REPORT

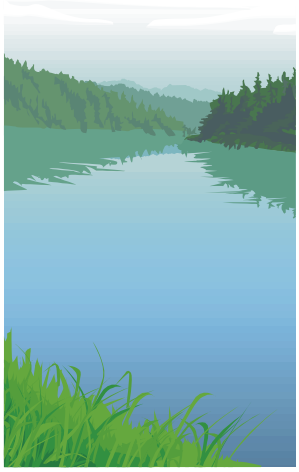
to the

INTERAGENCY COORDINATING COMMITTEE ON GROUNDWATER

from the

SUBCOMMITTEE ON INTEGRATED WATER PLANNING AND MANAGEMENT

With Recommendations Pursuant to Executive Order Number 5, 2002



December 20, 20002

PREFACE

Last year the *New York Times* reported that "Parts of six counties in a region that borders one of the world's largest freshwater sources, Lake Michigan, could be in for serious shortages within 20 years." The article was referring to northeastern Illinois, where the Northeastern Illinois Planning Commission has predicted severe water shortages by 2020 (NIPC, 2001).

Water availability is not just a regional issue here in Illinois. An August 2002 cover story for *U.S. News and World Report* was titled, "The Future of Water: Costly, Dirty, Scarce." A month later, an article in *The Nation* began "Water promises to be in the 21st century what oil was to the 20th century: the precious commodity that determines the wealth of nations." In 2002, about one half of the United States experienced severe drought. Illinois escaped this time, but scientists are are certain that major regional droughts will occur in the midwest in the future. After major and costly droughts in recent years, states such as California and Texas now have accepted the need for improved water supply planning and management. Water supply is a national issue, and it is a global issue.

The way Illinois manages how much water is available for its citizens' usage evolved over the years as the state needed to address diverse social and government interests. This has led to a fragmented and decentralized system that "is inadequate to meet present and future needs" (Assessment of Illinois Water Quantity Law, 1996). Recognizing the increasing demand on Illinois' water resources, Governor Ryan established the Water Resources Advisory Committee (WRAC) in June 2000 to look at the issue. Co-chaired by the director of the Illinois Department of Natural Resources (IDNR) and the director of the Illinois Environmental Protection Agency (IEPA), the committee of 27 individuals represented a cross section of water users and water suppliers. At the five WRAC meetings, held between August 2000 and January 2001, IDNR and IEPA staff gave presentations on a broad range of water issues that were then discussed by the committee members. The WRAC identified numerous water quantity issues on which they could reach a consensus. These are the "12 Consensus Principles" that are discussed in detail on page 11.

An interagency committee prepared legislative language consistent with these principles that established a comprehensive water quantity planning and management program. However, the draft legislation was not well received by the key constituent groups that reviewed it. Even with various amendments, the legislation could not garner enough support for introduction.

Last year the Groundwater Advisory Council (GAC), a citizen's advisory group to the Interagency Coordinating Committee on Groundwater (ICCG), proposed amending the Illinois Groundwater Protection Act (IGPA) to add comprehensive water quantity planning to the responsibilities of the ICCG. The IGPA already has an administrative structure in place, it has authority to include surface water/groundwater interaction issues in its oversight, interagency responsibilities are already delineated, and public participation is assured through the GAC.

It was clear based on the WRAC's deliberations that starting from a sound scientific basis would be key to implementing an attainable management plan. The GAC recommended the following as the basis for a water quantity planning program for the State of Illinois:

- A coordinated ground and surface water inventory program whose data are accessible and useable by all governmental agencies and the public to support a State Water Resources

Quantity Program;
- A statewide ground and surface water resource assessment program on which to base the formation of Priority Water Quantity Planning Areas; and
- Identification and recommendation of the appropriate organizational structure for Priority Water Quantity Planning Areas."

When it became clear that introducing water quantity legislation during the Spring 2002 legislative session would not be successful the Governor's Office decided to pursue an Executive Order. Advocates would first need to articulate a vision for future water quantity planning and management, and then develop a strategic plan to implement that vision. This approach led to Executive Order Number 5 which borrowed on the framework developed by the GAC to plan for a water resources program.

Signed on Earth Day 2002, Executive Order No. 5 established a subcommittee of the ICCG to develop the following integrated groundwater and surface water assessment report. Integrated water resources planning and management requires; 1) current data at appropriate scales; 2) an organized planning process; 3) appropriate water management tools; 4) appropriate water management authorities; 5) the appropriate human infrastructure to use the data, do the planning, and exercise authorities to use the available water management tools to avert future crises.

The report quantifies Illinois' water resources, analyzes the demands on them, and provides an agenda to plan for their protection. After reviewing these recommendations, the ICCG is charged with establishing water planning procedures for protecting water resources in the state. Protecting water resources, by definition, implies management action. The subcommittee report a) provides a brief summary of Illinois' water resources and identifies some of the water problems the state of Illinois currently faces; b) identifies the information gaps that need to be filled; c) argues that expanded, regional water quantity planning and management is needed to address some of the critical water conflicts that are emerging in Illinois; and d) discusses needed water management authorities; e) identifies available water management tools; and f) recommends an interim framework for establishing regional water management consortia to begin planning.

The ICCG Subcommittee on Integrated Water Planning and Management is comprised of the following representatives:

- Governor's Natural Resources Liaison
- Director, IDNR
- IDNR, Director, Office of Scientific Research and Assessment
- IDNR, Director, Waste Management and Research Center (WMRC)
- IDNR, Chief, Illinois State Geological Survey (ISGS)
- IDNR, Director, Office of Water Resources
- IDNR, Chief, Illinois State Water Survey (ISWS)
- IDNR, Chief, Illinois Natural History Survey (INHS)
- Illinois Department of Agriculture, Division of Natural Resources
- Chair of the GAC, and
- Director IEPA, Chair of the ICCG.

WATER AVAILABILITY, DEMAND, SUPPLY, AND USE

Four key terms are basic to understanding the current and future water quantity situation in Illinois: water availability, water demand, water supply, and water use. Water availability is the amount of water that can be obtained from rivers, streams, springs, lakes, reservoirs, and aquifers. Water demand is the amount of water that is desired for domestic, municipal, commercial, agricultural, industrial, mining, power generation, waste dilution, navigation, recreation, and environmental (e.g., fish and wildlife) purposes. Water supply is the amount of water capacity of existing delivery systems, and water use is the amount of water that is actually withdrawn or used for these purposes.

Much of the data and information contained in this chapter was taken from *A Plan for Scientific Assessment of Water Supplies in Illinois* (Illinois State Water Survey, 2001).

Although Illinois is blessed with abundant water resources, as population and water demand have increased over the past 200 years, so has water use. And while water shortages have occurred only occasionally—due mainly to drought—the demand for water is increasing so rapidly that shortages are anticipated in the next few decades in some areas of the state.

Several factors determine the regional variability of water availability and demand. They can be:

- Physical – the amount and distribution of precipitation and stream flow; hydrogeology; recharge and discharge rates;
- Geographical – the distribution of population, industries, and biological species;
- Chemical – natural and man-made chemicals that diminish water use;
- Ecological – the requirement to maintain minimum flows in rivers and streams;
- Economic – the cost of constructing reservoirs, well fields, pipelines, water treatment plants, and water distribution systems;
- Political – interstate transfers; use of Great Lakes water;
- Legal – restriction by decree of the United States Supreme Court of the amount of water that can be diverted from Lake Michigan; determination by the courts of what constitutes "reasonable" and "beneficial" use; and
- Social – the level of desired security and reliability of water supplies, or, alternatively, the acceptable level of risk of water shortages.

Water availability

All water originates from precipitation, which ranges from about 34 inches a year on average in northern Illinois to almost 50 inches in southern Illinois. On an average day, some 100 billion gallons of precipitation fall on Illinois, most of which is evaporated or transpired (Stan Changnon, August 5, 2002). In any given year precipitation is much more variable—as low as 25 inches in the north to as high as 65 inches in the south. Physical factors such as land use, evaporation, and the porosity of soils and rock materials add to the regional diversity of available water.

The amount of water withdrawn from rivers, streams, springs, lakes, reservoirs, and aquifers cannot increase indefinitely—safe withdrawal is dependent to a large extent on the recharge rate, i.e., the rate at which withdrawn water can be replaced. In general, the faster the recharge rate, the more water can be withdrawn safely. Rivers, streams, lakes, and reservoirs can be recharged in a matter

of days following heavy precipitation. Aquifers are recharged at a slower rate, ranging from months to thousands of years, depending on their depths and the characteristics of their overlying material. In general, rivers, streams, and many shallow aquifers can sustain higher withdrawal rates per unit area than can deep aquifers. However, expansion of surface water supplies is becoming difficult in some cases. A Supreme Court decision limits Illinois' Lake Michigan allocation and many barriers exist to the construction of major reservoirs. As a result increasing pressure is being placed on groundwater supplies.

Droughts put pressure on all water supplies because water availability decreases at the same time that demand increases. Groundwater supplies, however, tend to be less vulnerable to drought than are surface water supplies because they are not as sensitive to short-term precipitation deficits. And while groundwater withdrawals can actually increase the groundwater recharge rate, they also reduce instream flows of rivers and streams. A minimum instream flow is needed for fish, wildlife, recreation, navigation, and waste dilution, further limiting the amount of water that can be withdrawn.

Drought management generally is based on the calculation of 1-in-50-year droughts, but, reeling from recent disasters, many states are moving to worst-case drought management. In areas where surface water and groundwater are not readily available—particularly in central and southern Illinois—in-channel and side-channel reservoirs have been constructed to enhance water availability during drought years.

Water supply

When communities plan (and manage) water supplies, they have to consider all of the above factors while making water supply and demand projections several years, even decades, ahead. They have to identify and evaluate alternative water-supply options, and secure funds, permits, and agreements for additional sources of water and water-treatment and distribution projects. While most communities have local water-distribution systems, some use regional systems, e.g., Rend Lake and the Greater Chicago Metropolitan Area. Illinois also has agreements with other states and Canada on the use of Great Lakes water.

In the foreseeable future, water availability is not as limiting a factor for Illinois water supplies as is cost. The key question is not whether supply can meet demand, but at what cost can supply meet demand? How much are people prepared to pay, or will they have to pay, for a gallon of water for domestic use, for power generation, or to irrigate crops? No major reservoir has been constructed in Illinois for 25 years, with high cost being a significant barrier. Other supply options are treating highly-mineralized waters from deep aquifers or constructing in-channel reservoirs. But these also entail major costs. With legal changes, some communities could possibly withdraw additional water from the Great Lakes or the Illinois and Mississippi Rivers, though significant costs could also be associated with such efforts.

The amount of money that a consumer pays for water, however, is just one component of the cost of that water. Other components are non-monetary costs—to the environment and to fish and wildlife. Inter-generational equity can also come into play. For example, withdrawing large quantities of water that exceed the capacity of an aquifer to recharge can result in "mining" and depletion of the aquifer, such that the aquifer might not be able to provide water for future generations.

With demand rising rapidly in certain areas of the state and the high cost of bringing new water

supplies on line, water competition and conflicts will continue to grow. In some cases withdrawals are approaching, or have already exceeded, safe yield. The situation is not confined to the boundaries of Illinois. Around the globe, water is increasingly recognized as a precious resource that requires assiduous study and wise management.

Water use

Estimates of water use in Illinois are largely based upon the State Water Survey's Illinois Water Inventory Program (IWIP) questionnaires that are sent out to municipalities and *known* self-supplied industrial and commercial facilities. Completion of the questionnaires is voluntary and the resulting data are provided to the U. S. Geological Survey (USGS) for statewide and regional summary (Kay, 2002). Because irrigation withdrawals are not reported, the USGS estimates this use. Similarly, water use for rural self-supplied households must be estimated. All major water uses are accounted for and the USGS provides a fair sense of the amount of water being withdrawn in the state. For regional and local water planning and management, however, more accurate data will be needed.

We do know that total water withdrawals in Illinois have doubled since 1950 and that more than 90% is taken from surface waters. In 1995, approximately 20 billion gallons of water were withdrawn each day. Of this amount, 2.8 billion gallons were attributable to domestic, commercial, industrial, agricultural, and mining uses (two thirds from surface waters and one third from groundwater). The remainder was used by power plants, which recycle all but a few percent of their withdrawals. Per capita, water withdrawal was 1,680 gallons per day. Only about 10% of the withdrawals were for public water supply.

Large quantities of water also are needed instream to sustain habitat for fish and other wildlife, and for navigation, recreation, and waste dilution. Although domestic use generally has priority over other uses, conflicts can result when one use conflicts or impacts another, and its claim of reasonable and beneficial use is contested in court. More details on water withdrawals, use, and consumption can be found in Kay (2002).

Water demand

Demand for water is increasing in many parts of the state, primarily as a result of growth in the population and the economy. The Northeastern Illinois Planning Commission projects water shortages for 11 townships in the Chicago metropolitan area by 2020 (NIPC, 2001). Elsewhere electric utility deregulation has created additional demands for water to supply new electric power plants. Other pressures on water supplies are not yet obvious because most Illinois communities have not undertaken supply and demand projections.

Key Concerns

Below are some of the key concerns relating to Illinois water resources.

Surface water

- Withdrawal of water from Lake Michigan is set by decree of the U.S. Supreme Court at 2.1 billion gpd. The allocation is almost fully used and is unlikely to be increased in the near future.
- Streams, lakes, and wetlands that have outstanding aquatic resources, threatened and endangered species, high recreational use, or high waste discharges generally need more water and more consistent water supplies than other water bodies.

- The available water supply in the two large federal reservoirs on the Kaskaskia River, Lake Shelbyville and Carlyle Lake, will likely be fully allocated in 2003.
- Water levels in some reservoirs were reduced to critical levels during the 1999–2000 drought, even though the drought was not severe.
- The capacity of many reservoirs and lakes is not known, while for others it is known to be reduced due to sedimentation.
- Streamflow magnitudes and frequencies for many streams throughout Illinois have not been evaluated.
- Requirements for the maintenance of minimum instream flows are not well quantified.

Groundwater

- Withdrawals from the deep aquifer system in northeastern Illinois have approached or exceeded estimates of the aquifer's safe yield, and withdrawals continue to increase.
- Location, size, extent, and hydraulic properties of many aquifers, especially local aquifers in glacial deposits, is unknown.
- Many shallow aquifers across the state are sensitive to short-term droughts, threatening small community and private water supplies.
- It is not known how much water can be withdrawn safely from many aquifers.
- Due to legal and financial constraints associated with increasing surface water supplies, more pressure is likely to be placed on groundwater sources in the future.

Cross-cutting

- The reasonableness of water withdrawals typically does not consider cumulative impacts or safe yields.
- Key terms (e.g., adverse impacts, safe yield, and practical sustainable yield) either are not well defined or definitions vary and are not applied consistently.
- Estimates of water use often are quite inadequate, as many major uses (e.g., irrigation) are not reported.
- Water quantity management is impaired by the fact that the geographical extent of watersheds and aquifers do not coincide, and political boundaries do not coincide with either watersheds or aquifers.
- Interactions between groundwater and surface water are important but not well understood, also impairing effective resource management.
- Technical data and models needed for water quantity planning often are outdated, inadequate, or nonexistent.
- Naturally occurring pollutants, such as arsenic, radium, suspended solids, and chloride limit the availability of clean water at reasonable cost in some areas.
- Human activities that produce pollutants such as pesticides, metals, sediments, and nutrients add to these water-quality problems and treatment costs.
- Future droughts will occur as part of natural climate variability.
- Future water availability is highly dependent upon precipitation and temperature and some projections show that water availability in the Midwest could change dramatically as a result of climate change.
- Other conditions that could change water availability and supply include water quality, water treatment technologies, and changing social, economic, and land-use conditions. In addition, water conservation and reuse practices can change water supply and demand.

As water conflicts arise, any one of these issues could generate a specific legislative response, which could either move us toward integrated water planning and management or further complicate achieving that end. See Appendix I, "Critical Water Issues," for a more detailed discussion of several of these topics. The Subcommittee believes the State of Illinois could face serious water shortages by 2020 if action is not taken now.

NEEDED WATER RESOURCES DATA

Executive Order Number 5 "recognizes the need to develop basic scientific data about water resources that is accessible and usable by government and the public to support a statewide water resources program." While a diversity of information already exists, some is not readily available or easily used. Other data still needs to be developed. At a minimum, the following need to be evaluated:

- The accessibility of existing water resources data (i.e., from programs, studies);
- Current status of the SWS Illinois Water Inventory Program;
- The degree that existing data are integrated and useable by government and the public;
- The steps required to make the data useable in developing a water resources program; and
- Data gaps—what data is still needed to develop a coordinated water resources program.

While numerous water research efforts are ongoing (see Appendix II, Ongoing Water Quantity Assessment Activities), they are not comprehensive and the data are not all readily available or in a format that is easily used by decision makers. Even with significant, immediate funding increases, it could take a decade to acquire, organize and make available to planners and policy makers, in an easily useable format, the scientific information needed for integrated, statewide ground and surface water planning and management. The draft strategic plan in Appendix V details the specific scientific assessments that are needed and identifies a time frame for their completion.

THE NEED FOR EXPANDED WATER PLANNING IN ILLINOIS

Water planning identifies water availability, estimates demand, and evaluates options for increasing supply and/or reducing demand. It is a necessary foundation for efficient water management. With the high cost of tapping new sources of water, planning will ensure that water management tools and technologies are used to avert future water shortages, increase efficiencies, and minimize costs. Water planning is a common-sense alternative to disaster management.

Water in Illinois is similar to energy in that it is managed in a highly decentralized manner. The difference, however, is that there is an Energy Cabinet and a State Energy Plan. There are no comprehensive statewide or regional plans for water supply and no centralized or regional powers with adequate authority, responsibility, and resources for water planning and management. Whether the *status quo* continues or a new water management scheme is introduced, it is imperative that water planning activities be enhanced. Unless water quantity planning is conducted in a comprehensive, regional, and visionary manner, water will not be managed effectively or efficiently, conflicts can be expected to escalate, and water shortages can be expected to occur in some parts of the state soon and in many parts of the state in the decades ahead.

Historically in Illinois, water quantity planning and management have lacked sustained leadership, due process, coordination, delineation of clear and strong authorities and responsibilities, and adequate financial and human resources. Efforts have been made to strengthen water quantity

management through legislation and regulation, but without an effective planning process. An alternative approach is to commit to an open, continuing, adaptive, and resource-intensive planning process that establishes a sound scientific basis for water quantity management.

While some coordination occurs at the state level (see Appendix IV, State Involvement in Water Quantity Issues) and the State does have authority to regulate water withdrawal from a limited number of public waters, most water planning is conducted at the local community and county levels. The only regional planning taking place is in the northeastern part of the state by the Northeastern Illinois Planning Commission, in central Illinois by the Mahomet Aquifer Consortium, and in southern Illinois around Rend Lake.

Larger scale planning is needed because aquifers and watersheds are regional in nature, cutting across political boundaries, in some cases even state boundaries. And because aquifers and watersheds overlap geographically and are interdependent, water quantity planning and management must address these resources jointly. This does not mean, however, that local and county control will be lost. Water planning must involve local communities, political entities, and constituents, and planning should be occurring at several scales, which will require better communication in order to address shared problems and opportunities.

To address these issues, the subcommittee recommends that the ICCG develop, with public input, a "Strategic Plan for Water Quantity Planning and Management." Appendix V contains a draft strategic plan that provides detail in those areas in which Subcommittee members have specific expertise. The draft is intended to be used as a beginning point for further, broad-based public discussion.

NEEDED WATER MANAGEMENT POWERS

To maximize the benefits of Illinois' abundant water resources for the people of Illinois, it will be necessary to integrate ground and surface water management in an administrative framework that accommodates 1) the regional variation in and limitations of the state's water resources, 2) the diverse interests of local water users, and 3) the existing powers and authorities of other government institutions. The Water Resources Advisory Committee (WRAC) quickly reached consensus on the need for such a framework.

The WRAC developed the following Consensus Principles:

1. Better science and more funding for science is needed.
2. A system for identifying water resource problem areas is needed.
3. Water resource problem areas:
    - should not be too large,
    - could be based on ground or surface water sources or both,
    - should be based on supply and demand,
    - a drop below sustainable yield should be a criteria,
    - pollution could be a criteria.

4. Need to see details of how such areas will be identified both short-term, based on existing information, and long-term, as better data become available.
5. Emphasize regional water management authorities—boundary should have some relationship to scale of the water resource (watershed and/or aquifer boundary).
6. State's role:
   - for later resolution,
   - should support, provide science, establish or appoint regional authorities.
7. Will existing water authorities established under the Water Authorities Act work?
8. Phased approach to implementation would be received better by a broader group of interests.
9. Immediately begin pilot programs in "willing" areas; pilots programs should be site-based and located in problem areas.
10. Sunsets should be established for #8 and #9.
11. There should be an ongoing role for the Water Resources Advisory Committee in developing the details associated with establishing regional water management authorities.
12. Both groundwater and surface water should be considered.

The Subcommittee believes the recommendations presented to the ICCG in this report are consistent with these principles, and can serve as a roadmap in structuring future water management efforts. Finally, any future integrated water resources planning and management framework should be consistent with the GAC principles discussed in the Preface:

- A coordinated ground and surface water inventory program whose data are accessible and useable by all governmental agencies and the public to support a State Water Resources Quantity Program;
- A statewide ground and surface water resource assessment program on which to base the formation of Priority Water Quantity Planning Areas; and
- Identification and recommendation of the appropriate organizational structure for Priority Water Quantity Planning Areas."

Emergency Authority

Scientists are certain that major droughts will reoccur in the Midwest in the future. Based on its experience, the Subcommittee asserts that the administrative authorities currently in place can not deal with a sustained, regional drought (see Appendix I, Emergency Powers/Drought Management). There is an urgent, immediate need to provide the Governor with emergency powers to cope with a major drought and/or water related disasters. If such emergency powers were legislatively granted, the State would then be afforded the time needed 1) to secure scientific information for integrated water resources planning, and 2) to try to establish cooperative regional planning and management consortia—such as the Mahomet Aquifer Consortium—that could cover the whole state.

This combination of actions, enhancing the scientific information base, granting the Governor expanded water-related emergency powers, and cultivating regional consortia is the most effective way to avoid legislatively-imposed prescriptive regulatory frameworks. Consistent with the recommendations of the Water Resources Advisory Committee, the Mahomet Aquifer Consortium could even be empowered as a pilot Regional Water Quantity Planning Authority.

As previously mentioned, any of the "Critical Water Issues" discussed in Appendix I could spawn specific legislation and the ICCG should consider whether some of the issues Should be addressed preemptively. Appendix I provides a few recommendations and we have also included placeholders in the"Draft Strategic Plan" (Appendix V.) to further discussion.

AVAILABLE WATER MANAGEMENT TOOLS AND TECHNOLOGIES

Water management tools affect either the supply, demand, availability, or use of water. In many cases application of a water management tool will affect more than one component of the equation. Some of the most useful water management tools have reciprocal affects, for example, water conservation decreases water demand while reciprocally increasing supply. Some tools have collateral effects which can sometimes be complicated, for example, new source development can increase the water supply, while having no effect on demand. On the other hand, new source development may increase availability for some water uses but not others without the construction of additional infrastructure for delivery. Many water management tools are currently available, but others might require new program developments or additional legislative authorities. Some of the most important, currently-available tools are discussed below.

Water Conservation and Reuse

As used here conservation means the management of the supply and demand for water. Supply management refers to efforts to reduce the loss of water from the point of withdrawal to customer service connections. In the case of self-supplied water users, supply management operates from the point of withdrawal to the point of use. Demand management refers to efforts to reduce demand or increase efficiency of use at the service connection and beyond. In the case of self-supplied users, demand management applies to modifications in how the water is used in order to lower demand or increase efficiency.

Water Conservation Guidelines and Best Management Practices

Various guidance documents and best management practices (BMP) have been developed for water conservation for different uses and conditions including:

- Agricultural uses,
- Commercial uses,;
- Industrial uses,
- Irrigation uses,
- Landscaping uses,
- Lawn watering uses,
- Residential uses, and
- Drought and emergency conditions.

In addition, model conservation ordinances are available through the National Technical Information Service. The American Water Works Association Water Wiser web site at http://www.waterwiser.org/ contains many examples of water conservation BMPs. The United States Environmental Protection Agency has also developed *Guidelines for Water Conservation Plans,* published in 1998, and an *Annotated Bibliography of Source Materials (832-B-93-003) for Designing a Water Conservation Program*.

Water Reuse, Aquifer Storage and Recovery

Water reuse and aquifer storage and recovery are part of emerging integrated strategies for water conservation. In some water-limited areas of the U.S. the practice of direct water reuse is becoming more common. In this case municipal wastewater is treated with advanced technologies and reused in the drinking water supply system. For example, the Napa Sanitation District (Napa) first began using California Title 22 restricted-use recycled water for pasture irrigation in 1988. Since that time, areas using Napa's recycled water have grown to include approximately 1,000 acres of pasture land, several vineyards, a golf course, and landscaping at a corporate park. In April 1997, with the completion of construction of new tertiary treatment facilities, Napa began producing and delivering recycled water that meets Title 22 requirements for unrestricted use.

Aquifer storage and recovery (ASR) is another relatively new technology that has been used in Florida and other states, and in Finland. A proposed ASR for a community in Illinois would pump a portion of the community's treated Lake Michigan water (under the approved allocation) into the Cambrian Ordovician aquifer to store it for use during periods of peak demand.

Survey of State Water Conservation Programs

In 1998 the American Water Works Association, Water Conservation Division, Governmental Coordination Working Committee, conducted a survey of state water conservation programs. The emphasis was on water conservation programs administered by state agencies other than utility rate and service regulators. (State utility regulation commissions were surveyed on conservation pricing by the National Regulatory Research Institute in 1994.) The survey, which had an 84% response rate, revealed that 37 states (88.1% of the respondent states and 74.0% of all states) engage in some activity under at least one of the four on-going program categories. Of the responding states, only Indiana, Maine, Tennessee, West Virginia, and Vermont did not carry out any conservation activities. The survey covered four broad types of programs:

- *Water Conservation Planning* – If water conservation is to be an integral component of water supply planning and management, it must be the focus of planning when other supply options are evaluated. Twenty-five states (or 59.5% of those responding) require public water systems to prepare water conservation plans. States having this requirement fairly well represent all regions of the country.
- *Water Conservation Plumbing Codes* – Statewide adoption of water conserving plumbing codes is the third most popular conservation program among the states, with 20 of the 42 respondent states (47.6%) indicating such action. Of particular value as an indicator of a state's commitment to water conservation is whether a state had adopted a water conserving code with a requirement for 1.6 gpf toilets prior to the Federal Energy Efficiency Act (effective date of 1/1/94). Thirteen states (31.0% of those responding) answered this question in the affirmative (It should be noted that of the eight states which did not fill out the questionnaire, four had a requirement for 1.6 gpf toilets prior to 1/1/94.) Eight states reported having a requirement for 2.5 gallons-per-minute showerheads prior to when the federal government required it (1/1/94);
- *Outreach and Technical Assistance* – The most popular type of water conservation activity being conducted at the state level is public outreach. Thirty (71.4%) of the responding states engage in some form of water conservation outreach and/or technical assistance. The West, South and Northeast are well represented in this group.
- *Financial Assistance for Conservation Implementation* – This type of program is the least popular among the states, with only 15 (37.5%) of the respondent states stating they provide at least one category of such funding. Western states make up 10 of the 15 providing funding. Northeastern states comprise three and the southern states two of this group.

The survey also included question on the administration and funding of conservation activities and on the identification and characterization of each state's overall role in water conservation. So that a state's conservation activities could be related to water resources management, a background section had questions on water withdrawal monitoring and water allocation programs. Illinois' water conservation activities could be enhanced by a thorough review of the programs of other states.

Municipal Water Conservation In Illinois

For municipal/residential users there are many conservation options, including higher efficiency systems like toilets, showers and clothes washers. It has been estimated that a typical residence (2.7 persons) can reduce daily water use from 147.2 gallons per day to 56.7 gallons per day for a savings of about 60%. The use of grey-water for watering lawns and plants can result in further savings, but this requires separate plumbing. Voluntary water conservation initiatives have not been widely adopted in areas where water is thought to be abundant

Illinois' plumbing code does not have any requirements for conservation or water-saving devices, but those water-saving devices that meet ANSI or ASSE standards are approved. The plumbing code is being changed to incorporate other national testing facilities which are ANSI approved, or approved by the Department of Public Health. The only Illinois standards for low flow toilets are the1992 Energy Policy Act requirements.

Illinois Drinking Water State Revolving Fund incorporates the concept of water conservation. The priority system allows one point to be given to any community that has incorporated water conservation measures as a cost-effective alternative to additional capacity. The maximum points that can be received are 4, so it accounts for 25% of this factor.

Since October 1, 1999 new community water systems are required to demonstrate that managerial, technical, and financial resources are available to support operation in compliance with all state and federal drinking water regulations. This capacity development demonstration is a requirement of the Safe Drinking Water Act Amendments of 1996. Illinois adopted regulations to require this capacity demonstration for new public water supplies on July 29, 1999, and is implementing capacity evaluation as a part of the permits and engineering evaluation process.

Under the Capacity Development Program, Illinois EPA will encourage water supplies to have a water conservation ordinance in addition to the basic service requirements, fees ordinance, and the cross-connection control ordinance. The conservation ordinance can be used during times of drought or when major transmission lines leak or break, equipment fails and full pumping capacity cannot be achieved, or when a cross-connection or other contamination of a water system occurs and a portion of the system must be valved off, or is inoperable for any reason. Illinois EPA intends for this to be part of the routine management deliverables and emergency operations plan.

Industrial Water Conservation and Reuse in Illinois

The 2001 Illinois Manufacturing Directory lists 23,279 facilities, but data on how much water they use are sketchy. Many municipalities and water utilities do not provide industrial water use data, and only about 70% of the businesses that use groundwater voluntarily report their use annually to the State Water Survey. While we know that utilities do not provide assistance or incentives for business to reduce water use, no systematic study has determined the proportion of water used or to what extent water conservation practices have been implemented by business.

The Illinois Waste Management and Research Center (WMRC) provides outreach and technical assistance to businesses on water conservation practices and innovative technologies. The experience of WMRC over the past 17 years indicates that the potential for water conservation is great. Many companies have not even adopted water-saving technologies that have been available for decades, much less new technologies such as ultrafiltration, reverse osmosis, or electroconductivity. Key reasons cited are lack of awareness of the benefits, limited technical assistance to evaluate and implement new technologies, and reluctance to change.

Case studies have shown, however, that manufacturers who have adopted aggressive water conservation practices have reduced water use by more than 99%. Their reasons for implementing these practices include improving process efficiencies, reducing operating costs, or reducing pollution. Atlas Plating, for example, employed a range of technologies including leak controls, ultrafiltration for water purification and in-process reuse, and chemical substitution. Other electroplaters, chemical processors, printers, printed wiring board manufacturers, food processors, engine manufacturers, and assembly plants have also implemented water savings practices.

Many of these examples are documented in the annual Governors Pollution Prevention Awards program. Illinois' companies receiving these awards (about 0.3% of all businesses in the state) have achieved a water savings of over 400 million gallons per year. In most cases, they have cut costs and increased productivity and product quality.

Because of its potential to alleviate problems of inadequate supply, water conservation by businesses should be a key element of Illinois water resource planning. More data on their water use is needed however. Data needs include:

- Water use inventory by sector and geography (in cooperation with municipalities, utilities and business associations). Intensive pilot studies could be conducted in water short areas and areas of groundwater overuse in the Northeast. The findings from the pilot studies would allow us to project the costs and benefits of state-wide applications of various conservation strategies.
- Assessment of water conservation technologies and practices by sector (in cooperation with business groups)
- Determination and evaluation of policy options including water pricing, technical assistance, and voluntary programs.

Midwest Technology Assistance Center

The Midwest Technology Assistance Center for Small Public Water Systems (MTAC) is a USEPA-funded program dedicated to developing the technical, managerial, and financial capacity of small public water systems. MTAC sponsored the Emergency Planning Interactive Guide for Small Water Utilities. The guide, available as a CD or on-line, leads small system operators and/or managers through the process of creating their own Emergency Response Plan. A new, enhanced version of this program is being produced that will address terrorism in more detail, and will be accompanied by a companion work guide.

MTAC is also funding a project by a team from Southern Illinois University at Carbondale that is evaluating existing water supply capacity, and forecasting demand throughout the Midwest on a county-level basis for 2005, 2010, 2015, 2020, and 2025. The total existing water supply capacity will also be determined for those states on a county-level basis. This information is a critical component in developing a comprehensive state or regional water plan, and will benefit systems of all sizes.

Development of New Water Supply Facilities

New and existing public water supplies which intend to construct new water supply facilities, modify existing treatment facilities or equipment, or extend water mains are required to obtain a construction permit from the Illinois Environmental Protection Agency's (IEPA) Division of Public Water Supplies. Public water suppliers are also required to obtain an operating permit before putting newly constructed equipment, facilities (e.g., wells or intakes) or mains into operation. IEPA Permit Section personnel review permit applications to ensure that adequate water is available, the system is properly designed, and is in compliance with all applicable standards and regulations. Currently, the Illinois EPA is revising the construction and operational permit guidelines to determine the safe yield of a new well. See also Municipal Water Conservation In Illinois, Page 14.

Water Allocation

Local governments currently restrict uses of water supplies they control during times of drought. The State of Illinois, through the Office of Water Resources, in the Illinois Department of Natural Resources, currently allocates Lake Michigan water, permits withdrawels from Illinois' Public Waters (about 7.5%) of Illinois' stream miles, and contracts for use of the state's allocation in federal reservoirs (Lake shelbyville, Lake Carlyle, and Rend Lake). For a more expansive discussion of the States' authorities see Appendix III, State Involvement in Water Quantity Issues.

RECOMMENDED WATER MANAGEMENT FRAMEWORK

Given the pressing need for immediate progress on the water quantity issue, the barriers to comprehensive water management legislation, and the reality that some time will be needed to build a statewide database on water resources and a complementary decision support system, the Subcommittee recommends the State of Illinois foster the formation of regional water management consortia, like the Mahomet Aquifer Consortium, in Priority Water Quantity Planning Areas, areas of the state where existing data suggest future water shortages are likely to occur. As the statewide water resources database improves, there should be an ongoing effort to identify at-risk regions and organize consortia within them. A limiting factor in the success of these kinds of voluntary, cooperation-based efforts is the availability of dedicated technical and financial support. To encourage the formation of these consortia and ongoing cooperation within them, the State of Illinois should develop a package of incentives that provides some base financial support and dedicated technical assistance. Each regional consortium should develop its own regional water resources management plan, which describes its unique site-specific problems and proposes solutions. The regional planning process should mirror the statewide process being shepherded by the ICCG. However, in some regions the water resource may cross state boundaries requiring interstate coordination. By 2010 it should be obvious if these cooperative, incentive-based efforts have been successful in avoiding potential crises.

CONCLUSION

The Subcommittee recommends that the ICCG develop a detailed Statewide Strategic Plan for Water Quantity Planning and Management over the next 12 months (a skeleton outline has been provided in Appendix V). The plan should receive broad public review and input. An initial focus should be on securing and making easily accessible the scientific data that will be needed to designate Priority Water Quantity Planning Areas, areas that can be identified as being at risk for water shortages based on existing data or as new data becomes available. Since it will take some time to fill gaps in the statewide water resources data, as Priority Water Quantity Planning Areas are identified, the state should nurture the development of voluntary, cooperative regional water management consortia in those areas by providing technical and financial assistance for water planning and management. There is also an immediate need to grant the Governor emergency powers to deal with major region-wide droughts or water-related disasters. The Subcommittee believes this is the strategy most likely to avoid both prescriptive regulatory water allocation frameworks and future water quantity crises. Some consideration should also be given to voids in current law like instream flow and well interference. Initially, guidelines should be developed identifying best management practices (BMP's) for voluntary adoption. Experience with volunteer implementation of such BMP's will clarify whether it is necessary to adopt them statutorily.

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Appendix I
CRITICAL WATER ISSUES

Droughts

Drought is a severe threat to water-supply management in that less rainfall and often higher temperatures reduce water availability and increase water demand, sometimes creating emergency situations.

Instrumental records indicate that severe droughts were a recurring feature of Illinois' 20th Century climate, with the 1930s Dust Bowl era experiencing the worst droughts of the century. Fairly severe droughts typically occur every 10-20 years. It can be expected that future severe droughts will occur simply as part of natural climate variability. However, there remains uncertainty about the natural frequency and severity of droughts. Early instrumental, written, and proxy records prior to the 20th Century may be able to provide additional important information about the long-term threat of severe droughts. Analyses for the northern Great Plains have shown that droughts much more severe than those observed during the 1930s have occurred in the past and, therefore, could occur in the future.

An additional threat to future water availability is posed by the possibility of substantial climate change induced by human activities. There is great uncertainty about the probability, nature, and magnitude of such change, but some climate models suggest that the frequency and severity of droughts could change dramatically. One climate model used in international assessments projects mean annual precipitation in Illinois as low as 25 inches (compared to the present mean of 37 inches and the Dust Bowl era average of about 30 inches) by the end of the 21st Century, meaning that conditions year after year would be worse than the worst drought of the 20th Century. Another model projects mean annual precipitation as high as 50 inches by the end of the 21st century, meaning that conditions year after year would be as bad or worse than the Big Flood of 1993. Other models show more modest changes in precipitation, but with a higher frequency of floods and droughts from year to year. The range of possible water availability conditions associated with these climate scenarios is currently too large to be useful for water planning and management. However, it would be shortsighted to simply assume that future climate and water availability in Illinois will be the same as those of the recent past to which ecosystems, society, the economy, and water supplies, demand, and infrastructure have adapted.

Three efforts can provide an improved basis for drought management. First, the high uncertainty presently associated with future drought probabilities can be reduced through climate research. Secondly, the characterization of 1-in-50 year droughts, which presently provides a yardstick for drought management, can be refined and 1-in-100 year and worst-case droughts also can be characterized to provide an improved basis for risk assessment. And thirdly, evaluations can be conducted of the adequacy of public water supply systems to meet increased demand and droughts. Without knowledge of the systems which are at-risk and the capacity levels of those systems, conservation measures could be too little too late. When the next big drought comes, the State may be

scurrying to find the needed material supplies, manpower, and water to assist communities truly in need. Fundamentally, communities must have the willingness and desire to understand the limitations of their systems, assess and manage risk, and provide and/or seek the funding necessary to ensure adequate water supplies.

Water Emergencies and Water Security

The events of September 11, 2001 taught us that we must be ever vigilant in identifying our vulnerabilities. Water supplies are potentially soft targets and the infrastructure must be in place to respond to a sudden loss of a significant source of supply. Many of the mechanism designed to be useful in drought response can be adapted to security-related water emergencies, however, the response time must be much shorter in the case of water emergencies.

Emergency Powers for Drought Management and Water Emergencies

The issue of drought response and management was reviewed extensively by the State Water Plan Task Force in 1983. To drought management concerns we must now add concerns about water security. From its recommendations the interagency Drought Response Task Force was activated. In 1996 the Global Climate Change Task Force published recommendations (updated in 1999) for drought emergencies, and a consultant for Conservation 2000 also published recommendations on water quantity issues. The following excerpt from the 1996 Global Climate Change Task Force report summarizes our concerns regarding drought response.

> "Water supplies in Illinois are controlled by thousands of independent public water supply entities. There is no statutory authority for any state agency to intervene in disputes between those entities when conflicts arise over limited water resources. Thus, Illinois courts are called upon to settle disputes on a piecemeal basis, with inadequate rules of law to guide them, often leading to undesirable outcomes. In recent years, the governor has activated the drought response task force as needed to settle conflicts during drought. Lacking regulatory powers the task force relies on voluntary restrictions on users and arrangements between local water entities. These methods are useful and effective for moderate, short-term restrictions but insufficient in situations of chronic shortage. IDNR's Division of Water Resources is best suited to settling water disputes. It has served as the lead state agency for water use administration by allocating and regulating water supply from Lake Michigan through a permit system. It has also worked, statewide, in water supply planning and coordination of water supply users. State water law should be revised to give authority to the agency to settle water disputes. The Illinois Land and Water Use Task Force and the first Conservation Congress have already looked into this problem. Both concluded that the state does not have enough authority to deal with crises and that legislation is needed to fill the gap."

The following options were developed by the Water Plan Task Force.

Option 1. Seek a directive from the Governor to the Department of Natural Resources to prepare a drought response plan that would become part of a "comprehensive plan and program for the

emergency management of the State." (Source: *Assessment of Illinois Water Quantity Law*, July, 1996). Estimated cost: $125,000.

Option 2. Seek legislation that would mandate advance planning for drought conditions. One alternative is to do the planning at the state level. A second alternative is to supervise the planning at the state level but require it to be done at the local level. This approach could require a plan within a given period of time and provide that if none is forthcoming, the state would do it. Under this type of legislation it would be determined in advance what emergency conservation measures would come into play, and what alternative sources of water supply, if any, are at hand. Furthermore, any necessary agreements or preconditions for tapping into the emergency supply could be entered into or taken care of in advance. (Source: *Assessment of Illinois Water Quantity Law*, July, 1996). Estimated cost: $500,000 for planning over three years.

Option 3. Develop appropriate legislation to deal with water emergencies. (Source: *The Illinois Response to Climate Change*, Report of the Task force on Global Climate Change, January, 1996 and *Climate Change Developments: Kyoto and Beyond*, February, 1999). This recommendation was expanded in the C-2000 *Assessment of Illinois Water Quantity Law* report which stated: "seek more comprehensive legislation that would give a state water management agency authority to (1) declare the existence of a drought, (2) issue conservation and anti-waste measures that would apply during the emergency, and (3) expedite the location of, and access to, additional temporary supplies during the emergency." For areas that experience frequent drought problems, the statute could authorize general regulatory measures that would apply at times other than emergencies. Estimated cost: $150,000 to draft rules and prepare initial response plan and program.

Lake Michigan Allocations

Pursuant to state law and a United States Supreme Court Decree, the Department of Natural Resources is responsible for allocating Lake Michigan water. Currently, 201 public water supply systems serving approximately 6.8 million northeastern Illinois residents have an allocation permit from the Department. In 1996, Illinois and the other Great Lakes states and the U.S. Department of Justice signed a Memorandum of Understanding (MOU) to avoid a new round of litigation at the Supreme Court level concerning Illinois allegedly exceeding its allocation. Over the last six years, Illinois has fulfilled all of its MOU commitments and is making significant progress towards reducing our water debt and returning to full compliance with the Supreme Court limit of 2.1 billion gallons per day. The MOU requires liquidation of Illinois' water debt by the year 2019, but if current projections are met we should eliminate the water debt well before the deadline. Even though population forecasts for northeastern Illinois show continued growth, requiring water conservation by our permittees helps to moderate residential water use. An important part of our effort to comply with the Supreme Court Decree is the completion of Phase II of the Tunnel and Reservoir Plan, scheduled for sometime around water year 2015. It will reduce the use of Lake Michigan water that is now diverted for water quality enhancement in the Chicago waterway system.

Federal Reservoir Water Supply and Demand

Kaskaskia River System – The State paid $10,403,777 in capital costs assigned to water supply as the Lake Shelbyville and Carlyle Lake projects were built. Since then the state has paid an additional

$1,782,000 in water supply O&M charges. Now, after about 30 years since the projects were developed, the state is finally seeing a demand for the water, primarily for public water supply and electrical power generation. The electrical generation demand is due to anticipated increases in electrical power demands and recent financial incentives promoting the use of Illinois coal.

The water supply available to the state from these two reservoirs is:

Lake Shelbyville =	24,714 acre-feet for water supply (13.9% of joint-use volume)
	50-year yield estimated at 17 mgd after 40 years of sedimentation
Carlyle Lake =	32,692 acre-feet for water supply (14.2% of joint-use volume)
	50-year yield estimated at 24.5 mgd after 40 years of sedimentation

In June 2000 the state executed a water supply contract with Holland Energy, which built a power plant downstream of Lake Shelbyville and is now withdrawing water from the Kaskaskia River. Water supply contract negotiations are currently underway with two new public water supply entities, one new coal mine-to-mouth electric generating facility, and with Dynegy to serve the existing Baldwin Power Plant. With the execution of these contracts, the state's available yield from these two reservoirs will be fully utilized.

Big Muddy River System – Between 1966 and 1992, the State of Illinois expended considerable resources to support the water supply at Rend Lake—capital construction costs of $9,858,000 and water supply O&M costs (1972 through 1991) of $5,163,000. These payments placed a substantial burden on the state's budget for the preservation of a locally managed water supply resource. The water supply available from Rend Lake is 109,000 acre-feet of storage (68.1% of joint-use volume) with a 50-year yield estimated at 70 mgd.

Currently, the Rend Lake Conservancy District is under contract with the state for 17.5 mgd, which provides potable water for the Intercity Water System to serve approximately 300,000 people in more than 60 communities in southern Illinois. Recent discussions with the District and other entities indicate an interest in obtaining an additional water supply contract (about 25 mgd) from the state to enable serving one coal mine-to-mouth power plant in the area. If this power plant is constructed, more than 60% of the reservoir's yield will be assigned under contract. Other users of the this multi-purpose lake have expressed concern about the potential negative impacts of further water allocations from this federal reservoir.

Groundwater Quantity Management and Regulation

Groundwater quantity management and regulation was reviewed extensively by a subcommittee of the State Water Plan Task Force in 1989. Based on their recommendations, draft legislation was introduced in 1989 and 1990, generating significant debate and issue resolution but ultimately failing when the Farm Bureau and Municipal League mutually agreed to remove their support. The issue was taken up again in 1996 with the C-2000 water law studies. The following issues were identified by both the Water Plan Task Force subcommittee and the C-2000 water law consultant:

1) Current state law (Water Use Act of 1983 and the Water Authorities Act) does not provide for adequate or proper management of groundwater developments in Illinois.

2) Resolving well interference is a major issue in groundwater resource development. Interference occurs when the development of a high capacity well negatively impacts on the operation of a nearby smaller well, generally one in use by a rural household. This issue is discussed in the following section.

3) Political aspects of competition among and between urban and rural users of groundwater. This issue arose during the drought of 1988 and 1989 between irrigators and rural home owners in Kankakee County, and between municipalities and the newly formed water authorities created to protect rural use of the Mahomet aquifer.

4) The level of government that should have the ultimate power to regulate groundwater resources. Rural areas and agricultural interests support local control based on their position that state government would favor municipal and industrial users over rural users.

The State Water Plan Task Force favored a locally developed groundwater management and regulatory program that would be implemented on a regional basis with state agency oversight and approval. This approach to groundwater management was also recommended as a legislative option in the ASCE Model Water Code published in 1997. Most recently, interests in Northeastern Illinois such as Lake County, NIPC and the Barrington Area Council of Governments have expressed concern about the inadequacy of current groundwater law to deal with the major groundwater development occurring in the collar counties.

Well Interference

As previously mentioned, one of the major concerns relating to groundwater quantity management is well interference. Whenever a large-capacity well is constructed there is a potential for conflict—perceived or real—with existing, adjacent wells. While impact analyses, as provided for in the Water Use Act of 1983, can determine the magnitude and extent of probable drawdowns, the analyses are not being conducted due to loss of funding.

Even so, available data for impact analyses may not be adequate to determine interference with acceptable certainty. When a well is pumped, water is removed from the aquifer surrounding the well, and the level of the water table or potentiometric surface, depending upon the aquifer type, is lowered. The drawdown at any given point in time and space is the distance the water level is lowered by that pumpage. A drawdown curve graphically displays the variations of drawdown versus distance from the well for a given time, or for a single well over time. In three dimensions, the drawdown curve describes a conical shape known as the cone of depression. The outer limit of the cone of depression defines the area of influence of the well.

Cones of depression differ in size and shape depending upon the pumping rate, length of pumping period, aquifer characteristics, slope of the water table or potentiometric surface, and recharge rate. When the cones of depression of two nearby pumping wells intersect, the wells are said to interfere with each other because of the increased drawdown.

Provided there is adequate information on groundwater levels, aquifer areal extent and thickness, recharge rate, aquifer hydraulic properties, and the locations and withdrawal rates of nearby pumping

wells, hydrologists and geologists can make reasonably accurate estimates of drawdown (interference). To determine the impact of large capacity well(s) on groundwater levels, it may be necessary to install an observation well network and conduct aquifer tests along with an aquifer assessment program.

Compensation to existing (small and large) users impacted by new large users should be part of any future management program. Following are recommendations for four different kinds of conflict.

Large User Versus Small User(s)

According to the Water Use Act of 1983, all new groundwater users with well capacities greater than 100,000 (gpd) shall register their intent to develop a well with the local Soil and Water Conservation District. The District then requests that the Illinois State Water and Geological Surveys conduct an impact analysis of the proposed new use on nearby existing users. The results of this impact analysis are made available to the public.

The greatest drawdown will occur at the well of the large user or at the center of a large user's well field. Thus, small users should have groundwater as long as their pumps are set at the same elevation as the large users. However, wells near aquifer boundaries and in areas where the bottom elevation of the aquifer is higher than at the pumped well may be impacted even though the impacted wells are constructed to take full advantage of the aquifer. The following are recommended procedures for resolving large user/small user(s) conflicts:

- Register intent to develop well,
- Conduct impact analysis,
- Make the analysis available to the public,
- Estimate cost of deepening impacted wells and/or increasing pump settings, and
- Estimate cost of new water wells.

The well developer has the following options:

- Compensate impacted well owners for deepening wells and increased pump settings,
- Pay for locating new water-supply wells, or
- Reduce or cease pumping before significant interference occurs.

When there is more than one large user compensation will be based on the proportionate impact. For example, if User A causes 1/3 of the interference he would be liable for 1/3 of the compensation. Aquifer testing will likely be required to make a reasonable and fair determination of proportional compensation.

Large Users Competing With Each Other

If serious conflicts arise among large users that cannot be resolved through voluntary well construction practices such as well spacing, regulations will need to be imposed to limit total pumpage. If serious conflicts continue, users should be required to develop a plan to minimize well interference and/or seek alternative water supplies. The state could require and approve a plan for conflict resolution between impacted parties.

Irrigator(s) Versus Irrigator(s)

It is assumed for the purpose of the Irrigator(s) versus Irrigator(s) discussion that large user (irrigators) versus small user conflicts are a separate issue.

Irrigation in Illinois is concentrated in Kankakee and Iroquois Counties, the Havana Lowlands (Mason-Tazewell Counties), Green River Lowlands (Lee-Whiteside Counties), and in Lawrence and Crawford Counties along the Wabash River in southeastern Illinois. Irrigation may also be increasing in extreme southern Illinois along the Ohio and Cache Rivers. Most of these are areas where sandy soils are underlain by productive sand and gravel aquifers, except for the Kankakee-Iroquois County area which is underlain by a fractured carbonate aquifer.

Irrigator(s) versus irrigator(s) conflicts may arise when it is perceived that water levels are declining because of over-pumpage and/or well-yields are declining. Conflicts may also arise when irrigation wells are in close proximity. With the exception of the Kankakee-Iroquois County conflicts that arose during the drought of 1988-89, it is not known if irrigation withdrawals have caused significant water-level and/or well-yield declines. Studies by the ISWS in the Havana and Green River Lowlands document that groundwater levels are lowered during the summer irrigation season but, historically, have recovered during the winter and spring. However, as irrigation grows and if a persistent drought were to occur (i.e., multiple-year length), conflicts are likely to occur. In addition, irrigation withdrawals are not reported and the locations of irrigation systems across Illinois (especially outside of the Havana Lowlands) are not documented. For counties with water use emergency status or groundwater management authority, it is recommended that, at a minimum, all large users do the following:

- Provide access ports for groundwater-level measurements,
- Meter or make a reasonable accurate estimate of daily pumpage,
- Be prepared to set up well pump discharge for controlled pumping tests.

The state, whether or not new groundwater legislation is passed, should do the following:

- Measure static water levels at 5-year intervals or less,
- Annually compare potential aquifer yields with irrigation pumpage,
- Assist irrigators in conducting pumping tests to determine well and pump efficiency,
- Recommend well spacing for new wells to minimize interference.
- Continue research on aquifer assessment and irrigation-related topics.

Small Users Competing With Each Other

Closely spaced wells which supply individual households and tap one aquifer with limited yield may experience critical drawdowns. This is a symptom of woefully inadequate supply rather than use conflicts. Attention should be directed to developing new sources of supply.

Instream Flow Needs

While various efforts have been made, Illinois has had a problem protecting non-consumptive uses of streams, i.e. for recreation and aquatic life. Recognizing that unique and sensitive resources deserve more than minimal protection, the state's Instream Flow Protection Committee suggested in 1991 that rivers be categorized by their best uses. One legislative recommendation was that protected instream flow levels be set individually for each stream determined to be a Unique Resource River. The flow levels should be set for the use requiring the highest flow, and protected levels should retain the variation of a natural hydrograph.

In 1995 the State Protected Streams Work Group of the State Water Plan Task Force explored "options to protect the unique flora, fauna, and biological diversity specially catalogued for certain stream segments in Illinois." In their *Report on State Protected Streams*" they selected three natural resource inventories as containing the primary factual basis for identifying stream segments as protected streams: natural areas inventory, threatened and endangered species, and biological stream characterization (BSC) "A" streams. They chose nine criteria to evaluate injury that must be prevented to preserve protected streams:

Hydrologic – preserve low flows
Free flowing – no impoundments
Sediment/water – preserve equilibrium
Hydraulic geometry – maintain characteristic width, depth, and velocity
Sinuosity – maintain characteristics
Riparian vegetation – maintain stream corridor
Non-native species – do not introduce
Habitat quality index – maintain
No degradation of water quality.

Existing regulations generally do not consider these criteria and stream channelization, riparian corridor clearing, and water withdrawals receive little or no regulation. Some voluntary programs are potentially effective, but resources devoted to them are small, leaving most stream reaches without full legal protection for a long time.

Recently, in revisions to the Anti-degradation Rules, Section 106.995 states that the Pollution Control Board may designate a water body or water body segment as an Outstanding Resource Water and list it in Ill. Adm. Code 303.206 if it finds that the water body or water body segment is of uniquely high biological or recreational quality; and if the benefits of protection from degradation outweigh the benefits of lost economic or social opportunities. Because of the complexity of the issue, and the requirement to demonstrate lost economic and social opportunities, it is unlikely that this provision will be utilized in the future, or if so for only small segments of selected water bodies.

Appendix II
ONGOING WATER QUANTITY ASSESSMENT ACTIVITIES

The following activities, being conducted at the Illinois Scientific Surveys, represent only a fraction of the work that needs to be done.

Surface Water

- Assessing streamflow and water-use records as a basis for developing regional models that can be used to estimate long-term characteristics of streamflow frequency on ungaged streams throughout the region.
- Developing a database of lake-sedimentation studies and lake surveys as a first step to more fully document and assess water storage in reservoirs.
- Installed lake-level gages at additional public water supply lakes to gather data for lake-water budget studies and to monitor water supplies during drought conditions.
- Developing a large-scale hydrologic model for the Illinois River basin to help address the impacts of land-use and climate changes on the future availability of surface water resources in Illinois.
- Developing advanced dredging technologies to increase reservoir storage, improve river transportation, and enhance habitat.

Groundwater

- Adding water-well records to digital databases.
- Updating and improving databases on aquifer hydraulic properties, water withdrawals, and groundwater quality and making the data accessible to other agencies through the Internet.
- Mapping glacial deposits (in 21 USGS 1:24,000 scale quadrangles) in northeastern Illinois and the St. Louis Metro East area to delineate aquifers and their vulnerability to contamination.
- Helping water-short communities locate potential groundwater sources using surface geophysical surveys.
- Collecting groundwater samples to examine the occurrence of arsenic in private and public, non-community wells and to explore possible geochemical conditions controlling arsenic solution.
- Assessing water availability in Kane County (a 5-year study initiated in May 2002) via detailed mapping, aquifer characterization, and surface water evaluation.
- Inventorying shallow dolomite wells in northeastern Illinois and measuring groundwater levels in them.
- Developing regional models of the deep bedrock aquifer system in northern Illinois and the Mahomet aquifer system in east-central Illinois. Regional models simulate regional groundwater-flow patterns, regional groundwater availability, and provide estimates of the impacts of major groundwater withdrawals.
- Updating the 1984 Major Aquifer Map to include information obtained since it was produced.
- Determining groundwater resources availability for peaker power plants as requested by utility companies.

- Recently completed a study of the groundwater geology of DeWitt, Piatt, and Northern Macon Counties.
- A statewide monitoring network is in place to evaluate pesticide contamination.
- Supporting studies of arsenic in groundwater, including the development of highly sensitive and specific analytical techniques to better understand the extent and nature of this natural contaminant.
- Have determined the water quality and agrichemical loading in two groundwater basins of Illinois' sinkhole plain.
- Determining the effect of urban growth on groundwater quality in McHenry County, based on a chemical and isotopic assessment
- Have identified the source of sulfate in monitoring wells near paper/pulp waste water lagoons.
- Determining the age of groundwater that is recharging the Mahomet Aquifer using geochemical techniques.

Environmental Issues Affecting Availability

- Collecting and analyzing data that can be used to quantify variability and change in the state and regional water cycle.
- Conducting diagnostic studies of global climate models and developing a regional climate model.
- Conducting studies on aquatic threatened and endangered species and their habitat needs, including water flow.
- Conducting environmental risk assessment investigations due to water and sediment contamination in several locations throughout Illinois in order to design restoration strategies.

Water Conservation and Treatment

- Developing and implementing water reuse and conservation technologies in many types of manufacturing - computer boards, machinery, metal finishing, food processing, chemical manufacturing, printing, etc.
- Developing advanced separations technologies for drinking water purification.

These activities, while extensive, are not part of a cohesive and coordinated water quantity program or water quantity planning process. This list illustrates the key characteristics of water-quantity planning and management historically in Illinois: diverse constituent interests and great momentum in a fragmented and decentralized system. These characteristics have resulted in a lack of sustained support for change.

The pressure for an alternate approach to attack looming water quantity issues in Illinois is clearly spelled out in Executive Order Number 5, which explicitly recognizes the need to establish a statewide, integrated groundwater and surface water program. The process for developing this part of the water quantity program will at a minimum require an assessment of:

- Surface water resources availability on a watershed basis;
- Groundwater resource availability on a regional aquifer basis;
- Water demand to 2050;
- The potential for statewide delineation of surface and groundwater resource availability on a combined watershed/aquifer basis, taking into account geographical features and inter-basin transfers;

- The potential for statewide regional delineations based on existing factors, such as policy, programs, and political subdivisions, among other things.
- Regional and temporal variations in water availability based on evaluation of historical records, current conditions, and projection of surface water and groundwater conditions.

Appendix III
STATE INVOLVEMENT IN WATER QUANTITY ISSUES

Interagency Coordinating Committee on Groundwater

The Illinois Groundwater Protection Act (IGPA) created the Interagency Coordinating Committee on Groundwater (ICCG). Chaired by the director of the Illinois Environmental Protection Agency (or designee), the Committee has members from nine state agencies/departments:

- Environmental Protection Agency - (Chair)
- Department of Natural Resources
  - < Office of Water Resources
  - < Office of Mines and Minerals
  - < Illinois State Geological Survey
  - < Illinois State Water Survey
  - < Office of Realty and Environmental Planning
- Department of Public Health
- Office of the Fire Marshall
- Department of Agriculture
- Emergency Management Agency
- Department of Commerce and Community Affairs
- Department of Nuclear Safety
- Illinois Department of Transportation's Division of Highways

The ICCG has held quarterly meetings since 1988 to address groundwater protection issues. The ICCG is required to:

- Review and coordinate the state's policy on groundwater protection;
- Review and evaluate state laws, regulations, and procedures that relate to groundwater protection. [Surface water is hydraulically linked and relates to the protection of groundwater and vice versa];
- Review and evaluate the status of the state's efforts to improve groundwater quality and enforce groundwater protection laws, and make recommendations for improving these efforts;
- Recommend procedures for better coordination among state groundwater programs and with local programs related to groundwater protection;
- Review and recommend procedures to coordinate the state's response to specific incidents of groundwater pollution and coordinate dissemination of information among agencies responsible for the state's response;
- Make recommendations for and prioritize the state's groundwater research needs;

- Review, coordinate and evaluate groundwater data collection and analysis;
- Beginning on January 1, 1990, report biennially to the Governor and the General Assembly on groundwater quality, quantity, and the state's enforcement efforts.

The Chairman of the ICCG is required to propose a groundwater protection regulatory agenda for consideration by the Committee and the Groundwater Advisory Council (GAC). The principal purpose of the agenda is to systematically consider the groundwater protection aspects of relevant federal and state regulatory programs and to identify any areas where improvements may be warranted. To the extent feasible, the agenda also serves to facilitate a more uniform and coordinated approach toward protection of groundwater in Illinois. Upon adoption of the final agenda by the ICCG, the Chairman of the ICCG assigns a lead agency and any support agencies to prepare a regulatory assessment report for each item on the agenda. Each such report specifies the nature of the groundwater protection provisions being implemented and evaluates the results achieved. Special attention is given to any preventive measures being utilized. After review and consideration by the ICCG, the reports become the basis for recommending further legislative or regulatory action.

Moreover, since January 1, 1992, the ICCG has been required to provide a comprehensive status report to the Governor and the General Assembly concerning implementation of the IGPA. The ICCG is further required to consider findings and recommendations that are provided by the GAC, and to respond in writing regarding these recommendations. The Chairman of the ICCG is required to designate a liaison person to serve as a facilitator of communications with the GAC. (See http://www.epa.state.il.us/water/groundwater/groundwater-protection/index.html)

Groundwater Advisory Council

The GAC is composed of nine public members appointed by the Governor, including two persons representing environmental interests, two persons representing industrial and commercial interests, one person representing agricultural interests, one person representing local government interests, one person representing a regional planning agency, one person representing public water supplies, and one person representing the water well drilling industry. The GAC is required to:

- Review, evaluate, and make recommendations regarding state laws, regulations and procedures that relate to groundwater protection;
- Review, evaluate, and make recommendations regarding the state's efforts to implement the IGPA and to generally protect the groundwater of the state;
- Make recommendations relating to the state's needs for groundwater research; and
- Review, evaluate, and make recommendations regarding groundwater data collection and analyses.

The current members are:

- Bill Compton (Chair), Caterpillar
- Dennis Duffield, Director of Public Works, City of Joliet
- Jack Norman, Sierra Club.
- Dr. George Czapar, Coordinator – Illinois Council on Agricultural Best Management Practices
- Dennis Dreher, Northeastern Illinois Planning Commission

- Robert J. Millar, Industry Consultant
- Paul McNamara, Southwestern Metropolitan Planning Commission
- John D. Liberg, Illinois Association of Groundwater Professionals
- Robert C. Kohlhase, Farnsworth and Wylie

Priority Groundwater Protection Planning Regions and Committees

The Illinois EPA was required to establish a regional groundwater protection planning program. Since 1991 the Illinois EPA, in cooperation with IDNR, has designated four priority groundwater protection planning regions. These regional designations took into account the location of recharge areas that were identified and mapped by the State Geological Survey. Further, the IEPA director establishes a regional planning committee for each priority groundwater protection planning region. Each regional planning committee is responsible for the following:

- Identifying and advocating for region-specific groundwater protection matters;
- Monitoring and reporting the progress made within the region regarding implementation of protection for groundwater;
- Maintaining a registry of instances where the Agency has issued an advisory of groundwater contamination hazard within the region;
- Facilitating informational and educational activities relating to groundwater protection within the region; and
- Recommending to the Agency whether there is a need for regional protection pursuant to regulated recharge area.

State Water Plan Task Force

The State Water Plan Task Force is an interagency group composed of management level representatives from seven state resource agencies, the University of Illinois, and the Governor's Office. The task force has met on a quarterly basis since 1980 and held its 100th meeting in February 1999. Over the course of its existence, the task force has published the State Water Plan (in 1984) and 28 reports from 19 special work groups. As a result of these efforts, initiatives were undertaken for the comprehensive management of the Illinois River system, the Mahomet Aquifer system, statewide drought response, groundwater quantity management programs, instream flow protection management and research, water and sediment measuring networks, among others. The state's policy for groundwater quality protection that was adopted in the IGPA was drafted by a work group of the State Water Plan Task Force.

The task force is chaired by the director of the IDNR Office of Water Resources and is supported by technical staff of the various member agencies as well as the Scientific Surveys. It was initially funded by a federal grant but since 1984 has been a voluntary effort by the member agencies. It serves at the pleasure of the current administration and does not have any specific statutory origin other than the water planning and conflict resolution powers assigned to the Office of Water Resources under 20 ILCS 801/5-10 (a)-(e). These powers deal with research and data collection, conflict resolution and

equitable reconciliations, and making recommendations for legislation to better manage the state's water resources.

Drought Response Task Force

The State's Drought Response Task Force was first organized in 1983 under a recommendation of the Illinois State Water Plan Task Force. The Drought Task Force is co-chaired by the Director of the IDNR Office of Water Resources and the head of the Public Water Supply Section of the IEPA. Other members include the Department of Agriculture, Department of Commerce and Community Affairs, Emergency Management Agency, State Water Survey, IDNR Division of Fisheries, and the Office of the Governor. The task force does not have any specific statutory powers or authorities other than those of its member agencies, and participation is based on the voluntary cooperation of its member agencies. It has been activated eight times, most recently during a six-month period in August 1999.

Each task force agency has technical expertise and capabilities in specific areas of drought management, including in-depth knowledge of statewide rainfall distribution on a daily basis, soil moisture, streamflow, reservoir levels, evaluation of alternative water supply sources for both emergency and long-range uses, installation of emergency pumping and piping equipment, water sanitation and quality considerations, graduated water conservation practices, aquatic habitat impact assessment, and methods of financing alternative water supplies.

Current Statutory Authorities for Managing Water Supply Developments

Water developers may face several regulatory measures that constrain development of the state's water supplies, primarily federal and state controls that protect navigation and the environment. These measures, particularly at the federal level, can be regulations that directly require permits for development, or they can be indirect requirements that effectively control permitting under the regulatory programs.

Water Supply Protection through Federal Regulatory Programs

The three primary federal licensing procedures applicable to water resource development are the Federal Power Act, the Rivers and Harbors Act of 1899, and the dredge and fill permit program under the Clean Water Act.

Federal Power Act

The Federal Power Act (FPA) includes a licensing provision for water power development projects in the navigable waters of the U.S. and certain other projects such as those that utilize the surplus water or water power from any federal dam. The Act is administered by the Federal Energy Regulatory Commission (FERC).

FPA requires that any power project given authorization must be the one best adapted to a comprehensive development plan, not just for power development but also for other beneficial public uses, including recreational purposes. This means that FERC licensing proceedings provide a forum for

balancing opposing interests regarding the use of a particular stream. A basic aspect of this balancing process is an accommodation between developmental and preservationist interests.

While state participation is possible, a state cannot dictate the outcome of such proceedings or require compliance with state regulations. In 1946 the U.S. Supreme Court ruled that granting states a veto power over proposed projects would destroy the effectiveness of the federal control program.

Rivers and Harbors Act of 1899

The Rivers and Harbors Act of 1899 (RHA) provides authority for the Corps of Engineers (COE) to exercise control over construction in navigable waters. The original objective was to protect navigation and navigable capacity, but the program has been expanded to include environmental protection as well. RHA, therefore, provides a potential basis for consideration of minimum flow needs.

RHA applies to "navigable waters" as traditionally defined by the federal courts. Included in COE's current definition are "those waters that are subject to the ebb and flow of the tide and/or are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce." The definition has been extended to artificial waters subject to tidal action, natural waters that can be made navigable by means of improvements, and non-navigable tributaries that affect the navigable capacity of a navigable mainstream. Regulatory jurisdiction under RHA for rivers and lakes generally extends to the entire water surface and bed up to the high water mark.

Clean Water Act Dredge and Fill Permit Program

Section 404 of the Clean Water Act (CWA) gives COE authority to regulate dredge and fill activities in navigable waters. However, the term navigable waters as used in CWA is defined as "the waters of the United States, including the territorial seas." The definition is not limited to waters with physical suitability for navigation and is, therefore, broader than the traditional definition employed under RHA. COE has defined its regulatory jurisdiction under CWA to include coastal waters, waters suitable for use in interstate or foreign commerce and their tributaries, interstate waters and their tributaries, and other waters whose degradation or destruction could affect interstate commerce.

A broad range of activities that modify natural water conditions is covered by this program. Dredged material is defined as material that is excavated or dredged from waters of the United States. Fill material is any material used for the primary purpose of replacing an aquatic area with dry land or changing the bottom elevation of a water body.

The dredge and fill permit program potentially applies to all the nation's waterways and encompasses essentially all types of dredge and fill activities. Not all such projects require an individual permit. Provision is made for issuance of general permits on a nationwide and regional basis for activities that cause only minimal individual and cumulative environmental impact or where needed to avoid unnecessary duplication of regulatory control. Nationwide permits are published as part of general Department of the Army regulations while regional permits can be issued by individual COE division or district engineers according to prescribed procedures.

Water Resource Protection Provided Through Special Provisions to the Issuance of Federal Permits

The federal government has often imposed provisions before issuing the permits discussed above. Those discussed below may be applied for the protection and management of water supply sources.

National Environmental Policy Act

The National Environmental Policy Act (NEPA) requires federal agencies to consider the environmental consequences of their decisions, primarily through environmental impact statements (EIS). An EIS is required for every recommendation or report on proposals for legislation or other major federal actions that could significantly affecting the quality of the human environment. These include activities directly carried out by federal agencies, activities receiving federal funding,, and federally licensed activities. The initial determination of what constitutes a major federal action significantly affecting the quality of the human environment is made by the individual agency responsible for the activity in question, with such determinations subject to judicial review.

The decision-making agency must distribute draft environmental impact statements to interested parties relatively early in their decision process. In this way, it can consider outside comments and recommendation before formulating a final position on the proposed action. Thus, state agencies and other parties interested in protecting water resources have a forum for raising concerns and making recommendations about water developments.

Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act (FWCA) establishes the policy that wildlife conservation receive equal consideration and be coordinated with other aspects of water resources development.

Any federal agency or federal licensee proposing to modify a natural body of water must consult with the U.S. Fish and Wildlife Service and the wildlife management agency of the state involved. Resulting recommendations of the Fish and Wildlife Service and appropriate state agencies are required to be made part of the project proposal. FWCA does not establish an absolute procedure for the veto of a water development project by fish and wildlife agencies but the Act does provides a mechanism for identifying and considering the adverse effects within the project evaluation process.

Endangered Species Act

The Endangered Species Act (ESA) protects plant and animal species facing possible extinction. The Act prohibits direct harm to designated species and commercial activities associated with such species, and contains protective measures for ecosystems upon which such species depend. The protective provisions are limited to species specially designated under procedures established by the Act.

“Each Federal agency shall, in consultation with and with the assistance of the Secretary (of the Interior, Commerce or Agriculture), insure that any action authorized, funded, or carried out by such agency... does not jeopardize the continued existence of any endangered species or threatened species

or result in the destruction or adverse modification of habitat of such specie which is determined.., to be critical, unless such agency has been granted an exemption by the (Endangered Species) Committee..."

Since creation of the above exemption mechanism (in 1978), ESA's prohibition of destruction of the critical habitat of designated species is not absolute. The existence of an endangered species within the area of influence of a proposed project, however, remains a major impediment to the project's approval. While the ESA cannot be relied upon to provide systematic protection of water supply sources, it can provide protection wherever endangered species that require water-dependent habitat exist.

Federal Deference to State Views on Permit Issuance

In general, the federal government has voluntarily decided to give substantial weight to state views regarding approval of water development projects. Two provisions are particularly relevant: 1) the general Corps of Engineers (COE) regulatory procedures that incorporate state views to a substantial extent, and 2) a mechanism in the federal Clean Water Act that allows state veto of federal licenses in certain situations.

COE permits generally will be issued in cases of a favorable state review, provided federal concerns as reflected in relevant statutes and regulations have been "followed and considered." Permits for activities endorsed by a state would be denied only in the case of "overriding national factors of the public interest that may be revealed during the processing of the permit application.. . ." The COE permit will not be issued where required state or local approvals have been denied prior to final action on the COE permit application. In addition, COE conditions its permit on a positive expression of overall state consent.

The water quality certification provision of Section 401 of the Clean Water Act A provides the other advantage to state water rights. Section 401 requires certain applicants for federal licenses to provide the licensing agency with certification from the state that the activity will be consistent with specified sections of the act. The requested license cannot be granted without such certification if the provision applies. The scope of the provision encompasses ".. . any activity including, but not limited to, the construction or operation of facilities, which may result in any discharge into the navigable waters...." This language has been interpreted broadly to include not only waste disposal operations but also such activities as dam operation and excavation within navigable waters. When combined with the broad definition of 'navigable waters' used in the Clean Water Act, the range of activities covered is considerable.

The provision indicates that approval or denial of a certification is to be based on a determination of consistency with Sections 301,302, 303, 306 and 307 of CWA. These sections prescribe effluent and stream standards, the basic mechanisms for water quality control. While minimum flow is not directly addressed, water withdrawal can be addressed by recognizing the relationship between water withdrawal and water quality. A primary relationship arises from the water quality impacts of withdrawal facility construction. In fact, construction activity is essential to activating the certification process since water withdrawal alone does not require a federal permit to which the certification process could attach. Once the certification process is activated by the need for a federal permit, however, a

state apparently is free to consider the direct impacts of the water withdrawal as a factor in its decision to grant certification. The resulting reduction in streamflow may have the potential to violate stream standards or displace designated uses of the body of water in question, leading the state to deny certification.

The 401 certification process, therefore, appears to be a significant mechanism for protecting surface water sources even though this intent is not explicitly stated in the Clean Water Act. The federal government has also attempted to avoid displacement of a state's water allocation program by means of any federal pollution control activities. The primary limitation of the certification process appears to be its lack of applicability to water diversion not involving construction or disturbance within a body of water and, therefore, not requiring a federal license. Nevertheless, the process provides substantial authority for state action to protect minimum flows in a substantial range of situations. State flexibility has been promoted by court decisions holding that state certification decisions can only be reviewed in state courts and not federal courts or administrative agencies.

Use of State Controls Over Water Development to Achieve Protection Within the States' Public Waters

IDNR has full and complete jurisdiction over the public waters of the State of Illinois pursuant to "An Act in relation to the regulation of the rivers, lakes and streams of the State of Illinois." Under this legislation the department has a duty to supervise every use of public waters to protect navigation, aquatic life, and other instream public uses and to insure the natural conditions of public waters are not improperly changed to the detriment of these public uses. There are over 33,000 miles of rivers and stream in Illinois of which 7.5% (2,500 miles) are legally classified as public waters. Major public waters include the Illinois, Rock, Kankakee, and Fox rivers and the lower reaches of the Sangamon and Kaskaskia rivers.

Under the "Rivers, Lakes and Streams Act" the terms "public waters" or "public bodies of water" are defined as follows:

> "Wherever the terms public waters or public bodies of water are used or referred to in this Act, they mean all open public streams and lakes capable of being navigated by water craft, in whole or in part, for commercial uses and purposes, and all lakes, rivers and streams which in their natural condition were capable of being improved and made navigable, or that are connected with or discharged their waters into navigable lakes or rivers within, or upon the borders of the State of Illinois, together with all bayous, sloughs, backwaters, and submerged lands that are open to the main channel or body of water and directly accessible thereto."

The Department is authorized under the Rivers, Lakes and Streams Act to do the following:

> "It shall be the duty of the Department of Natural Resources to have a general supervision of every body of water within the State of Illinois, wherein the State or the people of the State have any rights or interests, whether the same be lakes or rivers, and at all times to exercise a vigilant care to see that none of said bodies of water are encroached upon or wrongfully seized or used by any private interest in any way, except as may be provided by law and then only

after permission shall be given by said department, and from time to time for that purpose to make accurate surveys of the shores of said lakes and rivers and to jealously guard the same in order that the true and natural conditions thereof may not be wrongfully and improperly changed to the detriment and injury of the State of Illinois.

"The Department of Natural Resources shall have power and authority to inquire into encroachments upon, wrongful invasion and private use of every stream, river, lake or other body of water in which the State of Illinois has any right or interests. The department shall have power to make an enforce such orders as will secure every stream, river, lake or other body of water, in which the State of Illinois has any right or interest against encroachment, wrongful seizure or private use.

"Said Department of Natural Resources shall, for the purpose of protecting the rights and interests of the State of Illinois, or the citizens of the State of Illinois, have full and complete jurisdiction of every public body of water in the State of Illinois, subject only to the paramount authority of the Government of the United States with reference to the navigation of such stream or streams, and the laws of Illinois, but nothing in this Act contained shall be construed or held to be any impairment whatsoever of the rights of the citizens of the State of Illinois to fully and in a proper manner enjoy the use of any and all of the public waters of the State of Illinois, and the jurisdiction of said Department of Natural Resources shall be deemed to be for the purpose of protecting the rights of the people of the State in the full and free enjoyment of all such bodies of water, and for the purpose of preventing unlawful and improper encroachment upon the same, or impairment of the rights of the people with reference thereto, and every proper use which the people may make of the public rivers and streams and lakes of the State of Illinois shall be aided, assisted, encouraged and protected by the Department of Natural Resources."

Under these authorities the Department presently requires permits for all dams, fills, or other permanent structures that are placed or constructed in the public waters. Permits are not required for water withdrawal if a permanent structure is not proposed as part of the withdrawal activity. Permits for withdrawal structures contain as a minimum a special condition to protect minimum stream flows, including a statement that withdrawals will be limited or prohibited during periods of low flow if necessary to prevent adverse effects on navigation and other public uses.

Lake Michigan Allocations

Pursuant to state law and a United States Supreme Court Decree, the Department of Natural Resources, Office of Water Resources, is responsible for allocating Lake Michigan water. Currently, 201 public water supply systems serving approximately 6.8 million northeastern Illinois residents have an allocation permit from the Department.

Allocations from Federal Reservoirs

The Illinois Department of Natural Resources is responsible for contracting with water users for portions of the states' previously acquired interest in several federal reservoirs. The reservoirs are Lake Shelbyville, Carlyle Lake, and Rend Lake.

Management of Groundwater Withdrawals

Through the Water Use Act of 1983 the General Assembly has declared it to be in the public interest to better manage and conserve water, and to provide for public notice of planned substantial (over 100,000 gpd) withdrawals of groundwater from new points of withdrawal before water is withdrawn.

The general purpose and intent of the Act was to establish a means of reviewing water conflicts before damage to any person is incurred, and to establish a rule for mitigating water shortage conflicts. The Act gives authority to county Soil and Water Conservation Districts (SWCD's) to receive notice of incoming substantial users of water and establishes a reasonable use rule for groundwater withdrawals. It also requires the SWCD to review, with help from the ISGS and ISWS, potential impacts of withdrawals within 30 days and to make the reports public.

In 1987, the Act was amended to add a section dealing with "groundwater emergency restrictions." The amendment provided authority to four county SWCD's (Kankakee, Iroquois, Tazewell and McLean) to recommend to the Department of Agriculture restrictions on groundwater withdrawal and required existing points of withdrawal that are capable of producing more than 100,000 gpd of water to be registered. The amendment also established a procedure for individuals to file complaints with the SWCD when a point of withdrawal fails to furnish its normal supply of water due to a substantial lowering of the groundwater level in the area.

Appendix IV
A DRAFT STRATEGIC PLAN FOR WATER QUANTITY PLANNING AND MANAGEMENT

The residents of Illinois will have a secure, adequate, and reliable supply of clean water at reasonable cost. This will be accomplished through statewide oversight of regional water quantity planning and management based on watersheds and aquifers. Regional planning will be conducted with input from professional scientists in close cooperation with local and county officials, constituents, and the public. Science-based regional planning will be the foundation for regional water quantity management.

GOAL

Establish a water quantity planning and management group to develop by March 1, 2003 a strategic plan for water quantity planning and management in Illinois. The plan shall include:

- Delineation of major aquifers and watersheds to form the basis for regional water quantity planning and management;
- Guidelines for the appropriate geographical resolution and accuracy of data sets, maps, and models for regional planning;
- Composition of regional planning teams;
- Authorities and responsibilities for the regional teams and for their interactions with local, county, and state officials;
- Mechanisms of integrating watershed and aquifer planning;
- An institutional framework for state oversight and default planning and appropriate state authorities and responsibilities;
- Mechanism for public input to the planning process and review of the products; and
- An estimate of financial and human resources needed for water quantity planning and management on a continuing basis.

STRATEGIES

- Establish avenues of communication with stakeholders statewide.
- Build a statewide consensus for water resources planning.
- Emphasize the need for sound science.
- Emphasize the need for long-range water resources planning (20 to 50 years).
- Consider conjunctive use of ground and surface water, and water conservation and reuse.
- Draw on the data and information available through a Decision Support System.
- Identify gaps in critical scientific information and emphasize the need to fill them.
- Express uncertainties, risk, and costs in the evaluation of water-supply options, etc.

AGENDA

FY 2003

1. By March 1, 2003 formally establish an interim water quantity planning and management process and develop a draft strategic plan for water quantity planning and management statewide.

It will be necessary for the administration and/or the legislature to require the establishment of an interim water quantity planning and management process. The first step in that process should be the development of a strategic plan for water quantity planning and management. The steps outlined hereafter begin to develop an outline for such a process. It is neither complete nor set in concrete. The intent is to demonstrate that strategic planning offers a suitable framework for water quantity planning and management in Illinois. The purpose of strategic planning is to establish a process in which diverse constituencies can participate to establish a common vision, goals, objectives, strategies, and identify data and resource needs. Establishing a water quantity plan should be the first step toward improved water quantity management.

2. By April 1, 2003 provide agency and public review of the draft strategic plan for water quantity planning and management, modify as necessary, develop an implementation plan, seek necessary funding, and begin implementation on July 1, 2003.

It is critical that any plan for establishment of an interim water quantity planning and management process have broad review by state and municipal governments, water suppliers, and water users. It is also critical that the process of collecting updated information about water supply, use, and demand (as described below) begin as soon as possible.

FY 2004

3. Strengthen the scientific basis for planning and management by funding needed scientific studies that answer the following questions:

A. How much water is potentially available from known sources and how well are they characterized?
B. How much water will be available in the future?
C. How much water do we withdraw, use, and lose?
D. ***What are the impacts of water withdrawals?***
E. ***How much water will be needed in the future?***
F. ***To what extent can our existing water supply and distribution systems meet additional demand?***
G. ***What are the options for increasing water supply and /or decreasing demand and where are suitable locations for water intakes?***
H. ***How can pricing/economics change demand?***

The hydrologic cycle provides a suitable scientific framework for studying the interactions among, for example, precipitation, streamflow, reservoir storage, soil moisture, aquifer potential yield, and

groundwater levels, all of which vary over time. For water quantity planningpurposes we recommend 2050 as a target year for supply/demand projections and recommend that 1 in 50 year, 1 in 100 year, and worst-case droughts and their potential impacts be addressed. These risk assessments will provide a basis for risk management.

A. How much water is potentially available from known sources and how well are they characterized?

A1. Use existing maps of the distribution and character of aquifers and available information on groundwater withdrawals to estimate known groundwater resources.

Data collection: compile existing statewide, regional, and local aquifer maps and data on aquifer properties, groundwater withdrawals, and groundwater resource potential.

Data analysis: develop groundwater resource estimates based on available mapping, known aquifer properties, and present climate conditions.

A2. Produce improved estimates of lake and reservoir evaporation by undertaking a monitoring program on 7 lakes and/or reservoirs across the state.

Data collection: install monitoring equipment at the water surface of 7 geographically dispersed reservoirs across the state to measure parameters needed to calculate evaporation from the lake surface.

Data analysis: compute water surface evaporation, compare to data collected a pan evaporation stations and determine validity of correlations, project long term evaporation potential for reservoir drought yield analyses.

A3. Assess regional surface water availability by completing a statewide development of regional models that assess streamflow frequency and estimate drought streamflows for ungaged sites.

Data collection: measure low flow at locations throughout the state; establish stream gages at critical locations for regional assessment.

Data analysis: develop low flow frequency analysis; assess surface and groundwater interactions.

A4. Evaluate the potential for increased withdrawals from existing and potential surface water bodies.

Data collection: compile available information on existing surface water bodies, present rates of withdrawal, and potential reservoir sites.

Data analysis: develop estimates of potential maximum withdrawals from existing surface water bodies and potential reservoirs under present climate conditions.

A5. Determine groundwater availability. Develop working models to a) accurately simulate aquifer hydraulic heads; b) estimate aquifer sustainable yields; c) evaluate impacts of withdrawals on surface water resources; and d) evaluate options for aquifer development and protection.

Data collection: compile available geologic records; collect additional geologic data where available data are sparse or uncertain, including borehole geology and geophysical data; measure hydraulic heads (water level elevations) at many locations within an aquifer and over a relatively short time periods; measure hydraulic heads at selected locations within an aquifer many times over long time periods; estimate, in the field, leakage to and from adjacent surface water bodies under normal and drought conditions; sample and analyze water for selected chemical constituents (e.g., chloride,

arsenic, radium); collect data on elevations of streambed and stage; collect data on streambed and streambank leakance.

Data analysis: spatially characterize the physical properties (shape, thickness) of aquifers; spatially characterize the hydraulic properties of the aquifers; create maps of aquifers and adjacent units at appropriate scales; create potentiometric surface maps of aquifers at appropriate scales; spatially characterize groundwater recharge rates under normal climate conditions; create and calibrate groundwater flow models of the state's major aquifers; evaluate the impacts of aquifer development on surface water resources; determine impacts of withdrawals on quality and quantity of groundwater resources.

B. How much water will be available in the future?

B1. Analyze direct and indirect climate data (tree rings, lake sediments, etc.), and documents produced during the early phases of European settlement to improve the estimates of the long-term risks of droughts.

Data collection: obtain written records of 19th Century severe climate events, climate proxy data, and early instrumental records for Illinois.

Data analysis: develop climate reconstructions from these records regarding the severity, extent, and frequency of past severe droughts.

B2. Establish the probability of future droughts by using a regional climate model to simulate precipitation at a 30km grid scale and by conducting diagnostic studies of a number of global circulation models.

Data collection: obtain data from global climate model simulations of future climate.

Data analysis: perform high resolution climate simulations of the future climate using the regional climate model; conduct diagnostic studies of the global climate model outputs for the Midwest; and analyze the model outputs to identify the frequency, severity, and characteristics of future drought episodes.

B3. Produce improved statewide estimates of climate variables important to water availability and drought management (e.g. temperature, precipitation, and soil moisture) by installing 12 additional Illinois Climate Network stations.

Data collection: measure relevant climate variables at 12 additional ICN stations.

Data analysis: determine the spatial and temporal variability of climate variables as they affect water variability and for use in drought management.

B4. Estimate sustainable yields from surface waters under variable climate and land use conditions using watershed and reservoir models.

Data collection: monitor inflows to reservoirs, precipitation, lake evaporation, soil moisture, and lake levels for model calibration; establish stream gages that directly address water availability for public water supplies; conduct sedimentation surveys for water-supply lakes at regular intervals.

Data analysis: develop watershed hydrologic models and water budget (precipitation -inflow-reservoir response) models for public water supplies; investigate scenarios of drought and alternate land use and climate patterns.

B5. Evaluate impacts of possible climate change, particularly long-term droughts, on sustainable aquifer yields.

Data collection: assemble precipitation estimates for long-term drought conditions; improve groundwater observation well network and correlate observed levels with present climatic conditions.

Data analysis: spatially characterize groundwater recharge rates under specified drought conditions; use revised recharge estimates as input to calibrated regional groundwater models.

C. How much water do we withdraw, use, and lose?

C1. Improve reporting and estimation of the timing and quantity of water withdrawals throughout the state. Develop a more comprehensive and publicly accessible database on all water withdrawals.

Data collection: increase return rate on Illinois Water Inventory Program (IWIP) questionnaires, create a web-interface or e-form for IWIP respondents, improve IWIP database access and query capabilities; obtain aerial/satellite photographs.

Data analysis: examine water use for geographical and temporal trends, summarize IWIP data in more timely fashion; produce more complete datasets on water withdrawals.

C2. Better document water needs for fish, other wildlife resources, recreation, and waste dilution.

C3. Document water losses for specific consumptive uses and major water distribution systems.

Data collection: work with selected water users to document water withdrawals (purchases), water use, and water returns (discharges).

Data analysis: compare differences in water used to water returns and summarize for types of water users (e.g., irrigation, industry, municipal), cross reference IEPA monthly discharge data on effluent discharges to streams.

D. What are the impacts of water withdrawals?

D1. Monitor and evaluate the effect of water withdrawals from streams and rivers on low flows.

Data collection: monitor withdrawals from streams and rivers, develop low stream flow statistics.

Data analysis: project the effect on low flow values for current and projected withdrawals.

D2. Monitor and evaluate the effect of groundwater withdrawals on groundwater levels and wells.

Data collection: expand and improve the ISWS observation well network, expand the ISWS aquifer testing program.

Data analysis: create hydrographs for each observation well and initiate analysis for water level trends, create potentiometric surface maps for selected aquifers or selected areas within regional aquifers and compare with historical surface maps, analyze aquifer test data and summarize.

D3. Monitor and evaluate the interaction between shallow groundwater supplies and streamflows, including the effects of pumpage on this interaction.

Data collection: monitor groundwater level; measure low flow at critical locations.

Data analysis: assess surface and groundwater interactions.

E. How much water will be needed in the future?

E1. Identify areas of potential water shortages and conflict in the state to set priorities for planning, management, and scientific studies. Examine all major aquifers and surface-waters and their natural and induced recharge rates and compare these to estimates of the capacities of existing water-supply systems and demand projections, including instream uses, to determine areas where water shortages and conflicts are likely to be most critical over a) the next 20 years, and b) the next 50 years.

Data collection: examine all major aquifers and surface-waters and their natural and induced recharge rates, the capacities of existing water-supply systems, and water demand (e.g., projections of population and economic growth and the needs of aquatic systems).

Data analysis: compare the estimated yield of water sources to the estimates of the capacities of existing water-supply systems and demand projections to determine areas where water shortages and conflicts are likely to be most critical over a) the next 20 years, and b) the next 50 years.

E2. Develop working definitions of key terms and identify methods for determining, e.g., adequate, reasonable, and beneficial supplies of water, and adverse impacts for a range of water uses that includes the concept of renewable/sustainable/safe yields and addresses long-term planning, including drought-related shortfalls. Regional variability in the nature of the water resources will be recognized.

F. To what extent can our existing water supply and distribution systems meet additional demand?

F1. Identify at-risk public water supply systems. Evaluate reliable current and future yields from rivers, reservoirs and aquifers used by public water supplies. For surface supplies, this will be done on the basis of updated low flow analyses and models that estimate drought flows at ungaged sites. Priority will be given to drought flows and system yield for existing public water supply systems that rely upon surface sources or are susceptible to drought impact. For groundwater supplies, this will be done by establishing a community-based groundwater level observation program in low-yielding aquifers, typically small aquifers supplying small communities or subdivisions, and using simple groundwater models. Hydraulic testing of previously untested aquifers will also be conducted.

Data collection: establish stream gages near existing public water supply systems; conduct sediment/capacity surveys of reservoirs; monitor reservoir levels, lake evaporation, stream sediment, and water quality related to water supply; collect groundwater level, groundwater withdrawal, and well construction data in developing low-yield aquifers; conduct aquifer tests.

Data analysis: develop low flow frequency analysis; reservoir capacity projections; update lake evaporation assessments; evaluate impacts of water quality constraints; evaluate impacts of groundwater withdrawals on groundwater levels using simple models.

F2. Update information on existing water-supply sources for each water-supply system, secondary and emergency supplies, interconnections with other supplies, communities/ populations served, withdrawal capacities, reservoir storage capacities and sedimentation surveys, and water-demand projections. Compare projected demands to system capabilities.

Data collection: inventory primary, secondary and emergency supplies, interconnections with other supplies, communities/ populations served, withdrawal capacities, reservoir storage capacities and sedimentation surveys, and water-demand projections.

Data analysis: compare projected demands to system capabilities.

G. What are the options for increasing water supply and /or decreasing demand and where are suitable locations for water intakes?

G1. Based on data and analyses from A through D, conduct systems analyses for evaluating all water supplies in a region for, e.g., optimal conjunctive uses and protection of surface water and groundwater resources, together with water conservation and reuse strategies.

G2. Provide assistance to local communities with the development of drought and other emergency management plans.

G3. Protect water withdrawal points from accidental contamination by determining travel times from potential pollutant sources.

G4. Evaluate options for the artificial recharge of aquifers.

G5. Evaluate options for water conservation and reuse.

H. ***How can pricing/economics change demand?***

Water can be treated by economists like any other economic resource, the price and allocation of which are determined by the laws of supply and demand. However, Illinois riparian water law allows water withdrawals according to principles of reasonable and beneficial use, and not economic principles. Some scientists argue that the lack of private ownership of water rights could restrict the ability of a market economy to provide efficient and effective solutions to water problems.

4. Develop a package of financial and technical support for and encourage the formation of regional water management consortia in Priority water Quantity Planning areas which can be identified using existing information.

While additional scientific information is needed to comprehensively identify Priority Water Quantity Planning Areas statewide, existing information may be adequate to identify a few such areas. Discussions should be held with the Mahomet Aquifer Consortium to identify the kinds of technical and financial assistance they most need to address the water management issues in their region. Based on these discussions, a package of financial and technical assistance can be developed which will provide the incentive for the formation of voluntary, cooperative regional water management consortia areas facing identifiable future water problems.

5.Compile available information and make it useful and easily accessible.

Water quantity planners and managers and the general public will be provided with easy access to an Internet-based decision-support system that contains all the data and information from A through F above, i.e., on climate, surface waters, aquifers, geology, water conservation and reuse, water supply sources (primary, secondary, and emergency), water withdrawals and withdrawal capacities, emerging technologies, water distribution systems and communities served, sedimentation surveys, interbasin transfers, water losses, economic analyses, analytical tools, water supply and demand projections, and water management options.

All relevant existing data and model results will be quality assured, archived, processed, analyzed, and presented in a variety of formats including GIS, graphical displays, and datasets. Updates will be provided as new and improved data and analytical tools become available.

Databases and models will be of appropriate resolution and accuracy for regional planning and management, as defined by the regional planning groups. Also, officials will be trained in regional water quantity planning and management, including conservation and reuse, and the general public will be provided information on regional water quantity planning and management, including conservation and reuse.

An annual summary of progress will be produced, including periodic assessments of the status and trends in the availability and use of water resources.

Building on ongoing activities, an 8-year program (FY04 through FY 11) is needed to provide the above data and services. However, many of these activities will need to be implemented on a permanent basis.

6. Implement a phased approach in establishing a sound scientific basis and an administrative framework for water quantity management.

The State's response to statewide water resources development issues and conflicts has been less than adequate since the budget cuts of the early 1990's. The data collection, research and planning activities that were initiated in the 1980's were significantly curtailed and in some cases eliminated due to shortfalls in revenue and dedicated staffing levels. These responsibilities need to be met through a concerted effort to restore the State's technical abilities to measure, evaluate and review on a scientific basis the short and long term needs and impacts concerning further development of the State's water resources. The following recommendations present an eight-year phased level of effort and commitment to develop the programs and authorities needed to respond on a statewide level to needs for further water resource management and development.

A. Full funding for "Water Use Act of 1983."
B. Full funding for Statewide water use inventory and annual assessment.

C. Emergency Powers Statute.

D. Discuss benefits/impacts of amending the "Water Use Act of 1983 to delete Section 5 and 5.1 exemption for Northeastern Illinois. (See Section 45/3c).

E. ***Develop statewide guidelines for stream withdrawals.***

F. Develop statewide guidelines for large scale groundwater developments.

G. Develop procedure to evaluate and respond to domestic well impact complaints.

Spring 2003

5A. ***Full funding for the "Water Use Act of 1983."***

This legislation provides a means for reviewing potential water conflicts before damage to any person is incurred and for mitigating groundwater shortage conflicts. Soil and Water Conservation Districts have the authority to receive notification of incoming substantial users of groundwater and to cooperate with the Illinois State Water Survey and the Geological Survey, which conduct a technical analysis of potential impacts of proposed development. Based on the extensive collection of scientific data that exists at the surveys, the analyses can assist both developers and local interests concerning the short and long range impacts of proposed groundwater withdrawals. Currently they are not being conducted due to limitations on staffing and funding, but they are a valuable public service that needs to be re-instituted immediately.

5B. Full funding for Statewide Water Use Inventory and Annual Assessment.

Regional planning for the long-term development and management of aquifers and watersheds cannot begin without a clear understanding and record of existing water withdrawals, uses, transfers and returns. Assessment of water availability is fundamental, but it is equally important that demands on the resource be measured and geographically identified. This information is useful on a statewide basis to assist future water resource developers in understanding the locational benefits of alternative water supply sources. The State Water Survey maintains a useful but less than comprehensive program of water withdrawal data collection, analysis, and reporting for surface waters and groundwater. Industry, public water supplies, consultants, and federal agencies expect this information to be available to develop or evaluate a water resource development. Additional funding and staffing is needed to maintain this public service.

5C. Emergency Powers Statute.

The issue of emergency response to drought and other water related emergencies has been extensively reviewed by numerous task forces and work groups since the 1950s. All of these groups have concluded that a severe drought can occur in any area of the state at any time, the state does not have enough authority to deal with a crisis, and legislation is needed to fill the gap. Legislative initiatives to deal with this issue have been recommended by the State Water Plan Task Force. See section on "Needed Water Management Authorities."

5D. Amend "Water Use Act of 1983."

Section 5 of the Water Use Act of 1983 allows for notification and impact analysis for new uses of a groundwater resource. (See the current authorities section and the above paragraph on funding for the Water Use Act of 1983.) Section 3 of the act effectively exempts the six northeastern counties of Lake, McHenry, Cook, DuPage, Will and Kane from the requirements of Section 5. The information that can be provided under Section 5 is currently not available for these counties. Discussions should be help with local officials and the public regarding the benefits/impacts of removing this exemption.

FY 2003-2004

5E. Develop statewide guidelines for stream withdrawals.

Since the early 1980s Illinois natural resources agencies have conducted research and collected data to better understand the scientific, technical, and legal issues involved in developing and operating stream withdrawal facilities. Other states have technical criteria and evaluation procedures for developing facilities that withdraw water from rivers and streams. Illinois developers and resource managers could also benefit from a reasonable set of guidelines. The guidelines should be based on existing data and take into account the important linkage between ground and surface water.

5F. Develop statewide guidelines for large-scale groundwater developments.

Technical criteria and evaluation procedures are used in other states for guiding and evaluating the development of major groundwater withdrawals. Illinois also needs to develop reasonable and responsible guidelines for major groundwater withdrawal developments, taking into account important linkages between groundwater and surface water.

5G. Develop procedures to evaluate and respond to domestic well impact complaints.

Impacts to domestic wells are the among the most common complaints registered with state and local resource agencies and elected officials. The complaints are often the result of inadequate domestic well construction or naturally-occurring seasonal lowering of water table elevations. Regardless of the cause, the interruption of domestic well service is an inconvenience to homeowners and other users of small wells. Because well owners and their elected officials expect a timely response to the problem, the state needs to develop procedures to evaluate and respond to complaints of domestic well interference.

TIMETABLE

FY '03

March

- Formally establish a water quantity planning and management process and develop a draft strategic plan for water quantity planning and management statewide.

April

- Provide agency and public review of the draft strategic plan for water quantity planning and management; submit an FY04 initiative to begin needed scientific studies.
- Submit a legislative proposal for full funding for "Water Use Act of 1983."
- Submit a legislative proposal for full funding for statewide water use inventory and annual assessment.
- Submit a legislative proposal for an Emergency Powers Statute.
- Amend "Water Use Act of 1983 to delete Section 5 and 5.1 exemption for Northeastern Illinois. (See Section 45/3c)

May

- Obtain funding for an 8-year water quantity program that would include implementation of the Water Use Act.

July

- Begin development of statewide guidelines for stream withdrawals.
- Begin development of statewide guidelines for large scale groundwater developments.
- Develop procedure to evaluate and respond to domestic well impact complaints.

FY '04

July

Initiate new scientific studies (dependent on funding):

- Install 12 new Illinois Climate Network stations.
- Install evaporation monitors on 7 lakes/reservoirs.
- Install stream gages to monitor low flow.
- Install observation wells to monitor groundwater levels.
- Install monitors on inflows to reservoirs.
- Install soil moisture instruments.
- Install lake-level recorders.
- Sample and analyze water for selected chemical constituents.
- Start lake/reservoir sediment/capacity surveys.
- Develop surface water models.

- Conduct surface geophysical studies.
- Continue detailed geologic mapping program.
- Develop maps of aquifers at scales appropriate for needed groundwater resource investigations, especially for aquifer-scale groundwater flow modeling.
- Develop maps of aquifer vulnerability to contamination.
- Integrate quadrangle-scale geologic maps into county-scale maps.
- Conduct aquifer tests.
- Develop groundwater flow models.
- Compile climatic, geologic, hydrologic, and aquifer records.
- Initiate new aquifer measurements of water levels and hydraulic properties.
- Collect data on elevation of streambed and stage.
- Prepare regional databases for aquifers and watersheds.
- Prepare detailed supply/demand projections to 2050.
- Determine the water needs for aquatic biota, recreation, waste dilution.
- Improve estimation of water withdrawals, use, and loss.
- Determine interactions between groundwater and surface waters.
- Evaluate water conservation and reuse and aquifer recharge options.
- Develop models for optimizing water-supply systems.
- Develop a decision support system, including training and outreach.
- Provide assistance for water-supply planning, including emergency planning.
- Report on reducing the range of precipitation projections in the Midwest by different global climate models.
- Report on historical occurrence of droughts and future drought probabilities.

August
- Report on capabilities of existing water-supply systems to meet projected demand in 2020.
- Report on water pricing and elasticities in Illinois.

September
- Report on I) working definitions of adequate, reasonable, and beneficial uses of water and adverse impacts of water withdrawals, ii) guidelines for stream withdrawals and large-scale groundwater developments, and iii) a procedure to evaluate and respond to domestic well complaints.
- Finalize development of statewide guidelines for stream withdrawals.
- Finalize development of statewide guidelines for large scale groundwater developments.

October
- Submit FY2005 new initiative to implement procedure to evaluate and respond to domestic well impact complaints.

December
- Report on 1:50, 1 in 100, and worst-case droughts and their potential impacts.

FY '05

July

- Report on water demands for fish, wildlife, recreation, and waste dilution.

December

- Report on water supply and demand to 2050 and identify "at risk" public water supplies (groundwater and surface water) and biological populations and the nature and magnitude of the risks.

June

- Release preliminary aquifer models.

FY '06 and annually thereafter

Annual Water Planning Report that discusses the status of:

- water planning issues,
- water availability,
- water demand,
- water withdrawals, use, and loss,
- water supply infrastructure,
- options to meet demand,
- databases and models,
- decision support.

Such annual reporting would incorporate, at the state level, all the major components identified in the recent USGS report on "Concepts for National Assessment of Water Availability and Use" (USGS, 2002) and could also contribute to a national assessment.

Managers will be able to draw on the best-available science whenever and however a water quantity management scheme is adopted. The prime focus will be on identifying and addressing public water supplies and aquatic systems at greatest risk.

FY '10

June

- Assess the effectiveness of voluntary, incentive-based regional water management consortia in averting water crises

FY '11

June

A suite of regional databases, data analyses, maps, GIS products, analytical tools, and analyses will be easily accessible via an Internet Decision Support System. This will allow the public to become educated about the need for water quantity planning and management, and officials to be educated and trained in regional water quantity planning and management. A few of the products will be:

- Projections of water availability, demand, supply, and use to 2050.
- Aquifer models capable of determining sustainable yield and identifying suitable locations for and adverse impacts from major groundwater withdrawals.
- Flow-frequency estimates for rivers and streams throughout the state.
- Determination of current and projected capacities of reservoirs and lakes.
- Evaluation of existing infrastructure to meet projected demands to 2050.
- Evaluation of water supply options, including water conservation and reuse.