

City/County Water & Wastewater Study Oversight Committee

MEMORANDUM

From: Jim Barry, Chair
To: Joint Oversight Committee
Re: Revisiting Population Growth
Date: July 7, 2009

Introduction

The Mayor and Council' and Board of Supervisors' Scope for Phase II states that (emphasis added):

"The joint City and County water planning effort should establish a common set of water resource development and conservation goals. Among these goals should be:

"A. Agreement on Population Growth, Water, Urban Form, Land Use Planning and Infrastructure

The City and County need to come to **common agreement** on the location of our **future population growth increment to 2050**. Urban form, water and infrastructure planning will directly influence where this **future population growth increment** will occur. Locating this **future population** should be done in a manner so as not to disadvantage or adversely impact existing residents. **New growth** must be located where it is beneficial to the environment, economy, and conservation of our resources. Large-scale infrastructure systems will be necessary to support the growth centers and integrate with the existing urban infrastructure systems that are in place. Most importantly, long-term future water supply cannot occur at the expense of our existing residents or the environment."

The Stantec/CLA white paper for our June 25, 2009 assumed a "future population growth increment" of one million, for a total population of 2 million, by an unspecified date in the future. Based on that assumption of population growth, Stantec/CLA then developed alternate density scenarios for locating the population growth increment.

The Committee received presentations at its August 27, 2008, from Jonathan Mawbry, Dave Taylor, and Bob Cook that either touched upon or directly related to population growth, defined simply as how many more people are or will be living here. To be consistent with our Scope, I believe the Committee needs to revisit the issue of "our future population growth increment," permitting us to weigh in on what is arguably the central, most intense of local issues.

Like every community in America, especially those experiencing rapid growth, the people of the Tucson metropolitan area are conflicted about growth (the number of people now and in the future). The community resembles the Roman god Janus, looking in two different directions while viewing the same phenomenon: lamenting growth and celebrating growth.

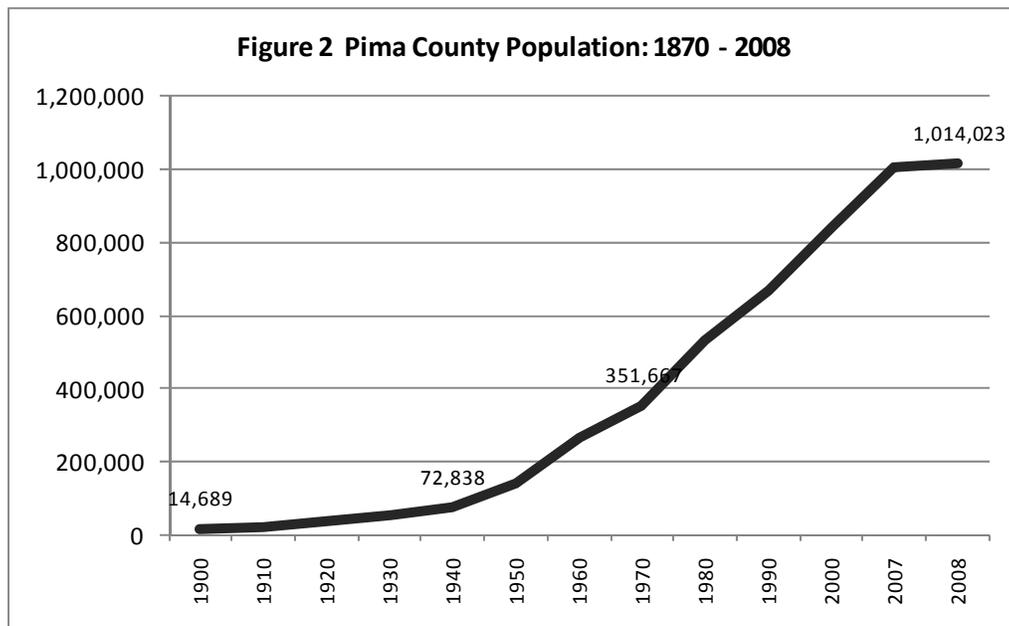
Figure 1 Roman God Janus

Lamenting Growth



Celebrating Growth

Figure 2 confirms that both perspectives on growth have been realized, with Pima County's population growing from 14,689 in 1900 to just over 1 million in 2008.



Figures 3 and 4, however, demonstrate that our growth from 14,689 to 1 million people has been a journey of peaks and valleys, not a straight line as shown in Figure 2. Figure 3 charts the size of the net annual growth increment from 1910 to 2008. The dotted grey line is the trendline, which shows a steady increase in then average size of annual growth increment, reaching 20,000 in 2008.

Figure 3 also shows, however, strong variations in the annual growth increment. For example, the years from 1929 to 1943 (the depression and war years) experienced the lowest sustained annual increases. In the post-war period, through about 1990, there was a pattern of a spike followed by downturns in the number, followed by another spike and subsequent downturn. Since a downturn in 1989, when the net increment was almost zero, the annual increment rebounded and then varied narrowly in a band between 20,000 and 25,000 people. The recent economic downturn of 2008 and 2009 undoubtedly will produce a significant drop in our annual growth increment. (The July 2009 issue of “Arizona’s Economy,” reports that net migration is off 97.9% from the first quarter of 2008 and off 81.4% for the most recent four quarters.)

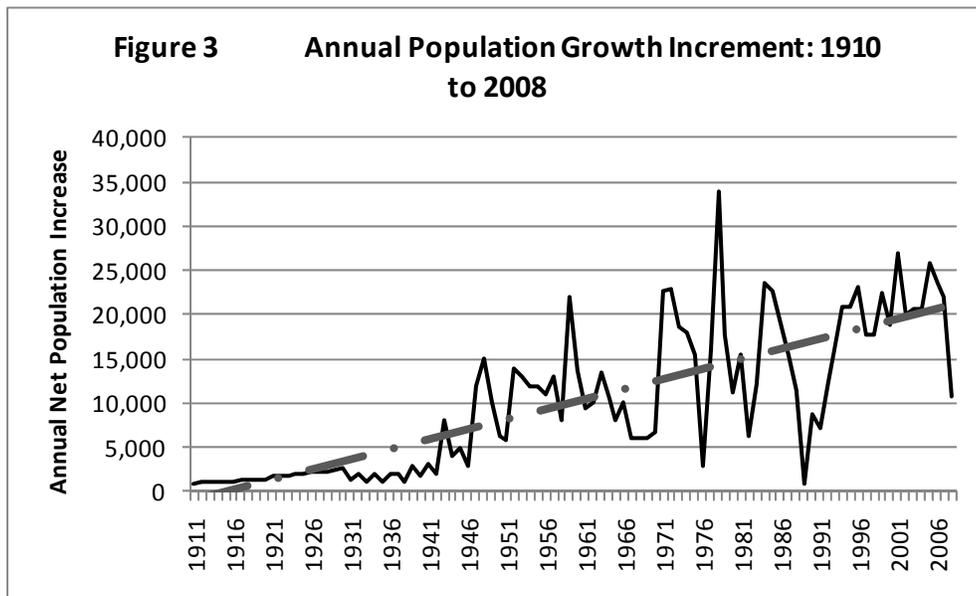
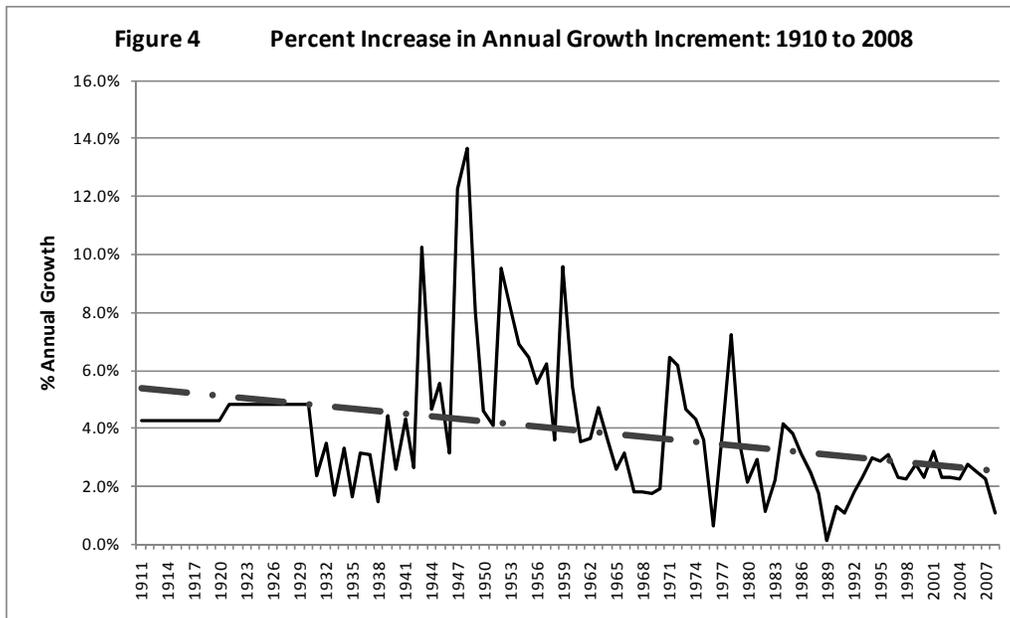


Figure 4 looks at the 1910 to 2008 population growth increment measured by the annual growth increment as a percent of the previous year’s population. As a percent, the annual growth increment has been trending downward. The annual percent increment was below 4% during the depression and war years. Between 1943 and 1978, there were six distinctive spikes in annual percent increases, ranging from 13.6% in 1948 to 7.3% in 1978. In the past two and one-half decades, the highest percent increase was 4.4% in 1984, with the lowest increase being 0.1% in 1989. In the other years, the annual increases ranked between 2.9% and 3.2%. For 2008, the percent increase was down to 1.1%



My point here is to suggest that population growth (or decline) is a dynamic process and we need to search for agreement on the terms with which we discuss and debate population growth.

For a discussion at the July 16, 2009 meeting, I would suggest the following topics:

1. The J-Curve versus S-Curve options for future growth;
2. The components of population growth; and,
3. The “official” population projections through 2050.

I offer these topics and questions in the hopes of sparking discussion, not in the expectations of answering issues. I do believe, however, that the issues raised in this memo are necessary to any sustained discussion of population growth. The Committee, of course, is free to dispute my contentions.

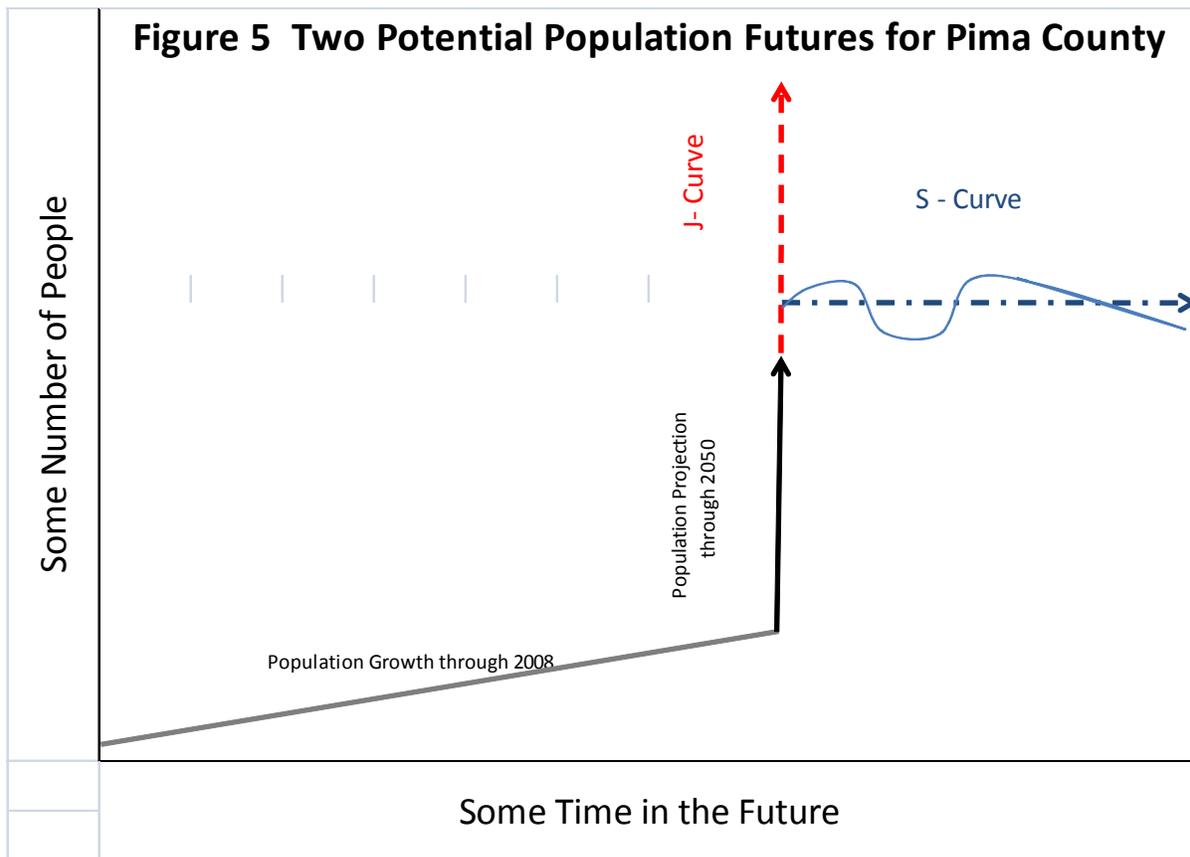
The J-Curve versus S-Curve options for future growth

Population experts posit two curves for population growth, as depicted in Figure 5. Figure 5 is meant to be a graphical representation of the two population curves, and has not been plotted with any population numbers or future dates established.

The bottom, grey line, simply represents Pima County's actual population growth through 2008. The vertical black line denotes a subject we will address, namely population projections through 2050.

The dashed red line denotes the J-Curve option for population growth, which suggests that our population will just continue to grow, with no known limits on how many people will live here in the future.

The dashed blue line denotes the S-Curve option for population growth. The S-Curve option assumes that there will be constraints on the ultimate size of the Pima County population, and as those constraints are reached, the population will fluctuate around what Bonnie has called a "steady state" population, sometimes growing and sometimes declining in numbers. (The Committee will remember that Dave Taylor presented population charts for various American cities that had growth lines like we see in Figure 2 for Pima County, with those growth lines leveling off and showing a pattern of increases and decreases.)



QUESTION FOR DISCUSSION:

Which curve does the Committee and staff believe most realistically represents the future of population growth for Pima County?

The components of population growth

In his presentation on August 27, 2009, Dave Taylor identified what he termed the “components of population growth,” which are depicted below. In local communities, as in nations, population change (growth, steady state, or decline) is the sum of net migration plus net natural change.

Net Migration

Net Natural Change

Population Change

$$[In\ Migrants - Out\ Migrants] + [Births - Deaths] = New\ Residents$$

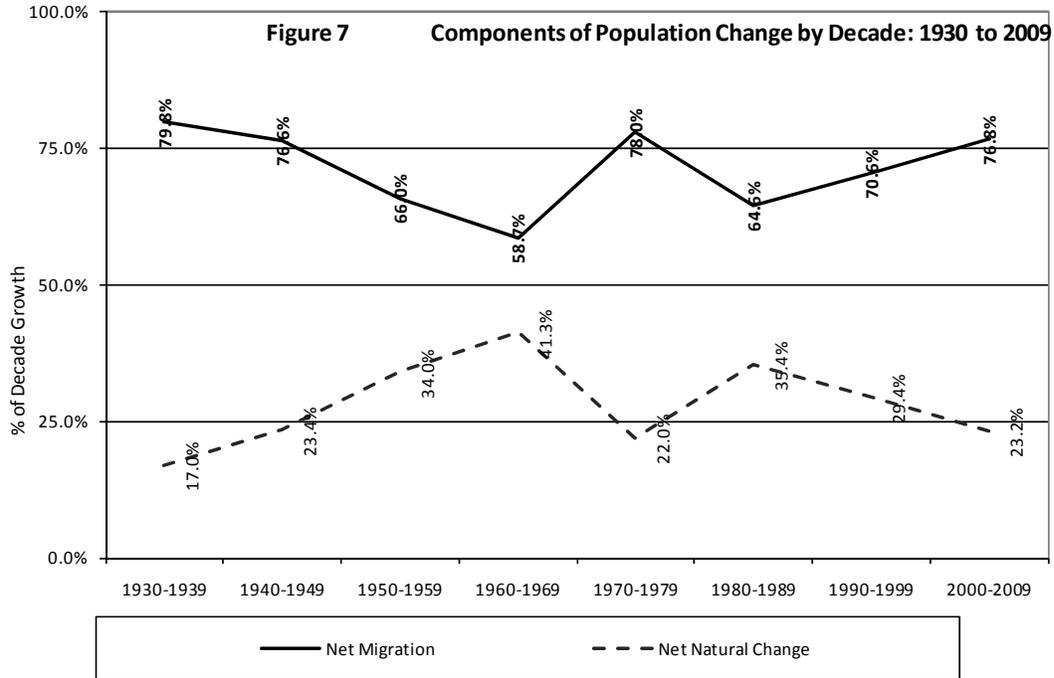
Net migration is the sum of in-migrants minus out migrants. If in migrants exceed out migrants, net migration will be a plus number; if out-migrants exceed in migrants, net migration will be a negative number. The same is obviously true for net natural change, which is the larger number – births or deaths.

In his presentation on August 27, 2008, Bob Cook gave the following data on net migration and net natural change for 2001 – 2002.

Figure 6 Components of the 2001 – 2002 Growth Increment in Pima County

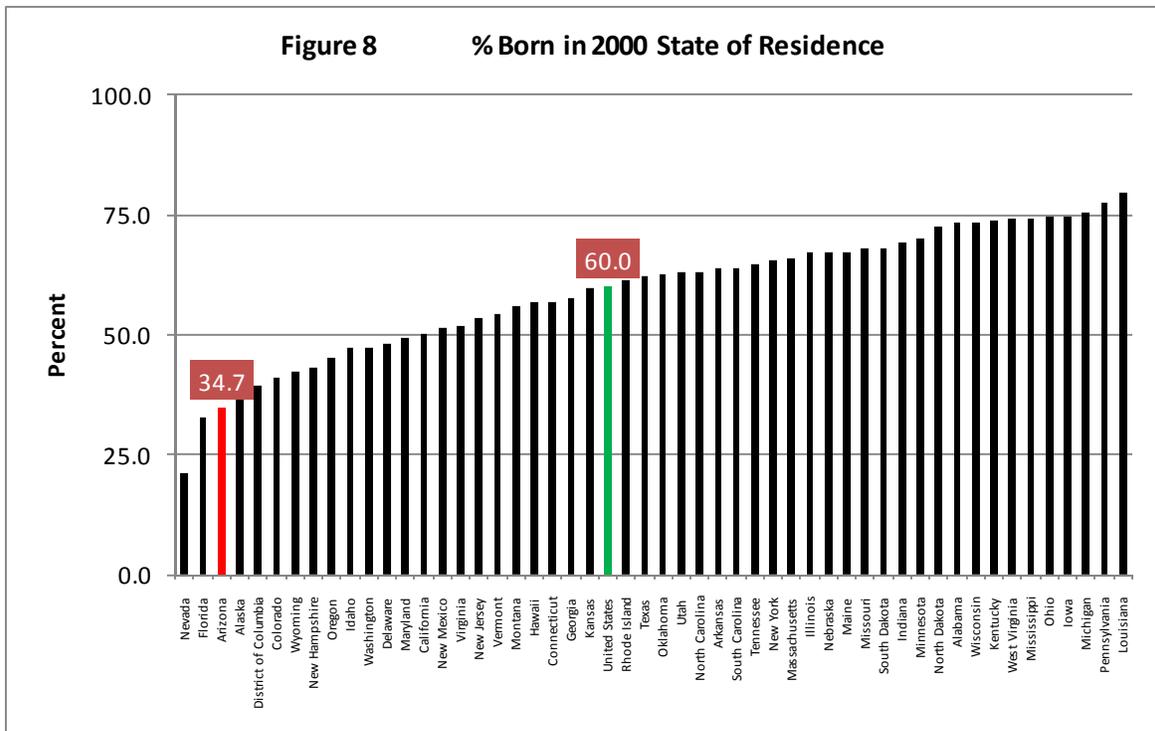
<u>Net Migration</u>		<u>Net Natural Change</u>		<u>Population Change</u>
{(50,433 – 35,300) = 15,132}	+	{(12,488 – 7,624) = 4,864}	=	19,996

The growth increment for 2001 – 2002 was 19,996, of which 15,132 (76%) was net migration and 4,864 (24%) was net natural change. The data for 2001 – 2002 corresponds to the comparative contributions of net migration and net natural increase to the Pima County population increments since the 1930’s, as shown in Figure 7 below.



During this period, net migration accounted for 71% of our population growth increments. In the 1960s, the spread between net migration and net natural increase narrowed, to 59% versus 31% and narrowed again during the 1980s to 65% versus 35%. In the 1990s, the spread widened again, to 77% versus 23%. **(To reiterate: the July 2009 edition of the Eller College of Management’s “Arizona’s Economy” shows net migration off 97.9% between the 1st quarter of 2008 and off 81.4% for the most recent four quarters. At this time, population change is essentially driven by net natural change.)**

There is abundant data demonstrating the importance of net in migration to the composition of Arizona and Pima County. For example, Figure 8 reproduces 2000 Census data showing the percentage of people in the United States and in each individual state who were born in the state of their 2000 residence. In Arizona (the red vertical line), 34.7% of the state resident population was born in Arizona, the third lowest percentage of the fifty states after Nevada and Florida. The 1980 and 1990 censuses show the same percentage of Arizonans born in Arizona, roughly one-third.



Nationwide (the vertical line in green), the number was 60 percent. The five states with the highest percent of residents born in the state of 2000 residence were Ohio, Iowa, Michigan, Pennsylvania, and Louisiana.

The data in Figures 9 and 10 below come from the most recent “2005-2007 American Community Survey 3-Year Estimates,” for the United States, Arizona, Pima County, and the City of Tucson. Figure 9 shows that Arizona residents are somewhat more mobile than the country as a whole and those of us in Pima County and the City of Tucson are somewhat more mobile than Arizona as a whole and than the country as a whole.

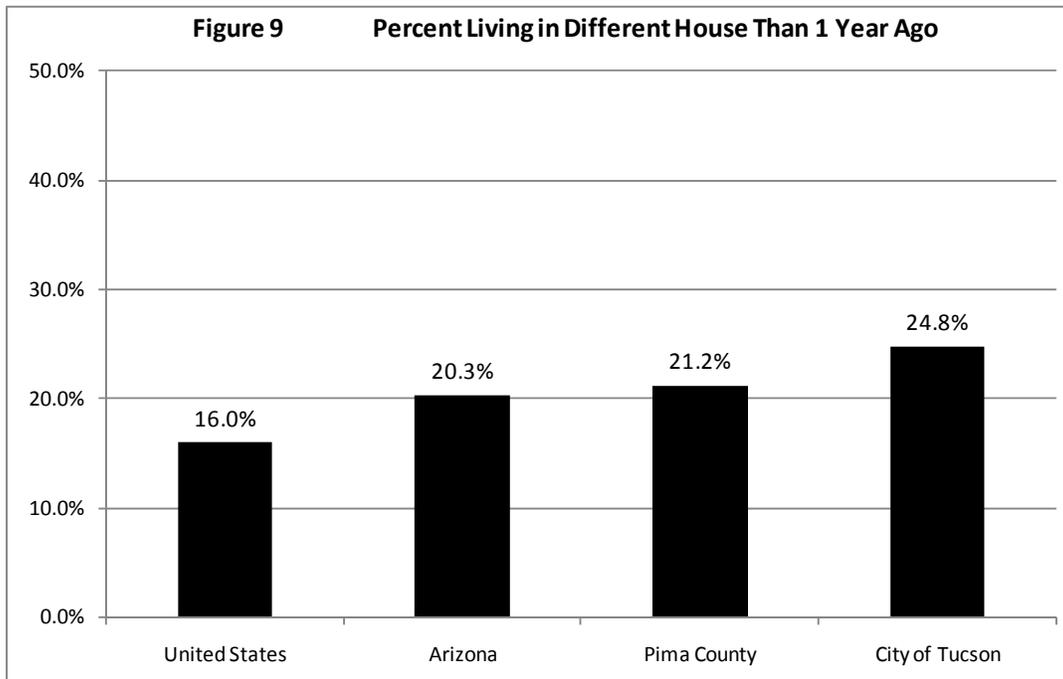


Figure 10 shows on place of birth for the U.S., Arizona, Pima County, and the City of Tucson. For the U.S. as a whole, more than twice as many native born Americans who were born in the U.S. are residing in the state where they were born than those born in another state. For Arizona and Pima County, the reverse is true, with significantly higher percentages of those born in the United States having been born in another state than Arizona. Interestingly enough, for the City of Tucson, the percentages of current residents are equal between those born in Arizona and those born elsewhere.

Figure 10 Date on Place of Birth from 2005-2007 ACS

Place of Birth	United States	Arizona	Pima County	City of Tucson
Native Born	87.5%	85.0%	86.6%	83.4%
Born in the U.S.	86.3%	83.9%	85.0%	81.7%
Born in State of Residence	58.9%	35.4%	37.4%	40.1%
Born in Different State	27.4%	48.4%	47.6%	41.6%
Born in Puerto Rico, U.S. Island areas, or born abroad to American parent(s)	1.3%	1.1%	1.6%	1.7%
Foreign Born	12.5%	15.0%	13.4%	16.6%

The bottom line, however, is that for current residents in Pima County and the City of Tucson 62.6% and 59.9% respectively are in migrants from some other state, territory, or country.

This information on in migration is important, because the data suggests that the distance people move is related to the reasons why they move. In May 2001, the Census Bureau issued a report "Why People

Move: Exploring the March 2000 Current Population Survey.” In this study, “movers” were defined “as those who were living in a different house or apartment one year prior to the March (2000) Current Population Survey.” The study distinguished between (1) “long-distance movers,” where people moving across county boundaries (intercounty migration), while movers within the same county were considered “short-distance moves” (“intracounty migration).

The study concludes that:

“Generally, the distance of the move is related to whether the move is motivated by employment or housing reasons. Interregional moves are more likely to be job-related, while intraurban moves are more likely to be housing related.”

The Census Bureau created four categories of reasons why people might move:

Family-related reasons

- Change in marital status
- To establish own household
- Other family reason

Work-related reasons

- New job/job transfer
- To look for work/lost job
- Closer to work/easier commute
- Retired
- Other job-related reason

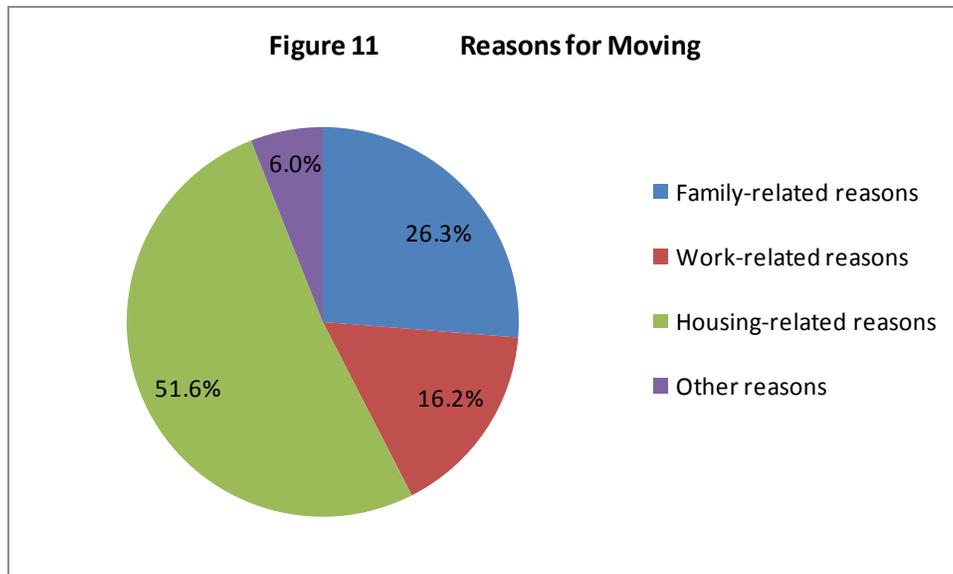
Housing-related reasons

- Wanted to own home/not rent
- New/better house/apartment
- Better neighborhood/less crime
- Cheaper housing
- Other housing reason

Other reasons

- Attend/leave college
- Change of climate
- Health reasons
- Other reason

Figure 11 presents data from the Census Bureau report on why people move in general. The largest reason is housing-related – 51.6%, followed by family-related reasons at 26.3%. Work-related reasons were the motivation for 16.2%, with the remaining 6.0% citing other reasons.



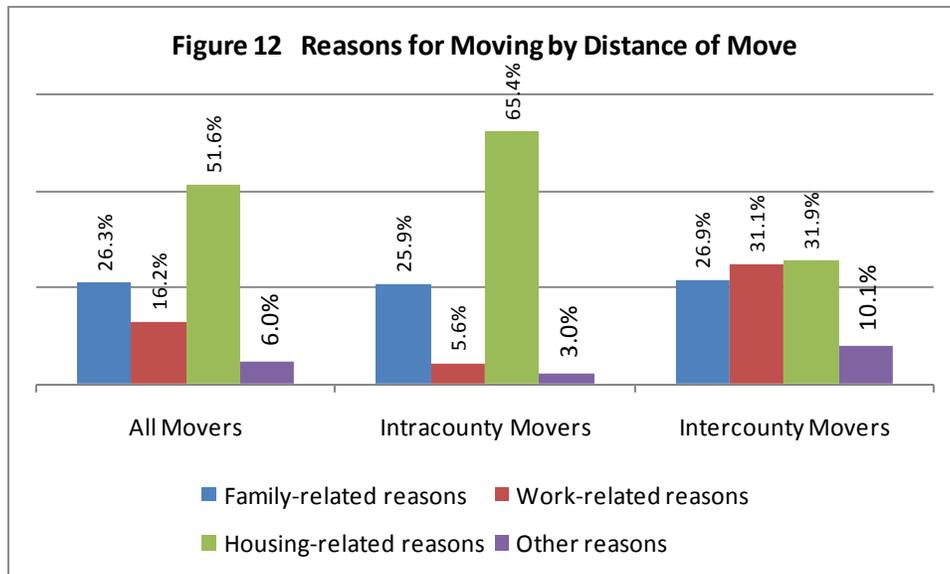
According to a second Census Bureau report on mobility between 1999 and 2000 (“People on the Move: Geographical Mobility, 1999-2000”), “forty-three million people ... moved between March 1999 and March 2000. That means that:

- 22.2 million moved for housing-related reasons
- 11.3 million moved for family-related reasons
- 7 million moved for work-related reasons
- 2.6 million moved for other reasons

Figure 12 compares reasons for moving for all movers, for intracounty migrants, and for intercounty migrants.

For **intracounty migrants**, housing-related reasons were the impetus for two-thirds of movers, a proportion higher than for all movers. Family-related reasons were the motivation for 25.9% of movers. Only 5.6% of moves were for work-related purposes.

For intercounty migrants, work-related reasons were the motivation for 31.1% of movers, compared 16.2% for all movers and only 5.6% for intracounty migrants. In fact, work-related reasons, housing-related reasons, and family-related reasons were about equally important to the intercounty migrants.



The Census Bureau report reaches three other conclusions about the correlates of moving for work-related reasons:

- “The highly educated are more likely to move for work-related reasons, **especially for long-distance moves.**”(emphasis added)
- “Lower income groups are less likely than higher income groups to move for work-related reasons.”
- “The nonpoor are more likely than the poor to move for work-related reasons, while the poor are more likely than the nonpoor to move for family-related reasons.”

Returning to the components of population change, the data above would be germane to any discussion of the components of net migration: what are the reasons that some people are in migrants to Pima County and some people are out migrants from Pima County.

Net Migration

Net Natural Change

Population Change

$$[In\ Migrants - Out\ Migrants] + [Births - Deaths] = New\ Residents$$

QUESTIONS FOR DISCUSSION

1. Do the committee and staff agree that the posited four components of population are a complete and accurate account of population change?
2. Do the committee and staff agree that we will just assume that net natural increase will continue and that our focus should be only on net migration?
3. Do the committee and staff agree that the Census Bureau reports on why people move account for the dynamics behind the net migration components of population change?
4. What powers do the committee and staff believe the Mayor and Council and Board of Supervisors now have, or should have in the future, to influence (in whatever direction) the magnitude of in migration and out migration?

The “official” population projections through 2050

Dave Taylor presented information at the Committees August 27, 2009 meeting on population projections. Dave first talked about how population projections are made and then on some differences in existing population projections for Pima County.

The following is from the transcript of Dave’s remarks about population projecting and how it is done.

“The other thing we’re going to talk about are forecasts or projections. What’s the difference? Well, forecast means I think I know the answer. A projection means that if you assume this, this and this, here’s the answer. Well, none of us are brave enough to do forecasts. There’s several ways we do ‘em. The State does what is called a "Cohort Survival Model." What is that? It says, "Marcelino, you’re of a certain age, a certain sex, you have a certain probability of making it to the next year. You have a certain probability of not making it to the next year. You have a certain probability of having a baby during that year.”

Population Projections

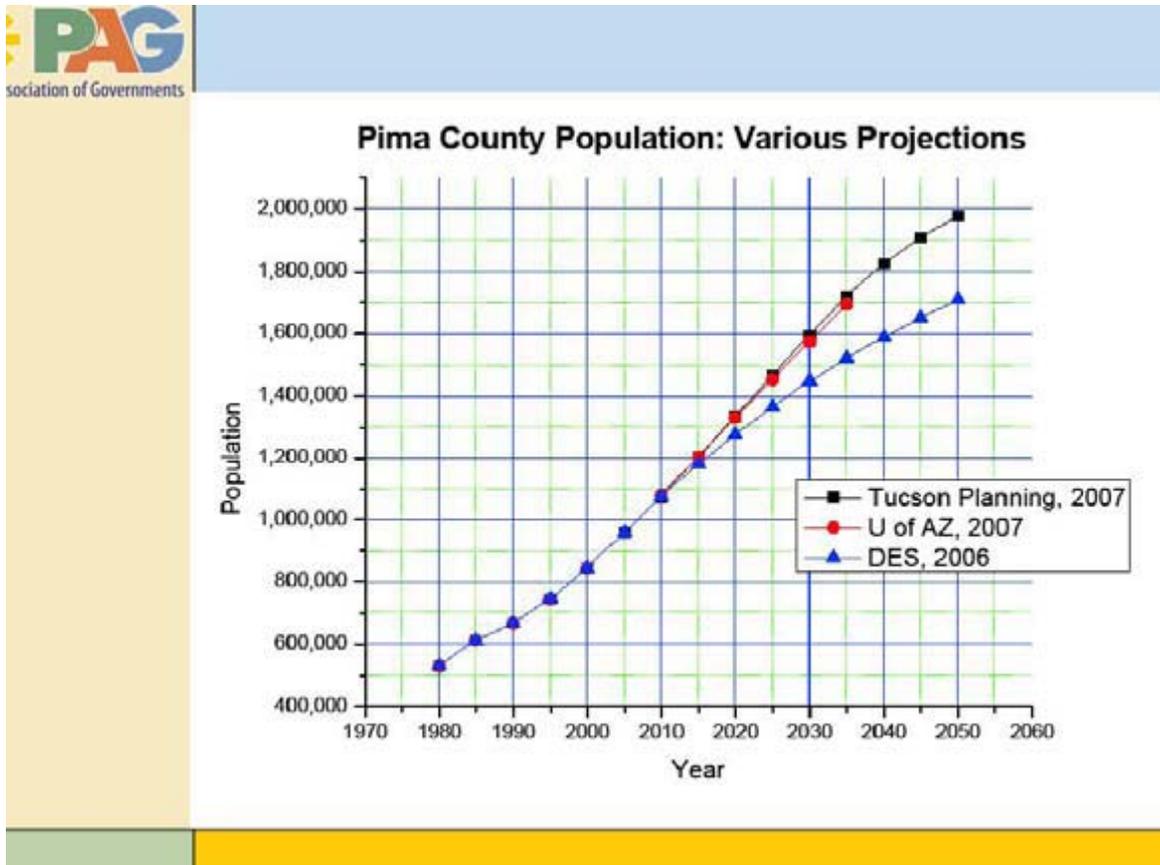
- **Methods –**
 - Cohort Survival [The AZ DES/DOC method]
 - Econometric [The U of AZ method]
 - Composites of the above, plus Curve Fitting
- **Mandate: All State agencies**
- **Uses:**
 - State agencies for capital planning
 - Local governments for planning generally, however PAG does not use the State Projection(s)

“So, we survive the population one age at a time since the last census making certain estimates about how – who migrates in, who migrates out, and when you do that, you get population forecasts. Well, that’s the stuff we use at the State level; it has this defect: It assumes nothing changes for 50 years. Everything changes.

“The other way we can do these forecasts is to do it econometrically; that is, measure the economy. And the University does this very well. They have a national renowned model. They’re quite good at what they do. And PAG, and other local jurisdictions, commonly rely on that series rather than the official State, or formerly DES, numbers.

“And we can have composites of both methods, various states try and use an econometric front end – oh, five, six years’ worth – to get the current business cycle, and then they use cohort survival thereafter, and that’s a very, very common technique.”

Dave talked about differences in various projections for Pima County, between those made by the City of Tucson, Arizona Department Economic Security, and the University of Arizona Eller School. The graphic below is from the transcript of Dave's remarks. The graphic shows there is agreement between the three projections, to a population of about 1.2 million by approximately 2015. After that time, the Tucson Planning and Eller School projections are on a steeper incline than the DES projections. The Eller School projections end in 2035, at which time both the Eller School and City of Tucson projections show a population of approximately 1.7 million. By 2050, the City of Tucson projections show a population of 2 million, while the DES projections show a population of 1.7 million.



At the same meeting, Bob Cook presented comments whose main thrust was to ask whether these are “population projections on steroids,” and to introduce what he considered to be constraints on future population growth. These constraints included:

Supply Factors:

Water quality and costs
Energy costs
Construction costs
Climate change mitigation

Demand Factors:

Job creation/destruction
Per capita income/consumption
Vehicles mile traveled
Climate
Burden of growth costs
Cost of living
Quality of life

QUESTIONS FOR DISCUSSION

1. Do the committee and staff agree that the population projection methodologies described by Dave Taylor are methodologically sound or are they, like Bob asks projections on steroids?
2. Do the committee and staff accept the general outlines of the population projections presented by Dave?
3. Do the committee and staff have a preference for the Eller School/City of Tucson or DES projections?
4. If we were to reject these available projections, as being either too high or too low, does the committee or staff have alternate projections that can be put forth and discussed?