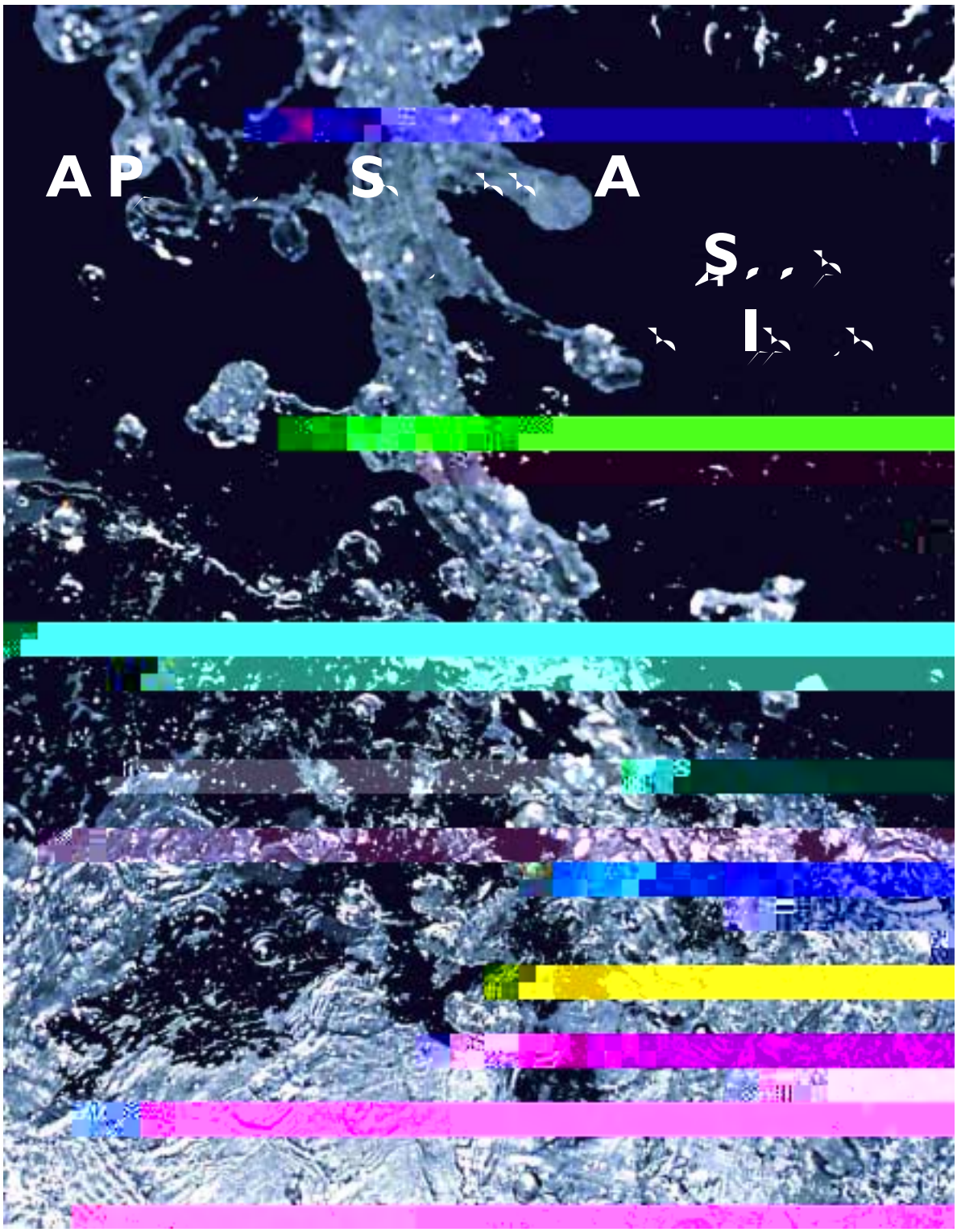
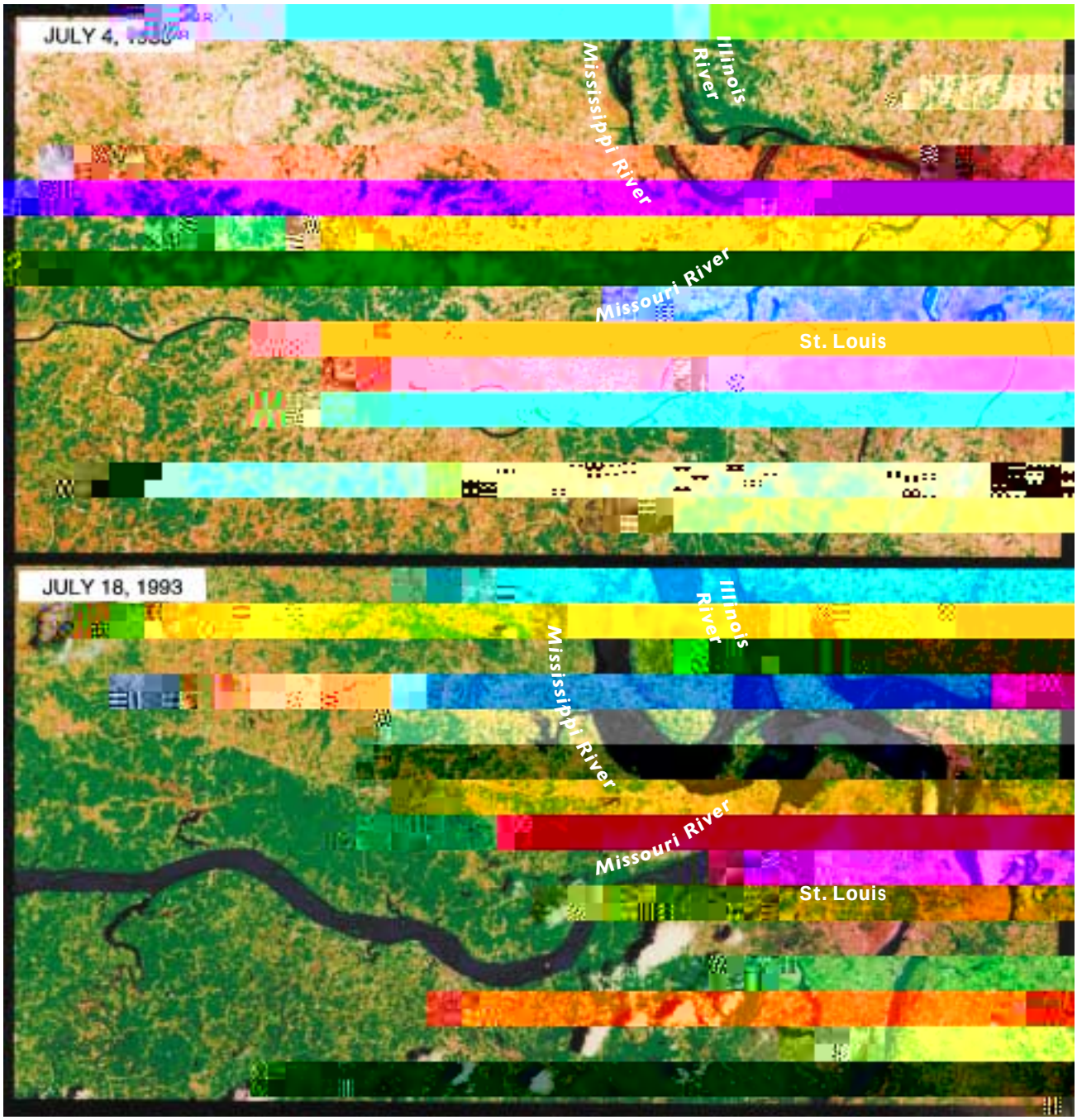


ILLINOIS STATE WATER SURVEY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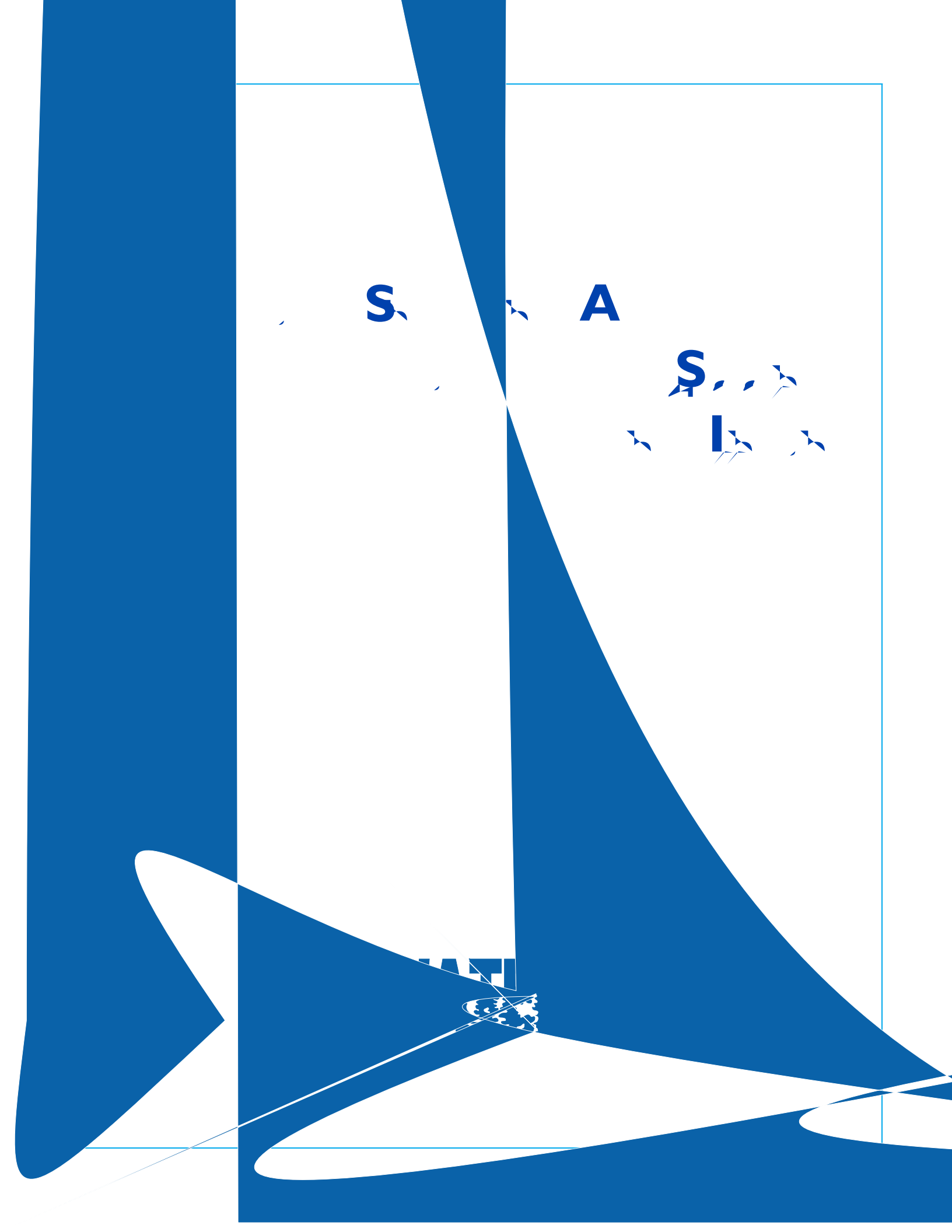
Mississippi River
Illinois River
Missouri River
St. Louis
JULY 18, 1993
Illinois River
Mississippi River
Missouri River
St. Louis



Illinois State Water Survey
Information/Educational Material 2001-03

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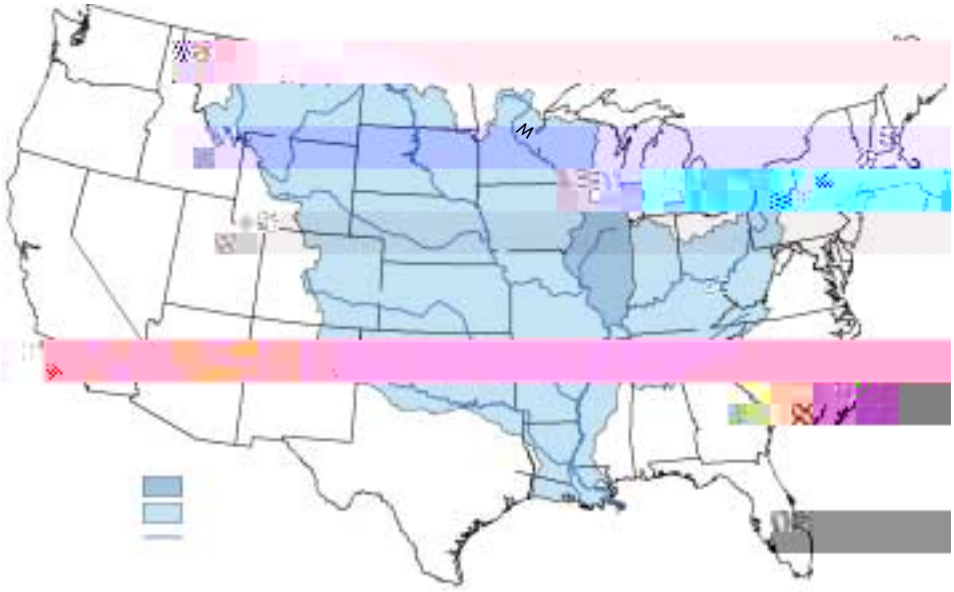
The Need for Scientific Assessment of Water Supplies in Illinois

Recent projections by the Northeastern Illinois Planning Commission of population growth of one million and water shortages in the Chicago metropolitan area by 2020 are a wake-up call for action. Similar analyses and projections for the rest of Illinois have not yet been made.

Water is increasingly recognized as a precious renewable resource to be managed wisely. About two thirds of Illinois' daily



Demand for water in Illinois is increasing, and water shortages in the Chicago metropolitan area have been projected. There are, however, limits to the availability of clean water at a reasonable cost. Limits to water availability are imposed by a number of factors including droughts, legal requirements to maintain minimum flows in rivers and streams, water recharge rates, and a decree of the United States Supreme Court limiting withdrawal of water from Lake Michigan. In addition, the specter of regional climate change could pose the greatest threat to Illinois water supplies over the long term: some projections show the possibility of persistent floods, whereas other projections show persistent droughts.

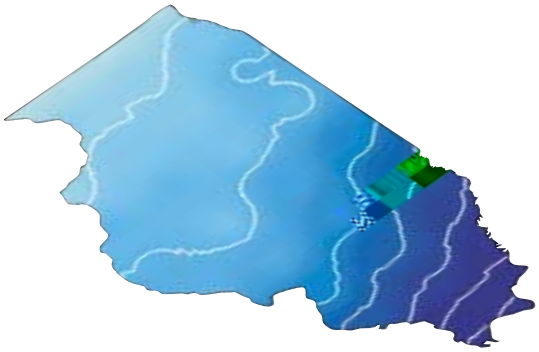
Additional sources of water do exist and can be tapped, but the cost of providing clean water increases with the necessity of water treatment, storage, and distribution, and the mitigation of impacts of new withdrawals on existing water supplies. Long lead times also are needed to construct major water projects. Unless the water supplies of Illinois are planned and managed in a comprehensive, regional, and visionary manner—based on the concept of renewable water supply capacity—water shortages could soon occur in some parts of the state. Water supply planning and management should be based on improved understanding and prediction of water supply and demand, and risk assessment.

The goal of this plan is to provide a framework for Illinois State Water Survey (ISWS) water supply programs and to document those studies that ISWS, working with others, needs to conduct to provide Illinois with comprehensive technical data and information, models, and training for water supply planning and management.

The following are the main tasks described in the plan:

- Collaborate with other organizations to coordinate and integrate relevant programs, set priorities, plan activities, conduct studies, and seek additional resources.
- Assemble, archive, digitize, analyze, and synthesize existing data.
- Determine areas of possible water shortages as a basis for setting priorities.
- Evaluate the quantity and quality of water resources throughout the state as they relate to water supply.
- Provide yield estimates for major aquifers and surface waters under variable and changing climatic conditions.
- Identify critical data gaps and conduct field studies to gather additional data and monitor the state's water resources.
- Evaluate opportunities for water conservation and reuse.
- Interpret and apply technical and economic data to assist and train water resource planners and managers.
- Develop and improve methods and models to evaluate water resources.
- Develop new quality-assured databases and an Internet-based decision support system to make data and models easily available for application by other agencies, professionals, and the general public.

The rate and order of implementation of these studies will depend upon the level and sources of funds and



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INTRODUCTION

Based upon consideration of relevant factors, this plan contains an overall goal of supporting water supply planning and management in Illinois. The plan identifies Illinois State Water Survey (ISWS) strategies to achieve that goal with associated products and outcomes. Section 1 addresses water supply and demand projections; Section 2, surface water supplies and quality; and Section 3, groundwater supplies and quality. Section 4 focuses on the understanding and prediction of the hydrologic cycle in Illinois; Section 5, the reporting of water use; and Section 6, comprehensive water supply planning and management. Because the components of the hydrologic cycle are intrinsically linked, there are some necessary and unavoidable overlaps among sections. A list of ISWS contacts also is provided.

On average, Illinois receives about 38 inches of precipitation per year and has abundant water resources. About 20 billion gallons of water are used each day for domestic, municipal, commercial, agricultural, industrial, mining, power generation, recreation, navigation, and waste dilution purposes. Large quantities of water also are needed to sustain healthy ecosystems, including habitat for fish and other wildlife.

But it is not simply water that is needed: many uses require clean water. Naturally occurring pollutants, such as arsenic, radium, suspended solids, and chloride can limit the availability of clean water in Illinois and increase the costs of water treatment. Human activities that produce pollutants such as pesticides, metals, sediments, and nutrients can add to these problems and costs. Precipitation also contains chemicals, some natural, but many from human sources.

The sources of water in Illinois are Lake Michigan, rivers, streams, lakes, reservoirs, shallow aquifers, and deep aquifers. Ultimately, all these sources are dependent on precipitation, and variations or changes in precipitation can affect the supply and demand for public and private water supplies. Excess water creates damaging floods, such as those that occurred in 1993. Drought, such as the one that occurred in 1988-1989, is a consequence of insufficient rainfall and, often, high temperatures.

Water is usually in motion, and scientists use the hydrologic cycle to study the flow of water between the atmosphere, soils, vegetation, rivers, lakes, aquifers, oceans, and its return to the atmosphere. These components are linked and a systems approach is thus needed to understand and predict how these components interact and to provide a basis for comprehensive water resources planning and management.

Surface waters, soil moisture, and shallow aquifers respond fairly quickly to variation in precipitation: rainfall recharges the water supplies in rivers, lakes, reservoirs, and shallow aquifers; lack of rainfall causes these water supplies to dry up. In a relative sense, these rapid response systems have fast recharge rates measured in terms of days or years. Deep aquifers are different in that they contain water that is thousands or, in some cases, tens of thousands of years old. These aquifers are slow response systems with slow recharge rates. Given an equal amount of water in two aquifers, larger amounts of water can be withdrawn safely from those aquifers that have faster recharge rates.

Water supply managers need data and information on precipitation amounts, recharge rates, and other variables to determine available quantities of water for design of reservoirs, flood controls, well fields, and water distribution systems. This information is also necessary to protect the precious water resources of the state from overuse, depletion, and contamination.

This plan emphasizes comprehensive regional assessments of renewable water supply capacity commensurate with the scientific data needs for comprehensive regional water supply planning and management. Consequently, the scope of the plan is necessarily broad. Regional assessments will be based on watersheds, aquifers, and/or groups of counties. More detailed studies will be conducted at the county and/or local levels. The time scale for water supply planning and management must extend over decades, commensurate with the long lead times needed for infrastructure development and with the dimensions of possible regional climate change.

The rate and order of implementation of the studies will depend upon the level and sources of funds, priorities, and upon collaborative efforts with other agencies such as the Illinois State Geological Survey, Office of Water Resources, Illinois Environmental Protection Agency, and United States Geological Survey. Existing resources at ISWS address many of these topics, but resources are limited and progress will be slow. A major infusion of new resources is needed for timely implementation of the studies described.

FACTORS CONSIDERED IN DEVELOPING THE PLAN

A number of developments, issues, and trends in Illinois, the Nation, and the world influence water resources and the need for water resources studies in

and either limit water availability or increase the cost of supplying clean water.

- The availability and quality of water varies regionally, posing challenges in meeting local and regional water demands. It is not known how much water can be withdrawn safely from many aquifers.
- The flows of surface waters and groundwater are linked and need to be studied and managed conjunctively.
- Estimates of water use are often quite inadequate, as many major uses are not reported.
- The geographical extent of watersheds and aquifers do not coincide, and political boundaries do not coincide with watersheds or aquifers.
- Withdrawal of water from Lake Michigan is set by decree of the United States Supreme Court and by agreement with other states and Canada. The allocation is almost fully used and is unlikely to be increased in the near future.
- Illinois does not have updated statewide or regional water plans for the efficient and effective management of water supplies.
- Technical data and models needed for water supply planning and management are often outdated, inadequate, or nonexistent.
- Management of the state's water supplies is fragmentary and decentralized.
- State laws permit reasonable use of water resources, but the courts often determine what is reasonable and resolve conflicts. Water withdrawals typically are not evaluated based on cumulative impacts or renewable yields.
- Weaknesses identified in current water laws relate to the protection of minimum instream flows, drought emergencies, and renewable yields from surface waters and aquifers. Various advisory bodies have recommended strengthening laws to protect minimum instream flows and groundwater resources and to improve drought management.

The following strategies will achieve this goal:

- Collaborate with other organizations and professionals to coordinate and integrate relevant programs, set priorities, plan activities, conduct studies, and seek additional funds.
- Assemble, archive, digitize, analyze, and synthesize existing data, including appropriate data from neighboring states.
- Incorporate estimates of uncertainty and risk in water supply assessments.
- Provide yield estimates for major aquifers and surface waters under variable and changing climatic conditions, including a worst drought scenario.
- Determine areas where water shortages

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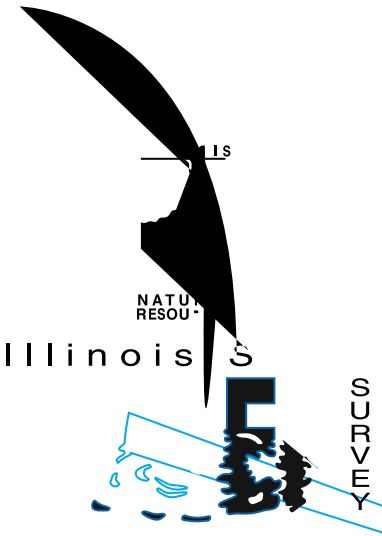

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