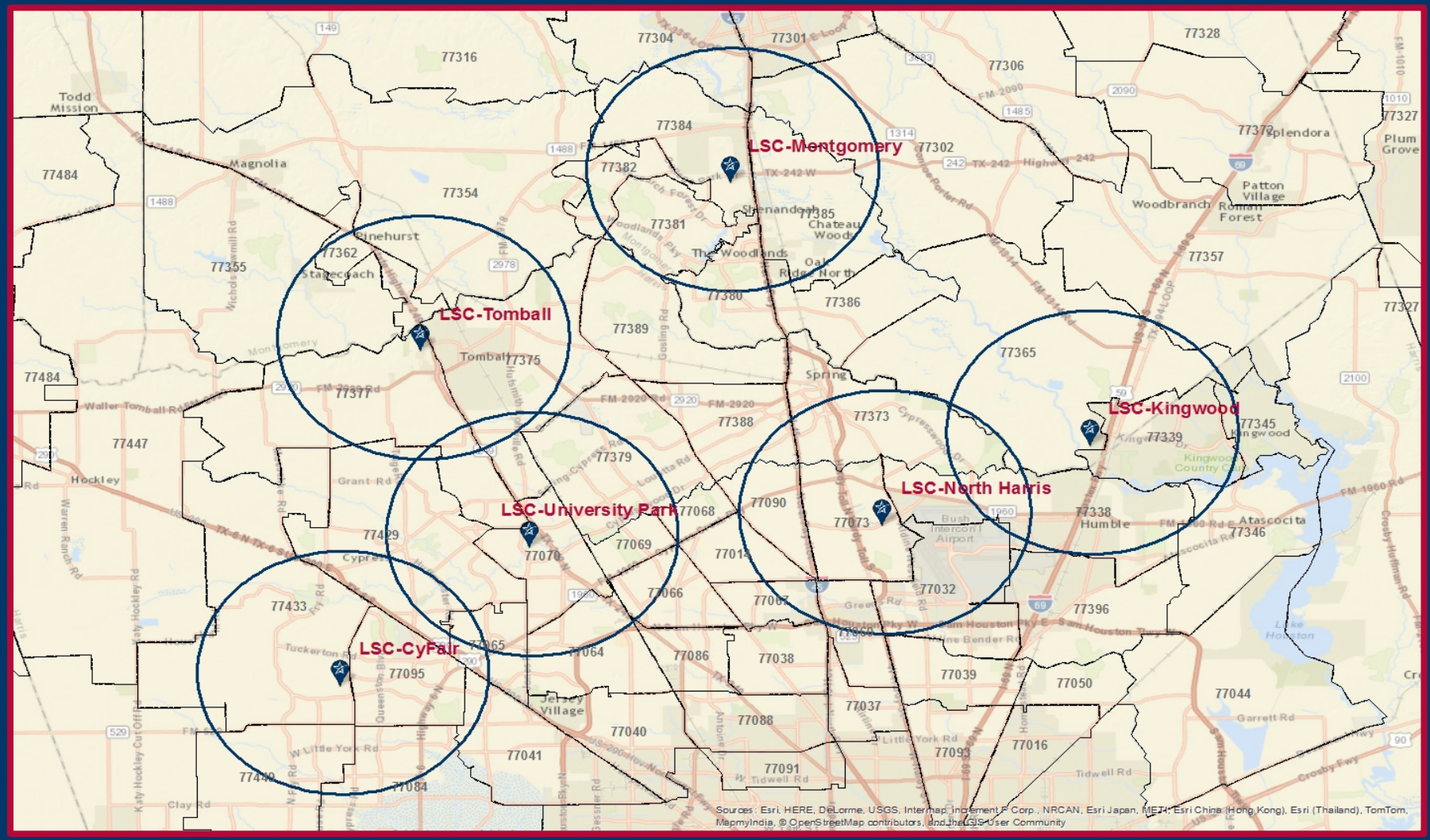
Study Area
5 Mile Radius



Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

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Top 15 Zip Codes

Top 15 Zip Codes in Which Our Students Reside

77449	4.0%	**77095**	3.9%	**77084**	3.8%
77429	3.7%	**77433**	3.6%	**77379**	3.3%
77346	3.0%	**77373**	2.9%	**77064**	2.5%
77070	2.4%	**77375**	2.4%	**77388**	2.2%
77073	2.1%	**77386**	2.0%	**77040**	2.0%

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Top Four ISD Attendance Areas Fall 2015

Top Four ISD Attendance Areas in Which Our Students Reside

Cypress-Fairbanks Independent School District
LEARN • EMPOWER • ACHIEVE • DREAM

22,169

Conroe ISD
Curriculum & Instruction
Committed to Excellence

9,143

Klein ISD
Future Ready

8,995

Aldine School District
Houston Texas
Excellence

8,798

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What Next?

Determining Outside Predictors and Collecting census data within the selected zip code study areas

- US Census Bureau

  www.census.gov

- ArcGIS BAO (Business Analyst Online) https://bao.arcgis.com/esriBAO/login

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Choosing Outside Predictors

- What outside predictors could we use that would be useful to our study?

- Finding data for the predictors that we choose meant that we would need to visit the US Census Bureau's website and that we would have to use historical Lone Star data since the US Census is always behind is not always up to date.

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Outside Predictors Total Population

First Predictor:

- Total Population
  - **Collecting population by zip code**

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Outside Predictors Under 25 Population

Second Predictor

- What is the “traditional” college age student?
- How does this group affect student headcount?
- Article: https://nces.ed.gov/pubs/web/97578e.asp

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Outside Variable Unemployment Rate

Third Predictor

- **Unemployment Rate**
  - Article on Unemployment Rate and Enrollment as a predictor http://www.monroeccc.edu/institutionalresearch/analyses/Unemployment%20Rate%20and%20Tuition%20as%20Enrollment%20Predictors%20Final.pdf

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Outside Predictors Family Income

Fourth Predictor

- How does family Income influence a student's path to college?
- According to US News and a statement released by National Student Clearinghouse, Students from high-poverty schools are less likely to immediately enroll in college – and to remain enrolled after one year http://www.usnews.com/news/blogs/data-mine/2014/10/14/poverty-a-strong-predictor-of-college-enrollment

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What we Expect

- **Total Population by zip code:** We expect to see a Positive correlation between population and student headcount

- If the total population increases, we should expect to see an increase in student headcount

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What we Expect

- **Unemployment Rate**: We expect student headcount to increase when the unemployment rate is up

- If we see unemployment rates down in a specific population area, we will expect to see little to no change in headcount

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What we Expect

- **Traditional College Student:** 68-72% of the population of students at Lone Star fall in the Under 25 age group.

- If student headcount increases, we should expect to see this portion of the population that are Under 25 (16-24) to be larger than some of the other age groups in that area's population

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What we Expect

- **Family Income:** When family income is up, we should expect to see an increase in student headcount

- If family income is down we should expect to see a decrease in student headcount

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Actual Results
Total Population

Zip Code	Population in 2012	Population in 2015	Population Growth 2012-2015		Lone Star College Headcount Growth 2012-2015	
			#	%	#	%
77433	51,200	79,948	28,748	56.1%	418	15.7%
77389	22,627	32,311	9,684	42.8%	178	21.4%
77386	38,004	49,990	11,986	31.5%	158	10.0%
77060	44,625	43,385	-1,240	-2.8%	-53	-5.3%
77381	36,405	33,994	-2,411	-6.6%	-32	-3.1%

- We found Population Growth to be a meaningful predictor for LSC's student headcount growth
(Positive correlation; r= 0.17 ~0.31)

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Actual Results
Under 25 Population

Zip Code	Population Growth 2012-2015		Population Growth Under 25 2012-2015		Lone Star College Headcount Growth 2012-2015	
	#	%	#	%	#	%
77389	9,684	42.8%	1,111	41.9%	178	21.4%
77068	2,248	21.9%	7	0.5%	2	0.5%
77384	1,492	12.7%	151	14.5%	72	16.1%
77382	2,181	6.1%	648	17.3%	312	35.1%
77380	1,000	4.2%	-322	-9.5%	-41	-5.1%
77060	-1,240	-2.8%	-874	-11.0%	-53	-5.3%
77095	-16,587	-25.3%	1,418	17.4%	387	13.3%

- Population growth in the Under 25 age group is a more powerful predictor for LSC college headcount growth
  (Positive correlation; r=0.41 ~0.68)

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Actual Results Family Income

Zip Code	Population Growth 2013-2015		Population Growth Under 25 2013-2015		Income Change 2013-2015		Lone Star College Headcount Growth 2013-2015	
	#	%	#	%	#	%	#	%
77362	858.0	17.7%	-203	-21.1%	13,982	17.7%	15	10.0%
77032	-476.0	-3.5%	-90	-3.7%	4,468	13.3%	49	14.3%
77064	324.0	0.7%	621	10.3%	3,338	4.0%	119	6.2%
77345	1,082.0	3.8%	494	13.8%	-15,826	-8.9%	-29	-3.0%
77090	1,746.0	5.1%	1,381	27.1%	-5,964	-10.3%	-132	-8.9%
77070	3,695.0	7.9%	356	5.7%	-11,213	-11.4%	-147	-6.7%
77069	566.0	3.5%	-320	-16.7%	-18,468	-14.0%	-40	-7.5%

- Family income change is also a significant predictor for LSC's headcount growth (Positive correlation; r= 0.15 ~0.35)

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Actual Results Unemployment Rate

Zip Code	Population Growth 2013-2015	Population Growth Under 25 2013-2015	Income Change 2013-2015	Unemployment Rate Change 2013-2015	Lone Star College Headcount Growth 2013-2015	
					#	%
77066	10.4%	8.8%	2.9%	-6.4%	-15	-1.0%
77379	7.9%	10.2%	-2.3%	-4.7%	-140	-4.8%
77070	7.9%	5.7%	-11.4%	-0.3%	-147	-6.7%

- A change in the unemployment rate is not a significant predictor
  (likely positive relation; r=0.03 ~.0.4)

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Revisit Shallow Pond Theory

- Revisiting the “Shallow Pond Theory” and how our research showed this theory to have some validity.
- Increase in Total Population had a direct effect on student headcount
- If the Under 25 population decreased (and the overall population increased), LSC-Tomball saw our headcount decrease or stay relatively the same

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Revisit
Stealing Students Theory

- Although all predictors positively affect LSC student headcount growth, we found that LSC-Tomball (individual) may not always received benefit from these predictors.

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Revisit
Stealing Students Theory

Zip Code	Five Mile Radius	Population Growth 2012-2015	Population Growth Under 25 2012-2015	Lone Star College Headcount Growth 2012-2015		LSC-T Headcount Growth 2012-2015		LSC-M Growth 2012-2015	LSC-UP Growth 2012-2015
				#	%	#	%	#	#
77389	LSC-T, LSC-M	42.8%	41.9%	178	21.4%	-6	-2.4%	39	173
77377	LSC-T, LSC-UP	10.5%	4.1%	189	14.1%	90	12.2%	-10	162
77362	LSC-T only	9.1%	-10.4%	-2	-1.2%	9	9.1%	-1	8
77375	LSC-T, LSC-UP	10.2%	24.5%	68	3.5%	-116	-11.5%	-28	291
77354	LSC-T, LSC-M	3.7%	16.6%	24	1.9%	-28	-5.0%	47	34
77355	LSC-T only	7.0%	10.9%	-41	-4.4%	-51	-7.9%	21	16

- We can see that if other colleges experienced growth in the shared service area, this can negatively affect the growth of LSC-Tomball

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Recommendations Under 25 Population

- We recommend that LSC-Tomball might consider advertising more heavily in zip code areas where we saw growth in the Under 25 population

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Recommendations Population

- For colleges that lost students in their service area (LSC-T) from another college, we might suggest to investigate other possible reasons on student's choice by conducting student surveys on that group of students

- We would also like to make a recommendation to conduct further analysis on population density since population is a meaningful predictor

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Recommendations Family Income

- Family income is also a meaningful predictor. We recommend that LSC-Tomball emphasize in zip code areas of low income that financial aid is available to Lone Star College students

- Make sure to advertise in the community and social media when the college holds a Job Fair

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Recommendations Low Income Levels

- Advertise in the zip code areas where we saw low family income levels on how a college education or a degree in one of our workforce programs will help to find better jobs

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Questions

Questions?

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Sources

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