

The Problem of Population & Planning: Assessing the Reliability of Past and Current Population Projections and Filling in the Seasonal Gaps in Wallowa County

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Planners face innumerable challenges as they look to the future of their communities. At the most basic level planners must attempt to understand the needs, values, and opinions of the community. The triple-bottom line of the environment, economy, and social demands must be balanced with sustainability to ensure that decisions made today will meet current needs without compromising future needs. One of the biggest challenges for planners is to try and see into the future and make informed decisions that will affect a changing population composition.

Understanding the multiple population estimates, projections, and forecasts can be a challenging task. To help facilitate understanding, the following basic definitions are provided. A **Population Estimate** is an educated guess about the population at any point in the present or the past based on non-census, non-survey data. An estimate might be measured from voter rolls. A **Population Projection** seeks to describe future populations based on present data if a certain set of chosen current trends continue, reverse, or remain the same. A **Population Forecast** also seeks to describe future populations based on present data but does so based on a prediction of how current trends will change in the future. The forecast differs from the projection in that it is based on an assumption that something will or will not happen. The projection only suggests how population may change if some certain trends remain or change, such as amenity migration, or economic recessions. With a better understanding of the methodology behind estimates, projections, and forecasts and an analysis of how past estimates, projections, and forecasts have fared, planners can make more informed choices when thinking about the future of their communities.

The purpose of this paper is to assist planners in Wallowa County, Oregon to fill gaps in knowledge of demography. As Wallowa County considers updating its Comprehensive Plan, this knowledge will inform planners as to the reliability of currently available projections and forecasts. Part I includes a discussion of current projection methodologies and assumptions, a brief annotated bibliography of population projections, as well as analyses of past population projections for two similar counties. Part II includes a discussion on seasonal population flux and is an examination of the challenges of measuring and planning for seasonal populations. At the end of this section is seasonal population data and a discussion of basic trends. Part III provides a summary and conclusion. References and Appendices follow.

I. Projection Methodologies and Assumptions

A. Current Projections and Methodologies for Wallowa County

This section includes identifying current demographic trends for Wallowa County, describing the methodologies behind the trends, and performing basic mathematical analyses to determine the strength of the trends. This information can be used by Wallowa County to decide if the available estimates, projections, and forecasts are a good indicator of population change in the county. Also included in this section is a brief annotated bibliography that includes peer-reviewed journal articles and books that can be used to further identify strengths and weaknesses of the various types of population projections, estimates, and forecasts.

Estimates and Forecasts

The following tables include population estimates and forecasts for Wallowa County. Table 1 includes three analyses for Wallowa County during the years of 2000-2007. Estimates from the US Census Bureau are listed first. Estimates from the Population Research Center (PRC) at Portland State University are listed in the second column. The PRC "is an interdisciplinary public service, research, and training unit for population-related data and research for the state of Oregon" with the mission of "provid[ing] population data, information, and research analysis for Oregon and its communities" according to its website. Finally, the third column contains a population forecast from the Oregon Office of Economic Analysis (OOEA), the mission of which is to "[provide] objective forecasts of the state's economy, revenue, population, corrections population, and Youth Authority population [which] are used to enable the governor, the legislature, state agencies, and the public to achieve their goals" according to its website. Table 2 is a long-term population forecast from 2000-2040 for Wallowa County published by OOEA. A short discussion of the methodologies and assumptions for all of the projections is provided after each table.

Table 1: Wallowa County Population Analyses 2000-2007

Year	US Census Bureau Estimate	PSU Population Research Center Estimate	Oregon Office of Economic Analysis Estimate
2000	7,215	7,250	7,216
2001	7,098	7,100	7,099
2002	7,019	7,150	7,021
2003	6,972	7,150	6,973
2004	6,856	7,150	6,861
2005	6,820	7,130	6,828
2006	6,742	7,140	6,740
2007	6,746	7,130	6,759

The side-by-side comparison of estimates and forecasts reveals that the three analyses brought similar results. The US Census estimate and the OOEA forecast found the closest results, generally with a difference of only a few people. The PRC estimate predicted a much smaller decrease in the population. The methodology used by the US Census Bureau and the OOEA was the cohort-component method. The components included in the US Census Bureau's analysis are births and deaths, net domestic migration, net international migration, group quarter's population, and age (www.census.gov). The components of the OOEA's analysis include births and deaths and migration (<http://www.oregon.gov/DAS/OEA/demographic.shtml>). The PSU Population Research Center uses a different method called ratio-correlation. This method relates the changes in the population since the last census in state tax returns, school enrollments, births, and voter registration, as well as the changes in housing stock. (www.pdx.edu/prc/methodology). It will be important to understand the different methodologies that are used by each organization that produce population projections when determining which projection will be used by the County.

Since the cohort-component method is widely used and is specifically used for two of the three projections we were able to locate, it is provided below.

"The *cohort-component method* for estimating and projecting a population, as previously indicated, is distinguished by its ability to preserve knowledge of an age distribution of a population (which may be of a single sex, race, and Hispanic origin) over time. It is a special case of a

component method, which is defined simply by the use of estimates or projections of births, deaths, and net migration to update a population.⁸ In its simplest statement, the component method is expressed by the following equation:

$$P_t = P_{t-1} + B_{t-1,t} - D_{t-1,t} + M_{t-1,t} \quad (1)$$

where P_t = population at time t ;

P_{t-1} = population at time $t-1$;

$B_{t-1,t}$ = births, in the interval from time $t-1$ to time t ;

$D_{t-1,t}$ = deaths, in the interval from time $t-1$ to time t ; and

$M_{t-1,t}$ = net migration, in the interval from time $t-1$ to time t . “

(<http://www.census.gov/population/www/documentation/twps0038/twps0038.html>)

Table 2: Wallowa County Population Forecasts 2000-2040 (5-year Intervals) from the OOE

Year	Oregon Office of Economic Analysis Forecast
2000	7,250
2003	7,150
2005	7,147
2010	7,315
2015	7,611
2020	7,892
2025	8,112
2030	8,232
2035	8,431
2040	8,783

The two base years for this population forecast are 2000 and 2003. The population numbers for these years are taken from Portland State University’s estimates. The methodology for this long-term population forecast is the cohort-component method as described above. The general trend from this forecast is a population increase in Wallowa County over the next 30 years.

Summary of Methodologies

For the three population projections we were able to acquire, two of them (US Census Bureau and OOE) use the cohort-component method, and Portland State University’s Population Research Center uses a ratio-correlation method. These methods each analyze births, deaths, migration, while the ratio-correlation method also analyzes school, housing, voter registration and tax records.

Measuring Accuracy of Projections

There are a number of simple equations for measuring accuracy and bias in population estimates and projections. The following equations are from “State and Local Population Projections: Methodology and Analysis” written by Stanley Smith, Jeff Tayman, and David Swanson (2001). From the estimates that we have for Wallowa County we are able to only analyze data from the US Census for the years 1980, 1990 and 2000 for accuracy. Those three years are selected because actual population numbers are recorded by the US Census, as well as population estimates by the US Census. For the first two equations, we have also included the population estimates from PSU’s PRC and the OOE for the year 2000. Estimates from these other two sources cannot be used in the other equations because of a lack of data for the

years 1980 and 1990. The first equation is designed to measure forecast error (E), which is the difference between the estimate/forecast (F) and the actual population (A) during a given year.

$$E = F - A$$

The following table shows the forecast error calculated for the US Census, the PRC, and the OOEА.

Table 3: Population Analysis Errors for Wallowa County

Year	US Census Bureau Estimate	Population Research Center Estimate	Oregon Office of Economic Analysis Forecast
1980	0	No data	No data
1990	146	No data	No data
2000	-11	24	-10

It is evident from the above calculations that the US Census' estimate for the year 2000 has a much smaller forecast error than 1990; however, it appears that in 1980 the US Census estimate was exactly correct. We were unable to find population estimates for 1990 from PRC and the OOEА; however, when OOEА's forecast error for the year 2000 is compared to the forecast error for the US Census Bureau in 2000 it is clear that the Census Bureau and the OOEА have a smaller forecast error than the PRC. Forecast errors like the ones just calculated are often times expressed in percentages. This is formally known as percent error (PE). The equation and calculations that measure PE for Wallowa County are provided below.

$$PE = [(F - A) / A] \times 100$$

The results of the PE calculation are shown in Table 4. It is clear that the US Census and the OOEА's 2000 projections have a percent error less than that of PSU PRC's; however in 1990 the US Census' projection had a percent error greater than all three projections in 2000.

Table 4: Population Analysis Percent Errors for Wallowa County

Year	US Census Bureau Estimate	Population Research Center Estimate	Oregon Office of Economic Analysis Forecast
1980	0%	No data	No data
1990	2.11%	No data	No data
2000	-0.15%	0.33%	-0.14%

Other equations used to measure the strength of projections are the mean error (ME) and the mean absolute error (MAE). These equations are expressed below. It should be noted that these two equations are based on numerical differences and not percentages. Numerical differences do not take into account the size of a population. For instance, a ME of 300 people means more to a community with 3,000 people than a community with 30,000 people. An equation dealing with the problem of the size of the community is discussed later on.

$$ME = \sum E_i / n$$

$$MAE = \sum |E_i| / n$$

The ME and MAE can only be calculated for the US Census estimates because we have three estimates from the same organization and actual population data for the years the estimates were given. The ME for Wallowa is 45, and the MAE is 52.3. The difference between the ME and the MAE is the ME allows for positive and negative Forecast Errors to cancel each other out, which is why the ME came out to be less than the MAE. According Smith et al., a more accurate average is the MAE which is not affected by the direction of estimates (2001).

The final two equations are the Mean Algebraic Percent Error (MALPE) and the Mean Absolute Percent Error (MAPE). The MALPE allows for positive and negative values to cancel each other out, so it is often used as a measure of estimate bias. If a MALPE is positive the projection is too high, if it is negative the estimate is too low. The MAPE does not cancel positive and negative values and simply shows the average percent difference between estimates and actual populations. The MAPE is often used as a measure of accuracy for the estimate. The MALPE and MAPE equations are shown below.

$$\text{MALPE} = \sum PE_t / n$$

$$\text{MAPE} = \sum |PE_t| / n$$

Once again, the MALPE and MAPE can only be calculated for the US Census projections because there are three projections and actual population data for those projection years. The MALPE for Wallowa County is 0.65, and the MAPE is 0.75. These numbers are both very good. A MALPE of 0.65 indicates a low level of bias in the projections and a MAPE of 0.75 indicates a high level of accuracy. It should be noted that the three projections that were used were spaced ten years apart and that the accuracy and bias could be affected by not having subsequent years measured.

Annotated Bibliography on Population Projections, Estimates and Forecasts

1. Stoto, M.A. 1983. *The accuracy of population projections*. Journal of the American Statistical Association, 78: 381, pp. 13-20

This article is the oldest piece in this bibliography, but it was selected because of its content. The author looks at past Census and United Nations estimates to determine if simple forecast models are more or less accurate than the more complex models used by demographers. The author established confidence intervals to analyze the data. The author found that the simple projections models were just as, if not more accurate (and consistent) than the more complex models.

2. Land, K.C. 1986. *Methods for national population forecasts: a review*. Journal of the American Statistical Association, 81: 396, pp. 888-901

This article is a review of the many different methods employed by agencies who perform population projections. Some of the methods include cohort-component method, statistical time-series method, and structural modeling. The author reviews the strengths and weaknesses of each of the different methods, as well as provides the factors that place limits on the accuracy of projections using the different methods.

3. Tayman, J., Swanson, D.A. 1996. *On the utility of population forecasts*. Demography, 33:4, pp. 523-528

This article was interesting and may be useful to Wallowa County. The authors were trying to see if value-added information had any utility in comparison to the effort it takes to incorporate the value-added information with the projection and analyze it. What the authors found was that the basic projection and simple mathematical calculations such as the MALPE and MAPE were sufficient and that the time and resources required to measure utility of value-added information was inefficient and did not provide significant differences. The take home message from this article is that Wallowa County should rely on the projections that are generated by the organizations who make the projections and perhaps limit their analysis to measuring accuracy and bias of the projections.

4. Smith, S.K., Tayman, J., Swanson, D.A. 2001. *State and local population projections: methodology and analysis*. Kluwer Academic/Plenum Publishers

This book is very useful and has many tools that can be used to measure population projection accuracy, bias, etc. The book is comprised of 15 chapters on topics that range from evaluating projections, to an overview on the cohort-component method, to special topics like migration, fertility, mortality, etc.

5. Smith, S.K., Tayman, J. 2003. *An evaluation of population projections by age*. Demography, 40: 4, pp. 741-757

This article is interesting because it looks at a particular subgroup of data and bases a population projection off of this subgroup. In this case the subgroup of data is age. The authors analyzed this information at the national, and state levels, and at the county level in Florida. Their findings were then compared to projections that were created using the cohort-component method. The authors found that the age group error patterns were different at the national, state and county levels. They also found that errors were different for different age groups, and that over a longer horizon these differences were less noticeable. We are not aware if this particular type of analysis has been used in Wallowa County, but find that it is another tool that can be used by the County to analyze different projections in determining which projection is best suited for Wallowa County.

6. Guangqing, C. 2009. *Can knowledge improve population forecasts at subcounty levels?* Demography, 41: 2, pp. 405-427

In this article the author was attempting to see if a non-extrapolation method, such as identifying transportation systems, amenities, etc., could be used to better predict future populations at the sub-county level. The author uses four regression models that used demographic, socio-economic and natural characteristics of the population and place to test if this approach is better. The author found that the regression models often produced more precise projections but that these projections were substantially more biased than the extrapolation methods. The author notes that the performance of the knowledge-based regression models is often discounted because of the temporal instability and the scale effect. This means that people and places are not stable/constant and that over time socio-economic patterns change many times, which makes analysis based on those characteristics more susceptible to bias and error.

B. Lessons from Past Projections and Methodologies

Examining past, projections and forecasts made for counties similar to Wallowa can provide insight into the projection accuracy. The following two comparisons examine cases from the recent past during influential time periods. First we examine conditions of Powell County, Montana from the 1980s when the U.S. suffered from an economic recession. Second we examine conditions of Lemhi County, Idaho from the 1990s when many western counties experienced an influx of amenity migrants and a decline in the natural resource industries.

Powell County, Montana

The early 1980s was a time of economic recession in the United States which affected rural counties in the west in terms of unemployment and industry closures. Comparing data and population estimates for a county similar to Wallowa from the 1980s and 2000s will help to highlight population estimates and any problems therein. Powell County, Montana provides a useful comparison to Wallowa County according to demographic, geographic, and economic characteristics.

Table 5: Comparison of Powell County, MT and Wallowa County, OR 1980

	Powell County	Wallowa County
Geography¹		
Area Covered by Land (sq. mi.)	2,332.68	3,151.69
Area Covered by Water (sq.mi.)	6.74	6.36
Population Density (people/sq. mi.)	3.1	2.3
Demographics¹		
	~97% White	~99% White
	~0% Black	~0% Black
	~2.8% Other	~0.5% Other
Economics²		
Agricultural Services	1.4%	0.5%
Mining	2.7%	0%
Construction	8.1%	8.8%
Manufacturing	12.8%	12.1%
Trans., Comm., & Util.	5.4%	7.7%
Wholesale Trade	4.7%	5.5%
Retail Trade	29.7%	35.2%
Finance, Ins., & Real Estate	6.8%	6.6%
Services	27.7%	19.8%
Unclassifiable	0.7%	3.8%

¹ This data is from the US Census Bureau's Website. The demographic data is based on the year 1980.

² This data is from the Headwaters Economic Website. The base year for this data is 1977.

The data in Table 5 show that around 1980 the two counties are similar geographically in land and water area, as well as population density. Demographically, both counties were predominately white, and economically the counties shared similar percentages of like industries. Today, Wallowa and Powell counties are both centers for seasonal amenity migrants. Timber is important in both counties, but it appears that there are more people employed in the timber industry in Powell County. The ranching industry is more important in Wallowa County than Powell County.

Tables 6-8 include population estimates, population density, and population change for the 1980s in Wallowa County and Powell County. Table IX is the current population estimates for Wallowa and Powell County.

Table 6: Wallowa and Powell County Population Estimates 1980-1989¹

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Wallowa County	7,273	7,381	7,412	7,458	7,523	7,323	6,881	6,825	6,767	6,818
Powell County	6,958	6,861	6,802	6,874	6,805	6,904	6,773	6,780	6,702	6,582

¹ These estimates were provided by the US Census Bureau

It should be noted that the recession lasted from 1980-1982. In these three years the population in Wallowa County increased from 7,273 to 7,412, a difference of +139 people. During the same three years, the population in Powell County decreased from 6,958 to 6,802, a difference of -156 people. While the two counties populations did not respond similarly to the recession of 1980-1982, over the course of the 1980's both counties saw their overall populations decline. Wallowa County decreased from 7,273 to 6,818, a difference of -455 persons, and Powell County decreased from 6,958 to 6,582, a difference of -376 persons. In terms of total percentage of population decline during the 1980's, Wallowa County decreased by 6.25% and Powell County decreased by 5.4%.

The data used to generate these estimates came from the 1980 US Census. The County estimates are produced using a cohort-component method based on age, sex, and race. A complete discussion of the methodology is not available on-line. The full explanation of the methodology for the 1980's estimates are available in a report, number is P26-88A, and can be obtained from the US Census Bureau at (301) 457-2422. We assume that the methodology doesn't vary significantly from the current cohort-component method used by the US Census Bureau today.

Table 7: Wallowa and Powell County Population Densities 1980-1989 (people/sq. mi.)¹

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Wallowa County	2.31	2.35	2.36	2.37	2.39	2.33	2.19	2.17	2.15	2.17
Powell County	2.99	2.95	2.92	2.96	2.93	2.97	2.91	2.91	2.88	2.83

¹ The Population Density is calculated by dividing the population estimates provided by the US Census by the area of the respective county.

Wallowa County is 3,145 sq. mi. in area, while Powell County is a little smaller at 2,326 sq. mi. It is interesting to note that the population densities of the two counties are separated by less than 1 person per sq. mi. each year. There are a number of possible explanations for this. One explanation is that Wallowa County has more cities and towns than Powell County.

Table 8: Wallowa and Powell County Population Change 1980-1989¹

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Wallowa County	N/A	0.02	0	0.01	0.01	-0.03	-0.06	-0.01	-0.01	0.01
Powell	N/A	-0.01	-0.01	0.01	-0.01	0.02	-0.02	0	-0.01	-0.02

County

¹ The Population Change is calculated by dividing the current year's population estimate by the previous year's population estimate.

Presently, the US Census Bureau estimates that Powell County's population has had minor fluctuations since the 2000 Census with an end result in a small decline in population. In 2000, the population for Powell County was 7,178, and in 2008 it was projected to be 7,041. Wallowa County is estimated to have lost nearly 500 residents since the 2000 Census (population 7,226), with 6,760 people estimated to reside there in 2008. The following table compares populations for the two counties throughout the 2000s, as estimated by the U.S. Census Bureau based on data from the 2000 census, using the same techniques described above.

Table 9: Wallowa and Powell County Population Estimates 2000-2008¹

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008
Wallowa County	7,215	7,098	7,019	6,972	6,856	6,820	6,742	6,746	6,760
Powell County	7,178	7,011	6,958	6,860	6,839	6,946	7,100	7,115	7,041

¹ The Population Estimates are provided by the US Census Bureau.

This final table (IX) shows that Wallowa County's population is now estimated to be less than Powell County. This is a change from the comparison of the two counties populations in the 1980s.

Summary of County Comparison between Wallowa and Powell Counties

The purpose of comparing these two counties is to see how their population responded to the economic recession in the early 1980s. As is stated above, the population of Wallowa County continued to increase in the early 1980s while Powell County has slight decreases. The overall result for both counties from 1980-1989 was a decrease in the population, which is consistent with the migration theory that during times of economic trouble counties lose their population to larger cities and metropolitan areas. It appears that these two counties may respond similarly to major economic forces, and because of their geographic, demographic and economic similarities may it would be beneficial for Wallowa County to work with Powell County in finding successful growth management strategies.

Lemhi County, Idaho

Two factors significantly affected rural, western counties in the 1990s: a decline in natural resource industries and an influx of amenity migrants. Lemhi County, Idaho provides a useful comparison to Wallowa County according to demographic, geographic, and economic characteristics. Lemhi is among a number of counties that exhibited similar demographic characteristics, including percent of population change (0-25% positive), percent of population over 65 (16-20%), and percent of population of working age (50-55%) in a study, *Changing Face of the Rural West*, conducted by the Western Regional Development Center at Utah State University. Closer inspection of 1990s Census data revealed more similarities, as illustrated in the following tables.

A notable difference exists in the counties' industries, with Wallowa relying more heavily on manufacturing and Lemhi relying more heavily on services. Lemhi stands out as a comparable county because of its proximity to natural and urban amenities, its population density, its urban areas, and its industries. Lemhi County forms part of the northeast border between Idaho and

Montana. It is situated about six hours from Boise, three hours from Missoula, MT, and seven hours from Billings, MT. There are just two incorporated cities, Leadore and Salmon. The Bitterroot Range and the Salmon River cut through the county. At 4564 sq. mi., it is a bit

Table 10: Comparison of Lemhi County, ID and Wallowa County, OR 1990

	Lemhi County	Wallowa County
Geography¹		
Area Covered by Land (sq. mi.)	4,569.50	3,151.69
Area Covered by Water (sq. mi.)	5.35	6.36
Population Density (people/sq. mi.)	1.7	2.3
Demographics¹		
	~95% white	~96% white
	~0% black	~0% black
	~5% other	~4% other
Economic²		
Agricultural Services	2.5%	2.6%
Mining	0.5%	0%
Construction	7.5%	4.3%
Manufacturing	4.5%	15.0%
Trans., Comm., & Util.	6.5%	9.0%
Wholesale Trade	6.0%	3.0%
Retail Trade	31.8%	33.0%
Finance, Ins., & Real Estate	5.0%	6.0%
Services	31.8%	24.5%
Unclassifiable	4.0%	2.6%

¹ This data is from the US Census Bureau's Website. The demographic data is based on the year 1980.

² This data is from the Headwaters Economic Website. The base year for this data is 1977.

bigger than Wallowa (3145 sq. mi.). Both counties have similar population and population densities as shown below in Tables 11 and 12. Lemhi has traditionally been dependent on mining for its well being. There is also a significant amount of ranching. With 90% of the county being federal lands, there is also a significant amount of government and timber work. 31% of nonfarm payroll jobs in 2007 were government. Trade, utilities & transportation jobs made up the next biggest sector with 17%, and leisure and hospitality made up the next with 14% according to the Idaho Department of Labor. Like many western counties, Lemhi has an interest in preserving its ranching and other natural resource-based industries in a changing economy. It just updated its comprehensive plan with the aim of integrating economic and environmental concerns efficiently towards a shared vision of the future with the help of the Sonoran Institute. Regional citizens formed Salmon Valley Stewardship, a collaborative group organized around promoting those goals locally (Sonoran Institute website).

Table 11: Wallowa and Lemhi County Population Estimates 1990-1999¹

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Wallowa County	7,057	7,272	7,398	7,600	7,634	7,661	7,661	7,678	7,544	7,479
Lemhi County	7,066	7,203	7,255	7,363	7,640	8,229	8,290	8,312	8,296	8,242

¹ The Population Estimates are provided by the US Census Bureau.

Table 12: Wallowa and Lemhi County Population Densities 1990-1999 (people/sq. mi.)¹

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Wallowa County	2.24	2.31	2.35	2.42	2.43	2.44	2.44	2.44	2.4	2.38
Lemhi County	1.55	1.58	1.59	1.61	1.67	1.8	1.81	1.82	1.82	1.8

¹ The Population Density is calculated by dividing the population estimates provided by the US Census by the area of the respective county.

The counties also had similar population change over the decade. Population growth early in the decade fizzled out toward the mid-1990s before becoming slightly negative.

Table 13: Wallowa and Lemhi County Population Change 1990-1999¹

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Wallowa County	N/A	0.03	0.02	0.03	0	0	0	0	-0.02	-0.01
Lemhi County	N/A	0.02	0.01	0.01	0.04	0.08	0.01	0	0	-0.01

¹ The Population Change is calculated by dividing the current year's population estimate by the previous year's population estimate.

For each state, the Bureau estimates a set of statistics by age, sex, race and Hispanic origin each year using a cohort-component method. From state level data county level estimates are then derived by *raking*, meaning analysts have applied a mathematical formula based on ratios to estimate the number of people of each age, sex, race and Hispanic origin in any given year. Presently, the US Census Bureau estimates that Lemhi's population has held about steady since the 2000 Census, which revealed a population of 7,806. Lemhi was estimated to have 7,808 residents in 2008. Wallowa County is estimated to have lost nearly 500 residents since the 2000 Census (population 7,226), with 6,760 people estimated to reside there in 2008. The following table compares populations for the two counties throughout the 2000s, as estimated by the U.S. Census Bureau based on data from the 2000 census, using the same techniques described above.

Table 14: Wallowa and Lemhi County Population Estimates 2000-2008¹

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008
Wallowa County	7,215	7,098	7,019	6,972	6,856	6,820	6,742	6,746	6,760
Lemhi County	7,735	7,603	7,599	7,602	7,662	7,706	7,731	7,692	7,808

What is most interesting is the adjustment from 1999 to 2000, when the new census data began informing all new estimates. The population change in 2000 (4% for Wallowa and 6% for Lemhi) stands out as slightly larger than the changes over the rest of the decade. This suggests that census estimates towards the end of the 1990s had become skewed too large and thus needed a slight downward adjustment.

Table 15: Wallowa and Lemhi County Population Estimates 2000-2008¹

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008
Wallowa County	-0.04	-0.02	-0.01	-0.01	-0.02	-0.01	-0.01	0	0
Lemhi County	-0.06	-0.02	0	0	0.01	0.01	0	-0.01	0.02

¹ The Population Change calculation is done by dividing the current year's projection by the previous year's projection.

Much other information for Lemhi County is hard to obtain. The Idaho Department of Labor releases monthly "Work Force Trends" which include a fairly detailed description of population trends as they relate to employment. The December 2008 release included the following analysis:

The county's population is ranked 32nd in the state at 7,717 in 2007, 378 fewer people than at its peak of 8,095 in 1997, reflecting some large declines in 1999 through 2001. Between 2002 and 2006, there was a steady increase in population totaling 140. However, a loss of 28 people in 2007 reversed the trend.

There is no indication as to how this information was gathered or estimated in the document, but the Department of Labor website indicates that it relies on Census data to make and analyze estimates. Several other documents, such as University of Idaho Extension analyses, reference the US Census. Indeed, it appears that the US Census estimates and projections underlie most information and analyses available for Lemhi County.

Summary of County Comparison between Wallowa and Lemhi Counties

The purpose of comparing these two counties is to see how their population responded to outside forces, especially an influx of natural amenity migrants, during the 1990s. The population of the two counties followed a similar trajectory with Lemhi County's population trend appearing to lag a few years behind Wallowa County's. Wallowa County also appeared to be more stable, hovering near no population change during the mid to late portion of the decade. The similarities between the two counties indicate that both are likely to experience similar challenges in the future. Looking closely at Lemhi County's plans may help Wallowa County to plan for its future.

II. Capturing Seasonal Population Trends

Wallowa County clearly experiences a seasonal population flux. Warm, clear summers and snowy mountain winters attract visitors year round at different rates. However, knowing exactly how many visitors come to Wallowa County and at what time of year is more difficult. No single source reliably captures this seasonal data. Researchers must attempt to describe the

seasonal population using less transparent data, including traffic data from the Oregon Department of Transportation (ODOT), traveler data from local hotels and campsites, resident data from realtors, and other data, for instance volume data from utilities companies.

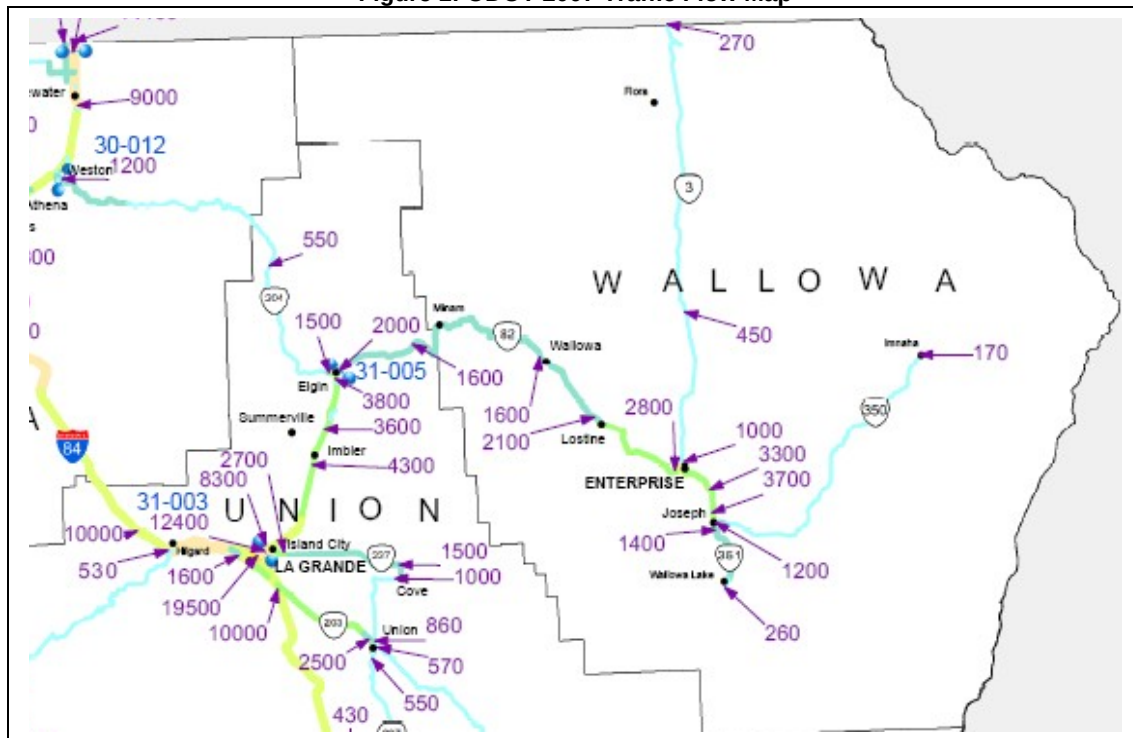
Traffic Data from ODOT

A reliable source of population data are traffic counts provided by ODOT. ODOT collects data at many permanent automatic traffic recorder (ATR) stations throughout the state. ODOT has not located an ATR inside Wallowa County. The nearest station, 31-005, is located on OR-82 at 0.45 miles northeast of OR-204 near Elgin. Figure 1 is excerpted from the 2007 Oregon Traffic Flow Volume Map produced by ODOT

(http://www.oregon.gov/ODOT/TD/TDATA/tsm/docs/Web_Flow_Map_GIS_2007.pdf).

The recorder stations are denoted in blue while the purple numbers indicate the average annual daily traffic (AADT) at each location. The AADT is calculated by dividing the total number of vehicles counted over the year by 365, the number of days in the year. AADT therefore is not useful for drawing conclusions about seasonal population. The daily data captured by traffic recorder no. 31-005 is useful, however. Because OR-82 is the main route into Wallowa and because Wallowa County is the major destination beyond Elgin on OR-82, we assume that traffic data at this counter will provide a reasonably accurate estimate of seasonal population

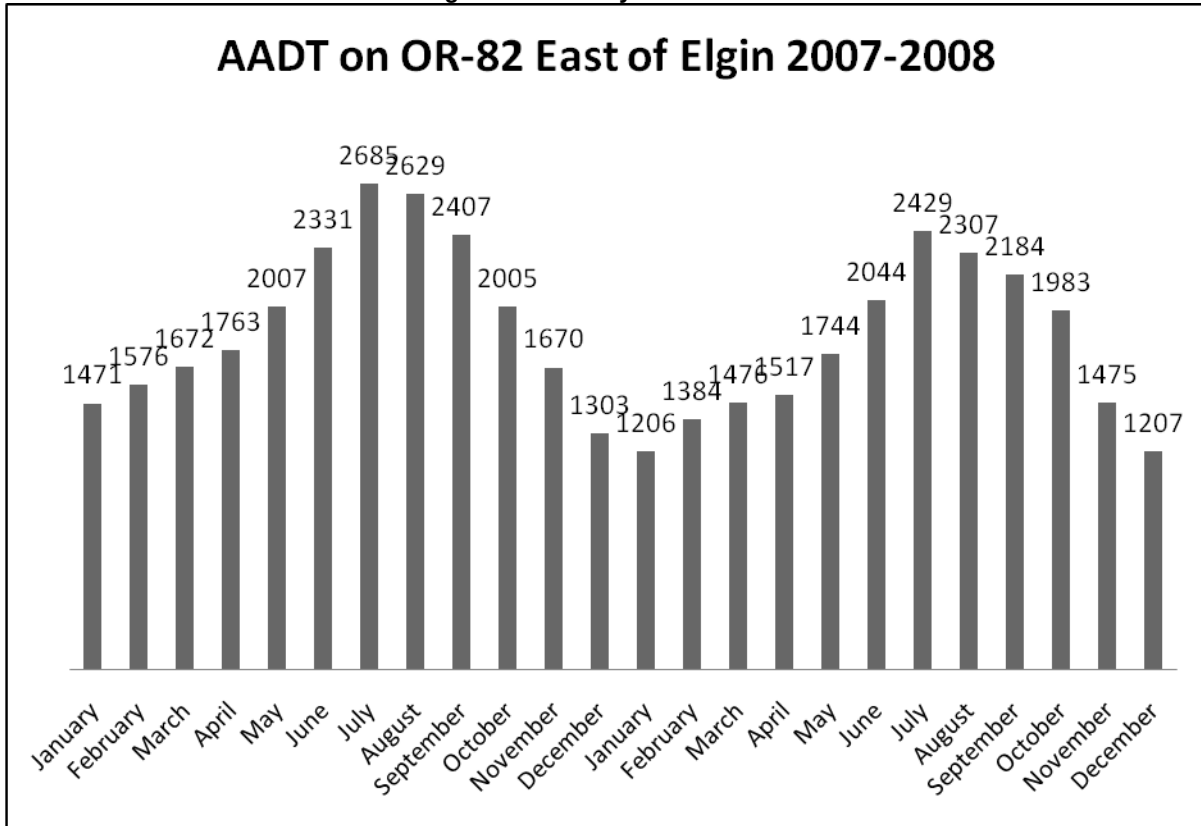
Figure 1: ODOT 2007 Traffic Flow Map



change in Wallowa County.

ODOT provides public access to its data on its website. The monthly figures used here are gathered from (<http://www.oregon.gov/ODOT/TD/TDATA/tsm/trendspage.shtml>) and represent 2007-2008 only. Figures dating back to 2001 are available from the website, and figures dating back to 2005 are included in Appendix B. From the traffic counter, the results show that the summer months have higher traffic volume (See Figure 2). In some recent years, the volume of cars passing the ATR in the summer has been twice that passing in the winter. The chart does not

Figure 2: AADT by Month 2007-2008



show a clear peak period of travel during the winter that might be explained by winter recreation enthusiasts.

Traveler Data from Hotels and Campsites

Hotel and campsite operators have some insight into not only how many visitors come to Wallowa but where visitors are from, why they came, and how long they stay. From the Wallowa Chamber of Commerce and additional web searches, we compiled a list of 55 hotels, campsites, and a few rental agencies located within the county, primarily in Joseph and Enterprise. This list is not meant to be a representative sample; it is a relatively thorough list of mainstream lodging sites. It may exclude entire sectors of seasonal population, such as private persons offering rooms to rent in their homes. With that caveat, we attempted to contact each business listed at least two times and were successful at contacting 32 of them, including at least one agency responsible for renting private homes and cabins.

Table 16 shows a breakdown of respondents' lodging types. It should be noted that the categories used here are general. A respondent whose lodging type is categorized as hotel/motel may actually have a few cabins on the property as well. Table 17 shows respondents' locations. The data we gathered does not allow us to extrapolate more information, such as the total number of visitors that may be in Wallowa County lodging at any given point in time. The complete set of responses is included in Appendix C. The responses we received indicate that we seemed to have hit a saturation point where answers no longer revealed new information. We hope that the initial list was thorough enough to provide a complete cross section of visitors to Wallowa County; however, some smaller or private operations may not have been contacted.

Table 16: Respondents' Lodging Types

Type	Hotel/Motel	B&B	Resort	Cabins/Homes	RV
# of Respondents	9	9	3	5	6

Table 17: Respondents' Locations

Location	Enterprise	Joseph	Inmaha	Wallowa
# of Respondents	8	20	1	3

Hotel and campsite operators were contacted by phone and were asked to share about five minutes of their time to answer about ten questions (included in the Appendix with responses). Responses revealed the following:

1. There is a great variety of lodging types available, which suggests a variety of types of visitors. We spoke with people who operated hotels, motels, lodges, campgrounds, and RV campgrounds. Many businesses offered a mix of accommodations, for instance some cabins and some tent pitches.
2. There is a wide range in the age of the businesses, from two to 86 years in operation, but only a few respondents were able to gauge their answers over a long period of time (more than 5 years). Some respondents were new to the business while other businesses had recently changed hands. Most respondents were only able to discuss recent changes to their business and the county (less than 5 years).
3. Respondents reported summer to be their busy season, with one exception. For most, the busy season began after Memorial Day and ended in September with some residual business extending into October and November. Slightly more than half of respondents reported being open year round. The rest opened only during summer. Only two respondents noted an increase in business in winter (January & February).
4. Respondents reported local events having a discernible effect on their business. Some operators reported increased business in years when seasonal work projects brought more laborers, such as road workers or loggers. Local festivals such as Chief Joseph Days also brought a high demand.
5. Only two respondents indicated they use any formal mechanism for gathering information from visitors. Others gather information through conversation.
6. Accommodations ranged from a bed & breakfast offering two rooms to a 48 unit campsite. One respondent operated a rental agency that managed 11 cabins and some private homes.
7. Respondents indicated a wide range of "average seasonal occupancies," from 45-100%. Some indicated being full frequently while others reported being full on weekends but spotty during the week.

8. Respondents indicated that visitors have a wide range of hometowns and reasons for traveling. Travelers included retirees, adventure-seekers, workers (government & seasonal laborers), & motorcyclists.
9. There were no discernible county-wide changes in the types of travelers visiting the county in recent times. Some respondents indicated that travelers had seemed to be younger, more outdoors-oriented, or from different hometowns in recent years, but no patterns held constant for a majority of the respondents.

Lodging operators are uniquely positioned to provide a wealth of information on seasonal population. This quick survey revealed several issues, but a more thorough analysis would illuminate more.

Resident Data from Realtors

Similar to hotel and campsite operators, realtors are uniquely positioned to provide information on not just the number of people in Wallowa County but their reasons for coming, going, and staying. We conducted brief interviews with three local real estate agents. Two of the three indicated they had noticed primarily retirees and absentee owners buying homes in Wallowa and staying 7 or fewer months of the year in the last five years, while the third indicated noticing a mix of buyers who mostly stay full time in the county. About 150 homes are currently for sale in the county, a slight increase over recent years. Two agents indicated that buyers are attracted to the small, rural community, the natural amenities, low crime rate, and good schools. Most buyers are from the Pacific Northwest, especially nearby cities such as Bend, Portland, Boise and Seattle. Most buyers would like somewhere between 1 and 10 acres, but not all can afford it. This quick survey seems to confirm the presence of natural amenity migrants, but more research is needed. Real estate agents may be able to offer a wealth of information that would help Wallowa County plan.

Other Data

Data from local power companies, sewage disposal companies, event organizers and the assessor may prove helpful as well. Attempts were made to contact the local sewer providers. The local sewer provider information was obtained from the Wallowa County Chamber of Commerce website. The water and sewer providers are the individual cities within Wallowa County (Enterprise, Joseph, Lostine, Wallowa, Wallowa Lake). None of the cities responded to voicemail messages left for them. It is anticipated that this data is available from the individual cities and could be obtained. The data could be a useful indicator of seasonal population increases depending on the number of users and the amount of sewage disposed of on a temporal scale (weekly, monthly, etc.). Attempts were also made to contact Pacific Power. After two attempts to contact by phone and once by email, Pacific Power responded with an email saying that the data is not available. Due to time constraints, we were not able to request or obtain any further data.

III. Summary and Conclusion

The difficulty with analyzing population predictions, methodologies, and assumptions is the lack of availability of multiple projections, especially past projections. It was not possible to analyze these projections because of the lack of available actual population counts. This may be a problem, because actual counts are only taken every ten years with the Census. Other than the lack of available data, we are able to recommend that the county consider using the US Census

or Office of Economic Analysis' population projections, which both use the cohort-component method.

It appears that during times of economic hardship rural counties lose a portion of their population to urban counties. Alternatively, the focus on natural resource protection and amenity migration will result in population increases for rural counties. We recommend that Wallowa County work with Powell and Lemhi County, and other comparable counties, to determine appropriate growth management strategies and incorporate these strategies into Wallowa's comprehensive plan.

Several issues arise from the analysis of seasonal population data. First, there is clearly a peak of population in summer, but it is not clear who travelers are, where they are coming from, and what has attracted them to Wallowa. There appear to be a strong mix of individuals and interests. There is a particular lack of data on travelers occupying private homes. Second, hotel and camp site operators can provide qualitative data not captured by other measurements, but they are not currently set up to do so. Instituting a county wide survey would help operators to understand their clientele and help county officials to understand seasonal population changes.

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http://factfinder.census.gov/servlet/GCTTable?_bm=y&-ds_name=DEC_2000_SF1_U&-CONTEXT=gct&-mt_name=DEC_2000_SF1_U_GCTPH1_US9&-redoLog=false&-_caller=geoselect&-geo_id=&-format=US-25|US-25S&-_lang=en

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<http://www.census.gov/popest/archives/1980s/>

US Census Bureau County Population Estimates for 1990s
<http://www.census.gov/popest/archives/1990s/>

US Census Bureau Definition of Cohort-Component Method <http://www.census.gov/population/www/projections/cohortcomponentmethod.html>

US Census Bureau. Methodology for the State and County Total Resident Population Estimates: April 1, 2000 to July 1, 2008.
<http://www.census.gov/popest/topics/methodology/2008-st-co-meth.pdf>

Wallowa County Chamber of Commerce
http://www.wallowacountychamber.com/community/relocate_serv.php

Appendix A

Historical Traffic Data for ATR 31-005 (<http://www.oregon.gov/ODOT/TD/TDATA/tsm/tvt.shtml>)

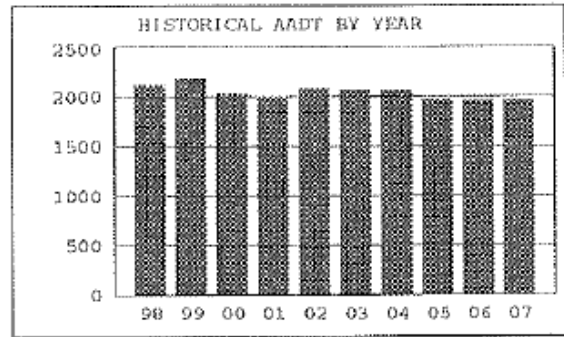
Location: OR82 MP 20.70, WALLOWA LAKE HIGHWAY, NO. 10
0.45 mile northeast of Weston-Elgin Hwy (OR204)

Recorder:
Installed:

ELGIN, 31-005
April, 1997

HISTORICAL TRAFFIC DATA

Year	Average Daily Traffic	Percent of ADT				
		Max Day	Max Hour	10TH Hour	20TH Hour	30TH Hour
1998	2119	172	16.9	13.6	13.3	12.8
1999	2181	189	19.3	15.3	14.7	14.0
2000	2031	199	19.3	15.8	14.7	13.9
2001	1984	192	19.7	15.6	14.6	14.0
2002	2087	185	18.8	15.5	14.7	13.9
2003	2070	193	27.8	16.2	15.1	14.2
2004	2060	177	17.3	13.6	13.0	12.4
2005	1972	183	19.9	14.8	14.0	13.6
2006	1955	190	20.0	14.4	13.9	13.5
2007	1959	195	22.0	15.3	14.4	13.9



2007 TRAFFIC DATA

Month	Average Weekday Traffic	Percent of ADT	Average Daily Traffic	Percent of ADT	Classification Breakdown of ADT	
					Classification	Percent of ADT
January	1552	79	1470	75	Passenger Cars	49.3
February	1613	82	1575	80	Other 2 axle 4 tire vehicles	38.5
March	1641	84	1671	85	Single Unit 2 axle 6 tire	2.0
April	1733	88	1762	90	Single Unit 3 axle	2.5
May	1940	99	2006	102	Single Trailer Truck 4 axle or less	1.5
June	2248	115	2330	119	Single Trailer Truck 5 axle	2.5
July	2516	128	2684	137	Single Trailer Truck 6 axle or more	2.0
August	2506	128	2628	134	Dbl-Trailer Truck 5 axle or less	0.0
September	2329	119	2406	123	Dbl-Trailer Truck 6 axle	0.2
October	1977	101	2004	102	Dbl-Trailer Truck 7 axle or more	1.0
November	1652	84	1669	85	Triple Trailer Trucks	0.1
December	1326	68	1302	66	Buses	0.4
					Motorcycles & Scooters	0.2

Appendix B

Traffic Data for ATR 31-005 January 2005 - February 2009 (<http://www.oregon.gov/ODOT/TD/TDATA/tsm/trendspage.shtml>)

	2005	2006	2007	2008	2009	
January		1492	1443	1471	1206	1274
February		1755	1623	1576	1384	1451
March		1691	1613	1672	1476	
April		1721	1653	1763	1517	
May		1995	1967	2007	1744	
June		2260	2444	2331	2044	
July		2715	2677	2685	2429	
August		2528	2509	2629	2307	
September		2295	2308	2407	2184	

October	2010	2146	2005	1983
November	1766	1742	1670	1475
December	1450	1550	1303	1207

Appendix C

Hotel and Campsite Questionnaire