

APPENDIX R

**Population Projection Methodology for
Act 220
State Water Plan**

**Department of Environmental Protection
Bureau of Watershed Management
Division of Water Use Planning**

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Background and Purpose

In water resource planning, population data is a key component for estimating water supply demands by sectors served by public water supply as well as estimating water supply demands of those who are self-supplied.

The Department of Environmental Protection developed population projections at the state, county and municipal levels during the 1970s and 1980s for state water planning purposes and has subsequently maintained census and projections data for use in surface water allocation permitting.

Act 220 of 2002, The Water Resources Planning Act, requires the Department to update the State Water Plan by March of 2008, thus necessitating the development of new population projections. The Department developed a procedure that utilized U.S. Census Bureau records for decades 1980, 1990 and 2000 for projecting decadal populations at the state, county and municipal levels through the year 2030. The approach and methodologies used by the Department are described below.

Census Information

Populations from the Federal Census Bureau for the decades 1980, 1990 and 2000 were used as the basis for projections for the years 2010, 2020 and 2030. The Department incorporated corrected census 2000 populations provided by the U.S. Census Bureau under the “Count Question Resolution (CQR) Program. The US Census Bureau does not change or republish corrected 2000 census figures but incorporates these corrections into post-census estimates. Consequently, the Department’s 2000 census numbers will vary from the original U.S. Census Bureau 2000 numbers.

Development of the Census 2000-Based Population Projections

The method used for development of the 2000-based population projections employed the Microsoft Excel® FORECAST function, a least squares trending/regression function.

This function was chosen after a close inspection of the county total population projections from 1990-based projections (*for years 2010 and 2020*) done by the Pennsylvania State Data Center and comparison to 2000-based state total projections (*for years 2010, 2020 and 2030*) done by the U.S. Census Bureau. These county and state totals were compared to those developed by using the FORECAST function.

In both comparisons, the FORECAST function projection method produced acceptable results. The spreadsheet procedure is described in more detail below.

Spreadsheet Method

- 1) The 1980, 1990, and 2000 municipal census population figures were entered into a spreadsheet.
- 2) The projections used the three most recent decades as a basis. These three decades were weighted 1:2:2 respectively, so the 2010 projections were based on the following population census figures: *1980, 1990, 1990, 2000, 2000*.

- 3) Columns for *1980, 1990, 1990, 2000, 2000* were developed in the spreadsheet. The Excel® FORECAST function was used to create the regression curve. The following is an illustration of the 2010 projection:

=FORECAST(2010, P1:P5, D1:D5)

Where P1:P5 represents the Y-axis being the five municipal population figures for respective decades *1980, 1990, 1990, 2000, 2000*.

Where D1:D5 represents the X-axis being the actual decades in question: *1980, 1990, 1990, 2000, 2000*.

- 4) Projections for decade 2020 were made by changing the input decade populations to *1990, 2000, 2000, 2010 and 2010*. Note that the 2010 figures were values derived from the previous projection and not census figures like 1980, 1990 and 2000.
- 5) Projections for decade 2030 were made by changing the base decade populations to *2000, 2010, 2010, 2020, 2020*.

Adjustment to the 2000-Based Population Projections

The Department recognized the need for local planning offices to review and comment on the Department's projections and, where available, provide local projection numbers that would assist the Department in producing the most accurate projection data set. All county planning commissions and regional planning commissions were afforded the opportunity to comment on the projections for their area.

About 25 counties responded with comments. Department staff met with the Pennsylvania State Data Center in November of 2005 to gain information from the Federal perspective. Subsequent to these meetings, the Department identified for follow-up contact an additional 11 counties that seemed likely to have developed their own county projections, but from which comments had not been received.

Department staff also met with the Department of Community and Economic Development to discuss projections submitted by the counties, that varied significantly from the Department's projections. It was decided that projections from five of the twenty-six counties, namely Adams, Allegheny, Franklin, Monroe and Pike should be used as submitted by the respective county (In all cases, their projections were higher than the Department's). The remaining counties' projections could be subject to adjustment.

It was also decided that county projections would be used only if a county has specifically requested use of their projections.

Overall, the review process resulted in a total of twenty-six counties submitting independent projections. Five of the counties' projections were used as submitted, while a final adjustment factor was applied to the remaining 21 counties' projections. .

Final Adjusted Projections

A final adjustment factor (applied only to decade 2030 individual municipal-level projections) was used to proportionally adjust the 2030 municipal-level projections to bring the DEP state total population to within 5% of the 2030 Census Bureau state total. The 2010 and 2020 projections were already within 5% of the Census Bureau state totals and were not adjusted.