

ILLINOIS STATE WATER SURVEY

STRATEGIC PLAN

Derek Winstanley, Chief
May, 2003

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BACKGROUND

Water always has been and will continue to be an essential natural resource in the development of Illinois and the nation. Ensuring the long-term availability of adequate supplies of clean water at a reasonable price is one of the greatest challenges facing Illinois and the nation. Clean drinking water is essential for human health, and large volumes of water are also needed for sanitation, agriculture, industry, power production, recreation, navigation, and countless other human activities. In addition, there is increasing recognition of the importance of maintaining surface waters to meet ecosystem needs.

Watersheds, aquifers, and ecosystems are recognized as units for resource management, complementing the more traditional political units, such as counties and municipalities. Still, water resource management in Illinois is conducted largely in a decentralized manner by a large number of private companies, municipalities, water authorities, and individuals.

Sound resource management practices must be based on many factors, including appropriate laws, regulations, and science. As concerns about water resources increase, new federal laws and regulations that impact Illinois are being formulated and implemented, and the possibility of new state water laws and management schemes in Illinois is being discussed.

The Illinois State Water Survey (www.sws.uiuc.edu) provides sound scientific and engineering data that are a necessary foundation for making wise decisions related to water resource issues and other issues such as climate change, severe weather, and air quality. The Water Survey also provides scientific and engineering data to researchers and the public.

This strategic plan provides a guide for resource planning within the Water Survey and is a source of information for those outside the Water Survey who have an interest in the organization's current and future activities. As a strategic plan, it focuses on future direction and the changes needed to achieve specified goals. It does not include explicitly the continuation of the many base programs. Therefore, the plan cannot be used as a comprehensive basis for budgeting and performance evaluation. The action items identified in the plan are included in staff job descriptions and provide a basis for performance evaluation.

The Water Survey has a long history of conducting objective scientific research and providing products and services to the citizens of Illinois and the nation. Over time, the mission has changed in response to evolving needs and opportunities. It is anticipated that this flexibility and responsiveness will continue to be a hallmark of the Water Survey.

The Water Survey is headquartered on the campus of the University of Illinois in Urbana-Champaign, and additional facilities are located in Champaign at Willard Airport, Peoria, and Carbondale. The current staff of about 200 employees includes professional scientists and engineers, technical and support staff, and university students and hourly employees.

The Water Survey has four sister agencies in the Illinois Department of Natural Resources (IDNR): the Illinois Natural History Survey (www.inhs.uiuc.edu); the Illinois State Geological Survey (www.isgs.uiuc.edu); the Waste Management and Research Center (www.wmrc.uiuc.edu); and the Illinois State Museum (www.museum.state.il.us). These institutions provide Illinois with a level of scientific expertise and capabilities that is unique in the nation.

The Water Survey was founded in 1895 as a unit of the University of Illinois (www.uiuc.edu) Department of Chemistry. Its original mission was to survey the waters of Illinois to trace the spread of waterborne disease, particularly typhoid. From these early times, the Water Survey also addressed the health and safety of public water supplies, water and wastewater treatment, and the establishment of sanitary standards for drinking water.

In 1917, the Scientific Surveys were transferred to the Illinois Department of Registration and Education, to be administered at the University of Illinois. At this time, the Board of Natural Resources and Conservation (the Board) was formed to guide Survey activities. The Board, composed of eminent scientists and professionals, continues to govern the Surveys today.

Scientific activities at the Water Survey have expanded greatly over time to include the development of an electronic dropline for measuring water levels, well and aquifer testing, and assessments of the state's surface and groundwaters. In 1933, the Water Survey accepted primary responsibility for the operation of the U.S. Geological Survey's stream-gaging program in Illinois. Water Survey chemists cooperated with the University and the federal government during World War II in studies to detect chemical-warfare agents in water and develop methods for their removal. Meteorological efforts further expanded in the post-war years to include the use of radar to measure rainfall and to track severe storms. In 1953, Water Survey scientists were the first in the world to identify and photograph the radar image of the development, growth, and partial disintegration of a severe tornado. Today, radar is used worldwide to detect and track tornados.

In 1978, the Surveys were incorporated into the new Illinois Institute of Natural Resources, which became the Department of Energy and Natural Resources in 1981. The Hazardous Waste Research and Information Center was originally organized as part of the Water Survey in 1984, but three years later it was authorized as a separate entity (its name was changed to the Waste Management Research Center in 1996). In 1995, the Surveys became divisions in the Office of Scientific Research and Analysis in the IDNR (www.dnr.state.il.us).

The Water Survey is supported by a combination of an annual appropriation from the General Assembly and by grants and contracts, which are funded by a wide range of sponsors in Illinois and the nation. The grants and contracts are awarded to and managed through the Board of Trustees of the University of Illinois. The Water Survey is also an Affiliated Member of the University of Illinois at Urbana-Champaign.

Mission

The mission of the Water Survey is based on a number of legal mandates and evolving priorities and is as follows:

The Illinois State Water Survey is the primary agency in Illinois for research and information on surface water, groundwater, and the atmosphere. Its mission is to characterize and evaluate the quality, quantity, and use of these resources. The mission is achieved through basic and applied research; by collecting, analyzing, archiving, and disseminating objective scientific and engineering data and information; and through service and outreach programs. This information provides a sound technical basis for the citizens and policymakers of Illinois and the nation to make wise social, economic, and environmental decisions.

Considerations in Developing the Strategic Plan

This strategic plan for the Water Survey has been developed in the context of current conditions and emerging trends. The following findings were important considerations in developing the strategic plan:

- Data collected and scientific expertise within the Water Survey will continue to be needed to contribute to a high quality of life, economic development, and the protection and restoration of natural resources in Illinois.
- In general, there is an inadequate understanding of the environmental implications of a variety of economic and societal decisions and activities.
- Populations are shifting and expanding rapidly in some parts of the state. This puts increased demands on water resources and ecosystems and on the science-based management of these resources. Water shortages have been projected for parts of the Chicago Metropolitan area by 2020. The scientific basis for improved management of water supplies is detailed in the October 2001 “A Plan for Scientific Assessment of Water Supplies in Illinois” (ISWS Information/Educational Material 2001-03).
- There is increasing concern about non-point source pollution, especially from nutrients, agrochemicals, and sediment. The accumulation and fate of nutrients, agrochemicals, and their associated products in soils and aquifers needs to be addressed. Data collection and scientific analysis will enhance evaluation of the needs for and the development of possible further voluntary and regulatory controls of pollutants.
- With a new federal standard to limit the concentration of arsenic in drinking water, the demand for reliable scientific data on arsenic sources, arsenic concentrations, and arsenic removal is increasing.

- Watersheds provide well-defined geographic units for studying surface waters and wetlands, connections between surface water and groundwater, and water quality. It is recognized that each watershed is unique and the management or restoration of any watershed should reflect all of the components that interact in the watershed to influence water quantity, quality, and use. Watershed issues will increase in complexity.
- The state and several federal agencies have made major commitments toward the restoration of the Illinois River Watersheds, as demonstrated by the development of the Integrated Management Plan for the Illinois River Watershed, the creation of the Illinois River Coordinating Council, and the success of the State in obtaining funding for the Illinois River Conservation Reserve Enhancement Program (CREP), and the Illinois Rivers 2020 initiative.
- There has been substantial grassroots interest in watershed restoration that includes stream, streambank, and lakeshore stabilization; wetland creation and restoration; and the implementation of different best management practices (BMPs) such as buffer strips and conservation tillage.
- Illinois continues to play a leading role in regional water-resource issues, including issues related to management of the Upper Mississippi River, Lake Michigan, non-point source chemicals, sediment, and nutrients.
- There is an increasing need to interpret and communicate the results of complex scientific research in non-technical terms for use by resource managers, policymakers, and the public.
- Illinois is increasingly influenced by environmental, economic, and energy issues outside of the state (e.g., hypoxia in the Gulf of Mexico; global climate change; and energy restructuring), as well as within Illinois. Addressing these issues will necessitate the development of regional, national, and global analytical capabilities to evaluate potential implications for Illinois. Increasingly complex state, regional, and national environmental, social, and economic issues pose greater challenges to define the issues, to communicate them to legislators and the public, and to identify possible solutions.
- Climate variability and air quality have great impacts on the environment, society, and economy in Illinois. Human activities in Illinois and the rest of the world also affect climate and air quality. Hence, there is a need to improve our understanding and prediction of the atmospheric system.
- The interconnectedness and complexity of issues means that computer models are needed to address them.
- More human and financial resources will be needed to address the issues. The Water Survey cannot continue to provide the current suite of public services, expand these services and address new issues with the existing financial resources.

- Public demand for short-term benefits, quicker responsiveness, and less expensive and more efficient government programs are likely to continue at the expense of longer-term research and planning efforts.
- The Water Survey is operating in an environment of increasing focus on quality management.
- The state has potentially competing interests in promoting economic development, while also supporting environmental stewardship, restoration, and protection. The Water Survey conducts research and provides services that can help harmonize these demands in the best interests of the citizens of Illinois.
- New technologies are rapidly changing our ability to communicate with large audiences and to archive, transmit, receive, and analyze large amounts of data. The Water Survey is challenged to stay abreast of these developments and utilize them.
- State government is strengthening its efforts in strategic planning, performance evaluation, and performance-based budgeting in order to demonstrate the efficient and effective use of public resources.

Vision to 2008

The following vision statement depicts the desired evolution of the Water Survey:

The Water Survey Research Center will be a center of excellence with facilities adequate to house its expanding programs and staff. The number of Survey staff, the Survey budget, and the number of people served by the Survey will increase by 25 percent. Scientists, engineers, and administrators from Illinois, other states, and other countries will want to work at the Water Survey, and current Water Survey employees will want to stay to take advantage of a competitive benefits package; education and training opportunities; safe, clean, and modern facilities; state-of-the-art technologies; and increased opportunities for creative research, public service, and promotion.

A fully electronic data system will provide Internet access to extensive scientific databases and to full text of all new and historical Water Survey reports. Administrative functions will be conducted via secure, electronic communication systems. Outreach and education efforts will be expanded. The resulting management of water and atmospheric resources, economic development, protection of the environment and human health, and the education system will strengthen in Illinois and nationwide based on increased use of quality data and information produced and disseminated by the Water Survey. In particular, planning and management of water resources in Illinois will improve when based on a foundation of sound science provided by the Water Survey.

OFFICE OF THE CHIEF

Mission

The Office of the Chief provides the scientific leadership and management of the Water Survey. The administrative functions within this office provide Survey-wide support of the research/service activities in the areas of human resources, financial management, publications services, library service, education and outreach, data management, quality management, information systems, equipment, and facilities.

Goals

- Provide leadership for high-quality program of research, data collection, analysis, and dissemination, and public service.
- Maintain a strategic plan for the management of programs and resources, leading to the identification of activity measures and performance indicators.
- Lead the expansion of scientific capabilities to address existing and emerging water and atmospheric resource issues.
- Strengthen and broaden the scientific basis for studying biogeochemical cycles.
- Provide effective and efficient administrative support to staff.
- Provide state-of-the-art facilities.
- Provide state-of-the-art equipment.

Strategies

The Office of the Chief will lead Survey-wide collaborative efforts to implement the following strategies.

- Collaboration among the Scientific Surveys (www.sws.uiuc.edu/JSPlan/). The Water Survey will function as a member of a shared pool of multi-disciplinary research and technical expertise provided by the Scientific Surveys and the State Museum. The diverse capabilities will focus on scientific, economic, environmental, and social issues of interest to Illinois. These institutions will act collectively to continue to be recognized as the prime source of objective scientific analyses in Illinois on natural resource-related issues affecting Illinois, the Midwest, and the nation. They will also expand their capabilities to address emerging natural resource-related issues in specific watersheds.

- **Dovetailing with Other IDNR Offices.** Science is an important basis for the management of natural resources, which is the prime function of IDNR. The Water Survey will continue to be an active player in the development and implementation of the Strategic Plan and Annual Management Plan for IDNR,” especially in enhancing the capabilities of the Department to provide Illinois with scientific expertise, data, and information to meet societal needs in the 21st century. In particular, the Water Survey will help build scientific capabilities to manage watersheds, water supplies, atmospheric resources, ecosystems, and state land.
- **Partnerships.** The history of the Scientific Surveys is intertwined with that of the University of Illinois, and there are ongoing discussions of new facilities on campus and enhanced program planning between the Scientific Surveys and the University. The Water Survey will participate actively to foster and strengthen this partnership in areas of research, data collection and access, public service, and new facilities. Partnerships with scientists and students at other universities and government laboratories also will be pursued to enhance the Water Survey’s and other organizations’ scientific activities and capabilities.
- **Relations with State and Federal Agencies.** Some relationships between the Water Survey and state agencies are legally mandated. These relationships will be fostered, and relationships between the Water Survey and other state and federal agencies will be enhanced as appropriate.
- **Constituent Relations.** The mission of the Water Survey is to serve the citizens of Illinois. In order to better serve the priority needs of multiple constituents, the Water Survey will enhance its education and outreach programs to identify information needs, to distribute information, and to provide leadership and advice to constituents in the use of this information.
- **Effective Use of Resources.** In order to ensure that scarce resources are used to meet priority needs in an effective manner, the Water Survey will evaluate the current use of state resources and ensure that these resources are applied in ways that best meet the state demands for information. Strategies for maximizing the use of grant and contract funds will be evaluated. Overall, an administrative structure will be continued that maximizes efficiency and keeps overhead costs to a minimum, while providing the highest level of service.
- **Facilities.** Survey facilities will be maintained in order to address health and safety issues. Capital Development funding will be pursued to provide for major renovations and/or new facilities to accommodate future needs.
- **Financial Support.** The Water Survey will seek to increase state appropriations to cover core operations and to secure additional support through grants, contracts, and nontraditional sources of financing. Competitive salaries and benefits will be sought and maintained.

- Hydrologic and Biogeochemical Cycles. The hydrologic and biogeochemical cycles will provide a systems framework for Water Survey projects. The major components of these cycles - atmosphere, hydrosphere, geosphere, and biosphere - will provide a basis for organization and program management at the Water Survey. Just as all the major components of the hydrologic and biogeochemical cycles are interconnected, so too will many of the major programs at the Water Survey be linked in a systems approach.
- The nitrogen cycle web site will be expanded to incorporate related biogeochemical cycles of oxygen, carbon, phosphorus, hydrogen, and sulfur. This will provide an educational tool accessible via the Internet to promote environmental studies of interconnections between major elements in the atmosphere, hydrosphere, biosphere, and geosphere. Such studies will result in more comprehensive research, education, and understanding of complex biogeochemical cycles and processes and human modifications of these cycles and processes.
- Watersheds. The Water Survey will use watersheds and basins as focal units of scientific investigation, data collection, and public service on the surface water resources of the State of Illinois.
- Groundwater. Aquifers are not coincident with watersheds or basins. The Water Survey will study the hydrology, hydraulics, and water quality of local and regional aquifers and their connections to surface waters.
- Analytical, Prediction and Presentation Tools. Consistent with a systems approach, greater emphasis will be placed on the development, calibration, testing, and application of mathematical, computer-based models as tools to better understand systems and to predict the state of the environment in the future.
- Data Collection and Analysis. To understand environmental processes, to document the variations of important variables over space and time, to evaluate the impacts of human activities on the environment, and to provide data for model development and testing, the Water Survey will review and, as necessary and according to resource availability, regenerate its data collection and analysis capabilities.
- Information Management. To ensure high-quality, distribution, access, and archiving of data and information, the Water Survey will implement an information management plan. Modern mathematical, computer-based tools will be used to handle, present, and distribute data and information. New databases will be created, when needed, and existing databases will be maintained and improved and made Web- and GIS-compatible. Access to stored data through user-friendly interfaces will be improved. A systematic approach to the archival of data will be made. Data contained within the Water Survey's historical records will be digitized and made available electronically.
- Quality Management. The Water Survey quality management plan (QMP) will serve as a

primary guidance document for all environmental data collection programs to ensure adequate management and quality controls. The QMP will be reviewed and revised on an annual basis to ensure that it meets the needs and requirements of internal staff and external funding agencies.

- **Scientific Outreach and Communication.** Scientific staff will continue to communicate their findings to the scientific community through peer-reviewed journal articles and presentations at professional meetings. These activities will ensure that the scientific output is of high quality, relevant, and a significant contribution to science.
- **Mentoring.** Active mentoring of new staff by senior staff will promote professional development and participation in Survey programs.
- **Recruiting and Training.** To ensure the continued provision of quality research and services; to improve efficiency, productivity, and accountability; and to promote professional development, professional training and staff development will continue to be offered to all salaried staff at the Water Survey. Internal staff expertise on issues of importance to Illinois will be maintained through literature review and attendance at relevant professional meetings. Competitive compensation will be emphasized in order to attract and retain staff with high levels of scientific and engineering expertise, and administrative and management skills. As programs grow and additional expertise is needed, new staff will be hired.
- **Computer Security** will continue to be a high priority. Software firewalls are required and will be installed. Other means of physical and logical security also will continue to be investigated.

Action Items: April 2003-March 2004

Education/Outreach

- Scan and digitize historical reports and make these available on the Internet.

Facilities

- Complete planning to staff additional office space in the new IDNR Tri-County building (Region #2) located near Bartlett, IL.
- Complete the planned installation of electronic exterior locks to increase safety and security of staff and facilities.
- Install no-trespassing signs and emergency phone for the buildings in the south part of the Water Survey complex.
- Complete Water Survey involvement in the South Campus Planning process regarding the planning of future Water Survey Research Center facilities.

- Monitor and support the need for traffic signal controls at Gerty/First Street; Hazelwood/First Street; and St. Mary's/First Street.

Web

- Continue to develop and improve overall web presence.
- Add advanced publication search.
- Continue to apply security updates as released and monitor the web server logs.

GIS

- Provide input to the Department of Natural Resources Quality Assurance Plan. Upon completion, determine its suitability for the Water Survey.
- If none exists, create metadata for any data that is requested prior to distribution.
- Continue to produce animations to support Water Survey Research

Data & Information Management

- Finalize and implement Information Management Plan.
- Implement through the University of Illinois, ADAMS, A Departmental Accounting Management System currently under development for large research departments.
- Conduct training for and participate in the UIUC "Integrate" system.
- Work with ISGS and computer staff to upgrade existing database software to a Web-based version, and to enhance and maintain the library Catalog databases to provide public access.
- Identify systems interoperability and data integration issues.
- Evaluate a prototype "point and click" interface for accessing ISWS scientific data.
- Identify data to be converted to SQL Server.
- Migrate Water Survey NT Domain to Windows Active Directory.
- Develop Prototype "Green Sheet" application using routed forms in Outlook.
- Migrate Fiscal Office Applications to MS SQL server where applicable.

Quality Assurance/Quality Control (QA/QC)

- Review and revise the ISWS Quality Management Plan to ensure that it meets the needs and requirements of internal staff and external funding agencies.
- Complete annual, internal review of PSL and Analytical Services group.
- Complete bi-annual, external review of PSL and Analytical Services group.
- Complete annual review of Laboratory Quality Assurance Plan.

Professional Development

- Provide seminars and training where possible on computers, software, security, GIS and related technological advances.

Research

- Conduct a literature review and synthesis of Gulf hypoxia and hydrologic cycle and develop web sites.
- Submit articles on soil organic carbon sequestration and Gulf hypoxia for publication in peer-reviewed literature.

Atmospheric Environment Section Strategic Plan

Mission

The mission of the Atmospheric Environment Section is to advance the use of atmospheric information for applications of benefit to the environment, the economy, and society of Illinois, the Midwest, and the nation through the performance of basic and applied research, the collection and analysis of relevant data, and the provision of scientifically sound and credible information to the citizens and policy makers.

Vision to 2008

The programs will enhance the state's scientists', analysts', and decision makers' abilities to understand complex air-quality, weather and climate issues, to assess water-resources issues related to the atmosphere, and to evaluate resource-management and policy options. Key decisions in Illinois relating to the development and management of natural resources and environmental protection in Illinois, the Midwest, and the nation increasingly will be made on the basis of scientific information provided by the AES. The programs also will be prominent internationally.

The programs will reduce uncertainties about the magnitude and direction of future climate variability and change, will provide a scientific basis for addressing air-quality problems particularly related to PM_{2.5} and ozone, and will produce information of substantial value needed to protect human health and well-being, improve water-resources management, and support agriculture and other weather-sensitive industries/sectors, including energy and transportation. Modeling on many scales will play an increasingly important role in focusing and integrating the research of the Section.

Goals

- To achieve a better understanding and greater predictability of climate and air quality variability and change in Illinois and the Midwest through data analysis and regional models. Conduct basic research to improve these models on topics including cloud-radiation interactions, cloud physics and dynamics, land-atmosphere interactions, aerosol physics and chemistry, and air/precipitation quality.
- To expand the extensive services program through the State Climatologist program and the Midwestern Regional Climate Center.
- To advance our understanding of severe and hazardous weather processes and events and their impacts in Illinois, including droughts, floods, heat and cold waves, intense lake-effect snow storms, lightning hazards, freezing rain, fog, and severe summer and winter storms.
- To provide the basis for improved understanding of atmospheric resources through experimental investigations to include focused field studies, laboratory investigations, and extended environmental monitoring programs.
- To improve our understanding of and capability to predict the impacts of weather, climate, and air pollutants on society (including health, economics, and quality of life), agriculture, and on water resources and other environmental conditions.

Strategies

- The modeling capabilities of the section will be developed through the continued implementation of the CAQIMS program. The modeling of cloud and weather systems will be continued and enhanced. Internal computer facilities and external computer resources will be expanded in order to provide the capabilities to perform key aspects of the modeling. Regional Climate Model (RCM) integrations will be conducted to generate a comprehensive and realistic database and, through detailed diagnoses, to evaluate the RCM capability to reproduce observations and to better understand the physical processes and underlying mechanisms that cause interannual climate (especially precipitation and surface air temperature) variations in Illinois and the Midwest.

- The laboratory and field experimental capabilities and data collection activities of the section will be expanded. This may include the use of Geographic Information Systems (GIS) and other state-of-the-art visualization tools, expanded access to data from satellites, aircraft, radar, wind profilers and lidars. Energy flux measurement capability will be enhanced to include carbon fluxes. Emphasis will continue to be placed on cloud and aerosol microphysics and on laboratory chemical analysis and techniques.
- Proposals to seek funds will be developed in response to selected opportunities in order to expand programs in mesoscale meteorology, boundary layer meteorology, aerobiology, air quality, geochemical cycles, aerosol physics and chemistry, regional climate and impacts modeling, agricultural climatology, hydrometeorology/climatology, climate change studies, and the effects on society of such problems as animal odor, airborne pests, and climate extremes.
- External support for the activities of the section will be enhanced by increasing our interactions with key Illinois user groups including state and local government agencies, business groups, private sector, and other organizations. Federal agency support will be increased by working closely with NOAA to establish a clear vision for the role of the RCCs.
- Partnerships with scientists at other organizations such as the University of Illinois, National Center for Atmospheric Research (NCAR), government laboratories, other universities, and the National Weather Service, etc., will be pursued to enhance the section's scientific activities and capabilities.
- Scientific staff will enhance communication of their findings to the scientific community through peer-reviewed journal articles and presentations at professional meetings. This activity will ensure that the research output of the section is scientifically defensible and a significant contribution to science.
- Scientific staff will translate their findings for communication to the non-scientific community through more press releases, popular articles, and items for the ISWS web page.
- The efficiency and value of the data collection and services program of the Office of State Climatologist and the Midwest Regional Climate Center will be improved by enhancing the quality and quantity of information available on the Web.
- Participation in national field programs and research initiatives will be pursued in order to leverage the Section's expertise and equipment, allowing a more comprehensive investigation of issues that relate to Illinois.
- Assessments of major climate anomalies that impact Illinois and the Midwest will be performed when they occur.

- Internal staff expertise on atmospheric environment issues of importance to Illinois will be enhanced through literature review and attendance at relevant scientific meetings.
- More active mentoring of younger staff by senior scientists will promote their more rapid advancement and participation in their scientific fields and the Section's programs.
- Staff will participate in the education of graduate and undergraduate students to encourage growth of knowledge in scientific areas relevant to the state.
- Scientific staff will be more involved in the review of scientific papers and proposals which reflects our staff's scientific importance, responsiveness to national needs, and the potential for learning new insights.

Action Items: April 2003 - March 2004

- Obtain funding to continue field studies on the carbon cycle with continued flux monitoring of CO₂, water vapor, energy balance and biological sampling of crops. Publish one paper describing the energy balance of corn and soybean fields on no-till soils under Illinois conditions.
- Complete a study of the linear trends for sulfur dioxide, particulate sulfate, and precipitation sulfate at the approximately 40 sites, mostly in the eastern USA, that began data collection in late 1980's. The study will investigate the preliminary finding that trends in sulfur dioxide and particulate sulfate are substantially different.
- Complete the first phase of monitoring of PM-2.5 constituents and PM-2.5 gas phase precursors at the Bondville field site. Expand the analysis of organic components of PM-2.5.
- Pursue new opportunities to serve on prestigious national, regional, and state advisory panels and committees to provide guidance and reflect Illinois' interests.
- Publish two scientific papers describing the alternative crop suitability project.
- Complete, print, and market a comprehensive Illinois Climate Atlas.
- Look for opportunities to expand interactions with NCDC and the other RCCs through participation in cooperative projects and the development of ACIS.
- Visit additional NWS offices in the Midwest to familiarize NWS staff with the RCC and State Climatologist program, and to learn about the developing NWS Climate Services program.

- Monitor Illinois and Midwest weather and climate conditions and release information during special conditions throughout the region, and assess the impacts of anomalous conditions.
- Install an optical particle measurement system near a roadway and analyze data to investigate the start, strength, and duration of salt emission following road salt application. The data will assist in formulating the source emission terms for a Gaussian dispersion model.
- Apply for a patent for the “nanonose” odor measurement device through the UI Office of Technology Management.
- Establish the relationship between nanonose measurements and dilution olfactory measurements of hog odor.
- Expand a study of the conditions that lead to dense fog events, by the incorporation of reanalysis data into the synoptic analysis in an attempt to identify differences in the low-level (surface to 850 mb) conditions in the hours prior to the onset of dense fog for various synoptic environments.
- Finish Regional Climate Model integrations for the period 1982-2000 through collaboration with NOAA Air Resources Laboratory (ARL) and UIUC Department of Atmospheric Sciences (DAS).
- Improve the Weather Research and Forecasting (WRF) model for regional climate applications. This includes cloud-radiation interaction, land-surface representation and atmosphere-surface interaction.
- Write a report on the results of an analysis of GCM simulations of the climate of Illinois.
- Pursue potential collaborative modeling development with China.
- Submit a proposal to fund an investigation of the urban lake breeze evolution in northeastern Illinois.
- Conduct a study of the diurnal variation of lake-effect snowfall in the western Great Lakes.
- Complete study, in collaboration with the National Weather Service office in Cleveland, OH, of the interactions between thunderstorm evolution and lake breezes.
- Add an assistant climate modeler to the regional climate modeling program.
- Assess the long-term variations in precipitation and levels of the Great Lakes.

- Develop guidelines for users of the seasonal climate outlook.
- Assess major 2002 rainstorms and write comprehensive report.
- Provide information on severe local storms to the public, media, and scientific community by participation in special regional-national forums ,including a Central Illinois Chapter of the American Meteorological Society meeting on severe and hazardous weather in the Midwest.
- Establish the nature of collaborative work with U.S. EPA scientists on a new project, funded by the U.S. EPA, to investigate the impacts of climate change on air quality.
- Hold a users meeting of governmental agency atmospheric chemistry experts to obtain advice on priorities for the AES atmospheric chemistry program.
- Complete development of worst case scenarios of Illinois droughts and floods.
- Develop pages on the state climatologist and Midwestern Regional Climate Center web sites that document 19th and 20th Century climate trends and variability for Illinois and the Midwest.
- Write an addendum to the CAQIMS strategic plan documenting major achievements to date and a plan of action for the next 3 years.
- Respond to unanticipated projects.
- Implement ISWS Information Management and QA/QC plans.

ANALYTICAL CHEMISTRY AND TECHNOLOGY UNIT

Mission

The Analytical Chemistry and Technology Unit (ACTU) provides analytical chemistry and technological services and consultation to state institutions, communities, and private citizens in Illinois and the Midwest, including Water Survey scientists. The Institutional Water Treatment Program (IWTP) provides advice to state facilities on the purchasing, specification, and implementation of chemical treatment for all of their water-using systems. The Public Service Laboratory (PSL) provides analytical testing and consultation to a wide range of users throughout Illinois. The Analytical Services group provides chemical analyses in support of the research activities of Water Survey staff and external researchers. The Midwest Technology

Assistance Center (MTAC) provides technological support for small public water supplies and Native American Indian water supplies throughout the Midwest.

Vision to 2008

The *Public Service Laboratory* (PSL) will be recognized as the premier information resource on water quality for private well owners. The PSL will continually expand the suite of analytes and broaden outreach efforts. This expanded suite of analytes and increased sensitivity will enable the *Analytical Services Laboratory* (ASL) to provide Water Survey scientists with access to data on a wider range of pollutants and naturally occurring chemicals at lower concentrations for research and monitoring studies. Adherence to stringent procedures for quality control and safety, state-of-the-art instrumentation in modern laboratories, and efficient systems for data storage and retrieval will make the PSL one of the highest quality and safest laboratories in the state. The *Institutional Water Treatment Program* (IWTP) will provide all state facilities and community colleges with state-of-the-art advice on water treatment and corrosion control, saving millions of dollars in reduced chemical and water usage and maintenance needs. The IWTP will lead the way in protecting the natural ecosystems of Illinois by promoting the use of environmentally friendly “green” chemical inhibitors for corrosion and scale control. The *Midwest Technology Assistance Center* (MTAC) will achieve national prominence in providing technical assistance for small public water systems, enabling them to provide secure, reliable, and safe supplies of water to the consumer at reasonable cost.

Goals

- Maximize the benefits that the ACTU provides to Illinois citizens and the Water Survey. Increase the efficiency, productivity, and accountability of the Analytical Services and Public Service laboratory groups.
- Maintain and strengthen existing quality-management practices and documentation to ensure the highest quality data and information is produced.
- Maintain and expand the level of participation by state agencies in the Institutional Water Treatment Program.
- Maintain a viable, productive Analytical Services Laboratory to support the analytical needs of other Water Survey scientists in a cost-effective manner.
- Establish the reputation of the Midwest Technology Assistance Center as a valuable resource for small public-water systems.
- Maintain an active research program with outside sponsors relating to corrosion control and water treatment.

Strategies

- Purchase analytical instruments with a combination of state and contractual money (as appropriate) that are needed to maintain, expand, and automate the analytical and data archival capabilities of the Analytical Services and PSL groups. Implement a depreciation account for all instruments purchased with contractual money, to allow replacement of the instruments on a regular basis without incurring undue expense to the service account.
- Conduct annual internal and periodic external reviews of the PSL (under the supervision of the ISWS Quality Assurance Officer) to assure compliance with good laboratory operating procedures and the laboratory Quality Assurance Plan.
- Fund competitive grants at universities or other technical assistance providers (utilizing a peer-review process) within the Midwest region through MTAC to address critical issues for small public water supplies.
- Develop MTAC training and education programs and/or tools (such as interactive CD's) in partnership with other groups such as the Illinois Section American Water Works Association (ISAWWA), the Illinois Rural Water Association (IRWA), and the Environmental Resources Training Center at SIU-E to use their expertise and established relationships with the small utilities.
- Maximize the Unit's benefit to Illinois citizens and the Water Survey by increasing public awareness among private citizens, government officials, and the news media. This will be accomplished by an increase in outreach activities.
- Continue to enhance Web presence for all ACTU programs.
- Continue to provide expert consultation to state facilities on water treatment and corrosion control, maintain current enrollment in the program, and expand participation from new or existing institutions in the IWTP.
- Maintain the highest standards in productivity and quality for laboratory activities while supporting the analytical needs of internal research staff, basing charges for analysis upon full-cost recovery of expenditures for supplies, staff, quality assurance requirements, data archival, and instrument maintenance costs. Encourage Principal Investigators in other Survey sections requiring analytical services to discuss their needs when preparing proposals. Encourage PI's to utilize available QA/QC data for reported measurements.
- Submit proposals for funding to address issues related to corrosion control and water treatment in potable, and other water-using systems as time and resources permit.

- Encourage staff to remain active in professional societies in a manner beneficial to their continued professional development and related to their job duties; encourage staff participation in conferences, technical symposia, technical committee meetings, and workshops as permitted by time and resources; and encourage senior staff to present peer-reviewed papers, perform technical committee work, or present oral presentations at these meetings.
- Facilitate improvement and growth in job expertise and professionalism of junior staff through mentoring by senior staff, particularly of those individuals who senior staff envision may have increased responsibilities in the future (staff supervision or PI status). Encourage all staff to continue their professional growth by taking advantage of the available staff development courses sponsored by the University of Illinois, the State Water Survey, IDNR, or other sources as appropriate.

Action Items: April 2002 - March 2003

- Contact a minimum of six additional Community Colleges around the state annually to encourage their participation in the IWT program. Encourage attendance at the Annual Illinois Institutional Chief Engineers Conference to familiarize them with the IWTP program.
- Comply fully with laboratory Quality Assurance Plan (QAP), including standards for sample tracking, quality assurance, and general laboratory practices.
- Cooperate fully with the Laboratory Quality Assurance Officer as needed to comply with the laboratory QAP.
- Cooperative with QA officer as required to complete external or internal reviews of PSL and Analytical Services group.
- Enhance existing ASL web site with links to QA/QAP information and resources to assist PI's in developing proposals. Add paragraph on the relevance of QMP and link to ISWS QMP.
- Participate in outreach activities to enhance ACTU program visibility. This will be done by participating in some, or all, of the following activities: Science Olympiad, Natural Resources Quiz Bowl, Regional Science Fairs, County Fairs, and the State Fair.
- Disseminate MTAC products and information regionally and nationally through a partnership with the National Drinking Water Clearinghouse.
- Update the MTAC web site design for content as needed. Web site will be checked a minimum of twice per month to ensure links are current and to update.

- Select proposals for funding from MTAC through a peer-review process in cooperation with John Braden, and oversee the progress and compliance of the PI's.
- Oversee development and progress of all directly funded MTAC cooperative projects.
- Submit quarterly progress reports to USEPA for MTAC.
- Work towards the implementation of, in cooperation with the Scientific Sections, of a water-quality plan for the Water Survey.
- Organize annual planning meeting for MTAC with other technical assistance providers and regulatory agencies in the State.
- Maintain contact with USEPA regional small system and capacity development staff to promote work of MTAC and foster closer relationships with USEPA.
- Work with Groundwater Section on PSL sample entry and integration with the groundwater database.
- Update IWTP web site content and appearance.
- Complete an updated PSL brochure.
- Complete an updated MTAC brochure.

WATERSHED SCIENCE SECTION

Mission

The mission of the Watershed Science Section is to characterize and evaluate the quantity, quality, and use of the surface-water resources important to the State, with emphasis on integrated watershed-based approaches. The mission is achieved by collecting, analyzing, archiving, and disseminating objective scientific and engineering data and information; and developing modeling and assessment tools. These data and tools, generated through state-of-the-art scientific methods and research, provide a sound technical basis for the citizens, resource managers, planners, and policymakers of Illinois to make informed resource-management decisions.

Vision to 2008

The Watershed Science Section (WSS) envisions providing state-of-the-art scientific analyses for managing surface-water resources to meet societal and ecosystem demands with

minimum conflict and at reasonable cost. The Section will continue to be recognized as a center of excellence for studies on floods, droughts, water quality, erosion and sedimentation, and watershed restoration. Collaborations with local, state, and federal agencies and universities will be strengthened.

Goals

- Conduct research to improve our understanding of the hydrologic and biogeochemical cycles as they relate to Illinois watersheds, including rivers, streams, lakes, and wetlands and their interaction and influence on the Mississippi River, the Gulf of Mexico, and Lake Michigan.
- Improve our capabilities to develop, apply, and test existing and new mathematical models that simulate hydrologic and biogeochemical processes based on theory, and field and laboratory data.
- Conduct research to advance our knowledge of the temporal and spatial variability of streamflows in Illinois to address water supply, flood, drought, water quality, instream-flow needs, and watershed-management issues.
- Develop, maintain, and distribute databases on Illinois surface-water resources including water supply and use, low flow and drought impacts, floods and floodplains, streamflow, water quality, lake sedimentation, and stream geomorphology.
- Improve and expand watershed, stream, wetland, and lake monitoring capabilities related to water quantity, water quality, sediment, and geomorphic characteristics and variations.
- Lead the development of the Illinois Rivers Decision Support System (ILRDSS), including coordination among the Scientific Surveys and constituents and the development and integration of models and databases related to climate, hydrologic, hydraulic, and water quality characteristics of the Illinois River watershed.
- Maintain core capabilities to provide technical assistance and information to state agencies, municipalities, professionals, and the general public on water resources issues.
- Effectively convey scientific results to the public in ways that are useful and easy to understand.

Strategies

- Improve our ability to predict the outcome of physical, chemical, and biological processes as they impact water quality.
- Identify, apply, and test new and existing mathematical models to simulate hydrologic and hydraulic processes such as the rainfall-runoff process; seepage into the unsaturated zone;

surface water and Groundwater interactions; soil erosion; transport of sediment; fate and transport of nutrients and contaminants; and the hydrodynamic character of rivers and lakes.

- Develop proposals, in cooperation with the Groundwater and Atmospheric Environment Sections, the other Scientific Surveys/Center, and the University of Illinois, to develop mathematical models and monitoring programs to study the physical, chemical, and biological interactions between the atmosphere, surface water, and Groundwater.
- Propose, conduct, interpret, and disseminate results of field and laboratory studies designed to advance our fundamental understanding of the fate and transport of nutrients and contaminants.
- Develop proposals and work to establish programs to monitor hydrologic and sediment budgets for reservoirs, point and non-point pollutant sources, and the impact of watershed and ecosystem management efforts.
- Give increased emphasis to data collection and the application of new data-management and data-archival technologies, as driven by the expanded database needs for numerical modeling and other forms of analyses.
- Seek state funding to develop and sustain core capabilities to provide technical assistance to state and local agencies, municipalities, and the general public on water-quantity and water-quality issues.
- Communicate and disseminate the Section's products by relying upon traditional forms of publication, presentation, and public service, but with increasing emphasis on electronic communications.
- Strengthen collaborative partnerships with other Sections and Units within the Water Survey, other Scientific Surveys, universities, state and federal agencies, and local and regional organizations in recognition of the multi-disciplinary nature of watershed science; and enhance our public outreach activities on watershed issues.
- Support efforts to improve floodplain mapping and its use in Illinois.

Action Items: April 2003 - March 2004

- In coordination with other Sections, apply hydrologic models and other analyses to evaluate the effect of potential climate change on Illinois water resources.
- Contribute to the development of plans for regional, county, and statewide water-resources studies.
- Develop, with other Sections, a water-quality plan for the Survey.

- Continue to participate in the nitrogen cycling (NITROMASS) project.
- Continue working with the water quality focus group within the Section and identify potential research areas.
- As part of the Water and Atmospheric Resource Monitoring Program, continue to monitor month-end reservoir water levels; compile supplementary reservoir water level data from cooperating operators; continue to update web site with provisional monthly flow data at 26 sites; continue to update suspended sediment data web site; and continue to provide surface water conditions monthly review for the *Illinois Water and Climate Summary*.
- Complete Phase I of the Fox River Watershed Investigation – Stratton Dam to the Illinois River by October 2003 and publish a project report.
- Complete analysis of data and publish project reports for IDNR Ecosystem watershed monitoring studies: Vermilion and Little Vermilion River Watersheds; and Hurricane and Kickapoo Creek Watersheds.
- Complete analysis of data and publish project reports for IDNR Pilot Watershed studies: Sugar Creek Watershed; Big/Cypress Creek Watershed; Hurricane/Kickapoo Creek Watershed.
- Complete project report for Lake Decatur Watershed, 2000-2003 monitoring period.
- Complete a publication on an inventory of sedimentation surveys for Illinois reservoirs.
- Prepare a draft report by March 2004 describing designs and current status of stream restoration projects installed in Illinois by the State Water Survey.
- Conduct literature review of historical and contemporary water quality issues in the Illinois River Basin and prepare a Water Survey report.
- Prepare a draft research report by March 2004 summarizing application of the Illinois Streamflow Assessment Model (ILSAM) for all watersheds and documenting the concepts and analyses used in its preparation.
- Prepare ISWS Research Report on “Dependence of Photochemical Transformation Rates on Water Quality in the Calumet River Watershed.”
- Design and oversee implementation of at least five stream restoration structures in North Creek of the Court Creek Watershed by June 2003.
- Continue data collection and analysis and prepare annual National Monitoring Program

- progress report on in-stream habitat and urban fisheries to IEPA for the Waukegan River.

 - Continue data collection and analysis and prepare annual National Monitoring Program progress report on in-stream habitat and rural fisheries to IEPA for Lake Pittsfield.
 - Conduct research on hydrologic drought, low flows, and water supply in Illinois and provide relevant information to IDNR, other state agencies, and the public.
 - Examine the adequacy of public water supply systems during drought, including estimation of reservoir yields, identification of appropriate indexes of hydrologic drought, and consideration of protected minimum flows in streams.
 - Continue development of the Illinois River Basin hydrologic model using the BASINS modeling framework. Additional work will include calibration of at least one more tributary watershed and a comparison of the capabilities of the SWAT and HSPF modeling components on one tributary.
 - Maintain and upgrade the Illinois River Decision Support System (ILRDSS) as much as possible depending on funding levels.
 - Initiate analysis of impacts and influences of land-use changes, climate changes, urbanization, hydraulic modifications on low flow and flood frequency.
 - Develop a sediment and streamflow monitoring plan for the Illinois River Watershed. Seek comments and make revisions to the plan based on input from relevant personnel.
 - Initiate the development of the Illinois Watershed Atlas.
 - Perform research on Rapid Solar Phototransformation of Nutrients in Natural Waters currently funded by Illinois Water Resources Center.
 - Perform research on “Development of Low-Cost Treatment Options for Arsenic Removal in Water Treatment Facilities” currently funded by Midwest Technology Assistance Center.
 - Perform research on the ion adsorption properties of mineral surfaces.
 - Develop a relational database for public water supply surface water reservoirs compiling historical and contemporary data and information from Watershed Science Section files.
 - Complete the development of the Illinois River Sediment Chemistry database for posting on ILRDSS.
 - Review and enhance an existing water quality database for the Illinois Waterway and analyze dissolved oxygen data for historical trends and identify potential water quality problems.

- Maintain and update the agricultural land use database for all counties in the state.
- Complete development of the on-line version of the Streamflow Assessment Model (ILSAM) for placement on the ISWS Web Site by August 2003.
- Complete Section's modeling plan based on the Modeling Panel review comments, input from Section staff, and other Sections.
- Work with federal agencies on using and enhancing existing models.
- Complete the development of ILSAM models for the Spoon, Mackinaw, and Vermilion-Illinois river basins.
- Develop the Lower Illinois River System hydraulic model for Flood Protection for use by the Office of Water Resources, IDNR, for planning and flood management.
- Construct a UNET model for the entire Illinois River from Dresden Island to Grafton for current condition to be integrated with the regional scale HSPF model for the Illinois River Basin.
- Develop a window-based interface to link a hydraulic model such as UNET to the hydrological model HSPF.
- Model the flow hydraulics in the La Grange Pool of Lower Illinois River with 1-D and 2-D unsteady flow hydraulic flow models as part of a multi-disciplinary research team on large river ecosystem restoration.
- Develop a 2-D sediment transport model for the Emiquon area for evaluating alternative restoration projects by The Nature Conservancy.
- Expand and improve long-term, instream sediment-transport data collection under the Benchmark Sediment Monitoring Network of the WARM Program.
- Improve our data collection capability for detailed chemical analysis of sediments.
- Enhance the credibility of the ISWS Sediment Laboratories at Champaign and Peoria by continued participation in external/internal quality control audits and development of a laboratory quality assurance plan and appropriate standard operational procedures documentation.

- Build and foster relationships with the Illinois Association of Floodplain Managers (IAFSM) and the national Association of State Floodplain Managers (ASFPM) by serving as an elected officer.
- Conduct public service outreach through information services to individuals, engineers, other agency staff including but not limited to calculation of 100-year flood elevations, instruct engineers on Federal Emergency Management Agency, National Flood Insurance Program technical issues, public water supplies.
- Continue to serve on Editorial Board of the *Journal of Advanced Oxidation Technologies*.
- Continue to serve as Associate Editor for journal, *Geochimica et Cosmochimica Acta*
- Write a manuscript on Illinois effective discharge values and submit it for publication in either the *J. of Hydraulic Engineering* or *Journal of Hydrology*.
- Prepare and submit a journal article to the *Journal of Advanced Oxidation Technology* on “Comparison of EE/M and Cumulative Efficiency Methods for the Evaluation and Optimization of Advanced Oxidation Processes for DOC Removal from Water.”
- Prepare and submit a journal article on “Variation of Photogeneration Rates of Reactive Aquatic Transient Species within a Small Watershed” to *Environmental Science and Technology*.
- Prepare and submit at least one peer-reviewed manuscript concerning fundamental studies of ion adsorption by mineral surfaces.
- Develop constituent load estimation/calculation methods by incorporating statistical analysis for reliability and uncertainty. Submit a manuscript by April 2004 for peer reviewed journal publication.
- Prepare a journal article entitled “Sensitivity of Parameters with Spillway Option in the UNET to Peak Flood Stage Reduction”, which will be submitted to the *Journal of Hydrology* or *ASCE Journal of Hydraulic Engineering*.
- Prepare a proposal for the Fox River Study Group to continue research and watershed scale model development for the Fox watershed downstream of Stratton Dam.
- Prepare and submit a proposal to USDA-NRI on hydrologic and water quality studies of Illinois watersheds.
- Prepare and submit a proposal to CFAR concerning the Impact of Sediments on Phosphorus Cycling and Potential Bioavailability in Illinois Streams.

- Prepare a proposal to the City of Decatur to continue watershed monitoring in the Lake Decatur watershed.
- Prepare a proposal in partnership with the Macon County Soil and Water Conservation District, for submission to IDOA/USDA, or other future RFP, to conduct a geomorphic analysis of the Big/Long Creek Watershed, Macon County, Illinois.
- Prepare a proposal on the Effects of Sediments on Water Quality in Lake Systems and submit to USEPA.
- Prepare a proposal to IDNR to design and oversee implementation of stream restoration projects for IDNR's ecosystems partnerships.
- Prepare a proposal to IDNR to conduct geomorphic and other watershed assessments used to prioritize critical project sites to be restored as cost share to the USACOE Section 519 Illinois Ecosystem Restoration project.
- Prepare a proposal to IDNR's Office of Water Resources to re-activate stream gauging, sediment transport, and water quality monitoring of the Des Plaines River in an area in Lake County as part of the WRDA Authorized Upper Des Plaines River & Tributaries Multi-Objective Feasibility Study.
- Prepare a Phase I proposal to IDNR's Office of Water Resources to initiate a multi-phased project to perform a watershed assessment of the Hickory Creek Watershed.
- Prepare a proposal for developing a stream classification system to assist nutrient criteria development in Illinois and submit it to USEPA.
- Prepare and submit a proposal to NSF on "Solar Transformation of Nitrogen and Organic Species in Water – Effect on Nutrients and Water Quality."
- Prepare and submit a continuation proposal to the U.S. Department of Energy concerning fundamental studies of ion adsorption by mineral surfaces.
- Complete a proposal under development in cooperation with NCSA to apply pattern recognition in regional water quality assessment and submit to NSF or other funding agency.
- Prepare a proposal "Quantifying the Impact of Land Cover Change and of Climate Change on Floods in Northeastern Illinois" and submit to the Illinois/Indiana Sea Grant.
- Develop proposals and submit to the USACOE and IDNR to continue the development of hydrologic, hydraulic, and water quality model development for the Illinois River as part of the ILRDSS.

- Prepare a proposal to the Office of Water Resources Management, IDNR on the real-time simulations of flood events in the Lower Illinois River for flood protection.
- Continue to monitor developments in the Federal Emergency Management Agency, Map Modernization Program for information dissemination and funding opportunities.

GROUNDWATER SECTION

Mission

The mission of the Groundwater Section is to help protect public health and natural resources and support development by providing a scientific basis for planning and decision making on critical groundwater issues in Illinois. This is achieved by conducting research, collecting and analyzing data, responding to public needs, and serving as the state's primary repository of groundwater records and data. The Section develops and applies appropriate scientific methods and techniques to improve the understanding of the occurrence, quantity, quality, treatment, and use of the state's groundwater resources. The Section also interacts with other programs and agencies in the study of larger hydrological and biogeochemical systems. Results of all data collection efforts and investigations are disseminated to the public in a timely manner through a wide variety of formats.

Vision to 2008

The public, state, local, and regional officials, and industry will rely on Groundwater Section (GWS) experts for technical data and assistance to help solve complex groundwater problems. Interagency cooperation will increase, especially with the Geological Survey. Assessments of water quality and groundwater resources using state-of-the-art science and technology, including the creation and use of models of the state's major aquifer systems, will contribute to wise consumption and protection of groundwater resources in Illinois. As a result, the GWS will achieve national recognition as a center for excellence in groundwater data collection, research, and public service.

Goals

- Increase the number of articles published in the open peer-reviewed literature and the number of presentations at professional meetings.
- Integrate existing statewide data bases with project and external data bases.
- Enhance and expand the Section's groundwater information services to meet customer requirements, and to increase the use of the Section's data and expertise.

- Improve the characterization of groundwater resources in Illinois.
- Expand the use of state-of-the-art water well design, well field optimization, and well maintenance and rehabilitation techniques.
- Increase staff training and personnel resources.
- Strengthen relationships with other scientific programs and agencies to foster multi-disciplinary collaboration.
- Expand program activities and improve its ability to identify and respond to emerging issues.
- Strengthen collaboration with other sections within the Water Survey.
- Strengthen an active research program in contaminant hydrology for the advancement of techniques and methodologies in site characterization, and fate, transport, and treatment assessments of point and nonpoint sources.
- Encourage presentation of material through a wide variety of formats, including Web pages, oral presentations to stakeholders, and development of short, readily understandable project summaries for wide distribution.
- Develop a groundwater data access and display system.
- Obtain funding for improved characterization of aquifers state-wide.

Strategies

- Improve data entry and service capabilities, including securing stable funding for “file-room” staff and archiving and scanning of well records.
- Update paper records and, where appropriate, use these data to update computer files.
- Continue mapping potentiometric surfaces within major aquifers such as the Cambrian-Ordovician aquifer system in northeastern Illinois, the American Bottoms of Metro-East, and the Mahomet Aquifer.
- Enhance an active research program on the distribution, fate, transport, and treatment of natural chemicals and contaminants in Illinois groundwater.
- Improve and expand the use of computer technologies in groundwater flow, transport, and geochemical modeling, data archiving, data mining, and data dissemination.

- Improve estimates of sustainable yield of the state's major aquifer systems and predictions of the effects of changing demands and climate.
- Enhance the water-use inventory program.
- Update the aquifer hydraulic properties data base with information from the Section's historic files, assess gaps in the spatial distribution of the data, and initiate a program to collect new data where gaps exist.
- Conduct studies of the state's major aquifer systems and create calibrated models starting with the Mahomet buried valley aquifer and the Cambrian-Ordovician aquifer systems, including collaboration with the ISGS geological mapping initiative.
- Conduct studies to estimate groundwater recharge to our aquifers.
- Expand and improve groundwater and geochemical modeling capabilities and presentation of results.
- Foster improved relationships with Illinois Environmental Protection Agency, Illinois Department of Public Health, Illinois Department of Agriculture, Illinois State Geological Survey, U.S. Geological Survey, U.S. Environmental Protection Agency, Illinois Association of Groundwater Professionals, academic institutions, and regional and local stakeholders.
- Aggressively seek additional funding through new state initiatives, external grants and contracts, and cost-recovery mechanisms.

Action Items: April 2003 - March 2004

- Complete the following activities related to arsenic in Illinois groundwater:
 - ① Survey water treatment plants for treatment processes and their effectiveness in arsenic removal
 - ② Complete system sampling and investigation of processes for arsenic removal by small water systems
 - ③ Finalize WMRC arsenic report
 - ④ Review recent arsenic PSL data and work with IDPH on press release
- Complete the following activities related to nitrogen in Illinois groundwater:
 - ① Characterize temporal variations of nitrogen species (nitrate, ammonia, organic nitrogen) in shallow groundwater in agricultural watersheds
 - ② Estimate the amount of nitrogen added to a stream by groundwater
 - ③ Use nitrate isotopes to identify sources and occurrence of denitrification
- Review and coordinate updating of the Section web pages

- Provide new input to the Water Supply web-site on:
 - ① Groundwater quality
 - ② Groundwater quantity
 - ③ General groundwater hydrology and well hydraulics
 - ④ General hydrologic cycle
 - ⑤ Groundwater modeling
 - ⑥ Well and aquifer testing procedures

- Continue contributions to a point-and-click data interface using a system compatible with IEPA's ArcIMS Source Water Assessment Program (SWAP) site
 - ① Develop a groundwater quality database interface for internal/external use
 - ② Complete the integration of the ISWS Public Service Lab analyses and the Groundwater Quality database
 - ③ Initiate the integration of ISWS contract lab analyses into the Groundwater Quality database
 - ④ Develop an interface for updating and querying the Aquifer Properties database and create a "data-quality indicator" map of test locations
 - ⑤ Complete the algorithm for aggregating Self-Supplied Industry water withdrawal data for use on the IEPA SWAP site

- Complete a prioritization scheme for targeted investigations of major aquifers using a township aquifer use-to-yield analysis based on water use in 2001

- Inventory projects, data bases, and field networks as a basis for integrating and archiving data

- Complete these tasks related to the WARM program:
 - ① Create water level database interface for entry and query of water level data
 - ② Work with Bob Scott to incorporate groundwater level data into the WARM web-site
 - ③ Review WARM ICN groundwater level data
 - ④ Review and recommend potential additions to the ob-well network

Conduct the following activities related to the Mahomet Aquifer, including the Mahomet Aquifer Consortium and the Imperial Valley Water Authority:

- ① Complete report on ob-well network of the eastern Mahomet aquifer
 - ② Complete preliminary aquifer-wide flow model
 - ③ Develop the irrigation test site for the Imperial Valley project
 - ④ Complete aquifer test and data analysis for Decatur Well #2 near Allerton Park
 - ⑤ Work with MAC Data and Scientific Assessment Committee (DSAC) to prepare an updated MAC proposal task outline and budget
 - ⑥ Work with MAC DSAC to prepare a bibliographic reference list
 - ⑦ Work with MAC Education and Public Relations Committee (EPRC) to update the MAC poster
 - ⑧ Work with MAC DSAC and EPRC to prepare contributions to the MAC web-page or the GWS web-page for linkage to the MAC web-page
- Review Route 25 Mine (near Elgin) Groundwater Model (version 2) and conduct water level monitoring at three nature preserves
 - Complete a Standard Operating Procedure for aquifer testing and analysis and water level measurement using datalogging devices
 - Complete documentation of the GWS computer backup procedures and promote participation by all staff
 - Continue working with the ISGS toward a common water well database, including preparation of an issue paper
 - Complete observation well network, perform slug tests, estimate groundwater flux to the surface and prepare contract report for the Emiquon area
 - Cooperate with other section representatives in creation of a Water Survey water quality plan
 - Complete these specific groundwater investigations in Kane County:
 - ① Complete well inventory for water level measurement
 - ② Coordinate synoptic measurement, compile field data, and create draft potentiometric surface map
 - ③ Conduct aquifer test for Elburn
 - ④ Complete aquifer analysis & groundwater model for Elburn
 - ⑤ Complete water use compilation for NE Illinois
 - ⑥ Compile water level and aquifer test analysis data for NE Illinois aquifers
 - ⑦ Complete data compilation for regional NE Illinois groundwater model
 - In addition to work in Kane County, complete these tasks related to Northeast Illinois:
 - ① Complete northeastern groundwater quality study

- ② Complete the literature review of the hydrogeology of northeastern Illinois
 - ③ Complete mass measurement of Silurian dolomite wells in northeastern Illinois and mapping of potentiometric surface
 - ④ Present water supply issues paper at College of Lake County, July 17
 - ⑤ Present paper on deep aquifer yield uncertainties at ASCE conference
 - ⑥ Conduct field reconnaissance to find “missing” deep aquifer wells in NE Illinois
 - ⑦ Cooperate with Northeastern Illinois Planning Commission on water resources planning issues for NE Illinois and ICCG on statewide issues.
- Update Policies and Procedures and charging policy for all groundwater data, to include mailing and e-mailing of digital data
 - Coordinate creation of a database of ISWS groundwater model results
 - Complete aquifer test analysis and report for Paris
 - Complete aquifer test and analysis for Chatham-Rochester
 - Present seminar to ISGS on groundwater modeling
 - Complete and maintain GWS computer inventory database

National Atmospheric Deposition Program

Mission

The National Atmospheric Deposition Program (NADP) provides quality-assured data and information in support of research on the exposure of managed and natural ecosystems and cultural resources to acidic compounds, nutrients, mercury, and base cations in precipitation and evaluates improvements in its measurement systems, including the addition of other chemical and biological species.

Vision to 2007

The NADP will remain one of the nation's premier research support projects serving science and education and supporting informed decisions on air quality issues related to precipitation chemistry, especially acidic compounds, nutrients, base cations, and mercury. The NADP will be responsive to emerging issues requiring new or expanded measurements. Its measurement system will be efficient, its data will meet pre-defined data quality objectives, and its reports and products will meet user needs.

Goals

- Increase the completeness and improve the accuracy and representativeness of valid wet-only deposition data.
- Increase the completeness and improve the data capture efficiency of valid precipitation depth measurements.
- Maintain up-to-date NADP Quality Management/Assurance Plans that satisfy the data quality objectives of the user community.
- Enhance the usefulness of NADP data by offering overlays of Geographic Information System (GIS) coverages of data that relates to pollutant sources or deposition effects.
- Facilitate use of NADP data in the Illinois River Decision Support system, which serves the needs of Illinois scientists and decision-makers.
- Market NADP data and reports to support scientific research, public decision-making, and education.

Strategies

- Replace the Aerochem Metrics wet deposition collector, designed in the mid 1970s, with a robust new collector equipped with up-to-date mechanical and electrical components.
- Replace the Belfort 5-780 Recording Precipitation Gage (dates to the 1940s) with a gage that measures all precipitation types reliably and accurately (i.e., no significant biases relative to the National Weather Service Standard Gage) and is equipped to produce precipitation measurements as a remotely accessible, digital, electronic signal.
- (A) Maintain and revise as appropriate the NADP Quality Management Plan, which documents how NADP plans, implements, and assesses its quality assurance programs. (B) Develop and maintain an NADP Quality Assurance Plan for the National Trends Network, Atmospheric Integrated Research and Monitoring Network, and Mercury Deposition Network.
- Develop Web presentations using GIS software and applications to prepare maps and overlays of watersheds, land use/cover, ecoregions, point and area SO_x and NO_x pollutant emissions, census information, road and highway distributions, topographic maps, etc.
- Develop data summaries that describe the trends and geographic distributions of wet deposition in the Illinois River watershed.
- Ensure that NADP remains sensitive to the needs of its sponsors, scientists, the public, and decision makers who need information on the exposure of managed and natural

ecosystems and cultural resources to chemical deposition in precipitation.

Action Items: April 2003 - March 2004

- Compare the performance of the N-Con Systems and Yankee Environmental Systems wet deposition collectors with the currently used Aerochem Metrics (ACM) collector. Conduct field tests of operational reliability and catch efficiency and ensure that potential ACM replacements meet NADP specifications. Compare sample chemistry (so far as the budget allows). Present summaries of test results at NADP meetings.
- Explore alternative sample collection containers that can accommodate bag liners (polyethylene, teflon, polypropylene, etc.). Identify liners with acceptable blanks and evaluate sample handling procedures and costs relative to currently used collection buckets. Present the results to the Network Operations Subcommittee (NOS).
- Field test the ETI Systems NOAH III precipitation gage and evaluate its output against the NWS reference (stick) gage and its performance against the Ott-Pluvio gage previously tested.
- Prepare a report that summarizes field test results of the Ott-Pluvio gage.
- Complete the NADP Quality Management Plan for approval at the Annual NADP Technical Committee meeting in October 2003. Publish this plan as an on-line report.
- Draft an NADP Quality Assurance Plan (QAP) for all three networks. At the October 2003 NOS meeting, present a list of differences among network procedures and quality assurance protocols. These differences need to be reviewed and reconciled, as recommended by the NOS. At the spring 2004 meeting, present a draft QAP for review by the Quality Assurance Advisory Group and NOS.
- Develop an on-line application that enables users to access site classifications and related information, such as population, SO_x and NO_x emissions, and roadway density.
- Develop computer programs that would enable site operators to enter field data and information using a handheld computer and evaluate the feasibility of this approach.
- Provide technical support for the development of the Watershed Science Section's water quality database.
- Prepare 2002 color concentration and deposition maps for the Illinois River Decision Support System Internet site.
- Solicit ideas on new data products, including Web-based presentations, new brochures, etc. from the NADP Executive Committee and Environmental Effects Subcommittee.
- Contribute to refinement of plans for building 11.

WATER AND ATMOSPHERIC RESOURCES MONITORING PROGRAM

Mission

The mission of the Water and Atmospheric Resources Monitoring (WARM) Program is to provide a long-term continuous record of the quality and quantity of the state's water and atmospheric resources in cooperation with local, state, and federal agencies, and to provide this information on a timely basis for research and analyses to better understand and manage the interactions of the various water and atmospheric resources and their impacts on Illinois' natural resources and economy.

Vision to 2008

Continuous records for up to 27 years will be available from statewide monitoring of climate, wind, solar radiation, sediment, groundwater, and soil moisture at WARM sites. Increasingly, these data will be collected and disseminated electronically, quality managed, and used for effective management of resources, development of alternative energy sources in Illinois, and research throughout the world.

Goals

- Ensure continuous, long-term collection, archival, and dissemination of high-quality data on the water and atmospheric resources of Illinois.
- Enhance and extend the physical measurements of our water and atmospheric resources across all parts of the state.
- Analyze and present the temporal and spatial variations in the data and participate in the determination of how these trends may alter the state's current water and atmospheric resources.
- Participate in inter-Survey collaborations in accordance with the joint Surveys Strategic Plan, particularly in activities related to restoration of the Illinois River watershed.
- Collaborate with other environmental monitoring agencies inside and outside of Illinois in order to share information and minimize duplication of effort.
- Assure that future long-term monitoring activities of the state remain consistent with monitoring needs.

Strategies

- Establish procedures and guideline criteria to determine how and under what conditions long-term monitoring activities will be continued or added to the WARM Program.
- Scrutinize current WARM Program networks to develop procedures to alter data collections where the present design is determined as inadequate.
- Develop and implement quality-assurance and quality-control procedures.
- Construct an interactive WARM Program home page to display the water and atmospheric data monitoring activities in Illinois with links to other home pages or sources of similar data.
- Develop working relationships with other Illinois agencies that monitor water and atmospheric resources of the state to foster two-way sharing of collection procedures and analyses of data in order to maximize data collection efficiencies and the number and quality of variables monitored within the state.
- Improve data quality and delivery by adopting advances in instrumentation and data downloading technologies.
- Submit data analyses and findings using WARM Program data for publication in refereed journals and for presentations at professional meetings.
- Participate in regional and national field programs. (The baseline nature of the current WARM networks allow data to be used in assessing event frequencies and background trends upon which short-term data sets are superimposed.)
- Seek internal and external funding to enhance water and atmospheric resource monitoring.
- Improve public awareness.

Action Items: April 2003 - March 2004

- Develop an annual implementation plan of WARM Program activities with timelines and task assignments in accordance with the WARM Program Strategic Plan.
- Finalize a WARM quality assurance plan.
- Expand near real-time water and atmospheric data on the Internet. Monitor users accessing WARM Program data to determine the frequency and expertise of Internet site visitors as a measure of evaluating the usefulness of products. Develop links to other Internet sites inside and outside the Water Survey.
- Provide daily access to WARM's soil temperature data in support of agricultural activities in Illinois related to appropriate post harvest chemical application.

- Expand and improve reservoir monitoring through installation of staff gages and development of Internet access to data in a user-friendly format.
- Make contacts with other environmental monitoring groups outside the Water Survey to enhance the efficiency of data collections, disseminations, and coordination of efforts.
- Prepare a brochure to describe explicitly what is included in the WARM Program and to inform users how to access data.
- Seek to establish new sediment and nutrient sampling stations in the Illinois River basin and pilot watersheds coordinated with Watershed Sciences Section.
- Install a geographically based selection procedure of inventoried items of WARM's inventory of water and atmospheric databases.
- Conduct seminars on the WARM Program.
- Provide input to the development of the Illinois River Decision Support System.
- Complete WARM brochure
- Update criteria for new WARM site selection.
- Define goals for each sub-part of WARM.
- Install ICN sensor array near Arcola in support of a C-FAR best management practice site.
- Plan retirement of neutron probes for soil moisture measurements. Complete comparison analyses with continuous automated sensors. Develop algorithms to normalize data sets.
- Cooperate with NEG Micon on analysis of existing tall tower data in Illinois compared with ICN data to assess wind power potential in the state.
- Assess, enhance, and further automate near real-time water, sediment, and atmospheric data on the Internet.
- Develop Internet access to reservoir and shallow groundwater monitoring data.
- Announce WARM Program and web site in appropriate fora. Expand WARM visibility. Conduct seminars.
- Identify information assets to include in the ISWS metadata repository (EIMS).
- Provide input into the continued development of the ILRDSS.

OUTCOMES

The Water Survey disseminates data and information either because they are of broad general interest, or because specific clients have requested specific data and information. The Water Survey has no control over the use of data and information once they are disseminated. However, it is how data and information are used by customers and constituents that determines the outcomes of all the work done by the Water Survey. The Water Survey does not specifically track and analyze the outcomes of its work, but knowledge of issues and problems and frequent customer interactions allow the Water Survey to make the following reasonable estimates of outcomes:

A. WITHIN THE WATER SURVEY

- Mission accomplishment.
- Safe work environment.
- Merit performance.
- Efficient and effective use of resources.
- Quality products, research, service, data dissemination, and outreach.

B. OUTSIDE THE WATER SURVEY

- Restoration and protection of the environment.
- Improved public health.
- Adequate and safe water supplies.
- Swimmable, fishable, and navigable waters.
- Economic development.
- Reliable and safe energy production and distribution.

All these outcomes have significant environmental, social, and economic benefits for Illinois and the nation.