COUNTYWIDE PROJECTIONS OF COMMUNITY WATER SUPPLY NEEDS IN THE MIDWEST

PROJECT COMPLETION REPORT

Research Report of the
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EXECUTIVE SUMMARY

This analysis of county-level, public-supply water use in six Midwestern states provides useful insights into the relationship between water use and those factors that are most likely to predict or explain water use. It also provides a perspective on the challenges that face water system managers and regional officials in planning to meet future water system infrastructure needs in the region. This summary reviews the water-use projections and related findings of the study, and makes several recommendations for actions that may improve water use forecasting and infrastructure planning for drinking water systems.

FORECASTS OF WATER USE

Statewide Forecasts

Table ES1 compares the projections of publicly-supplied, municipal and industrial (M&I) water use in the six Midwestern states in USPEA Region 5. The combined water use for the entire region is projected to increase from 6,617 mgd in 2005 to 7,102 mgd in 2025 (a 7.3 percent increase) in spite of an overall decline in per capita water use. Illinois and Ohio account for the majority of the projected increase in M&I water use. Water use is projected to slightly decrease in Indiana, Michigan and Minnesota.

Table ES1. Comparison of Statewide Forecasts of M&I Water Use

State	Quantity	2005	2010	2015	2020	2025
	Water Use (mgd)	1,938.37	2,014.03	2,094.87	2,176.89	2,264.64
Illinois	Population Served	11,128,110	11,399,105	11,679,221	11,927,025	12,183,566
	Per Capita Usage (gpcd)	174.2	176.7	179.4	182.5	185.9
	Water Use (mgd)	699.78	702.08	701.6	699.55	697.37
Indiana	Population Served	4,593,982	4,664,661	4,723,384	4,776,454	4,830,522
	Per Capita Usage (gpcd)	152.3	150.5	148.5	146.5	144.4
	Water Use (mgd)	1,213.05	1,183.37	1,155.17	1,128.70	1,108.81
Michigan	Population Served	7,250,749	7,318,290	7,390,327	7,469,768	7,556,951
	Per Capita Usage (gpcd)	167.3	161.7	156.3	151.1	146.7
	Water Use (mgd)	526.61	518.83	508.96	496.49	480.97
Minnesota	Population Served	3,790,954	3,877,549	3,949,313	3,999,805	4,022,093
	Per Capita Usage (gpcd)	138.9	133.8	128.9	124.1	119.6
	Water Use (mgd)	1,586.30	1,646.68	1,711.96	1,777.36	1,846.18
Ohio	Population Served	9,748,191	9,929,380	10,197,575	10,479,713	10,776,815
	Per Capita Usage (gpcd)	162.7	165.8	167.9	169.6	171.3
	Water Use (mgd)	652.95	672.37	684.23	694.15	704.15
Wisconsin	Population Served	3,747,037	3,869,535	3,942,009	4,004,386	4,066,763
	Per Capita Usage (gpcd)	174.3	173.8	173.6	173.3	173.1
	Water Use (mgd)	6,617.06	6,737.36	6,856.79	6,973.14	7,102.12
All states	Population Served	40,259,023	41,058,520	41,881,829	42,657,151	43,436,710
	Per Capita Usage (gpcd)	161.6	160.4	159.1	157.9	156.8

The projected change in water use between 2005 and 2025 was based upon projected changes in population served and per capita M&I water usage rates. Table ES2 shows the projected changes in public-supply water use between 2005 and 2025, and partitions these changes into two component parts: those attributed to population change, and those attributed to changes in per capita water use rates.

Table ES2. Projected 2005-2025 Changes in M&I Water Use and the Effects of Changes in Population Served and Per Capita Water Use

State	2025-2005 Growth/Decline (mgd)	Percent of 2005 Use, %	Contribution (mgd) from:	
			Population change	Per capita use change
Illinois	+326.3	+16.8	+177.0	+149.3
Indiana	-2.4	+0.4	+35.0	-37.4
Michigan	-104.2	-4.7	+55.9	-160.1
Minnesota	-45.6	-11.6	+26.8	-72.4
Ohio	+259.9	+13.5	+159.1	+100.8
Wisconsin	+51.2	+3.8	+55.0	-3.7
All six states	+485.2	+7.4	+508.8	-23.5

The comparisons in Table ES2 indicate that the total demand in the region is expected to increase by nearly one-half billion gallons per day (i.e., 485.2 mgd). This increase can be primarily attributed to the projected growth in population served within the six-state region. Changes in per capita water usage rates have only a small, and declining net effect in the entire region (i.e., -23.5 mgd). Major increases in M&I water use are projected for Illinois and Ohio. In these states the increases are a result of both increases in population served and increases in the projected rate of per capita water use. In Indiana, Michigan and Minnesota, the increases attributed to population growth are balanced against decreases in per capita water use, resulting in a net decrease in the projected water use.

Statewide estimates of water use were calculated by summing county-level projections. Table ES3 summarizes the projected changes in public-supply use within the counties of each state. Between 2005 and 2025, Ohio and Illinois have the largest number of counties that are projected to increase their water use by more than 0.5 mgd; Michigan and Minnesota have the largest number of counties that are projected to decrease their water use by more than 0.5 mgd. In the six states, 110 out of 524 counties, or 21 percent, are expected to have significant growth in M&I water. However, water use in more than half of Midwest counties (53 percent) is expected to remain relatively unchanged (±0.2 mgd) during the 20-year period.

Table ES3. Midwestern Counties with Increasing, Decreasing and Unchanged Water Use

State	No. of Counties with 2025-2005 Increase Greater than +0.5 MGD	No. of Counties with 2025-2005 Decrease Greater than -0.5 MGD	No. of Counties With 2005-2025 Change within ±0.2 MGD	Total Number of Counties
Illinois	26	0	63	102
Indiana	4	6	70	92
Michigan	8	21	37	83
Minnesota	6	12	46	87
Ohio	47	0	16	88
Wisconsin	19	0	44	72
All six states	110	39	276	524

Projected M&I water use estimates for each county in each of the six states are presented in Chapter 3. These can be used directly in studies of countywide water supply for public-supply purposes. For partial county areas, the projections can be prorated based on population served within the sub-area of the county. Similarly, county projections can be summed for areas spanning two or more counties. When using the projections presented in this report, care should be taken to account for differences between local conditions and the assumptions used in development of the state water use models.

The parameters of the water use models developed in this study can also be used to prepare independent projections for study areas that are smaller or larger than a county area. Ideally, projections for a specific water system or geographic region should be based upon a water-use model developed from data that were specific to that system or region. The methodology described in Chapter 2 can be used as a framework for developing such models. However, when either the data or expertise are unavailable for such model development, the variables and coefficients developed during this study can be substituted as a "next-best" approach to making M&I water use projections for systems and regions in the Midwest.

EFFECTS OF EXPLANATORY VARIABLES

One product of this study is a set of estimated parameters that can be applied in water-use modeling. Table ES4 compares the elasticities and regression coefficients for the explanatory variables that were used as predictors in the models of county-level per capita use in each state. The table shows the range of values of these coefficients and suggests a value for each that should be appropriate for use in "rational" equations of per capita water use within water system service areas in the Midwest.

Table ES4. Estimated Coefficients and Elasticities of M&I Water-use Models

Variables	Low Value	High Value	Suggested Value
Summer Season Precipitation [a]	-0.0349	-0.2785	-0.1747
Summer Season Temperature [a]	1.1126	1.2336	1.1126
Per Capita Income [a]	0.2173	0.4181	0.2445
Percent of Population Employed	0.0047	0.0099	0.0071
Annual Conservation Trend	-0.0037	-0.0074	-0.0053

[a] Variable values converted to natural logarithms.

The variables of precipitation, temperature and income were converted to their natural logarithms and, therefore the estimated coefficients are constant elasticities of the dependent variable with respect to the independent variables. Elasticity is a dimensionless coefficient which designates the percent change in the value of the dependent variable that would be brought about by a 1.0 percent change in the value of the independent variable.

The estimated values for population employed and conservation trend variables are not constant elasticities because the percentage ratio of employment to population and conservation trend are not converted into logarithms.

Elasticities of Income and Weather Variables

Total summer precipitation was found to be a significant predictor of per capita public-supply water use. The estimated elasticities of water use with respect to precipitation range from -0.0349 for Minnesota to -0.2785 for Michigan. These values indicate that a one percent increase in summer precipitation would result in approximately 0.035 to 0.28 percent decrease in per capita water use. A middle range value of –0.1747 obtained from the Indiana model is suggested for the Midwestern region.

Average summer air temperature was found to be a significant variable for Illinois and Michigan, with elasticities of +1.2336 and +1.1126, respectively. Both values are close to the expected values and can be used for the Midwest.

In three states (Indiana, Ohio and Wisconsin) the per capita income was found to be a significant explanatory variable of public-supply per capita water use. The estimated elasticities ranged from +0.2173 for Wisconsin to +0.4181 for Ohio. The midrange value of 0.2445 (obtained from the Indiana model) is suggested for use in the Midwest.

Effects of Employment and Conservation Trend

In all six states, the ratio (percentage) of employment to county resident population was found to be a significant predictor of per capita water use. All estimated coefficients are positive and range from 0.0047 to 0.0099, indicating that counties with

higher employment ratios tend to have higher per capita water use. The proper interpretation of these values is that a 1.0 percent increment in the employment/population ratio would increase the logarithm of per capita water use by 0.0047 to 0.0099. This is equivalent to an increase of between 0.7 and 1.5 gpcd in the average of per capita rate use of 150 gpcd.

The conservation time trend variable captures the influence of various long-term, water reducing technologies and activities that have occurred in the public-supply water sector. Significant downward trends in per capita use were found in five of the six Midwestern states. These coefficients represent a logarithmic decrease in per capita water use of 0.0037 to 0.0074 per year. At the mean per capita use of about 150 gpcd, these coefficients indicate a 0.07 to 0.15 percent annual decrease in water use due to long-term conservation.

The parameters from Table ES4 and Table 2.8 in Chapter 2 can be used to estimate long-term changes in per capita water use for water service areas other than the county areas used in this study.

WATER USE PROJECTIONS AND INFRASTRUCTURE CAPACITY

A second goal of this project was to compare state water use projections to current infrastructure capacity in each county. Measures of physical infrastructure capacity were generally unavailable in electronic format from state and federal agencies. A proxy measure of infrastructure capacity based upon reported levels of current water production was developed from data available for three states and compared to 2025 water use projections.

Table ES5 shows the number of counties and county groups in these three states that have adequate capacity (2025 water use projections are less than measures of current infrastructure capacity), or are projected to have deficits (2025 water use projections are greater than measures of current infrastructure capacity) greater than 5.0 mgd. Table ES3 also shows the statewide difference between 2025 projected water use and current capacity.

Table ES5. Comparison of Current Infrastructure Capacity and Projected Water Use

State	Total Number of Counties and Groups	No. of Counties/Groups with Adequate Capacity	No. of Counties/Groups with Deficits Greater than 5.0 MGD	Projected Statewide Deficit (-) or Surplus (+)
Illinois	70	34	10	+1,344
Minnesota	80	42	6	+127
Ohio	75	23	14	-314

Approximately, half of the counties and groups of counties in Illinois and Minnesota appear to have the capacity to meet 2025 water use without substantial alteration of addition of infrastructure. However, less than one-third of Ohio counties and groups are projected to be in this same situation. Illinois and Minnesota are projected to have statewide surplus capacity throughout the projection period, but the surplus in Illinois is primarily the result of the excess capacity in a single, large county located on Lake Michigan (Cook). More than two-thirds of the projected deficit in Ohio is concentrated in Franklin County and a group of interconnected counties in Southwest Ohio (Group 3: Butler, Hamilton, and Warren Counties).

RECOMMENDATIONS

The experience of developing long-term water use projections for Midwestern counties has provided considerable insight into the challenges of developing county-level water demand models from publicly available data sets. Water use modeling is primarily a mathematical exercise, and therefore the recommendations presented here are concerned with the quality and availability of data needed to develop water use relationships and forecasts.

Comprehensive water use data are difficult to obtain. This study sought to capitalize on the data available from the USGS National Water Use Inventory Program (NWUIP), the only set of time-series data that is available for all of the counties in the United States. This one-of-a-kind data set provides a general picture of changing water use patterns in the U.S. However, the application of these data in water use modeling is problematic for three reasons: (1) it is difficult to match the spatial extent of water "withdrawals" and water "uses"; (2) the 5-year data interval between inventories presents difficulties in data verification and correlation with explanatory variables; (3) the current level of data collection does not allow for the disaggregation of water uses into subcategories that are best suited to alignment with explanatory variables.

As water system planning needs become more critical, in more regions, there will be considerable value in organized efforts to improve data collection and storage. State and regional agencies should promote the routine collection of water withdrawals and use data from all classes of water users. Water system managers will need to be encouraged to collect and report water withdrawal and use data as accurately as possible, and they will need to be convinced of the practical value of this additional effort. Effective methods of data collection and processing will need to be designed to minimize time and cost commitments by participating systems. Smaller systems will need training and financial assistance to establish record keeping and reporting methods.

While the availability of improved water withdrawal and use data will greatly improve the types and quality of planning and data analysis that will be possible, start-up costs are likely to be substantial. States may wish to explore the possibility of using a portion of their allotment of federal drinking water funds to develop data collection-

storage-retrieval procedures. Reporting of water use data could be fit into an existing framework, such as the Consumer Confidence Reports.

Considerable difficulties were also encountered in collecting and preparing data sets of variables that can effectively explain and predict water use. The majority of the data used to develop explanatory variables in this study came from U.S. Census sources. In many cases, some of the data most relevant to water use (such as income and employment) were either unavailable due to confidentiality concerns or collected in time-frames that differ from those of other explanatory variables. Similar data is often available from local planning agencies and economic development entities, which collect it on an annual basis through the direct cooperation with state demographic agencies and taxing bodies. While it was beyond the scope of this project to work extensively with locally prepared data sources, it may be desirable for state water agencies to establish relationships with these organizations in order to improve the availability of data that can be used as explanatory variables.

One of the principal objectives of this study was to collect data on water supply infrastructure capacity and compare the aggregate countywide capacity to projected values of future water use. The lack of a uniform method of reporting water system infrastructure capacity, or even water system production, made it difficult to provide a meaningful comparison of system capacity with projected water use at the county level. Although not currently available, the description of the data that is available from the Safe Drinking Water Information System (*http:www.epa.gov/safewater/sdwisfed/sfed2.html)* makes it clear that there is a strong interest making this data available. The development of precise capacity definitions and implementation of the collection of infrastructure related information would greatly improve the kind of supply-demand analysis that was initiated by this study.

Improved water use forecasting can play a valuable role in infrastructure planning for individual water systems and regional planning for groups of systems and water resource regions. Improved planning can provide many economic and environmental benefits by improving the timing for the implementation of hugely expensive infrastructure projects and promotion of regional interactions that maximize the use of available infrastructure and water resources. This study has provided a preliminary exploration of the potential of large scale water use forecasting and can serve to guide future data collection and water use forecasting efforts.

CHAPTER 1

INTRODUCTION

BACKGROUND

The 1996 Safe Drinking Water Act Amendments directed the U.S. Environmental Protection Agency (USEPA) to assess the infrastructure needs of public water supply systems, and to repeat this assessment every four years. The most recent assessment estimated that drinking water infrastructure needs will exceed $150 billion over the next 20 years, with $102 billion needed immediately to ensure the provision of safe drinking water (EPA, 2001). Similar estimates from the Congressional Budget Office put the average annual average investment costs needed for drinking water and wastewater combined at $41.0 billion (CBO, 2002).

The nation's largest drinking water systems account for the majority of these projected infrastructure investments. However, the USEPA estimates that the cost per household will be four times greater for systems that serve less than 3,300 customers (EPA, 2001). The managers of these small systems face serious challenges in meeting their infrastructure needs. Small systems lack to economies of size that are available to larger systems and frequently serve a customer base that is least able to afford the increases in water rates needed to pay for infrastructure repair and replacement. (Boisvert and Schmidt, 1996; Shanaghan, 1994)

One of the most challenging aspects in the financial management of small water utilities is the development of effective long-range infrastructure improvement and capital financing plans. A thorough understanding of future water demands is essential to the assessment of infrastructure needs and the development of capital improvement plans (Brekke, et al., 2002; Raftelis, 1993). The estimation of future water demand is difficult even for large utilities with sophisticated planning staffs. However, small water systems rarely have the specialized staff or detailed water use records needed to conduct demand studies that can be used to assess future infrastructure needs. However, the development of capital improvement plans are especially important for small systems. Over-investment in infrastructure wastes scarce capital resources, and can result in unnecessary and unaffordable increases in water rates. Under-investment can result in antiquated systems with high maintenance costs that are unable to provide water to all of the potential customers in their service areas.

At the current time, information that can be used to assess future water needs and plan infrastructure investments is generally unavailable to small systems managers, or to guide state primacy agencies as they allocate resource available from the Drinking Water State Revolving Fund (DWSRF). The provision of estimates of future municipal and industrial (M&I) water demands at a county level can assist small water system managers, county and regional planning agencies, and state water resources managers in their assessment of future infrastructure needs.

While forecasts of future events always include some degree of uncertainty, those based upon established methodologies can be used to develop scenarios of alternative futures, as well as enhance the understanding of how changes in underlying local demographic and socioeconomic conditions are likely to influence future water demands. The research presented in this report is intended to provide an initial exploration into the kinds of forecasts and results that are possible given the quality of currently available information.

This first section of the report describes the purpose and scope of the study, provides a brief summary of the study area and characteristic of Midwestern systems, and presents a synopsis of the chapters that make up this report.

STUDY PURPOSE AND SCOPE

This report describes the development of countywide municipal and industrial (M&I) water demand forecasts for community drinking water systems in the six states in USEPA Region 5: Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin. Specifically, this project set out to:

1. Prepare water demand forecasts for the publicly-supplied municipal and industrial sector, for each county in the six states, for years 2005 to 2025, in five-year increments.

2. Collect data that can be used to estimate the "capacity" to produce and deliver drinking water for all of the systems in each state, and aggregate this data to prepare an estimate of the supply capacity in each county.

3. Compare the estimates of water supply capacity to the projected water demand for each forecast year, and evaluate the balance between water supply and demand for each county.

The results from this study are intended to support state and local water supply planning initiatives. Specifically, these projections are intended to support the infrastructure decision-making process for those small drinking water systems that lack access to other sources of information on the potential changes in future water demands in their service areas. The models presented in this study also provide insight into how water use responds to changes in population served and those factors that affect per capita rates of water use.

The general limitations of the water demand forecasting approach used in this study must be acknowledged:

1. These projections are based on structural relationships between water demand and explanatory factors that have been established during past research. These relationships, in turn, are based upon current economic, political, and technological conditions that are susceptible to change in the future.

2. The reliability of the relationship between explanatory variables and water use (as expressed in model coefficients) is also strongly influenced by the quality of historical water use data and explanatory variable data.

3. The accuracy of forecasting models is dependent upon the temporal and spatial scales of the measures of water use used in their development. For example, models developed from monthly water use data, daily rainfall data, or county-specific income data will be more accurate that those using annual total water use, seasonal rainfall, or state level income data. The selection of explanatory variables is dependent upon the availability of data at the chosen level of spatial disaggregation, in this case, county-level, total public water supply

4. The accuracy of projected water demand depends on the accuracy of the projected values of explanatory factors, such as population, income, housing, and employment. Considerable effort was made to locate authoritative forecasts of explanatory factors. Whenever such forecasts were unavailable at county level, other methods were used to estimate future values of model explanatory variables. Details of these projection methodologies appear in Chapter 2.

5. The analysis in this study includes only an *implicit* consideration of the effects of water demand management activities, such as improved water pricing practices, the adoption of higher efficiency water use equipment, water conservation campaigns, etc. These conservation effects are captured through a time *trend* variable for the 1985-2000 period. This study does not include a scenario analysis of the potential impacts of global climate change, even though this has been a topic of concern in several of the Region 5 states.

Water system managers and county and regional planning officials can use the projections of water use and the related data for countywide or multi-county regional planning initiatives. The water use models for each state can also be used to prepare service area level projections for individual water supply systems by re-estimating the projections using service area socioeconomic data. Model users should pay particular attention to the assumptions used during the preparation of the state models, and adjust for these where local data allows.

WATER SUPPLY IN USEPA REGION 5

Water Systems and Water Use

USEPA defines a *public* water system as a publicly- or privately-owned system that serves at least 25 people or 15 service connections for at least 60 days per year. *Community* water systems are a sub-category of public water systems consisting of those that provide water service to their customers throughout the year. Information on the

number and types of community water systems is available from state primacy agencies and the USEPA and was used throughout this study.

The US Geological Survey (USGS) has been preparing estimates of water withdrawals in the United States since 1950. USGS estimates of annual water withdrawals are prepared at five year intervals for eight water use sectors: public supply, and self-supplied domestic, industrial, commercial, irrigation, mining, livestock, and thermoelectric generation. USGS defines *public supply* withdrawals as: "Water withdrawn by public and private water suppliers and delivered to groups of users. Public suppliers provide water for a variety of uses, such as domestic, commercial, thermoelectric-power generation, industrial, and public water use." (Avery, 1999). Water use by *community* water systems corresponds to the USGS classification of *public supply* water use. Public supply use by community water systems is the focus of this investigation.

Characteristics of Region 5 Water Systems

Table 1.1 below describes some of the characteristics of public and community water systems in the USEPA Region 5 states.

Table 1.1. Total Population and Characteristics of Public and Community Water Systems in USEPA Region 5: Year 2000

Characteristic	Illinois	Indiana	Michigan	Minnesota	Ohio	Wisconsin
Public Water Systems						
Total population	12,419,293	6,080,485	9,938,444	4,919,479	11,353,140	5,363,675
Population served	11,499,787	4,976,412	8,657,535	4,293,036	10,960,841	4,580,987
Number of systems	5,801	4,837	12,350	8,352	5,939	11,724
- Groundwater	5,118	4,715	12,047	8,239	5,595	11,679
- Surface water	683	122	303	113	344	45
Community Water Systems						
Number of systems	1,801	916	1,472	953	1,429	1,140
Population served	10,947,281	4,119,623	7,044,085	3,798,571	10,142,141	3,645,732
Percent served	88.1%	67.8%	70.9%	77.2%	89.3%	68.0%
Number - small systems	1,386	732	1,211	821	1,119	999
Percent - small systems	77.0%	79.9%	82.3%	86.1%	78.3%	87.6%

Source: U.S. EPA Factoids: 2000; U.S. Census Bureau, Census 2000 (P1); SDWIS Database, Second Quarter, July 1999

Nearly 90 percent of the population in these states is served by public water systems. The overwhelming majority of the more than 49,000 public systems in Region 5 use groundwater sources. More than 65 percent of people in each state are served by the region's 7,700+ community water systems. USEPA defines *small* systems as those that serve 3,300 customers or less. More than 6,000, or 80 percent, of the community water systems Region 5 are *small* systems. These systems serve slightly more than 10 percent of the water customers in the region.

The majority of systems in the Midwest are small, groundwater systems, that can be operated at low-cost in remote areas. The monitoring and reporting of water quality and quantity data from such a large number of community water systems presents a significant challenge to state and federal agencies.

Information on individual water systems is available from the Safe Drinking Water Information System (*http://www.epa.gov/enviro/html/sdwis/sdwis_query.html*). Some state primacy agencies also have system information of their web sites. A complete accounting of the current number of small systems in each county is presented in Appendix A.

USEPA Region 5 Water Withdrawals

The USGS has prepared state-level water withdrawal estimates since 1950. Figure 1.1 displays the total water withdrawals in each of the six states in USEPA Region 5 from 1950 to 1995 (2000 data were not yet finalized at the time this report was being written). The general trend for the region as a whole is one of increasing withdrawals. However, the rate of increase slowed considerably after 1970, and half of the states in the region reported substantial declines in withdrawals since 1980.

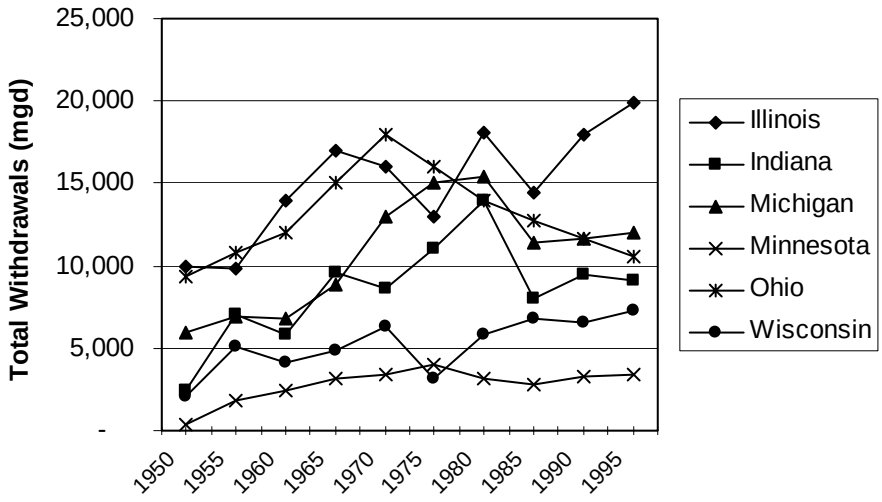

Figure 1.1 Total Water Withdrawals in USEPA Region 5 States: 1950 – 1995

USGS total withdrawal estimates are the summation of water withdrawals in eight water use sectors. Table 1.2 displays the distribution of 1995 withdrawals by the four major water use sectors in each state, and the percent of total water withdrawals in each of these sectors. There is considerable variation in the quantity and distribution of sectoral withdrawals. More than 60 percent of total withdrawals in every state are consumed by thermoelectric facilities, and in no state does the percent of public supply withdrawals exceed 15 percent.

Table 1.2. Freshwater Withdrawals by Major Water Use Sector for States in EPA Region 5 - 1995 (mgd / percent)

State	Public Supply	Self-supplied Industrial	Thermoelectric	Irrigation	Total
Illinois	1,822.55	452.03	17,103.55	180.02	19,922.36
	(9.2)	(2.3)	(85.5)	(0.9)	(100)
Indiana	668.58	2,274.88	5,688.38	115.79	9,139.31
	(7.3)	(24.9)	(62.2)	(1.3)	(100)
Michigan	1,300.11	1,853.85	8,374.6	227.2	12,063.61
	(10.8)	(15.4)	(69.4)	(1.9)	(100)
Minnesota	485.12	140.47	2,094.7	156.69	3,391.53
	(14.3)	(4.1)	(61.8)	(4.6)	(100)
Ohio	1,420.29	556.66	8,190.62	27.26	10,523.34
	(13.5)	(5.3)	(77.8)	(0.3)	(100)
Wisconsin	599.81	441.31	5,827.96	168.72	7,251.73
	(8.3)	(6.1)	(80.4)	(2.3)	(100)

Source: US Geological Survey, Water Use Reports, 1995, *http://water.usgs.gov/watuse/spread95.html*
Note: Table does not include livestock and self supplied domestic, commercial, or mining withdrawals; therefore, rows will not sum to the number in the *Total* column.

Figure 1.2 displays the historical trend in public-supply water use in the six states in USEPA Region 5 as reported by USGS. Public supply withdrawals in Indiana,

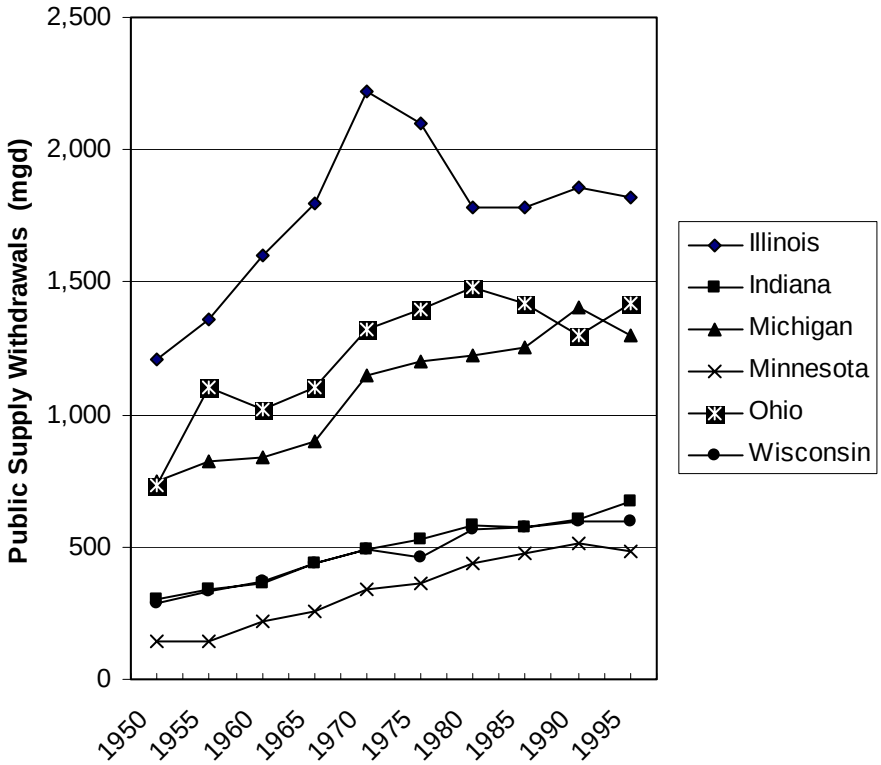

Figure 1.2 Public supply withdrawals in USEPA Region 5 states: 1950 – 1995

Minnesota, and Wisconsin increase incrementally throughout the period. Public supply withdrawals are significantly larger in the other three states, and increase much more rapidly for most of the time series. Reported public supply withdrawals in Illinois peaked in 1970, in 1980 in Ohio, and in 1990 in Michigan.

USGS has estimated county level withdrawals since 1985. Table 1.3 displays the descriptive statistics of the county public water supply withdrawals and the per capita withdrawals in each state in 1995. A county-by-county review of water use data from 1985 to 2000 (preliminary estimates) are presented in Chapter 3 of this report.

Table 1.3 Descriptive Statistics: County Public-supply and Per Capita Withdrawals: USEPA Region 5 - 1995 (mgd/gpcd)

Characteristic	Illinois	Indiana	Michigan	Minnesota	Ohio	Wisconsin
Number of counties	102	92	83	87	88	72
Public supply withdrawals (mgd)						
Total withdrawals (mgd)	1,822.55	668.58	1,300.11	485.12	1,420.29	599.81
Mean (county) total	17.87	7.27	15.66	5.58	16.14	8.33
Median total	2.36	2.66	3.02	1.25	4.67	2.56
Maximum total	1,134.35	131.78	676.86	131.35	281.85	170.91
Minimum total	0.00	0.03	0.05	0.09	0.19	0.08
Standard dev. total	73.55	16.79	74.60	16.96	39.00	21.22
Public supply per capita withdrawals (gpcd)						
State average per capita	175.3	156.1	188.4	145.2	153.1	168.6
Mean (county) per capita	197.1	143.2	303.3	154.6	139.5	163.3
Median per capita	138.4	140.3	212.8	131.2	126.2	157.5
Maximum per capita	1,487.0	361.5	7,228.9	1,005.6	428.8	360.6
Minimum per capita	0	2.6	5.1	33.3	24.0	60.9
Standard dev. per capita	213.9	49.6	777.8	130.7	72.1	53.5

Source: U.S Geological Survey, Water Use Reports, 1995, *http://water.usgs.gov/watuse/spread95.html*

Total and per capita withdrawals vary across counties because of differences in population, economic activities, household characteristics, and local climatic differences. In every state there is a widespread distribution of reported values of total and per capita withdrawals at county level. The extreme differences that are revealed in the descriptive summary of county data has significant implications for the methods that must be used to develop water demand models in these states. These are discussed in detail in Chapter 2.

ORGANIZATION OF THE REPORT

Chapter 2 describes the data sources, data collection and processing procedures, variable specification and modeling approach and estimated regression models of county level water use. It also offers some guidance on the application of state water use models in forecasting and planning activities. Chapter 3 presents and reviews the county water use projections in each state, and where data permitted, compares these to measures of current infrastructure capacity. The Executive Summary of the report summarizes the project and offers recommendations for improved forecasting tools. The appendices to the report provide details of the supportive data and the intermediate analysis conducted during the study.

CHAPTER 2

DATA, METHODS, AND MODELS

INTRODUCTION

This chapter describes the data collection and analysis process, the water-use modeling approach, and the statistical models of publicly-supplied, municipal and industrial (M&I) water use for each state. This chapter also discusses the methodological adjustments that were made to compensate for difficulties in obtaining consistent water use and explanatory variable data.

A four step analytical approach was used in this study:

1) County level water withdrawal data were collected and matched with county level data that represent factors that have been demonstrated to explain water use. Where transfers of water between counties were extensive, counties were aggregated into groups in order to insure a consistent spatial relationship between water withdrawals and explanatory factors. A statistical model for each state was developed that explains past water withdrawals as a function of the explanatory factors. The coefficients in these model equations measure the incremental response of changes in water use to changes in explanatory factors.
2) Projections of the values of explanatory variables were obtained from published sources, or developed using the best available information.
3) Projections of future water withdrawals in each county (and combined county group) were calculated using the projected values of explanatory variables and the model coefficients.
4) Estimates of the current infrastructure capacity in each county were developed from water system information provided by state primacy agencies. These capacity estimates were compared to projected M&I water demands.

DEVELOPMENT OF WATER-USE MODELS

Water Demand Modeling

Numerous water demand forecasting techniques are available for use in infrastructure assessment and environmental planning. The most advanced of these techniques have evolved from research into the underlying technical, climatic, and socioeconomic factors that can be used to "explain" water use.

Water-use relationships can be expressed in the form of mathematical functions which quantify the relationship between water use and one or more independent (explanatory) variables. The mathematical form (e.g., linear, multiplicative, exponential)

and the selection of "explanatory" or independent variables, depends on the category and aggregation of water demand that is represented by the dependent variable.

Generally, water use at any level of aggregation can be modeled as a function of one or more explanatory variables. Multivariate models have been successfully employed to estimate future demands at varying levels of spatial, sectoral, and temporal disaggregation (Dziegielewski et al., 1981; Dziegielewski, 1996). Because different components of aggregate water use may be determined by different subsets of explanatory variables, more precise models can be obtained by disaggregating total water use into its sectoral demands. For example, the public-supply, or M&I withdrawals can be estimated using the following linear model:

$$PS_{t,i} = a + \sum_j b_j X_{j,t,i} + \varepsilon_{t,i} \qquad (2.1)$$

where $PS_{t,i}$ represents public supply water use during year t within geographical area i, X_j is a set of explanatory variables that are correlated with public supply withdrawals, and ε_{ti} is random error term. The coefficients a and b_j can be estimated statistically by fitting a multiple regression model to historical water-use data.

Because the water withdrawn is typically used (or applied) over a larger land area, an appropriate definition of water use would be the water applied within a defined geographical area (e.g., an urban area, a county, or a river sub-basin). Total water use within a larger geographical area such as a county or a state can be represented as a sum of water use by several groups of users within a number of sub-areas.

Model Specification

Several different mathematical forms can used to describe the relationship between dependent and independent variables, and model runs were performed using each form. The exponential form, transformed into logarithms for use in statistical analysis (ordinary least squares), is commonly used with data that contain large ranges in values, such as what was available for use in this analysis. The large range of values of total and per capita withdrawals in every state (as described in Chapter 1) caused some difficulties in the development of water demand models for the Region 5 states. In double logarithm models both the dependent and independent variables are expressed in logarithmic form, and this was the form that was used for all of the models presented in this study. One useful advantage of this mathematical form is that the coefficients of the independent variables in double log models are "constant elasticities", that is, they express a unit change in the independent variable per unit change in each independent variable.

Another alternative for addressing the large range of values in the water use data was to development of several regional or sub-regional models for each state, based upon common county characteristics such as rural/urban or geographical regions. This

alternative was also explored, but no simple multi-model framework was found that worked for all states. It is likely that the development of multiple models would result in improved county-level predictions, but a detailed investigation of a multi-model approach was beyond the scope of this project.

The process of selecting models proceeded on a trial-and-error basis, and many different modeling specifications were tested before the final models were selected. Variables were also included in the models based upon practical experience and theoretical considerations of the causal factors of water use. This *a priori* selection meant that some causal variables were left in models in cases where their statistical significance was considerably less than what would normally be considered appropriate. The significance of these variables was probably confounded by incidental relationships that have little to do with water use. For example, most states in the Midwest have multiple climate zones, as well as a considerable degree of concentration of economic activities. In these cases, the relationship between weather and income has an impact upon the statistical significance of these variables in water use models.

However, while these variables do not meet expected levels of significance, their coefficients are well within expected ranges and are appropriate for forecasting water use. The coefficients of the variables used in the state models conform to past experience into the factors that contribute to water use.

Both log and linear models were tested using a stepwise regression procedure. A double log model was developed for each state, and the details of these models are described below.

Dependent Variables

Data sources

The water use data for this study were prepared by the USGS National Water-Use Information Program (NWUIP). The NWUIP works with local, State, and Federal agencies to collect water-use information at a site-specific level. These point withdrawals represent measured volumes of water at pumping or diversion points or estimates of the withdrawn volumes based on the time of pump operation, or other indirect measure of water use. These indirect measures of water use depend on water-use category and assume a specific relationship between the quantities of water use and the values of the corresponding indirect measures. USGS compiles the data from thousands of sites to estimate county, state, and national water-use. These data are available from the USGS water web site (*http://water.usgs.gov/watuse/wudownload.html*).

Counties are the lowest level of spatial aggregation of the USGS data, and are available for 1985, 1990, and 1995. As this report was being prepared the 2000 USGS county-level data were still in the process of being finalize for all states in the country, and had not yet been released to the public. The USGS did provide a set of "preliminary"

2000 data for use in this project. These preliminary data were reviewed by both USGS and the authors of this report, and it is not anticipated that there will be significant differences between the final data and those presented in this report.

The USGS water use category of *public supply* corresponds directly to municipal and industrial water use by the community water systems, and constitutes the water use sector that is the subject of this report. The public supply category from the 1985, 1990, and 1995 USGS inventories included values of county-level *withdrawals* as well as *deliveries to* various sub-sectors (domestic, commercial, industrial, institutional, etc.). It had been anticipated that the increased level of disaggregation of these *deliveries* data could be used to develop separate sets of explanatory variables for each sub-sector of water deliveries. However, reporting of public supply delivery data was optional for the 2000 inventory and this increased level of disaggregation was therefore unavailable for use in the development of dependent variables.

Data quality review

County-level water use data for 1985 to 1995 were downloaded from the USGS website. Data from 2000 were obtained in electronic format directly from representatives of the USGS water use program. The time series of county data in each state were assembled and, where necessary, per capita values were calculated from estimates of the population served by public supply systems in each county.

Examination of per capita water use revealed some extreme values among the counties, as well as inconsistent values within the time series for individual counties. In many cases all four values (1985, 1990, 1995, 2000) were well beyond the range of expected per capita values (i.e., approximately 50 gpcd to 500 gpcd). It was assumed that in most cases these were the result of transfers (imports/exports) with other counties, and this was verified through examination of state primacy agency files that document water transfers between individual systems. Since insufficient data were available to estimate the quantities of these transfers, a procedure was designed to group counties that are connected by direct or indirect water purchases. This grouping procedure was necessary in order match the spatial extent of water withdrawals and distribution (dependent variable), to the spatial extent of the explanatory factors (independent variables). A detailed description of county grouping procedures and grouping results appear in Appendix B. Maps of the county groups in each state appear in Figures 2.1 to 2.6.

When one of the values within a county time series appeared to be inconsistent with the other values, the independent variables associated with this value were inspected to see if they displayed a corresponding variance (for example, if a change in withdrawals corresponded to a similar change in county population served, employmay have been due to the large changes in manufacturing employment). If no correspondence was found the point was marked as an “outlier”. USGS representatives were contacted to assist in the assessment of general data quality, and to help correct these outlier data points. Those points that were not corrected through USGS collaboration were dealt with during the modeling process through the use of “outlier” binary variables (see below).

Figure 2.1 Illinois Counties and County Groupings

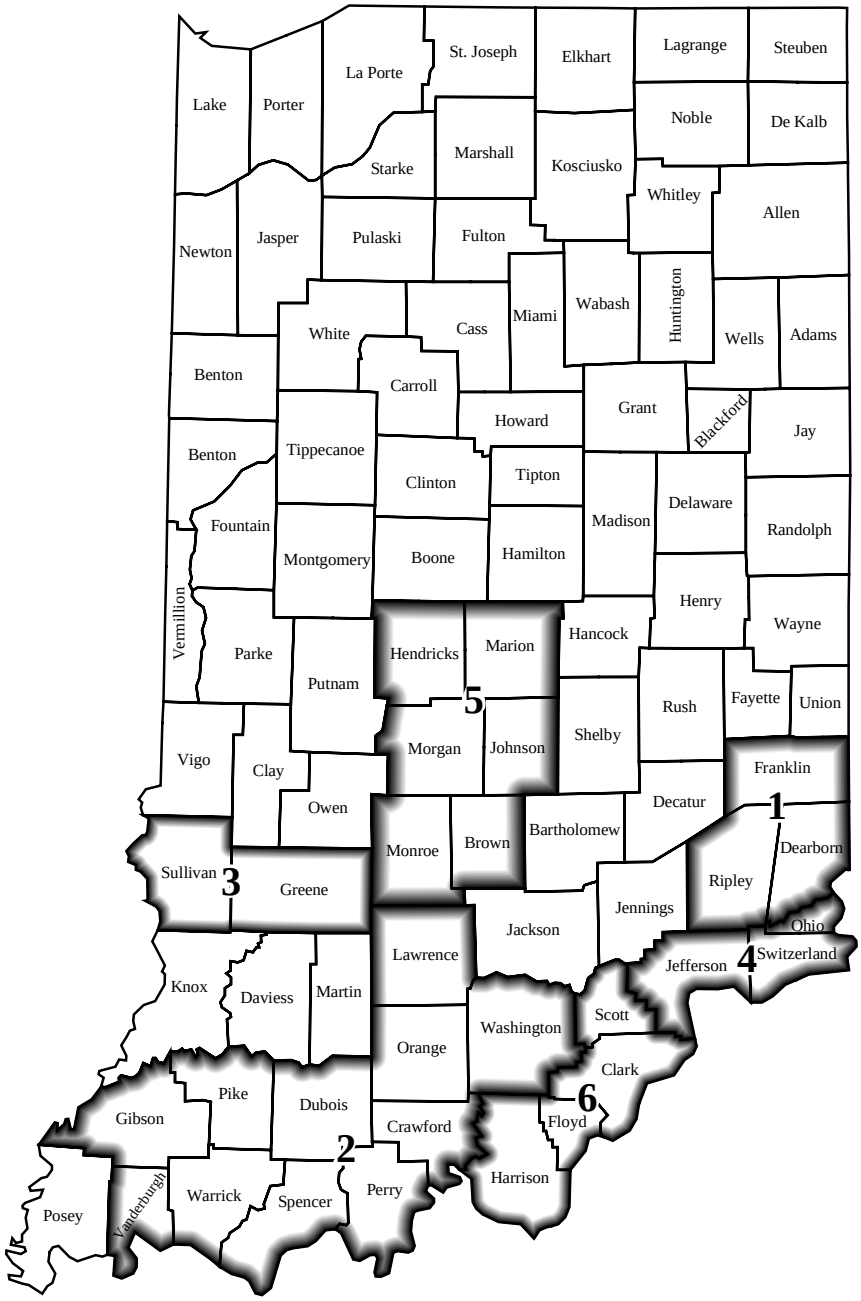

Figure 2.2 Indiana Counties and County Groupings

Figure 2.3 Michigan Counties and County Groupings

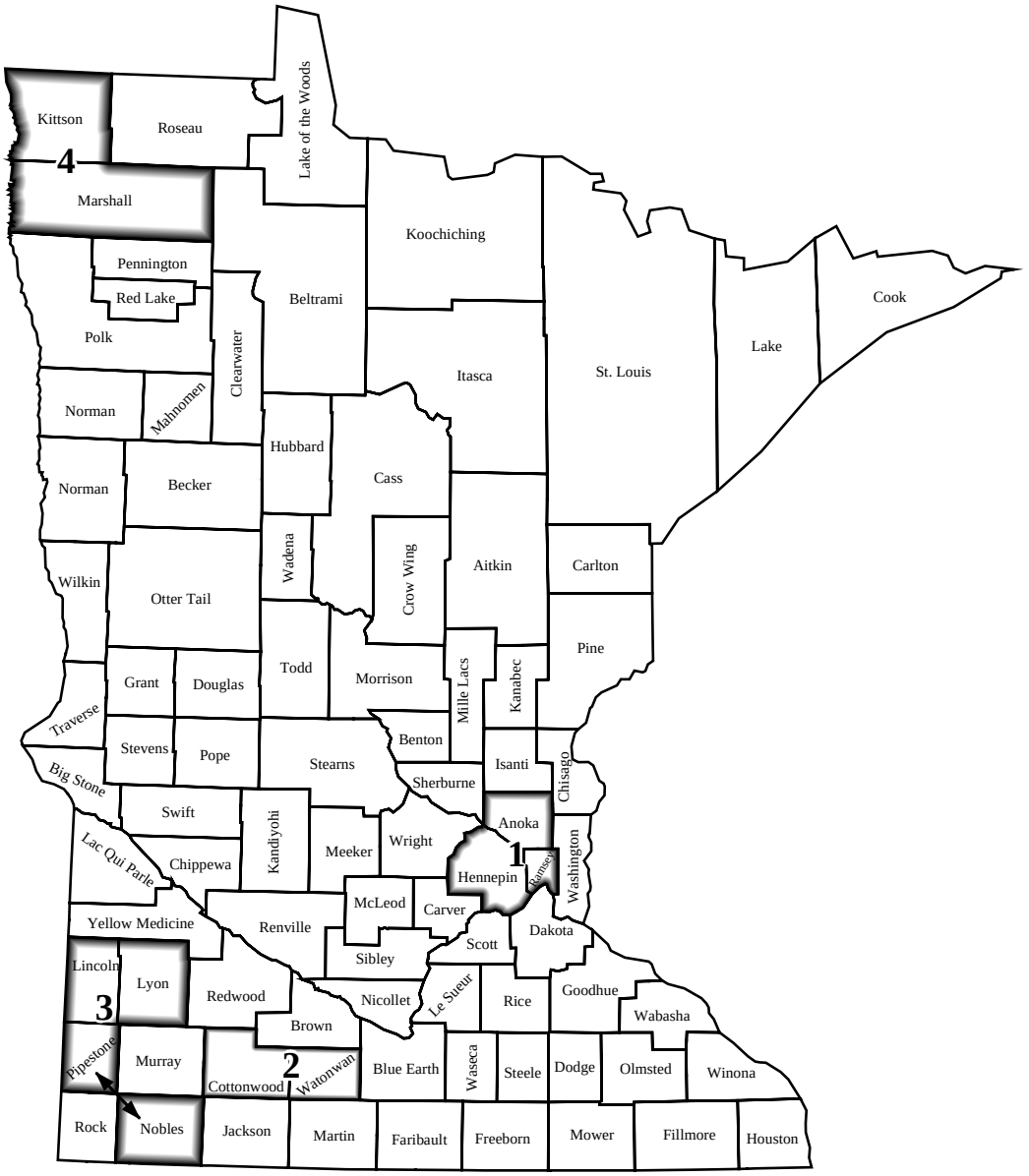

Figure 2.4 Minnesota Counties and County Groupings

Figure 2.5 Ohio Counties and County Groupings

Figure 2.6 Wisconsin Counties and County Groupings

Variable specification

The unavailability of "delivery" data for the year 2000 (and presumably all future USGS inventories) prevented further disaggregation of the county dependent variable into domestic and non-domestic components, and therefore the specification of dependent variable was restricted to a measure of total public supply withdrawals. Preliminary models were run using total public supply withdrawals in each county in millions gallons per day as the dependent variable. These models showed that more than 93 percent of the variability in total water use in every state could be explained by a single variable: *population served.*

In order to capitalize on the relationship between water and population served, and to more clearly identify the effect of other factors on water use, total public supply withdrawals per population served (i.e., per capita usage) was selected as the appropriate dependent variable to use in the modeling process.

Independent (Explanatory) Variables

The selection of explanatory variables was based upon an extensive literature review and the experience of the principal investigators. The data used in the specification of independent variables were obtained from sources that were readily accessible, historically consistent, and available for every county. The majority of data used in the specification of independent variables came from standard published reports from federal agencies, including:

- Department of Interior, Geological Survey
- U.S. Census Bureau
- U.S. Bureau of Labor Statistics
- Department of Commerce, Bureau of Economic Analysis
- National Atmospheric and Oceanic Administration, National Climatic Data Center (NCDC)

Numerous candidate variables were developed and tested during the statistical modeling procedure. Some were rejected as redundant or difficult to interpret; others because they failed to demonstrate a sufficiently strong relationship to water withdrawals. The general categories and a sample list of independent variables tested during this study appear in Table 2.1. A description of the source and specification of each variable appears in Appendix E.

Table 2.1 Categories of Explanatory Variables

Group	Potential Explanatory Variables
Socioeconomic Variables	Income per capita Median family income Percentage of single family housing units Percentage of multifamily housing units Percentage of mobile homes
Demographic Variables	Resident population Population density Percentage of urban population in county Population served by public water supply
Weather Variables	Total precipitation during summer months (growing season) Total annual precipitation Annual minimum monthly Palmer Drought Severity Index (PDSI) Average temperature in summer months (growing season) Cooling degree days Heating degree days
Labor Force Variables	Total number of employees Number of manufacturing employees Percentage of manufacturing employees in food and kindred products (SIC 20) Percentage of manufacturing employees in lumber & wood product (SIC 24) Percentage of manufacturing employees in paper and allied products (SIC 26) Percentage of manufacturing employees in chemical and allied products (SIC 28) Percentage of manufacturing employees in petroleum & coal products (SIC 29) Percentage of manufacturing employees in primary metal industries (SIC 33) Percent of population employed

Supplemental Independent Variables

Three additional categories of variables were included in each state model. Two of these variables were binary (or dichotomous or dummy), that were specified as 1 or 0. These binary variables were used to quantify some of the variance that was not accounted for by model explanatory variables. A third "time-series" variable was added to capture the effect of generally acknowledged trends in water using behavior. These supplemental variables are described below.

County binary variables

A binary variable was assigned to each county and included in the regression analysis. These binaries represent county-specific water use characteristics, that were not captured by the explanatory variables included in each model. These characteristics are considered to be permanent or mostly permanent attributes of each county. The coefficients assigned to county binaries in each model were held constant and included in the calculations of water use projections for all years.

Outlier adjustments

A second set of binary variables was added to each model to account for the effect of outlier values of the dependent variable. The points selected as "outliers" were identified graphically from scatter plots of early modeling runs. These binaries allow outlier observations to remain in the modeling process, and make the data "smoothing" or other approaches that account for extreme values in reported water withdrawal data unnecessary. These variables were included during the modeling procedure but do not play a direct role in the calculation of water use projections.

Conservation trend

A time-series "trend" variable was included in the model to account for a host of factors that are generally considered to be responsible for a reduction of unit use in virtually all water using enterprises. Some of the factors driving this trend include the dramatic increase in water awareness programs, implementation of laws mandating adoption of conservation technologies, the widespread marketing of water saving appliances and technology, and a new emphasis on the adoption of full-cost pricing of water. The *trend* variable included in the regression analysis was assigned a value of zero for 1985, 5 for 1990, 10 for 1995, and 15 for the year 2000. Because this declining trend is water use laws, behavior, and technology is expected to continue, its influence is calculated into county level projections by multiplying the coefficient of the trend variable by an annually increasing value (i.e., 20 for 2005, 25, for 2010, etc.).

Data Validation and Estimation Procedures

Care was taken to ensure the quality of the data used in the water demand modeling process. The following standard procedures were used to identify, correct and/or discard data with errors caused by mistakes in collection or input, and to identify extreme (or erroneous) values of dependent and independent variables.

1. Data were arranged in spreadsheets and visually inspected for apparent anomalies.
2. Standard ratios (i.e., per capita use) were calculated and compared to established benchmarks.
3. Time-series data were graphed to identify time trends and outliers.
4. Data were verified against other available data sources (i.e., county population and population served reported by USGS was compared to those reported by the U.S. Census).

The specification for some of the independent variables required various time-series adjustments, interpolation, or extrapolation before they could be used in modeling procedures. These adjustments can be grouped into three categories.

1) Lack of correspondence between the reported years of independent variables and those of water withdrawal data

This occurred most frequently with Census data which is often only reported on a decennial basis. For most of the Census data used in the study, simple midpoints were used to represent values for intervening years.

2) Real value adjustment for monetary variables

Economic data are generally reported in "current" dollars. In order to account for the time value of money, values for all monetary variables were adjusted to "constant" or "real" 1995 dollars, using the Bureau of Labor Statistics Consumer Price Index.

3) Projection values for explanatory variables

The calculation of future values of water use required the use of future values of model explanatory variables. An extensive search of governmental and non-governmental organizations was performed in an effort to seek out the most authoritative projections available. Whenever possible, projections of explanatory variables were obtained from these sources. However, projection values were often not available for the time periods used in this study or were not available at county level. The estimation of projection values for these variables employed methods that were deemed reasonable in the best judgment of the research team. Details on these projection procedures are described in the following section.

Development of Projection Data for Explanatory Variables

A variety of methods were used to develop future values for the variables included in each state water demand model. Projected values were prepared for only those variables that were included in the models for each state. The methods and assumptions used to develop each set of projections appears in the following sections.

Population served

Projections of the percent of population served in each county were not found in searches of potential agency sources or easily observable from the historical record. The simple extrapolation of trends in the USGS population-served data produced unreasonable estimates for many counties and could therefore not be used. Although it is likely that there is a general trend toward increased participation in public supplies, the percent of population served in 2000 was held constant throughout the projection period. Fixing the percent of population served at 2000 levels will bias projection results for those counties experiencing a transition from self-supplied to publicly-supplied water use during the projection period.

Demographic agencies in each state regularly prepare population estimates for each county, and where recent projections were available, these were used. Population projections in several states had been prepared prior to the 2000 census and an updated version was not yet available. Since these previous projections also include the year 2000,

the population projections used to estimate future water use were "updated" using the ratio of projected 2000 values to the estimate of 2000 population from the Census (see Appendix D.).

The population served for each projection year was estimated by multiplying the projected population in each county by the percent of population served in that county in 2000. Projections for the population served for grouped counties were calculated using the sum of projected population for each county in the group, and the 2000 percent of population served for the group.

Percent of multi-family housing

County-level projections of the number and mix of housing units were not found for any state. The Energy Information Administration (EIA) prepares estimates of future housing in each state (*www.eia.gov/oiaf/aeo/aeotab_20.htm*), which includes projections of the rate of change for each housing type from 2001 to 2025. The EIA rates of change were applied to the 2000 Census values for each housing type, and the number of future housing units was calculated. The percent of housing units by each housing type (the housing variable specified in the water demand models) was calculated. Housing projections for grouped counties was estimated by first calculating the values for the individual counties, summing the number of housing units, and re-calculating the percent of housing by type for each county grouping.

Summer temperature and precipitation

Each of the water use models prepared in this study include at least one weather variable. The projections of future water use do not attempt to account for any extreme changes in weather. It was assumed that weather would be *normal.*

The National Climatic Data Center publishes *normal* monthly precipitation and temperature for all weather stations. These *normal* values of temperature and precipitation were used to prepare values of model weather variable to use in calculations of projected water use and are held constant for all projection years. The average of the *normal* summer temperature and precipitation in each of the counties in a group was used as the value for the entire group.

Percent of population employed

Projected values for the percent of employed persons were calculated by combining population and employment projections. County population projections were obtained from state agencies, and updated where necessary (see Appendix D.).

Total employment projections (for All Occupations) for 2010 were available for all states from the Bureau of Economic Analysis and from state agencies in four of the six states (see Appendix E.). The annual growth rate from 2000 to 2010 was calculated for each region and used to represent the growth rate for all of the counties within each

region. In the two states using BEA projections, the state growth rate was applied to all counties. Estimated total employment for each projection year was calculated by applying this annualized value to the total employment reported for 2000 in County Business Patterns. Projected employment for groups of counties used the sum of projected employment in counties making up the group.

The percent of population employed was calculated by dividing projected employment by the projected population in each county. The percent of population employed for grouped counties was calculated from the sum of the projected population and employment from the individual counties in each group.

Per capita income and median household income

Per capita personal income projections at state and regional level are available from the Bureau of Economic Analysis. The state-level rate of change from these projections was calculated and applied to the 2000 per capita income estimate for each county in order to derive the values used in water use projections. No national or state level projections of median household income were found. Therefore, the BEA projections rates were also used to derive median household income projections.

ESTIMATED MODELS OF WATER USE

Preliminary modeling runs determined that more than 93 percent of the cross-sectional and time series variance in total public supply withdrawals in each state could be explained by "population served" alone. Therefore, county-level *per capita* public supply withdrawals were selected as the most appropriate dependent variable to use in the multiple regression models. If the per capita rate of water use in each county can be predicted with sufficient accuracy, then total public supply withdrawals can be estimated by multiplying the per capita use by population served.

An important advantage of the per capita water-use models is that by expressing total withdrawals in per capita terms, the dependent variable is "normalized" and the problems associated with non-constant error variance (i.e., heteroschedasticity) are avoided. Also, per capita usage rates are generally more "stable" than total water use in historical data, thus providing an accuracy check for the reported estimates of water use. The "out of range estimates" of per capita use can be easily spotted in the data and accounted for during model estimation.

Model Diagnostic and Validation Procedures

Three criteria were use to assess whether the water forecasting models derived in this study were reasonable:

1. The models must include variables that were identified by previous research, and their corresponding coefficients, where significant, were within the - range of *a priori* values, with the expected signs.
2. The explanatory power of the models, as measured by the coefficient of multiple determination (R^2), must achieve an acceptable level of performance (>60%).
3. The absolute percent error of model residuals was not excessive.

Numerous modeling runs were performed using a stepwise procedure, with various combinations of explanatory and binary variables. Once the resulting water demand models were judged to be adequate using the above criteria, they were used to forecast water use for each projection year.

Each of the six final state models contains at least one variable that does not meet commonly accepted levels of significance (based on the value of their t-statistic). These variables were kept in the models on an *a priori* basis, in order to present "rational" water use models that include explanatory variables that have been well established by past research.

Tables 2.2 to 2.7 present regression equations that were estimated using the 1985-2000 county-level per capita public supply withdrawals in each state. The estimated models are discussed in the following sections. A comparison of the estimated coefficients of the key explanatory variables for all the six states is included in Table 2.8.

Illinois Water-use Model

The Illinois model of per-capita water use includes three continuous explanatory variables (percent of multi-family housing, summer temperature, and percent of population employed), 21 county (and group) binary variables (indicated by county name), and 16 outlier adjustments (indicated by county name, with year of outlier point in *italics*). The model shown in Table 2.2 explained 81 percent of variance in per capita usage rates among individual counties and groups of counties (during reporting years). It can be considered to be a good "predictive" model with the size and signs of the regression coefficients that fall close to expected values. For example, the elasticity of demand with respect average summer air temperature is +1.0881, a value close to expectation for aggregate public supply data. This elasticity value indicates that per capita public-supply withdrawals in Illinois increase by 1.0881 percent for each one percent increase in average summer temperature.

Table 2.2 Regression Model of M&I Water Use for Illinois Counties

Explanatory Variable	***Regression Coefficient***	***t Statistic***
Intercept	0.0497	-0.18
Multi Family Housing (%)	-0.000042	-0.02
Average Summer Temperature (ln)	1.0881	1.53
Population Employed (%)	0.0082	4.02
Calhoun	0.5852	4.69
Cumberland	-0.4183	-2.95
Fulton	-0.2853	-2.34
Grundy	-0.3648	-3.00
Henry	-0.2184	-1.79
Iroquois	-0.3119	-2.57
Jo Daviess	0.3252	2.32
Kankakee	0.2129	1.74
Lee	0.2126	1.75
McLean	-0.4194	-3.36
Macon	0.7615	6.20
Marshall	0.3938	3.24
Morgan	0.2112	1.25
Ogle	0.4008	3.3
Piatt	0.3174	2.60
Schuyler	0.4749	3.38
Shelby	0.2208	1.80
Wayne	0.3021	2.13
Woodford	1.3603	9.78
Group1	0.4801	3.97
Group9	0.4312	3.48
Woodford*1985*	-1.5457	-5.62
Carrol*1990*	-3.0126	-12.54
Knox*2000*	-2.8303	-11.84
Knox*1990*	-1.5986	-6.70
Menard*2000*	-2.1342	-8.88
Mason*2000*	-0.9838	-4.11
Wayne*1995*	1.0604	3.86
Morgan*1990*	-1.9629	-6.73
Morgan*2000*	-2.4060	-8.25
Putnam*2000*	-1.1015	-4.59
Group10-*1995*	1.0861	4.51
Whiteside*1995*	0.5936	2.48
Cass*1990*	0.7445	3.11
Jo Daviess*1995*	0.5546	2.01
Schuyler*1995*	0.6700	2.44
Cumberland*1995*	0.9790	3.56
N = 280, R^2 = 0.813, Mean Y = 4.91 (135.60 gpcd), Root MSE = 0.2378 (33.92 gpcd).		

Note: ln = natural logarithm of the variable

Indiana Water-use Model

The Indiana model of per capita water use includes four continuous explanatory variables (per capita income, total summer precipitation, percent of population employed, and conservation time trend), 14 county binary variables, and 7 outlier adjustments (Table

2.3). The model explains 74 percent of variance in per capita usage rates among individual counties and groups of counties (during the data reporting years). The size and signs of the estimated regression coefficients fall close to expected values. For example, the elasticity of demand with respect per capita income is +0.2445, a value that is close to expectation for aggregate public supply data. This elasticity value indicates that per capita public-supply withdrawals in Indiana increase by 0.2445 percent for each one percent increase in per capita county income.

Table 2.3 Regression Model of M&I Water Use for Indiana Counties

Explanatory Variable	***Regression Coefficient***	***t Statistic***
Intercept	4.3820	9.72
Per Capita Income (in $ 1,000, ln)	0.2445	2.26
Total Summer Precipitation (ln)	-0.1747	-2.80
Population Employed (%)	0.0071	6.07
Conservation Trend	-0.0053	-2.41
Bartholomew	0.3716	4.18
Boone	-0.6352	-6.13
Carroll	0.3320	3.78
Cass	0.3788	4.36
Clay	-0.8641	-8.56
Clinton	0.3573	4.12
Daviess	0.2822	3.19
Fayette	0.3371	3.87
Jennings	-0.3209	-3.67
Porter	-0.2520	-2.75
Putnam	0.3224	3.72
Union	-0.6241	-6.95
Wabash	0.4875	5.61
Warren	0.4566	5.07
Adams*1985*	1.4701	8.51
Knox*2000*	1.0322	5.96
Adams*1990*	-1.2435	-7.21
Benton*1985*	-0.6650	-3.85
Clay*1985*	0.7933	3.99
Boone*1985*	0.7156	3.60
Miami*1990*	-0.5345	-3.08
N = 272, R^2 = 0.739, Mean Y = 4.96 (142.59 gpcd), Root MSE = 0.1714 (35.67 gpcd).		

Note: ln = natural logarithm of the variable

Michigan Water-use Model

The Michigan per capita water use model includes five continuous explanatory variables (percent of multi-family housing, total summer precipitation, average summer temperature, percent population employed, and conservation time trend), 17 county binary variables, and 9 outlier adjustments (Table 2.4).

The model explains 63 percent of the variance in per capita usage rates among individual counties and groups of counties (during the data reporting years). The size and signs of the estimated regression coefficients fall close to expected values.

Table 2.4 Regression Model of M&I Water Use for Michigan Counties

Explanatory Variable	***Regression Coefficient***	***t Statistic***
Intercept	1.4811	0.86
Multi Family Housing (%)	-0.0115	-2.98
Total Summer Precipitation (ln)	-0.2785	-3.20
Average Summer Temperature (ln)	1.1126	2.69
Population Employed (%)	0.0047	1.93
Conservation Trend	-0.0074	-2.55
Crawford	0.4463	3.80
Delta	-0.2638	-2.19
Emmet	0.2351	1.95
Gladwin	-0.4177	-3.50
Ionia	0.1498	1.25
Iron	0.3546	2.99
Isabella	-0.2490	-1.99
Kalamazoo	-0.1408	-0.97
Kalkaska	0.2778	2.35
Lenawee	-0.3214	-2.71
Mackinac	0.1649	0.99
Mecosta	-0.1086	-0.92
Menominee	-0.3935	-3.31
Missaukee	0.4006	3.37
Newaygo	0.2511	2.13
Osceola	1.0339	7.63
Shiawassee	-0.2954	-2.48
Grand Traverse*1985*	1.8538	7.87
Alcona*1995*	1.5619	6.71
Osceola*1995*	-0.9336	-3.48
Oscoda*2000*	-1.1460	-4.93
Mackinac*1995*	0.6568	2.32
Mackinac*2000*	0.6129	2.15
Presque Isle*1985*	-1.1878	-5.12
Mason*1990*	0.7159	3.09
Kalamazoo*1985*	0.7336	2.74
N = 276, R^2 = 0.631, Mean Y = 5.26 (192.48 gpcd), Root MSE = 0.2300 (44.7 gpcd).		

Note: ln = natural logarithm of the variable

Minnesota Water-use Model

The Minnesota per capita water use model includes five continuous explanatory variables (percent of multi-family housing, median family income, summer precipitation, percent population employed, and conservation time trend), 22 county (and group) binary variables, and 9 outlier adjustments. The model shown in Table 2.5 explained 78 percent of variance in per capita usage rates among individual counties and groups of counties

(and during the data reporting years). The size and signs of the estimated regression coefficients fall close to expected values. The elasticity of demand with respect per capita income is +0.0276, a value that lower than expectation for public supply. However, it is likely that the size of the income value is influenced by the inclusion of another income-related variable: the percent of multi-family housing.

Table 2.5 Regression Model of M&I Water Use for Minnesota Counties

Explanatory Variable	***Regression Coefficient***	***t Statistic***
Intercept	4.7622	12.85
Multi Family Housing (%)	-0.0088	-2.64
Median Family Income (in $ 1000, ln)	0.0276	0.27
Total Summer Precipitation (ln)	-0.0349	-0.47
Population Employed (%)	0.0087	4.59
Conservation Trend	-0.0064	-2.04
Aitkin	-0.2493	-2.14
Becker	0.2715	2.36
Brown	-0.7155	-6.21
Chippewa	-0.2997	-2.64
Chisago	-0.2716	-2.34
Freeborn	0.2406	2.11
Hubbard	0.5075	3.86
Jackson	-0.3719	-3.28
Koochiching	-2.3032	-14.38
Lake	0.3593	3.16
Mahnomen	0.3899	3.29
Morrison	0.2822	2.48
Nicollet	0.3065	2.67
Polk	1.2069	10.48
Red Lake	1.2529	9.47
Rock	0.5240	4.62
St. Louis	0.5694	4.98
Sibley	0.3202	2.81
Wabasha	0.3148	2.77
Group 2	0.2713	2.39
Group 3	0.3990	3.49
Group 4	-0.2538	-2.20
Carlton*1995*	2.0754	9.22
Waseca*1985*	1.6614	7.36
RedLake*1995*	-1.3989	-5.40
Cook*1985*	-2.8948	-12.84
Koochiching*2000*	2.0220	7.31
Koochiching*1995*	1.4355	5.22
Martin*1985*	-1.3957	-6.18
Martin*1990*	-1.3824	-6.13
Hubbard*1995*	-1.0487	-4.05
N = 320, R^2 = 0.784, Mean Y = 4.87 (130.32 gpcd), Root MSE = 0.2241 (29.45 gpcd).		

Note: ln = natural logarithm of the variable

Ohio Water-use Model

The Ohio model of per-capita water use includes four continuous explanatory variables (per capita income, summer precipitation, percent of population employed, and conservation time trend), 17 county (and group) binary variables, and 17 outlier adjustments. The model shown in Table 2.6 explained 88 percent of variance in per capita usage rates among individual counties and groups of counties. The elasticity of demand with respect per capita income is +0.4181.

Table 2.6 Regression Model of M&I Water Use for Ohio Counties

Explanatory Variable	***Regression Coefficient***	***t Statistic***
Intercept	3.9633	10.85
Per Capita Income (in $ 1000, ln)	0.4181	3.57
Total Summer Precipitation (ln)	-0.2025	-3.12
Population Employed (%)	0.0091	4.73
Conservation Trend	-0.0039	-1.66
Allen	0.4924	4.90
Carroll	0.3417	3.43
Coshocton	1.1842	11.98
Defiance	0.3761	3.81
Geauga	-0.8102	-6.65
Greene	-0.5024	-4.96
Hancock	0.4538	4.50
Madison	-0.5446	-5.52
Morgan	0.9818	8.58
Ottawa	-0.4498	-3.92
Paulding	0.3634	3.65
Sandusky	0.3275	3.34
Seneca	-0.7582	-6.72
Tuscarawas	0.7049	6.21
Van Wert	0.3201	3.26
Group 4	-0.7310	-7.43
Group 8	-1.0282	-9.10
Ashland*1990*	-2.9903	-15.26
Clermont*1990*	-2.3157	-11.77
Morrow*1990*	-1.8540	-9.46
Holmes*2000*	1.1278	5.72
Morgan*1985*	-0.6214	-2.76
Ottawwa*2000*	-2.0523	-9.11
Group 8-*1985*	1.1824	5.26
Logan*1990*	-1.5871	-8.13
Crawford*1985*	1.3476	6.90
Geauga*1985*	0.7491	3.33
Seneca*1985*	0.6783	3.02
Erie*1990*	-1.2406	-6.37
Tuscarawas*1990*	-2.0377	-9.01
Muskingum*1990*	-1.0030	-5.13
Washington*1990*	-0.9345	-4.78
Gallia*1990*	-0.8139	-4.16
Pike*1990*	-0.9056	-4.61
N = 300, R^2 = 0.878, Mean Y = 4.81 (122.73 gpcd), Root MSE = 0.1937 (23.92 gpcd).		

Note: ln = natural logarithm of the variable

Wisconsin Water-use Model

The Wisconsin per capita water use model includes four continuous explanatory variables (per capita income, summer precipitation, percent of population employed, and conservation time trend), 24 county binary variables, and 8 outlier adjustments. The model shown in Table 2.7 explained 78 percent of variance in per capita usage rates among individual counties and groups of counties. The size and signs of the estimated regression coefficients fall close to expected values.

Table 2.7 Regression Model of M&I Water Use for Wisconsin Counties

Explanatory Variable	***Regression Coefficient***	***t Statistic***
Intercept	4.3028	13.04
Per Capita Income (in $ 1000, ln)	0.2173	2.14
Total Summer Precipitation (ln)	-0.0477	-0.72
Population Employed (%)	0.0058	3.39
Conservation Trend	-0.0037	-1.72
Barron	0.3982	4.77
Chippewa	0.4209	5.06
Crawford	0.3917	4.63
Fond du Lac	0.2923	3.47
Jefferson	0.2738	3.26
La Crosse	0.4619	5.33
Lincoln	0.1983	2.37
Manitowoc	0.2628	3.14
Marathon	0.3442	4.07
Marinette	0.2599	3.10
Menominee	-0.5981	-6.31
Monroe	0.3669	4.40
Oneida	0.7681	9.20
Pierce	-0.2219	-2.57
Polk	0.3317	3.98
Portage	0.2234	2.68
Price	0.3323	3.98
Rock	0.2331	2.78
Sheboygan	0.4481	5.27
Trempealeau	0.2318	2.78
Vilas	0.6429	7.71
Washburn	0.3107	3.72
Waupaca	0.6075	7.30
Waushara	-0.3950	-4.66
Marquette*1990*	-1.2781	-7.73
Adams*1985*	0.6845	4.12
Sawyer*2000*	0.7431	4.49
Richland*1990*	0.4016	2.43
Florence*1995*	0.8310	4.96
Florence*2000*	0.8318	4.92
Iron*1985*	-0.6837	-4.13
Iron*1990*	-0.5975	-3.62
N = 272, R^2 = 0.783, Mean Y = 5.03 (152.93 gpcd), Root MSE = 0.1641 (25.2 gpcd).		

Note: ln = natural logarithm of the variable

APPLICATION OF WATER USE RELATIONSHIPS

Forecasts of future events are inherently uncertain, and these projections are no exception. They represent conditional predictions of future water use, based upon the assumptions used in their development. A single statewide model was developed for each state and the accuracy of projections for individual counties and county groupings result in projections that are less than appropriate in those counties where specific conditions result in significant differences from the state as a whole. Interpretation of projections for individual counties needs to be balanced with knowledge of how local conditions compare to the assumptions used in developing state models. Where local water use data are available, preparation of projections at water system or regional level, as suggested by Berke, et al (2002), are likely improve upon the results presented here. This section of the report provides guidance on how the water use models prepared in this study can be use to guide the preparation of water use projections.

Table 2.8 compares the results of the county-level, per capita water use models. The estimated coefficients of the explanatory variables can be used as parameters in "rational" equations of per capita water use within water service areas that are smaller or larger than counties used in this study.

Table 2.8 Comparison of Estimated Coefficients and Elasticities of Water-use Models

Variables	Illinois	Indiana	Michigan	Minnesota	Ohio	Wisconsin	Suggested Value
Equation Intercept	-0.497	4.382	1.4811	4.7622	3.9633	4.3028	------
Summer Precipitation	------	-0.1747	-0.2785	-0.0349	-0.2025	-0.0477	-0.1747
Summer Temperature	1.0881	------	1.1126	------	------	------	1.1126
Per Capita Income	------	0.2445	------	------	0.4181	0.2173	0.2445
Median Family Income	------	------	------	0.0276	------	------	------
Percent Pop. Employed	0.0082	0.0071	0.0047	0.0087	0.0091	0.0058	0.0071
Multi-family Housing	-0.00004	------	-0.0115	-0.0088	------	------	------
Conservation Trend	------	-0.0053	-0.0074	-0.0064	-0.039	-0.0037	-0.0053
Model statistics							
Number of observations	280	272	276	320	300	272	------
R-squared	0.791	0.739	0.631	0.784	0.878	0.783	------

Estimated Coefficients of Key Explanatory Variables

Weather variables

Total summer precipitation was used as a predictor of per capita public-supply water use in all states except Illinois, even though it has a low level of statistical significance in two states. The estimated elasticities range from -0.0349 for Minnesota to -0.2785 for Michigan. These values indicate that a one percent increase in summer precipitation would result in approximately 0.035 to 0.28 percent decrease in per capita

water use. A middle range value of –0.1747 obtained from the Indiana data is suggested as a reasonable value for water use models in the Midwest.

Average summer air temperature was found to be a significant variable only for Illinois and Michigan with elasticities of +1.0881 and +1.1126, respectively. Both values are close to the expected values and can be used for the Midwest.

Income and housing type variables

In three states (Indiana, Ohio and Wisconsin) the per capita income was found to be a significant explanatory variable of public-supply per capita water use. The estimated elasticities ranged from +0.2173 for Wisconsin to +0.4181 for Ohio. An elasticity of +0.0276 was estimated for median family income in Minnesota. Per capita income is recommended as the better income measure for water use models, and the midrange value of 0.2445 is suggested for use in the Midwest.

Percent of multifamily housing was used as a predictor of water use for Illinois, Michigan and Minnesota. The estimated coefficients ranged from -0.0029 to -0.0115. Housing variables can serve as a proxy for income in water use modeling,

Employment ratio

In all six states, the ratio (percentage) of employment to county resident population was found to be a significant predictor of per capita water use. All estimated coefficients are positive and range from 0.0047 to 0.0091, indicating that counties with higher employment ratios tend to have higher per capita water use. These estimated values are not constant elasticities because the percentage ratio of employment to population are not converted into logarithms. They suggest that a 1.0 percent increment in the employment/population ratio would increase the logarithm of per capita water use by 0.0047 to 0.0099.

Conservation time trend

This variable captures the long-term conservation effects in public-supply water use. Significant downward trends in per capita use were estimated in all states except Illinois. The coefficients indicate that the logarithm of per capita water use decreases by 0.0037 to 0.0074 per year. At the mean per capita use of about 150 gpcd, these coefficients indicate a 0.07 to 0.15 percent annual decrease in water use due to long-term conservation.

Parametric Estimation of Per Capita Water Use

The parameters from Table 2.8 can be used to calculate long-term changes in per capita water use for water service areas that are different from the county areas used in this study.

Rational Per Capita Model

The parameters (i.e., elasticities and regression coefficients) can be combined within a "rational" model of per capita water use of the following form:

$$q_t = \alpha I_t^{\beta} T_t^{\partial} R_t^{\delta} e^{aE_t} e^{bC_t} \qquad (2.2)$$

where

q_t = per capita water use in year t
α = intercept in gallons per person per day
I = per capita income
T = average summer temperature
R= total summer season precipitation
E = percentage ratio of employment to resident population
C = conservation time trend
β, ∂, δ= elasticities of income, temperature and precipitation variables
a, b = coefficients of employment ratio and conservation trend variables
e = base of the natural logarithm

Water use in any future year t+1 can be determined using Equation 2.2 as follows:

$$q_{t+1} = q_t \cdot \left(\frac{I_{t+1}}{I_t}\right)^{\beta} \cdot \left(\frac{T_{t+1}}{T_t}\right)^{\partial} \cdot \left(\frac{R_{t+1}}{R_t}\right)^{\delta} \cdot e^{a(E_{t+1}-E_t)} \cdot e^{b(C_{t+1}-C_t)} \qquad (2.3)$$

where the subscript *t+1* designates a future (forecast) year and *t* designates a base year. The use of this relationship is illustrated in the following example.

Illustrative example

Per capita water use in City A in the Midwest in the year 2000 was 150 gpcd. The year 2025 per capita rate can be determined from the following data assuming no change in climate (i.e., normal values of precipitation and temperature remain constant):

Per capita income in 2000 =	17.300 thousand $
Per capita income in 2025 =	20.500 thousand $
Ratio of employment to population in 2000 =	30 %
Ratio of employment to population in 2025 =	35 %
Coefficient of employment ratio in the Midwest =	0.0071
Coefficient of conservation trend in the Midwest =	0.0053

Calculation of per capita water use in 2025:

$$q_{2025} = 150 gpcd \cdot \left(\frac{20.500}{17.300}\right)^{0.2445} \cdot e^{0.0071(35-30)} \cdot e^{-0.0053(2025-2000)} \qquad (2.4)$$
$$= 150 \cdot 1.0424 \cdot 1.0361 \cdot 0.8759 = 141.9 gpcd$$

This result indicates that per capita water use in 2025 would decline to 141.9 gpcd primarily as a result of the long-term trend in conservation of water.

Illustrative example including price variable

Water use models that include price as an explanatory variable are know as "demand" models, because they express the relationship between the price of water and the quantity that is demanded as prices change. Price data is exceptionally difficult to collect and specify in aggregate water use models and therefore could not be considered in this study. However, price is frequently included as a variable in water projection analyses for individual water systems, or groups of water systems. The relationship of price to water use is well established and *marginal price* is the variable specification most often suggested as appropriate to the analysis of water demand. Marginal price can be defined as the price of the next unit of water at a specified level of water demand.

If the future level of water price is known, or can be estimated, then the ratio of prices can be added to the ratios in Equation 2.3. This price ratio can be represented as:

$$q_{t+1} = q_t \cdot \left(\frac{MP_{t+1}}{MP_t}\right)^{\varepsilon} \qquad (2.5)$$

where *MP* is marginal price of water in constant dollars at times *t* and *t+1*, and ε is elasticity of water demand with respect to price. For aggregate M&I demand a long-term elasticity of 0.200 is recommended. For example an increase in marginal price from $2.00 per 1000 gallons to $2.50 per 1000 gallons (a 25 percent increase) would have the following effect on per capita water use:

$$q_{t+1} = 150 gpcd \cdot \left(\frac{2.50}{2.00}\right)^{-0.200} = 150 \cdot 0.9564 = 143.5 \text{gpcd} \qquad (2.6)$$

This result indicates that a 25 percent increase in price would result in a 4.3 percent decrease in per capita water use.

Forecasts of future water use can be prepared by multiplying the projected population served by the future value of per capita water use as obtained from Equations 2.3 and/or 2.4.

CHAPTER 3

FORECASTS OF M&I WATER USE: 2005-2025

INTRODUCTION

This chapter presents the water use projections for each county and county grouping in the six Midwestern states that were analyzed in this study. Projections are presented for five forecast years (2005, 2010, 2015, 2020, and 2025). Per capita projections (in gallons per capita per day) were calculated from model-generated coefficients and projected values of the explanatory variables in each state model (Chapter 2). Annual average daily projections (in millions of gallons per day) were calculated as the product of per capita projections and population served projections.

The final section of this chapter compares these water use projection and estimates of current infrastructure capacity for counties and county groupings, for three of the six states.

PROJECTIONS OF FUTURE WATER USE

The following sections of the report present a brief overview and summary tables of the projections for each state. County projections were also ranked by the quantity of change from 2005 to 2025, and the contribution of population effects and per capita effects to this quantity of change are also reported.

The first four columns of the projection tables show the USGS historical estimates of the amount of water *withdrawn* in a county, regardless of whether or not the water is actually used within that county. In order to ensure that water withdrawals, water use, and the factors that were selected to explain water use were all attributable to same spatial extent, counties that were identified as having significant exchanges of water were grouped together (see Appendix B.). In the projection tables, counties with names in *Italics* are members of these special groupings of counties. The number in the superscript indicates the group to which each county is assigned.

The projections of water use for individual counties represent the contribution of the explanatory variables in that county to total public-supply water use, regardless of whether or not the county was grouped with neighboring counties for the purpose of estimating water use model parameters. The water use projections in the five right-hand columns of the projection tables represent water *use* in that county. While these forecasts for individual counties are valid projections of water *use* within each county; they are not directly comparable to the USGS historical data on water *withdrawals* (in the left hand columns). The difference between *withdrawal* data and *use* projections is indicative of cross-county transfers of water.

Forecasts of future water use for each group of counties were calculated using explanatory variables created for each group, and therefore may not be identical to the sum of projections of the counties within the group. These are included at the bottom of each projection table. In the group forecasts, the historical and projected values are comparable because water *withdrawals* are made equal to water *use*.

The method used to allocate population and per capita effects is described in the next section of the report. This is followed by the forecasts of county water use for the six states.

Partitioning of Population Change and Per Capita Effects

Population is often considered to be the single best predictor of water use, but relying upon population alone can result in large errors in water demand forecasts, particularly in areas with significant non-domestic water use. The forecasts of water use were analyzed to separate out the contributions that are attributable to projected changes in population served, and those that are attributable to projected changes in per capita water use.

The change in the projected water use in million gallons per day (mgd) was calculated as:

$$\Delta Q = Q_{2025} - Q_{2005} = \left(\Delta Q_{PG} + \Delta Q_{GPCD}\right)/1{,}000{,}000 \tag{3.1}$$

The effect of population growth (designated by the subscript *PG*, in gallons per day) on water use during the 20-year period was calculated as:

$$\Delta Q_{PG} = \left(P_{2025} - P_{2005}\right) \cdot GPCD_{2005} \tag{3.2}$$

The effect of change in per capita water use during the 2005-2025 period (designated by subscript *GPCD*, in gallons per day) was calculated as:

$$\Delta Q_{GPCD} = P_{2025} \cdot \left(GPCD_{2025} - GPCD_{2005}\right) \tag{3.3}$$

where:

Q = water use in mgd
$GPCD$ = per capita water use in gallons per capita per day
P = population served

The total projected change in water use was calculated for each county, and distributed into component contributions using the equations above. The counties in each state were then ranked by their 2025-2005 change in water use. Tables containing these county rankings appear immediately after the projection tables for each state (Tables 3.1b through 3.6b). Because these rankings are based on projected changes in water *use*, independent of *withdrawals* with the county, changes in county groups are not reported in these tables.

Illinois Forecasts

Table 3.1a contains historical estimates of water withdrawals and projections of water use for 102 counties in Illinois and 10 groups of counties (made up of 42 counties).

The statewide total public-supply water use is projected to increase from approximately 1,762 mgd in 2000 to 1,938 mgd in 2005 and then continue to increase to 2,265 mgd by 2025. This represents a net, 20-year statewide increase of 326 mgd, or a 17 percent increase over the 2005 level of water use. Approximately 177 mgd, or 54 percent, of this increase is due to the projected growth in population. The remaining 149 mgd is a result of projected increases in per capita water use. Approximately 71 percent of total statewide public-supply water use in 2025 will occur in five counties in Northeastern Illinois: Cook, DuPage, Kane, Lake and Will Counties.

Table 3.1b shows the ranking of Illinois counties in terms of the projected growth in water demand between 2005 and 2025. The top five counties (listed above) account for 82 percent of the projected growth, with projected increase of more than 20 mgd in each of these counties (McHenry, Sangamon, Madison, St. Clair, Winnebago, and Champaign are projected to increase water use by more than 4 mgd).

For the remaining 97 Illinois counties, the projected 20-year increase in water use is 59 mgd, or 9 percent, over the estimated 2005 water use. Approximately 39 mgd (66 percent) of the increase is attributed to population growth, with the other 20 mgd increase attributed to projected increases in per capita water use. In 26 counties the water use is projected to decrease by an average of 34 percent below the 2005 level. An average increase of 9.1 percent over 2005 water use levels is projected for the remaining 71 counties.

Table 3.1a Water Use Projections for Illinois
(in million gallons per day)

Illinois Counties	USGS Withdrawal Estimates				MTAC Water Use Projections				
	1985	*1990*	*1995*	*2000*	*2005*	*2010*	*2015*	*2020*	*2025*
Adams[2]	*7.02*	*8.73*	*9.11*	*9.34*	*10.77*	*10.91*	*11.07*	*11.24*	*11.41*
Alexander[8]	*1.76*	*1.78*	*1.33*	*1.18*	*1.22*	*1.21*	*1.21*	*1.21*	*1.21*
Bond[1]	*0.80*	*1.01*	*1.25*	*0.19*	*2.14*	*2.14*	*2.14*	*2.15*	*2.16*
Boone	3.04	3.83	3.57	3.71	3.79	3.82	3.86	3.90	3.93
Brown[2]	*0.06*	*0.09*	*0.08*	*0.08*	*0.81*	*0.82*	*0.83*	*0.84*	*0.84*
Bureau	3.67	3.18	2.10	2.90	2.51	2.53	2.55	2.58	2.62
Calhoun	0.38	0.34	0.40	0.30	0.30	0.30	0.30	0.30	0.31
Carroll	1.52	0.06	1.47	1.34	1.31	1.30	1.30	1.30	1.30
Cass	1.54	3.01	1.43	1.61	1.23	1.21	1.20	1.21	1.21
Champaign[6]	*19.94*	*20.57*	*22.59*	*22.65*	*27.65*	*29.01*	*30.04*	*31.03*	*32.06*
Christian	4.30	3.41	2.90	3.17	3.15	3.18	3.22	3.25	3.28
Clark	1.26	1.23	1.54	1.06	1.70	1.68	1.69	1.71	1.74
Clay[3]	*0.91*	*0.88*	*0.88*	*0.77*	*1.08*	*1.05*	*1.03*	*1.03*	*1.02*
Clinton[4]	*1.44*	*2.27*	*2.04*	*1.95*	*2.99*	*3.05*	*3.13*	*3.23*	*3.32*
Coles	4.93	5.03	7.34	4.53	8.01	8.31	8.63	9.01	9.40
Cook[5]	*1,113.29*	*1,122.87*	*1,134.35*	*1,043.16*	*916.95*	*947.95*	*981.02*	*1,018.84*	*1,059.33*
Crawford	2.05	2.05	2.01	2.38	1.66	1.63	1.61	1.60	1.58
Cumberland	0.40	0.28	1.06	0.43	0.42	0.43	0.44	0.47	0.50
De Kalb	7.06	7.79	6.75	7.70	10.89	11.48	11.95	12.40	12.86
De Witt	1.42	2.21	1.48	1.30	1.57	1.55	1.55	1.54	1.54
Douglas[6]	*0.79*	*1.24*	*1.26*	*0.47*	*2.13*	*2.12*	*2.13*	*2.15*	*2.17*
Du Page[5]	*77.20*	*86.35*	*11.96*	*10.03*	*188.42*	*199.95*	*212.40*	*225.97*	*240.88*
Edgar	1.80	1.54	1.71	1.57	1.68	1.65	1.63	1.63	1.63
Edwards[10]	*0.49*	*0.13*	*0.57*	*0.14*	*0.75*	*0.75*	*0.75*	*0.76*	*0.76*
Effingham[3]	*1.77*	*2.45*	*2.67*	*2.66*	*3.39*	*3.41*	*3.44*	*3.45*	*3.47*
Fayette	1.23	1.29	1.45	1.07	1.20	1.18	1.17	1.17	1.17
Ford	1.36	1.68	1.73	1.93	1.51	1.51	1.50	1.50	1.50
Franklin[7]	*13.51*	*12.52*	*12.87*	*14.37*	*5.44*	*5.34*	*5.32*	*5.36*	*5.41*
Fulton	2.49	2.72	3.14	2.26	2.57	2.53	2.50	2.50	2.50
Gallatin[7]	*0.64*	*2.72*	*3.51*	*3.25*	*0.54*	*0.54*	*0.54*	*0.55*	*0.56*
Greene[9]	*0.95*	*0.66*	*0.76*	*1.02*	*2.60*	*2.59*	*2.61*	*2.67*	*2.73*
Grundy	2.32	2.53	1.09	2.90	2.15	2.25	2.35	2.47	2.59
Hamilton[7]	*0.00*	*0.02*	*0.00*	*0.00*	*0.45*	*0.44*	*0.43*	*0.42*	*0.42*
Hancock[2]	*1.19*	*1.25*	*1.10*	*0.90*	*1.39*	*1.38*	*1.38*	*1.40*	*1.42*
Hardin[7]	*0.28*	*0.27*	*0.21*	*0.14*	*0.42*	*0.40*	*0.39*	*0.38*	*0.37*
Henderson[2]	*0.23*	*5.90*	*6.39*	*6.19*	*0.82*	*0.83*	*0.85*	*0.89*	*0.94*
Henry	3.74	4.76	3.90	3.56	4.37	4.28	4.21	4.16	4.11
Iroquois	2.13	2.17	2.34	1.63	2.36	2.33	2.32	2.32	2.32
Jackson	8.88	8.00	6.62	6.39	9.09	9.34	9.59	9.75	9.93
Jasper[3]	*0.41*	*0.40*	*0.63*	*1.28*	*1.03*	*1.04*	*1.06*	*1.10*	*1.14*
Jefferson[7]	*0.40*	*1.28*	*0.50*	*0.00*	*4.45*	*4.43*	*4.44*	*4.44*	*4.45*
Jersey[1]	*0.78*	*0.90*	*1.18*	*1.27*	*3.10*	*3.22*	*3.38*	*3.62*	*3.88*
Jo Daviess	1.79	2.44	2.54	2.37	2.43	2.47	2.49	2.53	2.57
Johnson[7]	*0.52*	*0.64*	*0.80*	*1.04*	*0.48*	*0.47*	*0.46*	*0.46*	*0.46*
Kane	33.34	37.90	47.97	52.71	69.73	76.03	82.68	87.34	92.31
Kankakee	12.19	13.52	13.88	14.37	18.53	19.00	19.54	20.20	20.89
Kendall	1.92	2.01	1.82	2.24	3.16	3.32	3.54	3.86	4.20
Knox	7.77	1.39	6.34	0.37	6.70	6.63	6.61	6.56	6.51
Lake	49.40	58.33	60.34	65.55	100.55	106.61	112.97	118.30	123.94

Table 3.1a Water Use Projections for Illinois
(in million gallons per day)

Illinois Counties	USGS Withdrawal Estimates				MTAC Water Use Projections				
	1985	*1990*	*1995*	*2000*	*2005*	*2010*	*2015*	*2020*	*2025*
La Salle	13.30	14.24	15.38	11.02	12.36	12.42	12.52	12.68	12.84
Lawrence	1.21	1.68	1.35	0.00*	1.48	1.47	1.48	1.49	1.50
Lee	3.62	3.94	4.28	4.28	5.21	5.24	5.27	5.37	5.47
Livingston	3.47	3.76	4.85	5.45	4.65	4.64	4.64	4.70	4.75
Logan	3.50	3.30	3.20	3.12	3.15	3.18	3.21	3.23	3.25
McDonough	3.01	3.18	3.23	2.94	4.29	4.39	4.48	4.57	4.65
McHenry	12.21	14.52	15.11	20.66	26.20	28.73	31.45	32.69	33.99
McLean	13.26	9.13	10.54	10.18	16.18	16.83	17.47	18.08	18.73
Macon	28.21	33.87	39.70	39.33	42.21	42.62	43.18	43.73	44.30
Macoupin[1]	*3.65*	*3.76*	*4.51*	*3.26*	*5.93*	*6.04*	*6.17*	*6.37*	*6.56*
Madison[1]	*54.35*	*56.11*	*53.46*	*54.30*	*40.31*	*41.29*	*42.32*	*43.84*	*45.42*
Marion[4]	*5.02*	*6.90*	*5.12*	*5.42*	*6.38*	*6.23*	*6.10*	*6.01*	*5.93*
Marshall	1.88	1.74	1.74	1.73	1.97	1.98	2.01	2.07	2.13
Mason	1.03	1.16	1.16	0.37	1.06	1.03	1.01	1.01	1.01
Massac[7]	*0.69*	*1.66*	*1.26*	*1.31*	*0.35*	*0.36*	*0.37*	*0.38*	*0.39*
Menard	0.68	0.71	0.76	0.12	1.26	1.36	1.46	1.59	1.72
Mercer	0.92	0.95	1.06	0.64	0.78	0.77	0.76	0.76	0.76
Monroe[4]	*0.55*	*0.62*	*0.66*	*0.17*	*1.20*	*1.28*	*1.35*	*1.45*	*1.55*
Montgomery	2.83	2.80	3.17	1.36	3.43	3.41	3.41	3.41	3.40
Morgan	4.63	0.76	5.98	0.36	4.43	4.56	4.70	4.83	4.97
Moultrie	1.12	1.08	1.16	1.02	1.41	1.42	1.44	1.46	1.48
Ogle	5.39	5.62	5.28	5.03	6.06	6.04	6.06	6.11	6.16
Peoria	21.76	26.69	24.89	25.69	32.07	32.90	33.80	34.68	35.62
Perry[7]	*0.61*	*0.55*	*0.53*	*0.73*	*2.88*	*2.89*	*2.92*	*2.97*	*3.02*
Piatt	1.25	1.93	1.35	1.90	2.01	2.03	2.06	2.11	2.16
Pike	1.23	1.46	1.71	1.90	1.49	1.49	1.50	1.50	1.51
Pope[7]	*0.90*	*0.08*	*0.07*	*0.00*	*0.53*	*0.53*	*0.53*	*0.55*	*0.56*
Pulaski[8]	*0.72*	*0.50*	*0.57*	*0.11*	*0.47*	*0.48*	*0.48*	*0.49*	*0.49*
Putnam	0.45	0.49	0.40	0.19	0.66	0.65	0.65	0.65	0.65
Randolph	3.76	3.37	3.56	3.40	3.19	3.20	3.21	3.23	3.24
Richland	1.26	1.57	1.67	1.46	2.02	1.98	1.95	1.93	1.92
Rock Island	20.03	17.45	17.42	15.79	23.28	23.56	23.80	24.10	24.42
St Clair[4]	*22.02*	*19.96*	*18.68*	*53.90*	*32.35*	*33.61*	*34.73*	*35.92*	*37.16*
Saline[7]	*2.21*	*0.34*	*0.00*	*0.00*	*3.77*	*3.77*	*3.79*	*3.85*	*3.90*
Sangamon[1]	*20.18*	*33.97*	*23.79*	*35.99*	*42.83*	*44.20*	*45.55*	*46.83*	*48.17*
Schuyler	0.73	0.64	1.45	1.03	0.79	0.77	0.76	0.76	0.75
Scott[9]	*0.25*	*0.98*	*4.00*	*4.74*	*0.40*	*0.41*	*0.42*	*0.44*	*0.46*
Shelby	1.19	2.53	2.39	2.17	2.55	2.58	2.65	2.75	2.85
Stark	0.43	0.70	0.49	0.29	0.31	0.31	0.31	0.31	0.32
Stephenson	5.84	4.80	5.04	4.00	4.78	4.84	4.90	4.97	5.04
Tazewell	13.02	16.27	14.77	15.11	17.16	17.34	17.56	17.87	18.19
Union[8]	*1.50*	*1.40*	*1.19*	*0.21*	*0.41*	*0.41*	*0.42*	*0.42*	*0.43*
Vermilion	10.08	11.46	10.55	9.93	10.11	10.19	10.29	10.43	10.57
Wabash[10]	*1.29*	*1.82*	*5.66*	*1.68*	*1.44*	*1.45*	*1.47*	*1.50*	*1.53*
Warren[2]	*2.86*	*2.36*	*2.49*	*2.81*	*1.75*	*1.77*	*1.79*	*1.83*	*1.87*
Washington[4]	*0.59*	*0.81*	*0.86*	*0.60*	*0.55*	*0.57*	*0.59*	*0.62*	*0.65*
Wayne	1.36	1.25	1.25	1.68	1.79	1.78	1.78	1.79	1.80
White[7]	*1.69*	*1.39*	*1.04*	*1.24*	*1.22*	*1.20*	*1.19*	*1.18*	*1.17*
Whiteside	4.55	5.03	5.78	4.95	2.73	2.72	2.72	2.72	2.72
Will[5]	*30.25*	*33.83*	*37.49*	*41.57*	*59.37*	*66.60*	*74.21*	*79.62*	*85.43*

Table 3.1a Water Use Projections for Illinois (in million gallons per day)

Illinois Counties	USGS Withdrawal Estimates				MTAC Water Use Projections				
	1985	*1990*	*1995*	*2000*	*2005*	*2010*	*2015*	*2020*	*2025*
Williamson[7]	*2.57*	*2.36*	*2.88*	*2.46*	*6.69*	*6.77*	*6.89*	*7.03*	*7.17*
Winnebago	35.24	36.76	35.99	32.80	39.30	40.30	41.37	42.61	43.89
Woodford	2.08	7.32	8.67	9.80	7.56	7.83	8.22	8.69	9.18
Group 1	79.76	95.75	84.19	95.02	93.00	95.45	98.00	101.17	104.48
Group 2	11.36	18.33	19.17	19.31	15.12	15.25	15.44	15.69	15.96
Group 3	3.09	3.73	4.18	4.71	5.51	5.50	5.53	5.56	5.60
Group 4	29.62	30.56	27.36	62.05	43.25	44.64	45.94	47.41	48.94
Group 5	1,220.74	1,243.05	1,183.80	1,094.75	1,163.85	1,213.83	1,266.81	1,322.60	1,382.37
Group 6	20.73	21.81	23.85	23.11	30.18	31.50	32.52	33.53	34.58
Group 7	24.02	23.83	23.67	24.54	27.24	27.18	27.31	27.60	27.90
Group 8	3.98	3.68	3.09	1.49	2.16	2.16	2.18	2.21	2.23
Group 9	1.20	1.64	4.76	5.76	3.03	3.05	3.09	3.18	3.27
Group 10	1.78	1.95	6.23	1.81	2.21	2.21	2.23	2.26	2.30
All Counties	**1,782.74**	**1,859.19**	**1,822.55**	**1,761.62**	**1,938.37**	**2,014.03**	**2,094.87**	**2,176.89**	**2,264.64**

Note: Counties in *italics* are members of grouped county. The number in the superscript indicates group membership. Projections for grouped counties represent the contribution of explanatory variables in that county to total water use in the group.

* USGS reported zero withdrawals in 2000 for Lawrence County. This was replaced with the average value from the three previous inventories (1.27 mgd or 127.02 gpcd) in the data set used to develop the Illinois water use model.

Table 3.1b. Ranking of Illinois Counties by Projected Change in Water Use

Illinois Counties	2025-2005 Change (mgd)	Percent of 2005 Use	Contribution from: (mgd)		Illinois County	2025-2005 Change (mgd)	Percent of 2005 Use	Contribution from: (mgd)	
			Pop	Per Capita				Pop	Per Capita
Cook	142.38	15.53	48.40	93.98	Livingston	0.10	2.11	-0.04	0.14
DuPage	52.46	27.84	21.30	31.15	Washington	0.09	16.85	0.10	-0.01
Will	26.06	43.90	28.77	-2.71	Wabash	0.09	6.15	0.06	0.03
Lake	23.39	23.26	18.32	5.06	Effingham	0.08	2.40	-0.04	0.12
Kane	22.58	32.38	20.76	1.82	Cumberland	0.08	19.16	0.09	-0.01
McHenry	7.79	29.72	8.19	-0.40	Moultrie	0.06	4.38	0.04	0.02
Sangamon	5.35	12.48	2.51	2.83	Scott	0.06	15.49	0.07	0.00
Madison	5.11	12.67	4.25	0.86	Randolph	0.05	1.71	-0.03	0.09
St. Clair	4.81	14.87	3.84	0.97	Douglas	0.04	1.89	-0.01	0.05
Winnebago	4.59	11.68	2.63	1.96	Clark	0.04	2.32	0.00	0.04
Champaign	4.41	15.94	3.97	0.43	Massac	0.04	10.77	0.04	0.00
Peoria	3.55	11.07	0.24	3.31	Brown	0.03	4.03	0.02	0.01
McLean	2.55	15.73	1.98	0.57	Pope	0.03	6.06	0.03	0.00
Kankakee	2.36	12.76	2.05	0.32	Hancock	0.03	1.92	0.01	0.02
Macon	2.09	4.95	0.21	1.88	Lawrence	0.02	1.48	-0.10	0.12
DeKalb	1.97	18.10	1.84	0.13	Union	0.02	5.24	0.01	0.01
Woodford	1.62	21.43	1.76	-0.14	Pike	0.02	1.41	0.01	0.01
Coles	1.39	17.32	1.27	0.11	Gallatin	0.02	3.68	0.01	0.01

Table 3.1b. Ranking of Illinois Counties by Projected Change in Water Use

Illinois Counties	2025-2005 Change (mgd)	Percent of 2005 Use	Contribution from: (mgd)		Illinois County	2025-2005 Change (mgd)	Percent of 2005 Use	Contribution from: (mgd)	
			Pop	Per Capita				Pop	Per Capita
Rock Island	1.14	4.88	-0.35	1.48	Pulaski	0.02	3.99	0.02	0.00
Kendall	1.05	33.12	1.16	-0.12	Bond	0.02	0.75	-0.01	0.02
Tazewell	1.03	5.99	0.55	0.48	Wayne	0.01	0.73	-0.02	0.03
Jackson	0.84	9.25	0.51	0.33	Edwards	0.01	1.35	-0.05	0.06
Jersey	0.78	25.17	0.83	-0.05	Stark	0.01	1.64	0.00	0.00
Adams	0.65	6.01	0.10	0.55	Calhoun	0.00	1.16	0.00	0.00
Macoupin	0.64	10.73	0.64	0.00	Jefferson	0.00	-0.01	-0.34	0.33
Morgan	0.54	12.24	0.55	-0.01	Ford	-0.01	-0.35	-0.05	0.05
Williamson	0.48	7.16	0.16	0.32	Alexander	-0.01	-0.71	-0.03	0.02
La Salle	0.48	3.87	0.09	0.39	Putnam	-0.01	-1.54	0.01	-0.02
Menard	0.46	36.30	0.49	-0.03	Carroll	-0.01	-0.88	-0.04	0.03
Vermilion	0.45	4.50	0.25	0.20	Mercer	-0.01	-1.87	-0.02	0.01
Grundy	0.44	20.40	0.45	-0.01	Whiteside	-0.02	-0.58	-0.08	0.06
McDonough	0.37	8.53	0.21	0.15	Cass	-0.02	-1.47	-0.07	0.05
Monroe	0.35	28.98	0.37	-0.03	Johnson	-0.02	-4.02	-0.02	0.00
Clinton	0.33	11.05	0.29	0.04	Montgomery	-0.03	-0.81	-0.14	0.11
Shelby	0.31	12.03	0.34	-0.03	Hamilton	-0.03	-7.08	-0.04	0.01
Lee	0.26	4.94	0.15	0.11	Schuyler	-0.03	-4.22	-0.05	0.02
Stephenson	0.26	5.34	0.09	0.16	De Witt	-0.03	-2.21	-0.08	0.04
Marshall	0.16	8.15	0.17	-0.01	Fayette	-0.03	-2.90	-0.10	0.06
Piatt	0.15	7.50	0.15	0.00	Franklin	-0.04	-0.66	-0.21	0.17
Perry	0.14	5.03	-0.02	0.16	Edgar	-0.04	-2.63	-0.09	0.05
Boone	0.14	3.68	0.14	0.00	Iroquois	-0.05	-1.93	-0.10	0.06
Saline	0.14	3.63	0.01	0.13	Hardin	-0.05	-11.44	-0.06	0.01
Jo Daviess	0.13	5.42	0.10	0.03	Mason	-0.05	-4.69	-0.07	0.02
Christian	0.13	4.18	0.04	0.10	Clay	-0.06	-5.24	-0.11	0.06
Greene	0.12	4.77	0.12	0.00	White	-0.06	-4.81	-0.11	0.05
Warren	0.11	6.56	0.10	0.01	Fulton	-0.07	-2.59	-0.13	0.07
Henderson	0.11	13.48	0.12	0.00	Crawford	-0.07	-4.48	-0.17	0.10
Bureau	0.11	4.33	-0.10	0.21	Richland	-0.10	-4.84	-0.30	0.21
Jasper	0.11	10.38	0.13	-0.02	Knox	-0.20	-2.93	-0.16	-0.03
Ogle	0.11	1.75	-0.06	0.17	Henry	-0.26	-5.91	-0.51	0.25
Logan	0.10	3.22	0.11	-0.01	Marion	-0.45	-7.03	-0.37	-0.08
					All counties	**326.27**	**16.8**	**176.95**	**149.3**

Indiana Forecasts

Table 3.2a contains historical water withdrawal estimates and water use projections for 92 counties and 6 county groups (made up of 29 counties) in Indiana. The statewide total of public-supply water use is projected to increase from 690 mgd in 2000 to 697 mgd in 2025, after peaking at 702 mgd in 2010.

The projected decline of 2.4 mgd between 2005 and 2025 is a net result of two compensating effects: an increase of 35 mgd attributable to increases in population, and a decrease of 37.4 mgd due to changes in per capita use. In other words, if the per capita water use in Indiana counties remained constant at the 2005 values, the total water use in 2025 would increase by 35 mgd or by 5 percent over the 2005 level. This potential population-related increase is not projected to materialize because of the projected declines in per capita water use.

In 2005, nearly half (~ 47 percent) of total statewide public-supply water use is projected to occur in six counties: Marion, Lake, Allen, St. Joseph, Vanderburgh, and Hamilton Counties. Of these six counties only Hamilton County is projected to have a significant growth in water use between 2005 and 2025. Four of the remaining five are projected to have little change, and Marion County is projected to experience a slight (2.1 percent) decrease in water use.

Table 3.2b shows the ranking of the projected growth in Indiana counties between 2005 and 2025. Only 14 of Indiana's 92 counties are projected to have increases in water use greater than 0.1 mgd. Water use is projected to decline in 39 counties (by 2.3 percent of the 2005 use on average), and remain constant or slightly increase (an average 1.5 percent) in the remaining 39 counties.

Table 3.2a Water Use Projections for Indiana (in million gallons per day)

Indiana Counties	USGS Withdrawal Estimates				MTAC Water Use Projections				
	1985	*1990*	*1995*	*2000*	*2005*	*2010*	*2015*	*2020*	*2025*
Adams	9.57	0.72	2.84	3.10	2.87	2.88	2.88	2.87	2.86
Allen	37.75	33.79	38.00	40.62	46.10	46.23	46.19	46.05	45.89
Bartholomew	8.56	9.60	12.48	11.99	12.24	12.28	12.28	12.24	12.21
Benton	0.46	0.57	1.29	0.58	0.79	0.78	0.78	0.77	0.76
Blackford	1.89	1.57	1.01	1.60	1.49	1.48	1.46	1.44	1.42
Boone	2.99	1.65	1.95	1.89	2.13	2.16	2.18	2.19	2.20
Brown[5]	*0.00*	*0.00*	*0.03*	*0.00*	*1.46*	*1.49*	*1.50*	*1.51*	*1.52*
Carroll	0.94	0.87	1.48	1.23	1.04	1.06	1.07	1.07	1.08
Cass	5.25	3.83	3.78	6.65	5.02	5.00	4.96	4.92	4.88
Clark[6]	*9.52*	*12.23*	*12.93*	*12.90*	*13.78*	*13.88*	*13.91*	*13.90*	*13.90*
Clay	2.18	0.87	0.93	0.95	0.96	0.96	0.96	0.95	0.95
Clinton	3.10	3.46	4.47	4.94	4.39	4.42	4.44	4.44	4.44
Crawford[2]	*0.58*	*2.12*	*2.48*	*2.62*	*0.80*	*0.80*	*0.80*	*0.79*	*0.78*
Daviess	2.88	2.80	3.40	4.03	3.81	3.83	3.83	3.83	3.82
Dearborn[1]	*3.04*	*3.61*	*4.28*	*3.58*	*5.78*	*5.93*	*6.04*	*6.11*	*6.19*
Decatur	1.94	2.53	2.40	2.33	2.60	2.62	2.63	2.63	2.63
De Kalb	3.27	3.07	3.94	4.05	3.88	3.92	3.94	3.95	3.96
Delaware	11.32	11.98	11.68	11.97	12.28	12.17	12.04	11.90	11.75
Dubois[2]	*6.16*	*5.46*	*6.76*	*7.65*	*6.32*	*6.33*	*6.31*	*6.28*	*6.25*
Elkhart	11.65	12.54	14.39	15.00	17.33	17.45	17.50	17.50	17.49
Fayette	4.86	4.28	3.48	3.04	3.84	3.81	3.78	3.75	3.71
Floyd[6]	*4.33*	*5.08*	*6.37*	*6.05*	*10.07*	*10.17*	*10.23*	*10.25*	*10.27*

Table 3.2a Water Use Projections for Indiana
(in million gallons per day)

Indiana Counties	USGS Withdrawal Estimates				MTAC Water Use Projections				
	1985	*1990*	*1995*	*2000*	*2005*	*2010*	*2015*	*2020*	*2025*
Fountain	1.55	1.07	1.03	1.25	1.33	1.33	1.32	1.31	1.31
Franklin[1]	*0.95*	*0.77*	*0.89*	*2.33*	*1.47*	*1.49*	*1.50*	*1.50*	*1.51*
Fulton	1.23	1.25	1.43	1.39	1.53	1.55	1.55	1.55	1.55
Gibson[2]	*3.58*	*2.68*	*2.39*	*2.63*	*3.78*	*3.77*	*3.74*	*3.71*	*3.68*
Grant	9.37	6.92	6.54	7.82	7.42	7.35	7.26	7.17	7.08
Greene[3]	*2.73*	*2.09*	*3.06*	*2.90*	*3.29*	*3.31*	*3.31*	*3.31*	*3.31*
Hamilton	6.82	7.35	17.49	23.77	21.88	22.74	23.36	23.86	24.36
Hancock	2.60	2.77	2.54	3.08	3.29	3.36	3.41	3.44	3.47
Harrison[6]	*1.41*	*1.49*	*1.67*	*2.23*	*3.84*	*3.92*	*3.98*	*4.02*	*4.06*
Hendricks[5]	*2.36*	*2.58*	*3.60*	*4.26*	*6.64*	*6.85*	*7.00*	*7.11*	*7.23*
Henry	3.77	3.56	3.91	3.92	3.81	3.80	3.77	3.74	3.71
Howard	8.45	12.24	13.16	12.66	12.23	12.19	12.11	12.01	11.91
Huntington	2.75	3.52	3.35	3.09	3.62	3.64	3.63	3.62	3.61
Jackson	2.40	2.60	4.28	4.76	4.24	4.27	4.28	4.29	4.29
Jasper	1.07	1.06	1.09	1.03	1.40	1.42	1.43	1.44	1.45
Jay	1.66	1.84	1.64	1.21	1.64	1.64	1.63	1.61	1.60
Jefferson[4]	*3.50*	*3.40*	*3.64*	*3.45*	*4.16*	*4.19*	*4.20*	*4.20*	*4.20*
Jennings	1.92	1.59	1.33	1.55	2.01	2.05	2.07	2.09	2.10
Johnson[5]	*5.87*	*8.40*	*10.61*	*11.63*	*14.59*	*14.94*	*15.17*	*15.34*	*15.50*
Knox	4.84	4.51	4.94	11.92	4.41	4.40	4.38	4.35	4.32
Kosciusko	3.25	3.61	3.93	3.99	4.01	4.04	4.05	4.04	4.04
Lagrange	0.51	0.77	0.87	0.90	0.91	0.92	0.93	0.94	0.94
Lake	51.74	78.57	83.54	85.55	72.78	72.59	72.19	71.65	71.11
La Porte	15.20	11.01	10.69	10.64	9.86	9.83	9.76	9.68	9.59
Lawrence[2]	*4.37*	*4.64*	*5.67*	*6.34*	*5.46*	*5.48*	*5.48*	*5.47*	*5.46*
Madison	10.87	12.76	13.31	13.68	12.94	12.85	12.74	12.61	12.48
Marion[5]	*122.71*	*125.41*	*131.78*	*123.82*	*132.52*	*132.19*	*131.52*	*130.64*	*129.74*
Marshall	2.94	2.97	2.76	2.91	3.01	3.02	3.02	3.01	3.00
Martin	1.49	0.79	0.98	0.85	0.94	0.93	0.92	0.91	0.90
Miami	2.73	1.48	2.18	2.11	2.71	2.74	2.76	2.76	2.77
Monroe[5]	*11.54*	*12.43*	*13.54*	*13.51*	*16.68*	*16.77*	*16.78*	*16.74*	*16.71*
Montgomery	2.38	2.89	2.98	3.00	3.25	3.26	3.25	3.23	3.21
Morgan[5]	*2.61*	*4.55*	*5.21*	*5.27*	*5.22*	*5.35*	*5.44*	*5.50*	*5.56*
Newton	0.65	0.61	0.68	0.82	0.84	0.84	0.85	0.85	0.85
Noble	2.36	2.48	2.81	2.75	3.06	3.09	3.10	3.11	3.11
Ohio[4]	*0.45*	*0.46*	*0.55*	*0.68*	*0.69*	*0.69*	*0.69*	*0.69*	*0.68*
Orange[2]	*1.49*	*1.14*	*1.23*	*0.86*	*1.49*	*1.50*	*1.50*	*1.50*	*1.50*
Owen	0.65	0.85	0.99	1.02	0.99	1.00	1.01	1.01	1.02
Parke	0.79	0.87	0.90	0.87	0.89	0.89	0.89	0.89	0.89
Perry[2]	*1.68*	*1.58*	*1.77*	*2.22*	*2.02*	*2.03*	*2.03*	*2.03*	*2.02*
Pike[2]	*1.28*	*1.33*	*1.21*	*1.27*	*1.35*	*1.36*	*1.37*	*1.38*	*1.38*
Porter	5.52	8.56	15.85	13.11	12.47	12.62	12.71	12.75	12.79
Posey	1.79	2.04	2.04	2.05	1.96	1.96	1.97	1.96	1.96
Pulaski	0.59	0.72	0.69	0.49	0.58	0.59	0.59	0.59	0.59
Putnam	2.31	3.38	4.27	4.18	4.10	4.14	4.15	4.16	4.16
Randolph	2.33	2.10	1.63	1.60	1.86	1.86	1.85	1.83	1.82
Ripley[1]	*1.66*	*2.18*	*2.55*	*2.38*	*2.74*	*2.76*	*2.76*	*2.76*	*2.76*
Rush	0.95	1.09	1.09	1.13	1.09	1.09	1.09	1.08	1.08
St. Joseph	31.04	28.37	30.82	30.82	27.29	27.32	27.25	27.13	26.99
Scott[6]	*1.54*	*2.30*	*2.99*	*3.45*	*3.01*	*3.03*	*3.04*	*3.04*	*3.04*

Table 3.2a Water Use Projections for Indiana
(in million gallons per day)

Indiana Counties	USGS Withdrawal Estimates				MTAC Water Use Projections				
	1985	*1990*	*1995*	*2000*	*2005*	*2010*	*2015*	*2020*	*2025*
Shelby	2.11	2.93	3.41	4.11	3.41	3.44	3.44	3.44	3.44
Spencer[2]	*0.40*	*2.47*	*2.19*	*2.10*	*2.02*	*2.04*	*2.04*	*2.04*	*2.04*
Starke	0.67	0.66	0.69	0.76	0.69	0.70	0.70	0.71	0.71
Steuben	1.21	1.23	1.47	1.45	1.74	1.75	1.76	1.76	1.76
Sullivan[3]	*1.93*	*1.21*	*1.68*	*1.72*	*2.17*	*2.19*	*2.20*	*2.20*	*2.19*
Switzerland[4]	*0.77*	*0.61*	*0.69*	*0.74*	*0.89*	*0.92*	*0.93*	*0.94*	*0.96*
Tippecanoe	18.21	14.97	13.66	14.14	17.91	17.91	17.85	17.76	17.66
Tipton	0.78	0.97	1.13	1.11	1.11	1.11	1.10	1.09	1.08
Union	0.15	0.18	0.27	0.29	0.24	0.24	0.24	0.23	0.23
Vanderburgh[2]	*25.01*	*28.81*	*27.77*	*30.86*	*26.71*	*26.60*	*26.42*	*26.21*	*25.99*
Vermillion	1.97	1.32	1.41	1.44	1.79	1.80	1.80	1.80	1.80
Vigo	9.60	11.19	12.10	11.29	11.12	10.98	10.83	10.67	10.52
Wabash	3.79	5.35	5.60	5.66	5.08	5.05	5.01	4.96	4.91
Warren	0.46	0.55	0.59	0.60	0.56	0.56	0.56	0.56	0.55
Warrick[2]	*2.92*	*1.67*	*2.45*	*2.68*	*6.65*	*6.76*	*6.83*	*6.87*	*6.92*
Washington[2]	*1.21*	*1.53*	*2.47*	*2.09*	*2.41*	*2.45*	*2.48*	*2.50*	*2.52*
Wayne	8.48	7.65	7.64	7.89	7.78	7.75	7.69	7.63	7.56
Wells	1.16	1.75	1.94	1.86	2.05	2.06	2.06	2.06	2.05
White	2.28	1.54	1.65	1.71	1.47	1.47	1.46	1.46	1.45
Whitley	1.21	1.22	1.30	1.59	1.69	1.70	1.70	1.70	1.69
Group 1	5.65	6.56	7.72	8.29	9.80	9.97	10.07	10.14	10.21
Group 2	48.68	53.43	56.39	61.32	57.30	57.43	57.34	57.13	56.90
Group 3	4.66	3.30	4.74	4.62	5.46	5.50	5.51	5.50	5.50
Group 4	4.72	4.47	4.88	4.87	5.72	5.78	5.80	5.81	5.82
Group 5	145.09	153.37	164.77	158.49	176.67	177.34	177.32	176.91	176.47
Group 6	16.80	21.10	23.96	24.63	30.19	30.50	30.65	30.72	30.77
All Counties	**574.81**	**604.07**	**668.58**	**690.01**	**699.78**	**702.08**	**701.60**	**699.55**	**697.37**

Table 3.2b. Ranking of Indiana Counties by Projected Change in Water Use

Indiana Counties	2025-2005 Change (mgd)	Percent of 2005 Use	Contribution from: (mgd)		Indiana Counties	2025-2005 Change (mgd)	Percent of 2005 Use	Contribution from: (mgd)	
			Pop	Per Capita				Pop	Per Capita
Hamilton	2.48	11.34	4.56	-2.08	Pulaski	0.00	0.78	0.04	-0.03
Johnson	0.92	6.28	1.95	-1.03	Parke	0.00	0.41	0.05	-0.05
Hendricks	0.59	8.87	1.06	-0.47	Whitley	0.00	0.23	0.10	-0.10
Dearborn	0.40	6.99	0.82	-0.41	Posey	0.00	0.05	0.11	-0.10
Morgan	0.34	6.48	0.67	-0.33	Perry	0.00	-0.03	0.11	-0.11
Porter	0.32	2.53	1.12	-0.80	Wells	0.00	0.00	0.12	-0.12
Warrick	0.27	4.07	0.67	-0.40	Lawrence	0.00	0.07	0.30	-0.30
Harrison	0.22	5.61	0.46	-0.25	Union	-0.01	-4.08	0.00	-0.01
Floyd	0.21	2.05	0.82	-0.62	Warren	-0.01	-1.32	0.02	-0.03
Hancock	0.18	5.41	0.39	-0.21	Ohio	-0.01	-1.71	0.02	-0.03
Elkhart	0.16	0.94	1.35	-1.19	Clay	-0.01	-0.82	0.04	-0.05

Table 3.2b. Ranking of Indiana Counties by Projected Change in Water Use

Indiana Counties	2025-2005 Change (mgd)	Percent of 2005 Use	Contribution from: (mgd)		Indiana Counties	2025-2005 Change (mgd)	Percent of 2005 Use	Contribution from: (mgd)	
			Pop	Per Capita				Pop	Per Capita
Clark	0.12	0.85	0.93	-0.81	Huntington	-0.01	-0.33	0.19	-0.20
Washington	0.11	4.77	0.26	-0.15	Adams	-0.01	-0.24	0.15	-0.16
Jennings	0.10	4.88	0.23	-0.13	Marshall	-0.01	-0.42	0.15	-0.16
De Kalb	0.08	2.09	0.36	-0.27	Crawford	-0.02	-2.53	0.02	-0.04
Switzerland	0.07	7.43	0.12	-0.05	Rush	-0.02	-1.77	0.03	-0.05
Boone	0.07	3.36	0.20	-0.13	Fountain	-0.02	-1.45	0.05	-0.07
Brown	0.06	4.11	0.14	-0.08	White	-0.02	-1.44	0.05	-0.08
Putnam	0.06	1.45	0.30	-0.24	Benton	-0.03	-3.42	0.01	-0.04
Miami	0.06	2.11	0.21	-0.15	Tipton	-0.03	-2.45	0.02	-0.05
Noble	0.05	1.55	0.24	-0.19	Bartholomew	-0.03	-0.27	0.69	-0.72
Clinton	0.05	1.13	0.30	-0.25	Martin	-0.04	-4.37	0.00	-0.04
Jackson	0.05	1.19	0.32	-0.27	Jay	-0.04	-2.63	0.04	-0.08
Carroll	0.04	3.72	0.10	-0.06	Montgomery	-0.04	-1.24	0.13	-0.17
Franklin	0.04	2.55	0.12	-0.08	Randolph	-0.05	-2.46	0.04	-0.09
Jasper	0.04	3.11	0.14	-0.09	Blackford	-0.07	-4.52	0.00	-0.06
Lagrange	0.03	3.71	0.09	-0.06	Dubois	-0.07	-1.12	0.30	-0.37
Pike	0.03	2.56	0.11	-0.07	Knox	-0.09	-1.93	0.13	-0.22
Shelby	0.03	0.81	0.22	-0.19	Gibson	-0.10	-2.55	0.08	-0.18
Kosciusko	0.03	0.79	0.27	-0.24	Henry	-0.11	-2.82	0.07	-0.18
Jefferson	0.03	0.80	0.28	-0.25	Fayette	-0.13	-3.27	0.05	-0.17
Scott	0.03	1.08	0.20	-0.17	Cass	-0.14	-2.81	0.09	-0.23
Ripley	0.03	0.96	0.20	-0.17	Wabash	-0.17	-3.29	0.05	-0.22
Starke	0.02	3.24	0.06	-0.04	Allen	-0.21	-0.45	2.44	-2.65
Owen	0.02	2.41	0.08	-0.05	Wayne	-0.22	-2.81	0.14	-0.36
Fulton	0.02	1.29	0.11	-0.09	Tippecanoe	-0.26	-1.44	0.68	-0.94
Sullivan	0.02	1.03	0.14	-0.12	La Porte	-0.27	-2.76	0.20	-0.48
Spencer	0.02	0.79	0.13	-0.12	St. Joseph	-0.30	-1.10	1.13	-1.43
Greene	0.02	0.52	0.19	-0.17	Howard	-0.32	-2.64	0.23	-0.55
Steuben	0.02	1.07	0.14	-0.12	Grant	-0.33	-4.51	-0.03	-0.30
Decatur	0.02	0.95	0.20	-0.17	Madison	-0.46	-3.55	0.13	-0.59
Monroe	0.02	0.15	0.97	-0.95	Delaware	-0.53	-4.30	-0.02	-0.51
Newton	0.01	1.35	0.06	-0.05	Vigo	-0.60	-5.39	-0.22	-0.38
Orange	0.01	0.78	0.10	-0.08	Vanderburgh	-0.72	-2.70	0.49	-1.21
Vermillion	0.01	0.42	0.11	-0.10	Lake	-1.67	-2.30	1.96	-3.63
Daviess	0.01	0.21	0.22	-0.21	Marion	-2.78	-2.10	2.89	-5.67
					All counties	**-2.44**	**0.43**	**34.99**	**-37.37**

Michigan Forecasts

Table 3.3a displays the historical water withdrawal estimates and water use projections for 83 counties and 5 groups of counties (made up of 19 counties) in Michigan.

Statewide total public-supply water use is projected to decline from 1,213 mgd in 2005 to 1,108 mgd in 2025. This represents a 104.2 mgd, or 8.6 percent, decrease in M&I demand during the 20-year period.

The projected 104.2 mgd decline is a net result of two compensating effects: the +55.9 mgd attributed to increasing population, and –160.1 mgd due to decreasing per capita use.

In 2025, approximately 75 percent of total statewide public-supply water use is projected to occur in ten counties: Wayne, Oakland, Macomb, Kent, Washtenaw, Genesee, Ottawa, Kalamazoo, Ingham and Saginaw Counties. The dominance of these counties occurs in spite of the fact that Wayne, Macomb, Genesee, Ingham, and Saginaw Counties are the counties projected to have the largest decreases in public-supply water use, ranging from 62.1 mgd for Wayne County to 4.6 mgd for Saginaw County. These five counties account for 90 percent of the projected 104.2 mgd decrease in statewide water use during the 2005-2025 period.

Table 3.3b shows the ranking of counties in terms of the projected growth and declines in water demand between 2005 and 2025. Only 19 counties are projected to have increases in water use greater than 0.1 mgd. Water use is projected to decline in 53 counties (on average, by 14 percent of the 2005 use) and remain constant or slightly increase in the remaining 11 counties.

Table 3.3a Water Use Projections for Michigan
(in million gallons per day)

Michigan Counties	USGS Withdrawal Estimates				MTAC Water Use Projections				
	1985	*1990*	*1995*	*2000*	*2005*	*2010*	*2015*	*2020*	*2025*
Alcona	0.56	0.59	0.74	0.10	0.13	0.13	0.12	0.12	0.12
Alger	0.81	0.82	1.22	0.69	0.73	0.71	0.69	0.67	0.65
Allegan[4]	*8.58*	*10.00*	*5.70*	*4.87*	*5.69*	*5.73*	*5.77*	*5.80*	*5.82*
Alpena	1.76	3.72	2.86	2.96	3.46	3.32	3.16	3.01	2.86
Antrim	1.36	1.58	2.37	1.44	1.59	1.62	1.66	1.69	1.72
Arenac[1]	*13.11*	*0.57*	*49.59*	*39.00*	*1.62*	*1.62*	*1.61*	*1.60*	*1.59*
Baraga	0.83	0.84	0.75	0.70	0.64	0.61	0.58	0.56	0.53
Barry	4.74	5.77	2.90	1.63	2.66	2.64	2.61	2.57	2.53
Bay[1]	*14.20*	*15.22*	*18.52*	*11.18*	*15.13*	*14.46*	*13.78*	*13.11*	*12.48*
Benzie	0.90	1.25	1.48	0.70	0.77	0.79	0.79	0.80	0.81
Berrien	16.60	22.01	21.31	19.15	16.98	16.29	15.63	15.01	14.43
Branch	4.19	4.89	3.67	3.57	3.77	3.74	3.69	3.64	3.60
Calhoun	14.29	16.37	14.46	17.04	13.53	13.21	12.88	12.56	12.26
Cass	4.87	6.26	3.02	1.54	2.29	2.21	2.14	2.05	1.97
Charlevoix	1.59	1.79	2.77	2.46	2.34	2.39	2.44	2.49	2.53
Cheboygan	1.23	2.42	1.48	1.28	1.18	1.17	1.15	1.13	1.10
Chippewa	1.79	4.38	3.43	2.98	3.74	3.81	3.91	4.00	4.10
Clare	2.78	3.25	1.54	1.16	1.12	1.14	1.16	1.17	1.19
Clinton[3]	*5.63*	*6.08*	*4.04*	*2.53*	*3.00*	*2.93*	*2.85*	*2.76*	*2.67*
Crawford	0.65	0.76	0.56	0.95	0.75	0.78	0.81	0.84	0.56
Delta	1.94	2.93	2.95	2.86	2.38	2.31	2.24	2.17	2.75
Dickinson	1.25	3.60	3.32	2.90	3.60	3.51	3.42	3.34	3.26
Eaton[3]	*9.09*	*9.55*	*10.45*	*3.50*	*8.34*	*8.28*	*8.22*	*8.16*	*8.10*
Emmet	2.12	2.09	3.02	3.78	3.00	3.02	3.05	3.07	2.45
Genesee[5]	*52.60*	*50.06*	*11.84*	*5.33*	*46.49*	*44.46*	*42.41*	*40.42*	*38.54*
Gladwin	2.58	2.94	0.56	0.57	0.57	0.57	0.58	0.58	0.88
Gogebic	2.72	3.30	3.01	2.25	2.21	2.02	1.87	1.72	1.59
Grand Traverse	4.64	2.88	4.41	6.70	8.17	8.38	8.61	8.81	9.02
Gratiot	4.66	4.81	4.40	3.74	3.39	3.28	3.17	3.05	2.93
Hillsdale	3.44	4.19	3.45	2.26	2.72	2.70	2.67	2.64	2.61
Houghton[2]	*3.58*	*5.68*	*4.80*	*3.72*	*4.32*	*4.22*	*4.13*	*4.03*	*3.93*
Huron	4.36	3.99	3.28	2.44	2.89	2.78	2.66	2.55	2.45
Ingham[3]	*34.60*	*37.60*	*61.62*	*34.36*	*35.38*	*34.13*	*32.95*	*31.82*	*30.74*
Ionia	5.33	6.73	6.30	5.55	5.77	5.68	5.56	5.43	4.56
Iosco	2.65	4.05	3.95	1.33	2.54	2.47	2.40	2.34	2.29
Iron	2.25	2.87	3.97	2.40	2.73	2.56	2.42	2.27	1.50
Isabella	6.61	4.49	5.79	3.63	3.69	3.65	3.60	3.55	4.48
Jackson	14.47	20.29	17.16	12.61	17.21	16.81	16.42	16.02	15.63
Kalamazoo	42.56	29.02	30.14	28.31	29.76	29.06	28.34	27.63	31.01
Kalkaska	0.93	0.95	0.72	0.62	0.55	0.57	0.59	0.60	0.47
Kent[4]	*47.04*	*77.83*	*80.21*	*60.77*	*68.60*	*69.07*	*69.60*	*70.10*	*70.60*
Keweenaw[2]	*0.21*	*0.18*	*0.06*	*0.05*	*0.08*	*0.08*	*0.07*	*0.07*	*0.07*
Lake	0.69	0.71	0.38	0.20	0.29	0.30	0.30	0.31	0.32
Lapeer[5]	*9.32*	*9.91*	*1.65*	*0.50*	*3.84*	*3.90*	*3.95*	*3.97*	*3.99*
Leelanau	1.17	1.34	1.27	0.47	0.84	0.83	0.83	0.83	0.83
Lenawee	5.42	11.01	8.81	6.81	6.24	6.15	6.05	5.94	8.03
Livingston	14.47	9.19	4.67	5.87	8.12	8.51	8.89	9.30	9.71
Luce	0.59	0.80	0.95	0.58	0.52	0.51	0.48	0.46	0.44

Table 3.3a Water Use Projections for Michigan
(in million gallons per day)

Michigan Counties	USGS Withdrawal Estimates				MTAC Water Use Projections				
	1985	*1990*	*1995*	*2000*	*2005*	*2010*	*2015*	*2020*	*2025*
Mackinac	0.67	1.48	1.35	1.44	0.72	0.74	0.77	0.81	0.73
Macomb[5]	*115.13*	*87.87*	*18.10*	*5.41*	*130.62*	*127.24*	*123.54*	*119.84*	*116.30*
Manistee	1.82	3.41	2.35	1.92	1.73	1.68	1.63	1.57	1.51
Marquette	6.19	9.92	12.64	6.17	6.41	6.15	5.88	5.61	5.36
Mason	1.97	3.83	1.49	2.36	2.06	2.02	1.97	1.91	1.86
Mecosta	3.24	3.43	2.66	1.52	2.09	2.06	2.02	1.98	2.17
Menominee	1.11	1.77	1.47	1.22	1.19	1.10	1.03	0.95	1.32
Midland[1]	*9.16*	*10.44*	*0.24*	*0.21*	*10.52*	*10.38*	*10.22*	*10.02*	*9.82*
Missaukee	0.85	0.98	0.67	0.59	0.40	0.41	0.42	0.43	0.29
Monroe[5]	*8.23*	*15.16*	*9.49*	*12.43*	*16.78*	*16.41*	*16.00*	*15.55*	*15.11*
Montcalm	5.02	5.65	4.21	4.26	3.18	3.19	3.19	3.19	3.18
Montmorency	0.45	0.46	0.31	0.19	0.20	0.21	0.23	0.24	0.25
Muskegon	27.40	27.56	25.41	18.88	18.88	18.35	17.83	17.31	16.81
Newaygo	3.03	3.64	2.19	2.62	2.27	2.33	2.40	2.47	1.97
Oakland[5]	*29.74*	*132.80*	*21.40*	*22.92*	*184.45*	*184.52*	*184.56*	*184.69*	*184.80*
Oceana	1.74	2.45	1.74	1.36	1.11	1.09	1.07	1.04	1.01
Ogemaw	2.02	2.20	0.84	0.44	0.43	0.45	0.47	0.48	0.50
Ontonagon	0.98	1.10	1.21	0.50	0.68	0.64	0.59	0.55	0.50
Osceola	2.37	2.45	1.46	3.16	2.84	2.81	2.79	2.75	0.96
Oscoda	0.40	0.57	0.05	0.05	0.16	0.16	0.17	0.18	0.18
Otsego	0.92	1.06	0.75	1.12	0.88	0.92	0.97	1.02	1.07
Ottawa[4]	*16.68*	*19.34*	*14.25*	*48.79*	*30.89*	*31.94*	*33.05*	*34.19*	*35.37*
Presque Isle	0.81	1.25	1.43	0.82	0.98	0.96	0.93	0.91	0.89
Roscommon	1.36	1.31	0.55	0.24	0.38	0.39	0.40	0.42	0.43
Saginaw[1]	26.54	27.52	1.28	12.46	31.39	30.22	29.06	27.92	26.84
St. Clair	21.09	24.80	19.03	20.23	19.75	19.72	19.66	19.55	19.43
St. Joseph	5.88	6.77	5.73	4.29	5.23	5.11	4.98	4.84	4.70
Sanilac	5.75	5.43	4.34	2.04	2.63	2.58	2.52	2.46	2.40
Schoolcraft	0.60	0.96	0.98	0.52	0.66	0.64	0.62	0.60	0.57
Shiawassee	7.83	9.05	4.06	4.73	3.76	3.63	3.48	3.32	4.27
Tuscola	6.69	6.95	4.37	2.85	2.76	2.68	2.61	2.51	2.43
Van Buren	6.77	7.79	5.92	4.48	4.43	4.47	4.50	4.53	4.55
Washtenaw[5]	*14.19*	*33.95*	*22.84*	*21.77*	*40.25*	*40.17*	*40.01*	*39.84*	*39.68*
Wayne[5]	*530.28*	*514.38*	*676.86*	*533.24*	*324.71*	*306.66*	*290.43*	*276.05*	*262.65*
Wexford	2.37	2.85	2.89	2.78	2.32	2.28	2.25	2.22	2.19
Group 1	63.01	53.75	69.63	62.85	58.25	56.26	54.23	52.20	50.26
Group 2	3.79	5.86	4.86	3.77	4.42	4.33	4.23	4.13	4.03
Group 3	49.32	53.23	76.11	40.39	47.25	45.79	44.39	43.04	41.73
Group 4	72.30	107.17	100.16	114.43	105.72	107.25	108.91	110.55	112.22
Group 5	759.49	844.13	762.18	761.60	739.11	715.20	692.65	672.05	652.65
All Counties	**1,251.04**	**1,402.14**	**1,300.11**	**1,228.05**	**1,213.05**	**1,183.37**	**1,155.17**	**1,128.70**	**1,108.81**

Table 3.3b. Ranking of Michigan by Projected Change in Water Use

Michigan Counties	2025-2005 Change (mgd)	Percent of 2005 Use	Contribution from: (mgd)		Michigan Counties	2025-2005 Change (mgd)	Percent of 2005 Use	Contribution from: (mgd)	
			Pop	Per Capita				Pop	Per Capita
Ottawa	4.48	14.49	11.49	-7.01	Hillsdale	-0.11	-4.14	0.28	-0.39
Kent	2.00	2.92	14.15	-12.15	Wexford	-0.13	-5.54	0.10	-0.23
Lenawee	1.80	28.80	0.49	1.31	Barry	-0.14	-5.15	0.25	-0.38
Livingston	1.59	19.59	3.37	-1.78	Ontonagon	-0.18	-25.85	-0.12	-0.06
Kalamazoo	1.25	4.20	1.58	-0.33	Branch	-0.18	-4.67	0.36	-0.54
Grand Traverse	0.85	10.39	2.43	-1.58	Crawford	-0.19	-24.91	0.29	-0.48
Isabella	0.78	21.26	0.36	0.43	Mason	-0.20	-9.77	0.06	-0.26
Shiawassee	0.51	13.46	-0.09	0.60	Manistee	-0.21	-12.38	-0.02	-0.19
Delta	0.37	15.61	0.04	0.33	Sanilac	-0.23	-8.79	0.15	-0.38
Chippewa	0.37	9.79	1.13	-0.76	Eaton	-0.24	-2.90	1.22	-1.46
Oakland	0.36	0.19	33.19	-32.83	Iosco	-0.25	-9.85	0.10	-0.35
Gladwin	0.32	55.76	0.11	0.21	Newaygo	-0.30	-13.03	0.71	-1.00
Charlevoix	0.19	8.29	0.62	-0.42	St. Clair	-0.31	-1.59	2.97	-3.28
Otsego	0.19	21.61	0.43	-0.24	Cass	-0.31	-13.76	-0.01	-0.31
Lapeer	0.15	3.87	0.86	-0.71	Tuscola	-0.33	-12.03	0.05	-0.38
Antrim	0.14	8.57	0.42	-0.28	Clinton	-0.33	-11.09	0.08	-0.42
Allegan	0.13	2.32	1.05	-0.92	Dickinson	-0.34	-9.45	0.10	-0.45
Menominee	0.13	10.92	-0.20	0.33	Houghton	-0.38	-8.84	0.26	-0.64
Van Buren	0.12	2.68	0.94	-0.82	Huron	-0.44	-15.26	-0.10	-0.34
Mecosta	0.08	3.84	0.16	-0.08	Gratiot	-0.46	-13.51	-0.08	-0.37
Clare	0.07	5.98	0.27	-0.20	St. Joseph	-0.53	-10.15	0.18	-0.72
Ogemaw	0.07	15.18	0.16	-0.09	Emmet	-0.55	-18.40	0.58	-1.13
Roscommon	0.06	14.82	0.13	-0.08	Washtenaw	-0.57	-1.42	5.56	-6.12
Montmorency	0.05	26.96	0.10	-0.05	Alpena	-0.60	-17.24	-0.23	-0.37
Benzie	0.04	4.64	0.16	-0.13	Gogebic	-0.63	-28.29	-0.47	-0.16
Oscoda	0.03	16.78	0.06	-0.03	Midland	-0.70	-6.66	0.87	-1.58
Lake	0.02	7.91	0.07	-0.05	Marquette	-1.05	-16.45	-0.29	-0.77
Mackinac	0.01	1.43	0.31	-0.30	Ionia	-1.21	-20.95	0.34	-1.55
Montcalm	0.00	-0.05	0.51	-0.51	Iron	-1.23	-45.13	-0.33	-0.90
Leelanau	0.00	-0.32	0.13	-0.13	Calhoun	-1.27	-9.41	0.34	-1.61
Keweenaw	-0.01	-16.95	0.00	-0.01	Jackson	-1.58	-9.18	0.66	-2.24
Alcona	-0.02	-11.60	0.00	-0.02	Monroe	-1.67	-9.97	0.60	-2.27
Arenac	-0.02	-1.29	0.23	-0.25	Osceola	-1.88	-66.10	0.27	-2.15
Cheboygan	-0.07	-6.24	0.10	-0.18	Muskegon	-2.07	-10.95	0.46	-2.53
Kalkaska	-0.08	-14.12	0.17	-0.25	Berrien	-2.55	-15.04	-0.39	-2.17
Alger	-0.08	-10.87	0.01	-0.09	Bay	-2.64	-17.47	-0.92	-1.72
Presque Isle	-0.08	-8.63	0.05	-0.14	Saginaw	-4.55	-14.50	-0.91	-3.64
Luce	-0.09	-16.73	-0.03	-0.06	Ingham	-4.63	-13.10	-0.08	-4.56
Schoolcraft	-0.09	-13.71	-0.01	-0.08	Genesee	-7.95	-17.10	-2.42	-5.52
Oceana	-0.10	-9.16	0.05	-0.16	Macomb	-14.32	-10.96	1.68	-16.00
Missaukee	-0.10	-26.30	0.11	-0.21	Wayne	-62.06	-19.11	-31.35	-30.71
Baraga	-0.10	-16.31	-0.03	-0.07	**All counties**	**-104.18**	**-4.70**	**55.88**	**-160.12**

Minnesota Forecasts

Table 3.4a contains historical estimates of water withdrawals and water use projections for 87 counties and 4 county groupings (made up of 11 counties) in Minnesota.

Statewide total public-supply water use is projected to decline from 527 mgd in 2005 to 481 mgd in 2025. This represents a 45.6 mgd or an 8.6 percent decrease of M&I water use during the 20-year period.

This 45.6 mgd decline is a net result of two compensating effects: the effect of +26.8 mgd attributed to increasing population, and –72.4 mgd due to the decreasing per capita use. In other words, if the per capita water use in Minnesota counties remained constant at the 2005 values, the total water use in 2025 would increase by 26.8 mgd, or 5.1 percent, over the 2005 level. This potential increase is not expected to materialize because of the projected declines in per capita water use.

In 2025, approximately two thirds (or 67 percent) of total statewide public-supply water use is projected to occur in six counties: Hennepin, Ramsey, Dakota, St. Louis, Anoka, and Washington Counties, even though Hennepin, Ramsey, and St. Louis Counties are projected to have the largest decreases in public-supply water use (Hennepin: -23.1 mgd; Ramsey: -8.5; St. Louis: -7.4 mgd). These three counties account for 87 percent of the projected 45.6 mgd decrease in statewide water use during the 2005-2025 period.

Table 3.4b shows the ranking of Minnesota counties in terms of the projected growth and declines in water use between 2005 and 2025. Only 9 of the Minnesota's 87 counties are projected to have increases greater than 0.1 mgd between 2005 and 2025. Water use is projected to decline in 74 counties, on average, by 15.3 percent of the 2005 use, and remain constant or slightly increase in the remaining 4 counties.

Table 3.4a Water Use Projections for Minnesota (in million gallons per day)

Minnesota Counties	USGS Withdrawal Estimates				MTAC Water Use Projections				
	1985	*1990*	*1995*	*2000*	*2005*	*2010*	*2015*	*2020*	*2025*
Aitkin	0.25	0.21	0.22	0.24	0.21	0.21	0.21	0.21	0.20
Anoka[1]	*125.11*	*143.69*	*131.35*	*123.50*	*28.48*	*29.21*	*29.74*	*29.95*	*29.83*
Becker	1.47	2.15	1.36	1.53	1.79	1.75	1.71	1.66	1.60
Beltrami	1.39	1.37	1.56	1.66	2.01	1.99	1.92	1.86	1.79
Benton	1.08	1.21	1.95	2.71	2.67	2.76	2.82	2.85	2.84
Big Stone	0.57	0.56	0.31	0.50	0.48	0.44	0.41	0.38	0.35
Blue Earth	4.78	5.03	3.23	5.23	5.07	4.94	4.77	4.59	4.44
Brown	1.31	3.11	0.65	1.72	1.43	1.38	1.33	1.29	1.24
Carlton	2.09	1.26	12.69	1.66	1.72	1.66	1.61	1.54	1.47
Carver	2.76	3.72	4.87	7.07	7.57	8.08	8.54	8.95	9.28
Cass	0.54	0.56	0.12	0.38	0.34	0.34	0.34	0.34	0.33
Chippewa	1.14	0.86	1.05	1.10	0.91	0.84	0.79	0.74	0.68
Chisago	1.37	1.33	1.02	1.53	1.48	1.54	1.59	1.64	1.67
Clay	4.54	5.08	5.04	4.96	5.28	5.15	4.95	4.73	4.52
Clearwater	0.27	0.30	0.12	0.25	0.28	0.27	0.26	0.25	0.24
Cook	0.01	0.22	0.24	0.24	0.14	0.14	0.14	0.13	0.13
Cottonwood[2]	*1.05*	*1.16*	*1.29*	*1.33*	*1.30*	*1.22*	*1.15*	*1.08*	*1.01*
Crow Wing	2.68	2.67	2.15	3.25	3.05	3.08	3.07	3.04	2.98
Dakota	21.85	26.57	27.54	31.98	43.81	45.33	46.46	47.19	47.40
Dodge	0.95	0.90	0.67	0.91	1.17	1.14	1.12	1.09	1.06
Douglas	1.42	1.53	1.50	1.68	1.54	1.51	1.49	1.45	1.41
Faribault	1.85	1.67	1.01	1.39	1.23	1.15	1.08	1.01	0.95
Fillmore	1.33	2.25	0.64	1.66	1.17	1.11	1.07	1.03	0.99
Freeborn	3.38	3.77	3.64	4.42	3.51	3.31	3.13	2.96	2.78
Goodhue	3.13	3.32	2.74	3.53	3.63	3.58	3.58	3.56	3.50
Grant	0.43	0.47	0.17	0.45	0.37	0.34	0.32	0.30	0.28
Hennepin[1]	*58.91*	*66.87*	*76.01*	*82.62*	*160.25*	*155.87*	*150.65*	*144.38*	*137.13*
Houston	1.18	0.78	0.89	1.11	1.20	1.16	1.13	1.09	1.05
Hubbard	0.54	0.79	0.21	0.62	0.73	0.73	0.73	0.73	0.71
Isanti	0.74	0.96	0.74	0.99	1.06	1.05	1.05	1.04	1.01
Itasca	2.7	2.09	1.77	2.44	1.96	1.90	1.84	1.77	1.70
Jackson	0.71	0.68	0.41	0.64	0.57	0.54	0.51	0.49	0.46
Kanabec	0.44	0.38	0.36	0.40	0.39	0.38	0.39	0.39	0.39
Kandiyohi	3.87	4.00	3.74	4.34	4.05	3.99	3.93	3.85	3.74
Kittson[4]	*0.61*	*0.49*	*0.16*	*0.09*	*0.06*	*0.06*	*0.06*	*0.05*	*0.05*
Koochiching	0.13	0.13	0.54	0.91	0.12	0.12	0.11	0.10	0.10
Lac qui Parle	0.72	0.64	0.40	0.70	0.47	0.42	0.39	0.36	0.33
Lake	1.36	1.26	1.14	0.97	0.95	0.91	0.86	0.81	0.75
Lake of the Woods	0.2	0.22	0.22	0.17	0.14	0.14	0.14	0.13	0.13
Le Sueur	1.97	1.94	1.43	2.05	1.56	1.56	1.57	1.57	1.56
Lincoln[3]	*1.11*	*1.24*	*0.09*	*1.18*	*0.86*	*0.80*	*0.74*	*0.69*	*0.64*
Lyon[3]	*2.93*	*3.38*	*3.95*	*3.32*	*3.32*	*3.23*	*3.08*	*2.97*	*2.86*
McLeod	2.76	2.22	3.08	3.42	3.46	3.47	3.48	3.48	3.46
Mahnomen	0.2	0.21	0.22	0.24	0.17	0.17	0.16	0.16	0.16
Marshall[4]	*0.66*	*0.62*	*0.48*	*0.30*	*0.31*	*0.29*	*0.28*	*0.26*	*0.24*
Martin	0.58	0.57	1.89	1.94	2.13	2.03	1.96	1.90	1.82
Meeker	2.01	1.42	1.28	1.41	1.17	1.13	1.09	1.05	1.01
Mille Lacs	0.64	0.98	0.72	1.05	1.04	1.03	1.03	1.03	1.02

Table 3.4a Water Use Projections for Minnesota (in million gallons per day)

Minnesota Counties	USGS Withdrawal Estimates				MTAC Water Use Projections				
	1985	*1990*	*1995*	*2000*	*2005*	*2010*	*2015*	*2020*	*2025*
Morrison	2.34	1.94	1.24	2.01	2.20	2.13	2.07	2.01	1.93
Mower	3.55	3.38	2.76	3.53	3.03	2.89	2.77	2.65	2.52
Murray	0.67	0.64	0.59	0.52	0.50	0.46	0.43	0.40	0.37
Nicollet	4.52	2.28	4.28	4.18	4.34	4.24	4.10	3.96	3.80
Nobles[3]	*2.59*	*2.80*	*3.06*	*2.96*	*2.67*	*2.60*	*2.53*	*2.44*	*2.36*
Norman	0.44	0.39	0.27	0.37	0.46	0.43	0.41	0.38	0.36
Olmsted	10.96	11.77	12.23	14.37	13.64	13.50	13.28	12.99	12.58
Otter Tail	3.35	4.03	3.91	4.24	2.57	2.49	2.40	2.31	2.20
Pennington	1.06	1.06	0.99	1.18	1.13	1.09	1.06	1.02	0.97
Pine	0.80	0.71	0.60	0.89	0.61	0.61	0.62	0.62	0.61
Pipestone[3]	*0.72*	*0.71*	*1.56*	*1.72*	*1.72*	*1.61*	*1.52*	*1.43*	*1.34*
Polk	5.35	6.46	9.44	7.75	8.22	7.83	7.50	7.15	6.77
Pope	0.86	0.56	0.20	0.62	0.52	0.49	0.46	0.43	0.40
Ramsey[1]	*62.74*	*66.98*	*23.39*	*22.66*	*60.11*	*58.34*	*56.42*	*54.16*	*51.61*
Red Lake	1.3	0.80	0.22	1.01	0.89	0.82	0.77	0.72	0.68
Redwood	1.23	1.13	0.95	1.11	1.29	1.22	1.16	1.10	1.04
Renville	1.07	1.19	0.9	1.10	1.17	1.10	1.04	0.98	0.92
Rice	4.64	4.50	3.41	5.32	4.99	4.90	4.80	4.67	4.53
Rock	1.74	1.93	1.84	0.85	1.11	1.04	0.98	0.93	0.87
Roseau	0.65	0.86	0.90	0.83	0.86	0.85	0.85	0.84	0.83
St. Louis	37.25	41.8	32.04	38.77	39.05	37.10	35.16	33.35	31.67
Scott	4.54	5.27	5.56	8.49	8.34	8.83	9.25	9.64	9.97
Sherburne	1.24	1.38	1.84	3.15	2.56	2.76	2.93	3.07	3.19
Sibley	0.95	1.03	1.25	1.59	1.10	1.07	1.05	1.03	1.00
Stearns	9.31	10.47	10.21	13.40	13.07	12.87	12.53	12.14	11.79
Steele	3.91	3.99	1.71	4.62	3.60	3.51	3.43	3.34	3.21
Stevens	0.88	1.01	0.73	0.88	0.94	0.88	0.83	0.78	0.74
Swift	0.73	0.59	0.68	1.06	0.76	0.74	0.72	0.70	0.67
Todd	1.22	1.09	0.91	1.50	0.94	0.90	0.87	0.84	0.81
Traverse	0.48	0.45	0.24	0.33	0.23	0.21	0.20	0.19	0.17
Wabasha	1.88	1.87	1.39	2.38	2.08	2.01	1.96	1.91	1.84
Wadena	0.83	0.88	0.90	0.79	0.81	0.78	0.74	0.71	0.67
Waseca	8.15	2.11	1.99	1.99	1.51	1.45	1.39	1.33	1.27
Washington	9.41	10.03	35.54	15.89	20.89	21.72	22.28	22.66	22.78
Watonwan[2]	*1.55*	*1.81*	*1.92*	*1.87*	*1.12*	*1.07*	*1.02*	*0.97*	*0.92*
Wilkin	0.45	0.54	0.42	0.35	0.51	0.48	0.46	0.43	0.41
Winona	5.06	5.39	4.41	3.15	4.57	4.41	4.25	4.08	3.92
Wright	2.67	3.52	3.27	5.30	4.89	5.02	5.13	5.21	5.24
Yellow Medicine	0.52	0.55	0.51	1.57	0.99	0.92	0.86	0.80	0.75
Group 1	246.76	277.54	230.75	228.78	246.51	241.75	235.79	228.10	218.75
Group 2	2.6	2.97	3.21	3.20	2.42	2.29	2.17	2.05	1.93
Group 3	7.35	8.13	8.66	9.18	8.64	8.30	7.95	7.62	7.28
Group 4	1.27	1.11	0.64	0.39	0.37	0.34	0.32	0.31	0.29
All Counties	**473.33**	**514.74**	**485.12**	**500.09**	**526.61**	**518.83**	**508.96**	**496.49**	**480.97**

Table 3.4b. Ranking of Minnesota Counties by Projected Change in Water Use

Minnesota Counties	2025-2005 Change (mgd)	Percent of 2005 Use	Contribution from: (mgd)		Minnesota Counties	2025-2005 Change (mgd)	Percent of 2005 Use	Contribution from: (mgd)	
			Pop	Per Capita				Pop	Per Capita
Dakota	3.60	8.21	10.72	-7.13	Pennington	-0.15	-13.62	-0.01	-0.14
Washington	1.89	9.06	5.16	-3.27	Meeker	-0.16	-13.96	-0.02	-0.14
Carver	1.71	22.57	3.05	-1.34	Fillmore	-0.18	-15.66	-0.04	-0.14
Scott	1.62	19.47	3.04	-1.42	Brown	-0.19	-13.38	-0.01	-0.18
Anoka	1.35	4.75	5.69	-4.34	Becker	-0.19	-10.83	0.03	-0.22
Sherburne	0.64	24.94	1.10	-0.46	Watonwan	-0.20	-17.46	-0.06	-0.14
Wright	0.35	7.10	1.09	-0.74	Stevens	-0.20	-21.01	-0.09	-0.11
Chisago	0.19	13.08	0.43	-0.23	Lake	-0.20	-21.30	-0.10	-0.10
Benton	0.18	6.69	0.61	-0.43	Red Lake	-0.21	-23.63	-0.11	-0.10
Kanabec	0.00	1.06	0.06	-0.05	Chippewa	-0.22	-24.53	-0.12	-0.10
Pine	0.00	0.27	0.08	-0.08	Lincoln	-0.23	-26.44	-0.14	-0.09
Le Sueur	0.00	-0.03	0.22	-0.22	Beltrami	-0.23	-11.35	0.02	-0.25
McLeod	0.00	-0.04	0.51	-0.51	Wabasha	-0.23	-11.26	0.03	-0.26
Aitkin	-0.01	-5.00	0.02	-0.03	Rock	-0.24	-21.33	-0.11	-0.13
Kittson	-0.01	-19.70	-0.01	-0.01	Yellow Medicine	-0.24	-24.39	-0.14	-0.11
Cook	-0.02	-10.93	0.00	-0.02	Waseca	-0.24	-16.20	-0.06	-0.18
Cass	-0.02	-4.72	0.03	-0.04	Renville	-0.25	-21.14	-0.12	-0.13
Lake of the Woods	-0.02	-11.46	0.00	-0.02	Carlton	-0.25	-14.73	-0.05	-0.21
Hubbard	-0.02	-2.67	0.08	-0.10	Redwood	-0.26	-19.87	-0.11	-0.15
Mahnomen	-0.02	-11.24	0.00	-0.02	Itasca	-0.26	-13.39	-0.03	-0.24
Mille Lacs	-0.02	-2.06	0.12	-0.14	Morrison	-0.26	-12.03	0.01	-0.27
Koochiching	-0.03	-22.30	-0.01	-0.01	Faribault	-0.29	-23.21	-0.15	-0.14
Roseau	-0.03	-3.61	0.08	-0.11	Cottonwood	-0.30	-22.82	-0.15	-0.14
Clearwater	-0.04	-15.13	-0.01	-0.03	Martin	-0.31	-14.55	-0.05	-0.26
Isanti	-0.04	-4.15	0.10	-0.14	Nobles	-0.31	-11.76	0.03	-0.35
Traverse	-0.05	-23.95	-0.03	-0.02	Kandiyohi	-0.32	-7.82	0.23	-0.55
Marshall	-0.07	-21.88	-0.03	-0.03	Otter Tail	-0.37	-14.52	-0.07	-0.31
Crow Wing	-0.08	-2.57	0.34	-0.42	Pipestone	-0.37	-21.81	-0.18	-0.19
Grant	-0.09	-23.61	-0.05	-0.04	Steele	-0.39	-10.75	0.08	-0.47
Swift	-0.09	-12.39	0.00	-0.10	Rice	-0.46	-9.22	0.20	-0.66
Sibley	-0.10	-9.25	0.04	-0.14	Lyon	-0.46	-13.98	-0.03	-0.43
Wilkin	-0.10	-20.06	-0.04	-0.06	Mower	-0.51	-16.85	-0.14	-0.37
Norman	-0.11	-23.06	-0.06	-0.05	Nicollet	-0.54	-12.54	0.02	-0.56
Dodge	-0.11	-9.18	0.04	-0.15	Blue Earth	-0.63	-12.49	0.04	-0.67
Jackson	-0.11	-19.27	-0.05	-0.07	Winona	-0.65	-14.25	-0.06	-0.59
Pope	-0.11	-21.92	-0.06	-0.06	Freeborn	-0.73	-20.71	-0.32	-0.41
Murray	-0.13	-25.44	-0.08	-0.05	Clay	-0.76	-14.44	-0.08	-0.68
Todd	-0.13	-13.78	-0.02	-0.11	Olmsted	-1.06	-7.77	0.84	-1.90
Douglas	-0.13	-8.40	0.07	-0.20	Stearns	-1.28	-9.79	0.49	-1.77
Goodhue	-0.13	-3.65	0.38	-0.51	Polk	-1.44	-17.57	-0.46	-0.99
Big Stone	-0.13	-27.84	-0.09	-0.05	St. Louis	-7.38	-18.90	-2.69	-4.69
Wadena	-0.14	-17.37	-0.05	-0.09	Ramsey	-8.50	-14.14	-0.40	-8.10
Lac qui Parle	-0.14	-30.07	-0.09	-0.05	Hennepin	-23.12	-14.43	-1.56	-21.56
Houston	-0.14	-11.81	0.01	-0.15	**All counties**	**45.64**	**-11.6**	**26.79**	**-72.43**

Ohio Forecasts

Table 3.5a contains historical water withdrawal estimates and water use projections for 88 counties and four county groupings (made up of 21 counties) in Ohio.

Statewide total public-supply water use is projected to increase from 1,586 mgd in 2005 to 1,846 mgd in 2025. This represents a 264.8 mgd, or a 16.2 percent, increase of M&I demands during the 20-year period from 2005 to 2025.

The projected decline of 259.9 mgd between 2005 and 2025 is a net result of an increase of 159.1 mgd attributed to increases in population served by public supplies, and an increase of 100.8 mgd due to increasing per capita use. In other words, if the per capita demand in Ohio counties remained constant at the 2005 values, the total demand in 2025 would increase by 159.1 mgd or by 10 percent over the 2005 level. However, there will be an additional increase of 100.8 mgd (or 6.2 percent) because of the projected increases in per capita water use in 64 Ohio counties.

In 2025, approximately two thirds (or 67 percent) of total statewide public-supply withdrawals will take place in ten counties: Cuyahoga, Franklin, Hamilton, Montgomery, Summit, Lucas, Butler, Stark, Lorain, and Lake Counties.

Franklin, Cuyahoga, Hamilton, Butler, Montgomery, Warren, and Summit Counties are projected to have the greatest increases in public-supply water use, ranging from 53.5 mgd for Franklin County to 10.3 mgd for Summit County. These seven counties account for nearly two thirds of the projected 259.9 mgd increase in statewide demand during the 2005-2025 period.

Table 3.5b shows the ranking of projected growth and declines in water demand between 2005 and 2025 for Ohio counties. Of the 88 counties, 76 counties have projected increases greater than 0.1 mgd. Water use is projected to decline slightly in only eight counties (on average, by 2.6 percent of the 2005 use) and remain constant or slightly increase in the remaining 4 counties.

Table 3.5a Water Use Projections for Ohio
(in million gallons per day)

Ohio Counties	USGS Withdrawal Estimates				MTAC Water Use Projections				
	1985	*1990*	*1995*	*2000*	*2005*	*2010*	*2015*	*2020*	*2025*
Adams	1.67	1.83	2.07	1.87	2.55	2.66	2.77	2.87	2.98
Allen	14.78	14.72	31.15	30.44	23.64	24.14	24.66	25.16	25.66
Ashland	3.32	0.17	3.87	3.84	3.67	3.78	3.91	4.03	4.16
Ashtabula	9.29	11.55	8.93	9.12	10.36	10.65	10.98	11.30	11.63
Athens[1]	*5.10*	*4.27*	*6.19*	*6.98*	*5.86*	*5.97*	*6.06*	*6.14*	*6.21*
Auglaize	3.83	3.62	4.66	4.71	4.30	4.43	4.60	4.77	4.94
Belmont[2]	*10.18*	*6.49*	*8.57*	*8.28*	*8.34*	*8.28*	*8.30*	*8.32*	*8.34*
Brown	1.71	2.00	3.11	4.18	4.31	4.55	4.82	5.11	5.40
Butler[3]	*29.69*	*36.5*	*36.84*	*45.32*	*49.88*	*53.34*	*57.32*	*61.45*	*65.85*
Carroll	1.03	0.97	1.08	1.14	1.28	1.29	1.34	1.39	1.44
Champaign	2.97	3.06	2.31	2.60	2.40	2.47	2.50	2.53	2.55
Clark	17.11	14.89	18.67	18.95	15.58	15.95	16.22	16.46	16.70
Clermont	10.75	1.58	13.92	18.71	21.56	22.69	23.75	24.81	25.90
Clinton[4]	*1.86*	*2.22*	*0.63*	*0.75*	*2.35*	*2.51*	*2.65*	*2.79*	*2.94*
Columbiana	8.78	9.29	9.94	11.09	8.50	8.72	8.97	9.22	9.46
Coshocton	7.12	7.75	8.70	8.40	9.43	9.59	9.75	9.89	10.05
Crawford	16.32	4.98	3.80	3.14	4.24	4.24	4.23	4.21	4.20
Cuyahoga	350.83	297.72	281.85	261.14	267.75	276.01	286.03	295.88	306.07
Darke	3.28	3.44	3.27	3.28	3.45	3.50	3.56	3.62	3.68
Defiance	5.86	4.55	4.95	5.17	5.68	5.78	5.90	6.00	6.11
Delaware	4.87	6.71	8.31	11.36	18.62	20.37	22.43	24.66	27.10
Erie	11.08	3.10	13.72	11.14	12.88	13.13	13.43	13.71	13.99
Fairfield	6.91	9.27	8.60	8.86	11.12	11.87	12.71	13.58	14.50
Fayette	1.61	1.79	1.71	1.78	2.29	2.39	2.46	2.54	2.61
Franklin	127.08	141.48	150.16	184.25	213.10	226.96	239.59	252.63	266.58
Fulton	3.08	2.65	3.89	4.02	3.82	3.93	4.06	4.18	4.30
Gallia	2.29	1.47	3.32	3.60	3.99	4.13	4.17	4.22	4.26
Geauga	1.74	0.69	1.44	1.47	1.38	1.46	1.52	1.59	1.66
Greene	8.94	7.39	8.70	9.42	11.19	11.62	11.90	12.17	12.43
Guernsey	4.62	3.39	4.57	4.49	4.23	4.26	4.35	4.43	4.51
Hamilton[3]	*141.56*	*160.98*	*154.51*	*158.69*	*179.70*	*188.01*	*196.84*	*205.90*	*215.60*
Hancock	7.91	11.06	13.82	14.91	12.84	13.19	13.52	13.84	14.16
Hardin	1.74	2.06	2.49	2.39	2.31	2.32	2.33	2.34	2.35
Harrison[2]	*0.89*	*0.49*	*0.84*	*0.71*	*1.16*	*1.14*	*1.15*	*1.15*	*1.15*
Henry	1.45	1.62	1.75	1.75	2.30	2.37	2.44	2.50	2.56
Highland[4]	*2.75*	*1.8*	*1.99*	*2.43*	*2.12*	*2.25*	*2.38*	*2.52*	*2.67*
Hocking[1]	*1.97*	*2.46*	*3.06*	*3.26*	*1.40*	*1.47*	*1.55*	*1.62*	*1.69*
Holmes	1.08	0.77	1.46	3.24	1.16	1.24	1.34	1.45	1.56
Huron[6]	*4.94*	*5.85*	*7.49*	*6.99*	*7.23*	*7.42*	*7.59*	*7.75*	*7.92*
Jackson[5]	*3.27*	*1.84*	*1.76*	*1.61*	*3.31*	*3.42*	*3.54*	*3.65*	*3.77*
Jefferson	9.26	9.33	4.67	8.80	7.61	7.63	7.68	7.72	7.77
Knox	3.62	3.59	3.66	4.25	4.12	4.26	4.41	4.56	4.71
Lake	26.68	30.83	29.27	27.49	36.04	37.03	38.08	39.09	40.13
Lawrence	4.80	4.97	4.71	5.47	5.48	5.50	5.54	5.57	5.60
Licking	10.88	9.50	10.84	13.53	12.52	13.12	13.93	14.74	15.60
Logan	3.56	0.54	3.02	3.29	3.56	3.80	4.02	4.25	4.49
Lorain[6]	*34.48*	*35.08*	*37.02*	*39.12*	*41.14*	*42.36*	*44.13*	*45.88*	*47.67*
Lucas[7]	75.01	82.71	82.24	89.73	76.15	77.70	79.28	80.73	82.21
Madison	1.94	1.09	1.78	1.89	2.24	2.37	2.52	2.68	2.84

Table 3.5a Water Use Projections for Ohio
(in million gallons per day)

Ohio Counties	USGS Withdrawal Estimates				MTAC Water Use Projections				
	1985	*1990*	*1995*	*2000*	*2005*	*2010*	*2015*	*2020*	*2025*
Mahoning[8]	*6.49*	*5.87*	*6.04*	*5.58*	*12.62*	*12.90*	*13.26*	*13.60*	*13.94*
Marion	5.51	5.16	5.95	6.58	6.86	6.81	6.81	6.80	6.79
Medina[6]	*4.61*	*5.48*	*6.93*	*6.58*	*11.05*	*11.74*	*12.55*	*13.38*	*14.27*
Meigs	1.87	1.26	1.79	1.82	2.28	2.33	2.43	2.53	2.64
Mercer	2.51	2.80	2.38	2.51	2.90	2.95	3.01	3.05	3.10
Miami	8.66	9.56	11.26	11.41	9.87	10.23	10.56	10.87	11.19
Monroe[2]	*0.65*	*0.55*	*1.65*	*1.13*	*1.38*	*1.35*	*1.32*	*1.28*	*1.25*
Montgomery	90.39	90.65	98.54	96.05	98.70	101.62	104.44	107.13	109.85
Morgan	0.76	1.05	1.21	1.25	1.31	1.35	1.41	1.47	1.53
Morrow	0.62	0.13	0.63	0.69	1.08	1.13	1.22	1.30	1.40
Muskingum	7.55	2.95	9.58	9.75	10.27	10.50	10.79	11.07	11.36
Noble	0.4	0.58	0.68	0.79	0.95	1.00	1.08	1.16	1.25
Ottawa	2.54	2.30	2.5	0.32	2.75	2.80	2.84	2.88	2.91
Paulding	1.04	0.78	1.21	1.99	1.19	1.19	1.19	1.19	1.20
Perry[1]	*1.19*	*1.21*	*1.26*	*1.41*	*2.38*	*2.43*	*2.49*	*2.54*	*2.60*
Pickaway	3.26	2.99	4.34	3.93	4.31	4.54	4.85	5.16	5.49
Pike	1.22	0.72	1.92	2.42	2.78	2.89	3.04	3.18	3.33
Portage	8.64	7.96	9.70	9.09	12.28	12.71	13.07	13.40	13.75
Preble	2.1	1.98	2.34	3.09	2.97	3.07	3.19	3.30	3.41
Putnam	1.64	1.99	2.7	3.02	2.02	2.07	2.13	2.18	2.23
Richland	13.75	11.25	13.06	16.14	13.62	13.67	13.77	13.84	13.91
Ross	4.65	8.84	7.47	7.50	7.51	7.82	8.14	8.46	8.78
Sandusky	5.23	6.79	6.37	6.36	6.80	7.03	7.25	7.45	7.66
Scioto[5]	*8.66*	*9.35*	*11.08*	*12.25*	*9.19*	*9.34*	*9.54*	*9.71*	*9.89*
Seneca	5.24	2.52	2.44	2.72	2.66	2.64	2.61	2.58	2.55
Shelby	3.35	3.30	3.66	3.95	4.73	4.89	5.06	5.22	5.38
Stark	40.29	28.89	30.91	33.18	46.40	47.60	48.85	50.06	51.32
Summit	59.2	57.9	56.62	52.35	74.07	76.32	79.00	81.62	84.32
Trumbull[8]	*65.51*	*14.00*	*16.43*	*16.43*	*9.20*	*9.35*	*9.57*	*9.76*	*9.96*
Tuscarawas	8.63	1.72	24.6	18.26	17.59	17.85	18.32	18.76	19.21
Union	1.56	1.74	2.17	2.30	2.68	2.90	3.13	3.38	3.64
Van Wert	2.08	2.56	2.95	3.54	2.86	2.90	2.90	2.90	2.90
Vinton[5]	*0.20*	*0.24*	*0.19*	*0.20*	*0.47*	*0.48*	*0.50*	*0.53*	*0.56*
Warren[3]	*7.59*	*8.79*	*17.67*	*17.29*	*4.60*	*26.41*	*29.08*	*31.96*	*35.14*
Washington	6.03	2.38	7.84	7.93	7.24	7.18	7.14	7.08	7.03
Wayne	7.21	7.74	8.6	7.44	8.99	9.36	9.76	10.15	10.55
Williams	3.21	3.59	3.28	3.03	3.51	3.59	3.67	3.75	3.82
Wood[7]	*5.47*	*4.75*	*5.48*	*5.66*	*12.30*	*12.74*	*13.07*	*13.39*	*13.71*
Wyandot	1.54	1.38	1.55	1.34	1.72	1.72	1.72	1.71	1.71
Group 1	8.26	7.94	10.51	11.65	9.67	9.93	10.19	10.43	10.67
Group 2	11.72	7.53	11.06	10.12	11.04	10.93	10.91	10.88	10.87
Group 3	178.84	206.27	209.02	221.30	250.33	262.71	276.67	290.89	305.93
Group 4	4.61	4.02	2.62	3.18	4.55	4.85	5.13	5.42	5.73
Group 5	12.13	11.43	13.03	14.06	12.78	13.07	13.42	13.76	14.10
Group 6	44.03	46.41	51.44	52.69	59.90	62.27	65.30	68.34	71.50
Group 7	80.48	87.46	87.72	95.39	87.47	89.49	91.40	93.16	94.94
Group 8	72	19.87	22.47	22.01	21.86	22.29	22.86	23.38	23.91
All Counties	**1,416.54**	**1,299.81**	**1,420.29**	**1,466.33**	**1,586.30**	**1,646.68**	**1,711.96**	**1,777.36**	**1,846.18**

Table 3.5b. Ranking of Ohio Counties by Projected Change in Water Use

Ohio Counties	2025-2005 Change (mgd)	Percent of 2005 Use	Contribution from: (mgd)		Ohio Counties	2025-2005 Change (mgd)	Percent of 2005 Use	Contribution from: (mgd)	
			Pop	Per Capita				Pop	Per Capita
Franklin	53.49	25.10	29.74	23.75	Clinton	0.58	24.71	0.80	-0.22
Cuyahoga	38.32	14.31	16.49	21.83	Pike	0.55	19.92	0.55	0.01
Hamilton	35.90	19.98	10.03	25.88	Highland	0.54	25.62	0.59	-0.04
Butler	15.97	32.01	17.63	-1.66	Ashland	0.49	13.25	0.54	-0.05
Montgomery	11.15	11.30	6.43	4.72	Fulton	0.49	12.72	0.44	0.04
Warren	10.54	42.86	12.67	-2.13	Jackson	0.46	13.93	0.38	0.08
Summit	10.25	13.83	5.46	4.78	Preble	0.45	15.04	0.46	-0.01
Delaware	8.48	45.57	9.85	-1.36	Defiance	0.42	7.48	0.17	0.26
Lorain	6.52	15.86	5.83	0.69	Adams	0.42	16.62	0.42	0.00
Lucas	6.06	7.96	1.63	4.43	Holmes	0.40	34.43	0.48	-0.08
Stark	4.92	10.60	1.08	3.84	Meigs	0.36	15.87	0.39	-0.03
Clermont	4.35	20.18	4.07	0.28	Athens	0.35	6.01	0.31	0.05
Lake	4.09	11.34	1.74	2.35	Fayette	0.33	14.24	0.12	0.20
Fairfield	3.38	30.43	3.40	-0.02	Morrow	0.32	29.43	0.36	-0.04
Medina	3.21	29.06	3.67	-0.46	Williams	0.31	8.77	0.17	0.14
Licking	3.08	24.61	2.68	0.40	Noble	0.30	31.33	0.34	-0.04
Allen	2.02	8.54	0.36	1.66	Hocking	0.29	20.48	0.33	-0.04
Tuscarawas	1.63	9.24	0.62	1.00	Richland	0.29	2.11	-0.49	0.78
Wayne	1.57	17.45	1.39	0.18	Geauga	0.27	19.78	0.28	0.00
Portage	1.47	11.95	1.04	0.43	Guernsey	0.27	6.45	0.03	0.24
Wood	1.41	11.44	1.24	0.17	Gallia	0.27	6.70	0.01	0.25
Mahoning	1.32	10.50	1.37	-0.04	Henry	0.26	11.11	0.23	0.02
Miami	1.32	13.41	1.23	0.10	Darke	0.24	6.85	0.12	0.12
Hancock	1.32	10.30	0.34	0.99	Morgan	0.22	16.69	0.24	-0.02
Ross	1.27	16.96	1.19	0.08	Perry	0.22	9.08	0.22	-0.01
Ashtabula	1.27	12.23	1.39	-0.13	Mercer	0.21	7.14	0.11	0.10
Greene	1.24	11.12	1.09	0.16	Putnam	0.21	10.18	0.17	0.04
Pickaway	1.18	27.36	1.15	0.03	Carroll	0.16	12.87	0.15	0.01
Clark	1.11	7.14	0.45	0.66	Ottawa	0.16	5.87	0.08	0.08
Erie	1.10	8.54	0.64	0.46	Jefferson	0.16	2.11	-0.42	0.58
Muskingum	1.09	10.60	0.42	0.67	Champaign	0.15	6.24	0.09	0.06
Brown	1.09	25.17	1.15	-0.07	Lawrence	0.12	2.20	-0.04	0.16
Columbiana	0.96	11.29	0.75	0.21	Vinton	0.09	19.03	0.09	0.00
Union	0.96	35.69	1.04	-0.08	Van Wert	0.04	1.48	-0.23	0.27
Logan	0.93	26.15	0.78	0.15	Hardin	0.04	1.56	-0.07	0.11
Sandusky	0.85	12.53	0.80	0.05	Paulding	0.00	0.39	-0.03	0.04
Trumbull	0.75	8.20	0.66	0.09	Belmont	-0.01	-0.09	-0.65	0.64
Scioto	0.70	7.58	0.40	0.30	Harrison	-0.01	-0.76	-0.06	0.05
Huron	0.68	9.46	0.64	0.04	Wyandot	-0.02	-0.99	-0.16	0.14
Shelby	0.64	13.61	0.53	0.11	Crawford	-0.04	-0.84	-0.30	0.27
Auglaize	0.64	14.81	0.62	0.01	Marion	-0.08	-1.12	-0.55	0.48
Coshocton	0.61	6.50	-0.13	0.74	Seneca	-0.11	-3.97	-0.34	0.24
Madison	0.60	27.02	0.58	0.03	Monroe	-0.14	-9.77	-0.22	0.09
Knox	0.59	14.30	0.66	-0.07	Washington	-0.21	-2.88	-0.81	0.60
					All counties	**259.88**	**13.5**	**159.07**	**100.81**

Wisconsin Forecasts

Table 3.6a contains historical water use estimates and projections for 82 counties in Wisconsin and 2 regional groupings (made up of 6 counties).

Statewide total public-supply water use is projected to increase from 653 mgd in 2005 to 704.2 mgd in 2025. This represents a 51.2 mgd or a 7.8 percent increase of M&I demands during the 20-year period from 2005 to 2025.

This projected increase is a net result of +55 mgd that can be attributed to increases in population, and –3.7 mgd due to the decreasing per capita use. In other words, if the per capita demand in Wisconsin counties remained constant at the 2005 values, the total demand in 2025 would increase by 55 mgd or by 8.4 percent over the 2005 level. However, there will be a small decrease of 3.7 mgd (or 0.6 percent) because of projected decreases in per capita water use in some counties.

Approximately 60 percent of total statewide public-supply water use in 2025 is projected to occur in Milwaukee, Dane, Waukesha, Brown, La Crosse, Rock, Sheboygan, and Outagamie Counties.

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Five of these counties (Milwaukee, Dane, Waukesha, Brown, La Crosse) are also projected to have the highest increases in public-supply water use, ranging from 14 (Milwaukee) to 2.6 mgd (La Crosse). These counties account for nearly two thirds (or 63 percent) of the projected 51.2 mgd increase in state water use during the 2005-2025 period.

Table 3.6b shows the ranking of Wisconsin counties in terms of the projected growth and declines in water demand between 2005 and 2025. Among Wisconsin's 82 counties, 32 counties are projected to have water use increases of greater than 0.1 mgd. Water use is projected to decline slightly in 12 counties (on average, by 3.2 percent of the 2005 use) and remain constant or slightly increase in the remaining 28 counties.

Table 3.6a Water Use Projections for Wisconsin
(in million gallons per day)

Wisconsin Counties	USGS Withdrawal Estimates				MTAC Water Use Projections				
	1985	*1990*	*1995*	*2000*	*2005*	*2010*	*2015*	*2020*	*2025*
Adams	0.29	0.32	0.38	0.35	0.33	0.34	0.33	0.32	0.31
Ashland	1.35	1.35	1.68	1.12	1.49	1.52	1.53	1.53	1.53
Barron	3.65	3.97	3.92	4.38	4.39	4.51	4.52	4.50	4.48
Bayfield	0.41	0.54	0.46	0.37	0.38	0.39	0.39	0.38	0.37
Brown	22.97	25.04	30.44	31.16	32.05	33.32	33.95	34.50	35.06
Buffalo	0.82	0.57	0.5	0.72	0.76	0.77	0.78	0.77	0.77
Burnett	0.33	0.38	0.33	0.35	0.40	0.41	0.41	0.40	0.39
Calumet[2]	*2.12*	*2.62*	*3.22*	*4.71*	*3.89*	*4.13*	*4.19*	*4.22*	*4.24*
Chippewa	4.31	5.36	4.94	4.99	5.47	5.67	5.68	5.66	5.63
Clark	1.88	2.14	1.57	1.51	1.62	1.66	1.66	1.66	1.66
Columbia	3.52	3.85	3.81	3.85	4.27	4.40	4.42	4.42	4.41
Crawford	1.5	2.12	1.43	2.11	1.88	1.91	1.92	1.91	1.90
Dane	41.72	45.99	46.76	48.15	64.10	66.99	69.10	71.08	73.03
Dodge	5.41	6.04	6.88	7.04	7.66	7.84	7.90	7.91	7.93
Door	1.68	1.79	2.00	2.07	1.66	1.71	1.71	1.70	1.68
Douglas	4.27	3.83	3.63	3.81	3.95	4.02	4.01	3.99	3.97
Dunn	1.77	2.03	2.55	2.27	2.73	2.83	2.89	2.97	3.04
Eau Claire	10.29	10.08	9.36	9.71	11.58	11.98	12.40	12.86	13.30
Florence	0.08	0.07	0.17	0.18	0.08	0.08	0.08	0.08	0.08
Fond du Lac	11.28	12.03	11.74	13.47	14.10	14.48	14.59	14.63	14.68
Forest	0.35	0.36	0.38	0.21	0.26	0.26	0.26	0.26	0.26
Grant	3.65	3.67	3.28	3.43	4.17	4.22	4.23	4.23	4.23
Green	3.08	3.25	3.34	3.01	2.95	3.04	3.04	3.03	3.02
Green Lake	1.26	1.47	1.5	1.54	1.38	1.41	1.41	1.40	1.39
Iowa	1.31	1.33	1.27	1.49	1.99	2.06	2.07	2.08	2.09
Iron	0.25	0.19	0.56	0.62	0.36	0.36	0.36	0.35	0.34
Jackson	0.66	0.82	0.86	0.74	0.85	0.87	0.87	0.87	0.87
Jefferson	7.84	8.53	8.65	9.61	9.92	10.27	10.41	10.51	10.61
Juneau	0.91	1.58	1.3	1.31	1.42	1.51	1.52	1.51	1.50
Kenosha	15.85	19.73	15.17	15.55	16.84	17.54	17.85	18.13	18.41
Kewaunee	0.85	0.98	1.05	1.07	1.14	1.16	1.17	1.16	1.16
La Crosse	19.58	19.78	16.63	18.15	21.31	21.86	22.54	23.24	23.93
Lafayette	1.16	1.11	1.01	0.90	0.99	1.00	1.00	1.00	0.99
Langlade	1.36	1.29	1.23	1.16	1.26	1.28	1.28	1.26	1.25
Lincoln	1.87	1.99	2.33	3.05	2.38	2.42	2.41	2.39	2.38
Manitowoc	9.6	11.73	11.03	11.49	11.73	11.97	12.02	12.02	12.02
Marathon	12.87	9.19	14.6	16.01	6.84	17.34	17.62	17.82	18.03
Marinette	3.46	3.75	3.91	3.50	3.80	3.87	3.86	3.83	3.80
Marquette	0.14	0.13	0.43	0.51	0.59	0.60	0.60	0.59	0.58
Menominee	0.08	0.08	0.08	0.09	0.10	0.11	0.12	0.12	0.13
Milwaukee[1]	*201.77*	*182.51*	*170.91*	*174.4*	*159.63*	*162.81*	*166.56*	*170.07*	*173.59*
Monroe	3.11	3.4	3.14	3.40	4.22	4.38	4.42	4.43	4.45
Oconto	1.08	1.34	1.29	1.32	1.36	1.42	1.41	1.40	1.38
Oneida	2.54	2.41	2.78	2.59	2.65	2.71	2.68	2.64	2.59
Outagamie[2]	*11.78*	*14.76*	*16.11*	*15.04*	*18.56*	*19.40*	*19.80*	*20.13*	*20.46*
Ozaukee[1]	*5.2*	*5.98*	*5.63*	*5.67*	*7.23*	*7.41*	*7.50*	*7.57*	*7.65*
Pepin	0.28	0.34	0.33	0.39	0.39	0.42	0.41	0.41	0.40

Table 3.6a Water Use Projections for Wisconsin
(in million gallons per day)

Wisconsin Counties	USGS Withdrawal Estimates				MTAC Water Use Projections				
	1985	***1990***	***1995***	***2000***	***2005***	***2010***	***2015***	***2020***	***2025***
Pierce	1.75	2.02	1.91	1.97	2.16	2.24	2.31	2.37	2.44
Polk	2.49	2.43	2.29	2.70	3.00	3.13	3.14	3.12	3.10
Portage	4.1	5.1	8.2	8.73	7.38	7.57	7.84	8.09	8.35
Price	0.91	0.95	1.32	1.15	1.02	1.02	1.02	1.00	0.99
Racine[1]	*25.37*	*29.51*	*28.45*	*27.47*	*17.08*	*17.45*	*17.68*	*17.85*	*18.02*
Richland	0.92	1.25	0.94	1.04	0.92	0.93	0.93	0.92	0.92
Rock	19.58	21.08	20.82	20.18	22.40	22.96	23.13	23.22	23.31
Rusk	0.57	0.61	0.66	0.69	0.78	0.80	0.80	0.79	0.78
St. Croix	3.88	4.53	5.8	3.50	5.20	5.70	5.78	5.83	5.87
Sauk	0.37	0.39	0.48	6.28	5.38	5.60	5.68	5.74	5.79
Sawyer	2.01	2.24	2.56	0.87	0.43	0.45	0.44	0.43	0.42
Shawano	15.5	17.42	19.27	2.20	1.98	2.03	2.01	1.99	1.96
Sheboygan	2.47	2.97	2.84	19.76	20.19	20.75	20.94	21.05	21.17
Taylor	0.66	0.68	0.69	0.75	0.82	0.83	0.84	0.84	0.85
Trempealeau	1.74	2.14	2.22	2.70	2.50	2.56	2.55	2.53	2.52
Vernon	1.41	1.32	1.33	1.21	1.52	1.57	1.57	1.57	1.56
Vilas	0.37	0.47	0.38	0.27	0.37	0.38	0.37	0.36	0.34
Walworth	5.62	6.22	7.35	8.81	7.45	7.75	7.91	8.05	8.20
Washburn	0.69	0.77	0.81	1.21	0.97	1.00	0.99	0.98	0.96
Washington	5.98	6.24	8.55	9.67	11.46	11.90	12.10	12.22	12.34
Waukesha[1]	*18.89*	*23.15*	*25.45*	*26.67*	*49.98*	*51.48*	*52.35*	*53.11*	*53.89*
Waupaca	4.88	5.28	6.38	6.48	6.20	6.34	6.32	6.26	6.20
Waushara	0.25	0.39	0.35	0.60	0.46	0.47	0.47	0.46	0.45
Winnebago	17.32	19.74	19.65	22.21	18.74	19.26	19.52	19.74	19.96
Wood	5.99	6.6	6.54	7.46	7.42	7.55	7.65	7.71	7.77
Group 1	251.23	241.15	230.44	234.21	275.37	281.72	287.24	292.22	297.24
Group 2	13.9	17.38	19.33	19.75	35.98	37.70	38.42	38.99	39.56
All Counties	**575.26**	**595.32**	**599.81**	**623.15**	**652.95**	**672.37**	**684.23**	**694.15**	**704.15**

Table 3.6b. Ranking of Wisconsin Counties by Projected Change in Water Use

Wisconsin Counties	2025-2005 Change (mgd)	Percent of 2005 Use	Contribution from: (mgd) Pop	Per Capita	Wisconsin Counties	2025-2005 Change (mgd)	Percent of 2005 Use	Contribution from: (mgd) Pop	Per Capita
Milwaukee	13.96	8.75	14.70	-0.73	Clark	0.04	2.57	0.06	-0.02
Dane	8.93	13.93	10.97	-2.04	Ashland	0.04	2.77	0.02	0.02
Waukesha	3.92	7.83	3.23	0.69	Vernon	0.03	2.18	0.06	-0.02
Brown	3.01	9.41	3.09	-0.08	Taylor	0.03	3.95	0.03	0.00
La Crosse	2.62	12.28	3.09	-0.47	Menominee	0.03	28.53	0.04	-0.01
Outagamie	1.90	10.24	2.02	-0.12	Door	0.03	1.73	0.01	0.02
Eau Claire	1.72	14.89	2.15	-0.43	Crawford	0.03	1.43	0.01	0.02
Kenosha	1.57	9.32	1.97	-0.40	Kewaunee	0.02	2.18	0.04	-0.01
Winnebago	1.22	6.51	1.08	0.14	Oconto	0.02	1.62	0.04	-0.02
Marathon	1.19	7.07	1.15	0.04	Jackson	0.01	1.73	0.02	-0.01
Sheboygan	0.98	4.85	0.69	0.29	Trempealeau	0.01	0.57	-0.01	0.02
Portage	0.97	13.15	1.21	-0.24	Buffalo	0.01	1.73	0.02	-0.01
Racine	0.94	5.49	1.02	-0.08	Douglas	0.01	0.31	0.00	0.01
Rock	0.91	4.06	0.87	0.04	Lafayette	0.01	0.77	0.03	-0.02
Washington	0.88	7.64	1.02	-0.14	Forest	0.01	2.15	0.01	0.00
Walworth	0.74	9.99	0.91	-0.16	Pepin	0.00	1.01	0.01	0.00
Jefferson	0.69	6.92	0.74	-0.05	Green Lake	0.00	0.21	-0.01	0.01
St. Croix	0.67	12.92	0.85	-0.18	Richland	0.00	0.23	0.01	-0.01
Fond du Lac	0.58	4.13	0.43	0.15	Florence	0.00	0.97	0.00	0.00
Ozaukee	0.41	5.72	0.40	0.02	Rusk	0.00	0.01	0.00	0.00
Sauk	0.41	7.63	0.44	-0.03	Marinette	0.00	-0.02	-0.07	0.07
Calumet	0.35	9.00	0.45	-0.10	Lincoln	0.00	-0.07	-0.01	0.01
Wood	0.35	4.67	0.20	0.14	Marquette	0.00	-0.54	0.00	-0.01
Dunn	0.31	11.44	0.39	-0.08	Waupaca	0.00	-0.08	-0.04	0.04
Manitowoc	0.29	2.47	0.16	0.13	Langlade	-0.01	-0.68	-0.02	0.01
Pierce	0.27	12.68	0.36	-0.08	Waushara	-0.01	-2.01	0.00	-0.01
Dodge	0.27	3.52	0.30	-0.03	Sawyer	-0.01	-2.24	-0.01	0.00
Monroe	0.23	5.41	0.28	-0.05	Washburn	-0.01	-1.08	-0.02	0.01
Chippewa	0.17	3.05	0.20	-0.04	Bayfield	-0.01	-3.15	-0.01	-0.01
Columbia	0.14	3.23	0.15	-0.01	Burnett	-0.01	-3.13	-0.01	0.00
Polk	0.11	3.61	0.15	-0.04	Iron	-0.02	-5.43	-0.03	0.01
Iowa	0.10	4.77	0.08	0.01	Shawano	-0.02	-1.04	-0.01	-0.01
Barron	0.09	2.02	0.06	0.03	Adams	-0.02	-6.34	-0.01	-0.01
Juneau	0.08	5.37	0.09	-0.02	Price	-0.03	-2.70	-0.05	0.02
Green	0.07	2.22	0.05	0.02	Vilas	-0.03	-8.70	-0.03	0.00
Grant	0.06	1.42	0.09	-0.03	Oneida	-0.06	-2.31	-0.16	0.10
					All counties	**51.2**	**3.82**	**54.95**	**-3.74**

EVALUATION OF INFRASTRUCTURE CAPACITY

Introduction

Water use projections are essential to the planning of timely implementation of system upgrades and the expansion of critical infrastructure components. This study set out to establish a link between estimates of current county infrastructure and the water use projections described above.

It had been anticipated that water system design and storage capacity data would be available through USEPA's Safe Drinking Water Information System (SDWIS), as stated on the SDWIS website (see Appendix C). A Freedom of Information Act request was submitted to USEPA to obtain this data, but unfortunately, it was not available for Region 5 states. State primacy agencies were then contacted to obtain information about system capacity that could be used to develop county-level estimates. Four of the six states were able to provide some capacity-related information in electronic format (site visits to retrieve information stored in files in state offices was beyond the scope of this project). Details of the process used to develop estimates of infrastructure capacity for counties and groups appear in Appendix C.

After reviewing the quality and completeness of the data, it was determined that it was adequate to perform a review of future capacity needs for three (of the four) states. However, the only information available from these states (in electronic format) were average day and maximum day production estimates, which are, at best, indirect measures of infrastructure capacity. The comparisons presented in the following sections are limited by scope and resources available for this project. It is likely that these comparisons reasonably represent current and future conditions for a majority of water systems, and by extension, counties and county groups. However, a complete evaluation of the current infrastructure conditions requires the additional knowledge of local conditions in specific counties and region.

Comparison methodology

The analysis below consist of comparing measures of current water system infrastructure, aggregated to county and county group level, to the 2025 water use projections for each county and county grouping. In two states the maximum day production is used as a proxy for infrastructure capacity, and so the 2025 average day water use projections were converted into maximum day projections to ensure a consistent comparison. This conversion was performed by first calculating a state average-day-to-maximum-day-ratio and applying that ratio to the 2025 average day projections in order to derive a 2025 maximum day projection.

The final 2025 estimate of projected water use (max day or average day) was then subtracted from the 2002 county-level infrastructure capacity estimate. This results in a measure of the 2025 infrastructure capacity *surplus* or *deficit* for each county and county

group. Estimates of total infrastructure capacity for groups are the sum of the estimates for each county in the group. Projections of water use for county grouping were calculated using group-level independent variables and may differ slightly from the sum of the projections of the individual counties that make up the group.

The results from this analysis must be interpreted with caution. Reporting of the production data that were used as proxies for infrastructure capacity is not mandatory, and therefore may not always occur in a timely or accurate manner. The use of these measures as estimates of infrastructure capacity is also likely to provide only a rough estimate of current infrastructure capacity, since many systems may never approach the maximum quantity of production available at their systems.

Also, transfers of water across county boundaries may result in double-counting or other misrepresentations of capacity, so interpretation of the results for many counties will require specific knowledge of the actual conditions within grouped counties (those in italics). Other anomalies in the data and methods may also produce results for individual counties that will only be interpretable by readers with a thorough knowledge of local conditions. Capacity estimates need to be examined carefully to see if they approximate local conditions. Finally, as discussed in the below, there were several counties in each state where data was only available for a small percentage of systems, and therefore the capacity estimate is not representative of the county as a whole.

Capacity Comparison for Illinois

The infrastructure capacity measure used for Illinois was maximum day production in million gallons per day. County-level estimates were developed by aggregating water production values of those systems reporting their primary service area in that county. If the maximum day production was not reported for a county (or if the average day production was larger), then the average day estimate was used. Systems that did not report either were not included in the analysis. Nearly 98 percent of all systems in the state reported average or maximum day production. These systems serve more than 99 percent of the population served in Illinois. More than 95 percent of the population served was represented in all but two counties (Calhoun: 60%; Massac: 46%).

The 2025 average day water projections derived from the Illinois model were converted to maximum day projections by multiplying them by an average day/maximum day ratio of 1.3. This estimate was derived from the a sample of 1,555 systems that reported average or max day production (or both), and also reported an average-to-maximum ratio of less than 1.0 (average>maximum) or greater than 5.0.

Table 3.7 below displays the comparison of the 2002 capacity estimates and the 2025 maximum day projections. The difference between these two estimates is calculated to show the magnitude of surplus or deficit in each county. Counties are ranked by their projected 2002 to 2025 deficit/surplus.

Table 3.7 Comparison of 2002 Capacity Estimate and 2025 Max Day Projections for Illinois

Illinois Counties/Groups of Counties	**Current Capacity Estimate** (2002 Max Day, mgd)	**2025 Projected Max Day Water Use** (2025 Avg Day* 1.3, mgd)	**Difference** (2002 estimate – 2025 projection)
Kane	61.4	120.0	-58.6
McHenry	22.2	44.2	-22.0
Macon	43.4	57.6	-14.2
Winnebago	44.5	57.1	-12.6
Kankakee	18.8	27.2	-8.4
Woodford	3.8	11.9	-8.1
De Kalb	10.6	16.7	-6.1
Rock Island	25.9	31.7	-5.8
Coles	6.7	12.2	-5.5
Peoria	42.0	46.3	-4.3
Kendall	3.2	5.5	-2.3
Vermilion	11.7	13.7	-2.0
Shelby	1.7	3.7	-2.0
Livingston	4.6	6.2	-1.6
Jackson	11.4	12.9	-1.5
Piatt	1.5	2.8	-1.3
Ogle	6.8	8.0	-1.2
McDonough	4.9	6.0	-1.1
Menard	1.1	2.2	-1.1
Randolph	3.2	4.2	-1.0
Wayne	1.8	2.3	-0.5
De Witt	1.5	2.0	-0.5
Richland	2.1	2.5	-0.4
Edgar	1.9	2.1	-0.2
Marshall	2.6	2.8	-0.2
Tazewell	23.5	23.6	-0.1
Cumberland	0.6	0.7	-0.1
Logan	4.2	4.2	-0.02
Moultrie	1.9	1.9	-0.02
Montgomery	4.4	4.42	-0.02
Lee	7.1	7.11	-0.01
Schuyler	1.0	0.98	0.03
Henry	5.4	5.3	0.1
Calhoun	0.5	0.4	0.1
Putnam	1.0	0.8	0.2
Stark	0.6	0.4	0.2
Carroll	1.9	1.7	0.2
Clark	2.5	2.3	0.2
Iroquois	3.3	3.0	0.3
McLean	24.7	24.3	0.4
Jo Daviess	3.7	3.3	0.4
Mercer	1.4	1.0	0.4
Knox	8.9	8.5	0.4

Illinois Counties/Groups of Counties	**Current Capacity Estimate (2002 Max Day, mgd)**	**2025 Projected Max Day Water Use (2025 Avg Day* 1.3, mgd)**	**Difference (2002 estimate – 2025 projection)**
Morgan	6.9	6.5	0.4
Pike	2.5	2.0	0.5
Lawrence	2.5	2.0	0.6
Ford	2.6	2.0	0.7
Fayette	2.2	1.5	0.7
Grundy	4.3	3.4	0.9
Mason	2.3	1.3	1.0
Cass	2.7	1.6	1.1
Bureau	4.6	3.4	1.2
Christian	5.9	4.3	1.6
Crawford	3.8	2.1	1.7
Stephenson	8.3	6.6	1.7
Boone	6.9	5.1	1.8
Fulton	5.7	3.3	2.5
Whiteside	7.2	3.5	3.7
La Salle	24.7	16.7	8.0
Lake	193.5	161.1	32.4
Group 1	**105.8**	**135.8**	**-30.0**
Bond[1]	*2.7*	*2.8*	*-0.1*
Jersey[1]	*2.9*	*5.0*	*-2.1*
Macoupin[1]	*7.6*	*8.5*	*-0.9*
Madison[1]	*48.3*	*59.0*	*-10.7*
Sangamon[1]	*44.3*	*62.6*	*-18.3*
Group 2	**22.7**	**20.7**	**2.0**
Adams[2]	*15.4*	*14.8*	*0.6*
Brown[2]	*0.8*	*1.1*	*-0.3*
Hancock[2]	*1.7*	*1.8*	*-0.1*
Henderson[2]	*1.1*	*1.2*	*-0.1*
Warren[2]	*3.6*	*2.4*	*1.2*
Group 3	**7.4**	**7.3**	**0.1**
Clay[3]	*2.2*	*1.3*	*0.9*
Effingham[3]	*3.8*	*4.5*	*-0.7*
Jasper[3]	*1.4*	*1.5*	*-0.1*
Group 4	**92.8**	**63.6**	**29.2**
Clinton[4]	*5.0*	*4.3*	*0.7*
Marion[4]	*8.2*	*7.7*	*0.5*
Monroe[4]	*2.5*	*2.0*	*0.5*
St Clair[4]	*74.1*	*48.3*	*25.8*
Washington[4]	*2.9*	*0.8*	*2.1*
Group 5	**3,234.9**	**1,797.1**	**1,437.8**
Cook[5]	*2,966.5*	*1,377.1*	*1,589.4*
Du Page[5]	*218.8*	*313.1*	*-94.3*
Will[5]	*49.6*	*111.1*	*-61.5*
Group 6	**41.6**	**45.0**	**-3.4**
Champaign[6]	*37.9*	*41.7*	*-3.8*
Douglas[6]	*3.6*	*2.8*	*0.8*

Illinois Counties/Groups of Counties	Current Capacity Estimate (2002 Max Day, mgd)	2025 Projected Max Day Water Use (2025 Avg Day* 1.3, mgd)	Difference (2002 estimate – 2025 projection)
Group 7	**50.2**	**36.3**	**13.9**
Franklin[7]	*19.4*	*7.0*	*12.4*
Gallatin[7]	*0.9*	*0.7*	*0.2*
Hamilton[7]	*0.9*	*0.5*	*0.4*
Hardin[7]	*0.5*	*0.5*	*0.02*
Jefferson[7]	*4.7*	*5.8*	*-1.1*
Johnson[7]	*1.2*	*0.6*	*0.6*
Massac[7]	*0.8*	*0.5*	*0.3*
Perry[7]	*2.5*	*3.9*	*-1.4*
Pope[7]	*1.3*	*0.7*	*0.6*
Saline[7]	*5.7*	*5.1*	*0.6*
White[7]	*3.1*	*1.5*	*1.6*
Williamson[7]	*9.2*	*9.3*	*-0.1*
Group 8	**5.8**	**2.9**	**2.9**
Alexander[8]	*2.2*	*1.6*	*0.6*
Pulaski[8]	*0.7*	*0.6*	*0.1*
Union[8]	*2.9*	*0.6*	*2.3*
Group 9	**2.2**	**4.3**	**-2.1**
Greene[9]	*1.5*	*3.5*	*-2.0*
Scott[9]	*0.7*	*0.6*	*0.1*
Group 10	**2.4**	**3.0**	**-0.6**
Edwards[10]	*0.7*	*1.0*	*-0.3*
Wabash[10]	*1.6*	*2.0*	*-0.4*
Total	**4,287.9**	**2,944.0**	**1,343.9**

Using the methodology presented here, the number of non-grouped counties with surpluses (29) and deficits (31) are about equal. Surpluses are projected for seven of the ten county groupings. The state as a whole is estimated to have considerable surplus production capacity, but this is largely due to the excess capacity available in Cook County. Max day estimates and projected demands are within ± 5 mgd for the great majority of counties and groups of counties in the state (49 of 60 counties, 6 of 10 groups).

Capacity Comparison for Michigan

The Michigan Department of Environmental Quality provided two measures of system capacity: total design capacity, and approved design capacity (see Appendix C.). Unfortunately, only 161 of the state's 1,468 community systems reported total design capacity, and only 916 reported approved design capacity. It was not possible to prepare any meaningful comparison of infrastructure capacity and projected water demands for Michigan counties because of the small number of systems reporting capacity information.

Capacity Comparison for Minnesota

As with Illinois, maximum and average day production estimates were available for most community water systems in Minnesota, and maximum day production was chosen as a proxy for infrastructure capacity. The analysis of maximum day production in Minnesota included more than 93 percent of all of the community water systems in the state. These systems served more than 99% of the population served in the Minnesota. More than 95 percent of the population served in every county is represented.

In order to compare the average day county projections to the maximum day capacity estimates, a statewide average-day-to-maximum-day ratio was calculated and applied to the 2025 average day projection. Those systems that did not report both average and maximum day (139), and those that reported either average day greater than maximum day, or reported a ratio greater than 5.0 (23) were excluded from the calculation of the average day to maximum day ratio. The final calculation was based on a sample of 795 systems and resulted in an average day-to-maximum day ratio of 2.38.

Table 3.8 Comparison of 2002 Capacity Estimate and 2025 Max Day Projections for Minnesota

Minnesota Counties/Groups of Counties	Current Capacity Estimate (2002 Max Day, mgd)	2025 Projected Max Day Water Use Estimate (2025 Avg Day* 2.38, mgd)	Difference (2002 estimate – 2025 projection)
St. Louis	49.8	75.4	-25.6
Dakota	94.1	112.8	-18.7
Polk	5.6	16.1	-10.5
Scott	14.8	23.7	-8.9
McLeod	0.5	8.2	-7.7
Carver	14.9	22.1	-7.2
Olmsted	25.7	29.9	-4.2
Nicollet	5.1	9.0	-3.9
Washington	50.5	54.2	-3.7
Benton	3.3	6.8	-3.5
Crow Wing	5	7.1	-2.1
Blue Earth	8.6	10.6	-2.0
Morrison	3	4.6	-1.6
Beltrami	2.7	4.3	-1.6
Dodge	1.2	2.5	-1.3
Red Lake	0.4	1.6	-1.2
Houston	1.6	2.5	-0.9
Carlton	2.6	3.5	-0.9
Roseau	1.1	2.0	-0.9
Freeborn	5.9	6.6	-0.7
Pennington	1.6	2.3	-0.7
Becker	3.2	3.8	-0.6
Goodhue	7.9	8.3	-0.4
Winona	8.9	9.3	-0.4

Minnesota Counties/Groups of Counties	**Current Capacity Estimate** (2002 Max Day, mgd)	**2025 Projected Max Day Water Use Estimate** (2025 Avg Day* 2.38, mgd)	**Difference** (2002 estimate – 2025 projection)
Kandiyohi	8.5	8.9	-0.4
Rice	10.5	10.8	-0.3
Wabasha	4.1	4.4	-0.3
Faribault	2	2.3	-0.3
Hubbard	1.5	1.7	-0.2
Sibley	2.2	2.4	-0.2
Redwood	2.3	2.5	-0.2
Kanabec	0.8	0.9	-0.1
Isanti	2.3	2.4	-0.1
Yellow Medicine	1.7	1.8	-0.1
Aitkin	0.4	0.5	-0.1
Clearwater	0.5	0.6	-0.1
Fillmore	2.3	2.4	-0.1
Mille Lacs	2.4	2.4	-0.03
Jackson	1.1	1.1	0.01
Chisago	4	4.0	0.03
Stevens	1.8	1.8	0.04
Steele	7.7	7.6	0.1
Lake of the Woods	0.4	0.3	0.1
Murray	1	0.9	0.1
Chippewa	1.8	1.6	0.2
Cook	0.5	0.3	0.2
Wadena	1.8	1.6	0.2
Renville	2.4	2.2	0.2
Douglas	3.7	3.4	0.3
Lac qui Parle	1.2	0.8	0.4
Traverse	0.9	0.4	0.5
Swift	2.1	1.6	0.5
Grant	1.2	0.7	0.5
Norman	1.4	0.9	0.5
Pope	1.5	1.0	0.5
Pine	2	1.5	0.5
Lake	2.4	1.8	0.6
Rock	2.8	2.1	0.7
Itasca	4.8	4.0	0.8
Todd	2.7	1.9	0.8
Meeker	3.2	2.4	0.8
Cass	1.6	0.8	0.8
Wilkin	1.8	1.0	0.8
Big Stone	1.8	0.8	1.0
Clay	11.8	10.8	1.0
Stearns	29.2	28.1	1.1
Waseca	4.5	3.0	1.5
Koochiching	1.8	0.2	1.6
Le Sueur	5.5	3.7	1.8
Mower	7.8	6.0	1.8
Martin	6.4	4.3	2.1

Minnesota Counties/Groups of Counties	Current Capacity Estimate (2002 Max Day, mgd)	2025 Projected Max Day Water Use Estimate (2025 Avg Day* 2.38, mgd)	Difference (2002 estimate – 2025 projection)
Brown	5.3	3.0	2.3
Sherburne	10	7.6	2.4
Mahnomen	3.1	0.4	2.7
Otter Tail	9.2	5.2	4.0
Wright	18.6	12.5	6.1
Group 1	**716.6**	**520.6**	**196.0**
Anoka[1]	*87.3*	*71.0*	*16.3*
Hennepin[1]	*442.9*	*326.4*	*116.5*
Ramsey[1]	*186.5*	*122.8*	*63.7*
Group 2	**6.1**	**4.6**	**1.5**
Cottonwood[2]	*3.0*	*2.4*	*0.6*
Watonwan[2]	*3.1*	*2.2*	*0.9*
Group 3	**17.5**	**17.3**	**0.2**
Lincoln[3]	*5.5*	*1.5*	*4.0*
Lyon[3]	*6*	*6.8*	*-0.8*
Nobles[3]	*4.7*	*5.6*	*-0.9*
Pipestone[3]	*1.2*	*3.2*	*-2.0*
Group 4	**2.2**	**0.7**	**1.5**
Kittson[4]	*1.4*	*0.1*	*1.3*
Marshall[4]	*0.8*	*0.6*	*0.2*
All Counties	**1,272.7**	**1,145.7**	**127.0**

The number of non-grouped counties with projected surpluses and deficits is split at 38 each. Deficits and surpluses were less than ±2.0 mgd in 58 counties, and in three of the four county groupings. The surpluses projected for Group 1 are largely responsible for the surplus in the state as a whole. The largest deficits are projected for St. Louis, Dakota and Polk Counties.

Capacity Comparison for Ohio

Average day water production was the only measure that was available that could be used as to estimate current infrastructure capacity. Approximately 93 percent of all community water systems provided an estimate of average daily production, representing more than 95 percent of the state population served, including three counties where considerably less than 90 percent of the population served was represented (Summit: 28%; Huron: 76%; Greene: 76%).

Table 3.7 Comparison of 2002 Capacity Estimate and 2025 Average Day Projections for Ohio

Ohio Counties/Groups of Counties	**Current Capacity Estimate** **(2002 Avg Day, mgd)**	**Projected 2025 Average Daily Water Use** **(mgd)**	**Difference** **(2002 estimate – 2025 projection)**
Franklin	154.2	266.6	-112.4
Summit	15.7	84.3	-68.6
Lake	26.7	40.1	-13.4
Cuyahoga	294.1	306.1	-12.0
Delaware	15.9	27.1	-11.2
Tuscarawas	8.3	19.2	-10.9
Allen	17.4	25.7	-8.3
Stark	43.7	51.3	-7.6
Clermont	18.6	25.9	-7.3
Hancock	7.1	14.2	-7.1
Fairfield	8.4	14.5	-6.1
Coshocton	5.9	10.1	-4.2
Licking	12.7	15.6	-2.9
Wayne	7.8	10.6	-2.8
Muskingum	9.2	11.4	-2.2
Sandusky	5.7	7.7	-2.0
Union	2.4	3.6	-1.2
Logan	3.3	4.5	-1.2
Gallia	3.1	4.3	-1.2
Brown	4.4	5.4	-1.0
Portage	12.8	13.8	-0.9
Pike	2.4	3.3	-0.9
Van Wert	2.0	2.9	-0.9
Shelby	4.5	5.4	-0.9
Henry	1.7	2.6	-0.9
Morgan	0.7	1.5	-0.8
Defiance	5.3	6.1	-0.8
Fayette	1.8	2.6	-0.8
Crawford	3.4	4.2	-0.8
Knox	4.0	4.7	-0.7
Marion	6.1	6.8	-0.7
Ashtabula	11.0	11.6	-0.6
Morrow	0.8	1.4	-0.6
Ross	8.2	8.8	-0.6
Carroll	0.9	1.4	-0.5
Williams	3.3	3.8	-0.5
Preble	3.0	3.4	-0.4
Paulding	0.8	1.2	-0.4
Darke	3.3	3.7	-0.4
Adams	2.6	3.0	-0.4
Holmes	1.2	1.6	-0.4
Mercer	2.8	3.1	-0.3
Pickaway	5.2	5.5	-0.3
Auglaize	4.7	4.9	-0.2

Ohio Counties/Groups of Counties	Current Capacity Estimate (2002 Avg Day, mgd)	Projected 2025 Average Daily Water Use (mgd)	Difference (2002 estimate – 2025 projection)
Meigs	2.4	2.6	-0.2
Clark	16.5	16.7	-0.2
Noble	1.1	1.3	-0.2
Fulton	4.2	4.3	-0.1
Ashland	4.1	4.2	-0.1
Wyandot	1.7	1.7	-0.01
Miami	11.2	11.2	0.01
Hardin	2.4	2.4	0.05
Madison	3.1	2.8	0.3
Greene	12.8	12.4	0.4
Columbiana	9.9	9.5	0.4
Washington	7.5	7.0	0.5
Geauga	2.2	1.7	0.5
Putnam	3.0	2.2	0.8
Champaign	3.4	2.6	0.9
Lawrence	6.6	5.6	1.0
Guernsey	5.6	4.5	1.1
Richland	15.0	13.9	1.1
Seneca	5.0	2.6	2.5
Erie	16.7	14.0	2.7
Ottawa	6.9	2.9	4.0
Jefferson	12.4	7.8	4.6
Montgomery	134.1	109.9	24.3
Group 1	**11.5**	**10.7**	**0.8**
Athens[1]	*8.2*	*6.2*	*2.0*
Hocking[1]	*1.4*	*1.7*	*-0.3*
Perry[1]	*1.9*	*2.6*	*-0.7*
Group 2	**12.3**	**10.9**	**1.4**
Belmont[2]	*9.7*	*8.3*	*1.4*
Harrison[2]	*1.0*	*1.2*	*-0.2*
Monroe[2]	*1.6*	*1.3*	*0.4*
Group 3	**201.4**	**305.9**	**-104.5**
Butler[3]	*53.4*	*65.9*	*-12.5*
Hamilton[3]	*131.1*	*215.6*	*-84.5*
Warren[3]	*16.8*	*35.1*	*-18.3*
Group 4	**6.1**	**5.7**	**0.4**
Clinton[4]	*2.4*	*6.1*	*-3.7*
Highland[4]	*3.7*	*5.5*	*-1.8*
Group 5	**17.6**	**14.1**	**3.5**
Jackson[5]	*4.8*	*3.8*	*1.0*
Scioto[5]	*11.9*	*9.9*	*2.0*
Vinton[5]	*0.9*	*0.6*	*0.3*
Group 6	**66.8**	**71.5**	**-4.7**
Huron[6]	*6.1*	*7.9*	*-1.8*
Lorain[6]	*51.1*	*47.7*	*3.4*
Medina[6]	*9.6*	*14.3*	*-4.7*

Ohio Counties/Groups of Counties	Current Capacity Estimate (2002 Avg Day, mgd)	Projected 2025 Average Daily Water Use (mgd)	Difference (2002 estimate – 2025 projection)
Group 7	**104.0**	**94.9**	**9.1**
Lucas[7]	*93.3*	*82.2*	*11.1*
Wood[7]	*10.7*	*13.7*	*-3.0*
Group 8	**67.4**	**23.9**	**43.5**
Mahoning[8]	*28.6*	*13.9*	*14.7*
Trumbull[8]	*38.7*	*10.0*	*28.7*
All Counties	**1,531.8**	**1,846.2**	**-314.4**

The majority (50 out of 67) of non-grouped counties in Ohio are projected to have deficits by 2025, with deficits projected to exceed 5.0 mgd in 11 counties. In 47 of the non-grouped counties deficits and surpluses are less than 2.0 mgd, but only one county projects surpluses greater than 5.0 mgd. Six of the eight county groups are projecting surpluses. Nearly one-third of the total state deficit is projected to occur in Frankin County.

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APPENDIX A.

POPULATION SERVED BY COMMUNITY WATER SYSTEMS AND SMALL SYSTEMS IN EACH COUNTY OF USEPA REGION 5

This appendix presents a summary of the distribution of small community water systems in all of the counties in USEPA Region 5.

The data that was used to prepare these tables was provided by state primacy agencies from the most recent data that was available (September, 2002). Systems were assigned to counties based upon the "primary county served" designation, as reported to USEPA. Also, some, wholesale water providers may be counted as small systems because they are listed in state data files as having minimal population served.

Table A-1. Community Water System by County in Illinois, 2002

County	Population 2000	Community Water Systems			Population Served		
		All	Small	% of Small Systems	By All Water Systems	By Small Water Systems	% by Small Systems
Adams[2]	*68,277*	*18*	*15*	*83*	*61,320*	*9,340*	*15*
Alexander[8]	*9,590*	*6*	*5*	*83*	*10,208*	*5,271*	*52*
Bond[1]	*17,633*	*9*	*8*	*89*	*11,360*	*5,760*	*51*
Boone	41,786	8	6	75	25,359	2,659	10
Brown[2]	*6,950*	*4*	*4*	*100*	*2,792*	*2,792*	*100*
Bureau	35,503	27	25	93	26,895	13,958	52
Calhoun	5,084	5	5	100	3,294	3,294	100
Carroll	16,674	9	8	89	10,186	6,367	63
Cass	13,695	5	4	80	10,269	4,269	42
Champaign[6]	*179,669*	*35*	*30*	*86*	*163,318*	*16,179*	*10*
Christian	35,372	13	11	85	29,627	8,387	28
Clark	17,008	6	3	50	14,816	2,275	15
Clay[3]	*14,560*	*6*	*5*	*83*	*9,169*	*3,494*	*38*
Clinton[4]	*35,535*	*19*	*17*	*89*	*27,419*	*20,169*	*74*
Coles	53,196	13	9	69	51,336	5,435	11
Cook[5]	*5,376,741*	*160*	*48*	*30*	*5,274,969*	*46,051*	*1*
Crawford	20,452	8	7	88	18,311	7,533	41
Cumberland	11,253	4	4	100	4,801	4,801	100
De Kalb	88,969	18	14	78	69,026	11,518	17
De Witt	16,798	10	9	90	12,539	4,739	38
Douglas[6]	*19,922*	*11*	*10*	*91*	*14,042*	*9,558*	*68*
Du Page[5]	*904,161*	*53*	*23*	*43*	*763,599*	*21,347*	*3*
Edgar	19,704	8	7	88	12,579	3,589	29
Edwards[10]	*6,971*	*4*	*4*	*100*	*4,547*	*4,547*	*100*
Effingham[3]	*34,264*	*12*	*11*	*92*	*22,864*	*10,464*	*46*
Fayette	21,802	8	7	88	16,675	8,825	53
Ford	14,241	10	8	80	11,056	3,033	27
Franklin[7]	*39,018*	*21*	*19*	*90*	*40,581*	*22,374*	*55*
Fulton	38,250	18	17	94	28,466	14,534	51
Gallatin[7]	*6,445*	*7*	*7*	*100*	*5,827*	*5,827*	*100*
Greene[9]	*14,761*	*10*	*10*	*100*	*11,235*	*11,235*	*100*
Grundy	37,535	19	16	84	28,278	7,550	27
Hamilton[7]	*8,621*	*5*	*5*	*100*	*6,281*	*6,281*	*100*
Hancock[2]	*20,121*	*11*	*11*	*100*	*13,659*	*13,659*	*100*
Hardin[7]	*4,800*	*5*	*5*	*100*	*3,466*	*3,466*	*100*
Henderson[2]	*8,213*	*7*	*7*	*100*	*5,680*	*5,680*	*100*
Henry	51,020	41	39	95	39,756	20,481	52
Iroquois	31,334	27	26	96	21,087	15,587	74
Jackson	59,612	18	14	78	62,827	12,171	19
Jasper[3]	*10,117*	*4*	*3*	*75*	*13,950*	*3,702*	*27*
Jefferson[7]	*40,045*	*9*	*7*	*78*	*31,581*	*9,596*	*30*
Jersey[1]	*21,668*	*6*	*4*	*67*	*24,370*	*1,530*	*6*
Jo Daviess	22,289	15	14	93	13,904	10,264	74
Johnson[7]	*12,878*	*6*	*5*	*83*	*8,385*	*4,923*	*59*
Kane	404,119	43	31	72	476,761	23,188	5
Kankakee	103,833	26	23	88	75,219	10,089	13
Kendall	54,544	10	7	70	30,834	2,692	9
Knox	55,836	18	16	89	49,227	10,573	21
Lake	644,356	107	75	70	528,861	37,057	7

Table A-1. Community Water System by County in Illinois, 2002

County	Population 2000	Community Water Systems			Population Served		
		All	Small	% of Small Systems	By All Water Systems	By Small Water Systems	% by Small Systems
La Salle	111,509	38	30	79	92,295	12,951	14
Lawrence	15,452	7	6	86	12,730	7,654	60
Lee	36,062	17	15	88	30,192	9,992	33
Livingston	39,678	16	13	81	29,449	8,153	28
Logan	31,183	13	12	92	23,158	8,358	36
McDonough	32,913	12	10	83	27,883	8,043	29
McHenry	260,077	37	26	70	168,804	17,073	10
McLean	150,433	34	31	91	134,928	26,058	19
Macon	114,706	12	9	75	105,794	11,787	11
Macoupin[1]	*49,019*	*30*	*25*	*83*	*44,024*	*20,069*	*46*
Madison[1]	*258,941*	*38*	*22*	*58*	*266,611*	*27,609*	*10*
Marion[4]	*41,691*	*16*	*13*	*81*	*43,675*	*14,351*	*33*
Marshall	13,180	11	11	100	9,530	9,530	100
Mason	16,038	6	5	83	9,434	5,824	62
Massac[7]	*15,161*	4	2	50	13,112	1,612	12
Menard	12,486	7	5	71	10,325	2,875	28
Mercer	16,957	14	13	93	10,266	6,466	63
Monroe[4]	*27,619*	*7*	*5*	*71*	*18,325*	*2,346*	*13*
Montgomery	30,652	18	16	89	21,512	10,338	48
Morgan	36,616	13	11	85	29,565	6,741	23
Moultrie	14,287	7	6	86	12,982	8,148	63
Ogle	51,032	24	21	88	32,039	13,494	42
Peoria	183,433	26	22	85	196,371	15,593	8
Perry[7]	*23,094*	9	7	78	15,926	4,966	31
Piatt	16,365	9	8	89	11,506	6,381	55
Pike	17,384	13	11	85	14,606	6,597	45
Pope[7]	*4,413*	2	1	50	4,697	844	18
Pulaski[8]	*7,348*	6	6	100	4,516	4,516	100
Putnam	6,086	8	8	100	4,212	4,212	100
Randolph	33,893	14	12	86	23,170	13,017	56
Richland	16,149	8	7	88	11,447	2,431	21
Rock Island	149,374	51	44	86	144,452	17,649	12
St Clair[4]	*256,082*	*23*	*13*	*57*	*250,204*	*16,764*	*7*
Saline[7]	*26,733*	*11*	*9*	*82*	*26,315*	*11,479*	*44*
Sangamon[1]	*188,951*	*20*	*13*	*65*	*193,315*	*17,112*	*9*
Schuyler	7,189	5	4	80	6,135	2,735	45
Scott[9]	*5,537*	*5*	*5*	*100*	*3,746*	*3,746*	*100*
Shelby	22,893	10	9	90	13,808	7,127	52
Stark	6,332	4	4	100	3,811	3,811	100
Stephenson	48,979	15	14	93	36,254	8,754	24
Tazewell	128,485	35	29	83	119,685	22,847	19
Union[8]	*18,293*	*8*	*7*	*88*	*12,056*	*6,718*	*56*
Vermilion	83,919	20	16	80	62,987	11,553	18
Wabash[10]	*12,937*	*6*	*5*	*83*	*10,561*	*2,186*	*21*
Warren[2]	*18,735*	*6*	*5*	*83*	*12,942*	*3,442*	*27*
Washington[4]	*15,148*	*12*	*10*	*83*	*18,364*	*5,896*	*32*
Wayne	17,151	10	9	90	12,130	5,469	45
White[7]	*15,371*	*9*	*8*	*89*	*13,608*	*6,921*	*51*
Whiteside	60,653	13	9	69	39,770	6,773	17

Table A-1. Community Water System by County in Illinois, 2002

County	Population 2000	Community Water Systems			Population Served		
		All	Small	% of Small Systems	By All Water Systems	By Small Water Systems	% by Small Systems
Will[5]	*502,266*	*61*	*44*	*72*	*382,070*	*35,453*	*9*
Williamson[7]	*61,296*	*25*	*19*	*76*	*66,532*	*18,352*	*28*
Winnebago	278,418	32	26	81	226,029	16,622	7
Woodford	35,469	19	17	89	22,367	13,967	62
Group 1	536,212	103	72	70	539,680	72,080	13
Group 2	122,296	46	37	80	83,451	31,471	38
Group 3	58,941	22	19	86	45,983	17,660	38
Group 4	376,075	77	58	75	357,987	59,526	17
Group 5	6,783,168	274	115	42	6,420,638	102,851	2
Group 6	199,591	46	40	87	177,360	25,737	15
Group 7	257,875	113	94	83	236,311	96,641	41
Group 8	35,231	20	18	90	26,780	16,505	62
Group 9	20,298	15	15	100	14,981	14,981	100
Group 10	19,908	10	9	90	15,108	6,733	45
All Counties	**12,419,293**	**1798**	**1376**	**77**	**11,312,836**	**1,041,518**	**9**

Table A-2. Community Water System by County in Indiana, 2002

County	Population 2000	Community Water Systems			Population Served		
		All	Small	%of Small Systems	By All Water Systems	By Small Water Systems	% by Small Systems
Adams	33,625	9	7	78	15,032	2,823	19
Allen	331,849	20	16	80	263,514	8,514	3
Bartholomew	71,435	7	4	57	48,997	2,927	6
Benton	9,421	6	6	100	6,603	6,603	100
Blackford	14,048	2	1	50	8,910	1,950	22
Boone	46,107	8	7	88	16,821	4,005	24
Brown[5]	*14,957*	*3*	*1*	*33*	*17,406*	*2,900*	*17*
Carroll	20,165	5	5	100	6,650	6,650	100
Cass	40,930	11	9	82	21,777	4,326	20
Clark[6]	*96,472*	*14*	*6*	*43*	*146,325*	*7,393*	*5*
Clay	26,556	6	5	83	13,359	5,359	40
Clinton	33,866	7	6	86	20,478	4,818	24
Crawford[2]	*10,743*	*6*	*6*	*100*	*5,617*	*5,617*	*100*
Daviess	29,820	6	4	67	21,958	3,184	15
Dearborn[1]	*46,109*	*9*	*2*	*22*	*35,929*	*2,720*	*8*
Decatur	24,555	7	6	86	17,234	5,734	33
De Kalb	40,285	8	6	75	20,350	6,001	29
Delaware	118,769	15	14	93	86,180	10,696	12
Dubois[2]	*39,674*	*11*	*7*	*64*	*44,749*	*11,744*	*26*
Elkhart	182,791	16	13	81	100,364	11,596	12
Fayette	25,588	5	4	80	19,220	3,220	17
Floyd[6]	*70,823*	*4*	*1*	*25*	*19,282*	*3,200*	*17*
Fountain	17,954	5	4	80	9,809	6,009	61
Franklin[1]	*22,151*	*4*	*3*	*75*	*10,290*	*5,430*	*53*
Fulton	20,511	4	3	75	7,614	1,645	22
Gibson[2]	*32,500*	*10*	*7*	*70*	*26,603*	*8,356*	*31*
Grant	73,403	12	10	83	48,833	12,333	25
Greene[3]	*33,157*	*7*	*4*	*57*	*35,975*	*5,087*	*14*
Hamilton	182,740	17	11	65	89,697	6,160	7
Hancock	55,391	8	7	88	16,503	3,303	20
Harrison[6]	*34,325*	*6*	*2*	*33*	*29,826*	*3,860*	*13*
Hendricks[5]	*104,093*	*12*	*8*	*67*	*43,933*	*4,733*	*11*
Henry	48,508	9	8	89	26,170	8,170	31
Howard	84,964	12	10	83	61,991	5,138	8
Huntington	38,075	10	9	90	23,873	6,673	28
Jackson	41,335	6	4	67	32,236	4,500	14
Jasper	30,043	12	11	92	8,637	3,592	42
Jay	21,806	4	3	75	13,239	6,756	51
Jefferson[4]	*31,705*	*8*	*6*	*75*	*28,010*	*9,610*	*34*
Jennings	27,554	9	6	67	25,271	7,102	28
Johnson[5]	*115,209*	*10*	*4*	*40*	*90,295*	*2,874*	*3*
Knox	39,256	14	12	86	33,865	8,215	24
Kosciusko	74,057	36	35	97	23,269	14,128	61
Lagrange	34,909	9	9	100	5,554	5,554	100
Lake	484,564	40	24	60	481,075	6,575	1
La Porte	110,106	26	23	88	72,686	10,974	15
Lawrence[2]	*45,922*	*6*	*1*	*17*	*39,745*	*1,295*	*3*

Table A-2. Community Water System by County in Indiana, 2002

County	Population 2000	Community Water Systems			Population Served		
		All	Small	%of Small Systems	By All Water Systems	By Small Water Systems	% by Small Systems
Madison	133,358	19	16	84	100,087	17,513	17
Marion[5]	*860,454*	*3*	*0*	*0*	*907,470*	*0*	*0*
Marshall	45,128	12	10	83	21,513	6,288	29
Martin	10,369	6	4	67	12,075	4,518	37
Miami	36,082	15	14	93	17,644	4,801	27
Monroe[5]	*120,563*	*10*	*3*	*30*	*109,597*	*785*	*1*
Montgomery	37,629	12	11	92	21,147	6,147	29
Morgan[5]	*66,689*	*11*	*7*	*64*	*38,615*	*7,416*	*19*
Newton	14,566	8	8	100	5,251	5,251	100
Noble	46,275	15	13	87	17,194	5,978	35
Ohio[4]	*5,623*	*2*	*1*	*50*	*6,528*	*2,400*	*37*
Orange[2]	*19,306*	*3*	*1*	*33*	*10,869*	*2,624*	*24*
Owen	21,786	3	2	67	12,394	3,754	30
Parke	17,241	8	7	88	8,785	4,600	52
Perry[2]	*18,899*	*5*	*3*	*60*	*16,625*	*3,891*	*23*
Pike[2]	*12,837*	*6*	*5*	*83*	*15,522*	*7,104*	*46*
Porter	146,798	14	12	86	36,039	7,539	21
Posey	27,061	5	4	80	12,026	3,114	26
Pulaski	13,755	4	4	100	4,121	4,121	100
Putnam	36,019	11	10	91	20,767	10,787	52
Randolph	27,401	9	7	78	14,631	5,495	38
Ripley[1]	*26,523*	*8*	*6*	*75*	*24,587*	*11,312*	*46*
Rush	18,261	6	5	83	8,964	2,824	32
St. Joseph	265,559	16	13	81	177,745	9,325	5
Scott[6]	*22,960*	*2*	*0*	*0*	*9,720*	*0*	*0*
Shelby	43,445	7	6	86	18,944	2,329	12
Spencer[2]	*20,391*	*11*	*11*	*100*	*15,200*	*15,200*	*100*
Starke	23,556	4	3	75	6,530	2,860	44
Steuben	33,214	19	18	95	13,605	6,505	48
Sullivan[3]	*21,751*	*10*	*9*	*90*	*18,830*	*12,350*	*66*
Switzerland[4]	*9,065*	*2*	*1*	*50*	*7,610*	*1,400*	*18*
Tippecanoe	148,955	16	13	81	103,191	5,360	5
Tipton	16,577	4	3	75	7,120	1,820	26
Union	7,349	2	2	100	2,911	2,911	100
Vanderburgh[2]	*171,922*	*2*	*0*	*0*	*158,750*	*0*	*0*
Vermillion	16,788	11	10	91	15,489	10,035	65
Vigo	105,848	18	16	89	80,838	10,090	12
Wabash	34,960	13	11	85	21,487	2,940	14
Warren	8,419	3	3	100	3,120	3,120	100
Warrick[2]	*52,383*	*7*	*4*	*57*	*39,180*	*6,368*	*16*
Washington[2]	*27,223*	*6*	*4*	*67*	*21,630*	*5,198*	*24*
Wayne	71,097	15	14	93	52,082	9,589	18
Wells	27,600	4	3	75	12,515	3,387	27
White	25,267	12	11	92	13,432	6,952	52
Whitley	30,707	7	6	86	12,040	4,040	34
Group 1	94,783	21	11	52	70,806	19,462	27
Group 2	451,800	73	49	67	394,490	67,397	17

Table A-2. Community Water System by County in Indiana, 2002

County	Population 2000	Community Water Systems			Population Served		
		All	Small	%of Small Systems	By All Water Systems	By Small Water Systems	% by Small Systems
Group 3	54,908	17	13	76	54,805	17,437	32
Group 4	46,393	12	8	67	42,148	13,410	32
Group 5	1,281,965	49	23	47	1,207,316	18,708	2
Group 6	224,580	26	9	35	205,153	14,453	7
All Counties	**6,080,485**	**867**	**674**	**78**	**4,496,174**	**530,093**	**12**

Table A-3. Community Water System by County in Michigan, 2002

County	Population 2000	Community Water Systems			Population Served		
		All	Small	% of Small Systems	By All Water Systems	By Small Water Systems	% by Small Systems
Alcona	11,719	6	6	100	758	758	100
Alger	9,862	6	6	100	4,357	4,357	100
Allegan[4]	*105,665*	*50*	*46*	*92*	*29,861*	*13,218*	*44*
Alpena	31,314	5	3	60	16,660	148	1
Antrim	23,110	12	12	100	9,125	9,125	100
Arenac[1]	*17,269*	*8*	*7*	*88*	*8,415*	*3,465*	*41*
Baraga	8,746	4	4	100	4,112	4,112	100
Barry	56,755	18	17	94	15,059	8,259	55
Bay[1]	*110,157*	*20*	*12*	*60*	*89,836*	*14,071*	*16*
Benzie	15,998	11	11	100	4,259	4,259	100
Berrien	162,453	51	44	86	98,926	27,181	27
Branch	45,787	13	12	92	20,777	8,080	39
Calhoun	137,985	21	16	76	78,567	10,714	14
Cass	51,104	20	19	95	12,574	6,427	51
Charlevoix	26,090	17	16	94	12,642	9,139	72
Cheboygan	26,448	8	7	88	6,623	1,328	20
Chippewa	38,543	6	4	67	23,475	1,445	6
Clare	31,252	4	4	100	6,207	6,207	100
Clinton[3]	*64,753*	*15*	*14*	*93*	*17,102*	*9,617*	*56*
Crawford	14,273	5	5	100	2,523	2,523	100
Delta	38,520	7	5	71	19,080	1,025	5
Dickinson	27,472	7	5	71	19,745	5,740	29
Eaton[3]	*103,655*	*15*	*11*	*73*	*52,100*	*8,768*	*17*
Emmet	31,437	30	29	97	13,724	7,644	56
Genesee[5]	*436,141*	*63*	*49*	*78*	*280,657*	*27,527*	*10*
Gladwin	26,023	9	9	100	4,837	4,837	100
Gogebic	17,370	10	9	90	18,212	9,212	51
Grand Traverse	77,654	26	23	88	37,601	10,369	28
Gratiot	42,285	11	9	82	20,000	6,231	31
Hillsdale	46,527	12	11	92	16,480	6,980	42
Houghton[2]	*36,016*	*19*	*16*	*84*	*28,959*	*13,230*	*46*
Huron	36,079	21	20	95	16,842	13,380	79
Ingham[3]	*279,320*	*23*	*16*	*70*	*238,289*	*8,920*	*4*
Ionia	61,518	18	15	83	28,829	7,403	26
Iosco	27,339	12	11	92	15,320	8,820	58
Iron	13,138	18	18	100	12,248	12,248	100
Isabella	63,351	11	9	82	35,854	2,721	8
Jackson	158,422	33	27	82	103,337	12,187	12
Kalamazoo	238,603	22	20	91	207,533	12,636	6
Kalkaska	16,571	1	1	100	2,226	2,226	100
Kent[4]	*574,335*	*50*	*39*	*78*	*403,140*	*19,429*	*5*
Keweenaw[2]	*2,301*	*6*	*6*	*100*	*523*	*523*	*100*
Lake	11,333	4	4	100	1,707	1,707	100
Lapeer[5]	*87,904*	*16*	*14*	*88*	*21,825*	*8,884*	*41*
Leelanau	21,119	17	17	100	4,860	4,860	100
Lenawee	98,890	30	27	90	51,667	17,678	34
Livingston	156,951	54	52	96	44,174	26,674	60
Luce	7,024	3	3	100	3,150	3,150	100

Table A-3. Community Water System by County in Michigan, 2002

County	Population 2000	Community Water Systems			Population Served		
		All	Small	% of Small Systems	By All Water Systems	By Small Water Systems	% by Small Systems
Mackinac	11,943	5	5	100	3,509	3,509	100
Macomb[5]	*788,149*	*28*	*8*	*29*	*774,242*	*3,229*	*0*
Manistee	24,527	11	10	91	9,884	3,298	33
Marquette	64,634	25	22	88	46,962	12,825	27
Mason	28,274	10	9	90	11,442	3,085	27
Mecosta	40,553	14	13	93	12,368	1,519	12
Menominee	25,326	5	4	80	11,443	2,045	18
Midland[1]	*82,874*	*10*	*8*	*80*	*54,127*	*6,324*	*12*
Missaukee	14,478	2	2	100	1,507	1,507	100
Monroe[5]	*145,945*	*11*	*6*	*55*	*101,005*	*6,805*	*7*
Montcalm	61,266	12	11	92	16,096	8,161	51
Montmorency	10,315	3	3	100	1,058	1,058	100
Muskegon	170,200	23	16	70	109,847	15,430	14
Newaygo	47,874	10	9	90	9,858	5,634	57
Oakland[5]	*1,194,156*	*140*	*101*	*72*	*978,488*	*68,826*	*7*
Oceana	26,873	6	6	100	5,081	5,081	100
Ogemaw	21,645	7	7	100	2,320	2,320	100
Ontonagon	7,818	5	5	100	3,250	3,250	100
Osceola	23,197	7	7	100	5,507	5,507	100
Oscoda	9,418	5	5	100	802	802	100
Otsego	23,301	10	9	90	4,363	682	16
Ottawa[4]	*238,314*	*27*	*16*	*59*	*179,141*	*13,930*	*8*
Presque Isle	14,411	6	5	83	5,581	2,259	40
Roscommon	25,469	15	15	100	2,069	2,069	100
Saginaw[1]	*210,039*	*25*	*16*	*64*	*181,882*	*25,110*	*14*
St. Clair	164,235	18	18	100	15,817	15,817	100
St. Joseph	62,422	3	2	67	4,174	300	7
Sanilac	44,547	26	23	88	30,940	7,913	26
Schoolcraft	8,903	23	13	57	111,962	17,982	16
Shiawassee	71,687	19	17	89	29,009	10,396	36
Tuscola	58,266	17	16	94	15,675	11,530	74
Van Buren	76,263	28	26	93	23,940	15,556	65
Washtenaw[5]	*322,895*	*27*	*19*	*70*	*257,747*	*18,022*	*7*
Wayne[5]	*2,061,162*	*47*	*1*	*2*	*3,056,805*	*3,141*	*0*
Wexford	30,484	6	5	83	13,640	2,940	22
Group 1	420,339	68	47	69	426,306	60,009	14
Group 2	38,317	25	22	88	29,482	13,753	47
Group 3	447,728	53	41	77	307,491	27,305	9
Group 4	918,314	127	101	80	612,142	46,577	8
Group 5	5,036,352	332	198	60	5,470,769	136,434	2
All Counties	**9,938,444**	**1484**	**1198**	**81**	**8,256,318**	**717,304**	**9**

Table A-4. Community Water System by County in Minnesota, 2002

County	Population 2000	Community Water Systems			Population Served		
		All	Small	% of Small Systems	By All Water Systems	By Small Water Systems	% by Small Systems
Aitkin	15,300	5	5	100	2,458	2,458	100
Anoka[1]	*298,080*	*27*	*16*	*59*	*233,347*	*12,697*	*5*
Becker	30,000	10	9	90	10,506	3,138	30
Beltrami	39,650	12	11	92	13,860	1,770	13
Benton	34,230	5	4	80	13,742	3,529	26
Big Stone	5,820	9	9	100	4,438	4,438	100
Blue Earth	55,940	21	20	95	43,969	11,907	27
Brown	26,910	6	4	67	20,439	3,115	15
Carlton	31,670	11	10	91	16,973	5,772	34
Carver	70,210	15	11	73	58,694	10,843	18
Cass	27,150	9	9	100	4,670	4,670	100
Chippewa	13,090	5	4	80	7,817	2,355	30
Chisago	41,100	19	18	95	19,487	15,887	82
Clay	51,230	13	12	92	44,565	10,065	23
Clearwater	8,420	3	3	100	2,080	2,080	100
Cook	5,170	2	2	100	1,378	1,378	100
Cottonwood[2]	*12,170*	*9*	*8*	*89*	*11,127*	*6,527*	*59*
Crow Wing	55,100	15	13	87	21,714	5,136	24
Dakota	355,900	20	11	55	310,738	4,166	1
Dodge	17,730	6	5	83	10,118	5,720	57
Douglas	32,820	11	10	91	12,647	3,827	30
Faribault	16,180	11	10	91	10,012	6,391	64
Fillmore	21,120	14	14	100	12,739	12,739	100
Freeborn	32,580	15	14	93	23,095	4,739	21
Goodhue	44,130	12	10	83	28,768	9,298	32
Grant	6,290	7	7	100	3,491	3,491	100
Hennepin[1]	*1,116,200*	*48*	*27*	*56*	*1,181,969*	*27,326*	*2*
Houston	19,720	6	5	83	11,086	6,163	56
Hubbard	18,380	5	5	100	4,152	4,152	100
Isanti	31,290	5	4	80	9,830	4,310	44
Itasca	43,990	20	19	95	16,806	8,077	48
Jackson	11,270	6	5	83	6,380	2,879	45
Kanabec	15,000	3	3	100	3,692	3,692	100
Kandiyohi	41,200	16	15	94	26,297	7,946	30
Kittson[4]	*5,290*	*6*	*6*	*100*	*6,154*	*6,154*	*100*
Koochiching	14,360	5	4	80	8,641	1,938	22
Lac qui Parle	8,070	6	6	100	4,148	4,148	100
Lake	11,060	4	3	75	5,881	2,268	39
Lake of the Woods	4,520	2	2	100	1,296	1,296	100
Le Sueur	25,430	12	10	83	16,105	8,917	55
Lincoln[3]	*6,430*	*7*	*6*	*86*	*11,840*	*3,440*	*29*
Lyon[3]	*25,430*	*12*	*11*	*92*	*19,820*	*7,085*	*36*
McLeod	34,900	3	3	100	1,699	1,699	100
Mahnomen	5,190	12	12	100	9,150	9,150	100
Marshall[4]	*10,160*	*9*	*8*	*89*	*15,922*	*5,033*	*32*
Martin	21,800	11	9	82	24,771	6,238	25
Meeker	22,640	7	6	86	11,559	5,281	46
Mille Lacs	22,330	9	8	89	9,393	5,460	58

Table A-4. Community Water System by County in Minnesota, 2002

County	Population 2000	Community Water Systems			Population Served		
		All	Small	% of Small Systems	By All Water Systems	By Small Water Systems	% by Small Systems
Morrison	31,710	9	8	89	12,164	4,445	37
Mower	38,600	16	15	94	29,130	5,816	20
Murray	9,170	9	9	100	4,593	4,593	100
Nicollet	29,770	6	4	67	23,555	2,010	9
Nobles[3]	*20,830*	*12*	*11*	*92*	*15,623*	*4,338*	*28*
Norman	7,440	9	9	100	4,142	4,142	100
Olmsted	124,280	21	19	90	99,672	8,255	8
Otter Tail	57,160	15	14	93	23,446	9,976	43
Pennington	13,580	5	4	80	9,038	628	7
Pine	26,530	15	14	93	10,532	6,532	62
Pipestone[3]	*9,900*	*10*	*9*	*90*	*6,970*	*2,690*	*39*
Polk	31,370	12	10	83	20,832	4,631	22
Pope	11,240	6	6	100	4,546	4,546	100
Ramsey[1]	*511,040*	*19*	*8*	*42*	*598,793*	*2,135*	*0*
Red Lake	4,300	3	3	100	2,268	2,268	100
Redwood	16,820	13	12	92	10,271	5,107	50
Renville	17,150	11	11	100	10,527	10,527	100
Rice	56,670	11	9	82	44,027	8,042	18
Rock	9,720	8	6	75	9,374	1,447	15
Roseau	16,340	12	12	100	6,951	6,951	100
St. Louis	200,530	30	24	80	154,486	22,696	15
Scott	89,500	16	12	75	60,428	5,263	9
Sherburne	64,420	8	6	75	21,453	6,953	32
Sibley	15,360	8	8	100	8,138	8,138	100
Stearns	133,170	36	31	86	110,014	23,764	22
Steele	33,680	6	5	83	26,566	4,132	16
Stevens	10,050	5	4	80	6,612	1,550	23
Swift	11,960	6	5	83	7,563	4,187	55
Todd	24,430	8	8	100	9,155	9,155	100
Traverse	4,130	4	4	100	2,442	2,442	100
Wabasha	21,610	9	8	89	13,262	8,312	63
Wadena	13,710	5	4	80	6,899	2,605	38
Waseca	19,530	5	4	80	13,235	3,624	27
Washington	201,130	28	18	64	167,431	11,404	7
Watonwan[2]	*11,880*	*8*	*7*	*88*	*8,389*	*3,694*	*44*
Wilkin	7,140	6	5	83	4,585	1,013	22
Winona	49,990	13	12	92	34,697	9,058	26
Wright	89,990	20	15	75	53,835	15,382	29
Yellow Medicine	11,080	8	8	100	7,308	7,308	100
Group 1	1,925,319	94	51	54	2,014,109	42,158	2
Group 2	24,043	17	15	88	19,516	10,221	52
Group 3	62,581	41	37	90	54,253	17,553	32
Group 4	15,440	15	14	93	22,076	11,187	51
All Counties	**4,919,560**	**957**	**807**	**84**	**4,012,415**	**540,547**	**13**

Table A-5. Community Water System by County in Ohio, 2002

County	Population 2000	Community Water Systems			Population Served		
		All	Small	% of Small Systems	By All Water Systems	By Small Water Systems	% by Small Systems
Adams	27,330	10	8	80	24,931	6,975	28
Allen	108,473	55	51	93	99,543	10,319	10
Ashland	52,523	68	67	99	41,020	19,771	48
Ashtabula	102,728	59	56	95	81,745	14,745	18
Athens[1]	*62,223*	*16*	*12*	*75*	*65,770*	*13,480*	*20*
Auglaize	46,611	43	41	95	36,416	16,188	44
Belmont[2]	*70,226*	*22*	*16*	*73*	*63,932*	*11,520*	*18*
Brown	42,285	13	10	77	40,076	10,220	26
Butler[3]	*332,807*	*38*	*29*	*76*	*332,597*	*13,479*	*4*
Carroll	28,836	66	65	98	16,705	13,036	78
Champaign	38,890	47	46	98	25,939	14,586	56
Clark	144,742	148	144	97	126,027	37,933	30
Clermont	177,977	11	7	64	153,203	12,941	8
Clinton[4]	*40,543*	*13*	*11*	*85*	*22,279*	*5,858*	*26*
Columbiana	112,075	163	156	96	90,722	30,035	33
Coshocton	36,655	55	53	96	45,166	12,566	28
Crawford	46,966	30	27	90	34,189	4,674	14
Cuyahoga	1,393,978	15	8	53	1,681,298	686	0
Darke	53,309	85	84	99	36,623	23,423	64
Defiance	39,500	33	31	94	28,889	8,230	28
Delaware	109,989	19	17	89	115,496	7,327	6
Erie	79,551	18	12	67	85,718	8,576	10
Fairfield	122,759	92	88	96	88,952	26,452	30
Fayette	28,433	22	20	91	23,749	6,522	27
Franklin	1,068,978	107	96	90	1,078,321	30,300	3
Fulton	42,084	31	28	90	25,527	9,428	37
Gallia	31,069	4	2	50	33,573	1,500	4
Geauga	90,895	275	274	100	61,739	57,339	93
Greene	147,886	92	85	92	151,074	24,674	16
Guernsey	40,792	26	23	88	37,535	6,927	18
Hamilton[3]	*845,303*	*40*	*32*	*80*	*815,998*	*9,314*	*1*
Hancock	71,295	62	61	98	54,332	14,332	26
Hardin	31,945	35	33	94	21,564	7,651	35
Harrison[2]	*15,856*	*43*	*42*	*98*	*14,998*	*11,690*	*78*
Henry	29,210	29	28	97	21,491	12,173	57
Highland[4]	*40,875*	*12*	*9*	*75*	*45,045*	*3,055*	*7*
Hocking[1]	*28,241*	*58*	*57*	*98*	*16,025*	*6,800*	*42*
Holmes	38,943	109	108	99	23,378	20,052	86
Huron[6]	*59,487*	*33*	*28*	*85*	*67,900*	*10,958*	*16*
Jackson[5]	*32,641*	*12*	*9*	*75*	*32,764*	*6,971*	*21*
Jefferson	73,894	51	46	90	66,665	18,676	28
Knox	54,500	62	60	97	35,450	14,887	42
Lake	227,511	38	34	89	221,240	9,522	4
Lawrence	62,319	9	3	33	62,616	1,697	3
Licking	145,491	136	130	96	116,329	36,040	31
Logan	46,005	127	125	98	43,652	28,010	64
Lorain[6]	*284,664*	*19*	*9*	*47*	*285,061*	*9,605*	*3*
Lucas[7]	*455,054*	*52*	*47*	*90*	*452,193*	*9,237*	*2*

Table A-5. Community Water System by County in Ohio, 2002

County	Population 2000	Community Water Systems			Population Served		
		All	Small	% of Small Systems	By All Water Systems	By Small Water Systems	% by Small Systems
Madison	40,213	78	75	96	47,672	29,282	61
Mahoning[8]	*257,555*	*118*	*113*	*96*	*261,794*	*18,044*	*7*
Marion	66,217	48	47	98	59,883	11,883	20
Medina[6]	*151,095*	*105*	*102*	*97*	*92,407*	*27,533*	*30*
Meigs	23,072	8	6	75	26,236	7,616	29
Mercer	40,924	85	83	98	32,881	16,752	51
Miami	98,868	97	92	95	83,997	24,978	30
Monroe[2]	*15,180*	*9*	*9*	*100*	*14,879*	*14,879*	*100*
Montgomery	559,062	90	76	84	584,230	18,691	3
Morgan	14,897	30	30	100	6,225	6,225	100
Morrow	31,628	25	25	100	11,497	11,497	100
Muskingum	84,585	44	39	89	78,366	16,314	21
Noble	14,058	6	5	83	13,302	5,802	44
Ottawa	40,985	80	78	98	42,376	21,276	50
Paulding	20,293	26	25	96	11,432	7,837	69
Perry[1]	*34,078*	*33*	*32*	*97*	*24,763*	*19,763*	*80*
Pickaway	52,727	65	62	95	45,829	18,988	41
Pike	27,695	18	16	89	23,994	7,281	30
Portage	152,061	207	202	98	120,656	50,330	42
Preble	42,337	40	39	98	26,638	19,138	72
Putnam	34,726	48	47	98	19,834	15,638	79
Richland	128,852	180	176	98	118,037	47,750	40
Ross	73,345	15	12	80	77,455	5,999	8
Sandusky	61,792	104	102	98	42,723	18,686	44
Scioto[5]	*79,195*	*35*	*28*	*80*	*108,211*	*6,594*	*6*
Seneca	58,683	90	88	98	52,920	19,723	37
Shelby	47,910	65	64	98	40,040	19,829	50
Stark	378,098	266	259	97	348,076	63,845	18
Summit	542,899	389	381	98	523,321	66,217	13
Trumbull[8]	*225,116*	*115*	*104*	*90*	*185,244*	*26,333*	*14*
Tuscarawas	90,914	88	83	94	70,803	19,349	27
Union	40,909	41	39	95	28,583	9,483	33
Van Wert	29,659	37	36	97	20,932	9,932	47
Vinton[5]	*12,806*	*11*	*11*	*100*	*5,919*	*5,919*	*100*
Warren[3]	*158,383*	*42*	*31*	*74*	*173,852*	*15,701*	*9*
Washington	63,251	36	32	89	59,864	16,970	28
Wayne	111,564	195	192	98	83,702	43,302	52
Williams	39,188	59	57	97	28,075	15,125	54
Wood[7]	*121,065*	*80*	*77*	*96*	*87,232*	*24,582*	*28*
Wyandot	22,908	35	33	94	15,516	5,138	33

Table A-5. Community Water System by County in Ohio, 2002

County	Population 2000	Community Water Systems			Population Served		
		All	Small	% of Small Systems	By All Water Systems	By Small Water Systems	% by Small Systems
Group 1	124,542	107	101	94	106,558	40,043	38
Group 2	101,262	74	67	91	93,809	38,089	41
Group 3	1,336,493	120	92	77	1,322,447	38,494	3
Group 4	81,418	25	20	80	67,324	8,913	13
Group 5	124,642	58	48	83	146,894	19,484	13
Group 6	495,246	157	139	89	445,368	48,096	11
Group 7	576,119	132	124	94	539,425	33,819	6
Group 8	482,671	233	217	93	447,038	44,377	10
All Counties	**11,353,140**	**5746**	**5436**	**95**	**10,844,851**	**1,500,604**	**14**

Table A-6. Community Water System by County in Wisconsin, 2002

County	Population 2000	Community Water Systems			Population Served		
		All	Small	% of Small Systems	By All Water Systems	By Small Water Systems	% by Small Systems
Adams	18,643	9	9	100	7,185	7,185	100
Ashland	16,866	4	3	75	11,527	2,412	21
Barron	44,963	15	14	93	18,006	10,315	57
Bayfield	15,013	6	6	100	4,345	4,345	100
Brown	226,778	20	14	70	177,690	8,896	5
Buffalo	13,804	8	8	100	5,458	5,458	100
Burnett	15,674	3	3	100	2,659	2,659	100
Calumet[2]	*40,631*	*10*	*8*	*80*	*15,599*	*8,886*	*57*
Chippewa	55,195	16	15	94	23,770	10,845	46
Clark	33,557	14	14	100	10,254	10,254	100
Columbia	52,468	25	23	92	28,669	15,737	55
Crawford	17,243	9	8	89	9,099	3,081	34
Dane	426,526	56	43	77	334,810	26,262	8
Dodge	85,897	29	25	86	46,661	15,435	33
Door	27,961	6	5	83	10,159	983	10
Douglas	43,287	5	4	80	30,154	583	2
Dunn	39,858	15	14	93	19,039	4,984	26
Eau Claire	93,142	18	16	89	72,986	5,171	7
Florence	5,088	1	1	100	1,809	1,809	100
Fond du Lac	97,296	23	20	87	55,580	6,290	11
Forest	10,024	5	5	100	3,998	3,998	100
Grant	49,597	28	26	93	31,451	17,551	56
Green	33,647	10	9	90	18,965	8,724	46
Green Lake	19,105	7	6	86	9,859	4,488	46
Iowa	22,780	16	15	94	11,070	7,188	65
Iron	6,861	5	5	100	4,003	4,003	100
Jackson	19,100	10	9	90	8,138	4,530	56
Jefferson	74,021	20	16	80	48,119	7,292	15
Juneau	24,316	17	16	94	10,704	6,955	65
Kenosha	149,577	42	40	95	106,065	7,445	7
Kewaunee	20,187	4	3	75	7,563	3,907	52
La Crosse	107,120	25	21	84	81,324	5,086	6
Lafayette	16,137	11	11	100	7,705	7,705	100
Langlade	20,740	5	4	80	9,317	717	8
Lincoln	29,641	6	4	67	14,521	840	6
Manitowoc	82,887	13	11	85	57,288	10,504	18
Marathon	125,834	23	18	78	79,055	17,734	22
Marinette	43,384	9	8	89	21,966	9,270	42
Marquette	15,832	3	3	100	1,440	1,440	100
Menominee	4,562	0	0	0	0	0	0
Milwaukee[1]	*940,164*	*29*	*14*	*48*	*1,015,709*	*3,397*	*0*
Monroe	40,899	11	9	82	21,527	5,187	24
Oconto	35,634	10	9	90	9,935	5,430	55
Oneida	36,776	13	12	92	10,959	3,532	32
Outagamie[2]	*160,971*	*17*	*10*	*59*	*142,911*	*11,241*	*8*
Ozaukee[1]	*82,317*	*57*	*52*	*91*	*50,561*	*10,079*	*20*
Pepin	7,213	3	3	100	2,907	2,907	100

Table A-6. Community Water System by County in Wisconsin, 2002

County	Population 2000	Community Water Systems			Population Served		
		All	Small	% of Small Systems	By All Water Systems	By Small Water Systems	% by Small Systems
Pierce	36,804	11	9	82	21,317	5,769	27
Polk	41,319	13	13	100	12,129	12,129	100
Portage	67,182	12	10	83	39,311	4,096	10
Price	15,822	5	4	80	5,897	2,497	42
Racine[1]	*188,831*	*30*	*23*	*77*	*141,852*	*8,740*	*6*
Richland	17,924	7	6	86	6,635	1,617	24
Rock	152,307	21	16	76	111,654	5,968	5
Rusk	15,347	9	8	89	5,799	1,973	34
St. Croix	63,155	24	22	92	28,879	13,842	48
Sauk	55,225	8	8	100	2,959	2,959	100
Sawyer	16,196	12	10	83	17,220	5,257	31
Shawano	40,664	18	15	83	85,082	15,949	19
Sheboygan	112,646	21	18	86	27,532	9,961	36
Taylor	19,680	5	4	80	5,606	1,596	28
Trempealeau	27,010	17	17	100	13,847	13,847	100
Vernon	28,056	16	15	94	12,466	8,131	65
Vilas	21,033	11	11	100	2,962	2,962	100
Walworth	93,759	33	26	79	59,748	12,043	20
Washburn	16,036	6	6	100	4,851	4,851	100
Washington	117,493	19	13	68	69,781	2,251	3
Waukesha[1]	*360,767*	*74*	*62*	*84*	*220,315*	*20,286*	*9*
Waupaca	51,731	11	8	73	22,254	7,005	31
Waushara	23,154	11	11	100	4,859	4,859	100
Winnebago	156,763	10	6	60	117,133	7,583	6
Wood	75,555	14	12	86	47,731	7,740	16
Group 1	1,572,079	190	151	79	1,428,437	42,502	3
Group 2	201,602	27	18	67	158,510	20,127	13
All Counties	**5,363,675**	**1,109**	**945**	**85**	**3,760,338**	**506,651**	**13**

APPENDIX B.

COUNTY GROUPING PROCEDURES AND RESULTS

One goal in this study was to develop county-level public water supply water demand models for the six states in EPA Region 5. The USGS National Water Use Inventory Program reports the amount of public supply water *withdrawals* in each county. However, in those counties with significant cross-county flows, public supply *water use* may be significantly different from the amount of public supply water withdrawals. To account for these cross-county flows, a county grouping procedure was designed to group the counties that are connected by direct or indirect water purchases. The rationale behind this approach is to group counties so that the total amount of public supply water withdrawals is comparable to their total amount of public supply water use.

The data that was used to create county groupings was solicited from the state primacy agencies in each of the six states in USEPA Region 5. All of the states were able to provide information on wholesale water exchanges between systems. This information included the selling water system facility identification number, the purchase water system facility identification number, the population served by each system, and the principal county served by each water system. Cross-county flows were identified by comparing the "principal county served" information of the buying and selling systems. The counties that are responsible for cross-county flows are grouped together, and the groupings for the six states are shown in Tables B.1 to B.6. Table B-7 summarizes the county groupings for each state that were used in the final model development.

Not all of the counties that are identified in Table B.1 to Table B.6 were included in the final groupings. The counties that are displayed in bold text in the tables were excluded from the groupings, because their cross-county flows were considered to be insignificant. Two factors were used to decide whether cross-county flows are significant. The first is the percent of the population served by the purchasing system to the total population of the county. The second is the ratio of population served by the selling system to the total population served in the county that sells water. If both ratios are less than 6 percent, then the cross county flow was considered to be insignificant.

This method was used in all states except Wisconsin, where there are very few cross-county flows. In Wisconsin, all county flows were considered to be significant and counties were grouped together as long as there are any cross-county purchases. The final results of county grouping for the six states are shown in Table B.7.

It must also be noted that many water systems have customers in more than one county. However, systems are not required to report the number of customers they serve in each county and it was not possible to account for the cross-county flows of individual water systems.

Table B.1. Cross County Flows in Illinois

Illinois Buying County	Retail Pop By Purchase System	Total Retail Pop In Buying County	% Pop in Buying County	Illinois Selling County	Total Retail Pop In Selling County	% Pop in Selling County
Bond	3346	11360	29.5	Madison	266611	1.3
Jersey	14118	24370	57.9	Madison	266611	5.3
Macoupin	10002	44024	22.7	Madison	266611	3.8
Madison	1050	266611	0.4	Bond	11360	9.2
Madison	**340**	**266611**	**0.1**	**Macoupin**	**44024**	**0.8**
Madison	**1755**	**266611**	**0.7**	**Montgomery**	**21512**	**8.2**
Madison	**3265**	**266611**	**1.2**	**St Clair**	**250204**	**1.3**
Sangamon	8947	193315	4.6	Macoupin	44024	20.3
Brown	2172	2792	77.8	Adams	61320	3.5
Hancock	1442	13659	10.6	Adams	61320	2.4
Hancock	1200	13659	8.8	Henderson	5680	21.1
Schuyler	**500**	**6135**	**8.1**	**Adams**	**61320**	**0.8**
Warren	1100	12942	8.5	Henderson	5680	19.4
Clay	1242	9169	13.5	Jasper	13950	8.9
Effingham	1641	22864	7.2	Jasper	13950	11.8
Clinton	1575	27419	5.7	Marion	43675	3.6
Clinton	7315	27419	26.7	St Clair	250204	2.9
Washington	2653	18364	14.4	Marion	43675	6.1
Washington	11498	18364	62.6	St Clair	250204	4.6
Monroe	16514	18325	90.1	St Clair	250204	6.6
Randolph	**1169**	**23170**	**5.0**	**St Clair**	**250204**	**0.5**
St Clair	2940	250204	1.2	Monroe	18325	16.0
Cook	**855**	**5274969**	**0.0**	**Lake**	**528861**	**0.2**
Du Page	703239	763599	92.1	Cook	5274969	13.3
Will	107037	382070	28.0	Cook	5274969	2.0
Douglas	7853	14042	55.9	Champaign	163318	4.8
Fulton	**250**	**28466**	**0.9**	**McDonough**	**27883**	**0.9**
McDonough	**333**	**27883**	**1.2**	**Fulton**	**28466**	**1.2**

Illinois Buying County	Retail Pop By Purchase System	Total Retail Pop In Buying County	% Pop in Buying County	Illinois Selling County	Total Retail Pop In Selling County	% Pop in Selling County
Greene	**238**	**11235**	**2.1**	**Madison**	**266611**	**0.1**
Hamilton	5587	6281	89.0	Franklin	40581	13.8
Hamilton	694	6281	11.0	White	13608	5.1
Jackson	**1240**	**62827**	**2.0**	**Franklin**	**40581**	**3.1**
Jefferson	12916	31581	40.9	Franklin	40581	31.8
Perry	9482	15926	59.5	Franklin	40581	23.4
Perry	**795**	**15926**	**5.0**	**Jackson**	**62827**	**1.3**
Saline	2187	26315	8.3	Franklin	40581	5.4
Saline	1492	26315	5.7	Pope	4697	31.8
White	1255	13608	9.2	Franklin	40581	3.1
Hardin	1401	3466	40.4	Saline	26315	5.3
Johnson	1755	8385	20.9	Saline	26315	6.7
Johnson	872	8385	10.4	Williamson	66532	1.3
Williamson	37047	66532	55.7	Franklin	40581	91.3
Gallatin	1112	5827	19.1	Saline	26315	4.2
Massac	4397	13112	33.5	Pope	4697	93.6
Pulaski	2776	4516	61.5	Alexander	10208	27.2
Union	841	12056	7.0	Alexander	10208	8.2
Scott	900	3746	24.0	Greene	11235	8.0
Wabash	1066	10561	10.1	Edwards	4547	23.4

Table B.2. Cross County Flows in Indiana

Indiana Buying County	Retail Pop By Purchase System	Total Retail Pop In Buying County	% Pop in Buying County	Indiana Selling County	Total Retail Pop In Selling County	% Pop in Selling County
Clark	4897	146325	3.35	Scott	9720	50.38
Dearborn	4509	35929	12.55	Floyd	19282	23.38
Floyd	4455	19282	23.10	Clark	146325	3.04
Harrison	13450	29826	45.09	Floyd	19282	69.75
Floyd	7320	19282	37.96	Harrison	29826	24.54
Ripley	6774	24587	27.55	Dearborn	35929	18.85
Franklin	2000	10290	19.44	Ripley	24587	8.13
Dearborn	4509	35929	12.55	Ripley	24587	18.34
Crawford	670	5617	11.93	Dubois	44749	1.50
Daviess	**400**	**21958**	**1.82**	**Dubois**	**44749**	**0.89**
Gibson	3856	26603	14.49	Dubois	44749	8.62
Orange	4735	10869	43.56	Dubois	44749	10.58
Perry	3419	16625	20.57	Dubois	44749	7.64
Pike	2294	15522	14.78	Dubois	44749	5.13
Spencer	5961	15200	39.22	Dubois	44749	13.32
Warrick	3410	39180	8.70	Dubois	44749	7.62
Washington	3132	21630	14.48	Dubois	44749	7.00
Pike	8418	15522	54.23	Gibson	26603	31.64
Orange	2624	10869	24.14	Lawrence	39745	6.60
Gibson	1015	26603	3.82	Pike	15522	6.54
Gibson	3129	26603	11.76	Vanderburgh	158750	1.97
Posey	**699**	**12026**	**5.81**	**Vanderburgh**	**158750**	**0.44**
Warrick	16300	39180	41.60	Vanderburgh	158750	10.27
Spencer	900	15200	5.92	Warrick	39180	2.30
Sullivan	4040	18830	21.46	Greene	35975	11.23
Martin	**329**	**12075**	**2.72**	**Greene**	**35975**	0.91
Jefferson	2420	28010	8.64	Ohio	6528	37.07
Jefferson	2420	28010	8.64	Switzerland	7610	31.80
Jennings	3132	25271	12.39	Jefferson	28010	11.18
Brown	2900	17406	16.66	Johnson	90295	3.21
Brown	3706	17406	21.29	Monroe	109597	3.38
Boone	**200**	**16821**	**1.19**	**Marion**	**907470**	**0.02**
Brown	10800	17406	62.05	Morgan	38615	27.97
Hendricks	3500	43933	7.97	Marion	907470	0.39
Morgan	1859	38615	4.82	Marion	907470	0.20
Porter	**1500**	**36039**	**4.16**	**Lake**	**481075**	**0.31**

Table B.3. Cross County Flows in Michigan

Michigan Buying County	Retail Pop By Purchase System	Total Retail Pop In Buying County	% Pop in Buying County	Michigan Selling County	Total Retail Pop In Selling County	% Pop in Selling County
Bay	1152	89836	1.28%	Arenac	8415	13.69
Bay	2011	89836	2.24%	Midland	54127	3.72
Bay	2400	89836	2.67%	Saginaw	181882	1.32
Iosco	**72**	**15320**	**0.47%**	**Arenac**	**8415**	0.86
Midland	41685	54127	77.01%	Arenac	8415	495.37
Saginaw	61799	181882	33.98%	Arenac	8415	734.39
Cass	**700**	**12574**	**5.57%**	**Berrien**	**98926**	**0.71**
Keneewaw	148	523	28.30%	Houghton	28959	0.51
Clinton	2300	17102	13.45%	Ingham	238289	0.97
Eaton	22100	52100	42.42%	Ingham	238289	9.27
Ottawa	107674	179141	60.11%	Kent	403140	26.71
Allegan	2163	29861	7.24%	Ottawa	179141	1.21
Genesee	124943	280657	44.52%	Wayne	2076376	6.02
Lapeer	15744	21825	72.14%	Wayne	2076376	0.76
Macomb	737068	774242	95.20%	Wayne	2076376	35.50
Monroe	12664	101005	12.54%	Wayne	2076376	0.61
Oakland	563907	939452	60.03%	Wayne	2076376	27.16
St. Clair	**3000**	**108396**	**2.77%**	**Wayne**	**2076376**	**0.14**
Washtenaw	76000	257747	29.49%	Wayne	2076376	3.66

Table B.4. Cross County Flows in Minnesota

Minnesota Buying County	Retail Pop By Purchase System	Total Retail Pop In Buying County	% Pop in Buying County	Minnesota Selling County	Total Retail Pop In Selling County	% Pop in Selling County
Anoka	233347	19270	8.3	Hennepin	1181969	1.6
Anoka	233347	29000	12.4	Ramsey	598793	4.8
Hennepin	**1181969**	**8012**	**0.7**	**Ramsey**	**598793**	**1.3**
Cottonwood	11127	2742	24.6	Watonwan	8389	32.7
Watonwan	8389	828	9.9	Cottonwood	11127	7.4
Hennepin	**1181969**	**2962**	**0.3**	**Carver**	**58694**	**5.0**
Jackson	**6380**	**79**	**1.2**	**Cottonwood**	**11127**	**0.7**
Lyon	**19820**	**159**	**0.8**	**Cottonwood**	**11127**	**1.4**
Lyon	19820	2861	14.4	Lincoln	11840	24.2
Nobles	15623	1584	10.1	Lincoln	11840	13.4
Pipestone	6970	1220	17.5	Lincoln	11840	10.3
Marshall	9150	708	7.7	Kittson	6154	11.5
Murray	**4593**	**67**	**1.5**	**Cottonwood**	**11127**	**0.6**
Nobles	**15623**	**100**	**0.6**	**Cottonwood**	**11127**	**0.9**
Rock	**9374**	**296**	**3.2**	**Lincoln**	**11840**	**2.5**
Washington	**167431**	**968**	**0.6**	**Ramsey**	**598793**	**0.2**
Yellow Medicine	**7308**	**313**	**4.3**	**Lincoln**	**11840**	**2.6**

Table B.5. Cross County Flows in Ohio

Ohio Buying County	Retail Pop By Purchase System	Total Retail Pop In Buying County	% Pop in Buying County	Ohio Selling County	Total Retail Pop In Selling County	% Pop in Selling County
Hocking	1505	11623	12.9	Athens	65723	2.3
Perry	10768	23625	45.6	Athens	65723	16.4
Harrison	4779	10473	45.6	Belmont	63335	7.5
Monroe	2565	12477	20.6	Belmont	63335	4.0
Miami	**37**	**65839**	**0.1**	**Clark**	**104230**	**0.0**
Geauga	**1276**	**20533**	**6.2**	**Cuyahoga**	**1680717**	**0.1**
Defiance	**266**	**25936**	**1.0**	**Fulton**	**22787**	**1.2**
Clark	**80**	**104230**	**0.1**	**Greene**	**142204**	**0.1**
Butler	77435	329233	23.5	Hamilton	856273	9.0
Warren	21500	164108	13.1	Hamilton	856273	2.5
Jefferson	**950**	**63842**	**1.5**	**Harrison**	**10473**	**9.1**
Brown	**97**	**38684**	**0.3**	**Highland**	**44540**	**0.2**
Clinton	1676	21297	7.9	Highland	44540	3.8
Richland	**1852**	**91152**	**2.0**	**Huron**	**67630**	**2.7**
Vinton	2263	5198	43.5	Jackson	31082	7.3
Jackson	3234	31082	10.4	Scioto	89630	3.6
Geauga	**900**	**20533**	**4.4**	**Lake**	**218417**	**0.4**
Ashland	**440**	**28685**	**1.5**	**Lorain**	**284331**	**0.2**
Huron	17387	67630	25.7	Lorain	284331	6.1
Medina	47621	78426	60.7	Lorain	284331	16.7
Wayne	**1600**	**58041**	**2.8**	**Lorain**	**284331**	**0.6**
Fulton	**430**	**22787**	**1.9**	**Lucas**	**446305**	**0.1**
Ottawa	**2240**	**31264**	**7.2**	**Lucas**	**446305**	**0.5**
Wood	33100	78897	42.0	Lucas	446305	7.4
Trumbull	17500	165449	10.6	Mahoning	246924	7.1

Ohio Buying County	Retail Pop By Purchase System	Total Retail Pop In Buying County	% Pop in Buying County	Ohio Selling County	Total Retail Pop In Selling County	% Pop in Selling County
Athens	**820**	**65723**	**1.2**	**Meigs**	**26211**	**3.1**
Greene	**2359**	**142204**	**1.7**	**Montgomery**	**572403**	**0.4**
Perry	**200**	**23625**	**0.8**	**Morgan**	**4765**	**4.2**
Pike	**701**	**22107**	**3.2**	**Ross**	**76980**	**0.9**
Hancock	**537**	**44478**	**1.2**	**Seneca**	**39284**	**1.4**
Portage	**60**	**93568**	**0.1**	**Stark**	**310053**	**0.0**
Mahoning	175000	246924	70.9	Trumbull	165449	105.8
Brown	**423**	**38684**	**1.1**	**Warren**	**164108**	**0.3**
Clinton	**500**	**21297**	**2.3**	**Warren**	**164108**	**0.3**

Table B.6. Cross County Flows in Wisconsin

Wisconsin Buying County	Retail Pop By Purchase System	Total Retail Pop In Buying County	% Pop in Buying County	Wisconsin Selling County	Total Retail Pop In Selling County	% Pop in Selling County
Ozaukee	5105	50561	10.10	Milwaukee	1015709	0.50
Waukesha	2042	220315	0.93	Milwaukee	1015709	0.20
Racine	4021	141852	2.84	Milwaukee	1015709	0.40
Calumet	3301	15599	21.16	Outagamie	142911	2.31

Table B.7. County Grouping Results for USEPA Region 5 States

State	Group	Counties in the Group
Illinois	Group 1	Bond, Madison, Jersey, Macoupin, Sangamon
	Group 2	Adams, Brown, Hancock, Henderson, Warren
	Group 3	Clay, Effingham, Jasper
	Group 4	Clinton, St. Clair, Monroe, Washington, Marion
	Group 5	Cook, Du Page, Will
	Group 6	Douglas, Champaign
	Group 7	Franklin, Hamilton, Jefferson, Perry, White, Williamson, Johnson, Saline, Gallatin, Hardin, Pope, Massac
	Group 8	Alexander, Pulaski, Union
	Group 9	Scott, Greene
	Group 10	Wabash, Edwards
Indiana	Group 1	Dearborn, Franklin, Ripley
	Group 2	Crawford, Dubois, Gibson, Lawrence, Orange, Perry, Pike, Spencer, Vanderburgh, Warrick, Washington
	Group 3	Greene, Sullivan
	Group 4	Jefferson, Ohio, Switzerland
	Group 5	Brown, Hendricks, Johnson, Marion, Monroe, Morgan
	Group 6	Clark, Floyd, Harrison, Scott
Michigan	Group 1	Arenac, Bay, Midland, Saginaw
	Group 2	Houghton, Keweenaw
	Group 3	Clinton, Eaton, Ingham
	Group 4	Allegan, Kent, Ottawa
	Group 5	Genesee, Lapeer, Macomb, Monroe, Oakland, Washtenaw, Wayne
Minnesota	Group 1	Anoka, Hennepin, Ramsey
	Group 2	Cottonwood, Watonwan
	Group 3	Lyon, Lincoln, Nobles, Pipestone
	Group 4	Kittson, Marshall
Ohio	Group 1	Athens, Hocking, Perry
	Group 2	Belmont, Harrison, Monroe
	Group 3	Butler, Hamilton, Warren
	Group 4	Clinton, Highland, Scioto
	Group 5	Jackson, Vinton
	Group 6	Huron, Lorain, Medina
	Group 7	Lucas, Wood
	Group 8	Mahoning, Trumbull
Wisconsin	Group 1	Racine, Milwaukee, Ozaukee, Waukesha
	Group 2	Calumet, Outagamie

APPENDIX C.

ESTIMATION OF CURRENT WATER SUPPLY INFRASTRUCTURE CAPACITY

INTRODUCTION

One of the goals of this investigation was to compare projected county water use to current infrastructure capacity in all of the counties served by USEPA Region 5.

This evaluation requires the estimation of current county water system production capacity. The intended source of production capacity data was the USEPA SDWIS data base. The type of data that SDWIS is capable of storing is described below:

> Water production information (for the entire water system and each individual treatment plant). At the system level: total design capacity, emergency capacity, and total storage capacity. At the plant level: the specific capacity for the plant, and the date the plant was constructed and put into operation.
> *Information Available from the Safe Drinking Water Information System*
> http://www.epa.gov/safewater/sdwisfed/sfed2.html
> Last updated October 29, 2002

However, states are not currently *required* to report water production information, and it was unavailable from USEPA for the states served by Region 5.

State primacy agencies were contacted to request production capacity information. Four of the six state primacy agencies were able to provide some type of information in electronic format that could be used to estimate water system production capacity. However, none of the states had information available for every water system, and in general, smaller systems were less likely to have reported production information. Furthermore, several agency officials cautioned that some of this information is likely to be out of date.

Although capacity information is generally available from individual water utilities, collecting this information from the more than 7,000 community water systems in USEPA Region 5 was beyond the scope of this project. Regional or county planning officials interested in pursuing individual assessments in their regions should have no difficulty in improving upon the estimates presented here by contacting local water officials.

A state-by-state review of the production capacity assessment appears in the following sections. Only four out of the six states in EPA region 5 are discussed because county level production capacity data was not available in electronic format for Indiana and Wisconsin. The production capacity assessment of each state includes a discussion of the data that were available from state water officials, the measure that was selected to

represent county infrastructure capacity, and a table of the estimated infrastructure capacity in each county and groups of counties. Not all systems reported the measure chosen to estimate capacity, or the reported values were not used because they were clearly outside the range of values that was considered to be reasonable. Therefore, each table also includes two columns of "coverage" for each county, which represent the number of systems and the estimated population served that are accounted for by the reported capacity measures.

STATE-SPECIFIC COUNTY LEVEL WATER SUPPLY CAPACITY

Illinois

There are several potential capacity measures available in the data provided by the Illinois Environmental Protection Agency: average daily maximum usage, average daily usage, total facility storage capacity (sum of ground facility storage, elevated facility storage, pressure facility storage, and standpipe facility storage), total storage capacity of treatment application points (sum of pressure storage capacity and ground storage capacity of treatment application points), and total capacity of treatment application points.

Water usage data was reported for almost all Illinois systems. However, while average and maximum daily water usage for each water system are reported, maximum daily usage was not always larger than average usage as would be expected. Furthermore, some systems in the database report zero maximum daily usage. Maximum day usage was the measure chosen to represent water system capacity. The value used for this measure for each water system was either average or maximum day usage, depending on which was larger. County measures were calculated as the sum of the measures of all of the systems reporting that county as their primary service area.

Table C.1. shows the estimated water supply capacity for each county as well as the "coverage" based on the number of systems used in the estimation process. For those counties that are grouped together because of significant cross-county flows, the estimated water supply capacity and its coverage are also shown for the whole group. As seen from the table, the coverage of population and system are above 90% in most of the counties and groups. There are two counties with relatively low coverage. In Calhoun County, the water supply capacity measure only covers 60 percent of its total population served by public water systems. Massac County is grouped together with eleven other counties. Although its own water supply capacity measure only covered about 46 percent of total population served, the population coverage of the whole group is above 95%.

Table C.1. Estimated County Infrastructure Capacity and Coverage in Illinois

County/ Group	Estimated Water Supply Capacity (mgd)	Population Covered	Systems Covered	% Population Covered	% Systems Covered
Boone	6.9	25,359	8	100.0	100.0
Bureau	4.6	26,895	27	100.0	100.0
Calhoun	0.5	1,977	4	60.0	80.0
Carroll	1.9	10,186	9	100.0	100.0
Cass	2.7	10,269	5	100.0	100.0
Christian	5.9	29,627	13	100.0	100.0
Clark	2.5	14,816	6	100.0	100.0
Coles	6.7	50,361	12	98.1	92.3
Crawford	3.8	18,311	8	100.0	100.0
Cumberland	0.6	4,801	4	100.0	100.0
De Kalb	10.6	69,026	18	100.0	100.0
De Witt	1.5	12,499	9	99.7	90.0
Edgar	1.9	12,579	8	100.0	100.0
Fayette	2.2	16,675	8	100.0	100.0
Ford	2.6	11,056	10	100.0	100.0
Fulton	5.7	28,466	18	100.0	100.0
Grundy	4.3	28,218	18	99.8	94.7
Henry	5.4	39,706	40	99.9	97.6
Iroquois	3.3	20,865	25	98.9	92.6
Jackson	11.4	62,827	18	100.0	100.0
Jo Daviess	3.7	13,904	15	100.0	100.0
Kane	61.4	389,054	40	100.0	95.2
Kankakee	18.8	75,219	26	100.0	100.0
Kendall	3.2	30,834	10	100.0	100.0
Knox	8.9	49,227	18	100.0	100.0
Lake	193.5	526,064	99	99.5	92.5
La Salle	24.7	92,295	38	100.0	100.0
Lawrence	2.5	12,730	7	100.0	100.0
Lee	7.1	30,192	17	100.0	100.0
Livingston	4.6	29,449	16	100.0	100.0
Logan	4.2	23,158	13	100.0	100.0
McDonough	4.9	27,883	12	100.0	100.0
McHenry	22.2	168,779	36	100.0	97.3
McLean	24.7	133,597	31	99.0	91.2
Macon	43.4	105,794	12	100.0	100.0
Marshall	2.6	9,530	11	100.0	100.0
Mason	2.3	9,434	6	100.0	100.0
Menard	1.1	10,325	7	100.0	100.0
Mercer	1.4	10,266	14	100.0	100.0
Montgomery	4.4	20,787	17	96.6	94.4
Morgan	6.9	29,565	13	100.0	100.0
Moultrie	1.9	12,982	7	100.0	100.0
Ogle	6.8	31,793	23	99.2	95.8
Peoria	42.0	196,336	25	100.0	96.2

County/ Group		Estimated Water Supply Capacity (mgd)	Population Covered	Systems Covered	% Population Covered	% Systems Covered
Piatt		1.5	11,506	9	100.0	100.0
Pike		2.5	14,606	13	100.0	100.0
Putnam		1.0	4,212	8	100.0	100.0
Randolph		3.2	23,170	14	100.0	100.0
Richland		2.1	11,322	7	98.9	87.5
Rock Island		25.9	144,452	51	100.0	100.0
Schuyler		1.0	6,135	5	100.0	100.0
Shelby		1.7	13,808	10	100.0	100.0
Stark		0.6	3,811	4	100.0	100.0
Stephenson		8.3	36,254	15	100.0	100.0
Tazewell		23.5	119,317	32	99.7	91.4
Vermilion		11.7	62,871	19	99.8	95.0
Wayne		1.8	12,130	10	100.0	100.0
Whiteside		7.2	39,770	13	100.0	100.0
Winnebago		44.5	226,029	32	100.0	100.0
Woodford		3.8	22,367	19	100.0	100.0
Group 1	Bond	2.7	11,360	9	100.0	100.0
	Jersey	2.9	24,370	6	100.0	100.0
	Macoupin	7.6	43,954	29	99.8	96.7
	Madison	48.3	266,611	38	100.0	100.0
	Sangamon	44.3	193,315	20	100.0	100.0
	Group Total	105.8	539,610	102	100.0	99.0
Group 2	Adams	15.4	61,320	18	100.0	100.0
	Brown	0.8	2,792	4	100.0	100.0
	Hancock	1.7	13659	11	100.0	100.0
	Henderson	1.1	5,680	7	100.0	100.0
	Warren	3.6	12,942	6	100.0	100.0
	Group Total	22.7	96,393	46	100.0	100.0
Group 3	Clay	2.2	9,169	6	100.0	100.0
	Effingham	3.8	22,864	12	100.0	100.0
	Jasper	1.4	13,950	4	100.0	100.0
	Group Total	7.4	45,983	22	100.0	100.0
Group 4	Clinton	5.0	27,419	19	100.0	100.0
	St Clair	74.1	250,204	23	100.0	100.0
	Marion	8.2	43,675	16	100.0	100.0
	Monroe	2.5	18,325	7	100.0	100.0
	Washington	2.9	18,364	12	100.0	100.0
	Group Total	92.8	357,987	77	100.0	100.0
Group 5	Cook	2966.5	5,274,744	158	100.0	98.8
	Du Page	218.8	763,569	52	100.0	98.1
	Will	49.6	382,070	61	100.0	100.0
	Group Total	3234.9	6,420,383	271	100.0	98.9
Group 6	Champaign	37.9	162,762	31	99.7	88.6
	Douglas	3.6	14,042	11	100.0	100.0
	Group Total	41.6	176,804	42	99.7	91.3

County/ Group		Estimated Water Supply Capacity (mgd)	Population Covered	Systems Covered	% Population Covered	% Systems Covered
Group 7	Franklin	19.4	40,581	21	100.0	100.0
	Gallatin	0.9	5,827	7	100.0	100.0
	Hamilton	0.9	6,281	5	100.0	100.0
	Hardin	0.5	3,466	5	100.0	100.0
	Jefferson	4.7	31,581	9	100.0	100.0
	Johnson	1.2	8,385	6	100.0	100.0
	Massac	0.8	6,009	3	45.8	75.0
	Perry	2.5	15,926	9	100.0	100.0
	Pope	1.3	4,697	2	100.0	100.0
	Saline	5.7	26,315	11	100.0	100.0
	White	3.1	13,608	9	100.0	100.0
	Williamson	9.2	66,532	25	100.0	100.0
	Group Total	50.2	229,208	112	97.0	99.1
Group 8	Alexander	2.2	10,208	6	100.0	100.0
	Pulaski	0.7	4,516	6	100.0	100.0
	Union	2.9	12,056	8	100.0	100.0
	Group Total	5.8	26,780	20	100.0	100.0
Group 9	Greene	1.5	11,235	10	100.0	100.0
	Scott	0.7	3,746	5	100.0	100.0
	Group Total	2.2	14,981	15	100.0	100.0
Group 10	Edwards	0.7	4,547	4	100.0	100.0
	Wabash	1.6	10,561	6	100.0	100.0
	Group Total	2.4	15,108	10	100.0	100.0

Michigan

Two potential capacity measures were available from the Michigan Department of Environmental Quality (DEQ): total design capacity of water systems, and approved design capacity of treatment plants. The DEQ defines the total design capacity of water systems as “the rated capacity of a surface water system or the firm capacity of a ground water system." Systems are not required to report this information to the state. Only 161 systems out of the total 1,468 systems reported total design capacity.

The approved design capacity of treatment plants is defined as “the rated capacity". All water systems in Michigan are required to report this information to the state. However, electronic data were only available for 519 out of 898 treatment plants. In addition, 916 did not report information on treatment plants. These water systems are either ground water systems, or purchase their water from other systems. Total design capacity of the treatment plants was chosen as the measure to account for county water supply capacity. Table C.2 shows the estimated county water supply capacity and its coverage in Michigan. Overall, coverage is low, with a few counties having 100 percent coverage, with many counties reporting zero coverage.

Table C.2. Estimated County Infrastructure Capacity and Coverage in Michigan

County/ Group	Estimated Water Supply Capacity (mgd)	Population Covered	Systems Covered	Percent Population Covered	Percent Systems Covered
Alcona	0.5	514	1	67.8	16.7
Alger	0.0	0	0	0.0	0.0
Alpena	6.0	11,332	2	68.0	40.0
Antrim	7.4	7,193	6	78.8	50.0
Baraga	0.0	0	0	0.0	0.0
Barry	7.0	10,239	6	68.0	33.3
Benzie	5.2	3,309	5	77.7	45.5
Berrien	72.0	81,585	13	82.5	25.5
Branch	13.3	20,064	5	96.6	38.5
Calhoun	0.0	0	0	0.0	0.0
Cass	14.3	10,220	5	81.3	25.0
Charlevoix	13.9	11,189	7	88.5	41.2
Cheboygan	8.2	6,154	2	92.9	25.0
Chippewa	0.0	0	0	0.0	0.0
Clare	6.2	4,028	2	64.9	50.0
Crawford	2.8	1,952	1	77.4	20.0
Delta	0.0	0	0	0.0	0.0
Dickinson	0.0	0	0	0.0	0.0
Emmet	13.9	9,342	5	68.1	16.7
Gladwin	3.1	4,107	2	85.8	25.0
Gogebic	0.0	0	0	0.0	0.0
Grand Traverse	26.9	20,361	9	54.2	34.6
Gratiot	5.8	11,579	4	57.9	36.4
Hillsdale	10.6	15,791	6	95.8	50.0
Huron	8.1	5,514	4	32.7	19.0
Ionia	15.2	23,698	4	82.2	22.2
Iosco	5.4	1	1	0.0	8.3
Iron	0.0	0	0	0.0	0.0
Isabella	12.5	34,866	4	97.2	36.4
Jackson	44.7	78,873	5	79.7	16.7
Kalamazoo	3.6	2,586	3	1.2	13.6
Kalkaska	2.1	2,226	1	100.0	100.0
Lake	0.0	0	0	0.0	0.0
Leelanau	2.9	2,313	4	47.6	23.5
Lenawee	27.5	46,279	14	91.0	48.3
Livingston	14.5	19,031	5	44.6	9.4
Luce	0.0	0	0	0.0	0.0
Mackinac	0.0	0	0	0.0	0.0
Manistee	16.0	8,403	4	85.0	36.4
Marquette	0.0	0	0	0.0	0.0
Mason	6.5	8,357	1	73.0	10.0
Mecosta	4.1	11,044	3	89.3	21.4
Menominee	0.0	0	0	0.0	0.0

County/ Group		Estimated Water Supply Capacity (mgd)	Population Covered	Systems Covered	Percent Population Covered	Percent Systems Covered
Missaukee		3.3	1,507	2	100.0	100.0
Montcalm		15.1	15,279	7	94.9	58.3
Montmorency		0.9	1,029	2	97.3	66.7
Muskegon		51.1	59,867	7	54.5	30.4
Newaygo		5.1	6,775	3	68.7	30.0
Oceana		0.5	958	1	18.9	16.7
Ogemaw		2.6	1,796	2	77.4	28.6
Ontonagon		0.0	0	0	0.0	0.0
Osceola		10.2	5,004	3	90.9	42.9
Oscoda		1.4	700	3	87.3	60.0
Otsego		7.3	3,908	5	89.6	50.0
Presque Isle		4.4	5,068	4	90.8	66.7
Roscommon		0.0	0	0	0.0	0.0
Sanilac		8.4	10,595	9	67.0	50.0
Schoolcraft		0.0	0	0	0.0	0.0
Shiawassee		6.7	19,112	7	61.8	26.9
St Clair		153.0	65,888	6	58.8	26.1
St Joseph		14.5	17,900	6	61.7	31.6
Tuscola		9.2	12,196	7	77.8	41.2
Van Buren		0.0	0	0	0.0	0.0
Wexford		15.3	11,922	3	87.4	50.0
Group 1	Arenac	151.7	8,147	5	96.8	62.5
	Bay	40.2	39,652	2	44.1	10.0
	Midland	48.0	41,685	1	77.0	10.0
	Saginaw	351.5	65,847	3	36.2	12.0
	Group Total	591.4	155,331	11	46.5	17.5
Group 2	Houghton	0.0	0	0	0.0	0.0
	Keweenaw	0.0	0	0	0.0	0.0
	Group Total	0.0	0	0	0.0	0.0
Group 3	Clinton	0.0	0	0	0.0	0.0
	Eaton	0.0	0	0	0.0	0.0
	Ingham	15.0	1	1	0.0	4.3
	Group Total	15.0	1	1	0.0	1.9
Group 4	Allegan	15.6	16,381	11	54.9	22.0
	Kent	255.1	318,256	14	78.9	28.0
	Ottawa	53.9	34,178	3	19.1	11.1
	Group Total	324.6	368,815	28	60.2	22.0
Group 5	Genesee	18.0	41,371	10	14.7	15.9
	Lapeer	2.5	2,713	5	12.4	31.3
	Macomb	21.0	8,692	2	1.1	7.1
	Monroe	21.1	57,141	4	56.6	36.4
	Oakland	187.0	76,455	4	8.1	3.0
	Washtenaw	66.1	140,094	10	54.4	37.0
	Wayne	4550.0	975,810	2	47.0	4.5
	Group Total	4865.7	1,302,276	37	29.3	11.5

Minnesota

Two potential capacity measures were available from the Minnesota Department of Health: average daily production and maximum daily production. No units were specified for either measure, but they were assumed to be in gallons per day. Out of a total of 957 systems, 896 reported nonzero values for average daily production, and 818 systems reported nonzero maximum daily production. The average daily production and maximum daily production were compared, and the larger of the two was used as the measure of water system infrastructure capacity. Table C.3 shows the estimated value of infrastructure capacity and coverage for each county. The population coverage for every county was above 95%.

Table C.3. Estimated County Infrastructure Capacity and Coverage in Minnesota

County/ Group	Estimated Water Supply Capacity (mgd)	Population Covered	System Covered	% Population Covered	% Systems Covered
Aitkin	0.4	2,458	5	100.0	100.0
Becker	3.2	10,506	10	100.0	100.0
Beltrami	2.7	13,810	11	99.6	91.7
Benton	3.3	1,3742	5	100.0	100.0
Bigstone	1.8	4,438	9	100.0	100.0
Blue Earth	8.6	43,879	20	99.8	95.2
Brown	5.3	20,439	6	100.0	100.0
Carlton	2.6	16,141	10	95.1	90.9
Carver	14.9	57,973	13	98.8	86.7
Cass	1.6	4,670	9	100.0	100.0
Chippewa	1.8	7,817	5	100.0	100.0
Chisago	4.0	19,487	19	100.0	100.0
Clay	11.8	44,565	13	100.0	100.0
Clearwater	0.5	2,080	3	100.0	100.0
Cook	0.5	1,353	1	98.2	50.0
Crow Wing	5.0	21,714	15	100.0	100.0
Dakota	94.1	309,838	17	99.7	85.0
Dodge	1.2	10,118	6	100.0	100.0
Douglas	3.7	12,647	11	100.0	100.0
Faribault	2.0	10,012	11	100.0	100.0
Fillmore	2.3	12,689	13	99.6	92.9
Freeborn	5.9	22,983	14	99.5	93.3
Goodhue	7.9	28,743	11	99.9	91.7
Grant	1.2	3,491	7	100.0	100.0
Houston	1.6	11,086	6	100.0	100.0
Hubbard	1.5	4,152	5	100.0	100.0
Isanti	2.3	9,830	5	100.0	100.0
Itasca	4.8	16,626	19	98.9	95.0
Jackson	1.1	6,380	6	100.0	100.0
Kanabec	0.8	3,692	3	100.0	100.0

County/ Group	Estimated Water Supply Capacity (mgd)	Population Covered	System Covered	% Population Covered	% Systems Covered
Kandiyohi	8.5	26,297	16	100.0	100.0
Koochiching	1.8	8,641	5	100.0	100.0
Lac Qui Parle	1.2	4,148	6	100.0	100.0
Lake	2.4	5,856	3	99.6	75.0
Lake of the Woods	0.4	1,296	2	100.0	100.0
LeSueur	5.5	15,983	9	99.2	75.0
Mahnomen	0.5	1,699	3	100.0	100.0
Martin	3.1	15,922	9	100.0	100.0
McLeod	6.4	24,771	11	100.0	100.0
Meeker	3.2	11,559	7	100.0	100.0
Mille Lacs	2.4	9,287	8	98.9	88.9
Morrison	3.0	12,164	9	100.0	100.0
Mower	7.8	29,011	14	99.6	87.5
Murray	1.0	4,593	9	100.0	100.0
Nicollet	5.1	23,555	6	100.0	100.0
Norman	1.4	4,107	8	99.2	88.9
Olmsted	25.7	99,135	14	99.5	66.7
Otter Tail	9.2	23,346	14	99.6	93.3
Pennington	1.6	9,038	5	100.0	100.0
Pine	2.0	10,507	14	99.8	93.3
Polk	5.6	20,832	12	100.0	100.0
Pope	1.5	4,546	6	100.0	100.0
Red Lake	0.4	2,268	3	100.0	100.0
Redwood	2.3	10,271	13	100.0	100.0
Renville	2.4	10,527	11	100.0	100.0
Rice	10.5	43,687	8	99.2	72.7
Rock	2.8	9,374	8	100.0	100.0
Roseau	1.1	6,791	11	97.7	91.7
Saint Louis	49.8	150,387	25	97.3	83.3
Scott	14.8	59,483	13	98.4	81.3
Sherburne	10.0	21,428	7	99.9	87.5
Sibley	2.2	8,138	8	100.0	100.0
Stearns	29.2	110,014	36	100.0	100.0
Steele	7.7	26,566	6	100.0	100.0
Stevens	1.8	6,612	5	100.0	100.0
Swift	2.1	7,563	6	100.0	100.0
Todd	2.7	9,155	8	100.0	100.0
Traverse	0.9	2,442	4	100.0	100.0
Wabasha	4.1	13,262	9	100.0	100.0
Wadena	1.8	6,899	5	100.0	100.0
Waseca	4.5	13,235	5	100.0	100.0
Washington	50.5	165,883	26	99.1	92.9
Wilkin	1.8	4,585	6	100.0	100.0
Winona	8.9	34,504	10	99.4	76.9
Wright	18.6	53,835	20	100.0	100.0
Yellow Medicine	1.7	7,308	8	100.0	100.0

County/ Group		Estimated Water Supply Capacity (mgd)	Population Covered	System Covered	% Population Covered	% Systems Covered
Group 1	Anoka	87.3	233,347	27	100.0	100.0
	Hennepin	442.9	1,176,359	36	99.5	75.0
	Ramsey	186.5	598,793	19	100.0	100.0
	Group Total	716.6	2,008,499	82	99.7	87.2
Group 2	Cottonwood	3.0	11,076	8	99.5	88.9
	Watonwan	3.1	8,389	8	100.0	100.0
	Group Total	6.1	19,465	16	99.7	94.1
Group 3	Lincoln	5.5	11,840	7	100.0	100.0
	Lyon	6.0	19,820	12	100.0	100.0
	Nobles	4.7	15,623	12	100.0	100.0
	Pipestone	1.2	6,970	10	100.0	100.0
	Group Total	17.5	54,253	41	100.0	100.0
Group 4	Marshall	1.4	9,150	12	100.0	100.0
	Kittson	0.8	6,154	6	100.0	100.0
	Group Total	2.2	15,304	18	100.0	100.0

Ohio

The only potential capacity measure available from the Ohio Environmental Protection Agency is average daily production. Information on the unit of the capacity measure was not included in the database, and it was assumed to be gallons per day. Twelve systems reported average daily production less than 5 gallons/day, and their capacity estimates were not included in the analysis. Table C.4 shows the estimated value of infrastructure capacity and coverage for each county. The population coverage is above 90% in every county but Greene, Summit, and Huron.

Table C.4. Estimated County Infrastucture Capacity and Coverage in Ohio

County/ Group	Estimated Water Supply Capacity (mgd)	Population Covered	System Covered	% Population Covered	% Systems Covered
Adams	2.6	25,114	6	100.0	100.0
Allen	17.4	92,489	8	100.0	100.0
Ashland	4.1	28,685	12	100.0	100.0
Ashtabula	11.0	72,190	12	100.0	100.0
Auglaize	4.7	30,004	8	100.0	100.0
Brown	4.4	38,588	11	99.8	91.7
Carroll	0.9	7,956	8	100.0	100.0
Champaign	3.4	18,819	13	100.0	100.0
Clark	16.5	104,230	35	100.0	100.0
Clermont	18.6	153,782	10	100.0	100.0
Columbiana	9.9	67,698	22	99.8	91.7
Coshocton	5.9	21,018	10	100.0	100.0
Crawford	3.4	31,110	7	100.0	100.0
Cuyahoga	294.1	1,680,717	9	100.0	100.0

County/ Group	Estimated Water Supply Capacity (mgd)	Population Covered	System Covered	% Population Covered	% Systems Covered
Darke	3.3	25,321	12	100.0	100.0
Defiance	5.3	25,936	10	100.0	100.0
Delaware	15.9	113,384	6	100.0	100.0
Erie	16.7	85,819	14	100.0	100.0
Fairfield	8.4	76,717	22	100.0	100.0
Fayette	1.8	19,900	9	100.0	100.0
Franklin	154.2	1,065,815	31	100.0	100.0
Fulton	4.2	22,667	9	99.5	90.0
Gallia	3.1	34,046	4	100.0	100.0
Geauga	2.2	20,533	34	100.0	100.0
Greene	12.8	107,851	21	75.8	84.0
Guernsey	5.6	35,594	8	100.0	100.0
Hancock	7.1	44,478	7	100.0	100.0
Hardin	2.4	18,360	8	100.0	100.0
Henry	1.7	16,219	8	100.0	100.0
Holmes	1.2	9,317	12	100.0	100.0
Jefferson	12.4	63,842	21	100.0	100.0
Knox	4.0	28,217	13	100.0	100.0
Lake	26.7	218,417	10	100.0	100.0
Lawrence	6.6	59,813	9	100.0	100.0
Licking	12.7	88,882	30	100.0	100.0
Logan	3.3	23,272	20	100.0	100.0
Madison	3.1	29,636	20	100.0	100.0
Marion	6.1	49,211	5	100.0	100.0
Meigs	2.4	26,211	7	100.0	100.0
Mercer	2.8	22,296	14	100.0	100.0
Miami	11.2	65,839	17	100.0	100.0
Montgomery	134.1	572,403	25	100.0	100.0
Morgan	0.7	4,735	6	99.4	85.7
Morrow	0.8	6,585	6	100.0	100.0
Muskingum	9.2	70,936	16	100.0	100.0
Noble	1.1	13,030	5	97.0	83.3
Ottawa	6.9	31,264	11	100.0	100.0
Paulding	0.8	7,440	5	100.0	100.0
Pickaway	5.2	36,392	23	100.0	100.0
Pike	2.4	22,107	9	100.0	100.0
Portage	12.8	91,243	47	97.5	95.9
Preble	3.0	20,043	11	100.0	100.0
Putnam	3.0	14,796	13	100.0	100.0
Richland	15.0	91,152	60	100.0	100.0
Ross	8.2	76,980	9	100.0	100.0
Sandusky	5.7	29,669	7	100.0	100.0
Seneca	5.0	39,284	13	100.0	100.0
Shelby	4.5	28,053	16	100.0	100.0
Stark	43.7	310,053	44	100.0	100.0
Summit	15.7	130,071	47	27.7	85.5
Tuscarawas	8.3	64,078	17	100.0	100.0

County/ Group		Estimated Water Supply Capacity (mgd)	Population Covered	System Covered	% Population Covered	% Systems Covered
Union		2.4	21,071	5	100.0	100.0
Van Wert		2.0	14,245	7	100.0	100.0
Washington		7.5	58,709	16	100.0	100.0
Wayne		7.8	58,019	34	100.0	97.1
Williams		3.3	21,885	14	100.0	100.0
Wyandot		1.7	12,141	4	100.0	100.0
Group 1	Athens	8.2	65,723	16	100.0	100.0
	Hocking	1.4	11,623	9	100.0	100.0
	Perry	1.9	23,625	21	100.0	100.0
	Group Total	11.5	100,971	46	100.0	100.0
Group 2	Belmont	9.7	63,335	16	100.0	100.0
	Harrison	1.0	10,473	14	100.0	100.0
	Monroe	1.6	12,477	6	100.0	100.0
	Group Total	12.3	86,285	36	100.0	100.0
Group 3	Butler	53.4	329,233	21	100.0	100.0
	Hamilton	131.1	856,273	17	100.0	100.0
	Warren	16.8	153,108	24	93.3	96.0
	Group Total	201.4	1,338,614	62	99.2	98.4
Group 4	Clinton	2.4	21,297	6	100.0	100.0
	Highland	3.7	44,540	5	100.0	100.0
	Group Total	6.1	65,837	11	100.0	100.0
Group 5	Jackson	4.8	27,932	10	89.9	90.9
	Scioto	11.9	89,630	16	100.0	100.0
	Vinton	0.9	5,198	5	100.0	100.0
	Group Total	17.6	122,760	31	97.5	96.9
Group 6	Huron	6.1	51,194	13	75.7	92.9
	Lorain	51.1	284,306	14	100.0	93.3
	Medina	9.6	77,411	15	98.7	93.8
	Group Total	66.8	412,911	42	95.9	93.3
Group 7	Lucas	93.3	446,305	9	100.0	100.0
	Wood	10.7	78,897	23	100.0	100.0
	Group Total	104.0	525,202	32	100.0	100.0
Group 8	Mahoning	28.6	246,924	16	100.0	100.0
	Trumbull	38.7	165,449	34	100.0	100.0
	Group Total	67.4	412,373	50	100.0	100.0

APPENDIX D.

ESTIMATES AND PROJECTIONS OF TOTAL POPULATION, POPULATION SERVED, AND PER CAPITA WATER USE

This appendix contains the historical estimates (1985, 1990, 1995, and 2000) of total population, population served by community water supply systems, and per capita water use in each county and county grouping in USEPA Region 5. This appendix also contains projections of these same parameters for five projection years (2005, 2010, 2015, 2020, 2025).

Historical estimates (1985, 1990 and 1995) of per capita water use and population served were prepared by the USGS National Water Use Information Program and downloaded from their website (*http://water.usgs.gov/watuse/wudownload.html*). Preliminary estimates of the population served and per capita water use for the year 2000 were also obtained from USGS and are presented in this appendix.

County population projection estimates were developed from projections provided by state demographic agencies. The web pages sources of these projections appear below:

Table D1. State Sources of Population Projection Data for Region 5 States

State	Web Page
Illinois	*http://www.cadus.ilstu.edu/database/population.xls*
Indiana	*http://www.iupui.edu/it/ibrc/Population/Projections/figure4.html*
Michigan	*http://www.state.mi.us/dmb/mic/census/demo/pop_pro/mi_co.htm*
Minnesota	*http://www.mnplan.state.mn.us/demography/demog_3c.html*
Ohio	*http://www.odod.state.oh.us/osr/people.htm*
Wisconsin	*http://www.doa.state.wi.us/dhir/boir/demographic/queries/pproj4.idc*

Wherever agency projection years did not match the five projections years, they were adjusted using interpolation and extrapolation of trends. Updated population projections were being released in every state during this project and where possible these newer projections were used (Minnesota and Wisconsin). In the remaining states projections were also adjusted by the ratio of 2000 population projections to Census Bureau estimates of 2000 population.

Projections of population served were first developed using the historical trends in population served as reported in the USGS water use inventories from 1985 to 2000. However, the wide disparity in reported values across this time period for many counties resulted in values for projections years that were unreasonable, and this simple extrapolation technique could not be used. A review of the Census data on household

water sources from 1970 to 1990 (this information was not collected in the 2000 Census) revealed a slight trend toward increasing population served nationally but no practical method of applying this observed trend to individual counties could be devised. Consequently, projections of the population served for each county were calculated by multiplying the projected population values in each county by the percent of population served in that county in the year 2000.

The static values of percent of population served used in the projections presented in this study will result in an underestimation of public supply water use for those counties where public supplies are expanding faster than self-supplied supplies, or where self-supplied users are switching to public systems. The population effect dominates projections in many counties and readers are encourage to adjust this percentage to better represent public water supply participation in their counties or regions.

The projected values of per capita water use presented in this appendix were the result of the state models developed during this study.

The data presented here were aggregated into the county groupings (as described in Appendix B) using the methods described in Chapter 2.

Table D1-A. Historical Estimates and Projections of Population - Illinois

County	USGS Historical Estimates				MTAC Study Projections				
	1985	1990	1995	2000	2005	2010	2015	2020	2025
Adams[2]	*71,700*	*66,090*	*68,040*	*68,277*	*69,410*	*69,428*	*69,609*	*69,833*	*70,058*
Alexander[8]	*12,370*	*10,630*	*10,180*	*9,590*	*9,395*	*9,216*	*9,199*	*9,173*	*9,148*
Bond[1]	16,420	14,990	15,740	17,633	17,575	17,469	17,417	17,469	17,522
Boone	28,670	30,810	36,180	41,786	42,151	42,440	42,977	43,332	43,688
Brown[2]	5,440	5,840	6,250	6,950	7,065	7,130	7,185	7,229	7,273
Bureau	39,290	35,690	36,050	35,503	35,074	34,617	34,297	34,012	33,728
Calhoun	6,010	5,320	4,950	5,084	4,987	4,903	4,903	4,962	5,021
Carroll	18,920	16,800	16,870	16,674	16,100	15,885	15,746	15,648	15,552
Cass	15,500	13,440	13,330	13,695	13,374	12,967	12,793	12,718	12,644
Champaign[6]	*169,800*	*173,020*	*169,100*	*179,669*	*186,234*	*195,752*	*201,810*	*207,331*	*213,002*
Christian	37,460	34,420	34,920	35,372	35,593	35,689	35,815	35,902	35,988
Clark	17,140	15,920	16,280	17,008	16,839	16,491	16,396	16,620	16,846
Clay[3]	*16,140*	*14,460*	*14,440*	*14,560*	*14,064*	*13,392*	*13,052*	*12,816*	*12,585*
Clinton[4]	*32,640*	*33,940*	*35,280*	*35,535*	*36,016*	*36,580*	*37,430*	*38,436*	*39,469*
Coles	54,450	51,640	52,360	53,196	54,841	56,587	58,556	61,005	63,556
Cook[5]	*5,212,220*	*5,105,070*	*5,136,880*	*5,376,741*	*5,396,919*	*5,456,149*	*5,514,377*	*5,597,469*	*5,681,813*
Crawford	20,990	19,460	19,910	20,452	19,770	19,142	18,631	18,174	17,728
Cumberland	11,640	10,670	11,110	11,253	11,513	11,820	12,286	13,074	13,912
De Kalb	76,250	77,930	83,440	88,969	93,942	99,148	102,951	106,345	109,851
De Witt	18,920	16,520	16,820	16,798	16,546	16,253	16,033	15,874	15,717
Douglas[6]	*20,700*	*19,460*	*19,800*	*19,922*	*19,899*	*19,628*	*19,548*	*19,688*	*19,828*
Du Page[5]	*743,200*	*781,670*	*853,460*	*904,161*	*922,970*	*949,679*	*975,494*	*1,001,074*	*1,027,324*
Edgar	21,880	19,600	19,980	19,704	19,233	18,733	18,368	18,289	18,210
Edwards[10]	*7,810*	*7,440*	*7,260*	*6,971*	*6,759*	*6,554*	*6,441*	*6,362*	*6,284*
Effingham[3]	*32,790*	*31,700*	*33,010*	*34,264*	*34,713*	*34,644*	*34,743*	*34,530*	*34,319*
Fayette	22,740	20,890	21,240	21,802	21,182	20,547	20,120	19,812	19,508
Ford	15,550	14,280	14,130	14,241	14,177	14,075	13,940	13,804	13,671
Franklin[7]	*45,650*	*40,320*	*40,810*	*39,018*	*37,936*	*36,786*	*36,267*	*36,377*	*36,487*
Fulton	45,580	38,080	38,790	38,250	37,295	36,389	35,780	35,578	35,378
Gallatin[7]	*7,590*	*6,910*	*6,780*	*6,445*	*6,369*	*6,316*	*6,376*	*6,454*	*6,532*
Greene[9]	*16,800*	*15,320*	*15,640*	*14,761*	*14,690*	*14,591*	*14,679*	*15,031*	*15,391*
Grundy	37,170	32,340	35,160	37,535	39,123	40,798	42,814	44,993	47,283
Hamilton[7]	*10,080*	*8,500*	*8,520*	*8,621*	*8,293*	*8,012*	*7,820*	*7,692*	*7,566*
Hancock[2]	*23,890*	*21,370*	*21,290*	*20,121*	*19,895*	*19,581*	*19,485*	*19,748*	*20,014*
Hardin[7]	*5,910*	*5,190*	*5,180*	*4,800*	*4,592*	*4,360*	*4,184*	*4,046*	*3,913*
Henderson[2]	*9,940*	*8,100*	*8,430*	*8,213*	*8,332*	*8,399*	*8,609*	*9,045*	*9,504*
Henry	60,170	51,160	51,720	51,020	49,121	47,308	45,869	44,626	43,416
Iroquois	33,340	30,790	31,410	31,334	30,757	30,075	29,795	29,611	29,428
Jackson	61,630	61,070	61,500	59,612	61,041	62,383	63,559	64,011	64,467
Jasper[3]	*11,460*	*10,610*	*10,590*	*10,117*	*10,287*	*10,378*	*10,660*	*11,110*	*11,580*
Jefferson[7]	*37,490*	*37,020*	*39,000*	*40,045*	*39,710*	*38,862*	*38,155*	*37,430*	*36,718*
Jersey[1]	*20,590*	*20,540*	*21,190*	*21,668*	*22,533*	*23,409*	*24,635*	*26,536*	*28,584*
Jo Daviess	23,680	21,820	21,930	22,289	22,420	22,623	22,790	23,066	23,345
Johnson[7]	*11,330*	*11,350*	*12,430*	*12,878*	*12,692*	*12,402*	*12,252*	*12,152*	*12,053*
Kane	279,160	317,470	359,950	404,119	440,560	482,589	526,441	548,614	571,721
Kankakee	103,200	96,260	102,050	103,833	106,371	108,261	110,595	114,295	118,119
Kendall	43,760	39,410	45,400	54,544	58,944	62,256	66,679	73,338	80,663
Knox	61,720	56,390	56,070	55,836	55,575	54,991	54,978	54,603	54,231
Lake	455,490	516,420	572,430	644,356	675,002	711,773	749,755	773,501	797,999
La Salle	111,870	106,910	109,960	111,509	111,545	110,996	110,996	111,657	112,322
Lawrence	18,490	15,970	15,920	15,452	15,100	14,666	14,431	14,265	14,100
Lee	35,710	34,390	35,800	36,062	35,694	35,589	35,547	36,129	36,721
Livingston	41,710	39,300	40,400	39,678	39,268	38,853	38,496	38,723	38,952
Logan	32,280	30,800	31,270	31,183	31,763	32,166	32,473	32,669	32,866
McDonough	38,160	35,240	35,520	32,913	33,478	34,022	34,496	34,815	35,138
McHenry	164,510	183,240	224,680	260,077	288,007	319,910	354,281	365,939	377,980
McLean	120,180	129,180	139,270	150,433	156,861	162,357	167,370	171,641	176,021
Macon	135,620	117,210	116,410	114,706	114,516	114,242	114,597	114,845	115,093
Macoupin[1]	*50,020*	*47,680*	*48,730*	*49,019*	*49,625*	*50,536*	*51,558*	*53,226*	*54,947*
Madison[1]	*240,500*	*249,240*	*256,460*	*258,941*	*264,230*	*268,794*	*273,635*	*282,720*	*292,107*
Marion[4]	*44,830*	*41,560*	*42,000*	*41,691*	*40,831*	*39,936*	*39,232*	*38,857*	*38,486*
Marshall	16,610	12,850	12,790	13,180	13,290	13,305	13,505	13,967	14,445
Mason	19,680	16,270	16,690	16,038	15,443	14,911	14,568	14,469	14,370

Table D1-A. Historical Estimates and Projections of Population - Illinois

County	USGS Historical Estimates				MTAC Study Projections				
	1985	1990	1995	2000	2005	2010	2015	2020	2025
Massac[7]	*16,120*	*14,750*	*15,370*	*15,161*	*15,376*	*15,520*	*15,827*	*16,414*	*17,022*
Menard	12,360	11,160	12,280	12,486	13,772	14,879	16,082	17,522	19,091
Mercer	20,010	17,290	17,440	16,957	16,590	16,264	16,089	16,088	16,087
Monroe[4]	*20,210*	*22,420*	*24,720*	*27,619*	*29,841*	*31,927*	*33,943*	*36,444*	*39,128*
Montgomery	32,230	30,730	30,990	30,652	30,611	30,160	29,971	29,687	29,406
Morgan	38,110	36,400	36,170	36,616	38,012	39,241	40,467	41,605	42,775
Moultrie	16,140	13,930	14,170	14,287	14,302	14,340	14,413	14,578	14,745
Ogle	46,380	45,960	49,410	51,032	50,683	50,119	49,863	50,005	50,147
Peoria	200,600	182,830	183,380	183,433	184,292	185,005	185,976	185,818	185,661
Perry[7]	*23,020*	*21,410*	*21,300*	*23,094*	*22,888*	*22,685*	*22,614*	*22,672*	*22,730*
Piatt	16,760	15,550	16,160	16,365	16,555	16,699	16,946	17,347	17,757
Pike	19,800	17,580	17,340	17,384	17,354	17,278	17,331	17,392	17,454
Pope[7]	*4,830*	*4,370*	*4,690*	*4,413*	*4,440*	*4,468*	*4,504*	*4,607*	*4,713*
Pulaski[8]	*8,870*	*7,520*	*7,460*	*7,348*	*7,396*	*7,416*	*7,461*	*7,573*	*7,686*
Putnam	6,060	5,730	5,720	6,086	6,145	6,151	6,185	6,231	6,278
Randolph	35,770	34,580	34,300	33,893	33,844	33,732	33,634	33,558	33,482
Richland	17,340	16,540	16,790	16,149	15,369	14,620	13,975	13,506	13,052
Rock Island	159,980	148,720	149,830	149,374	150,245	149,833	148,907	148,460	148,015
St Clair[4]	*267,890*	*262,850*	*265,420*	*256,082*	*265,016*	*273,978*	*281,126*	*288,685*	*296,447*
Saline[7]	*28,530*	*26,550*	*26,520*	*26,733*	*26,453*	*26,184*	*26,098*	*26,305*	*26,514*
Sangamon[1]	*176,600*	*178,390*	*184,730*	*188,951*	*194,971*	*198,763*	*201,954*	*204,173*	*206,415*
Schuyler	8,750	7,500	7,800	7,189	6,947	6,737	6,609	6,544	6,480
Scott[9]	*6,510*	*5,640*	*5,630*	*5,537*	*5,791*	*6,000*	*6,221*	*6,485*	*6,761*
Shelby	24,710	22,260	22,560	22,893	23,127	23,457	24,082	25,107	26,175
Stark	7,880	6,530	6,400	6,332	6,317	6,295	6,321	6,346	6,371
Stephenson	49,430	48,050	48,840	48,979	49,417	49,661	49,873	50,111	50,351
Tazewell	134,510	123,690	127,600	128,485	129,922	130,233	130,857	132,465	134,093
Union[8]	*17,850*	*17,620*	*18,110*	*18,293*	*18,351*	*18,395*	*18,558*	*18,748*	*18,940*
Vermilion	92,530	88,260	86,540	83,919	84,324	84,471	84,872	85,640	86,414
Wabash[10]	*14,030*	*13,110*	*12,930*	*12,937*	*12,891*	*12,834*	*12,960*	*13,187*	*13,417*
Warren[2]	*23,360*	*19,180*	*18,820*	*18,735*	*18,865*	*18,985*	*19,194*	*19,579*	*19,973*
Washington[4]	*16,550*	*14,960*	*15,240*	*15,148*	*15,664*	*16,164*	*16,797*	*17,678*	*18,606*
Wayne	18,540	17,240	17,210	17,151	17,008	16,803	16,743	16,778	16,814
White[7]	*18,870*	*16,520*	*15,900*	*15,371*	*14,899*	*14,459*	*14,131*	*13,844*	*13,562*
Whiteside	67,770	60,190	60,350	60,653	60,001	59,360	58,805	58,560	58,316
Will[5]	*351,120*	*357,310*	*413,380*	*502,266*	*573,500*	*652,809*	*736,050*	*791,645*	*851,438*
Williamson[7]	*57,360*	*57,730*	*59,750*	*61,296*	*61,413*	*61,310*	*61,648*	*62,270*	*62,899*
Winnebago	250,050	252,910	264,950	278,418	281,991	285,537	289,598	295,180	300,869
Woodford	35,030	32,650	34,580	35,469	36,869	38,226	40,238	42,756	45,431
Group 1	504,130	510,840	526,850	536,212	548,934	558,970	569,199	584,124	599,576
Group 2	134,330	120,580	122,830	122,296	123,566	123,523	124,081	125,434	126,821
Group 3	60,390	56,770	58,040	58,941	59,063	58,414	58,455	58,457	58,483
Group 4	382,120	375,730	382,660	376,075	387,367	398,584	408,528	420,100	432,137
Group 5	6,306,540	6,244,050	6,403,720	6,783,168	6,893,389	7,058,636	7,225,921	7,390,187	7,560,575
Group 6	190,500	192,480	188,900	199,591	206,133	215,380	221,359	227,019	232,831
Group 7	266,780	250,620	256,250	257,875	255,061	251,364	249,879	250,263	250,709
Group 8	39,090	35,770	35,750	35,231	35,141	35,026	35,218	35,494	35,773
Group 9	23,310	20,960	21,270	20,298	20,481	20,591	20,900	21,516	22,151
Group 10	21,840	20,550	20,190	19,908	19,650	19,389	19,402	19,549	19,700
All Counties	**11,584,900**	**11,430,590**	**11,829,960**	**12,419,293**	**12,678,976**	**12,998,740**	**13,334,404**	**13,628,351**	**13,933,698**

Note: Counties in *italics* are members of a county grouping. The number in the superscript indicates group membership.

Table D1-B. Historical Estimates and Projections of Population - Indiana

County	USGS Historical Estimates				MTAC Study Projections				
	1985	1990	1995	2000	2005	2010	2015	2020	2025
Adams	30,170	31,090	32,310	33,625	34,538	35,089	35,547	35,960	36,379
Allen	290,730	300,840	308,500	331,849	340,798	346,203	350,692	354,750	358,854
Bartholomew	64,970	63,660	68,060	71,435	73,480	74,715	75,741	76,668	77,606
Benton	6,920	9,440	9,700	9,421	9,473	9,504	9,531	9,555	9,580
Blackford	15,090	14,070	14,160	14,048	14,032	14,022	14,014	14,006	13,998
Boone	38,090	38,150	41,810	46,107	48,337	49,684	50,802	51,813	52,844
Brown[5]	*12,600*	*14,080*	*15,100*	*14,957*	*15,719*	*16,180*	*16,562*	*16,908*	*17,261*
Carroll	19,290	18,810	19,500	20,165	21,201	21,826	22,345	22,815	23,294
Cass	40,070	38,410	38,580	40,930	41,279	41,490	41,665	41,823	41,981
Clark[6]	*89,750*	*87,780*	*91,830*	*96,472*	*99,808*	*101,824*	*103,498*	*105,011*	*106,545*
Clay	24,770	24,700	26,310	26,556	27,130	27,477	27,765	28,026	28,290
Clinton	31,280	30,970	32,590	33,866	35,063	35,785	36,385	36,928	37,478
Crawford[2]	*10,090*	*9,910*	*10,440*	*10,743*	*10,859*	*10,929*	*10,987*	*11,039*	*11,092*
Daviess	28,790	27,530	28,600	29,820	30,678	31,196	31,627	32,016	32,409
Dearborn[1]	*36,770*	*38,830*	*44,370*	*46,109*	*49,566*	*51,653*	*53,388*	*54,955*	*56,568*
Decatur	23,680	23,640	25,000	24,555	25,501	26,073	26,548	26,977	27,413
De Kalb	33,670	35,320	37,960	40,285	42,197	43,351	44,310	45,177	46,060
Delaware	122,310	119,660	118,580	118,769	118,690	118,643	118,603	118,568	118,533
Dubois[2]	*35,680*	*36,610*	*38,730*	*39,674*	*40,615*	*41,184*	*41,656*	*42,083*	*42,515*
Elkhart	145,110	156,200	166,990	182,791	190,142	194,579	198,266	201,598	204,986
Fayette	27,680	26,010	26,430	25,588	25,747	25,843	25,923	25,995	26,067
Floyd[6]	*62,860*	*64,400*	*70,060*	*70,823*	*73,813*	*75,619*	*77,119*	*78,474*	*79,853*
Fountain	18,690	17,810	18,060	17,954	18,278	18,474	18,637	18,784	18,932
Franklin[1]	*20,390*	*19,580*	*20,960*	*22,151*	*23,084*	*23,647*	*24,114*	*24,537*	*24,967*
Fulton	18,890	18,840	19,920	20,511	21,250	21,696	22,067	22,402	22,743
Gibson[2]	*33,780*	*31,910*	*32,160*	*32,500*	*32,848*	*33,057*	*33,232*	*33,389*	*33,547*
Grant	77,430	74,170	73,720	73,403	73,246	73,151	73,074	73,002	72,930
Greene[3]	*30,480*	*30,410*	*32,700*	*33,157*	*34,132*	*34,720*	*35,210*	*35,651*	*36,099*
Hamilton	90,960	108,940	140,650	182,740	203,620	216,227	226,703	236,169	246,030
Hancock	44,370	45,530	50,770	55,391	58,799	60,857	62,567	64,112	65,696
Harrison[6]	*28,790*	*29,890*	*32,590*	*34,325*	*36,492*	*37,801*	*38,888*	*39,872*	*40,880*
Hendricks[5]	*73,570*	*75,720*	*86,620*	*104,093*	*112,970*	*118,329*	*122,782*	*126,806*	*130,962*
Henry	50,270	48,140	49,280	48,508	48,976	49,259	49,493	49,706	49,919
Howard	85,230	80,830	83,760	84,964	*85,761*	*86,242*	*86,643*	*87,004*	87,367
Huntington	35,380	35,430	36,810	38,075	*39,077*	*39,683*	*40,187*	*40,641*	41,101
Jackson	37,090	37,730	40,400	41,335	*42,929*	*43,892*	*44,692*	*45,414*	46,148
Jasper	26,590	24,960	27,900	30,043	*31,550*	*32,460*	*33,217*	*33,900*	34,597
Jay	22,080	21,510	21,900	21,806	22,046	22,192	22,312	22,420	22,529
Jefferson[4]	*29,690*	*29,800*	*30,810*	*31,705*	*32,797*	*33,457*	*34,006*	*34,502*	*35,005*
Jennings	22,780	23,660	26,170	27,554	29,178	30,159	30,974	31,711	32,465
Johnson[5]	*81,950*	*88,110*	*101,690*	*115,209*	*123,352*	*128,269*	*132,354*	*136,047*	*139,842*
Knox	41,980	39,880	40,190	39,256	39,841	40,194	40,488	40,752	41,019
Kosciusko	62,460	65,290	69,210	74,057	76,625	78,176	79,463	80,628	81,810
Lagrange	27,490	29,480	31,650	34,909	36,763	37,882	38,812	39,652	40,512
Lake	497,730	475,590	482,670	484,564	491,135	495,104	498,401	501,380	504,378
La Porte	106,110	107,070	110,380	110,106	111,248	111,938	112,511	113,029	113,550
Lawrence[2]	*42,380*	*42,840*	*45,100*	*45,922*	*47,208*	*47,985*	*48,630*	*49,212*	*49,801*
Madison	132,810	130,670	132,800	133,358	134,017	134,416	134,747	135,045	135,345
Marion[5]	*779,630*	*797,160*	*817,600*	*860,454*	*869,856*	*875,533*	*880,251*	*884,513*	*888,797*
Marshall	40,980	42,180	44,880	45,128	46,275	46,967	47,542	48,062	48,588
Martin	10,980	10,370	10,540	10,369	10,364	10,361	10,359	10,357	10,355
Miami	37,670	36,900	32,610	36,082	*37,523*	*38,393*	*39,115*	*39,769*	40,434
Monroe[5]	*101,320*	*108,980*	*115,210*	*120,563*	*124,141*	*126,301*	*128,096*	*129,718*	*131,361*
Montgomery	35,590	34,440	36,090	37,629	38,397	38,861	39,245	39,593	39,945
Morgan[5]	*54,370*	*55,920*	*62,120*	*66,689*	*71,168*	*73,871*	*76,117*	*78,148*	*80,232*
Newton	14,090	13,550	14,410	14,566	15,085	15,398	15,659	15,895	16,134
Noble	36,880	37,880	40,880	46,275	48,129	49,249	50,179	51,021	51,876
Ohio[4]	*5,400*	*5,310*	*5,400*	*5,623*	*5,716*	*5,773*	*5,819*	*5,862*	*5,905*
Orange[2]	*18,990*	*18,410*	*19,010*	*19,306*	*19,941*	*20,324*	*20,641*	*20,928*	*21,220*
Owen	16,580	17,280	19,660	21,786	22,671	23,206	23,651	24,052	24,461
Parke	16,080	15,410	16,090	17,241	17,729	18,024	18,269	18,491	18,715
Perry[2]	*19,190*	*19,110*	*19,130*	*18,899*	*19,403*	*19,709*	*19,962*	*20,190*	*20,421*
Pike[2]	*13,290*	*12,510*	*12,610*	*12,837*	*13,370*	*13,692*	*13,960*	*14,202*	*14,449*

Table D1-B. Historical Estimates and Projections of Population - Indiana

County	USGS Historical Estimates				MTAC Study Projections				
	1985	1990	1995	2000	2005	2010	2015	2020	2025
Porter	123,450	128,930	140,490	146,798	153,607	157,720	161,135	164,223	167,370
Posey	26,360	25,970	26,490	27,061	27,807	28,256	28,630	28,968	29,311
Pulaski	13,290	12,640	12,960	13,755	14,201	14,471	14,695	14,898	15,104
Putnam	29,900	30,310	32,940	36,019	37,366	38,180	38,855	39,466	40,086
Randolph	28,280	27,150	27,380	27,401	27,726	27,923	28,086	28,234	28,382
Ripley[1]	*25,280*	*24,610*	*26,830*	*26,523*	*27,510*	*28,106*	*28,602*	*29,049*	*29,503*
Rush	18,790	18,130	18,460	18,261	18,552	18,728	18,874	19,006	19,139
St. Joseph	214,850	247,050	258,080	265,559	271,137	274,504	277,301	279,830	282,381
Scott[6]	*20,490*	*20,990*	*22,570*	*22,960*	*23,743*	*24,216*	*24,609*	*24,965*	*25,326*
Shelby	39,680	40,310	42,810	43,445	44,847	45,693	46,397	47,033	47,677
Spencer[2]	*20,290*	*19,490*	*20,370*	*20,391*	*21,074*	*21,485*	*21,827*	*22,137*	*22,452*
Starke	21,190	22,750	22,620	23,556	24,647	25,305	25,852	26,347	26,852
Steuben	25,680	27,450	30,060	33,214	34,594	35,428	36,120	36,746	37,382
Sullivan[3]	*20,580*	*18,990*	*19,880*	*21,751*	*22,460*	*22,888*	*23,244*	*23,565*	*23,891*
Switzerland[4]	*7,300*	*7,740*	*8,220*	*9,065*	*9,704*	*10,090*	*10,410*	*10,699*	*10,997*
Tippecanoe	123,720	130,600	135,280	148,955	151,809	153,533	154,965	156,259	157,563
Tipton	16,190	16,120	16,460	16,577	16,763	16,876	16,969	17,054	17,139
Union	6,900	6,980	7,290	7,349	7,364	7,374	7,382	7,389	7,396
Vanderburgh[2]	*167,510*	*165,060*	*168,060*	*171,922*	*173,493*	*174,442*	*175,230*	*175,942*	*176,657*
Vermillion	17,690	16,770	16,840	16,788	17,296	17,603	17,857	18,087	18,321
Vigo	110,290	106,110	106,620	105,848	104,835	104,224	103,716	103,256	102,799
Wabash	34,990	35,070	34,900	34,960	35,146	35,259	35,352	35,436	35,521
Warren	8,590	8,180	8,390	8,419	8,570	8,662	8,737	8,806	8,875
Warrick[2]	*45,270*	*44,920*	*49,380*	*52,383*	*55,139*	*56,803*	*58,185*	*59,434*	*60,711*
Washington[2]	*22,190*	*23,720*	*26,090*	*27,223*	*28,764*	*29,695*	*30,467*	*31,166*	*31,880*
Wayne	73,160	71,950	72,800	71,097	71,755	72,152	72,482	72,780	73,079
Wells	24,180	25,950	26,510	27,600	28,395	28,873	29,272	29,632	29,996
White	23,490	23,260	24,500	25,267	25,740	26,025	26,262	26,476	26,691
Whitley	26,290	27,650	29,430	30,707	31,624	32,179	32,639	33,055	33,476
Group 1	82,440	83,020	92,160	94,783	100,160	103,405	106,104	108,541	111,038
Group 2	428,660	424,490	441,080	451,800	462,713	469,304	474,776	479,723	484,744
Group 3	51,060	49,400	52,580	54,908	56,593	57,608	58,454	59,217	59,990
Group 4	42,390	42,850	44,430	46,393	48,218	49,320	50,235	51,063	51,907
Group 5	1,103,440	1,139,970	1,198,340	1,281,965	1,317,207	1,338,484	1,356,163	1,372,140	1,388,454
Group 6	201,890	203,060	217,050	224,580	233,856	239,459	244,114	248,321	252,605
All Counties	**5,466,650**	**5,544,160**	**5,803,430**	**6,080,485**	**6,251,328**	**6,354,485**	**6,440,193**	**6,517,653**	**6,596,630**

Note: Counties in *italics* are members of a county grouping. The number in the superscript indicates group membership.

Table D1-C. Historical Estimates and Projections of Population - Michigan

County	USGS Historical Estimates				MTAC Study Projections				
	1985	1990	1995	2000	2005	2010	2015	2020	2025
Alcona	9,560	10,140	10,590	11,719	11,940	12,051	12,161	12,161	12,161
Alger	8,810	8,970	9,850	9,862	9,962	10,061	10,161	10,161	10,161
Allegan[4]	*84,180*	*90,510*	*97,690*	*105,665*	*110,299*	*115,243*	*120,392*	*125,439*	*130,696*
Alpena	30,190	30,600	30,840	31,314	31,109	30,802	30,291	29,677	29,075
Antrim	16,770	18,180	20,260	23,110	24,707	26,198	27,902	29,500	31,189
Arenac[1]	*15,150*	*14,930*	*16,150*	*17,269*	*17,989*	*18,708*	*19,325*	*19,942*	*20,578*
Baraga	8,310	7,950	8,490	8,746	8,538	8,434	8,330	8,225	8,123
Barry	46,440	50,060	52,640	56,755	58,522	60,185	61,641	62,784	63,949
Bay[1]	*117,120*	*111,720*	*111,530*	*110,157*	*109,367*	*108,082*	*106,403*	*104,526*	*102,682*
Benzie	11,120	12,200	13,660	15,998	16,881	17,874	18,646	19,529	20,453
Berrien	162,900	161,380	162,620	162,453	161,953	160,952	159,851	159,050	158,253
Branch	38,680	41,500	42,740	45,787	46,937	48,191	49,341	50,387	51,454
Calhoun	137,670	135,980	140,690	137,985	139,433	140,496	141,365	142,137	142,914
Cass	47,790	49,480	49,600	51,104	51,514	51,720	51,720	51,514	51,310
Charlevoix	19,690	21,470	23,050	26,090	27,674	29,470	31,266	33,061	34,960
Cheboygan	20,850	21,400	22,850	26,448	27,229	28,010	28,680	29,126	29,580
Chippewa	23,770	34,600	36,860	38,543	41,093	43,741	46,781	50,018	53,478
Clare	24,720	24,950	28,080	31,252	33,041	34,830	36,829	38,828	40,936
Clinton[3]	*55,250*	*57,880*	*61,660*	*64,753*	*66,081*	*67,000*	*67,511*	*67,715*	*67,920*
Crawford	9,810	12,260	13,520	14,273	15,614	16,955	18,488	20,021	21,680
Delta	39,420	37,780	38,660	38,520	38,619	38,818	38,917	39,116	39,315
Dickinson	25,290	26,830	27,180	27,472	27,572	27,773	27,973	28,174	28,376
Eaton[3]	*89,250*	*92,880*	*98,090*	*103,655*	*107,513*	*111,269*	*115,229*	*119,188*	*123,283*
Emmet	23,580	25,040	27,350	31,437	32,856	34,275	35,803	37,441	39,153
Genesee[5]	*433,930*	*430,460*	*436,380*	*436,141*	*433,949*	*429,565*	*423,785*	*417,508*	*411,323*
Gladwin	21,270	21,900	24,300	26,023	27,441	28,858	30,276	31,491	32,755
Gogebic	19,690	18,050	17,890	17,370	16,342	15,314	14,492	13,670	12,894
Grand Traverse	57,000	64,270	70,870	77,654	83,034	88,718	94,910	101,102	107,698
Gratiot	39,660	38,980	39,970	42,285	42,285	42,285	42,074	41,652	41,235
Hillsdale	41,660	43,430	45,220	46,527	47,825	49,123	50,321	51,519	52,746
Houghton[2]	*35,320*	*35,450*	*36,140*	*36,016*	*36,411*	*37,003*	*37,595*	*38,088*	*38,588*
Huron	35,970	34,950	35,220	36,079	35,771	35,462	35,154	34,846	34,540
Ingham[3]	*271,520*	*281,910*	*277,890*	*279,320*	*279,719*	*279,420*	*279,320*	*279,220*	*279,121*
Ionia	52,350	57,020	59,850	61,518	*62,722*	64,027	65,030	65,733	66,443
Iosco	29,440	30,210	24,480	27,339	*27,559*	27,778	27,998	28,327	28,660
Iron	14,000	13,180	13,180	13,138	*12,724*	12,310	12,000	11,586	11,187
Isabella	54,530	54,620	56,210	63,351	*64,778*	66,425	68,182	69,609	71,066
Jackson	145,220	149,760	154,010	158,422	160,444	162,163	163,780	165,196	166,623
Kalamazoo	215,140	223,410	227,970	238,603	242,787	246,257	249,523	252,584	255,684
Kalkaska	11,490	13,500	14,700	16,571	17,822	19,281	20,740	22,095	23,538
Kent[4]	*461,530*	*500,630*	*525,360*	*574,335*	*601,625*	*630,160*	*660,874*	*692,522*	*725,686*
Keweenaw[2]	*2,070*	*1,700*	*1,970*	*2,301*	*2,180*	*2,180*	*2,059*	*2,059*	*2,059*
Lake	8,420	8,580	9,660	11,333	11,889	12,555	13,333	14,111	14,934
Lapeer[5]	*69,010*	*74,770*	*83,850*	*87,904*	*93,594*	*99,186*	*104,484*	*109,389*	*114,525*
Leelanau	14,370	16,530	18,500	21,119	21,772	22,425	23,296	24,167	25,071
Lenawee	88,150	91,480	96,710	98,890	101,571	103,854	105,939	107,727	109,544
Livingston	100,590	115,640	133,600	156,951	172,667	188,594	205,682	224,140	244,256
Luce	5,960	5,760	5,600	7,024	7,024	7,024	6,899	6,773	6,650
Mackinac	10,220	10,670	10,980	11,943	12,577	13,423	14,585	16,171	17,928
Macomb[5]	*673,280*	*717,400*	*733,610*	*788,149*	*801,711*	*807,657*	*809,952*	*810,995*	*812,040*
Manistee	22,320	21,260	22,920	24,527	24,634	24,741	24,741	24,527	24,315
Marquette	72,400	70,890	65,440	64,634	*64,447*	63,979	63,231	62,389	61,558
Mason	24,190	25,540	27,490	28,274	28,481	28,792	29,103	29,206	29,310
Mecosta	37,210	37,310	37,720	40,553	41,292	42,243	42,982	43,721	44,473
Menominee	22,490	24,920	24,570	25,326	24,146	23,072	22,107	21,033	20,012
Midland[1]	*75,590*	*75,650*	*79,750*	*82,874*	*85,570*	*87,767*	*89,664*	*91,161*	*92,684*
Missaukee	10,550	12,150	13,520	14,478	15,483	16,489	17,695	18,701	19,763
Monroe[5]	*128,630*	*133,600*	*139,550*	*145,945*	*148,701*	*150,742*	*152,171*	*153,089*	*154,013*
Montcalm	49,730	53,060	57,870	61,266	63,802	66,439	68,975	71,409	73,930
Montmorency	7,750	8,940	9,680	10,315	11,366	12,607	14,040	15,473	17,051
Muskegon	152,530	158,980	164,460	170,200	171,427	172,655	173,780	174,700	175,626
Newaygo	36,210	38,200	43,590	47,874	51,059	54,654	58,661	62,668	66,948
Oakland[5]	*1,004,460*	*1,083,590*	*1,153,460*	*1,194,156*	*1,250,097*	*1,302,511*	*1,356,982*	*1,414,784*	*1,475,049*

Table D1-C. Historical Estimates and Projections of Population - Michigan

County	USGS Historical Estimates				MTAC Study Projections				
	1985	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**
Oceana	21,360	22,450	23,880	26,873	27,315	27,758	28,200	28,421	28,644
Ogemaw	17,410	18,680	20,560	21,645	23,578	25,510	27,636	29,762	32,051
Ontonagon	9,670	8,850	8,640	7,818	7,535	7,253	6,970	6,593	6,237
Osceola	20,120	20,150	21,760	23,197	23,818	24,440	25,061	25,579	26,107
Oscoda	6,900	7,840	8,680	9,418	10,211	11,103	11,996	12,987	14,060
Otsego	15,330	17,960	20,760	23,301	25,912	28,624	31,738	34,952	38,491
Ottawa[4]	*163,650*	*187,770*	*210,390*	*238,314*	*258,225*	*279,277*	*302,404*	*327,293*	*354,231*
Presque Isle	13,840	13,740	14,240	14,411	14,611	14,811	15,011	15,212	15,414
Roscommon	18,100	19,780	22,590	25,469	27,436	29,610	31,888	34,373	37,051
Saginaw[1]	*218,920*	*211,950*	*212,300*	*210,039*	*209,941*	*208,860*	*207,386*	*205,618*	*203,865*
St. Clair	126,940	145,610	154,230	164,235	171,146	177,752	184,256	190,456	196,864
St. Joseph	57,690	58,910	60,680	62,422	63,231	64,041	64,648	65,052	65,460
Sanilac	39,420	39,930	42,200	44,547	45,276	46,108	46,837	47,357	47,883
Schoolcraft	7,720	8,300	8,700	8,903	9,004	9,004	9,105	9,004	8,904
Shiawassee	68,550	69,770	72,080	71,687	72,179	72,179	71,785	71,096	70,413
Tuscola	55,250	55,500	57,490	58,266	59,063	59,660	60,059	60,059	60,059
Van Buren	66,490	70,060	74,590	76,263	80,236	84,403	88,667	92,833	97,196
Washtenaw[5]	*265,080*	*282,940*	*292,610*	*322,895*	*335,651*	*347,457*	*358,843*	*370,228*	*381,974*
Wayne[5]	*2,166,240*	*2,111,690*	*2,055,500*	*2,061,162*	*2,007,865*	*1,951,001*	*1,900,048*	*1,856,534*	*1,814,016*
Wexford	26,130	26,360	28,690	30,484	30,903	31,217	31,636	31,951	32,268
Group 1	426,780	414,250	419,730	420,339	422,866	423,417	422,778	421,247	419,809
Group 2	37,390	37,150	38,110	38,317	38,591	39,183	39,654	40,147	40,647
Group 3	416,020	432,670	437,640	447,728	453,313	457,689	462,059	466,123	470,324
Group 4	709,360	778,910	833,440	918,314	970,150	1,024,680	1,083,670	1,145,254	1,210,613
Group 5	4,740,630	4,834,450	4,894,960	5,036,352	5,071,567	5,088,119	5,106,264	5,132,527	5,162,940
All Counties	**9,006,980**	**9,295,280**	**9,549,360**	**9,938,444**	**10,118,307**	**10,278,948**	**10,445,592**	**10,618,220**	**18,804,394**

Note: Counties in *italics* are members of a county grouping. The number in the superscript indicates group membership.

Table D1-D. Historical Estimates and Projection of Population - Minnesota

County	USGS Historical Estimates				MTAC Study Projections				
	1985	1990	1995	2000	2005	2010	2015	2020	2025
Aitkin	13,390	12,430	13,440	15,300	14,410	14,760	15,170	15,410	15,540
Anoka[1]	*215,570*	*243,640*	*275,760*	*298,080*	*318,260*	*337,590*	*355,540*	*370,530*	*381,890*
Becker	31,130	27,880	29,120	30,000	30,410	30,720	31,010	31,120	30,890
Beltrami	33,940	34,380	37,930	39,650	40,590	41,340	41,370	41,280	41,050
Benton	27,030	30,190	32,950	34,230	39,590	42,450	44,890	46,980	48,650
Big Stone	7,930	6,290	5,900	5,820	5,300	4,990	4,760	4,570	4,360
Blue Earth	53,280	54,040	54,130	55,940	56,110	56,650	56,590	56,490	56,540
Brown	28,260	26,980	27,130	26,910	27,750	27,710	27,750	27,740	27,530
Carlton	28,530	29,260	30,420	31,670	31,110	31,020	30,920	30,720	30,250
Carver	40,660	47,920	59,220	70,210	72,940	80,460	87,910	95,360	102,320
Cass	21,350	21,790	24,740	27,150	26,220	27,050	27,710	28,180	28,350
Chippewa	14,820	13,230	13,110	13,090	12,170	11,710	11,350	10,960	10,510
Chisago	28,380	30,520	37,020	41,100	43,110	46,290	49,500	52,670	55,570
Clay	49,770	50,420	52,180	51,230	54,310	54,850	54,580	54,100	53,490
Clearwater	9,110	8,310	8,370	8,420	8,260	8,170	8,130	8,070	7,970
Cook	4,340	3,870	4,480	5,170	4,360	4,400	4,420	4,440	4,420
Cottonwood[2]	*13,830*	*12,690*	*12,370*	*12,170*	*12,010*	*11,650*	*11,300*	*10,970*	*10,600*
Crow Wing	42,900	44,250	49,780	55,100	54,470	56,700	58,460	59,730	60,530
Dakota	220,830	275,230	316,470	355,900	380,410	407,520	432,510	455,080	473,540
Dodge	15,260	15,730	16,700	17,730	17,350	17,530	17,760	17,950	17,970
Douglas	29,910	28,670	30,400	32,820	32,240	32,810	33,340	33,740	33,790
Faribault	18,720	16,940	16,430	16,180	15,280	14,680	14,240	13,850	13,410
Fillmore	21,610	20,780	20,750	21,120	20,040	19,720	19,600	19,500	19,290
Freeborn	34,960	33,060	31,930	32,580	31,030	30,280	29,690	29,020	28,190
Goodhue	40,000	40,690	42,300	44,130	43,600	44,490	45,940	47,290	48,170
Grant	7,180	6,250	6,220	6,290	5,810	5,560	5,380	5,220	5,060
Hennepin[1]	*960,610*	*1,032,430*	*1,053,470*	*1,116,200*	*1,097,610*	*1,106,900*	*1,109,570*	*1,103,090*	*1,086,950*
Houston	18,980	18,500	19,300	19,720	19,520	19,590	19,690	19,740	19,660
Hubbard	15,350	14,940	16,120	18,380	17,900	18,540	19,100	19,530	19,800
Isanti	26,080	25,920	28,290	31,290	31,360	32,240	33,120	33,910	34,310
Itasca	44,140	40,860	43,050	43,990	42,930	42,920	42,950	42,780	42,340
Jackson	13,450	11,680	11,780	11,270	11,310	11,050	10,870	10,670	10,420
Kanabec	12,590	12,800	13,580	15,000	13,820	14,210	14,830	15,430	15,880
Kandiyohi	39,900	38,760	40,790	41,200	*43,370*	44,200	45,010	45,630	45,860
Kittson[4]	*6,760*	*5,770*	*5,460*	*5,290*	*5,170*	*5,010*	*4,910*	*4,830*	*4,730*
Koochiching	16,600	16,300	15,980	14,360	*15,320*	15,000	14,640	14,200	13,580
Lac qui Parle	10,330	8,920	8,400	8,070	*7,850*	7,370	6,950	6,600	6,260
Lake	11,590	10,420	10,570	11,060	10,420	10,230	10,000	9,720	9,340
Lake of the Woods	3,890	4,080	4,490	4,520	4,470	4,470	4,490	4,520	4,490
Le Sueur	23,770	23,240	24,360	25,430	25,300	26,030	27,090	28,080	28,870
Lincoln[3]	*7,810*	*6,890*	*6,700*	*6,430*	*6,130*	*5,830*	*5,620*	*5,380*	*5,140*
Lyon[3]	*25,860*	*24,790*	*25,000*	*25,430*	*25,850*	*26,010*	*25,740*	*25,740*	*25,610*
McLeod	30,290	32,030	33,250	34,900	36,100	37,430	38,940	40,310	41,410
Mahnomen	5,620	5,040	5,150	5,190	4,980	4,950	4,990	5,010	5,030
Marshall[4]	*12,800*	*10,990*	*10,600*	*10,160*	*10,120*	*9,840*	*9,580*	*9,300*	*9,000*
Martin	24,400	22,910	22,490	21,800	21,840	21,580	21,570	21,550	21,360
Meeker	21,120	20,850	21,290	22,640	21,340	21,220	21,220	21,170	20,950
Mille Lacs	18,620	18,670	20,080	22,330	21,220	21,710	22,420	23,140	23,710
Morrison	30,110	29,600	30,180	31,710	31,190	31,220	31,390	31,470	31,280
Mower	39,590	37,390	37,310	38,600	36,790	36,400	36,100	35,680	35,100
Murray	11,230	9,660	9,510	9,170	8,870	8,490	8,180	7,860	7,530
Nicollet	28,190	28,080	29,720	29,770	*31,640*	32,000	32,050	32,000	31,780
Nobles[3]	*21,740*	*20,100*	*20,170*	*20,830*	*20,610*	*20,720*	*20,850*	*20,860*	*20,850*
Norman	9,200	7,980	7,720	7,440	7,380	7,130	6,920	6,700	6,470
Olmsted	98,030	106,470	112,620	124,280	122,490	125,440	127,840	129,490	130,000
Otter Tail	55,070	50,710	53,210	57,160	54,840	54,830	54,600	54,220	53,430
Pennington	13,880	13,310	13,370	13,580	13,370	13,390	13,410	13,370	13,230
Pine	20,970	21,260	22,880	26,530	23,920	24,650	25,650	26,550	27,230
Pipestone[3]	*11,300*	*10,490*	*10,340*	*9,900*	*9,830*	*9,530*	*9,290*	*9,060*	*8,780*
Polk	34,200	32,500	32,690	31,370	32,120	31,660	31,350	30,940	30,330
Pope	11,780	10,750	10,940	11,240	10,760	10,510	10,240	9,950	9,580
Ramsey[1]	*460,660*	*485,770*	*482,120*	*511,040*	*501,780*	*504,920*	*506,390*	*504,290*	*498,460*
Red Lake	5,150	4,530	4,420	4,300	4,210	4,030	3,900	3,800	3,670

Table D1-D. Historical Estimates and Projection of Population - Minnesota

County	USGS Historical Estimates				MTAC Study Projections				
	1985	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**
Redwood	18,720	17,250	16,950	16,820	16,500	16,100	15,790	15,490	15,110
Renville	19,470	17,670	17,280	17,150	16,690	16,180	15,790	15,430	15,000
Rice	47,430	49,180	51,930	56,670	56,390	57,290	58,120	58,560	58,700
Rock	10,600	9,810	9,840	9,720	9,210	8,910	8,710	8,540	8,300
Roseau	13,640	15,030	16,000	16,340	17,150	17,600	18,060	18,490	18,820
St. Louis	206,260	198,210	197,140	200,530	197,520	194,170	190,500	187,050	183,910
Scott	51,200	57,850	69,920	89,500	87,850	96,060	104,040	112,160	119,890
Sherburne	34,690	41,950	52,860	64,420	68,960	77,030	84,370	91,620	98,540
Sibley	15,700	14,370	14,720	15,360	14,180	14,170	14,360	14,590	14,700
Stearns	114,920	118,790	125,850	133,170	139,750	142,480	143,630	144,050	144,980
Steele	30,640	30,730	31,500	33,680	32,570	32,830	33,190	33,410	33,320
Stevens	11,260	10,630	10,420	10,050	10,850	10,590	10,290	10,050	9,840
Swift	12,640	10,720	10,780	11,960	10,990	11,060	11,130	11,110	11,010
Todd	25,650	23,360	23,990	24,430	22,920	22,670	22,720	22,710	22,500
Traverse	5,190	4,460	4,290	4,130	3,950	3,760	3,640	3,530	3,430
Wabasha	19,300	19,740	20,500	21,610	20,570	20,600	20,730	20,850	20,830
Wadena	13,880	13,150	13,170	13,710	13,490	13,410	13,250	13,030	12,730
Waseca	18,720	18,080	18,000	19,530	17,600	17,410	17,310	17,150	16,890
Washington	125,520	145,900	179,820	201,130	221,250	237,890	252,340	265,370	275,950
Watonwan[2]	*11,810*	*11,680*	*11,620*	*11,880*	*11,160*	*10,990*	*10,890*	*10,750*	*10,560*
Wilkin	8,350	7,520	7,400	7,140	6,980	6,800	6,670	6,550	6,380
Winona	46,980	47,830	48,560	49,990	50,760	50,730	50,620	50,350	50,060
Wright	63,280	68,710	78,620	89,990	89,840	95,160	100,480	105,550	109,820
Yellow Medicine	12,790	11,680	11,750	11,080	10,790	10,360	10,020	9,700	9,310
Group 1	1,636,840	1,761,840	1,811,350	1,925,319	1,917,650	1,949,410	1,971,500	1,977,910	1,967,300
Group 2	25,640	24,370	23,990	24,043	23,170	22,640	22,190	21,720	21,160
Group 3	66,710	62,270	62,210	62,581	62,420	62,090	61,500	61,040	60,380
Group 4	19,560	16,760	16,060	15,440	15,290	14,850	14,490	14,130	13,730
All Counties	**4,192,990**	**4,375,130**	**4,609,560**	**4,919,560**	**4,948,790**	**5,066,600**	**5,167,930**	**5,243,630**	**5,282,880**

Note: Counties in *italics* are members of a county grouping. The number in the superscript indicates group membership.

Table D1-E. Historical Estimates and Projections of Population - Ohio

County	USGS Historical Estimates				MTAC Study Projections				
	1985	1990	1995	2000	2005	2010	2015	2020	2025
Adams	24,700	25,370	27,670	27,330	28,943	29,993	31,196	32,447	33,748
Allen	109,100	109,760	109,400	108,473	107,266	107,064	107,668	108,275	108,886
Ashland	46,400	47,510	51,240	52,523	54,593	55,908	58,059	60,293	62,612
Ashtabula	101,700	99,820	102,360	102,728	105,790	108,358	112,112	115,995	120,013
Athens[1]	*58,000*	*59,550*	*60,690*	*62,223*	*63,143*	*63,960*	*64,777*	*65,605*	*66,444*
Auglaize	43,100	44,580	46,880	46,611	48,582	49,469	51,440	53,489	55,620
Belmont[2]	*81,800*	*71,070*	*70,380*	*70,226*	*69,057*	*66,826*	*65,764*	*64,718*	*63,689*
Brown	33,500	34,970	38,850	42,285	45,148	47,492	50,530	53,764	57,204
Butler[3]	*265,500*	*291,480*	*315,600*	*332,807*	*358,643*	*383,190*	*414,610*	*448,607*	*485,391*
Carroll	26,900	26,520	28,140	28,836	29,783	29,783	30,941	32,143	33,393
Champaign	33,500	36,020	37,690	38,890	39,394	40,301	40,502	40,705	40,908
Clark	147,600	147,550	147,730	144,742	144,452	146,000	146,871	147,747	148,628
Clermont	136,500	150,190	166,940	177,977	188,197	196,869	205,437	214,379	223,710
Clinton[4]	*34,800*	*35,420*	*38,020*	*40,543*	*43,109*	*46,843*	*50,227*	*53,856*	*57,747*
Columbiana	112,000	108,280	111,850	112,075	114,209	115,835	118,578	121,386	124,261
Coshocton	36,400	35,420	36,240	36,655	36,862	36,655	36,552	36,449	36,346
Crawford	49,000	47,870	47,730	46,966	46,156	45,245	44,436	43,640	42,859
Cuyahoga	1,460,600	1,412,140	1,398,170	1,393,978	1,385,348	1,386,770	1,414,182	1,442,136	1,470,643
Darke	53,900	53,620	54,320	53,309	53,608	53,608	54,206	54,810	55,422
Defiance	38,400	39,350	40,120	39,500	40,183	40,183	40,573	40,967	41,364
Delaware	57,300	66,930	78,960	109,989	123,371	135,603	151,372	168,975	188,625
Erie	77,900	76,780	78,800	79,551	80,568	80,873	82,094	83,333	84,591
Fairfield	95,800	103,460	117,560	122,759	133,178	141,471	151,546	162,338	173,899
Fayette	27,400	27,470	28,430	28,433	29,403	30,083	30,374	30,668	30,965
Franklin	893,800	961,440	1,011,020	1,068,978	1,105,158	1,154,137	1,188,201	1,223,270	1,259,375
Fulton	38,400	38,500	40,850	42,084	43,118	43,945	45,289	46,675	48,102
Gallia	30,100	30,950	32,580	31,069	31,069	31,734	31,544	31,355	31,167
Geauga	74,900	81,130	84,260	90,895	93,997	98,961	103,407	108,054	112,909
Greene	129,500	136,730	141,180	147,886	150,798	155,918	159,030	162,205	165,442
Guernsey	41,500	39,020	40,250	40,792	41,520	40,896	41,208	41,523	41,840
Hamilton[3]	*864,000*	*866,220*	*863,910*	*845,303*	*847,723*	*854,014*	*867,469*	*881,135*	*895,017*
Hancock	64,900	65,540	68,240	71,295	72,337	72,650	73,171	73,696	74,225
Hardin	31,700	31,110	31,560	31,945	32,048	31,636	31,430	31,225	31,022
Harrison[2]	*16,600*	*16,080*	*16,100*	*15,856*	*15,856*	*15,338*	*15,234*	*15,131*	*15,029*
Henry	28,200	29,110	29,810	29,210	29,883	30,555	31,324	32,112	32,920
Highland[4]	*34,200*	*35,730*	*39,240*	*40,875*	*43,591*	*46,048*	*49,054*	*52,256*	*55,667*
Hocking[1]	*24,700*	*25,530*	*28,000*	*28,241*	*29,821*	*31,352*	*33,068*	*34,878*	*36,788*
Holmes	30,100	32,850	36,160	38,943	42,377	45,583	49,917	54,663	59,860
Huron[6]	*55,000*	*56,240*	*58,610*	*59,487*	*61,679*	*62,875*	*64,270*	*65,696*	*67,153*
Jackson[5]	*29,900*	*30,230*	*31,930*	*32,641*	*33,931*	*34,724*	*35,717*	*36,737*	*37,787*
Jefferson	87,800	80,300	78,260	73,894	73,323	71,799	70,942	70,095	69,259
Knox	47,400	47,470	51,010	54,500	56,611	58,386	60,739	63,186	65,732
Lake	215,500	215,500	223,000	227,511	227,408	228,957	232,055	235,195	238,378
Lawrence	62,800	61,830	64,210	62,319	63,112	62,616	62,616	62,616	62,616
Licking	124,000	128,300	136,590	145,491	152,200	156,953	165,722	174,982	184,759
Logan	39,500	42,310	45,200	46,005	48,216	51,090	53,544	56,117	58,813
Lorain[6]	*271,300*	*271,130*	*281,450*	*284,664*	*295,964*	*300,628*	*312,582*	*325,010*	*337,933*
Lucas[7]	*464,000*	*462,360*	*455,020*	*455,054*	*452,477*	*452,873*	*455,946*	*459,040*	*462,154*
Madison	34,600	37,070	40,880	40,213	42,637	44,664	47,466	50,445	53,610
Mahoning[8]	*281,200*	*264,810*	*262,340*	*257,555*	*261,687*	*265,724*	*273,604*	*281,718*	*290,073*
Marion	66,400	64,270	65,780	66,217	65,365	63,236	62,172	61,125	60,096
Medina[6]	*116,000*	*122,350*	*135,740*	*151,095*	*161,939*	*172,140*	*185,580*	*200,069*	*215,689*
Meigs	23,700	22,990	24,070	23,072	24,143	24,630	25,798	27,021	28,303
Mercer	38,600	39,440	40,910	40,924	40,924	41,232	41,642	42,056	42,475
Miami	89,300	93,180	97,010	98,868	102,556	105,745	108,835	112,014	115,287
Monroe[2]	*16,400*	*15,500*	*15,390*	*15,180*	*14,767*	*14,147*	*13,528*	*12,935*	*12,369*
Montgomery	563,800	573,810	570,490	559,062	559,537	567,040	576,539	586,196	596,015
Morgan	14,100	14,190	14,600	14,897	15,207	15,725	16,449	17,206	17,999
Morrow	26,600	27,750	30,140	31,628	33,765	35,495	38,426	41,599	45,033
Muskingum	84,200	82,070	84,170	84,585	85,000	85,000	86,140	87,295	88,466
Noble	11,300	11,340	12,100	14,058	15,218	16,117	17,516	19,036	20,688
Ottawa	39,700	40,030	40,590	40,985	41,290	41,595	41,900	42,208	42,517
Paulding	20,700	20,490	20,440	20,293	20,490	20,194	20,096	19,998	19,900

Table D1-E. Historical Estimates and Projections of Population - Ohio

County	USGS Historical Estimates				MTAC Study Projections				
	1985	1990	1995	2000	2005	2010	2015	2020	2025
Perry[1]	*31,700*	*31,560*	*33,550*	*34,078*	*35,150*	*35,692*	*36,594*	*37,519*	*38,467*
Pickaway	42,800	48,260	52,510	52,727	55,664	58,079	61,962	66,104	70,524
Pike	24,000	24,250	26,780	27,695	29,093	29,981	31,511	33,120	34,811
Portage	137,500	142,590	148,700	152,061	155,189	159,023	162,050	165,135	168,279
Preble	38,500	40,110	42,170	42,337	43,916	45,199	46,975	48,822	50,740
Putnam	33,200	33,820	35,090	34,726	35,506	36,092	36,872	37,669	38,484
Richland	129,100	126,140	128,420	128,852	128,438	126,265	125,437	124,614	123,797
Ross	67,500	69,330	73,940	73,345	77,561	80,111	83,249	86,509	89,898
Sandusky	62,200	61,960	63,000	61,792	63,773	65,471	67,358	69,299	71,296
Scioto[5]	*84,500*	*80,330*	*81,410*	*79,195*	*81,019*	*81,307*	*82,363*	*83,432*	*84,516*
Seneca	61,400	59,730	60,370	58,683	57,242	55,286	53,432	51,641	49,910
Shelby	43,300	44,920	47,080	47,910	49,906	50,904	52,402	53,943	55,529
Stark	377,300	367,580	375,550	378,098	380,015	380,621	383,345	386,089	388,853
Summit	512,600	514,990	530,140	542,899	552,377	556,250	568,276	580,562	593,113
Trumbull[8]	*236,800*	*227,810*	*228,420*	*225,116*	*228,132*	*229,299*	*234,261*	*239,330*	*244,508*
Tuscarawas	85,400	84,090	87,320	90,914	92,415	91,772	93,058	94,363	95,686
Union	30,700	31,970	36,530	40,909	44,871	48,377	52,615	57,225	62,239
Van Wert	30,000	30,460	30,460	29,659	29,265	28,969	28,280	27,606	26,949
Vinton[5]	*11,500*	*11,100*	*12,070*	*12,806*	*13,645*	*13,928*	*14,683*	*15,479*	*16,319*
Warren[3]	*102,500*	*113,910*	*131,300*	*158,383*	*175,682*	*188,936*	*211,805*	*237,442*	*266,182*
Washington	64,800	62,250	63,840	63,251	62,209	60,125	58,458	56,837	55,261
Wayne	99,700	101,460	107,530	111,564	114,989	118,517	123,084	127,826	132,751
Williams	36,200	36,960	37,850	39,188	39,705	40,015	40,532	41,056	41,586
Wood[7]	*108,400*	*113,270*	*116,930*	*121,065*	*123,604*	*127,362*	*130,206*	*133,113*	*136,085*
Wyandot	22,400	22,250	22,730	22,908	22,593	22,067	21,542	21,029	20,528
Group 1	114,400	116,640	122,240	124,542	128,114	131,003	134,439	138,002	141,698
Group 2	114,800	102,650	101,870	101,262	99,680	96,311	94,526	92,785	91,087
Group 3	1,232,000	1,271,610	1,310,810	1,336,493	1,382,048	1,426,141	1,493,884	1,567,184	1,646,590
Group 4	69,000	71,150	77,260	81,418	86,700	92,891	99,281	106,112	113,414
Group 5	125,900	121,660	125,410	124,642	128,595	129,960	132,763	135,649	138,621
Group 6	442,300	449,720	475,800	495,246	519,582	535,644	562,432	590,775	620,776
Group 7	572,400	575,630	571,950	576,119	576,081	580,235	586,152	592,153	598,239
Group 8	518,000	492,620	490,760	482,671	489,819	495,023	507,865	521,048	534,581
All Counties	**10,752,200**	**10,847,130**	**11,150,550**	**11,353,140**	**11,589,687**	**11,814,381**	**12,143,564**	**12,490,266**	**12,855,748**

Note: Counties in *italics* are members of a county grouping. The number in the superscript indicates group membership.

Table D1-F. Historical Estimates and Projections of Population - Wisconsin

County	USGS Historical Estimates				MTAC Study Population Projections				
	1985	1990	1995	2000	2005	2010	2015	2020	2025
Adams	14,660	15,680	16,770	18,643	20,796	21,528	21,182	20,522	19,862
Ashland	16,780	16,310	16,610	16,866	17,120	17,461	17,486	17,425	17,364
Barron	41,040	40,750	41,770	44,963	46,067	47,401	47,428	47,075	46,721
Bayfield	13,910	14,010	14,300	15,013	15,432	15,830	15,787	15,493	15,198
Brown	185,260	194,590	209,080	226,778	237,515	248,529	252,937	256,688	260,440
Buffalo	14,260	13,580	13,650	13,804	14,057	14,364	14,447	14,427	14,407
Burnett	12,970	13,080	13,640	15,674	16,375	16,993	16,805	16,386	15,966
Calumet[2]	*33,330*	*34,290*	*36,850*	*40,631*	*44,182*	*47,398*	*48,231*	*48,751*	*49,272*
Chippewa	53,700	52,360	53,670	55,195	57,740	60,217	60,440	60,162	59,885
Clark	32,940	31,650	32,150	33,557	34,307	35,258	35,522	35,569	35,616
Columbia	43,680	45,090	47,220	52,468	54,434	56,366	56,597	56,477	56,358
Crawford	16,700	15,940	16,000	17,243	17,481	17,838	17,852	17,693	17,535
Dane	339,190	367,080	393,560	426,526	455,927	480,573	498,671	516,313	533,955
Dodge	76,890	76,560	79,920	85,897	88,192	90,565	91,307	91,491	91,676
Door	26,170	25,690	26,030	27,961	29,023	30,112	30,078	29,654	29,231
Douglas	42,680	41,760	42,230	43,287	43,973	44,734	44,612	44,282	43,952
Dunn	35,430	35,910	37,060	39,858	42,046	43,771	44,957	46,530	48,103
Eau Claire	83,740	85,180	87,830	93,142	97,679	101,580	105,936	110,875	115,814
Florence	4,290	4,590	4,830	5,088	5,220	5,348	5,404	5,403	5,402
Fond du Lac	90,130	90,080	93,390	97,296	100,163	103,031	103,484	103,344	103,205
Forest	9,370	8,780	9,000	10,024	10,182	10,350	10,411	10,476	10,542
Grant	52,300	49,260	49,400	49,597	50,778	51,517	51,770	51,799	51,829
Green	30,470	30,340	31,070	33,647	34,906	36,093	36,050	35,751	35,453
Green Lake	19,150	18,650	18,980	19,105	19,321	19,666	19,629	19,398	19,166
Iowa	20,190	20,150	21,090	22,780	23,527	24,333	24,489	24,491	24,493
Iron	6,460	6,150	6,240	6,861	6,841	6,830	6,716	6,534	6,353
Jackson	16,910	16,590	17,020	19,100	19,710	20,293	20,389	20,314	20,238
Jefferson	66,580	67,780	70,890	74,021	79,030	82,161	83,326	84,121	84,915
Juneau	21,920	21,650	22,680	24,316	25,640	27,677	27,736	27,533	27,329
Kenosha	121,160	128,180	136,830	149,577	157,935	165,678	169,334	172,882	176,429
Kewaunee	20,190	18,880	19,280	20,187	20,765	21,343	21,480	21,447	21,413
La Crosse	96,630	97,900	102,270	107,120	110,302	113,211	117,331	121,804	126,277
Lafayette	17,430	16,080	16,060	16,137	16,213	16,401	16,580	16,613	16,646
Langlade	20,320	19,510	20,240	20,740	21,165	21,616	21,501	21,194	20,888
Lincoln	26,800	26,990	28,170	29,641	30,018	30,511	30,448	30,159	29,869
Manitowoc	83,130	80,420	83,630	82,887	84,574	86,307	86,455	86,099	85,743
Marathon	111,940	115,400	122,100	125,834	130,242	134,504	136,540	137,844	139,148
Marinette	40,100	40,550	41,680	43,384	43,875	44,557	44,311	43,693	43,075
Marquette	12,580	12,320	12,990	15,832	15,052	15,579	15,581	15,351	15,121
Menominee	3,850	3,890	4,150	4,562	4,756	4,978	5,468	5,986	6,503
Milwaukee[1]	*964,990*	*959,270*	*965,260*	*940,164*	*956,478*	*973,363*	*997,426*	*1,020,988*	*1,044,550*
Monroe	36,180	36,630	37,840	40,899	42,780	44,684	45,126	45,363	45,599
Oconto	30,290	30,230	31,750	35,634	37,720	39,670	39,632	39,228	38,824
Oneida	32,630	31,680	33,470	36,776	37,515	38,284	37,590	36,407	35,225
Outagamie[2]	*134,100*	*140,510*	*150,050*	*160,971*	*170,939*	*180,260*	*183,834*	*186,669*	*189,503*
Ozaukee[1]	*67,460*	*72,830*	*77,730*	*82,317*	*85,047*	*87,238*	*88,212*	*88,974*	*89,737*
Pepin	7,510	7,110	7,180	7,213	7,631	8,121	8,055	7,924	7,793
Pierce	32,130	32,770	33,690	36,804	38,194	39,818	41,362	42,930	44,498
Polk	34,950	34,770	36,040	41,319	43,621	45,901	46,097	45,926	45,754
Portage	61,400	61,400	65,120	67,182	70,175	72,259	75,344	78,509	81,674
Price	16,290	15,600	16,000	15,822	15,797	15,831	15,637	15,326	15,015
Racine[1]	*169,190*	*175,030*	*183,360*	*188,831*	*193,189*	*197,662*	*200,482*	*202,600*	*204,717*
Richland	17,370	17,520	17,470	17,924	18,124	18,395	18,438	18,354	18,271
Rock	138,690	139,510	145,370	152,307	156,691	160,911	161,907	162,357	162,806
Rusk	15,610	15,080	15,230	15,347	15,564	15,854	15,837	15,715	15,593
St. Croix	46,550	50,250	53,400	63,155	72,377	80,779	82,223	83,220	84,218
Sauk	45,730	46,980	50,090	55,225	58,121	60,930	61,801	62,337	62,874
Sawyer	13,780	14,180	14,820	16,196	16,923	17,633	17,402	16,914	16,425
Shawano	36,780	37,160	37,820	40,664	41,815	42,987	42,624	42,092	41,560
Sheboygan	102,180	103,880	107,840	112,646	116,070	119,411	119,998	120,010	120,023
Taylor	19,540	18,900	19,140	19,680	19,793	19,998	20,265	20,397	20,529
Trempealeau	26,710	25,260	25,750	27,010	27,644	28,326	28,131	27,846	27,561
Vernon	26,340	25,620	26,070	28,056	29,115	30,232	30,359	30,289	30,218

Table D1-F. Historical Estimates and Projections of Population - Wisconsin

County	USGS Historical Estimates				MTAC Study Population Projections				
	1985	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**
Vilas	17,400	17,710	18,660	21,033	21,532	22,009	21,407	20,498	19,589
Walworth	72,200	75,000	80,410	93,759	96,182	100,634	103,085	105,489	107,893
Washburn	14,150	13,770	14,330	16,036	16,671	17,250	17,146	16,768	16,390
Washington	87,250	95,330	106,970	117,493	123,570	129,085	131,558	133,047	134,535
Waukesha[1]	*285,900*	*304,720*	*328,630*	*360,767*	*374,891*	*386,460*	*391,251*	*395,176*	*399,101*
Waupaca	44,740	46,100	48,430	51,731	52,995	54,263	53,975	53,297	52,618
Waushara	19,630	19,390	20,090	23,154	25,675	26,548	26,410	25,972	25,534
Winnebago	136,130	140,320	148,120	156,763	162,076	166,717	168,597	170,006	171,416
Wood	75,460	73,600	76,010	75,555	76,420	77,455	78,100	78,302	78,503
Group 1	1,487,540	1,511,850	1,554,980	1,572,079	1,609,605	1,644,723	1,677,371	1,707,738	1,738,106
Group 2	167,430	174,800	186,900	201,602	215,121	227,658	232,065	235,420	238,775
All Counties	**4,804,490**	**4,891,760**	**5,102,470**	**5,363,675**	**5,563,896**	**5,751,470**	**5,844,022**	**5,916,979**	**5,989,937**

Note: Counties in *italics* are members of a county grouping. The number in the superscript indicates group membership.

Table D2-A. Historical Estimates and Projections of Population Served - Illinois

County	USGS Historical Estimates				MTAC Study Projections				
	1985	1990	1995	2000	2005	2010	2015	2020	2025
Adams[2]	*64,150*	*60,970*	*65,200*	*61,960*	*62,988*	*63,005*	*63,169*	*63,372*	*63,576*
Alexander[8]	*10,920*	*9,710*	*9,580*	*8,590*	*8,416*	*8,255*	*8,239*	*8,217*	*8,194*
Bond[1]	*9,850*	*7,070*	*7,160*	*9,030*	*9,000*	*8,946*	*8,919*	*8,946*	*8,973*
Boone	18,560	17,630	23,170	26,970	27,206	27,392	27,739	27,968	28,198
Brown[2]	*3,090*	*2,810*	*4,950*	*5,450*	*5,540*	*5,591*	*5,634*	*5,668*	*5,703*
Bureau	30,530	24,630	20,870	17,190	16,982	16,761	16,606	16,468	16,331
Calhoun	2,080	1,300	2,030	1,310	1,285	1,263	1,263	1,278	1,294
Carroll	11,790	10,360	10,110	10,050	9,704	9,575	9,490	9,432	9,374
Cass	10,960	10,420	9,620	8,090	7,900	7,660	7,557	7,513	7,469
Champaign[6]	*135,910*	*141,980*	*166,880*	*166,020*	*172,086*	*180,881*	*186,479*	*191,580*	*196,821*
Christian	29,000	25,140	19,040	21,170	21,302	21,360	21,435	21,487	21,539
Clark	10,740	9,820	11,010	11,510	11,396	11,160	11,096	11,247	11,400
Clay[3]	*8,500*	*8,080*	*8,460*	*6,710*	*6,481*	*6,172*	*6,015*	*5,906*	*5,800*
Clinton[4]	*22,440*	*26,560*	*19,020*	*20,380*	*20,656*	*20,979*	*21,467*	*22,044*	*22,636*
Coles	41,250	45,270	50,890	46,540	47,979	49,507	51,229	53,372	55,604
Cook[5]	*4,795,240*	*5,099,990*	*5,132,290*	*5,371,360*	*5,391,518*	*5,450,688*	*5,508,858*	*5,591,867*	*5,676,127*
Crawford	15,230	13,230	6,800	10,570	10,217	9,893	9,629	9,393	9,162
Cumberland	4,980	4,450	5,050	4,680	4,788	4,916	5,110	5,437	5,786
De Kalb	70,960	54,350	67,890	70,190	74,113	78,221	81,220	83,898	86,665
De Witt	12,430	9,880	12,380	11,030	10,864	10,672	10,527	10,423	10,320
Douglas[6]	*14,110*	*11,240*	*13,060*	*12,920*	*12,905*	*12,729*	*12,678*	*12,768*	*12,859*
Du Page[5]	*619,660*	*680,130*	*849,190*	*882,500*	*900,858*	*926,927*	*952,124*	*977,091*	*1,002,712*
Edgar	13,930	12,460	12,440	11,770	11,488	11,190	10,972	10,925	10,878
Edwards[10]	*4,410*	*3,240*	*4,490*	*4,370*	*4,237*	*4,109*	*4,038*	*3,988*	*3,939*
Effingham[3]	*22,030*	*16,960*	*5,810*	*18,020*	*18,256*	*18,220*	*18,272*	*18,160*	*18,049*
Fayette	11,400	10,430	10,570	8,520	8,278	8,029	7,863	7,742	7,624
Ford	11,610	11,540	9,230	10,420	10,373	10,298	10,199	10,101	10,003
Franklin[7]	*32,100*	*32,870*	*39,200*	*37,520*	*36,479*	*35,374*	*34,875*	*34,980*	*35,086*
Fulton	29,980	31,310	28,580	25,700	25,059	24,450	24,040	23,905	23,770
Gallatin[7]	*6,410*	*5,570*	*5,080*	*3,860*	*3,815*	*3,783*	*3,819*	*3,865*	*3,912*
Greene[9]	*12,270*	*11,440*	*11,280*	*12,970*	*12,907*	*12,821*	*12,898*	*13,207*	*13,523*
Grundy	30,800	22,600	19,950	20,540	21,409	22,326	23,429	24,621	25,874
Hamilton[7]	*4,330*	*3,780*	*5,940*	*3,470*	*3,338*	*3,225*	*3,148*	*3,096*	*3,045*
Hancock[2]	*14,840*	*10,090*	*13,290*	*9,930*	*9,818*	*9,664*	*9,616*	*9,746*	*9,877*
Hardin[7]	*2,850*	*4,380*	*3,600*	*3,200*	*3,061*	*2,906*	*2,790*	*2,698*	*2,609*
Henderson[2]	*3,120*	*1,660*	*6,110*	*6,630*	*6,726*	*6,780*	*6,950*	*7,302*	*7,672*
Henry	44,650	36,650	39,060	38,420	*36,990*	*35,625*	*34,541*	*33,605*	*32,694*
Iroquois	22,030	19,840	23,760	23,830	23,391	22,872	22,660	22,520	22,380
Jackson	58,690	56,630	56,790	57,690	59,073	60,372	61,510	61,948	62,388
Jasper[3]	*4,450*	*3,020*	*7,600*	*7,120*	*7,240*	*7,304*	*7,502*	*7,819*	*8,149*
Jefferson[7]	*27,700*	*28,160*	*29,940*	*26,880*	*26,655*	*26,086*	*25,612*	*25,124*	*24,647*
Jersey[1]	*17,610*	*18,390*	*9,640*	*13,100*	*13,623*	*14,152*	*14,894*	*16,043*	*17,282*
Jo Daviess	14,380	11,280	7,700	12,160	12,232	12,342	12,433	12,584	12,736
Johnson[7]	*6,330*	*5,250*	*3,940*	*3,700*	*3,647*	*3,563*	*3,520*	*3,492*	*3,463*
Kane	225,360	279,370	358,450	402,500	438,795	480,655	524,332	546,416	569,430
Kankakee	79,540	66,210	71,020	79,550	81,495	82,942	84,731	87,566	90,495
Kendall	14,460	10,430	14,910	21,480	23,213	24,517	26,259	28,881	31,766
Knox	53,540	49,360	45,870	42,930	42,729	42,281	42,270	41,982	41,696
Lake	406,920	397,980	535,400	563,380	590,174	622,325	655,533	676,295	697,715
La Salle	96,040	92,080	83,680	84,510	84,538	84,121	84,121	84,622	85,126
Lawrence	11,340	10,930	11,190	9,980	9,753	9,473	9,321	9,213	9,107
Lee	28,820	23,340	19,950	30,020	*29,713*	*29,626*	*29,591*	*30,076*	*30,568*
Livingston	30,890	25,300	28,450	31,730	31,402	31,070	30,785	30,966	31,149
Logan	26,180	23,920	25,970	21,270	21,666	21,941	22,150	22,283	22,418
McDonough	29,590	29,560	30,400	28,170	28,654	29,119	29,525	29,798	30,074
McHenry	96,740	110,680	132,400	160,810	178,079	197,806	219,058	226,266	233,711
McLean	100,500	114,060	79,170	129,620	135,158	139,894	144,214	147,894	151,667
Macon	118,850	108,190	100,300	109,610	109,428	109,166	109,506	109,743	109,980
Macoupin[1]	*42,160*	*32,610*	*24,480*	*25,440*	*25,755*	*26,227*	*26,758*	*27,623*	*28,516*
Madison[1]	*236,670*	*233,410*	*151,330*	*152,940*	*156,064*	*158,759*	*161,619*	*166,985*	*172,529*
Marion[4]	*44,230*	*32,620*	*39,680*	*39,390*	*38,577*	*37,731*	*37,067*	*36,713*	*36,362*
Marshall	10,200	8,760	10,430	9,380	9,458	9,469	9,612	9,940	10,280
Mason	9,940	8,200	8,960	8,040	7,742	7,475	7,303	7,253	7,204

Table D2-A. Historical Estimates and Projections of Population Served - Illinois

County	USGS Historical Estimates				MTAC Study Projections				
	1985	1990	1995	2000	2005	2010	2015	2020	2025
Massac[7]	*12,180*	*11,290*	*1,290*	*2,200*	*2,231*	*2,252*	*2,297*	*2,382*	*2,470*
Menard	8,260	5,860	8,730	8,990	9,916	10,713	11,579	12,616	13,745
Mercer	11,030	7,650	10,120	6,280	6,144	6,023	5,958	5,958	5,958
Monroe[4]	*8,720*	*13,110*	*7,420*	*7,620*	*8,233*	*8,809*	*9,365*	*10,055*	*10,795*
Montgomery	23,880	19,120	22,880	21,650	21,621	21,303	21,169	20,968	20,770
Morgan	31,090	29,300	29,080	21,300	22,112	22,827	23,540	24,202	24,883
Moultrie	11,270	9,670	9,750	9,680	9,690	9,716	9,765	9,877	9,990
Ogle	27,980	25,400	28,020	29,030	28,831	28,511	28,365	28,446	28,527
Peoria	200,600	171,350	167,650	169,700	170,495	171,155	172,052	171,907	171,761
Perry[7]	*13,840*	*10,960*	*17,910*	*19,090*	*18,920*	*18,752*	*18,693*	*18,741*	*18,789*
Piatt	11,570	10,230	6,580	10,680	10,804	10,898	11,059	11,321	11,588
Pike	12,940	11,520	10,620	10,900	10,881	10,834	10,866	10,905	10,944
Pope[7]	*3,800*	*3,900*	*1,190*	*3,900*	*3,924*	*3,949*	*3,980*	*4,072*	*4,165*
Pulaski[8]	*5,350*	*4,560*	*3,840*	*3,350*	*3,372*	*3,381*	*3,402*	*3,452*	*3,504*
Putnam	5,160	3,910	4,110	4,590	4,635	4,639	4,664	4,700	4,735
Randolph	29,560	26,350	25,410	19,970	19,941	19,875	19,818	19,773	19,728
Richland	11,890	11,800	13,270	12,680	12,067	11,479	10,973	10,605	10,248
Rock Island	148,090	139,240	136,110	134,370	135,153	134,783	133,950	133,548	133,147
St Clair[4]	*201,710*	*222,340*	*210,870*	*201,080*	*208,095*	*215,132*	*220,745*	*226,680*	*232,775*
Saline[7]	*24,740*	*23,160*	*26,520*	*24,230*	*23,976*	*23,732*	*23,655*	*23,842*	*24,032*
Sangamon[1]	*134,970*	*159,510*	*143,120*	*149,840*	*154,614*	*157,621*	*160,152*	*161,911*	*163,689*
Schuyler	4,730	3,950	3,800	3,690	3,566	3,458	3,392	3,359	3,326
Scott[9]	*3,420*	*2,570*	*2,690*	*1,830*	*1,914*	*1,983*	*2,056*	*2,143*	*2,235*
Shelby	14,190	9,350	13,990	14,240	14,385	14,591	14,980	15,617	16,281
Stark	4,230	3,950	3,760	2,370	2,364	2,356	2,366	2,375	2,385
Stephenson	38,460	37,250	32,530	30,980	31,257	31,411	31,545	31,696	31,848
Tazewell	120,940	113,630	113,460	111,540	112,787	113,058	113,599	114,995	116,408
Union[8]	*11,600*	*11,350*	*1,730*	*2,700*	*2,708*	*2,715*	*2,739*	*2,767*	*2,795*
Vermilion	79,620	70,170	74,750	64,620	64,932	65,045	65,354	65,945	66,541
Wabash[10]	*10,360*	*9,540*	*9,560*	*9,320*	*9,287*	*9,246*	*9,337*	*9,500*	*9,666*
Warren[2]	*12,100*	*13,500*	*12,940*	*12,090*	*12,174*	*12,251*	*12,386*	*12,635*	*12,889*
Washington[4]	*14,640*	*12,070*	*5,350*	*3,320*	*3,433*	*3,543*	*3,682*	*3,875*	*4,078*
Wayne	6,470	8,710	2,410	9,290	9,213	9,101	9,069	9,088	9,108
White[7]	*10,760*	*11,600*	*11,410*	*8,500*	*8,239*	*7,996*	*7,814*	*7,655*	*7,499*
Whiteside	43,760	37,450	23,240	18,430	18,232	18,037	17,869	17,794	17,720
Will[5]	*254,190*	*240,740*	*281,210*	*371,200*	*423,846*	*482,459*	*543,978*	*585,066*	*629,256*
Williamson[7]	*55,570*	*55,870*	*41,310*	*41,300*	*41,379*	*41,310*	*41,537*	*41,957*	*42,380*
Winnebago	186,970	189,560	214,590	231,200	234,167	237,111	240,484	245,119	249,844
Woodford	21,640	18,600	21,500	13,370	13,898	14,409	15,168	16,117	17,125
Group 1	441,260	450,990	335,730	350,350	358,662	365,220	371,903	381,655	391,750
Group 2	97,300	89,030	102,490	96,060	97,058	97,024	97,462	98,525	99,614
Group 3	34,980	28,060	21,870	31,850	31,916	31,565	31,587	31,588	31,602
Group 4	291,740	306,700	282,340	271,790	279,950	288,057	295,244	303,607	312,306
Group 5	5,669,090	6,020,860	6,262,690	6,625,060	6,732,712	6,894,108	7,057,493	7,217,930	7,384,347
Group 6	150,020	153,220	179,940	178,940	184,805	193,095	198,455	203,530	208,740
Group 7	200,610	196,790	187,330	177,850	175,909	173,359	172,335	172,600	172,908
Group 8	27,870	25,620	15,150	14,640	14,603	14,555	14,635	14,749	14,865
Group 9	15,690	14,010	13,970	14,800	14,933	15,013	15,239	15,688	16,151
Group 10	14,770	12,780	14,050	13,690	13,513	13,333	13,342	13,443	13,547
All Counties	**9,832,550**	**10,059,670**	**10,395,410**	**10,915,910**	**11,128,110**	**11,399,105**	**11,679,221**	**11,927,025**	**12,183,566**

Note: Counties in *italics* are members of a county grouping. The number in the superscript indicates group membership.

Table D2-B. Historical Estimates and Projections of Population Served - Indiana

County	USGS Historical Estimates				MTAC Study Projections				
	1985	1990	1995	2000	2005	2010	2015	2020	2025
Adams	14,380	17,580	18,550	19,300	19,824	20,140	20,403	20,640	20,881
Allen	177,750	249,710	261,610	281,410	288,999	293,582	297,389	300,830	304,311
Bartholomew	39,620	40,490	47,170	49,510	50,927	51,783	52,494	53,137	53,787
Benton	6,090	5,940	6,250	6,070	6,103	6,124	6,141	6,156	6,172
Blackford	9,300	9,380	9,700	9,620	9,609	9,602	9,597	9,591	9,586
Boone	19,650	21,840	24,750	27,300	28,620	29,418	30,080	30,678	31,289
Brown[5]	*9,030*	*8,690*	*11,480*	*11,370*	*11,950*	*12,299*	*12,590*	*12,853*	*13,121*
Carroll	5,830	6,320	5,690	5,880	6,182	6,364	6,516	6,653	6,792
Cass	21,350	22,320	21,800	23,130	23,327	23,447	23,545	23,635	23,724
Clark[6]	*63,820*	*82,000*	*88,340*	*92,800*	*96,009*	*97,948*	*99,558*	*101,014*	*102,490*
Clay	17,930	16,370	17,790	17,960	18,348	18,583	18,778	18,954	19,132
Clinton	18,510	19,420	20,760	21,580	22,343	22,803	23,185	23,531	23,882
Crawford[2]	*4,670*	*4,720*	*6,860*	*7,060*	*7,136*	*7,182*	*7,220*	*7,255*	*7,290*
Daviess	16,380	19,210	20,740	21,620	22,242	22,618	22,930	23,212	23,497
Dearborn[1]	*20,860*	*30,930*	*37,850*	*39,330*	*42,278*	*44,059*	*45,539*	*46,875*	*48,251*
Decatur	12,640	12,920	13,980	13,720	14,249	14,568	14,834	15,073	15,317
De Kalb	18,840	21,020	22,550	23,920	25,055	25,741	26,310	26,824	27,349
Delaware	79,450	82,540	85,140	85,280	85,223	85,189	85,161	85,136	85,110
Dubois[2]	*28,640*	*30,190*	*34,820*	*35,660*	*36,506*	*37,017*	*37,442*	*37,826*	*38,213*
Elkhart	75,770	82,840	91,340	99,990	104,011	106,438	108,455	110,278	112,131
Fayette	18,590	18,940	19,560	18,940	19,057	19,129	19,188	19,241	19,294
Floyd[6]	*49,870*	*59,040*	*67,470*	*68,200*	*71,079*	*72,818*	*74,263*	*75,568*	*76,895*
Fountain	9,350	9,980	10,130	10,070	10,251	10,361	10,453	10,535	10,618
Franklin[1]	*6,790*	*8,840*	*10,630*	*11,230*	*11,703*	*11,988*	*12,225*	*12,440*	*12,658*
Fulton	6,620	7,130	8,740	9,000	9,324	9,520	9,683	9,830	9,979
Gibson[2]	*22,070*	*24,680*	*26,950*	*27,230*	*27,522*	*27,697*	*27,843*	*27,975*	*28,107*
Grant	50,850	52,550	52,270	52,040	51,929	51,862	51,806	51,756	51,705
Greene[3]	*17,350*	*22,480*	*26,360*	*26,730*	*27,516*	*27,990*	*28,385*	*28,741*	*29,102*
Hamilton	49,850	61,700	94,520	122,800	136,831	145,303	152,343	158,704	165,331
Hancock	15,170	18,940	20,920	22,820	24,224	25,072	25,776	26,413	27,066
Harrison[6]	*16,630*	*19,250*	*26,760*	*28,180*	*29,959*	*31,034*	*31,926*	*32,734*	*33,562*
Hendricks[5]	*22,240*	*30,510*	*37,510*	*45,070*	*48,914*	*51,234*	*53,162*	*54,904*	*56,704*
Henry	26,030	29,400	29,760	29,300	29,582	29,753	29,895	30,023	30,152
Howard	53,110	59,650	60,650	61,510	62,087	62,435	62,725	62,987	63,250
Huntington	20,460	22,630	23,520	24,330	24,971	25,358	25,679	25,970	26,263
Jackson	24,540	24,350	27,720	28,360	29,454	30,114	30,663	31,159	31,662
Jasper	6,360	8,320	9,040	9,730	10,218	10,513	10,758	10,979	11,205
Jay	8,940	12,220	12,350	12,300	12,436	12,517	12,585	12,646	12,708
Jefferson[4]	*25,770*	*26,610*	*28,440*	*29,260*	*30,268*	*30,877*	*31,384*	*31,841*	*32,306*
Jennings	13,870	15,880	19,520	20,550	21,761	22,493	23,101	23,650	24,213
Johnson[5]	*55,100*	*69,200*	*83,890*	*95,050*	*101,768*	*105,825*	*109,195*	*112,242*	*115,373*
Knox	41,280	31,270	33,280	32,510	32,995	33,286	33,530	33,749	33,970
Kosciusko	19,170	21,200	20,630	22,070	22,835	23,297	23,681	24,028	24,381
Lagrange	4,790	6,590	5,820	6,420	6,761	6,967	7,138	7,292	7,450
Lake	459,100	431,050	437,300	439,010	444,964	448,559	451,546	454,246	456,961
La Porte	66,540	68,940	69,650	69,480	70,201	70,636	70,998	71,325	71,653
Lawrence[2]	*32,980*	*35,160*	*40,180*	*40,910*	*42,056*	*42,748*	*43,322*	*43,841*	*44,366*
Madison	90,430	92,100	94,690	95,090	95,560	95,844	96,080	96,293	96,507
Marion[5]	*729,960*	*709,810*	*747,280*	*786,450*	*795,044*	*800,232*	*804,544*	*808,440*	*812,355*
Marshall	16,790	18,720	20,420	20,540	21,062	21,377	21,639	21,875	22,115
Martin	8,060	7,060	7,650	7,530	7,526	7,524	7,523	7,521	7,520
Miami	15,390	21,370	18,550	20,530	21,350	21,845	22,256	22,628	23,006
Monroe[5]	*71,600*	*99,550*	*109,330*	*114,410*	*117,805*	*119,856*	*121,559*	*123,098*	*124,656*
Montgomery	19,300	20,420	21,290	22,200	22,653	22,927	23,154	23,359	23,566
Morgan[5]	*24,860*	*28,850*	*35,600*	*38,210*	*40,776*	*42,325*	*43,612*	*44,775*	*45,970*
Newton	5,100	5,950	6,300	6,370	6,597	6,734	6,848	6,951	7,056
Noble	13,900	17,150	17,950	20,320	21,134	21,626	22,034	22,404	22,780
Ohio[4]	*4,690*	*4,780*	*4,840*	*5,040*	*5,123*	*5,174*	*5,216*	*5,254*	*5,293*
Orange[2]	*13,590*	*10,330*	*10,910*	*11,090*	*11,455*	*11,674*	*11,857*	*12,022*	*12,189*
Owen	7,290	6,360	7,330	8,130	8,460	8,660	8,826	8,976	9,128
Parke	8,000	8,240	7,900	8,460	8,700	8,844	8,964	9,073	9,183
Perry[2]	*11,270*	*14,330*	*15,820*	*15,630*	*16,047*	*16,300*	*16,509*	*16,698*	*16,889*
Pike[2]	*11,240*	*9,410*	*10,680*	*10,880*	*11,332*	*11,605*	*11,832*	*12,037*	*12,246*

Table D2-B. Historical Estimates and Projections of Population Served - Indiana

County	USGS Historical Estimates				MTAC Study Projections				
	1985	1990	1995	2000	2005	2010	2015	2020	2025
Porter	58,340	87,260	97,780	102,170	106,909	109,771	112,148	114,297	116,488
Posey	13,680	12,700	13,690	13,990	14,375	14,608	14,801	14,976	15,153
Pulaski	4,220	4,420	4,210	4,480	4,625	4,713	4,786	4,852	4,919
Putnam	15,880	16,770	19,600	21,430	22,231	22,715	23,117	23,481	23,850
Randolph	13,560	14,160	14,700	14,710	14,884	14,990	15,078	15,157	15,237
Ripley[1]	*12,240*	*13,690*	*18,380*	*18,170*	*18,846*	*19,254*	*19,594*	*19,900*	*20,212*
Rush	7,700	8,440	8,620	8,530	8,666	8,748	8,816	8,878	8,940
St. Joseph	153,370	179,910	184,270	189,610	193,592	195,996	197,994	199,799	201,621
Scott[6]	*16,700*	*17,810*	*20,940*	*21,310*	*22,036*	*22,476*	*22,840*	*23,171*	*23,506*
Shelby	16,220	18,450	20,080	20,370	21,028	21,424	21,754	22,052	22,354
Spencer[2]	*8,470*	*11,890*	*14,080*	*14,090*	*14,562*	*14,846*	*15,083*	*15,297*	*15,514*
Starke	5,820	5,930	5,250	5,470	5,723	5,876	6,003	6,118	6,235
Steuben	7,900	9,320	9,140	10,090	10,509	10,762	10,973	11,163	11,356
Sullivan[3]	*13,300*	*14,300*	*16,160*	*17,680*	*18,257*	*18,604*	*18,894*	*19,155*	*19,419*
Switzerland[4]	*4,730*	*5,650*	*6,570*	*7,240*	*7,751*	*8,059*	*8,314*	*8,545*	*8,783*
Tippecanoe	95,790	102,160	107,410	118,280	120,546	121,916	123,053	124,080	125,116
Tipton	6,690	7,790	8,130	8,190	8,282	8,338	8,383	8,425	8,468
Union	2,870	3,300	3,780	3,810	3,818	3,823	3,827	3,831	3,835
Vanderburgh[2]	*133,100*	*148,440*	*156,460*	*160,060*	*161,522*	*162,406*	*163,139*	*163,802*	*164,468*
Vermillion	13,130	13,290	13,520	13,480	13,888	14,134	14,338	14,523	14,711
Vigo	71,890	76,010	78,580	78,010	77,264	76,813	76,438	76,100	75,763
Wabash	20,240	21,580	21,290	21,330	21,444	21,512	21,569	21,621	21,672
Warren	3,170	2,740	2,850	2,860	2,911	2,942	2,968	2,992	3,015
Warrick[2]	*31,600*	*38,180*	*45,330*	*48,080*	*50,610*	*52,137*	*53,405*	*54,552*	*55,724*
Washington[2]	*7,540*	*13,490*	*17,740*	*18,510*	*19,558*	*20,191*	*20,716*	*21,191*	*21,677*
Wayne	48,680	53,700	54,310	53,040	53,531	53,827	54,073	54,295	54,519
Wells	10,050	12,600	13,120	13,660	14,053	14,290	14,488	14,666	14,846
White	10,460	11,290	10,040	10,360	10,554	10,671	10,768	10,856	10,944
Whitley	8,300	10,180	10,950	11,430	11,771	11,978	12,149	12,304	12,461
Group 1	39,890	53,460	66,860	68,730	72,629	74,982	76,939	78,706	80,517
Group 2	305,170	340,820	379,830	389,200	398,601	404,278	408,992	413,254	417,580
Group 3	30,650	36,780	42,520	44,410	45,773	46,594	47,278	47,895	48,520
Group 4	35,190	37,040	39,850	41,540	43,174	44,161	44,980	45,722	46,477
Group 5	912,790	946,610	1,025,090	1,090,560	1,120,540	1,138,640	1,153,680	1,167,271	1,181,150
Group 6	147,020	178,100	203,510	210,490	219,184	224,436	228,799	232,742	236,756
All Counties	**3,671,040**	**3,990,820**	**4,284,260**	**4,476,930**	**4,593,982**	**4,664,661**	**4,723,384**	**4,776,454**	**4,830,522**

Note: Counties in *italics* are members of a county grouping. The number in the superscript indicates group membership.

Table D2-C. Historical Estimates and Projections of Population Served - Michigan

County	USGS Historical Estimates				MTAC Study Projections				
	1985	1990	1995	2000	2005	2010	2015	2020	2025
Alcona	2,860	3,140	800	760	774	782	789	789	789
Alger	5,370	5,350	4,290	4,360	4,404	4,448	4,492	4,492	4,492
Allegan[4]	*42,320*	*51,320*	*28,140*	*30,090*	*31,410*	*32,817*	*34,284*	*35,721*	*37,218*
Alpena	8,150	18,430	15,950	21,260	21,121	20,913	20,565	20,148	19,740
Antrim	5,920	8,690	8,610	8,700	9,301	9,863	10,504	11,106	11,741
Arenac[1]	*1,840*	*4,340*	*6,860*	*8,650*	*9,010*	*9,371*	*9,680*	*9,989*	*10,307*
Baraga	4,000	3,860	3,570	4,110	4,012	3,963	3,914	3,865	3,817
Barry	25,220	34,200	13,630	14,760	15,220	15,652	16,031	16,328	16,631
Bay[1]	*67,930*	*73,180*	*91,870*	*89,840*	*89,195*	*88,148*	*86,778*	*85,247*	*83,743*
Benzie	4,930	6,270	4,320	4,260	4,495	4,759	4,965	5,200	5,446
Berrien	90,310	92,940	99,090	99,690	99,383	98,769	98,093	97,602	97,113
Branch	20,850	21,850	17,660	20,780	21,302	21,871	22,393	22,867	23,352
Calhoun	89,350	91,580	90,330	78,570	79,395	80,000	80,494	80,934	81,377
Cass	27,370	36,820	12,860	12,620	12,721	12,772	12,772	12,721	12,671
Charlevoix	6,800	8,450	12,780	12,640	13,408	14,278	15,148	16,017	16,937
Cheboygan	5,720	9,230	6,720	6,690	6,888	7,085	7,255	7,367	7,482
Chippewa	8,360	16,430	22,690	23,550	25,108	26,726	28,584	30,561	32,675
Clare	16,400	16,350	6,570	6,210	6,565	6,921	7,318	7,715	8,134
Clinton[3]	*30,730*	*33,490*	*22,910*	*17,380*	*17,736*	*17,983*	*18,120*	*18,175*	*18,230*
Crawford	1,790	2,320	2,830	2,520	2,757	2,994	3,264	3,535	3,828
Delta	20,890	17,740	19,650	19,080	19,129	19,228	19,277	19,375	19,474
Dickinson	13,370	14,580	19,730	19,740	19,812	19,956	20,100	20,244	20,389
Eaton[3]	*68,850*	*72,710*	*47,550*	*52,100*	*54,039*	*55,927*	*57,917*	*59,907*	*61,966*
Emmet	8,510	8,730	14,900	13,720	14,339	14,959	15,626	16,340	17,087
Genesee[5]	*424,410*	*336,780*	*322,180*	*281,940*	*280,523*	*277,689*	*273,953*	*269,895*	*265,897*
Gladwin	18,730	19,530	4,830	4,740	4,998	5,256	5,515	5,736	5,966
Gogebic	13,790	13,720	16,210	15,690	14,762	13,833	13,090	12,348	11,647
Grand Traverse	3,740	18,030	27,130	42,080	44,995	48,076	51,431	54,787	58,361
Gratiot	29,030	19,220	19,610	19,930	19,930	19,930	19,831	19,632	19,435
Hillsdale	20,790	22,960	14,730	15,030	15,449	15,869	16,256	16,643	17,039
Houghton[2]	*22,900*	*22,830*	*29,650*	*28,960*	*29,277*	*29,753*	*30,229*	*30,626*	*31,028*
Huron	25,300	12,880	15,440	16,310	16,171	16,031	15,892	15,752	15,614
Ingham[3]	*270,490*	*270,750*	*246,030*	*238,290*	*238,630*	*238,375*	*238,290*	*238,205*	*238,120*
Ionia	26,410	32,250	24,630	28,810	29,374	29,985	30,455	30,784	31,116
Iosco	10,480	21,890	14,770	15,240	15,362	15,485	15,607	15,791	15,977
Iron	8,660	11,500	11,950	12,250	11,864	11,478	11,189	10,803	10,431
Isabella	53,760	43,790	29,570	31,150	31,852	32,662	33,525	34,227	34,944
Jackson	67,060	109,070	82,570	98,730	99,990	101,061	102,069	102,951	103,841
Kalamazoo	124,660	198,070	204,400	207,670	211,312	214,332	217,174	219,839	222,536
Kalkaska	3,850	4,880	2,080	2,230	2,398	2,595	2,791	2,973	3,168
Kent[4]	*245,980*	*420,890*	*375,920*	*398,360*	*417,288*	*437,080*	*458,384*	*480,335*	*503,337*
Keweenaw[2]	*1,000*	*1,000*	*400*	*520*	*493*	*493*	*465*	*465*	*465*
Lake	2,940	3,240	1,040	1,710	1,794	1,894	2,012	2,129	2,253
Lapeer[5]	*64,800*	*63,830*	*18,660*	*21,680*	*23,083*	*24,463*	*25,769*	*26,979*	*28,246*
Leelanau	5,700	6,560	4,850	4,860	5,010	5,161	5,361	5,561	5,769
Lenawee	53,910	76,540	47,300	49,580	50,924	52,069	53,114	54,010	54,921
Livingston	90,210	62,260	30,300	41,440	45,590	49,795	54,306	59,180	64,491
Luce	4,010	3,940	2,990	3,150	3,150	3,150	3,094	3,038	2,982
Mackinac	3,140	7,400	3,230	3,510	3,696	3,945	4,287	4,752	5,269
Macomb[5]	*669,360*	*658,660*	*669,700*	*735,110*	*747,759*	*753,305*	*755,446*	*756,419*	*757,393*
Manistee	15,350	16,840	9,730	9,920	9,963	10,007	10,007	9,920	9,834
Marquette	39,500	42,900	61,080	46,960	46,824	46,484	45,941	45,329	44,725
Mason	9,190	10,540	12,160	11,490	11,574	11,700	11,827	11,869	11,911
Mecosta	15,240	21,300	13,930	13,830	14,082	14,406	14,658	14,910	15,167
Menominee	11,710	11,940	11,160	11,440	10,907	10,422	9,986	9,501	9,040
Midland[1]	*67,110*	*43,580*	*47,160*	*54,130*	*55,891*	*57,326*	*58,565*	*59,543*	*60,538*
Missaukee	4,100	5,080	1,650	1,510	1,615	1,720	1,846	1,950	2,061
Monroe[5]	*89,970*	*93,760*	*72,290*	*96,300*	*98,118*	*99,465*	*100,408*	*101,014*	*101,624*
Montcalm	22,260	27,060	16,830	17,400	18,120	18,869	19,589	20,281	20,997
Montmorency	2,090	2,160	990	1,060	1,168	1,296	1,443	1,590	1,752
Muskegon	110,970	139,220	107,520	112,820	113,634	114,447	115,193	115,803	116,417
Newaygo	13,170	14,430	8,800	9,570	10,207	10,925	11,726	12,527	13,383
Oakland[5]	*1,004,460*	*1,005,250*	*919,850*	*954,630*	*999,350*	*1,041,251*	*1,084,796*	*1,131,004*	*1,179,181*

Table D2-C. Historical Estimates and Projections of Population Served - Michigan

County	USGS Historical Estimates				MTAC Study Projections				
	1985	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**
Oceana	8,010	13,180	5,630	6,370	6,475	6,580	6,685	6,737	6,790
Ogemaw	14,310	14,970	3,080	2,320	2,527	2,734	2,962	3,190	3,435
Ontonagon	6,680	6,500	4,620	4,250	4,096	3,943	3,789	3,584	3,391
Osceola	4,170	4,960	5,910	5,540	5,688	5,837	5,985	6,109	6,235
Oscoda	1,860	2,800	330	840	911	990	1,070	1,158	1,254
Otsego	4,580	4,580	4,100	4,360	4,849	5,356	5,939	6,540	7,202
Ottawa[4]	*91,630*	*106,930*	*132,050*	*166,040*	*179,913*	*194,580*	*210,693*	*228,034*	*246,802*
Presque Isle	13,780	12,150	5,230	5,580	5,658	5,735	5,813	5,890	5,969
Roscommon	6,250	6,300	2,300	2,070	2,230	2,407	2,592	2,794	3,011
Saginaw[1]	*188,440*	*192,480*	*177,950*	*182,060*	*181,975*	*181,038*	*179,761*	*178,228*	*176,708*
St. Clair	123,690	140,940	102,640	111,180	115,858	120,330	124,734	128,930	133,268
St. Joseph	29,170	31,900	28,480	29,000	29,376	29,752	30,034	30,222	30,411
Sanilac	35,550	30,600	13,980	14,700	14,940	15,215	15,456	15,627	15,801
Schoolcraft	3,080	4,800	4,060	4,170	4,217	4,217	4,265	4,217	4,171
Shiawassee	62,270	63,860	31,780	31,010	31,223	31,223	31,053	30,754	30,459
Tuscola	46,910	46,550	14,910	15,710	15,925	16,086	16,193	16,193	16,193
Van Buren	37,270	43,190	23,550	23,940	25,187	26,495	27,834	29,142	30,511
Washtenaw[5]	*265,080*	*205,250*	*196,220*	*250,810*	*260,718*	*269,889*	*278,732*	*287,576*	*296,700*
Wayne[5]	*2,166,240*	*2,111,630*	*2,054,830*	*2,060,490*	*2,007,210*	*1,950,365*	*1,899,428*	*1,855,928*	*1,813,425*
Wexford	13,010	15,260	13,180	12,940	13,118	13,251	13,429	13,563	13,697
Group 1	325,320	313,580	323,840	334,680	336,072	335,883	334,784	333,007	331,297
Group 2	23,900	23,830	30,050	29,480	29,770	30,246	30,695	31,091	31,493
Group 3	370,070	376,950	316,490	307,770	310,406	312,285	314,327	316,287	318,316
Group 4	379,930	579,140	536,110	594,490	628,611	664,478	703,361	744,090	787,358
Group 5	4,684,320	4,475,160	4,253,730	4,400,960	4,416,762	4,416,426	4,418,532	4,428,815	4,442,465
All Counties	**7,370,050**	**7,607,360**	**6,902,460**	**7,165,490**	**7,250,749**	**7,318,290**	**7,390,327**	**7,469,768**	**7,556,951**

Note: Counties in *italics* are members of a county grouping. The number in the superscript indicates group membership.

Table D2-D. Historical Estimates and Projection of Population Served - Minnesota

County	USGS Historical Estimates				MTAC Study Projections				
	1985	1990	1995	2000	2005	2010	2015	2020	2025
Aitkin	4,440	2,210	1,400	2,470	2,326	2,383	2,449	2,488	2,509
Anoka[1]	*128,400*	*147,360*	*171,120*	*219,040*	*233,866*	*248,070*	*261,260*	*272,275*	*280,623*
Becker	9,280	9,700	8,410	8,730	8,849	8,940	9,024	9,056	8,989
Beltrami	12,290	12,290	15,350	16,060	16,441	16,745	16,757	16,720	16,627
Benton	11,870	12,800	17,530	21,630	25,020	26,827	28,369	29,690	30,746
Big Stone	4,960	4,660	2,820	4,430	4,034	3,798	3,623	3,479	3,319
Blue Earth	37,250	37,570	35,970	40,920	41,044	41,439	41,395	41,322	41,358
Brown	24,860	20,560	19,500	20,830	21,479	21,448	21,479	21,472	21,309
Carlton	13,230	13,750	12,620	14,480	14,224	14,182	14,137	14,045	13,830
Carver	28,640	30,630	42,050	56,190	58,379	64,398	70,361	76,323	81,894
Cass	4,000	3,880	1,230	3,020	2,917	3,009	3,082	3,135	3,153
Chippewa	11,720	11,290	10,030	10,920	10,154	9,770	9,470	9,144	8,769
Chisago	11,000	12,670	15,830	15,440	16,195	17,389	18,595	19,786	20,875
Clay	43,140	39,380	43,150	46,410	49,201	49,690	49,446	49,011	48,458
Clearwater	2,130	2,130	1,430	2,430	2,383	2,357	2,345	2,328	2,299
Cook	1,440	1,330	1,220	1,220	1,029	1,039	1,043	1,048	1,043
Cottonwood[2]	*10,560*	*10,730*	*9,560*	*8,160*	*8,055*	*7,813*	*7,579*	*7,357*	*7,109*
Crow Wing	21,920	18,380	18,260	23,210	22,945	23,884	24,626	25,161	25,498
Dakota	163,210	199,310	272,900	328,890	351,536	376,588	399,681	420,538	437,597
Dodge	8,100	8,210	7,320	10,310	10,088	10,193	10,327	10,437	10,449
Douglas	10,630	10,710	9,260	11,850	11,640	11,846	12,037	12,182	12,200
Faribault	15,050	12,500	8,580	10,840	10,236	9,834	9,540	9,278	8,984
Fillmore	10,520	11,970	8,200	10,350	9,820	9,663	9,604	9,555	9,452
Freeborn	23,700	24,310	20,480	22,640	21,560	21,039	20,629	20,164	19,587
Goodhue	23,700	23,960	26,390	28,280	27,942	28,513	29,442	30,307	30,871
Grant	3,910	4,040	1,200	3,430	3,169	3,032	2,934	2,847	2,760
Hennepin[1]	*570,440*	*709,130*	*1,044,300*	*1,097,390*	*1,079,113*	*1,088,247*	*1,090,872*	*1,084,501*	*1,068,633*
Houston	12,340	8,630	8,640	10,880	10,771	10,809	10,865	10,892	10,848
Hubbard	3,090	2,610	2,860	3,640	3,546	3,672	3,783	3,869	3,922
Isanti	4,940	7,710	10,640	9,120	9,141	9,398	9,654	9,885	10,001
Itasca	15,820	15,890	12,630	15,900	15,516	15,513	15,523	15,462	15,303
Jackson	9,050	7,030	5,460	6,370	6,394	6,247	6,145	6,032	5,891
Kanabec	3,220	3,320	3,410	3,520	3,244	3,336	3,481	3,622	3,728
Kandiyohi	23,700	25,110	22,420	28,460	29,957	30,530	31,090	31,518	31,677
Kittson[4]	*3,200*	*2,980*	*1,870*	*880*	*861*	*834*	*818*	*804*	*788*
Koochiching	9,840	10,490	10,000	9,270	9,893	9,687	9,454	9,170	8,770
Lac qui Parle	4,780	5,070	3,650	3,900	3,795	3,563	3,360	3,191	3,026
Lake	7,660	6,870	5,570	5,760	5,428	5,329	5,209	5,063	4,865
Lake of the Woods	1,390	1,170	1,150	1,150	1,137	1,137	1,142	1,149	1,142
Le Sueur	14,400	12,110	10,800	12,200	12,140	12,490	12,998	13,473	13,853
Lincoln[3]	*3,680*	*3,240*	*550*	*6,360*	*6,064*	*5,767*	*5,560*	*5,322*	*5,085*
Lyon[3]	*18,110*	*17,460*	*15,750*	*16,650*	*16,928*	*17,033*	*16,856*	*16,856*	*16,771*
McLeod	19,340	24,540	20,830	25,330	26,202	27,168	28,264	29,258	30,057
Mahnomen	1,280	1,290	1,350	1,270	1,219	1,211	1,221	1,226	1,231
Marshall[4]	*9,330*	*8,420*	*6,430*	*3,430*	*3,418*	*3,324*	*3,236*	*3,141*	*3,040*
Martin	17,260	17,200	14,860	16,490	16,519	16,322	16,315	16,299	16,156
Meeker	10,720	10,110	8,680	10,530	9,924	9,868	9,868	9,845	9,742
Mille Lacs	7,650	6,860	6,090	8,130	7,726	7,904	8,163	8,425	8,632
Morrison	11,640	10,980	8,610	13,840	13,612	13,625	13,699	13,734	13,651
Mower	28,760	28,360	22,400	26,760	25,503	25,233	25,025	24,734	24,332
Murray	5,740	5,400	4,200	4,280	4,142	3,965	3,820	3,671	3,516
Nicollet	19,750	20,420	20,600	23,430	24,901	25,184	25,224	25,184	25,011
Nobles[3]	*14,620*	*13,970*	*12,770*	*14,280*	*14,128*	*14,203*	*14,292*	*14,299*	*14,292*
Norman	4,760	3,750	2,700	4,130	4,096	3,957	3,840	3,718	3,591
Olmsted	69,780	72,260	83,880	97,060	95,664	97,968	99,843	101,131	101,530
Otter Tail	34,520	34,090	21,130	21,410	20,541	20,538	20,451	20,309	20,013
Pennington	10,540	10,150	8,530	8,980	8,839	8,852	8,865	8,839	8,746
Pine	4,990	5,990	3,530	5,900	5,320	5,482	5,704	5,904	6,056
Pipestone[3]	*6,610*	*7,030*	*10,260*	*8,780*	*8,722*	*8,456*	*8,243*	*8,039*	*7,791*
Polk	14,630	17,190	18,640	21,050	21,554	21,245	21,037	20,762	20,353
Pope	4,130	4,130	3,720	4,410	4,223	4,125	4,019	3,905	3,760
Ramsey[1]	*460,660*	*485,770*	*477,850*	*489,870*	*480,998*	*484,008*	*485,417*	*483,404*	*477,816*
Red Lake	2,620	2,620	2,190	2,150	2,105	2,015	1,950	1,900	1,835

Table D2-D. Historical Estimates and Projection of Population Served - Minnesota

County	USGS Historical Estimates				MTAC Study Projections				
	1985	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**
Redwood	11,140	10,800	6,860	10,390	10,195	9,948	9,757	9,571	9,336
Renville	11,630	11,450	8,490	9,190	8,941	8,668	8,459	8,266	8,036
Rice	27,730	33,830	30,810	40,870	40,672	41,321	41,919	42,237	42,338
Rock	7,900	7,810	7,960	5,830	5,524	5,344	5,224	5,122	4,978
Roseau	5,050	5,520	4,880	5,690	5,973	6,130	6,290	6,439	6,554
St. Louis	160,980	163,400	167,510	183,610	180,856	177,788	174,428	171,269	168,394
Scott	32,220	37,800	47,940	66,280	65,060	71,140	77,049	83,063	88,788
Sherburne	11,820	9,990	13,420	21,170	22,663	25,315	27,727	30,110	32,384
Sibley	7,510	7,430	5,860	7,770	7,175	7,170	7,266	7,382	7,438
Stearns	74,130	79,750	72,280	91,300	95,814	97,686	98,474	98,762	99,400
Steele	22,080	22,520	22,240	24,520	23,712	23,901	24,163	24,323	24,258
Stevens	7,540	7,440	5,900	7,200	7,771	7,585	7,370	7,198	7,047
Swift	6,820	6,660	4,840	6,940	6,379	6,420	6,461	6,449	6,391
Todd	9,550	7,570	6,230	8,780	8,239	8,149	8,167	8,163	8,088
Traverse	3,200	3,090	1,830	2,550	2,437	2,319	2,245	2,177	2,116
Wabasha	11,130	11,690	7,890	12,690	12,079	12,097	12,173	12,244	12,232
Wadena	6,930	6,990	6,350	6,580	6,473	6,435	6,358	6,252	6,108
Waseca	11,750	11,700	11,670	13,580	12,240	12,108	12,039	11,928	11,747
Washington	82,610	92,070	127,430	158,530	174,389	187,504	198,894	209,164	217,503
Watonwan[2]	*10,410*	*7,990*	*6,860*	*7,820*	*7,349*	*7,237*	*7,171*	*7,079*	*6,953*
Wilkin	5,030	5,010	3,710	4,710	4,606	4,487	4,401	4,322	4,210
Winona	33,700	33,770	33,510	36,160	36,721	36,699	36,619	36,424	36,214
Wright	28,760	24,910	31,610	40,430	40,364	42,755	45,145	47,423	49,341
Yellow Medicine	4,730	5,480	4,460	7,710	7,508	7,209	6,972	6,750	6,478
Group 1	1,159,500	1,342,260	1,693,270	1,806,300	1,799,105	1,828,902	1,849,626	1,855,640	1,845,686
Group 2	20,970	18,720	16,420	15,980	15,400	15,048	14,748	14,436	14,064
Group 3	43,020	41,700	39,330	46,070	45,951	45,709	45,274	44,936	44,450
Group 4	12,530	11,400	8,300	4,310	4,268	4,145	4,045	3,944	3,833
All Counties	**2,699,290**	**2,930,350**	**3,341,300**	**3,765,440**	**3,790,954**	**3,877,549**	**3,949,313**	**3,999,805**	**4,022,093**

Note: Counties in *italics* are members of a county grouping. The number in the superscript indicates group membership.

Table D2-E. Historical Estimates and Projections of Population Served - Ohio

County	USGS Historical Estimates				MTAC Study Projections				
	1985	1990	1995	2000	2005	2010	2015	2020	2025
Adams	15,470	19,400	21,030	23,880	25,290	26,207	27,258	28,351	29,488
Allen	85,810	86,560	86,430	92,480	91,451	91,279	91,794	92,311	92,832
Ashland	26,710	29,030	31,260	27,510	28,594	29,283	30,409	31,579	32,795
Ashtabula	71,600	80,650	82,910	80,600	83,003	85,018	87,963	91,010	94,162
Athens[1]	*46,700*	*50,460*	*51,590*	*52,730*	*53,509*	*54,202*	*54,895*	*55,596*	*56,307*
Auglaize	26,610	27,390	28,590	28,260	29,455	29,993	31,188	32,430	33,722
Belmont[2]	*77,150*	*71,070*	*70,380*	*71,620*	*69,057*	*66,826*	*65,764*	*64,718*	*63,689*
Brown	22,030	29,640	33,020	37,870	40,434	42,533	45,255	48,150	51,231
Butler[3]	*261,290*	*255,020*	*274,570*	*322,910*	*347,978*	*371,795*	*402,281*	*435,266*	*470,956*
Carroll	6,700	6,740	7,040	7,710	7,963	7,963	8,273	8,594	8,928
Champaign	17,320	17,790	18,470	18,940	19,185	19,627	19,725	19,824	19,923
Clark	112,910	106,060	106,370	110,430	110,209	111,390	112,054	112,722	113,395
Clermont	94,510	144,850	160,260	150,600	159,248	166,586	173,836	181,402	189,298
Clinton[4]	*21,060*	*24,440*	*26,230*	*26,360*	*28,028*	*30,456*	*32,656*	*35,016*	*37,546*
Columbiana	63,440	65,820	68,230	68,720	70,028	71,025	72,707	74,429	76,192
Coshocton	18,550	19,950	20,290	21,230	21,350	21,230	21,170	21,111	21,051
Crawford	32,840	34,050	33,890	31,970	31,419	30,799	30,247	29,706	29,174
Cuyahoga	1,460,600	1,412,140	1,398,170	1,393,970	1,385,348	1,386,770	1,414,182	1,442,136	1,470,643
Darke	24,740	25,410	25,530	25,140	25,281	25,281	25,563	25,848	26,136
Defiance	23,100	24,280	24,870	25,050	25,483	25,483	25,730	25,980	26,232
Delaware	32,330	47,520	56,060	101,870	114,264	125,593	140,198	156,502	174,702
Erie	76,610	76,770	78,800	83,250	80,568	80,873	82,094	83,333	84,591
Fairfield	54,550	63,550	71,710	75,470	81,876	86,974	93,167	99,802	106,910
Fayette	16,780	16,020	16,490	16,790	17,363	17,764	17,936	18,110	18,285
Franklin	893,800	961,430	1,011,020	1,064,720	1,105,158	1,154,137	1,188,201	1,223,270	1,259,375
Fulton	19,520	20,000	21,240	22,660	23,217	23,662	24,386	25,132	25,901
Gallia	24,300	30,810	32,580	32,990	31,069	31,734	31,544	31,355	31,167
Geauga	13,380	15,940	16,850	19,800	20,476	21,557	22,526	23,538	24,595
Greene	85,690	119,060	122,830	129,640	132,192	136,681	139,409	142,192	145,030
Guernsey	34,730	29,670	30,590	33,480	34,078	33,565	33,822	34,080	34,340
Hamilton[3]	*846,830*	*851,820*	*846,630*	*835,520*	*837,912*	*844,131*	*857,429*	*870,937*	*884,658*
Hancock	43,890	44,360	46,400	44,030	44,674	44,867	45,189	45,513	45,839
Hardin	18,040	19,780	20,200	18,830	18,891	18,648	18,526	18,406	18,286
Harrison[2]	*11,480*	*10,650*	*10,630*	*10,890*	*10,890*	*10,534*	*10,463*	*10,392*	*10,322*
Henry	14,550	15,090	15,500	16,080	*16,450*	16,821	17,244	17,677	18,122
Highland[4]	*29,570*	*33,810*	*37,280*	*36,730*	*39,171*	*41,378*	*44,080*	*46,957*	*50,022*
Hocking[1]	9,160	8,970	9,800	11,880	*12,545*	13,189	13,911	14,672	15,475
Holmes	7,410	8,370	9,040	8,930	9,717	10,453	11,447	12,535	13,727
Huron[6]	*37,380*	*37,530*	*39,270*	*49,620*	*51,449*	*52,446*	*53,610*	*54,799*	*56,015*
Jackson[5]	*23,480*	*24,980*	*26,490*	*26,470*	*27,516*	*28,160*	*28,964*	*29,792*	*30,643*
Jefferson	75,720	64,620	62,610	61,710	61,233	59,960	59,245	58,538	57,839
Knox	23,700	27,090	29,080	31,960	33,198	34,239	35,619	37,054	38,547
Lake	200,800	204,250	211,850	217,500	217,401	218,882	221,844	224,846	227,889
Lawrence	50,050	52,780	54,570	52,980	53,654	53,233	53,233	53,233	53,233
Licking	71,880	74,380	79,230	86,470	90,458	93,282	98,494	103,997	109,808
Logan	21,510	22,340	23,960	21,980	23,036	24,409	25,582	26,811	28,099
Lorain[6]	*232,850*	*259,860*	*270,190*	*275,690*	*286,634*	*291,151*	*302,728*	*314,765*	*327,280*
Lucas[7]	*450,630*	*432,390*	*427,720*	*442,310*	*439,805*	*440,190*	*443,177*	*446,184*	*449,211*
Madison	19,670	24,830	27,390	28,680	30,409	31,854	33,853	35,977	38,234
Mahoning[8]	*281,200*	*249,850*	*246,600*	*246,010*	*249,957*	*253,813*	*261,340*	*269,090*	*277,070*
Marion	54,340	54,400	55,920	49,250	48,617	47,033	46,241	45,463	44,697
Medina[6]	*43,060*	*51,340*	*57,000*	*69,450*	*74,435*	*79,123*	*85,301*	*91,961*	*99,140*
Meigs	21,190	22,590	23,580	22,660	23,712	24,190	25,337	26,539	27,798
Mercer	20,180	20,540	21,270	21,660	21,660	21,823	22,040	22,259	22,481
Miami	57,970	62,540	65,000	62,850	65,194	67,222	69,186	71,207	73,288
Monroe[2]	*10,200*	*11,080*	*10,920*	*12,600*	*12,257*	*11,743*	*11,229*	*10,737*	*10,267*
Montgomery	557,740	573,800	570,490	559,060	559,535	567,038	576,537	586,194	596,013
Morgan	4,470	4,010	4,090	4,840	4,941	5,109	5,344	5,590	5,848
Morrow	5,650	8,540	9,340	9,800	10,462	10,998	11,906	12,889	13,954
Muskingum	61,240	66,820	68,180	70,480	70,825	70,825	71,776	72,738	73,714
Noble	6,620	6,520	6,890	9,170	9,927	10,513	11,425	12,417	13,495
Ottawa	30,660	27,590	28,010	29,770	29,992	30,213	30,435	30,658	30,883
Paulding	7,220	7,500	7,570	7,180	7,250	7,145	7,110	7,076	7,041

Table D2-E. Historical Estimates and Projections of Population Served - Ohio

County	USGS Historical Estimates				MTAC Study Projections				
	1985	1990	1995	2000	2005	2010	2015	2020	2025
Perry[1]	*15,570*	*16,240*	*17,110*	*23,620*	*24,363*	*24,738*	*25,364*	*26,005*	*26,662*
Pickaway	25,050	33,500	36,230	35,240	37,203	38,817	41,412	44,181	47,135
Pike	13,860	16,900	18,740	20,690	21,734	22,398	23,541	24,743	26,006
Portage	85,400	87,510	90,710	90,060	91,913	94,184	95,976	97,803	99,665
Preble	17,390	18,100	18,980	23,590	24,470	25,185	26,174	27,203	28,272
Putnam	13,570	13,950	14,390	14,600	14,928	15,174	15,502	15,837	16,180
Richland	90,660	94,520	96,320	96,890	96,579	94,944	94,322	93,703	93,089
Ross	41,150	55,140	59,150	56,560	59,811	61,777	64,197	66,712	69,325
Sandusky	32,920	33,010	33,390	32,930	33,986	34,891	35,896	36,931	37,995
Scioto[5]	*81,840*	*80,320*	*81,410*	*79,190*	*81,019*	*81,307*	*82,363*	*83,432*	*84,516*
Seneca	44,020	42,860	43,470	42,220	41,183	39,776	38,442	37,154	35,908
Shelby	23,520	26,000	27,310	26,820	27,938	28,496	29,334	30,197	31,085
Stark	268,710	283,890	289,180	298,760	300,275	300,753	302,906	305,074	307,258
Summit	501,300	384,560	397,600	425,740	433,173	436,210	445,640	455,275	465,118
Trumbull[8]	*172,880*	*187,450*	*187,310*	*174,250*	*176,584*	*177,488*	*181,328*	*185,252*	*189,260*
Tuscarawas	57,430	55,760	57,640	64,500	65,565	65,108	66,021	66,947	67,885
Union	12,600	13,640	15,710	15,190	16,661	17,963	19,537	21,248	23,110
Van Wert	14,630	14,640	14,620	14,610	14,416	14,270	13,930	13,599	13,275
Vinton[5]	*3,930*	*4,290*	*4,710*	*4,700*	*5,008*	*5,112*	*5,389*	*5,681*	*5,989*
Warren[3]	*78,600*	*93,790*	*107,670*	*148,280*	*164,475*	*176,884*	*198,294*	*222,296*	*249,203*
Washington	50,200	52,120	53,620	54,140	53,248	51,464	50,037	48,650	47,301
Wayne	52,400	56,820	60,220	61,000	62,873	64,802	67,299	69,892	72,584
Williams	20,590	21,340	21,950	22,250	22,544	22,720	23,013	23,311	23,612
Wood[7]	*58,470*	*65,600*	*67,820*	*78,290*	*79,932*	*82,362*	*84,201*	*86,081*	*88,003*
Wyandot	11,710	12,990	13,180	12,100	11,933	11,656	11,378	11,108	10,843
Group 1	71,430	75,670	78,500	88,230	90,760	92,808	95,242	97,766	100,384
Group 2	98,830	92,800	91,930	95,110	93,624	90,460	88,783	87,148	85,553
Group 3	1,186,720	1,200,630	1,228,870	1,306,710	1,351,250	1,394,360	1,460,594	1,532,260	1,609,896
Group 4	50,630	58,250	63,510	63,090	67,183	71,980	76,932	82,225	87,884
Group 5	109,250	109,590	112,610	110,360	113,860	115,068	117,550	120,106	122,738
Group 6	313,290	348,730	366,460	394,760	414,159	426,961	448,314	470,906	494,820
Group 7	509,100	497,990	495,540	520,600	520,566	524,320	529,666	535,089	540,589
Group 8	454,080	437,300	433,910	420,260	426,484	431,015	442,196	453,675	465,458
All Counties	**8,899,570**	**9,061,480**	**9,278,440**	**9,567,910**	**9,748,191**	**9,929,380**	**10,197,575**	**10,479,713**	**10,776,815**

Note: Counties in *italics* are members of a county grouping. The number in the superscript indicates group membership.

Table D2-F. Historical Estimates and Projections of Population Served - Wisconsin

County	USGS Historical Estimates				MTAC Study Population Projections				
	1985	1990	1995	2000	2005	2010	2015	2020	2025
Adams	1,220	2,440	2,500	2,630	2,748	2,844	2,799	2,711	2,624
Ashland	10,840	10,050	10,190	9,870	10,019	10,218	10,233	10,197	10,161
Barron	17,580	19,090	19,500	19,950	20,440	21,032	21,044	20,887	20,730
Bayfield	3,610	3,070	3,100	2,960	3,043	3,121	3,113	3,055	2,997
Brown	146,380	158,800	168,580	176,400	184,850	193,421	196,852	199,772	202,691
Buffalo	5,270	6,000	6,130	5,390	5,489	5,609	5,641	5,633	5,625
Burnett	2,660	2,630	2,720	3,010	3,145	3,263	3,227	3,147	3,066
Calumet[2]	*11,240*	*21,830*	*23,780*	*25,220*	*27,424*	*29,420*	*29,937*	*30,260*	*30,583*
Chippewa	21,240	23,510	24,040	24,120	25,232	26,315	26,412	26,291	26,169
Clark	12,770	11,920	12,180	12,090	12,360	12,703	12,798	12,815	12,832
Columbia	25,500	24,900	26,290	28,390	29,454	30,499	30,624	30,559	30,495
Crawford	9,190	8,650	8,730	8,720	8,840	9,021	9,028	8,948	8,867
Dane	260,090	299,810	322,620	351,540	375,772	396,085	411,002	425,542	440,082
Dodge	39,350	46,140	49,990	52,320	53,718	55,163	55,615	55,728	55,840
Door	9,410	10,770	11,000	10,320	10,712	11,114	11,101	10,945	10,789
Douglas	29,820	29,870	30,140	27,730	28,169	28,657	28,579	28,367	28,156
Dunn	16,170	17,600	18,130	18,640	19,663	20,470	21,025	21,760	22,496
Eau Claire	62,490	64,120	66,490	69,750	73,148	76,069	79,331	83,029	86,728
Florence	680	590	600	630	646	662	669	669	669
Fond du Lac	51,360	58,360	61,350	64,060	65,948	67,836	68,134	68,042	67,951
Forest	3,820	1,960	2,040	1,960	1,991	2,024	2,036	2,048	2,061
Grant	30,850	29,500	29,960	30,180	30,899	31,348	31,502	31,520	31,538
Green	18,220	18,330	18,720	19,250	19,970	20,649	20,625	20,454	20,283
Green Lake	9,890	9,850	9,910	9,220	9,324	9,491	9,473	9,361	9,249
Iowa	9,920	10,970	11,780	12,730	13,147	13,598	13,685	13,686	13,687
Iron	3,890	2,620	2,650	2,660	2,652	2,648	2,604	2,533	2,463
Jackson	5,900	5,770	5,920	6,140	6,336	6,524	6,554	6,530	6,506
Jefferson	42,260	41,320	43,430	46,660	48,669	50,598	51,315	51,804	52,294
Juneau	8,970	9,340	9,730	9,850	10,386	11,211	11,236	11,153	11,071
Kenosha	88,360	100,800	107,550	109,500	115,619	121,287	123,963	126,560	129,158
Kewaunee	7,560	7,800	8,050	8,100	8,332	8,564	8,619	8,605	8,592
La Crosse	66,240	70,700	75,520	79,620	81,985	84,147	87,210	90,534	93,859
Lafayette	8,050	7,470	7,600	7,950	7,987	8,080	8,168	8,185	8,201
Langlade	9,530	8,580	8,870	8,890	9,072	9,265	9,216	9,085	8,953
Lincoln	13,100	13,190	13,710	13,920	14,097	14,329	14,299	14,163	14,027
Manitowoc	56,040	55,550	57,480	57,540	58,707	59,910	60,012	59,765	59,518
Marathon	53,450	56,280	60,300	71,250	73,746	76,159	77,312	78,050	78,789
Marinette	18,900	19,920	20,120	19,750	19,974	20,284	20,172	19,891	19,609
Marquette	1,270	3,650	3,810	4,490	4,643	4,806	4,807	4,736	4,665
Menominee	1,250	1,250	1,250	1,360	1,418	1,484	1,630	1,784	1,939
Milwaukee[1]	*906,640*	*959,150*	*964,160*	*940,160*	*956,474*	*973,359*	*997,422*	*1,020,984*	*1,044,546*
Monroe	16,740	11,590	19,260	20,300	21,235	22,180	22,400	22,517	22,635
Oconto	9,530	11,780	9,840	9,920	10,499	11,041	11,031	10,918	10,806
Oneida	10,270	7,430	7,710	7,740	7,896	8,057	7,911	7,662	7,414
Outagamie[2]	*90,860*	*93,800*	*97,380*	*100,350*	*106,485*	*112,291*	*114,518*	*116,283*	*118,049*
Ozaukee[1]	*34,090*	*57,040*	*61,540*	*39,670*	*40,986*	*42,042*	*42,511*	*42,878*	*43,246*
Pepin	2,940	2,970	2,960	2,850	3,015	3,209	3,183	3,131	3,079
Pierce	15,960	17,870	18,450	19,530	20,268	21,129	21,948	22,781	23,613
Polk	11,800	12,890	13,500	14,930	15,762	16,586	16,657	16,595	16,533
Portage	26,240	36,270	38,850	38,240	39,944	41,130	42,886	44,687	46,489
Price	5,320	5,610	5,820	5,090	5,082	5,093	5,031	4,930	4,830
Racine[1]	*103,540*	*106,700*	*108,490*	*108,040*	*110,533*	*113,093*	*114,706*	*115,918*	*117,129*
Richland	6,860	6,590	6,580	6,880	6,957	7,061	7,077	7,045	7,013
Rock	101,230	103,400	108,610	114,260	117,549	120,715	121,462	121,799	122,136
Rusk	5,450	6,110	6,100	5,840	5,923	6,033	6,026	5,980	5,933
St. Croix	16,140	24,460	26,280	30,250	34,667	38,692	39,383	39,861	40,339
Sauk	21,970	27,470	29,890	32,790	34,510	36,177	36,694	37,013	37,332
Sawyer	2,350	2,790	2,850	3,000	3,135	3,266	3,223	3,133	3,042
Shawano	21,850	15,740	13,960	14,590	15,003	15,423	15,293	15,102	14,912
Sheboygan	61,520	74,300	76,840	76,400	78,715	80,981	81,379	81,388	81,396
Taylor	5,390	6,220	6,370	5,670	5,703	5,762	5,839	5,877	5,915
Trempealeau	11,970	11,880	12,530	13,530	13,848	14,189	14,092	13,949	13,806
Vernon	10,400	11,350	11,670	11,670	12,110	12,575	12,628	12,599	12,569

Table D2-F. Historical Estimates and Projections of Population Served - Wisconsin

County	USGS Historical Estimates				MTAC Study Population Projections				
	1985	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**
Vilas	1,400	1,370	1,440	1,440	1,474	1,507	1,466	1,403	1,341
Walworth	38,710	39,270	44,160	48,330	50,520	52,858	54,145	55,408	56,671
Washburn	4,490	4,590	4,770	5,010	5,208	5,389	5,357	5,239	5,121
Washington	45,920	53,950	63,080	69,420	73,009	76,267	77,728	78,608	79,487
Waukesha[1]	*175,050*	*227,000*	*249,060*	*254,440*	*264,401*	*272,561*	*275,939*	*278,708*	*281,476*
Waupaca	20,540	21,520	22,500	22,730	23,243	23,799	23,673	23,375	23,078
Waushara	2,580	5,510	5,750	4,940	5,499	5,686	5,656	5,562	5,469
Winnebago	103,480	98,240	103,910	109,460	113,170	116,410	117,723	118,707	119,691
Wood	42,940	46,080	47,470	43,940	44,443	45,045	45,420	45,537	45,655
Group 1	1,219,320	1,349,890	1,383,250	1,342,310	1,372,394	1,401,054	1,430,578	1,458,488	1,486,397
Group 2	102,100	115,630	121,160	125,570	133,909	141,711	144,455	146,544	148,632
All Counties	**3,128,510**	**3,405,940**	**3,558,240**	**3,616,170**	**3,747,037**	**3,869,535**	**3,942,009**	**4,004,386**	**4,066,763**

Note: Counties in *italics* are members of a county grouping. The number in the superscript indicates group membership.

Table D3-A. Historical Estimates and Projections of Per Capita Water Withdrawals and Use - Illinois

County	USGS Per Capita Withdrawal Estimates				MTAC Study Per Capita Water Use Projections				
	1985	1990	1995	2000	2005	2010	2015	2020	2025
Adams[2]	*109.4*	*143.2*	*139.7*	*150.8*	*170.9*	*173.1*	*175.2*	*177.3*	*179.5*
Alexander[8]	*161.2*	*183.3*	*138.8*	*136.8*	*145.2*	*146.1*	*146.7*	*147.4*	*148.0*
Bond[1]	*81.2*	*142.9*	*174.6*	*21.3*	*238.0*	*238.8*	*239.6*	*240.0*	*240.5*
Boone	163.8	217.2	154.1	137.7	139.3	139.4	139.3	139.4	139.4
Brown[2]	*19.4*	*32.0*	*16.2*	*14.3*	*146.4*	*146.7*	*147.1*	*147.5*	*147.9*
Bureau	120.2	129.1	100.6	168.4	147.9	150.8	153.8	157.0	160.5
Calhoun	182.7	261.5	197.0	226.7	236.6	237.4	237.7	237.7	237.7
Carroll	128.9	5.8	145.4	132.9	135.0	135.9	136.8	137.6	138.5
Cass	140.5	288.9	148.7	198.8	155.4	157.7	159.3	160.6	161.9
Champaign[6]	*146.7*	*144.9*	*135.4*	*136.4*	*160.7*	*160.4*	*161.1*	*162.0*	*162.9*
Christian	148.3	135.6	152.3	149.6	147.9	149.0	150.1	151.2	152.4
Clark	117.3	125.3	139.9	91.9	149.3	150.9	152.0	152.3	152.7
Clay[3]	*107.1*	*108.9*	*104.0*	*114.3*	*165.9*	*169.4*	*171.7*	*173.7*	*175.7*
Clinton[4]	*64.2*	*85.5*	*107.3*	*95.8*	*144.8*	*145.5*	*145.9*	*146.3*	*146.7*
Coles	119.5	111.1	144.2	97.3	167.0	167.8	168.5	168.8	169.0
Cook[5]	*232.2*	*220.2*	*221.0*	*194.2*	*170.1*	*173.9*	*178.1*	*182.2*	*186.6*
Crawford	134.6	155.0	295.6	225.5	162.4	165.0	167.6	170.2	172.9
Cumberland	80.3	62.9	209.9	92.5	87.0	86.8	86.6	86.2	85.7
De Kalb	99.5	143.3	99.4	109.7	146.9	146.7	147.1	147.7	148.4
De Witt	114.2	223.7	119.6	117.9	144.5	145.7	146.8	147.7	148.7
Douglas[6]	*56.0*	*110.3*	*96.5*	*36.1*	*165.1*	*166.7*	*167.8*	*168.3*	*168.8*
Du Page[5]	*124.6*	*127.0*	*14.1*	*11.4*	*209.2*	*215.7*	*223.1*	*231.3*	*240.2*
Edgar	129.2	123.6	137.5	133.6	146.1	147.6	148.8	149.5	150.3
Edwards[10]	*111.1*	*40.1*	*127.0*	*31.1*	*178.0*	*182.5*	*186.4*	*190.1*	*194.1*
Effingham[3]	*80.3*	*144.5*	*459.6*	*147.7*	*185.6*	*187.1*	*188.2*	*190.2*	*192.2*
Fayette	107.9	123.7	137.2	126.1	145.4	147.5	149.4	151.3	153.3
Ford	117.1	145.6	187.4	185.2	145.2	146.2	147.4	148.7	150.0
Franklin[7]	*420.9*	*380.9*	*328.3*	*383.1*	*149.3*	*151.1*	*152.4*	*153.3*	*154.2*
Fulton	83.1	86.9	109.9	88.0	102.6	103.4	104.2	104.7	105.3
Gallatin[7]	*99.8*	*488.3*	*690.9*	*842.5*	*141.5*	*142.3*	*142.6*	*142.8*	*143.1*
Greene[9]	*77.4*	*57.7*	*67.4*	*78.7*	*201.6*	*202.0*	*202.1*	*201.9*	*201.6*
Grundy	75.3	112.0	54.6	141.2	100.6	100.6	100.5	100.3	100.2
Hamilton[7]	*0.0*	*5.3*	*0.0*	*0.0*	*135.3*	*136.1*	*136.7*	*137.3*	*137.8*
Hancock[2]	*80.2*	*123.9*	*82.8*	*90.2*	*141.9*	*142.9*	*143.6*	*143.7*	*143.8*
Hardin[7]	*98.3*	*61.6*	*58.3*	*43.1*	*137.7*	*139.1*	*140.5*	*141.7*	*143.0*
Henderson[2]	*73.7*	*3554.2*	*1045.8*	*933.2*	*122.6*	*122.6*	*122.5*	*122.2*	*121.9*
Henry	83.8	129.9	99.9	92.6	118.1	120.1	121.9	123.8	125.8
Iroquois	96.7	109.4	98.5	68.4	101.1	101.9	102.5	103.0	103.6
Jackson	151.3	141.3	116.6	110.7	153.8	154.8	155.8	157.4	159.1
Jasper[3]	*92.1*	*132.5*	*82.9*	*179.8*	*142.1*	*141.9*	*141.3*	*140.3*	*139.3*
Jefferson[7]	*14.4*	*45.5*	*16.7*	*0.0*	*166.8*	*170.0*	*173.2*	*176.7*	*180.4*
Jersey[1]	*44.3*	*48.9*	*122.4*	*96.9*	*227.3*	*227.4*	*226.9*	*225.6*	*224.3*
Jo Daviess	124.5	216.3	329.9	194.7	199.1	199.7	200.5	201.0	201.5
Johnson[7]	*82.2*	*121.9*	*203.1*	*280.8*	*131.0*	*131.4*	*131.7*	*132.0*	*132.4*
Kane	147.9	135.7	133.8	131.0	158.9	158.2	157.7	159.8	162.1
Kankakee	153.3	204.2	195.4	180.7	227.3	229.1	230.6	230.7	230.8
Kendall	132.8	192.7	122.1	104.5	136.0	135.6	134.8	133.5	132.3
Knox	145.1	28.2	138.2	8.6	156.9	156.9	156.4	156.2	156.1
Lake	121.4	146.6	112.7	116.3	170.4	171.3	172.3	174.9	177.6
La Salle	138.5	154.7	183.8	130.4	146.2	147.6	148.8	149.8	150.8
Lawrence	106.7	153.7	120.6	0.0	152.0	155.3	158.4	161.6	165.1
Lee	125.6	168.8	214.5	142.4	175.5	176.8	178.1	178.5	179.0
Livingston	112.3	148.6	170.5	171.8	148.1	149.5	150.9	151.6	152.4
Logan	133.7	138.0	123.2	146.5	145.2	145.0	144.9	144.9	144.9
McDonough	101.7	107.6	106.3	104.2	149.6	150.7	151.8	153.3	154.7
McHenry	126.2	131.2	114.1	128.5	147.2	145.3	143.6	144.5	145.4
McLean	131.9	80.1	133.1	78.6	119.7	120.3	121.1	122.3	123.5
Macon	237.4	313.1	395.8	358.8	385.8	390.4	394.3	398.5	402.8
Macoupin[1]	*86.6*	*115.3*	*184.2*	*128.3*	*230.2*	*230.5*	*230.7*	*230.4*	*230.2*
Madison[1]	*229.6*	*240.4*	*353.3*	*355.1*	*258.3*	*260.1*	*261.8*	*262.5*	*263.2*
Marion[4]	*113.5*	*211.5*	*129.0*	*137.5*	*165.3*	*165.1*	*164.7*	*163.8*	*163.0*
Marshall	184.3	198.6	166.8	184.3	208.4	208.9	208.9	208.1	207.4
Mason	103.6	141.5	129.5	45.9	136.6	137.8	138.7	139.3	140.0

Table D3-A. Historical Estimates and Projections of Per Capita Water Withdrawals and Use - Illinois

County	USGS Per Capita Withdrawal Estimates				MTAC Study Per Capita Water Use Projections				
	1985	1990	1995	2000	2005	2010	2015	2020	2025
Massac[7]	*56.7*	*147.0*	*976.7*	*595.0*	*158.2*	*158.8*	*159.1*	*158.6*	*158.2*
Menard	82.3	121.2	87.1	13.8	127.5	127.0	126.5	125.9	125.4
Mercer	83.4	124.2	104.7	102.5	126.6	127.2	127.6	127.9	128.2
Monroe[4]	*63.1*	*47.3*	*89.0*	*22.8*	*145.7*	*145.0*	*144.6*	*143.9*	*143.3*
Montgomery	118.5	146.4	138.6	62.8	158.7	160.1	161.2	162.5	163.8
Morgan	148.9	25.9	205.6	16.9	200.3	200.0	199.8	199.8	199.8
Moultrie	99.4	111.7	119.0	105.4	146.0	146.6	147.1	147.5	147.8
Ogle	192.6	221.3	188.4	173.3	210.1	212.0	213.6	214.8	216.1
Peoria	108.5	155.8	148.5	151.4	188.1	192.2	196.5	201.7	207.4
Perry[7]	*44.1*	*50.2*	*29.6*	*38.3*	*152.0*	*154.2*	*156.4*	*158.5*	*160.7*
Piatt	108.0	188.7	205.2	177.8	186.2	186.5	186.7	186.7	186.6
Pike	95.1	126.7	161.0	173.9	137.1	137.5	137.8	138.0	138.2
Pope[7]	*236.8*	*20.5*	*58.8*	*0.0*	*134.1*	*134.2*	*134.2*	*134.1*	*134.0*
Pulaski[8]	*134.6*	*109.7*	*148.4*	*32.2*	*140.4*	*140.6*	*140.7*	*140.6*	*140.5*
Putnam	87.2	125.3	97.3	42.3	141.7	140.4	139.1	137.8	136.6
Randolph	127.2	127.9	140.1	170.4	159.8	160.9	162.0	163.1	164.3
Richland	106.0	133.1	125.9	115.1	167.4	172.3	177.5	182.3	187.6
Rock Island	135.3	125.3	128.0	117.5	172.3	174.8	177.7	180.5	183.4
St Clair[4]	*109.2*	*89.8*	*88.6*	*268.1*	*155.4*	*156.2*	*157.3*	*158.5*	*159.6*
Saline[7]	*89.3*	*14.7*	*0.0*	*0.0*	*157.1*	*158.8*	*160.3*	*161.3*	*162.4*
Sangamon[1]	*149.5*	*213.0*	*166.2*	*240.2*	*277.0*	*280.4*	*284.4*	*289.2*	*294.3*
Schuyler	154.3	162.0	381.6	280.2	220.5	222.4	223.9	225.1	226.4
Scott[9]	*73.1*	*381.3*	*1487.0*	*2587.4*	*206.6*	*206.1*	*205.6*	*205.0*	*204.4*
Shelby	83.9	270.6	170.8	152.7	177.0	177.0	176.7	175.9	175.2
Stark	101.7	177.2	130.3	123.6	131.1	131.5	131.7	131.9	132.1
Stephenson	151.9	128.9	154.9	129.1	153.0	154.2	155.5	156.8	158.1
Tazewell	107.7	143.2	130.2	135.5	152.2	153.4	154.5	155.4	156.3
Union[8]	*129.3*	*123.4*	*687.9*	*77.8*	*151.2*	*152.1*	*152.8*	*153.5*	*154.2*
Vermilion	126.6	163.3	141.1	153.6	155.7	156.7	157.5	158.1	158.8
Wabash[10]	*124.5*	*190.8*	*592.1*	*180.0*	*155.5*	*156.9*	*157.7*	*158.2*	*158.7*
Warren[2]	*236.4*	*174.8*	*192.4*	*232.5*	*143.9*	*144.4*	*144.7*	*144.8*	*144.8*
Washington[4]	*40.3*	*67.1*	*160.8*	*181.3*	*161.0*	*160.9*	*160.4*	*159.4*	*158.4*
Wayne	210.2	143.5	518.7	180.6	194.4	195.7	196.6	197.4	198.1
White[7]	*157.1*	*119.8*	*91.2*	*146.1*	*148.6*	*150.4*	*152.0*	*153.6*	*155.4*
Whiteside	104.0	134.3	248.7	268.6	150.0	151.0	151.9	152.7	153.4
Will[5]	*119.0*	*140.5*	*133.3*	*112.0*	*140.1*	*138.0*	*136.4*	*136.1*	*135.8*
Williamson[7]	*46.3*	*42.2*	*69.7*	*59.5*	*161.8*	*163.9*	*165.8*	*167.5*	*169.3*
Winnebago	188.5	193.9	167.7	141.9	167.8	170.0	172.0	173.8	175.7
Woodford	96.1	393.6	403.3	733.3	544.1	543.7	541.8	538.9	536.2
Group 1	180.8	212.3	250.8	271.2	259.3	261.4	263.5	265.1	266.7
Group 2	116.8	205.9	187.0	201.1	155.8	157.2	158.4	159.3	160.2
Group 3	88.3	132.9	191.1	147.8	172.6	174.3	175.2	176.1	177.1
Group 4	101.5	99.6	96.9	228.3	154.5	155.0	155.6	156.1	156.7
Group 5	215.3	206.5	189.0	165.2	172.9	176.1	179.5	183.2	187.2
Group 6	138.2	142.3	132.5	129.2	163.3	163.1	163.9	164.8	165.7
Group 7	119.7	121.1	126.4	138.0	154.9	156.8	158.5	159.9	161.4
Group 8	142.8	143.6	204.0	102.0	147.8	148.6	149.1	149.6	150.1
Group 9	76.5	117.1	340.7	388.9	202.8	203.0	203.0	202.6	202.3
Group 10	120.5	152.6	443.4	132.5	163.3	165.5	167.0	168.3	169.6
All Counties	**181.3**	**184.8**	**175.3**	**161.4**	**174.2**	**176.7**	**179.4**	**182.5**	**185.9**

Note: Counties in *italics* are members of a county grouping. The number in the superscript indicates group membership.

Table D3-B. Historical Estimates and Projections of Per Capita Water Withdrawals and Use - Indiana

County	USGS Per Capita Withdrawal Estimates				MTAC Study Per Capita Water Use Projections				
	1985	1990	1995	2000	2005	2010	2015	2020	2025
Adams	665.5	41.0	153.1	160.6	144.7	142.9	141.0	139.0	137.0
Allen	212.4	135.3	145.3	144.3	159.5	157.5	155.3	153.1	150.8
Bartholomew	216.1	237.1	264.6	242.2	240.3	237.2	233.9	230.4	226.9
Benton	75.5	96.0	206.4	95.6	129.1	127.9	126.5	124.9	123.3
Blackford	203.2	167.4	104.1	166.3	155.0	153.6	152.0	150.2	148.4
Boone	152.2	75.6	78.8	69.2	74.5	73.5	72.5	71.5	70.4
Brown[5]	*0.0*	*0.0*	*2.6*	*0.0*	*122.4*	*121.0*	*119.4*	*117.7*	*116.0*
Carroll	161.2	137.7	260.1	209.2	168.2	166.0	163.7	161.2	158.8
Cass	245.9	171.6	173.4	287.5	215.1	213.1	210.8	208.2	205.6
Clark[6]	*149.2*	*149.2*	*146.4*	*139.0*	*143.5*	*141.7*	*139.7*	*137.6*	*135.6*
Clay	121.6	53.2	52.3	52.9	52.1	51.5	50.9	50.2	49.6
Clinton	167.5	178.2	215.3	228.9	196.4	194.0	191.4	188.6	185.8
Crawford[2]	*124.2*	*449.2*	*361.5*	*371.1*	*112.5*	*111.4*	*110.2*	*108.8*	*107.4*
Daviess	175.8	145.8	163.9	186.4	171.4	169.4	167.2	164.9	162.5
Dearborn[1]	*145.7*	*116.7*	*113.1*	*91.0*	*136.8*	*134.7*	*132.6*	*130.4*	*128.2*
Decatur	153.5	195.8	171.7	169.8	182.7	180.0	177.3	174.4	171.6
De Kalb	173.6	146.1	174.7	169.3	154.9	152.4	149.9	147.4	144.9
Delaware	142.5	145.1	137.2	140.4	144.1	142.9	141.4	139.7	138.1
Dubois[2]	*215.1*	*180.9*	*194.1*	*214.5*	*173.2*	*170.9*	*168.6*	*166.1*	*163.6*
Elkhart	153.8	151.4	157.5	150.0	166.6	164.0	161.3	158.7	156.0
Fayette	261.4	226.0	177.9	160.5	201.2	199.4	197.1	194.7	192.3
Floyd[6]	*86.8*	*86.0*	*94.4*	*88.7*	*141.6*	*139.7*	*137.7*	*135.7*	*133.6*
Fountain	165.8	107.2	101.7	124.1	129.3	127.9	126.3	124.7	123.0
Franklin[1]	*139.9*	*87.1*	*83.7*	*207.5*	*125.4*	*124.0*	*122.4*	*120.6*	*118.9*
Fulton	185.8	175.3	163.6	154.4	164.5	162.5	160.3	158.0	155.7
Gibson[2]	*162.2*	*108.6*	*88.7*	*96.6*	*137.4*	*136.0*	*134.5*	*132.8*	*131.1*
Grant	184.3	131.7	125.1	150.3	142.8	141.6	140.2	138.6	137.0
Greene[3]	*157.4*	*93.0*	*116.1*	*108.5*	*119.5*	*118.2*	*116.8*	*115.2*	*113.6*
Hamilton	136.8	119.1	185.0	193.6	159.9	156.5	153.3	150.3	147.4
Hancock	171.4	146.3	121.4	135.0	136.0	134.2	132.3	130.3	128.3
Harrison[6]	*84.8*	*77.4*	*62.4*	*79.1*	*128.2*	*126.5*	*124.6*	*122.7*	*120.9*
Hendricks[5]	*106.1*	*84.6*	*96.0*	*94.5*	*135.7*	*133.7*	*131.6*	*129.5*	*127.5*
Henry	144.8	121.1	131.4	133.8	128.9	127.7	126.2	124.6	122.9
Howard	159.1	205.2	217.0	205.8	197.1	195.2	193.0	190.7	*188.3*
Huntington	134.4	155.6	142.4	127.0	145.1	143.4	141.5	139.5	*137.5*
Jackson	97.8	106.8	154.4	167.8	143.8	141.8	139.7	137.5	*135.4*
Jasper	168.2	127.4	120.6	105.9	137.3	135.3	133.3	131.2	*129.1*
Jay	185.7	150.6	132.8	98.4	132.0	130.7	129.1	127.5	125.8
Jefferson[4]	*135.8*	*127.8*	*128.0*	*117.9*	*137.5*	*135.7*	*133.8*	*131.9*	*129.9*
Jennings	138.4	100.1	68.1	75.4	92.2	90.9	89.6	88.2	86.9
Johnson[5]	*106.5*	*121.4*	*126.5*	*122.4*	*143.4*	*141.1*	*138.9*	*136.6*	*134.4*
Knox	117.3	144.2	148.4	366.7	133.6	132.2	130.6	129.0	127.2
Kosciusko	169.5	170.3	190.5	180.8	175.6	173.3	170.9	168.3	165.8
Lagrange	106.5	116.8	149.5	140.2	134.5	132.6	130.6	128.6	126.6
Lake	112.7	182.3	191.0	194.9	163.6	161.8	159.9	157.7	155.6
La Porte	228.4	159.7	153.5	153.1	140.5	139.1	137.5	135.7	133.9
Lawrence[2]	*132.5*	*132.0*	*141.1*	*155.0*	*129.7*	*128.3*	*126.6*	*124.8*	*123.1*
Madison	120.2	138.6	140.6	143.9	135.4	134.1	132.6	130.9	129.3
Marion[5]	*168.1*	*176.7*	*176.4*	*157.4*	*166.7*	*165.2*	*163.5*	*161.6*	*159.7*
Marshall	175.1	158.7	135.2	141.7	142.8	141.2	139.4	137.4	135.5
Martin	184.9	111.9	128.1	112.9	124.9	123.8	122.5	121.0	119.5
Miami	177.4	69.3	117.5	102.8	126.9	125.4	123.8	122.0	*120.3*
Monroe[5]	*161.2*	*124.9*	*123.9*	*118.1*	*141.6*	*139.9*	*138.0*	*136.0*	*134.0*
Montgomery	123.3	141.5	140.0	135.1	143.6	142.0	140.2	138.3	136.3
Morgan[5]	*105.0*	*157.7*	*146.4*	*137.9*	*128.1*	*126.4*	*124.6*	*122.8*	*120.9*
Newton	127.5	102.5	107.9	128.7	126.8	125.3	123.7	121.9	120.2
Noble	169.8	144.6	156.6	135.3	144.8	142.8	140.8	138.6	136.4
Ohio[4]	*96.0*	*96.2*	*113.6*	*134.9*	*135.2*	*133.8*	*132.2*	*130.4*	*128.7*
Orange[2]	*109.6*	*110.4*	*112.7*	*77.5*	*130.1*	*128.6*	*126.9*	*125.1*	*123.3*
Owen	89.2	133.7	135.1	125.5	117.3	116.0	114.5	112.9	111.3
Parke	98.8	105.6	113.9	102.8	102.1	101.0	99.8	98.4	97.1
Perry[2]	*149.1*	*110.3*	*111.9*	*142.0*	*125.9*	*124.5*	*123.0*	*121.3*	*119.6*
Pike[2]	*113.9*	*141.3*	*113.3*	*116.7*	*118.8*	*117.5*	*115.9*	*114.3*	*112.7*

Table D3-B. Historical Estimates and Projections of Per Capita Water Withdrawals and Use - Indiana

County	USGS Per Capita Withdrawal Estimates				MTAC Study Per Capita Water Use Projections				
	1985	1990	1995	2000	2005	2010	2015	2020	2025
Porter	94.6	98.1	162.1	128.3	116.6	115.0	113.3	111.5	109.8
Posey	130.9	160.6	149.0	146.5	136.0	134.5	132.8	131.0	129.1
Pulaski	139.8	162.9	163.9	109.4	125.7	124.2	122.6	120.8	119.1
Putnam	145.5	201.6	217.9	195.1	184.5	182.2	179.7	177.1	174.5
Randolph	171.8	148.3	110.9	108.8	125.2	124.0	122.5	120.9	119.3
Ripley[1]	*135.6*	*159.2*	*138.7*	*131.0*	*145.2*	*143.1*	*141.0*	*138.8*	*136.6*
Rush	123.4	129.2	126.5	132.5	126.3	125.0	123.6	121.9	120.3
St. Joseph	202.4	157.7	167.3	162.5	141.0	139.4	137.6	135.8	133.9
Scott[6]	*92.2*	*129.1*	*142.8*	*161.9*	*136.6*	*135.0*	*133.2*	*131.3*	*129.4*
Shelby	*130.1*	*158.8*	*169.8*	*201.8*	162.2	160.3	158.3	156.1	153.8
Spencer[2]	*47.2*	*207.7*	*155.5*	*149.0*	*139.0*	*137.3*	*135.4*	*133.5*	*131.5*
Starke	115.1	111.3	131.4	138.9	120.2	118.8	117.2	115.6	113.9
Steuben	153.2	132.0	160.8	143.7	165.5	162.8	160.2	157.5	154.8
Sullivan[3]	*145.1*	*84.6*	*104.0*	*97.3*	*119.0*	*117.7*	*116.2*	*114.6*	*113.0*
Switzerland[4]	*162.8*	*108.0*	*105.0*	*102.2*	*114.9*	*113.6*	*112.1*	*110.5*	*108.9*
Tippecanoe	190.1	146.5	127.2	119.5	148.6	146.9	145.1	143.1	141.1
Tipton	116.6	124.5	139.0	135.5	134.2	132.9	131.4	129.7	128.0
Union	52.3	54.6	71.4	76.1	63.0	62.4	61.7	61.0	60.2
Vanderburgh[2]	*187.9*	*194.1*	*177.5*	*192.8*	*165.4*	*163.8*	*162.0*	*160.0*	*158.0*
Vermillion	150.0	99.3	104.3	106.8	129.0	127.5	125.8	124.1	122.3
Vigo	133.5	147.2	154.0	144.7	143.9	142.9	141.7	140.3	138.8
Wabash	187.3	247.9	263.0	265.4	236.9	234.7	232.2	229.4	226.7
Warren	145.1	200.7	207.0	209.8	192.3	190.4	188.1	185.7	183.2
Warrick[2]	*92.4*	*43.7*	*54.1*	*55.7*	*131.3*	*129.7*	*127.9*	*126.0*	*124.1*
Washington[2]	*160.5*	*113.4*	*139.2*	*112.9*	*123.1*	*121.5*	*119.9*	*118.1*	*116.4*
Wayne	174.2	142.5	140.7	148.8	145.4	143.9	142.3	140.5	138.7
Wells	115.4	138.9	147.9	136.2	146.2	144.4	142.4	140.4	138.4
White	218.0	136.4	164.3	165.1	139.1	137.6	135.9	134.1	132.2
Whitley	145.8	119.8	118.7	139.1	143.6	141.8	139.9	138.0	135.9
Group 1	141.6	122.7	115.5	120.6	134.9	132.9	130.9	128.9	126.8
Group 2	159.5	156.8	148.5	157.6	143.8	142.1	140.2	138.2	136.3
Group 3	152.0	89.7	111.5	104.0	119.3	118.0	116.5	114.9	113.3
Group 4	134.1	120.7	122.5	117.2	132.6	130.9	129.0	127.1	125.2
Group 5	159.0	162.0	160.7	145.3	157.7	155.7	153.7	151.6	149.4
Group 6	114.3	118.5	117.7	117.0	137.7	135.9	134.0	132.0	130.0
All Counties	**156.6**	**151.4**	**156.1**	**154.1**	**152.3**	**150.5**	**148.5**	**146.5**	**144.4**

Note: Counties in *italics* are members of a county grouping. The number in the superscript indicates group membership.

Table D3-C. Historical Estimates and Projections of Per Capita Water Withdrawals and Use - Michigan

County	USGS Per Capita Withdrawal Estimates				MTAC Study Per Capita Water Use Projections				
	1985	1990	1995	2000	2005	2010	2015	2020	2025
Alcona	195.8	187.9	925.0	131.6	168.3	162.3	156.6	151.2	146.0
Alger	150.8	153.3	284.4	158.3	164.8	159.2	153.8	148.8	144.0
Allegan[4]	*202.7*	*194.9*	*202.6*	*161.8*	*181.2*	*174.7*	*168.3*	*162.3*	*156.5*
Alpena	216.0	201.8	179.3	139.2	163.9	158.7	153.9	149.4	145.1
Antrim	229.7	181.8	275.3	165.5	170.6	164.3	158.1	152.3	146.7
Arenac[1]	7125.0	131.3	7228.9	4508.7	179.3	172.7	166.4	160.5	154.7
Baraga	207.5	217.6	210.1	170.3	159.0	153.9	149.0	144.3	139.8
Barry	188.0	168.7	212.8	110.4	175.1	168.9	163.0	157.4	152.0
Bay[1]	*209.0*	*208.0*	*201.6*	*124.4*	*169.6*	*164.0*	*158.8*	*153.8*	*149.1*
Benzie	182.6	199.4	342.6	164.3	172.0	165.6	159.7	154.0	148.5
Berrien	183.8	236.8	215.1	192.1	170.9	165.0	159.3	153.8	148.6
Branch	201.0	223.8	207.8	171.8	177.1	170.9	165.0	159.4	154.0
Calhoun	159.9	178.8	160.1	216.9	170.5	165.1	160.1	155.2	150.7
Cass	177.9	170.0	234.8	122.0	179.8	173.4	167.2	161.3	155.7
Charlevoix	233.8	211.8	216.7	194.6	174.3	167.5	161.2	155.2	149.4
Cheboygan	215.0	262.2	220.2	191.3	170.9	164.5	158.5	152.9	147.5
Chippewa	214.1	266.6	151.2	126.5	148.8	142.7	136.7	131.0	125.6
Clare	169.5	198.8	234.4	186.8	170.9	164.4	158.0	152.0	146.2
Clinton[3]	*183.2*	*181.6*	*176.3*	*145.6*	*169.2*	*163.1*	*157.3*	*151.7*	*146.4*
Crawford	363.1	327.6	197.9	377.0	270.9	259.7	248.9	238.7	146.5
Delta	92.9	165.2	150.1	149.9	124.2	120.0	116.0	112.1	141.1
Dickinson	93.5	246.9	168.3	146.9	181.6	175.9	170.3	165.0	159.8
Eaton[3]	*132.0*	*131.3*	*219.8*	*67.2*	*154.3*	*148.0*	*142.0*	*136.2*	*130.7*
Emmet	249.1	239.4	202.7	275.5	209.5	202.1	195.0	188.1	143.4
Genesee[5]	*123.9*	*148.6*	*36.8*	*18.9*	*165.7*	*160.1*	*154.8*	*149.8*	*144.9*
Gladwin	137.8	150.5	115.9	120.3	113.1	108.8	104.7	100.9	147.5
Gogebic	197.2	240.5	185.7	143.4	149.9	146.2	142.5	139.2	136.3
Grand Traverse	1240.6	159.7	162.6	159.2	181.5	174.3	167.3	160.8	154.5
Gratiot	160.5	250.3	224.4	187.7	170.1	164.8	159.8	155.2	150.9
Hillsdale	165.5	182.5	234.2	150.4	176.2	170.1	164.2	158.6	153.2
Houghton[2]	*156.3*	*248.8*	*161.9*	*128.5*	*147.4*	*141.9*	*136.6*	*131.6*	*126.8*
Huron	172.3	309.8	212.4	149.6	178.9	173.1	167.6	162.2	157.0
Ingham[3]	*127.9*	*138.9*	*250.5*	*144.2*	*148.2*	*143.2*	*138.3*	*133.6*	*129.1*
Ionia	201.8	208.7	255.8	192.6	196.4	189.3	182.6	176.3	146.5
Iosco	252.9	185.0	267.4	87.3	165.2	159.4	153.8	148.4	143.2
Iron	259.8	249.6	332.2	195.9	229.7	222.9	216.2	210.2	143.4
Isabella	123.0	102.5	195.8	116.5	115.9	111.6	107.5	103.6	128.1
Jackson	215.8	186.0	207.8	127.7	172.1	166.4	160.8	155.6	150.5
Kalamazoo	341.4	146.5	147.5	136.3	140.9	135.6	130.5	125.7	139.4
Kalkaska	241.6	194.7	346.2	278.0	227.3	218.6	210.3	202.6	147.8
Kent[4]	*191.2*	*184.9*	*213.4*	*152.6*	*164.4*	*158.0*	*151.8*	*145.9*	*140.3*
Keweenaw[2]	*210.0*	*180.0*	*150.0*	*96.2*	*162.7*	*157.3*	*153.0*	*147.9*	*143.1*
Lake	234.7	219.1	365.4	117.0	163.1	157.1	151.2	145.6	140.1
Lapeer[5]	*143.8*	*155.3*	*88.4*	*23.1*	*166.4*	*159.6*	*153.2*	*147.1*	*141.3*
Leelanau	205.3	204.3	261.9	96.7	167.0	161.1	155.4	149.9	144.5
Lenawee	100.5	143.9	186.3	137.4	122.5	118.1	113.9	109.9	146.3
Livingston	160.4	147.6	154.1	141.7	178.2	170.8	163.8	157.1	150.6
Luce	147.1	203.1	317.7	184.1	166.0	160.4	155.4	150.6	146.0
Mackinac	213.4	200.0	418.0	410.3	194.5	186.5	178.6	170.7	138.4
Macomb[5]	*172.0*	*133.4*	*27.0*	*7.4*	*174.7*	*168.9*	*163.5*	*158.4*	*153.6*
Manistee	118.6	202.5	241.5	193.5	173.2	167.8	162.8	158.1	153.8
Marquette	156.7	231.2	206.9	131.4	137.0	132.3	127.9	123.8	119.8
Mason	214.4	363.4	122.5	205.4	178.1	172.2	166.5	161.3	156.2
Mecosta	212.6	161.0	191.0	109.9	148.1	142.8	137.7	132.8	142.8
Menominee	94.8	148.2	131.7	106.6	108.7	105.8	103.0	100.5	145.5
Midland[1]	*136.5*	*239.6*	*5.1*	*3.9*	*188.2*	*181.1*	*174.5*	*168.2*	*162.2*
Missaukee	207.3	192.9	406.1	390.7	244.9	235.9	227.1	218.9	141.4
Monroe[5]	*91.5*	*161.7*	*131.3*	*129.1*	*171.1*	*165.0*	*159.3*	*153.9*	*148.7*
Montcalm	225.5	208.8	250.2	244.8	175.7	169.2	163.1	157.2	151.5
Montmorency	215.3	213.0	313.1	179.2	170.7	163.6	156.8	150.5	144.4
Muskegon	246.9	198.0	236.3	167.3	166.1	160.3	154.8	149.5	144.4
Newaygo	230.1	252.3	248.9	273.8	222.0	213.3	204.9	196.9	147.2
Oakland[5]	*29.6*	*132.1*	*23.3*	*24.0*	*184.6*	*177.2*	*170.1*	*163.3*	*156.7*

Table D3-C. Historical Estimates and Projections of Per Capita Water Withdrawals and Use - Michigan

County	USGS Per Capita Withdrawal Estimates				MTAC Study Per Capita Water Use Projections				
	1985	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**
Oceana	217.2	185.9	309.1	213.5	171.5	165.4	159.5	153.9	148.6
Ogemaw	141.2	147.0	272.7	189.7	170.8	163.8	157.1	150.8	144.7
Ontonagon	146.7	169.2	261.9	117.6	166.2	161.3	156.7	152.6	148.9
Osceola	568.4	494.0	247.0	570.4	499.5	482.1	465.4	449.6	154.5
Oscoda	215.1	203.6	151.5	59.5	173.4	166.3	159.7	153.2	147.1
Otsego	200.9	231.4	182.9	256.9	181.4	172.4	163.8	155.9	148.5
Ottawa[4]	*182.0*	*180.9*	*107.9*	*293.8*	*171.7*	*164.1*	*156.9*	*149.9*	*143.3*
Presque Isle	58.8	102.9	273.4	147.0	172.7	166.6	160.7	155.1	149.6
Roscommon	217.6	207.9	239.1	115.9	168.4	161.6	155.2	149.1	143.2
Saginaw[1]	*140.8*	*143.0*	*7.2*	*68.4*	*172.5*	*166.9*	*161.7*	*156.7*	*151.9*
St. Clair	170.5	176.0	185.4	1621.1	170.5	163.9	157.6	151.6	145.8
St. Joseph	201.6	212.2	201.2	147.9	178.0	171.7	165.7	160.0	154.5
Sanilac	161.7	177.5	310.4	138.8	175.8	169.3	163.1	157.3	151.6
Schoolcraft	194.8	200.0	241.4	124.7	157.2	151.8	146.5	141.7	137.1
Shiawassee	125.7	141.7	127.8	152.5	120.5	116.1	112.0	108.1	140.1
Tuscola	142.6	149.3	293.1	181.4	173.1	166.9	160.9	155.2	149.8
Van Buren	181.7	180.4	251.4	187.1	175.9	168.7	161.8	155.3	149.1
Washtenaw[5]	*53.5*	*165.4*	*116.4*	*86.8*	*154.4*	*148.8*	*143.6*	*138.6*	*133.7*
Wayne[5]	*244.8*	*243.6*	*329.4*	*258.8*	*161.8*	*157.2*	*152.9*	*148.7*	*144.8*
Wexford	182.2	186.8	219.3	214.8	176.6	172.1	167.7	163.6	159.8
Group 1	193.7	171.4	215.0	187.8	173.3	167.5	162.0	156.7	151.7
Group 2	158.6	245.9	161.7	127.9	148.5	143.0	137.8	132.8	127.9
Group 3	133.3	141.2	240.5	131.2	152.2	146.6	141.2	136.1	131.1
Group 4	190.3	185.1	186.8	192.5	168.2	161.4	154.8	148.6	142.5
Group 5	162.1	188.6	179.2	173.1	167.3	161.9	156.8	151.7	146.9
All Counties	**169.7**	**184.3**	**188.4**	**171.4**	**167.3**	**161.7**	**156.3**	**151.1**	**146.7**

Note: Counties in *italics* are members of a county grouping. The number in the superscript indicates group membership.

Table D3-D. Historical Estimates and Projections of Per Capita Water Withdrawals and Use - Minnesota

County	USGS Per Capita Withdrawal Estimates				MTAC Study Per Capita Water Use Projections				
	1985	1990	1995	2000	2005	2010	2015	2020	2025
Aitkin	56.3	95.0	157.1	97.2	91.9	89.1	86.3	83.6	81.0
Anoka[1]	*974.4*	*975.1*	*767.6*	*563.8*	*121.8*	*117.8*	*113.8*	*110.0*	*106.3*
Becker	158.4	221.7	161.7	175.3	202.3	195.9	189.6	183.5	177.6
Beltrami	113.1	111.5	101.6	103.4	122.5	118.6	114.7	111.0	107.4
Benton	91.0	94.5	111.2	125.3	106.5	102.9	99.3	95.8	92.5
Big Stone	114.9	120.2	109.9	112.9	119.8	116.0	112.2	108.6	105.1
Blue Earth	128.3	133.9	89.8	127.8	123.5	119.3	115.2	111.2	107.3
Brown	52.7	151.3	33.3	82.6	66.4	64.2	62.1	60.0	58.0
Carlton	158.0	91.6	1005.6	114.6	121.2	117.3	113.6	109.9	106.3
Carver	96.4	121.5	115.8	125.8	129.7	125.5	121.3	117.3	113.4
Cass	135.0	144.3	97.6	125.8	118.2	114.5	111.0	107.5	104.1
Chippewa	97.3	76.2	104.7	100.7	89.4	86.5	83.6	80.8	78.1
Chisago	124.6	105.0	64.4	99.1	91.3	88.4	85.6	82.8	80.1
Clay	105.2	129.0	116.8	106.9	107.3	103.6	100.0	96.6	93.2
Clearwater	126.8	140.9	83.9	102.9	118.1	114.4	110.8	107.2	103.8
Cook	6.9	165.4	196.7	196.7	139.7	135.3	131.0	126.8	122.7
Cottonwood[2]	*99.4*	*108.1*	*134.9*	*163.0*	*161.7*	*156.4*	*151.3*	*146.3*	*141.4*
Crow Wing	122.3	145.3	117.7	140.0	133.1	128.9	124.7	120.7	116.7
Dakota	133.9	133.3	100.9	97.2	124.6	120.4	116.2	112.2	108.3
Dodge	117.3	109.6	91.5	88.3	115.7	112.0	108.4	104.9	101.4
Douglas	133.6	142.9	162.0	141.8	132.1	127.7	123.5	119.4	115.4
Faribault	122.9	133.6	117.7	128.2	120.6	116.7	112.8	109.1	105.5
Fillmore	126.4	188.0	78.1	160.4	119.2	115.4	111.6	108.0	104.4
Freeborn	142.6	155.1	177.7	195.2	162.6	157.2	151.9	146.8	141.9
Goodhue	132.1	138.6	103.8	124.8	130.0	125.7	121.5	117.4	113.4
Grant	110.0	116.3	141.7	131.2	116.2	112.4	108.8	105.3	101.9
Hennepin[1]	*103.3*	*94.3*	*72.8*	*75.3*	*148.5*	*143.2*	*138.1*	*133.1*	*128.3*
Houston	95.6	90.4	103.0	102.0	111.0	107.4	103.9	100.5	97.2
Hubbard	174.8	302.7	73.4	170.3	206.4	199.9	193.7	187.5	181.6
Isanti	149.8	124.5	69.6	108.6	115.8	112.1	108.4	104.9	101.4
Itasca	170.7	131.5	140.1	153.5	126.4	122.4	118.5	114.7	111.0
Jackson	78.5	96.7	75.1	100.5	89.5	86.6	83.8	81.1	78.4
Kanabec	136.7	114.5	105.6	113.6	119.0	115.2	111.6	108.1	104.6
Kandiyohi	163.3	159.3	166.8	152.5	135.3	130.8	126.4	122.1	*117.9*
Kittson[4]	*190.6*	*164.4*	*85.6*	*102.3*	*74.7*	*72.4*	*70.1*	*67.8*	*65.6*
Koochiching	13.2	12.4	54.0	98.2	12.6	12.2	11.8	11.4	*11.1*
Lac qui Parle	150.6	126.2	109.6	179.5	123.2	119.2	115.4	111.6	*108.0*
Lake	177.6	183.4	204.7	168.4	175.4	169.8	164.4	159.1	154.0
Lake of the Woods	143.9	188.0	191.3	147.8	127.3	123.4	119.5	115.8	112.2
Le Sueur	136.8	160.2	132.4	168.0	128.8	124.6	120.6	116.6	112.8
Lincoln[3]	*301.6*	*382.7*	*163.6*	*185.5*	*142.5*	*138.0*	*133.6*	*129.2*	*125.0*
Lyon[3]	*161.8*	*193.6*	*250.8*	*199.4*	*196.1*	*189.4*	*182.8*	*176.4*	*170.3*
McLeod	142.7	90.5	147.9	135.0	132.0	127.6	123.3	119.1	115.0
Mahnomen	156.3	162.8	163.0	189.0	143.6	139.0	134.6	130.3	126.2
Marshall[4]	*70.7*	*73.6*	*74.7*	*87.5*	*90.9*	*88.0*	*85.2*	*82.5*	*79.8*
Martin	33.6	33.1	127.2	117.7	128.7	124.5	120.4	116.4	112.5
Meeker	187.5	140.5	147.5	133.9	118.0	114.2	110.5	106.9	103.4
Mille Lacs	83.7	142.9	118.2	129.2	135.0	130.7	126.4	122.3	118.3
Morrison	201.0	176.7	144.0	145.2	161.5	156.4	151.3	146.4	141.7
Mower	123.4	119.2	123.2	131.9	118.6	114.7	110.8	107.0	103.4
Murray	116.7	118.5	140.5	121.5	119.9	116.1	112.4	108.8	105.3
Nicollet	228.9	111.7	207.8	178.4	174.3	168.4	162.7	157.1	*151.7*
Nobles[3]	*177.2*	*200.4*	*239.6*	*207.3*	*189.3*	*183.0*	*176.9*	*170.9*	*165.1*
Norman	92.4	104.0	100.0	89.6	113.2	109.6	106.1	102.7	99.4
Olmsted	157.1	162.9	145.8	148.1	142.6	137.8	133.0	128.4	124.0
Otter Tail	97.1	118.2	185.0	198.0	125.2	121.3	117.4	113.6	109.9
Pennington	100.6	104.4	116.1	131.4	127.5	123.3	119.2	115.2	111.3
Pine	160.3	118.5	170.0	150.9	115.2	111.6	108.2	104.8	101.5
Pipestone[3]	*108.9*	*101.0*	*152.1*	*195.9*	*196.8*	*190.5*	*184.2*	*178.2*	*172.3*
Polk	365.7	375.8	506.4	368.2	381.3	368.7	356.4	344.5	332.9
Pope	208.2	135.6	53.8	140.6	122.0	118.1	114.3	110.6	107.0
Ramsey[1]	*136.2*	*137.9*	*49.0*	*46.3*	*125.0*	*120.5*	*116.2*	*112.0*	*108.0*
Red Lake	496.2	305.3	100.5	469.8	421.1	407.6	394.3	381.4	368.9

Table D3-D. Historical Estimates and Projections of Per Capita Water Withdrawals and Use - Minnesota

County	USGS Per Capita Withdrawal Estimates				MTAC Study Per Capita Water Use Projections				
	1985	1990	1995	2000	2005	2010	2015	2020	2025
Redwood	110.4	104.6	138.5	106.8	126.7	122.6	118.6	114.6	110.9
Renville	92.0	103.9	106.0	119.7	131.0	126.8	122.8	118.8	115.0
Rice	167.3	133.0	110.7	130.2	122.6	118.5	114.5	110.6	106.9
Rock	220.3	247.1	231.2	145.8	200.7	194.1	187.6	181.3	175.2
Roseau	128.7	155.8	184.4	145.9	143.7	139.2	134.7	130.4	126.2
St. Louis	231.4	255.8	191.3	211.2	215.9	208.7	201.6	194.7	188.1
Scott	140.9	139.4	116.0	128.1	128.3	124.1	120.1	116.1	112.3
Sherburne	104.9	138.1	137.1	148.8	112.8	109.1	105.5	102.0	98.7
Sibley	126.5	138.6	213.3	204.6	153.7	148.7	143.8	139.1	134.5
Stearns	125.6	131.3	141.3	146.8	136.4	131.8	127.3	122.9	118.6
Steele	177.1	177.2	76.9	188.4	151.9	146.9	141.9	137.2	132.5
Stevens	116.7	135.8	123.7	122.2	120.6	116.6	112.6	108.8	105.1
Swift	107.0	88.6	140.5	152.7	119.2	115.3	111.5	107.8	104.3
Todd	127.8	144.0	146.1	170.8	113.6	110.0	106.5	103.1	99.8
Traverse	150.0	145.6	131.2	129.4	94.0	90.9	88.0	85.1	82.3
Wabasha	168.9	160.0	176.2	187.6	171.8	166.3	160.9	155.7	150.6
Wadena	119.8	125.9	141.7	120.1	125.0	120.9	117.0	113.2	109.4
Waseca	693.6	180.3	170.5	146.5	123.5	119.5	115.5	111.6	107.9
Washington	113.9	108.9	278.9	100.2	119.8	115.9	112.0	108.3	104.7
Watonwan[2]	*148.9*	*226.5*	*279.9*	*239.1*	*152.4*	*147.3*	*142.4*	*137.6*	*133.0*
Wilkin	89.5	107.8	113.2	74.3	110.5	106.9	103.4	100.0	96.7
Winona	150.2	159.6	131.6	87.1	124.3	120.1	116.0	112.0	108.1
Wright	92.8	141.3	103.5	131.1	121.2	117.3	113.5	109.8	106.2
Yellow Medicine	109.9	100.4	114.4	203.6	131.6	127.4	123.2	119.2	115.3
Group 1	212.8	206.8	136.3	126.7	137.0	132.2	127.5	122.9	118.5
Group 2	124.0	158.7	195.5	200.3	157.1	151.9	146.9	142.0	137.2
Group 3	170.9	195.0	220.2	199.3	187.9	181.7	175.5	169.6	163.8
Group 4	101.4	97.4	77.1	90.5	85.6	82.9	80.2	77.7	75.2
All Counties	**175.4**	**175.7**	**145.2**	**132.8**	**138.9**	**133.8**	**128.9**	**124.1**	**119.6**

Note: Counties in *italics* are members of a county grouping. The number in the superscript indicates group membership.

Table D3-E. Historical Estimates and Projections of Per Capita Water Withdrawals and Use - Ohio

County	USGS Per Capita Withdrawal Estimates				MTAC Study Per Capita Water Use Projections				
	1985	1990	1995	2000	2005	2010	2015	2020	2025
Adams	108.0	94.3	98.4	78.3	101.0	101.5	101.5	101.3	101.0
Allen	172.2	170.1	360.4	329.2	258.5	264.4	268.7	272.5	276.4
Ashland	124.3	5.9	123.8	139.6	128.4	128.9	128.4	127.6	126.8
Ashtabula	129.8	143.2	107.7	113.2	124.8	125.2	124.9	124.2	123.5
Athens[1]	*109.2*	*84.6*	*120.0*	*132.4*	*109.5*	*110.2*	*110.4*	*110.4*	*110.3*
Auglaize	143.9	132.2	163.0	166.7	146.1	147.7	147.5	147.1	146.5
Belmont[2]	*132.0*	*91.3*	*121.8*	*115.6*	*120.8*	*124.0*	*126.3*	*128.5*	*130.9*
Brown	77.6	67.5	94.2	110.4	106.7	106.9	106.6	106.0	105.4
Butler[3]	*113.6*	*143.1*	*134.2*	*140.3*	*143.4*	*143.5*	*142.5*	*141.2*	*139.8*
Carroll	153.7	143.9	153.4	147.9	160.2	161.9	161.9	161.6	161.2
Champaign	171.5	172.0	125.1	137.3	125.3	126.1	126.9	127.6	128.2
Clark	151.5	140.4	175.5	171.6	141.4	143.2	144.7	146.0	147.3
Clermont	113.7	10.9	86.9	124.2	135.4	136.2	136.6	136.8	136.8
Clinton[4]	*88.3*	*90.8*	*24.0*	*28.5*	*84.0*	*82.4*	*81.1*	*79.6*	*78.2*
Columbiana	138.4	141.1	145.7	161.4	121.4	122.8	123.4	123.8	124.2
Coshocton	383.8	388.5	428.8	395.7	441.9	451.9	460.5	468.7	477.3
Crawford	497.0	146.3	112.1	98.2	134.9	137.5	139.8	141.8	144.0
Cuyahoga	240.2	210.8	201.6	187.3	193.3	199.0	202.3	205.2	208.1
Darke	132.6	135.4	128.1	130.5	136.3	138.3	139.4	140.2	140.9
Defiance	253.7	187.4	199.0	206.4	223.0	226.9	229.2	231.1	232.9
Delaware	150.6	141.2	148.2	111.5	162.9	162.2	160.0	157.6	155.1
Erie	144.6	40.4	174.1	133.8	159.9	162.4	163.6	164.5	165.3
Fairfield	126.7	145.9	119.9	117.4	135.8	136.5	136.4	136.1	135.6
Fayette	96.0	111.7	103.7	106.0	131.8	134.4	137.2	140.0	143.0
Franklin	142.2	147.2	148.5	173.1	192.8	196.6	201.6	206.5	211.7
Fulton	157.8	132.5	183.2	177.4	164.4	166.1	166.4	166.3	166.1
Gallia	94.2	47.7	101.9	109.1	128.6	130.1	132.3	134.5	136.7
Geauga	130.0	43.3	85.5	74.2	67.6	67.7	67.7	67.5	67.4
Greene	104.3	62.1	70.8	72.7	84.6	85.0	85.4	85.6	85.7
Guernsey	133.0	114.3	149.4	134.1	124.3	127.0	128.6	129.9	131.3
Hamilton[3]	*167.2*	*189.0*	*182.5*	*189.9*	*214.5*	*222.7*	*229.6*	*236.4*	*243.7*
Hancock	180.2	249.3	297.8	338.6	287.5	293.9	299.2	304.0	309.0
Hardin	96.5	104.2	123.3	126.9	122.5	124.5	126.0	127.3	128.6
Harrison[2]	*77.5*	*46.0*	*79.0*	*65.2*	*106.6*	*108.6*	*109.7*	*110.6*	*111.6*
Henry	99.7	107.4	112.9	108.8	140.0	141.0	141.3	141.3	*141.2*
Highland[4]	*93.0*	*53.2*	*53.4*	*66.2*	*54.2*	*54.3*	*54.1*	*53.7*	*53.3*
Hocking[1]	*215.1*	*274.3*	*312.2*	*274.4*	*111.9*	*111.8*	*111.1*	*110.2*	*109.3*
Holmes	145.8	92.0	161.5	362.8	119.4	118.8	117.2	115.4	113.6
Huron[6]	*132.2*	*155.9*	*190.7*	*140.9*	*140.5*	*141.4*	*141.6*	*141.5*	*141.3*
Jackson[5]	*139.3*	*73.7*	*66.4*	*60.8*	*120.2*	*121.5*	*122.2*	*122.6*	*123.0*
Jefferson	122.3	144.4	74.6	142.6	124.2	127.2	129.6	131.8	134.3
Knox	152.7	132.5	125.9	133.0	124.1	124.3	123.8	123.0	122.2
Lake	132.9	150.9	138.2	126.4	165.8	169.2	171.6	173.8	176.1
Lawrence	95.9	94.2	86.3	103.2	102.1	103.3	104.1	104.6	105.2
Licking	151.4	127.7	136.8	156.5	138.4	140.7	141.4	141.8	142.1
Logan	165.5	24.2	126.0	149.7	154.4	155.7	157.3	158.5	159.7
Lorain[6]	*148.1*	*135.0*	*137.0*	*141.9*	*143.5*	*145.5*	*145.8*	*145.8*	*145.7*
Lucas[7]	*166.5*	*191.3*	*192.3*	*202.9*	*173.1*	*176.5*	*178.9*	*180.9*	*183.0*
Madison	98.6	43.9	65.0	65.9	73.6	74.3	74.4	74.4	74.3
Mahoning[8]	*23.1*	*23.5*	*24.5*	*22.7*	*50.5*	*50.8*	*50.8*	*50.5*	*50.3*
Marion	101.4	94.9	106.4	133.6	141.2	144.8	147.2	149.5	151.8
Medina[6]	*107.1*	*106.7*	*121.6*	*94.7*	*148.5*	*148.4*	*147.1*	*145.5*	*143.9*
Meigs	88.3	55.8	75.9	80.3	96.0	96.3	96.0	95.5	94.9
Mercer	124.4	136.3	111.9	115.9	133.7	135.3	136.4	137.2	138.0
Miami	149.4	152.9	173.2	181.5	151.4	152.2	152.7	152.7	152.7
Monroe[2]	*63.7*	*49.6*	*151.1*	*89.7*	*112.8*	*115.1*	*117.2*	*119.3*	*121.5*
Montgomery	162.1	158.0	172.7	171.8	176.4	179.2	181.2	182.7	184.3
Morgan	170.0	261.9	295.8	258.3	264.5	265.0	264.1	262.5	260.8
Morrow	109.7	15.2	67.5	70.4	103.1	103.0	102.2	101.1	100.1
Muskingum	123.3	44.2	140.5	138.3	145.0	148.3	150.4	152.2	154.1
Noble	60.4	89.0	98.7	86.2	95.7	95.5	94.6	93.5	92.4
Ottawa	82.8	83.4	89.3	10.7	91.8	92.7	93.4	93.9	94.3
Paulding	144.0	104.0	159.8	277.2	164.3	166.4	167.8	168.8	169.8

Table D3-E. Historical Estimates and Projections of Per Capita Water Withdrawals and Use - Ohio

County	USGS Per Capita Withdrawal Estimates				MTAC Study Per Capita Water Use Projections				
	1985	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**
Perry[1]	76.4	74.5	73.6	59.7	97.7	98.1	98.0	97.7	97.4
Pickaway	130.1	89.3	119.8	111.5	116.0	117.0	117.1	116.8	116.6
Pike	88.0	42.6	102.5	117.0	127.9	129.2	129.1	128.7	128.2
Portage	101.2	91.0	106.9	100.9	133.6	135.0	136.2	137.1	137.9
Preble	120.8	109.4	123.3	131.0	121.3	121.9	121.7	121.3	120.8
Putnam	120.9	142.7	187.6	206.8	135.3	136.6	137.1	137.4	137.6
Richland	151.7	119.0	135.6	166.6	141.1	144.0	146.0	147.7	149.4
Ross	113.0	160.3	126.3	132.6	125.6	126.5	126.8	126.8	126.7
Sandusky	158.9	205.7	190.8	193.1	200.2	201.5	201.9	201.7	201.5
Scioto[5]	*105.8*	*116.4*	*136.1*	*154.7*	*113.5*	*114.9*	*115.8*	*116.4*	*117.0*
Seneca	119.0	58.8	56.1	64.4	64.6	66.3	67.9	69.4	71.1
Shelby	142.4	126.9	134.0	147.3	169.4	171.6	172.4	172.7	173.0
Stark	149.9	101.8	106.9	111.1	154.5	158.3	161.3	164.1	167.0
Summit	118.1	150.6	142.4	123.0	171.0	175.0	177.3	179.3	181.3
Trumbull[8]	*378.9*	*74.7*	*87.7*	*94.3*	*52.1*	*52.7*	*52.8*	*52.7*	*52.6*
Tuscarawas	150.3	30.9	426.8	283.1	268.2	274.2	277.5	280.2	283.0
Union	123.8	127.6	138.1	151.4	161.0	161.3	160.3	158.9	157.5
Van Wert	142.2	174.9	201.8	242.3	198.5	202.9	208.1	213.2	218.8
Vinton[5]	*50.9*	*55.9*	*40.3*	*42.6*	*93.2*	*93.7*	*93.5*	*93.2*	*92.7*
Warren[3]	*96.6*	*93.7*	*164.1*	*116.6*	*149.5*	*149.3*	*146.6*	*143.8*	*141.0*
Washington	120.1	45.7	146.2	146.5	136.0	139.6	142.6	145.6	148.7
Wayne	137.6	136.2	142.8	122.0	142.9	144.4	145.0	145.2	145.4
Williams	155.9	168.2	149.4	136.2	155.9	158.2	159.6	160.8	161.9
Wood[7]	*93.6*	*72.4*	*80.8*	*72.3*	*153.9*	*154.6*	*155.3*	*155.6*	*155.8*
Wyandot	131.5	106.2	117.6	110.7	144.5	148.0	151.1	154.2	157.5
Group 1	115.6	104.9	133.9	132.0	106.6	107.0	107.0	106.7	106.3
Group 2	118.6	81.1	120.3	106.4	118.0	120.8	122.9	124.9	127.0
Group 3	150.7	171.8	170.1	169.4	185.3	188.4	189.4	189.8	190.0
Group 4	91.1	69.0	41.3	50.4	67.8	67.4	66.7	65.9	65.2
Group 5	111.0	104.3	115.7	127.4	112.3	113.6	114.2	114.5	114.9
Group 6	140.5	133.1	140.4	133.5	144.6	145.8	145.7	145.1	144.5
Group 7	158.1	175.6	177.0	183.2	168.0	170.7	172.6	174.1	175.6
Group 8	158.6	45.4	51.8	52.4	51.3	51.7	51.7	51.5	51.4
All Counties	**159.2**	**143.4**	**153.1**	**153.3**	**162.7**	**165.8**	**167.9**	**169.6**	**171.3**

Note: Counties in *italics* are members of a county grouping. The number in the superscript indicates group membership.

Table D3-F. Historical Estimates and Projections of Per Capita Water Withdrawals and Use - Wisconsin

County	USGS Per Capita Withdrawal Estimates				MTAC Study Per Capita Water Use Projections				
	1985	1990	1995	2000	2005	2010	2015	2020	2025
Adams	237.7	131.2	152.0	133.1	119.8	119.1	118.5	118.0	117.5
Ashland	124.5	134.3	164.9	113.5	149.0	149.1	149.6	150.3	151.0
Barron	207.6	208.0	201.0	219.5	214.8	214.2	214.6	215.3	216.1
Bayfield	113.6	175.9	148.4	125.0	124.9	124.3	123.7	123.3	122.9
Brown	156.9	157.7	180.6	176.6	173.4	172.3	172.5	172.7	173.0
Buffalo	155.6	95.0	81.6	133.6	138.4	138.0	137.7	137.5	137.4
Burnett	124.1	144.5	121.3	116.3	127.3	126.6	126.4	126.4	126.5
Calumet[2]	*188.6*	*120.0*	*135.4*	*186.8*	*142.0*	*140.4*	*139.9*	*139.3*	*138.8*
Chippewa	202.9	228.0	205.5	206.9	216.7	215.4	215.2	215.2	215.3
Clark	147.2	179.5	128.9	124.9	130.8	130.3	130.0	129.6	129.3
Columbia	138.0	154.6	144.9	135.6	145.0	144.4	144.4	144.5	144.6
Crawford	163.2	245.1	163.8	242.0	212.2	212.0	212.6	213.5	214.5
Dane	160.4	153.4	144.9	137.0	170.6	169.1	168.1	167.0	166.0
Dodge	137.5	130.9	137.6	134.6	142.5	142.1	142.0	142.0	141.9
Door	178.5	166.2	181.8	200.6	154.5	153.8	154.3	155.1	156.1
Douglas	143.2	128.2	120.4	137.4	140.4	140.2	140.4	140.6	140.9
Dunn	109.5	115.3	140.7	121.8	138.8	138.0	137.3	136.3	135.2
Eau Claire	164.7	157.2	140.8	139.2	158.3	157.5	156.4	154.8	153.4
Florence	117.7	118.6	283.3	285.7	125.3	124.6	123.8	123.0	122.2
Fond du Lac	219.6	206.1	191.4	210.3	213.8	213.4	214.1	215.0	216.1
Forest	91.6	183.7	186.3	107.1	129.2	128.8	128.4	127.9	127.4
Grant	118.3	124.4	109.5	113.7	134.8	134.6	134.4	134.2	134.0
Green	169.1	177.3	178.4	156.4	147.8	147.2	147.6	148.1	148.7
Green Lake	127.4	149.2	151.4	167.0	148.2	148.1	148.5	149.1	149.7
Iowa	132.1	121.2	107.8	117.0	151.7	151.1	151.5	152.0	152.6
Iron	64.3	72.5	211.3	233.1	136.9	137.2	137.7	138.5	139.4
Jackson	111.9	142.1	145.3	120.5	134.3	133.7	133.5	133.2	133.1
Jefferson	185.5	206.4	199.2	206.0	203.9	202.9	202.9	202.9	202.9
Juneau	101.5	169.2	133.6	133.0	136.8	135.1	135.0	135.1	135.3
Kenosha	179.4	195.7	141.1	142.0	145.7	144.6	144.0	143.3	142.6
Kewaunee	112.4	125.6	130.4	132.1	136.3	135.8	135.5	135.2	135.0
La Crosse	295.6	279.8	220.2	228.0	259.9	259.8	258.5	256.7	254.9
Lafayette	144.1	148.6	132.9	113.2	123.6	123.2	122.6	122.0	121.3
Langlade	142.7	150.4	138.7	130.5	138.5	138.2	138.5	138.9	139.4
Lincoln	142.8	150.9	170.0	219.1	168.7	168.6	168.7	169.1	169.5
Manitowoc	171.3	211.2	191.9	199.7	199.8	199.8	200.4	201.1	202.0
Marathon	240.8	163.3	242.1	224.7	228.3	227.7	228.0	228.4	228.8
Marinette	183.1	188.3	194.3	177.2	190.4	190.6	191.4	192.6	193.9
Marquette	110.2	35.6	112.9	113.6	126.4	125.7	125.4	125.2	125.1
Menominee	64.0	64.0	64.0	66.2	72.9	72.4	71.1	69.8	68.6
Milwaukee[1]	*222.6*	*190.3*	*177.3*	*185.5*	*166.9*	*167.3*	*167.0*	*166.6*	*166.2*
Monroe	185.8	293.4	163.0	167.5	198.8	197.5	197.2	196.9	196.6
Oconto	113.3	113.8	131.1	133.1	129.3	128.3	128.1	127.8	127.7
Oneida	247.3	324.4	360.6	334.6	335.9	336.0	339.3	344.0	349.5
Outagamie[2]	*129.7*	*157.4*	*165.4*	*149.9*	*174.3*	*172.8*	*172.9*	*173.1*	*173.3*
Ozaukee[1]	*152.5*	*104.8*	*91.5*	*142.9*	*176.5*	*176.3*	*176.4*	*176.6*	*176.8*
Pepin	95.2	114.5	111.5	136.8	130.9	129.7	129.6	129.5	129.5
Pierce	109.7	113.0	103.5	100.9	106.7	106.0	105.2	104.2	103.2
Polk	211.0	188.5	169.6	180.8	190.1	188.6	188.2	188.0	187.7
Portage	156.3	140.6	211.1	228.3	184.7	184.1	182.7	181.1	179.5
Price	171.1	169.3	226.8	225.9	200.5	201.1	202.2	203.6	205.2
Racine[1]	*245.0*	*276.6*	*262.2*	*254.3*	*154.5*	*154.3*	*154.2*	*154.0*	*153.8*
Richland	134.1	189.7	142.9	151.2	131.8	131.5	131.3	131.2	131.0
Rock	193.4	203.9	191.7	176.6	190.6	190.2	190.4	190.6	190.9
Rusk	104.6	99.8	108.2	118.2	132.4	132.1	132.1	132.1	132.2
St. Croix	153.0	121.4	108.1	115.7	150.0	147.3	146.7	146.1	145.6
Sauk	176.6	164.9	194.0	191.5	156.0	154.9	154.9	155.0	155.2
Sawyer	157.5	139.8	168.4	290.0	137.3	136.5	136.8	137.5	138.3
Shawano	92.0	142.3	183.4	150.8	132.2	131.7	131.6	131.6	131.6
Sheboygan	252.0	234.5	250.8	258.6	256.5	256.2	257.3	258.6	260.1
Taylor	122.5	109.3	108.3	132.3	143.2	143.4	143.4	143.4	143.5
Trempealeau	145.4	180.1	177.2	199.6	180.6	180.3	180.9	181.5	182.2
Vernon	135.6	116.3	114.0	103.7	125.8	125.1	124.7	124.3	123.9

Table D3-F. Historical Estimates and Projections of Per Capita Water Withdrawals and Use - Wisconsin

County	USGS Per Capita Withdrawal Estimates				MTAC Study Per Capita Water Use Projections				
	1985	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**
Vilas	264.3	343.1	263.9	187.5	253.9	252.9	253.1	253.8	254.8
Walworth	145.2	158.4	166.4	182.3	147.5	146.6	146.0	145.3	144.7
Washburn	153.7	167.8	169.8	241.5	186.0	185.2	185.4	186.2	187.2
Washington	130.2	115.7	135.5	139.3	157.0	156.1	155.7	155.5	155.3
Waukesha[1]	*107.9*	*102.0*	*102.2*	*104.8*	*189.0*	*188.9*	*189.7*	*190.5*	*191.5*
Waupaca	237.6	245.4	283.6	285.1	266.9	266.3	266.8	267.6	268.6
Waushara	96.9	70.8	60.9	121.5	83.5	83.0	82.7	82.5	82.3
Winnebago	167.4	200.9	189.1	202.9	165.6	165.4	165.8	166.3	166.8
Wood	139.5	143.2	137.8	169.8	167.0	167.7	168.3	169.2	170.2
Group 1	206.0	178.6	166.6	174.5	171.1	171.3	171.2	171.1	171.0
Group 2	136.1	150.3	159.5	157.3	167.3	165.6	165.6	165.6	165.7
All Counties	**183.9**	**174.8**	**168.6**	**172.3**	**174.3**	**173.8**	**173.6**	**173.3**	**173.1**

Note: Counties in *italics* are members of a county grouping. The number in the superscript indicates group membership.

APPENDIX E.

VARIABLE DEFINITIONS AND DATA SOURCES

This appendix documents the data source and specification of the dependent and independent variables used in the analysis of public-supply water use in the five Midwest states. The description of each variable includes the variable name, units (in parenthesis), the source of raw data, the method used to specify the variable, and any modifications or adjustments made to the original data. It should be noted that the units in a few variables were altered in several models so that regression coefficients might be more easily interpreted. Variables that are estimated as ratios of other variables are also described in this appendix. Some of the variables described in this appendix were included in the final models in every state; others were tested in early modeling runs but were not included in any model.

Values of each variable for county groupings were estimated using several different techniques. When possible, values for county groupings were calculated by summing the values from each county in the group. For weather variables, county averages were used. For variables specified as ratios (percentages), projected values of the components of the ratios were estimated, and the ratios were recalculated for the group.

Projected values for variables were developed only for those that were included in the final model in each state.

DEPENDENT VARIABLES

Total public-supply water withdrawals (mgd)

Source: USGS water use inventories.

Estimation/Modification:

Zero values for Lawrence County (2000) were replace with average from the three previous inventories (1.27 mgd)

In Michigan, 160 mgd from the 2000 estimate were reallocated from St. Clair County to County Group #5. This decision was based on water withdrawal data reported by the State of Michigan Department of Environmental Quality (*2000 Water Withdrawals for Community Public Water Supply Systems in Michigan, by County, http://www.deq.state.mi.us/documents/deq-wd-wurp-Public2000.pdf*)

Public water supply per capita withdrawals (gallons per capita per day)

Source: USGS water use inventories.

Estimation/Modification:

Not all states reported per capita water withdrawals in their preliminary 2000 estimates. Public water supply per capita for these states was estimated by dividing the total public supply water withdrawals by the total population served reported by USGS. Per capita values were adjusted for Lawrence County, Illinois and St. Clair County, Michigan using adjusted withdrawal data (see above).

INDEPENDENT VARIABLES

Total population (thousands)

Source: USGS water use inventories.

Population served by public water supply (thousands)

Source: USGS water use inventories.

Personal income per capita ($ 1995)

Source: Bureau of Economic Analysis.

Estimation/Modification:

Data are downloaded from the website:

http://www.bea.doc.gov/bea/regional/reis/

Nominal values were converted to 1995 dollars using the consumer price index-all urban consumers (*http://www.bls.gov/cpi/*).

Median family income (1995 $ in thousands)

Source: Bureau of Census.

Estimation/Modification:

1979 and 1989 data are downloaded from the website

http://www.census.gov/hhes/income/histinc/county/county2.

1999 data are downloaded from the website

http://factfinder.census.gov/servlet/BasicFactsServlet Table STF3

The 1985 and 1995 values are estimated by midpoints.

Nominal values were converted to 1995 dollars using the consumer price index-all urban consumers (*http://www.bls.gov/cpi*).

GSP per capita (1995 $ in thousands)

Source: Bureau of Economic Analysis

http://www.bea.doc.gov/bea/regional/gsp/action.cfm

Estimation/Modification:

Nominal values were converted to 1995 dollars using the consumer price index-all urban consumers

http://data.bls.gov/servlet/SurveyOutputServlet

Percentage of urban population (%)

Source: Bureau of Economic Analysis.

Estimation/Modification:

The percentage is calculated by dividing urban population by total population.

1980 urban population data are downloaded from the website:

http://www.nationalatlas.gov/census1980m.html

1990 urban population data are downloaded from the website

http://venus.census.gov/cdrom/lookup STF3A Table P6

2000 urban population data are downloaded from the website

http://factfinder.census.gov/servlet/BasicFactsServlet Table P5

Percentage values for 1985 and 1995 are estimated by mid points.

Land area (square miles)

Source: Bureau of Census

Estimation/Modification:

Data are downloaded from the website:
http://www.census.gov/population/censusdata/90den_stco.txt

Gross population density (persons/square mile)

Estimation/Modification:

Calculated as: (total county population/land area)

Total employment (BEA) (thousands)

Source: Bureau of Economic Analysis.

Data are downloaded from the website:
http://www.bea.gov/bea/regional/reis/ Table CA25

For 1985 data, the county Shawano (Wisconsin) and the county Menominee (Wisconsin) are reported together. The employment in the two counties is estimated as 14,743 and 1,110, respectively based on the estimated historical ratio of 93:7.

Total employment (CBP) (thousands)

Source: County Business Pattern.

Data are downloaded from the website:
http://fisher.lib.virginia.edu/cbp/county.html

Percentage of total manufacturing employment in SIC 20 (%)

Source: County Business Patterns
http://fisher.lib.virginia.edu/cbp/state.html

Estimation/Modification:

The two-digit SIC employment data available from CBP contains many "missing" data points due to Census Bureau non-disclosure policies. Two-digit SIC employment data was obtained for the State of Illinois through a special arrangement with the Illinois Department of Employment Security, and tested in the Illinois water use model. The relationship between these variables and water use in Illinois was not strong enough in the Illinois test case and so collection and testing of these variables in other state models was abandoned. Although past research demonstrates a clear relationship between employment in the manufacturing sector and publicly-provided water use, the USGS water use data that was available for this study may lack the precision to verify this relationship.

Percentage of total manufacturing employment in SIC 24 (%)

Source: County Business Patterns
http://fisher.lib.virginia.edu/cbp/state.html

Estimation/Modification:

See SIC 20 above.

Percentage of total manufacturing employment in SIC 26 (%)

Source: County Business Patterns

http://fisher.lib.virginia.edu/cbp/state.html

Estimation/Modification:

See SIC 20 above.

Percentage of total manufacturing employment in SIC 28 (%)

Source: County Business Patterns

http://fisher.lib.virginia.edu/cbp/state.html

Estimation/Modification:

See SIC 20 above.

Percentage of total manufacturing employment in SIC 29 (%)

Source: County Business Patterns

http://fisher.lib.virginia.edu/cbp/state.html

Estimation/Modification:

See SIC 20 above.

Percentage of total manufacturing employment in SIC 33 (%)

Source: County Business Patterns

http://fisher.lib.virginia.edu/cbp/state.html

Estimation/Modification:

See SIC 20 above.

Percentage of population employed (BEA) & (CBP) (%)

Estimation/Modification:

Calculated as: (total employment*100/total population) using total both CBP and BEA total employment estimates

Total employees in manufacturing

Source: Country Business Pattern

http://fisher.lib.virginia.edu/cbp/state.html

Percentage of total manufacturing employment

Source: Country Business Pattern

http://fisher.lib.virginia.edu/cbp/state.html

Total employment (CBP) divided by CBP manufacturing employment

Percentage of single family housing units (%); *Source:* Bureau of Census.

Estimation/Modification:

1980 data on housing units are obtained from 1980 census Table 93.

1990 data on housing units are downloaded from the website:

http://venus.census.gov/cdrom/lookup/, STF3A Table H20

2000 data on housing units are downloaded from the website:

http://factfinder.census.gov/servlet/BasicFactsServlet, Table H30

Single family units were calculated as the sum of "1 detached" and "1 attached" housing units

The percentage value is calculated as:

(total number of single housing units)/(total number of housing units)*100

Percentage values of 1985 and 1995 are estimated by midpoints.

Percentage of multi-family housing units (%)

Source: Bureau of Census.

Estimation/Modification:

Calculated using the same sources and methods as single family housing units.

Multi-family housing were calculted as the sum of "2 units, " 3 or 4 units", "5 to 9 units", 10 to 49 units", and "50 or more units".

Percentage of mobile homes (%)

Source: Bureau of Census

Estimation/Modification:

Calculated using the same sources and methods as single family housing units.

Mobile homes were calculated and the sum of "Mobile homes or trailers" and "Other".

Monthly precipitation (Inches)

Source: National Oceanic and Atmospheric Administration

Estimation/Modification:

Precipitation data for 344 climatic divisions are downloaded from the website:

ftp.ncdc.noaa.gov/pub/data/cirs/hold/0105.pcp

Using GIS software, each county was assigned to the climate division where the centroid of that county is located. The weather data for that climate division is used to represent the weather in the county. This same method was used for all weather variables (below).

Total precipitation of summer months (Inches)

Source: National Oceanic and Atmospheric Administration

Estimation/Modification:

It is calculated as the sum of monthly precipitation from May to September.

Monthly temperature (°F)

Source: National Oceanic and Atmospheric Administration

Estimation/Modification:

Temperature data for 344 climatic divisions are downloaded from the website:

ftp.ncdc.noaa.gov/pub/data/cirs/hold/0105.tmp

Average summer temperature (°F)

Source: National Oceanic and Atmospheric Administration

Estimation/Modification:

It is calculated as the average of monthly temperature from May to September.

Monthly Palmer drought severity index

Source: National Oceanic and Atmospheric Administration

Estimation/Modification:

Drought index data for 344 climatic divisions are downloaded from the website:

ftp.ncdc.noaa.gov/pub/data/cirs/hold/0105.pdsi

Minimum monthly Palmer drought severity index

Source: National Oceanic and Atmospheric Administration

Estimation/Modification:

The minimum monthly value of the Palmer drought severity index is used.

PROJECTED VALUES OF MODEL VARIABLES

Total population (thousands)

County population projection estimates were developed from projections provided by state demographic agencies.

See Chapter 2 and Appendix D.

Population served by public water supply (thousands)

Population served projections for each county were calculated by multiplying the projected population values in each county by the percent of population served in that county in the year 2000.

See Chapter 2 and Appendix D.

Percentage of multi-family housing units (%)

Source: Energy Information Administration

Estimation/Modification:

EIA has prepared projections of the rate of change of housing types by state. The EIA rates of change were applied to the 2000 Census values for each housing type, and the number of future housing units and percentages were calculated.

See Chapter 2.

Percentage of population employed (%)

Source: Various state agencies and the Bureau of Economic Analysis

Average annual rates of change were calculated from 2000-2010 regional projections (all jobs) and applied to 2000 total employment to project employment for all forecast years. Regional projections from state agencies were located for four states. BEA projections were used to calculate state-level employment projections for Minnesota and Wisconsin and applied uniformly to all counties in these states. The sources of employment projections appear below:

Illinois Department of Employment Security
http://lmi.ides.state.il.us/projections/countyltproj.htm
Indiana Department of Workforce Development:
http://www.in.gov/dwd/inews/lmi22.asp?md=1&tp=05&qs=&go=09
Michigan Office of Labor Market Information
http://www.in.gov/dwd/inews/lmi22.asp?md=1&tp=05&qs=&go=09
(note: Lapeer County is included in two regions, Detroit MSA and Thumb Area, and is projected using an average of the two)
Ohio Department of Job and Family Services, Bureau of Labor Market Information
http://lmi.state.oh.us/PROJ/OhioJobOutlook.htm
2045 BEA Regional Projections
http://www.ctre.iastate.edu/Research/bts_wb/cd-rom/employment/bea.htm

Per Capita and Median Family Income Projections (1995 $ in thousands)

Source: Bureau of Economic Analysis
BEA Regional Projections to 2045, Vol. 1: Summary - Per Capita Personal Income for the United States, Regions, and States (1987 dollars)
The rate of change from state projections is calculated and applied to all counties.
See Chapter 2.

Average Summer Temperature and Precipitation (°F and Inches)

Source: National Oceanic and Atmospheric Administration
Estimation/Modification:
Weather station "normal" weather data was obtained for each weather station and assigned to counties and groups and weather variables calculated as above.
See Chapter 2.