

POPULATION PROJECTIONS FOR THE  
NEW MEXICO STATE WATER PLAN

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Introduction

Why are we concerned about future population size in water-use planning? The answer is obvious to most and quite important for all. The first building block upon which realistic forecasts of the future are made is estimates of population size. Various levels of projected population are often used to allow planners to plan for different contingencies. Without such estimates for cities, counties, states, regions, and nations, little meaningful planning for the future could occur.

We might consider briefly some recently added dimensions regarding world population. Recent work sponsored by the Club of Rome<sup>1</sup> indicates that it may not be possible for the world to sustain unlimited population growth in the future, that the resources to support more and more people are limited. There are a number of alternative ways of examining this situation but the conclusion is not new to the history of mankind. It now appears that at least some countries are exhibiting rates of population growth which will assist in solving the problem. When might the world, or the United States, achieve zero population growth? Not for a long time. Current projections for water-use planning in the U.S. go to 2020 and most optimistic projections for zero growth rates are beyond that date.

We are probably more concerned with what is likely to occur here in our own area of the world. What about New Mexico and the Southwest? Many consider this part of the United States relatively underpopulated. If so, is that situation likely to obtain in the future? The obvious answer to me is "No." Unless there are absolute resource limitations, there are going to be more residents in our future, and one of the major resource considerations is that of water. So, the interactions of water-use planning and projected population of our region is a paramount concern for the future.

Clearly, population projections are extremely important. They do have severe limitations and need to be well understood in order to be used correctly. Therefore, a short examination of what they actually are is in order.

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1 Donella H. Meadows and others, The Limits to Growth (New York: Universe Books, 1972), 205 p.

## The Nature of Population Projections

It is quite important to understand that what we are talking about here today is not accurate numbers relating to future population size of any particular area. Population projections do not predict what the actual population of an area will be at a given date in the future. Even though we sometimes forget the obvious, it should be apparent that such prognostication is beyond the capabilities of human intelligence. Projections of any activity related to human endeavor are very directly related to the assumptions upon which those projections are based. If the assumptions are in error, it follows that the projected data will also be in error. If the assumptions are fundamentally correct but contain a quantity factor which is over- or under-stated, the resulting projections will contain an error in the same direction. Too often persons looking at the printed page assume that the figures on that page are correct. That assumption is indeed hazardous with respect to population projections. Therefore, it should be emphasized once more that intelligent use of projections may be equally as important as the preparation of them.

What are projections? They are expressions of assumptions about phenomena which relate to population size. Among the items which may be considered in any set of projections are fertility rates, mortality rates, migration, economic conditions, health conditions, war or peace, natural resources, and so on ad infinitum. With so many potential considerations, it is clear that chances for errors or misinterpretations are great. Projections are tools for planners and as such are often expressed in ranges, e.g., the population of X will be between 10,000 and 15,000 in year Y. This is often disconcerting to users of such projections, for they want to know the exact future population. Such precise prognostication appears to be beyond our grasp even with the most sophisticated techniques possible. What are population projections? They are guides along the road--baseline date--which simply tell us that if the assumptions behind them turn out to be correct, the figures depicting them may also be correct. They are that and nothing more.

## Projections for Water-Use Planning 1970-2020

The projections of population, employment, and income formulated as guides for water-use planning in New Mexico are the work of two separate organizations and numerous researchers. The Bureau of Business Research at The University of New Mexico constructed two separate series at different times under quite different conditions. The series named BBR I in some publications was completed under the direction of Professor Ralph L. Edgel in 1967-68. That work was under contract to the New Mexico State Planning Office and was a part of the comprehensive planning activities of the State. It is a large work which goes into such detail as projections of employment by broad industry category. BBR II, the lower range of projections, was a much less complex undertaking. The Bureau of Economic Analysis of the U.S. Department of Commerce provided new projections for state populations in 1971. These projections accounted for changes which were registered in the 1970 Census of Population.

The projected figures were lower than previous projections. BBR II utilized these lower state totals and allocated these totals to the counties of the State on the basis of several other county distributions. This work was accomplished by staff members of the Bureau of Business Research working with representatives of the New Mexico State Engineer Office and the Interstate Stream Commission.

The OBERS projections are the third set published by the Bureau of Business Research and used in water-use planning. These data come from a continuing project of the U.S. Water Resources Council. The projections were prepared by the Regional Economics Division, Bureau of Economic Analysis, Social and Economic Statistics Administration, U.S. Department of Commerce and the Natural Resources Economics Division, Economic Research Service, U.S. Department of Agriculture. (The OBERS nomenclature was derived from the former name of the first organization combined with that of the latter.) The OBERS projections are considered preliminary and are subject to revision. They were formulated during the period 1967-71. The system used provided estimates for many areas of the United States.

#### Methodologies and Assumptions of Population Projections for Water Planning in New Mexico

As explained previously, assumptions, in a real sense, determine the outcome of the projections. Because they are so important and because the projections vary significantly, the general nature of these assumptions is explained below.

BBR I (Edgel)

First, the basic philosophy underlying these projections is that the size of New Mexico's population in the foreseeable future will be determined by the size of the State's employment, by the nature of its resources, and by the character of the utilization of those resources. Employment is the major determinant of population size in the Edgel work. Other specific assumptions were:

1. The institutional framework within which the U.S. economy operates will remain relatively constant.
2. There will be changing patterns of resource development.
3. There will be changes in labor force participation.
4. The level of economic activity in the Nation will be the basic determinant of the level of economic activity in New Mexico.

In summary, projections to the year 2000 were made in the following steps:<sup>2</sup>

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<sup>2</sup> Edgel, Ralph L., Projections of the Population of New Mexico and Its Counties to the Year 2070, Bureau of Business Research, The University of New Mexico, Unpublished, 1968, pp. 7-8.

1. As projected by Resources for the Future, the national requirements for various commodities produced in New Mexico or by New Mexico industry were examined in detail, to determine their implications for the State.
2. New Mexico industry was assigned a specific role in meeting these requirements--a role based upon the State's known and estimated resources, their quality and general accessibility, the likelihood of their being exploited at various future times, etc. A somewhat more precise account of the assumptions regarding each industry appears in a subsequent section.
3. A total for basic employment--that which is determined by demands exterior to New Mexico--was secured by adding together the figures obtained in Step 2.
4. A preliminary figure for total employment was secured by using an employment multiplier (the ratio between basic and total employment), which was increased slightly for each decade in conformity with but less rapidly than historical trends.
5. A preliminary estimate of the size of the labor force was secured by assuming an average employment rate of 95 per cent.
6. The age distribution (by broad age groups) of the preliminary labor-force estimate was obtained on the basis of the past age distribution of the labor force and the historical trends therein and the age distribution projected for the Nation by the Bureau of Labor Statistics in studies referred to above. This step produced an estimate of the size of the population 14 years old and older.
7. A preliminary estimate of the size of the total population was obtained by using the historical relationship between the under-14-years and the 14-and-over groups, modified for historical trends and projections of national population by age groups made by the Bureau of the Census.
8. A revised estimate of the volume of secondary employment was made by calculating for each industry the employment that would be required to provide local goods and services to the projected population. For this purpose we assumed a relationship between population and employment in each secondary industry which reflected the relationships of recent years, modified by historical trends and anticipated changes therein. The addition of the revised estimate of secondary employment to basic employment resulted in a new estimate of total employment.

9. The first preliminary estimates of labor force and population were then modified to reflect the new estimate of total employment, with the same relationships being used as had been assumed for the first estimates, modified to produce internal consistency in the figures.
10. The projected employment for the State for each industry for each 10-year period was allocated to the several counties on the basis of the present distribution among the counties but modified in light of past trends, known resources, and geographical relationships. In this manner a projected total employment for each county was obtained.
11. An estimate of each county's labor force and population was obtained by using past relationships among employment, labor force, and population in each of the counties, modified for apparent trends and the changing structure of each county's economy which was implied by the assumed changing employment structure.
12. After a thorough examination of the implications of the distribution among the counties of the employment and population figures obtained as above, we obtained a new set of projections of population for the State by addition of the county figures. This new set of projections was taken as the final Medium Projection of population and employment for the counties and the State.
13. Probable High and Low Projections were set up by our using the Medium Projection as obtained above and making arbitrary assumptions with respect to three variables: employment, age distribution, and labor force participation. From the numerous projections resulting from these calculations a set of High and Low Projections was selected as representing the most logical range of possibilities which should (sic) be considered in using the Medium Projection of employment and population.

#### OBERS

The OBERS projections are based on long-run or secular trends and ignore the cyclical fluctuations which characterize the short-run path of the economy. The general assumptions that underlie the projections are as follows:

1. Growth of population will be conditioned by a decline of fertility rates from those of the 1962-1965 period.

2. Nationally, reasonably full employment, represented by a 4 percent unemployment rate, will prevail as the points for which projections are made; as in the past, unemployment will disproportionately distributed regionally, but the extent of disproportionality will diminish.
3. No foreign conflicts are assumed to occur at the projection dates.
4. Continued technological progress and capital accumulation will support a growth in private output per manhour of 3 percent annually.
5. The new products that will appear will be accommodated within the existing industrial classification system, and, therefore, no new industrial classifications are necessary.
6. Growth in output can be achieved without ecological disaster or serious deterioration, although diversion of resources for pollution control will cause changes in the industrial mix of output.

The regional projections are based on the following additional assumptions:

1. Most factors that have influenced historical shifts in regional "export" industry location will continue into the future with varying degrees of intensity.
2. Trends toward economic area self-sufficiency in local-service industries will continue.
3. Workers will migrate to areas of economic opportunities and away from slow-growth or declining areas.
4. Regional earnings per worker and income per capita will continue to converge toward the national average.
5. Regional employment/population ratios will tend to move toward the national ratio.

#### BBR II

The basic methodology of these projections was to utilize relationships established under both the Edgel and the OBERS methodology and assumptions as the basis for allocating State totals provided by the Bureau of Economic Analysis to the counties of New Mexico. The only additional assumption was that all counties in New Mexico would have greater populations in 1980 than had been the case in 1970. That is, all New Mexico counties are assumed to have already reached their lowest population level.

## Conclusions

Few conclusions can be drawn. We have three sets of population projections using different assumptions and methodologies to come to varying figures. These figures provide us with a high, medium, and low range of projections. Water-use planners can then utilize these figures with their own assumptions about water and devise projected water-use patterns and alternatives.

A pertinent question at this point might well be, "Is all of this worth the effort?" Population is clearly dependent upon so many variables that cannot be measured. Is it worth it? The question is complex, but the clear answer is that it must be worth the effort if New Mexico is going to grow. If we do not plan to accommodate that growth in important resource allocations, we will surely have ensuing chaos. Planning is important, and without the proper tools may be of little positive effect. So, we must have population projections if we are to plan at all. We just need to remember when using them that they are projections and are not prognostications of future census figures.

## Reference:

1972 OBERS Projections, Regional Economic Activity in the U.S., "Concepts Methodology, and Summary Data" Volume I. U.S. Water Resources Council, Washington, D. C.

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NEW MEXICO POPULATION, ACTUAL AND PROJECTED  
By County, 1960, 1970, 1980, 2000, and 2020

<u>County</u>	<u>1960*</u>	<u>1970*</u>	<u>1980</u>	<u>2000</u>	<u>2020</u>
<u>STATE TOTAL</u>					
1. BBR I			1,630,000	2,778,000	4,621,400
2. OBERS	951,023	1,016,000	1,301,400	1,854,400	2,743,900
3. BBR II			1,119,000	1,336,000	1,589,000
<u>BERNALILLO</u>					
BBR I			531,500	948,000	1,546,600
OBERS	262,199	315,774	424,300	632,300	919,200
BBR II			353,500	425,800	514,800
<u>CATRON</u>					
BBR I			4,200	9,300	11,900
OBERS	2,773	2,198	3,900	5,600	8,200
BBR II			2,400	2,900	3,400
<u>CHAVES</u>					
BBR I			92,400	151,400	253,100
OBERS	57,649	43,335	74,200	100,100	150,900
BBR II			47,800	57,000	67,800
<u>COLFAX</u>					
BBR I			18,000	26,400	39,200
OBERS	13,806	12,170	14,300	18,600	22,000
BBR II			13,400	16,000	19,000
<u>CURRY</u>					
BBR I			68,100	123,700	215,600
OBERS	32,691	39,517	54,600	81,600	129,000
BBR II			43,600	52,000	61,800
<u>DE BACA</u>					
BBR I			4,600	10,100	12,900
OBERS	2,991	2,547	3,900	7,400	8,200
BBR II			2,800	3,300	4,000
<u>DONA ANA</u>					
BBR I			136,300	224,000	425,000
OBERS	59,948	69,773	109,300	148,400	252,400
BBR II			76,900	91,800	109,100
<u>EDDY</u>					
BBR I			66,500	104,200	171,900
OBERS	50,783	41,119	53,400	68,700	101,500
BBR II			44,000	52,000	61,000



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NEW MEXICO POPULATION, Cont'd.

<u>County</u>	<u>1960*</u>	<u>1970*</u>	<u>1980</u>	<u>2000</u>	<u>2020</u>
<u>GRANT</u>					
BBR I			28,600	44,800	73,100
OBERS	18,700	22,030	23,400	29,700	43,900
BBR II			24,300	29,000	34,500
<u>GUADALUPE</u>					
BBR I			8,000	16,000	21,800
OBERS	5,610	4,969	6,500	11,100	13,700
BBR II			5,500	6,500	7,800
<u>HARDING</u>					
BBR I			3,800	8,100	10,400
OBERS	1,874	1,348	2,600	5,600	5,500
BBR II			1,500	1,800	2,100
<u>HIDALGO</u>					
BBR I			7,900	11,800	19,800
OBERS	4,961	4,734	6,500	7,400	11,000
BBR II			5,200	6,200	7,400
<u>LEA</u>					
BBR I			84,600	140,300	245,400
OBERS	53,429	49,554	67,700	92,700	145,400
BBR II			53,600	63,200	74,000
<u>LINCOLN</u>					
BBR I			13,900	23,900	30,500
OBERS	7,744	7,560	11,700	16,700	19,200
BBR II			8,300	9,900	11,800
<u>LOS ALAMOS</u>					
BBR I			34,700	56,300	92,300
OBERS	13,037	15,198	27,300	37,100	54,900
BBR II			16,800	20,000	23,800
<u>LUNA</u>					
BBR I			17,400	30,600	51,100
OBERS	9,839	11,706	14,300	20,400	30,200
BBR II			12,900	15,400	18,300
<u>McKINLEY</u>					
BBR I			58,700	88,200	145,000
OBERS	37,209	43,208	46,900	59,300	85,100
BBR II			46,600	54,800	64,600

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NEW MEXICO POPULATION, Cont'd.

<u>County</u>	<u>1960*</u>	<u>1970*</u>	<u>1980</u>	<u>2000</u>	<u>2020</u>
<u>MORA</u>					
BBR I			5,300	10,200	13,100
OBERS	6,028	4,673	3,900	7,400	8,200
BBR II			5,200	6,100	7,300
<u>OTERO</u>					
BBR I			60,800	102,600	194,000
OBERS	36,976	41,097	48,200	68,600	115,200
BBR II			44,300	52,000	61,300
<u>QUAY</u>					
BBR I			16,200	26,500	35,500
OBERS	12,279	10,903	13,000	18,500	22,000
BBR II			12,000	14,300	16,000
<u>RIO ARRIBA</u>					
BBR I			26,600	43,600	70,500
OBERS	24,193	25,170	20,800	29,700	41,200
BBR II			27,000	31,500	36,200
<u>ROOSEVELT</u>					
BBR I			26,200	38,700	77,400
OBERS	16,198	16,479	20,800	26,000	46,600
BBR II			17,200	19,700	22,800
<u>SANDOVAL</u>					
BBR I			18,600	26,500	51,000
OBERS	14,201	17,492	14,300	18,500	30,200
BBR II			20,200	26,000	29,400
<u>SAN JUAN</u>					
BBR I			66,200	100,500	175,000
OBERS	53,306	52,517	53,400	66,700	104,300
BBR II			57,900	69,100	82,100
<u>SAN MIGUEL</u>					
BBR I			30,100	49,000	69,200
OBERS	23,468	21,951	23,400	33,400	41,200
BBR II			23,000	26,900	31,300
<u>SANTA FE</u>					
BBR I			82,200	178,500	287,200
OBERS	44,970	53,756	65,100	118,700	170,100
BBR II			59,200	70,700	84,100

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NEW MEXICO POPULATION, Cont'd.

<u>County</u>	<u>1960*</u>	<u>1970*</u>	<u>1980</u>	<u>2000</u>	<u>2020</u>
<u>SIERRA</u>					
BBR I			9,900	18,000	24,700
OBERS	6,409	7,189	7,800	11,100	13,700
BBR II			7,900	9,500	11,200
<u>SOCORRO</u>					
BBR I			12,700	21,200	29,400
OBERS	10,168	9,763	10,400	14,800	16,500
BBR II			10,800	12,800	15,300
<u>TAOS</u>					
BBR I			24,800	37,900	52,900
OBERS	15,934	17,516	19,500	26,000	30,200
BBR II			19,300	23,000	27,400
<u>TORRANCE</u>					
BBR I			6,500	10,400	13,200
OBERS	6,497	5,290	5,200	7,400	8,200
BBR II			5,800	7,000	8,300
<u>UNION</u>					
BBR I			7,200	10,800	15,300
OBERS	6,068	4,925	5,200	7,400	8,200
BBR II			5,400	6,500	7,700
<u>VALENCIA</u>					
BBR I			57,500	86,500	147,400
OBERS	39,085	40,539	45,600	57,500	87,800
BBR II			44,700	53,300	63,400

\* Census data

1. UNM Bureau of Business Research, first projection
2. Office of Business Economics, USDC, and Economic Research Service USDA
3. UNM Bureau of Business Research, second projection, based upon State totals provided by Bureau of Economic Analysis, USDC