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## 16. Abstract

Texas population has been growing rapidly since the past decade. To plan for future transportation needs, officials in transportation planning have to know the size of the future population. This study presents population projections for the state and for the twenty-five State Department of Highway and Public Transportation districts between 1985 and 2005 at every five-year interval, using existing projections prepared by various agencies. Three sets of population projections were made at both the state and the district levels: high, medium, and low. By the year 2005, the medium forecast predicts that the Texas population will grow to 23.6 million.

The composition of the Texas population by age, by sex, and by race was briefly examined. According to the transportation needs, the age of the population was divided into three groups: the young (age $0-15$ ), the driving age (age $16-74$ ), and the old (age 75+).

To apply the state population projections to transportation use, a two-equation model was used to estimate the number of vehicle-miles traveled based on the population projected. High and low forecasts were made by the assumption of two different economic growth rates. In the year 2005, the high forecast predicts a total of 402 billion vehicle-miles will be traveled as compared to the 290 billion vehicle-miles predicted in the low forecast.

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by<br>Margaret K. Chui<br>Research Associate

# Research Report 268-3F <br> Research Study Number 2-1-79-268 <br> Transportation Costs and Resources 

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Texas State Department of Highways and Public Transportation
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The contents of this report reflect the views of the author and do not necessarily reflect the official views or policies of the Federal Highway Administration or the State Department of Highway and Public Transportation. This report does not constitute a standard, a specification, or a regulation.

## EXECUTIVE SUMMARY

Texas population grew very slowly before 1970. During the 1970-1980 decade, an unprecedented number of people migrating into the state was prompted as a result of the migratory movement from other regions of the country to the sunbelt coupled with the energy crisis which created rosier job opportunities in the oil-rich states. Despite the decline in oil prices since the early 1980's, Texas population continues to grow rapidly. The latest census estimates reveal, between 1980 and 1982, Texas gained nearly .95 million people, an increase which is higher than any of the recent projections made for the state. Whether or not the Texas population growth has slowed down during the recent recession cannot be determined until the release of the census estimates of the 1983 and 1984.

This study presents population projections for the state and for the twenty-five SDHPT districts between 1985 and 2005 based on existing projections made by six agencies. Three sets of projections are made for the state population: high, medium, and low forecasts. By the year 2005, the medium forecast predicts Texas population will grow to 23.6 million while the high and the low forecasts show it to be 30.6 million and 20.7 million , respectively.

At the district level, population of a SDHPT district is projected at high, medium, and low levels between 1985 and 2005 by using the average of the county percentage distributions projected by the three agencies which prepared county projections. Districts 12 and 18 are forecasted to continue to lead the state as the most populous districts. By the year 2005, the medium forecast shows District 12 to have 5.9 milion residents and District 18 to have 3.2 million people. Meanwhile, District 25 , which suffered a population loss between 1970 and 1980, is predicted to turn around and to gain 21.8 percent in population
over the period between 1980 and 2005. Among all the bordering districts in the state, Districts 21,11 , and 24 are predicted to be the fastest growing districts between 1980 and 2005.

The composition of the Texas population by age, sex, and race is breifly examined. The Texas population is separated into three age groups: the young (age $0-15$ ), the driving age (age 16-74), and the old (age 75+); their respective percentage shares of the state population in 1980 were 26.5 percent, 69.8 percent, and 3.7 percent. This distribution among the three groups is forecasted to change little by the year 2005.

The sex distribution of the Texas population is split fairly evenly between the two sexes, and for the age-sex distribution, Texas has a slightly larger young male population than young female population, but the number of females aged 75 or more is about twice as many as their male counterparts.

An examination of the race-ethnicity distribution of the Texas population shows that both the white and the black are losing their percentage shares to the hispanic population. The rapid growth of the districts along the Rio Grande border is the major reason for the big increase in the hispanic population in the state.

To apply the state population projections to transportation use, a twoequation model is used to estimate the number of vehicle-miles traveled based on the population projected. By assuming two different economic growth rates, high and low forecasts on vehicle-miles traveled were made. By the year 2005, the high forecast indicates a total of 402 billion vehicle-miles will be traveled while the low forecast predicts 290 billion vehicle-miles.

## IMPLEMENTATION STATEMENT

This report presents three sets of population projections for the state and for each of the twenty-five SDHPT districts of Texas at five year intervals from 1985 to 2005. Based on the state population projections, total vehicle-miles traveled are forecasted for the same period. These projections and forecasts which indicate that population, licensed drivers, and total miles of travel will probably continue to increase at relatively high rates in the future, can be used by transportation officials in their planning and decision-making process.

METRIC CONVERSION FACTORS


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## INTRODUCTION

During the past decade, Texas has experienced tremendous population and economic growth. According to the latest census figures, Texas population grew a total of 3 million from 11.2 million in 1970 to 14.2 million in 1980 [9]. This represents an annual growth rate of 2.4 percent, compared to the national growth rate of 1.1 percent per year during the same period. This unprecedented growth is believed to have been a result of migration from the northern states to the sunbelt, a movement that began in the late $1960^{\prime}$ s and later accelerated as a result of the oil crisis, and attendant higher oil prices and increased activity in the petroleum industry, during the middle and late 1970's. The active oil industry in Texas has attracted not only people but business as well, so that Texas has enjoyed a relatively high rate of economic growth along with the rapid population expansion.

However, the continued high rate of population growth in the state, despite the decline in oil prices during the $1980^{\prime} \mathrm{s}$, makes one question whether oil has, in fact, been primarily responsible for the population and economic growth in Texas. The latest population estimates, published in June 1984 [8], indicate that Texas grew another 3.7 percent between 1981 and 1982, whereas oil prices dropped 5.5 percent during the same period. It is possible that there exists a time lag effect of oil prices on population growth, in that recent population growth may be a result of the negative reactions by businesses and people from other geographical regions in the U.S. to the high oil prices up to the early 1980's. Furthermore, other industries in Texas have been expanding during the past few years, although it is unclear whether their expansions were planned
before the rapid increase in population growth or were induced by anticipation of this growth.

The next two decades are expected to continue to bring relatively high population growth to Texas, although at a lower rate than during the past decade. The upturns of the economy in the Northeast and Midwest, together with uncertainty over the adequacy of water resources in Texas, are factors behind the anticipated slower growth [6]. With continued growth in the Texas economy and population, the demand for services, including transportation, will continue to rise. In order to provide adequate transportation facilities for the next decade, transportation officials need estimates of future population growth and travel demand. The main objective of this study was to develop population projections for use in transportation planning by the SDHPT districts in Texas.

## Sources of Texas Population Projections

Agencies that provide population projections for Texas include the Bureau of Business Research (BBR), Texas Department of Health (TDH), Texas Department of Water Resources (TDWR), the U.S. Bureau of the Census (BC), the National Planning Association (NPA), which is a private firm, and the Governor's Office, which prepared the Texas 2000 Project. Some of these agencies make projections only at the state level, while others provide population projections by counties. Amony the six ayencies identified, the NPA, the TDH, and the TDWR are the only ones that make county projections. Further, the TDH and the BBR make annual projections of state-wide population, while the TDWR and the NPA make only five-year projections. The BC and the Texas 2000 Project, make ten-year population projections.

Table 1 shows the census population of 1980, population projections for the year 2000 given by the six agencies listed above, and the race and age distributions of the population. The percent changes in population during the periods from 1980 to 1990 and 1990 to 2000 are also given. Projections made by the TDH show the highest figures, while the NPA projections give the lowest. According to the TDH, the population in Texas will grow from $14,229,190$ in 1980 to 27,855,444 in 2000, representing an increase of 95.8 percent for the period. The average increase projected by all the other agencies for the same period is 47.0 percent. Figure 1 illustrates the historic population for the state from 1960 to 1980, and the highest, lowest, and average population projections by the six agencies from 1980 to 2000. Appendix Table Al provides the data used for this figure.

Table 1. Census Population for 1980 and Available Population Projections for 2000

|  | $\begin{aligned} & 1980 \\ & \text { Census } \end{aligned}$ | Texas <br> Department of Water Resourcesa | $\begin{aligned} & \text { Texas } \\ & 2000 \end{aligned}$ | Texas <br> Department of Health | Bureal of Business, Research $b$ | Bureal of Census | National Plamning Association |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Total Population | 14,229,290 | 21,239,282 | 22,091,000 | 27,855,444 | 21,713,500 | 20,739,000 | 18,789,900 |
| Percent Change 1980-1990 | - | 25.4 | 24.4 | 34.9 | 24.1 | 23.0 | 18.2 |
| Percent Change 1990-2000 | - | 19.0 | 24.8 | 45.1 | 23.0 | 18.5 | 11.7 |
| Percent Change 1980-2000 | - | 49.3 | 55.3 | 95.8 | 52.6 | 45.8 | 32.1 |
| Percent Anglo | 67.0 | N/ | 64.7 | 51.5 | N/A | N/A | N/A |
| Percent Black | 12.0 | N/A | 14.8 | 8.4 | N/A | N/A | N/A |
| Percent Hispanic | 21.0 | N/A | 20.5 | 40.0 | N/A | N/A | N/A |
| Percent Age Group (0-9) | 16.4 | N/A | 15.8 | 17.7 | 16.0 | 16.0 | 14.6 |
| Percent Age Group (10-19) | 17.8 | N/A | 15.6 | 16.3 | 15.2 | 16.2 | 15.3 |
| Percent Age Group (20-34) | 27.0 | N/A | 21.0 | 21.1 | 23.6 | 21.3 | 21.2 |
| Percent Age Group (35-49) | 16.1 | NA | 22.9 | 22.6 | 22.0 | 23.2 | $15.4{ }^{\text {c }}$ |
| Percent Age Group (50-64) | 13.0 | N/A | 13.4 | 12.8 | 13.9 | 13.5 | $21.3{ }^{\text {d }}$ |
| Percent Age Group (65+) | 9.7 | N/A | 11.3 | 9.5 | 9.3 | 9.9 | 12.2 |

[^0]

Figure 1. Historic and Projected Population of Texas by Agencies, 1960-2000.

The population estimate made by each agency is a function of the technique and assumptions used by the agency in making its projection. The differences in the projections by the six agencies demonstrate the fact that no one technique or set of assumptions is adopted uniformly by all six agencies. Several factors, two of which are the projection technique and the specific assumptions employed, affect the accuracy of a projection. Other factors affecting accuracy include the size of the population, the size of the area, the quality of the data used, and unexpected events that can cause trend fluctuations. The larger the size of a population or an area, the more accurate the projections tend to be.

## Methods for Population Projection

There are two basic methods used to project population: the cohort component method and the ratio-correlation method. Both the cohort component and the ratio-correlation methods are used by demographers, although the cohort component method is more popular. One of the major drawbacks of the two methods is the lack of considertions of changes in economic conditions believed to influence migration and, in turn, birth rates, although attempts have been made by some forecasters to bridge this shortcoming.

## Cohort Component Method

The change in total population for any given year represents the difference between births and deaths plus net migration for that year. Births, deaths and migration are termed components of a population by demographers. Rates of births and deaths are recognized to be age-,sex-, and race-specific. In other words, fertility rates vary according to both the age and race of females.

Males and females have different death rates, and the older groups of the population have higher death rates than the younger ones.

In the cohort component method, trends in these three basic demographic components of population change can be projected or extrapolated by assuming certain birth, death, and migration rates to the various age-sex-race subgroups, called cohorts by demographers, of the population can be projected. In general, the latest 10 -year census estimate of the population by age, sex, and race is used as the base population, and that particular year is designated as the base year. Fertility and mortality rates are either held constant during all or part of the projection period or are allowed to vary according to specified formulas, depending on what is considered appropriate by individual forecasters.

Net migration is usually computed as a residual. A particular year, usual$1 y 10$ years prior to the base year, is chosen. Births and deaths during the period from this prior year to the base year are calculated for each age-sexrace cohort using annual rates of births and deaths for the respective cohorts. Adding the sum of the differences between births and deaths for the various cohorts to the total population for the prior year produces the "measured" population for the base year. Net migration, then, is equal to the difference between the base population and the measured population.

The cohort component method was used by the $B C$, and modified versions of it were used by other agencies, in projecting Texas population from 1980 to 2000. Often migration trends for more than one time period were used by agencies to develop their projections. The use of more than one time period to derive net migration led to more than one population projection by the $B C$ and by the TDWR. The BBR used three different forecasts of oil prices to generate three different Texas population projections.

## Ratio-Correlation Method

The ratio-correlation method for population projection relates changes in symptomatic indicator variables to population changes via a regression equation. Symptomatic indicators include births, deaths, automobile registrations, voter registrations, school enrollments, housing permits, and other variables related to population size. The relationship is then estimated based on data for decades preceding the base year, using the multiple linear regression technique.

The ratio-correlation method is mainly used to make population projections for subareas of a state, such as cities or counties. An independently prepared state-wide projection is needed in order to use the ratio-correlation method for projections for subarea population.

## State Population Projections

State population is projected by the six sources identified earlier. A brief discussion of these sources and their population projection techniques is given here, before the technique adopted by this study is presented.

Review of Existing State Population Projections
Besides the $B C$, four agencies reqularly prepare population projections at the state level. They are the TDH, the TDWR, the BBR, and the NPA. In addition, in 1981, the Governor's Office made state population projections for 1990 and 2000 for their Texas 2000 Project [4]. Some of these agencies develop more than one set of projections. Based on three forecasted oil prices shown in Figure 2, the BBR makes three population projections: a low, a control, and a high. The TDWR prepares low and high projections based on migration trends from two different periods, 1950-80 and 1970-80. Appendix Table A2 shows the different forecasts by these two agencies. These five sets of forecasts, together
U.S. Refinery Acquisition Price of Crude $0 i 1$

1981 Dollars Per Barrel


Source: Plaut, Thomas R., "Texas Economic and Population Growth: The Next Century," Bureau of Business Research, University of Texas, Austin, 1983.

Figure 2. World 0il Price 1960 to 2007
with those prepared by the other four agencies yield a total of nine sets of projections of Texas population at the state level.

Of the six sources of Texas population projections, the $B C$ uses the cohort component method in making its projections. The other five agencies use modified versions of the cohort component method. While the TDH, TDWR, and the Texas 2000 study differ with respect to migration rates, the BBR and the NPA use as their base populations estimates of population obtained from their economic submodels.

Instead of deriving net migration as described previously, the TDH considers migration trends obtained from the latest U.S. census in adjusting the migration rates initially calculated by following the original version of the cohort component method. The TDWR uses multiple regression analysis to estimate linear relationships between county migration (by county size) and county characteristics, to arrive at overall county migration rates by county size. From each overall county migration rate, cohort migration rates for each county are approximated using historic cohort migration rates for each county. The Texas 2000 study made two assumptions on net migration for each county for its projection [4], one being that future migration would follow the historical trend and the other assuming zero net migration. Population projections based on these two assumptions were then compared and adjusted by planners knowledgeable of local conditions to arrive at the final projected population.

Apart from the TDWR, which utilizes economic measures in addition to demographic measures to derive migration rates, the BBR and the NPA also attempt to incorporate changes in economic conditions into their projection techniques.

The Reyional Economic Projection Series [3] by the NPA uses economic trends to generate total population estimates on which demographic projections are based.

The Texas Economic Demographic Forecasting model formulated by Plaut [5] of the BBR uses three submodels - the manufacturing submodel, the projection submodel, and the labor market submodel - in addition to the demographic submodel to forecast population growth in Texas. Plaut assumes that the relative attractiveness of the state, as measured by its economic strength, determines its population growth. The three sets of population forecasts based on the three forecasted oil prices reflect this view. However, it is difficult to envision, given current conditions in the world petroleum market, the large increase in the oil price forecasted for late 1984 and 1985, for the high projection (Figure 2). Yet, the BBR's high forecast of the 1985 population is below the TDH projection.

Another major difference among the six sources is that, while the $B C$, the Texas 2000 study, and the BBR make their projections only at the state level, the TDH, the TDWR, and the NPA project population at the county level. The latter group makes their state population projections by aggregating their projected county populations.

An examination of the nine sets of state population projections (Appendix Tables A1 and A2 and Figure 1) reveals that the TDH projections and the BBR high projection are comparatively high. One reason for the high projections by the TDH is the migration trend used in the projections. The latest migration trend in Texas, 1975-80, used by the TDH in adjusting their migration rates was caused by a combined effect of several factors that occurred at about the same time:
the energy crisis, the decline of manufacturing industries in the northeast, the movement to the sunbelt from other regions, and the devaluation of the Mexican peso. This trend may not continue during the next decade or two because of the decline in oil prices, the recovery of the manufacturing industries in the northeast region, and the concern over the adequacy of water resources in the state. However, high though the TDH projections are, they may underestimate the 1985 population. The latest U.S. census estimates show Texas population as of Ju7y 1,1982 , to be 15.3 million compared with 14.9 miliion projected by the TDH for the same year.

The lowest set of projections is by the NPA. It is closest to the low forecasts by the TDWR and the BBR. As described earlier, the TDWR low set is developed by assuming that the future migration rate follows the same trend set between 1950-80. In the $1960^{\prime} \mathrm{s}$, Texas had negative net migration, meaning that more people were leaving the state than were coming into the state. Unless something unexpected occurs, the probability that this migration pattern will reoccur appears relatively low.

The remaining four sets of projections - the $B C$, the $B B R$ control, the Texas 2000, and the TDWR high - fall fairly close to one another in the medium range of the nine projections. The BC projection listed in Table A1 represents the middle series, which assumes that the future migration trend will be the same as that between 1970-80, the same assumption used for the TDWR high projection. This is apparently a more realistic assumption than that used for the TDWR low set, and the fact that the TDWR publishes its high projection set confirms this view. The $B C$ and the TDWR high sets of projections are about 0.3 million apart for 1990 and 0.5 million apart for 2000. Actually, all four sets
are extremely close for the 1990 projections, with the $B C$ and the Texas 2000 projections being the lowest and the highest, respectively, in this group ( 0.5 millions apart). By the year 2000, the BC projection still remains the lowest and is about 1.4 million less than the Texas 2000 projection, which is the highest in this group.

Selection of Projection Technique
After reviewing the projection techniques used, together with the projections made by each of the six agencies, it was deemed appropriate to average the sets of population projections for use in projecting Texas population for this study. Since the nine sets of projections by the six agencies fall into three groups--10w, medium, and high--the averages of the sets in each of the groups represent different levels of projection. The low group consists of the NPA set, the TDWR low set, and the $B B R$ low set; the medium group includes the $B C$, the BBR control, the Texas 2000, and the TDWR high sets; and the high group is composed of the TDH and the BBR high sets of projections. Projections at each level are made from 1982, when the latest U.S. census estimates are available, to 2005. A step-by-step procedure for each level of projection is outlined as follows:

Step 1: Obtain the latest census population estimate (1982) to be the base population.

Step 2: Derive the first projection, for the year closest to 1982 and when projections are available from all agencies in the group, by averaying the agency projections for that year.

Step 3: Derive projections for the years between 1982 and the year when the first projection is made in Step 2, by assuming a constant
growth rate during this period when the base population has grown to the first projection.

Step 4: Calculate projections for other years, when agency projections are available from all participating agencies, by averaging the agency projections for those years.

Step 5: Derive projections for the years between projections, as in Step 3 , but use the projection for an earlier year as the base population and the projection for a latter year as the ending population.

Step 6: Ubtain the projection for 2005 by extrapolating the projected 2000 population, based on the same growth rate existing in the last projection period.

## Results of State Population Projections

Following the procedure described above, Texas state population was projected at three levels from 1985 to 2005. By the medium forecast, Texas will grow from 15.1 million in 1982 to 23.6 million in 2005 , an increase of 56 percent. The low forecast predicts 20.7 million in 2005 , while the high projects 30.6 million. The high projection for 2005 may appear high, but if Texas continues to grow at the rate that it grew between 1980 and 1982, then by 1985 there will be 16.6 million people-- surpassing even the high forecast of 16.1 million for 1985. Table 2 and Figure 3 present the three levels of Texas state population projections from 1985 to 2005.

## District Population Projections

Because of the scarcity of public funds available to support highway and public transportation needs, equitable allocation of scarce resources for

Table 2. Three Levels of Texas State Population Projections -1985-2005

| Year | Low <br> $(1,000)$ | Medium <br> $(1,000)$ | High <br> $(1,000)$ |
| :---: | :---: | :---: | :---: |
| 1985 | $15,770.7$ | $16,046.4$ | $16,113.1$ |
| 1990 | $16,877.0$ | $17,675.3$ | $18,873.5$ |
| 1995 | $18,065.4$ | $19,469.5$ | $21,991.3$ |
| 2000 | $19,337.4$ | $21,445.8$ | $25,934.9$ |
| 2005 | $20,699.0$ | $23,622.7$ | $30,585.7$ |



Figure 3. Historic and TTI Projected Population
of Texas, 1960-2000
roadway improvements is an important concern of state transportation officials. One aspect of the allocation process is the expected population growth of the highway districts in the state. Information on population trends throughout the state can assist SDHPT officials in directing resources to the various districts.

Highway district population projections are an essential input to the planning and decision making process of allocating highway funds. Using population projections at the county level and aggregating these projections across the counties within each SDHPT district, district population projections can be made.

## Sources of District Population Projections

As discussed above, there are three agencies that regularly prepare county population projections: the TDH, the TDWR, and the NPA, all of which make county projections from 1980-2000 at five-year intervals. Thus, projections available from these sources are for $1985,1990,1995$, and 2000 and are listed in Appendix Table A3 by district. Appendix Table A4 lists historical district percentage distribution of the state population for 1970 and 1980, and the projected district percentage distribution by the three agencies for the year 2000. Appendix Tables A5 and A6 show population projections made by these three agencies for the 25 SDHPT districts and for their respective counties for 1990 and 2000 .

In addition to these projections, the $B C$ makes annual estimates of county population. The latest census estimates, published in June 1984, give estimates of county population from July 1,1981 to July 1, 1982 (provisional data). Table 3 shows SDHPT district populations as of July 1,1980 along with census estimates of district populations for July 1, 1981 and for July 1, 1982,

Table 3. Census Estimates of \& Percentage Changes in District Population Between 1980-1982

| District | Census $7 / 1 / 80$ | Estimates 7/1/81 | $\begin{aligned} & \text { Estimates } \\ & 7 / 1 / 82 \end{aligned}$ | Percentage Change 1980-1982 |
| :---: | :---: | :---: | :---: | :---: |
| 1 | 270343 | 274100 | 277900 | 2.7953 |
| 2 | 1083269 | 1113900 | 1159700 | 7.0556 |
| 3 | 225666 | 228400 | 233200 | 3.3387 |
| 4 | 316339 | 322400 | 331000 | 4.6345 |
| 5 | 421060 | 424100 | 427500 | 1.5295 |
| 6 | 284609 | 298000 | 324600 | 14.0513 |
| 7 | 130532 | 133600 | 138600 | 6.1809 |
| 8 | 240051 | 244600 | 253700 | 5.6858 |
| 9 | 471667 | 477400 | 484500 | 2.7207 |
| 10 | 447104 | 457600 | 473900 | 5.9932 |
| 11 | 220255 | 224800 | 230200 | 4.5151 |
| 12 | 3142627 | 3274100 | 3451500 | 9.8285 |
| 13 | 235469 | 239400 | 245700 | 4.3450 |
| 14 | 650186 | 667600 | 696200 | 7.0771 |
| 15 | 1211531 | 1243600 | 1278300 | 5.5111 |
| 16 | 475964 | 483600 | 498200 | 4.6718 |
| 17 | 258861 | 271400 | 288300 | 11.3726 |
| 18 | 2005212 | 2055200 | 2117800 | 5.6148 |
| 19 | 263017 | 267000 | 273900 | 4.1378 |
| 20 | 503245 | 510700 | 519300 | 3.1903 |
| 21 | 677422 | 705700 | 739000 | 9.0900 |
| 22 | 120230 | 122900 | 125900 | 4.7956 |
| 23 | 117252 | 118500 | 121500 | 3.6230 |
| 24 | 504160 | 519400 | 534500 | 6.0179 |
| 25 | 53619 | 53300 | 53600 | -0.0358 |
| Total | 14329690 | 14731300 | 15278500 |  |

together with the percentage changes in district populations between 1980 and 1982.

By the year 2000, the fastest growing districts will be Districts 21, 14, and 22, as forecasted by the TDWR; 14, 12, and 22 by the NPA; and 21, 11, and 12 by the TDH. Thus, the consensus is that Districts 21 and 22 along the Mexican border, and the Houston and Austin districts will represent the fastest growing districts in the year 2000. The census district population data indicate that, during 1970-80, Districts 21,14 , and 12 experienced the highest percentage increases in population. Figure 4 illustrates the ranges of percentage changes in population among districts between 1970 and 1980. Appendix Table A7 lists the actual percentage changes for each district. Using recent census estimates, districts that experienced the highest percentage gains between 1980 and 1982 were Districts $6,17,12$, and 21 . Figure 5 shows the percentage changes in population by district between 1980 and 1982.

Selection of Projection Technique
The TDH is the only source among the three (TDH, TDWR, and NPA) that relies on demographic data for its projections; both the TDWR and the NPA use economic variables in addition to demographic data. Thus, the TDH projections may be more appealing to some demographers. However, a closer examination of the projections made by the three agencies (Appendix Table A3) indicates that, for some districts, the three agencies are similar in their projections, especially for 1985. However, the populations of some districts appear to be underprojected, even by the TDH. For example, the 1985 populations of two of the fastest growing districts (according to the latest census estimates), Districts 6 and 17 , are projected by the TDH to be 316,991 and 275,857 , respectively, which are less than the 1982 census estimates of 324,600 and 288,300 for these two districts.


Figure 4. Percentage Change in Census Population Between 1970 - 1980 for Texas SDHPT Districts.


Figure 5. Estimated Percentage Change in Census Population Between July 1, 1980 and July 1, 1982 for Texas SDHPT Districts.

After a review of the strengths and the weaknesses of the three sets of projections, it was concluded that the average of the three district population projections should be used in this study as the district distribution of the state population. Based on the three levels of Texas population projections discussed previously, district populations were projected at three levels. A step-by-step procedure for district population projection is outlined as follows:

Step 1: Obtain district population projection by each agency for each district, by summing the appropriate county projections for the district by each agency.

Step 2: Derive the district population distribution percentage projected by each agency for each district, by dividing the district population projection by agency, obtained in Step 1, by the state population projected by the same agency.

Step 3: Obtain the district population distribution percentage for each district by averaging the district distribution percentages projected by the three agencies.

Step 4: Ubtain the district population distribution percentages for the year 2005 by extrapolating the district percentages for 2000 derived in Step 3, based on the same growth rates existing in the last projection period.

Step 5: Develop the district population projection for each district at each level of projection by multiplying the district population distribution percentage for each district by the projected state population at each level of projection.

Following the procedure described above, three sets of district population projections for the 25 SDHPT districts were derived for 1985-2005 at five-year intervals. They represent low, medium, and high sets of projection. Tables 48 present the district population projections at low, medium, and high levels of projection for $1985,1990,1995,2000$, and 2005. By 2005, the medium projection set shows District 12 as the most populated district in the state, with 5.9 million people, and District 18 as the next most populated district, with 3.2 million. District 25, which experienced population loss during 1970-1980, is forecasted to have 65,451 people, representing a 21.9 percent gain over the 1980 census figure.

Tables A8-A10 have been included in the Appendix to show the three sets (low, medium, and high) of district population projections for 1985-2005, using the district population distribution percentages developed by each of the three agencies (the TDH, the TDWR, and the NPA) and the three levels of state population projections derived previously. The district populations (Tables 4-8) developed from the projection procedure used in this study represent the average of the district population distribution percentages prepared by these three agencies. Appendix Tables A8-A10 are included for those readers who may be interested in the projections that would result from using one of the three agencies' percentages by district instead of the average of all three.

Compared to the 1980 census, Districts, 21, 22, and 24 along the Mexican border, and Districts 14 and 12 will still be the fastest-growing districts by 2005. During 1980-2005, District 21's population will increase by 117.2 percent, the highest gain in the state, followed closely by District 22 with a

Table 4. District Population Projection for 1985, By Level of Projection.

| District | Low | Medium | High |
| :---: | ---: | ---: | ---: |
| 1 | 282763 | 287707 | 288902 |
| 2 | 1164614 | 1184973 | 1189899 |
| 3 | 234410 | 238508 | 239500 |
| 4 | 333382 | 339210 | 340620 |
| 5 | 441901 | 449626 | 451495 |
| 6 | 312575 | 318039 | 319361 |
| 7 | 139161 | 141594 | 142182 |
| 8 | 249638 | 254003 | 255058 |
| 9 | 508793 | 517688 | 519840 |
| 10 | 496496 | 505176 | 507275 |
| 11 | 242236 | 246471 | 247496 |
| 12 | 3584258 | 3646917 | 3662076 |
| 13 | 249315 | 253674 | 254728 |
| 14 | 742617 | 755599 | 758740 |
| 15 | 1316434 | 1339447 | 1345015 |
| 16 | 510390 | 519313 | 521471 |
| 17 | 284723 | 289701 | 290905 |
| 18 | 2194052 | 2232408 | 2241687 |
| 19 | 281737 | 286663 | 287854 |
| 20 | 530904 | 540185 | 542431 |
| 21 | 785271 | 798999 | 802320 |
| 22 | 138765 | 141191 | 141778 |
| 23 | 123812 | 125977 | 126500 |
| 24 | 568438 | 578375 | 580779 |
| 25 | 54014 | 54959 | 55187 |
|  | $======$ | $======$ | $=======$ |
| Total | 15770700 | 16046400 | 16113100 |

Table 5. District Population Projection for 1990 , By Level of Projection.

| District | Low | Medium | High |
| :---: | :---: | :---: | :---: |
| 1 | 285578 | 299086 | 319361 |
| 2 | 1214462 | 1271907 | 1358129 |
| 3 | 235550 | 246692 | 263415 |
| 4 | 341355 | 357501 | 381736 |
| 5 | 451332 | 472680 | 504723 |
| 6 | 332385 | 348107 | 371705 |
| 7 | 144567 | 151405 | 161669 |
| 8 | 251615 | 263517 | 281381 |
| 9 | 535454 | 560781 | 598796 |
| 10 | 532302 | 557481 | 595272 |
| 11 | 257822 | 270017 | 288321 |
| 12 | 3957837 | 4145047 | 4426038 |
| 13 | 255140 | 267208 | 285322 |
| 14 | 830202 | 869472 | 928413 |
| 15 | 1391782 | 1457614 | 1556425 |
| 16 | 526435 | 551336 | 588711 |
| 17 | 308339 | 322923 | 344814 |
| 18 | 2338596 | 2449214 | 2615245 |
| 19 | 291647 | 305442 | 326148 |
| 20 | 541945 | 567579 | 606055 |
| 21 | 889981 | 932078 | 995263 |
| 22 | 156605 | 164013 | 175131 |
| 23 | 126940 | 132945 | 141957 |
| 24 | 625955 | 655563 | 700003 |
| 25 | 53177 | 55692 | 59468 |
|  | = = = = = = = | = = = = = = = | = = = = = = = |
| Total | 16877000 | 17675300 | 18873500 |

Table 6. District Population Projection for 1995, By Level of Projection.

| District | Low | Medium | High |
| :---: | :---: | :---: | :---: |
| 1 | 289870 | 312400 | 352864 |
| 2 | 1262045 | 1360135 | 1536307 |
| 3 | 242901 | 261780 | 295687 |
| 4 | 351713 | 379049 | 428146 |
| 5 | 472741 | 509484 | 575475 |
| 6 | 350681 | 377937 | 426890 |
| 7 | 151350 | 163114 | 184241 |
| 8 | 257314 | 277313 | 313232 |
| 9 | 568036 | 612186 | 691479 |
| 10 | 564226 | 608079 | 686841 |
| 11 | 272395 | 293567 | 331591 |
| 12 | 4329478 | 4665979 | 5270343 |
| 13 | 261546 | 281874 | 318384 |
| 14 | 927781 | 999891 | 1129403 |
| 15 | 1479422 | 1594407 | 1800923 |
| 16 | 543243 | 585466 | 661299 |
| 17 | 325973 | 351309 | 396812 |
| 18 | 2492079 | 2685771 | 3033647 |
| 19 | 302988 | 326537 | 368832 |
| 20 | 557130 | 600432 | 678203 |
| 21 | 1007131 | 1085409 | 1225997 |
| 22 | 176586 | 190311 | 214961 |
| 23 | 133011 | 143350 | 161917 |
| 24 | 692131 | 745925 | 842542 |
| 25 | 53630 | 57798 | 65285 |
|  | $==== \pm= \pm=$ | $======$ | $=\sim=-==$ |
| Total | 18065400 | 19469500 | 21991300 |

Table 7. District Population Projection for 2000, By Level of Projection.

| District | Low | Medium | High |
| :---: | ---: | ---: | ---: |
| 1 | 292522 | 324416 | 392324 |
| 2 | 1302712 | 1444750 | 1747169 |
| 3 | 251382 | 278791 | 337148 |
| 4 | 366419 | 406370 | 491433 |
| 5 | 502533 | 557326 | 673987 |
| 6 | 375133 | 416034 | 503120 |
| 7 | 160167 | 177631 | 214813 |
| 8 | 266182 | 295205 | 356998 |
| 9 | 607404 | 673630 | 814637 |
| 10 | 595195 | 660090 | 798262 |
| 11 | 287360 | 318691 | 385401 |
| 12 | 4722168 | 5237037 | 6333269 |
| 13 | 268115 | 297348 | 359590 |
| 14 | 1035925 | 1148874 | 1389360 |
| 15 | 1568486 | 1739501 | 2103619 |
| 16 | 560641 | 621769 | 751920 |
| 17 | 346483 | 384261 | 464695 |
| 18 | 2650393 | 2939371 | 3554649 |
| 19 | 313849 | 348069 | 420927 |
| 20 | 569889 | 632025 | 764323 |
| 21 | 1134022 | 1257667 | 1520925 |
| 22 | 198897 | 220583 | 266756 |
| 23 | 140951 | 156319 | 189040 |
| 24 | 765122 | 848545 | 1026165 |
| 25 | 55451 | 61497 | 74369 |
|  | $========$ | $=======$ | $====0$ |
| Total | 19337400 | 21445800 | 25934900 |

Table 8. District Population Projection for 2005. By Level of Projection.

| District | Low | Medium | High |
| ---: | ---: | ---: | ---: |
| 1 |  |  |  |
| 2 | 295258 | 336963 | 436286 |
| 3 | 1343552 | 1533327 | 1985288 |
| 4 | 260715 | 297541 | 385243 |
| 5 | 381394 | 435265 | 563563 |
| 6 | 533832 | 609235 | 788813 |
| 7 | 401369 | 458061 | 593079 |
| 8 | 169423 | 193354 | 250346 |
| 9 | 275077 | 313931 | 406465 |
| 10 | 649311 | 741026 | 959449 |
| 11 | 627198 | 715789 | 926774 |
| 12 | 302832 | 345606 | 447477 |
| 13 | 5145467 | 5872256 | 7603156 |
| 14 | 274637 | 313429 | 405814 |
| 15 | 1155562 | 1318783 | 1707506 |
| 16 | 1662758 | 1897620 | 2456960 |
| 17 | 578265 | 659943 | 854468 |
| 18 | 367905 | 419871 | 543632 |
| 19 | 2815527 | 3213216 | 4160339 |
| 20 | 324957 | 370856 | 480169 |
| 21 | 582909 | 665244 | 861331 |
| 22 | 1275730 | 1455925 | 1885072 |
| 23 | 223830 | 255446 | 330741 |
| 24 | 149194 | 170267 | 220455 |
| 25 | 844948 | 964295 | 1248530 |
|  | 57350 | 65451 | 84743 |
| Total | 20699000 | 23622700 | 30585700 |

113.7 percent gain. For the same period, Districts 1 and 25 are projected to experience the least increases, 25.1 percent and 21.9 percent, respectively. Figure 6 illustrates the ranges of projected percentage changes in district populations during this period. The projected percentage changes for individual districts are included in Appendix Table A7.

If Texas is to continue its population growth at the current rate, the high projection set may be the most accurate projection for years that are closer to the present. In later years, should the growth slow down, as is generally expected by most forecasters, the medium projection set may be more appropriate.


Figure 6. Projected Percentage Change in District
Population Between 1980-2005.

## POPULATION COMPOSITION

A population can be separated into components according to various characteristics, in particular, age, sex, and race. Information on these characteristics is of interest to many groups, since changes in the composition of population will affect the needs of each component group, needs which must be faced by planners in cities, corporations, or businesses. The baby boom after World War II has been tracked not only by demographers, but also by many industries producing baby goods, automobiles, housing, and many other products. In this study, the age, sex, and race characteristics of the Texas population are examined.

## Age Distribution

Texas is reported to have a younger population than the U.S. average, and the average age in Texas is gradually increasing [7]. The median age of Texas citizens in 1980 was 28.2 , as compared with 30.0 for a U.S. resident, while the average Texan was 9.5 years older in 1980 than in 1900 . For the purpose of this study, the age distribution in Texas is separated into three groups: the young (age $0-15$ ), the driving age (age 16-74), and the old (age 75+). The young and the old together account for approximately one-third of the total population with the remaining two-thirds falling into the driving group.

According to the 1980 census, the young group declined as a proportion of the state population, from 31.7 percent in 1970 to 26.5 percent in 1980 , while the old group retained approximately the same percentage share, 3.3 percent in 1970 and 3.7 percent in 1980. Most of the population share loss by the young group went to the driving age group, which went from 65.0 percent to 69.8 percent during the same period.

The future is not expected to bring much change in the age distribution relative to 1980. The $B C$ predicts that only the young will lose about one percentage point of its share to the old by 2000 , while the driving age group will retain approximately the same percentage share. Other agencies that make population forecasts see things slightly differently. The NPA agrees with the general direction of the $B C$ prediction but foresees an additional 0.5 percentage point increase in the old group, whereas the BBR predicts that the old group's percentage share will remain unchanged and that the driving age group will gain from the loss by the young group. Table 9 illustrates the census historic and projected age distribution of Texas population from 1970 to 2000. Appendix Tables All-A13 show predictions of the age distribution of Texas population by the NPA, the BBR, and the TDH.

At the district level, the border districts (Districts 21 and 22) experienced the fastest growth in their young groups among all the district young groups during the last decade, while Districts 14 and 12 experienced the biggest gains in the driving age group among all the district driving age groups. The old groups that experienced the largest increase during the same period were from Districts 21 and 6. According to the TDH projections, Districts 21 and 22 will not only continue to lead the state in their young group growth during the next two decades, but will also take over as leaders in the growth of the other two age groups, making them the fastest growing districts in the state.

## Sex Distribution

The latest census projections show the 1980 male and female populations in Texas to be $6,998,723$ an $7,230,468$, respectively, representing 49.2 percent and 50.8 percent of the total state population. This distribution has not changed

Table 9. State Population and Its Percentage Distribution by Age Group and Sex - Historic and Projected by the Bureau of the Census.

| Year | Total Population$(1,000)$ | Age Distribution |  |  | Sex Distribution |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Young | Driver (Percent) | 01d | Male | $\begin{aligned} & \text { Female } \\ & \text { (Percent) } \end{aligned}$ |
| 1970 | 11,196.7 | 31.7 | 65.0 | 3.3 | 49.0 | 51.0 |
| 1980 | 14,229.2 | 26.5 | 69.8 | 3.7 | 49.2 | 50.8 |
| 1990 | 17,498.2 | 26.6 | 69.0 | 4.4 | 49.4 | 50.6 |
| 2000 | 20,739.4 | 25.8 | 69.4 | 4.7 | 49.6 | 50.4 |

significantly since 1970 . The future is expected to bring little change, to the state population distribution by sex. Both the $B C$ and the TDH predict only a very slight increase in the male population percentage share by 2000 , narrowing even further the gap in the distribution between the two sexes (Table 9 and Appendix Table A13). Meanwhile, the opposite trend is projected by the NPA, which expects the male population to decline slightly in its percentage share, from 49 percent to 48.8 percent, during 1980 to 2000 (Appendix Table A11). The BBR predicts that the male/female proportions of the state population will be the same by 2000 (Appendix Table A12).

The age-sex distribution in Texas for 1970-2000, as compiled by the BC, is shown in Table 10. Throughout this period, the young male group has been -- and is forecasted to continue to be -- slightly larger than the roung female group. In the driving age group, females currently (1980) outnumber males by 3.3 percent in the driving age group, but by 2000 this situation is expected to reverse, with males slightly outnumbering females in this age group. In the old group, the wide gap between females and males is forecasted to grow even wider. The ratio of females to males in the old group, equal to 1.58 in 1970 , is currently (1980) 1.78 and is expected to grow to 1.88 by 2000 . However, since the old age group accounts for only a few percent of the total Texas population, the age-sex trend in the old group will not significantly affect the forecasted trend towards nearly equal male/female proportions in the state population (see Table 9). The 1980 and projected 2000 population pyramids for the three age groups (by sex) are illustrated in Figure 7.

## Race-Ethnicity Distribution

In the race-ethnicity distribution of the Texas population among whites, blacks, and hispanics, both whites and blacks are losing their respective shares

Table 10. State Population by Age Group and by Sex between 1970-2000 Historic and Projected by the Bureau of the Census.

|  |  | Sex |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Male |  |  | Female |  |
| Year | Total | Young | Driving | 01d | Young | Driving | 01d |
| 1970 | 11,196,741 | 1,809,494 | 3,530,700 | 140,985 | 1,746,573 | 3,745,672 | 223,317 |
| 1980 | 14,229,191 | 1,927,391 | 4,883,196 | 188,136 | 1,847,243 | 5,047,465 | 335,760 |
| 1990 | 17,498,200 | 2,377,140 | 6,002,860 | 271,200 | 2,269,820 | 6,078,280 | 498,900 |
| 2000 | 20,739,400 | 2,743,060 | 7,210,840 | 342,000 | 2,615,740 | 7,185,960 | 641,800 |



Figure 7. Historic and Projected Population of Texas by Age and Sex: 1980 and 2000 (Bureau of Census).
to hispanics. In 1970, the Texas population was 73.2 percent white, 13.2 percent black, and 13.6 percent hispanic. The 1980 census indicates that the percentage shares of whites and blacks have declined to 67.1 percent and 11.9 percent, respectively, implying that the hispanic percentage share has increased from 13.6 percent to 21.0 percent during this period. This trend is forecasted by the TDH to continue during the next two decades. By 2000, hispanics will account for 40.0 percent of the state population, while whites will have 51.5 percent, and blacks only 8.4 percent (Appendix Table A13). The rapid growth in the border districts, Districts 21 and 22, is a major factor in this large increase in the hispanic population.

Table 11 shows the Texas population by race and age groups for 1970 and 1980. While the total numbers of individuals in all three racial groups increased during this period, the percentage increases were 16.6 percent for whites and 14.4 percent for blacks, compared with 95.9 percent for hispanics. While the young age groups for both whites and blacks declined, the young group increased by 68.8 percent for hispanics. The driving age groups for both whites and blacks increased by about 26 percent, compared with 115.7 percent for hispanics. 01d groups increased by 38.5 percent and 35.3 percent for whites and blacks, respectively, while this group increased by 125.1 percent for hispanics.

Table 11. State Population by Race and by Age Group between 1970 and 1980

| Year | White |  |  |  | Black |  |  |  | Hispanic |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Total | Young | Driving | Old | Total | Young | Driving | Old | Total | Young | Driving | Old |
| 1970 | 8,193,281 | 2,358,147 | 5,534,931 | 300,203 | 1,479,602 | 551,186 | 888,058 | 40,358 | 1,523,858 | 646,734 | 853,383 | 23,741 |
| 1980 | 9,550,825 | 2,160,637 | 6,974,349 | 415,839 | 1,692,542 | 522,233 | 1,115,687 | 54,622 | 2,985,824 | 1,091,764 | 1,840,625 | 53,435 |

## APPLICATION OF POPULATION PROJECTIONS

Population projections are of great importance to transportation planners. The level of population in any given area determines the number of licensed drivers in the area, and therefore the number of vehicles using the transportation system. The state's population, number of licensed drivers, and vehicle miles traveled from 1960 through 1982 were analyzed to determine the relationship between the population and vehicle-miles traveled.

After considering several alternative models, it was decided that a twoequation model would be used to forecast vehicle-miles traveled. The first equation expresses vehicle-miles traveled as a function of the real price of gasoline and the number of licensed drivers:

$$
Y=\underset{(-2.63479)}{-1.32550}-\underset{(-3.42247)}{0.134519} X_{1}+\underset{(19.4498)}{1.23223} X_{2}, \quad R^{2}=.9573
$$

where $Y$ is the natural logarithm of vehicle-miles traveled per licensed driver, $X_{1}$ is the natural logarithm of the real gasoline price index, and $X_{2}$ is the natural logarithm of the real gross Texas product per licensed driver. The $R_{2}$ statistic measures the proportion of variation in the variable which is explained by the regression equation while the t-statistic, given in parentheses below the coefficient, tests the significance of the estimated coefficient. The second equation is a mathematical equation fitted to data for 1960, 1970, and 1980, which estimates licensed drivers as a function of the population over sixteen years of age:

$$
e^{\frac{Y}{10}}=16585.94642-97283.65598\left(\frac{1}{X}\right)
$$

where $Y$ is the percent of licensed drivers in the population over sixteen years old, and $X$ is the population over sixteen years of age. $X$ was calculated by multiplying the $B B R^{\prime}$ 's projected ratio of population of this age group to the total population by the medium state population projected earlier in this study. For a given year, the number of licensed drivers is obtained by multiplying the estimated $Y$ by the population over sixteen years of age of that particular year.

These two equations were used to project a high and a low estimates of vehicle-miles traveled to indicate future usage of the transportation system in Texas. The medium projections of the state population obtained earlier and real gas price index projected by TTI [1] were used in both the high and the low projections. The high and low projections differ in their assumed growth of the Texas economy. The high projection uses the real gross Texas product forecast estimated by Plaut [5], who forecasts the real gross Texas product to increase at an average growth rate of 4.6 percent a year from 1980 to 2005 while the low projection assumes a lower growth rate of 3.5 percent which was derived by the assumption of a continual growth pattern in the real gross Texas product per licensed driver set during the period from 1960 to 1980.

The historical (1970-1980) and projected (1985-2005) number of licensed drivers and vehicle-miles traveled are presented in Table 12. The number of licensed drivers increased from 6.38 million in 1970 to 9.29 million in 1980 , representing an increase of 45.6 percent during the period. At the same time, vehicle-miles traveled grew from 68,031 million miles in 1970 to 110,381 milion miles in 1980, an increase of 62.3 percent. Vehicle-miles traveled will continue to increase through the year 2005 as population and the number of licensed

Table 12. Licensed Drivers and Vehicle-Miles Traveled Historic and Projected

| Year | Number of Licensed Drivers $(1,000)$ | Vehicle-Miles Traveled (1,000,000) |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  | Low Forecast | Historic | $\begin{gathered} \text { High } \\ \text { Forecast } \end{gathered}$ |
| 1970 | 6,380.1 |  | 68,031 |  |
| 1975 | 7,509.5 |  | 84,582 |  |
| 1980 | 9,287.8 |  | 110,381 |  |
| 1985 | 10,679.7 | 142,887 |  | 148,480 |
| 1990 | 11,893.0 | 169,752 |  | 192,078 |
| 1995 | 13,269.2 | 202,332 |  | 247,871 |
| 2000 | 14,851.4 | 242,691 |  | 316,000 |
| 2005 | 16,571.8 | 290,162 |  | 401,829 |

drivers grow. The number of licensed drivers is projected to increase 78.4 percent from 1980 to 2005. In the low growth scenario, vehicle-miles are projected to increase 163 percent from 1980 to 2005. Under the higher economic growth assumption, an increase of 264 percent in vehicle-miles are forecasted for the same period.

## CONCLUSIONS

The tremendous yrowth in Texas during the past decade is predicted to slow down during the coming decade. Three sets--1ow, medium, and high--of state population projections from 1985 to 2005, were derived following the projection procedure used in this study. The medium forecast predicts the Texas state population to increase to 23.6 million by 2005 . The low forecast puts the state population at 20.7 million for that year, while the high forecast predicts 30.6 million.

Populations of SDHPT districts were also projected at low, medium, and high levels, using the average of three available county projections and each of three sets of state population projections. The districts containing Houston and Dallas are forecasted to continue to lead the state as the most populous districts. By 2005, the medium projection shows District 12 to be the most populated district with 5.9 million residents, followed by District 18 with 3.2 million residents. District 25 , which experienced population loss between 1970 and 1980 , is predicted to have a 21.8 percent gain between 1980 and 2005. Among all districts, the border districts, Districts 21,11 , and 24 , are predicted to be the fastest-growing districts in the state during 1980-2005.

The Texas population is found to be younger on average than the U.S. as a whole, although the average age of Texans is increasing. The driving age group (age 16-74) constitutes two-thirds of the state population, with the remaining one-third including the young (age $0-15$ ) and the old (age 74+). This age distribution is expected to change very little in the near future.

The distribution of the Texas population by sex indicates an approximately equal split between the two sexes, with females slightly outnumbering males.

However, with the old age group, there are far more females than males. The Bureau of the Census predicts that, by the year 2000, there will be twice as many females than males in the old age category.

As for the race-ethnicity distribution, rapid growth in the border districts will lead to a large increase in the hispanic population in Texas. By 2000, the Department of Health predicts that hispanics will comprise 40.0 percent of the state population, with whites and blacks accounting for 51.5 percent and 8.4 percent, respectively.

The population projections developed in this study were applied to forecasting total vehicle-miles traveled in Texas. Multiple regression analysis results of a two-equation forecasting model indicate that by the year 2005, the Texas population (projected at the medium level) will travel 290,162 million miles, an increase of 162.9 percent over the 1980 level.

The findings of this study should be helpful to transportation planning officials. The forecasts of Texas population growth trends and vehicle-miles traveled during the next 20 years can be used in planning for meeting future transportation needs in this state.

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APPENDIX TABLES

Table Al. State Poplulation (1,000) Projected by Various Sources - 1980 to 2000

| Year | Texas Department of Health ${ }^{\text {a }}$ | Bureau of Censusb | Texas <br> Department of Water Resources ${ }^{C}$ | Texas 2000d | Bureau of Business Research ${ }^{\text {e }}$ | National Plamning Association ${ }^{f}$ | Average |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1980 | 14,229.19 | 14,229.19 | 14,229.20 | 14,228.38 | 14,321.00 | 14,263.00 |  |
| 1981 | 14,572.77 |  |  |  | 14,678.60 |  |  |
| 1982 | 14,944.49 |  |  |  | 15,053.10 |  |  |
| 1983 | 15,345.76 |  |  |  | 15,384.00 |  |  |
| 1984 | 15,779.24 |  |  |  | 15,682.00 |  |  |
| 1985 | 16,245.59 |  | 15,910.60 |  | 15,980.70 | 15,678.00 | 15,953.70 |
| 1986 | 16,751.01 |  |  |  | 16,292.10 |  |  |
| 1987 | 17,294.85 |  |  |  | 16,609.10 |  |  |
| 1988 | 17,881.52 |  |  |  | 16,940.80 |  |  |
| 1989 | 18,514.47 |  |  |  | 17,288.50 |  |  |
| 1990 | 19,197.55 | 17,498.20 | 17,846.10 | 17,703.00 | 17,653.70 | 16,818.70 | 17,786.20 |
| 1991 | 19,800.42 |  |  |  | 18,031.80 |  |  |
| 1992 | 20,449.83 |  |  |  | 18,418.00 |  |  |
| 1993 | 21,149.76 |  |  |  | 18,820.70 |  |  |
| 1994 | 21,904.42 |  |  |  | 19,223.80 |  |  |
| 1995 | 22,716.38 |  | 19,450.60 |  | 19,633.10 | 17,852.00 | 19,913.00 |
| 1996 | 23,594.48 |  |  |  | 20,043.30 |  |  |
| 1997 | 24,540.40 |  |  |  | 20,454.70 |  |  |
| 1998 | 25,561.42 |  |  |  | 20,869.70 |  |  |
| 1999 | 26,663.97 |  |  |  | 21,289.60 |  |  |
| 2000 | 27,855.44 | 20,739.40 | 21,239.30 | 22,091.00 | 21,713.50 | 18,790.00 | 22,071.40 |

a These are the October 1982 projections, latest as of Jume 1984.
b Population Estimates and Projections, Series P-25, No. 937, U.S. Department of Commerce, Bureau of the Census.
c These are the latest projections as of June 1984, representing the high projections.
d "Texas Past and Future: A Survey Fconomic Development Issues", Texas 2000 Project, Office of the Governor, Jume 1981.
e Plaut, Thomas R., Texas Economic and Population Growth: The Next Quarter Century, Bureau of Business Research, Uhiversity of Texas, Austin, 1983. These represent the control projections.
£ Holdrich, Martin K., Regional Economic Projections Series, National Plaming Association, 1982.

Table A2. Levels of State Population Projection by the Texas Department of Water Resources and by the Bureau of Business Research: 1985-2000

| Year | Texas Department of Water Resources |  | Bureau of Business Research |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | Low | High | Low | Control | High |
|  | (Million) |  | (Million) |  |  |
| 1985 |  | 15.9 | 15.8 | 16.0 | 16.0 |
| 1990 | 16.8 | 17.8 | 17.0 | 17.7 | 18.5 |
| 1995 |  | 19.5 | 18.3 | 19.6 | 21.3 |
| 2000 | 19.6 | 21.2 | 19.6 | 21.7 | 24.0 |

Table A3. District Population Projected by Different Agencies: Between 1985-2000.

| Year | District | Water Resources | National Planning Association | Dept of Health |
| :---: | :---: | :---: | :---: | :---: |
| 1985 | 1 | 284966 | 286000 | 286517 |
| 1985 | 2 | 1170355 | 1166400 | 1195437 |
| 1985 | 3 | 233054 | 246200 | 231335 |
| 1985 | 4 | 335355 | 335400 | 340307 |
| 1985 | 5 | 443518 | 444400 | 452282 |
| 1985 | 6 | 317237 | 313700 | 316991 |
| 1985 | 7 | 138183 | 141700 | 142133 |
| 1985 | 8 | 251521 | 255500 | 249903 |
| 1985 | 9 | 509463 | 515400 | 518100 |
| 1985 | 10 | 500413 | 492000 | 513584 |
| 1985 | 11 | 244390 | 241300 | 249023 |
| 1985 | 12 | 3570408 | 3556400 | 3745867 |
| 1985 | 13 | 253827 | 251500 | 250694 |
| 1985 | 14 | 770614 | 721900 | 760069 |
| 1985 | 15 | 1345691 | 1304900 | 1342072 |
| 1985 | 16 | 514531 | 518800 | 514337 |
| 1985 | 17 | 298699 | 288600 | 275857 |
| 1985 | 18 | 2208549 | 2183000 | 2263301 |
| 1985 | 19 | 283697 | 281600 | 289201 |
| 1985 | 20 | 539488 | 532000 | 538571 |
| 1985 | 21 | 807290 | 731400 | 844593 |
| 1985 | 22 | 141182 | 133600 | 146241 |
| 1985 | 23 | 123051 | 125700 | 126730 |
| 1985 | 24 | 571891 | 554900 | 597749 |
| 1985 | 25 | 53180 | 55900 | 54700 |
| 1990 | 1 | 301560 | 299000 | 308837 |
| 1990 | 2 | 1275333 | 1241500 | 1355293 |
| 1990 | 3 | 241645 | 263300 | 243318 |
| 1990 | 4 | 357883 | 345600 | 385393 |
| 1990 | 5 | 468642 | 455100 | 516552 |
| 1990 | 6 | 358854 | 322900 | 379650 |
| 1990 | 7 | 147351 | 149700 | 163945 |
| 1990 | 8 | 265031 | 262800 | 273556 |
| 1990 | 9 | 552121 | 562200 | 591564 |
| 1990 | 10 | 563768 | 529300 | 605836 |
| 1990 | 11 | 272782 | 258200 | 291647 |
| 1990 | 12 | 4106866 | 3882800 | 4656115 |
| 1990 | 13 | 275190 | 261000 | 276709 |
| 1990 | 14 | 921040 | 800400 | 928637 |
| 1990 | 15 | 1505254 | 1403300 | 1528374 |
| 1990 | 16 | 559008 | 543500 | 574725 |
| 1990 | 17 | 350192 | 312700 | 318554 |
| 1990 | 18 | 2456515 | 2345900 | 2660121 |
| 1990 | 19 | 307429 | 297500 | 324945 |
| 1990 | 20 | 582024 | 553900 | 591022 |
| 1990 | 21 | 973745 | 787600 | 1090546 |
| 1990 | 22 | 167440 | 147400 | 186041 |
| 1990 | 23 | 129757 | 131800 | 143154 |
| 1990 | 24 | 653986 | 603900 | 743220 |
| 1990 | 25 | 52724 | 56900 | 59800 |

Table A3. (Continued) District Population Projected by Different Agencies: Between 1985-2000.

| Year | District | Water Resources | National Planning Association | Dept of Health |
| :---: | :---: | :---: | :---: | :---: |
| 1995 | 1 | 314912 | 309000 | 332511 |
| 1995 | 2 | 1350219 | 1300800 | 1528714 |
| 1995 | 3 | 261927 | 278800 | 255636 |
| 1995 | 4 | 371669 | 353600 | 442764 |
| 1995 | 5 | 497233 | 467300 | 607996 |
| 1995 | 6 | 377666 | 331600 | 459862 |
| 1995 | 7 | 152650 | 157000 | 192887 |
| 1995 | 8 | 275900 | 269000 | 306157 |
| 1995 | 9 | 597179 | 604700 | 675918 |
| 1995 | 10 | 602209 | 561300 | 710895 |
| 1995 | 11 | 288474 | 272500 | 343912 |
| 1995 | 12 | 4519412 | 4174100 | 5742638 |
| 1995 | 13 | 290902 | 268700 | 304982 |
| 1995 | 14 | 1064360 | 885800 | 1129688 |
| 1995 | 15 | 1657136 | 1501300 | 1735156 |
| 1995 | 16 | 589678 | 565700 | 640778 |
| 1995 | 17 | 378572 | 334300 | 362161 |
| 1995 | 18 | 2671816 | 2482100 | 3122163 |
| 1995 | 19 | 327654 | 311000 | 364570 |
| 1995 | 20 | 625195 | 569800 | 646465 |
| 1995 | 21 | 1124243 | 848800 | 1406170 |
| 1995 | 22 | 190021 | 161300 | 238969 |
| 1995 | 23 | 138690 | 137100 | 165333 |
| 1995 | 24 | 730296 | 648800 | 932463 |
| 1995 | 25 | 52597 | 57600 | 67588 |
| 2000 | 1 | 328936 | 316100 | 364117 |
| 2000 | 2 | 1430900 | 1340700 | 1765464 |
| 2000 | 3 | 284421 | 295000 | 275995 |
| 2000 | 4 | 386358 | 363000 | 538625 |
| 2000 | 5 | 527768 | 482900 | 763633 |
| 2000 | 6 | 397534 | 342100 | 592608 |
| 2000 | 7 | 158374 | 164700 | 240289 |
| 2000 | 8 | 287482 | 277200 | 362326 |
| 2000 | 9 | 648399 | 657600 | 799632 |
| 2000 | 10 | 643604 | 590400 | 852782 |
| 2000 | 11 | 305169 | 285100 | 418936 |
| 2000 | 12 | 4976598 | 4417100 | 7331705 |
| 2000 | 13 | 307635 | 274300 | 348548 |
| 2000 | 14 | 1231951 | 971300 | 1421097 |
| 2000 | 15 | 1824527 | 1602900 | 2009051 |
| 2000 | 16 | 622280 | 588500 | 734243 |
| 2000 | 17 | 409544 | 353100 | 436739 |
| 2000 | 18 | 2913396 | 2578700 | 3809839 |
| 2000 | 19 | 349394 | 324600 | 416850 |
| 2000 | 20 | 673232 | 578100 | 722801 |
| 2000 | 21 | 1298909 | 912300 | 1844670 |
| 2000 | 22 | 215916 | 175400 | 316328 |
| 2000 | 23 | 148849 | 143400 | 201313 |
| 2000 | 24 | 815611 | 696400 | 1204389 |
| 2000 | 25 | 52495 | 58900 | 83464 |

Table A4. District Population Percentage Distribution: Historic(1970 and 1980) and Projected(2000).

|  |  |  | Year $=2000$ |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| District | $\begin{gathered} \text { Census } \\ 1970 \end{gathered}$ | $\begin{gathered} \text { Census } \\ 1980 \end{gathered}$ | Texas Dept of Health | Texas Dept of Water Resources | National <br> Planning <br> Association | Average |
|  | 2.134 | 1.893 | 1.307 | 1.549 | 1.682 | 1.513 |
| 2 | 7.847 | 7.559 | 6.338 | 6.737 | 7.135 | 6.737 |
| 3 | 1.899 | 1.581 | 0.991 | 1.339 | 1.570 | 1.300 |
| 4 | 2.460 | 2.213 | 1.934 | 1.819 | 1.932 | 1.895 |
| 5 | 3.402 | 2.954 | 2.741 | 2.485 | 2.570 | 2.599 |
| 6 | 2.110 | 1.977 | 2.127 | 1.872 | 1.821 | 1.340 |
| 7 | 0.997 | 0.912 | 0.863 | 0.746 | 0.877 | 0.828 |
| 8 | 2.000 | 1.679 | 1.301 | 1.354 | 1.475 | 1.377 |
| 9 | 3.425 | 3.305 | 2,871 | 3.053 | 3.500 | 3.141 |
| 10 | 2.984 | 3.124 | 3.061 | 3.030 | 3. 142 | 3.078 |
| 11 | 1.492 | 1.540 | 1.504 | 1.437 | 1.517 | 1.486 |
| 12 | 19.451 | 21.855 | 26.321 | 23.431 | 23.508 | 24.420 |
| 13 | 1.871 | 1.648 | 1.251 | 1.448 | 1.460 | 1.387 |
| 14 | 3.955 | 4.539 | 5. 102 | 5.800 | 5.169 | 5.357 |
| 15 | 8.829 | 8.458 | 7. 212 | 8.590 | 8.531 | 8.111 |
| 16 | 3.726 | 3.332 | 2.636 | 2.930 | 3.132 | 2.899 |
| 17 | 1.682 | 1.797 | 1.568 | 1.928 | 1.879 | 1.792 |
| 18 | 14.175 | 14.004 | 13.677 | 13.717 | 13.724 | 13.706 |
| 19 | 1.958 | 1.841 | 1.496 | 1.645 | 1.728 | 4.623 |
| 20 | 3.929 | 3.524 | 2.595 | 3.170 | 3.077 | 2.947 |
| 21 | 4.086 | 4.711 | 6.622 | 6.116 | 4.855 | 5.864 |
| 22 | 0.799 | 0.840 | 1.136 | 1.017 | 0.933 | 1.029 |
| 23 | 0.913 | 0.822 | 0.723 | 0.701 | 0.763 | 0.729 |
| 24 | 3.387 | 3.516 | 4.324 | 3.840 | 3.706 | 3.957 |
| 25 | 0.489 | 0.377 | 0.300 | 0.247 | 0.313 | 0.287 |
|  | $=====$ | $======$ | = = = = = = | $======$ | $======$ | = $=$ |
|  | 100.000 | 100.001 | 100.000 | 100.000 | 100.000 | 100.000 |


| County | Texas Dept of Water Resources | Texas Dept of Health | National Planning Association |
| :---: | :---: | :---: | :---: |
| DELTA | 4915 | 5081 | 5200 |
| FANNIN | 26235 | 26639 | 26000 |
| FRANKLIN | 8441 | 9499 | 8100 |
| GRAYSON | 101921 | 96737 | 99100 |
| HOPKINS | 29943 | 31287 | 28900 |
| HUNT | 60404 | 63988 | 61700 |
| LAMAR | 47132 | 50274 | 46900 |
| RAINS | 6012 | 6502 | 5700 |
| RED RIVER | 16557 | 18830 | 17400 |
| TOTAL | 301560 | 308837 | 299000 |
| County | Texas Dept of Water Resources | Texas Dept of Health | National Planning Association |
| ERATH | 25806 | 28802 | 26200 |
| HOOD | 32794 | 36842 | 28600 |
| JACK | 8145 | 8452 | 8200 |
| JOHNSON | 91598 | 100965 | 84200 |
| PALO PINTO | 28681 | 22097 | 23300 |
| PARKER | 51007 | 60904 | 53200 |
| SOMERVELL | 5111 | 6806 | 5200 |
| TARRANT | 998659 | 1053858 | 980700 |
| WISE | 33532 | 36567 | 31900 |
| TOTAL | 1275333 | 1355293 | 1241500 |
| county | Texas Dept of Water Resources | Texas Dept of Health | National Planning Association |
| ARCHER | 8702 | 9529 | 9500 |
| BAYLOR | 4824 | 4904 | 5500 |
| CLAY | 10632 | 11685 | 11600 |
| COOKE | 31964 | 32960 | 30900 |
| MONTAGUE | 19258 | 19982 | 19300 |
| THROCKMORTON | 1931 | 2103 | 2000 |
| WICHITA | 125180 | 119739 | 141800 |
| WILEARGER | 16204 | 17769 | 19000 |
| YOUNG | 22950 | 24647 | 23700 |
| TOTAL | 241645 | 243318 | 263300 |

Table A5. (Continued) Population of Districts \& Corresponding Counties Projected By Available Sources for 1990.


Table 45. (Continued) Population of Districts \& Corresponding Counties Projected By Available Sources for 1990.


Table As. (Continued) Population of Distriets \& Corresponding Counties Projected By Available Sources for 1990.


Table A5. (Continued) Population of Districts \& Corresponding Counties Projected By Available Sources for 1990.


Table As. (Continued) Population of Distriets \& corresponding Counties Projected By Available Sources for 1990.


Table (contatued) Population of tistricts \& Corresponding Counttes Projected By Available Sources for 1990.


Table AG. (Continued) Population of Districts \& Correspanding Counties Projected By Available Sources for 1990.


Table AG." Population of Districts \& Corresponding Counties Projected By Available Sources for 2000.

| County | Texas Dept of Water Resources | Texas Dept of Health | Nationa? Planning Association |
| :---: | :---: | :---: | :---: |
| DELTA | 5061 | 5580 | 5200 |
| FANNIN | 29216 | 30251 | 26700 |
| FRANKLIN | 9980 | 13517 | 8800 |
| GRAYSON | 109528 | 105731 | 103600 |
| HOPKINS | 33075 | 39727 | 31100 |
| HUNT | 66608 | 76161 | 65000 |
| LAMAR | 50776 | 61404 | 50900 |
| RAINS | 7477 | 8804 | 6200 |
| RED RIVER | 17215 | 22942 | 18600 |
| TOTAL | 328936 | 364117 | 316100 |


| County | Texas Dept of Water Resources | Texas Dept of Health | National Planning Association |
| :---: | :---: | :---: | :---: |
| ERATH | 28491 | 40016 | 28300 |
| HOOD | 45998 | 75252* | 38800 |
| JACK | 8794 | 9984 | 8600 |
| JOHNSON | 118151 | 154475 | 95600 |
| PALO PINTO | 33362 | 23872 | 22300 |
| PARKER | 55032 | 84617 | 58600 |
| SOMERVELL | 6017 | 11903 | 5900 |
| TARRANT | 1092943 | 1312295 | 1047200 |
| WISE | 42112 | 53050 | 35400 |
| TOTAL | 1430900 | 1765464 | 1340700 |


| County | Texas Dept of <br> Water Resources | Texas Dept <br> of Health | National Planning <br> Association |
| :--- | :---: | :---: | :---: |
| ARCHER |  |  |  |
| BAYLOR | 9470 | 12823 | 11600 |
| CLAY | 4370 | 5661 | 6000 |
| COOKE | 11134 | 14380 | 13500 |
| MONTAGUE | 36135 | 39933 | 32500 |
| THROCKMORTON | 21400 | 1916 | 23361 |
| WICHITA | 158227 | 2366 | 20200 |
| WHLBARGER | 16684 | 120436 | 2000 |
| VOUNG | 25085 | 23804 | 159600 |
| TOTAL | $-28-2$ | 33231 | 21600 |
|  | 284421 | -275995 | 28000 |
|  |  |  | 295000 |

Table AG. (Continued) Population of Districts \& Corresponding Counties Projected By Available Sources for 2000.


Table A\%. (Continued) Population of Districts \& Corresponding Counties Projected By Aveilable Sources for 2000.


Table AG. (Continued) Population of Disteicts \& Corresponding Counties Projected By Available Soupces for 2000.


Table A6, (Continued) Population of Districts \& corresponging counties Projected By Avatiabie Sources for 2000.


Table AG. (Continued) Population ef Districts \& Cocresponding Counties Projected By Avallable Saurces for 2000.


Table AG. (Continued) poputation of Districts corfesponatng counties Projected Ey Available Sources for 2000.


Table A6. (Continued) Population of Districts $\&$ Corresponding Counties Projected By Avallable Sources for 2000.


Table A7. Percent Changes in District Population: 1970-80, 1980-2005.

| District | Percent Change | Percent Change |
| :---: | :---: | :---: |
|  |  | $1980-2005$ |
| 1 | 12.7600 | 25.077 |
| 2 | 22.4183 | 42.554 |
| 3 | 5.7853 | 32.251 |
| 4 | 14.3148 | 38.257 |
| 5 | 10.3523 | 44.952 |
| 6 | 19.0321 | 62.860 |
| 7 | 16.2915 | 49.003 |
| 8 | 6.7004 | 31.399 |
| 9 | 22.6142 | 57.587 |
| 10 | 33.0245 | 61.040 |
| 11 | 31.1540 | 57.725 |
| 12 | 42.7898 | 88.833 |
| 13 | 11.9121 | 33.666 |
| 14 | 45.8318 | 104.199 |
| 15 | 21.7395 | 57.673 |
| 16 | 13.6302 | 39.212 |
| 17 | 35.7948 | 64.188 |
| 18 | 25.5570 | 61.248 |
| 19 | 19.5400 | 41.537 |
| 20 | 13.9746 | 32.682 |
| 21 | 46.5377 | 17.188 |
| 22 | 33.6691 | 113.650 |
| 23 | 14.4059 | 45.602 |
| 24 | 31.9276 | 92.724 |
| 25 | -2.0181 | 21.884 |

Table A8. Population Projection for SDHPT Districts Between 1985-2005, Using County Population Percentage Distribution by Agency,

Level of Projection: Low.

Year District Texas Dept Texas Dept of National Planning


Table AB. (Continued) Population Projection for SDHPT Districts Between 1985-2005, Using County Population Percentage Distribution by Agency, Level of Projection: Low.

| Year | District | Texas Dept of Health | Texas Dept of Water Resources | National Planning Association |
| :---: | :---: | :---: | :---: | :---: |
| 1990 | 25 | 52572 | 49861 | - . . . . - 57099 |
| 1995 | 1 | 264432 | 292485 | 312694 |
| 1995 | 2 | 1215723 | 1254061 | 1316350 |
| 1995 | 3 | 203297 | 243273 | 282133 |
| 1995 | 4 | 352112 | 345200 | 357827 |
| 1995 | 5 | 483514 | 461822 | 472886 |
| 1995 | 6 | 365709 | 350770 | 335564 |
| 1995 | 7 | 15.3395 | 141779 | 158877 |
| 1995 | 8 | 243474 | 256251 | 272216 |
| 1995 | 9 | 537530 | 554650 | 611928 |
| 1995 | 10 | 565346 | 559322 | 568010 |
| 1995 | 1.1 | 273499 | 267930 | 275757 |
| 1995 | 12 | 4566884 | 4197554 | 4223997 |
| 1995 | 13 | 242540 | 270185 | 271912 |
| 1995 | 14 | 898394 | 988560 | 896389 |
| 1995 | 15 | 1379898 | 1539120 | 1519246 |
| 1995 | 16 | 509584 | 547683 | 572462 |
| 1995 | 17 | 288012 | 351611 | 338296 |
| 1995 | 18 | 2482928 | 2481538 | 2511771 |
| 1995 | 19 | 289928 | 304320 | 314718 |
| 1995 | 20 | 514107 | 580671 | 576611 |
| 1995 | 21 | 1118269 | 1044178 | 858946 |
| 1995 | 22 | 190042 | 176488 | 163228 |
| 1995 | 23 | 131483 | 128813 | 138739 |
| 1995 | 24 | 741549 | 678287 | 656556 |
| 1995 | 25 | 53750 | 48851 | 58289 |
| 2000 | 1 | 252772 | 299481 | 325312 |
| 2000 | 2 | 1225595 | 1302769 | 1379773 |
| 2000 | 3 | 191597 | 258952 | 303597 |
| 2000 | 4 | 373916 | 351761 | 373579 |
| 2000 | 5 | 530118 | 480509 | 496973 |
| 2000 | 6 | 411392 | 361937 | 352070 |
| 2000 | 7 | 166810 | 144192 | 169500 |
| 2000 | 8 | 251529 | 261739 | 285279 |
| 2000 | 9 | 555109 | 590338 | 676765 |
| 2000 | 10 | 592006 | 585972 | 607606 |
| 2000 | 11 | 290828 | 277842 | 293409 |
| 2000 | 12 | 5089709 | 4530966 | 4545830 |
| 2000 | 13 | 241964 | 280088 | 282294 |
| 2000 | 14 | 986533 | 1121635 | 999607 |
| 2000 | 15 | 1394694 | 1661149 | 1649614 |
| 2000 | 16 | 509715 | 566558 | 605651 |
| 2000 | 17 | 303187 | 372871 | 363391 |
| 2000 | 18 | 2644811 | 2652515 | 2653852 |
| 2000 | 19 | 289380 | 318107 | 334060 |
| 2000 | 20 | 501772 | 612947 | 594948 |
| 2000 | 21 | 1280580 | 1182598 | 938888 |
| 2000 | 22 | 219597 | 196582 | 180512 |
| 2000 | 23 | 139753 | 135520 | 147579 |


| Year | District | Texas Dept of Health | Texas Dept of Water Resources | National Planning Association |
| :---: | :---: | :---: | :---: | :---: |
| 2000 | 24 | 836093 | 742577 | 716696 |
| 2000 | 25 | 57941 | 47794 | 60617 |
| 2005 | 1 | 241056 | 306401 | 338318 |
| 2005 | 2 | 1232631 | 1352294 | 1445731 |
| 2005 | 3 | 180145 | 275423 | 326577 |
| 2005 | 4 | 396134 | 358163 | 389884 |
| 2005 | 5 | 579843 | 499555 | 522100 |
| 2005 | 6 | 461688 | 373162 | 369255 |
| 2005 | 7 | 180970 | 146530 | 180768 |
| 2005 | 8 | 259237 | 267132 | 298861 |
| 2005 | 9 | 571910 | 627822 | 748201 |
| 2005 | 10 | 618464 | 613404 | 649729 |
| 2005 | 11 | 308524 | 287893 | 312078 |
| 2005 | 12 | 5659005 | 4886973 | 4890424 |
| 2005 | 13 | 240820 | 290123 | 292967 |
| 2005 | 14 | 1080763 | 1271613 | 1114310 |
| 2005 | 15 | 1406323 | 1791427 | 1790525 |
| 2005 | 16 | 508644 | 585617 | 640533 |
| 2005 | 17 | 318408 | 395102 | 390206 |
| 2005 | 18 | 2810601 | 2833017 | 2802963 |
| 2005 | 19 | 288151 | 332255 | 354464 |
| 2005 | 20 | 488578 | 646503 | 613647 |
| 2005 | 21 | 1462989 | 1338302 | 1025900 |
| 2005 | 22 | 253148 | 218789 | 199554 |
| 2005 | 23 | 148192 | 142463 | 156926 |
| 2005 | 24 | 940467 | 812314 | 782063 |
| 2005 | 25 | 62312 | 46723 | 63015 |

Table A备. Population Projection for SOHPT Districts Between 1985-2005, Using County Population Percentage Distribution by Agency. Level of Projection: Medium.

| Year | District | Texas Dept of Health | Texas Dept of Water Resources | National Planning Association |
| :---: | :---: | :---: | :---: | :---: |
| 1985 | 1 - | 283004 | 287399 | 292717 |
| 1985 | 2 | 1180779 | 1180348 | 1193793 |
| 1985 | 3 | 228499 | 235044 | 251982 |
| 1985 | 4 | 336134 | 338218 | 343277 |
| 1985 | 5 | 446736 | 447305 | 454837 |
| 1985 | 6 | 313104 | 319946 | 321067 |
| 1985 | 7 | 140390 | 139363 | 145028 |
| 1985 | 8 | 246839 | 253669 | 261500 |
| 1985 | 9 | 511747 | 513813 | 527504 |
| 1985 | 10 | 507287 | 504686 | 503555 |
| 1985 | 11 | 245970 | 246477 | 246967 |
| 1985 | 12 | 3699937 | 3600893 | 3639921 |
| 1985 | 13 | 247620 | 255994 | 257406 |
| 1985 | 14 | 750749 | 777194 | 738854 |
| 1985 | 15 | 1325616 | 1357181 | 1335545 |
| 1985 | 16 | 508030 | 518924 | 530984 |
| 1985 | 17 | 272475 | 301249 | 295378 |
| 1985 | 18 | 2235550 | 2227406 | 2234267 |
| 1985 | 19 | 285655 | 286119 | 288213 |
| 1985 | 20 | 531967 | 544094 | 544494 |
| 1985 | 21 | . 834237 | 814183 | 748577 |
| 1985 | 22 | 144448 | 142387 | 136738 |
| 1985 | 23 | 125176 | 124102 | 128652 |
| 1985 | 24 | 590420 | 576774 | 567932 |
| 1085 | 25 | 54029 | 53634 | 57213 |
| 1990 | 1 | 284348 | 298673 | 314238 |
| 1990 | 2 | 1247826 | 1263124 | 1304770 |
| 1990 | 3 | 224024 | 239332 | 276718 |
| 1990 | 4 | 354834 | 354457 | 363213 |
| 1990 | 5 | 475592 | 464156 | 478293 |
| 1990 | 6 | 349546 | 355419 | 339356 |
| 1890 | 7 | -150945 | $\cdots 145940$ | 157329 |
| 1990 | 8 | 251865 | 262494 | 276193 |
| 1990 | 9 | 544656 | 546836 | 590851 |
| 1990 | 10 | 557797 | 558371 | 556275 |
| 1990 | 11 | 268521 | 270171 | 271359 |
| 1990 | 12 | 4286912 | 4067551 | 4080678 |
| 1990 | 13 | 254768 | 272556 | 274301 |
| 1990 | 14 | 855002 | 912223 | 841191 |
| 1990 | 15 | 1407183 | 1490844 | 1474816 |
| 1990 | 16 | 529153 | 553657 | 571198 |
| 1990 | 17 | 293295 | 346840 | 328636 |
| 1990 | 18 | 2449189 | 2432999 | 2465453 |
| 1990 | 19 | 299179 | 304486 | 312661 |
| 1990 | 20 | 544157 | 576452 | 582128 |
| 1990 | 21 | 1004072 | 964423 | 827738 |
| 1990 | 22 | 171289 | 165837 | 154912 |
| 1990 | 23 | 131803 | 128515 | 138517 |
| 1990 | 24 | 684287 | 647725 | 634676 |

Table A9. (Continued) Population Projection for SDHPT Districts Between 1985-2005, Using County Population Percentage Distribution by Agency, Level of Projection: Medium.

| Year | District | Texas Dept of Health | Texas Dept of Water Resources | National Pianning Assuciation |
| :---: | :---: | :---: | :---: | :---: |
| 1990 | 25 | 55058 | 52219 | 59800 |
| 1995 | 1 | 284985 | 315218 | 336997 |
| 1995 | 2 | 1310213 | 1351530 | 1418660 |
| 1995 | 3 | 219098 | 262181 | 304061 |
| 1995 | 4 | 379479 | 372030 | 385638 |
| 1995 | 5 | 521094 | 497716 | 509640 |
| 1995 | 6 | 394133 | 378033 | 361645 |
| 1995 | 7 | 165317 | 152798 | 171225 |
| 1995 | 8 | 262398 | 276168 | 293373 |
| 1995 | 9 | 579308 | 597759 | 659490 |
| 1995 | 10 | 609286 | 602794 | 612157 |
| 1995 | 11 | 294756 | 288754 | 297190 |
| 1995 | 12 | 4921837 | 4523801 | 4552299 |
| 1995 | 13 | 261391 | 291185 | 293046 |
| 1995 | 14 | 968220 | 1065394 | 966059 |
| 1995 | 15 | 1487148 | 1658745 | 1637327 |
| 1995 | 16 | 549191 | 590251 | 616956 |
| 1995 | 17 | 310397 | 378940 | 364590 |
| 1995 | 18 | 2675909 | 2674411 | 2706993 |
| 1995 | 19 | 312462 | 327972 | 339178 |
| 1995 | 20 | 554065 | 625802 | 621427 |
| 1995 | 21 | 1205185 | 1125335 | 925706 |
| 1995 | 22 | 204813 | 190206 | 175915 |
| 1995 | 23 | 141702 | 138825 | 149522 |
| 1995 | 24 | 799185 | 731005 | 707585 |
| 1995 | 25 | 57928 | 52648 | 62819 |
| 2000 | 1 | 280332 | 332134 | 360782 |
| 2000 | 2 | 1359224 | 1444813 | 1530212 |
| 2000 | 3 | 212487 | 287187 | 336699 |
| 2000 | 4 | 414685 | 390115 | 414311 |
| 2000 | 5 | 587918 | 532900 | 551160 |
| 2000 | $-6$ | 456247 | 404399 | 390457 |
| 2000 | 7 | 184998 | 159914 | 187981 |
| 2000 | 8 | 278953 | 290277 | 316383 |
| 2000 | 9 | 615634 | 654704 | 750554 |
| 2000 | 10 | 656554 | 649862 | 673855 |
| 2000 | 11 | 322537 | 308136 | 325400 |
| 2000 | 12 | 5644652 | 5024987 | 5041472 |
| 2000 | 13 | 268346 | 310626 | 313073 |
| 2000 | 14 | 1094097 | 1243930 | 1108596 |
| 2000 | 15 | 1546761 | 1842268 | 1829475 |
| 2000 | 16 | 565291 | 628331 | 671686 |
| 2000 | 17 | 336244 | 413526 | 403012 |
| 2000 | 18 | 2933181 | 2941724 | 2943208 |
| 2000 | 19 | 320931 | 352791 | 370483 |
| 2000 | 20 | 556482 | 679778 | 659816 |
| 2000 | 21 | 1420204 | 1311539 | 1041257 |
| 2000 | 22 | 243540 | 218015 | 200193 |
| 2000 | 23 | 154990 | 150296 | 163670 |

Table A9. (Continued) Population Projection for SDHPT Districts Between 1985-2005, Using County Population Percentage Distribution by Agency, Level of Projection: Medium.

| Year | District | Texas Dept <br> of Health | Texas Dept of <br> Water Resources | National Planning <br> Association |
| :--- | ---: | ---: | :---: | ---: |
| 2000 | 24 | 927254 | 823542 |  |
| 2000 | 25 | 67259 | 53005 | 794838 |
| 2005 | 1 | 275104 | 349680 | 67226 |
| 2005 | 2 | 1406738 | 1543303 | 386105 |
| 2005 | 3 | 205590 | 314326 | 1649939 |
| 2005 | 4 | 452087 | 408752 | 372706 |
| 2005 | 5 | 661745 | 570116 | 444955 |
| 2005 | 6 | 526901 | 425870 | 595846 |
| 2005 | 7 | 206532 | 167228 | 421412 |
| 2005 | 8 | 295853 | 304864 | 206302 |
| 2005 | 9 | 652692 | 716501 | 341075 |
| 2005 | 10 | 705817 | 700047 | 853884 |
| 2005 | 11 | 352103 | 328557 | 741503 |
| 2005 | 12 | 6458330 | 5577249 | 356158 |
| 2005 | 13 | 274835 | 331102 | 5581189 |
| 2005 | 14 | 1233419 | 1451227 | 334348 |
| 2005 | 15 | 1604963 | 2044463 | 1271704 |
| 2005 | 16 | 580489 | 668334 | 2043433 |
| 2005 | 17 | 363382 | 450910 | 731008 |
| 2005 | 18 | 3207584 | 3233176 | 445322 |
| 2005 | 19 | 328852 | 379186 | 3198876 |
| 2005 | 20 | 557589 | 737821 | 404531 |
| 2005 | 21 | 1669634 | 1527334 | 700323 |
| 2005 | 22 | 288905 | 249692 | 1170806 |
| 2005 | 23 | 169124 | 162586 | 227740 |
| 2005 | 24 | 1073306 | 927052 | 179092 |
| 2005 | 25 | 71113 | 53323 | 892528 |
|  |  |  |  |  |

Table A 10. Population Projection for SDHPT Districts Between 1985-2005. Using County Population-Percentage Distribution by Agency, Level of Projection: High.

Year District Texas Dept Texas Dept of National Planning

able A10. (Continued) Population Projection for SDHPT Districts Between 1985-2005, Using County Population Percentage Distribution by Agency, Level of Projection: High.

| Year | District | Texas Dept of Health | Texas Dept of Water Resources | National Planning Association |
| :---: | :---: | :---: | :---: | :---: |
| 1990 | 25 | 58791 | 55759 | 63854 |
| $-1995$ | 1 | $32+898$ | -356047 | 380647 |
| 1995 | 2 | 1479920 | 1526588 | 1602413 |
| 1995 | 3 | 247476 | 296141 | 343445 |
| 1995 | 4 | 428632 | 420217 | 435588 |
| 1995 | 5 | 588590 | 562183 | 575652 |
| 1995 | 6 | 445184 | 426998 | 408487 |
| 1995 | 7 | 186730 | 172590 | 193403 |
| 1995 | 8 | 296385 | 311939 | 331372 |
| 1995 | 9 | 654344 | 675184 | 744910 |
| 1995 | 10 | 688204 | 680871 | 691447 |
| 1995 | 11 | 332935 | 326155 | 335684 |
| 1995 | 12 | 5559341 | 5109750 | 5141938 |
| 1995 | 13 | 295247 | 328900 | 331003 |
| 1995 | 14 | 1093630 | 1203390 | 1091188 |
| 1995 | 15 | 1679772 | 1873595 | 1849403 |
| 1995 | 16 | 620325 | 666703 | 696867 |
| 1995 | 17 | 350601 | 428022 | 411813 |
| 1995 | 18 | 3022508 | 3020816 | 3057619 |
| 1995 | 19 | 352933 | 370453 | 383111 |
| 1995 | 20 | 625831 | 706860 | 701918 |
| 1995 | 21 | 1361287 | 1271095 | 1045609 |
| 1995 | 22 | 231341 | 214842 | 198700 |
| 1995 | 23 | 160056 | 156806 | 168889 |
| 1995 | 24 | 902700 | 825689 | 799236 |
| 1995 | 25 | 65431 | 59467 | 70956 |
| 2000 | 1 | 339012 | 401658 | 436302 |
| 2000 | 2 | 1643741 | 1747246 | 1850521 |
| 2000 | 3 | 256966 | 347301 | 407178 |
| 2000 | 4 | 501489 | 471775 | 501036 |
| 2000 | 5 | 710983 | 644448 | 666530 |
| 2000 | 6 | 551750 | 485422 | 472189 |
| 2000 | 7 | 223722 | 193388 | 227330 |
| 2000 | 8 | 337345 | 351039 | 382609 |
| -2000- | 9 | 744500 | 791748 | 907662 |
| 2000 | 10 | 793985 | 785893 | 814908 |
| 2000 | 11 | 390052 | 372636 | 393514 |
| 2000 | 12 | 6826207 | 6076833 | 6096768 |
| 2000 | 13 | 324517 | 375647 | 378607 |
| 2000 | 14 | 1323117 | 1504313 | 1340651 |
| 2000 | 15 | 1870533 | 2227897 | 2212426 |
| 2000 | 16 | 683619 | 759855 | 812286 |
| 2000 | 17 | 406627 | 500087 | 487372 |
| 2000 | 18 | 3547163 | 3557495 | 3559289 |
| 2000 | 19 | 388110 | 426639 | 448034 |
| 2000 | 20 | 672966 | 822071 | 797931 |
| 2000 | 21 | 1717486 | 1586074 | 1259216 |
| 2000 | 22 | 294518 | 263651 | 242098 |
| 2000 | 23 | 187433 | 181757 | 197930 |

Table A10. (Continued) Population Projection for SDHPT Districts Between 1985-2005, Using County Population Percentage Distribution by Agency, Level of Projection: High.

| Year | District | Texas Dept of Health | Texas Dept of Water Resources | National Planning Association |
| :---: | :---: | :---: | :---: | :---: |
| 2000 | 24 | 1121350 | 995928 | 961216 |
| 2000 | 25 | 77709 | 64101 | 81298 |
| 2005 | 1 | 356194 | 452751 | 499913 |
| 2005 | 2 | 1821386 | 1998205 | 2136273 |
| 2005 | 3 | 266190 | 406976 | 482564 |
| 2005 | 4 | 585344 | 529236 | 576109 |
| 2005 | 5 | 856800 | 738162 | 771476 |
| 2005 | 6 | 682210 | 551400 | 545627 |
| 2005 | 7 | 267409 | 216519 | 267111 |
| 2005 | 8 | 383059 | 394726 | 441609 |
| 2005 | 9 | 845078 | 927696 | 1105574 |
| 2005 | 10 | 913863 | 906392 | 960067 |
| 2005 | 11 | 455889 | 425402 | 461139 |
| 2005 | 12 | 8361980 | 7221193 | 7226294 |
| 2005 | 13 | 355846 | 428697 | 432900 |
| 2005 | 14 | 1596980 | 1878988 | 1646551 |
| 2005 | 15 | 2078041 | 2647087 | 2645753 |
| 2005 | 16 | 751593 | 865332 | 946478 |
| 2005 | 17 | 470493 | 583819 | 576585 |
| 2005 | 18 | 4153061 | 4186184 | 4141774 |
| 2005 | 19 | 425784 | 490954 | 523770 |
| 2005 | 20 | 721943 | 955300 | 906750 |
| 2005 | 21 | 2161773 | 1977530 | 1515912 |
| 2005. | 22 | 374063 | 323291 | 294869 |
| 2005 | 23 | 218975 | 210510 | 231881 |
| 2005 | 24 | 1389673 | 1200309 | 1155608 |
| 2005 | 25 | 92075 | 69040 | 93113 |

Fable All. State-poputation and its Distribution by Age Group and Sex - Projected by the National Planning Association

|  | Total Population <br> $(1,000)$ | Age Distribution |  |  | Sex Distribution |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | (Percent) |  |  | (Percent) |  |
| 1970 | 11,237.70 | 31.7 | 65.0 | 3.2 | 49.0 | 51.0 |
| 1980 | 14,263.00 | 25.6 | 70.6 | 3.8 | 49.0 | 51.0 |
| 1985 | 15,678.04 | 24.8 | 71.0 | 4.3 | 48.9 | 51.1 |
| 1990 | 16,818.65 | 24.8 | 70.5 | 4.6 | 48.9 | 51.1 |
| 1995 | 17,851.99 | 25.1 | 69.9 | 4.9 | 48.8 | 51.2 |
| 2000 | 18,789.95 | 23.9 | 70.8 | 5.3 | 48.8 | 51.2 |

Table An2, State Population and Its Distribution by Age Group and Sex - Projected by the Bureau of Business Research

| Year | Total Population | Age Distribution |  |  | Sex Distribution |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Young | Driver | 01d | Male | Female |
|  | $(1,000)$ | (Percent) |  |  | (Percent) |  |
| 1985 | 15,980.7 | 26.3 | 69.9 | 3.8 | 49.5 | 50.5 |
| 1990 | 17,653.7 | 26.2 | 69.9 | 3.9 | 49.6 | 50.4 |
| 1995 | 19,633.1 | 25.9 | 70.2 | 3.9 | 49.9 | 50.1 |
| 2000 | 21,713.5 | 25.2 | 70.9 | 3.9 | 49.9 | 50.1 |
| 2005 | 24,082.8 | 24.7 | 71.3 | 4.0 | 50.0 | 50.0 |

Table A13. State Popalation-and Its Distribution by Age Group, Sex, and Race-Projected by the Department of Health

| YearTotal <br> Population <br> $(1,000)$ |  | Age Distribution |  |  | Sex DistributionMale Female(Percent) |  | Race Distribution |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Yeumg | Driver <br> (Percent |  |  |  | Wite | fispan <br> (Perce | Black |
| 1975 | 12,345.20 | 28.9 | 67.6 | 3.5 | 49.0 | 51.0 | 70.7 | 16.6 | 12.7 |
| 1985 | 16,245.59 | 26.7 | 69.4 | 4.0 | 49.4 | 50.6 | 63.8 | 25.1 | 11.2 |
| 1990 | 19,197.55 | 26.6 | 69.2 | 4.2 | 49.6 | 50.4 | 60.1 | 29.6 | 10.3 |
| 1995 | 22,716.38 | 27.2 | 68.4 | 4.4 | 49.7 | 50.3 | 55.9 | 34.7 | 9.4 |
| 2000 | 27,855.44 | 27.6 | 67.8 | 4.6 | 49.8 | 50.2 | 51.5 | 40.0 | 8.4 |


[^0]:    a Representing the high series
    b Representing the control series
    c Age Group 35-44
    d Age Group 45-64

