

6-1-2006

# Centennial School District: Enrollment Forecast, 2004 to 2015

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## Recommended Citation

Portland State University. Population Research Center and Hough, George C. Jr., "Centennial School District: Enrollment Forecast, 2004 to 2015" (2006). *School District Enrollment Forecast Reports*. 10. <https://pdxscholar.library.pdx.edu/enrollmentforecasts/10>

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**CENTENNIAL SCHOOL DISTRICT**  
**SCHOOL ENROLLMENT FORECAST, 2004 TO 2015**

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**March 2005**  
**Updated June 2006**

# ENROLLMENT FORECASTS FOR CENTENNIAL SCHOOL DISTRICT

## EXECUTIVE SUMMARY

The Population Research Center at Portland State University was asked by Centennial School District to provide enrollment forecasts for the District by grade level for the years 2004 to 2015.

This report presents enrollment forecasts for the school district, as well as background information on the District, and the methods used for the forecast.

### Enrollment Trends

Our analysis begins by examining historic patterns of growth in the District from 1990 to 2004, the most recent school year for which enrollment data are available. Census data for 1990 and 2000 also provide critical information on population and housing that is needed to make the enrollment forecast. There was rapid enrollment growth in the Centennial School District from 1990 to about 1994, growing from 4,971 to 5,561 students, or about 3 percent annually. Growth from 1994 to 2000 slackened, with an overall increase of 453 students. From 2000 to 2004 the district has grown at an annual rate of 1.5 percent, or 349 students. These differences in the levels of recent growth raise questions about what growth rates are likely to be experienced in the future.

Table 1. Centennial School District Enrollment by Grade Level and Year.

Grade/Yr	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
K-5	2,425	2,471	2,664	2,637	2,686	2,664	2,795	2,765	2,791	2,756	2,820	2,844	2,892	2,831	2,936
6-8	1,216	1,265	1,253	1,326	1,342	1,429	1,385	1,412	1,354	1,425	1,437	1,538	1,515	1,529	1,530
9-12	1,330	1,376	1,399	1,485	1,533	1,492	1,643	1,657	1,744	1,743	1,757	1,789	1,854	1,898	1,897
Total	4,971	5,112	5,316	5,448	5,561	5,585	5,823	5,834	5,889	5,924	6,014	6,171	6,261	6,258	6,363

### Population Trends

Studies by the Population Research Center (PRC), Metro, and the City of Gresham and Clackamas County planners suggest that the population growth rates for the Centennial area have fluctuated between 1.5 and 3.5 percent annually since 1990. Decennial census data demonstrated that the Centennial School District population grew at an average annual increase of 1.9 percent from 29,655 in 1990 to 35,775 in 2000. Since 2000, we estimate that the District's population has been increasing at 2.1 percent annually.

## **Housing and Population Forecasts**

In order to develop assumptions for future growth in the Centennial School District (CENT), we contacted planners for the City of Gresham, Multnomah and Clackamas counties, and Metro as well as several local real estate developers. The Office of Economic Analysis for the State of Oregon sees weak growth in Multnomah County over the next decade or so, with a population growth rate under 0.7 percent annually; Clackamas County is expected to see growth rates twice this average at 1.6 over the coming decade. Due to an expansion of the Urban Growth Boundary, local planners believe that the CENT population is likely to grow more quickly than either county in the next few years, and to experience more rapid growth in the longer term because other areas in Multnomah and Clackamas counties contain fewer areas for housing development. When asked about a reasonable range for the CENT area population growth over the next decade or so, local planners suggest that a range of 1.58 to 3.04 percent annually seems to span the boundary of low to high.

We contacted several local developers to ask them about the number of housing units under development, about their expectations for future housing growth, and about the areas where new housing construction is likely to take place. We also attended planning meetings discussing concept plans for the development of the Damascus area and Springwater Corridor, and integrated results published by ECONorthwest. There are currently several hundred or more units approved for possible construction; however, the strength of the local economy and the demand for new housing are tentative. There is considerable uncertainty about housing construction in the immediate years. Several housing projects are approved for the Damascus area, but there are no immediate plans to start large housing developments in the CENT School District for another few years. There continues to be moderate development of smaller projects in the area. Given the housing projects (for both multiple and single family units) now under consideration, it appears that there may be about 240 to 500 new housing units added in the District each year in the longer term. We estimate that, if 340 new housing units are added each year in the District, the District's population will increase by about 2.2 percent (medium growth assumption).

### **Housing and Population Growth Assumptions for the Enrollment Forecast**

We made a medium or "most likely" school enrollment forecast for the Centennial School District assuming that there will be about 320 new housing units added in the District each year for the next five to six years. By 2010, we assume that housing development will increase to about 365 new units each year. Such housing development implies that the District's population will increase by 2.2 percent annually between 2004 and 2015.

For an assumption about lower growth, we assume that there will be an immediate change from the current conditions and that only 230 new housing units will be added annually in the District. By 2010, we assume that housing development will increase to over 250 new units each year. If this should occur, the District's population would increase by about 1.58 percent annually between 2004 and 2015, a percent increase in population that is at the low end of the range of forecasts by local planners.

For an assumption about higher growth, we assume that there will be about 410 housing units added each year -- or considerably higher than the number expected for the next few years by local developers. Nevertheless, it is important to note that more than 400 housing units were added for a few years in the 1990s. An assumption of more than 500 new housing units is not out of range, if the local economy revives and several possible large housing projects occur. By 2010 we assume that housing development will increase to over 580 new units each year. If the higher growth scenario occurs, the District's population would increase by about 3.04 percent annually between 2005 and 2015.

It is difficult to select the appropriate housing and population growth assumptions for Centennial School District right now. Current housing growth is in the medium range of possible assumptions - probably close to those made for the "most likely" growth scenario. It appears the local economy will revive within the next year or so, and housing growth will increase. There are only a few areas of Multnomah and Clackamas counties with prospects for larger housing developments and the CENT area is one of them. When the economy improves and stronger job growth resumes, the prospects are that housing and population growth in Centennial will resemble the medium to possibly high growth assumptions.

### Enrollment Forecasts

We have prepared three district-wide enrollment forecasts, based on the three sets of assumptions about housing and population growth patterns between now and 2015. Based on current trends, we expect continued growth in school enrollments, with larger increases expected in the K-5 grades.

**Low growth.** The low growth assumption forecasts slower, but continuous, enrollment increases for the District. *The low growth assumption suggests that overall school enrollments will increase from 2004 levels of 6,363 to 7,099 in 2015, an increase of 736 students.* Even if housing and population growth continues at this lower rate, there will still be increases in Centennial's school enrollments, especially from 2008-2015 when housing development in the Damascus area is expected to phase in.

Table 2. Low Growth Assumption: School Enrollment Forecast for the Centennial School District, 2005 to 2015

	Actual		Projection >										
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
<b>K-5</b>	2,831	2,936	3,017	3,061	3,065	3,066	3,082	3,095	3,129	3,195	3,268	3,344	3,419
<b>6-8</b>	1,529	1,530	1,519	1,528	1,576	1,618	1,628	1,621	1,625	1,633	1,635	1,630	1,634
<b>9-12</b>	1,898	1,897	1,915	1,920	1,902	1,913	1,927	1,964	2,008	2,030	2,039	2,045	2,046
<b>Other</b>	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total</b>	6,258	6,363	6,450	6,509	6,543	6,597	6,636	6,680	6,763	6,858	6,943	7,019	7,099

**Medium Growth.** We think that the amount of housing and population growth forecast for the District will produce enrollment increases over the next decade. *The medium growth assumption indicates that overall school enrollments will increase from present levels of 6,363 to 7,612 in 2015, an increase of 1,249 students.* Between 2004 and 2015, the model forecasts that there will

be an increase of 761 students in the K-5 grades, 222 students in the 6-8 grades, and 266 in the 9-12 grades. It should be emphasized that the model forecasts long-term school enrollment levels and will not necessarily be accurate on a year-to-year basis.

Table 3. Medium Growth Assumption: School Enrollment Forecast for the Centennial School District, 2005 to 2015

	Actual		Projection >										
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
<b>K-5</b>	2,831	2,936	3,023	3,083	3,108	3,133	3,173	3,211	3,274	3,371	3,477	3,586	3,697
<b>6-8</b>	1,529	1,530	1,522	1,537	1,595	1,648	1,668	1,672	1,687	1,708	1,724	1,734	1,752
<b>9-12</b>	1,898	1,897	1,918	1,929	1,918	1,938	1,961	2,008	2,066	2,102	2,127	2,146	2,163
<b>Other</b>	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total</b>	6,258	6,363	6,462	6,548	6,621	6,718	6,802	6,892	7,027	7,181	7,328	7,466	7,612

**High Growth.** What will happen if housing and population growth is more rapid, climbing to levels that are above those witnessed in the 1990s and higher than those now experienced? *The high growth assumption indicates that overall school enrollments will increase from current levels of 6,363 to 8,375 in 2015, an increase of 2,012 students.*

Table 4. High Growth Assumption: School Enrollment Forecast for the Centennial School District, 2005 to 2015

	Actual		Projection >										
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
<b>K-5</b>	2,831	2,936	3,029	3,104	3,150	3,198	3,263	3,327	3,435	3,589	3,760	3,939	4,125
<b>6-8</b>	1,529	1,530	1,525	1,546	1,614	1,677	1,708	1,723	1,754	1,799	1,841	1,879	1,925
<b>9-12</b>	1,898	1,897	1,920	1,937	1,934	1,963	1,995	2,053	2,128	2,189	2,239	2,283	2,326
<b>Other</b>	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total</b>	6,258	6,363	6,474	6,587	6,698	6,838	6,966	7,103	7,317	7,577	7,840	8,101	8,375

## INTRODUCTION

This report presents the results of a study conducted by the Population Research Center (PRC) to address the long-range planning needs of the Centennial School District (CENT). It provides annual enrollment forecasts by grade for the Centennial School District from 2005 to 2015. In addition to the "expected" future enrollments that will result from the most likely population patterns, two additional scenarios – for low and for high growth trends – are presented. The report shows forecasts of the total and school age population of CENT for 2005, 2010, and 2015.

The report starts with the description of methodology used in the development of the population and enrollment forecasts. Next, it presents the results of the study by grade levels. Finally, it discusses the assumptions used in the study and circumstances that may change the assumptions and therefore affect the prediction ability of the forecasts. The Appendix provides the projected enrollment by individual grades and forecasts of population and school age children.

## METHODS AND DATA

### **Cohort-Component Method**

This study employs a version of a commonly used demographic forecasting method, called "cohort-component method." It enhances the traditional grade progression ratio (GPR) model employed by school districts by modeling future populations and school enrollments as outcomes of the life events that occur in populations over time. These events are comprised of *births*, *deaths*, and relocations (*migration*) into or out of the area. Thus, the Centennial School District population would grow when births outnumber deaths and more people move into Centennial than leave it. These events occur more often in certain age groups, or cohorts, than in others; for example, people

tend to move around the most when they are in their 20s, and the elderly have lower chances than people in their 40s to survive over the next 5 years. Applying appropriate age- and gender-specific rates of birth, death and migration to the existing population cohorts of the District produce its future population including school age children. Most of these children would attend the area's public schools, however some of them would not be "captured" by the system: some might attend private schools, be home-schooled or attend schools outside of the local school district. To address this phenomenon, *capture rates* would have to be applied to derive figures of future public school enrollment.

Clearly, the cohort-component method depends on the availability of accurate data on the age and gender composition of the District's population. The most precise information about population structure of an area is usually provided by the most recent population census; the farther away from this known census population the forecast moves, the less certain its predictions become. The model is also sensitive to the rates of life events that are applied to the known population cohorts. These rates are usually derived from the known data such as one provided by the census, and then they are modified to account for the most recent trends as well as the likely future ones. Examples of such trends that may affect the future population of an area include the recent tendency among women of childbearing ages to delay having their first child, or a predisposition of young men (ages 20 to 24) to be more mobile than women in the same age cohort. After a decision is made about the plausibility of these trends to evolve in the study area, a set of assumptions is developed to address likely changes in the initial rates of life events. Since the existing population structure defines future population composition of the area, the method works best in the short and medium range.

We used the **cohort-component method** to develop the enrollment forecast for Centennial School District. The population data that the study used came from the 1990 and 2000 Censuses of Population and Housing and the National Center for Education Statistics; the Oregon Health



Department provided information on fertility and mortality; and the Centennial School District furnished past and current enrollment data and information on home-schooling. PRC staff conducted surveys of private schools for enrollment data.

The initial populations of the Centennial School District were collected from special tabulations of the 1990 and 2000 Censuses of Population and Housing, funded by the National Center for Education Statistics. The 2000 population data were organized into five-year cohorts, such as 0 to 4 years, 5 to 9 years, and so on. Each of these cohorts was then "survived", or aged 5 years into the next cohort for the year 2005. "Surviving" of the cohorts is accomplished by applying age-sex-specific survival rates; these rates represent the proportion of population in each younger cohort that would survive during a given time period (such as 5 years between 2000 and 2005) to become the next older cohort. This process is repeated for each five-year interval between 2000 and 2015.

During each five-year interval, a certain number of live births occur to the women in childbearing ages. To calculate the number of newly born residents of the Centennial School District, age-specific fertility rates were applied to the numbers of women in childbearing cohorts (15 to 19, 20 to 24 and so on till 45 to 49 years old). Fertility rates indicate how many children women in a given age group are likely to have during each five-year period. Once born, the children become subject to survival rates and are "moved" through the system like all other cohorts. The births from the periods 1990-1994, 1995-1999, and 2000-2004 are reconciled with the geocoding of actual births provided by the Oregon Health Department.

The most difficult part of the model is an estimate of the in- and out-migration for the area. In reality, since little reliable data are available to study in- and out-migration, one works with net migration rates, or the balance between in- and out-migration. Net migration can be calculated if one knows the population at the beginning and the end of the interval as well as the number of

births and deaths over that period. Net migration is positive when more people move into the area than leave it and negative if the opposite is true. Net migration rates used in the cohort-component model can be interpreted as the number of people who are added to (or subtracted from) a given cohort per each 100 persons due to migration over a given time period (in our case, five years). The initial net migration rates for the cohort-component method were derived from the 1990 and 2000 population cohorts of the District, and births and deaths that occurred during 1990-2000. Since migration patterns changed in the early 90s, the net migration rates were modified, or "calibrated", to accommodate these changes. When the 1990-2000 demographic model was calibrated to fit the observed level and grade pattern of Centennial School District, it became apparent that net migration (and population growth) was somewhat higher in the first half of the 1990s than in the second half.

The net migration rates used to forecast the District's population for 2005, 2010, and 2015 were further modified to reflect the most likely future migration patterns. Our study showed that migration will remain the major force behind the rates of population and enrollment growth in the Centennial District.

The longer the time span of the forecast, the more difficult it is to make a decision about the rates and assumptions. Thus, it is crucial to have some more recent data that would allow us to test, or calibrate, the assumptions used in the model. Centennial School District's historical enrollment helped us to calibrate and adjust original migration rates so that a better fit between actual and predicted enrollment figures could be achieved.

### **Housing Unit Method**

Since the cohort-component method does not explicitly account for such events as the construction of new houses in the area, a version of the model was developed to produce the high school

attendance area forecasts. Its task was to provide ways of accounting for the future housing trends that are likely to take place in each of the two high school attendance areas. Additionally, the 2002 expansion of the urban growth boundary by the *Metro* Council, the incorporation of the City of Damascus, and the Springwater Corridor all have impacts on the future of the Centennial School District, as well as other neighboring school districts.

When data on addresses of *building permits* issued since the last census are available, we can employ the housing unit method which takes into account changes in the initial housing stock of the study area since the last census by factoring in the net balance of the on-going housing construction. Post-2000 census housing data for this study were provided by *Metro* and local developers and included on-going and planned future housing developments by number of units, their type (single family residential units, multi-family residential units, and manufactured homes), and location via high school attendance areas. This required us to modify the standard housing unit method so that only the future housing growth rates in the areas were produced by the model.

Using the housing vacancy rates by type of housing unit, and the number of school-age children per household by housing type, estimates of likely future school-age populations can be derived. These numbers are used to produce enrollment growth rates that served to adjust Centennial District rates thus accounting for local housing trends.

## **ENROLLMENT AND POPULATION TRENDS**

Our analysis begins by examining historic patterns of growth in Centennial District from 1990 to 2004, the most recent school year for which enrollment data are available. Census data for 1990

and 2000 also provide critical information on population and housing that is needed to make the enrollment forecast. There was rapid enrollment growth in the Centennial School District from 1990 to about 1994, growing from 4,971 to 5,561 students, or about 3 percent annually. Growth from 1994 to 2000 slackened, with an overall increase of 453 students; 1.36 percent per annum. From 2000 to 2004 the district has grown at an annual rate of 1.45 percent, or 349 students. These differences in the levels of recent growth raise questions about what growth rates are likely to be experienced in the future.

Table 7. Centennial School District Enrollment by Grade Level and Year.

<b>Grade/Yr</b>	<b>1990</b>	<b>1991</b>	<b>1992</b>	<b>1993</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>
<b>K-5</b>	2,425	2,471	2,664	2,637	2,686	2,664	2,795	2,765	2,791	2,756	2,820	2,844	2,892	2,831	2,936
<b>6-8</b>	1,216	1,265	1,253	1,326	1,342	1,429	1,385	1,412	1,354	1,425	1,437	1,538	1,515	1,529	1,530
<b>9-12</b>	1,330	1,376	1,399	1,485	1,533	1,492	1,643	1,657	1,744	1,743	1,757	1,789	1,854	1,898	1,897
<b>Other</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total</b>	4,971	5,112	5,316	5,448	5,561	5,585	5,823	5,834	5,889	5,924	6,014	6,171	6,261	6,258	6,363

Studies by the Population Research Center (PRC), Metro, and the City of Gresham and Clackamas County planners suggest that the population growth rates for the Centennial area have fluctuated between 1.7 and 2.2 percent annually since 1990. Decennial census data demonstrated that the Centennial School District population grew at an average annual increase of 1.9 percent from 29,655 in 1990 to 35,775 in 2000. Since 2000, we estimate that the District's population has been increasing at 2.1 percent annually.

## **ENROLLMENT FORECASTS**

Three growth scenarios (low, medium, and high) are assumed for these enrollment forecasts. The next section describes the assumptions made for each of the three scenarios. As shown later, each growth scenario -- low growth, medium, or most likely, growth, and high growth -- predicts that the Centennial School District enrollment will increase over the forecast horizon.

Tables 8 to 10 below provide enrollment forecasts by grade level for each of the three scenarios. Note that each of them assumed a continuation of current housing and population growth patterns between 2000 and 2004. So there is no difference in the three scenarios for school enrollment leading up to the year 2004. Based on current trends, we expect continued growth in school enrollments in the next year or so, although larger increases are expected in the K-5 grades.

**Low growth.** The low growth assumption forecasts slower, but continuous, enrollment increases for the District. The low growth assumption suggests that overall school enrollments will increase from 2004 levels of 6,363 to 7,099 in 2015, an increase of 736 students. Even if housing and population growth continues at this lower rate, there will still be increases in Centennial's school enrollments, especially from 2008-2015 when housing development in the Damascus area is expected to phase in.

Table 8. Low Growth Assumption: School Enrollment Forecast for the Centennial School District, 2005 to 2015

	Actual		Projection >										
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
<b>K-5</b>	2,831	2,936	3,017	3,061	3,065	3,066	3,082	3,095	3,129	3,195	3,268	3,344	3,419
<b>6-8</b>	1,529	1,530	1,519	1,528	1,576	1,618	1,628	1,621	1,625	1,633	1,635	1,630	1,634
<b>9-12</b>	1,898	1,897	1,915	1,920	1,902	1,913	1,927	1,964	2,008	2,030	2,039	2,045	2,046
<b>Other</b>	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total</b>	6,258	6,363	6,450	6,509	6,543	6,597	6,636	6,680	6,763	6,858	6,943	7,019	7,099

**Medium Growth.** We think that the amount of housing and population growth forecast for the District will produce enrollment increases over the next decade. *The medium growth assumption indicates that overall school enrollments will increase from present levels of 6,363 to 7,612 in 2015, an increase of 1,249 students.* Between 2004 and 2015, the model forecasts that there will be an increase of 761 students in the K-5 grades, 222 students in the 6-8 grades, and 266 in the 9-12 grades. It should be emphasized that the model forecasts long-term school enrollment levels and

will not necessarily be accurate on a year-to-year basis.

Table 9. Medium Growth Assumption: School Enrollment Forecast for the Centennial School District, 2005 to 2015 (includes Alternative High School).

	Actual		Projection >										
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
<b>K-5</b>	2,831	2,936	3,023	3,083	3,108	3,133	3,173	3,211	3,274	3,371	3,477	3,586	3,697
<b>6-8</b>	1,529	1,530	1,522	1,537	1,595	1,648	1,668	1,672	1,687	1,708	1,724	1,734	1,752
<b>9-12</b>	1,898	1,897	1,918	1,929	1,918	1,938	1,961	2,008	2,066	2,102	2,127	2,146	2,163
<b>Other</b>	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total</b>	6,258	6,363	6,462	6,548	6,621	6,718	6,802	6,892	7,027	7,181	7,328	7,466	7,612

**High Growth.** What will happen if housing and population growth is more rapid, climbing to levels that are above those witnessed in the 1990s and higher than those now experienced? *The high growth assumption indicates that overall school enrollments will increase from current levels of 6,363 to 8,375 in 2015, an increase of 2,012 students.*

Table 10. High Growth Assumption: School Enrollment Forecast for the Centennial School District, 2005 to 2015

	Actual		Projection >										
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
<b>K-5</b>	2,831	2,936	3,029	3,104	3,150	3,198	3,263	3,327	3,435	3,589	3,760	3,939	4,125
<b>6-8</b>	1,529	1,530	1,525	1,546	1,614	1,677	1,708	1,723	1,754	1,799	1,841	1,879	1,925
<b>9-12</b>	1,898	1,897	1,920	1,937	1,934	1,963	1,995	2,053	2,128	2,189	2,239	2,283	2,326
<b>Other</b>	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total</b>	6,258	6,363	6,474	6,587	6,698	6,838	6,966	7,103	7,317	7,577	7,840	8,101	8,375

The differences between the low, medium, and high assumptions are pronounced in the first few years, largely based upon the uncertainty of the economy and housing starts. After a few years, it should become apparent whether the District's population resumes lower growth or continues with somewhat higher growth levels.

## HOUSING AND POPULATION GROWTH ASSUMPTIONS

We made a medium or "most likely" school enrollment forecast for the Centennial School District assuming that there will be about 320 new housing units added in the District each year for the next five to six years. By 2010, we assume that housing development will increase to about 365 new units each year. Such housing development implies that the District's population will increase by 2.2 percent annually between 2004 and 2015.

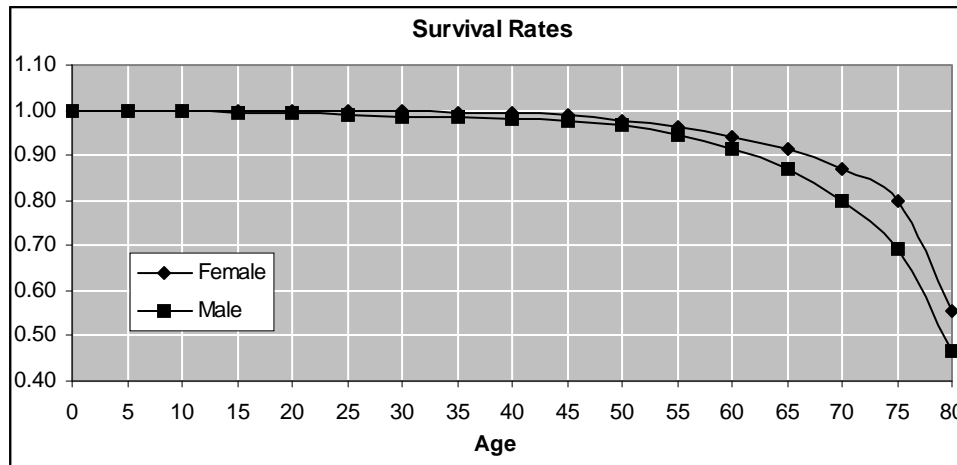
For an assumption about lower growth, we assume that there will be an immediate change from the current conditions and that only 230 new housing units will be added annually in the District during the 2005-2010 period. By 2010, we assume that housing development will increase to over 250 new units each year. If this should occur, the District's population would increase by about 1.6 percent annually between 2004 and 2015, a percent increase in population that is at the low end of the range of forecasts by local planners.

For an assumption about higher growth, we assume that there will be about 410 housing units added each year -- or considerably higher than the number expected for the next few years by local developers. Nevertheless, it is important to note that more than 400 housing units were added for a few years in the 1990s. An assumption of more than 500 new housing units is not out of range, if the local economy revives and several possible large housing projects occur. By 2010 we assume that housing development will increase to over 580 new units each year. If the higher growth scenario occurs, the District's population would increase by about 3.04 percent annually between 2005 and 2015.

Should the future population and housing trends deviate significantly from the assumptions presented here, they will unquestionably affect this forecast. Yet, some components of population change are less sensitive to changes than others.

**Survival rates** reflect the chances of a given cohort to live to the next five-year period change very little over time, especially for the youngest age groups. Almost all school-age kids will survive to be included in the next cohort. The model uses the survival rates provided by the Oregon Health Division (Figure 1).

Figure 1. Survival Rates by Age and Sex, Oregon, 2000, Used in the Model



Since the rates are unlikely to change during the projection period, 2000 rates for the State of Oregon were utilized in the model for each forecasting period. It is unlikely that changes in mortality will affect our school enrollment forecast for the years to 2015. (Mortality improvements will increase the likelihood for survival to advanced ages but will have little effect on school enrollment forecasts.)

**Fertility rates** tend to fluctuate more than mortality rates over time, but still display a rather stable age pattern. The model uses the 2000 fertility rates for the Centennial School District (see Figure 2). Fertility rates by age have been relatively stable in recent years in Clackamas and Multnomah counties. However, if a greater proportion of in-migration were to include couples with higher fertility, this would increase overall future fertility levels and would lead to more students than we are forecasting. Alternatively, holding fertility rates constant as the female age structure changes,



leads to varying birth cohorts. Examining the birth cohorts produced using the 2000 CENT fertility schedule reveals a trend in births that mirrors the growth in the overall population.

Figure 2. Age-Specific Fertility Rates, Centennial School District 2000.



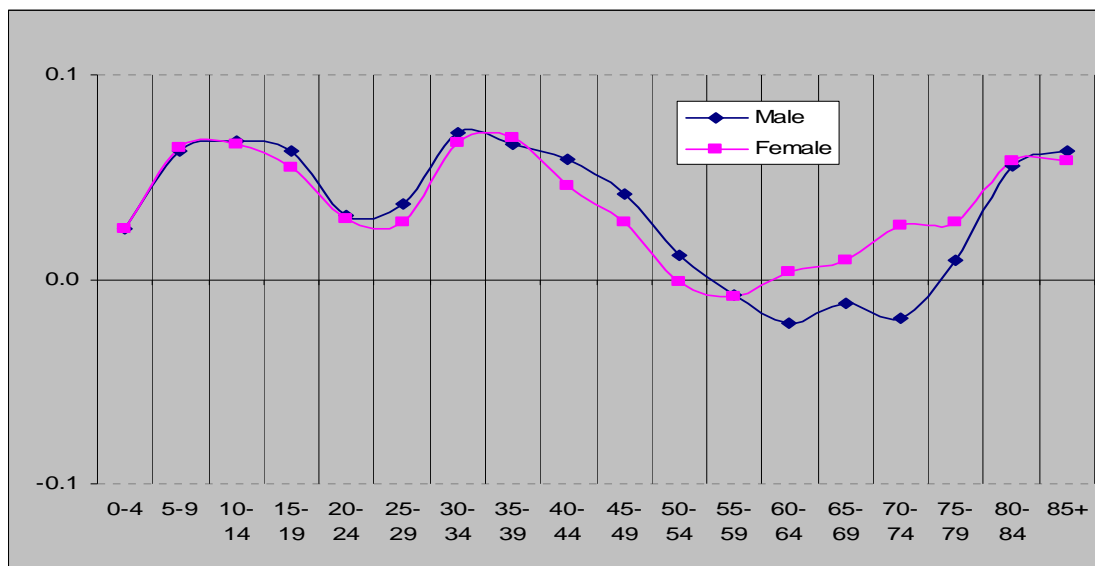
Of all assumptions, *net migration rates* tend to be the most uncertain, yet even they have some likely upper and lower limits, as well as characteristic age patterns. We make an initial estimate based on a comparison of the District's 1990 and 2000 population by age and sex. We adjust the historical net in-migration data for Centennial School District population in order to predict enrollment from 1990 to 1995 and 1995 to 2000. This "calibration" of the model is useful. It makes sure that the assumptions that we make about births, deaths, and migration correspond closely to actual changes in school enrollment from 1990 to 2000.

There is a difference of 42 students between the estimated and actual 1995 Centennial school enrollments, and a difference of 36 students for the 2000 enrollments. Such agreement does not prove that the forecasting model is correct, but helps to establish that it utilizes reasonable net migration rates and creates proper age and grade level distributions.

Having "calibrated" the model, we derive the pattern of net migration for the District shown

below (Figure 3). This figure shows that there is a net in-migration of couples with children as well as a net in-migration for older females. There is a distinctive pattern of lower net in-migration, however, for younger adults in the ages 18 to 27 years. This pattern is not unusual and reflects the movement out of the Centennial area of younger persons to attend college, pursue opportunities in other cities, or to serve in the Armed Forces. Couples then return in their early- to mid-thirties.

Figure 3. Net Migration Rates by Age and Gender, 1995-2000: Centennial School District.



While migration rates were tested and produced a close fit with actual enrollment changes for the 1990-1995 and 1995-2000 periods, a longer forecast horizon provides more chances for the rates to change in response to a number of factors. Such factors could include a recession, national or local, that would increase out-migration and decrease in-migration, or an accelerated economic growth pattern similar to one that took place in first half of the 90s and brought in many new residents. However, in the absence of such major changes – an assumption reflected in the medium-growth, or "most likely," scenario – the migration rates utilized are reasonably reliable, at least for the near future.

*Capture rates* do not influence population components directly, but reflect how attractive public education is for families. Analyzing data on 1990-2004 enrollment, numbers of home-schooled children and children in private schools led us to estimate the capture rate for the District at a level of 89 percent overall. This means that about 9 out of 10 school-age kids attend public schools. The rate for grades K-5 is the highest at 91 to 94 percent, with a lower rate of 79 to 87 percent for grades 9-12, reflecting in part that some high school-age students are not attending high school. The three growth scenarios assume that the capture rates will change minimally for the 2004-2015 period.

The smaller the forecasted population, the higher is the probability of an error associated with any forecast: an unforeseen change of 10 people in a population of 100 will be more noticeable than in a population of 100,000.

## CONCLUSIONS

This study considers several factors that are likely to affect the District's enrollment between 2004 and 2015. To account for different probabilities of demographic events, three scenarios of population and enrollment changes were developed. Under any of the three scenarios, the school-age population living in the Centennial School District will increase. Assuming the medium growth scenario, school enrollments will increase by about 260 students annually, at an average annual rate of growth of 1.9 percent. Elementary enrollment (grades K-5) will see the greatest gains of about 135 to 145 students a year between 2004 and 2015, or an annual growth rate of 2.4 percent. Middle schools (grades 6-8) will grow more modestly at 2.0 percent per year, with about 55 to 65 additional students annually. Enrollment in grades 9-12 will grow at 1.9 percent annually, with about an additional 50 to 60 students per year between 2004 and 2015.

**APPENDIX**

**DETAILED RESULTS FOR  
CENTENNIAL SCHOOL DISTRICT  
POPULATION AND ENROLLMENT  
FORECASTS  
2005 TO 2015**

**Appendix A. Centennial School District 28J Enrollment Forecasts, 2005 to 2015**  
**Low Growth Assumptions**

Table A.1. Population Projections

<b>Age/Year</b>	<b>2000</b>	<b>2005</b>	<b>2010</b>	<b>2015</b>
<b>0-4</b>	2,630	2,794	3,154	3,503
<b>5-9</b>	2,695	2,876	2,939	3,319
<b>10-14</b>	2,790	3,023	3,124	3,193
<b>15-19</b>	2,715	2,934	3,112	3,216
<b>20-24</b>	2,200	2,814	2,961	3,141
<b>25-29</b>	2,050	2,518	3,061	3,222
<b>30-34</b>	2,410	2,362	2,765	3,362
<b>35-39</b>	2,775	2,752	2,576	3,018
<b>40-44</b>	3,115	3,012	2,909	2,721
<b>45-49</b>	2,955	3,145	3,057	2,955
<b>50-54</b>	2,200	3,003	3,120	3,033
<b>55-59</b>	1,660	2,191	2,918	3,031
<b>60-64</b>	1,370	1,597	2,091	2,788
<b>65-69</b>	1,150	1,309	1,504	1,967
<b>70-74</b>	1,070	1,070	1,201	1,380
<b>75-79</b>	860	965	929	1,038
<b>80-84</b>	660	693	748	722
<b>85+</b>	470	627	727	812
<b>Total</b>	<b>35,775</b>	<b>39,684</b>	<b>42,897</b>	<b>46,420</b>

Table A.2. Low Growth Enrollment Forecast

Centennial School District: Based on October 2004 Enrollments -- Low Level Growth Assumptions

Enrollment by Grade and Year												Actual > / Projected >										
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
<b>K</b>	427	381	431	431	405	396	448	438	446	430	455	476	480	484	488	492	496	509	523	536	550	565
<b>1</b>	456	471	471	465	486	449	454	505	487	495	485	485	493	488	488	490	493	500	518	533	548	563
<b>2</b>	454	465	479	463	476	485	458	454	496	485	505	490	491	499	492	492	493	501	513	531	546	560
<b>3</b>	441	445	476	467	483	470	478	459	453	485	516	522	511	514	524	518	517	524	535	547	564	578
<b>4</b>	443	455	454	481	463	485	494	491	476	451	490	530	542	534	538	550	544	547	556	565	574	588
<b>5</b>	465	447	484	458	478	471	489	497	534	485	485	513	544	547	535	540	552	548	550	555	561	566
<b>6</b>	450	474	446	478	450	488	476	513	521	545	496	496	516	538	537	526	532	543	537	537	539	542
<b>7</b>	479	459	485	446	469	453	506	490	504	496	530	520	532	555	577	577	565	570	580	573	571	573
<b>8</b>	413	496	454	488	435	484	455	535	490	488	504	502	480	483	503	525	524	513	516	526	519	518
<b>9</b>	441	417	513	449	507	452	503	484	521	510	510	542	550	531	537	560	584	584	571	575	587	581
<b>10</b>	402	422	413	483	449	489	453	499	479	511	520	485	500	497	479	485	507	528	527	515	520	532
<b>11</b>	354	358	403	372	449	405	429	407	471	442	466	475	451	473	475	458	465	484	503	502	492	497
<b>12</b>	336	295	314	353	339	397	372	399	383	435	401	412	419	400	421	423	408	413	429	446	446	437
<b>Other</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>K-5</b>	2,686	2,664	2,795	2,765	2,791	2,756	2,820	2,844	2,892	2,831	2,936	3,017	3,061	3,065	3,066	3,082	3,095	3,129	3,195	3,268	3,344	3,419
<b>6-8</b>	1,342	1,429	1,385	1,412	1,354	1,425	1,437	1,538	1,515	1,529	1,530	1,519	1,528	1,576	1,618	1,628	1,621	1,625	1,633	1,635	1,630	1,634
<b>9-12</b>	1,533	1,492	1,643	1,657	1,744	1,743	1,757	1,789	1,854	1,898	1,897	1,915	1,920	1,902	1,913	1,927	1,964	2,008	2,030	2,039	2,045	2,046
<b>Other</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total</b>	5,561	5,585	5,823	5,834	5,889	5,924	6,014	6,171	6,261	6,258	6,363	6,450	6,509	6,543	6,597	6,636	6,680	6,763	6,858	6,943	7,019	7,099
<b>Change</b>	113	24	238	11	55	35	90	157	90	(3)	105	87	59	35	54	39	44	83	95	85	75	81

## Medium Growth Assumptions

Table A.3. Population Projections

<b>Age/Year</b>	<b>2000</b>	<b>2005</b>	<b>2010</b>	<b>2015</b>
<b>0-4</b>	2,630	2,794	3,285	3,784
<b>5-9</b>	2,695	2,876	3,055	3,592
<b>10-14</b>	2,790	3,023	3,225	3,426
<b>15-19</b>	2,715	2,934	3,179	3,392
<b>20-24</b>	2,200	2,814	3,039	3,294
<b>25-29</b>	2,050	2,518	3,220	3,479
<b>30-34</b>	2,410	2,362	2,901	3,710
<b>35-39</b>	2,775	2,752	2,695	3,312
<b>40-44</b>	3,115	3,012	2,988	2,923
<b>45-49</b>	2,955	3,145	3,040	3,017
<b>50-54</b>	2,200	3,003	3,197	3,089
<b>55-59</b>	1,660	2,191	2,991	3,184
<b>60-64</b>	1,370	1,597	2,106	2,878
<b>65-69</b>	1,150	1,309	1,526	2,010
<b>70-74</b>	1,070	1,070	1,215	1,417
<b>75-79</b>	860	965	966	1,093
<b>80-84</b>	660	693	777	780
<b>85+</b>	470	627	732	836
<b>Total</b>	<b>35,775</b>	<b>39,684</b>	<b>44,137</b>	<b>49,217</b>



Table A.4. Medium Growth Enrollment Forecast

Centennial School District: Based on October 2004 Enrollments -- Medium Level Growth Assumptions

Enrollment by Grade and Year												Actual > / Projected >										
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
<b>K</b>	427	381	431	431	405	396	448	438	446	430	455	476	484	492	500	508	517	534	553	572	591	612
<b>1</b>	456	471	471	465	486	449	454	505	487	495	485	487	496	495	500	506	513	525	547	568	589	610
<b>2</b>	454	465	479	463	476	485	458	454	496	485	505	492	495	505	504	507	512	525	542	566	586	607
<b>3</b>	441	445	476	467	483	470	478	459	453	485	516	524	515	521	534	533	537	548	565	582	605	625
<b>4</b>	443	455	454	481	463	485	494	491	476	451	490	531	546	541	549	564	563	571	585	600	614	634
<b>5</b>	465	447	484	458	478	471	489	497	534	485	485	514	547	554	546	555	570	571	578	589	600	610
<b>6</b>	450	474	446	478	450	488	476	513	521	545	496	497	519	545	548	540	549	563	563	568	575	583
<b>7</b>	479	459	485	446	469	453	506	490	504	496	530	522	535	561	588	591	583	592	606	604	608	615
<b>8</b>	413	496	454	488	435	484	455	535	490	488	504	503	483	489	512	537	540	532	539	552	550	554
<b>9</b>	441	417	513	449	507	452	503	484	521	510	510	543	552	537	546	572	600	603	594	603	618	618
<b>10</b>	402	422	413	483	449	489	453	499	479	511	520	486	502	501	485	494	518	543	546	538	547	561
<b>11</b>	354	358	403	372	449	405	429	407	471	442	466	476	453	477	481	466	474	497	520	523	515	524
<b>12</b>	336	295	314	353	339	397	372	399	383	435	401	413	421	403	426	429	416	423	443	464	466	459
<b>Other</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>K-5</b>	2,686	2,664	2,795	2,765	2,791	2,756	2,820	2,844	2,892	2,831	2,936	3,023	3,083	3,108	3,133	3,173	3,211	3,274	3,371	3,477	3,586	3,697
<b>6-8</b>	1,342	1,429	1,385	1,412	1,354	1,425	1,437	1,538	1,515	1,529	1,530	1,522	1,537	1,595	1,648	1,668	1,672	1,687	1,708	1,724	1,734	1,752
<b>9-12</b>	1,533	1,492	1,643	1,657	1,744	1,743	1,757	1,789	1,854	1,898	1,897	1,918	1,929	1,918	1,938	1,961	2,008	2,066	2,102	2,127	2,146	2,163
<b>Other</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total</b>	5,561	5,585	5,823	5,834	5,889	5,924	6,014	6,171	6,261	6,258	6,363	6,462	6,548	6,621	6,718	6,802	6,892	7,027	7,181	7,328	7,466	7,612

## High Growth Assumptions

Table A.5. Population Projections

Age/Year	2000	2005	2010	2015
0-4	2,630	2,794	3,416	4,233
5-9	2,695	2,876	3,171	4,018
10-14	2,790	3,023	3,326	3,779
15-19	2,715	2,934	3,246	3,646
20-24	2,200	2,814	3,117	3,537
25-29	2,050	2,518	3,379	3,920
30-34	2,410	2,362	3,037	4,257
35-39	2,775	2,752	2,813	3,771
40-44	3,115	3,012	3,067	3,213
45-49	2,955	3,145	3,022	3,061
50-54	2,200	3,003	3,273	3,219
55-59	1,660	2,191	3,064	3,419
60-64	1,370	1,597	2,121	2,991
65-69	1,150	1,309	1,548	2,083
70-74	1,070	1,070	1,230	1,472
75-79	860	965	1,003	1,192
80-84	660	693	806	871
85+	470	627	737	866
<b>Total</b>	<b>35,775</b>	<b>39,684</b>	<b>45,378</b>	<b>53,549</b>

Table A.6. High Growth Enrollment Forecast

Centennial School District: Based on October 2004 Enrollments -- High Level Growth Assumptions

Enrollment by Grade and Year												Actual > / / Projected >										
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
<b>K</b>	427	381	431	431	405	396	448	438	446	430	455	476	488	500	512	524	537	564	592	622	653	685
<b>1</b>	456	471	471	465	486	449	454	505	487	495	485	488	498	503	511	521	532	551	586	618	650	683
<b>2</b>	454	465	479	463	476	485	458	454	496	485	505	493	498	510	515	522	532	551	577	614	646	679
<b>3</b>	441	445	476	467	483	470	478	459	453	485	516	525	519	528	544	548	556	574	601	628	665	697
<b>4</b>	443	455	454	481	463	485	494	491	476	451	490	532	549	548	560	577	583	598	621	646	671	705
<b>5</b>	465	447	484	458	478	471	489	497	534	485	485	515	551	561	557	570	587	596	613	633	654	674
<b>6</b>	450	474	446	478	450	488	476	513	521	545	496	498	522	552	558	554	567	586	595	609	626	643
<b>7</b>	479	459	485	446	469	453	506	490	504	496	530	523	538	568	599	606	601	616	637	646	659	675
<b>8</b>	413	496	454	488	435	484	455	535	490	488	504	504	485	494	521	549	555	552	567	586	594	606
<b>9</b>	441	417	513	449	507	452	503	484	521	510	510	544	555	542	554	584	615	624	622	639	661	671
<b>10</b>	402	422	413	483	449	489	453	499	479	511	520	486	504	506	492	503	530	560	569	567	583	603
<b>11</b>	354	358	403	372	449	405	429	407	471	442	466	476	455	481	486	473	484	510	540	548	546	561
<b>12</b>	336	295	314	353	339	397	372	399	383	435	401	414	423	406	431	436	424	434	459	485	493	491
<b>Other</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>K-5</b>	2,686	2,664	2,795	2,765	2,791	2,756	2,820	2,844	2,892	2,831	2,936	3,029	3,104	3,150	3,198	3,263	3,327	3,435	3,589	3,760	3,939	4,125
<b>6-8</b>	1,342	1,429	1,385	1,412	1,354	1,425	1,437	1,538	1,515	1,529	1,530	1,525	1,546	1,614	1,677	1,708	1,723	1,754	1,799	1,841	1,879	1,925
<b>9-12</b>	1,533	1,492	1,643	1,657	1,744	1,743	1,757	1,789	1,854	1,898	1,897	1,920	1,937	1,934	1,963	1,995	2,053	2,128	2,189	2,239	2,283	2,326
<b>Other</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total</b>	5,561	5,585	5,823	5,834	5,889	5,924	6,014	6,171	6,261	6,258	6,363	6,474	6,587	6,698	6,838	6,966	7,103	7,317	7,577	7,840	8,101	8,375

