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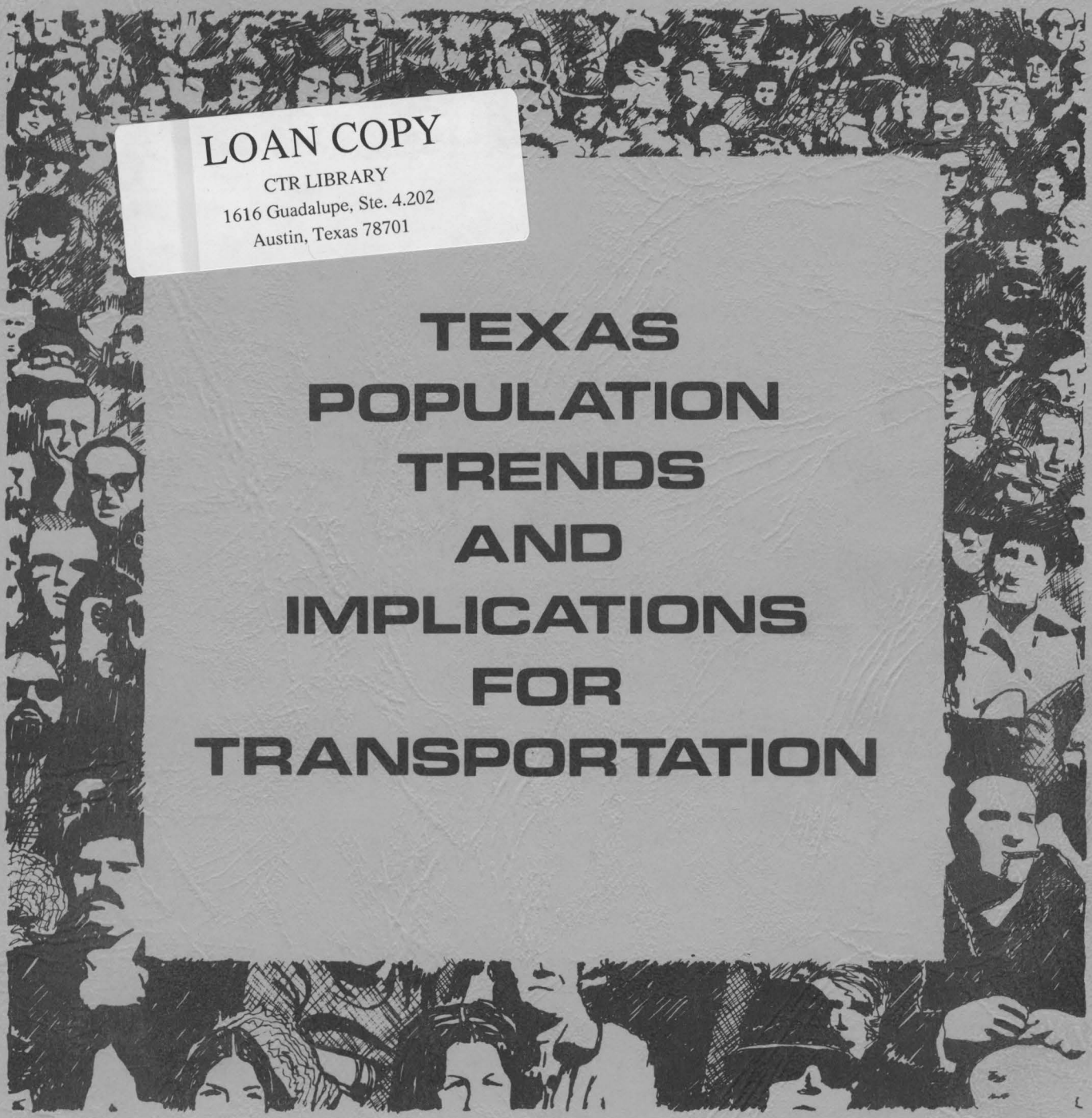

TEXAS POPULATION TRENDS AND IMPLICATIONS FOR TRANSPORTATION

REPORT PREPARED FOR:
TEXAS DEPARTMENT OF HIGHWAYS
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16. Abstract

Both the demand for and utilization of transportation facilities in Texas are heavily influenced by population trends occurring in the State. This report attempts to identify changes in the following areas: migration patterns, population density, age structure, and household formations. In addition, the implications for transportation are discussed for each of these dimensions. Among the most significant trends emerging in Texas are: 1) a consistent gain in metropolitan population, with an estimated increase from 67 percent in 1970 to 72 percent in 1975; 2) an expected eight percent increase in non-metropolitan county population for the 1970-1980 decade--compared to a five percent population loss for such counties in the 1960-1970 decade; and 3) a significant decrease in household size, with single individuals accounting for nearly one-half of the total increase in households in 1975.

To strategically plan for transportation facilities, there is a continual need to have access to yearly population estimates and projections obtained for the State, as well as for SDHPT districts. Both SDHPT districts and Texas counties are analyzed and assessed regarding current population trends and projected growth patterns in this report. Aggregating the 1975 county estimates by SDHPT districts points to a marked population increase over the 1970-1975 period in almost all cases, with the Texas population becoming continually more concentrated in the large urban regions. Furthermore, projections indicate 10.0-19.9 percent population increases in the majority of SDHPT districts in the 1980s, with less disparity among districts in terms of population growth patterns.

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Research Report 227-2F

Transportation, Population and Economic Growth

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TEXAS STATE DEPARTMENT OF HIGHWAYS

AND PUBLIC TRANSPORTATION

Texas Transportation Institute

Texas A&M University

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EXECUTIVE SUMMARY

A. Since 1940, four significant population changes have affected the dependence of Texans on public transportation facilities:

1. *The population of Texas doubled between 1940 and 1970, reaching 11,200,000 persons.*
2. *In 1940, there was an average of 24.3 persons per square mile of land area; this figure also doubled to an average of 42.7 persons per square mile by 1970.*
3. *In 1970, the State's population had increased to 5.5 percent of the total United States population--over one-twentieth of the nation's residents.*
4. *The actual number of elderly persons in Texas almost tripled between 1940 and 1970, increasing from five percent of the total population to nine percent in 1970, thus creating special transportation dependency problems.*

B. The report emphasizes the importance of the migration stream into Texas, and the South generally, which has generated the following patterns:

1. *Dividing the nation into four regions, the South has evidenced a greater population increase than the Northeast, Northwest, and West combined.*
2. *Texas population alone increased by 9.3 percent between 1970 and 1975 to an estimated 12,237,000. If this trend continues, the 1980 Texas population will be 13,371,600.*
3. *The positive migration stream accounted for 51 percent of the State's population growth between 1973-76, the latest period for which data is available.*

4. *The number of persons currently moving into Texas is 10 times greater per year than it was in the 1950-60 decade.*

C. The residential preference patterns of Texans, as well as of newcomers to the State, and exogeneous socio-economic trends have precipiated a pronounced re-distribution of the population in several important respects:

1. *Texas is consistently gaining in metropolitan population, with an estimated increase from 67 percent in 1970 to 72 percent in 1975. Thus, Texas contains highly populated "catchment areas" and there is evidence of greater numbers of metropolitan residents for the next two decades.*
2. *A radical departure in population trends for non-metropolitan counties is evidenced in the 1970s, for many are in a history-making growth phase. Almost a five percent population loss for the counties was shown in the 1960-70 decade, whereas an expected eight percent increase is anticipated for the 1970-80 decade. Interestingly, 65 percent of the Texas non-metropolitan counties showing population increases are adjacent to existing metropolitan areas (SMSAs).*
3. *Household size is decreasing significantly with new household formations and new dwelling units required. The average size of households in the United States was 2.9 persons in 1975 while in the early 1960s the average size was 3.3. Primary individuals (those persons who live alone or with non-relatives) represented less than one-fourth of the total number of households in 1975, yet they accounted for nearly one-half of the total increase in households in 1975.*

D. Population estimates and projections for State Department of Highways and Public Transportation districts document more specifically the population shifts occurring in Texas (refer to the Figures in Chapter V).

1. Current Population Estimates for SDHPT Districts:

- Aggregating the 1975 county estimates by SDHPT districts points to a marked population increase over the 1970-75 period in almost all cases. District 25, the only SDHPT district that contains no large urban area, was the only district showing a population loss in the five-year period.
- The Texas population is becoming continually more concentrated in the large urban regions, especially Districts 12, 18, 15, and 14 (containing the cities of Houston, Dallas, San Antonio, and Austin, respectively), which are listed in order of absolute population increases.
- Districts 2, 9, 12, 14, 15, 18, and 24 have shown an average per district population increase of 108,000 between 1970-75.
- Assessment of the estimated percentage change in district population provides a somewhat different picture. Districts 14 and 21 show at least a twenty percent population increase in five years, while one-third of the SDHPT districts (District 9, 10, 11, 12, 15, 17, 22, and 24) had an estimated 10 to 19.9 percent increase.

2. Population Projections for SDHPT Districts:

- District 3 shows an expected population loss by the Water Development Board 1970-80 projections, whereas District 23 is the only region showing such a loss over the 1970 decade according to the Governor's Office projections.

- For the 1970s, Water Development Board projections point to at least a twenty percent increase in population along the IH-35 corridor, encompassing Districts 2, 18, 9, 14, and 15. Additionally, greater than twenty percent increases are projected for Districts 12, 24, and 25. With the exception of District 25 (which is not depicted as a growth region according to the Governor's Office projections), the remaining seven districts contain major urban centers.
- In the 1980-90 decade, two regions, Districts 23 and 25, show an anticipated loss of population according to both sets of projections.
- In the 1980-90 decade, no SDHPT districts are projected to have a twenty percent or greater population change by the Water Development Board; however, the Governor's Office points to District 24 as evidencing at least a twenty percent increase in the 1980s.

Transportation planning and the directions for seeking improvements in transport facilities can be more thoroughly discerned with a strong data base to specify population trends. Because of the pronounced growth rate of the Texas population and high projected population increases, it is recommended that more specific strategies be undertaken to establish transportation plans that are compatible with these population changes. Strategic transportation plans which reflect population patterns should include the following features:

1. *Incremental or trend planning--an examination of existing and projected future population trends for baseline state level planning.*
2. *Growth allocation models--the examination of population levels, current and anticipated (a) for input into traffic forecasting*

models; (b) to test alternative regional plans; and (c) for allocation of funding.

3. *A strong data base to objectify transportation planning statewide for assessment of migration patterns both within the State and of newcomers to Texas, and for evaluating prime locations of new household formations, changing age structure, and other population indicators.*
4. *A consistent data base across SDHPT districts--rather than having no comparable information regarding trends for districts, the preceeding item (#3) provides the capability for obtaining population data for comparison purposes.*
5. *A yearly limited statewide survey to provide information regarding population shifts and transportation needs.*

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CHAPTER I
INTRODUCTION

A high interdependence is known to exist between transportation and the quality of community life. The availability of transportation, for example, determines to a very large extent the social and economic activities of a community, while pronounced growth in specific areas precipitates an aggressive demand for transportation facilities. The nature of the relationship between these variables suggests that transportation improvements should reflect population growth trends and population distribution patterns.

Future population in Texas is dependent upon three major factors: (1) the number of current residents, (2) natural population increase, and (3) net migration.[1] Projections of future populations for large areas, such as Texas, are fairly accurate for ten-year and fifteen-year periods, particularly if there is little migration during the specified time interval. In addition, forecasts can be accurately derived regarding the number of individuals in specific age segments, with projections for older age groups tending to be quite reliable. Forecasts of the number of people who will be driving automobiles in 1990, for example, should be fairly reliable because those individuals have already been born.

Various population trends recently evidenced in Texas have made it increasingly problematic to derive projections for the State. To illustrate, although natural population increase has been somewhat stable, net in-migration has had a tremendous impact on the total population within Texas. Secondly, while

[1] Natural increase is a function of the number of births minus the number of deaths. Net migration is the result of out-migration compared to in-migration. When movement to an area is positive or the stream of residents into the area is greater than the number leaving, such a situation is referred to as net in-migration.

a consistent movement toward metropolitan areas is occurring, simultaneous growth outward from large central cities has caused these metropolitan areas to become less concentrated. Finally, major changes in household size, household formations, and longevity have contributed to the difficulty of measuring transportation and housing demand in specific areas for specific age groups.

Components of Population Trends

This report represents an initial attempt at documenting some of the recent trends in Texas population growth and the changing character and distribution patterns of Texas residents. Emphasis is placed on providing general trends as background information for transportation officials and leaders in Texas. No attempt is made to provide detailed information for use in the planning of specific transportation facilities.

Chapter II of the report discusses current migration patterns in Texas, which includes both intrastate movement and migration into the State from other parts of the nation. Additionally, information is presented concerning residential preference patterns and the effects such shifts will have on the demand for transportation facilities.

Density patterns are analyzed for the State in Chapter III, with the major emphasis being placed on: (1) internal density, (2) structural density, and (3) areal density. These measures indicate the dispersion of Texas residents, and suggest which areas will evidence the highest demand for transportation services in the future.

Both age composition trends and household formation are investigated in Chapter IV, with information presented concerning the following measures of age composition patterns:

- median age,
- age levels in the life cycle,
- the dependency ratio, and
- the index of aging.

Differential transportation requirements among age groups is emphasized in this chapter.

Information on population projections for various geographic and/or agency regions is crucial to the planning process. Therefore, in Chapter V, State Department of Highways and Public Transportation (SDHPT) districts are analyzed and assessed regarding current population trends and projected growth patterns. In addition, Texas county trends are analyzed, providing a further level of specificity in terms of current patterns within SDHPT districts.

Data on these demographic patterns identify where individuals are moving within the State, as well as in- and out-migration; how many individuals are living in specified areas; the numbers and proportions of persons in particular age categories; and the number of independent households currently in existence. The bearing these variables have on the demand for, and potential use of, transportation facilities within selected corridors is quite significant. Transportation leaders need to know where people are currently moving and where they are apt to move in the coming years in order to plan facilities to adequately serve future transportation needs.

To provide some insight into the patterns emerging in Texas over the last few decades, the next section highlights demographic changes in the State since 1940. Such information is useful in that it enables comparisons between current shifts and previous patterns, thereby determining whether the changes presently occurring are continuations of past trends or entirely new developments.

Analysis of Historical Population Trends

The analysis of population trends in Texas is based on two sources of population data: (1) the decennial Census of the Population, and (2) the Current Population Survey. The decennial census provides complete enumerations of the population at ten-year intervals, and is the most accurate source of population data. The Current Population Survey provides data comparable to the decennial census from small sample surveys across the nation with additional information obtained on specific topical areas, including migration patterns. These periodic surveys are generally the most accurate source of population data for intercensal years.

Estimates of the number of persons living in Texas for the years 1940-1970 are shown in Tables 1 and 2 and illustrated graphically in Figure 1. It can be seen that there has been a tremendous growth in the State's population during this time period. In 1940, there were approximately 6,400,000 persons living in Texas. By 1970, the State's population had grown to some 11,200,000 persons, representing a 99 percent increase in population size in a span of 30 years. Comparison of the decennial Census figures for 1940-1970 shows that the population increased at a relatively steady rate; the total population grew by 20 percent between 1940 and 1950, 24 percent between 1950 and 1960, and 17 percent between 1960 and 1970. Yearly rates of population change (shown in Table 2) indicate that the population of Texas increased at rates of 0.13-2.88 percent per year in the period between 1940 and 1975.

Comparisons of the population estimates of Texas with those for the United State as a whole show that the population of Texas is growing at a faster rate than the rest of the country. In 1940, Texas residents comprised 4.86 percent of the population of the United States. In 1975, the State's population had

Table 1. Total Population of Texas and the United States: 1940-1975. (in thousands)

Year	Resident Population		Texas Population as a Percentage of U.S. Population
	Texas	United States	
1940	6,415	132,122	4.86
1950	7,711	151,684	5.08
1957	9,070	171,274	5.29
1958	9,252	174,141	5.31
1959	9,405	177,073	5.31
1960	9,580	180,671	5.30
1961	9,856	183,691	5.37
1962	10,124	186,538	5.43
1963	10,257	189,242	5.42
1964	10,270	191,889	5.35
1965	10,378	194,303	5.34
1966	10,492	196,560	5.34
1967	10,599	198,712	5.33
1968	10,819	200,706	5.39
1969	11,045	202,677	5.39
1970	11,236	204,879	5.48
1971	11,416	207,053	5.51
1972	11,604	208,846	5.55
1973	11,828	210,410	5.62
1974	12,017	211,901	5.67
1975	12,237	213,540	5.73

Source: U.S. Bureau of the Census, 1970 Census of Population and Housing, Series P-25.

Table 2. Total Population of Texas and Rate of Change by Year: 1957-1975.

Year	Total Population (in thousands)	Percent Change over Previous Year
1957	9,070	-----
1958	9,252	+2.01
1959	9,405	+1.65
1960	9,580	+1.86
1961	9,856	+2.88
1962	10,124	+2.72
1963	10,257	+1.31
1964	10,270	+0.13
1965	10,378	+1.05
1966	10,492	+1.10
1967	10,599	+1.02
1968	10,819	+2.08
1969	11,045	+2.09
1970	11,236	+1.73
1971	11,416	+1.60
1972	11,604	+1.65
1973	11,828	+1.93
1974	12,017	+1.60
1975	12,237	+1.83

Source: U.S. Bureau of the Census, 1970 Census of Population and Housing, Series P-25.

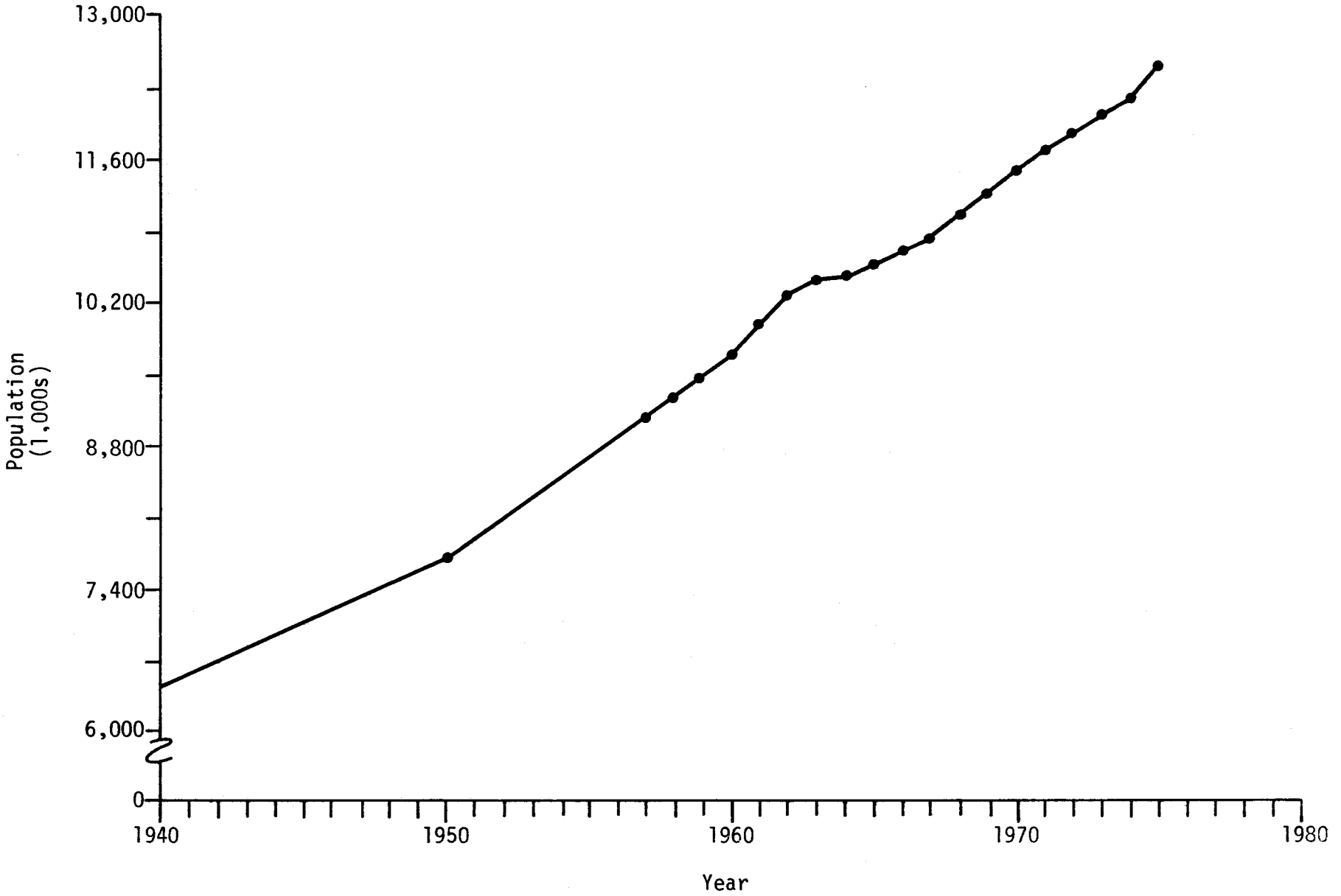

Figure 1. Estimated Population of Texas, 1940-1975.

increased to an estimated 5.73 percent of the nation's total population. This faster rate of population growth can be expected to continue as long as the economy of Texas grows at a faster rate than that of the rest of the country, and as migration increases to the "Sunbelt" from other sections of the nation as a result of energy problems and the amenities sought in the southern states.

Changes in Demographic Characteristics of the Population

The growth of the State's population has been accompanied by changes in the demographic characteristics of residents, which have caused major shifts in the demand for transportation and in the overall nature of Texas' transportation system. Perhaps the most visible demographic change has been the increasing trend toward urbanization. As shown in Table 3, urban residents made up 45 percent of the total population in 1940 and rural residents made up 55 percent. By 1970, the urban population had increased to 80 percent, while the rural population had decreased to 20 percent of the total population.

The growth of the Texas population has been paralleled by corresponding increases in the State's overall population density. In 1940, there was an average of 24.3 persons per square mile of land area. Because of population growth, population density increased to an average of 42.7 persons per square mile in 1970.

Major changes have also been taking place in the age structure of the State's population, as can be seen from Table 3. One significant change has been the increase in the proportion of the elderly (those 65 and older) in the population. The number of elderly persons in Texas almost tripled between 1940 and 1970. In examining percentage changes, older persons increased from five percent of the total population in 1940 to nine percent of the

Table 3. Distribution of the Population of Texas by Selected Demographic Characteristics: 1940-1970.

Year	Residence		Residents Per Square Mile of Land Area	Age			
	Urban	Rural		0-14	15-24	25-64	65+
1940	45.4%	54.6%	24.3	28%	19%	48%	5%
1950	62.7%	37.3%	29.3	29%	16%	48%	7%
1960	75.0%	25.0%	36.4	33%	14%	45%	8%
1970	79.7%	20.3%	42.7	30%	18%	43%	9%

Source: U.S. Bureau of the Census, 1970 Census of Population and Housing, Series P-25.

total population in 1970. Both the number and percentage of older persons in the population will continue to increase until 1990 and beyond. This means that the transportation needs and demands of the elderly will become an increasingly more important factor in Texas transportation planning in the future.

Examination of the age structure of the population shows that persons 15-64 years old, who can be considered the major users of the State's highways, have decreased in proportion to the rest of the population. In 1940, the 15-64 age group made up 67 percent of the population. In 1970, this group made up 61 percent of the population. Most of this decrease can be attributed to the relative increase in the 0-14 age group--those who are too young to drive. A consequence of this shift toward a relative increase in the proportion of those in the younger age group has probably been to delay some of the effects of population increase on the demand for transportation until a later time when those in this age group become of driving age.

These historical trends in the State provide a basis for reflection regarding current and future interdependencies between transportation facilities and population patterns. More recent developments in the composition and distribution of the Texas population, as well as projections of future demographic changes, are presented in the remainder of the report. Knowledge of these population trends should prove highly beneficial to officials in the transportation field and other individuals concerned with meeting the population's increasing needs and demands for transportation within Texas.

CHAPTER II
CURRENT MIGRATION PATTERNS IN TEXAS

Residential mobility in Texas has been substantial since 1970 and the current migration patterns will have pronounced transportation impacts. Some of the on-going population shifts represent a continuation of expected trends, while other changes reflect a departure from past migration patterns in the State.

The State and the Nation--How the Population is Shifting

Since 1970, Americans have increasingly moved to the South. Between 1970 and 1975, the number of people living in the southern states grew by 5,300,000--almost one million more than the combined growth in the remainder of the United States. Figure 2 depicts the percentage increase in population experienced by each state in the nation between 1970 and 1975. Although the western and southwestern states (Nevada, Idaho, Utah, Arizona, Colorado, and Wyoming) appear to be growing at faster rates than the rest of the nation, the percentages are somewhat misleading. Smaller resident populations in these states mean that a relatively small number of in-migrants tends to increase total population by a significant amount. In terms of absolute numbers, however, the southern states were receiving a much larger proportion of in-migrants during this five-year interval. Dividing the United States into four regions, as shown in Figure 3, shows the southern region is evidencing both the greatest in-migration and net migration during this time period.

Of the ten largest cities nationally, seven have lost population since 1970; only Houston, San Diego, and San Antonio show gains (see Table 4).

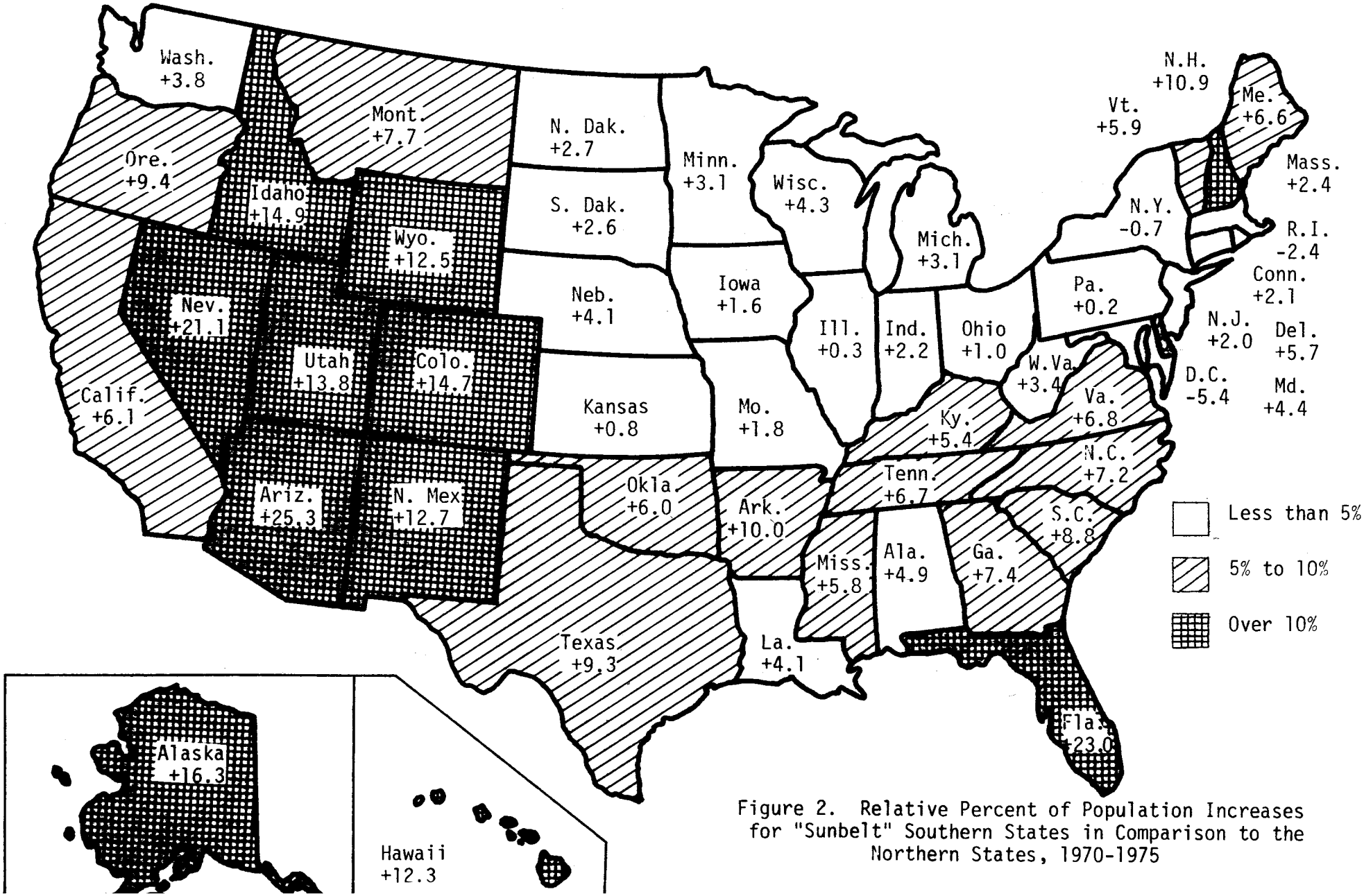

Figure 2. Relative Percent of Population Increases for "Sunbelt" Southern States in Comparison to the Northern States, 1970-1975

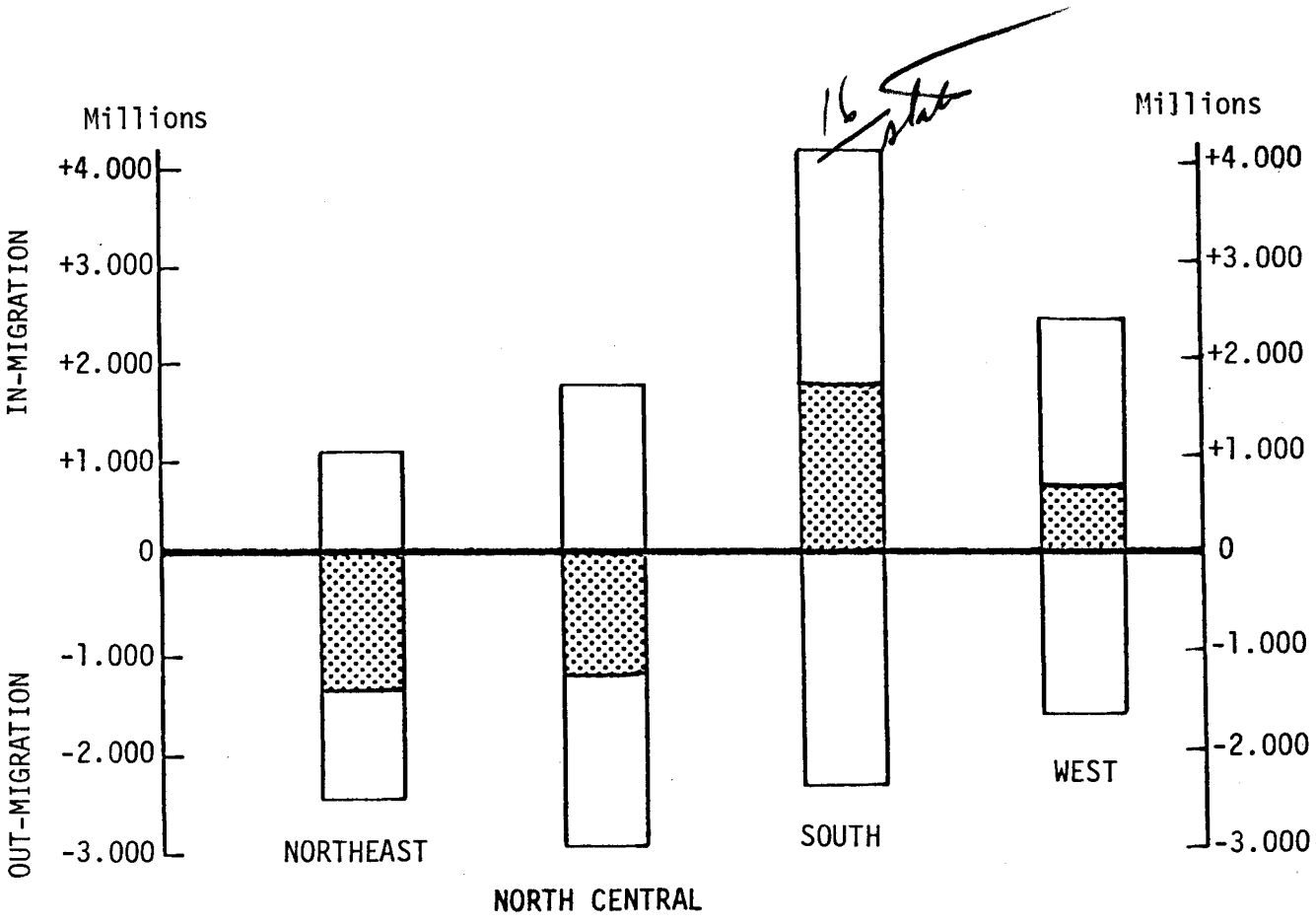

Figure 3. In-migration, Out-migration, and Net Migration for Regions in the United States, 1970-1975.

*The darkened area represents the net migration for each region.

Table 4. American Cities with the Largest Population in 1975.

1975 Rank		1975 Population	Change Since 1970	1970 Rank
1.	New York	7,481,613	- 5.2%	1
2.	Chicago	3,099,391	- 8.0%	2
3.	Los Angeles	2,727,399	- 3.0%	3
4.	Philadelphia	1,815,808	- 6.9%	4
5.	Detroit	1,335,085	-11.8%	5
*6.	Houston	1,326,809	+ 5.9%	6
7.	Baltimore	851,698	- 6.0%	7
*8.	Dallas	812,797	- 3.7%	8
9.	San Diego	773,996	+11.0%	15
*10.	San Antonio	773,248	+ 9.1%	14

*Texas cities

Further, in depicting ten cities out of the 100 largest cities nationally experiencing the greatest percent of population increase between 1970 and 1975, two Texas cities were included. El Paso had a 19.7 percent increase in the five-year period and Austin, a 17.7 percent population gain. Interacting with net migration patterns in the above cases are birth rates and death rates, so that separating out the percent of change explained by migration becomes necessary.

Net In-Migration to Texas

As noted earlier, Texas has consistently gained population through migration into the State that exceeded movement outward to other states. However, this trend is rapidly accelerating. Since the mid-1960s, a national stream of persons from the North and East to the South and West has brought migrants to Texas.

In the decades of the 1950s and 1960s, net in-migration averaged less than 10 percent of the total number of additional Texas residents. However, as can be observed in Figure 4, this positive migration stream accounted for 51 percent of the State's total population growth in the 1973-76 period. Between 1950 and 1960, the number moving to Texas exceeded the number leaving by an average of 11,400 per year. Between 1973 and 1976, this figure jumped to an average net in-migration of 122,000 per year (Skrabanek, 1977). Thus, the number of persons currently moving into Texas is approximately 10 times greater per year than it was in the 1950-60 decade.

> Many of these people are following jobs as industries relocate in areas where wages are lower, unions are less organized and the general cost of living is lower. Another reason for the Sun Belt in-migration is that many Americans who are reaching retirement age prefer areas of warmer climate and a lower cost of living. Texas can be seen as a giant magnet drawing people from other regions at an accelerated rate (Skrabanek, 1977:21).

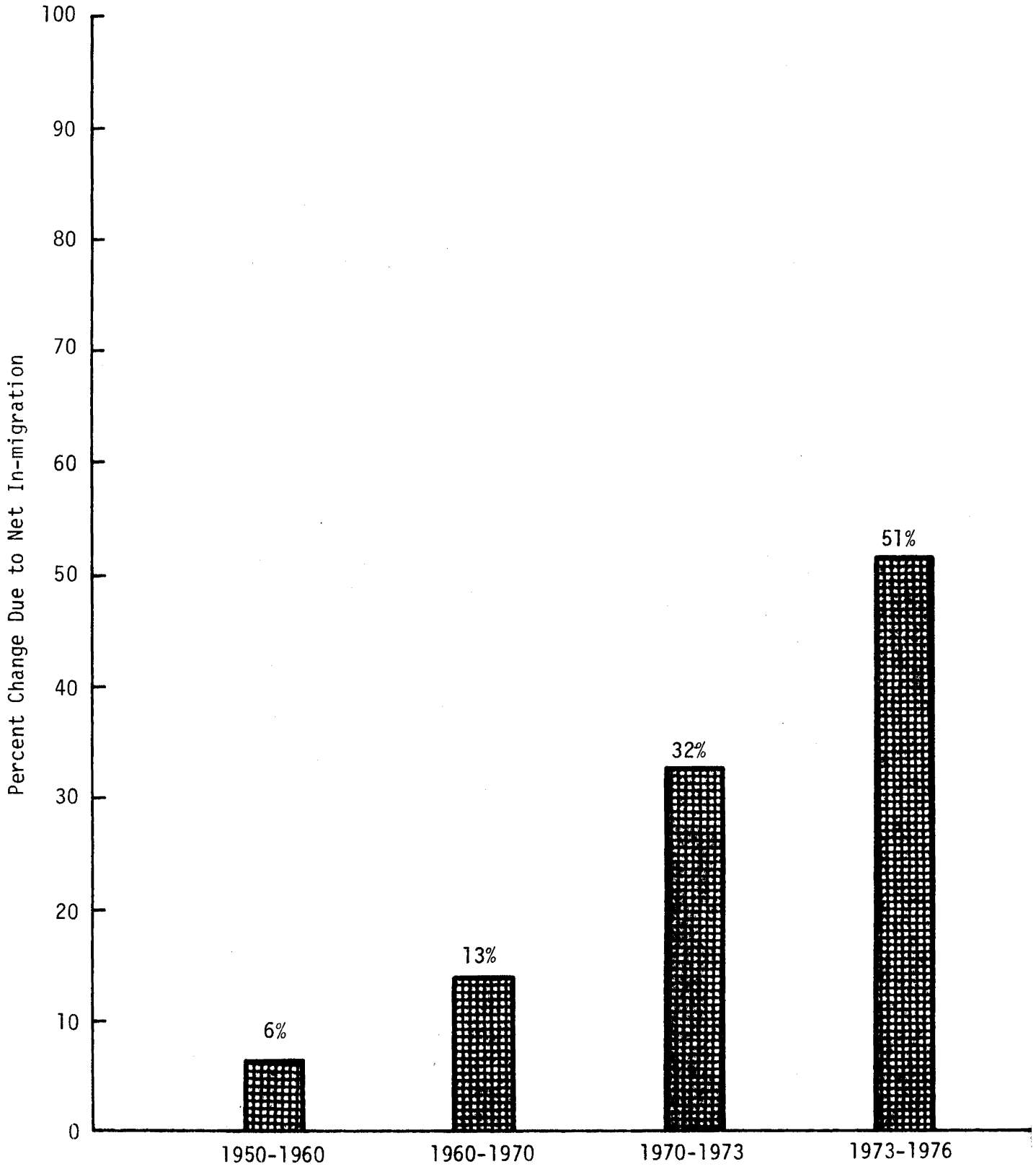

Figure 4. Percent of Texas' Population Change Explained by Net In-migration.

The number of Texas residents can be expected to increase exponentially with in-migration continuing to account for even greater proportions of the State's population growth. The increased population size promises a healthy demand for improved personal transportation facilities across the State. Additionally, the new residents will be followed by expanded services and industry moving into Texas, augmenting the need for access to these facilities, and accelerating the need for new and improved roadways.

According to Skrabanek (1977:12):

> A larger proportionate share of people moving to the state will be better educated, in higher income brackets and at the age levels when they have families. As a group, they are more likely to be upwardly mobile in the class of housing they rent or buy. The new migrants will also be in a position to make more frequent use of high-quality business and service establishments.

In the aggregate, the in-migrants to Texas during the 1970s should have greater mobility due to ownership of multiple vehicles per household. Based on the raw numbers and personal characteristics of newcomers to the State, a critical need for expanding transportation facilities should be evidenced well into the 1980s.

Residential Mobility Within the State

Traditionally, Texas, as with all other states, has been shifting from a rural to an urbanized environment. In 1970, 79.9 percent of Texas' residents lived in urban areas of 2,500 population or greater. Especially in looking at the increase in the proportion of metropolitan population, Texas appears to be a state of highly concentrated "catchment areas." In 1970, 67 percent of all Texans lived in Standard Metropolitan Statistical Areas (SMSAs) of 50,000 or more population, in contrast to such states as Arkansas with only 24 percent, 31 percent in New Mexico, 46 percent in Oklahoma, and

59 percent in Louisiana. In 1975, an estimated 72 percent of Texans lived in metropolitan settings, while in 1980, 76 percent are projected to reside in these large urban regions (Guseman and Buffington, 1976:4). Based on projected population trends in Texas, there is consistent evidence of greater numbers of metropolitan residents for the next two decades.

However, it must not be assumed that all non-metropolitan areas are losing population. Because of (1) the larger net in-migration to Texas and (2) the renewed interest in a semi-rural lifestyle, non-metropolitan counties are now having a new, history-making growth phase. This non-metropolitan population increase being observed throughout the nation is especially evident in Texas where the majority of non-metropolitan counties traditionally have been losing population, as noted in Table 5. Almost a five percent population loss for these counties was evidenced in the 1960-70 decade, whereas an expected 8.0 percent increase for the 1970-80 decade points to a radical departure from past trends.

Further, the increases in non-metropolitan population lie primarily in those counties adjacent to metropolitan areas. Thus, the large urban regions within the State appear to be expanding, with Texans becoming more dispersed in these areas. Between 1970 and 1975, 31 rural counties without a town as large as 2,500 residents experienced net in-migration. At the same time, 5 of the 14 counties with cities of 100,000 or more population had a net out-migration (Skrabanek, 1977:21). Broadly defined, there appears to be a slowing of movement to the counties containing the largest cities, with migration to contiguous counties in the rural-urban fringe.[2] Barring the crippling

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[2]Nevertheless, in raw numbers, Harris County had the largest estimated net in-migration between 1970 and 1975 with 101,000, followed by Travis County (43,00) and Montgomery County (32,000). Others with an estimated 20,000 or greater net in-migration were Denton, Collin and Bell counties. On the other hand, Jefferson, Tarrant, and Dallas counties had greater than 10,000 lost in net out-migration (Skrabanek, 1977).

Table 5.

MEAN PERCENT POPULATION GROWTH FOR METROPOLITAN

AND NON-METROPOLITAN TEXAS COUNTIES

	METROPOLITAN	NON-METROPOLITAN
1970 - 1979 (projected)	18.0	8.0
1960 - 1969	24.1	- 4.8
1950 - 1959	28.4	- 0.2
1940 - 1949	48.1	- 0.7

effect of an energy crisis, near-term prospects for continued population dispersal outward from urban regions in Texas appears to be probable.

Cities tend to be losing manufacturing functions and some headquarters for corporations to what were once rural counties. These facilities attract subsidiary service companies, so that a cyclical process of continual dispersal is observed. The basic reason for this outward movement in Texas is that most residents--and businesses--have found that the fringe areas offer the benefits of both city and country environments. Nevertheless, transportation facilities must meet the increasing demands for access into the downtown areas as well as around the periphery of large cities. Further, metropolitan deconcentration will be closely linked with an increase in household automobile usage in the State and with a heightened need for efficient movement of goods and services.

Reasons for the Shift to Non-Metropolitan Counties

As noted, the primary--and continuing--trend in Texas is toward ever-increasing numbers of people residing in large urban regions. Secondary to this, however, is the fact that people are becoming more spread out in these metropolitan settings. It is difficult to determine whether the deconcentration and outward movement is a long-term trend, primarily because the occurrence is so recent. In order to ascertain the future population shifts in Texas with accuracy, it is necessary to understand the several conditions forcing change. Four possible types of change are discussed below, with a focus on one question: Do the population shifts noted since 1970 in Texas

represent an extension of, or a departure from, the urbanization processes that have shaped population distribution for the past two decades?[3]

THE SPILLOVER EFFECT

The fact that 63 percent of the net in-migration to non-metropolitan counties in Texas is observed in those units contiguous to metropolitan counties indicates that a "spillover" has occurred. This explanation suggests that growth patterns since 1970 are thus similar to the past urbanization trends, and the fact that many non-metropolitan counties are finally receiving a population growth simply provides the appearance of change or of a radically new trend (see Wardwell, 1977:159).

EVIDENCE FOR EQUILIBRIUM

A second explanation for the slight increase in non-metropolitan population may lie in the decline or stability of farm out-migration. There are strong indicators that urbanization has reached a limit, not only in the United States but also in other highly urbanized countries.

Of further interest is the operation of the equilibrating process in changes in land values associated with differences in the scale and size of urban areas. According to a review by the National Research Council (1974: 89-90) land values in metropolitan areas that are manufacturing centers diminish after these areas reach between 500,000 and 1,000,000 population. Similarly, corporate centers show signs of diminishing net gains in land values as the population exceeds 100,000. These socioeconomic data imply a turnaround in terms of previous trends--to a more stable proportion of urban

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[3]Wardwell (1977) and DeJong and Sell (1977) provide the basis for the presentation of feasible explanations of the population shifts, with separate analyses of changes in the nation since 1970.

and rural population segments, with a leveling off of the Texas urban residents at nearly 80 percent of the total population. Rural-urban migration should be expected to occur but the proportions of those in each setting will remain in equilibrium.

CHANGES IN DEMOGRAPHIC COMPOSITION

The population composition of metropolitan and non-metropolitan areas is changing and these alterations may have a long-term effect on further population dispersal (DeJong and Sell, 1977:141). According to Wardwell (1977: 169-70):

> . . . movers from SMSAs into non-metropolitan areas are likely to be older, out of the labor force and slightly less well-educated but otherwise highly comparable to those in the counterstream from non-metropolitan counties into SMSAs. These age and labor force status findings support the inference that as the structure of the population *shifts upwards in age* [italics added], as earlier retirements become more prevalent, and as retirement benefits improve, we may expect to see continuing and increased movement of these portions of the population into non-metropolitan counties.

With the lowering of the birth rate and the gradual aging of the Texas population through lower fertility rates, the migration stream could actually reverse to non-metropolitan areas based on the above findings.

CHANGES IN RESIDENTIAL PREFERENCES

In attempting to explain the shift in population distribution, the preferences of Texas residents for an optimum living environment must be considered. While conservationists and land use planners are becoming increasingly concerned about urban sprawl, Texans continue to disperse. With adequate household income and transportation facilities, it appears that Texas residents prefer metropolitan fringe areas as optimum locations. While no known data exist on residential preference patterns in Texas per se, an examination

of five nationwide opinion polls is revealing (see Table 6). During a 25-year period (1948-1972), according to Gallup and Roper polls, the desire for suburban living increased considerably with a concomitant decreased preference for city living. Additionally, a slight increase in preference for small towns is evidenced in the last decade. Table 7 points to the discrepancy between current residence of those respondents in a 1972 national survey and their preferred residence. Because of the discrepancies in actual and preferred places of residence for those currently living in large cities, we can anticipate an even further dispersion of the population outward to suburbs and to non-metropolitan counties adjacent to large cities.

Figure 5 depicts specific reasons respondents provided for their stated residential preferences (Fuguitt and Zuiches, 1975). Those who preferred to reside on the periphery of big cities or in rural, isolated settings agreed that these areas had less crime, less air and water pollution, were better areas for raising children, and provided a lower cost of living. Contrastingly, those respondents preferring large cities suggested that higher wages and better jobs were available in these areas, and that cities provided contacts with a variety of people, as well as better schools, friendship, recreational and cultural ties.

Thus, two residential trends are emerging: first, a "simulated" rural life style seems to be evolving as a plausible preference pattern, with residents still desirous of living within commuting range of a metropolitan central city. New household starts or household formations based on newly constructed dwellings in Texas further support this proposition--that is, residents who are desirous of living in a different location are moving outward, to the periphery of metropolitan areas. Nevertheless, residents are continuing to move to, and remain within, the major urban regions of Texas.

Table 6.

SURVEYS OF RESIDENTIAL PREFERENCES IN THE UNITED STATES

FROM 1948 TO 1972

PREFERRED RESIDENCE*	ROPER	GALLUP			
	1948	1966	1968	1970	1972
Cities	15%	22%	18%	18%	13%
Suburbs	20%	28%	25%	26%	31%
Small towns	41%	31%	29%	31%	32%
Rural areas	24%	18%	27%	24%	23%
No opinion	0%	1%	1%	1%	1%
Total	100%	100%	100%	100%	100%

*Cities are defined as places of 50,000 or more population with suburbs defined as areas within 30 miles of a major city, small towns as containing 10,000-25,000 for the majority of the surveys, and rural areas as those sites with less than 2,500.

Source: Fuguitt, G.V. and J.J. Zuiches, "Residential Preferences and Population Distribution," Demography 12 (August), 1975, p. 493.

Table 7.

ACTUAL AND PREFERRED RESIDENCE IN THE

UNITED STATES, 1972

TYPE OF LOCATION	CURRENT RESIDENCE	PREFERRED RESIDENCE
City over 50,000	44%	25%
Within 30 miles of city over 50,000	34%	55%
More than 30 miles from city over 50,000	21%	19%
Not ascertained	1%	1%
Total	**100%**	**100%**

Source: Fuguitt, G.V. and J.J. Zuiches, "Residential Preferences and Population Distribution," Demography 12 (August), 1975, p. 495.

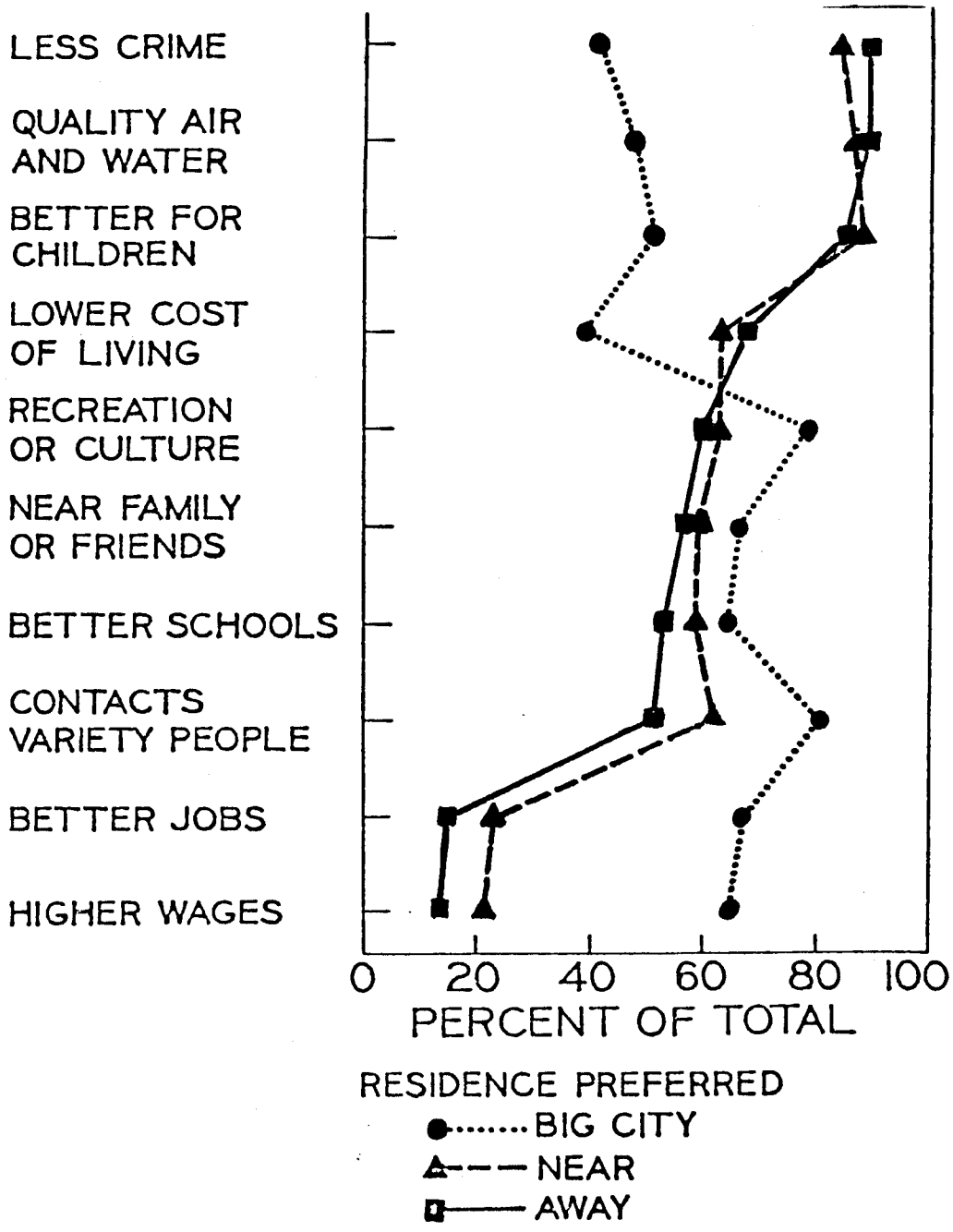

Figure 5. Proportion of Residents Ranking Each of Ten Reasons for Preferred Place of Residence.

Source: Fuguitt, G.V. and J.J. Zuiches, "Residential Preferences and Population Distribution," Demography 12 (August), 1975, p. 500.

Implications of Texas Migration Patterns for Transportation Facilities

Based on the trends for three decades, especially the last six years, an exponential increase in new residents to Texas can be anticipated, at least through 1980. The in-migrants tend to be of middle and upper socioeconomic status and in the child-rearing phases of the family life cycle. Therefore, the newcomers can be expected to be multiple-vehicle households, with an aggressive demand for expanded roadways and ready access to commercial and service centers.

Of further significance are the patterns of residential mobility within the State. Metropolitan regions are continuing to increase in population. However, the migration to non-metropolitan counties contiguous to SMSAs is an important new demographic trend in Texas, with an eight percent increase expected for non-metropolitan counties' population in the decade of the 1970s. This shift, as well as the continued exodus to suburbs generally, is related to the residential preference patterns of Texas residents, as well as socio-economic factors. Additionally, these trends are dependent on transportation technology. If highway/freeway systems continue to improve, then the dispersion of residents can be expected to continue. With the potential for developing automobiles with lower intensities of energy usage and lower pollution levels, the deconcentration of Texas' cities may be further augmented. Ironically, the migration patterns within the State may create the conurbations (or continuous cities), and accelerated congestion and pollution levels that in-migrants from the North and East have attempted to escape. A deceleration of the deconcentration trends could be evidenced if housing and land development costs discourage Texas' continued dispersal and sprawl. Also, intense energy problems could act as a catalyst to re-activate the more densely

populated environments of the pre-automobile city. In summary, Texans' preference patterns alone will not determine the population distribution of the State. New and improved highway/freeway facilities and availability of energy for augmenting private vehicle use will determine to a large extent population distribution and growth patterns in Texas.

CHAPTER III

CHANGES IN THE DENSITY PATTERNS OF THE TEXAS POPULATION

Residents in Texas, as well as in the nation, move approximately once every five years. According to Skrabanek (1977:2), a stereotype of the average Texan drawn from census data is one who lives in fourteen different houses, five different counties, and two or three states in the course of a lifetime. While it is known that the great volume of residential movement is dependent on the repeated relocation of a small proportion of individuals, a high potential nevertheless exists for radical changes in the distribution of the Texas population within a short time span.

Density has been a particular concern for those analyzing redistribution trends. Increasing interest in the effects of changing population density has been precipitated by anticipated energy shortages and the projected impact on those isolated from employment and services. In the recent past, the popularization of animal studies regarding crowding also have stimulated an interest in human density patterns.

According to one perspective, the increased density of city life induces so-called "pathological" behavior, such as increased criminal activity and declining mental health. The diversification of the city's population, relative to such factors as income, racial and ethnic characteristics, preferences, habits, and social status, act as sources of antagonism (Wirth, 1968:50-56; Carnahan, et al., 1974:63).

A second perspective points to the positive technological and economic gains brought about by population density. Hoch (1972:235-236), for example, notes that both higher pay for identical work and the availability of

specialized production are viable only with a more complex division of labor which characterizes high density areas. Both of the above perspectives are empirically supported. As a result, an evaluation of the overall change in quality of life precipitated by different density levels is difficult to ascertain.

Transportation plays a predominant role in determining density gradients. Efforts to assess the interplay between transportation facilities and density must first take into account the varying types of density measures. Most researchers distinguish several dimensions of population density, that is, certain characteristics of density from which measurements can be drawn. For the most part, these dimensions of population density are:

- Areal, or external, density, which is measured by the number of persons residing on a standard unit of land area (Levy and Herzog, 1974:230; Gillis, 1974:308).

- Structural density, measured by both the number of housing units per structure and the number of residential structures per acre, is concerned with the building structure that a household occupies and the spacing of these structures. For example, for there to be a high population density among housing units composed of single, detached structures, the number of residential structures per acre must be relatively high. Conversely, among high-rise multiple-dwelling units, the number of housing units per structure will be high while the number of structures per acre may stay relatively low (Galle, et al., 1972:26).

- Internal density, or "interpersonal press," is the level of overcrowding at the personal or individual level. Internal density refers primarily to the spatial dimensions of the dwelling unit and the separation of members of one household (Gillis, 1974:308).

For purposes of assessing the consequences of density patterns on transportation improvements and alterations, all three density dimensions must be emphasized. Five specific density characteristics which are commonly used to measure areal, structural, and internal density are: (1) persons per acre

(or square mile); (2) structures per acre; (3) housing units per structure; (4) rooms per housing unit; and (5) persons per room.

These five specific measures reflect the three different dimensions of density (as shown in Table 8). In the studies reviewed, measures of internal density are not normally related to measures of areal density. One reason for this inconsistency is the tendency of high-income persons to live in more densely populated areas in which there is little personal crowding at the household level.

Preferences of Texas residents determine to a large extent the residential configurations and patterns of land occupancy which have occurred in the recent as well as distant past. Transportation agencies are responsible for supplying transport capabilities to meet the residential preferences of the populous by providing adequate accessibility. On the other hand, the institutions supplying transportation facilities heavily influence land use patterns and create traffic generators. The effectiveness of transportation policy decisions will depend on:

(1) ascertaining population preferences so as to accurately respond to these needs and to community values; and

(2) forming alliances cooperatively with other agencies that have land development functions.

In the first case, the value systems and preferences of Texas residents seem to be operative in altering density patterns in the State since 1970 in at least three major ways:

- Overall, the population is continuing to concentrate in the urban regions of the State.
- The population is becoming continually more dispersed in the urban regions, spilling over into adjacent non-metropolitan counties.
- Household size is decreasing significantly with new household formations and new dwelling units required.

Table 8. Interrelations Among the Components of Population Density

Measures of the Interrelations	Components of Population Density				
	Internal Density		*Structural Density*	*Areal Density*	
	Persons Per Room	Rooms Per Housing Unit	Housing Units Per Structure	Structures Per Acre	Persons Per Acre
Zero-order correlations with persons per acre	0.146	-0.560	0.741	0.717	1.000
Standardized regression coefficients from a multiple regression analysis of the four components of population density on persons per acre	0.226	0.242	0.811	0.699	---

Source: Gale, Omev, et al., "Population density and pathology: What are the relations for man?" Science 176 (7 April), 1972.

The first two alterations in density patterns in Texas have been discussed in Chapter III, "Current Migration Patterns in Texas." The continued percent increase in urban populations is an on-going trend within the State. However, the increase in non-metropolitan residents, primarily adjacent to SMSAs, is a trend which vies with the lowered birth rate as the most signficant demographic feature of the Texas population.

The third trend--decreasing household size, has been relatively undocumented, but also has probable far-reaching consequences in the augmented demand for private vehicles and a continued lessening of persons dependent on other household members for transportation. The average size of households in the United States for March 1975 was 2.94 persons, continuing a pattern of decline observed since the early 1960s when the corresponding average was 3.33 persons per household. Figure 6 points to the increasing number of households proportionate to the total population in Texas and the United States, further emphasizing the diminishing number of persons per dwelling. Reasons for the decline include the falling birth rate, reflected in a decrease of the average number of persons under 18 years old in households, and the increasing proportion of households which contain only one individual.

In 1970, 81 percent of all households were comprised of primary families (i.e., a household head and related family members) and 19 percent were headed by primary individuals (i.e., persons who live alone or with nonrelatives only). The corresponding proportions were 78 percent and 22 percent, respectively, in 1975. Furthermore, even though households of primary individuals represented less than one-fourth of all households in 1975, they have accounted for nearly one-half (47 percent) of the total household increase since 1970. According to the U.S. Bureau of the Census (1975:1):

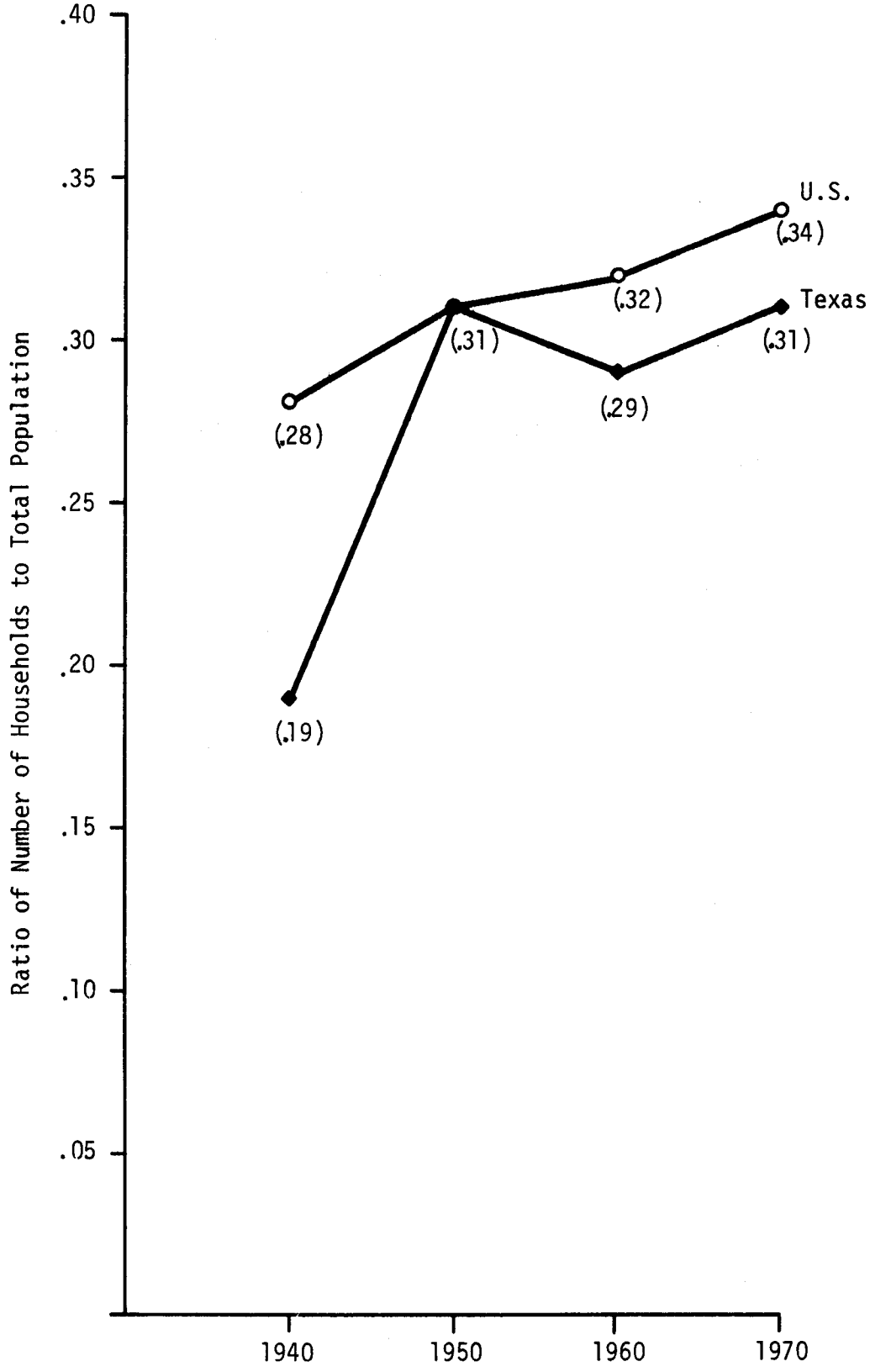

Figure 6. Increasing Number of Households Proportionate to Total Population in Texas and the United States: 1940-1970

> This increase in primary individual households is attributable to several factors including the increasing number of younger persons who leave their parental homes to establish nonfamily households of their own and the increasing number of older persons who, after their families have dissolved, continue to maintain homes apart from any relatives. Much of the recent increase in primary individuals has been concentrated among young adults. Fifty-six percent of the 3.6 million increase in primary individuals observed between 1970 and 1975 was for persons under 35 years old. In 1975, six of every 10 primary individuals under the age of 35 were men, whereas three of every four primary individuals 65 years old and over were women.

Implications of Changing Density Patterns for Transportation

In general, the Texas population has become continually less dense in terms of both external (areal) and internal (household) density in urban centers throughout the State. As has historically occurred, the population per area declines with distance from the city center. Explanations of these patterns are found in both the residential preferences of individuals and in the availability of adequate transportation facilities.

In the past, a high concentration of Texas population in specific urban centers has had a significant relationship to higher road density. Increases in population density for any particular area have an economic benefit in terms of highway/freeway construction and usage. With all other factors held constant (including per capita income), the more dispersed the population in a given geographic area, the more cost per person to construct a common facility such as a road (Glover and Simon, 1975:454). Thus, the benefit/cost ratio tends to be higher with greater population densities.

With continued dispersion, there may be expected to be more roads per unit area serving lower vehicle miles. Additionally, with increased areal dispersion throughout urban regions, mass transit becomes a less feasible

alternative transportation mode in the suburban and rural-urban fringe portions of these regions. However, because of the pronounced increase in single person households, the dependency on family members or friends for transportation may decrease. These individuals who reside in single-person households will either require an increase in private vehicles or accelerate the demand for transit accessibility.

CHAPTER IV
CHANGING POPULATION COMPOSITION IN TEXAS

The importance of studying aging trends within the Texas population becomes apparent when one considers that age composition trends will subsequently affect future patterns of fertility, mortality, and migration in the State. More importantly, however, ". . . municipalities, legislatures, and public agencies must be cognizant of these changes if they plan to meet the needs of their constituency in an optimal manner" (Skrabanek, 1974b:18). The demand for transportation facilities, for example, is affected to a great extent by changes in age distribution patterns because specific age groups within the population evidence differential transportation needs and usage patterns.

Changing Age Structure

Age composition patterns can be measured and described in a variety of ways, but among the most commonly utilized are:

- median age
- age levels in the life cycle
- the dependency ratio
- the index of aging

A brief discussion of the construction and utility of each measure follows, along with pertinent figures for the population of Texas and the nation.

MEDIAN AGE

The median age of a given population is that age which divides the population into two equal groups (i.e., with one-half of the population younger

and one-half older than the derived figure). This number provides a simple measure of aging trends within the population when viewed over time.

In Texas, as in the rest of the nation, median age increased steadily from the beginning of the century until approximately 1950 (see Figure 7). Among the factors responsible for this increase were:

1. reduced fertility rates;
2. more restrictive immigration laws; and
3. increased life expectancies.

The first two factors served to limit the number of younger individuals in the population, while the medical advances which increased life expectancies resulted in a larger proportion of elderly persons. As noted in Chapter I, the number of Texans 65 years of age and over has tripled since 1940.

In the past twenty years, however, the trend in Texas shifted so that median age dropped slightly from 27.9 years in 1950 to 26.4 years in 1970. This reflects in large part the increased birth rate of the 1950s (popularly referred to as the postwar "baby boom") as well as reduced rates of increase in life expectancies. Given the fact that birth rates are currently lower than in the 1950s or early 1960s, the median age of the Texas population is expected to increase once again by 1980.

AGE LEVELS IN THE LIFE CYCLE

Whereas median age describes shifts in the population as a whole, a more detailed explanation of the changes taking place can be obtained by analyzing various age groups within the population.

For example, breaking the population down into three broad categories (under 18, 18-64, and 65+) reveals that: (Figure 8)

1. Children under 18 years of age in 1970 represented a smaller proportion of the total population than in 1960, and with

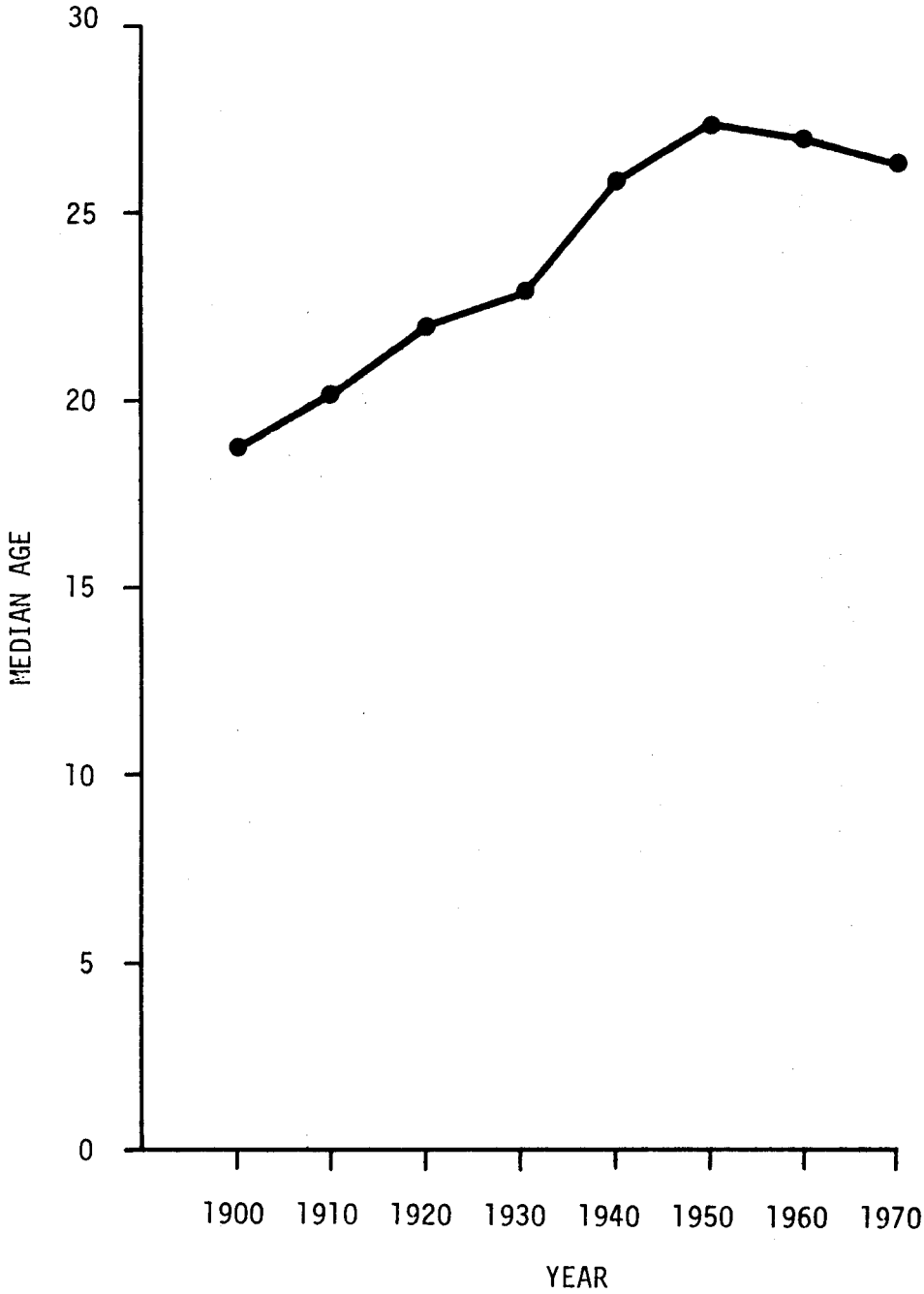

Figure 7. Median Age of the Texas Population 1900-1970

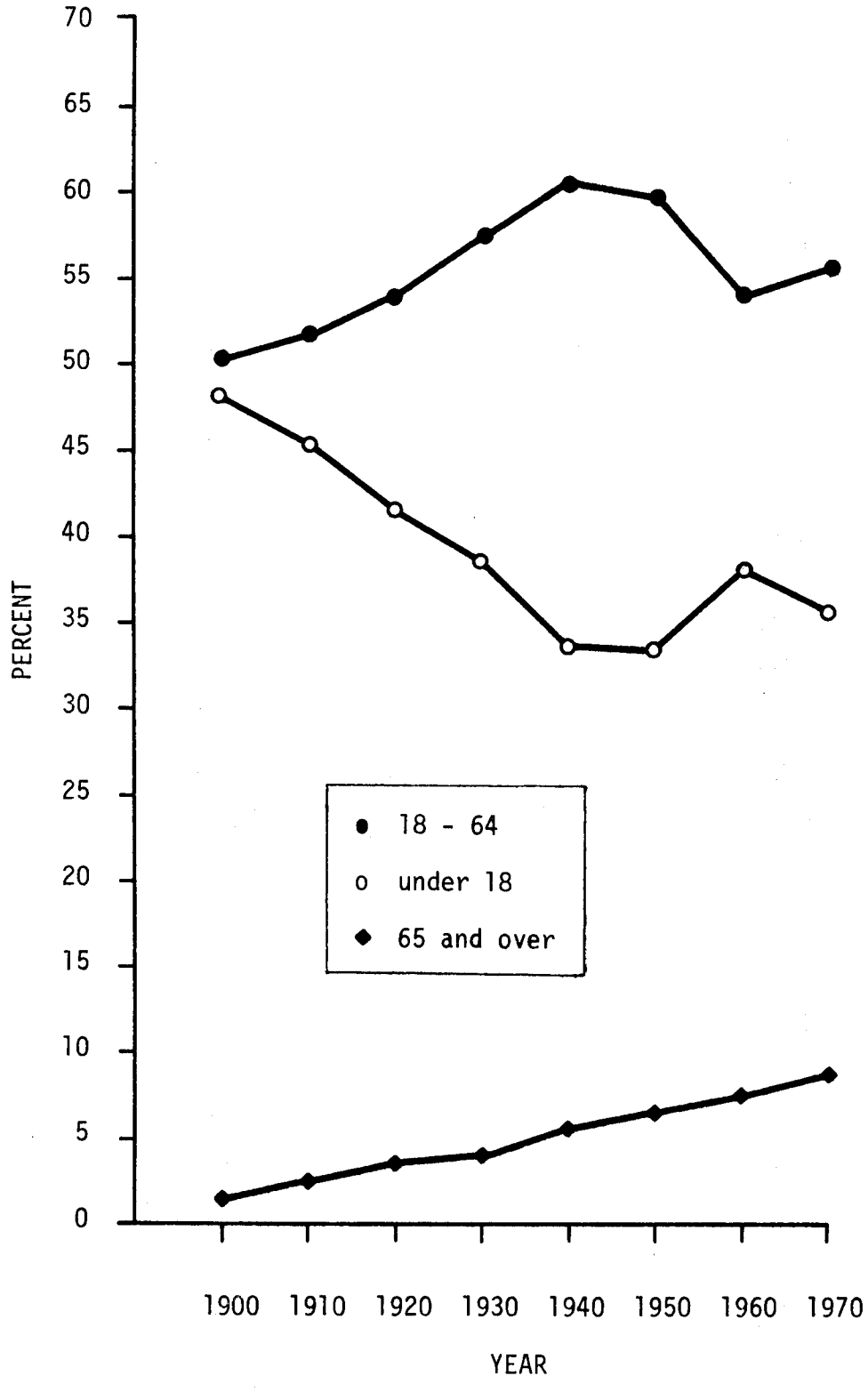

Figure 8. Percentage Distribution of the Texas Population by Three Broad Age Groups, 1900-1970

the present low fertility rates, the decrease in numbers of children is expected to continue at least through 1980;

2. Those persons aged 18-64 have increased in proportion to the total population since 1960, again reflecting the baby boom phenomena--those born in the 1950s and early 1960s are now reaching this stage of their life cycle;

3. The elderly (65+) are greatly increasing their proportion of the total population.

> For example, the number of older persons has grown so much faster than the remainder of Texas' population that in 1900 the aged made up only 1 out of every 67 people in Texas but grew to 1 out of every 11 in 1970 (Skrabanek, 1974b:17).

In terms of actual numbers, Figure 9 provides estimates of the Texas population by both age and sex. This information reconfirms several previously mentioned demographic trends developing in the State. For example, the number of persons aged 65 and over is steadily increasing, with females far outnumbering their male counterparts. Perhaps the most significant change projected for the Texas population between 1970 and 1985 is the increasing number of individuals in the 20-39 year age group. For this younger adult segment, increases in both household formations and the demand for transportation to areas of concentrated dwellings can be expected in the near future. (More detailed information on household formations is presented later in this chapter).

THE DEPENDENCY RATIO

This descriptive measure relates the number of dependent individuals (those under 18 plus those over 65) to the number of productive individuals (those 18-65) in the population.

Again, increased fertility rates caused an upward swing in the dependency ratio in the decade between 1950 and 1960 in Texas (see Figure 10). Among almost all the subareas of Texas in 1970, individuals aged 18 to 64 comprised

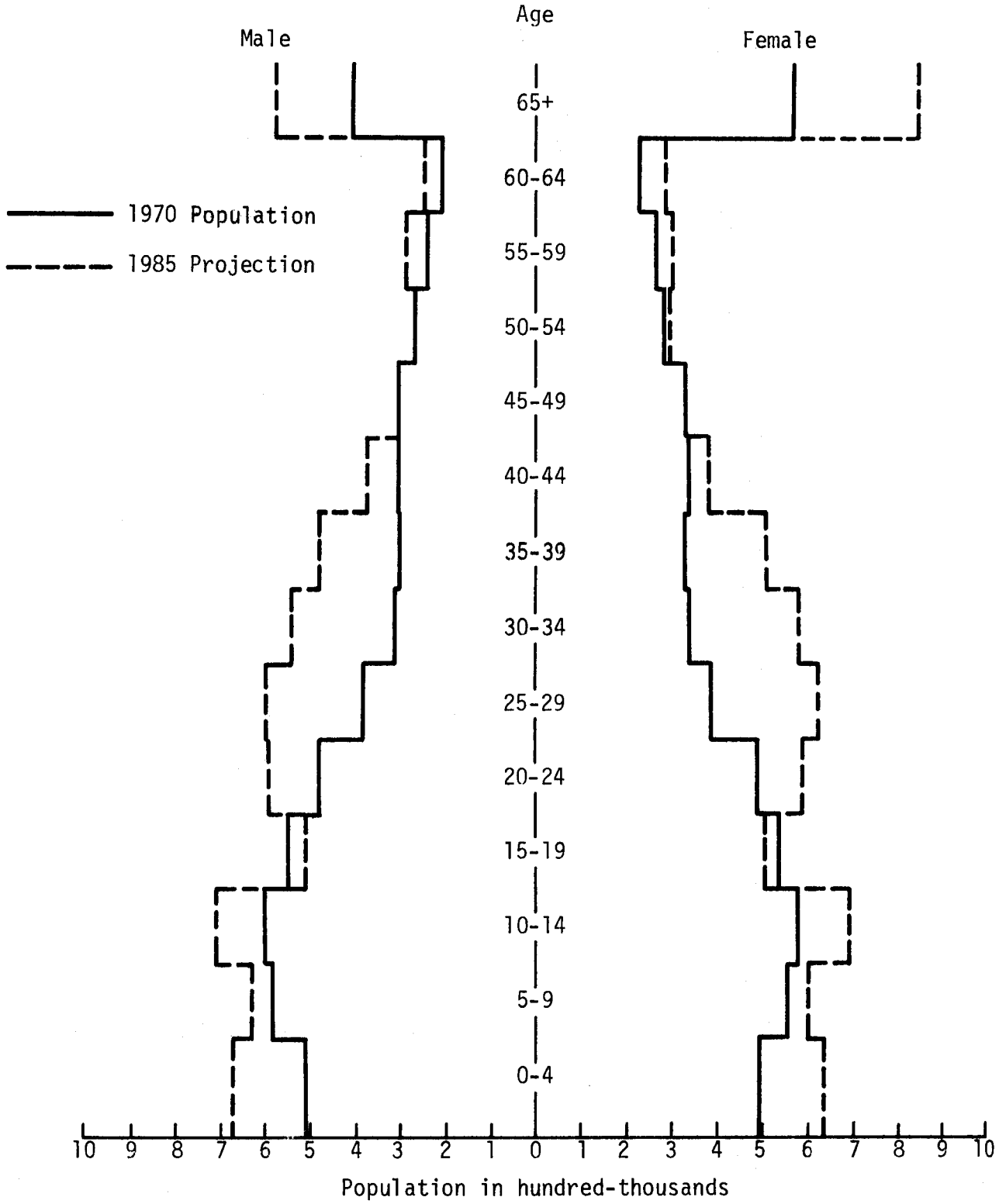

Figure 9: Estimates of the Population of Texas, by Age and Sex: 1970 and 19

Source: Dudley Poston, Population Research Center, Univeristy of Texas: Austin, Texas, August 16, 1977.

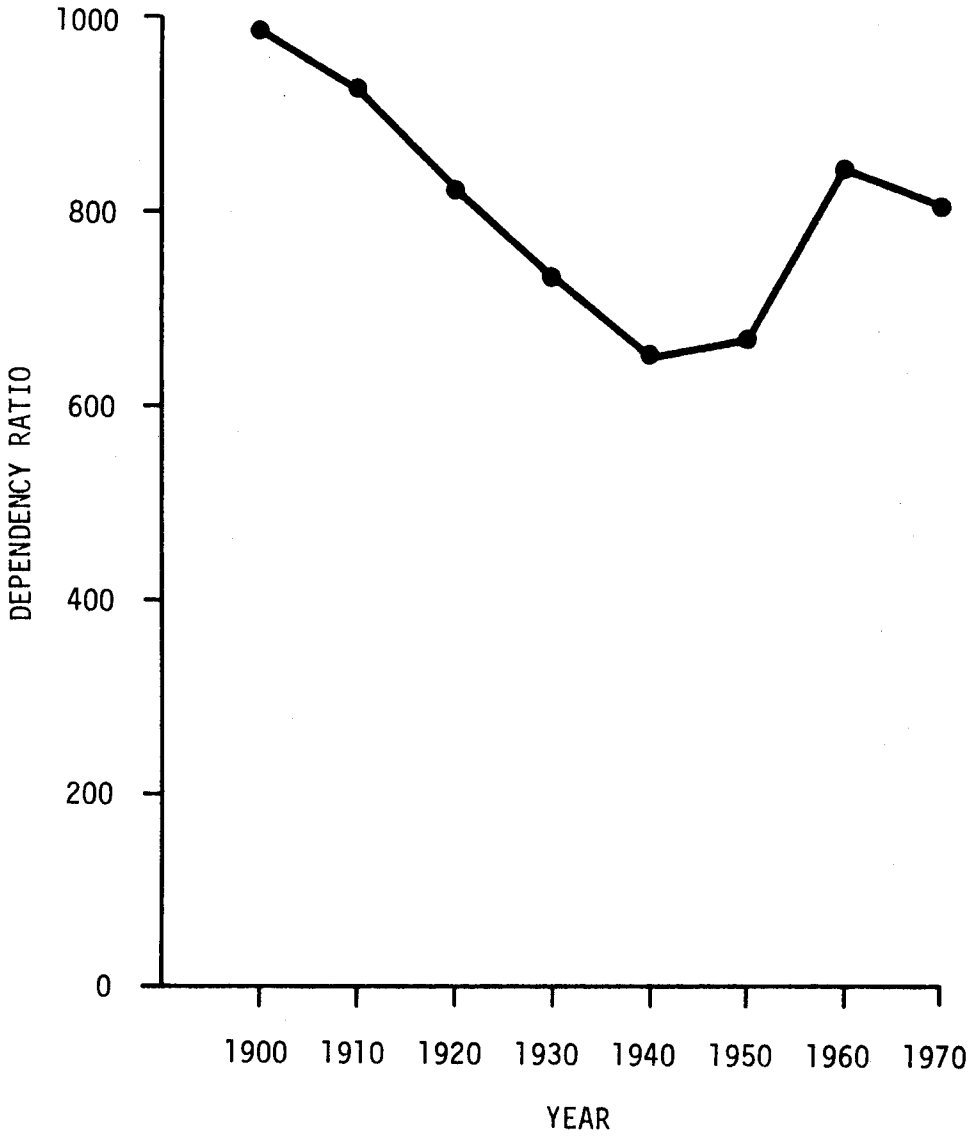

Figure 10. Number of Persons in the Dependent Ages (Under 18 and 65 and over) per 1,000 in the Productive Ages (18-64) in Texas, 1900-1970

47 to 57 percent of the total population. Major differences occurred, however, between areas in the proportion of those under 18 years of age and those over 65.

The majority of metropolitan areas had average population concentrations in both the young- and old-age categories. Exceptions to this included Corpus Christi and El Paso metropolitan areas which had above-average concentrations in the young-age category, and the Abilene, Waco, and Wichita Falls regions which had greater than average concentrations in the old-age category (Poston and Bradshaw, 1971).

A downward shift has occurred since 1960 in both Texas and the nation. The dependency ratio of older persons compared to the working age category is over 3 to 1 currently, but has been predicted to be less than 2 to 1 within 60 years (Newsweek, 1977).

INDEX OF AGING

The index of aging provides knowledge of the changing age patterns of the young and the elderly within a given population. This measure is computed as a ratio of persons aged 65 and over to those under 18 years of age.

As shown in Figure 11, the index of aging in Texas has increased steadily since 1900, again indicating a signficantly larger proportion of elderly persons in the population. Barring a dramatic increase in current fertility rates, this ratio should continue to increase in the near future.

Interestingly, definite regional patterns have been found in the distribution of the aging index in Texas. For example, ". . . with only a few exceptions, all counties with aging indexes above 50.0 in magnitude are no more than one hundred miles from a metropolitan center" (Poston and Bradshaw, 1971). For the most part, these counties are located along either side of the

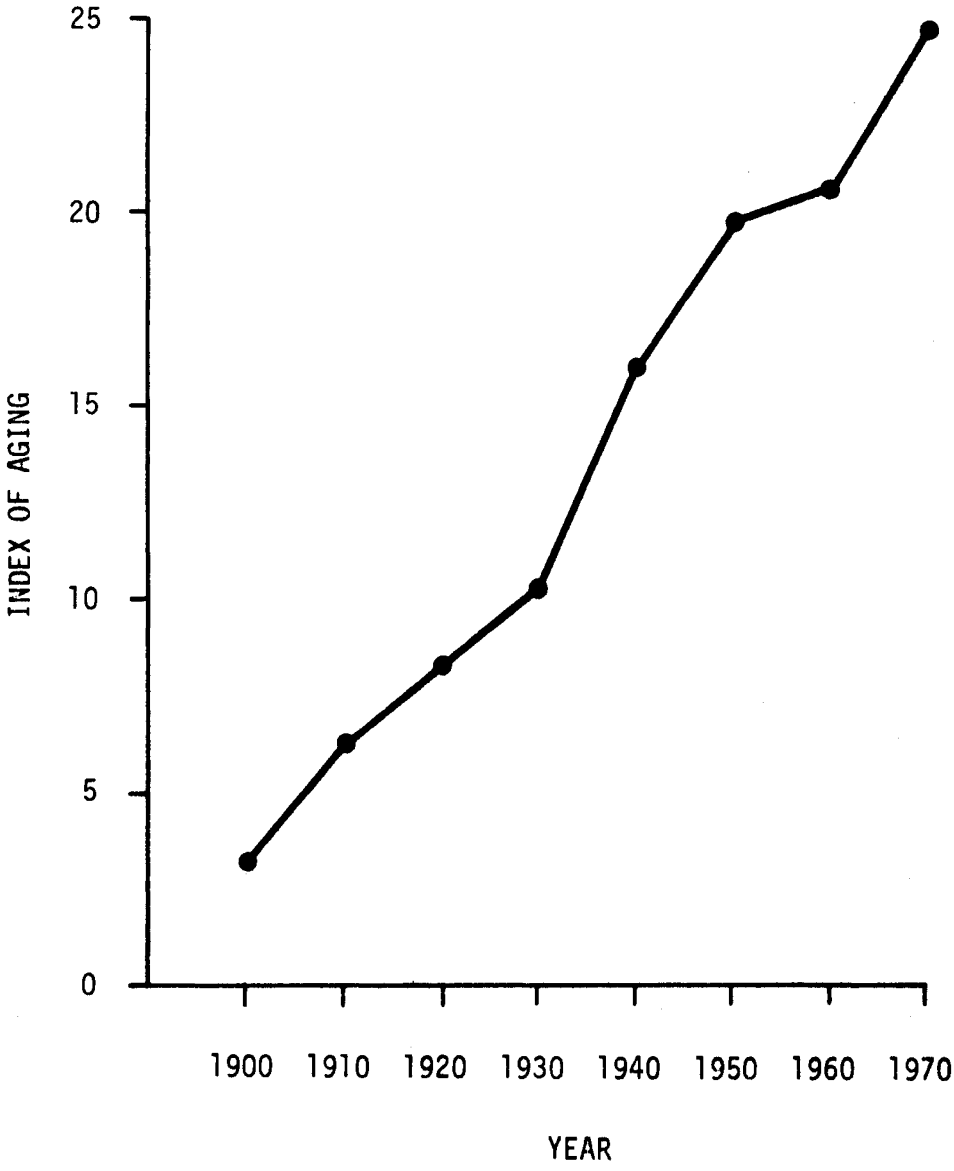

Figure 11. Number of Aged Persons (65 and over) per 100 Young (under 18) in the Texas Population, 1900-1970

north-south metropolitan axis in the state. Most metropolitan areas, on the other hand, are characterized by younger populations, due primarily to heavy net in-migration. This supports the theory that economic areas experiencing heavy net in-migration should be young while those with substantial out-migration evidence older populations (Poston and Bradshaw, 1971).

CHANGING AGE STRUCTURE AND TRANSPORTATION DEMAND

The two population age groups which have the most pronounced differences in terms of their needs for transportation services and facilities (as compared with the rest of the population) are the elderly and the young. The elderly have often been classified as all those aged 65 and over, because that particular age is so frequently associated with retirement status. Neugarten (1974), however, found it useful to recategorize the elderly population into two groups:

- the young-old (aged 55-75)
- the old-old (aged 75+)

She points out that the young-old--who comprised 15 percent of the population in 1974--are relatively healthy, affluent, and free from traditional work and family responsibilites, as compared with persons over 75. Thus, the transportation needs of the young-old will largely depend upon their selected leisure time activities.

> The large majority will be living independently, apart from children and other relatives. This fact, combined with the desire to find interesting things to do, will lead them to seek environments which maximize options for meaningful pursuits (Neugarten, 1974:196).

Additionally, it must be remembered that this cohort grew up in an automobile-oriented society; their reliance on private vehicles for most if not all their travel needs is well-established, at least for the majority of

individuals in this age group. The expectation, then, is for continued use of personal vehicles with the major trip purposes centering around leisure activities or the typical home-to-work trip.

Contrary to what was once believed, the travel needs of individuals in the 55-75 year age group are not markedly reduced; in fact, increased leisure time and reduced responsibilities may allow these persons to actually travel more often. Furthermore, these individuals are apt to continue driving automobiles as they reach their 70s and 80s, representing a continuation of past behavior patterns. Extended use of personal vehicles (as either drivers or passengers) and an increase in the number of privately-owned automobiles can thus be expected for this young-old population.

The old-old, on the other hand, are more apt to fall into the category of the transportation disadvantaged (i.e., those who for various reasons cannot or choose not to drive automobiles). The determining factor in terms of transportation needs for those aged 75 and over is health status. Many will continue to rely on the automobile, especially as passengers, for their travel needs, although this will often mean postponing or eliminating trips if an automobile is not available.

The opportunity exists for transit systems to capitalize on the needs of this population segment; data from smaller Texas cities indicate a great number of potential transit patrons are over 65 years of age. Fixed-route service into the areas of concentrated living quarters (e.g., retirement communities, nursing homes, or inner city neighborhoods) should prove to be a useful service, with routes running to local shopping areas, medical facilities, and social activity centers. The need also exists for the transmission of goods and services, particularly those relating to health care, into these areas.

The young represent another faction of the transportation disadvantaged because they are ineligible for driver's licenses. Previous studies have pointed to a heavy reliance on the automobile by today's youth, however, resulting in chauffering by parents, particularly during late afternoon and early evening hours. Again, public transportation should attempt to capture large ridership totals from this age group who have definite travel needs relating to school and social/recreational activities.

In general, then, the higher dependency ratio can be seen as an indication of a greater need for transportation provision, particularly with regard to those under 16 years of age and the old-old group over 75. For young adults and middle-aged individuals, particularly those in the middle- and upper-income brackets, an increased demand for recreational facilities located away from large population centers has recently been evidenced. This is indicative of a more recreation-oriented society resulting from increases in family incomes, and the combination of two working parents and reduced family size. These factors suggest that more money can and will be spent on items once considered "luxuries" such as new automobiles or the addition of a second or third car to the household. Furthermore, the implication is for increased air travel and greater use of existing highways by these individuals pursuing recreational activities.

The Changing Sex Ratio in Texas

Another interesting population trend which will affect transportation planning is the change in the sex ratio in Texas. Figure 12 depicts six ratios for the State, broken down into age categories. As shown, the number of males per 100 females steadily decreases as age increases. In 1970, there were 234,000 more females than males in Texas and ". . . population projections

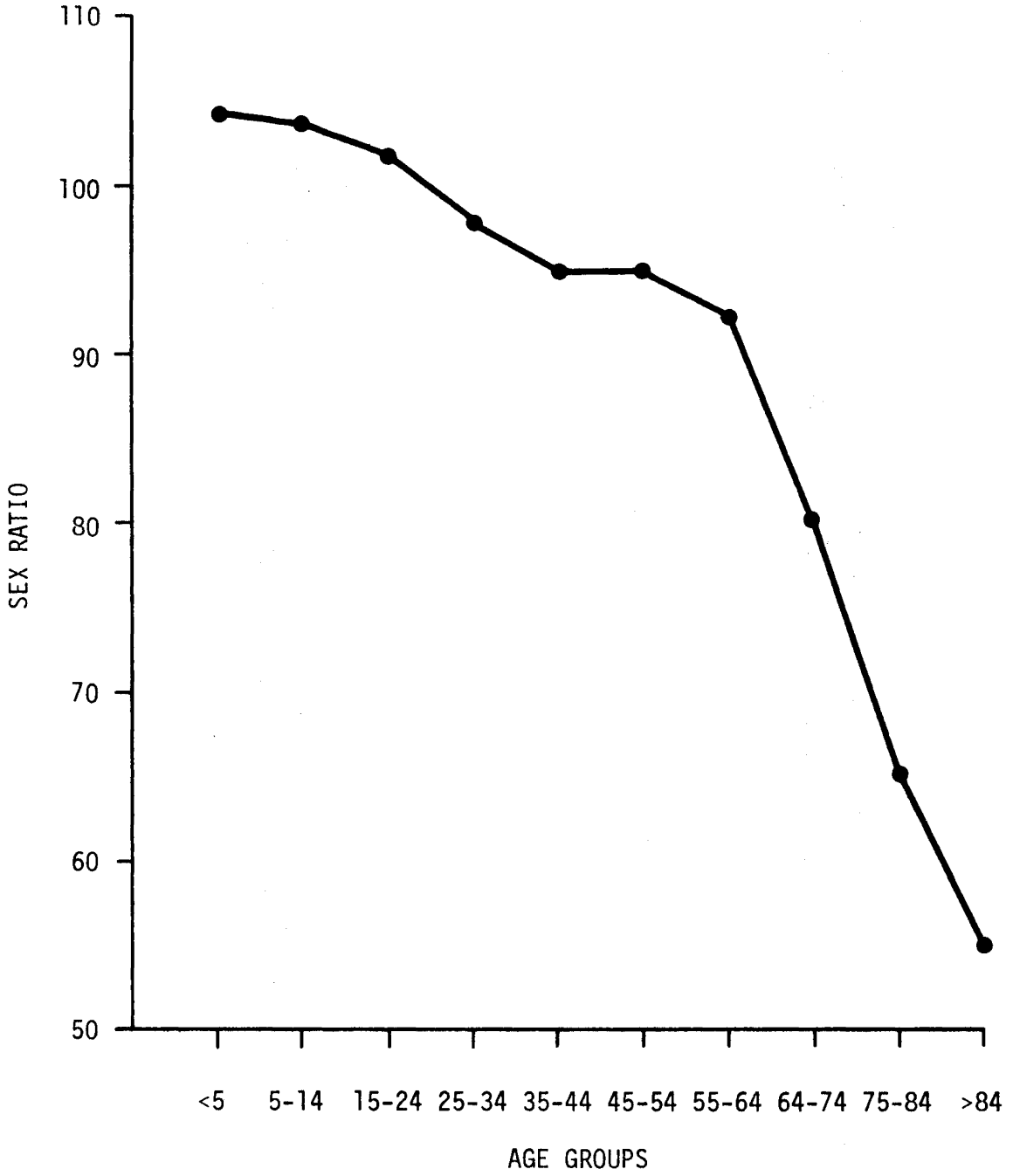

Figure 12. Sex Ratios for Texas, by Age Groups, 1970

indicate that by 1980, Texas females will outnumber the male population by a margin of 410,000" (Skrabanek, 1974a:23).

When analyzing sex ratios by residence, it can be seen that, in general, the more urbanized the area, the lower the sex ratio (see Table 9). While both rural and urban sex ratios declined from 1960 to 1970, Skrabanek hypothesizes that the larger decline for rural areas is at least partially due to increased male migration into urban areas during the time period.

This increasing proportion of females in Texas does have some noteworthy implications for transportation planning. Above all else, an excess of females will mean more single women in the population who (either by choice or necessity) will be in the labor force and therefore, will require transportation to and from their place of employment. For many, this will mean owning a private vehicle. For others, particularly blue collar females, public transit may provide a viable substitute for the automobile. According to TTI findings for smaller Texas cities, females evidence a higher potential to use transit, given certain feasible service developments. This option may be especially appropriate for those large numbers of females residing in central city locations.

A second group of women with special travel needs are the widows in the population. This group increased in number by approximately 100,000 between 1960 and 1970 while the number of widowers declined by over 2,000. "The absence of a spouse to drive the family automobile may partially account for the generally reduced mobility of senior women, many of whom are widows" (Patton , 1975:60). If these women are not able to drive, transportation should be provided for them so that they can maintain contact with the rest of the community.

Table 9. Sex Ratios for Texas, by Residence, 1960 and 1970

	1960	1970
Rural	105.6	100.1
Urban	95.8	94.8

These kinds of problems experienced by the elderly, both urban and rural residents, have recently received greater attention by the government. At the 1971 White House Conference on Aging, for example, delegates rated transportation problems third in priority, preceded only by income and health, thus attesting to their importance.

Natural Decrease in Texas Counties

Natural decrease simply refers to a greater number of deaths than births occurring in a population over a given time period. Although this phenomenon has not been observed frequently in the United States, its occurrence has been documented among a number of counties recently, including 93 in Texas (see Table 10).

To a large extent, natural decrease is precipitated by various migration patterns occurring in a region. That is, migration may be responsible for a disproportionately large number of older people in a given population, which would result in a greater number of deaths than births occurring in that area. This unequal age distribution may be caused by net in-migration of older persons, net out-migration of younger individuals, or some combination of both patterns. In any case, migration can be viewed as an exogenous variable which contributes to and facilitates the occurrence of natural decrease.

Predictions for the 1970 and 1980 time period indicate that all 93 of these counties in Texas which have experienced natural decrease in the past will do so again at some time in the future. It is also expected that additional counties may have natural decreases occurring in this decade, with most of these new counties being located adjacent to the present natural decrease

Table 10. Natural Decrease Counties in Texas, 1950 - 1970

Year of Occurrence	Total Number in Year	Number of New Counties	Accumulative Total
1950	0	0	0
1951	0	0	0
1952	1	1	1
1953	1	0	1
1954	1	0	1
1955	1	0	1
1956	5	4	5
1957	4	2	7
1958	6	2	9
1959	10	5	14
1960	14	8	22
1961	12	4	26
1962	16	4	30
1963	20	3	33
1964	24	3	36
1965	40	10	46
1966	49	11	57
1967	58	14	71
1968	66	13	84
1969	64	7	91
1970	60	2	93

counties. Furthermore, it appears that natural decrease will not be limited to non-metropolitan counties in the future.

> Of the 254 counties in the state, 133 (or over 52 percent) probably will be characterized by more deaths than births for one or more years during the 1971-1980 time frame. In terms of population size these 133 counties had a 1970 population of more than 1.5 million and comprise over 13 percent of the population of Texas (Poston, et al., 1972:9).

The effect natural decrease has on population shifts, age composition, labor supply, economic development, and tax resources will, in turn, influence transportation planning, both in terms of the movement of goods and services into and out of the particular area and the demand for transportation facilities based on population members themselves. Thus, the occurrence of natural decrease and developing patterns should not be ignored.

New Household Formations

NEW HOUSEHOLD GROWTH AND CHANGING AGE STRUCTURE

> In the early 1970s, net household formation was at an all-time high, while population growth had declined to its lowest rate since the 1930s. This paradox was possible because of the extremely unbalanced age distribution in the U.S. population (Marcin, 1976:31).

Today's population growth is predominantly in the 15 to 34 year-old age category--again reflecting the impact of the baby boom in the 1950s. By the year 2000, the median age of the nation's population will have increased from 28 to 35 years and the needs of society, including housing and transportation, will be affected by this aging trend.

Recently, there has been an unprecedented increase in new household formations such that the household growth rate for Texas approximately doubles the current rate of population growth in the State. The magnitude of this increase becomes more apparent when one considers that Texas is the third

fastest growing state in the nation with an anticipated increase of over one million residents by 1980.

FACTORS INFLUENCING HOUSEHOLD GROWTH

Several factors, although interrelated, can be identified as contributing to the recent boom in new household formations:

- increasing proportion of young adults (17-20) in the population
- increasing number of marriages
- increasing number of divorces
- increasing number of singles living alone

As noted in Chapter III, young adults are forming separate households at earlier ages than in the past and whether they choose to live alone or marry, their new living arrangements result in increased housing demand.

> All but a very few youngsters are leaving the homes of their parents at the present time between the ages of 17 and 20, inclusive. In 1970, there were 846,000 living in Texas at these specific age levels . . . by 1975 the 17 to 20 year-olds will increase to at least 934,000, and to over 946,000 by 1980 (Skrabanek, 1975:30).

Marriage rates are also increasing in the State; in 1975 over 140,000 couples were living in separate households, as compared to only approximately 90,000 in 1960. At the same time, divorce rates are steadily on the rise. There were about 58,000 divorces granted in Texas in 1975 and the figure is expected to increase in the future. Most newly divorced individuals choose to live alone at least for some period of time which signficantly increases the number of new households being set up.

Finally, there is a growing tendency for single individuals to live alone. "This groups includes widows, widowers, divorced persons, people who do not

intend to get married, and married couples, who, because of their job situations, occupy living accomodations in separate cities" (Skrabanek, 1975:32).

The number of households headed by nonrelated individuals has doubled since 1960 with over 15 million households being headed by single adults in 1975 (Marcin, 1976). "Nationally, in 1975, an estimated 9 of every 10 primary individuals (i.e., those persons who maintain their own households while living alone or with persons not related to them) lived alone as one-person households" (Bureau of the Census, 1976).

Implications of Household Formation Changes for Transportation

The preceding discussion highlighted certain changes in household formation patterns occurring in Texas and the nation. These changes suggest the emergence of trends which are believed to have signficant implications for transportation planning in the State.

The fact that young adults are setting up households at earlier ages, for example, means that fewer of these individuals are able to rely on other family members to satisfy their transportation needs. In many cases, these youngsters will purchase their own automobiles, when economically feasible, as a matter of convenience and/or status. For the majority of today's youth, a car is viewed as a necessity more than a luxury item. Thus, this age group contributes to the heavy reliance on automobiles in the United States.

Major trip purposes for young adults are related to school or work. Because of congestion and parking problems on many college campuses, students may elect to use a shuttle bus for transportation to and from classes. In general, however, an increase in the number of privately-owned vehicles can be anticipated.

Similarly, the rising number of divorces in Texas can be expected to increase the number of personal vehicles in the State. Whereas husbands and wives often share a single automobile, a divorce can leave one spouse without access to the accustomed mode of transportation. The most common solution for those who find it possible financially is to purchase a car so that normal travel behavior patterns can be maintained.

In addition to divorcees, the number of single individuals, in general, who are living alone is steadily increasing. This results in higher demand for concentrated living quarters (e.g., apartments, mobile homes, duplexes) which may be effectively served by public transportation. The bus transit service instituted in the Chimney Rock district of Houston is an example of one such successful arrangement. Furthermore, these concentrations of single-member or single-family dwellings are commonly located in the suburbs of metropolitan cities which means that goods and services must be transmitted into outlying areas.

CHAPTER V

POPULATION ESTIMATES AND PROJECTIONS FOR TEXAS AND FOR STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION DISTRICTS

The purpose of this chapter is to summarize population changes in the State by assessing current and anticipated trends in SDHPT districts. To measure present population characteristics in the districts, U.S. Bureau of the Census estimates are utilized. An "estimate" is an indirect measure of a condition that exists or has existed and which, in principle, could have been measured directly. However, estimates are derived from a data base other than total population counts. It is very difficult to have the exact enumeration for each SDHPT district on a yearly basis, for example, so an estimate is used.

A "projection" represents the exact measurement of a future condition that would exist if the assumptions utilized in the projection procedure prove to be empirically valid. The general method for establishing population projections consists of extrapolating statistical trends in the basic demographic components of population change to obtain the potential size and characteristics of the population at some future point in time.[4]

Benefits of Population Estimates and Projections

Estimates of current and future population are needed for a wide variety of planning and policy-making purposes by many public and private agencies. Public programs which provide services to various segments of the population cannot be appropriately planned and implemented without information about the

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[4]For a more complete definition, refer to Donald B. Pittenger's Projecting State and Local Populations, Cambridge, Massachusetts, Ballinger Publishing Company, 1976, pp. 3-4

trends in numbers of people to be served and the size of the population of political subdivisions involved. Both capital investments and operating budgets for transportation, education, and health services, as well as a vast array of other service facilities, depend directly upon the numbers of people to be served (Perrin and Grubb, 1975:1). Increasingly, local and state planning agencies are dependent on census estimates and projections from the U.S. Bureau of the Census and from other demographic sources to strategically and objectively allocate scarce resources.

Accuracy of Population Estimates and Projections

Estimates of the population, especially those undertaken at the state level by the Bureau of the Census, yield a fairly accurate picture of total population. Using the Administrative Records Method, the deviation for this approach compared with two other methods is 0.5 percent for states of 4 million and over. In comparing 1970 population estimates prepared by the Bureau of the Census to actual 1970 enumerations for states, a difference of 1.2 percent was indicated (U.S. Bureau of the Census, 1977:5-6). In sum, the standard estimating procedures used by the Bureau indicate a degree of consistency among estimation approaches and are reasonably accurate reflections of actual population size at the state level.

Population projections are produced on the basis of estimates of the size and distribution of the population at some base date and on assumptions regarding trends in the components of population change. The validity of a particular population projection depends upon how accurately the size and composition of the initial population has been estimated, and how closely the assumed fertility rates, mortality rates, and migration rates approximate the actual rates. A weakness of these projections is that it is very difficult to

predict future trends in components. For this reason, demographers tend to make assumptions regarding components of population change which are based on statistical observations of historical trends and prevailing demographic conditions. Because of the uncertainties regarding the future direction of trends in the components of population change, the projections are usually described as "if-then" estimates--"if these trends in fertility, mortality, and migration, then the future population will be known."[3]

One of the major weaknesses of population projections is the lack of an adequate model of the relationships between changes in economic conditions and changes in population size and composition. It is evident that the structure of the population and the structure of the economy are interrelated. For example, growth in the economy of an area can stimulate population growth through migration into the area, and economic decline can result in population loss through out-migration and a lowered birth rate. However, because of the complexity of the interrelationships, no adequate theoretical explanations of the effects of economic change on population change have been developed. For this reason, economic trends are usually ignored when making population projections. Ordinarily, no attempt is made to allow for future economic fluctuations of a cyclical nature when deriving projections, even though the age-sex structure of the population, the marital status, the cumulative fertility of females, and other measures of its current demographic status reflect the impact of such events in the past. There is an implicit assumption that economic conditions in the future will mirror those of the past. Reports presenting projections often state that conditions of nearly full-employment are expected to continue, even though relatively

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[3]For this reason, demographers refer to future population estimates as "projections" rather than "forecasts."

little is known about how variations in these economic phenomena affect population change.

When population projections are used as forecasts, one appropriate concern is their accuracy in estimating future population size. An appropriate measure of the accuracy of a population projection is a subsequent comparison with a census count or current estimate of current population, as described earlier.

Several systematic studies of population projections provide some general analyses of their weaknesses.[4] These studies show that projections for smaller geographic areas are subject to much greater average error than those for larger geographic areas. The greater inaccuracy results partly from the added uncertainties of internal migration, and partly from the fact that errors (or deviations in general) tend to vary inversely with population size. Thus, for a given length projection period, local area population projections tend to be subject to much greater average error than projections for counties, and projection of county populations tend to be subject to greater error than projections for the state as a whole.

The amount of error in projections tends to vary directly with the rate of population growth and with the length of the projection period. For twenty-year projections, no method provides very accurate forecasts. In

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[4]See: Jacob S. Siegel, "Development and Accuracy of Projections of Population and Households in the United States," Demography 9 (February): 51-86, 1972; Meyer Zitter and Henry S. Shryock, Jr., "Accuracy of Methods of Preparing Population Estimates for States and Local Areas," Demography 1: 234-236, 1964; Helen R. White, "Empirical Study of the Accuracy of Selected Methods of Projecting State Populations," Journal of the American Statistical Association, 49 (297): 480-498, September 1954; Jacob S. Siegel, "Forecasting and Population of Small Areas," Land Economics, 29(1): 72-87, February 1953; and Robert C. Schmitt and Albert H. Crosetti, "Accuracy of the Ratio Method for Forecasting City Population," Land Economics, 27(4): 346-348, November 1951.

general, the longer the projection period, the greater the likelihood of unforeseen developments which can cause the actual population to fall far outside the range of the projected population. Projections of rapidly growing populations tend to be less accurate than projections of slowly growing or stable populations.

Examination of the population projections for Texas in the light of these general findings produces the following observations. The rate of population growth in Texas has been relatively high, and all indications are that this will continue over the time period covered by the population projections. Similarly, the economy of Texas has been growing and will probably continue to do so for some time. These two factors will probably cause the Texas population projections using 1970 as the base year to underestimate the actual population to some degree. Furthermore, the relative amount of underestimation should increase as the time period of the projections increases. The amount of underestimation error in the projections may tend to be relatively greater for those counties in the State undergoing rapid population increase and sustained economic growth, due mainly to increased rates of net migration into these areas.

Since errors in projections tend to vary inversely with population size, the projections for heavily populated metropolitan counties should tend to have smaller average errors than those for the sparsely populated rural counties. Also, relatively small changesin the components of population change in sparsely populated counties can cause major shifts in the relative size of the county's population, resulting in a large percentage error in the projected population. Thus, population projections for Texas counties should be supplemented by information regarding current economic and social conditions within each

county. This should be done for all counties, but is especially important in the case of sparsely populated counties, whose population size can change relatively quickly due to changes in local conditions.

Population Estimates and Projections for Texas

Prior to the decennial census, the Bureau of the Census issues a standard series of population projections for each state. The Bureau of the Census has provided an estimate of the 1975 Texas population of 12,237,000. Prior to the derivation of this estimate, the Bureau issued a standard series of population projections for each state. Each set of estimates in the series represents "if-then" estimates of future population, based on different assumptions regarding trends in births, deaths, and migration.

The bureau projections of Texas population for 1980 and 1985 are:

	Series I-E	Series III-E
1980	12,812,000	12,847,000
1985	13,625,000	13,711,000

In designating a set of projections, the Roman numerals indicate interstate migration assumptions. Series I assumes 1960-1970 migration patterns will continue. Series III assumes no interstate migration. The letter 'E' represents the assumption of a long-term trend in which the average fertility level will ultimately reach 2.1 births per woman. These projections are prepared by the cohort-component method. The Bureau does not revise their projections, and cautions against their being used as forecasts, suggesting that ". . . these projections are consistent with the 1970 census, but do not reflect actual population trends since 1970. Thus, for many states, these projections no longer appear reasonable."[7]

[7]U.S. Bureau of the Census, Current Population Reports, series P-25, No. 477.

The Texas Water Development Board has provided a projection of the 1980 Texas population of 13,400,000. The Office of the Governor has produced 1980 and 1985 Texas projections of 12,594,100 and 13,421,600, respectively, assuming zero net migration and figures of 31,109,600 and 14,117,600, based on the assumption of continued migration trends. In extrapolating the 1970-75 trend to 1975-80, i.e. a 9.27 percent population increase, the anticipated 1980 population of Texas is 13,371,600. This latter figure is somewhat higher than the other projections for Texas in 1980, reflecting the pronounced migratio stream into Texas since 1970.

Prior to the 1970 census, the Bureau also prepared standard series of projections for the counties in each state, but these were discontinued because of the large amount of variation between the projections and actual population. Additionally, since the early 1970s, no official organization or agency in Texas has been responsible for the derivation of population projections for counties, so that a number of state agencies are attempting this task. Nevertheless, the U.S. Bureau of the Census has maintained the responsibility for county population estimates to assess current trends.

Population Estimates for State Department of Highways and Public Transportation Districts

As has been noted earlier, the net in-migration into Texas coupled with the re-distribution of existing residents provided the basis for extensive population changes within the State in the 1970-75 period. The Bureau of the Census provides estimates by counties. Aggregating the 1975 county estimates by SDHPT districts points to a marked population increase over the five-year period in almost all cases (see Figure 13).

Further, population is becoming continually more concentrated in large urban regions, as can be noted for SDHPT Districts 13, 18, 15, and 14 (con-

taining the metropolitan areas of Houston, Dallas, San Antonio, and Austin, respectively). Nevertheless, it should be re-emphasized that the counties contiguous to the actual SMSA boundaries also are accounting for this growth rate in the large urban regions. These two trends--the continued population increase in metropolitan areas and the further dispersal of the population in major urban centers--are undoubtedly related to residential preference patterns of Texas residents, as well as the many exogeneous factors that have created these preferences.

While Figure 13 is concerned with population growth by SDHPT districts in an absolute sense, assessment of the estimated percentage change in district populations between 1970 and 1975 provides a somewhat different picture (see Figure 14). Only Districts 14 and 21 show a pronounced increase proportionate to the 1970 population--20 percent or greater in five years. Thus, in terms of the impact on transportation facilities, SDHPT facilities and personnel in Districts 21 and 14 should evidence greater strain in meeting the travel needs and capacity demands of such a large proportionate increase in population relative to other districts, unless these growth patterns were predicted earlier and facilities improved to meet the potential demand.

Assimilation of newcomers providing an estimated 10 to 19.9 percent population increase between 1970-1975 has been observed in one-third of the SDHPT districts, including Districts 9, 10, 11, 12, 15, 17, 22, and 24. An estimated population loss was shown for only one district in the five-year period, accruing to District 25, which is the only SDHPT region that contains no large urban area.

Appendix B, Table 1, presents the U.S. Bureau of the Census figures for 1970 population, 1975 estimates, and absolute population change, as well as the percent change for all counties on an alphabetized basis for the five-year period. Table 2 in Appendix B points to absolute population change and per-

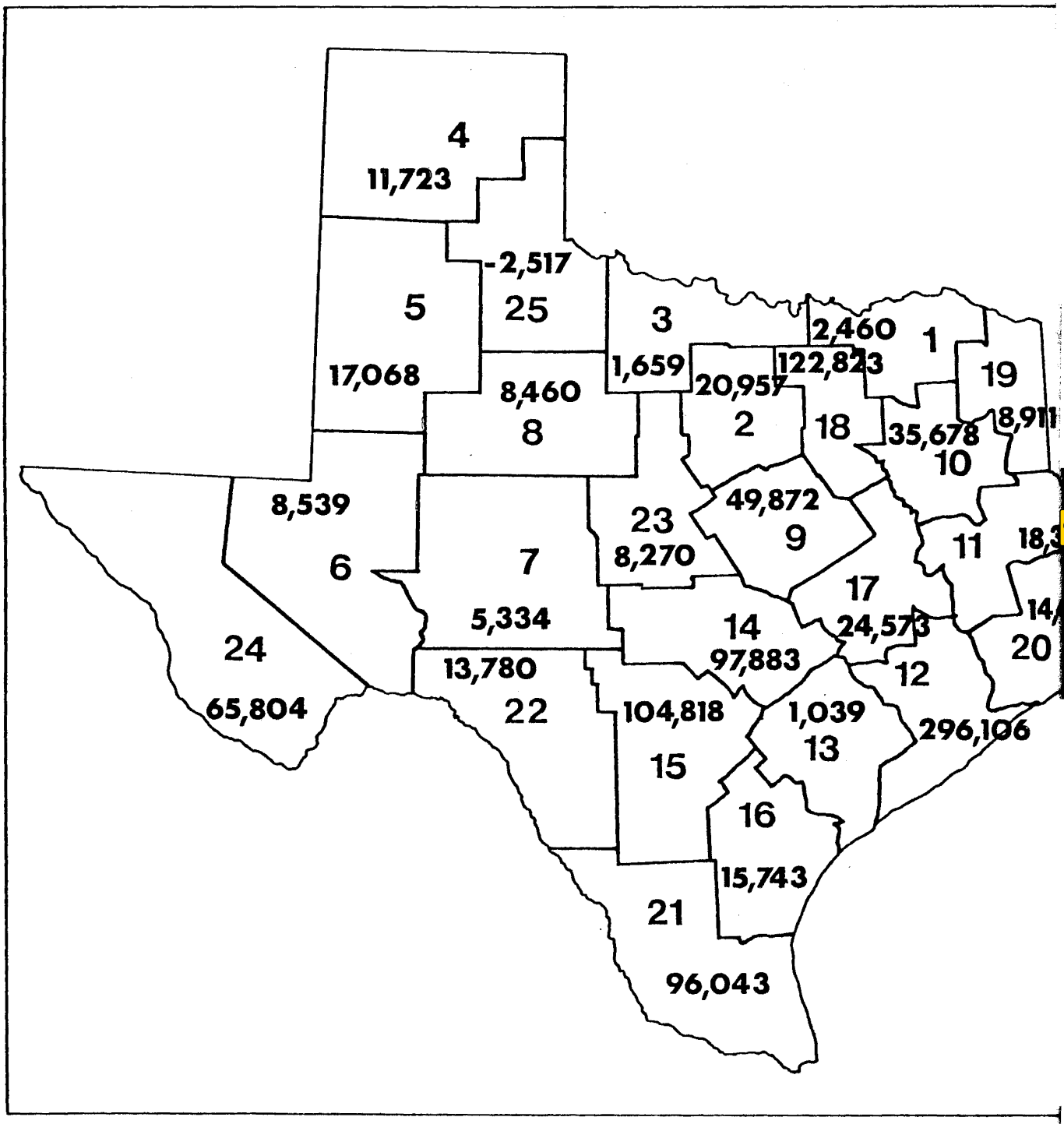

Figure 13. Population Change in Texas State Department of Highways and Public Transportation Districts, 1970-1975 (Based on U.S. Bureau of the Census County Estimates).

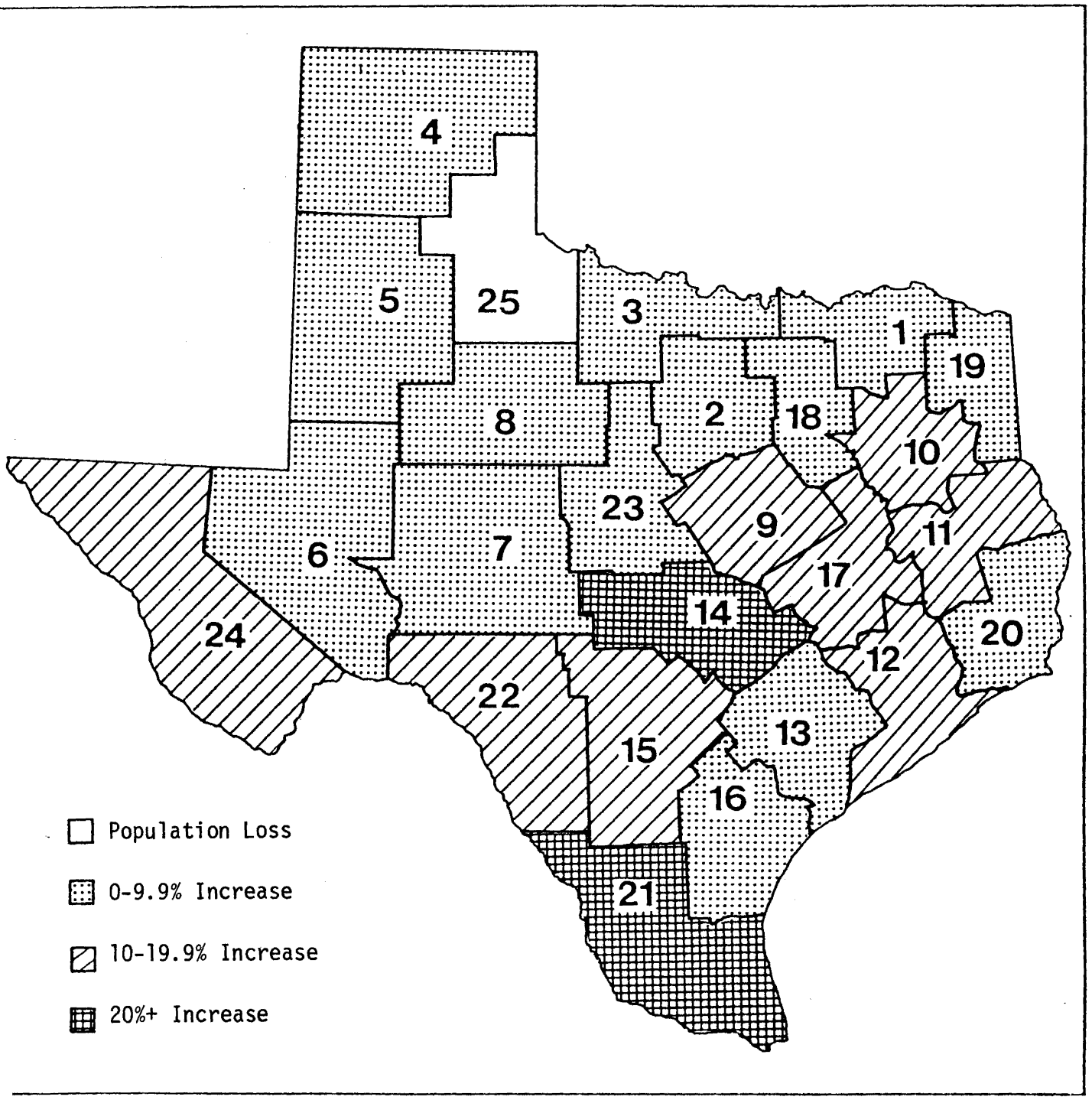

Figure 14. Estimated Percentage Change Between 1970-1975 for Texas SDHPT Districts.

centage change for counties in each SDHPT district. Finally, Table 3 provides the percentage error between 1975 county populations estimated by census tabulation and earlier population projections for 1975 derived by the Division of Planning Coordination, Office of the Governor, and the Texas Water Development Board. The average deviation for the Governor's Office figures was 2.895 for all Texas counties and 2.186 for the Water Development Board projections. Thus, the estimates shown in Figures 13 and 14 reflect rather clearly the Texas population trends from 1970 to 1975.

Population Projections for State Department of Highways and Public Transportation Districts

After a survey of the available population projections prepared by various agencies in Texas, the projections of county population prepared by the Texas Water Development Board and the Division of Planning Coordination, Office of the Governor, were selected for inclusion in this report. The reasons for selecting these two sets of projections were: (1) they are typical of the population projections prepared by planning agencies in Texas, both in the methodology used and in their estimates of future population; (2) the two sets represent distinctly different techniques for making projections; and (3) they are among the most recent projections, and are therefore probably more accurate than older projections because observed trends could be taken into account. The techniques used to prepare each set of projections are discussed in the next two sections of the report.

THE TECHNIQUES USED TO PREPARE THE TEXAS WATER DEVELOPMENT BOARD PROJECTIONS[8]

The projections of population for all Texas counties were developed in two basic steps. In step one, projections were derived to account for near-term trends in population change. In step two, these projections were used as the initial "building blocks" in the derivation of a set of longer-range projections. The final set of projections prepared for each county fully accounted for both short- and long-range trends.

Step One: Short-range Projections. Four alternative 1980 projections were made for each county, by utilizing both economic and demographic variables as predictors in multiple regression equations to produce three of the alternative sets of 1980 county projections, as well as a set of projections of 1980 county population, derived in 1972. On a county-by-county basis, the "best" projection for 1980 was chosen from the four alternatives based on professional knowledge of the areas involved. Additionally, each projection was chosen by comparing the four sets of projections with:

1. extrapolations of detailed time series data on post-censal trends in economic and demographic indicators (e.g., employment, motor vehicle registration, births, tax collections) for each county;

2. extrapolations to 1980 of current population estimates from the U.S. Bureau of the Census, Sales Management, Editor and Publisher, and Standard Rate and Data Service; and

3. comparisons with other 1980 projections (based on a variety of techniques) from the U.S. Bureau of the Census, the Population Research Center of the University of Texas at Austin, and the Office of Information Services of the Governor's Office (Texas Water Development Board, 1976:6-7).

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[8]The basic source for this presentation is: Texas Water Development Board, Economics, Water Requirements and Uses Division, Texas Water Development Board Population Projections, November, 1976.

The new 1980 projections for each county were adjusted proportionately in a 1980 State control total of 13.4 million people.[9]

Step Two: Long-range Projections. A detailed review of each county's long-range prospects was undertaken and the current population estimates, socioeconomic indicators, and county population projections listed in step one were reexamined. Additional information by county was developed and utilized. On the basis of this review, those Texas counties with changing long-range prospects were identified.

Alternative projections for 2020 were developed for each county by extrapolation of population trends indicated by the following current estimates and projections:

1. U.S. Bureau of the Census current estimates and projections through 1990;
2. Sales Management current estimates;
3. Editor and Publisher current estimates;
4. Standard Rate and Data Service current estimates; and
5. Office of Information Services projections to 1990 (Texas Water Development Board, 1976:8).

Trend extrapolation was used to make alternative projections for the year 2020. The trends derived allowed for the comparison and evaluation of a variety of assumptions about future population growth. The projections for the distant future were intended to serve as indications of the direction of long-run change rather than as precise estimates of total population for an individual county.

The alternative long-range county population projections were evaluated for each individual county by comparison with the indicators of local change

[9]"Estimates of the Population of States: July 1, 1974 and 1975," Bureau of the Census, U.S. Department of Commerce, Series P-25, No. 615 (Advance Report), November, 1975.

cited above, information on natural and institutional resources, and forecasted regional changes within the State. The projections derived for the year 2020 were utilized, along with the short-range 1980 projections, to interpolate populations of each Texas county for 1990.

THE TECHNIQUES USED TO PREPARE THE OFFICE OF THE GOVERNOR, DIVISION OF PLANNING COORDINATION, PROJECTIONS[10]

A variation of the "cohort survival-migration component method" was used to develop the Office of the Governor's population projections. For projection purposes, the total population of each county was grouped into 14 male and 14 female age groups or "cohorts." Each cohort contained the number of individuals within each five-year age span except the final age group of each sex which included the total number of persons aged 65 and over. County population data for each age group and each sex were obtained from the U.S. Population Census of 1950, 1960 and 1970.[11]

The projection procedure consisted of three major steps. The first step accounted for expected deaths by "surviving" the population of each county for a period of ten years and adjusting the totals for expected deaths during that ten-year period. That is, each cohort becomes ten years older and the number of expected deaths are deducted. For the Office of the Governor's projections, it was necessary to use the latest available United States life table to estimate the cohort survival rate of the population of each county.[12] Such an

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[10]The basic source for this presentation is: John Perrin and Herbert W. Grubb, Office of the Governor, Division of Planning Coordination, Population Projections for Texas Counties--1980 and 1990, with Interpolation for 1975 and 1985, June, 1975.

[11]U.S. Department of Commerce, Bureau of the Census, Census of Population, 1960, 1970, General Population Characteristics, Texas, PC 1 (C) 45, Washington, D.C., U.S. Government Printing Office.

[12]U.S. Department of Health, Education, and Welfare, Vital Statistics of the United States: Life Tables, Vol. II-Section 5. Washington, D.C., U.S. Government Printing Office, 1969.

approach has little effect on the validity of the projections because survival rates have shown a very slow rate of change over time and studies have shown the variation among states to be fairly small.

The second step accounted for net migration for each cohort in each county. Two alternative assumptions were specified and calculations of projected population sizes were made for each county under each assumption. These two assumptions about net migration were: (1) future net migration of Texas counties will follow migration trends of the recent past; and (2) future net migration of Texas counties will be zero. These two assumptions were selected because of the lack of high quality data pertaining to migration into and out of counties and the general interest in the relative importance of migration in the total projected population of each Texas county. Additionally, these two different assumptions also are utilized by the Bureau of the Census for state-level projections. The projected population of each county for each assumption specified above provides a basis of comparison so that planners can assess the natural change and the migration factors separately and thereby obtain measures of the relative size of each component in each county's expected future population. As emphasized by Perrin and Grubb in presenting the Office of the Governor's projections (1975), the trends in each factor are important in planning local area programs of public service. The underlying economic and personal preference factors which affect migration are the indicators to which much of the public sector planning attention may be directed.

Each county's net migration was used to project future net migration, based on average migration rates for each cohort over the past two decades. The projected net migration for each cohort was added to the estimated survived population of each cohort to obtain the total projection for each cohort 10 years old and over.

The third step accounted for the births during the projection period. Persons born during the 1970-80 projection period will be in the 0-4 and 5-9 year-old cohorts at the end of this period. The number of individuals in the 0-4 and 5-9 year-old cohorts was expressed as a function of the projected number of females in the reproductive age range--ages 15 to 49. For each county the number of males in the age groups 0-5 and 5-9, and the number of females in the age groups 0-4 and 5-9, were determined and compared to the number of females in the age group 15-49. Children per woman ratios for the four groups (ages 0-4 and 5-9, both male and female) were calculated for each county based on 1970 census data. Each of these ratios was then multiplied by the projected number of females 15-49 years old in 1980. The fertility assumption was that the 1970 ratio of males and females aged 0-4 and 5-9 to females aged 15-49 should remain constant throughout the projection period. As an end result, the total population projection for each county was obtained by summing the projections for all cohorts.

Examination of State Department of Highways and Public Transportation District Population Projections

Two sets of projections for the 1970-80 decade for SDHPT districts are presented in Figures 15 and 16. Based on projections derived on a county basis by the Governor's Office and the Water Development Board, each set utilizes different assumptions about births, deaths, and migration patterns of the Texas population, as noted earlier. The Water Development Board projections (Figure 15) point to at least a 20 percent increase in population along the IH-35 corridor, encompassing Districts 2, 18, 9, 14, and 15. Additionally, greater than 20 percent increases are projected for Districts 12, 24, and 25. With the exception of District 25 (which is not depicted as a growth region according to the Governor's Office projections), the remaining

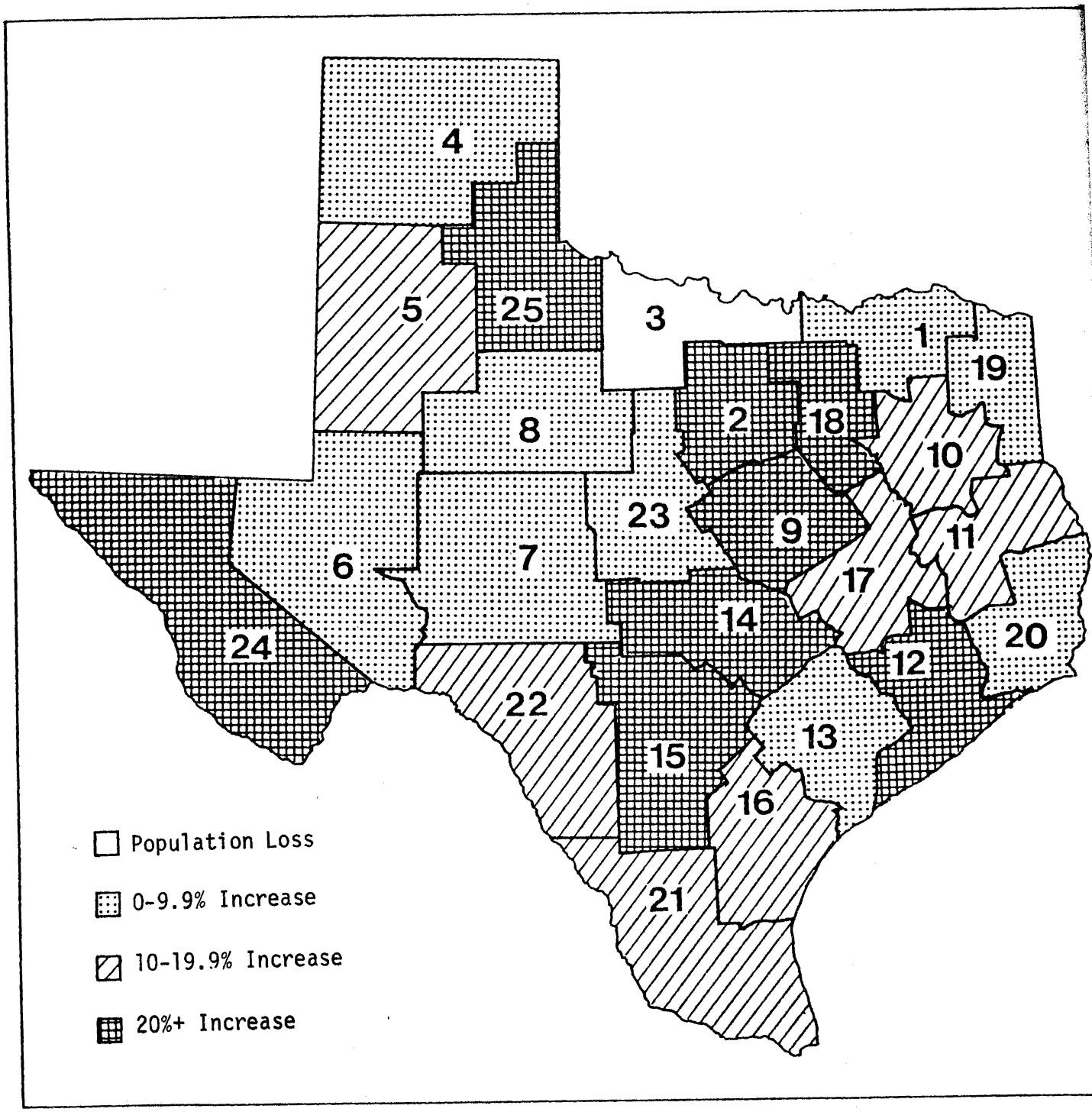

Figure 15. Percent Change Projected Between 1970-1980 for Texas SDHPT Districts (Based on county projections prepared by the Texas Water Development Board).

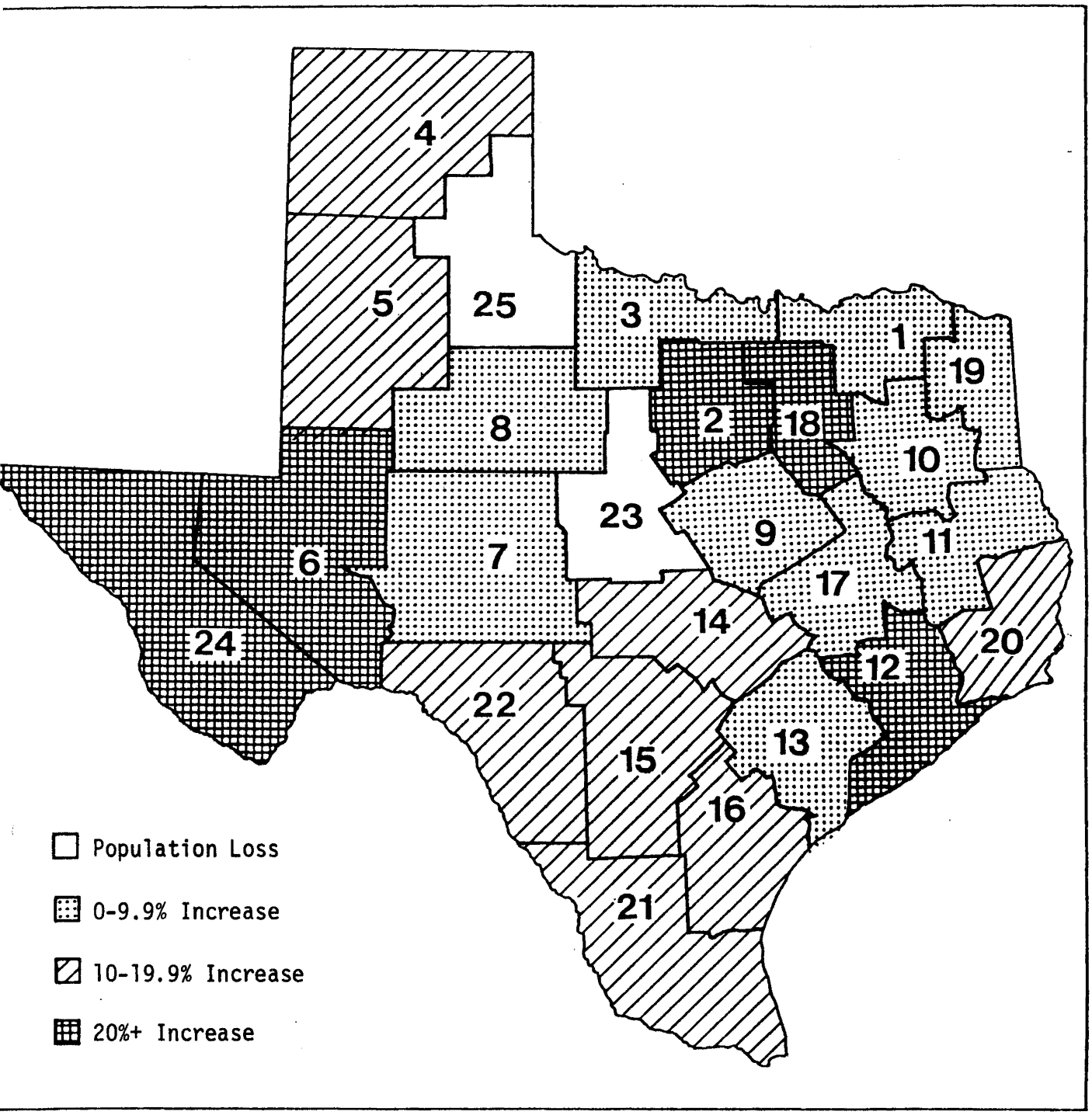

Figure 16. Percent Change Projected Between 1970-1980 for Texas SDHPT Districts (Based on county projections prepared by the Governor's Office).

seven districts contain major urban centers. Further, these regions (Districts 2, 9, 12, 14, 15, 18, and 24) averaged a 108,000 increase in population between 1970 and 1975, further validating the 1970-80 projections described by the Water Development Board on a county basis.

The Governor's Office projections for the 1970-80 decade (in Figure 16) show fewer SDHPT Districts increasing population by 20 percent or greater. Only five regions (Districts 2, 6, 12, 18 and 24) show at least a twenty percent projected increase compared to eight districts from the Water Development Board's projections. Further, District 6 was shown in the Water Development Board projections as having less than a 10 percent population increase by 1980.

One basis for the disparity lies in the underlying assumptions with one projection procedure utilizing both economic and demographic input variables and the other the cohort survival-migration component method. These approaches have been discussed earlier in detail. Additionally, in comparing the two sets of projections through interpolation to 1975 Bureau of the Census estimates, it was found that both the Governor's Office and the Water Development Board projections predicted a net underenumeration of county populations--2.895 and 2.186, respectively. However, the Governor's Office showed the greater undercount, with 2.895 net deviation and a 8.420 absolute deviation. This greater underestimation for the Governor's Office estimates also explains the smaller number of SDHPT districts predicted to incur at least a twenty percent growth rate. The less pronounced net deviation for the Water Development Board estimates (between 1975 Census figures and 1975 Board interpolations) point to this agency as providing more accurate projections to date than the Governor's Office derivations.

Another readily observable disparity in the two sets of 1970-80 projections revolves around the SDHPT Districts with predicted population losses. The one region projected by the Water Development Board to show a net loss between

1970-80 was District 3, while two areas (Districts 23 and 25) show projected losses by the Governor's Office. In all three cases, the districts contain no cities over 100,000 population.

The 1980-90 projections must, by virtue of the inflexibility of the underlying assumptions, evidence less validity and provide only rough indicators of expected future trends. The two sets of projections for the decade of the 1980s, depicted in Figures 17 and 18, point to a slowing of population growth in SDHPT Districts. The Governor's Office shows only District 24 as evidencing at least a twenty percent increase in population, based on the expected fertility rate and continued migration stream to this area. Only two districts are projected by both the Governor's Office and the Water Development Board to continue declining in population, Districts 23 and 25. Both sets of 1980-90 projections show the majority of SDHPT Districts increasing at a 10 to 19.9 percent growth rate and imply less radical redistribution of the Texas population than has been evidenced for 1970-75 and projected for the 1970s overall.

Table 1 in Appendix B details the actual, estimated, and projected populations for Texas counties based on 1970, 1975, 1980, and 1990 time periods. Table 2 in Appendix B utilizes the same time frames, but provides estimated and projected changes in populations of Texas counties compiled according to SDHPT Districts.

Population Trends in State Department of Highways and Public Transportation Districts and the Impact on Transportation Facilities

Districts in Northwestern portions of the State evidencing and anticipating population losses reflect a lessened demand for transport facilities, at least for travel by residents indigeneous to these areas, while the seven districts (Districts 2, 9, 12, 14, 15, 18, and 24) which have shown an average

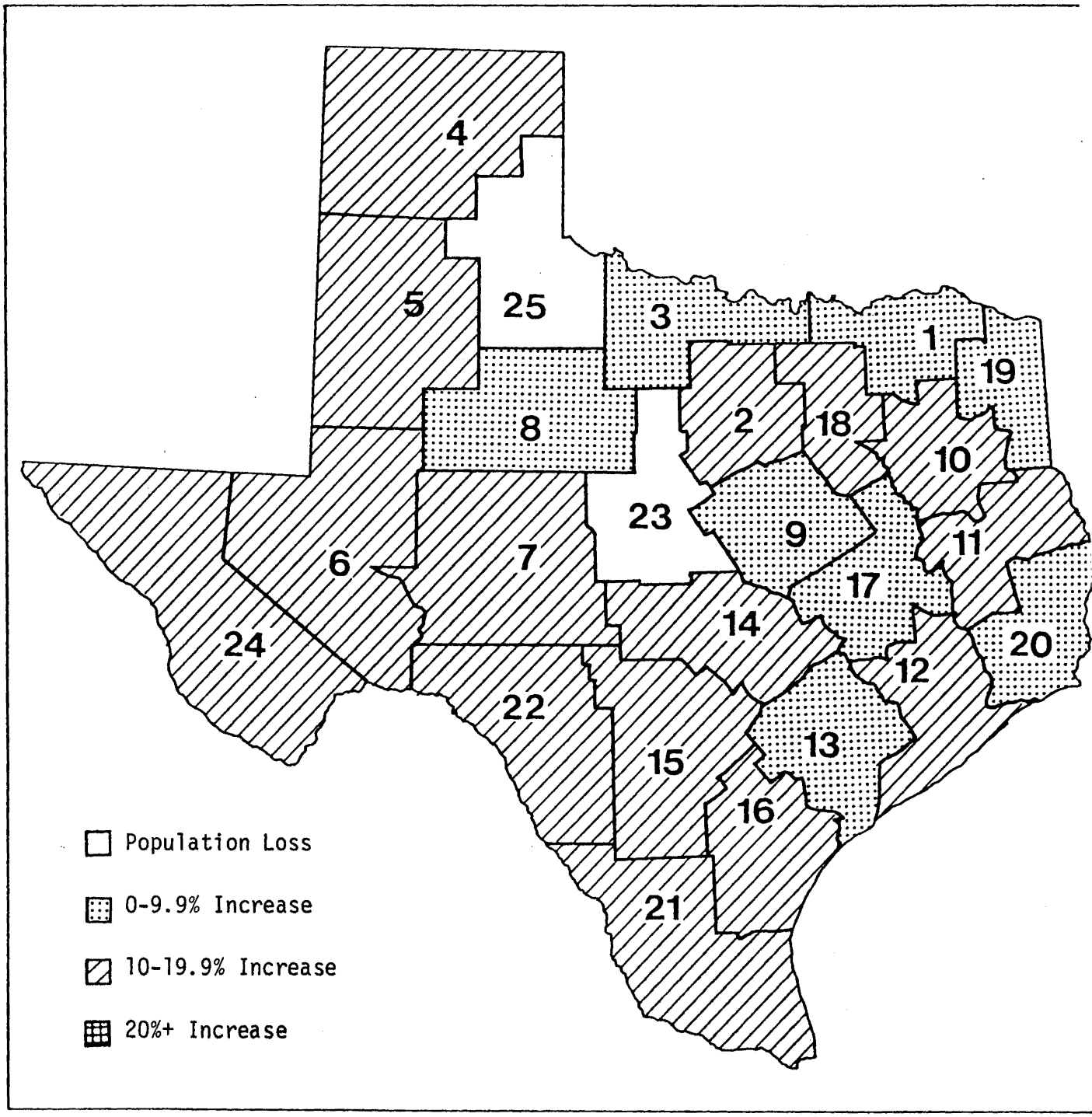

Figure 17. Percent Change Projected Between 1980-1990 for Texas SDHPT Districts (Based on county projections prepared by the Texas Water Development Board).

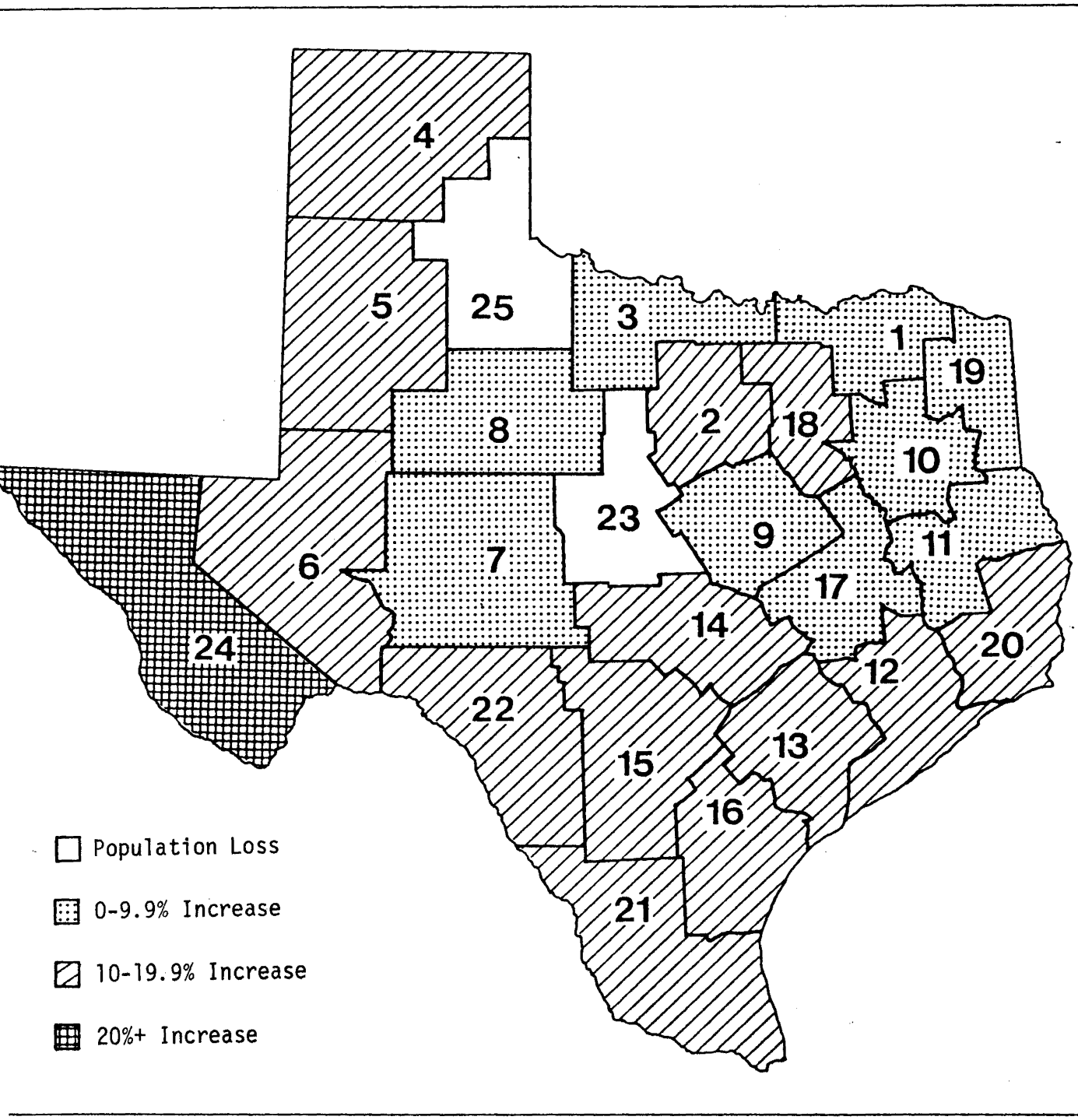

Figure 18. Percent Change Projected Between 1980-1990 for Texas SDHPT Districts (Based on county projections prepared by the Governor's Office).

absolute population increase of 108,000 have a pronounced need for improved transportation services to even maintain existent levels of accessibility. These seven districts, as well as Districts 6 and 24, were described as high growth areas in terms of percent of population changes currently observed, and expected population increases. In many instances, the percent change in population by district is a more accurate indication of the impact on existing transportation facilities, rather than the absolute figures for population increase. In instances where projected high growth areas have not been incorporated into transportation plans and improved roadway and transit services provided in advance of the actual increase, a two percent increment per year in population can have adverse effects upon the ability of transportation agencies to meet transport demands in an ex post facto manner (Campbell, 1977). With a two percent per year increase, the population doubles in 35 years; with a three percent yearly growth rate, a doubling of the population is evidenced in 24 years. In SDHPT districts with major metropolitan centers, a doubling of the population represents a pronounced population impact on public services in terms of the actual numbers of residents to be served. As Rex R. Campbell has emphasized, if transportation facilities are already overloaded in high growth areas, then further population increases present an even more formidable problem.

The 1970s in Texas should yield a marked re-distribution of residents within the State, precipitated by both in-migrants to the State as well as the changing socioeconomic conditions in specific areas and changing residential preference patterns of Texans. In order for agencies to meet increased capacity demands, facilities must be improved and altered based on shifting population patterns and vehicular travel estimates and forecasts.

CHAPTER VI

IMPLICATIONS OF TEXAS POPULATION TRENDS FOR STRATEGIC TRANSPORTATION PLANNING

An outstanding characteristic of Texans is their dependence on public transportation facilities, in the form of highways, freeways, streets, and mass transit, to move them long distances for daily activities. Just as notable is the fact that Texas is evidencing the third highest growth rate of the fifty states, with a continuous and substantial migration stream into the State further accelerating the already observable growth trends. These two features provide the basis for a transportation system that must be continually maintained and improved simply to keep equilibrium.

A brief review of the most salient historical population patterns in the State point to the following trends:

- The population of Texas doubled between 1940 and 1970, reaching 11,200,000 persons.
- In 1940, there was an average of 24.3 persons per square mile of land area; this figure also doubled to an average of 42.7 persons per square mile.
- In 1970, the State's population had increased to 5.5 percent of the total United States population--over one-twentieth of the nation's residents.
- The actual number of elderly persons in Texas almost tripled between 1940 and 1970, increasing from five percent of the total population to nine percent in 1970.

These historical trends provide a basis for reflection regarding current and future interdependencies between transportation facilities and population patterns. Strategic transportation planning is evolving as a necessity because of the need to make more efficient use of transport facilities and to coordinate planning across modes for more effectively serving a rapidly growing public. Since 1970, a formidable migration stream into Texas, and the

South generally, has preciptated the following patterns:

- Dividing the nation into four regions, the South has evidenced a greater population increase than the Northeast, Northwest, and West combined.
- Texas population alone increased by 9.3 percent between 1970 and 1975 to an estimated 12,237,000. If this trend continues, the 1980 population will be 13,371,600.
- The positive migration stream accounted for 51 percent of the State's population growth between 1973-76, the latest period for which data is available.
- The number of persons currently moving into Texas is 10 times greater per year than it was in the 1950-60 decade.

Residential mobility within the State has re-distributed the population to a pronounced degree, as reflected in the following patterns:

I. Texas is consistently gaining in metropolitan population, with an estimated increase from 67 percent in 1970 to 72 percent in 1975. Thus, Texas contains highly populated "catchment areas" and there is evidence of greater numbers of metropolitan residents for the next two decades.

II. A radical departure in population trends for non-metropolitan counties is being evidenced in the 1970s, for many are in a history-making growth phase. Almost a five percent population loss for the counties was shown in the 1960-70 decade, whereas an expected eight percent increase is anticipated for the 1970-80 decade. Interestingly, 65 percent of the Texas non-metropolitan counties showing population increases are adjacent to existing metropolitan areas (SMSAs).

III. Household size is decreasing significantly with new household formations and new dwelling units required. The average size of households in the United States was 2.9 persons in 1975 while in the early 1960s the average size was 3.3. Primary individuals (those persons who live alone or with non-relatives) represented less than one-fourth of the total number of households in 1975, yet they accounted for nearly one-half of the total increase in households in 1975.

Impacts of Population Trends on Transportation

These three trends point to important patterns of population redistribution in Texas. The first two trends--the continuing growth of metropolitan areas, with the increase of population in non-metropolitan counties primarily contiguous to SMSAs--suggest that highway/freeway systems in and around the 25 metropolitan areas in Texas are receiving greater levels of usage, both in the movement of people and of goods and services. Without extended energy shortages, continued population dispersal around major urban centers in Texas appears to be probable. This deconcentration near large urban centers is based on the residential preference patterns of Texans, as well as exogeneous socio-economic trends. If roadways are improved in and around the major urban centers, the dispersal process should become accelerated. Further, with the potentital for developing more energy-efficient automobiles, this deconcentration of residents will be augmented. However, one consequence of the dispersion trends in the State may be the creation of the "continuous cities" that in-migrants from the North and East have moved to Texas to escape. A slowing of the dispersal trends could be evidenced if housing and land development costs discourage continued deconcentration and sprawl.

Obviously a high concentration of Texas population in specific urban centers has had a significant relationship to higher road density in the past. Increased population density for a particular areas has a basic economic benefit in terms of roadway construction and usage; likewise, the more dispersed the population in a given geographic area, the more cost per person to construct a transport facility. Thus, the benefits relative to costs of highway/freeways systems are lower with a dispersed population. Additionally, with increased areal dispersion throughout urban regions, mass transit becomes a

less feasible alternative transportation mode, especially in the suburban and rural-urban fringe portions of urban areas.

While residents are becoming more dispersed in metropolitan regions, the average density or persons per square mile throughout the State is increasing, based on the population growth rates described earlier. Furthermore, there has been an unprecedented increase in new household formations such that the household growth rate for Texas is almost twice the current rate of population growth in the State. The magnitude of this increase is especially significant considering that Texas is the third fastest growing state nationally with an expected increase of over 1,000,000 residents in the decade of the 1970s. Finally, the unprecedented increase in households of primary individuals decreases the dependency of these single persons on family members or friends for transportation. Persons in such household arrangements will either precipitate an increase in private vehicles or accelerate the demand for transit accessibility.

In evaluating the population estimates and projections for SDHPT districts, re-distribution trends can be specifically documented. The implications for transportation planning and directions for seeking improvements in transport facilities can be discerned more thoroughly with the consideration of SDHPT district population trends. A brief summary of these district population changes, current and projected, is presented below.

POPULATION ESTIMATES FOR SDHPT DISTRICTS

I. Aggregating the 1975 county estimates by SDHPT districts points to a marked population increase over the 1970-75 period in almost all cases. District 25 which is the only SDHPT district that contains no large urban area, was the only district showing a population loss in the five-year period.

II. The Texas population is becoming continually more concentrated in the large urban regions, especially Districts 12, 18, 15, and 14 (containing the cities of Houston, Dallas, San Antonio, and Austin, respectively), which are listed in order of absolute population increases.

III. Districts 2, 9, 12, 14, 15, 18, and 24 have shown an average absolute population increase of 108,000 between 1970-75.

IV. Assessment of the estimated percentage change in district populations provides a somewhat different picture. Districts 14 and 21 show at least a twenty percent population increase in five years, while one-third of the SDHPT districts (Districts 9, 10,11, 12, 15, 17, 22, and 24) had an estimated 10 to 19.9 percent increase.

POPULATION PROJECTIONS FOR SDHPT DISTRICTS

I. District 3 shows an expected population loss by the Water Development Board 1970-80 projections, whereas District 23 is the only region showing such a loss over the 1970 decade according to the Governor's Office projections.

II. In the 1980-90 decade, two regions, Districts 23 and 25, show an anticipated loss of population according to both sets of projections.

III. For the 1970s, Water Development Board projections point to at least a twenty percent increase in population along the IH-35 corridor, encompassing Districts 2, 18, 9, 14, and 15. Additionally, greater than twenty percent increases are projected for Districts 12, 24, and 25. With the exception of District 25 (which is not depicted as a growth region according to the Governor's Office projections), the remaining seven districts contain major urban centers.

IV. In the 1980-90 decade, no SDHPT districts are projected to have a twenty percent or greater population change by the Water Development Board;

however, the Governor's Office points to District 24 as evidencing at least a twenty percent increase in the 1980s.

V. In the case of both sets of projections, the 1980s are viewed as a decade of 10.0 to 19.9 percent population increases in the majority of SDHPT districts, with less disparity among districts in terms of population growth patterns.

Strategic Transportation Planning and Population Trends

Because of the large amounts of funding involved in providing public transportation, there is a strong need to have accurate information regarding the trends in the numbers of people to be served in each region of the State. For the most part, state and local governments have evidenced great difficulty in systematically predicting population growth trends and responding with increased service. Further, funding is often available for only ex post facto alterations and improvements in service. Nevertheless, given a suitable time frame, service improvements should be aimed at meeting the growing public facility demands--including transportation--in those districts and urban areas where projected population increases are the most pronounced.

Because of the high rates of current and anticipated population increase in Texas and the population re-distribution in the State, it is recommended that more specific strategies be undertaken to establish transportation plans that are compatable with these population changes. Such strategic transportation planning emphasizes the following features:

I. *Incremental or trend planning*--an examination of existing and projected future population trends for baseline state level planning.

II. *Growth allocation models*--the examination of population levels, current and anticipated, (a) for input into traffic forecasting models; (b) to test alternative regional plans; and (c) for allocation of funding.

III. *A strong data base to objectify transportation planning statewide* for assessment of migration patterns both within the State and of newcomers to Texas, and for evaluating prime locations of new household formations, changing age structure, and other population indicators.

IV. *A consistent data base across SDHPT districts*--rather than having no comparable information regarding trends for districts, the preceeding item (III) provides the capability for obtaining population data for comparison purposes.

V. *A yearly limited statewide survey* to provide information regarding population shifts and transportation needs.

To strategically plan for transportation facilities, there is a continual need to have access to yearly population estimates and projections obtained for the State, as well as for SDHPT districts. Urban Transportation Plans undertaken by many district offices are extremely useful at the district level in providing population estimates and predicted population trends. Nevertheless, the comparability of such data sources across districts often is problematic, because data sources and data gathering procedures are markedly different. The procurement of data tapes such as the Brown-Hines Human Resources Profile tape for measuring migration patterns within the State would prove useful. Additionally, the Continuous Work History Sample, provided from Social Security files, measures changes in the labor force and

concomitant population and economic trends in the State. Finally, the Dualabs Census Tapes provide a needed data base to be used by state transportation planners for two-way comparisons of population and housing characteristics that cannot be obtained from published census accounts. These three data sources are in current use by various state agencies and university-based researchers in Texas and could be readily obtained by the State Department of Highways and Public Transportation. Data sources such as these provide a means of maintaining current information regarding Texas population trends and provide an approach for more efficiently incorporating population estimates and projections into the planning process. Growth allocation formulas can be derived from this data and included in district transportation planning and in traffic forecasting models. In addition, yearly limited surveys are needed to provide representative information across the State regarding the movement of households and re-distribution trends.[14]

There has been a growing emphasis on assessing objectively the public's demands for transportation facilities (Project Committee on Urban Transportation Planning, 1977). Strategic transportation planning is necessary in high growth states and in subregions of these states to meet the increasing population needs and demands for improved transport facilities. With a strong data base, at both the state and district levels, trend planning can be undertaken and growth allocation models utilized more fully for adequate transportation service provision.

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[14]Further, personal transportation plans can be assessed (such as vehicle purchase plans and plans for energy conservation). Information also can be obtained on attitudes toward further expenditures for highways, mass transit, and other public transportation expenditures.

APPENDIX A

PERCENT AND ABSOLUTE POPULATION CHANGE FOR TEXAS COUNTIES, 1970 TO 1975

APPENDIX A

Table 1. Estimated Population of Texas Counties, 1970 and 1975, and Changes in County Population, 1970 to 1975.

	County	Population			
		July 1, 1975	April 1, 1970 (Census)	Change, 1970 to 1975	
				Number	Percent
1.	Anderson	31,244	27,789	3,455	12.4
2.	Andrews	11,342	10,372	970	9.4
3.	Angelina	54,019	49,349	4,670	9.5
4.	Aransas	10,507	8,902	1,605	18.0
5.	Archer	6,271	5,759	512	8.9
6.	Armstrong	1,874	1,895	-21	-1.1
7.	Atascosa	20,266	18,696	1,570	8.4
8.	Austin	15,194	13,831	1,363	9.9
9.	Bailey	8,369	8,487	-118	-1.4
10.	Bandera	6,420	4,747	1,673	35.2
11.	Bastrop	20,002	17,297	2,705	15.6
12.	Baylor	4,970	5,221	-251	-4.8
13.	Bee	23,577	22,737	840	3.7
14.	Bell	156,781	124,483	32,298	25.9
15.	Bexar	912,934	830,460	82,474	9.9
16.	Blanco	4,257	3,567	690	19.3
17.	Borden	781	888	-107	-12.0
18.	Bosque	11,997	10,966	1,031	9.4
19.	Bowie	69,918	68,909	1,009	1.5
20.	Brazoria	124,380	108,312	16,068	14.8
21.	Brazos	71,251	57,978	13,273	22.9
22.	Brewster	7,867	7,780	87	1.1
23.	Briscoe	2,294	2,794	-500	-17.9
24.	Brooks	7,749	8,005	-256	-3.2
25.	Brown	30,756	25,877	4,879	18.9
26.	Burleson	10,815	9,999	816	8.2
27.	Burnet	15,706	11,420	4,286	37.5
28.	Caldwell	21,369	21,178	191	0.9

Table 1 (continued)

		Population			
		July 1, 1975	April 1, 1970 (Census)	Change, 1970 to 1975	
				Number	Percent
29.	Calhoun	17,781	17,831	-50	-0.3
30.	Callahan	9,238	8,205	1,033	12.6
31.	Cameron	176,931	140,368	36,563	26.0
32.	Camp	7,908	8,005	-97	-1.2
33.	Carson	6,238	6,358	-120	-1.9
34.	Cass	26,170	24,133	2,037	8.4
35.	Castro	10,181	10,394	-213	-2.0
36.	Chambers	13,159	12,187	972	8.0
37.	Cherokee	33,597	32,008	1,589	5.0
38.	Childress	6,440	6,605	-165	-2.5
39.	Clay	8,363	8,079	284	3.5
40.	Cochran	5,004	5,326	-322	-6.0
41.	Coke	3,381	3,087	294	9.5
42.	Coleman	10,005	10,288	-283	-2.8
43.	Collin	94,613	66,920	27,693	41.4
44.	Collingsworth	4,371	4,755	-384	-8.1
45.	Colorado	16,863	17,638	-775	-4.4
46.	Comal	29,478	24,165	5,313	22.0
47.	Comanche	12,052	11,898	154	1.3
48.	Concho	2,805	2,937	-132	-4.5
49.	Cooke	25,106	23,471	1,635	7.0
50.	Coryell	44,590	35,311	9,279	26.3
51.	Cottle	2,999	3,204	-205	-6.4
52.	Crane	4,085	4,172	-87	-2.1
53.	Crockett	4,304	3,885	419	10.8
54.	Crosby	8,969	9,085	-116	-1.3
55.	Culberson	3,485	3,429	56	1.6
56.	Dallam	6,533	6,012	521	8.7
57.	Dallas	1,388,615	1,327,695	60,920	4.6

Table 1 (continued)

		Population			
		July 1, 1975	April 1, 1970 (Census)	Change, 1970 to 1975	
				Number	Percent
58.	Dawson	16,030	16,604	-574	-3.5
59.	Deaf Smith	19,229	18,999	230	1.2
60.	Delta	4,717	4,927	-210	-4.3
61.	Denton	97,410	75,633	21,777	28.8
62.	De Witt	18,382	18,660	-278	-1.5
63.	Dickens	3,476	3,737	-261	-7.0
64.	Dimmit	10,881	9,039	1,842	20.4
65.	Donley	3,857	3,641	216	5.9
66.	Duval	12,161	11,722	439	3.7
67.	Eastland	18,276	18,092	184	1.0
68.	Ector	97,460	92,660	4,800	5.2
69.	Edwards	2,025	2,107	-82	-3.9
70.	Ellis	51,872	46,638	5,234	11.2
71.	El Paso	424,479	359,291	65,188	18.1
72.	Erath	19,312	18,141	1,171	6.5
73.	Falls	16,497	17,300	-803	-4.6
74.	Fannin	23,246	22,705	541	2.4
75.	Fayette	17,048	17,650	-602	-3.4
76.	Fisher	5,858	6,344	-486	-7.7
77.	Floyd	10,787	11,044	-257	-2.3
78.	Foard	2,244	2,211	33	1.5
79.	Fort Bend	76,245	52,314	23,931	45.7
80.	Franklin	6,180	5,291	889	16.8
81.	Freestone	11,924	11,116	808	7.3
82.	Frio	12,398	11,159	1,239	11.1
83.	Gaines	11,288	11,593	-305	-2.6
84.	Galveston	183,244	169,812	13,432	7.9
85.	Garza	5,258	5,289	-31	-0.6
86.	Gillespie	11,335	10,553	782	7.4
87.	Glasscock	1,132	1,155	-23	-2.0

Table 1 (continued)

		Population			
		July 1, 1975	April 1, 1970 (Census)	Change, 1970 to 1975	
				Number	Percent
88.	Goliad	4,858	4,869	-11	-0.2
89.	Gonzales	16,342	16,375	-33	-0.2
90.	Gray	25,144	26,949	-1,805	-6.7
91.	Grayson	78,831	83,225	-4,394	-5.3
92.	Gregg	81,798	75,929	5,869	7.7
93.	Grimes	12,249	11,855	394	3.3
94.	Guadalupe	39,154	33,554	5,600	16.7
95.	Hale	35,732	34,137	1,595	4.7
96.	Hall	6,385	6,015	370	6.2
97.	Hamilton	7,579	7,198	381	5.3
98.	Hansford	6,006	6,351	-345	-5.4
99.	Hardeman	6,315	6,795	-480	-7.1
100.	Hardin	34,085	29,996	4,089	13.6
101.	Harris	1,944,431	1,741,912	202,519	11.6
102.	Harrison	44,359	44,841	-482	-1.1
103.	Hartley	3,012	2,782	230	8.3
104.	Haskell	7,859	8,512	-653	-7.7
105.	Hays	35,052	27,642	7,410	26.8
106.	Hemphill	3,793	3,084	709	23.0
107.	Henderson	30,675	26,466	4,209	15.9
108.	Hidalgo	227,853	181,535	46,318	25.5
109.	Hill	22,838	22,596	242	1.1
110.	Hockley	21,052	20,396	656	3.2
111.	Hood	10,308	6,368	3,940	61.9
112.	Hopkins	21,662	20,710	952	4.6
113.	Houston	17,932	17,855	77	0.4
114.	Howard	38,170	37,796	374	1.0
115.	Hudspeth	2,968	2,392	576	24.1
116.	Hunt	49,367	47,948	1,419	3.0
117.	Hutchinson	24,810	24,443	367	1.5

Table 1 (continued)

		Population			
		July 1, 1975	April 1, 1970 (Census)	Change, 1970 to 1975	
				Number	Percent
118.	Irion	1,099	1,070	29	2.7
119.	Jack	6,308	6,711	-403	-6.0
120.	Jackson	12,565	12,975	-410	-3.2
121.	Jasper	26,587	24,692	1,895	7.7
122.	Jess Davis	1,456	1,527	-71	-4.6
123.	Jefferson	241,246	246,402	-5,156	-2.1
124.	Jim Hogg	4,804	4,654	150	3.2
125.	Jim Wells	33,919	33,032	887	2.7
126.	Johnson	55,564	45,769	9,795	21.4
127.	Jones	15,989	16,106	-117	-0.7
128.	Karnes	12,955	13,462	-507	-3.8
129.	Kaufman	36,209	32,392	3,817	11.8
130.	Kendall	8,818	6,964	1,854	26.6
131.	Kenedy	604	678	-74	-10.9
132.	Kent	1,248	1,434	-186	-13.0
133.	Kerr	21,707	19,454	2,253	11.6
134.	Kimble	4,111	3,904	207	5.3
135.	King	420	464	-44	-9.5
136.	Kinney	2,253	2,006	247	12.3
137.	Kleberg	32,823	33,166	-343	-1.0
138.	Knox	5,596	5,972	-376	-6.3
139.	Lamar	38,221	36,062	2,159	6.0
140.	Lamb	16,992	17,770	-778	-4.4
141.	Lampasas	12,577	9,323	3,254	34.9
142.	La Salle	5,456	5,014	442	8.8
143.	Lavaca	17,243	17,903	-660	-3.7
144.	Lee	9,558	8,048	1,510	18.8
145.	Leon	8,777	8,738	39	0.4
146.	Liberty	38,441	33,014	5,427	16.4
147.	Limestone	18,830	18,100	730	4.0

Table 1 (continued)

		Population			
		July 1, 1975	April 1, 1970 (Census)	Change, 1970 to 1975	
				Number	Percent
148.	Lipscomb	3,376	3,486	-110	-3.2
149.	Live Oak	6,453	6,697	-244	-3.6
150.	Llano	8,696	6,979	1,717	24.6
151.	Loving	114	164	-50	-30.5
152.	Lubbock	197,248	179,295	17,953	10.0
153.	Lynn	8,841	9,107	-266	-2.9
154.	McCullock	8,375	8,571	-196	-2.3
155.	McLennan	154,267	147,553	6,714	4.6
156.	McMullen	853	1,095	-242	-22.1
157.	Madison	8,521	7,693	828	10.8
158.	Marion	7,638	8,517	-879	-10.3
159.	Martin	4,791	4,774	17	0.4
160.	Mason	3,462	3,356	106	3.2
161.	Matagorda	27,720	27,913	-193	-0.7
162.	Maverick	22,164	18,093	4,071	22.5
163.	Medina	21,970	20,249	1,721	8.5
164.	Menard	2,515	2,646	-131	-5.0
165.	Midland	69,214	65,443	3,781	5.8
166.	Milam	20,114	20,028	86	0.4
167.	Mills	4,225	4,212	13	0.3
168.	Mitchell	8,853	9,073	-220	-2.4
169.	Montague	16,354	15,326	1,028	6.7
170.	Montgomery	87,213	49,479	37,734	76.3
171.	Moore	14,037	14,060	-23	-0.2
172.	Morris	13,130	12,310	820	6.7
173.	Motley	1,779	2,178	-399	-18.3
174.	Nacogdoches	42,519	36,362	6,157	16.9
175.	Navarro	32,054	31,150	904	2.9
176.	Newton	11,892	11,657	235	2.0
177.	Nolan	15,986	16,220	-234	-1.4

Table 1 (continued)

		Population			
		July 1, 1975	April 1, 1970 (Census)	Change, 1970 to 1975	
				Number	Percent
178.	Nueces	248,422	237,544	10,878	4.6
179.	Ochiltree	8,775	9,704	-929	-9.6
180.	Oldham	2,711	2,258	453	20.1
181.	Orange	75,190	71,170	4,020	5.6
182.	Palo Pinto	21,547	28,962	-7,415	-25.6
183.	Panola	16,628	15,894	734	4.6
184.	Parker	33,629	33,888	-259	-0.8
185.	Parmer	10,302	10,509	-207	-2.0
186.	Pecos	13,448	13,748	-300	-2.2
187.	Polk	18,420	14,457	3,963	27.4
188.	Potter	93,462	90,511	2,951	3.3
189.	Presidio	4,810	4,842	-32	-0.7
190.	Rains	4,412	3,752	660	17.6
191.	Randall	63,542	53,885	9,657	17.9
192.	Reagan	3,452	3,239	213	6.6
193.	Real	2,339	2,013	326	16.2
194.	Red River	14,742	14,298	444	3.1
195.	Reeves	16,272	16,526	-254	-1.5
196.	Refugio	9,052	9,494	-442	-4.7
197.	Roberts	1,041	967	74	7.7
198.	Robertson	14,279	14,389	-110	-0.8
199.	Rockwall	9,150	7,046	2,104	29.9
200.	Runnels	11,547	12,108	-561	-4.6
201.	Rusk	36,403	34,102	2,301	6.7
202.	Sabine	7,461	7,187	274	3.8
203.	San Augustine	8,179	7,858	321	4.1
204.	San Jacinto	8,419	6,702	1,717	25.6
205.	San Patricio	50,378	47,288	3,090	6.5
206.	San Saba	5,853	5,540	313	5.6
207.	Schleicher	2,620	2,277	343	15.1

Table 1 (continued)

		Population			
		July 1, 1975	April 1, 1970 (Census)	Change, 1970 to 1975	
				Number	Percent
208.	Scurry	17,494	15,760	1,734	11.0
209.	Shackelford	3,365	3,323	42	1.3
210.	Shelby	20,704	19,672	1,032	5.2
211.	Sherman	3,541	3,657	-116	-3.2
212.	Smith	107,597	97,096	10,501	10.8
213.	Somervell	3,071	2,793	278	10.0
214.	Starr	20,885	17,707	3,178	17.9
215.	Stephens	8,366	8,414	-48	-0.6
216.	Sterling	1,038	1,056	-18	-1.7
217.	Stonewall	2,140	2,397	-257	-10.7
218.	Sutton	4,382	3,175	1,207	38.0
219.	Swisher	10,339	10,373	-34	-0.3
220.	Tarrant	728,951	715,587	13,364	1.9
221.	Taylor	105,390	97,853	7,537	7.7
222.	Terrell	1,834	1,940	-106	-5.5
223.	Terry	14,158	14,118	40	0.3
224.	Throckmorton	2,291	2,205	86	3.9
225.	Titus	18,594	16,702	1,892	11.3
226.	Tom Green	74,534	71,047	3,487	4.9
227.	Travis	361,839	295,516	66,323	22.4
228.	Trinity	7,754	7,628	126	1.7
229.	Tyler	13,758	12,417	1,341	10.8
230.	Upshur	23,757	20,976	2,781	13.3
231.	Upton	4,463	4,697	-234	-5.0
232.	Uvalde	20,549	17,348	3,201	18.5
233.	Val Verde	31,943	27,471	4,472	16.3
234.	Van Zandt	27,252	22,155	5,097	23.0
235.	Victoria	58,108	53,766	4,342	8.1
236.	Walker	34,849	27,680	7,169	25.9
237.	Waller	15,537	14,285	1,252	8.8

Table 1 (continued)

		Population			
		July 1, 1975	April 1, 1970 (Census)	Change, 1970 to 1975	
				Number	Percent
238.	Ward	12,551	13,019	-468	-3.6
239.	Washington	20,112	18,842	1,270	6.7
240.	Webb	81,009	72,859	8,150	11.2
241.	Wharton	36,229	36,729	-500	-1.4
242.	Wheeler	6,112	6,434	-322	-5.0
243.	Wichita	119,515	120,563	-1,048	-0.9
244.	Wilbarger	15,467	15,355	112	0.7
245.	Willacy	16,849	15,570	1,279	8.2
246.	Williamson	49,468	37,305	12,163	32.6
247.	Wilson	13,961	13,041	920	7.1
248.	Winkler	9,255	9,640	-385	-4.0
249.	Wise	20,903	19,687	1,216	6.2
250.	Wood	21,196	18,589	2,607	14.0
251.	Yoakum	7,389	7,344	45	0.6
252.	Young	16,000	15,400	600	3.9
253.	Zapata	4,828	4,352	476	10.9
254.	Zavala	11,073	11,370	-297	-2.6

APPENDIX A

Table 2. Population Changes in SDHPT Districts, 1970 to 1975

	Population Change	Percent Change
District 1	2,460	1.0
Delta	-210	-4.3
Fannin	541	2.4
Franklin	889	16.8
Grayson	-4,394	-5.3
Hopkins	952	4.6
Hunt	1,419	3.0
Lamar	2,159	6.0
Rains	660	17.6
Red River	444	3.1
District 2	20,957	2.4
Erath	1,171	6.5
Hood	3,940	61.9
Jack	-403	-6.0
Johnson	9,795	21.4
Palo Pinto	-7,415	-25.6
Parker	259	-0.8
Somervell	278	10.0
Tarrant	12,634	1.8
Wise	1,216	6.2
District 3	1,659	0.8
Archer	512	8.9
Baylor	-251	-4.8
Clay	284	3.5
Cooke	1,635	7.0
Montague	1,028	6.7
Throckmorton	86	3.9
Wichita	-2,347	-1.9
Wilbarger	112	0.7
Young	600	3.9
District 4	11,723	4.3
Armstrong	-21	-1.1
Carson	-120	-1.9
Dallam	521	8.7
Deaf Smith	230	1.2
Gray	-1,805	-6.7
Hansford	-345	-5.4
Hartley	230	8.3
Hemphill	709	23.0
Hutchinson	367	1.5
Lipscomb	-110	-3.2
Moore	-23	-0.2
Ochiltree	-929	-9.6
Oldham	453	20.1
Potter	2,951	3.3
Randall	9,657	17.9
Roberts	74	7.7
Sherman	-116	-3.2
District 5	17,068	4.5
Bailey	-118	-1.4
Castro	-213	-2.0
Cochran	-322	-6.0
Crosby	-116	-1.3
Dawson	-574	-3.5
Floyd	-257	-2.3
Gaines	-305	-2.6
Garza	-31	-0.6
Hale	1,595	4.7
Hockley	656	3.2
Lamb	-778	-4.4
Lubbock	17,953	10.0
Lynn	-266	-2.9
Parmer	-207	-2.0
Swisher	-34	-0.3
Terry	40	0.3
Yoakum	45	0.6
District 6	8,539	3.6
Andrews	970	9.4
Crane	-87	-2.1
Ector	5,655	6.2
Loving	-50	-30.5
Martin	17	0.4
Midland	3,781	5.8
Pecos	-300	-2.2
Reeves	-254	-1.5
Terrell	-106	-5.5
Upton	-234	-5.0
Ward	-468	-3.6
Winkler	-385	-4.0
District 7	5,334	4.8
Coke	294	9.5
Concho	-132	-4.5
Crockett	419	10.8
Glasscock	-23	-2.0
Irion	29	2.7

Table 2 (continued)

	Population Change	Percent Change		Population Change	Percent Change
Kimble	207	5.3	Houston	77	0.4
Menard	-131	-5.0	Nacogdoches	6,157	16.9
Reagan	213	6.6	Polk	3,963	27.4
Runnels	-561	-4.6	Sabine	274	3.8
Schleicher	343	15.1	San Augustine	312	4.1
Sterling	-18	-1.7	San Jacinto	1,717	25.6
Sutton	1,207	38.0	Shelby	1,032	5.2
Tom Green	3,487	4.9	Trinity	126	1.7
District 8	8,460	3.8	District 12	296,106	13.6
Borden	-107	-12.0	Austin	1,363	9.9
Callahan	1,033	12.6	Brazoria	16,068	14.8
Fisher	-486	-7.7	Fort Bend	23,931	45.7
Haskell	-653	-7.7	Galveston	13,432	7.9
Howard	374	1.0	Harris	202,519	11.6
Jones	-117	-0.7	Matagorda	193	-0.7
Kent	-186	-13.0	Montgomery	37,734	76.3
Mitchell	-220	-2.4	Waller	1,252	8.8
Nolan	-234	-1.4			
Scurry	1,734	11.0	District 13	1,039	0.5
Shackelford	42	1.3	Calhoun	-50	-0.3
Stonewall	-257	-10.7	Colorado	-775	-4.4
Taylor	7,537	7.7	DeWitt	-278	-1.5
			Fayette	-602	-3.4
District 9	49,872	13.0	Gonzales	-28	-0.2
Bell	32,298	25.9	Jackson	-410	-3.2
Bosque	1,031	9.4	Lavaca	-660	-3.7
Coryell	9,279	26.3	Victoria	4,342	8.1
Falls	-803	-4.6	Wharton	-500	-1.4
Hamilton	381	5.3			
Hill	242	1.1	District 14	97,883	22.1
Limestone	730	4.0	Bastrop	2,705	15.6
McLennan	6,714	4.6	Blanco	690	19.3
			Burnet	4,286	37.5
District 10	35,628	10.7	Caldwell	191	0.9
Anderson	3,455	12.4	Gillespie	782	7.4
Cherokee	1,589	5.0	Hays	7,410	26.8
Gregg	5,869	7.7	Lee	1,510	18.8
Henderson	4,209	15.9	Llano	1,717	24.6
Rusk	2,301	6.7	Mason	106	3.2
Smith	10,501	10.8	Travis	66,323	22.4
Van Zandt	5,097	23.0	Williamson	12,163	32.6
Wood	2,607	14.0			
			District 15	104,818	10.6
District 11	18,377	11.0	Atascosa	1,571	8.4
Angelina	4,670	9.5	Bandera	1,673	35.2

Table 2 (continued)

	Population Change	Percent Change
Bexar	82,474	9.9
Comal	5,313	22.0
Frio	1,239	11.1
Guadalupe	5,600	16.7
Kendall	1,854	26.6
Kerr	2,253	11.6
La Salle	442	8.8
McMullen	-242	-22.1
Medina	1,721	8.5
Wilson	920	7.1
District 16	15,743	3.8
Aransas	1,605	18.0
Bee	840	3.7
Goliad	-21	-0.4
Jim Wells	887	2.7
Karnes	-507	-3.8
Kleberg	-343	-1.0
Live Oak	-244	-3.6
Nueces	10,878	4.6
Refugio	-442	-4.7
San Patricio	3,090	6.5
District 17	24,573	13.0
Brazos	13,273	22.9
Burleson	816	8.2
Freestone	808	7.3
Grimes	394	3.3
Leon	39	0.4
Madison	828	10.8
Milam	86	0.4
Robertson	-110	-0.8
Walker	7,169	25.9
Washington	1,270	6.7
District 18	24,573	7.7
Collin	27,693	41.4
Dallas	61,294	4.6
Denton	21,777	28.8
Ellis	5,234	11.2
Kaufman	3,817	11.8
Navarro	904	2.9
Rockwall	2,104	29.9
District 19	122,823	4.1
Bowie	2,105	3.1
Camp	-97	-1.2
Cass	2,037	8.4
Harrison	-482	-1.1
Marion	-879	-10.3
Morris	820	6.7
Panola	734	4.6
Titus	1,892	11.3
Upshur	2,781	13.3
District 20	14,452	3.3
Chambers	972	8.0
Hardin	4,089	13.6
Jasper	1,895	7.7
Jefferson	3,527	-1.4
Liberty	5,427	16.4
Newton	235	2.0
Orange	4,020	5.6
Tyler	1,341	10.8
District 21	96,043	21.0
Brooks	-256	-3.2
Cameron	36,563	26.0
Duval	439	3.7
Hidalgo	46,318	25.5
Jim Hogg	150	3.2
Kenedy	-74	-10.9
Starr	3,178	17.9
Webb	8,150	11.2
Willacy	1,279	8.2
Zapata	296	6.5
District 22	13,780	15.4
Dimmit	1,842	20.4
Edwards	-82	-3.9
Kinney	247	12.3
Maverick	4,071	22.5
Real	326	16.2
Uvalde	3,201	18.5
Val Verde	4,472	16.3
Zavala	-297	-2.6
District 23	8,270	8.1
Brown	4,879	18.9
Coleman	-283	-2.8
Comanche	154	1.3
Eastland	184	1.0
Lampasas	3,254	34.9
McCulloch	-196	-2.3

Table 2 (continued)

	Population Change	Percent Change
Mills	13	0.3
San Saba	313	5.6
Stephens	-48	-0.6
District 24	65,804	17.4
Brewster	87	1.1
Culberson	56	1.6
El Paso	65,188	18.1
Hudspeth	576	24.1
Jeff Davis	-71	-4.6
Presidio	-32	-0.7
District 25	-2,517	-4.6
Briscoe	-500	-17.9
Childress	-165	-2.5
Collingsworth	-384	-8.1
Cottle	-205	-6.4
Dickens	-261	-7.0
Donley	216	5.9
Foard	33	1.5
Hall	370	6.2
Hardeman	-480	-7.1
King	-44	-9.5
Knox	-376	-6.3
Motley	-399	-18.3
Wheeler	-322	-5.0

APPENDIX A

Table 3. Percentage Error Between Estimated County Population and Population Projections[1] for 1975.

County	Projection			County	Projection	
	Texas Water Development Board (percent)	Division of Planning Coordination (percent)			Texas Water Development Board (percent)	Division of Planning Coordination (percent)
nderson	5.8	12.3	31.	Cameron	13.1	15.6
ndrews	6.2	-4.7	32.	Camp	-4.4	-1.2
ngelina	-0.6	2.5	33.	Carson	-0.7	-1.8
ransas	2.9	7.5	34.	Cass	1.9	7.3
rcher	10.2	9.2	35.	Castro	-5.6	-17.3
rmstrong	1.4	1.7	36.	Chambers	-2.5	0.4
tascosa	4.8	5.3	37.	Cherokee	-1.8	7.2
ustin	3.8	10.3	38.	Childress	2.9	4.7
ailey	-1.5	-6.5	39.	Clay	4.5	5.8
andera	17.1	26.8	40.	Cochran	-4.2	-10.0
astrop	4.3	13.9	41.	Coke	14.4	12.0
aylor	-1.8	-0.4	42.	Coleman	1.1	3.7
ee	-2.5	1.4	43.	Collin	12.0	20.0
ell	0.0	17.5	44.	Collingsworth	-0.1	-1.5
exar	-3.1	1.3	45.	Colorado	-4.5	-4.5
lanco	5.3	18.2	46.	Comal	4.2	13.9
orden	-14.5	-13.2	47.	Comanche	0.8	4.8
osque	6.0	12.1	48.	Concho	-0.5	1.6
owie	-2.5	-0.1	49.	Cooke	4.1	5.1
razoria	0.9	0.0	50.	Coryell	6.2	15.8
razos	3.8	12.3	51.	Cottle	-0.1	-1.1
rewster	-2.8	-1.7	52.	Crane	-0.0	-5.6
riscoe	-15.4	-21.1	53.	Crockett	10.7	6.7
rooks	-2.6	-6.9	54.	Crosby	-0.3	-5.1
rown	12.6	17.2	55.	Culberson	0.6	-14.0
urleson	10.0	9.8	56.	Dallam	8.8	7.3
urnet	15.2	27.9	57.	Dallas	-8.0	-10.0
aldwell	44.8	-0.1	58.	Dawson	-0.4	-5.9
alhoun	-3.3	-14.0	59.	Deaf Smith	-8.4	-14.6
allahan	6.9	14.0	60.	Delta	-2.0	2.5

[1] Negative percentage error means that the projection is larger than the estimated population.

Table 3 (continued)

County	Projection: Texas Water Development Board (percent)	Projection: Division of Planning Coordination (percent)	County	Projection: Texas Water Development Board (percent)	Projection: Divisi Plann Coordin (perc
61. Denton	-0.5	14.0	91. Brayson	-12.1	-9.
62. DeWitt	1.6	1.3	92. Gregg	0.5	3.
63. Dickens	1.7	-1.4	93. Grimes	3.0	5.
64. Dimmit	16.2	13.6	94. Guadalupe	4.5	9.
65. Donley	11.3	13.0	95. Hale	3.5	-1.
66. Duval	4.1	2.9	96. Hall	2.8	10.
67. Eastland	1.0	6.9	97. Hamilton	5.7	12.
68. Ector	0.9	-8.1	98. Hansford	-7.8	-15.
69. Edwards	-1.4	-5.8	99. Hardeman	-2.1	-2.
70. Ellis	3.0	7.6	100. Hardin	1.3	5.
71. El Paso	4.8	4.9	101. Harris	-1.2	-2.
72. Erath	-3.7	8.1	102. Harrison	-2.1	-2.
73. Falls	-2.4	0.3	103. Hartley	4.0	2.
74. Fannin	2.8	6.1	104. Haskell	-2.5	-2.
75. Fayette	-1.0	2.9	105. Hays	-2.3	16.
76. Fisher	-3.7	-3.1	106. Hamphill	15.8	19.
77. Floyd	-0.3	-6.8	107. Henderson	-4.1	11.
78. Foard	8.4	8.9	108. Hidalgo	15.6	15.
79. Fort Bend	17.8	23.4	109. Hill	1.7	5.
80. Franklin	9.5	16.8	110. Hockley	2.9	-0.
81. Freestone	8.9	11.0	111. Hood	1.2	37.
82. Frio	8.2	4.0	112. Hopkins	-1.6	4.
83. Gaines	-1.8	-10.5	113. Houston	1.7	2.
84. Galveston	-0.8	0.2	114. Howard	-3.2	-2.
85. Garza	-0.7	-1.0	115. Hudspeth	21.0	19.
86. Gillespie	1.4	7.8	116. Hunt	-3.9	0.
87. Glasscock	-4.0	-8.7	117. Hutchinson	3.4	3.
88. Goliad	-0.8	1.8	118. Irion	5.8	5.
89. Gonzales	0.4	1.5	119. Jack	-1.5	-3.
90. Gray	0.1	-9.1	120. Jackson	-5.8	-5.

Table 3 (continued)

County	Projection			County	Projection	
	Texas Water Development Board (percent)	Division of Planning Coordination (percent)			Texas Water Development Board (percent)	Division of Planning Coordination (percent)
Jasper	0.7	2.9	151.	Loving	-15.8	-43.0
Jeff Davis	-3.9	-4.1	152.	Lubbock	-1.0	-0.9
Jefferson	-3.4	-6.0	153.	Lynn	-2.4	-5.3
Jim Hogg	2.6	0.5	154.	Madison	0.9	10.0
Jim Wells	-0.4	-3.3	155.	Marion	-13.3	-10.4
Johnson	2.6	12.1	156.	Martin	3.2	-2.3
Jones	0.5	2.7	157.	Mason	6.8	8.2
Karnes	-0.2	-4.2	158.	Matagorda	-5.7	-6.0
Kaufman	3.9	9.2	159.	Maverick	5.3	8.8
Kendall	10.0	18.8	160.	McCullock	-1.9	0.8
Kenedy	-14.1	-20.3	161.	McLennan	-1.1	2.4
Kent	-9.5	-9.6	162.	McMullen	-22.8	-29.6
Kerr	1.3	9.2	163.	Medina	1.8	3.8
Kimble	6.3	5.2	164.	Menard	-4.3	-0.8
King	-14.8	-6.5	165.	Midland	2.4	-11.0
Kinney	15.5	11.3	166.	Milam	0.2	2.2
Kleberg	-7.6	-4.9	167.	Mills	1.6	6.6
Knox	-0.7	-1.4	168.	Mitchell	-0.4	0.7
Lamar	1.7	5.7	169.	Montague	2.1	8.1
Lamb	-3.2	-5.7	170.	Montgomery	25.5	35.8
Lampasas	12.8	26.7	171.	Moore	0.0	-4.3
LaSalle	4.6	6.7	172.	Morris	2.1	2.7
Lavaca	-1.8	0.1	173.	Motley	-9.0	-14.2
Lee	17.6	19.2	174.	Nacogdoches	1.6	12.9
Leon	2.9	4.8	175.	Navarro	3.8	5.7
Liberty	4.8	10.7	176.	Newton	-4.1	-2.2
Limestone	8.4	9.2	177.	Nolan	-0.5	-0.3
Lipscomb	-0.5	-3.8	178.	Nueces	-3.2	-3.4
Live Oak	-0.7	-3.2	179.	Ochiltree	-13.4	-22.2
Llano	9.3	21.0	180.	Oldham	1.2	12.2

Table 3 (continued)

	County	Projection			County	Projection	
		Texas Water Development Board (percent)	Division of Planning Coordination (percent)			Texas Water Development Board (percent)	Divisio Plannin Coordina (percen
181.	Orange	-4.6	-4.7	211.	Sherman	42.7	-13.5
182.	Palo Pinto	-12.9	-42.6	212.	Smith	1.4	5.5
183.	Panola	4.4	6.1	213.	Somervell	0.8	8.8
184.	Parker	-6.3	-4.1	124.	Starr	8.1	8.0
185.	Parmer	-3.4	-15.6	215.	Stephens	1.3	2.8
186.	Pecos	-2.8	-11.8	216.	Sterling	1.0	-2.3
187.	Polk	9.5	21.6	217.	Stonewall	-7.4	-6.0
188.	Potter	-1.1	-2.5	218.	Sutton	28.4	27.2
189.	Presidio	-0.2	0.2	219.	Swisher	-3.8	-6.5
190.	Rains	5.3	15.8	220.	Tarrant	-9.4	-10.4
191.	Randall	0.9	-5.4	221.	Taylor	3.1	2.4
192.	Reagan	9.6	3.5	222.	Terrell	-4.7	-3.8
193.	Real	12.1	13.4	223.	Terry	1.8	-5.2
194.	Red River	5.0	7.3	224.	Throckmorton	8.2	11.4
195.	Reeves	-1.2	-12.9	225.	Titus	-2.2	9.8
196.	Refugio	-3.3	-7.1	226.	Tom Green	-1.7	1.8
197.	Roberts	5.5	5.5	227.	Travis	5.5	9.6
198.	Robertson	0.6	1.6	228.	Trinity	0.5	4.3
199.	Rockwall	11.8	19.0	229.	Tyler	49.4	8.5
200.	Runnels	-2.2	-0.6	230.	Upshur	4.1	11.1
201.	Rusk	6.5	8.9	231.	Upton	2.6	-7.3
202.	Sabine	1.6	3.9	232.	Uvalde	10.3	12.1
203.	San Augustine	0.0	3.8	233.	Val Verde	4.7	7.7
204.	San Jacinto	4.4	19.5	234.	Van Zandt	11.3	19.0
205.	San Patricio	-1.8	-1.1	235.	Victoria	1.5	-2.2
206.	San Saba	6.5	10.6	236.	Walker	8.6	18.6
207.	Schleicher	20.3	14.2	237.	Waller	0.3	5.4
208.	Scurry	9.8	11.6	238.	Ward	-2.1	-7.3
209.	Shackelford	4.6	7.7	239.	Washington	4.4	8.0
210.	Shelby	2.3	5.9	240.	Webb	2.0	6.7

Table 3 (continued)

County	Projection	
	Texas Water Development Board (percent)	Division of Planning Coordination (percent)
241. Wharton	-2.2	-3.8
242. Wheeler	-1.7	0.0
243. Wichita	-0.7	-6.9
244. Wilbarger	2.5	4.0
245. Willacy	3.6	5.2
246. Williamson	10.7	24.1
247. Wilson	2.8	4.8
248. Sinkler	-1.8	-6.8
249. Wise	-2.8	2.2
250. Wood	8.3	14.8
251. Yoakum	0.9	-10.6
252. Young	3.8	6.4
253. Zapata	2.3	5.4
254. Zavala	-4.6	-9.2

APPENDIX B

PROJECTED POPULATION CHANGE FOR TEXAS COUNTIES, 1970 TO 1990

APPENDIX B

Table 1. Population and Projected Population of Texas Counties 1970-1990.

County	Population		Projections			
	1970	1975 (est.)	Texas Water Development Board 1980	Division of Planning Coordination 1980	Texas Water Development Board 1990	Division of Planning Coordination 1990
Anderson	27,789	31,244	31,100	26,985	32,600	27,401
Andrews	10,372	11,342	10,900	13,369	11,300	15,762
Angelina	49,349	54,019	59,300	55,992	73,800	63,598
Aransas	8,902	10,507	11,500	10,535	15,400	11,738
Archer	5,759	6,271	5,500	5,628	5,100	5,752
Armstrong	1,895	1,874	1,800	1,789	1,700	1,733
Atascosa	18,695	20,266	19,900	19,670	20,500	21,885
Austin	13,831	15,194	15,400	13,431	16,900	13,561
Bailey	8,487	8,369	8,500	9,344	8,300	10,706
Bandera	4,747	6,420	5,900	4,652	7,300	4,548
Bastrop	17,297	20,002	21,000	17,149	22,000	17,927
Baylor	5,221	4,970	4,900	4,761	4,400	4,514
Bee	22,737	23,577	25,600	23,761	28,400	26,011
Bell	124,483	156,781	189,200	134,248	225,500	146,663
Bexar	830,460	912,934	1,051,600	971,639	1,195,700	1,129,877
Blanco	3,567	4,257	4,500	3,394	5,500	3,321
Borden	888	781	900	880	800	910
Bosque	10,966	11,997	11,600	10,135	12,000	9,478
Bowie	67,813	69,918	75,500	72,118	83,000	78,411
Brazoria	108,312	124,380	138,200	140,403	174,100	169,815
Brazos	57,978	71,251	79,100	66,975	9,300	76,930
Brewster	7,780	7,867	8,400	8,228	9,000	9,050
Briscoe	2,794	2,294	2,500	2,760	2,100	2,885
Brooks	8,005	7,749	7,900	8,570	7,900	9,701
Brown	25,877	30,756	27,900	25,029	29,700	24,853
Burleson	9,999	10,815	9,500	9,500	8,900	9,652
Burnet	11,420	15,706	15,200	11,215	17,800	10,877
Caldwell	21,178	21,369	2,400	21,614	26,600	23,229
Calhoun	17,831	17,781	18,900	22,709	22,300	28,089
Callahan	8,205	9,238	9,000	7,681	9,100	7,403
Cameron	140,368	176,931	167,300	158,223	181,300	186,294

Table 1 (continued)

County	Population		Projections			
	1970	1975 (est.)	Texas Water Development Board	Division of Planning Coordination	Texas Water Development Board	Division of Planning Coordination
Camp	8,005	7,908	8,500	7,996	9,000	8,416
Carson	6,358	6,238	6,200	6,337	6,000	6,585
Cass	24,133	26,170	27,200	24,371	28,400	25,658
Castro	10,394	10,181	11,100	13,490	12,000	17,248
Chambers	12,187	13,159	14,800	14,018	17,800	15,821
Cherokee	32,008	33,597	36,400	30,355	37,700	29,939
Childress	6,605	6,440	5,900	5,676	5,300	5,215
Clay	8,079	8,363	7,900	7,670	7,600	7,593
Cochran	5,326	5,004	5,100	5,683	5,000	6,421
Coke	3,087	3,381	2,700	2,861	2,400	2,755
Coleman	10,288	10,005	9,500	8,980	8,600	8,293
Collin	66,920	94,613	99,600	84,404	115,000	102,766
Collingsworth	4,755	4,371	4,000	4,116	3,200	3,899
Colorado	17,638	16,863	17,600	17,589	17,300	18,234
Comal	24,165	29,478	32,300	26,618	34,300	28,825
Comanche	11,898	12,052	12,000	11,025	11,700	10,607
Concho	2,937	2,805	2,700	2,581	2,100	2,480
Cooke	23,471	25,106	24,700	24,169	25,700	25,588
Coryell	35,311	44,590	48,300	39,738	51,800	44,572
Cottle	3,204	2,999	2,800	2,859	2,300	2,810
Crane	4,172	4,085	4,000	4,456	3,600	4,844
Crockett	3,885	4,304	3,800	4,149	3,700	4,596
Crosby	9,085	8,969	8,900	9,760	8,500	11,196
Culberson	3,429	3,485	3,500	4,519	3,800	5,888
Dallam	6,012	6,533	5,900	6,101	5,600	6,608
Dallas	1,327,321	1,388,615	1,672,400	1,715,206	2,081,200	2,072,954
Dawson	16,604	16,030	15,600	17,332	14,300	19,258
Deaf Smith	18,999	19,229	22,700	25,085	27,000	32,242
Delta	4,927	4,717	4,700	4,272	4,000	3,979
Denton	75,633	97,410	120,100	92,010	155,500	105,833
DeWitt	18,660	18,382	17,500	17,618	15,100	17,706
Dickens	3,737	3,476	3,100	3,309	2,500	3,183

Table 1 (continued)

County	Population		Projections			
	1970	1975 (est.)	Texas Water Development Board	Division of Planning Coordination	Texas Water Development Board	Division of Planning Coordination
Dimmit	9,039	10,881	9,220	9,770	9,200	11,582
Donley	3,641	3,857	3,200	3,073	2,800	2,756
Duval	11,722	12,161	11,600	11,900	10,200	13,078
Eastland	18,092	18,276	18,100	15,956	16,600	14,671
Ector	91,805	97,460	101,300	118,987	114,600	143,467
Edwards	2,107	2,025	2,000	2,179	1,900	2,463
Ellis	46,638	51,872	54,000	49,266	57,500	54,011
El Paso	359,291	424,479	449,100	448,218	546,000	544,219
Erath	18,141	19,312	21,900	17,365	23,700	16,903
Falls	17,300	16,497	16,500	15,600	15,600	15,278
Fannin	22,705	23,246	22,500	20,929	21,000	20,347
Fayette	17,650	17,048	16,800	15,477	15,700	14,181
Fisher	6,344	5,858	5,800	5,735	5,300	5,606
Floyd	11,044	10,787	10,600	11,987	10,000	13,658
Foard	2,211	2,244	1,900	1,877	1,600	1,701
Fort Bend	52,314	76,245	73,000	64,496	95,000	76,786
Franklin	5,291	6,180	5,900	4,988	5,900	4,858
Freestone	11,116	11,924	10,600	10,109	9,900	9,819
Frio	11,159	12,398	11,600	12,639	12,700	15,262
Gaines	11,593	11,288	11,400	13,361	11,100	15,644
Galveston	169,812	183,244	199,600	196,000	231,800	223,143
Garza	5,289	5,258	5,300	5,327	5,100	5,664
Gillespie	10,553	11,335	11,800	10,349	12,200	10,536
Glasscock	1,155	1,132	1,200	1,305	1,300	1,548
Goliad	4,869	4,848	4,900	4,657	4,300	4,776
Gonzales	16,375	16,347	16,200	15,829	14,900	16,427
Gray	26,949	25,144	23,300	27,921	22,100	29,252
Grayson	83,225	78,831	93,500	89,189	103,700	96,276
Gregg	75,929	81,798	86,800	82,140	97,800	89,266
Grimes	11,855	12,249	11,900	11,273	11,800	11,579
Guadalupe	33,554	39,154	41,200	36,981	46,100	40,985

County	Population		Projections			
	1970	1975 (est.)	Texas Water Development Board	Division of Planning Coordination	Texas Water Development Board	Division of Planning Coordination
Hale	34,137	35,732	34,800	38,360	34,500	44,102
Hall	6,015	6,385	6,400	5,368	6,600	5,232
Hamilton	7,198	7,579	7,100	6,050	6,900	5,246
Hansford	6,351	6,006	6,600	7,470	6,700	8,673
Hardeman	6,795	6,315	6,100	6,110	5,000	5,871
Hardin	29,996	34,085	37,300	34,643	45,800	39,529
Harris	1,741,912	1,944,431	2,192,400	2,240,461	2,725,400	2,705,378
Harrison	44,841	44,359	45,700	45,783	46,000	48,842
Hartley	2,782	3,012	3,000	3,086	3,100	3,338
Haskell	8,512	7,859	7,600	7,627	6,700	7,352
Hays	27,642	35,052	44,100	30,740	54,900	34,180
Hemphill	3,084	3,793	3,300	3,056	3,400	3,214
Henderson	26,466	30,675	37,400	27,616	42,400	29,127
Hidalgo	181,535	227,853	203,100	205,903	221,000	245,137
Hill	22,596	22,838	22,300	20,742	21,700	20,064
Hockley	20,396	21,052	20,500	21,781	19,900	24,165
Hood	6,368	10,308	14,000	6,546	15,300	6,725
Hopkins	20,710	21,662	23,300	20,524	25,800	20,972
Houston	17,855	17,932	17,400	17,199	16,200	17,630
Howard	37,796	38,170	41,000	40,662	43,200	44,192
Hudspeth	2,392	2,968	2,300	2,381	2,200	2,636
Hunt	47,948	49,367	54,600	50,468	63,400	53,673
Hutchinson	24,443	24,810	23,500	23,312	22,300	22,930
Irion	1,070	1,099	1,000	1,010	1,000	1,024
Jack	6,711	6,308	6,100	6,367	5,800	6,260
Jackson	12,975	12,565	13,600	13,551	14,700	14,744
Jasper	24,692	26,587	28,100	26,918	33,200	29,888
Jeff Davis	1,527	1,456	1,500	1,503	1,400	1,585
Jefferson	244,773	241,246	254,100	266,883	268,000	292,504
Jim Hogg	4,654	4,804	4,700	4,907	4,700	5,508
Jim Wells	33,032	33,919	35,100	37,070	36,200	42,780

Table 1 (continued)

County	Population		Projections			
	1970	1975 (est.)	Texas Water Development Board	Division of Planning Coordination	Texas Water Development Board	Division of Planning Coordination
Johnson	45,769	55,564	62,500	51,920	75,000	57,899
Jones	16,106	15,989	15,700	15,007	15,000	14,857
Karnes	13,462	12,955	12,500	13,543	12,200	14,731
Kaufman	32,392	36,209	37,200	33,352	40,100	35,195
Kendall	6,964	8,818	8,900	7,348	10,500	7,698
Kenedy	678	604	700	775	600	925
Kent	1,434	1,248	1,300	1,302	1,000	1,258
Kerr	19,454	21,707	23,400	19,961	26,700	19,683
Kimble	3,904	4,111	3,800	3,890	3,600	4,093
King	464	420	500	431	400	439
Kinney	2,006	2,253	1,800	1,992	1,600	2,140
Kleberg	33,166	32,823	37,500	35,684	44,400	39,585
Knox	5,972	5,596	5,300	5,382	4,500	5,281
Lamar	36,062	38,221	39,100	36,034	42,000	37,836
Lamb	17,770	16,992	17,300	18,159	16,600	19,541
Lampasas	9,323	12,577	12,600	9,123	14,500	9,280
LaSalle	5,014	5,456	5,400	5,167	5,800	5,913
Lavaca	17,903	17,243	17,200	16,541	16,200	16,045
Lee	8,048	9,558	7,700	7,402	7,200	7,150
Leon	8,738	8,777	8,300	7,981	7,900	7,773
Liberty	33,014	38,441	40,200	35,607	43,600	39,007
Limestone	18,100	18,830	16,400	16,100	14,600	15,087
Lipscomb	3,486	3,376	3,300	3,523	3,100	3,624
Live Oak	6,697	6,453	6,300	6,624	5,800	7,005
Llano	6,979	8,696	8,800	6,755	9,700	6,053
Loving	164	114	100	162	100	164
Lubbock	179,295	197,248	219,200	218,921	261,100	257,161
Lynn	9,107	8,841	9,000	9,512	8,700	10,767
Madison	7,693	8,521	9,200	7,646	9,600	7,866
Marion	8,517	7,638	8,800	8,341	9,300	8,616
Martin	4,774	4,791	4,500	5,024	4,500	5,638

County	Population		Projections			
	1970	1975 (est.)	Texas Water Development Board	Division of Planning Coordination	Texas Water Development Board	Division of Planning Coordination
Mason	3,356	3,462	3,100	2,998	2,900	2,823
Matagorda	27,913	27,720	30,700	30,845	33,400	34,615
Maverick	18,093	22,164	23,900	22,324	2,900	28,181
McCulloch	8,571	8,375	8,500	8,041	8,300	8,086
McLenna	147,553	154,267	164,300	153,601	171,900	161,453
McMullen	1,095	853	1,000	1,116	900	1,192
Medina	20,249	21,970	22,900	22,020	25,600	24,793
Menard	2,646	2,515	2,600	2,423	2,400	2,400
Midland	65,433	69,214	69,700	88,266	72,200	108,045
Milam	20,028	20,114	20,100	19,320	20,100	19,783
Mills	4,212	4,225	4,100	3,678	3,600	3,344
Mitchell	9,073	8,853	8,700	8,508	8,200	8,632
Montague	15,326	16,354	16,700	14,734	17,800	14,525
Montgomery	49,479	87,213	80,400	62,452	115,200	73,839
Moore	14,060	14,037	14,000	15,231	13,900	16,967
Morris	12,310	13,130	13,400	13,249	14,500	14,288
Motley	2,178	1,779	1,700	1,885	1,500	1,794
Nacogdoches	36,362	42,519	47,300	37,679	54,400	39,628
Navarro	31,150	32,054	30,500	29,285	29,500	29,097
Newton	11,657	11,892	13,100	12,652	14,500	14,311
Nolan	16,220	15,986	15,900	15,844	15,300	16,246
Nueces	237,544	248,422	275,100	276,268	316,800	321,309
Ochiltree	9,704	8,775	10,200	11,742	11,400	13,825
Oldham	2,258	2,711	3,100	2,500	3,300	2,775
Orange	71,170	75,190	86,200	86,291	10,300	101,767
Palo Pinto	28,962	21,547	19,700	32,472	2,300	36,748
Panola	15,894	16,628	15,900	15,317	15,600	15,437
Parker	33,888	33,629	37,600	36,112	41,200	38,491
Parmer	10,509	10,302	10,800	13,311	11,000	16,557
Pecos	13,748	13,448	13,900	16,330	14,500	19,679
Polk	14,457	18,420	18,900	14,424	21,700	15,169

Table 1 (continued)

County	Population		Projections			
	1970	1975 (est.)	Texas Water Development Board	Division of Planning Coordination	Texas Water Development Board	Division of Planning Coordination
Potter	90,511	93,462	98,400	101,073	105,700	111,733
Presidio	4,842	4,810	4,800	4,762	4,600	5,142
Rains	3,752	4,412	4,600	3,675	5,400	3,644
Randall	53,885	63,542	72,100	80,072	95,300	101,771
Reagan	3,239	3,452	3,000	3,425	2,600	3,708
Real	2,013	2,339	2,100	2,038	2,200	2,196
Red River	14,298	14,742	13,700	13,024	12,900	12,770
Reeves	16,526	16,272	16,400	20,210	16,000	25,065
Refugio	9,494	9,052	9,200	9,896	8,800	10,721
Roberts	967	1,041	1,000	1,001	1,000	1,067
Robertson	14,389	14,279	14,000	13,726	13,400	14,314
Rockwall	7,046	9,150	9,100	7,777	10,700	8,718
Runnels	12,108	11,547	11,500	11,124	10,800	10,909
Rusk	34,102	36,403	34,000	32,197	32,800	32,031
Sabine	7,187	7,461	7,500	7,157	7,700	7,553
San Augustine	7,858	8,179	8,500	7,876	8,900	8,306
San Jacinto	6,702	8,419	9,400	6,851	10,200	7,374
San Patricio	47,288	50,378	55,300	54,537	57,300	64,472
San Saba	5,540	5,853	5,400	4,927	5,000	4,695
Schleicher	2,277	2,620	1,900	2,219	1,600	2,299
Scurry	15,760	17,494	15,800	15,157	15,600	15,429
Shackelford	3,323	3,365	3,100	2,886	2,700	2,629
Shelby	19,672	20,704	20,800	19,278	21,600	19,900
Sherman	3,657	3,541	400	4,380	4,300	5,179
Smith	97,096	107,597	115,100	106,171	132,600	116,354
Somervell	2,793	3,071	3,300	2,807	3,800	2,853
Starr	17,707	20,885	20,700	20,723	23,900	25,131
Stephens	8,414	8,366	8,100	7,846	7,700	7,631
Sterling	1,056	1,038	1,000	1,067	900	1,140
Stonewall	2,397	2,140	2,200	2,141	2,000	2,011
Sutton	3,175	4,382	3,100	3,203	2,700	3,438

County	Population		Projections			
	1970	1975 (est.)	Texas Water Development Board	Division of Planning Coordination	Texas Water Development Board	Division of Planning Coordination
Swisher	10,373	10,339	11,100	11,651	11,700	13,375
Tarrant	716,317	728,951	879,300	893,078	1,066,100	1,052,859
Taylor	97,853	105,390	106,400	107,959	114,200	118,222
Terrell	1,940	1,834	1,900	1,868	1,800	1,940
Terry	14,118	14,158	13,700	15,675	13,200	18,070
Throckmorton	2,205	2,291	2,000	1,856	1,700	1,629
Titus	16,702	18,594	21,300	16,851	22,500	17,526
Tom Green	71,047	74,534	80,600	75,393	91,300	80,927
Travis	295,516	361,839	388,100	358,450	496,500	412,980
Trinity	7,628	7,754	7,800	7,213	7,900	7,241
Tyler	12,417	13,758	1,500	12,762	17,800	13,407
Upshur	20,976	23,757	24,600	21,263	26,600	22,283
Upton	4,697	4,463	4,000	4,881	3,300	5,320
Uvalde	17,348	20,549	19,500	18,790	21,600	21,289
Val Verde	27,471	31,943	33,400	31,492	39,400	37,219
Van Zandt	22,155	27,252	26,200	22,013	30,600	22,356
Victoria	53,766	58,108	60,700	65,056	67,500	77,326
Walker	27,680	34,849	36,000	29,022	43,400	30,125
Waller	14,285	15,537	16,700	15,126	19,300	16,452
Ward	13,019	12,551	12,600	13,917	12,100	15,459
Washington	18,842	20,112	19,600	18,167	19,600	18,310
Webb	72,859	81,009	85,900	78,282	100,000	95,062
Wharton	36,729	36,229	37,300	38,503	37,300	42,134
Wheeler	6,434	6,112	6,000	5,786	5,600	5,534
Wichita	121,862	119,515	118,900	133,558	127,900	145,284
Wilbarger	15,355	15,467	14,800	14,339	14,200	13,980
Willacy	15,570	16,849	16,900	16,390	18,200	18,982
Williamson	37,305	49,468	51,000	37,828	67,300	40,201
Wilson	13,041	13,961	14,100	13,544	15,100	14,947
Winkler	9,640	9,255	9,200	10,123	8,600	10,891
Wise	19,687	20,903	23,300	21,207	26,700	23,034

Table 1 (continued)

County	Population		Projections			
	1970	1975 (est.)	Texas Water Development Board	Division of Planning Coordination	Texas Water Development Board	Division of Planning Coordination
Wood	18,589	21,196	20,300	17,548	21,900	16,952
Yoakum	7,344	7,389	7,300	8,995	7,200	10,677
Young	15,400	16,000	15,400	14,544	14,600	14,074
Zapata	4,532	4,828	4,900	4,601	5,200	5,140
Zavala	11,370	11,073	11,800	12,812	12,100	15,455

APPENDIX B

Table 2. Estimated Change in Population of Texas Counties 1970-75; and Projected Changes in Population of Texas Counties 1970-80 and 1980-90.

	Estimated Change 1970-75	Projected Change 1970-80		Projected Change 1980-90	
		Texas Water Development Board	Division of Planning Coordination	Texas Water Development Board	Division of Planning Coordination
District 1	2,460	22,982	4,185	22,200	11,252
Delta	-210	-227	-655	-700	-293
Fannin	541	-205	-1,776	-1,500	-582
Franklin	889	609	-303	0	-130
Grayson	-4,394	10,275	5,964	10,200	7,087
Hopkins	952	2,590	-186	2,500	448
Hunt	1,419	6,652	2,520	8,800	3,205
Lamar	2,159	3,038	-28	2,900	1,802
Rains	660	848	-77	800	-31
Red River	444	-598	-1,274	-800	-254
District 2	20,957	189,064	189,238	192,200	173,898
Erath	1,171	3,759	-776	1,800	-462
Hood	3,940	7,632	178	1,300	179
Jack	-403	-611	-344	-300	-107
Johnson	9,795	16,731	6,151	12,500	5,979
Palo Pinto	-7,415	-9,262	3,510	-17,400	4,276
Parker	-259	3,712	2,224	3,600	2,379
Somervell	278	507	14	500	46
Tarrant	12,634	162,983	176,761	186,800	159,781
Wise	1,216	3,613	1,520	3,400	1,827
District 3	1,659	-1,878	8,581	8,200	11,680
Archer	512	-259	-131	-400	124
Baylor	-251	-321	-460	-500	-247
Clay	284	-179	-409	-300	-77
Cooke	1,635	1,229	698	1,000	1,419
Montague	1,028	1,374	-592	1,100	-209
Throckmorton	86	-205	-349	-300	-227
Wichita	-2,347	-2,962	11,696	9,000	11,726
Wilbarger	112	-555	-1,016	-600	-359
Young	600	0	-856	-800	-470
District 4	11,723	23,399	48,278	37,100	47,837
Armstrong	-21	-95	-106	-100	-56
Carson	-120	-158	-21	-200	248
Dallam	521	-112	89	-300	507
Deaf Smith	230	3,701	6,086	4,300	7,157
Gray	-1,805	-3,649	972	-1,200	1,331
Hansford	-345	249	1,119	100	1,203
Hartley	230	218	304	100	252
Hemphill	709	216	-28	100	158

Table 2 (continued)

	Estimated Change 1970-75	Projected Change 1970-80 Texas Water Development Board	1970-80 Division of Planning Coordination	1980-90 Texas Water Development Board	1980-90 Division of Planning Coordinati
Hutchinson	367	-943	-1,131	-1,200	-382
Lipscomb	-110	-186	37	-200	101
Moore	-23	-60	1,171	-100	1,736
Ochiltree	-929	496	2,038	1,200	2,083
Oldham	453	842	242	200	275
Potter	2,951	7,889	10,562	7,300	10,660
Randall	9,657	18,215	26,187	23,200	21,699
Raberts	74	33	34	0	66
Sherman	-116	-3,257	723	3,900	799
District 5	17,068	39,329	61,788	38,000	71,571
Bailey	-118	13	857	-200	1,362
Castro	-213	706	3,096	900	3,758
Cochran	-322	-226	357	-100	738
Crosby	-116	-185	675	-400	1,436
Dawson	-574	-1,004	728	-1,300	1,926
Floyd	-257	-444	943	-600	1,681
Gaines	-305	-193	1,768	-300	2,283
Garza	-31	11	38	-200	337
Hale	1,595	663	4,223	-300	5,742
Hockley	656	104	1,385	-600	2,384
Lamb	-778	-470	389	-700	1,382
Lubbock	17,953	39,905	39,626	41,900	38,240
Lynn	-266	-107	405	-300	1,255
Parmer	-207	291	2,802	200	3,246
Swisher	-34	727	1,278	600	1,724
Terry	40	-418	1,557	-500	2,395
Yoakum	45	-44	1,651	-100	1,682
District 6	8,539	12,210	61,203	14,100	58,681
Andrews	970	528	2,997	400	2,393
Crane	-87	-172	284	-400	388
Ector	5,655	9,495	27,182	13,300	24,480
Loving	-50	-64	-2	0	2
Martin	17	-274	250	0	614
Midland	3,781	4,267	22,833	2,500	19,779
Pecos	-300	152	2,582	600	3,349
Reeves	-254	-126	3,684	-400	4,855
Terrell	-106	-40	-72	-100	72
Upton	-234	-697	184	-700	439
Ward	-468	-419	898	-500	1,542
Winkler	-385	-440	483	-600	768

Table 2 (continued)

	Estimated Change 1970-75	Projected Change 1970-80		Projected Change 1980-90	
		Texas Water Development Board	Division of Planning Coordination	Texas Water Development Board	Division of Planning Coordination
District 7	5,334	7,314	3,064	7,500	6,667
Coke	294	-387	-226	-300	-106
Concho	-132	-237	-356	-600	-101
Crockett	419	-85	264	-100	447
Glasscock	-23	45	150	100	243
Irion	29	-70	-60	0	14
Kimble	207	-104	-14	-200	203
Menard	-131	-46	-223	-200	-23
Reagan	213	-239	186	-400	283
Runnels	-561	-608	-984	-700	-215
Schleicher	343	-377	-58	-300	80
Sterling	-18	-56	11	-100	73
Sutton	1,207	-75	28	-400	235
Tom Green	3,487	9,553	4,346	10,700	5,534
District 8	7,460	9,489	7,478	5,700	13,358
Borden	-107	12	-8	-100	30
Callahan	1,033	795	-524	100	-278
Fisher	-486	-544	-609	-500	-129
Haskell	-653	-912	-885	-900	-275
Howard	374	3,204	2,866	2,200	3,530
Jones	-117	-406	-1,099	-700	-150
Kent	-186	-134	-132	-300	-44
Mitchell	-220	-373	-565	-500	124
Nolan	-234	-320	-376	-600	402
Scurry	1,734	40	-603	-200	272
Shackelford	42	-223	-437	-400	-257
Stonewall	-257	-197	-256	-200	-130
Taylor	7,537	8,547	10,106	7,800	10,263
District 9	49,872	92,193	12,707	44,300	21,627
Bell	32,298	64,717	9,765	36,300	12,415
Bosque	1,031	634	-831	400	-657
Coryell	9,279	12,989	4,427	3,500	4,834
Falls	-803	-800	-1,700	-900	-322
Hamilton	381	-98	-1,148	-200	-804
Hill	242	-296	-1,854	-600	-678
Limestone	730	-1,700	-2,000	-1,800	-1,013
McLennan	6,714	16,747	6,048	7,600	7,852
District 10	35,628	53,166	10,891	41,100	18,401
Anderson	3,455	3,311	-804	1,500	416
Cherokee	1,589	4,392	-1,653	1,300	-416

Table 2 (continued)

	Estimated Change 1970-75	Projected Change 1970-80 Texas Water Development Board	1970-80 Division of Planning Coordination	1980-90 Texas Water Development Board	1980-90 Division of Planning Coordinatio
Gregg	5,869	10,871	6,211	11,000	7,126
Henderson	4,209	10,934	1,150	5,000	1,511
Rusk	2,301	-102	-1,905	-1,200	-166
Smith	10,501	18,004	9,075	17,500	10,183
Van Zandt	5,097	4,045	-142	4,400	343
Wood	2,607	1,711	-1,041	1,600	-596
District 11	18,337	29,830	6,599	25,500	12,730
Angelina	4,670	9,951	6,643	14,500	7,606
Houston	77	-455	-656	-1,200	431
Nacogdoches	6,157	10,938	1,317	7,100	1,949
Polk	3,963	4,443	-33	2,800	745
Sabine	274	313	-30	200	396
San Augustine	321	642	18	400	430
San Jacinto	1,717	2,698	149	800	523
Shelby	1,032	1,128	-394	800	622
Trinity	126	172	-415	100	28
District 12	296,106	568,542	585,356	664,700	552,375
Austin	1,363	1,569	-400	1,500	130
Brazoria	16,068	29,888	32,091	35,900	29,412
Fort Bend	23,931	20,686	12,182	22,000	14,290
Galveston	13,432	29,788	26,188	32,200	27,143
Harris	202,519	450,488	498,549	533,000	464,917
Matagorda	-193	2,787	2,932	2,700	3,770
Montgomery	37,734	30,921	12,973	34,800	11,387
Waller	1,252	2,415	841	2,600	1,326
District 13	1,039	6,273	13,346	5,200	22,013
Calhoun	-50	1,069	4,878	3,400	5,380
Colorado	-775	-38	-49	-300	645
DeWitt	-278	-1,160	-1,042	-2,400	88
Fayette	-602	-850	-2,173	-1,100	-1,296
Gonzales	-28	-175	-546	-1,300	598
Jackson	-410	625	576	1,100	1,193
Lavaca	-660	-703	-1,362	-1,000	-496
Victoria	4,342	6,934	11,290	6,800	12,270
Wharton	-500	571	1,774	0	3,631
District 14	97,883	114,839	65,033	164,900	61,383
Bastrop	2,705	3,703	-148	1,000	778
Blanco	690	933	-173	1,000	-73
Burnet	4,286	3,780	-205	2,600	-338
Caldwell	191	-18,778	436	24,200	1,615

Table 2 (continued)

	Estimated Change 1970-75	Projected Change 1970-80 Texas Water Development Board	Projected Change 1970-80 Division of Planning Coordination	Projected Change 1980-90 Texas Water Development Board	Projected Change 1980-90 Division of Planning Coordination
Gillespie	782	1,247	-204	400	187
Hays	7,410	16,458	3,098	10,800	3,440
Lee	1,510	-348	-646	-500	-252
Llano	1,717	1,821	-224	900	-702
Mason	106	-256	-358	-200	-175
Travis	66,323	92,584	62,934	108,400	54,530
Williamson	12,163	13,695	523	16,300	2,373
District 15	104,818	249,603	152,758	163,000	174,253
Atascosa	1,571	1,205	975	600	2,215
Bandera	1,673	1,153	-95	1,400	-104
Bexar	82,474	221,140	141,179	144,100	158,238
Comal	5,313	8,135	2,453	2,000	2,207
Frio	1,239	441	1,480	1,100	2,623
Guadalupe	5,600	7,646	3,427	4,900	4,004
Kendall	1,854	1,936	384	1,600	350
Derr	2,253	3,946	507	3,300	-278
La Salle	442	386	153	400	746
McMullen	-242	-95	21	-100	76
Medina	1,721	2,651	1,771	2,700	2,773
Wilson	920	1,059	503	1,000	1,403
District 16	15,743	55,809	55,384	56,600	70,553
Aransas	1,605	2,598	1,633	3,900	1,203
Bee	840	2,863	1,024	2,800	2,250
Goliad	-21	31	-212	-600	119
Jim Wells	887	2,068	4,038	1,100	5,710
Karnes	-507	-962	81	-300	1,188
Kleberg	-343	4,334	2,518	6,900	3,901
Live Oak	-244	-397	-73	-500	381
Nueces	10,878	37,556	38,724	41,700	45,041
Refugio	-442	-294	402	-400	825
San Patricio	3,090	8,012	7,249	2,000	9,935
District 17	24,573	29,982	5,401	-64,400	12,432
Brazos	13,273	21,122	8,997	-69,800	9,955
Burleson	816	-499	-499	-600	152
Freestone	808	-516	-1,007	-700	-290
Grimes	394	45	-582	-100	306
Leon	39	-438	-757	-400	-208
Madison	828	1,507	-47	400	220
Milam	86	72	-708	0	463
Robertson	-110	-389	-663	-600	588

Table 2 (continued)

	Estimated Change 1970-75	Projected Change 1970-80 Texas Water Development Board	1970-80 Division of Planning Coordination	1980-90 Texas Water Development Board	1980-90 Division Planning Coordinati
Walker	7,169	8,320	1,342	7,400	1,103
Washington	1,270	758	-675	0	143
District 18	122,823	435,800	424,200	466,600	297,274
Collin	27,693	32,680	17,484	15,400	18,362
Dallas	61,294	345,079	387,885	408,800	357,748
Denton	21,777	44,467	16,377	35,400	13,823
Ellis	5,234	7,362	2,628	3,500	4,745
Kaufman	3,817	4,808	960	2,900	1,843
Navarro	904	-650	-1,865	-1,000	-188
Rockwall	2,104	2,054	731	1,600	941
District 19	8,911	21,709	6,098	14,000	14,188
Bowie	2,105	7,687	4,305	7,500	6,293
Camp	-97	495	-9	500	420
Cass	2,037	3,067	238	1,200	1,287
Harrison	-482	859	942	300	3,059
Marion	-879	283	-176	500	275
Morris	820	1,090	939	1,100	1,039
Panola	734	6	-577	-300	120
Titus	1,892	4,598	149	1,200	675
Upshur	2,781	3,624	287	2,000	1,020
District 20	14,452	35,394	49,868	-24,300	56,460
Chambers	972	2,613	1,831	3,000	1,803
Hardin	4,089	7,304	4,647	8,500	4,886
Jasper	1,895	3,408	2,226	5,100	2,970
Jefferson	-3,527	9,327	22,110	13,900	25,621
Liberty	5,427	7,186	2,593	3,400	3,400
Newton	235	1,443	995	1,400	1,659
Orange	4,020	15,030	15,121	-75,900	15,476
Tyler	1,341	-10,917	345	16,300	645
District 21	96,043	66,070	52,644	49,300	94,684
Brooks	-256	-105	565	0	1,131
Cameron	36,563	26,932	17,855	14,000	28,071
Duval	439	-122	178	-1,400	1,178
Hidalgo	46,318	21,565	24,368	17,900	39,234
Jim Hogg	150	46	253	0	601
Kenedy	-74	22	97	-100	150
Starr	3,178	2,993	3,016	3,200	4,408
Webb	8,140	13,041	5,423	14,100	16,780
Willacy	1,279	1,330	820	1,300	2,592
Zapata	296	368	69	300	539

Table 2 (continued)

	Estimated Change 1970-75	Projected Change 1970-80 Texas Water Development Board	Projected Change 1970-80 Division of Planning Coordination	Projected Change 1980-90 Texas Water Development Board	Projected Change 1980-90 Division of Planning Coordination
District 22	13,780	14,253	11,950	-12,800	19,128
Dimmit	1,842	161	731	0	1,812
Edwards	-82	-107	72	-100	284
Kinney	247	-206	-14	-200	148
Maverick	4,071	5,807	4,231	-21,000	5,857
Real	326	87	25	100	158
Uvalde	3,201	2,152	1,442	2,100	2,499
Val Verde	4,472	5,929	4,021	6,000	5,727
Zavala	-297	430	1,442	300	2,643
District 23	8,270	3,985	-7,610	-500	-3,145
Brown	4,879	2,023	-848	1,800	-176
Coleman	-283	-788	-1,308	-900	-687
Comanche	154	102	-873	-300	-418
Eastland	184	8	-2,136	-1,500	-1,285
Lampasas	3,254	3,277	-200	1,900	157
McCullock	-196	-71	-530	-200	45
Mills	13	-112	-534	-500	-334
San Saba	313	-140	-613	-400	-232
Stephens	-48	-314	-568	-400	-215
District 24	65,804	90,339	90,350	97,400	98,909
Brewster	87	620	448	600	822
Culverson	56	71	1,090	300	1,369
El Paso	65,188	89,809	88,927	96,900	96,001
Hudspeth	576	-92	-11	-100	255
Jeff Davis	-71	-27	-24	-100	82
Presidio	-32	-42	-80	-200	380
District 25	-2,517	-5,405	-6,173	-6,000	-2,032
Briscoe	-500	-294	-34	-400	125
Childress	-165	-705	-929	-600	-461
Collingsworth	-384	-755	-639	-800	-217
Dottle	-205	-404	-345	-500	-49
Dickens	-261	-637	-428	-600	-126
Donley	216	-441	-568	-400	-317
Foard	33	-311	-334	-300	-176
Hall	370	385	-647	200	-136
Hardeman	-480	-695	-685	-1,100	-239
King	-44	36	-33	-100	8
Knox	-376	-672	-590	-800	-101
Motley	-399	-478	-293	-200	-91
Wheeler	-322	-434	-648	-400	-252

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