

ILLINOIS STATE WATER SURVEY

STRATEGIC PLAN

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TABLE OF CONTENTS

BACKGROUND.....	1
Mission	2
Considerations in Developing the Strategic Plan.....	2
Vision to 2012.....	4
OFFICE OF THE CHIEF.....	5
Mission	5
Vision to 2012.....	5
Goals	5
Strategies	6
Action Items: April 2006 - March 2007	8
CENTER FOR ATMOSPHERIC SCIENCE	10
Mission	10
Vision to 2012.....	10
Goals	10
Strategies	11
Action Items: April 2006 - March 2007	12
CENTER FOR CHEMISTRY AND TECHNOLOGY	15
Mission	15
Vision to 2012.....	15
Goals	15
Strategies	15
Action Items: April 2006 - March 2007	16
CENTER FOR WATERSHED SCIENCE.....	18
Mission	18
Vision to 2012.....	18

Goals	18
Strategies	19
Action Items: April 2006 - March 2007	19
CENTER FOR GROUNDWATER SCIENCE.....	26
Mission	26
Vision to 2012.....	26
Goals	26
Strategies	27
Action Items: April 2006- March 2007	28
NATIONAL ATMOSPHERIC DEPOSITION PROGRAM.....	31
Mission	31
Vision to 2012.....	31
Goals	31
Strategies	31
Action Items: April 2006 - March 2007	32
WATER AND ATMOSPHERIC RESOURCES MONITORING PROGRAM.....	34
Mission	34
Vision to 2012.....	34
Goals	34
Strategies	34
Action Items: April 2006- March 2007	35
OUTCOMES.....	37

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 cost 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, of improving water quality, restoring watersheds, and protecting aquifers.

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. 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.

In 2005, the Atmospheric Environment Section, the Watershed Science Section, the Groundwater Section, and the Analytical Chemistry and Technology unit were renamed as the Center for Atmospheric Science, the Center for Watershed Science, the Center for Groundwater Science, and the Center for Chemistry and Technology.

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, education, 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.

- The organization of the Water Survey and the breadth of scientific and engineering expertise are suitable for studying the entire water cycle in intensely managed landscapes.
- 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 the improved planning and 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).
- In January 2006 the Governor issued Executive Order 2006-01 requiring DNR to prepare regional water supply plans in at least two priority areas.
- 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.

Vision to 2012

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

The Water Survey will join the Illinois State Geological Survey, the Illinois Natural History Survey, and the Waste Management and Research Center in the creation of a world-class environmental science Institute. The formation of such an Institute will help strengthen collaborative efforts, increase administrative efficiencies, and provide stronger collective identity for the Surveys.

The Water Survey will remain a center of scientific excellence with facilities adequate to house its expanding programs and staff. 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 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.

Vision to 2012

The Office of the Chief will provide scientific leadership to continue and strengthen existing Water Survey programs that are important to the state, while terminating lower priority programs, and stimulating the development of new programs to address emerging priority issues. Cross-disciplinary studies among the Centers and with external scientists will be strengthened. Efficient central management of human resources, finance, equipment purchases, publication services, library services, geographical information systems, an electronic data system, and web development will continue. The Office of the Chief will continue to coordinate education and outreach and quality management activities of the Water Survey. The Office of the Chief will provide leadership in combining the Water Survey with the Illinois State Geological Survey, the Illinois Natural History Survey, and the Waste Management and Research Center in a world-class environmental science Institute.

Goals

- Provide leadership for high-quality programs 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 action items, 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 hydrological and biogeochemical cycles.
- In cooperation with IDNR/OWR, IDNR/ISGS, and local and regional organizations, establish and implement a process for regional water supply planning and provide the scientific basis for the development of regional water supply plans.
- Strengthen cooperation with academic institutions.
- Provide effective and efficient administrative support to staff.
- Coordinate the financial activities of the Surveys with the Department of Natural Resources and the University of Illinois at Urbana/Champaign.
- Provide safe, state-of-the-art facilities and equipment.

- Digitize and make available via the Internet all Water Survey publications.

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. Options will be identified and evaluated for the formation of an environmental science Institute. The diverse capabilities will focus on scientific, economic, environmental, and social issues of interest to Illinois. The Surveys 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 and aquifers.
- 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 in a sustainable manner.
- 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 strategic planning, 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 among 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 renovations and/or new facilities to accommodate future needs.

- **Financial Support.** The Water Survey will seek to increase state funds 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.
- **Administrative efficiencies.** The Water Survey will seek to increase administrative efficiencies within the Water Survey, among the Surveys, and with the Department of Natural Resources and the University of Illinois at Urbana/Champaign.
- **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. 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, Simulation, 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 simulate 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 and public meetings. These activities will ensure that the scientific output is of high quality, relevant, and a significant contribution to science.
- **Education.** Water Survey staff will contribute to K-12 environmental education and teacher training, serve as advisors to university students, give talks, seminars and lectures, and foster informed public policy decisions concerning environmental and resource issues.

- 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, as resources permit. 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. Software firewalls are required and will be installed and updated. Other means of physical and logical security also will continue to be investigated.

Action Items: April 2006 - March 2007

Education/Outreach:

- Promote ISWS Outreach activities by continue to update the ISWS Outreach web page, providing coverage of events with pictures and discussions, and expand the speakers bureau.
- Continue to publicize the Rain Check Network (RCN) and distribute rain gages, and promote student participation.
- Publicize ISWS Educational Outreach activities on DNR web site.
- Participate in science activities and events, e.g., the national ACS Earth Day Program, National Chemistry Week, and/or the Science Olympiad.
- Participate in the State Fair by providing hands-on activities for children and parents, distributing information about ISWS programs, and speaking with constituents throughout the state.
- Collaborate with national professional organizations to promote science and science education.
- Inform the public of current projects and programs through listings on the web.
- Host student field trips that are educational, hands-on and fun.

Facilities:

- Complete the construction of and occupy the new Building 11.
- Move staff and equipment from Q6.
- Complete replacement of the central boilers, chiller, and Building 3 make-up air system.
- Contribute to the South Campus Planning, including a new facility for the Water Survey Research Center.

Web:

- Continue to develop and improve overall web presence.
- Continue to apply security updates as released and monitor the web server logs.
- Update WARM Web site.

GIS:

- Maintain ISWS geodatabases used by all GIS users.
- Maintain internal and public GIS Metadata Services.
- Integrate GIS Metadata search tool with public metadata on ISWS's public GIS page.
- Re-vamp public ISWS GIS web pages.
- Assist with the Point-and-Click Metadata Search interface for the Water Survey.
- Build GIS functionality into FEMA MapMod website.

Data & Information Management:

- Lead implementation of the Metadata Standard.
- Continue to implement Information Management Plan.
- Continue to evaluate and develop "point and click" interface for accessing ISWS scientific data.
- Develop phone bill application using CITES data.
- Develop NADP MOA application.
- Update annual performance evaluation.
- Develop Web based metadata input form.

Quality Assurance/Quality Control:

- Review and revise the ISWS Quality Management Plan to ensure that it meets the needs and requirements of staff and external funding agencies.
- Complete annual, internal review of PSL and Analytical Services group.
- Investigate the feasibility of creating a team of professional from UI and outside agencies in order to perform review of quality systems. The team would operate on a volunteer or time-barter system
- Review Quality Assurance Plans (QAPs) and Standard Operating Procedures (SOPs) upon request and ensure all appropriate projects have QAPs and SOPs.

Professional Development:

- Provide seminars, training, and electronic documents where possible for computer use, software use, security, and GIS.
- Provide resources for specialized training.

Research and Service:

- Participate in the Governor's Drought Response Task Force.
- Coordinate implementation of ISWS Water Quality Plan.
- Work with IDNR/OWR and ISGS to implement the Governor's Executive Order for water supply planning.
- Foster regional water supply planning with the Southern Lake Michigan Water Supply Consortium and the Mahomet Aquifer Consortium.
- Conduct research to enhance the SWAT surface water model.
- Publish two articles on Gulf hypoxia in the peer-review literature.
- Prepare a report on nutrient ratios and limitations in the Gulf of Mexico.
- Produce a pilot Gulf hypoxia ISWS website.
- Produce a report on the water cycle and drought planning.
- Conduct a study with the other Surveys to analyze the historical mercury content of fish in Illinois streams.
- Support a WARM study to characterize the variability of soil moisture under sod at ICN sites.

CENTER FOR ATMOSPHERIC SCIENCE

Mission

The mission of the Center for Atmospheric Science (CAS) 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.

CAS Vision to 2012

The programs in CAS 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 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 CAS. The programs also will be prominent internationally.

The programs will quantify and reduce uncertainties about the magnitude and direction of future climate variability and change, will provide a scientific basis for addressing contemporary air-quality problems and atmospheric influences on water quantity and quality problems, and will produce information of substantial value needed to protect human health and well-being, to improve water-resources management, and to 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 Center. Critical long-term and episodic observations will contribute to advances in basic understanding of atmospheric processes and model performance.

Goals

- Achieve greater understanding and predictability of climate and air quality variability and change in Illinois and the Midwest through data analysis and regional modeling.
- Enhance the extensive services program provided by the State Climatologist program and the Midwestern Regional Climate Center.
- Advance understanding and improve predictability of weather processes, including severe and hazardous events and their impacts in Illinois, such as droughts, floods, heat and cold waves, intense lake-effect snow storms, lightning hazards, freezing rain, fog, and severe summer and winter storms.
- Provide the basis for improved understanding of atmospheric resources through experimental investigations including focused field studies, laboratory investigations, and extended environmental monitoring programs.
- Improve understanding and the predictability of the impacts of weather, climate, and air pollutants on society (including health, economics, security, and quality of life), agriculture, ecosystems, and on water resources and other environmental conditions.
- Share scientific information with the public and decision makers.

Strategies

- The modeling capabilities of the center will be enhanced through the continued implementation of the Climate, Air Quality, and Impacts Modeling System (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 variations (especially precipitation and surface air temperature) in Illinois and the Midwest.
- The laboratory and field experimental capabilities and data collection activities of the center will be expanded. This may include the use of Geographic Information Systems (GIS) and other state-of-the-art visualization tools, and expanded access to data from satellites, aircraft, radar, wind profilers and lidars. Emphasis will continue to be placed on cloud and aerosol microphysics and on laboratory chemical analysis and techniques.
- Proposals to seek funds from federal and other agencies 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 data quality, 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 center 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.
- The Midwestern Regional Climate Center will work closely with the other five Regional Climate Centers and the National Oceanic and Atmospheric Administration (NOAA) to enhance their mutual relationships and contributions to NOAA's mission.
- Partnerships with scientists at other organizations such as the University of Illinois, National Center for Atmospheric Research, government laboratories, other universities, and the National Weather Service, etc., will be pursued to enhance the center's scientific activities and capabilities.
- Scientific staff will provide timely communication of their findings to the scientific community through peer-reviewed journal articles and presentations at professional meetings and to the non-scientific community through press releases, popular articles, oral presentations and regular updates on the ISWS web page. This activity will ensure that the research output of the center is scientifically defensible and a significant contribution to science and society, in addition to enhancing the visibility and credibility of CAS research.
- The efficiency and value of the Center's data and information will be improved by enhancing the quality and quantity of information available on the Web.
- Funding for participation in national field programs and research initiatives will be pursued from federal and other agencies in order to leverage the Center's expertise and equipment, allowing a more comprehensive investigation of issues that relate to Illinois.
- Assessments of major climate anomalies and severe weather events that impact Illinois and the Midwest will be performed when they occur.
- More active mentoring of younger staff by senior scientists will promote their more rapid advancement and participation in their scientific fields and the Center'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 and responsiveness to national needs. This activity also provides the potential for learning new insights.
- Research will be undertaken to develop improved methodologies for addressing the issue of uncertainty, particularly as it pertains to climate change.
- International collaboration will be pursued in order to accelerate progress on addressing fundamental scientific problems that affect Illinois.
- Participation in national and international professional organizations and committees will be encouraged to increase the Center's visibility, enhance collaborative opportunities, and to contribute to scientific understanding of issues affecting Illinois and the nation.

Action Items: April 2006 - March 2007

Publish journal papers or ISWS reports on:

- Frequency and location of lake-to-lake snowbands.
- Case of influences of Great Lakes pack ice on surface heat fluxes.
- Evolution of lake-enhanced snow storm.
- 19th Century trends in climate extremes.
- Issues with identification of trends in snowfall.
- Assessment of uncertainties in heavy precipitation frequencies.
- Impacts of climate change on air quality.
- PM2.5 and gaseous speciation monitoring data collected at the LADCO sites.
- The response of soybeans to short-term (10-20 day) drought periods.
- The effects of meteorology and climate on the energy balance for maize and soybean.
- Initial Trends from the Mercury Deposition Network.
- Ambient ammonia in the Midwest.
- 2005 drought in Illinois.
- Climatology and history of the Peoria climate station, the longest continuous station in Illinois: 1856-present.
- Emission inventory preparation using economic modeling.
- Hygroscopic properties of PM2.5 organic matter.
- The effect of growth in elevated CO₂, O₃, and CO₂ X O₃ on leaf photosynthesis and water use for soybean over four complete growing seasons (SoyFACE).
- Climate modeling uncertainty.
- Severe weather in the Midwest.
- Weather risk management industry.
- Tornado outbreak and winter storms of March 2006.
- The Pharmaceutical and Personal Care Product (PPCP) pilot study, either independently, or in cooperation with USGS.
- Regional Climate Modeling improvements and simulation results

Seek funding for:

- Participation in the Quebec-Windsor CORidor Experiment (CORE), which is proposed to collect enhanced atmospheric observations in the data-void region north of the Great Lakes.
- Support of continuing drought research.
- Regional climate modeling.

- The interaction between meteorological processes and mercury deposition.
- A new research initiative to study trends in the Mercury Deposition Network observations of mercury deposition.
- Pharmaceutical and personal care product research by responding to a pending USEPA RFA dealing with agriculture derived PPCPs in the environment.
- The effects of climate/emissions changes on U.S. air quality by responding to a USEPA call.

Achieve progress on existing projects through the following specific actions:

- Calculate heat fluxes from at least two intensive operations periods of the Great Lakes Ice Cover – Atmospheric Flux experiment, and relate to surface pack ice concentrations.
- Finish the development of a set of at last 50 homogenized time series of heat waves, cold waves, and heavy precipitations, events for the United States and its sub-regions.
- Collect one more year of data, finish analysis on all data collected and prepare a manuscript on the effect of elevated CO₂, O₃, and CO₂, X O₃ on ET for soybean measured over five complete growing seasons at SoyFACE.
- Collect one more year of data, finish analysis of all data collect and prepare a manuscript, on the effect of elevated CO₂ on ET for maize over two complete growing seasons at SoyFACE.
- Analyze all data collected on the relative differences in canopy evapotranspiration between standard Illinois crops and alternative crops using a residual energy balance approach.
- Trends of the current measurements made within the MDN.
- Organize the scanned records of Peoria and Ft. Armstrong (Rock Island) and give copies to the National Climatic Data Center as part of the Climate Database Modernization Program (DCMO). Visit the Cairo Public Library to examine records from the old Cairo U.S. Weather Bureau office for possible scanning.
- Complete an analysis of the effects of orography (resolved) treatment in the CWRf for the NOAA NCAS project.
- Complete the air quality model simulations and analysis of those simulations for the USEPA STAR project on the impacts of future climate change on air quality.
- Complete the field sampling and laboratory analysis phases of the Pharmaceutical and Personal Care Product (PPCP) study and organize the pertinent project data.
- Complete development of pages on the Midwestern Regional Center web sites that document 19th and 20th Century climate trends and variability for the Midwest.
- Initiate a new direction in research, particularly the interaction between meteorological processes and mercury deposition.
- Look for opportunities in cooperative projects.
- Complete GPIC monitoring at the North brook site and continue GPIC monitoring at Bondville.
- Complete the ongoing LADCO, CENRAP and ODEQ ammonia monitoring projects.
- Continue and complete the SWS pilot study measuring PPCPs in Illinois Rivers.
- Promote the use by the national research community of the digital, national historical weather data set developed through the Climate Database Modernization Program's Fort Database Build Project by documenting data quality, making the data available on-line through the project web site, and developing and making available on-line data visualization tools.
- Publish the station histories produced through the Climate Database Modernization Program's Development of Climatological Station Histories Project on-line through the CDMP Archival web site.
- Continue collection of ET measurements over corn grown in control and elevated [CO₂] and soybean grown in control, elevated CO₂, O₃, and elevated CO₂, X O₃ at SoyFACE.
- Continue to provide local leadership in the multi-disciplinary Bondville Intensive Project to characterize and scale fluxes from eddy covariance and aircraft over maize and soybean fields and to link these fluxes to ground-truth (biomass, physiology) and remote sensing (aircraft and satellite) measurements.
- Promote the Mercury Deposition Network at many scientific and policy forums.
- Promote the Illinois Climate Atlas as opportunities arise.
- Visit NWS offices in the Midwest to familiarize NWS staff with the RCC and State Climatologist program, and to explore partnerships with both the individual offices and the Climate Services program.
- Respond to ongoing drought conditions in Illinois, including press releases, interacting with the media and groups impacted by drought, producing reports for the Drought Response Task Force and the Water Survey, contributing to the U.S. Drought Monitor, and maintaining up-to-date web pages.

- Participate in updating the Illinois drought plan.
- Initiate the RCM seasonal climate prediction focusing on model system interface development.
- Collaborate with the Chinese scholars on regional weather/climate modeling.
- Enhance research efforts on boundary layer and precipitation processes in the Great Lakes through hiring and participating in the guidance of graduate students (as research advisory, member of advisory committees).
- Organize the development of a new field experiment to understand the influence of pack ice on atmosphere modification by the Great Lakes.
- Perform a pilot study of the wet deposition of metals in precipitation at Bondville.
- Complete metadata forms for relevant datasets.
- Provide updated web information to the ISWS webmaster on a timely basis.

Strengthen cooperation with Illinois constituents, including state agencies, through the following specific actions:

- Direct communication with scientists at other Illinois agencies when it is appropriate.
- Seek collaboration and funding from the Lake Michigan Air Directors Consortium and the Illinois Environmental Protection Agency for investigations of the synoptic-and meso-scale meteorological influences on wet mercury deposition in the Great Lakes region.
- Present results at relevant meetings within Illinois including Illinois Water 2006 and the Governor's Conference on the Management of the Illinois River System.
- Contribute to the regional water supply planning initiative.

CENTER FOR CHEMISTRY AND TECHNOLOGY

Mission

The Center for Chemistry and Technology (CCT) 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 and organizations on the purchasing, specification, and implementation of chemical treatment for all of their water-using systems. The Public Service Laboratory (PSL) provides analytical testing of water samples and consultation to a wide range of users throughout Illinois. The Analytical Services group provides chemical analyses of water samples 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 2012

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 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 Center 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. Explore nontraditional sources of support.
- 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 operators and managers, technical assistance providers, and regulatory agencies.

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 undo 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 Internal Research Projects at the University of Illinois and the State Water Survey through MTAC to address critical issues for small public water supplies. Joint efforts between the two entities will be encouraged.
- Develop MTAC training and education programs and/or tools (such as interactive CD's) for 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 centers requiring analytical services to discuss their needs when preparing proposals. Encourage PI's to utilize available QA/QC data for reported measurements.
- Encourage staff to remain active in professional societies in a manner beneficial to their continued

professional development when related to their job duties; encourage staff participation in conferences, technical symposia, technical committee meetings, and workshops as permitted by time and resources.

- 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 when resources are available.

Action Items: April 2006 - March 2007

- Contact a minimum of eight additional Community Colleges around the state annually to encourage their participation in the IWT program. Seek out nontraditional sources for additional IWT agreements to broaden program support base. Encourage attendance at the Annual Illinois Institutional Chief Engineers Conference to familiarize them with the IWT 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 internal review of PSL and Analytical Services group. Implement changes recommended from last years internal review as outlined in our response to the Chief and QA officer.
- Improve turnaround time on PSL sample response to customers. Our goal is that letters to customers will be sent an average of 45 days and a maximum of 60 days after receipt of the samples.
- Participate in outreach activities to enhance CCT 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 and/or TacNet.
- Update Unit web sites for design and content as needed. Web sites will be checked a minimum of monthly to ensure links are current.
- Select research topics for funding from MTAC in cooperation with Dr. Warner and Dr. Braden, and oversee the progress and compliance of the PI's. All final reports and a companion summary fact sheet will be posted on the MTAC web site.
- Work towards the implementation of, in cooperation with the Scientific Centers, a water-quality plan for the Water Survey.
- Maintain contact with USEPA regional small system and capacity development staff to promote work of MTAC and foster closer relationships with USEPA. MTAC will sponsor, in conjunction with USEPA Headquarters and USEPA Region 5, a regional workshop for representatives of all the states in the MTAC service area.
- Work with Center for Groundwater Science on PSL sample entry and integration with the groundwater database. We will begin incorporation of QC data into the database.

- Complete an updated IWTP brochure.
- Complete an updated MTAC and/or TacNet brochure.
- Implement Metadata Standard.
- Complete water treatment monitoring study for USACERL to help them evaluate the effectiveness of chemical treatment and smart water treatment control systems. Provide monthly reports to CERL on project progress/results.

CENTER FOR WATERSHED SCIENCE

Mission

The mission of the Center for Watershed Science (CWS) is to characterize and evaluate the quantity, quality, and use of the surface-water resources important to the State of Illinois, with an emphasis on integrated watershed-based approaches. This 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 sound technical information for the general public and resource managers, planners, and policymakers of Illinois who make policy and resource-management decisions.

Vision to 2012

The Center for Watershed Science (CWS) provides state-of-the-art scientific analyses for managing surface-water resources to meet societal and ecosystem demands with minimal conflict and at reasonable cost. The Center will continue to be recognized for excellence in its studies on floods, droughts, water quality, erosion and sedimentation, and watershed restoration. Collaboration with local, state, and federal agencies, and universities also will be strengthened.

Goals

- Conduct research to improve the understanding of hydrologic and biogeochemical cycles as they relate to Illinois watersheds, including rivers, streams, lakes, and wetlands, and their interactions and influence on the Mississippi River, the Gulf of Mexico, and Lake Michigan.
- Improve 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 knowledge of temporal and spatial variability of streamflows in Illinois to address issues such as water supply, flood, drought, water quality, instream-flow needs, and watershed management.
- Develop, maintain, and distribute databases on Illinois' surface-water resources, including water supply and use, low flows and drought impacts, floods and floodplains, streamflows, water quality, lake sedimentation, and stream geomorphology.
- Improve and expand watershed, stream, wetland, and lake monitoring capabilities related to water quantity and quality, sediment, and geomorphic characteristics and variations.
- Further develop the Illinois Rivers Decision Support System or ILRDSS (<http://ilrdss.sws.uiuc.edu/>), including coordination among the Scientific Surveys and constituents, and 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 government agencies, professionals, and the general public on water resources.

- 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 Centers, 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 Center'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 Centers 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 2006 - March 2007

- Analyze the sensitivity of surface water supplies to possible decreases in available flow as induced by potential climate change. Develop a continuous simulation watershed model for a priority watershed (proposed: Sangamon River watershed) with emphasis on simulating low flows and streamflows during drought periods. Work in coordination with the Center for Atmospheric Science to establish potential climate scenarios and use evapotranspiration methods and data consistent with the WARM-ICN networks. A calibrated continuous-simulation watershed model will be ready by March 2007.

- Conduct research on hydrologic drought, low flows, and water supply in Illinois; analyze emerging water supply issues; and provide relevant information to IDNR, other state agencies, and the public. Conduct analysis related to the adequacy of public water supply systems during drought, including a general overview of the levels of error/uncertainty in estimates of reservoir volume, lake evaporation, and drought inflow, and identifying the potential impact of these uncertainties on water supply yield estimates. Publish a report on uncertainties in the estimation of surface water yields, with a draft report by 8/31/2006.
- Contribute to the development of comprehensive and strategic plan documents for state and regional water supply planning and management, with FY2007 deliverables as outlined in the Water Supply Planning Initiative Proposal.
- Finalize, with other Centers, and begin to implement a water-quality plan for the Survey by January 2007.
- Continue the water quality focus group within the Center and meet on a regular basis to identify potential research areas. Respond to appropriate RFP's on water quality if consistent with the Center's Strategic Plan.
- Update the Center's modeling plan annually.
- Implement the Metadata Standard for all projects.
- 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 provide surface water conditions monthly review for the *Illinois Water and Climate Summary* by the 5th of each month; and continue to update suspended sediment data web site as data becomes available.
- Complete analysis of data and publish project report for IDNR Pilot Watershed study: Sugar Creek Watershed.
- Continue hydrologic, sediment, and geomorphic monitoring in Big Creek-Cache River watershed. Complete analysis of data through WY 2005 and publish project report for IDNR.
- Complete project report for Lake Decatur Watershed, 2004-2005 monitoring period.
- Analyze data and prepare and submit a Water Survey Research Report on Solar-Driven Ammonia Production in Illinois Waters, by October 31, 2007.
- Complete the project report for hydrologic, sediment and nutrient monitoring in the CREP watersheds.
- Prepare and publish ISWS Research Report on "Dependence of Photochemical Transformation Rates on Water Quality in the Calumet River Watershed," by December 31, 2006.
- Finalize and deliver to the IEPA by March 31, 2007 the Final Report and video material on in-stream habitat and urban fisheries for the Waukegan River National Monitoring Program.
- Finalize and deliver to the IEPA by March 31, 2007 the Lake Pittsfield National Monitoring Program final report on evaluation of sediment delivery to Lake Pittsfield after Best Management Practice implementation.
- If funded by CFAR, conduct a 3-year research project to monitor, measure, and model channel forming discharges in agricultural headwater streams. After collecting, recording, and analyzing field data, a contract report and at least 1 journal article will be written in the second half of the project.

- Continue to maintain, improve, and expand the Illinois Rivers Decision Support System (ILRDSS). New features will include aerial reconnaissance video streaming; more advanced ILRDSS features (user-generated content to encourage community-based participation in ILRDSS, customizable “dashboards” displaying Illinois environmental data); more robust GIS metadata searching; and hydrologic/hydraulic modeling simulation results.
- Finalize the final report on the effects of climate change and urbanization on floods in northeastern Illinois and deliver it to the NOAA Sea-Grant.
- Continue compiling data and maps needed to develop the Illinois Watershed Atlas.
- Jointly with NCSA and IEPA, complete the initial tasks as specified in the proposal for developing watershed and water quality assessment tools to facilitate management strategies (if funded by NOAA’s Ecofore 06).
- Jointly with NCSA develop and test several data mining tools on algal bloom prediction (funded by the NCSA Faculty Fellow Program). One conference paper will be completed by March, 2007.
- Develop a relational database for public water supply surface water reservoirs compiling historical and contemporary data and information from Center for Watershed Science files by March 31, 2007.
- Complete the development of the Illinois River Sediment Chemistry database for posting on ILRDSS. A web-based, searchable database of Illinois sediment chemistry data, focusing on ISWS/ISGS data sources will be incorporated to the ILRDSS. This will integrate GIS mapping and graphing of results to users.
- Complete Phase II of the Fox River Watershed Investigation project by May 2007. Deliverables include: Fox River Water Quality Database updated with recent water quality data, NPDES Database reviewed, updated and processed, and Fox River Watershed Investigation website updated with new findings and data.
- Incorporate existing biological data in the FoxDB database and analysis (Phase II of the Fox River Watershed Investigation project) by April 2007. Deliverables include: Fox River Water Quality Database modified to include biological and habitat data and a report on biological analysis.
- Develop a plan by March 31, 2007 for preserving original copies of video and 35mm slides of past and ongoing projects by copying into a digital format and archiving.
- Review and enhance the water quality database for the Illinois Waterway in preparation for posting on the ILRDSS and analyze dissolved oxygen data for historical trends and prepare a written summary by March 31, 2007.
- Maintain and update the agricultural land use database for all counties in the state.
- Enhance the windows-based interface for real-time simulations of flood in the Lower Illinois River System for use by the Office of Water Resources, IDNR, for planning and flood management. A windows-based interface and user’s manual for the program will be delivered by December 31, 2006.
- Develop a UNET model for the entire Illinois River with geometry data derived from Woermann maps and simulate flow conditions of the Illinois River prior to 1900. A progress report will be completed by June 30, 2007 to document the development of the model.
- Improve the window-based interface for linking a hydraulic model such as UNET to the hydrological model HSPF. A windows-based interface and user’s manual for the program will be delivered by June 30, 2007.

- Conduct hydrologic and hydraulic analyses of the Cache River basin to guide restoration efforts by the Joint Venture Partnership. A draft report will be completed by June 30, 2007 to document the development, calibration of hydrologic and hydraulic models, and the evaluation of water level management alternatives.
- Watershed modeling to evaluate water quantities and qualities at distributed locations, including surface water supply intakes, by enhancing the BASIN's SWAT model with storm event and streambank erosion simulations and incorporating high temporal- and spatial-resolution precipitation data from NOAA multi-sensor (radar plus gauge) measurements or mesoscale regional climate model simulations, in collaboration with USDA-ARS, and applying it to the Little Wabash River watershed.
- Watershed modeling to evaluate water quantities and qualities at distributed locations, including surface water supply intakes. The deliverables include:
 - a) MTAC Final Report, "Watershed Modeling to Evaluate Water Quality at Intakes of Small Drinking Water Systems" by June 30, 2006.
 - b) ASABE 2006 Annual Meeting paper, "Modeling an Illinois Watershed for Water Quantity and Quality Assessments at the Surface Water Supply Intakes" by May 12, 2006.
 - c) A revised manuscript, "Storm Event and Continuous Hydrologic Modeling of an Illinois Agricultural Watershed," for publishing in the *Journal of Hydrologic Engineering* by December 2006.
 - d) An enhanced BASIN's SWAT model with storm event hydrologic, sediment, and agrochemical simulations and test it on an Illinois watershed, such as the Little Wabash River watershed. Journal manuscript will be completed by March 2007.
 - e) Use of the enhanced SWAT model for Illinois Water Supply Planning as assigned by the Chief.
- Develop BASINS-HSPF based hydrological and water quality simulation models for the Fox River watershed from the Stratton Dam to the confluence with the Illinois River (Phase II of the Fox River Watershed Investigation project). Deliverables by April 2007 include: a report on the watershed hydrology model and the development and parameterization of water quality model.
- Develop hierarchical model for linking IBIs to watershed stressors utilizing the finalized environmental database STARED. Draft report will be submitted to sponsor by September 30, 2006.
- Develop a watershed loading model for simulating fate and transport of suspended sediment and nutrients in Illinois River watersheds. A manuscript based on the research will be submitted to a journal by April 2007.
- Conduct CFAR funded research on the Impact of Sediments on Phosphorus Cycling and Potential Bioavailability in Illinois Streams.
- Maintain and improve long-term, instream sediment-transport data collection under the Benchmark Sediment Monitoring Network of the WARM Program.
- Continue developing constituent load estimation/calculation methods by incorporating statistical analysis for reliability and uncertainty. In particular, develop baseline loadings estimates for nutrients in the Lower Illinois River Basin. Jointly with IEPA prepare and submit a journal manuscript by March, 2007.
- Analyze spatial and temporal variations in sediment transport in Illinois and the Upper Midwest and examine potential relationships to climate variability and land use, and stream management. A journal article quantifying the accuracy of sediment load estimates computed using instantaneous suspended sediment data will be prepared and submitted by January 2007.
- Study the effects of land-use changes on sediment and water quality from watersheds in the Illinois River Basin and explore possibility of implementing an optimization approach for selection and evaluation of

Best Management Practices for improving water quality and reducing sediment yield. Submit a proposal to the Fox River Study Group to design and evaluate BMP scenarios in the watershed using USEPA's BASINS-HSPF modeling system by April 2007.

- Update the Waukegan River YSI Sondes Database (Excel Spreadsheet) by June 31, 2006 and again by December 31, 2006 and continue to monitor water quality of the Waukegan River using YSI Sondes.
- Perform hydrologic and nutrient monitoring for the USEPA Targeted Watershed and City of Decatur projects in the Upper Sangamon River watershed.
- Provide at least one Watershed Assessment Report on Senachwine Creek by March 31, 2007-and continue to participate with IDNR and USACOE in the Illinois River Ecosystem Restoration Project by performing watershed and stream assessments, including geomorphic and other field and office-based assessments in prioritized watersheds. Also, continue to conduct GPS tracked aerial flyovers of priority stream systems when resources are available.
- Provide specialized sediment sampling capabilities to support Illinois State Water Survey and other federal, state and private entities in their research efforts, if funding is available.
- Provide specialized capabilities to collect 3-D acoustic discharge and velocity data to support ISWS research efforts in water supply, flood measurement, and other hydrologic/hydraulic research and modeling efforts, if funding becomes available.
- Continue to collect, reduce, and analyze data from five monitoring stations in support of the Conservation Reserve Enhancement Program.
- Continue to provide technical assistance to DNR's Illinois River Basin Restoration Project through the program's Technical Advisory Group and the Middle Illinois and Kankakee Regional Teams.
- Perform sediment analyses for research projects in the ISWS Sediment Laboratories at Champaign and Peoria. Participate in external/internal quality control audits, complete laboratory quality assurance plan, and perform and maintain standard operational procedures.
- Build and foster relationships with the Illinois Association for Floodplain and Stormwater Managers (IAFSM) and the national Association of State Floodplain Managers (ASFPM) by serving as an elected officer.
- In partnership with IDNR/OWR conduct statewide conversion of Flood Insurance Rate Map information into Geographic Information Systems (GIS) database format.
- 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, as requested. Based on previous years, we expect to process 300 requests between April 2006 and March 2007.
- Prepare and submit a journal article quantifying the accuracy of various sediment load estimates computed using instantaneous suspended sediment data.
- Prepare and submit at least one peer-reviewed manuscript by March 2007 concerning the sorption properties of oxide powders and single crystals to elevated temperatures.
- Prepare and submit at least one peer-reviewed manuscript concerning the size dependent properties of oxide nanoparticles in aqueous solutions by March 2007.

- 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 by October 31, 2006.
- Analyze data and prepare and submit a journal article on Solar-Driven Ammonia Production in Illinois Waters by July 31, 2007.
- Conclude research on, analyze data for, and prepare and submit a journal article on “Demonstration of Low-Cost Arsenic Removal from a Variety of Illinois Drinking Water Sources,” currently funded by the Midwest Technology Assistance Center, by April 30, 2007.
- Prepare and submit a contract report on “Demonstration of Low-Cost Arsenic Removal from a Variety of Illinois Drinking Water Sources,” to be published on the Midwest Technology Assistance Center website by August 31, 2006.
- Present paper on Environmental Applications of Free Radical Reactions at a national or international meeting.
- Prepare and submit a journal article on “Development of Low-Cost Treatment Options for Arsenic Removal in Water Treatment Facilities” currently funded by Midwest Technology Assistance Center.
- Complete and submit 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’s Journal of Hydraulic Engineering by December 31, 2006.
- Complete and submit a journal article entitled “*Coupling of Hydrologic and Hydraulic Models for the Illinois River Basin*”, which will be submitted to the Journal of Hydrology or ASCE’s Journal of Hydraulic Engineering by June 30, 2006.
- Prepare and submit a journal article on application artificial neural networks and genetic algorithms in water quality real-time forecasting by March 2007.
- Prepare and submit a conference presentation, and a journal manuscript on evaluation of the effects of climate change and urbanization on floods in northeastern Illinois by March 2007.
- Incorporate the required changes in a paper on hydrologic applications of MRAN neural networks, currently reviewed by ASCE Journal of Hydrology, if needed. Expected to be published before March 2007.
- Incorporate the required modifications in a paper on watershed classification based on susceptibility to algal growth, currently under review by Water Research, if needed. Expected to be published before March 2007.
- Using geomorphic assessment data on Big Creek, a preliminary investigation into the concept of using effective shear stress as a means of characterizing channel forming/maintenance flows will be conducted. Results will be reported in a conference paper and/or presentation by March 07.
- Complete the USDA-CSREES-CEAP proposal, “SWAT Evaluations of ISNT-Based Nutrient Management on Water Quality and Farm Profitability in a Midwestern Agricultural Watershed” by April 11, 2006. If proposal is funded, 15% of PI’s time will be supported by Grants & Contracts during October 2006 – December 2009.
- Prepare a proposal to IDNR by February 1, 2007 to conduct geomorphic and other watershed assessments used to prioritize critical project sites to be restored for the Illinois River Ecosystem Restoration project.

- Prepare a proposal by October 31, 2006 and submit to IEPA to monitor flows, water quality and habitat conditions in the Waukegan River in support of a new comprehensive planning process and project implementation schedule.
- Continue to participate in the Kankakee River-Riffles Critical Restoration Project Team meetings. Write a proposal (by January 2007) to the Army Corps of Engineers to monitor bed material stability and composition within the Kankakee River's riffle habitats.

CENTER FOR GROUNDWATER SCIENCE

Mission

The mission of the Center for Groundwater Science (CGS) 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 Center 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 Center 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 2012

The public, state, local, and regional officials, and industry will rely on CGS 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 CGS 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 Center's groundwater information services to meet customer requirements, and to increase the use of the Center'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 Centers 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.
- Map 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.
- Revitalize the Illinois Water-use Inventory Program and coordinate with the Lake Michigan Diversion program of IDNR/OWR.
- Update the aquifer hydraulic properties data base with information from the Center’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 2006 - March 2007

- Complete these activities related to the Governor's Initiative on Water Supply Planning
 - Contribute toward definition of a comprehensive program for state and regional water supply planning and management
 - Contribute toward the production of a strategic plan for public review
 - Provide liaison, coordination, and program management for researchers, local & regional water supply planning committees, and state agencies
 - Contribute toward revision of the state drought plan
 - Develop a plan, with WSS and OC, for identifying and studying groundwater – surface water interconnections in the Fox River basin and the Mahomet Aquifer region
- Maintain the Illinois Water Inventory Program database by adding new data for Year 2005, conduct annual survey mailing for 2006, and initiate data entry for 2006
- Complete the following activities related to the Mahomet Aquifer
 - Install datalogger(s) and display near real-time water levels from selected well(s) in the Mahomet Aquifer via the Internet
 - Complete installation of dataloggers in Imperial Valley ob-wells
 - Complete contract reports (with CAS) for Years 12 and 13 of water level and precipitation monitoring in the Imperial Valley
 - Construct observation wells in Champaign County and survey wells
 - Conduct synoptic measurement of water levels in Mahomet Aquifer wells across the entire aquifer
 - Prepare a new potentiometric surface map for the Mahomet Aquifer
 - Conduct aquifer tests and estimate aquifer properties
 - Implement stream gauging at selected locations over the Mahomet Aquifer
 - Collect water samples from selected wells for water quality analysis
 - Improve the Mahomet Aquifer flow model for assessing availability
 - Review the IAWC contractor's model and report.
- Complete the following activities related to water supply in northeast Illinois
 - For Kane County:
 - Complete regional deep aquifer and local shallow aquifer groundwater flow models
 - Assess groundwater availability in Kane County by running model pumping scenarios
 - Evaluate density-dependent effects of salinity in the regional deep bedrock model, include results with final report on groundwater availability of Kane County
 - Complete final potentiometric surface maps of shallow aquifers
 - Prepare final report for Kane County
 - For Kendall County:
 - Collect water level measurements in ~150 selected wells in Kendall County
 - Collect and analyze water quality samples from ~20 selected wells in Kendall County
 - Complete digital scanning of water wells records in Kendall County
 - Complete technical review of the literature review of hydrogeology of northeastern Illinois
 - Publish the five-year summary of deep bedrock aquifer pumpage for the Chicago region (2000-2004) including a list of new deep aquifer community wells drilled since last measurement in 2000
 - Install datalogger and initiate daily data collection in DesPlaines deep bedrock well

- Create new potentiometric surface map of the Silurian dolomite incorporating data from McHenry and Kane counties into current map
- Complete the following activities related to water quality
 - Complete and initiate implementation of the ISWS Water Quality Plan
 - Arsenic investigations
 - Complete investigations on economical As removal. Write final report.
 - Complete investigations of As geochemistry and related elements in major sand and gravel aquifers.
 - Conduct experiments on immobilizing As from sulfate and nitrate addition *in situ*. Write final report.
 - Initiate research on small-scale spatial variations in As concentrations.
 - Nutrients investigations
 - Complete characterization of phosphorus geochemistry and bioavailability in stream sediments (with CWS)
 - Characterize sediment quality in relation to fingernail clam abundance (with CWS)
 - Complete the following activities related to data archival and access
 - Complete an inventory of projects and data as a basis for archiving and integrating data in GWINFO.
 - Test and refine the integration of selected project data into GWINFO starting with high-priority aquifers
 - Conduct in-house training for GWINFO
 - Complete GWINFO interface for aquifer property data entry, query, and access
 - Complete GWINFO interface for water level data entry, query, and access
 - Complete web interface for WARM and ICN water level data
 - In addition to ICN wells already operating, install dataloggers and display near real-time water levels in 2 wells in the WARM network via the Internet
 - Install Thalidemes[®] analog-to-digital converter on an ob-well currently using a Stevens recorder
 - Incorporate metadata standard entry into GWINFO
 - Complete metadata standard for all new projects
 - Initiate data entry into GWINFO for all new projects
 - Complete data entry into GWINFO for all newly completed projects
 - Improve contributions to the Center for Groundwater Science and ISWS web-pages
 - Add new content to the Mahomet aquifer pages
 - Add new introduction to the Center page
 - Work with GIS Group on creation of aquifer yield and well yield maps and community well map
 - Complete initial assessment of small community groundwater supply adequacy
 - Prepare searchable pdf-format publications of these 1999 ISWS Contract Reports
 - Roadcap et al., 1999, *An Assessment of the Hydrology and Water Quality of Indian Ridge Marsh and the Potential Effects of Wetland Rehabilitation on the Diversity of Wetland Plant Communities*, CR 654
 - Sanderson and Olson, 1999, *Dewatering Well Assessment for the Highway Drainage System at Five Sites in the East St. Louis Area, Illinois (FY 94 - Phase 11)*, CR 641
 - Anliker, 1999, *Long-term Ground-water Level Monitoring Network and Aquifer Hydraulic Properties Database for DeWitt, Piatt, and Northern Macon Counties*, CR 642
 - Complete internal review and publish (in cooperation with others), *The Water Cycle and Water Budgets in Illinois: A Framework for Drought and Water-Supply Planning*
 - Conduct IWRC-funded research on heterogenous aquifer systems:
 - reinterpret archived aquifer tests for fractured dolomite in Northeastern Illinois using advanced analysis software

calibrate existing NSCA simulations to represent fractured dolomite aquifers
prepare letter report to IWRC summarizing the above

- Contact drilling companies and investigate the feasibility of using sinusoidal aquifer tests for characterizing aquifers in Illinois, and prepare memo summarizing findings
- Visit all ICN well sites, inspect observation wells, measure water levels and calibrate dataloggers
- Visit Russell-Allison Water Authority officials in Lawrence County and with their permission, survey elevations of their observation wells, measure water levels, pump wells to insure functionality, and collect samples. Prepare proposal for hydraulic testing of Wabash River outwash at new Lawrenceville community well
- Complete the alpha-version of the Pattern Recognition Utility (PRU) in ArcGIS platform for groundwater recharge/discharge estimation
- Continue research and project review related to wetlands and Nature Preserves

Continue review of Route 25 Mine (near Elgin) Groundwater Model and continue water level monitoring at Bluff Springs Fen and other nature preserves
Assemble hydrologic information for Class III designation petitions for 4 nature preserves
Review hydrologic data and reports concerning restoration and remediation for wetlands and contaminated sites in the Lake Calumet area
Complete contract report on hydrologic investigations at the Emiquon Natural Area and publish summary of findings in the peer-reviewed literature

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 2012

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.
- Provide analytical laboratory, data management, site support, and Network Equipment Depot (NED) services that are cost-effective and meet work statement requirements and delivery schedules.
- Evaluate alternative methods and new measurements that meet user needs for atmospheric deposition data.
- Maintain up-to-date quality system documentation and ensure that NADP data meet data quality objectives.
- Enhance data usage by offering on-line products and presentations that support research activities related to ecosystem exposure to atmospheric deposition.
- Facilitate NADP data usage in the Illinois River Decision Support system.
- Market data and reports to support scientific research, public decision-making, and education.

Strategies

- Replace the NADP-approved wet deposition collector, designed by the Aerochem Metrics company in the mid 1970s, with a reliable new collector that has up-to-date mechanical and electrical components, greater snow retention capacity, and improved catch efficiency in light rain and snow.
- Replace the NADP-approved Belfort 5-780 Recording Precipitation Gage with gages that measure all precipitation types reliably and accurately (i.e., no significant biases relative to the National Weather Service Standard Gage) and are equipped to produce precipitation measurements as a remotely accessible, digital, electronic signal.
- Ensure service-providers (Central Analytical Laboratory, Mercury Analytical Laboratory, etc.) have appropriate facilities, efficient and accurate instrumentation, and trained and adequate staff for routine

measurements.

- Investigate sample collection and measurement methods for analytes that data users want or need but are not routinely measured.
- Maintain and revise as appropriate NADP quality system documentation, including the NADP Quality Management Plan, quality assurance plans, and standard operational procedures.
- Develop on-line products that present NADP data in ways that facilitate research on atmospheric deposition effects in watersheds, ecoregions, estuaries, and other potentially sensitive environments or research on the relationships of atmospheric deposition with point and area pollutant emissions, census information, road and highway distributions, topography, 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 2006 - March 2007

- Continue to evaluate the operational reliability, catch efficiency, sample chemistry, and overall performance of alternative wet-only deposition collectors (e.g., N-Con Systems, Yankee Environmental Systems, LODA Electronics Company, and others) against the currently used Aerochem Metrics (ACM) collector. Ensure that potential ACM replacements meet NADP specifications. Present summaries of field and laboratory tests at NADP meetings.
- Prepare and post an on-line report summarizing performance indicators for the ETI Systems NOAH IV and Hach Environmental Ott-Pluvio precipitation gages. (The NADP Executive Committee has approved these gages as replacements for the Belfort recording gage.)
- Write, test, and implement a *Pocket PC* program that communicates with data loggers in the ETI Systems - NOAH IV and Hach Environmental - Ott/Pluvio precipitation gages. Program tasks include: (a) download electronic gage data, (b) check gage and wet-deposition-collector operational status, © compute and display precipitation amounts, (d) calculate sample exposure (i.e., collector open) time, (e) determine start and stop times and duration of precipitation, and (f) assess collector and gage data to ensure that the collector is operating in a wet-only deposition mode.
- Design and implement a limited (e.g. 6-site) test of a computer program that enables site operators to use a *Pocket PC* for entry of field form data and information, followed by transfer (with verification) of these data to the Program Office and to the CAL or HAL.
- Prepare an updated space utilization plan that addresses the Central Analytical Laboratory's (CAL) projected needs and uses for the present Water Survey shipping/receiving area (rooms 222 & 224); include a brief description of changes/upgrades in facilities and utilities, including cost estimates.
- Publish a report summarizing the CAL investigation of total nitrogen (persulfate/UV digestion method) in AIRMoN and NTN samples.
- Publish the new NADP Quality Assurance Plan, complete with data quality objectives and performance indicators for NADP network measurements.
- Summarize and report sample collection problems at high elevation (above ~2,000 meters MSL) NADP

sites and propose alternatives for reporting these data and modifying wet deposition collectors to improve catch efficiency.

- Report on task group's progress in preparing new NTN and MDN design plans.
- Publish NADP data report summarizing 1985-2004 trends in the concentrations and deposition of precipitation sulfate, nitrate, ammonium, dissolved inorganic nitrogen, and crustal cations.
- Implement an on-line application that provides access to NADP site classifications and related site characterization information (population, SO_x, and NO_x emissions, and roadway densities).
- Prepare 2005 color concentration and deposition maps for the Illinois River Decision Support System Internet site.
- Complete and publish a manuscript addressing Mercury Deposition Network data: a summary of MDN objectives, methods, procedures, and results from 1996 - present.

WATER AND ATMOSPHERIC RESOURCES MONITORING PROGRAM

Mission

The mission of the Water and Atmospheric Resources Monitoring (WARM) Program is the timely collection and provision of a continuous long-term record of the water and atmospheric resources in Illinois.

Vision to 2012

Continuous records for up to 28 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.
- Maintain and enhance an interactive WARM Program home page to display the water and atmospheric monitoring activities and data 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.

WARM Action Items: April 2006 - March 2007

- Maintain ICN, soil moisture, reservoir water level, streamflow, suspended sediment, and shallow groundwater data collections and archives, the quality control and quality assurance of each, the reporting structures of the WARM web pages, and the *Illinois Water and Climate Summary*.
- Continue to expand the WARM web pages. Work with CAS, CWS, and CGS to enhance existing pages and add new sections as they receive approval. Add current development web site pages on: new site meta data, hourly and daily interactive access to ICN data, and monthly groundwater level data from WARM ICN and non-ICN shallow water table wells. Collaborate with Integrated Pest Management, U of I, on additional pest degree-day pages as needed. Work with ISWS's webmaster on appearance and presentation for live release.
- Update ICN data loggers.
- Complete groundwater well drilling required at the Dixon Springs ICN site and non-ICN WARM well at Snicarte.
- Report to WARM Committee on rating of ICN sites by criteria developed for new site selection. Suggest sites requiring relocation.
- Estimate missing data in current ICN archives to finalize assessment of potential evapotranspiration data related to standard climate models in coordination with Integrated Water Cycle Modeling.
- Complete gravimetric soil moisture analyses at ICN sites where neutron probe data are at a distance. Correlate results to new continuous soil moisture sensor data. Compare analyses of continuous data with programming made available by the NRCS.
- Monitor and analyze differences in soil moisture under sod at the Bondville ICN site.
- Produce a new ICN Site Description manual to replace ISWS Circular 178.

- Construct a WARM brochure.
- Update the WARM QAP.
- Explore opportunities for expansion of ICN via modernization of National Weather Services Cooperative Network. Explore potential working relationship with International Soil Moisture Working Group.
- Continue to expand WARM visibility. Conduct seminars. Submit articles to refereed journals where appropriate.

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 the use of data and information 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, safe, and sustainable water supplies.
- Swimmable, fishable, and navigable waters.
- Economic and development.
- Safe transportation.
- Improved environmental education.
- Reliable and safe energy production and distribution.

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