

# TECHNICAL MEMORANDUM



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## TM 3.5 – Population Projections

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City of Bend, Oregon  
Engineering Division

**Date:** Final -March 14, 2007

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Attachment A - Deschutes County Coordinated Population Forecast - 2000 – 2025

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**INTRODUCTION**

The City of Bend (City) sanitary sewer collection system was constructed in the early 1980’s. The system provided gravity sanitary sewer service to much of the developed city. Since that time, the population of the City has grown from

The City has grown from a population of 17,300 in 1980 to 70,330 in 2005. Over this period the wastewater collection system has been expanded as areas are developed. These expansions have connected to the original core system. Much of this sanitary sewer expansion has incorporated either pump stations to avoid deep sewer construction or use of pressure sewer systems which can also be constructed in much shallower trenches. All new sewers were oriented to discharge to the core area and ultimately flow through the plant interceptor to the Wastewater Reclamation Facility. This has created two major issues that, unless corrected will cause problems with future sanitary sewer service.

**HISTORICAL POPULATION**

Population growth occurs through births, migration into the City and through annexation. The population of the City has grown dramatically between 1970 and 2005. The historical population for the City is summarized in *Table 1*. This data shows that the population growth was fairly low between 1970 and 1990 averaging 2.05%. The rate of population growth has increased dramatically since 1990 with an average annual growth rate (AAGR) 5.33%. The average growth rates for various historical periods are shown in *Table 2*. This information is shown graphically in *Figure 1*. This figure clearly shows that high rate of growth that has occurred over the past 15-years.

Table 2  
 City of Bend  
 Average Rate of Growth

Period	AAGR
1970-2003:	3.34%
1980-2003:	3.76%
1990-2003:	5.33%

Table 1  
City of Bend  
Historical Population Data<sup>1</sup>

Year	Population	Persons Annexed	Net Natural and Migration Change	Annual Percent Change
70	13,710	0	390	2.84%
71	14,100	0	430	3.05%
72	14,530	0	1,030	7.09%
73	15,560	0	640	4.11%
74	16,200	0	(400)	-2.47%
75	15,800	0	200	1.27%
76	16,000	0	500	3.13%
77	16,500	0	(350)	-2.12%
78	16,150	0	600	3.72%
79	16,750	0	550	3.28%
80	17,300	0	125	0.72%
81	17,425	0	375	2.15%
82	17,800	0	40	0.22%
83	17,840	0	430	2.41%
84	18,270	0	180	0.99%
85	18,450	0	125	0.68%
86	18,575	0	125	0.67%
87	18,700	0	270	1.44%
88	18,970	0	755	3.98%
89	19,725	0	744	3.77%
90	20,469	351	1,685	8.23%
91	22,505	1,210	1,000	4.44%
92	24,715	1,755	1,085	4.39%
93	27,555	0	1,870	6.79%
94	29,425	24	1,181	4.01%
95	30,630	17	1,573	5.14%
96	32,220	53	1,467	4.55%
97	33,740	1	1,894	5.61%
98	35,635	13,649	1,366	3.83%
99	50,650	0	2,150	4.24%
00	52,800	0	2,280	4.32%
01	55,080	0	2,670	4.85%
02	57,750	0	5,150	8.92%
03	62,900	0	-	-

<sup>1</sup> From August 25, 2004 Deschutes County Coordinated Population Forecast 2000 - 2025

## POPULATION PROJECTIONS

The historical population growth provides an explanation of how the wastewater flows have increased in the system over time. The high rate of growth over the past 15-years provides insight into the reasons why there are capacity deficiencies in the existing system.

Projecting future population growth is critical to the planning of future infrastructure for the City. The rate at which the City’s population grows and the specific areas that growth will be

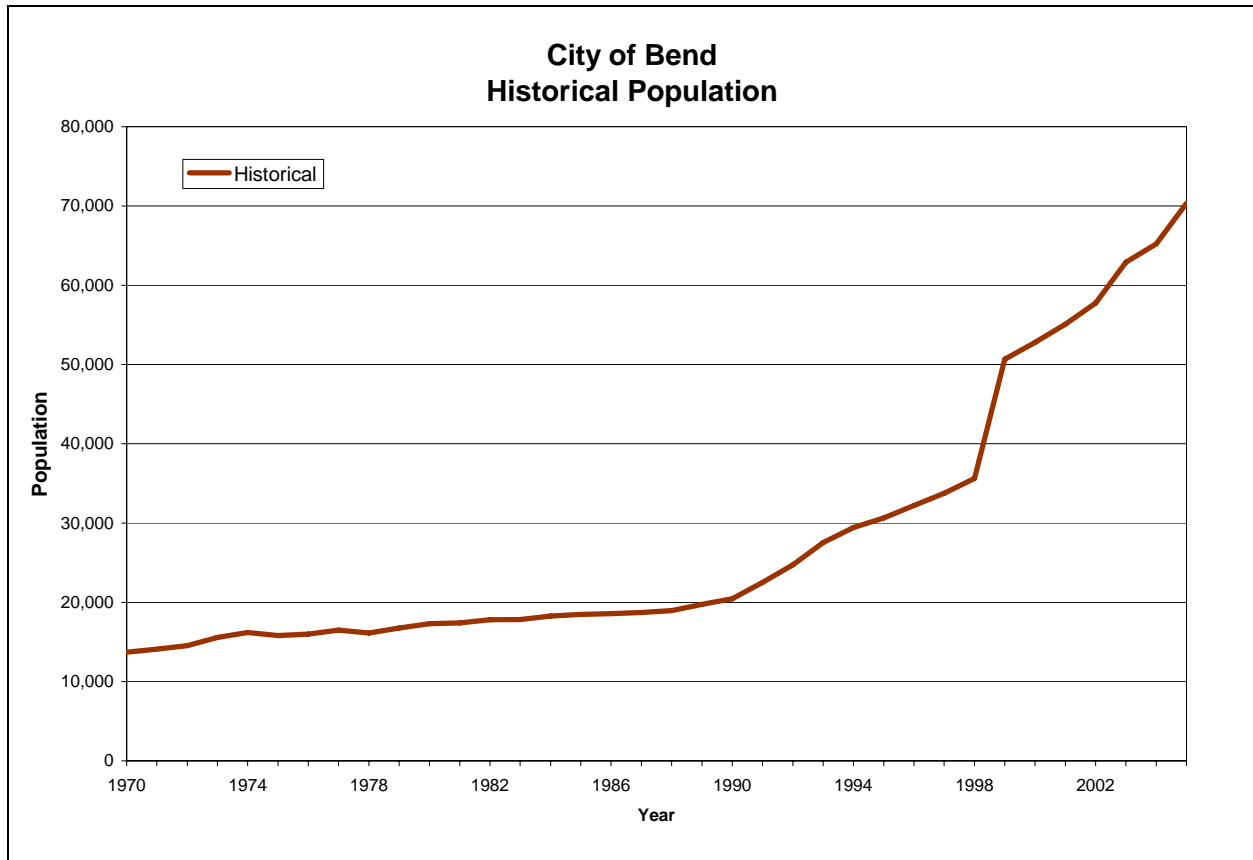


Figure 1 – Historical Population

occurring will determine when and where the investment in future infrastructure must be made. In addition, an understanding of the rate of growth will be essential in the development of financing strategies for the new projects.

The formal planning document that was developed in a concerted effort between the City, Deschutes County and the State of Oregon is the Deschutes County Coordinated Population Forecast – 2000 – 2025. This study was completed on August 24, 2004. A copy of this document is provided in *Attachment A*. This document provides the official population forecast that must be used in infrastructure planning. This study presented population projections for the period between 2000 and 2025. The 2030 projected population used in this study used the same AAGR for the period 2026 – 2030 that the study used for the period 2020 – 2025. The official population projections for the City are summarized in *Table 3*. These projections combined with the historical population from 1970 to 2005 are shown graphically in *Figure 2*.

Table 3  
 City of Bend  
 Population Projections

Year	Population
2000	52,800
2005	69,004
2010	81,242
2015	91,158
2020	100,646
2025	109,389
2030	119,009

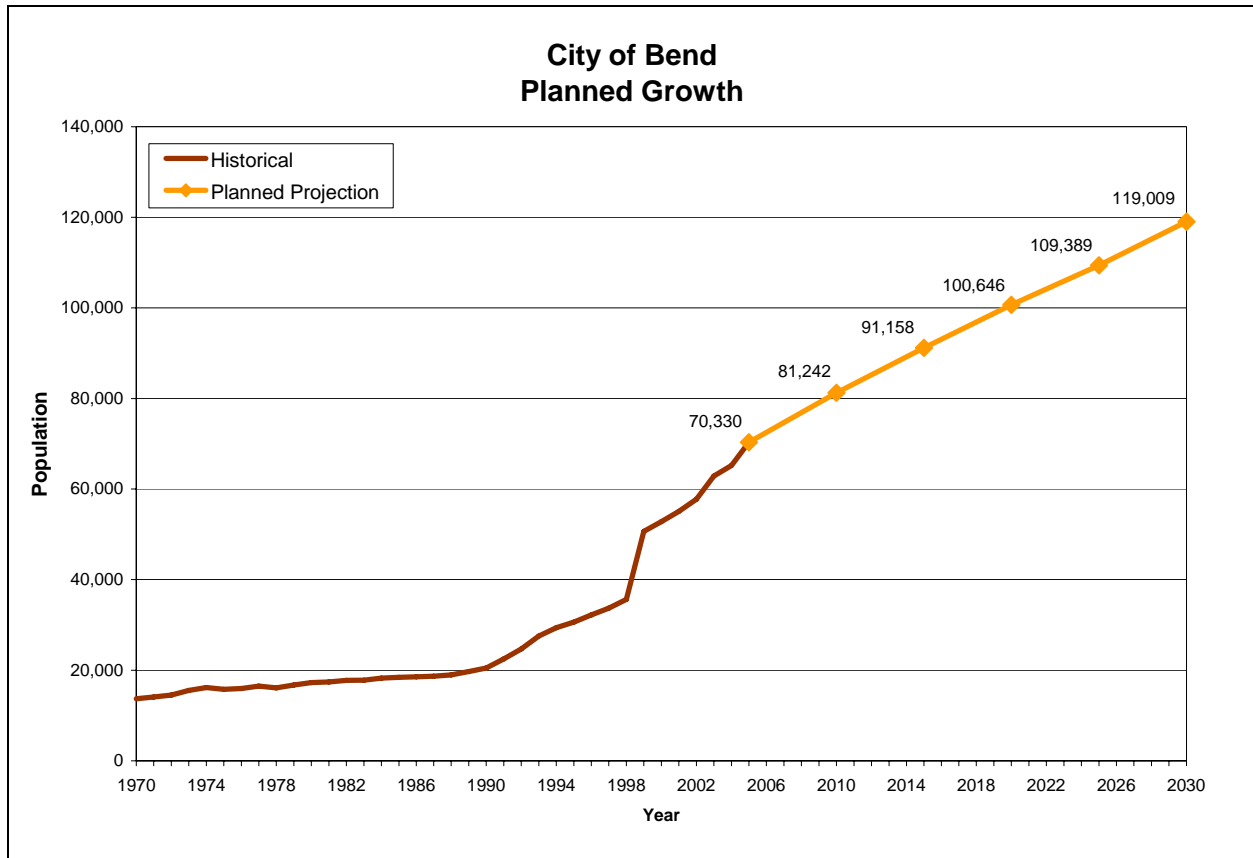


Figure 2 – Planned Growth

As shown graphically in *Figure 2*, the planned population growth projects a slowing rate of growth for the City. To provide an understanding of the future populations that will require service if the rate of growth continues at a high rate, two additional growth scenarios were developed. The first was for the AAGR to continue at a rate of 5% per year through 2015 and then follow the planned growth rate. The second was for the AAGR to continue at a rate of 5% per year through 2030.

The first scenario of a 5% growth through 2015 and then planned growth through 2030 is shown graphically in *Figure 3*. This growth scenario ends with a population of 149,414 at 2030, which is about 30,000 more people than in the planned growth scenario.

The second scenario of a 5% growth rate through 2030 is shown graphically in *Figure 4*. This growth scenario ends with a population of 238,162 which is 119,000 more than the planned growth scenario.

## POPULATION AND FLOWS BY STUDY AREA

The study area has been divided into nine study areas to simplify the presentation of Master Plan. These study areas have been developed around current and future sewer drainage basins. The nine study areas are shown in *Figure 5*. This analysis determines population growth by study area.

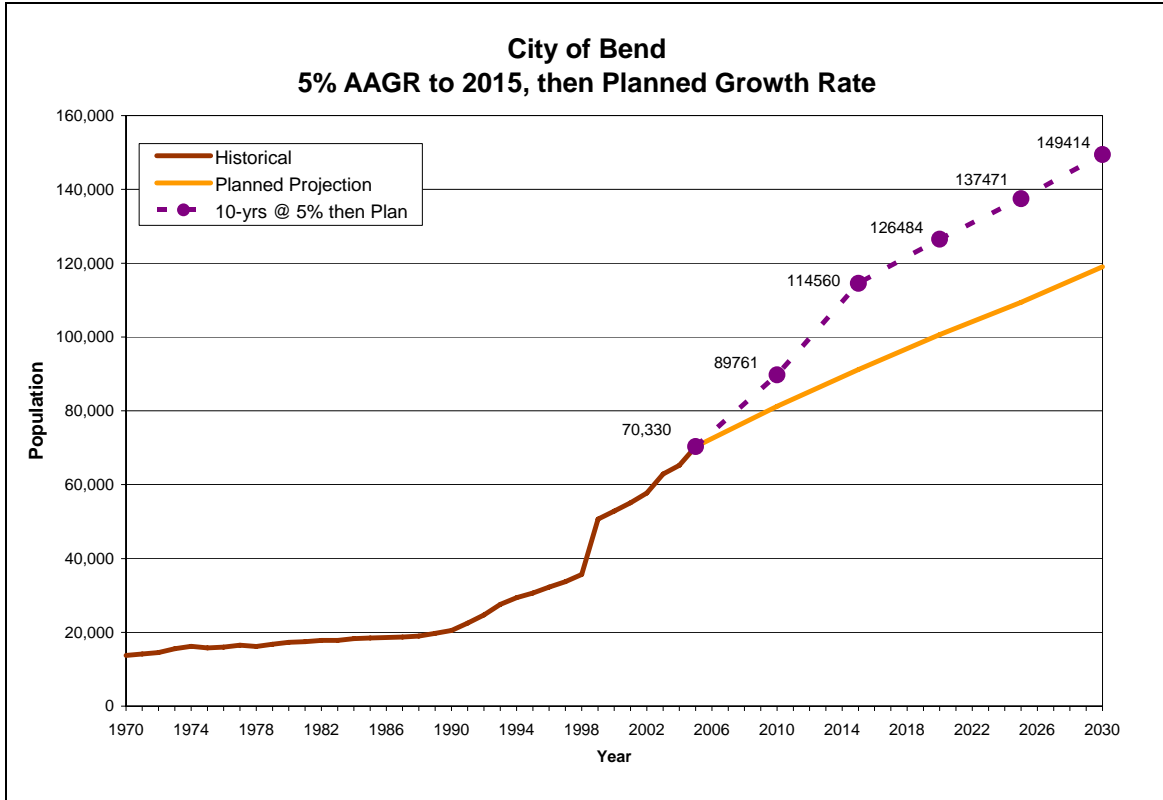


Figure 3 – 5% AAGR to 2015, then Planned Growth Rate

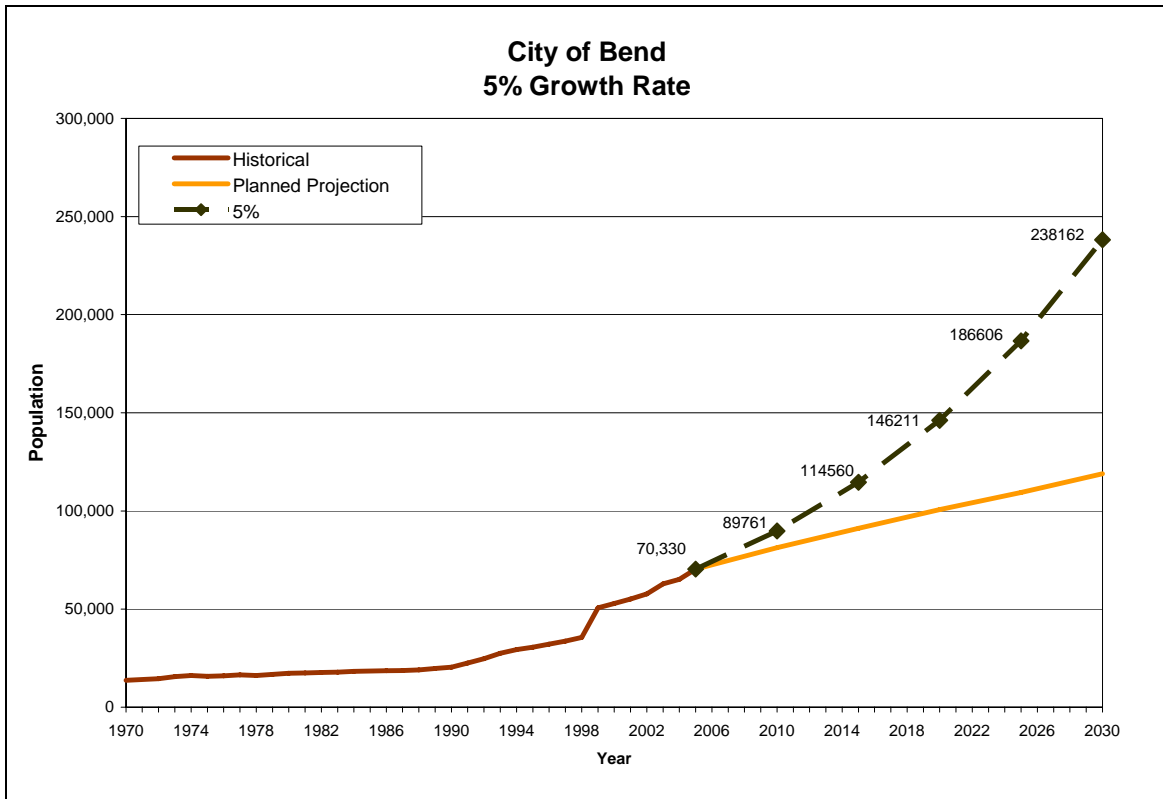


Figure 4 – 5% AAGR

Population tends to grow in the areas where utilities are provided. Sanitary service is one of those utilities. Growth can occur in areas where there is no sanitary service by the new residence using a septic tank. Currently much of the City is on septic tank in areas that sanitary service has not yet been installed. An analysis was performed on the May 2005 tax database and sanitary billing records to determine the parcels that sanitary service was and was not provided. The population served and unserved is shown in **Table 4** by Study Area. This analysis shows that the areas with the highest populations on septic tank are Study Areas 7, 8 and 9.

**Table 4** also provides another interesting piece of data. The base flow for the population served is 4.45-mgd. The base flow for the population that is unserved was 1.12-mgd. This analysis shows that if the current unserved population were to receive sanitary service, the system flows would increase by 25%.

Table 4  
 City of Bend  
 Distribution of Sanitary Service  
 May 2005 in UGB

Study Area	Served		Unserved	
	Population	Flow (gpd)	Population	Flow (gpd)
1	5	400	18	1400
2	12432	994600	422	33800
3	4213	337000	1062	85000
4	362	29000	560	44800
5	3872	309800	878	70200
6	5455	436400	1042	83400
7	3562	285000	4095	327600
8	7592	607400	3775	302000
9	18078	1446200	2127	170200
<b>Total (mgd)</b>	<b>55571</b>	<b>4.45</b>	<b>13979</b>	<b>1.12</b>

Notes:

1. Base flows are in units of gallons per day (gpd)
2. Total flows are in million gallons per day (mgd)

The population of each study area was calculated as of May 2005 and at build-out for each of the Study Areas. Two sets of data were developed. The first was to determine the current and potential population and flows for each Study Area for the current UGB only. This information is summarized in **Table 5**. The second was to determine the build-out population and flows for each Study Area for both the UGB and UAR. This information is summarized in **Table 6**. This analysis shows that the base wastewater flow at build-out is estimated to be 13.41-mgd for the existing UGB area and 19.06-mgd for the UGB and UAR planning area.

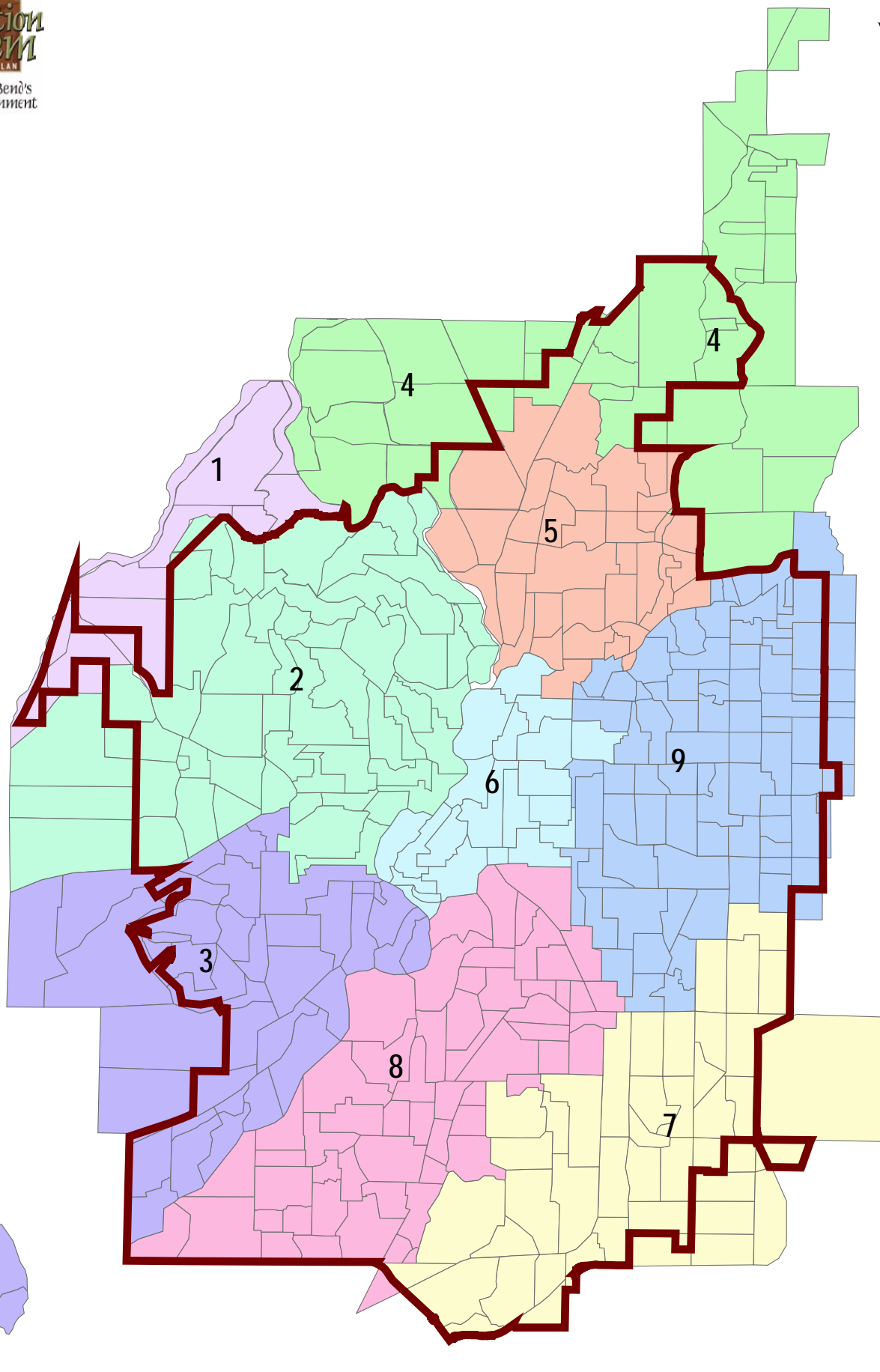
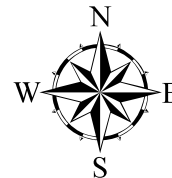


FIGURE 5  
PLANNING STUDY AREAS



Table 5  
2005 and Build-out Population and Flows  
UGB Only

Study Area	2005		Build-out	
	Population	Base Flow (gpd)	Population	Base Flow (gpd)
1	23	1800	1325	0.11
2	12855	1028400	35869	2.87
3	5275	422000	16371	1.31
4	922	73800	2375	0.19
5	4750	380000	10948	0.88
6	6497	519800	11866	0.95
7	7657	612600	21517	1.72
8	11368	909400	26011	2.08
9	20205	1616400	41346	3.31
<b>Total (mgd)</b>	<b>69552</b>	<b>5.56</b>	<b>167628</b>	<b>13.41</b>

Notes:

1. Base flows are in units of gallons per day (gpd)
2. Total flows are in million gallons per day (mgd)

Table 6  
2005 and Build-out Population and Flows  
UGB and UAR

Study Area	2005		Build-out	
	Population	Base Flow (mgd)	Population	Base Flow (mgd)
1	23	0.002	10382	0.83
2	12855	1.028	43606	3.49
3	5275	0.422	31096	2.49
4	922	0.074	27529	2.20
5	4750	0.380	10949	0.88
6	6497	0.520	11867	0.95
7	7657	0.613	31434	2.51
8	11368	0.909	26307	2.10
9	20205	1.616	45100	3.61
<b>Total</b>	<b>69552</b>	<b>5.56</b>	<b>238270</b>	<b>19.06</b>

Notes:

1. Flows are in million gallons per day (mgd)

## POPULATION PROJECTIONS BY STUDY AREA

An analysis of the population projection for each study area was performed to determine the potential population of each study area under each of the three planning scenarios. These three scenarios were:

- Planned Growth Rate through 2030
- 5% through 2015 and then Planned Growth Rate through 2030
- 5% Growth Rate through 2030

The results of each of these projections is discussed in the following sections,

### **Planned Growth Rate through 2030**

The planned growth rate is based on the Deschutes County Coordinated Population Forecast provided in **Attachment A**. In this forecast, the AAGR is 3.52% between 2005 and 2010, 2.33% between 2011 and 2015, 2.00% between 2016 and 2020 and 1.68% between 2021 and 2025. The 1.68% AAGR was assumed for the period 2026 and 2030 for this analysis.

The planned growth rates were applied to the 2005 population in each study area shown in **Table 5**. The population in each of the Study Areas was then increased at the planned growth rate. The results of this analysis are shown in **Table 7**. At this growth rate, none of the Study areas reached the build-out population by 2030.

### **5% through 2015 and then Planned Growth Rate through 2030**

This analysis assumed that the current 5% AAGR continued through 2015, then slowed to the planned growth rate through 2030. This growth strategy was applied to the 2005 population in each study area shown in **Table 5**. The population in each of the Study Areas was then increased at the planned growth rate. The results of this analysis are shown in **Table 8**. At this growth rate, none of the Study areas reached the build-out population by 2030.

### **5% Growth Rate through 2030**

This analysis assumed that the current 5% AAGR continued through 2030. This growth strategy was applied to the 2005 population in each study area shown in **Table 5**. The population in each of the Study Areas was then increased at the planned growth rate. All but Study Area 1 reached the build-out population prior to 2030. In this analysis, when a Study Area reached build-out, the growth was distributed across the remaining Study Areas. The results of this analysis are shown in **Table 9**. The study areas that have reached their build-out population are highlighted.

Table 7  
City of Bend  
Population Growth by Study Area  
Planned Growth Rate through 2030

Year	Growth Rate	Study Area									Total
		1	2	3	4	5	6	7	8	9	
2005	3.52	22	12304	5275	923	4750	6498	7660	11367	20205	69004
2006	3.52	23	12737	5461	955	4917	6727	7930	11767	20916	71433
2007	3.52	24	13185	5653	989	5090	6964	8209	12181	21652	73947
2008	3.52	24	13650	5852	1024	5269	7209	8498	12610	22415	76550
2009	3.52	25	14130	6058	1060	5455	7462	8797	13054	23204	79245
2010	2.52	26	14486	6211	1087	5592	7650	9019	13383	23788	81242
2011	2.33	27	14824	6355	1112	5723	7829	9229	13695	24343	83135
2012	2.33	27	15169	6503	1138	5856	8011	9444	14014	24910	85072
2013	2.33	28	15522	6655	1164	5993	8198	9664	14340	25490	87054
2014	2.33	28	15884	6810	1192	6132	8389	9889	14675	26084	89082
2015	2.33	29	16254	6969	1219	6275	8584	10119	15016	26692	91158
2016	2.00	30	16579	7108	1244	6401	8756	10322	15317	27226	92981
2017	2.00	30	16911	7250	1269	6529	8931	10528	15623	27770	94841
2018	2.00	31	17249	7395	1294	6659	9110	10739	15936	28326	96738
2019	2.00	31	17594	7543	1320	6792	9292	10953	16254	28892	98672
2020	2.00	32	17946	7694	1346	6928	9478	11172	16579	29470	100646
2021	1.68	33	18247	7823	1369	7045	9637	11360	16858	29965	102337
2022	1.68	33	18554	7955	1392	7163	9799	11551	17141	30469	104056
2023	1.68	34	18866	8088	1415	7283	9963	11745	17429	30980	105804
2024	1.68	34	19183	8224	1439	7406	10131	11942	17722	31501	107582
2025	1.68	35	19505	8362	1463	7530	10301	12143	18020	32030	109389
2026	1.68	35	19833	8503	1488	7656	10474	12347	18322	32568	111227
2027	1.68	36	20166	8646	1513	7785	10650	12554	18630	33115	113095
2028	1.68	37	20505	8791	1538	7916	10829	12765	18943	33672	114995
2029	1.68	37	20849	8938	1564	8049	11011	12980	19261	34237	116927
2030	1.68	38	21199	9089	1590	8184	11196	13198	19585	34813	118892
<b>Build-out</b>		10382	43606	31096	27529	10949	11867	31434	26307	45100	238270

Table 8  
City of Bend  
Population Growth by Study Area  
5 Percent Growth Through 2015, then Planned Growth Rate Through 2030

Year	Growth Rate	Study Area									Total
		1	2	3	4	5	6	7	8	9	
2005	3.52	22	12304	5275	923	4750	6498	7660	11367	20205	69004
2006	3.52	23	12919	5539	969	4988	6823	8043	11935	21215	72454
2007	3.52	24	13565	5816	1018	5237	7164	8445	12532	22276	76077
2008	3.52	25	14243	6106	1068	5499	7522	8867	13159	23390	79881
2009	3.52	27	14956	6412	1122	5774	7898	9311	13817	24559	83875
2010	2.52	28	15703	6732	1178	6062	8293	9776	14507	25787	88069
2011	2.33	29	16489	7069	1237	6365	8708	10265	15233	27077	92472
2012	2.33	31	17313	7422	1299	6684	9143	10778	15995	28430	97096
2013	2.33	33	18179	7794	1364	7018	9601	11317	16794	29852	101950
2014	2.33	34	19088	8183	1432	7369	10081	11883	17634	31345	107048
2015	2.33	35	19532	8374	1465	7541	10315	12160	18045	32075	109542
2016	2.00	36	19923	8541	1495	7691	10522	12403	18406	32716	111733
2017	2.00	36	20321	8712	1524	7845	10732	12651	18774	33371	113968
2018	2.00	37	20728	8886	1555	8002	10947	12904	19149	34038	116247
2019	2.00	38	21142	9064	1586	8162	11166	13162	19532	34719	118572
2020	2.00	39	21565	9245	1618	8325	11389	13426	19923	35413	120943
2021	1.68	39	21928	9401	1645	8465	11580	13651	20258	36008	122975
2022	1.68	40	22296	9559	1673	8607	11775	13881	20598	36613	125041
2023	1.68	41	22691	9728	1702	8760	11867	14127	20963	37262	127141
2024	1.68	41	23112	9908	1734	8922	11867	14388	21352	37953	129277
2025	1.68	42	23539	10092	1766	9087	11867	14655	21747	38655	131450
2026	1.68	43	23974	10278	1798	9255	11867	14925	22148	39369	133658
2027	1.68	44	24416	10468	1832	9426	11867	15200	22557	40095	135903
2028	1.68	44	24865	10660	1865	9599	11867	15480	22972	40833	138187
2029	1.68	45	25322	10856	1900	9776	11867	15765	23394	41583	140508
2030	1.68	46	25787	11055	1934	9955	11867	16054	23823	42346	142868
<b>Build-out</b>		<b>10382</b>	<b>43606</b>	<b>31096</b>	<b>27529</b>	<b>10949</b>	<b>11867</b>	<b>31434</b>	<b>26307</b>	<b>45100</b>	<b>238270</b>

Table 9  
City of Bend  
Population Growth by Study Area  
5 Percent Growth Rate Through 2030

Year	Growth Rate	Study Area									Total
		1	2	3	4	5	6	7	8	9	
2005	5.00	22	12304	5275	923	4750	6498	7660	11367	20205	69004
2006	5.00	23	12919	5539	969	4988	6823	8043	11935	21215	72454
2007	5.00	24	13565	5816	1018	5237	7164	8445	12532	22276	76077
2008	5.00	25	14243	6106	1068	5499	7522	8867	13159	23390	79881
2009	5.00	27	14956	6412	1122	5774	7898	9311	13817	24559	83875
2010	5.00	28	15703	6732	1178	6062	8293	9776	14507	25787	88069
2011	5.00	29	16489	7069	1237	6365	8708	10265	15233	27077	92472
2012	5.00	31	17313	7422	1299	6684	9143	10778	15995	28430	97096
2013	5.00	33	18179	7794	1364	7018	9601	11317	16794	29852	101950
2014	5.00	34	19088	8183	1432	7369	10081	11883	17634	31345	107048
2015	5.00	36	20042	8592	1503	7737	10585	12477	18516	32912	112400
2016	5.00	38	21044	9022	1579	8124	11114	13101	19441	34557	118020
2017	5.00	40	22096	9473	1658	8530	11669	13756	20413	36285	123921
2018	5.00	42	23276	9979	1746	8986	11867	14491	21504	38223	130113
2019	5.00	44	24556	10528	1842	9480	11867	15288	22686	40325	136617
2020	5.00	46	25902	11105	1943	10000	11867	16126	23929	42535	143453
2021	5.00	49	27314	11710	2049	10545	11867	17004	25234	44853	150624
2022	5.00	54	30045	12881	2254	10949	11867	18705	26307	45100	158162
2023	5.00	60	33759	14473	2532	10949	11867	21017	26307	45100	166064
2024	5.00	67	37661	16146	2825	10949	11867	23446	26307	45100	174369
2025	5.00	75	41759	17903	3133	10949	11867	25997	26307	45100	183089
2026	5.00	86	43606	20680	3618	10949	11867	30030	26307	45100	192243
2027	5.00	115	43606	27638	4836	10949	11867	31434	26307	45100	201853
2028	5.00	270	43606	31096	11316	10949	11867	31434	26307	45100	211945
2029	5.00	516	43606	31096	21669	10949	11867	31434	26307	45100	222544
2030	5.00	5784	43606	31096	27529	10949	11867	31434	26307	45100	233672
<b>Build-out</b>		<b>10382</b>	<b>43606</b>	<b>31096</b>	<b>27529</b>	<b>10949</b>	<b>11867</b>	<b>31434</b>	<b>26307</b>	<b>45100</b>	<b>238270</b>

**Attachment A**  
**Deschutes County Coordinated Population Forecast**  
**2000 – 2025**



EXHIBIT E  
*August 2004 Draft*

**DESCHUTES COUNTY  
COORDINATED POPULATION FORECAST  
2000 – 2025**

Findings In Support of Forecast

*August 25, 2004  
Board of County Commissioners Public Hearing Draft*

*A COOPERATIVE PROJECT OF:*

**Deschutes County  
City of Bend  
City of Redmond  
City of Sisters  
Oregon Department of Land Conservation and Development**

## EXECUTIVE SUMMARY

This report presents the results and findings in support of a coordinated population forecast for Deschutes County and the cities of Bend, Redmond, and Sisters from the year 2000 to the year 2025. The following table presents the forecast for each jurisdiction and the entire County as of July 1 for each five-year period:

Deschutes County 2000-2025 Coordinated Population Forecast					
Year	Bend UGB	Redmond UGB	Sisters UGB	Unincorp. County	Total County
2000	52,800	15,505	975	47,320	116,600
2005	69,004	19,249	1,768	53,032	143,053
2010	81,242	23,897	2,306	59,127	166,572
2015	91,158	29,667	2,694	65,924	189,443
2020	100,646	36,831	3,166	73,502	214,145
2025	109,389	45,724	3,747	81,951	240,811

The forecast report provides background information on sources of population data and methods for forecasting population. It presents a summary of population data that describes changes in the population of the County and the three cities from 1980 to 2002. The report also compares the above forecast with a draft population forecast for Deschutes County prepared by the State of Oregon Office of Economic Analysis in January of 2003.

Deschutes County and each city decided to update the coordinated population forecast because the results of the 2000 Census and subsequent population estimates from Portland State University and the Census Bureau showed the County's population growing faster than anticipated under a 1998 coordinated population forecast. Each jurisdiction prepared its own population forecast. The sum of the four forecasts is the coordinated population forecast for the entire County.

The city of Bend used historic growth rates (1980 to 1998) and annualized population growth rates developed by the State of Oregon Office of Economic Analysis to develop its forecast. Bend estimates a population of 109,389 residing in the city's urban growth boundary (UGB) by the year 2025.

The city of Redmond forecasted population growth using an average annual increase of population based on past population growth trends. Redmond forecasts a population of 45,724 people in its UGB by the year 2025.

The city of Sisters forecasted population within its urban growth boundary using a combination of OEA growth rates and projected building permit activity. Sisters estimates that a population of 3,747 people will reside in its UGB by the year 2025.

The County considered three alternative forecasts for the unincorporated area. The selected forecast is based upon the historic 2.2 percent average annual growth rate to forecast population growth from 2003 through 2025. By the year 2025, the County estimates 81,951 people could reside in the unincorporated areas of Deschutes County.



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## HISTORY

The 1995 Oregon Legislature recognized a need for local consistency in population forecasting and for a coordinated statewide total by adding a statute requiring counties to:

*...establish and maintain a population forecast for the entire area within its boundary for use in maintaining and updating comprehensive plans, and shall coordinate the forecast with the local governments within its boundary. [ORS 195.036]<sup>1</sup>*

The state Office of Economic Analysis (OEA), a division of the Department of Administrative Services, was designated as the main forecasting unit for the state of Oregon. In addition to preparing population and employment forecasts that could be used consistently by state agencies, the OEA was given the task to forecast population and employment changes for the state and each County. Oregon state planning law (ORS 197.295 – 197.296) requires cities to plan for needed housing to accommodate population growth in urban growth boundaries. ORS 197.712 also requires cities to ensure that sufficient land is available in urban growth boundaries for commercial development and economic growth.

The goal of this project is to develop a coordinated population forecast from the year 2000 to the year 2025. The city and County staff working on this project used draft forecasts (2002 and 2003) from OEA as benchmarks for evaluating the proposed forecast. There is no requirement in state law or administrative rule that the OEA forecast must be adopted and used by the County and cities. As an alternative to the OEA forecast, the jurisdictions (County and cities) can develop, justify, and come to a consensus on a population forecast to the Department of Land Conservation and Development. An adequate factual base must support such a forecast.

In January 1997, the OEA produced the first statewide coordinated population and employment forecast for all the counties through the year 2040. Later that year representatives from Deschutes County, Bend, Redmond, and Sisters – in cooperation with OEA – agreed upon a coordinated County population forecast through the year 2020.<sup>2</sup> Table 1 shows the 1997 OEA forecast for the total County population through 2025.

2000	2005	2010	2015	2020	2025
112,846	132,829	151,230	167,231	181,448	190,697

In 1998, the County planning staff coordinated with planning staff from the three cities and the staff of the OEA to develop a coordinated population forecast from 1995 to 2020. Table 2 presents the first County coordinated population forecast adopted by the Board of Commissioners in 1998. This same table appears in the County Comprehensive Plan as Table A of Chapter 23.16, Existing Conditions, of the plan.

<sup>1</sup> 1995 House Bill 2709

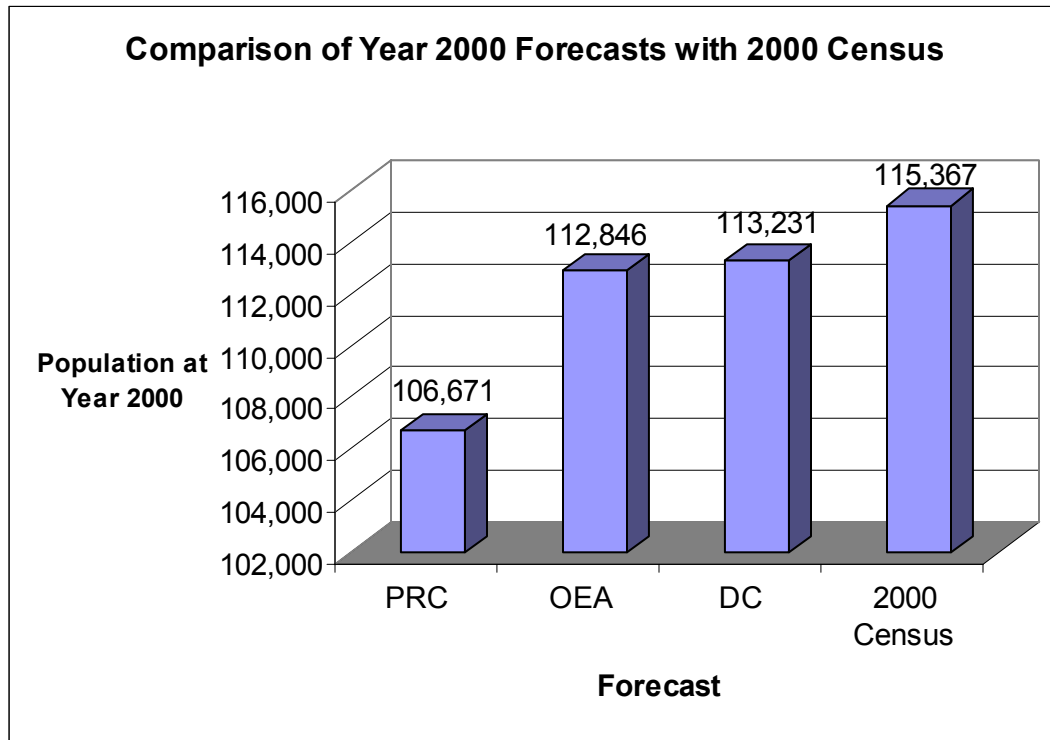
<sup>2</sup> These 1997 coordinated population numbers were adopted by the County through Ordinance 98-084 and incorporated into the County Comprehensive Plan. The City of Bend included the coordinated population numbers in its 1998 update to the Bend Area General Plan. Redmond adopted the forecast numbers into the 2001 update of the Redmond Comprehensive Plan.

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<b>Table 2</b>					
<b>1998 Deschutes County Coordinated Population Forecast</b>					
1990	2000	2005	2010	2015	2020
74,958	113,231	132,329	151,431	167,911	182,353

The rate of population growth in Deschutes County during the late 1990s and early 2000s was one of the highest in the state. In 1993, the Population Research Center (PRC) at Portland State University forecasted a population of 106,671 for the Deschutes County in 2000. By late 2000 the local planning staffs were aware that the actual population numbers for the County were exceeding the 1993 PRC forecast, the 1997 OEA forecast, and the County forecast prepared just two years earlier. The results of the 2000 Census, released in March of 2001, showed Deschutes County had a population of 115,367 people on April 1, 2000<sup>3</sup>. This census exceeded the OEA forecast for 2000 of 112,846 by 2,521 people or 2.2 percent. The PRC developed a July 1, 2000 population estimate of 116,600 for Deschutes County in the fall of 2000. In the fall of 2001, the PRC developed a July 1, 2001 population estimate of 122,050 for Deschutes County. *It was evident after the release of the 2000 Census data and the subsequent estimates of population for the County that population growth was occurring faster than contemplated under the previous forecasts of the PRC, OEA, and the County.* The following graph compares the previous forecasts with the results of the 2000 Census for Deschutes County.

**Figure 1**



**Sources:**

- PRC – Population Research Center, Portland State University (1993)
- OEA – Office of Economic Analysis, State of Oregon (1997)
- DC – Deschutes County (1998)

<sup>3</sup> Table DP-1. Profile of General Demographic Characteristics: 2000. For Deschutes County, Oregon. Bureau of the Census. [www.census.gov](http://www.census.gov).

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2000 Census – Results of 2000 Census for Oregon, Census Bureau (2001)

One of the goals of developing a population forecast is to see how past trends in the change of a population will translate into future changes. The population of the County grew dramatically since 1980, and due mostly to positive net migration. The population of a given area grows if it experiences more live births than deaths (natural increase)<sup>4</sup> and more people moving in than moving out (positive net migration)<sup>5</sup> of an area. The following data from the PRC shows the components of population change for the County since 1980:

<b>Table 3 Deschutes County Population Growth: 1980-2003<sup>6</sup></b>			
Time Period	Change	Natural Increase	Net Migration
1980 to 1989	8,458	4,465	3,993
	Percent	+53%	+47%
1990 to 1999	31,742	4,341	27,401
	Percent	+14%	+86%
2000 to 2003	15,133	1,744	13,359
	Percent	+12%	+88%
Total 1980-2003	54,501	10,406	43,695
	Percent	+19%	+81%

From 1980 to 1989, 53 percent of the change in the County's population was due to natural increase: the population grew as a result of the number of live births exceeding the number of deaths. Positive net migration contributed forty-seven (47) percent of the new population of the County during this same period. This trend changes in the 1990s as the population of the County has grown more by net migration. From 1990 to 1999, eighty-six (86%) percent of the increase in the County's entire population occurred due to positive net migration.

The County experienced a substantial increase in its population during the 1990s. According to data from the PRC, Deschutes County had the highest percent change in population of all the Oregon counties – almost 54 percent – between the 1990 Census and 2000 Census. In real numbers, the County had the fifth largest population increase, trailing only the three Portland metropolitan counties and Marion County.

This increase in population was fueled by population growth in all three cities and the unincorporated portions of the County. The following graph shows the population growth of the population of each jurisdiction starting from 1960:

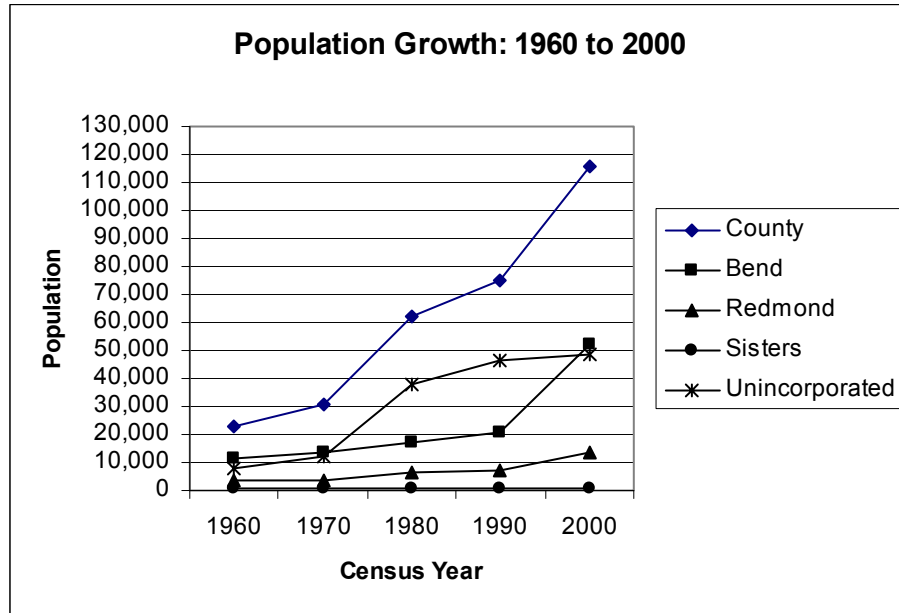
<sup>4</sup> Natural Increase: The surplus of births over deaths in a population in a given time period. See Haupt, Arthur, Population Reference Bureau's Population Handbook (4<sup>th</sup> ed.) (1998) [www.prb.org](http://www.prb.org).

<sup>5</sup> Net migration: the net effect of immigration and emigration on an area's population in a given time period, expressed as an increase or decrease. See Haupt (1998).

<sup>6</sup> Oregon Population Reports (1989), (1999), and (2003). Population Research Center, Portland State University



Figure 2



Source: Oregon Blue Books for 1995-1996 and 2003-2004. Reported Results Decennial Census.

## POPULATION DATA SOURCES AND FORECASTING METHODS

Several agencies or departments of the federal government and the State of Oregon collect and publish demographic and population data. This section discusses the sources of demographic and population data used to prepare the respective city and County population forecasts. This discussion includes a presentation of two methods of forecasting population that were used in developing the coordinated forecast.

### Data Sources

The Bureau of the Census (Census Bureau) enumerates the population of each state, city, and County on April 1 of each year ending in zero<sup>7</sup>. The most recent Census was taken on April 1, 2000. The Census Bureau also prepares and releases estimates of the population of counties and cities in the United States as of July 1 of a given year<sup>8</sup>. Table 5 shows the Census results for 1980, 1990, and 2000 and the July 1 estimates for the years 2000, 2001, and 2002.

The Population Research Center (PRC) of the School of Urban and Public Affairs at Portland State University has been charged with estimating the annual population of the State of Oregon and each County and incorporated city as of July 1<sup>9</sup>. Table 5 also shows the PRC estimates for the County and each city from 1980 to 2002. The PRC releases preliminary estimates on November 15 of the estimate year. Local governments have until December 15 to

<sup>7</sup> See Census Bureau History at <http://www.census.gov/acsd/www/history.html>.

<sup>8</sup> See Census Bureau County population estimates at <http://eire.census.gov/popest/data/counties.php>.

<sup>9</sup> See ORS 190.510-190.540 and OAR 577-050.

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review and comment on the preliminary estimates. Once complete, the estimates are then forwarded to the Secretary of State's office for certification.

The State of Oregon Office of Economic Analysis (OEA) collects and analyses state and County-level demographic and economic data<sup>10</sup>. The OEA is the official forecasting arm of the state and has prepared both population and employment forecasts for the state and all 36 counties. The County worked with OEA in 1997 and 1998 to develop the initial coordinated population forecast for the County. OEA provided the County and the cities with a draft forecast of the population of the state and all 36 counties beginning in 2000 to the year 2040. The OEA was originally scheduled to generate new population and employment numbers in March of 2002, but did not release draft forecast numbers for the counties until February 2003.<sup>11</sup>

<b>Table 4 County and City Population by Year and Source</b>							
<b>Jurisdiction</b>	<b>Source</b>	<b>1980</b>	<b>1990</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>
<b>Deschutes County</b>	PRC	62,500	75,600	116,600	122,050	126,500	130,500
	Census	62,142	74,958	115,367			
	Cen Est		76,053	116,597	120,702	125,258	129,492
	OEA 97			112,846			
<b>Bend</b>	PRC	17,300		52,800	55,080	57,750	62,900
	Census	17,263	20,447	52,029			
	Cen Est			52,618	54,610	57,010	
<b>Redmond</b>	PRC	6,480		13,770	14,960	16,110	17,450
	Census	6,452	7,165	13,481			
	Cen Est			14,086	14,912	16,023	
<b>Sisters</b>	PRC	695		975	960	1,080	1,430
	Census	696	708	959			
	Cen Est			971	1,011	1,099	
<b>Unincorporated</b>	PRC	38,025		49,055	51,050	51,560	48,720
	Census	37,731	46,638	48,898			
	Cen Est			48,922	50,169	51,126	

**Sources:**

Census = Represents April 1 census count for the County ([www.census.gov](http://www.census.gov))

Cen Est = Represents July 1 population estimate ([www.census.gov](http://www.census.gov))

PRC = July 1 certified estimates of Population Research Center, Portland State University ([www.upa.pdx.edu/CPRC](http://www.upa.pdx.edu/CPRC))

OEA 97 = 1997 County population forecast, Oregon Office of Economic Analysis ([www.oea.das.state.or.us](http://www.oea.das.state.or.us))

<sup>10</sup> Office of Economic Analysis – [www.oea.das.state.or.us](http://www.oea.das.state.or.us).

<sup>11</sup> The County coordinating group released its forecast for public hearings in November 2002, before the release of the OEA draft forecast in February 2003. A comparison of the two population forecasts is discussed in this report.

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Forecasting Methods

This forecast is based on state and local forecasts using two established methods of forecasting population. The References section of this report includes citations to texts that describe in more detail these methods and how they can be used to forecast population.

Cohort-Component Model – *natural increase + migration patterns = total*. This is the method that the Oregon Office of Economic Analysis used in its statewide 2003 draft forecast<sup>12</sup>. This method looks at the age/sex groupings of the existing population and future aging patterns to estimate birth and death rates in order to calculate the “natural change” in population. The natural change component is especially useful for areas with a stable population (like many Eastern Oregon cities and counties) or a city with a large retirement population (like Florence, Oregon for example). However, this component by itself is less accurate when a large share of the forecast increase is due to people moving into the areas. For example, if an area has a high percentage of growth due to in-migration the in-migration numbers can “swamp” the natural increase numbers and make them less important.

Because migration can be a significant part of the growth calculation this method usually considers both the natural increase and migration patterns to generate the total population change. However, as the OEA states in its draft 2003 long-term forecast, “*Migration is the most complex and most volatile component of population change.*”<sup>13</sup> The migration component cannot be easily predicted because the reasons people choose to move from one area to another are based on a variety of individual and family decisions including personal choice, economics, quality of life changes, quality of education, safety, political climate and others factors.

Linear or Trending Model – *growth rates and patterns are the basis for future growth*. In this method various trends in population changes are evaluated as a basis for future growth. Trend data could include annual population changes by percent or number, school enrollment, housing starts, and utility service connections. A longer trend period is better because it can reflect the impact of changes in demographics, economic conditions and other factors in the population growth or decline. The trend data does not automatically lead to a continuation of past trends and can be adjusted with other data that reflect expected changes over time. All three cities and the County used a linear or trending model to forecast their respective populations from 2000 to 2025.

This is a simple forecasting method. A benefit of using this method is that many of the factors that affect the pattern of growth are already imbedded in the trend data. In other words, since this method uses the real numbers for historic change it already includes the aggregate result of various growth components such as natural increase from births and deaths, net migration, employment levels, and local and national economic conditions. For example, an average annual growth rate of 1 percent can reflect a rate of change from one time period to the next and reflect population growth due to natural increase and net migration.

This forecast method can be used with assumptions regarding physical and/or political constraints that will control the amount of growth. Physical constraints can include, for example, a limited supply of land for future homes or infrastructure capacity issues. Political constraints

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<sup>12</sup> Page 2 of “Long Term Population Forecast for Oregon and its Counties, 2000-2040 (Draft), Office of Economic Analysis, January 2003

<sup>13</sup> “Long-Term Population Forecast for Oregon and Its Counties, 2000-2040 (Draft)”, Office of Economic Analysis, January 2003, first page.

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can include state planning laws, local policies, zoning limitations or other conditions that constrain or control the level of growth. The physical or political constraints (or a combination of both) can be used to form or adjust the basis for calculating the potential population changes. Examples of political stimuli include efforts such as local or state governments' tax incentives to support job creation, active employer recruitment, low impact fees, choosing to locate offices or facilities in an area, and tourism campaigns.

In addition, trending of population over time can also be based upon the amount of land or homes available for future growth. This information can be calculated and used to generate dwelling units available for growth over a period of time. The dwelling unit numbers can then be converted to a population number based on estimated persons per household, per housing unit, vacancy rates, and other factors. Physical conditions can also be incorporated into the assumptions that affect trend or linear forecasts. Examples of such conditions include surplus of land for development and new or expanded public facilities.

### **Forecasting for Small Areas**

The City of Redmond hired ECONorthwest, an economic and planning consulting firm, to evaluate the city's proposed population forecast. This assessment supported the use of linear or trending models for forecasting population. ECONorthwest provided the following background on the risks associated with forecasting population for small areas<sup>14</sup>:

*“Projections for population in most cities and counties are not based on deterministic models of growth; they are simple projections of past growth rates into the future. They have no quantitative connection to the underlying factors that explain why and how much growth will occur.*

*Even if planners had a sophisticated model that links all these important variables together (which they do not), they would still face the problem of having to forecast the future of the variables that they are using to forecast growth (in, say, population or employment). In the final analysis, all forecasting requires making assumptions about the future.*

*Comparisons of past population projections to subsequent population counts have revealed that even much more sophisticated methods than the ones used in the study “are often inaccurate even for relatively large populations and for short periods of time.”<sup>15</sup> The smaller the area and the longer the period of time covered, the worse the results for any statistical method.*

*Small areas start from a small base. A new subdivision of 200 homes inside the Portland Urban Growth Boundary has an effect on total population of 0.02%. That same subdivision in Redmond would increase the community's housing stock by more than 3.5%—and population by a similar percentage.*

*Especially for small cities in areas that can have high growth potential (e.g., because they are near to concentrations of demand in neighboring metropolitan areas, or because they have high amenity value for recreation or retirement), there is ample evidence of very high growth rates in short-term; there are also cases (fewer) of high growth rates sustained over 10 to 30 years.*

*Public policy makes a difference. Cities can affect the rate of growth through infrastructure, land supply, incentives and other policies. Such policies generally do not have an impact on growth rates in a region, but may cause shifts of population and employment among cities.”*

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<sup>14</sup> March 15, 2004 memorandum to Chuck McGraw, City of Redmond, from Bob Parker and Terry Moore, ECONorthwest

<sup>15</sup> Murdock, Steve H., et. al. 1991. "Evaluating Small-Area Population Projections." *Journal of the American Planning Association*, Vol. 57, No. 4, page 432.

## 2000 – 2025 COORDINATED POPULATION FORECAST

ORS 195.036 requires the coordinating body (the County) to accomplish two things with respect to population forecasts. The County is required to establish and maintain a population forecast for the entire area within its boundary for use in maintaining and updating comprehensive plans. The County is also required to coordinate the forecast with the local governments within its boundary. The statute does not require cities and counties to use specific methods of forecasting population<sup>16</sup>. There is also no statutory requirement that the cities use the same method as the County or vice versa. In addition, the statute does not require or give deference to the population forecast prepared by an agency of the state (e.g. OEA) or the federal government. Each city has prepared its own population forecast and the County has relied on each jurisdiction to use accepted methods of forecasting population. The County also assumes each forecast is supportable on its own.

The process for developing a new coordinated population forecast involved city and County planning and legal staff meeting and evaluating progress on jurisdictional forecasts over several months. In the fall of 2001, the County Community Development Department (CDD) received a grant from the Department of Land Conservation and Development (DLCD) to coordinate a local population forecast in anticipation of the March 2002 OEA draft population forecasts for the state and the counties. This effort undertaken by the County involved ten meetings over 24 months among staff of all four jurisdictions in the County and the two DLCD regional field representatives. The County and city planning staff agreed that a new forecast was needed and set 2025 year as the ending date for this coordinated forecast.<sup>17</sup> Issues discussed during the coordination meetings included:

- Data sources including County GIS records
- Comparison of OEA forecast numbers to actual population numbers
- Historic growth rates (e.g. 10-year; 20-year) for each jurisdiction
- Growth of urban areas relative to non-urban areas of the County
- Demographic patterns
- Limitations and incentives affecting growth
- Various methods to forecast population change
- Documenting assumptions and establishing a factual base

The sum total of the four (cities and County) forecasts were also compared against a 2002 draft forecast of Deschutes County from OEA. The cities and County staff developed a consensus draft in September of 2002 that became the subject of public hearings before the Deschutes County Planning Commission in December of 2002.

The Board of County Commissioners held its first public hearing on the forecast in January 2003. Subsequent hearings were also held in February and in March 2003 to compare the forecast with a second draft forecast of the County's population from OEA (January 2003) and to address issues raised at the three public hearings. The March 26, 2003 decision of the Board adopting the 2003 coordinated forecast was appealed to the Land Use Board of Appeals in April 2003. After receipt of the petitioner's brief in July 2003, and review of the issues raised in the appeal, the Board of Commissioners repealed the forecast and directed County planning

<sup>16</sup> The Oregon Administrative Rules (OAR) governing land use planning also do not require cities and counties to use a specific method of forecasting or a forecast produced by a state or federal agency.

<sup>17</sup> Redmond is currently conducting an urban reserve study and will independently forecast its population growth out an additional 25 years to 2050.

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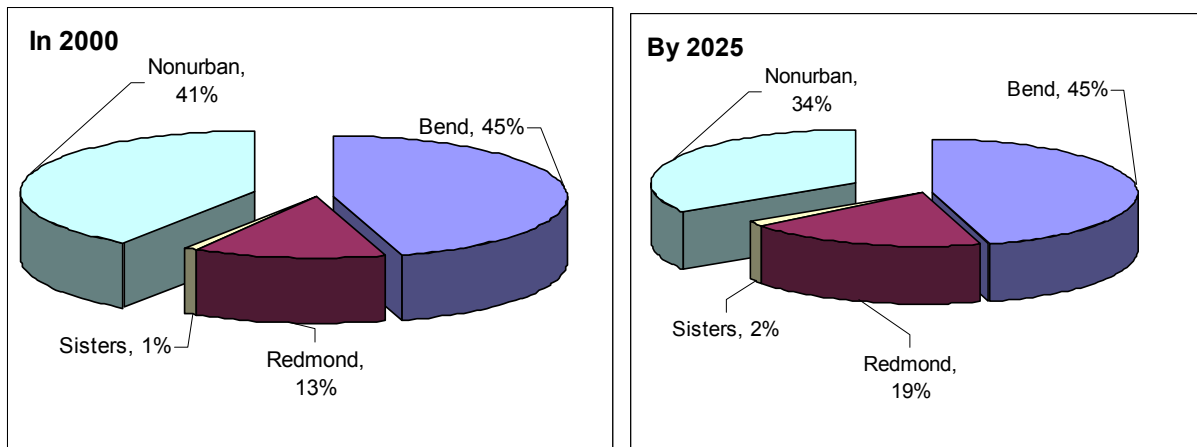
and legal staff to coordinate with the cities to re-examine the assumptions behind the forecast, improve the documentation of the methods and data sources, and prepare a new forecast. The city and County staffs reconvened and met frequently during 2003 and 2004 to address the issues raised in the brief and prepare a defensible forecast.

The following table is the 2000 – 2005 coordinated population forecast in five-year increments.

<b>Table 5 Deschutes County 2000- 2025 Coordinated Population Forecast</b>									
Year	Bend UGB		Redmond UGB		Sisters UGB		Non-Urban County		Total County
	July 1 <sup>st</sup> Forecast	Five Yr. Change	July 1 <sup>st</sup> Forecast	Five Yr. Change	July 1 <sup>st</sup> Forecast	Five Yr. Change	July 1 <sup>st</sup> Forecast	Five Yr. Change	
2000	52,800		15,505		975		47,320		116,600
2005	69,004	30.69%	19,249	24.15%	1,768	81.33%	53,032	12.07%	143,053
2010	81,242	17.74%	23,897	24.15%	2,306	30.43%	59,127	11.49%	166,572
2015	91,158	12.21%	29,667	24.15%	2,694	16.83%	65,924	11.50%	189,443
2020	100,646	10.41%	36,831	24.15%	3,166	17.52%	73,502	11.50%	214,145
2025	109,389	8.69%	45,724	24.15%	3,747	18.35%	81,951	11.49%	240,811

The following figures show how each jurisdiction's share of the total County population changes over time.

**Figure 3  
Comparison of Each Jurisdiction's Share of the County Population in 2000 and 2025**



**Comparison with OEA Draft Forecast**

In January 2003 the Office of Economic Analysis released a draft population forecast for the State of Oregon and for each of the 36 counties. The OEA released a final forecast in April of 2004. The OEA 2004 population forecast for Deschutes County is lower than the forecast developed through the local coordinated effort. The following table compares the two forecasts for Deschutes County.

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<b>Table 6</b>				
<b>Comparison of Local and State Forecasts</b>				
Year	Coordinated Forecast	Oregon OEA 2004 Forecast	Difference	Percent Difference
2000	116,600	116,600	N/A	N/A
2005	143,053	139,994	3,059	2%
2010	166,572	155,792	10,780	7%
2015	189,443	178,418	11,025	6%
2020	214,145	197,150	16,995	9%
2025	240,811	214,479	26,332	12%
<b>Sources:</b> Table 6 of this report and February 2003 Population Forecast, OEA				

The main difference in the two forecasts is the level of growth during the first five to ten years of the forecast. The OEA expects the rate of growth in Deschutes County in the next few years to be significantly less than the growth rates experienced in the 1990s, while the local forecast expects continued strong growth rates in the near term (2005 to 2010). Since the level of “natural increase” (births over deaths) is a small part of the total population increase the driving component of growth in either forecast is the amount of in-migration that will occur. The following table compares the draft OEA forecast for 2000 to 2005 with the annual population estimates of the County from the PRC.

<b>Table 7</b>			
<b>Comparison of OEA Forecast with Population Estimates for 2000 to 2005</b>			
<b>OEA April 2004 Final Forecast for Deschutes County</b>			
Year	Population	Change	AAGR
2000	116,600		
2005	139,994	23,394	3.7%
<b>PRC – July 1, 2000 and July 1, 2003 Certified Estimates</b>			
Year	Population	Change	AAGR
2000	116,600		
2003	130,500	13,900	3.8%
<b>Census Bureau Estimates – July 1, 2000 to July 1, 2003</b>			
Year	Population	Change	AAGR
2000	116,594		
2003	129,492	+12,898	+3.6%

According to the annual estimates of the PRC, the County’s population has grown an average of 3.8%, or approximately 4,633 persons, per year since July 1, 2000. The OEA 2004 forecast shows the County’s population growing by an annual rate of 3.7%, which is now consistent with the recent PRC estimates. This data is supported by the Census Bureau estimates that show the County’s population growing by an average of 3.6% per year. The following table shows the annualized growth rates of OEA’s 2004 final population forecast for the County for the 2000 to 2025 period:

<b>Table 8</b>				
<b>OEA Population Growth Rates (Annualized) for Deschutes County</b>				
2000 to 2005	2005 to 2010	2010 to 2015	2015 to 2025	2020 to 2025
3.66%	2.52%	2.33%	2.00%	1.68%
<b>Source:</b> Forecast of Oregon’s County Populations and Components of Change, 2000-2040 Oregon Office of Economic Analysis – <a href="http://www.oea.das.state.or.os/demographic">www.oea.das.state.or.os/demographic</a> .				

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The OEA forecast predicts that the level of positive net migration that currently makes up almost ninety (90%) percent of the growth will continue and represent 94% of the growth by 2025.<sup>18</sup> As noted earlier in this report, the rate of migration is the volatile part of the forecast and subject to different interpretations and estimates.

The County's forecast is reasonable despite forecasting greater population growth over the 2000 to 2025 period than the OEA forecast. The population growth forecasted by the local coordinated forecast is not unprecedented. The following table compares the change of population and the percent change from each forecast from 2000 to 2025:

<b>Table 9</b>		
<b>Comparison of Forecast County Population Growth 2000 to 2025 with County Population Growth Between 1980 and 2003</b>		
	<b>Change</b>	<b>Percent Change</b>
<b>County 2004 Draft Forecast 2000 to 2025</b>	+124,211	+107%
<b>OEA 2004 Final Forecast 2000 to 2025</b>	+97,879	+84%
<b>County population change 1980 to 2003</b>	+68,358	+109%
<b>Sources:</b> OEA April 2004 Forecast – <a href="http://www.oea.das.state.or.us/demographic">www.oea.das.state.or.us/demographic</a> .		

This data shows that the forecasted increase in population from 2000 to 2025 is similar to the population growth of the County over the last 23-year period.

The OEA forecast is strongly influenced by the recent recession and the sluggish national and statewide economy. Although, in general, the state economy has slowed, local economic data seem to show that the County's local housing and employment markets have not been affected in the same way. The number of building permits for new single family dwellings has increased fourteen (14%) percent over the last year<sup>19</sup>. In addition, data from the Oregon Employment Department (OED) suggests regional and County employment projections are positive. The OED projects a 15.2% increase in total nonfarm payroll employment from 2002 to 2012 for Region 10<sup>20</sup>. This region includes Crook, Deschutes, and Jefferson counties, with approximately eighty (80%) percent of this region's workforce located in Deschutes County<sup>21</sup>.

In addition, the OED reports that between November 2000 and the end of 2003, the job market in Central Oregon, including Deschutes County, was essentially flat<sup>22</sup>. OED includes Crook, Deschutes, and Jefferson counties in Region 10 for data collection and dissemination purposes<sup>23</sup>. According to OED, the data on nonfarm employment in Region 10 has fluctuated between 62,000 to 68,000 since November of 2000. At the same time, the PRC data shows that the population of Region 10 has grown by 11 percent during this same period. The following table shows the growth in population in Region 10 between April 2000 and July 2003. During this period the population of Deschutes County grew 13 percent while the population of the State grew by four percent.

<b>Table 10</b>				
<b>Population Growth of OED Region 10 From April 2000 to July 2003</b>				
	<b>4/1/00 population</b>	<b>7/1/03 population</b>	<b>Change</b>	<b>%Change</b>
<b>Crook</b>	19,184	20,300	1,116	6%

<sup>18</sup> See Forecast Tables for State and counties at <http://www.oea.das.state.or.us/DAS/OEA/demographic.shtml>

<sup>19</sup> Deschutes County CDD Monthly Statistics for February 2004

<sup>20</sup> Employment Projections by Industry 2002-2012 (July 2003), Oregon Employment Department ([www.WorkingInOregon.org](http://www.WorkingInOregon.org)).

<sup>21</sup> Central Oregon Labor Trends (October 2003), Oregon Employment Department ([www.Qualityinfo.org](http://www.Qualityinfo.org)).

<sup>22</sup> Recent Trends: Region 10 (October 7, 2003) Oregon Employment Department.

<sup>23</sup> <http://www.qualityinfo.org/olmisi/ArticleReader?print=1&itemid=00002496>.

<sup>23</sup> See <http://www.qualityinfo.org/olmisi/Regions?area=000010>.



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Prineville	7,358	8,500	1,142	16%
<b>Deschutes</b>	115,367	130,500	15,133	13%
Bend	52,029	62,900	10,871	21%
Redmond	13,481	17,450	3,969	29%
Sisters	959	1,430	471	49%
<b>Jefferson</b>	19,009	19,900	891	5%
Culver	802	840	38	5%
Madras	5,078	5,370	292	6%
Metolius	729	780	51	7%
<b>Total</b>	153,560	170,700	17,140	11%
<b>State of Oregon</b>	3,421,399	3,541,500	120,101	4%
<b>Source:</b> Certified Estimates for Oregon, Its Counties and Cities, July 1, 2003. PRC <a href="http://www.upa.pdx.edu/CPRC/publications/annualorpopulation.html">http://www.upa.pdx.edu/CPRC/publications/annualorpopulation.html</a> .				

**Table 11**  
**Comparison of Population and Total Nonfarm Employment Change for**  
**Deschutes County: 2000 to 20003**

	<b>April 2000</b>	<b>July 2003</b>	<b>Change</b>	<b>Percent Change</b>
<b>Population</b>	115,367	130,500	15,133	13.1%
<b>Nonfarm employment</b>	50,900	54,060	3,160	6.2%
<b>Sources:</b> PRC and OED "Local Labor Trends" newsletters for May 18, 2000 and August 14, 2003				

This data shows that population growth has exceeded growth in nonfarm employment during the last three years and that the economy of the state has not had the predicted influence on population growth factored in the OEA forecast.

## **JURISDICTION FORECAST FINDINGS**

Deschutes County contains four jurisdictions: The cities of Bend, Redmond and Sisters and Deschutes County. Each city prepared a population forecast for the area within their respective urban growth boundary. The County prepared a forecast for the unincorporated area outside of the Urban Growth Boundaries. Each section begins by presenting the jurisdiction's forecast for the 2000-2025 period. The forecast is followed by a discussion of the methods used for the forecast. Each section concludes with factual data supporting the jurisdiction's forecast. The jurisdictions coordinated their forecasts and the aggregated forecast is the County wide forecast shown in Table 5.

### **Common Assumptions**

The respective forecasts for all three cities share common assumptions about anticipated population growth and infrastructure. All three cities assume that during the forecast period (2000 to 2025) the city and/or other providers of infrastructure and public service will be able to serve growing populations. This assumption covers infrastructure customarily provided by cities including roads, water and sewer service. In addition, the cities assume that each respective school district will be able to accept and teach new students that enroll in the districts. None of the cities are anticipating the capacities of infrastructure or public institutions such as schools acting as limitations on population growth during the forecast period.

For consistency in using the annual estimates of the PRC and the Census Bureau, the jurisdictions decided to use the July 1, 2000 PRC estimate for each city's urban growth boundary (UGB) and the unincorporated County as the starting point. In Bend and Sisters the UGB and the City Limits are the same. City of Redmond has not annexed out to the UGB. The PRC estimate for the City of Redmond was modified to include the population within the city's UGB, but outside the city limits. The starting points, as of July 1, 2000, for each jurisdiction are as follows: City of Bend, 52,800; City of Redmond, 15,505; City of Sisters, 975, and; unincorporated Deschutes County, 47,320.

## Unincorporated Deschutes County Population Forecast

### 1. Forecast Table

<b>Table 12</b>	
<b>Population Forecast for Unincorporated Deschutes County</b>	
<b>Year</b>	<b>Population</b>
2000	47,320
2005	53,032
2010	59,127
2015	65,924
2020	73,502
2025	81,951

### 2. Method

To forecast population from the year 2000, County planning staff examined the past rates of population increase or decrease for unincorporated Deschutes County from 1980 to 2002. These historic rates were used to develop growth rates for the period of 2003 to 2025. The following table presents population estimates released by the PRC and the Census Bureau for unincorporated Deschutes County for the years 1980 to 2002:

<b>Table 13</b>							
<b>Population Growth of Unincorporated Deschutes County, 1980 through 2002</b>							
<b>Population Research Center Estimates <sup>(1)</sup></b>				<b>Census Bureau Census Counts and Estimates <sup>(2)</sup></b>			
<b>Year</b>	<b>Population</b>	<b>Change</b>	<b>Percent Change</b>	<b>Year</b>	<b>Population</b>	<b>Change</b>	<b>Percent Change</b>
1980	38,025			1980	37,731		
1981	38,960	935	2.46%	1981			
1982	39,205	245	0.63%	1982			
1983	38,125	-1,080	-2.75%	1983			
1984	38,335	210	0.55%	1984			
1985	39,470	1,135	2.96%	1985			
1986	39,270	-200	-0.51%	1986			
1987	39,305	35	0.09%	1987			
1988	42,010	2,705	6.88%	1988			
1989	43,720	1,710	4.07%	1989			
1990	46,638	2,918	6.67%	1990	43,929		
1991	48,680	2,042	4.38%	1991	48,726	4,797	10.92%
1992	48,760	80	0.16%	1992	48,726	-	0.00%
1993	46,525	-2,235	-4.58%	1993	50,768	2,042	4.19%
1994	49,660	3,135	6.74%	1994	52,071	1,303	2.57%
1995	52,110	2,450	4.93%	1995	53,728	1,657	3.18%
1996	53,830	1,720	3.30%	1996	55,543	1,815	3.38%
1997	54,665	835	1.55%	1997	57,033	1,490	2.68%

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<b>Table 13</b>							
<b>Population Growth of Unincorporated Deschutes County, 1980 through 2002</b>							
<b>Population Research Center Estimates <sup>(1)</sup></b>				<b>Census Bureau Census Counts and Estimates <sup>(2)</sup></b>			
1998	55,980	1,315	2.41%	1998	58,972	1,939	3.40%
1999	42,400	-13,580	-24.26%	1999	61,324	2,352	3.99%
2000	49,055	6,655	15.70%	2000	48,922	(12,402)	-20.22%
2001	51,050	1,995	4.07%	2001	50,169	1,247	2.55%
2002	51,560	510	1.00%	2002	51,126	957	1.91%

**Source:**  
 (1) Oregon Population Reports for 1989, 1999, and 2002, Population Research Center (PRC); Portland State University. Estimates as of July 1. 1990 figure is count reported in 1990 Census.  
 (2) SU-99-8, Population Estimates for Places in Oregon, Annual Time Series, July 1, 1990 to July 1, 1999. Population Estimates Program, Population Division, U.S. Census Bureau. 1980 count is count reported in 1980 Census. Estimates from 1990 through 1999 as of July 1.

The County used the estimates prepared by the Census Bureau to forecast future growth because the Bureau's estimates, unlike those prepared by the PRC, are estimates of the unincorporated County population. The PRC recently informed the County through a December 11, 2003 letter that the PRC prepares estimates for the city populations but does not prepare an estimate for the unincorporated areas of the County. The PRC uses a ratio-correlation method, to estimate the population of counties as a whole. Then PRC uses a housing unit method for estimating the city population. The population number for the unincorporated area is the residual calculated by subtracting the city estimates from the whole County estimate.

In contrast, the Census Bureau prepares sub-County area estimates, including those areas of counties that are unincorporated, or what the Census Bureau defines as "balance of County"<sup>24</sup>. The Census Bureau develops sub-County estimates using the "Distributive Housing Unit Method". This method uses building permits, mobile home shipments, and estimates of housing unit loss to update housing unit change since the last census. Census counts of housing units are updated each year through the Bureau's Geographic Update System to Support Intercensal Estimates (GUSSIE).

To find the average annual growth rate (AAGR) of the population of the unincorporated County over the time period of 1980 through 2002, the County used both the reported Census counts and PRC estimates shown in Table 13. The average annual growth rate (annualized) from 1980 to 2002 was 1.4 percent per year<sup>25</sup>. This period of 22 years includes times of population decrease because of a recession (1980 to 1989) and a period of constant growth (e.g. 1994 to 1998). The County had originally used this rate of annual growth to project population in the October 30, 2003. The County realized that this growth rate might be skewed due the city of Bend's annexation of the population in the unincorporated areas of its UGB in 1999. Bend annexed approximately 13,000 people effective July 1, 1999. This annexed population was counted in previous estimates of the unincorporated County population. To correct the problem of this large decrease in population from skewing the calculation, the County eliminated the year 1999 from the calculation of the average annual growth rate. Instead, the average annual growth rates for the unincorporated County were calculated for the

<sup>24</sup> The Census Bureau describes its method for sub-County area estimates through this website: <http://eire.census.gov/popest/topics/methodology/citymeth.php>.

<sup>25</sup> The average annual growth rate (annualized) was calculated by dividing the end PRC population (51,126) by the beginning population (37,731), finding the "nth" root of this number, where n = 22 years, subtracting one, and then multiplying by 100 to convert to a percent.

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periods of 1980 to 1998 and 2000 to 2002. From 1980 to 1998, the population of the unincorporated County grew at an average annual rate of 2.5%. From 2000 to 2002, the population of the unincorporated County grew at an average annual rate of 2.2%.

### 3. Factual Base

Table 14 shows three possible forecasts for the population of the unincorporated County from 2000 to 2025. The year 2000 starting population is based on the July 1, 2000 PRC estimate of population for the unincorporated County minus the portion of this population residing in the city of Redmond urban growth boundary<sup>26</sup>. For the years 2001 and 2002, the table shows the Census Bureau estimates of unincorporated Deschutes County for July 1 of these years. From 2003 to 2025, each forecast uses different growth rates to forecast population. The first forecast (2.2% Forecast) relies on a constant average annual growth rate of 2.2 percent. The second forecast (OEA Rates) uses the population growth rates (annualized) calculated by OEA for the entire County<sup>27</sup>. The third forecast (Bend method) uses a combination of past average annual growth rates and those developed by OEA (See description of Bend method).

<b>Table 14</b>						
<b>Unincorporated Deschutes County Population Forecasts from 2000 to 2025,</b>						
<b>Using Three Methods</b>						
<b>Year</b>	<b>2.2% Forecast</b>	<b>Annual Growth Rates</b>	<b>OEA Rates Forecast</b>	<b>Annual Growth Rates</b>	<b>Bend Method</b>	<b>Annual Growth Rates</b>
2000	47,320		47,320		47,320	
2001	48,723	2.96%	48,723	2.96%	48,723	2.96%
2002	49,680	1.96%	49,680	1.96%	49,680	1.96%
2003	50,773	2.20%	51,498	3.66%	50,872	2.40%
2004	51,890	2.20%	53,383	3.66%	52,093	2.40%
2005	53,032	2.20%	55,337	3.66%	53,343	2.40%
2006	54,198	2.20%	56,731	2.52%	54,677	2.50%
2007	55,391	2.20%	58,161	2.52%	56,044	2.50%
2008	56,609	2.20%	59,627	2.52%	57,445	2.50%
2009	57,855	2.20%	61,129	2.52%	58,881	2.50%
2010	59,127	2.20%	62,670	2.52%	60,306	2.42%
2011	60,428	2.20%	64,130	2.33%	61,766	2.42%
2012	61,758	2.20%	65,624	2.33%	63,260	2.42%
2013	63,116	2.20%	67,153	2.33%	64,791	2.42%
2014	64,505	2.20%	68,718	2.33%	66,359	2.42%
2015	65,924	2.20%	70,319	2.33%	67,905	2.33%
2016	67,374	2.20%	71,725	2.00%	69,488	2.33%
2017	68,857	2.20%	73,160	2.00%	71,107	2.33%

<sup>26</sup> The Staff of CDD used the Department's GIS to estimate this number of people to be 1,446 people. The City of Redmond findings in support of its population forecast provides the detail behind this calculation.

<sup>27</sup> See Table 2 of "Long-Term Population Forecast for Oregon and its Counties, 2000-2040" prepared by the Office of Economic Analysis, Department of Administrative Services, State of Oregon, April 2004.

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2018	70,371	2.20%	74,623	2.00%	72,763	2.33%
2019	71,920	2.20%	76,116	2.00%	74,459	2.33%
2020	73,502	2.20%	77,638	2.00%	75,762	1.75%
2021	75,119	2.20%	78,942	1.68%	77,088	1.75%
2022	76,771	2.20%	80,268	1.68%	78,437	1.75%
2023	78,460	2.20%	81,617	1.68%	79,809	1.75%
2024	80,187	2.20%	82,988	1.68%	81,206	1.75%
2025	81,951	2.20%	84,382	1.68%	82,627	1.75%

The County finds using the 2.2% average annual growth rate forecast is more conservative than the forecasts using the OEA annualized growth rates or Bend's method. The 2.2% forecast uses an average annual growth rate that is lower, but within two-tenths of a percentage of the annual growth rate of 2.4% derived from the OEA forecast. OEA calculated the population growth rates (annualized) for every five year period in its forecast (See Table 9). The OEA's average annual growth rate for the entire County from 2000 (116,600) to 2025 (209,919) is 2.4%. The Bend method uses higher annual growth rates in the short term and transitions to using OEA's annual growth rates from 2010 to 2025.

The County finds that using the historic 2.2% AAGR for the forecast is reasonable because the time period calculating the historic rate is practically equivalent to the forecast period. This method uses the growth rate as a compounding rate throughout the entire forecast and the 2.2% AAGR is relatively close to the growth rates calculated by OEA for the forecast of the entire County. In addition, the regulatory and economic conditions that occurred in the past 23 years are likely reflective of those that could occur during the forecast period to 2025. The County assumes that the system of land use regulations of the past 23 years, which limit development in farm and forest zones and encourage development in cities, will remain in place for the planning horizon. Also the past 23 year period contained periods of rapid growth and recession. It is reasonable to expect that in the next 20 year period these economic conditions could also occur. The proposed unincorporated County forecast shows the unincorporated County growing at rates below those of the cities and of the County as a whole.

For the purpose of determining if the unincorporated County could accommodate expected non-urban population growth, the County estimated the development potential for the unincorporated County. The only purpose of estimating the development potential was to determine whether, under existing land use regulations, more of the forecast population growth would have to be accommodated within the city UGBs instead of in the unincorporated County. The estimate of a potential population was based on the current zoning and development standards in place and assumes that they will remain in effect. Changes in state law could increase or decrease the development potential for the unincorporated area.

Appendix A to this report describes the process and the results of the development potential estimate analysis. Based on the assumptions of this estimate, the unincorporated County includes the potential for 44,898 dwellings, including an estimate of potential dwellings in a new destination resort and in forest zones. The County calculated the number of

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residential units in each zoning district, based on current minimum lot size standards and density limitations. The County translated this potential number of dwellings into population by multiplying the number of dwellings by 1.9 persons per housing unit, which was the number of persons per housing unit in unincorporated Deschutes County reported in the 2000 Census results (See Appendix A). This analysis yielded an estimated maximum population in the unincorporated areas of 85,306.

Based on the development potential estimate, the population in the unincorporated County will not reach "build out" in the forecast period if the unincorporated population grows as forecasted (2.2%/year) and the state planning and land use laws are not changed. The forecast population for the unincorporated County in 2025 is 81,951 and the development potential estimate shows a potential for 85,306. Therefore, in coordinating County population forecast with the cities, the County was able to use an annual growth rate (2.2%) for the unincorporated County because the development potential estimate showed that for the forecast period the County would likely be able to accommodate that overall growth.

The population of the unincorporated County has not grown as rapidly as the population of the urban areas and County planning staff does not anticipate this changing in the future for two reasons. First, the County cannot anticipate that land use regulations will be changed in such a way as to direct population growth to the unincorporated areas of the County. Second, there is no reason to anticipate demand for new housing outside the urban growth boundaries will fluctuate dramatically. Assuming a constant rate of population growth over the forecast horizon is also sufficient for planning in the unincorporated County. The County is not as concerned about short-term forecast numbers as the cities which are required to plan for housing, commercial and industrial land needs and the infrastructure to serve that development.

## City of Bend UGB Forecast

### 1. Forecast Table

<b>Year</b>	<b>Population</b>
2000	52,800
2005	69,004
2010	81,242
2015	91,158
2020	100,646
2025	109,389

### 2. Method

The City of Bend Planning staff used both the Linear or Trending Model and Cohort-Component Model in developing different parts of the Bend UGB forecast. The growth rate for the first couple of years of the forecast is based on Bend's historic growth rates from 1991 to 2003.<sup>28</sup> The forecast period from 2004 to 2009 is based on the average growth rates for Bend since 1980, more than 20 years of data. These parts of the forecast follow the Linear or Trending Model. The forecast population levels for later years in the forecast, the period from 2010 to 2025, are based on the OEA forecast growth rates. The OEA forecast uses a Cohort-Component model. The data sources used in developing the Bend forecast are listed below. The following section titled **Factual Base** describes in more detail how each of these data sources were used in the forecast.

- Portland State University's *Population Research Center* [PRC] "certified estimate" of Bend's population;
- City population and annexation history [1970 – 2002];
- Mid-term [1991 – 2002] historic population change and growth rates for Bend;
- Long-term [1980 – 2002] historic population change and growth rates for Bend;
- The Oregon *Office of Economic Analysis* growth forecasts for Deschutes County (January 2003 draft report), and;
- Final *Office of Economic Analysis* population forecasts for Deschutes County for 2000 to 2040 (April, 2004).

Table 16 provides a summary of the different components of the Bend forecast by each year of the forecast. The starting point for the forecast is the July 1, 2000 "certified estimate" population number for Bend from the Portland State University *Population Research Center*.

Although population and growth rates are provided in Table 16 for each year up to the year 2025, city staff recognizes that it is more useful to review the forecast numbers over a longer period, such as five years, to look for trends rather than to focus on the difference in any one year. It is the population at the five-year mark (2005, 2010, etc.) highlighted in Table 16 that makes up Bend's component of the Deschutes County Coordinated Forecast.

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<sup>28</sup> This growth rate excludes annexed population. See the **Factual Base** section for more information.



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Table 16 Bend Population Forecast			
Year	City Forecast	Annual Growth Rate	5-Year Change
2000	<b>52,800</b>		
2001	55,080	4.32%	
2002	57,750	4.85%	
2003	62,900	8.92%	
2004	65,881	4.74%	
2005	<b>69,004</b>	4.74%	16,204
2006	71,433	3.52%	
2007	73,948	3.52%	
2008	76,551	3.52%	
2009	79,245	3.52%	
2010	<b>81,242</b>	2.52%	12,238
2011	83,135	2.33%	
2012	85,072	2.33%	
2013	87,054	2.33%	
2014	89,083	2.33%	
2015	<b>91,158</b>	2.33%	9,916
2016	92,981	2.00%	
2017	94,841	2.00%	
2018	96,738	2.00%	
2019	98,673	2.00%	
2020	<b>100,646</b>	2.00%	9,488
2021	102,337	1.68%	
2022	104,056	1.68%	
2023	105,804	1.68%	
2024	107,582	1.68%	
2025	<b>109,389</b>	1.68%	8,743

Population Research Center certified population estimates and actual growth rates

Average annual growth rate for Bend from 1991-2002

Long term average annual growth rate for Bend from 1980 – 2002

Oregon Office of Economic Analysis average annual growth rates for Deschutes County.

**3. Factual Base**

As noted in Table 16, the population forecast for Bend is made up of four components. Although these components are from different sources, they each have a valid factual base and provide substantial evidence for the forecast. These four components, and Bend’s historical population patterns, are described in the sections below.

Forecast years 2000 – 2003

The population numbers in Table 16 for the years 2000 through 2003 are the *Population Research Center* certified estimates for Bend. The *Population Research Center* at Portland State University, acting on behalf of the State Board of Higher Education, is mandated by Oregon law to prepare annual population estimates for each County and city in the State.<sup>29</sup> The corresponding annual growth percentage for these years are from the PRC certified estimates, so the first four years of the forecast period are actual population figures for Bend.<sup>30</sup>

<sup>29</sup> See ORS 190.510 to 190.610; OAR 577-050

<sup>30</sup> This information is available in several PRC papers. See for example Tables 4 and 7 of the PRC report “Population Growth in Oregon: 2000 to 2003” available on its Portland State University website [www.upa.pdx.edu/CPRC](http://www.upa.pdx.edu/CPRC).

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Forecast years 2004 – 2009

The factual base for the short term forecast period from 2004 – 2009 are historic growth rates for Bend. The average annual growth rate for Bend during the 1990s and current decade was used to forecast the population for the years 2004 and 2005. To forecast the population for the period for 2006 – 2009, the city staff used a longer term average growth rate. These parts of the forecast are explained following Table 17.

The historic long-term change in Bend’s population is provided below in Table 17. The information in Table 17 was compiled by City staff from various sources.<sup>31</sup> This table also shows the number of people annexed into the City during the 1990s, the period when Bend was actively annexing all the land within the urban growth boundary into the city limits. *The numbers in the “Annual Percent Change” column are calculated only on the “Net Natural and Migration Change” number.* Persons who were annexed to Bend are not included in the annual percentage change figure for each year.

<b>Table 17</b>				
<b>Bend Historical Population Data</b>				
<b>Year</b>	<b>City of Bend Population</b>	<b>Persons Annexed</b>	<b>Net Natural and Migration Change</b>	<b>Annual Percent Change</b>
70	13,710	0	390	2.84%
71	14,100	0	430	3.05%
72	14,530	0	1,030	7.09%
73	15,560	0	640	4.11%
74	16,200	0	(400)	-2.47%
75	15,800	0	200	1.27%
76	16,000	0	500	3.13%
77	16,500	0	(350)	-2.12%
78	16,150	0	600	3.72%
79	16,750	0	550	3.28%
80	17,300	0	125	0.72%
81	17,425	0	375	2.15%
82	17,800	0	40	0.22%
83	17,840	0	430	2.41%
84	18,270	0	180	0.99%
85	18,450	0	125	0.68%
86	18,575	0	125	0.67%
87	18,700	0	270	1.44%

<sup>31</sup> The population for years 1970, 1980, and 1990 are from the US Census Bureau; for the other years the number is the PSU Population Research Center’s July 1<sup>st</sup> certified population number. The annexation count comes from Bend annexation records for 12-month periods from July 1<sup>st</sup> of the first year through June 30<sup>th</sup> of the next year. The net natural increase and migration numbers in column four is the certified population number minus persons annexed. The averages at the end of the table are the simple average of the growth rates for time period.

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<b>Table 17</b>				
<b>Bend Historical Population Data</b>				
<b>Year</b>	<b>City of Bend Population</b>	<b>Persons Annexed</b>	<b>Net Natural and Migration Change</b>	<b>Annual Percent Change</b>
88	18,970	0	755	3.98%
89	19,725	0	744	3.77%
90	20,469	351	1,685	8.23%
91	22,505	1,210	1,000	4.44%
92	24,715	1,755	1,085	4.39%
93	27,555	0	1,870	6.79%
94	29,425	24	1,181	4.01%
95	30,630	17	1,573	5.14%
96	32,220	53	1,467	4.55%
97	33,740	1	1,894	5.61%
98	35,635	13,649	1,366	3.83%
99	50,650	0	2,150	4.24%
00	52,800	0	2,280	4.32%
01	55,080	0	2,670	4.85%
02	57,750	0	5,150	8.92%
03	62,900	0		
Average Rate of Growth 1970-2003:				3.34%
Average Rate of Growth 1980-2003:				3.76%
Average Rate of Growth 1990-2003:				5.33%

Since 1990, a period of 13 years, Bend's average annual population growth rate has been more than five percent (5%). This pattern of consistent growth during the past decade and into the current decade provides a base of trend data on which to base Bend's growth for 2004 and 2005. However, a close look at the data shows growth rates at the beginning and end of the 13 year period that are significantly higher than the average.

Because the first year of this period [1990 – 1991] had an extra-ordinary growth rate of 8.23 percent, City staff decided to drop this year from the mid-range data set.<sup>32</sup> In addition, the PRC certified population estimate for 2003 results in an 8.92% increase over the previous year. The PRC figure for 2003 is based on building permits issued in the previous 12 months for a record 2,200 net new dwelling units – a dwelling unit number that is *about 1,000 more* than the average of the previous three years.<sup>33</sup> City staff felt that this annual growth rate should be similarly excluded from calculations used for the short term forecast.

<sup>32</sup> Because the cycle for this "year" period is actually 15-months from the April 1<sup>st</sup> Census to July 1, 1991, and because the growth rate for this year is substantially higher than the other years, staff felt it was reasonable to delete this year from the mid-term data set and recalculate the annual average growth rate using the years 1991- 2002.

<sup>33</sup> The totals for 2000 – 2002 were 1008, 1396, and 1276 respectively. Anecdotal evidence suggests that in 2003 more permits than usual were "pulled" in December to avoid a Systems Development Charge (fee) increase, and that large apartment projects were started for investment reasons.

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Staff then used the 11-year historic period of 1991 to 2002 as the basis for years 2004 – 2005 in the forecast, and calculated the annual average growth rate for 1991-2002 at 4.74 percent. This recalculated 4.74 percent annual growth rate was used to generate the forecast population for 2004 – 2005.

As a cross-test of this level of growth the staff also reviewed short term natural increase and net migration data for Deschutes County from the PRC<sup>34</sup>. There is no separate data source for Bend but it is reasonable for the cross-test to assume in the forecast that the *short term historic* patterns and rates of population change for Deschutes County as a whole can be applied to Bend as well because most of the County's population increase has occurred in the cities.

Although the statewide average rate of net migration (persons moving in vs. persons moving out) has declined during the past ten years, this is not the case for Deschutes County. During the period from April 1, 2000 to July 1, 2003 the statewide net migration rate was 55.7 percent of total population growth, but as noted in Table 3 earlier in this report, the net migration rate for Deschutes County was 88 percent of total growth during that period.<sup>35</sup>

Even more telling about this 2000 – 2003 level of in-migration increase in Deschutes County is the actual number of persons compared to the rest of the state. In this recent three-year period, the net migration number for Deschutes County (13,359) was higher than any other County in the state. In fact, during these three years, 20 percent of the total net migration number for the whole state [13,359 out of 66,845] is attributed to Deschutes County.<sup>36</sup> To put it another way, one out of every five persons that are counted as net migrants to Oregon during 2000-03 have moved into Deschutes County. The PRC 2000 – 2003 data on percentage growth rates and in-migrant numbers are higher than would be expected under the OEA forecast for the years 2000 – 2005. These higher PRC numbers provides additional support for the use of a 4.74 percent growth rate for years 2004 and 2005 of the forecast.

For the period of 2006 to 2009 in the forecast, the Staff again used trend data, but from a longer period, that includes years of both economic boom and recession. As noted at the end of Table 17, the long-term (1980 – 2003) average annual growth rate for Bend is 3.76 percent. If the high growth rate for the year 2003 is removed, then the average annual growth rate drops to 3.52 percent. Staff feels that this adjusted growth rate of 3.52 percent represents a more accurate basis for long-term trend data for the 2006-09, taking into account periods of economic recession and economic boom.

OEA acknowledged that rates of in-migration can be highly volatile, therefore, difficult to predict.<sup>37</sup> For this reason, and in the absence of clear indicators that net migration rates will change significantly, staff finds it reasonable to apply historically documented growth rates to the 2003 – 2009 forecast years. Although the short term growth data for the County and City suggest that high growth rates (4.74%) should hold for the first years of the forecast, the staff took a more conservative approach using 3.52% for the next few years (2006 – 2009) consistent with the longer term historic growth rate.

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<sup>34</sup> Historic data on births, deaths, in-migration, and out-migration are recorded and compiled by state agencies at the County level. Although there are good data for Deschutes County as a whole, there are no separate historic counting of births, deaths, and migration levels for the cities in the County.

<sup>35</sup> Data are from PRC report *Population Growth in Oregon: 2000 to 2003*, table 3.

<sup>36</sup> Data are from PRC report *Population Growth in Oregon: 2000 to 2003*, table 3.

<sup>37</sup> OEA *Long-Term Population Forecast for Oregon and Its Counties, 2000 – 2040*, [draft, January 2003], first page.

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Forecast years 2010 – 2025

The Oregon Office of Economic Analysis bases its population forecast on demographic data, and on assumptions about projected age-specific birth and age and sex-specific death rates for the existing population and in-migrants to the state and counties.<sup>38</sup> Table 18 shows the historic (1990-2005) and forecast (2000-2025) annual growth rates for Deschutes County as prepared by OEA.<sup>39</sup>

Time Period	Growth Rate
1990-05	4.55%
1995-00	3.99%
2000-05	3.66%
2005-10	2.52%
2010-15	2.33%
2015-20	2.00%
2020-25	1.68%

The longer the time line for a population forecast the more speculative the forecast numbers become toward the end of the forecast (end years) because the factors that influence the population growth, such as the age and rate of in-migrants and economic conditions, are harder to predict over longer periods. The OEA forecasts that the annual rate of growth for Deschutes County will decline significantly over time, although the reasons for the decline are not explained in the April 2004 final population forecast report.

While the Bend staff believes that the data supports higher growth rates for Bend during the first ten years (2000 – 2010) than are forecast by OEA for the County, the staff is less confident that the growth rates will be this high over the longer period. Because of this, the City accepts and has used the OEA County-wide “annualized” growth rates for the period from 2010 to 2025 in the Bend forecast.

<sup>38</sup> For more information see the first page of the OEA draft report titled *Long-Term Population Forecast for Oregon and Its Counties, 2000-2040*, (January 2003).

<sup>39</sup> OEA 2004 final report titled **Forecasts of Oregon's County Populations and Components of Change, 2000 – 2040**. The OEA 2003 draft report refers to these rates as “annualized”.

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REVISED BY ECONORTHWEST – 8/6/04

## City of Redmond Forecast

During the past 12 years, Redmond has experienced exceptional population increases; growth in the Redmond City Limits and UGB averaged about 7.0 percent per year during this time, with the last couple of years averaging over 8 percent.<sup>40</sup>

### 1. Forecast Table

ECONorthwest developed the 2000-2025 population forecast for Redmond. Table 19 presents the 2000-2025 forecast for Redmond. The forecast reaches a 2025 population of 45,724.

<b>Table 19.</b>			
<b>Redmond UGB population forecast, 2000-2025</b>			
<b>Year</b>	<b>Population</b>	<b>Annual Increase</b>	<b>Percent change</b>
<b>2000</b>	<b>15,505</b>	--	
2001	16,190	685	4.42%
2002	16,906	716	4.42%
2003	17,654	747	4.42%
2004	18,434	780	4.42%
<b>2005</b>	<b>19,249</b>	<b>815</b>	<b>4.42%</b>
2006	20,100	851	4.42%
2007	20,988	889	4.42%
2008	21,916	928	4.42%
2009	22,885	969	4.42%
<b>2010</b>	<b>23,897</b>	<b>1,012</b>	<b>4.42%</b>
2011	24,953	1,056	4.42%
2012	26,056	1,103	4.42%
2013	27,208	1,152	4.42%
2014	28,411	1,203	4.42%
<b>2015</b>	<b>29,667</b>	<b>1,256</b>	<b>4.42%</b>
2016	30,979	1,312	4.42%
2017	32,348	1,370	4.42%
2018	33,778	1,430	4.42%
2019	35,272	1,493	4.42%
<b>2020</b>	<b>36,831</b>	<b>1,559</b>	<b>4.42%</b>
2021	38,459	1,628	4.42%
2022	40,159	1,700	4.42%
2023	41,935	1,775	4.42%
2024	43,788	1,854	4.42%
<b>2025</b>	<b>45,724</b>	<b>1,936</b>	<b>4.42%</b>
<b>Total Increase</b>	<b>30,219</b>		

<sup>40</sup> See Appendix B – “Review of Redmond Population Forecast” prepared by Bob Parker and Terry More, ECONorthwest (2004)

## 2. Method

ECONorthwest evaluated several different methods for the forecast including a compounding method, a ratio method, a decreasing rate method (similar to the one used by Bend), and a straight-line method. We selected the compounding methodology because it is (1) most consistent with Redmond's historic population growth trends, (2) it is a relatively simple approach that builds from historical data and assumptions about future City growth policies, and (3) it assumes that the increment of population growth (e.g., the rate of growth or annual percent change) will be constant. The compounding methodology also assumes that the number of persons added will increase each year. The rate selected is the rate that Redmond observed between 1980 and 2003 (4.42% annually).

The City selected the compounding methodology because:

- It provides the best approximation of historical growth trends in Redmond;
- The City has not identified any constraints to population growth;
- It is a simple method that implicitly considers factors that have affected historical population growth; and
- It is an accepted method for extrapolating population growth trends.

In summary, the compounding approach provides a simple method for extrapolating historical trends to a future population figure. While it does ignore annual variations in population growth that have occurred in the past and will continue in the future, it is at least as justifiable—and perhaps more justifiable—than other assumptions about how population growth rates will vary in the future. Figure 4 graphically displays the differences between (1) actual population growth, (2) a compound growth trend, and (3) a straight-line growth trend based on the amount of growth in Redmond between 1980 and 2003. The graph shows that the compound methodology is a better (but not perfect) representation of the 23-year growth trend in Redmond.

**Figure 4. Growth in Redmond, 1980-2003**

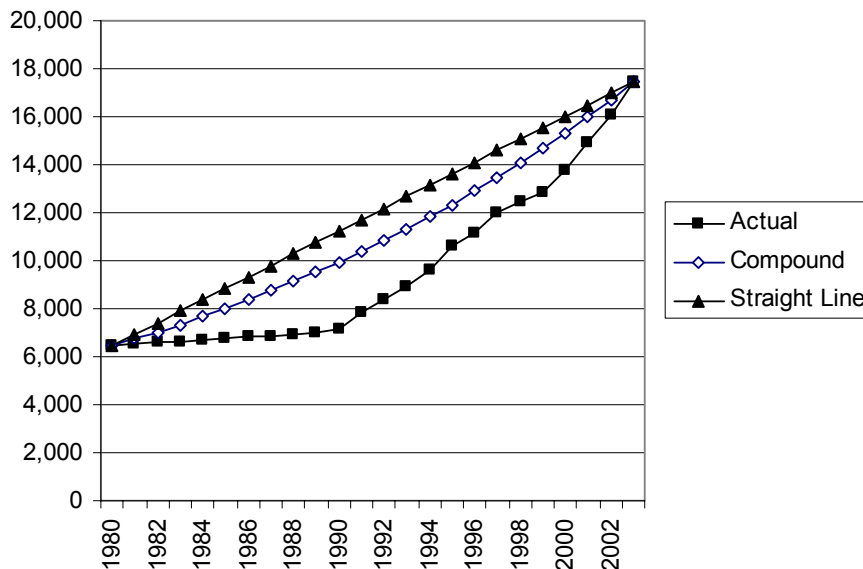


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The Redmond population forecast assumes an annual growth rate of 4.42%. This rate is the same rate the City observed between 1980 and 2003. This rate represents the long-term growth trend in Redmond and includes annual population growth rates that range from –0.2% to 10.3%. While the City could have selected another time period to base its growth rate on, growth rates in more recent time periods are much higher. While annexations are included in this growth rate, they have little affect on the rate: annexations accounted for about 2% of total population growth between 1980 and 2002 (3% between 1994 and 2002—the period for which the City has records). In short, the affect of annexations on the average annual growth rate is less than 0.1%.

The Redmond population forecast uses a year 2000 base population of 15,505 persons—for the Redmond UGB. The base population represents the City’s best estimate of how many people lived within the Redmond UGB in 2000. Annexations are implicitly factored into the City’s forecast because it uses population in the UGB as the base for the projections. In other words, annexations will add population to the city limits, but not to the UGB—because people in the **urbanizable** area have already been counted and factored into the base population. Moreover, City annexation records show that the City annexed 228 persons between 1993 and 2002 (the City did not keep annexation records prior to 1993).

Consistent with ORS 195.303, statewide planning Goal 14, and accepted planning principles, the Redmond population forecast is for the area within the Urban Growth Boundary (UGB).

### **3. Factual Base**

#### **Data Sources Used for Forecasting the Redmond Population to Year 2025**

Data sources used in developing the population forecast for the Redmond UGB area included:

- U.S. Census and Portland State University Center for Population Research Annual Reports
- City population and annexation history [1994 – 2003]
- Mid-term [1990 – 2002] historic population change and growth rates for Redmond
- Long-term [1980 – 2002] historic population change and growth rates for Redmond
- The Oregon Office of Economic Analysis growth forecasts for Deschutes County (January 2003 Draft Report).
- Comparative Housing Costs and Trends (Central Oregon Regional Housing Authority Needs Assessment Update, 2002).

Each of these sources used in the forecast is described in more detail below.

The following sections provide factual evidence in support of the City’s coordinated population forecast.



## **Regional Population Trends**

Population growth in Oregon tends to follow economic cycles. Oregon's economy is generally more cyclical than the nation's, growing faster than the national economy during expansions and contracting more rapidly than the nation during recessions. This pattern is shown in Table 20, which presents data on population in the U.S., Oregon, and selected areas in Oregon over the 1970–2000 period. Table 20 shows Oregon grew more rapidly than the U.S. in the 1970s and 1990s (which were generally expansionary periods) but lagged behind the U.S. in the 1980s. Oregon's slow growth in the 1980s was primarily due to the nationwide recession early in the decade. Oregon's population growth regained momentum in 1987, growing at annual rates of 1.4%–2.9% between 1988 and 1996. The Willamette Valley received over 70% of the state's population growth during this period.

Population growth for Oregon and its regions slowed in 1997, to 1.1% statewide, the slowest rate since 1987. Net migration into Oregon, which is the largest component of population growth, dropped from 35,000 in 1996 to 18,000 in 1999. The reasons most often cited for this slowing of population growth are the recovery of the California economy, the combination of a high cost of living (especially housing) and low wages in Oregon, and a perceived decline in the quality of Oregon's schools.

Redmond, Bend, and Deschutes County have grown faster than other areas in Table 20 throughout the 1980–2000 period. Deschutes County was the fastest growing county in Oregon between 1990 and 2000, growing at an average annual rate of 4.25% and adding 24,333 persons. Bend grew at an average annual rate of nearly 10% during the 1990s, in part because it annexed many developed areas within its UGB, while Redmond grew at an average annual rate of 6.5%.

Deschutes County's share of Oregon's population has increased from 2.4% in 1980 to 3.4% in 2000. Redmond's share of Deschutes County's population has increased from 10.4% in 1980 to 11.4% in 2000. In summary, between 1980 and 2000, Deschutes County grew at a rate nearly 2.4 times faster than Oregon, while Redmond grew at a rate nearly four times as fast as Oregon.

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<b>Table 20.</b>						
<b>Population in the U.S., Oregon, Willamette Valley, Deschutes County, Bend, and Redmond, 1980–2000</b>						
<b>Area</b>	<b>1980</b>	<b>1990</b>	<b>2000</b>	<b>Avg. Ann. Growth Rate</b>		
				<b>80-90</b>	<b>90-00</b>	<b>80-00</b>
U.S.	226,545,805	248,709,873	281,421,906	0.9%	1.2%	1.1%
Oregon	2,633,156	2,842,321	3,421,399	0.8%	1.9%	1.3%
Willamette Valley	1,788,577	1,962,816	2,380,606	0.9%	1.9%	1.4%
Deschutes County	62,142	74,958	115,367	1.9%	4.4%	3.1%
Bend	17,263	20,447	52,029	1.7%	9.8%	5.7%
Redmond	6,452	7,165	13,481	1.1%	6.5%	3.8%

**Sources:** U.S. Census and Center for Population Research and Census, Portland State University. Average annual growth rates calculated by ECONorthwest.

**Notes:** The Willamette Valley consists of Benton, Clackamas, Lane, Linn, Marion, Multnomah, Polk, Washington, and Marion Counties.

Between 1990 and 1999, almost 70% of Oregon’s total population growth was from net migration (in-migration minus out-migration), with the remaining 30% from natural increase (births minus deaths). Migrants to Oregon tend to have many characteristics in common with existing residents, with some differences—recent in-migrants to Oregon are, on average, younger and more educated, and are more likely to hold professional or managerial jobs, compared to Oregon’s existing population. The race and ethnicity of in-migrants generally mirrors Oregon’s established pattern, with one exception: Hispanics make up more than 7% of in-migrants but only 3% of the state’s population. The number-one reason cited by in-migrants for coming to Oregon was family or friends, followed by quality of life and employment.<sup>41</sup> Migration is a significant component of population growth in Deschutes County. Data in the County Report underscore this point: 81% of population growth in Deschutes County between 1980 and 2002 was from in-migration. In fact, the rate of in-migration increased in the 1990s, accounting for 86% of population growth. This figure increased to 89% for the 2000-2002 period.

The U.S. Census collects data on migration patterns. Specifically, it asks households where their residence was in 1995 (5 years prior to the Census count). Table 21 shows place of residence in 1995 for Deschutes County and Redmond. The data show that population in both geographic areas is transitory. Only 41% of individuals in Deschutes County lived in the same residence in 1995; the figure was only 31% in Redmond. About one-third of persons in both Deschutes County and Redmond lived in a different county in 1995; about 15% lived in a different state.

<sup>41</sup> State of Oregon, Employment Department. 1999. *1999 Oregon In-migration Study*.

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<b>Table 21 Place of residence in 1995, Deschutes County and Redmond, persons 5 years and over</b>				
<b>Location</b>	<b>Deschutes County</b>		<b>Redmond</b>	
	<b>Persons</b>	<b>Percent</b>	<b>Persons</b>	<b>Percent</b>
Population 5 years and over	108,293	100%	12,626	100%
Same house in 1995	43,935	41%	3,916	31%
Different house in 1995	64,358	59%	8,710	69%
Same county	28,743	27%	4,394	35%
Different county	34,501	32%	4,234	34%
Same state	16,865	16%	2,512	20%
Different state	17,636	16%	1,722	14%
<b>Source:</b> U.S. Census, SF-3				

The data are conclusive: Central Oregon has experienced a tremendous amount of in-migration. A corollary finding based on Table 21 is that Deschutes County's population is mobile—a majority of people lived in a different housing in 2000 than they did in 1995. All the evidence suggests that in-migration will continue to contribute the majority of population growth in Deschutes County and Redmond.

Historically, quality of life factors have played a central role in attracting people to Deschutes County. The County has stunning scenery and ample outdoor recreation opportunities that are available in all seasons. Destination resorts such as Sunriver, Black Butte Ranch and Eagle Crest attract many tourists to the region. The Central Oregon OSU campus provides educational opportunities for individuals desiring to attend college.

Moreover, as the region has grown, Bend has added many urban amenities such as the Mountain View Mall and the Les Schwab Amphitheater. Growth has helped revitalized Bend's downtown. Redmond is home to a regional airport and the new Deschutes County Fairground. Many of the urban amenities are relatively new and contribute to the region's quality of life.

In summary, the combination of outdoor and urban amenities are likely to continue attracting people to Deschutes County. In fact, the presence of new urban amenities will probably attract some households that wouldn't have moved the region previously. The urban amenities, combined with the fact that cities in Deschutes County are still relatively small (Bend, the largest city had a 2003 population of 62,900) and have a small town feel provides a combination of factors that are extremely attractive to households. Advances in telecommunications make many households less bound to geography. In-migration will be the dominant cause of population growth in Deschutes County and its cities for years to come. That conclusion does not tell us how much growth these areas will get, but it does explain in part why forecasting is an uncertain business: birth and death rates are relatively stable over time and easy to predict; migration rates are much more variable.

### **Redmond Population Trends**

The first step in developing the forecast for Redmond was to estimate the current UGB population. The forecast using a 15,505 population figure as a starting point for the 2000 to 2025 period which represents the population in the Redmond urban growth boundary on July 1,

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2000. The 15,505 figure was derived by taking the 2000 census data (13,770) for the city limits and added the population within the unincorporated area (1,446) to get a total of 15,216 ( $13,770 + 1,446 = 15,216$ ).

The 1,446 population within the unincorporated area was calculated by using the 2000 Census Block Group GIS data as provided by the US Census Bureau. All of the block group polygons that were within the Redmond city limits, then found the total population 13,481 (same as April 1, 2000 census) of all block groups within the city limits.

In order to find the population of the Redmond UGB, all block group polygons that fell inside the UGB were selected to determine the 1, 446 population.

Then the difference between the 2000 census count for Redmond 13,481 (on April 1, 2000) and the PRC population estimate of 13,770 (on July 1, 2000) was 289. These 289 people were added to the 15,216 to account for the population growth between the census taken on April 1 and PRC's estimate as of July 1 for a total estimate of 15,505 ( $15,216 + 289 = 15,505$ ).

Table 22 shows population estimates from the Population Research Center at Portland State University for the Redmond city limit for the period between 1980 and 2003. The data show that Redmond grew relatively slowly during the 1980s (averaging about 1.0 percent annually). Starting in 1990, the annual growth rates increase dramatically. Between 1990 and 2000, population in the Redmond city limit grew by 6,635 persons—averaging a 6.8% increase annually. That trend continued between 2000 and 2003.

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<b>Table 22 Redmond City Limit Population Data – 1980 to 2003</b>		
Year	City of Redmond Population	Annual Percent Change
1980	6,452	-----
1981	6,575	1.9%
1982	6,615	0.6%
1983	6,605	-0.2%
1984	6,675	1.1%
1985	6,740	1.0%
1986	6,830	1.3%
1987	6,850	0.3%
1988	6,950	1.5%
1989	7,000	0.7%
1990	7,135	1.9%
1991	7,870	10.3%
1992	8,365	6.3%
1993	8,955	7.1%
1994	9,650	7.8%
1995	10,585	9.7%
1996	11,175	5.6%
1997	11,990	7.3%
1998	12,435	3.7%
1999	12,810	3.0%
2000	13,770	7.5%
2001	14,960	8.6%
2002	16,110	7.7%
2003	17,450	8.3%

\* Source: Oregon Population Reports for 1999 and 2003, PRC

Table 23 shows the impact of annexations on Redmond's population between 1980 and 2002. The City did not keep annexation records until 1993.

The annexation history shows that Redmond added 228 persons through annexations between 1994 and 2002. This equates to about 3% of total population growth during this period.

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<b>Table 23 Redmond City Limit Population Data – Annexations</b>				
Year	City of Redmond Population	# Persons Annexed	Net Natural and Migration Change	Annual Percent Change
1980	6,452	N/A*	-----	-----
1981	6,575	N/A*	123	1.9%
1982	6,615	N/A*	40	0.6%
1983	6,605	N/A*	-10	-0.2%
1984	6,675	N/A*	70	1.1%
1985	6,740	N/A*	65	1.0%
1986	6,830	N/A*	90	1.3%
1987	6,850	N/A*	20	0.3%
1988	6,950	N/A*	100	1.5%
1989	7,000	N/A*	10	0.7%
1990	7,135	N/A*	135	1.9%
1991	7,870	N/A*	735	10.3%
1992	8,365	N/A*	495	6.3%
1993	8,955	4	590	7.1%
1994	9,650	2	695	7.8%
1995	10,585	35	935	9.7%
1996	11,175	3	590	5.6%
1997	11,990	5	815	7.3%
1998	12,435	8	445	3.7%
1999	12,810	79	375	3.0%
2000	13,770	15	960	7.5%
2001	14,960	8	1190	8.6%
2002	16,110	69	1150	7.7%

**Source:** City of Redmond Annexation Records. Note: no population records related to annexations within Redmond were kept until 1993.

Redmond calculated a growth trend (net natural and migration change, column 4 above) using data from PRC's annual population reports from April 1, 1980 to July 1, 2002. The total increase in population from 1980 to 2002 was 250%. The average annual growth rate (AAGR) for the period 1980 to 1990 was 0.9%. The AAGR for the period 1990 to 2000 was 6.4%, and the average rate of growth from 1992 to 2002 was 7.4%.

Table 24 shows growth rates in Redmond for several time periods. These historical growth rates provide context for developing a range of population projections. ECO calculated the rates using the compounding method. The data underscore several key points:

- The start date has a big impact on the growth rate. This is because population growth spiked in 1990 and have sustained high rates since then.
- The average annual growth rate (AAGR) is between 4.42% (1980-2003) and 8.21% (2000-2003) depending on the time period. The period between 2000 and 2003 showed the highest annual growth rate.

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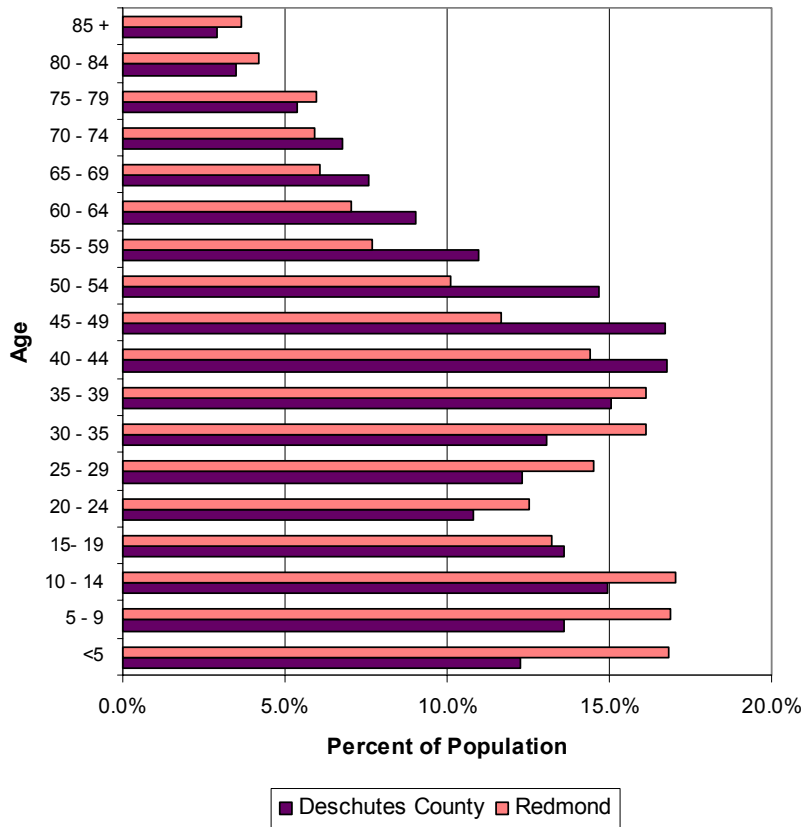
<b>Table 24. Compound Growth Rates by Time Period, City of Redmond</b>				
<b>Period</b>	<b>Number of Years</b>	<b>AAGR (Compound growth rate)</b>	<b>Population Increase</b>	<b>% Change (full period)</b>
1980-03	23	4.42%	10,998	170%
1983-03	20	4.98%	10,845	164%
1990-03	13	7.12%	10,315	145%
1993-03	10	6.90%	10,845	95%
2000-03	3	8.21%	3,680	27%

**Socioeconomic Trends**

This section reviews historical socioeconomic trends in Redmond. Socioeconomic trends provide a broader context for growth in a city; factors such as age, income, migration and other trends show how communities have grown and shape future growth. To provide context, we compare Redmond with Bend, Deschutes County and Oregon. Characteristics such as age, household composition, and race are indicators of how population has grown in the past and provide insight into factors that may affect future growth. Where relevant, Redmond is compared to Deschutes County.

Figure 4 compares age in Deschutes County and Redmond for 2000. The data show that Redmond has a higher percentage of its population in all of the age classes under 39 except for 15-19 years. This suggests that Redmond is attracting younger households, many of whom have children. Redmond also has a slightly higher percentage of individuals aged 75 or older. Both of these trends are probably related to lower housing costs in Redmond compared to Bend.

**Figure 5. Age distribution, Deschutes County and Redmond, 2000**



Source: U.S. Census, SF-1

During the 1990s Redmond experienced changes in the age structure of its residents. Table 25 shows population by age for the City of Redmond for 1990 and 2000. The Census data show that Redmond grew by 6,537 persons between 1990 and 2000—a 94% increase. The age breakdown provides evidence of how Redmond grew. While Redmond experienced an increase in population for every age group, the fastest growing age groups were 5-17 years and 18-24 years. The under 5 and 45-64 years age groups also grew faster than the citywide average growth rate. The over 65 age group grew the slowest of any of the age groups shown in Table 3.

A comparison of population increase by age between Redmond and Deschutes County shows that:

- Redmond grew faster than Deschutes County. The population of Redmond increased 94% between 1990 and 2000 while Deschutes County experienced a 58% population increase.
- Redmond had a higher percentage of growth in younger age groups. Population in Redmond grew at faster rates for all age groups under 45 years. Deschutes County experienced higher growth rates in the 45-64 year and over 65 year age groups than Redmond.



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The Census data suggest that Redmond is attracting younger individuals—including families with children. Consistent with that finding, Redmond has a slightly higher average household size (2.54 persons) than Deschutes County (2.5 persons). One hypothesis that potentially explains the age structure is that Redmond is getting more of the households that have the service jobs in Bend, and they are trading off lower housing costs against travel time and cost. While ECONorthwest did not have data to prove this conclusively, anecdotal evidence (e.g., discussions with City and County staff) also suggest this is the case.

<b>Table 25.</b>							
<b>Population by Age, City of Redmond, 1990 and 2000</b>							
<b>Age Group</b>	<b>1990</b>		<b>2000</b>		<b>Change</b>		
	<b>Number</b>	<b>Percent</b>	<b>Number</b>	<b>Percent</b>	<b>Number</b>	<b>Percent</b>	<b>Share</b>
Under 5	559	8%	1,129	8%	570	102%	0%
5-17	1,276	18%	2,862	21%	1,586	124%	3%
18-24	514	7%	1,154	9%	640	125%	1%
25-44	2,196	32%	4,121	31%	1,925	88%	-1%
45-64	1,232	18%	2,463	18%	1,231	100%	1%
65 and over	1,167	17%	1,752	13%	585	50%	-4%
Total	6,944	100%	13,481	100%	6,537	94%	0%
<b>Source:</b> U.S. Census, 1990 and 2000							

Table 26 shows the number of persons of Hispanic or Latino origin for Deschutes County, Bend and Redmond for 1990 and 2000. The Census data show that the number of Hispanics in Deschutes County increased by 182% between 1990 and 2000. At 5.5%, Redmond had the highest percentage of Hispanic population in 2000. In summary, similar to statewide trends, the Hispanic / Latino population of Deschutes County, Bend and Redmond are growing faster than the overall population. National demographic trends suggest this trend will continue in Deschutes County.

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<b>Table 26.</b>			
<b>Persons of Hispanic or Latino origin, Deschutes County, Bend and Redmond, 1990 and 2000</b>			
	<b>Deschutes County</b>	<b>Bend</b>	<b>Redmond</b>
<b>1990</b>			
Total population	74,958	20,469	7,163
Hispanic or Latino	1,526	485	197
Percent Hispanic or Latino	2.0%	2.4%	2.8%
<b>2000</b>			
Total population	115,367	52,029	13,481
Hispanic or Latino	4,304	2,396	739
Percent Hispanic or Latino	3.7%	4.6%	5.5%
<b>Change 1990-2000</b>			
Persons	2,778	1,911	542
Percent Hispanic or Latino	182%	394%	275%
<b>Source:</b> U.S. Census, SF-1, 1990 and 2000			

**Housing Trends**

Recent analysis of housing costs between Bend and Redmond shows that the average sale price for a 2200 square foot home, 3-4 bedrooms with 2.5 baths in Bend is \$293,225, while the sale price for the equivalent home in Redmond is \$204,606<sup>42</sup>.

<b>Table 27</b>			
<b>Housing Unit and Household Estimates</b>			
	<b>2000 Census</b>	<b>2003 Estimate</b>	<b>2008 Projection</b>
Total population	13,481	16,652	22,087
Average household size	2.54	2.54	2.54
Owner-occupied	2.6	2.6	2.6
Renter-occupied	2.46	2.46	2.46
Total housing units	5,584		
Occupied (94.2%)	5,260	6,497	8,618
Vacant (5.8%)	324		
Owner occupied (60.6%)	3,185	3,937	5,223
Renter occupied (39.4%)	2,075	2,560	3,394
<b>Source:</b> Rees Consulting, Inc. (2003)			

<sup>42</sup> Rees Consulting, Inc. (2003) Central Oregon Housing Needs Update. Prepared for Central Oregon Regional Housing Authority and The Central Oregon Partnership.

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Figure 6 – Type of Structure

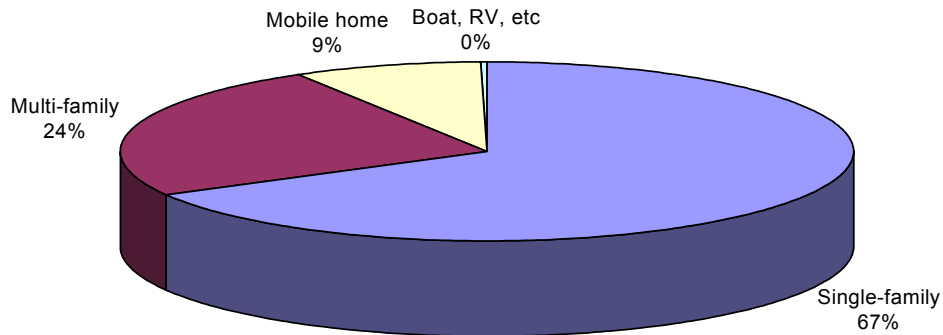


Table 28 Affordability and No. Households Cost Burdened by Housing Payment								
Household Income	Less than \$10,000	\$10,000 - \$19,999	\$20,000 - \$34,999	\$35,000 - \$49,999	\$50,000 - \$74,999	\$75,000 - \$99,999	\$100,000 or more	Total
# Owners	131	292	754	710	841	293	164	3185
# Renters	339	435	743	306	177	36	39	2075
Total	470	727	1497	1016	1018	329	203	5260
Cost Burdened								
# Owners	88	188	292	147	65	0	7	787
# Renters	252	362	284	30	0	0	0	928
Total – 2000	340	550	576	177	65	0	7	1715
Percent – 2000	72%	76%	38%	17%	6%	0%	3%	32.6%
Estimate – 2003	420	679	711	219	80	0	9	2118
Projection – 2008	557	901	944	290	106	0	11	2810
Low Income Households in 2003			≤30% AMI	31 – 50% AMI	51 – 80% AMI	Total		
# Households			693	669	1342	2704		
# Cost Burdened Households			505	506	547	1558		
<b>Source:</b> Central Oregon Housing Needs Update (March, 2003) Rees Consulting, Inc.								

**Summary of Findings**

The City of Redmond makes the following findings in support of its 2000-2025 population growth forecast.

**Redmond has experienced rapid population growth since 1990**

- The total percentage increase in population from 1980 to 2002 was 250%. The average annual growth rate (AAGR) for the period 1980 to 1990 was 0.9%. The AAGR for the period 1990 to 2000 was 6.4%, and the average rate of growth from 1992 to 2002 was 7.4%.
- Between 1980 and 2000, Deschutes County grew at a rate nearly 2.4 times faster than Oregon, while Redmond grew at a rate nearly four times as fast as Oregon.

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- Population growth rates in Redmond increased in 1990 and have sustained high levels since then. However, long-term trends provide a more realistic base for future population forecasts due to factors that affect population growth: regional growth changes, demographic shifts, economic trends, and migration patterns.

**In-migration has accounted for the majority of recent growth and will continue to drive population increases in Redmond through 2025**

- Eighty-one percent of population growth in Deschutes County between 1980 and 2002 was from in-migration. In fact, the rate of in-migration increased in the 1990s, accounting for 86% of population growth. This figure increased to 88% for the 2000-2003 period.
- Only 41% of individuals in Deschutes County lived in the same residence in 1995; the figure was only 31% in Redmond. About one-third of persons in both Deschutes County and Redmond lived in a different county in 1995; about 15% lived in a different state.
- The combination of outdoor and urban amenities are likely to continue attracting people to Deschutes County. In fact, the presence of new urban amenities will probably attract some households that wouldn't have moved the region previously. The urban amenities, combined with the fact that cities in Deschutes County are still relatively small (Bend, the largest city had a 2003 population was 62,900) and have a small town feel provides a combination of factors that are extremely attractive to households. Advances in telecommunications make many households less bound to geography.

**Redmond is attracting younger households, many of whom have children**

- Redmond has a higher percentage of its population in all of the age classes under 39 except for 15-19 years. This suggests that Redmond also has a slightly higher percentage of individuals aged 75 or older. Both of these trends are probably related to lower housing costs in Redmond compared to Bend.
- During the 1990s Redmond experienced changes in the age structure of its residents. While Redmond experienced an increase in population for every age group, the fastest growing age groups were 5-17 years and 18-24 years. The under 5 and 45-64 years age groups also grew faster than the citywide average growth rate. The over 65 age group grew the slowest of any of the age groups.
- Redmond has a slightly higher average household size (2.54 persons) than Deschutes County (2.5 persons). One potentially explanation of the age structure is that Redmond is getting more of the households that have the service jobs in Bend, and they are trading off lower housing costs against travel time and cost.

**Redmond is becoming more diverse**

- The number of Hispanics in Deschutes County increased by 182% between 1990 and 2000. At 5.5%, Redmond had the highest percentage of Hispanic population of any incorporated City in Deschutes County in 2000.

## **City of Sisters Forecast**

The official July 1, 2003 population estimated for the City of Sisters is 1,430 (Portland State University, PRC July 1, 2003 estimates). In Sisters, the Sisters City limits and Urban Growth Boundary are coincident, so this estimate and further estimates refer to the City and UGB. The City of Sisters (hereafter referred to as Sisters or City) population is forecast to remain small compared to the other jurisdictions, but will experience consistent growth over the long-term. . The City's population forecasting methodology, assumptions made, factual basis, and yearly population forecasts to the year 2025 are presented below.

### **1. Forecast Table**

The City of Sisters expects population growth as described in *Table 29: Population Forecast in Five-Year Increments*. Tables 29 and 30 are summary tables that provide a quick overview of the population forecasts for the Sisters UGB between 2000 and 2025. Additional information in the following pages fully explains the assumptions and factual basis for these forecasts. All relevant and referenced materials should be reviewed and understood in order to understand the forecasts to avoid unnecessary duplication of information.

<b>Table 29 Population Forecast in Five-Year Increments</b>		
<b>Year</b>	<b>City of Sisters Population <sup>2</sup></b>	<b>5-year Average Annual Growth Rate (previous to current year)</b>
2000	975 <sup>1</sup>	NA
2005	1,768	12.64%
2010	2,306	5.46%
2015	2,694	3.16%
2020	3,166	3.28%
2025	3,747	3.43%

<sup>1</sup> Source: PRC July 1, Official Population Estimate for City of Sisters.

<sup>2</sup> Source: Population Estimates by City of Sisters, see Table 30.

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**Table 30  
Population and Building Permit Forecasts for the Sisters UGB:  
2003-2025**

Forecast Year	Forecasted Rate of Building Permit Growth <sup>1</sup>	Forecasted Residential Housing Units <sup>2</sup>	Forecasted New Residential Building Permits Issued/Yr. <sup>3</sup>	Persons per Dwelling Unit <sup>4</sup>	Population Forecast <sup>5</sup>
2003	NA	725	104	NA	1,430
2004	11.10%	805	80	1.99	1,590
2005	11.10%	895	89	1.99	1,768
2006	8.90%	Declining 975	80	1.99	1,927
2007	5.40%	Influence of New Sewer 1,027	53	1.99	2,031
2008	4.30%		44	1.99	2,119
2009	4.30%	1,117	46	1.99	2,211
2010	4.30%	1,165	48	1.99	2,306
2011	3.13%	1,202	36	1.99	2,379
2012	3.13%	1,240	38	2.00	2,454
2013	3.13%	1,278	39	2.00	2,532
2014	3.13%	1,318	40	2.00	2,612
2015	3.13%	Rate of Building Permit Growth same rate as 1990 through 2000 1,360	41	2.00	2,694
2016	3.13%	1,402	43	2.00	2,780
2017	3.13%	1,446	44	2.10	2,872
2018	3.13%	1,491	45	2.10	2,967
2019	3.13%	1,538	47	2.10	3,065
2020	3.13%	1,586	48	2.10	3,166
2021	3.13%	1,636	50	2.20	3,275
2022	3.13%	1,687	51	2.20	3,388
2023	3.13%	1,740	53	2.20	3,504
2024	3.13%	1,794	54	2.20	3,624
2025	3.13%	1,850	56	2.20	3,747

<sup>1</sup> Source: Rates between 2004 through 2010 based on weighted average of growth rates before and after the construction of the municipal sewer, see Table 37. Rates of Building Permit Growth between 2011 and 2025 based on rate of housing unit growth between 1990-2000 as determined by the U.S. Census, see Table 34.

<sup>2</sup> Source: "Forecasted Residential Housing Units" based on "Forecasted Rate of Building Permit Growth" applied to base of 725 Residential Housing Units in 2003, and grown by the applicable rate per year.

<sup>3</sup> Source: Current year minus previous years "Forecasted Residential Housing Units", for example in 2004, 805 Forecasted Residential Units in 2004 minus 725 Forecasted Housing Units in 2003 equals 80.

<sup>4</sup> Source: Persons per Dwelling Unit of 1.99 is from the 2000 U. S. Census, SF-1.

This statistic accounts for vacancy rates and second homes. The statistic increases over time as estimated here by the City of Sisters Planning Department based on the assumption that the City will approach the State of Oregon statistic of 2.4 Persons Per Dwelling Unit as determined by the 2000 U.S. Census, SF-1. In other words, the City of Sisters will become more like the state in terms of persons per household in the future.

<sup>5</sup> Source: Calculated by adding the total of (Total Res. Permits/Yr. in Sisters UGB x Persons Per Dwelling Unit) to previous year's Population Forecast.

## 2. Method

The City of Sisters uses a housing unit method based on housing unit trends to estimate future population growth in Sisters. The following discussion in the Methodology portion of this report explains the general process and methods used to determine future population. The factual basis and assumptions for the forecasts are provided in the Factual Basis portion of this report.

### Overview of Methodology Used to Determine Population Forecasts

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The City of Sisters' methodology for determining population is based on the current estimates of the City's population (from PRC) plus estimates of population growth based on the number of new residential building permits that will be issued in the city between 2004 and 2025. The housing unit method approximates population for the city based on the number of occupied housing units in the city multiplied by the city's average household size. Based on the number of building permits issued each year, and the number of people per household (considering vacancy rate and local demographics) it is possible to forecast how many people will be "added" to the City in the future.

This technique is one of the most feasible, accurate, and cost-effective among the major methods of population estimation available for small geographies such as Sisters. Using the number of building permits coupled with other demographic information to estimate population is commonly used to estimate populations for small geographic areas. Different versions of the housing unit model are used by the US Census Bureau to estimate sub-County populations and by a wide variety of cities, counties, states and special districts. The official yearly estimates of the City's population determined by Portland State University's Center for Population Research and Census are based on a housing unit method.

**Overview of Factors Resulting in Forecast**

As discussed in greater detail later in the Factual Basis portion of the report, the City of Sisters has recently experienced a surge of residential building activity and population growth. The City assumes this surge will decrease back to levels of building activity and population growth experienced between 1990 and 2000.

**Assumptions**

The act of forecasting requires that assumptions be made. There is no single right "answer" or "equation" that will result in an infallible population forecast. Therefore, assumptions are an integral part of making a forecast and are discussed explicitly. As much as possible and feasible, factual information is provided to substantiate assumptions that are made to demonstrate that the resulting forecast is reasonable. Where factual information is lacking, assumptions are still discussed. Important in all discussions of assumptions is not if all assumptions are exactly right, but if they are reasonable, since nearly all assumptions could be varied slightly to change the entire forecast.

**3. Factual Base**

The following discussion is a description of the reasoning, assumptions, factual information, and results of the population forecasting methodology.

**Step 1: Determining Appropriate Sources of Data**

*Step 1(A): U.S. Census Data and Portland State University PRC Data*

The City relies upon data from the 1990 and 2000 U.S. Censuses and Portland State University's PRC July 1 Official Population Estimates to estimate population in the City. For census years (1990, 2000, 2010, etc.) the City uses information to describe demographic and housing characteristics and trends. The U.S. Census data is 100-percent data count of persons in the City of Sisters.

Assumption: The City assumes that U.S. Census data and PRC Official Population Estimates are reliable and accurate sources of demographic and housing data. The City assumes

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relevant data from these sources can be used to describe the characteristics of the City, as a basis for calculating rates of growth describing past and current trends, and for background information.

*Step 1(B): City issued building permits for residential structures are an appropriate measure to estimate population. By predicting how many building permits will be issued in combination with information such as persons per dwelling unit, population can be predicted.*

The growth of the City's population is estimated in part based on the growth of building permits. The City believes this is an accurate and reliable means of estimating population for the City. The building permit information presented in the following discussion refers to building permits for residential structures (single-family, duplexes, triplexes, town homes, multi-family, etc.) after subtracting demolitions. Demolition permits are required by the City when existing dwelling units are destroyed or removed. The City believes that nearly all demolitions receive demolition permits, but like all permit processes, some persons who remove a dwelling unit do not receive a permit. The City assumes a very small fraction of demolitions occur without permits and any differences between actual demolitions and permitted demolitions is negligible in examining rates of growth and using rates of growth for predictive purposes. The small difference in actual demolitions versus permitted demolitions is explained in more detail in Table 35.

**Assumption:**

Building Permits issued for residential structures in the future (coupled with information on persons per household) is an accurate method to estimate the future population of the City.

An alternative to the City's assumption is that building permits are not appropriate for this use, and that there is no connection between the construction of residential buildings and population. Facts presented below demonstrate the City's assumption is reasonable.

*Factual Basis for Assumption*

The information presented below demonstrates that rates of building permit issuance closely match population growth in Sisters. In Table 31 average annual rates of population growth for the periods between 1990 and 2000 and 2001-2003 are shown.

<b>Table 31 City of Sisters Population Growth Rates, 1990-2000, 2000-2003</b>		
<b>Year</b>	<b>City of Sisters Population</b>	<b>5-year Average Annual Growth Rate (1990- 2000, 2000-2003) <sup>3</sup></b>
1990	679 <sup>1</sup>	NA
2000	975 <sup>2</sup>	3.68%
2003	1,430 <sup>2</sup>	13.62%

<sup>1</sup> Source: 1990 U.S. Census, Summary File 1 (SF-1) 100-Percent Data

<sup>2</sup> Source: PRC July 1, Official Population Estimate City of Sisters

<sup>3</sup> Source: Calculated based on Future Value = Present Value (1+r) <sup>t</sup>



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Population estimates in Table 31 show a rapid increase between 2001 and 2003 compared to the rate of growth over the previous decade. As further discussed in Appendix C, this is due to construction of a municipal wastewater treatment facility that was mostly completed by year 2001.

Over the period of time between 1990 and 2000, the number of housing units increased 3.13 percent/year according to Table 32. Note in Table 33, using the exact same source of data (U.S. Census data), the rate of population growth was 3.51 percent per year. These two rates of average annual growth are very similar. Differences may occur if there are shifts in the number of people per dwelling unit. As shown in Appendix C, in 1990 the City's rate of Persons Per Housing Unit was 1.90 and increased to 1.99 in year 2000 (U.S. Census, see Appendix C). The City predicts this increase is one reason why the rate of population in Table 33 grew faster than for dwelling units in Table 32. This information demonstrates why it is appropriate to use the number of new dwelling units to predict population, in combination with other important data.

<b>Table 32</b>		
<b>Rate of Housing Unit Growth in City of Sisters, 1990 and 2000</b>		
<b>Period</b>	<b>Number of Total Housing Units In City of Sisters</b>	<b>Average Annual Growth Rate of Building Permit Issuance</b>
1990-2000 <sup>1</sup>	354 to 482 housing units	3.13%

<sup>1</sup> Source: 1990 and 2000 U.S. Census, Summary File 1 (SF-1) 100-Percent Data

Table 33 shows that according to the U.S. Census the City's population grew at 3.51 percent per year between 1990 and 2000. This is slightly different than PRC's estimates of population during the same time period because the U.S. Census reflects April's population and PRC reflects July 1 population for the year. Tables 32 and 33 demonstrate that there is a 0.38 percent per year difference between population growth and growth of housing units in the City, further substantiating that rates of growth of housing units are comparable to population growth rates (all else being equal).

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<b>Table 33</b>		
<b>Rate of Population Growth in City of Sisters, 1990-2000</b>		
<b>Period</b>	<b>Population by Year, City of Sisters</b>	<b>Average Annual Growth Rates of Population</b>
<i>1990-2000</i> <sup>1</sup>	679 to 959 people	3.51%

<sup>1</sup> Source: 1990 and 2000 U.S. Census, Summary File 1 (SF-1) 100-Percent Data

Comparing Table 33 with Table 32 further demonstrates the appropriateness of using building permits to estimate population even in times of rapid changes with respect to building activity. Table 31 shows that according to PRC's Official July 1 Population Estimates for Sisters between 2001 and 2003; the population grew at a rate of 13.62 percent per year. Comparing this to the rate of housing unit growth explained in Tables 34 and 35, total housing units grew at a rate off 14.57 percent per year over the same time period (2001-2003). Although not exactly the same, nor as closely related as the rates shown between 1990 and 2000, the rates differ by only less than 1%. This may be explained by a change in the vacancy rate as a result of the rapid building activity.

<b>Table 34</b>		
<b>Comparative Housing Unit Growth Rates, 1990-2000 and 2001-2003</b>		
<b>Period</b>	<b>Number of Total Housing Units</b>	<b>Average Annual Growth Rate of Housing Construction</b>
<i>1990-2000</i> <sup>1</sup>	354 to 482 housing units	3.13%
<i>2001-2003</i> <sup>2</sup>	482 to 725 housing units	14.57%

<sup>1</sup> Source: 1990 and 2000 U.S. Censuses, Summary File 1 (SF-1) 100-Percent Data

<sup>2</sup> Source: City of Sisters Building Permits for Residential Units, after subtracting demolitions.

Table 35 below, shows exactly how many building permits for residential units after subtracting demolitions were issued by year in the City between 1990 and 2003. Using data from the 1990 U.S. Census to estimate the number of housing units in the City and adding each year's additional building permits provides a running total of the number of housing units in the City by year. This demonstrates the slow rate of building in the early 1990's, the acceleration in anticipation of construction of the municipal sewer in 1996, the dramatic and sustained increases in issuance of building permits as the sewer became operational, and the continued rate of building permit issuance since the sewer's completion.

Table 35 also provides two data points from the U.S. Census in 1990 and 2000 which help evaluate the accuracy of the City's records with respect to using residential building permits to predict housing units. Total housing units in 1990 and 2000 are from the U.S. Census, but years in between are calculated by adding the Building Permits for Residential Units (by year) to the previous year's Total Housing Units. In 2000, the U.S. Census estimated 482 housing units in the City. If each year's building permits are added up between 1991 and 2000 it equals 496 Total Housing Units. This is only a 16 building permit difference between the City's calculated number of Total Housing Units and the U.S. Census data. This difference is most likely due to demolitions that were not permitted but actually occurred. This indicates the City did not permit an average of 1.6 demolitions per year over a 10 year period. To account for this the City uses housing unit growth rates calculated based on the U.S. Census for estimation later in this report.

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<b>Table 35 Building Permits Issued by City, Growth Rates, and U.S. Census Data</b>			
Year	Building Permits for Residential Units <sup>1</sup>	Total Housing Units <sup>2</sup>	Average Annual Rate of Growth of Total Housing Units
1990	7	<b>354</b>	NA
1991	10	364	2.8%
1992	4	368	1.1%
1993	11	379	2.9%
1994	5	384	1.3%
1995	5	389	1.3%
1996	13	402	3.3%
1997	13	415	3.2%
1998	11	426	2.7%
1999	20	446	4.7%
2000	52	<b>482</b>	8.1%
2001	69	551	14.3%
2002	70	621	12.7%
2003	104	725	16.7%

<sup>1</sup> Source: City of Sisters Building Permits for Residential Units (with demolitions subtracted)

<sup>2</sup> Source: Housing unit counts in 1990 and 2000 from U.S. Census, remaining are past year's Total Housing Units plus the Building Permits for Residential Units of each year (ex. 354 Total Housing Units in 1990 + 10 Building Permits in 1991 = 364 Total Housing Units for 1991).  
Note: In 2000, a difference of 16 Total Housing Units between calculated 496 Total Housing Units and US Census of 482 Total Housing Units.

The factual information above supports the City's assumption that using residential building permits to approximate the growth of housing units and to predict population is appropriate when used with other information such as the number of people per dwelling unit. The rates of growth of the City's housing units and population mirror each other over a decade between 1990 and 2000 as well as during a short period such as 2001-2003. Increases in housing unit construction are mirrored by the increases in the official population estimates by PRC. Multiple sources of public data verify these conclusions.

**Step 2: Determining Appropriate Rates of Growth for the Future**

As shown in Tables 31 and 34, a rapid increase in the City's population occurred after the year 2000 and continues today. The City assumes this change was due to the construction of a municipal sewer system resulting in a surge of residential building activity, increased housing stock, and then population increases proportional to the new housing. The City is faced with predicting population growth in a local "boom" cycle within a larger County which has (and is expected) to experience sizable population increases.

Assumption: The historic rate of population growth between 1990 and 2000 is not appropriate as the sole predictor for future growth from 2004 to 2025.

*Factual Basis for Assumption:*

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In years 1990 through 2000, no municipal sewer was available and residential development was limited to single-family development on large (1/2 acre) lots. The relatively low average annual population growth rate of 3.68 percent per year between 1990 and 2000 shown in Table 31 reflects this when compared to the rate of population growth after the municipal sewer installation in 2001. In years 2001 to 2003 the average annual rate of population growth in the City was 13.62 percent per year, nearly four times the rate during the 1990s. In addition, the City's development codes were dramatically updated in 2001, implementing the Department of Land Conservation and Development's "Model Development Code". This code facilitates development of infill and smaller lot sizes. Thus, the conditions (new sewer and code) present in 2004 and beyond are significantly different than in the 1990's and a predictive rate or methodology that considers new conditions is necessary to accurately predict future population growth.

Assumption: The extraordinary rate of population growth experienced between 2001 and 2003 is a result of new conditions such as a new municipal sewer and Development Code, and therefore should not be used as the sole predictor for future growth from 2004 to 2025.

*Factual Basis for Assumption:*

As shown in Table 31, in years 2001 to 2003 the average annual rate of population growth in the City was 13.62 percent per year, nearly four times the rate during the 1990s. Although building permit activity for year 2003 was the highest on record for the City, other sources of information suggest that 2003 may be the "crest" of the wave of building activity. For example, in Appendix C, there were five fewer partitions in 2003 as in 2002 (Appendix C, Table 3). Likewise, there was a decrease in lots created via subdivision, from 85 to 22 between 2002 and 2003 (Appendix C, Table 4). Building permits are also tracking to be slightly less in 2004 than 2003. Keep in mind that a handful of applications could result in a dramatic change upward in this trend. However, it appears that the immediate affect of the new sewer and development code may be slowing slightly.

Assumption: The high rate of building permit issuance and population growth between 2001 and 2003 will slowly decrease to a slower rate of growth approximated by population and building permit growth rates of the 1990s.

*Factual Basis for Assumption:*

The factual basis demonstrating why it is inappropriate to rely upon population growth rates between 1990 and 2000 or between 2001 and 2003 is incorporated herein. The methodology to predict the future then is based on the following discussion.

*Step 2(A) Predicting the Decline of the Current Rapid Population Growth in Sisters*

An examination of when and how much the development of the municipal sewer system influenced growth is presented in Table 36. This analysis assumes the extent of the influence of the new sewer on higher growth will decline at approximately the same rate in which it increased. The rise and decline is expressed in building permits for residential units after subtracting for demolitions.

The City assumes the public debate preceding the public vote on the sewer in 1998 exerted a minor influence upon development decisions resulting in additional building permit issuance in 1996 and 1997. This is demonstrated by the relatively small increases in building permit activity between 1996 and 1997 compared to the following years. The assumption is that

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this is a small, or gradual effect took place since the number of building permits in 1996 and 1997 relative to the 2003 "peak" is only 10 percent. The municipal sewer was approved by voters in 1998 but not completed until 2001. In years 1998 through 2003 there is a steady increase in the number of building permits issued. In years 2001 and 2002, building permit issuance was 70 percent of the peak in each year.

Table 36 relates the number of building permits issued for residential units to the peak year of permit issuance in 2003 in order to predict how long the influence of the sewer may last in years to come (as predicted in Table 37). Implicit is the assumption that as the sewer influenced building prior to the peak of 2003, its influence will similarly decline in the coming years. This is an attempt to mathematically represent the timing of the influence of the sewer, and to quantify its affects relative to building permit issuance. From this information, the City assumes that the affect of the sewer started gradually in 1996 and peaked in 2003. In each year after 1996 the influence of the sewer system is expressed as the Percent of Annual Building Permits to Peak of 2003.

<b>Table 36</b>			
<b>Influence of New Sewer Upon Residential Building Permits</b>			
<b>Year</b>	<b>Building Permits Issued for Residential Units <sup>1</sup></b>	<b>Percent of Annual Building Permits to Peak of 2003 <sup>2</sup></b>	<b>Permits to Peak of 2003 Rounded, Used to Estimate Future Decline <sup>3</sup></b>
1990	7	NA	Sewer System Not Influencing
1991	10	10%	Sewer System Not Influencing
1992	4	4%	Sewer System Not Influencing
1993	11	11%	Sewer System Not Influencing
1994	5	5%	Sewer System Not Influencing
1995	5	5%	Sewer System Not Influencing
1996	13	13%	10%
1997	13	13%	10%
1998	11	11%	10%
1999	20	19%	20%
2000	52	50%	50%
2001	69	66%	70%
2002	70	67%	70%
2003	104	100%	Peak of "Pent up Demand"

<sup>1</sup> Source: City of Sisters Building Permits for Residential Units (with demolitions subtracted)

<sup>2</sup> Source: Calculated based on the "Building Permits for Residential Units" for each year divided by the estimated peak of 104 building permits in year 2003.

<sup>3</sup> Source: City of Sisters Planning Department assumes that the planning and publicity regarding construction of the municipal sewer accelerated building of residential units prior to the sewer construction (beginning in 1996) and this "pent up demand" for residential structures peaked in 2003.

Table 37 uses the information in Table 36 further and results in weighted growth rates that are used to determine future building permit issuance based on the declining influence of the new sewer. Implicit is the assumption that the rate of increase of building permit issuance caused by the new sewer will be stronger in the upcoming years, decrease over the same period of time as the increase (7 years), and reduce in effect over the time period.

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Since the City requires rates of growth of future building permit issuance to predict future population, Table 37 produces a growth rate (in last column) that is the result of weighting the faster growth rates experienced during 2001-2003 and the slower rates between 1990 and 2000. The growth rates that are weighted represent growth of housing units are from Table 34.

In the second column of Table 37, a 14.57 percent per year growth rate represents the actual “peak” growth rate of the period between 2001 and 2003. The third column represents the actual “pre-sewer” rate of growth of 3.13 percent per year experienced between 1990 and 2000. The last column contains yearly growth rates for building permit issuance calculated based on the weighted values in the previous two rows.

The weighted values in the column “2001-2003 Annual Average Growth Rate of Building Permits (14.57%) Weighted by Following %” come directly from Table 36. For example, in Table 36, in year 2002 building permit issuance was 70 percent of the peak of 2003. Following the assumption that the influence of the sewer will decline as it rose, then in year 2004, the most recent rate of building permit growth between 2001 and 2003 (14.57 percent) is weighted by 70 percent and the 1990-2000 rate of building permit growth (3.13) is weighted by 30 percent as shown in Table 37. The resulting weighted growth rate for the year 2004 is 11.1 percent. For 2005, the resulting weighted growth rate is the same because as shown in Table 36, two year preceding the peak building permit issuance of 2003, 70 percent of the building permit peak occurred. This calculation was performed for each year in Table 37 according to the “Permits to Peak Rounded, Used to Estimate Future Decline” in Table 36, preceding the peak year of 2003 until the effect of the sewer is anticipated to be gone, in year 2012.

<b>Table 37</b>			
<b>Weighted Growth Rates to Estimate Declining Influence of New Sewer System</b>			
<b>Projection Year</b>	<b>2001-2003 Annual Average Growth Rate of Building Permits (14.57%) Weighted by Following %<sup>1</sup></b>	<b>1990-2000 Annual Average Growth Rate of Building Permits (3.13%) Weighted by Following %<sup>1</sup></b>	<b>Building Permit Growth Rate/Yr Used in Projection<sup>2</sup></b>
2004	70%	30%	11.1%
2005	70%	30%	11.1%
2006	50%	50%	8.9%
2007	20%	80%	5.4%
2008	10%	90%	4.3%
2009	10%	90%	4.3%
2010	10%	90%	4.3%
2012	10%	90%	4.3%

<sup>1</sup> Source: Growth rates for periods 1990-2000, 2001-2003 from Table 34.

<sup>2</sup> Source: Calculated based on formula ((Weighted % x (rate)) + (Weighted % x (rate))) = Building Permit Growth Rate/Yr Used in Projection).

The resulting weighted rates of building permit growth are shown in the last column of Table 37. These are used to predict the number of building permits that will be issued in the City reflecting the declining influence of the municipal sewer system and declining rate of growth.

Table 38 demonstrates the purpose of Tables 36 and 37 and results in predictions of new building permits issued in the City between 2004 and 2025. From the number of building permits for residential dwellings issued in this period in combination with the number of persons

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per dwelling, yearly population estimates are constructed. The assumption is rapid growth of the 2001-2003 period will decline as shown to a rate of 3.13 percent per year. The rate of 3.13 percent per year growth of residential building permits is the same rate of building permit issuance between 1990 and 2003 (see Table 35). This is appropriate because it is over a 10 year period, is relatively recent, and was the rate of growth in housing units prior to the major affect of the new municipal sewer.

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**Table 38**  
**Forecasted Rates of Building Permit Issuance, Housing Units, and New Residential Building Permits Issued/Yr. (not including rural transfer)**

Forecast Year	Forecasted Rate of Building Permit Growth <sup>1</sup>	Forecasted Residential Housing Units <sup>2</sup>	Forecasted New Residential Building Permits Issued/Yr. <sup>3</sup>	Persons per Dwelling Unit <sup>4</sup>	Population Forecast <sup>5</sup>
2003	NA	725	104	NA	1,430
2004	11.10%	805	80	1.99	1,590
2005	11.10%	895	89	1.99	1,768
2006	8.90%	Declining 975	80	1.99	1,927
2007	5.40%	Influence of 1,027	53	1.99	2,031
2008	4.30%	New Sewer 1,071	44	1.99	2,119
2009	4.30%	1,117	46	1.99	2,211
2010	4.30%	1,165	48	1.99	2,306
2011	3.13%	1,202	36	1.99	2,379
2012	3.13%	1,240	38	2.00	2,454
2013	3.13%	1,278	39	2.00	2,532
2014	3.13%	1,318	40	2.00	2,612
2015	3.13%	Rate of Building 1,360	41	2.00	2,694
2016	3.13%	Permit 1,402	43	2.00	2,780
2017	3.13%	Growth 1,446	44	2.10	2,872
2018	3.13%	same rate as 1990 1,491	45	2.10	2,967
2019	3.13%	through 1,538	47	2.10	3,065
2020	3.13%	2000 1,586	48	2.10	3,166
2021	3.13%	1,636	50	2.20	3,275
2022	3.13%	1,687	51	2.20	3,388
2023	3.13%	1,740	53	2.20	3,504
2024	3.13%	1,794	54	2.20	3,624
2025	3.13%	1,850	56	2.20	3,747

<sup>1</sup> Source: Rates between 2004 through 2010 based on weighted average of growth rates before and after the construction of the municipal sewer, see Table 37. Rates of Building Permit Growth between 2011 and 2025 based on rate of housing unit growth between 1990-2000 as determined by the U.S. Census, see Table 34.

<sup>2</sup> Source: "Forecasted Residential Housing Units" based on "Forecasted Rate of Building Permit Growth" applied to base of 725 Residential Housing Units in 2003, and grown by the applicable rate per year.

<sup>3</sup> Source: Current year minus previous years "Forecasted Residential Housing Units", for example in 2004, 805 Forecasted Residential Units in 2004 minus 725 Forecasted Housing Units in 2003 equals 80.

<sup>4</sup> Source: Persons per Dwelling Unit of 1.99 is from the 2000 U. S. Census, SF-1.

This statistic accounts for vacancy rates and second homes. The statistic increases over time as estimated here by the City of Sisters Planning Department based on the assumption that the City will approach the State of Oregon statistic of 2.4 Persons Per Dwelling Unit as determined by the 2000 U.S. Census, SF-1. In other words, the City of Sisters will become more like the state in terms of persons per household in the future.

<sup>5</sup> Source: Calculated by adding the total of (Total Res. Permits/Yr. in Sisters UGB x Persons Per Dwelling Unit) to previous year's Population Forecast.

#### Step 4: A Comprehensive Population Forecast for the Sisters UGB

The following population forecast presented in Table 38 assembles the data, methodologies, and assumptions in the preceding pages to result in a population forecast that demonstrate:

1. Historic rates of housing unit growth from 1990 to 2000 closely match population growth over the same period of time, and because of this, using the issuance of new building permits to predict population growth (along with persons per dwelling unit data) is accurate and appropriate;



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2. New building permits issued by the City for residential structures after subtracting demolitions closely match U.S. Census Data for housing units;
3. Planning and construction of a new municipal sewer in the City starting in 1998 and finishing in 2001 resulted in a dramatic increase of building permit issuance, housing construction, and population growth that has continued since completion of the sewer;
4. Official PRC Population Estimates for the City's population closely match the issuance of new building permits by the City for residential units;
5. The City expects the high rate of building permit issuance for residential structures and rates of population growth to decline at approximately the same rate as they increases as a result of the municipal sewer construction;
6. The rate of building permit issuance will normalize in the next seven years to levels of housing unit growth observed in the City between 1990 and 2000;
7. From 2011 to 2025, the rate of housing unit growth will be the same as the rate of growth in the Sisters City Limits between years 1990 and 2000

It is important to reference the discussion of "persons per dwelling unit" in Appendix C as it relates to Table 38. Persons per dwelling unit accounts for second homes and vacancies because it takes the total number of people in an area and divides it by the total number of dwelling units. The City uses persons per dwelling unit to predict future populations in concert with building permits for residential dwelling units.

Also important is the very local nature of the statistic "persons per dwelling unit". Deschutes County, Bend, Redmond, and Sisters may all share a general proximity, but the specific housing characteristics of each community vary greatly. Therefore, it is appropriate for each jurisdiction to use its own estimates to reflect local norms. Between 1990 and 2000, the City of Sisters has seen a slow increase in the number of persons per dwelling unit, from 1.9 to 1.99 (see Appendix C, source U.S. Census). The City expects this trend to continue and for the City to become more like the surrounding communities and state. Generally, rates for persons per household are higher for a city, but since Sisters is a recreation oriented city with numerous second homes and vacation homes, a rate of 1.99 is not abnormal. However, the City assumes that this will normalize as the City grows, diversifies, and attracts increasing numbers of younger families and adults with more children.

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