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## **STATE WATER PLANNING (Act 220 Implementation) RESOURCE CENTER**

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

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

**June 2006**

## **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.

County	Municipality Name	DEP Municipal Code	2000 Census	2010 Projected	2020 Projected	2030 Projected
<b>LEHIGH</b>	Alburtis B	39908	2,117	2,161	2,202	2,154
	Allentown C	39001	106,632	106,652	106,665	102,406
	Bethlehem C	39002	19,029	19,029	19,029	18,268
	Catasauqua B	39804	6,588	6,588	6,588	6,324
	Coopersburg B	39909	2,582	2,582	2,582	2,479
	Coplay B	39805	3,387	3,387	3,387	3,252
	Emmaus B	39003	11,313	11,313	11,313	10,860
	Fountain Hill B	39806	4,614	4,614	4,614	4,429
	Hanover T	39910	1,913	1,941	1,977	1,940
	Heidelberg T	39911	3,279	3,507	3,696	3,703
	Lower Macungie T	39912	19,220	23,374	27,898	31,647
	Lower Milford T	39913	3,617	3,924	4,246	4,388
	Lowhill T	39914	1,869	2,258	2,626	2,855
	Lynn T	39915	3,849	4,477	5,132	5,568
	Macungie B	39916	3,039	3,039	3,039	2,917
	North Whitehall T	39917	14,731	17,425	19,530	20,275
	Salisbury T	39918	13,498	13,588	14,044	13,427
	Slatington B	39807	4,434	4,434	4,434	4,257
	South Whitehall T	39919	18,028	19,702	21,413	22,085
	Upper Macungie T	39920	13,895	17,536	20,913	23,042
	Upper Milford T	39921	6,889	7,161	7,370	7,229
	Upper Saucon T	39922	11,939	13,398	15,544	15,660
	Washington T	39923	6,588	7,277	7,847	7,980
	Weisenberg T	39924	4,144	4,807	5,409	5,721
	Whitehall T	39925	24,896	25,379	25,786	25,094
<b>LEHIGH</b>			<b>312,090</b>	<b>329,552</b>	<b>347,286</b>	<b>347,962</b>
<b>LUZERNE</b>	Wilkes Barre C	40001	43,123	38,936	34,627	34,644
	Hazleton C	40002	23,329	21,250	19,558	19,503
	Kingston B	40003	13,855	12,905	12,125	12,101
	Nanticoke C	40004	10,955	9,949	8,768	8,793
	Pittston C	40005	8,104	7,244	6,141	6,176
	Plymouth B	40006	6,507	5,969	5,380	5,388
	Penn Lake Park B	40007	269	295	321	321
	Ashley B	40807	2,866	2,558	2,183	2,192
	Avoca B	40808	2,851	2,466	2,275	2,247
	Dallas B	40809	2,557	2,489	2,454	2,449
	Dupont B	40810	2,719	2,333	2,017	2,007
	Duryea B	40811	4,634	4,221	3,910	3,896
	Edwardsville B	40812	4,984	4,618	4,223	4,227
	Exeter B	40813	5,955	6,181	6,429	6,426
	Forty Fort B	40814	4,579	4,068	3,581	3,578
	Freeland B	40815	3,643	3,314	3,021	3,016
	Larksville B	40816	4,694	4,857	4,924	4,937
	Luzerne B	40817	2,952	2,559	2,246	2,234
	Swoyersville B	40818	5,157	4,860	4,462	4,477
	West Hazleton (D) B	40819	3,542	2,867	2,239	2,232
	West Pittston B	40820	5,072	4,627	4,140	4,146
	West Wyoming B	40821	2,833	2,614	2,357	2,363

County	Municipality Name	DEP Municipal Code	2000 Census	2010 Projected	2020 Projected	2030 Projected
	Wilkes-Barre T	40822	3,235	2,707	2,288	2,272
	Wyoming B	40823	3,221	2,978	2,854	2,837
	Harveys Lake B	40824	2,888	3,193	3,405	3,419
	Bear Creek T	40924	2,580	2,317	2,122	2,112
	Black Creek T	40925	2,132	2,221	2,371	2,362
	Buck T	40926	396	392	404	402
	Butler T	40927	7,166	7,934	8,916	8,885
	Conyngham B	40928	1,958	1,810	1,689	1,685
	Conyngham T	40929	1,385	1,243	1,114	1,112
	Courtdale B	40930	791	760	750	747
	Dallas T	40931	8,179	8,610	9,111	9,101
	Dennison T	40932	908	982	1,072	1,070
	Dorrance T	40933	2,109	2,222	2,459	2,441
	Exeter T	40934	2,557	2,658	2,759	2,759
	Fairmount T	40935	1,226	1,258	1,280	1,281
	Fairview T	40936	3,995	4,476	5,243	5,202
	Foster T	40937	3,323	3,368	3,357	3,365
	Franklin T	40938	1,601	1,647	1,774	1,763
	Hanover T	40939	11,488	10,932	10,373	10,373
	Hazle T	40940	9,000	8,763	8,477	8,484
	Hollenback T	40941	1,243	1,373	1,452	1,459
	Hughestown B	40942	1,541	1,430	1,273	1,279
	Hunlock T	40943	2,568	2,643	2,716	2,716
	Huntington T	40944	2,104	2,168	2,309	2,297
	Jackson T	40945	4,453	5,443	5,363	5,516
	Jeddo B	40946	144	150	164	163
	Jenkins T	40947	4,584	4,648	4,593	4,610
	Kingston T	40948	7,145	7,439	7,783	7,776
	Lafin B	40949	1,502	1,417	1,383	1,375
	Lake T	40950	2,110	2,270	2,445	2,443
	Laurel Run B	40951	723	720	727	725
	Lehman T	40952	3,206	3,288	3,397	3,394
	Nescopeck B	40953	1,528	1,408	1,287	1,287
	Nescopeck T	40954	1,096	1,243	1,320	1,330
	New Columbus B	40955	215	217	211	212
	Newport T	40956	5,006	4,957	5,172	5,134
	Nuangola B	40957	671	644	615	615
	Pittston T	40958	3,450	3,254	3,585	3,510
	Plains T	40959	10,906	10,672	10,519	10,508
	Plymouth T (D)	40960	2,097	1,856	1,938	1,892
	Pringle B	40961	991	884	741	746
	Rice T	40962	2,460	2,681	3,092	3,065
	Ross T	40963	2,742	2,966	3,124	3,133
	Salem T	40964	4,269	4,098	3,891	3,896
	Shickshinny B	40965	959	847	714	717
	Slocum T	40966	1,112	1,174	1,174	1,183
	Sugarloaf T	40967	3,652	3,892	4,064	4,073
	Sugar Notch B	40968	1,023	930	878	872
	Union T	40969	2,100	2,245	2,348	2,354

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County	Municipality Name	DEP Municipal Code	2000 Census	2010 Projected	2020 Projected	2030 Projected
	Warrior Run B	40970	624	537	482	477
	White Haven B	40971	1,182	753	597	558
	Wright T	40972	5,593	5,918	6,576	6,529
	Yatesville B	40973	649	682	778	769
	Bear Creek Village B	40974	284	279	273	273
	<b>LUZERNE</b>		<b>319,250</b>	<b>306,778</b>	<b>296,181</b>	<b>295,913</b>
<b>LYCOMING</b>	Williamsport C	41001	30,706	29,341	28,055	28,044
	Jersey Shore B	41802	4,482	4,378	4,408	4,389
	Montoursville B	41803	4,777	4,449	4,190	4,180
	Muncy B	41804	2,663	2,647	2,618	2,620
	South Williamsport B	41805	6,412	6,327	6,243	6,243
	Anthony T	41906	904	978	1,111	1,103
	Armstrong T	41907	717	707	726	722
	Bastress T	41908	574	608	657	655
	Brady T	41909	1,351	1,588	1,992	1,968
	Brown T	41910	111	125	136	137
	Cascade T	41911	419	445	477	477
	Clinton T	41912	3,090	3,445	3,600	3,629
	Cogan House T	41913	974	1,039	1,162	1,154
	Cummings T	41914	355	344	351	349
	Duboistown B	41915	1,280	1,304	1,360	1,355
	Eldred T	41916	2,178	2,393	2,555	2,563
	Fairfield T	41917	2,659	2,858	2,988	2,998
	Franklin T	41918	915	970	994	998
	Gamble T	41919	854	940	1,040	1,038
	Hepburn T	41920	2,836	3,008	3,083	3,097
	Hughesville B	41921	2,220	2,222	2,320	2,307
	Jackson T	41922	414	395	383	382
	Jordan T	41923	878	909	926	928
	Lewis T	41924	1,139	1,141	1,111	1,115
	Limestone T	41925	2,136	2,271	2,468	2,459
	Loyalsock T	41926	10,876	10,907	11,053	11,037
	Lycoming T	41927	1,606	1,457	1,312	1,312
	McHenry T	41928	145	126	60	66
	McIntyre T	41929	539	455	391	388
	McNett T	41930	211	196	195	193
	Mifflin T	41931	1,145	1,231	1,288	1,293
	Mill Creek T	41932	572	647	733	732
	Montgomery B	41933	1,695	1,710	1,753	1,749
	Moreland T	41934	1,036	1,125	1,192	1,195
	Muncy Creek T	41935	3,487	3,509	3,568	3,562
	Muncy T	41936	1,059	1,060	1,074	1,072
	Nippenose T	41937	729	739	736	738
	Old Lycoming T	41938	5,508	5,675	5,736	5,752
	Penn T	41939	900	976	1,073	1,070
	Piatt T	41940	1,259	1,350	1,482	1,476
	Picture Rocks B	41941	693	733	769	769
	Pine T	41942	329	333	357	354

$319,250 - 295,913$   
 $317,250$   
 $\approx 0.073$   
 $\times 100$   
 $\approx 7\%$