Toward Understanding the Age Distribution Of the Colorado Population

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By Jim Westkott, November 17, 2006

The subject of this paper is the understanding of the age distributions of the United States, Colorado, and, ultimately, those of the state's sub-units. It reports on the work of a project that was undertaken in 2006, and on many of its key findings.

There were two purposes for this work, one general and the other specific. The general purpose had to do with the need of the Colorado State Demography Office (CSDO) to understand and to be able to explain to others why the age distribution of a certain population was or is what it is . . . what its causes were, and when and how they occurred. This need was in the context of the fact that CSDO work on populations by age was / is second in importance only to that on population totals.

The need for data, information, and understanding on age is especially important because of the Office's first responsibility to state agencies. These agencies needs for population data are primarily those of populations by age, e.g., Department of Education (k-12), Colorado Commission on Higher Education, Division of Criminal Justice, Department of Public Health and Environment, Aging and Adult Services, etc. ***The accuracy of these estimates and short-term forecasts by age are crucial to the success of the state budgeting process.***

The specific purpose of this project is related to the aging of the baby-boomers in our state. The Office has come to feel that the Colorado population is in for a big change with the aging of its existing population . . . but it has not been satisfied that its staff have been able to explain this prospective development in such a way so as to have an appropriate and effective impact on the public and the users of its data. It has been the hope of this project that its findings would shed a stronger light and understanding of staff intuitions of the expected, very large impact of the aging of the baby-boomers.

Achieving a general understanding of age distributions and how they come about has been the first and main purpose of this work. This purpose or goal was broken down into two steps or objectives. The first was to search for and select a "standard" age distribution which could serve as a basis for defining an "expected" population distribution. The second was to identify elements that could serve as a basis for explaining variations from that standard. It was hoped that these findings could then help to better explain anticipated changes to the age distributions of Colorado populations and, specifically, of changes that will result from the "aging of the baby-boomers".

Method of Analysis

Perspectives. Two perspectives were key in establishing our methods of analysis: One was that the numbers of people of any age is affected by developments that may have occurred at different points over their entire life. Thus, for us to explain the age distribution of a population at any (later) point in time we had to be able to relate it to events in each age groups past. This has meant (for this study) that for upper age groups we needed to go back in time over 80 – 90 years.

The second was to acknowledge that, as demographers, the primary elements of our analysis of population change are the standard "components of change": natural increase (births minus deaths) and migration (net = in- minus out-migration). Thus, these were selected as part of our analysis . . . to structure a sense of what constitutes a "standard" and to explain variations from that standard.

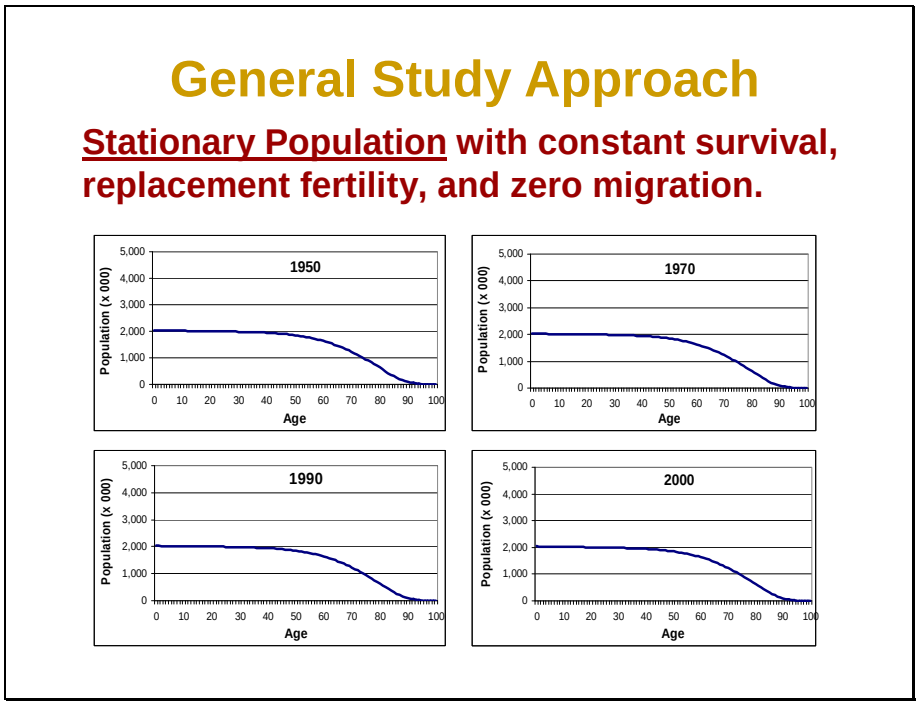
The Standard Age Distribution. The first step in the construction of the analysis was the selection of a ***"standard"*** distribution. Here, the ***stationary population*** of a life table proved to be most appropriate and convenient for the analysis of the age distribution of a population. The stationary population of a life table represents the population of an initial amount -- generally assumed to be 100,000 -- that would exist in subsequent single-year age groups if the survival rates for each age for that time period remained constant. In fact, … if those survival rates remained constant through time, ***and*** … if fertility rates were at replacement level, (here, meaning that each year there would again be 100,000 new people of age zero), ***and*** . . . if there was no migration (in- or out-), . . . then the population of the area and its distribution by age would remain unchanged through time. ***Thus, this serves as the perfect base for our analysis. Then, by allowing each of the demographic variables – survival rates, fertility rates, and migration – to change over time as occurred in reality, we can identify the effects of each of these variations at any point in time – even on any age group.***

In the next section, the steps in the analysis are explained in detail and applied to the U. S. population. This serves to both illustrate the method of the analysis used here – and developed for use in other settings – as well as provide information on national components of change for comparison with other sub-national geographic areas, e.g. other states or the Rocky Mountain Region.

Steps in the Analysis as Applied to the U. S. Population

Step 1. Stationary Population Unchanged. The charts on Slide US-1 present the age distribution of the U. S. population beginning in 1950 – using the stationary population from the U. S. 1950 life table -- through to the year 2000 with the assumptions of constant survival rates, replacement level fertility and zero migration. (The charts for the years 1960 and 1980 have been skipped to make the slide more readable.) The result of the beginning distribution and the three assumptions is that the original distribution, that of the 1950 stationary population, is unchanged through time. Even in 2000, given these assumptions, the total population and its distribution by age are unchanged from that (the stationary population) in 1950.

Slide US-1.



The stationary population with constant survival, replacement fertility and zero migration thus serves as the standard or expected population for the analysis. Causes of variation, following demographic

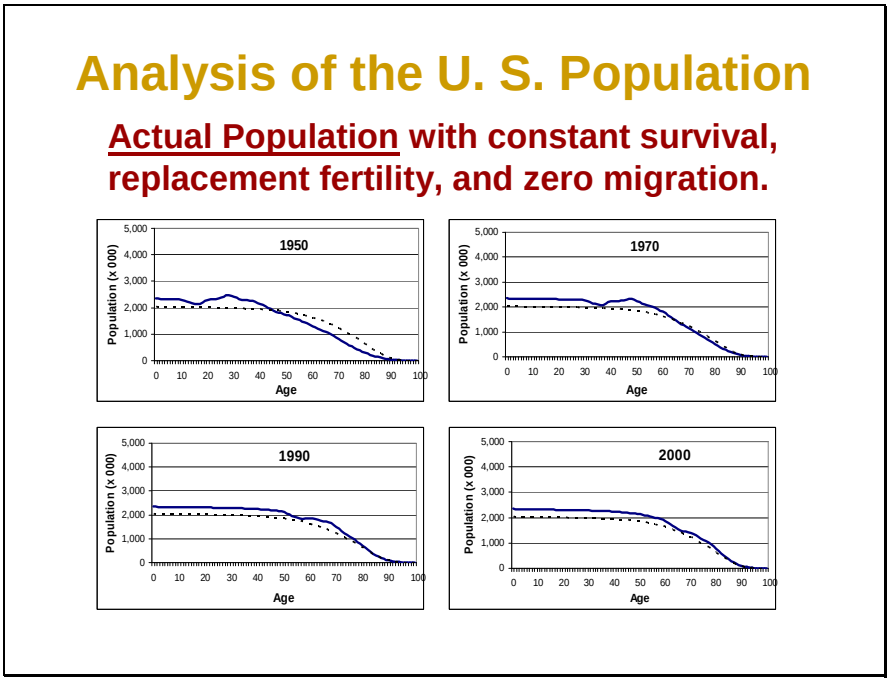
components of change, will be: changes in survival rates (Step 3), changes in fertility rates relative to replacement level (Steps 4 & 5), and migration (Step 6). The need for a Step 2 is explained next; the reason for two steps related to fertility will be evident as that subject is developed.

Step 2. Starting Point – the Actual Population in 1950. The charts which you saw previously started with 1950. Ideally, the analysis should start with a stationary population for 1920 to account for variations all along the way for populations still alive. However, consistent life table data at the time of this study were available only back to 1960, limiting how far back the study was able to go. The well-known baby-boom which began in earnest after World War II – 1946 -- and the need to include its effect in the study demanded an effort be made to begin the study before 1960. Therefore, a life table for 1950 was created by back-casting one from the 1960 and 1970 life tables. Fertility effects in the decade before 1950 were estimated from total fertility rates. However, it was felt that it was not possible to carry other aspects of the analysis back before 1950.

Because it was not possible to go back to 1920 with the analysis, the differences between the stationary population in 1950 and the actual population had to be accounted for. These differences would be the result of changes to the expected (stationary) population that occurred before 1950. As can seen from the charts on Slide US-2, the actual population in 1950 was younger than the standard population (shown by the dotted lines), i.e., that there were more populations in younger age groups and less in those over 44. As this was probably not the result of any baby boom in the previous decades (that would have added to younger age groups), it was likely the result of events that reduced the numbers of those over 44.

There are several possibilities of such events: lower survival rates in previous decades, the 1918 flu which caused the premature deaths of 550,000 people, and emigration that occurred during the

Slide US-2.



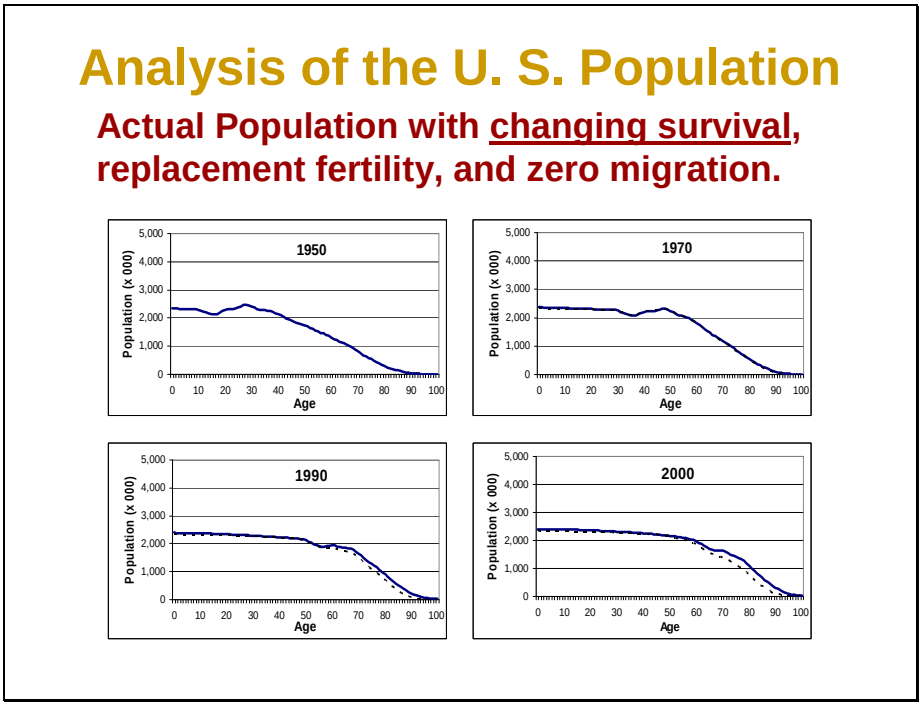
Depression. In any case, the effect of this ***actual*** distribution, which is a younger one than the stationary distribution, is to result in 14.7% more people in the United States in total and, in particularly, in the upper age groups by the year 2000 than would have occurred had the actual distribution of the 1950 population been that of the stationary population.

Step 3. Changes in Survival Rates. The next variation or change introduced to our stationary population is the result of increases in survival rates that actually occurred from 1950 to 2000. The largest improvement in survival rates over the fifty year period were for those over 65, with the biggest occurring in the 1970. (Colorado's life expectancies have always been somewhat higher than those of the U. S.. However, in the 1990s the U. S. rates improved more strongly than Colorado's, nearly closing this gap.)

Reductions in infant mortality were also important in extending life expectancies; the strongest of these occurred during the 1960s and 1970s. Also, automobile safety features have led to improvements in survival rates for young adults after 1970. In the two preceding decades, the survival rates for young adults actually declined as automobiles, not nearly as safe as today's cars, became much more available to them then they had been before.

The charts on Slide US-3 show the effects of the improved survival rates on the actual population. They show, as expected, significant increases in the number of people over the age of 55. (The dotted lines represent the data from the previous slide.) These increases resulted in an increase of 7.7% in the population total, with 6.1% (80% of the 7.7%) of this affecting the population over 55.

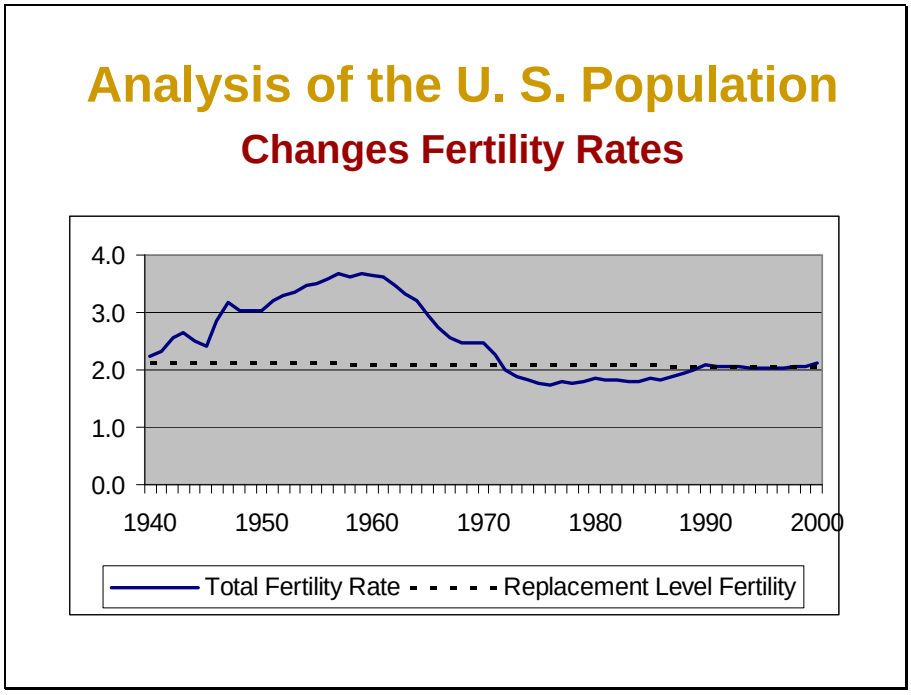
Slide US-3.



Step 4. Changes in Fertility Rates. The next change or variation applied to the stationary population was any increases or decreases in fertility that occurred during the period of analysis. As indicated earlier, an effort was made to include any variation before 1950 since the major thrust of the well-known baby-boom occurred in 1946. Chart US-1 (on the next page) shows the total fertility rates of women of child-bearing age from 1940 through 2000. Total fertility rates represent the total number of children that would be born to a woman (in the course of her lifetime) on the basis of age-specific fertility rates at that time. As can be seen, the rates have been close to two (2) except during the 1940 to 1970 when they were ***considerably*** above two, and then, from 1970 to 1990 when they were slightly below two.

Up to this point in our analysis we have been assuming that total fertility was at replacement level, which is a little above two. (Replacement level is the number of children a woman of child bearing age

Chart US-1.



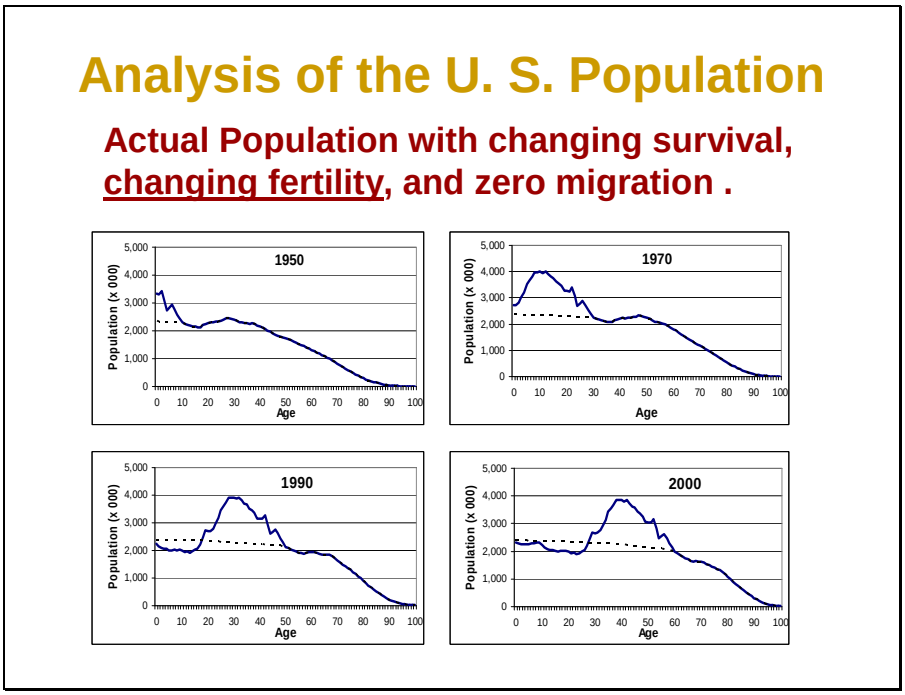
would need to have in order to replace herself as a mother. Since, first there was a 50-50 chance (approximately) her child would be a boy, she would need two children to get one female. Then an additional portion of a child is need to insure one female survives until child-bearing age.) For this study, replacement level fertility was estimated to be 2.11 in 1950, and, then because of improvements in survival (of young females), estimated to decline 0.01 per decade, to be 2.06 in 2000. For our analysis, children born above or below replacement level fertility were viewed as a variation to our stationary population. (Note, by this definition, a fertility "boom" actually occurred beginning in 1940, though there is a huge spike that occurs in 1946 – when the baby boom is said to have begun. It ended in 1972[1] when there is then a relatively minor "fertility bust", with TFR dropping to 1.74 at its lowest in 1978 and which ended in 1990.

The charts on Slide US-4 show the effect of these fertility booms and busts relative to an age distribution that begins with the 1950 stationary population (Step 1) and accounts for differences in the actual population (Step 2) and from increases in survival rates (Step 3). This boom, especially, and then even the bust, have significantly larger affects on the population – adding 21% to the population total -- (and its age distribution) than the previous ones. Note, too, how the peak of the fertility boom

[1] Many view the baby boom as ending in 1964 when fertility rates began to drop precipitously.

(and then the trough of the bust) moves upward into the age distribution as these population cohorts age through time.

Slide US-4.



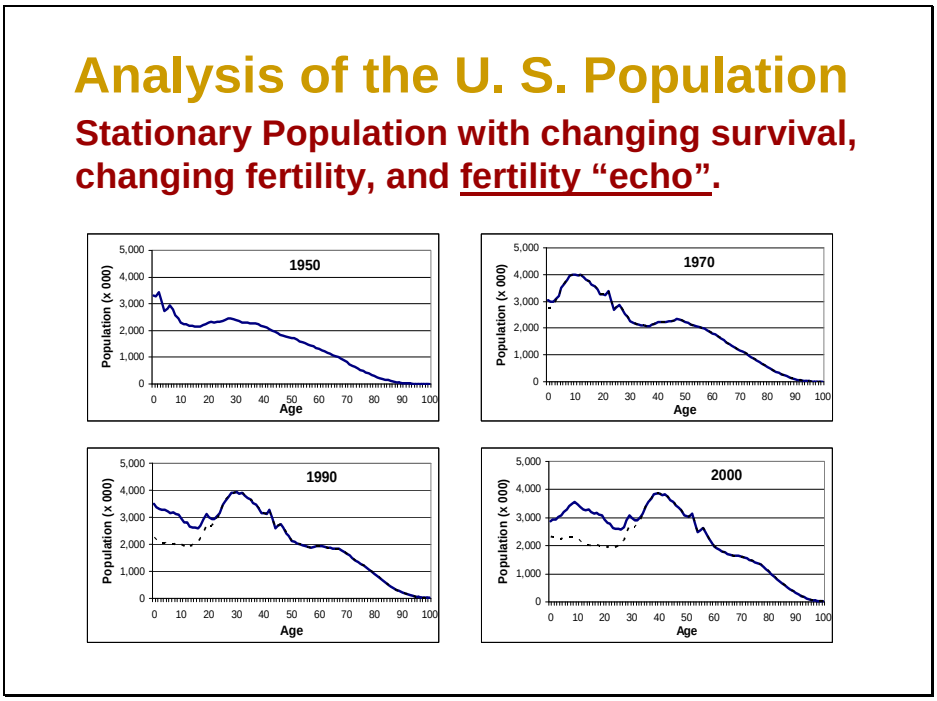
Step 5. The "Echo" Effect of Changes in Fertility Rates. However, there is also a second effect that results from a fertility boom or bust. This is referred to as a fertility ***echo***. A fertility echo occurs a generation later from a fertility boom when the extra boomer-babies become extra-boomer mothers. If fertility rates have returned to replacement levels at the time boomers become mothers, the fertility echo will essentially be equal to the boom itself.

In the period of this analysis, there is an echo from the fertility ***boom*** of the 1940s to 1971, but not yet one – an echo – from the fertility ***bust*** of the 1970s and 1980s. (The echo effect of the fertility bust is beginning to take place in the current decade – 2000 – 2010, and will have an even greater effect on the next.) Thus, over the fifty year period of this analysis, the overall effect of fertility ***booms*** and ***bust*** is less than the echo's boom-only effect.

The charts on Slide US-5 show the echo effect relative to the age distribution of the population in the previous set of charts which already account for the fertility boom. Note there is no echo effect until

after 1990. Then for both 1990 and 2000 there are significant increases in the populations under 20 and 30 respectively. (The dotted lines show the age distributions resulting from the previous steps, i.e., before this effect is added.)

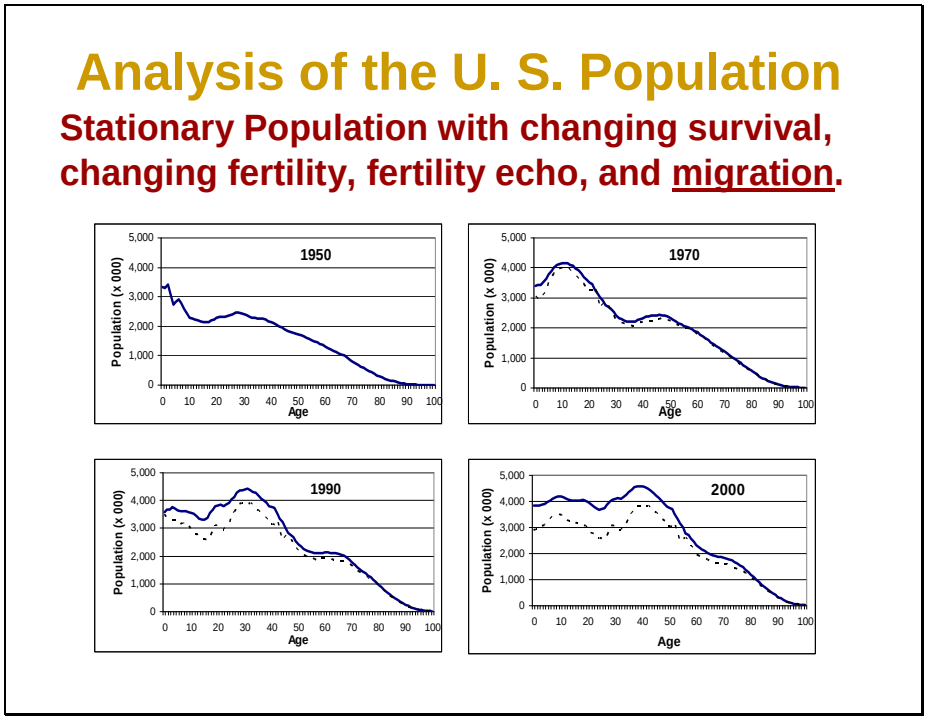
Slide US-5.



Step 6. Changes Due to Migration. The last type of effects accounted for in this analysis is the migration effect. These are calculated as a residual, i.e., as the difference between the actual population and that determined from the previous steps. The migration effects counted here include not only the immigrants themselves (who arrived during the fifty year period of this analysis) but also the children that were born to them after they arrived.

The charts on Slide US-6 show the migration effects for the U. S. over the study period (1950 – 2000). Note that the increases, when they occur, are for young adults (mainly) and then, for their children. The levels of immigration were relatively insignificant until the 1980s and then they became strong during the 1990s.

Slide US-6.



Findings for the United States

The results of these analyses have been summarized in two ways: The first has been in regards to the ***amounts of population***, for the total or for a particular age group. The tables on the next two pages show these effects for, first, the total U. S. population (Table US-1), and then the second for the population 35 – 54 (Table US-2) -- essentially the baby-boom cohort -- in the year 2000.

The second set of summaries are in regard to the overall ***distribution of the population***. The data shown here present the effects regarding the distribution in terms of percents of the total. The data are first presented – on Table US-3 -- in terms of percent of the base year population for that age group. This is to show the effects or the increases (or decreases) in each age group in terms of its ***initial*** population. However, to show changes in the ***actual*** distribution, the sum of the percents in any year had to equal 100%. Since the population as a whole (the total) grew during this fifty-year period – and by 93% or 193% of the initial population, the 2000 population percentages had to be squeezed or collapsed to again represent a total of (only) 100%. Thus, for an age group to gain as a percent of the total in 2000 over 1950, it had to grow faster than most of the others, i.e., more than 93%. These data

are shown on Table US-4 which present the Causes of Change in the Age Distribution as a percent of the ***final*** year total.

Summary of Effects on Population Amounts.

Table US-1 (below) shows the summary of the effects by each component of change on the ***total*** population. The 1950 (beginning year) population for the U. S. was 145,134,000, shown in the upper left hand corner of the data on the table. (See note on bottom.) The number is the reference number for all other data elements – it represents 100%. Over the fifty+ year period, the population increases to 281,422,000 or 193.9% of the original total. The data on the table show which component of change in each decade contributed to the ultimate 93.9% increase.

Table US-1.

Analysis of the U. S. Population

Summary of Effects on All Ages (Base Yr = 100%)

PERIOD	Population Begin Year	+ 1950 Age Adjustment	+ Change Surv. Rate	+ Fertility Boom/Bust	+ Fertility Echo	+ Effect of Migration	Total Chng in Period	Population Ending Yr.
	145,134,000							
Before 1950	100.0%	0.0%	0.0%	4.3%	0.0%	0.0%	4.3%	104.3%
1950 - 1960	104.3%	6.3%	0.2%	9.8%	0.0%	3.0%	19.3%	123.6%
1960 - 1970	123.6%	4.4%	0.6%	6.9%	0.6%	4.0%	16.5%	140.0%
1970 - 1980	140.0%	2.6%	1.6%	-1.6%	4.6%	8.9%	16.1%	156.1%
1980 - 1990	156.1%	1.2%	2.6%	-2.2%	8.4%	5.3%	15.3%	171.4%
1990 - 2000	171.4%	0.3%	2.6%	-0.8%	6.4%	14.1%	22.5%	193.9%
								281,422,000
Bf '50 - 2000	100.0%	14.7%	7.7%	16.2%	19.9%	35.4%	93.9%	193.9%

Note, on the bottom row, the relative contributions of each component. The migration (immigration) effect was the largest contributor, at 35.4%, but slightly less than the fertility boom and the fertility boom echo combined (16.2% + 19.9% = 36.1%). (The fertility boom is less than the echo because of the negative contributions of the fertility bust in the 1970s and 1980s.) The younger than "expected" (relative to the stationary population) age distribution in 1950 contributed 14.7%, more than the changes or improvements to survival rates – 7.7% -- mainly because its effect was immediate (impacted the entire 50 year period) while the improvements to survival rates only gradually effected

the population as they took place and as the populations entered those age groups with the greater improvements.[2]

The analysis on Table US-2 is identical in its purpose to the previous one, except that it shows the data for a specific age group, that 35 – 54. The population in this age group was 38,011,000 in 1950. It grew to 82,452,000 in 2000. The data show that most of this increase of over 100% (116.9%) was due to the fertility boom (64.3%) as this is the "baby boom" cohort. However, 36.2% was also due to

Table US-2.

Analysis of the U. S. Population

Summary of Effects - Ages 35 - 54 (Base Yr = 100%)

PERIOD	Population Begin Year	+ 1950 Age Adjustment	+ Change Surv. Rate	+ Fertility Boom/Bust	+ Fertility Echo	+ Effect of Migration	Total Chng in Period	Population Ending Yr.
	38,011,000							
Before 1950	100.0%	2.2%	0.0%	0.0%	0.0%	0.0%	2.2%	102.2%
1950 - 1960	102.2%	13.0%	0.0%	0.0%	0.0%	1.6%	14.5%	116.7%
1960 - 1970	116.7%	0.6%	-0.2%	0.0%	0.0%	4.6%	5.1%	121.8%
1970 - 1980	121.8%	-3.5%	0.1%	5.0%	0.0%	4.3%	6.0%	127.8%
1980 - 1990	127.8%	1.7%	0.5%	26.0%	0.0%	9.2%	37.4%	165.2%
1990 - 2000	165.2%	1.1%	0.8%	33.4%	0.0%	16.5%	51.8%	216.9%
								82,452,000
Bf '50 - 2000	100.0%	15.1%	1.3%	64.3%	0.0%	36.2%	116.9%	216.9%

immigration, and mostly, in the last two decades (1980 – 2000). ***(Data for other age groups are shown in the Appendix.)***

<u>Summary of Effects on the Population Distribution</u>.

Tables US-3 and US-4 address the issue of the age distribution itself, that is the proportion that each age group is of the total. Many would like to say, for example, that because of the baby boom the age

[2] Note: The U. S. population in 1950 was actually 151,326,000. However, 6,192,000 has been attributed to the fertility boom that occurred from 1940 to 1950. Thus, that amount was withdrawn from the base year population and then added back in under the Fertility Boom / Bust column (4.3%) for the Before 1950 time period

group 35 -54 is a significantly higher percent of the total in 2000 than it was in 1950. This is partly true, but its percent of the total in 2000 – if the total remains at 100% -- is offset by increases that have also occurred in other age groups.

To show these effects, the data are presented in two steps. The first, shown on Table US-3, keeps all the percents in terms of the base year population. With 1950 as the base year of 100%, the year 2000 (shown above) has a total population of 193.9%. This table shows that increases actually occurred in all age groups.

Table US-3.

Analysis of the U. S. Population

Causes of the Age Distribution in 2000

As Percent of Base Year Total

AGE GRP	Begin Year Stat. Pop.	Actl. Pop. Adjustmnt	+ Increase Surv. Rates	+ Fertility Boom/Bust	+ Fertility Echo	+ Migratn Effect	End Year Population
0 - 4	7.0%	1.1%	0.2%	-0.2%	2.5%	2.7%	13.3%
5 - 14	13.9%	2.1%	0.5%	-1.0%	8.3%	4.5%	28.3%
15 - 24	13.8%	2.1%	0.4%	-2.4%	6.8%	6.4%	27.0%
25 - 34	13.7%	2.1%	0.2%	1.8%	2.3%	7.6%	27.6%
35 - 44	13.4%	2.0%	0.1%	10.2%	0.0%	5.1%	30.9%
45 - 54	12.8%	1.9%	0.2%	6.6%	0.0%	4.3%	25.9%
55 - 64	11.3%	1.5%	0.8%	1.2%	0.0%	2.0%	16.8%
65 - 74	8.6%	1.0%	1.5%	0.0%	0.0%	1.6%	12.7%
75 - 84	4.6%	0.9%	2.1%	0.0%	0.0%	0.8%	8.5%
85 +	0.9%	0.1%	1.7%	0.0%	0.0%	0.2%	2.9%
Total Pop.	100.0%	14.7%	7.7%	16.2%	19.9%	35.4%	193.9%

However, for an age group to increase as a percent of a year 2000 100% total (shown in the next table) the percentage here would have to have nearly doubled (as explained before). Note on Table US-3 (above) that the 35 -44 age group more than doubled (went from 13.4% to 30.9% in 2000) while the same is also true for the 45 – 54 age group (which went from 12.8% to 25.9%). Most other age groups, especially those over 55 did not double, and thus, for them, the percent of the total in 2000 will be less than it was in 1950 (see Table US-4)[3].

[3] Note: the data are presented in 10-year age groups, except for the first which is a five year age group. If in the first – Begin Year Stat. Pop. – column the percent for the first age group is doubled (from 7.0% to 14.0%) one can see a smooth decline in the percent of the total of each age group as they are of equal size. This arrangement should help in the evaluation of the data regarding the overall age distribution.

Table US-4 shows the age distribution for the ***final*** year – 2000 – in terms of 100% of the ***final*** year total. Here, it is easier to see which age groups increased or decreased as a percent of that year's total than from the previous table. However, this table is somewhat harder to grasp intuitively without having seen Table US-3. This is because along with the increases in population occurring in each age

Table US-4.

Analysis of the U. S. Population

Causes of the Age Distribution in 2000

As Percent of Final Year Total

AGE GRP	Begin Year Stat. Pop.	Actl. Pop. Adjustmen	+ Increase Surv. Rates	+ Fertility Boom/Bust	+ Fertility Echo	+ Migratn Effect	End Year Population
0 - 4	7.0%	0.0%	-0.3%	-1.0%	0.9%	0.2%	6.8%
5 - 14	13.9%	0.0%	-0.5%	-2.3%	3.8%	-0.4%	14.6%
15 - 24	13.8%	0.0%	-0.6%	-3.3%	3.0%	0.9%	13.9%
25 - 34	13.7%	0.0%	-0.7%	-0.2%	-0.2%	1.6%	14.2%
35 - 44	13.4%	0.0%	-0.8%	5.9%	-2.3%	-0.3%	15.9%
45 - 54	12.8%	0.0%	-0.6%	3.4%	-1.9%	-0.2%	13.4%
55 - 64	11.3%	-0.2%	-0.1%	-0.4%	-1.3%	-0.6%	8.7%
65 - 74	8.6%	-0.3%	0.7%	-1.1%	-1.0%	-0.4%	6.5%
75 - 84	4.6%	0.2%	1.4%	-0.7%	-0.7%	-0.4%	4.4%
85 +	0.9%	0.0%	1.3%	-0.3%	-0.2%	-0.2%	1.5%
Total Pop.	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%

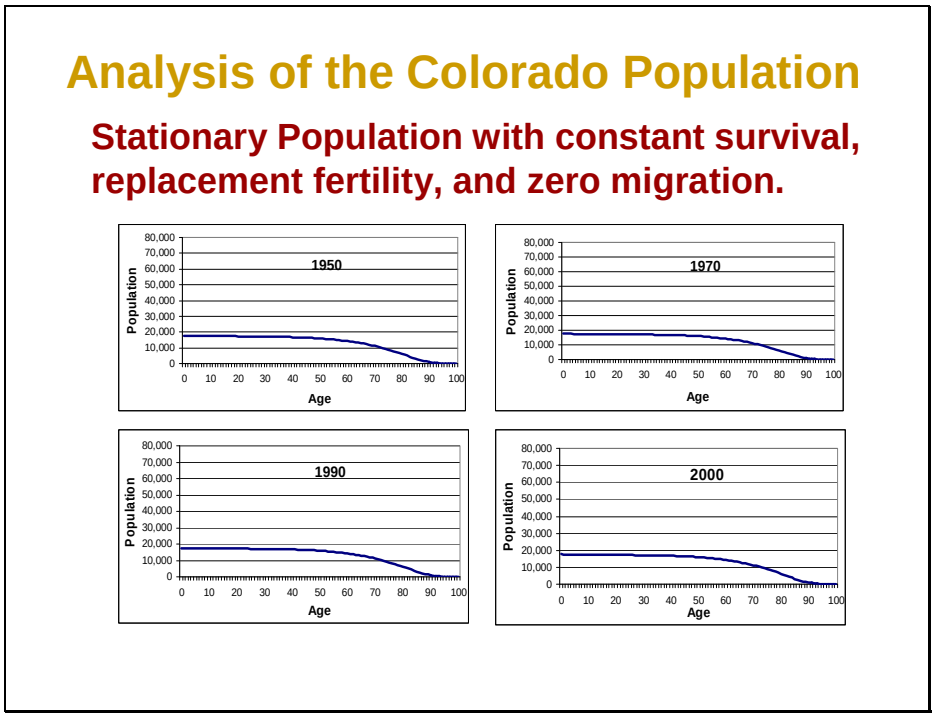
group, there is a ***"squishing"*** effect on each age group that results from increases in the other (age groups) while keeping all the numbers as a percent of a total of 100%. The negatives (or the positives) in each of the columns mean that the causes relative to the age group are below (or above) average.

The Analysis of the Colorado Population

What now follows is a similar analysis for Colorado.

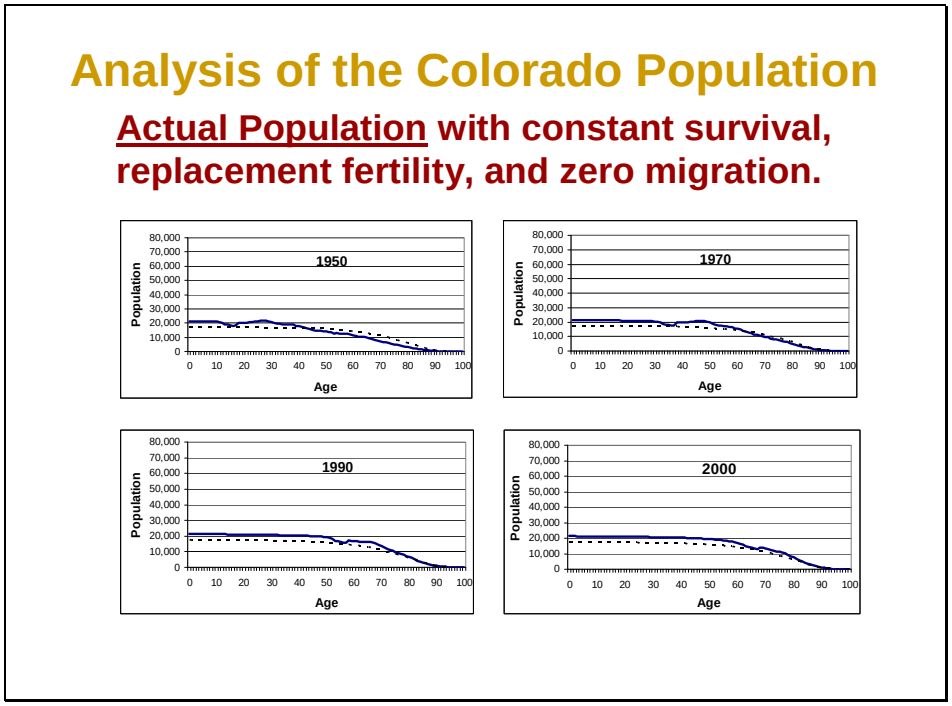
Step 1. Stationary Population Unchanged. Slide C-1shows the 1950 stationary population for Colorado, which, with constant survival, replacement level fertility and zero migration, results in no change in the total nor in the age distribution of the population over the fifty year period ending in 2000.

Slide C-1.



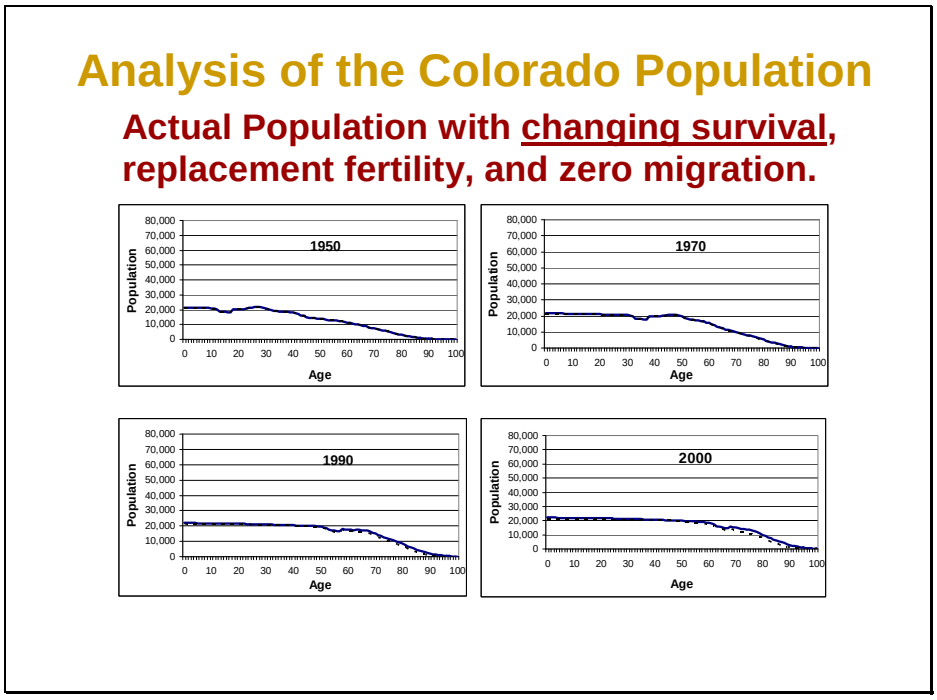
Step 2. Starting Point – The Actual Population in 1950. Now (on Slide C-2), the age distribution of the actual population in 1950 is shown as a factor, and similar to the United States as a whole, it is younger than that represented by the stationary population.

Slide C-2.



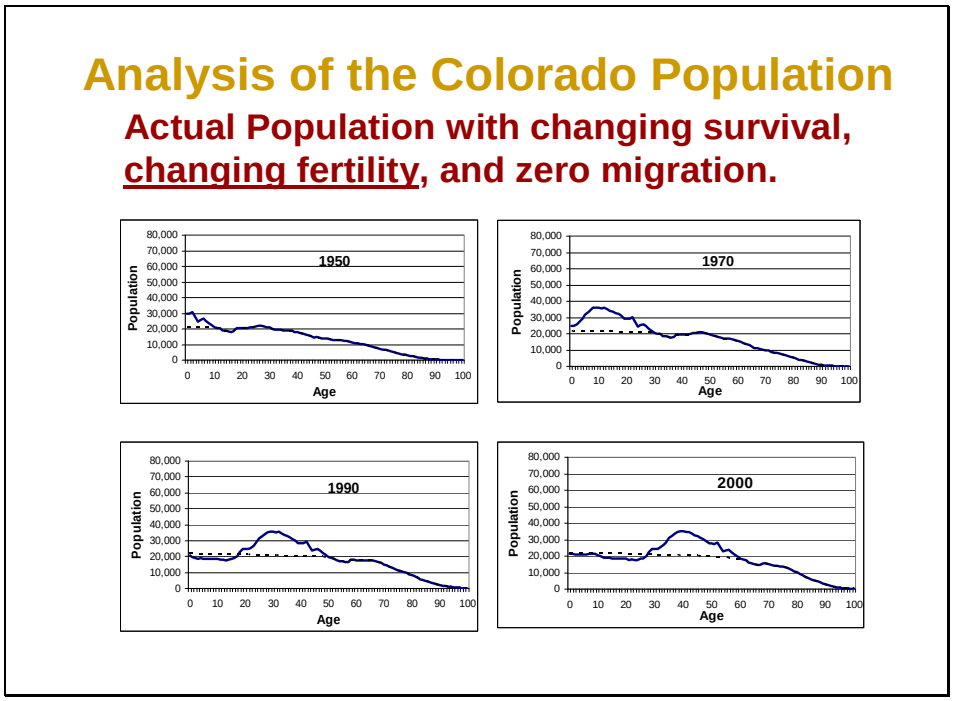
Step 3. Changes in Survival Rates. On Slide C-3, changing – mostly improved – survival rates are applied to the actual population, resulting in more people – particularly those over 50 – by the year 2000.

Slide C-3.



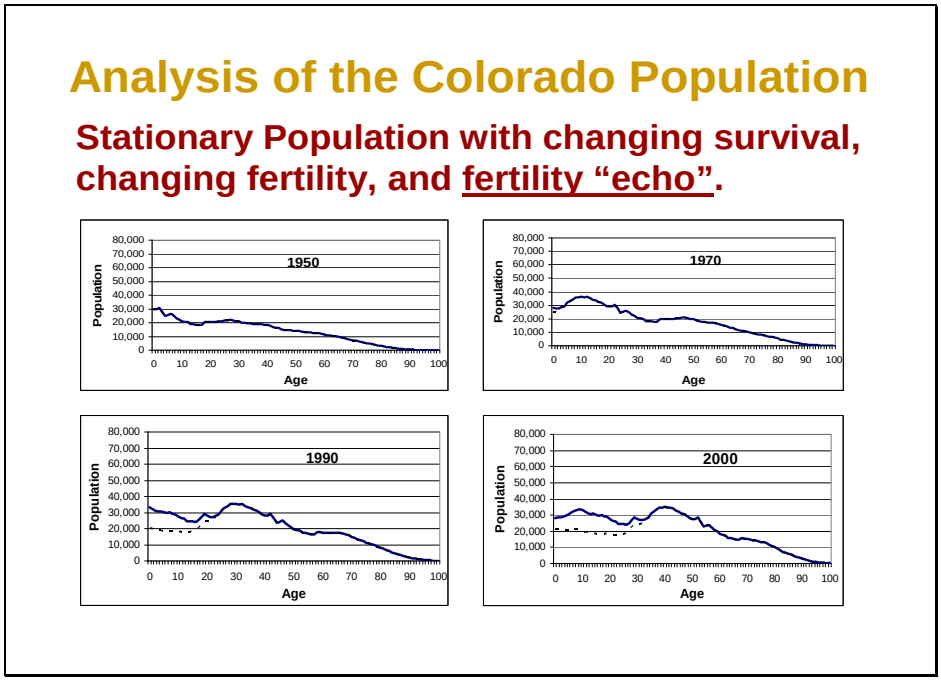
Step 4. Changes in Fertility Rates. Next (shown on Slide C-4), above and below replacement level fertility rates are applied to the (Colorado) population resulting in the classic bulge in the age groups affected by the fertility boom and a slight drop in those affected by the fertility bust.

Slide C-4.



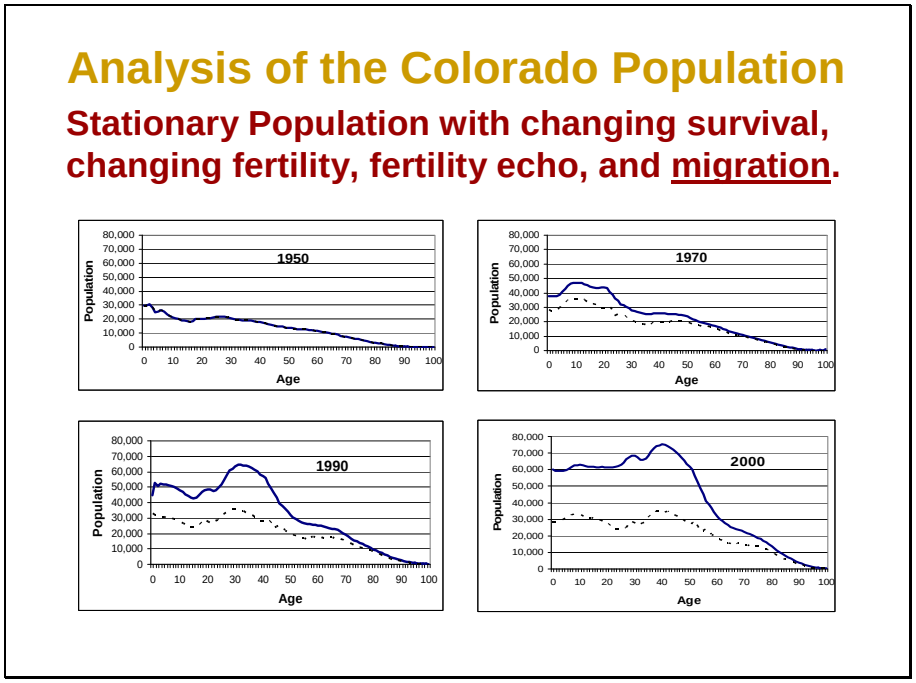
Step 5. The "Echo" Effect of Changes in Fertility Rates. Next (shown on Slide C-5), the fertility "echo" effect is applied to the population, resulting in significant increases in younger populations in 1990 and 2000. One of the interesting findings of this study is the little peak or blip that shows for the early 20 year olds in 1990 and the early 30 years old in 2000. This blip has appeared in all our previous age analysis and that related to our forecasts but for which we had no explanation. From this analysis, it seems that it is an echo (effect) from the sudden jump in fertility after WWII in 1946. (The jump in fertility in this year is also mirrored in 1990 for the 44 years olds and in 2000 for the 54 year olds.) However, the point where it creates a sudden echo effect, the effect of the fertility bust has not yet hit its nadir. Thus, the blip jumps up from an only modestly declining fertility bust and appears as a seemingly unexplainable spike.

Slide C-5.



Step 6. Changes Due to Migration. This next set of charts, on Slide C-6, shows the effect of migration on the state's population by age. Here, we are looking at something very different from the U. S. age distribution. Here, for Colorado, migration comes out as not just a significant cause of

Slide C-6.



change but a ***major – if not dominant – one***. Several tables in the next section will show just how large the effects of this factor have been.

Findings for Colorado

Summary of Effects on Population Amounts.

This next table (Table C-1) shows the Colorado population increase from 1950 to 2000 by components of change and by decade. As we can see, during the fifty year period Colorado's population increased 239.4%, as compared to the U. S.'s population of 93.9% -- two and a half times that of the U. S. – and, virtually all of this additional increase is due to net in-migration. The state's increase due to the fertility boom was 15.3% compared to the U. S.'s of 16.2%. Its increase due to the fertility echo was 22.4% compared to the U. S.'s of 19.9%. Its increase due to the 1950 age adjustment was 20.5%, a bit higher than the U. S.'s of 14.7%.

Table C-1.

Analysis of the Colorado Population

Summary of Effects on All Ages (Base Yr = 100%)

PERIOD	Population Begin Year	+ 1950 Age Adjustment	+ Change Surv. Rate	+ Fertility Boom/Bust	+ Fertility Echo	+ Effect of Migration	Total Chng in Period	Population Ending Yr.
	1,267,452							
Before 1950	100.0%	0.0%	0.0%	4.2%	0.0%	0.0%	4.2%	104.2%
1950 - 1960	104.2%	7.4%	0.3%	9.8%	0.0%	16.7%	34.2%	138.4%
1960 - 1970	138.4%	5.6%	0.8%	6.8%	0.7%	21.9%	35.8%	174.1%
1970 - 1980	174.1%	4.0%	1.8%	-1.9%	5.2%	44.9%	53.9%	228.0%
1980 - 1990	228.0%	2.5%	2.8%	-2.5%	9.2%	20.0%	31.9%	259.9%
1990 - 2000	259.9%	1.1%	2.6%	-1.1%	7.4%	69.4%	79.4%	339.4%
								4,301,261
Bf '50 - 2000	100.0%	20.5%	8.3%	15.3%	22.4%	172.8%	239.4%	339.4%

The real difference, however, is that due to migration, which is 172.8% for Colorado, compared to 35.4% for the U. S. This later finding suggests that it is a mistake to talk about the aging of the state's baby boomers as the cause – or at least sole cause -- of the coming "aging" of the state's population or

that over 65. More appropriately, possibly, we can talk about boomers moving to the state during their early adult ages, and hence (reflected here in the migration component) the state does have a disproportionate share of the nation's baby or fertility boomers and "echoers" (see next page). Even more, as well shall see, it is definitely wrong to talk about the state's age distribution as a function of the fertility boom and echo. Migrants to the state between 1990 and 2000 filled in the saddle between the state's fertility boom and echo, see previous page, while the saddle still remains in the U. S. age distribution in 2000.

The analysis of the causes of change of the Colorado population 35 – 54, the age group of the fertility boom cohort, is shown on Table C-2 (below). Here again the increase is two and a half times that of the U. S. and the margin of difference is due to migration. (The increase, due to the fertility boom of its own is almost identical to that of the U. S.: 65.6% for Colorado vs. 64.3% for the U. S.) However, the increase due to migrants is 222.4% versus 36.2% for the U. S.. There is reason to believe here that many of these migrants are from the larger pool of fertility boomers elsewhere in the country.

Table C-2.

Analysis of the Colorado Population

Summary of Effects - Ages 35 - 54 (Base Yr = 100%)

PERIOD	Population Begin Year	+ 1950 Age Adjustment	+ Change Surv. Rate	+ Fertility Boom/Bust	+ Fertility Echo	+ Effect of Migration	Total Chng in Period	Population Ending Yr.
	327,158							
Before 1950	100.0%	-2.7%	0.0%	0.0%	0.0%	0.0%	-2.7%	97.3%
1950 - 1960	97.3%	17.1%	0.0%	0.0%	0.0%	12.9%	30.0%	127.3%
1960 - 1970	127.3%	4.0%	0.1%	0.0%	0.0%	18.3%	22.3%	149.7%
1970 - 1980	149.7%	-1.8%	0.4%	5.0%	0.0%	36.3%	39.9%	189.6%
1980 - 1990	189.6%	3.3%	0.8%	26.3%	0.0%	56.3%	86.7%	276.3%
1990 - 2000	276.3%	1.7%	1.2%	34.3%	0.0%	98.6%	135.8%	412.1%
								1,348,129
Bf '50 - 2000	100.0%	21.6%	2.5%	65.6%	0.0%	222.4%	312.1%	412.1%

If it is assumed that 80% of this difference is due to boomer migrants from within the U. S., then Colorado's boomers are nearly four times that of the U. S.. (222.4 x .80 = 176 – 36.2 = 139.8 versus 36.2 = 3.9) (The next tables show, among other things, how other age groups fared from the overall migration effect on Colorado.)

Summary of Effects on the Population Distribution.

On the table below (Table C-3), we can see the percentage increases in the population and, specifically, those caused by the migration effect (third to last column) on all age groups. The largest percentage increase of an age group as caused by migration is the baby-boom age group 35 - 44 (44.5%) with its companion boomer group, ages 45 – 54, also strong. But here, also, the younger adult age groups show strong increases, due mainly to the in-migration that occurred to the state in the 1990s.

Table C-3.

Analysis of the Colorado Population

Causes of the Age Distribution in 2000

As Percent of Base Year Total

AGE GRP	Begin Year Stat. Pop.	Actl. Pop. Adjustmnt	+ Increase Surv. Rates	+ Fertility Boom/Bust	+ Fertility Echo	+ Migration Effect	Total Change	End Year Population
0 - 4	6.9%	1.5%	0.3%	-0.4%	3.0%	12.1%	16.5%	23.4%
5 - 14	13.8%	3.0%	0.6%	-1.3%	9.2%	23.6%	35.1%	48.8%
15 - 24	13.6%	2.9%	0.5%	-2.8%	7.5%	26.8%	34.9%	48.6%
25 - 34	13.5%	2.9%	0.4%	1.6%	2.7%	31.3%	38.9%	52.4%
35 - 44	13.2%	2.8%	0.3%	10.3%	0.0%	31.1%	44.5%	57.7%
45 - 54	12.6%	2.7%	0.4%	6.6%	0.0%	26.3%	36.0%	48.6%
55 - 64	11.3%	2.1%	0.9%	1.2%	0.0%	11.5%	15.7%	27.0%
65 - 74	8.9%	1.3%	1.4%	0.0%	0.0%	6.2%	8.9%	17.8%
75 - 84	5.1%	1.2%	1.9%	0.0%	0.0%	3.0%	6.1%	11.1%
85 +	1.1%	0.1%	1.6%	0.0%	0.0%	1.0%	2.7%	3.9%
Total Pop.	100.0%	20.5%	8.3%	15.3%	22.4%	172.8%	239.4%	339.4%

By reviewing the second-to-last column, one can see that there were strong increases during the period in all age groups 5 – 54. For ages 35 – 54, there is an effect of 10.3% and 6.6% due to the fertility boom and for the ages 5 – 24, a 9.2% and 7.5% effect, as the result of the echo. Increases in these age groups under the migration effect can be said to have drawn off of boomers and echoers in the rest of the U. S., but it would have taken a faster growing economy to do so. The more important role of the

state's economy is shown by its generating an even larger migration effect in the 1990s at a time when there is a lesser proportion of the migration-prone age groups in the United States.

This last table (Table C-4) shows the *"squishing"* effect of reducing the total percentages in the final year of 2000 from 339.4% to 100%. Here, the percentages of most age groups change very little from 1950 because many of them had large increases, mostly due to migration. The age groups with the larger relative increases (second to least column) are the boomers + the 25 – 34 year age group most effected by the migration of the 1990s.

Table C-4.

Analysis of the Colorado Population

Causes of the Age Distribution in 2000

As Percent of Final Year Total

AGE GRP	Begin Year Stat. Pop.	Actl. Pop. Adjustment	+ Increase Surv. Rates	+ Fertility Boom/Bust	+ Fertility Echo	+ Migration Effect	Total Change	End Year Population
0 - 4	6.9%	0.1%	-0.2%	-1.0%	1.0%	0.1%	0.0%	6.9%
5 - 14	13.8%	0.1%	-0.5%	-2.3%	4.0%	-0.8%	0.6%	14.4%
15 - 24	13.6%	0.1%	-0.5%	-3.3%	3.1%	1.2%	0.7%	14.3%
25 - 34	13.5%	0.1%	-0.6%	-0.3%	-0.1%	2.8%	2.0%	15.4%
35 - 44	13.2%	0.1%	-0.7%	5.8%	-2.5%	1.0%	3.8%	17.0%
45 - 54	12.6%	0.1%	-0.5%	3.3%	-2.1%	0.9%	1.7%	14.3%
55 - 64	11.3%	-0.2%	0.0%	-0.3%	-1.4%	-1.3%	-3.4%	7.9%
65 - 74	8.9%	-0.4%	0.6%	-1.0%	-1.1%	-1.7%	-3.7%	5.3%
75 - 84	5.1%	0.1%	1.2%	-0.7%	-0.8%	-1.6%	-1.8%	3.3%
85 +	1.1%	-0.1%	1.2%	-0.2%	-0.3%	-0.6%	0.0%	1.1%
Total Pop.	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%

Note sharp decreases as a percent of the total for those over 55. This relates to what the State Demography Office staff have been saying about the coming of the boomers representing a bigger change than we feel people are expecting. During the analysis period, and especially during the last 20 – 30 years, there has been strong growth in the working age adult population. The effect of this has been to strongly ***reduce*** the population over 55 as a percent of the total by almost **9%** (-3.4%, -3.7% and -1.8% in the second-to-last column). This will be radically reversed as our own fertility boomers, but more importantly, our fertility boomer ***migrants*** enter the older age groups**.**

Comparison of the U. S. and Colorado Populations.

These tables (Table US-3 andTable C-3) were shown before but are presented again to enable readers to compare the data of the effects on the total population of that for the U. S. with that for Colorado.

Table US-3.

Analysis of the U. S. Population

Causes of the Age Distribution in 2000

As Percent of Base Year Total

AGE GRP	Begin Year Stat. Pop.	Actl. Pop. Adjustmnt	+ Increase Surv. Rates	+ Fertility Boom/Bust	+ Fertility Echo	+ Migratn Effect	End Year Population
0 - 4	7.0%	1.1%	0.2%	-0.2%	2.5%	2.7%	13.3%
5 - 14	13.9%	2.1%	0.5%	-1.0%	8.3%	4.5%	28.3%
15 - 24	13.8%	2.1%	0.4%	-2.4%	6.8%	6.4%	27.0%
25 - 34	13.7%	2.1%	0.2%	1.8%	2.3%	7.6%	27.6%
35 - 44	13.4%	2.0%	0.1%	10.2%	0.0%	5.1%	30.9%
45 - 54	12.8%	1.9%	0.2%	6.6%	0.0%	4.3%	25.9%
55 - 64	11.3%	1.5%	0.8%	1.2%	0.0%	2.0%	16.8%
65 - 74	8.6%	1.0%	1.5%	0.0%	0.0%	1.6%	12.7%
75 - 84	4.6%	0.9%	2.1%	0.0%	0.0%	0.8%	8.5%
85 +	0.9%	0.1%	1.7%	0.0%	0.0%	0.2%	2.9%
Total Pop.	100.0%	14.7%	7.7%	16.2%	19.9%	35.4%	193.9%

Table C-3.

Analysis of the Colorado Population

Causes of the Age Distribution in 2000

As Percent of Base Year Total

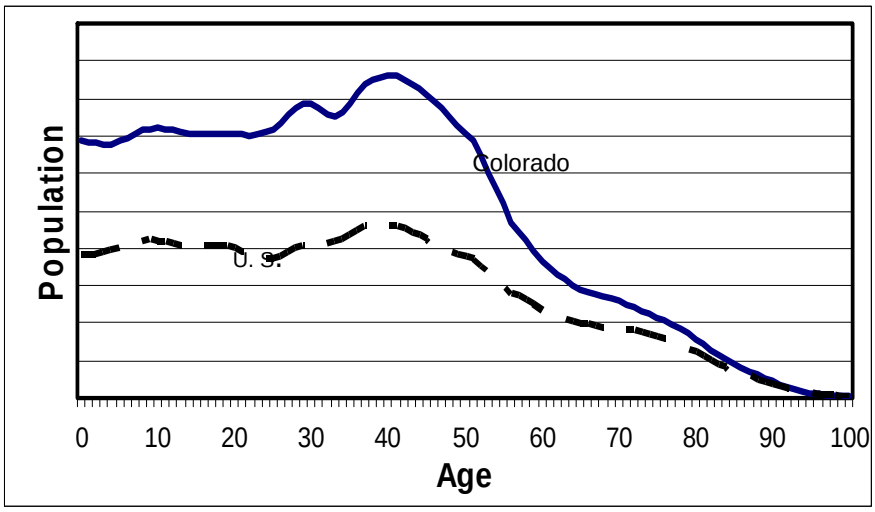
AGE GRP	Begin Year Stat. Pop.	Actl. Pop. Adjustmnt	+ Increase Surv. Rates	+ Fertility Boom/Bust	+ Fertility Echo	+ Migration Effect	Total Change	End Year Population
0 - 4	6.9%	1.5%	0.3%	-0.4%	3.0%	12.1%	16.5%	23.4%
5 - 14	13.8%	3.0%	0.6%	-1.3%	9.2%	23.6%	35.1%	48.8%
15 - 24	13.6%	2.9%	0.5%	-2.8%	7.5%	26.8%	34.9%	48.6%
25 - 34	13.5%	2.9%	0.4%	1.6%	2.7%	31.3%	38.9%	52.4%
35 - 44	13.2%	2.8%	0.3%	10.3%	0.0%	31.1%	44.5%	57.7%
45 - 54	12.6%	2.7%	0.4%	6.6%	0.0%	26.3%	36.0%	48.6%
55 - 64	11.3%	2.1%	0.9%	1.2%	0.0%	11.5%	15.7%	27.0%
65 - 74	8.9%	1.3%	1.4%	0.0%	0.0%	6.2%	8.9%	17.8%
75 - 84	5.1%	1.2%	1.9%	0.0%	0.0%	3.0%	6.1%	11.1%
85 +	1.1%	0.1%	1.6%	0.0%	0.0%	1.0%	2.7%	3.9%
Total Pop.	100.0%	20.5%	8.3%	15.3%	22.4%	172.8%	239.4%	339.4%

The next chart (Chart US-C-1) enables the comparison of the Colorado population by age in 2000 with that of the U. S.[4] in terms of their respective 1950 populations. (These data are from the last column on Tables US-3 and C-3 shown on the previous page.) The fertility boom and its echo are discernible in the U. S. distribution (which is also effected by considerable immigration in the 1990s), but they are dwarfed in the Colorado distribution by the migration effect. Again, this effect in the state covers most age groups under 50, especially those either side of 40, the latter the result of the U. S. fertility boom. More importantly, however, they result from the Colorado economic growth during the skiing industry and energy booms of the 1970s and early 1980s. The bulge in the 27 – 33 years old in 2000 in Colorado is due to the migration caused by the strong economy of the 1990s.

Chart US-C-1.

Age Distributions of the U. S. and Colorado Populations, 2000

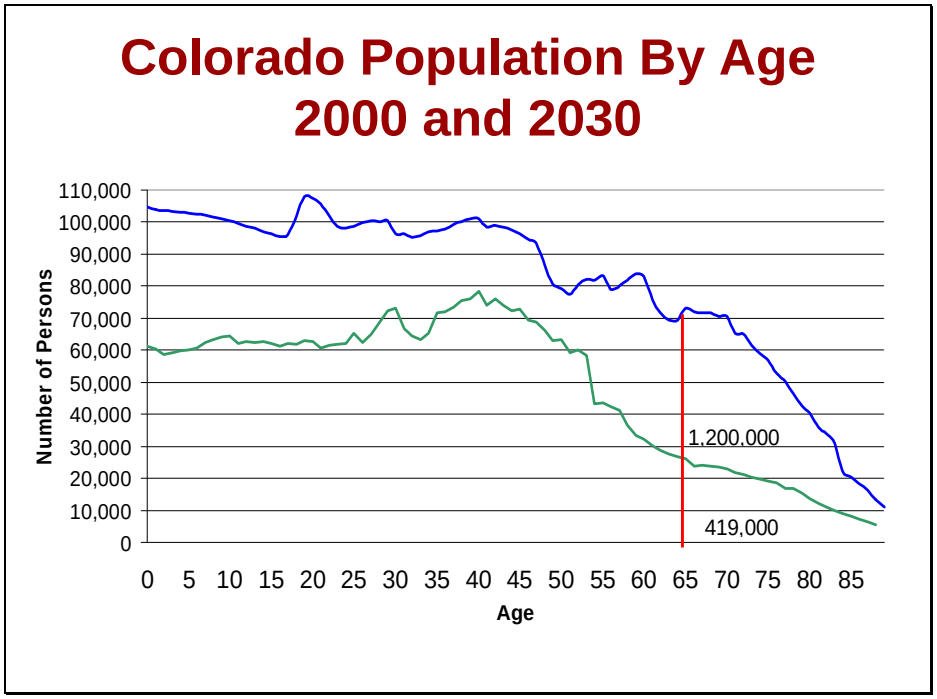
In relation to their 1950 base year population totals.



On the following chart (Chart C-2) the population of Colorado by age in 2030 (top line) is compared to that in 2000 (bottom line). A vertical line has been added to identify the population that is 65. It highlights that the number of persons age 65 ***and over*** in the year 2000 (419,000), and then in the year 2030 (1,200,000 – almost three times as much as in 2000).

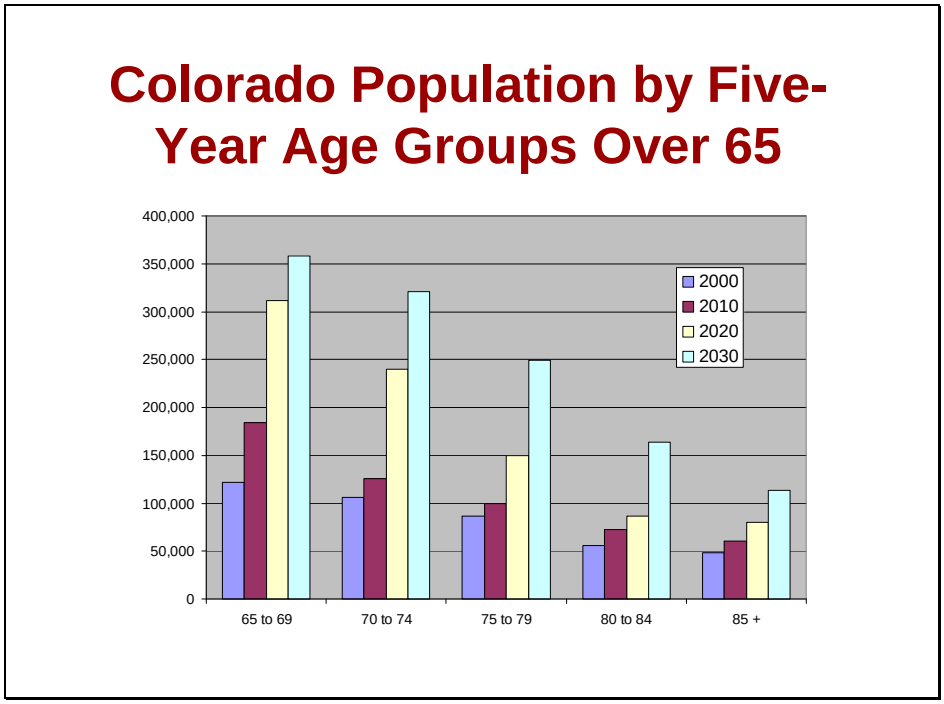
[4] On a scale equal to the stationary population.

Chart C-2.



These series of bar charts, showing the populations of each five-year age group over 65 for 2000, 2010, 2020, and 2030, display the increases in each group that are expected over the next 30 years (since 2000). Note that all except the last are expected to nearly ***triple*** during the period.

Chart C-3.



Conclusions

The purposes of this work were to: 1.) to develop a tool that would enable demographers to understand and explain to others why the age distribution of a certain population was what it was, and 2.) to provide a specific explanation of why the aging of the "baby boomers" in Colorado will result in an unusually large change in the population 65 and over after 2010.

Regarding the first purpose, a tool was developed which used the standard population from a life table for an area as a standard distribution, and then, beginning with this base, identify the effects of 2.) the actual population in 1950 (versus the standard), 3.) changes in survival rates, 4.) changes in fertility rates, 5.) the "echo" effect of changes in fertility rates, 6.) changes dues to migration. These effects were presented on slides containing charts and tables in Findings sections for both the United States and Colorado.

For the second purpose regarding the "baby boom" cohort, findings were presented for the age group 35 – 54 in 2000. These showed (from Tables US-2, page 12, and C-2, page 20) increases of 116.9% and 312.1% for the United States and Colorado, respectively, during the period 1950 – 2000. The causes of the U. S. increase were mainly from the fertility boom (64.3%) and net immigration (36.2%) plus the 1950 age adjustment (15.1%). Those of Colorado's increases were, yes, from the fertility boom (similar to the U. S. – 65.6%), but from net migration a whooping 222.4%. It is this factor – the net (in-) migration to the state during the period's 50 years – that has caused this "baby boom" cohort to have grown faster in Colorado than in the United States, or to be 4.12 times as large as it would have been off its 1950 population while that of the United States would have been "only" 2.17 times as large.[5]

There are findings for other years, i.e., 1960, 1970, 1980, 1990, and other age groups, i.e., 0-4, 5-14, and any ten-year or twenty-year age group which could be included in an Appendix if so decided.

[5] As a result of this age cohort in 2000, the State Demography Office expects the population over 65 to triple by 2030.

POSTSCRIPT

The following comments relate to the attractiveness and expected migration patterns of the populations over 65 in the state. ***I am not sure if they are appropriate for this report, so have not done any work to edit or revise these last three pages. If, however, we decide to include them, we should review whether we want to use any of the slide formats in the text.***

Slide CR-1.

The Metropolitan Front Range

Each of the state's Front Range metropolitan areas have, at one time or another, been recognized as especially attractive for retirees.

A retirement magazine recently identified the Denver Metro area as the most attractive in the country for retirees, mainly because of its relative modest densities and ease of getting around, especially to cultural and sports events.

The North Front Range counties of Larimer and Weld have been noted to be attractive for retirees, again because of their relative low density, their rural lifestyle and open space, and their having full urban (including health) services and a university.

The Colorado Springs metropolitan area has many of the above attractions, is especially scenic, and has always been a first choice for military retirees.

Pueblo county (and metropolitan area) is ten degrees warmer than the above three and thus, provides a milder climate and more golfing days. It also has attractive -- undiscovered -- mountain areas.

Slide CR-2.

The Metropolitan Front Range Attractiveness for Retirees

- **Each metropolitan area offers special features for retirees.**
- **In general, the metropolitan areas provide for access to services, entertainment, museums, friends and relatives.**
- **But, there are problems of congestion, high costs, other.**

The Western Slope and Central Mountains

The Western Slope and Central Mountains have already been receiving migrant retirees from out of state as well as the Front Range. The milder climate in Grand Junction and south along highway 50 (+ readily available water for development) have made the Delta-Montrose region most attractive. The resort counties of Routt, Grand, Summit, Eagle, Pitkin, Gunnison and San Miguel are especially attractive, though because they are relatively colder, may keep their retirees for only part of the year. The urban counties of Mesa, La Plata (Durango), Fremont (Canon City) + Montrose will attract retirees not only because of the beauty of the surrounding area but also because of the broad spectrum of services that are available in those places.

Slide CR-3.

The Eastern Plains and San Luis Valley

Because the front end of the fertility boomers is still below 65, it is not yet clear how large an impact there will be from retirees on the Eastern Plains and the San Luis Valley. The economies of many of these areas are currently struggling and there are concerns regarding health services for older people. However, the Demography staff anticipates that there may be some growth in some of these areas from retirees. In many instances in the Eastern part of the country as retirees faced higher cost of living in metropolitan areas, their churches took the lead in developing retirement communities in rural areas. These proved to be most successful, especially in areas within one + hour of the metro areas where their children lived and worked. We anticipate some of this development taking place in Colorado.

Slide CR-4.