APPENDIX A

DETAILED POPULATION STATISTICS

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Table A-1. Ancestry: Sylacauga, 2000		
	First ancestry reported	**Second ancestry reported**
African	88	0
British	69	0
Canadian	10	0
Czech	5	5
Czechoslovakian	13	0
Dutch	43	78
English	770	87
French	44	51
German	262	116
Irish	476	167
Italian	42	0
Lebanese	0	7
Norwegian	14	7
Polish	36	6
Russian	16	0
Scotch-Irish	188	55
Scottish	177	42
Swedish	8	0
Welsh	74	69
Reported specific ethnic group	2,335	690
European	147	
United States or American	2,586	0
Other groups	3,601	171
Unclassified or not reported	3,778	11,586

Source: U.S. Census, 2000

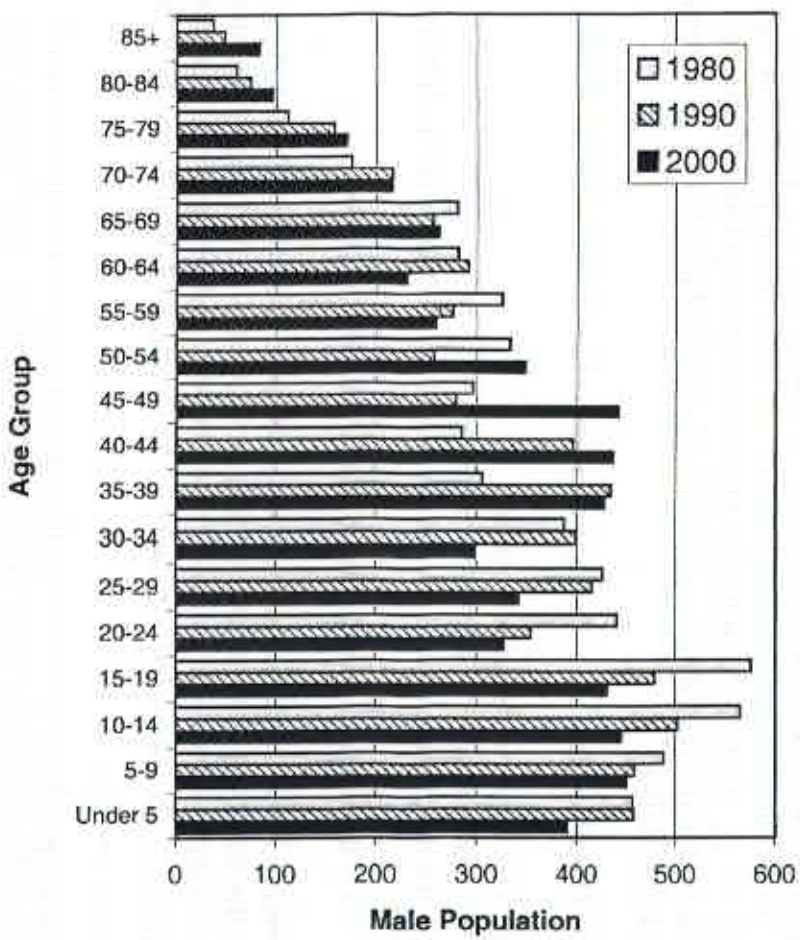
Table A-2. Other Ethnic Characteristics: Sylacauga		
	1990	2000
Persons of Hispanic Origin	43	63
Language Spoken at Home		
Persons 5 years and over	11,650	11,663
Speak a language other than English	241	414
Speak English "not well" or "not at all"	52	75
Speak Spanish	104	197
Speak English "not well" or "not at all"	10	40
Speak other Indo-European languages	96	129
Speak English "not well" or "not at all"	32	13
Speak Asian and Pacific Island languages	28	81
Speak English "not well" or "not at all"	10	22
Speak other languages	13	7
Speak English "not well" or "not at all"	0	0

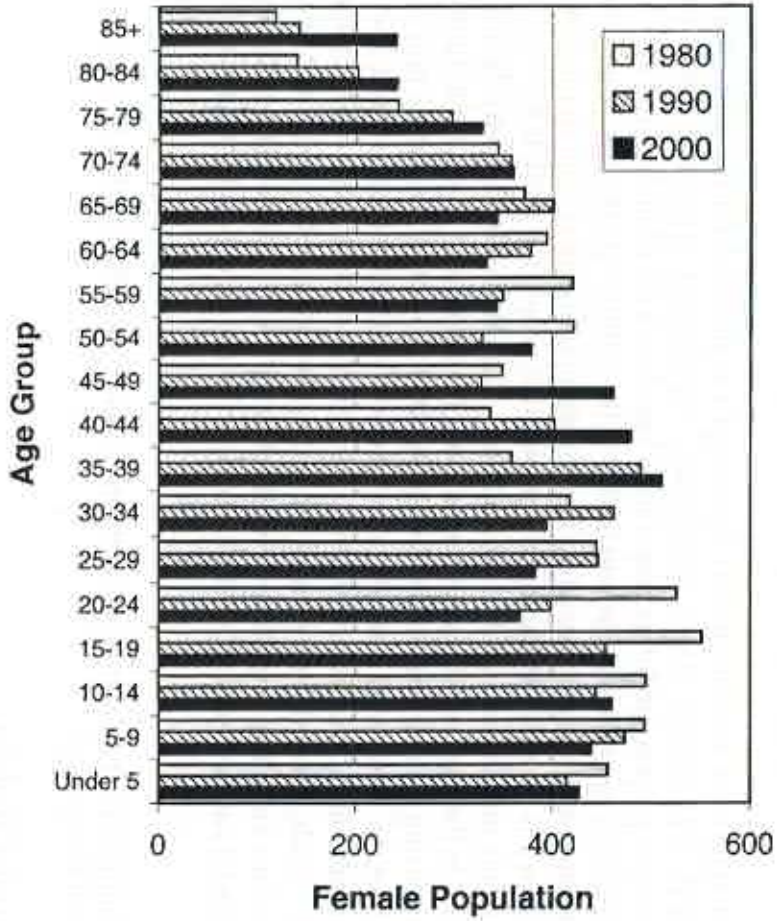
Source: U.S. Census of Population and Housing, 1990 and 2000

Table A-3. Population Composition by Age: City of Sylacauga										
Age	Male			% Change		Female			% Change	
	1980	1990	2000	1980-90	1990-00	1980	1990	2000	1980-90	1990-00
Under 5	457	458	390	0.2%	-14.8%	456	415	427	-9.0%	2.9%
5-9	488	459	451	-5.9%	-1.7%	493	473	440	-4.1%	-7.0%
10-14	565	502	446	-11.2%	-11.2%	494	444	460	-10.1%	3.6%
15-19	576	479	431	-16.8%	-10.0%	551	454	462	-17.6%	1.8%
20-24	441	354	327	-19.7%	-7.6%	525	399	368	-24.0%	-7.8%
25-29	426	415	342	-2.6%	-17.6%	445	446	384	0.2%	-13.9%
30-34	387	399	298	3.1%	-25.3%	418	462	395	10.5%	-14.5%
35-39	305	434	428	42.3%	-1.4%	359	489	510	36.2%	4.3%
40-44	285	396	437	38.9%	10.4%	337	402	479	19.3%	19.2%
45-49	296	279	442	-5.7%	58.4%	349	328	461	-6.0%	40.5%
50-54	333	257	348	-22.8%	35.4%	421	329	379	-21.9%	15.2%
55-59	325	276	259	-15.1%	-6.2%	420	350	344	-16.7%	-1.7%
60-64	281	291	231	3.6%	-20.6%	394	378	333	-4.1%	-11.9%
65-69	280	256	262	-8.6%	2.3%	371	400	344	7.8%	-14.0%
70-74	175	216	216	23.4%	0.0%	345	358	361	3.8%	0.8%
75-79	112	158	170	41.1%	7.6%	243	298	329	22.6%	10.4%
80-84	60	74	96	23.3%	29.7%	140	202	242	44.3%	19.8%
85+	37	48	83	29.7%	72.9%	118	142	241	20.3%	69.7%
Subtotal	5,829	5,751	5,657	-1.3%	-1.6%	6,879	6,769	6,959	-1.6%	2.8%

Source: U.S. Census of Population, 1980, 1990 and 2000

Figure A-1. Age Distribution: City of Sylacauga





Math Model Population Projections[1]

Six types of math models were used to project Sylacauga's population for the year 2030: linear, exponential, modified exponential, linear regression, exponential regression, and parabolic regression. These models project the future population based on a set of underlying assumptions. The most basic assumptions are that past growth trends will continue into the future and that birth, death, and migration rates will remain constant. These assumptions are crucial to interpreting the projections presented in this section. Mathematical population projection models are based strictly on the past, and they only utilize quantifiable information. They do not tell us why the population increased or decreased in the past, and they cannot account for the impact of potential future events (like the opening or closing of a large manufacturing plant) in projecting the future population. It is important, therefore, to remember that these projection methodologies are not intended to accurately predict a community's future population. They merely indicate what *could* happen in the future, based on past trends, if conditions remain the same. The local government and its advisory boards and commissions can then determine, based upon the trend analysis and upon their own knowledge of local social and economic conditions, what actions to take to continue, slow, or reverse the trend.

This section will examine the different population projection methods and their results, and offer a basic interpretation of the results.

Linear and Exponential Models

The linear and exponential models are the most basic of the population projection techniques. The linear model projects the future population by adding the average annual population growth for the historical period (in number of persons per year) to the most recent population figure. The exponential model, on the other hand, multiplies the most recent population figure by 1 plus the average annual rate of population change to generate the projected population. The equations for these two models are as follows:

Linear: $Pt+n = Pt + b(n)$ Exponential: $Pt+n = Pt(1+r)^n$

where: Pt = the most recent population
n = the number of units of time (in years)
b = the average annual change (in number of persons) over the historical period

r = the average rate of change over the historical period

Since they are based on the average change over time, both models tend to reflect–and project–past trends best when the historical population increases or decreases in fairly equal increments. An extended period of very rapid growth, followed by a period of reduced growth or decline, would result in an unexpectedly high projected population. The rapid growth would strongly influence the

[1] Computerized population projection models based on programs presented in John R. Ottensmann's book, *BASIC Microcomputer Programs for Urban Analysis and Planning*, 1985.

average rate of change or average numerical change, generating larger population increases than would be expected given the more recent trend.

Sylacauga's population projections provide a good example of this occurrence. The city's long period of strong growth overrides the post-1960 period of no growth. The projections generated using the 1900 to 2000 data show an increasing population through the year 2030 (see Table A-4). The linear model predicts modest growth over the next twenty years, while the exponential model shows much more robust growth.

Table A-4. Linear and Exponential Model Projections: City of Sylacauga, 1900-2000 data

Year	Population Growth, Number of People			Population Growth, Rate of Change		
	Historical Population	Change per Decade	Annual Change	Historical Population	Change per Decade	Annual Change
1900	880			880		
1910	1,456	576	57.6	1,456	65.5%	6.5%
1920	2,141	685	68.5	2,141	47.0%	4.7%
1930	4,115	1,974	197.4	4,115	92.2%	9.2%
1940	6,269	2,154	215.4	6,269	52.3%	5.2%
1950	9,606	3,337	333.7	9,606	53.2%	5.3%
1960	12,857	3,251	325.1	12,857	33.8%	3.4%
1970	12,255	(602)	(60.2)	12,255	-4.7%	-0.5%
1980	12,708	453	45.3	12,708	3.7%	0.4%
1990	12,520	(188)	(18.8)	12,520	-1.5%	-0.1%
2000	12,641	121	12.1	12,641	1.0%	0.1%
Total Change, 1990-2000		11,761	1,176.1	Total Change	342.6%	34.3%
Average Annual Change, 1940-1990			117.6	Average Annual Change		3.43%
Year	Population Projection (formula)			Population Projection (formula)		
2010	13,817	(12,641 + (117.6 x 10))		17,705	(12,641 x $(1+.0343)^{10}$)	
2020	14,993	(13,817 + (117.6 x 10))		24,797	(17,705 x $(1+.0343)^{10}$)	
2030	16,169	(14,993 + (117.6 x 10))		34,730	(24,797 x $(1+.0343)^{10}$)	

Source: sources cited for Table P-1; projections by EARPDC

The linear model projected a moderate population increase for 2000 through 2030 because this model uses the average *numerical* change of the historical data to project the future population. This methodology produces a constant change each decade. The historical population grew by an average of 117.6 persons per year, or 1,176 persons per decade. Adding 1,176 persons to the 2000 population and then to the 2010 and 2020 projected population resulted in a 2030 population projection of 16,169. As seen in Figure A-2, these figures do not correlate well with the historical population trends.

The exponential model produced the higher population projection for Sylacauga, at 34,730 persons in the year 2030, because of the high overall growth rate between 1900 and 2000. Even though the population has been virtually unchanged since 1960, population increases between 1900 and 1960 were strong enough to result in an average growth rate of 34.3% for each decade between 1900 and 2000. The growth rate applied to each year after 2000 is 3.4%. In the exponential model, the numerical change in population increases each decade as the base number increases. For example, between 2000 and 2010 the population is projected to increase by 5,064 persons. That number increases to 7,092 for the period from 2010 to 2020 and to 9,933 between 2020 and 2030. This high growth rate is even less consistent with recent trends.

Population projections also were run using only the 1960 through 2000 data. Although these data produced reasonable population projections given recent trends–12,479 for the linear model and 12,481 for the exponential model–the graphed population projection curves did not correlate well with the historical data curves.

Modified Exponential Model

As its name implies, the modified exponential model is a variation on the exponential model. The modified exponential model sets an upper capacity limit for the population (that is, it "caps" the population) and is best for populations that are increasing or decreasing at a decreasing rate. This model uses the following equation to calculate the future population:

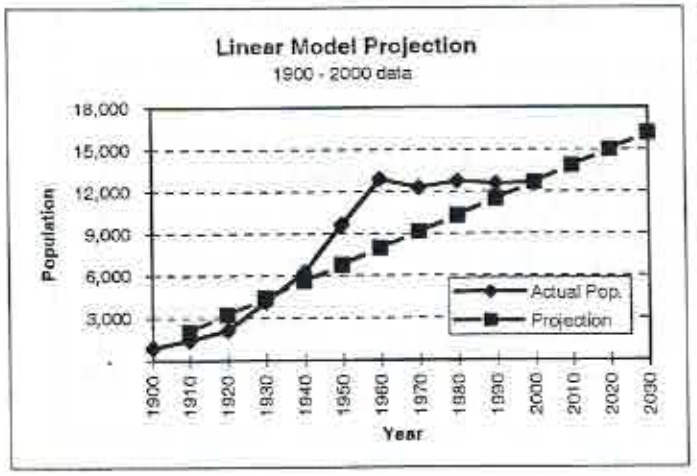
$$Pt+n = K - [\ (K-Pt)(v)^n\ ]$$

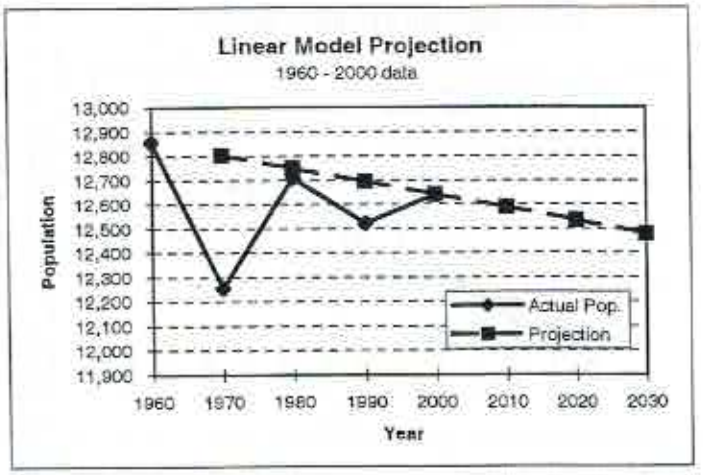
where: Pt = the most recent population
n = the number of units of time (in years)
K = the maximum limit of the population
v = the rate of convergence on K

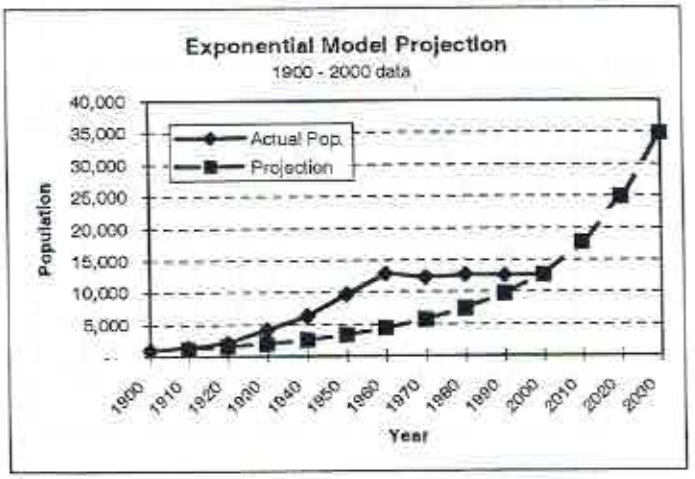
Sylacauga's population is not increasing or decreasing at a decreasing rate; however, it has been slowly reaching a point of equilibrium over the past four decades. The population decreased 4.7% between 1960 and 1970, increased 3.7% by 1980, decreased 1.5% by 1990, and increased 0.8% by 2000. If this pattern were to continue, each decrease or increase would be less than the previous one, and each increase would be slightly less than the preceding decrease. The population probably would eventually stabilize somewhere between 12,550 and 12,560 persons.

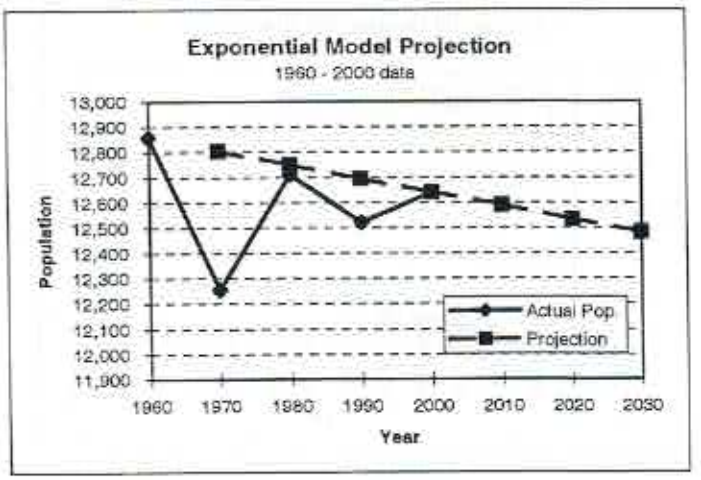
Although the data patterns do not technically fit the criteria for generating a capacity limit, the modified exponential model produces reasonable population projections given the recent trends. The 1900 to 2000 data generate a 2030 projection of 12,586 persons, and the 1960 to 2000 data project a 2030 population of 12,564. Graphically, the 1960 to 2000 data produce a curve with the closest "fit" to the historical data (see Figure A-2). These data fluctuate up and down in the same general pattern as the historical data, whereas the 1900 to 2000 data curve flattens out at 12,586 beginning in 1950.

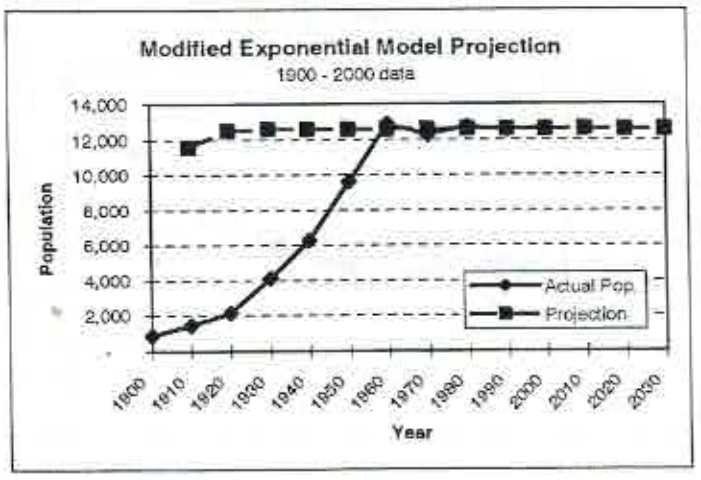
Figure A-2. Population Projections: City of Sylacauga











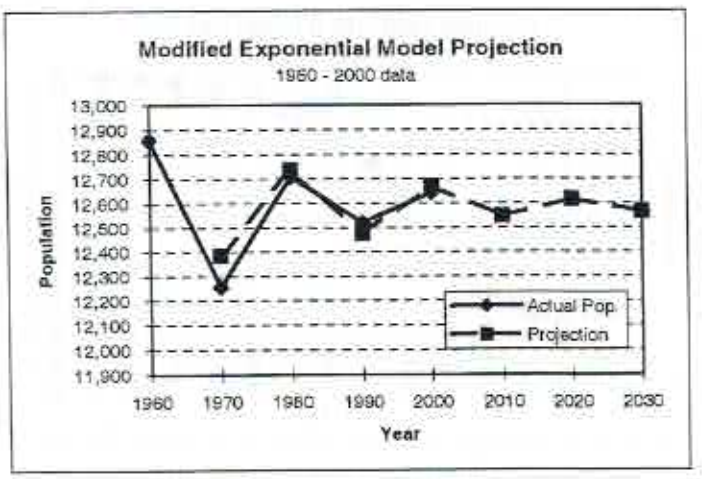
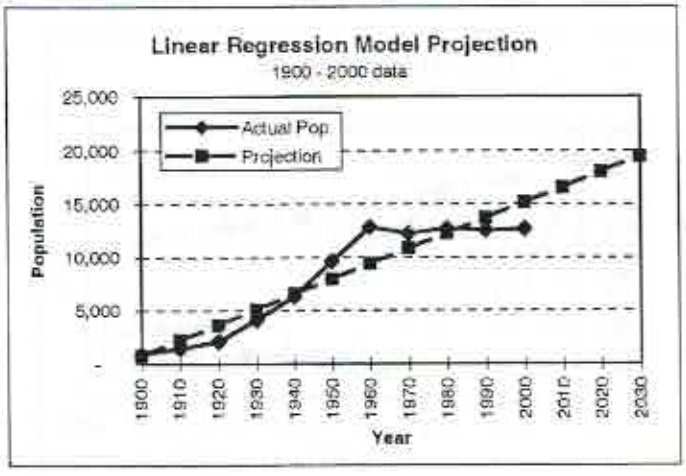
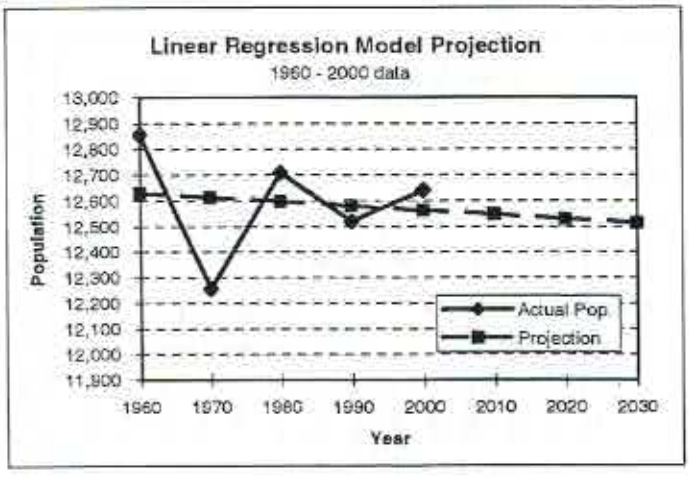
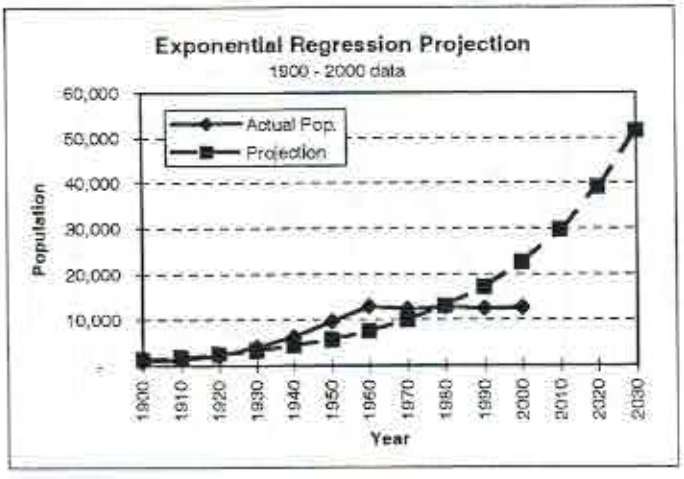
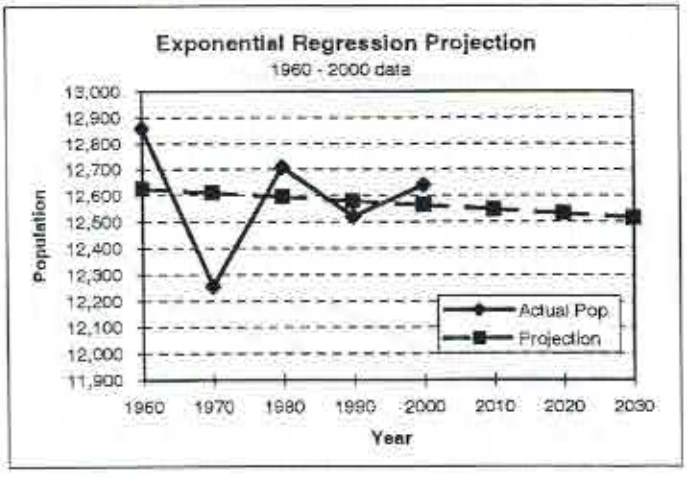


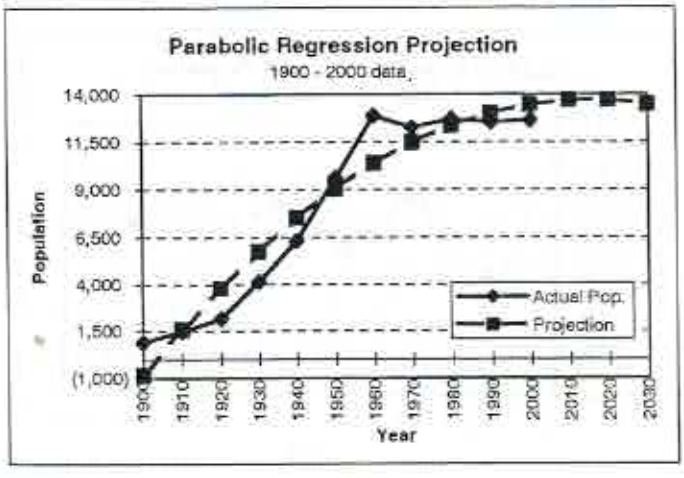
Figure A-3. Population Projections: City of Sylacauga

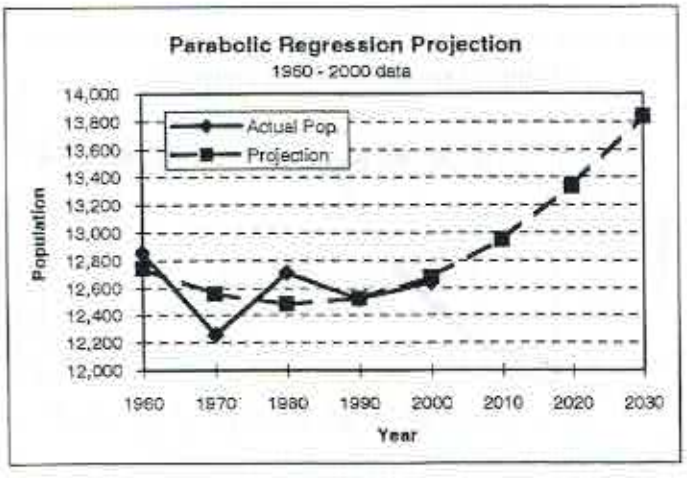












Linear, Exponential, and Parabolic Regression Models

The regression models fit a curve to scattered points that closely approximate, but do not perfectly fit, a straight line or smooth curve. The model produces the curve that "best fits" the given data by minimizing the deviation between the historical data points and the curve. The closeness of the fit is measured by the correlation coefficient. The "fit" (correlation) between the curve and the data points strengthens as the correlation coefficient approaches +1 or -1. Conversely, as the correlation coefficient approaches zero, the correlation becomes weaker. Models with correlation coefficients near zero should not be used for generating population projections. The regression model and correlation coefficient equations are very complex and difficult to follow. Therefore, this section contains only the results of these computations and a brief analysis of the results.

Table A-5. Regression Model Population Projections: City of Sylacauga, 1900-2000 data

Year	Historical Data	Linear Regression	Exponential Regression	Parabolic Regression
1900	880	785	1,452	(869)
1910	1,456	2,218	1,910	1,556
1920	2,141	3,651	2,513	3,761
1930	4,115	5,084	3,306	5,745
1940	6,269	6,517	4,350	7,509
1950	9,606	7,950	5,722	9,052
1960	12,857	9,383	7,528	10,375
1970	12,255	10,816	9,905	11,477
1980	12,708	12,249	13,031	12,359
1990	12,520	13,682	17,143	13,020
2000	12,641	15,115	22,554	13,461
2010		16,548	29,673	13,681
2020		17,981	39,038	13,681
2030		19,414	51,360	13,461
Correlation Coefficient		.9424418	.9170028	.9639514

Source: sources cited for Table P-1; projections by EARPDC

The linear and exponential regression models produced results similar to the linear and exponential models (see Table A-5, Figure A-3). The regression model projections are somewhat higher, however, because the regression technique shifted the curves upward to more closely fit the historical data curve. As with their non-regression counterparts, the exponential (regression) model produced a higher population projection, at 51,360, than did the linear (regression) model, at 19,414. The correlation between the curves and the data points is fairly high--especially for the linear regression model. According to the correlation coefficient figures, the parabolic regression model produced the graph with the best "fit" to the 1900 to 2000 historical data. This technique resulted in a 2030 population projection of 13,461. This figure is the most reasonable given recent population trends.

Population projections also were generated using only the 1960 to 2000 data. The linear regression model produced a 2030 projection of 12,513, the exponential regression model projected a population of 12,516, and the parabolic regression projection was 13,836. Although all of these projections seem reasonable, there are not enough data points to generate a statistically sound projection. The correlation coefficients for this data set range from a low of 0.1088662 to a high of 0.4892544.

Conclusions

Historical population data show Sylacauga to be a community which has seen its heyday and has now stabilized. Population growth was very strong in each decade between 1900 and 1960. Since 1960, the population has been fluctuating up and down toward a point of equilibrium. The population projection techniques predict year 2030 populations ranging from a low of 12,479 to a high of 51,360. Based solely on the statistics, the regression models that used the 1900 to 2000 data produced fairly reliable results, although, intuitively, only the parabolic model produced a reasonable 2030 population figure, at 13,461. A visual assessment of the graphs suggest that the non-regression models do not fit the historical data curves as well as the regression models. However, the modified exponential model did produce a population figure in keeping with recent trends (12,586). Running the models with only the data from 1960 onward produces results that are not statistically reliable due to lack of sufficient historical data. However, five of the models produced results that are in keeping with recent population trends, ranging from a low of 12,479 to a high of 12,564. The parabolic regression model projected a 2030 population of 13,836. Although it is questionable whether enough data exists to generate a valid projection, graphically, the modified exponential model using the 1960 to 2000 data produced the projection curve that best "fits" the historical data curve. That model also generates the figure that appears to be closest to the apparent "equilibrium point." Therefore, if Sylacauga continues along the course it has taken over the past forty years, it can expect a population of about 12,564 by the year 2030.