Appendix E
Population Subgroup Report

N. AZ Water Supply Study Report of Findings for Tribal Population
(Summary of Water Demand Analysis, Hopi/Western Navajo Water Supply Study)

STUDY AREA

The Northern Arizona Water Supply Study encompasses some Tribal areas that include the following chapters:

Navajo	Hopi
Coppermine	Moenkopi
Lechee	Lower Moenkopi
Boadaway/Gap	
Cameron	
Tuba City	

METHODOLOGY

Tribal population estimates were based on U.S. census data and adjusted for undercounts for both the Navajo and Hopi Tribes. Population projections for both Tribes were assigned three scenarios; a low, mid and high range depending on the amount of growth that could potentially occur. The mid range population estimate for the Navajo Nation was further examined to include two scenarios; one based on the assumption of uniform growth across the chapters, and the other assuming population migration to economic growth centers, which is the adopted methodology from the study. The population estimates for the Hopi Tribe were based on their assumptions of development of new villages.

The specific assumptions associated with the current (2000) population scenarios for each Tribe are as follows:

Navajo Low Population Scenario: The unadjusted 2000 census value for the current Navajo study area was assumed to be the low end of the possible range of the current population due to a probability that the census undercounts the actual number of individuals in the Navajo Nation

Navajo Mid-range Population Scenario: The mid-range level of current Navajo LCRB population is assumed to be the 2000 census multiplied by 1.079, which represents the average 7.9 percent undercount for all Native Americans in the State of Arizona.

Navajo High Population Scenario: The high level was assumed to be the unadjusted 2000 census estimated multiplied by 1.10, which represents the potential for an undercount of as much as 10 percent, which is the high end of the current range of the potential undercount for Native Americans in Arizona.

Hopi Low Population Scenario: Similar to the assumption used for the Navajo Nation, the low population scenario is the unadjusted 2000 census value.

Hopi Mid-range Population Scenario: Like the Navajo Nation, the mid-range Hopi population estimate is the 2000 census estimate adjusted upwards by 7.9 percent.

Hopi High Population Scenario: The high population estimate was developed by the Hopi Tribe, reported in earlier HKM Reports, and used by NEA in their population projections.

For both the Navajo and Hopi Tribes, future growth scenarios for 2000-2050[12] were based on the following assumptions:

Low Growth Scenario: The low end of the range of possible population growth rates for 2000-2050 was assumed to be 1.3 percent. This reflects the possibility that the proposed settlement projects may not be built, or may be built but fail to provide the desired levels of economic development. The rate of 1.3 percent is also reflective of recent historical population trends in the Navajo Nation.

Mid-range Growth Scenario: The mid-range scenario was previously identified as NEA's estimate of the long-term population growth rate of 2.48 percent.

High Growth Scenario: The population growth rate for the high scenario is 2.75 percent. The high growth scenario boundary is not a calculated value but it is intended to reflect a long-term condition in which Reservation out-migration is reduced and employment opportunities on the Reservation increase.

In addition to projecting future population for the Navajo Nation across the chapters in a uniform way, HDR presents population growth under the assumption that population would migrate to Economic Centers. Future economic development is likely to occur in a limited number of communities, which would result in members migrating from remote areas of the Reservation to the Economic Centers for employment and other factors. The Hopi/Western Navajo Water Supply Study assumes that one-half of the future population growth in each of the remote Chapters migrates to its corresponding Economic Growth Center.

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[12] The Northern Arizona Water Supply Study uses a 50 year period of analysis.

The result is that population grows at a higher rate in the communities in which the Economic Growth Center is located and at a lower rate the more remote communities, which is more likely to occur based on growth patterns in other Tribal and non-Tribal areas. For more information, see the Hopi/Western Navajo Water Supply Study, Water Demand Analysis.

The population estimates for the Hopi Tribe take into consideration the rates of growth in certain villages as well as the formation of new villages. For the Hopi's, the Hopi/Western Navajo Water Supply Study assigned individual growth rates to each existing and new community over the time periods considered to incorporate their assumptions while still averaging an overall 2.48 percent population growth rate from 2000-2050. For a full explanation of how this was accomplished see the Hopi/Western Navajo Water Supply Study, Water Demand Analysis. The benchmark numbers (the population estimates not accounting for the development of new villages) are not reported by village in the Hopi/Western Navajo Water Supply Study.

RESULTS

Table 1 shows the historic, current and future population estimates that were presented in the Hopi/Western Navajo Water Supply Study for the Navajo Tribe. Historic population was not presented for the Hopi Tribe. These estimates will be used in the Northern Arizona Water Supply Study.

Chapter		1980 Census	1990 Census (adj.)	1996 (Chapter Images, 1997)	2000	2000 pop. adj. upward by 7.9%	2007 using current growth rate 1.25%	2010	2020	2030	2040	2050	Growth Rate (2000-2050)[13]
Navajo[14]													
Coppermine	Low					726	793	809	865	930	1,004	1,087	33.2%
	Mid	684	423	443	673	726	793	823	942	1,093	1,286	1,533	52.6%
	High					726	793	827	960	1,136	1,366	1,669	56.5%
Lechee	Low					2,039	2,225	2,269	2,428	2,609	2,816	3,051	33.2%
	Mid	1,060	1,561	1,728	1,890	2,039	2,226	2,311	2,643	3,068	3,611	4,304	52.6%
	High					2,039	2,225	2,319	2,695	3,188	3,835	4,684	56.5%
Bodaway/Gap	Low					1,982	2,162	2,205	2,360	2,536	2,737	2,965	33.2%
	Mid	1,238	1,649	1,814	1,837	1,982	2,163	2,246	2,569	2,982	3,509	4,183	52.6%
	High					1,982	2,162	2,254	2,619	3,099	3,728	4,552	56.5%
Cameron	Low					1,328	1,449	1,515	1,754	2,026	2,336	2,688	50.6%
	Mid	901	1,011	1,100	1,231	1,328	1,450	1,577	2,076	2,713	3,528	4,568	70.9%
	High					1,328	1,449	1,590	2,155	2,895	3,866	5,139	74.2%

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[13] Because Lower Moenkopi is a new village, its rate of growth is calculated from 2010 to 2050.
[14] Population estimates are based on the assumption of migration to economic growth centers as discussed in the text

Chapter		1980 Census	1990 Census (adj.)	1996 (Chapter Images, 1997)	2000	2000 pop. adj. upward by 7.9%	2007 using current growth rate 1.25%	2010	2020	2030	2040	2050	Growth Rate (2000-2050)[13]
Tuba City	Low					9,426	10,283	10,731	12,360	14,213	16,322	18,722	49.7%
	Mid	5,416	7,305	8,041	8,736	9,426	10,288	11,155	14,552	18,892	24,436	31,520	70.1%
	High					9,426	10,283	11,246	15,088	20,127	26,736	35,406	73.4%
Hopi													
Moenkopi[15]	Low					749	818	819	1,100	1,478	1,987	2,670	71.9%
	Mid					749	814	889	1,195	1,606	2,158	2,901	74.2%
	High					749	818	819	1,100	1,478	1,987	2,670	71.9%
Lower Moenkopi[16]	Low							125	160	204	261	333	62.5%
	Mid							160	237	351	519	768	79.2%
	High							150	269	481	862	1,543	90.3%

[15] For Moenkopi, HDR assumed that there is an annual rate of growth of 3 percent for the low, mid and high population growth scenarios. They assigned individual growth rates to each existing and new community over the time periods considered to incorporate their assumptions while still averaging an overall 2.48 percent population growth rate from 2000-2050. The discrepancy between the high and low scenario and the mid scenario is due to the rate of growth being calculated from 2007 to 2050 for the low and high and from 210-2050 for the mid-range, as reported in the Hopi/Western Navajo Water Supply Study

[16] Lower Moenkopi is considered a newer village that is expected to grow in the future.

CONCLUSION

Future population growth may be dependent on a number of variables, some of which, are unpredictable. This analysis attempts to estimate as close as possible, the range of potential population growth for the Tribal areas in the study area for the Northern Arizona water Supply Study. Given the demand area, the total range of population in 2050 is estimated to be 31,516 to 55,663, a difference of over 24,000 people.

N. AZ Water Supply Study Population Sub-group
Report of Findings

BACKGROUND

The Population Sub-group formed in mid November of 2002. Members were asked to sign-up after a USBR presentation (attachment 1) to the Technical Advisory Group (TAG) suggesting that the population projections to be used in this study would be the 1997 ADES population projections if there were no objections. Arizona Department of Water Resources (ADWR), Grand Canyon Trust (GCT), the City of Flagstaff, Grand Canyon National Park (GCNP), and the City of Williams originally signed up to be active in the Sub-group. The City of Williams and the GCNP were not represented on the Sub-group conference calls but were kept informed of the issues and meetings through numerous e-mails.

The tasks of the Sub-group were to document the existing population for non-tribal demand areas of the N. AZ Water Supply Study demand area, determine the methodology used to estimate population projections, and use this methodology to develop population projections for 2010, 2020, 2030, 2040 and 2050 for the study area. The recommendations of the Sub-group would then be presented to the TAG.

Feedback was solicited from the Sub-group members regarding the USBR presentation made on November 8, 2002. Two related comments were received prior to the group's first conference call. The first comment was in regard BOR's suggestion of using a modified trend analysis as a sensitivity analysis to the 1997 ADES population projections. It was felt that this methodology would not be appropriate for cities such as Flagstaff due to the surrounding forest areas, zoning, development ability, etc. The comment further suggested that the Sub-group consult city planners on the future population projections for Flagstaff. This was accomplished through the City of Flagstaff's long-range planner joining the Sub-group and being actively involved in Flagstaff's population projections.

One of the first tasks the Sub-group undertook was to gather the existing data regarding population and population projections for the area. Arizona Department of Economic Security (ADES), Northern Arizona Council of Governments (NACOG), and U.S. Census Bureau were contacted to distribute their pertinent population data.

The Sub-group's first conference call occurred on December 19, 2002 and notes (attachment 2) were distributed that afternoon. In the conference call, it was suggested that we contact ADES to see if their *Arizona Demographic Cohort-*

survival Projections Model was proprietary. There was some thought that the model's net migration rates could be modified to produce a range of population projections. The limitations of the 1997 ADES Model were discussed briefly. The major limitation is that we do not know what assumptions are made in the model. GCT suggested that our Sub-group adopt similar methodology conducted in the Hopi/Western Navajo Water Supply Study by HDR. The suggestion was to look at a low, mid and high range of population projections for Flagstaff. It was further suggested that a probability analysis similar to the HDR study be considered. The City of Flagstaff was asked to look at developing projections based on their Urban Growth Boundaries and what population growth might occur within the limits of these boundaries. It was concluded that the 1997 ADES population projections would be used for other non-tribal areas unless those entities suggested an alternate methodology (no alternate methodologies were suggested), the Sub-group would look at a low, mid and high range population for Flagstaff provided that there was reliable data to do so, and the Sub-group would also consider conducting a probability analysis for this range of projections.

It was subsequently found that the 1997 ADES *Arizona Demographic Cohort-survival Projections Model* was indeed proprietary. Therefore, the model can not be modified to produce a range of population projections. The assumptions made in the model were based on decennial U.S. Census Bureau data. Since this model only provides a single point of reference, it was recommended that the Sub-group look at other methods to provide the other data points needed to produce a range. To accomplish this, the City of Flagstaff and BOR produced four alternate means to look at population in Flagstaff. There was no single method that produced more than one population estimate/data point. All methods with their estimated data points that were distributed to the Sub-group, are described below along with the reasons why they were or were not recommended and are illustrated in Table 1. The Sub-group's second conference call (attachment 3) discussed these methodologies and data points and determined which ones were the most reliable and technically sound based on the information provided. The data points below represent the Sub-group's best estimates of the projected population of Flagstaff given the available data, and can be updated if better data becomes available. In addition, the Sub-group determined that two data points rather than three will represent the range of Flagstaff's population.

METHODOLOGIES

1997 ADES *Arizona Demographic Cohort-survival Projections Model*:
Population projections are frequently generated using the cohort-component method. A cohort represents a group of individuals say males aged 20-25. The

cohort method involves separating the population under consideration (in this case Flagstaff) into cohorts, looking at the demographic components of each cohort using U.S. Census Bureau statistics, and forecasting population for each cohort for successive periods into the future. Births, deaths, and net migration rates are typically those demographic components and are also used in this model. This data point was chosen by the Sub-group because it was developed by a state agency that is familiar with projecting population and it is based on identified factors that influence population which can be varied to reflect expectations for the future.

Adjusted 1997 ADES: This method was adopted as a sensitivity analysis to measure the discrepancy between actual and projected population. This method looked at the percent difference between the 1997 ADES projected 2002 Flagstaff population (63,107) and Flagstaff's actual 2002 population (59,158). This percent difference (-6.3 percent) was then applied to the projected population estimates from 2003 to 2050. This is not a statistical methodology but a calculator exercise. The results show that the difference in the average annual rates of growth between the two projections is insignificant. Because a calculator exercise that utilizes a single population year (2002) as a frame of reference has no technical validity, it was not recommended.

Modified Trend Analysis: A modified trend analysis uses the rate in the change of growth from year to year to adjust the average historical rate of growth. The percent change in population from one year to the next is likely to better predict population than the change in population over several years. A modified trend analysis is the method typically adopted at an appraisal level of analysis. However, there were objections to using this type of analysis early-on even as a sensitivity analysis due to the fact that Flagstaff has the surrounding forest areas, zoning, and development ability issues. The modified trend analysis may not be the best method to adopt for the above reasons and because of the lack of historical data at the sub-area level (only 20 years worth) which lessens the model's technical capabilities of accurate projection.

City of Flagstaff's Buildout Model: This model uses the city's Planning Reserve Areas as developed in the Regional Plan. These Planning Reserve Areas (3,125 acres) are developed at the required minimum densities of 3, 5, and 7 dwelling units per acre (also in the Regional Plan). The undeveloped land in the city within the Urban Growth Boundary that is 5 acres and larger is also considered. That estimated population is then multiplied by the 2000 U.S. Census average household size for Flagstaff to calculate the population for the total number of estimated dwelling units in the Planning Reserve Areas and undeveloped areas of the city. This method considers the efficient growth of the

City of Flagstaff to contain sprawl and protect open spaces. The population Sub-group members felt that this is a realistic rate and level of growth in comparison to historic levels.

Historical Growth Rate (1992-2002): This method was used to examine the more current trends in population and growth in Flagstaff. It was found that the average annual rate of growth in the last decade was 2.04 percent. This same rate was applied annually to 2050 to estimate the projected population. The Sub-group felt that the annual rate of growth and average annual population gain was too high in comparison to historical rates because just the last 10 years is not reflective of past growth or the true future population growth. In general, 10 years worth of data is not enough to develop a statistically significant trend that would make the population projections reliable.

Table 1: Flagstaff Population Projections and Average Annual Rates of Growth Using the Various Methodologies

	POPULATION		
	2002	2050	AVG. ANNUAL GROWTH RATE
CITY OF FLAGSTAFF BUILDOUT	59,158	124,840	1.57%
HISTORICAL GROWTH RATE (1992 - 2002)	59,158	156,099	2.04%
Adjusted ADES	59,158	106,570	1.22%
Trend Analysis using 1980-2000 historic population	59,158	120,044	1.46%
1997 ADES Demographic Cohort-survival Projections Model	63,107	113,684	1.23%

CONCLUSION

After discussions about the methodologies, the Population Sub-group endorsed the 1997 ADES *Arizona Demographic Cohort-survival Projections Model* as the best method for Flagstaff's low-end population projection and the City of Flagstaff's Buildout Model as the best method to adopt for the high-end projection. Since no other entities expressed concern over using the 1997 ADES *Arizona Demographic Cohort-survival Projections Model* for their population projections, that method was adopted for all non-tribal areas outside of Flagstaff within the study area.

After the Sub-group's presentation of recommendations to the TAG on February 21, 2003, (attachment 4) it was suggested that the same method or model be used to estimate the range of population projections for Flagstaff. However, as mentioned previously, the methods and models described above do not have this capability. Regardless, if a valid population projection technique is applied to the same area, the results can be compared.[17]

Table 2 shows the historical population as well as the preliminary population projections for the study area in the NCAWSS.   The table includes the low and high estimates for Flagstaff. The demand analysis will use the range of population to estimate water demand in the study area

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[17] Piper, Steve. Estimating Future Water Demand Using Population and Economic Growth projections: A Guide for Municipal, Rural and Industrial (MR&I) Water Assessments. Bureau of Reclamation, Technical Service Center, November 200.

Table 2: Historical and Projected Population for N. AZ Water Supply Study Demand Areas

	1970	1980	1990	2000	2010	2020	2030	2040	2050	2000-2050
Coconino County	48,326	75,008	96,591	124,575	147,352	169,343	189,868	211,616	235,707	89%
Doney Park/Timberline	n/a	3,550	5,504	7,979	9,737	11,734	13,608	15,605	17,831	123%
Fort Valley	n/a	350	534	660	754	863	964	1068	1,182	79%
Grand Canyon Village	1,011	1,348	1,499	1,460	1,888	2,048	2,214	2,406	2,639	81%
Kachina Village	n/a	1,250	1,711	2,664	2,683	3,120	3,522	3,941	4,397	65%
Mountainaire	n/a	500	738	1,014	1,046	1,199	1,340	1,486	1,646	62%
Page	1,409	4,907	6,598	9,570	11,128	13,057	14,841	16,714	18,770	96%
Parks	n/a	950	603	1,137	1,335	1,604	1,898	2,256	2,701	138%
Tusayan	n/a	500	555	562	819	890	996	1152	1,372	144%
Valle	n/a	n/a	123	534	632	726	814	907	1,010	89%
Williams	2,386	2,266	2,532	2,905	3,310	3,601	3,925	4,323	4,826	66%
				2002						2002-2050
Flagstaff	26,117	34,845	45,990	63,107	71,981	81,972	91,529	101,907	113,684	80%
				59,158	67,024	78,299	91,471	106,859	124,840	111%
Total population range										
low				91,592	105,313	120,814	135,651	151,765	170,058	86%
high				87,643	100,356	117,141	135,593	156,717	181,214	107%

Sources: U.S. Census Bureau, ADES, City of Flagstaff

The U.S. Census Bureau and ADES do not estimate population projections for Valle therefore, Valle's population projections were estimated using the county level growth rate between 2000 and 2050.
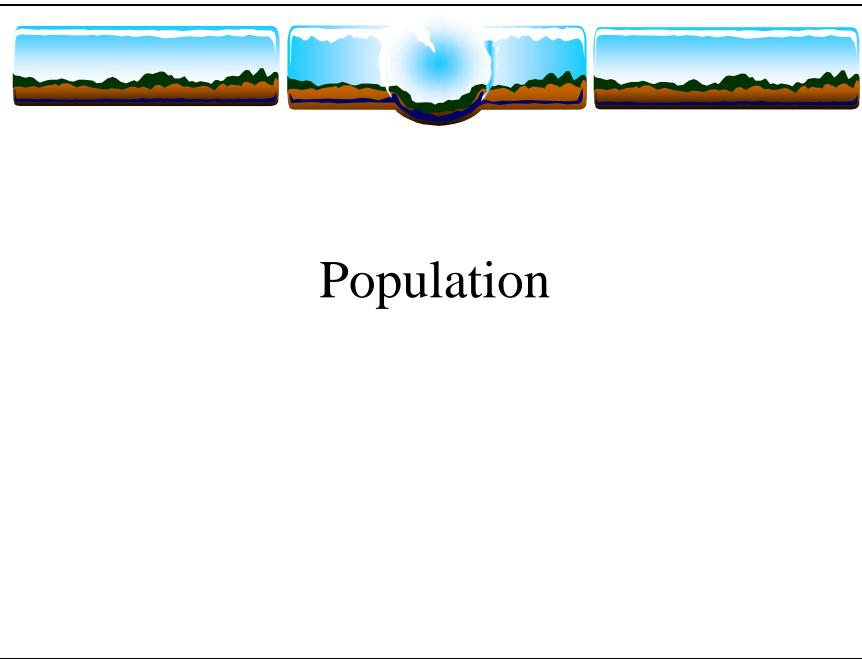
Table 2 shows the projected population for Flagstaff as estimated by the methods chosen by the Population Sub-group. The baseline year for Flagstaff is 2002 rather than 2000 due to severe undercounts by U.S. census in 2000.

Attachment 1

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Slide 1

Population

Slide 2

TAG Considerations for Population Projections

❖ Years targeted 2010, 2020…2050 or 2010, 2025, 2050

❖ ADES population projections

❖ Sensitivity analysis to produce a range of populations

❖ The Hopi and Navajo Reservations' population projections

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Slide 3

Historical and Projected Population

	1970	1980	1990	2000	2010	2020	2050	2000-2050
Coconino County	48,326	75,008	96,591	124,575	147,352	169,343	235,707	89%
Flagstaff	26,117	34,743	45,857	62,710	71,981	81,972	113,684	81%
Doney Park/Timberline	n/a	3,550	5,504	7,979	9,737	11,734	17,831	123%
Fort Valley	n/a	350	534	660	754	863	1,182	79%
Grand Canyon Village	1,011	1,348	1,499	1,460	1,888	2,048	2,639	81%
Kachina Village	n/a	1,250	1,711	2,664	2,683	3,120	4,397	65%
Mountainaire	n/a	500	738	1,014	1,046	1,199	1,646	62%
Page	1,409	4,907	6,598	9,570	11,128	13,057	18,770	96%
Parks	n/a	950	603	1,137	1,335	1,604	2,701	138%
Tusayan	n/a	500	555	562	819	890	1,372	144%
Valle	n/a	n/a	123	534				
Williams	2,386	2,266	2,532	2,905	3,310	3,601	4,826	66%
Study area subtotal	30,923	50,364	66,254	91,195	104,681	120,088	169,048	85%
% of County	64%	67%	69%	73%	71%	71%	72%	
Sources: U.S. Census Bureau and ADES.								

Courtesy of RMI

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Slide 4

Alternative Approaches

❖ Trend Analysis
  ❖ Too simplified
❖ Modified Trend Analysis
  ❖ Use to conduct sensitivity analysis
❖ Demographic Modeling
  ❖ Hopi/Western Navajo Water Supply Study
  ❖ Cohorts are more complex
  ❖ Level of analysis

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N. AZ Water Supply Study Population Sub-group Conference Call Notes
12/19/02

Participants:
John Fortune
Ron Doba
Ursula Montano
Nikolai Ramsey
Bob McCaig
Dawn Munger

-Dawn and John have gathered all the data that is available from U.S. census and ADES. The data includes 1970-present county estimates, 1997 ADES population projections to 2050 for Coconino county and some areas within the county, and 1980-2002 population estimates for Flagstaff, Page and Williams.

-Trend Analysis will not provide good information given the lack of historical data.

-John Fortune will see if the *Arizona Demographic Cohort-survival Projections Model* is public information and if we can obtain it. We may be able to re-estimate their net migration assumptions to produce a range of population projections using the 1997 ADES population projections because the new projections won't be available until late spring/early summer of 2003.

-Nikolai asked if what was done for the LCR study as far as the population projections were concerned, could be applied to Flagstaff.
      -Low, mid-range, and high estimates were made.
      -Probabilities were assigned to these estimates.
      -Dawn will revisit the Kyl methodology.
      -Doing a probability analysis may be restricted by time and budget.

-Nikolai asked what were the limitations of the ADES projections.
      -It is based on historical data, mostly which is from past decennial census data.
      -We don't know what their assumptions were.

-Short explanation of a cohort model was given.
      -Grouping of different people and projecting those cohorts.

-Ursula mentioned that some people think that ADES annual population growth rates are too low compared to past rates.

    -Although the decreasing growth rate may be realistic, how was this arrived at?

        -Need to find out what assumptions ADES made to obtain these lower rates of population growth.

-The current developable footprint of the Flagstaff area.

    -Ursula is having someone work on that. May not be ready until mid to late January.

    -Will be rough as areas are subject to rezoning; numbers, units are highly volatile.

-Adjustments based on the 2000 census.

    -Dawn said that 3,500 difference in 2000 would not make the population projections nor rates of growth much different from the current projections.

    -Ron said that 3,000 people is equivalent to 1 water well.

-ADES usable for other locales?

    -GCNP had indicated that they had revised their visitation projections and that ADES data is too high based on the new projections, but Jeff Cross did not call in.

    -Everyone will get the opportunity to comment on a draft recommendation.

    -Will send out meeting notes and cite our direction to use ADES data for other areas unless there are others that feel the ADES data does not represent their area well and can give us better data and information.

-We will look at a high, mid-range, and low estimates for Flagstaff providing there is reliable data to do so.

    -May also assign a probability to these estimates.

    -Pre-NEPA so can do for one or two areas without having to provide for every area within Coconino County.

Attachment 3

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N. AZ Water Supply Study Population Sub-group Conference Call
2/10/03

Participants:
John Fortune- ADWR
Ron Doba- City of Flagstaff
Ursula Montano- City of Flagstaff
Neil Cobb- NAU
Bob McCaig- USBR
Dawn Munger- USBR

-The methodologies used to obtain the data points for the population projections
for the city of Flagstaff were explained and discussed. The city of Flagstaff's
Buildout Model created the most discussion. Among the points discussed were:
    -buildout is based on currently undeveloped land in the city within the
    urban Growth Boundary
    -these areas are called planning reserve areas
    -the minimum residential density (in the Regional Plan) was attached to
them
    -the areas were of 5 or more acres of land
    -Flagstaff is consuming land at a much higher rate of growth than their
    population growth rate
    -they may see boundaries change to accommodate the rate of land
consumption

-The historical growth rate methodology was dismissed due to its average annual
growth rate and average annual population being much higher than flagstaff has
seen in the past.

-The adjusted 1997 ADES projections and the 1997 ADES Demographic Cohort-
survival Projections Model were very close. It was decided by the Sub-group to
use the later as one of the data points. This seemed to be the methodology that
would be the closet to the most likely future population in Flagstaff.

-The City of Flagstaff's Buildout Model was a second data point that the team
thought reflected the high side of the potential growth rate but still within reason.

-The team decided the range of population projections for Flagstaff could consist
of these two data points rather than a low, mid-, and high as previously discussed.

-The peak season water demands will be handled in the Water Demand Analysis
rather than in the population projections (please contact Brenda Kinkel at

303.445.2530 or bkinkel@do.usbr.gov for information on the water demand analysis).

-The team concluded that the best data points to use for the range of population projections for Flagstaff is a low 2050 population estimate of 113,684 (based on the 1997 ADES Model) averaging an annual rate of growth of 1.23 percent and a high estimate of 124,867 (based on the City of Flagstaff's Buildout Model) averaging 1.57 percent annual growth rate.
-The year 2000 would not be a good year to use for Flagstaff population baseline due to the severe undercounts by the U.S. Census Bureau that year. A better year to use for the baseline would be 2002.

-Neil Cobb expressed concern that the areas outside of Flagstaff may have much less reliable population projections.

Attachment 4

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Slide 1

Population Sub-group Timeline

- Initial contact with sub-group (11/14/02)
- Outlined our tasks (11/26/02)
- Correspondence with NACOG (12/12-12/17/02)
- Conference call reminder with attachments of population estimates and projections (12/18/03)
- Correspondence with ADWR and ADES (ongoing from the beginning)
- Conference call (12/19/02)
- Sent conference call notes (12/19/02)
- Correspondence with city of Flagstaff regarding UGB population projections (1/9/03-1/21/03)
- Correspondence with Census Bureau (1/17/03)
- Findings and Action items from 12/19 conference call (1/24/03)
- Conference call 2/10/03

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Slide 2

Population Projections Methodologies

- 1997 ADES Demographic Cohort-survival Projections Model
- Trend Analysis
- Adjusted 1997 ADES
- City of Flagstaff's Buildout Model
- HDR Study population data for tribal areas

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Slide 3

Other Population
Sub-group Findings

- Monte Carlo Probability Analysis is not appropriate for this level of analysis
- Lack of historical data by sub-area
- ADES Demographic Cohort-survival Projections Model is proprietary

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Slide 4

Population Sub-group Recommendations

- Use 1997 ADES population projections
- Low and high range population estimates for Flagstaff
  - 1997 ADES Demographic Cohort-survival Projections Model for low estimate
  - City of Flagstaff's Buildout Model for high estimate

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Slide 5

Population Sub-group Recommendations (cont.)

- Population projections for tribal areas will be provided in the Hopi and Western Navajo Water Supply Study, if acceptable to the tribes

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Slide 7

Historical and Projected Population

	1970	1980	1990	2000	2010	2020	2050	2000-2050
Coconino County	48,326	75,008	96,591	124,575	147,352	169,343	235,707	89%
Doney Park/Timberline	n/a	3,550	5,504	7,979	9,737	11,734	17,831	123%
Fort Valley	n/a	350	534	660	754	863	1,182	79%
Grand Canyon Village	1,011	1,348	1,499	1,460	1,888	2,048	2,639	81%
Kachina Village	n/a	1,250	1,711	2,664	2,683	3,120	4,397	65%
Mountainaire	n/a	500	738	1,014	1,046	1,199	1,646	62%
Page	1,409	4,907	6,598	9,570	11,128	13,057	18,770	96%
Parks	n/a	950	603	1,137	1,335	1,604	2,701	138%
Tusayan	n/a	500	555	562	819	890	1,372	144%
Valle	n/a	n/a	123	534				
Williams	2,386	2,266	2,532	2,905	3,310	3,601	4,826	66%
				2002				2002-2050
Flagstaff	26,117	34,845	45,990	63,107	71,981	81,972	113,684	80%
				59,158	67,024	78,299	124,867	111%
Sources: U.S. Census Bureau, ADES, City of Flagstaff								

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