

MEMORANDUM

To: Florida Great Northwest, Inc.

From: Planner XXXX

Date: February 13, 2004

Re: Population Projections for Bay, Calhoun, Gulf, Walton, and Washington Counties

INTRODUCTION

Florida's Great Northwest is poised for significant growth over the next 30 years. Trying to quantify that growth is a challenge to local planners and community organizations. This memo will project population increases for Bay, Calhoun, Gulf, Walton, and Washington Counties through 2030 using historical census data. This technique, known as extrapolation, uses the aggregate historical populations of the past to predict future trends.

There are a variety of extrapolation models that can be applied to different amounts of historical data. Here we used 9 techniques (Linear, Geometric, Parabolic, Modified Exponential, Mod Exponential with Upper Limit, Gompertz, Gompertz with Upper Limit, Logistic, Logistic with Upper Limit) for 3 base periods (1920-2000, 1950-2000 and 1980-2000), resulting in 27 possible projections for each county. We then analyzed these projections to eliminate those that were inferior. Inferior scenarios are those that 1) look illogical to a layperson e.g., show a negative population, 2) are extreme outliers that show growth (or lack of) that makes little sense to an individual familiar with the area, and 3) fare poorly in a variety of standardized statistical tests that measure internal validity of each model. All three of the standardized statistical tests (Coefficient of Relative Variation or CRV, Mean Error or ME, and Mean Absolute Percentage Error or MAPE) rate values closest to zero as superior. Of these 3 tests, MAPE is considered the strongest, followed by CRV and then ME.

BAY COUNTY

The 27 projections for Bay County resulted in 2030 population projections ranging from 163,700 to 400,966, a rather wide variation. Of these 27 projections, 21 can be eliminated for one or more of the reasons listed previously. This left six strong projections which are listed in Table 1 (attached) along with an evaluation of these six in Table 2. Looking at Table 2, one can see that the two projections based on the period 1980-2000 have the best statistics but the lack of more extensive historical data to test the validity of these two models makes one reticent to choose them when there are other reasonable and logical possibilities. Thus, it appears that the one best projection is the one associated with the Gompertz Upper Limit. This has the lowest MAPE for the longer projection periods and as can be seen in Figure 1 (attached) has a curve which closely

matches historical data and has a similar population projection for the launch year to the actual observed population (approximately 150,000). The Gompertz Upper Limit (Base Period 1950-2000) projects Bay County's population to be 179,105 in 2010, 210,239 in 2020 and 243,127 in 2030.

CALHOUN COUNTY

Calhoun County is sparsely populated with little dynamic population change over the past 80 years. It has only increased from about 6,000 to 13,000 between 1920 and 2000. Many of the models were unhelpful for Calhoun as their projections generated wildly between negative numbers and numbers in the hundreds of thousands. The data from the Base Period 1980-2000 generated six best projections which were in line with likely historical trends deducible by an amateur mathematician. Because many of the projection techniques for the BP 1980-2000 don't generate test statistics, we have more confidence in the two (linear and geometric) that do. Of these two, the geometric projection has the best test statistics and is thus the projection we select to determine future population in Calhoun County. Like our selection for Bay County, its curve matches historical data and has a similar population projected for the launch year 2000 (approximately 13,000) as the observed data. This curve can be seen in figure 2 (attached). The Geometric Curve (BP 1980-2000) projects Calhoun County's population to be 15,411 in 2010, 18,238 in 2020, and 21,584 in 2030.

GULF COUNTY

Gulf County is similar to Calhoun County in that is also sparsely populated with little dynamic population change over the past 80 years. It has increased from around 2,600 to 13,300 between 1920 and 2000. After rejecting those projections that have poor test statistics and/or patently illogical outputs, six scenarios remain which are extremely similar to each other which can be seen in Table 5 (attached). 2010 projections hover around 14,000, 2020 around 16,000 and 2030 around 17,000. Since they are so similar, we have chosen the one with the most superior test statistics, namely Geometric (BP '80-'00) with the lowest CRV (44.9) and the lowest MAPE (1.58%). Like our selection for Bay and Calhoun County, its curve matches historical data and has a similar population projected for the launch year 2000 (approximately 13,300) as the observed data. This curve can be seen in figure 3 (attached). The Geometric Curve (BP 1980-2000) projects Gulf's County's population to be 14,735 in 2010, 16,480 in 2020, and 18,432 in 2030.

WALTON COUNTY

Walton County presents a special challenge to individuals attempting to project populations. It experienced very slow growth from 1920 to 1970 (12,119 population to 16,087) and rather dynamic growth from 1970 to 2000 (16,087 to 40,601). Many of the projected scenarios can be rejected outright as they show either a loss of population or an explosive growth into the 100,000's. The special challenge comes in choosing from the four remaining scenarios which

show very different results, unlike the situation with Gulf County where the 'superior finalists' were all similar in magnitude. The four best projections for Walton County result in projected 2030 populations which range from 68,489 to 104,816! The strongest of the four appears to be the Parabolic Curve with BP 1950-2000. Not only does it have a decent CRV (102.9) and an excellent MAPE (3.46%), it has a curve which closely matches historical data and a similar population projection for the launch year to the actual observed population (approximately 40,000). This closely matched curve can be seen in Figure 4 (attached). The Parabolic Curve (BP 1950-2000) projects populations for Walton County of 53,747 for 2010, 70,601 for 2020 and 90,445 for 2030.

WASHINGTON COUNTY

Washington County is slightly similar to Walton County in its historical trends. It had no growth (as opposed to Walton's slow growth) from 1920 to 1970. It actually lost several hundred people in that time period. Since 1970 it has almost doubled in population (from 11,453 to 20,973). As with the previous counties, many of the 27 scenarios can be discounted due to illogic or bad standardized test scores. The six projections that remain after the first elimination are listed below in Table 9. Of these 6, the Parabolic Curve with Base Period 1950-2000 seems to perform the best. As with the Walton County scenario, the Parabolic Curve (BP 1950-2000) has a good CRV (125.1) and an excellent MAPE (1.93%, the second lowest of all 27 curves). Its curve also closely matches historical data and has a similar population projection for the launch year to the actual observed population (approximately 21,000). This closely matched curve can be seen in Figure 5 (attached). The Parabolic Curve (BP 1950-2000) projects populations of 26,429, 32,913 and 40,550 for 2010, 2020 and 2030 respectively.

CONCLUSION

Bay County and its four neighbors (Calhoun, Gulf, Walton and Washington) will experience dynamic growth between now and 2030. The best estimates predict that the 5-county area will increase its population by 53,287 in 2010, another 59,004 by 2020 and another 65,667 by 2030. This growth will result in cumulative populations for the 5-county area increasing from 236,130 in 2000 to 289,427 in 2010, 348,471 in 2020 and 414,138 in 2030. This represents a 75% increase in population in 30 years. It's safe to say the Great Northwest is no longer Florida's best kept secret. It is this planner's hope that the inevitable growth in these five counties will be managed with vision and wise stewardship in order to preserve the extraordinary beauty as well as the broad ecological diversity of this area.

ATTACHMENTS

TABLE 1. Bay County Best Fitting Extrapolation Curves

TABLE 2. Bay County Best Fitting Curve Evaluations

FIGURE 1. Bay County Gompertz Upper Limit (BP '50-'00) Population Projection

TABLE 3. Calhoun County Best Fitting Extrapolation Curves

TABLE 4. Calhoun County Best Fitting Curve Evaluations

FIGURE 2. Calhoun County Geometric Curve (BP '80-'00) Population Projection

TABLE 5. Gulf County Best Fitting Extrapolation Curves

TABLE 6. Gulf County Best Fitting Curve Evaluations

FIGURE 3. Gulf County Geometric Curve (BP '80-'00) Population Projection

TABLE 7. Walton County Best Fitting Extrapolation Curves

TABLE 8. Walton County Best Fitting Curve Evaluations

FIGURE 4. Walton County Parabolic Curve (BP '50-'00) Population Projection

TABLE 9. Washington County Best Fitting Extrapolation Curves

TABLE 10. Washington County Best Fitting Curve Evaluations

FIGURE 5. Washington County Parabolic Curve (BP '50-'00) Population Projection

TABLE 1. Bay County Best Fitting Extrapolation Curves

Year	Observed	Mod Exp BP '20-'00	Linear BP '50-'00	Gompertz UL BP '50-'00	Logistic UL BP '50-'00	Linear BP '80-'00	Geometric BP '80-'00
1920	11,407						
1930	12,091						
1940	20,686						
1950	42,689						
1960	67,131						
1970	75,283						
1980	97,740						
1990	126,994						
2000	148,217						
2010		176,331	165,978	179,105	191,901	174,794	185,813
2020		206,765	186,826	210,239	236,004	200,033	228,818
2030		240,260	207,674	243,127	286,648	225,271	281,775

TABLE 2. Bay County Best Fitting Curve Evaluations

Curve Type	Base Period	CRV	ME	MAPE
Mod Exp	1920-2000	140.7	0.0	18.59%
Linear	1950-2000	37.2	0.0	5.33%
Gompertz UL	1950-2000	85.9	59.7	4.41%
Logistic UL	1950-2000	85.9	-2.0	4.92%
Linear	1980-2000	22.5	0.0	1.46%
Geometric	1980-2000	36.4	7.9	2.37%

FIGURE 1. Bay County Gompertz Upper Limit (BP '50-'00) Population Projection

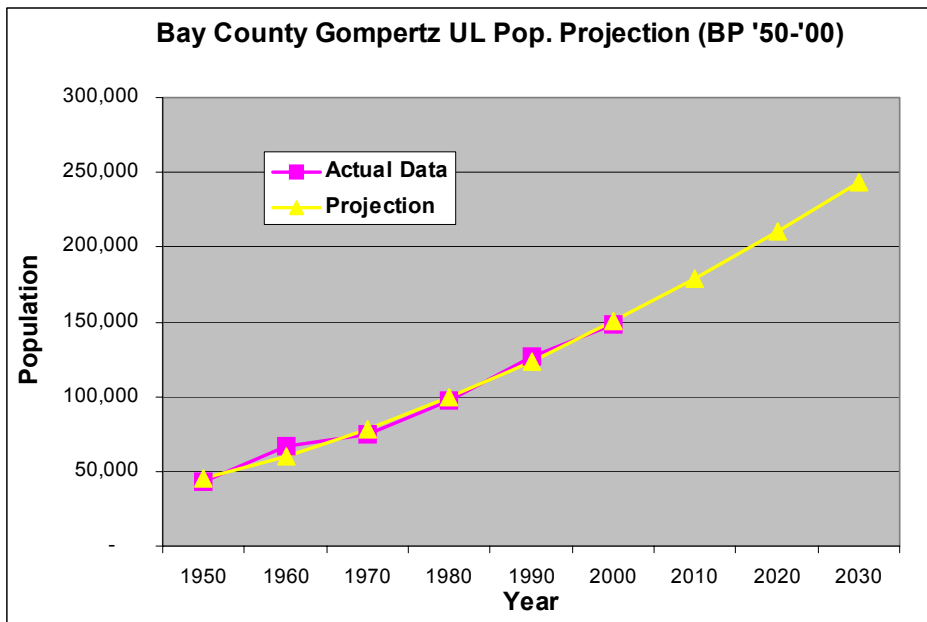


TABLE 3. Calhoun County Best Fitting Extrapolation Curves

Year	Observed	Linear '80-'00	Geometric BP '80-'00	Parabolic BP '80-'00	Mod. Exp. BP '80-'00	Gompertz BP '80-'00	Logistic BP '80-'00
1920	6,111						
1930	7,298						
1940	8,218						
1950	7,922						
1960	7,422						
1970	7,624						
1980	9,294						
1990	11,011						
2000	13,017						
2010		14,830	15,411	15,312	15,361	15,356	15,350
2020		16,692	18,238	17,896	18,099	18,076	18,048
2030		18,553	21,584	20,769	21,298	21,235	21,148

TABLE 4. Calhoun County Best Fitting Curve Evaluations

Curve Type	Base Period	CRV	ME	MAPE
Linear	1980-2000	11.0	0.0	.59%
Geometric	1980-2000	.9	0.0	0.05%
Parabolic	1980-2000	NA	NA	NA
Mod. Exp.	1980-2000	NA	NA	NA
Gompertz	1980-2000	NA	NA	NA
Logistic	1980-2000	NA	NA	NA

FIGURE 2. Calhoun County Geometric Curve (BP '80-'00) Population Projection

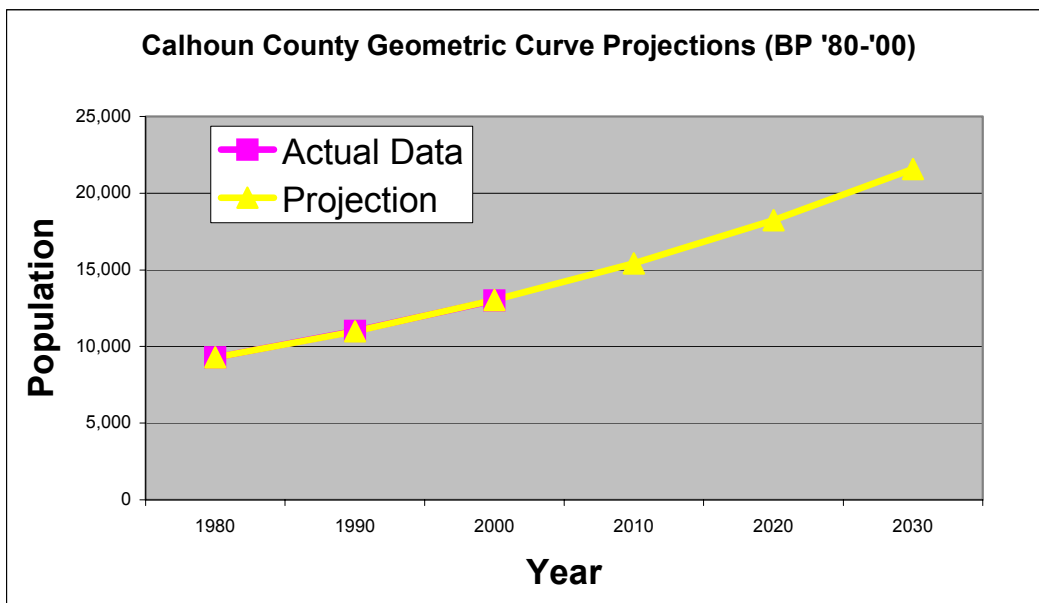


TABLE 5. Gulf County Best Fitting Extrapolation Curves

Year	Observed	Geometric '50-'00	Gompertz '50-'00	Gompertz UL '50-'00	Log UL '50-'00	Linear BP '80-'00	Geometric BP '80-'00
1920	2,664						
1930	3,182						
1940	6,951						
1950	7,460						
1960	9,937						
1970	10,096						
1980	10,658						
1990	11,504						
2000	13,332						
2010		14,525	14,068	14,358	14,513	14,505	14,735
2020		16,005	15,273	15,679	15,980	15,842	16,480
2030		17,636	16,547	17,088	17,593	17,179	18,432

TABLE 6. Gulf County Best Fitting Curve Evaluations

Curve Type	Base Period	CRV	ME	MAPE
Geometric	1950-2000	91.9	13.5	4.70%
Gompertz	1950-2000	81.5	31.3	4.82%
Gompertz UL	1950-2000	81.5	11.1	4.70%
Log UL	1950-2000	81.5	13.4	4.70%
Linear	1980-2000	51.9	0.0	1.87%
Geometric	1980-2000	44.9	2.2	1.58%

FIGURE 3. Gulf County Geometric Curve (BP '80-'00) Population Projection

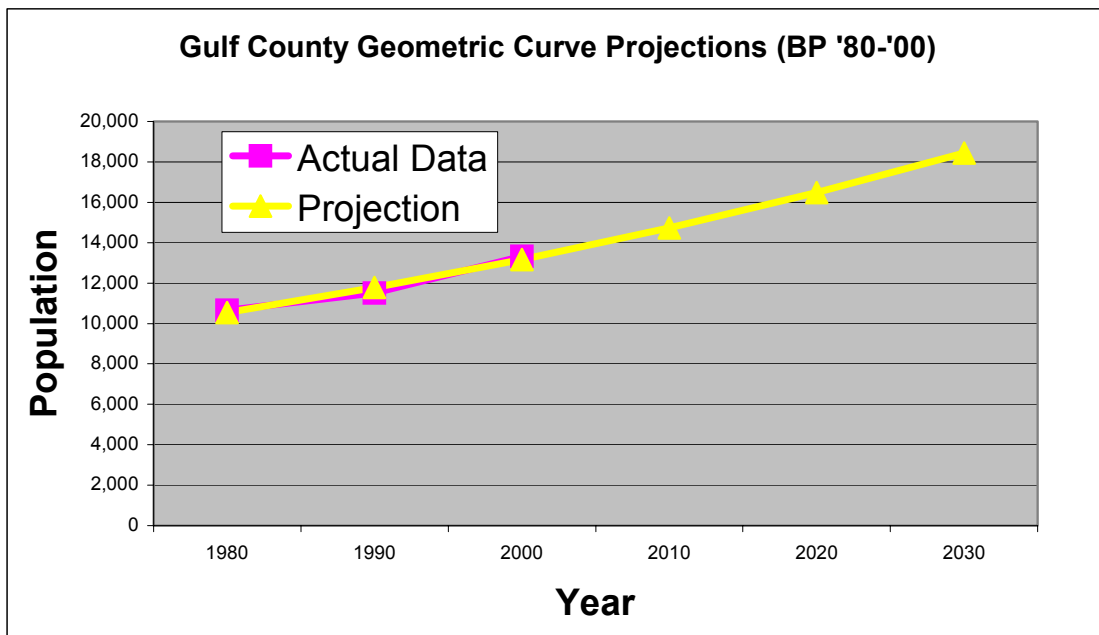


TABLE 7. Walton County Best Fitting Extrapolation Curves

Year	Observed	Parabolic '20-'00	Parabolic '50-'00	Linear '80-'00	Geometric '80-'00
1920	12,119				
1930	14,576				
1940	14,246				
1950	14,725				
1960	15,576				
1970	16,087				
1980	21,300				
1990	27,760				
2000	40,601				
2010		46,698	53,747	49,188	54,988
2020		57,285	70,601	58,839	75,919
2030		69,286	90,445	68,489	104,816

TABLE 8. Walton County Best Fitting Curve Evaluations

Curve Type	Base Period	CRV	ME	MAPE
Parabolic	1920-2000	209.0	0.0	11.83%
Parabolic	1950-2000	102.9	0.0	3.46%
Linear	1980-2000	46.8	0.0	5.09%
Geometric	1980-2000	25.3	30.2	2.58%

FIGURE 4. Walton County Parabolic Curve (BP '50-'00) Population Projection

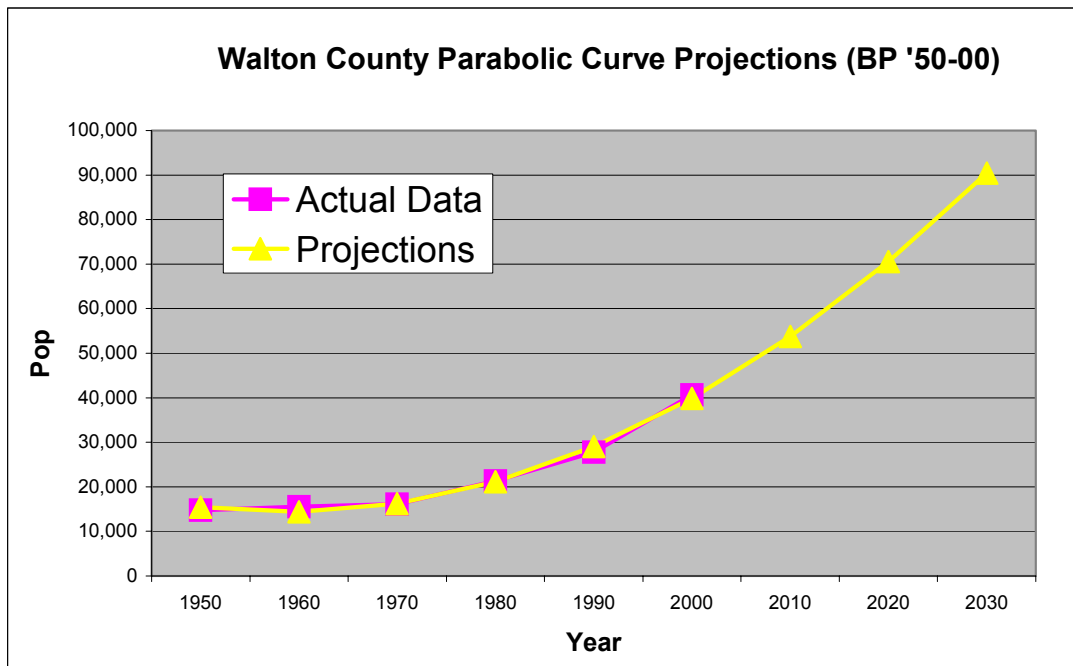


TABLE 9. Washington County Best Fitting Extrapolation Curves

Year	Observed	Parabolic '20-'00	Parabolic '50-'00	Linear '80-'00	Geometric '80-'00	Parabolic BP '80-'00	Mod. Exp. BP '80-'00
1920	11,828						
1930	12,180						
1940	12,302						
1950	11,888						
1960	11,249						
1970	11,453						
1980	14,509						
1990	16,919						
2000	20,973						
2010		23,937	26,429	23,931	24,960	26,671	27,792
2020		28,253	32,913	27,163	30,010	34,013	39,264
2030		33,187	40,550	30,395	36,080	42,999	58,561

TABLE 10. Washington County Best Fitting Curve Evaluations

Curve Type	Base Period	CRV	ME	MAPE
Parabolic	1920-2000	248.9	0.0	5.87%
Parabolic	1950-2000	125.1	0.0	1.93%
Linear	1980-2000	36.0	0.0	2.14%
Geometric	1980-2000	23.5	3.8	1.36%
Parabolic	1980-2000	NA	NA	NA
Mod. Exp.	1980-2000	NA	NA	NA

FIGURE 5. Washington County Parabolic Curve (BP '50-'00) Population Projection

