Southeastern Wisconsin Regional Water Supply Planning Program Update

Focus on Alternative and Preliminary Recommended Plans

SOUTHEASTERN WISCONSIN REGIONAL PLANNING COMMISSION

KENOSHA · MILWAUKEE · OZAUKEE · RACINE · WALWORTH · WASHINGTON · WAUKESHA

Milwaukee County Public Informational Meetings

January 12, 13, & 14, 2009

#141727

Presentation Overview

- Background
- Alternative and Preliminary Recommended Plans

Background

A Cooperative Program…

SE Wisconsin Water Utilities

USGS science for a changing world

Southeastern Wisconsin Regional Planning Commission

Seven Southeastern Wisconsin Counties

WISCONSIN DEPT. OF NATURAL RESOURCES

UNIVERSITY of WISCONSIN UWMILWAUKEE

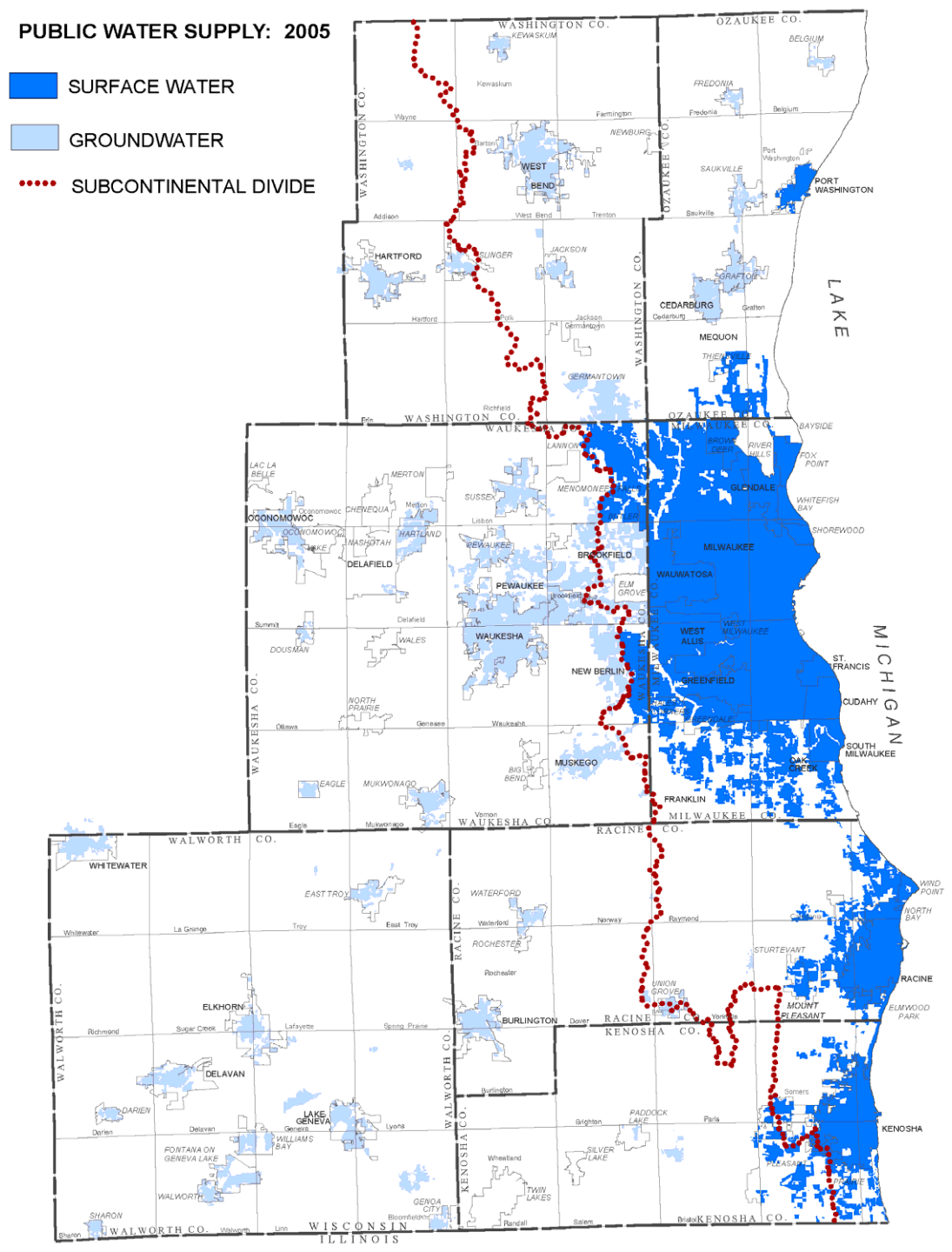
UW Extension Wisconsin Geological and Natural History Survey

Background

Objective – To assure that the water supply for this Region can sustain existing and planned population and development.

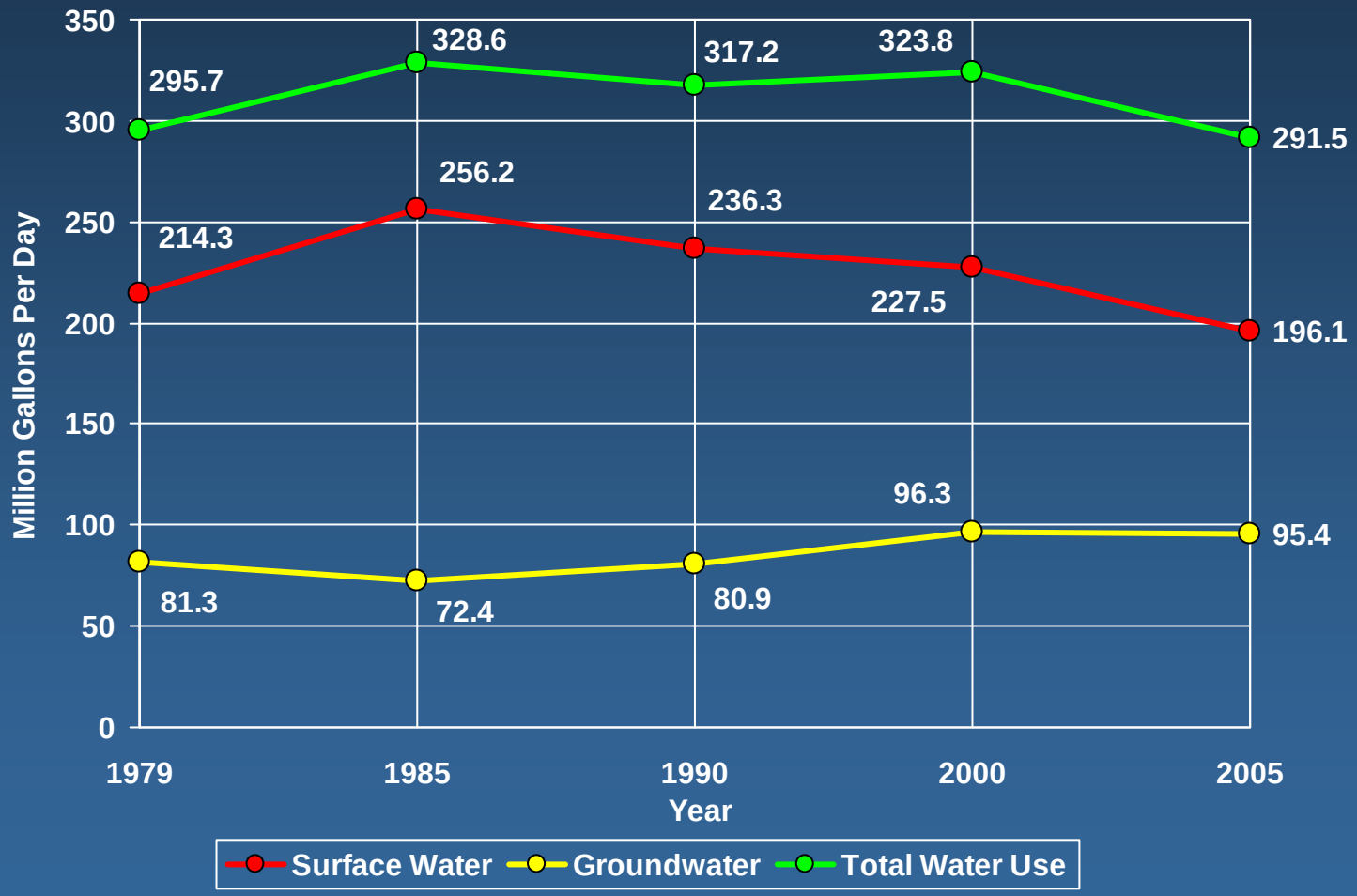
Experience to Date

- **Current water supply (290 mgd)**
  - **Lake Michigan – 9 plants (28 systems) serving 1.2 million people (210 mgd-72%). Milwaukee County – 6 plants (14 systems) serving 917,000 people**
  - **Groundwater – 50 systems serving 400,000 people (55 mgd-19%).**
  - **Groundwater – individual wells serving 350,000 people (25 mgd-9%).**
- **Groundwater deep aquifer – historic 4 to 5 feet annual drawdown and some radium and dissolved solids problems.**
- **Lake Michigan water – existing treatment plants operating at less than 50 percent of capacity.**



Background

Trends in Water Use for the Region: 1979-2005 (in Million Gallons Per Day)*

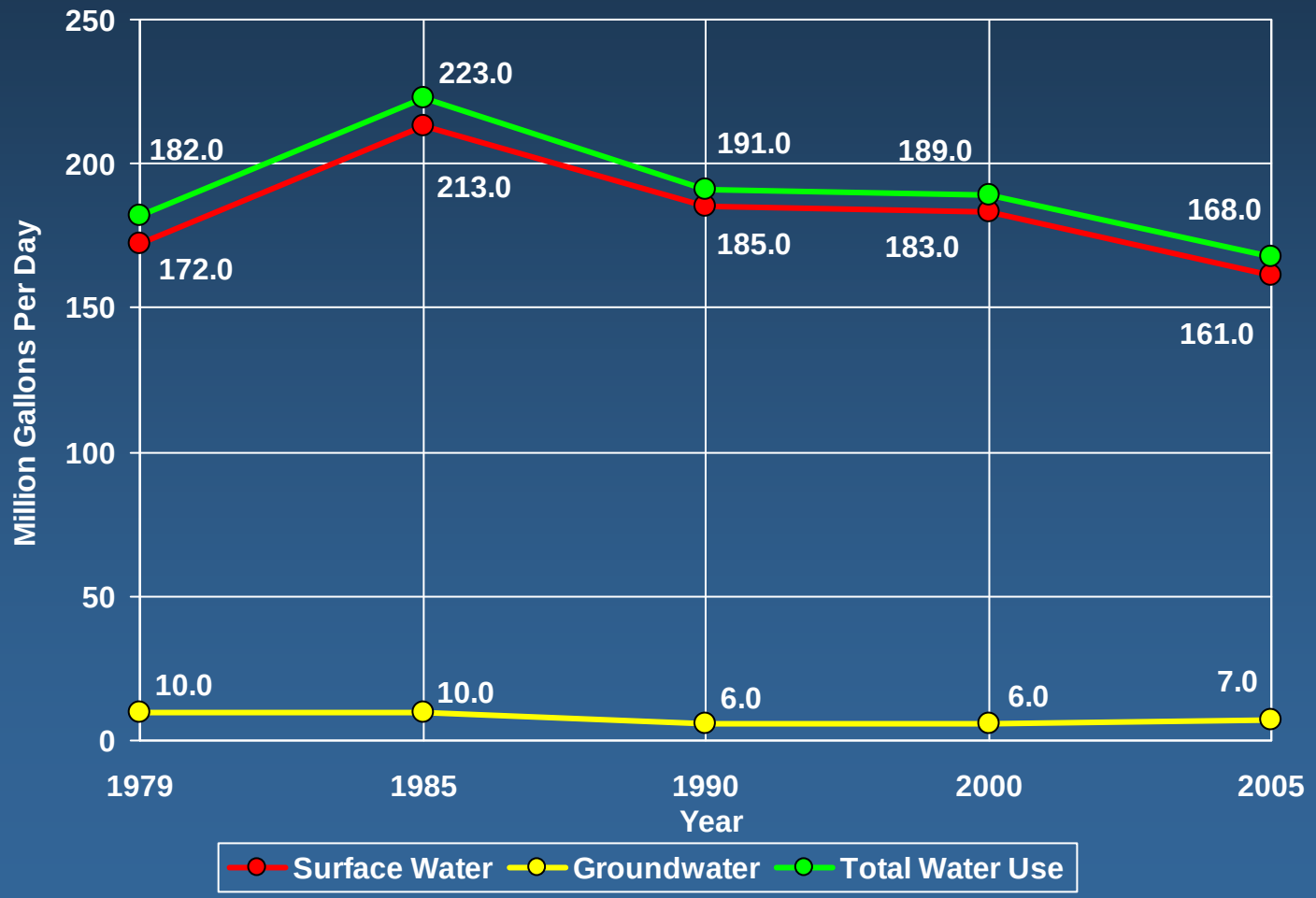


Source: USGS

* Excludes thermoelectric power generation uses

Background

Trends in Water Use for Milwaukee County: 1979-2005 (in Million Gallons Per Day)*

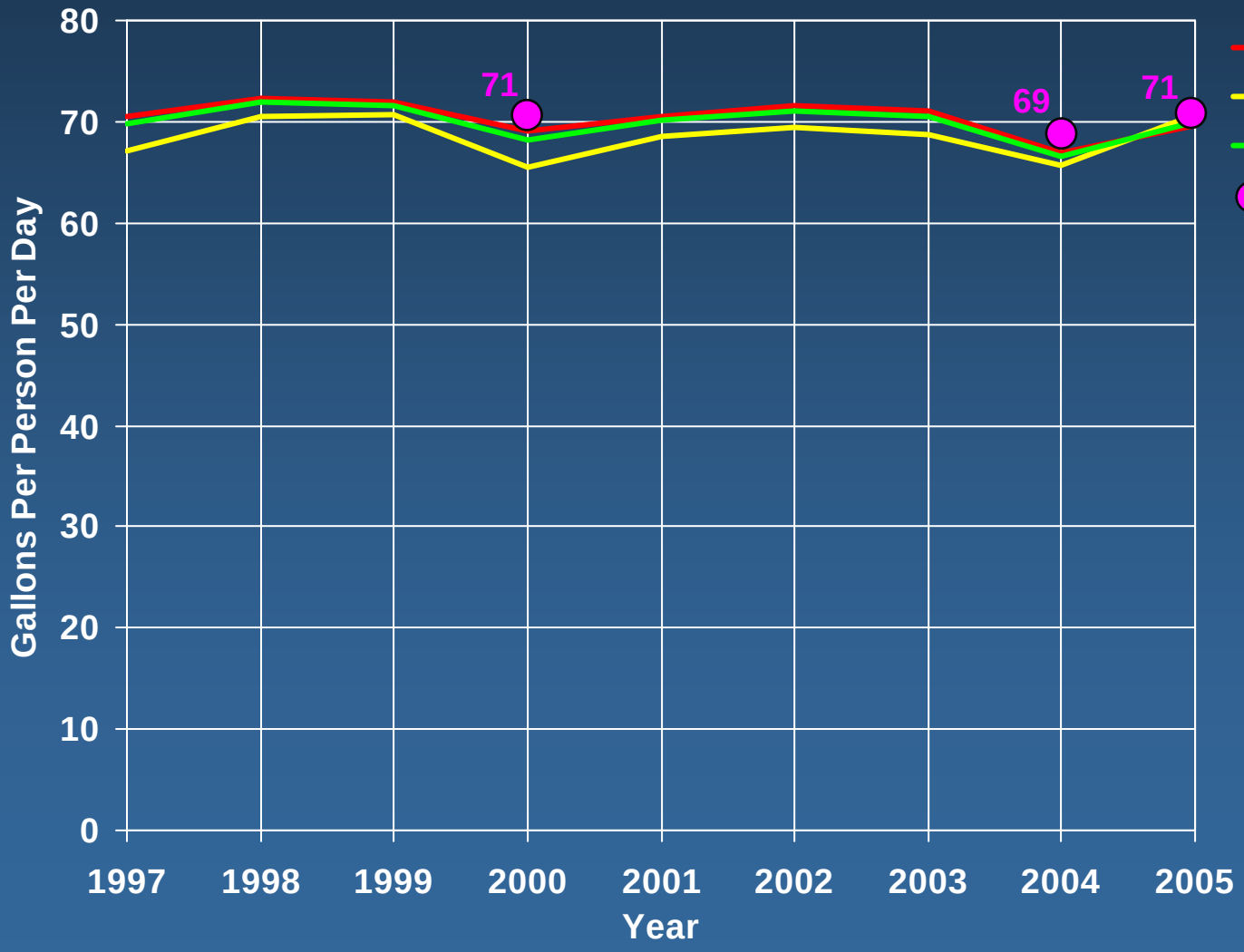


Source: USGS

* Excludes thermoelectric power generation uses

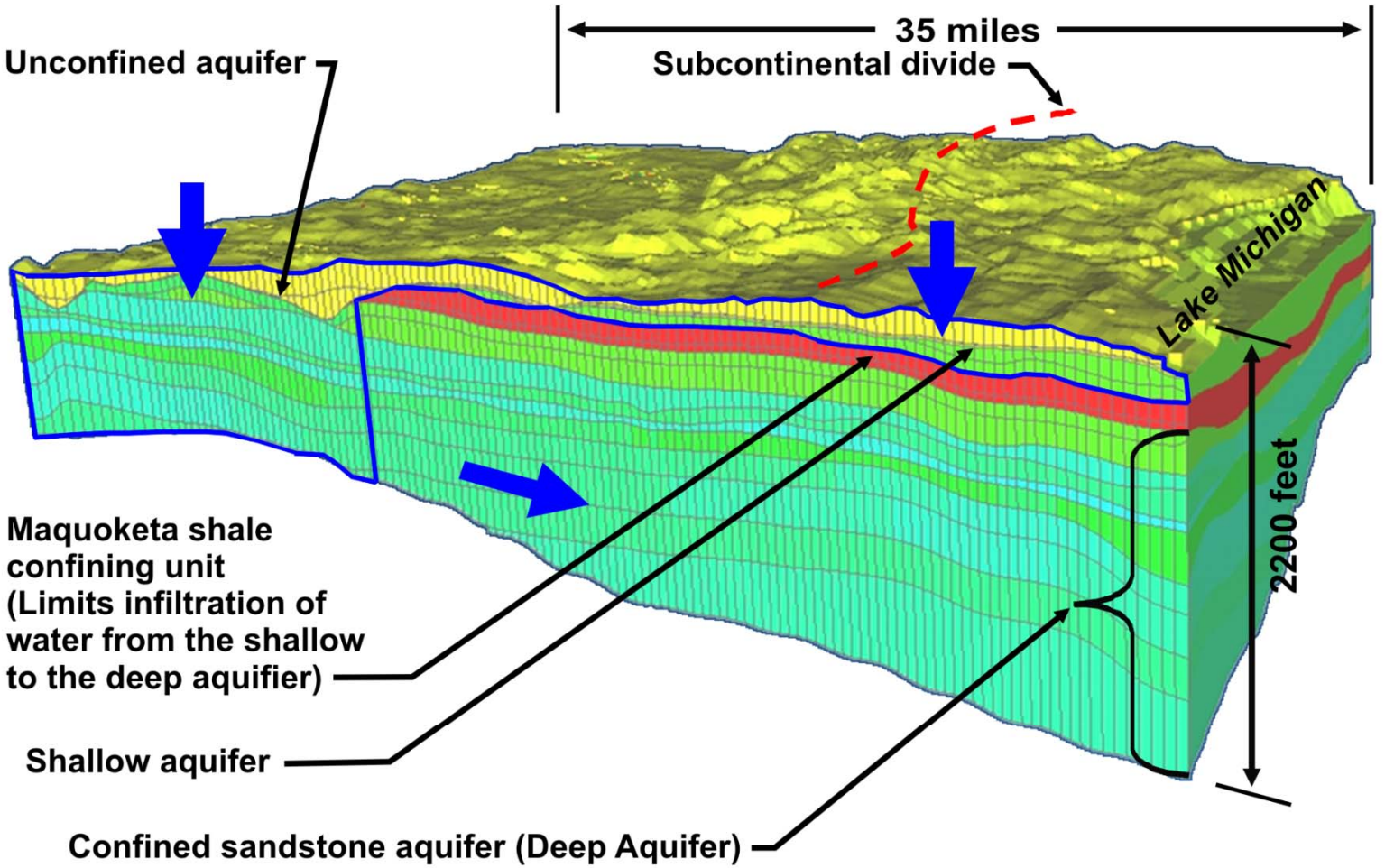
Background

Average Daily Residential Municipal Water Use Per Capita: 1997 - 2005



Background

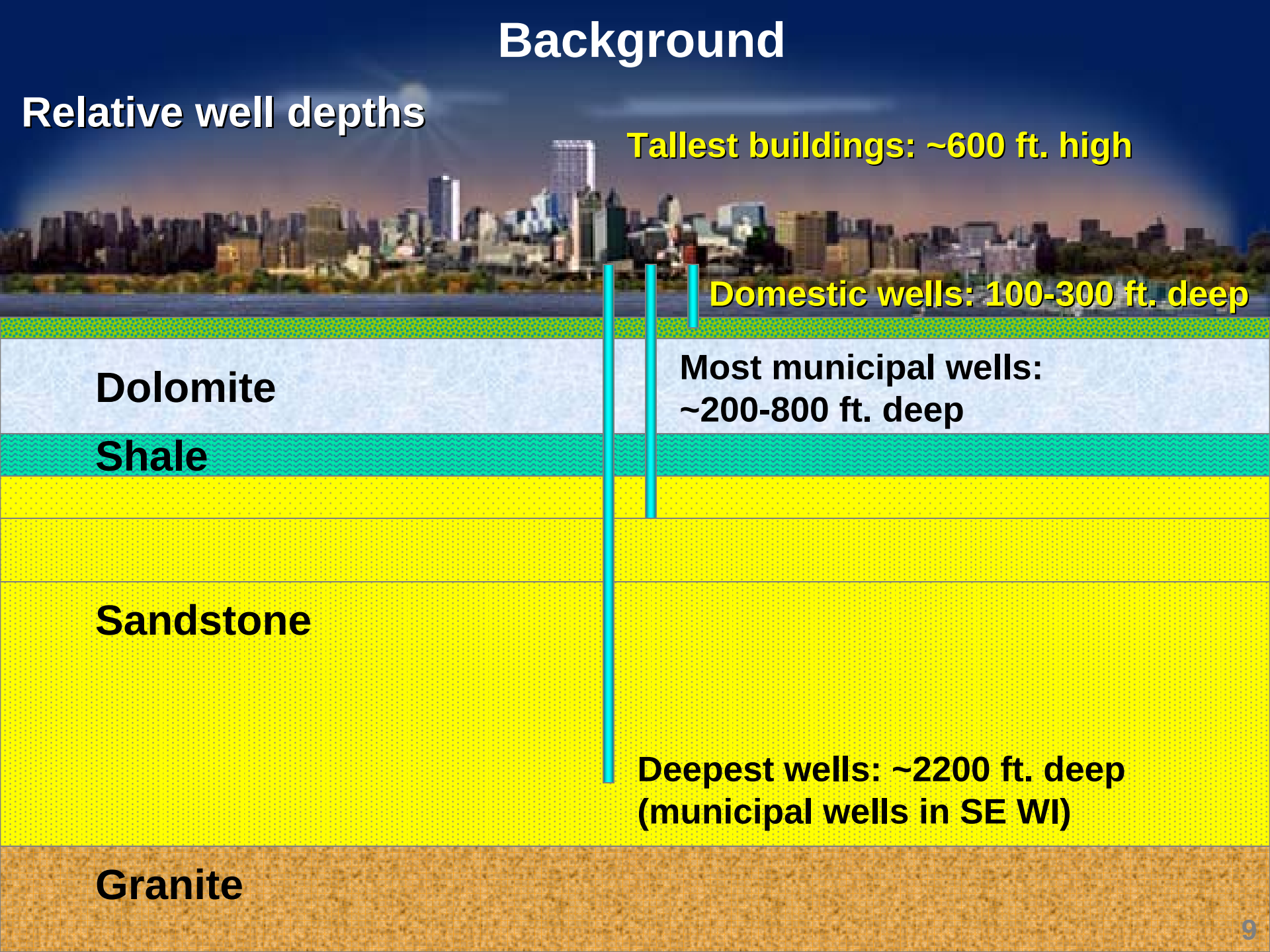
General Hydrogeology of Southeast Wisconsin



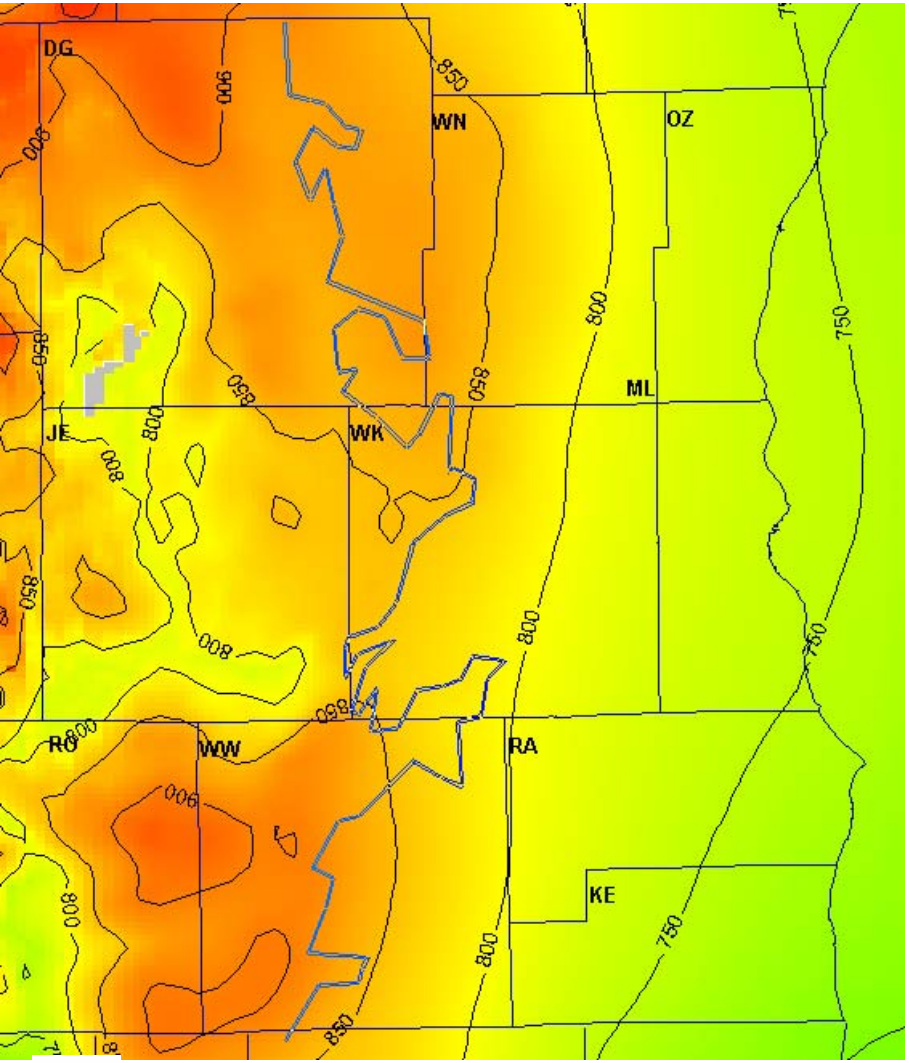
Private residential wells are generally in the shallow aquifer and 100 to 300 feet deep. Most municipal wells are 200 to 800 feet deep with some up to 2,200 feet deep, and are in both the shallow and deep aquifer.

Source: USGS.

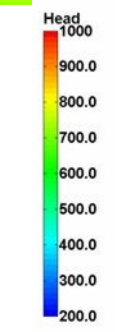
Background

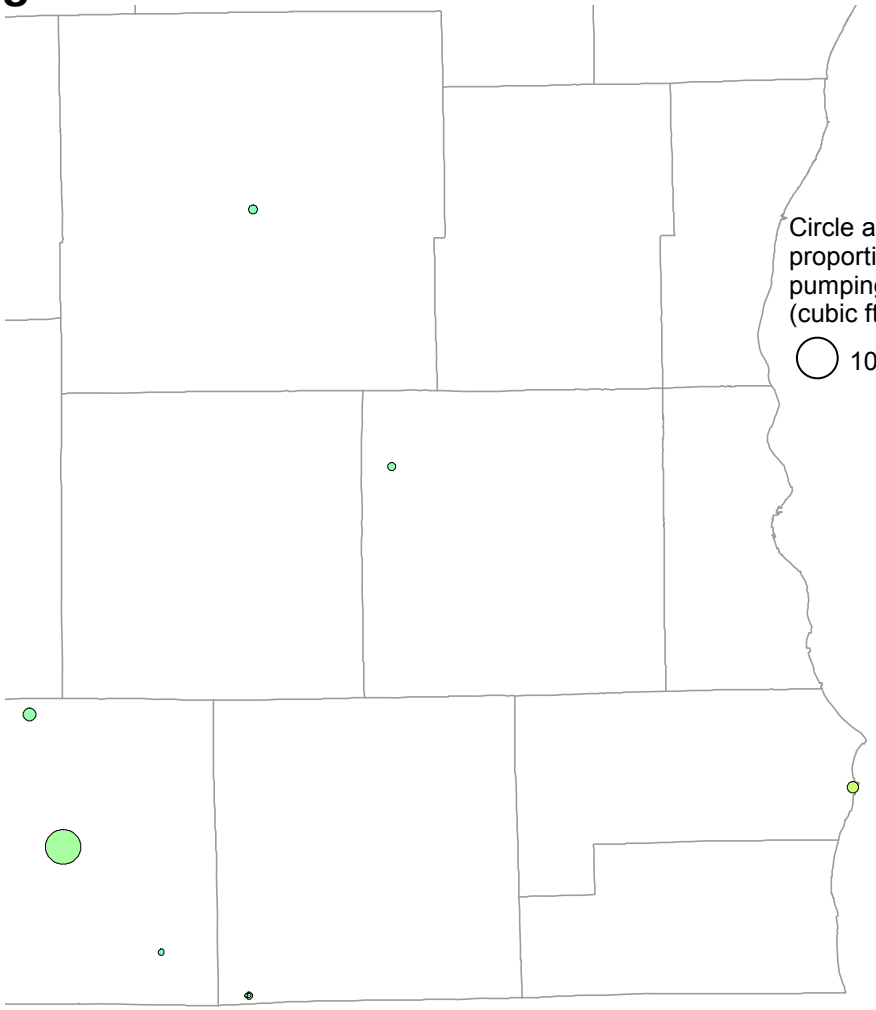

Relative well depths
Tallest buildings: ~600 ft. high
Domestic wells: 100-300 ft. deep
Most municipal wells:
~200-800 ft. deep
Dolomite
Shale
Sandstone
Deepest wells: ~2200 ft. deep
(municipal wells in SE WI)
Granite

Background



Water Levels in the Sandstone Aquifer
(feet above sea level)





Well Locations and Pumping Rates

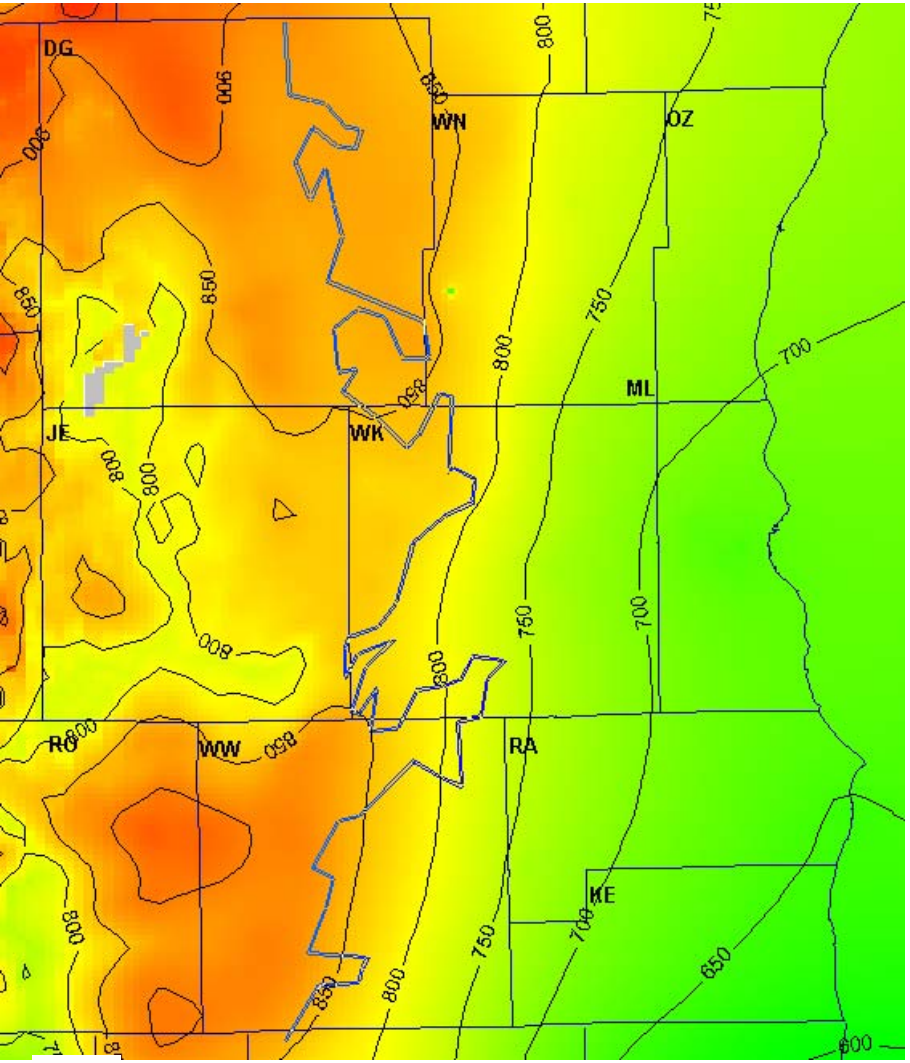
Shallow

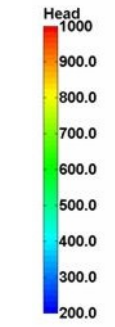
Mixed or Intermediate Depth

Deep

1880-1900

Background





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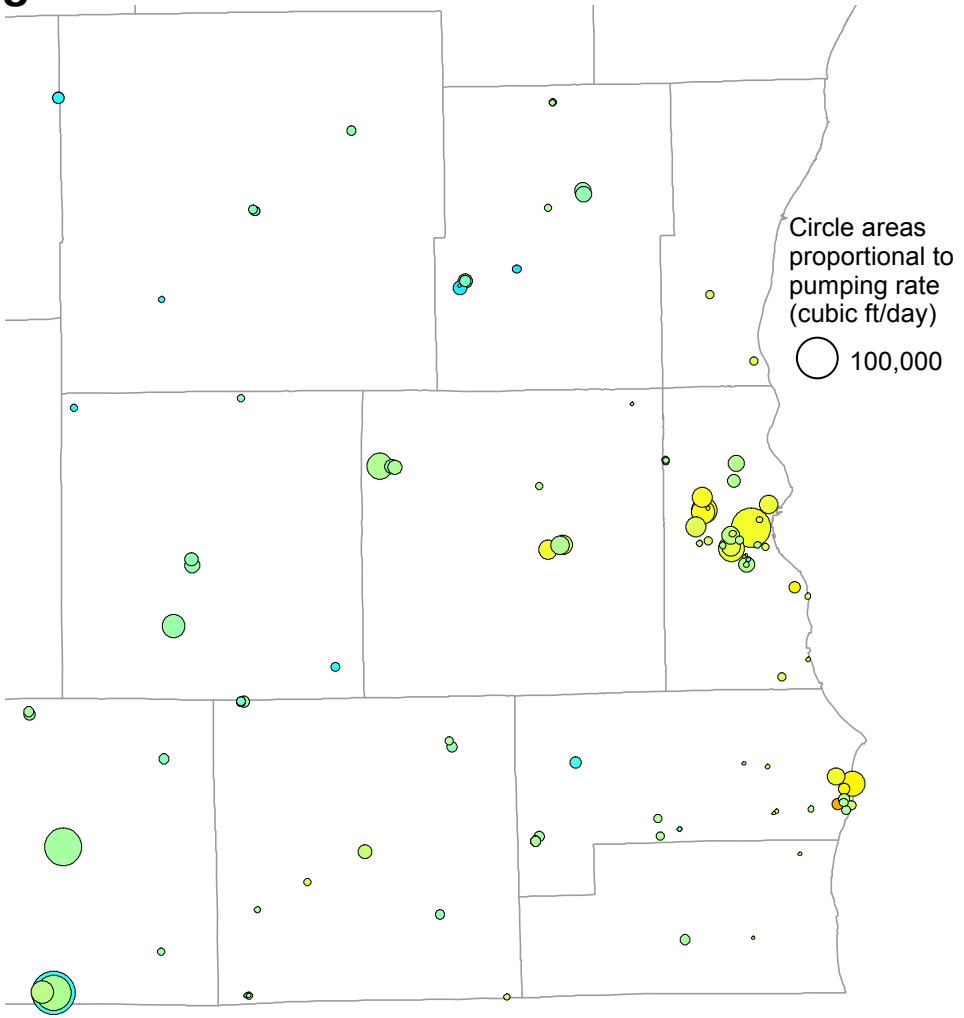


Well Locations and Pumping Rates

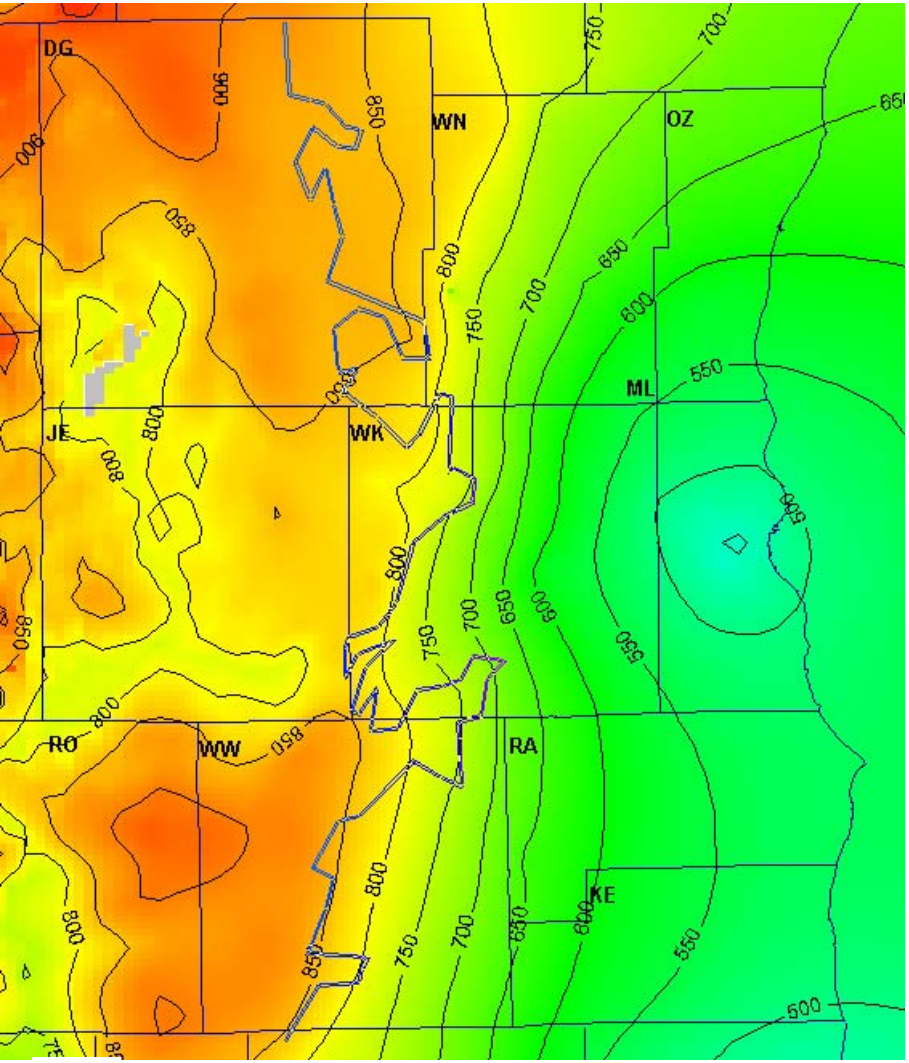
Shallow

Mixed or Intermediate Depth

Deep

1920-1930

Background



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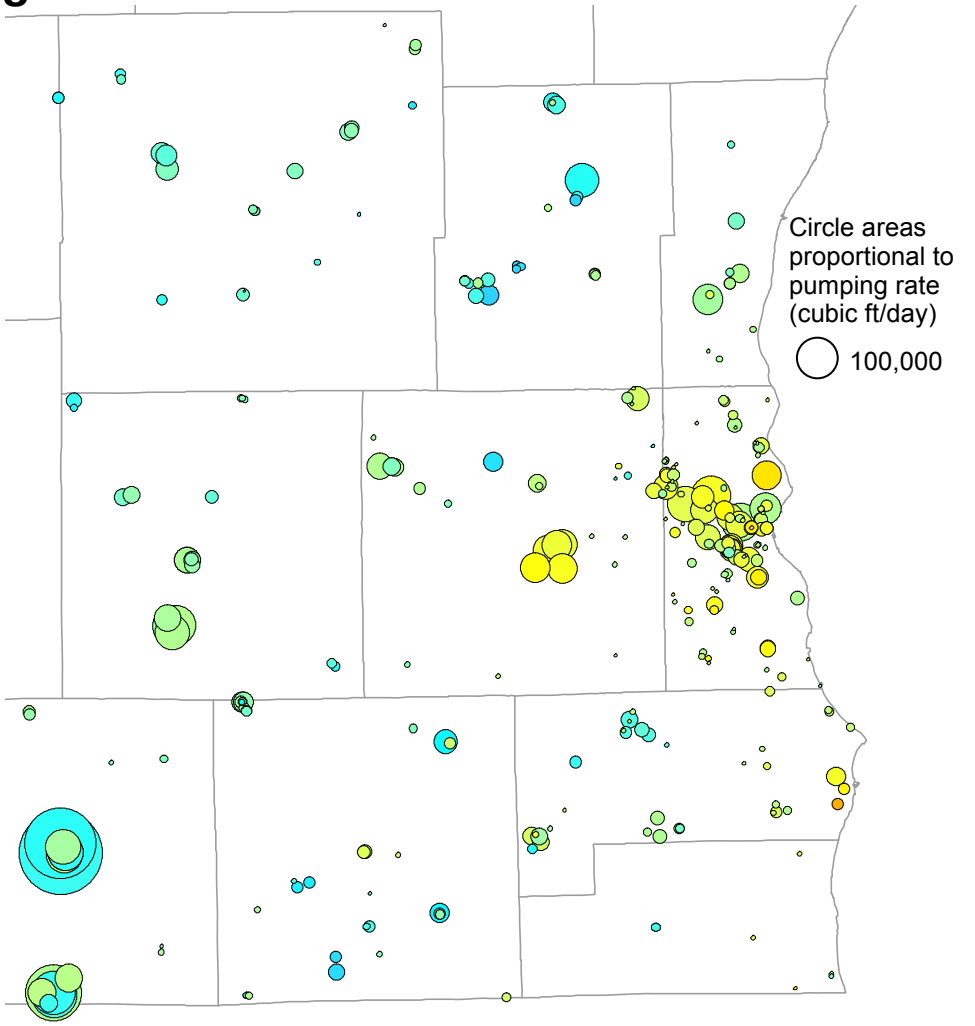


Well Locations and Pumping Rates

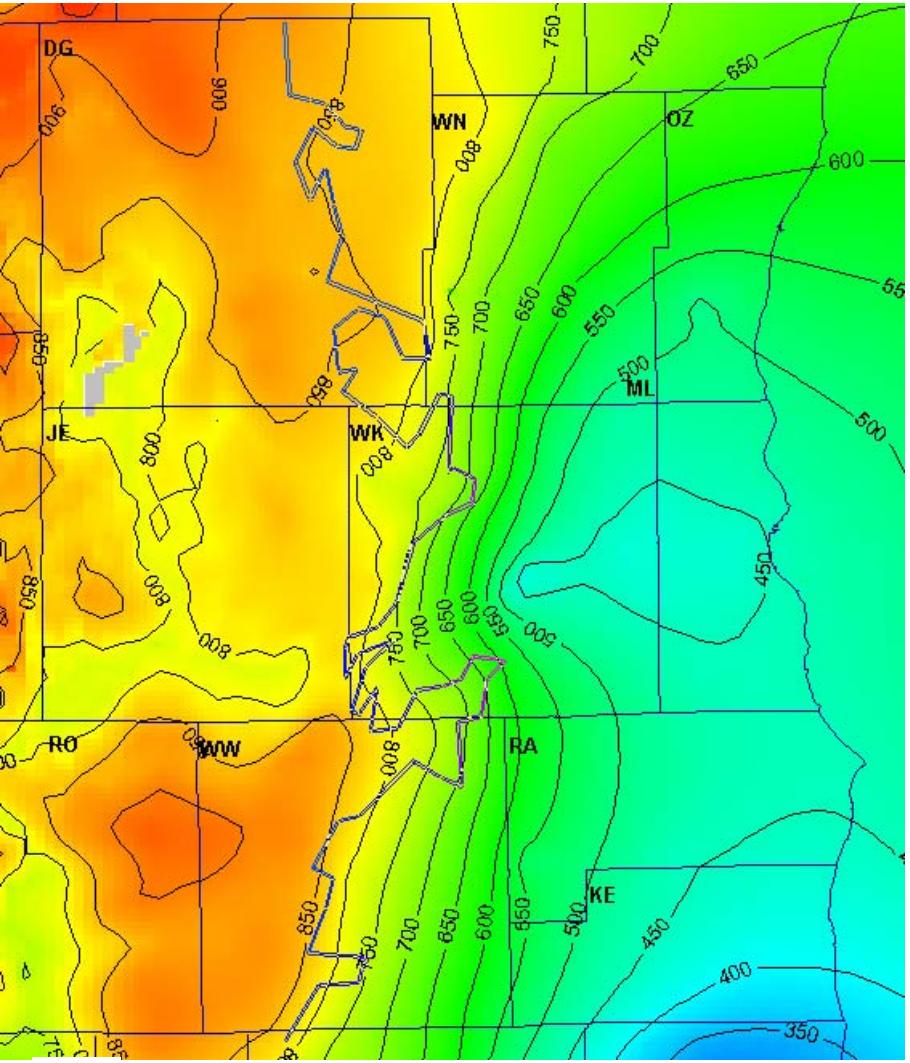
Shallow

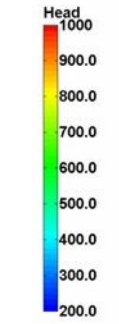
Mixed or Intermediate Depth

Deep

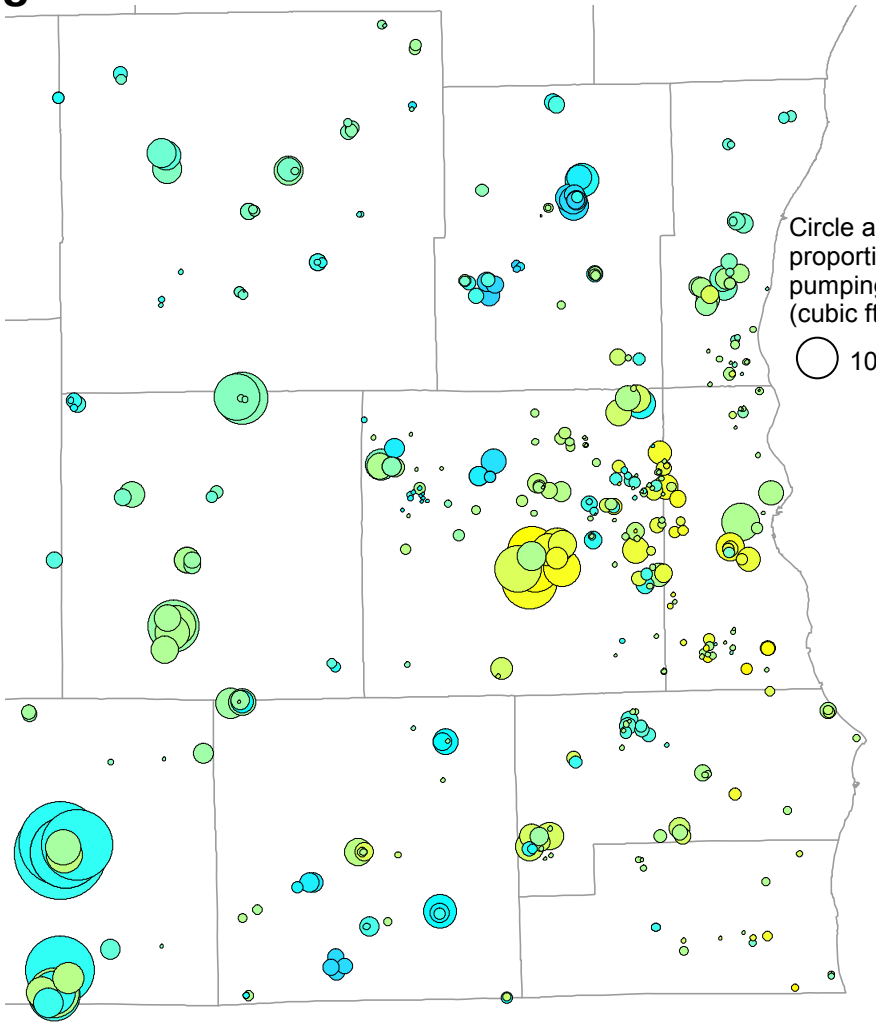
1950-1961

Background





Water Levels in the Sandstone Aquifer
(feet above sea level)



Well Locations and Pumping Rates

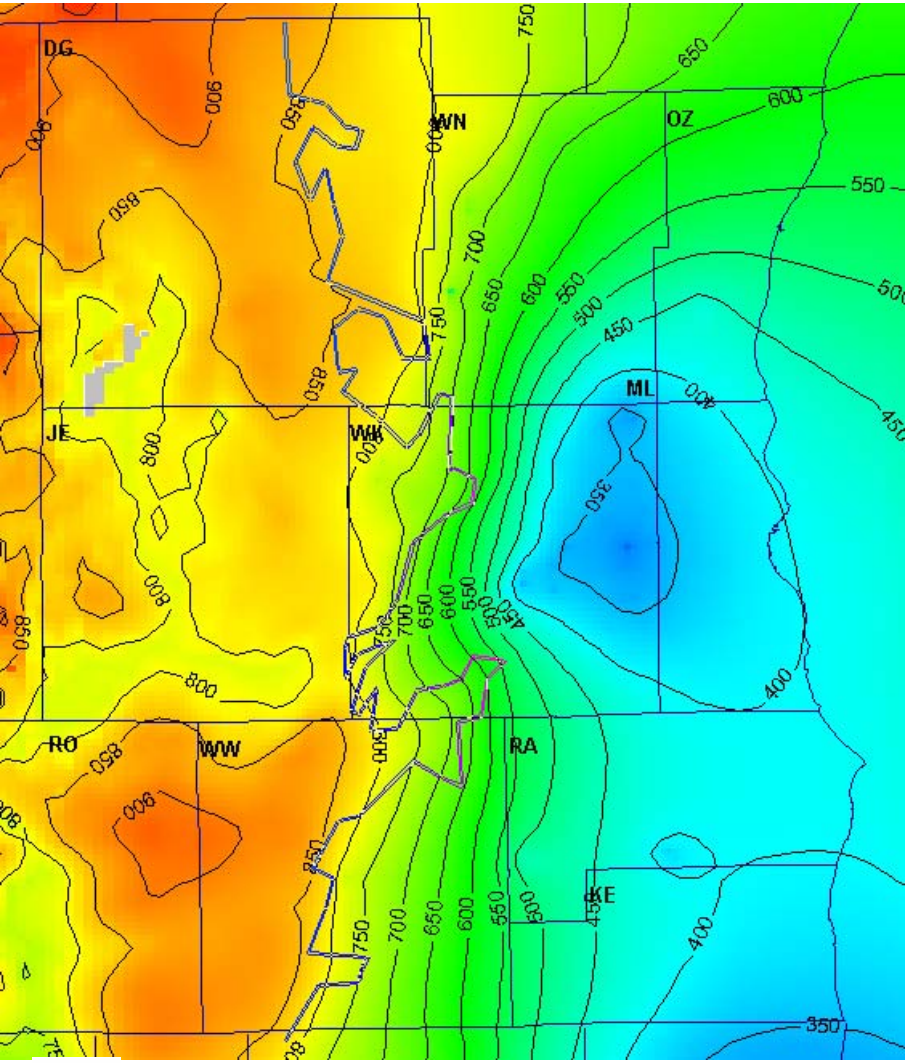
Shallow

Mixed or Intermediate Depth

Deep

1970-1980

Background



Water Levels in the Sandstone Aquifer
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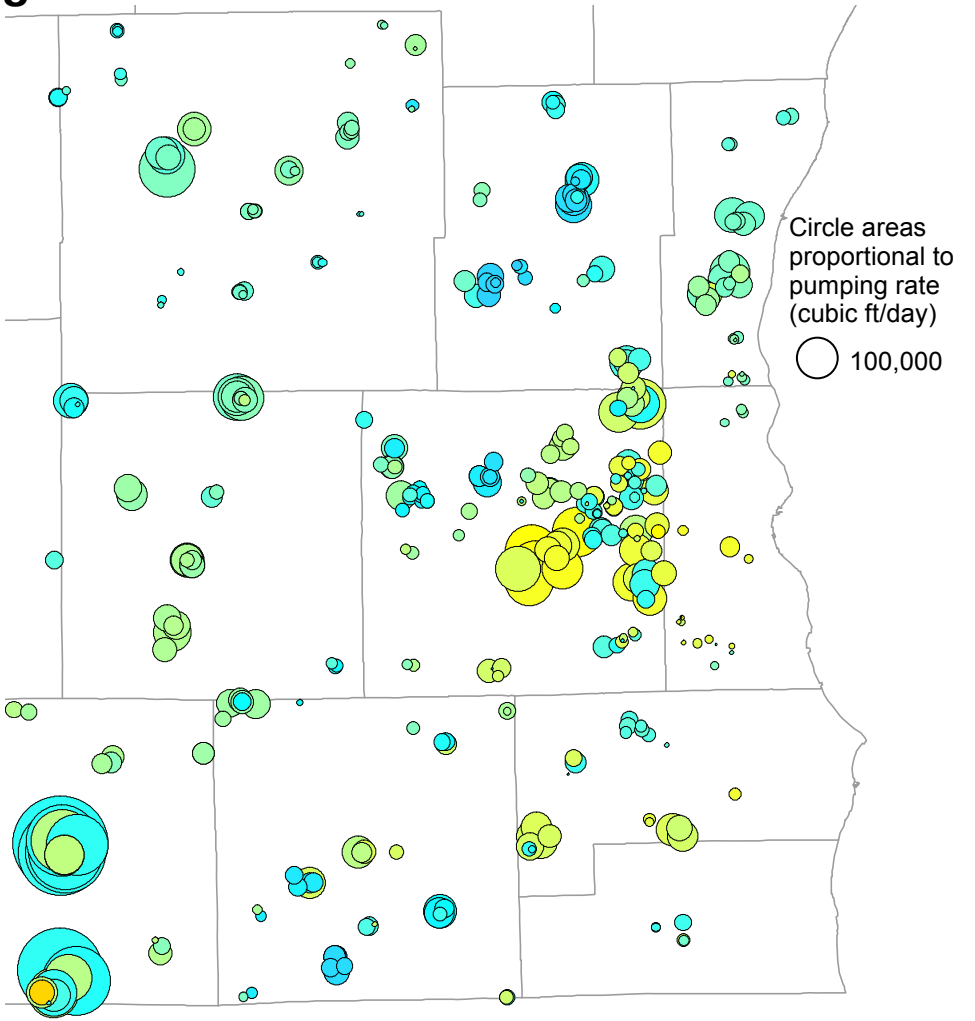


Well Locations and Pumping Rates

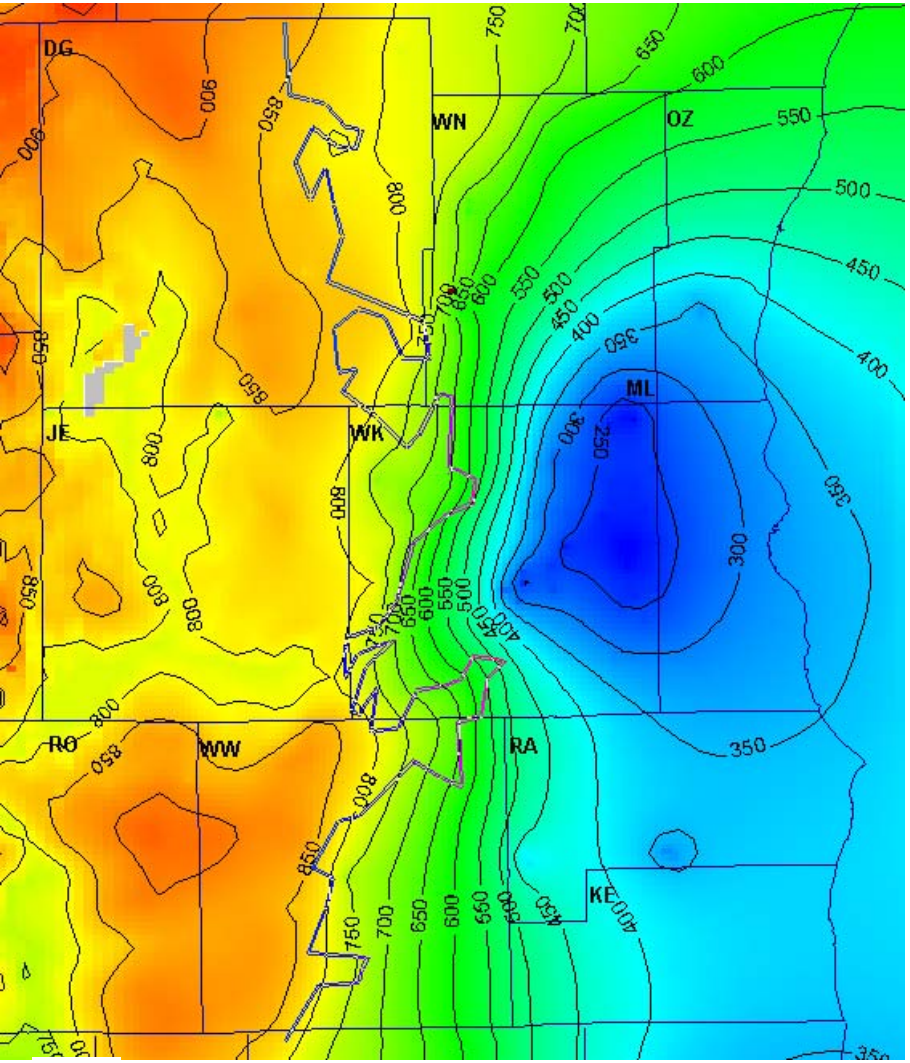
Shallow

Mixed or Intermediate Depth

Deep

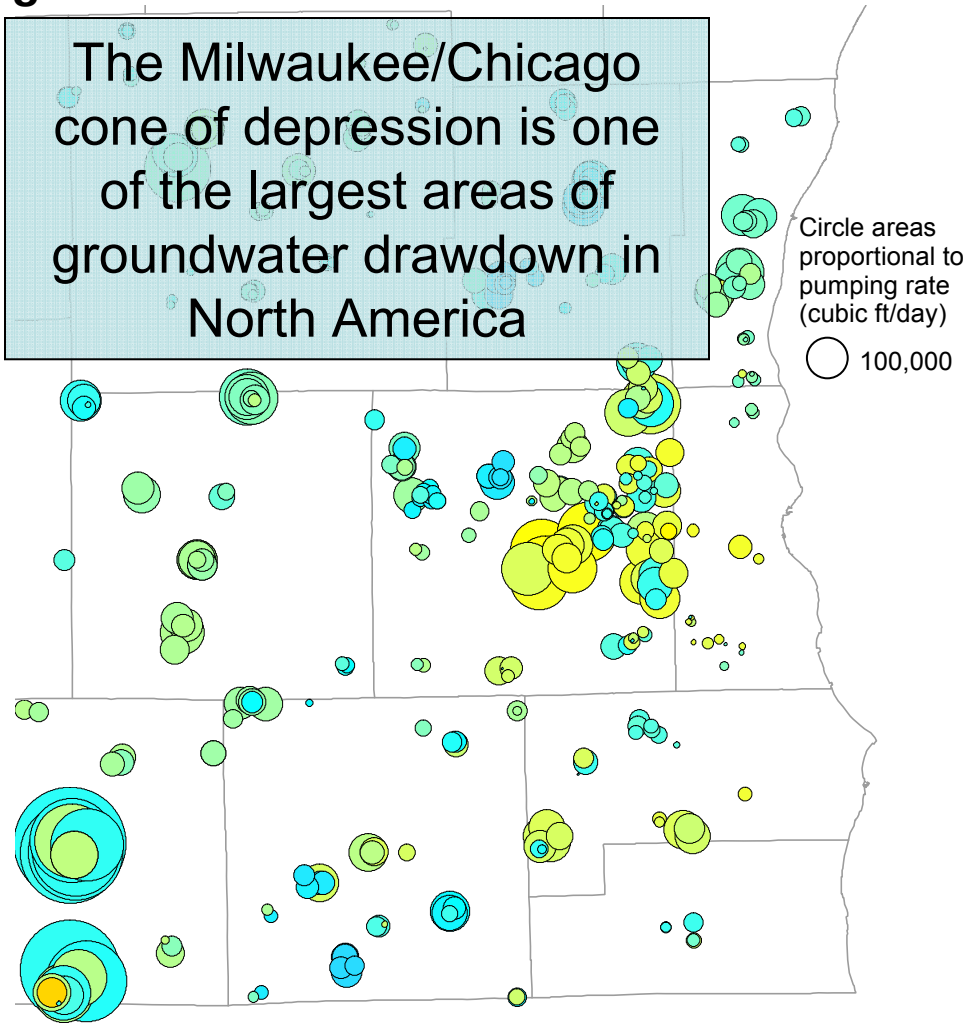
1990-2000

Background



Water Levels in the Sandstone Aquifer
(feet above sea level)

The Milwaukee/Chicago cone of depression is one of the largest areas of groundwater drawdown in North America



Well Locations and Pumping Rates

Shallow

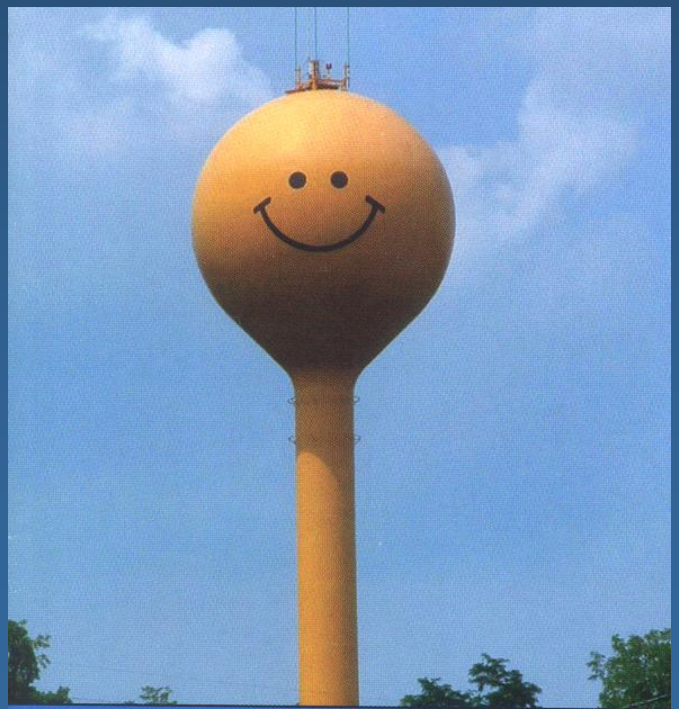
Mixed or Intermediate Depth

Deep

2010-2020

Background

- **All Groundwater Use Has Consequences – Most (80%) well pumpage is water transferred from the local surface water system**
- **Balancing Groundwater Water Supply Needs With Surface Water Impacts (Reasonableness) is an Important Part of Alternative Plan Development and Evaluation**



Background

Regional Water Supply Planning Program

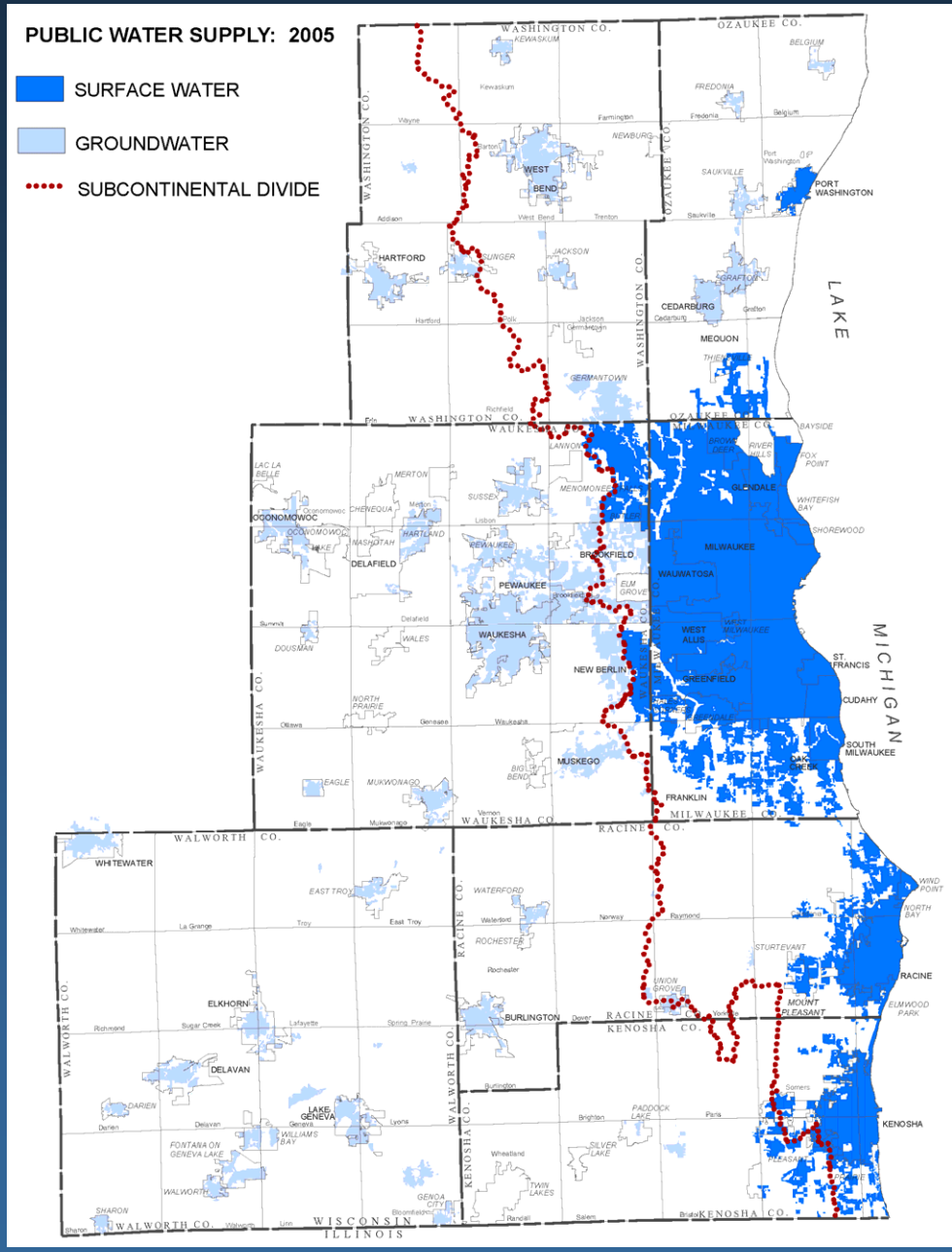
Three Elements (Coordinated With And Designed To Complement Local Actions)

1. Conduct Basic Groundwater Inventories (Completed in 2001 With Partners—WGNHS and WDNR)
2. Collect Additional Inventory Data and Develop Regional Aquifer Simulation Model (Completed in 2005 with Partners—USGS, WGNHS, UW-Milwaukee, WDNR, and SE Wisconsin Water Utilities)
3. Prepare Regional Water Supply System Plan (Planning is Underway With Support from Seven Counties in Southeastern Wisconsin; Partners Include USGS, WGNHS, UW-Milwaukee, and WDNR)

Background

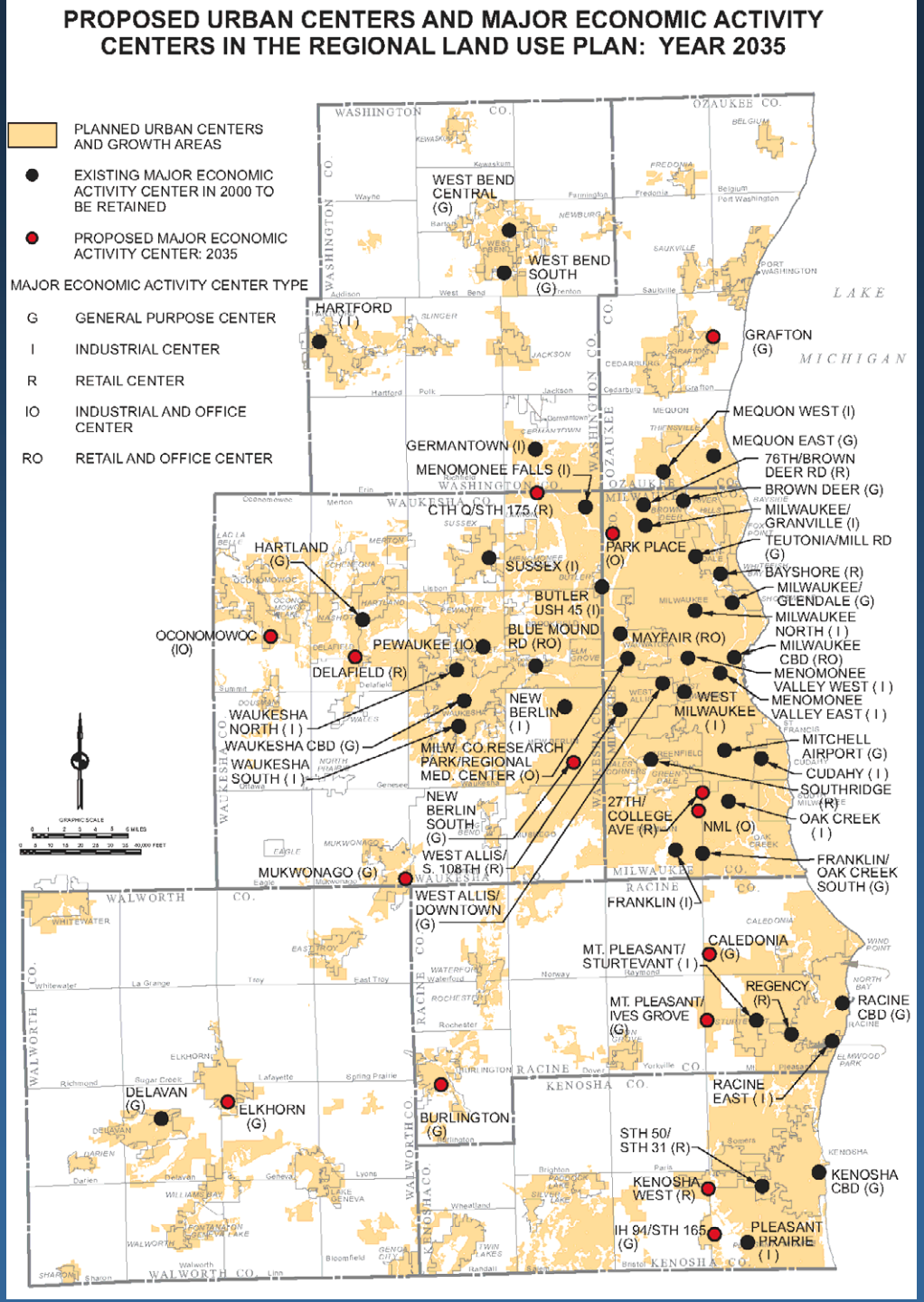
Scope of Study

- Forecast future water use demand in the Region.
- Consider potential of water conservation to reduce future demand.
- Identify groundwater recharge areas which should be protected from development.
- Assess potential for shallow groundwater recharge through infiltration of stormwater runoff and treatment plant effluent.
- Consider potential alternative sources of supply
  - Shallow groundwater
  - Lake Michigan water replacing groundwater east of the subcontinental divide.
  - Lake Michigan water replacing groundwater in "straddling communities" which already have "return flow"
  - Lake Michigan water replacing groundwater in "straddling communities" and "communities in straddling counties" and providing for "return flow".
- Estimate costs and impacts of alternatives
  - Groundwater-Surface Water Interdependence and Impacts
- Identify any development constraints necessary to assure water supply sustainability; amend regional land use plan if necessary



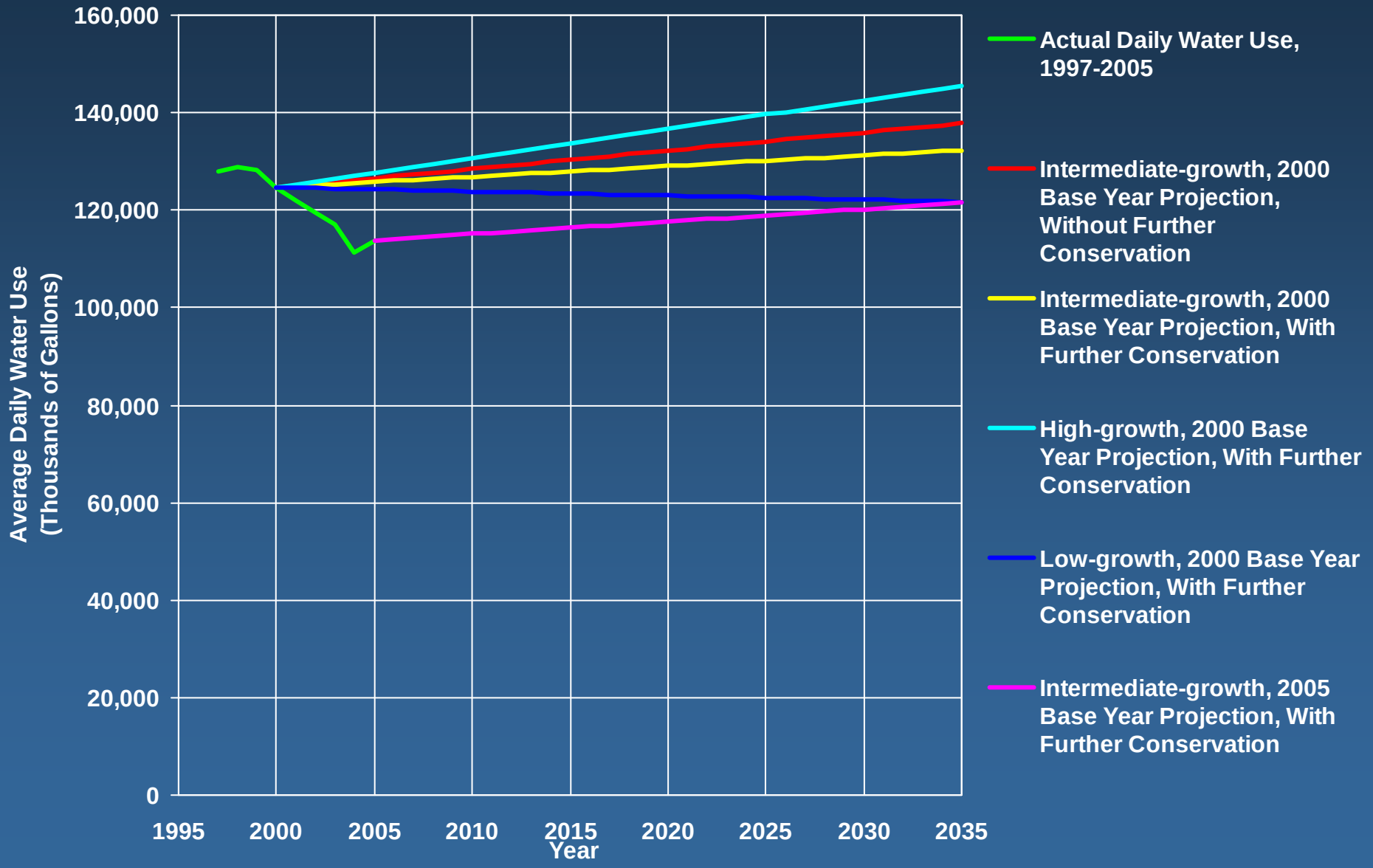
Year 2035 Regional Land Use Plan is Basis for Regional Water Supply Plan

- Preservation of environmental corridors and natural areas which account for 23% of the area of the Region
- Preservation of the most productive farmland which accounts for 36% of the area of the Region
- Accommodate new urban development to around existing urban centers
- Emphasis on stabilizing and revitalizing the central cities of Kenosha, Milwaukee, and Racine
- Population changes: 2005 - 2035
  - Region 15% increase
  - Milwaukee County 939,000 to 1,007,000 (7%)
  - Waukesha County 377,000 to 447,000 (19%)
- Urban land use changes in square miles: 2000 – 2035:
  - Region 13% increase
  - Milwaukee County 194 to 204 (5%)
  - Waukesha County 199 to 227 (14%)



Background

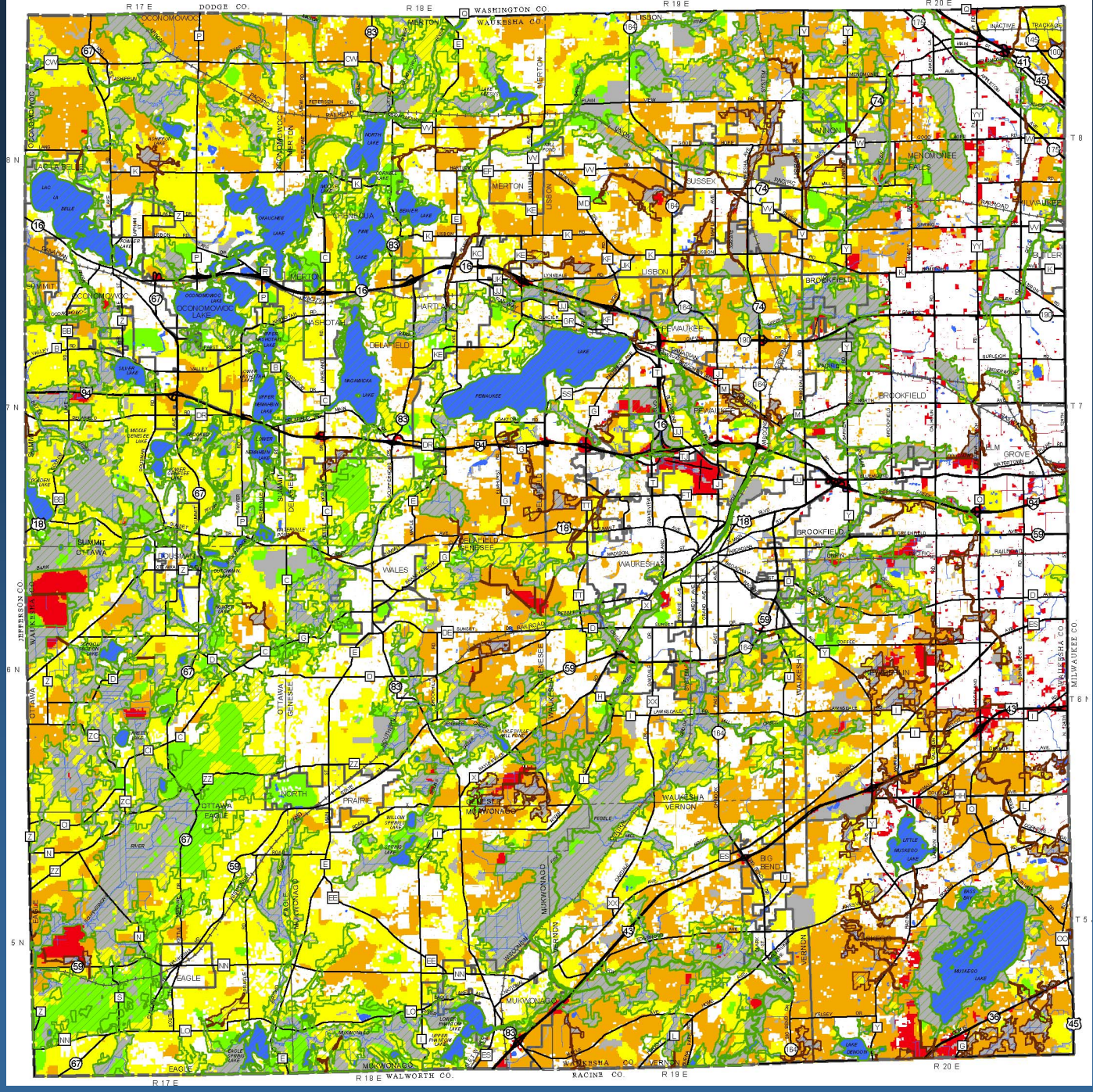
Actual, Projected, and Forecast Average Daily Water Use: Milwaukee County



Alternative Plan Components

Ranking of Areas Based Upon Estimated Average Annual Groundwater Recharge

- Low
- Moderate
- High
- Very High
- Undefined
- Urban Development
- Primary Environmental Corridor
- Secondary Environmental Corridor



Based Upon

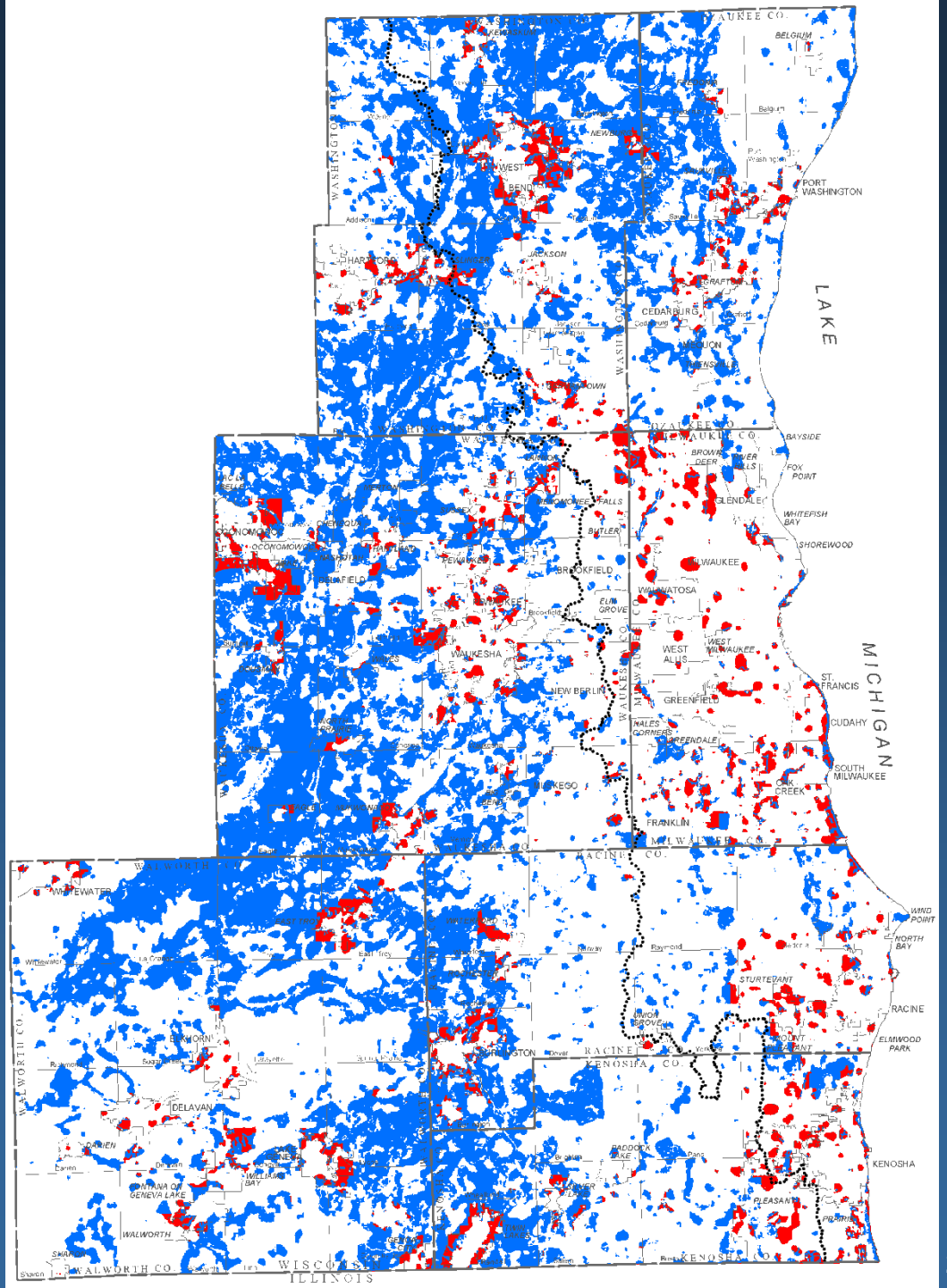
- Land use
- Topography
- Soil water storage
- Soil permeability
- Typical rainfall pattern

Groundwater Recharge Protection Component of the Preliminary Recommended Water Supply Plan

AREAS OF HIGH OR VERY HIGH RECHARGE POTENTIAL NOT PROTECTED THROUGH IMPLEMENTATION OF THE 2035 LAND USE PLAN. RECOMMENDATIONS FOR DEVELOPMENT AND STORMWATER MANAGEMENT PRACTICES DESIGNED TO MAINTAIN HYDROLOGY (208 SQ. MILES OR 26 PERCENT).

AREAS OF HIGH OR VERY HIGH RECHARGE POTENTIAL PROTECTED THROUGH IMPLEMENTATION OF THE 2035 LAND USE PLAN (587 SQ. MILES OR 74 PERCENT).

SUBCONTINENTAL DIVIDE



Water Conservation Measures Envisioned Under the Alternative and Preliminary Recommended Water Supply Plan

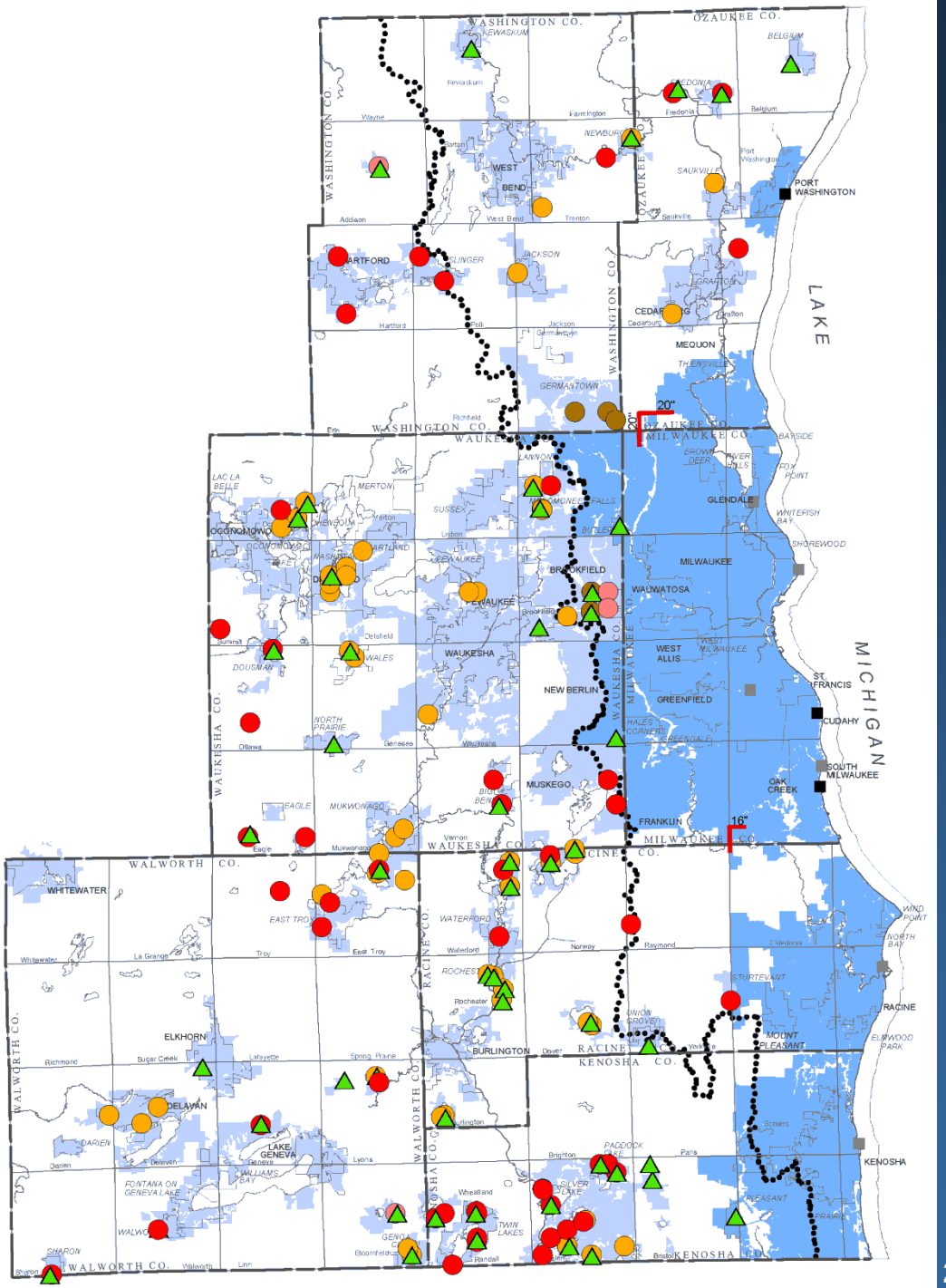
- Base Level Program Providing a 4% reduction in average day demand, and from 6 to 10% reduction in maximum day demand. Utilities using Lake Michigan with none or modest supply infrastructure needs.
- Intermediate Level Program Providing a 6 to 8% reduction in average day demand, and a 12 to 14% reduction in maximum day demand. Utilities using groundwater supply with no major problems and with supply infrastructure needs or using new surface water supplies with significant infrastructure needs.
- Advanced Level Program Providing a 10% reduction in average day demand, and an 18% reduction in maximum day demand. Utilities using groundwater supply with aquifer problems and infrastructure needs or using new surface water supplies and return flow required with major infrastructure needs.
- High Level Program (Evaluated and not included in regional plan recommendations – may be considered on a local utility specific basis) Providing a 25 to 35% reduction in average day demand, and a 30 to 50% reduction in maximum day demand

Note: All programs would be designed to meet requirements of the Compact and State regulations under development. Additional measures may be applicable if needed to meet sewerage system protection or stormwater management objectives.

Regional Water Supply Plan

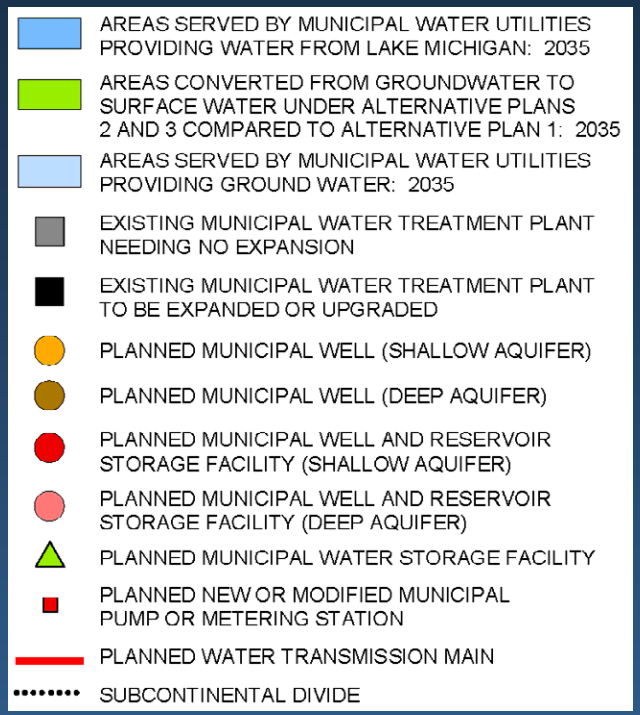
Alternative Plan 1–Design Year 2035 Forecast Conditions Under Existing Trends and Committed Actions

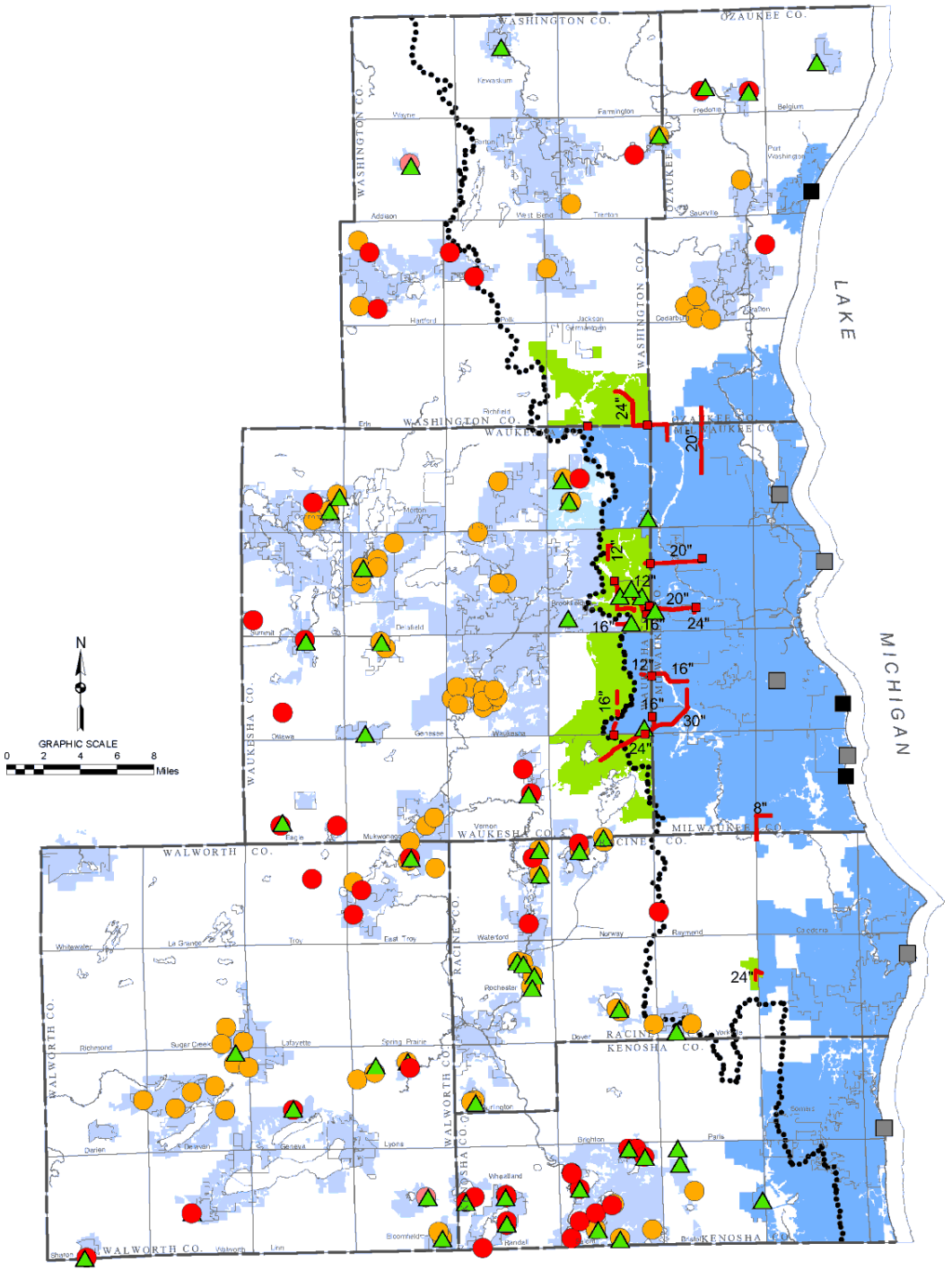
- AREAS SERVED BY MUNICIPAL WATER UTILITIES PROVIDING WATER FROM LAKE MICHIGAN: 2035
- AREAS SERVED BY MUNICIPAL WATER UTILITIES PROVIDING GROUND WATER: 2035
- EXISTING MUNICIPAL WATER TREATMENT PLANT NEEDING NO EXPANSION
- EXISTING MUNICIPAL WATER TREATMENT PLANT TO BE EXPANDED OR UPGRADED
- PLANNED MUNICIPAL WELL (SHALLOW AQUIFER)
- PLANNED MUNICIPAL WELL (DEEP AQUIFER)
- PLANNED MUNICIPAL WELL AND RESERVOIR STORAGE FACILITY (SHALLOW AQUIFER)
- PLANNED MUNICIPAL WELL AND RESERVOIR STORAGE FACILITY (DEEP AQUIFER)
- PLANNED MUNICIPAL WATER STORAGE FACILITY
- PLANNED WATER TRANSMISSION MAIN
- SUBCONTINENTAL DIVIDE



- Existing 2007 water supply facilities
- Enhanced local water conservation programs
- Continued reliance on groundwater sources to meet 2035 demand (light blue)
- Continued reliance on Lake Michigan water sources for all areas now served, meeting 2035 demand (dark blue)
- Recharge of groundwater at new construction sites to the extent required by State law
- Continued reliance on private wells for residential areas (about 180,000 persons) plus selected agricultural, irrigation, and industrial uses

Regional Water Supply Plan
Alternative Plan 2–Limited Expansion of Lake Michigan Supply





- **Includes most aspects of Alternative Plan 1, but converts certain areas to Lake Michigan supply**
  - **4 areas east of the subcontinental divide (Germantown, Elm Grove, Brookfield-east, and Yorkville) all with existing return flow (green)**
  - **2 areas west of the divide (New Berlin-central, Muskego) both straddling communities with existing return flow (green)**
  - **Includes conversion of selected treated deep aquifer sources to shallow aquifer**

Regional Water Supply Plan
Alternative Plan 3–Groundwater Recharge

SHALLOW AQUIFER RECHARGE FACILITIES

RAINFALL INFILTRATION FACILITIES (MILLION GALLONS PER YEAR)

- 0.1 - 5.0
- 5.1 - 10.0
- 10.1 - 15.0
- 15.1 - 20.0
- 20.1 - 25.0

WASTEWATER TREATMENT PLANT EFFLUENT INFILTRATION FACILITIES (MILLION GALLONS PER YEAR)

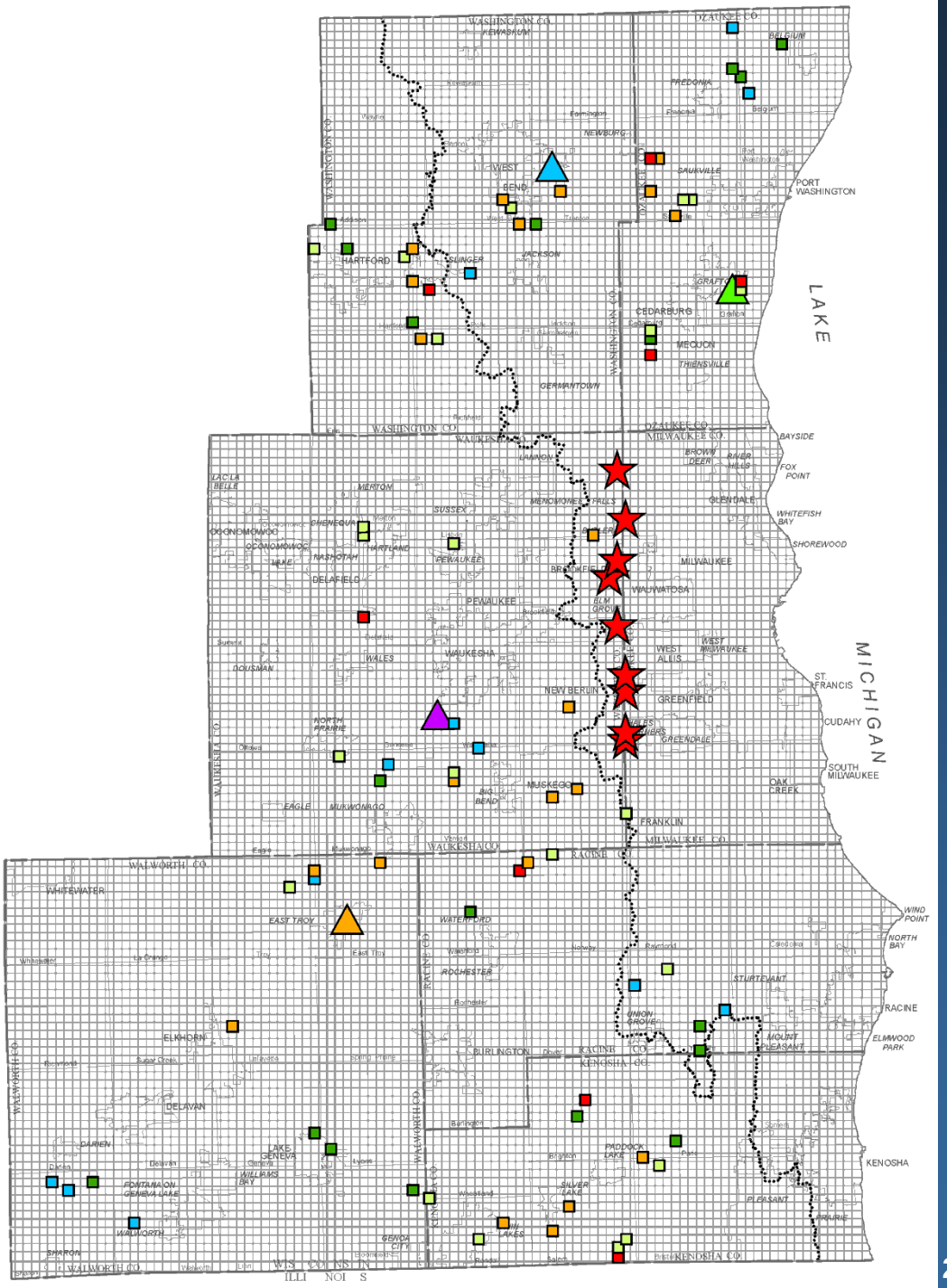
- 146
- 584
- 1,460
- 1,825

DEEP AQUIFER RECHARGE FACILITIES

INJECTION WELLS (MILLION GALLONS PER YEAR)

- 365

SUBCONTINENTAL DIVIDE



- Includes all aspects of Alternative Plan 2
- Enhancement of rainfall infiltration over 4.0 square miles of open space through bioengineering; sites to be selected
- Protection of most significant groundwater recharge areas through public purchase if necessary
- Recharge of groundwater at new construction sites beyond the extent required in State law
- Redirection of wastewater treatment plant effluent to shallow aquifer after enhanced treatment at 4 demonstration locations
- Recharge deep aquifer with treated Lake Michigan water

Regional Water Supply Plan
Alternative Plan 4–Further Expansion of Lake Michigan Supply

- AREAS SERVED BY MUNICIPAL WATER UTILITIES PROVIDING WATER FROM LAKE MICHIGAN: 2035
- AREAS CONVERTED FROM GROUNDWATER TO SURFACE WATER UNDER ALTERNATIVE PLAN 4 COMPARED TO ALTERNATIVE PLAN 1: 2035
- AREAS SERVED BY MUNICIPAL WATER UTILITIES PROVIDING GROUND WATER: 2035
- EXISTING MUNICIPAL WATER TREATMENT PLANT NEEDING NO EXPANSION
- EXISTING MUNICIPAL WATER TREATMENT PLANT TO BE EXPANDED OR UPGRADED
- EXISTING MUNICIPAL WASTEWATER TREATMENT PLANT
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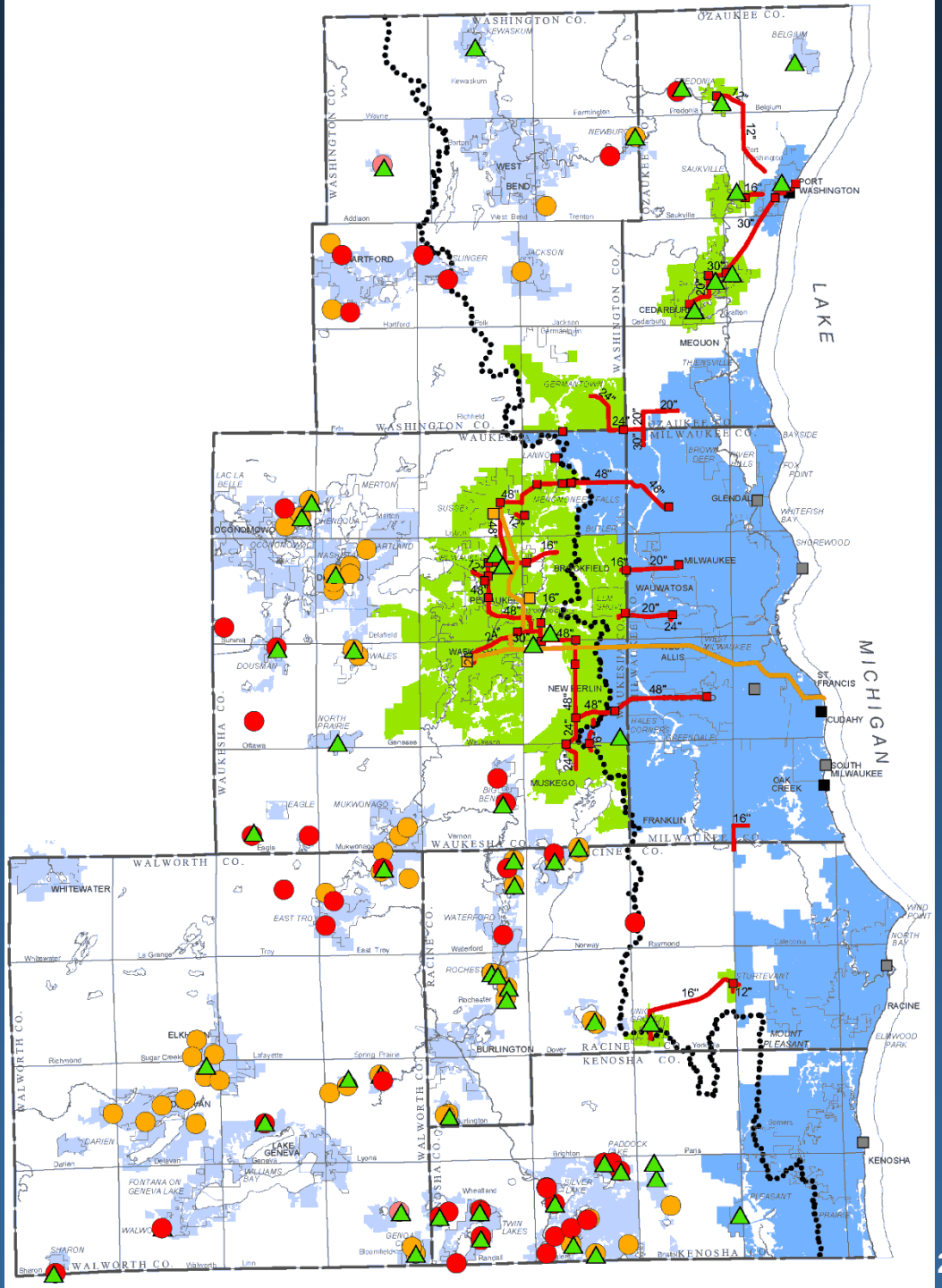
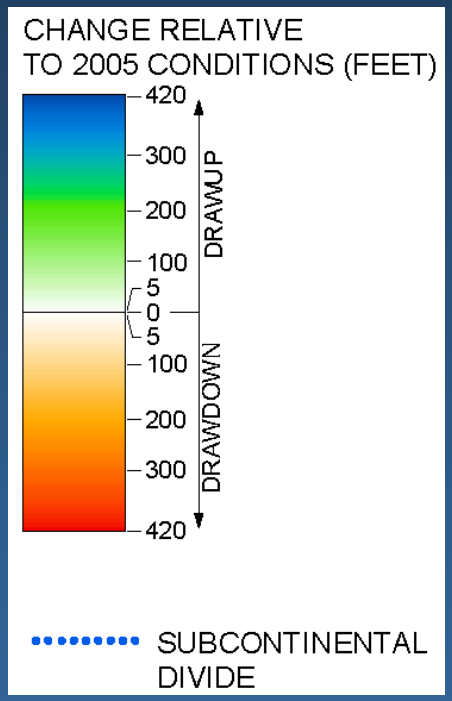
- PLANNED MUNICIPAL WELL AND RESERVOIR STORAGE FACILITY (DEEP AQUIFER)
- PLANNED MUNICIPAL WATER STORAGE FACILITY
- PLANNED NEW OR MODIFIED MUNICIPAL PUMP OR METERING STATION
- PLANNED WATER TRANSMISSION MAIN
- PLANNED WATER RETURN-FLOW PIPELINE
- SUBCONTINENTAL DIVIDE

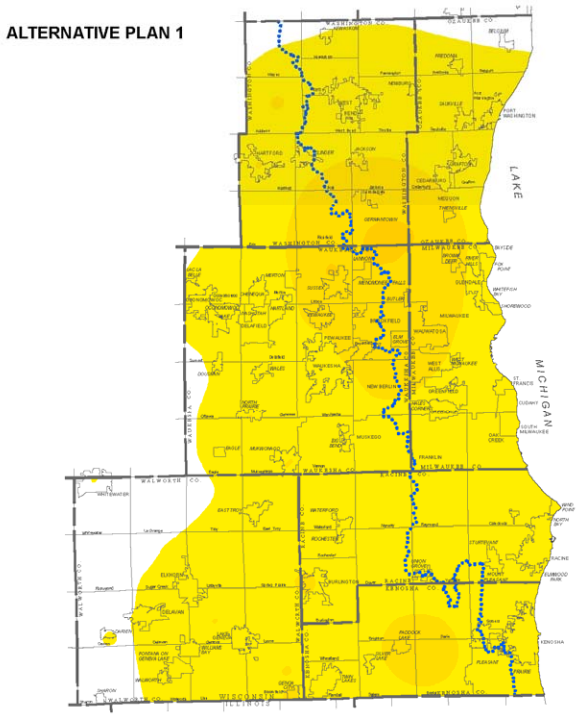


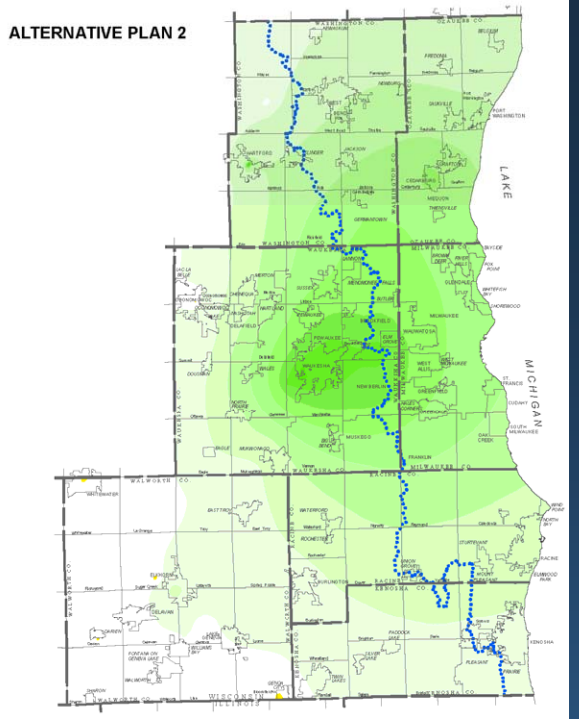
- **Includes all aspects of Alternative Plan 2 but with conversion of selected additional areas to Lake Michigan supply all with return flow components**
  - **4 areas east of the subcontinental divide (Cedarburg, Grafton, Fredonia, Saukville) (green)**
  - **4 areas in communities which straddle the divide (Brookfield-west, Menomonee Falls-west, Brookfield-Town, Union Grove) (green)**
  - **9 areas which are in communities west of the divide within a straddling county (Pewaukee-City, Pewaukee-Village, Sussex, portion of the Town of Lisbon, Lannon, Waukesha-City, portions of the Towns of Waukesha, Genessee, and Delafield) (green)**

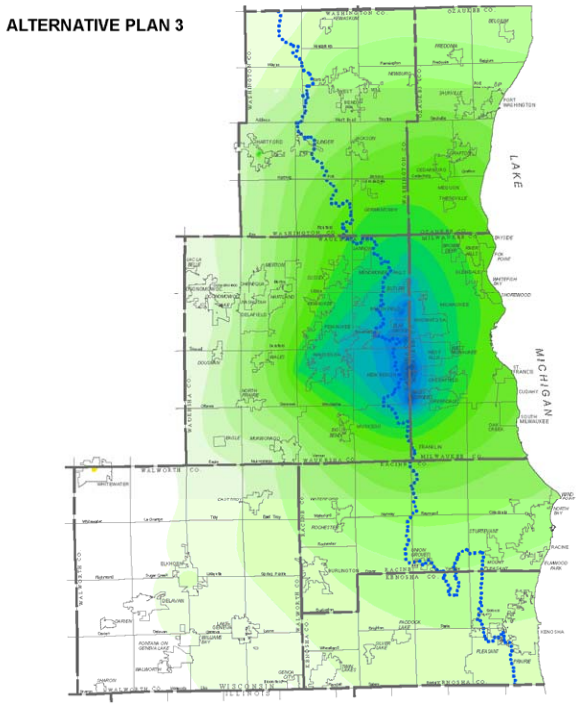
Evaluation of Four Alternative Plans

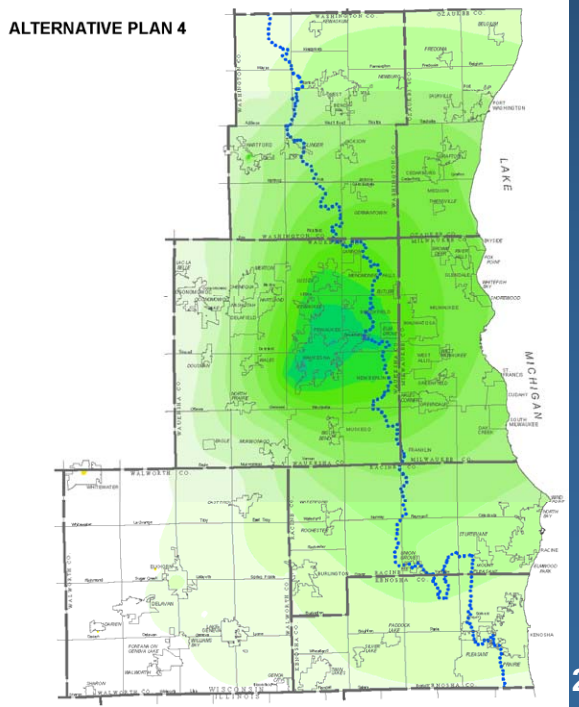
Deep Aquifer Conditions Associated with Alternative Water Supply Plans











Four Alternative Plans

Test and Evaluation Results-Summary

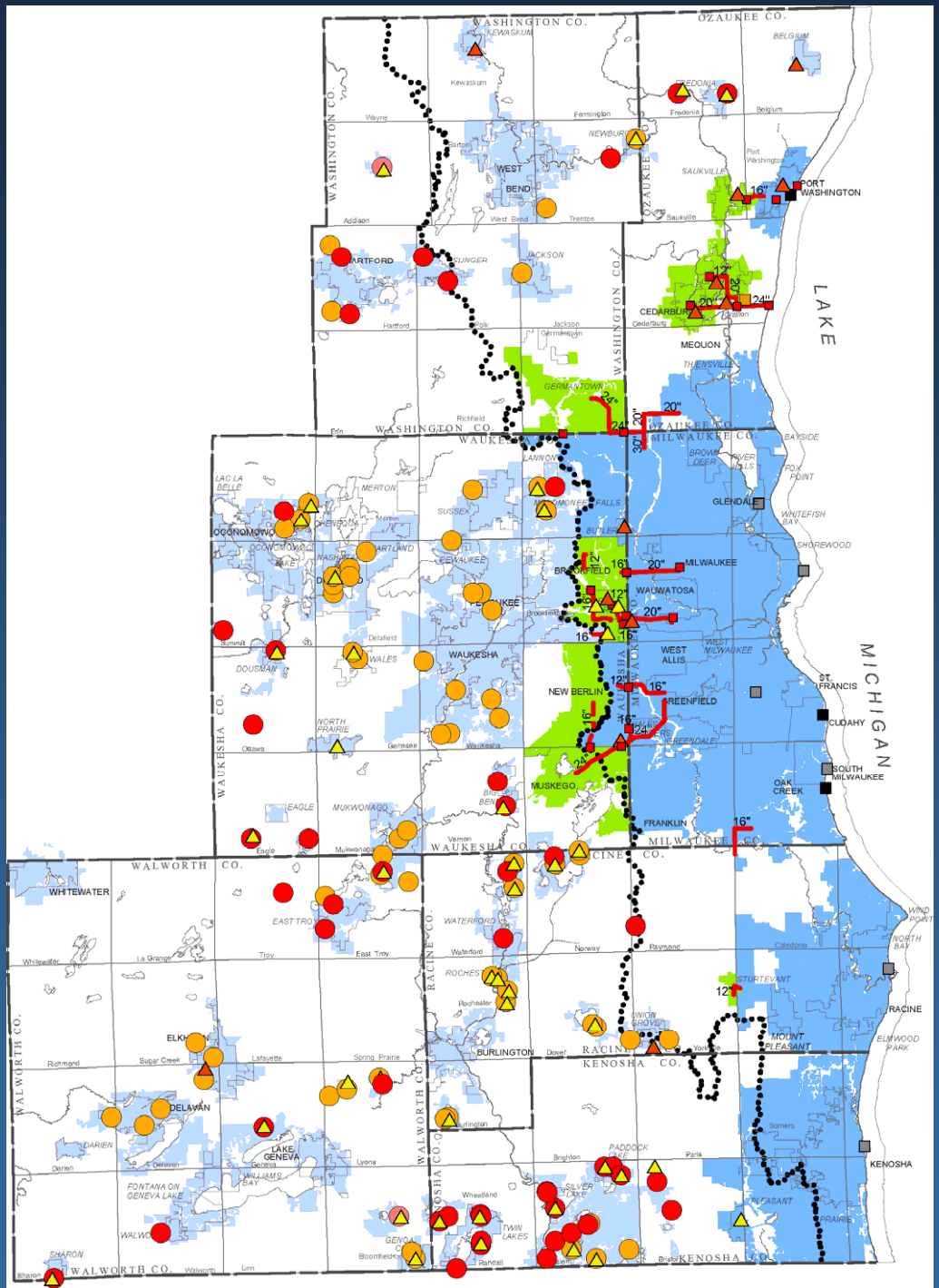
	Capital Costs	Annual Operating and Maintenance Cost	Equivalent Annual Cost	Deep Aquifer Impact	Shallow Aquifer Impact	Surface Water Impact
Alternative Plan 1	$170 million	$5.1 million	$11.2 million	Significant slowdown in the drawdown of the deep aquifer	Localized impact around community wells	4.5% reduction in groundwater derived baseflow
Alternative Plan 2	$219 million	$3.2 million gross -$3.3 million net*	$6.2 million	Drawup in the deep aquifer	Localized impact around community wells	5.3% reduction in groundwater derived baseflow
Alternative Plan 3	$367 million	$8.6 million gross $2.1 million net*	$12.9 million	Drawup in the deep aquifer	Localized impact around community wells	1.7% reduction in groundwater derived baseflow
Alternative Plan 4	$470 million	$7.3 million gross -$14.4 million net**	$14.3 million	Drawup in the deep aquifer	Localized impact around community wells	0.7% reduction in groundwater derived baseflow

*Includes a credit of $6.5 million for reduced household water softening costs.

**Includes a credit of $21.7 million for reduced water softening costs.

Regional Water Supply Plan
Subalternative 1 to the Composite Plan:

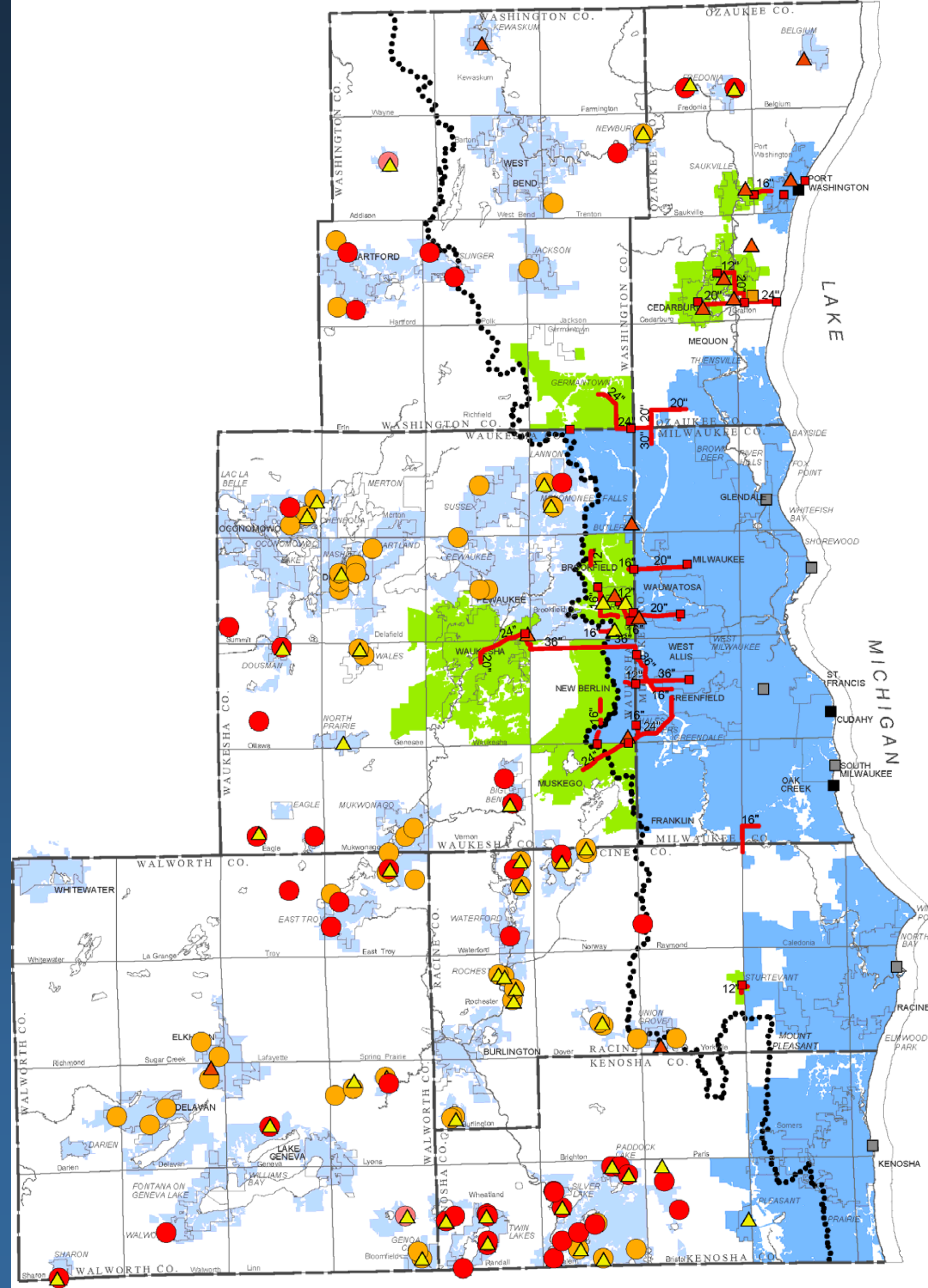
- AREAS SERVED BY MUNICIPAL WATER UTILITIES PROVIDING WATER FROM LAKE MICHIGAN: 2035
- AREAS CONVERTED FROM GROUNDWATER TO SURFACE WATER UNDER COMPOSITE SUBALTERNATIVE 1 PLAN: 2035
- AREAS SERVED BY MUNICIPAL WATER UTILITIES PROVIDING GROUND WATER: 2035
- PLANNED MUNICIPAL WELL (SHALLOW AQUIFER)
- PLANNED MUNICIPAL WELL (DEEP AQUIFER)
- PLANNED MUNICIPAL WELL AND RESERVOIR STORAGE FACILITY (SHALLOW AQUIFER)
- PLANNED MUNICIPAL WELL AND RESERVOIR STORAGE FACILITY (DEEP AQUIFER)
- EXISTING MUNICIPAL WATER TREATMENT PLANT NEEDING NO EXPANSION
- EXISTING MUNICIPAL WATER TREATMENT PLANT TO BE EXPANDED OR UPGRADED
- PLANNED NEW MUNICIPAL WATER TREATMENT PLANT
- PLANNED NEW OR MODIFIED MUNICIPAL PUMP OR METERING STATION
- PLANNED MUNICIPAL ELEVATED TANK
- PLANNED MUNICIPAL REPUMP RESERVOIR
- PLANNED WATER TRANSMISSION MAIN
- SUBCONTINENTAL DIVIDE



- Enhanced local conservation programs
- Conversion of selected areas with current return flow to Lake Michigan supply
- Conversion of selected groundwater supply from deep to shallow aquifer supply
- Enhancement of rainfall infiltration over 2.0 square miles of open space through bioengineering
- Continued reliance on private wells for selected residential areas (about 180,000 persons plus selected agricultural, irrigation, and industrial uses)

Regional Water Supply Plan
Subalternative 2 to the Composite Plan: (Preliminary Recommended Water Supply Plan)

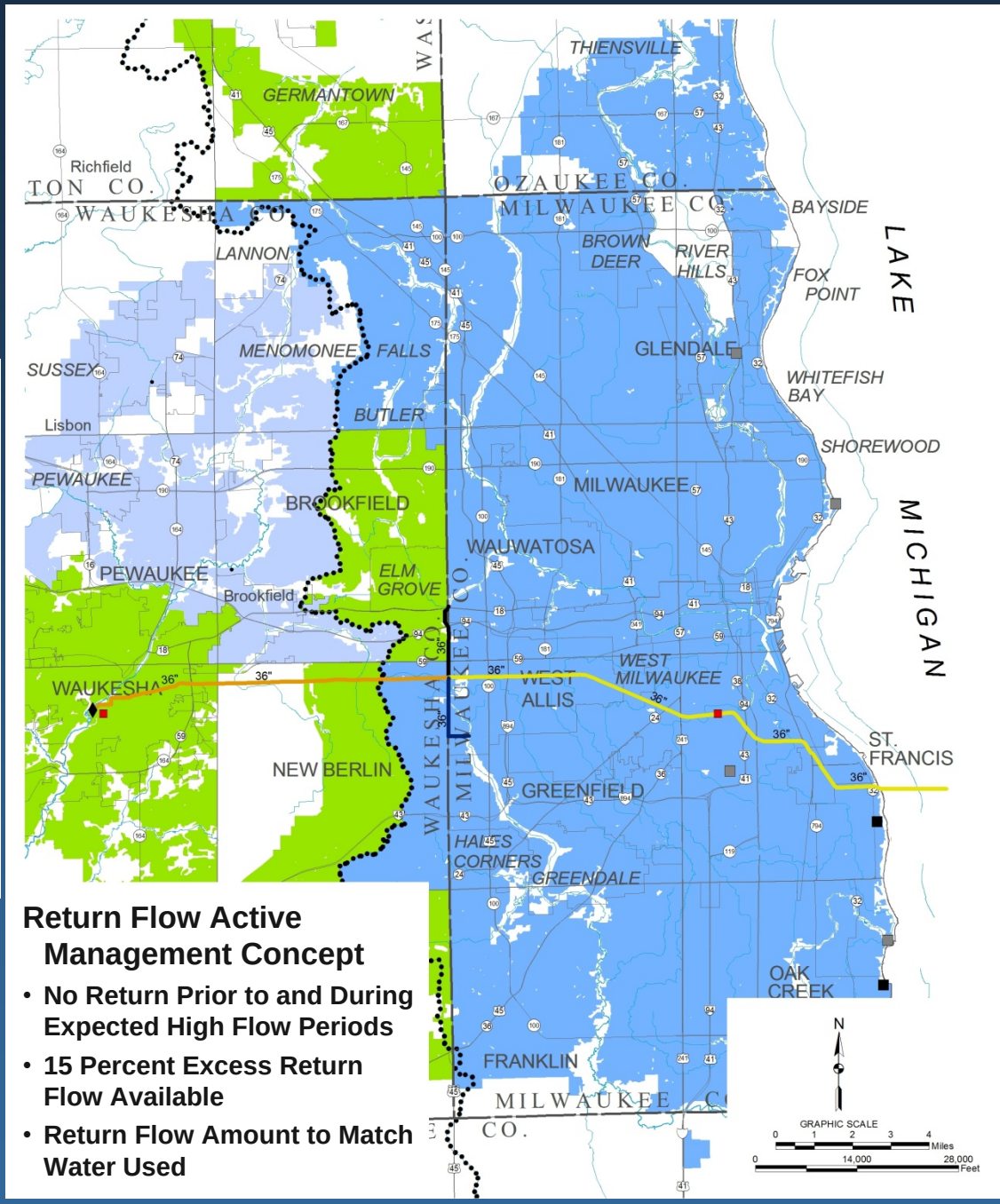
- AREAS SERVED BY MUNICIPAL WATER UTILITIES PROVIDING WATER FROM LAKE MICHIGAN: 2035
- AREAS CONVERTED FROM GROUNDWATER TO SURFACE WATER UNDER COMPOSITE SUBALTERNATIVE 2 PLAN: 2035
- AREAS SERVED BY MUNICIPAL WATER UTILITIES PROVIDING GROUND WATER: 2035
- PLANNED MUNICIPAL WELL (SHALLOW AQUIFER)
- PLANNED MUNICIPAL WELL (DEEP AQUIFER)
- PLANNED MUNICIPAL WELL AND RESERVOIR STORAGE FACILITY (SHALLOW AQUIFER)
- PLANNED MUNICIPAL WELL AND RESERVOIR STORAGE FACILITY (DEEP AQUIFER)
- EXISTING MUNICIPAL WATER TREATMENT PLANT NEEDING NO EXPANSION
- EXISTING MUNICIPAL WATER TREATMENT PLANT TO BE EXPANDED OR UPGRADED
- PLANNED NEW MUNICIPAL WATER TREATMENT PLANT
- PLANNED NEW OR MODIFIED MUNICIPAL PUMP OR METERING STATION
- PLANNED MUNICIPAL ELEVATED TANK
- PLANNED MUNICIPAL REPUMP RESERVOIR
- PLANNED WATER TRANSMISSION MAIN
- SUBCONTINENTAL DIVIDE



- Includes all aspects of subalternative 1 to the composite plan except:
  - The city of Waukesha water utility is converted to a Lake Michigan supply with a return flow component
  - The enhanced rainfall infiltration acreage is reduced from 2.0 to 1.7 square miles

Options 1 – 4 for Return Flow for Subalternative 2 to the Composite Plan: Return Flow Pipelines to Lake Michigan, Underwood Creek, and Root River

- AREAS SERVED BY PUBLIC WATER UTILITIES PROVIDING WATER FROM LAKE MICHIGAN UNDER ALTERNATIVE PLAN 1: 2035
- AREAS CONVERTED FROM GROUNDWATER TO SURFACE WATER UNDER THE PRELIMINARY RECOMMENDED PLAN: 2035
- AREAS SERVED BY PUBLIC WATER UTILITIES PROVIDING GROUNDWATER: 2035
- EXISTING MUNICIPAL WATER TREATMENT PLANT NEEDING NO EXPANSION
- EXISTING MUNICIPAL WATER TREATMENT PLANT TO BE EXPANDED OR UPGRADED
- EXISTING MUNICIPAL WASTEWATER TREATMENT PLANT
- PLANNED NEW PUMPING STATION
- PLANNED WATER RETURN FLOW PIPELINE: OPTIONS 1, 2, 3, AND 4
- PLANNED WATER RETURN FLOW PIPELINE: OPTION 1
- PLANNED WATER RETURN FLOW PIPELINE: OPTION 2 AND 4
- PLANNED WATER RETURN FLOW PIPELINE: OPTION 3 AND 4
- SUBCONTINENTAL DIVIDE

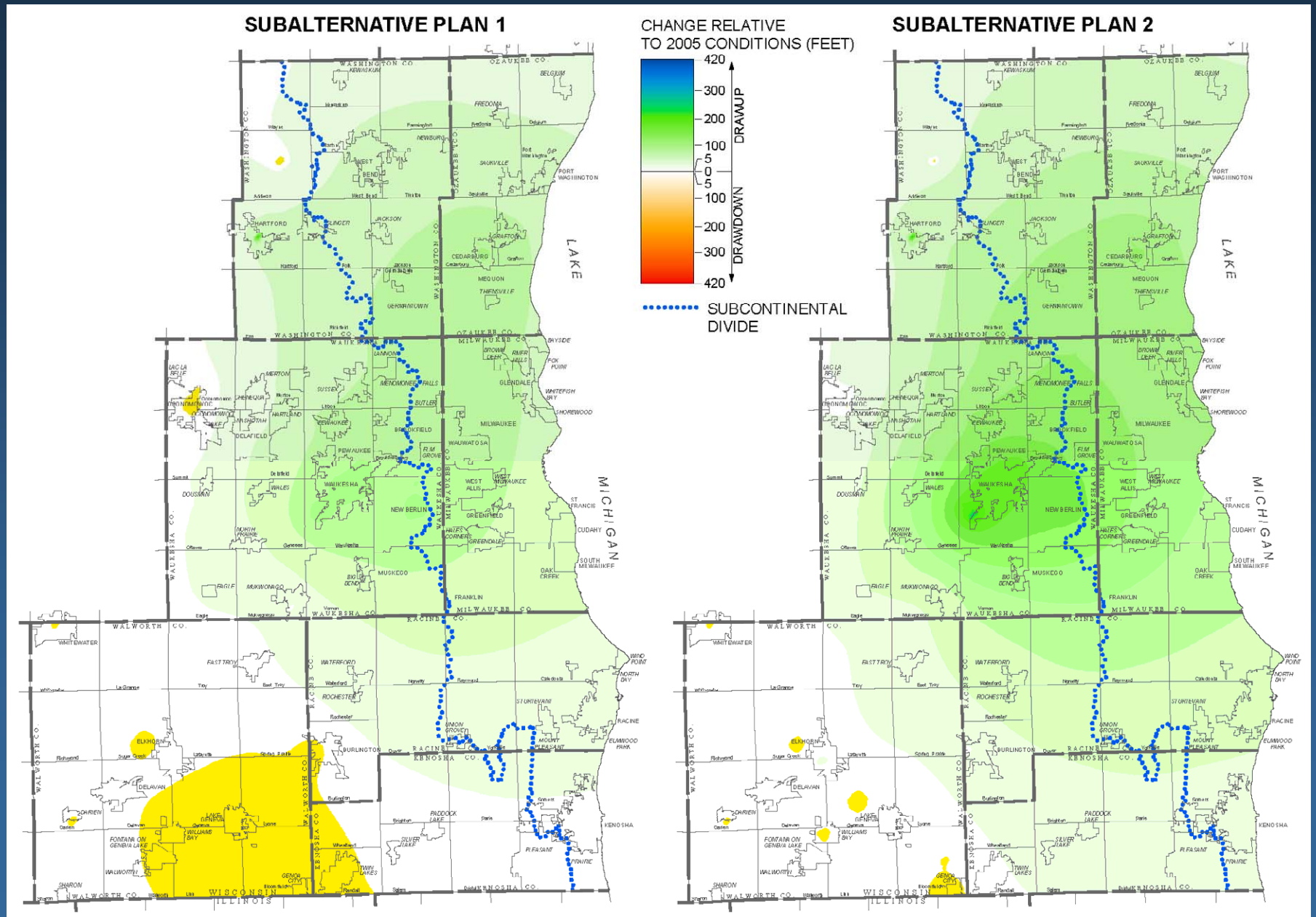


Return Flow Active Management Concept

- **No Return Prior to and During Expected High Flow Periods**
- **15 Percent Excess Return Flow Available**
- **Return Flow Amount to Match Water Used**

Evaluation of Subalternative Composite Plans

Deep Aquifer Conditions Associated with Subalternatives of the Composite Plan



Composite Plans

Test and Evaluation Results-Summary

	Capital Costs	Annual Operating and Maintenance Cost	Equivalent Annual Cost	Deep Aquifer Impact	Shallow Aquifer Impact	Surface Water Impact
Subalternative 1 Composite Plan	$276 million	$5.4 million gross -$4.0 million net*	$9.9 million	Drawup in the deep aquifer	Localized impact around community wells	3.4% reduction in groundwater derived baseflow
Subalternative 2 Composite Plan	$324 to 352 million	$8.0 to 8.5 million gross -$8.2 to 8.7 million net*	$8.2 to 10.5 million	Drawup in the deep aquifer	Localized impact around community wells	2.0% reduction in groundwater derived baseflow

*Includes a credit of $9.4 million for reduced household water softening costs.

**Includes a credit of $16.7 million for reduced water softening costs.

Summary of Plan Findings and Recommendations

- Water Conservation
  - The level of water conservation to be implemented should be utility-specific based upon the utility infrastructure needs, the characteristics and sustainability of the source of supply, and consistency with the Compact and Federal and State regulations.
  - The level of water demand reduction which might be expected from water conservation programs utility-wide will vary from 4 to 10 percent in average daily demand and from 6 to 18 percent in maximum day demand. For all Milwaukee County communities the recommendations provide for base level water conservation programs providing for about a 4 percent reduction in average daily demand and a 6 to 8 percent reduction in maximum daily demand.
- Groundwater Recharge
  - The recharge areas within southeastern Wisconsin have been identified and ranked low, moderate, high, and very high with regard to the amount of recharge which occurs on each acre of land. Implementation of the 2035 regional land use plan will result in protection of about 74 percent of the areas ranked as having high recharge and very high recharge characteristics. Careful design of new residential development and the use of selected stormwater management practices would be expected to increase this amount.

Summary of Plan Findings and Recommendations

Water Supply Sources

- There are viable options which rely on increased use of groundwater as a source of supply for communities located west of the subcontinental divide.
- The existing Lake Michigan treatment supplies are generally of a high quality and have adequate or excess capacity. Some added capacity would be needed to serve expanded service areas in Ozaukee County and Oak Creek in Milwaukee County.

Summary of Plan Findings and Recommendations

- For 59 water utilities the existing sources of supply—generally Lake Michigan, the shallow aquifer, or a combination of shallow and deep aquifers underlying the Region were determined to be adequate. Therefore, the plan proposes that these utilities continue to utilize their existing sources of supply with expansion as needed.
- For four utilities the plan places greater reliance on use of the shallow groundwater aquifer as a source of water supply (Delavan, Elkhorn, Hartford, Bristol).
- Utility areas expected to change to a Lake Michigan supply over the planning period (to 2035) include
  - Cedarburg (east of divide)
  - Grafton (east of divide)
  - Saukville (east of divide)
  - Eastern Brookfield (east of divide)
  - Central New Berlin (straddling community, return flow system already in place)
  - Elm Grove (east of divide)
  - Muskego (straddling community , return flow system already in place)
  - Waukesha (west of divide in straddling county , new return flow system required)
  - Germantown (east of divide)
  - Yorkville (east of divide)
- This plan is being proposed because of its benefits in the drawup of the deep and shallow aquifers, minimizing loss of baseflow in surface waters, and reducing chloride discharges to surface waters.

Summary of Plan Findings and Recommendations

- Groundwater pumping in the Region by 2035 is expected to remain about the same as in 2005–about 78 mgd. However, pumping from the shallow aquifer is expected to increase and pumping from the deep aquifer is expected to decrease.
- The use of Lake Michigan supplies is expected to increase from about 206 mgd in 2005 to 242 mgd in 2035.

Summary of Plan Findings and Recommendations

- Recommended high capacity wells siting procedures would involve more site selection and impact analysis, monitoring, and mitigation steps.
- The cost of the new facilities and programs envisioned in the plan for municipal utilities averages $14 per capita per year, with a range of from under $2 per person in Milwaukee County to over $80 per person in Ozaukee County. The fiscal impact on Milwaukee County residents and businesses would be a net savings when factoring in revenue sales to new customers outside the County.
- The water table in the deep aquifer in the Region is expected to stabilize or partially recover in most of the Region.
- The impacts of groundwater pumping on stream baseflow are minimized. 2.0 percent reduction is expected by 2035. County specific impacts range from a 14 percent augmentation to a 4.5 percent reduction.

Summary of Plan Findings and Recommendations

- Impacts of Preliminary Recommended Plan on Milwaukee County Communities, Residents
  - Existing water treatment supplies are generally of a high quality and have adequate capacity. (In the case of the City of Milwaukee Water Works, considerable excess capacity exists.) No major new infrastructure requirements are envisioned, except at the City of Oak Creek water treatment plant where expansion has long been planned and was found to be needed under all alternative plans evaluated due to planned growth in the areas served by the Utility.
  - An opportunity would be presented to expand the customer base for the Milwaukee Water Works and potentially the City of Oak Creek Water Utility by the addition of customer communities outside of Milwaukee County. This could take advantage of unused water treatment plant capacity in the case of the Milwaukee Water Works treatment plants. Such an increase in customer base should result in a reduction in water rates, all other things being equal.
  - The cost for providing any new conveyance infrastructure needed for new customer communities would be borne by those new customer communities.
  - Return flow options for Waukesha will need careful environmental evaluation as part of plan implementation. Groundwater remains a viable option for Waukesha should the environmental evaluation conclude that Lake Michigan should not be used as a source of supply.

Regional Water Supply Planning Program

Remaining Steps in Planning Process	Estimated Time Frame
Public informational meetings, outreach, and other activities	October 2008 through February 2009
Complete planning report (recommended plan, implementation, and summary chapters)	April, 2009